Comprehensive Product Catalog

2011- 2012 Edition



PRESSURE

TEMPERATURE

DP FLOW

LEVEL

WIRELESS

ROSEMOUNT®

EMERSON™
Process Management

2011 - 2012 Catalog Introduction

Dear Valued Customer,

We are excited to introduce the 2011 – 2012 Rosemount Product Catalog. After more than 50 years, our mission is still to provide customers with solutions that improve safety, enhance product quality, increase efficiency, and reduce environmental impact. We continue to invest in our products, people, and capabilities to provide devices that meet your process and measurement needs.

The Emerson Process Management product development process has delivered several new and innovative Rosemount products over the past two years. New this year is the Rosemount 3051S Electronic Remote Sensor system. Ideal applications for this DP level system include tall vessels and distillation columns that have traditionally required long lengths of capillary or impulse piping. When used in these applications, the Rosemount 3051S ERS™ system delivers more accurate and repeatable measurements, faster time response, simplified installations, additional process insights, and reduced maintenance.

In addition we continue to expand our Emerson Smart Wireless product portfolio. By using innovative Smart Wireless solutions you can obtain more field intelligence, reduce installed costs, eliminate process blind spots and provide access to difficult to monitor locations. With the launch of the Smart Wireless THUM™ Adapter, wireless capabilities are not limited to just our wireless offering – by using the Smart Wireless THUM Adapter any device can become a wireless transmitter.

Another change is the introduction of our standard and expanded product offering. The standard offering, represented by the starred options (★) in the product ordering tables, represents the most common models and options. These standard options should be selected for best delivery. The expanded offering is subject to additional delivery lead times. We continue to strive and build products to your specifications and are committed to meeting your delivery requirements, even in an emergency situation.

You will also notice this Quick Reader Code in this catalog. You can use your Smartphone and any Quick Reader application to scan this image. You will be taken directly to the www.rosemount.com/documentation website where you can get the latest and most up to date product information.

At Emerson, quality continues to be our top priority. Rosemount products are manufactured or assembled in ISO 9001 certified facilities in locations around the globe. We continually test our instrument solutions so you can be confident that they will meet and even exceed published specifications. Our global sales force is trained to help you determine the best devices and services for your measurement needs.

Sincerely,



Tom Moser
President
Emerson Process Management – Rosemount Division

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A WorldWide Network of Sales and Services

Visit us online at www.rosemount.com

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The United States has two toll-free assistance numbers and one international number.

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Pressure

Rosemount 3051S Series of Instrumentation

- Unique scalable platform enables best practice integrated pressure, flow, and level solutions
- Incorporates latest technology advancements including wireless and diagnostics
- Industry-leading performance and reliability for increased plant productivity

Rosemount 3051 Pressure Transmitter

- Proven industry standard with best-in-class capabilities
- Broadest offering to meet every application need
- Flexible Coplanar™ platform enables integration of manifolds, remote seals and primary elements

Rosemount 2051 Pressure Transmitter

- Best-in-Class performance with up to 0.065%
- Coplanar™ platform enables integration of primary elements, manifolds, and remote seal solutions
- Complete pressure transmitter family to meet your pressure, level, and flow needs

Rosemount 3095 MultiVariable™ Mass Flow Transmitter

- “Real-Time” fully-compensated mass flow based on three-in-one differential pressure, line pressure and temperature measurements
- Improve performance and reduce maintenance costs with Ultra for Flow option
- Complies with ISO, AGA, ASME, and API flow measurement standards

Rosemount 2088 Pressure Transmitter

- Delivers consistent accuracy and stability
- Lightweight, compact design enables cost effective installation
- Optional HART low-power with 1-5 Vdc output

Rosemount 2090F Hygienic Pressure Transmitter

- Design conforms to 3-A Sanitary Standards
- Features CIP/SIP service for process temperatures up to 284 °F (140 °C)

Rosemount 4600 Panel Mount Transmitter

- Compact, lightweight, all-welded stainless steel design ideal for panel mounting
- Available for pressure measurements up to 20,000 psi (1380 bar)
- HART capabilities allow effortless field adjustments and troubleshooting

Rosemount 2090P Pulp and Paper Pressure Transmitter

- Non-clogging flush mount transmitter for the pulp and paper industry
- Features stable performance and a rugged design

Rosemount Manifolds

- Complete offering of integral, conventional, and in-line configurations
- Integral manifold results in 50% fewer leak points and a 30% reduction in installed costs
- Factory-assembled and leak-tested to reduce risk

Rosemount 333 HART® Tri-Loop™

- Convert a digital HART signal into three additional analog signals
- Easy to configure and install
- Accessory product for multivariable instruments
- Available as either High-alarm or Low-alarm device

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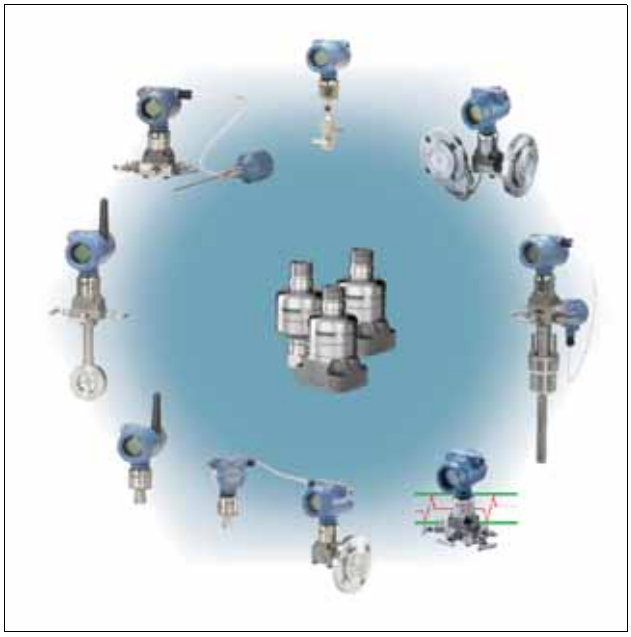
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Rosemount 3051S Series of Instrumentation
Scalable Pressure, Flow, and Level Solutions

- *3051S Series delivers highest field performance and reliability*
- *SuperModule® Platform provides a foundation for integrated pressure, flow, and level solutions*
- *IEC 62591 (WirelessHART™) Protocol enables cost effective installations*
- *MultiVariable™ technology enables fully compensated mass and energy flow*
- *Advanced Diagnostics provides coverage from the process to the host system*
- *Innovative DP Flowmeters integrate a primary element and transmitter into a single device*
- *Electronic Remote Sensors and Tuned-System™ Assemblies provide cost efficient, optimized level measurement*



HART COMMUNICATION PROTOCOL · IEC · FOUNDATION · CE · WirelessHART

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Rosemount 3051S Series

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Achieve More with Rosemount 3051S Series of Instrumentation



The Foundation for Pressure, Flow, and Level Measurement

- SuperModule® Platform delivers the highest field reliability with all-welded hermetic SST design
- Ultra and Ultra for Flow provide industry leading performance, 10-year stability, and a 12-year limited warranty
- Simplify compliance with IEC 61508 safety certification



The World's Only Scalable Platform

- Optimize performance, functionality, and process connections for your application
- MultiVariable, Advanced Diagnostics, Wireless, Electronic Remote Sensors, and enhanced FOUNDATION™ fieldbus capabilities enable better plant performance
- Seamless integration of flanges, manifolds, remote mount seals, and flow elements



Industry Leading Capabilities Extended To IEC 62591 (WirelessHART)

- Cost effectively implement wireless on the proven SuperModule platform
- Realize a decade of virtually maintenance-free performance
- Optimize safety with the industry's only intrinsically safe Power Module
- Implement wireless using existing tools and practices
- Installation-ready integrated wireless pressure, flow, and level solutions



Advanced Diagnostics Provides Coverage from the Process to the Host

- Proactively monitor for loop wiring and power supply issues
- Predict and prevent abnormal process conditions
- Log process characteristics and device health
- Extend diagnostic coverage to Safety Instrumented Systems

Advanced MultiVariable Technology



- Dynamically calculate mass or volumetric, energy, and totalized flow through real time compensation of over 25 variables
- Customize the level of compensation with the scalable platform
- Easily configure flow and device parameters with Engineering Assistant™ software.
- Achieve up to ±0.65% flow accuracy over a 14:1 flow turndown

Innovative, Integrated DP Flowmeters



- Fully assembled and leak tested for out-of-the-box installation
- Lower installed costs by replacing 10 devices with one integrated flowmeter
- Reduce straight pipe requirements, lower permanent pressure loss, and achieve accurate measurement in small line sizes
- Measure up to 14:1 flow turndown with % of reading performance

Proven, Reliable, and Innovative DP Level Technologies



- Connect to virtually any process with a comprehensive offering of process connections, fill fluids, direct mount or capillary connections, and materials
- Quantify and optimize total system performance with QZ option
- Achieve success on tall vessels and distillation towers with Electronic Remote Sensor digital architecture
- Optimize level measurement with cost efficient Tuned-System Assemblies

Instrument Manifolds – Quality, Convenient, and Easy



- Designed and engineered for optimal performance with Rosemount transmitters
- Save installation time and money with factory assembled manifolds
- Offers a variety of styles, materials, and configurations
- Enable “flange-less” valve integration with Coplanar™ design

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Rosemount 3051S Scalable Coplanar Pressure Transmitter



3051S Scalable Coplanar Pressure Transmitter

Rosemount 3051S Scalable Coplanar Pressure transmitters are the industry leader for Differential, Gage, and Absolute pressure measurement. The coplanar platform allows seamless integration with manifolds, primary elements, and seal solutions. Capabilities include:

- Ultra, Ultra for Flow, and Classic Performance
- HART/4-20 mA, Wireless, FOUNDATION fieldbus protocols
- Safety Certification (Option Code QT)
- Advanced Diagnostics (Option Code DA2)
- Remote Display and Interface (Option Code M7, M8, or M9)

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Table 1. Rosemount 3051S Scalable Coplanar Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	**Transmitter Type**			
3051S	Scalable Pressure Transmitter			
Performance Class				
Standard				**Standard**
1	Ultra: 0.025 percent span accuracy, 200:1 rangedown, 10-yr stability, 12-yr limited warranty			★
3(1)	Ultra for Flow: 0.04 percent reading accuracy, 200:1 turndown, 10-yr stability, 12-yr ltd warranty			★
2	Classic: 0.055 percent span accuracy, 100:1 rangedown, 5-yr stability			★
Connection Type				
Standard				**Standard**
C	Coplanar			★
Measurement Type(2)				
Standard				**Standard**
D	Differential			★
G	Gage			★
Expanded				
A	Absolute			
Pressure Range				
	Differential	**Gage**	**Absolute**	
Standard				**Standard**
1A	-25 to 25 inH_2O (-62,2 to 62,2 mbar)	-25 to 25 inH_2O (-62,2 to 62,2 mbar)	0 to 30 psia (0 to 2,06 bar)	★
2A	-250 to 250 inH_2O (-623 to 623 mbar)	-250 to 250 inH_2O (-623 to 623 mbar)	0 to 150 psia (0 to 10,34 bar)	★
3A	-1000 to 1000 inH_2O (-2,5 to 2,5 bar)	-393 to 1000 inH_2O (-0,98 to 2,5 bar)	0 to 800 psia (0 to 55,2 bar)	★
4A	-300 to 300 psi (-20,7 to 20,7 bar)	-14.2 to 300 psig (-0,98 to 21 bar)	0 to 4000 psia (0 to 275,8 bar)	★
5A	-2000 to 2000 psi (-137,9 to 137,9 bar)	-14.2 to 2000 psig (-0,98 to 137,9 bar)	N/A	★
Expanded				
0A(3)	-3 to 3 inH_2O (-7,47 to 7,47 mbar)	N/A	0 to 5 psia (0 to 0,34 bar)	
Isolating Diaphragm				
Standard				**Standard**
2(4)	316L SST			★
3(4)	Alloy C-276			★
Expanded				
4	Alloy 400			
5(5)	Tantalum			
6	Gold-Plated Alloy 400 (includes Graphite-Filled PTFE o-ring)			
7	Gold-plated 316L SST			

Table 1. Rosemount 3051S Scalable Coplanar Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Process Connection		Size	Materials of Construction			
			Flange Material	Drain Vent	Bolting	
Standard						**Standard**
000	None					★
A11[6]	Assemble to Rosemount 305 Integral Manifold					★
A12[6]	Assemble to Rosemount 304 or AMF Manifold and SST traditional flange					★
B11[6][7][8]	Assemble to one Rosemount 1199 Seal		SST			★
B12[6][7][8]	Assemble to two Rosemount 1199 Seals		SST			★
C11[6]	Assemble to Rosemount 405 Primary Element					★
D11[6]	Assemble to Rosemount 1195 integral orifice and Rosemount 305 Integral Manifold					★
EA2[6]	Assemble to Rosemount Annubar® Primary Element with Coplanar flange		SST	316 SST		★
EA3[6]	Assemble to Rosemount Annubar Primary Element with Coplanar flange		Cast C-276	Alloy C-276		★
EA5[6]	Assemble to Rosemount Annubar Primary Element with Coplanar flange		SST	Alloy C-276		★
E11	Coplanar flange	1/4–18 NPT	CS	316 SST		★
E12	Coplanar flange	1/4–18 NPT	SST	316 SST		★
E13[4]	Coplanar flange	1/4–18 NPT	Cast C-276	Alloy C-276		★
E14	Coplanar flange	1/4–18 NPT	Cast Alloy 400	Alloy 400/K-500		★
E15[4]	Coplanar flange	1/4–18 NPT	SST	Alloy C-276		★
E16[4]	Coplanar flange	1/4–18 NPT	CS	Alloy C-276		★
E21	Coplanar flange	RC 1/4	CS	316 SST		★
E22	Coplanar flange	RC 1/4	SST	316 SST		★
E23[4]	Coplanar flange	RC 1/4	Cast C-276	Alloy C-276		★
E24	Coplanar flange	RC 1/4	Cast Alloy 400	Alloy 400/K-500		★
E25[4]	Coplanar flange	RC 1/4	SST	Alloy C-276		★
E26[4]	Coplanar flange	RC 1/4	CS	Alloy C-276		★
F12	Traditional flange	1/4–18 NPT	SST	316 SST		★
F13[4]	Traditional flange	1/4–18 NPT	Cast C-276	Alloy C-276		★
F14	Traditional flange	1/4–18 NPT	Cast Alloy 400	Alloy 400/K-500		★
F15[4]	Traditional flange	1/4–18 NPT	SST	Alloy C-276		★
F22	Traditional flange	RC 1/4	SST	316 SST		★
F23[4]	Traditional flange	RC 1/4	Cast C-276	Alloy C-276		★
F24	Traditional flange	RC 1/4	Cast Alloy 400	Alloy 400/K-500		★
F25[4]	Traditional flange	RC 1/4	SST	Alloy C-276		★
F52	DIN-compliant traditional flange	1/4–18 NPT	SST	316 SST	7/16-in. bolting	★
G11	Vertical mount level flange	2-in. ANSI class 150	SST	316 SST		★
G12	Vertical mount level flange	2-in. ANSI class 300	SST	316 SST		★
G21	Vertical mount level flange	3-in. ANSI class 150	SST	316 SST		★
G22	Vertical mount level flange	3-in. ANSI class 300	SST	316 SST		★
G31	Vertical mount level flange	DIN- DN 50 PN 40	SST	316 SST		★
G41	Vertical mount level flange	DIN- DN 80 PN 40	SST	316 SST		★
Expanded						
F32	Bottom vent traditional flange	1/4–18 NPT	SST	316 SST		
F42	Bottom vent traditional flange	RC 1/4	SST	316 SST		
F62	DIN-compliant traditional flange	1/4–18 NPT	SST	316 SST	M10 bolting	
F72	DIN-compliant traditional flange	1/4–18 NPT	SST	316 SST	M12 bolting	
Transmitter Output						
Standard						**Standard**
A	4–20 mA with digital signal based on HART® protocol					★
F[9]	FOUNDATION™ fieldbus protocol					★
X[10]	Wireless (Requires wireless options and wireless PlantWeb housing)					★

Rosemount 3051S Series

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Table 1. Rosemount 3051S Scalable Coplanar Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Housing Style		**Material**	**Conduit Entry Size**	
Standard				**Standard**
00	None (SuperModule spare part, order output code A)			★
1A	PlantWeb housing	Aluminum	1/2–14 NPT	★
1B	PlantWeb housing	Aluminum	M20 x 1.5	★
1J	PlantWeb housing	SST	1/2–14 NPT	★
1K	PlantWeb housing	SST	M20 x 1.5	★
5A(11)	Wireless PlantWeb housing	Aluminum	1/2–14 NPT	★
5J(11)	Wireless PlantWeb housing	SST	1/2–14 NPT	★
2A	Junction Box housing	Aluminum	1/2–14 NPT	★
2B	Junction Box housing	Aluminum	M20 x 1.5	★
2J	Junction Box housing	SST	1/2–14 NPT	★
2E	Junction Box Housing with output for remote display and interface	Aluminum	1/2–14 NPT	★
2F	Junction Box Housing with output for remote display and interface	Aluminum	M20 x 1.5	★
2M	Junction Box Housing with output for remote display and interface	SST	1/2–14 NPT	★
7J(12)	Quick Connect (A size Mini, 4-pin male termination)	SST		★
Expanded				
1C	PlantWeb housing	Aluminum	G1/2	
1L	PlantWeb housing	SST	G1/2	
2C	Junction Box housing	Aluminum	G1/2	
2G	Junction Box Housing with output for remote display and interface	Aluminum	G1/2	

Wireless Options (Requires option code X and wireless PlantWeb housing)

Update Rate		
Standard		**Standard**
WA	User Configurable Update Rate	★
Operating Frequency and Protocol		
Standard		**Standard**
3	2.4 GHz DSSS, IEC 62591 (WirelessHART)	★
Omnidirectional Wireless Antenna		
Standard		**Standard**
WK	External Antenna	★
WM	Extended Range, External Antenna	★
Expanded		
WN	High-Gain, Remote Antenna	
SmartPower™		
Standard		**Standard**
1(13)	Adapter for Black Power Module (I.S. Power Module Sold Separately)	★

Other Options (Include with selected model number)

PlantWeb Control Functionality		
Standard		**Standard**
A01(14)	FOUNDATION fieldbus Advanced Control Function Block Suite	★
PlantWeb Diagnostic Functionality		
Standard		**Standard**
D01(14)	FOUNDATION fieldbus Diagnostics Suite	★
DA2(14)(15)	Advanced HART Diagnostics Suite	★
PlantWeb Enhanced Measurement Functionality		
Standard		**Standard**
H01(14)(16)	FOUNDATION fieldbus Fully Compensated Mass Flow Block	★
Mounting Bracket(17)		
Standard		**Standard**
B4	Coplanar flange bracket, all SST, 2-in. pipe and panel	★
B1	Traditional flange bracket, CS, 2-in. pipe	★
B2	Traditional flange bracket, CS, panel	★
B3	Traditional flange flat bracket, CS, 2-in. pipe	★

Table 1. Rosemount 3051S Scalable Coplanar Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

B7	Traditional flange bracket, B1 with SST bolts	★
B8	Traditional flange bracket, B2 with SST bolts	★
B9	Traditional flange bracket, B3 with SST bolts	★
BA	Traditional flange bracket, B1, all SST	★
BC	Traditional flange bracket, B3, all SST	★
Software Configuration		
Standard		**Standard**
C1[18]	Custom software configuration (Requires Configuration Data Sheet)	★
C2	Custom flow configuration (Requires H01 and Configuration Data Sheet)	★
Gage Pressure Calibration		
Standard		**Standard**
C3	Gage pressure calibration on Rosemount 3051S_CA4 only	★
Alarm Limit		
Standard		**Standard**
C4[14][18]	NAMUR alarm and saturation levels, high alarm	★
C5[14][18]	NAMUR alarm and saturation levels, low alarm	★
C6[14][18]	Custom alarm and saturation signal levels, high alarm (Requires C1 and Configuration Data Sheet)	★
C7[14][18]	Custom alarm and saturation signal levels, low alarm (Requires C1 and Configuration Data Sheet)	★
C8[14][18]	Low alarm (standard Rosemount alarm and saturation levels)	★
Hardware Adjustments		
Standard		**Standard**
D1[14][18][19]	Hardware adjustments (zero, span, alarm, security)	★
Flange Adapter		
Standard		**Standard**
D2[17]	1/2-14 NPT flange adapter	★
Expanded		
D9[17]	RC1/2 SST flange adapter	
Custody Transfer		
Standard		**Standard**
D3[20]	Measurement Canada Accuracy Approval	★
Ground Screw		
Standard		**Standard**
D4	External ground screw assembly	★
Drain/Vent Valve		
Standard		**Standard**
D5[17]	Delete transmitter drain/vent valves (install plugs)	★
Expanded		
D7[17]	SST Coplanar flange without drain/vent ports	
Conduit Plug		
Standard		**Standard**
DO[21]	316 SST Conduit Plug	★
Product Certifications[22]		
Standard		**Standard**
E1	ATEX Flameproof	★
I1	ATEX Intrinsic Safety	★
IA	ATEX FISCO Intrinsic Safety (FOUNDATION™ fieldbus protocol only)	★
N1	ATEX Type n	★
K1	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
ND	ATEX Dust	★
E4	TIIS Flameproof	★
I4[11]	TIIS Intrinsic Safety	★
E5	FM Explosion-proof, Dust Ignition-proof	★
I5	FM Intrinsically Safe, Division 2	★
IE	FM FISCO Intrinsically Safe (FOUNDATION™ fieldbus protocol only)	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★

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Table 1. Rosemount 3051S Scalable Coplanar Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

E6[23]	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
I6	CSA Intrinsically Safe	★
IF	CSA FISCO Intrinsically Safe (FOUNDATION™ fieldbus protocol only)	★
K6[23]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E7	IECEx Flameproof, Dust Ignition-proof	★
I7	IECEx Intrinsic Safety	★
IG	IECEx FISCO Intrinsic Safety (FOUNDATION™ fieldbus protocol only)	★
N7	IECEx Type n	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsic Safety	★
K2	INMETRO Flameproof, Intrinsic Safety	★
E3	China Flameproof	★
I3	China Intrinsic Safety	★
N3	China Type n	★
KA[23]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB[23]	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[23]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe	★
Shipboard Approvals		
Standard		**Standard**
SBS	American Bureau of Shipping	★
Sensor Fill Fluid		
Standard		**Standard**
L1[24]	Inert sensor fill fluid	★
O-ring		
Standard		**Standard**
L2	Graphite-filled PTFE o-ring	★
Bolting Material		
Standard		**Standard**
L4[17]	Austenitic 316 SST bolts	★
L5[4][17]	ASTM A 193, Grade B7M bolts	★
L6[17]	Alloy K-500 bolts	★
L7[4][17]	ASTM A453, Class D, Grade 660 bolts	★
L8[17]	ASTM A193, Class 2, Grade B8M bolts	★
Display Type[25]		
Standard		**Standard**
M5	PlantWeb LCD Display	★
M7[14][26][27]	Remote mount LCD display and interface, PlantWeb housing, no cable, SST bracket	★
M8[14][26]	Remote mount LCD display and interface, PlantWeb housing, 50 ft. (15 m) cable, SST bracket	★
M9[14][26]	Remote mount LCD display and interface, PlantWeb housing, 100 ft. (31 m) cable, SST bracket	★
Pressure Testing		
Expanded		
P1[28]	Hydrostatic testing with certificate	
Special Cleaning		
Expanded		
P2[17]	Cleaning for special services	
P3[17]	Cleaning for less than 1PPM chlorine/fluorine	
Maximum Static Line Pressure		
Standard		**Standard**
P9	4500 psig (310 bar) static pressure limit (Rosemount 3051S_CD only)	★
P0[29]	6092 psig (420 bar) static pressure limit (Rosemount 3051S2CD only)	★
Calibration Certification		
Standard		**Standard**
Q4	Calibration certificate	★
QP	Calibration certificate and tamper evident seal	★

Table 1. Rosemount 3051S Scalable Coplanar Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Material Traceability Certification		
Standard		**Standard**
Q8	Material traceability certification per EN 10204 3.1	★
Quality Certification for Safety		
Standard		**Standard**
QS[14][18]	Prior-use certificate of FMEDA Data	★
QT[30]	Safety-certified to IEC 61508 with certificate of FMEDA data	★
Transient Protection		
Standard		**Standard**
T1[31][32]	Transient terminal block	★
Drinking Water Approval		
Standard		**Standard**
DW[33]	NSF Drinking Water Approval	★
Surface Finish Certification		
Standard		**Standard**
Q16	Surface finish certification for sanitary remote seals	★
Toolkit Total System Performance Reports		
Standard		**Standard**
QZ	Remote Seal System Performance Calculation Report	★
Conduit Electrical Connector		
Standard		**Standard**
GE[34]	M12, 4-pin, Male Connector (eurofast®)	★
GM[34]	A size Mini, 4-pin, Male Connector (minifast®)	★
Typical Model Number: 3051S1CD 2A 2 E12 A 1A DA2 B4 M5		

(1) This option is only available with range codes 2A and 3A, 316L SST or Alloy C-276 isolating diaphragm and silicone fill fluid.

(2) Performance Class code 3 is available with Measurement Type code D only.

(3) 3051S_CD0 is only available with traditional flange, 316L SST diaphragm material, and Bolting option L4.

(4) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(5) Tantalum diaphragm material is only available for ranges 2A - 5A, differential and gage.

(6) "Assemble to" items are specified separately and require a completed model number. Process connection option codes B12, C11, D11, EA2, EA3, and EA5 are only available on differential Measurement Type, code D.

(7) Consult an Emerson Process Management representative for performance specifications.

(8) Not available with performance class code 3.

(9) Requires PlantWeb housing.

(10) Available approvals are FM Intrinsically Safe, Division 2 (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).

(11) Only available with output code X.

(12) Available with output code A only. Available approvals are FM Intrinsically Safe, Division 2 (option code I5), ATEX Intrinsic Safety (option code I1), or IECEx Intrinsic Safety (option code I7). Contact an Emerson Process Management representative for additional information.

(13) Long-Life Power Module must be shipped separately, order Part #00753-9220-0001.

(14) Not available with output code X.

(15) Requires PlantWeb housing and output code A. Includes Hardware Adjustments as standard.

(16) Requires Rosemount Engineering Assistant to configure.

(17) Not available with process connection option code A11.

(18) Not available with output code F.

(19) Not available with housing style codes 00, 2E, 2F, 2G, 2M, 5A, 5J, or 7J.

(20) Requires PlantWeb housing and Hardware Adjustments option code D1. Limited availability depending on transmitter type and range. Contact an Emerson Process Management representative for additional information.

(21) Transmitter is shipped with 316 SST conduit plug (uninstalled) in place of standard carbon steel conduit plug.

(22) Valid when SuperModule Platform and housing have equivalent approvals.

(23) Not available with M20 or G ½ conduit entry size.

(24) Only available on differential and gage measurement types. Silicone fill fluid is standard.

(25) Not available with Housing code 7J.

(26) Not available with output code F, option code DA2, or option code QT.

(27) See the 3051S Reference Manual (document number 00809-0100-4801) for cable requirements. Contact an Emerson Process Management representative for additional information.

(28) P1 is not available with 3051S_CA0.

(29) Requires 316L SST, Alloy C-276, or Gold-plated 316L SST diaphragm material, assemble to Rosemount 305 integral manifold or DIN-compliant traditional flange process connection, and bolting option L8. Limited to Pressure Range (Differential), ranges 2A – 5A.

(30) Not available with output code F or X. Not available with housing code 7J.

(31) Not available with Housing code 00, 5A, 5J, or 7J.

(32) The T1 option is not needed with FISCO Product Certifications; transient protection is included in the FISCO product certification codes IA, IE, IF, and IG.

(33) Requires 316L SST diaphragm material, glass-filled PTFE O-ring (standard), and Process Connection code E12 or F12.

(34) Not available with Housing code 00, 5A, 5J, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Division 2 (option code I5) or FM FISCO Intrinsically Safe (option code IE), install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66).

Rosemount 3051S Scalable In-Line Pressure Transmitter



3051S Scalable In-Line Pressure Transmitter

Rosemount 3051S Scalable In-line Pressure transmitters are the industry leader for Gage and Absolute pressure measurement. The in-line, compact design allows the transmitter to be connected directly to a process for quick, easy and cost effective installation. Capabilities include:

- Ultra and Classic Performance
- HART/4-20 mA, Wireless, FOUNDATION fieldbus protocols
- Safety Certification (Option Code QT)
- Advanced Diagnostics (Option Code DA2)
- Remote Display and Interface (Option Code M7, M8, or M9)

Additional Information
Specifications: page Pressure-70
Certifications: page Pressure-88
Dimensional Drawings: page Pressure-102

Table 2. Rosemount 3051S Scalable In-Line Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	**Transmitter Type**		
3051S	Scalable Pressure Transmitter		
Performance Class			
Standard			**Standard**
1	Ultra: 0.025 percent span accuracy, 200:1 rangedown, 10-yr stability, 12-yr limited warranty		★
2	Classic: 0.055 percent span accuracy, 100:1 rangedown, 5-yr stability		★
Connection Type			
Standard			**Standard**
T	In-Line		★
Measurement Type			
Standard			**Standard**
G	Gage		★
A	Absolute		★
Pressure Range			
	Gage	**Absolute**	
Standard			**Standard**
1A	-14.7 to 30 psi (-1,0 to 2,1 bar)	0 to 30 psia (2,1 bar)	★
2A	-14.7 to 150 psi (-1,0 to 10,3 bar)	0 to 150 psia (10,3 bar)	★
3A	-14.7 to 800 psi (-1,0 to 55 bar)	0 to 800 psia (55 bar)	★
4A	-14.7 to 4000 psi (-1,0 to 276 bar)	0 to 4000 psia (276 bar)	★
5A	-14.7 to 10000 psi (-1,0 to 689 bar)	0 to 10000 psia (689 bar)	★
Isolating Diaphragm			
Standard			**Standard**
2[(1)]	316L SST		★
3[(1)]	Alloy C-276		★
Process Connection			
Standard			**Standard**
A11[(2)]	Assemble to Rosemount 306 Integral Manifold		★
B11[(2)(3)]	Assemble to one Rosemount 1199 Seal		★
E11	1/2–14 NPT female		★
G11	G1/2 A DIN 16288 male (Range 1-4 only)		★
Expanded			
F11	Non-threaded instrument flange (I-flange) (Range 1-4 only)		

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Table 2. Rosemount 3051S Scalable In-Line Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Transmitter Output				
Standard				**Standard**
A	4–20 mA with digital signal based on HART® protocol			★
F[4]	FOUNDATION™ fieldbus protocol			★
X[5]	Wireless (Requires wireless options and wireless PlantWeb housing)			★
Housing Style		**Material**	**Conduit Entry Size**	
Standard				**Standard**
00	None (SuperModule spare part, order output code A)			★
1A	PlantWeb housing	Aluminum	1/2–14 NPT	★
1B	PlantWeb housing	Aluminum	M20 x 1.5	★
1J	PlantWeb housing	SST	1/2–14 NPT	★
1K	PlantWeb housing	SST	M20 x 1.5	★
5A[6]	Wireless PlantWeb housing	Aluminum	1/2–14 NPT	★
5J[6]	Wireless PlantWeb housing	SST	1/2–14 NPT	★
2A	Junction Box housing	Aluminum	1/2–14 NPT	★
2B	Junction Box housing	Aluminum	M20 x 1.5	★
2J	Junction Box housing	SST	1/2–14 NPT	★
2E	Junction Box Housing with output for remote display and interface	Aluminum	1/2–14 NPT	★
2F	Junction Box Housing with output for remote display and interface	Aluminum	M20 x 1.5	★
2M	Junction Box Housing with output for remote display and interface	SST	1/2–14 NPT	★
7J[7]	Quick Connect (A size Mini, 4-pin male termination)	SST		★
Expanded				
1C	PlantWeb housing	Aluminum	G1/2	
1L	PlantWeb housing	SST	G1/2	
2C	Junction Box housing	Aluminum	G1/2	
2G	Junction Box Housing with output for remote display and interface	Aluminum	G1/2	

Wireless Options (Requires option code X and wireless PlantWeb housing)

Update Rate		
Standard		**Standard**
WA	User Configurable Update Rate	★
Operating Frequency and Protocol		
Standard		**Standard**
3	2.4 GHz DSSS, IEC 62591 (WirelessHART)	★
Omnidirectional Wireless Antenna		
Standard		**Standard**
WK	External Antenna	★
WM	Extended Range, External Antenna	★
Expanded		
WN	High-Gain, Remote Antenna	
SmartPower™		
Standard		**Standard**
1[8]	Adapter for Black Power Module (I.S. Power Module Sold Separately)	★

Other Options (Include with selected model number)

PlantWeb Control Functionality		
Standard		**Standard**
A01[9]	FOUNDATION fieldbus Advanced Control Function Block Suite	★
PlantWeb Diagnostic Functionality		
Standard		**Standard**
D01[9]	FOUNDATION fieldbus Diagnostics Suite	★
DA2[9][10]	Advanced HART Diagnostics Suite	★
Mounting Bracket[11]		
Standard		**Standard**
B4	Bracket, all SST, 2-in. pipe and panel	★
Software Configuration		
Standard		**Standard**
C1[12]	Custom software configuration (Requires Configuration Data Sheet)	★

Table 2. Rosemount 3051S Scalable In-Line Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Alarm Limit		
Standard		**Standard**
C4[9][12]	NAMUR alarm and saturation levels, high alarm	★
C5[9][12]	NAMUR alarm and saturation levels, low alarm	★
C6[9][12]	Custom alarm and saturation signal levels, high alarm (Requires C1 and Configuration Data Sheet)	★
C7[9][12]	Custom alarm and saturation signal levels, low alarm (Requires C1 and Configuration Data Sheet)	★
C8[9][12]	Low alarm (standard Rosemount alarm and saturation levels)	★
Hardware Adjustments		
Standard		**Standard**
D1[9][12][13]	Hardware adjustments (zero, span, alarm, security)	★
Custody Transfer		
Standard		**Standard**
D3[14]	Measurement Canada Accuracy Approval	★
Ground Screw		
Standard		**Standard**
D4	External ground screw assembly	★
Conduit Plug		
Standard		**Standard**
DO[15]	316 SST Conduit Plug	★
Product Certifications[16]		
Standard		**Standard**
E1	ATEX Flameproof	★
I1	ATEX Intrinsic Safety	★
IA	ATEX FISCO Intrinsic Safety (FOUNDATION™ fieldbus protocol only)	★
N1	ATEX Type n	★
K1	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
ND	ATEX Dust	★
E4	TIIS Flameproof	★
I4[6]	TIIS Intrinsic Safety	★
E5	FM Explosion-proof, Dust Ignition-proof	★
I5	FM Intrinsically Safe, Division 2	★
IE	FM FISCO Intrinsically Safe (FOUNDATION™ fieldbus protocol only)	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E6[17]	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
I6	CSA Intrinsically Safe	★
IF	CSA FISCO Intrinsically Safe (FOUNDATION™ fieldbus protocol only)	★
K6[17]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E7	IECEx Flameproof, Dust Ignition-proof	★
I7	IECEx Intrinsic Safety	★
IG	IECEx FISCO Intrinsic Safety (FOUNDATION™ fieldbus protocol only)	★
N7	IECEx Type n	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsic Safety	★
K2	INMETRO Flameproof, Intrinsic Safety	★
E3	China Flameproof	★
I3	China Intrinsic Safety	★
N3	China Type n	★
KA[17]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB[17]	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[17]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe	★
Shipboard Approvals		
Standard		**Standard**
SBS	American Bureau of Shipping	★

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Table 2. Rosemount 3051S Scalable In-Line Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Sensor Fill Fluid		
Standard		**Standard**
L1[18]	Inert sensor fill fluid	★
Display Type[19]		
Standard		**Standard**
M5	PlantWeb LCD Display	★
M7[9][20][21]	Remote mount LCD display and interface, PlantWeb housing, no cable, SST bracket	★
M8[9][20]	Remote mount LCD display and interface, PlantWeb housing, 50 ft. (15 m) cable, SST bracket	★
M9[9][20]	Remote mount LCD display and interface, PlantWeb housing, 100 ft. (31 m) cable, SST bracket	★
Pressure Testing		
Expanded		
P1	Hydrostatic testing with certificate	
Special Cleaning		
Expanded		
P2[11]	Cleaning for special services	
P3[11]	Cleaning for less than 1PPM chlorine/fluorine	
Calibration Certification		
Standard		**Standard**
Q4	Calibration certificate	★
QP	Calibration certificate and tamper evident seal	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material traceability certification per EN 10204 3.1	★
Quality Certification for Safety		
Standard		**Standard**
QS[9][12]	Prior-use certificate of FMEDA Data	★
QT[22]	Safety-certified to IEC 61508 with certificate of FMEDA data	★
Transient Protection		
Standard		**Standard**
T1[23][24]	Transient terminal block	★
Drinking Water Approval		
Standard		**Standard**
DW[25]	NSF Drinking Water Approval	★
Surface Finish Certification		
Standard		**Standard**
Q16	Surface finish certification for sanitary remote seals	★
Toolkit Total System Performance Reports		
Standard		**Standard**
QZ	Remote Seal System Performance Calculation Report	★
Conduit Electrical Connector		
Standard		**Standard**
GE[26]	M12, 4-pin, Male Connector (eurofast®)	★
GM[26]	A size Mini, 4-pin, Male Connector (minifast®)	★
Typical Model Number: 3051S1TG 2A 2 E11 A 1A DA2 B4 M5		

(1) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(2) "Assemble to" items are specified separately and require a completed model number.

(3) Consult an Emerson Process Management representative for performance specifications.

(4) Requires PlantWeb housing.

(5) Available approvals are FM Intrinsically Safe, Division 2 (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).

(6) Only available with output code X.

(7) Available with output code A only. Available approvals are FM Intrinsically Safe, Division 2 (option code I5), ATEX Intrinsic Safety (option code I1), or IECEx Intrinsic Safety (option code I7). Contact an Emerson Process Management representative for additional information.

(8) Long-Life Power Module must be shipped separately, order Part #00753-9220-0001.

(9) Not available with output code X.

(10) Requires PlantWeb housing and output code A. Includes Hardware Adjustments as standard.

(11) Not available with process connection option code A11.

(12) Not available with output code F.

(13) Not available with housing style codes 00, 01, 2E, 2F, 2G, 2M, 5A, 5J, or 7J.

(14) Requires PlantWeb housing and Hardware Adjustments option code D1. Limited availability depending on transmitter type and range. Contact an Emerson Process Management representative for additional information.

(15) Transmitter is shipped with 316 SST conduit plug (uninstalled) in place of standard carbon steel conduit plug.

(16) Valid when SuperModule Platform and housing have equivalent approvals.

(17) Not available with M20 or G ½ conduit entry size.

(18) Silicone fill fluid is standard.

(19) Not available with Housing code 7J.

(20) Not available with output code F, option code DA2, or option code QT.

(21) See the 3051S Reference Manual (document number 00809-0100-4801) for cable requirements. Contact an Emerson Process Management representative for additional information.

(22) Not available with output code F or X. Not available with housing code 7J.

(23) Not available with Housing code 00, 5A, 5J, or 7J.

(24) The T1 option is not needed with FISCO Product Certifications; transient protection is included in the FISCO product certification codes IA, IE, IF, and IG.

(25) Requires 316L SST diaphragm material and Process Connection code E11 or G11.

(26) Not available with Housing code 00, 5A, 5J, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Division 2 (option code I5) or FM FISCO Intrinsically Safe (option code IE), install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66).

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Rosemount 3051S Scalable MultiVariable Transmitter



3051S Scalable MultiVariable Transmitter

The Rosemount 3051S Scalable MultiVariable Transmitter delivers unprecedented performance and capabilities by providing superior flow calculations including fully compensated mass or volume, energy, and totalized flow. Specify the level of compensation that best matches the application:

- Gas, natural gas, and steam measurement: Utilize full compensation (differential pressure, line pressure, and temperature measurement)
- Saturated steam: Utilize differential and line pressure, or differential pressure and temperature measurement
- Liquids: Utilize differential pressure and temperature measurement
- Liquids at stable temperatures: Utilize differential pressure measurement

Additional Information

Specifications: page Pressure-70
Certifications: page Pressure-95
Dimensional Drawings: page Pressure-100

Table 3. Rosemount 3051S Scalable MultiVariable Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Transmitter Type	
3051SMV	Scalable MultiVariable Transmitter	
Performance Class		
Standard		**Standard**
3051SMV MultiVariable SuperModule, Measurement Types 1 and 2		
3[1]	Ultra for Flow: 0.04% reading DP accuracy, 200:1 rangedown,10-year stability, 12-year limited warranty	★
5	Classic MV: 0.04% span DP accuracy, 100:1 rangedown, 5-year stability	★
3051SMV Single Variable SuperModule, Measurement Types 3 and 4		
1[2]	Ultra: 0.025% span DP accuracy, 200:1 rangedown, 10-year stability, 12-year limited warranty	★
2	Classic: 0.055% span DP accuracy, 100:1 rangedown, 5-year stability	★
3[1]	Ultra for Flow: 0.04% reading DP accuracy, 200:1 rangedown,10-year stability, 12-year limited warranty	★
MultiVariable Type		
Standard		**Standard**
M	MultiVariable Measurement with Fully Compensated Mass and Energy Flow	★
P	MultiVariable Measurement with Direct Process Variable Output	★
Measurement Type		
Standard		**Standard**
1	Differential Pressure, Static Pressure, and Temperature	★
2	Differential Pressure and Static Pressure	★
3	Differential Pressure and Temperature	★
4	Differential Pressure	★
Differential Pressure Range		
Standard		**Standard**
0[2][3]	-3 to 3 inH_2O (-7,47 to 7,47 mbar)	★
1	-25 to 25 inH_2O (-62,2 to 62,2 mbar)	★
2	-250 to 250 inH_2O (-623 to 623 mbar)	★
3	-1000 to 1000 inH_2O (-2,5 to 2,5 bar)	★
4[2]	-300 to 300 psi (-20,7 to 20,7 bar)	★
5[2]	-2000 to 2000 psi (-137,9 to 137,9 bar)	★

Table 3. Rosemount 3051S Scalable MultiVariable Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Static Pressure Type						
Standard						**Standard**
N[4]	None					★
A	Absolute					★
G	Gage					★
Static Pressure Range		**Absolute**		**Gage**		
Standard						**Standard**
N[4]	None					★
3	Range 3	0.5 to 800 psia (0,03 to 55,2 bar)		-14.2 to 800 psig (-0,98 to 55,2 bar)		★
4[5]	Range 4	0.5 to 3626 psia (0,03 to 250 bar)		-14.2 to 3626 psig (-0,98 to 250 bar)		★
Temperature Input						
Standard						**Standard**
N[6]	None					★
R[7]	RTD Input (Type Pt 100, -328 to 1562 °F (-200 to 850 °C))					★
Isolating Diaphragm						
Standard						**Standard**
2[8]	316L SST					★
3[8]	Alloy C-276					★
Expanded						
5[9]	Tantalum					
7	Gold-Plated 316L SST					
Process Connection		**Size**	**Material Type**			
			Flange Material	**Drain Vent**	**Bolting**	
Standard						**Standard**
000	None					★
A11[10]	Assemble to Rosemount 305/306 Integral Manifold					★
A12[10]	Assemble to Rosemount 304 or AMF Manifold with SST Traditional Flange					★
B11[10][11]	Assemble to one Rosemount 1199 Seal					★
B12[10][11]	Assemble to two Rosemount 1199 Seals					★
C11[10]	Assemble to Rosemount 405 Primary Element					★
D11[10]	Assemble to Rosemount 1195 Integral Orifice and Rosemount 305 Integral Manifold					★
EA2[10]	Assemble to Rosemount Annubar Primary Element with Coplanar flange		SST	316 SST		★
EA3[10]	Assemble to Rosemount Annubar Primary Element with Coplanar flange		Cast C-276	Alloy C-276		★
EA5[10]	Assemble to Rosemount Annubar Primary Element with Coplanar flange		SST	Alloy C-276		★
E11	Coplanar flange	1/4–18 NPT	Carbon Steel	316 SST		★
E12	Coplanar flange	1/4–18 NPT	SST	316 SST		★
E13[8]	Coplanar flange	1/4–18 NPT	Cast C-276	Alloy C-276		★
E14	Coplanar flange	1/4–18 NPT	Cast Alloy 400	Alloy 400/K-500		★
E15[8]	Coplanar flange	1/4–18 NPT	SST	Alloy C-276		★
E16[8]	Coplanar flange	1/4–18 NPT	Carbon Steel	Alloy *C-276*		★
E21	Coplanar flange	RC 1/4	Carbon Steel	316 SST		★
E22	Coplanar flange	RC 1/4	SST	316 SST		★
E23[8]	Coplanar flange	RC 1/4	Cast C-276	Alloy C-276		★
E24	Coplanar flange	RC 1/4	Cast Alloy 400	Alloy 400/K-500		★
E25[8]	Coplanar flange	RC 1/4	SST	Alloy C-276		★
E26[8]	Coplanar flange	RC 1/4	Carbon Steel	Alloy C-276		★

Rosemount 3051S Series

Product Data Sheet
00813-0100-4801, Rev PA
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Table 3. Rosemount 3051S Scalable MultiVariable Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

F12	Traditional flange	1/4–18 NPT	SST	316 SST		★
F13[8]	Traditional flange	1/4–18 NPT	Cast C-276	Alloy C-276		★
F14	Traditional flange	1/4–18 NPT	Cast Alloy 400	Alloy 400/K-500		★
F15[8]	Traditional flange	1/4–18 NPT	SST	Alloy C-276		★
F22	Traditional flange	RC 1/4	SST	316 SST		★
F23[8]	Traditional flange	RC 1/4	Cast C-276	Alloy C-276		★
F24	Traditional flange	RC 1/4	Cast Alloy 400	Alloy 400/K-500		★
F25[8]	Traditional flange	RC 1/4	SST	Alloy C-276		★
F52	DIN-compliant traditional flange	1/4–18 NPT	SST	316 SST	7/16-in. bolting	★
G11	Vertical mount level flange	2-in. ANSI class 150	SST			★
G12	Vertical mount level flange	2-in. ANSI class 300	SST			★
G14[8]	Vertical mount level flange	2-in. ANSI class 150	Cast C-276			★
G15[8]	Vertical mount level flange	2-in. ANSI class 300	Cast C-276			★
G21	Vertical mount level flange	3-in. ANSI class 150	SST			★
G22	Vertical mount level flange	3-in. ANSI class 300	SST			★
G31	Vertical mount level flange	DIN- DN 50 PN 40	SST			★
Expanded						
EB6	Assemble to Primary Element with Manifold and Coplanar Flange, CS, Alloy C-276					
F32	Bottom vent traditional flange	1/4–18 NPT	SST	316 SST		
F42	Bottom vent traditional flange	RC 1/4	SST	316 SST		
F62	DIN-compliant traditional flange	1/4–18 NPT	SST	316 SST	M10 bolting	
F72	DIN-compliant traditional flange	1/4–18 NPT	SST	316 SST	M12 bolting	
G41	Vertical mount level flange	DIN- DN 80 PN 40	SST			
Transmitter Output						
Standard						**Standard**
A	4–20 mA with digital signal based on HART protocol					★
Housing Style			**Material**	**Conduit Entry Size**		
Standard						**Standard**
1A	PlantWeb housing		Aluminum	1/2–14 NPT		★
1B	PlantWeb housing		Aluminum	M20 x 1.5		★
1J	PlantWeb housing		SST	1/2–14 NPT		★
1K	PlantWeb housing		SST	M20 x 1.5		★
Expanded						
1C	PlantWeb housing		Aluminum	G1/2		
1L	PlantWeb housing		SST	G1/2		

Options (Include with selected model number)

RTD Cable (RTD Sensor must be ordered separately)		
Standard		**Standard**
C12	RTD Input with 12 ft. (3.66 m) of Shielded Cable	★
C13	RTD Input with 24 ft. (7.32 m) of Shielded Cable	★
C14	RTD Input with 75 ft. (22.86 m) of Shielded Cable	★
C20[12]	RTD Input with 27 in. (69 cm) of Armored Shielded Cable	★
C21	RTD Input with 4 ft. (1.22 m) of Armored Shielded Cable	★
C22	RTD Input with 12 ft. (3.66 m) of Armored Shielded Cable	★
C23	RTD Input with 24 ft. (7.32 m) of Armored Shielded Cable	★
C24	RTD Input with 75 ft. (22.86 m) of Armored Shielded Cable	★
C30[12]	RTD Input with 25 in. (64 cm) of ATEX/IECEx Flameproof Cable	★
C32	RTD Input with 12 ft. (3.66 m) of ATEX/IECEx Flameproof Cable	★
C33	RTD Input with 24 ft. (7.32 m) of ATEX/IECEx Flameproof Cable	★
C34	RTD Input with 75 ft. (22.86 m) of ATEX/IECEx Flameproof Cable	★
C40[12]	RTD Input with 34 in. (86.36 cm) Shielded Cable and 24 in. (60.96 cm) FM Approved Coupling Flex	★
C41[12]	RTD Input with 40 in. (101.60 cm) Shielded Cable and 30 in. (76.20 cm) FM Approved Coupling Flex	★

Table 3. Rosemount 3051S Scalable MultiVariable Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Mounting Brackets[13]		
Standard		**Standard**
B4	Coplanar flange bracket, all SST, 2-in. pipe and panel	★
B1	Traditional flange bracket, Carbon Steel, 2-in. pipe	★
B2	Traditional flange bracket, Carbon Steel, panel	★
B3	Traditional flange flat bracket, Carbon Steel, 2-in. pipe	★
B7	Traditional flange bracket, B1 with SST bolts	★
B8	Traditional flange bracket, B2 with SST bolts	★
B9	Traditional flange bracket, B3 with SST bolts	★
BA	Traditional flange bracket, B1, all SST	★
BC	Traditional flange bracket, B3, all SST	★
Software Configuration		
Standard		**Standard**
C1	Custom software configuration *Note: A Configuration Data Sheet must be completed, see document number 00806-0100-4803.*	★
C2	Custom flow configuration *Note: A Custom Fluid Data Sheet must be completed, see document number 00806-0200-4803.*	★
C4	NAMUR alarm and saturation levels, high alarm	★
C5	NAMUR alarm and saturation levels, low alarm	★
C6	Custom alarm and saturation signal levels, high alarm	★
C7	Custom alarm and saturation signal levels, low alarm	★
C8	Low alarm (standard Rosemount alarm and saturation levels)	★
Special Configuration		
Standard		**Standard**
D2[13]	1/2-14 NPT flange adapter	★
D4	External ground screw assembly	★
D5[13]	Delete transmitter drain/vent valves (install plugs)	★
Expanded		
D9[13]	RC 1/2 SST flange adapter	
D7[13]	Coplanar flange without drain/vent ports	
Product Certifications		
Standard		**Standard**
E1	ATEX Flameproof	★
I1	ATEX Intrinsic Safety	★
N1	ATEX Type n	★
ND	ATEX Dust	★
K1	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E1, I1, N1, and ND)	★
E4	TIIS Flameproof	★
K4	TIIS Flameproof and Intrinsic Safety (combination E4 and I4)	★
E5	FM Explosion-proof, Dust Ignition-proof	★
I5	FM Intrinsically Safe, Division 2	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	★
E6[14]	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
I6	CSA Intrinsically Safe	★
K6[14]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	★
E7	IECEx Flameproof, Dust Ignition-proof	★
I7	IECEx Intrinsic Safety	★
N7	IECEx Type n	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, and Type n (combination of E7, I7, and N7)	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsic Safety	★
E3	China Flameproof	★
I3	China Intrinsic Safety	★

Rosemount 3051S Series

Table 3. Rosemount 3051S Scalable MultiVariable Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

KA[14][15]	ATEX and CSA Explosion-proof, Intrinsically Safe, Division 2 (combination of E1, E6, I1, and I6)	★
KB[14][15]	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)	★
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2 (combination of E5, E1, I5, and I1)	★
KD[14][15]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, E6, E1, I5, I6, and I1)	★
DW[16]	NSF Drinking Water Certification	★
Alternate Materials of Construction		
Standard		**Standard**
L1	Inert sensor fill fluid (Differential and Gage sensors only) *Note: Silicone fill fluid is standard.*	★
L2	Graphite-filled PTFE O-ring	★
L4[13]	Austenitic 316 SST bolts	★
L5[8][13]	ASTM A193, Grade B7M bolts	★
L6[13]	Alloy K-500 bolts	★
L7[8][13]	ASTM A453, Class D, Grade 660 bolts	★
L8[13]	ASTM A193, Class 2, Grade B8M bolts	★
Digital Display		
Standard		**Standard**
M5	PlantWeb LCD Display	★
Special Procedures		
Standard		**Standard**
P1[17]	Hydrostatic testing with certificate	★
P9[2]	4500 psig (310 bar) static pressure limit	★
P0[2][18]	6092 psig (420 bar) static pressure limit	★
Expanded		
P2[13]	Cleaning for special services	
P3[13]	Cleaning for less than 1PPM chlorine/fluorine	
Special Certifications		
Standard		**Standard**
Q4	Calibration Certificate	★
QP	Calibration Certificate and Tamper Evident Seal	★
Q8	Material Traceability Certification per EN 10204 3.1	★
Q16	Surface Finish Certification for Sanitary Remote Seals	★
QZ	Remote Seal System Performance Calculation Report	★
Transient Protection		
Standard		**Standard**
T1	Transient terminal block	★
Conduit Electrical Connector		
Standard		**Standard**
GE[19]	M12, 4-pin, Male Connector (eurofast®)	★
GM[19]	A size Mini, 4-pin, Male Connector (minifast®)	★
Cold Temperature		
Standard		**Standard**
BRR	-60 °F (-51 °C) Cold Temperature Start-up	★
Typical Model Number: 3051SMV 3 M 1 2 G 4 R 2 E12 A 1A B4 C2 M5		

(1) Only available with DP range codes 2 and 3, 316L SST or Alloy C-276 isolating diaphragm and silicone fill fluid.

(2) Only available with Measurement Type codes 3 and 4.

(3) DP Range 0 is only available with traditional flange, 316L SST diaphragm material, and Bolting option L4.

(4) Required for Measurement Type codes 3 and 4.

(5) For Measurement Type 1 and 2 with DP range 1, absolute limits are 0.5 to 2000 psi (0,03 to 137,9 bar) and gage limits are -14.2 to 2000 psig (-0,98 to 137,9 bar).

(6) Required for Measurement Type codes 2 and 4.

(7) Required for Measurement Type codes 1 and 3. RTD Sensor must be ordered separately.

(8) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(9) Tantalum diaphragm material is only available for DP ranges 2-5.

(10) "Assemble to" items are specified separately and require a completed model number.

(11) Consult an Emerson Process Management representative for performance specifications.

(12) For use with Flowmeters with integral RTDs.

(13) Not available with process connection option code A11.

(14) Not available with M20 or G ½ conduit entry size.

(15) RTD cable not available with this option.

(16) Requires 316L SST diaphragm material, glass-filled PTFE O-ring (standard), and Process Connection code E12 or F12.

(17) Not available with DP range 0.

(18) Requires 316L SST or Alloy C-276 diaphragm material, assemble to Rosemount 305 Integral Manifold or DIN-compliant traditional flange process connection, and bolting option L8. Limited to differential pressure ranges 2-5.

(19) Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Non-Incendive approval (option code I5), install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66).

Product Data Sheet
00813-0100-4801, Rev PA
Catalog 2011 - 2012

Rosemount 3051SF DP Flowmeters



Rosemount 3051SF Flowmeters integrate industry leading transmitters with industry leading primary elements. Capabilities include:

- Flowmeters are factory configured to meet your application needs (Configuration Data Sheet required)
- MultiVariable capabilities allow scalable flow compensation (Measurement Types 1-7)
- HART 4-20, Wireless, and FOUNDATION fieldbus protocols
- Ultra for Flow for improved flow performance across wider flow ranges
- Integral temperature measurement (Option Code T)
- Advanced Diagnostics (Option Code DA2)
- Direct or remote mount configurations available

Additional Information
Specifications: page Pressure-70
Dimensional Drawings: page Pressure-105



Rosemount 3051SFA Annubar Flowmeter

- Annubar flowmeters reduce permanent pressure loss by creating less blockage in the pipe
- Ideal for large line size installations when cost, size and weight of the flowmeter are concerns

Table 4. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	Measurement Type		• = Available — = Unavailable
		D	1-7	
3051SFA	Annubar Flowmeter	•	•	
Measurement Type				
Standard				**Standard**
1	MultiVariable (Fully Compensated Mass & Energy Flow) – Differential & Static Pressures w/ Temperature	—	•	★
2	MultiVariable (Compensated Flow) – Differential & Static Pressures	—	•	★
3	MultiVariable (Compensated Flow) – Differential Pressure & Temperature	—	•	★
4	MultiVariable (Compensated Flow) – Differential Pressure	—	•	★
5	MultiVariable (Direct Measurement) – Differential & Static Pressures with Temperature	—	•	★
6	MultiVariable (Direct Measurement) – Differential & Static Pressures	—	•	★
7	MultiVariable (Direct Measurement) – Differential Pressure & Temperature	—	•	★
D	Differential Pressure	•	—	★
Fluid Type				
Standard				**Standard**
L	Liquid	•	•	★
G	Gas	•	•	★
S	Steam	•	•	★

Table 4. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Line Size		**D**	**1-7**	
Standard				**Standard**
020	2-in. (50 mm)	•	•	★
025	2 1/2-in. (63.5 mm)	•	•	★
030	3-in. (80 mm)	•	•	★
035	3 1/2-in. (89 mm)	•	•	★
040	4-in. (100 mm)	•	•	★
050	5-in. (125 mm)	•	•	★
060	6-in. (150 mm)	•	•	★
070	7-in. (175 mm)	•	•	★
080	8-in. (200 mm)	•	•	★
100	10-in. (250 mm)	•	•	★
120	12-in. (300 mm)	•	•	★
Expanded				
140	14-in. (350 mm)	•	•	
160	16-in. (400 mm)	•	•	
180	18-in. (450 mm)	•	•	
200	20-in. (500 mm)	•	•	
240	24-in. (600 mm)	•	•	
300	30-in. (750 mm)	•	•	
360	36-in. (900 mm)	•	•	
420	42-in. (1066 mm)	•	•	
480	48-in. (1210 mm)	•	•	
600	60-in. (1520 mm)	•	•	
720	72-in. (1820 mm)	•	•	
780	78-in. (1950 mm)	•	•	
840	84-in. (2100 mm)	•	•	
900	90-in. (2250 mm)	•	•	
960	96-in. (2400 mm)	•	•	
Pipe I.D. Range				
Standard				**Standard**
C	Range C from the Pipe I.D. table	•	•	★
D	Range D from the Pipe I.D. table	•	•	★
Expanded				
A	Range A from the Pipe I.D. table	•	•	
B	Range B from the Pipe I.D. table	•	•	
E	Range E from the Pipe I.D. table	•	•	
Z	Non-standard Pipe I.D. Range or Line Sizes greater than 12-in. (300 mm)	•	•	
Pipe Material / Mounting Assembly Material				
Standard				**Standard**
C	Carbon steel (A105)	•	•	★
S	316 Stainless Steel	•	•	★
0(1)	No Mounting (Customer Supplied)	•	•	★
Expanded				
G	Chrome-Moly Grade F-11	•	•	
N	Chrome-Moly Grade F-22	•	•	
J	Chrome-Moly Grade F-91	•	•	
Piping Orientation				
Standard				**Standard**
H	Horizontal Piping	•	•	★
D	Vertical Piping with Downwards Flow	•	•	★
U	Vertical Piping with Upwards Flow	•	•	★

Rosemount 3051S Series

Table 4. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Annubar Type				**D**	**1-7**	
Standard						**Standard**
P	Pak-Lok			•	•	★
F	Flanged with opposite side support			•	•	★
Expanded						
L	Flange-Lok			•	•	
G	Gear-Drive Flo-Tap			•	•	
M	Manual Flo-Tap			•	•	
Sensor Material						
Standard						**Standard**
S	316 Stainless Steel			•	•	★
Expanded						
H	Alloy C-276			•	•	
Sensor Size						
Standard						**Standard**
1	Sensor size 1 — Line sizes 2-in. (50 mm) to 8-in. (200 mm)			•	•	★
2	Sensor size 2 — Line sizes 6-in. (150 mm) to 96-in. (2400 mm)			•	•	★
3	Sensor size 3 — Line sizes greater than 12-in. (300 mm)			•	•	★
Mounting Type						
Standard						**Standard**
T1	Compression/Threaded Connection			•	•	★
A1	150# RF ANSI			•	•	★
A3	300# RF ANSI			•	•	★
A6	600# RF ANSI			•	•	★
D1	DN PN16 Flange			•	•	★
D3	DN PN40 Flange			•	•	★
D6	DN PN100 Flange			•	•	★
Expanded						
A9[(2)]	900# RF ANSI			•	•	
AF[(2)]	1500# RF ANSI			•	•	
AT[(2)]	2500 # RF ANSI			•	•	
R1	150# RTJ Flange			•	•	
R3	300# RTJ Flange			•	•	
R6	600# RTJ Flange			•	•	
R9[(2)]	900# RTJ Flange			•	•	
RF[(2)]	1500# RTJ Flange			•	•	
RT[(2)]	2500# RTJ Flange			•	•	
Opposite Side Support or Packing Gland						
Standard						**Standard**
0	No opposite side support or packing gland (Required for Pak-Lok and Flange-Lok models)			•	•	★
	Opposite Side Support – Required for Flanged Models					
C	NPT Threaded Opposite Support Assembly – Extended Tip			•	•	★
D	Welded Opposite Support Assembly – Extended Tip			•	•	★
Expanded						
	Packing Gland – Required for Flo-Tap Models					
	Packing Gland Material	*Rod Material*	*Packing Material*			
J	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	PTFE	•	•	
K	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	PTFE	•	•	
L	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	Graphite	•	•	
N	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	Graphite	•	•	
R	Alloy C-276 Packing Gland / Cage Nipple	Stainless Steel	Graphite	•	•	

Table 4. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Isolation Valve for Flo-Tap Models				**D**	**1-7**	
Standard						**Standard**
0[1]	Not Applicable or Customer Supplied			•	•	★
Expanded						
1	Gate Valve, Carbon Steel			•	•	
2	Gate Valve, Stainless Steel			•	•	
5	Ball Valve, Carbon Steel			•	•	
6	Ball Valve, Stainless Steel			•	•	
Temperature Measurement						
Standard						**Standard**
T[3]	Integral RTD – not available with Flanged model greater than class 600#			•	•	★
0[4]	No Temperature Sensor			•	•	★
Expanded						
R[3]	Remote Thermowell and RTD			•	•	
Transmitter Connection Platform						
Standard						**Standard**
3	Direct-mount, Integral 3-valve Manifold– not available with Flanged model greater than class 600			•	•	★
5	Direct -mount, 5-valve Manifold – not available with Flanged model greater than class 600			•	•	★
7	Remote-mount NPT Connections ($^1/_2$-in. FNPT)			•	•	★
Expanded						
6	Direct-mount, High Temperature 5-valve Manifold – not available with Flanged model greater than class 600			•	•	
8	Remote-mount SW Connections ($^1/_2$-in.)			•	•	
Differential Pressure Range						
Standard						**Standard**
1	0 to 25 in H_2O (0 to 62.3 mbar)			•	•	★
2	0 to 250 in H_2O (0 to 623 mbar)			•	•	★
3	0 to 1000 in H_2O (0 to 2.5 bar)			•	•	★
Static Pressure Range						
Standard						**Standard**
A[5]	None			•	•	★
D	Absolute 0 to 800 psia (0 to 55.2 bar)			—	•	★
E[6]	Absolute 0 to 3626 psia (0 to 250 bar)			—	•	★
J	Gage -14.2 to 800 psig (-0.979 to 55.2 bar)			—	•	★
K[6]	Gage -14.2 to 3626 psig (-0.979 to 250 bar)			—	•	★
Transmitter Output						
Standard						**Standard**
A	4–20 mA with digital signal based on HART protocol			•	•	★
F	FOUNDATION fieldbus protocol (requires PlantWeb housing)			•	—	★
X[7]	Wireless (Requires wireless options and Wireless Plantweb housing)			•	—	★
Transmitter Housing Style		**Material**	**Conduit Entry Size**			
Standard						**Standard**
00	None (Customer-supplied electrical connection)			•	—	★
1A	PlantWeb Housing	Aluminum	$^1/_2$-14 NPT	•	•	★
1B	PlantWeb Housing	Aluminum	M20 x 1.5	•	•	★
1J	PlantWeb Housing	SST	$^1/_2$-14 NPT	•	•	★
1K	PlantWeb Housing	SST	M20 x 1.5	•	•	★
2A	Junction Box Housing	Aluminum	$^1/_2$-14 NPT	•	—	★
2B	Junction Box Housing	Aluminum	M20 x 1.5	•	—	★
2E	Junction Box housing with output for remote display and interface	Aluminum	$^1/_2$-14 NPT	•	—	★

Rosemount 3051S Series

Table 4. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

2F	Junction Box housing with output for remote display and interface	Aluminum	M20 x 1.5	•	—	★
2J	Junction Box Housing	SST	1/2-14 NPT	•	—	★
2M	Junction Box housing with output for remote display and interface	SST	1/2-14 NPT	•	—	★
5A[8]	Wireless PlantWeb housing	Aluminum	1/2-14 NPT	•	—	★
5J[8]	Wireless PlantWeb housing	SST	1/2-14 NPT	•	—	★
7J[7][9]	Quick Connect (A size Mini, 4-pin male termination)			•	—	★
Expanded						
1C	PlantWeb Housing	Aluminum	G1/2	•	•	
1L	PlantWeb Housing	SST	G1/2	•	•	
2C	Junction Box Housing	Aluminum	G1/2	•	—	
2G	Junction Box housing with output for remote display and interface	Aluminum	G1/2	•	—	
Transmitter Performance Class				**D**	**1-7**	
Standard						**Standard**
3051S MultiVariable SuperModule, Measurement Types 1, 2, 5, and 6						
3	Ultra for Flow: 0.8% flow rate accuracy, 14:1 flow turndown, 10-year stability, limited 12-year warranty			•	•	★
5	Classic MV: 1.15% flow rate accuracy, 8:1 flow turndown, 5-yr. stability			—	•	★
3051S Single Variable SuperModule, Measurement Types 3, 4, 7, and D						
1	Ultra: up to 0.95% flow rate accuracy, 8:1 flow turndown, 10-year stability, limited 12-year warranty			•	—	★
2	Classic: up to 1.4% flow rate accuracy, 8:1 flow turndown, 5-year stability			•	—	★
3[10]	Ultra for Flow: 0.8% flow rate accuracy, 14:1 flow turndown, 10-year stability, limited 12-year warranty			•	•	★

Wireless Options (Requires option code X and wireless PlantWeb housing)

Update Rate, Operating Frequency and Protocol				
Standard				**Standard**
WA	User Configurable Update Rate	•	—	★
Operating Frequency and Protocol				
Standard				
3	2.4 GHz DSSS, IEC 62591 (WirelessHART)	•	—	★
Omnidirectional Wireless Antenna				
Standard				
WK	External Antenna	•	—	★
WM	Extended Range, External Antenna	•	—	★
Expanded				
WN	High-Gain, Remote Antenna	•	—	
SmartPower™				
Standard				
1[11]	Adapter for Black Power Module (I.S. Power Module Sold Separately)	•	—	★

Other Options (Include with selected model number)

Pressure Testing				
Expanded				
P1[12]	Hydrostatic Testing with Certificate	•	•	
PX[12]	Extended Hydrostatic Testing	•	•	
Special Cleaning				
Expanded				
P2	Cleaning for Special Services	•	•	
PA	Cleaning per ASTM G93 level D (section 11.4)	•	•	
Material Testing				
Expanded				
V1	Dye Penetrant Exam	•	•	

Table 4. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Material Examination		**D**	**1-7**	
Expanded				
V2	Radiographic Examination	•	•	
Flow Calibration				
Expanded				
W1	Flow Calibration (Average K)	•	•	
WZ	Special Calibration	•	•	
Special Inspection				
Standard				**Standard**
QC1	Visual & Dimensional Inspection with Certificate	•	•	★
QC7	Inspection & Performance Certificate	•	•	★
Surface Finish				
Standard				**Standard**
RL	Surface finish for Low Pipe Reynolds Number in Gas & Steam	•	•	★
RH	Surface finish for High Pipe Reynolds Number in Liquid	•	•	★
Material Traceability Certification				
Standard				**Standard**
Q8[13]	Material Traceability Certificate per EN 10204:2004 3.1	•	•	★
Code Conformance				
Expanded				
J2[14]	ANSI / ASME B31.1	•	•	
J3[14]	ANSI / ASME B31.3	•	•	
Material Conformance				
Expanded				
J5[15]	NACE MR-0175 / ISO 15156	•	•	
Country Certification				
Standard				**Standard**
J6	European Pressure Directive (PED)	•	•	★
Expanded				
J1	Canadian Registration	•	•	
Installed in Flanged Pipe Spool Section				
Expanded				
H3	150# Flanged Connection with Rosemount Standard Length and Schedule	•	•	
H4	300# Flanged Connection with Rosemount Standard Length and Schedule	•	•	
H5	600# Flanged Connection with Rosemount Standard Length and Schedule	•	•	
Instrument Connections for Remote Mount Option				
Standard				**Standard**
G2	Needle Valves, Stainless Steel	•	•	★
G6	OS&Y Gate Valve, Stainless Steel	•	•	★
Expanded				
G1	Needle Valves, Carbon Steel	•	•	
G3	Needle Valves, Alloy C-276	•	•	
G5	OS&Y Gate Valve, Carbon Steel	•	•	
G7	OS&Y Gate Valve, Alloy C-276	•	•	
Special Shipment				
Standard				**Standard**
Y1	Mounting Hardware Shipped Separately	•	•	★
Attach To				
Expanded				
H1	Attach to Transmitter	•	•	
Special Dimensions				
Expanded				
VM	Variable Mounting	•	•	
VT	Variable Tip	•	•	
VS	Variable length Spool Section	•	•	

Rosemount 3051S Series

Table 4. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transmitter Calibration Certification				
Standard				**Standard**
Q4	Calibration Certificate for Transmitter	•	•	★
QP	Calibration Certificate & Tamper Evident Seal	•	•	★
Quality Certification For Safety		**D**	**1-7**	
Standard				**Standard**
QS[18][24]	Prior-use Certificate of FMEDA data	•	—	★
QT[17][18][24]	Safety certified to IEC 61508 with certificate of FMEDA data	•	—	★
Product Certifications				
Standard				**Standard**
E1	ATEX Flameproof	•	•	★
I1	ATEX Intrinsic Safety	•	•	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	•	—	★
N1	ATEX Type n	•	•	★
ND	ATEX Dust	•	•	★
K1	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E1, I1, N1, and ND)	•	•	★
E4	TIIS Flameproof	•	•	★
E5	FM Explosion-proof, Dust Ignition-proof	•	•	★
I5	FM Intrinsically Safe, Division 2	•	•	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	•	•	★
E6[16]	CSA Explosion-proof, Dust Ignition-proof, Division 2	•	•	★
I6	CSA Intrinsically Safe	•	•	★
K6[16]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	•	•	★
E7	IECEx Flameproof, Dust Ignition-proof	•	•	★
I7	IECEx Intrinsic Safety	•	•	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	•	•	★
E3	China Flameproof	•	•	★
I3	China Intrinsic Safety	•	•	★
KA[16]	ATEX and CSA Explosion-proof, Intrinsically Safe, Division 2 (combination of E1, I1, E6, and I6)	•	•	★
KB[16]	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)	•	•	★
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2 (combination of E5, E1, I5, and I1)	•	•	★
KD[16]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)	•	•	★
Shipboard Approvals				
Standard				**Standard**
SBS	American Bureau of Shipping	•	•	★
Sensor Fill Fluid and O-ring Options				
Standard				**Standard**
L1	Inert Sensor Fill Fluid	•	•	★
L2	Graphite-Filled (PTFE) O-ring	•	•	★
LA	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	•	•	★
Digital Display[17]				
Standard				**Standard**
M5	PlantWeb LCD display (Requires PlantWeb housing)	•	•	★
M7[18][19][20]	Remote mount LCD display and interface, PlantWeb housing, no cable; SST bracket	•	•	★
M8[18][19]	Remote mount LCD display and interface, PlantWeb housing, 50 ft. (15 m) cable; SST bracket	•	•	★
M9[18][19]	Remote mount LCD display and interface, PlantWeb housing, 100 ft. (31 m) cable; SST bracket	•	•	★
Transient Protection				
Standard				**Standard**
T1[21]	Transient terminal block	•	•	★
Manifold for Remote Mount Option				
Standard				**Standard**
F2	3-Valve Manifold, Stainless Steel	•	•	★
F6	5-Valve Manifold, Stainless Steel	•	•	★

Table 4. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded				
F1	3-Valve Manifold, Carbon Steel	•	•	
F3	3-Valve Manifold, Alloy C-276	•	•	
F5	5-Valve Manifold, Carbon Steel	•	•	
F7	5-Valve Manifold, Alloy C-276	•	•	
PlantWeb Control Functionality		**D**	**1-7**	
Standard				**Standard**
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	•	—	★
PlantWeb Diagnostic Functionality				
Standard				**Standard**
D01	FOUNDATION fieldbus Diagnostics Suite	•	—	★
DA2(22)	Advanced HART Diagnostic Suite	•	—	★
PlantWeb Enhanced Measurement Functionality				
Standard				**Standard**
H01(23)	FOUNDATION fieldbus Fully Compensated Mass Flow Block	•	—	★
Cold Temperature				
Standard				**Standard**
BRR	-60 °F (-51 °C) Cold Temperature Start-up	—	•	★
Alarm Limit(18)(24)				
Standard				**Standard**
C4	NAMUR Alarm & Saturation Levels, High Alarm	•	•	★
C5	NAMUR Alarm & Saturation Levels, Low Alarm	•	•	★
C6	Custom Alarm & Saturation Levels, High Alarm	•	•	★
C7	Custom Alarm & Saturation Levels, Low Alarm	•	•	★
C8	Low Alarm (Standard Rosemount Alarm & Saturation Levels)	•	•	★
Hardware Adjustments and Ground Screw				
Standard				**Standard**
D1(18)(24)(25)	Hardware Adjustments (zero, span, alarm, security)	•	—	★
D4	External Ground Screw Assembly	•	•	★
DA(18)(24)(25)	Hardware Adjustments (zero, span, alarm, security) & External Ground Screw Assembly	•	—	★
Conduit Plug				
Standard				**Standard**
DO	316 SST Conduit Plug *(standard for all 3051SF Models)*	•	•	★
Conduit Electrical Connector				
Standard				**Standard**
GE(26)	M12, 4-pin, Male Connector (*eurofast*®)	•	•	★
GM(26)	A size Mini, 4-pin, Male Connector (*minifast*®)	•	•	★
Typical Model Number: 3051SFA D L 060 D C H P S 2 T1 0 0 0 3 2A A 1A 3				

(1) Provide the "A" dimension for Flanged, Flange-Lok, and Threaded Flo-Tap models. Provide the "B" dimension for Flange Flo-Tap models.

(2) Available in remote mount applications only.

(3) Temperature Measurement Option code T or R is required for Measurement Type codes 1, 3, 5, and 7.

(4) Required for Measurement Type codes 2, 4, 6, and D.

(5) Required for Measurement Type codes 3, 4, 7, and D.

(6) For Measurement Type 1, 2, 5, and 6 with DP range 1, absolute limits are 0.5 to 2000 psi (0,03 to 137,9 bar) and gage limits are -14.2 to 2000 psig (-0,98 to 137,9 bar).

(7) Available approvals are FM Intrinsically Safe, Division 2 (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).

(8) Only available with output code X.

(9) Available with output code A only.

(10) Only available with differential pressure ranges 2 and 3, and silicone fill fluid.

(11) Long-life Power Module must be shipped separately, order Part No. 00753-9220-0001.

(12) Applies to assembled flowmeter only, mounting not tested.

(13) Instrument Connections for Remote Mount Options and Isolation Valves for Flo-tap Models are not included in the Material Traceability Certification.

(14) Not available with Transmitter Connection Platform 6.

(15) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(16) Not available with M20 or G ½ conduit entry size.

(17) Not available with housing code 7J.

(18) Not available with output code X.

(19) Not available with output code F, option code DA2, or option code QT.

(20) See the 3051S Reference Manual (document number 00809-0100-4801) for cable requirements. Contact an Emerson Process Management representative for additional information.

(21) Not available with Housing code 5A, 5J, or 7J. External ground screw assembly (option code D4) is included with the T1 option. The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(22) Includes Hardware Adjustments (option code D1) as standard. Not available with output code X.

(23) Requires Rosemount Engineering Assistant version 5.5.1 to configure.

(24) Not available with Output Protocol code F.

(25) Not available with housing style codes 2E, 2F, 2G, 2M, 5A, 5J, or 7J.

(26) Not available with Housing code 5A, 5J, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Division 2 (option code I5) or FM FISCO Intrinsically Safe (option code IE), install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66).



Rosemount 3051SFC Compact Orifice Flowmeter

- Compact Conditioning flowmeters reduce straight piping requirements to 2D upstream and 2D downstream from a flow disturbance
- Simple installation of Compact flowmeters between any existing raised-face flanges

Table 5. Rosemount 3051SFC Compact Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description	Measurement Type		• = Available — = Unavailable
		D	1-7	
3051SFC	Compact Orifice Flowmeter	•	•	
Transmitter Feature Board Measurement Type				
Standard				**Standard**
1	MultiVariable (Fully Compensated Mass & Energy Flow) – Differential & Static Pressure w/ Temperature	—	•	★
2	MultiVariable (Compensated Flow) – Differential & Static Pressures	—	•	★
3	MultiVariable (Compensated Flow) – Differential Pressure & Temperature	—	•	★
4	MultiVariable (Compensated Flow) – Differential Pressure	—	•	★
5	MultiVariable (Direct Measurement) – Differential & Static Pressures with Temperature	—	•	★
6	MultiVariable (Direct Measurement) – Differential & Static Pressures	—	•	★
7	MultiVariable (Direct Measurement) – Differential Pressure & Temperature	—	•	★
D	Differential Pressure	•	—	★
Primary Element Technology				
Standard				**Standard**
C	Conditioning Orifice Plate	•	•	★
P	Orifice Plate	•	•	★
Material Type				
Standard				**Standard**
S	316 SST	•	•	★
Line Size				
Standard				**Standard**
005(1)	1/2-in. (15 mm)	•	•	★
010(1)	1-in. (25 mm)	•	•	★
015(1)	1 1/2-in. (40 mm)	•	•	★
020	2-in. (50 mm)	•	•	★
030	3-in. (80 mm)	•	•	★
040	4-in. (100 mm)	•	•	★
060	6-in. (150 mm)	•	•	★
080	8-in. (200 mm)	•	•	★
100	10-in. (250 mm)	•	•	★
120	12-in. (300 mm)	•	•	★
Primary Element Style				
Standard				**Standard**
N	Square Edged	•	•	★
Primary Element Type				
Standard				**Standard**
040	0.40 Beta Ratio (β)	•	•	★
065(2)	0.65 Beta Ratio (β)	•	•	★
Temperature Measurement				
Standard				**Standard**
T(4)	Integral RTD	—	•	★
0(3)	No Temperature Sensor	•	•	★

Rosemount 3051S Series

Product Data Sheet
00813-0100-4801, Rev PA
Catalog 2011 - 2012

Table 5. Rosemount 3051SFC Compact Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded					
R[4]	Remote Thermowell and RTD		•	•	
Transmitter Connection Platform			**D**	**1-7**	
Standard					**Standard**
3	Direct-mount, 3-valve Integral Manifold, SST		•	•	★
7	Remote-mount, 1/4-in. NPT Connections		•	•	★
Differential Pressure Range					
Standard					**Standard**
1	0 to 25 inH_2O (0 to 62.3 mbar)		•	•	★
2	0 to 250 inH_2O (0 to 623 mbar)		•	•	★
3	0 to 1000 inH_2O (0 to 2.5 bar)		•	•	★
Static Pressure Range					
Standard					**Standard**
A[5]	None		•	•	★
D	Absolute 0 to 800 psia (0 to 55.2 bar)		—	•	★
E[6]	Absolute 0 to 3626 psia (0 to 250 bar)		—	•	★
J	Gage -14.2 to 800 psig (-0.979 to 55.2 bar)		—	•	★
K[6]	Gage -14.2 to 3626 psig (-0.979 to 250 bar)		—	•	★
Transmitter Output					
Standard					**Standard**
A	4–20 mA with digital signal based on HART protocol		•	•	★
F[7]	FOUNDATION fieldbus protocol		•	—	★
X[8][9]	Wireless		•	—	★
Transmitter Housing Style		**Material**	**Conduit Entry Size**		
Standard					**Standard**
00	None (Customer-supplied electrical connection)			•	—	★
1A	PlantWeb Housing	Aluminum	1/2-14 NPT	•	•	★
1B	PlantWeb Housing	Aluminum	M20 x 1.5	•	•	★
1J	PlantWeb Housing	SST	1/2-14 NPT	•	•	★
1K	PlantWeb Housing	SST	M20 x 1.5	•	•	★
2A	Junction Box Housing	Aluminum	1/2-14 NPT	•	—	★
2B	Junction Box Housing	Aluminum	M20 x 1.5	•	—	★
2E	Junction Box housing with output for remote display and interface	Aluminum	1/2-14 NPT	•	—	★
2F	Junction Box housing with output for remote display and interface	Aluminum	M20 x 1.5	•	—	★
2J	Junction Box Housing	SST	1/2-14 NPT	•	—	★
2M	Junction Box housing with output for remote display and interface	SST	1/2-14 NPT	•	—	★
5A[10]	Wireless PlantWeb housing	Aluminum	1/2-14 NPT	•	—	★
5J[10]	Wireless PlantWeb housing	SST	1/2-14 NPT	•	—	★
7J[8][11]	Quick Connect (A size Mini, 4-pin male termination)			•	—	★
Expanded						
1C	PlantWeb Housing	Aluminum	G1/2	•	•	
1L	PlantWeb Housing	SST	G1/2	•	•	
2C	Junction Box Housing	Aluminum	G1/2	•	—	
2G	Junction Box housing with output for remote display and interface	Aluminum	G1/2	•	—	
Transmitter Performance Class						
Standard						**Standard**
3051S MultiVariable SuperModule, Measurement Types 1, 2, 5, and 6				•	•	
3	Ultra for Flow: 0.75% flow rate accuracy, 14:1 flow turndown, 10-yr stability, limited 12-yr warranty			•	•	★
5	Classic MV: 1.10% flow rate accuracy, 8:1 flow turndown, 5-yr stability			—	•	★

Table 5. Rosemount 3051SFC Compact Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

3051S Single Variable SuperModule, Measurement Types 3, 4, 7, and D		•	•	
1	Ultra: 0.90% flow rate accuracy, 8:1 flow turndown, 10-yr stability, limited 12-yr warranty	•	—	★
2	Classic: 1.40% flow rate accuracy, 8:1 flow turndown, 5-yr stability	•	—	★
3(12)	Ultra for Flow: 0.75% flow rate accuracy, 14:1 flow turndown, 10-yr stability, limited 12-yr warranty	•	•	★

Wireless Options (Requires option code X and wireless PlantWeb housing)

Update Rate, Operating Frequency, and Protocol				
Standard				**Standard**
WA	User Configurable Update Rate	•	—	★
Operating Frequency and Protocol				
Standard				
3	2.4 GHz DSSS, IEC 62591 (WirelessHART)	•	—	★
Omnidirectional Wireless Antenna				
Standard				
WK	External Antenna	•	—	★
WM	Extended Range, External Antenna	•	—	★
Expanded				
WN	High-Gain, Remote Antenna	•	—	
SmartPower™				
Standard				
1(13)	Adapter for Black Power Module (I.S. Power Module Sold Separately)	•	—	★

Other Options (Include with selected model number)

Installation Accessories				
Standard				**Standard**
A	ANSI Alignment Ring (150#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	•	•	★
C	ANSI Alignment Ring (300#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	•	•	★
D	ANSI Alignment Ring (600#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	•	•	★
G	DIN Alignment Ring (PN 16)	•	•	★
H	DIN Alignment Ring (PN 40)	•	•	★
J	DIN Alignment Ring (PN 100)	•	•	★
Expanded				
B	JIS Alignment Ring (10K)	•	•	
R	JIS Alignment Ring (20K)	•	•	
S	JIS Alignment Ring (40K)	•	•	
Remote Adapters				
Standard				**Standard**
E	Flange adapters 316 SST ($^1/_2$-in. NPT)	•	•	★
High Temperature Applications				
Expanded				
T	Graphite Valve Packing (Tmax = 850 °F)	•	•	
Flow Calibration				
Expanded				
WC	Discharge Coefficient Verification (3 point)	•	•	
WD	Discharge Coefficient Verification (full 10 point)	•	•	
Pressure Testing				
Expanded				
P1	Hydrostatic Testing with Certificate	•	•	
Special Cleaning				
Expanded				
P2	Cleaning for Special Processes	•	•	
PA	Cleaning per ASTM G93 Level D (section 11.4)	•	•	

Rosemount 3051S Series

Table 5. Rosemount 3051SFC Compact Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Special Inspection				
Standard				**Standard**
QC1	Visual & Dimensional Inspection with Certificate	•	•	★
QC7	Inspection & Performance Certificate	•	•	★
Transmitter Calibration Certification				
Standard				**Standard**
Q4	Calibration Data Certificate for Transmitter	•	•	★
QP	Calibration Certificate and Tamper Evident Seal	•	•	★
Quality Certification for Safety		**D**	**1-7**	
Standard				**Standard**
QS[14][15]	Prior-use certificate of FMEDA data	•	—	★
QT[14][15][18]	Safety Certified to IEC 61508 with certificate of FMEDA data	•	—	★
Material Traceability Certifications				
Standard				**Standard**
Q8	Material Traceability Certification per EN 10204:2004 3.1	•	•	★
Code Conformance				
Expanded				
J2	ANSI / ASME B31.1	•	•	
J3	ANSI / ASME B31.3	•	•	
J4	ANSI / ASME B31.8	•	•	
Material Conformance				
Expanded				
J5[16]	NACE MR-0175 / ISO 15156	•	•	
Country Certification				
Expanded				
J1	Canadian Registration	•	•	
Product Certifications				
Standard				**Standard**
E1	ATEX Flameproof	•	•	★
I1	ATEX Intrinsic Safety	•	•	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	•	—	★
N1	ATEX Type n	•	•	★
ND	ATEX Dust	•	•	★
K1	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E1, I1, N1, and ND)	•	•	★
E4	TIIS Flameproof	•	•	★
E5	FM Explosion-proof, Dust Ignition-proof	•	•	★
I5	FM Intrinsically Safe, Division 2	•	•	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	•	•	★
E6[17]	CSA Explosion-proof, Dust Ignition-proof, Division 2	•	•	★
I6	CSA Intrinsically Safe	•	•	★
K6[17]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	•	•	★
E7	IECEx Flameproof, Dust Ignition-proof	•	•	★
I7	IECEx Intrinsic Safety	•	•	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	•	•	★
E3	China Flameproof	•	•	★
I3	China Intrinsic Safety	•	•	★
KA[17]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2 (combination of E1, I1, E6, and I6)	•	•	★
KB[17]	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)	•	•	★
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2 (combination of E5, E1, I5, and I1)	•	•	★
KD[17]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, E6, E1, I5, I6, and I1)	•	•	★

Table 5. Rosemount 3051SFC Compact Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Shipboard Approvals				
Standard				
SBS	American Bureau of Shipping	•	•	★
Sensor Fill Fluid and O-ring Options		**D**	**1-7**	
Standard				**Standard**
L1	Inert Sensor Fill Fluid	•	•	★
L2	Graphite-filled (PTFE) O-ring	•	•	★
LA	Inert sensor fill fluid and graphite-filled (PTFE) O-ring	•	•	★
Digital Display[18]				
Standard				**Standard**
M5	PlantWeb LCD display	•	•	★
M7[15][19][20]	Remote mount LCD display and interface, PlantWeb housing, no cable, SST bracket	•	•	★
M8[15][19]	Remote mount LCD display and interface, PlantWeb housing, 50 ft. (15m) cable, SST bracket	•	•	★
M9[15][19]	Remote mount LCD display and interface, PlantWeb housing, 100 ft. (31m) cable, SST bracket	•	•	★
Transient Protection				
Standard				**Standard**
T1[21]	Transient terminal block	•	•	★
Manifold for Remote Mount Option				
Standard				**Standard**
F2	3-Valve Manifold, SST	•	•	★
F6	5-Valve Manifold, SST	•	•	★
PlantWeb Control Functionality				
Standard				**Standard**
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	•	—	★
PlantWeb Diagnostic Functionality				
Standard				**Standard**
D01	FOUNDATION fieldbus Diagnostics Suite	•	—	★
DA2[22]	Advanced HART Diagnostic Suite	•	—	★
PlantWeb Enhanced Measurement Functionality				
Standard				**Standard**
H01[23]	FOUNDATION fieldbus Fully Compensated Mass Flow Block	•	—	★
Cold Temperature				
Standard				**Standard**
BRR	-60 °F (-51 °C) Cold Temperature Start-up	•	•	★
Alarm Limit[14][15]				
Standard				**Standard**
C4	NAMUR Alarm & Saturation Levels, High Alarm	•	•	★
C5	NAMUR Alarm & Saturation Levels, Low Alarm	•	•	★
C6	Custom Alarm & Saturation Levels, High Alarm	•	•	★
C7	Custom Alarm & Saturation Levels, Low Alarm	•	•	★
C8	Low Alarm (Standard Rosemount Alarm & Saturation Levels)	•	•	★
Hardware Adjustments and Ground Screw				
Standard				**Standard**
D1[14][15][24]	Hardware Adjustments (zero, span, alarm, security).	•	—	★
D4	External ground screw assembly	•	•	★
DA[14][15][24]	Hardware adjustments (zero, span, alarm, security) and external ground screw assembly	•	—	★
Conduit Plug				
Standard				**Standard**
DO	316 SST Conduit Plug	•	•	★
Conduit Electrical Connector				
Standard				**Standard**
ZE[25]	M12, 4-pin, Male Connector (eurofast)	•	•	★
ZM[25]	A size Mini, 4-pin, Male Connector (minifast)	•	•	★
Typical Model Number: 3051SFC 1 C S 060 N 065 T 3 2 J A 1A 3				

Rosemount 3051S Series

(1) Not available for Primary Element Technology code C.

(2) For 2-in. (50 mm) line sizes the Primary Element Type is 0.6 for Primary Element Technology Code C.

(3) Required for Measurement Type codes 2, 4, 6, and D.

(4) Only available with Transmitter Feature Board Measurement Type: 1, 3, 5, 7.

(5) Required for Measurement Type codes 3, 4, 7, and D.

(6) For Measurement Type 1, 2, 5, and 6 with DP range 1, absolute limits are 0.5 to 2000 psi (0,03 to 137,9 bar) and gage limits are -14.2 to 2000 psig (-0,98 to 137,9 bar).

(7) Requires PlantWeb housing.

(8) Available approvals are FM Intrinsically Safe, Division 2 (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).

(9) Requires wireless options and wireless PlantWeb housing.

(10) Only available with output code X.

(11) Available with output code A only.

(12) Only available with differential pressure ranges 2 and 3, and silicone fill fluid.

(13) Long-life Power Module must be shipped separately, order Part No. 00753-9220-0001.

(14) Not available with Output Protocol code F.

(15) Not available with output code X.

(16) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(17) Not available with M20 or G ½ conduit entry size.

(18) Not available with housing code 7J.

(19) Not available with output code F, option code DA2, or option code QT.

(20) See the 3051S Reference Manual (document number 00809-0100-4801) for cable requirements. Contact an Emerson Process Management representative for additional information.

(21) Not available with Housing code 00, 5A, 5J, or 7J. External ground screw assembly (option code D4) is included with the T1 option. The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(22) Includes Hardware Adjustments (option code D1) as standard. Not available with output code X.

(23) Requires Rosemount Engineering Assistant version 5.5.1 to configure.

(24) Not available with housing style codes 2E, 2F, 2G, 2M, 5A, 5J, or 7J.

(25) Not available with Housing code 5A, 5J, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Division 2 (option code I5) or FM FISCO Intrinsically Safe (option code IE), install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66).



Rosemount 3051SFP Integral Orifice Flowmeter

- Precision honed pipe section for increased accuracy in small line sizes
- Self-centering plate design prevents alignment errors that magnify measurement inaccuracies in small line sizes

Table 6. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description	Measurement Type		• = Available — = Unavailable
		D	1-7	
3051SFP	Integral Orifice Flowmeter	•	•	
Measurement Type				
Standard				**Standard**
1	MultiVariable (Fully Compensated Mass & Energy Flow) – Differential & Static Pressures w/ Temperature	—	•	★
2	MultiVariable (Compensated Flow) – Differential and Static Pressures	—	•	★
3	MultiVariable (Compensated Flow) – Differential Pressure and Temperature	—	•	★
4	MultiVariable (Compensated Flow) – Differential Pressure	—	•	★
5	MultiVariable (Direct Measurement) – Differential and Static Pressures with Temperature	—	•	★
6	MultiVariable (Direct Measurement) – Differential and Static Pressures	—	•	★
7	MultiVariable (Direct Measurement) – Differential Pressure and Temperature	—	•	★
D	Differential Pressure	•	—	★
Body Material				
Standard				**Standard**
S	316 SST	•	•	★
Line Size				
Standard				**Standard**
005	1/2-in. (15 mm)	•	•	★
010	1-in. (25 mm)	•	•	★
015	1 1/2-in. (40 mm)	•	•	★
Process Connection				
Standard				**Standard**
T1	NPT Female Body (Not Available with Remote Thermowell and RTD)	•	•	★
S1(1)	Socket Weld Body (Not Available with Remote Thermowell and RTD)	•	•	★
P1	Pipe Ends: NPT threaded	•	•	★
P2	Pipe Ends: Beveled	•	•	★
D1	Pipe Ends: Flanged, DIN PN16, slip-on	•	•	★
D2	Pipe Ends: Flanged, DIN PN40, slip-on	•	•	★
D3	Pipe Ends: Flanged, DIN PN100, slip-on	•	•	★
W1	Pipe Ends: Flanged, ANSI Class 150, weld-neck	•	•	★
W3	Pipe Ends: Flanged, ANSI Class 300, weld-neck	•	•	★
W6	Pipe Ends: Flanged, ANSI Class 600, weld-neck	•	•	★
Expanded				
A1	Pipe Ends: Flanged, RF, ANSI Class 150, slip-on	•	•	
A3	Pipe Ends: Flanged, RF, ANSI Class 300, slip-on	•	•	
A6	Pipe Ends: Flanged, RF, ANSI Class 600, slip-on	•	•	
R1	Pipe Ends: Flanged, RTJ, ANSI Class 150, slip-on	•	•	
R3	Pipe Ends: Flanged, RTJ, ANSI Class 300, slip-on	•	•	
R6	Pipe Ends: Flanged, RTJ, ANSI Class 600, slip-on	•	•	
P9	Special Process Connection	•	•	
Orifice Plate Material				
Standard				**Standard**
S	316 SST	•	•	★

Rosemount 3051S Series

Product Data Sheet
00813-0100-4801, Rev PA
Catalog 2011 - 2012

Table 6. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded				
H	Alloy C-276	•	•	
M	Alloy 400	•	•	
Bore Size Option		**D**	**1-7**	
Standard				**Standard**
0066	0.066-in. (1.68 mm) for 1/2-in. pipe	•	•	★
0109	0.109-in. (2.77 mm) for 1/2-in. pipe	•	•	★
0160	0.160-in. (4.06 mm) for 1/2-in. pipe	•	•	★
0196	0.196-in. (4.98 mm) for 1/2-in. pipe	•	•	★
0260	0.260-in. (6.60 mm) for 1/2-in. pipe	•	•	★
0340	0.340-in. (8.64 mm) for 1/2-in. pipe	•	•	★
0150	0.150-in. (3.81 mm) for 1-in. pipe	•	•	★
0250	0.250-in. (6.35 mm) for 1-in. pipe	•	•	★
0345	0.345-in. (8.76 mm) for 1-in. pipe	•	•	★
0500	0.500-in. (12.70 mm) for 1-in. pipe	•	•	★
0630	0.630-in. (16.00 mm) for 1-in. pipe	•	•	★
0800	0.800-in. (20.32 mm) for 1-in. pipe	•	•	★
0295	0.295-in. (7.49 mm) for 1 1/2-in. pipe	•	•	★
0376	0.376-in. (9.55 mm) for 1 1/2-in. pipe	•	•	★
0512	0.512-in. (13.00 mm) for 1 1/2-in. pipe	•	•	★
0748	0.748-in. (19.00 mm) for 1 1/2-in. pipe	•	•	★
1022	1.022-in. (25.96 mm) for 1 1/2-in. pipe	•	•	★
1184	1.184-in. (30.07 mm) for 1 1/2-in. pipe	•	•	★
Expanded				
0010	0.010-in. (0.25 mm) for 1/2-in. pipe	•	•	
0014	0.014-in. (0.36 mm) for 1/2-in. pipe	•	•	
0020	0.020-in. (0.51 mm) for 1/2-in. pipe	•	•	
0034	0.034-in. (0.86 mm) for 1/2-in. pipe	•	•	
Transmitter Connection Platform				
Standard				**Standard**
D3	Direct-mount, 3-valve Manifold, SST	•	•	★
D5	Direct-mount, 5-valve Manifold, SST	•	•	★
R3	Remote-mount, 3-valve Manifold, SST	•	•	★
R5	Remote-mount, 5-valve Manifold, SST	•	•	★
Expanded				
D4	Direct-mount, 3-valve Manifold, Alloy C-276	•	•	
D6	Direct-mount, 5-valve Manifold, Alloy C-276	•	•	
D7	Direct-mount, High Temperature, 5-valve Manifold, SST	•	•	
R4	Remote-mount, 3-valve Manifold, Alloy C-276	•	•	
R6	Remote-mount, 5-valve Manifold, Alloy C-276	•	•	
Differential Pressure Range				
Standard				**Standard**
1	0 to 25 inH_2O (0 to 62.3 mbar)	•	•	★
2	0 to 250 inH_2O (0 to 623 mbar)	•	•	★
3	0 to 1000 inH_2O (0 to 2.5 bar)	•	•	★
Static Pressure Range				
Standard				**Standard**
A[(2)]	None	•	•	★
D	Absolute 0 to 800 psia (0 to 55.2 bar)	—	•	★
E[(3)]	Absolute 0 to 3626 psia (0 to 250 bar)	—	•	★
J	Gage -14.2 to 800 psig (-0.979 to 55.2 bar)	—	•	★
K[(3)]	Gage -14.2 to 3626 psig (-0.979 to 250 bar)	—	•	★

Table 6. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transmitter Output				**D**	**1-7**	
Standard						**Standard**
A	4–20 mA with digital signal based on HART protocol			•	•	★
F	FOUNDATION fieldbus (Requires PlantWeb housing)			•	—	★
X[4]	Wireless (Requires wireless options and wireless PlantWeb housing)			•	—	★
Transmitter Housing Style		**Material**	**Conduit Entry Size**			
Standard						**Standard**
00	None (Customer-supplied electrical connection)			•	—	★
1A	PlantWeb Housing	Aluminum	1/2-14 NPT	•	•	★
1B	PlantWeb Housing	Aluminum	M20 x 1.5	•	•	★
1J	PlantWeb Housing	SST	1/2-14 NPT	•	•	★
1K	PlantWeb Housing	SST	M20 x 1.5	•	•	★
2A	Junction Box Housing	Aluminum	1/2-14 NPT	•	—	★
2B	Junction Box Housing	Aluminum	M20 x 1.5	•	—	★
2E	Junction Box Housing with output for remote display and interface	Aluminum	1/2-14 NPT	•	—	★
2F	Junction Box Housing with output for remote display and interface	Aluminum	M20 x 1.5	•	—	★
2J	Junction Box Housing	SST	1/2-14 NPT	•	—	★
2M	Junction Box Housing with output for remote display and interface	SST	1/2-14 NPT	•	—	★
5A[5]	Wireless PlantWeb Housing	Aluminum	1/2–14 NPT	•	—	★
5J[5]	Wireless PlantWeb Housing	SST	1/2–14 NPT	•	—	★
7J[4][6]	Quick Connect (A size Mini, 4-pin male termination)			•	—	★
Expanded						
1C	PlantWeb Housing	Aluminum	G1/2	•	•	
1L	PlantWeb Housing	SST	G1/2	•	•	
2C	Junction Box Housing	Aluminum	G1/2	•	—	
2G	Junction Box Housing with output for remote display and interface	Aluminum	G1/2	•	—	
Transmitter Performance Class						
Standard						**Standard**
3051S MultiVariable SuperModule, Measurement Types 1, 2, 5, and 6						
3[7]	Ultra for Flow: 0.95% flow rate accuracy, 14:1 flow turndown, 10-year stability, limited 12-year warranty			•	•	★
5	Classic MV: 1.25% flow rate accuracy, 8:1 flow turndown, 5-year stability			—	•	★
3051S Single Variable SuperModule, Measurement Types 3, 4, 7, and D						
1	Ultra: 1.05% flow rate accuracy, 8:1 flow turndown, 10-year stability, limited 12-year warranty			•	•	★
2	Classic: 1.50% flow rate accuracy, 8:1 flow turndown, 5-year stability			•	•	★
3[7]	Ultra for Flow: 0.95% flow rate accuracy, 14:1 flow turndown, 10-year stability, limited 12-year warranty			•	•	★

Wireless Options (Requires option code X and wireless PlantWeb housing)

Update Rate, Operating Frequency and Protocol				
Standard				**Standard**
WA	User Configurable Update Rate	•	—	★
Operating Frequency and Protocol				
Standard				
3	2.4 GHz DSSS, IEC 62591 (WirelessHART)	•	—	★
Omnidirectional Wireless Antenna				
Standard				
WK	External Antenna	•	—	★
WM	Extended Range, External Antenna	•	—	★

Rosemount 3051S Series

Table 6. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded				
WN	High-Gain, Remote Antenna	•	—	
SmartPower™				
Standard				
1[8]	Adapter for Black Power Module (I.S. Power Module Sold Separately)	•	—	★

Other Options (Include with selected model number)

Transmitter / Body Bolt Material		**D**	**1-7**	
Expanded				
G[9]	High temperature Option (850 °F (454 °C))	•	•	
Temperature Sensor				
Standard				**Standard**
T[10]	Thermowell and RTD	•	•	★
Optional Connection				
Standard				**Standard**
G1	DIN 19213 Transmitter Connection	•	•	★
Pressure Testing				
Expanded				
P1[11]	Hydrostatic Testing with Certificate	•	•	
Special Cleaning				
Expanded				
P2	Cleaning for Special Services	•	•	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	•	•	
Material Testing				
Expanded				
V1	Dye Penetrant Exam	•	•	
Material Examination				
Expanded				
V2	Radiographic Examination (available only with Process Connection code W1, W3, and W6)	•	•	
Flow Calibration				
Expanded				
WD[12]	Discharge Coefficient Verification	•	•	
WZ[12]	Special Calibration	•	•	
Special Inspection				
Standard				**Standard**
QC1	Visual & Dimensional Inspection with Certificate	•	•	★
QC7	Inspection & Performance Certificate	•	•	★
Material Traceability Certification				
Standard				**Standard**
Q8	Material certification per EN 10204:2004 3.1	•	•	★
Code Conformance				
Expanded				
J2[13]	ANSI / ASME B31.1	•	•	
J3[13]	ANSI / ASME B31.3	•	•	
J4[13]	ANSI / ASME B31.8	•	•	
Materials Conformance				
Expanded				
J5[14]	NACE MR-0175 / ISO 15156	•	•	
Country Certification				
Standard				**Standard**
J6	European Pressure Directive (PED)	•	•	★
Expanded				
J1	Canadian Registration	•	•	

Table 6. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transmitter Calibration Certification				
Standard				**Standard**
Q4	Calibration Data Certificate for Transmitter	•	•	★
Quality Certification for Safety				
Standard				**Standard**
QS[15][16]	Prior-use Certificate of FMEDA data	•	—	★
QT[15][16][18]	Safety-certified to IEC 61508 with Certificate of FMEDA data	•	—	★
Product Certifications		**D**	**1-7**	
Standard				**Standard**
E1	ATEX Flameproof	•	•	★
I1	ATEX Intrinsic Safety	•	•	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	•	—	★
N1	ATEX Type n	•	•	★
ND	ATEX Dust	•	•	★
K1	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E1, I1, N1, and ND)	•	•	★
E4	TIIS Flameproof	•	•	★
E5	FM Explosion-proof, Dust Ignition-proof	•	•	★
I5	FM Intrinsically Safe, Division 2	•	•	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	•	•	★
E6[17]	CSA Explosion-proof, Dust Ignition-proof, Division 2	•	•	★
I6	CSA Intrinsically Safe	•	•	★
K6[17]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	•	•	★
E7	IECEx Flameproof, Dust Ignition-proof	•	•	★
I7	IECEx Intrinsic Safety	•	•	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	•	•	★
E3	China Flameproof	•	•	★
I3	China Intrinsic Safety	•	•	★
KA[17]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2 (combination of E1, I1, E6, and I6)	•	•	★
KB[17]	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)	•	•	★
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2 (combination of E5, E1, I5, and I1)	•	•	★
KD[17]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)	•	•	★
Shipboard Approvals				
Standard				**Standard**
SBS	American Bureau of Shipping	•	•	★
Sensor Fill Fluid and O-ring Options				
Standard				**Standard**
L1	Inert Sensor Fill Fluid	•	•	★
L2	Graphite-filled (PTFE) O-ring	•	•	★
LA	Inert sensor fill fluid and graphite-filled (PTFE) O-ring	•	•	★
Digital Display[18]				
Standard				**Standard**
M5	PlantWeb LCD display (Requires PlantWeb housing)	•	•	★
M7[15][19][20]	Remote mount LCD display and interface, PlantWeb housing, no cable, SST bracket	•	—	★
M8[15][20]	Remote mount LCD display and interface, PlantWeb housing, 50 ft. (15 m) cable, SST bracket	•	—	★
M9[15][20]	Remote mount LCD display and interface, PlantWeb housing, 100 ft. (31 m) cable, SST bracket	•	—	★
Transient Protection				
Standard				**Standard**
T1[21]	Transient terminal block	•	•	★
PlantWeb Control Functionality				
Standard				**Standard**
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	•	—	★

Rosemount 3051S Series

Table 6. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

PlantWeb Diagnostic Functionality				
Standard				**Standard**
D01	FOUNDATION fieldbus Diagnostics Suite	•	—	★
DA2[22]	Advanced HART Diagnostics Suite	•	—	★
PlantWeb Enhanced Measurement Functionality				
Standard				**Standard**
H01[23]	FOUNDATION fieldbus Fully Compensated Mass Flow Block	•	—	★
Cold Temperature				
Standard				**Standard**
BRR	-60 °F (-51 °C) Cold Temperature Start-up	—	•	★
Alarm Limit[15][16]		**D**	**1-7**	
Standard				**Standard**
C4	NAMUR Alarm & Saturation Levels, High Alarm	•	•	★
C5	NAMUR Alarm & Saturation Levels, Low Alarm	•	•	★
C6	Custom Alarm & Saturation Levels, High Alarm	•	•	★
C7	Custom Alarm & Saturation Levels, Low Alarm	•	•	★
C8	Low Alarm (Standard Rosemount Alarm & Saturation Levels)	•	•	★
Hardware Adjustments and Ground Screw				
Standard				**Standard**
D1[15][16][24]	Hardware Adjustments (zero, span, alarm, security)	•	—	★
D4	External ground screw assembly	•	•	★
DA[15][16][24]	Hardware adjustments (zero, span, alarm, security) & External Ground Screw Assembly	•	—	★
Conduit Plug				
DO	316 SST Conduit Plug			
Conduit Electrical Connector				
Expanded				
GE [25]	M12, 4-pin, Male Connector (*eurofast*®)	•	•	
GM[25]	A size Mini, 4-pin, Male Connector (*minifast*®)	•	•	
Typical Model Number: 3051SFP 1 S 010 W3 S 0150 D3 1 J A 1A 3 M5				

(1) To improve pipe perpendicularity for gasket sealing, socket diameter is smaller than standard pipe O.D.

(2) Required for Measurement Type codes 3, 4, 7, and D.

(3) For Measurement Type 1, 2, 5, and 6 with DP range 1, absolute limits are 0.5 to 2000 psi (0,03 to 137,9 bar) and gage limits are -14.2 to 2000 psig (-0,98 to 137,9 bar).

(4) Available approvals are FM Intrinsically Safe, Division 2 (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).

(5) Only available with output code X.

(6) Only available with output code A.

(7) Only available with differential pressure ranges 2 and 3, and silicone fill fluid.

(8) Long-life Power Module must be shipped separately, order Part No. 00753-9220-0001.

(9) Not available with $1^1/_2$-in. (38 mm) line size.

(10) Thermowell material is the same as the body material.

(11) Does not apply to Process Connection codes T1 and S1.

(12) Not available for bore sizes 0010, 0014, 0020, or 0034.

(13) Not available with DIN Process Connection codes D1, D2, or D3.

(14) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(15) Not available with output code X.

(16) Not available with Output Protocol code F.

(17) Not available with M20 or G ½ conduit entry size.

(18) Not available with housing code 7J.

(19) See the 3051S Reference Manual (document number 00809-0100-4801) for cable requirements. Contact an Emerson Process Management representative for additional information.

(20) Not available with output code F, option code DA2, or option code QT.

(21) Not available with Housing code 5A, 5J, or 7J. The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(22) Includes Hardware Adjustments (option code D1) as standard. Not available with output code X.

(23) Requires Rosemount Engineering Assistant version 5.5.1 to configure.

(24) Not available with housing style codes 2E, 2F, 2G, 2M, 5A, 5J, or 7J.

(25) Not available with Housing code 5A, 5J, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Division 2 (option code I5) or FM FISCO Intrinsically Safe (option code IE), install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66).

Product Data Sheet
00813-0100-4801, Rev PA
Catalog 2011 - 2012

Rosemount 3051S Electronic Remote Sensors



1

3051SAM



Coplanar **In-Line**

3051SAL



Coplanar **In-Line**

Secondary



2

Primary

3 **3051SAL1PG4AA1A1020DFF71DA00M5**
3051SAM1ST2A2E11A2A

The 3051S ERS™ System is a flexible, 2-wire 4-20 mA HART architecture that calculates differential pressure (DP) electronically using two pressure sensors that are linked together with a non-proprietary electrical wire.

Ideal applications for the 3051S ERS System include tall vessels and distillation columns that have traditionally required long lengths of capillary or impulse piping. When used in these types of applications, the 3051S ERS System can deliver:

- More accurate and repeatable DP measurements
- Faster time response
- Simplified installations
- Reduced maintenance

How to Order

1. Choose two ERS transmitter models. These may be any combination of 3051SAM and 3051SAL models.
2. Decide which model will be the ERS Primary (4-20 mA loop termination and optional LCD) and which will be the ERS Secondary. This will be specified by the “Configuration Type” code in each model number.

3.Specify two full model numbers per the desired configuration.

Additional Information
Specifications: page Pressure-70
Certifications: page Pressure-98
Dimensional Drawings: page Pressure-100



Rosemount 3051SAM Transmitter for ERS Applications

- Coplanar and In-Line sensor module platforms
- Variety of process connections including threaded NPT, flanges, manifolds, and 1199 remote seals

•Available with 10-year stability and limited 12-year warranty

Table 7. 3051SAM Scalable Advanced Measurement Transmitter for ERS Applications Ordering Information

★ The Standard offering represents the most common models and options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Transmitter Type	
3051SAM	Scalable Advanced Measurement Transmitter	
Performance Class		
Standard		**Standard**
1	Ultra: 0.025% span accuracy, 200:1 rangedown, 10-year stability, 12-year limited warranty	★
2	Classic: 0.055% span accuracy, 100:1 rangedown, 5-year stability	★
Configuration Type		
Standard		**Standard**
P	Electronic Remote Sensor - Primary	★
S	Electronic Remote Sensor - Secondary	★

Table 7. 3051SAM Scalable Advanced Measurement Transmitter for ERS Applications Ordering Information

★ The Standard offering represents the most common models and options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Pressure Module Type		**Pressure Sensor Type**			
Standard					**Standard**
G	Coplanar	Gage			★
T	In-Line	Gage			★
E	In-Line	Absolute			★
Expanded					
A	Coplanar	Absolute			
Pressure Range[1]					
	Coplanar Gage	**In-Line Gage**	**In-Line Absolute**	**Coplanar Absolute**	
Standard					**Standard**
1A	N/A	-14.7 to 30 psig (-1,0 to 2,06 bar)	0 to 30 psia (0 to 2,06 bar)	0 to 30 psia (0 to 2,06 bar)	★
2A	-250 to 250 inH2O (-623 to 623 mbar)	-14.7 to 150 psig (-1,0 to 10,34 bar)	0 to 150 psia (0 to 10,34 bar)	0 to 150 psia (0 to 10,34 bar)	★
3A	-393 to 1000 inH2O (-0,98 to 2,49 bar)	-14.7 to 800 psig (-1,0 to 55,2 bar)	0 to 800 psia (0 to 55,2 bar)	0 to 800 psia (0 to 55,2 bar)	★
4A	-14.2 to 300 psig (-0,98 to 20,7 bar)	-14.7 to 4000 psig (-1,0 to 275,8 bar)	0 to 4000 psia (0 to 275,8 bar)	0 to 4000 psia (0 to 275,8 bar)	★
5A	-14.2 to 2000 psig (-0,98 to 137,9 bar)	-14.7 to 10000 psig (-1,0 to 689,5 bar)	0 to 10000 psia (0 to 689,5 bar)	N/A	★
Isolating Diaphragm					
Standard					**Standard**
2[2]	316L SST				★
3[2]	Alloy C-276				★
Expanded					
4[3]	Alloy 400				
5[3][4]	Tantalum				
6[3]	Gold-plated Alloy 400 (includes Graphite-Filled PTFE O-Ring)				
7[3]	Gold-plated 316L SST				
Process Connection					
	Coplanar Module Type		**In-Line Module Type**		
Standard					**Standard**
000	None		N/A		★
A11[5]	Assemble to Rosemount 305 Manifold		Assemble to Rosemount 306 Manifold		★
A12[5]	Assemble to Rosemount 304 or AMF Manifold with SST Traditional Flange		N/A		★
B11[5][6]	Assemble to One Rosemount 1199 Remote Diaphragm Seal with SST transmitter flange		Assemble to One Rosemount 1199 Remote Diaphragm		★
E11	Coplanar Flange (CS), ¼-18 NPT, 316 SST Drain Vents		½ -14 NPT Female		★
E12	Coplanar Flange (SST), ¼-18 NPT, 316 SST Drain Vents		N/A		★
E13[2]	Coplanar Flange (Cast C-276), ¼-18 NPT, Alloy C-276 Drain Vents		N/A		★
E14	Coplanar Flange (Cast Alloy 400), ¼-18 NPT, Alloy 400/K-500 Drain Vents		N/A		★
E15[2]	Coplanar Flange (SST), ¼-18 NPT, Alloy C-276 Drain Vents		N/A		★
E16[2]	Coplanar Flange (CS), ¼-18 NPT, Alloy C-276 Drain Vents		N/A		★
E21	Coplanar Flange (CS), RC ¼, 316 SST Drain Vents		N/A		★
E22	Coplanar Flange (SST), RC ¼, 316 SST Drain Vents		N/A		★
E23[2]	Coplanar Flange (Cast C-276), RC ¼, Alloy C-276 Drain Vents		N/A		★
E24	Coplanar Flange (Cast Alloy 400), RC ¼, alloy 400/K-500 Drain Vents		N/A		★
E25[2]	Coplanar Flange (SST), RC ¼, Alloy C-276 Drain Vents		N/A		★
E26[2]	Coplanar Flange (CS), RC ¼, Alloy C-276 Drain Vents		N/A		★

Rosemount 3051S Series

Product Data Sheet
00813-0100-4801, Rev PA
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Table 7. 3051SAM Scalable Advanced Measurement Transmitter for ERS Applications Ordering Information

★ The Standard offering represents the most common models and options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

F12	Traditional Flange (SST), 1/4-18 NPT, 316 SST Drain Vents	N/A		★
F13(2)	Traditional Flange (Cast C-276), 1/4-18 NPT, Alloy C-276 Drain Vents	N/A		★
F14	Traditional Flange (Cast Alloy 400), 1/4-18 NPT, Alloy 400/K-500 Drain Vents	N/A		★
F15(2)	Traditional Flange (SST), 1/4-18 NPT, Alloy C-276 Drain Vents	N/A		★
F22	Traditional Flange (SST), RC ¼, 316 SST Drain Vents	N/A		★
F23(2)	Traditional Flange (Cast C-276), RC ¼, Alloy C-276 Drain Vents	N/A		★
F24	Traditional Flange (Cast Alloy 400), RC ¼, Alloy 400/K500 Drain Vents	N/A		★
F25(2)	Traditional Flange (SST), RC ¼, Alloy C-276 Drain Vents	N/A		★
F52	DIN-Compliant Traditional Flange (SST), ¼-18 NPT, 316 Drain Vents, 7-16-in. Bolting	N/A		★
G11	Vertical Mount Level Flange (SST), 2-in ANSI Class 150, 316 SST Drain Vents	G ½ A DIN 16288 Male (Range 1-4 Only)		★
G12	Vertical Mount Level Flange (SST), 2-in ANSI Class 300, 316 SST Drain Vents	N/A		★
G21	Vertical Mount Level Flange (SST), 3-in ANSI Class 150, 316 SST Drain Vents	N/A		★
G22	Vertical Mount Level Flange (SST), 3-in ANSI Class 300, 316 SST Drain Vents	N/A		★
G31	Vertical Mount Level Flange (SST), DIN-DN 50 PN 40, 316 SST Drain Vents	N/A		★
G41	Vertical Mount Level Flange (SST), DIN-DN 80 PN 40, 316 SST Drain Vents	N/A		★
Expanded				
F11	Traditional Flange (CS), ¼-18 NPT, 316 SST Drain / Vents	Non-Threaded Instrument Flange (I-Flange)		
F32	Bottom Vent Traditional Flange (SST), ¼-18 NPT, 316 SST Drain Vents	N/A		
F42	Bottom Vent Traditional Flange (SST), RC ¼, 316 SST Drain Vents	N/A		
F62	DIN-Compliant Traditional Flange (316 SST), ¼-18 NPT, 316 Drain Vents, M10 Bolting	N/A		
F72	DIN-Compliant Traditional Flange (316 SST), ¼-18 NPT, 316 Drain Vents, M12 Bolting	N/A		
Transmitter Output				
Standard				**Standard**
A	4–20 mA with digital signal based on HART protocol			★
Housing Style		**Material**	**Conduit Entry Size**	
Standard				**Standard**
Housings for ERS Primary - Configuration Type code P				
1A	PlantWeb Housing	Aluminum	1/2–14 NPT	★
1B	PlantWeb Housing	Aluminum	M20 x 1.5 (CM 20)	★
1J	PlantWeb Housing	SST	1/2–14 NPT	★
1K	PlantWeb Housing	SST	M20 x 1.5 (CM 20)	★
2E	Junction Box with Remote Display Output	Aluminum	1/2–14 NPT	★
2F	Junction Box with Remote Display Output	Aluminum	M20 x 1.5 (CM 20)	★
2M	Junction Box with Remote Display Output	SST	1/2–14 NPT	★
Housings for ERS Secondary - Configuration Type code S				
2A	Junction Box	Aluminum	1/2–14 NPT	★
2B	Junction Box	Aluminum	M20 x 1.5 (CM 20)	★
2J	Junction Box	SST	1/2–14 NPT	★

Table 7. 3051SAM Scalable Advanced Measurement Transmitter for ERS Applications Ordering Information

★ The Standard offering represents the most common models and options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Expanded				
Housings for ERS Primary - Configuration Type code P				
1C	PlantWeb Housing	Aluminum	G1/2	
1L	PlantWeb Housing	SST	G1/2	
2G	Junction Box with Remote Display Output	Aluminum	G1/2	
Housings for ERS Secondary - Configuration Type code S				
2C	Junction Box	Aluminum	G1/2	

Options (Include with selected model number)

Electronic Remote Sensor Connection Cable		
Standard		**Standard**
R05	50 ft. (15.2 m) Spool of Electronic Remote Sensor Cable	★
R10	100 ft. (30.5 m) Spool of Electronic Remote Sensor Cable	★
Mounting Bracket		
Standard		**Standard**
B1(3)	Traditional flange bracket, CS, 2-in. pipe	★
B2(3)	Traditional flange bracket, CS, panel	★
B3(3)	Traditional flange flat bracket, CS, 2-in. pipe	★
B4	Bracket, all SST, 2-in. Pipe and Panel	★
B7(3)	Traditional flange bracket, B1 with SST bolts	★
B8(3)	Traditional flange bracket, B2 with SST bolts	★
B9(3)	Traditional flange bracket, B3 with SST bolts	★
BA(3)	Traditional flange bracket, B1, all SST	★
BC(3)	Traditional flange bracket, B3, all SST	★
Special Configuration (Software)		
Standard		**Standard**
C1(7)	Customer Software Configuration (“Configuration Data Sheet” Must Be Completed)	★
C3	Gage Pressure Calibration on Rosemount 3051SAM_ _A4 only	★
C4(7)	NAMUR Alarm and Saturation Levels, High Alarm	★
C5(7)	NAMUR Alarm and Saturation Levels, Low Alarm	★
C6(7)	Custom Alarm and Saturation Levels, High Alarm (Requires C1 and Configuration Data Sheet)	★
C7(7)	Custom Alarm and Saturation Levels, Low Alarm (Requires C1 and Configuration Data Sheet)	★
C8(7)	Low alarm (standard Rosemount alarm and saturation levels)	★
Special Configuration (Hardware)		
Standard		**Standard**
D2(8)	1/2-14 NPT Flange Adapters	★
D4	External ground screw assembly	★
D5(8)	Delete transmitter drain/vent valves (install plugs)	★
Expanded		
D7(8)	Coplanar flange without drain/vent ports	
D9(8)	RC 1/2 Flange Adapters	
Product Certifications		
Standard		**Standard**
E1	ATEX Flameproof	★
I1	ATEX Intrinsic Safety	★
N1	ATEX Type n	★
K1	ATEX Flameproof and Intrinsically Safe, Type n, Dust	★
ND	ATEX Dust	★
E4	TIIS Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
I5	FM Intrinsically Safe, Division 2	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E6(9)	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
I6	CSA Intrinsically Safe	★
K6(9)	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E7	IECEx Flameproof	★
I7	IECEx Intrinsic Safety	★

Rosemount 3051S Series

Table 7. 3051SAM Scalable Advanced Measurement Transmitter for ERS Applications Ordering Information

★ The Standard offering represents the most common models and options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

N7	IECEx Type n	★
K7	IECEx Flameproof, Intrinsic Safety, Type n	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsically Safe	★
K2	INMETRO Flameproof, Intrinsic Safety, Type n	★
E3	China Flameproof	★
I3	China Intrinsic Safety	★
KA(9)	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB(9)	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD(9)	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe	★
Special Certifications		
Standard		**Standard**
Q4	Calibration certificate	★
QP	Calibration Certificate and Tamper Evident Seal	★
Q8	Material Traceability Certification per EN 10204 3.1B	★
Q16	Surface Finish Certification for Hygienic Remote Seals	★
QZ(10)	Remote Seal System Performance Calculation Report	★
Terminal Blocks		
Standard		**Standard**
T1(7)	Transient Terminal Block	★
Alternate Materials of Construction		
Standard		**Standard**
L1(11)	Inert Sensor Fill Fluid	★
L2	Graphite-Filled PTFE O-Ring	★
L4(8)	Austenitic 316 SST Bolts	★
L5(2)(8)	ASTM A 193, Grade B7M Bolts	★
L6(8)	Alloy K-500 Bolts	★
L7(2)(8)	ASTM A 453, Class D, Grade 660 Bolts	★
L8(8)	ASTM A 193, Class 2, Grade B8M Bolts	★
Display Type (ERS Primary Only)		
Standard		**Standard**
M5(7)	PlantWeb LCD Display	★
M7(7)	Remote Mount LCD Display and Interface, PlantWeb Housing, No Cable, SST Bracket	★
M8(7)	Remote Mount LCD Display and Interface, PlantWeb Housing, 50 ft. (15.2 m) Cable, SST Bracket	★
M9(7)	Remote Mount LCD Display and Interface, PlantWeb Housing, 100 ft. (30.5 m) Cable, SST Bracket	★
Special Procedures		
Expanded		
P1	Hydrostatic Testing with Certificate	
P2(8)	Cleaning for Special Services	
P3(8)	Cleaning for Less than 1 PPM Chlorine/Fluorine	
Typical Model Number: 3051SAM 1 S T 2A 2 E11 A 2A		

(1) The pressure range should be specified based on the maximum static pressure, not differential pressure.

(2) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(3) Not available with Pressure Sensor / Module codes T or E.

(4) Tantalum diaphragm material is only available with Pressure Sensor / Module code G.

(5) "Assemble to" items are specified separately and require a completed model number.

(6) Consult an Emerson Process Management representative for performance specifications.

(7) Not available with Configuration Type code S.

(8) Not available with Process Connection code A11.

(9) Not available with M20 or G ½ conduit entry size.

(10) The QZ report quantifies the performance of the entire ERS system. One report is provided per ERS system. The QZ option is specified on the Primary Transmitter (Configuration Type code P).

(11) Silicone fill fluid is standard.



Rosemount 3051SAL Level Transmitter for ERS Applications

- Integrated transmitter and remote seal in a single model number
- Variety of process connections including flanged, threaded, and hygienic remote seals
- Available with 10-year stability and limited 12-year warranty

A 3051SAL Transmitter consists of 3 parts. First, specify the transmitter model codes found on page Pressure-51. Then, specify a remote seal found on page Pressure-61. Finish the model number by specifying all desired options on page Pressure-53.

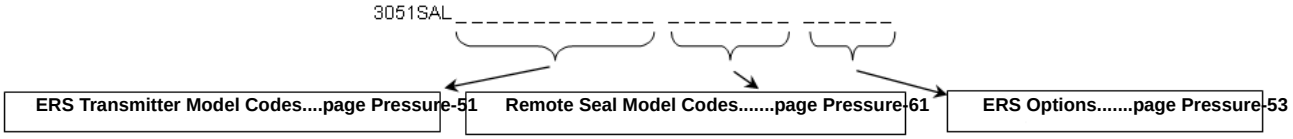


Table 8. 3051SAL Scalable Advanced Level Transmitter for ERS Applications Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	**Transmitter Type**				
3051SAL	Scalable Advanced Level Transmitter				
Performance Class					
Standard					**Standard**
1	Ultra: 0.065% span accuracy, 100:1 rangedown, 12-year limited warranty				★
2	Classic: 0.065% span accuracy, 100:1 rangedown				★
Configuration Type					
Standard					**Standard**
P	Electronic Remote Sensor - Primary				★
S	Electronic Remote Sensor - Secondary				★
Pressure Module Type	**Pressure Sensor Type**				
Standard					**Standard**
G	Coplanar	Gage			★
T	In-Line	Gage			★
E	In-Line	Absolute			★
Expanded					
A	Coplanar	Absolute			
Pressure Range[5]					
	Coplanar Gage	**In-Line Gage**	**In-Line Absolute**	**Coplanar Absolute**	
Standard					**Standard**
1A	N/A	-14.7 to 30 psig (-1,0 to 2,06 bar)	0 to 30 psia (0 to 2,06 bar)	0 to 30 psia (0 to 2,06 bar)	★
2A	-250 to 250 inH2O (-623 to 623 mbar)	-14.7 to 150 psig (-1,0 to 10,34 bar)	0 to 150 psia (0 to 10,34 bar)	0 to 150 psia (0 to 10,34 bar)	★
3A	-393 to 1000 inH2O (-0,98 to 2,49 bar)	-14.7 to 800 psig (-1,0 to 55,2 bar)	0 to 800 psia (0 to 55,2 bar)	0 to 800 psia (0 to 55,2 bar)	★
4A	-14.2 to 300 psig (-0,98 to 20,7 bar)	-14.7 to 4000 psig (-1,0 to 275,8 bar)	0 to 4000 psia (0 to 275,8 bar)	0 to 4000 psia (0 to 275,8 bar)	★
5A	-14.2 to 2000 psig (-0,98 to 137,9 bar)	-14.7 to 10000 psig (-1,0 to 689,5 bar)	0 to 10000 psia (0 to 689 bar)	N/A	★
Transmitter Output					
Standard					**Standard**
A	4-20 mA with Digital Signal Based on HART Protocol				★
Housing Style		**Material**		**Conduit Entry Size**	
Standard					**Standard**
Housings for ERS Primary - Configuration Type code P					
1A	PlantWeb Housing	Aluminum	1/2–14 NPT		★
1B	PlantWeb Housing	Aluminum	M20 x 1.5 (CM 20)		★

Rosemount 3051S Series

Table 8. 3051SAL Scalable Advanced Level Transmitter for ERS Applications Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

1J	PlantWeb Housing	SST	1/2–14 NPT	★
1K	PlantWeb Housing	SST	M20 x 1.5 (CM 20)	★
2E	Junction Box with Remote Display Output	Aluminum	1/2–14 NPT	★
2F	Junction Box with Remote Display Output	Aluminum	M20 x 1.5 (CM 20)	★
2M	Junction Box with Remote Display Output	SST	1/2–14 NPT	★
Housings for ERS Secondary - Configuration Type code S				
2A	Junction Box	Aluminum	1/2–14 NPT	★
2B	Junction Box	Aluminum	M20 x 1.5 (CM 20)	★
2J	Junction Box	SST	1/2–14 NPT	★
Expanded				
Housings for ERS Primary - Configuration Type code P				
1C	PlantWeb Housing	Aluminum	G1/2	
1L	PlantWeb Housing	SST	G1/2	
2G	Junction Box with Remote Display Output	Aluminum	G1/2	
Housings for ERS Secondary - Configuration Type code S				
2C	Junction Box	Aluminum	G1/2	

Seal System Type		
Standard		**Standard**
1	Direct-Mount Seal System	★
Direct-Mount Extension (Between Transmitter Flange and Seal)		
Standard		**Standard**
0	No Extension	★
2	2-in. (50 mm) Extension	★
4	4-in. (100 mm) Extension	★
5	4-in. (100 mm) Thermal Optimizer Extension	★
Transmitter Reference Pressure Connection		
Standard		**Standard**
00	None (In-Line Style Sensor)	★
20	316L SST Isolator / SST Transmitter Flange	★
30	Alloy C-276 Isolator / SST Transmitter Flange	★

Seal Fill Fluid		**Specific Gravity at 77 °F (25 °C)**	**Temperature Limits[1]**				
			No Extension	**2-in. (50 mm) Extension**	**4-in. (100 mm) Extension**	**Thermal Optimizer**	
Standard							**Standard**
A	Syltherm XLT	0.85	-102 to 293 °F (-75 to 145 °C)	-102 to 293 °F (-75 to 145 °C)	-102 to 293 °F (-75 to 145 °C)	-102 to 293 °F (-75 to 145 °C)	★
C	Silicone 704	1.07	32 to 401 °F[2] (0 to 205 °C)	32 to 464 °F[2] (0 to 240 °C)	32 to 500 °F[2] (0 to 260 °C)	32 to 599 °F (0 to 315 °C)	★
D	Silicone 200	0.93	-49 to 401 °F (-45 to 205 °C)	-49 to 401 °F (-45 to 205 °C)	-49 to 401 °F (-45 to 205 °C)	-49 to 401 °F (-45 to 205 °C)	★
H	Inert (Halocarbon)	1.85	-49 to 320 °F (-45 to 160 °C)	-49 to 320 °F (-45 to 160 °C)	-49 to 320 °F (-45 to 160 °C)	-49 to 320 °F (-45 to 160 °C)	★
G[3][4]	Glycerin and Water	1.13	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	★
N[3]	Neobee M-20	0.92	5 to 401 °F[2] (-15 to 205 °C)	5 to 437 °F (-15 to 225 °C)	5 to 437 °F (-15 to 225 °C)	5 to 437 °F (-15 to 225 °C)	★
P[3][4]	Propylene Glycol and Water	1.02	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	★

Continue specifying a completed model number by choosing a remote seal type below:

	page Pressure-61	FF Flush Flanged Seal	Process Connections: 2 in. / DN 50 / 50A 3 in. / DN 80 / 80A 4 in. / DN 100 / 100A
	page Pressure-63	EF Extended Flanged Seal	Process Connections: 3 in. / DN 80 / 80A 4 in. / DN 100 / 100A
	page Pressure-64	RF Remote Flanged Seal	Process Connections: 1 in. / DN 25 / 25A 1.5 in. / DN 40 / 40A
	page Pressure-66	RT Remote Threaded Seal	Process Connections: ¼ - 18 NPT ½ - 14 NPT ¾ - 14 NPT 1 – 11.5 NPT
	page Pressure-68	SC Hygienic Tri-Clamp Seal	Process Connections: 1.5 in. 2 in. 3 in.
	page Pressure-69	SS Hygienic Tank Spud Seal	Process Connections: 4 in.

Options (Include with selected model number)

Electronic Remote Sensor Connection Cable		
Standard		**Standard**
R05	50 ft. (15.2 m) Spool of Electronic Remote Sensor Cable	★
R10	100 ft. (30.5 m) Spool of Electronic Remote Sensor Cable	★
Special Configuration (Software)		
Standard		**Standard**
C1[(6)]	Customer Software Configuration (“Configuration Data Sheet” Must Be Completed)	★
C3	Gage Pressure Calibration on Rosemount 3051SAL_ _A4 only	★
C4[(6)]	NAMUR Alarm and Saturation Levels, High Alarm	★
C5[(6)]	NAMUR Alarm and Saturation Levels, Low Alarm	★
C6[(6)]	Custom Alarm and Saturation Levels, High Alarm (Requires C1 and Configuration Data Sheet)	★
C7[(6)]	Custom Alarm and Saturation Levels, Low Alarm (Requires C1 and Configuration Data Sheet)	★
C8[(6)]	Low Alarm (Standard Rosemount Alarm and Saturation Levels)	★
Special Configuration (Hardware)		
Standard		**Standard**
D4	External Ground Screw Assembly	★
Product Certifications		
Standard		**Standard**
E1	ATEX Flameproof	★
I1	ATEX Intrinsic Safety	★
N1	ATEX Type n	★
K1	ATEX Flameproof and Intrinsically Safe, Type n, Dust	★
ND	ATEX Dust	★
E4	TIIS Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
I5	FM Intrinsically Safe, Division 2	★

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K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E6[7]	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
I6	CSA Intrinsically Safe	★
K6[7]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E7	IECEx Flameproof	★
I7	IECEx Intrinsic Safety	★
N7	IECEx Type n	★
K7	IECEx Flameproof, Intrinsic Safety, Type n	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsically Safe	★
K2	INMETRO Flameproof, Intrinsic Safety, Type n	★
KA[7]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB[7]	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[7]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe	★
Alternate Materials of Construction		
Standard		**Standard**
L1[8]	Inert Sensor Fill Fluid	★
L2	Graphite-Filled PTFE O-Ring	★
L4	Austenitic 316 SST Bolts	★
L5[9]	ASTM A 193, Grade B7M Bolts	★
L6	Alloy K-500 Bolts	★
L7[9]	ASTM A 453, Class D, Grade 660 Bolts	★
L8	ASTM A 193, Class 2, Grade B8M Bolts	★
Display Type (ERS Primary Only)		
Standard		**Standard**
M5[6]	PlantWeb LCD Display	★
M7[6]	Remote Mount LCD Display and Interface, PlantWeb Housing, No Cable, SST Bracket	★
M8[6]	Remote Mount LCD Display and Interface, PlantWeb Housing, 50 ft. (15.2 m) Cable, SST Bracket	★
M9[6]	Remote Mount LCD Display and Interface, PlantWeb Housing, 100 ft. (30.5 m) Cable, SST Bracket	★
Special Procedures		
Expanded		
P1	Hydrostatic Testing with Certificate	
P2	Cleaning for Special Services	
P3	Cleaning for Less than 1 PPM Chlorine/Fluorine	
Special Certifications		
Standard		**Standard**
Q4	Calibration Certificate	★
QP	Calibration certificate with tamper evident seal	★
Q8	Material traceability certification per EN 10204 3.1	★
QZ[10]	Remote Seal System Performance Calculation Report	★
Transient Protection		
Standard		**Standard**
T1[6]	Transient Terminal Block	★
Typical Model Number: 3051SAL 1 P G 4A A 1A 1 0 20 D FF 7 1 DA 0 0 M5		

(1) At ambient pressure of 14.7 psia (1 bar-a) and ambient temperature of 70°F (21°C).

(2) Maximum process temperature is limited by heat transfer to the transmitter electronics and must be further derated if ambient.

(3) This is a food grade fill fluid.

(4) Not suitable for vacuum applications.

(5) The pressure range should be specified based on the maximum static pressure, not differential pressure.

(6) Not available with Configuration Type code S.

(7) Not available with M20 or G ½ conduit entry size.

(8) Silicone fill fluid is standard.

(9) Materials of construction comply with metallurgical requirements highlighted within NACE MR0175 / ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(10) The QZ report quantifies the performance of the entire ERS system. One report is provided per ERS system. The QZ option is specified on the Primary Transmitter (Configuration Type code P).

Rosemount 3051S Liquid Level Transmitter



3051SAL In-Line with "FF" Flanged Seal



3051SAL Coplanar with "SS" Hygienic Tank Spud Seal



Tuned-System Assembly Comprised of 3051SAL with 1199 Flanged Seal

Rosemount 3051S liquid level transmitters combine the scalable features and benefits of a high-performance 3051S transmitter with the durability and reliability of a remote diaphragm seal all in a single model number.

Level transmitters can also be ordered with an additional 1199 remote seal to form a Tuned-System Assembly that offers improved performance and reduced costs compared to traditional symmetrical (balanced) assemblies.

Product features and capabilities include:

- Variety of process connections including flanged, threaded, and hygienic seals
- Quantified performance for the entire transmitter / seal assembly (QZ option)
- HART, FOUNDATION fieldbus, and Wireless protocols

Additional Information
Specifications: page Pressure-70
Dimensional Drawings: page Pressure-100

Rosemount 3051SAL Liquid Level Transmitter

A 3051SAL Transmitter consists of 3 parts. First, specify the transmitter model codes found on page Pressure-55. Then, specify a remote seal found on page Pressure-61. Finish the model number by specifying all desired options on page Pressure-57.

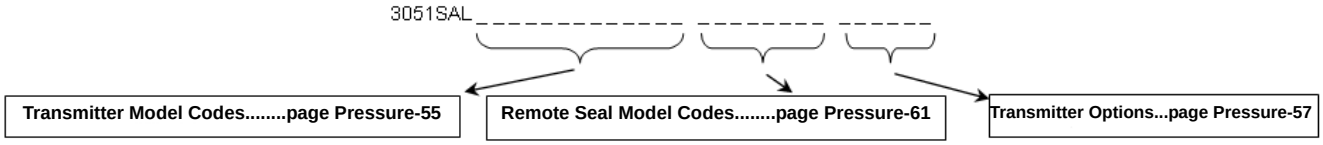


Table 9. Rosemount 3051S Liquid Level Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Transmitter Type		
3051SAL	Scalable Advanced Level Transmitter for Liquid Level Applications		
Performance Class			
Standard			**Standard**
1	Ultra: 0.065% Span Accuracy, 100:1 Rangedown, 12-Year Limited Warranty		★
2	Classic: 0.065% Span Accuracy, 100:1 Rangedown		★
Configuration Type			
Standard			**Standard**
C	Liquid Level Transmitter		★
Pressure Module Type		**Pressure Sensor Type**	
Standard			**Standard**
D	Coplanar	Differential	★
G	Coplanar	Gage	★
T	In-Line	Gage	★
E	In-Line	Absolute	★
Expanded			
A	Coplanar	Absolute	

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Table 9. Rosemount 3051S Liquid Level Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Pressure Range						
	Coplanar DP	**Coplanar Gage**	**In-Line Gage**	**In-Line Absolute**	**Coplanar Absolute**	
Standard						**Standard**
1A	N/A	N/A	-14.7 to 30 psig (-1,0 to 2,06 bar)	0 to 30 psia (0 to 2,06 bar)	0 to 30 psia (0 to 2,06 bar)	★
2A	-250 to 250 inH2O (-623 to 623 mbar)	-250 to 250 inH2O (-623 to 623 mbar)	-14.7 to 150 psig (-1,0 to 10,3 bar)	0 to 150 psia (0 to 10,34 bar)	0 to 150 psia (0 to 10,34 bar)	★
3A	-1000 to 1000 inH2O (-2,5 to 2,5 bar)	-393 to 1000 inH2O (-0,98 to 2,5 bar)	-14.7 to 800 psig (-1,0 to 55,2 bar)	0 to 800 psia (0 to 55,2 bar)	0 to 800 psia (0 to 55,2 bar)	★
4A	-300 to 300 psi (-20,7 to 20,7 bar)	-14.2 to 300 psig (-0,98 to 20,7 bar)	-14.7 to 4000 psig (-1,0 to 275,8 bar)	0 to 4000 psia (0 to 275,8 bar)	0 to 4000 psia (0 to 275,8 bar)	★
5A	-2000 to 2000 psi (-137,9 to 137,9 bar)	-14.2 to 2000 psig (-0,98 to 137,9 bar)	-14.7 to 10000 psig (-1,0 to 689 bar)	0 to 10000 psia (0 to 689 bar)	N/A	★
Transmitter Output						
Standard						**Standard**
A	4-20 mA with digital signal based on HART protocol					★
F[10]	FOUNDATION fieldbus protocol					★
X[11]	Wireless (Requires wireless options and wireless PlantWeb housing)					★
Housing Style			**Material**[17]	**Conduit Entry**		
Standard						**Standard**
1A	PlantWeb housing		Aluminum	1/2–14 NPT		★
1B	PlantWeb housing		Aluminum	M20 x 1.5		★
1J	PlantWeb housing		SST	1/2–14 NPT		★
1K	PlantWeb housing		SST	M20 x 1.5		★
2A	Junction Box housing		Aluminum	1/2–14 NPT		★
2B	Junction Box housing		Aluminum	M20 x 1.5		★
2E	Junction Box with output for remote interface		Aluminum	1/2–14 NPT		★
2F	Junction Box with output for remote interface		Aluminum	M20 x 1.5		★
2J	Junction Box housing		SST	1/2–14 NPT		★
5A[5]	Wireless PlantWeb housing		Aluminum	1/2–14 NPT		★
5J[5]	Wireless PlantWeb housing		SST	1/2–14 NPT		★
7J[12]	Quick Connect (A size Mini, 4-pin male termination)		SST			★
Expanded						
1C	PlantWeb housing		Aluminum	G1/2		
1L	PlantWeb housing		316L SST	G1/2		
2C	Junction Box housing		Aluminum	G1/2		
2G	Junction Box with output for remote interface		Aluminum	G1/2		
Direct-Mount Extension (Between Transmitter Flange and Seal)						
Standard						**Standard**
10	No Extension					★
12	2-in. (50 mm) Extension					★
14	4-in. (100 mm) Extension					★
15	4-in. (100 mm) Thermal Optimizer Extension					★
Transmitter Reference Pressure Connection						
Standard						**Standard**
00	None (Inline Module Type Only)					★
10[13]	Tuned-System Assembly, One Capillary Remote Seal (Requires separate 1199 model number)					★
20	316 L SST Isolator with SST Transmitter Flange					★
30	Alloy C-276 Isolator with SST Transmitter Flange					★

Table 9. Rosemount 3051S Liquid Level Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Seal Fill Fluid		Specific Gravity at 77 °F (25 °C)	Temperature Limits[1]				
			No Extension	2-in. (50 mm) Extension	4-in. (100 mm) Extension	Thermal Optimizer	
Standard							**Standard**
A	Syltherm XLT	0.85	-102 to 293 °F (-75 to 145 °C)	-102 to 293 °F	102 to 293 °F (-75 to 145 °C)	102 to 293 °F (-75 to 145 °C)	★
C	Silicone 704	1.07	32 to 401 °F (0 to 205 °C)[2]	32 to 464 °F (0 to 240 °C)[2]	32 to 500 °F (0 to 260 °C)[2]	32 to 599 °F (0 to 315 °C)	★
D	Silicone 200	0.93	-49 to 401 °F (-45 to 205 °C)	-49 to 401 °F (-45 to 205 °C)	-49 to 401 °F (-45 to 205 °C)	-49 to 401 °F (-45 to 205 °C)	★
H	Inert (Halocarbon)	1.85	-49 to 320 °F (-45 to 160 °C)	-49 to 320 °F (-45 to 160 °C)	-49 to 320 °F (-45 to 160 °C)	-49 to 320 °F (-45 to 160 °C)	★
G[3][4]	Glycerine and Water	1.13	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	★
N[3]	Neobee M-20	0.92	5 to 401 °F (-15 to 205 °C)[2]	5 to 437 °F (-15 to 225 °C)	5 to 437 °F (-15 to 225 °C)	5 to 437 °F (-15 to 225 °C)	★
P[3][4]	Propylene Glycol and Water	1.02	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	★

Continue specifying a completed model number by choosing a remote seal type below:

	page Pressure-61	FF Flush Flanged Seal	Process Connections: 2 in. / DN 50 / 50A 3 in. / DN 80 / 80A 4 in. / DN 100 / 100A
	page Pressure-63	EF Extended Flanged Seal	Process Connections: 3 in. / DN 80 / 80A 4 in. / DN 100 / 100A
	page Pressure-64	RF Remote Flanged Seal	Process Connections: 1 in. / DN 25 / 25A 1.5 in. / DN 40 / 40A
	page Pressure-66	RT Remote Threaded Seal	Process Connections: ¼ - 18 NPT ½ - 14 NPT ¾ - 14 NPT 1 – 11.5 NPT
	page Pressure-68	SC Hygienic Tri-Clamp Seal	Process Connections: 1.5 in. 2 in. 3 in.
	page Pressure-69	SS Hygienic Tank Spud Seal	Process Connections: 4 in.

Wireless Options (Requires option code X and wireless PlantWeb housing)

Update Rate		
Standard		**Standard**
WA	User Configurable Update Rate	★
Operating Frequency and Protocol		
Standard		
3	2.4 GHz DSSS, IEC 62591 (WirelessHART)	★

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Omnidirectional Wireless Antenna		
Standard		
WK	External Antenna	★
WM	Extended Range, External Antenna	★
Expanded		
WN	High-Gain, Remote Antenna	
SmartPower™		
Standard		
1(6)	Adapter for Black Power Module (I.S. Power Module Sold Separately)	★

Other Options (Include with selected model number)

PlantWeb Control Functionality		
Standard		**Standard**
A01(7)(8)	FOUNDATION fieldbus Advanced Control Function Block Suite	★
PlantWeb Diagnostic Functionality		
Standard		**Standard**
D01(7)(8)	FOUNDATION fieldbus Diagnostics Suite	★
DA2(9)	Advanced HART Diagnostics Suite	★
Special Configuration (Software)		
Standard		
C1(14)	Custom software configuration (Requires Configuration Data Sheet)	★
C3	Gage pressure calibration on Rosemount 3051SAL_ _A4 only	★
C4(7)(14)	NAMUR alarm and saturation levels, high alarm	★
C5(7)(14)	NAMUR alarm and saturation levels, low alarm	★
C6(7)(14)	Custom alarm and saturation signal levels, high alarm (Requires C1 and Configuration Data Sheet)	★
C7(7)(14)	Custom alarm and saturation signal levels, low alarm (Requires C1 and Configuration Data Sheet)	★
C8(7)(14)	Low alarm (standard Rosemount alarm and saturation levels)	★
Special Configuration (Hardware)		
Standard		
DO(15)	316 SST Conduit Plug	★
D1(7)(14)(16)	Hardware adjustments (zero, span, alarm, security)	★
D2	1/2-14 NPT flange adapter	★
D4	External ground screw assembly	★
D5	Delete transmitter drain/vent valves (install plugs)	★
D9	RC 1/2 SST flange adapter	★
Product Certifications(17)		
Standard		
E1	ATEX Flameproof	★
I1	ATEX Intrinsic Safety	★
IA	ATEX FISCO Intrinsic Safety (FOUNDATION fieldbus protocol only)	★
N1	ATEX Type n	★
K1	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
ND	ATEX Dust	★
E4	TIIS Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
I5	FM Intrinsically Safe, Division 2	★
IE	FM FISCO Intrinsically Safe (FOUNDATION fieldbus protocol only)	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E6(18)	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
I6	CSA Intrinsically Safe	★
IF	CSA FISCO Intrinsically Safe (FOUNDATION fieldbus protocol only)	★
K6(18)	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
D3(19)	Measurement Canada Accuracy Approval	★
E7	IECEx Flameproof, Dust Ignition-proof	★
I7	IECEx Intrinsic Safety	★
IG	IECEx FISCO Intrinsic Safety (FOUNDATION fieldbus protocol only)	★
N7	IECEx Type n	★

K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsic Safety	★
K2	INMETRO Flameproof, Intrinsic Safety	★
E3	China Flameproof	★
I3	China Intrinsic Safety	★
KA(18)	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB(18)	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD(18)	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe	★
Alternate Materials of Construction		
Standard		**Standard**
L1(20)	Inert sensor fill fluid	★
L2	Graphite-filled PTFE o-ring	★
L4	Austenitic 316 SST bolts	★
L5(21)	ASTM A193, Grade B7M bolts	★
L6	Alloy K-500 bolts	★
L7(21)	ASTM A453, Class D, Grade 660 bolts	★
L8	ASTM A193, Class 2, Grade B8M bolts	★
Display Type(22)		
Standard		
M5	PlantWeb LCD Display	★
M7(7)	Remote mount LCD display and interface, PlantWeb housing, no cable, SST bracket	★
M8(7)	Remote mount LCD display and interface, PlantWeb housing, 50 ft. (15 m) cable, SST bracket	★
M9(7)	Remote mount LCD display and interface, PlantWeb housing, 100 ft. (31 m) cable, SST bracket	★
Special Procedures		
Expanded		
P1	Hydrostatic testing with certificate	
P2	Cleaning for special services	
P3	Cleaning for less than 1PPM chlorine/fluorine	
Special Certification		
Standard		
Q4	Calibration certificate	★
QP	Calibration certificate and tamper evident seal	★
Q8	Material traceability certification per EN 10204 3.1.B	★
QS(7)(14)	Prior-use certificate of FMEDA Data	★
QT(23)	Safety-certified to IEC 61508 with certificate of FMEDA data	★
QZ	Remote Seal System Performance Calculation Report	★
Transient Protection		
Standard		
T1(24)(25)	Transient terminal block	★
Conduit Electrical Connector		
Standard		
GE(26)	M12, 4-pin, Male Connector (*eurofast*®)	★
GM(26)	A size Mini, 4-pin, Male Connector (*minifast*®)	★
Typical Model Number: 3051SAL 1 C G 2A A 1A 10 20 D FF G 1 DA 0 0		

(1) At ambient pressure of 14.7 psia (1 bar-a) and ambient temperature of 70°F (21°C)

(2) Maximum process temperature is limited by heat transfer to the transmitter

(3) This is a food grade fill fluid.

(4) Not suitable for vacuum applications.

(5) Only available with output code X.

(6) Long-Life Power Module must be shipped separately, order Part #00753-9220-0001.

(7) Not available with output code X.

(8) Not available with output code A.

(9) Requires PlantWeb housing and Output code A. Includes Hardware Adjustments as standard.

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(10) Requires PlantWeb housing.

(11) Available approvals are FM Intrinsically Safe, Division 2 (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).

(12) Available with output code A only. Available approvals are FM Intrinsically Safe, Division 2 (option code I5), ATEX Intrinsic Safety (option code I1), or IECEx Intrinsic Safety (option code I7). Contact an Emerson Process Management representative for additional information.

(13) With option code 10, user must select Seal Location option code M in Table 7 of Rosemount DP Level PDS.

(14) Not available with output code F.

(15) Transmitter is shipped with 316 SST conduit plug (uninstalled) in place of carbon steel conduit plug.

(16) Not available with housing style codes 2E, 2F, 2G, 2M, 5A, 5J, or 7J.

(17) Valid when SuperModule Platform and housing have equivalent approvals.

(18) Not available with M20 or G ½ conduit entry size.

(19) Requires PlantWeb housing and Hardware Adjustments option code D1. Limited availability depending on transmitter type and range. Contact an Emerson Process Management representative for additional information.

(20) Silicone fill fluid is standard.

(21) Materials of construction comply with metallurgical requirements highlighted within NACE MR0175 / ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(22) Not available with Housing code 01 or 7J.

(23) Not available with output code F or X. Not available with housing code 01 or 7J.

(24) Not available with Housing code 00, 01, 5A, or 7J.

(25) The T1 option is not needed with FISCO Product Certifications; transient protection is included in the FISCO product certification codes IA, IE, IF, and IG.

(26) Not available with Housing code 00, 01, 5A, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Division 2 (option code I5) or FM FISCO Intrinsically Safe (option code IE), install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66).

Direct Mount Seals for 3051SAL



Flush Flanged (FF) Seal

- Most common seal
- Good for use in general applications
- Easy installation on flanged connections ranging from 2-in. (DN 50) to 4-in. (DN 100)

Table 10. Flush Flanged (FF) Seal Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	**Process Connection**			
FF	Flush Flanged Seal			
Process Connection Size				
Standard				**Standard**
G	2-in. / DN 50 / 50A			★
7	3-in. / 80A			★
J	DN 80			★
9	4-in. / DN 100 / 100A			★
Flange / Pressure Rating				
Standard				**Standard**
1	Class 150 per ANSI/ASME B16.5			★
2	Class 300 per ANSI/ASME B16.5			★
4	Class 600 per ANSI/ASME B16.5			★
G	PN 40 per EN 1092-1			★
Expanded				
A	10K per JIS B2238			
B	20K per JIS B2238			
D	40K per JIS B2238			
E	PN 10/16 per EN 1092-1 (DN 100 only)			
Materials of Construction				
	Isolating Diaphragm	**Upper Housing**	**Flange**	
Standard				**Standard**
CA	316L SST	316L SST	CS	★
DA	316L SST	316L SST	316 SST	★
CB[(1)]	Alloy C-276	316L SST	CS	★
DB[(1)]	Alloy C-276	316L SST	316 SST	★
CC	Tantalum	316L SST	CS	★
DC	Tantalum	316L SST	316 SST	★
Flushing Connection Ring (Lower Housing)[(2)]				
Standard				**Standard**
0	None			★
A	316 SST			★
B	Alloy C-276			★
Flushing Connection Quantity & Size				
Standard				**Standard**
0	None			★
1	One 1/4-18 NPT Flushing Connection			★
3	Two 1/4-18 NPT Flushing Connections			★
7	One 1/2-14 NPT Flushing Connection			★
9	Two 1/2-14 NPT Flushing Connections			★

Table 10. Flush Flanged (FF) Seal Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Options (Include with selected model number)

Flushing Connection Ring Plugs		
Standard		**Standard**
SD	Alloy C-276 Plug(s) for Flushing Connection(s)	★
SG	SST Plug(s) for Flushing Connection(s)	★
SH	SST Drain / Vent(s) for Flushing Connection(s)	★
Flushing Connection Ring Gaskets		
Expanded		
SK	Barium Sulfate-Filled PTFE Gasket	
SN	Grafoil Gasket	
Additional Options		
Expanded		
SB	Extra Fill Fluid for Cold Temperature Applications	
SJ	PTFE Gasket	
SC(3)	0.006-in. (150 µm) Diaphragm Thickness	
ST(4)	Wetted Materials Compliance to NACE MR 0175 / ISO 1516, MR 0103	
SU(3)	0.001-in. (25 µm) Gold Plated Diaphragm	
SV(5)	PTFE Coated Diaphragm for Non-Stick Purposes	

Complete the 3051SAL model number by specifying options as needed:

ERS Transmitter Options, see page Pressure-53	
Liquid Level Transmitter Options, see page Pressure-57	

(1) Not available with option code SC.

(2) Supplied with Thermo Tork TN9000 gasket.

(3) Not available with Tantalum diaphragms (Material of Construction codes CC and DC).

(4) Materials of construction comply with metallurgical requirements highlighted within NACE MR0175 / ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(5) Not available with transmitter option code Q8 (Material Traceability per EN 10204 3.1)



Extended Flanged (EF) Seal

- Good for use in viscous applications with plugging issues
- Seal diaphragm installed flush with inner tank wall to prevent process plugging
- Easy installation on 3-in. (DN 80) and 4-in. (DN 100) flanged connections

Table 11. Extended Flanged (EF) Seal Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	**Process Connection**			
EF	Extended Flanged Seal			
Process Connection Size				
Standard				**Standard**
7	3-in. / DN 80 / 80A			★
9	4-in. / DN 100 / 100A			★
Flange / Pressure Rating				
Standard				**Standard**
1	Class 150 per ANSI/ASME B16.5			★
2	Class 300 per ANSI/ASME B16.5			★
4	Class 600 per ANSI/ASME B16.5			★
G	PN 40 per EN 1092-1			★
Expanded				
A	10K per JIS B2238			
B	20K per JIS B2238			
D	40K per JIS B2238			
E	PN 10/16 per EN 1092-1 (DN 100 only)			
Materials of Construction				
	Isolating Diaphragm	**Extension / Gasket Surface**	**Mounting Flange**	
Standard				**Standard**
CA	316L SST	316L SST	CS	★
DA	316L SST	316L SST	316 SST	★
CB	Alloy C-276	Alloy C-276	CS	★
DB	Alloy C-276	Alloy C-276	316 SST	★
Seal Extension Length				
Standard				**Standard**
20	2-in. (50 mm)			★
40	4-in. (100 mm)			★
60	6-in. (150 mm)			★

Options (Include with selected model number)

Standard		**Standard**
ST[(1)]	Wetted Materials Compliance per NACE MR 0175 / ISO 1516, MR 0103	★
SB	Extra Fill Fluid for Cold Temperature Applications	★
Expanded		
SC	0.0016-in. (150 µm) Diaphragm Thickness	
SU	0.001-in. (25 µm) Gold Plated Diaphragm	
SV[(2)]	PTFE Coated Diaphragm for Non-Stick Purposes	

Complete the 3051SAL model number by specifying options as needed:

ERS Transmitter Options, see page Pressure-53	
Liquid Level Transmitter Options, see page Pressure-57	

(1) Materials of construction comply with metallurgical requirements highlighted within NACE MR0175 / ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(2) Not available with transmitter option code Q8 (Material Traceability per EN 10204 3.1)

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Remote Flanged (RF) Seal

- Designed to improve performance on smaller process connections
- Easy installation on flanged connections ranging from 1-in. to 1.5-in. (DN 50 – DN 40)
- Lower housing / flushing ring required

Table 12. Remote Flanged (RF) Seal Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	**Process Connection**			
RF	Remote Flanged Seal			
Process Connection Size				
Standard				**Standard**
2	1-in. / 25A			★
4	1.5-in. / 40A			★
D	DN 25			★
F	DN 40			★
Flange / Pressure Rating				
Standard				**Standard**
1	Class 150 per ANSI/ASME B16.5			★
2	Class 300 per ANSI/ASME B16.5			★
4	Class 600 per ANSI/ASME B16.5			★
G	PN 40 per EN 1092-1			★
Expanded				
A	10K per JIS B2238			
B	20K per JIS B2238			
D	40K per JIS B2238			
Materials of Construction				
	Isolating Diaphragm	**Upper Housing**	**Flange**	
Standard				**Standard**
CA	316L SST	316L SST	CS	★
DA	316L SST	316L SST	316 SST	★
CB	Alloy C-276	316L SST	CS	★
DB	Alloy C-276	316L SST	316 SST	★
CC	Tantalum	316L SST	CS	★
DC	Tantalum	316L SST	316 SST	★
Flushing Connection Ring Material (Lower Housing)[(1)]				
Standard				**Standard**
A	316L SST			★
B	Alloy C-276			★
D	Plated CS			★
Number of Flushing Connections				
Standard				**Standard**
1	One ¼-18 NPT Flushing Connection			★
3	Two ¼-18 NPT Flushing Connections			★
5	None			★

Options (Include with selected model number)

Flushing Connection Ring Plugs		
Standard		**Standard**
SD	Alloy C-276 Plugs	★
SG	316 SST Plugs	★
SH	316 SST Drain / Vents	★
Flushing Connection Ring Gaskets		
Standard		**Standard**
SJ	PTFE Gasket	★

Table 12. Remote Flanged (RF) Seal Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded		
SK	Barium Sulfate-Filled PTFE Gasket	
SN	Grafoil Gasket	
SR	Ethylene Propylene Gasket	
Additional Options		
Standard		**Standard**
ST[(2)]	Wetted Materials Compliance per NACE MR 0175 / ISO 1516, MR 0103	★
SB	Extra Fill Fluid for Cold Temperature Applications	★
Expanded		
SC[(3)]	0.006-in. (150 µm) Diaphragm Thickness	
SU[(3)]	0.001-in. (25 µm) Gold Plated Diaphragm	
SV[(4)]	PTFE Coated Diaphragm for Non-Stick Purposes	

Complete the 3051SAL model number by specifying options as needed:

ERS Transmitter Options, see page Pressure-53	
Liquid Level Transmitter Options, see page Pressure-57	

(1) Supplied with C4401 Aramid fiber gasket.

(2) Materials of construction comply with metallurgical requirements highlighted within NACE MR0175 / ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(3) Not available with Tantalum diaphragms (Material of Construction codes CC and DC).

(4) Not available with transmitter option code Q8 (Material Traceability per EN 10204 3.1)

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Remote Threaded (RT) Seal

- For use with threaded process connections (1/4-18 to 1-11.5 NPT)
- Rated for use in high-pressure applications (up to 2500 PSI)
- Optional flushing connections available

Table 13. RT Threaded Seal Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Process Connection Style				
Standard				**Standard**
RT	Remote Threaded Seal			★
Process Connection Size				
Standard				**Standard**
3	1/2-14 NPT			★
4	3/4-14 NPT			★
5	1-11.5 NPT			★
Expanded				
1	1/4-18 NPT			
Pressure Rating				
Standard				**Standard**
0	2500 psi			★
Isolating Diaphragm Material		**Upper Housing Material**	**Flange**	
Standard				**Standard**
CA	316L SST	316L SST	CS	★
DA	316L SST	316L SST	316 SST	★
CB	Alloy C-276	316L SST	CS	★
DB	Alloy C-276	316L SST	316 SST	★
CC	Tantalum	316L SST	CS	★
DC	Tantalum	316L SST	316 SST	★
Flushing Connection Ring Material (Lower Housing)(1) (2)				
Standard				**Standard**
A	316L SST			★
B	Alloy C-276			★
Expanded				
D	Plated CS			
Number of Flushing Connections				
Standard				**Standard**
1	One 1/4-in. Flushing Connection			★
3	Two 1/4-in. Flushing Connections			★
5	No Flushing Connection			★

Options (Include with selected model number)

Flushing Connection Ring Plugs		
Standard		**Standard**
SD	Alloy C-276 Plugs	★
SG	316 SST Plugs	★
SH	316 SST Drain / Vents	★
Flushing Connection Ring Gaskets		
Standard		**Standard**
SJ	PTFE Gasket	★
SN	Grafoil Gasket	★
SR	Ethylene Propylene Gasket	★

Table 13. RT Threaded Seal Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded		
SK	Barium Sulfate-Filled PTFE Gasket	
Bolting		
Standard		**Standard**
S3	304 SST Bolts	★
Expanded		
S4	S16 SST Bolts	
Additional Options		
Standard		**Standard**
ST(3)	Wetted Materials Compliance per NACE MR 0175 / ISO 1516, MR 0103	★
SB	Extra Fill Fluid for Cold Temperature Applications	★
Expanded		
SC(4)	0.006-in. (150 µm) Diaphragm Thickness	
SU(4)	0.001-in. (25 µm) Gold Plated Diaphragm	
SV(5)	PTFE Coated Diaphragm for Non-Stick Purposes	

Complete the 3051SAL model number by specifying options as needed:

ERS Transmitter Options, see page Pressure-53	
Liquid Level Transmitter Options, see page Pressure-57	

(1) Supplied with C4401 aramid fiber gasket.

(2) Flushing Connection Ring/ Lower Housing assembly bolts provided as standard are carbon steel.

(3) Materials of construction comply with metallurgical requirements highlighted within NACE MR0175 / ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(4) Not available with Tantalum diaphragms (Material of Construction codes CC and DC).

(5) Not available with transmitter option code Q8 (Material Traceability per EN 10204 3.1)

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Hygienic Tri-Clamp (SC) Seal

- Good for use in hygienic applications
- Easy installation on Tri-Clover style Tri-Clamp connections (1.5-in. to 3-in.)
- Conforms to 3-A standard 74-03

Table 14. SC Hygienic Tri-Clover Style Tri-Clamp Seal Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Process Connection			
Standard			**Standard**
SC(1)	Tri-Clover Style Tri-Clamp Seal		★
Process Connection Size			
Standard			**Standard**
3(2)	1½ in.		★
5(2)	2 in.		★
7	3 in.		★
Maximum Working Pressure			
Standard			**Standard**
0	1000 PSI		★
Isolating Diaphragm Material		**Upper Housing Material**	
Standard			**Standard**
LA00	316L SST	316L SST	★
Expanded			
LB00	Alloy C-276	316L SST	

Options (Include with selected model number)

Diaphragm Surface Finish and Polishing		
Expanded		
R6	Electropolishing	
RD	10 μin. (0.25 μm) R_a Diaphragm Surface Finish	
RG	15 μin. (0.375 μm) R_a Diaphragm Surface Finish	
RH	20 μin. (0.5 μm) R_a Diaphragm Surface Finish	
Certifications		
Standard		**Standard**
Q16	Surface Finish Certification	★

Complete the 3051SAL model number by specifying options as needed:

ERS Transmitter Options, see page Pressure-53
Liquid Level Transmitter Options, see page Pressure-57

(1) Clamp and gasket furnished by user. The maximum working pressure is dependent upon the clamp pressure rating.

(2) Consult factory for calibrated spans lower than 5 psi (345 mbar).



Hygienic Tank Spud (SS) Seal

- Commonly used in hygienic level applications
- Seal diaphragm installed flush with inner tank wall
- Conforms to 3-A standard 74-03

Table 15. SS Hygienic Tank Spud Seal Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Process Connection			
Standard			**Standard**
SS[1]	Hygienic Tank Spud Seal		★
Process Connection Size			
Standard			**Standard**
A	4-in. Sch. 5 Tri-Clamp		★
Maximum Working Pressure (Clamp Rating)			
Standard			**Standard**
0	600 PSI (41 bar)		★
Upper Housing			
Standard			**Standard**
A	316L SST		★
Diaphragm and Wetted, Extension Material			
	Diaphragm and Wetted	**Extension**	
Standard			**Standard**
AL	316L SST[2]	316L SST[2]	★
Expanded			
BB	Alloy C-276	316L SST	
Extension Length			
Standard			**Standard**
2	2 in. (50 mm) Extension		★
6	6 in. (150 mm) Extension		★

Options (Include with selected model number)

Diaphragm Surface Finish and Polishing		
Expanded		
R6	Electropolishing	
RH	20 μin. (0.5 μm) R_a Diaphragm Surface Finish	
RG[3]	15 μin. (0.375 μm) R_a Diaphragm Surface Finish	
Additional Options		
Standard		**Standard**
Q16	Surface Finishing Certification	★
S1	Tank Spud Included with Shipment	★
Expanded		
SC	0.006-in. (150 μm) Diaphragm Thickness	

Complete the 3051SAL model number by specifying options as needed:

ERS Transmitter Options, see page Pressure-53
Liquid Level Transmitter Options, see page Pressure-57

(1) Clamp and Ethylene Propylene o-ring (conforms to 3-A standard 74 and USP class VI) supplied.

(2) Diaphragm brazed and TIG-welded to extension.

(3) Require Option code R6 (Electropolishing).

Specifications

PERFORMANCE SPECIFICATIONS

For zero-based spans, reference conditions, silicone oil fill, glass-filled PTFE o-rings, SST materials, Coplanar flange (3051SMV, 3051S_C) or 1/2 in.- 14 NPT (3051S_T) process connections, digital trim values set to equal range points.

Conformance to Specification (±3σ (Sigma))

Technology leadership, advanced manufacturing techniques, and statistical process control ensure measurement specification conformance to ±3σ or better.

Reference Accuracy

Stated reference accuracy equations include terminal based linearity, hysteresis, and repeatability.

For FOUNDATION fieldbus and wireless devices, use calibrated range in place of span.

Transmitter with Coplanar Sensor Module (Single Variable)

Differential Pressure (3051S_CD) Gage Pressure (3051S_CG, 3051SAM_ _G(1))			
	Ultra	**Classic**	**Ultra for Flow(2)**
Ranges 2 - 4	±0.025% of span; For spans less than 10:1, ±[0.005 + 0.0035(URL / Span)]% of span	±0.055% of span; For spans less than 10:1, ±[0.015 + 0.005(URL / Span)]% of span	±0.04% of reading up to 8:1 DP turndown from URL; ±[0.04 + 0.0023(URL / Reading)]% of reading to 200:1 DP turndown from URL
Range 5	±0.05% of span; For spans less than 10:1, ±[0.005 + 0.0045(URL / Span)]% of span	±0.065% of span; For spans less than 10:1, ±[0.015 + 0.005(URL / Span)]% of span	Not Available
Range 1	±0.09% of span; For spans less than 15:1, ±[0.015 + 0.005(URL / Span)]% of span	±0.10% of span; For spans less than 15:1, ±[0.025 + 0.005(URL / Span)]% of span	Not Available
Range 0	±0.09% of span; For spans less than 2:1, ±0.045% of URL	±0.10% of span; For spans less than 2:1, ±0.05% of URL	Not Available
Absolute Pressure (3051S_CA, 3051SAM_ _A(1))			
	Ultra	**Classic**	
Ranges 1 - 4	±0.025% of span; For spans less than 10:1, ±[0.004(URL / Span)]% of span	±0.055% of span; For spans less than 10:1, ±[0.0065(URL / Span)]% of span	
Range 0	±0.075% of span; For spans less than 5:1, ±[0.025 + 0.01(URL / Span)]% of span	±0.075% of span; For spans less than 5:1, ±[0.025 + 0.01(URL / Span)]% of span	

(1) Specifications are for each gage / absolute pressure sensor of the ERS system and are not reflective of the DP calculation.

(2) Ultra for Flow is only available for 3051S_CD ranges 2-3 and 3051SMV DP ranges 2-3. For calibrated spans from 1:1 to 2:1 of URL, add ±0.005% of span analog output error.

Transmitter with In-Line Sensor Module

Absolute Pressure (3051S_TA, 3051SAM_ _E[1]) **Gage Pressure (3051S_TG, 3051SAM_ _T[1])**		
	Ultra	**Classic**
Ranges 1 - 4	±0.025% of span For spans less than 10:1, ±[0.004(URL / Span)]% of span	±0.055% of span For spans less than 10:1, ±[0.0065(URL / Span)]% of span
Range 5	±0.04% of span	±0.065% of span

(1) Specifications are for each gage / absolute pressure sensor of the ERS system and are not reflective of the DP calculation.

Transmitter with MultiVariable Sensor Module

Differential Pressure and Static Pressure (3051SMV_ _1 or 2)		
	Classic MV	**Ultra for Flow[1]**
DP Ranges 2-3	±0.04% of span For spans less than 10:1, ±[0.01 + 0.004(URL / Span)]% of span	±0.04% of reading up to 8:1 DP turndown from URL ±[0.04 + 0.0023(URL / Reading)]% of reading to 200:1 DP turndown from URL
DP Range 1	±0.10% of span For spans less than 15:1, ±[0.025 + 0.005(URL / Span)]% of span	Not Available
AP & GP Ranges 3-4	±0.055% of span For spans less than 10:1, ±[0.0065(URL / Span)]% of span	±0.025% of span For spans less than 10:1, ±[0.004(URL / Span)]% of span

(1) Ultra for Flow is only available for 3051SMV DP ranges 2-3. For calibrated DP spans from 1:1 to 2:1 of URL, add ±0.005% of span analog output error.

Liquid Level Transmitter

3051SAL		
	Ultra	**Classic**
	±0.065% of span For spans less than 10:1, ±[0.015 + 0.005(URL / Span)]% of span	±0.065% of span For spans less than 10:1, ±[0.015 + 0.005(URL / Span)]% of span

Process Temperature RTD Interface[1]

Process Temperature (3051SMV_ _1 or 3)
±0.67 °F (0.37 °C)

(1) Specifications for process temperature are for the transmitter portion only. The transmitter is compatible with any Pt 100 (100 ohm platinum) RTD. Examples of compatible RTDs include Rosemount series 68 and 78 RTD Temperature Sensors.

DP Reference Accuracy of 3051S ERS System[1]

2 Coplanar Gage Transmitters (3051SAM_ _G)		
	Ultra	**Classic**
Ranges 2-4	±0.035% of DP span	±0.078% of DP span
Range 5	±0.071% of DP span	±0.092% of DP span
2 Coplanar Absolute Transmitters (3051SAM_ _A)		
	Ultra	**Classic**
Ranges 1-4	±0.035% of DP span	±0.078% of DP span
2 In-Line Gage Transmitters (3051SAM_ _T) **2 In-Line Absolute Transmitters (3051SAM_ _E)**		
	Ultra	**Classic**
Ranges 1-4	±0.035% of DP span	±0.078% of DP span
2 Liquid Level Transmitters (3051SAL)		
	Ultra	**Classic**
Ranges 1-4	±0.092% of DP span	±0.092% of DP span

(1) Reference Accuracy specifications for ERS system assume that the configuration contains two transmitters with identical sensor ranges, each transmitter sensor is calibrated 0 – URL, and the DP Span = 10% of transmitter URL.

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Transmitter Total Performance

Total performance is based on combined errors of reference accuracy, ambient temperature effect, and line pressure effect.

Models		Ultra	Classic and Classic MV	Ultra for Flow[1]
3051S_CD	Ranges 2-3	±0.1% of span For ±50 °F (28 °C) temperature changes; 0-100% relative humidity, up to 740 psi (51 bar) line pressure (DP only) from 1:1 to 5:1 rangedown	±0.15% of span For ±50 F (28 °C) temperature changes, 0-100% relative humidity, up to 740 psi (51 bar) line pressure (DP only) from 1:1 to 5:1 rangedown	±0.15% of reading For ±50 °F (28 °C) temperature changes, 0-100% relative humidity, up to 740 psi (51 bar) line pressure (DP only) over 8:1 DP turndown from URL
3051S_CG	Ranges 2-5			
3051S_CA	Ranges 2-4			
3051S_T	Ranges 2-4			
3051SMV[2]	DP Ranges 2-3			
3051SAM_ _G[3]	Ranges 2-5			
3051SAM_ _A[3]	Ranges 2-4			
3051SAM_ _T[3]	Ranges 2-4			
3051SAM_ _E[3]	Ranges 2-4			
3051SAL		Use *Instrument Toolkit or the QZ Option to quantify the total performance of a remote seal assembly under operating conditions.*		

(1) Ultra for Flow is only available for 3051S_CD Ranges 2-3 and 3051SMV DP Ranges 2-3.

(2) For 3051SMV, Transmitter Total Performance specification applies to differential pressure measurement only.

(3) Specifications are for each gage / absolute pressure sensor of the ERS system and are not reflective of the DP calculation.

MultiVariable Flow Performance[1]

Mass, Energy, Actual Volumetric, and Totalized Flow Reference Accuracy

Models	Ultra for Flow	Classic MV
3051SMV[2]		
DP Ranges 2-3	±0.65% of Flow Rate over a 14:1 flow range (200:1 DP range)	±0.70% of Flow Rate over 8:1 flow range (64:1 DP range)
DP Range 1	Not Available	±0.90% of Flow Rate over 8:1 flow range (64:1 DP range)
Annubar Flowmeter (3051SFA)		
Ranges 2-3	±0.80% of flow rate at 14:1 flow turndown	±1.15% of flow rate at 8:1 flow turndown
Compact Conditioning Orifice Flowmeter (3051SFC_C)		
Ranges 2-3		
$\beta = 0.4$	±0.75% of flow rate at 14:1 flow turndown	±1.10% of flow rate at 8:1 flow turndown
$\beta = 0.65$	±1.15% of flow rate at 14:1 flow turndown	±1.45% of flow rate at 8:1 flow turndown
Compact Orifice Flowmeter[3] (3051SFC_P)		
Ranges 2-3		
$\beta = 0.4$	±1.30% of flow rate at 14:1 flow turndown	±1.45% of flow rate at 8:1 flow turndown
$\beta = 0.65$	±1.30% of flow rate at 14:1 flow turndown	±1.45% of flow rate at 8:1 flow turndown
Integral Orifice Flowmeter (3051SFP)		
Ranges 2-3		
$\beta < 0.1$	±2.50% of flow rate at 14:1 flow turndown	±2.65% of flow rate at 8:1 flow turndown
$0.1 < \beta < 0.2$	±1.40% of flow rate at 14:1 flow turndown	±1.60% of flow rate at 8:1 flow turndown
$0.2 < \beta < 0.6$	±0.95% of flow rate at 14:1 flow turndown	±1.25% of flow rate at 8:1 flow turndown
$0.6 < \beta < 0.8$	±1.60% of flow rate at 14:1 flow turndown	±1.80% of flow rate at 8:1 flow turndown

(1) Flow performance specifications assume device is configured for full compensation of static pressure, process temperature, density, viscosity, gas expansion, discharge coefficient, and thermal correction variances over a specified operating range.

(2) Uncalibrated differential producer (0.2 < beta < 0.6 Orifice) installed per ASME MFC 3M or ISO 5167-1. Uncertainties for discharge coefficient, producer bore, tube diameter, and gas expansion factor as defined in ASME MFC 3M or ISO 5167-1. Reference accuracy does not include RTD sensor accuracy.

(3) For line sizes less than 2-in. (50mm) or greater than 8 in. (200 mm), see the Rosemount DP Flowmeters and Primary Elements Product Data Sheet (document number 00813-0100-4485).

Uncompensated Flow Performance

Flow performance specifications assume the device only uses DP readings without pressure and temperature compensation.

Models	Ultra	Classic	Ultra for Flow
Annubar Flowmeter (3051SFA)			
Ranges 2-3	±0.95% of flow rate at 8:1 flow turndown	±1.4% of flow rate at 8:1 flow turndown	±0.80% of flow rate at 14:1 flow turndown
Compact Conditioning Orifice Flowmeter (3051SFC_C)			
Ranges 2-3			
$\beta = 0.4$	±0.90% of flow rate at 8:1 flow turndown	±1.40% of flow rate at 8:1 flow turndown	±0.75% of flow rate at 14:1 flow turndown
$\beta = 0.65$	±1.25% of flow rate at 8:1 flow turndown	±1.65% of flow rate at 8:1 flow turndown	±1.15% of flow rate at 14:1 flow turndown
Compact Orifice Flowmeter(1) (3051SFC_P)			
Ranges 2-3			
$\beta = 0.4$	±1.35% of flow rate at 8:1 flow turndown	±1.80% of flow rate at 8:1 flow turndown	±1.30% of flow rate at 14:1 flow turndown
$\beta = 0.65$	±1.35% of flow rate at 8:1 flow turndown	±1.80% of flow rate at 8:1 flow turndown	±1.30% of flow rate at 14:1 flow turndown
Integral Orifice Flowmeter (3051SFP)			
Ranges 2-3			
$\beta < 0.1$	±2.65% of flow rate at 8:1 flow turndown	±2.70% of flow rate at 8:1 flow turndown	±2.60% of flow rate at 14:1 flow turndown
$0.1 < \beta < 0.2$	±1.45% of flow rate at 8:1 flow turndown	±1.80% of flow rate at 8:1 flow turndown	±1.40% of flow rate at 14:1 flow turndown
$0.2 < \beta < 0.6$	±1.05% of flow rate at 8:1 flow turndown	±1.50% of flow rate at 8:1 flow turndown	±0.95% of flow rate at 14:1 flow turndown
$0.6 < \beta < 0.8$	±1.70% of flow rate at 8:1 flow turndown	±2.00% of flow rate at 8:1 flow turndown	±1.60% of flow rate at 14:1 flow turndown

(1) For line sizes less than 2-in. (50mm) or greater than 8 in. (200 mm), see the Rosemount DP Flowmeters and Primary Elements Product Data Sheet (document number 00813-0100-4485).

Long Term Stability

Pressure

Models		Ultra and Ultra for Flow(1)	Classic and Classic MV
3051S_CD	Ranges 2-5	±0.20% of URL for 10 years; for ±50 °F (28 °C) temperature changes, up to 1000 psi (68,9 bar) line pressure	±0.125% of URL for 5 years; for ±50 °F (28 °C) temperature changes, up to 1000 psi (68,9 bar) line pressure
3051S_CG	Ranges 2-5		
3051S_CA	Ranges 1-4		
3051S_T	Ranges 1-5		
3051SMV **3051SF**	DP Ranges 2-5 AP & GP Ranges 3-4		
3051SAM_ _G(2)	Ranges 2-5		
3051SAM_ _A(2)	Ranges 1-4		
3051SAM_ _T(2)	Ranges 1-5		
3051SAM_ _E(2)	Ranges 1-5		

(1) Ultra is only available for 3051S, 3051SMV_ _3 and 4, 3051SF_3, 4, 7, and D. Ultra for Flow is only available on 3051S_CD ranges 2-3, 3051SMV DP ranges 2-3, and 3051SF DP ranges 2-3.

(2) Specifications are for each gage / absolute pressure sensor of the ERS system and are not reflective of the DP calculation.

Process Temperature(1)

Models		
3051SMV **3051SF**	RTD Interface	The greater of ±0.185 °F (0.103 °C) or 0.1% of reading per year (excludes RTD sensor stability).

(1) Specifications for process temperature are for the transmitter portion only. The transmitter is compatible with any Pt 100 (100 ohm platinum) RTD. Examples of compatible RTDs include the Rosemount Series 68 and 78 RTD Temperature Sensors.

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Warranty(1)

Models	Ultra and Ultra for Flow	Classic and Classic MV
All 3051S Products	12-year limited warranty(2)	1-year limited warranty(3)

(1) Warranty details can be found in Emerson Process Management Terms & Conditions of Sale, Document 63445, Rev G (10/06).

(2) Rosemount Ultra and Ultra for Flow transmitters have a limited warranty of twelve (12) years from date of shipment. All other provisions of Emerson Process Management standard limited warranty remain the same.

(3) Goods are warranted for twelve (12) months from the date of initial installation or eighteen (18) months from the date of shipment by seller, whichever period expires first.

Dynamic Performance

Total Time Response at 75 °F (24 °C), includes dead time(1)(2)

3051S_C 3051SF_D	3051S_T	3051SMV_ _1 or 2 3051SF_1, 2, 5, or 6	3051SMV_ _3 or 4 3051SF_3, 4, or 7	ERS System (3051SAM)
DP Ranges 2-5: 100 ms Range 1: 255 ms Range 0: 700 ms	100 ms	DP Range 1: 310 ms DP Range 2: 170 ms DP Range 3: 155 ms AP & GP: 240 ms	DP Ranges 2-5: 145 ms DP Range 1: 300 ms DP Range 0: 745 ms	360 ms

(1) For FOUNDATION fieldbus (output code F), add 52 ms to stated values (not including segment macro-cycle). For option code DA2, add 45 ms (nominal) to stated values.

(2) Consult Instrument Toolkit for transmitter configurations with remote seals including 3051SAL

Dead Time(1)

3051S_C 3051S_T 3051SF_D 3051SAL_C	3051SMV 3051SF_1-7	ERS System (includes 3051SAM, 3051SAL_P, and 3051SAL_S models
45 ms (nominal)	DP: 100 ms AP & GP: 140 ms RTD Interface: 1 s	220 ms

(1) For option code DA2, dead time is 90 milliseconds (nominal).

Update Rate(1)

3051S_C or T 3051SF_D 3051SAL_C	3051SMV 3051SF_1-7		ERS System (includes 3051SAM, 3051SAL_P, and 3051SAL_S models
22 updates per sec.	DP: 22 updates per sec. AP & GP: 11 updates per sec. RTD Interface: 1 update per sec.	Calculated Variables: Mass / Volumetric Flow Rate: 22 updates per sec. Energy Flow Rate: 22 updates per sec. Totalized Flow: 1 update per sec.	11 updates per sec.

(1) Does not apply to Wireless (output code X). See"IEC 62591 (WirelessHART)" on page 82 for wireless update rate.

Ambient Temperature Effect

Transmitter with Coplanar Sensor Module (Single Variable)

Differential Pressure: (3051S_CD, 3051SMV_ _3 or 4) **Gage Pressure: (3051S_CG, 3051SAM_ _G[1])**			
	Ultra **per 50 °F (28 °C)**	**Classic** **per 50 °F (28 °C)**	**Ultra for Flow[2]** **-40 to 185 °F (-40 to 85 °C)**
Ranges 2 - 5[3]	±(0.009% URL + 0.025% span) from 1:1 to 10:1; ±(0.018% URL + 0.08% span) from >10:1 to 200:1	±(0.0125% URL +0.0625% span) from 1:1 to 5:1; ±(0.025% URL + 0.125% span) from >5:1 to 100:1	±0.13% of reading up to 8:1 DP turndown from URL; ±[0.13 + 0.0187(URL/Reading)]% of reading to 100:1 DP turndown from URL
Range 0	±(0.25% URL + 0.05% span) from 1:1 to 30:1	±(0.25% URL + 0.05% span) from 1:1 to 30:1	Not Available
Range 1	±(0.1% URL + 0.25% span) from 1:1 to 50:1	±(0.1% URL + 0.25% span) from 1:1 to 50:1	Not Available
Absolute Pressure: (3051S_CA, 3051SAM_ _A[1])			
	Ultra **per 50 °F (28 °C)**	**Classic** **per 50 °F (28 °C)**	
Ranges 2-4	±(0.0125% URL + 0.0625% span) from 1:1 to 5:1; ±(0.025% URL + 0.125% span) from >5:1 to 200:1	±(0.0125% URL + 0.0625% span) from 1:1 to 5:1; ±(0.025% URL + 0.125% span) from >5:1 to 100:1	
Range 0	±(0.1% URL + 0.25% span) from 1:1 to 30:1	±(0.1% URL + 0.25% span) from 1:1 to 30:1	
Range 1	±(0.0125% URL + 0.0625% span) from 1:1 to 5:1; ±(0.025% URL + 0.125% span) from >5:1 to 100:1	±(0.0125% URL + 0.0625% span) from 1:1 to 5:1; ±(0.025% URL + 0.125% span) from >5:1 to 100:1	

(1) Specifications are for each gage / absolute pressure sensor of the ERS system and are not reflective of the DP calculation.

(2) Ultra for Flow is only available for 3051S_CD Ranges 2-3 and 3051SMV DP Ranges 2-3.

(3) Use Classic specification for 3051SMV DP Range 5 Ultra and 3051S_CD Range 5 Ultra.

Transmitter with In-Line Sensor Module

Absolute Pressure: (3051S_TA, 3051SAM_ _E[1]) **Gage Pressure: (3051S_TG, 3051SAM_ _T[1])**			
	Ultra **per 50 °F (28 °C)**	**Classic** **per 50 °F (28 °C)**	
Ranges 2-4	±(0.009% URL + 0.025% span) from 1:1 to 10:1; ±(0.018% URL + 0.08% span) from >10:1 to 100:1	±(0.0125% URL + 0.0625% span) from 1:1 to 5:1; ±(0.025% URL + 0.125% span) from >5:1 to 100:1	
Range 5	±(0.05% URL + 0.075% span) from 1:1 to 10:1	±(0.05% URL + 0.075% span) from 1:1 to 10:1	
Range 1	±(0.0125% URL + 0.0625% span) from 1:1 to 5:1; ±(0.025% URL + 0.125% span) from >5:1 to 100:1	±(0.0125% URL + 0.0625% span) from 1:1 to 5:1; ±(0.025% URL + 0.125% span) from >5:1 to 100:1	

(1) Specifications are for each gage / absolute pressure sensor of the ERS system and are not reflective of the DP calculation.

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Ambient Temperature Effect (continued)

Transmitter with MultiVariable Sensor Module

Differential Pressure and Static Pressure (3051SMV_ _1 or 2)			
Models		**Classic MV** **Per 50 °F (28 °C)**	**Ultra for Flow** **-40 to 185 °F (-40 to 85 °C)**
DP Ranges 2-3		±(0.0125% URL + 0.0625% span) from 1:1 to 5:1; ±(0.025% URL + 0.125% span) for >5:1	±0.13 reading up to 8:1 DP turndown from URL; ±[0.13 + 0.0187(URL/Reading)]% reading to 100:1 DP turndown from URL
DP Range 1		±(0.1% URL + 0.25% span) from 1:1 to 50:1	Not available
AP & GP		±(0.0125% URL + 0.0625% span) from 1:1 to 10:1; ±(0.025% URL + 0.125% span) for >10:1	±(0.009% URL + 0.025% span) from 1:1 to 10:1; ±(0.018% URL + 0.08% span) for >10:1

Liquid Level Transmitter

3051SAL			
		Ultra	**Classic**
		See *Instrument Toolkit*	See *Instrument Toolkit*

Process Temperature RTD Interface(1)

Process Temperature (3051SMV_ _1 or 3)			
		Classic MV **Per 50 °F (28 °C)**	**Ultra for Flow** **-40 to 185 °F (-40 to 85 °C)**
		±0.39 °F (0,216 °C) per 50 °F (28 °C)	±0.39 °F (0,216 °C) per 50 °F (28 °C)

(1) Specifications for process temperature are for the transmitter portion only. The transmitter is compatible with any Pt 100 (100 ohm platinum) RTD. Examples of compatible RTDs include Rosemount series 68 and 78 RTD Temperature Sensors.

Line Pressure Effect(1)

3051S_CD **3051SMV (DP Measurement Only)**	**Ultra and Ultra for Flow**	**Classic and Classic MV**
Zero Error(2)		
Range 2-3	± 0.025% URL per 1000 psi (69 bar)	± 0.05% URL per 1000 psi (69 bar)
Range 0	± 0.125% URL per 100 psi (6,9 bar)	± 0.125% URL per 100 psi (6,9 bar)
Range 1	± 0.25% URL per 1000 psi (69 bar)	± 0.25% URL per 1000 psi (69 bar)
Span Error(3)		
Range 2-3	± 0.1% of reading per 1000 psi (69 bar)	± 0.1% of reading per 1000 psi (69 bar)
Range 0	± 0.15% of reading per 100 psi (6,9 bar)	± 0.15% of reading per 100 psi (6,9 bar)
Range 1	± 0.4% of reading per 1000 psi (69 bar)	± 0.4% of reading per 1000 psi (69 bar)

(1) For zero error specifications for line pressures above 2000 psi (137,9 bar) or line pressure effect specifications for DP Ranges 4-5, see the 3051SMV Reference Manual (document number 00809-0100-4803) or 3051S Reference Manual (document number 00809-0100-4801).

(2) Zero error can be removed by performing a zero trim at line pressure.

(3) Specifications for option code P0 are 2 times those shown above.

Mounting Position Effects

Models		Ultra, Ultra for Flow, Classic and Classic MV
3051S_CD or CG **3051SMV_ _ 3 or 4** **3051SF_3, 4, 7, or D** **3051SAM_ _G**		Zero shifts up to ±1.25 inH_2O (3,11 mbar), which can be zeroed Span: no effect
3051S_CA **3051S_T** **3051SAM_ _A, T, or E**		Zero shifts to ±2.5 inH_2O (6,22 mbar), which can be zeroed Span: no effect
3051SMV_ _ 1 or 2 **3051SF_1, 2, 5, or 6**	DP Sensor:	Zero shifts up to ±1.25 inH_2O (3,11 mbar), which can be zeroed Span: no effect
	GP/AP Sensor:	Zero shifts to ±2.5 inH_2O (6,22 mbar), which can be zeroed Span: no effect
3051SAL		With liquid level diaphragm in vertical plane, zero shift of up to ±1 inH_2O (2,5 mbar). With diaphragm in vertical plane, zero shift of up to ±5 inH_2O (12,4 mbar) plus extension length on extended units. All zero shifts can be zeroed. Span: no effect

Vibration Effect

Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field or pipeline with high vibration level (10-60 Hz 0.21 mm displacement peak amplitude / 60-2000 Hz 3g).

For Housing Style codes 1J, 1K, 1L, 2J, and 2M:
Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field with general application or pipeline with low vibration level (10-60 Hz 0.15 mm displacement peak amplitude / 60-500 Hz 2g).

Power Supply Effect

Less than ±0.005% of calibrated span per volt change in voltage at the transmitter terminals

Electromagnetic Compatibility (EMC)

Meets all relevant requirements of EN 61326 and NAMUR NE-21.(1)(2)

(1) NAMUR NE-21 does not apply to wireless output code X or ERS configurations.

(2) 3051SMV and 3051SF_1, 2, 3, 4, 5, 6, 7 requires shielded cable for both temperature and loop wiring.

Transient Protection (Option T1)

Tested in accordance with IEEE C62.41.2-2002,
Location Category B

6 kV crest (0.5 μs - 100 kHz)

3 kA crest (8 × 20 microseconds)

6 kV crest (1.2 × 50 microseconds)

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FUNCTIONAL SPECIFICATIONS

Range and Sensor Limits

Transmitter with Coplanar Sensor Module (Single Variable)

Range	DP Sensor[1] (3051S_CD, 3051SMV_ _3, 4, or D 3051SF_3, 4, or 7, 3051SAL_CD)		GP Sensor (3051S_CG, 3051SAM_ _G, 3051SAL_ _G)		AP Sensor[2] (3051S_CA, 3051SAM_ _A, 3051SAL_ _A)	
	Lower (LRL)[3]	Upper (URL)	Lower (LRL)[4]	Upper (URL)	Lower (LRL)	Upper (URL)
0	-3 inH_2O (-7,5 mbar)	3 inH_2O (7,5 mbar)	N/A	N/A	0 psia (0 bar)	5 psia (0,34 bar)
1	-25 inH_2O (-62,3 mbar)	25 inH_2O (62,3 mbar)	-25 inH_2O (-62,3 mbar)	25 inH_2O (62,3 mbar)	0 psia (0 bar)	30 psia (2,07 bar)
2	-250 inH_2O (-0,62 bar)	250 inH_2O (0,62 bar)	-250 inH_2O (-0,62 bar)	250 inH_2O (0,62 bar)	0 psia (0 bar)	150 psia (10,34 bar)
3	-1000 inH_2O (-2,49 bar)	1000 inH_2O (2,49 bar)	-393 inH_2O (-979 mbar)	1000 inH_2O (2,49 bar)	0 psia (0 bar)	800 psia (55,16 bar)
4	-300 psi (-20,7 bar)	300 psi (20,7 bar)	-14.2 psig (-979 mbar)	300 psi (20,7 bar)	0 psia (0 bar)	4000 psia (275,8 bar)
5	-2000 psi (-137,9 bar)	2000 psi (137,9 bar)	-14.2 psig (-979 mbar)	2000 psi (137,9 bar)	N/A	N/A

(1) 3051SF flowmeters only available with ranges 1, 2, and 3.

(2) Range 0 is not available for 3051SAL_ _A.

(3) The Lower Range Limit (LRL) is 0 inH_20 (0 mbar) for Ultra for Flow performance class and 3051SF flowmeters.

(4) Assumes atmospheric pressure of 14.7 psig (1 bar).

Transmitter with In-Line Sensor Module

Range	GP Sensor (3051S_TG, 3051SAM_ _T, 3051SAL_ _T)		AP Sensor (3051S_TA, 3051SAM_ _E, 3051SAL_ _E)	
	Lower (LRL)[1]	Upper (URL)	Lower (LRL)	Upper (URL)
1	-14.7 psig (-1,01 bar)	30 psig (2,07 bar)	0 psia (0 bar)	30 psia (2,07 bar)
2	-14.7 psig (-1,01 bar)	150 psig (10,34 bar)	0 psia (0 bar)	150 psia (10,34 bar)
3	-14.7 psig (-1,01 bar)	800 psig (55,16 bar)	0 psia (0 bar)	800 psia (55,16 bar)
4	-14.7 psig (-1,01 bar)	4000 psig (275,8 bar)	0 psia (0 bar)	4000 psia (275,8 bar)
5	-14.7 psig (-1,01 bar)	10000 psig (689,5 bar)	0 psia (0 bar)	10000 psia (689,5 bar)

(1) Assumes atmospheric pressure of 14.7 psig (1 bar).

Transmitter with MultiVariable Sensor Module (3051SMV_ _1, 3051SMV_ _2, 3051SF_1, 3051SF_2, 3051SF_5, and 3051SF_6)

Range	DP Sensor	
	Lower (LRL)[1]	Upper (URL)
1	-25.0 inH_2O (-62,3 mbar)	25.0 inH_2O (62,3 mbar)
2	-250.0 inH_2O (-0,62 bar)	250.0 inH_2O (0,62 bar)
3	-1000.0 inH_2O (-2,49 bar)	1000.0 inH_2O (2,49 bar)

(1) Lower (LRL) is 0 inH_2O (0 mbar) for Ultra for Flow and 3051SF_ Flowmeters.

Range	Static Pressure Sensor (GP/AP)	
	Lower (LRL)	Upper (URL)[1]
3	GP[2][3]: -14.2 psig (0,98 bar) AP: 0.5 psia (34,5 mbar)	GP: 800 psig (55,16 bar) AP: 800 psia (55,16 bar)
4	GP[2][3]: -14.2 psig (0,98 bar) AP: 0.5 psia (34,5 mbar)	GP: 3626 psig (250 bar) AP: 3626 psia (250 bar)

(1) For SP Range 4 with DP Range 1, the URL is 2000 psi (137,9 bar).

(2) Inert Fill: Minimum pressure = 1.5 psia (0,10 bar) or -13.2 psig (-0,91 bar).

(3) Assumes atmospheric pressure of 14.7 psig (1 bar).

Process Temperature RTD Interface (3051SMV_ _1 or 3, 3051SF_1, 3, 5 or 7)(1)

Lower (LRL)	Upper (URL)
-328 °F (-200 °C)	1562 °F (850 °C)

(1) Transmitter is compatible with any Pt 100 RTD sensor. Examples of compatible RTDs include Rosemount Series 68 and 78 RTD Temperature Sensors.

Minimum Span Limits

Transmitter with Coplanar Sensor Module (Single Variable)

Range	DP Sensor(1) (3051S_CD, 3051SMV_ _3 or 4, 3051SF_D, 3, 4 or 7, 3051SAL_ _CD)		GP Sensor (3051S_CG, 3051SAM_ _G, 3051SAL_ _G(2))		AP Sensor (3051S_CA, 3051SAM_ _A, 3051SAL_ _A(2))	
	Ultra & Ultra for Flow	Classic	Ultra	Classic	Ultra	Classic
0	0.1 inH_2O (0,25 mbar)	0.1 inH_2O (0,25 mbar)	N/A	N/A	0.167 psia (11,5 mbar)	0.167 psia (11,5 mbar)
1	0.5 inH_2O (1,24 mbar)	0.5 inH_2O (1,24 mbar)	0.5 inH_2O (1,24 mbar)	0.5 inH_2O (1,24 mbar)	0.3 psia (20,7 mbar)	0.3 psia (20,7 mbar)
2	1.3 inH_2O (3,23 mbar)	2.5 inH_2O (6,23 mbar)	1.3 inH_2O (3,23 mbar)	2.5 inH_2O (6,23 mbar)	0.75 psia (51,7 mbar)	1.5 psia (103,4 mbar)
3	5.0 inH_2O (12,4 mbar)	10.0 inH_2O (24,9 mbar)	5.0 inH_2O (12,4 mbar)	10.0 inH_2O (24,9 mbar)	4 psia (275,8 mbar)	8 psia (0,55 bar)
4	1.5 psi (103,4 mbar)	3.0 psi (206,8 mbar)	1.5 psig (103,4 mbar)	3.0 psig (206,8 mbar)	20 psia (275,8 mbar)	40 psia (2,76 bar)
5	10.0 psi (689,5 mbar)	20.0 psi (1,38 bar)	10.0 psig (689,5 mbar)	20.0 psig (1,38 bar)	N/A	N/A

(1) 3051SF flowmeters only available with ranges 1, 2, and 3.

(2) Specifications are for each gage / absolute pressure sensor of the ERS system and are not reflective of the DP calculation.

Transmitter with In-Line Sensor Module

Range	GP Sensor (3051S_TG, 3051SAM_ _T, 3051SAL_ _T(1))		AP Sensor (3051S_TA, 3051SAM_ _E, 3051SAL_ _E(1))	
	Ultra	Classic	Ultra	Classic
1	0.3 psig (20,7 mbar)	0.3 psig (20,7 mbar)	0.3 psia (20,7 mbar)	0.3 psia (20,7 mbar)
2	0.75 psig (51,7 mbar)	1.5 psig (103,4 bar)	0.75 psia (51,7 mbar)	1.5 psia (103,4 bar)
3	4 psig (275,8 mbar)	8 psig (0,55 bar)	4 psia (275,8 mbar)	8 psia (0,55 bar)
4	20 psig (1,58 bar)	40 psig (2,76 bar)	20 psia (1,58 bar)	40 psia (2,76 bar)
5	1000 psig (68,9 bar)	2000 psig (137,9 bar)	1000 psia (68,9 bar)	2000 psia (137,9 bar)

(1) Specifications are for each gage / absolute pressure sensor of the ERS system and are not reflective of the DP calculation.

Transmitter with MultiVariable Sensor Module (3051SMV_ _1 or 2, 3051SF_1, 2, 5, or 6)

Range	DP Sensor	
	Ultra for Flow	Classic MV
1	0.5 inH_2O (1,24 mbar)	0.5 inH_2O (1,24 mbar)
2	1.3 inH_2O (3,23 mbar)	2.5 inH_2O (6,23 mbar)
3	5.0 inH_2O (12,4 mbar)	10.0 inH_2O (24,9 mbar)
Range	**Static Pressure Sensor (GP/AP)**	
	Ultra for Flow	**Classic MV**
3	4.0 psi (276 mbar)	8.0 psi (522 mbar)
4	18.13 psi (1,25 bar)	36.26 psi (2,50 bar)

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Process Temperature RTD Interface (3051SMV_ _1 or 3, 3051SF_1, 3, 5 or 7)

Minimum Span = 50 °F (28 °C)

DP Span Considerations for Electronic Remote Sensor Applications

It is recommended that the DP rangedown (Operating Pressure/DP Span) for ERS applications not exceed 100:1. Consult with your Emerson Process Management sales representative when considering a 3051S ERS System for applications beyond 100:1 rangedown.

Service

3051S, 3051SMV_P, 3051SAM, and 3051SF_5, 6, 7, or D (Direct Process Variable Output):

Liquid, gas, and vapor applications

3051SAL

Liquid level applications

3051SMV_M and 3051SF_1, 2, 3, or 4 (Mass and Energy Flow Output):

Some fluid types are only supported by certain measurement types

Fluid Compatibility with Pressure and Temperature Compensation • Available — Not available

Ordering Code		Fluid Types			
	Measurement Type	Liquids	Saturated Steam	Superheated Steam	Gas and Natural Gas
1	DP / P/ T (Full Compensation)	•	•	•	•
2	DP / P	•	•	•	•
3	DP / T	•	•	—	—
4	DP only	•	•	—	—

HART / 4–20 mA

Zero and Span Adjustment

Zero and span values can be set anywhere within the range. Span must be greater than or equal to the minimum span.

Output

Two-wire 4–20 mA is user-selectable for linear or square root output. Digital process variable superimposed on 4–20 mA signal, available to any host that conforms to the HART protocol.

Power Supply

External power supply required.

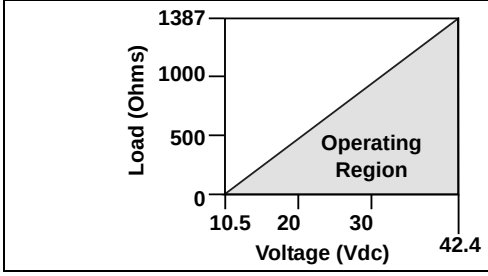
- 3051S and 3051SF_D: 10.5 to 42.4 Vdc with no load
- 3051S and 3051SF_D with Advanced HART Diagnostics Suite: 12 to 42.4 Vdc with no load
- 3051SMV and 3051SF_1-7: 12 to 42.4 Vdc with no load

Load Limitations

Maximum loop resistance is determined by the voltage level of the external power supply, as described by:

3051S and 3051SF_D

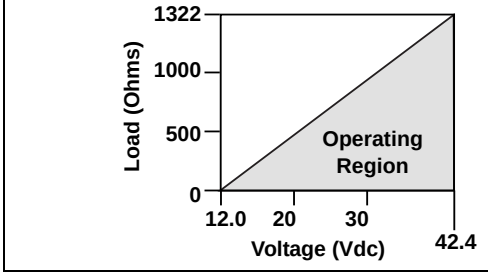
Maximum Loop Resistance = 43.5 * (Power Supply Voltage – 10.5)



The Field Communicator requires a minimum loop resistance of 250Ω for communication.

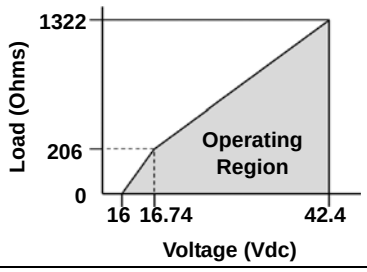
3051SMV and 3051SF_1-7
3051S and 3051SF_D with HART Diagnostics (option code DA2)

Maximum Loop Resistance = 43.5 * (Power Supply Voltage – 12.0)



The Field Communicator requires a minimum loop resistance of 250Ω for communication.

3051S ERS System
If supply voltage ≤ 16.74 Vdc: Maximum Loop Resistance = 277 * (Power Supply Voltage – 16.0) If supply voltage > 16.74 Vdc: Maximum Loop Resistance = 43.5 * (Power Supply Voltage – 12.0)



The Field Communicator requires a minimum loop resistance of 250Ω for communication.

Advanced HART Diagnostics Suite (Option Code DA2)

Statistical Process Monitoring (SPM) provides statistical data (standard deviation, mean, coefficient of variation) that can be used to detect process and process equipment anomalies, including plugged impulse lines, air entrainment, pump cavitation, furnace flame instability, distillation column flooding and more. This diagnostic allows you to take preventative measures before abnormal process situations result in unscheduled downtime or rework.

Power Advisory diagnostic proactively detects and notifies you of degraded electrical loop integrity before it can affect your process operation. Example loop problems that can be detected include water in the terminal compartment, corrosion of terminals, improper grounding, and unstable power supplies.

The Device Dashboard presents the diagnostics in a graphical, task-based interface that provides single click access to critical process/device information and descriptive graphical troubleshooting.

Suite includes: Statistical Process Monitoring (SPM), Power Advisory, Status Log, Variable Log, Advanced Process Alerts, Service Alerts, and Time Stamp capability.

FOUNDATION fieldbus

Power Supply

External power supply required; transmitters operate on 9.0 to 32.0 Vdc transmitter terminal voltage.

Current Draw

17.5 mA for all configurations (including LCD display option)

FOUNDATION fieldbus Parameters

Schedule Entries	14 (max.)
Links	30 (max.)
Virtual Communications Relationships (VCR)	20 (max.)

Standard Function Blocks

Resource Block

- Contains hardware, electronics, and diagnostic information.

Transducer Block

- Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

LCD Block

- Configures the local display.

2 Analog Input Blocks

- Processes the measurements for input into other function blocks. The output value is in engineering or custom units and contains a status indicating measurement quality.

PID Block with Auto-tune

- Contains all logic to perform PID control in the field including cascade and feedforward. Auto-tune capability allows for superior tuning for optimized control performance.

Backup Link Active Scheduler (LAS)

The transmitter can function as a Link Active Scheduler if the current link master device fails or is removed from the segment.

Software Upgrade in the Field

Software for the 3051S with FOUNDATION fieldbus is easy to upgrade in the field using the FOUNDATION fieldbus Common Device Software Download procedure.

PlantWeb Alerts

Enable the full power of the PlantWeb digital architecture by diagnosing instrumentation issues, communicating advisory, maintenance, and failure details, and recommending a solution.

Advanced Control Function Block Suite (Option Code A01)

Input Selector Block

- Selects between inputs and generates an output using specific selection strategies such as minimum, maximum, midpoint, average, or first “good.”

Arithmetic Block

- Provides pre-defined application-based equations including flow with partial density compensation, electronic remote sensors, hydrostatic tank gauging, ratio control and others.

Signal Characterizer Block

- Characterizes or approximates any function that defines an input/output relationship by configuring up to twenty X, Y coordinates. The block interpolates an output value for a given input value using the curve defined by the configured coordinates.

Integrator Block

- Compares the integrated or accumulated value from one or two variables to pre-trip and trip limits and generates discrete output signals when the limits are reached. This block is useful for calculating total flow, total mass, or volume over time.

Output Splitter Block

- Splits the output of one PID or other control block so that the PID will control two valves or other actuators.

Control Selector Block

- Selects one of up to three inputs (highest, middle, or lowest) that are normally connected to the outputs of PID or other control function blocks.

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Block	Execution Time
Resource	-
Transducer	-
LCD Block	-
Analog Input 1, 2	20 milliseconds
PID with Auto-tune	35 milliseconds
Input Selector	20 milliseconds
Arithmetic	20 milliseconds
Signal Characterizer	20 milliseconds
Integrator	20 milliseconds
Output Splitter	20 milliseconds
Control Selector	20 milliseconds

Fully Compensated Mass Flow Block (Option Code H01)

Calculates fully compensated mass flow based on differential pressure with external process pressure and temperature measurements over the fieldbus segment. Configuration for the mass flow calculation is easily accomplished using the Rosemount Engineering Assistant 5.5.1.

FOUNDATION fieldbus Diagnostics Suite (Option Code D01)

Statistical Process Monitoring (SPM) provides statistical data (standard deviation and mean) that can be used to detect process and process equipment anomalies, including plugged impulse lines, air entrainment, pump cavitation, furnace flame instability, distillation column flooding, and more. This diagnostic allows you to take preventative measures before abnormal process situations result in unscheduled downtime or rework.

The Device Dashboard presents the diagnostics in a graphical, task-based interface that provides single click access to critical process/device information and descriptive graphical troubleshooting.

Suite includes: Statistical Process Monitoring (SPM) and Plugged Impulse Line Detection (PIL).

IEC 62591 (WirelessHART)

Output

IEC 62591 (WirelessHART), 2.4 GHz DSSS

Radio Frequency Power Output from Antenna

External Antenna (WK option): Maximum of 10 mW (10 dBm) EIRP

Extended Range, External Antenna (WM option): Maximum of 18 mW (12.5 dBm) EIRP

Local Display

The optional seven-digit LCD can display user-selectable information such as primary variable in engineering units, percent of range, sensor module temperature, and electronics temperature. Display updates at the user-configured update rate.

Update Rate

IEC 62591 (WirelessHART), user selectable 4 sec. to 60 min.

Power Module

Field replaceable, keyed connection eliminates the risk of incorrect installation, Intrinsically Safe Lithium-thionyl chloride Power Module with polybutadine terephthalate (PBT) enclosure. Ten-year life at one minute update rate.(1)

(1) Reference conditions are 70 °F (21 °C), and routing data for three additional network devices.
NOTE: Continuous exposure to ambient temperature limits of -40 °F or 185 °F (-40 °C or 85 °C) may reduce specified life by less than 20 percent.

Overpressure Limits

Transmitters withstand the following limits without damage:

Coplanar Sensor Module (Single Variable)

Range	DP[1] & GP 3051S_CD, 3051S_CG 3051SMV_ _3 or 4 3051SF_3, 4, 7, or D 3051SAM_ _G	AP 3051S_CA 3051SAM_ _A
0	750 psi (51,7 bar)	60 psia (4,13 bar)
1	2000 psi (137,9 bar)	750 psia (51,7 bar)
2	3626 psi (250,0 bar)	1500 psia (103,4 bar)
3	3626 psi (250,0 bar)	1600 psia (110,3 bar)
4	3626 psi (250,0 bar)	6000 psia (413,7 bar)
5	3626 psi (250,0 bar)	N/A

(1) The overpressure limit of a DP Sensor with the P9 option is 4500 psig (310,3 bar). The overpressure limit of a DP Sensor with the P0 option is 6092 psig (420 bar).

In-Line Sensor Module

Range	GP 3051S_TG 3051SAM_ _T	AP 3051S_TA 3051SAM_ _E
1	750 psi (51,7 bar)	
2	1500 psi (103,4 bar)	
3	1600 psi (110,3 bar)	
4	6000 psi (413,7 bar)	
5	15000 psi (1034,2 bar)	

Coplanar MultiVariable Sensor Module (3051SMV_ _1 or 2, 3051SF_1, 2, 5, or 6)

Static Pressure	Differential Pressure		
	Range 1	Range 2	Range 3
Range 3 GP/AP	1600 psi (110,3 bar)	1600 psi (110,3 bar)	1600 psi (110,3 bar)
Range 4 GP/AP	2000 psi (137,9 bar)	3626 psi (250 bar)	3626 psi (250 bar)

Liquid Level Transmitter (3051SAL)

Overpressure limit is dependent on the flange rating or sensor rating (whichever is lower). Use *Instrument Toolkit* to ensure the seal system meets all pressure and temperature limits.

Static Pressure Limits

Coplanar Sensor Module (Single Variable)

Operates within specifications between static line pressures of:

Range	DP Sensor[1] 3051S_CD 3051SMV_ _3 or 4 3051SF_3, 4, 7, or D
0	0.5 psia to 750 psig (0,03 to 51,71 bar)
1	0.5 psia to 2000 psig (0,03 to 137,9 bar)
2	0.5 psia to 3626 psig (0,03 to 250 bar)
3	0.5 psia to 3626 psig (0,03 to 250 bar)
4	0.5 psia to 3626 psig (0,03 to 250 bar)
5	0.5 psia to 3626 psig (0,03 to 250 bar)

(1) The static pressure limit of a DP Sensor with the P9 option is 4500 psig (310,3 bar). The static pressure limit of a DP Sensor with the P0 option is 6092 psig (420 bar).

Coplanar MultiVariable Sensor Module (3051SMV_ _1 or 2, 3051SF_1, 2, 5, or 6)

Operates within specifications between static line pressures of 0.5 psia (0,03 bar) and the values in the table below:

Static Pressure	Differential Pressure		
	Range 1	Range 2	Range 3
Range 3 GP/AP	800 psi (57,91 bar)	800 psi (57,91 bar)	800 psi (57,91 bar)
Range 4 GP/AP	2000 psi (137,9 bar)	3626 psi (250 bar)	3626 psi (250 bar)

Burst Pressure Limits

Coplanar Sensor Module (3051S_C, 3051SMV, 3051SF, 3051SAM_ _G or A)

10000 psig (689,5 bar)

In-Line Sensor Module (3051S_T, 3051SAM_ _T or E)

- Ranges 1-4: 11000 psi (758,4 bar)
- Range 5: 26000 psi (1792,64 bar)

Temperature Limits

Ambient

-40 to 185 °F (-40 to 85 °C)
With LCD display[1]: -40 to 175 °F (-40 to 80 °C)
With option code P0: -20 to 185 °F (-29 to 85 °C)

(1) LCD display may not be readable and LCD updates will be slower at temperatures below -4 °F (-20 °C).

Storage

-50 to 185 °F (-46 to 85 °C)
With LCD display: -40 to 185 °F (-40 to 85 °C)
With Wireless Output: -40 to 185 °F (-40 to 85 °C)

Rosemount 3051S Series

Process Temperature Limits

At atmospheric pressures and above:

Coplanar Sensor Module 3051S_C, 3051SMV, 3051SF, 3051SAM_ _G or A	
Silicone Fill Sensor(1)(2)	
with Coplanar Flange	-40 to 250 °F (-40 to 121 °C)(3)
with Traditional Flange	-40 to 300 °F (-40 to 149 °C)(3)(4)
with Level Flange	-40 to 300 °F (-40 to 149 °C)(3)
with 305 Integral Manifold	-40 to 300 °F (-40 to 149 °C)(3)(4)
Inert Fill Sensor(1)(5)	-40 to 185 °F (-40 to 85 °C)(6)(7)
In-Line Sensor Module 3051S_T, 3051SAM_ _T or E	
Silicone Fill Sensor(1)	-40 to 250 °F (-40 to 121 °C)(3)
Inert Fill Sensor(1)	-22 to 250 °F (-30 to 121 °C)(3)
3051SAL Level Transmitter	
Syltherm® XLT	-102 to 293 °F (-75 to 145 °C)
Silicone 704(8)	32 to 401 °F (0 to 205 °C)
Silicone 200	-49 to 401 °F (-45 to 205 °C)
Inert (Halocarbon)	-49 to 320 °F (-45 to 160 °C)
Glycerin and Water	5 to 203 °F (-15 to 95 °C)
Neobee M-20®(9)	5 to 401 °F (-15 to 205 °C)
Propylene Glycol and Water	5 to 203 °F (-15 to 95 °C)

(1) Process temperatures above 185 °F (85 °C) require derating the ambient limits by a 1.5:1 ratio. For example, for process temperature of 195 °F (91 °C), new ambient temperature limit is equal to 170 °F (77 °C). This can be determined as follows: (195 °F - 185 °F) x 1.5 = 15 °F, 185 °F - 15 °F = 170 °F

(2) 212 °F (100 °C) is the upper process temperature limit for DP Range 0.

(3) 220 °F (104 °C) limit in vacuum service; 130 °F (54 °C) for pressures below 0.5 psia.

(4) -20 °F (-29 °C) is the lower process temperature limit with option code P0.

(5) 32 °F (0 °C) is the lower process temperature limit for DP Range 0.

(6) For 3051S_C, 160 ° F (71 °C) limit in vacuum service. For 3051SMV_ _ 1, 2, 140 ° F (60 °C) limit in vacuum service.

(7) Not available for 3051S_CA.

(8) Upper temperature limit is 464 °F (240 °C) for a 2-in. direct-mount extension, 500 °F (260 °C) for a 4-in. direct-mount extension, and 599 °F (315 °C) for an In-Line Thermal Optimizer direct-mount connection.

(9) Upper temperature limit is 437 °F (225 °C) for a 2-in. direct-mount extension or greater.

Humidity Limits

0–100% relative humidity

Turn-On Time(1)

When power is applied to the transmitter during startup, performance will be within specifications per the time period described below:

Transmitter	Turn-On Time (Typical)
3051S, 3051SF_D, 3051SAL_ _C	2 seconds
Diagnostics	5 seconds
3051SMV, 3051SF_1-7	5 seconds
3051S ERS System	6 seconds

(1) Does not apply to wireless option code X.

Volumetric Displacement

Less than 0.005 in^3 (0,08 cm^3)

Damping(1)

Analog output response time to a step change is user-selectable from 0 to 60 seconds for one time constant. For 3051SMV, 3051SF_1-7, each variable can be individually adjusted. Software damping is in addition to sensor module response time.

(1) Does not apply to wireless option code X.

Failure Mode Alarm

HART 4-20 mA (output option code A)

If self-diagnostics detect a gross transmitter failure, the analog signal will be driven offscale to alert the user. Rosemount standard (default), NAMUR, and custom alarm levels are available (see Alarm Configuration below).

High or low alarm signal is software-selectable or hardware-selectable via the optional switch (option D1).

Alarm Configuration

	High Alarm	Low Alarm
Default	≥ 21.75 mA	≤ 3.75 mA
NAMUR compliant(1)	≥ 22.5 mA	≤ 3.6 mA
Custom levels(2) (3)	20.2 - 23.0 mA	3.4 - 3.8 mA

(1) Analog output levels are compliant with NAMUR recommendation NE 43, see option codes C4 or C5.

(2) Low alarm must be 0.1 mA less than low saturation and high alarm must be 0.1 mA greater than high saturation.

(3) For 3051SMV and option code DA2, low alarm custom values are 3.6 - 3.8 mA.

Safety-Certified Transmitter Failure Values(1)

Safety accuracy: 2.0%(2)
Safety response time: 1.5 seconds

(1) Does not apply to wireless option code X.

(2) A 2% variation of the transmitter mA output is allowed before a safety trip. Trip values in the DCS or safety logic solver should be derated by 2%.

PHYSICAL SPECIFICATIONS

Electrical Connections

1/2–14 NPT, G1/2, and M20 × 1.5 conduit. HART interface connections fixed to terminal block for Output code A and X.

Process Connections

Coplanar Sensor Module (3051S_C, 3051SMV, 3051SF, 3051SAM_ _G or A)	
Standard	1/4-18 NPT on 2 1/8-in. centers
Flange Adapters	1/2-14 NPT and RC 1/2 on 2-in. (50.8 mm), 2 1/8-in. (54.0 mm), or 2 1/4-in. (57.2 mm) centers
In-Line Sensor Module (3051S_T, 3051SAM_ _T or E)	
Standard	1/2-14 NPT Female
F11 Code	Non-threaded instrument flange (available in SST for sensor ranges 1-4 only)
G11 Code	G 1/2 A DIN 16288 Male (available in SST for sensor ranges 1-4 only)
H11 Code	Autoclave type F-250C (Pressure relieved 9/16-18 gland thread; 1/4 OD high pressure tube 60° cone; available in SST for sensor range 5 only)
Level Transmitter (3051SAL)	
FF Seal	2-in. (DN 50), 3-in. (DN 80), or 4-in. (DN 100); ANSI Class 150, 300, or 600 flange; JIS 10K, 20K, or 40K flange; PN 10/16 or PN 40 flange
EF Seal	
RF Seal	1-in. (DN 25) or 1.5-in. (DN 40); ANSI Class 150, 300, or 600 flange; JIS 10K, 20K, or 40K flange; PN 40 flange
RT Seal	1/4-18, 1/2-14, 3/4-14, or 1-11.5 NPT Female
SC Seal	1.5-in, 2-in, or 3-in. Hygienic Tri-Clover Style Tri-Clamp
SS Seal	4-in. Hygienic Tank Spud

Process-Wetted Parts

Process Isolating Diaphragms

Coplanar Sensor Module (3051S_C, 3051SMV)	
316L SST (UNS S31603), Alloy C-276 (UNS N10276), Alloy 400 (UNS N04400), Tantalum (UNS R05440), Gold-Plated Alloy 400, Gold-plated 316L SST	
B11 Code	Low side process connection is SST
In-Line Sensor Module (3051S_T)	
316L SST (UNS S31603), Alloy C-276 (UNS N10276)	
Level Transmitter (3051SAL)	
FF Seal	316L SST, Alloy C-276, Tantalum
EF Seal	
RF Seal	
RT Seal	
SC Seal	316L SST, Alloy C-276
SS Seal	

Drain/Vent Valves

316 SST, Alloy C-276, or Alloy 400/K-500(1) material
(Drain vent seat: Alloy 400, Drain vent stem: Alloy K-500)

(1) Alloy 400/K-500 is not available with 3051SAL.

Process Flanges and Flange Adapters

Plated carbon steel
SST: CF-8M (Cast 316 SST) per ASTM A743
Cast C-276: CW-12MW per ASTM A494
Cast Alloy 400: M-30C per ASTM A494

Wetted O-rings

Glass-filled PTFE
(Graphite-filled PTFE with Isolating Diaphragm code 6)

3051SAL Mounting Flange

Zinc-cobalt plated CS or 316 SST

3051SAL Seal Extension

CF-3M (Cast 316L SST, material per ASTM A743) or
CW-12MW (Cast C-276, material per ASTM A494)

Non-Wetted Parts

Electronics Housing

Low-copper aluminum alloy or CF-8M (Cast 316 SST)
NEMA 4X, IP 66, IP 68 (66 ft (20 m) for 168 hours)
Note: IP 68 not available with Wireless Output.

Coplanar Sensor Module Housing

SST: CF-3M (Cast 316L SST)

Bolts

Plated carbon steel per ASTM A449, Type 1
Austenitic 316 SST per ASTM F593
ASTM A453, Class D, Grade 660 SST
ASTM A193, Grade B7M alloy steel
ASTM A193, Class 2, Grade B8M SST
Alloy K-500

Sensor Module Fill Fluid

Silicone or inert halocarbon (Inert is not available with 3051S_CA). In-Line series uses Fluorinert® FC-43.

Seal Fill Fluid (Liquid Level Only)

3051SAL: Syltherm XLT, Silicone 704, Silicone 200, inert, glycerin and water, Neobee M-20, propylene glycol and water.

Paint for Aluminum Housing

Polyurethane

Cover O-rings

Buna-N

Wireless Antenna

PBT/ polycarbonate (PC) integrated omnidirectional antenna

Power Module

Field replaceable, keyed connection eliminates the risk of incorrect installation, Intrinsically Safe Lithium-thionyl chloride Power Module with PBT enclosure

Rosemount 3051S Series

Product Data Sheet
00813-0100-4801, Rev PA
Catalog 2011 - 2012

Shipping Weights

Sensor Module Weights

Coplanar Sensor Module[1]
3.1 lb (1,4 kg)
In-Line Sensor Module
1.4 lb (0,6 kg)

(1) Flange and bolts not included.

Transmitter Weights[1]

Transmitter with Coplanar Sensor Module (3051S_C, 3051SMV, 3051SAM_ _G or A)	
Junction Box Housing, SST Flange	6.3 lb (2,8 kg)
PlantWeb Housing, SST Flange	6.7 lb (3,1 kg)
Wireless PlantWeb Housing, SST Flange	7.3 lb (3,3 kg)
Transmitter with In-Line Sensor Module (3051S_T, 3051SAM_ _T or E)	
Junction Box Housing	3.2 lb (1,4 kg)
PlantWeb Housing	3.7 lb (1,7 kg)
Wireless PlantWeb Housing	4.2 lb (1,9 kg)

(1) Fully functional transmitter with sensor module, housing, terminal block, and covers. Does not include LCD display.

Transmitter Option Weights

Option Code	Option	Add lb (kg)
1J, 1K, 1L	SST PlantWeb Housing	3.5 (1,6)
2J	SST Junction Box Housing	3.4 (1,5)
7J	SST Quick Connect	0.4 (0,2)
2A, 2B, 2C	Aluminum Junction Box Housing	1.1 (0,5)
1A, 1B, 1C	Aluminum PlantWeb Housing	1.1 (0,5)
M5	LCD Display for Aluminum PlantWeb Housing[1], LCD Display for SST PlantWeb Housing[1]	0.8 (0,4) 1.6 (0,7)
B4	SST Mounting Bracket for Coplanar Flange	1.2 (0,5)
B1, B2, B3	Mounting Bracket for Traditional Flange	1.7 (0,8)
B7, B8, B9	Mounting Bracket for Traditional Flange with SST Bolts	1.7 (0,8)
BA, BC	SST Bracket for Traditional Flange	1.6 (0,7)
B4	SST Mounting Bracket for In-Line	1.3 (0,6)
F12, F22	SST Traditional Flange with SST Drain Vents[2]	3.2 (1,5)
F13, F23	Cast C-276 Traditional Flange with Alloy C-276 Drain Vents[2]	3.6 (1,6)
E12, E22	SST Coplanar Flange with SST Drain Vents[2]	1.9 (0,9)
F14, F24	Cast Alloy 400 Traditional Flange with Alloy 400/K-500 Drain Vents[2]	3.6 (1,6)
F15, F25	SST Traditional Flange with Alloy C-276 Drain Vents[2]	3.2 (1,5)
G21	Level Flange—3 in., 150	12.6 (5,7)
G22	Level Flange—3 in., 300	15.9 (7,2)
G11	Level Flange—2 in., 150	6.8 (3,1)
G12	Level Flange—2 in., 300	8.2 (3,7)
G31	DIN Level Flange, SST, DN 50, PN 40	7.8 (3,5)
G41	DIN Level Flange, SST, DN 80, PN 40	13.0 (5,9)

(1) Includes LCD display and display cover.

(2) Includes mounting bolts.

Item	Weight in lb. (kg)
Aluminum Standard Cover	0.4 (0,2)
SST Standard Cover	1.3 (0,6)
Aluminum Display Cover	0.7 (0,3)
SST Display Cover	1.5 (0,7)
Wireless Extended Cover	0.7 (0,3)
LCD Display(1)	0.1 (0,04)
Junction Box Terminal Block	0.2 (0,1)
PlantWeb Terminal Block	0.2 (0,1)
Power Module	0.5 (0,2)

(1) Display only.

3051SAL Weights Without SuperModule Platform, Housing, or Transmitter Options

Flange	Flush lb. (kg)	2-in. Ext. lb (kg)	4-in. Ext. lb (kg)	6-in. Ext. lb (kg)
2-in., 150	9.5 (4,3)	—	—	—
3-in., 150	15.7 (7,1)	16.4 (7,4)	17.6 (8,0)	18.9 (8,6)
4-in., 150	21.2 (9,6)	20.9 (9,5)	22.1 (10,0)	23.4 (10,6)
2-in., 300	11.3 (5,1)	—	—	—
3-in., 300	19.6 (8,9)	20.3 (9,2)	21.5 (9,8)	22.8 (10,3)
4-in., 300	30.4 (13.8)	30.3 (13,7)	31.5 (14,3)	32.8 (14,9)
2-in., 600	12.8 (5,8)	—	—	—
3-in., 600	22.1 (10,0)	22.8 (10,3)	24.0 (10,9)	25.3 (11,5)
DN 50 / PN 40	11.3 (5,1)	—	—	—
DN 80 / PN 40	16.0 (7,3)	16.7 (7,6)	17.9 (8,1)	19.2 (8,7)
DN 100 / PN 10/16	11.2 (5,1)	11.9 (5,4)	13.1 (5,9)	14.4 (6,5)
DN 100 / PN 40	12.6 (5,7)	13.3 (6,0)	14.5 (6,6)	15.8 (7,1)

Rosemount 3051S Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA
Emerson Process Management GmbH & Co. — Wessling, Germany
Emerson Process Management Asia Pacific Private Limited — Singapore
Beijing Rosemount Far East Instrument Co., LTD — Beijing, China
Emerson Process Management LTDA — Sorocaba, Brazil
Emerson Process Management (India) Pvt. Ltd. — Mumbai, India
Emerson Process Management, Emerson FZE — Dubai, United Arab Emirates

Ordinary Location Certification for FM

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

Models 3051S_CA4; 3051S_CD2, 3, 4, 5; (also with P9 option)

Pressure Transmitters — QS Certificate of Assessment - EC No. 59552-2009-CE-HOU-DNV, Module H Conformity Assessment

All other Model 3051S Pressure Transmitters — Sound Engineering Practice

Transmitter Attachments: Diaphragm Seal - Process Flange - Manifold — Sound Engineering Practice

Primary Elements, Flowmeter — See appropriate Primary Element QIG

Electro Magnetic Compatibility (EMC) (2004/108/EC)

EN 61326-1:2006
EN 61326-2-3:2006

HART & FOUNDATION Fieldbus Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion-proof for Class I, Division 1, Groups B, C, and D, T5 (T_a = 85 °C); Dust Ignition-proof for Class II and Class III, Division 1, Groups E, F, and G, T5 (T_a = 85 °C); hazardous locations; enclosure Type 4X, conduit seal not required when installed according to Rosemount drawing 03151-1003.

I5/IE Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D, T4 (T_a = 70 °C for output options A or X; T_a = 60 °C for output option F); Class II, Division 1, Groups E, F, and G; Class III, Division 1; Class I, Zone 0 AEx ia IIC T4 (T_a = 70 °C for output options A or X; T_a = 60 °C for output option F) when connected in accordance with Rosemount drawing 03151-1006; Non-Incendive for Class I, Division 2, Groups A, B, C, and D; T4 (T_a = 70 °C for output options A or X; T_a = 60 °C for output option F) Enclosure Type 4X
For entity parameters see control drawing 03151-1006.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

E6 Explosion-proof for Class I, Division 1, Groups B, C, and D; Dust Ignition-proof for Class II and Class III, Division 1, Groups E, F, and G; suitable for Class I, Division 2, Groups A, B, C, and D, when installed per Rosemount drawing 03151-1013, CSA Enclosure Type 4X; conduit seal not required; Dual Seal.

I6/IF Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount drawings 03151-1016; Dual Seal.
For entity parameters see control drawing 03151-1016.

European Certifications

I1/IA ATEX Intrinsic Safety
Certificate No.: BAS01ATEX1303X ⟨Ex⟩ II 1G
Ex ia IIC T4 (T_a = -60 °C to 70 °C) -HART/Remote Display/Quick Connect/HART Diagnostics
Ex ia IIC T4 (T_a = -60 °C to 70 °C) -FOUNDATION fieldbus
Ex ia IIC T4 (T_a = -60 °C to 40 °C) -FISCO
CE 1180

Input Parameters

Loop / Power	Groups
U_i = 30 V	HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics
U_i = 17.5 V	FISCO
I_i = 300 mA	HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics
I_i = 380 mA	FISCO
P_i = 1.0 W	HART / Remote Display / Quick Connect / HART Diagnostics
P_i = 1.3 W	FOUNDATION fieldbus
P_i = 5.32 W	FISCO
C_i = 30 nF	SuperModule Platform
C_i = 11.4 nF	HART / HART Diagnostics / Quick Connect
C_i = 0	FOUNDATION fieldbus / Remote Display / FISCO
L_i = 0	HART / FOUNDATION fieldbus/ FISCO / Quick Connect / HART Diagnostics
L_i = 60 µH	Remote Display
RTD Assembly (3051SFx Option T or R)	
U_i = 5 Vdc	
I_i = 500 mA	
P_i = 0.63 W	

Special conditions for safe use (x)

1. The apparatus, excluding the Types 3051 S-T and 3051 S-C (In-line and Coplanar SuperModule Platforms respectively), is not capable of withstanding the 500V test as defined in Clause 6.4.12 of EN 60079-11. This must be considered during installation.
2. The terminal pins of the Types 3051 S-T and 3051 S-C must be protected to IP20 minimum.

N1 ATEX Type n
Certificate No.: BAS01ATEX3304X ⟨Ex⟩ II 3 G
Ex nL IIC T4 (T_a = -40 °C TO 70 °C)
Ui = 45 Vdc max
Ci = 11.4 nF (Transmitter Output Option A)
Ci = 0 (Transmitter Output Option F)
Li = 0
For remote display, Ci = 0, Li = 60 µH
IP66
CE

Special conditions for safe use (x)

The apparatus is not capable of withstanding the 500V insulation test required by Clause 6.8.1 of EN 60079-15. This must be taken into account when installing the apparatus.

NOTE
RTD Assembly is not included with the 3051SFx Type n Approval.

ND ATEX Dust
Certificate No.: BAS01ATEX1374X ⟨Ex⟩ II 1 D
Ex tD A20 IP66 T105°C (-20 °C ≤ T_{amb} ≤ 85 °C)
V_{max} = 42.4 volts max
IP66
CE 1180

Special conditions for safe use (x)

1. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
2. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
3. Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact test.
4. The 3051S SuperModule must be securely screwed in place to maintain the ingress protection of the enclosure. (The 3051S SuperModule must be properly assembled to the 3051S housing to maintain ingress protection.)

E1 ATEX Flameproof
Certificate No.: KEMA00ATEX2143X ⟨Ex⟩ II 1/2 G
Ex d IIC T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
Ex d IIC T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
V_{max} = 42.4V
CE 1180

Special conditions for safe use (x)

1. The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
2. The 3051S SuperModule contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

Rosemount 3051S Series

Japanese Certifications

E4 TIIS Flameproof
Ex d IIC T6

Certificate	Description
TC15682	Coplanar with Junction Box Housing
TC15683	Coplanar with PlantWeb Housing
TC15684	Coplanar with PlantWeb Housing and LCD Display
TC15685	In-Line SST with Junction Box Housing
TC15686	In-Line Alloy C-276 with Junction Box Housing
TC15687	In-Line SST with PlantWeb Housing
TC15688	In-Line Alloy C-276 with PlantWeb Housing
TC15689	In-Line SST with PlantWeb Housing and LCD Display
TC15690	In-Line Alloy C-276 with PlantWeb Housing and LCD Display
TC17102	Remote Display
TC17099	3051SFA/C/P SST/Alloy C-276 with PlantWeb Housing and LCD Display
TC17100	3051SFA/C/P SST/Alloy C-276 with PlantWeb Housing and Remote Display
TC17101	3051SFA/C/P SST/Alloy C-276 with Junction Box Housing

China Certifications

E3 China Flameproof, Dust Ignition-proof
NEPSI Certificate No. (manufactured in Chanhassen, MN): GYJ091035
Certificate No. (manufactured in Beijing, China): GYJ06366
Certificate No. (manufactured in Singapore): GYJ06364
Certificate No. (3051SFx RTC, BMMC, SMMC): GYJ071086
Ex d IIB+H_2 T3~T5
DIP A21 T_A T3~T5 IP66

NOTE
Refer to Appendix B of the 3051S Reference Manual (document number 00809-0100-4801) for Special Conditions for Safe Use.

I3 China Intrinsic Safety, Dust Ignition-proof
NEPSI Certificate No. (manufactured in Chanhassen, MN): GYJ081078
Certificate No. (manufactured in Beijing, China): GYJ06367
Certificate No. (manufactured in Singapore): GYJ06365
Certificate No. (3051SFx RTC, BMMC, SMMC): GYJ071293
Ex ia IIC T4
DIP A21 T_A T4 IP66

NOTE
Refer to Appendix B of the 3051S Reference Manual (document number 00809-0100-4801) for Special Conditions for Safe Use.

Input Parameters

Loop / Power	Groups
U_i = 30 V	HART / FOUNDATION fieldbus / Remote Display / Quick Connect / HART Diagnostics
I_i = 300 mA	HART / FOUNDATION fieldbus / Remote Display / Quick Connect / HART Diagnostics
P_i = 1.0 W	HART / Remote Display / Quick Connect / HART Diagnostics
P_i = 1.3 W	FOUNDATION fieldbus
C_i = 38 nF	SuperModule Platform
C_i = 11.4 nF	HART / HART Diagnostics / Quick Connect
C_i = 0	FOUNDATION fieldbus / Remote Display
L_i = 0	SuperModule Platform / FOUNDATION fieldbus
L_i = 2.4 µH	HART / Quick Connect / HART Diagnostics
L_i = 58.2 µH	Remote Display
RTD Assembly (3051SFx Option T or R)	
U_i = 5 Vdc	
I_i = 500 mA	
P_i = 0.63 W	

N3 China Type n - Energy Limited
NEPSI Certificate No.: GYJ101112X
Ex nL IIC T5 (-40 °C ≤ Ta ≤ 70 °C)
IP66

Loop / Power	Transmitter Output
U_i = 30 V	HART / FOUNDATION fieldbus
I_i = 300 mA	HART / FOUNDATION fieldbus
P_i = 1.0 W	HART
P_i = 1.3 W	FOUNDATION fieldbus
C_i = 11.4 nF	HART
C_i = 0 nF	FOUNDATION fieldbus
L_i = 0 µH	HART(1) / FOUNDATION fieldbus

(1) For remote meter option (M7, M8, M9), L_i = 60 µH.

NOTE
Refer to Appendix B of the 3051S Reference Manual (document number 00809-0100-4801) for Special Conditions for Safe Use.

Brazil Certifications

I2 INMETRO Intrinsic Safety

Certificate number: CEPEL-EX-0722/05X
(manufacturing in Chanhassen, MN and Singapore)
Certificate number: CEPEL-EX-1414/07X
(manufacturing in Brazil)
INMETRO Marking: BR-Ex ia IIC T4 IP66W

Special conditions for safe use (x)

The apparatus, excluding the Types 3051S-T and 3051S-C (In-line and Coplanar SuperModule Platforms respectively), is not capable of withstanding the 500V test as defined in Clause 6.4.12 of IEC60079-11. This must be considered during installation.

E2 INMETRO Flameproof
Certificate number: CEPEL-EX-140/2003X
(manufacturing in Chanhassen, MN and Singapore)
Certificate number: CEPEL-EX-1413/07X
(manufacturing in Brazil)
INMETRO Marking: BR-Ex d IIC T5/T6 IP66W

Special conditions for safe use (x)

1. This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
2. For ambient temperature above 60 ºC, cable wiring must have minimum isolation temperature of 90 ºC, to be in accordance to equipment operation temperature.
3. The accessory of cable entries or conduit must be certified as flameproof and needs to be suitable for use conditions.
4. Where electrical entry is via conduit, the required sealing device must be assembled immediately close to enclosure.

IECEx Certifications

E7 IECEx Flameproof and Dust (each listed separately)

IECEx Flameproof
Certificate No.: IECExKEM08.0010X
Ex d IIC T5 or T6 Ga/Gb
T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
V_{max} = 42.4V

Special conditions for safe use (x)

1. The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
2. The 3051S SuperModule contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

IECEx Dust
Certificate No. IECExBAS09.0014X
Ex tD A20 IP66 T105 °C (-20 °C ≤ T_a ≤ 85 °C)
Vmax = 42.4 V
A = 22 mA
IP66

Special conditions for safe use (x)

1. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
2. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
3. Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact test.
4. The 3051S SuperModule must be securely screwed in place to maintain the ingress protection of the enclosure. (The 3051S SuperModule must be properly assembled to the 3051S housing to maintain ingress protection.)

Rosemount 3051S Series

I7/IG IECEx Intrinsic Safety
Certificate No.: IECExBAS04.0017X
Ex ia IIC T4 (T_a = -60 °C to 70 °C) -HART/Remote Display/Quick Connect/HART Diagnostics
Ex ia IIC T4 (T_a = -60 °C to 70 °C) -FOUNDATION fieldbus
Ex ia IIC T4 (T_a = -60 °C to 40 °C) -FISCO
IP66

Input Parameters

Loop / Power	Groups
U_i = 30 V	HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics
U_i = 17.5 V	FISCO
I_i = 300 mA	HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics
I_i = 380 mA	FISCO
P_i = 1.0 W	HART / Remote Display / Quick Connect / HART Diagnostics
P_i = 1.3 W	FOUNDATION fieldbus
P_i = 5.32 W	FISCO
C_i = 30 nF	SuperModule Platform
C_i = 11.4 nF	HART / HART Diagnostics / Quick Connect
C_i = 0	FOUNDATION fieldbus / Remote Display / FISCO
L_i = 0	HART / FOUNDATION fieldbus/ FISCO / Quick Connect / HART Diagnostics
L_i = 60 µH	Remote Display
RTD Assembly (3051SFx Option T or R)	
U_i = 5 Vdc	
I_i = 500 mA	
P_i = 0.63 W	

Special conditions for safe use (x)

1. The 3051S HART 4-20 mA, 3051S FOUNDATION fieldbus, and 3051S FISCO are not capable of withstanding the 500V test as defined in clause 6.4.12 of IEC 60079-11. This must be taken into account during installation.
2. The terminal pins of the Types 3051S-T and 3051S-C must be protected to IP20 minimum.

N7 IECEx Type n
Certificate No.: IECExBAS04.0018X
Ex nC IIC T4 (-40 °C ≤ T_a ≤ +70 °C)
IP66
Special conditions for safe use (x)
The apparatus is not capable of withstanding the 500 V insulation test required by Clause 8 of IEC 60079-15:1987.

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K1 Combination of E1, I1, N1, and ND
K2 Combination of E2 and I2
K5 Combination of E5 and I5
K6 Combination of E6 and I6
K7 Combination of E7, I7, and N7
KA Combination of E1, I1, E6, and I6
KB Combination of E5, I5, I6, and E6
KC Combination of E5, E1, I5, and I1
KD Combination of E5, I5, E6, I6, E1, and I1

Rosemount 3051S Wireless Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA
Emerson Process Management GmbH & Co. — Wessling, Germany
Emerson Process Management Asia Pacific Private Limited — Singapore
Beijing Rosemount Far East Instrument Co., LTD — Beijing, China
Emerson Process Management LTDA — Sorocaba, Brazil
Emerson Process Management (India) Pvt. Ltd. — Mumbai, India

Telecommunication Compliance

All wireless devices require certification to ensure that they adhere to regulations regarding the use of the RF spectrum. Nearly every country requires this type of product certification. Emerson is working with governmental agencies around the world to supply fully compliant products and remove the risk of violating country directives or laws governing wireless device usage.

FCC and IC Approvals

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: This device may not cause harmful interference and must accept any interference received, including interference that may cause undesired operation.

This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.

Ordinary Location Certification for FM

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

Models 3051S_CA4; 3051S_CD2, 3, 4, 5; *(also with P9 option)*
Pressure Transmitters — QS Certificate of Assessment - EC No. 59552-2009-CE-HOU-DNV, Module H Conformity Assessment

All other Model 3051S Pressure Transmitters — Sound Engineering Practice

Transmitter Attachments: Diaphragm Seal - Process Flange - Manifold — Sound Engineering Practice

Primary Elements, Flowmeter — See appropriate Primary Element QIG

Electro Magnetic Compatibility (EMC) (2004/108/EC)

EN 61326-1:2006
EN 61326-2-3:2006

Radio and Telecommunications Terminal Equipment Directive (R&TTE)(1999/5/EC)

Emerson Process Management complies with the R&TTE Directive.

Hazardous Locations Certifications

North American Certifications

Factory Mutual (FM) Approvals

I5 FM Intrinsically Safe, Non-Incendive, and Dust Ignition-proof.
Intrinsically Safe for Class I/II/III, Division 1, Groups A, B, C, D, E, F, and G.
Zone Marking: Class I, Zone 0, AEx ia llC
Temperature Codes T4 (T_{amb} = -50 to 70 °C)
Non-Incendive for Class I, Division 2, Groups A, B, C, and D.
Dust Ignition-proof for Class II/III, Division 1, Groups E, F, and G.
Ambient temperature limits: -50 to 85 °C
For use with Rosemount SmartPower options 00753-9220-0001 only.
Enclosure Type 4X / IP66

CSA - Canadian Standards Association

Process Sealing

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

I6 CSA Intrinsically Safe
Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D.
Temp Code T3C
Enclosure Type 4X / IP66
For use with Rosemount SmartPower options 00753-9220-0001 only.

Rosemount 3051S Series

European Certifications

I1 ATEX Intrinsic Safety
Certificate No.: BAS01ATEX1303X ⟨Ex⟩ II 1G
Ex ia IIC T4 (T_a = -60 °C to 70 °C)
IP66
For use with Rosemount SmartPower options
00753-9220-0001 only.

Special conditions for safe use (x)

The surface resistivity of the antenna is greater than one gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.
CE 1180

CE ⓘ

Country	Restriction
Bulgaria	General authorization required for outdoor use and public service
France	Outdoor use limited to 10mW e.i.r.p.
Italy	If used outside of own premises, general authorization is required.
Norway	May be restricted in the geographical area within a radius of 20 km from the center of Ny-Alesund.
Romania	Use on a secondary basis. Individual license required.

IECEx Certifications

I7 IECEx Intrinsic Safety
Certificate No.: IECEx BAS 04.0017X
Ex ia IIC T4 (Ta = -60 °C to 70 °C)
For use with Rosemount SmartPower options
00753-9220-0001 only.
IP66

Special conditions for safe use (x)

The surface resistivity of the antenna is greater than one gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.

Rosemount 3051S MultiVariable Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA

Emerson Process Management GmbH & Co. — Wessling, Germany

Emerson Process Management Asia Pacific Private Limited — Singapore

Ordinary Location Certification for FM

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

Models with Differential Pressure Ranges = 2 through 5 and/or Static Pressure Range 4 or options P0 and P9.

QS Certificate of Assessment - EC No. 59552-2009-CE-HOU-DNV,

Module H Conformity Assessment — Sound Engineering Practice

Transmitter Attachments: Diaphragm Seal - Process Flange - Manifold — Sound Engineering Practice

Primary Elements, Flowmeter — See appropriate Primary Element QIG

Electro Magnetic Compatibility (EMC) (2004/108/EC)

EN 61326-1:2006 and EN 61326-2-3:2006

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion-proof for Class I, Division 1, Groups B, C, and D; dust-ignition proof for Class II and Class III, Division 1, Groups E, F, and G; T_a = 85 °C; hazardous locations; enclosure Type 4X, conduit seal not required.

I5 Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1; Class I, Zone 0 AEx ia IIC when connected in accordance with Rosemount drawing 03151-1206;
T_a = 70 °C;
Non-incendive for Class I, Division 2, Groups A, B, C, and D Enclosure Type 4X
For entity parameters see control drawing 03151-1206.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

E6 Explosion-proof for Class I, Division 1, Groups B, C, and D; Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G; suitable for Class I, Division 2, Groups A, B, C, and D, CSA Enclosure Type 4X; conduit seal not required. Dual Seal. T5 (T_a = -40 °C to 85 °C).

I6 Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D, T3C; when connected in accordance with Rosemount drawings 03151-1207; Dual Seal.
For entity parameters see control drawing 03151-1207.

European Certifications

I1 ATEX Intrinsic Safety
Certificate No.: Baseefa 08ATEX0064X ⟨Ex⟩ II 1G
Ex ia IIC T4 (-60 °C ≤ T_{amb} ≤ +70 °C)
CE 1180

Field Connection / 4-20 mA Loop Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.0 W
C_i = 14.8 nF
L_i = 0

RTD Connection Parameters

U_O = 30 V
I_O = 2.31 mA
P_O = 17.32 mW
C_i = 0
L_i = 0

Special conditions for safe use (x)

If the equipment is fitted with the optional 90 V transient suppressor, it is incapable of withstanding the 500 V isolation from earth test and this must be taken into account during installation.

N1 ATEX Type n
Certificate No.: Baseefa 08ATEX0065X ⟨Ex⟩ II 3 G
Ex nA nL IIC T4 (-40 °C ≤ T_{amb} ≤ +70 °C)
Ui = 45 Vdc max
U_O = 30 V (RTD Connection)
IP66
CE

Special conditions for safe use (x)

If fitted with a 90 V transient suppressor, the equipment is not capable of withstanding the 500 V electrical strength test as defined in Clause 6.8.1 of EN 60079-15:2005. This must be taken into account during installation.

ND ATEX Dust
Certificate No.: BAS01ATEX1374X ⟨Ex⟩ II 1 D
Ex tD A20 IP66 T105°C (-20 °C ≤ T_{amb} ≤ 85 °C)
IP66
CE 1180

Rosemount 3051S Series

Special conditions for safe use (x)

1. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
2. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
3. Cable entries and blanking plugs must be suitable for the ambient temperature range of the apparatus and capable of withstanding a 7J impact test.
4. The 3051S SuperModule must be securely screwed in place to maintain the ingress protection of the enclosure.

E1 ATEX Flameproof
Certificate No.: KEMA00ATEX2143X ⟨Ex⟩ II 1/2 G
Ex d IIC T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
Ex d IIC T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
V_{max} = 42.4V
CE 1180

Special conditions for safe use (x)

1. The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
2. Transmitter Model 3051S contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

Japanese Certifications

E4 TIIS Flameproof
Ex d IIC T6
TC19070 With RTD and LCD Display
TC19071 With LCD
TC19072 RTD without LCD Display
TC19073 Without LCD

Brazil Certifications

E2 INMETRO Flameproof
Certificate number: NCC 5886/09X
BR-Ex d IIC T5/T6 Gb IP66W
T6 (-50 °C to 65 °C)
T5 (-50 °C to 80 °C)

Special conditions for safe use (x)

For processes with temperatures above 135 °C, the user should evaluate whether the SuperModule temperature class is suitable for the application. The temperatures of the SuperModule may be above class T4, considering that this temperature depends on the type of ventilation used on the equipment.

I2 INMETRO Intrinsic Safety
Certificate No. NCC 5870/09X
BR-Ex ia IIC T4 (-60 °C ≤ T_a ≤ 70 °C) Ga IP66W

Field Connection / 4-20 mA Loop Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.0 W
C_i = 14.8 nF
L_i = 0

RTD Connection Parameters

U_O = 30 V
I_O = 2.31 mA
P_O = 17.32 mW
C_i = 0
L_i = 0

Special conditions for safe use (x)

1. If the equipment is fitted with the option 90 V transient suppressor, it is incapable of withstanding the 500 V isolation from earth test and this must be taken into account during installation.
2. For processes with temperatures above 135 °C, the user should evaluate whether the SuperModule temperature class is suitable for the application. The temperatures of the SuperModule may be above class T4, considering that this temperature depends on the type of ventilation used on the equipment.

China Certifications

E3 China Flameproof
NEPSI Certificate No.: GYJ091001
Ex d IIC T5/T6
T6 (-50 °C to 65 °C)
T5 (-50 °C to 80 °C)

NOTE
Refer to Appendix B of the 3051S MultiVariable Reference Manual (document number 00809-0100-4803) for Special Conditions for Safe Use.

I3 China Intrinsic Safety
NEPSI Certificate No.: GYJ091002X
Ex ia IIC T4 (-60 °C to 70 °C)

Field Connection / 4-20 mA Loop Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.0 W
C_i = 14.8 nF
L_i = 0

RTD Connection Parameters

U_O = 30 V
I_O = 2.31 mA
P_O = 17.32 mW
C_i = 0
L_i = 0

NOTE
Refer to Appendix B of the 3051S MultiVariable Reference Manual (document number 00809-0100-4803) for Special Conditions for Safe Use.

IECEx Certifications

I7 IECEx Intrinsic Safety
Certificate No.: IECExBAS08.0025X
Ex ia IIC T4(-60 °C ≤ T_a ≤ 70 °C)
IP66

Field Connection / 4-20 mA Loop Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.0 W
C_i = 14.8 nF
L_i = 0

RTD Connection Parameters

U_O = 30 V
I_O = 2.31 mA
P_O = 17.32 mW
C_i = 0
L_i = 0

Special conditions for safe use (x)
If the equipment is fitted with the optional 90 V transient suppressor, it is incapable of withstanding the 500 V isolation from earth test and this must be taken into account during installation.

N7 IECEx Type n
Certificate No.: IECExBAS08.0026X
Ex nAnL IIC T4 (-40 °C ≤ T_a ≤ 70 °C)
Ui = 45 Vdc MAX
U_O = 30 V (RTD Connection)
IP66

Special conditions for safe use (x)
If fitted with a 90 V transient suppressor, the equipment is not capable of withstanding the 500 V electrical strength test as defined in Clause 6.8.1 of EN 60079-15:2005. This must be taken into account during installation.

E7 IECEx Flameproof
Certificate No.: IECExKEM08.0010X
Ex d IIC T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
Ex d IIC T5 (-50 °C ≤ T_{amb} ≤ 80 °C)

Special conditions for safe use (x)

1. The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
2. Transmitter Model 3051S contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K1 Combination of E1, I1, N1, and ND
K4 Combination of E4 and I4
K5 Combination of E5 and I5
K6 Combination of E6 and I6
K7 Combination of E7, I7, and N7
KA Combination of E1, E6, I1, and I6
KB Combination of E5, E6, I5, and I6
KC Combination of E5, E1, I5, and I1
KD Combination of E5, E6, E1, I5, I6, and I1

Rosemount 3051S Series

Product Data Sheet
00813-0100-4801, Rev PA
Catalog 2011 - 2012

3051S ERS System Certifications

Approved Manufacturing Locations

Rosemount Inc. – Chanhassen, Minnesota, USA
Emerson Process Management GmbH & Co. – Wessling, Germany
Emerson Process Management Asia Pacific Private Limited – Singapore
Beijing Rosemount Far East Instrument Co., LTD – Beijing, China

Ordinary Location Certification for FM Approvals

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

European Directive Information

Consult your Emerson Process Management sales representative for more information about the EC declaration of conformity.

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion-proof for Class I, Division 1, Groups B, C, and D; Dust Ignition-proof for Class II and Class III, Division 1, Groups E, F, and G; hazardous locations; enclosure Type 4X, conduit seal not required.

I5 Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1; Class I, Zone 0 AEx ia IIC when connected in accordance with Rosemount drawing 03151-1306; Non-Incendive for Class I, Division 2, Groups A, B, C, and D Enclosure Type 4X

For entity parameters see control drawing 03151-1306.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

E6 Explosion-proof for Class I, Division 1, Groups B, C, and D; Dust Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G; suitable for Class I, Division 2, Groups A, B, C, and D, CSA Enclosure Type 4X; conduit seal not required; Dual Seal.

I6 Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount Drawings 03151-1316; Dual Seal.

For entity parameters see control drawing 03151-1316.

European Certifications

I1 ATEX Intrinsic Safety
Consult factory for availability.

N1 ATEX Type n
Consult factory for availability.

ND ATEX Dust
Certificate No.: BAS01ATEX1374X ⟨Ex⟩ II 1 D
Ex tD A20 IP66 T105 °C (-20 °C ≤ T_{amb} ≤ 85 °C)
V_{max} = 42.4 V max
IP66
CE 1180

Special Conditions for safe use (X):

1. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
2. Unused cable entries must be filled suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
3. Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact test.
4. Each 3051S ERS transmitter must be securely screwed in place to maintain the ingress protection of the enclosure. (The 3051S Super Module must be properly assembled to the 3051S housing to maintain ingress protection.)

E1 ATEX Flameproof
Certificate No.: KEMA00ATEX2143X ⟨Ex⟩ II 1/2 G
Ex d IIC T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
Ex d IIC T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
V_{max} = 42.4 V
CE 1180

Special Conditions for safe use (X):

1. The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
2. Transmitter Model 3051S contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

Japanese Certifications

E4 TIIS Flameproof: Consult factory for availability

INMETRO Certifications

E2 INMETRO Flameproof: Consult factory for availability

I2 INMETRO Intrinsic Safety: Consult factory for availability

China Certifications

E3 China Flameproof: Consult factory for availability

I3 China Intrinsically Safe: Consult factory for availability

IECEx Certifications

I7 IECEx Intrinsic Safety
Consult factory for availability.

N7 IECEx Type n
Consult factory for availability.

E7 IECEx Flameproof and Dust (each listed separately)

IECEx Flameproof
Certificate No.: IECExKEM08.0010X
Ex d IIC T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
Ex d IIC T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
V_{max} = 42.4 V

Special conditions for safe use (X)

1. The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
2. Transmitter Model 3051S contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

IECEx Dust
Certificate No. IECExBAS09.0014X
Ex tD A20 IP66 T105°C (-20 °C ≤ Tamb ≤ 85 °C)
Vmax = 42.4 V
A = 22 mA
IP66

Special conditions for safe use (x)

1. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
2. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
3. Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact test.
4. Each 3051S ERS sensor must be securely screwed in place to maintain the ingress protection of the enclosure. (Each sensor module must be properly assembled to the housing to maintain ingress protection.)

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

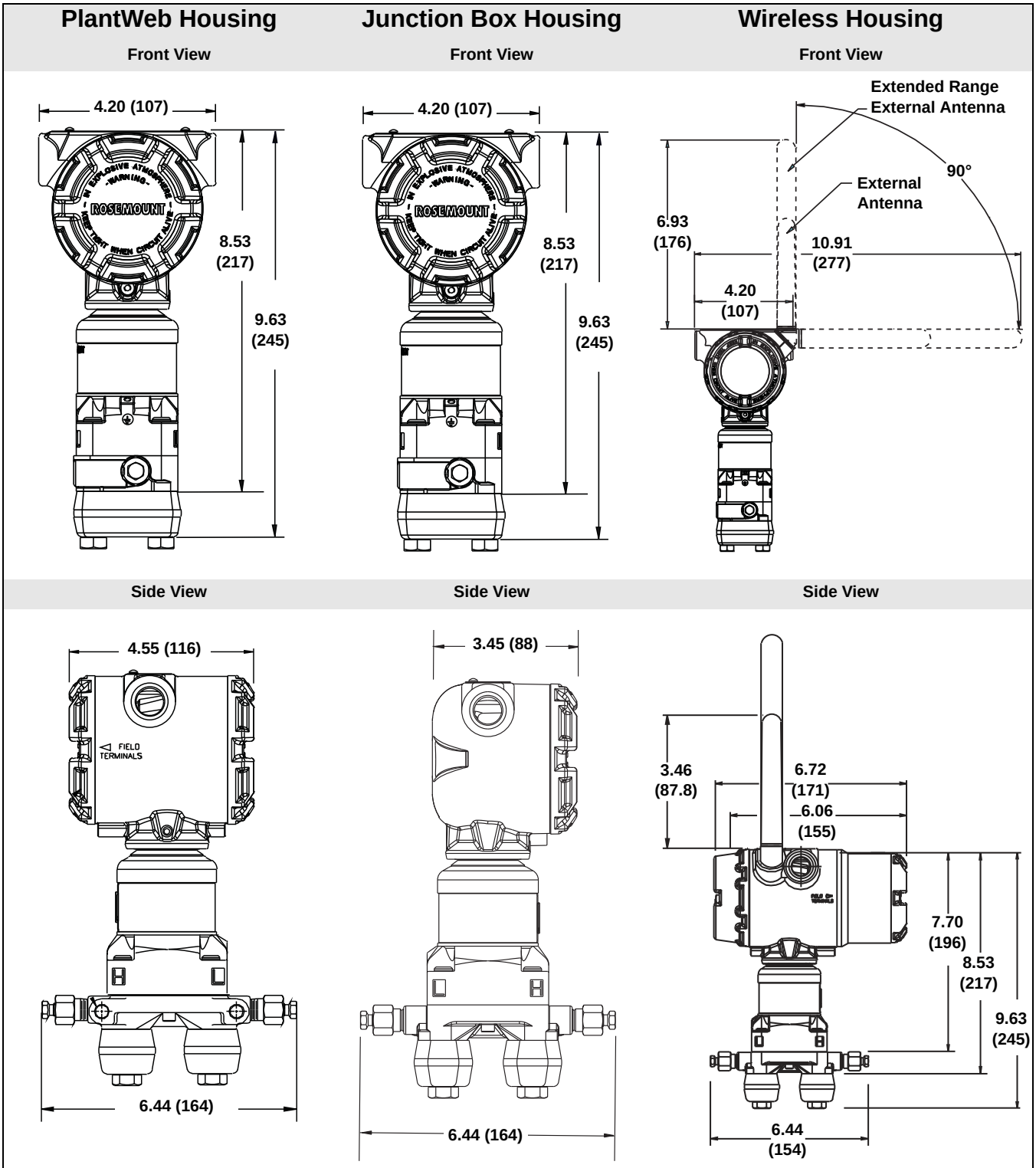
K1 Combination of **E1**, **I1**, **N1**, and **ND**
K2 Combination of **E2** and **I2**
K5 Combination of **E5** and **I5**
K6 Combination of **E6** and **I6**
K7 Combination of **E7**, **I7**, and **N7**
KA Combination of **E1**, **E6**, **I1,** and **I6**
KB Combination of **E5**, **E6**, **I1,** and **I6**
KC Combination of **E5**, **E1**, **I5,** and **I1**
KD Combination of **E5, E6, E1, I5, I6,** and **I1**

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Rosemount 3051S Series

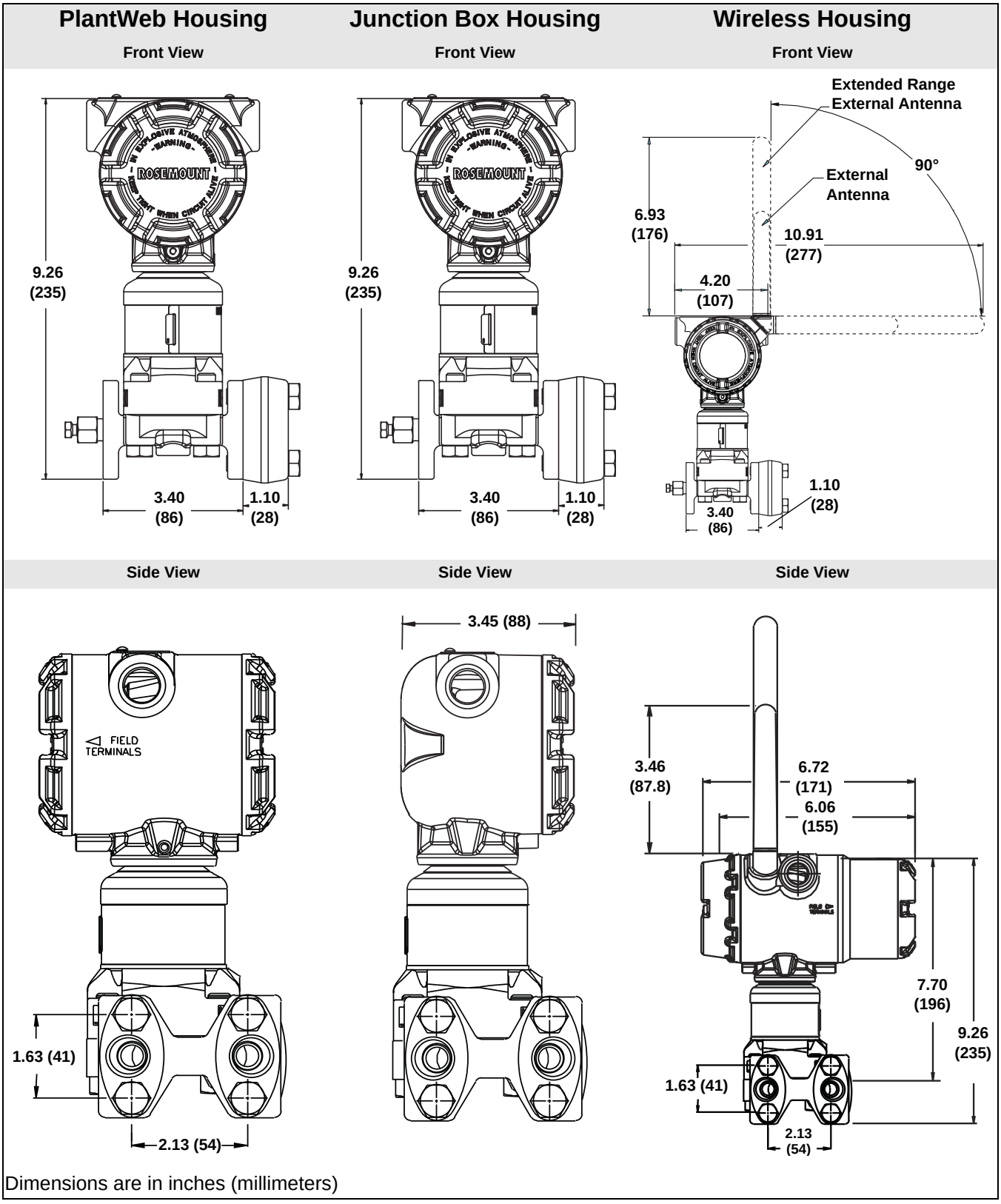
Dimensional Drawings

Figure 1. Transmitter with Coplanar Sensor Module and Flange



Dimensions are in inches (millimeters)

Figure 2. Transmitter with Coplanar Sensor Module and Traditional Flange

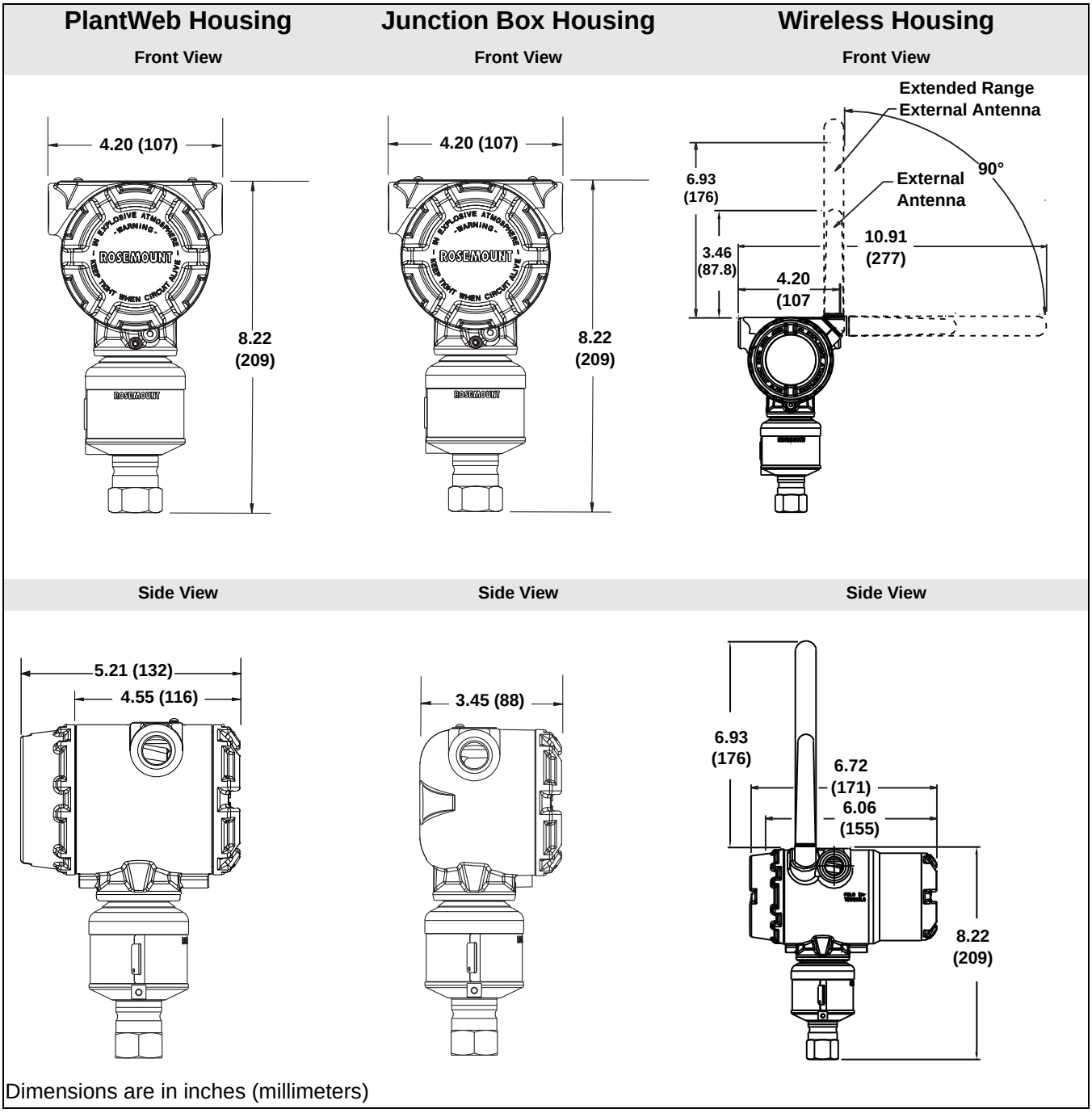


Dimensions are in inches (millimeters)

Rosemount 3051S Series

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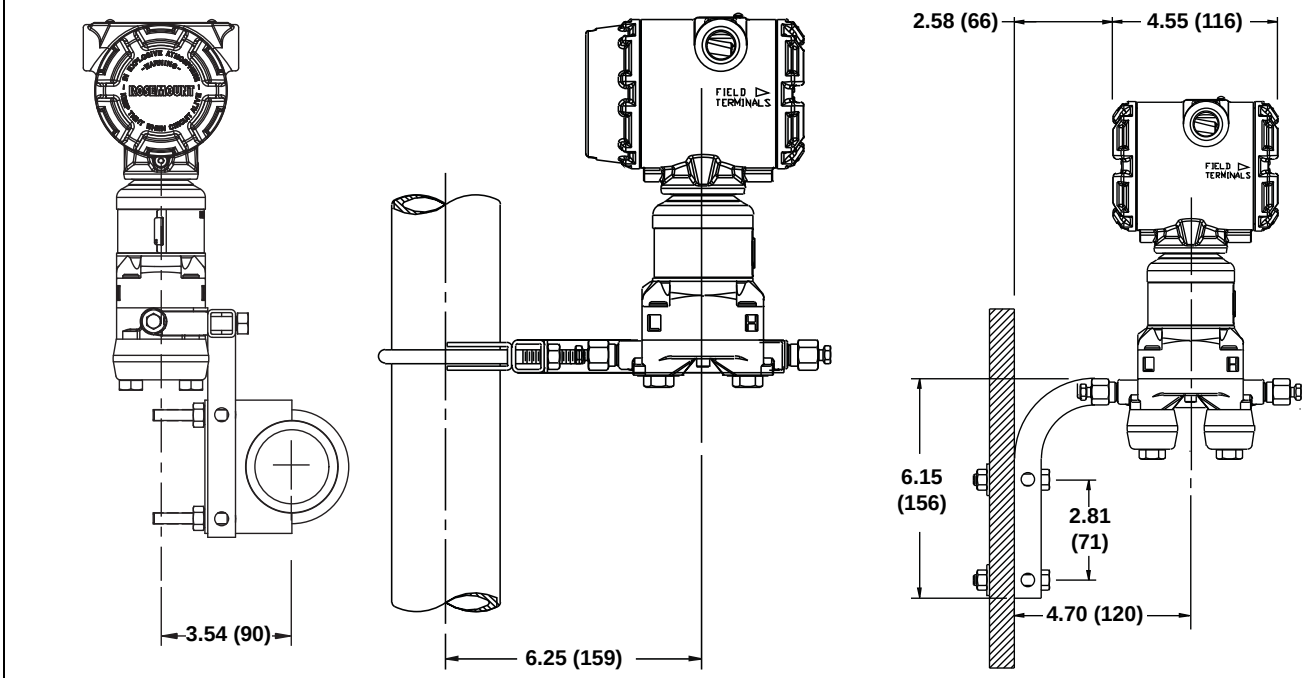
Figure 3. Transmitter with In-Line Sensor Module



Dimensions are in inches (millimeters)

Figure 4. Coplanar Mounting Configurations (B4 Bracket)

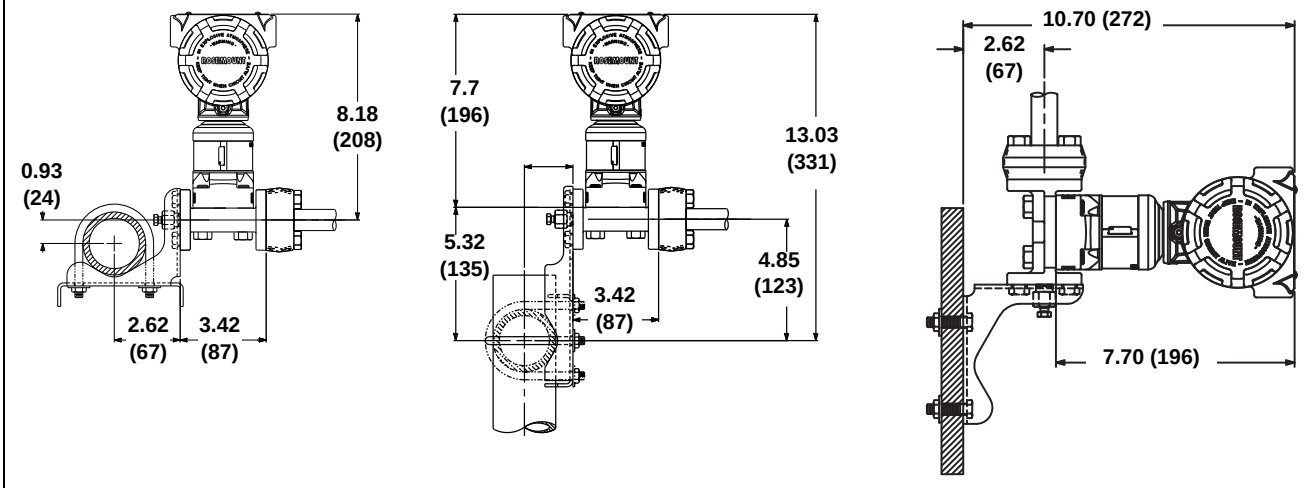
Pipe Mount		Panel Mount
Front View	Front View	Front View



Dimensions are in inches (millimeters)

Figure 5. Traditional Mounting Configurations

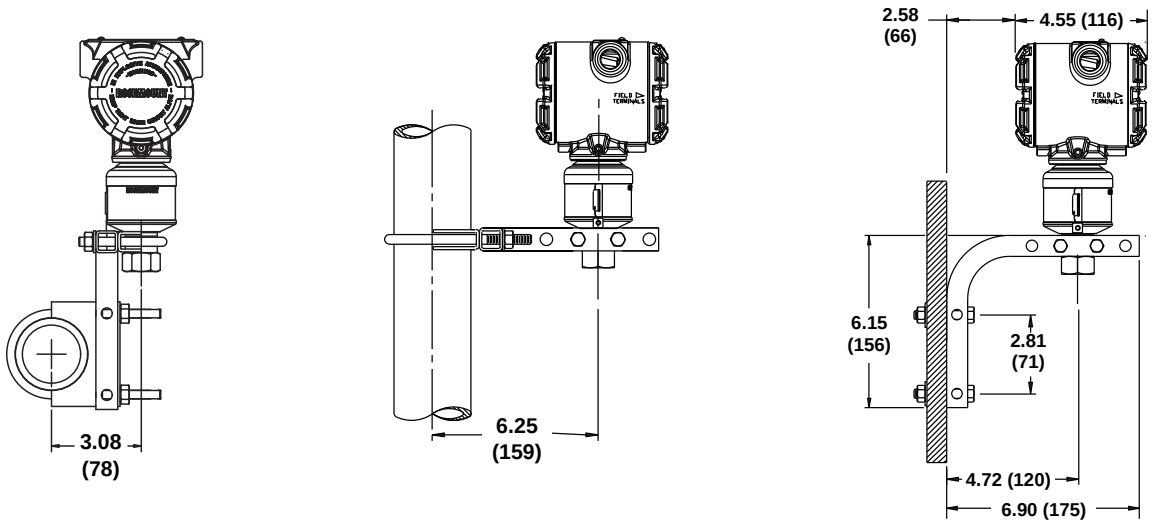
Pipe Mount	Pipe Mount (Flat Bracket)	Panel Mount



Dimensions are in inches (millimeters)

Figure 6. In-Line Mounting Configurations (B4 Bracket)

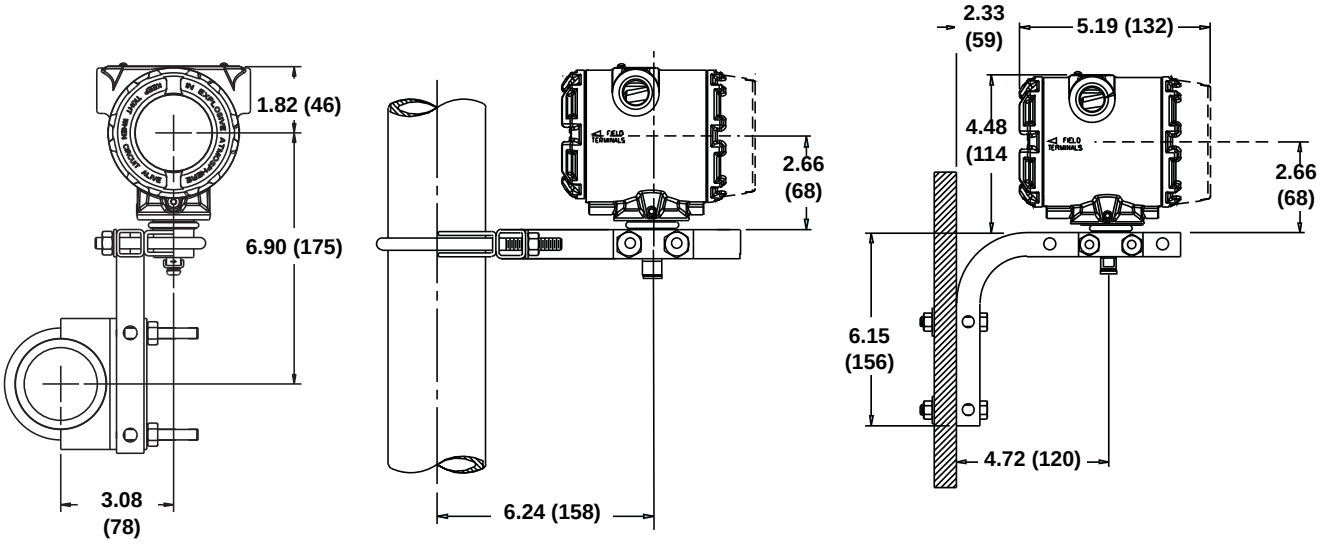
Pipe Mount		Panel Mount
Front View	Side View	



Dimensions are in inches (millimeters)

Figure 7. Remote Display Mounting Configurations (B4 Bracket)

Pipe Mount		Panel Mount
Front View	Side View	

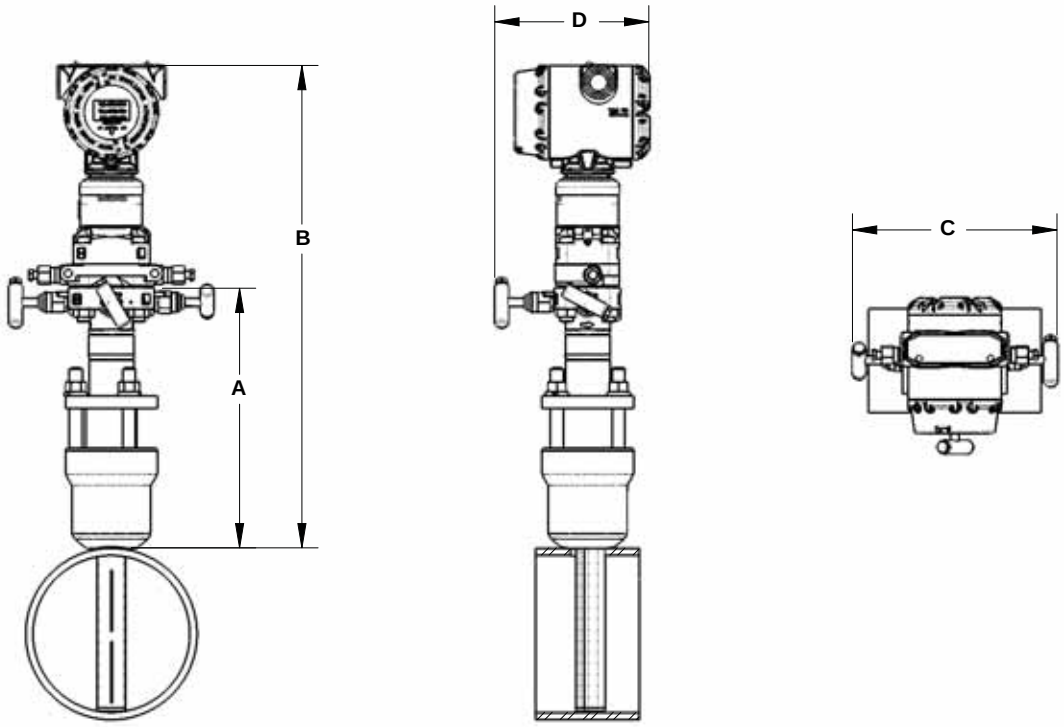


Dimensions are in inches (millimeters)

Figure 8. Rosemount 3051SFA Annubar Flowmeter

Rosemount 3051SFA Annubar Flowmeter(1)

Front View	Side View	Top View



Dimensions are in inches (millimeters)

(1) The Pak-Lok Annubar model is available up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

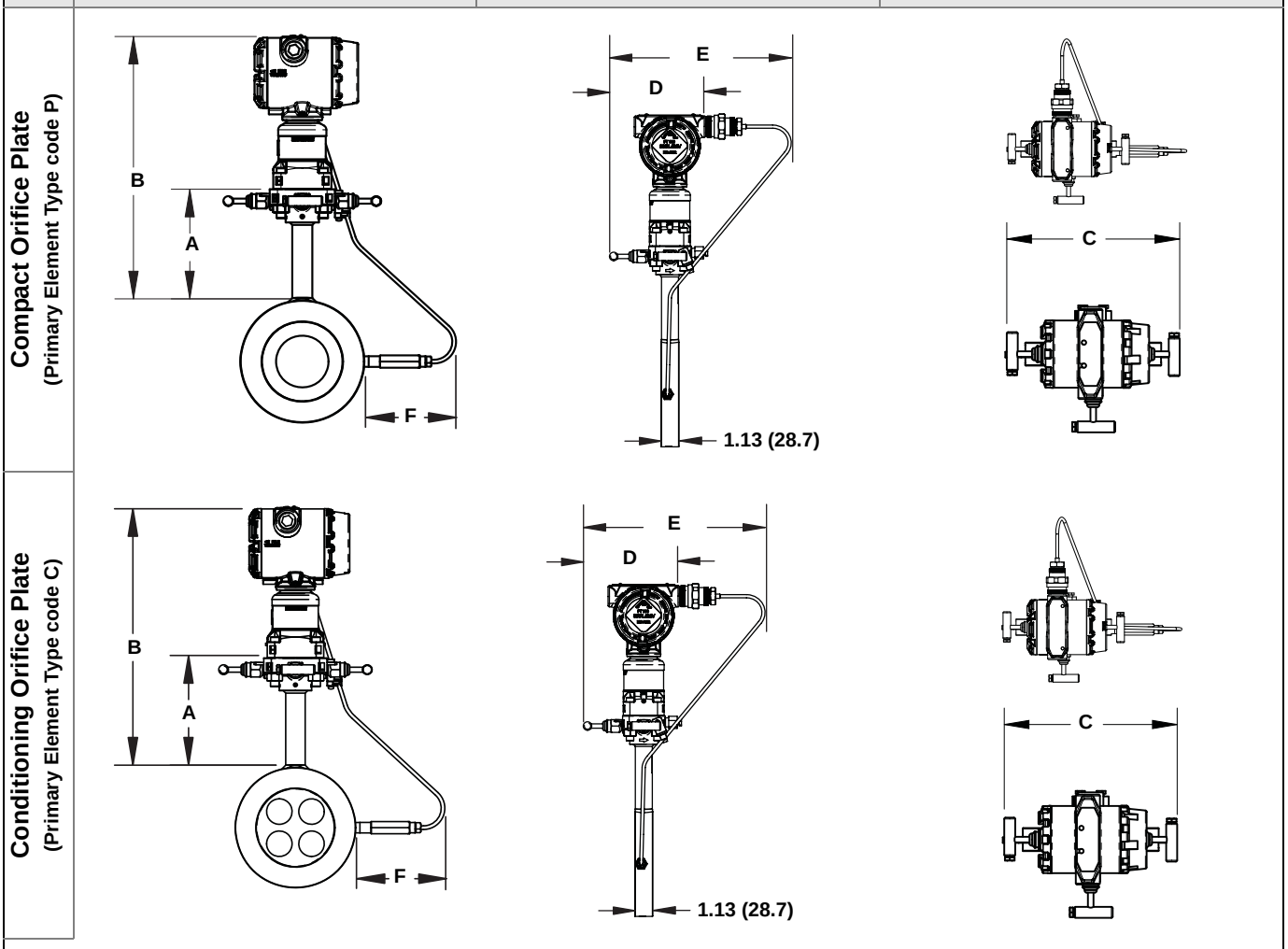
Table 16. 3051CFA Annubar Flowmeter Dimensional Data

Sensor Size	A (Max)	B (Max)	C (Max)	D (Max)
1	7.50 (190.5)	16.03 (407.2)	9.00 (228.6)	6.90 (175.3)
2	9.25 (235.0)	17.78 (451.6)	9.00 (228.6)	6.90 (175.3)
3	12.00 (304.8)	20.53 (521.5)	9.00 (228.6)	6.90 (175.3)
Dimensions are in inches (millimeters)				

Rosemount 3051S Series

Figure 9. Rosemount 3051SFC Compact Orifice Flowmeter

Rosemount 3051SFC Compact Orifice Flowmeter



Dimensions are in inches (millimeters)

Table 17. Dimensional Drawings[1]

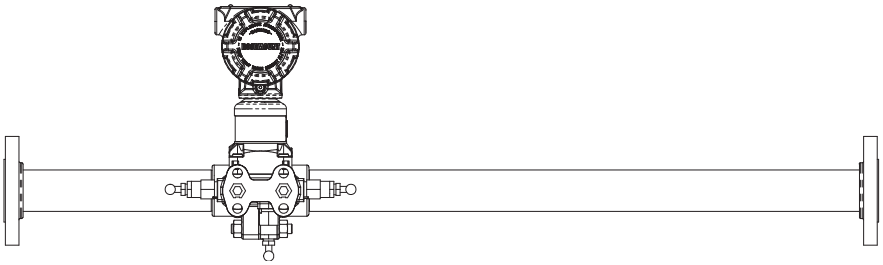
Primary[1] Element Type	A	B	Transmitter Height	C	D	E	F
Type P and C	5.62 (143)	Transmitter Height + A	7.70 (196)	7.75 (197) - closed 8.25 (210) - open	6.00 (152) - closed 6.25 (159) - open	10.2 (257.8) - closed 10.4 (264.2) - open	Max of 6.7 (71)

(1) Measurement in inches (millimeters).

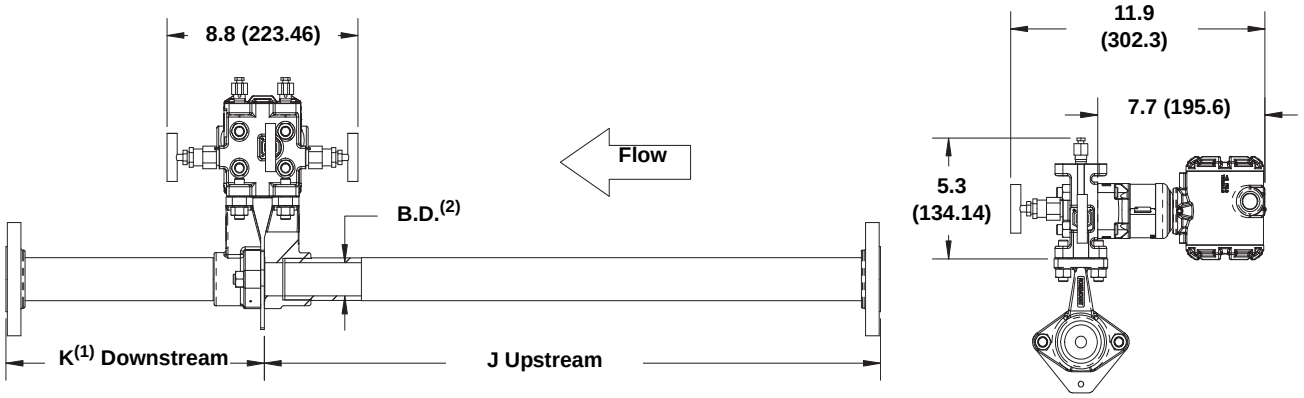
Figure 10. Rosemount 3051SFP Integral Orifice Flowmeter

Rosemount 3051SFP Integral Orifice Flowmeter

Front View



Bottom View **Side View**



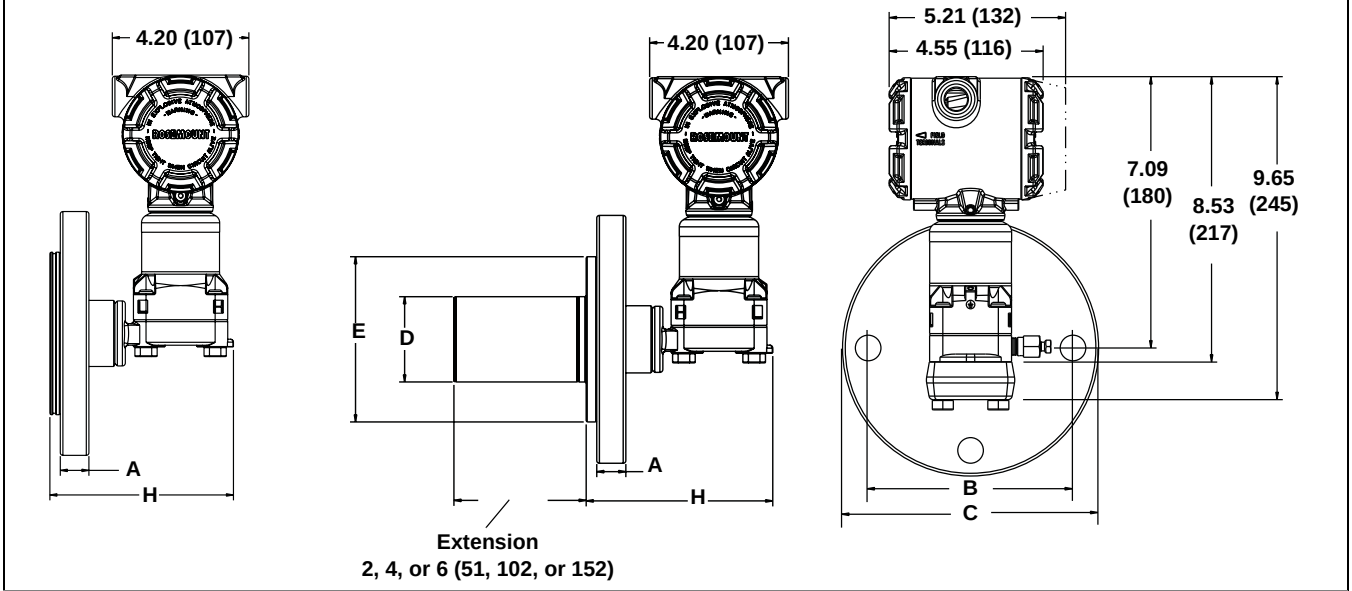
Dimensions are in inches (millimeters)

	Line Size		
Dimension	**1/2-in. (15 mm)**	**1-in. (25 mm)**	**1 1/2-in. (40 mm)**
J (Beveled/Threaded pipe ends)	12.54 (318.4)	20.24 (514.0)	28.44 (722.4)
J (RF slip-on, RTJ slip-on, RF-DIN slip on)	12.62 (320.4)	20.32 (516.0)	28.52 (724.4)
J (RF 150#, weld neck)	14.37 (364.9)	22.37 (568.1)	30.82 (782.9)
J (RF 300#, weld neck)	14.56 (369.8)	22.63 (574.7)	31.06 (789.0)
J (RF 600#, weld neck)	14.81 (376.0)	22.88 (581.0)	31.38 (797.1)
K (Beveled/Threaded pipe ends)	5.74 (145.7)	8.75 (222.2)	11.91 (302.6)
K (RF slip-on, RTJ slip-on, RF-DIN slip on)(1)	5.82 (147.8)	8.83 (224.2)	11.99 (304.6)
K (RF 150#, weld neck)	7.57 (192.3)	10.88 (276.3)	14.29 (363.1)
K (RF 300#, weld neck)	7.76 (197.1)	11.14 (282.9)	14.53 (369.2)

(1) Downstream length shown here includes plate thickness of 0.162-in. (4.11 mm).

Rosemount 3051S Series

Figure 11. Rosemount 3051SAL Liquid Level Transmitter



Dimensions are in inches (millimeters)

Class	Pipe Size	Flange Thickness A	Bolt Circle Diameter B	Outside Diameter C	No. of Bolts	Bolt Hole Diameter	Extension Diameter[1] D	E	H
ASME B16.5 (ANSI) 150	2 (51)	0.69 (18)	4.75 (121)	6.0 (152)	4	0.75 (19)	N/A	3.6 (92)	5.65 (143)
	3 (76)	0.88 (22)	6.0 (152)	7.5 (191)	4	0.75 (19)	2.58 (66)	5.0 (127)	5.65 (143)
	4 (102)	0.88 (22)	7.5 (191)	9.0 (229)	8	0.75 (19)	3.5 (89)	6.2 (158)	5.65 (143)
ASME B16.5 (ANSI) 300	2 (51)	0.82 (21)	5.0 (127)	6.5 (165)	8	0.75 (19)	N/A	3.6 (92)	5.65 (143)
	3 (76)	1.06 (27)	6.62 (168)	8.25 (210)	8	0.88 (22)	2.58 (66)	5.0 (127)	5.65 (143)
	4 (102)	1.19 (30)	7.88 (200)	10.0 (254)	8	0.88 (22)	3.5 (89)	6.2 (158)	5.65 (143)
ASME B16.5 (ANSI) 600	2 (51)	1.00 (25)	5.0 (127)	6.5 (165)	8	0.75 (19)	N/A	3.6 (92)	7.65 (194)
	3 (76)	1.25 (32)	6.62 (168)	8.25 (210)	8	0.88 (22)	2.58 (66)	5.0 (127)	7.65 (194)
DIN 2501 PN 10–40	DN 50	20 mm	125 mm	165 mm	4	18 mm	N/A	4.0 (102)	5.65 (143)
DIN 2501 PN 25/40	DN 80	24 mm	160 mm	200 mm	8	18 mm	66 mm	5.4 (138)	5.65 (143)
	DN 100	24 mm	190 mm	235 mm	8	22 mm	89 mm	6.2 (158)	5.65 (143)
DIN 2501 PN 10/16	DN 100	20 mm	180 mm	220 mm	8	18 mm	89 mm	6.2 (158)	5.65 (143)

(1) Tolerances are 0.040 (1,02), –0.020 (0,51).

ACCESSORIES

Rosemount Engineering Assistant (EA) Software Packages

The Rosemount Engineering Assistant software supports flow configuration for the 3051S MultiVariable and 3051S FOUNDATION fieldbus Fully Compensated Mass Flow Block (H01 option). The package is available with or without modem and connecting cables. All configurations are packaged separately.

For best performance of the EA Software, the following computer hardware and software is recommended:

Minimum System Requirements for Engineering Assistant 6 for the 3051SMV

- Pentium-grade Processor: 500MHz or faster
- Operating System: Microsoft Windows 2000 (32-bit), Windows XP Professional (32-bit), or Windows 7 (32-bit)
- 256 MB RAM
- 100 MB of available hard disk space
- RS232 serial port or USB port (for use with HART modem)
- CD-ROM

NOTE
Engineering Assistant version 6.1 or later requires the use of Microsoft® .NET Framework version 2.0 or later. If .NET version 2.0 is not currently installed, the software will be automatically installed during the Engineering Assistant installation. Microsoft .NET version 2.0 requires an additional 200 MB of disk space.

Minimum System Requirements for Engineering Assistant 5.5.1 for the 3051S FOUNDATION fieldbus with Fully Compensated Mass Flow Block (H01 option)

- PC Compatible Pentium 400 or above
- Operating System: Windows XP Professional (32-bit) or Windows Vista (32-bit)
- 256 MB RAM
- 535 MB free Hard disk space
- RS232 serial port or USB port (for use with HART modem)
- CD-ROM

Engineering Assistant Software Packages

Code	Product Description
EA	Engineering Assistant Software Program
Code	**Software Media**
2	EA Rev. 5 (Compatible with 3095, 3051S FOUNDATION fieldbus, and 333)
3	EA Rev. 6 (Compatible with 3051SMV only)
Code	**Language**
E	English
Code	**Modem and Connecting Cables**
0	None
H	Serial Port HART Modem and Cables
B	USB Port HART Modem and Cables
C	FOUNDATION fieldbus PCM-CIA Interface Card and Cables
Code	**License**
N1	Single PC license
N2	Site license
Typical Model Number: EA 2 E 0 N1	

Accessories

Item Description	Part Number
Serial Port HART Modem and Cables Only	03095-5105-0001
USB Port HART Modem and Cables Only(1)	03095-5105-0002
FOUNDATION fieldbus PCM-CIA Interface Card and Cables Only	03095-5108-0001
Long-life Power Module for Wireless option	00753-9220-0001

(1) Supported by Snap-On EA with AMS Device Manager version 6.2 or higher.

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Process Management

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Rosemount 3051 Pressure Transmitter

THE PROVEN INDUSTRY LEADER IN PRESSURE MEASUREMENT

- *Best-in-Class performance with up to 0.04% reference accuracy*
- *Industry first installed five-year stability*
- *Unmatched Dynamic Performance*
- *Coplanar™ platform enables integrated pressure, flow, and level solutions*
- *Advanced PlantWeb® Functionality to increase plant productivity*



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Rosemount 3051T In-Line Pressure Transmitter . . . . . page Pressure-120

Rosemount 3051CF Flowmeter Series . . . . . page Pressure-124

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Rosemount 3051

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Setting the Standard for Pressure Measurement



Proven best-in-class performance, reliability and safety

- Over 4 million installed
- Meet your application needs with extensive offering
- Real world total performance of ±0.15%
- Reference accuracy of ±0.04%



Flow



Pressure

Maximize Installation Flexibility with Coplanar Platform

- Improve reliability and performance with integrated DP Flowmeters, DP Level and manifolds
- Easy installation with all solutions fully assembled, leak-tested and calibrated
- Meet your application needs with an unsurpassed offering



Level



Unlock the Value of Devices with the Smart Wireless THUM™ Adapter

- Gain access to field intelligence and improve quality, safety, availability, operations and maintenance costs
- Remotely manage devices and monitor health
- Enable new wireless measurement points
- Utilize existing loop power



Innovative, Integrated DP Flowmeters

- Fully assembled and leak tested for out-of-the-box installation
- Reduce straight pipe requirements, lower permanent pressure loss and achieve accurate measurement in small line sizes
- Up to 1.65% volumetric flow accuracy at 8:1 turndown



Proven, Reliable and Innovative DP Level Technologies

- Connect to virtually any process with a comprehensive offering of process connections, fill fluids, direct mount or capillary connections and materials
- Quantify and optimize total system performance with QZ option
- Operate at higher temperature and in vacuum applications
- Optimize level measurement with cost efficient Tuned-System™ Assemblies



Instrument Manifolds – Quality, Convenient, and Easy

- Design and engineered for optimal performance with Rosemount transmitters
- Save installation time and money with factory assembly
- Offers a variety of styles, materials and configurations

Rosemount 3051C Coplanar Pressure Transmitter



3051C Coplanar Pressure Transmitter

Industry's best total performance, a flexible Coplanar platform, and installed five-year stability has made Rosemount 3051 the standard for Differential, Gage, and Absolute pressure measurement. Select from the following capabilities for seamless integration:

- Performance up to 0.04% accuracy
- Manifolds, Primary Elements and Seal Solutions
- 4-20 mA HART, 1-5 Vdc HART low power, FOUNDATION fieldbus, and Profibus PA protocols
- Calibrated spans/ranges from 0.1 inH2O to 4000 psi (0,25 mbar to 276 bar)
- 316 SST, Alloy C-276, Alloy 400, Tantalum, Gold-Plated Alloy 400 or 316L SST wetted materials

Additional Information
Specifications: page Pressure-145
Certifications: page Pressure-154
Dimensional Drawings: page Pressure-159

Table 1. 3051C Coplanar Pressure Transmitters Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Transmitter Type			
3051C	Coplanar Pressure Transmitter			
Measurement Type				
Standard				**Standard**
D	Differential			★
G	Gage			★
Expanded				
A	Absolute			
Pressure Range				
	3051CD	**3051CG**	**3051CA**	
Standard				**Standard**
1	–25 to 25 inH_2O (–62.2 to 62.2 mbar)	–25 to 25 inH_2O (–62,1 to 62.2 mbar)	0 to 30 psia (0 to 2.1 bar)	★
2	–250 to 250 inH2O (–623 to 623 mbar)	–250 to 250 inH_2O (–621 to 623 mbar)	0 to 150 psia (0 to 10.3 bar)	★
3	–1000 to 1000 inH_2O (–2.5 to 2.5 bar)	–393 to 1000 inH_2O (–0.98 to 2.5 bar)	0 to 800 psia (0 to 55.2 bar)	★
4	–300 to 300 psi (–20.7 to 20.7 bar)	–14.2 to 300 psi (–0.98 to 20.7 bar)	0 to 4000 psia (0 to 275.8 bar)	★
5	–2000 to 2000 psi (–137.9 to137.9 bar)	–14.2 to 2000 psi (–0.98 to 137.9 bar)	Not Applicable	★
Expanded				
0[(1)]	–3 to 3 inH_2O (–7.5 to 7.5 mbar)	Not Applicable	Not Applicable	
Transmitter Output				
Standard				**Standard**
A	4–20 mA with Digital Signal Based on HART Protocol			★
F	FOUNDATION fieldbus Protocol			★
W[(2)]	Profibus PA Protocol			★

Rosemount 3051

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Table 1. 3051C Coplanar Pressure Transmitters Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded				
M	Low-Power, 1–5 V dc with Digital Signal Based on HART Protocol *(See Option C2 for 0.8–3.2 V dc)*			
Materials of Construction				
	Process Flange Type	**Flange Material**	**Drain/Vent**	
Standard				**Standard**
2	Coplanar	SST	SST	★
3(3)	Coplanar	Cast C-276	Alloy C-276	★
4	Coplanar	Cast Alloy 400	Alloy 400/K-500	★
5	Coplanar	Plated CS	SST	★
7(3)	Coplanar	SST	Alloy C-276	★
8(3)	Coplanar	Plated CS	Alloy C-276	★
0	Alternate Process Connection			★
Isolating Diaphragm				
Standard				**Standard**
2(3)	316L SST			★
3(3)	Alloy C-276			★
Expanded				
4	Alloy 400			
5	Tantalum (Available on 3051CD and CG, Ranges 2–5 only. Not available on 3051CA)			
6	Gold-plated Alloy 400 (Use in combination with O-ring Option Code B.)			
7	Gold-plated SST			
O-ring				
Standard				**Standard**
A	Glass-filled PTFE			★
B	Graphite-filled PTFE			★
Sensor Fill Fluid				
Standard				**Standard**
1	Silicone			★
2	Inert (Differential and Gage only)			★
Housing Material			**Conduit Entry Size**	
Standard				**Standard**
A	Aluminum		½–14 NPT	★
B	Aluminum		M20 × 1.5	★
J	SST		½–14 NPT	★
K	SST		M20 × 1.5	★
Expanded				
D	Aluminum		G½	
M	SST		G½	

Options (Include with selected model number)

Plantweb Control Functionality		
Standard		**Standard**
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	★
Plantweb Diagnostic Functionality		
Standard		**Standard**
D01	FOUNDATION fieldbus Diagnostics Suite	★

Table 1. 3051C Coplanar Pressure Transmitters Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Alternate Flange[4]		
Standard		**Standard**
H2	Traditional Flange, 316 SST, SST Drain/Vent	★
H3[3]	Traditional Flange, Alloy C, Alloy C-276 Drain/Vent	★
H4	Traditional Flange, Cast Alloy 400, Alloy 400/K-500 Drain/Vent	★
H7[3]	Traditional Flange, 316 SST, Alloy C-276 Drain/Vent	★
HJ	DIN Compliant Traditional Flange, SST, 1/16 in. Adapter/Manifold Bolting	★
FA	Level Flange, SST, 2 in., ANSI Class 150, Vertical Mount	★
FB	Level Flange, SST, 2 in., ANSI Class 300, Vertical Mount	★
FC	Level Flange, SST, 3 in., ANSI Class 150, Vertical Mount	★
FD	Level Flange, SST, 3 in., ANSI Class 300, Vertical Mount	★
FP	DIN Level Flange, SST, DN 50, PN 40, Vertical Mount	★
FQ	DIN Level Flange, SST, DN 80, PN 40, Vertical Mount	★
Expanded		
HK[5]	DIN Compliant Traditional Flange, SST, 10 mm Adapter/Manifold Bolting	
HL	DIN Compliant Traditional Flange, SST, 12mm Adapter/Manifold Bolting (Not available on 3051CD0)	
Manifold Assembly[5][9]		
Standard		**Standard**
S5	Assemble to Rosemount 305 Integral Manifold	★
S6	Assemble to Rosemount 304 Manifold or Connection System	★
Integral Mount Primary Element[5][9]		
Standard		**Standard**
S4[6]	Assemble to Rosemount Annubar or Rosemount 1195 Integral Orifice	★
S3	Assemble to Rosemount 405 Compact Orifice Plate	★
Seal Assemblies[9]		
Standard		**Standard**
S1[7]	Assemble to one Rosemount 1199 seal	★
S2[8]	Assemble to two Rosemount 1199 seals	★
All-Welded Seal Assemblies (for high vacuum applications)[9]		
Standard		**Standard**
S0	One Seal, All-Welded System (Direct Mount Connection Type)	★
S7	One Seal, All-Welded System (Capillary Connection Type)	★
S8	Two Seals, All-Welded System (Capillary Connection Type)	★
S9	Two Seals, All-Welded System (One Direct Mount and One Capillary Connection Type)	★
Mounting Bracket		
Standard		**Standard**
B1	Traditional Flange Bracket for 2-in. Pipe Mounting, CS Bolts	★
B2	Traditional Flange Bracket for Panel Mounting, CS Bolts	★
B3	Traditional Flange Flat Bracket for 2-in. Pipe Mounting, CS Bolts	★
B4	Coplanar Flange Bracket for 2-in. Pipe or Panel Mounting, all SST	★
B7	B1 Bracket with Series 300 SST Bolts	★
B8	B2 Bracket with Series 300 SST Bolts	★
B9	B3 Bracket with Series 300 SST Bolts	★
BA	SST B1 Bracket with Series 300 SST Bolts	★
BC	SST B3 Bracket with Series 300 SST Bolts	★

Rosemount 3051

Table 1. 3051C Coplanar Pressure Transmitters Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Product Certifications		
Standard		**Standard**
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
E2[11]	INMETRO Flameproof	★
E3[11]	China Flameproof	★
E4[10]	TIIS Flame-proof	★
E5	FM Explosion-proof, Dust Ignition-Proof	★
E7[11]	IECEx Flameproof, Dust Ignition-proof	★
E8	ATEX Flameproof and Dust Certification	★
I1[11]	ATEX Intrinsic Safety and Dust	★
I2[11]	INMETRO Intrinsic Safety	★
I3	China Intrinsic Safety	★
I4[12]	TIIS Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I7[11]	IECEx Intrinsic Safety	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	★
IE	FM FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only	★
K2[11]	INMETRO Flameproof, Instrinsic Safety	★
K5	FM Explosion-proof, Dust Ignition-Proof, Intrinsically Safe, and Division 2	★
K6[11]	CSA and ATEX Explosion-proof, Intrinsically Safe, and Division 2 (combination of C6 and K8)	★
K7[11]	IECEx Flame-proof, Dust Ignition-proof, Intrinsic Safety, and Type n (combination of I7, N7, and E7)	★
K8[11]	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E8, I1 and N1)	★
KB	FM and CSA Explosion-proof, Dust Ignition Proof, Intrinsically Safe, and Division 2 (combination of K5 and C6)	★
KD[11]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★
N1[11]	ATEX Type n Certification and Dust	★
N3	China Type n	★
N7[11]	IECEx Type n Certification	★
Drinking Water Approval		
Standard		**Standard**
DW[13]	NSF drinking water approval	★
Shipboard Approvals		
Standard		**Standard**
SBS	American Bureau of Shipping	★
Custody Transfer		
Standard		**Standard**
C5[16]	Measurement Canada Accuracy Approval *(Limited availability depending on transmitter type and range. Contact an Emerson Process Management representative)*	★
Bolting Material		
Standard		**Standard**
L4	Austenitic 316 SST Bolts	★
L5	ASTM A 193, Grade B7M Bolts	★
L6	Alloy K-500 Bolts	★
Display and Interface Options		
Standard		**Standard**
M4[14]	LCD Display with Local Operator Interface	★
M5	LCD Display for Aluminum Housing (Housing Codes A, B, C, and D only)	★
M6	LCD Display for SST Housing (Housing Codes J, K, L, and M only)	★

Table 1. 3051C Coplanar Pressure Transmitters Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Calibration Certificate		
Standard		**Standard**
Q4	Calibration Certificate	★
QG	Calibration Certificate and GOST Verification Certificate	★
QP	Calibration certification and tamper evident seal	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204 3.1.B	★
Quality Certification for Safety		
Standard		**Standard**
QS[15]	Prior-use certificate of FMEDA data	★
Hardware Adjustments		
Standard		**Standard**
J1[16][17]	Local Zero Adjustment Only	★
J3[16][17]	No Local Zero or Span Adjustment	★
Transient Protection Terminal Block		
Standard		**Standard**
T1[18]	Transient Protection Terminal Block	★
Software Configuration		
Standard		**Standard**
C1[16]	Custom Software Configuration (Completed CDS 00806-0100-4001 required with order)	★
Low Power Output		
Expanded		
C2	0.8–3.2 V dc Output with Digital Signal Based on HART Protocol (Output Code M only)	
Gage Pressure Calibration		
Standard		**Standard**
C3	Gage Calibration (Model 3051CA4 only)	★
Alarm Limit		
Standard		**Standard**
C4[16][19]	Analog Output Levels Compliant with NAMUR Recommendation NE 43, Alarm High	★
CN[16][19]	Analog Output Levels Compliant with NAMUR Recommendation NE 43, Alarm Low	★
Pressure Testing		
Expanded		
P1	Hydrostatic Testing with Certificate	
Cleaning Process Area		
Expanded		
P2	Cleaning for Special Service	
P3	Cleaning for <1 PPM Chlorine/Fluorine	
Pressure Calibration		
Expanded		
P4	Calibrate at Line Pressure *(Specify Q48 on order for corresponding certificate)*	
Performance		
Standard		**Standard**
P8[20]	High Performance Option	★

Rosemount 3051

Table 1. 3051C Coplanar Pressure Transmitters Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Flange Adapters		
Standard		**Standard**
DF(21)	1/2 -14 NPT flange adapter(s)	★
Vent/Drain Valves		
Expanded		
D7	Coplanar Flange Without Drain/Vent Ports	
Conduit Plug		
Standard		**Standard**
DO(22)	316 SST Conduit Plug	★
RC1/4 RC1/2 Process Connection		
Expanded		
D9(23)	RC ¼ Flange with RC ½ Flange Adapter - SST	
Max Static Line Pressure		
Standard		**Standard**
P9	4500 psig (310 bar) Static Pressure Limit (3051CD Ranges 2–5 only)	★
Ground Screw		
Standard		**Standard**
V5(24)	External Ground Screw Assembly	★
Surface Finish		
Standard		**Standard**
Q16	Surface finish certification for sanitary remote seals	★
Toolkit Total System Performance Reports		
Standard		**Standard**
QZ	Remote Seal System Performance Calculation Report	★
Conduit Electrical Connector		
Standard		**Standard**
GE	M12, 4-pin, Male Connector (eurofast®)	★
GM	A size Mini, 4-pin, Male Connector (minifast®)	★
Typical Model Number: 3051CD 2 A 2 2 A 1 A B4		

(1) 3051CD0 is available only with Output Code A, Process Flange Code 0 (Alternate Flange H2, H7, HJ, or HK), Isolating Diaphragm Code 2, O-ring Code A, and Bolting Option L4.

(2) Option code M4 - LCD Display with Local Operator Interface required for local addressing and configuration.

(3) Materials of Construction comply with recommendations per NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(4) Requires 0 code in Materials of Construction for Alternate Process Connection.

(5) Not valid with optional code P9 for 4500 psi Static Pressure.

(6) Process Flange limited to Coplanar (codes 2, 3, 5, 7, 8) or Traditional (H2, H3, H7).

(7) Not valid with optional code D9 for RC1/2 Adaptors.

(8) Not valid for optional codes DF and D9 for Adaptors.

(9) "Assemble-to" items are specified separately and require a completed model number.

(10) Available only with output codes A - 4-20 HART and F - FOUNDATION fieldbus.

(11) Not available with Low Power code M.

(12) Available only with 3051CD and 3051CG and output code A - 4-20 mA HART

(13) Not available with Alloy C-276 isolator (3 code), tantalum isolator (5 code), all cast C-276 flanges, all plated CS flanges, all DIN flanges, all Level flanges, assemble-to manifolds (S5 and S6 codes), assemble-to seals (S1 and S2 codes), assemble-to primary elements (S3 and S4 codes), surface finish certification (Q16 code), and remote seal system report (QZ code).

(14) Available only with output code W - Profibus PA.

(15) Only available with HART 4-20 mA output (output code A).

(16) Not available with Fieldbus (output code F) or Profibus (output code W).

(17) Local zero and span adjustments are standard unless Option Code J1 or J3 is specified

(18) The T1 option is not needed with FISCO Product Certifications; transient protection is included in the FISCO product certification codes IA and IE.

(19) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(20) High Performance Option includes 0.04% Reference Accuracy. See Performance Specifications for details.

(21) Not valid with Alternate Process Connection options S3, S4, S5, and S6.

(22) Transmitter is shipped with 316 SST conduit plug (uninstalled) in place of standard carbon steel conduit plug.

(23) Not available with Alternate Process Connection; DIN Flanges and Level Flanges.

(24) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.

Rosemount 3051

Product Data Sheet
00813-0100-4001, Rev LA
Catalog 2011 - 2012

Rosemount 3051T In-Line Pressure Transmitter



3051T In-Line Pressure Transmitter

Rosemount 3051T In-line Pressure transmitters provide reliable Gage and Absolute pressure measurement in a compact in-line design. Select from the following capabilities for seamless integration:

- Performance up to 0.04% accuracy
- Manifolds and Seal Solutions
- 4-20 mA HART, 1-5 Vdc HART low power, FOUNDATION fieldbus, and Profibus PA protocols
- Calibrated spans/ranges from 0.3 to 10,000 psi (10,3 mbar to 689 bar)
- 316 SST and Alloy C-276 process isolators

Additional Information
Specifications: page Pressure-145
Certifications: page Pressure-154
Dimensional Drawings: page Pressure-159

Table 2. 3051T In-Line Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	**Transmitter Type**		
3051T	In-Line Pressure Transmitter		
Pressure Type			
Standard			**Standard**
G	Gage		★
A	Absolute		★
Pressure Range			
	3051TG(1)	**3051TA**	
Standard			**Standard**
1	-14.7 to 30 psi (-1.0 to 2.1 bar)	0 to 30 psia (0 to 2.1 bar)	★
2	-14.7 to 150 psi (-1.0 to 10.3 bar)	0 to 150 psia (0 to 10.3 bar)	★
3	-14.7 to 800 psi (-1.0 to 55 bar)	0 to 800 psia (0 to 55 bar)	★
4	-14.7 to 4000 psi (-1.0 to 276 bar)	0 to 4000 psia (0 to 276 bar)	★
5	-14.7 to 10000 psi (-1.0 to 689 bar)	0 to 10000 psia (0 to 689 bar)	★
Transmitter Output			
Standard			**Standard**
A	4–20 mA with Digital Signal Based on HART Protocol		★
F	FOUNDATION fieldbus Protocol		★
W(2)	Profibus PA Protocol		★
Expanded			
M	Low-Power 1–5 V dc with Digital Signal Based on HART Protocol		
Process Connection Style			
Standard			**Standard**
2B	1/2–14 NPT Female		★
2C	G½ A DIN 16288 Male (Available in SST for Range 1–4 only)		★
Expanded			
2F	Coned and Threaded, Compatible with Autoclave Type F-250-C		
61	Non-threaded Instrument flange (Range 1-4 only)		
Isolating Diaphragm		**Process Connection Wetted Parts Material**	
Standard			**Standard**
2(3)	316L SST	316L SST	★
3(3)	Alloy C-276	Alloy C-276	★

Table 2. 3051T In-Line Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Sensor Fill Fluid			
Standard			**Standard**
1	Silicone		★
2	Inert		★
Housing Material		**Conduit Entry Size**	
Standard			**Standard**
A	Aluminum	½–14 NPT	★
B	Aluminum	M20 × 1.5	★
J	SST	½–14 NPT	★
K	SST	M20 × 1.5	★
Expanded			
D	Aluminum	G½	
M	SST	G½	

Options (Include with selected model number)

PlantWeb Control Functionality		
Standard		**Standard**
A01	Advanced Control Function Block Suite	★
PlantWeb Diagnostic Functionality		
Standard		**Standard**
D01	FOUNDATION fieldbus Diagnostics Suite	★
Manifold Assemblies		
Standard		**Standard**
S5[4]	Assemble to Rosemount 306 Integral Manifold	★
Seal Assemblies		
Standard		**Standard**
S1[4]	Assemble to one Rosemount 1199 seal	★
Mounting Bracket		
Standard		**Standard**
B4	Bracket for 2-in. Pipe or Panel Mounting, All SST	★
Product Certifications		
Standard		**Standard**
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
E2	INMETRO Flameproof	★
E3	China Flameproof	★
E4[5]	TIIS Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E7[5]	IECEx Flameproof, Dust Ignition-proof	★
E8	ATEX Flameproof and Dust Certification	★
I1[5]	ATEX Intrinsic Safety and Dust	★
I2	INMETRO Intrinsic Safety	★
I3	China Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I7[5]	IECEx Intrinsic Safety	★
IA	ATEX Intrinsic Safety for FISCO; for *FOUNDATION* fieldbus protocol only	★
IE	FM FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only	★
K2	INMETRO Flameproof, Intrinsic Safety	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
K6[5]	CSA and ATEX Explosion-proof, Intrinsically Safe, and Division 2 (combination of C6 and K8)	★
K7[5]	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, and Type n (combination of I7, N7, and E7)	★
K8[5]	ATEX Flame-proof, Intrinsic Safety, Type n, Dust (combination of E8, I1 and N1)	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2 (combination of K5 and C6)	★
KD[5]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★
N1[5]	ATEX Type n Certification and Dust	★
N3	China Type n	★
N7[5]	IECEx Type n Certification	★

Table 2. 3051T In-Line Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Drinking Water Approval		
Standard		**Standard**
DW[6]	NSF drinking water approval	★
Shipboard Approvals		
Standard		**Standard**
SBS	American Bureau of Shipping	★
Custody Transfer		
Standard		**Standard**
C5	Measurement Canada Accuracy Approval *(Limited availability depending on transmitter type and range. Contact an Emerson Process Management representative)*	★
Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate	★
QG	Calibration Certificate and GOST Verification Certificate	★
QP	Calibration Certification and tamper evident seal	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204 3.1.B	★
Quality Certification for Safety		
Standard		**Standard**
QS[7]	Prior-use certificate of FMEDA Data	★
Zero/Span Adjustment		
Standard		**Standard**
J1[8][9]	Local Zero Adjustment Only	★
J3[8][9]	No Local Zero or Span Adjustment	★
Expanded		
D1	Hardware adjustments (zero, span, alarm, security)	
Display and Interface Options		
Standard		**Standard**
M4[10]	LCD Display with Local Operator Interface	★
M5	LCD Display	★
M6	LCD Display for SST Housing (Housing Codes J, K, L and M only)	★
Conduit Plug		
Standard		**Standard**
DO[11]	316 SST Conduit Plug	★
Transient Terminal Block		
Standard		**Standard**
T1[12]	Transient Protection Terminal Block	★
Software Configuration		
Standard		**Standard**
C1[8]	Custom Software Configuration (Completed CDS 00806-0100-4001 required with order)	★
Expanded		
C2[8]	0.8–3.2 V dc Output with Digital Signal Based on *HART* Protocol (Output Code M only)	
Alarm Limit		
Standard		**Standard**
C4[8][13]	Analog Output Levels Compliant with NAMUR Recommendation NE 43, Alarm High	★
CN[8][13]	Analog Output Levels Compliant with NAMUR Recommendation NE 43, Low Alarm	★
Pressure Testing		
Expanded		
P1	Hydrostatic Testing with Certificate	

Table 2. 3051T In-Line Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Cleaning Process Area(14)		
Expanded		
P2	Cleaning for Special Service	
P3	Cleaning for <1 PPM Chlorine/Fluorine	
Performance		
Standard		**Standard**
P8(15)	High Performance Option	★
Ground Screw		
Standard		**Standard**
V5(16)	External Ground Screw Assembly	★
Surface Finish		
Standard		**Standard**
Q16	Surface finish certification for sanitary remote seals	★
Toolkit Total System Performance Reports		
Standard		**Standard**
QZ	Remote Seal System Performance Calculation Report	★
Conduit Electrical Connector		
Standard		**Standard**
GE	M12, 4-pin, Male Connector (eurofast®)	★
GM	A size Mini, 4-pin, Male Connector (minifast®)	★
Typical Model Number:	**3051T G 5 F 2A 2 1 A B4**	

(1) 3051TG lower range limit varies with atmospheric pressure.

(2) Option code M4 - LCD Display with Local Operator Interface required for local addressing and configuration.

(3) Materials of Construction comply with recommendations per NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(4) "Assemble-to" items are specified separately and require a completed model number.

(5) Not available with low-power Option Code M.

(6) Not available with Alloy C-276 isolator (3 code), tantalum isolator (5 code), all cast C-276 flanges, all plated CS flanges, all DIN flanges, all Level flanges, assemble-to manifolds (S5 and S6 codes), assemble-to seals (S1 and S2 codes), assemble-to primary elements (S3 and S4 codes), surface finish certification (Q16 code), and remote seal system report (QZ code).

(7) Only available with HART 4-20 mA output (output code A).

(8) Not available with fieldbus (output code F) or Profibus protocols (output code W).

(9) Local zero and span adjustments are standard unless Option Code J1 or J3 is specified.

(10) Available only with output code W - Profibus PA.

(11) Transmitter is shipped with 316 SST conduit plug (uninstalled) in place of standard carbon steel conduit plug.

(12) The T1 option is not needed with FISCO Product Certifications; transient protection is included in the FISCO product certification codes IA and IE.

(13) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(14) Not valid with Alternate Process Connection S5.

(15) High Performance Option includes 0.04% Reference Accuracy. See Performance Specifications for details.

(16) The V5 option is not needed with T1 option; external ground screw assembly is included with the T1 option.

Rosemount 3051

Product Data Sheet
00813-0100-4001, Rev LA
Catalog 2011 - 2012

Rosemount 3051CF Flowmeter Series





Rosemount 3051CFA
Annubar Flowmeter

Rosemount 3051CF Flowmeters combine the proven 3051C pressure transmitter and the latest primary element technology: Annubar Averaging Pitot Tube, Compact Conditioning Orifice Plate, and Integral Orifice Plate.

- Flowmeters are factory configured to meet your application needs (Configuration Data Sheet required)
- 4-20 mA HART, FOUNDATION fieldbus, and Profibus PA protocols
- Integral temperature measurement (T option)
- Direct or remote mount configurations available

Additional Information
Specifications: page Pressure-145
Certifications: page Pressure-154
Dimensional Drawings: page Pressure-159

Table 3. Rosemount 3051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
3051CFA	Annubar Flowmeter	
Measurement Type		
Standard		**Standard**
D	Differential Pressure	★
Fluid Type		
Standard		**Standard**
L	Liquid	★
G	Gas	★
S	Steam	★
Line Size		
Standard		**Standard**
020	2-in. (50 mm)	★
025	2 1/2-in. (63.5 mm)	★
030	3-in. (80 mm)	★
035	3 1/2-in. (89 mm)	★
040	4-in. (100 mm)	★
050	5-in. (125 mm)	★
060	6-in. (150 mm)	★
070	7-in. (175 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
Expanded		
140	14-in. (350 mm)	
160	16-in. (400 mm)	
180	18-in. (450 mm)	
200	20-in. (500 mm)	
240	24-in. (600 mm)	
300	30-in. (750 mm)	
360	36-in. (900 mm)	
420	42-in. (1066 mm)	
480	48-in. (1210 mm)	
600	60-in. (1520 mm)	
720	72-in. (1820 mm)	
780	78-in (1950 mm)	

Table 3. Rosemount 3051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

840	84-in. (2100 mm)	
900	90-in. (2250 mm)	
960	96-in (2400 mm)	
Pipe I.D. Range		
Standard		**Standard**
C	Range C from the Pipe I.D. table	★
D	Range D from the Pipe I.D. table	★
Expanded		
A	Range A from the Pipe I.D. table	
B	Range B from the Pipe I.D. table	
E	Range E from the Pipe I.D. table	
Z	Non-standard Pipe I.D. Range or Line Sizes greater than 12 inches	
Pipe Material / Mounting Assembly Material		
Standard		**Standard**
C	Carbon steel (A105)	★
S	316 Stainless Steel	★
0	No Mounting (Customer Supplied)	★
Expanded		
G	Chrome-Moly Grade F-11	
N	Chrome-Moly Grade F-22	
J	Chrome-Moly Grade F-91	
Piping Orientation		
Standard		**Standard**
H	Horizontal Piping	★
D	Vertical Piping with Downwards Flow	★
U	Vertical Piping with Upwards Flow	★
Annubar Type		
Standard		**Standard**
P	Pak-Lok	★
F	Flanged with opposite side support	★
Expanded		
L	Flange-Lok	
G	Gear-Drive Flo-Tap	
M	Manual Flo-Tap	
Sensor Material		
Standard		**Standard**
S	316 Stainless Steel	★
Expanded		
H	Alloy C-276	
Sensor Size		
Standard		**Standard**
1	Sensor size 1 — Line sizes 2-in. (50 mm) to 8-in. (200 mm)	★
2	Sensor size 2 — Line sizes 6-in. (150 mm) to 96-in. (2400 mm)	★
3	Sensor size 3 — Line sizes greater than 12-in. (300 mm)	★
Mounting Type		
Standard		**Standard**
T1	Compression or Threaded Connection	★
A1	150# RF ANSI	★
A3	300# RF ANSI	★
A6	600# RF ANSI	★
D1	DN PN16 Flange	★
D3	DN PN40 Flange	★
D6	DN PN100 Flange	★

Table 3. Rosemount 3051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded				
A9(1)	900# RF ANSI			
AF(1)	1500# RF ANSI			
AT(1)	2500 # RF ANSI			
R1	150# RTJ Flange			
R3	300# RTJ Flange			
R6	600# RTJ Flange			
R9(1)	900# RTJ Flange			
RF(1)	1500# RTJ Flange			
RT(1)	2500# RTJ Flange			
Opposite Side Support or Packing Gland				
Standard				**Standard**
0	No opposite side support or packing gland (Required for Pak-Lok and Flange-Lok models)			★
	Opposite Side Support – Required for Flanged Models			
C	NPT Threaded Opposite Support Assembly – Extended Tip			★
D	Welded Opposite Support Assembly – Extended Tip			★
Expanded				
	Packing Gland – Required for Flo-Tap Models			
	Packing Gland Material	*Rod Material*	*Packing Material*	
J	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	PTFE	
K	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	PTFE	
L	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	Graphite	
N	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	Graphite	
R	Alloy C-276 Packing Gland / Cage Nipple	Stainless Steel	Graphite	
Isolation Valve for Flo-Tap Models				
Standard				**Standard**
0	Not Applicable or Customer Supplied			★
Expanded				
1	Gate Valve, Carbon Steel			
2	Gate Valve, Stainless Steel			
5	Ball Valve, Carbon Steel			
6	Ball Valve, Stainless Steel			
Temperature Measurement				
Standard				**Standard**
T	Integral RTD – not available with Flanged model greater than class 600#			★
0	No Temperature Sensor			★
Expanded				
R	Remote Thermowell and RTD			
Transmitter Connection Platform				
Standard				**Standard**
3	Direct-mount, Integral 3-valve Manifold– not available with Flanged model greater than class 600			★
5	Direct -mount, 5-valve Manifold – not available with Flanged model greater than class 600			★
7	Remote-mount NPT Connections ($^1/_2$-in. NPT)			★
Expanded				
6	Direct-mount, high temperature 5-valve Manifold – not available with Flanged model greater than class 600			
8	Remote-mount SW Connections ($^1/_2$-in.)			
Differential Pressure Range				
Standard				**Standard**
1	0 to 25 in H_2O (0 to 62,3 mbar)			★
2	0 to 250 in H_2O (0 to 623 mbar)			★
3	0 to 1000 in H_2O (0 to 2,5 bar)			★

Table 3. Rosemount 3051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transmitter Output			
Standard			**Standard**
A	4–20 mA with digital signal based on HART Protocol		★
F	FOUNDATION fieldbus Protocol		★
W[2]	Profibus PA Protocol		★
Expanded			
M	Low-Power, 1-5 V dc with Digital Signal Based on HART Protocol		
Transmitter Housing Material		**Conduit Entry Size**	
Standard			**Standard**
A	Aluminum	1/2-14 NPT	★
B	Aluminum	M20 x 1.5	★
J	SST	1/2-14 NPT	★
K	SST	M20 x 1.5	★
Expanded			
D	Aluminum	G1/2	
M	SST	G1/2	
Transmitter Performance Class			
Standard			**Standard**
1	1.6% flow rate accuracy, 8:1 flow turndown, 5-yr. stability		★

Options (Include with selected model number)

Pressure Testing		
Expanded		
P1[3]	Hydrostatic Testing with Certificate	
PX[3]	Extended Hydrostatic Testing	
Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Material Testing		
Expanded		
V1	Dye Penetrant Exam	
Material Examination		
Expanded		
V2	Radiographic Examination	
Flow Calibration		
Expanded		
W1	Flow Calibration (Average K)	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection & Performance Certificate	★
Surface Finish		
Standard		**Standard**
RL	Surface finish for Low Pipe Reynolds # in Gas & Steam	★
RH	Surface finish for High Pipe Reynolds # in Liquid	★
Material Traceability Certification		
Standard		**Standard**
Q8[4]	Material Traceability Certification per EN 10474:2004 3.1	★
Code Conformance[5]		
Expanded		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	

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Table 3. Rosemount 3051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Materials Conformance		
Expanded		
J5[6]	NACE MR-0175 / ISO 15156	
Country Certification		
Standard		**Standard**
J6	European Pressure Directive (PED)	★
Expanded		
J1	Canadian Registration	
Installed in Flanged Pipe Spool Section		
Expanded		
H3	150# Flanged Connection with Rosemount Standard Length and Schedule	
H4	300# Flanged Connection with Rosemount Standard Length and Schedule	
H5	600# Flanged Connection with Rosemount Standard Length and Schedule	
Instrument Connections for Remote Mount Options		
Standard		**Standard**
G2	Needle Valves, Stainless Steel	★
G6	OS&Y Gate Valve, Stainless Steel	★
Expanded		
G1	Needle Valves, Carbon Steel	
G3	Needle Valves, Alloy C-276	
G5	OS&Y Gate Valve, Carbon Steel	
G7	OS&Y Gate Valve, Alloy C-276	
Special Shipment		
Standard		**Standard**
Y1	Mounting Hardware Shipped Separately	★
Special Dimensions		
Expanded		
VM	Variable Mounting	
VT	Variable Tip	
VS	Variable length Spool Section	
PlantWeb Control Functionality		
Standard		**Standard**
A01[7]	FOUNDATION fieldbus Advanced Control Function Block Suite	★
PlantWeb Diagnostic Functionality		
Standard		**Standard**
D01[7]	FOUNDATION fieldbus Diagnostics Suite	★
Product Certifications		
Standard		**Standard**
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E7[8]	IECEx Flameproof, Dust Ignition-proof	★
E8	ATEX Flameproof, Dust	★
I1[8]	ATEX Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	★
K6[8]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	★
K8[8]	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E8, I1 and N1)	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of K5 and C6)	★
KD[8]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★
N1[8]	ATEX Type n	★
Sensor Fill Fluid and O-ring Options		
Standard		**Standard**
L1	Inert Sensor Fill Fluid *Note: Silicone fill fluid is standard.*	★
L2	Graphite-Filled (PTFE) O-ring	★
LA	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★

Table 3. Rosemount 3051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Shipboard Approvals		
Standard		**Standard**
SBS	American Bureau of Shipping	★
Display and Interface Options		
Standard		**Standard**
M4(9)	LCD Display with Local Operator Interface	★
M5	LCD Display	★
Transmitter Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate for Transmitter	★
Quality Certification for Safety		
Standard		**Standard**
QS(11)	Prior-use certificate of FMEDA data	★
Transient Protection		
Standard		**Standard**
T1(10)	Transient terminal block	★
Manifold for Remote Mount Option		
Standard		**Standard**
F2	3-Valve Manifold, Stainless Steel	★
F6	5-Valve Manifold, Stainless Steel	★
Expanded		
F1	3-Valve Manifold, Carbon Steel	
F3	3-Valve Manifold, Alloy C-276	
F5	5-Valve Manifold, Carbon Steel	
F7	5-Valve Manifold, Alloy C-276	
Lower Power Output		
Standard		**Standard**
C2(11)	0.8-3.2 V dc Output with Digital Signal Based on Hart Protocol	★
Alarm Limit		
Standard		**Standard**
C4(11)(12)	NAMUR Alarm and Saturation Levels, High Alarm	★
CN(11)(12)	NAMUR Alarm and Saturation Levels, Low Alarm	★
Ground Screw		
Standard		**Standard**
V5(13)	External Ground Screw Assembly	★
Typical Model Number: 3051CFA D L 060 D C H P S 2 T1 0 0 0 3 2 A A 1		

(1) Available in remote mount applications only.

(2) Option code M4 - LCD Display with Local Operator Interface required for local addressing and configuration.

(3) Applies to assembled flowmeter only, mounting not tested.

(4) Instrument Connections for Remote Mount Options and Isolation Valves for Flo-tap Models are not included in the Material Traceability Certification.

(5) Not available with Transmitter Connection Platform 6.

(6) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(7) Only valid with FOUNDATION fieldbus Output Code F.

(8) Not available with Low Power code M.

(9) Available only with output code W - Profibus PA.

(10) The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(11) Not available with FOUNDATION fieldbus (Output Code F) or Profibus (Output Code W).

(12) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(13) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.

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00813-0100-4001, Rev LA
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Rosemount 3051CFC Compact Flowmeter

Additional Information
Specifications: page Pressure-145
Certifications: page Pressure-154
Dimensional Drawings: page Pressure-159

Table 4. Rosemount 3051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
3051CFC	Compact Flowmeter	
Measurement Type		
Standard		**Standard**
D	Differential Pressure	★
Primary Element Technology		
Standard		**Standard**
C	Conditioning Orifice Plate	★
P	Orifice Plate	★
Material Type		
Standard		**Standard**
S	316 SST	★
Line Size		
Standard		**Standard**
005(1)	1/2-in. (15 mm)	★
010(1)	1-in. (25 mm)	★
015(1)	1 1/2-in. (40 mm)	★
020	2-in. (50 mm)	★
030	3-in. (80 mm)	★
040	4-in. (100 mm)	★
060	6-in. (150 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
Primary Element Style		
Standard		**Standard**
N	Square Edged	★
Primary Element Type		
Standard		**Standard**
040	0.40 Beta Ratio	★
065(2)	0.65 Beta Ratio	★
Temperature Measurement		
Standard		**Standard**
0	No Temperature Sensor	★
Expanded		
R	Remote Thermowell and RTD	
Transmitter Connection Platform		
Standard		**Standard**
3	Direct-mount, Integral 3-valve Manifold	★
7	Remote-mount, 1/4-in. NPT Connections	★
Differential Pressure Range		
Standard		**Standard**
1	0 to 25 in H_2O (0 to 62,3 mbar)	★
2	0 to 250 in H_2O (0 to 623 mbar)	★
3	0 to 1000 in H_2O (0 to 2,5 bar)	★

Table 4. Rosemount 3051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transmitter Output			
Standard			**Standard**
A	4–20 mA with digital signal based on HART Protocol		★
F	FOUNDATION fieldbus Protocol		★
W(3)	Profibus PA Protocol		★
Expanded			
M	Low-Power, 1-5 V dc with Digital Signal Based on HART Protocol		
Transmitter Housing Material		**Conduit Entry Size**	
Standard			**Standard**
A	Aluminum	1/2-14 NPT	★
B	Aluminum	M20 x 1.5	★
J	SST	1/2-14 NPT	★
K	SST	M20 x 1.5	★
Expanded			
D	Aluminum	G1/2	
M	SST	G1/2	
Transmitter Performance Class			
Standard			**Standard**
1	Up to ±1.75% flow rate accuracy, 8:1 flow turndown, 5-year stability		★

Options (Include with selected model number)

Installation Accessories		
Standard		**Standard**
AB	ANSI Alignment Ring (150#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	★
AC	ANSI Alignment Ring (300#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	★
AD	ANSI Alignment Ring (600#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	★
DG	DIN Alignment Ring (PN16)	★
DH	DIN Alignment Ring (PN40)	★
DJ	DIN Alignment Ring (PN100)	★
Expanded		
JB	JIS Alignment Ring (10K)	
JR	JIS Alignment Ring (20K)	
JS	JIS Alignment Ring (40K)	
Remote Adapters		
Standard		**Standard**
FE	Flange Adapters 316 SST (1/2-in NPT)	★
High Temperature Application		
Expanded		
HT	Graphite Valve Packing (Tmax = 850 °F)	
Flow Calibration		
Expanded		
WC(4)	Flow Calibration Certification (3 point)	
WD(4)	Discharge Coefficient Verification (full 10 point)	
Pressure Testing		
Expanded		
P1	Hydrostatic Testing with Certificate	
Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection and Performance Certificate	★

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Table 4. Rosemount 3051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transmitter Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate for Transmitter	★
Quality Certification for Safety		
Standard		**Standard**
QS[5]	Prior-use certificate of FMEDA data	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204:2004 3.1	★
Code Conformance		
Expanded		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
J4	ANSI/ASME B31.8	
Materials Conformance		
Expanded		
J5[6]	NACE MR-0175 / ISO 15156	
Country Certification		
Expanded		
J1	Canadian Registration	
Product Certifications		
Standard		**Standard**
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E7[7]	IECEx Flameproof, Dust Ignition-proof	★
E8	ATEX Flameproof, Dust	★
I1[7]	ATEX Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	★
K6[7]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	★
K8[7]	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E8, I1 and N1)	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of K5 and C6)	★
KD[7]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★
N1[7]	ATEX Type n	★
Sensor Fill Fluid and O-ring Options		
Standard		**Standard**
L1	Inert Sensor Fill Fluid	★
L2	Graphite-Filled (PTFE) O-ring	★
LA	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★
Shipboard Approvals		
Standard		**Standard**
SBS	American Bureau of Shipping	★
Display and Interface Options		
Standard		**Standard**
M4[8]	LCD Display with Local Operator Interface	★
M5	LCD Display	★
Transient Protection		
Standard		**Standard**
T1[9]	Transient terminal block	★
Manifold for Remote Mount Option		
Standard		**Standard**
F2	3-Valve Manifold, Stainless Steel	★
F6	5-Valve Manifold, Stainless Steel	★

Table 4. Rosemount 3051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

PlantWeb Control Functionality		
Standard		**Standard**
A01[10]	FOUNDATION fieldbus Advanced Control Function Block Suite	★
PlantWeb Diagnostic Functionality		
Standard		**Standard**
D01[10]	FOUNDATION fieldbus Diagnostic Suite	★
Low Power Output		
Standard		**Standard**
C2[11]	0.8-3.2 V dc Output with Digital Signal Based on Hart Protocol	★
Alarm Limit		
Standard		**Standard**
C4[11][12]	NAMUR Alarm and Saturation Levels, High Alarm	★
CN[11][12]	NAMUR Alarm and Saturation Levels, Low Alarm	★
Ground Screw		
Standard		**Standard**
V5[13]	External Ground Screw Assembly	★
Typical Model Number: 3051CFC D C S 060 N 065 0 3 2 A A 1 WC E5 M5		

(1) Not available for Primary Element Technology C.

(2) For 2-in. (50 mm) line sizes the Primary Element Type is 0.6 for Primary Element Technology Code C.

(3) Option code M4 - LCD Display with Local Operator Interface required for local addressing and configuration.

(4) Not available with Primary Element Technology P.

(5) Not available with FOUNDATION fieldbus (Output Code F) or Profibus (Output Code W).

(6) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(7) Not available with Low Power code M.

(8) Available only with output code W - Profibus PA.

(9) The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(10) Only valid with FOUNDATION fieldbus Output Code F.

(11) Not available with FOUNDATION fieldbus (Output Code F) or Profibus (Output Code W).

(12) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(13) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.

Rosemount 3051

Product Data Sheet
00813-0100-4001, Rev LA
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Rosemount 3051CFP Integral Orifice Flowmeter

Additional Information
Specifications: page Pressure-145
Certifications: page Pressure-154
Dimensional Drawings: page Pressure-159

Table 5. Rosemount 3051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
3051CFP	Integral Orifice Flowmeter	
Measurement Type		
Standard		**Standard**
D	Differential Pressure	★
Body Material		
Standard		**Standard**
S	316 SST	★
Line Size		
Standard		**Standard**
005	1/2-in. (15 mm)	★
010	1-in. (25 mm)	★
015	1 1/2-in. (40 mm)	★
Process Connection		
Standard		**Standard**
T1	NPT Female Body (Not Available with Remote Thermowell and RTD)	★
S1(1)	Socket Weld Body (Not Available with Remote Thermowell and RTD)	★
P1	Pipe Ends: NPT Threaded	★
P2	Pipe ends: Beveled	★
D1	Pipe Ends: Flanged, DIN PN16, slip-on	★
D2	Pipe Ends: Flanged, DIN PN40, slip-on	★
D3	Pipe Ends: Flanged, DIN PN100, slip-on	★
W1	Pipe Ends: Flanged, RF, ANSI Class 150, weld-neck	★
W3	Pipe Ends: Flanged, RF, ANSI Class 300, weld-neck	★
W6	Pipe Ends: Flanged, RF, ANSI Class 600, weld-neck	★
Expanded		
A1	Pipe Ends: Flanged, RF, ANSI Class 150, slip-on	
A3	Pipe Ends: Flanged, RF, ANSI Class 300, slip-on	
A6	Pipe Ends: Flanged, RF, ANSI Class 600, slip-on	
R1	Pipe Ends: Flanged, RTJ, ANSI Class 150, slip-on	
R3	Pipe Ends: Flanged, RTJ, ANSI Class 300, slip-on	
R6	Pipe Ends: Flanged, RTJ, ANSI Class 600, slip-on	
Orifice Plate Material		
Standard		**Standard**
S	316 SST	★
Expanded		
H	Alloy C-276	
M	Alloy 400	
Bore Size Option		
Standard		**Standard**
0066	0.066-in. (1.68 mm) for 1/2-in. Pipe	★
0109	0.109-in. (2.77 mm) for 1/2-in. Pipe	★
0160	0.160-in. (4.06 mm) for 1/2-in. Pipe	★
0196	0.196-in. (4.98 mm) for 1/2-in. Pipe	★

Table 5. Rosemount 3051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

0260	0.260-in. (6.60 mm) for 1/2-in. Pipe		★
0340	0.340-in. (8.64 mm) for 1/2-in. Pipe		★
0150	0.150-in. (3.81 mm) for 1-in. Pipe		★
0250	0.250-in. (6.35 mm) for 1-in. Pipe		★
0345	0.345-in. (8.76 mm) for 1-in. Pipe		★
0500	0.500-in. (12.70 mm) for 1-in. Pipe		★
0630	0.630-in. (16.00 mm) for 1-in. Pipe		★
0800	0.800-in. (20.32 mm) for 1-in. Pipe		★
0295	0.295-in. (7.49 mm) for 1 1/2-in. Pipe		★
0376	0.376-in. (9.55 mm) for 1 1/2-in. Pipe		★
0512	0.512-in. (13.00 mm) for 1 1/2-in. Pipe		★
0748	0.748-in. (19.00 mm) for 1 1/2-in. Pipe		★
1022	1.022-in. (25.96 mm) for 1 1/2-in. Pipe		★
1184	1.184-in. (30.07 mm) for 1 1/2-in. Pipe		★
Expanded			
0010	0.010-in. (0.25 mm) for 1/2-in. Pipe		
0014	0.014-in. (0.36 mm) for 1/2-in. Pipe		
0020	0.020-in. (0.51 mm) for 1/2-in. Pipe		
0034	0.034-in. (0.86 mm) for 1/2-in. Pipe		
Transmitter Connection Platform			
Standard			**Standard**
D3	Direct-mount, 3-Valve Manifold, SST		★
D5	Direct-mount, 5-Valve Manifold, SST		★
R3	Remote-mount, 3-Valve Manifold, SST		★
R5	Remote-mount, 5-Valve Manifold, SST		★
Expanded			
D4	Direct-mount, 3-Valve Manifold, Alloy C-276		
D6	Direct-mount, 5-Valve Manifold, Alloy C-276		
D7	Direct-mount, High Temperature, 5-Valve Manifold, SST		
R4	Remote-mount, 3-Valve Manifold, Alloy C-276		
R6	Remote-mount, 5-Valve Manifold, Alloy C-276		
Differential Pressure Ranges			
Standard			**Standard**
1	0 to 25 in H_2O (0 to 62,3 mbar)		★
2	0 to 250 in H_2O (0 to 623 mbar)		★
3	0 to 1000 in H_2O (0 to 2,5 bar)		★
Transmitter Output			
Standard			**Standard**
A	4–20 mA with digital signal based on HART Protocol		★
F	FOUNDATION fieldbus Protocol		★
W[(2)]	Profibus PA Protocol		★
Expanded			
M	Low-Power, 1-5 V dc with Digital Signal Based on HART Protocol		
Transmitter Housing Material		**Conduit Entry Size**	
Standard			**Standard**
A	Aluminum	1/2-14 NPT	★
B	Aluminum	M20 x 1.5	★
J	SST	1/2-14 NPT	★
K	SST	M20 x 1.5	★
Expanded			
D	Aluminum	G1/2	
M	SST	G1/2	
Transmitter Performance Class			
Standard			**Standard**
1	up to ±1.75% flow rate accuracy, 8:1 flow turndown, 5-year stability		★

Rosemount 3051

Table 5. Rosemount 3051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Options (Include with selected model number)

Transmitter Body / Bolt Material		
Expanded		
GT	High Temperature (850 °F / 454 °C)	
Temperature Sensor		
Expanded		
RT(3)	Thermowell and RTD	
Optional Connection		
Standard		**Standard**
G1	DIN 19213 Transmitter Connection	★
Pressure Testing		
Expanded		
P1(4)	Hydrostatic Testing with Certificate	
Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Material Testing		
Expanded		
V1	Dye Penetrant Exam	
Material Examination		
Expanded		
V2	Radiographic Examination	
Flow Calibration		
Expanded		
WD(5)	Discharge Coefficient Verification	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection and Performance Certificate	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204:2004 3.1	★
Code Conformance		
Expanded		
J2(6)	ANSI/ASME B31.1	
J3(6)	ANSI/ASME B31.3	
J4(6)	ANSI/ASME B31.8	
Materials Conformance		
Expanded		
J5(7)	NACE MR-0175 / ISO 15156	
Country Certification		
Standard		**Standard**
J6	European Pressure Directive (PED)	★
Expanded		
J1	Canadian Registration	
Transmitter Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate for Transmitter	★
Quality Certification for Safety		
Standard		**Standard**
QS(8)	Prior-use certificate of FMEDA data	★

Table 5. Rosemount 3051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Product Certifications		
Standard		**Standard**
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E7(9)	IECEx Flameproof, Dust Ignition-proof	★
E8	ATEX Flameproof, Dust	★
I1(9)	ATEX Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	★
K6(9)	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	★
K8(9)	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E8, I1 and N1)	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of K5 and C6)	★
KD(9)	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1 and E8)	★
N1(9)	ATEX Type n	★
Sensor Fill Fluid and O-ring Options		
Standard		**Standard**
L1	Inert Sensor Fill Fluid	★
L2	Graphite-Filled (PTFE) O-ring	★
LA	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★
Shipboard Approvals		
Standard		**Standard**
SBS	American Bureau of Shipping	★
Display and Interface Options		
Standard		**Standard**
M4(10)	LCD Display with Local Operator Interface	★
M5	LCD Display	★
Transient Protection		
Standard		**Standard**
T1(11)	Transient terminal block	★
PlantWeb Control Functionality		
Standard		**Standard**
A01(12)	FOUNDATION fieldbus Advanced Control Function Block Suite	★
PlantWeb Diagnostic Functionality		
Standard		**Standard**
D01(12)	FOUNDATION fieldbus Diagnostic Suite	★
Lower Power Output		
Standard		**Standard**
C2(13)	0.8-3.2 V dc Output with Digital Signal Based on Hart Protocol	★
Alarm Limit		
Standard		**Standard**
C4(13)(14)	NAMUR Alarm and Saturation Levels, High Alarm	★
CN(13)(14)	NAMUR Alarm and Saturation Levels, Low Alarm	★
Ground Screw		
Standard		**Standard**
V5(15)	External Ground Screw Assembly	★
Typical Model Number: 3051CFP D S 010 W1 S 0500 D3 2 A A 1 E5 M5		

(1) To improve pipe perpendicularity for gasket sealing, socket diameter is smaller than standard pipe O.D.

(2) Option code M4 - LCD Display with Local Operator Interface required for local addressing and configuration.

(3) Thermowell Material is the same as the body material.

(4) Does not apply to Process Connection codes T1 and S1.

(5) Not available for bore sizes 0010, 0014, 0020, or 0034.

(6) Not available with DIN Process Connection codes D1, D2, or D3.

(7) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(8) Not available with FOUNDATION fieldbus (Output Code F) or Profibus (Output Code W).

(9) Not available with Low Power code M.

(10) Available only with output code W - Profibus PA.

(11) The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(12) Only valid with FOUNDATION fieldbus Output Code F.

(13) Not available with FOUNDATION fieldbus (Output Code F) or Profibus (Output Code W).

(14) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(15) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.

Rosemount 3051L Liquid Level Transmitter



3051L Liquid Level Transmitter

Rosemount 3051 liquid level transmitters combine the features and benefits of a 3051 transmitter with the durability and reliability of a direct mount seal all in a single model number.

Level transmitters can also be ordered with an additional 1199 remote seal to form a Tuned-System Assembly that offers improved performance and reduced costs compared to traditional symmetrical (balanced) assemblies.

Product features and capabilities include:

- Variety of process connections
- Quantified performance for the entire transmitter / seal assembly (QZ option)
- 4-20 mA HART, 1-5 Vdc HART low power, FOUNDATION fieldbus, and Profibus PA protocols

Additional Information
Specifications: page Pressure-145
Certifications: page Pressure-154
Dimensional Drawings: page Pressure-159

Table 6. Rosemount 3051L Liquid Level Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	**Transmitter Type**			
3051L	Liquid Level Transmitter			
Pressure Range				
Standard				**Standard**
2	–250 to 250 inH_2O (–0,6 to 0,6 bar)			★
3	–1000 to 1000 inH_2O (–2,5 to 2,5 bar)			★
4	–300 to 300 psi (–20,7 to 20,7 bar)			★
Transmitter Output				
Standard				**Standard**
A	4–20 mA with Digital Signal Based on *HART* Protocol			★
F	FOUNDATION fieldbus Protocol			★
W(1)	Profibus PA Protocol			★
Expanded				
M	Low-Power 1–5 V dc with Digital Signal Based on *HART* Protocol (See Option Code C2 for 0.8–3.2 V dc Output)			
Process Connection Size, Material, Extension length (High Side)				
Standard				**Standard**
Code	**Process Connection Size**	**Material**	**Extension Length**	★
G0(2)	2-in./DN 50	316L SST	Flush Mount Only	★
H0(2)	2-in./DN 50	Alloy C-276	Flush Mount Only	★
J0	2-in./DN 50	Tantalum	Flush Mount Only	★
A0(2)	3-in./DN 80	316L SST	Flush Mount	★
A2(2)	3-in./DN 80	316L SST	2-in./50 mm	★
A4(2)	3-in./DN 80	316L SST	4-in./100 mm	★
A6(2)	3-in./DN 80	316L SST	6-in./150 mm	★
B0(2)	4-in./DN 100	316L SST	Flush Mount	★
B2(2)	4-in./DN 100	316L SST	2-in./50 mm	★
B4(2)	4-in./DN 100	316L SST	4-in./100 mm	★

Table 6. Rosemount 3051L Liquid Level Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

B6[2]	4-in./DN 100	316L SST	6-in./150 mm	★
C0[2]	3-in./DN 80	Alloy C-276	Flush Mount	★
C2[2]	3-in./DN 80	Alloy C-276	2-in./50 mm	★
C4[2]	3-in./DN 80	Alloy C-276	4-in./100 mm	★
C6[2]	3-in./DN 80	Alloy C-276	6-in./150 mm	★
D0[2]	4-in./DN 100	Alloy C-276	Flush Mount	★
D2[2]	4-in./DN 100	Alloy C-276	2-in./50 mm	★
D4[2]	4-in./DN 100	Alloy C-276	4-in./100 mm	★
D6[2]	4-in./DN 100	Alloy C-276	6-in./150 mm	★
E0	3-in./DN 80	Tantalum	Flush Mount Only	★
F0	4-in./DN 100	Tantalum	Flush Mount Only	★
Mounting Flange Size, Rating, Material (High Side)				
	Size	**Rating**	**Material**	
Standard				**Standard**
M	2-in.	ANSI/ASME B16.5 Class 150	CS	★
A	3-in.	ANSI/ASME B16.5 Class 150	CS	★
B	4-in.	ANSI/ASME B16.5 Class 150	CS	★
N	2-in.	ANSI/ASME B16.5 Class 300	CS	★
C	3-in.	ANSI/ASME B16.5 Class 300	CS	★
D	4-in.	ANSI/ASME B16.5 Class 300	CS	★
P	2-in.	ANSI/ASME B16.5 Class 600	CS	★
E	3-in.	ANSI/ASME B16.5 Class 600	CS	★
X[2]	2-in.	ANSI/ASME B16.5 Class 150	SST	★
F[2]	3-in.	ANSI/ASME B16.5 Class 150	SST	★
G[2]	4-in.	ANSI/ASME B16.5 Class 150	SST	★
Y[2]	2-in.	ANSI/ASME B16.5 Class 300	SST	★
H[2]	3-in.	ANSI/ASME B16.5 Class 300	SST	★
J[2]	4-in.	ANSI/ASME B16.5 Class 300	SST	★
Z[2]	2-in.	ANSI/ASME B16.5 Class 600	SST	★
L[2]	3-in.	ANSI/ASME B16.5 Class 600	SST	★
Q	DN 50	PN 10-40 per EN 1092-1	CS	★
R	DN 80	PN 40 per EN 1092-1	CS	★
S	DN 100	PN 40 per EN 1092-1	CS	★
V	DN 100	PN 10/16 per EN 1092-1	CS	★
K[2]	DN 50	PN 10-40 per EN 1092-1	SST	★
T[2]	DN 80	PN 40 per EN 1092-1	SST	★
U[2]	DN 100	PN 40 per EN 1092-1	SST	★
W[2]	DN 100	PN 10/16 per EN 1092-1	SST	★
7[2]	4 in.	ANSI/ASME B16.5 Class 600	SST	★
Expanded				
1	—	10K per JIS B2238	CS	
2	—	20K per JIS B2238	CS	
3	—	40K per JIS B2238	CS	
4[2]	—	10K per JIS B2238	316 SST	
5[2]	—	20K per JIS B2238	316 SST	
6[2]	—	40K per JIS B2238	316 SST	

Table 6. Rosemount 3051L Liquid Level Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Seal Fill Fluid (High Side)		**Specific Gravity**	**Temperature Limits (Ambient Temperature of 70° F (21° C))**	
Standard				**Standard**
A	Syltherm XLT	0.85	-102 to 293 °F (-75 to 145 °C)	★
C	Silicone 704	1.07	32 to 401 °F (0 to 205 °C)	★
D	Silicone 200	0.93	-49 to 401 °F (-45 to 205 °C)	★
H	Inert (Halocarbon)	1.85	-49 to 320 °F (-45 to 160 °C)	★
G	Glycerine and Water	1.13	5 to 203 °F (-15 to 95 °C)	★
N	Neobee M-20	0.92	5 to 401 °F (-15 to 205 °C)	★
P	Propylene Glycol and Water	1.02	5 to 203 F (-15 to 95 °C)	★

Low Pressure Side					
	Configuration	**Flange Adapter**	**Diaphragm Material**	**Sensor Fill Fluid**	
Standard					**Standard**
11[(2)]	Gage	SST	316L SST	Silicone	★
21[(2)]	Differential	SST	316L SST	Silicone	★
22[(2)]	Differential	SST	Alloy C-276	Silicone	★
2A[(2)]	Differential	SST	316L SST	Inert (Halocarbon)	★
2B[(2)]	Differential	SST	Alloy C-276	Inert (Halocarbon)	★
31[(2)]	Tuned-System Assembly with Remote Seal	None	316L SST	Silicone *(Requires Option Code S1)*	★

O-ring			
Standard			**Standard**
A	Glass-filled PTFE		★

Housing Material		**Conduit Entry Size**	
Standard			**Standard**
A	Aluminum	½–14 NPT	★
B	Aluminum	M20 × 1.5	★
J	SST	½–14 NPT	★
K	SST	M20 × 1.5	★
Expanded			
D	Aluminum	G½	
M	SST	G½	

Options (Include with selected model number)

PlantWeb Control Functionality		
Standard		**Standard**
A01[(3)]	FOUNDATION fieldbus Advanced Control Function Block Suite	★
PlantWeb Diagnostic Functionality		
Standard		**Standard**
D01[(3)]	FOUNDATION fieldbus Diagnostics Suite	★
Seal Assemblies		
Standard		**Standard**
S1[(4)]	Assembled to One Rosemount 1199 Seal (Requires 1199M)	★

Table 6. Rosemount 3051L Liquid Level Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Product Certifications		
Standard		**Standard**
E5	FM Explosion-proof, Dust Ignition-proof	★
I5	FM Intrinsically Safe, Division 2	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
I1[5]	ATEX Intrinsic Safety and Dust	★
N1[5]	ATEX Type n Certification and Dust	★
E8	ATEX Flameproof and Dust Certification	★
E4[5]	TIIS Flameproof	★
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
K6[5]	CSA and ATEX Explosion-proof, Intrinsically Safe, and Division 2 (combination of C6 and K8)	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2 (combination of K5 and C6)	★
K7[5]	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, and Type n (combination of I7, N7 and E7)	★
K8[5]	ATEX Flame-proof and Intrinsic Safety Approvals (combination of I1 and E8)	★
KD[5]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★
I7[5]	IECEx Intrinsic Safety	★
E7[5]	IECEx Flameproof, Dust Ignition-proof	★
N7[5]	IECEx Type n Certification	★
IA	ATEX FISCO Intrinsic Safety	★
IE	FM FISCO Intrinsically Safe	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsic Safety	★
K2	INMETRO Flameproof, Intrinsic Safety	★
E3	China Flameproof	★
I3	China Intrinsic Safety	★
N3	China Type n	★
Shipboard Approvals		
Standard		**Standard**
SBS	American Bureau of Shipping	★
Bolting Material		
Standard		**Standard**
L4	Austenitic 316 SST Bolts	★
L5	ASTM A 193, Grade B7M bolts	★
L6	Alloy K-500 Bolts	★
L8	ASTM A 193 Class 2, Grade B8M Bolts	★
Display and Interface Options		
Standard		**Standard**
M4[6]	LCD Display with Local Operator Interface	★
M5	LCD Display for Aluminum Housing (Housing Codes A, B, C, and D only)	★
M6	LCD Display for SST Housing (Housing Codes J, K, L, and M only)	★
Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate	★
QP	Calibration Certificate and tamper evident seal	★
QG	Calibration Certificate and GOST Verification Certificate	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204 3.1	★
Quality Certification for Safety		
Standard		**Standard**
QS[7]	Prior-use certificate of FMEDA data	★

Table 6. Rosemount 3051L Liquid Level Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Toolkit Total System Performance Reports				
Standard				**Standard**
QZ	Remote Seal System Performance Calculation Report			★
Conduit Electrical Connector				
Standard				**Standard**
GE	M12, 4-pin, Male Connector (eurofast®)			★
GM	A size Mini, 4-pin, Male Connector (minifast®)			★
Hardware Adjustments				
Standard				**Standard**
J1(8)(9)	Local Zero Adjustment Only			★
J3(8)(9)	No Local Zero or Span Adjustment			★
Transient Protection				
Standard				**Standard**
T1(10)	Transient Protection Terminal Block			★
Software Configuration				
Standard				**Standard**
C1(8)	Custom Software Configuration (Completed CDS 00806-0100-4001 required with order)			★
Low Power Output				
Standard				**Standard**
C2(8)	0.8–3.2 V dc Output with Digital Signal Based on HART Protocol (Available with Output code M only)			★
Alarm Limit				
Standard				**Standard**
C4(8)(11)	NAMUR alarm and saturation levels, high alarm			★
CN(8)(11)	NAMUR alarm and saturation levels, low alarm			★
Conduit Plug				
Standard				**Standard**
DO	316 SST Conduit Plug			★
Ground Screw				
Standard				**Standard**
V5(12)	External Ground Screw Assembly			★
Lower Housing Flushing Connection Options				
	Ring Material	**Number**	**Size (NPT)**	
Standard				**Standard**
F1	316 SST	1	1/4-18 NPT	★
F2	316 SST	2	1/4-18 NPT	★
F3	Alloy C-276	1	1/4-18 NPT	★
F4	Alloy C-276	2	1/4-18 NPT	★
F7	316 SST	1	1/2-14 NPT	★
F8	316 SST	2	1/2-14 NPT	★
F9	Alloy C-276	1	1/2-14 NPT	★
F0	Alloy C-276	2	1/2-14 NPT	★
Typical Model Number: 3051L 2 A A0 D 21 A A F1				

(1) Option code M4 - LCD Display with Local Operator Interface required for local addressing and configuration.

(2) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(3) Only valid with FOUNDATION fieldbus Output Code F.

(4) "Assemble-to" items are specified separately and require a completed model number.

(5) Not available with low-power Option Code M

(6) Available only with output code W - Profibus PA.

(7) Only available with HART 4-20 mA output (output code A).

(8) Not available with fieldbus (output code F) or profibus protocols (output code W).

(9) Local zero and span adjustments are standard unless Option Code J1 or J3 is specified.

(10) The T1 option is not needed with FISCO Product Certifications; transient protection is included in the FISCO product certification codes IA, IE, IF, and IG.

(11) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(12) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.

Specifications

PERFORMANCE SPECIFICATIONS

This product data sheet covers HART, FOUNDATION fieldbus and Profibus PA protocols unless specified.

Conformance To Specification (±3σ (Sigma))

Technology leadership, advanced manufacturing techniques and statistical process control ensure specification conformance to at least ±3σ.

Reference Accuracy

Stated reference accuracy equations include terminal based linearity, hysteresis, and repeatability.

For FOUNDATION fieldbus and Profibus PA devices, use calibrated range in place of span.

Models	Standard	High Accuracy Option
3051C Ranges 2-5	±0.065% of span For spans less than 10:1, accuracy = $\pm\left[0.015 + 0.005\left(\frac{URL}{Span}\right)\right]$% of Span	Ranges 2-5 High Accuracy Option, P8 ±0.04% of span For spans less than 5:1, accuracy = $\pm\left[0.015 + 0.005\left(\frac{URL}{Span}\right)\right]$% of Span
Range 1	±0.10% of span For spans less than 15:1, accuracy = $\pm\left[0.025 + 0.005\left(\frac{URL}{Span}\right)\right]$% of Span	
Range 0 (CD)	±0.10% of span For spans less than 2:1, accuracy = ±0.05% of URL	
3051CA Ranges 1-4	±0.065% of span For spans less than 10:1, accuracy = $\pm\left[0.0075\left(\frac{URL}{Span}\right)\right]$% of Span	Ranges 2-4 High Accuracy Option, P8 ±0.04% of span For spans less than 5:1, accuracy = $\pm\left[0.0075\left(\frac{URL}{Span}\right)\right]$% of Span
3051T Ranges 1-4	±0.065% of span For spans less than 10:1, accuracy = $\pm\left[0.0075\left(\frac{URL}{Span}\right)\right]$% of Span	Ranges 2-4 High Accuracy Option, P8 ±0.04% of span For spans less than 5:1, accuracy = $\pm\left[0.0075\left(\frac{URL}{Span}\right)\right]$% of Span
Range 5	±0.075% of span For spans less than 10:1, accuracy = $\pm\left[0.0075\left(\frac{URL}{Span}\right)\right]$% of Span	
3051L Ranges 2-4	±0.075% of span For spans less than 10:1, accuracy = $\pm\left[0.025 + 0.005\left(\frac{URL}{Span}\right)\right]$% of Span	

Flow Performance - Flow Reference Accuracy

3051CFA Annubar Flowmeter		
Ranges 2-3		±1.80% of Flow Rate at 8:1 flow turndown
3051CFC Compact Orifice Flowmeter – Conditioning Option C		
Ranges 2-3	β =0.4	±1.75% of Flow Rate at 8:1 flow turndown
	β =0.65	±1.95% of Flow Rate at 8:1 flow turndown
3051CFC Compact Orifice Flowmeter – Orifice Type Option P(1)		
Ranges 2-3	β =0.4	±2.00% of Flow Rate at 8:1 flow turndown
	β =0.65	±2.00% of Flow Rate at 8:1 flow turndown
3051CFP Integral Orifice Flowmeter		
Ranges 2-3	β <0.1	±3.00% of Flow Rate at 8:1 flow turndown
	0.1< β <0.2	±1.95% of Flow Rate at 8:1 flow turndown
	0.2< β <0.6	±1.75% of Flow Rate at 8:1 flow turndown
	0.6< β <0.8	±2.15% of Flow Rate at 8:1 flow turndown

(1) For smaller line sizes, see Rosemount Compact Orifice

Total Performance

Total Performance is based on combined errors of reference accuracy, ambient temperature effect, and static pressure effect.

For ±50 °F (28 °C) temperature changes, up to 1000 psi (6,9 MPa) line pressure (CD only), from 1:1 to 5:1 rangedown.

Models	Total Performance
3051C Ranges 2-5	±0.15% of span
3051T Ranges 1-4	±0.15% of span

Long Term Stability

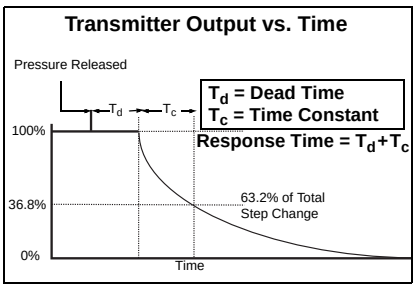
Models	Long Term Stability
3051C Ranges 2-5	±0.125% of URL for 5 years ±50 °F (28 °C) temperature changes, and up to 1000 psi (6.9 MPa) line pressure.
3051CD, 3051CG Low/Draft Range Ranges 0-1	±0.2% of URL for 1 year
3051CA Low Range Range 1	±0.125% of URL for 5 years ±50 °F (28 °C) temperature changes, and up to 1000 psi (6.9 MPa) line pressure.
3051T Ranges 1-5	±0.125% of URL for 5 years ±50 °F (28 °C) temperature changes, and up to 1000 psi (6.9 MPa) line pressure.

Dynamic Performance

	4 - 20 mA HART(1) 1-5 Vdc HART Low Power	FOUNDATION fieldbus and Profibus PA protocols(3)
Total Response Time (T_d + T_c)(2):		
3051C, Ranges 2-5:	100 ms	152 ms
Range 1:	255 ms	307 ms
Range 0:	700 ms	N/A
3051T:	100 ms	152 ms
3051L:	See Instrument Toolkit®	See Instrument Toolkit
Dead Time (Td)	45 ms (nominal)	97 ms
Update Rate	22 times per second	22 times per second

(1) Dead time and update rate apply to all models and ranges; analog output only
(2) Nominal total response time at 75 °F (24 °C) reference conditions.
(3) Transducer block response time, Analog Input block execution time not included.

Typical HART Transmitter Response Time



Line Pressure Effect per 1000 psi (6,9 MPa)

For line pressures above 2000 psi (13,7 MPa) and Ranges 4-5, see user manual (Document number 00809-0100-4001 for HART, 00809-0100-4774 for FOUNDATION fieldbus, and 00809-0100-4797 for Profibus PA).

Models	Line Pressure Effect
3051CD, 3051CF	Zero Error(1)
Ranges 2-3	±0.05% of URL/1000 psi (68.9 bar) for line pressures from 0 to 2000 psi (0 to 13.7 MPa)
Range 1	±0.25% of URL/1000 psi (68.9 bar)
Range 0	±0.125% of URL/100 psi (6.89 bar)
	Span Error
Ranges 2-3	±0.1% of reading/1000 psi (68.9 bar)
Range 1	±0.4% of reading/1000 psi (68.9 bar)
Range 0	±0.15% of reading/100 psi (6.89 bar)

(1) Can be calibrated out at line pressure.

Ambient Temperature Effect per 50°F (28°C)

Models	Ambient Temperature Effect
3051C	
Ranges 2-5	±(0.0125% URL + 0.0625% span) from 1:1 to 5:1 ±(0.025% URL + 0.125% span) from 5:1 to 100:1
Range 1	±(0.1% URL + 0.25% span) from 1:1 to 30:1
Range 0	±(0.25% URL + 0.05% span) from 1:1 to 30:1
3051CA	
Ranges 1-4	±(0.025% URL + 0.125% span) from 1:1 to 30:1
	±(0.035% URL + 0.125% span) from 30:1 to 100:1
3051T	
Range 2-4	±(0.025% URL + 0.125% span) from 1:1 to 30:1 ±(0.035% URL + 0.125% span) from 30:1 to 100:1
Range 1	±(0.025% URL + 0.125% span) from 1:1 to 10:1 ±(0.05% URL + 0.125% span) from 10:1 to 100:1
Range 5	±(0.1% URL + 0.15% span)
3051L	See Instrument Toolkit software.

Mounting Position Effects

Models	Mounting Position Effects
3051C	Zero shifts up to ±1.25 inH_2O (3.11 mbar), which can be calibrated out. No span effect.
3051CA, 3051T	Zero shifts up to 2.5 inH_2O (6.22 mbar), which can be calibrated out. No span effect.
3051L	With liquid level diaphragm in vertical plane, zero shift of up to 1 inH_2O (2.49 mbar). With diaphragm in horizontal plane, zero shift of up to 5 inH_2O (12.43 mbar) plus extension length on extended units. All zero shifts can be calibrated out. No span effect.

Vibration Effect

Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field or pipeline with high vibration level (10-60 Hz 0.21 mm displacement peak amplitude / 60-2000 Hz 3g).

Power Supply Effect

Less than ±0.005% of calibrated span per volt.

Electromagnetic Compatibility (EMC)

Meets all relevant requirements of EN 61326 and Namur NE-21.

Transient Protection (Option Code T1)

Meets IEEE C62.41, Category Location B

6 kV crest (0.5 μs - 100 kHz)
3 kV crest (8 × 20 microseconds)
6 kV crest (1.2 × 50 microseconds)

Rosemount 3051

Product Data Sheet
00813-0100-4001, Rev LA
Catalog 2011 - 2012

FUNCTIONAL SPECIFICATIONS

Range and Sensor Limits

Table 7. 3051CD, 3051CG, 3051CF, and 3051L Range and Sensor Limits

Range	Minimum Span		Range and Sensor Limits			
			Lower (LRL)			
	3051CD[(1)], 3051CG, 3051CF, 3051L	Upper (URL)	3051CD Differential 3051CF Flowmeters	3051CG Gage	3051L Differential	3051LGage
0	0.1 inH_2O (0,25 mbar)	3.0 inH_2O (7,47 mbar)	-3.0 inH_2O (-7,47 mbar)	NA	NA	NA
1	0.5 inH_2O (1,2 mbar)	25 inH_2O (62,3 mbar)	-25 inH_2O (-62,1 mbar)	-25 inH_2O (-62,1 mbar)	NA	NA
2	2.5 inH_2O (6,2 mbar)	250 inH_2O (0,62 bar)	-250 inH_2O (-0,62 bar)	-250 inH_2O (-0,62 bar)	-250 inH_2O (-0,62 bar)	-250 inH_2O (-0,62 bar)
3	10 inH_2O (24,9 mbar)	1000 inH_2O (2,49 bar)	-1000 inH_2O (-2,49 bar)	0.5 psia (34,5 mbar abs)	-1000 inH_2O (-2,49 bar)	0.5 psia (34,5 mbar abs)
4	3 psi (0,20 bar)	300 psi (20,6 bar)	-300 psi (-20,6 bar)	0.5 psia (34,5 mbar abs)	-300 psi (-20,6 bar)	0.5 psia (34,5 mbar abs)
5	20 psi (1,38 bar)	2000 psi (137,9 bar)	- 2000 psi (-137,9 bar)	0.5 psia (34,5 mbar abs)	NA	NA

(1) Range 0 only available with 3051CD. Range 1 only available with 3051CD, 3051CG, or 3051CF.

Table 8. Range and Sensor Limits

Range	3051CA				Range	3051T			
		Range and Sensor Limits					Range and Sensor Limits		
	Minimum Span	Upper (URL)	Lower (LRL)			Minimum Span	Upper (URL)	Lower (LRL)	Lower[(1)] (LRL) (Gage)
1	0.3 psia (20,6 mbar)	30 psia (2,07 bar)	0 psia (0 bar)		1	0.3 psi (20,6 mbar)	30 psi (2,07 bar)	0 psia (0 bar)	-14.7 psig (-1,01 bar)
2	1.5 psia (0,103 bar)	150 psia (10,3 bar)	0 psia (0 bar)		2	1.5 psi (0,103 bar)	150 psi (10,3 bar)	0 psia (0 bar)	-14.7 psig (-1,01 bar)
3	8 psia (0,55 bar)	800 psia (55,2 bar)	0 psia (0 bar)		3	8 psi (0,55 bar)	800 psi (55,2 bar)	0 psia (0 bar)	-14.7 psig (-1,01 bar)
4	40 psia (2,76 bar)	4000 psia (275,8 bar)	0 psia (0 bar)		4	40 psi (2,76 bar)	4000 psi (275,8 bar)	0 psia (0 bar)	-14.7 psig (-1,01 bar)
					5	2000 psi (137,9 bar)	10000 psi (689,4 bar)	0 psia (0 bar)	-14.7 psig (-1,01 bar)

(1) Assumes atmospheric pressure of 14.7 psig.

Service

Liquid, gas, and vapor applications

4-20 mA HART (Output Code A)

Output

Two-wire 4-20 mA, user-selectable for linear or square root output. Digital process variable superimposed on 4-20 mA signal, available to any host that conforms to the *HART* protocol.

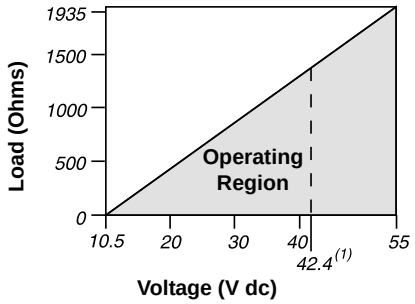
Power Supply

External power supply required. Standard transmitter (4-20 mA) operates on 10.5 to 55 V dc with no load.

Load Limitations

Maximum loop resistance is determined by the voltage level of the external power supply, as described by:

Max. Loop Resistance = 43.5 (Power Supply Voltage – 10.5)



Communication requires a minimum loop resistance of 250 ohms.

(1) For CSA approval, power supply must not exceed 42.4 V.

Zero and Span Adjustment Requirements

Zero and span values can be set anywhere within the range limits stated in Table 7 and Table 8.

Span must be greater than or equal to the minimum span stated in Table 7 and Table 8.

Indication

Optional two line LCD display

FOUNDATION fieldbus (Output code F)

Power Supply

External power supply required; transmitters operate on 9.0 to 32.0 V dc transmitter terminal voltage.

Current Draw

17.5 mA for all configurations (including LCD display option)

Indication

Optional two line LCD display

FOUNDATION fieldbus Function Block Execution Times

Block	Execution Time
Resource	-
Transducer	-
LCD Block	-
Analog Input 1, 2	30 milliseconds
PID	45 milliseconds
Input Selector	30 milliseconds
Arithmetic	35 milliseconds
Signal Characterizer	40 milliseconds
Integrator	35 milliseconds

FOUNDATION fieldbus Parameters

Schedule Entries	7 (max.)
Links	20 (max.)
Virtual Communications Relationships (VCR)	12 (max.)

Standard Function Blocks

Resource Block

Contains hardware, electronics, and diagnostic information.

Transducer Block

Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

LCD Block

Configures the local display.

2 Analog Input Blocks

Processes the measurements for input into other function blocks. The output value is in engineering units or custom and contains a status indicating measurement quality.

PID Block

Contains all logic to perform PID control in the field including cascade and feedforward.

Backup Link Active Scheduler (LAS)

The transmitter can function as a Link Active Scheduler if the current link master device fails or is removed from the segment.

Advanced Control Function Block Suite (Option Code A01)

Input Selector Block

Selects between inputs and generates an output using specific selection strategies such as minimum, maximum, midpoint, average or first “good.”

Arithmetic Block

Provides pre-defined application-based equations including flow with partial density compensation, electronic remote seals, hydrostatic tank gauging, ratio control and others.

Signal Characterizer Block

Characterizes or approximates any function that defines an input/output relationship by configuring up to twenty X, Y coordinates. The block interpolates an output value for a given input value using the curve defined by the configured coordinates.

Integrator Block

Compares the integrated or accumulated value from one or two variables to pre-trip and trip limits and generates discrete output signals when the limits are reached. This block is useful for calculating total flow, total mass, or volume over time.

FOUNDATION fieldbus Diagnostics Suite (Option Code D01)

The 3051C FOUNDATION fieldbus Diagnostics provide Abnormal Situation Prevention (ASP) indication. The integral statistical process monitoring (SPM) technology calculates the mean and standard deviation of the process variable 22 times per second. The 3051C ASP algorithm uses these values and highly flexible configuration options for customization to many user-defined or application specific abnormal situations. The detection of plugged impulse lines is the first available predefined application.

Profibus PA (Output Code W)

Profile Version

3.02

Power Supply

External power supply required; transmitters operate on 9.0 to 32.0 V dc transmitter terminal voltage.

Current Draw

17.5 mA for all configurations (including LCD display option)

Output Update Rate

Four times per second

Standard Function Blocks

Analog Input (AI Block)

The AI function block processes the measurements and makes them available to the host device. The output value from the AI block is in engineering units and contains a status indicating the quality of the measurement.

Physical Block

The physical block defines the physical resources of the device including type of memory, hardware, electronics and diagnostic information.

Transducer Block

Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

Indication

Optional two line LCD display

Local Operator Interface

Optional external configuration buttons

1-5 Vdc HART Low Power (Output Code M)

Output

Three wire 1-5 V dc or 0.8-3.2 V dc (Option Code C2) user-selectable output. Also user selectable for linear or square root output configuration. Digital process variable superimposed on voltage signal, available to any host conforming to the *HART* protocol. Low-power transmitter operates on 6-12 V dc with no load.

Power Consumption

3.0 mA, 18-36 mW

Minimum Load Impedance

100 kΩ (V_{out} wiring)

Indication

Optional 5-digit LCD display

Overpressure Limits

Rosemount 3051CD/CG/CF

- Range 0: 750 psi (51,7 bar)
- Range 1: 2000 psig (137,9 bar)
- Ranges 2-5: 3626 psig (250 bar)
  4500 psig (310,3 bar) for option code P9

Rosemount 3051CA

- Range 1: 750 psia (51,7 bar)
- Range 2: 1500 psia (103,4 bar)
- Range 3: 1600 psia (110,3 bar)
- Range 4: 6000 psia (413,7 bar)

Rosemount 3051TG/TA

- Range 1: 750 psi (51,7 bar)
- Range 2: 1500 psi (103,4 bar)
- Range 3: 1600 psi (110,3 bar)
- Range 4: 6000 psi (413,7 bar)
- Range 5: 15000 psi (1034,2 bar)

For 3051L or Level Flange Option Codes FA, FB, FC, FD, FP, and FQ, limit is 0 psia to the flange rating or sensor rating, whichever is lower.

Table 9. 3051L and Level Flange Rating Limits

Standard	Type	CS Rating	SST Rating
ANSI/ASME	Class 150	285 psig	275 psig
ANSI/ASME	Class 300	740 psig	720 psig
ANSI/ASME	Class 600	1480 psig	1440 psig
At 100 °F (38 °C), the rating decreases with increasing temperature, per ANSI/ASME B16.5.			
DIN	PN 10-40	40 bar	40 bar
DIN	PN 10/16	16 bar	16 bar
DIN	PN 25/40	40 bar	40 bar
At 248 °F (120 °C), the rating decreases with increasing temperature, per DIN 2401.			

Static Pressure Limit

Rosemount 3051CD Only

Operates within specifications between static line pressures of 0.5 psia and 3626 psig (4500 psig (310, 3 bar) for Option Code P9).

Range 0: 0.5 psia and 750 psig (3, 4 bar and 51, 7 bar)

Range 1: 0.5 psia and 2000 psig (3, 4 bar and 137, 9 bar)

Burst Pressure Limits

3051C, 3051CF Coplanar or Traditional process flange

10000 psig (69 MPa)

3051T Inline

Ranges 1-4: 11000 psi (75,8 MPa)

Range 5: 26000 psig (179 MPa)

Failure Mode Alarm

If self-diagnostics detect a sensor or microprocessor failure, the analog signal is driven either high or low to alert the user. High or low failure mode is user-selectable with a jumper on the transmitter. The values to which the transmitter drives its output in failure mode depend on whether it is factory-configured to *standard* or *NAMUR-compliant* operation. The values for each are as follows:

Standard Operation			
Output Code	**Linear Output**	**Fail High**	**Fail Low**
A	3.9 ≤ I ≤ 20.8	I ≥ 21.75 mA	I ≤ 3.75 mA
M	0.97 ≤ V ≤ 5.2	V ≥ 5.4 V	V ≤ 0.95V

NAMUR-Compliant Operation			
Output Code	**Linear Output**	**Fail High**	**Fail Low**
A	3.8 ≤ I ≤ 20.5	I ≥ 22.5 mA	I ≤ 3.6 mA

Output Code F and W

If self-diagnostics detect a gross transmitter failure, that information gets passed as a status along with the process variable.

Temperature Limits

Ambient

-40 to 185 °F (-40 to 85 °C)

With LCD display(1): -40 to 175 °F (-40 to 80 °C)

Storage

-50 to 230 °F (-46 to 110 °C)

With LCD display: -40 to 185 °F (-40 to 85 °C)

Process

At atmospheric pressures and above. See Table 10

(1) LCD Display may not be readable and updates may be slower at temperatures below -22 °F (-30 °C)

Table 10. 3051 Process Temperature Limits

3051CD, 3051CG, 3051CF, 3051CA	
Silicone Fill Sensor(1)	
with Coplanar Flange	–40 to 250 °F (–40 to 121 °C)(2)
with Traditional Flange	–40 to 300 °F (–40 to 149 °C)(2)(3)
with Level Flange	–40 to 300 °F (–40 to 149 °C)(2)
with 305 Integral Manifold	–40 to 300 °F (–40 to 149 °C)(2)
Inert Fill Sensor(1)	0 to 185 °F (–18 to 85 °C)(4)(5)
3051T (Process Fill Fluid)	
Silicone Fill Sensor(1)	–40 to 250 °F (–40 to 121 °C)(2)
Inert Fill Sensor(1)	–22 to 250 °F (–30 to 121 °C)(2)
3051L Low-Side Temperature Limits	
Silicone Fill Sensor(1)	–40 to 250 °F (–40 to 121 °C)(2)
Inert Fill Sensor(1)	0 to 185 °F (–18 to 85 °C)(2)
3051L High-Side Temperature Limits (Process Fill Fluid)	
Syltherm® XLT	–100 to 300 °F (–73 to 149 °C)
D.C. Silicone 704®	32 to 400 °F (0 to 205 °C)
D.C. Silicone 200	–40 to 400 °F (–40 to 205 °C)
Inert	–50 to 350 °F (–45 to 177 °C)
Glycerin and Water	0 to 200 °F (–18 to 93 °C)
Neobee M-20	0 to 400 °F (–18 to 205 °C)
Propylene Glycol and Water	0 to 200 °F (–18 to 93 °C)

(1) Process temperatures above 185 °F (85 °C) require derating the ambient limits by a 1.5:1 ratio.

(2) 220 °F (104 °C) limit in vacuum service; 130 °F (54 °C) for pressures below 0.5 psia.

(3) 3051CD0 process temperature limits are –40 to 212 °F (–45 to 100 °C)

(4) 160 °F (71 °C) limit in vacuum service.

(5) Not available for 3051CA.

Humidity Limits

0–100% relative humidity

Turn-On Time

Performance within specifications less than 2.0 seconds (10.0 s for Profibus protocol) after power is applied to the transmitter

Volumetric Displacement

Less than 0.005 in^3 (0,08 cm^3)

Damping

4-20 mA HART

Analog output response to a step input change is user-selectable from 0 to 36 seconds for one time constant. This software damping is in addition to sensor module response time.

FOUNDATION fieldbus

Transducer block: 0.4 seconds fixed

AI Block: User configurable

Profibus PA

AI Block only: User configurable

Rosemount 3051

Product Data Sheet
00813-0100-4001, Rev LA
Catalog 2011 - 2012

PHYSICAL SPECIFICATIONS

Electrical Connections

1/2–14 NPT, G1/2, and M20 × 1.5 conduit. *HART* interface connections fixed to terminal block.

Process Connections

Rosemount 3051C

1/4–18 NPT on 2 1/8-in. centers
1/2–14 NPT on 2-, 2 1/8-, or 2 1/4-in. centers

Rosemount 3051L

High pressure side: 2-, 3-, or 4-in., ASME B 16.5 (ANSI) Class 150, 300 or 600 flange; 50, 80 or 100 mm, PN 40 or 10/16 flange
Low pressure side: 1/4–18 NPT on flange 1/2–14 NPT on adapter

Rosemount 3051T

1/2–14 NPT female. A DIN 16288 Male (available in SST for Range 1–4 transmitters only), or Autoclave type F-250-C (Pressure relieved 9/16–18 gland thread; 1/4 OD high pressure tube 60° cone; available in SST for Range 5 transmitters only).

Rosemount 3051CF

For 3051CFA, see 00813-01000-4485 in the 485 section
For 3051CFC, see 00813-01000-4485 in the 405 section
For 3051CFP, see 00813-01000-4485 in the 1195 section

Process-Wetted Parts

Drain/Vent Valves

316 SST, Alloy C-276, or Alloy 400 material (Alloy 400 not available with 3051L)

Process Flanges and Adapters

Plated carbon steel, SST cast CF-8M (cast version of 316 SST, material per ASTM-A743), C-Type cast alloy CW12MW, or cast alloy M30C

Wetted O-rings

Glass-filled PTFE or Graphite-filled PTFE

Process Isolating Diaphragms

Isolating Diaphragm Material	3051CD 3051CG	3051T	3051CA
316L SST	•	•	•
Alloy C-276	•	•	•
Alloy 400	•		•
Tantalum	•		
Gold-plated Alloy 400	•		•
Gold-plated SST	•		•

Rosemount 3051L Process Wetted Parts

Flanged Process Connection (Transmitter High Side)

Process Diaphragms, Including Process Gasket Surface

316L SST, Alloy C-276, or Tantalum

Extension

CF-3M (Cast version of 316L SST, material per ASTM-A743), or Alloy C-276. Fits schedule 40 and 80 pipe.

Mounting Flange

Zinc-cobalt plated CS or SST

Reference Process Connection (Transmitter Low Side)

Isolating Diaphragms

316L SST or Alloy C-276

Reference Flange and Adapter

CF-8M (Cast version of 316 SST, material per ASTM-A743)

Non-Wetted Parts

Electronics Housing

Low-copper aluminum or CF-8M (Cast version of 316 SST). Enclosure Type 4X, IP 65, IP 66, IP 68

Coplanar Sensor Module Housing

CF-3M (Cast version of 316L SST, material per ASTM-A743)

Bolts

ASTM A449, Type 1 (zinc-cobalt plated carbon steel)
ASTM F593G, Condition CW1 (Austenitic 316 SST)
ASTM A193, Grade B7M (zinc plated alloy steel)
Alloy K-500

Sensor Module Fill Fluid

Silicone or inert halocarbon
In-line series uses Fluorinert® FC-43

Process Fill Fluid (3051L only)

Sylthern XLT, D.C. Silicone 704,
D.C. Silicone 200, inert, glycerin and water, Neobee M-20 or propylene glycol and water

Paint

Polyurethane

Cover O-rings

Buna-N

Shipping Weights

Table 11. Transmitter Weights without Options

Transmitter	Add Weight In lb. (kg)
3051C	6.0 (2,7)
3051T	3.0 (1,4)
3051L	Table 12 on page 153

Table 12. 3051L Weights without Options

Flange	Flush lb. (kg)	2-in. Ext. lb. (kg)	4-in. Ext. lb. (kg)	6-in. Ext. lb. (kg)
2-in., 150	12.5 (5,7)	—	—	—
3-in., 150	17.5 (7,9)	19.5 (8,8)	20.5 (9,3)	21.5 (9,7)
4-in., 150	23.5 (10,7)	26.5 (12,0)	28.5 (12,9)	30.5 (13,8)
2-in., 300	17.5 (7,9)	—	—	—
3-in., 300	22.5 (10,2)	24.5 (11,1)	25.5 (11,6)	26.5 (12,0)
4-in., 300	32.5 (14,7)	35.5 (16,1)	37.5 (17,0)	39.5 (17,9)
2-in., 600	15.3 (6,9)	—	—	—
3-in., 600	25.2 (11,4)	27.2 (12,3)	28.2 (12,8)	29.2 (13,2)
DN 50/PN 40	13.8 (6,2)	—	—	—
DN 80/PN 40	19.5 (8,8)	21.5 (9,7)	22.5 (10,2)	23.5 (10,6)
DN 100/ PN 10/16	17.8 (8,1)	19.8 (9,0)	20.8 (9,5)	21.8 (9,9)
DN 100/ PN 40	23.2 (10,5)	25.2 (11,5)	26.2 (11,9)	27.2 (12,3)

Table 13. Transmitter Options Weights

Code	Option	Add lb. (kg)
J, K, L, M	Stainless Steel Housing (T)	3.9 (1,8)
J, K, L, M	Stainless Steel Housing (C, L, H, P)	3.1 (1,4)
M4/M5	LCD display for Aluminum Housing	0.5 (0,2)
M4/M6	LCD display for SST Housing	1.25 (0,6)
B4	SST Mounting Bracket for Coplanar Flange	1.0 (0,5)
B1, B2, B3	Mounting Bracket for Traditional Flange	2.3 (1,0)
B7, B8, B9	Mounting Bracket for Traditional Flange	2.3 (1,0)
BA, BC	SST Bracket for Traditional Flange	2.3 (1,0)
H2	Traditional Flange	2.4 (1,1)
H3	Traditional Flange	2.7 (1,2)
H4	Traditional Flange	2.6 (1,2)
H7	Traditional Flange	2.5 (1,1)
FC	Level Flange—3 in., 150	10.8 (4,9)
FD	Level Flange—3 in., 300	14.3 (6,5)
FA	Level Flange—2 in., 150	10.7 (4,8)
FB	Level Flange—2 in., 300	14.0 (6,3)
FP	DIN Level Flange, SST, DN 50, PN 40	8.3 (3,8)
FQ	DIN Level Flange, SST, DN 80, PN 40	13.7 (6,2)

Product Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA
Emerson Process Management GmbH & Co. — Wessling, Germany
Emerson Process Management Asia Pacific Private Limited — Singapore
Beijing Rosemount Far East Instrument Co., LTD — Beijing, China
Emerson Process Management LTDA — Sorocaba, Brazil
Emerson Process Management (India) Pvt. Ltd. — Daman, India

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

ATEX Directive (94/9/EC)

All 3051 transmitters comply with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

3051CA4; 3051CG2, 3, 4, 5; 3051CD2, 3, 4, 5
(also with P9 option)
— QS Certificate of Assessment - EC No. 59552-2009-CE-HOU-DNV
Module H Conformity Assessment

All other 3051Pressure Transmitters

— Sound Engineering Practice

Transmitter Attachments: Diaphragm Seal - Process Flange - Manifold

— Sound Engineering Practice

Electro Magnetic Compatibility (EMC) (2004/108/EC)

All 3051 Pressure Transmitters meet all of the requirements of EN61326 and NAMUR NE-21

Ordinary Location Certification for Factory Mutual

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

HART PROTOCOL

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II, Division 1, Groups E, F, and G. Dust-Ignition-Proof for Class III, Division 1.
Factory Sealed, Enclosure Type 4X

I5 Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 when connected per Rosemount drawing 03031-1019; Non-incendive for Class I, Division 2, Groups A, B, C, and D.
Temperature Code:T4 (Ta = 40 °C), T3 (Ta = 85 °C), Enclosure Type 4X
For input parameters see control drawing 03031-1019.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

E6 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D for indoor and outdoor hazardous locations. Enclosure type 4X, factory sealed

C6 Explosion-Proof and intrinsically safe approval. Intrinsically safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount drawings 03031-1024. Temperature Code T3C.
Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D hazardous locations. Enclosure type 4X, factory sealed
For input parameters see control drawing 03031-1024.

European Certifications

I1 ATEX Intrinsic Safety and Dust
Certification No.: BAS 97ATEX1089X ⟨Ex⟩ II 1 GD
Ex ia IIC T4 (–60 ≤ T_a ≤ +70 °C)
Dust Rating: Ex tD A20 T80 °C (–20 ≤ T_a ≤ 40 °C) IP66
CE 1180

TABLE 14. Input Parameters

U_i = 30V
I_i = 200 mA
P_i = 0.9W
C_i = 0.012 µF

TABLE 15. RTD Assembly (3051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63W

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the apparatus.
The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact or abrasion located in Zone 0.

N1 ATEX Type n and Dust
Certification No.: BAS 00ATEX3105X ⟨Ex⟩ II 3 GD
U_i = 55 Vdc max
Ex nA nL T5 (–40°C ≤ T_{amb} ≤ 70 °C)
Dust rating: Ex tD A22 T80 °C (–20 ≤ T_a ≤ 40 °C) IP66
CE

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding a 500V r.m.s. test to case. This must be taken into account on any installation in which it is used, for example by assuring that the supply to the apparatus is galvanically isolated.

E8 ATEX Flame-Proof and Dust
Certification No.: KEMA 00ATEX2013X ⟨Ex⟩ II 1/2 GD
Ex d IIC T6 (–50 ≤ T_a ≤ 65 °C)
Dust rating: Ex tD A20/A21 T90 °C, IP66
CE 1180
Vmax = 55 V dc

Special Conditions for Safe Use (X):
This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

IECEx Certifications

I7 IECEx Intrinsic Safety
Certification No.: IECEx BAS 09.0076X
Ex ia IIC T4 (–60 °C ≤ T_a ≤ 70 °C)
IP66

TABLE 16. Input Parameters

U_i = 30V
I_i = 200 mA
P_i = 0.9W
C_i = 0.012 µF

TABLE 17. RTD Assembly (3051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63W

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500V insulation test required by Clause 6.3.12 of IEC 60079-11. This must be taken into account when installing the apparatus.
The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact or abrasion located in Zone 0.

E7 IECEx Explosion-Proof (Flame-Proof)
Certification No.: IECEx KEM 09.0034X
Ga/Gb Ex d IIC T6 or T5
Ex tD A20/A21 IP66 T90 °C
IP66

Special Conditions for Safe Use (X):
This device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

N7 IECEx Type n
Certification No.: IECEx BAS 09.0077X
Ex nA nL IIC T5 (–40 °C ≤ T_a ≤ 70 °C)
IP66

Special Conditions for Safe Use (X):
The apparatus is not capable of withstanding the 500V insulation test required by clause 6.8.1 of IEC 60079-15. This must be taken into account when installing the apparatus.

TIIS Certifications

E4 TIIS Flame-Proof
Ex d IIC T6

Certificate	Description
TC15850	3051C/D/1 4–20 mA HART — no display
TC15851	3051C/D/1 4–20 mA HART — with display
TC15854	3051T/G/1 4–20 mA HART, SST, Silicon — no display
TC15855	3051T/G/1 4–20 mA HART, Alloy C-276, Silicon — no display
TC15856	3051T/G/1 4–20 mA HART, SST, Silicon — with display
TC15857	3051T/G/1 4–20 mA HART, Alloy C-276, Silicon — with display

I4 TIIS Intrinsic Safety
Ex ia IIC T4

Certificate	Description
TC16406	3051CD/CG

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K5 **E5** and **I5** combination

KB **K5** and **C6** combination

KD **K5**, **C6**, **I1**, and **E8** combination

K6 **C6**, **I1**, and **E8** combination

K8 **E8** and **I1** combination

K7 **E7**, **I7**, and **N7** combination

FOUNDATION FIELDBUS AND PROFIBUS PA PROTOCOLS

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II, Division 1, Groups E, F, and G. Dust-Ignition-Proof for Class III, Division 1.

I5 Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 when connected per Rosemount drawing 03031-1019; Non-incendive for Class I, Division 2, Groups A, B, C, and D.

Temperature Code:T4 (Ta = 60 °C), T3 (Ta = 85 °C), Enclosure Type 4X
For input parameters see control drawing 03031-1019.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

E6 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D for indoor and outdoor hazardous locations. Enclosure type 4X, factory sealed

C6 Explosion-Proof and intrinsically safe approval. Intrinsically safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount drawings 03031-1024. Temperature Code T3C.
Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D hazardous locations. Enclosure type 4X, factory sealed
For input parameters see control drawing 03031-1024.

European Certifications

I1 ATEX Intrinsic Safety and Dust
Certification No.: BAS 98ATEX1355X ⟨Ex⟩ II 1 GD
Ex ia IIC T4 (T_{amb} = –60 to +60 °C)
Ex td A20 IP66 T 70 °C (-20 ≤ T_a ≤ 40 °C)
CE 1180

TABLE 18. Input Parameters

U_i = 30V
I_i = 300 mA
P_i = 1.3 W
C_i = 0 µF

TABLE 19. RTD Assembly (3051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63W

Special Conditions for Safe Use (X):
1. If the apparatus is fitted with an optional 90V transient suppressor, it is not capable of withstanding the 500V insulation test required by clause 6.3.12 of EN 60079-11. This must be taken into account when installing the apparatus.
2. The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in Zone 0.

IA ATEX FISCO Intrinsic Safety
Certification No.: BAS 98ATEX1355X ⟨Ex⟩ II 1 G
Ex ia IIC T4 (T_{amb} = –60 to +60 °C)
IP66
CE 1180

TABLE 20. Input Parameters

U_i = 17.5 V
I_i = 380 mA
P_i = 5.32 W
C_i = ≤ 5 µF
L_i = ≤ 10 µH

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the apparatus.
The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact or abrasion located in Zone 0.

N1 ATEX Type n and Dust
Certification No.: BAS 98ATEX3356X ⟨Ex⟩ II 3 GD
U_i = 40 Vdc max
Ex nL IIC T5 (T_a = –40°C to 70 °C)
Dust rating: Ex tD A22 T80 °C (T_{amb} = –20 to 40 °C) IP66

Special Conditions for Safe Use (X):
The apparatus is not capable of withstanding the 500V insulation test required by clause 6.8.1 of EN 60079-15. This must be taken into account when installing the apparatus.

E8 ATEX Flame-Proof and Dust
Certification No.: KEMA 00ATEX2013X ⟨Ex⟩ II 1/2 GD
Ex d IIC T6 (T_{amb} = –50 to 65 °C)
Dust rating: Ex tD A20/21 T90 °C, IP66
CE 1180
Vmax = 55 V dc

Special Conditions for Safe Use (X):
This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

IECEx Certifications

I7 IECEx Intrinsic Safety
Certification No.: IECEx BAS 09.0076X
Ex ia IIC T4 (–60 °C ≤ T_a ≤ 60 °C)
IP66

TABLE 21. Input Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.3 W
C_i = 0 µF
L_i = 0 µH

TABLE 22. RTD Assembly (3051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63W

Special Conditions for Safe Use (X):
1. If the apparatus is fitted with an optional 90V transient suppressor, it is not capable of withstanding the 500V insulation test required by clause 6.3.12 of IEC 60079-11. This must be taken into account when installing the apparatus.
2. The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in Zone 0.

E7 IECEx Explosion-Proof (Flame-Proof)
Certification No.: IECEx KEM 09.0034X
Ga/Gb Ex d IIC T6 or T5
Ex tD A20/A21 IP66 T90 °C
IP66

Special Conditions for Safe Use (X):
This device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

N7 IECEx Type n
Certification No.: IECEx BAS 09.0077X
Ex nA nL IIC T5 (–40 °C ≤ T_a ≤ 70 °C)
IP66

Special Conditions for Safe Use (X):
The apparatus is not capable of withstanding the 500V insulation test required by clause 6.8.1 of IEC 60079-15. This must be taken into account when installing the apparatus.

TIIS Certifications

E4 TIIS Flame-Proof
Ex d IIC T6

Certificate	Description
TC15852	3051C/D/1 FOUNDATION Fieldbus — no display
TC15853	3051C/D/1 FOUNDATION Fieldbus — with display
TC15858	3051T/G/1 FOUNDATION Fieldbus, SST, Silicon — no display
TC15859	3051T/G/1 FOUNDATION Fieldbus, Alloy C-276, Silicon — no display
TC15860	3051T/G/1 FOUNDATION Fieldbus, SST, Silicon — with display
TC15861	3051T/G/1 FOUNDATION Fieldbus, Alloy C-276, Silicon — with display

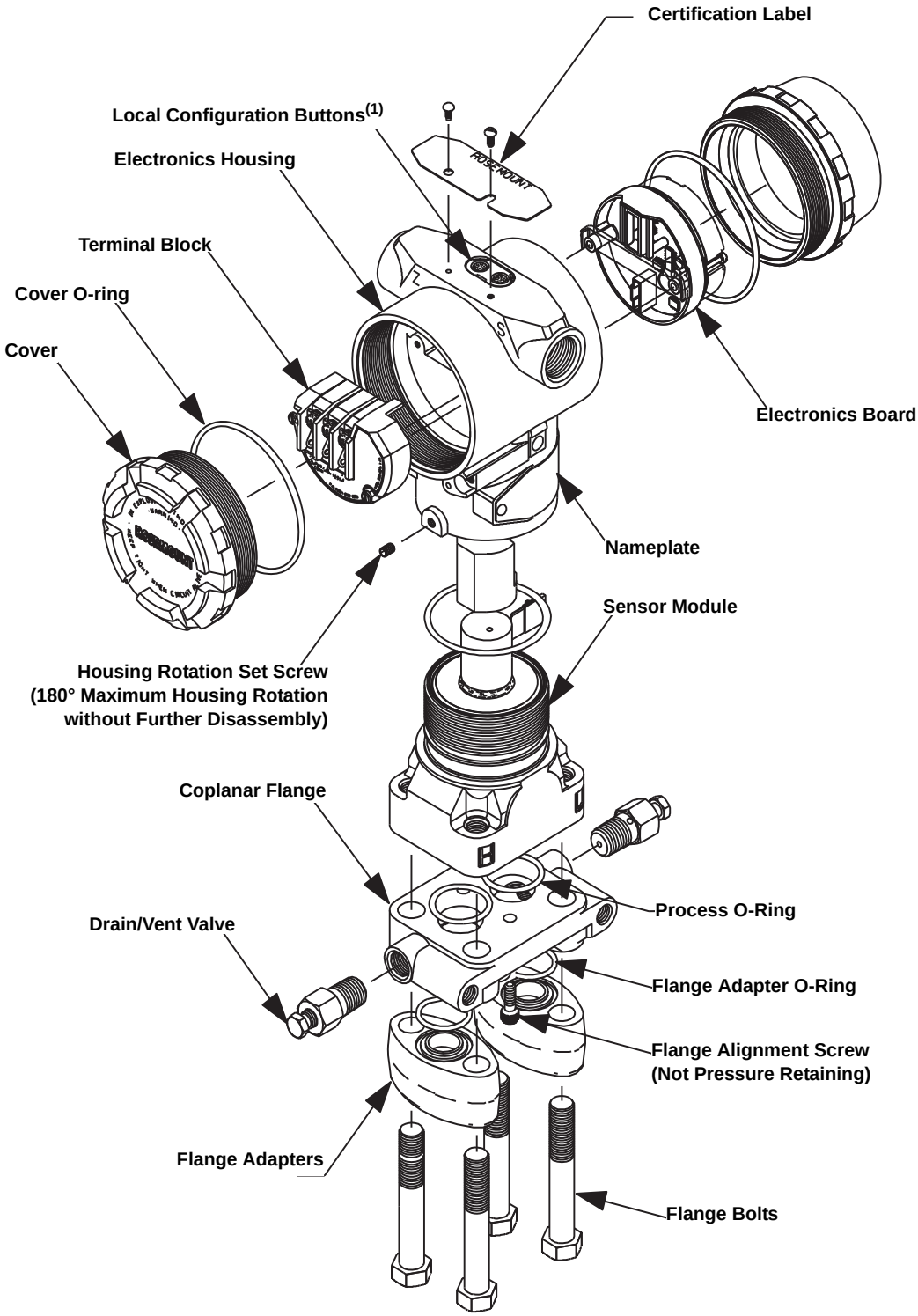
Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K5 **E5** and **I5** combination
KB **K5** and **C6** combination
KD **K5**, **C6**, **I1**, and **E8** combination
K6 **C6**, **I1**, and **E8** combination
K8 **E8** and **I1** combination
K7 **E7**, **I7**, and **N7** combination

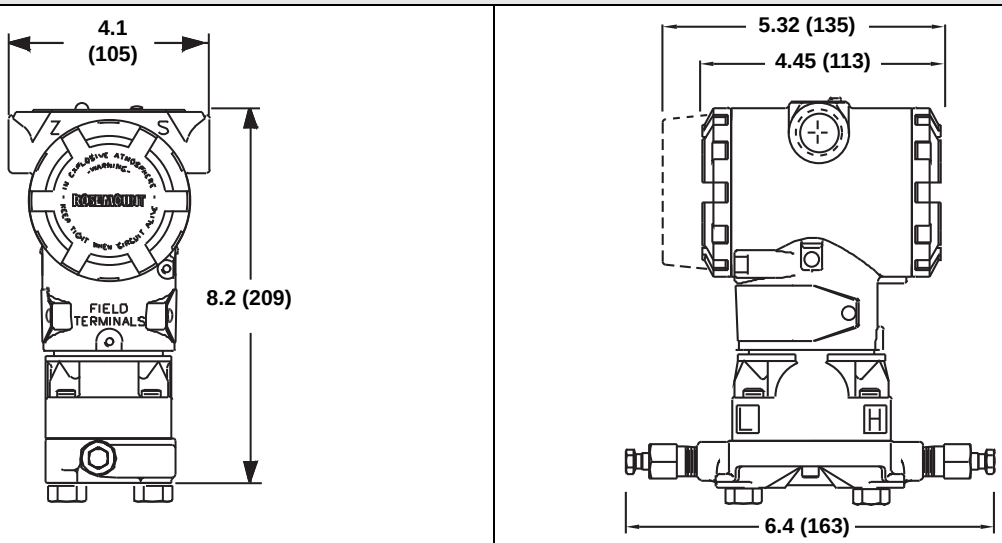
Dimensional Drawings

3051C Exploded View



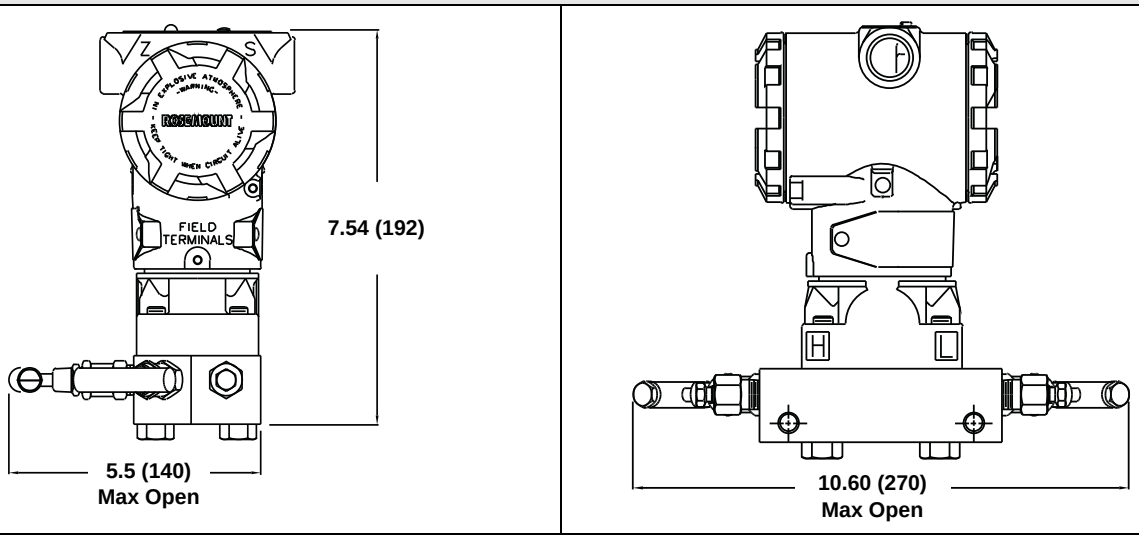
1) Span and Zero Adjustment Buttons are standard with 4-20 mA and 1-5 Vdc HART protocol. Local Operator Interface buttons are optional for Profibus PA protocol. Local Configuration Buttons are not available with FOUNDATION fieldbus.

3051C Coplanar Flange[1]



(1) For FOUNDATION fieldbus and Profibus PA transmitters with LCD Display, housing length is 5.78 in. (147 mm).

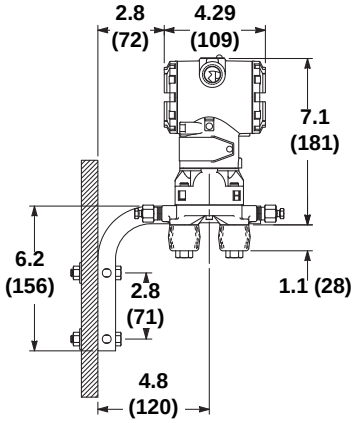
3051C Coplanar Flange with Rosemount 305 3-Valve Coplanar Integral Manifold

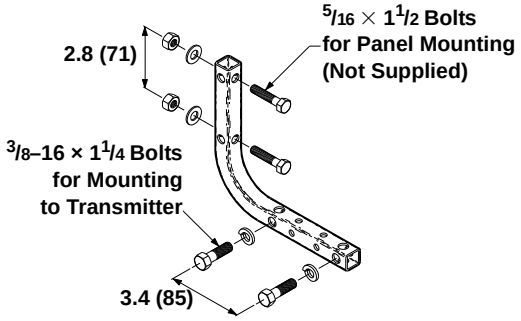


Dimensions are in inches (millimeters)

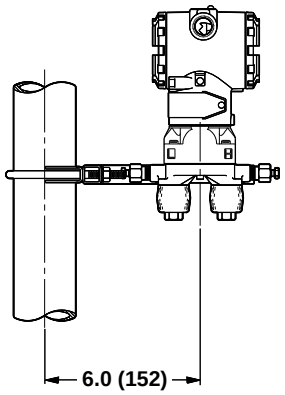
Coplanar Flange Mounting Configurations with Optional Bracket (B4) for 2-in. Pipe or Panel Mounting

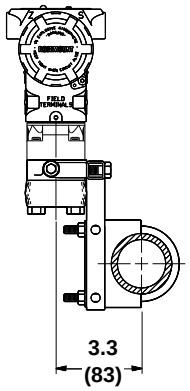
PANEL MOUNTING

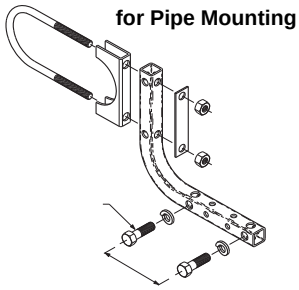




PIPE MOUNTING



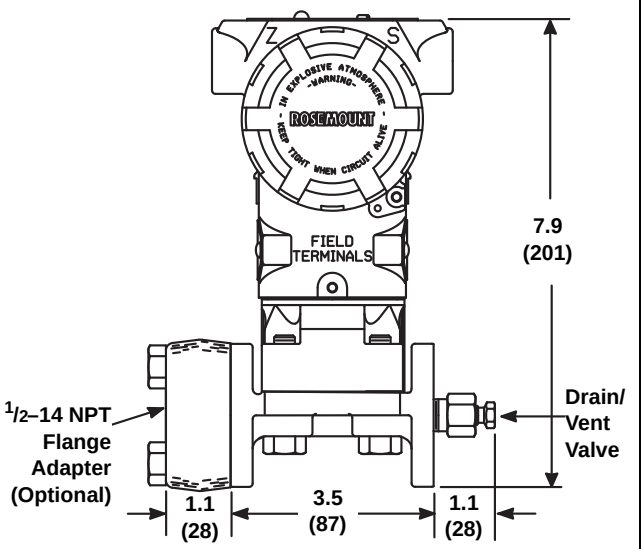


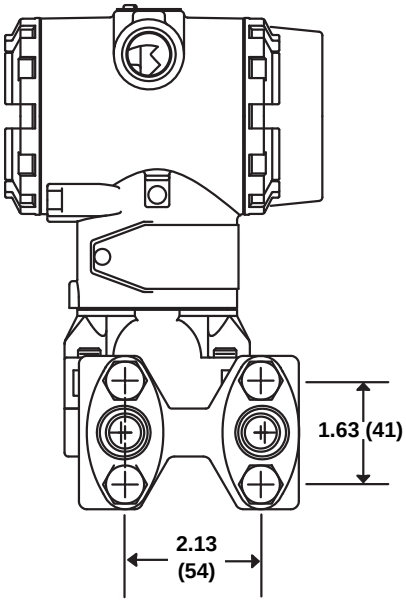


Dimensions are in inches (millimeters)

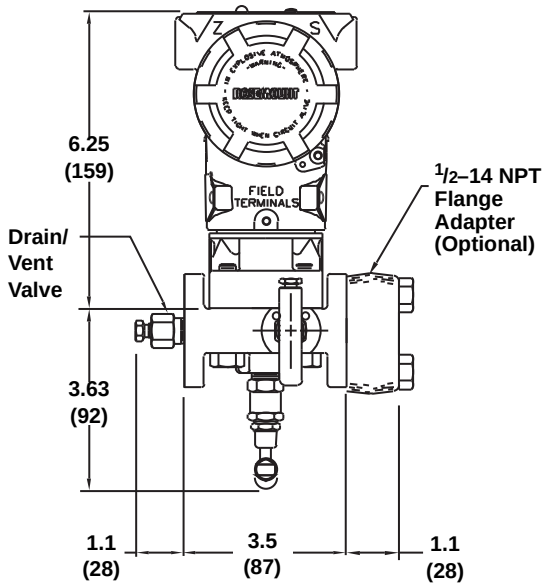
Rosemount 3051

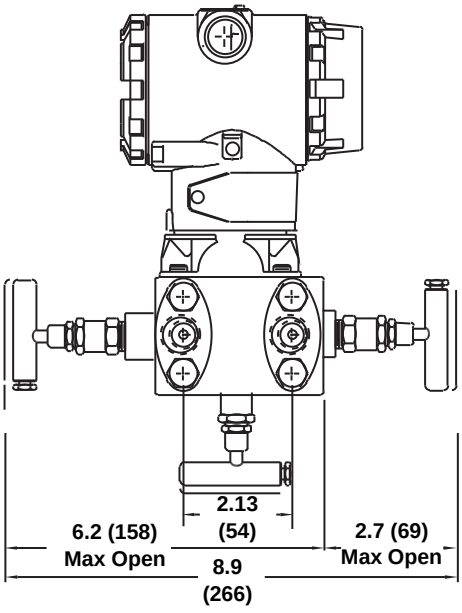
3051C Coplanar with Traditional Flange





3051C Coplanar with Rosemount 305 3-Valve Traditional Integral Manifold

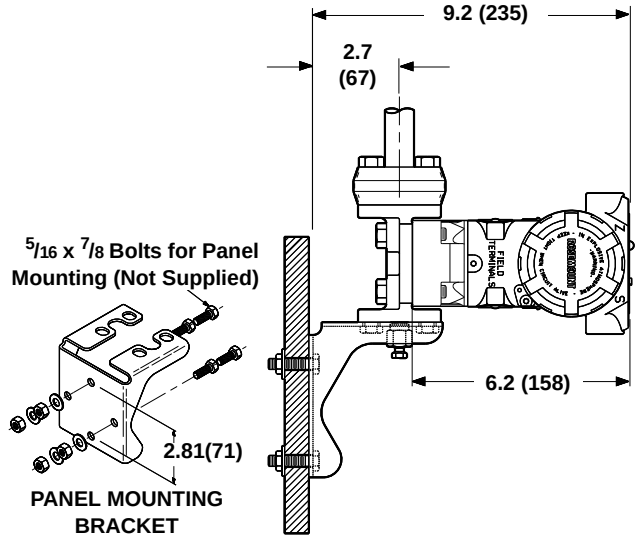




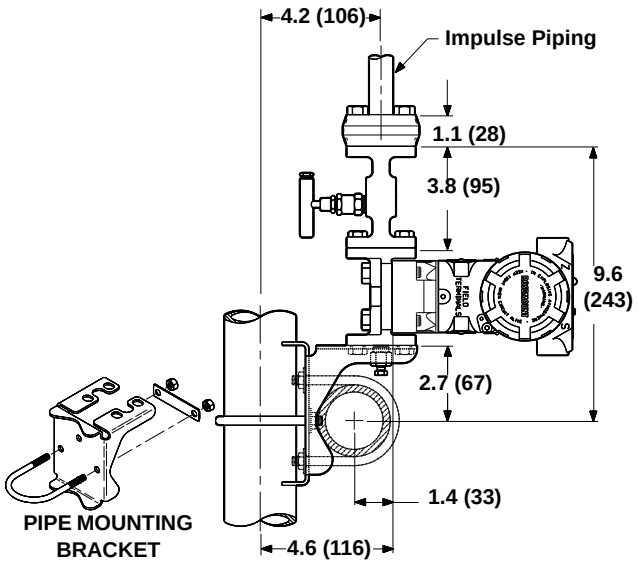
Dimensions are in inches (millimeters)

Traditional Flange Mounting Configurations with Optional Brackets for 2-in. Pipe or Panel Mounting

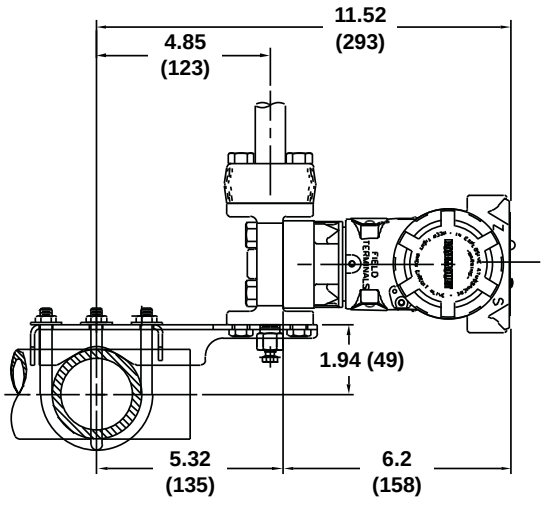
Panel Mounting Bracket (option B2/B8)



2-in. Pipe Mounting Bracket (option B1/B7/BA)

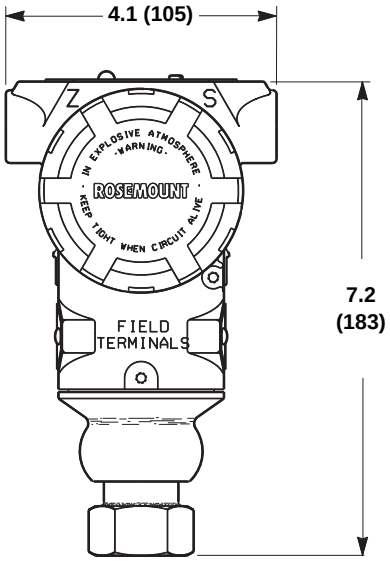


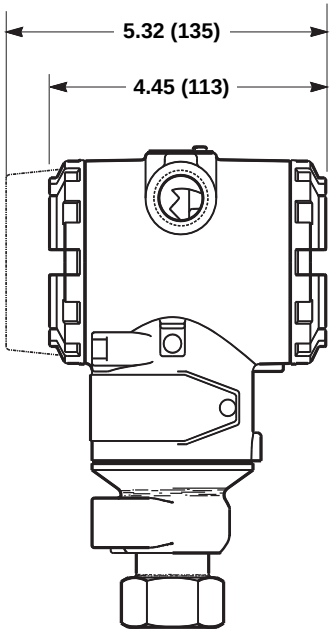
2-in. Pipe Mounting Bracket (option B3/B9/BC)



Dimensions are in inches (millimeters)

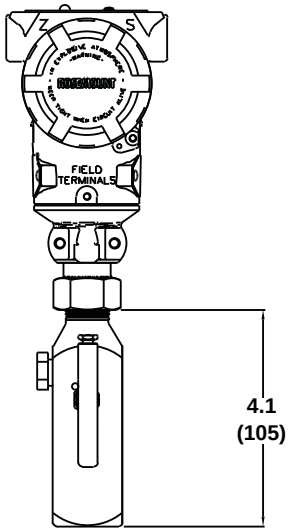
3051T Dimensional Drawings(1)

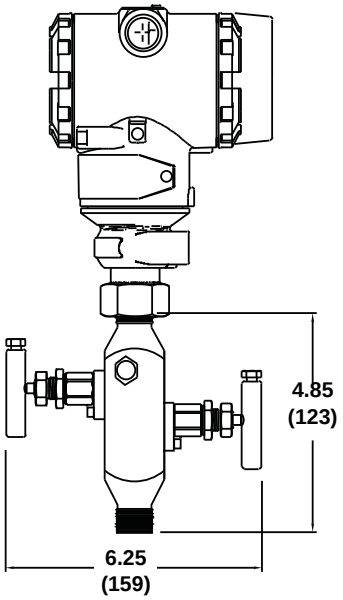




(1) For FOUNDATION fieldbus and Profibus PA transmitters with LCD Display, housing length is 5.78 in. (146 mm).

3051T with Rosemount 306 2-Valve I Integral Manifold

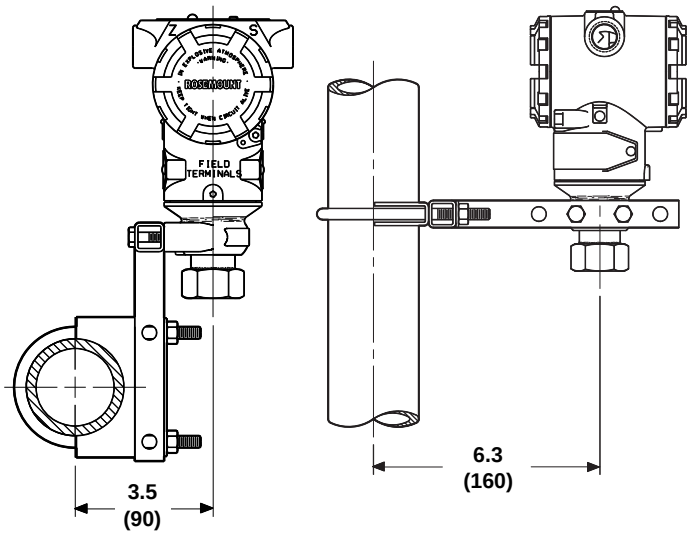




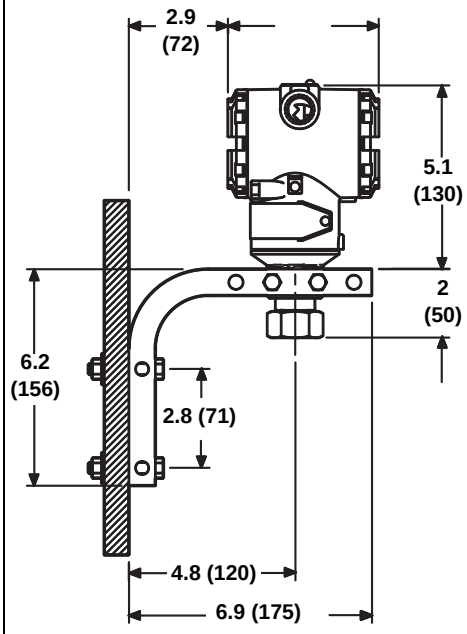
Dimensions are in inches (millimeters)

3051T Typical Mounting Configurations with Optional Mounting Bracket

Pipe Mounting



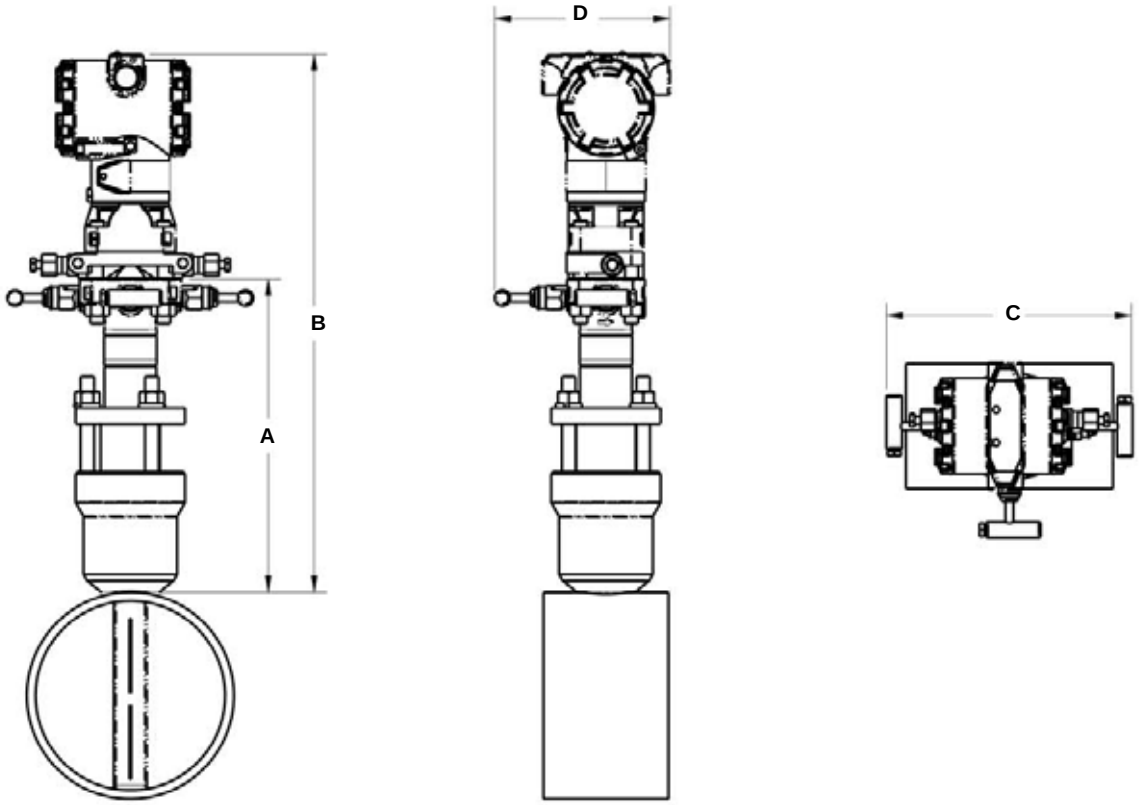
Panel Mounting



Dimensions are in inches (millimeters)

Rosemount 3051CFA Pak-Lok Annubar Flowmeter(1)

Front View	Side View	Top View



(1) The Pak-Lok Annubar model is available up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

Table 23. 3051CFA Pak-Lok Annubar Flowmeter Dimensional Data

Sensor Size	A (Max)	B (Max)	C (Max)	D (Max)
1	8.50 (215.9)	14.60 (370.8)	9.00 (228.6)	6.00 (152.4)
2	11.0 (279.4)	16.35 (415.3)	9.00 (228.6)	6.00 (152.4)
3	12.00 (304.8)	19.10 (485.1)	9.00 (228.6)	6.00 (152.4)
Dimensions are in inches (millimeters)				

Rosemount 3051CFC Compact Orifice Flowmeter

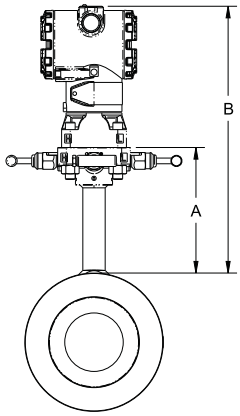
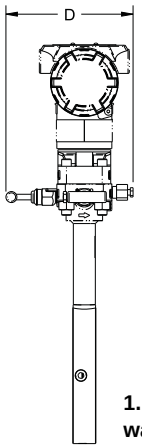
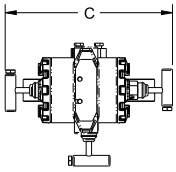
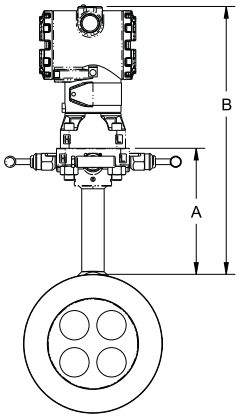
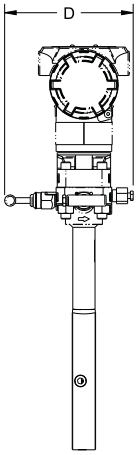
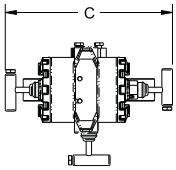
	Orifice Plate Side View	Orifice Plate Front View	Orifice Plate Top View
Compact Orifice Plate (Primary Element Type code P)		 **1.13-in. (28.7 mm) wafer thickness**	
Conditioning Orifice Plate (Primary Element Type code C)			

Table 24. Dimensional Drawings

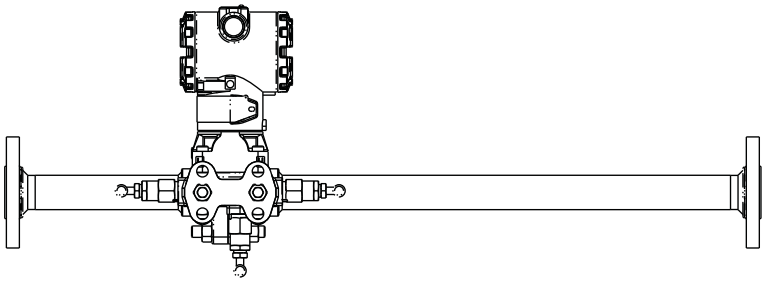
Primary Element Type	A	B	Transmitter Height	C	D
Type P and C	5.62 (143)	Transmitter Height + A	6.27 (159)	7.75 (197) - closed 8.25 (210) - open	6.00 (152) - closed 6.25 (159) - open

Dimensions are in inches (millimeters)

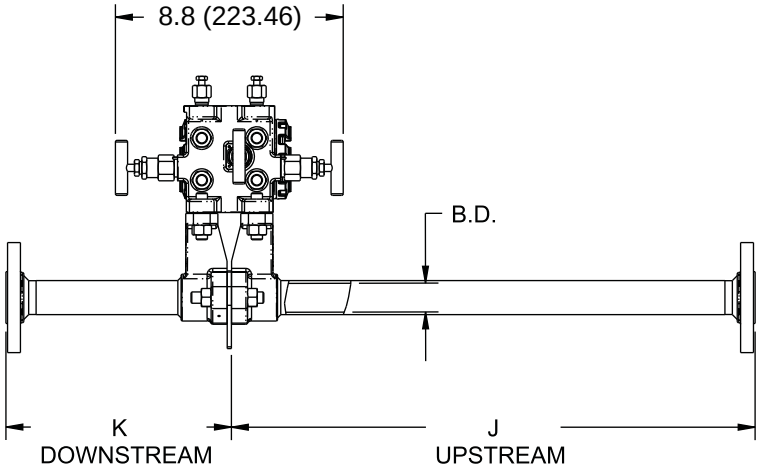
Rosemount 3051

Rosemount 3051CFP Integral Orifice Flowmeter

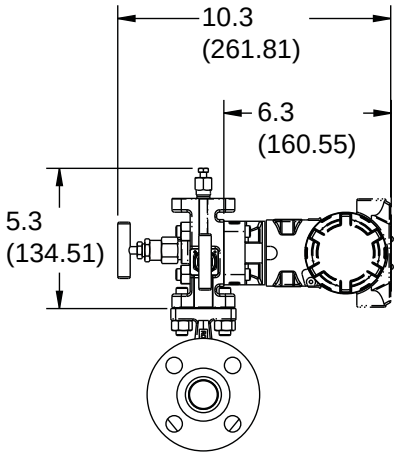
Side View



Bottom View



Front View



Dimensions are in inches (millimeters).

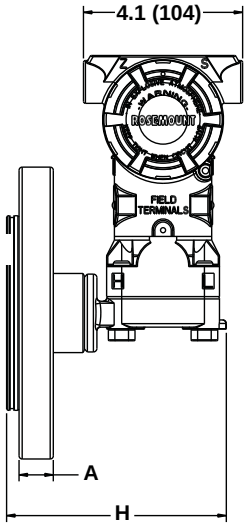
	Line Size		
Dimension	**1/2-in. (15 mm)**	**1-in. (25 mm)**	**1 1/2-in. (40 mm)**
J (Beveled/Threaded pipe ends)	12.54 (318.4)	20.24 (514.0)	28.44 (722.4)
J (RF slip-on, RTJ slip-on, RF-DIN slip on)	12.62 (320.4)	20.32 (516.0)	28.52 (724.4)
J (RF 150#, weld neck)	14.37 (364.9)	22.37 (568.1)	30.82 (782.9)
J (RF 300#, weld neck)	14.56 (369.8)	22.63 (574.7)	31.06 (789.0)
J (RF 600#, weld neck)	14.81 (376.0)	22.88 (581.0)	31.38 (797.1)
K (Beveled/Threaded pipe ends)	5.74 (145.7)	8.75 (222.2)	11.91 (302.6)
K (RF slip-on, RTJ slip-on, RF-DIN slip on)(1)	5.82 (147.8)	8.83 (224.2)	11.99 (304.6)
K (RF 150#, weld neck)	7.57 (192.3)	10.88 (276.3)	14.29 (363.1)
K (RF 300#, weld neck)	7.76 (197.1)	11.14 (282.9)	14.53 (369.2)
K (RF 600#, weld neck)	8.01 (203.4)	11.39 (289.2)	14.85 (377.2)
B.D. (Bore Diameter)	0.664 (16.87)	1.097 (27.86)	1.567 (39.80)

Dimensions are in inches (millimeters).

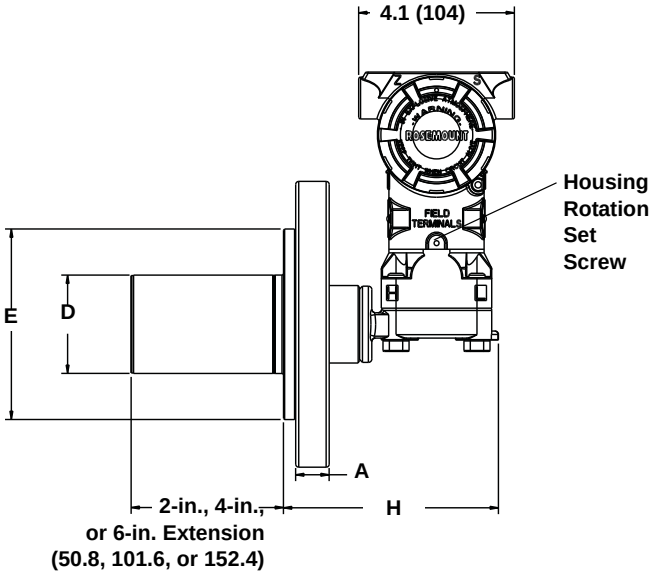
(1) Downstream length shown here includes plate thickness of 0.162-in. (4.11 mm).

3051L Dimensional Drawings

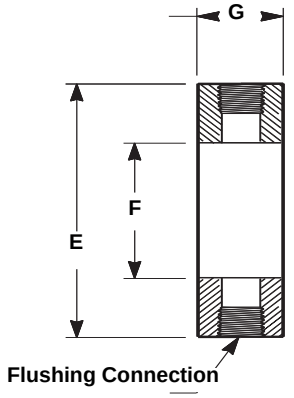
2-in. Flange Configuring (Flush Mount Only)



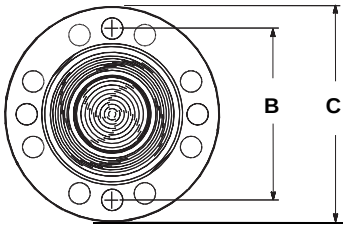
3- and 4-in. Flange Configuration

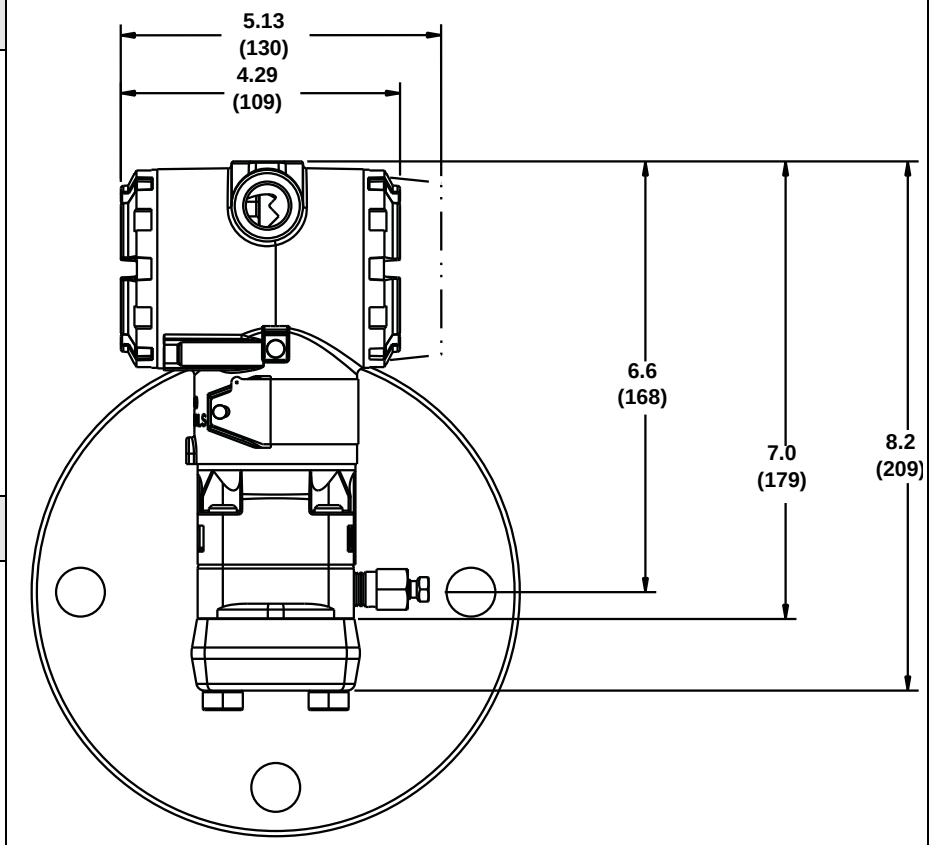


Optional Flushing Connection Ring (Lower Housing)



Diaphragm Assembly and Mounting Flange





Dimensions are in inches (millimeters)

Table 25. 3051L Dimensional Specifications

Class[1]	Pipe Size	Flange Thickness A	Bolt Circle Diameter B	Outside Diameter C	No. of Bolts	Bolt Hole Diameter	Extension Diameter[1] D	O.D. Gasket Surface E
ASME B16.5 (ANSI) 150	2 (51)	0.69 (18)	4.75 (121)	6.0 (152)	4	0.75 (19)	NA	3.6 (92)
	3 (76)	0.88 (22)	6.0 (152)	7.5 (191)	4	0.75 (19)	2.58 (66)	5.0 (127)
	4 (102)	0.88 (22)	7.5 (191)	9.0 (229)	8	0.75 (19)	3.5 (89)	6.2 (158)
ASME B16.5 (ANSI) 300	2 (51)	0.82 (21)	5.0 (127)	6.5 (165)	8	0.75 (19)	NA	3.6 (92)
	3 (76)	1.06 (27)	6.62 (168)	8.25 (210)	8	0.88 (22)	2.58 (66)	5.0 (127)
	4 (102)	1.19 (30)	7.88 (200)	10.0 (254)	8	0.88 (22)	3.5 (89)	6.2 (158)
ASME B16.5 (ANSI) 600	2 (51)	1.00 (25)	5.0 (127)	6.5 (165)	8	0.75 (19)	NA	3.6 (92)
	3 (76)	1.25 (32)	6.62 (168)	8.25 (210)	8	0.88 (22)	2.58 (66)	5.0 (127)
DIN 2501 PN 10–40	DN 50	20 mm	125 mm	165 mm	4	18 mm	NA	4.0 (102)
DIN 2501 PN 25/40	DN 80	24 mm	160 mm	200 mm	8	18 mm	66 mm	5.4 (138)
	DN 100	24 mm	190 mm	235 mm	8	22 mm	89 mm	6.2 (158)
DIN 2501 PN 10/16	DN 100	20 mm	180 mm	220 mm	8	18 mm	89 mm	6.2 (158)

Dimensions are in inches (millimeters)

(1) Tolerance are 0.040 (1.02), - 0.020 (0.51)

Class[1]	Pipe Size	Process Side F	Lower Housing G		H
			1/4-in. NPT	1/2 -in. NPT	
ASME B16.5 (ANSI) 150	2 (51)	2.12 (54)	0.97 (25)	1.31 (33)	5.65 (143)
	3 (76)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
	4 (102)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
ASME B16.5 (ANSI) 300	2 (51)	2.12 (54)	0.97 (25)	1.31 (33)	5.65 (143)
	3 (76)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
	4 (102)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
ASME B16.5 (ANSI) 600	2 (51)	2.12 (54)	0.97 (25)	1.31 (33)	7.65 (194)
	3 (76)	3.6 (91)	0.97 (25)	1.31 (33)	7.65 (194)
DIN 2501 PN 10–40	DN 50	2.4 (61)	0.97 (25)	1.31 (33)	5.65 (143)
DIN 2501 PN 25/40	DN 80	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
	DN 100	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
DIN 2501 PN 10/16	DN 100	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)

(1) Tolerances are 0.040 (1.02), –0.020 (0.51).

OPTIONS

Standard Configuration

Unless otherwise specified, transmitter is shipped as follows:

ENGINEERING UNITS	
***Differential/Gage*:**	inH_2O (Range 0, 1, 2, and 3) psi (Range 4 and 5)
***Absolute/3051TA*:**	psi (all ranges)
4 mA (1 V dc)[(1)]:	0 (engineering units above)
20 mA (5 V dc)[(1)]:	Upper range limit
Output:	Linear
Flange type:	Specified model code option
Flange material:	Specified model code option
O-ring material:	Specified model code option
Drain/vent:	Specified model code option
LCD Display:	Installed or none
Alarm[(1)]:	High
Software tag:	(Blank)

(1) Not applicable to FOUNDATION fieldbus or Profibus PA.

Custom Configuration[(1)]

If Option Code C1 is ordered, the customer may specify the following data in addition to the standard configuration parameters.

- Output Information
- Transmitter Information
- LCD display Configuration
- Hardware Selectable Information
- Signal Selection

Refer to the "Rosemount 3051 Configuration Data Sheet" document number 00806-0100-4001.

Tagging (3 options available)

- Standard SST hardware tag is wired to the transmitter. Tag character height is 0.125 in. (3,18 mm), 56 characters maximum.
- Tag may be permanently stamped on transmitter nameplate upon request, 56 characters maximum.
- Tag may be stored in transmitter memory (30 characters maximum). Software tag is left blank unless specified.

Commissioning Tag[(2)]

A temporary commissioning tag is attached to all transmitters. The tag indicates the device ID and allows an area for writing the location.

Optional Rosemount 304, 305 or 306 Integral Manifolds

Factory assembled to 3051C and 3051T transmitters. Refer to the following Product Data Sheet (document number 00813-0100-4839 for Rosemount 304 and 00813-0100-4733 for Rosemount 305 and 306) for additional information.

(1) Not applicable to FOUNDATION fieldbus or Profibus PA protocols.
(2) Only applicable to FOUNDATION fieldbus.

Other Seals

Refer to Product Data Sheet 00813-0100-4016 for additional information.

Output Information

Output range points must be the same unit of measure. Available units of measure include:

Pressure			
atm	inH2O@4 °C[(1)]	g/cm^2	psi
mbar	mmH_2O	kg/cm^2	torr
bar	mmHg	Pa	
inH_20	mmH2O@4 °C[(1)]	kPa	
inHg	ftH_20	MPa[(2)]	
Flow[(2)(3)]			
bbl	kg	cm^3	
ft^3	lb	m^3	
gal	L	ton	
Level[(2)]			
%	ft	cm	
in	mm		

(1) Only available on 4-20mA HART.

(2) Only available on Profibus PA.

(3) All flow units are available per second, minute, hour or day.

Display and Interface options

M4 Digital Display with Local Operator Interface (LOI)

- Available for Profibus PA
- Commission the device with external Local Configuration Buttons
- LOI Menu includes: Address, Units, Calibration, Damping, Display, Identification Number

M5 Digital Display

- 2-Line, 5-Digit LCD for 4-20 mA HART
- 1-Line, 4-Digit LCD for 1-5 Vdc HART Low Power
- 2-Line, 8-Digit LCD for FOUNDATION fieldbus and Profibus PA
- Direct reading of digital data for higher accuracy
- Displays user-defined flow, level, volume, or pressure units
- Displays diagnostic messages for local troubleshooting
- 90-degree rotation capability for easy viewing

M6 Digital Display with 316 Stainless Steel Cover

- For use with stainless steel housing option (housing codes J, K, and L)

Hardward Adjustments[(1)]

4-20 mA HART and 1-5 Vdc HART Low Power transmitters ship with local span and zero adjustments standard unless otherwise specified.

- Non-interactive external zero and span adjustments ease calibration
- Magnetic switches replace standard potentiometer adjustments to optimize performance

J1 Local Zero Adjustment Only[(1)]

J3 No Local Zero or Span Adjustment[(1)]

Rosemount 3051

Product Data Sheet
00813-0100-4001, Rev LA
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Transient Protection

T1 Integral Transient Protection Terminal Block
Meets IEEE C62.41, Category Location B
6 kV crest (0.5 μs - 100 kHz)
3 kV crest (8 × 20 microseconds)
6 kV crest (1.2 × 50 microseconds)

Bolts for Flanges and Adapters

- Options permit bolts for flanges and adapters to be obtained in various materials
- Standard material is plated carbon steel per ASTM A449, Type 1

L4 Austenitic 316 Stainless Steel Bolts
L5 ASTM A 193, Grade B7M Bolts
L6 Alloy K-500 Bolts

Conduit Plug

DO 316 SST Conduit Plug
Single 316 SST conduit plug replaces carbon steel plug

Rosemount 3051C Coplanar Flange and 3051T Bracket Option

B4 Bracket for 2-in. Pipe or Panel Mounting
- For use with the standard Coplanar flange configuration
- Bracket for mounting of transmitter on 2-in. pipe or panel
- Stainless steel construction with stainless steel bolts

Rosemount 3051C Traditional Flange Bracket Options

B1 Bracket for 2-in. Pipe Mounting
- For use with the traditional flange option
- Bracket for mounting on 2-in. pipe
- Carbon steel construction with carbon steel bolts
- Coated with polyurethane paint

B2 Bracket for Panel Mounting
- For use with the traditional flange option
- Bracket for mounting transmitter on wall or panel
- Carbon steel construction with carbon steel bolts
- Coated with polyurethane paint

B3 Flat Bracket for 2-in. Pipe Mounting
- For use with the traditional flange option
- Bracket for vertical mounting of transmitter on 2-in. pipe
- Carbon steel construction with carbon steel bolts
- Coated with polyurethane paint

B7 B1 Bracket with SST Bolts
- Same bracket as the B1 option with Series 300 stainless steel bolts

B8 B2 Bracket with SST Bolts
- Same bracket as the B2 option with Series 300 stainless steel bolts

B9 B3 Bracket with SST Bolts
- Same bracket as the B3 option with Series 300 stainless steel bolts

BA Stainless Steel B1 Bracket with SST Bolts
- B1 bracket in stainless steel with Series 300 stainless steel bolts

BC Stainless Steel B3 Bracket with SST Bolts
- B3 bracket in stainless steel with Series 300 stainless steel bolts

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00813-0100-4001 Rev LA, 7/11

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Product Data Sheet
00813-0100-4101, Rev FA
Catalog 2011 - 2012

Rosemount 2051 Pressure Transmitter

- *Best in Class performance with up to 0.065% high accuracy option*
- *Rangeability of 100:1*
- *Protocols available include HART® 4-20 mA, FOUNDATION™ fieldbus, PROFIBUS PA, HART 1-5 Vdc Low Power*
- *Coplanar™ platform enables integration of primary elements, manifolds, and remote seal solutions*
- *Complete pressure transmitter family to meet your pressure, level, and flow needs*



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Rosemount 2051 Pressure Transmitter Product Offering



Foundation of Reliable Measurement

- Differential, gage, and absolute pressure measurement
- Select from an extensive offering of DP Flowmeters, Liquid Level, Manifolds and Flanges.
- Available with variety of protocols and materials.



Unlock the Value of Devices with the Smart Wireless THUM™ Adapter

- Gain access to field intelligence and improve quality, safety, availability, operations, and maintenance costs
- Remotely manage devices and monitor health
- Enable new wireless measurement points
- Utilize existing loop power



Innovative, Integrated DP Flowmeters

- Fully assembled and leak tested for out-of-the-box installation
- Reduce straight pipe requirements, lower permanent pressure loss, and achieve accurate measurement in small line sizes
- Up to 2.00% volumetric flow accuracy at 5:1 turndown



Proven, Reliable, and Innovative DP Level Technologies

- Connect to virtually any process with a comprehensive offering of process connections, fill fluids, direct mount or capillary connections and materials
- Quantify and optimize total system performance with QZ option
- Optimize level measurement with cost efficient Tuned-System Assemblies



Instrument Manifolds – Quality, Convenient, and Easy

- Designed and engineered for optimal performance with Rosemount transmitters
- Save installation time and money with factory assembly
- Offers a variety of styles, materials, and configurations

Rosemount 2051C Coplanar Pressure Transmitter



2051C Coplanar Pressure Transmitter

Rosemount 2051 pressure transmitters provide the foundation for reliable measurement by offering a variety of product capabilities to meet your application needs. The flexible Coplanar design enables best process connection practices for reduced engineering and installed costs.

- Performance up to 0.065% accuracy
- Two-year stability of 0.10%, optional five-year stability
- 4-20 mA HART, 1-5 Vdc HART low power and FOUNDATION fieldbus and PROFIBUS PA protocols
- Coplanar platform enables integrated manifold, primary element, and seal solutions
- Calibrated spans/ranges from 0.5 inH2O to 2000 psi (1,2 mbar to 138 bar)
- 316L SST, Alloy C-276, and Tantalum process wetted materials

Additional Information
Specifications: page Pressure-207
Certifications: page Pressure-216
Dimensional Drawings: page Pressure-222

Table 1. Rosemount 2051C Coplanar Pressure Transmitters Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Transmitter Type		
2051C	Coplanar Pressure Transmitter		
Measurement Type			
Standard			**Standard**
D	Differential		★
G	Gage		★
Pressure Range			
Standard			**Standard**
	2051CD	**2051CG**	
1	-25 to 25 inH_2O (-62.2 to 62.2 mbar)	-25 to 25 inH_2O (-62.2 to 62.2 mbar)	★
2	-250 to 250 inH_2O (-623 to 623 mbar)	-250 to 250 inH_2O (-623 to 623 mbar)	★
3	-1000 to 1000 inH_2O (-2.5 to 2.5 bar)	-393 to 1000 inH_2O (-0.98 to 2.5 bar)	★
4	-300 to 300 psi (-20.7 to 20.7 bar)	-14.2 to 300 psi (-0.98 to 20.7 bar)	★
5	-2000 to 2000 psi (-137.9 to 137.9 bar)	-14.2 to 2000 psi (-0.98 to 137.9 bar)	★
Transmitter Output			
Standard			**Standard**
A	4–20 mA with Digital Signal Based on HART Protocol		★
F	FOUNDATION fieldbus Protocol		★
W	PROFIBUS PA Protocol		★
Expanded			
M	Low-Power, 1–5 Vdc with Digital Signal Based on *HART* Protocol		

Rosemount 2051

Product Data Sheet
00813-0100-4101, Rev FA
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Table 1. Rosemount 2051C Coplanar Pressure Transmitters Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Materials of Construction				
	Process Flange Type	**Flange Material**	**Drain/Vent**	
Standard				**Standard**
2	Coplanar	SST	SST	★
3(1)	Coplanar	Cast C-276	Alloy C-276	★
5	Coplanar	Plated CS	SST	★
7(1)	Coplanar	SST	Alloy C-276	★
8(1)	Coplanar	Plated CS	Alloy C-276	★
0	Alternate Process Connection			★
Isolating Diaphragm				
Standard				**Standard**
2(1)	316L SST			★
3(1)	Alloy C-276			★
Expanded				
5(2)	Tantalum			
O-ring				
Standard				**Standard**
A	Glass-filled PTFE			★
B	Graphite-filled PTFE			★
Sensor Fill Fluid				
Standard				**Standard**
1	Silicone			★
2	Inert			★
Housing Material			**Conduit Entry Size**	
Standard				**Standard**
A	Aluminum		½–14 NPT	★
B	Aluminum		M20 × 1.5	★
J	SST		½–14 NPT	★
K(3)	SST		M20 × 1.5	★
Expanded				
D	Aluminum		G½	
M(3)	SST		G½	

Table 1. Rosemount 2051C Coplanar Pressure Transmitters Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Options (Include with selected model number)

PlantWeb Control Functionality		
Standard		**Standard**
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	★
Alternate Flange[4]		
Standard		**Standard**
H2	Traditional Flange, 316 SST, SST Drain/Vent	★
H3[1]	Traditional Flange, Cast C-276, Alloy C-276 Drain/Vent	★
H7[1]	Traditional Flange, 316 SST, Alloy C-276 Drain/Vent	★
HJ	DIN Compliant Traditional Flange, SST, 7/16 in. Adapter/Manifold Bolting	★
FA	Level Flange, SST, 2 in., ANSI Class 150, Vertical Mount	★
FB	Level Flange, SST, 2 in., ANSI Class 300, Vertical Mount	★
FC	Level Flange, SST, 3 in., ANSI Class 150, Vertical Mount	★
FD	Level Flange, SST, 3 in., ANSI Class 300, Vertical Mount	★
FP	DIN Level Flange, SST, DN 50, PN 40, Vertical Mount	★
FQ	DIN Level Flange, SST, DN 80, PN 40, Vertical Mount	★
Expanded		
HK[5]	DIN Compliant Traditional Flange, SST, 10 mm Adapter/Manifold Bolting	
HL	DIN Compliant Traditional Flange, SST, 12 mm Adapter/Manifold Bolting	
Manifold Assembly[5][6]		
Standard		**Standard**
S5	Assemble to Rosemount 305 Integral Manifold	★
S6	Assemble to Rosemount 304 Manifold or Connection System	★
Integral Mount Primary Element[5][6]		
Standard		**Standard**
S4[7]	Assemble to Rosemount Annubar® Flowmeter or Rosemount 1195 Integral Orifice	★
S3	Assemble to Rosemount 405 Primary Element	★
Seal Assemblies[6]		
Standard		**Standard**
S1[8]	Assemble to one Rosemount 1199 diaphragm seal	★
S2[9]	Assemble to two Rosemount 1199 diaphragm seals	★
Mounting Brackets		
Standard		**Standard**
B1	Traditional Flange Bracket for 2-in. Pipe Mounting, CS Bolts	★
B2	Traditional Flange Bracket for Panel Mounting, CS Bolts	★
B3	Traditional Flange Flat Bracket for 2-in. Pipe Mounting, CS Bolts	★
B4	Coplanar Flange Bracket for 2-in. Pipe or Panel Mounting, all SST	★
B7	B1 Bracket with Series 300 SST Bolts	★
B8	B2 Bracket with Series 300 SST Bolts	★
B9	B3 Bracket with Series 300 SST Bolts	★
BA	SST B1 Bracket with Series 300 SST Bolts	★
BC	SST B3 Bracket with Series 300 SST Bolts	★

Rosemount 2051

Product Data Sheet
00813-0100-4101, Rev FA
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Table 1. Rosemount 2051C Coplanar Pressure Transmitters Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Product Certifications		
Standard		**Standard**
E1[3]	ATEX Flameproof	★
E2[3]	INMETRO Flameproof	★
E3[3]	China Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
E7[3]	IECEx Flameproof	★
EW	India (CCOE) Flameproof Approval	★
I1[3]	ATEX Intrinsic Safety	★
I2[3]	INMETRO Intrinsically Safe	★
I3[3]	China Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I6	CSA Intrinsically Safe	★
I7[3]	IECEx Intrinsic Safety	★
IA[10]	ATEX FISCO Intrinsic Safety	★
IE[13]	FM FISCO Intrinsically Safe	★
IF[13]	CSA FISCO Intrinsically Safe	★
IG[13]	IECEx FISCO Intrinsically Safe	★
IW	India (CCOE) Intrinsically Safe	★
K1[3]	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
K7[3]	IECEx Flameproof, Intrinsic Safety, Type n	★
KA[3]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
KC[3]	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[3]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe	★
N1[3]	ATEX Type n	★
N7[3]	IECEx Type n	★
ND[3]	ATEX Dust	★
Drinking Water Approval		
Standard		**Standard**
DW[11]	NSF Drinking Water Approval	★
Shipboard Approvals		
Standard		**Standard**
SBV	Bureau Veritas (BV) Type Approval	★
SDN	Det Norske Veritas (DNV) Type Approval	★
SLL	Lloyds Register (LR) Type Approval	★

Table 1. Rosemount 2051C Coplanar Pressure Transmitters Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Bolting Materials		
Standard		**Standard**
L4	Austenitic 316 SST Bolts	★
L5	ASTM A 193, Grade B7M Bolts	★
L6	Alloy K-500 Bolts	★
L8	ASTM A 193 Class 2, Grade B8M Bolts	★
Display and Interface Options		
Standard		**Standard**
M4(12)	LCD Display with Local Operator Interface	★
M5	LCD display	★
Hardware Adjustments		
Standard		**Standard**
D4(13)	Zero and Span Configuration Buttons	★
Flange Adapters		
Standard		**Standard**
DF(14)	1/2-14 NPT Flange Adapters	★
Conduit Plug		
Standard		**Standard**
DO(15)	316 SST Conduit Plug	★
RC1/4 RC1/2 Process Connection		
Expanded		
D9(16)	RC 1/4 Flange with RC 1/2 Flange Adapter - SST	
Ground Screw		
Standard		**Standard**
V5(17)	External Ground Screw Assembly	★
Performance		
Standard		**Standard**
P8(18)	High Performance Option	★
Transient Protection		
Standard		**Standard**
T1(19)	Transient Protection Terminal Block	★
Software Configuration		
Standard		**Standard**
C1(20)	Custom Software Configuration (Completed CDS 00806-0100-4101 required with order)	★
Alarm Limit		
Standard		**Standard**
C4(20)(21)	NAMUR alarm and saturation levels, high alarm	★
CN(20)(21)	NAMUR alarm and saturation levels, high alarm	★
Pressure Testing		
Expanded		
P1	Hydrostatic testing with certificate	

Rosemount 2051

Table 1. Rosemount 2051C Coplanar Pressure Transmitters Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Cleaning Process Area		
Expanded		
P2	Cleaning for Special Service	
P3	Cleaning for < 1 PPM Chlorine/Flourine	
Maximum Static Line Pressure		
Standard		**Standard**
P9	4500 psig (310 bar) Static Pressure Limit (2051CD Ranges 2-5 only)	★
Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate	★
QG	Calibration Certificate and GOST Verification Certificate	★
QP	Calibration certification and tamper evident seal	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204 3.1.B	★
Quality Certification for Safety		
Standard		**Standard**
QS(20)	Prior-use certificate of FMEDA data	★
Surface Finish		
Standard		**Standard**
Q16	Surface finish certification for sanitary remote seals	★
Toolkit Total System Performance Reports		
Standard		**Standard**
QZ	Remote Seal System Performance Calculation Report	★
Conduit Electrical Connection		
Standard		**Standard**
GE	M12, 4-pin, Male Connector (eurorast®)	★
GM	A size Mini, 4-pin, Male Connector (minifast®)	★
Typical Model Number: 2051C D 2 A 2 2 A 1 A B4 M5		

(1) Materials of Construction comply with recommendations per NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(2) Available in Ranges 2-5 only.

(3) Not available with Low Power output code M.

(4) Requires 0 code in Materials of Construction for Alternate Process Connection.

(5) Not valid with optional code P9 for 4500 psi Static Pressure.

(6) "Assemble-to" items are specified separately and require a completed model number.

(7) Process Flange limited to Coplanar (codes 2, 3, 5, 7, 8) or Traditional (H2, H3, H7).

(8) Not valid with optional code D9 for RC1/2 Adaptors.

(9) Not valid with optional codes DF and D9 for Adaptors.

(10) Only valid with FOUNDATION fieldbus output code F.

(11) Not available with Alloy C-276 isolator (3 code), tantalum isolator (5 code), all cast C-276 flanges, all plated CS flanges, all DIN flanges, all Level flanges, assemble-to manifolds (S5 and S6 codes), assemble-to seals (S1 and S2 codes), assemble-to primary elements (S3 and S4 codes), surface finish certification (Q16 code), and remote seal system report (QZ code).

(12) Available only with output code W-PROFIBUS PA

(13) Not available with FOUNDATION fieldbus output code F.

(14) Not valid with Alternate Process Connection options S3, S4, S5, S6.

(15) Transmitter is shipped with 316 SST conduit plug (uninstalled) in place of standard carbon steel conduit plug

(16) Not available with Alternate Process Connection: DIN Flanges and Level Flanges.

(17) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.

(18) Available with 4-20 mA HART output code A, FOUNDATION fieldbus output code F, 2051C Ranges 2-5 or 2051T Ranges 1-4, SST diaphragms and silicone fill fluid. High Performance Option includes 0.065% Reference Accuracy, 5 year stability and improved ambient temperature effect specifications. See Performance Specifications for details.

(19) The T1 option is not needed with FISCO Product Certifications; transient protection is included in the FISCO product certification codes IA and IE.

(20) Only available with HART 4-20 mA output (output code A).

(21) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

Rosemount 2051

Product Data Sheet
00813-0100-4101, Rev FA
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Rosemount 2051T In-Line Pressure Transmitter



2051T In-Line Pressure Transmitter

Rosemount 2051T In-line pressure transmitters provide reliable Gage and Absolute pressure measurement. The compact inline design makes the 2051 suitable for a variety of applications.

- Performance up to 0.065% accuracy
- Two-year stability of 0.10%, optional five-year stability
- 4-20 mA HART, 1-5 Vdc HART low power and FOUNDATION fieldbus and PROFIBUS PA protocols
- Calibrated spans/ranges from 0.2 to 10000 psi (10,3 mbar to 689 bar)
- Multiple process connections available
- 316L SST and Alloy C-276 process wetted parts

Additional Information
Specifications: page Pressure-207
Certifications: page Pressure-216
Dimensional Drawings: page Pressure-222

Table 2. Rosemount 2051T In-Line Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Transmitter Type		
Standard			**Standard**
2051T	In-Line Pressure Transmitter		★
Pressure Type			
Standard			**Standard**
G	Gage		★
A	Absolute		★
Pressure Range			
Standard			**Standard**
	2051TG	**2051TA**	
1	-14.7 to 30 psi (-1.0 to 2.1 bar)	0 to 30 psi (0 to 2.1 bar)	★
2	-14.7 to 150 psi (-1.0 to 10.3 bar)	0 to 150 psi (0 to 10.3 bar)	★
3	-14.7 to 800 psi (-1.0 to 55 bar)	0 to 800 psi (0 to 55 bar)	★
4	-14.7 to 4000 psi (-1.0 to 276 bar)	0 to 4000 psi (0 to 276 bar)	★
5	-14.7 to 10000 psi (-1.0 to 689 bar)	0 to 10000 psi (0 to 689 bar)	★
Transmitter Output			
Standard			**Standard**
A	4–20 mA with Digital Signal Based on HART Protocol		★
F	FOUNDATION fieldbus Protocol		★
W	PROFIBUS PA Protocol		★
Expanded			
M	Low-Power, 1–5 Vdc with Digital Signal Based on HART Protocol		

Table 2. Rosemount 2051T In-Line Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Process Connection Style			
Standard			**Standard**
2B	1/2–14 NPT female		★
2C	G1/2 A DIN 16288 male (Available in SST for Range 1-4 only)		★
Expanded			
2F	Coned and Threaded, Compatible with Autoclave Type F-250-C (Range 5 only)		
Isolating Diaphragm		**Process Connection Wetted Parts Material**	
Standard			**Standard**
2(1)	316L SST	316L SST	★
3(1)	Alloy C-276	Alloy C-276	★
Sensor Fill Fluid			
Standard			**Standard**
1	Silicone		★
2	Inert		★
Housing Material		**Conduit Entry Size**	
Standard			**Standard**
A	Aluminum	½–14 NPT	★
B	Aluminum	M20 × 1.5	★
J	SST	½–14 NPT	★
K(2)	SST	M20 × 1.5	★
Expanded			
D	Aluminum	G½	
M(2)	SST	G½	

Options (Include with selected model number)

PlantWeb Control Functionality		
Standard		**Standard**
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	★
Manifold Assemblies		
Standard		**Standard**
S5(3)	Assemble to Rosemount 306 Integral Manifold	★
Seal Assemblies		
Standard		**Standard**
S1(3)	Assemble to one Rosemount 1199 diaphragm seal	★
Mounting Bracket		
Standard		**Standard**
B4	Bracket for 2-in. Pipe or Panel Mounting, All SST	★

Table 2. Rosemount 2051T In-Line Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Product Certifications		
Standard		**Standard**
E1	ATEX Flameproof	★
E2[3]	INMETRO Flameproof	★
E3[3]	China Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
E7[3]	IECEx Flameproof	★
EW	India (CCOE) Flameproof Approval	★
I1[3]	ATEX Intrinsic Safety	★
I2[3]	INMETRO Intrinsically Safe	★
I3[3]	China Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I6	CSA Intrinsically Safe	★
I7[3]	IECEx Intrinsic Safety	★
IA[4]	ATEX FISCO Intrinsic Safety	★
IE[4]	FM FISCO Intrinsically Safe	★
IF[4]	CSA FISCO Intrinsically Safe	★
IG[4]	IECEx FISCO Intrinsically Safe	★
IW	India (CCOE) Intrinsic Safety Approval	★
K1[3]	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
K7[3]	IECEx Flameproof, Intrinsic Safety, Type n	★
KA[3]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
KC[3]	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[3]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe	★
N1[3]	ATEX Type n	★
N7[3]	IECEx Type n	★
ND[3]	ATEX Dust	★
Drinking Water Approval		
Standard		**Standard**
DW[5]	NSF Drinking Water Approval	★
Shipboard Approvals		
Standard		**Standard**
SBV	Bureau Veritas (BV) Type Approval	★
SDN	Det Norske Veritas (DNV) Type Approval	★
SLL	Lloyds Register (LR) Type Approval	★
Display and Interface Options		
Standard		**Standard**
M4[6]	LCD Display with Local Operator Interface	★
M5	LCD display	★
Hardware Adjustments		
Standard		**Standard**
D4[7]	Zero and Span Configuration Buttons	★
Conduit Plug		
Standard		**Standard**
DO[8]	316 SST Conduit Plug	★

Table 2. Rosemount 2051T In-Line Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Ground Screw		
Standard		**Standard**
V5[9]	External Ground Screw Assembly	★
Performance		
Standard		**Standard**
P8[10]	High Performance Option	★
Terminal Blocks		
Standard		**Standard**
T1[11]	Transient Protection Terminal Block	★
Software Configuration		
Standard		**Standard**
C1[12]	Custom Software Configuration (Completed CDS 00806-0100-4101 required with order)	★
Alarm Limits		
Standard		**Standard**
C4[12][13]	Analog Output Levels Compliant with NAMUR Recommendation NE 43, Alarm High	★
CN[12][13]	Analog Output Levels Compliant with NAMUR Recommendation NE 43, Alarm Low	★
Pressure Testing		
Expanded		
P1	Hydrostatic testing with certificate	
Cleaning Process Area[14]		
Expanded		
P2	Cleaning for Special Service	
P3	Cleaning for <1 PPM Chlorine/Fluorine	
Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate	★
QG	Calibration Certificate and GOST Verification Certificate	★
QP	Calibration Certificate and tamper evident seal	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204 3.1.B	★
Quality Certification for Safety		
Standard		**Standard**
QS[12]	Prior-use certificate of FMEDA data	★
Surface Finish		
Standard		**Standard**
Q16	Surface finish certification for sanitary remote seals	★
Toolkit Total System Performance Reports		
Standard		**Standard**
QZ	Remote Seal System Performance Calculation Report	★
Conduit Electrical Connector		
Standard		**Standard**
GE	M12, 4-pin, Male Connector (eurofast®)	★
GM	A size Mini, 4-pin, Male Connector (minifast®)	★
Typical Model Number:	**2051T G 3 A 2B 2 1 A B4 M5**	

(1) Materials of Construction comply with recommendations per NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(2) Not available with Low Power output code M.

(3) "Assemble-to" items are specified separately and require a completed model number.

(4) Only valid with FOUNDATION fieldbus output code F.

(5) Not available with coned and threaded connection (2F code), assemble-to manifold (S5 code), assemble-to seal (S1 code), surface finish certification (Q16 code), remote seal system report (QZ code).

(6) Available only with output code W-PROFIBUS PA

(7) Not available with FOUNDATION fieldbus output code F.

(8) Transmitter is shipped with 316 SST conduit plug (uninstalled) in place of standard carbon steel conduit plug

(9) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.

(10) Available with 4-20 mA HART output code A, FOUNDATION fieldbus output code F, 2051C Ranges 2-5 or 2051T Ranges 1-4, SST diaphragms and silicone fill fluid. High Performance Option includes 0.065% Reference Accuracy, 5 year stability and improved ambient temperature effect specifications. See Performance Specifications for details.

(11) The T1 option is not needed with FISCO Product Certifications; transient protection is included in the FISCO product certification codes IA and IE.

(12) Only available with HART 4-20 mA output (output code A).

(13) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(14) Not valid with Alternate Process Connection S5.

Rosemount 2051CF Flowmeters



Rosemount 2051CF Flowmeters combine the 2051C pressure transmitter with industry leading primary element technologies, including: Annubar Averaging Pitot Tube, Compact Conditioning Orifice Plate, and Integral Orifice Plate.

- Flowmeters are factory configured to meet your application needs (Configuration Data Sheet required).
- HART 4-20 mA, HART 1-5 Vdc low power, FOUNDATION fieldbus protocols and and PROFIBUS PA protocols
- Integral temperature measurement (T option)
- Direct or remote mount configurations available



Rosemount 2051CFA Annubar Flowmeter

Additional Information
Specifications: page Pressure-207
Certifications: page Pressure-216
Dimensional Drawings: page Pressure-222

Table 3. Rosemount 2051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
2051CFA	Annubar Flowmeter	
Measurement Type		
Standard		**Standard**
D	Differential Pressure	★
Fluid Type		
Standard		**Standard**
L	Liquid	★
G	Gas	★
S	Steam	★
Line Size		
Standard		**Standard**
020	2-in. (50 mm)	★
025	$2^{1}/_{2}$-in. (63.5 mm)	★
030	3-in. (80 mm)	★
035	$3^{1}/_{2}$-in. (89 mm)	★
040	4-in. (100 mm)	★
050	5-in. (125 mm)	★
060	6-in. (150 mm)	★
070	7-in. (175 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
Pipe I.D. Range		
Standard		**Standard**
C	Range C from the Pipe I.D. table	★
D	Range D from the Pipe I.D. table	★

Rosemount 2051

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Table 3. Rosemount 2051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded		
A	Range A from the Pipe I.D. table	
B	Range B from the Pipe I.D. table	
E	Range E from the Pipe I.D. table	
Z	Non-standard Pipe I.D. Range or Line Sizes greater than 12 in.	
Pipe Material / Mounting Assembly Material		
Standard		**Standard**
C	Carbon steel (A105)	★
S	316 Stainless Steel	★
0[(1)]	No Mounting (Customer Supplied)	
Expanded		
G	Chrome-Moly Grade F-11	
N	Chrome-Moly Grade F-22	
J	Chrome-Moly Grade F-91	
Piping Orientation		
Standard		**Standard**
H	Horizontal Piping	★
D	Vertical Piping with Downwards Flow	★
U	Vertical Piping with Upwards Flow	★
Annubar Type		
Standard		**Standard**
P	Pak-Lok	★
F	Flanged with opposite side support	★
Sensor Material		
Standard		**Standard**
S	316 Stainless Steel	★
Sensor Size		
Standard		**Standard**
1	Sensor size 1 — Line sizes 2-in. (50 mm) to 8-in. (200 mm)	★
2	Sensor size 2 — Line sizes 6-in. (150 mm) to 96-in. (2400 mm)	★
3	Sensor size 3 — Line sizes greater than 12-in. (300 mm)	★
Mounting Type		
Standard		**Standard**
T1	Compression or Threaded Connection	★
A1	150# RF ANSI	★
A3	300# RF ANSI	★
A6	600# RF ANSI	★
D1	DN PN16 Flange	★
D3	DN PN40 Flange	★
D6	DN PN100 Flange	★
Expanded		
R1	150# RTJ Flange	
R3	300# RTJ Flange	
R6	600# RTJ Flange	
Opposite Side Support or Packing Gland		
Standard		**Standard**
0	No opposite side support or packing gland (Required for Pak-Lok and Flange-Lok models)	★
	Opposite Side Support – Required for Flanged Models	
C	NPT Threaded Opposite Support Assembly – Extended Tip	★
D	Welded Opposite Support Assembly – Extended Tip	★
Isolation Valve for Flo-Tap Models		
Standard		**Standard**
0[(1)]	Not Applicable or Customer Supplied	★

Table 3. Rosemount 2051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Temperature Measurement			
Standard			**Standard**
T	Integral RTD – not available with Flanged model greater than class 600#		★
0	No Temperature Sensor		★
Expanded			
R	Remote Thermowell and RTD		
Transmitter Connection Platform			
Standard			**Standard**
3	Direct-mount, Integral 3-valve Manifold– not available with Flanged model greater than class 600		★
5	Direct -mount, 5-valve Manifold – not available with Flanged model greater than class 600		★
7	Remote-mount NPT Connections ($^1/_2$-in. FNPT)		★
Expanded			
8	Remote-mount SW Connections ($^1/_2$-in.)		
Differential Pressure Range			
Standard			**Standard**
1	0 to 25 in H_2O (0 to 62,3 mbar)		★
2	0 to 250 in H_2O (0 to 623 mbar)		★
3	0 to 1000 in H_2O (0 to 2,5 bar)		★
Transmitter Output			
Standard			**Standard**
A	4–20 mA with digital signal based on HART Protocol		★
F	FOUNDATION fieldbus Protocol		★
W	PROFIBUS PA Protocol		★
Expanded			
M	Low-Power, 1-5 Vdc with Digital Signal Based on HART Protocol		
Transmitter Housing Material		**Conduit Entry Size**	
Standard			**Standard**
A	Aluminum	$^1/_2$-14 NPT	★
B	Aluminum	M20 x 1.5	★
J	SST	$^1/_2$-14 NPT	★
K[(2)]	SST	M20 x 1.5	★
Expanded			
D	Aluminum	G$^1/_2$	
M[(2)]	SST	G$^1/_2$	
Transmitter Performance Class			
Standard			**Standard**
1	2.0% flow rate accuracy, 5:1 flow turndown, 2-year stability		★

Options (Include with selected model number)

Pressure Testing		
Expanded		
P1[(3)]	Hydrostatic Testing with Certificate	
PX[(3)]	Extended Hydrostatic Testing	
Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Material Testing		
Expanded		
V1	Dye Penetrant Exam	
Material Examination		
Expanded		
V2	Radiographic Examination	

Table 3. Rosemount 2051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection & Performance Certificate	★
Surface Finish		
Standard		**Standard**
RL	Surface finish for Low Pipe Reynolds # in Gas & Steam	★
RH	Surface finish for High Pipe Reynolds # in Liquid	★
Material Traceability Certification		
Standard		**Standard**
Q8[4]	Material Traceability Certification per EN 10474:2004 3.1	★
Code Conformance		
Expanded		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
Materials Conformance		
Expanded		
J5[5]	NACE MR-0175 / ISO 15156	
Country Certification		
Standard		**Standard**
J6	European Pressure Directive (PED)	★
Expanded		
J1	Canadian Registration	
Instrument Connections for Remote Mount Options		
Standard		**Standard**
G2	Needle Valves, Stainless Steel	★
G6	OS&Y Gate Valve, Stainless Steel	★
Expanded		
G1	Needle Valves, Carbon Steel	
G3	Needle Valves, Alloy C-276	
G5	OS&Y Gate Valve, Carbon Steel	
G7	OS&Y Gate Valve, Alloy C-276	
Special Shipment		
Standard		**Standard**
Y1	Mounting Hardware Shipped Separately	★
Product Certifications		
Standard		**Standard**
E1[2]	ATEX Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
E7	IECEx Flameproof, Dust Ignition-proof	★
I1[2]	ATEX Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I6	CSA Intrinsically Safe	★
I7[2]	IECEx Intrinsic Safety	★
IA[6]	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	★
IE[6]	FM FISCO Intrinsically Safe	★
IF[6]	CSA FISCO Intrinsically Safe	★
IG[6]	IECEx FISCO Intrinsically Safe	★
K1[2]	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	★
K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	★
K7[2]	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	★
KA[2]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★

Table 3. Rosemount 2051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)	★
KC[(2)]	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[(2)]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)	★
N1[(2)]	ATEX Type n	★
N7[(2)]	IECEx Type n	★
ND[(2)]	ATEX Dust	★
Sensor Fill Fluid and O-ring Options		
Standard		**Standard**
L1	Inert Sensor Fill Fluid	★
L2	Graphite-Filled (PTFE) O-ring	★
LA	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★
Shipboard Approvals		
Standard		**Standard**
SBV	Bureau Veritas (BV) Type Approval	★
SDN	Det Norske Veritas (DNV) Type Approval	★
SLL	Lloyds Register (LR) Type Approval	★
Display and Interface Options		
Standard		**Standard**
M4[(7)]	LCD Display with Local Operator Interface	★
M5	LCD display	★
Transmitter Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate for Transmitter	★
Quality Certification for Safety		
Standard		**Standard**
QS[(8)]	Prior-use certificate of FMEDA data	★
Transient Protection		
Standard		**Standard**
T1[(9)]	Transient terminal block	★
Manifold for Remote Mount Option		
Standard		**Standard**
F2	3-Valve Manifold, Stainless Steel	★
F6	5-Valve Manifold, Stainless Steel	★
Expanded		
F1	3-Valve Manifold, Carbon Steel	
F5	5-Valve Manifold, Carbon Steel	
PlantWeb Control Functionality		
Standard		**Standard**
A01[(6)]	FOUNDATION fieldbus Advanced Control Function Block Suite	★
Hardware Adjustments		
Standard		**Standard**
D4[(8)]	Zero and Span Hardware Adjustments	★
Alarm Limit		
Standard		**Standard**
C4[(8)(10)]	NAMUR Alarm and Saturation Levels, High Alarm	★
CN[(8)(10)]	NAMUR Alarm and Saturation Levels, Low Alarm	★
Ground Screw		
Standard		**Standard**
V5[(11)]	External Ground Screw Assembly	★
Typical Model Number: 2051CFA D L 060 D C H P S 2 T1 0 0 0 3 2A A 1A 3		

(1) Provide the "A" dimension for Flanged (page Pressure-229) and Pak-Lok (page Pressure-229).

(2) Not available with Low Power Output Code M.

(3) Applies to assembled flowmeter only, mounting not tested.

(4) Instrument Connections for Remote Mount Options and Isolation Valves for Flo-tap Models are not included in the Material Traceability Certification.

(5) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(6) Only valid with FOUNDATION fieldbus Output Code F.

(7) Available only with output code W-PROFIBUS PA

(8) Not available with Output Protocol code F.

(9) Not available with Housing code 00, 5A or 7J. The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(10) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(11) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.



Rosemount 2051CFC Compact Flowmeter

Additional Information
Specifications: page Pressure-207
Certifications: page Pressure-216
Dimensional Drawings: page Pressure-222

Table 4. Rosemount 2051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
2051CFC	Compact Flowmeter	
Measurement Type		
Standard		**Standard**
D	Differential Pressure	★
Primary Element Technology		
Standard		**Standard**
C	Conditioning Orifice Plate	★
P	Orifice Plate	★
Material Type		
Standard		**Standard**
S	316 SST	★
Line Size		
Standard		**Standard**
005(1)	1/2-in. (15 mm)	★
010(1)	1-in. (25 mm)	★
015(1)	1 1/2-in. (40 mm)	★
020	2-in. (50 mm)	★
030	3-in. (80 mm)	★
040	4-in. (100 mm)	★
060	6-in. (150 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
Primary Element Style		
Standard		**Standard**
N	Square Edged	★
Primary Element Type		
Standard		**Standard**
040	0.40 Beta Ratio	★
065(2)	0.65 Beta Ratio	★
Temperature Measurement		
Standard		**Standard**
0	No Temperature Sensor	★
Expanded		
R	Remote Thermowell and RTD	
Transmitter Connection Platform		
Standard		**Standard**
3	Direct-mount, Integral 3-valve Manifold	★
7	Remote-mount, 1/4-in. NPT Connections	★

Rosemount 2051

Product Data Sheet
00813-0100-4101, Rev FA
Catalog 2011 - 2012

Table 4. Rosemount 2051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Differential Pressure Range			
Standard			**Standard**
1	0 to 25 in H_2O (0 to 62,3 mbar)		★
2	0 to 250 in H_2O (0 to 623 mbar)		★
3	0 to 1000 in H_2O (0 to 2,5 bar)		★
Transmitter Output			
Standard			**Standard**
A	4–20 mA with digital signal based on HART Protocol		★
F	FOUNDATION fieldbus Protocol		★
W	PROFIBUS PA Protocol		★
Expanded			
M	Low-Power, 1-5 Vdc with Digital Signal Based on HART Protocol		
Transmitter Housing Material		**Conduit Entry Size**	
Standard			**Standard**
A	Aluminum	$^1/_2$-14 NPT	★
B	Aluminum	M20 x 1.5	★
J	SST	$^1/_2$-14 NPT	★
K[3]	SST	M20 x 1.5	★
Expanded			
D	Aluminum	G$^1/_2$	
M[3]	SST	G$^1/_2$	
Transmitter Performance Class			
Standard			**Standard**
1	up to ±2.25% flow rate accuracy, 5:1 flow turndown, 2-year stability		★

Options (Include with selected model number)

Installation Accessories		
Standard		**Standard**
AB	ANSI Alignment Ring (150#) (Only required for 10-in. (250 mm) and 12-in. (300 mm) line sizes)	★
AC	ANSI Alignment Ring (300#) (Only required for 10-in. (250 mm) and 12-in. (300 mm) line sizes)	★
AD	ANSI Alignment Ring (600#) (Only required for 10-in. (250 mm) and 12-in. (300 mm) line sizes)	★
DG	DIN Alignment Ring (PN16)	★
DH	DIN Alignment Ring (PN40)	★
DJ	DIN Alignment Ring (PN100)	★
Expanded		
JB	JIS Alignment Ring (10K)	
JR	JIS Alignment Ring (20K)	
JS	JIS Alignment Ring (40K)	
Remote Adapters		
Standard		**Standard**
FE	Flange Adapters 316 SST (1/2-in NPT)	★
High Temperature Application		
Expanded		
HT	Graphite Valve Packing (Tmax = 850 °F)	
Flow Calibration		
Expanded		
WC[4]	Flow Calibration Certification (3 point)	
WD[4]	Discharge Coefficient Verification (full 10 point)	
Pressure Testing		
Expanded		
P1	Hydrostatic Testing with Certificate	
Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	

Table 4. Rosemount 2051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection and Performance Certificate	★
Transmitter Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate for Transmitter	★
Quality Certification for Safety		
Standard		**Standard**
QS(5)	Prior-use certificate of FMEDA data	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204:2004 3.1	★
Code Conformance		
Expanded		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
J4	ANSI/ASME B31.8	
Materials Conformance		
Expanded		
J5(6)	NACE MR-0175 / ISO 15156	
Country Certification		
Expanded		
J1	Canadian Registration	
Product Certifications		
Standard		**Standard**
E1(3)	ATEX Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
E7(3)	IECEx Flameproof, Dust Ignition-proof	★
I1(3)	ATEX Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I6	CSA Intrinsically Safe	★
I7(3)	IECEx Intrinsic Safety	★
IA(7)	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	★
IE(7)	FM FISCO Intrinsically Safe	★
IF(7)	CSA FISCO Intrinsically Safe	★
IG(7)	IECEx FISCO Intrinsically Safe	★
K1(3)	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	★
K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	★
K7(3)	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	★
KA(3)	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)	★
KC(3)	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD(3)	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)	★
N1(3)	ATEX Type n	★
N7(3)	IECEx Type n	★
ND(3)	ATEX Dust	★
Sensor Fill Fluid and O-ring Options		
Standard		**Standard**
L1	Inert Sensor Fill Fluid	★
L2	Graphite-Filled (PTFE) O-ring	★
LA	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★

Table 4. Rosemount 2051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Shipboard Approvals		
Standard		**Standard**
SBV	Bureau Veritas (BV) Type Approval	★
SDN	Det Norske Veritas (DNV) Type Approval	★
SLL	Lloyds Register (LR) Type Approval	★
Display and Interface Options		
Standard		**Standard**
M4[8]	LCD Display with Local Operator Interface	★
M5	LCD Display	★
Transient Protection		
Standard		**Standard**
T1[9]	Transient terminal block	★
Manifold for Remote Mount Option		
Standard		**Standard**
F2	3-Valve Manifold, Stainless Steel	★
F6	5-Valve Manifold, Stainless Steel	★
Alarm Limit		
Standard		**Standard**
C4[10][11]	NAMUR Alarm and Saturation Levels, High Alarm	★
CN[10][11]	NAMUR Alarm and Saturation Levels, Low Alarm	★
PlantWeb Control Functionality		
Standard		**Standard**
A01[7]	FOUNDATION fieldbus Advanced Control Function Block Suite	★
Hardware Adjustments		
Standard		**Standard**
D4[10]	Zero and Span Hardware Adjustments	★
Ground Screw		
Standard		**Standard**
V5[12]	External Ground Screw Assembly	★
Typical Model Number: 2051CFC D C S 060 N 065 0 3 2 A A 1 WC E5 M5		

(1) Not available for Primary Element Technology C.

(2) For 2-in. (50 mm) line sizes the Primary Element Type is 0.6 for Primary Element Technology Code C.

(3) Not available with Low Power Output Code M.

(4) Not available with Primary Element Technology P.

(5) Not available with Output Protocol code F.

(6) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(7) Only valid with FOUNDATION fieldbus Output Code F.

(8) Available only with output code W-RPOFIBUS PA

(9) Not available with Housing code 00, 5A or 7J. The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(10) Not available with FOUNDATION fieldbus (Output Code F).

(11) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(12) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.



Rosemount 2051CFP
Integral Orifice Flowmeter

Additional Information
Specifications: page Pressure-207
Certifications: page Pressure-216
Dimensional Drawings: page Pressure-222

Table 5. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
2051CFP	Integral Orifice Flowmeter	
Measurement Type		
Standard		**Standard**
D	Differential Pressure	★
Material Type		
Standard		**Standard**
S	316 SST	★
Line Size		
Standard		**Standard**
005	1/2-in. (15 mm)	★
010	1-in. (25 mm)	★
015	1 1/2-in. (40 mm)	★
Process Connection		
Standard		**Standard**
T1	NPT Female Body (Not Available with Remote Thermowell and RTD)	★
S1(1)	Socket Weld Body (Not Available with Remote Thermowell and RTD)	★
P1	Pipe Ends: NPT Threaded	★
P2	Pipe ends: Beveled	★
D1	Pipe Ends: Flanged, DIN PN16, slip-on	★
D2	Pipe Ends: Flanged, DIN PN40, slip-on	★
D3	Pipe Ends: Flanged, DIN PN100, slip-on	★
W1	Pipe Ends: Flanged, RF, ANSI Class 150, weld-neck	★
W3	Pipe Ends: Flanged, RF, ANSI Class 300, weld-neck	★
W6	Pipe Ends: Flanged, RF, ANSI Class 600, weld-neck	★
Expanded		
A1	Pipe Ends: Flanged, RF, ANSI Class 150, slip-on	
A3	Pipe Ends: Flanged, RF, ANSI Class 300, slip-on	
A6	Pipe Ends: Flanged, RF, ANSI Class 600, slip-on	
R1	Pipe Ends: Flanged, RTJ, ANSI Class 150, slip-on	
R3	Pipe Ends: Flanged, RTJ, ANSI Class 300, slip-on	
R6	Pipe Ends: Flanged, RTJ, ANSI Class 600, slip-on	
Orifice Plate Material		
Standard		**Standard**
S	316 SST	★
Bore Size Option		
Standard		**Standard**
0066	0.066-in. (1.68 mm) for 1/2-in. Pipe	★
0109	0.109-in. (2.77 mm) for 1/2-in. Pipe	★
0160	0.160-in. (4.06 mm) for 1/2-in. Pipe	★
0196	0.196-in. (4.98 mm) for 1/2-in. Pipe	★

Table 5. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

0260	0.260-in. (6.60 mm) for 1/2-in. Pipe		★
0340	0.340-in. (8.64 mm) for 1/2-in. Pipe		★
0150	0.150-in. (3.81 mm) for 1-in. Pipe		★
0250	0.250-in. (6.35 mm) for 1-in. Pipe		★
0345	0.345-in. (8.76 mm) for 1-in. Pipe		★
0500	0.500-in. (12.70 mm) for 1-in. Pipe		★
0630	0.630-in. (16.00 mm) for 1-in. Pipe		★
0800	0.800-in. (20.32 mm) for 1-in. Pipe		★
0295	0.295-in. (7.49 mm) for 1 1/2-in. Pipe		★
0376	0.376-in. (9.55 mm) for 1 1/2-in. Pipe		★
0512	0.512-in. (13.00 mm) for 1 1/2-in. Pipe		★
0748	0.748-in. (19.00 mm) for 1 1/2-in. Pipe		★
1022	1.022-in. (25.96 mm) for 1 1/2-in. Pipe		★
1184	1.184-in. (30.07 mm) for 1 1/2-in. Pipe		★
Expanded			
0010	0.010-in. (0.25 mm) for 1/2-in. Pipe		
0014	0.014-in. (0.36 mm) for 1/2-in. Pipe		
0020	0.020-in. (0.51 mm) for 1/2-in. Pipe		
0034	0.034-in. (0.86 mm) for 1/2-in. Pipe		
Transmitter Connection Platform			
Standard			**Standard**
D3	Direct-mount, 3-Valve Manifold, SST		★
D5	Direct-mount, 5-Valve Manifold, SST		★
R3	Remote-mount, 3-Valve Manifold, SST		★
R5	Remote-mount, 5-Valve Manifold, SST		★
Differential Pressure Ranges			
Standard			**Standard**
1	0 to 25 in H_2O (0 to 62,3 mbar)		★
2	0 to 250 in H_2O (0 to 623 mbar)		★
3	0 to 1000 in H_2O (0 to 2,5 bar)		★
Transmitter Output			
Standard			**Standard**
A	4–20 mA with digital signal based on HART protocol		★
F	FOUNDATION fieldbus protocol		★
W	PROFIBUS PA Protocol		★
Expanded			
M	Low-Power, 1-5 Vdc with Digital Signal Based on HART Protocol		
Transmitter Housing Material		**Conduit Entry Size**	
Standard			**Standard**
A	Aluminum	$^1/_2$-14 NPT	★
B	Aluminum	M20 x 1.5	★
J	SST	$^1/_2$-14 NPT	★
K[(2)]	SST	M20 x 1.5	★
Expanded			
D	Aluminum	G$^1/_2$	
M[(2)]	SST	G$^1/_2$	
Transmitter Performance Class			
Standard			**Standard**
1	up to ±2.25% flow rate accuracy, 5:1 flow turndown, 2-year stability		★

Options (Include with selected model number)

Temperature Sensor		
Expanded		
RT[(3)]	Thermowell and RTD	

Table 5. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Optional Connection		
Standard		**Standard**
G1	DIN 19213 Transmitter Connection	★
Pressure Testing		
Expanded		
P1[4]	Hydrostatic Testing with Certificate	
Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Material Testing		
Expanded		
V1	Dye Penetrant Exam	
Material Examination		
Expanded		
V2	Radiographic Examination	
Flow Calibration		
Expanded		
WD[5]	Discharge Coefficient Verification	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection and Performance Certificate	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204:2004 3.1	★
Code Conformance		
Expanded		
J2[6]	ANSI/ASME B31.1	
J3[6]	ANSI/ASME B31.3	
J4[6]	ANSI/ASME B31.8	
Materials Conformance		
Expanded		
J5[7]	NACE MR-0175 / ISO 15156	
Country Certification		
Standard		**Standard**
J6	European Pressure Directive (PED)	★
Expanded		
J1	Canadian Registration	
Transmitter Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate for Transmitter	★
Quality Certification for Safety		
Standard		**Standard**
QS[8]	Prior-use certificate of FMEDA data	★
Product Certifications		
Standard		**Standard**
E1[9]	ATEX Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
E7[9]	IECEx Flameproof, Dust Ignition-proof	★
I1[9]	ATEX Intrinsic Safety	★

Table 5. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

I5	FM Intrinsically Safe, Division 2	★
I6	CSA Intrinsically Safe	★
I7[9]	IECEx Intrinsic Safety	★
IA[10]	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	★
IE[10]	FM FISCO Intrinsically Safe	★
IF[10]	CSA FISCO Intrinsically Safe	★
IG[10]	IECEx FISCO Intrinsically Safe	★
K1[9]	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	★
K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	★
K7[9]	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	★
KA[9]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)	★
KC[9]	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[9]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)	★
N1[9]	ATEX Type n	★
N7[9]	IECEx Type n	★
ND[9]	ATEX Dust	★
Sensor Fill Fluid and O-ring Options		
Standard		**Standard**
L1	Inert Sensor Fill Fluid	★
L2	Graphite-Filled (PTFE) O-ring	★
LA	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★
Shipboard Approvals		
Standard		**Standard**
SBV	Bureau Veritas (BV) Type Approval	★
SDN	Det Norske Veritas (DNV) Type Approval	★
SLL	Lloyds Register (LR) Type Approval	★
Display and Interface Options		
Standard		**Standard**
M4[11]	LCD Display with Local Operator Interface	★
M5	LCD display	★
Transient Protection		
Standard		**Standard**
T1[12]	Transient terminal block	★
Alarm Limit		
Standard		**Standard**
C4[13][14]	NAMUR Alarm and Saturation Levels, High Alarm	★
CN[13][14]	NAMUR Alarm and Saturation Levels, Low Alarm	★
PlantWeb Control Functionality		
Standard		**Standard**
A01[10]	FOUNDATION fieldbus Advanced Control Function Block Suite	★
Hardware Adjustments		
Standard		**Standard**
D4[13]	Zero and Span Hardware Adjustments	★
Ground Screw		
Standard		**Standard**
V5[15]	External Ground Screw Assembly	★
Typical Model Number: 2051CFP D S 010 W1 S 0500 D3 2 A A 1 E5 M5		

(1) To improve pipe perpendicularity for gasket sealing, socket diameter is smaller than standard pipe O.D.

(2) Not available with Low Power Output Code M.

(3) Thermowell Material is the same as the body material.

(4) Does not apply to Process Connection codes T1 and S1.

(5) Not available for bore sizes 0010, 0014, 0020, or 0034.

(6) Not available with DIN Process Connection codes D1, D2, or D3.

(7) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(8) Not available with Output Protocol code F.

(9) Not available with Low Power Output Code M.

(10) Only valid with FOUNDATION fieldbus Output Code F.

(11) Available only with output code W-PROFIBUS PA

(12) Not available with Housing code 00, 5A or 7J. The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(13) Not available with FOUNDATION fieldbus (Output Code F).

(14) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(15) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.

Rosemount 2051L Liquid Level Transmitter



2051L Liquid Level Transmitter

Rosemount 2051 liquid level transmitters combine the 2051 transmitters with the durability and reliability of a direct mount seal all in one single model number. Level transmitters can be ordered with an additional Rosemount 1199 remote seal to form a Tuned-System Assembly for improved performance and reduced costs compared to traditional (balanced-symmetric) assemblies
Product features and capabilities include:

- Variety of process connections
- Quantified performance for the entire transmitter / seal assembly (QZ option code)
- 4-20 mA HART, 1-5 Vdc HART low power and FOUNDATION fieldbus and PROFIBUS PA protocols

Additional Information
Specifications: page Pressure-207
Certifications: page Pressure-216
Dimensional Drawings: page Pressure-222

Table 6. Rosemount 2051L Liquid Level Transmitter Ordering Information
★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Transmitter Type		
Standard			**Standard**
2051L	Liquid Level Transmitter		★
Pressure Range			
Standard			**Standard**
2	–250 to 250 inH_2O (–0,6 to 0,6 bar)		★
3	–1000 to 1000 inH_2O (–2,5 to 2,5 bar)		★
4	–300 to 300 psi (–20,7 to 20,7 bar)		★
Transmitter Output			
Standard			**Standard**
A	4–20 mA with Digital Signal Based on HART Protocol		★
F	FOUNDATION fieldbus Protocol		★
W	PROFIBUS PA Protocol		★
Expanded			
M	Low-Power, 1–5 V dc with Digital Signal Based on HART Protocol		
Process Connection Size, Diaphragm Material (High Side)			
	Process Connection Size	**Diaphragm**	
Standard			**Standard**
G[1]	2 in./DN 50	316L SST	★
H[1]	2 in./DN 50	Alloy C-276	★
J	2 in./DN 50	Tantalum	★
A[1]	3 in./DN 80	316L SST	★
B[1]	4 in./DN 100	316L SST	★
C[1]	3 in./DN 80	Alloy C-276	★
D[1]	4 in./DN 100	Alloy C-276	★
E	3 in./DN 80	Tantalum	★
F	4 in./DN 100	Tantalum	★

Table 6. Rosemount 2051L Liquid Level Transmitter Ordering Information
★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Extension Length (High Side)					
Standard					**Standard**
0	None, Flush Mount				★
2	2 in./50 mm				★
4	4 in./100 mm				★
6	6 in./150 mm				★
Mounting Flange Size, Rating, Material (High Side)					
	Size	**Rating**	**Material**		
Standard					**Standard**
M	2-in.	ANSI/ASME B16.5 Class 150	CS		★
A	3-in.	ANSI/ASME B16.5 Class 150	CS		★
B	4-in.	ANSI/ASME B16.5 Class 150	CS		★
N	2-in.	ANSI/ASME B16.5 Class 300	CS		★
C	3-in.	ANSI/ASME B16.5 Class 300	CS		★
D	4-in.	ANSI/ASME B16.5 Class 300	CS		★
X(1)	2-in.	ANSI/ASME B16.5 Class 150	SST		★
F(1)	3-in.	ANSI/ASME B16.5 Class 150	SST		★
G(1)	4-in.	ANSI/ASME B16.5 Class 150	SST		★
Y(1)	Displayed	ANSI/ASME B16.5 Class 300	SST		★
H(1)	3-in.	ANSI/ASME B16.5 Class 300	SST		★
J(1)	4-in.	ANSI/ASME B16.5 Class 300	SST		★
Q	DN50	PN 10-40 per EN 1092-1	CS		★
R	DN80	PN 40 per EN 1092-1	CS		★
K(1)	DN50	PN 10-40 per EN 1092-1	SST		★
T(1)	DN80	PN 40 per EN 1092-1	SST		★
Seal Fill Fluid (High Side)		**Specific Gravity**	**Temperature Limits (Ambient Temperature of 70 °F (21 °C))**		
Standard					**Standard**
A	Syltherm XLT	0.85	-102 to 293 °F (-75 to 145 °C)		★
C	Silicone 704	1.07	32 to 401 °F (0 to 205 °C)		★
D	Silicone 200	0.93	-49 to 401 °F (-45 to 205 °C)		★
H	Inert (Halocarbon)	1.85	5 to 401 °F (-15 to 205 °C)		★
G	Glycerin and Water	1.13	-49 to 320 °F (-45 to 160 °C)		★
N	Neobee M-20	0.92	5 to 401 °F (-15 to 205 °C)		★
P	Propylene Glycol and Water	1.02	5 to 203 °F (-15 to 95 °C)		★
Sensor Module Configuration, Flange Adapter (Low Side)					
	Configuration	**Flange Adapter**			
Standard					**Standard**
1(1)	Gage	SST			★
2(1)	Differential	SST			★
3(1)(2)	Tuned-System with Remote Seal	None			★
Sensor Module Diaphragm Material, Sensor Fill Fluid (Low Side)					
	Diaphragm Material	**Sensor Fill Fluid**			
Standard					**Standard**
1(1)	316L SST	Silicone			★
2(1)	Alloy C-276 (SST Valve Seat)	Silicone			★
7(1)	Alloy C-276 (Alloy C-276 Valve Seat)	Silicone			★
A(1)	316L SST	Inert (Halocarbon)			★

Table 6. Rosemount 2051L Liquid Level Transmitter Ordering Information
★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

B[1]	Alloy C-276 (SST Valve Seat)	Inert (Halocarbon)		★
G[1]	Alloy C-276 (Alloy C-276 Valve Seat)	Inert (Halocarbon)		★
O-ring				
Standard				**Standard**
A	Glass-filled PTFE			★
Housing Material			**Conduit Entry Size**	
Standard				**Standard**
A	Aluminum		½–14 NPT	★
B	Aluminum		M20 × 1.5	★
J	SST		½–14 NPT	★
K[4]	SST		M20 × 1.5	★
Expanded				
D	Aluminum		G½	
M[4]	SST		G½	

Options (Include with selected model number)

PlantWeb Control Functionality		
Standard		**Standard**
A01[5]	Foundation fieldbus Advanced Control Function Block Suite	★
Seal Assemblies		
Standard		**Standard**
S1[3]	Assemble to One Rosemount 1199 Seal (Requires 1199M)	★
Product Certifications		
Standard		**Standard**
E1[4]	ATEX Flameproof	★
E2[4]	INMETRO Flameproof	★
E3[4]	China Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
E7[4]	IECEx Flameproof	★
EW	India (CCOE) Flameproof Approval	★
I1[4]	ATEX Intrinsic Safety	★
I2[4]	INMETRO Intrinsically Safe	★
I3[4]	China Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I6	CSA Intrinsically Safe	★
I7[4]	IECEx Intrinsic Safety	★
IA[5]	ATEX FISCO Intrinsic Safety	★
IE[5]	FM FISCO Intrinsically Safe	★
IF[5]	CSA FISCO Intrinsically Safe	★
IG[5]	IECEx FISCO Intrinsically Safe	★
IW	India (CCOE) Intrinsically Safety Approval	★
K1[4]	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
K7[4]	IECEx Flameproof, Intrinsic Safety, Type n	★
KA[4]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
KC[4]	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[4]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe	★
N1[4]	ATEX Type n	★
N7[4]	IECEx Type n	★
ND[4]	ATEX Dust	★

Table 6. Rosemount 2051L Liquid Level Transmitter Ordering Information
★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Shipboard Approvals				
Standard				**Standard**
SBV	Bureau Veritas (BV) Type Approval			★
SDN	Det Norske Veritas (DNV) Type Approval			★
SLL	Lloyds Register (LR) Type Approval			★
Display and Interface Options				
Standard				**Standard**
M4[(6)]	LCD Display with Local Operator Interface			★
M5	LCD display			★
Hardware Adjustments				
Standard				**Standard**
D4[(7)]	Zero and Span Configuration Buttons			★
Flange Adapters				
Standard				**Standard**
DF[(8)]	1/2-14 NPT Flange Adapters			★
Conduit Plug				
Standard				**Standard**
DO[(9)]	316 SST Conduit Plug			★
Ground Screw				
Standard				**Standard**
V5[(10)]	External Ground Screw Assembly			★
Transient Protection				
Standard				**Standard**
T1[(11)]	Transient Terminal Block			★
Software Configuration				
Standard				**Standard**
C1[(12)]	Custom Software Configuration (Requires completed Configuration Data Sheet)			★
Alarm Limit				
Standard				**Standard**
C4[(12)(13)]	NAMUR alarm and saturation levels, high alarm			★
CN[(12)(13)]	NAMUR alarm and saturation levels, low alarm			★
Calibration Certification				
Standard				**Standard**
Q4	Calibration Certificate			★
QG	Calibration Certificate and GOST Verification Certificate			★
GP	Calibration Certificate and tamper evident seal			★
Material Traceability Certification				
Standard				**Standard**
Q8	Material Traceability Certification per EN 10204 3.1.B			★
Quality Certification for Safety				
Standard				**Standard**
QS[(12)]	Prior-use certificate of FMEDA data			★
Toolkit Total System Performance Reports				
Standard				**Standard**
QZ	Remote Seal System Performance Calculation Report			★
Conduit Electrical Connector				
Standard				**Standard**
GE	M12, 4-pin, Male Connector (eurofast®)			★
GM	A size Mini, 4-pin, Male Connector (minifast®)			★
Lower Housing Flushing Connection Options				
	Ring Material	**Number**	**Size (NPT)**	
Standard				**Standard**
F1	316 SST	1	1/4-18 NPT	★
F2	316 SST	2	1/4-18 NPT	★

Rosemount 2051

Table 6. Rosemount 2051L Liquid Level Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

F3(14)	Alloy C-276	1	1/4-18 NPT	★
F4(14)	Alloy C-276	2	1/4-18 NPT	★
F7	316 SST	1	1/2-14 NPT	★
F8	316 SST	2	1/2-14 NPT	★
F9	Alloy C-276	1	1/2-14 NPT	★
F0	Alloy C-276	2	1/2-14 NPT	★
Typical Model Number:	**2051L 2 A A0 X D 21 A A B4 M5 F1**			

(1) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(2) Requires option code S1.

(3) "Assemble-to" items are specified separately and require a completed model number.

(4) Not available with Low Power output code M.

(5) Only valid with FOUNDATION fieldbus output code F.

(6) Available only with output code W-PROFIBUS PA

(7) Not valid with FOUNDATION fieldbus output code F.

(8) Not available with Remote Mount Seal Assembly option S1.

(9) Transmitter is shipped with 316 SST conduit plug (uninstalled) in place of standard carbon steel conduit plug

(10) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.

(11) The T1 option is not needed with FISCO Product Certifications; transient protection is included in the FISCO product certification codes IA, IE, IF, and IG.

(12) Only available with HART 4-20 mA output (output code A).

(13) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(14) Not available with Option Codes A0, B0, and G0.

Specifications

PERFORMANCE SPECIFICATIONS

This product data sheet covers HART, FOUNDATION fieldbus and PROFIBUS PA protocols unless specified.

Conformance To Specification (±3σ (Sigma))

Technology leadership, advanced manufacturing techniques, and statistical process control ensure specification conformance to at least ±3σ.

Reference Accuracy

Stated reference accuracy equations include terminal based linearity, hysteresis, and repeatability.For FOUNDATION fieldbus and PROFIBUS PA devices, use calibrated range in place of span.

Models	Standard	High Performance Option, P8	
2051C			
Ranges 2-5	±0.075% of span For spans less than 10:1, accuracy = $\pm\left[0.025 + 0.005\left(\frac{URL}{Span}\right)\right]$% of Span	Ranges 2-5	High Accuracy Option, P8 ±0.065% of span For spans less than 10:1, accuracy = $\pm\left[0.015 + 0.005\left(\frac{URL}{Span}\right)\right]$% of Span
Range 1	±0.10% of span For spans less than 15:1, accuracy = $\pm\left[0.025 + 0.005\left(\frac{URL}{Span}\right)\right]$% of Span		
2051T			
Ranges 1-4	±0.075% of span For spans less than 10:1, accuracy = $\pm\left[0.0075\left(\frac{URL}{Span}\right)\right]$% of Span	Ranges 1-4	High Accuracy Option, P8 ±0.065% of span For spans less than 10:1, accuracy = $\pm\left[0.0075\left(\frac{URL}{Span}\right)\right]$% of Span
Range 5	±0.075% of span For spans less than 10:1, accuracy = $\pm\left[0.0075\left(\frac{URL}{Span}\right)\right]$% of Span		
2051L			
Ranges 2-4	±0.075% of span For spans less than 10:1, accuracy = $\pm\left[0.025 + 0.005\left(\frac{URL}{Span}\right)\right]$% of Span		

Flow Performance - Flow Reference Accuracy

2051CFA Annubar Flowmeter		
Ranges 2-3		±2.00% of Flow Rate at 5:1 flow turndown
2051CFC Compact Orifice Flowmeter – Conditioning Option C		
Ranges 2-3	β =0.4	±2.25% of Flow Rate at 5:1 flow turndown
	β =0.65	±2.45% of Flow Rate at 5:1 flow turndown
2051CFC Compact Orifice Flowmeter – Orifice Type Option P(1)		
Ranges 2-3	β =0.4	±2.50% of Flow Rate at 5:1 flow turndown
	β =0.65	±2.50% of Flow Rate at 5:1 flow turndown
2051CFP Integral Orifice Flowmeter		
Ranges 2-3	β <0.1	±3.10% of Flow Rate at 5:1 flow turndown
	0.1< β <0.2	±2.75% of Flow Rate at 5:1 flow turndown
	0.2< β <0.6	±2.25% of Flow Rate at 5:1 flow turndown
	0.6< β <0.8	±3.00% of Flow Rate at 5:1 flow turndown

(1) For smaller line sizes, see Rosemount Compact Orifice

Long Term Stability

± 50 °F (28 °C) temperature changes and up to 1000 psi (6,9 MPa) line pressure.

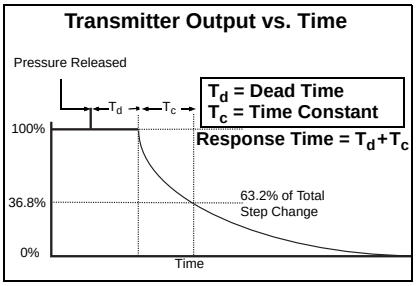
Models	Standard	High Performance Option, P8
2051C		
Range 1 (CD)	±0.2% of URL for 1 year	
Ranges 2-5	±0.1% of URL for 2 years	±0.125% of URL for 5 years
2051T		
Ranges 1-5	±0.1% of URL for 2 years	±0.125% of URL for 5 years

Dynamic Performance

	4-20 mA HART(1) 1-5 Vdc HART Low Power	FOUNDATION fieldbus and PROFIBUS PA protocols (3)
Total Response Time (T_d + T_c)(2):		
2051C, Range 3-5:	115 ms	152 ms
Range 1:	270 ms	307 ms
Range 2:	130 ms	152 ms
2051T:	100 ms	152 ms
2051L:	See *Instrument Toolkit*®	See *Instrument Toolkit*
Dead Time (Td)	60 ms (nominal)	97 ms
Update Rate	22 times per second	22 times per second

(1) Dead time and update rate apply to all models and ranges; analog output only
(2) Nominal total response time at 75 °F (24 °C) reference conditions.
(3) Transducer block response time, Analog Input block execution time not included.

Typical HART Transmitter Response Time



Line Pressure Effect per 1000 psi (6,9 MPa)

For line pressures above 2000 psi (13,7 MPa) and Ranges 4-5, see user manual (Document number 00809-0100-4001 for HART, 00809-0100-4774 for FOUNDATION fieldbus, and 00809-0300-4101 for PROFIBUS PA)

Models	Line Pressure Effect
2051CD, 2051CF	Zero Error(1)
Ranges 2-3	±0.05% of URL/1000 psi (68.9 bar) for line pressures from 0 to 2000 psi (0 to 13.7 MPa)
Range 1	±0.25% of URL/1000 psi (68.9 bar)
	Span Error
Ranges 2-3	±0.1% of reading/1,000 psi (68.9 bar)
Range 1	±0.4% of reading/1,000 psi (68.9 bar)

(1) Can be calibrated out at line pressure.

Ambient Temperature Effect per 50 °F (28 °C)

Models	Ambient Temperature Effect	High Performance Option, P8
2051C, 2051CF		
Ranges 2-5	±(0.025% URL + 0.125% span) from 1:1 to 5:1 ±(0.05% URL + 0.25% span) from 5:1 to 100:1	±(0.0125% URL + 0.0625% span) from 1:1 to 5:1 ±(0.025% URL + 0.125% span) from 5:1 to 100:1
Range 1	±(0.1% URL + 0.25% span) from 1:1 to 30:1	
2051T		
Range 2-4	±(0.05% URL + 0.25% span) from 1:1 to 30:1 ±(0.07% URL + 0.25% span) from 30:1 to 100:1	±(0.025% URL + 0.125% span) from 1:1 to 30:1 ±(0.035% URL + 0.125% span) from 30:1 to 100:1
Range 1	±(0.05% URL + 0.25% span) from 1:1 to 10:1 ±(0.10% URL + 0.25% span) from 10:1 to 100:1	±(0.025% URL + 0.125% span) from 1:1 to 10:1 ±(0.05% URL + 0.125% span) from 10:1 to 100:1
Range 5	±(0.1% URL + 0.15% span)	
2051L	See *Instrument Toolkit*	

Mounting Position Effects

Models	Mounting Position Effects
2051C	Zero shifts up to ±1.25 inH_2O (3.1 mbar), which can be calibrated out. No span effect.
2051T	Zero shifts up to ±2.5 inH_2O (6.2 mbar), which can be calibrated out. No span effect.
2051L	With liquid level diaphragm in vertical plane, zero shift of up to 1 inH_2O (2.49 mbar). With diaphragm in horizontal plane, zero shift of up to 5 inH_2O (12.43 mbar) plus extension length on extended units. Zero shifts can be calibrated out. No span effect.

Vibration Effect

Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field or pipeline with high vibration level (10-60 Hz 0.21mm displacement peak amplitude / 60-2000 Hz 3g).

Power Supply Effect

Less than ±0.005% of calibrated span per volt.

Electromagnetic Compatibility (EMC)

Meets all relevant requirements of EN 61326 and NAMUR NE-21.

Transient Protection (Option Code T1)

Meets IEEE C62.41, Category Location B

- 6 kV crest (0.5 μs - 100 kHz)
- 3 kV crest (8 × 20 microseconds)
- 6 kV crest (1.2 × 50 microseconds)

Rosemount 2051

Product Data Sheet
00813-0100-4101, Rev FA
Catalog 2011 - 2012

FUNCTIONAL SPECIFICATIONS

Range and Sensor Limits

Table 7. Range and Sensor Limits

Range	2051CD, 2051CF, 2051CG, 2051L					
		Range and Sensor Limits				
			Lower (LRL)			
	Minimum Span	Upper (URL)	2051C Differential 2051CF Flowmeters	2051C Gage(1)	2051L Differential	2051L Gage(1)
1	0.5 inH_2O (1.2 mbar)	25 inH_2O (62.3 mbar)	–25 inH_2O (–62.1 mbar)	–25 inH_2O (–62.1 mbar)	N/A	N/A
2	2.5 inH_2O (6.2 mbar)	250 inH_2O (0.62 bar)	–250 inH_2O (–0.62 bar)	–250 inH_2O (–0.62 bar)	–250 inH_2O (–0.62 bar)	–250 inH_2O (–0.62 bar)
3	10 inH_2O (24.9 mbar)	1000 inH_2O (2.49 bar)	-1000 inH_2O (-2.49 bar)	–393 inH_2O (–979 mbar)	–1000 inH_2O (–2.49 bar)	–393 inH_2O (–979 mbar)
4	3 psi (0.207 bar)	300 psi (20.6 bar)	-300 psi (-20,6 bar)	–14.2 psig (–979 mbar)	–300 psi (–20.7 bar)	–14.2 psig (–979 mbar)
5	20 psi (1.38 bar)	2000 psi (137.9 bar)	-2000 psi (-137.9 bar)	–14.2 psig (–979 mbar)	N/A	N/A

(1) Assumes atmospheric pressure of 14.7 psig.

Table 8. Range and Sensor Limits

Range	2051T			
		Range and Sensor Limits		
	Minimum Span	Upper (URL)	Lower (LRL) (Abs)	Lower(1) (LRL) (Gage)
1	0.3 psi (20.6 mbar)	30 psi (2.06 bar)	0 psia (0 bar)	–14.7 psig (–1.01 bar)
2	1.5 psi (0.103 bar)	150 psi (10.3 bar)	0 psia (0 bar)	–14.7 psig (–1.01 bar)
3	8 psi (0.55 bar)	800 psi (55.2 bar)	0 psia (0 bar)	–14.7 psig (–1.01 bar)
4	40 psi (2.76 bar)	4000 psi (275.8 bar)	0 psia (0 bar)	–14.7 psig (–1.01 bar)
5	2,000 psi (137.9 bar)	10,000 psi (689.4 bar)	0 psia (0 bar)	–14.7 psig (–1.01 bar)

(1) Assumes atmospheric pressure of 14.7 psig.

Service

Liquid, gas, and vapor applications

Protocols

4–20 mA HART (Output Code A)

Output

Two-wire 4–20 mA, user-selectable for linear or square root output. Digital process variable superimposed on 4–20 mA signal, available to any host that conforms to the *HART* protocol.

Power Supply

External power supply required. Standard transmitter operates on 10.5 to 55 Vdc with no load.

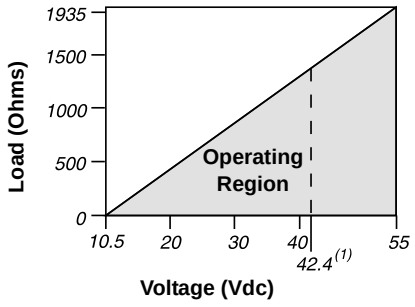
Turn-On Time

Performance within specifications less than 2.0 seconds after power is applied to the transmitter.

Load Limitations

Maximum loop resistance is determined by the voltage level of the external power supply, as described by:

Max. Loop Resistance = 43.5 (Power Supply Voltage – 10.5)



Communication requires a minimum loop resistance of 250 ohms.

(1) For CSA approval, power supply must not exceed 42.4 V.

Zero and Span Adjustment Requirements

Zero and span values can be set anywhere within the range limits stated in Table 7 and Table 8.

Span must be greater than or equal to the minimum span stated in Table 7 and Table 8.

FOUNDATION fieldbus (Output code F)

Power Supply

External power supply required; transmitters operate on 9.0 to 32.0 Vdc transmitter terminal voltage.

Current Draw

17.5 mA for all configurations (including LCD display option)

Indication

Optional two line LCD display

FOUNDATION fieldbus Function Block Execution Times

Block	Execution Time
Resource	-
Transducer	-
LCD Block	-
Analog Input 1, 2	30 milliseconds
PID	45 milliseconds
Input Selector	30 milliseconds
Arithmetic	35 milliseconds
Signal Characterizer	40 milliseconds
Integrator	35 milliseconds

FOUNDATION fieldbus Parameters

Schedule Entries	7 (max.)
Links	20 (max.)
Virtual Communications Relationships (VCR)	12 (max.)

Standard Function Blocks

Resource Block

Contains hardware, electronics, and diagnostic information.

Transducer Block

Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

LCD Block

Configures the local display.

2 Analog Input Blocks

Processes the measurements for input into other function blocks. The output value is in engineering units or custom and contains a status indicating measurement quality.

PID Block

Contains all logic to perform PID control in the field including cascade and feedforward.

Backup Link Active Scheduler (LAS)

The transmitter can function as a Link Active Scheduler if the current link master device fails or is removed from the segment.

Advanced Control Function Block Suite (Option Code A01)

Input Selector Block

Selects between inputs and generates an output using specific selection strategies such as minimum, maximum, midpoint, average or first “good.”

Arithmetic Block

Provides pre-defined application-based equations including flow with partial density compensation, electronic remote seals, hydrostatic tank gauging, ratio control, and others.

Signal Characterizer Block

Characterizes or approximates any function that defines an input/output relationship by configuring up to twenty X, Y coordinates. The block interpolates an output value for a given input value using the curve defined by the configured coordinates.

Integrator Block

Compares the integrated or accumulated value from one or two variables to pre-trip and trip limits and generates discrete output signals when the limits are reached. This block is useful for calculating total flow, total mass, or volume over time.

PROFIBUS PA (Output Code W)

Profile Version

3.02

Power Supply

External power supply required; transmitters operate on 9.0 to 32.0 Vdc transmitter terminal voltage.

Current Draw

17.5 mA for all configurations (including LCD display option)

Output Update Rate

Four times per second

Standard Function Blocks

Analog Input (AI Block)

The AI function block processes the measurements and makes them available to the host device. The output value from the AI block is in engineering units and contains a status indicating the quality of the measurement.

Physical Block

The physical block defines the physical resources of the device including type of memory, hardware, electronics, and diagnostic information.

Transducer Block

Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

Indication

Optional two line LCD display

Local Operator Interface

Optional external configuration buttons

HART 1-5 Vdc Low Power (Output Code M)

Output

Three wire 1–5 Vdc output, user-selectable for linear or square root output. Digital process variable superimposed on voltage signal, available to any host conforming to the *HART* protocol.

Power Supply

External power supply required. Standard transmitter operates on 9 to 28 Vdc with no load.

Power Consumption

3.0 mA, 27–84 mW

Output Load

100 kΩ or greater

Turn-On Time

Performance within specifications less than 2.0 seconds after power is applied to the transmitter.

Overpressure Limits

Transmitters withstand the following limits without damage:

2051C, 2051CF

- Ranges 2–5: 3,626 psig (250 bar)
  4,500 psig (310,3 bar) for option code P9
- Range 1: 2,000 psig (137,9 bar)

2051T

- Range 1: 750 psi (51,7 bar)
- Range 2: 1,500 psi (103,4 bar)
- Range 3: 1,600 psi (110,3 bar)
- Range 4: 6,000 psi (413,7 bar)
- Range 5: 15,000 psi (1034,2 bar)

2051L

Limit is flange rating or sensor rating, whichever is lower (Table 9 on page 212).

Table 9. 2051L Flange Rating

Standard	Type	CS Rating	SST Rating
ANSI/ASME	Class 150	285 psig	275 psig
ANSI/ASME	Class 300	740 psig	720 psig
At 100 °F (38 °C), the rating decreases with increasing temperature, per ANSI/ASME B16.5.			
DIN	PN 10–40	40 bar	40 bar
DIN	PN 10/16	16 bar	16 bar
At 248 °F (120 °C), the rating decreases with increasing temperature, per DIN 2401.			

Static Pressure Limit

2051CD, 2051CF

- Operates within specifications between static line pressures of -14.2 psig (0.034 bar) and 3,626 psig (250 bar)
  •For Option Code P9, 4,500 psig (310,3 bar)
- Range 1: 0.5 psia to 2,000 psig (34 mbar and 137,9 bar)

Burst Pressure Limits

2051C, 2051CF Coplanar or traditional process flange

- 10,000 psig (689.5 bar)

2051T In-line

- Ranges 1–4: 11,000 psi (758.4 bar)
- Range 5: 26,000 psi (1792.6 bar)

Temperature Limits

Ambient

–40 to 185 °F (–40 to 85 °C)

With LCD display(1): –40 to 175 °F (–40 to 80 °C)

Storage(1)

–50 to 230 °F (–46 to 110 °C)

With LCD display: –40 to 185 °F (–40 to 85 °C)

(1) LCD display may not be readable and LCD updates may be slower at temperatures below -4 °F (-20 °C).

Process

At atmospheric pressures and above. See Table 10.

Table 10. Process Temperature Limits

2051C, 2051CF	
Silicone Fill Sensor(1)	
with Coplanar Flange	–40 to 250 °F (–40 to 121 °C)(2)
with Traditional Flange	–40 to 300 °F (–40 to 149 °C)(2)(3)
with Level Flange	–40 to 300 °F (–40 to 149 °C)(2)
with 305 Integral Manifold	–40 to 300 °F (–40 to 149 °C)(2)
Inert Fill Sensor(1)	–40 to 185 °F (–40 to 85 °C)(3)
2051T (Process Fill Fluid)	
Silicone Fill Sensor(1)	–40 to 250 °F (–40 to 121 °C)(2)
Inert Fill Sensor(1)	–22 to 250 °F (–30 to 121 °C)(2)
2051L Low-Side Temperature Limits	
Silicone Fill Sensor(1)	–40 to 250 °F (–40 to 121 °C)(2)
Inert Fill Sensor(1)	0 to 185 °F (–18 to 85 °C)(2)
2051L High-Side Temperature Limits (Process Fill Fluid)	
Syltherm® XLT	–102 to 293 °F (–75 to 145 °C)
D.C. Silicone 704®	32 to 599 °F (0 to 315 °C)
D.C. Silicone 200	–49 to 401 °F(–45 to 205 °C)
Inert	–49 to 320 °F(–45 to 160 °C)
Glycerin and Water	5 to 203 °F (-15 to 95 °C)
Neobee M-20	5 to 437 °F (-15 to 225 °C)
Propylene Glycol and Water	5 to 203 °F (-15 to 95 °C)

(1) Process temperatures above 185 °F (85 °C) require derating the ambient limits by a 1.5:1 ratio.

(2) 220 °F (104 °C) limit in vacuum service; 130 °F (54 °C) for pressures below 0.5 psia.

(3) 160 °F (71 °C) limit in vacuum service.

Humidity Limits

0–100% relative humidity

Volumetric Displacement

Less than 0.005 in^3 (0.08 cm^3)

Damping

4-20 mA HART

Analog output response to a step input change is user-selectable from 0 to 36 seconds for one time constant. This software damping is in addition to sensor module response time.

FOUNDATION fieldbus

Transducer block: 0.4 seconds fixed

AI Block: User configurable

PROFIBUS PA

AI Block only: User configurable

Failure Mode Alarm

If self-diagnostics detect a sensor or microprocessor failure, the analog signal is driven either high or low to alert the user. High or low failure mode is user-selectable with a jumper on the transmitter. The values to which the transmitter drives its output in failure mode depend on whether it is factory-configured to *standard* or *NAMUR-compliant* operation. The values for each are as follows:

Standard Operation			
Output Code	**Linear Output**	**Fail High**	**Fail Low**
A	3.9 ≤ I ≤ 20.8	I ≥ 21.75 mA	I ≤ 3.75 mA
M	0.97 ≤ V ≤ 5.2	V ≥ 5.4 V	V ≤ 0.95 V

NAMUR-Compliant Operation			
Output Code	**Linear Output**	**Fail High**	**Fail Low**
A	3.8 ≤ I ≤ 20.5	I ≥ 22.5 mA	I ≤ 3.6 mA

Output Code F

If self-diagnostics detect a gross transmitter failure, that information gets passed as a status along with the process variable.

Rosemount 2051

Product Data Sheet
00813-0100-4101, Rev FA
Catalog 2011 - 2012

PHYSICAL SPECIFICATIONS

Electrical Connections

1/2–14 NPT, G1/2, and M20 × 1.5 conduit.

Process Connections

2051C

- 1/4–18 NPT on 2 1/8-in. centers
- 1/2–14 NPT and RC 1/2 on 2-in.(50,8 mm), 2 1/8-in. (54,0 mm), or 2 1/4-in. (57,2 mm) centers (process adapters)

2051T

- 1/2–14 NPT female
- G1/2 A DIN 16288 Male (available in SST for Range 1–4 transmitters only)
- Autoclave type F-250-C (Pressure relieved 9/16–18 gland thread; 1/4 OD high pressure tube 60° cone; available in SST for Range 5 transmitters only)

2051L

- High pressure side: 2-in.(50,8 mm), 3-in. (72 mm), or 4-in. (102 mm), ASME B 16.5 (ANSI) Class 150 or 300 flange; 50, 80, or 100 mm, DIN 2501 PN 40 or 10/16 flange
- Low pressure side: 1/4–18 NPT on flange, 1/2–14 NPT on process adapter

2051CF

- For 2051CFA wetted parts, see 00813-01000-4485 in the 485 section
- For 2051CFC wetted parts, see 00813-01000-4485 in the 405 section
- For 2051CFP wetted parts, see 00813-01000-4485 in the 1195 section

2051C Process Wetted Parts

Drain/Vent Valves

316 SST or Alloy C-276

Process Flanges and Adapters

Plated carbon steel, SST CF-8M (cast version of 316 SST, material per ASTM-A743), or CW2M (cast version of Alloy C)

Wetted O-rings

Glass-filled PTFE or Graphite-filled PTFE

Process Isolating Diaphragms

316L SST, Alloy C-276, or Tantalum

2051T Process Wetted Parts

Process Connections

- 316L SST or Alloy C-276

Process Isolating Diaphragms

- 316L SST or Alloy C-276

2051L Process Wetted Parts

Flanged Process Connection (Transmitter High Side)

Process Diaphragms, Including Process Gasket Surface

•316L SST, Alloy C-276, or Tantalum

Extension

•CF-3M (Cast version of 316L SST, material per ASTM-A743), or Cast C-276. Fits schedule 40 and 80 pipe.

Mounting Flange

•Zinc-cobalt plated CS or SST

Reference Process Connection (Transmitter Low Side)

Isolating Diaphragms

•316L SST or Alloy C-276

Reference Flange and Adapter

•CF-8M (Cast version of 316 SST, material per ASTM-A743)

Non-Wetted Parts for 2051C/T/L

Electronics Housing

Low-copper aluminum or CF-8M (Cast version of 316 SST).
Enclosure Type 4X, IP 65, IP 66, IP68

Paint for Aluminum Housing

Polyurethane

Coplanar Sensor Module Housing

CF-3M (Cast version of 316L SST)

Bolts

ASTM A449, Type 1 (zinc-cobalt plated carbon steel)
ASTM F593G, Condition CW1 (Austenitic 316 SST)
ASTM A193, Grade B7M (zinc plated alloy steel)
Alloy K-500

Sensor Module Fill Fluid

Silicone or inert halocarbon
In-Line series uses Fluorinert® FC-43

Process Fill Fluid (2051L only)

Syltherm XLT, D.C. Silicone 704,
D.C. Silicone 200, inert, glycerin and water, Neobee M-20 or propylene glycol and water

Cover O-rings

Buna-N

Shipping Weights

Table 11. Transmitter Weights without Options

Transmitter	lb. (kg)
2051C	4.9 (2.2)
2051L	Table 12 below
2051T	3.1 (1.4)

Table 12. 2051L Weights without Options

Flange	Flush lb. (kg)	2-in. Ext. lb (kg)	4-in. Ext. lb (kg)	6-in. Ext. lb (kg)
2-in., 150	12.5 (5,7)	—	—	—
3-in., 150	17.5 (7,9)	19.5 (8,8)	20.5 (9,3)	21.5 (9,7)
4-in., 150	23.5 (10,7)	26.5 (12,0)	28.5 (12,9)	30.5 (13,8)
2-in., 300	17.5 (7,9)	—	—	—
3-in., 300	22.5 (10,2)	24.5 (11,1)	25.5 (11,6)	26.5 (12,0)
4-in., 300	32.5 (14,7)	35.5 (16,1)	37.5 (17,0)	39.5 (17,9)
DN 50/PN 40	13.8 (6,2)	—	—	—
DN 80/PN 40	19.5 (8,8)	21.5 (9,7)	22.5 (10,2)	23.5 (10,6)
DN 100/ PN 10/16	17.8 (8,1)	19.8 (9,0)	20.8 (9,5)	21.8 (9,9)
DN 100/ PN 40	23.2 (10,5)	25.2 (11,5)	26.2 (11,9)	27.2 (12,3)

Table 13. Transmitter Options Weights

Code	Option	Add lb (kg)
J, K, L, M	Stainless Steel Housing	3.9 (1,8)
M5	LCD display for Aluminum Housing	0.5 (0,2)
B4	SST Mounting Bracket for Coplanar Flange	1.0 (0,5)
B1 B2 B3	Mounting Bracket for Traditional Flange	2.3 (1,0)
B7 B8 B9	Mounting Bracket for Traditional Flange	2.3 (1,0)
BA, BC	SST Bracket for Traditional Flange	2.3 (1,0)
H2	Traditional Flange	2.6 (1,2)
H3	Traditional Flange	3.0 (1,4)
H4	Traditional Flange	3.0 (1,4)
H7	Traditional Flange	2.7 (1,2)
FC	Level Flange—3 in., 150	12.7 (5,8)
FD	Level Flange—3 in., 300	15.9 (7,2)
FA	Level Flange—2 in., 150	8.0 (3,6)
FB	Level Flange—2 in., 300	8.4 (3,3)
FP	DIN Level Flange, SST, DN 50, PN 40	7.8 (3,5)
FQ	DIN Level Flange, SST, DN 80, PN 40	12.7 (5,8)

Product Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA
Emerson Process Management GmbH & Co. — Wessling, Germany
Emerson Process Management Asia Pacific Private Limited — Singapore
Beijing Rosemount Far East Instrument Co., LTD — Beijing, China
Emerson Process Management LTDA — Sorocaba, Brazil
Emerson Process Management (India) Pvt. Ltd — Daman, India

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

ATEX Directive (94/9/EC)

All 2051 transmitters comply with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

2051CG2, 3, 4, 5; 2051CD2, 3, 4, 5 (also with P9 option)
— QS Certificate of Assessment - EC No. 59552-2009-CE-HOU-DNV
Module H Conformity Assessment

All other 2051 Pressure Transmitters

— Sound Engineering Practice

Transmitter Attachments: Diaphragm Seal - Process Flange - Manifold

— Sound Engineering Practice

Electro Magnetic Compatibility (EMC) (2004/108/EC)

All 2051 Pressure Transmitters meet all of the requirements of EN 61326 and NAMUR NE-21.

Ordinary Location Certification for Factory Mutual

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

HART PROTOCOL

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II, Division 1, Groups E, F, and G. Dust-Ignition-Proof for Class III, Division 1.
T5 (Ta = 85 °C), Factory Sealed, Enclosure Type 4X

I5 Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1, ZONE 0 AEx ia IIC T4 when connected per Rosemount drawing 02051-1009; Non-incendive for Class I, Division 2, Groups A, B, C, and D.

Temperature Code: T4 (T_a = 70 °C)
Enclosure Type 4X
For input parameters see control drawing 02051-1009.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

E6 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D for indoor and outdoor hazardous locations. Enclosure type 4X, factory sealed. Single Seal.

I6 Intrinsically safe approval. Intrinsically safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount drawing 02051-1008. Temperature Code T3C.
Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D hazardous locations. Enclosure type 4X, factory sealed. Single Seal.
For input parameters see control drawing 02051-1008.

European Certifications

I1 ATEX Intrinsic Safety
Certification No. Baseefa08ATEX0129X ⟨Ex⟩ II 1 G
Ex ia IIC T4 (–60 ≤ T_a ≤ +70 °C)
IP66 IP68
CE 1180

Table 14. Input Parameters

U_i = 30 V
I_i = 200 mA
P_i = 1.0 W
C_i = 0.012 µF
L_i = 10 µH

Table 15. RTD Assembly (2051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i =0.63 W

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the apparatus.
The enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact or abrasion located in Zone 0.

N1 ATEX Type n
Certification No. Baseefa08ATEX0130X ⟨Ex⟩ II 3 G
Ex nAnL IIC T4 (–40 ≤ T_a ≤ +70 °C)
U_i = 42.4 Vdc max
IP66
CE

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding a 500 V r.m.s. test to case. This must be taken into account on any installation in which it is used, for example by assuring that the supply to the apparatus is galvanically isolated.

E1 ATEX Flame-Proof
Certification No. KEMA 08ATEX0090X ⟨Ex⟩ II $^1/_2$ G
Ex d IIC T6 (–50 ≤ T_a ≤ 65 °C)
Ex d IIC T5 (–50 ≤ T_a ≤ 80 °C)
IP66
CE 1180
Vmax = 42.4 Vdc

Special Conditions for Safe Use (X):
1. Appropriate ex d blanking plugs, cable glands, and wiring needs to be suitable for a temperature of 90 °C.
2. This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. The 2051 does not comply with the requirements of EN60079-1 Clause 5 for flameproof joints. Contact Emerson Process Management for information on the dimensions of flameproof joints.

ND ATEX Dust
Certification No. Baseefa08ATEX0182X ⟨Ex⟩ II 1 D
Dust Rating: II 1 D Ex tD A20 T115 °C (-20 °C ≤ T_a ≤ 85 °C)
IP66 IP68
Vmax = 42.4 Vdc
A = 22 mA
CE 1180

Special Conditions for Safe Use (X):
If the equipment is fitted with an optional 90 V transient suppressor, it is incapable of isolation from earth test and this must be taken into account during installation.

IECEx Certifications

I7 IECEx Intrinsic Safety
Certification No. IECExBAS08.0045X
Ex ia IIC T4 (–60 ≤ T_a ≤ +70 °C)
CE 1180

Table 16. Input Parameters

U_i = 30 V
I_i = 200 mA
P_i = 1.0 W
C_i = 0.012 µF

Table 17. RTD Assembly (2051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63 W

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of IEC60079-11. This must be taken into account when installing the apparatus.

E7 IECEx Flame-Proof
Certification No. IECEx KEM 08.0024X
Ex d IIC T6 (–50 ≤ T_a ≤ 65 °C)
Ex d IIC T5 (–50 ≤ T_a ≤ 80 °C)
CE 1180
Vmax = 42.4 Vdc

Special Conditions for Safe Use (X):
The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
The device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

N7 IECEx Type n
Certification No. IECExBAS08.0046X
Ex nAnL IIC T4 (–40 ≤ T_a ≤ +70 °C)
U_i = 42.4 Vdc max
CE

Special Conditions for Safe Use (X):

When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding a 500 V r.m.s. test to case. This must be taken into account on any installation in which it is used, for example by assuring that the supply to the apparatus is galvanically isolated.

TIIS Certifications

E4 TIIS Flame-Proof
Ex d IIC T6

Inmetro Certifications

E2 Flame-Proof
Certificate number CEPEL - EX - 1767/09X
BR-Ex d IIC T6/T5

I2 Intrinsic Safety
Certificate number CEPEL - EX - 1768/09X
BR-Ex ia IIC T4

GOST - Russia Certifications

IM Intrinsic Safety
Ex ia IIC T4

EM Flame-Proof
Ex d IIC T5/T6

China (NEPSI) Certifications

E3 Flame-Proof
Ex d IIC T5/T6

I3 Intrinsic Safety
Ex ia IIC T4

CCOE Certifications

IW Intrinsic Safety
Ex ia IIC T4

EW Flame-Proof
Ex d IIC T5 or T6

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K1 **E1, I1, N1,** and **ND** combination

K4 **E4** and **I4** combination

K5 **E5** and **I5** combination

K6 **I6** and **E6** combination

K7 **E7, I7,** and **N7** combination

KA **E1, I1, E6,** and **I6** combination

KB **E5, I5, E6,** and **I6** combination

KC **E1, I1, E5,** and **I5** combination

KD **E1, I1, E5, I5, E6,** and **I6** combination

FOUNDATION FIELDBUS AND PROFIBUS PA PROTOCOLS

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II, Division 1, Groups E, F, and G. Dust-Ignition-Proof for Class III, Division 1.

T5 (T_a = 85 °C), Factory Sealed, Enclosure Type 4X

IE/I5 Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1, ZONE 0 AEx ia IIC T4 when connected per Rosemount drawing 02051-1009; Non-incendive for Class I, Division 2, Groups A, B, C, and D.

For FOUNDATION fieldbus and PROFIBUS PA, Temperature Code: T4 (T_a = 70 °C)

For FISCO,
Temperature Code: T4 (T_a = 60 °C)
Enclosure Type 4X
For input parameters see control drawing 02051-1009.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.02-2003.

E6 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D for indoor and outdoor hazardous locations. Enclosure type 4X, factory sealed. Single Seal.

C6 Explosion-Proof and intrinsically safe approval. Intrinsically safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount drawings 02051-1008. Temperature Code T3C. For input parameters see control drawing 02051-1008. Single Seal.

Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D hazardous locations. Enclosure type 4X, factory sealed

European Certifications

I1 ATEX Intrinsic Safety
Certification No.: Baseefa08ATEX0129X ⟨Ex⟩ II 1 G
Ex ia IIC T4 (T_{amb} = –60 to +70 °C)
CE 1180

Table 18. Input Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.3 W
C_i = 0 µF

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the apparatus. The enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact or abrasion located in Zone 0.

IA ATEX FISCO Intrinsic Safety
Certification No.: Baseefa08ATEX0129X ⟨Ex⟩ II 1 G
Ex ia IIC T4 (T_{amb} = –60 to +60 °C)
IP66
CE 1180

Table 19. Input Parameters

U_i = 17.5 V
I_i = 380 mA
P_i = 5.32 W
C_i = ≤ 5 µF
L_i = ≤ 10 µH

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the apparatus. The enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact or abrasion located in Zone 0.

N1 ATEX Type n
Certification No.: Baseefa08ATEX0130X ⟨Ex⟩ II 3 G
Ex nA nL IIC T4 (T_{amb} = –40 to +70 °C)
U_i = 42.4 Vdc max

Special Conditions for Safe Use (X):
The device is not capable of withstanding the 500 V insulation test required by Clause 6.8.1 of EN60079-15. This must be taken into account when installing the apparatus.

E1 ATEX Flame-Proof
Certification No.: KEMA08ATEX0090X ⟨Ex⟩ II 1/2 G
Ex d IIC T6 (T_{amb} = –50 to 65 °C)
Ex d IIC T5 (T_{amb} = –50 to 80 °C)
CE 1180

Special Conditions for Safe Use (X):

1. Appropriate ex d blanking plugs, cable glands, and wiring needs to be suitable for a temperature of 90 °C.
2. This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. The 2051 does not comply with the requirements of EN60079-1 Clause 5 for flameproof joints. Contact Emerson Process Management for information on the dimensions of flameproof joints.

ND ATEX Dust
Certification No. Baseefa08ATEX0182X ⟨Ex⟩ II 1 D
Dust Rating: II 1 D Ex tD A20 T115 °C (-20 °C ≤ T_a ≤ 85 °C) IP66 IP68
Vmax = 42.4 Vdc
A = 22 mA
CE 1180

Special Conditions for Safe Use (X):
If the equipment is fitted with an optional 90 V transient suppressor, it is incapable of isolation from earth test and this must be taken into account during installation.

IECEx Certifications

I7 IECEx Intrinsic Safety
Certification No. IECEx BAS08.0045X
Ex ia IIC T4 (T_{amb} = –60 to 70 °C)
IP66
CE 1180

Table 20. Input Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.3 W
C_i = 0 µF

Special Conditions for Safe Use (X):
The device is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of IEC60079-11. This must be taken into account when installing the apparatus.

IG IECEx FISCO Intrinsic Safety
Certification No. IECExBAS08.0045X
Ex ia IIC T4 (T_{amb} = –60 to +60 °C)
IP66
CE 1180

Table 21. Input Parameters

U_i = 17.5 V
I_i = 380 mA
P_i = 5.32 W
C_i = ≤ 5 µF
L_i = ≤ 10 µH

Special Conditions for Safe Use (X):
The device is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of IEC 60079-11. This must be taken into account when installing the apparatus.

E7 IECEx Flame-Proof
Certification No. IECEx KEM 08.0024X
Ex d IIC T6 (T_{amb} = –50 to 65 °C)
Ex ia IIC T5 (T_{amb} = –50 to 80 °C)
IP66
CE 1180
Vmax = 42.4 Vdc

Special Conditions for Safe Use (X):

1. Appropriate ex d blanking plugs, cable glands, and wiring needs to be suitable for a temperature of 90 °C.
2. This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. The 2051 does not comply with the requirements of IEC 60079-1 Clause 5 for flameproof joints. Contact Emerson Process Management for information on the dimensions of flameproof joints.

N7 IECEx Type n
Certification No. IECEx BAS08.0046X
Ex nAnL IIC T4 (T_{amb} = –40 to 70 °C)
U_i = 42.4 Vdc max
IP66

Special Conditions for Safe Use (X):

The device is not capable of withstanding the 500 V insulation test required by Clause 6.8.1 of IEC60079-15. This must be taken into account when installing the device.

TIIS Certifications

E4 TIIS Flame-Proof
Ex d IIC T6

GOST - Russia Certifications

IM Intrinsic Safety
Ex ia IIC T4

EM Flame-Proof
Ex d IIC T5/T6

Inmetro Certifications

E2 Flameproof
Certificate number CEPEL - EX - 1767/09X
BR - Ex d IIC T6/T5 IP66

I2 Intrinsic Safety
Certificate number CEPEL - EX - 1768/09X
BR - Ex ia IIC T4 IP66

IB FISCO Intrinsic Safety
Certificate No. CEPEL-EX-1768/09X
BR-Ex ia IIC T4

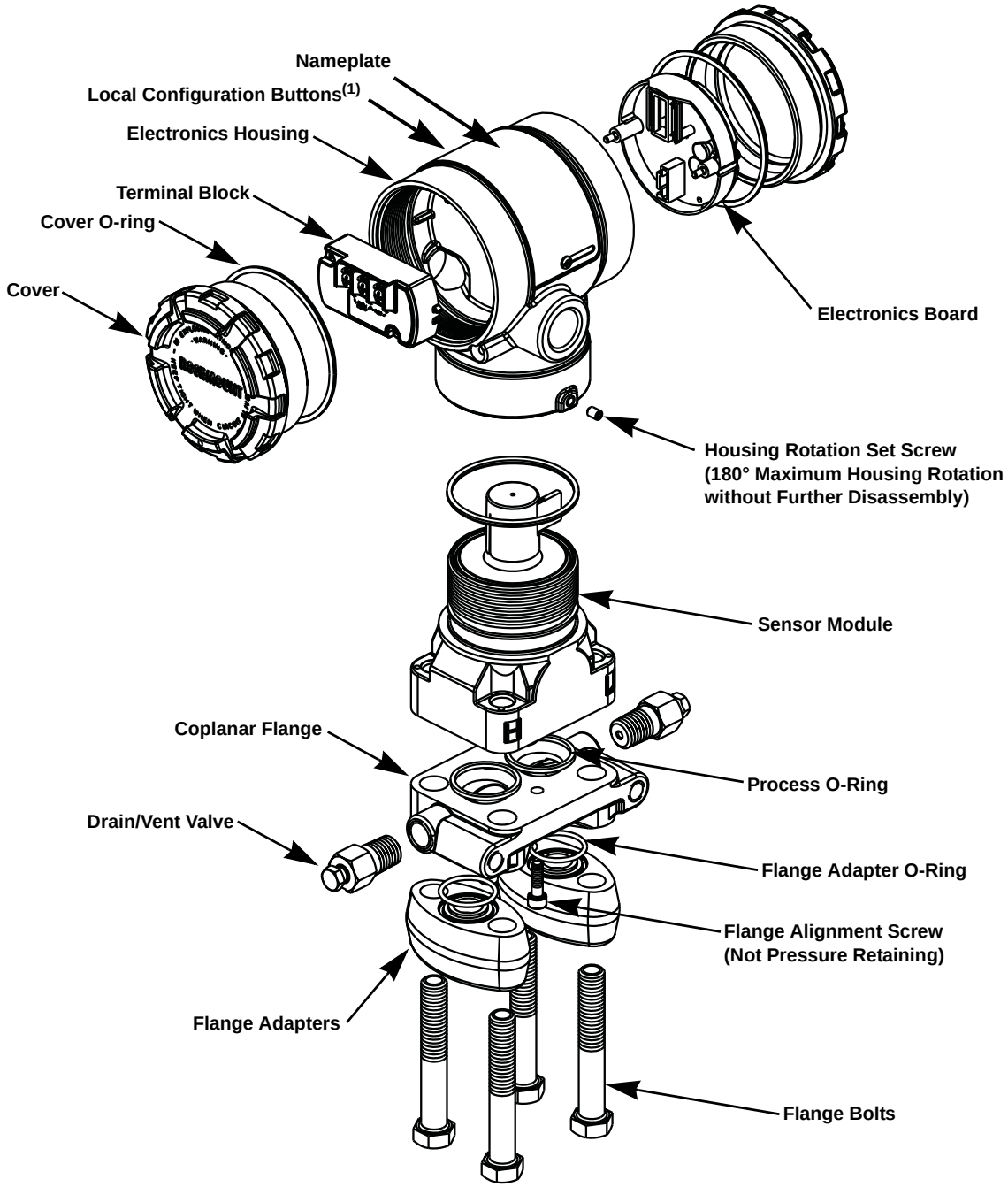
Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K5 **E5** and **I5** combination
KB **K5** and **C6** combination
KD **K5**, **C6**, **I1**, and **E1** combination
K6 **C6**, **I1**, and **E1** combination
K8 **E1** and **I1** combination
K7 **E7**, **I7**, and **N7** combination

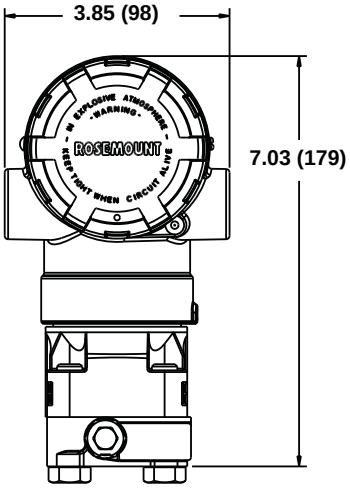
Dimensional Drawings

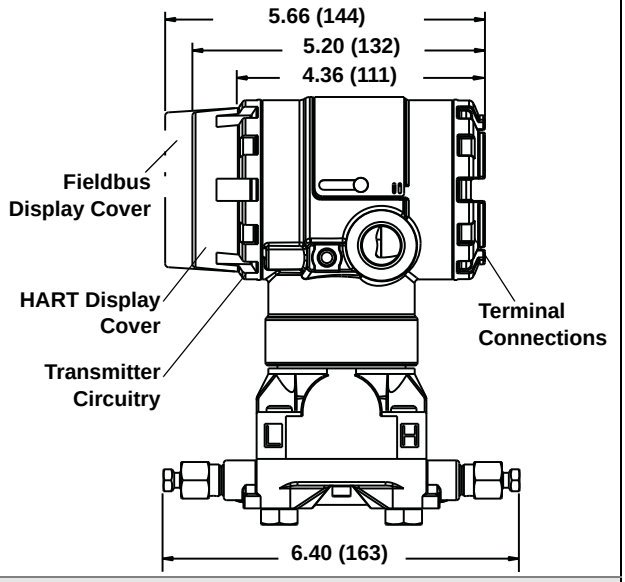
2051C Exploded View



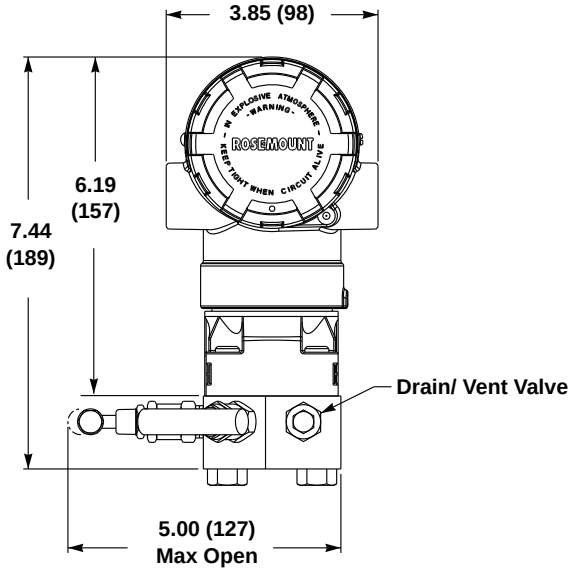
1) Span and Zero Adjustment Buttons are optional with 4-20 mA and 1-5 Vdc HART protocol. Local Operator Interface buttons are optional for PROFIBUS PA protocol. Local Configuration Buttons are not available with FOUNDATION fieldbus.

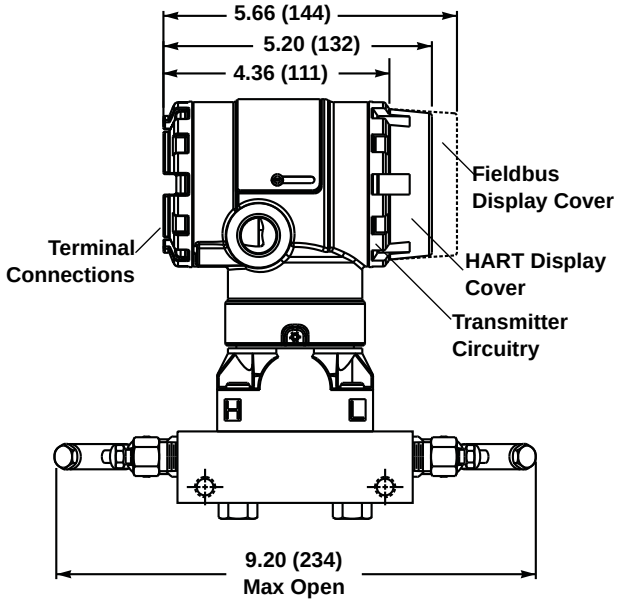
2051C Coplanar Flange





2051C Coplanar with Rosemount 305 3-Valve Coplanar Integral Manifold





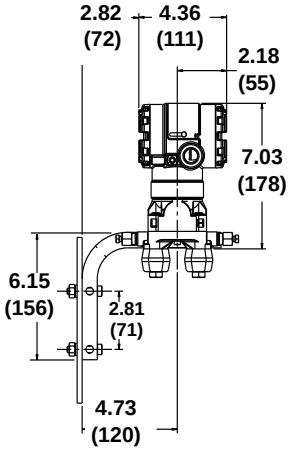
Dimensions are in inches (millimeters).

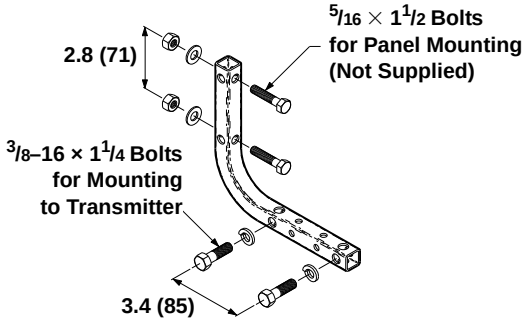
Rosemount 2051

Product Data Sheet
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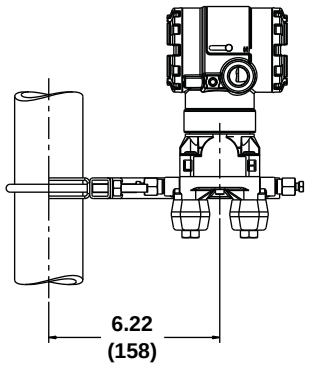
Coplanar Flange Mounting Configurations with Optional Bracket (B4) for 2-in. Pipe or Panel Mounting

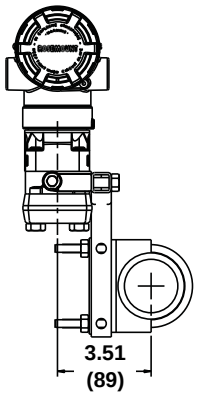
PANEL MOUNTING

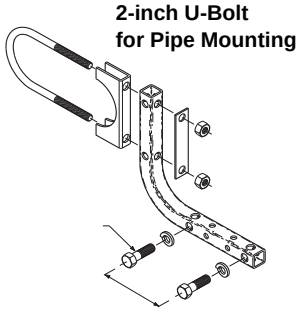




PIPE MOUNTING

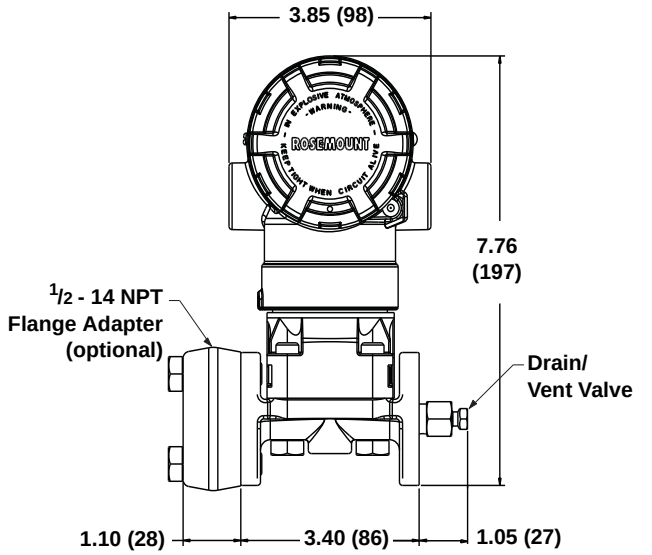


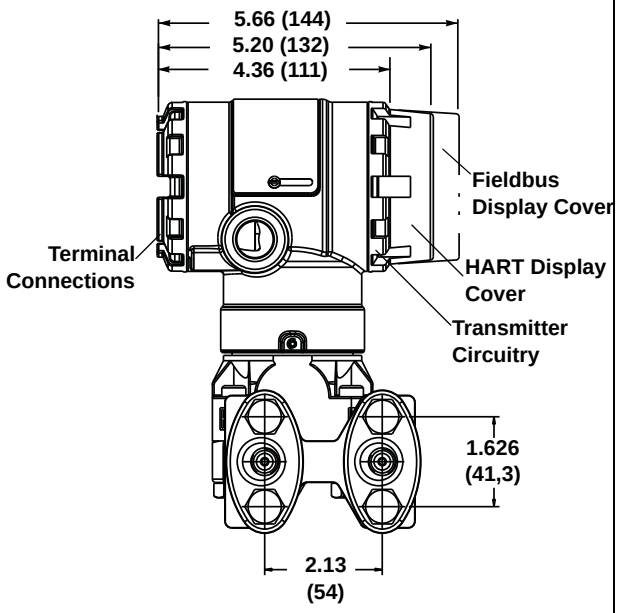




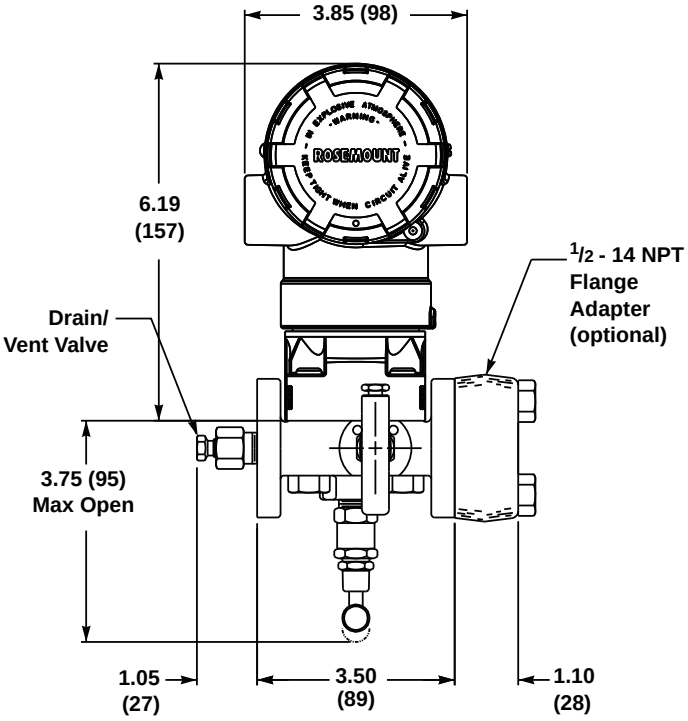
Dimensions are in inches (millimeters).

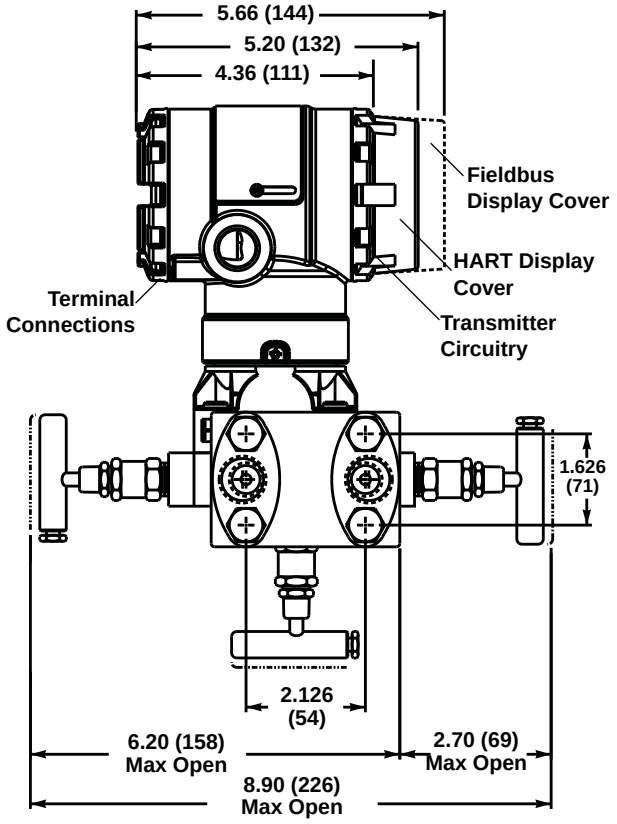
2051C Coplanar with Traditional Flange





2051C Coplanar with Rosemount 305 3-Valve Traditional Integral Manifold





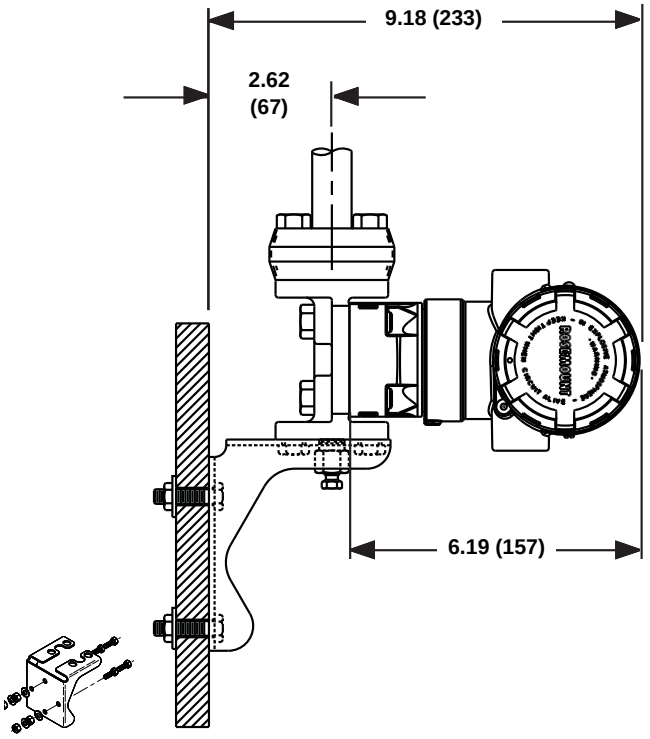
Dimensions are in inches (millimeters).

Rosemount 2051

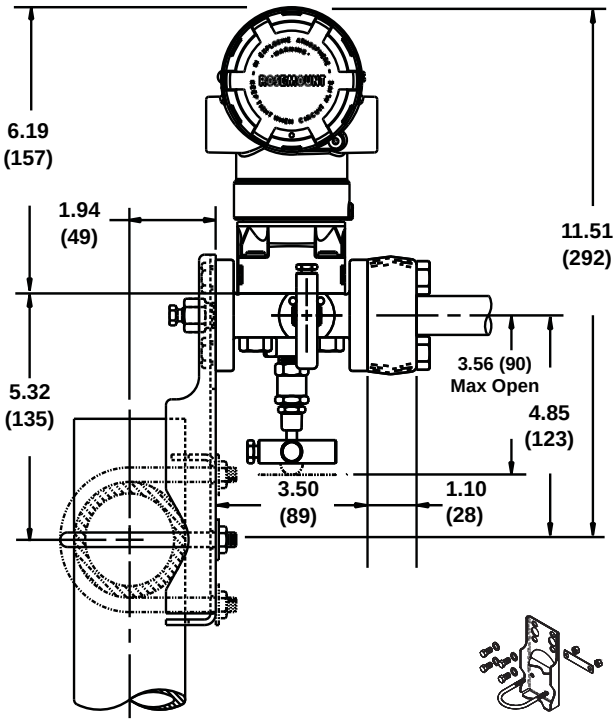
Product Data Sheet
00813-0100-4101, Rev FA
Catalog 2011 - 2012

Traditional Flange Mounting Configurations with Optional Brackets for 2-in. Pipe or Panel Mounting

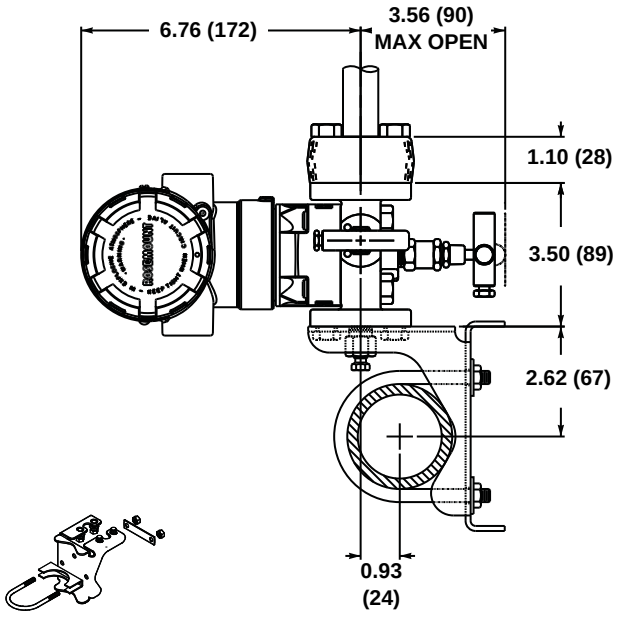
Panel Mount (Bracket Option B2/B8)



Pipe Mount (Bracket Option B3/B9/BC)

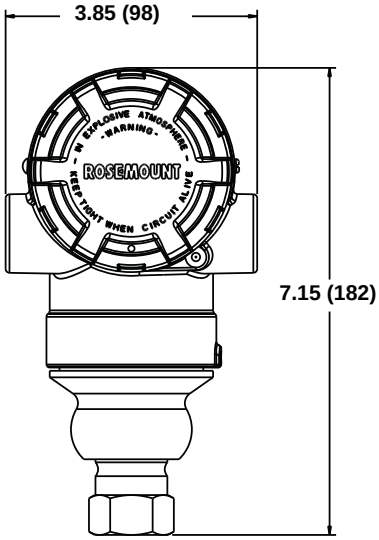


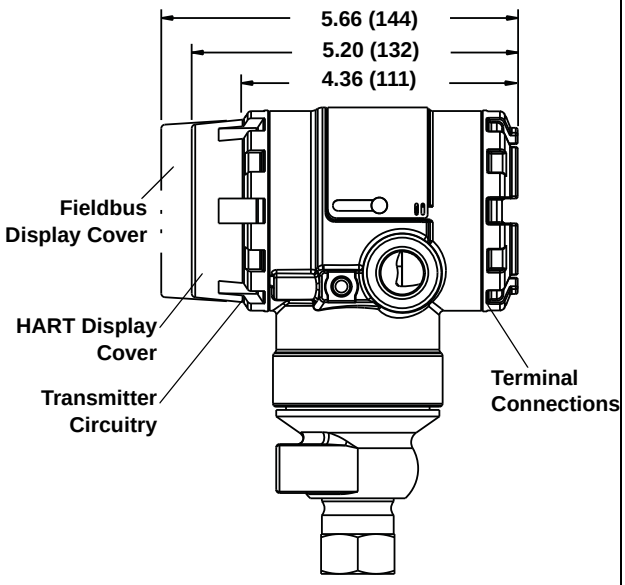
Pipe Mount (Bracket Option B1 / B7 / BA)



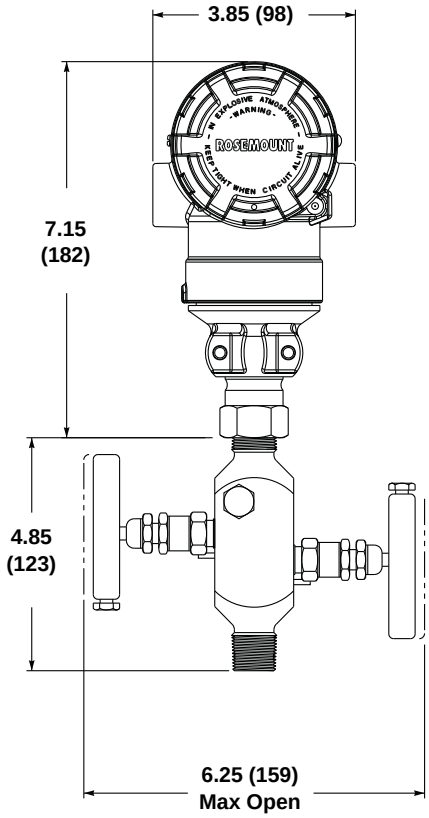
Dimensions are in inches (millimeters).

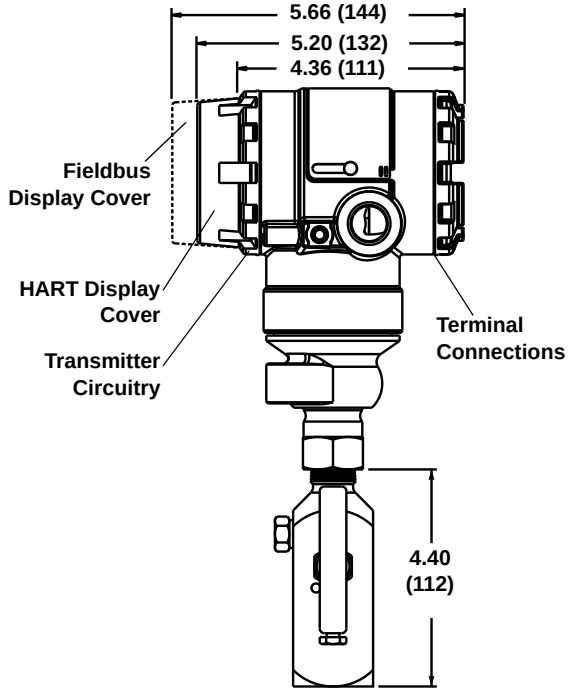
2051T Dimensional Drawings





2051T with Rosemount 306 2-Valve Integral Manifold



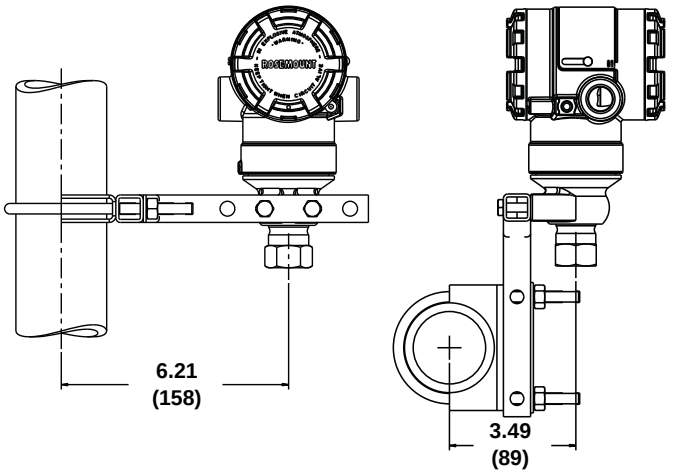


Dimensions are in inches (millimeters).

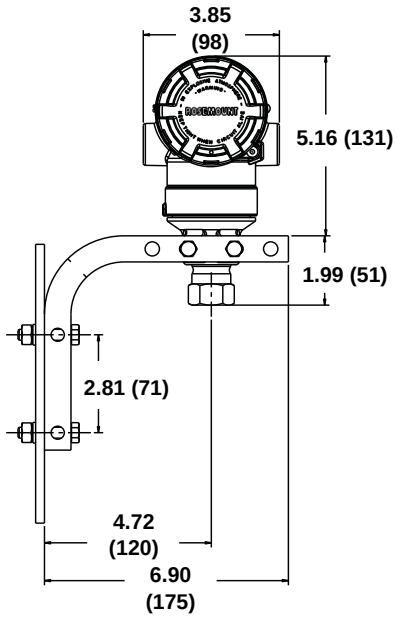
Rosemount 2051

2051T Typical Mounting Configurations with Optional Mounting Bracket

Pipe Mounting



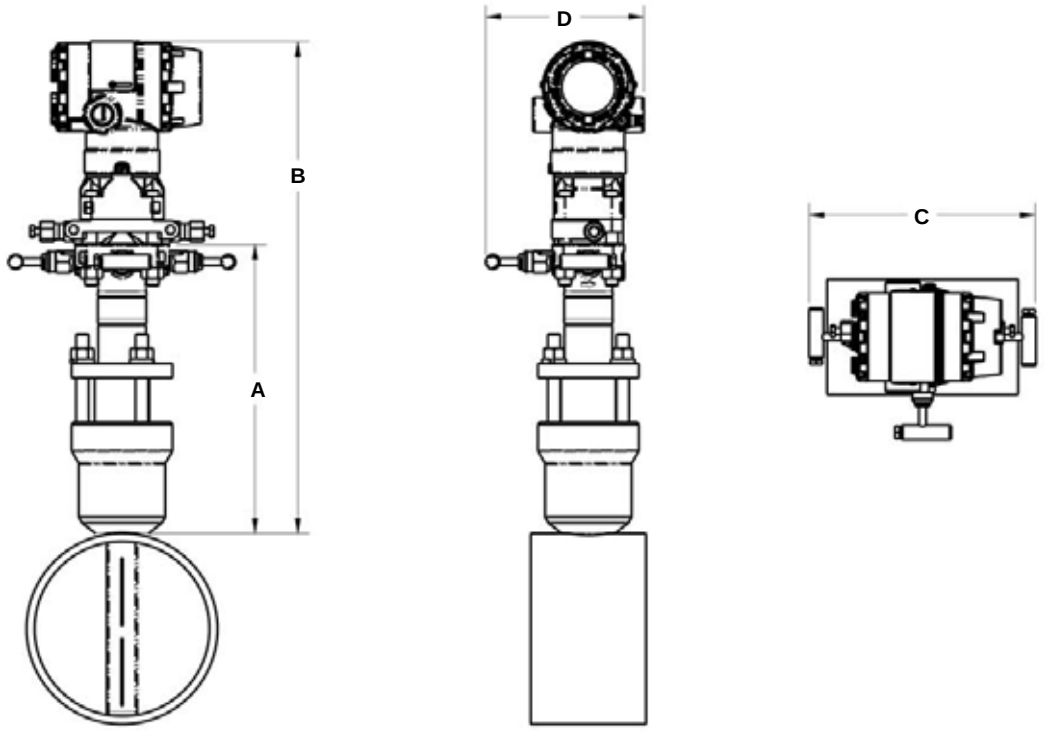
Panel Mounting



Dimensions are in inches (millimeters).

Rosemount 2051CFA Pak-Lok Annubar Flowmeter(1)

Front View	Side View	Top View



(1) The Pak-Lok Annubar model is available up to 600# ANSI (1,440 psig at 100 °F (99 bar at 38 °C)).

Table 22. 2051CFA Pak-Lok Annubar Flowmeter Dimensional Data

Sensor Size	A (Max)	B (Max)	C (Max)	D (Max)
1	8.50 (215.9)	14.55 (369.6)	9.00 (228.6)	6.00 (152.4)
2	11.00 (279.4)	16.30 (414.0)	9.00 (228.6)	6.00 (152.4)
3	12.00 (304.8)	19.05 (483.9)	9.00 (228.6)	6.00 (152.4)
Dimensions are in inches (millimeters)				

Rosemount 2051CFC Compact Orifice Flowmeter

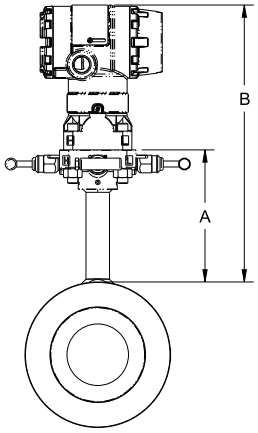
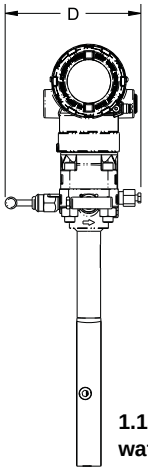
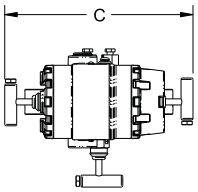
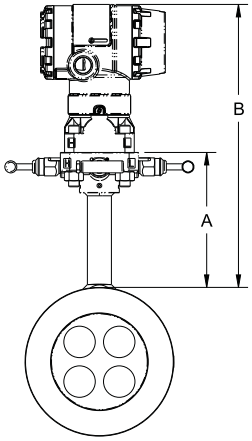
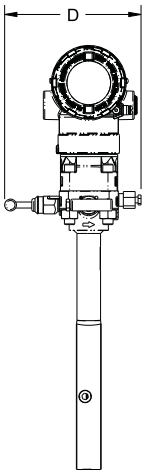
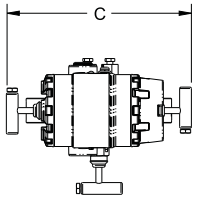
	Orifice Plate Side View	Orifice Plate Front View	Orifice Plate Top View
Compact Orifice Plate (Primary Element Type code P)		 **1.13-in. (28.7 mm) wafer thickness**	
Conditioning Orifice Plate (Primary Element Type code C)			

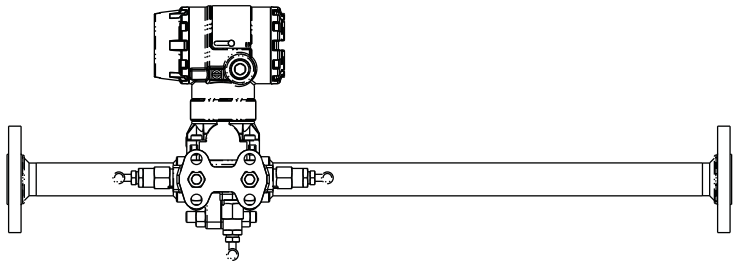
Table 23. 2051CFC Dimensional Drawings

Primary Element Type	A	B	Transmitter Height	C	D
Type P and C	5.62 (143)	Transmitter Height + A	6.27 (159)	7.75 (197) - closed 8.25 (210) - open	6.00 (152) - closed 6.25 (159) - open

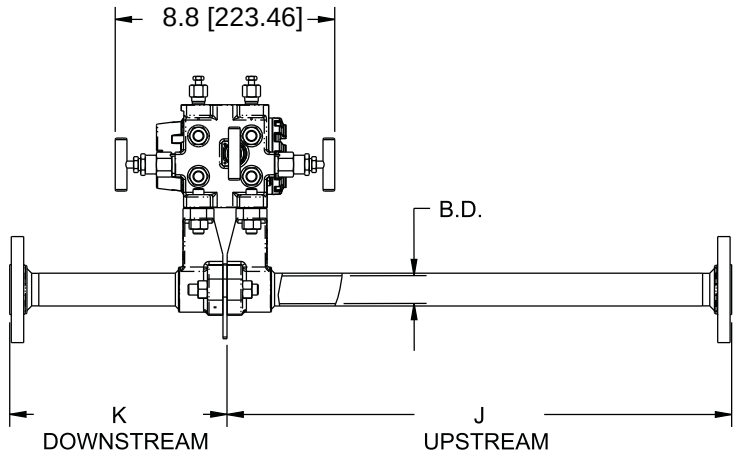
Dimensions are in inches (millimeters).

Rosemount 2051CFP Integral Orifice Flowmeter

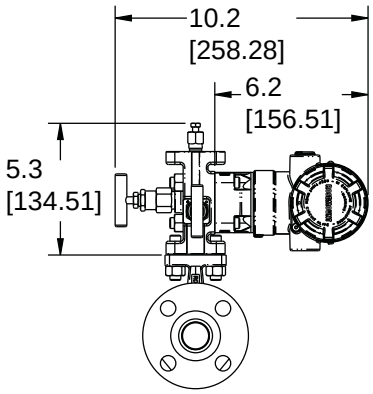
Side View



Bottom View



Front View



Dimensions are in inches (millimeters).

Table 24. 2051CFP Dimensional Drawings

	Line Size		
Dimension	**1/2-in. (15 mm)**	**1-in. (25 mm)**	**1 1/2-in. (40 mm)**
J (Beveled/Threaded pipe ends)	12.54 (318.4)	20.24 (514.0)	28.44 (722.4)
J (RF slip-on, RTJ slip-on, RF-DIN slip on)	12.62 (320.4)	20.32 (516.0)	28.52 (724.4)
J (RF 150#, weld neck)	14.37 (364.9)	22.37 (568.1)	30.82 (782.9)
J (RF 300#, weld neck)	14.56 (369.8)	22.63 (574.7)	31.06 (789.0)
J (RF 600#, weld neck)	14.81 (376.0)	22.88 (581.0)	31.38 (797.1)
K (Beveled/Threaded pipe ends)	5.74 (145.7)	8.75 (222.2)	11.91 (302.6)
K (RF slip-on, RTJ slip-on, RF-DIN slip on)(1)	5.82 (147.8)	8.83 (224.2)	11.99 (304.6)
K (RF 150#, weld neck)	7.57 (192.3)	10.88 (276.3)	14.29 (363.1)
K (RF 300#, weld neck)	7.76 (197.1)	11.14 (282.9)	14.53 (369.2)
K (RF 600#, weld neck)	8.01 (203.4)	11.39 (289.2)	14.85 (377.2)
B.D. (Bore Diameter)	0.664 (16.87)	1.097 (27.86)	1.567 (39.80)
Dimensions are in inches (millimeters).			

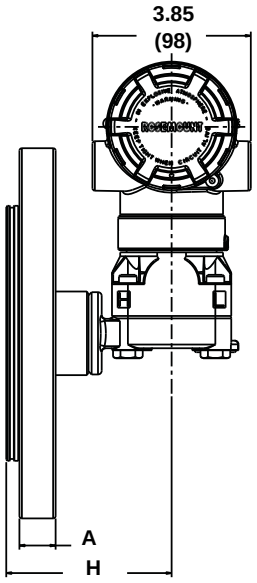
(1) Downstream length shown here includes plate thickness of 0.162-in. (4.11 mm).

Rosemount 2051

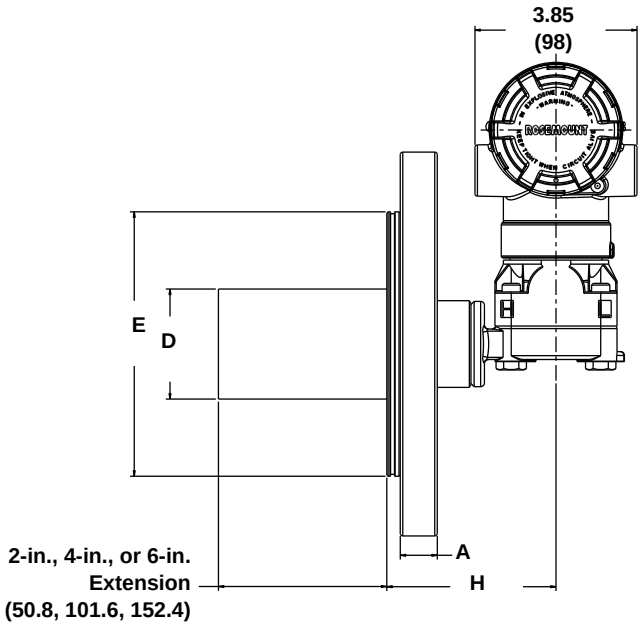
Product Data Sheet
00813-0100-4101, Rev FA
Catalog 2011 - 2012

2051L Liquid Level

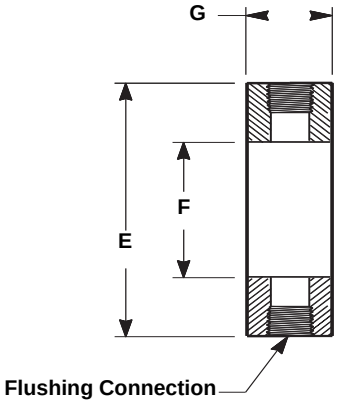
2-in. Flange Configuration (Flush Mount Only)



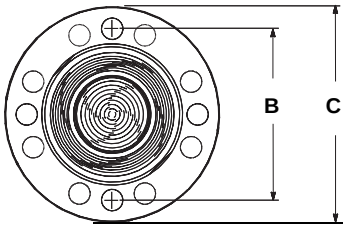
3- and 4-in. Flange Configuration

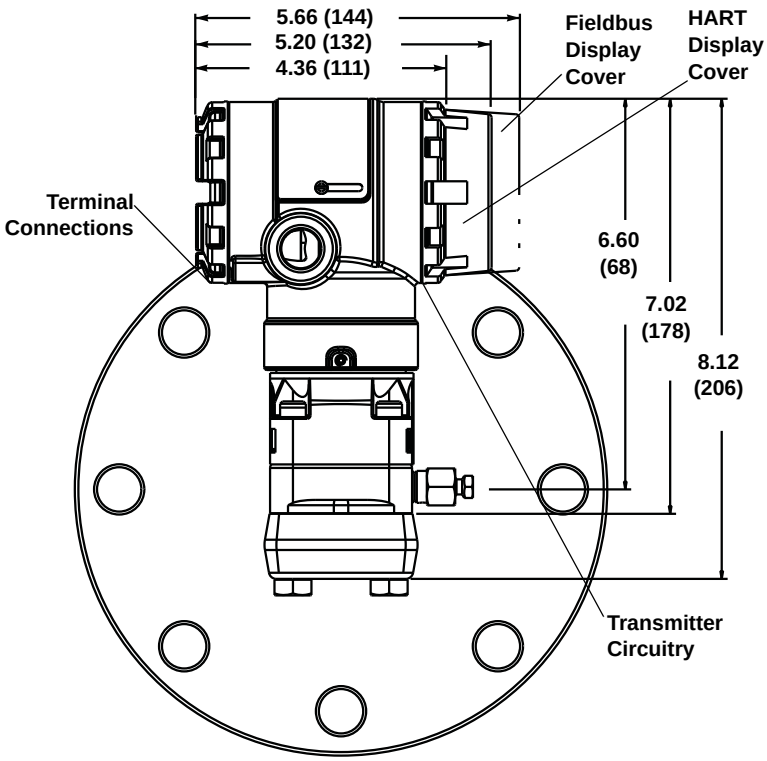


Optional Flushing Connection Ring (Lower Housing)



Diaphragm Assembly and Mounting Flange





Dimensions are in inches (millimeters).

Table 25. 2051L Dimensional Specifications

Class[1]	Pipe Size	Flange Thickness A	Bolt Circle Diameter B	Outside Diameter C	No. of Bolts	Bolt Hole Diameter	Extension Diameter[1] D	O.D. Gasket Surface E
ASME B16.5 (ANSI) 150	2 (51)	0.69 (18)	4.75 (121)	6.0 (152)	4	0.75 (19)	NA	3.6 (92)
	3 (76)	0.88 (22)	6.0 (152)	7.5 (191)	4	0.75 (19)	2.58 (66)	5.0 (127)
	4 (102)	0.88 (22)	7.5 (191)	9.0 (229)	8	0.75 (19)	3.5 (89)	6.2 (158)
ASME B16.5 (ANSI) 300	2 (51)	0.82 (21)	5.0 (127)	6.5 (165)	8	0.75 (19)	NA	3.6 (92)
	3 (76)	1.06 (27)	6.62 (168)	8.25 (210)	8	0.88 (22)	2.58 (66)	5.0 (127)
	4 (102)	1.19 (30)	7.88 (200)	10.0 (254)	8	0.88 (22)	3.5 (89)	6.2 (158)
DIN 2501 PN 10–40	DN 50	20 mm	125 mm	165 mm	4	18 mm	NA	4.0 (102)
DIN 2501 PN 25/40	DN 80	24 mm	160 mm	200 mm	8	18 mm	66 mm	5.4 (138)
	DN 100	24 mm	190 mm	235 mm	8	22 mm	89 mm	6.2 (158)

Dimensions are in inches (millimeters).

Class[1]	Pipe Size	Process Side F	Lower Housing G		H
			1/4 NPT	1/2 NPT	
ASME B16.5 (ANSI) 150	2 (51)	2.12 (54)	0.97 (25)	1.31 (33)	5.65 (143)
	3 (76)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
	4 (102)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
ASME B16.5 (ANSI) 300	2 (51)	2.12 (54)	0.97 (25)	1.31 (33)	5.65 (143)
	3 (76)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
	4 (102)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
DIN 2501 PN 10–40	DN 50	2.4 (61)	0.97 (25)	1.31 (33)	5.65 (143)
DIN 2501 PN 25/40	DN 80	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
	DN 100	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)

(1) Tolerances are -0.020 and +0.040 (-0,51 and +1,02)

Rosemount 2051

OPTIONS

Standard Configuration

Unless otherwise specified, transmitter is shipped as follows:

ENGINEERING UNITS Differential/Gage 2051TA	inH_2O (Ranges 1, 2, and 3) psi (Ranges 4-5) psi (all ranges)
4 mA (1 Vdc)[1]:	0 (engineering units)
20 mA (5 Vdc)[1]:	Upper range limit
Output:	Linear
Flange type:	Specified model code option
Flange material:	Specified model code option
O-ring material:	Specified model code option
Drain/vent:	Specified model code option
LCD Display:	Installed or none
Alarm[1]:	High
Software tag:	(Blank)

(1) Not applicable to FOUNDATION fieldbus or PROFIBUS PA.

Custom Configuration[1]

If Option Code C1 is ordered, the customer may specify the following data in addition to the standard configuration parameters.

- Output Information
- Transmitter Information
- LCD display Configuration
- Hardware Selectable Information
- Signal Selection

Refer to the “Rosemount 2051 Configuration Data Sheet” document number 00806-0100-4101.

Tagging (3 options available)

- Standard SST hardware tag is permanently affixed on transmitter. Tag character height is 0.125 in. (3,18 mm), 84 characters maximum.
- Tag may be wired to the transmitter nameplate upon request, 85 characters maximum.
- For HART protocols, the tag may be stored in transmitter memory (eight characters maximum). Software tag is left blank unless specified.

Commissioning tag[2]

A temporary commissioning tag is attached to all transmitters. The tag indicates the device ID and allows an area for writing the location.

Optional Rosemount 304, 305, or 306 Integral Manifolds

Factory assembled to 2051C and 2051T transmitters. Refer to Product Data Sheet (document number 00813-0100-4839 for Rosemount 304 and 00813-0100-4733 for Rosemount 305 and 306) for additional information.

(1) Not applicable to FOUNDATION fieldbus or PROFIBUS PA protocols.
(2) Only applicable to FOUNDATION fieldbus.

Other Seals

Refer to Product Data Sheet (document number 00813-0100-4016 or 00813-0201-4016) for additional information.

Output Information

Output range points must be the same unit of measure. Available units of measure include:

Pressure			
atm	inH2O@4 °C[1]	g/cm^2	psi
mbar	mmH_2O	kg/cm^2	torr
bar	mmHg	Pa	
inH_20	mmH2O@4 °C[1]	kPa	
inHg	ftH_20	MPa[2]	
Flow[2][3]			
bbl	kg	cm^3	
ft^3	lb	m^3	
gal	L	ton	
Level[2]			
%	ft	cm	
in	mm		

(1) Only available on 4-20mA HART.

(2) Only available on PROFIBUS PA.

(3) All flow units are available per second, minute, hour, or day.

Display and Interface Options

M4 Digital Display with Local Operator Interface (LOI)

- Available for PROFIBUS PA
- Commission the device with external Local Configuration Buttons
- LOI Menu includes: Address, Units, Calibration, Damping, Display, Identification Number

M5 Digital Meter

- 2-Line, 5-Digit LCD for 4-20 mA HART
- 1-Line, 4-Digit LCD for 1-5 Vdc HART Low Power
- 2-Line, 8-Digit LCD for FOUNDATION fieldbus and PROFIBUS PA
- Direct reading of digital data for higher accuracy
- Displays user-defined flow, level, volume, or pressure units
- Displays diagnostic messages for local troubleshooting
- 90-degree rotation capability for easy viewing

Hardware Adjustments[1]

D4 Local zero and span adjustments

- Alarm and security adjustments ship standard

Transient Protection

T1 Integral Transient Protection Terminal Block

Meets IEEE C62.41, Category Location B

6 kV crest (0.5 μs - 100 kHz)
3 kV crest (8 × 20 microseconds)
6 kV crest (1.2 × 50 microseconds)

Bolts for Flanges and Adapters

- Standard material is plated carbon steel per ASTM A449, Type 1

L4 Austenitic 316 Stainless Steel Bolts
L5 ASTM A 193, Grade B7M Bolts
L6 Alloy K-500 Bolts
L8 ASTM A 193 Class 2, Grade B8M Bolts

Conduit Plug

DO 316 SST Conduit Plug

- Single 316 SST conduit plug replaces carbon steel plug

Rosemount 2051C Coplanar Flange and 2051T Bracket Option

B4 Bracket for 2-in. Pipe or Panel Mounting

- For use with the standard Coplanar flange configuration
- Bracket for mounting of transmitter on 2-in. pipe or panel
- Stainless steel construction with stainless steel bolts

Rosemount 2051C Traditional Flange Bracket Options

B1 Bracket for 2-in. Pipe Mounting

- For use with the traditional flange option
- Bracket for mounting on 2-in. pipe
- Carbon steel construction with carbon steel bolts
- Coated with polyurethane paint

B2 Bracket for Panel Mounting

- For use with the traditional flange option
- Bracket for mounting transmitter on wall or panel
- Carbon steel construction with carbon steel bolts
- Coated with polyurethane paint

B3 Flat Bracket for 2-in. Pipe Mounting

- For use with the traditional flange option
- Bracket for vertical mounting of transmitter on 2-in. pipe
- Carbon steel construction with carbon steel bolts
- Coated with polyurethane paint

B7 B1 Bracket with SST Bolts

- Same bracket as the B1 option with Series 300 stainless steel bolts

B8 B2 Bracket with SST Bolts

- Same bracket as the B2 option with Series 300 stainless steel bolts

B9 B3 Bracket with SST Bolts

- Same bracket as the B3 option with Series 300 stainless steel bolts

BA Stainless Steel B1 Bracket with SST Bolts

- B1 bracket in stainless steel with Series 300 stainless steel bolts

BC Stainless Steel B3 Bracket with SST Bolts

- B3 bracket in stainless steel with Series 300 stainless steel bolts

Rosemount 2051

Product Data Sheet
00813-0100-4101, Rev FA
Catalog 2011 - 2012

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00813-0100-4101 Rev FA,7/11

EMERSON
Process Management

Product Data Sheet
00813-0100-4690, Rev LA
Catalog 2011 - 2012

Rosemount 2088 Absolute and Gage Pressure Transmitter

- *Performance of 0.075% with High Accuracy option*
- *Lightweight, compact design for cost effective installation*
- *Protocols available include 4-20 mA HART® and 1-5 Vdc HART Low Power*
- *Absolute and gage pressure ranges up to 4,000 psi (276 bar)*
- *Rangeability of 20:1*



HART COMMUNICATION PROTOCOL CE

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Specifications . . . . . page Pressure-242
Product Certifications . . . . . page Pressure-244
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Rosemount 2088 Pressure Transmitter Product Offering



Proven Reliability for Gage and Absolute Applications

- Available protocols include 4-20 mA HART® and 1-5 Vdc HART Low Power
- Fully Configurable LCD to display process variable, percent of range, and diagnostic messages
- Lightweight, compact design enables easy installation
- Choice of Stainless Steel or Alloy C-276 wetted materials



Unlock the Value of Devices with the Smart Wireless THUM™ Adapter

- Gain access to field intelligence and improve quality, safety, availability, operations, and maintenance costs
- Remotely manage devices and monitor health
- Enable new wireless measurement points
- Utilize existing loop power



Proven, Reliable, and Innovative DP Level Technologies

- Connect to virtually any process with a comprehensive offering of process connections, fill fluids, direct mount or capillary connections and materials
- Quantify and optimize total system performance with QZ option



Instrument Manifolds – Quality, Convenient, and Easy

- Designed and engineered for optimal performance with Rosemount transmitters
- Save installation time and money with factory assembly
- Offers a variety of styles, materials, and configurations

Ordering Information

Table 1. Rosemount 2088 Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is manufactured after receipt of order and is subject to additional delivery lead time.

Model	Product description			
Standard				**Standard**
2088	Pressure Transmitter			★
Code	**Measurement Type**			
Standard				**Standard**
A	Absolute			★
G	Gage			★
Code	**Pressure Ranges**			
Standard				**Standard**
	2088G		**2088A**	
1	-14.7 to 30 psi /(-1,01 to 2,1 bar)		0 to 30 psi (0 to 2,1 bar)	★
2	-14.7 to 150 psi (-1,01 to 10,3 bar)		0 to 150 psi (0 to 10,3 bar)	★
3	-14.7 to 800 psi (-1,01 to 55,2 bar)		0 to 800 psi (0 to 55,2 bar)	★
4	-14.7 to 4,000 psi (-1,01 to 275,8 bar)		0 to 4,000 psi (0 to 275,8 bar)	★
Code	**Transmitter Output**			
Standard				**Standard**
S	4–20 mA dc/Digital HART® Protocol			★
N	1-5 Vdc Low Power/ Digital HART protocol			★
Code	**Materials of Construction**			
Standard				**Standard**
	Process connection	**Isolating diaphragm**	**Fill Fluid**	
22(1)	316L SST	316L SST	Silicone	★
33(1)	Alloy C-276	Alloy C-276	Silicone	★
Expanded				
2B(1)	316L SST	316L SST	Inert	
Code	**Process Connection**			
Standard				**Standard**
A	½–14 NPT Female			★
B(2)	DIN 16288 G ½ Male			★
Expanded				
C(2)(3)	RC ½ Female (PT ½ Female)			
Standard				**Standard**
D(2)(3)	M20 × 1.5 Male (CM20 Male)			★
Code	**Conduit Entry**			
Standard				**Standard**
1	½–14 NPT			★
2(2)	M20 × 1.5 Female			★
Expanded				
4(2)	G ½ Female (PF ½ Female)			

Rosemount 2088

Product Data Sheet
00813-0100-4690, Rev LA
Catalog 2011 - 2012

Table 1. Rosemount 2088 Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is manufactured after receipt of order and is subject to additional delivery lead time.

Options (Include with selected model number)

Diaphragm seal assemblies		
Standard		**Standard**
S1[4][5]	Assemble to one Rosemount 1199 diaphragm seal	★
Display and Interface		
Standard		**Standard**
M5	LCD display	★
M7	LCD display, special configuration	★
Mounting brackets		
Standard		**Standard**
B4	SST mounting bracket with SST Bolts	★
Product Certifications		
Standard		**Standard**
C6	CSA Explosion-Proof, Intrinsically Safe, and non-Incendive	★
E2	INMETRO Flameproof	★
E4[2][6]	TIIS Flameproof	★
E5	FM Explosion-Proof, Dust Ignition-proof	★
E7	IECEx Flameproof	★
ED	ATEX Flameproof	★
I1[2]	ATEX Intrinsic Safety	★
I2	INMETRO Intrinsic Safety	★
I5	FM Intrinsically safe, Division 2	★
I7	SAA Intrinsic Safety	★
K1	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
K5	FM Explosion-Proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
K6[2]	CSA Explosion-Proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
K7	SAA Intrinsic Safety and Type n; IECEx Flameproof and Dust	★
KB	FM and CSA Explosion-Proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
KH[2]	FM Approvals and ATEX Explosion-Proof and Intrinsically Safe	★
N1[2]	ATEX Type n	★
N7	SAA Type n	★
ND[2]	ATEX Dust	★
NK	IECEx Dust	★
Shipboard Approvals		
Standard		**Standard**
SBS	American Bureau of Shipping	★
Pressure Testing		
Expanded		
P1	Hydrostatic testing	
Terminal Blocks		
Standard		**Standard**
T1	Transient protection	★
Special Cleaning		
Expanded		
P2	Cleaning for special service	
Calibration Certificate		
Standard		**Standard**
Q4	Calibration certificate	★

Table 1. Rosemount 2088 Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is manufactured after receipt of order and is subject to additional delivery lead time.

Quality Calibration Certificate Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204 3.1B	★
Digital Signal		
Standard		**Standard**
C4[(2)]	NAMUR alarm and saturation levels, high alarm	★
CN[(2)]	NAMUR alarm and saturation levels, low alarm	★
Configuration		
Standard		**Standard**
C9	Software configuration	★
Manifold Assemblies		
Standard		**Standard**
S5[(4)(5)]	Assemble to Rosemount 306 integral manifold	★
Calibration Accuracy		
Standard		**Standard**
P8[(7)]	0.075% accuracy to 10:1 turndown	★
Water Approval		
Standard		**Standard**
DW[(8)]	NSF drinking water approval	★
Low Output for Low Power		
Expanded		
C2	0.8 - 3.2 Vdc output with HART protocol	
Surface Finish		
Standard		**Standard**
Q16	Surface finish certification for sanitary remote seals	★
Toolkit Total System Performance Reports		
Standard		**Standard**
QZ	Remote Seal System Performance Calculation Report	★
Typical Model Number: 2088 G 2 S 22 A 1 B4 M5		

(1) Materials of Construction comply with recommendations per NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(2) Not available with low-power Output code N.

(3) Not available with Alloy C-276, Materials of Construction code 33.

(4) Use 1/2 - 14 NPT Female Process Connection code A.

(5) "Assemble-to" items are specified separately and require a completed model number.

(6) Only available with Conduit Thread code 4.

(7) Available with Output code S, stainless steel isolators, and silicone fill.

(8) Requires Materials of Construction code 22 with Process Connection code A.

Specifications

Performance Specifications

(Zero-based spans, reference conditions, silicone oil fill, and 316L SST isolating diaphragm.)

Reference Accuracy

- ±0.10% of calibrated span. Includes combined effects of linearity, hysteresis, and repeatability
- ±0.075% of calibrated span (high accuracy option)

Ambient Temperature Effect

Expressed as a total effect per 50 ℉ (28 ℃)
Total effect includes zero and span effects.
± (0.15% URL + 0.15% of span) from –40 °F to 185 °F
(-40 ℃ to 85 ℃)

Stability

±0.10% of URL for 12 months

Vibration Effect

Less than ±0.1% of URL when subjected to vibration of: peak to peak constant displacement of 4 mm (5–15 Hz) and constant acceleration of 2 g (15–150 Hz) and 1 g (150–2000 Hz).

Power Supply Effect

Less than 0.01% of calibrated span per volt

Mounting Position Effect

Zero shift of up to 1.2 inH_2O (0.30 kPa), which can be calibrated out. No span effect.

RFI Effect

Less than ±0.25% of upper range limit from 20–1000 MHz at 30 V/m with leads in conduit. Less than ±0.25% of upper range limit from 20-1000 MHz at 10 V/m with unshielded twisted pair (no conduit).

Transient Protection Limits

IEEE 587 Category B

6 kV Crest (1.2 × 50 μs)
3 kA Crest (8 × 20 μs)
6 kV Crest (0.5 μs by 100 kHz)

IEEE 472

SWC 2.5 kV Crest,1 MHz waveform

General Specifications

Tested to IEC 801-3

Functional Specifications

Service

Liquid, gas, and vapor applications

Ranges

Range	Minimum Span	Upper (URL)	Lower (LRL)	Lower[(1)] (LRL) (Gage)
1	1.5 psi (0,103 bar)	30 psi (2,1 bar)	0 psia (0 bar)	–14.7 psig (–1,01 bar)
2	8 psi (0,55 bar)	150 psi (10,3 bar)	0 psia (0 bar)	–14.7 psig (–1,01 bar)
3	40 psi (2,76 bar)	800 psi (55,2 bar)	0 psia (0 bar)	–14.7 psig (–1,01 bar)
4	200 psi (13,8 bar)	4000 psi (275,8 bar)	0 psia (0 bar)	–14.7 psig (–1,01 bar)

(1) Assumes atmospheric pressure of 14.7 psig.

Output

Code S: 4–20 mA dc
Code N: 1-5 volt dc, low power
(Outputs are directly proportional to the input pressure)

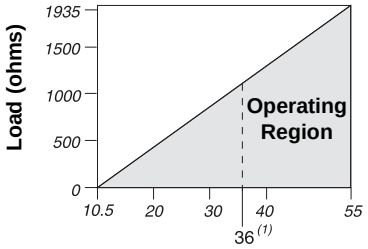
Rangedown

20 to 1

Load Limitations

Reverse polarity protection is standard. Maximum loop resistance is determined by the power supply voltage as described by the following equations:

Max. Loop Resistance = 43.5 (Power Supply Voltage – 10.5)



Power Supply Output Code S (dc Volts)

Communication requires a minimum loop resistance of 250 ohms.

(1) For hazardous location approvals, power supply must not exceed 36 V.

(2) For CENELEC Ex ia approval, the power supply must not exceed 30 V.

Power Supply

External power supply required. Transmitter operates on 10.5–36 Vdc with no load (6–14 V for Low Power). Reverse polarity protection is standard.

Current Draw

Output Code N: ≤ 3 mA without LCD display.

Overpressure Limits

Range 1: 120 psig max
All other ranges: two times the URL

Burst Pressure

11,000 psi for all ranges

Zero Elevation and Suppression

Zero can be suppressed between atmosphere for gage transmitters or 0 psia for absolute transmitters and upper range limit, provided the calibrated span is equal to or greater than the minimum span, and the upper range value does not exceed the upper range limit.

Time Response

Time Constant: 200 milliseconds
Dead time: < 0.1 s
Update rate: 20 times per second minimum

Temperature Limits

Ambient:
–40 to 185 °F (–40 to 85 °C)
–4 to 175 °F (–20 to 80 °C) with LCD display(1)

(1) LCD display may not be readable and LCD updates will be slower at temperatures below -4 °F (-20 °C).

Storage:
–50 to 230 °F (–46 to 110 °C)
–40 to 185 °F (–40 to 85 °C) with LCD display

Process:
Silicone fill sensor: –40 to 250 °F (–40 to 121 °C)(1)
Inert fill sensor: –22 to 250 °F (–30 to 121 °C)(1)

Process temperatures above 185 °F (85 °C) require derating the ambient limits by a 1.5:1 ratio. For example, for process temperature of 195 °F (91 °C), new ambient temperature limit is equal to 170 °F (77 °C). This can be determined as follows: (195 °F - 185 °F) x 1.5 = 15 °F, 185 °F - 15 °F = 170 °F

(1) 250 °F (140 °C) limit in vacuum service; 130 °F (54 °C) for pressures below 0.5 psia.

Humidity Limits

0–100% relative humidity

Volumetric Displacement

Less than 0.00042 cm^3

Turn-on Time

2.0 seconds, no warm-up required

Transmitter Security

Activating the transmitter security function prevents changes to the transmitter configuration, including local zero and span adjustments. Security is activated by an internal switch.

Failure Mode

If self-diagnostics detect a sensor or microprocessor failure, the analog signal is driven either high or low to alert the user. High or low failure mode is user-selectable with a jumper on the transmitter. The values to which the transmitter drives its output in failure mode depend on whether it is factory-configured to *standard* or *NAMUR-compliant* operation. The values for each are as follows:

Standard Operation			
Output Code	**Linear Output**	**Fail High**	**Fail Low**
S	3.9 ≤ I ≤ 20.8	I ≥ 21.75 mA	I ≤ 3.75 mA
N	0.97 ≤ V ≤ 5.2	V ≥ 5.4 V	V ≤ 0.95 V
N with Code C2	0.78 ≤ V ≤ 3.44	V ≥ 4.0 V	V ≤ 0.77 V

NAMUR-Compliant Operation	Linear Output	Fail High	Fail Low
Output Code S	3.8 ≤ I ≤ 20.5	I ≥ 22.5 mA	I ≤ 3.6 mA

Physical Specifications

Electrical Connection

1/2–14 NPT, M20 × 1.5 (CM20), PG 13.5, or
G 1/2 female (PF 1/2 female) conduit entry

Process Connection

1/2–14 NPT female, DIN 16288 G 1/2 male, RC 1/2 female (PT 1/2 female), M20 × 1.5 (CM20) male

Process Wetted Parts

Isolating Diaphragm

316L stainless steel or Alloy C-276

Process Connector

316L stainless steel CF-3M (Cast version of 316L SST, material per ASTM_A743) or Alloy C-276

Non-wetted Parts

Electronics Housing

Low-copper aluminum, NEMA 4X, IP65, IP67,CSA enclosure Type 4X

Paint

Polyurethane

Cover O-rings

Buna-N

Fill Fluid

Silicone or inert fill

Weight

Output Code S and N: Approximately 2.44 lb (1.11 kg)

Tagging

The transmitter is tagged, at no charge, in accordance with customer requirements. All tags are stainless steel. The standard tag is permanently attached to the transmitter. Tag character height is 1/8 in. (0.318 cm). A wired tag is available upon request.

Accessory Block and Bleed Valve (S5 Option)

The Rosemount 306 Integral Manifold is pre-assembled to transmitter and leak checked.

Product Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota, USA

Emerson Process Management GmbH & Co. — Wessling, Germany

Emerson Process Management Asia Pacific Private Limited — Singapore

Beijing Rosemount Far East Instrument Co., LTD — Beijing, China

European Directive Information

The EC declaration of conformity can be found at www.rosemount.com.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

2088/2090 Pressure Transmitters
— Sound Engineering Practice

Electro Magnetic Compatibility (EMC) (2004/108/EC)

All Model 2088/2090 Pressure Transmitter:
EN 61326-1:2006

Hazardous Locations Certifications

North American Certifications

Ordinary Location Certification for Factory Mutual

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Factory Mutual (FM) Approvals

E5 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II, Division 1, Groups E, F, G, Class III, Division 1, indoor and outdoor (NEMA 4X) hazardous locations; factory sealed. Temperature Class T5 Ta = 85 °C.

I5 Intrinsically safe for use in Class I, Division 1, Groups A, B, C, D; Class II, Division 1, Groups E, F, and G; and Class III, Division 1 when connected in accordance with Rosemount drawing 02088-1018. Non-incendive for Class I, Division 2, Groups A, B, C, and D.
For input parameters see control drawing 02088-1018.
Temperature Class T4 Ta = 85 °C; indoor and outdoor (NEMA 4X) hazardous locations.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

C6 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II, Division 1, Groups E, F, G, Class III, indoor and outdoor hazardous locations. CSA enclosure Type 4X; factory sealed. Suitable for Class I, Division 2, Groups A, B, C, and D. 2088 is Single Seal.

Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D. Temp. Code T3C. Intrinsically safe when connected with approved barriers in accordance with Rosemount drawing 02088-1024. 2088 is Single Seal.
For input parameters see control drawing 02088-1024.

European Certifications

I1 BASEEFA ATEX Intrinsic Safety
Certificate No.: BAS00ATEX1166X ⟨Ex⟩ II 1 G
Ex ia IIC T5 (–55 °C ≤ T_{amb} ≤ 40 °C)
Ex ia IIC T4 (–55 °C ≤ T_{amb} ≤ 70 °C)
CE 1180

Table 2. Input Parameters

Loop/Power
U_i = 30 Vdc
I_i = 200 mA
P_i = 0.9 W
C_i = 0.012 µF

Special Conditions For Safe Use (x):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding a 500 V root-mean-square test to case. This must be taken into account on any installation in which it is used, for example by assuring that the supply to the apparatus is galvanically isolated.

N1 BASEEFA ATEX Type n
Certification No.: BAS00ATEX3167X ⟨Ex⟩ II 3 G
Ex nA nL IIC T5 (–40 °C ≤ T_{amb} ≤ 70 °C)
U_i = 50 Vdc max
CE

Special Conditions For Safe Use (x):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding a 500 V root-mean-square test to case. This must be taken into account on any installation in which it is used, for example, by assuring that the supply to the apparatus is galvanically isolated.

ND BASEEFA ATEX Dust
Certificate No.: BAS01ATEX1427X ⟨Ex⟩ II 1 D
Ex tD A20 T105 °C (–20 °C ≤ T_{amb} ≤ 85 °C)
IP66
CE 1180
Vmax = 36 Vdc

Special Conditions For Safe Use (x):

1. The user must ensure that the maximum rated voltage and current (36 volts, 24 mA, D.C.) are not exceeded. All connections to other apparatus or associated apparatus shall have control over this voltage and current equivalent to a category “ib” circuit according to EN50020.
2. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
3. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
4. Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact test.
5. The 2088/2090 sensor module must be securely screwed in place to maintain the ingress protection of the enclosure.

ED KEMA ATEX Flameproof
Certification No.: KEMA97ATEX2378 ⟨Ex⟩ II 1/2 G
Ex d IIC T6 (–40 °C ≤ T_{amb} ≤ 40 °C)
T4 (–40 °C ≤ T_{amb} ≤ 40 °C)
CE 1180
Vmax = 36 (with Output Code S)
Vmax = 14 (with Output Code N)

Special Conditions for Safe Use (x):

1. The cable and conduit entry devices shall be of a certified flameproof type Ex d, suitable for the conditions of use and correctly installed.
2. With the use of conduit entries a sealing device shall be provided immediately on the entrance thereto.
3. Unused apertures shall be closed with suitable Ex d certified blanking elements.
4. Suitable heat-resisting cables shall be used when the ambient temperature at the cable or conduit entries exceed 65 °C.
5. This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
6. For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

Japanese Certifications

E4 TIIS Flameproof
Ex d IIC T6 (T_{amb} = 85 °C)

Certificate	Description
TC15874	2088 with Alloy C-276 wetted parts (with display)
TC15873	2088 with Alloy C-276 wetted parts (no display)
TC15872	2088 with SST wetted parts (with display)
TC15871	2088 with SST wetted parts (no display)

Australian Certifications

I7 SAA Intrinsic Safety
Certification No.: AUS Ex 1249X
Ex ia IIC T4 (T_{amb} = 70 °C)
Ex ia IIC T5 (T_{amb} = 40 °C)
IP66
When connected per Rosemount drawing 03031-1026

Table 3. Input Parameters

Loop/Power
U_{max} = 30 V
I_{max} = 200 mA
P_{max} = 0.9 W
C_i = 0.01 μF
L_i = 10 μH

Special Conditions For Safe Use (X):

Observe barrier/entity parameters during installation. A passive current limited power source must be used. The power source must be such that Po ≤ (Uo * Io)/4. For modules using transient protection in the terminal assembly (T1 transient protection models), the apparatus enclosure is to be electrically bonded to the protective earth. The conductor used for the connection shall be equivalent to a copper conductor of 4 mm^2 minimum cross-sectional area.

N7 SAA Type n (Non-Sparking)
Certificate No.: AUS Ex 1249X
Ex n IIC T4 (T_{amb} = 70 °C)
Ex n IIC T5 (T_{amb} = 40 °C)
IP66

Special Conditions For Safe Use (X):

Where the equipment is installed such that there is an unused conduit entry, it must be sealed with a suitable blanking plug to maintain the IP66 degree of protection. Any blanking plug used with the equipment shall be of a type which requires the use of a tool to affect its removal. Voltage source shall not exceed 60 Vac or 75 Vdc.

E7 KEMA IECEx Flameproof
Certification No.: IECEx KEM 06.0021X
Ex d IIC T4 (–40 °C ≤ T_{amb} ≤ 80 °C)
CE 1180
Vmax = 36 (with Output Code S)
Vmax = 14 (with Output Code N)

NK IECEx Dust Ignition Proof
IECEx Certificate number: IECEx KEM 06.0021X
Ex tD A22 IP66 T90 °C(T_{amb} = -20 °C to 80 °C)
Vmax = 55 Vdc
Ii = 23 mA

Special Conditions For Safe Use (x):

1. The device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
2. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP 66.
3. Unused cable entries must be used which maintain the ingress protection of the enclosure to at least IP 66.
4. Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact.
5. The 2088/2090 sensor module must be securely screwed in place to maintain the ingress protection of the enclosure

Brazil Certifications

I2 INMETRO Intrinsic Safety
Certification No.: CEPEL-Ex-063/97-1X
BR-Ex ia IIC T5/T4

Special Conditions For Safe Use (x):

Only the sensor piezo-resistive can be installed in Zone 0. The transmitter must be installed in Zone 1 or 2.

E2 INMETRO Flameproof
Certification No.: CEPEL-Ex-076/97-1
BR-Ex d IIC T6/T5

China Certifications

I3 China (NEPSI) Intrinsic Safety
Ex ia IIC T4

E3 China (NEPSI) Flameproof
Ex d IIB + H2 T4/T5

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

KB Combination of K5 and C6

KH Combination of K5, I1, and ED

K5 Combination of E5 and I5

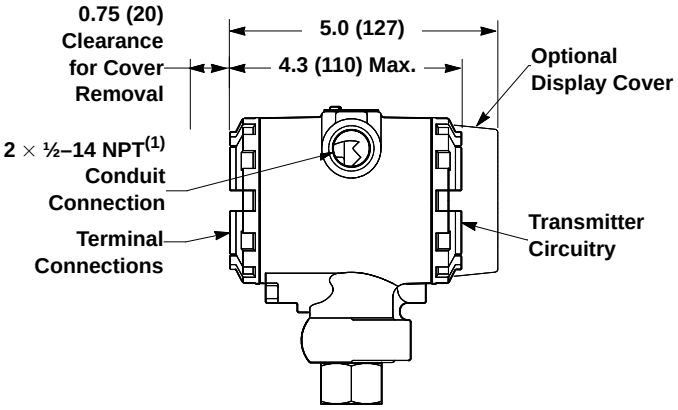
K6 Combination of C6, I1, and ED

K7 Combination of I7, N7, E7, and NK

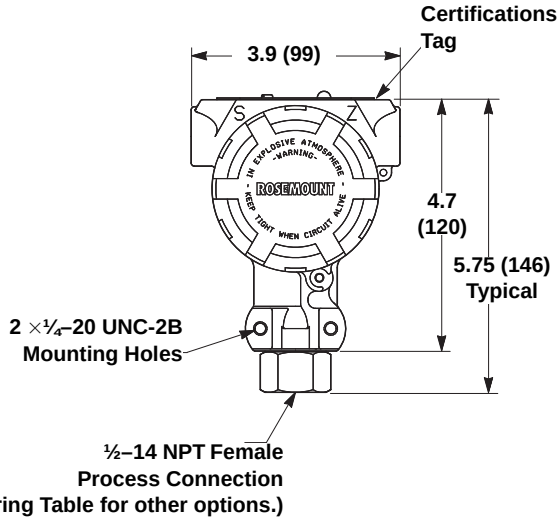
K1 Combination of I1, N1, ED, and ND

Dimensional Drawings

Rosemount 2088

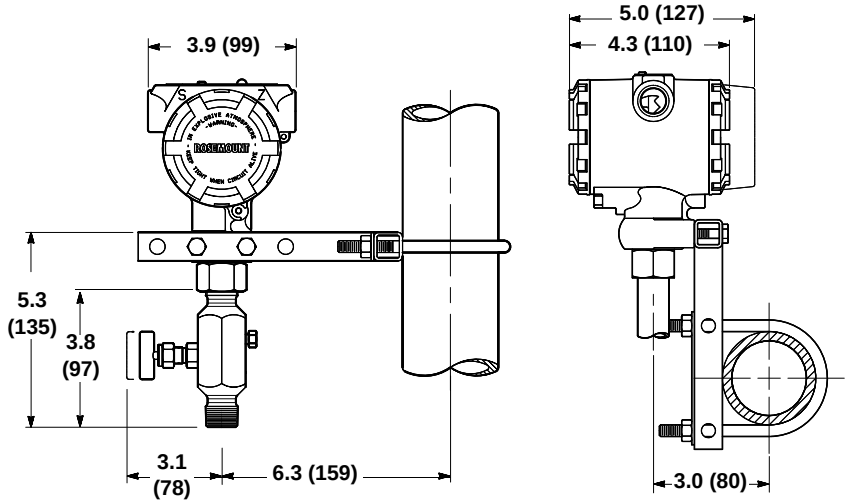


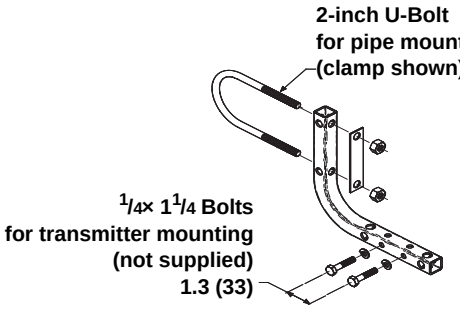
(1) *M20 × 1.5 Female (CM20), PG 13.5, and G 1/2 Female (PF 1/2 Female) also available as options.*



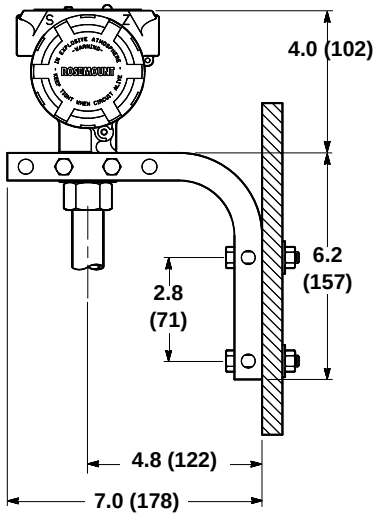
Mounting Configurations with Optional Mounting Brackets

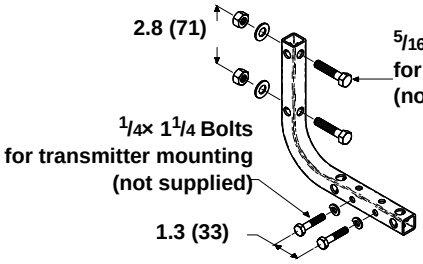
Pipe Mounting





Panel Mounting





Dimensions are in inches (millimeters).

Rosemount 2088

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00813-0100-4690 Rev LA, 7/11

EMERSON
Process Management

Product Data Sheet
00813-0100-4022, Rev FB
Catalog 2011 - 2012

Rosemount 4600 Oil & Gas Panel Pressure Transmitter

TRANSMITTER FEATURES:

- *A compact, lightweight, all-welded stainless steel design*
- *40:1 rangeability for increased flexibility and reduced inventories*
- *3 year stability guarantee reduces maintenance costs*
- *Leading edge capacitance sensor with integral temperature measurement for improved total performance*
- *4-20 mA HART® Smart capabilities and 0.25% of calibrated span reference accuracy*



HART COMMUNICATION PROTOCOL CE

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Rosemount 4600

Product Data Sheet
00813-0100-4022, Rev FB
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Legendary Rosemount Performance, Customized For Your Panel Applications

The Rosemount 4600 Oil & Gas Panel Transmitter is a compact, reliable transmitter designed to meet your panel-mount monitoring needs. The Rosemount 4600 continues the Rosemount tradition of delivering superior performance, industry leading reliability, and exceptional value.

A compact, lightweight, all-welded stainless steel design

You asked for it and we've delivered — the stability, performance and reliability of Rosemount are now available in a compact transmitter for your space and weight constrained panel applications. The entire transmitter weighs less than 1.5 pounds (0,6 kg) and the all-welded, hermetic enclosure maximizes reliability by minimizing environmental effects, such as salt spray and humidity, on the electronics and sensor.

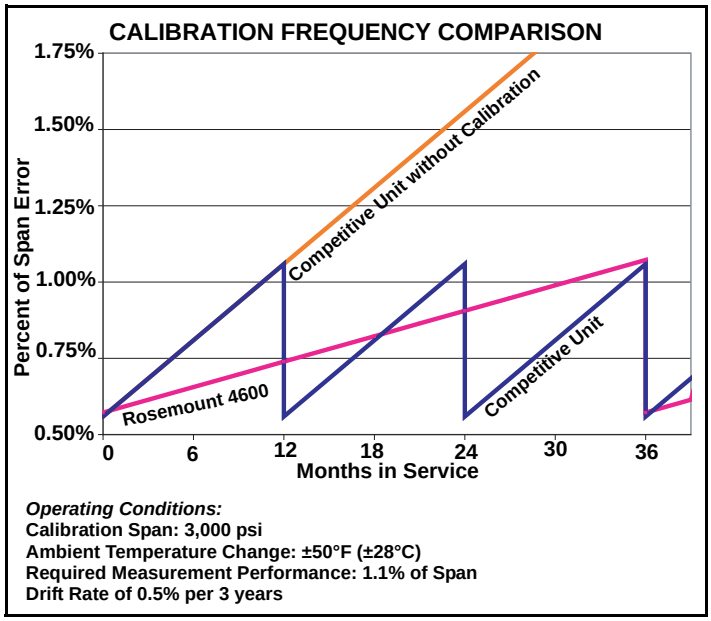
40:1 rangeability for increased flexibility and reduced inventories

Rosemount understands that Oil & Gas Well Pressures are sometimes unpredictable, and that's why we've incorporated 40:1 rangeability into the Rosemount 4600 Oil & Gas Panel Transmitter. Not only does 40:1 rangeability allow you incredible flexibility, it also lowers your transmitter inventories by allowing you to measure pressure ranges from 20 psi to 20,000 psi with only 4 transmitter ranges.

Leading edge capacitance sensor with integral temperature measurement for improved total performance

Integral temperature measurement means the Rosemount 4600 provides superior temperature compensation and therefore, a more precise pressure measurement over the entire operating temperature range.

3-year stability guarantee reduces maintenance costs



Most competitive devices can drift out of specification after just a few months and require recalibration, which consumes both your time and money. The Rosemount 4600 carries a 3-year "Set and Forget" stability guarantee to reduce the frequency of calibration and lower maintenance costs.

4-20 mA HART Smart capabilities and 0.25% of calibrated span reference accuracy

The HART protocol enables quick and easy reranging, calibration and troubleshooting for nearly effortless field adjustments. As always, reference accuracy is specified as a percent of *calibrated span*, not as a percent of full scale, so you're guaranteed 0.25% reference accuracy whether you're measuring 20,000 psi or 20 psi.

Ordering Information

Table 1. Rosemount 4600 Oil and Gas Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Transmitter Type	
4600	Oil and Gas Panel Pressure Transmitter	
Measurement Type		
Standard		**Standard**
G	Sealed Gauge	★
A	Absolute	★
Pressure Range		
Standard		**Standard**
2	0-20 to 0-150 psi	★
4	0-125 to 0-5000 psi	★
5	0-330 to 0-10,000 psi	★
6	0-660 to 0-20,000 psi (available only with H11)	★
Isolating Diaphragm/ Process Connection Materials		
Standard		**Standard**
2	316L SST (1)	★
3	Alloy C-276 (1)	★
Process Connection Style		
Standard		**Standard**
E09	1/4-18 NPT Female (not available with Pressure Range 6)	★
E11	1/2-14 NPT Female (not available with Pressure Range 5 or 6)	★
H11	Coned and Threaded, compatible with autoclave type F-250-C	★
Output		
Standard		**Standard**
A	4-20 mA with Digital Signal Based on HART protocol	★
Electrical Connection		
Standard		**Standard**
5A	1/2-14 NPT Male with 72 in. Flying Lead	★

Options (Include with selected model number)

Software Configuration		
Standard		**Standard**
C1	Custom Software Configuration (CDS required with order)	★
Alarm Limits		
Standard		**Standard**
C6	Custom Alarm and Saturation Signal Levels, High Alarm	★
C7	Custom Alarm and Saturation Signal Levels, Low Alarm	★
Hardware Adjustments		
Standard		**Standard**
D1	Zero and Span Adjustments	★
External Ground Screw Assembly		
Standard		**Standard**
D4	External Ground Screw Assembly	★
Product Certifications		
Standard		**Standard**
E1	ATEX Flameproof	★
I1	ATEX Intrinsic Safety	★
K1	ATEX Flameproof, Intrinsic Safety, Type n (combination of E1, I1, and N1)	★
N1	ATEX Type n	★

Rosemount 4600

Table 1. Rosemount 4600 Oil and Gas Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

ND	ATEX Dust Ignition-Proof	★
E5	FM Approval Explosionproof	★
I5	FM Approval Intrinsic Safety, Non-incendive	★
K5	FM Approval Explosionproof, Intrinsic Safety, Non-incendive (combination of E5 and I5)	★
E6	CSA Explosionproof, Division 2	★
I6	CSA Intrinsic Safety	★
K6	CSA Explosionproof, Intrinsic Safety, Division 2 (combination of E6 and I6)	★
KA	ATEX/ CSA Flameproof and Intrinsic Safety (combination of E1, I1, E6, and I6)	★
KB	FM Approval and CSA Explosionproof and Intrinsic Safety (combination of E5, E6, I5, and I6)	★
KC	FM Approval and ATEX Explosionproof and Intrinsic Safety (combination of E5, E1, I5, and I1)	★
Calibration Certifications		
Standard		**Standard**
Q4	Calibration Data Certificate consistent with ISO 104742.1 or EN 10204 2.1	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204 3.1B	★
Transient Protection		
Standard		**Standard**
T1	Transient Protection	★
Quality Certification for Safety		
Standard		**Standard**
QS	Prior-use certificate of FMEDA data	★
Typical Model Number: 4600 G 4 2 E11 A 5A D1 E5		

(1) Materials of Construction comply with recommendations per NACE MR0175/ISO 15156 for sour oilfield production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

Specifications

PERFORMANCE SPECIFICATIONS

For zero-based spans, reference conditions, silicone oil fill, SST materials, 1/2 in.- 14 NPT process connections, digital trim values set to equal range points. Does not include any error due to the effects of sealed gauge.

Conformance to specification (±3 Sigma)

Technology leadership, advanced manufacturing techniques and statistical process control ensure specification conformance to at least ±3 sigma.

Reference Accuracy

Includes the effects of terminal based linearity, hysteresis, and repeatability.

Range 2: ±0.25% of calibrated span from 1:1 to 7.5:1 rangedown

Range 4: ±0.25% of calibrated span from 1:1 to 40:1 rangedown

Range 5: ±0.25% of calibrated span from 1:1 to 30:1 rangedown

Range 6: ±0.25% of calibrated span from 1:1 to 30:1 rangedown

Long Term Stability

0.5% of span for 3 years under normal operating conditions

Vibration Effect

Less than ±0.1% of URL when tested per the requirements of IEC 60770.84 pipeline (general and extreme vibration level) (10-60 Hz 0.21mm peak to peak displacement/60-2000 Hz 3g).

Electromagnetic Compatibility (EMC)

Meets all relevant requirements of EN 61326

Transient Protection (Option T1)

Meets IEEE C62.41, Category B

- 6 kV crest (0.5 μs - 100 kHz)
- 3 kA crest (8 × 20 microseconds)
- 6 kV crest (1.2 × 50 microseconds)

Meets IEEE C37.90.1, Surge Withstand Capability

- SWC 2.5 kV crest, 1.25 MHz wave form

General Specifications:

- Response Time: < 1 nanosecond
- Peak Surge Current: 5000 amps to housing
- Peak Transient Voltage: 100 V dc
- Loop Impedance: < 25 ohms
- Applicable Standards: IEC61000-4-4, IEC61000-4-5

NOTE:
Calibrations at 68 °F (20 °C) per ASME Z210.1 (ANSI)

Range and Sensor Limits

Rosemount 4600 Oil & Gas Panel Transmitter Range Limits								
Units	Range 2		Range 4 Span		Range 5		Range 6	
	min.	max.	min.	max.	min.	max.	min.	max.
psi	20	150	125	5,000	330	10,000	660	20,000
MPa	0.14	1.03	125	34.47	2.28	68.95	4.55	137.90
bar	1.38	10.34	125	344.74	22.75	689.48	45.51	1378,95
kg/cm^2	1.41	10.55	125	351.535	23.20	703.07	46.40	1406,14

FUNCTIONAL SPECIFICATIONS

Dynamic Performance

500 Milliseconds (response time + dead time)

Ambient Temperature Effect per 100°F (56°C)

±0.03% URL + 1.0% span from 1:1 to maximum rangedown

Service

Liquid, gas, and vapor applications

4–20 mA (output code A)

Zero and Span Adjustment

Zero and span values can be set anywhere within the range. Span must be greater than or equal to the minimum span.

Output

Digital process variable superimposed on 4–20 mA signal, available to any host that conforms to the HART protocol.

Power Supply

External power supply required. Standard transmitter (4–20 mA) operates on 11.25 to 42.4 V dc with no load.

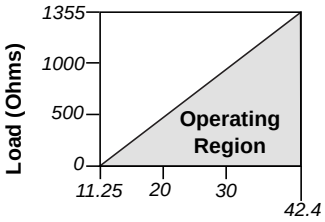
Load Limitations

Maximum loop resistance is determined by the voltage level of the external power supply, as described by:

Rosemount 4600

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Max. Loop Resistance = 43.5 (Power Supply Voltage – 11.25)



Communication requires a minimum loop resistance of 250 ohms.

Overpressure Limits

Transmitters withstand the following pressure without damage:

Range 2: 1,500 psi (103,4 bar)

Range 4: 7,500 psi (517,1 bar)

Range 5: 15,000 psi (1034 bar)

Range 6: 24,000 psi (1655 bar)

Burst Pressure Limits

Range 2: 11,000 psi (758,4 bar)

Range 4: 11,000 psi (758,4 bar)

Range 5: 26,000 psi (1793 bar)

Range 6: 31,000 psi (2137 bar)

Temperature Limits

Ambient

–40 to 185 °F (–40 to 85 °C)

Storage

–50 to 230 °F (–46 to 110 °C)

Process Temperature Limits

–40 to 200 °F (–40 to 93°C)

Turn-On Time

Performance within specifications less than 2.5 seconds after power is applied to the transmitter

Damping

Analog output response to a step input change is user-selectable from 0.3 to 60 seconds for one time constant. This software damping is in addition to sensor module response time.

Failure Mode Alarm

HART 4-20mA (output code A)

If self-diagnostics detect a gross transmitter failure, the analog signal will be driven offscale to alert the user. Rosemount standard and custom alarm levels are available.

High or low alarm signal is software-selectable.

Alarm Configuration

Rosemount

High Alarm: ≥ 21.75 mA

Low Alarm: ≤ 3.75 mA

Custom Level (1)

High Alarm: 20.2 - 23.0 mA

Low Alarm: 3.6 - 3.8 mA

PHYSICAL SPECIFICATIONS

Electrical Connections

1/2–14 NPT Male, 72in. flying leads (polyvinyl chloride insulated #18 AWG copper wire)

Conduit Seal

Integral conduit seal meets the requirements of NEC© 2002 section 501.5 (A), 501.5 (B) and 505.16 (B)(1). No additional conduit seal required.

Process Connections

- 1/2-14 NPT female (Available on Ranges 2 and 4 only)
- 1/4–18 NPT female (Not available on Range 6)
- Autoclave type F-250-C (Pressure relieved 9/16-18 gland thread: 1/4 OD high pressure tube 60° cone: available Range 5 and 6 transmitters only.

Process Sealing

Reliable dual process seal design meets the requirements NEC© 2002 section 501.5 (F)(3), 505.16 (E)(3) and API 14F/14FZ 6.8.2.2. No additional process sealing is required.

Process-Wetted Parts

Process Isolating Diaphragms

316L SST (2)

Alloy C-276® (2)

Non-Wetted Parts

Electronics Housing

316L SST

NEMA 4X

IP 68, IP 66

Sensor Module Fill Fluid

Silicone

Shipping Weights for Rosemount 4600

Range 2 and 4: 1.34 lb. (0,61 kg.)

Range 5 and 6: 2.03 lb. (0,92 kg.)

(1) Low alarm must be 0.1 mA less than low saturation and high alarm must be 0.1 mA greater than high saturation.

(2) Materials of Construction comply with recommendations per NACE MR0175/ISO 15156 for sour oilfield production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

Product Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota, USA

Ordinary Locations Certifications

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting our local sales office.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

Model 4600 Pressure Transmitters-
Sound Engineering Practice

Electro Magnetic Compatibility (EMC) (89/336/EEC)

All Models: EN 50081-1: 1992; EN 50082-2:1995;
EN 61326-1:1997 + A1, A2, and A3 – Industrial

Process Sealing Certification

FM Approved Dual Process Seal

Certified to the requirements of ANSI / ISA 12.27.01

No additional sealing required.

Hazardous Locations Certifications

North American Certifications

Factory Mutual (FM) Approvals

E5 Explosion-Proof for Class I, Division 1, Groups B, C, and D; dust-ignition proof for Class II and Class III, Division 1, Groups E, F, and G hazardous locations;
Temperature Code T5
(T_{amb} = -40°C to 85°C);
Explosion-Proof for Class 1, Zone 1 AEx d IIC
T5 (T_{amb} = -40°C to 85°C);
Enclosure Type 4X
Conduit seal not required

I5 Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D;
Temperature Code T4 (T_{amb} = -50°C to 70°C);
Intrinsically Safe for use in Class I, Zone 0 AEx ia IIC
T4 (T_{amb} = -50°C to 70°C);
Non-incendive for Class I, Division 2, Groups A, B, C, and D;
When connected in accordance with
Rosemount drawing 04620-5007;
Enclosure Type 4X
For entity parameters see control drawing 04620-5007

Canadian Standards Association (CSA) Approvals

E6 Explosion-Proof for Class I, Division 1, Groups B, C, and D; dust-ignition proof for Class II and Class III, Division 1, Groups E, F, and G hazardous locations;
Temperature Code T5 (T_{amb} = -50°C to 40°C);
Explosion-Proof for Class 1, Zone 1 Ex d IIC
T5 (T_{amb} = -20°C to 40°C);
Suitable for Class I, Division 2, Groups A, B, C, and D, when installed per Rosemount drawing 04620-5005;
Enclosure Type 4X
Conduit seal not required

I6 Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D;
Temperature Code T3C (T_{amb} = -50°C to 70°C);
Intrinsically Safe for use in Class I, Zone 0 Ex ia IIC
T4 (T_{amb} = -50°C to 70°C);
When connected in accordance with
Rosemount drawing 04620-5005;
Enclosure Type 4X
For entity parameters see control drawing 04620-5005

Rosemount 4600

European Certifications

I1 **ATEX Intrinsic Safety**
Certificate No. Baseefa03ATEX0114X
ATEX Marking: ⟨Ex⟩ II 1 G
EEx ia IIC T4 (-40 ≤ Ta ≤ 70°C)
CE 1180
Input Parameters:
U_i = 30V
I_i = 200mA
P_i = 1.0W
C_i = 35nF
L_i = 390µH

SPECIAL CONDITIONS FOR SAFE USE (X):

The Apparatus with the Transient Protection (T1) option is not capable of withstanding the 500V insulation test required by Clause 6.4.12 of EN50020 2002. This must be taken into account when installing the apparatus.

E1 **ATEX Flame-Proof**
Certificate No. KEMA02ATEX2231X
ATEX Marking: ⟨Ex⟩ II 1/2 G
EEx d IIC T6 (-40 ≤ Ta ≤ 80°C)
CE 1180

SPECIAL CONDITIONS FOR SAFE USE (X):

This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

The Model 4600 Pressure transmitter is provided with a permanently connected unterminated cable. The free end of the cable shall be connected using a suitable junction box, e.g. in type of explosion protection flameproof enclosure "d" or increased safety "e".

N1 **ATEX Type n**
Certificate No. Baseefa03ATEX0115X
ATEX Marking: ⟨Ex⟩ II 3 G
EEx nA II T5 (-40 ≤ Ta ≤ 70°C)
U_i = 42.4V MAXIMUM

SPECIAL CONDITIONS FOR SAFE USE (X):

The Apparatus with the Transient Protection (T1) option is not capable of withstanding the 500V insulation test required by Clause 9.1 of EN50021 1999. This must be taken into account when installing the apparatus.

ND **ATEX Dust Ignition-Proof**
Certificate No. KEMA02ATEX2231X
ATEX Marking: ⟨Ex⟩ II 1 D
Dust Rating: T85°C (-40 ≤ Ta ≤ 80°C)
IP66, IP68
CE 1180
V = 42.4 Volts MAX
A = 24mA

SPECIAL CONDITIONS FOR SAFE USE (X):

This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

The Model 4600 Pressure transmitter is provided with a permanently connected unterminated cable. The free end of the cable shall be connected using a suitable junction box, e.g. in type of explosion protection flameproof enclosure "d" or increased safety "e".

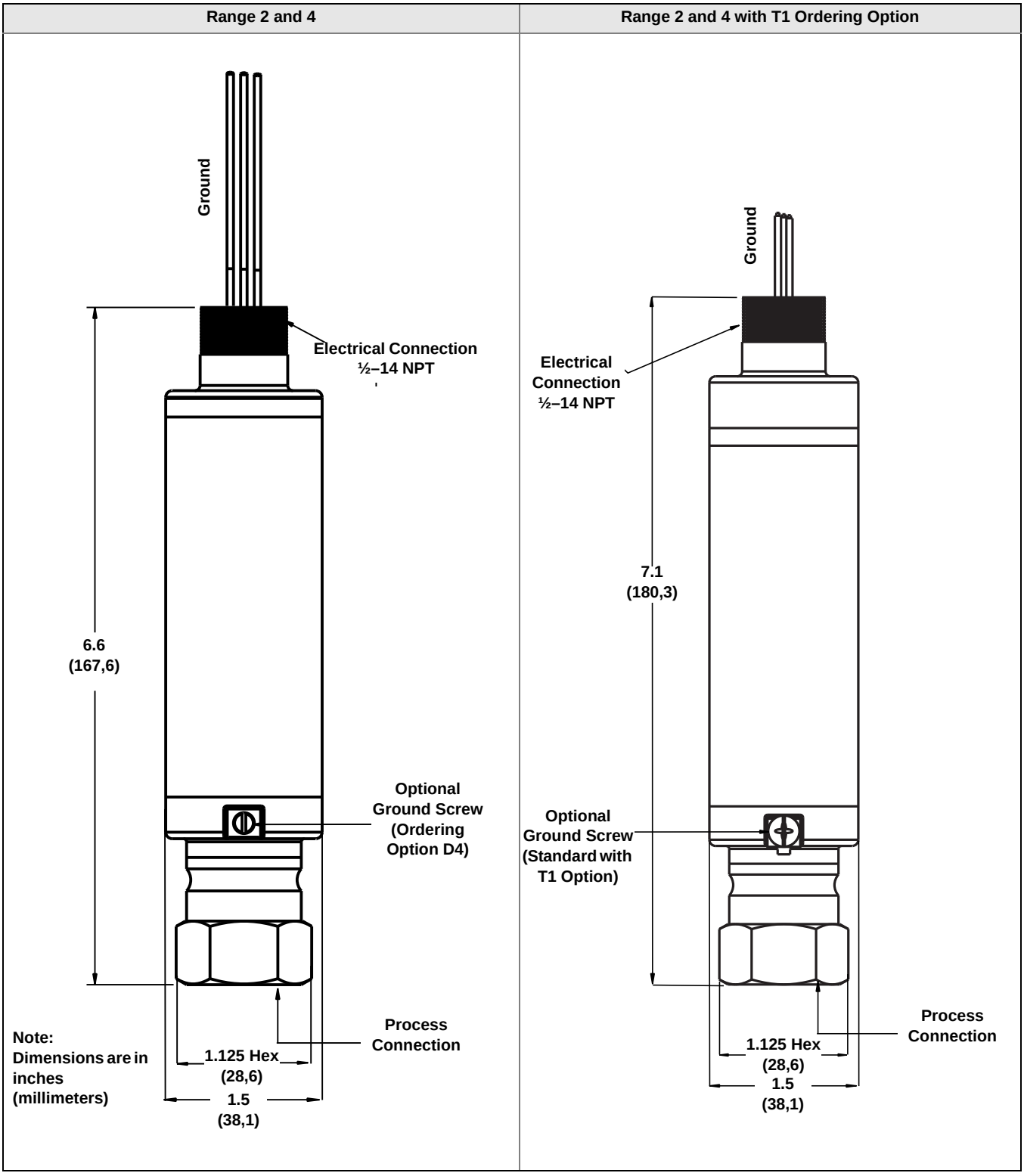
Combinations of Certifications

A certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K1 Combination of **E1**, **I1**, and **N1**
K5 Combination of **E5** and **I5**
K6 Combination of **E6** and **I6**
KA Combination of **E1**, **I1**, **E6,** and **I6**
KB Combination of **E5**, **I5**, **I6** and **E6**
KC Combination of **E5**, **E1**, **I5** and **I1**

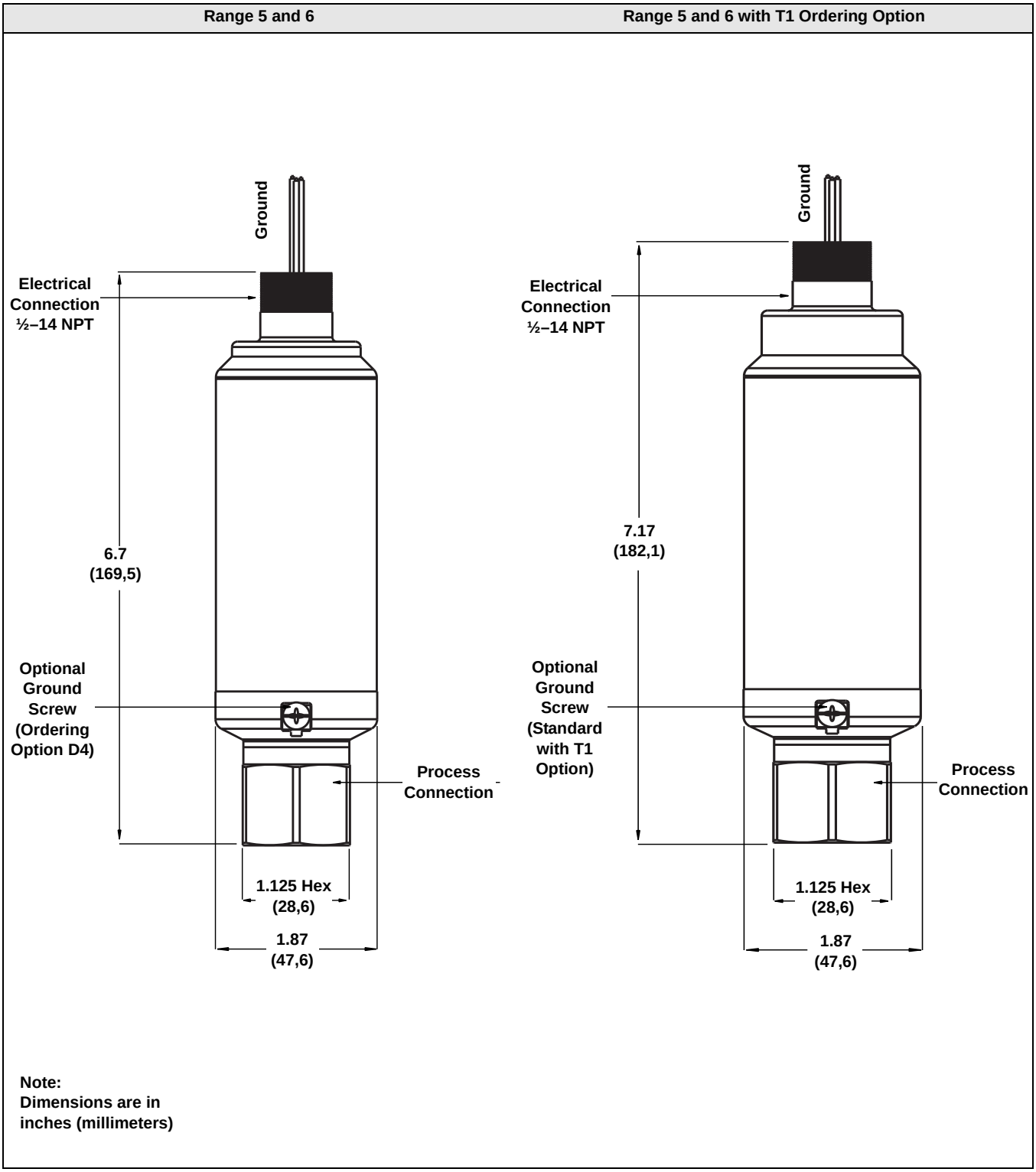
Dimensional Drawings

Figure 1. Dimensional Drawings for the Rosemount 4600 Oil & Gas Panel Pressure Transmitter



Rosemount 4600

Figure 2. Dimensional Drawings for the Rosemount 4600 Oil & Gas Panel Pressure Transmitter



Rosemount 4600

Product Data Sheet
00813-0100-4022, Rev FB
Catalog 2011 - 2012

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EMERSON
Process Management

Product Data Sheet
00813-0100-4698, Rev EA
Catalog 2011 - 2012

Rosemount 2090F Hygienic Pressure Transmitter

- *Conforms to 3-A® Sanitary Standards*
- *Features CIP/SIP service for process temperatures up to 284 ° F (140 ° C)*
- *Absolute or gage pressure ranges from 0-1.5 to 0-300 psi*
- *Mounts with either 1½- or 2-in. Tri-Clamp® connection*
- *Utilizes single-filled sensor system for reliability and outstanding accuracy*



HART COMMUNICATION PROTOCOL CE

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Rosemount 2090F

Product Data Sheet
00813-0100-4698, Rev EA
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Accurate, stable, and reliable pressure measurements for the Pharmaceutical and Food and Beverage Industry

Conforms to 3-A Sanitary Standards

The 2090F is a microprocessor-based Smart pressure transmitter that conforms to 3-A Sanitary Standards. The sanitary design also provides a product contact surface that is easy to clean and able to withstand thermal shocks.

Features CIP/SIP service with an upper temperature limit of 284 °F (140 °C)

The 2090F provides accurate, stable, and reliable pressure measurement, which makes it an ideal choice for pharmaceutical and food and beverage applications, including CIP/SIP service for process temperatures up to 284 °F (140 °C).

Absolute or Gauge pressure ranges from 0-1.5 to 0-300 psi and 20:1 turndown

Higher turndown allows for lower inventories by allowing you to measure pressures from 1.5 psi to 300 psi with only three transmitter ranges.

Mounts with either 1 1/2-in or 2-in. Tri-Clamp Connection

The 2090F is available with both 1 1/2-in. and 2-in. Tri-Clamp process connections, designed for sanitary applications to easily connect to standard sanitary fittings without requiring special mounting hardware.

Utilizes single-filled sensor system for reliability and outstanding accuracy

The 2090F sensor has a single-filled system with Neobee M-20 fill fluid which is approved as an indirect food additive according to the FDA. Its benefits include reliability, low oil fill for less temperature effect, and outstanding accuracy due to full sensor compensation.

Rosemount Pressure Solutions

Rosemount 3051S Series of Instrumentation
Scalable pressure, flow and level measurement solutions improve installation and maintenance practices.

Rosemount 3095 MultiVariable™ Mass Flow Transmitter
Accurately measures differential pressure, static pressure and process temperature to dynamically calculate fully compensated mass flow.

Rosemount 304, 305, and 306 Integral Manifolds
Factory-assembled, calibrated and seal-tested manifolds reduce on-site installation costs.

Rosemount 1199 Diaphragm Seals
Provides reliable, remote measurements of process pressure and protects the transmitter from hot, corrosive, or viscous fluids.

Annubar Flowmeter Series: Rosemount 3051SFA, 3095MFA, and 485
The state-of-the-art, fifth generation Rosemount 485 Annubar combined with the 3051S or 3095MV MultiVariable transmitter creates an accurate, repeatable and dependable insertion-type flowmeter.

Compact Orifice Flowmeter Series: Rosemount 3051SFC, 3095MFC, and 405
Compact Orifice Flowmeters can be installed between existing flanges, up to a Class 600 (PN100) rating. In tight fit applications, a conditioning orifice plate version is available, requiring only two diameters of straight run upstream.

Integral Orifice Flowmeter Series: Rosemount 3051SFP, 3095MFP, and 1195
These integral orifice flowmeters eliminate the inaccuracies that become more pronounced in small orifice line installations. The completely assembled, ready to install flowmeters reduce cost and simplify installation.

Orifice Plate Primary Element Systems: Rosemount 1495 and 1595 Orifice Plates, 1496 Flange Unions and 1497 Meter Sections
A comprehensive offering of orifice plates, flange unions and meter sections that is easy to specify and order. The 1595 Conditioning Orifice provides superior performance in tight fit applications.

Ordering Information

Table 1. Rosemount 2090F Sanitary Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is manufactured after receipt of order and is subject to additional delivery lead time.

Model	**Product Description**			
2090F	Sanitary Pressure Transmitter			
Transmitter Type				
Standard				**Standard**
A	Absolute			★
G	Gage			★
Pressure Ranges				
	Range	**Minimum Span**	**URL/Max. Span Sensor Limit**	
Standard				**Standard**
1	0–30 psi (0–2 bar)	1.5 psi (103 mbar)	30 psi (2,06 bar)	★
2	0–150 psi (0–10.3 bar)	7.5 psi (517 mbar)	150 psi (10,34 bar)	★
3	0–300 psi (0–20.7 bar)	40 psi (2,76 bar)	300 psi (20,68 bar)	★
Output				
Standard				**Standard**
S	4–20 mA dc/Digital HART Protocol			★
Material of Construction				
	Process Connection	**Isolating Diaphragm**	**Oil Fill**	
Standard				**Standard**
2D	316L SST	316L SST	*Neobee*	★
Code	**Process Connection**			
Standard				**Standard**
E	1 1/2–in. *Tri-Clamp* Connection			★
F	2–in. *Tri-Clamp* Connection			★
Conduit Entry				
Standard				**Standard**
1	1/2–14 NPT			★
2	M20 × 1.5 (CM 20)			★
OPTIONS				
Digital Display				
Standard				**Standard**
M5	LCD display, scaled 0-100%			★
M7	LCD display, special configuration			★
Mounting Brackets				
Standard				**Standard**
B4	SST mounting bracket with SST Bolts			★
Product Certifications				
Standard				**Standard**
E5	FM Explosion-Proof, Dust Ignition-proof			★
ED	ATEX Flameproof			★
I5	FM Intrinsically safe, Division2			★
K5	FM Explosion-Proof, Dust Ignition-proof, Intrinsically Safe, Division 2			★
I1	ATEX Intrinsic Safety			★
N1	ATEX Type n			★
C6	CSA Explosion-Proof, Intrinsically Safe, and Non-incendive			★
KB	FM and CSA Explosion-Proof, Dust Ignition-proof, Intrinsically Safe, Division 2			★
KH	FM Approvals and ATEX Explosion-Proof and Intrinsically Safe			★
ND	ATEX Dust			★
NK	IECEx Dust			★
K7	I7, N7, E7 & NK Combination			★

Rosemount 2090F

Product Data Sheet
00813-0100-4698, Rev EA
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Table 1. Rosemount 2090F Sanitary Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is manufactured after receipt of order and is subject to additional delivery lead time.

K1	I1, N1, ED & ND Combination	★
K6	CSA Explosion-Proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
Terminal Blocks		
Standard		**Standard**
T1	Transient Protection	★
Special Certificate		
Standard		**Standard**
Q4	Calibration Certificate	★
Alarm Limit		
Standard		**Standard**
C4	NAMUR alarm and saturation levels, high alarm	★
CN	NAMUR alarm and saturation levels, low alarm	★
Special Procedures		
Expanded		
P2	Cleaning for Special Service	
Calibration Accuracy		
Standard		**Standard**
P8	0.1% Accuracy to 10:1 Turndown	★
P Specials		
Standard		**Standard**
PXXXX	Special that need to be created	★
Typical Model Number: 2090FG 2 S 2D E 1		

Specifications

Functional Specifications

Service

Liquid, gas, vapor, and high-viscosity applications

Ranges

Range	Minimum Span	URL/Max. Span Sensor Limit
1	1.5 psi (103 mbar)	30 psi (2,06 bar)
2	7.5 psi (517 mbar)	150 psi (10,34 bar)
3	40 psi (2,76 bar)	300 psi (20,68 bar)

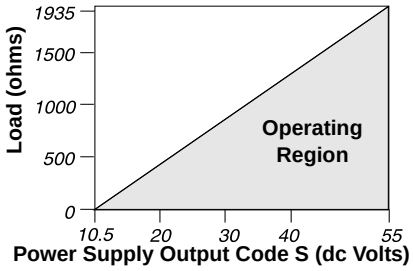
Output

4–20 mA dc/Digital HART Protocol

Load Limitations

Maximum loop resistance is determined by the power supply voltage, as described by the following equation:

Max. Loop Resistance = 43.5
(Power Supply Voltage – 10.5)



(1) For hazardous location approvals, power supply must not exceed 36 V.

Power Supply

External power supply required. Transmitter operates on 10.5–36 V dc with no load. Reverse polarity protection is standard.

Zero Elevation and Suppression

Zero can be suppressed between atmosphere (2090FG), or 0 psia (2090FA) and upper range limit, if the calibrated span is equal to or greater than the minimum span, and the upper range value does not exceed the upper range limit. No vacuum calibrations are allowed on the 2090F.

Overpressure Limits

Range 1:120 psig max
All other ranges: Twice the upper range limit

Temperature Limits

Process

–4 to 284 °F (–20 to 140 °C)

Ambient

–4 to 185 °F (–20 to 85 °C)

Storage

–22 to 185 °F (–30 to 85 °C)

Process temperatures above 185 °F (85 °C) require lowering the ambient limits by a 1.5:1 ratio:

Max. Ambient temperature in °F =

$$\frac{\textbf{185 – (Process Temp – 185)}}{\textbf{1.5}}$$

Max. Ambient temperature in °C =

$$\frac{\textbf{85 – (Process Temp – 85)}}{\textbf{1.5}}$$

Humidity Limits

0–100% relative humidity

Volumetric Displacement

Less than 0.00042 cm^3

Turn-on Time

2.0 seconds, no warm-up required

Failure Alarm

If self-diagnostics detect a sensor or microprocessor failure, the analog signal is driven either high or low to alert the user. High or low failure mode is user-selectable by a jumper on the transmitter. The values to which the transmitter drives its output in failure mode depend on whether it is factory-configured to *standard* or *NAMUR-compliant* operation. The values for each are as follows:

Standard Operation

Linear Output: $3.9 \leq I \leq 20.8$
Fail High: $I \geq 21.75$ mA
Low: $I \leq 3.75$ mA

NAMUR-Compliant Operation

Linear Output: $3.8 \leq I \leq 20.5$
Fail High: $I \geq 22.5$ mA
Low: $I \leq 3.6$ mA

Transmitter Security

Activating the transmitter security function prevents changes to the transmitter configuration, including local zero and span adjustments. Security is activated by an internal jumper.

Performance Specifications

(Zero-based spans, reference conditions, and 316 SST isolating diaphragm.)

Reference Accuracy

±0.20% of calibrated span. Includes combined effects of linearity, hysteresis, and repeatability.

Ambient Temperature Effect per 100 °F (56 °C)

±(0.3% URL + 0.3% of span) from –40 to 185 °F (-40 to 85 °C)

Stability

±0.10% of upper range limit for 12 months

Time Response

Less than 200 ms time constant (63.2% response to a step change in pressure)

Vibration Effect

Less than ±0.1% of upper range limit when subjected to vibration of peak to peak constant displacement of 4 mm (5–15 Hz) and constant acceleration of 2 g (15–150 Hz) and 1 g (150–2000 Hz).

Power Supply Effect

Less than 0.01% of calibrated span per volt

Mounting Position Effect

Zero shift of up to 1.2 inH_2O (0,3 kPa), which can be calibrated out. No span effect

RFI Effect

Less than ±0.25% of upper range limit from 20–1000 MHz at 30 V/m with leads in conduit. Less than ±0.25% of upper range limit from 20-1000 MHz at 10 V/m with unshielded twisted pair (no conduit).

Physical Specifications

Electrical Connection

$^1/_2$–14 NPT, PG 13.5, or M20 × 1.5 (CM20) conduit entry.

Process Wetted Parts

Isolating Diaphragm

316L stainless steel

Process Connector

316L stainless steel

Non-wetted Parts

Electronics Housing

Low-copper aluminum, NEMA 4X, IP65, IP67, CSA enclosure Type 4X

Paint

Polyurethane

Cover O-rings

Buna-N

Fill Fluid

Neobee® M-20

Weight

Approximately 2.74 lb (1.24 kg)

Rosemount 2090F

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Product Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota, USA

Emerson Process Management GmbH & Co. — Wessling, Germany

Emerson Process Management Asia Pacific Private Limited — Singapore

Beijing Rosemount Far East Instrument Co., LTD — Beijing, China

European Union Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting our local sales office.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

2088/2090 Pressure Transmitters
— Sound Engineering Practice

Electro Magnetic Compatibility (EMC) (2004/108/EC)

All 2088/2090 Smart Pressure Transmitter:
EN 61326-1:1997 with Amendments A1, A2, and A3

Ordinary Location Certification for Factory Mutual

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Hazardous Locations Certifications

North American Certifications

Factory Mutual (FM) Approvals

E5 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II, Division 1, Groups E, F, G, Class III, Division 1, indoor and outdoor (NEMA 4X) hazardous locations; factory sealed.

I5 Intrinsically safe for use in Class I, Division 1, Groups A, B, C, D; Class II, Division 1, Groups E, F, and G; and Class III, Division 1 when connected in accordance with Rosemount drawing 02088-1018. Non-incendive for Class I, Division 2, Groups A, B, C, and D.
For input parameters see control drawing 02088-1018.

Canadian Standards Association (CSA)

C6 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II, Division 1, Groups E, F, G, Class III, indoor and outdoor hazardous locations. CSA enclosure Type 4X; factory sealed. Suitable for Class I, Division 2, Groups A, B, C, and D.
Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D. Temp. Code T3C. Intrinsically safe when connected with approved barriers in accordance with Rosemount drawing 02088-1024.
For input parameters see control drawing 02088-1024.

European Certifications

I1 ATEX Intrinsic Safety
Certificate No.: BAS00ATEX1166X ⟨Ex⟩ II 1 G
EEx ia IIC T5 (T_{amb} = –55 to 40 °C)
EEx ia IIC T4 (T_{amb} = –55 to 70°C)
CE 1180

TABLE 2. Input Parameters

Loop/Power	Input Type
U_i = 30 V dc	Smart
I_i = 200 mA	Smart
P_i = 0.9 W	Smart
C_i = 0.012 µF	Smart

Special Conditions for Safe Use (x):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding a 500V rms test to case. This must be taken into account on any installation in which it is used, for example by assuring that the supply to the apparatus is galvanically isolated.

N1 ATEX Type n
Certification No.: BAS00ATEX3167X ⟨Ex⟩ II 3 G
EEx nL IIC T5 (T_a = -40 °C to 70 °C)
U_i = 50 V dc max
CE

Special Conditions for Safe Use (x):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding a 500 V r.m.s. test to case. This must be taken into account on any installation in which it is used, for example, by assuring that the supply to the apparatus is galvanically isolated.

ND ATEX Combustible Dust
Certificate No.: BAS01ATEX1427X ⟨Ex⟩ II 1 D
T105°C (T_{amb} = -20°C to 85°C)
IP66
CE 1180
Vmax = 36 V dc Max
I_i - 24 mA

Special Conditions for Safe Use (x):
1. The user must ensure that the maximum rated voltage and current (36 volts, 24 mA, D.C.) are not exceeded. All connections to other apparatus or associated apparatus shall have control over this voltage and current equivalent to a category “ib” circuit according to EN50020.
2. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
3. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.

4. Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact test.
5. The 2088/2090 sensor module must be securely screwed in place to maintain the ingress protection of the enclosure.

ED ATEX Flameproof
Certification No.: KEMA97ATEX2378 ⟨Ex⟩ II 1/2 G
EEx d IIC T6 (T_a = -20 °C to 40°C)
T4 (T_a = -20 °C to 80 °C)
CE 1180
Vmax = 36 (with Smart output option)
Vmax = 14 (with low power output option)

Japanese Certifications

E4 TIIS Flame-Proof
Ex d IIC T6 (T_{amb} = 85 °C)

Certificate	Description
C15870	2090F with SST wetted parts (with meter)
C15878	2090F with SST wetted parts (no meter)

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

KB Combination of E5, I5, and C6
KH Combination of E5, I5 and I1
K5 Combination of E5 and I5
K6 Combination of C6, I1, and ED

Calibration

Transmitters are factory calibrated to customer's specified range. If calibration is not specified, transmitters are calibrated at maximum range. Calibration is at ambient temperature and pressure.

Tagging

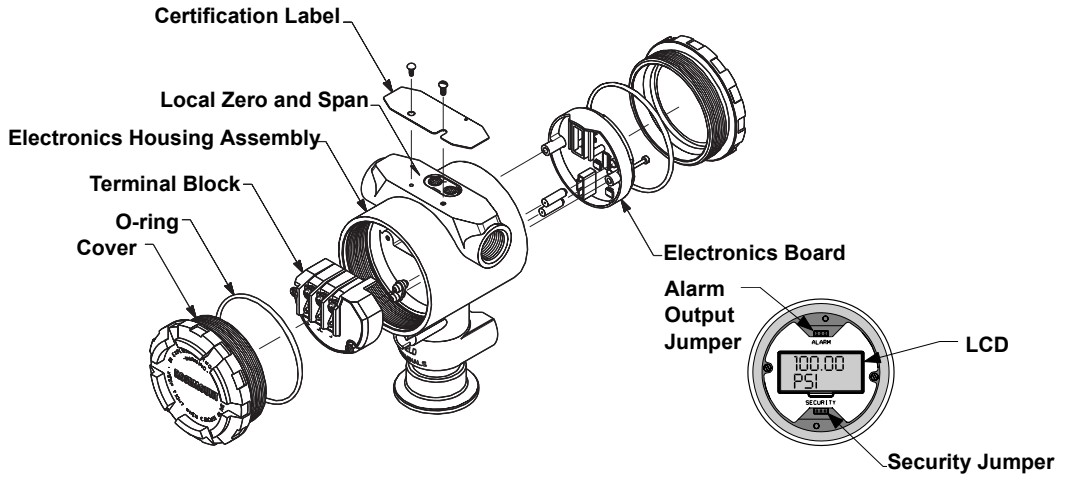
The transmitter will be tagged, at no charge, in accordance with customer requirements. All tags are stainless steel. The standard tag is wired to the transmitter. Tag character height is $^1/_8$ inch (0.318 cm). A permanently attached tag is available upon request.

Rosemount 2090F

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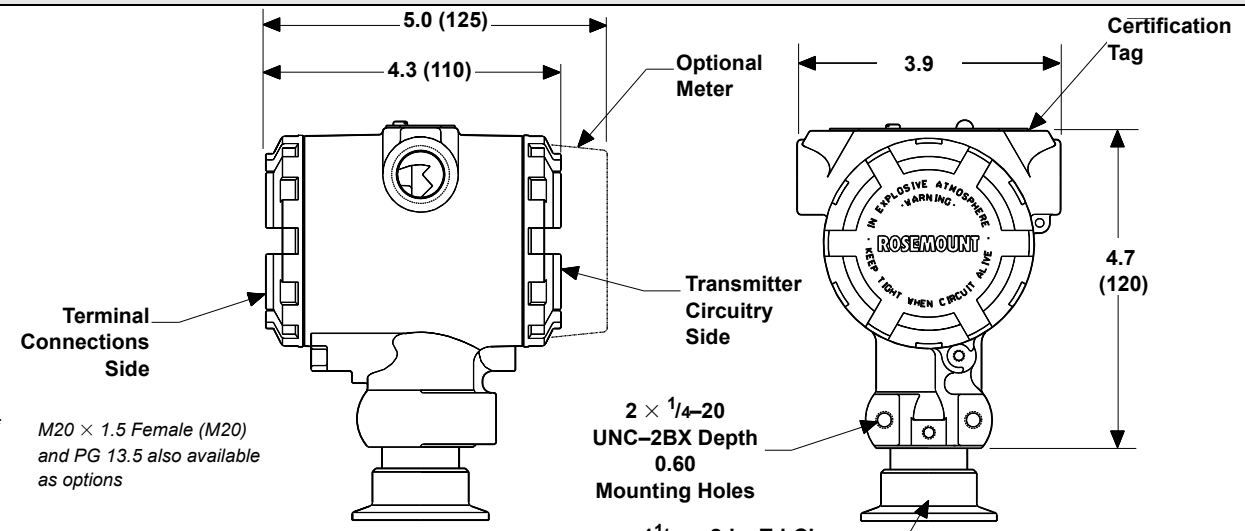
Dimensional Drawings

Rosemount 2090F Transmitter Exploded View



OPTIONAL SMART LCD DISPLAY

Rosemount 2090F



* *M20 × 1.5 Female (M20) and PG 13.5 also available as options*

NOTE
Dimensions are in inches (millimeters).

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EMERSON
Process Management

Product Data Sheet
00813-0100-4699, Rev GA
Catalog 2011 - 2012

Rosemount 2090P Pulp and Paper Pressure Transmitter

- *1-inch flush mount compatible with a PMC® process connection, or 1½-inch threaded mounting connection*
- *Absolute or gage pressure ranges from 0–1.5 to 0–300 psi*
- *20:1 turndown*
- *Communicates via the HART® protocol*
- *0.20% reference accuracy, including linearity, hysteresis, and repeatability*



Content

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Product Certifications . . . . . page Pressure-274
Dimensional Drawings. . . . . page Pressure-276

Rosemount 2090P

Product Data Sheet
00813-0100-4699, Rev GA
Catalog 2011 - 2012

Accurate, stable, and reliable pressure measurements for the Pulp and Paper Industry

1-in. flush mount compatible with PMC process connection, or 1 1/2-in. threaded mounting connection

The 2090P has process connections that position the isolation diaphragm flush with vessel or pipe walls, eliminating clogging problems associated with highly viscous processes that tend to crystallize, polymerize, or precipitate, such as those in the pulp and paper industry.

Absolute or gauge pressure ranges from 0-1.5 to 0-300 psi and 20:1 turndown

Higher turndown allows for lower inventories by allowing you to measure pressures from 1.5 psi to 300 psi with only three transmitter ranges.

Communicates via the HART® protocol

The 2090P utilizes the advantages of HART communication, enabling quick and easy reranging, calibration and troubleshooting.

0.20% Reference Accuracy, including linearity, hysteresis, and repeatability

The single-filled sensor system of the 2090P leads to outstanding accuracy due to full sensor compensation.

Rosemount Pressure Solutions

Rosemount 3051S Series of Instrumentation
Scalable pressure, flow and level measurement solutions improve installation and maintenance practices.

Rosemount 3095 MultiVariable™ Mass Flow Transmitter
Accurately measures differential pressure, static pressure and process temperature to dynamically calculate fully compensated mass flow.

Rosemount 304, 305, and 306 Integral Manifolds
Factory-assembled, calibrated and seal-tested manifolds reduce on-site installation costs.

Rosemount 1199 Diaphragm Seals
Provides reliable, remote measurements of process pressure and protects the transmitter from hot, corrosive, or viscous fluids.

Annubar Flowmeter Series: Rosemount 3051SFA, 3095MFA, and 485
The state-of-the-art, fifth generation Rosemount 485 Annubar combined with the 3051S or 3095MV MultiVariable transmitter creates an accurate, repeatable and dependable insertion-type flowmeter.

Compact Orifice Flowmeter Series: Rosemount 3051SFC, 3095MFC, and 405
Compact Orifice Flowmeters can be installed between existing flanges, up to a Class 600 (PN100) rating. In tight fit applications, a conditioning orifice plate version is available, requiring only two diameters of straight run upstream.

Integral Orifice Flowmeter Series: Rosemount 3051SFP, 3095MFP, and 1195
These integral orifice flowmeters eliminate the inaccuracies that become more pronounced in small orifice line installations. The completely assembled, ready to install flowmeters reduce cost and simplify installation.

Orifice Plate Primary Element Systems: Rosemount 1495 and 1595 Orifice Plates, 1496 Flange Unions and 1497 Meter Sections
A comprehensive offering of orifice plates, flange unions and meter sections that is easy to specify and order. The 1595 Conditioning Orifice provides superior performance in tight fit applications.

Ordering Information

Table 1. Rosemount 2090P Flush Mount Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is manufactured after receipt of order and is subject to additional delivery lead time.

Model	Product Description			
2090P	Flush Mount Pressure Transmitter			
Transmitter Type				
Standard				**Standard**
A	Absolute			★
G	Gage			★
Pressure Ranges				
	Range	**Minimum Span**	**URL/Max. Span Sensor Limit**	
Standard				**Standard**
1	0–30 psi (0–2 bar)	1.5 psi (103 mbar)	30 psi (2,06 bar)	★
2	0–150 psi (0–10.3 bar)	7.5 psi (517 mbar)	150 psi (10,34 bar)	★
3	0–300 psi (0–20.7 bar)	40 psi (2,76 bar)	300 psi (20,68 bar)	★
Output				
Standard				**Standard**
S	4–20 mA dc/Digital HART Protocol			★
Material of Construction				
	Process Connection	**Isolating Diaphragm**	**Oil Fill**	
Standard				**Standard**
22	316L SST	316L SST	*Silicone*	★
Process Connection				
Standard				**Standard**
A	1 1/2-in. Threaded, No Weld Spud, 1 1/2-in. PTFE Gasket			★
C	1 1/2-in. Threaded, 316L SST Weld Spud with Stress Isolation and PTFE Gasket			★
D	1-in. Flush Mount			★
G	1-in. Flush Mount with weld-on nipple			★
Conduit Entry				
Standard				**Standard**
1	1/2–14 NPT			★
2	M20 × 1.5 (CM 20)			★
OPTIONS				
Digital Display				
Standard				**Standard**
M5	LCD display, scaled 0-100%			★
M7	LCD display, special configuration			★
Mounting Brackets				
Standard				**Standard**
B4	SST mounting bracket with SST Bolts			★
Product Certifications				
Standard				**Standard**
E5	FM Explosion-Proof, Dust Ignition-proof			★
ED	ATEX Flameproof			★
I5	FM Intrinsically safe, Division2			★
K5	FM Explosion-Proof, Dust Ignition-proof, Intrinsically Safe, Division 2			★
I1	ATEX Intrinsic Safety			★
N1	ATEX Type n			★
C6	CSA Explosion-Proof, Intrinsically Safe, and Non-incendive			★
KB	FM and CSA Explosion-Proof, Dust Ignition-proof, Intrinsically Safe, Division 2			★
KH	FM Approvals and ATEX Explosion-Proof and Intrinsically Safe			★

Rosemount 2090P

Product Data Sheet
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Table 1. Rosemount 2090P Flush Mount Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is manufactured after receipt of order and is subject to additional delivery lead time.

ND	ATEX Dust	★
NK	IECEx Dust	★
K7	I7, N7, E7 & NK Combination	★
K1	I1, N1, ED & ND Combination	★
K6	CSA Explosion-Proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
Terminal Blocks		
Standard		**Standard**
T1	Transient Protection	★
Special Certificate		
Standard		**Standard**
Q4	Calibration Certificate	★
Alarm Limit		
Standard		**Standard**
C4	NAMUR alarm and saturation levels, high alarm	★
CN	NAMUR alarm and saturation levels, low alarm	★
Wetted O-ring Material		
Standard		**Standard**
W2	Buna-N	★
W3	Ethylene-Propylene	★
Special Procedures		
Expanded		
P2	Cleaning for Special Service	
Calibration Accuracy		
Standard		**Standard**
P8	0.1% Accuracy to 10:1 Turndown	★
P Specials		
Standard		**Standard**
PXXXX	Special that need to be created	★
Typical Model Number: 2090PG 2 S 22 A 1		

Specifications

Functional Specifications

Service

Liquid, gas, vapor, and high-viscosity applications

Ranges

Ranges	Min. Span	URL/Max. Span. Sensor Limit
1	1.5 psi (103 mbar)	30 psi (2,06 bar)
2	7.5 psi (517 mbar)	150 psi (10,34 bar)
3	40 psi (2,76 bar)	300 psi (20,68 bar)

Output

4–20 mA dc/Digital HART Protocol

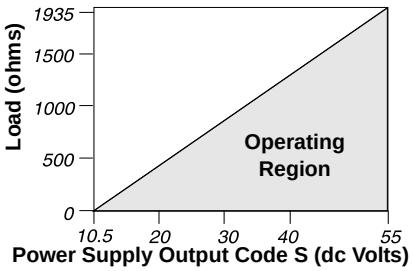
Rangedown

20:1

Load Limitations

Reverse polarity protection is standard. Maximum loop resistance is determined by the power supply voltage as described by the following equation:

Max. Loop Resistance = 43.5
(Power Supply Voltage – 10.5)



(1) For hazardous location approvals, power supply must not exceed 36 V.

Zero Elevation and Suppression

Zero can be suppressed between atmosphere (2090PG), or 0 psia (2090PA) and upper range limit, provided the calibrated span is equal to or greater than the minimum span, and the upper range value does not exceed the upper range limit. No vacuum calibrations are allowed on the 2090P.

Overpressure Limits

Range 1: 120 psig

Range 2: 300 psig

Range 3: 1,600 psig

Temperature Limits

Process: Codes A & C: –40 to 250 °F (–40 to 121 °C)

Codes D & G: –4 to 250 °F (–20 °C to 121 °C)

Ambient: All Codes: –4 to 185 °F (–20 to 85 °C)

Storage: All Codes: –50 to 185 °F (–46 to 85 °C)

Process temperatures above 185 °F (85 °C) require derating the ambient limits by a 1.5:1 ratio.

$$\textbf{Maximum Ambient Temperature in °F} = 185 - \frac{(\text{Process Temp} - 185)}{1.5}$$

$$\textbf{Maximum Ambient Temperature in °C} = 85 - \frac{(\text{Process Temp} - 85)}{1.5}$$

Humidity Limits

0–100% relative humidity

Volumetric Displacement

Less than 0.00042 cm^3

Turn-on Time

2.0 seconds, no warm-up required

Failure Alarm

If self-diagnostics detect a sensor or microprocessor failure, the analog signal is driven either high or low to alert the user. High or low failure mode is user-selectable with a jumper on the transmitter. The values to which the transmitter drives its output in failure mode depend on whether it is factory-configured to *standard* or *NAMUR-compliant* operation. The values for each are as follows:

Standard Operation

Linear Output: $3.9 \leq I \leq 20.8$
Fail High: $I \geq 21.75$ mA
Low: $I \leq 3.75$ mA

NAMUR-Compliant Operation

Linear Output: $3.8 \leq I \leq 20.5$
Fail High: $I \geq 22.5$ mA
Low: $I \leq 3.6$ mA

Transmitter Security

Activating the transmitter security function prevents changes to the transmitter configuration, including local zero and span adjustments. Security is activated by an internal jumper.

Performance Specifications

(Zero-based spans, reference conditions, and 316 SST isolating diaphragm.)

Reference Accuracy

±0.20% of calibrated span. Includes combined effects of linearity, hysteresis, and repeatability.

Ambient Temperature Effect per 100 °F (56 °C)

±(0.3% URL + 0.3% of span) from –40 to 185 °F (–40 to 85 °C)

Stability

±0.10% of upper range limit for 12 months

Time Response

Less than 200 ms time constant (63.2% response to a step change in pressure).

Vibration Effect

Less than ±0.1% of upper range limit when subjected to vibration of peak to peak constant displacement of 4 mm (5–15 Hz) and constant acceleration of 2 g (15–150 Hz) and 1 g (150–2000 Hz).

Power Supply Effect

Less than 0.01% of calibrated span per volt

Mounting Position Effect

Zero shift of up to 1.2 inH_2O (0.003 bar), which can be calibrated out. No span effect.

RFI Effect

Less than ±0.25% of upper range limit from 20–1000 MHz at 30 V/m with leads in conduit. Less than ±0.25% of upper range limit from 20-1000 MHz at 10 V/m with unshielded twisted pair (no conduit).

Physical Specifications

Electrical Connection

$^1/_2$–14 NPT, M20 × 1.5 (CM20), or PG 13.5 conduit entry

Process Wetted Parts

Isolating Diaphragm

316L stainless steel

Process Connector

316L stainless steel

Process Connection Size

$1^1/_2$ –11.5 NPT or 1-in. Flush Mount

Process Connector Gasket ($1^1/_2$-in.)

TFE

Process Connection O-rings (1-in.)

Standard: Viton®. Optional: Buna-N or Ethylene propylene

Rosemount 2090P

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Non-wetted Parts

Electronics Housing
Low-copper aluminum, NEMA 4X, IP65, IP67, CSA enclosure Type 4X

Paint
Polyurethane

Cover O-rings
Buna-N

Fill Fluid
Silicone oil

Weight
Approximately 2.96 lb (1.34 kg)

Product Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota, USA

Emerson Process Management GmbH & Co. — Wessling, Germany

Emerson Process Management Asia Pacific Private Limited — Singapore

Beijing Rosemount Far East Instrument Co., LTD — Beijing, China

European Union Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting our local sales office.

ATEX Directive (94/9/EC)
Emerson Process Management complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)
2088/2090 Pressure Transmitters
— Sound Engineering Practice

Electro Magnetic Compatibility (EMC) (89/336/EEC)
All 2088/2090 Smart Pressure Transmitter:
EN 61326-1:1997 with Amendments A1, A2, and A3

Ordinary Location Certification for Factory Mutual
As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Hazardous Locations Certifications

North American Certifications

Factory Mutual (FM) Approvals

E5 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II, Division 1, Groups E, F, G, Class III, Division 1, indoor and outdoor (NEMA 4X) hazardous locations; factory sealed.

I5 Intrinsically safe for use in Class I, Division 1, Groups A, B, C, D; Class II, Division 1, Groups E, F, and G; and Class III, Division 1 when connected in accordance with Rosemount drawing 02088-1018. Non-incendive for Class I, Division 2, Groups A, B, C, and D.
For input parameters see control drawing 02088-1018.

Canadian Standards Association (CSA)

C6 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II, Division 1, Groups E, F, G, Class III, indoor and outdoor hazardous locations. CSA enclosure Type 4X; factory sealed. Suitable for Class I, Division 2, Groups A, B, C, and D.

Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D. Temp. Code T3C. Intrinsically safe when connected with approved barriers in accordance with Rosemount drawing 02088-1024.
For input parameters see control drawing 02088-1024.

European Certifications

I1 ATEX Intrinsically Safe
Certificate No.: BAS00ATEX1166X ⟨Ex⟩ II 1 G
EEx ia IIC T5 (T_{amb} = –55 to 40 °C)
EEx ia IIC T4 (T_{amb} = –55 to 70°C)
CE 1180

TABLE 2. Input Parameters

Loop/Power	Input Type
U_i = 30 V dc	Smart
I_i = 200 mA	Smart
P_i = 0.9 W	Smart
C_i = 0.012 µF	Smart

Special Conditions for Safe Use (x):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding a 500V rms test to case. This must be taken into account on any installation in which it is used, for example by assuring that the supply to the apparatus is galvanically isolated.

N1 ATEX Type n
Certification No.: BAS00ATEX3167X ⟨Ex⟩ II 3 G
EEx nL IIC T5 (T_a = -40 °C to 70 °C)
U_i = 50 V dc max
CE

Special Conditions for Safe Use (x):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding a 500 V r.m.s. test to case. This must be taken into account on any installation in which it is used, for example, by assuring that the supply to the apparatus is galvanically isolated.

ND ATEX Combustible Dust
Certificate No.: BAS01ATEX1427X ⟨Ex⟩ II 1 D
T105°C (T_{amb} = -20°C to 85°C)
IP66
CE 1180
Vmax = 36 V dc Max
I_i = 24 mA

Special Conditions for Safe Use (x):
1. The user must ensure that the maximum rated voltage and current (36 volts, 24 mA, D.C.) are not exceeded. All connections to other apparatus or associated apparatus shall have control over this voltage and current equivalent to a category “ib” circuit according to EN50020.
2. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
3. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
4. Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact test.
5. The 2088/2090 sensor module must be securely screwed in place to maintain the ingress protection of the enclosure.

ED ATEX Flame-Proof
Certification No.: KEMA97ATEX2378 ⟨Ex⟩ II 1/2 G
EEx d IIC T6 (T_a = -20 °C to 40°C)
EEx d IIC T4 (T_a = -20 °C to 80 °C)
CE 1180
Vmax = 36 (with Smart output option)
Vmax = 14 (with low power output option)

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

KB Combination of E5, I5, and C6

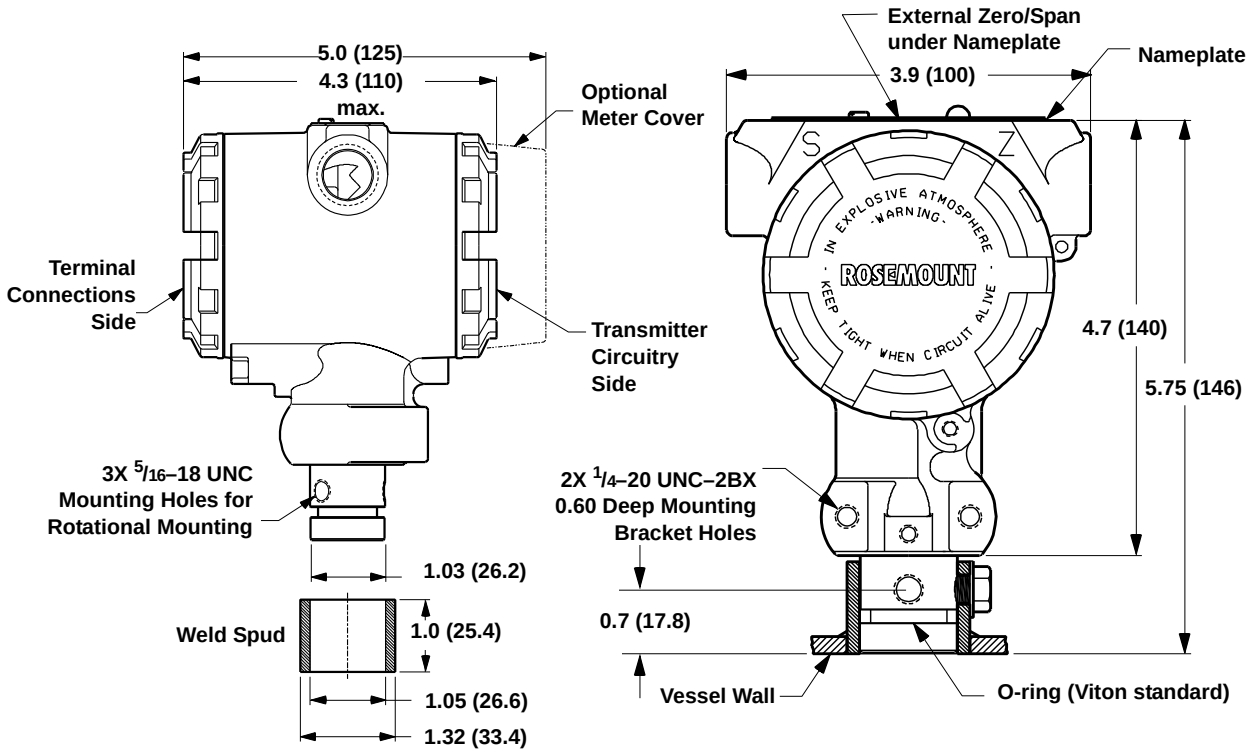
KH Combination of E5, I5, and I1

K5 Combination of E5 and I5

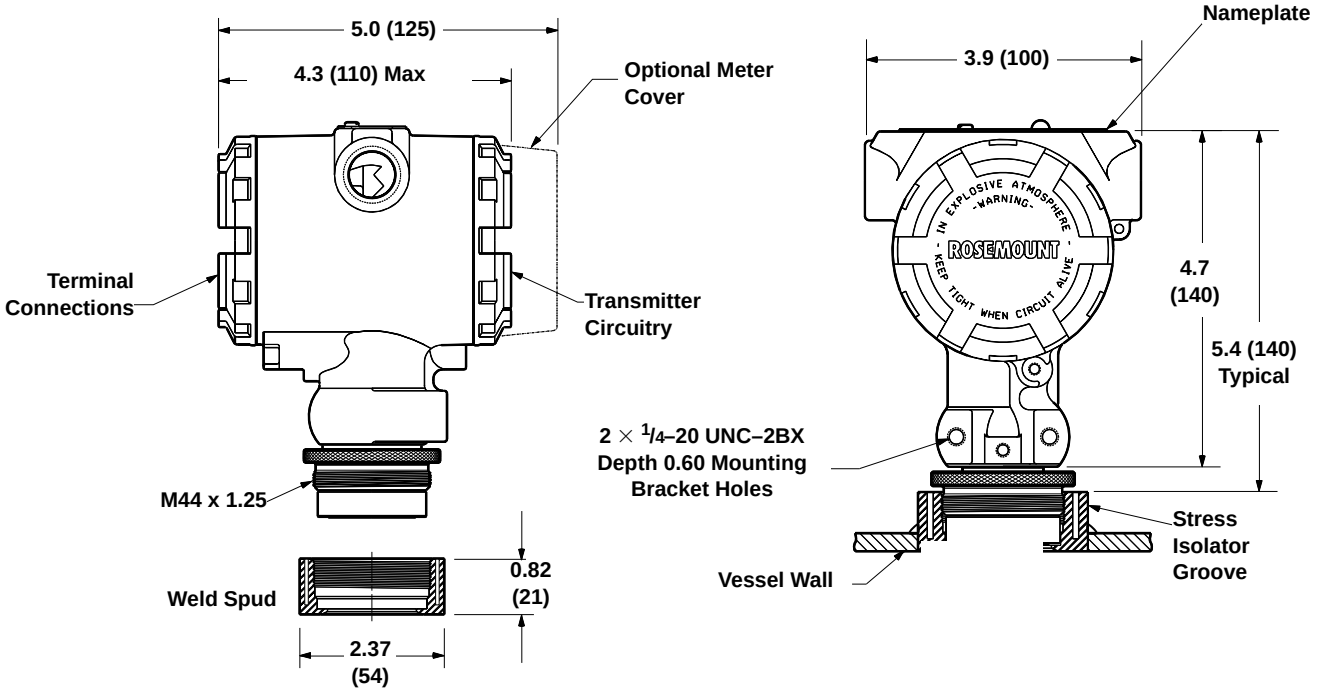
K6 Combination of C6, I1, and ED

Dimensional Drawings

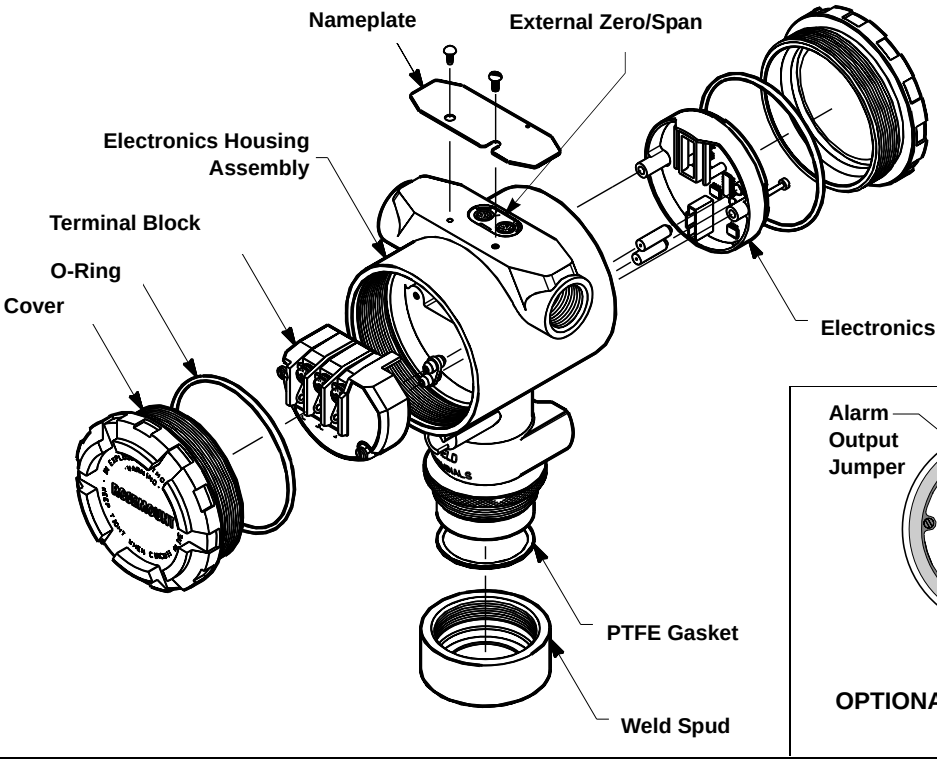
Rosemount 2090P One-inch Flush Mount

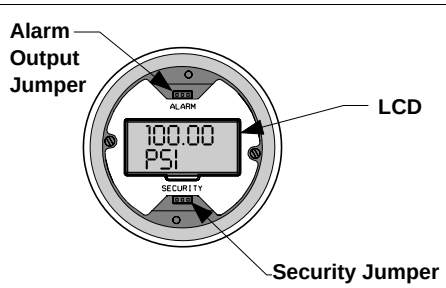


Rosemount 2090P 1 1/2 inch Flush Mount

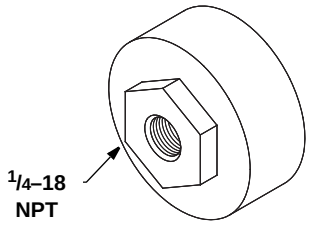
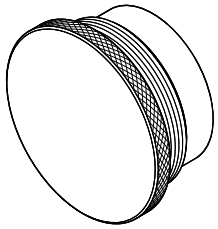
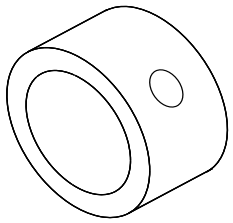


Rosemount 2090P 1 1/2 inch Flush Mount Exploded View and Optional LCD Display





OPTIONAL SMART LCD DISPLAY

Calibration Adapter(1)	316 SST Plug/Heat Sink for Process Connection Codes A and C	Weld Spud for Process Connection Codes D and G
		

Note: See "Accessories" on page 278 for part numbers.

(1) See ordering information.

Rosemount 2090P

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Standard Configuration

Unless otherwise specified, transmitter is shipped as follows:

- Engineering units: psi
- 4 mA: 0 psi
- 20 mA: Upper Range Limit
- Alarm Output High
- LCD Display: 0–100%

Custom Configuration

Calibration

Transmitters are factory calibrated to customer's specified range. If calibration is not specified, transmitters are calibrated at maximum range. Calibration is at ambient temperature and pressure.

Tagging

The transmitter will be tagged, at no charge, in accordance with customer requirements. All tags are stainless steel. The standard tag is wired to the transmitter. Tag character height is 1/8 in. (0.318 cm). A permanently attached tag is available upon request.

Accessories

Item Description	Part Number
Calibration Adapter (1) Use to connect a calibration device to a transmitter. (See the dimensional drawing of the Calibration Adapter)	02088-0197-0001
316 SST Plug/Heat Sink(1) Use during installation to prevent welding damage. (See the drawing of the 316 SST Plug/Heat Sink).	02088-0196-0001
1-in. Flush Mount Calibration Adapter(2) Use to connect a calibration device to the 1” Flush Mount. (See the drawing of the Calibration Adapter)	02088-0198-0002
1-in. Flush Mount Weld Spud (2) (See the drawing of the Weld Spud)	02088-0285-0001
1 1/2-in. Threaded Weld Spud Kit Includes PTFE O-ring.	02088-0295-0003

(1) Process Connection Codes A and C only.

(2) Process Connection Codes D and G only.

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Product Data Sheet
00813-0100-4716, Rev MB
Catalog 2011 - 2012

Rosemount 3095 MultiVariable™ Mass Flow Transmitter and Flowmeters

THE PROVEN LEADER IN MULTIVARIABLE MASS FLOW MEASUREMENT

- *1.0% Mass Flow rate accuracy over 10:1 Flow Range*
- *Ten year stability under actual process conditions*
- *Unprecedented reliability backed by a limited 12-year warranty*
- *Four variables in one device*
- *"Real-Time" fully-compensated Mass Flow*
- *Coplanar™ platform enables DP Flowmeters*



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Rosemount 3095M Selection Guide



Rosemount 3095M Mass Flow Transmitter

See ordering information on page Pressure-281.

- Measures differential pressure, static pressure, and process temperature to dynamically calculate fully compensated mass flow
- Up to ±1.0% mass flow accuracy over a 10:1 flow turndown
- Ultra for Flow performance provides a 10-year stability and 12-year limited warranty
- Available with HART or FOUNDATION Fieldbus Protocols



Rosemount 3095MFA Annubar Flowmeter

See ordering information on page Pressure-299.

- Annubar flowmeters reduce permanent pressure loss by creating less blockage in the pipe
- Ideal for large line size installations when cost, size, and weight of the flowmeter are concerns



Rosemount 3095MFC Compact Orifice Flowmeter

See ordering information on page Pressure-319.

- Compact Conditioning flowmeters reduce straight piping requirements to 2D upstream and 2D downstream from a flow disturbance
- Simple installation of Compact flowmeters between any existing raised-face flanges



Rosemount 3095MFP Integral Orifice Flowmeter

See ordering information on page Pressure-330.

- Precision honed pipe section for increased accuracy in small line sizes
- Self-centering plate design prevents alignment errors that magnify measurement inaccuracies in small line sizes

Rosemount 3095M MultiVariable Mass Flow Transmitter

Table 1. Rosemount 3095M Multivariable Mass Flow Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

			— Not available	
			3095MA	**3095MV**
Model	**Product Description**			
Standard			**Standard**	**Standard**
3095M	MultiVariable Mass Flow Transmitter		★	★
Output				
Standard			**Standard**	**Standard**
A	4–20 mA with Digital Signal Based on HART Protocol		★	—
V	FOUNDATION™ fieldbus Protocol		—	★
Differential Pressure Ranges				
Standard			**Standard**	**Standard**
1(1)	0–0,5 to 0–25 inH_2O (0–1,25 to 0–62,2 mbar)		★	★
2	0–2,5 to 0–250 inH_2O (0–6,22 to 0–623 mbar)		★	★
3	0–10 to 0–1000 inH_2O (0–25 mbar to 0–2,49 bar)		★	★
Static Pressure Ranges				
Standard			**Standard**	**Standard**
3	0.5-8 to 0.5–800 psia (0,03-0,552 to 0,03-55,2 bar)		★	★
4	0.5-36.26 to 0.5–3626 psia (0,03-2,5 to 0,03–250bar)		★	★
C	0-8 to 0-800 psig (0–0,552 to 0–55,2 bar)		★	★
D	0-36.26 to 0-3626 psig (0-2,5 to 0-250 bar)		★	★
Isolator Material		**Fill Fluid**		
Standard			**Standard**	**Standard**
A(2)	316L SST	Silicone	★	★
B(2)	Alloy C-276	Silicone	★	★
J(2)(3)	316L SST	Inert	★	★
K(2)(3)	Alloy C-276	Inert	★	★
Expanded				
F	Gold-Plated 316L SST	Silicone		
D(4)	Tantalum	Silicone		
L(4)	Tantalum	Inert		
Flange Style		**Material**		
A(2)	Coplanar	CS	★	★
B(2)	Coplanar	SST	★	★
C(2)	Coplanar	Alloy C-276	★	★
J	DIN Compliant Traditional Flange, SST 10 mm Adapter/Manifold Bolting	SST, 7/16 — 20 Bolting	★	★
0	None		★	★
Drain/Vent Material				
Standard			**Standard**	**Standard**
A	SST		★	★
C(2)	Alloy C-276		★	★
0	None		★	★
O-ring				
1	Glass-Filled PTFE		★	★
Process Temperature Input				
Standard			**Standard**	**Standard**
0	Fixed Process Temperature (No Cable)		★	★
1	RTD Input with 12 ft. (3,66 m) of Shielded Cable		★	★
2	RTD Input with 24 ft. (7,32 m) of Shielded Cable		★	★
7	RTD Input with 75 ft. (22,86 m) of Shielded Cable		★	★

Rosemount 3095 MultiVariable

Product Data Sheet
00813-0100-4716, Rev MB
Catalog 2011 - 2012

Table 1. Rosemount 3095M Multivariable Mass Flow Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

3	RTD Input with 12 ft. (3,66 m) of Armored, Shielded Cable		★	★
4	RTD Input with 24 ft. (7,32 m) of Armored, Shielded Cable		★	★
8	RTD Input with 75 ft. (22,86 m) of Armored, Shielded Cable		★	★
A	RTD Input with 12 ft. (3,66 m) of ATEX/IECEx Flameproof Cable		★	★
B	RTD Input with 24 ft. (7,32 m) of ATEX/IECEx Flameproof Cable		★	★
C	RTD Input with 75 ft. (22,86 m) of ATEX/IECEx Flameproof Cable		★	★
Code	**Transmitter Housing Material**	**Conduit**		
Standard			**Standard**	**Standard**
A	Polyurethane-Covered Aluminum	½–14 NPT	★	★
B	Polyurethane-Covered Aluminum	M20 × 1.5 (CM20)	★	★
J	SST	½–14 NPT	★	★
K	SST	M20 × 1.5 (CM20)	★	★
Expanded				
D	Polyurethane-Covered Aluminum	PG 13.5		
M	SST	PG 13.5		
Terminal Block				
Standard			**Standard**	**Standard**
A	Standard		★	★
B	With Integral Transient Protection		★	★
Display				
Standard			**Standard**	**Standard**
0	None		★	★
1	LCD Display		★	★
Bracket				
Standard			**Standard**	**Standard**
0	None (Required for Option Codes S3 or S5)		★	★
1	Coplanar SST Flange Bracket for 2-in. Pipe or Panel Mount, SST Bolts		★	★
2	Traditional Flange Bracket for 2-in. Pipe Mounting, CS Bolts		★	★
3	Traditional Flange Bracket for Panel Mounting, CS Bolts		★	★
5	Traditional Flange Bracket for 2-in. Pipe Mounting, 300-Series, SST Bolts		★	★
6	Traditional Flange Bracket for Panel Mounting, 300-Series, SST Bolts		★	★
8	SST Traditional Flange Bracket for 2-in. Pipe Mounting, 300-Series, SST Bolts		★	★
9	SST Traditional Flange Flat Bracket for 2-in. Pipe Mounting, 300-Series, SST Bolts		★	★
Bolts				
Standard			**Standard**	**Standard**
0	CS bolts		★	★
1	Austenitic 316 SST Bolts		★	★
N	None		★	★
Product Certifications				
Standard			**Standard**	**Standard**
0	None		★	★
A	FM Explosion-proof		★	★
J	FM Intrinsically Safe, Division 2		★	★
B	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (Combination of A and J)		★	★
V	FM FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only		—	★
K	CSA Intrinsically Safe, Division 2		★	★
C	CSA Explosion-proof, Dust Ignition-proof, Division 2		★	★
D	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (Combination of C and K)		★	★
W	CSA FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only		—	★
H	ATEX Flameproof		★	★
F	ATEX Intrinsic Safety		★	★
G	ATEX Type n		★	★
P	ATEX Dust		★	★
L	ATEX Flameproof, Intrinsic Safety, Type n, Dust (Combination of F, G, H, and P)		★	★

Table 1. Rosemount 3095M Multivariable Mass Flow Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

T	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	—	★
6	ATEX FISCO, Intrinsic Safety, Flameproof, Type n, Dust Combination of F, G, H, P and T	—	★
7	IECEx Flameproof	★	★
4	IECEx Intrinsic Safety	★	★
5	IECEx Type n	—	★
8	IECEx Dust	★	★
9	IECEx Flameproof, Dust, Intrinsic Safe	★	★
Y	IECEx FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	—	★
E	INMETRO Flameproof	★	★
2	China Intrinsic Safety	★	—
3	China Flameproof	★	★
R	TIIS Flameproof	—	★
Engineered Measurement Solution (EMS)			
Standard		**Standard**	**Standard**
B[5]	Fully Compensated Mass Flow and Measured Variables (DP, P, and T) with HART or FOUNDATION fieldbus.	★	★
V[6]	Direct Process Variable Measurement (DP, P, and T) Only (No Mass Flow Variable) with FOUNDATION fieldbus.	—	★

Options (Include with selected model number)

Custom Configuration			
Standard		**Standard**	**Standard**
C2	Custom Flow Configuration (Requires completed Configuration Data Sheet)	★	★
Process Adapter			
Standard		**Standard**	**Standard**
DF[7]	1/2-14 NPT Process Adapter, Material Type Determined by Selected Flange Material: Plated CS, SST, Cast C-276	★	★
Remote Seal			
Standard		**Standard**	**Standard**
S1	One Remote Seal	★	★
S2	Two Remote Seal	★	★
Integral Manifold			
Standard		**Standard**	**Standard**
S3	Assemble to Rosemount 405 Compact Orifice	★	★
S5[8]	Assemble to Rosemount 305 Integral Manifold	★	★
S6[8]	Assemble to Rosemount 304 Manifold or Connection System	★	★
Cleaning			
Expanded			
P2	Cleaning for Special Services		
Material Traceability Certification			
Standard		**Standard**	**Standard**
Q8[9]	Material Inspection Certificate per EN 10204 3.1B	★	★
Calibration Certificate			
Standard		**Standard**	**Standard**
Q4	Inspection Certificate for Calibration Data	★	★
Pressure Testing			
Expanded			
P1	Hydrostatic Testing with Certificate		
Primary Element			
Standard		**Standard**	**Standard**
S4[8][10]	Assemble to Rosemount 485 or Rosemount 1195	★	★
Surface Finish Certification			
Standard		**Standard**	**Standard**
Q16	Surface Finish Certification for sanitary remote seals	★	★
Performance Class			
Standard		**Standard**	**Standard**
U3[11]	Ultra for Flow: 0.05% DP Reading Accuracy, Up to 100:1 Rangedown, 10 Yr Stability, 12 Yr Warranty	★	★

Rosemount 3095 MultiVariable

Product Data Sheet
00813-0100-4716, Rev MB
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Table 1. Rosemount 3095M Multivariable Mass Flow Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

PlantWeb Control Functionality			
Standard		**Standard**	**Standard**
A01(12)	Advanced Control Suite: PID, arith, signal char, integ, etc.; requires FOUNDATION fieldbus	—	★
PlantWeb Diagnostic Functionality			
Standard		**Standard**	**Standard**
D01	Cleaning for Special Services	—	★
Typical Model Number 3095M A 2 3 A A A 1 3 A B 0 1 1 0 B			

(1) Available only with 3 or C sensor modules and "A" 316L SST/silicone, Isolator/Fill Fluid option.

(2) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(3) Only available with C or D Gage Sensor Modules.

(4) Not available with Absolute / Gage Pressure Ranges C or D.

(5) Requires Rosemount 3095 Engineering Software Assistant to configure mass flow.

(6) Not available with HART output.

(7) Not available with assembly to Rosemount 1195 Integral Orifice Option Code S4.

(8) "Assemble-to" items are specified separately and require a completed model number.

(9) This option is available for the sensor module housing, Coplanar and Coplanar flange adapters.

(10) With a primary element installed, the maximum operating pressure will be the lesser of either the transmitter or the primary element.

(11) Ultra for Flow applicable for HART protocol, DP ranges 2 and 3 with SST isolator material and silicone fill fluid options only.

(12) Function Blocks include: Arithmetic, Integrator, Analog Output, Signal Characterizer, Control Selector, and Output Selector.

3095M SPECIFICATIONS

3095M Functional Specifications

Service

Gas, liquid, or steam

Differential Sensor

Limits

- Range 1: 0 to 25 inH2O (0 to 62,2 mbar)
- Range 2: 0 to 250 inH2O (0 to 623 mbar)
- Range 3: 0 to 1000 inH2O (0 to 2,49 bar)

Absolute Sensor

Limits

- Range 3: 0.5 to 800 psia (0,03 to 55,2 bar)
- Range 4: 0.5 to 3,626 psia (0,03 to 250 bar)

Gage Sensor

Limits

- Range C: 0 to 800 psig (0 to 55,2 bar)
- Range D: 0 to 3,626 psig (0 to 250 bar)

Temperature Sensor

Process Temperature Range

- –300 to 1500 °F (–184 to 816 °C)

Fixed Temperature Range

- –459 to 3500 °F (–273 to 1927 °C)

Overpressure Limit

0.5 psia (0,03 bar) to two times the static pressure sensor range up to a maximum of 3,626 psia (250 bar) for differential pressure ranges 2-3 and 2000 psia (137,9 bar) for differential pressure range 1.

Static Pressure Limit

Operates within specifications between static line pressures of 0.5 psia (0,03 bar) and the URL of the absolute pressure sensor.

Temperature Limits

Process (at transmitter isolator flange for atmospheric pressures and above)

- Silicone fill: –40 to 250 °F (–40 to 121 °C)
- Inert fill: 0 to 185 °F (–18 to 85 °C) (Process temperature above 185 °F (85 °C) require derating the ambient limits by a 1.5:1 ratio.)

Ambient:

- -40 to 185 °F (-40 to 85 °C)
- With LCD Display(1): -40 to 175 °F (-40 to 80 °C)

Storage:

- -50 to 230 °F (-46 to 110 °C)
- With LCD Display: -40 to 185 °F (-40 to 85 °C)

(1) LCD Display may not be readable and LCD updates will be slow at temperatures below -4 °F (-20 °C).

Damping

Analog output response to step input change can be user-selectable from 0 to 29 seconds for one time constant.

4–20 mA (output option code A)

Zero and Span Adjustment

Zero and span values can be set anywhere within the range. Span must be greater than or equal to the minimum span.

Output

Two-wire 4–20 mA, user-selectable for DP, AP, GP, PT, mass flow, or totalized flow. Digital HART protocol superimposed on 4–20 mA signal, available to any host that conforms to the HART protocol.

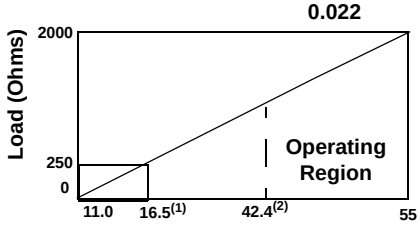
Power Supply

External power supply required. Transmitter operates on terminal voltage of 11–55 Vdc.

Load Limitations

Maximum loop resistance is determined by the voltage level of the external power supply, as described by:

$$\text{Maximum Loop Resistance} = \frac{\text{Power Supply} - 11.0}{0.022}$$



(1) HART protocol communication requires a loop resistance value between 250-1100 ohms, inclusive.

(2) For CSA approval, power supply must not exceed 42.4 Vdc.

FOUNDATION fieldbus (output option code V)

Power Supply

External power supply required; transmitters operate on 9.0 to 30.0 Vdc for Intrinsically Safe applications, 9.0 to 17.5 Vdc for FISCO applications, and 9.0 to 32.0 Vdc for all other applications.

Current Draw

17.5 mA for all configurations (including LCD Display option)

Humidity Limits

0–100% relative humidity

Turn-on Time

Digital and analog measured variables will be within specifications 7–10 seconds after power is applied to transmitter.

Digital and analog flow output will be within specifications 10–14 seconds after power is applied to transmitter.

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Failure Mode Alarm

Output Code A

If self-diagnostics detect a non-recoverable transmitter failure, the analog signal will be driven either below 3.75 mA or above 21.75 mA to alert the user. High or low alarm signal is user-selectable by internal jumper pins.

Output Code V

If self-diagnostics detect a gross transmitter failure, that information gets passed as a status along with the process variable(s).

Configuration

475 Field Communicator

- Performs traditional transmitter maintenance functions

3095 Multivariable Engineering Assistant (EA) software package

- Contains built-in physical property database
- Enables mass flow configuration, maintenance, and diagnostic functions via HART modem (output option code A)
- Enables mass flow configuration via PCM-CIA Interface for FOUNDATION fieldbus (output option code V)

Primary Elements

Supports over 25 different primary elements including:

- *Annubar* Averaging Pitot Tube
- Rosemount 1195 Integral Orifice Plate
- Rosemount 405 Compact and Conditioning Orifice
- ISO/ASME Orifice Flange Taps
- Calibrated and Custom Primary Elements
- ISO/ASME Corner Taps
- AGA Flange Taps
- ISO/ASME Venturi
- ISO/ASME Venturi Nozzle
- Area Averaging Meter
- V-Cone

Physical Properties Database

- Maintained in Engineering Assistant Software Configurator
- Physical properties for over 110 fluids
- Natural gas per AGA
- Steam and water per ASME
- Other database fluids per American Institute of Chemical Engineers (AIChE)
- Optional custom entry

FOUNDATION fieldbus Function Blocks

Standard Function Blocks

Resource Block

- Contains hardware, electronics, and diagnostic information.

Transducer Block

- Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

LCD Block

- Configures the local display.

5 Analog Input Blocks

- Processes the measurements for input into other function blocks. The output value is in engineering or custom units and contains a status indicating measurement quality.

PID Block with Auto-tune

- Contains all logic to perform PID control in the field including cascade and feedforward. Auto-tune capability allows for superior tuning for optimized control performance.

Advanced Control Function Block Suite (Option Code A01)

Input Selector Block

- Selects between inputs and generates an output using specific selection strategies such as minimum, maximum, midpoint, average, or first “good.”

Arithmetic Block

- Provides pre-defined application-based equations including flow with partial density compensation, electronic remote seals, hydrostatic tank gauging, ratio control, and others.

Signal Characterizer Block

- Characterizes or approximates any function that defines an input/output relationship by configuring up to twenty X, Y coordinates. The block interpolates an output value for a given input value using the curve defined by the configured coordinates.

Integrator Block

- Compares the integrated or accumulated value from one or two variables to pre-trip and trip limits and generates discrete output signals when the limits are reached. This block is useful for calculating total flow, total mass, or volume over time.

Output Splitter Block

- Splits the output of one PID or other control block so that the PID will control two valves or other actuators.

Control Selector Block

- Selects one of up to three inputs (highest, middle, or lowest) that are normally connected to the outputs of PID or other control function blocks.

Steam Flow Calculations

Steam densities calculated per ASME steam tables.

Saturated steam configurable using static pressure based density calculations.

Natural Gas Flow Calculations

Flow calculations per 1992 AGA (American Gas Association) Report No 3 or ISO-5167 (2003).

Compressibilty Calculations per AGA Report No 8 or ISO-12213.

3095M Performance Specifications

(Zero-based spans, reference conditions, silicone oil fill, 316 SST isolating diaphragms, 4–20 mA analog output.)

Specification Conformance

The Rosemount 3095 maintains a specification conformance of measured variables to at least 3σ.

Mass Flow

Fully compensated for pressure, temperature, density, viscosity gas expansion, discharge coefficient, and thermal correction variances over operating range.

$$Q_m = NC_d E Y_1 d^2 \sqrt{DP(\rho)}$$

Ultra for Flow: Mass Flow Reference Accuracy (option U3)(1)

- ±1.0% of Mass Flow Rate over a 10:1 flow range (100:1 DP range for liquids and gases)

Mass Flow Reference Accuracy

- ±1.0% of Mass Flow Rate over 8:1 flow range (64:1 DP range for liquids and gases)

Totalized Mass Flow

- ±1.0% of Total Mass Flow

(Uncalibrated differential producer (Orifice) installed per ASME MFC3M or ISO 5167-1. Uncertainties for discharge coefficient, producer bore, tube diameter, and gas expansion factor defined in ASME MFC3M or ISO 5167-1. Density uncertainty of 0.1%. Differential pressure calibrated at up to 1/10th full scale for optimum flow accuracy/rangeability.)

Differential Pressure

Range 1

- 0–0.5 to 0–25 inH2O (0–1,25 to 0–62,3 mbar) (50:1 rangeability is allowed)

Range 2

- 0–2.5 to 0–250 inH2O (0–6,22 to 0–623 mbar) (100:1 rangeability is allowed)

Range 3

- 0–10 to 0–1000 inH2O (0–0,249 to 0–2,49 bar) (100:1 rangeability is allowed)

Reference Accuracy (including Linearity, Hysteresis, Repeatability)(2)

Range 2-3 Ultra for Flow (Option U3)(1)

- ±0.05% of DP reading up to 3:1 DP turndown from URL
- For DP turndowns up to 100:1 from URL,

$$\text{Accuracy} = \pm\left[0.05 + 0.0145\left(\frac{URL}{DPReading}\right)\right] \text{\% of DP Reading}$$

Accuracy = Range 2-3

- ±0.075% of span for spans from 1:1 to 10:1 of URL
- For spans less than 10:1 of URL,

$$\text{Accuracy} = \pm\left[0.025 + 0.005\left(\frac{URL}{Span}\right)\right] \text{\% of Span}$$

Range 1

- ±0.10% of span for spans from 1:1 to 15:1 of URL
- For spans less than 15:1 of URL,

$$\text{Accuracy} = \pm\left[0.025 + 0.005\left(\frac{URL}{Span}\right)\right] \text{\% of Span}$$

Ambient Temperature Effect per 50 °F (28 °C)

Range 2-3 Ultra for Flow (Option U3)(1)

- ±0.130% of DP reading up to 3:1 DP turndown from URL
- ±[0.05 + 0.0345 (URL/DP Reading)]% of DP reading up to 100:1 DP turndown from URL

Range 2-3

- ±(0.025% of URL + 0.125% of span) for spans from 1:1 to 30:1
- ±(0.035% of URL – 0.175% of span) for spans from 30:1 to 100:1

Range 1

- ±(0.20% of URL + 0.25% of span) for spans from 1:1 to 30:1
- ±(0.24% of URL +0.15% of span) for spans from 30:1 to 50:1

Static Pressure Effects

Range 2-3

- Zero error = ±0.05% of URL per 1,000 psi (68,95 bar)
- Span error = ±0.20% of DP Reading per 1,000 psi (68,95 bar)

Range 1

- Zero error = ±0.05% of URL per 800 psi (55,1 bar)
- Span error = ±0.40% of DP Reading per 800 psi (55,1 bar)

Stability

Range 2-3 Ultra for Flow (Option U3)(1)

- ±0.25% of URL for 10 years for ±50 °F (28 °C) temperature changes, up to 1000 psi (68,95 bar) line pressure

Ranges 2-3

- ±0.125% URL for 5 years for ±50 °F (28 °C) ambient temperature changes, and up to 1000 psi (68,95 bar) line pressure.

Range 1

- ±0.2% of URL for 1 year

Absolute/Gage Pressure

Absolute (100:1 rangeability allowed)

Range 3

0.5–8 to 0.5–800 psia (0,03-0,552 to 0,03-55,2 bar)

Range 4

0.5–36.26 to 0.5–3,626 psia (0,03-2,5 to 0,03-250 bar)

Gage (100:1 rangeability allowed)

Range C

0–8 to 0–800 psig (0-0,552 to 0-55,2 bar)

Range D

- 0–36.26 to 0–3,626 psig (0-2,5 to 0-250 bar)

Reference Accuracy (including Linearity, Hysteresis, Repeatability)

±0.075% of span for spans from 1:1 to 10:1 of URL
For spans less than 10:1 of URL,

$$\text{Accuracy} = \pm\left[0.03 + 0.0075\left(\frac{URL}{Span}\right)\right] \text{\% of Span}$$

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(1) Ultra for Flow (option U3) applicable for HART protocol, DP ranges 2 and 3 with SST isolator material and silicone fill fluid options only.

(2) For FOUNDATION fieldbus transmitters, use calibrated range in place of span.

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Ambient Temperature Effect per 50 °F (28 °C)

±(0.050% of URL + 0.125% of span) spans from 1:1 to 30:1

±(0.060% of URL – 0.175% of span) spans from 30:1 to 100:1

Stability

±0.125% URL for 5 years for ±50 °F (28 °C) ambient temperature changes, and up to 1000 psi (68,95 bar) line pressure.

Process Temperature

Specification for process temperature is for the transmitter portion only. Sensor errors caused by the RTD are not included. The transmitter is compatible with any PT100 RTD conforming to IEC 751 Class B, which has a nominal resistance of 100 ohms at 0 °C and $\propto$ = 0.00385. Examples of compatible RTDs include the Rosemount Series 68 and 78 RTD Temperature Sensors.

RTD Range

–300 to 1500 °F (–184 to 816 °C)

Accuracy
(including Linearity, Hysteresis, Repeatability)

For 12 and 24 ft. Cables

- ±1.0 °F (0.56 °C) for process temperatures from –300 to 1200 °F (–184 to 649 °C)
- For process temperatures above 1200 °F (649 °C), add ±1.0 °F (0.56 °C) per 100 °F (38 °C)

For 75 ft. cables:

- ±2.0 °F (1.12 °C) for process temperatures from –300 to 1200 °F (–184 to 649 °C)
- For process temperatures above 1200 °F (649 °C), add ±1.0 °F (0.56 °C) per 100 °F (38 °C)

Stability

±1.0 °F (0.56 °C) for 12 months

Vibration Effect

Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field or pipeline with high vibration level (10-60 Hz 0.21mm displacement peak amplitude / 60-2000 Hz 3g).

For Housing Style codes 1J, 1K, 1L, 2J, and 2M:
Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field with general application or pipeline with low vibration level (10-60 Hz 0.15mm displacement peak amplitude / 60-500 Hz 2g).

3095M Physical Specifications

Security

Transmitter security jumper mounted on electronics board, when enabled prevents changes to transmitter configuration.

User Engineering Assistant provides two levels of optional password security.

Electrical Connections

½–14 NPT, M20 × 1.5 (CM20), PG-13.5. HART interface connections fixed to terminal block for output code A.

RTD Process Temperature Input

100-ohm platinum RTD per IEC-751 Class B

Process Connections

Transmitter: ¼–18 NPT on $2^1/_8$-in. centers $^1/_2$–14 NPT on 2-, $2^1/_8$-, or $2^1/_4$-in. centers with optional flange adapters
RTD: RTD dependent.

Process Wetted Parts

Isolating Diaphragms

- 316L SST or Alloy C-276. CF-8M (last version of 316 SST, material per ASTM-A743)

Drain/Vent Valves

- 316 SST or Alloy C-276

Flanges

- Plated carbon steel, 316 SST, or Alloy C-276

Wetted O-rings

- Glass-Filled PTFE

Non-Wetted Parts

Electronics Housing

- Low copper aluminum. NEMA 4X, CSA, Enclosure Type 4X, IP 65, IP 66, IP 68

Bolts

- Plated carbon steel per ASTM A449, Grade 5 or austenitic 316 SST

Fill Fluid

- Silicone or halocarbon inert oil (Inert oil only available for gage sensor modules.)

Paint (Aluminum Housing only)

- Polyurethane

O-rings

- Buna-N

Weight

Component	Weight in lb (kg)
Rosemount 3095 Transmitter	6.0 (2.7)
SST Mounting Bracket	1.0 (0.4)
12 ft (3.66 m) RTD Shielded Cable	0.5 (0.2)
12 ft (3.66 m) RTD Armored Cable	1.1 (0.5)
12 ft (3.66 m) RTD ATEX/IECEx Cable	2.1 (0.9)
24 ft (7.32 m) RTD Shielded Cable	1.0 (0.4
24 ft (7.32 m) RTD Armored Cable	2.2 (1.0)
24 ft (7.32 m) RTD ATEX/IECEx Cable	3.0 (1.4)
75 ft (22.86 m) RTD Shielded Cable	1.9 (0.9)
75 ft (22.86 m) RTD Armored Cable	7.2 (3.2)
75 ft (22.86 m) RTD ATEX/IECEx Cable	7.1 (3.2)

Rosemount 3095M Product Certifications

ROSEMOUNT 3095M WITH HART

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA

Emerson Process Management GmbH & Co. — Wessling, Germany

Emerson Process Management Asia Pacific Private Limited — Singapore

Beijing Rosemount Far East Instrument Co., Limited – Beijing, China

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting our local sales office.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

3095F_2/3,4/D and 3095M_2/3,4/D Flow Transmitters — QS Certificate of Assessment - EC No. PED-H-100 Module H Conformity Assessment

All other 3095_ Transmitters/Level Controller — Sound Engineering Practice

Transmitter Attachments: Process Flange - Manifold — Sound Engineering Practice

Electro Magnetic Compatibility (EMC) (2004/108/EC)

3095 Flow Transmitters

— EN61326-1:2006, EN61326-2-3:2006

Ordinary Location Certification for Factory Mutual

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Rosemount 3095M HART Hazardous Locations Certifications

North American Certifications

FM Approvals

A Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/Class III, Division 1, Groups E, F, and G. Enclosure Type 4X. Factory Sealed. Provides nonincendive RTD connections for Class I, Division 2, Groups A, B, C, and D.

J Intrinsically Safe for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F, and G hazardous outdoor locations. Non-incendive for Class I, Division 2, Groups A, B, C, and D. Temperature Code T4. Factory Sealed.

For input parameters and installation see control drawing 03095-1010.

Canadian Standards Association (CSA)

C Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/Class III, Division 1, Groups E, F, and G. CSA enclosure Type 4X suitable for indoor and outdoor hazardous locations. Provides nonincendive RTD connection for Class I, Division 2, Groups A, B, C, and D. Factory Sealed. Install in accordance with Rosemount Drawing 03095-1024. Approved for Class I, Division 2, Groups A, B, C, and D.

K Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D. when installed in accordance with Rosemount drawing 03095-1021. Temperature Code T3C.

For input parameters and installation see control drawing 03095-1021.

European Certifications

F ATEX Intrinsic Safety
Certificate Number: BAS98ATEX1359X  II 1 G
EEx ia IIC T5 (T_{amb} = –45 °C to 40 °C)
EEx ia IIC T4 (T_{amb} = –45 °C to 70 °C)
CE 1180

TABLE 2. Connection Parameters
(Power/Signal Terminals)

U_i = 30 V
I_i = 200 mA
P_i = 1.0 W
C_i = 0.012 µF
L_i = 0

TABLE 3. Temperature Sensor Connection Parameters

U_o = 30 V
I_o = 19 mA
P_o = 140 mW
C_i = 0.002 µF
L_i = 0

TABLE 4. Connection Parameters for Temperature Sensor Terminals

C_o = 0.066 µF	Gas Group IIC
C_o = 0.560 µF	Gas Group IIB
C_o = 1.82 µF	Gas Group IIA
L_o = 96 mH	Gas Group IIC
L_o = 365 mH	Gas Group IIB
L_o = 696 mH	Gas Group IIA
L_o/R_o = 247 µH/ohm	Gas Group IIC
L_o/R_o = 633 µH/ohm	Gas Group IIB
L_o/R_o= 633 µH/ohm	Gas Group IIA

Special Conditions for Safe Use

The 3095, when fitted with the transient terminal block (order code B), are not capable of withstanding the 500 V insulation test required by EN 60079-11: 2007, Clause 6.3.12. This condition must be accounted for during installation.

G ATEX Type n

Certificate Number: BAS98ATEX3360X ⟨Ex⟩ II 3 G

EEx nL IIC T5 (T_{amb} = –45 °C to 40 °C)
EEx nL IIC T4 (T_{amb} = –45 °C to 70 °C)

U_i = 55 V

CE

The apparatus is designed for connection to a remote temperature sensor such as a resistance temperature detection (RTD).

Special Conditions for Safe Use

The 3095, when fitted with the transient terminal block (order code B), are not capable of withstanding the 500 V insulation test required by EN50 021, Clause 9.1 (1995). This condition must be accounted for during installation.

H ATEX Flameproof

Certificate Number: KEMA02ATEX2320X ⟨Ex⟩ II 1/2 G
EEx d IIC T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
CE 1180

Special Conditions for Safe Use (x):

The device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

P ATEX Dust
Certificate Number: KEMA02ATEX2321 ⟨Ex⟩ II 1 D T 90°C
V = 55 Vdc MAX
I = 23 mA MAX
IP66
CE 1180

IECEx Certifications (HART)

4 IECEx Intrinsic Safety
Certificate Number: IECEx BAS06.0070X
Ex ia IIC T4 (-45 °C ≤ T_a ≤ 70 °C)
Ex ia IIC T5 (-45 °C ≤ T_a ≤ 40 °C)

Table 5. Input Parameters

HART I.S.
U_i = 30 Vdc
I_i = 200 mAdc
P_i = 1.0 W
C_i = 12 nF
L_i = 0

Table 6. RTD Terminals Entity Parameters

U_o = 30 Vdc
I_o = 19 mAdc
P_o = 140 mW

The capacitance and either the Inductance or the Inductance to Resistance Ratio (L/R) of the load connected to the 4-pin connector must not exceed the following values:

Group	Capacitance (µF)	Inductance (mH)	or L/R Ratio µH/Ohm
IIC	**0.066**	**96**	**247**
IIB	**0.56**	**365**	**633**
IIA	**1.82**	**696**	**633**

NOTE
1. The external circuit contains no combined lumped inductance and capacitance greater than 1% of the above values.
Or 2. The inductance and capacitance are distributed as in a cable.
Or 3. The external circuit contains only lumped inductance or only lumped capacitance in combination with a cable.
In all other situations, e.g. combined lumped inductance and capacitance, up to 50% of each of L and C values is allowed.

Conditions of Certification (X):

When fitted with the transient option, the apparatus is not capable of withstanding the 500 V electrical strength test as defined in Clause 6.4.12 of IEC 60079-11: 1999. This must be taken into account during installation.

5 IECEx Type n
Certificate Number: IECEx BAS06.0071X
Ex nA nL IIC T4 (-45 °C ≤ T_a ≤ 70 °C)
Ex nA nL IIC T5 (-45 °C ≤ T_a ≤ 40 °C)
U_i = 55 Vdc max

Conditions of Certification (X):
When fitted with the transient option, the apparatus is not capable of withstanding the 500 V electrical strength test as defined in Clause 6.8.1 of IEC 60079-15: 2005. This must be taken into account during installation.

7 IECEx Flameproof
Certificate Number: IECEx KEM 06.0018
Zone 0/1 Ex d IIC T6 (-20 °C ≤ T_a ≤ 65 °C)
Zone 0/1 Ex d IIC T5 (-20 °C ≤ T_a ≤ 80 °C)
V_{max} = 55 Vdc
I_{max} = 23 mAdc

8 IECEx Dust
Certificate Number: IECEx KEM 06.0018
Ex tD A22 T90°C
IP66

INMETRO Certifications

E INMETRO Flameproof
BR-Ex d IIC T6/T5

China (NEPSI) Certifications

2 China Intrinsic Safety
Ex ia IIC T4

Special conditions for safe use (x)

1. The ambient temperature range is (-20 ~ +60) °C.
2. The relation between temperature class and maximum temperature of process medium is as following.

Maximum Temperature of Process Medium (°C)	Temperature Class
121	T4
95	T5
80	T6

3. The earth connection facility in the enclosure should be connected reliably.
4. During installation, use, and maintenance of transmitter, observe the warning, “Don’t open the cover when the circuit is alive.”
5. During installation, there should be no mixture harm to flameproof housing.
6. Cable entry, certified by NEPSI with type of protection Ex d IIC in accordance with GB3836.2-2000, should be applied when installation in hazardous location. Five full threads should be in engagement when the cable entry is assembled onto the transmitter.
7. The diameter of cable should observe the instruction manual of cable entry. The compressing nut should be fastened. The aging of seal ring should be changed in time.
8. Maintenance should be done in non-hazardous location.
9. End users is not permitted to change any components insides.
10. During installation, use, and maintenance of transmitter, observe following standards.
GB3836.13-1997 “Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres”
GB3836.15-2000 “Electrical apparatus for explosive gas atmospheres Part 15: Electrical installations in hazardous area (other than mines)”
GB50257-1996 “Code for contruction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering”.

3 China Flameproof
Ex d II B+H_2T4~T6

Special conditions for safe use (x)

1. 3095 Series transmitter with temperature sensor have **not** been certified.
2. The temperature of process medium should be less than 121 °C.
3. The ambient temperature range is (-40~+60) °C.
4. Safety parameters
4.1 Input parameters
4.1.1 Transmitter with output code “V”
U_i = 30 V I_i = 300 mA P_i = 1.3 W $C_i \approx 0$ $L_i \approx 0$
4.1.2 Other transmitters
U_i=40 V I_i=165 mA P_i=1.0 W C_i=0.012 μ F L_i=20 μ H
4.2 RTD terminals
U_o=30 V I_o=12 mA P_o=100 mW C_o=66 nF L_o=100 mH
5. The cable entry of transmitter should be protected to ensure the degree of protection of the enclosure IP 20 (GB4208-1993) at least.
6. The terminals for connection to power supply of transmitter should be connected to associated apparatus certified by NEPSI in accordance with GB3836.1-2000 and GB3836.4-2000 to establish intrinsic safety system, it has to fulfill the following requirements:
$U_o \le U_i$ $I_o \le I_i$ $P_o \le P_i$ $C_o \ge C_c + C_i$ $L_o \ge L_c + L_i$
Note: C_c, L_c the distributed capacitance and inductance of the cables
U_o, I_o, P_o maximum output parameters of associated apparatus
C_o, L_o, maximum external parameters of associated apparatus
7. The terminals for connection to sensor of transmitter should be connected to intrinsic safety sensor certified by NEPSI in accordance with GB3836.1-2000 and GB3836.4-2000 to establish intrinsic safety system, it has to fulfill the following requirements:
$U_i \ge U_o$ $I_i \ge I_o$ $P_i \ge P_o$ $C_i \le C_o - C_c$ $L_i \le L_c + L_o$
Note: C_c, L_c the distributed capacitance and inductance of the cables
U_i, I_i, P_i maximum input parameters of intrinsic safety sensor
C_i, L_i, maximum internal parameters of intrinsic safety sensor
8. The cables between the transmitter, associated apparatus and sensor are 2-core shielded cables (the cables must have insulated shield). The cable core section area should be more than 0.5 mm^2. The shielded has to be grounded in a non-hazardous area and isolated from the housing. The wiring has to be unaffected by electromagnetic disturbance.
9. Associated apparatus should be installed in a safe location, and during installation, operation, and maintenance, the regulations of the instruction manual have to be strictly observed.
10. End users are not permitted to change any components insides.

11. During installation, use, and maintenance transmitter, observe the following standards
GB3836.13-1997 “Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres”
GB3836.15-2000 “Electrical apparatus for explosive gas atmospheres Part 15: Electrical installations in hazardous area (other than mines)”
GB3836.16-2006 “Electrical apparatus for explosive gas atmospheres Part 16: Inspection and maintenance of electrical installation (other than mines):
GB50257-1996 “Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering”

R TIIS Flameproof
Consult factory for availability

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

B A and J combination
D C and K combination
L F, G, H, and P combination
9 4, 5, 7, and 8 combination

ROSEMOUNT 3095M WITH *FIELDBUS*

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting our local sales office.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

3095F_2/3,4/D and 3095M_2/3,4/D Flow Transmitters

— QS Certificate of Assessment - EC No. PED-H-100 Module H Conformity Assessment

All other 3095_ Transmitters/Level Controller

— Sound Engineering Practice

Transmitter Attachments: Process Flange - Manifold

— Sound Engineering Practice

Primary Elements, Flowmeter

— See appropriate Primary Element QIG

Electro Magnetic Compatibility (EMC) (2004/108/EC)

3095 Flow Transmitters

— EN 50081-1: 1992; EN 50082-2:1995; EN61326-1:2006, EN61326-2-3:2006

Ordinary Location Certification for Factory Mutual

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Rosemount 3095M Fieldbus Hazardous Locations Certifications

North American Certifications

FM Approvals

A Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/Class III, Division 1, Groups E, F, and G. Enclosure type NEMA 4X. Factory Sealed. Provides nonincendive RTD connections for Class I, Division 2, Groups A, B, C, and D.

J Intrinsically Safe for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F, and G hazardous outdoor locations. Non-incendive for Class I, Division 2, Groups A, B, C, and D. Temperature Code T4. Factory Sealed.

For input parameters and installation see control drawing 03095-1020.

V FISCO for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F, and G hazardous outdoor locations. Temperature Code T4. Factory Sealed.

For input parameters and installation see control drawing 03095-1020.

Canadian Standards Association (CSA)

C Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/Class III, Division 1, Groups E, F, and G. Factory Sealed. CSA enclosure Type 4X for indoor and outdoor hazardous locations. Suitable for Class I, Division 2, Groups A, B, C, and D. Install in accordance with Rosemount Drawing 03095-1024.

K Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D. When installed in accordance with Rosemount Drawing 03095-1021. Temperature Code T3C.

W FISCO Field Device. Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D. When installed in accordance with Rosemount Drawing 03095-1021. Temperature Code T3C.

European Certifications

F/T ATEX Intrinsic Safety Certificate Number:
Baseefa 05ATEX0022X
Ⓔx II 1 G
EEx ia IIC T5 (T_{amb} = -45 °C to 40 °C)
EEx ia IIC T4 (T_{amb} = -45 °C to 70 °C)
CE 1180

TABLE 7. Connection Parameters (Power/Signal Terminals)

Fieldbus (F Option)		FISCO (T Option)
U_i = 30 V		U_i = 17.5 V
I_i = 300 mA		I_i = 380 mA
P_i = 1.3 W		P_i = 5.32 W
C_i = 3.3 nF		$C_i \leq$ 5 nF
L_i = 0		L_i = 10 µH

TABLE 8. Temperature Sensor Connection Parameters

U_o = 30 V
I_o = 19 mA
P_o = 140 mW

TABLE 9. Connection Parameters for Temperature Sensor Terminals

C_o = 0.066 µF	Gas Group IIC
C_o = 0.560 µF	Gas Group IIB
C_o = 1.82 µF	Gas Group IIA
L_o = 96 mH	Gas Group IIC
L_o = 365 mH	Gas Group IIB
L_o = 696 mH	Gas Group IIA
L_o/R_o = 247 µH/ohm	Gas Group IIC
L_o/R_o = 633 µH/ohm	Gas Group IIB
L_o/R_o= 633 µH/ohm	Gas Group IIA

Special Conditions for Safe Use

Versions of the apparatus fitted with the transient protected terminals are not capable of withstanding the 500 V insulation test required by Clause 6.4.12 of EN 50020:2002. This must be taken into account when installing the apparatus.

G ATEX Type N

Certificate Number: Baseefa05ATEX0023X
Ⓔx II 3 G

EEx nA nL IIC T5 (T_{amb} = –45 °C to 40 °C)
EEx nA nL IIC T4 (T_{amb} = –45 °C to 70 °C)

U_i = 55 V
RTD Terminals - The apparatus is designed for connection to a remote temperature sensor such as a resistance temperature detection (RTD).

Special Conditions for Safe Use

Versions of the apparatus fitted with the transient protected terminals are not capable of withstanding the 500 V insulation test required by Clause 8.1 of EN 60079-15:2003. This must be taken into account when installing the apparatus.

H ATEX Flameproof

Certificate Number: KEMA02ATEX2320X
Ⓔx II 1/2 G
EEx d IIC T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
Vmax = 55 Vdc MAX
Imax = 23 mA MAX
IP66
CE 1180

Special Conditions for Safe Use (x):

The device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

P ATEX Dust

Certificate Number: KEMA02ATEX2321
Ⓔx II 1 D T90 °C (-50 °C ≤ T_{amb} ≤ 80 °C)
Vmax = 55 Vdc
Imax = 23 mA
IP66
CE 1180

IECEx Certifications (Fieldbus)

4/Y IECEx Intrinsic Safety
Certificate Number: IECEx BAS05.0023X
Ex ia IIC T4 (-45 °C ≤ T_a ≤ 70 °C)
Ex ia IIC T5 (-45 °C ≤ T_a ≤ 40 °C)

Table 10. Input Parameters

Fieldbus I.S.		FISCO
U_i = 30 Vdc		U_i = 17.5 Vdc
I_i = 300 mAdc		I_i = 380 mAdc
P_i = 1.3 W		P_i = 5.32 W
C_i = 3.3 nF		$C_i \leq$ 5 nF
L_i = 0		$L_i \leq$ 10 mH

Table 11. RTD Terminals Entity Parameters

U_o = 30 Vdc
I_o = 19 mAdc
P_o = 140 mW

The capacitance and either the Inductance or the Inductance to Resistance Ratio (L/R) of the load connected to the 4-pin connector must not exceed the following values:

Group	Capacitance (µF)	Inductance (mH)	or L/R Ratio µH/Ohm
IIC	**0.066**	**96**	**247**
IIB	**0.56**	**365**	**633**
IIA	**1.82**	**696**	**633**

Conditions of Certification (X):

When fitted with the transient option, the apparatus is not capable of withstanding the 500 V electrical strength test as defined in Clause 6.4.12 of IEC 60079-11: 1999. This must be taken into account during installation.

5 IECEx Type n
Certificate Number: IECEx BAS05.0024X
Ex nC IIC T4 (-45 °C ≤ T_a ≤ 70 °C)
Ex nC IIC T5 (-45 °C ≤ T_a ≤ 40 °C)
U_i = 55 Vdc max

Conditions of Certification (X):

When fitted with the transient option, the apparatus is not capable of withstanding the 500 V electrical strength test as defined in Clause 8 of IEC 60079-15: 1987. This must be taken into account during installation.

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7 IECEx Flameproof
Certificate Number: IECEx KEM 06.0018
Zone 0/1 Ex d IIC T6 (-20 °C ≤ T_a ≤ 65 °C)
Zone 0/1 Ex d IIC T5 (-20 °C ≤ T_a ≤ 80 °C)
V_{max} = 55 Vdc
I_{max} = 23 mAdc

8 IECEx Dust
Certificate Number: IECEx KEM 06.0018
Ex tD A22 T90°C
IP66

Combinations of Certifications

SST certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

B A and J combination

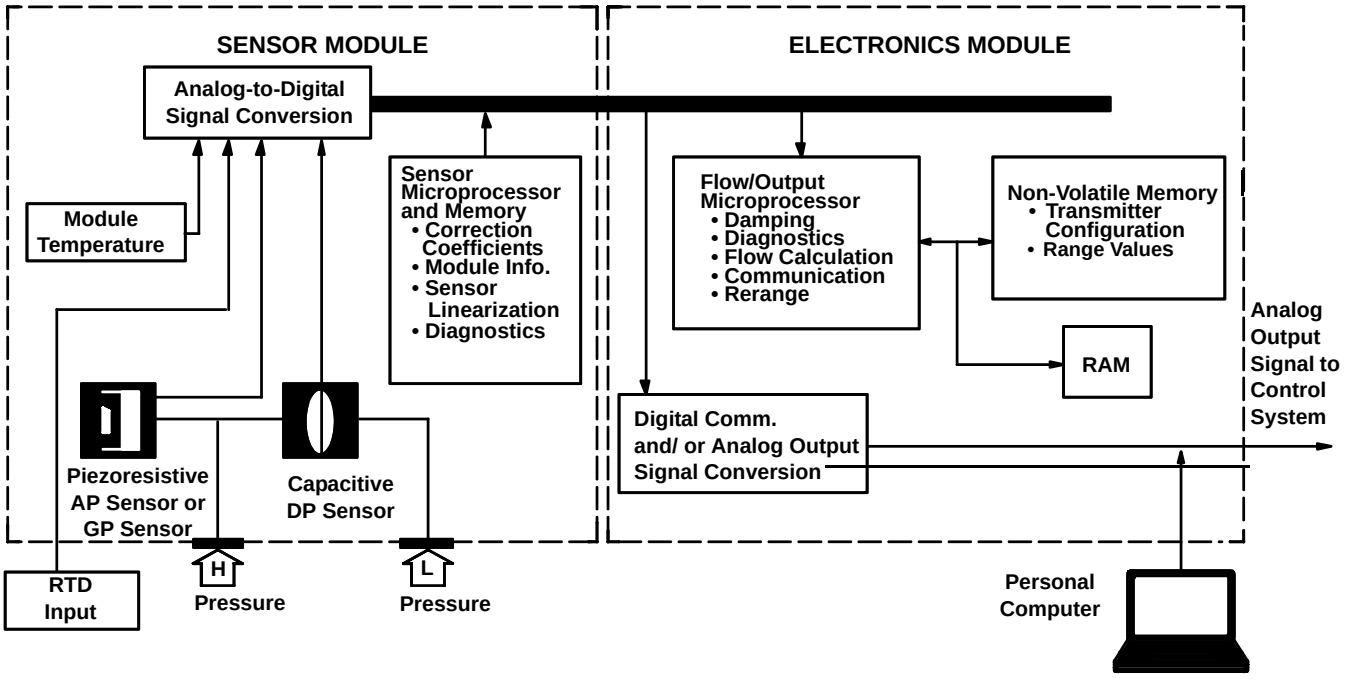
D C and K combination

L F, G, H, and P combination

6 T, G, H, and P combination

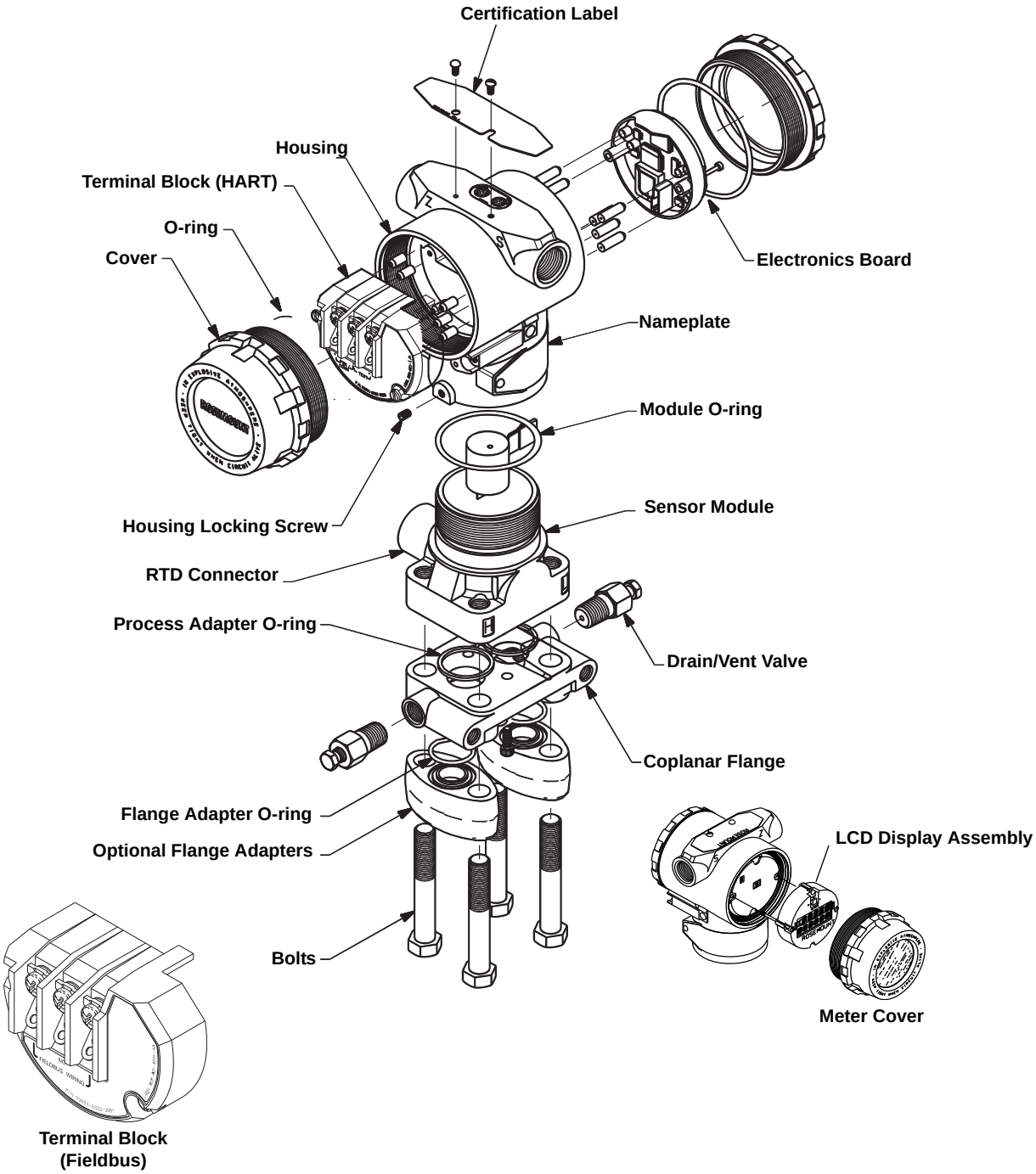
9 4, 5, 7, and 8 combination

Figure 1. 3095 MultiVariable Sensor Module/ Electronics Module



Rosemount 3095M Dimensional Drawings

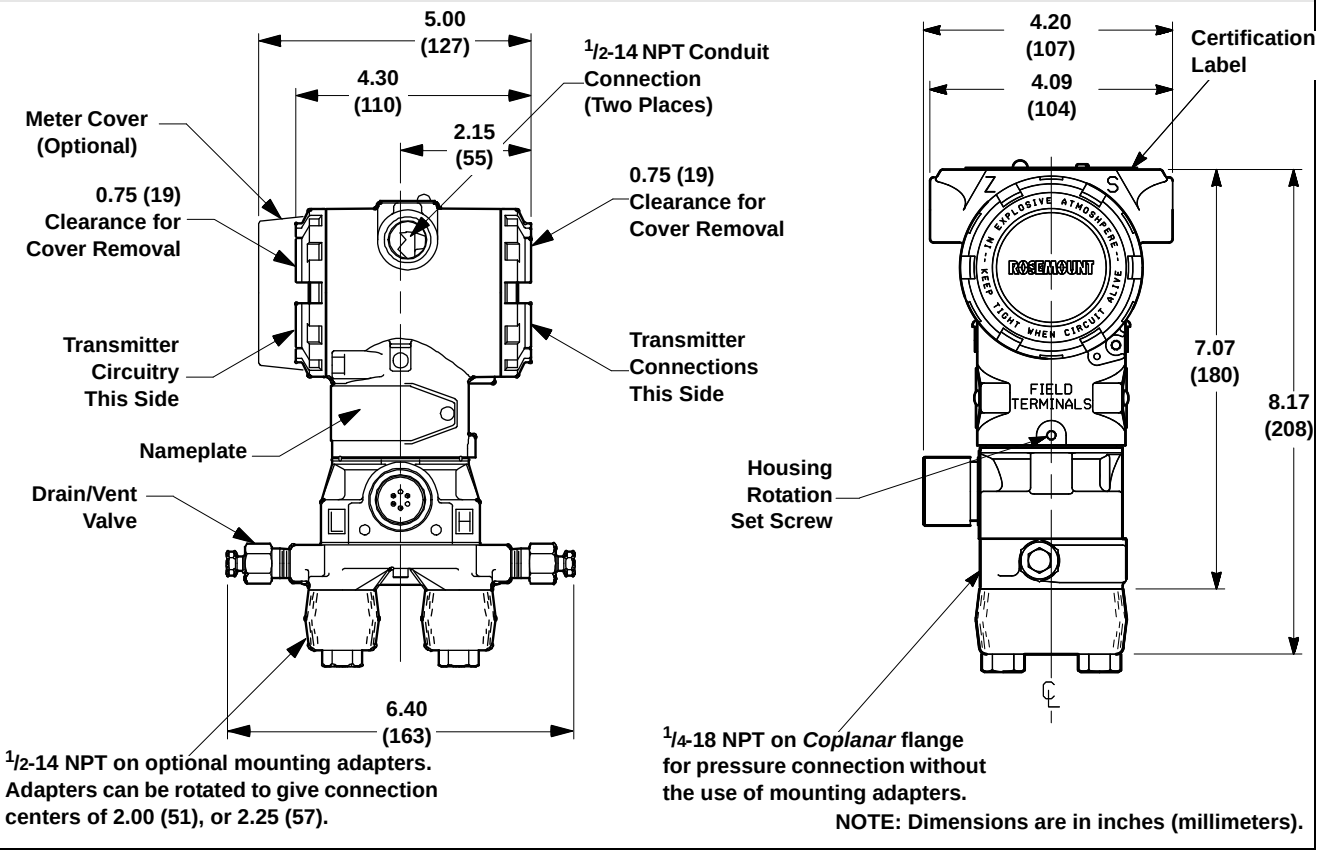
Exploded View of the Rosemount 3095M



Rosemount 3095 MultiVariable

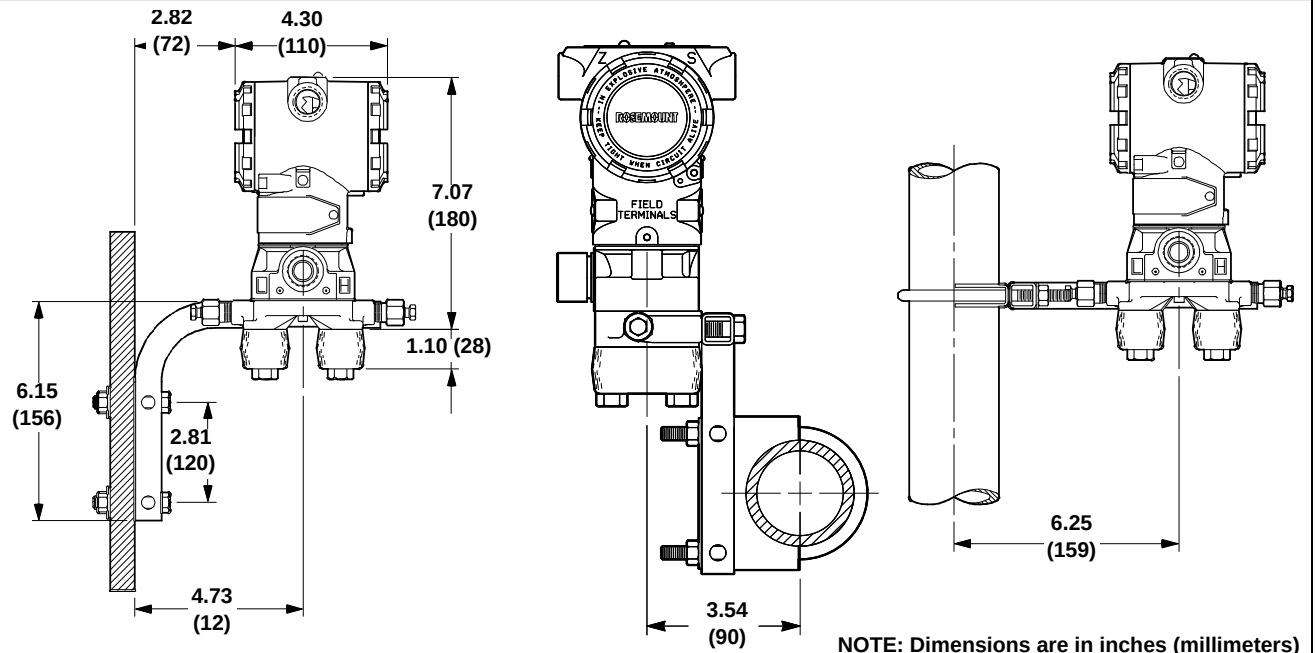
Product Data Sheet
00813-0100-4716, Rev MB
Catalog 2011 - 2012

Rosemount 3095M



NOTE: Dimensions are in inches (millimeters).

Mounting Configurations



NOTE: Dimensions are in inches (millimeters)

OPTIONS

Standard Configuration

Unless otherwise specified, transmitter is shipped as follows:

Engineering units:	
Differential	inH_2O (Range 2)
Absolute/gage	psi (all ranges)
Output:	Specified model code option
Flange type:	Specified model code option
Flange material:	Specified model code option
O-ring material:	Specified model code option
Drain/vent:	Specified model code option
Flow Configuration Parameters:	Factory default
Software tag:	(Blank)

In addition, transmitter is shipped as follows:

- The three process variables are digitally trimmed to the specified upper and lower range values.
- For Mass Flow and Measured Variables (EMS Code B), process variable output order is set to Flow, DP, AP/GP, PT.
- Flow is configured to measure air via ASME Orifice: Flange Tap, with a primary element minimum diameter of 0.5 in. (SST material), meter tube diameter of 2 in. (carbon steel material), flow range configured from 0–8,262 SCFH, 10–100 psia operating pressure range, and 50–100 °F operating temperature range.

Custom Configuration (Option Code C2)

If Option Code C2 is ordered, the custom flow configuration parameters are specified in addition to the standard configuration parameters.

Fixed Process Temperature (Option Code 0)

If Process Temperature Input (option code 0) is ordered, the fixed process temperature is set to 68 °F unless specified during order entry (HART protocol only).

Tagging

Three customer tagging options are available:

- Standard SST tag is wired to the transmitter. Tag character height is 0.125 in. (3.18 mm), 85 characters maximum.
- Tag may be permanently stamped on transmitter nameplate upon request. Tag character height is 0.0625 in. (1.59 mm), 65 characters maximum.
- Tag may be stored in transmitter memory.
- Software tag (8 characters maximum HART protocol; 32 characters maximum FOUNDATION fieldbus protocol) is left blank unless specified.

Optional Rosemount 305 Integral Manifolds

Rosemount 3095 Transmitter and 305AC (305BC) Integral Manifold are fully assembled, calibrated, and seal tested by the factory. Refer to PDS 00813-0100-4733 for additional information.

Temperature Sensors and Assemblies

Rosemount offers many types of temperature sensors and assemblies.

ACCESSORIES

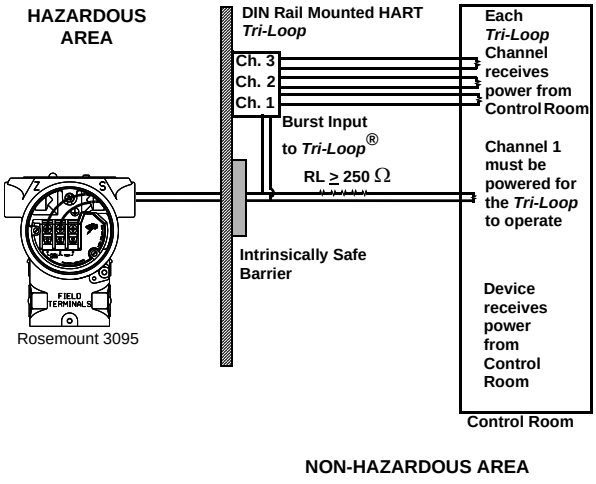
Rosemount 333 HART *Tri-Loop*™ HART-to-Analog Signal Converter

The Rosemount 333 HART *Tri-Loop* can be installed with the 3095 without disrupting existing device wiring. The 333 HART *Tri-Loop* provides up to three additional analog outputs for process monitoring or control without additional pipe penetrations.

The HART *Tri-Loop* accepts the 3095 digital signal and converts it to three independent isolated 4–20 mA analog signals. Any of the 3095 process variables (DP, AP, GP, PT, or flow) can be provided via the 333 HART *Tri-Loop*.

Rosemount 333 HART *Tri-Loop*

Model	**Product Description**
333	*HART Tri-Loop* (standard configuration)
Code	**Alarm Option**
U	High Alarm
D	Low Alarm
Code	**Options**
C2	Custom Configuration. Requires a completed Configuration Data Sheet (00806-0100-4754)
Typical Model Number: 333 U	



Rosemount 3095 MultiVariable

Accessories

Item Description	Part Number
Serial Port HART Modem and Cables Only	03095-5105-0001
USB Port HART Modem and Cables Only(1)	03095-5105-0002
FOUNDATION fieldbus PCM-CIA Interface Card and Cables Only	03095-5108-0001

(1) Supported by Snap-On EA with AMS Device Manager version 6.2 or higher.

Rosemount 3095 Engineering Assistant (EA) Software Packages

The Rosemount 3095 Engineering Assistant software supports mass flow configuration for both HART and FOUNDATION fieldbus protocols. The package is available with or without protocol-specific modem and connecting cables. All configurations are packaged separately.

For best performance of the EA Software, the following computer hardware and software is recommended:

- Pentium, 800MHz personal computer or above
- 512 MB RAM
- 350 MB of available hard disk space
- Mouse or other pointing device
- Color computer display
- Microsoft ® Windows™ XP

3095 Engineering Assistant Software Package

Code	Product Description
EA	Engineering Assistant Software Package
Code	**Software Version**
2	EA Rev. 5 (Compatible with 3095, 3051S FOUNDATION fieldbus, and 333)
Code	**Language**
E	English
Code	**Modem and Connecting Cables**
0	None
H	Serial Port HART Modem and Cables
B	USB Port HART Modem and Cables
C	FOUNDATION fieldbus PCM-CIA Interface Card and Cables
Code	**License**
N1	Single PC License
N2	Site License
Typical Model Number:	**EA 2 E O N1**

Rosemount 3095MFA Annubar Flowmeter

Table 12. Rosemount 3095MFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	DP Flow Flowmeter Type	
3095MFA	Annubar Flowmeter	
Fluid Type		
Standard		**Standard**
L	Liquid	★
G	Gas	★
S	Steam	★
Line Size		
Standard		**Standard**
020	2-in. (50 mm)	★
025	2 1/2-in. (63,5 mm)	★
030	3-in. (80 mm)	★
035	3 1/2-in. (89 mm)	★
040	4-in. (100 mm)	★
050	5-in. (125 mm)	★
060	6-in. (150 mm)	★
070	7-in. (175 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
Expanded		
140	14-in. (350 mm)	
160	16-in. (400 mm)	
180	18-in. (450 mm)	
200	20-in. (500 mm)	
240	24-in. (600 mm)	
300	30-in. (750 mm)	
360	36-in. (900 mm)	
420	42-in. (1066 mm)	
480	48-in. (1210 mm)	
600	60-in. (1520 mm)	
720	72-in. (1820 mm)	
780	78-in. (1950 mm)	
840	84-in. (2100 mm)	
900	90-in. (2250 mm)	
960	96-in. (2400 mm)	
Pipe I.D. Range		
Standard		**Standard**
C	Range C from the Pipe I.D. table	★
D	Range D from the Pipe I.D. table	★
Expanded		
A	Range A from the Pipe I.D. table	
B	Range B from the Pipe I.D. table	
E	Range E from the Pipe I.D. table	
Z	Non-standard Pipe I.D. Range or Above 12-in. Line Size	
Pipe Material / Assembly Material		
Standard		**Standard**
C	Carbon steel (A105)	★
S	316 SST	★
0(1)	No Mounting (Customer Supplied)	★
Expanded		
G	Chrome-Moly Grade F-11	
N	Chrome-Moly Grade F-22	
J	Chrome-Moly Grade F-91	

Rosemount 3095 MultiVariable

Table 12. Rosemount 3095MFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Piping Orientation				
Standard				**Standard**
H	Horizontal Piping			★
D	Vertical Piping with Downwards Flow			★
U	Vertical Piping with Upwards Flow			★
Annubar Type				
Standard				**Standard**
P	Pak-Lok			★
F	Flanged with opposite side support			★
Expanded				
L	Flange-Lok			
G	Gear-Drive Flo-Tap			
M	Manual Flo-Tap			
Sensor Material				
Standard				**Standard**
S	316 SST			★
Expanded				
H	Alloy C-276			
Sensor Size				
Standard				**Standard**
1	Sensor size 1 - Line sizes 2-in. (50 mm) to 8-in. (200 mm)			★
2	Sensor size 2 - Line sizes 6-in. (150 mm) to 96-in. (2400 mm)			★
3	Sensor size 3 - Line sizes 12-in. (300 mm)			★
Mounting Type				
Standard				**Standard**
T1	Compression/Threaded Connection			★
A1	150# RF ANSI			★
A3	300# RF ANSI			★
A6	600# RF ANSI			★
D1	DN PN16 Flange			★
D3	DN PN40 Flange			★
D6	DN PN100 Flange			★
Expanded				
A9	900# RF ANSI			
AF	1500# RF ANSI			
AT	2500# RF ANSI			
R1	150# RTJ Flange			
R3	300# RTJ Flange			
R6	600# RTJ Flange			
R9	900# RTJ Flange			
RF	1500# RTJ Flange			
RT	2500# RTJ Flange			
Opposite Side Support or Packing Gland				
Standard				**Standard**
0	No opposite side support or packing gland (Required for Pak-Lok and Flange-Lok models)			★
	Opposite Side Support – Required for Flanged Models			
C	NPT Threaded Opposite Support Assembly – Extended Tip			★
D	Welded Opposite Support Assembly – Extended Tip			★
Expanded				
	Packing Gland – Required for Flo-Tap Models			
	Packing Gland Material	*Rod Material*	*Packing Material*	
J	SST Packing Gland / Cage Nipple	Carbon Steel	PTFE	
K	SST Packing Gland / Cage Nipple	SST	PTFE	
L	SST Packing Gland / Cage Nipple	Carbon Steel	Graphite	
N	SST Packing Gland / Cage Nipple	SST	Graphite	
R	Alloy C-276 Packing Gland / Cage Nipple	SST	Graphite	

Table 12. Rosemount 3095MFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Isolation Valve for Flo-Tap Models			
Standard			**Standard**
0[(1)]	Not Applicable or Customer Supplied		★
Expanded			
1	Gate Valve, Carbon Steel		
2	Gate Valve, SST		
5	Ball Valve, Carbon Steel		
6	Ball Valve, SST		
Temperature Measurement			
Standard			**Standard**
T	Integral RTD – not available with Flanged model greater than class 600		★
0	No Temperature Sensor		★
Expanded			
R	Remote Thermowell and RTD		
Transmitter Connection Platform			
Standard			**Standard**
3	Direct-mount, Integral 3-valve manifold– not available with Flanged model greater than class 600		★
5	Direct -mount, 5-valve manifold– not available with Flanged model greater than class 600		★
7	Remote-mount NPT Connections ($^1/_2$-in. FNPT)		★
8	Remote-mount SW Connections ($^1/_2$-in.)		★
Expanded			
6	Direct-mount, high temperature 5-valve manifold– not available with Flanged model greater than class 600		
Differential Pressure Ranges			
Standard			**Standard**
1	0 to 25 in H_2O (0 to 62,3 mbar) – not available with Sensor Material code H		★
2	0 to 250 in H_2O (0 to 623 mbar)		★
3	0 to 1000 in H_2O (0 to 2,5 bar)		★
Static Pressure Ranges			
Standard			**Standard**
B	0–8 to 0–800 psia (0–55,16 to 0–5515,8 kPa)		★
C	0–8 to 0–800 psig (0–55,16 to 0–5515,8 kPa)		★
D	0–36.2 to 0–3626 psia (0–250 to 0–25000 kPa)		★
E	0–36.2 to 0–3626 psig (0–250 to 0–25000 kPa)		★
Output Protocol			
Standard			**Standard**
A	4–20 mA with digital signal based on HART protocol		★
V	FOUNDATION fieldbus		★
Code	**Transmitter Housing Style**	**Conduit Entry Size**	
Standard			**Standard**
1A	Polyurethane-covered aluminum	$^1/_2$-14 NPT	★
1B	Polyurethane-covered aluminum	M20 x 1.5	★
1J	SST	$^1/_2$-14 NPT	★
1K	SST	M20 x 1.5	★
Expanded			
1C	Polyurethane-covered aluminum	G $^1/_2$	
1L	SST	G $^1/_2$	

Options (Include with selected model number)

Performance Class		
Standard		**Standard**
U3[(2)]	Ultra for Flow: up to 0.95% mass flow rate accuracy, up to 10:1 turndown, 10-year stability, limited 12-year warranty	★
PlantWeb Control Functionality		
Standard		**Standard**
A01[(3)]	Advanced Control Function Block Suite	★

Rosemount 3095 MultiVariable

Table 12. Rosemount 3095MFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Pressure Testing		
Expanded		
P1[4]	Hydrostatic Testing	
PX[4]	Extended Hydrostatic Testing	
Special Cleaning		
Expanded		
P2	Cleaning for Special Processes	
PA	Cleaning per ASTM G93 level D (section 11.4)	
Material Testing		
Expanded		
V1	Dye Penetrant Exam	
Material Examination		
Expanded		
V2	Radiographic Examination	
Flow Calibration		
Expanded		
W1	Flow Calibration (Average K)	
WZ	Special Calibration	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection & Performance Certificate	★
Surface Finish		
Standard		**Standard**
RL	Surface finish for Low Pipe Reynolds Number in Gas and Steam	★
RH	Surface finish for High Pipe Reynolds Number in Liquid	★
Material Traceability Certification		
Standard		**Standard**
Q8[5]	Material Certificate per EN 10204:2004 3.1	★
Code Conformance		
Expanded		
J2[6]	ANSI/ASME B31.1	
J3[6]	ANSI/ASME B31.3	
Material Conformance		
Expanded		
J5[7]	NACE MR-0175 / ISO 15156	
Country Certification		
Expanded		
J1	Canadian Registration	
Installed in Flanged Pipe Spool Section[8]		
Expanded		
H3	150# Flanged Connection with Rosemount Standard Length and Schedule	
H4	300# Flanged Connection with Rosemount Standard Length and Schedule	
H5	600# Flanged Connection with Rosemount Standard Length and Schedule	
Instrument Connections for Remote Mount Option		
Standard		**Standard**
G2	Needle Valves, SST	★
G6	OS&Y Gate Valve, SST	★
Expanded		
G1	Needle Valves, Carbon Steel	
G3	Needle Valves, Alloy C-276	
G5	OS&Y Gate Valve, Carbon Steel	
G7	OS&Y Gate Valve, Alloy C-276	
Special Shipment		
Standard		**Standard**
Y1	Mounting Hardware Shipped Separately	★

Table 12. Rosemount 3095MFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Special Dimensions		
Expanded		
VM	Variable Mounting	
VT	Variable Tip	
VS	Variable length Spool Section	
V9	Special Dimension	
Transmitter Calibration Certification		
Standard		**Standard**
Q4	Calibration Data Certificate for Transmitter	★
Product Certifications		
Standard		**Standard**
E5	FM Approvals Explosion-proof	★
I5	FM Approvals Intrinsic Safety, Non-Incendive	★
K5	FM Approvals Explosion-proof, Intrinsic Safety, Non-Incendive (combination of E5 and I5)	★
E6	CSA Explosion-proof	★
I6	CSA Intrinsically Safe, Division 2	★
K6	CSA Explosion-proof, Intrinsically Safe, Division 2	★
I1	ATEX Intrinsic Safety	★
E1	ATEX Flameproof	★
N1	ATEX Type n	★
K1	ATEX Flameproof, Intrinsic Safety, Type n	★
ND	ATEX Dust	★
E4	TIIS Flameproof Certification	★
I7	IECEx Intrinsic Safety	★
Alternate Transmitter Material of Construction		
Standard		**Standard**
L1(9)	Inert Sensor Fill Fluid	★
Display		
Standard		**Standard**
M5	Digital Display	★
Terminal Blocks		
Standard		**Standard**
T1	Transient Protection	★
Manifold for Remote Mount Option		
Standard		**Standard**
F2	3-Valve Manifold, SST	★
F6	5-Valve Manifold, SST	★
Expanded		
F1	3-Valve Manifold, Carbon Steel	
F3	3-Valve Manifold, Alloy C-276	
F5	5-Valve Manifold, Carbon Steel	
F7	5-Valve Manifold, Alloy C-276	
Typical Model Number: 3095MFA L 060 D C H P S 2 T1 0 0 0 3 2 C A 1A		

(1) Provide the "A" dimension for Flanged, Flange-Lok, and Threaded Flo-Tap models. Provide the "B" dimension for Flange Flo-Tap models.

(2) Ultra for Flow applicable for HART protocol, DP ranges 2 and 3 with SST isolator material and silicone fill fluid options only.

(3) Function Blocks include: Arithmetic, Integrator, Analog Output, Signal Characterizer, Control Selector, and Output Selector.

(4) Applies to assembled flowmeter only, mounting not tested.

(5) Isolation and Instrument valves not included in Traceability Certification.

(6) Not available with Transmitter Connection Platform 6.

(7) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(8) Available for line sizes from 2 to 8-in. (50 to 200 mm).

(9) Not available with DP range 1.

Rosemount 3095 MultiVariable

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Rosemount 3095MFA Specifications

3095MFA Performance Specifications

System Reference Accuracy

±1.40 (8:1 turndown) of mass flow rate accuracy

With Ultra for Flow:

±0.95% (10:1 turndown) of mass flow rate accuracy

Repeatability

±0.1%

Line Sizes

- Sensor Size 1: 2-in. to 8-in. (50 to 200 mm)
- Sensor Size 2: 6-in. to 96-in. (150 to 2400 mm)
- Sensor Size 3: 12-in. to 96-in. (300 to 2400 mm)

NOTE
Some mounting types are not available in larger line sizes.

TABLE 13. Reynolds Number and Probe Width

Sensor Size	Minimum Rod Reynolds Number (R_d)	Probe Width ($_d$) (inches)
1	6500	0.590-in. (14.99 mm)
2	12500	1.060-in. (26.92 mm)
3	25000	1.935-in. (49.15 mm)

$$R_d = \frac{d \times v \times p}{\mu}$$

Where
d = Probe width (feet)
v = Velocity of fluid (ft/sec)
p = Density of fluid (lbm/ft^3)
μ = Viscosity of the fluid (lbm/ft-sec)

Output

Two-wire 4–20 mA, user-selectable for DP, AP, GP, PT, mass flow, or totalized flow. Digital HART protocol superimposed on 4–20 mA signal, available to any host that conforms to the HART protocol

Performance Statement Assumptions

- Measured pipe I.D.
- Electronics are trimmed for optimum flow accuracy.
- Performance dependent on application parameters.

Sizing

Contact an Emerson Process Management sales representative for assistance. A “Configuration Data Sheet” is required prior to order for application verification.

Optional Performance Class Specification

Ultra for Flow (Code U3): up to 0.95% mass flow rate accuracy, 10:1 turndown, 10-year stability, limited 12-year warranty

Annubar Sensor Surface Finish

The front surface of the Annubar primary is textured for high Reynolds number applications (typically gas and steam). The surface texture creates a more turbulent boundary layer on the front surface of the sensor. The increased turbulence produces a more predictable and repeatable separation of flow at the edge of the sensor. The appropriate surface finish will be determined for each application by the Emerson Process Management sizing program, Instrument Toolkit software.

3095MFA Functional Specifications

Service

- Liquid
- Gas
- Steam

Power Supply

4–20 mA option

- External power supply required. Standard transmitter (4–20 mA) operates on 11 to 55 Vdc with no load

Process Temperature Limits

Direct Mount Transmitter

- 500 °F (260 °C)
- 750 °F (398 °C) when used with a direct mount, high temperature 5-valve manifold (Transmitter Connection Platform code 6)
- 400 °F (205 °C) when top mounted in steam service

Remote Mount Transmitter

- 1250 °F (677 °C) – Alloy C-276 Sensor Material (For superheated steam applications above 1000 °F (538 °C), it is recommended that the Rosemount 585 with Alloy 800H sensor material is used.)
- 850 °F (454 °C) – SST Sensor Material

Transmitter Temperature Limits

Ambient

- –40 to 185 °F (–40 to 85 °C)
- With Integral Display: –4 to 175 °F (–20 to 80 °C)

Storage

- –50 to 230 °F (–46 to 110 °C)
- With Integral Display: –40 to 185 °F (–40 to 85 °C)

Pressure Limits

Direct Mount Transmitter

- Up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C))
- Integral temperature measurement is not available with Flanged mounting type greater than class 600

Remote Mount Transmitter(1)

- Up to 2500# ANSI (6000 psig at 100 °F (416 bar at 38 °C))

(1) Maximum allowable pressure will be limited by the transmitter pressure limit of 3626 psi.

Overpressure Limits

0 to 2 times the absolute pressure range with a maximum of 3626 psia (250 bar).

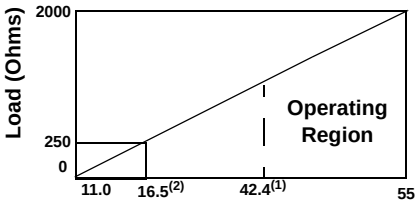
Static Pressure Limits

- Operates within specification between static pressures of 0.5 psia (0.03 bar-A) and the URL of the static pressure sensor.

Load Limitations

Maximum loop resistance is determined by the voltage level of the external power supply, as described by:

$$\text{Maximum Loop Resistance} = \frac{\text{Power Supply} - 11.0}{0.022}$$



(1) For CSA approval, power supply must not exceed 42.4 Vdc.

(2) HART protocol communication requires a loop resistance value between 250-1100 ohms, inclusive.

FOUNDATION fieldbus (output option code V)

Power Supply

External power supply required; transmitters operate on 9.0 to 32.0 Vdc transmitter voltage.

Current Draw

17.5 mA for all configurations (including LCD display option).

Humidity Limits

- 0–100% relative humidity

Turn-On Time

Digital and analog measured variables will be within specification 7 – 10 seconds after power is applied to the transmitter.

Digital and analog flow output will be within specifications 10 – 14 seconds after power is applied to the transmitter.

Damping

Analog output response to a step input change is user-selectable from 0 to 29 seconds for one time constant. This software damping is in addition to sensor module response time.

Failure Mode Alarm

Output Code A

If self-diagnostics detect a non-recoverable transmitter failure, the analog signal will be driven either below 3.75 mA or above 21.75 mA to alert the user. High or low alarm signal is user-selectable by internal jumper pins.

Output Code V

If self-diagnostics detect a gross transmitter failure, that information gets passed as a status along with the process variable(s).

Configuration

Field Hand-held Communicator

- Performs traditional transmitter maintenance functions

3095 Multivariable Engineering Assistant (EA) software package

- Contains built-in physical property database
- Enables mass flow configuration, maintenance, and diagnostic functions via HART modem (output option code A)
- Enables mass flow configuration via PCMCIA Interface for FOUNDATION fieldbus (output option code V)

Physical Properties Database

- Maintained in Engineering Assistant Software Configurator
- Physical properties for over 110 fluids
- Natural gas per AGA
- Steam and water per ASME
- Other database fluids per American Institute of Chemical Engineers (AIChE)
- Optional custom entry

FOUNDATION fieldbus Function Blocks

Standard Function Blocks

Resource Block

- Contains hardware, electronics, and diagnostic information.

Transducer Block

- Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

LCD Block

- Configures the local display.

5 Analog Input Blocks

- Processes the measurements for input into other function blocks. The output value is in engineering or custom units and contains a status indicating measurement quality.

PID Block with Auto-tune

- Contains all logic to perform PID control in the field including cascade and feedforward. Auto-tune capability allows for superior tuning for optimized control performance.

Advanced Control Function Block Suite (Option Code A01)

Input Selector Block

- Selects between inputs and generates an output using specific selection strategies such as minimum, maximum, midpoint, average, or first “good.”

Arithmetic Block

- Provides pre-defined application-based equations including flow with partial density compensation, electronic remote seals, hydrostatic tank gauging, ratio control and others.

Signal Characterizer Block

- Characterizes or approximates any function that defines an input/output relationship by configuring up to twenty X, Y coordinates. The block interpolates an output value for a given input value using the curve defined by the configured coordinates.

Integrator Block

- Compares the integrated or accumulated value from one or two variables to pre-trip and trip limits and generates discrete output signals when the limits are reached. This block is useful for calculating total flow, total mass, or volume over time.

Output Splitter Block

- Splits the output of one PID or other control block so that the PID will control two valves or other actuators.

Control Selector Block

- Selects one of up to three inputs (highest, middle, or lowest) that are normally connected to the outputs of PID or other control function blocks.

Rosemount 3095 MultiVariable

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3095MFA Physical Specifications

Temperature Measurement

Integral RTD

- 100 Ohm platinum RTD
- 4-wire RTD (α = 0.00385)

Remote RTD

- 100 Ohm platinum RTD, spring loaded with 1/2-in. NPT nipple and union (078 series with Rosemount 644 housing)

Thermowell

- 1/2-in. x 1/2-in NPT, 316 SST with 1/2-in. Weld coupling material to match process pipe.

Housing Connections

1/2–14 NPT, G1/2, and M20 × 1.5 (CM20) conduit. HART interface connections fixed to terminal block for output code A

Annubar Sensor Material

- 316 SST
- Alloy C-276

Annubar Type

See “Dimensional Drawings” on page 313

Pak-Lok Model (option P)

- Provided with a compression sealing mechanism rated up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C))
- Graphite Packing (–100 to 850 °F (–73 to 454 °C)).
- Not available for steam above 600 °F (315 °C)

Flanged with Opposite Side Support Model (option F)

- Provided with opposite side support, which is the same material as the pipe and requires a second pipe penetration
- Sensor flange is the same material as the Annubar sensor and the mounting flange is the same material as the pipe material.
- Flanged mounting hardware: nuts, studs, and gaskets (DIN units supplied without nuts, studs, and gaskets)
- SST: (–300 to 850 °F (–184 to 454 °C)).
- Alloy C-276: (–300 to 1250 °F (–184 to 677 °C)).
- Top mounting is recommended for steam temperatures above 600 °F (315 °C).

Flange–Lok Model (option L)

- Flange–Lok assembly is supplied in 316 SST material.
- Flange-Lok mounting hardware: nuts, studs, and gaskets (DIN units supplied without nuts, studs, and gaskets)
- –100 to 850 °F (–73 to 454 °C).
- Not available for steam above 600 °F (315 °C)

Flo-Tap Models (options G and M)

- Opposite side support is not available
- Threaded connection is not available with Sensor Size 3
- Gear Drive is not available with Sensor Size 1
- Packing gland required
- Packing Gland Material Temperature Limits
  - PTFE: –40 to 400 °F (–40 to 204 °C)
  - Graphite: –100 to 850 °F (–73 to 454 °C)
- Isolation valve included
  - The isolation valve will carry the same pressure rating as the sensor flange and mounting flange specified in the mounting type
  - Ball valves have a 300# limitation
  - For threaded flo-tap models, the isolation valve NPT size is 1 1/4-in. (Sensor Size one) and 2-in. (Sensor Size 2).
  - Top mounting is recommended for steam temperatures above 600 °F (315 °C).

Process-Wetted Parts

Integral Manifolds

- 316 SST
- Alloy C-276

Remote Manifolds

- 316 SST
- Alloy C-276

Transmitter Vent Valves and Process Flanges

- 316 SST
- Alloy C-276
- Glass-filled PTFE O-rings

Process Isolation Diaphragms

- 316 SST
- Alloy C-276

Integral Manifold O-Rings

- PTFE/Graphite

Non-Wetted Parts

Sensor Module Fill Fluid

- Silicone oil
- Inert Fill optional

Cover O-rings

- Buna-N

Remote Mounting Brackets

- SST

Sensor Mounting (including nuts, bolts, and gasket)

- Match Process Pipe Material

Transmitter Housing

- Low copper aluminum, NEMA 4x, IP65
- SST (optional)

Paint

- Polyurethane

Bolts

- Carbon Steel

Annubar Type Specification Chart

Option Code	Description	Pak-Lok[1]	Flange-Lok	Flange	Manual and Gear Drive Flo-Tap
T1[1]	Pak-Lok Body	X			
	Threaded connection				X
A1	150# RF ANSI		X	X	X
A3	300# RF ANSI		X	X	X
A6	600# RF ANSI		X	X	X
A9[2]	900# RF ANSI			X	
AF[2]	1500# RF ANSI			X	
AT[2]	2500# RF ANSI			X	
D1	DN PN 16		X	X	X
D3	DN PN 40		X	X	X
D6	DN PN 100		X	X	X
R1	150# RTJ Flange		X	X	X
R3	300# RTJ Flange		X	X	X
R6	600# RTJ Flange		X	X	X
R9[2]	900# RTJ Flange			X	
RF[2]	1500# RTJ Flange			X	
RT[2]	2500# RTJ Flange			X	

(1) Available up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)) rating.

(2) Remote mount only. Maximum allowable pressure will be limited by the transmitter pressure limit of 3626 psi.

Instrument Connections Temperature Ranges

Table 14. Minimum / Maximum Temperature Range

Code	Description	Temperature
G1	Needle Valves, Carbon Steel	–20 to 500 °F (–29 to 260 °C)
G2	Needle Valves, SST	–40 to 600 °F (–40 to 316 °C)
G3	Needle Valves, Alloy C-276	–40 to 600 °F (–40 to 316 °C)
G5	OS&Y Gate Valve, Carbon Steel	–20 to 775 °F (–29 to 413 °C)
G6	OS&Y Gate Valve, SST	–40 to 850 °F (–40 to 454 °C)
G7	OS&Y Gate Valve, Alloy C-276	–40 to 1250 °F (–40 to 677 °C)

Flowmeter Installed in Flanged Pipe Spool Section (option codes H3, H4, and H5)

- All pipe spool sections are flanged pipe sections
- The flanged pipe spool section is constructed from the same material as the pipe.
- Consult the factory for remote temperature measurement and ANSI ratings above 600# and DIN flanges.
- Available in carbon steel (A105) and SST.

Table 15. Flanged Pipe Spool Section Schedule

ANSI	Schedule
150# ANSI	40
300# ANSI	40
600# ANSI	80

Table 16. Flange Pipe Spool Section Length

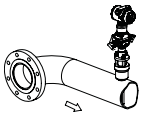
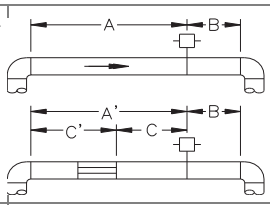
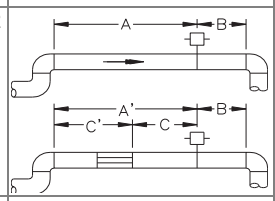
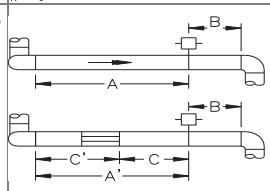
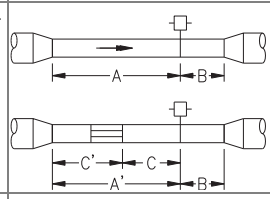
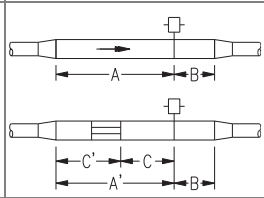
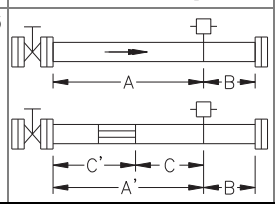
Nominal Pipe Size	Length
2-in. (50 mm)	10.52-in. (267.2 mm)
3-in. (80 mm)	11.37-in. (288.8 mm)
4-in. (100 mm)	12.74-in. (323.6 mm)
6-in. (150 mm)	14.33-in. (364.0 mm)
8-in. (200 mm)	16.58-in. (421.1 mm)

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3095MFA Installation Considerations

Straight Run Requirements(1)

	In Plane  Out of Plane 	Upstream Dimensions (Pipe Diameters)					Downstream
		Without Vanes(2)		With Vanes(3)			
		In Plane A	Out of Plane A	A'	C	C'	B
1		8 —	10 —	— 8	— 4	— 4	4 4
2		11 —	16 —	— 8	— 4	— 4	4 4
3		23 —	28 —	— 8	— 4	— 4	4 4
4		12 —	12 —	— 8	— 4	— 4	4 4
5		18 —	18 —	— 8	— 4	— 4	4 4
6		30 —	30 —	— 8	— 4	— 4	4 4

(1) Consult the factory for instructions regarding use in square or rectangular ducts.

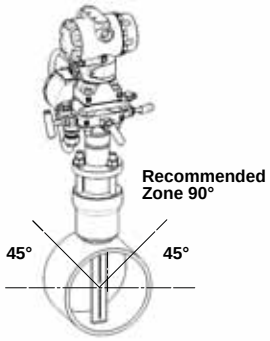
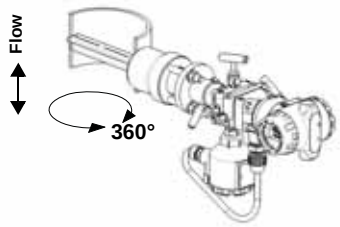
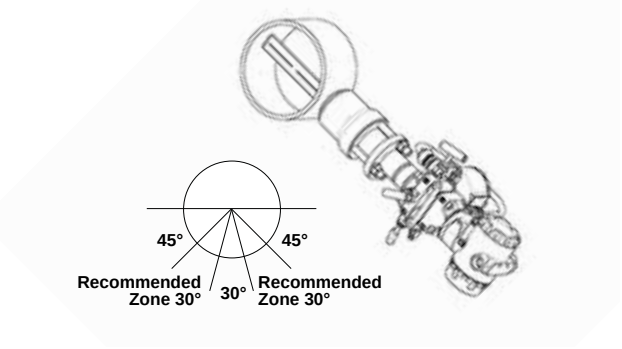
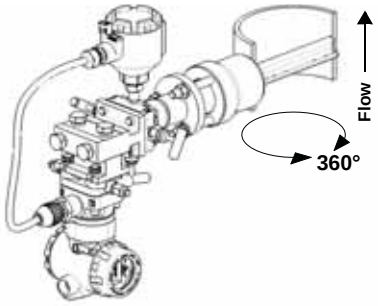
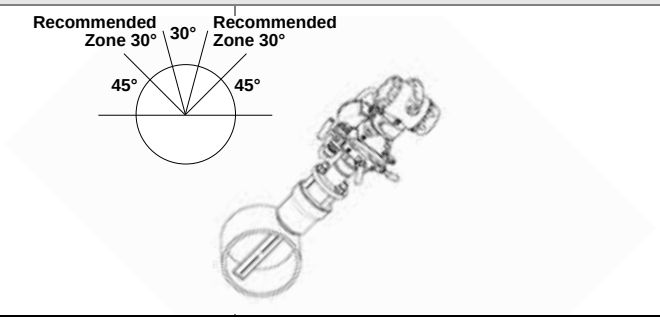
(2) "In Plane A" means the bar is in the same plane as the elbow. "Out of Plane A" means the bar is perpendicular to the plane of the upstream elbow.

(3) Use straightening vane to reduce the required straight run length.

Drill Hole Size According to Sensor Size

Sensor Size	Diameter
1	$^{3}/_{4}$-in. (19 mm)
2	$1^{5}/_{16}$-in. (34 mm)
3	$2^{1}/_{2}$-in. (64 mm)

Flowmeter Orientation (Recommended)(1)

Gas (Horizontal)	Gas (Vertical)
	
Liquid and Steam (Horizontal)	**Steam (Vertical)**
	
Top Mounting for Steam (Horizontal)(2)	
	

(1) The flowmeter orientation recommendations may vary for the Manual and Gear-Drive Flo-Tap Annubar Types.

(2) Direct mount up to 400 °F (205 °C).

Rosemount 3095 MultiVariable

Product Data Sheet
00813-0100-4716, Rev MB
Catalog 2011 - 2012

Pipe I.D. Range Code

See Table 12 on page 299.

For pipes with an Inner Diameter (I.D.) Range / Pipe Wall Thickness not found in this table or with a line size greater than 12-in. (300 mm), choose option code Z and specify the exact pipe dimensions (I.D. and Pipe Wall Thickness) on the Configuration Data Sheet (See document 00806-0100-4010). The Emerson process Management sizing program will determine this code, based on the application piping.

	Line Size			Inner Diameter (I.D.) Range	Pipe Wall Thickness		I.D. Range Code
	Nominal	Max. O.D.	Option Code		ANSI Pipes	Non-ANSI Pipes	
	2-in. (50 mm)	2.625-in. (66.68 mm)	020	1.784 to 1.841-in. (45.31 to 46.76 mm)	0.065 to 0.545-in. (1.7 to 13.8 mm)	0.065 to 0.488-in. (1.7 to 12.4 mm)	A
				1.842 to 1.938-in. (46.79 to 49.23 mm)		0.065 to 0.449-in. (1.7 to 11.4 mm)	B
				1.939 to 2.067-in. (49.25 to 52.50 mm)		0.065 to 0.417-in. (1.7 to 10.6 mm)	C
				2.068 to 2.206-in. (52.53 to 56.03 mm)		0.065 to 0.407-in. (1.7 to 10.3 mm)	D
	2 1/2-in. (63.5 mm)	3.188-in. (80.98 mm)	025	2.207 to 2.322-in. (56.06 to 58.98 mm)	0.083 to 0.563-in. (2.1 to 14.3 mm)	0.083 to 0.448-in. (2.1 to 11.4 mm)	B
				2.323 to 2.469-in. (59.00 to 62.71 mm)		0.083 to 0.417-in. (2.1 to 10.6 mm)	C
				2.470 to 2.598-in. (62.74 to 65.99 mm)		0.083 to 0.435-in. (2.1 to 11.0 mm)	D
				2.599 to 2.647-in. (66.01 to 67.23 mm)		0.083 to 0.515-in. (2.1 to 13.1 mm)	E
	3-in. (80 mm)	3.75-in. (95.25 mm)	030	2.648 to 2.751-in. (67.26 to 69.88 mm)	0.083 to 0.563-in. (2.1 to 14.3 mm)	0.083 to 0.460-in. (2.1 to 11.7 mm)	A
				2.752 to 2.899-in. (69.90 to 73.63 mm)		0.083 to 0.416-in. (2.1 to 10.6 mm)	B
				2.900 to 3.068-in. (73.66 to 77.93 mm)		0.083 to 0.395-in. (2.1 to 10.0 mm)	C
				3.069 to 3.228-in. (77.95 to 81.99 mm)		0.083 to 0.404-in (2.1 to 10.3 mm)	D
	3 1/2-in. (89 mm)	4.25-in. (107.95 mm)	035	3.229 to 3.333-in. (82.02 to 84.66 mm)	0.120 to 0.600-in. (3.0 to 15.2 mm)	0.120 to 0.496-in. (3.0 to 12.6 mm)	B
				3.334 to 3.548-in. (84.68 to 90.12 mm)		0.120 to 0.386-in. (3.0 to 9.8 mm)	C
				3.549 to 3.734-in. (90.14 to 94.84 mm)		0.120 to 0.415-in. (3.0 to 10.5 mm)	D
	4-in. (100 mm)	5.032-in. (127.81 mm)	040	3.735 to 3.825-in. (94.87 to 97.16 mm)	0.120 to 0.600-in. (3.0 to 15.2 mm)	0.120 to 0.510-in. (3.0 to 13.0 mm)	B
				3.826 to 4.026-in. (97.18 to 102.26 mm)		0.120 to 0.400-in. (3.0 to 10.2 mm)	C
				4.027 to 4.237-in. (102.29 to 107.62 mm)		0.120 to 0.390-in. (3.0 to 9.9 mm)	D
				4.238 to 4.437-in. (107.65 to 112.70 mm)		0.120 to 0.401-in. (3.0 to 10.2 mm)	E
	5-in. (125 mm)	6.094-in. (154.79 mm)	050	4.438 to 4.571-in. (112.73 to 116.10 mm)	0.134 to 0.614-in. (3.4 to 15.6 mm)	0.134 to 0.481-in. (3.4 to 12.2 mm)	A
				4.572 to 4.812-in. (116.13 to 122.22 mm)		0.134 to 0.374-in. (3.4 to 9.5 mm)	B
				4.813 to 5.047-in. (122.25 to 128.19 mm)		0.134 to 0.380-in. (3.4 to 9.7 mm)	C
				5.048 to 5.249-in. (128.22 to 133.32 mm)		0.134 to 0.413-in. (3.4 to 10.5 mm)	D
Sensor Size 1	6-in. (150 mm)	6.93-in. (176.02 mm)	060	5.250 to 5.472-in. (133.35 to 138.99 mm)	0.134 to 0.614-in. (3.4 to 15.6 mm)	0.134 to 0.3919-in. (3.4 to 9.9 mm)	A
				5.473 to 5.760-in. (139.01 to 146.30 mm)		0.134 to 0.327-in. (3.4 to 8.3 mm)	B
				5.761 to 6.065-in. (146.33 to 154.05 mm)		0.134 to 0.31-in. (3.4 to 7.9 mm)	C
				6.066 to 6.383-in. (154.08 to 162.13 mm)		0.134 to 0.297-in. (3.4 to 7.5 mm)	D
Sensor Size 2	6-in. (150 mm)	6.93-in. (176.02 mm)	060	5.250 to 5.472-in. (133.35 to 139.99 mm)	0.134 to 1.354-in. (3.4 to 34.4 mm)	0.134 to 1.132-in. (3.4 to 28.7 mm)	A
				5.473 to 5.760-in. (139.01 to 146.30 mm)		0.134 to 1.067-in. (3.4 to 27.1 mm)	B
				5.761 to 6.065-in. (146.33 to 154.05 mm)		0.134 to 1.05-in. (3.4 to 26.7 mm)	C
				6.066 to 6.383-in. (154.08 to 162.13 mm)		0.134 to 1.037-in. (3.4 to 26.3 mm)	D
Sensor Size 1	7-in. (180 mm)	7.93-in. (201.42 mm)	070	6.384 to 6.624-in. (162.15 to 168.25 mm)	0.134 to 0.614-in. (3.4 to 15.6 mm)	0.134 to 0.374-in. (3.4 to 9.5 mm)	B
				6.625 to 7.023-in. (168.28 to 178.38 mm)		0.134 to 0.216-in. (3.4 to 5.5 mm)	C
				7.024 to 7.392-in. (178.41 to 187.76 mm)		0.134 to 0.246-in. (3.4 to 6.2 mm)	D
Sensor Size 2	7-in. (180 mm)	7.93-in. (201.42 mm)	070	6.384 to 6.624-in. (162.15 to 168.25 mm)	0.134 to 1.354-in. (3.4 to 34.4 mm)	0.134 to 1.114-in. (3.4 to 28.3 mm)	B
				6.625 to 7.023-in. (168.28 to 178.38 mm)		0.134 to 0.956-in. (3.4 to 24.3 mm)	C
				7.024 to 7.392-in. (178.41 to 187.76 mm)		0.134 to 0.986-in. (3.4 to 25.0 mm)	D
Sensor Size 1	8-in. (200 mm)	9.688-in. (246.08 mm)	080	7.393 to 7.624-in. (187.78 to 193.65 mm)	0.250 to 0.73-in. (6.4 to 18.5 mm)	0.250 to 0.499-in. (6.4 to 12.6 mm)	B
				7.625 to 7.981-in. (193.68 to 202.72 mm)		0.250 to 0.374-in. (6.4 to 9.5 mm)	C
				7.982 to 8.400-in. (202.74 to 213.36 mm)		0.250 to 0.312-in. (6.4 to 7.9 mm)	D
				8.401 to 8.766-in. (213.39 to 222.66 mm)		0.250 to 0.364-in. (6.4 to 9.2 mm)	E
Sensor Size 2	8-in. (200 mm)	9.688-in. (246.08 mm)	080	7.393 to 7.624-in. (187.78 to 193.65 mm)	0.250 to 1.47-in. (6.4 to 37.3 mm)	0.250 to 1.239-in. (6.4 to 31.4 mm)	B
				7.625 to 7.981-in. (193.68 to 202.72 mm)		0.250 to 1.114-in. (6.4 to 28.3 mm)	C
				7.982 to 8.400-in. (202.74 to 213.36 mm)		0.250 to 1.052-in. (6.4 to 26.7 mm)	D
				8.401 to 8.766-in. (213.39 to 222.66 mm)		0.250 to 1.104-in. (6.4 to 28.0 mm)	E
	10-in. (250 mm)	11.75-in. (298.45 mm)	100	8.767 to 9.172-in. (222.68 to 232.97 mm)	0.250 to 1.470-in. (6.4 to 37.3 mm)	0.250 to 1.065-in. (6.4 to 27.1 mm)	A
				9.173 to 9.561-in. (232.99 to 242.85 mm)		0.250 to 1.082-in. (6.4 to 27.5 mm)	B
				9.562 to 10.020-in. (242.87 to 254.51 mm)		0.250 to 1.012-in. (6.4 to 25.7 mm)	C
				10.021 to 10.546-in. (254.53 to 267.87 mm)		0.250 to 0.945-in. (6.4 to 24.0 mm)	D
				10.547 to 10.999-in. (267.89 to 279.37 mm)		0.250 to 1.018-in. (6.4 to 25.9 mm)	E
	12-in. (300 mm)	13.0375-in. (331.15 mm)	120	11.000 to 11.373-in. (279.40 to 288.87 mm)	0.250 to 1.470-in. (6.4 to 37.3 mm)	0.250 to 1.097-in. (6.4 to 27.9 mm)	B
				11.374 to 11.938-in. (288.90 to 303.23 mm)		0.250 to 0.906-in. (6.4 to 23.0 mm)	C
				11.939 to 12.250-in. (303.25 to 311.15 mm)		0.250 to 1.159-in. (6.4 to 29.4 mm)	D

Rosemount 3095MFA Product Certifications

Rosemount 3095MFA with HART

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting our local sales office.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

3095M_2/3,4/D Flow Transmitters — QS Certificate of Assessment - EC No. PED-H-20
Module H Conformity Assessment

All other 3095_ Transmitters/Level Controller — Sound Engineering Practice

Transmitter Attachments: Process Flange - Manifold — Sound Engineering Practice

Electro Magnetic Compatibility (EMC) (89/336/EEC)

3095MV Flow Transmitters
— EN50081-1:1992; EN50082-2:1995; EN61326-1:2006; EN61326-2-3:2006

Ordinary Location Certification for Factory Mutual

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/Class III, Division 1, Groups E, F, and G. Enclosure type NEMA 4X. Factory Sealed. Provides nonincendive RTD connections for Class I, Division 2, Groups A, B, C, and D.

I5 Intrinsically Safe for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F, and G hazardous outdoor locations and Zone 0 A Exia IIC T4.
Non-incendive for Class I, Division 2, Groups A, B, C, and D. Temperature Code T4. Factory Sealed.
For input parameters and installation see control drawing 03095-1020.

Canadian Standards Association (CSA)

E6 Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/Class III, Division 1, Groups E, F, and G. CSA enclosure Type 4X suitable for indoor and outdoor hazardous locations. Provides nonincendive RTD connection for Class I, Division 2, Groups A, B, C, and D. Factory Sealed. Install in accordance with Rosemount Drawing 03095-1024. Approved for Class I, Division 2, Groups A, B, C, and D.

I6 Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D. when installed in accordance with Rosemount drawing 03095-1021. Temperature Code T3C.

For input parameters and installation see control drawing 03095-1021.

European Certifications

I1 ATEX Intrinsic Safety
Certificate Number: BAS98ATEX1359X ⟨Ex⟩ II 1 G
Ex ia IIC T5 (T_{amb} = –45 °C to 40 °C)
Ex ia IIC T4 (T_{amb} = –45 °C to 70 °C)
CE 1180

TABLE 17. Connection Parameters (Power/Signal Terminals)

U_i = 30 V
I_i = 200 mA
P_i = 1.0 W
C_i = 0.012 µF
L_i = 0

TABLE 18. Temperature Sensor Connection Parameters

U_o = 30 V
I_o = 19 mA
P_o = 140 mW
C_i = 0.002 µF
L_i = 0

TABLE 19. Temp Sensor Terminals Connection Parameters

C_o = 0.066 µF	Gas Group IIC
C_o = 0.560 µF	Gas Group IIB
C_o = 1.82 µF	Gas Group IIA
L_o = 96 mH	Gas Group IIC
L_o = 365 mH	Gas Group IIB
L_o = 696 mH	Gas Group IIA
L_o/R_o = 247 µH/ohm	Gas Group IIC
L_o/R_o = 633 µH/ohm	Gas Group IIB
L_o/R_o= 633 µH/ohm	Gas Group IIA

Special Conditions for Safe Use

The 3095, when fitted with the transient terminal block (order code B), are not capable of withstanding the 500 V insulation test required by EN60079-11, Clause 6.3.12. This condition must be accounted for during installation.

N1 ATEX Type N
Certificate Number: BAS98ATEX3360X ⟨Ex⟩ II 3 G
Ex nL IIC T5 (T_{amb} = –45 °C to 40 °C)
Ex nL IIC T4 (T_{amb} = –45 °C to 70 °C)
U_i = 55 V
CE
The apparatus is designed for connection to a remote temperature sensor such as a resistance temperature detection (RTD).

Special Conditions for Safe Use

The 3095, when fitted with the transient terminal block (order code B), are not capable of withstanding the 500 V insulation test required by EN60079-15, Clause 6.8.1. This condition must be accounted for during installation.

E1 ATEX Flameproof
Certificate Number: KEMA02ATEX2320X ⟨Ex⟩ II 1/2 G
EEx d IIC T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
CE 1180

Special Conditions for Safe Use (x):

The device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

ND ATEX Dust
Certificate Number: KEMA02ATEX2321 ⟨Ex⟩ II 1 D
V = 55 Vdc MAX
I = 23 mA MAX
IP66
CE 1180

Combinations of Certifications

SST certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K5 E5 and I5 combination

K6 E6 and I6 combination

K1 I1, N1, E1, and ND combination

Rosemount 3095MFA with *Fieldbus*

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting our local sales office.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

3095F_2/3,4/D and 3095M_2/3,4/D Flow Transmitters

— QS Certificate of Assessment - EC No. PED-H-20 Module H Conformity Assessment

All other 3095_ Transmitters/Level Controller

— Sound Engineering Practice

Transmitter Attachments: Process Flange - Manifold

— Sound Engineering Practice

Primary Elements, Flowmeter

— See appropriate Primary Element QIG

Electro Magnetic Compatibility (EMC) (89/336/EEC)

3095 Flow Transmitters

— EN50081-1:1992; EN50082-2:1995; EN61326-1:2006; EN61326-2-3:2006

Ordinary Location Certification for Factory Mutual

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Rosemount 3095MFA Fieldbus Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/Class III, Division 1, Groups E, F, and G. Enclosure type NEMA 4X. Factory Sealed. Provides nonincendive RTD connections for Class I, Division 2, Groups A, B, C, and D.

I5 Intrinsically Safe for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F, and G hazardous outdoor locations. Non-incendive for Class I, Division 2, Groups A, B, C, and D. Temperature Code T4. Factory Sealed.

For input parameters and installation, see control drawing 03095-1020.

IE FISCO for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F, and G hazardous outdoor locations. Temperature Code T4. Factory Sealed.

For input parameters and installation see control drawing 03095-1020.

Combinations of Certifications

SST certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K5 E5 and I5 combination

Canadian Standards Association (CSA)

IF CSA FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only

European Certifications

IA ATEX FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only

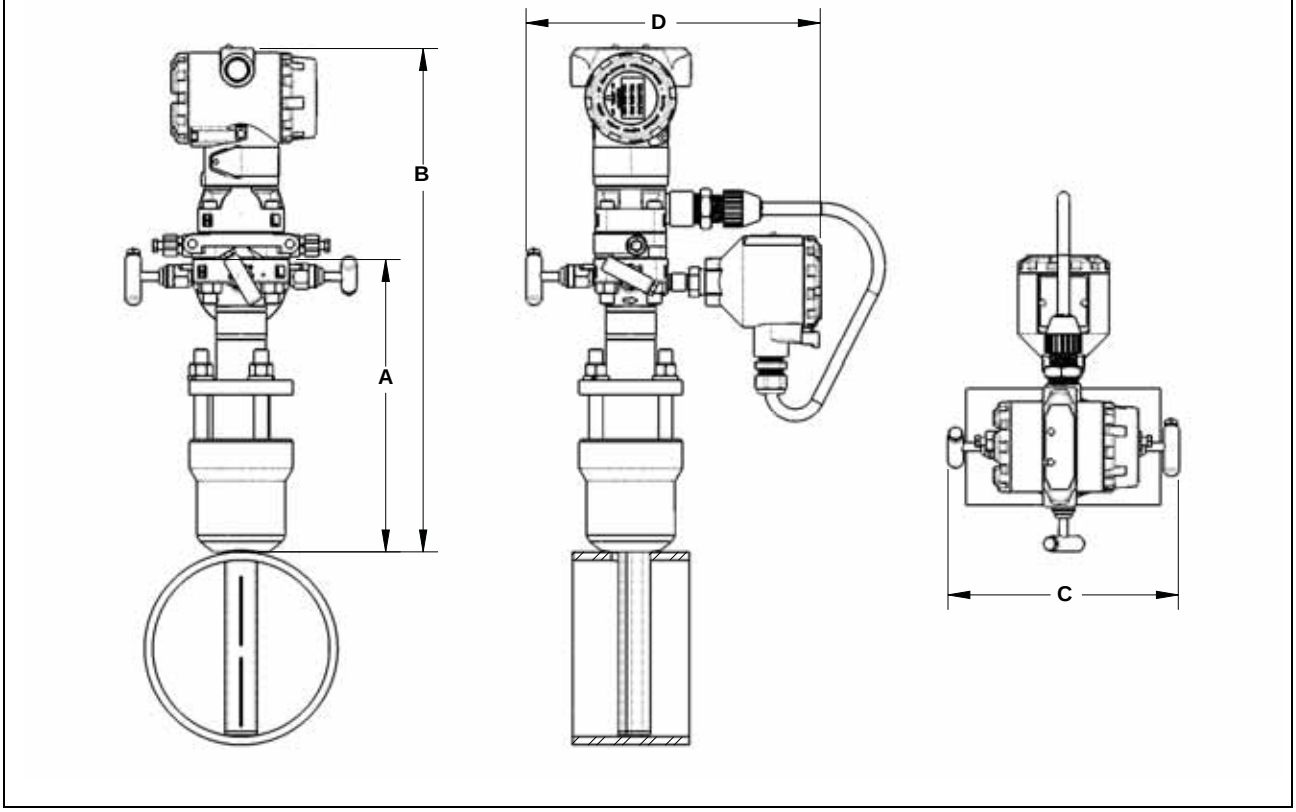
Australian Certifications

IG IECEx FISCO Intrinsic Safety

DIMENSIONAL DRAWINGS

Rosemount 3095MFA Pak-Lok Annubar Flowmeter(1)

Front View	Side View	Top View



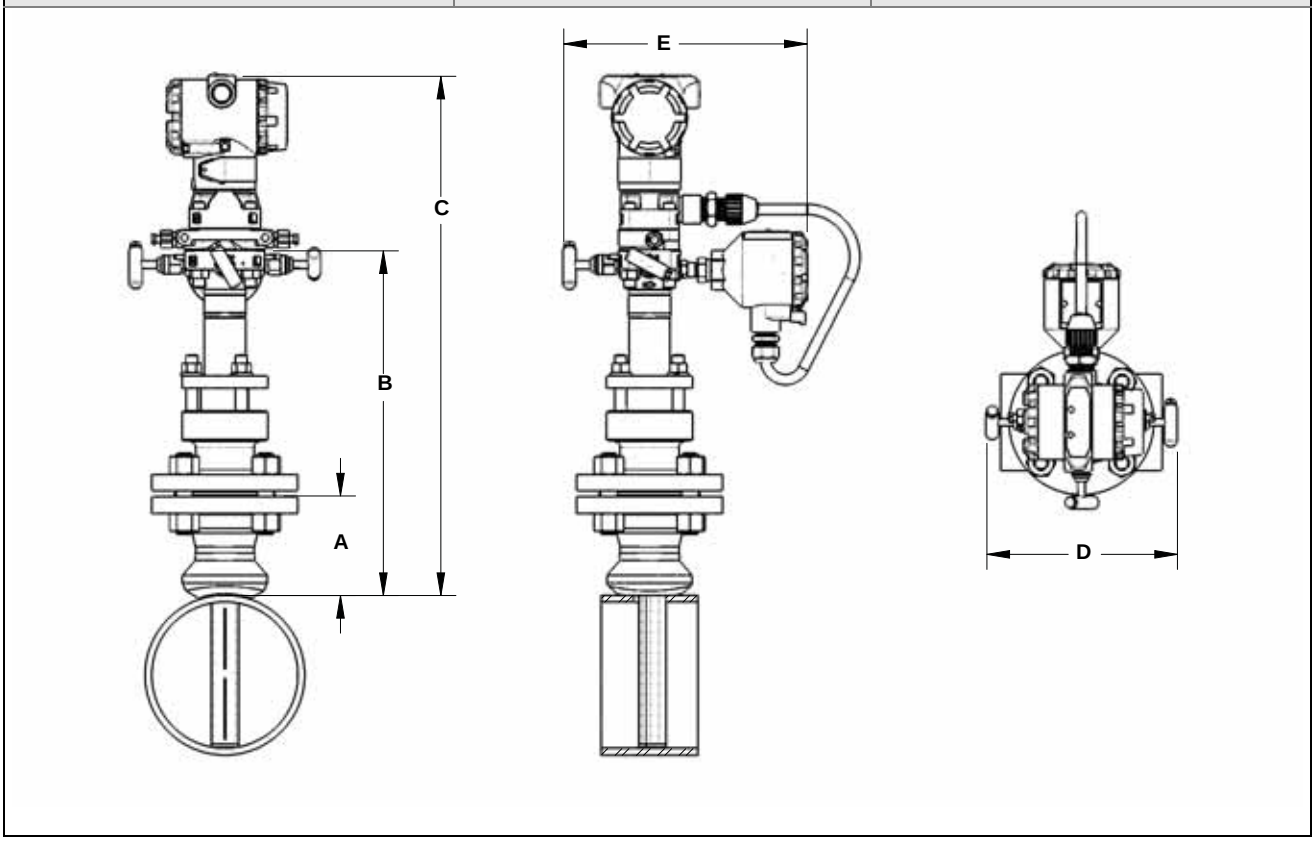
(1) The Pak-Lok Annubar model is available up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

Table 20. Pak-Lok Annubar Flowmeter Dimensional Data

Sensor Size	A (Max)	B (Max)	C (Max)	D (Max)
1	7.50 (190.5)	14.60 (370.8)	9.00 (228.6)	11.25 (285.8)
2	9.25 (235.0)	16.35 (415.3)	9.00 (228.6)	11.25 (285.8)
3	12.00 (304.8)	19.10 (485.1)	9.00 (228.6)	11.25 (285.8)
Dimensions are in inches (millimeters)				

Rosemount 3095 MultiVariable

Rosemount 3095MFA Flange-Lok Annubar Flowmeter(1)



(1) The Flange-Lok Annubar model can be direct mounted up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

Table 21. Flange-Lok Annubar Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C (Max)	D (Max)	E (Max)
1	1 1/2 – 150#	3.88 (98.6)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	11.25 (285.8)
1	1 1/2 – 300#	4.13 (104.9)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	11.25 (285.8)
1	1 1/2 – 600#	4.44 (112.8)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	11.25 (285.8)
1	DN40/PN16	3.09 (78.5)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	11.25 (285.8)
1	DN40/PN40	3.21 (81.5)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	11.25 (285.8)
1	DN40/ PN100	3.88 (98.6)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	11.25 (285.8)
2	2 – 150#	4.13 (104.9)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	11.25 (285.8)
2	2 – 300#	4.38 (111.3)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	11.25 (285.8)
2	2 – 600#	4.76 (120.9)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	11.25 (285.8)
2	DN50/PN16	3.40 (86.4)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	11.25 (285.8)
2	DN50/PN40	3.51 (89.2)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	11.25 (285.8)
2	DN50/PN100	4.30 (109.2)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	11.25 (285.8)
3	3 – 150#	4.63 (117.6)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	11.25 (285.8)
3	3 – 300#	5.00 (127.0)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	11.25 (285.8)
3	3 – 600#	5.38 (136.7)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	11.25 (285.8)
3	DN80/PN16	3.84 (97.5)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	11.25 (285.8)
3	DN80/PN40	4.16 (105.7)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	11.25 (285.8)
3	DN80/PN100	4.95 (125.7)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	11.25 (285.8)
Dimensions are in inches (millimeters)						

Rosemount 3095MFA Flanged Annubar Flowmeter

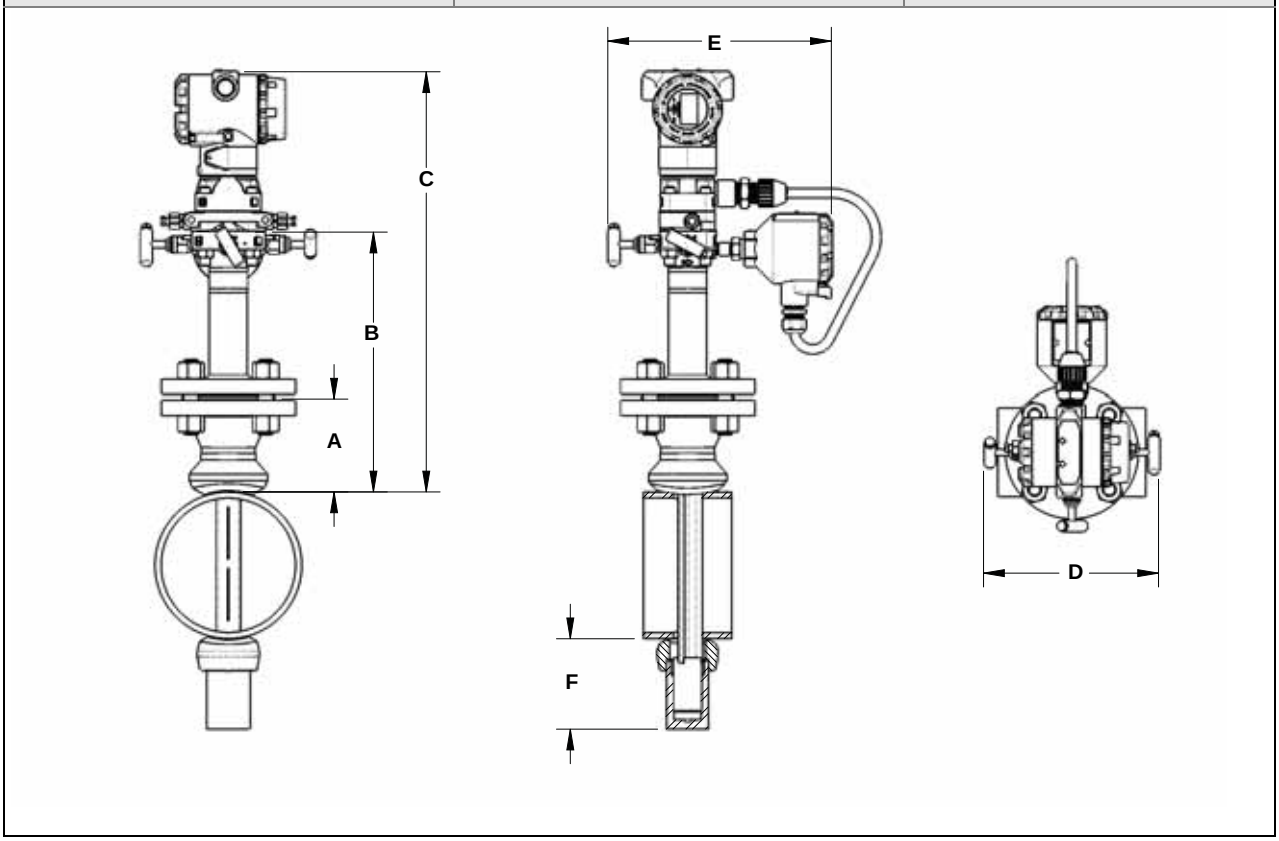


Table 22. Flanged Annubar Flowmeter Dimensional Data

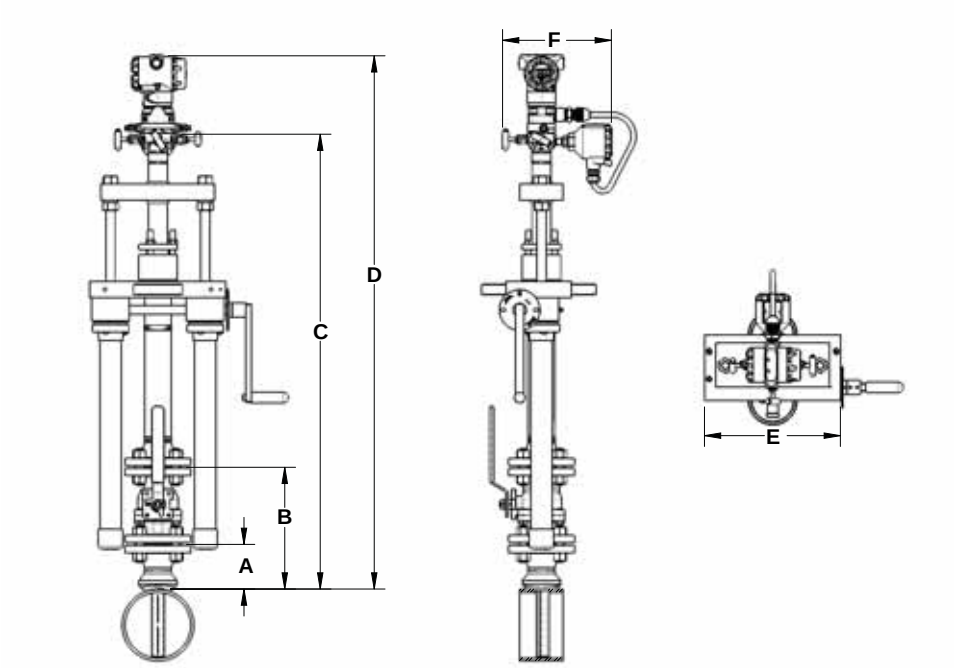
Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C ± 0.25 (6.4)	D (Max)	E (Max)	F (Max)
1	1 1/2 – 150#	3.88 (98.6)	11.00 (279.4)	18.10 (459.7)	9.00 (228.6)	11.25 (285.8)	3.50 (88.9)
1	1 1/2 – 300#	4.13 (104.9)	11.00 (279.4)	18.10 (459.7)	9.00 (228.6)	11.25 (285.8)	3.50 (88.9)
1	1 1/2 – 600#	4.44 (112.8)	11.00 (279.4)	18.10 (459.7)	9.00(228.6)	11.25 (285.8)	3.50 (88.9)
1	DN40/PN16	3.09 (78.5)	11.00 (279.4)	18.10 (459.7)	9.00 (228.6)	11.25 (285.8)	3.50 (88.9)
1	DN40/PN40	3.21 (81.5)	11.00 (279.4)	18.10 (459.7)	9.00 (228.6)	11.25 (285.8)	3.50 (88.9)
1	DN40/ PN100	3.88 (98.6)	11.00 (279.4)	18.10 (459.7)	9.00 (228.6)	11.25 (285.8)	3.50 (88.9)
1	1 1/2 – 900#	4.94 (125.5)	9.32 (236.6)	—	—	—	3.50 (88.9)
1	1 1/2 – 1500#	4.94 (125.5)	9.32 (236.6)	—	—	—	3.50 (88.9)
1	1 1/2 – 2500#	6.76 (171.7)	11.64 (295.5)	—	—	—	4.00 (101.6)
2	2 – 150#	4.13 (104.9)	12.00 (304.8)	19.10 (485.1)	9.00 (228.6)	11.25 (285.8)	5.00 (127.0)
2	2 – 300#	4.38 (111.3)	12.00 (304.8)	19.10 (485.1)	9.00 (228.6)	11.25 (285.8)	5.00 (127.0)
2	2 – 600#	4.76 (120.9)	12.00 (304.8)	19.10 (485.1)	9.00 (228.6)	11.25 (285.8)	5.00 (127.0)
2	DN50/PN16	3.40 (86.4)	12.00 (304.8)	19.10 (485.1)	9.00 (228.6)	11.25 (285.8)	5.00 (127.0)
2	DN50/PN40	3.51 (89.2)	12.00 (304.8)	19.10 (485.1)	9.00 (228.6)	11.25 (285.8)	5.00 (127.0)
2	DN50/ PN100	4.30 (109.2)	12.00 (304.8)	19.10 (485.1)	9.00 (228.6)	11.25 (285.8)	5.00 (127.0)
2	2 – 900#	5.88 (149.4)	10.51 (266.8)	—	—	—	5.00 (127.0)
2	2 – 1500#	5.88 (149.4)	10.51 (266.8)	—	—	—	5.00 (127.0)
2	3 – 2500#	9.87 (250.7)	15.62 (396.7)	—	—	—	4.50 (114.3)

Table 22. Flanged Annubar Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C ± 0.25 (6.4)	D (Max)	E (Max)	F (Max)
3	3 – 150#	4.63 (117.6)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	11.25 (285.8)	4.00 (101.6)
3	3 – 300#	5.00 (127.0)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	11.25 (285.8)	4.00 (101.6)
3	3 – 600#	5.38 (136.7)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	11.25 (285.8)	4.00 (101.6)
3	DN80/PN16	3.84 (97.5)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	11.25 (285.8)	4.00 (101.6)
3	DN80/PN40	4.16 (105.7)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	11.25 (285.8)	4.00 (101.6)
3	DN80/ PN100	4.95 (125.7)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	11.25 (285.8)	4.00 (101.6)
3	4 – 900#	8.19 (208.0)	13.44 (341.3)	—	—	—	7.00 (177.8)
3	4 – 1500#	8.56 (217.4)	13.81 (350.8)	—	—	—	7.00 (177.8)
3	4 – 2500#	11.19 (284.2)	17.32 (439.8)	—	—	—	7.00 (177.8)
	Dimensions are in inches (millimeters)						

Rosemount 3095MFA Flanged Flo-Tap Annubar Flowmeter(1)

Front View	Side View	Top View



(1) The Flanged Flo-Tap Annubar Flowmeter is available with both the manual and gear drive options.

Table 23. Flanged Flo-Tap Annubar Flowmeter Dimensional Data

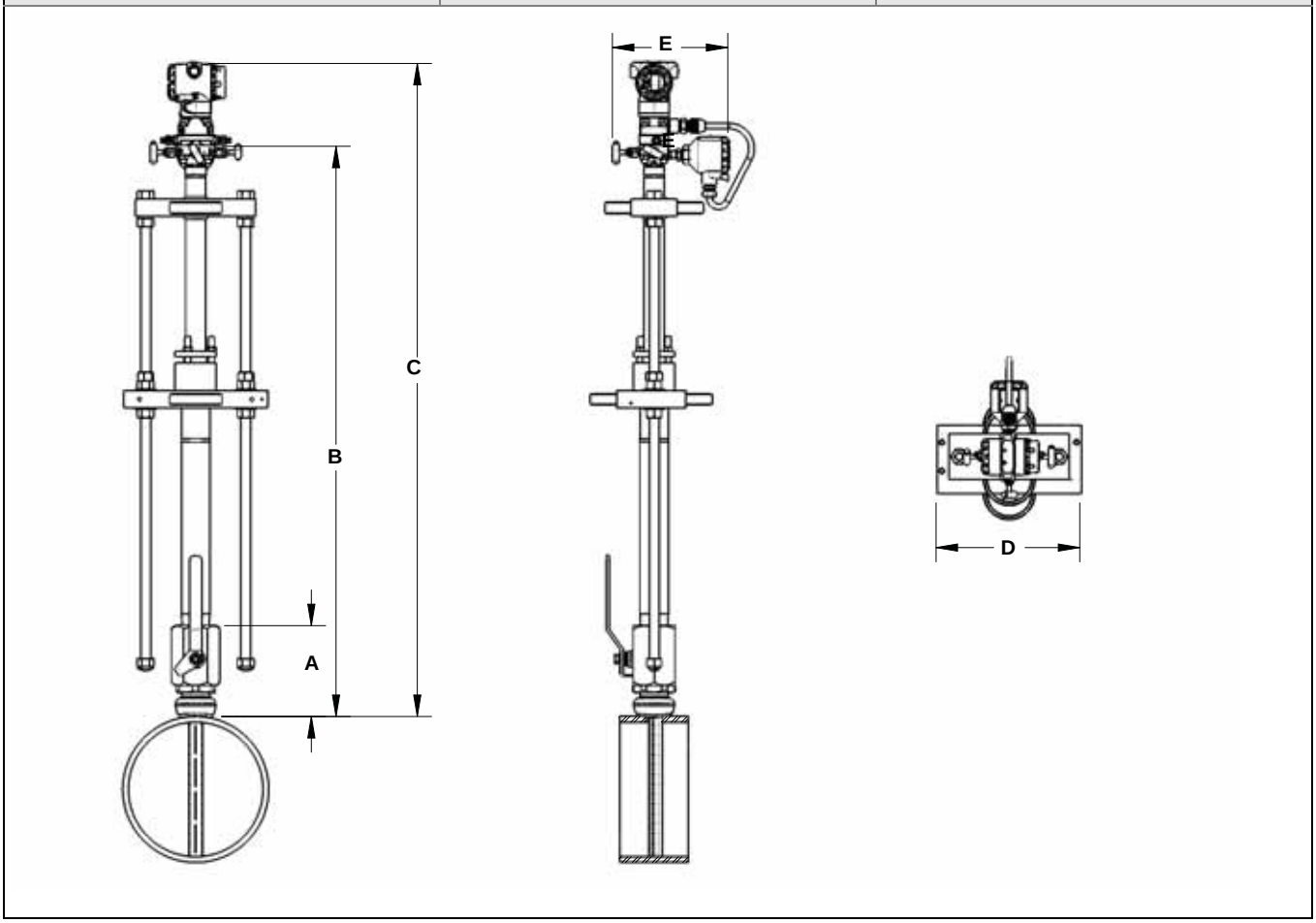
Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C^I (Max) (Gear Drive)	C^I (Max) (Manual)	D (Max)	E (Max)	F (Max)
1	1 1/2 – 150#	3.88 (98.5)	10.50 (266.7)	—	17.9 (454.7)	C + 7.10 (180.3)	10.50 (266.7)	11.25 (285.8)
1	1 1/2 – 300#	4.13 (104.9)	11.75 (298.5)	—	17.9 (454.7)	C + 7.10 (180.3)	10.50 (266.7)	11.25 (285.8)
1	1 1/2 – 600#	4.44 (112.8)	14.06 (357.2)	—	17.9 (454.7)	C + 7.10 (180.3)	10.50 (266.7)	11.25 (285.8)
1	DN40/PN16	3.09 (78.5)	See Note.	—	17.9 (454.7)	C + 7.10 (180.3)	10.50 (266.7)	11.25 (285.8)
1	DN40/PN40	3.21 (81.5)	See Note.	—	17.9 (454.7)	C + 7.10 (180.3)	10.50 (266.7)	11.25 (285.8)
1	DN40/PN100	3.88 (98.6)	See Note.	—	17.9 (454.7)	C + 7.10 (180.3)	10.50 (266.7)	11.25 (285.8)
2	2 – 150#	4.13 (104.9)	11.25 (285.8)	24.6 (624.8)	21.4 (543.6)	C + 7.10 (180.3)	12.56 (319.0)	11.25 (285.8)
2	2 – 300#	4.38 (111.3)	13.00 (330.2)	24.6 (624.8)	21.4 (543.6)	C + 7.10 (180.3)	12.56 (319.0)	11.25 (285.8)
2	2 – 600#	4.76 (120.9)	16.38 (416.0)	24.6 (624.8)	21.4 (543.6)	C + 7.10 (180.3)	12.56 (319.0)	11.25 (285.8)
2	DN50/PN16	3.40 (86.4)	See Note.	24.6 (624.8)	21.4 (543.6)	C + 7.10 (180.3)	12.56 (319.0)	11.25 (285.8)
2	DN50/PN40	3.51 (89.2)	See Note.	24.6 (624.8)	21.4 (543.6)	C + 7.10 (180.3)	12.56 (319.0)	11.25 (285.8)
2	DN50/PN100	4.30 (109.2)	See Note.	24.6 (624.8)	21.4 (543.6)	C + 7.10 (180.3)	12.56 (319.0)	11.25 (285.8)
3	3 – 150#	4.63 (117.6)	12.75 (323.9)	26.5 (673.1)	23.3 (591.8)	C + 7.10 (180.3)	14.13 (358.9)	11.25 (285.8)
3	3 – 300#	5.00 (127.0)	16.25 (412.8)	26.5 (673.1)	23.3 (591.8)	C + 7.10 (180.3)	14.13 (358.9)	11.25 (285.8)
3	3 – 600#	5.38 (136.7)	19.50 (495.4)	26.5 (673.1)	23.3 (591.8)	C + 7.10 (180.3)	14.13 (358.9)	11.25 (285.8)
3	DN80/PN16	3.84 (97.5)	See Note.	26.5 (673.1)	23.3 (591.8)	C + 7.10 (180.3)	14.13 (358.9)	11.25 (285.8)
3	DN80/PN40	4.16 (105.7)	See Note.	26.5 (673.1)	23.3 (591.8)	C + 7.10 (180.3)	14.13 (358.9)	11.25 (285.8)
3	DN80/PN100	4.95 (125.7)	See Note.	26.5 (673.1))	23.3 (591.8)	C + 7.10 (180.3)	14.13 (358.9)	11.25 (285.8)
	Dimensions are in inches (millimeters)							

Note: Customer Supplied.

Inserted, C Dimension = Pipe I.D. + Wall Thickness + B + C^I

Retracted, C Dimension = 2 x (Pipe I.D. + Wall Thickness + B) + C^I

Rosemount 3095MFA Threaded Flo-Tap Annubar Flowmeter(1)



(1) The Threaded Flo-Tap Annubar Flowmeter is available with both the manual and gear drive options.

Table 24. Threaded Flo-Tap Annubar Flowmeter Dimensional Data

Sensor Size	A ± 0.50 (12.7)	B^I (Max) (Gear Drive)	B^I (Max) (Manual)	C (Max)	D (Max)	E (Max)
1	6.76 (171.8)	—	17.40 (442.0)	B + 7.10 (180.3)	10.50 (266.7.0)	11.25 (285.8)
2	8.17 (207.5)	23.70 (602.0)	20.80 (528.3)	B + 7.10 (180.3)	12.56 (319.0)	11.25 (285.8)
Sensor Size 3 is not available in a Threaded Flo-Tap.						
Dimensions are in inches (millimeters)						

Inserted, B Dimension = Pipe I.D. + Wall Thickness + A + B^I
Retracted, B Dimension = 2 x (Pipe I.D. + Wall Thickness + A) + B^I

Rosemount 3095MFC Compact Orifice Flowmeter

Table 25. Rosemount 3095MFC Compact Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
3095MFC	Compact Orifice Flowmeter	
Primary Element Technology		
Standard		**Standard**
C	Conditioning Orifice Plate	★
P	Orifice Plate	★
Material Type		
Standard		**Standard**
S	316 SST	★
Line Size		
Standard		**Standard**
005(1)	1/2-in. (15 mm)	★
010(1)	1-in. (25 mm)	★
015(1)	1 1/2-in. (40 mm)	★
020	2-in. (50 mm)	★
030	3-in. (80 mm)	★
040	4-in. (100 mm)	★
060	6-in. (150 mm)	★
080	8-in. (200 mm)	★
100(2)	10-in. (250 mm)	★
120(2)	12-in. (300 mm)	★
Primary Element Style		
Standard		**Standard**
N	Square Edged	★
Beta Ratio		
Standard		**Standard**
040	0.40 Beta Ratio (β)	★
065(3)	0.65 Beta Ratio (β)	★
Temperature Measurement		
Standard		**Standard**
T	Integral RTD	★
0	No Temperature Sensor	★
Expanded		
R	Remote Thermowell and RTD	
Transmitter Connection Platform		
Standard		**Standard**
3	Direct-mount, 3-valve Integral Manifold, SST	★
7	Remote-mount, 1/4-in. NPT connections	★
Differential Pressure Range		
Standard		**Standard**
1	0 to 25 in H_2O (0 to 62,3 mbar)	★
2	0 to 250 in H_2O (0 to 623 mbar)	★
3	0 to 1000 in H_2O (0 to 2,5 bar)	★
Static Pressure Range		
Standard		**Standard**
B	0 – 8 to 0 – 800 psia (0 –55,16 to 0 – 5515,8 kPa)	★
C	0 – 8 to 0 – 800 psig (0 –55,16 to 0 – 5515,8 kPa)	★
D	0 – 36.2 to 0 – 3626 psia (0 –250 to 0 – 25000 kPa)	★
E	0 – 36.2 to 0 – 3626 psig (0 –250 to 0 – 25000 kPa)	★

Rosemount 3095 MultiVariable

Table 25. Rosemount 3095MFC Compact Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Output Protocol			
Standard			**Standard**
A	4–20 mA with digital signal based on HART protocol		★
V	FOUNDATION fieldbus protocol		★
	Transmitter Housing Style	**Conduit Entry Size**	
Standard			**Standard**
1A	Polyurethane-covered, Aluminum	1/2-14 NPT	★
1B	Polyurethane-covered, Aluminum	M20 x 1.5 (CM20)	★
1J	SST	1/2-14 NPT	★
1K	SST	M20 x 1.5 (CM20)	★
Expanded			
1C	Polyurethane-covered, Aluminum	G1/2	
1L	SST	G1/2	

Options (Include with selected model number)

Performance Class		
Standard		**Standard**
U3[4]	Ultra for Flow: up to ±0.70% mass flow rate accuracy, up to 10:1 turndown, 10-year stability, limited 12-year warranty	★
Plantweb Control Functionality		
Standard		**Standard**
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	★
Installation Accessories		
Standard		**Standard**
A	ANSI Alignment Ring (150#), (Only required for 10-in. (250 mm) and 12-in. (300 mm) line sizes)	★
C	ANSI Alignment Ring (300#), (Only required for 10-in. (250 mm) and 12-in. (300 mm) line sizes)	★
D	ANSI Alignment Ring (600#), (Only required for 10-in. (250 mm) and 12-in. (300 mm) line sizes)	★
G	DIN Alignment Ring (PN 16)	★
H	DIN Alignment Ring (PN 40)	★
J	DIN Alignment Ring (PN 100)	★
Expanded		
B	JIS Alignment Ring (10K)	
R	JIS Alignment Ring (20K)	
S	JIS Alignment Ring (40K)	
Remote Adapters		
Standard		**Standard**
E	Flange adapters 316 SST (1/2-in. NPT)	★
High Temperature Applications		
Expanded		
T	Graphite Valve Packing (T_{max} = 850 °F)	
Flow Calibration		
Expanded		
WC[5]	Discharge Coefficient Verification (3 point)	
WD[5]	Discharge Coefficient Verification (10 point)	
Pressure Testing		
Expanded		
P1	Hydrostatic Testing	
Special Cleaning		
Expanded		
P2	Cleaning for Special Processes	
PA	Cleaning per ASTM G93 Level D (section 11.4)	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection & Performance Certificate	★

Table 25. Rosemount 3095MFC Compact Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transmitter Calibration Certification		
Standard		**Standard**
Q4	Calibration Data Certificate for Transmitter	★
Quality Certification for Safety		
Standard		**Standard**
QS	Prior-use Certificate of FMEDA data	★
Material Traceability Certification		
Standard		**Standard**
Q8(6)	Material Traceability Certification per EN 10204:2004 3.1	★
Code Conformance		
Expanded		
J2	ANSI / ASME B31.1	
J3	ANSI / ASME B31.3	
Materials Conformance		
Expanded		
J5(7)(8)	NACE MR-0175 / ISO 15156	
Country Certification		
Expanded		
J1	Canadian Registration	
Product Certifications		
Standard		**Standard**
E5	FM Approvals Explosion-proof	★
I5	FM Approvals Intrinsic Safety and Non-Incendive	★
K5	FM Approvals Explosion-proof, Intrinsic Safety, and Non-Incendive (combination of E5 and I5)	★
E6	CSA Explosion-proof	★
I6	CSA Intrinsically Safe, Division 2	★
K6	CSA Explosion-proof, Intrinsically Safe, Division 2	★
I1	ATEX Intrinsic Safety	★
E1	ATEX Flameproof	★
N1	ATEX Type n	★
K1	ATEX Flameproof, Intrinsic Safety, Type n	★
ND	ATEX Dust	★
E4	TIIS Flameproof Certification	★
I7	IECEx Intrinsically Safe	★
Alternate Transmitter Material of Construction		
Standard		**Standard**
L1(8)	Inert Sensor Fill Fluid	★
Digital Display		
Standard		**Standard**
M5	Integral mount LCD Display	★
Terminal Blocks		
Standard		**Standard**
T1	Transient Protection	★
Manifold for Remote Mount Option		
Standard		**Standard**
F2	3-Valve Manifold, SST	★
F6	5-Valve Manifold, SST	★
Typical Model Number: 3095MFC C S 040 N 040 0 3 B A 1A		

(1) Not available for Primary Element Type code C.

(2) Requires the selection of an alignment ring option code in the Installation Accessories section.

(3) For 2-in. (50.8 mm) line sizes the Beta Ratio is 0.6 for Primary Element Type code C.

(4) Ultra for Flow applicable for HART protocol, DP ranges 2 and 3 with SST isolator material and silicone fill fluid options only.

(5) Not available with Primary Element Type code P.

(6) Instrument valves not included in Traceability Certification.

(7) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(8) Not available with DP range 1.

Rosemount 3095MFC Specifications

3095MFC Performance Specifications

System Reference Accuracy

Percent (%) of mass flow rate

TABLE 26. 3095MFCC - Conditioning Orifice Plate Technology(1)

Beta	3095MFCC (8:1 flow turndown)	3095MFCC with Ultra for Flow (10:1 flow turndown)
0.4	±1.40%	±0.90%
0.65	±1.85%	±1.25%

(1) For line sizes greater than 8 in. (200 mm), see the Rosemount DP Flowmeters and Primary Elements Product Data Sheet (document number 00813-0100-4485).

TABLE 27. 3095MFCP - Compact Orifice Plate Technology(1)

Beta	3095MFCP (8:1 flow turndown)	3095MFCP with Ultra for Flow (10:1 flow turndown)
0.4 0.65	±1.85%	±1.35%

(1) For line sizes less than 2-in. (50mm) or greater than 8 in. (200 mm), see the Rosemount DP Flowmeters and Primary Elements Product Data Sheet (document number 00813-0100-4485).

Repeatability

±0.1%

Line Sizes

- 1/2-in. (15 mm) – not available for the 3095MFCC
- 1-in. (25 mm) – not available for the 3095MFCC
- 1 1/2-in. (40 mm) – not available for the 3095MFCC
- 2-in. (50 mm)
- 3-in. (80 mm)
- 4-in. (100 mm)
- 6-in. (150 mm)
- 8-in. (200 mm)
- 10-in. (250 mm)
- 12-in. (300 mm)

Output

Two-wire 4–20 mA, user-selectable for DP, AP, GP, PT, mass flow, or totalized flow. Digital HART protocol superimposed on 4–20 mA signal, available to any host that conforms to the HART protocol.

Performance Statement Assumptions

- Measured pipe I.D.
- Electronics are trimmed for optimum flow accuracy

Sizing

Contact an Emerson Process Management representative for assistance. A Configuration Data Sheet is required prior to order for application verification.

3095MFC Functional Specifications

Service

- Liquid
- Gas
- Steam

Power Supply

4–20 mA option

- External power supply required. Standard transmitter (4–20 mA) operates on 11 to 55 Vdc with no load

Process Temperature Limits

Direct Mount Transmitter

- 450 °F (232 °C)
- 400 °F (204 °C) when top mounted in steam service

Remote Mount Transmitter

- 850 °F (454 °C) – SST

Transmitter Temperature Limits

Ambient

- -40 to 185 °F (-40 to 85 °C)
- with integral display: -4 to 175 °F (-20 to 80 °C)

Storage

- -50 to 230 °F (-46 to 110 °C)
- with integral display: -40 to 185 °F (-40 to 85 °C)

Differential Pressure Limits

Maximum differential pressure (DP) up to 800 inH_2O.

Pressure Limits(1)

Direct Mount Transmitter

- Pressure retention per ANSI B16.5 600# or DIN PN 100

Overpressure Limits

0 to 2 times the absolute pressure range with a maximum of 3626 psia (250 bar).

Static Pressure Limits

Operates within specification between static pressures of 0.5 psia (0.03 bar-A) and the URL of the static pressure sensor.

Vibration Limits

Qualified per IEC61298-3 (1998) for field with high vibration level or pipeline with high vibration level (10-60Hz 0.21mm displacement peak amplitude / 60 - 2000Hz 3g).

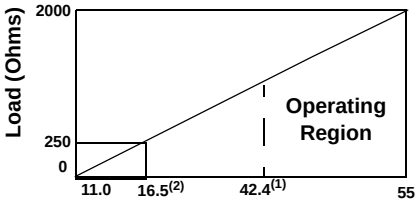
(1) Static pressure selection may effect pressure limitations.

The weight and length of the transmitter assembly shall not exceed 5.8 lbs and 7.75-in.

Load Limitations

Maximum loop resistance is determined by the voltage level of the external power supply, as described by:

$$\text{Maximum Loop Resistance} = \frac{\text{Power Supply} - 11.0}{0.022}$$



(1) For CSA approval, power supply must not exceed 42.4 Vdc.

(2) HART protocol communication requires a loop resistance value between 250-1100 ohms, inclusive.

FOUNDATION fieldbus (output option code V)

Power Supply

External power supply required; transmitters operate on 9.0 to 32.0 Vdc transmitter terminal voltage.

Current Draw

17.5 mA for all configurations (including LCD display option)

Humidity Limits

- 0–100% relative humidity

Turn-On Time

Digital and analog measured variables will be within specification 7 – 10 seconds after power is applied to the transmitter.

Digital and analog flow output will be within specifications 10 – 14 seconds after power is applied to the transmitter.

Damping

Analog output response to a step input change is user-selectable from 0 to 29 seconds for one time constant. This software damping is in addition to sensor module response time.

Failure Mode Alarm

Output Code A

If self-diagnostics detect a non-recoverable transmitter failure, the analog signal will be driven either below 3.75 mA or above 21.75 mA to alert the user. High or low alarm signal is user-selectable by internal jumper pins.

Output Code V

If self-diagnostics detect a gross transmitter failure, that information gets passed as a status along with the process variable(s).

Configuration

475 Field Communicator

- Performs traditional transmitter maintenance functions

3095 MultiVariable Engineering Assistant (EA) software package

- Contains built-in physical property database
- Enables mass flow configuration, maintenance, and diagnostic functions via HART modem (output option code A)

  Enables mass flow configuration via PCMCIA Interface for FOUNDATION fieldbus (output option code V)

Physical Properties Database

- Maintained in Engineering Assistant Software Configurator
- Physical properties for over 110 fluids
- Natural gas per AGA
- Steam and water per ASME
- Other database fluids per American Institute of Chemical Engineers (AIChE)
- Optional custom entry

FOUNDATION fieldbus Function Blocks

Standard Function Blocks

Resource Block

- Contains hardware, electronics, and diagnostic information.

Transducer Block

- Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

LCD Block

- Configures the local display.

5 Analog Input Blocks

- Processes the measurements for input into other function blocks. The output value is in engineering or custom units and contains a status indicating measurement quality.

PID Block with Auto-tune

- Contains all logic to perform PID control in the field including cascade and feedforward. Auto-tune capability allows for superior tuning for optimized control performance.

Advanced Control Function Block Suite (Option Code A01)

Input Selector Block

- Selects between inputs and generates an output using specific selection strategies such as minimum, maximum, midpoint, average, or first “good.”

Arithmetic Block

- Provides pre-defined application-based equations including flow with partial density compensation, electronic remote seals, hydrostatic tank gauging, ratio control, and others.

Signal Characterizer Block

- Characterizes or approximates any function that defines an input/output relationship by configuring up to twenty X, Y coordinates. The block interpolates an output value for a given input value using the curve defined by the configured coordinates.

Rosemount 3095 MultiVariable

Product Data Sheet
00813-0100-4716, Rev MB
Catalog 2011 - 2012

Integrator Block

- Compares the integrated or accumulated value from one or two variables to pre-trip and trip limits and generates discrete output signals when the limits are reached. This block is useful for calculating total flow, total mass, or volume over time.

Output Splitter Block

- Splits the output of one PID or other control block so that the PID will control two valves or other actuators.

Control Selector Block

- Selects one of up to three inputs (highest, middle, or lowest) that are normally connected to the outputs of PID or other control function blocks.

3095MFC Physical Specifications

Temperature Measurement

Integral RTD

- 100 Ohm platinum RTD temperature sensor assembly (316 SST Mineral Insulated Cable) with 1/4-in. NPT connection to wafer side and 1/2-in. NPT connection to transmitter RTD sensor is separated from process fluid by 1/16-in. and is pressure retaining rated for ANSI 600#. Complies with IEC-751 Class B accuracy. Meets Intrinsic Safety certification, see “Rosemount 3095MFC Specifications” on page 322.

Remote RTD

- 100 Ohm platinum with 1/2-in. NPT nipple and union (078 series with Rosemount 644 housing)
  Model 0078D21N00A025T32Ex
  Connection Head: 00644-4410-0011
- Standard RTD cable is shielded armored cable, length is 12-ft. (3.66 m)
- Remote RTD material is SST

Thermowell

- 1/2-in. x 1/2-in. NPT, 316 SST

Electronic Connections for Remote Mount

- 1/2–14 NPT, G1/2, and M20 × 1.5 (CM20) conduit. HART interface connections fixed to terminal block for output code A

Process-Wetted Parts

Integral Manifolds

- 316 SST
- Alloy C-276

Remote Manifolds

- 316 SST
- Alloy C-276

Transmitter Vent Valves and Process Flanges

- 316 SST
- Alloy C-276
- Glass-filled PTFE O-rings

Process Isolating Diaphragms

- 316L SST
- Alloy C-276

Integral Manifold O-Rings

- PTFE/Graphite

Non-Wetted Parts

Sensor Module Fill Fluid

- Silicone oil
- Inert Fill optional

Cover O-rings

- Buna-N

Remote Mounting Brackets

- SST

Electronic Housing

- Low copper aluminum, NEMA 4x, IP65
- SST (optional)

Paint

- Polyurethane

Bolts

- CS

Material of Construction

Body/Plate

- 316 SST
- 50 micro-inch Ra surface finish

Manifold Head/Valves

- 316 SST

Flange Studs and Nuts

- Customer supplied
- Available as a spare part

Transmitter Connection Studs and Nuts

- Studs– A193 Grade B8M.
- Nuts– A194 Grade 8M.

Gasket and O-rings

- Gaskets are customer supplied.
- Durlon 8500 fiber gaskets are recommended. Consult an Emerson Process Management representative for use with other gaskets.
- Available as a spare part

NOTE
Gaskets and O-rings should be replaced when the 405 is disassembled.

Transmitter Connections

Remote Mount

- Available with 1/4-in. (standard) or 1/2-in. (option code E) connections

Orifice Type

- Square edged, Wafer style

Orifice Pressure Taps

- Corner

Process Connections

Mounts between the following flange configurations

ASME B16.5 (ANSI)	DIN	JIS
Class 150	PN16 (option code G)	10k (option code B)
Class 300	PN40 (option code H)	20k (option code R)
Class 600	PN100 (option code H)	40k (option code S)

ANSI alignment ring is included as standard when ordering.

Typical Orifice Hole Sizes (For 3095MFCC)

Beta is calculated by: (β) = d_C / Pipe ID, where the calculated bore is equal to 2 x typical orifice hole size (d_C = 2d). The table below shows the diameter of each of the four typical orifice holes.

TABLE 28. β = 0.4[(1)(2)]

Line Size	3095MFCC	3095MFCP
1/2-in. (15 mm)	Not Available	0.249 (6.325)
1-in. (25 mm)	Not Available	0.420 (10.668)
1 1/2-in. (40 mm)	Not Available	0.644 (16.358)
2-in. (50 mm)	0.413 (10.490)	0.827 (21.006)
3-in. (80 mm)	0.614 (15.596)	1.227 (31.166)
4-in. (100 mm)	0.805 (20.447)	1.610 (40.894)
6-in. (150 mm)	1.213 (30.810)	2.426 (61.620)
8-in. (200 mm)	1.596 (40.538)	3.192 (81.077)
10-in. (250 mm)	2.004 (50.902)	4.008 (101.80)
12-in. (300 mm)	2.400 (60.960)	4.800 (121.92)

(1) Measurement is in inches (millimeters)

(2) Tolerance = ±0.002-in.

TABLE 29. β = 0.65[(1)(2)]

Line Size	3095MFCC	3095MFCP
1/2-in. (15 mm)	Not Available	0.404 (10.262)
1-in. (25 mm)	Not Available	0.682 (17.323)
1 1/2-in. (40 mm)	Not Available	1.047 (26.594)
2-in. (50 mm)	0.620 (15.748)[(3)]	1.344 (34.138)
3-in. (80 mm)	0.997 (25.324)	1.994 (50.648)
4-in. (100 mm)	1.308 (33.223)	2.617 (66.472)
6-in. (150 mm)	1.971 (50.063)	3.942 (100.127)
8-in. (200 mm)	2.594 (65.888)	5.188 (131.775)
10-in. (250 mm)	3.257 (82.728)	6.513 (165.43)
12-in. (300 mm)	3.900 (99.060)	7.800 (198.120)

(1) Measurement is in inches (millimeters)

(2) Tolerance = ±0.002-in.

(3) Beta (β) = 0.60-in. (15.24 mm) for 2-in. line size only.

3095MFC Weight

Line Size	Direct Mount (D3)[(1)(2)]	Remote Mount (R3)[(1)]
1/2-in. (15 mm)	9.50 (4.69)	6.3 (3.11)
1-in. (25 mm)	10.25 (5.06)	7.05 (3.48)
1 1/2-in. (40 mm)	10.75 (5.31)	7.55 (3.73)
2-in. (50 mm)	11.00 (5.43)	7.80 (3.85)
3-in. (80 mm)	13.00 (6.42)	9.80 (4.84)
4-in. (100 mm)	15.50 (7.65)	12.30 (6.07)
6-in. (150 mm)	20.45 (9.28)	17.25 (7.83)
8-in. (200 mm)	24.95 (11.32)	21.75 (9.87)
10-in. (250 mm)	30.70 (13.92)	27.50 (13.58)
12-in. (300 mm)	36.70 (16.64)	33.50 (16.54)

(1) Measurement in lb (kg).

(2) Includes 3095 MultiVariable transmitter.

3095MFC Installation Considerations

Straight Run Requirements

TABLE 30. 3095MFCC Straight Pipe Requirements[(1)]

	Beta	0.40	0.65
Upstream (inlet) side of primary	Reducer (1 line size)	2	2
	Single 90° bend or tee	2	2
	Two or more 90 ° bends in the same plane	2	2
	Two or more 90° bends in different plane	2	2
	Up to 10° of swirl	2	2
	Butterfly valve (75% to 100% open)	2	N/A
Downstream (outlet) side of primary		2	2

TABLE 31. 3095MFCP Straight Pipe Requirements[(1)(2)(3)]

	Beta	0.40	0.65
Upstream (inlet)[(2)(3)] side of primary	Reducer	5	12
	Single 90° bend or tee	16	44
	Two or more 90° bends in the same plane	10	44
	Two or more 90° bends in different plane	50	60
	Expander	12	28
	Ball / Gate valve fully open	12	18
Downstream (outlet) side of primary		6	7

(1) Consult an Emerson Process Management representative if disturbance is not listed.

(2) Recommended lengths represented in pipe diameters per ISO 5167.

(3) Refer to ISO 5167 for recommended lengths when using flow straighteners.

Pipe Orientation

Pipe orientation for both 3095MFCC Compact Conditioning Mass Orifice and standard 3095MFCP Compact Mass Orifice.

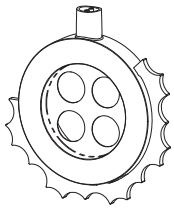
Orientation/ Flow Direction	Process[(1)]		
	Gas	Liquid	Steam
Horizontal	D/R	D/R	D/R
Vertical Up	R	D/R	R
Vertical Down	D/R	NR	NR

(1) D = Direct mount acceptable (recommended)
R = Remote mount acceptable
NR = Not recommended

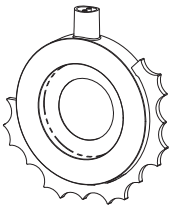
Rosemount 3095 MultiVariable

Pipe Centering

Improper centering of any orifice type device can cause an error of up to ±5% in small line sizes. A centering mechanism (centering ring) independent of flange rating comes standard with the 405 Compact Orifice Series.



3095MFCC
Conditioning Orifice

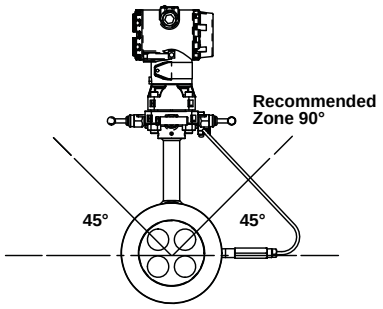


3095MFCP
Compact Orifice

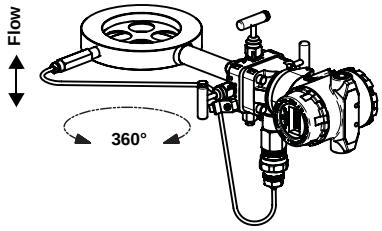
Flowmeter Orientation

Flowmeter orientation for both 3095MFC Conditioning Compact Orifice and standard Compact Orifice.

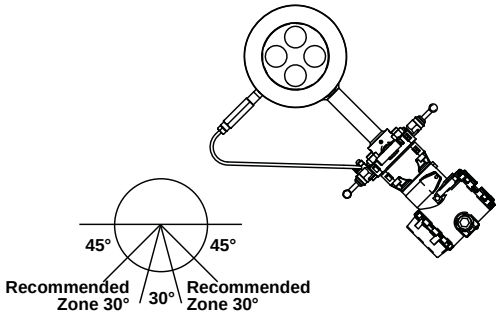
Gas (Horizontal)



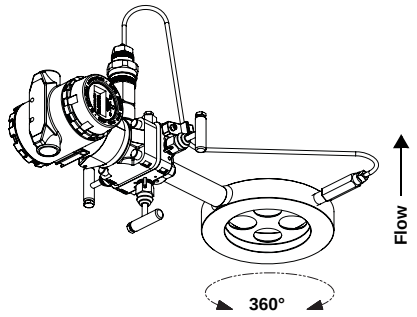
Gas (Vertical)



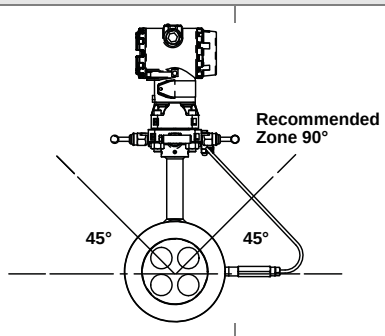
Liquid and Steam (Horizontal)



Steam (Vertical)



Top Mounting for Steam (Horizontal)



Rosemount 3095MFC Product Certifications

Rosemount 3095MFC with HART

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting our local sales office.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

3095M_2/3,4/D Flow Transmitters — QS Certificate of Assessment - EC No. PED-H-20
Module H Conformity Assessment

All other 3095_ Transmitters/Level Controller — Sound Engineering Practice

Transmitter Attachments: Process Flange - Manifold — Sound Engineering Practice

Electro Magnetic Compatibility (EMC) (89/336/EEC)

3095MV Flow Transmitters

— EN 50081-1: 1992; EN 50082-2:1995; EN61326-1:2006; EN61326-2-3:2006

Ordinary Location Certification for Factory Mutual

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/Class III, Division 1, Groups E, F, and G. Enclosure type NEMA 4X. Factory Sealed. Provides nonincendive RTD connections for Class I, Division 2, Groups A, B, C, and D.

I5 Intrinsically Safe for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F, and G hazardous outdoor locations and Zone 0 Exia IIC T4.
Non-incendive for Class I, Division 2, Groups A, B, C, and D. Temperature Code T4. Factory Sealed.
For input parameters and installation see control drawing 03095-1020.

Canadian Standards Association (CSA)

E6 Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/Class III, Division 1, Groups E, F, and G. CSA enclosure Type 4X suitable for indoor and outdoor hazardous locations. Provides nonincendive RTD connection for Class I, Division 2, Groups A, B, C, and D. Factory Sealed. Install in accordance with Rosemount Drawing 03095-1024. Approved for Class I, Division 2, Groups A, B, C, and D.

I6 Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D. when installed in accordance with Rosemount drawing 03095-1021. Temperature Code T3C.

For input parameters and installation see control drawing 03095-1021.

European Certifications

I1 ATEX Intrinsic Safety
Certificate Number: BAS98ATEX1359X ⟨Ex⟩ II 1 G
Ex ia IIC T5 (T_{amb} = –45 °C to 40 °C)
Ex ia IIC T4 (T_{amb} = –45 °C to 70 °C)
CE 1180

TABLE 32. Connection Parameters (Power/Signal Terminals)

U_i = 30 V
I_i = 200 mA
P_i = 1.0 W
C_i = 0.012 µF
L_i = 0

TABLE 33. Temperature Sensor Connection Parameters

U_o = 30 V
I_o = 19 mA
P_o = 140 mW
C_i = 0.002 µF
L_i = 0

TABLE 34. Temp Sensor Terminals Connection Parameters

C_o = 0.066 µF	Gas Group IIC
C_o = 0.560 µF	Gas Group IIB
C_o = 1.82 µF	Gas Group IIA
L_o = 96 mH	Gas Group IIC
L_o = 365 mH	Gas Group IIB
L_o = 696 mH	Gas Group IIA
L_o/R_o = 247 µH/ohm	Gas Group IIC
L_o/R_o = 633 µH/ohm	Gas Group IIB
L_o/R_o= 633 µH/ohm	Gas Group IIA

Special Conditions for Safe Use

The 3095, when fitted with the transient terminal block (order code B), are not capable of withstanding the 500 V insulation test required by EN60079-11, Clause 6.3.12 (1994). This condition must be accounted for during installation.

N1 ATEX Type N

Certificate Number: BAS98ATEX3360X ⟨Ex⟩ II 3 G

Ex nL IIC T5 (T_{amb} = –45 °C to 40 °C)
Ex nL IIC T4 (T_{amb} = –45 °C to 70 °C)

U_i = 55 V

CE

The apparatus is designed for connection to a remote temperature sensor such as a resistance temperature detection (RTD).

Special Conditions for Safe Use

The 3095, when fitted with the transient terminal block (order code B), are not capable of withstanding the 500 V insulation test required by EN60079-15, Clause 6.8.1. This condition must be accounted for during installation.

E1 ATEX Flameproof
Certificate Number: KEMA02ATEX2320X ⟨Ex⟩ II 1/2 G
EEx d IIC T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
CE 1180

Special Conditions for Safe Use (x):

The device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

ND ATEX Dust
Certificate Number: KEMA02ATEX2321 ⟨Ex⟩ II 1 D
V = 55 Vdc MAX
I = 23 mA MAX
IP66
CE 1180

Combinations of Certifications

SST certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K5 E5 and I5 combination
K6 E6 and I6 combination
K1 I1, N1, E1, and ND combination

Rosemount 3095MFC with Fieldbus

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting our local sales office.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

3095F_2/3,4/D and 3095M_2/3,4/D Flow Transmitters

— QS Certificate of Assessment - EC No. PED-H-20 Module H Conformity Assessment

All other 3095_ Transmitters/Level Controller

— Sound Engineering Practice

Transmitter Attachments: Process Flange - Manifold

— Sound Engineering Practice

Primary Elements, Flowmeter

— See appropriate Primary Element QIG

Electro Magnetic Compatibility (EMC) (89/336/EEC)

3095 Flow Transmitters

— EN 50081-1: 1992; EN 50082-2:1995; EN61326-1:2006; EN61326-2-3:2006

Ordinary Location Certification for Factory Mutual

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Rosemount 3095MFC Fieldbus Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/Class III, Division 1, Groups E, F, and G. Enclosure type NEMA 4X. Factory Sealed. Provides nonincendive RTD connections for Class I, Division 2, Groups A, B, C, and D.

I5 Intrinsically Safe for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F, and G hazardous outdoor locations. Non-incendive for Class I, Division 2, Groups A, B, C, and D. Temperature Code T4. Factory Sealed.

For input parameters and installation see control drawing 03095-1020.

IE FISCO for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F, and G hazardous outdoor locations. Temperature Code T4. Factory Sealed.

For input parameters and installation see control drawing 03095-1020.

Combinations of Certifications

SST certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K5 E5 and I5 combination

Canadian Standards Association (CSA)

IF CSA FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only

European Certifications

IA ATEX FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only

Australian Certifications

IG IECEx FISCO Intrinsic Safety

DIMENSIONAL DRAWINGS

Rosemount 3095MFC Compact Orifice Flowmeter

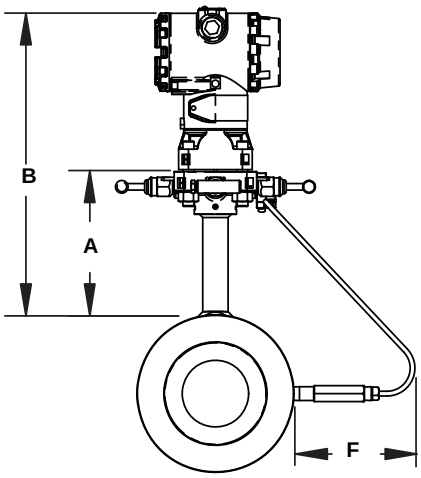
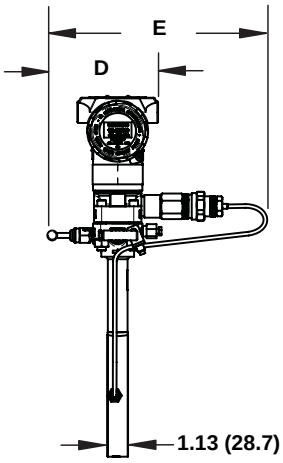
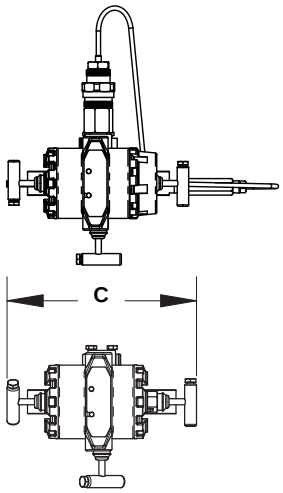
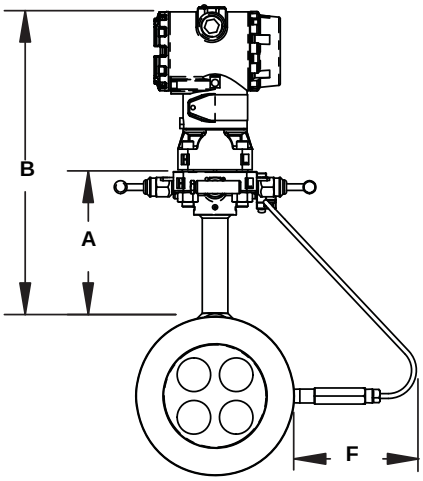
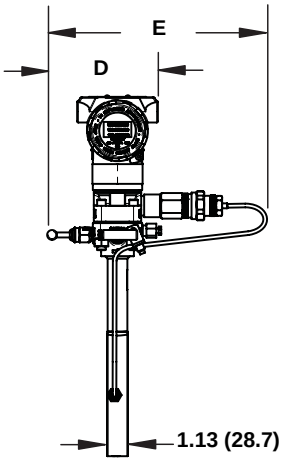
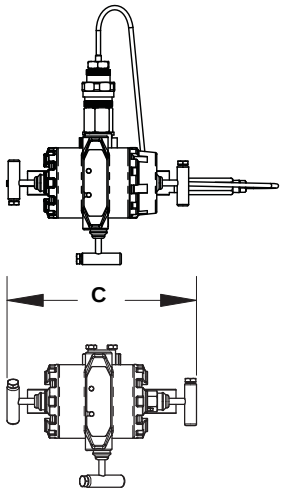
	Orifice Plate Front View	Orifice Plate Side View	Orifice Plate Top View
Compact Orifice Plate (Primary Element Type code P)			
Conditioning Orifice Plate (Primary Element Type code C)			

Table 35. Dimensional Drawings[(1)]

Plate Type[(1)]	A	B	Transmitter Height	C	D	E	F
Type P & C	5.50 (140)	Transmitter Height + A	6.25 (159)	7.75 (197) - closed 8.25 (210) - open	6.0 (152) - closed 6.25 (159) - open	Max of 11.9 (302)	Max of 7.2 (183)

(1) Measurement is in inches (millimeters).

Rosemount 3095MFP Integral Orifice Flowmeter

Table 36. Rosemount 3095MFP Integral Orifice Flowmeter

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
3095MFP	Integral Orifice Flowmeter	
Body Material		
Standard		**Standard**
S	316 SST	★
Line Size/Schedule		
Standard		**Standard**
005	1/2-in. (15 mm)	★
010	1-in. (25 mm)	★
015	1 1/2-in. (40 mm)	★
Process Connection		
Standard		**Standard**
T1	NPT Female Body (not available with thermowell and RTD, requires Temperature Sensor Code N)	★
S1(1)	Socket Weld Body (not available with thermowell and RTD, requires Temperature Sensor Code N)	★
P1	Pipe Ends: NPT threaded	★
P2	Pipe Ends: Beveled	★
D1	Pipe Ends: Flanged, RF, DIN PN16, slip-on	★
D2	Pipe Ends: Flanged, RF, DIN PN40, slip-on	★
D3	Pipe Ends: Flanged, RF, DIN PN100, slip-on	★
W1	Pipe Ends: Flanged, RF, ANSI Class 150, weld-neck	★
W3	Pipe Ends: Flanged, RF, ANSI Class 300, weld-neck	★
W6	Pipe Ends: Flanged, RF, ANSI Class 600, weld-neck	★
Expanded		
A1	Pipe Ends: Flanged, RF, ANSI Class 150, slip-on	
A3	Pipe Ends: Flanged, RF, ANSI Class 300, slip-on	
A6	Pipe Ends: Flanged, RF, ANSI Class 600, slip-on	
R1	Pipe Ends: Flanged, RTJ, ANSI Class 150, slip-on	
R3	Pipe Ends: Flanged, RTJ, ANSI Class 300, slip-on	
R6	Pipe Ends: Flanged, RTJ, ANSI Class 600, slip-on	
P9	Special Process Connection	
Orifice Plate Material		
Standard		**Standard**
S	316 SST	★
Expanded		
H	Alloy C-276	
M	Alloy 400	
Bore Size Option		
Standard		**Standard**
0066	0.066-in. (1,68 mm) for 1/2-in. pipe	★
0109	0.109-in. (2,77 mm) for 1/2-in. pipe	★
0160(2)	0.160-in. (4,06 mm) for 1/2-in. pipe	★
0196(2)	0.196-in. (4,98 mm) for 1/2-in. pipe	★
0260(2)	0.260-in. (6,60 mm) for 1/2-in. pipe	★
0340(2)	0.340-in. (8,64 mm) for 1/2-in. pipe	★
0150	0.150-in. (3,81 mm) for 1-in. pipe	★
0250(2)	0.250-in. (6,35 mm) for 1-in. pipe	★
0345(2)	0.345-in. (8,76 mm) for 1-in. pipe	★
0500(2)	0.500-in. (12,70 mm) for 1-in. pipe	★
0630(2)	0.630-in. (16,00 mm) for 1-in. pipe	★
0800	0.800-in. (20,32 mm) for 1-in. pipe	★

Table 36. Rosemount 3095MFP Integral Orifice Flowmeter

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

0295	0.295-in. (7,49 mm) for 1 1/2-in. pipe	★
0376(2)	0.376-in. (9,55 mm) for 1 1/2-in. pipe	★
0512(2)	0.512-in. (13,00 mm) for 1 1/2-in. pipe	★
0748(2)	0.748-in. (19,00 mm) for 1 1/2-in. pipe	★
1022	1.022-in. (25,96 mm) for 1 1/2-in. pipe	★
1184	1.184-in. (30,07 mm) for 1 1/2-in. pipe	★
Expanded		
0010	0.010-in. (0,25 mm) for 1/2-in. pipe	
0014	0.014-in. (0,36 mm) for 1/2-in. pipe	
0020	0.020-in. (0,51 mm) for 1/2-in. pipe	
0034	0.034-in. (0,86 mm) for 1/2-in. pipe	
Transmitter Connection Platform		
Standard		**Standard**
D3	Direct-mount, 3-valve manifold, SST	★
D5	Direct-mount, 5-valve manifold, SST	★
R3	Remote-mount, 3-valve manifold, SST	★
R5	Remote-mount, 5-valve manifold, SST	★
Expanded		
D4	Direct-mount, 3-valve manifold, Alloy C-276	
D6	Direct-mount, 5-valve manifold, Alloy C-276	
D7	Direct-mount, High Temperature, 5-valve manifold, SST	
R4	Remote-mount, 3-valve manifold, Alloy C-276	
R6	Remote-mount, 5-valve manifold, Alloy C-276	
Differential Pressure Range		
Standard		**Standard**
1	0 to 25 in H_2O (0 to 62,3 mbar)	★
2	0 to 250 in H_2O (0 to 623 mbar)	★
3	0 to 1000 in H_2O (0 to 2,5 bar)	★
Static Pressure Range		
Standard		**Standard**
B	0 – 8 to 0 – 800 psia (0 –55,16 to 0 – 5515,8 kPa)	★
C	0 – 8 to 0 – 800 psig (0 –55,16 to 0 – 5515,8 kPa)	★
D	0 – 36.2 to 0 – 3626 psia (0 –250 to 0 – 25000 kPa)	★
E	0 – 36.2 to 0 – 3626 psig (0 –250 to 0 – 25000 kPa)	★
Output Protocol		
Standard		**Standard**
A	4–20 mA with digital signal based on HART protocol	★
V	FOUNDATION fieldbus protocol	★

	Transmitter Housing Style	**Conduit Entry Size**	
Standard			**Standard**
1A	Polyurethane-covered aluminum	1/2-14 NPT	★
1B	Polyurethane-covered aluminum	M20 x 1.5 (CM20)	★
1J	SST	1/2-14 NPT	★
1K	SST	M20 x 1.5 (CM20)	★
Expanded			
1C	Polyurethane-covered aluminum	G 1/2	
1L	SST	G 1/2	

Options (Include with selected model number)

Performance Class		
Standard		**Standard**
U3(3)	Ultra for Flow: up to ±0.95% mass flow rate accuracy, up to 10:1 turndown, 10-year stability, limited 12-year warranty	★

Rosemount 3095 MultiVariable

Table 36. Rosemount 3095MFP Integral Orifice Flowmeter

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transmitter / Body Bolt Material		
Expanded		
G	High temperature (850 °F (454 °C))	
Temperature Sensor(4)		
Expanded		
N	No thermowell, Cable and RTD	
Optional Bore Calculation		
Standard		**Standard**
BC	Bore Calculation	★
Optional Connection		
Standard		**Standard**
G1	DIN 19231 Transmitter Connection	★
Pressure Testing		
Expanded		
P1(5)	Hydrostatic Testing with Certificate	
Special Cleaning		
Expanded		
P2	Cleaning for Special Processes	
PA	Cleaning per ASTM G93 Level D (section 11.4)	
Material Testing		
Expanded		
V1	Dye Penetrant Exam	
Material Examination		
Expanded		
V2	Radiographic Examination (available only with Process Connection codes W1, W3, and W6)	
Flow Calibration		
Expanded		
WD(6)	Flow Rate Calibration	
WZ(6)	Special Calibration	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection & Performance Certificate	★
Material Traceability Certification		
Standard		**Standard**
Q8(7)	Material certification per EN 10204:2004 3.1	★
Code Conformance		
Expanded		
J2(8)	ANSI / ASME B31.1	
J3(8)	ANSI / ASME B31.3	
Materials Conformance		
Expanded		
J5(9)	NACE MR-0175 / ISO 15156	
Country Certification		
Standard		**Standard**
J6	European Pressure Directive (PED)	★
Expanded		
J1	Canadian Registration	
Transmitter Calibration Certificate		
Standard		**Standard**
Q4	Calibration Data Certificate for Transmitter	★
Product Certifications		
Standard		**Standard**
E5	FM Explosion-proof	★
I5	FM Intrinsic Safety and Non-Incendive	★

Table 36. Rosemount 3095MFP Integral Orifice Flowmeter

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

K5	FM Explosion Proof, Intrinsic Safety, and Non-Incendive (combination of E5 and I5)	★
E6	CSA Explosion Proof	★
I6	CSA Intrinsically Safe, Division 2	★
K6	CSA Explosion Proof, Intrinsically Safe, Division 2	★
I1	ATEX Intrinsic Safety	★
E1	ATEX Flameproof	★
N1	ATEX Type n	★
ND	ATEX Combustible Dust	★
K1	ATEX Flameproof, Intrinsic Safety, Type n	★
I7	IECEX Intrinsically Safe	★
Alternative Transmitter Material of Construction		
Standard		**Standard**
L1	Inert Sensor Fill Fluid (not available with Static Pressure range codes B and D)	★
Digital Display		
Standard		**Standard**
M5	Integral mount LCD display	★
Terminal Blocks		
Standard		**Standard**
T1	Transient Protection	★
Typical Model Number: 3095MFP S 010 A3 S 0150 D3 1 C A 1A		

(1) To improve pipe perpendicularity for gasket sealing, socket diameter is smaller than standard pipe O.D.

(2) Best flow coefficient uncertainty is between ($0.2 < \beta < 0.6$).

(3) Ultra for Flow applicable for HART protocol, DP ranges 2 and 3 with SST isolator material and silicone fill fluid options only.

(4) Rosemount 3095MFP is supplied with an integral temperature sensor as standard. Thermowell material is the same as the body material.

(5) Does not apply to Process Connection codes T1 and S1.

(6) Not available for bore sizes 0010, 0014, 0020, or 0034.

(7) Includes certificates for mechanical and chemical properties of bodies, orifice plates, pipes, flanges, and adapters as applicable.

(8) Not available with DIN Process Connection codes D1, D2, or D3.

(9) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

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Rosemount 3095MFP Specifications

3095MFP Performance Specifications

System Reference Accuracy

Percentage (%) of mass flow rate(1)

Beta (β)(2)	Classic (8:1 flow turndown)	Ultra for Flow (10:1 flow turndown)
β < 0.1	±2.70%	±2.65%
0.1 < β < 0.2	±1.80%	±1.45%
0.2 < β < 0.6	±1.50%	±1.05%
0.6 < β < 0.8	±2.00%	±1.70%

(1) Without associated straight run piping, discharge coefficient uncertainty can add up to 1.5% - 5% additional error. Consult the factory for additional information.

(2) $\beta = \frac{\text{Orifice Plate Bore}}{\text{body I.D.}}$

Repeatability

±0.1%

Line Sizes

- 1/2-in. (15 mm)
- 1-in. (25 mm)
- 1 1/2-in. (40 mm)

Output

Two-wire 4–20 mA, user-selectable for DP, AP, GP, PT, mass flow, or totalized flow. Digital HART protocol superimposed on 4–20 mA signal, available to any host that conforms to the HART protocol.

Performance Statement Assumptions

- Measured pipe I.D
- Electronics are trimmed for optimum flow accuracy

Sizing

Contact an Emerson Process Management sales representative for assistance. A “Configuration Data Sheet” is required prior to order for application verification.

3095MFP Functional Specifications

Service

- Liquid
- Gas
- Steam

Power Supply

4–20 mA option

- External power supply required. Standard transmitter (4–20 mA) operates on 11 to 55 Vdc with no load

Process Temperature Limits

Direct Mount Transmitter

- –40 to 450 °F (–40 to 232 °C)

Remote Mount Transmitter

- –148 to 850 °F (–100 to 454 °C)(1)

(1) High temperature option code G must be selected.

Transmitter Temperature Limits

Ambient

- –40 to 185 °F (–40 to 85 °C)
- With Integral Mount LCD Display: –4 to 175 °F (–20 to 80 °C)

Storage

- –50 to 230 °F (–46 to 110 °C)
- With Integral Mount LCD Display: –40 to 185 °F (–40 to 85 °C)

Maximum Working Pressure

Transmitter

- Zero to two times the absolute pressure range with a maximum of 3626 psia (250 bar).

Flowmeter

- Pressure retention per ANSI B16.5 600 lb. or DIN PN100

TABLE 37. 1195 Pressure Limits

Line Size	Process Connection Code	Maximum Working Pressure @ 100 °F(1)(2)
1/2-in. (12.7 mm)	S1 or P2	3000 psig (207 bar)
	T1 or P1	1500 psig (103 bar)
1-in. (25.4 mm)	S1 or P2	2000 psig (138 bar)
	T1 or P1	1500 psig (103 bar)
1 1/2-in. (38.1 mm)	S1 or P2	1500 psig (103 bar)
	T1 or P1	1500 psig (103 bar)
All	Flanged	Meets flange primary pressure rating per ANSI B16.5 (EN-1092-1 for DIN flanges)

(1) For pressure ratings at temperatures less than -20 °F (-29 °C) or above 100 °F (38 °C) consult an Emerson Process Management representative.

(2) Transmitter static pressure range may limit maximum working pressure. Refer to Static Pressure Ranges specification.

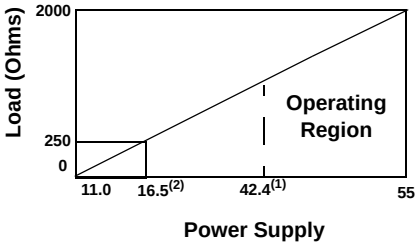
Static Pressure Limits

Operates within specification between static pressures of 0.5 psia (0.03 bar-A) and the URL of the static pressure sensor.

Load Limitations

Maximum loop resistance is determined by the voltage level of the external power supply, as described by:

$$\text{Maximum Loop Resistance} = \frac{\text{Power Supply} - 11.0}{0.022}$$



(1) For CSA approval, power supply must not exceed 42.4 Vdc.

(2) HART protocol communication requires a loop resistance value between 250-1100 ohms, inclusive.

Humidity Limits

- 0–100% relative humidity

Turn-On Time

Digital and analog measured variables will be within specification 7 – 10 seconds after power is applied to the transmitter.

Digital and analog flow output will be within specifications 10 – 14 seconds after power is applied to the transmitter.

Damping

Analog output response to a step input change is user-selectable from 0 to 29 seconds for one time constant. This software damping is in addition to sensor module response time

Failure Mode Alarm

Output Code A

If self-diagnostics detect a non-recoverable transmitter failure, the analog signal will be driven either below 3.75 mA or above 21.75 mA to alert the user. High or low alarm signal is user-selectable by internal jumper pins.

Output Code V

If self-diagnostics detect a gross transmitter failure, that information gets passed as a status along with the process variable(s).

Configuration

475 Field Communicator

- Performs traditional transmitter maintenance functions

3095 Multivariable Engineering Assistant (EA) software package

- Contains built-in physical property database
- Enables mass flow configuration, maintenance, and diagnostic functions via HART modem (output option code A)

  Enables mass flow configuration via PCMCIA Interface for FOUNDATION fieldbus (output option code V)

Physical Properties Database

- Maintained in Engineering Assistant Software Configurator
- Physical properties for over 110 fluids
- Natural gas per AGA
- Steam and water per ASME
- Other database fluids per American Institute of Chemical Engineers (AIChE)
- Optional custom entry

FOUNDATION fieldbus Function Blocks

Standard Function Blocks

Resource Block

- Contains hardware, electronics, and diagnostic information.

Transducer Block

- Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

LCD Block

- Configures the local display.

5 Analog Input Blocks

- Processes the measurements for input into other function blocks. The output value is in engineering or custom units and contains a status indicating measurement quality.

PID Block with Auto-tune

- Contains all logic to perform PID control in the field including cascade and feedforward. Auto-tune capability allows for superior tuning for optimized control performance.

Advanced Control Function Block Suite (Option Code A01)

Input Selector Block

- Selects between inputs and generates an output using specific selection strategies such as minimum, maximum, midpoint, average, or first “good.”

Arithmetic Block

- Provides pre-defined application-based equations including flow with partial density compensation, electronic remote seals, hydrostatic tank gauging, ratio control, and others.

Signal Characterizer Block

- Characterizes or approximates any function that defines an input/output relationship by configuring up to twenty X, Y coordinates. The block interpolates an output value for a given input value using the curve defined by the configured coordinates.

Integrator Block

- Compares the integrated or accumulated value from one or two variables to pre-trip and trip limits and generates discrete output signals when the limits are reached. This block is useful for calculating total flow, total mass, or volume over time.

Output Splitter Block

- Splits the output of one PID or other control block so that the PID will control two valves or other actuators.

Control Selector Block

- Selects one of up to three inputs (highest, middle, or lowest) that are normally connected to the outputs of PID or other control function blocks.

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3095MFP Physical Specifications

Temperature Measurement

Remote RTD

- 100 Ohm platinum with 1/2-in. NPT nipple and union (078 series with Rosemount 644 housing)
- Standard RTD cable is shielded armored cable, length is 12 feet (3.66 m)
- Remote RTD material is SST

Thermowell

- 1/2-in. x 1/2-in. NPT, 316 SST

Electrical Considerations

1/2–14 NPT, G1/2, and CM20 conduit. HART interface connections permanently fixed to terminal block

Material of Construction

Orifice Plate

- 316/316L SST
- Alloy C-276
- Alloy 400

Body

- 316 SST (CF8M), material per ASTM A351
- Alloy C-276 (CW12MW), material per ASTM A494

Flange and Pipe Material (If Applicable)

- A312 Gr 316/316L, B622 UNS N10276
- Flange pressure limits are per ANSI B16.5
- Flange face finish per ANSI B16.5, 125 to 250 RMS

Body Bolts/Studs

- ASTM A193 Gr B8M studs
- SAE J429 Gr 8 bolts (meets or exceeds ASTM A193 B7 requirements) for body bolt/stud material option code G for high temperatures.

Transmitter Connection Studs

- ASTM A193 Gr B8M studs

Gaskets/O-rings

- Glass filled PTFE
- Optional high temperature Inconel® X-750
- Gaskets and o-rings must be replaced each time the 3095MFP is disassembled for installation or maintenance.

Orifice Type

Square edged—orifice bore size

- 0.066-in and larger

Quadrant edged—orifice bore size (for 1/2-in. line size only)

- 0.034-in
- 0.020-in
- 0.014-in
- 0.010-in

NOTE
Integral Orifice bodies contain corner tapped pressure ports.

Pipe Lengths

- Upstream and downstream associated piping sections are available on the 1195. The table below lists the standard overall length (lay length) as a function of end connections and line size.

	Line Size		
Flanged Process Connection(1) (2) (3)	**1/2-in. (15 mm)**	**1-in. (25 mm)**	**1 1/2-in. (40 mm)**
RF, ANSI Class 150, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, ANSI Class 300, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, ANSI Class 600, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, DIN PN16, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, DIN PN40, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, DIN PN100, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RF, ANSI Class 150, weld-neck	21.8 (554)	33.2 (843)	44.9 (1140)
RF, ANSI Class 300, weld-neck	22.2 (564)	33.7 (856)	45.5 (1156)
RF, ANSI Class 600, weld-neck	22.8 (579)	34.3 (871	46.1 (1171)
RTJ, ANSI Class 150, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RTJ, ANSI Class 300, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
RTJ, ANSI Class 600, slip-on	18.2 (463)	28.9 (734)	40.3 (1023)
NPT / Beveled Process Connection(1)(2)(3)	18 (457)	28.9 (734)	40.3 (1023)

(1) See the ordering information for model code description.

(2) Consult factory for other lengths.

(3) See page Pressure-336 for additional information on associated pipe lengths.

Weight

The following weights are approximate

Line Size	With Body		With Flanged Piping(1)	
	lb	**kg**	**lb**	**kg**
1/2-in. (15 mm)	16.1	7.3	20.1	9.1
1-in. (25 mm)	18.1	8.2	24.1	10.9
1 1/2-in. (40 mm)	20.1	9.1	37.1	16.8

(1) As supplied with standard lengths, ANSI Class 150 flanges.

3095MFP Installation Considerations

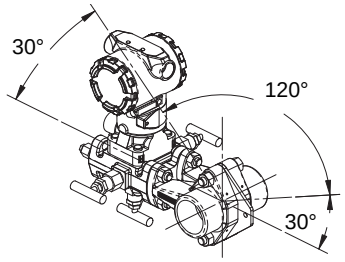
Pipe Orientation

Orientation/ Flow Direction	Process[1]		
	Gas	Liquid	Steam
Horizontal	D/R	D/R	D/R
Vertical Up	R	R	R
Vertical Down	R	NR	NR

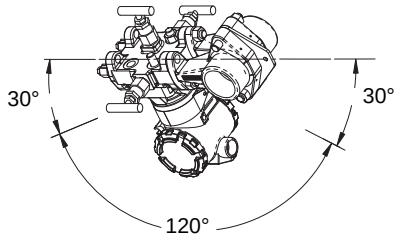
(1) D = Direct mount acceptable (recommended)
R = Remote mount acceptable
NR = Not recommended

Flowmeter Orientation

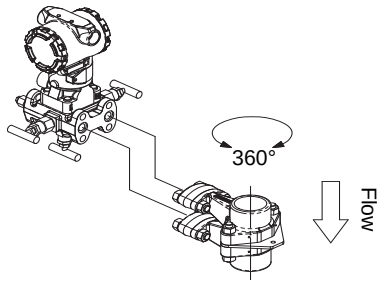
Gas (Horizontal)



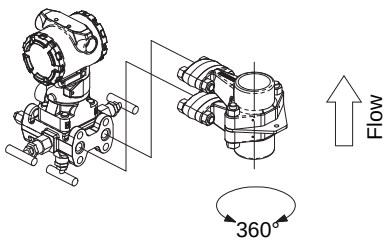
Liquid and Steam (Horizontal)



Gas (Vertical)



Liquid (Vertical)



Process-Wetted Parts

Manifolds

- 316 SST
- Alloy C-276

Manifold Option	Type	Type with J2, J3 Option
Direct Mount: D3-D6	Traditional	Traditional
Direct Mount: D7	Traditional	N/A
Remote Mount: R3-R6	Coplanar	Traditional

Transmitter Vent Valves and Process Flanges

- 316 SST
- Alloy C-276

Process Isolating Diaphragms

- 316L SST
- Alloy C-276

O-rings

- Glass-filled PTFE / Inconel X-750

Integral Manifold O-Rings

- PTFE / Graphite (D7)

Non-Wetted Parts

Electronics Housing

Low-copper aluminum alloy or SST: CF-3M (Cast 316L SST) or CF-8M (Cast 316 SST) NEMA 4X, IP 66,
IP 68 (66 ft (20 m) for 168 hours)
Note: IP 68 not available with Wireless Output

Coplanar Sensor Module Housing

SST: CF-3M (Cast 316L SST)

Sensor Module Fill Fluid

Silicone or inert halocarbon (Inert is not available with 3051S_CA). In-Line series uses Fluorinert® FC-43.

Remote Mounting Brackets

SST

Sensor mounting (including nuts, bolts, and gasket)

SST (CS optional for high temperature)

Bolts

CS

Paint

Polyurethane

Cover O-rings

Buna-N

Wireless Antenna

PBT/ polycarbonate (PC) integrated omnidirectional antenna

Power Module

Field replaceable, keyed connection eliminates the risk of incorrect installation, Intrinsically Safe Lithium-thionyl chloride Power Module with PBT enclosure

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Rosemount 3095MFP Product Certifications

Rosemount 3095MFP with HART

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting our local sales office.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

3095M_2/3,4/D Flow Transmitters — QS Certificate of Assessment - EC No. PED-H-20
Module H Conformity Assessment

All other 3095_ Transmitters/Level Controller — Sound Engineering Practice

Transmitter Attachments: Process Flange - Manifold — Sound Engineering Practice

Electro Magnetic Compatibility (EMC) (89/336/EEC)

3095MV Flow Transmitters

— EN 50081-1: 1992; EN 50082-2:1995; EN61326-1:2006; EN61326-2-3:2006

Ordinary Location Certification for Factory Mutual

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/Class III, Division 1, Groups E, F, and G. Enclosure type NEMA 4X. Factory Sealed. Provides nonincendive RTD connections for Class I, Division 2, Groups A, B, C, and D.

I5 Intrinsically Safe for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F, and G hazardous outdoor locations. Non-incendive for Class I, Division 2, Groups A, B, C, and D. Temperature Code T4. Factory Sealed.

For input parameters and installation see control drawing 03095-1020.

Canadian Standards Association (CSA)

E6 Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/Class III, Division 1, Groups E, F, and G. CSA enclosure Type 4X suitable for indoor and outdoor hazardous locations. Provides nonincendive RTD connection for Class I, Division 2, Groups A, B, C, and D. Factory Sealed. Install in accordance with Rosemount Drawing 03095-1024. Approved for Class I, Division 2, Groups A, B, C, and D.

I6 Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D. when installed in accordance with Rosemount drawing 03095-1021. Temperature Code T3C.

For input parameters and installation see control drawing 03095-1021.

European Certifications

I1 ATEX Intrinsic Safety
Certificate Number: BAS98ATEX1359X ⟨Ex⟩ II 1 G
EEx ia IIC T5 (T_{amb} = –45 °C to 40 °C)
EEx ia IIC T4 (T_{amb} = –45 °C to 70 °C)
CE 1180

TABLE 38. Connection Parameters (Power/Signal Terminals)

U_i = 30 V
I_i = 200 mA
P_i = 1.0 W
C_i = 0.012 µF
L_i = 0

TABLE 39. Temperature Sensor Connection Parameters

U_o = 30 V
I_o = 19 mA
P_o = 140 mW
C_i = 0.002 µF
L_i = 0

TABLE 40. Temp Sensor Terminals Connection Parameters

C_o = 0.066 µF	Gas Group IIC
C_o = 0.560 µF	Gas Group IIB
C_o = 1.82 µF	Gas Group IIA
L_o = 96 mH	Gas Group IIC
L_o = 365 mH	Gas Group IIB
L_o = 696 mH	Gas Group IIA
L_o/R_o = 247 µH/ohm	Gas Group IIC
L_o/R_o = 633 µH/ohm	Gas Group IIB
L_o/R_o= 633 µH/ohm	Gas Group IIA

Special Conditions for Safe Use

The 3095, when fitted with the transient terminal block (order code B), is not capable of withstanding the 500 V insulation test required by EN50 020, Clause 6.4.12 (1994). This condition must be accounted for during installation.

N1 ATEX Type N

Certificate Number: BAS98ATEX3360X ⟨Ex⟩ II 3 G

EEx nL IIC T5 (T_{amb} = –45 °C to 40 °C)
EEx nL IIC T4 (T_{amb} = –45 °C to 70 °C)

U_i = 55 V

CE

The apparatus is designed for connection to a remote temperature sensor such as a resistance temperature detection (RTD).

Special Conditions for Safe Use

The 3095, when fitted with the transient terminal block (order code B), are not capable of withstanding the 500 volts insulation test required by EN50 021, Clause 9.1 (1995). This condition must be accounted for during installation.

E1 ATEX Flameproof
Certificate Number: KEMA02ATEX2320X ⟨Ex⟩ II 1/2 G
EEx d IIC T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
CE 1180

Special Conditions for Safe Use (x):

The device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

ND ATEX Dust
Certificate Number: KEMA02ATEX2321 ⟨Ex⟩ II 1 D
V = 55 Vdc MAX
I = 23 mA MAX
IP66
CE 1180

Combinations of Certifications

SST certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K5 E5 and I5 combination

K6 E6 and I6 combination

K1 I1, N1, E1, and ND combination

Rosemount 3095MFP with *Fieldbus*

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting our local sales office.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

3095F_2/3,4/D and 3095M_2/3,4/D Flow Transmitters

— QS Certificate of Assessment - EC No. PED-H-20 Module H Conformity Assessment

All other 3095_ Transmitters/Level Controller

— Sound Engineering Practice

Transmitter Attachments: Process Flange - Manifold

— Sound Engineering Practice

Primary Elements, Flowmeter

— See appropriate Primary Element QIG

Electro Magnetic Compatibility (EMC) (89/336/EEC)

3095 Flow Transmitters

— EN 50081-1: 1992; EN 50082-2:1995; EN61326-1:2006; EN61326-2-3:2006

Ordinary Location Certification for Factory Mutual

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Rosemount 3095MFP Fieldbus Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/Class III, Division 1, Groups E, F, and G. Enclosure type NEMA 4X. Factory Sealed. Provides nonincendive RTD connections for Class I, Division 2, Groups A, B, C, and D.

I5 Intrinsically Safe for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F, and G hazardous outdoor locations. Non-incendive for Class I, Division 2, Groups A, B, C, and D. Temperature Code T4. Factory Sealed.

For input parameters and installation see control drawing 03095-1020.

IE FISCO for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F, and G hazardous outdoor locations. Temperature Code T4. Factory Sealed.

For input parameters and installation see control drawing 03095-1020.

Combinations of Certifications

SST certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K5 E5 and I5 combination

Canadian Standards Association (CSA)

IF CSA FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only

European Certifications

IA ATEX FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only

Australian Certifications

IG IECEx FISCO Intrinsic Safety

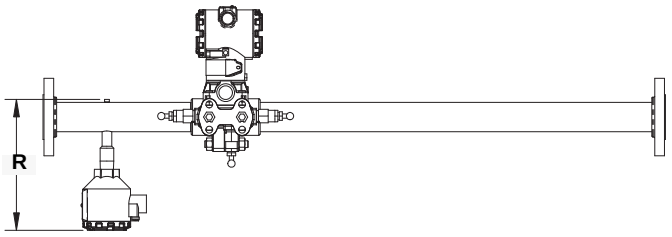
Rosemount 3095 MultiVariable

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00813-0100-4716, Rev MB
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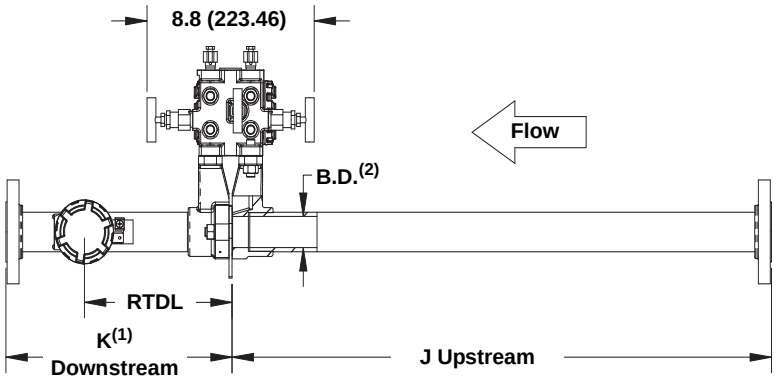
DIMENSIONAL DRAWINGS

Rosemount 3095MFP Integral Orifice Flowmeter

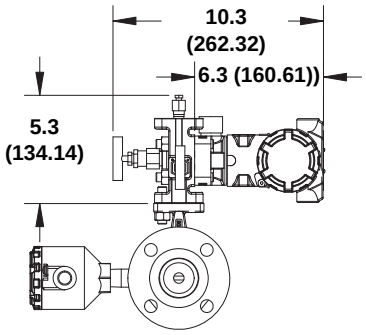
Top View



Bottom View



Side View



Dimensions are in inches (millimeters).

	Line Size					
Dimension	**1/2-in. (12.7 mm)**		**1-in. (25.4 mm)**		**1 1/2-in. (38.1 mm)**	
J (RF slip-on, RTJ slip-on, RF-DIN slip-on)	12.5-in.	318 mm	20.2-in.	513 mm	28.4-in.	721 mm
J (RF 150#, weld-neck)	14.3-in.	363 mm	22.3-in.	566 mm	30.7-in.	780 mm
J (RF 300#, weld-neck)	14.5-in.	368 mm	22.6-in.	574 mm	31.0-in.	787 mm
J (RF 600#, weld-neck)	14.8-in.	376 mm	22.9-in.	582 mm	31.3-in.	795 mm
K ((RF slip-on, RTJ slip-on, RF-DIN slip-on)(1)	5.7-in.	145 mm	8.7-in.	221 mm	11.9-in.	302 mm
K (RF 150#, weld-neck)	7.5-in.	191 mm	10.9-in.	277 mm	14.2-in.	361 mm
K (RF 300#, weld-neck)	7.7-in.	196 mm	11.1-in.	282 mm	14.5-in.	368 mm
K (RF 600#, weld-neck)	8.0-in.	203 mm	11.4-in.	290 mm	14.8-in.	376 mm
B.D.(2)	0.664-in.	16.86 mm	1.097-in.	27.86 mm	1.567-in.	39.80 mm
RTDL	3.11-in.	78.9 mm	5.25-in.	133.4 mm	7.50-in.	190.5 mm
R	7.4-in.	187.96 mm	7.8-in.	198.12 mm	8.4-in.	213.36 mm

(1) Downstream length shown here includes plate thickness of 0.162-in. (4.11 mm).

(2) B.D is diameter of the precision bored portion of the upstream and downstream piping.

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EMERSON
Process Management

Product Data Sheet
00813-0100-4738, Rev JA
Catalog 2011 - 2012

Rosemount 3095 MultiVariable™ Transmitter with MODBUS® Protocol

THE PROVEN LEADER IN MULTIVARIABLE MEASUREMENT

- *Industry leading performance with ±0.05% of DP reading accuracy*
- *Ten year stability under actual process conditions*
- *Unprecedented reliability backed by a limited 12-year warranty*
- *Four outputs from one device including Mass Flow and advanced data logging*
- *Easy integration with MODBUS protocol*
- *Coplanar™ platform enables DP Flowmeters*



CE

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Product Data Sheet
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Rosemount 3095 Product Overview



Industry leading performance with ±0.05% of DP reading accuracy

Enabled by superior sensor technology and engineered for optimal flow performance, the 3095FB delivers unprecedented reference accuracy with up to 100:1 rangeability. Superior performance results in increased measurement accuracy.

Ten year stability of 0.25%

Through aggressive testing, the 3095FB has proven its ability to maintain unprecedented performance under the most demanding conditions. Superior transmitter stability decreases calibration frequency for reduced maintenance and operation costs.

Unprecedented reliability backed by a limited 12-year warranty

Further enhance installation practices with the most reliable platform supported by a 12-year warranty.

Four outputs from one device

The advanced MultiVariable device measures three process variables simultaneously with optional calculated mass flow and advanced data logging capabilities. One device installation means reduced process penetrations, reduced inventory, and reduced installations costs.

Easily integrated with MODBUS communications

Designed for easy integration with Supervisory Control and Data Acquisition units (SCADA), Distributed Control Systems (DCS), Flow Computers or Programmable Logic Controllers (PLC) and capable of multi-dropping up to 32 transmitters on one RS-485 bus. Easy integration reduces engineering and installation costs.

Coplanar platform enables DP flowmeters

The flexible coplanar platform allows integration with the complete offering of Rosemount primary elements for any flow application. The solution arrives factory calibrated, pressure-tested, and ready to install right out of the box. Only Rosemount has a scalable coplanar transmitter design to reduce engineering and inventory costs.

Ordering Information

TABLE 1. Rosemount 3095F MultiVariable Transmitter Ordering Information

			— Not available	
			3095FB	**3095FC**
Code	**Product Description**			
Standard			**Standard**	**Standard**
3095F	MultiVariable Transmitter		★	★
Code	**Output**			
Standard			**Standard**	**Standard**
B	Process Variable Measurement: Modbus RS-485		★	—
C	Process Variable Measurement: Mass Flow and Data Logging, Modbus RS-485		—	★
Code	**Differential Pressure Ranges**			
Standard			**Standard**	**Standard**
2	0–2.5 to 0–250 inH_2O (0–6,23 to 623 mbar)		★	★
3	0–10 to 0–1000 inH_2O (0–25 mbar to 0–2,5 mbar)		★	★
Code	**Static Pressure Ranges**			
Standard			**Standard**	**Standard**
3	0.5–8 to 0.5–800 psia (0,03–0,552 to 0,03–55,2 bar)		★	★
4	0.5–36.26 to 0.5–3626 psia (0,03-2,5 to 0,03–250 bar)		★	★
C	0–8 to 0–800 psig (0–0,552 to 0–55,2 bar)		★	★
D	0–36.26 to 0–3626 psig (0-2,5 to 0–250 bar)		★	★
Isolator Material		**Fill Fluid**		
Standard			**Standard**	**Standard**
A	316L SST	Silicone	★	★
B(1)	Alloy C-276	Silicone	★	★
J(2)	316L SST	Inert	★	★
K(1)(2)	Alloy C-276	Inert	★	★
Expanded				
F	Gold-Plated 316L SST	Silicone		
D(3)	Tantalum	Silicone		—
L(3)	Tantalum	Inert		—
Flange Style		**Material**		
Standard			**Standard**	**Standard**
A	Coplanar	CS	★	★
B	Coplanar	SST	★	★
C	Coplanar	Alloy C-276(1)	★	★
J	DIN Compliant Traditional Flange, SST 10 mm Adapter/Manifold Bolting	SST, 7/16 - 20 Bolting	★	★
0	None		★	★
Drain/Vent Material				
Standard			**Standard**	**Standard**
A	SST		★	★
C(1)	Alloy C-276		★	★
0	None		★	★
O-ring				
Standard			**Standard**	**Standard**
1	Glass-filled PTFE		★	★
Process Temperature Input				
Standard			**Standard**	**Standard**
0	Fixed Process temperature (No Cable)		★	★
1	RTD Input with 12 ft. (3,66 m) of Shielded Cable		★	—
2	RTD Input with 24 ft. (7,32 m) of Shielded Cable		★	—
7	RTD Input with 75 ft. (22,86 m) of Shielded Cable		★	—
3	RTD Input with 12 ft. (3,66 m) of Armored, Shielded Cable		★	—
4	RTD Input with 24 ft. (7,32 m) of Armored, Shielded Cable		★	—
8	RTD Input with 75 ft. (22,86 m) of Armored, Shielded Cable		★	—
A	RTD Input with 12 ft. (3,66 m) of ATEX/IECEx Flameproof Cable		★	—
B	RTD Input with 24 ft. (7,32 m) of ATEX/IECEx Flameproof Cable		★	—
C	RTD Input with 75 ft. (22,86 m) of ATEX/IECEx Flameproof Cable		★	—

Rosemount 3095

Product Data Sheet
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TABLE 1. Rosemount 3095F MultiVariable Transmitter Ordering Information

			— Not available	
			3095FB	**3095FC**
Code	**Transmitter Housing Material**	**Conduit**		
Standard			**Standard**	**Standard**
A	Polyurethane-covered Aluminum	1/2–14 NPT	★	★
B	Polyurethane-covered Aluminum	M20 x 1.5 (CM20)	★	★
E	Polyurethane-covered Aluminum	3/4–14 NPT	—	★
J	SST	1/2–14 NPT	★	—
K	SST	M20 x 1.5 (CM20)	★	—
Code	**Terminal Block**			
Standard			**Standard**	**Standard**
A	Standard		★	★
B	With Integral Transient Protection		★	—
C	CE MARK/ Compliant with EMC - Transient Protection Included		★	★
Code	**Display**			
Standard			**Standard**	**Standard**
0	None		★	★
1	LCD Display		★	★
Code	**Bracket**			
Standard			**Standard**	**Standard**
0	None (required for option code S3 or S5)		★	★
1	Coplanar SST Flange Bracket for 2-in. Pipe or Panel Mount, SST Bolts		★	★
2	Traditional Flange Bracket for 2-in. Pipe Mounting, CS Bolts		★	★
3	Traditional Flange Bracket for Panel Mounting, CS Bolts		★	★
5	Traditional Flange Bracket for 2-in. Pipe Mounting, 300 Series, SST Bolts		★	★
6	Traditional Flange Bracket for Panel Mounting, 300 Series, SST Bolts		★	★
8	SST Traditional Flange Bracket for 2-in. Pipe Mounting, 300 Series, SST Bolts		★	★
9	SST Traditional Flange Flat Bracket for 2-in. Pipe Mounting, 300 Series, SST Bolts		★	★
Code	**Bolts**			
Standard			**Standard**	**Standard**
0	CS bolts		★	★
1	Austenitic 316 SST bolts		★	★
N	None		★	★
Code	**Approvals**			
Standard			**Standard**	**Standard**
0	None		★	★
A	FM Explosion-proof, Dust Ignition-proof		★	—
C	CSA Explosion-proof, Dust Ignition-proof, Division 2		★	—
M	CSA Explosion-proof (United States and Canada)		—	★
H	ATEX Flameproof		★	★
P	ATEX Dust		★	—
7	IECEx Flameproof		★	—
8	IECEx Dust		★	—
Code	**Engineered Measurement Solution**			
Standard			**Standard**	**Standard**
N	Direct Process Variable Measurement: *MODBUS* (Required for 3095FB)		★	—
C	Mass Flow with Process Variable Measurement & Data Logging: *MODBUS* (Required for 3095FC)		—	★

Options (Include with selected model number)

Configuration			
Standard		**Standard**	**Standard**
C1[4]	Custom Configuration (Requires Completed Configuration Data Sheet)	★	★
Process Adapter			
Standard		**Standard**	**Standard**
DF[5]	1/2-14 NPT Process Adapter,Type Determined by Selected Flange Material: Plated CS, SST, Cast C-276	★	★
Material Traceability Certification			
Standard		**Standard**	**Standard**
Q8	Material Traceability Certification per EN 10204 3.1B	★	★

TABLE 1. Rosemount 3095F MultiVariable Transmitter Ordering Information

		— Not available	
		3095FB	**3095FC**
Calibration Certificate			
Standard		**Standard**	**Standard**
Q4	Calibration Data Sheet	★	★
Pressure Testing			
Expanded			
P1	Hydrostatic Testing with Certificate		
Cleaning			
Expanded			
P2	Cleaning for Special Services		
Integral Manifold			
Standard		**Standard**	**Standard**
S3[6]	Assemble to Rosemount 405 Compact Orifice	★	—
S5[6]	Assemble to 305 Integral Manifold	★	★
Primary Element			
Standard		**Standard**	**Standard**
S4[6][7]	Assemble to Rosemount 485 or Rosemount 1195	★	—
Communication Board			
Standard		**Standard**	**Standard**
A1	Additional RS-232 Communication Board	—	★
Power Options			
Standard		**Standard**	**Standard**
A2	12 Vdc System with Batteries	—	★
A3	Mast with Solar Panel Assembly and 12 Vdc Batteries	—	★
Performance Class			
Standard		**Standard**	**Standard**
U3[8]	Ultra for Flow: 0.05% DP Reading Accuracy, Up to 100:1 Rangedown, 10 Yr Stability, 12 Yr Warranty	★	—
Typical Model Number: 3095F B 2 3 A B A 1 1 A B 0 1 0 A N			

(1) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(2) Only available with C or D Gage Sensor Modules.

(3) Not available with Absolute / Gage Pressure Ranges C or D.

(4) 3095FC only allows all English or all Metric units.

(5) Not available with S4 option.

(6) "Assemble-to" items are specified separately and require a completed model number.

(7) With a primary element installed, the maximum operating pressure will be the lesser of either the transmitter or the primary element.

(8) Ultra for Flow (Option U3) applicable for 3095FB DP ranges 2 and 3 with SST isolator material and silicone fill fluid only.

Specifications

Functional Specifications

Service

3095FB

- Gas, Liquid, or Steam
- DP, P, and T with MODBUS output

3095FC

- AGA 8 Natural Gas, AGA 3 Orifice Plates
- Consult factory for other fluid and primary element combinations
- DP, P, T, mass flow, and API compliant data log with MODBUS output

Differential Sensor

Limits

- Range 2: –250 to 250 inH_2O (-623 to 623 bar)
- Range 3: –1000 to 1000 inH_2O (-2,49 to 2,49 bar)

Absolute Sensor

Limits

- Range 3: 0.5 to 800 psia (0,03 to 55,2 bar)
- Range 4: 0.5 to 3,626 psia (0,03 to 250 bar)

Gage Sensor

Limits

- Range C: 0 to 800 psig (0 to 55,2 bar)
- Range D: 0 to 3,626 psig (0 to 250 bar)

Over Pressure Limit

0.5 psia (0,03 bar) to two times the absolute pressure sensor range up to a maximum of 3,626 psia (250 bar).

Static Pressure Limit

Operates within specifications between static line pressures of 0.5 psia (0,03 bar) and the URL of the absolute pressure sensor.

Power

3095FB

- Quiescent supply current 10 mA typical. Transmitting supply current not to exceed 100 mA.
- External power supply required
- Transmitter: operates on terminal voltage of 7.5 - 30 Vdc

3095FC

- Transmitter: operates on terminal voltage of 8 - 28 Vdc
- Input current: 5mA nominal, 9.5 mA at 100% duty cycle (battery charging not included)
- Internal battery: rechargeable, Nominal 6.2 Vdc (2.5 Amp/hr)
- Maximum power consumption: 19 watts
- Solar panel input: nominal 8 V to 200 mA
- Solar panel output: 2 watts, 9 V nominal
- External charging input: 12 Vdc max (8 - 10 Vdc nominal)

RS-485 Signal Wiring

2-wire half-duplex RS-485 *MODBUS* with 8 data bits, 1 stop bit, and no parity

Bus Terminations

Standard RS-485 bus terminations required per EIA-485.

Failure Mode Alarm

If self-diagnostics detect a gross transmitter failure, non-latched status bits are set in the transmitter alarm registers.

Humidity Limits

3095FB

- 0 – 100% relative humidity

3095FC

- 0 – 95%, non condensing

Communications

PC-Based User Interface Software

Baud Rate: 3095FB - 1200 to 9600 User selectable
3095FC - 600 to 19.2K User selectable

Host: 3095FB - RS485 (MODBUS)
3095FC - RS485 (MODBUS) or RS-232 Direct Connect

User Interface Software and Hardware Requirements:

3095FB

- IBM-compatible PC
- 10 MB of available hard drive space
- Microsoft® Windows® 98 or higher operating system
- CD-ROM drive
- 32 MB of RAM

3095FC

- IBM-compatible PC
- 1 MB of RAM
- Pentium-grade processor: 233 MHz or faster
- Microsoft Windows 98 or higher operating system
- CD-ROM drive

Temperature Limits

Process (at transmitter isolator flange for atmospheric pressures and above):

3095FB

- With standard Silicon Fill Sensor: –40 to 250 °F (–40 to 121 °C)
- Inert Fill Sensor: 0 to 185 °F (-18 to 85 °C).
- Process temperatures above 185 °F (85 °C) requires derating the ambient limits by a 1.5:1 ratio.

3095FC

- With standard Silicon Fill Sensor: –40 to 212 °F (–40 to 100 °C)
- Inert Fill Sensor: 0 to 185 °F (-18 to 85 °C).
- Process temperatures above 185 °F (85 °C) requires derating the ambient limits by a 1.5:1 ratio.

Ambient:

3095FB

- With Standard Silicon Fill Sensor: –40 to 185 °F (–40 to 85 °C)
- With LCD Display[(1)]: -40 to 175 °F (-40 to 80 °C)

3095FC

- –40 to 167 °F (–40 to 75 °C)
- With LCD Display: -4 to 167 °F (-20 to 75 °C)

Storage:

3095FB

- –50 to 212 °F (–46 to 100 °C)
- With LCD Display: -40 to 185 °F (-40 to 85 °C)

3095FC

- –50 to 185 °F (–46 to 85 °C)
- With LCD Display: -40 to 185 °F (-40 to 85 °C)

(1) LCD Display may not be readable and LCD updates will be slow at temperatures below -4 °F (-20 °C).

Turn-on Time

Process variables will be within specifications less than 4 seconds after power is applied to transmitter.

Damping (3095FB only)

Response to step input change can be user-selectable from 0.1 to 30 seconds for one time constant. This is in addition to sensor response time of 0.2 seconds.

Filtering (3095FC only)

Response to step input change can be filtered by user entered percentage of add value to be used.

(Last Value X Entered %) + [New Value X (100 - Entered %)] = Filtered Value

Real Time Clock (3095FC only)

- Year / month / day / hour / minute / second
- Battery backed

Performance Specifications

(Zero-based spans, reference conditions, silicone oil fill, 316 SST isolating diaphragms, and digital trim values equal to the span end points.)

Specification Conformance

The Rosemount 3095 maintains a specification conformance of measured variables to at least 3σ.

Differential Pressure

Range 2

0–2.5 to 0–250 inH_2O (0-6,23 to 623 mbar)
(100:1 rangeability is allowed)

Range 3

0–10 to 0–1000 inH_2O(0-25 mbar to 0-2,5 bar)
(100:1 rangeability is allowed)

Accuracy (including Linearity, Hysteresis, Repeatability)

Range 2-3: 3095FB Ultra for Flow (Option U3)[(1)]

- ±0.05% of DP reading up to 3:1 DP turndown from URL
- For DP turndowns up to 100:1 from URL

$$\text{Accuracy} = \pm \left[0.05 + 0.0145\left(\frac{\text{URL}}{\text{DP Reading}}\right)\right] \text{ \% of DP Reading}$$

Range 2-3: 3095FB and 3095FC

- ±0.075% of span for spans from 1:1 to 10:1 URL
- For spans less than 10:1 rangedown

$$\text{Accuracy} = \pm\left[0.025 + 0.005\left(\frac{\text{URL}}{\text{Span}}\right)\right] \text{\% of span}$$

Ambient Temperature Effect per 50 °F (28 °C)

Range 2-3: 3095FB Ultra for Flow (Option U3)[(1)]

- ±0.130% of DP reading up to 3:1 DP turndown URL
- ±[0.05 + 0.0345 (URL/DP Reading)]% of DP Reading up to 100:1 DP turndown from URL

Range 2-3: 3095FB and 3095FC

- ±(0.025% URL + 0.125% span) spans from 1:1 to 30:1
- ±(0.035% URL - 0.175% span) spans from 30:1 to 100:1

Static Pressure Effects

- Zero error = ±0.05% of URL per 1000 psi (68,95 bar)
- Span error = ±0.20% of DP Reading per 1000 psi (68,95 bar)

Stability

Range 2-3: 3095FB Ultra for Flow (Option U3)[(1)]

- ±0.25% of URL for 10 years for ±50 °F (28 °C) temperature changes, and up to 1000 psi (68,95 bar) line pressure

Range 2-3: 3095FB and 3095FC

- ±0.125% of URL for five years for ±50 °F (28 °C) ambient temperature changes, and up to 1000 psi (68,95 bar) line pressure.

Absolute/Gage Pressure

Absolute (100:1 rangeability allowed)

Range 3

0.5–8 to 0.5–800 psia (0,03-0,552 to 0,03-55,2 bar)

Range 4

0.5–36.26 to 0.5–3,626 psia (0,03-2,5 to 0,03-250 bar)

Gage (100:1 rangeability allowed)

Range C

0–8 to 0–800 psig (0-0,552 to 0-55,2 bar)

Range D

0–36.26 to 0–3,626 psig (0-2,5 to 0-250 bar)

Ambient Temperature Effect per 50 °F (28 °C)

- ±(0.05% URL + 0.125% of span) spans from 1:1 to 30:1
  ±(0.06% URL – 0.175% of span) spans from 30:1 to 100:1

(1) Ultra for Flow (Option U3) applicable for 3095FB DP ranges 2 and 3 with SST isolator material and silicone fill fluid only.

Rosemount 3095

Stability

±0.125% of URL for five years for ±50 °F (28 °C) ambient temperature changes.

Accuracy (including Linearity, Hysteresis, Repeatability)

- ±0.075% of span for spans from 1:1 to 10:1 of URL
- For spans less than 10:1 rangedown,

$$\text{Accuracy} = \pm\left[0.03 + 0.0075\left(\frac{\text{URL}}{\text{Span}}\right)\right]\% \text{ of span}$$

Process Temperature (RTD)

Specification for process temperature is for the transmitter portion only. Sensor errors caused by the RTD are not included. The transmitter is compatible with any PT100 RTD conforming to IEC 751 Class B, which has a nominal resistance of 100 ohms at 0 °C and $\propto$ = 0.00385. Examples of compatible RTDs include the Rosemount Series 68 and 78 RTD Temperature Sensors.

Sensing Range

3095FB

- –300 to 1500 °F (–184 to 816 °C)

3095FC

- –40 to 464 °F (–40 to 240 °C)

Accuracy (including Linearity, Hysteresis, Repeatability)

- ±1.0 °F (0.56 °C) for process temperatures from –300 to 1200 °F (–184 to 649 °C)
- For process temperatures above 1200 °F (649 °C), add ±1.0 °F (0.56 °C) per 100 °F (38 °C)

Ambient Temperature Effects per 50 °F (28 °C)

3095FB

- ±0.72 °F (0.40 °C) for process temperatures from –40 to 185 °F (–40 to 85°C)
- (±1.28 °F (0.72 °C) + 0.16% of reading) for process temperatures from 185 to 1500 °F (85 to 816 °C)

3095FC

- ±0.90 °F (0.50 °C) for process temperatures from –40 to 464°F (–40 to 240°C)

Stability

±1.0 °F (0.56 °C) for one year

Physical Specifications

Electrical Connections

- ½–14 NPT, M20 x 1.5 (CM20), PG-13.5
- $^3/_4$–14 NPT (3095FC only)

RTD Process Temperature Input:

100-ohm platinum RTD per IEC-751 Class B

Process Connections

- Transmitter: ¼–18 NPT on $2^1/_8$-in. centers
- RTD: RTD dependent (see ordering information)

Radiated/Conducted Transmissions

Meets requirements of IEC 61326

Process Wetted Parts

Isolating Diaphragms

- 316L SST or Alloy C-276

Drain/Vent Valves

- 316 SST or Alloy C-276

Flanges

- Plated carbon steel, 316 SST, or Cast C-276

Wetted O-rings

- Glass-Filled PTFE

Non-Wetted Parts

Electronics Housing

- Low copper aluminum

Bolts

- Plated carbon steel per ASTM A449, Grade 5; or austenitic 316 SST

Fill Fluid

- Silicone oil
- Inert oil (available for gage pressure ranges only)

Paint

- Polyurethane

O-rings

- Buna-N

Battery (3095FC only)

- Lead-acid, rechargeable

Weight

Components	Weight in lb. (kg)	
	3095FB	3095FC
3095 Transmitter	6.0 (2.7)	11.5 (5.2)
LCD Meter	0.5 (0.2)	0.6 (0.3)
SST Mounting Bracket	1.0 (0.5)	1.0 (0.5)
12 ft (3.66 m) RTD Shielded Cable	0.5 (0.2)	–
12 ft (3.66 m) RTD Armored Cable	1.1 (0.5)	–
24 ft (7.32 m) RTD Shielded Cable	1.0 (0.4	–
24 ft (7.32 m) RTD Armored Cable	2.2 (1.0)	–
75 ft (22.86 m) RTD Shielded Cable	1.9 (0.9)	–
75 ft (22.86 m) RTD Armored Cable	7.2 (3.2)	–
12 ft (3.66 m) RTD ATEX/IECEx Cable	2.1 (0.9)	–
24 ft (7.32 m) RTD ATEX/IECEx Cable	3.0 (1.4)	–
75 ft (22.86 m) RTD ATEX/IECEx Cable	4.8 (2.2)	–
Battery / Solar panel	–	2.0 (0.9)
Battery Backup	–	1.3 (0.6)

3095FC Memory Specifications

Programmable Memory

2 MB x 8 flash EPROM

Data Memory

512 kB SRAM

Boot Memory

128 kB flash EPROM

History Database

The history database archives measured and calculated values for on-demand viewing or saving to a file. Each point in the historical database can be configured to archive the current value, average value, totalized value, or accumulated value.

Up to 35 standard history points provided, with archiving of min/max (for today and yesterday), minute (for last 60 minutes), hourly and daily values (for last 35 days). The first 8 of these are non-configurable.

Up to 15 extended history points provided with archiving of up to 5040 entries at 1, 2, 3, 4, 5, 10, 12, 15, 20, 30, or 60 minute intervals.

Memory Logging

- 240 alarms before rollover
- 240 events before rollover

3095FC Flow Specifications

Flow Calculation:

- Computed in accordance with ANSI/API 2530-92 (AGA 3, 1992), API 14.2 (AGA 8, 1992), and API 21.1. Detail, Gross I, Gross II.

Product Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting our local sales office.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

3095F_2/3,4/D Flow Transmitters — QS Certificate of Assessment - EC No. PED-H-100 Module H Conformity Assessment

All other 3095_ Transmitters/Level Controller — Sound Engineering Practice

Transmitter Attachments: Process Flange - Manifold — Sound Engineering Practice

Electro Magnetic Compatibility (EMC) (2004/108/EC)

3095F Flow Transmitters - EN61326-1:2006, EN61326-2-3:2006

Ordinary Location Certification for Factory Mutual

As standard, the Rosemount 3095FB transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Hazardous Locations Certifications

North American Certifications

FM Approvals

A 3095FB
Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/III, Division 1, Groups E, F, and G, hazardous locations. Factory Sealed. Provides non-incendive RTD connections for Class I, Division 2, Groups A, B, C, and D. Install per Rosemount drawing 03095-1025. Enclosure Type 4X.

Canadian Standards Association (CSA) - Canada only

C 3095FB
Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/III, Division 1, Groups E, F, and G, hazardous locations. CSA enclosure Type 4X. Factory Sealed. Provides a non-incendive RTD Connection for Class I, Division 2, Groups A, B, C, and D. Suitable for use in Class I, Division 2, Groups A, B, C, and D. Install in accordance with Rosemount Drawing 03095-1024.

Canadian Standards Association (CSA) - U.S. and Canada

M 3095FC
Explosion-Proof for Class I, Division 1, Groups C and D including optional solar panel: mast option: Suitable for use in Class I, Division 2, Groups A, B, C, D, and T3. CSA Enclosure Type 4.

European Certifications

H **ATEX Flameproof**
3095FB
Certificate Number: KEMA02ATEX2320X ⟨Ex⟩ II 1/2 G
EEx d IIC T5 (-50°C ≤ T_{amb} ≤ 80°C)
T6 (-50°C ≤ T_{amb} ≤ 65°C)
V_{max} = 55V dc
CE 1180
Special Conditions for Safe Use (x):
The device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

3095FC
Certificate Number: LCIE05ATEX6057X ⟨Ex⟩ II 2 G
EEx d IIB T5
V_{max} = 28V dc
IP66
CE 1180
Special Conditions for Safe Use (x):
Operating ambient temperature: -40°C to 75°C
The users have to make sure that the thermal fluid transfer doesn't overheat the equipment to a temperature corresponding to the spontaneous combustion temperature of surrounding gas.

P **ATEX Dust**
3095FB
Certificate Number: KEMA02ATEX2321 ⟨Ex⟩ II 1 D T90°C
Ambient Temp (-50°C ≤ T_{amb} ≤ 80°C**)**
V = 55 Vdc MAX
I = 23 mA MAX
IP66
CE 1180

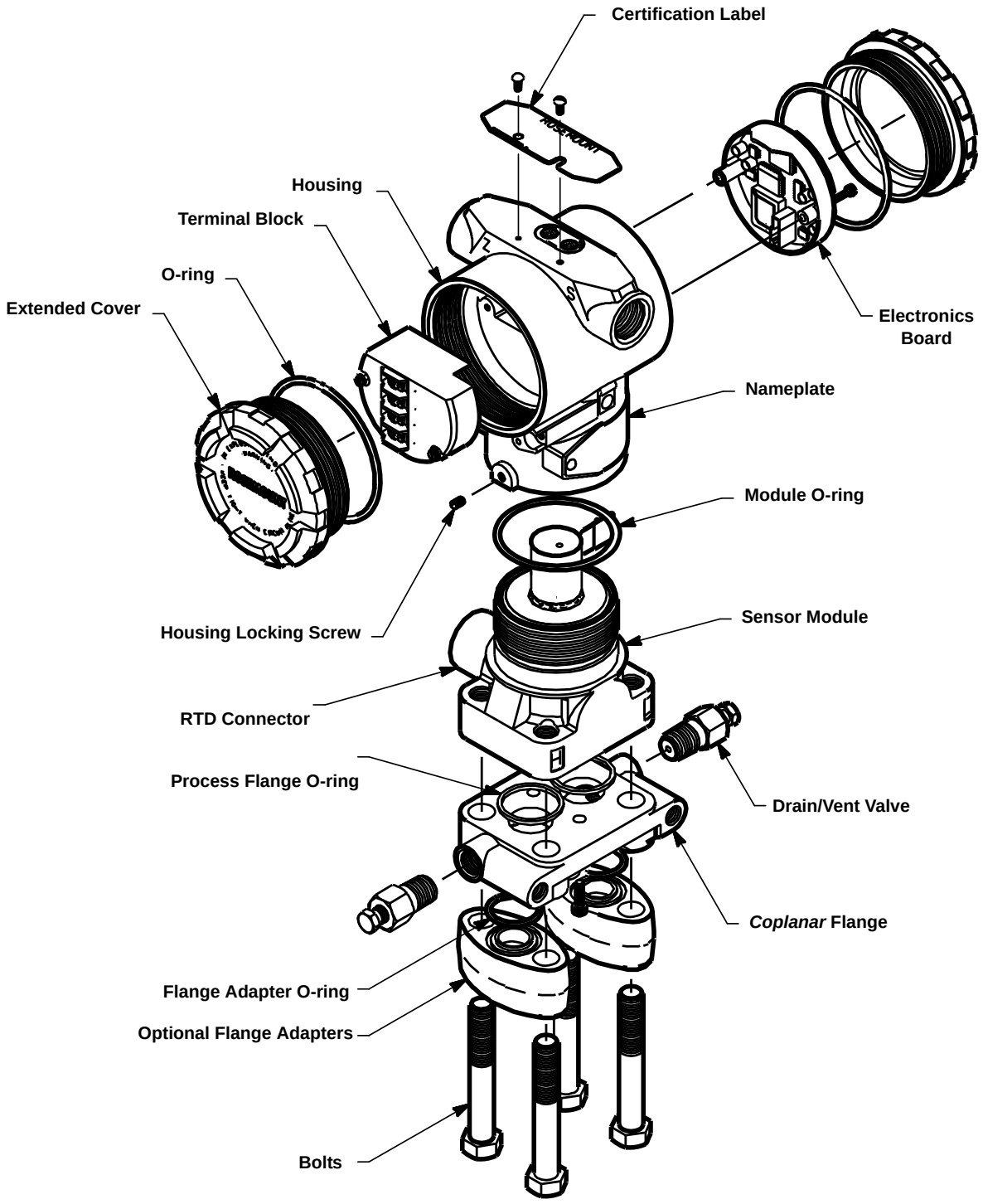
IECEx Certifications

7 **IECEx Flameproof**
3095FB
Certificate Number: IECEx KEM 06.0018
Zone 0/1 Ex d IIC T6 (-20°C ≤ T_a ≤ 65°C)
Zone 0/1 Ex d IIC T5 (-20°C ≤ T_a ≤ 80°C)
V_{max} = 55 Vdc
I_{max} = 23 mAdc

8 **IECEx Dust**
3095FB
Certificate Number: IECEx KEM 06.0018
Ex tD A22 T90°C
IP66

Dimensional Drawings

Exploded View of 3095FB Transmitter

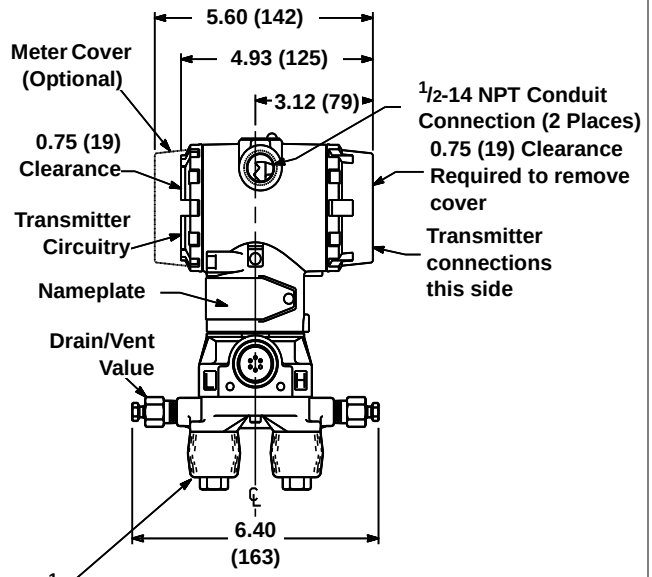


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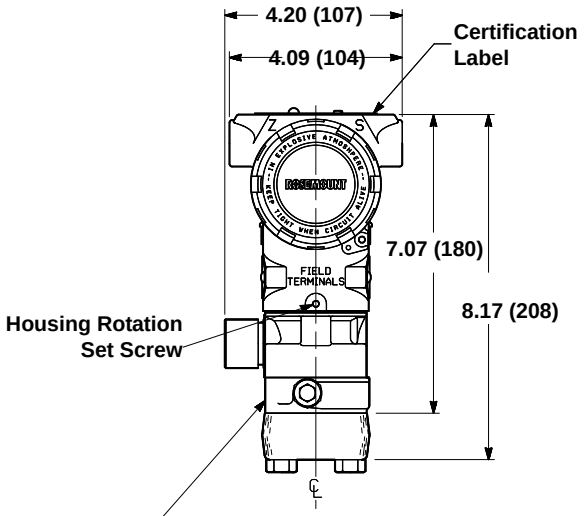
3095FB

Side View



1/2-14 NPT on Optional Mounting Adapters. Adapters Can be Rotated to Give Connection Centers of 2.00 (51), 2.125 (54), or 2.25 (57)

Front View

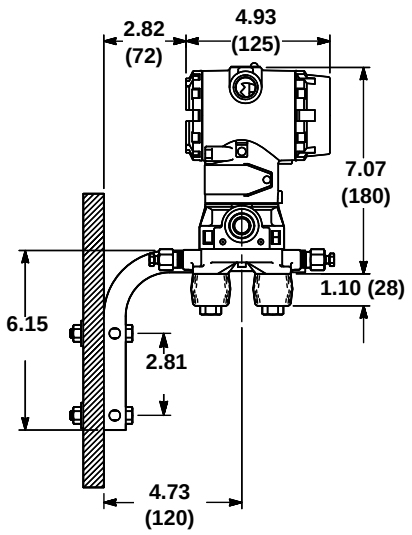


1/4-18 NPT on *Coplanar* Flange for Pressure Connection without the use of Mounting Adapters

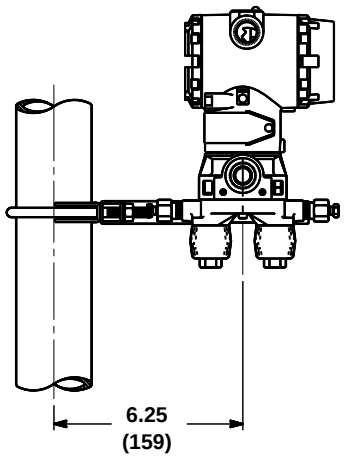
Dimensions are in inches (millimeters)

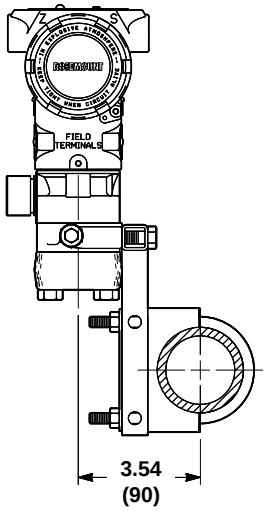
Mounting Configurations for 3095FB Transmitter

Panel Mount



Pipe Mount

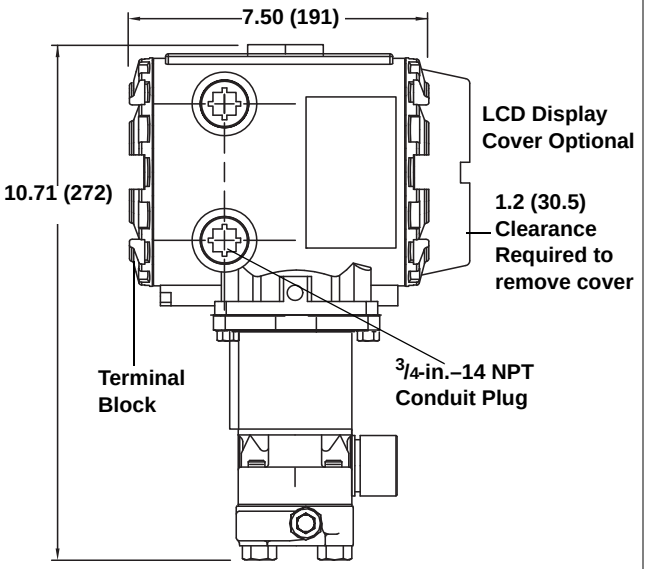




Dimensions are in inches (millimeters)

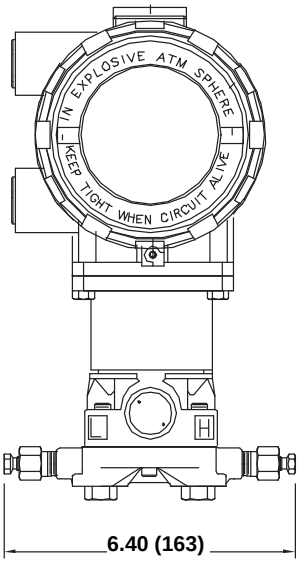
3095FC

Side View

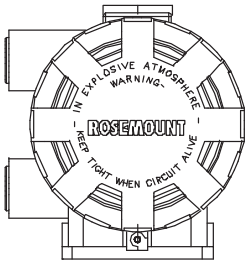


Front View

With LCD Display



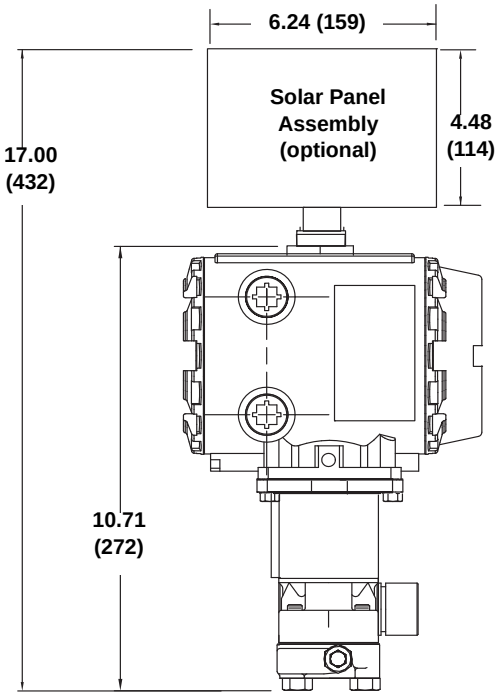
Without LCD Display



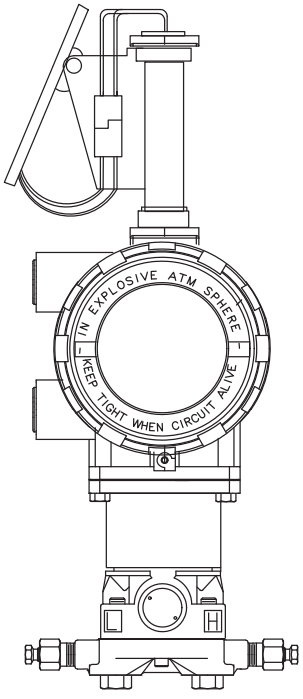
Dimensions are in inches (millimeters)

3095FC with Solar Panel Assembly

Side View



Front View



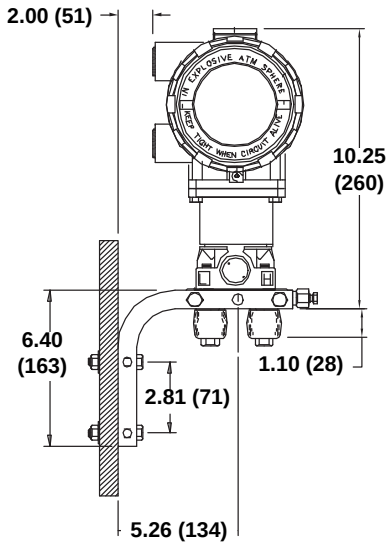
Dimensions are in inches (millimeters)

Rosemount 3095

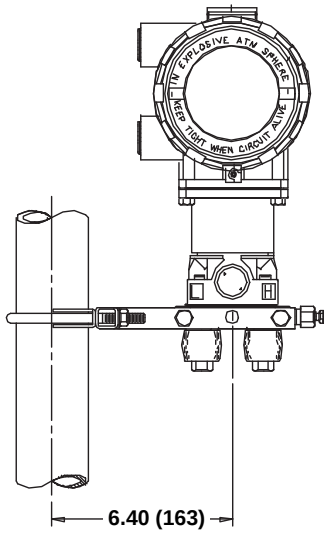
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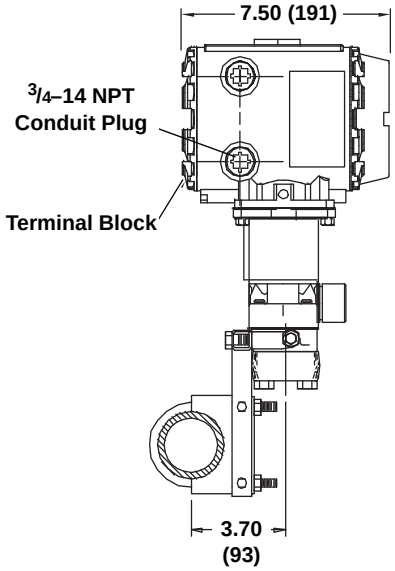
Mounting Configurations for 3095FC Transmitter

Panel Mount



Pipe Mount





Dimensions are in inches (millimeters)

OPTIONS

Standard Configuration

Unless otherwise specified, the transmitter is shipped as follows:
Engineering units:

Differential	inH_2O
Absolute/gage	psi
Output:	MODBUS RTU protocol signal
Flange type:	Specified model code option
Flange material:	Specified model code option
O-ring material:	Specified model code option
Drain/vent:	Specified model code option
Flow Configuration Parameters:	Factory default
Software tag:	(Blank)

Custom Configuration (Option Code C1)(1)

If Option Code C1 is ordered, the user-specified information and standard configuration parameters are factory configured. Unspecified parameters will remain at the factory default settings.

(1) 3095FC only allows all English or all Metric units.

Tagging

Three customer tagging options are available:

- Standard SST tag is wired to the transmitter. Tag character height is 0.125 in. (3.18 mm), 85 characters maximum.
- Tag may be permanently marked on transmitter nameplate upon request.
  Tag character height is 0.0625 in. (1.59 mm), 65 characters maximum.
- Tag may be stored in transmitter memory. Software tag is left blank unless specified.
- Software tag is left blank unless specified.

Optional 305 Integral Manifolds

The Rosemount MultiVariable transmitters with 305R Integral Manifold are fully assembled, calibrated, and seal tested by the factory. Refer to PDS 00813-0100-4733 for additional information.

ACCESSORIES

3095 User Interface Software Packages

The User Interface software package is available with or without the converter and connecting cables. All configurations are packaged separately.

Windows 98 or higher

3095FB

- Part Number 03095-5130-0003: Windows User Interface Software–Single PC License, Converter, and Cable.
- Part Number 03095-5125-0004: Windows User Interface Software–Single PC License.
- Part Number 03095-5125-0005: Windows User Interface Software– Site License.
- Part Number 03095-5106-0002: RS-485 Converter and Cable.

3095FC

- Part Number 03095-5136-0001: Windows User Interface Software–Single PC License, and Cable.
- Part Number 03095-5135-0001: Windows User Interface Software–Single PC License.
- Part Number 03095-5135-0002: Windows User Interface Software– Site License.
- Part Number 03095-5106-0003: 10 foot (3.05 m) 9-pin Serial Cable (For direct connect method)

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EMERSON
Process Management

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Rosemount 3095FT MultiVariable™ Flow Data Logger

THE PROVEN LEADER IN MULTIVARIABLE MEASUREMENT

- *Industry leading performance with ±0.05% of DP reading accuracy*
- *Ten year stability under actual process conditions*
- *Unprecedented reliability backed by a limited 12-year warranty*
- *Measures natural gas flow through an orifice plate per AGA, API, and GPA standards*
- *Advanced data and event logging, API compliant*



CE

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Specifications . . . . . page Pressure-362
Product Certifications . . . . . page Pressure-365
Dimensional Drawings. . . . . page Pressure-366

Product Data Sheet
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Rosemount 3095FT Product Overview



Industry leading performance with ±0.05% of DP reading accuracy

Enabled by superior sensor technology and engineered for optimal flow performance, the 3095FT delivers unprecedented reference accuracy with 100:1 rangeability. Superior performance means reduced variability for improved billing accuracy.

Ten year stability of 0.25%

Through aggressive simulation testing, the 3095FT has proven its ability to maintain unprecedented performance under the most demanding conditions. Superior transmitter stability decreases calibration frequency for reduced maintenance and operation costs.

Unprecedented reliability backed by a limited 12-year warranty

Further enhance installation practices with the most reliable platform supported by a 12-year warranty.

Four variables in one device

The advanced 3095FT measured three process variables simultaneously, while calculating flow through an orifice plate per American Gas Association (AGA), American Petroleum Institute (API) and Gas Processors Associations (GPA) standards. One installation means reduced process penetrations, inventory and installation costs.

Advanced Data Logging Capability

With user-configurable data logging exceeding EFM requirements of API MPMS Chapter 21.1, the 3095FT logs the continuously averaged flow data. The nonvolatile memory logs 50 days of daily, variable and event logs. A cost effective solution for natural gas flow monitoring and custody transfer.

Ordering Information

Table 1. Rosemount 3095F MultiVariable Flow Data Logger Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	**Product Description**			
3095F	MultiVariable Flow Data Logger			
Code	**Output**			
Standard				**Standard**
H(1)	Data Log via PC based User Interface Software			★
Code	**Differential Pressure Range**			
Standard				**Standard**
2	0–2.5 to 0–250 inH_2O (0–0,63 to 0–623 mbar)			★
3	0–10 to 0–1000 inH_2O (0–2,5 mbar to 0–2,5 bar)			★
Code	**Static Pressure Range**			
Standard				**Standard**
3	0.5-8 to 0.5–800 psia (0,03–0,552 to 0,03–55,2 bar)			★
4	0.5-36.26 to 0.5–3626 psia (0,03–2,5 to 0,03–250 bar)			★
C	0-8 to 0-800 psig (0–0,552 to 0–55,2 bar)			★
D	0-36.26 to 0-3626 psig (0-2,5 to 0–250 bar)			★
Code	**Isolator Material**	**Fill Fluid**		
Standard				**Standard**
A(2)	316L SST	Silicone		★
B(2)	Alloy C-276	Silicone		★
Expanded				
F	Gold-Plated 316L SST	Silicone		
Code	**Flange Style**		**Material**	
Standard				**Standard**
A	Coplanar		CS	★
B	Coplanar		SST	★
C	Coplanar		Cast C-276	★
J	DIN compliant traditional flange, SST 10 mm adapter/manifold bolting		SST, 7/16 — 20 Bolting	★
0	None (Required for Option Code S5)			★
Code	**Drain/Vent Material**			
Standard				**Standard**
A	SST			★
C	Alloy C-276			★
0	None (Required for Option Code S5)			★
Code	**O-ring**			
Standard				**Standard**
1	Glass-filled PTFE			★
Code	**Process Temperature Input (RTD ordered separately)**			
Standard				**Standard**
0	No RTD Cable			★
1	RTD input with 12 ft. (3,66 m) of Shielded Cable (intended for use with conduit)			★
2	RTD input with 24 ft. (7,32 m) of Shielded Cable (intended for use with conduit)			★
7	RTD input with 75 ft.(22,86 m) of Shielded Cable (intended for use with conduit)			★
3	RTD input with 12 ft. (3,66 m) of Armored, Shielded Cable			★
4	RTD input with 24 ft. (7,32 m) of Armored, Shielded Cable			★
8	RTD Input with 75 ft. (22,86 m) of Armored, Shielded Cable			★
A	RTD input with 12 ft. (3,66 m) ATEX/IECEx Flameproof Cable			★
B	RTD input with 24 ft. (7,32 m) ATEX/IECEx Flameproof Cable			★
C	RTD input with 75 ft. (22,86 m) ATEX/IECEx Flameproof Cable			★

Rosemount 3095FT

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Table 1. Rosemount 3095F MultiVariable Flow Data Logger Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Code	Transmitter Housing Material	Conduit	
Standard			**Standard**
A	Polyurethane-covered Aluminum	½–14 NPT	★
B	Polyurethane-covered Aluminum	M20 × 1.5 (CM20)	★
J	SST	½–14 NPT	★
K	SST	M20 × 1.5 (CM20)	★
Code	**Terminal Block**		
Standard			**Standard**
A	Standard		★
B	With Integral Transient Protection		★
Code	**Display**		
Standard			**Standard**
0	None		★
1	LCD Display		★
Code	**Bracket**		
Standard			**Standard**
0	None		★
1	Coplanar SST flange bracket for 2-in. pipe or panel mount, SST bolts		★
2	Traditional Flange Bracket for 2-in. Pipe Mounting, CS Bolts		★
3	Traditional Flange Bracket for panel Mounting, CS Bolts		★
5	Traditional Flange Bracket for 2-in. Pipe Mounting, 300-Series, SST Bolts		★
6	Traditional Flange Bracket for panel Mounting, 300-Series, SST Bolts		★
8	SST Traditional Flange Bracket for 2-in. Pipe Mounting, 300-Series, SST Bolts		★
9	SST Traditional Flange Flat Bracket for 2-in. Pipe Mounting, 300-Series, SST Bolts		★
Code	**Bolts**		
Standard			**Standard**
0	CS bolts		★
1	Austenitic 316 SST Bolts		★
N	None (Required for Option Code S5)		★
Code	**Product Certifications**		
Standard			**Standard**
0	None		★
A	FM Explosion-proof, Dust Ignition-proof		★
C	CSA Explosion-proof, Dust Ignition-proof, Division 2		★
H	ATEX Flameproof		★
P	ATEX Dust		★
7	IECEx Flameproof		★
8	IECEx Dust		★
Code	**Engineered Measurement Solution (EMS)**		
Standard			**Standard**
A	Averaging Method: Time-weighted Formulaic Averaging Compressibility Factor		★

Options (Include with selected model number)

Code	Configuration	
Standard		**Standard**
C1	Custom Configuration (requires completed Configuration Data Sheet)	★
Code	**Process Adapter**	
Standard		**Standard**
DF	1/2-14 NPT Process Adapter, Type Determined by Selected Flange Material: Plated CS, SST, Cast C-276	★

Table 1. Rosemount 3095F MultiVariable Flow Data Logger Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Code	Material Traceability Certification	
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204 3.1B	★
Code	**Calibration Certificate**	
Standard		**Standard**
Q4	Calibration Certificate	★
Code	**Pressure Testing**	
Expanded		
P1	Hydrostatic Testing with Certificate	
Code	**Cleaning**	
Expanded		
P2	Cleaning for Special Services	
Code	**Integral Manifold**	
Standard		**Standard**
S5[3]	Assembly with Rosemount 305 Integral Manifold	★
Code	**Performance Class**	
Standard		**Standard**
U3[4]	Ultra for Flow: ±0.05% DP reading accuracy, up to 100:1 rangedown, 10 year stability, limited 12 year warranty	★
Typical Model Number	**3095F H 2 3 A B A 1 1 A B 1 1 0 A A**	

(1) Communication based on Digital HART Protocol.

(2) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(3) "Assemble-to" items are specified separately and require a completed model number.

(4) Ultra for Flow (Option U3) applicable for DP ranges 2 and 3 with SST isolator material and silicone fill fluid only.

Rosemount 3095FT

Product Data Sheet
00813-0100-4015, Rev GA
Catalog 2011 - 2012

Specifications

FUNCTIONAL

Service

AGA 8 Natural Gas, AGA 3 Orifice Plates
Consult factory for other fluid and primary element combinations.

Differential Sensor

Limits

- Range 2: 0 to 250 inH_2O (0 to 623 bar)
- Range 3: 0 to 1000 inH_2O (0 to 2,49 bar)

Absolute Sensor

Limits

- Range 3: 0.5 to 800 psia (0,03 to 55,2 bar)
- Range 4: 0.5 to 3,626 psia (0,03 to 250 bar)

Gage Pressure

Limits

- Range C: 0 to 800 psig (0 to 55,2 bar)
- Range D: 0 to 3,626 psig (0 to 250 bar)

Over Pressure Limit

0.5 psia (0,03 bar) to two times the absolute pressure sensor range up to a maximum of 3,626 psia (250 bar).

Static Pressure Limit

Operates within specifications between static line pressures of 0.5 psia (0,03 bar) and the URL of the absolute pressure sensor.

Flow Calculations

- 1992 AGA Report No. 3(1)
- API MPMS Chapter 14.3(1)
- GPA(1)
- Flange tap configurable per corresponding AGA calculations
- Pipe Tap configurable per corresponding AGA calculations

NOTE
Flow calculations will cease when DP readings are below low flow cut off.

Compressibility Calculations

- AGA Report No. 8
- API MPMS Chapter 14.2
- Gross or Detailed Characterization Method

Data Logging

- Exceeds API MPMS 21.1
- Daily & Variable Logs have user selected time duration between 1-99 minutes
- Event Logs record alarms, configuration changes, and significant occurrences affecting flow calculation
- 50 days of daily logs maintained for user-selected process variables and calculated values when seven required API variables are logged.
- Logged files saved as ASCII file or comma separated value file.

Daily Variable Log Parameters

Maximum: DP, PT, and SP
Minimum: DP, PT, and SP
Average: DP, PT, and SP
Total: Energy, Flow, and Flow Time
Average: Energy Rate, Flow Rate, Integral Value, C', Z
Specific Gravity
Heating Value

Audit Trail

Exceeds API MPMS Chapter 21.1 standards for electronic flow measurement systems.

User Interface Software and Hardware Requirements

- PC with CD-ROM Drive
- 4 MB RAM minimum
- Microsoft® Windows® 98, NT, 2000, or XP
- 2 MB of free hard disk space

Output

Two-wire, constant 9.5mA current, data logging

Power Supply

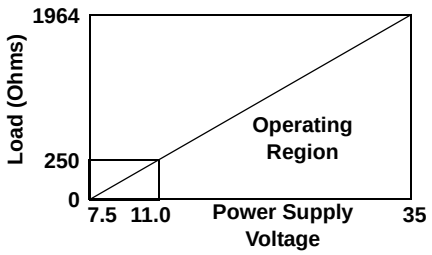
External power supply required. Data Logger operates on terminal voltage of 7.5–35 Vdc with a constant average operating current of 9.5 mA.

(1) "Orifice Metering of Natural Gas and Other Related Hydrocarbon Fluids." Third Edition, August 1992. Part 3 Natural Gas Applications. American Gas Association Report No. 3; American Petroleum Institute API 14.3; Gas Processor Association GPA 8185-92.

Load Limitations

Maximum loop resistance is determined by the voltage level of the external power supply, as described by:

$$\text{Max. Loop Resistance} = \frac{\text{Power Supply Voltage} - 7.5}{0.014}$$



Communication requires a minimum loop resistance of 250 ohms.

Temperature Limits

Process (at transmitter isolator flange for atmospheric pressures and above)

- –40 to 185 °F (–40 to 85 °C)

Ambient:

- -40 to 185 °F (-40 to 85 °C)
- With LCD Display(1): -40 to 175 °F (-40 to 80 °C)

Storage:

- -50 to 212 °F (-46 to 100 °C)
- With LCD Display: -40 to 185 °F (-40 to 85 °C)

Humidity Limits

0–100% relative humidity

Failure Mode Alarm

If self-diagnostics detect a gross transmitter failure, the output registers an alarm with each message.

Turn-on Time

Process variables will be within specifications less than 60 seconds after power is applied to transmitter.

Damping

Response to step input change can be user-selectable from 0 to 15 seconds for one time constant. This is in addition to sensor response time of 0.2 seconds.

Real-Time Clock Accuracy

±2 minutes per month at reference conditions.

Memory

Non-volatile memory per applicable A.G.A., A.P.I., and G.P.A. orifice meter and electronic flow measurement standards.

PERFORMANCE

Zero-based spans, reference conditions, silicone oil fill, 316 SST isolating diaphragms, and digital trim values equal to the span end points.

Specification Conformance

The Rosemount 3095 maintains a specification conformance of measured variables to at least 3σ.

Differential Pressure

Range 2:

0–2.5 to 0-250 inH2O (0-6,23 to 623 mbar)

Range 3:

0-10 to 0-1000 inH2O (0-25 mbar to 0-2,5 bar)

Reference Accuracy (including Linearity, Hysteresis, Repeatability)

Range 2-3 Ultra for Flow (Option U3)(2)

- ±0.05% of DP reading up to 3:1 DP turndown from URL
- For DP turndowns up to 100:1 from URL,

  $$\text{Accuracy} = \pm\left[0.05 + 0.0145\left(\frac{URL}{DPReading}\right)\right] \text{ \% of DP Reading}$$

Range 2-3

- ±0.075% of span for spans from 1:1 to 10:1 of URL
- For spans less than 10:1 of URL,

  $$\text{Accuracy} = \pm\left[0.025 + 0.005\left(\frac{URL}{Span}\right)\right] \text{ \% of Span}$$

Ambient Temperature Effect per 50 °F (28 °C)

Range 2-3 Ultra for Flow (Option U3)(2)

- ±0.130% of DP reading up to 3:1 DP turndown from URL
- ±[0.05 + 0.0345 (URL/DP Reading)]% of DP reading up to 100:1 DP turndown from URL

Range 2-3

- ±(0.025% URL + 0.125% span) spans from 1:1 to 30:1
- ±(0.035% URL – 0.175% span) spans from 30:1 to 100:1

Static Pressure Effects

- Zero error = ±0.05% of URL per 1,000 psi (68,95 bar)
- Span error = ±0.20% of DP Reading per 1,000 psi (68,95 bar)

Stability

Range 2-3 Ultra for Flow (Option U3)(2)

- ±0.25% of URL for 10 years; for ±50 °F (28 °C) temperature changes, up to 1000 psi (68,95 bar) line pressure

Range 2-3

- ±0.125% of URL for five years for ±50 °F (28 °C) ambient temperature changes, and up to 1000 psi (68,95 bar) line pressure.

(1) LCD Display may not be readable and LCD updates will be slow at temperatures below -4 °F (-20 °C).

(2) Ultra for Flow (option U3) applicable for DP ranges 2 and 3 with SST isolator material and silicone fill fluid options only.

Rosemount 3095FT

Product Data Sheet
00813-0100-4015, Rev GA
Catalog 2011 - 2012

Absolute/ Gage Pressure

Absolute (100:1 rangeability allowed)

Range 3

0.5–8 to 0.5–800 psia (0,03-0,552 to 0,03-55,2 bar)

Range 4

0.5–36.26 to 0.5–3,626 psia (0,03-2,5 to 0,03-250 bar)

Gage (100:1 rangeability allowed)

Range C

0–8 to 0–800 psig (0-0,552 to 0-55,2 bar)

Range D

0–36.26 to 0–3,626 psig (0-2,5 to 0-250 bar)

Reference Accuracy (including linearity, hysteresis, repeatability)

- ±0.075% of span for spans from 1:1 to 6:1 of URL
- For spans less than 6:1 rangedown

$$\text{Accuracy} = \pm\left[0.03 + 0.0075\left(\frac{\text{URL}}{\text{Span}}\right)\right]\% \text{ of span}$$

Ambient Temperature Effect per 50 °F (28 °C)

- ±(0.05% URL + 0.125% of span) spans from 1:1 to 30:1
- ±(0.06% URL - 0.175% of span) spans from 30:1 to 100:1

Stability

- ±0.125% of URL for five years for ±50 °F (28 °C) ambient temperature changes, and up to 1000 psi (68,95 bar) line pressure.

Process Temperature (RTD)

Specification for process temperature is for the transmitter portion only. Sensor errors caused by the RTD are not included. The transmitter is compatible with any PT100 RTD conforming to IEC 751 Class B, which has a nominal resistance of 100 ohms at 0 °C and $\propto$ = 0.00385. Examples of compatible RTDs include the Rosemount Series 68 and 78 RTD Temperature Sensors.

Range

–40 to 185 °F (–40 to 85 °C). May be limited by the flow calculation characterization method.

Accuracy (including Linearity, Hysteresis, Repeatability)

±1.0 °F (0.56 °C)

Ambient Temperature Effects

±0.72 °F (0.40 °C) per 50 °F (28 °C)

Stability

±1.0 °F (0.56 °C) for one year

PHYSICAL

Security

Transmitter security switch mounted on electronics board, when enabled prevents changes to transmitter security.

User Interface Software provides three levels of password security, they are as follows:

- System Administrator (one password)
- Maintenance (three passwords)
- Operation (six passwords)

Electrical Connections

½–14 NPT, M20 x 1.5 (CM20), PG-13.5

Process Connections

Transmitter

- ¼–18 NPT on $2\frac{1}{8}$-in. centers.

RTD

- RTD dependent (see “Options” on page 368)

RTD Process Temperature Input

100-ohm platinum RTD per IEC-751 Class B

Process Wetted Parts

Isolating Diaphragms

- 316L SST or Alloy C-276

Drain/Vent Valves

- 316 SST or Alloy C-276

Flanges

- Plated carbon steel, 316 SST, or Alloy C-276

Wetted O-rings

- Glass-Filled PTFE

Non-Wetted Parts

Electronics Housing

- Low copper aluminum

Bolts

- Plated carbon steel per ASTM A449, Grade 5; or austenitic 316 SST

Fill Fluid

- Silicone oil

Paint

- Polyurethane

O-rings

- Buna-N

Weight

Component	Weight in lb (kg)
Rosemount 3095FT Transmitter	6.0 (2.7)
LCD Display	0.5 (0.2)
SST Mounting Bracket	1.0 (0.4)
12 ft (3.66 m) RTD Shielded Cable	0.5 (0.2)
12 ft (3.66 m) RTD Armored Cable	1.1 (0.5)
12 ft. (3.66 m) RTD ATEX/IECEx Cable	2.1 (0.9)
24 ft (7.32 m) RTD Shielded Cable	1.0 (0.4
24 ft (7.32 m) RTD Armored Cable	2.2 (1.0)
24 ft. (7.32 m) RTD ATEX/IECEx Cable	3.0 (1.4)
75 ft (22.86 m) RTD Shielded Cable	1.9 (0.9)
75 ft (22.86 m) RTD Armored Cable	7.2 (3.2)
75 ft. (22.86 m) RTD ATEX/IECEx Cable	7.1 (3.2)

Product Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting our local sales office.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

3095F_2/3,4/D Flow Transmitters — QS Certificate of Assessment - EC No. PED-H-100 Module H Conformity Assessment

All other 3095_ Transmitters/Level Controller \— Sound Engineering Practice

Transmitter Attachments: Process Flange - Manifold — Sound Engineering Practice

Electro Magnetic Compatibility (EMC) (2004/108/EC)

3095FT Flow Transmitters — EN 61326:1997/ A1, A2, and A3

Ordinary Location Certification for Factory Mutual

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Hazardous Locations Certifications

North American Certifications

FM Approvals

A Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II, Division 1, Groups E, F, and G. Suitable for Class III, Division 1, indoor and outdoor (Type 4X) hazardous locations. Factory Sealed. Provides non-incendive RTD connections for Class I, Division 2, Groups A, B, C, and D. Install per Rosemount drawing 03095-1025.

Canadian Standards Association (CSA)

C Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II, Division 1, Groups E, F, and G. Suitable for Class III, Division 1, indoor and outdoor hazardous locations, CSA enclosure Type 4X. Factory Sealed. Provides non-incendive RTD connection for Class I, Division 2, Groups A, B, C, and D. Approved for Class I, Division 2, Groups A, B, C, and D. Install in accordance with Rosemount Drawing 03095-1024.

European Certifications

H ATEX Flameproof
Certificate Number: KEMA02ATEX2320X ⟨Ex⟩ II 1/2 G
EEx d IIC T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
CE 1180

Special Conditions for Safe Use (x):

The device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

P ATEX Dust
Certificate Number: KEMA02ATEX2321 ⟨Ex⟩ II 1 D
V = 55 Vdc MAX
I = 23 mA MAX
IP66
CE 1180

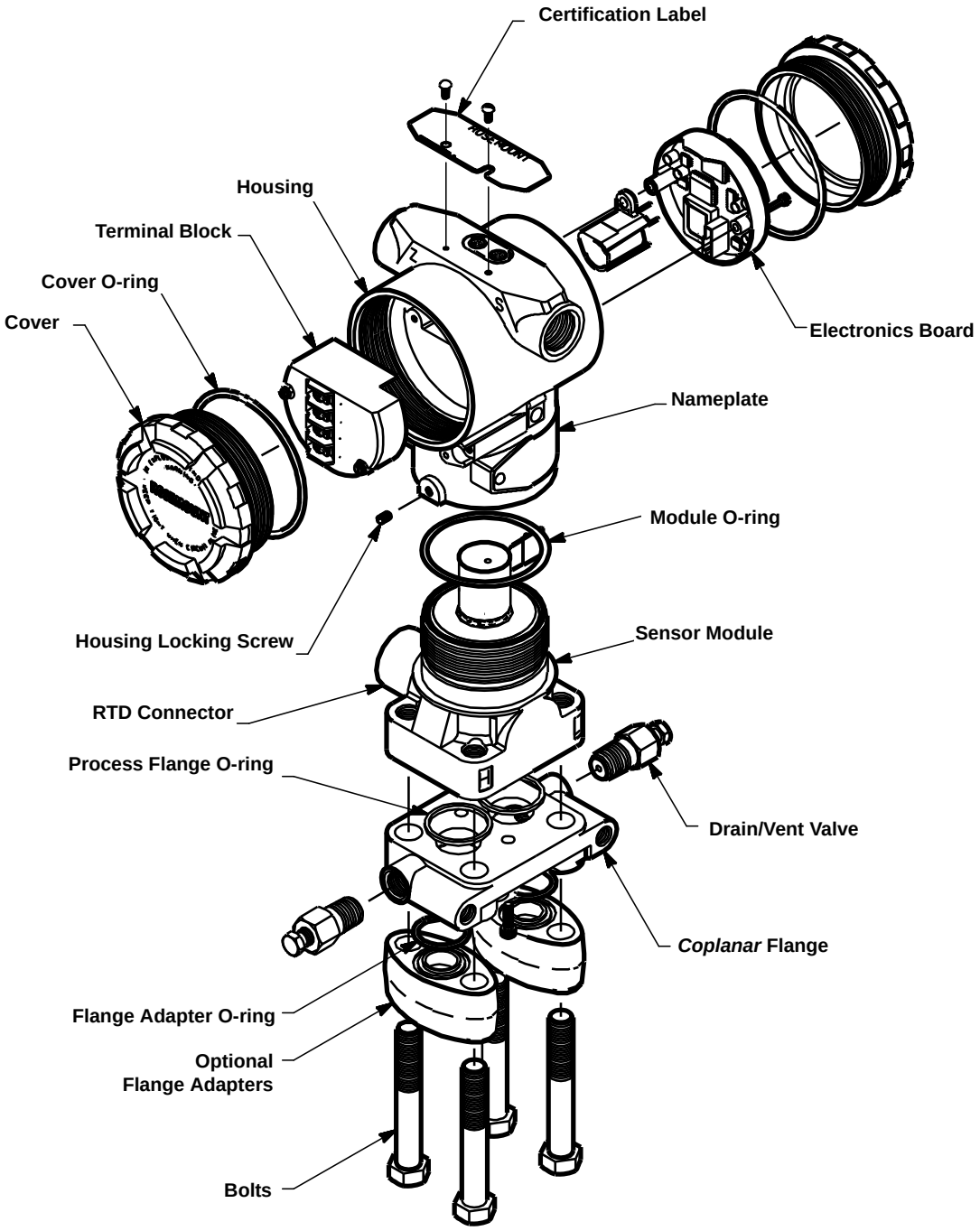
IECEx Certifications

7 IECEx Flameproof
Certificate Number: IECEx KEM 06.0018
Zone 0/1 Ex d IIC T6 (-20 °C ≤ T_a ≤ 65 °C)
Zone 0/1 Ex d IIC T5 (-20 °C ≤ T_a ≤ 80 °C)
V_{max} = 55 Vdc
I_{max} = 23 mAdc

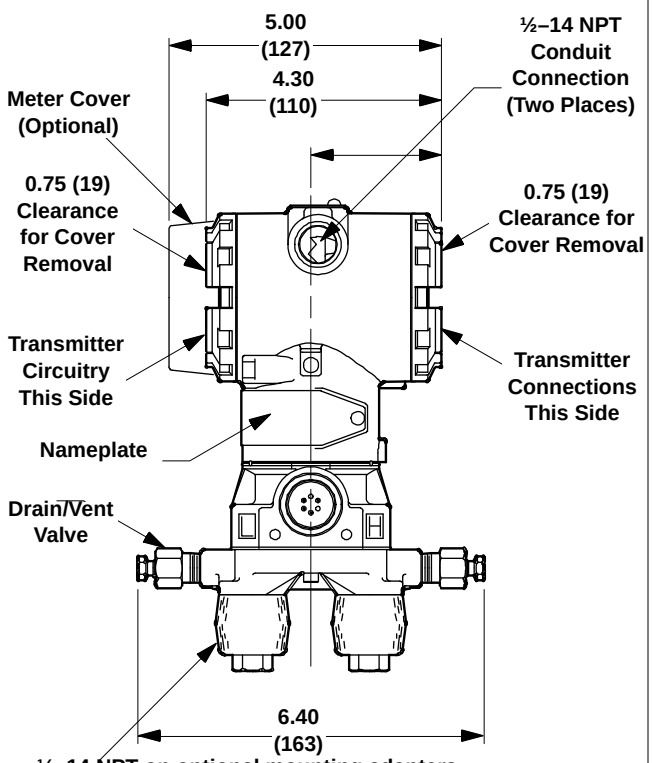
8 IECEx Dust
Certificate Number: IECEx KEM 06.0018
Ex tD A22 T90°C
IP66

Dimensional Drawings

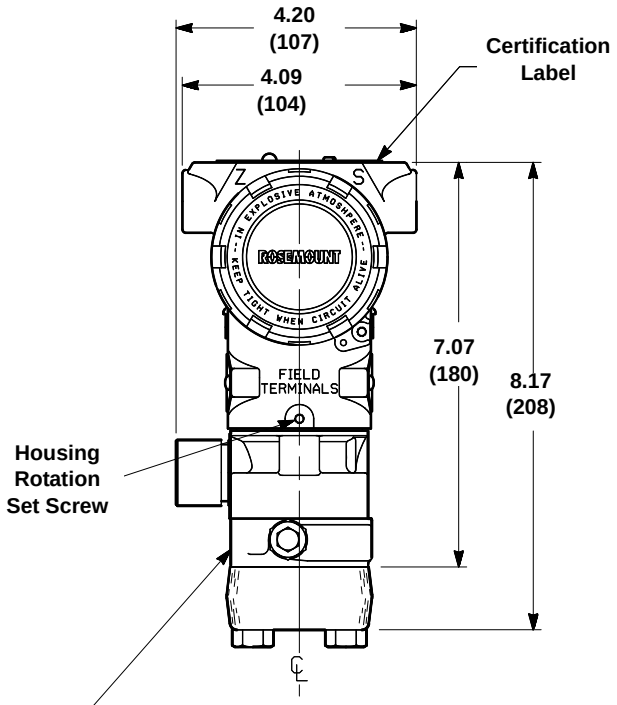
Exploded View of 3095FT



3095FT



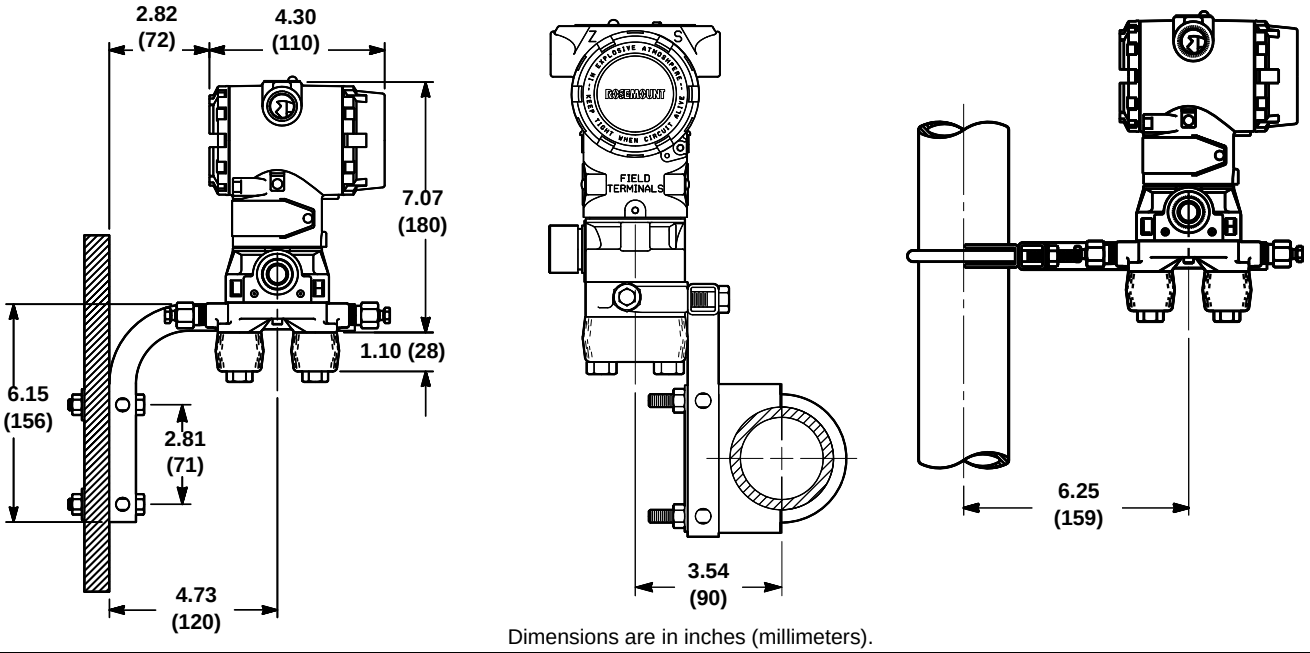
½–14 NPT on optional mounting adapters. Adapters can be rotated to give connection centers of 2.00 (51), 2.125 (54), or 2.25 (57).



¼–18 NPT on *Coplanar* flange for pressure connection without the use of mounting adapters

Dimensions are in inches (millimeters).

Mounting Configurations for 3095FT



Dimensions are in inches (millimeters).

Rosemount 3095FT

Product Data Sheet
00813-0100-4015, Rev GA
Catalog 2011 - 2012

OPTIONS

Standard Configuration

Unless otherwise specified, the transmitter is shipped as follows:

Engineering units:	
Differential	inH_2O at 60 °F (All ranges)
Absolute/gage	psi (all ranges)
Output:	9.5mA with Data Logging
Flange type:	Specified model code option
Flange material:	Specified model code option
O-ring material:	Specified model code option
Drain/vent:	Specified model code option
Flow Configuration Parameters:	Factory default
Software tag:	(Blank)

Custom Configuration (Option Code C1)

If Option Code C1 is ordered, the customer specifies the following information for the 3095FT in addition to the standard configuration parameters.

Configuration Data Sheet (see rosemount.com): Gas composition parameters, contract hour, log parameters, LCD display parameters, meter run configuration parameters, low flow cut-off, passwords, static pressure tap location, static pressure measurement, damping, descriptor, message, and upper and lower trim points for each process variable.

Tagging

Three customer tagging options are available:

- Standard SST tag is wired to the transmitter. Tag character height is 0.125 in. (3,18 mm), 85 characters maximum.
- Tag may be stored in transmitter memory. Software tag (8 characters maximum) is left blank unless specified.
- Tag may be permanently stamped on transmitter nameplate upon request. Tag character height is 0.0625 in. (1,59 mm), 65 characters maximum.
- Software tag (8 characters maximum) is left blank unless specified.

ADDITIONAL INFORMATION

Rosemount transmitters are available as fully assembled and factory calibrated flowmeters. Flowmeter Product Data Sheets are listed below:

- Orifice Plate Primary Element Systems: 00813-0100-4792
  Rosemount 1495 Orifice Plate
  Rosemount 1496 Flange Union
  Rosemount 1497 Meter Section

ACCESSORIES

3095FT User Interface Software Packages

All configurations are packaged separately.

Windows 98, NT, 2000, and XP

- Single PC license: 03095-5100-0104
  Site license: 03095-5100-0105
- Single PC license, Serial Port HART Modem and cables: 3095-5100-0102
- Single PC license, USB HART Modem and Cables (Requires Windows XP or 2000 Operating System): 03095-5100-0103

Communication Accessories

Item Description	Part Number
Serial Port HART Modem and Cables Only	03095-5105-0001
USB Port HART Modem and Cables Only	03095-5105-0002

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EMERSON™
Process Management

Rosemount Manifolds

- *Factory assembled, leak-tested, and calibrated*
- *Full breadth of offering including integral, conventional, and inline designs*
- *Integral design enables “flangeless” valve integration*
- *2, 3, and 5 valve configurations*
- *Compact, lightweight design*
- *Easy in-process calibration*
- *Direct-mount capability*



Contents

Rosemount Manifolds Selection Guide . . . . . page Pressure-370
Valve Configuration . . . . . page Pressure-371
Ordering Information . . . . . page Pressure-373
Specifications . . . . . page Pressure-379
Dimensional Drawings. . . . . page Pressure-385

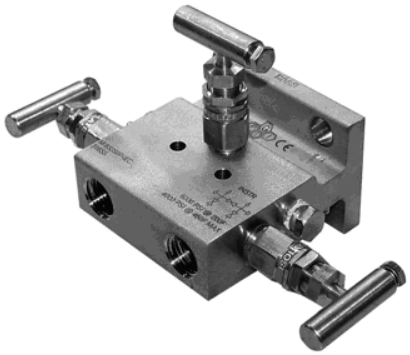
Product Data Sheet
00813-0100-4733, Rev NB
Catalog 2011 - 2012

Rosemount Manifolds Selection Guide

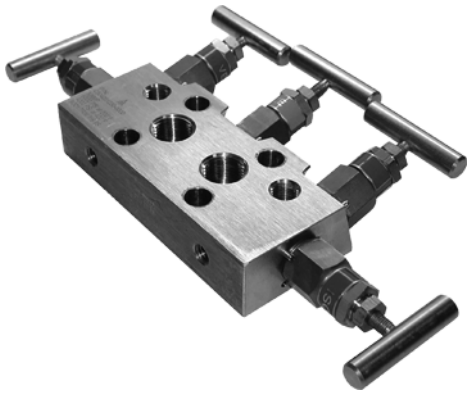
ROSEMOUNT 304 CONVENTIONAL MANIFOLD

See “Options” on page 395.

- Attaches to transmitter flange
- 2, 3, and 5-valve configurations
- Traditional (Flange x Flange, Flange x NPT) & Wafer styles
- Factory assembled, seal-tested, and calibrated



Rosemount 304 Conventional Manifold-Traditional Style

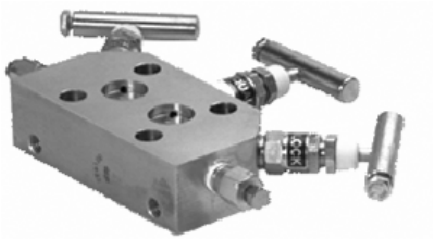


Rosemount 304 Conventional Manifold-Wafer Style

ROSEMOUNT 305 INTEGRAL MANIFOLD

See “Options” on page 395.

- Assembles directly to transmitter, eliminating need for flange
- 2, 3, and 5-valve configuration
- Available in Coplanar™ and traditional styles
- Compact, lightweight assembly
- Factory assembled, seal-tested, and calibrated
- 50% fewer leak points than conventional transmitter / flange / manifold interface



Rosemount 305 Integral Manifold Coplanar Style

ROSEMOUNT 306 INLINE MANIFOLD

See “Options” on page 395.

- Assembled directly to inline pressure transmitters
- Block-and-Bleed and 2-valve configurations
- Male or Female threaded NPT process connection



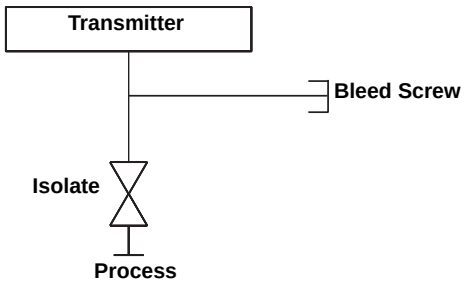
Rosemount 306 Inline Manifold

Valve Configuration

BLOCK-AND-BLEED

The block-and-bleed configuration is available on the Rosemount 306 Manifold for use with inline gage and absolute pressure transmitters. A single block valve provides instrument isolation and a plug provides drain/vent capabilities.

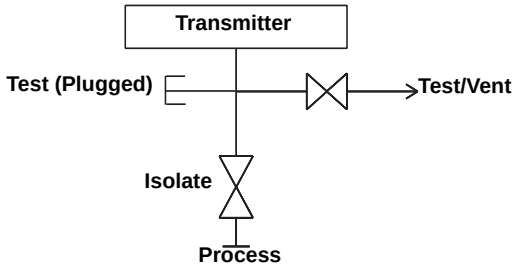
306 Manifold



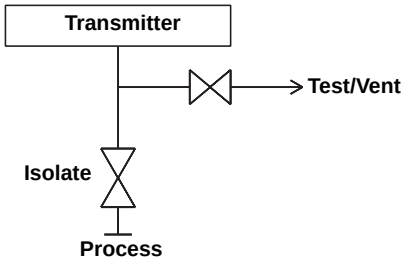
TWO-VALVE

The two-valve configuration is available on Rosemount 304, 305, and 306 Manifolds for use with absolute and gage pressure transmitters. A block valve provides instrument isolation and a drain/vent valve allows venting, draining, or calibration.

304 Manifold



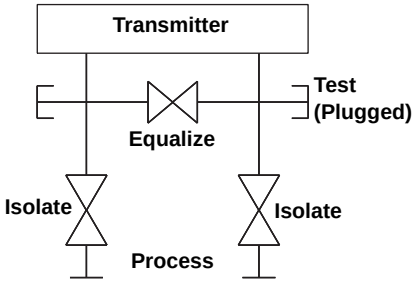
305 & 306 Manifolds



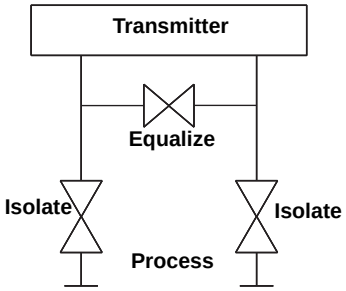
THREE-VALVE

The three-valve configuration is available on Rosemount 304 and 305 Manifolds for use with differential pressure and multivariable transmitters. Two block valves provide instrument isolation, and one equalize valve is positioned between the high and low transmitter process connections.

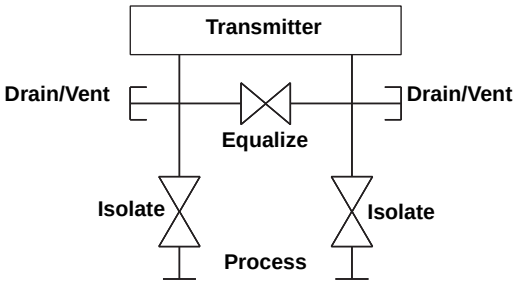
304 (Traditional) Manifold



304 (Wafer) Manifold



305 Manifold



NOTE
Test/Vents receive plastic caps to protect threaded connections unless otherwise noted.

NOTE
Test (Plugged) connections receive ¼-in. NPT plugs unless otherwise noted.

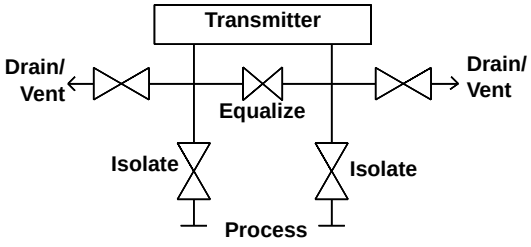
Rosemount Manifolds

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FIVE-VALVE

The five-valve configuration is available on Rosemount 304 and 305 Manifolds for use with differential pressure and multivariable transmitters. Two block valves provide instrument isolation and one equalize valve is positioned between the high and low transmitter process connections. In addition, two drain/vent valves allow for controlled venting, 100% capture of vented or drained process, and simplified in-process calibration capability.

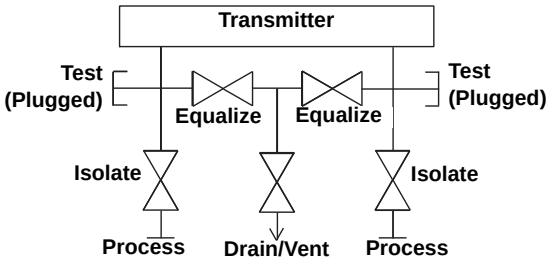
304 (Wafer) & 305 Manifolds



FIVE-VALVE NATURAL GAS

The five-valve natural gas configuration is available on the Rosemount 304 and 305 Manifolds for use with differential pressure and multivariable transmitters. Two block valves provide instrument isolation and a single drain/vent valve allows for controlled venting, 100% capture of vented or drained process, and simplified in-process calibration capability. In addition, two equalize valves provide extra protection from leaking to ensure DP signal integrity.

304 (Traditional) & 305 Manifolds



NOTE
Test/Vents receive plastic caps to protect threaded connections unless otherwise noted.

NOTE
Test (Plugged) connections receive ¼-in. NPT plugs unless otherwise noted.

Ordering Information

Rosemount Manifolds can be ordered as a stand-alone product or as an integrated assembly that is attached to a transmitter.

Stand-Alone Manifold:

1. Reference the “Rosemount Manifolds Selection Guide” (see page Pressure-370) for assistance on choosing the type of manifold needed.
2. Specify a completed model number by referencing the applicable ordering table for the selected manifold type:

   a. Rosemount 304 Conventional Manifold, see page Pressure-374.

   b. Rosemount 305 Integral Manifold, see page Pressure-376.

   c. Rosemount 306 Inline Manifold, see page Pressure-378.

Transmitter / Manifold Assembly:

1. Specify a completed Rosemount transmitter model number by referencing the applicable product data sheet.
2. Specify a completed manifold model number by referencing the applicable ordering table for the selected manifold type:

   a. Rosemount 304 Conventional Manifold, see page Pressure-374.

   b. Rosemount 305 Integral Manifold, see page Pressure-376.

   c. Rosemount 306 Inline Manifold, see page Pressure-378.
3. Verify the transmitter model number contains the correct “Process Connection” code or “Manifold Option” code for the desired transmitter manifold assembly (see Table 1).

TABLE 1. Ordering Codes for a Transmitter / Manifold Assembly

Transmitter	Manifold	Process Connection Code	“Manifold” Option Code
3051S	304	A12	–
	305	A11	–
	306	A11	–
3051/2051/3095	304	–	S6
	305	–	S5
	306	–	S5
1151	304	S6	–
	305	–	–
	306	–	–
2088	304	–	–
	305	–	–
	306	–	S5

Rosemount Manifolds

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Rosemount 304 Conventional Manifolds

TABLE 2. Rosemount 304 Conventional Manifold Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description				
0304	Conventional Manifold				
Manufacturer					
Standard					**Standard**
R	Rosemount Inc.				★
Manifold Style					
Standard					**Standard**
T	Traditional (Flange x Flange or Flange x NPT)				★
Expanded					
W(1)	Wafer				
Manifold Type					
Standard					**Standard**
2(2)	2-valve				★
3	3-valve				★
5(3)	5-valve				★
6(2)	5-valve Natural Gas Metering Pattern				★
Expanded					
7(2)(4)	2-valve (per ASME B31.1 [ANSI] Power and Piping Code)				
8(2)(4)	3-valve (per ASME B31.1 [ANSI] Power and Piping Code)				
	Body	**Bonnet**	**Stem**	**Tip**	
Standard					**Standard**
2	316 SST	316 SST	316 SST	316 SST	★
5	CS	316 SST	316 SST	316 SST	★
Process Connection Style					
Standard					**Standard**
B	1/2-14 NPT				★
F(2)	Flanged				★
Packing Material					
Standard					**Standard**
1	PTFE				★
Expanded					
2(1)	Graphite-based				
Bolts					
Standard					**Standard**
1	For assembly to 2051/3051 Traditional Flange				★
2	For assembly to 2051/3051/3095 DIN Compliant Traditional Flange				★
3	For assembly to 2051/3051/3095 Coplanar Flange				★
Expanded					
4	For assembly to 1151 (Ranges 3-5)				

Options

Mounting Brackets		
Standard		**Standard**
VC(2)	Manifold Heavy Duty Mounting Bracket, CS for Traditional Style	★
VS(2)	Manifold Heavy Duty Mounting Bracket, SST for Traditional Style	★
B4(3)	Manifold SST Mounting Bracket for 2-in. pipe mount with series 300 SST bolts for wafer style	★
Adapters		
Standard		**Standard**
DF(5)	1/2-14 NPT Female Flange Adapter	★
DT(5)	1/2-in. ferrule flange adapter	★
DQ(5)	12 mm ferrule flange adapter	★

TABLE 2. Rosemount 304 Conventional Manifold Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Bolt Material		
Standard		**Standard**
L4[6]	Austenitic 316 SST Bolts	★
L5	ASTM A 193, Grade B7M Bolts	★
L8	ASTM A 193, Class 2, Grade B8M Bolts	★
Material Recommendations for NACE		
Standard		**Standard**
SG[1][7]	Sour Gas (Meets NACE MR 0175 / ISO 15156, MR 0103)	★
Cleanings		
Expanded		
P2[8]	Cleaning for special service	
Heater Block Kits		
Standard		**Standard**
SB	Steam block kit, ¼-in. NPT connection	★
Typical Model Number:_ 0304_R_T_3_2_B_1_1_VS		

(1) Only allowed with Material of Construction code 2.

(2) Not available with Wafer Manifold Style code W.

(3) Not available with Traditional Manifold Style code T.

(4) Only available with 316 SST materials of construction code 2 and graphite based packing code 2.

(5) Only allowed with both Manifold Style code T and Process Connection code F. Not allowed with Graphite-based Packing Code 2.

(6) Not available with Manifold Type codes 7, 8.

(7) Materials of construction comply with recommendations per NACE MR 0175 / ISO 1516 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR 0103 for sour refining environments.

(8) Not available with Graphite-Based Packing Material code 2.

Rosemount Manifolds

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Rosemount 305 Integral Manifolds

TABLE 3. Rosemount 305 Integral Manifold Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description			
0305	Integral Manifold			
Manufacturer				
Standard				**Standard**
R	Rosemount			★
Manifold Style				
Standard				**Standard**
C	Coplanar			★
T	Traditional			★
M	Traditional (Rosemount 3095-compatible; DIN-compliant flange)			★
Manifold Type				
Standard				**Standard**
2	2-valve			★
3	3-valve			★
5(1)	5-valve			★
6(2)	5-valve Natural Gas Metering Pattern			★
Expanded				
7(2)(3)	2-valve (per ASME B31.1 [ANSI] Power and Piping Code)			
8(2)(3)	3-valve (per ASME B31.1 [ANSI] Power and Piping Code)			
9(2)(3)	5-valve (per ASME B31.1 [ANSI] Power and Piping Code)			
	Body	**Bonnet**	**Stem and Tip / Ball**	
Standard				**Standard**
2	316 SST	316 SST	316 SST	★
Expanded				
3(4)	Alloy C-276	Alloy C-276	Alloy C-276	
4	Alloy 400	Alloy 400	Alloy 400 / K-500	
Process Connection Style				
Standard				**Standard**
A(5)	1/4–18 NPT female			★
B(6)	1/2–14 NPT female			★
Packing Material				
Standard				**Standard**
1	PTFE			★
Expanded				
2(7)	Graphite-based			
Valve Seat				
Standard				**Standard**
1	Integral			★
5	Soft delrin (only available with natural gas metering pattern)			★

Options

Mounting Brackets		
Standard		**Standard**
B1	Bracket for 2-in. pipe mounting, CS bolts	★
B3(8)	Flat bracket for 2-in. pipe mounting, CS bolts	★
B4	SST Mounting Bracket for 2-in. pipe mounting, 300 SST bolts	★
B7	B1 bracket with series 300 SST bolts	★
B9(8)	B3 bracket with series 300 SST bolts	★
BA	SST B1 bracket with series 300 SST bolts	★
BC(8)	SST B3 bracket with series 300 SST bolts	★

TABLE 3. Rosemount 305 Integral Manifold Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Bolt Materials		
Standard		**Standard**
L4[9]	Austenitic 316 SST bolts	★
L5	ASTM-A-193-B7M bolts	★
L8	ASTM-A-193, Class 2, Grade B8M bolts	★
Cleanings		
Standard		**Standard**
P2[10]	Cleaning for special services	★
Material Recommendations for NACE		
Standard		**Standard**
SG[4][11]	Sour Gas (Meets NACE MR 0175 / ISO 15156, MR 0103)	★
Adapters		
Standard		**Standard**
DF[12]	1/2-14 NPT female flange adapter	★
Expanded		
DQ[12]	12 mm ferrule flange adapter	
Process Flange Bolting Connection		
Standard		**Standard**
HK[13]	10 mm (M10) process flange bolting connection	★
HL[13]	12 mm (M12) process flange bolting connection	★
Typical Coplanar Integral Manifold Model Number: 305RC32B11B4		
Typical Transmitter Model Number: 3051CD2A02A1AS5		

(1) Not available with traditional manifold style T.

(2) Only available with Coplanar manifold style code C.

(3) Only available with 316 SST materials of construction code 2 and graphite based backing code 2.

(4) Materials of Construction comply with recommendations per NACE MR 0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(5) Only available with traditional manifold style codes T and M.

(6) Not available with traditional manifold style code M.

(7) Includes graphite tape on drain/vent valves and plugs.

(8) Not compatible with the Rosemount 3095 transmitter.

(9) Not available with ASME B31.1 manifold type codes 7, 8, and 9.

(10) Not available with Graphite-Based Packing Material code 2.

(11) Only available with 316 SST Materials of Construction Code 2: 316 SST body and bonnets; Alloy C-276 stems, tip/balls, and drain/vents.

(12) Only allowed with Manifold Style code T. Not allowed with Graphite-Based Packing code 2.

(13) Only available with traditional manifold style code M.

Rosemount Manifolds

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Rosemount 306 Inline Manifolds

TABLE 4. Rosemount 306 Inline Pressure Manifold Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description			
0306	Pressure Manifold			
Manufacturer				
Standard				**Standard**
R	Rosemount Inc.			★
Manifold Style				
Standard				**Standard**
T	Threaded			★
Manifold Type				
Standard				**Standard**
1	Block and bleed			★
2	2-valve			★
Expanded				
3(1)	2-valve (per ASME B31.1 Power Piping Code)			
	Body	**Bonnet**	**Stem and Tip / Ball**	
Standard				**Standard**
2	316 SST	316 SST	316 SST	★
Expanded				
3(2)(3)	Alloy C-276	Alloy C-276	Alloy C-276	
Process Connection				
Standard				**Standard**
AA	1/2–14 male NPT			★
BA(2)	1/2–14 female NPT			★
Packing Material				
Standard				**Standard**
1	PTFE			★
Expanded				
2(4)	Graphite-based			
Valve Seat				
Standard				**Standard**
1	Integral			★

Options

Cleanings		
Expanded		
P2(5)	Cleaning for special services	
Material Recommendations for NACE		
Standard		**Standard**
SG(3)(6)	Sour Gas (Meets NACE MR 0175 / ISO 15156, MR 0103)	★
Typical Integral Manifold Model Number: 3 0 6 R T 2 2 B A 1 1		
Typical Transmitter Model Number: 3051TG3A2B21AS5B4		

(1) Only available with 316 SST materials of construction and graphite-based packing.

(2) Not available with block-and-bleed manifold type

(3) Materials of Construction comply with recommendations per NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(4) Includes graphite tape on plugs.

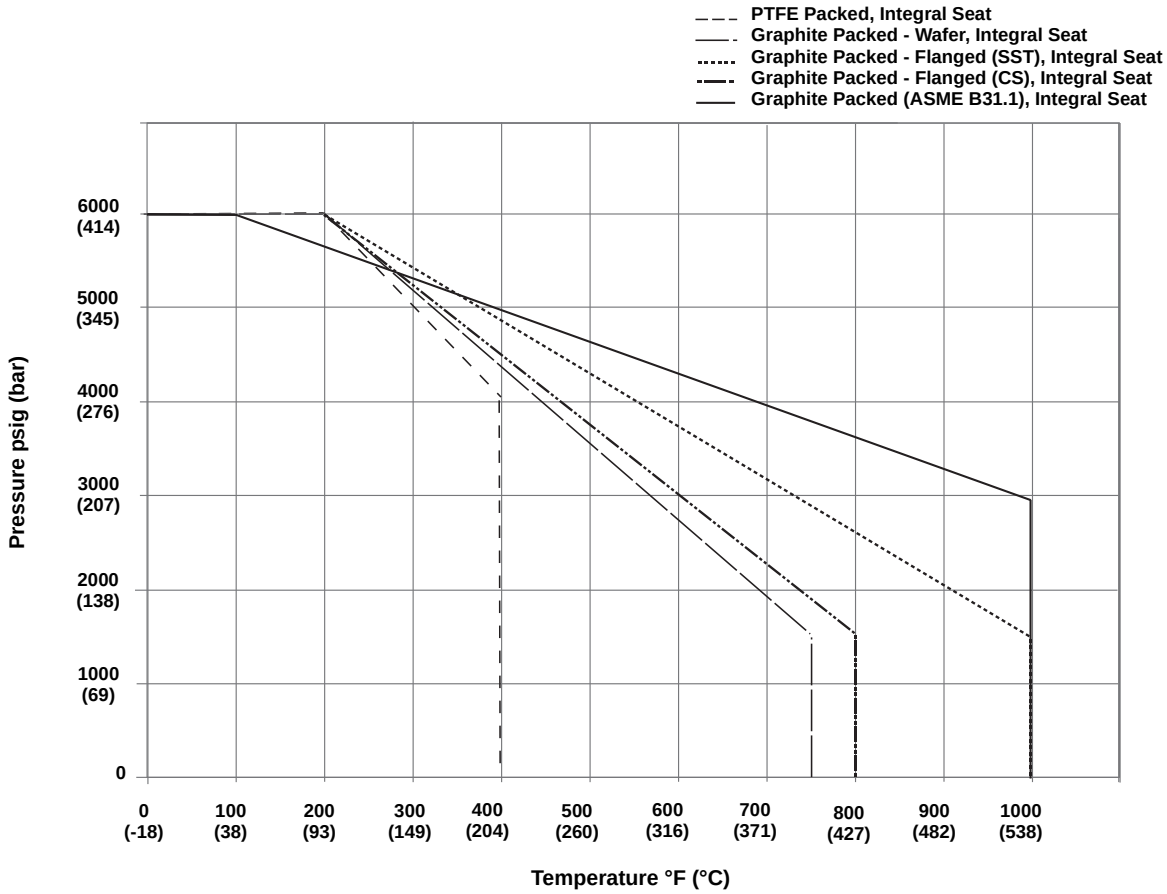
(5) Not available with Graphite-Based Packing Material code 2.

(6) Only available with 316 SST material of construction code 2. Manifolds with SG option are built with 316 SST body and bonnets; Alloy C-276 stems, tips/balls.

Specifications

Pressure and Temperature Ratings

FIGURE 1. 304 Conventional Manifolds - Pressure vs.



Temperature

TABLE 5. 304 Conventional Manifolds - Pressure and Temperature Ratings

Packing	Seat	Pressure and Temperature Ratings
PTFE	Integral	6000 psi @ 200 °F (414 bar @ 93 °C) 4000 psi @ 400 °F (276 bar @ 204 °C)
Graphite - Wafer	Integral	6000 psi @ 200 °F (414 bar @ 93 °C) 1500 psi @ 750 °F (103 bar @ 399 °C)
Graphite - Flanged (SST)	Integral	6000 psi @ 200 °F (414 bar @ 93 °C) 1500 psi @ 1000 °F (103 bar @ 538 °C)
Graphite - Flanged (CS)	Integral	6000 psi @ 200 °F (414 bar @ 93 °C) 1500 psi @ 800 °F (103 bar @ 427 °C)
Graphite (ASME B31.1)	Integral	6000 psi @ 100 °F (414 bar @ 38 °C) 2915 psi @ 1000 °F (201 bar @ 538 °C)

Rosemount Manifolds

FIGURE 2. 305 Integral Manifolds - Pressure vs. Temperature

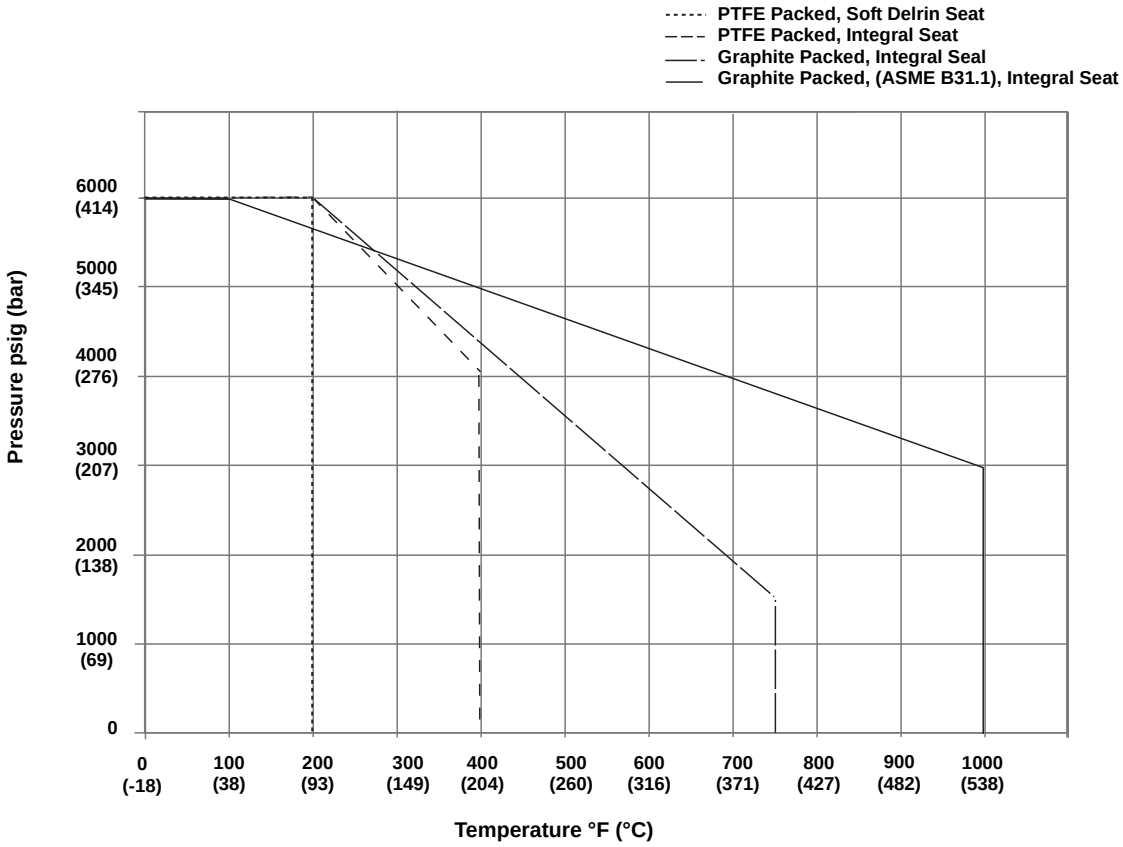
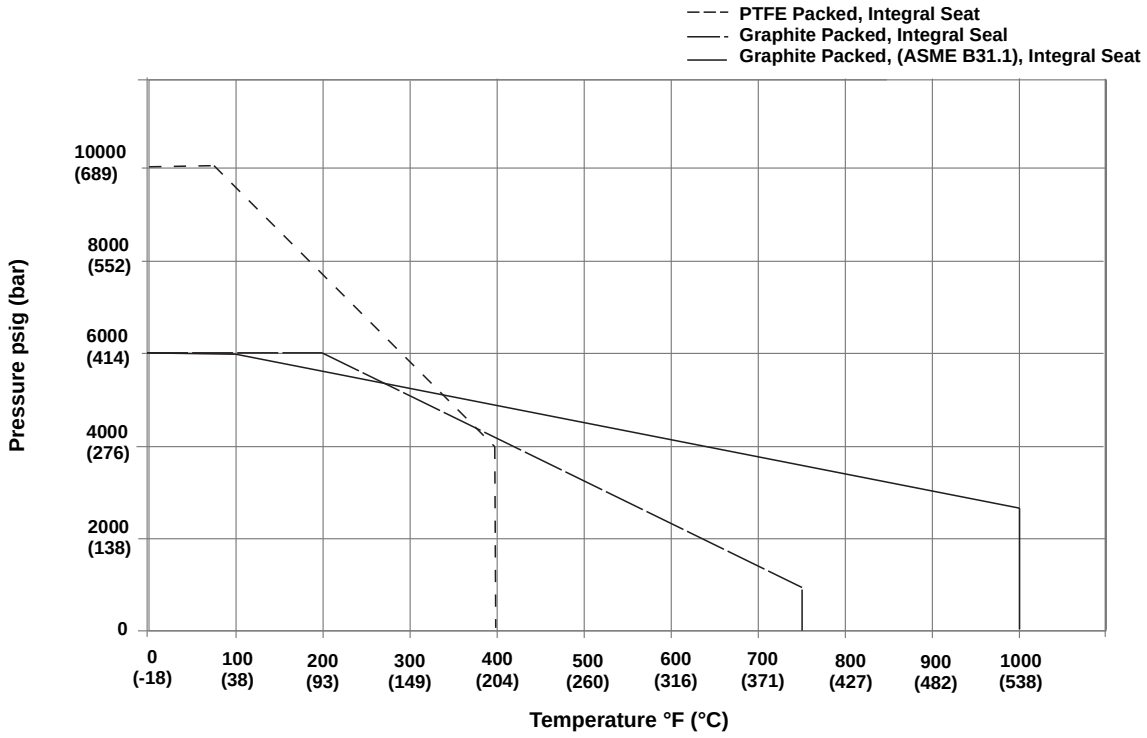


TABLE 6. 305 Integral Manifolds - Pressure and Temperature Ratings[(1)]

Packing[(1)]	Seat	Pressure and Temperature Ratings
PTFE	Integral	6092 psi @ 200 °F (420 bar @ 93 °C) 4000 psi @ 400 °F (276 bar @ 204 °C)
PTFE	Soft Delrin	6092 psi @ 200 °F (420 bar @ 38 °C)
Graphite	Integral	6092 psi @ 200 °F (420 bar @ 93 °C) 1500 psi @ 750 °F (103 bar @ 399 °C)
Graphite (ASME B31.1)	Integral	6092 psi @ 100 °F (420 bar @ 38 °C) 2915 psi @ 1000 °F (201 bar @ 538 °C)

(1) Except option HK:
PTFE, Integral seat: 2324 psi @ 200 °F (160 bar @ 93 °C), 1680 psi @ 400 °F (116 bar @ 204 °C)
Graphite, Integral seat: 2324 psi @ 200 °F (160 bar @ 93 °C), 1125 psi @ 750 °F (78 bar @ 399 °C)

FIGURE 3. 306 Integral Manifolds - Pressure vs.



Temperature

TABLE 7. 306 Integral Manifolds - Pressure and Temperature Ratings

Packing	Seat	Pressure and Temperature Ratings
PTFE	Integral	10000 psi @ 85 °F (689 bar @ 29 °C) 4000 psi @ 400 °F (276 bar @ 204 °C)
Graphite	Integral	6000 psi @ 200 °F (414 bar @ 93 °C) 1500 psi @ 750 °F (103 bar @ 399 °C)
Graphite (ASME B31.1)	Integral	6000 psi @ 100 °F (414 bar @ 38 °C) 2915 psi @ 1000 °F (201 bar @ 538 °C)

Rosemount Manifolds

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Process Connections

TABLE 8. Process Connections

Model and Style	Connection
304 Flange by Pipe Flange by Flange Wafer	 1/2 - 14 Female NPT 2 1/8-in. (54 mm) center-to-center connection (Process Adapters required) 1/2 - 14 Female NPT Process Adapters 1/2 - 14 Female NPT Flange Adapter 1/2-in. Ferrule Flange Adapter 12-mm Ferrule Flange Adapter
305 Coplanar Traditional	 1/2 - 14 Female NPT 1/4 - 18 Female NPT (Process Adapters optional) Optional Process Adapters 1/2 - 14 Female NPT Flange Adapter 12 mm Ferrule Flange Adapter
306 Block-and-Bleed 2-Valve	 1/2 - 14 Male NPT 1/2 - 14 NPT (Male or Female)

Instrument Connections

TABLE 9. Manifold - Transmitter Interface

Model	Connection
304	Mounted to traditional transmitter flange, 2 1/8-in. (54 mm) center-to-center connection per IEC 61518, Type B shut-off device (without SPIGOT)
305	Mounted directly to Coplanar sensor module of transmitter, 1.3-in. (287 mm) center-to-center process isolators
306	1/2 - 14 Male NPT

Test / Vent Connections

1/4-18 Female NPT

Manifold Bolts

Standard material is plated carbon steel per ASTM A449, Type 1

Alternative bolt materials offered through Option Codes

- L4 Austenitic 316 Stainless Steel Bolts
- L5 ASTM-A-193, Grade B7M Bolts
- L8 ASTM-A-193, Class 2, Grade B8M Bolts

O-Rings

FIGURE 4. 304 Manifold O-Rings

Manifold-to-Flange O-Rings
Same material as specified by manifold "Packing Material" selection:

- **"1" = PTFE**
- **"2" = Graphite**

Flange Adapter O-Rings
Glass-filled PTFE

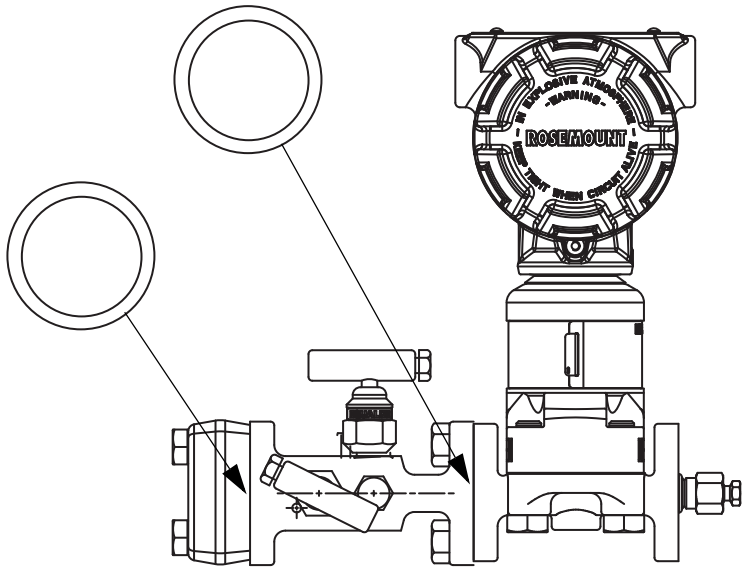
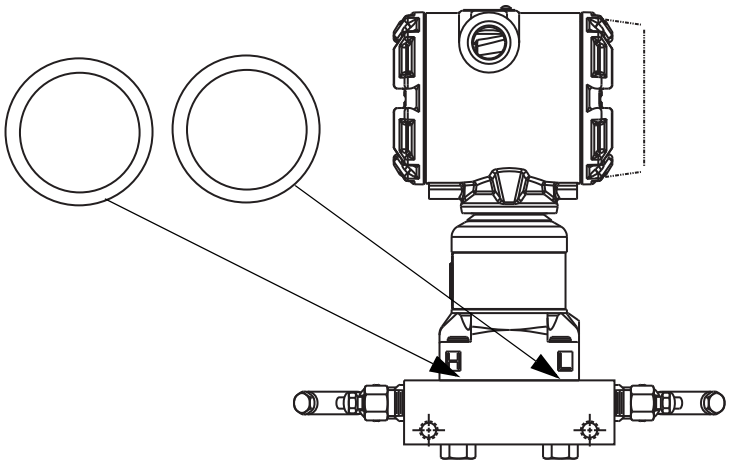


FIGURE 5. 305 Manifold O-Rings

Sensor Module-to-Manifold O-Rings
Specified in the transmitter model number



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TABLE 10. 304 Conventional Manifolds - Process Wetted Materials of Construction

Component	SST	CS	SST with SG Option	
Body	316 SST	CS	316 SST	
Ball / Tip	316 SST /316Ti SST	316 SST	Alloy C-276	
Stem	316 SST	316 SST	Alloy C-276	
Packing	PTFE / Graphite	PTFE	PTFE / Graphite	
Bonnet	316 SST	316 SST	316 SST	
Pipe Plug	316 SST	CS	316 SST	

TABLE 11. 305 Integral Manifolds - Process Wetted Materials of Construction

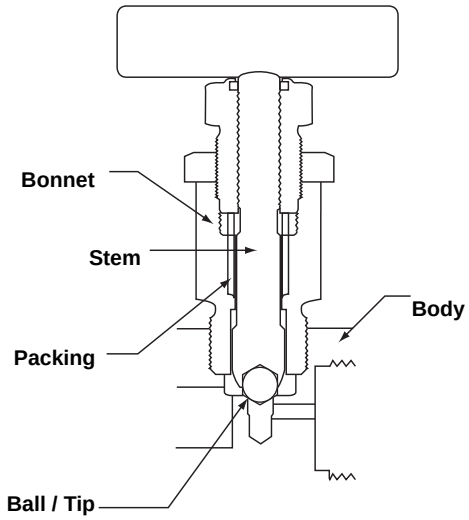
Component	SST	Alloy C-276	316 SST with SG option	
Body	316 SST	Alloy C-276	316 SST	
Ball / Tip	316 SST /316Ti SST	Alloy C-276	Alloy C-276	
Stem	316 SST	Alloy C-276	Alloy C-276	
Packing	PTFE / Graphite	PTFE / Graphite	PTFE / Graphite	
Bonnet	316 SST	Alloy C-276	316 SST	
Pipe Plug	316 SST	Alloy C-276	316 SST	
Drain / Vent Valve	316 SST	Alloy C-276	Alloy C-276	

TABLE 12. 306 Inline Manifolds - Process Wetted Materials of Construction

Component	SST	Alloy C-276	316 SST with SG option	
Body	316 SST	Alloy C-276	316 SST	
Ball / Tip	316 SST /316Ti SST	Alloy C-276	Alloy C-276	
Stem	316 SST	Alloy C-276	Alloy C-276	
Packing	PTFE / Graphite	PTFE / Graphite	PTFE / Graphite	
Bonnet	316 SST	Alloy C-276	316 SST	
Pipe Plug	316 SST	Alloy C-276	316 SST	
Bleed Screw	316 SST / 316Ti SST	Alloy C-276	Alloy C-276	

Materials of Construction - Typical

FIGURE 6. Typical Rosemount Manifold Valve

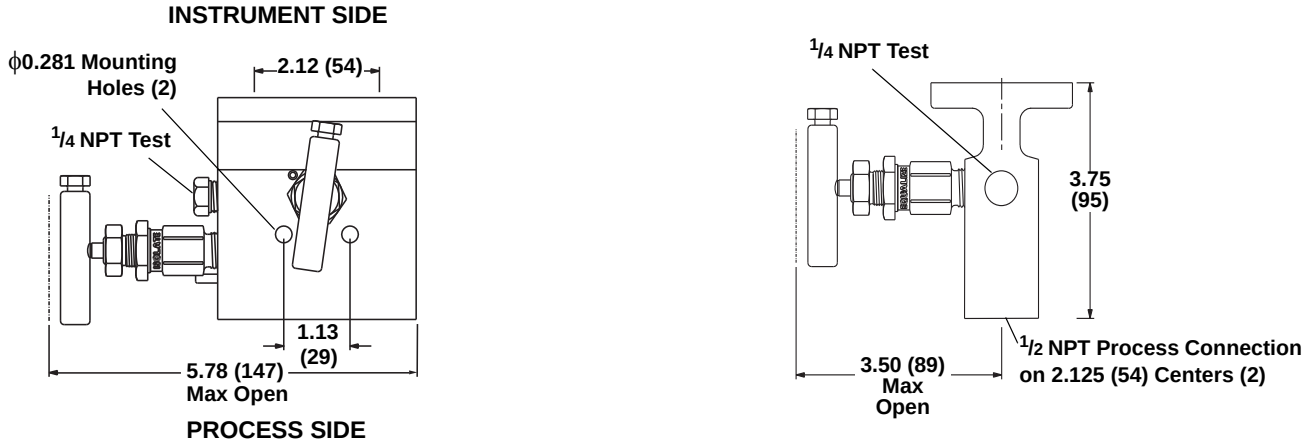


Estimated Weight

Model and Description	Weight
304	
2-valve traditional flange x NPT	5.0 lbs (2.3 kg)
2-valve traditional flange-x flange	5.5 lbs (2.5 kg)
3-valve traditional flange x NPT	5.2 lbs (2.4 kg)
3-valve traditional flange x flange	5.7 lbs (2.6 kg)
3-valve wafer flange x NPT	4.0 lbs (1.8 kg)
5-valve wafer flange x NPT	5.7 lbs (2.6 kg)
5-valve traditional flange x NPT	5.7 lbs (2.6 kg)
5-valve traditional flange x flange	5.7 lbs (2.6 kg)
305	
2-valve Coplanar	4.5 lbs (2.0 kg)
2-valve traditional	6.0 lbs (2.7 kg)
3-valve Coplanar	4.7 lbs (2.1 kg)
3-valve traditional	6.0 lbs (2.7 kg)
5-valve Coplanar	6.5 lbs (3.0 kg)
306	
Block-and-Bleed	1.1 lbs (0.5 kg)
2-valve	2.5 lbs (1.1 kg)

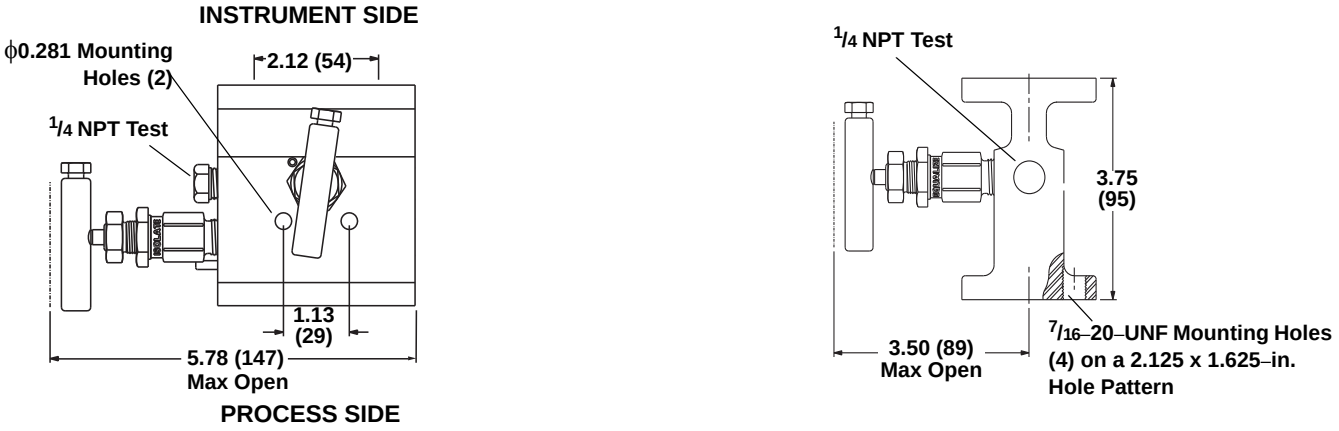
Dimensional Drawings

Rosemount 304 Two-Valve Flange X NPT Conventional Manifold



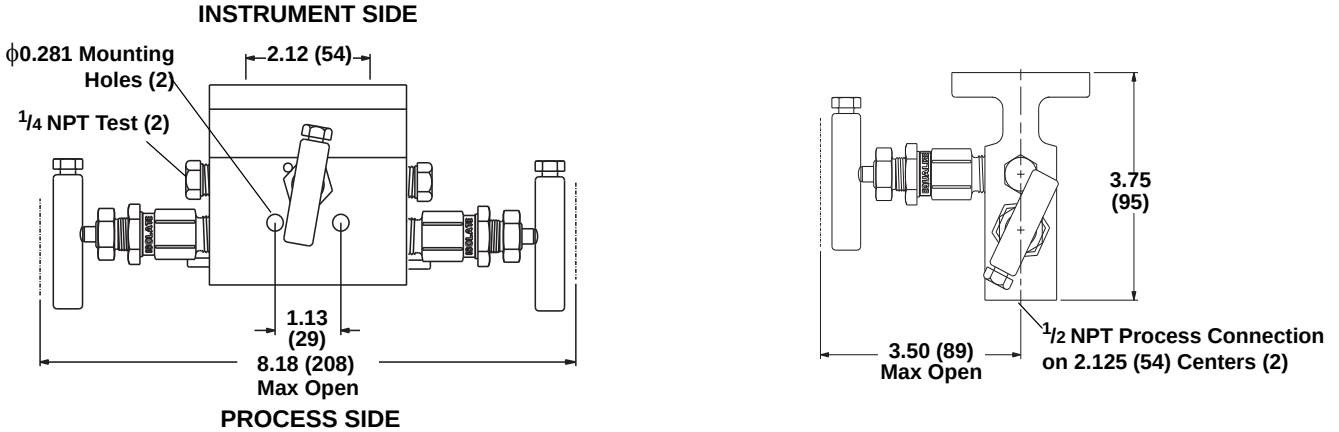
Dimensions are in inches (millimeters)

Rosemount 304 Two-Valve Flange X Flange Conventional Manifold



Dimensions are in inches (millimeters)

Rosemount 304 Three-Valve Flange X NPT Conventional Manifold

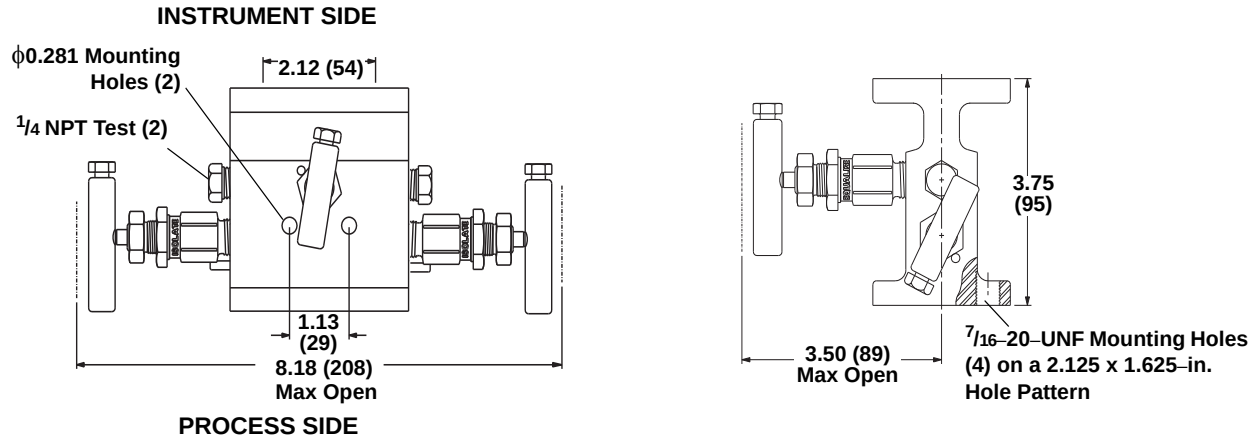


Dimensions are in inches (millimeters)

Rosemount Manifolds

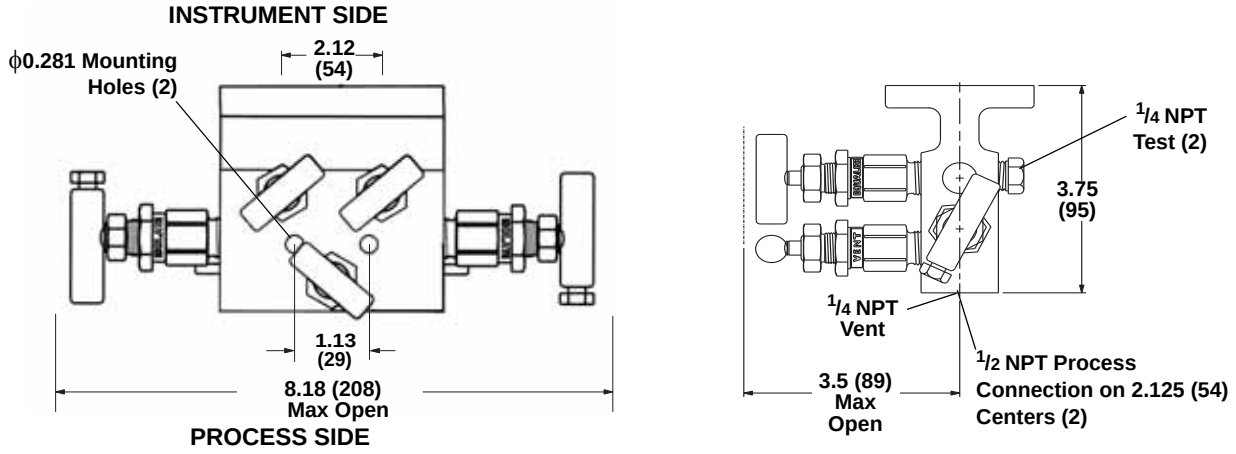
Product Data Sheet
00813-0100-4733, Rev NB
Catalog 2011 - 2012

Rosemount 304 Three-Valve Flange X Flange Conventional Manifold



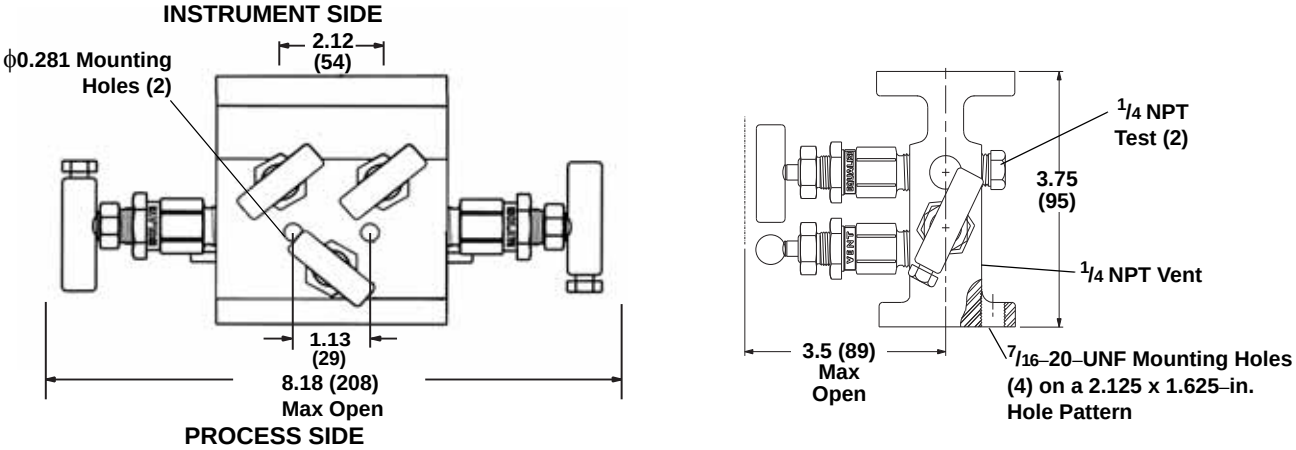
Dimensions are in inches (millimeters)

Rosemount 304 Natural Gas Five-Valve Flange X NPT Conventional Manifold



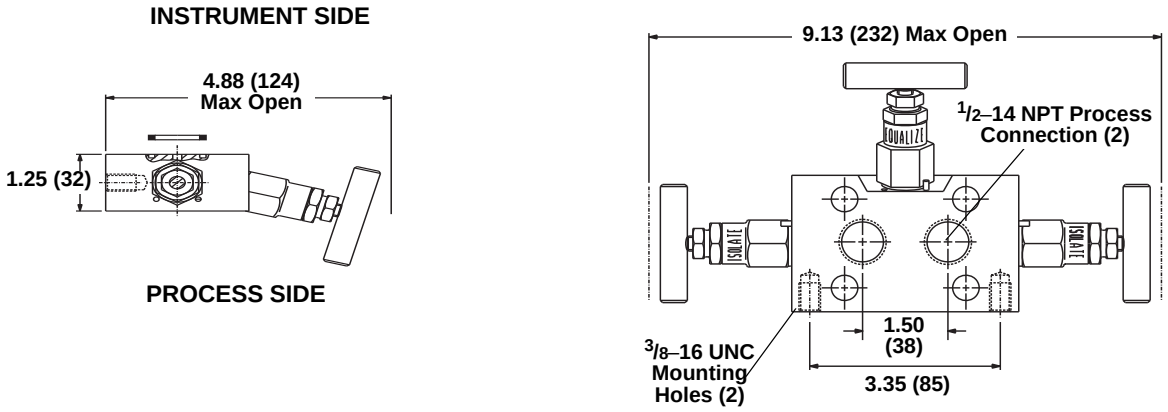
Dimensions are in inches (millimeters)

Rosemount 304 Natural Gas Five-Valve Flange X Flange Conventional Manifold



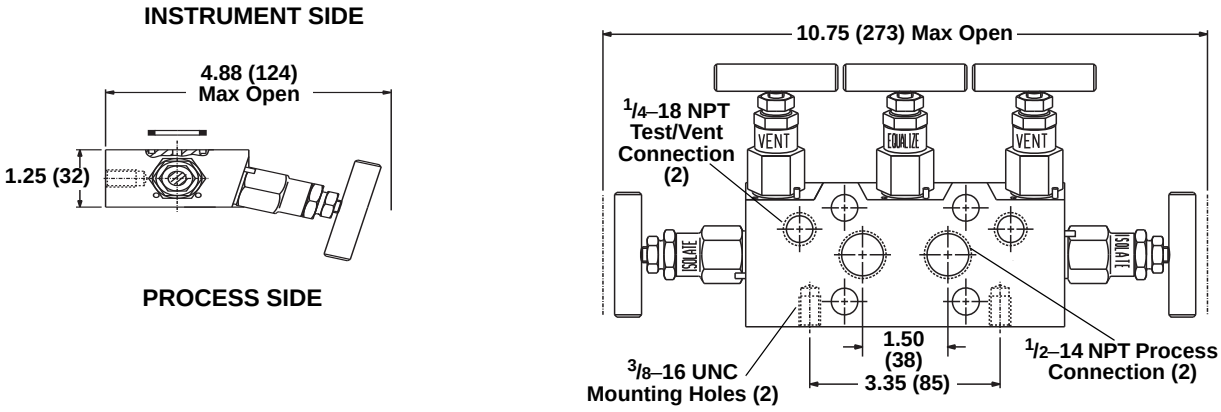
Dimensions are in inches (millimeters)

Rosemount 304 Three-Valve Wafer Manifold



Dimensions are in inches (millimeters)

Rosemount 304 Five-Valve Wafer Manifold

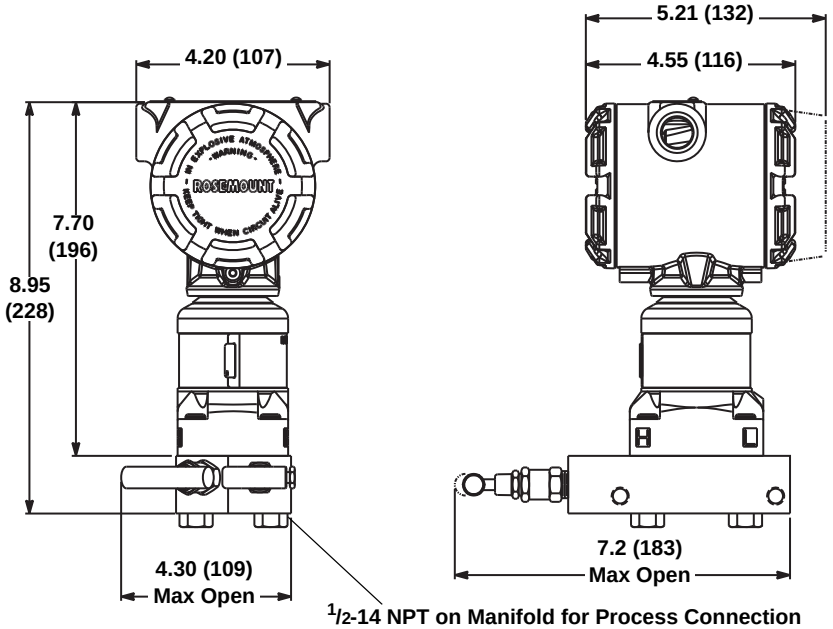


Dimensions are in inches (millimeters)

Rosemount Manifolds

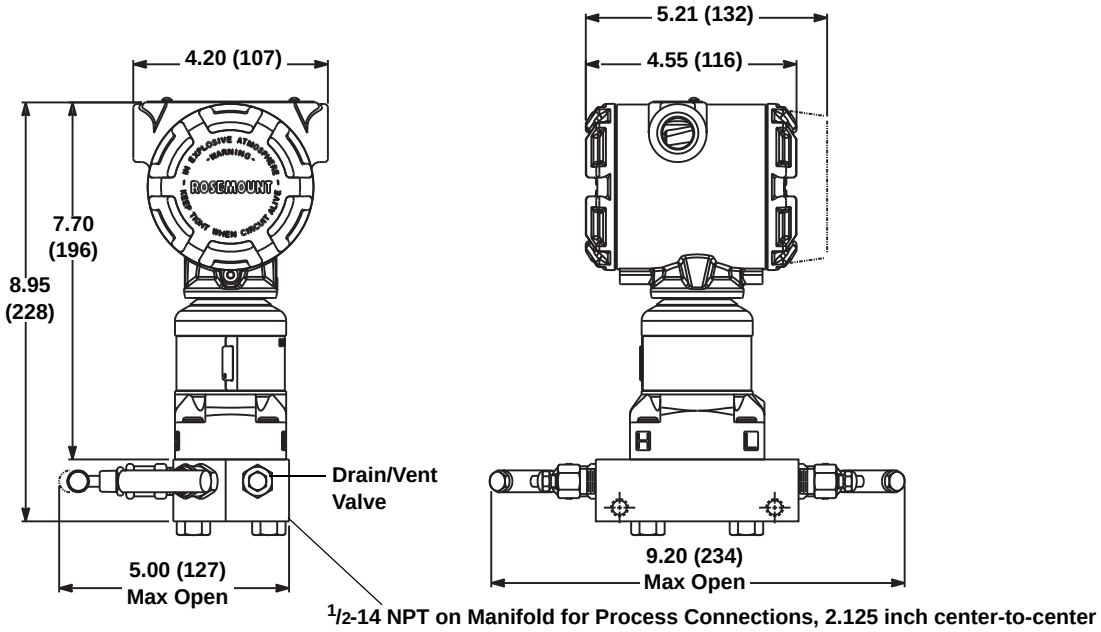
Product Data Sheet
00813-0100-4733, Rev NB
Catalog 2011 - 2012

Rosemount 305R Two-Valve Coplanar Style Manifold



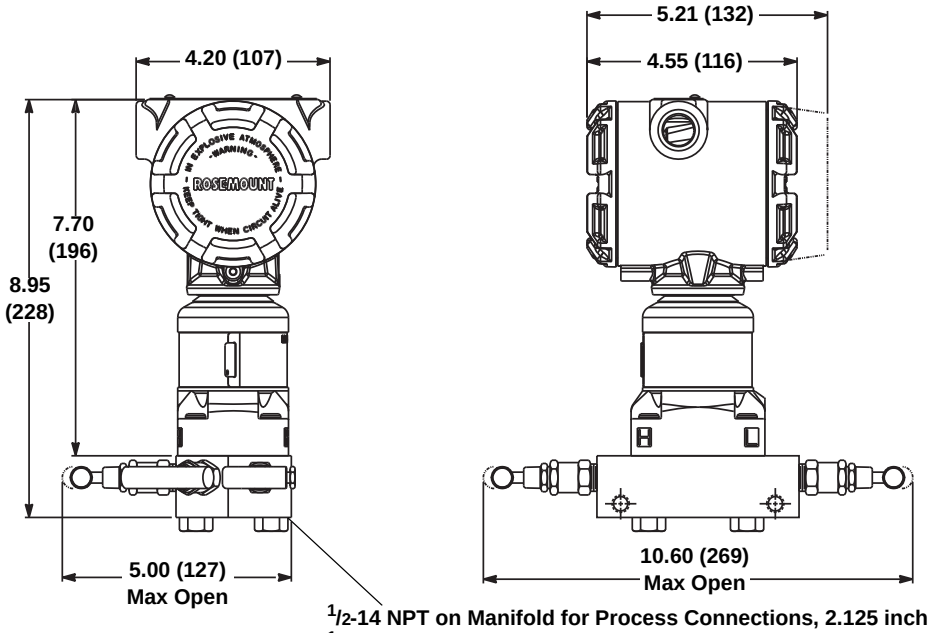
Dimensions are in inches (millimeters)

Rosemount 305R Three-Valve Coplanar Style Manifolds



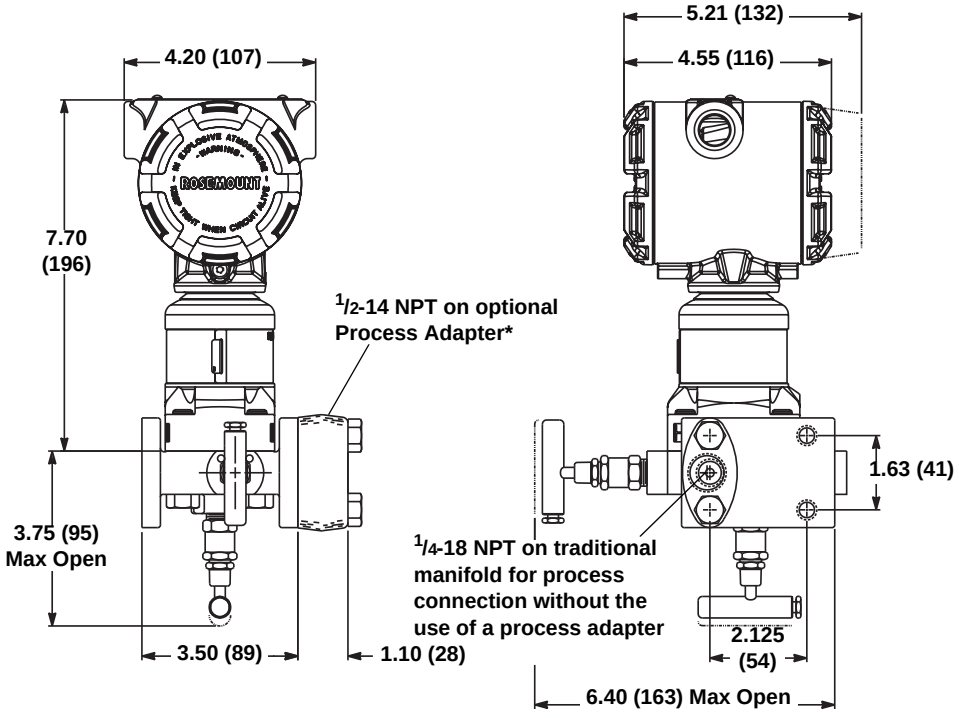
Dimensions are in inches (millimeters)

Rosemount 305R Five-Valve Coplanar Style Manifold



Dimensions are in inches (millimeters)

Rosemount 305RT Two-Valve Traditional Style Manifold

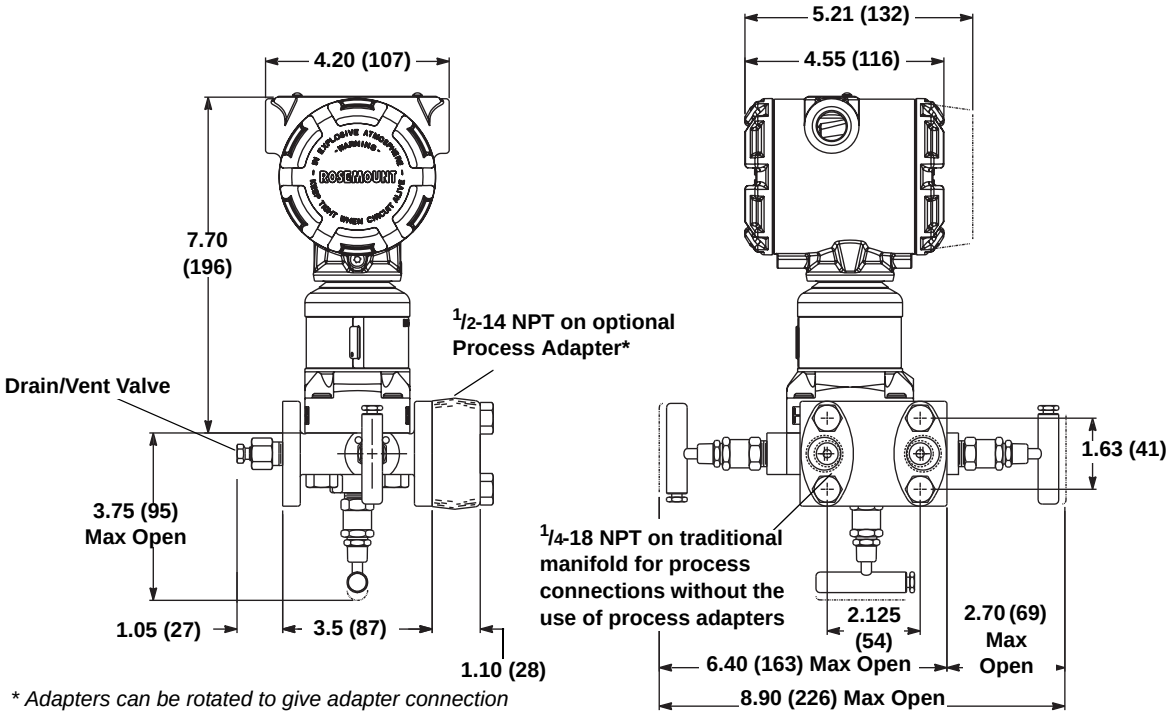


Dimensions are in inches (millimeters)

Rosemount Manifolds

Product Data Sheet
00813-0100-4733, Rev NB
Catalog 2011 - 2012

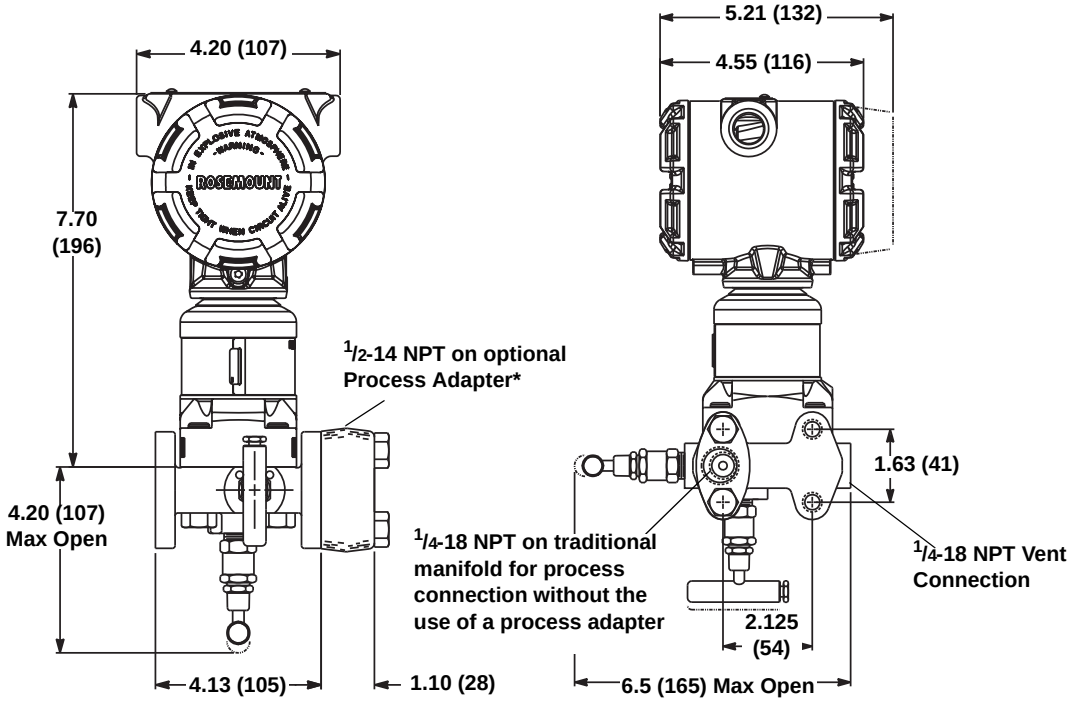
Rosemount 305RT Three-Valve Traditional Style Manifold



** Adapters can be rotated to give adapter connection centers of 2.0 (51), 2.125 (54), or 2.25 (57).*

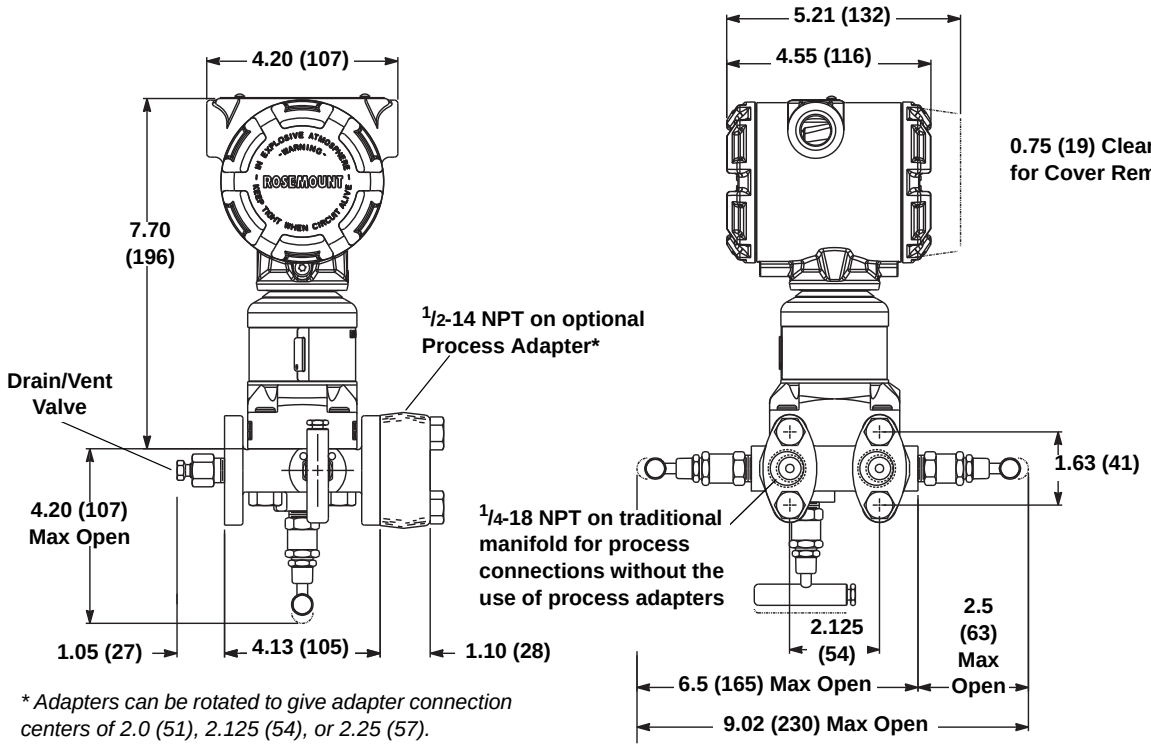
Dimensions are in inches (millimeters)

Rosemount 305RM Two-Valve Traditional Style Manifold



Dimensions are in inches (millimeters)

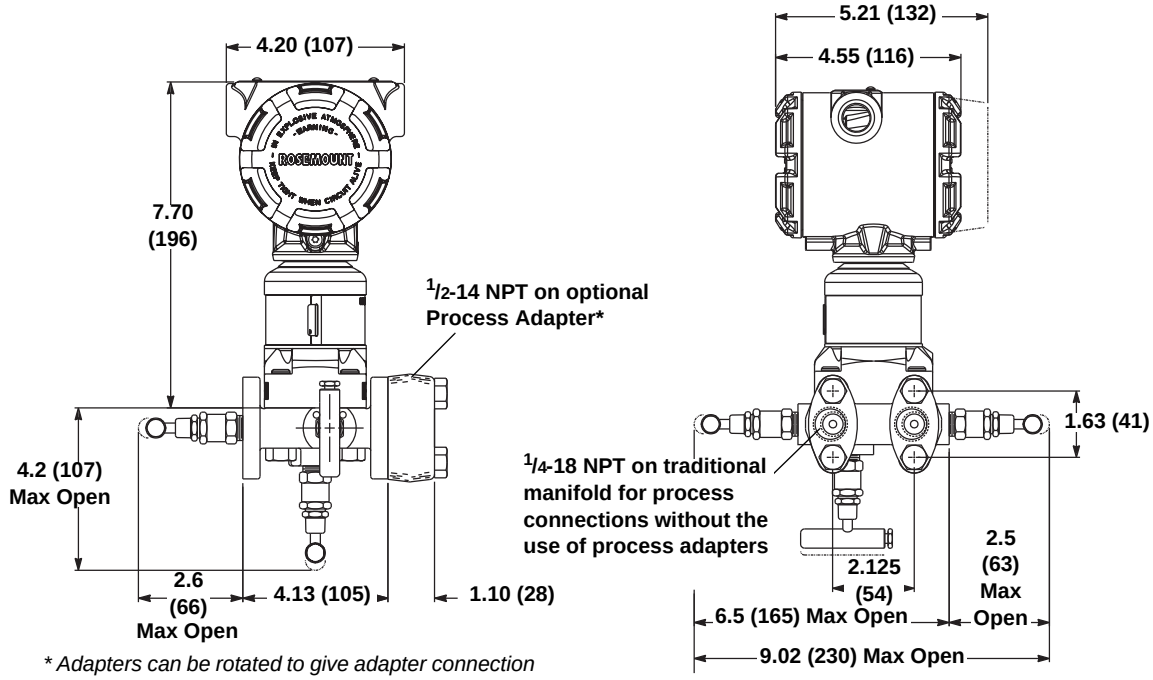
Rosemount 305RM Three-Valve Traditional Style Manifold



** Adapters can be rotated to give adapter connection centers of 2.0 (51), 2.125 (54), or 2.25 (57).*

Dimensions are in inches (millimeters)

Rosemount 305RM Five-Valve Traditional Style Manifold



** Adapters can be rotated to give adapter connection centers of 2.0 (51), 2.125 (54), or 2.25 (57).*

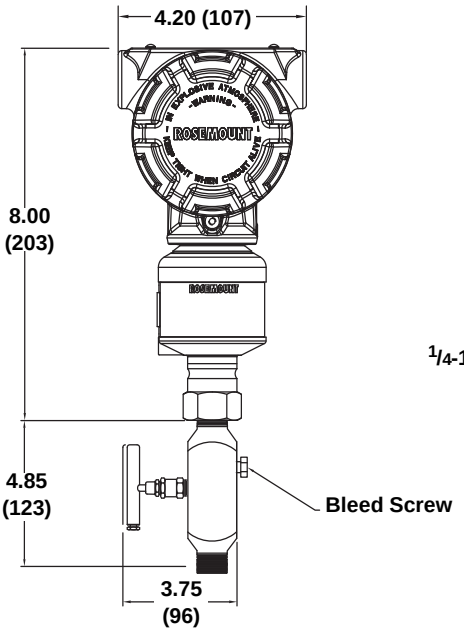
Dimensions are in inches (millimeters)

Rosemount Manifolds

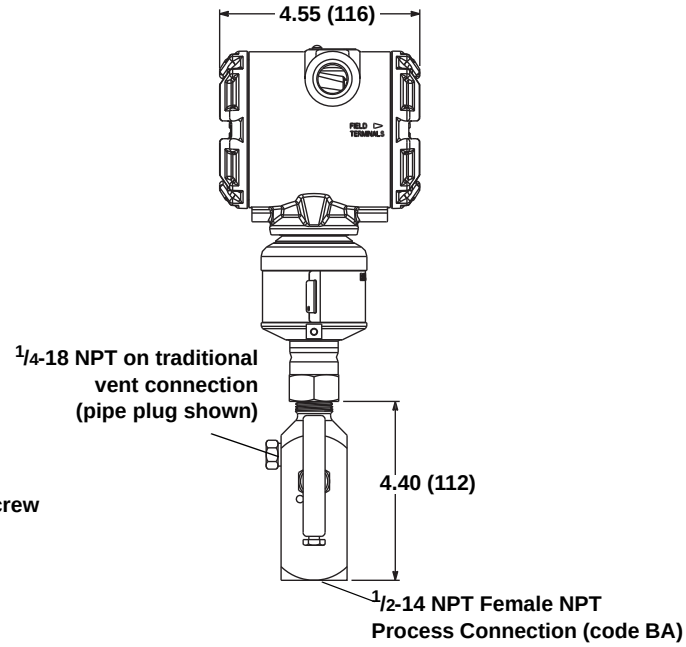
Product Data Sheet
00813-0100-4733, Rev NB
Catalog 2011 - 2012

Rosemount 306R Pressure Style Manifold (3051S_T Shown)

BLOCK AND BLEED STYLE



TWO-VALVE STYLE

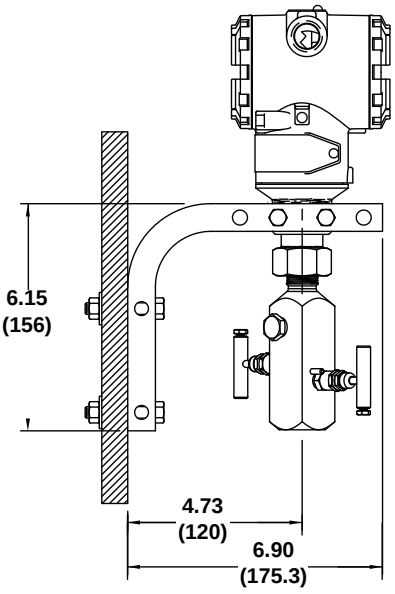


Manifold valve orientation may vary with respect to transmitter mounting holes.

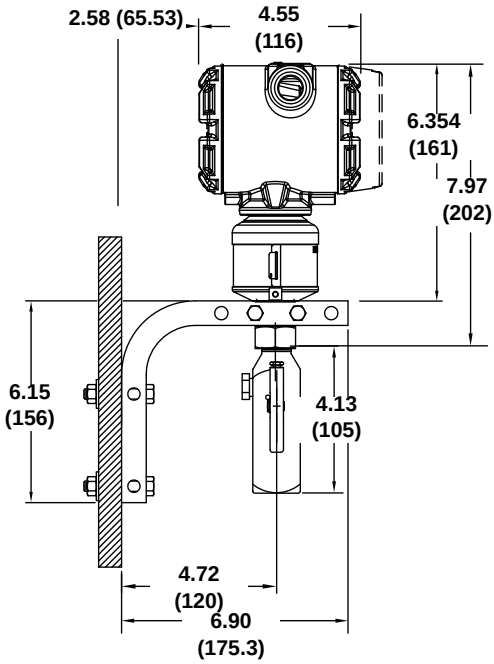
Dimensions are in inches (millimeters)

Installations for Rosemount 3051T and 3051S_T Transmitters for Panel Mounting

ROSEMOUNT 3051T



ROSEMOUNT 3051S_T

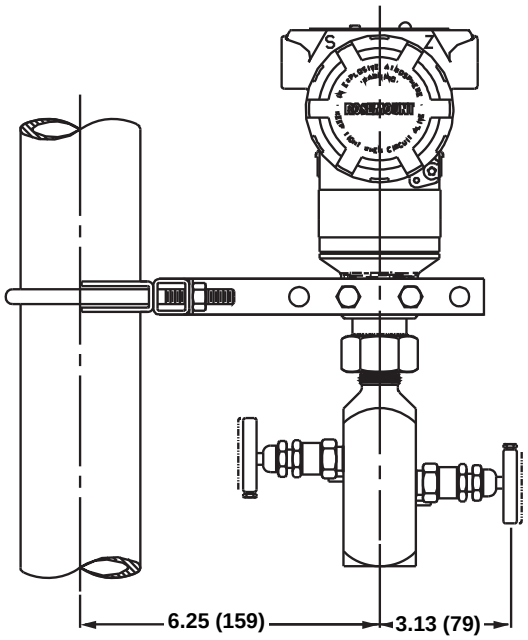


Manifold valve orientation may vary with respect to transmitter mounting holes.

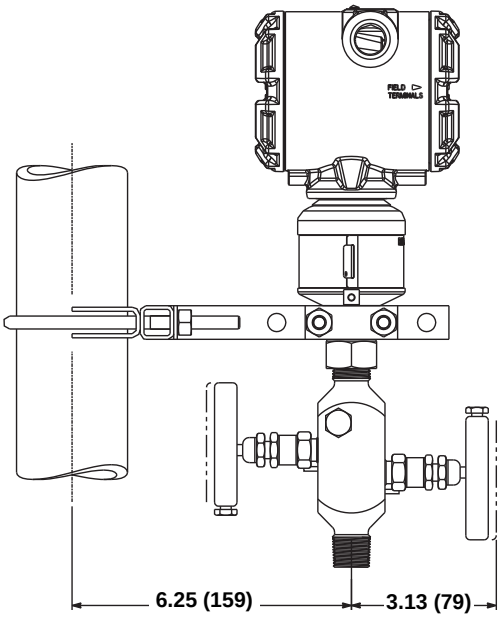
Dimensions are in inches (millimeters)

Installations for Rosemount 3051T and 3051S_T Transmitters for 2-in. Pipe Mounting

ROSEMOUNT 3051T



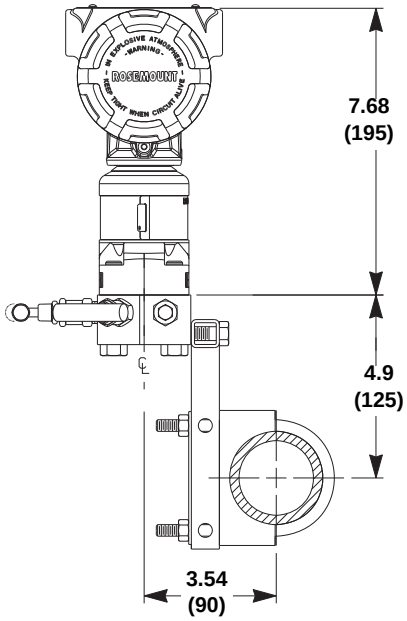
ROSEMOUNT 3051S_T

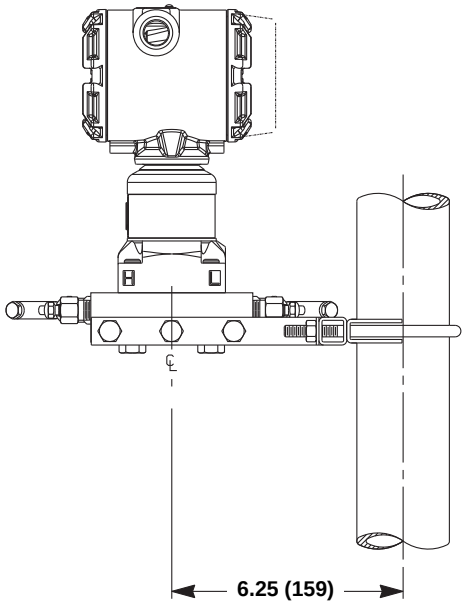


Manifold valve orientation may vary with respect to transmitter mounting holes.

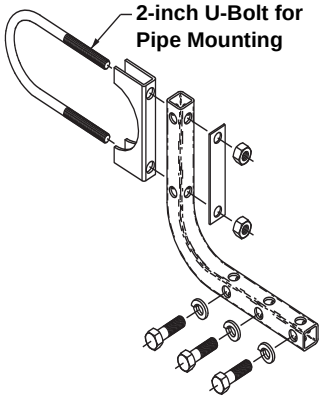
Dimensions are in inches (millimeters)

Coplanar Manifold with Optional Bracket for 2-in. Pipe Mounting





OPTION CODE B4

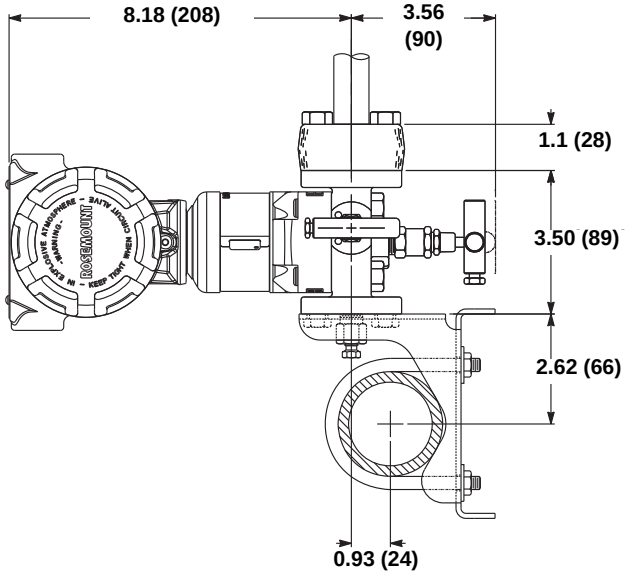


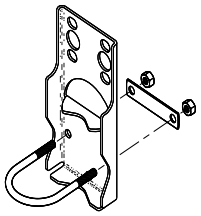
Dimensions are in inches (millimeters)

Rosemount Manifolds

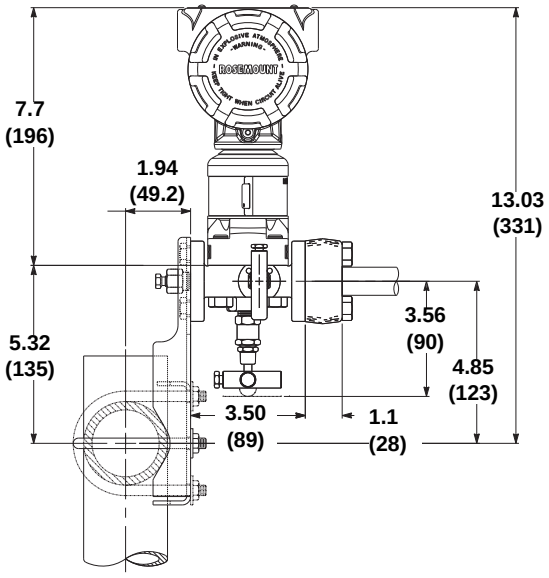
Product Data Sheet
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Traditional Manifold with Optional Brackets for 2-in. Pipe Mounting

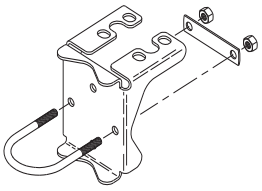




B3/B9/BC MOUNTING BRACKET



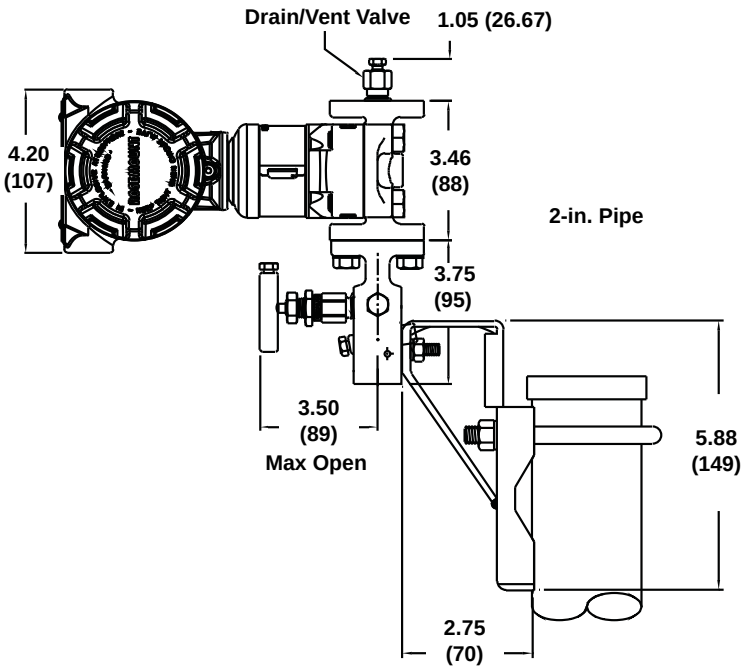
B1/B7/BA MOUNTING BRACKET



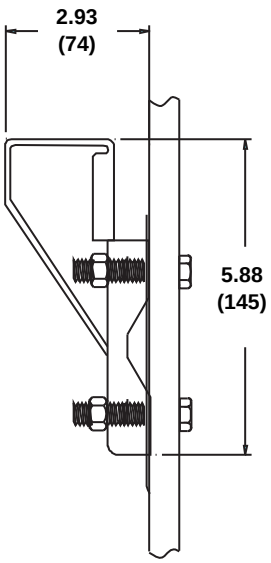
Dimensions are in inches (millimeters)

VS/VC Heavy Duty Manifold Mounting Bracket

2-IN. PIPE MOUNT



PANEL MOUNT



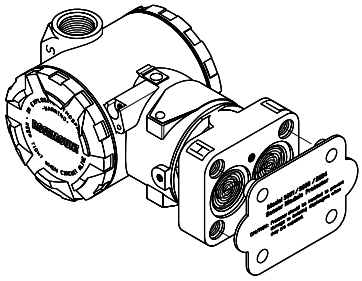
Dimensions are in inches (millimeters)

OPTIONS

Module Guard

A sensor module guard is available to protect the transmitter process isolating diaphragms. This guard should be used whenever the transmitter is removed from the integral manifold to avoid damage to the isolating diaphragms.

- Part number: 00305-1000-0001 (5/pack)



P2 Cleaning for Special Services

Per ASTM G93-96, this option minimizes process contaminants by cleaning wetted surfaces with a suitable detergent.

SG Sour Gas

Materials of Construction comply with recommendations per NACE MR 0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

Heat Block Kits

Rosemount 304 Manifolds are available with steam heat block kits for cold environments and services. The steam block attaches directly to the manifold to prevent the process from freezing.

ASME B31.1 Power Piping Code

Rosemount Manifolds are available in configurations that meet the requirements of the ASME B31.1 Power Piping Code. This code specifies design criteria for most air, gas, steam, water, and oil systems used in electric generating systems, central and district heating systems, industrial power plants, and geothermal plants. ASME B31.1 includes requirements for manifolds, valves, and piping. Transmitters and other measuring devices do not fall within the scope of this code.

Marking

Manifolds are tagged with a part number, schematic drawing, temperature, and pressure limits.

Other Publications

For additional information, go to www.rosemount.com.

Rosemount Manifolds

SPARE PARTS LIST

TABLE 13. Rosemount 304 Conventional Manifold

Part Description	Part Number (Traditional Style)	Part Number (Wafer Style)
Mounting Brackets (qty. 1)		
Manifold Heavy Duty Mounting Bracket, CS	01166-8005-0002	NA
Manifold Heavy Duty Mounting Bracket, SST	01166-8005-0001	NA
Manifold SST Mounting Bracket for 2-in. Pipe Mount	NA	00305-0405-0001
O-Rings (set of 12)		
Manifold-to-Flange O-Ring, Glass-filled PTFE	03031-0019-0003	03031-0019-0003
Manifold-to-Flange O-Ring, Graphite-filled PTFE	03031-1302-0002	03031-1302-0002
Manifold-to-Flange Bolt Kits (set of 4)		
Consult factory for part numbers	Consult Factory	Consult Factory
Heater Block Kits (qty. 1)		
Steam Block Kit	00305-0406-0001	NA

TABLE 14. Rosemount 305 Integral Manifold

Part Description	Part Number (Traditional Style)	Part Number (Coplanar Style)
Mounting Brackets (qty. 1)		
Manifold SST Mounting Bracket for 2-in Pipe Mount	NA	00305-0405-0001
Bolt Kits (set of 4)		
CS Bolt Kit	03031-0312-0001	03031-0311-0001
SST Bolt Kit	03031-0312-0002	03031-0311-0002
ANSI/ASTM-A-193-B7M Bolt Kit	03031-0312-0003	03031-0311-0003
Drain/Vents (qty. 1)		
316 SST Drain/Vent for use with 3-valve 305 Manifold	01151-0028-0012	01151-0028-0012
Alloy C-276 Drain/Vent for use with 3-valve 305 Manifold	01151-0028-0013	01151-0028-0013
Coplanar Flange Kits (qty. 1)		
Differential Flange Kit, SST	NA	00305-1001-0001
Gauge Flange Kit, SST	NA	00305-1001-1001
O-Rings (set of 12)		
Manifold-to-Module O-Ring, Glass-filled PTFE	03031-0234-0001	03031-0234-0001
Manifold-to-Module O-Ring, Graphite-filled PTFE	03031-0234-0002	03031-0234-0002
Sensor Guard (set of 5)		
Coplanar Module Sensor Guard	00305-1000-0001	00305-1000-0001

Rosemount Manifolds

Product Data Sheet
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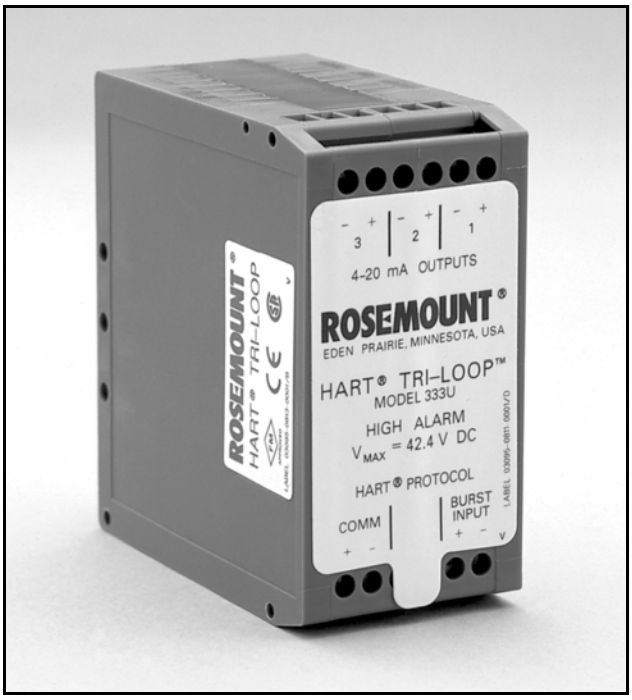
EMERSON™
Process Management

Product Data Sheet
00813-0100-4754, Rev FA
Catalog 2011 - 2012

Rosemount 333 HART® Tri-Loop™

HART-TO-ANALOG SIGNAL CONVERTER

- *Convert a digital HART signal into three additional analog signals*
- *Easy to configure and install*
- *Accessory product for multivariable instruments*
- *Available as either High-alarm or Low-alarm device*



CE

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Specifications . . . . . page Pressure-401
Dimensional Drawings. . . . . page Pressure-403

Rosemount 333

Product Data Sheet
00813-0100-4754, Rev FA
Catalog 2011 - 2012

HART Tri-Loop HART-to-Analog Signal Converter

Convert a digital HART signal into three analog signals

Convert a multivariable digital HART signal into independent 4-20 mA analog process variables using the Rosemount 333 HART Tri-Loop. Apply in control or monitoring applications to obtain up to three additional analog outputs without additional process penetrations.

Accessory product for multivariable instruments

For use with the Rosemount 3051S MultiVariable™, 3051S Advanced HART Diagnostics, and 3144P products. When used with the 3051S MultiVariable transmitter, the 333 HART Tri-Loop allows possible outputs of Differential, Absolute or Gage pressure, Process Temperature, Mass or Volumetric Flow, Energy Flow, Totalized Flow, and Sensor Module Temperature. When used with the 3051S Advanced HART Diagnostics, possible outputs include Pressure, Sensor Module Temperature, Scaled Variable, Standard Deviation, and Mean. When used with the Rosemount 3144P, possible outputs include Sensor 1, Sensor 2, Differential and Transmitter Terminal Temperature.

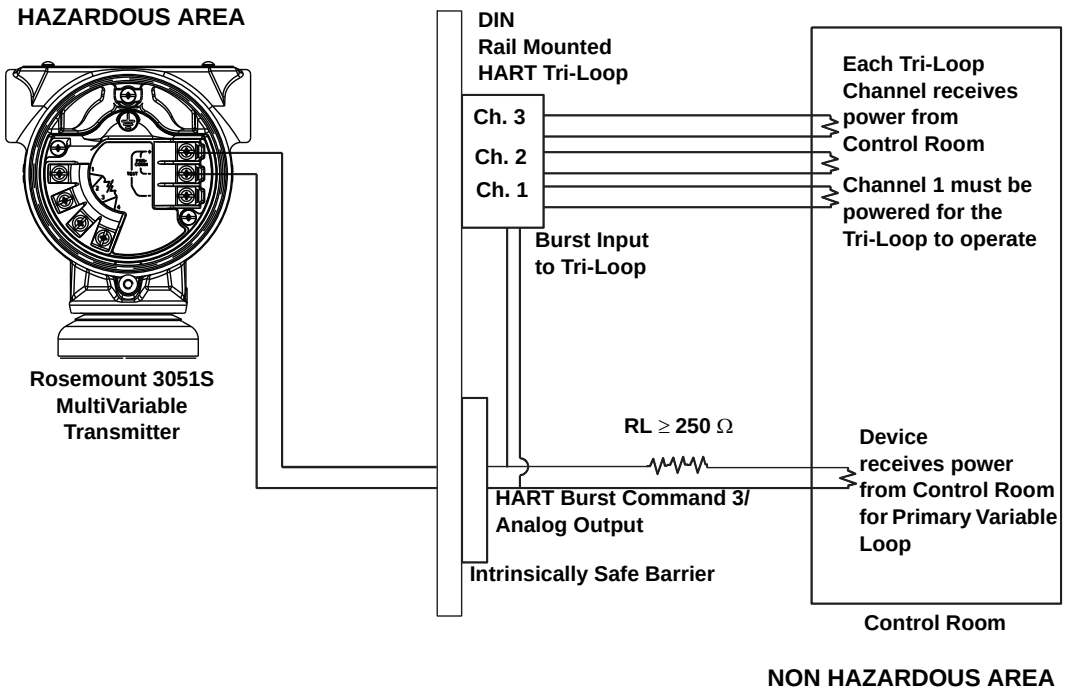
Easy to configure and install

The 333 HART Tri-Loop is easy to configure and maintain using the 475 Field Communicator. AMS Device Manager provides easy PC-based user configuration. Installation is quick and easy with three DIN rail mount options and electrically isolated analog output channels for flexible grounding.

Available as either High-alarm or Low-alarm device

Tri-Loop alarm channels are factory configured. All channels alarm if the attached device indicates a sensor failure or transmitter malfunction.

Figure 1. Example Tri-Loop Installation with Rosemount 3051S MultiVariable Transmitter



Ordering Information

Table 1. Rosemount 333 HART Tri-Loop

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
333	HART Tri-Loop	
Alarm Option		
Standard		**Standard**
U	High Alarm	★
D	Low Alarm	★
Configuration Option		
Standard		**Standard**
C2	Custom Configuration (Configuration Data Sheet must be completed)	★
Typical Model Number: 333 U		

Specifications

FUNCTIONAL SPECIFICATIONS

Service

Accessory product for use with the 3051S MultiVariable Transmitter, 3051S Advanced HART Diagnostics Transmitter, 3144P Temperature Transmitter, or any other HART device with a burst mode output.

Output

One, two, or three 4–20 mA user-selectable output signals.

Device	Output Options
3051S MultiVariable	DP, AP, GP, PT, Mass or Volumetric, Energy Flow, Totalized Flow, and Sensor Module Temperature.
3051S	Pressure, Sensor Module Temperature, Scaled Variable, Standard Deviation, and Mean.
3144P	Sensor 1, Sensor 2, Differential Temperature, or Transmitter Terminal Temperature.

Power Supply

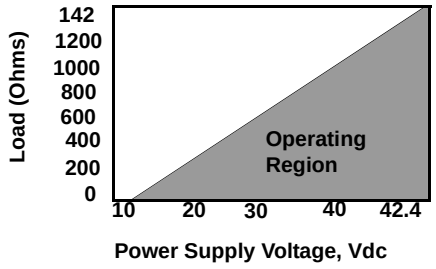
External power supply required for each channel. Each channel operates on terminal voltage of 11–42.4 Vdc.

NOTE
Channel 1 must be powered for Tri-Loop operation.

Load Limitations

Loop resistance is determined by the voltage level of the external power supply, as described below:

$$\text{Max. Loop Resistance} = \frac{\text{Power Supply Voltage} - 11}{0.022}$$



Turn-on Time

Analog signals will be within specifications five seconds after power is applied to Tri-Loop.

Installation Locations

Approved for FM ordinary locations, approved for CSA ordinary locations

Temperature Limits

Ambient

50 to 104 °F (10 to 40 °C)

Storage

–40 to 158 °F (–40 to 70 °C)

Rosemount 333

Humidity Limits

0–95% non-condensing relative humidity.

Failure Mode Alarm

If Tri-Loop diagnostics detect a Tri-Loop failure or the transmitter indicates a transmitter malfunction, the analog signal for all channels will be driven either below 3.75 mA or above 21.75 mA to alert the user. The high or low alarm signal is determined by the Tri-Loop Model Number, see “Alarm Configuration” on page 402.

PERFORMANCE SPECIFICATIONS

(Performance specifications are for the HART Tri-Loop only.)

Reference Accuracy

±0.045% of span

Ambient Temperature Effect per 50 °F (28 °C)

±0.15% of span

Stability

±0.1% of span for 12 months

Analog Output Update

Tri-Loop responds to every HART burst update (Typical transmitter burst update rate: 0.3 to 0.5 s.)

Tri-Loop Response Time (after each burst update)

Channel 1:120 ms; Channel 2:220 ms; Channel 3:320 ms

Total Response Time

Typical response time from sensor change to transmitter to Tri-Loop analog update: 0.7 to 1.0 seconds.

Electromagnetic Compatibility (EMC)

Meets all relevant requirements of EN 61326-1:2006

- ESD tested to 4 kV contact and 4 kV air
- EM field immunity from 80 MHz to 1 GHz tested to 3 V/m
- Limits of performance criterion A defined as < ± 0.1% of span

PHYSICAL SPECIFICATIONS

Electrical Connections

Screw clamps. Accepts 24–12 AWG solid or stranded wire.

Dimensions

1.57 × 3.11 × 3.36 in. (40 × 79 × 85,5 mm)

DIN Rail Mounting Options

Asymmetrical 32 mm G rail, symmetrical 35 × 7.5 mm top hat rail, or symmetrical 35 × 15 mm top hat rail (see Tri-Loop Dimensions on page Pressure-403).

Weight

0.27 lb (0,1 2 kg)

Alarm Configuration

Tri-Loops are configured with all channels to alarm in the same direction. Alarm direction is configured at the factory, and cannot be changed in the field. In addition, all channels alarm if the attached device indicates a sensor failure or transmitter malfunction. Tri-Loops are ordered according to the desired alarm direction.

Standard Configuration

Unless otherwise specified with a C2 option, Tri-Loop is shipped as described in Table 2.

Tri-Loop Label

Each Tri-Loop is labeled with serial number, part number, and factory configuration.

Custom Configuration

If a Tri-Loop is ordered with a C2 option for custom configuration, the assigned variable, variable range, variable units, and channel status are assigned for all three channels.

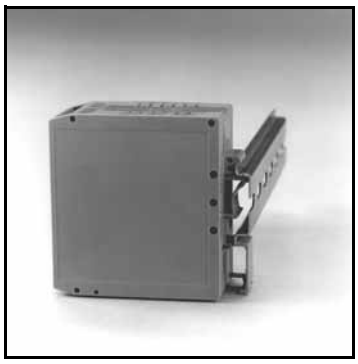
333 HART Tri-Loop Configuration

The 333 HART Tri-Loop can be fully configured using the 475 Field Communicator. AMS Device Manager software provides a PC-based user configuration.

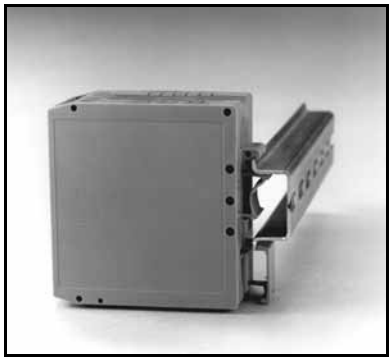
Table 2. Standard Configuration

Tri-Loop Channel	Assigned Variable	Variable Range	Variable Units	Channel Status
Channel 1	Second	0–250	inH_2O at 68 °F	Disabled
Channel 2	Third	0–800	psi	Disabled
Channel 3	Fourth	–40 to 400	Degree F	Disabled

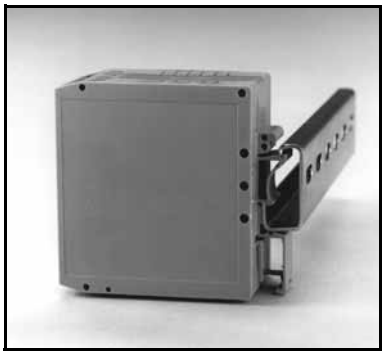
Figure 2. DIN Rail Mounting Options



SYMMETRICAL 35 X 7.5 MM TOP HAT RAIL



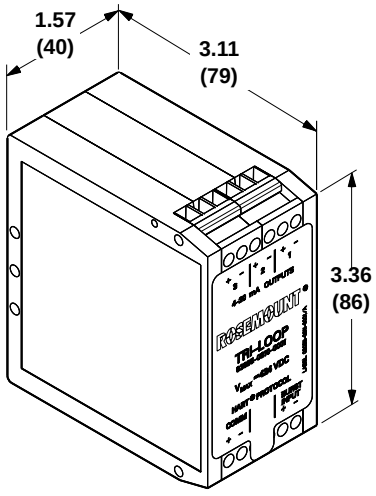
SYMMETRICAL 35 X 15 MM TOP HAT RAIL



ASYMMETRICAL 32 MM G RAIL

Dimensional Drawings

Tri-Loop Dimensions



NOTE
Dimensions are in inches (millimeters)

Rosemount 333

Product Data Sheet
00813-0100-4754, Rev FA
Catalog 2011 - 2012

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00813-0100-4754 Rev FA, 7/11

EMERSON
Process Management

Temperature

Rosemount 3144P Temperature Transmitter

- Industry-leading temperature transmitter delivers unmatched field reliability and innovative process measurement solutions
- A comprehensive diagnostic offering increases measurement reliability and provides visibility into process conditions

Rosemount 648 Wireless Temperature Transmitter

- Industry-leading temperature transmitter delivers field reliability as a wireless measurement solution
- Provides superior performance, comprehensive diagnositcs and an information-rich LCD display.

Rosemount 644 Temperature Transmitter

- Versatile temperature transmitter delivers field reliability and advanced accuracy to meet demanding process needs
- A standard diagnostic offering provides visibility into process conditions

Rosemount 248 Temperature Transmitter

- Standard temperature transmitter offers a reliable solution for temperature measurement points

Rosemount 248 Wireless Temperature Transmitter

- Standard temperature transmitter offers a wireless solution for process monitoring

Rosemount 148 Temperature Transmitter

- Basic temperature transmitter offers a cost effective solution for temperature monitoring points

Rosemount 848T High Density Temperature Transmitter

- Innovative temperature measurement solution with eight independently configurable inputs
- FOUNDATION fieldbus functionality provides process diagnostics and advanced control capabilities

Rosemount 848T Wireless High Density Temperature Transmitter

- Innovative wireless temperature solution with four independently configurable inputs
- Voltage, 4-20 mA, and temperature inputs provide enhanced measurement versatility

Volume 1 Temperature Sensors and Accessories (English)

- RTDs (68, 78) and Thermocouples (185) in single and dual sensor models
- Barstock Thermowell offering in wide range of materials and process connections
- Calibration capabilities for increased measurement accuracy
- Sanitary RTD for hygienic applications

Rosemount DIN-Style Temperature Sensors and Thermowells (Metric)

- RTDs (0065) and Thermocouples (0185) available to meet any process requirement
- DIN-style for easy installation and replacement or spring loaded threaded adapters
- Tubular and Barstock Thermowells in variety of process connections

Rosemount 1067 Compact Sensor and 1097 Thermowell

- RTD and Thermocouple single and dual sensor models (1067 Model)
- Wide selection of materials available for thermowells (1097 Model)
- Integrated temperature assembly is available with Rosemount 248 and 644 Temperature Transmitters

Rosemount 1075 and 1099 Series High Temperature Thermocouples

- Accurate and reliable measurements in high temperature applications such as heat treatment and combustion processes
- Ceramic protection tube materials available for use up to 1800 °C (3272 °F)
- Metal protection tube materials for use up to 1200 °C (2192 °F)

Resistance Temperature Sensors for Hygienic and Sanitary Applications

- Resistance temperature sensors for applications in the food and beverage, pharmaceutical and life-science industries
- Aseptic process connections suitable for CIP and SIP dead-pocked free measurement applications
- Exchangeable measuring insert to ensure process integrity

Rosemount Pipe Clamp RTD Sensor

- Platinum RTD Temperature Sensors with silver or nickel tip
- Non intrusive design for measurement on pipe applications
- Temperature-sensor matching provides increased measurement accuracy

Rosemount 751 Field Signal Indicator

- Available with a LCD or analog meter
- Compact, rugged, and designed for industrial environments
- Available with explosion-proof and intrinsic safety certifications

Rosemount 752 Foundation™ fieldbus Remote Indicator

- Two-wire segment powered device
- Displays up to 8 values
- Link Master Capability

Comprehensive Product Catalog

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Rosemount 3144P Temperature Transmitter

- *Industry-leading temperature transmitter delivers unmatched field reliability and innovative process measurement solutions*
- *Achieve optimal efficiency with Best-in-Class product specifications and capabilities*
- *A comprehensive diagnostic offering increases measurement reliability and provides visibility into process conditions*
- *Explore the benefits of a Complete Point Solution from Rosemount Temperature*



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Rosemount 3144P Temperature Transmitter

Industry-leading temperature transmitter delivers unmatched field reliability and innovative process measurement solutions

- Superior accuracy and stability
- Dual and single sensor capability with universal sensor inputs (RTD, T/C, mV, ohms)
- Comprehensive sensor and process diagnostics offering
- IEC 61508 safety certification
- Dual-compartment housing
- Large LCD display
- HART/4-20 mA or FOUNDATION fieldbus protocols



Achieve optimal efficiency with Best-in-Class product specifications and capabilities

- An industry-leading accuracy specification and five-year stability rating reduces maintenance costs
- **Transmitter-Sensor Matching** eliminates the interchangeability error of sensors, improving measurement point accuracy by 75%
- PlantWeb alerts and user-centric Device Dashboards communicate important diagnostics and ensure process health
- Local LCD display enables viewing of configuration and diagnostics from the field
- Compensation for ambient temperatures enhances transmitter performance
- Dual-compartment housing provides the highest reliability in harsh industrial environments



A comprehensive diagnostic offering increases measurement reliability and provides visibility into process conditions

- **Thermocouple Degradation Diagnostic** monitors the health of a thermocouple loop, enabling preventative maintenance
- **Minimum and Maximum Temperature Tracking** tracks and records temperature extremes of the process sensors and the ambient environment
- **Sensor Drift Alert** detects sensor drift and alerts the user
- **Hot Backup**® provides temperature measurement redundancy

Explore the benefits of a Complete Point Solution from Rosemount Temperature

- An “Assemble To Sensor” option enables Emerson to provide a complete point temperature solution, delivering an installation-ready transmitter and sensor assembly
- Emerson offers a selection of RTDs, thermocouples, and thermowells that bring superior durability and Rosemount reliability to temperature sensing, complementing the Rosemount Transmitter portfolio



Experience global consistency and local support from numerous worldwide Rosemount Temperature manufacturing sites



- World-class manufacturing provides globally consistent product from every factory and the capacity to fulfill the needs of any project, large or small
- Experienced Instrumentation Consultants help select the right product for any temperature application and advise on best installation practices
- An extensive global network of Emerson service and support personnel can be on-site when and where they are needed

- Looking for a wireless temperature solution? For wireless applications that require superior performance and unmatched reliability, consider the **Rosemount 648 Wireless** temperature transmitter.
- A demanding high temperature application requires an innovative temperature solution. Pair the 3144P Thermocouple Diagnostic with the **Rosemount 1075 High Temperature Thermocouple**.

Rosemount 3144P Temperature Transmitter



The industry-leading Rosemount 3144P Single Point temperature transmitter delivers unmatched field reliability and innovative process measurement solutions and diagnostics

Transmitter features include:

- Dual and Single Sensor Input Capabilities
- Transmitter-Sensor Matching (Option Code C2)
- Integral Transient Protector (Option Code T1)
- IEC 61508 Safety Certificate of Compliance (Option Code QT)
- Advanced Sensor and Process Diagnostics (Option Code D01)
- Large, Easy to Read LCD Display (Option Code M5)
- “Assemble to Sensor” option (Option Code XA)

Table 1. Rosemount 3144P Temperature Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	**Product Description**			
3144P	Temperature Transmitter			
Housing Style		**Material**	**Conduit Entry Size**	
Standard				**Standard**
D1	Field Mount Housing, Dual-Compartment Housing	Aluminum	1/2–14 NPT	★
D2	Field Mount Housing, Dual-Compartment Housing	Aluminum	M20 x 1.5 (CM20)	★
D3	Field Mount Housing, Dual-Compartment Housing	Aluminum	PG 13.5 (PG11)	★
D4	Field Mount Housing, Dual-Compartment Housing	Aluminum	JIS G 1/2	★
D5	Field Mount Housing, Dual-Compartment Housing	Stainless Steel	1/2–14 NPT	★
D6	Field Mount Housing, Dual-Compartment Housing	Stainless Steel	M20 x 1.5 (CM20)	★
D7	Field Mount Housing, Dual-Compartment Housing	Stainless Steel	PG 13.5 (PG11)	★
D8	Field Mount Housing, Dual-Compartment Housing	Stainless Steel	JIS G 1/2	★
Transmitter Output				
Standard				**Standard**
A	4-20 mA with digital signal based on HART protocol			★
F	FOUNDATION fieldbus digital signal (includes 3 AI function block and Backup Link Active Scheduler)			★
Measurement Configuration				
Standard				**Standard**
1	Single-Sensor Input			★
2	Dual-Sensor Input			★
Product Certifications				
Standard				**Standard**
NA	No Approval			★
E5	FM Explosion-proof, Dust Ignition-Proof, and Non-incendive approval			★
I5[(1)]	FM Intrinsically Safe and Non-incendive (includes standard IS and FISCO for fieldbus units)			★
K5[(1)]	FM IS, Non-incendive & Explosion-proof combo (includes standard IS and FISCO for fieldbus units)			★
KB[(1)]	FM and CSA IS, Explosion-proof, and Non-incendive combo (includes standard IS and FISCO for FF units)			★
I6[(1)]	CSA Intrinsically Safe/FISCO and Division 2 (includes standard IS and FISCO for fieldbus units)			★
K6[(1)]	CSA IS, FISCO Division 2 and Explosion-proof combo (includes standard IS, FISCO for fieldbus units)			★
E1	ATEX Flameproof approval			★
N1	ATEX type n approval			★
I1[(1)]	ATEX intrinsic safety approval (includes standard IS and FISCO for fieldbus units)			★

Table 1. Rosemount 3144P Temperature Transmitter Ordering Information
★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

K1[1]	ATEX IS, Flameproof, Dust Ignition-Proof and type n combo (includes standard IS and FISCO for fieldbus units)	★
ND	ATEX Dust Ignition-Proof approval	★
KA[1]	ATEX/CSA intrinsic safety, Explosion-proof combo (includes standard IS and FISCO for fieldbus units)	★
E7	IECEx Flameproof approval	★
N7	IECEx Type 'n' approval	★
I7[1][2]	IECEx Intrinsic Safety	★
K7[1][2]	IECEx Intrinsic Safety, Flameproof, Dust Ignition-Proof and Type n combination	★
E2[2]	INMETRO Flameproof	★
I2[2][5]	INMETRO Intrinsic safety	★
E4[2]	TIIS Flameproof approval	★
E3[2]	NEPSI Flameproof approval	★
I3[1][2]	NEPSI Intrinsic safety	★

Options (Include with selected model number)

PlantWeb Control Functionality		
Standard		**Standard**
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	★
PlantWeb Advanced Diagnostic Functionality		
Standard		**Standard**
D01	Diagnostics Suite: Statistical Process Monitoring (SPM), Thermocouple Diagnostic, Min/Max Tracking – FOUNDATION fieldbus only	★
Mounting Bracket		
Standard		**Standard**
B4	Universal Mounting Bracket for 2-inch pipe and panel mounting—SST bracket and bolts	★
B5	Universal “L” Mounting Bracket for 2-inch pipe mounting—SST bracket and bolts	★
Display		
Standard		**Standard**
M5	LCD Display	★
External Ground		
Standard		**Standard**
G1	External Ground Lug Assembly (See “External Ground Screw Assembly” on page 9.)	★
Transient Protector		
Standard		**Standard**
T1	Integral Transient Protector	★
Software Configuration		
Standard		**Standard**
C1[3]	Custom Configuration of Date, Descriptor and Message (Requires CDS with order)	★
Line Filter		
Standard		**Standard**
F5	50 Hz Line Voltage Filter	★
Alarm Level Configuration		
Standard		**Standard**
A1	NAMUR alarm and saturation levels, high alarm	★
CN	NAMUR alarm and saturation levels, low alarm	★
Low Alarm		
Standard		**Standard**
C8	Low Alarm (Standard Rosemount Alarm and Saturation Values)	★
Sensor Trim		
Standard		**Standard**
C2	Transmitter-Sensor Matching – Trim to Specific Rosemount RTD Calibration Schedule (CVD constants)	★
Expanded		
C7	Trim to Non-Standard Sensor (Special Sensor–Customer must provide sensor information)	
5-Point Calibration		
Standard		**Standard**
C4	5-Point Calibration (Requires the Q4 option code to generate a Calibration Certificate)	★

Table 1. Rosemount 3144P Temperature Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate (3-Point Calibration)	★
QP	Calibration Certificate and Tamper Evident Seal	★
Dual-Input Custom Configuration (only with measurement type option code 2)		
Standard		**Standard**
U1(4)	Hot Backup	★
U2(5)	Average temperature with Hot Backup and Sensor Drift Alert – warning mode	★
U3(5)	Average temperature with Hot Backup and Sensor Drift Alert – alarm mode	★
U5	Differential temperature	★
U6(4)	Average temperature	★
U7(4)	First good temperature	★
Expanded		
U4	Two independent sensors	
Quality Certification for Safety		
Standard		**Standard**
QS	Prior-use certificate of FMEDA data (HART Only)	★
QT	Safety-certified to IEC 61508 with certificate of FMEDA data (HART only)	★
Conduit Electrical Connector		
Standard		**Standard**
GE(6)	M12, 4-pin, Male Connector (*eurofast*®)	★
GM(6)	A size Mini, 4-pin, Male Connector (*minifast*®)	★
Assemble To Options		
Standard		**Standard**
XA	Sensor Specified Separately and Assembled to Transmitter	★
Typical Model Number: 3144P D1 A 1 E5 B4 M5		

(1) When IS approval is ordered on a FOUNDATION fieldbus, both standard IS and FISCO IS approvals apply. The device label is marked appropriately.

(2) Consult factory for availability when ordering with HART or FOUNDATION fieldbus models.

(3) Consult factory for availability when ordering with FOUNDATION fieldbus models.

(4) Codes U1 and U6 for HART transmitters will not have drift alert enabled; option codes U1, U6, U7, U8, and U9 for FOUNDATION fieldbus transmitters will have drift alert enabled.

(5) Not available for FOUNDATION Fieldbus.

(6) Available with Intrinsically Safe approvals only. For FM Intrinsically Safe or non-incendive approval (option code I5), install in accordance with Rosemount drawing 03151-1009 to maintain 4X rating.

Transmitter Specifications

HART® AND FOUNDATION™ FIELDBUS

Functional Specifications

Inputs
User-selectable. See “Transmitter Accuracy” on page 10 for sensor options.

Output
2-wire device with either 4–20 mA/HART, linear with temperature or input, or completely digital output with FOUNDATION fieldbus communication (ITK 5.0.1 compliant).

Isolation
Input/output isolation specified to 500 Vdc (500 Vrms 707 V peak) at 50/60 Hz.

Humidity Limits
0–99% relative humidity.

Update Time
Approximately 0.5 seconds for a single sensor (1 second for dual sensors).

Physical Specifications

Conduit Connections
The standard field mount housing has ½–14 NPT conduit entries. Additional conduit entry types are available, including PG13.5 (PG11), M20 X 1.5 (CM20), or JIS G ½. When any of these additional entry types are ordered, adapters are placed in the standard field housing so these alternative conduit types fit correctly. See “Dimensional Drawings” on page 20 for dimensions.

Materials of Construction
Electronics Housing

- Low-copper aluminum or CF-8M (cast version of 316 Stainless Steel)

Paint

- Polyurethane

Cover O-rings
Buna-N

Mounting
Transmitters may be attached directly to the sensor. Optional mounting brackets (codes B4 and B5) allow for remote mounting. See “Optional Transmitter Mounting Brackets” on page 21.

Weight

Aluminum(1)	Stainless Steel(1)
3.1 lb (1.4 kg)	7.8 lb (3.5 kg)

(1) Add 0.5 lb (0.2 kg) for local display or 1.0 lb (0.5 kg) for bracket options.

Enclosure Ratings
Type 4X
IP66 and IP68

Stability
- RTDs: - ±0.1% of reading or 0.1 °C, whichever is greater, for 24 months.
- Thermocouples: - ±0.1% of reading or 0.1 °C, whichever is greater, for 12 months.

5 Year Stability
- RTDs: - ±0.25% of reading or 0.25 °C, whichever is greater, for 5 years.
- Thermocouples: - ±0.5% of reading or 0.5 °C, whichever is greater, for 5 years.

Vibration Effect
Tested to the following with no effect on performance per IEC 60770-1, 1999:

Frequency	Acceleration
10–60 Hz	0.21 mm peak displacement
60–2000 Hz	3 g

Self Calibration
The analog-to-digital measurement circuitry automatically self-calibrates for each temperature update by comparing the dynamic measurement to extremely stable and accurate internal reference elements.

RFI Effect
Worst case RFI effect is equivalent to the transmitter’s nominal accuracy specification, according to Table on page Temperature-10, when tested in accordance with IEC 61000-4-3, 30 V/m (HART) / 20 V/m (HART T/C) /10 V/m (FOUNDATION fieldbus), 80 to 1000 MHz, with unshielded cable.

CE Electromagnetic Compatibility Compliance Testing
The 3144P meets or exceeds all requirements listed under IEC 61326: 2006.

External Ground Screw Assembly
The external ground screw assembly can be ordered by specifying code G1. However, some approvals include the ground screw assembly in the transmitter shipment, hence it is not necessary to order code G1. The table below identifies which approval options include the external ground screw assembly.

Approval Type	External Ground Screw Assembly Included?(1)
E5, I1, I2, I5, I6, I7, K5, K6, KB, NA	No–Order option code G1
E1, E2, E3, E4, E7, K1, K7, KA, N1, N7, ND, NF	Yes

(1) The parts contained with the G1 option are included with the Integral Protector option code T1. When ordering T1, the G1 option code does not need to be ordered separately.

Hardware Tag

- No charge
- 2 lines of 28 characters (56 characters total)
- Tags are stainless steel
- Permanently attached to transmitter
- Character height is $^{1}/_{16}$-in. (1.6mm)
- A wire-on tag is available upon request. 5 lines of 12 characters (60 characters total)

Software Tag

- HART transmitter can store up to 8 characters. FOUNDATION fieldbus transmitters can store up to 32 characters.
- Can be ordered with different software and hardware tags.
- If no software tag characters are specified, the first 8 characters of the hardware tag are the default.

Transmitter Accuracy

Sensor Options	Sensor Reference	Input Ranges		Minimum Span(1)		Digital Accuracy(2)		D/A Accuracy(3)(4)
2-, 3-, 4-wire RTDs		°C	°F	°C	°F	°C	°F	
Pt 100 (α = 0.00385)	IEC 751	–200 to 850	–328 to 1562	10	18	± 0.10	± 0.18	±0.02% of span
Pt 200 (α = 0.00385)	IEC 751	–200 to 850	–328 to 1562	10	18	± 0.22	± 0.40	±0.02% of span
Pt 500 (α = 0.00385)	IEC 751	–200 to 850	–328 to 1562	10	18	± 0.14	± 0.25	±0.02% of span
Pt 1000 (α = 0.00385)	IEC 751	–200 to 300	–328 to 572	10	18	± 0.10	± 0.18	±0.02% of span
Pt 100 (α = 0.003916)	JIS 1604	–200 to 645	–328 to 1193	10	18	± 0.10	± 0.18	±0.02% of span
Pt 200 (α = 0.003916)	JIS 1604	–200 to 645	–328 to 1193	10	18	± 0.22	± 0.40	±0.02% of span
Ni 120	Edison Curve No. 7	–70 to 300	–94 to 572	10	18	± 0.08	± 0.14	±0.02% of span
Cu 10	Edison Copper Winding No. 15	–50 to 250	–58 to 482	10	18	±1.00	± 1.80	±0.02% of span
Pt 50 (α=0.00391)	GOST 6651-94	–200 to 550	–328 to 1022	10	18	±0.20	±0.36	±0.02% of span
Pt 100 (α=0.00391)	GOST 6651-94	–200 to 550	–328 to 1022	10	18	±0.10	±0.18	±0.02% of span
Cu 50 (α=0.00426)	GOST 6651-94	–50 to 200	–122 to 392	10	18	±0.34	±0.61	±0.02% of span
Cu 50 (α=0.00428)	GOST 6651-94	–185 to 200	–365 to 392	10	18	±0.34	±0.61	±0.02% of span
Cu 100 (α=0.00426)	GOST 6651-94	–50 to 200	–122 to 392	10	18	±0.17	±0.31	±0.02% of span
Cu 100 (α=0.00428)	GOST 6651-94	–185 to 200	–365 to 392	10	18	±0.17	±0.31	±0.02% of span
Thermocouples(5)								
Type B(6)	NIST Monograph 175, IEC 584	100 to 1820	212 to 3308	25	45	± 0.75	± 1.35	±0.02% of span
Type E	NIST Monograph 175, IEC 584	–50 to 1000	–58 to 1832	25	45	± 0.20	± 0.36	±0.02% of span
Type J	NIST Monograph 175, IEC 584	–180 to 760	–292 to 1400	25	45	± 0.25	± 0.45	±0.02% of span
Type K(7)	NIST Monograph 175, IEC 584	–180 to 1372	–292 to 2502	25	45	± 0.25	± 0.45	±0.02% of span
Type N	NIST Monograph 175, IEC 584	–200 to 1300	–328 to 2372	25	45	± 0.40	± 0.72	±0.02% of span
Type R	NIST Monograph 175, IEC 584	0 to 1768	32 to 3214	25	45	± 0.60	± 1.08	±0.02% of span
Type S	NIST Monograph 175, IEC 584	0 to 1768	32 to 3214	25	45	± 0.50	± 0.90	±0.02% of span
Type T	NIST Monograph 175, IEC 584	–200 to 400	–328 to 752	25	45	± 0.25	± 0.45	±0.02% of span
DIN Type L	DIN 43710	–200 to 900	–328 to 1652	25	45	± 0.35	± 0.63	±0.02% of span
DIN Type U	DIN 43710	–200 to 600	–328 to 1112	25	45	± 0.35	± 0.63	±0.02% of span
Type W5Re/W26Re	ASTM E 988-96	0 to 2000	32 to 3632	25	45	± 0.70	± 1.26	±0.02% of span
GOST Type L	GOST R 8.585-2001	–200 to 800	–392 to 1472	25	45	± 0.25	± 0.45	±0.02% of span
Other Input Types								
Millivolt Input		–10 to 100 mV		3 mV		±0.015 mV		±0.02% of span
2-, 3-, 4-wire Ohm Input		0 to 2000 ohms		20 ohm		±0.35 ohm		±0.02% of span

(1) No minimum or maximum span restrictions within the input ranges. Recommended minimum span will hold noise within accuracy specification with damping at zero seconds.

(2) Digital accuracy: Digital output can be accessed by the Field Communicator.
(3) Total Analog accuracy is the sum of digital and D/A accuracies.
(4) Applies to HART / 4-20 mA devices.
(5) Total digital accuracy for thermocouple measurement: sum of digital accuracy +0.25 °C (0.45 °F) (cold junction accuracy).
(6) Digital accuracy for NIST Type B is ±3.0 °C (±5.4 °F) from 100 to 300 °C (212 to 572 °F).
(7) Digital accuracy for NIST Type K is ±0.50 °C (±0.9 °F) from –180 to –90 °C (–292 to –130 °F).

Reference Accuracy Example (HART only)

When using a Pt 100 (α = 0.00385) sensor input with a 0 to 100 °C span: Digital Accuracy would be ±0.10 °C, D/A accuracy would be ±0.02% of 100 °C or ±0.02 °C, Total = ±0.12 °C.

Differential Capability Exists Between Any Two Sensor Types (dual-sensor option)

For all differential configurations, the input range is X to Y where:

- X = Sensor 1 minimum – Sensor 2 maximum *and*
- Y = Sensor 1 maximum – Sensor 2 minimum.

Digital Accuracy for Differential Configurations (dual-sensor option, HART only)

- Sensor types are similar (e.g., both RTDs or both T/Cs): Digital Accuracy = 1.5 times worst case accuracy of either sensor type.
- Sensor types are dissimilar (e.g., one RTD, one T/C): Digital Accuracy = Sensor 1 Accuracy + Sensor 2 Accuracy.

Ambient Temperature Effect

Transmitters may be installed in locations where the ambient temperature is between –40 and 85 °C (–40 and 185 °F). To maintain excellent accuracy performance, each transmitter is individually characterized over this ambient temperature range at the factory.

Table 2. Ambient Temperature Effect on Digital Accuracy

Sensor Options	Sensor Reference	Effect per 1.0 °C (1.8 °F) Change in Ambient[1]	Input Temperature (T)	D/A Effect[2]
2-, 3-, or 4- Wire RTDs				
Pt 100 (α = 0.00385)	IEC 751	0.0015 °C (0.0027 °F)	Entire Sensor Input Range	0.001% of span
Pt 200 (α = 0.00385)	IEC 751	0.0023 °C (0.00414 °F)	Entire Sensor Input Range	0.001% of span
Pt 500 (α = 0.00385)	IEC 751	0.0015 °C (0.0027 °F)	Entire Sensor Input Range	0.001% of span
Pt 1000 (α = 0.00385)	IEC 751	0.0015 °C (0.0027 °F)	Entire Sensor Input Range	0.001% of span
Pt 100 (α = 0.003916)	JIS 1604	0.0015 °C (0.0027 °F)	Entire Sensor Input Range	0.001% of span
Pt 200 (α = 0.003916)	JIS 1604	0.0023 °C (0.00414 °F)	Entire Sensor Input Range	0.001% of span
Ni 120	Edison Curve No. 7	0.0010 °C (0.0018 °F)	Entire Sensor Input Range	0.001% of span
Cu 10	Edison Copper Winding No. 15	0.015 °C (0.0027 °F)	Entire Sensor Input Range	0.001% of span
Pt 50 (α = 0.00391)	GOST 6651-94	0.003 °C (0.0054 °F)	Entire Sensor Input Range	0.001% of span
Pt 100 (α = 0.00391)	GOST 6651-94	0.0015 °C (0.0027 °F)	Entire Sensor Input Range	0.001% of span
Cu 50 (α =0.00426)	GOST 6651-94	0.003 °C (0.0054 °F)	Entire Sensor Input Range	0.001% of span
Cu 50 (α =0.00428)	GOST 6651-94	0.003 °C (0.0054 °F)	Entire Sensor Input Range	0.001% of span
Cu 100 (α =0.00426)	GOST 6651-94	0.0015 °C (0.0027 °F)	Entire Sensor Input Range	0.001% of span
Cu 100 (α =0.00428)	GOST 6651-94	0.0015 °C (0.0027 °F)	Entire Sensor Input Range	0.001% of span
Thermocouples				
Type B	NIST Monograph 175, IEC 584	0.014 °C 0.029 °C – 0.0021% of (T – 300) 0.046 °C – 0.0086% of (T – 100)	T ≥ 1000 °C 300 °C ≤ T < 1000 °C 100 °C ≤ T < 300 °C	0.001% of span
Type E	NIST Monograph 175, IEC 584	0.004 °C + 0.00043% of T		0.001% of span
Type J	NIST Monograph 175, IEC 584	0.004 °C + 0.00029% of T 0.004 °C + 0.0020% of abs. val. T	T ≥ 0 °C T < 0 °C	0.001% of span
Type K	NIST Monograph 175, IEC 584	0.005 °C + 0.00054% of T 0.005 °C + 0.0020% of abs. val. T	T ≥ 0 °C T < 0 °C	0.001% of span
Type N	NIST Monograph 175, IEC 584	0.005 °C + 0.00036% of T	All	0.001% of span
Types R	NIST Monograph 175, IEC 584	0.015 °C 0.021 °C – 0.0032% of T	T ≥ 200 °C T < 200 °C	0.001% of span
Types S	NIST Monograph 175, IEC 584	0.015 °C 0.021 °C – 0.0032% of T	T ≥ 200 °C T < 200 °C	0.001% of span
Type T	NIST Monograph 175, IEC 584	0.005 °C 0.005 °C + 0.0036% of abs. val. T	T ≥ 0 °C T < 0 °C	0.001% of span
DIN Type L	DIN 43710	0.0054 °C + 0.00029% of R 0.0054 °C + 0.0025% of abs. val. T	T ≥ 0 °C T < 0 °C	0.001% of span
DIN Type U	DIN 43710	0.0064 °C 0.0064 °C + 0.0043% of abs. val. T	T ≥ 0 °C T < 0 °C	0.001% of span
Type W5Re/W26Re	ASTM E 988-96	0.016 °C 0.023 °C + 0.0036% of T	T ≥ 200 °C T < 200 °C	0.001% of span
GOST Type L	GOST R 8.585-2001	0.005 > 0 °C 0.005 - 0.003% < 0 °C		0.001% of span
Other Input Types				
Millivolt Input		0.00025 mV	Entire Sensor Input Range	0.001% of span
2-, 3-, 4-wire Ohm Input		0.007 Ω	Entire Sensor Input Range	0.001% of span

(1) Change in ambient is in reference to the calibration temperature of the transmitter (20 °C [68 °F])
(2) Applies to HART / 4-20 mA devices.

Temperature Effects Example

When using a Pt 100 (α = 0.00385) sensor input with a 0 to 100 °C span at 30 °C ambient temperature, the following statements would be true:

Digital Temp Effects

- $0.0015 \frac{^\circ C}{^\circ C} \times (30\ ^\circ C - 20\ ^\circ C) = 0.015\ ^\circ C$

D/A Effects (HART / 4–20 mA only)%

- [0.01% / °C of span] x |(Ambient temp - Calibrated temp)| = D/A Effects
- [0.01% / °C x 100] x |(30 - 20)| = 0.01 °C

Worst Case Error

- Digital + D/A + Digital Temp Effects + D/A Effects = 0.10 °C + 0.02 °C + 0.015 °C + 0.01 °C = 0.145 °C

Total Probable Error

$$\sqrt{0.10^2 + 0.02^2 + 0.015^2 + 0.01^2} = 0.10\ ^\circ C$$

HART / 4–20 MA SPECIFICATIONS

Power Supply

External power supply required. Transmitters operate on 12.0 to 42.4 Vdc transmitter terminal voltage (with 250 ohm load, 18.1 Vdc power supply voltage is required). Transmitter power terminals rated to 42.4 Vdc.

Wiring Diagram

See Figure 1 on page 22.

Alarms

Custom factory configurations of alarm and saturation levels are available for valid values with option code C1. These values can also be configured in the field using a Field Communicator.

Transient Protection (option code T1)

The transient protector helps to prevent damage to the transmitter from transients induced on the loop wiring by lightning, welding, heavy electrical equipment, or switch gears. The transient protection electronics are contained in an add-on assembly that attaches to the standard transmitter terminal block. The external ground lug assembly (code G1) is included with the Transient Protector. The transient protector has been tested per the following standard:

- IEEE C62.41-1991 (IEEE 587)/ Location Categories B3.
  6kV/3kA peak (1.2 × 50 μS Wave 8 × 20 μS Combination Wave)
  6kV/0.5kA peak (100 kHz Ring Wave)
  EFT, 4kVpeak, 2.5kHz, 5*50nS
- Loop resistance added by protector: 22 ohms max.
- Nominal clamping voltages: 90 V (common mode), 77 V (normal mode)

Local Display

Optional five-digit LCD display includes 0–100% bar graph. Digits are 0.4 inches (8 mm) high. Display options include engineering units (°F, °C, °R, K, ohms, and millivolts), percent, and milliamperes. The display can also be set to alternate between engineering units/milliamperes, Sensor 1/Sensor 2, Sensor 1/Sensor 2/Differential Temperature, and Sensor 1/Sensor2/Average Temperature. All display options, including the decimal point, may be reconfigured in the field using a Field Communicator or AMS.

Turn-on Time

Performance within specifications is achieved less than 6 seconds after power is applied to the transmitter when the damping value is set to 0 seconds.

Power Supply Effect

Less than ±0.005% of span per volt.

SIS Safety Transmitter Failure Values

IEC 61508 Safety Certified SIL 2 and SIL 3 Claim Limit

- Safety accuracy: 2.0%(1) or 2 °C (3.6 °F), whichever is greater
- Safety response time: 5 seconds
- Safety specifications and FMEDA Report available at www. rosemount.com/safety
- Software suitable for SIL3 Applications

(1) Trip values in the DCS or safety logic solver should be derated by 2%. A 2% variation of the transmitter mA output is allowed before a safety trip.

Temperature Limits

Description	Operating Limit	Storage Limit
Without LCD	–40 to 185 °F –40 to 85 °C	–60 to 250 °F –50 to 120 °C
With LCD(1)	–4 to 185 °F –20 to 85 °C	–40 to 185 °F –40 to 85 °C

(1)LCD display may not be readable and LCD updates will be slower at temperatures below -4 °F (-20 °C).

Field Communicator Connections

Field Communicator connections are permanently fixed to power/signal block.

Failure Mode

The 3144P features software and hardware failure mode detection. An independent circuit is designed to provide backup alarm output if the microprocessor hardware or software fails.

The alarm level is user-selectable using the failure mode switch. If failure occurs, the position of the hardware switch determines the direction in which the output is driven (HIGH or LOW). The switch feeds into the digital-to-analog (D/A) converter, which drives the proper alarm output even if the microprocessor fails. The values at which the transmitter drives its output in failure mode depends on whether it is configured to standard, or NAMUR-compliant (NAMUR recommendation NE 43) operation. The values for standard and NAMUR-compliant operation are as follows:

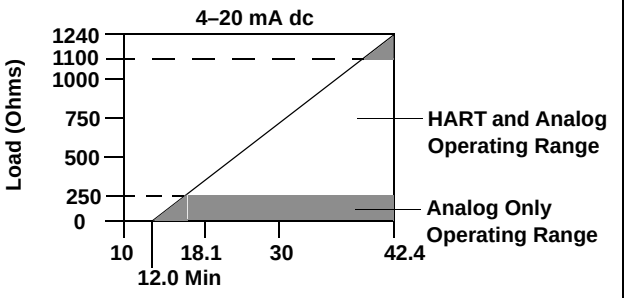
Table 3. Operation Parameters

	Standard (1)	NAMUR-Compliant(1)
Linear Output:	3.9 ≤ I ≤ 20.5	3.8 ≤ I ≤ 20.5
Fail HIGH:	21.75 ≤ I ≤ 23 (default)	21.5 ≤ I ≤ 23 (default)
Fail Low:	I ≤ 3.75	I ≤ 3.6

(1) Measured in milliamperes

Load Limitations

Maximum Load = 40.8 X (Supply Voltage - 12.0)(1)



(1) Without transient protection (optional).

NOTE
HART Communication requires a loop resistance between 250 and 1100 ohms. Do not communicate with the transmitter when power is below 12 Vdc at the transmitter terminals.

FOUNDATION FIELDBUS SPECIFICATIONS

Power Supply

Powered over FOUNDATION fieldbus with standard fieldbus power supplies. Transmitters operate on 9.0 to 32.0 Vdc, 12 mA maximum. Transmitter power terminals are rated to 42.4 Vdc.

Wiring Diagram

See Figure 2 on page 22.

Alarms

The AI function block allows the user to configure the alarms to HIGH-HIGH, HIGH, LOW, or LOW-LOW with a variety of priority levels and hysteresis settings

Transient Protection (option code T1)

The transient protector helps to prevent damage to the transmitter from transients induced on the loop wiring by lightning, welding, heavy electrical equipment, or switch gears. The transient protection electronics are contained in an add-on assembly that attaches to the standard transmitter terminal block. The transient terminal block is not polarity insensitive. The transient protector has been tested to the following standard:

- IEEE C62.41-1991 (IEEE 587)/ Location Categories B3.
  6kV/3kA peak (1.2 × 50 μS Wave 8 × 20 μS Combination Wave)
  6kV/0.5kA peak (100 kHz Ring Wave)
  EFT, 4kVpeak, 2.5kHz, 5*50nS
- Loop resistance added by protector: 22 ohms maximum
- Nominal clamping voltages: 90 V (common mode), 77 V (normal mode)

Diagnostics Suite for FOUNDATION fieldbus (Option Code D01)

The 3144P Diagnostics Suite for FOUNDATION fieldbus provides advanced functionality in the form of Statistical Process Monitoring (SPM), a thermocouple Diagnostic, and Sensor Drift Alert. SPM technology calculates the mean and standard deviation of the process variable and makes them available to the user. This may be used to detect abnormal process situations.

The Thermocouple Diagnostic enables the 3144P to measure and monitor the resistance of thermocouple loops in order to detect drift or changing wiring connections.

Sensor Drift Alert allows the user to monitor the difference in measurement between two sensors installed in one process point. A change in this differential value may indicate drifting sensors.

Local Display

Displays all DS_65 measurements in the Transducer and Function Blocks including Sensor 1, Sensor 2, differential, and terminal temperatures. The display alternates up to four selected items. The meter can display up to five digits in engineering units (°F, °C, °R, K, Ω, and millivolts). Display settings are configured at the factory according to the transmitter configuration (standard or custom). These settings can be reconfigured in the field using a Field Communicator or DeltaV. In addition, the LCD provides the ability to display DS_65 parameters from other devices. In addition to the configuration of the meter, sensor diagnostic data is displayed. If the measurement status is Good, the measured value is shown. If the measurement status is Uncertain, the status indicating uncertain is shown in addition to the measured value. If the measurement status is Bad, the reason for the bad measurement is shown.

Note: When ordering a spare electronics module assembly, the LCD transducer block will display the default parameter.

Turn-on Time

Performance within specifications is achieved less than 20 seconds after power is applied to the transmitter when the damping value is set to 0 seconds.

Status

If self-diagnostics detect a sensor burnout or a transmitter failure, the status of the measurement will be updated accordingly. The status may also send the PID output to a safe value.

FOUNDATION Fieldbus Parameters

Schedule Entries	25 (max.)
Links	30 (max.)
Virtual Communications Relationships (VCR)	20 (max.)

Backup Link Active Scheduler (LAS)

The transmitter is classified as a device link master, which means it can function as a Link Active Scheduler (LAS) if the current link master device fails or is removed from the segment. The host or other configuration tool is used to download the schedule for the application to the link master device. In the absence of a primary link master, the transmitter will claim the LAS and provide permanent control for the H1 segment.

Function Blocks

Resource Block

- Contains physical transmitter information including available memory, manufacture identification, device type, software tag, and unique identification.
- PlantWeb Alerts enable the full power of the PW digital architecture by diagnosing instrumentation issues, communicating the details, and recommending a solution.

Transducer Block

- Contains the actual temperature measurement data, including sensor 1, sensor 2, and terminal temperature.
- Includes information about sensor type and configuration, engineering units, linearization, range, damping, and diagnostics.

LCD Block (when an LCD display is used)

- Configures the local display.

Analog Input (AI)

- Processes the measurement and makes it available on the fieldbus segment.
- Allows filtering, engineering unit, and alarm changes.

PID Block (provides control functionality)

- Performs single loop, cascade, or feedforward control in the field.

Block	Execution Time
Resource	–
Transducer	–
LCD Block	–
Advanced Diagnostics	–
Analog Input 1, 2, 3	60 milliseconds
PID 1 and 2 with Autotune	90 milliseconds
Input Selector	65 milliseconds
Signal Characterizer	45 milliseconds
Arithmetic	60 milliseconds
Output Splitter	60 milliseconds

Product Certifications

ROSEMOUNT 3144P WITH HART / 4–20 MA

Approved Manufacturing Locations

Rosemount Inc. – Chanhassen, Minnesota, USA

Rosemount Temperature GmbH – Germany

Emerson Process Management Asia Pacific – Singapore

European Union Directive Information

The most recent revision of the European Union Declaration of Conformity can be found at www.emersonprocess.com.

ATEX Directive (94/9/EC)

Rosemount Inc. complies with the ATEX Directive.

Electro Magnetic Compatibility (EMC) (2004/108/EC)

EN 61326-2-3:2006 and EN 61326-1:2006

Hazardous Locations Installations

North American Certifications

Factory Mutual (FM) Approvals

E5 FM Explosion-proof, Dust Ignition-proof and Non-Incendive

Certificate Number: 3012752

Explosion-proof for Class I, Division 1, Groups A, B, C, D. Dust Ignition-Proof for use in Class II/III, Division 1, Groups E, F, and G.

Temperature Code: T5 (T_{amb} = – 50 to 85 °C)

Explosion-proof and Dust Ignition-proof when installed in accordance with Rosemount drawing 03144-0320. Indoor and outdoor use. Type 4X.

NOTE
For Group A, seal all conduits within 18 inches of enclosure; otherwise, conduit seal not required for compliance with NEC 501-15(A)(1).

Non-incendive for use in Class I, Division 2, Groups A, B, C, and D. Suitable for use in Class II/III, Division 2, Groups F and G.

Temperature Codes: T5 (T_{amb} = – 60 to 85 °C)
T6 (T_{amb} = – 60 to 60 °C)

Non-incendive when installed in accordance with Rosemount drawing 03144-0321.

I5 FM Intrinsically Safe and Non-incendive
Certificate Number: 3012752

Intrinsically Safe for Class I/II/III, Division 1, Groups A, B, C, D, E, F, and G.
Temperature Codes: T4A (T_{amb} = – 60 to 60 °C)
T5 (T_{amb} = – 60 to 50 °C)
Zone Marking: Class I, Zone 0, AEx ia IIC
Temperature Code: T4 (T_{amb} = – 50 to 60 °C)
Non-incendive for use in Class I, Division 2, Groups A, B, C, and D. Suitable for use in Class II / III, Division 2, Groups F and G.

Temperature Codes: T6 (T_{amb} = – 60 to 60 °C)
T5 (T_{amb} = – 60 to 85 °C)

Intrinsically Safe and Non-incendive when installed in accordance with Rosemount drawing 03144-0321.

Canadian Standards Association (CSA) Approvals

I6 CSA Intrinsically Safe and Division 2

Certificate Number: 1242650

Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1

Suitable for Class I, Division 2, Groups A, B, C, and D. Intrinsically Safe and Division 2 when installed per Rosemount drawing 03144–0322.

K6 Combination of I6 and the following:
Explosion-proof for Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 hazardous locations. Factory sealed.

European Certifications

E1 ATEX Flameproof (Zone 1)
Certificate Number: KEMA01ATEX2181X
ATEX Category Marking ⟨Ex⟩ II 2 G
Ex d IIC T6 (T_{amb} = –40 to 70 °C)
Ex d IIC T5 (T_{amb} = –40 to 80 °C)
Maximum Supply Voltage: 42.4 Vdc

Special Conditions for Safe Use (X):

For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

I1 ATEX Intrinsic Safety (Zone 0)
Certificate Number: BAS01ATEX1431X
ATEX Category Marking ⟨Ex⟩ II 1 G
Ex ia IIC T6 (T_{amb} = –60 to 50 °C)
Ex ia IIC T5 (T_{amb} = –60 to 75 °C)

Table 4. Input Entity Parameters

Power/Loop		Sensor	
U_i = 30 Vdc	C_i = 5 nF	U_o = 13.6 V	C_i = 78 nF
I_i = 300 mA	L_i = 0	I_o = 56 mA	L_i = 0
P_i = 1.0 W		P_o =190 mW	

Special Conditions for Safe Use (X):

The transmitter is not capable of withstanding the 500 V insulation test as defined in Clause 6.4.12 of EN50 020. This condition must be taken into account during installation.

N1 ATEX Type n (Zone 2)
Certificate Number: BAS01ATEX3432X
ATEX Category Marking ⟨Ex⟩ II 3 G
Ex nL IIC T6 (T_{amb} = –40 to 50 °C)
Ex nL IIC T5 (T_{amb} = –40 to 75 °C)
U_i = 42.4 V

Special Conditions for Safe Use (X):

The transmitter is not capable of withstanding the 500 V insulating test required by Clause 9.1 of EN50021:1999. This condition must be taken into account during installation.

ND ATEX Dust Ignition-proof
Certificate Number: KEMA01ATEX2205
ATEX Category Marking ⟨Ex⟩ II 1 D
Ex tD A20 IP66 T95 °C (T_{amb} = –40 to 80 °C)
Maximum Supply Voltage: 42.4 Vdc

International Certifications

IECEx Certifications

E7 IECEx Flameproof
Certificate Number: IECEx KEM 09.0035X
Ex d IIC T6 (T_{amb} = -40 to 70 °C)
Ex d IIC T5 (T_{amb} = -40 to 80 °C)
Maximum Supply Voltage: 42.4 V

Special Conditions for Safe Use (X):

For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

I7 IECEx Intrinsic Safety
Certificate Number: IECEx BAS 07.0002X
Ex ia IIC T6 (T_{amb} = –60 to 50 °C)
Ex ia IIC T5 (T_{amb} = –60 to 75 °C)

Table 5. Input Entity Parameters

Power/Loop		Sensor	
U_i = 30 V	C_i = 5 nF	U_o = 13.6 V	C_i = 78 nF
I_i = 300 mA	L_i = 0	I_o = 56 mA	L_i = 0
P_i = 1.0 W		P_o = 190 mW	

Special Conditions for Safe Use (X):

When fitted with the transient terminal options, the apparatus is not capable of withstanding the 500 V electrical strength test as defined in Clause 6.4.12 of IEC 60079-11: 1999. This must be taken into account during installation.

N7 IECEx Type n
Certificate Number: IECEx BAS 07.0003X
Ex nA nL IIC T6 (T_{amb} = –40 to 50 °C)
Ex nA nL IIC T5 (T_{amb} = –40 to 75 °C)
U_i = 42.4 V

Special Conditions for Safe Use (x):

When fitted with the transient terminal options, the apparatus is not capable of withstanding the 500 V electrical strength test as defined in Clause 6.8.1 of IEC 60079-15: 2005. This must be taken into account during installation.

NF IECEx Dust Ignition-proof
Certificate Number: IECEx KEM 09.0036
Ex tD A20 IP66 T95 °C (T_{amb} = -40 to 80 °C)
Maximum Supply Voltage: 42.4 Vdc
Consult factory for NF availability

Brazilian Certifications

Centro de Pesquisas de Energia Eletrica (CEPEL) Approval

E2 INMETRO Flameproof
Certificate Number: CEPEL-EX-0307/2004X
BR-Ex d IIC T6 (T_{amb}= -40 to 65 °C)
BR-Ex d IIC T5 (T_{amb}= -40 to 80 °C)

Special Conditions for Safe Use (X):

1. The accessory of cable entries or conduit must be certified as flameproof and needs to be suitable for use conditions.
2. For ambient temperature above 60 ºC, cable wiring must have minimum isolation temperature 90 ºC, to be in accordance to equipment operation temperature.
3. Where electrical entry is via conduit, the required sealing device must be assembled immediately close to enclosure.

I2 INMETRO Intrinsic Safety
Certificate Number: CEPEL-Ex-0723/05X
BR-Ex ia IIC T6 (T_{amb}= -60 to 50 °C)
BR-Ex ia IIC T5 (T_{amb}= -60 to 75 °C)
Enclosure: IP66W

Special Conditions for Safe Use (X):

1. The apparatus enclosure may contain light metals. The apparatus must be installed in such a manner as to minimize the risk of impact or friction with other metal surfaces.
2. A transient protection device can be fitted as an option, in which the equipment will not pass the 500 V test.

Japanese Certifications

E4 TIIS Flameproof
Various certificates and configurations available. Consult factory for certified assemblies.

China (NEPSI) Certifications

E3 China Flameproof
Certificate Number: GYJ06583/GYJ06584
Ex d IIC T6

NOTE
For Special Conditions for Safe Use, please reference the Rosemount 3144P Product Manual or Quick Installation Guide.

I3 China Intrinsic Safety
Certificate Number: GYJ06586/GYJ06587
Ex ia IIC T4

NOTE
For Special Conditions for Safe Use, please reference the Rosemount 3144P Product Manual or Quick Installation Guide.

Combination Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

KA Combination of K1 and K6
KB Combination of K5 and K6
K1 Combination of E1, N1, I1, and ND
K7 Combination of E7, N7, and I7
K5 Combination of I5 and E5
K6 CSA Combination

Additional Certifications

American Bureau of Shipping (ABS) Type Approval

ABS Type Approval for temperature measurements in hazardous locations on ABS Classed Vessels, Marine and Offshore Installations. Type Approval is based on Factory Mutual (FM) Approvals; therefore, specify order code K5. Please contact your Emerson Process Management representative if a copy of the certification is required. Consult factory for availability.

Bureau Veritas (BV) Type Approval Shipboard

Consult factory for availability.

Det Norske Veritas (DNV) Type Approval for Shipboard and Offshore Installations

DNV rules for classifications of ships and mobile offshore units for temperature measurements in the following locations:

Table 6. Applications / Limitations

Location	Class
Temperature	D
Humidity	B
Vibration	B/C
Enclosure	D

NOTE
The transient protector (option code T1) is required when requesting DNV Type Approval. Additionally, hazardous locations approvals may be required (based on shipboard location) and will need to be specified by the Hazardous Locations option code.

Please contact your Emerson Process Management representative if a copy of the certification is required.

GOSTANDART

Tested and approved by Russian Metrological Institute.

Measuring Instruments Directive Parts Certification

The Rosemount 3144P Temperature Transmitter and Rosemount 0065 RTD Temperature Sensor have been certified to meet the European Union Measurement Instrument Directive (MID) for Custody Transfer metering of liquids and gases.(1) Choosing Rosemount Temperature for a MID solution ensures that critical temperature measurement equipment will meet high expectations for unmatched system accuracy and reliability. For more information, please contact your local Emerson Process Management Representative.

ROSEMOUNT 3144P WITH FOUNDATION FIELDBUS

Approved Manufacturing Locations

Rosemount Inc. – Chanhassen, Minnesota, USA
Rosemount Temperature GmbH – Germany
Emerson Process Management Asia Pacific – Singapore

European Union Directive Information

The most recent revision of the European Union Declaration of Conformity can be found at www.emersonprocess.com.

ATEX Directive (94/9/EC)

Rosemount Inc. complies with the ATEX Directive.

Electro Magnetic Compatibility (EMC) (2004/108/EC)

EN 61326-1:2006 / EN 61326-2-3:2006

Hazardous Locations Installations

North American Certifications

Factory Mutual (FM) Approvals

E5 Explosion-proof for Class I, Division 1, Groups A, B, C, and D.
Dust Ignition-proof for use in Class II/III, Division 1, Groups E, F, and G.
Certificate Number: 3012752
Temperature Code: T5 (T_{amb} = – 50 to 85 °C)
Explosion-proof and Dust Ignition-proof when installed in accordance with Rosemount drawing 03144-0320. Indoor and outdoor use.
Enclosure: Type 4X

NOTE
For Group A, seal all conduits within 18 inches of enclosure; otherwise, conduit seal not required for compliance with NEC 501-15(A)(1).

(1) Limited global availability. Consult factory for available ordering locations.

Non-incendive for use in Class I, Division 2, Groups A, B, C, and D. Suitable for use in Class II/III, Division 2, Groups F and G.

Temperature Codes: T5 (T_{amb} = – 60 to 75 °C),
T6 (T_{amb} = – 60 to 50 °C)

Non-incendive when installed in accordance with Rosemount drawing 03144-5075.

I5 FM Intrinsically Safe / FISCO and Non-incendive
Certificate Number: 3012752
Intrinsically Safe / FISCO for use in Class I, II, III, Division 1, Groups A, B, C, D, E, F, and G;
Temperature code: T4 (T_{amb} = – 60 to 60 °C)
Zone marking: Class I, Zone 0, AEx ia IIC
Temperature Code: T4 (T_{amb} = – 50 to 60 °C)
Non-incendive for use in Class, Division 2, Groups A, B, C and D; Suitable for use in Class II/III, Division 2, Groups F and G.
Temperature Codes: T6 (T_{amb} = – 60 to 50 °C)
T5 (T_{amb} = – 60 to 75 °C)
Intrinsically safe and Non-incendive when installed in accordance with Rosemount drawing 003144-5075.

Canadian Standards Association (CSA) Approvals

I6 CSA Intrinsically Safe / FISCO and Division 2
Certificate Number: 1242650
Intrinsically Safe / FISCO for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1.
Temperature Code: T4 (T_{amb} = – 50 to 60 °C)
Suitable for Class I, Division 2, Groups A, B, C, and D.
Temperature Codes: T5 (T_{amb} = – 60 to 85 °C)
T6 (T_{amb} = – 60 to 60 °C)
Intrinsically Safe / FISCO and Division 2 when installed per Rosemount drawing 03144-5076.

K6 Combination of I6 and the following:
Explosion-proof for Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 hazardous locations. Factory sealed.

European Certifications

E1 ATEX Flameproof (Zone 1)
Certificate Number: KEMA01ATEX2181X
ATEX Category Marking ⟨Ex⟩ II 2 G
Ex d IIC T6 (T_{amb} = –40 to 70 °C)
Ex d IIC T5 (T_{amb} = –40 to 80 °C)
Maximum Supply Voltage: 32 Vdc

Special Condition for Safe Use (X):
For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

I1 ATEX Intrinsic Safety / FISCO (Zone 0)
Certificate Number: Baseefa03ATEX0708X
ATEX Category Marking ⟨Ex⟩ II 1 G
Ex ia IIC T4 (T_{amb} = –60 to 60 °C)

Table 7. Input Entity Parameters

Power/Loop	FISCO Power/Loop	Sensor
U_i = 30 V	U_i = 17.5 V	U_o = 13.9 V
I_i = 300 mA	I_i = 380 mA	I_o = 23 mA
P_i = 1.3 W	P_i = 5.32 W	P_o =79 mW
C_i = 2.1 nF	C_i = 2.1 nF	C_i = 7.7 nF
L_i = 0	L_i = 0	L_i = 0

Special Conditions for Safe Use (X):
1. The apparatus enclosure may contain light metals. The apparatus must be installed in such a manner as to minimize the risk of impact or friction with other metal surfaces.
2. A transient protection device can be fitted as an option, in which the equipment will not pass the 500 V test.

N1 ATEX Type n (Zone 2)
Certificate Number: Baseefa03ATEX0709
ATEX Category Marking ⟨Ex⟩ II 3 G
Ex nA nL IIC T5 (T_{amb} = –40 to 75 °C)
U_i = 32 V maximum

ND ATEX Dust
Certificate Number: KEMA01ATEX2205
ATEX Category Marking ⟨Ex⟩ II 1 D
Ex tD A20 IP66 T95 °C (T_{amb} = –40 to 80 °C)
Maximum Supply Voltage: 32 Vdc

International Certifications

IECEx Certifications

E7 IECEx Flameproof (Zone 1)
Certificate Number: IECEx KEM 09.0035X
Ex d IIC T6 (T_{amb} = -40 to 70 °C)
Ex d IIC T5 (T_{amb} = -40 to 80 °C)
Maximum Supply Voltage: 32 Vdc

Special Condition for Safe Use (X):
For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

I7 IECEx Intrinsic Safety
Certificate Number: IECEx BAS 07.0004X
Ex ia IIC T4 (T_{amb} = –60 to 60 °C)

Power/Loop	FISCO Power/Loop	Sensor
U_i = 30 Vdc	U_i = 17.5 Vdc	U_o = 13.9 Vdc
I_i = 300 mA	I_i = 380 mA	I_o = 23 mA
P_i = 1.3 W	P_i = 5.32 W	P_o =79 mW
C_i = 2.1 nF	C_i = 2.1 nF	C_i = 7.7 nF
L_i = 0	L_i = 0	L_i = 0

Special Condition for Safe Use (X):
When fitted with the transient terminal options, the apparatus is not capable of withstanding the 500 V electrical strength test as defined in Clause 6.8.1 of IEC 60079-15: 2005. This must be taken into account during installation.

N7 IECEx Type n (Zone 2)
Certificate Number: IECEx BAS 07.0005X
Ex ia IIC T4 (T_{amb} = –40 to 75 °C)
Maximum Supply Voltage: 32 V
Enclosure: IP66

NF IECEx Dust Ignition-proof
Certificate Number: IECEx KEM 09.0036
Ex tD A20 IP66 T95 °C (T_{amb} = -40 to 80 °C)
Maximum Supply Voltage: 32 Vdc
Consult factory for NF availability

Brazilian Certifications

Centro de Pesquisas de Energia Eletrica (CEPEL) Approval

E2 INMETRO Flameproof
Certificate Number: CEPEL-EX-0307/2004X
BR-Ex d IIC T6 (T_{amb}= -40 to 65 °C)
BR-Ex d IIC T5 (T_{amb}= -40 to 80 °C)

Special Conditions for Safe Use (x):

1. The accessory of cable entries or conduit must be certified as flameproof and needs to be suitable for use conditions.
2. For ambient temperature above 60 ºC, cable wiring must have minimum isolation temperature 90 ºC, to be in accordance to equipment operation temperature.
3. Where electrical entry is via conduit, the required sealing device must be assembly immediately close to enclosure.

I2 INMETRO Intrinsic Safety
Certificate Number: CEPEL-Ex-0723/05X
BR-Ex ia IIC T6 (T_{amb}= -60 to 50 °C)
BR-Ex ia IIC T5 (T_{amb}= -60 to 75 °C)
Enclosure: IP66W

Special Conditions for Safe Use (X):

1. The apparatus enclosure may contain light metals. The apparatus must be installed in such a manner as to minimize the risk of impact or friction with other metal surfaces.
2. A transient protection device can be fitted as an option, in which the equipment will not pass the 500 V test.

Japanese Certifications

E4 TIIS Flameproof
Various certificates and configurations available. Consult factory for certified assemblies.

China (NEPSI) Certifications

E3 China Flameproof
Certificate Number: GYJ06583/GYJ06584
Ex d IIC T6

NOTE
For Special Conditions for Safe Use, please reference the Rosemount 3144P Product Manual or Quick Installation Guide.

I3 China Intrinsic Safety
Certificate Number: GYJ06586/GYJ06587
Ex ia IIC T4

NOTE
For Special Conditions for Safe Use, please reference the Rosemount 3144P Product Manual or Quick Installation Guide.

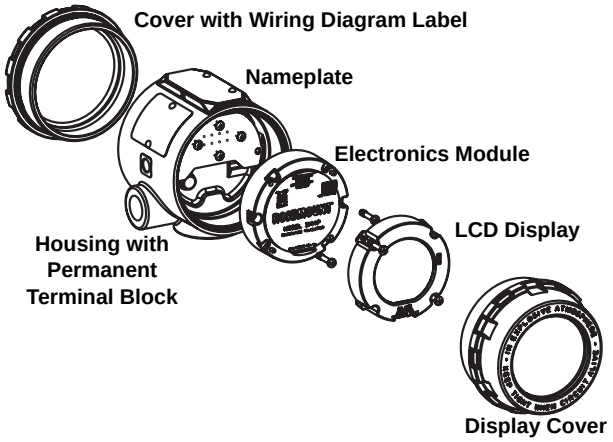
Combination Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

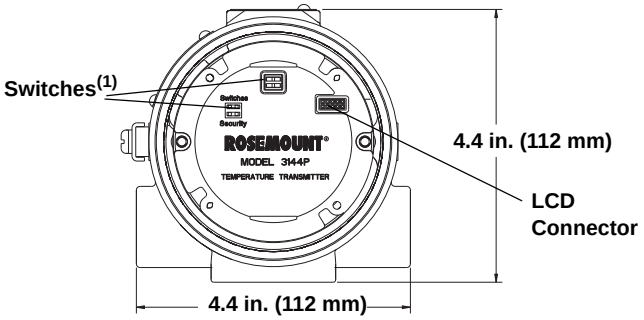
KA Combination of K1 and K6
KB Combination of K5 and K6
K1 Combination of E1, N1, I1, and ND
K7 Combination of E7, N7, I7, and NF
K5 Combination of I5 and E5
K6 CSA Combination

Dimensional Drawings

Transmitter Exploded View



Switch Location



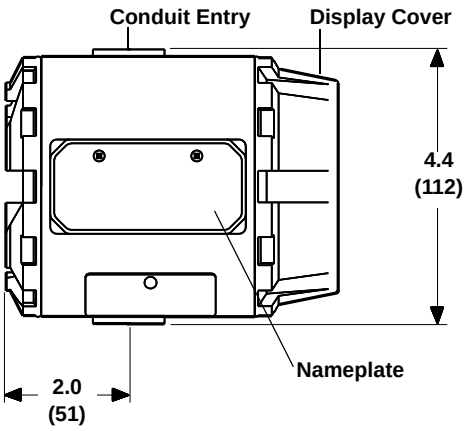
(1) Alarm and Write Protect (HART), Simulate and Write Protect (FOUNDATION Fieldbus)

LCD Display Faceplate

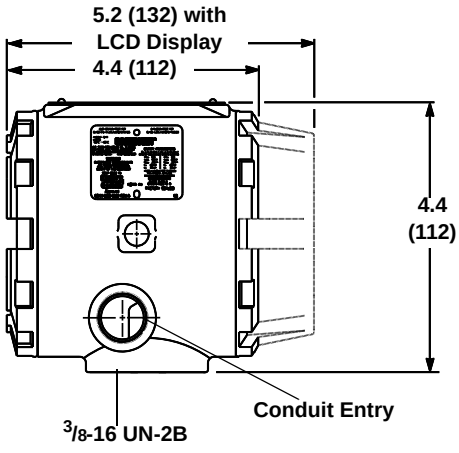


Transmitter Dimensional Drawing

Top View



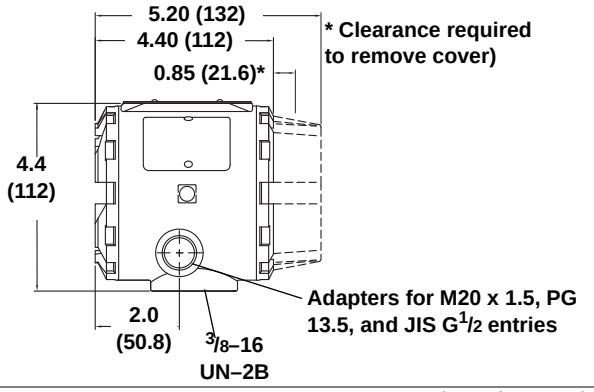
Side View



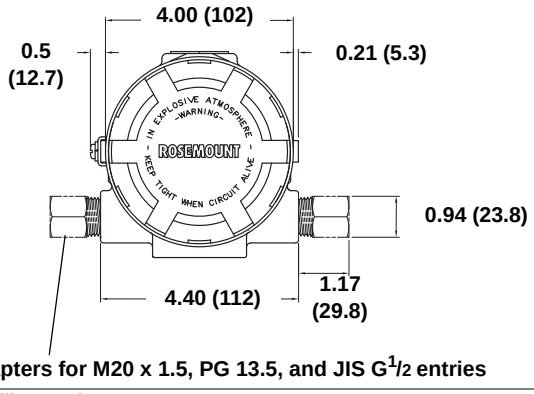
Dimensions are in inches (millimeters)

Transmitter Dimensional Drawing for Conduits with M20 x 1.5, PG 13.5, and JIS G1/2 Entries

Top View



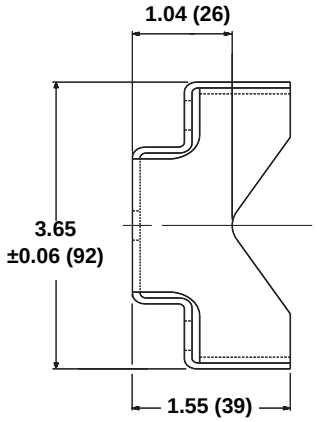
Front View

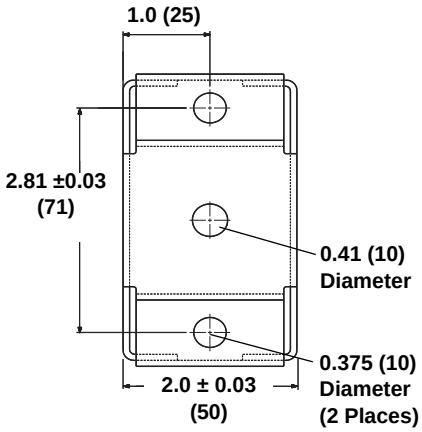


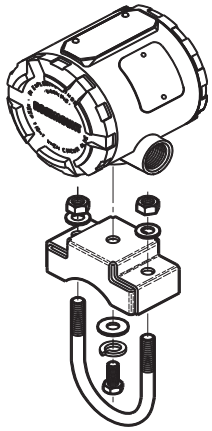
Dimensions are in inches (millimeters)

Optional Transmitter Mounting Brackets

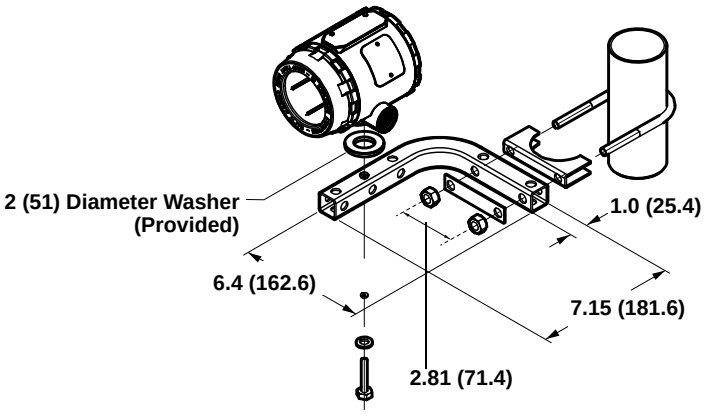
Option Code B4 Bracket







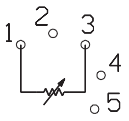
Option Code B5 Bracket



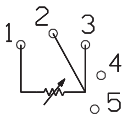
Dimensions are in inches (millimeters)

Figure 1. HART / 4–20 mA

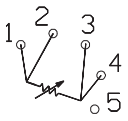
3144P Single-Sensor Connections Diagram



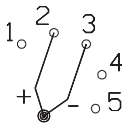
2-wire RTD and Ohms



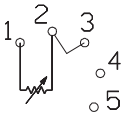
3-wire RTD and Ohms**



4-wire RTD and Ohms



T/Cs and Millivolts

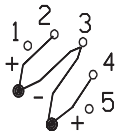


RTD with Compensation Loop*

3144P Dual-Sensor Connections Diagram



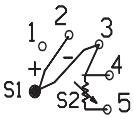
ΔT/Hot Backup/Dual Sensor with 2 RTDs



ΔT/Hot Backup/Dual Sensor with 2 Thermocouples



ΔT/Hot Backup/Dual Sensor with RTDs/ Thermocouples**



ΔT/Hot Backup/Dual Sensor with RTDs/ Thermocouples**



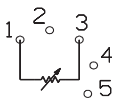
ΔT/Hot Backup/Dual Sensor with 2 RTDs with Compensation Loop**

** Transmitter must be configured for a 3-wire RTD in order to recognize an RTD with a compensation loop.*

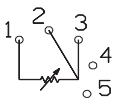
*** Emerson Process Management provides 4-wire sensors for all single-element RTDs. Use these RTDs in 2-wire or 3-wire configurations by leaving the unneeded leads disconnected and insulated with electrical tape.*

Figure 2. FOUNDATION fieldbus

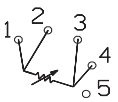
3144P Single-Sensor Connections Diagram



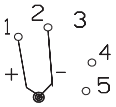
2-wire RTD and Ohms



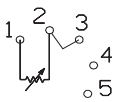
3-wire RTD and Ohms**



4-wire RTD and Ohms

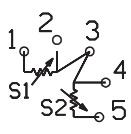


T/Cs and Millivolts

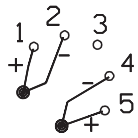


RTD with Compensation Loop*

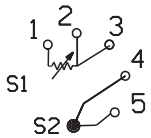
3144P Dual-Sensor Connections Diagram



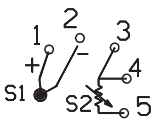
ΔT/Hot Backup/Dual Sensor with 2 RTDs



ΔT/Hot Backup/Dual Sensor with 2 Thermocouples



ΔT/Hot Backup/Dual Sensor with RTDs/ Thermocouples**



ΔT/Hot Backup/Dual Sensor with RTDs/ Thermocouples**



ΔT/Hot Backup/Dual Sensor with 2 RTDs with Compensation Loop**

** Transmitter must be configured for a 3-wire RTD in order to recognize an RTD with a compensation loop.*

*** Emerson Process Management provides 4-wire sensors for all single-element RTDs. Use these RTDs in 2-wire or 3-wire configurations by leaving the unneeded leads disconnected and insulated with electrical tape.*

Standard Configuration

Both standard and custom configuration settings may be changed. Unless specified, the transmitter will be shipped as follows:

Standard Configuration	
4 mA value / Lower Range (HART / 4–20 mA) Measurement Point LO (FOUNDATION Fieldbus)	0 °C
20 mA value / Upper Range (HART / 4–20 mA) Measurement Point HI (FOUNDATION Fieldbus)	100 °C
Damping	5 seconds
Output	Linear with temperature
Failure Mode (HART / 4–20 mA)	High
Line Voltage Filter	60 Hz
Software Tag	See “Tagging”
Optional Integral Display	Units and mA / Sensor 1 units
Single-Sensor option	
Sensor Type	4-wire, Pt 100 α = 0.00385 RTD
Primary Variable (HART / 4–20 mA) AI 1400 (FOUNDATION Fieldbus)	Sensor 1
Secondary Variable AI 1600 (FOUNDATION Fieldbus)	Terminal Temperature
Tertiary Variable	Not Used
Quaternary Variable	Not Used
Dual-Sensor option	
Sensor Type	Two 3-wire, Pt 100 α = 0.00385 RTD
Primary Variable (HART / 4–20 mA) AI 1400 (FOUNDATION Fieldbus)	Sensor 1
Secondary Variable AI 1500 (FOUNDATION Fieldbus)	Sensor 2
Tertiary Variable AI 1600 (FOUNDATION Fieldbus)	Terminal Temperature
Quaternary Variable	Not Used

Custom Configuration

The 3144P transmitter can be ordered with custom configuration. The table below lists the requirements necessary to specify a custom configuration.

Option Code	Requirements/Specification
C1: Factory Data(1)	Date: day/month/year Descriptor: 16 alphanumeric character Message: 32 alphanumeric character Custom Alarm Levels can be specified for configuration at the factory.
C2: Transmitter-Sensor Matching	The 3144P transmitter is designed to accept Callendar-van Dusen constants from a calibrated RTD schedule and generate a custom curve to match any specific sensor curve. Specify a Series 68, 65, or 78 RTD sensor on the order with a special characterization curve (V or X8Q4 option). These constants will be programmed into the 3144P when this option is selected.
C4: Five Point Calibration	Will include five-point calibration at 0, 25, 50, 75, and 100% analog and digital output points. Use with option code Q4 to obtain a Calibration Certificate.
C7: Special Sensor	Used for non-standard sensor, adding a special sensor or expanding input. Customer must supply the non-standard sensor information. Additional special curve will be added to sensor curve input choices.
A1: NAMUR- Compliant, high alarm	Analog output levels compliant with NAMUR. Alarm is set to fail high.
CN: NAMUR- Compliant, low alarm	Analog output levels compliant with NAMUR. Alarm is set to fail low.
C8: Low Alarm	Analog output levels compliant with Rosemount standard. Alarm is set to fail low.
F5: 50 Hz Line Voltage Filter	Calibrated to 50 Hz line voltage filter.

(1) CDS required.

To custom configure the 3144P with the dual-sensor option transmitter for one of the applications described below, indicate the appropriate option code in the model number. If a sensor type is not specified, the transmitter will be configured for two 3-wire Pt 100 (α = 0.00385) RTDs if any of the following option codes are selected.

Option Code U1: Hot Backup	
Primary Usage	Primary usage sets the transmitter to automatically use sensor 2 as the primary input if sensor 1 fails. Switching from sensor 1 to sensor 2 is accomplished without any effect on the analog signal. A digital alert will be sent in the event of a failed sensor.
Primary Variable	1st good
Secondary Variable	Sensor 1
Tertiary Variable	Sensor 2
Quaternary Variable	Terminal Temperature

Option Code U2: Average Temperature with Hot Backup and Sensor Drift Alert – Warning Mode	
Primary Usage	Critical applications, such as safety interlocks and control loops. Outputs the average of two measurements and sends a digital alert if temperature difference exceeds the set maximum differential (Sensor Drift Alert – warning mode). If a sensor fails, an alert will be sent digitally and the primary variable will be reported as the remaining good sensor value.
Primary Variable	Sensor Average
Secondary Variable	Sensor 1
Tertiary Variable	Sensor 2
Quaternary Variable	Terminal Temperature

Option Code U3: Average temperature with Hot Backup and Sensor Drift Alert – Alarm Mode	
Primary Usage	Critical applications, such as safety interlocks and control loops. Outputs the average of two measurements and sets the analog output into alarm if temperature difference exceeds the set maximum differential (Sensor Drift Alert – alarm mode). If a sensor fails, an alert will be sent digitally and the primary variable will be reported as the remaining good sensor value.
Primary Variable	Sensor Average
Secondary Variable	Sensor 1
Tertiary Variable	Sensor 2
Quaternary Variable	Terminal Temperature

Option Code U4: Two Independent Sensors	
Primary Usage	Used in non-critical applications where the digital output is used to measure two separate process temperatures.
Primary Variable	Sensor 1
Secondary Variable	Sensor 2
Tertiary Variable	Terminal Temperature
Quaternary Variable	Not Used

Option Code U5: Differential Temperature	
Primary Usage	The differential temperature of two process temperatures is configured as the primary variable. If the temperature difference exceeds the maximum differential, the analog output will go into alarm. Primary Variable will be reported as a bad sensor value.
Primary Variable	Differential Temperature
Secondary Variable	Sensor 1
Tertiary Variable	Sensor 2
Quaternary Variable	Terminal Temperature

Option Code U6: Average Temperature	
Primary Usage	When average measurement of two different process temperatures is required. If a sensor fails, the analog output will go into alarm and the primary variable will report the measurement of the remaining good sensor.
Primary Variable	Sensor Average
Secondary Variable	Sensor 1
Tertiary Variable	Sensor 2
Quaternary Variable	Terminal Temperature

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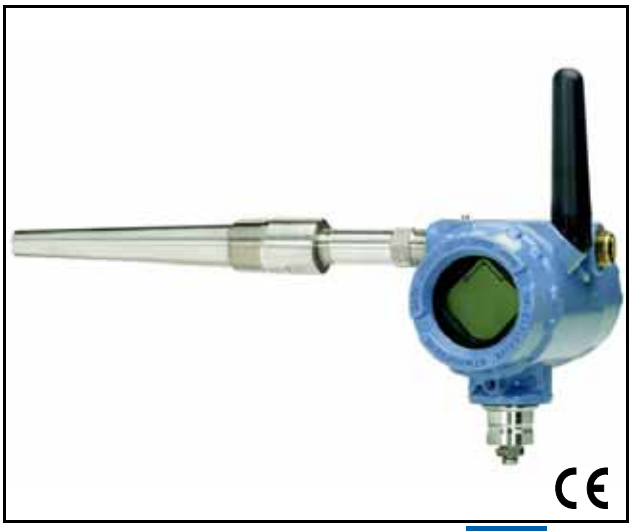
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Process Management

Rosemount 648 Wireless Temperature Transmitter

- *Industry-leading temperature transmitter delivers field reliability as a wireless measurement solution*
- *Achieve optimal efficiency with Best-in-Class product specifications and capabilities*
- *Smart Wireless delivers innovative wireless solutions for temperature measurement and overall transmitter performance*
- *Explore the benefits of a Complete Point Solution from Rosemount Temperature*



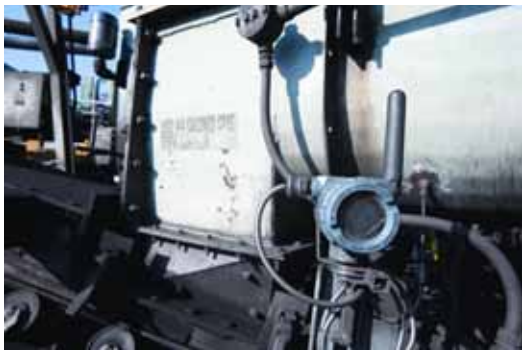
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Rosemount 648 Wireless Temperature Transmitter

Industry-leading temperature transmitter delivers field reliability as a wireless measurement solution

- Superior accuracy and stability
- Single sensor capability with universal sensor inputs (RTD, T/C, mV, ohms)
- Transmitter-Sensor Matching with Callendar-Van Dusen
- IEC-approved WirelessHART® protocol
- Dual-compartment housing, available in aluminum or stainless steel
- Large LCD display
- Extended Range Antenna options available



Achieve optimal efficiency with Best-in-Class product specifications and capabilities

- Two-year stability rating reduces maintenance costs
- **Transmitter-Sensor Matching** eliminates the interchangeability error of sensors, improving measurement point accuracy by 75%
- User-centric Device Dashboards communicate important diagnostics and ensure process health
- Compensation for ambient temperature enhances transmitter performance
- Dual-compartment housing provides the highest reliability in harsh industrial environments



A standard diagnostic offering increases measurement reliability and provides visibility into process conditions

- Four user-configurable alerts provide increased process information and measurement point insight
- Open/short sensor diagnostics assist with detecting issues in sensor loops
- The terminal temperature feature verifies the installation location temperature conditions to ensure optimal transmitter operation

Smart Wireless delivers innovative wireless solutions for temperature measurement and overall transmitter performance



- Self-organizing network delivers information rich data with >99% data reliability and establishes a highly stable network
- Smart Wireless capabilities extend the full benefits of PlantWeb® to previously inaccessible temperature measurement locations
- Emerson SmartPower™ Solutions provide an intrinsically safe Power Module, allowing field replacements without removing the transmitter from the process, keeping personnel safe and reducing maintenance costs
- Emerson Process Management's layered approach to wireless network security ensures that data transmissions are secure

Explore the benefits of a Complete Point Solution from Rosemount Temperature Measurement

- An "Assemble To Sensor" option enables Emerson to provide a complete point temperature solution, delivering an installation-ready transmitter and sensor assembly
- Emerson offers a selection of RTDs, thermocouples, and thermowells that bring superior durability and Rosemount reliability to temperature sensing, complementing the Rosemount Transmitter portfolio



Experience global consistency and local support from numerous worldwide Rosemount Temperature manufacturing sites



- World-class manufacturing provides globally consistent product from every factory and the capacity to fulfill the needs of any project, large or small
- Experienced Instrumentation Consultants help select the right product for any temperature application and advise on best installation practices
- An extensive global network of Emerson service and support personnel can be on-site when and where they are needed

- Make wireless installation and configuration easy with the **Emerson Smart Wireless Gateway**.
- For installations that have a high number of temperature measurements in close proximity, consider the **Rosemount 848T** High Density temperature transmitter.

Rosemount 648 Temperature Transmitter



The Rosemount 648 Wireless Temperature transmitter delivers industry-leading temperature field reliability as a wireless process measurement with Best-in-Class specifications and capabilities.

Transmitter features include:

- IEC-approved *Wireless*HART protocol (Option Code WA3)
- External Antenna (Option Code WK1)
- Extended Range, External Antenna (Option Code WM1)
- Large LCD Display (Option Code M5)
- Transmitter-Sensor Matching (Option Code C2)
- 3-Point Calibration Certificate (Option Code Q4)
- Assemble to Sensor (Option Code XA)

Table 1. Rosemount 648 Temperature Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description		
648	Temperature Transmitter		
Transmitter Type			
Standard			**Standard**
D	Wireless Field Mount		★
Transmitter Output			
Standard			**Standard**
X	Wireless		★
Measurement Configuration			
1	Single-Sensor Input		★
Housing Style		**Material**	
Standard			**Standard**
D	Dual Compartment Housing	Aluminum	★
E	Dual Compartment Housing	SST	★
Conduit Entry Size			
Standard			**Standard**
1	1/2-14 NPT		★
Product Certifications			
Standard			**Standard**
NA	No Approval		★
I5	FM Intrinsically Safe, Non-Incendive, and Dust Ignition-proof		★
N5	FM Non-Incendive and Dust Ignition-proof		★
I6	CSA Intrinsically Safe		★
I1	ATEX Intrinsic Safety		★
I7	IECEx Intrinsic Safety		★
I4	TIIS Intrinsic Safety		★
I3	China Intrinsic Safety		★

Table 1. Rosemount 648 Temperature Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Wireless Options (Include with selected model number)

Wireless Update Rate, Operating Frequency, and Protocol		
Standard		**Standard**
WA3	User Configurable Update Rate, 2.4 GHz DSSS, IEC 62591 (WirelessHART)	★
Omnidirectional Wireless Antenna and SmartPower™		
Standard		**Standard**
WK1	External Antenna, Adapter for Black Power Module (I.S. Power Module Sold Separately)	★
WM1	Extended Range, External Antenna, Adapter for Black Power Module (I.S. Power Module Sold Separately)	★
	NOTE: Black Power Module must be shipped separately, order Part #00753-9220-0001.	
Mounting Bracket		
Standard		**Standard**
B5(1)	"L" Mounting Bracket for 2-inch pipe and panel mounting - All SST	★
Display		
Standard		**Standard**
M5	LCD Display	★
Software Configuration		
Standard		**Standard**
C1	Custom Configuration of Date, Descriptor, Message and Wireless Parameters (Requires CDS with order)	★
Line Filter		
Standard		**Standard**
F5	50 Hz Line Voltage Filter	★
F6	60 Hz Line Voltage Filter	★
Sensor Trim		
Standard		**Standard**
C2	Transmitter-Sensor Matching - Trim to Specific Rosemount RTD Calibration Schedule (CVD Constants)	★
5-Point Calibration		
Standard		**Standard**
C4	5-Point Calibration (Requires Q4 option code to generate a Calibration Certificate)	★
Calibration Certificate		
Standard		**Standard**
Q4	Calibration Certificate (3-Point Calibration)	★
Cable Gland Option		
Standard		**Standard**
G2	Cable Gland (7.5 mm - 11.9 mm)	★
G4	Thin Wire Cable Gland (3 mm - 8 mm)	★
Assemble To Options		
Standard		**Standard**
XA (1)	Sensor Specified Separately and Assembled to Transmitter	★
Typical Model Number: 648 D X 1 D 1 NA WA 3 WK 1 M5 C1 F6		

(1) When ordering a Rosemount 648 with the XA option, a mounting bracket is not included. If a bracket is required, please order option code B5.

Transmitter Specifications

Functional Specifications

Input

Supports Thermocouple, RTD, millivolt, and ohm input types. See “Transmitter Accuracy” on page 34 for sensor options.

Output

IEC 62591 (WirelessHART), 2.4 GHz DSSS

Local Display

The optional five-digit integral LCD Display can display engineering units (°F, °C, °R, K, Ω, and millivolts). Display update rate up to once per minute.

Humidity Limits

0–99% Non-condensing Relative Humidity

Update Rate

WirelessHART, user-selectable 4 seconds to 60 minutes

Accuracy (Pt 100 @ reference condition: 20 °C)
±0.225 °C (±0.405 °F)

Radio Frequency Power Output from Antenna

External Antenna (WK1 option): Maximum of 10 mW (10dBm) EIRP

Physical Specifications

Electrical Connections

Power Module

The Emerson SmartPower™ Power Module is field replaceable, featuring keyed connections that eliminate the risk of incorrect installation.

The Power Module is an Intrinsically Safe solution, containing Lithium-thionyl chloride with a polybutadine terephthalate (PBT) enclosure.

The 648 Wireless has Power Module life time rating of 10 years with a one-minute update rate, at reference conditions.(1)

Sensor Terminals

Sensor terminals permanently fixed to terminal block

Field Communicator Connections

Communication Terminals

Clips permanently fixed to terminal block, designated by the text “COMM.”

Materials of Construction

Enclosure

Housing - Low-copper aluminum or stainless steel

Paint - Polyurethane

Cover O-ring - Buna-N

Terminal Block and Power Module

PBT

Antenna

PBT/Polycarbonate (PC) integrated omnidirectional antenna

Mounting

Transmitters may be attached directly to the sensor. Mounting brackets also permit remote mounting. See “Dimensional Drawings” on page 38.

Weight

Low-copper Aluminum:
- 648 without LCD - 4.6 lbs. (2.0 kg)
- 648 with M5 LCD - 4.7 lbs (2.1 kg)

Stainless Steel:
- 648 without LCD - 8.0 lbs. (3.6 kg)
- 648 with M5 LCD - 8.1 lbs (3.7 kg)

Enclosure Ratings (648)

Housing Style option codes D and E are Type 4X and IP66/67 rated dual-compartment housings.

Performance Specifications

ElectroMagnetic Compatibility (EMC)

All Models:

Meets all relevant requirements of EN 61326-1; 2006; EN 61326-2-3; 2006

Transmitter Stability

The 648 has a stability of ±0.15% of output reading or 0.15 °C (whichever is greater) for 24 months.

Self Calibration

The analog-to-digital measurement circuitry automatically self-calibrates for each temperature update by comparing the dynamic measurement to extremely stable and accurate internal reference elements.

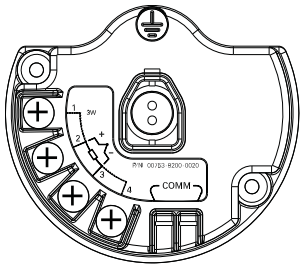
Vibration Effect

No effect when tested per the requirements of IEC60770-1:

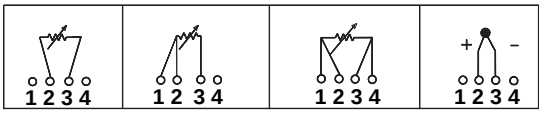
High Vibration Level - field or pipeline (10-60 Hz 0.21mm displacement peak amplitude / 60-2000 Hz 3g).

(1) Reference conditions are 70 °F (21 °C), and routing data for three additional network devices.
NOTE: Continuous exposure to ambient temperature limits (-40 °F or 185 °F; -40 °C or 85 °C) may reduce specified life by less than 20 percent.

Sensor Connections



648 Wireless Sensor Connections Diagram



2-wire RTD and Ω *

3-wire RTD and Ω *

4-wire RTD and Ω

T/C and mV

* *Rosemount Inc. provides 4-wire sensors for all single element RTDs. You can use these RTDs in 3-wire or 2-wire configurations by leaving the unneeded leads disconnected and insulated with electrical tape.*

Temperature Limits

Description	Operating Limit	Storage Limit
Without LCD Display	–40 to 185 °F –40 to 85 °C	–40 to 185 °F –40 to 85 °C
With LCD Display	–4 to 175 °F –20 to 80 °C	–40 to 185 °F –40 to 85 °C

Transmitter Accuracy

TABLE 2. Rosemount 648 Input Options and Accuracy

Sensor Options	Sensor Reference	Input Ranges		Digital Accuracy[1]	
2-, 3-, 4-wire RTDs		°C	°F	°C	°F
Pt 100 (α = 0.00385)	IEC 751	–200 to 850	–328 to 1562	± 0.225	± 0.405
Pt 200 (α = 0.00385)	IEC 751	–200 to 850	–328 to 1562	± 0.405	± 0.729
Pt 500 (α = 0.00385)	IEC 751	–200 to 850	–328 to 1562	± 0.285	± 0.513
Pt 1000 (α = 0.00385)	IEC 751	–200 to 300	–328 to 572	± 0.285	± 0.513
Pt 100 (α = 0.003916)	JIS 1604	–200 to 645	–328 to 1193	± 0.225	± 0.405
Pt 200 (α = 0.003916)	JIS 1604	–200 to 645	–328 to 1193	± 0.405	± 0.729
Ni 120	Edison Curve No. 7	–70 to 300	–94 to 572	± 0.225	± 0.405
Cu 10	Edison Copper Winding No. 15	–50 to 250	–58 to 482	± 2.1	± 3.78
Pt 50 (α = 0.00391)	GOST 6651-94	–200 to 550	–328 to 990	± 0.45	± 0.81
Pt 100 (α = 0.00391)	GOST 6651-94	–200 to 550	–328 to 990	± 0.225	± 0.405
Cu 50 (α = 0.00426)	GOST 6651-94	–50 to 200	–58 to 392	± 0.72	± 1.296
Cu 50 (α = 0.00428)	GOST 6651-94	–185 to 200	–301 to 392	± 0.72	± 1.296
Cu 100 (α = 0.00426)	GOST 6651-94	–50 to 200	–58 to 392	± 0.36	± 0.648
Cu 100 (α = 0.00428)	GOST 6651-94	–185 to 200	–301 to 392	± 0.36	± 0.648
Thermocouples[2]					
Type B[3]	NIST Monograph 175, IEC 584	100 to 1820	212 to 3308	± 1.155	± 2.079
Type E	NIST Monograph 175, IEC 584	–50 to 1000	–58 to 1832	± 0.30	± 0.54
Type J	NIST Monograph 175, IEC 584	–180 to 760	–292 to 1400	± 0.525	± 0.945
Type K[4]	NIST Monograph 175, IEC 584	–180 to 1372	–292 to 2501	± 0.75	± 1.35
Type N	NIST Monograph 175, IEC 584	–200 to 1300	–328 to 2372	± 0.75	± 1.35
Type R	NIST Monograph 175, IEC 584	0 to 1768	32 to 3214	± 1.125	± 2.025
Type S	NIST Monograph 175, IEC 584	0 to 1768	32 to 3214	± 1.05	± 1.89
Type T	NIST Monograph 175, IEC 584	–200 to 400	–328 to 752	± 0.525	± 0.945
DIN Type L	DIN 43710	–200 to 900	–328 to 1652	± 0.525	± 0.945
DIN Type U	DIN 43710	–200 to 600	–328 to 1112	± 0.525	± 0.945
Type W5Re/W26Re	ASTM E 988-96	0 to 2000	32 to 3632	± 1.05	± 1.89
GOST L	GOST R 8.585-2001	–200 to 800	–328 to 1472	± 0.525	± 0.945
Other Input Types					
Millivolt Input		–10 to 100 mV		± 0.0225 mV	
2-, 3-, 4-wire Ohm Input		0 to 2000 ohms		± 0.675 ohm	

(1) The published digital accuracy applies over the entire sensor input range. Digital output can be accessed by HART Communications or WirelessHART.

(2) Total digital accuracy for thermocouple measurement: sum of digital accuracy +0.8 °C. (cold junction accuracy).

(3) Digital accuracy for NIST Type B T/C is ±4.5 °C (±8.1 °F) from 100 to 300 °C (212 to 572 °F).

(4) Digital accuracy for NIST Type K T/C is ±1.05 °C (±1.895 °F) from –180 to –90 °C (–292 to –130 °F).

Ambient Temperature Effect

TABLE 3. Ambient Temperature Effect on Digital Accuracy

Sensor Options	Sensor Reference	Effects per 1.0 °C (1.8 °F) Change in Ambient Temperature(1)	Input Temperature (T)
2-, 3-, 4-wire RTDs			
Pt 100 (α = 0.00385)	IEC 751	0.0045 °C (0.0081 °F)	Entire Sensor Input Range
Pt 200 (α = 0.00385)	IEC 751	0.006 °C (0.0108 °F)	Entire Sensor Input Range
Pt 500 (α = 0.00385)	IEC 751	0.0045 °C (0.0081 °F)	Entire Sensor Input Range
Pt 1000 (α = 0.00385)	IEC 751	0.0045 °C (0.0081 °F)	Entire Sensor Input Range
Pt 100 (α = 0.003916)	JIS 1604	0.0045 °C (0.0108 °F)	Entire Sensor Input Range
Pt 200 (α = 0.003916)	JIS 1604	0.006 °C (0.0108 °F)	Entire Sensor Input Range
Ni 120	Edison Curve No. 7	0.0045 °C (0.0081 °F)	Entire Sensor Input Range
Cu 10	Edison Copper Winding No. 15	0.045 °C (0.081 °F)	Entire Sensor Input Range
Pt 50 (α = 0.003910)	GOST 6651-94	0.009 °C (0.0162 °F)	Entire Sensor Input Range
Pt 100 (α = 0.003910)	GOST 6651-94	0.0045 °C (0.0081 °F)	Entire Sensor Input Range
Cu 50 (α = 0.00426)	GOST 6651-94	0.009 °C (0.0162 °F)	Entire Sensor Input Range
Cu 50 (α = 0.00428)	GOST 6651-94	0.009 °C (0.0162 °F)	Entire Sensor Input Range
Cu 100 (α = 0.00426)	GOST 6651-94	0.0045 °C (0.0081 °F)	Entire Sensor Input Range
Cu 100 (α = 0.00428)	GOST 6651-94	0.0045 °C (0.0081 °F)	Entire Sensor Input Range
Thermocouples			
Type B	NIST Monograph 175, IEC 584	0.021 °C	T ≥ 1000 °C
		0.048 °C – (0.00375% of (T – 300))	300 °C ≤ T < 1000 °C
		0.081 °C – (0.0165% of (T – 100))	100 °C ≤ T< 300 °C
Type E	NIST Monograph 175, IEC 584	0.0075 °C +(0.000645% of T)	All
Type J	NIST Monograph 175, IEC 584	0.0081 °C +(0.000435%of T)	T ≥ 0 °C
		0.0081 °C + (0.00375% of absolute value T)	T < 0 °C
Type K	NIST Monograph 175, IEC 584	0.0092 °C +(0.00081% of T)	T ≥ 0 °C
		0.0092 °C + (0.00375% of absolute value T)	T < 0 °C
Type N	NIST Monograph 175, IEC 584	0.0102 °C +(0.00054% of T)	All
Type R	NIST Monograph 175, IEC 584	0.024 °C	T ≥ 200 °C
		0.0345 °C – (0.0108% of T)	T < 200 °C
Type S	NIST Monograph 175, IEC 584	0.024 °C	T ≥ 200 °C
		0.0345 °C – (0.0108% of T)	T < 200 °C
Type T	NIST Monograph 175, IEC 584	0.0096 °C	T ≥ 0 °C
		0.0096 °C +(0.00645% of absolute value T)	T < 0 °C
DIN Type L	DIN 43710	0.0081 °C + (0.000435% of T)	T ≥ 0 °C
		0.0081 °C +(0.00375% of absolute value T)	T < 0 °C
DIN Type U	DIN 43710	0.0096 °C	T ≥ 0 °C
		0.0096 °C +(0.00645% of absolute value T)	T < 0 °C
Type W5Re/W26Re	ASTM E 988-96	0.024 °C	T ≥ 200 °C
		0.0345 °C – (0.0108% of T)	T < 200 °C
GOST L	GOST R. 8.585-2001	0.0105 °C	T ≥ 0 °C
		0.0105 °C + (0.0045% of absolute value T)	T < 0 °C
Other Input Types			
Millivolt Input		0.0008 mV	Entire Sensor Input Range
2-, 3-, 4-wire Ohm Input		0.0126 Ω	Entire Sensor Input Range

(1) Change in ambient is with reference to the calibration temperature of the transmitter 68 °F (20 °C) from factory.

Transmitters can be installed in locations where the ambient temperature is between –40 and 85 °C (–40 and 185 °F). In order to maintain excellent accuracy performance, each transmitter is individually characterized over this ambient temperature range at the factory.

Temperature Effects Example

When using a Pt 100 (α = 0.00385) sensor input at 30 °C ambient temperature:

- Digital Temperature Effects: 0.0045 °C x (30 - 20) = 0.045 °C
- Worst Case Error: Digital + Digital Temperature Effects = 0.225 °C + 0.045 °C = 0.27 °C
- Total Probable Error: $\sqrt{0.225^2 + 0.045^2} = 0.23$

Product Certifications

Approved Manufacturing Locations

Rosemount Inc. – Chanhassen, Minnesota, USA
Emerson Process Management GmbH & Co. - Karlstein, Germany
Emerson Process Management Asia Pacific Private Limited - Singapore

European Union Directive Information

The current Declaration of Conformity is located at the end of this document. The most recent revision of the European Union Declaration of Conformity can be found at www.emersonprocess.com.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

Electro Magnetic Compatibility (EMC) (2004/108/EC)

Emerson Process Management complies with EMC Directive.

Radio and Telecommunications Terminal Equipment Directive (R&TTE)(1999/5/EC)

Emerson Process Management complies with the R&TTE Directive.

Telecommunication Compliance

All wireless devices require certification to ensure that they adhere to regulations regarding the use of the RF spectrum. Nearly every country requires this type of product certification. Emerson is working with governmental agencies around the world to supply fully compliant products and remove the risk of violating country directives or laws governing wireless device usage.

FCC and IC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation.

This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.

Ordinary Location Certification for FM

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Hazardous Locations Certificates

North American Certifications

Factory Mutual (FM) Approvals

I5 FM Intrinsically Safe, Non-incendive and Dust Ignition-proof
Certificate Number: 3027705
Intrinsically Safe for Class I/II/III, Division 1, Groups A, B, C, D, E, F, and G.
Zone Marking: Class I, Zone 0, AEx ia IIC
Temperature Codes: T4 (T_{amb} = -50 to 70 °C)
T5 (T_{amb} = -50 to 40 °C)
Non-incendive for Class I, Division 2, Groups A, B, C, and D.
Temperature Codes: T4 (T_{amb} = -50 to 70 °C)
T5 (T_{amb} = -50 to 40 °C)
Dust Ignition-proof for Class II/III, Division 1, Groups E, F, and G.
Ambient temperature limits: -50 to 85 °C

Enclosure: Type 4X/IP66/IP67
Intrinsically Safe and Non-incendive when installed in accordance with Rosemount drawing 00648-1000.
For use with Rosemount Power Module P/N 753-9220-XXXX only.

N5 FM Non-incendive and Dust Ignition-proof
Certificate Number: 3027705
Non-incendive for Class I, Division 2, Groups A, B, C, and D.
Temperature Codes: T4 (T_{amb} = -50 to 70 °C)
T5 (T_{amb} = -50 to 40 °C)
Dust Ignition-proof for Class II/III, Division 1, Groups E, F, and G.
Ambient temperature limits: -50 to 85 °C

Enclosure: Type 4X/IP66/IP67
For use with Rosemount Power Module P/N 753-9220-XXXX only.

Canadian Standards Association (CSA)

I6 CSA Intrinsically Safe
Certificate Number: 1143113
Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D.
Temp Code T3C

Enclosure: Type 4X/IP66/IP67
Intrinsically Safe when installed per Rosemount drawing 00648-1020.
For use with Rosemount Power Module P/N 753-9220-XXXX only.

European Certifications

I1 ATEX Intrinsic Safety
Certificate Number: Baseefa07ATEX0011 ⟨Ex⟩ II 1G
Ex ia IIC T4 (T_{amb} = -60 °C to 70 °C)
Ex ia IIC T5 (T_{amb} = -60 °C to 40 °C)
Enclosure: IP66/IP67
CE 1180

Table 4. Sensor Parameters

Sensor
U_o = 6.6 V
I_o = 26.2 mA
P_o = 42.6 mW
C_o = 23.8 uF
L_o = 25 mH

Intrinsically Safe when installed per Rosemount drawing 00648-1025.
For use with Rosemount Power Module P/N 753-9220-XXXX only.

Special Conditions for Safe Use
The surface resistivity of the antenna is greater than one gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.

International Certifications

I7 IECEx Intrinsic Safety
Certificate Number: IECEx BAS 07.0007
Ex ia IIC T4 (T_{amb} = -60 °C to 70 °C)
Ex ia IIC T5 (T_{amb} = -60 °C to 40 °C)
Enclosure: IP66/IP67

Table 5. Sensor Parameters

Sensor
U_o = 6.6 V
I_o = 26.2 mA
P_o = 42.6 mW
C_o = 23.8 uF
L_o = 25 mH

Intrinsically Safe when installed per Rosemount drawing 00648-1025.
For use with Rosemount Power Module P/N 753-9220-XXXX only.

Special Conditions for Safe Use
The surface resistivity of the antenna is greater than one gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.

Japanese Certifications

I4 TIIS Intrinsic Safety
Certificate Number: TC18638
Ex ia IIC T4 (T_{amb} = -20 °C to 60 °C)
Various configurations available. Consult factory for certified assemblies.

China (NEPSI) Certifications

I3 China Intrinsic Safety
Certificate Number: GYJ071412
Ex ia IIC T4/T5

Special Conditions for Safe Use:

1. The temperature class depends on ambient temperature range as following:

Temperature Class	Ambient Temperature Range
T4	(-55 to 70) °C
T5	(-55 to 40) °C

2. Safety Parameters:

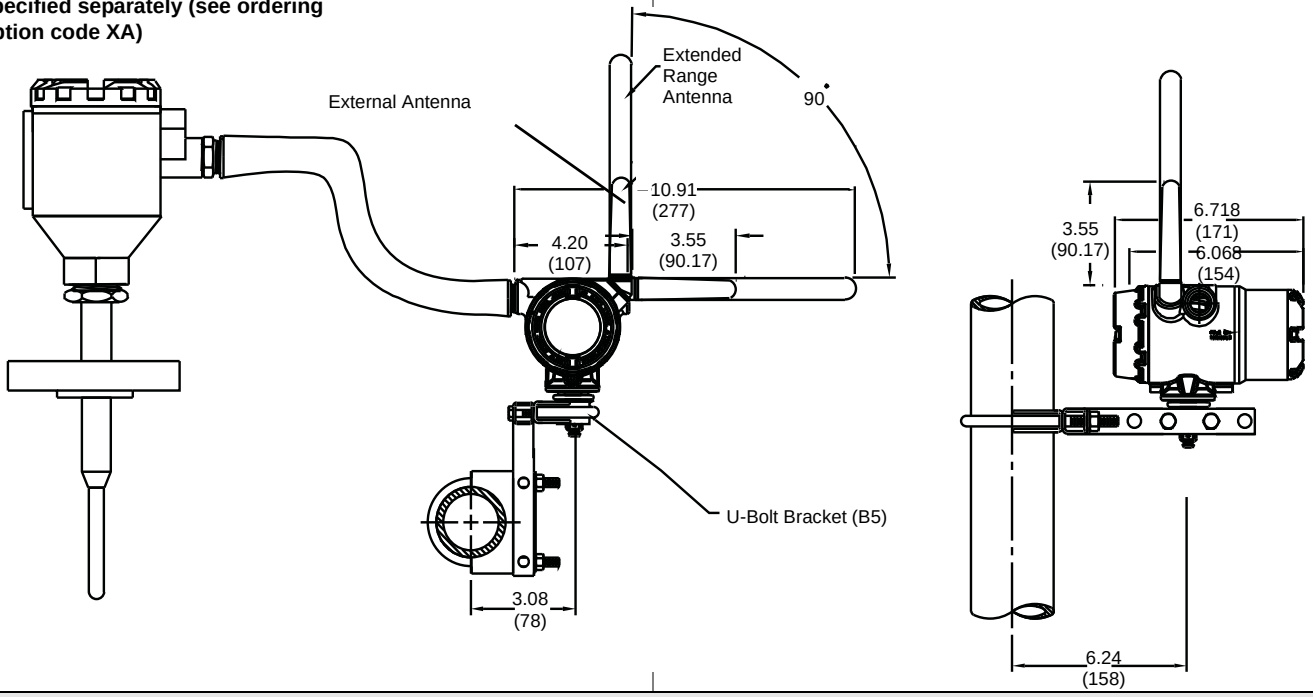
   U_o = 6.6 V
   I_o = 26 mA
   P_o = 42.6 mW
   C_o = 11 uF
   L_o = 25 uH

3. The cable entry of wireless temperature transmitter should be protected to ensure the degree of protection of the enclosure IP 20 (GB4208-1993) at least.
4. Associated apparatus should be installed in a safe location, and during installation, operation, and maintenance, the regulations of the instruction manual have to be strictly observed.
5. End users are not permitted to change any components inside.
6. During installation, use, and maintenance of the wireless temperature transmitter, observe the following standards:
   a. GB3836.13-1997 “Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres”
   b. GB3836.15-2000 “Electrical apparatus for explosive gas atmospheres Part 15: Electrical installations in hazardous area (other than mines)”
   c. GB3836.16-2006 “Electrical apparatus for explosive gas atmospheres Part 16: Inspection and maintenance of electrical installation (other than mines)”
   d. GB50257-1996 “Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering”

Dimensional Drawings

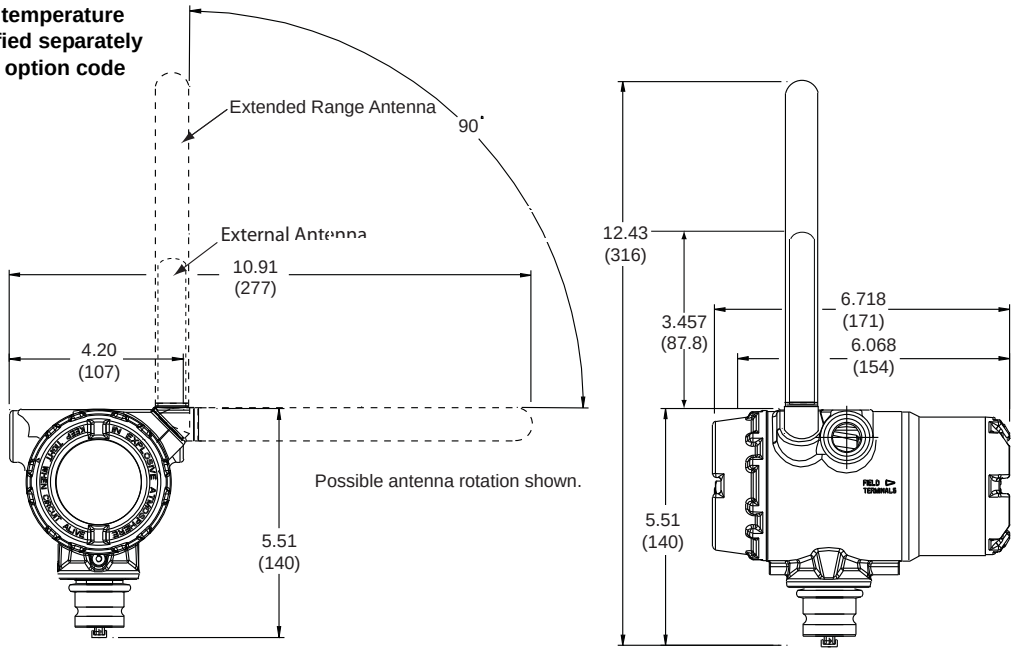
648 Remote Mount

Remote mount temperature sensor specified separately (see ordering option code XA)



648 Direct Mount

Direct mount temperature sensor specified separately (see ordering option code



Dimensions are in inches (millimeters)

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EMERSON™
Process Management

Rosemount 644 Temperature Transmitter

- *Versatile temperature transmitter delivers field reliability and advanced accuracy to meet demanding process needs*
- *Optimize plant efficiency and increase measurement reliability with industry-proven capabilities and specifications*
- *A standard diagnostic offering provides visibility into process conditions*
- *Explore the benefits of a Complete Point Solution from Rosemount Temperature*



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Dimensional Drawings . . . . . page Temperature-58

Rosemount 644 Temperature Transmitter

Versatile temperature transmitter delivers field reliability and advanced accuracy to meet demanding process needs

- DIN A style Head Mount transmitter or Rail Mount transmitter
- Variety of DIN A enclosure options
- Single sensor capability with universal sensor inputs (RTD, T/C, mV, ohms)
- HART / 4-20 mA, FOUNDATION fieldbus or Profibus PA protocols
- Transmitter-Sensor Matching with Callendar-Van Dusen
- LCD display



Optimize plant efficiency and increase measurement reliability with industry-proven capabilities and specifications

- Two-year stability rating reduces maintenance costs
- Transmitter-Sensor Matching eliminates the interchangeability error of sensors, improving measurement point accuracy by 75%
- PlantWeb alerts and user-centric Device Dashboards communicate important diagnostics and ensure process health
- Compensation for ambient temperatures enhances transmitter performance
- Aluminum or stainless steel connection heads for simplified electrical connections and wiring

A standard diagnostic offering provides visibility into process conditions



- Open/short sensor diagnostics assist with detecting issues in the sensor loop
- Intermittent Sensor Detect and Open Sensor Holdoff provide reliability in high vibration and noisy environments
- The terminal temperature feature verifies the installation temperature to ensure optimal transmitter operation

Explore the benefits of a Complete Point Solution from Rosemount Temperature Measurement

- An “Assemble To Sensor” option enables Emerson to provide a complete point temperature solution, delivering an installation-ready transmitter and sensor assembly
- Emerson offers a selection of RTDs, thermocouples, and thermowells that bring superior durability and Rosemount reliability to temperature sensing, complementing the Rosemount Transmitter portfolio



Experience global consistency and local support from numerous worldwide Rosemount Temperature manufacturing sites



- World-class manufacturing provides globally consistent product from every factory and the capacity to fulfill the needs of any project, large or small.
- Experienced Instrumentation Consultants help select the right product for any temperature application and advise on best installation practices.
- An extensive global network of Emerson service and support personnel can be on-site when and where they are needed.

- Critical measurement points that require advanced diagnostics, safety-certification or dual sensor redundancy are ideal for the Rosemount 3144P temperature transmitter.
- For installations that have a high number of temperature measurement in close proximity, consider the Rosemount 848T High Density temperature transmitter.

Rosemount 644 Temperature Transmitter



The Rosemount 644 is a versatile temperature transmitter that delivers field reliability and advanced accuracy to meet demanding process needs.

Transmitter features include:

- HART / 4-20 mA, FOUNDATION fieldbus or Profibus PA protocols
- DIN A or Rail Mount transmitter types
- LCD Display (Option Code M5 or M6)
- Transmitter-Sensor Matching (Option Code C2)
- 3-Point Calibration Certificate (Option Code Q4)
- Assemble to Sensor options (Option Code XA)

Table 1. Rosemount 644 Smart Temperature Transmitter Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery. The Expanded offering is manufactured after receipt of order and is subject to additional delivery lead time.

● = Available
– = Not Available

Model	Product Description					
644	Temperature Transmitter					
Transmitter Type						
Standard						**Standard**
H	DIN A Head Mount (suitable for mounting in the field with enclosure options below)					★
R	Rail Mount					★
Output		**Head**			**Rail**	
Standard						**Standard**
A	4–20 mA with digital signal based on HART protocol	●			●	★
F	FOUNDATION fieldbus digital signal (includes 2 AI function blocks and Backup Link Active Scheduler)	●			–	★
W	Profibus PA digital signal	●			–	★
Product Certifications						
Hazardous Locations Certificates (consult factory for availability)		**A**	**F**	**W**	**A**	
Standard						**Standard**
NA	No approval	●	●	●	●	★
E5[1]	FM Explosion–Proof	●	●	●	–	★
I5[2]	FM Intrinsically Safe	●	●	●	●	★
K5[2][1]	FM Intrinsically Safe, Explosion-Proof Combination	●	●	●	–	★
KC	FM/CSA Intrinsically Safe and Non-incendive Approval	●	●	●	–	★
I6[2]	CSA Intrinsically Safe	●	●	●	–	★
K6[1][3]	CSA Intrinsically Safe, Explosion-Proof Combination	●	●	●	–	★
E1[1]	ATEX Flameproof	●	●	●	–	★
I1[2]	ATEX Intrinsically Safe	●	●	●	●	★
N1[1]	ATEX Type n	●	●	●	–	★
NC	ATEX Type n Component	●	●	●	●	★
ND[1]	ATEX Dust Ignition–Proof	●	●	●	–	★
E7[1]	IECEx Flameproof and Dust	●	●	●	–	★
I7[2]	IECEx Intrinsically Safe	●	●	●	●	★

Table 1. Rosemount 644 Smart Temperature Transmitter Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is manufactured after receipt of order and is subject to additional delivery lead time.

		● = Available – = Not Available				
N7[1]	IECEx Type n	●	●	●	–	★
NG	IECEx Type n Component	●	●	●	●	★
E2[1]	INMETRO Flameproof	●	●	●	–	★
E4[1][3]	TIIS Explosion–Proof	●	●	●	●	★
E3[1]	China Flameproof	●	●	●	–	★
I3	China Intrinsic Safety	●	●	●	–	★

Options

		A	F	W	A	
PlantWeb Control Functionality						
Standard						**Standard**
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	–	●	–	–	★
Assemble To Options						
Standard						**Standard**
XA	Sensor Specified Separately and Assembled To Transmitter	●	●	●	–	★
		Head			**Rail**	
		A	**F**	**W**	**A**	
Enclosure Options						
Standard						**Standard**
J5[4][5]	Universal Head (junction box), aluminum alloy with 50.8 mm (2-in.) SST pipe bracket (M20 entries)	●	●	●	–	★
J6[4]	Universal Head (junction box), aluminum alloy with 50.8 mm (2-in.) SST pipe bracket ($^1/_2$–14 NPT entries)	●	●	●	–	★
J7[4][5]	Universal Head (junction box), cast SST with 50.8 mm (2-in.) SST pipe bracket (M20 entries)	●	●	●	–	★
J8[4]	Universal Head (junction box), cast SST with 50.8 mm (2-in.) SST pipe bracket ($^1/_2$–14 NPT entries)	●	●	●	–	★
Expanded						
S1	Connection Head, Polished Stainless Steel ($^1/_2$–14 NPT entries)	●	●	●	–	
S2	Connection Head, Polished Stainless Steel ($^1/_2$–14 NPSM entries)	●	●	●	–	
S3	Connection Head, Polished Stainless Steel (M20 x 1.5 conduit and entries)	●	●	●	–	
S4	Connection Head, Polished Stainless Steel (M20 x 1.5 conduit entries, M24 x 1.5 head entry)	●	●	●	–	
Display						
Standard						**Standard**
M5	LCD Display	●	●	●	–	★
Expanded						
M6	LCD Display with Polycarbonate Meter Face	●	●	●	–	
Software Configuration						
Standard						**Standard**
C1	Custom Configuration of Date, Descriptor and Message (Requires CDS with order)	●	●	●	●	★
Alarm Level Configuration						
Standard						**Standard**
A1	NAMUR alarm and saturation levels, high alarm	●	–	–	●	★
CN	NAMUR alarm and saturation levels, low alarm	●	–	–	●	★
C8	Low Alarm (Standard Rosemount Alarm and Saturation Values)	●	–	–	●	★
Line Filter						
Standard						**Standard**
F6	60 Hz Line Voltage Filter	●	●	●	●	★

Table 1. Rosemount 644 Smart Temperature Transmitter Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is manufactured after receipt of order and is subject to additional delivery lead time.

		● = Available – = Not Available				
Sensor Trim						
Standard						**Standard**
C2	Transmitter-Sensor Matching - Trim to Specific Rosemount RTD Calibration Schedule (CVD constants)	●	●	●	●	★
5-Point Calibration Option						
Standard						**Standard**
C4	5-point calibration. *Use option code Q4 to generate a calibration certificate*	●	●	●	●	★
Calibration Certificate						
Standard						**Standard**
Q4	Calibration certificate. *3-Point calibration with certificate*	●	●	●	●	★
External Ground						
Standard						**Standard**
G1	External ground lug assembly (see “External Ground Screw Assembly” on page 47)	●	●	●	–	★
Cable Gland Option						
Standard						**Standard**
G2	Cable gland(6) (7.5 mm - 11.99 mm)	●	●	●	–	★
G7	Cable gland, M20x1.5, Ex e, Blue Polyamide (5 mm - 9 mm)	●	●	●	–	★
Cover Chain Option						
Standard						**Standard**
G3	Cover chain	●	●	●	–	★
Terminal						
Standard						**Standard**
G5	WAGO spring clamp terminals	●	●		–	★
Conduit Electrical Connector						
Standard						**Standard**
GE(7)	M12, 4-pin, Male Connector (eurofast®)	●	●	●	–	★
GM(7)	A size Mini, 4-pin, Male Connector (minifast®)	●	●	●	–	★
External Label						
Standard						**Standard**
EL	External label for ATEX Intrinsic Safety	●	●	●	–	★
Typical Rail Mount Model Number: 644 R A I5 **Typical Head Mount Model Number: 644 H F I5 M5 J5 C1**						

(1) Requires enclosure option J5, J6, J7, or J8.

(2) When IS approval is ordered on a FOUNDATION fieldbus, both standard IS and FISCO IS approvals apply. The device label is marked appropriately.

(3) Consult factory for availability.

(4) Suitable for remote mount configuration.

(5) When ordered with XA, 1/2-in. NPT enclosure will come equipped with an M20 adapter with the sensor installed as process ready.

(6) Only available with Enclosure option code J5.

(7) Available with Intrinsically Safe approvals only. For FM Intrinsically Safe or non-incendive approval (option code I5), install in accordance with Rosemount drawing 03151-1009 to maintain NEMA 4X rating.

NOTE
For additional options (e.g. “K” codes), please contact your local Emerson Process Management representative.

Tagging

Hardware

- 13 characters total
- Tags are adhesive labels
- Permanently attached to transmitter
- Character height is $^{1}/_{16}$-in (1.6 mm)

Software

- Order with C1 option
- The transmitter can store up to 13 characters for FOUNDATION fieldbus and Profibus PA or 8 for HART protocol. If no characters are specified, the first 8 characters of the hardware tag are the default.

Considerations

Special Mounting Considerations

See “Mounting Kits for both 644H and 644R” on page 59 for the special hardware that is available to:

- Mount a 644H to a DIN rail. (see Table 2 on page 47)
- Retrofit a new 644H to replace an existing 644H transmitter in an existing threaded sensor connection head.(see Table 2 on page 47)

External Ground Screw Assembly

The external ground screw assembly can be ordered by specifying code G1 when an enclosure is specified. However, some approvals include the ground screw assembly in the transmitter shipment, hence it is not necessary to order code G1. The table below identifies which approval options include the external ground screw assembly and which do not.

Approval Type	External Ground Screw Assembly Included?
E5, I1, I2, I5, I6, I7, K5, K6, NA, I4	No–Order option code G1
E1, E2, E3, E4, E7, K7, N1, N7, ND	Yes

Table 2. Transmitter Accessories

Part Description	Part Number
Aluminum alloy Universal Head, standard cover—M20 entries	00644-4420-0002
Aluminum alloy Universal Head, meter cover—M20 entries	00644-4420-0102
Aluminum alloy Universal Head, standard cover—$^{1}/_{2}$-14 NPT entries	00644-4420-0001
Aluminum alloy Universal Head, meter cover—$^{1}/_{2}$-14 NPT entries	00644-4420-0101
LCD Display (includes meter and meter spacer assembly)	00644-4430-0002
LCD Display kit (includes meter and meter spacer assembly, and meter cover)	00644-4430-0001
Ground screw assembly kit	00644-4431-0001
Kit, Hardware for mounting a 644H to a DIN rail (includes clips for symmetrical and asymmetrical rails)	00644-5301-0010
Kit, Hardware for retrofitting a 644H in an existing threaded sensor connection head (former option code L1)	00644-5321-0010
Kit, 316 U-Bolt for Universal Housing	00644-4423-0001
Universal clip for rail or wall mount	03044-4103-0001
24 Inches of symmetric (top hat) rail	03044-4200-0001
24 Inches of asymmetric (G) Rail	03044-4201-0001
Ground clamp for symmetric or asymmetric rail	03044-4202-0001
End clamp for symmetric or asymmetric rail	03044-4203-0001
Snap rings kit (used for assembly to a DIN sensor – quantity 12)	00644-4432-0001
SST Universal Head, standard cover—M20 entries	00644-4433-0002
SST Universal Head, meter cover—M20 entries	00644-4433-0102
SST Universal Head, standard cover—1/2-14 NPT entries	00644-4433-0001
SST Universal Head, meter cover—1/2-14 NPT entries	00644-4433-0101
Polished SST Connection Head, standard cover—1/2-14 NPT entries	00079-0312-0011
Polished SST Connection Head, meter cover—1/2-14 NPT entries	00079-0312-0111
Polished SST Connection Head, standard cover—1/2-14 NPSM entries	00079-0312-0022
Polished SST Connection Head, meter cover—1/2-14 NPSM entries	00079-0312-0122
Polished SST Connection Head, standard cover—M20 x 1.5 entries	00079-0312-0033
Polished SST Connection Head, meter cover—M20 x 1.5 entries	00079-0312-0133
Polished SST Connection Head, standard cover—M20 x 1.5 / M24 x 1.5 entries	00079-0312-0034
Polished SST Connection Head, meter cover—M20 x 1.5 / M24 x 1.5 entries	00079-0312-0134

Specifications

HART, FOUNDATION FIELDBUS, AND PROFIBUS PA

Functional Specifications

Inputs

User-selectable; sensor terminals rated to 42.4 Vdc. See “Accuracy” on page 51 for sensor options.

Output

Single 2-wire device with either 4–20 mA/HART, linear with temperature or input; or completely digital outputs with FOUNDATION fieldbus communication (ITK 5.01 compliant), or Profibus PA (compliant with profile 3.02).

Isolation

Input/output isolation tested to 600 Vrms.

Local Display

The optional five-digit integral LCD Display includes a floating or fixed decimal point. It can also display engineering units (°F, °C, °R, K, Ω, and mV), mA, and percent of span. The display can be configured to alternate between selected display options. Display settings are preconfigured at the factory according to the standard transmitter configuration. They can be reconfigured in the field using either HART, FOUNDATION fieldbus or Profibus PA communications.

Humidity Limits

0–99% relative humidity

Update Time

≤ 0.5 sec.

Accuracy (default configuration) PT 100

HART (0-100 °C): ±0.18 °C

FOUNDATION fieldbus: ±0.15 °C

Profibus PA: ±0.15 °C

Physical Specifications

Electrical Connections

Model	Power and Sensor Terminals
644H	Compression screws permanently fixed to terminal block
644R	Compression screw permanently fixed to front panel
WAGO® Spring clamp terminals are optional (option code G5)	

Field Communicator Connections

Communication Terminals	
644H	Clips permanently fixed to terminal block
644R	Clips permanently fixed to front panel

Materials of Construction

Electronics Housing and Terminal Block	
644H	*Noryl*® glass reinforced
644R	*Lexan*® polycarbonate
Enclosure (Option code J5 or J6)	
Housing	Low-copper aluminum
Paint	Polyurethane
Cover O-ring	Buna-N

Materials of Constructions (Stainless Steel Housing for Biotechnology, Pharmaceutical Industries, and Sanitary Applications)

Housing and Standard Meter Cover

- 316 SST

Cover O-Ring

- Buna-N

Mounting

The 644R attaches directly to a wall or a DIN rail. The 644H installs in a connection head or universal head mounted directly on a sensor assembly, apart from a sensor assembly using a universal head, or to a DIN rail using an optional mounting clip.

Weight

Code	Options	Weight
644H	HART, Head Mount Transmitter	96 g (3.39 oz)
644H	FOUNDATION fieldbus, Head Mount Transmitter	92 g (3.25 oz)
644H	Profibus PA Head Mount Transmitter	92 g (3.25 oz)
644R	HART, Rail Mount Transmitter	174 g (6.14 oz)
M5	LCD Display	38 g (1.34 oz)
J5, J6	Universal Head, Standard Cover	577 g (20.35 oz)
J5, J6	Universal Head, Meter Cover	667 g (23.53 oz)
J7, J8	SST Universal Head, Std. Cover	1620 g (57.14 oz)
J7, J8	SST Universal Head, Meter Cover	1730 g (61.02 oz)

Weight (Stainless Steel Housing for Biotechnology, Pharmaceutical Industries, and Sanitary Applications)

Option Code	Standard Cover	Meter Cover
S1	840 g (27 oz)	995 g (32 oz)
S2	840 g (27 oz)	995 g (32 oz)
S3	840 g (27 oz)	995 g (32 oz)
S4	840 g (27 oz)	995 g (32 oz)

Enclosure Ratings (644H)

All option codes (S1, S2, S3, S4, J5, J6, J7, J8, R1, R2, R3 and R4) are NEMA 4X, IP66, and IP68. Option code J6 is CSA Enclosure Type 4X.

Sanitary Housing Surface

Surface finish is polished to 32 RMA. Laser etched product marking on housing and standard covers.

Performance Specifications

EMC (ElectroMagnetic Compatibility) NAMUR NE 21 Standard

The 644H HART meets the requirements for NAMUR NE 21 Rating.

Susceptibility	Parameter	Influence
		HART
ESD	• 6 kV contact discharge • 8 kV air discharge	None
Radiated	• 80 – 1000 MHz at 10 V/m AM	< 0.5%
Burst	• 1 kV for I.O.	None
Surge	• 0.5 kV line–line • 1 kV line–ground (I.O. tool)	None
Conducted	• 150 kHz to 80 MHz at 10 V	< 0.5%

CE Electromagnetic Compatibility Compliance Testing

The 644 is compliant with Directive 2004/108/EC. Meets the criteria under IEC 61326:2006

Power Supply Effect

Less than ±0.005% of span per volt

Stability

RTDs and thermocouples have a stability of ±0.15% of output reading or 0.15 °C (whichever is greater) for 24 months

Self Calibration

The analog-to-digital measurement circuitry automatically self-calibrates for each temperature update by comparing the dynamic measurement to extremely stable and accurate internal reference elements.

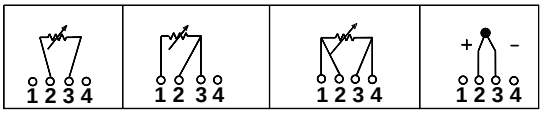
Vibration Effect

The 644 is tested to the following specifications with no effect on performance per IEC 60770-1, 1999:

Frequency	Vibration
10 to 60 Hz	0.21 mm displacement
60 to 2000 Hz	3 g peak acceleration

Sensor Connections

644 Sensor Connections Diagram



2-wire RTD and Ω | **3-wire RTD and Ω*** | **4-wire RTD and Ω** | **T/C and mV**

* *Rosemount Inc. provides 4-wire sensors for all single element RTDs. You can use these RTDs in 3-wire configurations by leaving the unneeded leads disconnected and insulated with electrical tape.*

FOUNDATION FIELDBUS SPECIFICATIONS

Function Blocks

Resource Block

- The resource block contains physical transmitter information including available memory, manufacture identification, device type, software tag, and unique identification.

Transducer Block

- The transducer block contains the actual temperature measurement data, including sensor 1 and terminal temperature. It includes information about sensor type and configuration, engineering units, linearization, reranging, damping, temperature correction, and diagnostics.

LCD Block

- The LCD block is used to configure the local display, if an LCD Display is being used.

Analog Input (AI)

- Processes the measurement and makes it available on the fieldbus segment
- Allows filtering, alarming, and engineering unit changes.

PID Block

- The transmitter provides control functionality with one PID function block in the transmitter. The PID block can be used to perform single loop, cascade, or feedforward control in the field.

Block	Execution Time (milliseconds)
Resource	–
Transducer	–
LCD Block	–
Analog Input 1	45
Analog Input 2	45
PID 1	60

Turn-on Time

Performance within specifications in less than 20 seconds after power is applied, when damping value is set to 0 seconds.

Status

If self-diagnostics detect a sensor burnout or a transmitter failure, the status of the measurement will be updated accordingly. Status may also send the AI output to a safe value.

Power Supply

Powered over FOUNDATION fieldbus with standard fieldbus power supplies. The transmitter operates between 9.0 and 32.0 Vdc, 12 mA maximum. The power terminals are rated to 42.4 Vdc (max.).

Alarms

The AI function block allows the user to configure the alarms to HI-HI, HI, LO, or LO-LO with hysteresis settings.

Backup Link Active Scheduler (LAS)

The transmitter is classified as a device link master, which means it can function as a Link Active Scheduler (LAS) if the current link master device fails or is removed from the segment.

The host or other configuration tool is used to download the schedule for the application to the link master device. In the absence of a primary link master, the transmitter will claim the LAS and provide permanent control for the H1 segment.

FOUNDATION fieldbus Parameters

Schedule Entries	25
Links	16
Virtual Communications Relationships (VCR)	12

PROFIBUS PA SPECIFICATIONS

Function Blocks

Physical Block

- The Physical Block contains physical transmitter information including manufacturer identification, device type, software tag, and unique identification.

Transducer Block

- The Transducer Block contains the actual temperature measurement data, including sensor 1 and terminal temperature. It includes information about sensor type and configuration, engineering units, linearization, re-ranging, damping, temperature correction, and diagnostics.

Analog Input Block (AI)

- The Analog Input Block processes the measurement and makes it available on the Profibus segment. Allows filtering, alarming, and engineering unit changes.

Turn on time:

Performance within specifications in less than 20 seconds after power is applied, when damping value is set to 0 seconds.

Power Supply:

Powered over Profibus with standard fieldbus power supplies. The transmitter operates between 9.0 and 32.0 Vdc,12 mA maximum. The power terminals are rated to 42.4 Vdc (max.)

Alarms

The AI function block allows the user to configure the alarms to HI-HI, HI, LO, or LO-LO with hysteresis settings.

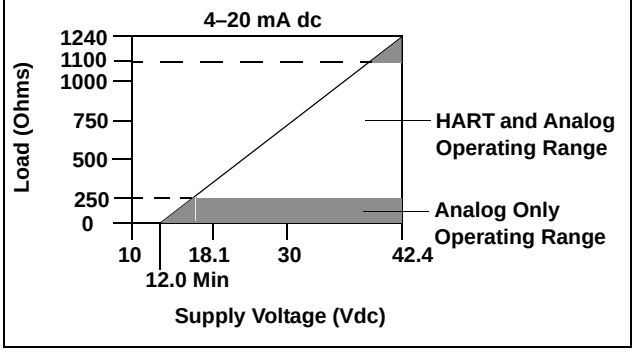
4–20 mA / HART SPECIFICATIONS

Power Supply

External power supply required. Transmitters operate on 12.0 to 42.4 Vdc transmitter terminal voltage (with 250 ohm load, 18.1 Vdc power supply voltage is required). Transmitter power terminals rated to 42.4 Vdc.

Load Limitations

Maximum Load = 40.8 X (Supply Voltage - 12.0)(1)



(1) Without transient protection (optional).

NOTE
HART Communication requires a loop resistance between 250 and 1100 ohms. Do not communicate with the transmitter when power is below 12 Vdc at the transmitter terminals.

Temperature Limits

	Operating Limit	Storage Limit
With LCD(1)	–4 to 185 °F –20 to 85 °C	–50 to 185 °F –45 to 85 °C
Without LCD	–40 to 185 °F –40 to 85 °C	–58 to 248 °F –50 to 120 °C

(1) LCD may not be readable and display updates will be slower at temperatures below -4 °F (-20 °C).

Hardware and Software Failure Mode

The 644 features software driven alarm diagnostics and an independent circuit which is designed to provide backup alarm output if the microprocessor software fails. The alarm direction (HI/LO) is user-selectable using the failure mode switch. If failure occurs, the position of the switch determines the direction in which the output is driven (HI or LO). The switch feeds into the digital-to-analog (D/A) converter, which drives the proper alarm output even if the microprocessor fails. The values at which the transmitter software drives its output in failure mode depends on whether it is configured to standard, custom, or NAMUR-compliant (NAMUR recommendation NE 43, June 1997) operation. Table 3 shows the configuration alarm ranges.

Table 3. Available Alarm Range(1)

	Standard	NAMUR- NE 43 Compliant
Linear Output:	$3.9 \leq I^{(2)} \leq 20.5$	$3.8 \leq I \leq 20.5$
Fail High:	$21.75 \leq I \leq 23$	$21.5 \leq I \leq 23$
Fail Low:	$3.5 \leq I \leq 3.75$	$3.5 \leq I \leq 3.6$

(1) Measured in mA.

(2) I = Process Variable (current output).

Custom Alarm and Saturation Level

Custom factory configuration of alarm and saturation level is available with option code C1 for valid values. These values can also be configured in the field using a Field Communicator.

Turn-on Time

Performance within specifications in less than 5.0 seconds after power is applied, when damping value is set to 0 seconds.

Transient Protection

The Rosemount 470 prevents damage from transients induced by lightning, welding, or heavy electrical equipment. For more information, refer to the 470 Product Data Sheet (document number 00813-0100-4191).

Accuracy

Table 4. Rosemount 644 Input Options and Accuracy.

Sensor Options	Sensor Reference	Input Ranges		Recommended Min. Span[1]		Digital Accuracy[2]		D/A Accuracy[3]
2-, 3-, 4-wire RTDs		°C	°F	°C	°F	°C	°F	
Pt 100 (α = 0.00385)	IEC 751	–200 to 850	–328 to 1562	10	18	± 0.15	± 0.27	±0.03% of span
Pt 200 (α = 0.00385)	IEC 751	–200 to 850	–328 to 1562	10	18	± 0.15	± 0.27	±0.03% of span
Pt 500 (α = 0.00385)	IEC 751	–200 to 850	–328 to 1562	10	18	± 0.19	± 0.34	±0.03% of span
Pt 1000 (α = 0.00385)	IEC 751	–200 to 300	–328 to 572	10	18	± 0.19	± 0.34	±0.03% of span
Pt 100 (α = 0.003916)	JIS 1604	–200 to 645	–328 to 1193	10	18	± 0.15	± 0.27	±0.03% of span
Pt 200 (α = 0.003916)	JIS 1604	–200 to 645	–328 to 1193	10	18	± 0.27	± 0.49	±0.03% of span
Ni 120	Edison Curve No. 7	–70 to 300	–94 to 572	10	18	± 0.15	± 0.27	±0.03% of span
Cu 10	Edison Copper Winding No. 15	–50 to 250	–58 to 482	10	18	±1.40	± 2.52	±0.03% of span
Pt 50 (α = 0.00391)	GOST 6651-94	–200 to 550	–328 to 1022	10	18	± 0.30	± 0.54	±0.03% of span
Pt 100 (α = 0.00391)	GOST 6651-94	–200 to 550	–328 to 1022	10	18	± 0.15	± 0.27	±0.03% of span
Cu 50 (α = 0.00426)	GOST 6651-94	–50 to 200	–58 to 392	10	18	±1.34	± 2.41	±0.03% of span
Cu 10 (α = 0.00428)	GOST 6651-94	–185 to 200	–301 to 392	10	18	±1.34	± 2.41	±0.03% of span
Cu 10 (α = 0.00426)	GOST 6651-94	–50 to 200	–58 to 392	10	18	±0.67	± 1.20	±0.03% of span
Cu 10 (α = 0.00428)	GOST 6651-94	–185 to 200	–301 to 392	10	18	±0.67	± 1.20	±0.03% of span
Thermocouples[4]								
Type B[5]	NIST Monograph 175, IEC 584	100 to 1820	212 to 3308	25	45	± 0.77	± 1.39	±0.03% of span
Type E	NIST Monograph 175, IEC 584	–50 to 1000	–58 to 1832	25	45	± 0.20	± 0.36	±0.03% of span
Type J	NIST Monograph 175, IEC 584	–180 to 760	–292 to 1400	25	45	± 0.35	± 0.63	±0.03% of span
Type K[6]	NIST Monograph 175, IEC 584	–180 to 1372	–292 to 2501	25	45	± 0.50	± 0.90	±0.03% of span
Type N	NIST Monograph 175, IEC 584	–200 to 1300	–328 to 2372	25	45	± 0.50	± 0.90	±0.03% of span
Type R	NIST Monograph 175, IEC 584	0 to 1768	32 to 3214	25	45	± 0.75	± 1.35	±0.03% of span
Type S	NIST Monograph 175, IEC 584	0 to 1768	32 to 3214	25	45	± 0.70	± 1.26	±0.03% of span
Type T	NIST Monograph 175, IEC 584	–200 to 400	–328 to 752	25	45	± 0.35	± 0.63	±0.03% of span
DIN Type L	DIN 43710	–200 to 900	–328 to 1652	25	45	± 0.35	± 0.63	±0.03% of span
DIN Type U	DIN 43710	–200 to 900	–328 to 1112	25	45	± 0.35	± 0.63	±0.03% of span
Type W5Re/W26Re	ASTM E 988-96	0 to 2000	32 to 3632	25	45	± 0.70	± 1.26	±0.03% of span
GOST Type L	GOST R 8.585-2001	–200 to 800	–328 to 1472	25	45	± 1.00	± 1.26	±0.03% of span
Other Input Types								
Millivolt Input		–10 to 100 mV				±0.015 mV		±0.03% of span
2-, 3-, 4-wire Ohm Input		0 to 2000 ohms				±0.45 ohm		±0.03% of span

(1) No minimum or maximum span restrictions within the input ranges. Recommended minimum span will hold noise within accuracy specification with damping at zero seconds.

(2) The published digital accuracy applies over the entire sensor input range. Digital output can be accessed by HART or FOUNDATION fieldbus Communications or Rosemount control system.

(3) Total Analog accuracy is the sum of digital and D/A accuracies. This is not applicable for FOUNDATION fieldbus.

(4) Total digital accuracy for thermocouple measurement: sum of digital accuracy +0.5 °C. (cold junction accuracy).

(5) Digital accuracy for NIST Type B T/C is ±3.0 °C (±5.4 °F) from 100 to 300 °C (212 to 572 °F).

(6) Digital accuracy for NIST Type K T/C is ±0.70 °C (±1.26 °F) from –180 to –90 °C (–292 to –130 °F).

Accuracy Example (HART devices)

When using a Pt 100 (α = 0.00385) sensor input with a 0 to 100 °C span:

- Digital accuracy = ±0.15 °C
- D/A accuracy = ±0.03% of 100 °C or ±0.03 °C
- Total accuracy = ±0.18 °C.

Accuracy Example (FOUNDATION fieldbus and Profibus PA devices)

When using a Pt 100 (α = 0.00385) sensor input:

- Total accuracy = ±0.15 °C.
- No D/A accuracy effects apply

Ambient Temperature Effect

Table 5. Ambient Temperature Effect

Sensor Options	Sensor Reference	Input Range (°C)	Temperature Effects per 1.0 °C (1.8 °F) Change in Ambient Temperature[1]	Range	D/A Effect[2]
2-, 3-, 4-wire RTDs					
Pt 100 (α = 0.00385)	IEC 751	-200 to 850	0.003 °C (0.0054 °F)	Entire Sensor Input Range	0.001% of span
Pt 200 (α = 0.00385)	IEC 751	-200 to 850	0.004 °C (0.0072 °F)	Entire Sensor Input Range	0.001% of span
Pt 500 (α = 0.00385)	IEC 751	-200 to 850	0.003 °C (0.0054 °F)	Entire Sensor Input Range	0.001% of span
Pt 1000 (α = 0.00385)	IEC 751	-200 to 300	0.003 °C (0.0054 °F)	Entire Sensor Input Range	0.001% of span
Pt 100 (α = 0.003916)	JIS 1604	-200 to 645	0.003 °C (0.0054 °F)	Entire Sensor Input Range	0.001% of span
Pt 200 (α = 0.003916)	JIS 1604	-200 to 645	0.004 °C (0.0072 °F)	Entire Sensor Input Range	0.001% of span
Ni 120	Edison Curve No. 7	-70 to 300	0.003 °C (0.0054 °F)	Entire Sensor Input Range	0.001% of span
Cu 10	Edison Copper Winding No. 15	-50 to 250	0.03 °C (0.054 °F)	Entire Sensor Input Range	0.001% of span
Pt 50 (α = 0.00391)	GOST 6651-94	-200 to 550	0.004 °C (0.0072 °F)	Entire Sensor Input Range	0.001% of span
Pt 100 (α = 0.00391)	GOST 6651-94	-200 to 550	0.003 °C (0.0054 °F)	Entire Sensor Input Range	0.001% of span
Cu 50 (α = 0.00426)	GOST 6651-94	-50 to 200	0.008 °C (0.0144 °F)	Entire Sensor Input Range	0.001% of span
Cu 50 (α = 0.00428)	GOST 6651-94	-185 to 200	0.008 °C (0.0144 °F)	Entire Sensor Input Range	0.001% of span
Cu 100 (α = 0.00426)	GOST 6651-94	-50 to 200	0.004 °C (0.0072 °F)	Entire Sensor Input Range	0.001% of span
Cu 100 (α = 0.00428)	GOST 6651-94	-185 to 200	0.004 °C (0.0072 °F)	Entire Sensor Input Range	0.001% of span
Thermocouples					
Type B	NIST Monograph 175, IEC 584	100 to 1820	0.014 °C	T ≥ 1000 °C	0.001% of span
			0.032 °C – (0.0025% of (T – 300))	300 °C ≤ T < 1000 °C	0.001% of span
			0.054 °C – (0.011% of (T – 100))	100 °C ≤ T < 300 °C	0.001% of span
Type E	NIST Monograph 175, IEC 584	-50 to 1000	0.005 °C + (0.0043% of T)	All	0.001% of span
Type J	NIST Monograph 175, IEC 584	-180 to 760	0.0054 °C + (0.00029%of T)	T ≥ 0 °C	0.001% of span
			0.0054 °C + (0.0025% of absolute value T)	T < 0 °C	0.001% of span
Type K	NIST Monograph 175, IEC 584	-180 to 1372	0.0061 °C + (0.0054% of T)	T ≥ 0 °C	0.001% of span
			0.0061 °C + (0.0025% of absolute value T)	T < 0 °C	0.001% of span
Type N	NIST Monograph 175, IEC 584	-200 to 1300	0.0068 °C + (0.00036% of T)	All	0.001% of span
Type R	NIST Monograph 175, IEC 584	0 to 1768	0.016 °C	T ≥ 200 °C	0.001% of span
			0.023 °C – (0.0036% of T)	T < 200 °C	0.001% of span
Type S	NIST Monograph 175, IEC 584	0 to 1768	0.016 °C	T ≥ 200 °C	0.001% of span
			0.023 °C – (0.0036% of T)	T < 200 °C	0.001% of span
Type T	NIST Monograph 175, IEC 584	-200 to 400	0.0064 °C	T ≥ 0 °C	0.001% of span
			0.0064 °C +(0.0043% of absolute value T)	T < 0 °C	0.001% of span
DIN Type L	DIN 43710	-200 to 900	0.0054 °C + (0.00029% of T)	T ≥ 0 °C	0.001% of span
			0.0054 °C + (0.0025% of absolute value T)	T < 0 °C	0.001% of span
DIN Type U	DIN 43710	-200 to 900	0.0064 °C	T ≥ 0 °C	0.001% of span
			0.0064 °C + (0.0043% of absolute value T)	T < 0 °C	0.001% of span
Type W5Re/W26Re	ASTM E 988-96	0 to 2000	0.016 °C	T ≥ 200 °C	0.001% of span
			0.023 °C – (0.0036% of T)	T < 200 °C	0.001% of span
GOST Type L	GOST R 8.585-2001	-200 to 800	0.007 °C	T ≥ 0 °C	0.001% of span
			0.007 °C – (0.003% of absolute value T)	T < 0 °C	0.001% of span
Other Input Types					
Millivolt Input		-10 to 100 mV	0.0005 mV	Entire Sensor Input Range	0.001% of span
2-, 3-, 4-wire Ohm		0 to 2000 Ω	0.0084 Ω	Entire Sensor Input Range	0.001% of span

(1) Change in ambient is with reference to the calibration temperature of the transmitter 68 °F (20 °C) from factory.

(2) Does not apply to FOUNDATION fieldbus.

Transmitters can be installed in locations where the ambient temperature is between –40 and 85 °C (–40 and 185 °F). In order to maintain excellent accuracy performance, each transmitter is individually characterized over this ambient temperature range at the factory.

Temperature Effects Example (HART devices)

When using a Pt 100 (α = 0.00385) sensor input with a 0–100 °C span at 30 °C ambient temperature:

- Digital Temperature Effects: 0.003 °C x (30 - 20) = 0.03 °C
- D/A Effects: [0.001% of 100] x (30 - 20) = 0.01 °C
- Worst Case Error: Digital + D/A + Digital Temperature Effects + D/A Effects = 0.15 °C + 0.03 °C + 0.03 °C + 0.01 °C = 0.22 °C
- Total Probable Error: $\sqrt{0.15^2 + 0.03^2 + 0.03^2 + 0.01^2} = 0.16°C$

Temperature Effects Examples (FOUNDATION fieldbus devices and Profibus PA)

When using a Pt 100 (α = 0.00385) sensor input at 30 °C span at 30 °C ambient temperature:

- Digital Temperature Effects: 0.003 °C x (30 - 20) = 0.03 °C
- D/A Effects: No D/A effects apply
- Worst Case Error: Digital + Digital Temperature Effects = 0.15 °C + 0.03 °C = 0.18 °C
- Total Probable Error: $\sqrt{0.15^2 + 0.03^2} = 0.153°C$

Product Certifications

ROSEMOUNT 644 WITH FOUNDATION FIELDBUS AND PROFIBUS PA

Approved Manufacturing Locations

Emerson Process Management Rosemount Division. – Chanhassen, Minnesota, USA

Rosemount Temperature GmbH – Germany

Emerson Process Management Asia Pacific – Singapore

European Union Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting our local sales representative.

ATEX Directive (94/9/EC)

Rosemount Inc. complies with the ATEX Directive.

CE Electromagnetic Compatibility Compliance Testing

The 644 meets the criteria under IEC 61326:2006

Hazardous Locations Certificates

North American Certifications

Factory Mutual (FM) Approvals

I5 FM Intrinsically Safe
Intrinsically Safe FISCO for use in Class I, II, III, Division 1, Groups A, B, C, D, E, F, and G; when installed per control drawing 00644-2075.
Temperature Code: T4A (T_{amb} = – 50 °C to 60 °C).

Nonincendive for use in Class I, Division 2, Groups A, B, C, and D.
Temperature Code: T5 (T_{amb} = – 50 °C to 85 °C);
T6 (T_{amb} = – 50 °C to 70 °C)

When installed per Rosemount control drawing 00644-2075

E5 FM Explosion Proof
Explosion Proof for Class I, Division 1, Groups B, C, and D.

Nonincendive for use in Class 1, Division 2, Groups A, B, C, and D.

Temperature Code: T5 (T_{amb} = – 50 °C to 85 °C)
When installed per Rosemount control drawing 00644-1049

Dust Ignition Proof for Class II/III, Division 1, Groups E, F, G.
Temperature Code: T5 (T_a = – 50 °C to 85 °C)

When installed per Rosemount drawing 00644-1049.
(J5, J6 and J8 options only.)

Canadian Standards Association (CSA) Approvals

I6 CSA Intrinsically Safe
Intrinsically Safe and FISCO for Class I, Division 1, groups A, B, C, and D when connected per Rosemount drawing 00644-2076.

Temperature code: T4 (T_{amb} = – 50 °C to 60 °C);

Suitable for Class I, Division 2, groups A, B, C, and D (must be installed in a suitable enclosure)

K6 CSA Intrinsically Safe, Explosion-proof
Includes Intrinsically Safe "I6" and Explosion-Proof for Class I, Division 1, groups B, C, and D.
Dust-Ignition Proof for Class II, Division 1, Groups E, F, and G.
Dust-Ignition Proof for Class III, Division 1
Seal not required.
CSA Enclosure Type 4X

Temperature Code: T4 (T_{amb} = – 50 °C to 60 °C);
T5 (T_{amb} = – 50 °C to 85 °C)

NOTE:
(For J5 and J6 enclosure options only)

European Certifications

E1 ATEX Flame-Proof
Certificate Number: KEMA99ATEX8715X
ATEX Marking: ⟨Ex⟩ II 2 G
CE 1180
Ex d IIC T6 (–40 °C ≤ T_{amb} ≤ 65 °C)
U_i = 32 Vdc

Special Conditions for Safe Use (X):
For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

I1 ATEX Intrinsic Safety
Certificate Number: Baseefa03ATEX0499X
ATEX Marking: ⟨Ex⟩ II 1 G
CE 1180
Ex ia IIC T4 (-50 °C ≤ T_{amb} ≤ 60 °C)

Table 6. Entity Parameters

I.S. Loop/Power Terminals
U_i = 30 V
I_i = 300 mA
P_i = 1.3 W
C_i = 2.1 nF
L_i = 0
FISCO Loop/Power Terminals
U_i = 17.5 V
I_i = 380 mA
P_i = 5.32 W
C_i = 2.1 nF
L_i = 0
Sensor Terminals
U_o = 13.9 V
I_o = 23 mA
P_o = 79 mW
C_i = 7.7 nF
L_i = 0

Special Conditions for Safe Use (X):
The apparatus must be installed in an enclosure which affords it a degree of protection of at least IP20. Non-metallic enclosures must have a surface resistance of less than 1GΩ, light alloy or zirconium enclosures must be protected from impact and friction when installed.

N1 ATEX Type n
Certificate Number: BAS00ATEX3145
ATEX Marking: ⟨Ex⟩ II 3 G
Ex nL IIC T5 (-40 °C ≤ T_{amb} ≤ 70 °C)
U_i = 32 V

NC ATEX Type n Component
Certificate Number: BAS99ATEX3084U
ATEX Marking: ⟨Ex⟩ II 3 G
Ex nL IIC T5 (-40 °C ≤ T_{amb} ≤ 70 °C)
U_i = 32 V

NOTE:
The equipment must be installed in an enclosure meeting the requirements of IP54 and the requirements of the impact tests described in EN50021.

ND ATEX Dust Ignition-Proof
Certificate Number: KEMA99ATEX8715X
ATEX Marking: ⟨Ex⟩ II 1 D
tD A20 T95°C (-40 °C ≤ T_{amb} ≤ 85 °C)
CE 1180
IP66

Special Conditions for Safe Use (X):
For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

IECEx Certifications

E7 IECEx Flameproof and Dust
Certificate Number: IECEx KEM 09.0015X
Ex d IIC T6 (Flameproof)
Ex tD A20 IP 66 T 95 °C (Dust)
Vmax = 32 V

Special Conditions for Safe Use (X):
For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

Table 7. Electrical Data

Transmitter	**Sensor**
V_{max} = 32 Vdc	U_{max} = 5 Vdc
I_{max} = 12.0 mA	I_{max} = 2.0 mA

I7 IECEx Intrinsic Safety
Certificate Number: IECEx BAS 07.0053X
Ex ia IIC T4/T5/T6

Table 8. Temperature Classification

$P_{i\ (W)}$	**Temperature Class**	**T_{amb}**
1.3	T4	-50 °C to 60 °C
5.32 (FISCO Group IIC)	T4	-60 °C to 80 °C

Special Conditions for Safe Use (X):

1. The apparatus must be installed in an enclosure which affords it a degree of protection of at least IP20.
2. Non-metallic enclosures must have a surface resistance of less than 1 GΩ; light alloy or zirconium enclosures must be protected from impact and friction when installed.

Table 9. Entity Parameters

Transmitter (I.S.)	Transmitter (FISCO)	Sensor
U_i = 30 Vdc	U_i = 17.5 Vdc	U_o = 13.9 Vdc
I_i = 300 mA	I_i = 380 mA	I_o = 23 mA
P_i = 1.3 W	P_i = 5.32 W	P_o = 79 mW
C_i = 2.1 nF	C_i = 2.1 nF	C_i = 7.7 nF
L_i = 0 mH	L_i = 0 mH	L_i = 0 mH

N7 IECEx Type n
Certificate Number: IECEx BAS 07.0055
Ex nA nL IIC T5 (-40 °C ≤ T_{amb} ≤ 70 °C)

Table 10. Electrical Data

Transmitter	Sensor	
	RTD	Thermocouple
U_i = 32 V	U_i = 5 V	U_i = 0

NG IECEx Type n Component
Certificate Number: IECEx BAS 07.0054U
Ex nA nL IIC T5 (-40 °C ≤ T_{amb} ≤ 75 °C)
Input Parameter: Ui = 32 Vdc

Schedule of Limitations:

The component must be housed in a suitably certified enclosure that provides a degree of protection of at least IP54.

Japanese Certifications

Japanese Industrial Standard (JIS) Approvals

I4 JIS Intrinsic Safety

E4 JIS Explosion Proof

Table 11. Certificate and Description

Certificate	Description	Approval Group	Temp Code
C15744	644H with meter and no sensor	Ex d II C	T6
C15745	644H without meter and no sensor	Ex d II C	T6
C15749	644H without meter and with RTD	Ex d II B	T4
C15750	644H without meter and with thermocouple	Ex d II B	T4
C15751	644H with meter and thermocouple	Ex d II B	T4
C15752	644H with meter and RTD	Ex d II B	T4
C15910	644H without meter and with thermocouple	Ex d II B + H2	T4

Table 11. Certificate and Description

Certificate	Description	Approval Group	Temp Code
C15911	644H with meter and thermocouple	Ex d II B + H2	T4
C15912	644H without meter and with RTD	Ex d II B + H2	T4
C15913	644H with meter and RTD	Ex d II B + H2	T4

Combination Approvals

K5 Combination of I5 and E5.

Russian GOST Certifications

PPC BA-13006:

0 Ex ia IIC T4/T5/T6

Kazakhstan GOST

Pattern approval Certificate for Measuring Instruments

See Certificate

Ukraine GOST

Pattern Approval for Measuring Instruments

See Certificate

ROSEMOUNT 644 WITH HART

Approved Manufacturing Locations

Emerson Process Management Rosemount Division. – Chanhassen, Minnesota, USA

Rosemount Temperature GmbH – Germany

Emerson Process Management Asia Pacific – Singapore

European Union Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting our local sales representative.

ATEX Directive (94/9/EC)

Rosemount Inc. complies with the ATEX Directive.

CE Electromagnetic Compatibility Compliance Testing

The 644 meets the criteria under IEC 61326:2006

Hazardous Locations Certificates

North American Certifications

Factory Mutual (FM) Approvals

I5 FM Intrinsically Safe and Non-incendive
Intrinsically Safe for Class I/II/III, Division 1, Groups A, B, C, D, E, F, and G.
Non-incendive for Class I, Division 2, Groups A, B, C, and D.
Temperature Code: T5 (T_a = – 50 °C to 85 °C)
When installed in accordance with Rosemount drawing 00644-0009.

Table 12. Temperature Code

Pi	Temperature Code
0.67 W	T5 (T_{amb} = – 50 °C to 50 °C)
0.67 W	T6 (T_{amb} = – 50 °C to 40 °C)
1.0 W	T4 (T_{amb} = – 50 °C to 80 °C)
1.0 W	T5 (T_{amb} = – 50 °C to 40 °C)

E5 FM Explosion Proof
Explosion Proof for Class I, Division 1, Groups B, C, and D.
Nonincendive for use in Class 1, Division 2, Groups A, B, C, and D.
Temperature Code: T5 (T_{amb} = – 50 °C to 85 °C)
When installed per Rosemount control drawing 00644-1049
Dust Ignition Proof for Class II/III, Division 1, Groups E, F, G.
Temperature Code: T5 (T_a = – 50 °C to 85 °C)
When installed per Rosemount drawing 00644-1049.
(J5, J6 and J8 options only.)

K5 Combination of I5 and E5.

NOTE
K5 is only available with 644H option code J6.

Canadian Standards Association (CSA) Approvals

I6 CSA Intrinsically Safe
Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D when installed in accordance with Rosemount drawing 00644–1064.

Table 13. Temperature Code

Pi	Temperature Code
0.67 W	T6 (T_{amb} = – 50 °C to 40 °C)
0.67 W	T5 (T_{amb} = – 50 °C to 60 °C)
1.0 W	T4 (T_{amb} = – 50 °C to 80 °C)

K6 CSA Intrinsically Safe, Explosion–Proof, and Non-incendive
Combination of I6 and Explosion–proof for Class I, Division 1, Groups B, C, and D; Dust-ignition proof for Class II, Division 1, Groups E, F, and G; Class III, Division 1 hazardous locations, when installed in accordance with Rosemount drawing 00644–1059.
Suitable for Class I, Division 2, Groups B, C, and D when installed in a suitable enclosure.
Temperature Code: Ambient Limits –50 °C to 85 °C.

NOTE
K6 is only available with 644H option code J6.

European Certifications

I1 ATEX Intrinsic Safety
Certificate Number: BAS00ATEX1033X
ATEX Marking: ⟨Ex⟩ II 1 G Ex ia IIC T4/T5/T6
CE 1180

Table 14. Temperature Code

Pi	Temperature Code
0.67 W	T6 (– 60 °C ≤ T_{amb} ≤ 40 °C)
0.67 W	T5 (– 60 °C ≤ T_{amb} ≤ 50 °C)
1.0 W	T5 (– 60 °C ≤ T_{amb} ≤ 40 °C)
1.0 W	T4 (– 60 °C ≤ T_{amb} ≤ 80 °C)

Table 15. Entity Parameters

Loop/Power	Sensor
U_i = 30 V	U_o = 13.6 V
I_i = 200 mA	I_o = 80 mA
P_i = 0.67 W or 1.0 W	P_o = 80 mW
C_i = 10 nF	C_i = 75 nF
L_i = 0	L_i = 0

Special Conditions for Safe Use (X):
The transmitter must be installed so that its external terminals and communication pins are protected to at least IP20.
Non-metallic enclosures must have a surface resistance of less than 1GΩ. Light alloy or zirconium enclosures must be protected from impact and friction when installed.

E1 ATEX Flame-Proof
Certificate Number: KEMA99ATEX8715X
ATEX Marking: ⟨Ex⟩ II 2 G Ex d IIC T6
CE 1180
Temperature Code: T6 (–40 °C ≤ T_{amb} ≤ 65 °C)
Max Input Voltage: U_i = 42.4 Vdc
Special Conditions for Safe Use (X):
For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

N1 ATEX Type n
Certificate Number: BAS00ATEX3145
ATEX Marking: ⟨Ex⟩ II 3 G Ex nL IIC T5
Temperature Code: T5 (–40 °C ≤ T_{amb} ≤ 70 °C)
Max Input Voltage: U_i= 42.4 Vdc

NC ATEX Type n Component
Certificate Number: BAS99ATEX3084U
ATEX Marking: ⟨Ex⟩ II 3 G Ex nL IIC T5
Temperature Code: T5 (–40 °C ≤ T_{amb} ≤ 70 °C)
Max Input Voltage: U_i= 42.4 Vdc

NOTE
The equipment must be installed in an enclosure meeting the requirements of IP54 and the requirements of the impact tests described in EN50021.

ND ATEX Dust Ignition-Proof
Certificate Number: KEMA99ATEX8715X
ATEX Marking: ⟨Ex⟩ II 1 D
tD A20 T95 C (-40 °C = T_{amb} = +85 °C)
IP 66

Special Conditions for Safe Use (X):
For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

IECEx Certifications

E7 IECEx Flameproof and Dust
Certificate Number: IECEx KEM 09.0015X
Ex d IIC T6 (Flameproof)
Ex tD A20 IP 66 T 95 °C (Dust)
Vmax = 42.4 V

Special Conditions for Safe Use (X):
For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

Table 16. Electrical Data

Transmitter	Sensor
U_{max} = 42.4 Vdc	U_{max} = 5 Vdc
I_{max} = 24.0 mA	I_{max} = 2.0 mA

I7 IECEx Intrinsic Safety
Certificate Number: IECEx BAS 07.0053X
Ex ia IIC T4/T5/T6

Table 17. Temperature Classification

$P_{i\ (W)}$	Temperature Class	T_{amb}
0.67	T6	-60 °C to 40 °C
0.67	T5	-60 °C to 50 °C
1.0	T5	-60 °C to 40 °C
1.0	T4	-60 °C to 80 °C

Special Conditions for Safe Use (X):

1. The apparatus must be installed in an enclosure which affords it a degree of protection of at least IP20.
2. Non-metallic enclosures must have a surface resistance of less than 1 GΩ; light alloy or zirconium enclosures must be protected from impact and friction when installed.

Table 18. Entity Parameters

Transmitter	Sensor
U_i = 30 Vdc	U_o = 13.6 Vdc
I_i = 200 mA	I_o = 80 mA
P_i = 0.67 W or 1.0 W	P_o = 80 mW
C_i = 10 nF	C_i = 75 nF
L_i = 0 mH	L_i = 0 mH

N7 IECEx Type n
Certificate Number: IECEx BAS 07.0055
Ex nA nL IIC T5 (-40 °C ≤ T_{amb} ≤ 70 °C)

Table 19. Electrical Data

Transmitter	Sensor	
	RTD	Thermocouple
U_i = 42.4 V	U_i = 5 V	U_i = 0

NG IECEx Type n Component
Certificate Number: IECEx BAS 07.0054U
Ex nA nL IIC T5 (-40 °C ≤ T_{amb} ≤ 75 °C)
Input Parameter: Ui = 42.4 Vdc

Schedule of Limitations:

The component must be housed in a suitably certified enclosure that provides a degree of protection of at least IP54.

Brazilian Certifications

Centro de Pesquisas de Energia Eletrica (CEPEL) Approval

I2 CEPEL Intrinsic Safety. Not available, consult factory

Russian Certifications

Gostandart

Tested and approved by the Russian Metrological Institute GOSTANDART.

Japanese Certifications

Japanese Industrial Standard (JIS) Approvals

E4 JIS Explosion-Proof

Table 20. Certificate and Description

Certificate	Description	Approval Group	Temp Code
C15744	644H with meter and no sensor	Ex d II C	T6
C15745	644H without meter and no sensor	Ex d II C	T6
C15749	644H without meter and with RTD	Ex d II B	T4
C15750	644H without meter and with thermocouple	Ex d II B	T4
C15751	644H with meter and thermocouple	Ex d II B	T4
C15752	644H with meter and RTD	Ex d II B	T4
C15910	644H without meter and with thermocouple	Ex d II B + H2	T4
C15911	644H with meter and thermocouple	Ex d II B + H2	T4
C15912	644H without meter and with RTD	Ex d II B + H2	T4
C15913	644H with meter and RTD	Ex d II B + H2	T4

NOTE
Explosion Proof certification is only available as a complete assembly with Rosemount universal head – option codes J5, J6, J7, and J8.

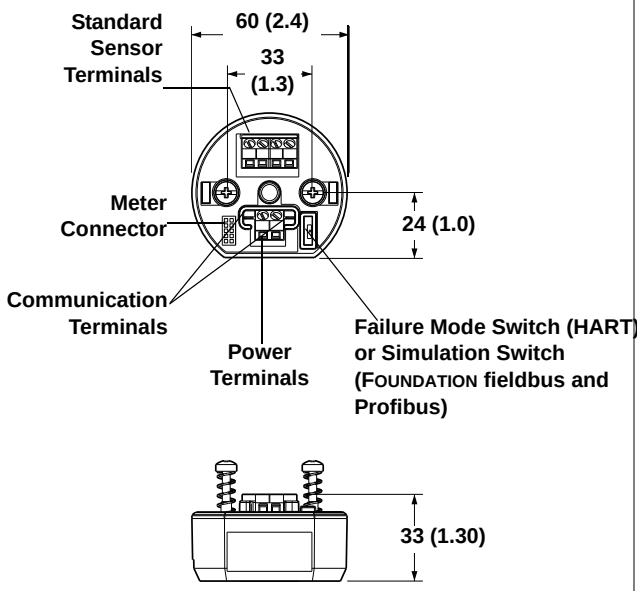
Slovak Republic Certification

Ex ia IIC T4 & T5
See Intrinsic Safety Certificate

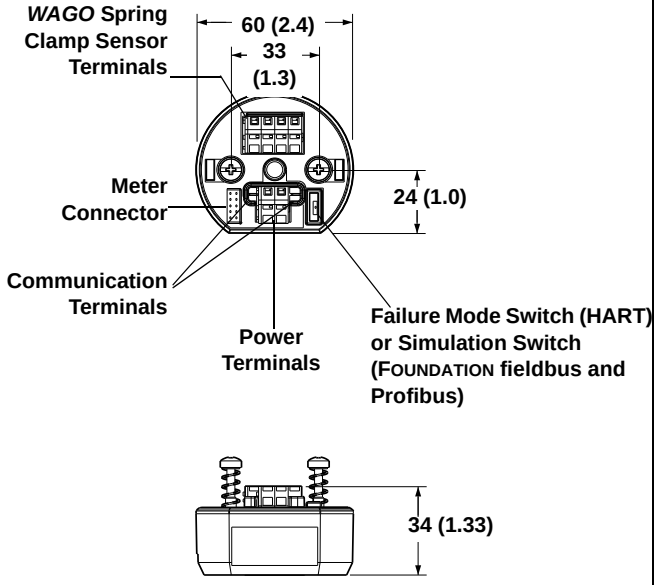
Dimensional Drawings

644H (DIN A Head Mount)

Shown with Standard Compression Screw Terminals

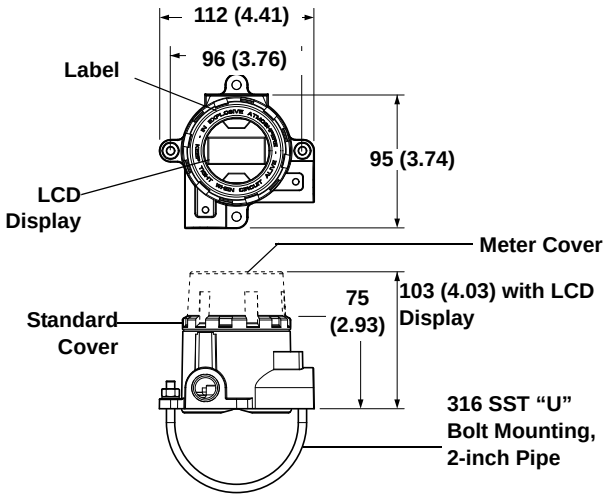


Shown with WAGO® Spring Clamp Terminals (Option code G5)



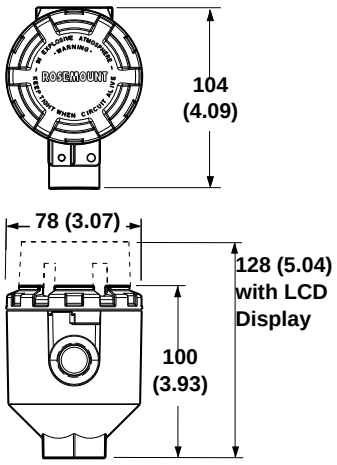
Note: WAGO spring clamps (Option G5) not available with Profibus PA

Threaded-Sensor Universal Head (Option code J5, J6, J7 or J8)



Note: A "U" Bolt is shipped with each universal head unless assembly option XA is ordered. Since the head is integrally mounted to the sensor, it may not need to be used.

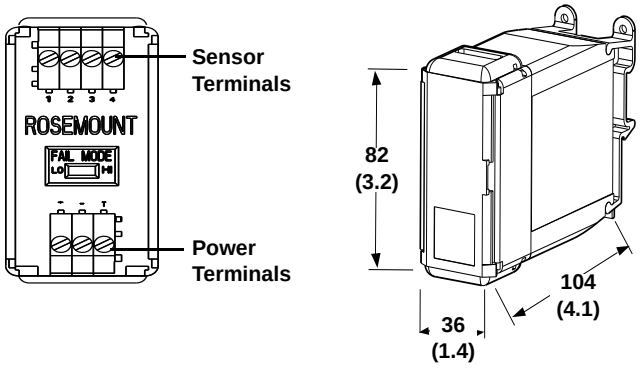
Integral DIN Style Sensor Connection Head (see Sensor PDS for ordering options)



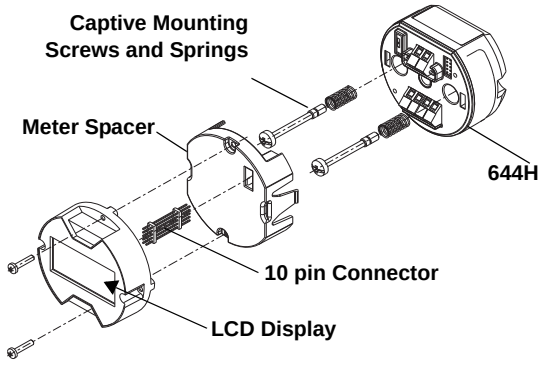
Note: If ordering the transmitter with a DIN style sensor, it is required that the enclosure be ordered within the Sensor Model (Product Data Sheet doc # 00813-0200-2654) rather than within the transmitter model, this is in order to drive necessary parts.

Dimensions are in millimeters (inches)

644 Rail Mount

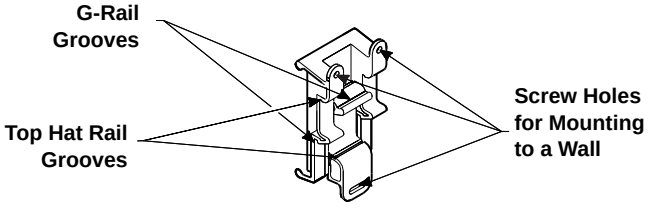


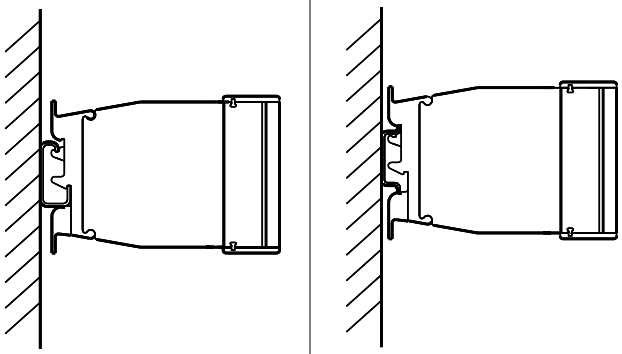
644H with LCD Display



Mounting Kits for both 644H and 644R

644R Rail & Walls Clips

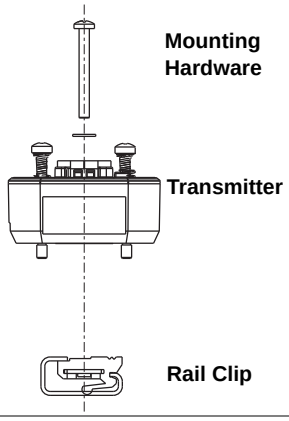




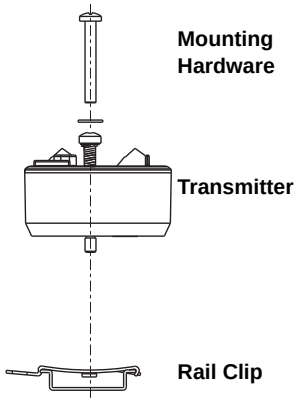
(part number 03044-4103-0001)

644H Rail Clips

G-Rail (asymmetric)

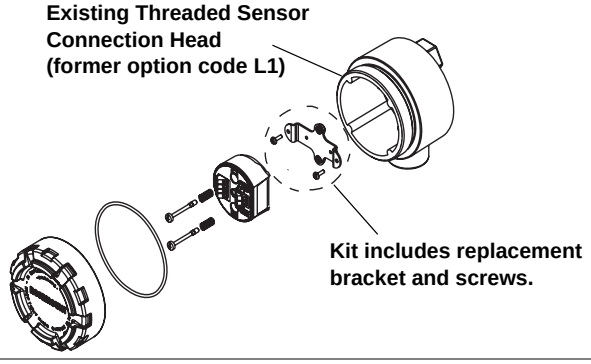


Top Hat Rail (symmetric)



Note: Kit (part number 00644-5301-0010) includes mounting hardware and both types of rail kits.

644H Retrofit Kit



Note: Kit (part number 00644-5321-0010) includes a new mounting bracket and the hardware necessary to facilitate the installation.

STAINLESS STEEL HOUSING FOR BIOTECHNOLOGY, PHARMACEUTICAL INDUSTRIES, AND SANITARY APPLICATIONS

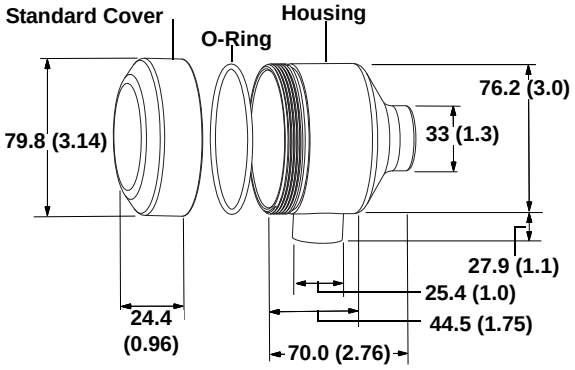
LCD Display Cover

- 316L SST
- Glass

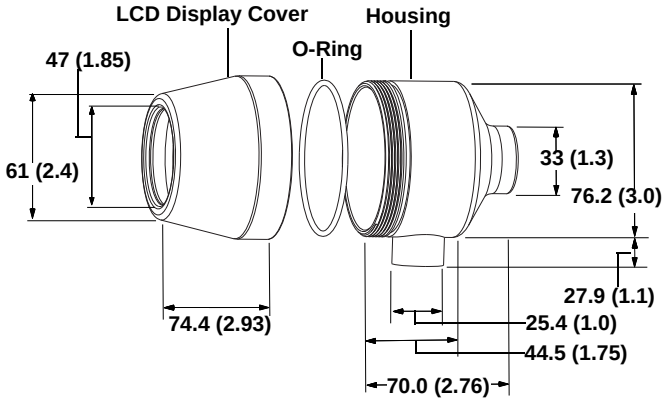
Dimensional Drawings

Sanitary Housing Covers (Option Code S1, S2, S3, S4)

Standard Cover



LCD Display Cover



Dimensions are in millimeters (inches)

Configuration

Transmitter Configuration

The transmitter is available with standard configuration setting for either HART, FOUNDATION fieldbus (see Standard Foundation fieldbus Configuration) or Profibus PA (see Standard Profibus PA Configuration). The configuration settings and block configuration may be changed in the field with Emerson's DeltaV®, AMS™ Suite, Handheld Field Communicator or other host or configuration tool.

Standard HART Configuration

Unless specified, the transmitter will be shipped as follows:

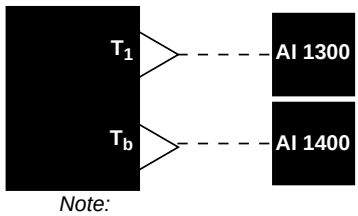
Sensor Type	RTD, Pt 100 (α=0.00385, 4-wire)
4 mA Value	0 °C
20 mA Value	100 °C
Output	Linear with temperature
Saturation Levels	3.9 / 20.5 mA
Damping	5 sec.
Line Voltage Filter	50 Hz
Alarm	High (21.75 mA)
LCD (when installed)	Engineering Units and mA
Tag	See "Tagging" on page 47

Standard FOUNDATION fieldbus Configuration

Unless otherwise specified, the transmitter will be shipped as follows:

Sensor Type: RTD, Pt 100 (α=0.00385, 4-wire)
Damping: 5 sec.
Units of Measurement: °C
Line Voltage Filter: 50 Hz
Software Tag: See Tagging
Function Blocks Tags: • Resource Block: Resource • Transducer Block: Transducer • LCD Block: LCD • Analog Input Blocks: AI 1300, AI 1400 • PID Block: PID 1500
Alarm Limits of AI 1300, AI 1400 • HI-HI: Infinity • HI: Infinity • LO: Infinity • LO-LO: Infinity
Local Display (when installed): Engineering Units of Temperature

Standard Block Configuration



Note:
T_1 = Sensor Temperature
T_b = Terminal Temperature

Final Station

AI Blocks are scheduled for 1 second. AI Blocks are linked as shown above.

Standard Profibus PA Configuration

Unless specified, the transmitter will be shipped as follows:

Device Address: 126
Sensor Type: RTD, Pt 100 (α=0.00385, 4-wire)
Damping: 5 sec.
Units of Measurement: °C
Line Voltage Filter: 50 Hz
Software Tag: See Tagging
Alarm Limits: • HI-HI: Infinity • HI: Infinity • LO: - Infinity • LO-LO: Infinity
Local Display (when installed): Engineering Units of Temperature

Custom Configuration

Custom configurations are to be specified when ordering. The following tables list the descriptions and elements necessary to specify a custom configuration.

	Option Code	Requirements/ Specification
HART	C1: Factory Configuration Data (CDS required)	Date: day/month/year Descriptor: 8 alphanumeric characters Message: 32 alphanumeric characters Analog Output: Alarm and saturation levels.
	C2: Transmitter – Sensor Matching	The transmitters are designed to accept Callendar-Van Dusen constants from a calibrated RTD. Using these constants, the transmitter generates a custom curve to match the sensor-specific curve. Specify a Series 65, 65, or 78 RTD sensor on the order with a special characterization curve (V or X8Q4 option). These constants will be programmed into the transmitter with this option.
	C4: Five-Point Calibration	Will include five-point calibration at 0, 25, 50, 75, and 100% analog and digital output points. Use with Calibration Certificate Q4.
	Q4: Three-Point Calibration with Certificate	Calibration certificate. *Three-Point calibration with certificate.*

	Option Code	Requirements/ Specification
FOUNDATION fieldbus	C1: Factory Configuration Data (CDS required)	Date: day/month/year Descriptor: 16 alphanumeric characters Message: 32 alphanumeric characters
	C2:Transmitter – Sensor Matching	The transmitters are designed to accept Callendar-Van Dusen constants from a calibrated RTD. Using these constants, the transmitter generates a custom curve to match the sensor-specific curve. Specify a Series 65, 65, or 78 RTD sensor on the order with a special characterization curve (V or X8Q4 option). These constants will be programmed into the transmitter with this option.
	C4: Five-Point Calibration	Will include five-point calibration at 0, 25, 50, 75, and 100% analog and digital output points. Use with Calibration Certificate Q4.
	Q4: Three-Point Calibration with Certificate	Calibration certificate. *Three-Point calibration with certificate.*

	Option Code	Requirements/ Specification
Profibus PA	C1: Factory Configuration Data (CDS required)	Date: day/month/year Descriptor: 16 alphanumeric characters Message: 32 alphanumeric characters
	C2:Transmitter – Sensor Matching	The transmitters are designed to accept Callendar-Van Dusen constants from a calibrated RTD. Using these constants, the transmitter generates a custom curve to match the sensor-specific curve. Specify a Series 65, 65, or 78 RTD sensor on the order with a special characterization curve (V or X8Q4 option). These constants will be programmed into the transmitter with this option.
	C4: Five-Point Calibration	Will include five-point calibration at 0, 25, 50, 75, and 100% analog and digital output points. Use with Calibration Certificate Q4.
	Q4: Three-Point Calibration with Certificate	Calibration certificate. *Three-Point calibration with certificate.*

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EMERSON™
Process Management

Rosemount 248 Wireless Temperature Transmitter

- *Standard temperature transmitter offers a wireless solution for process monitoring*
- *Optimize plant efficiency and increase measurement reliability with industry-proven capabilities and specifications*
- *Smart Wireless delivers innovative wireless solutions for temperature measurement and overall transmitter performance*
- *Explore the benefits of a Complete Point Solution from Rosemount Temperature*



Contents

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Transmitter Specifications . . . . . page Temperature-68
Product Certifications . . . . . page Temperature-72
Dimensional Drawings . . . . . page Temperature-74

Rosemount 248 Wireless Temperature Transmitter

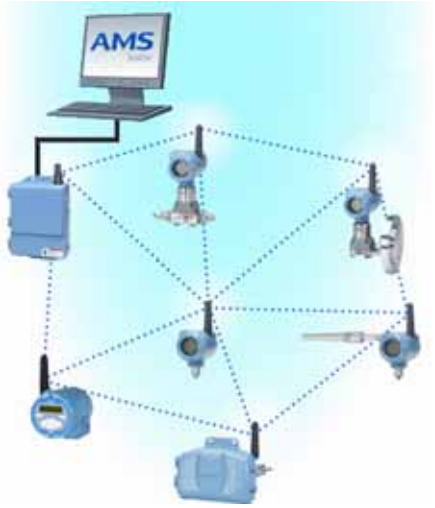
Standard temperature transmitter offers a cost effective solution for wireless process monitoring

- Single sensor capability with universal sensor inputs (RTD, T/C, mV, ohms)
- IEC-approved WirelessHART® protocol
- Dual-compartment, aluminum housing

Optimize plant efficiency and increase measurement reliability with industry-proven capabilities and specifications

- One-year stability rating reduces maintenance costs
- User-centric Device Dashboards communicate important diagnostics and ensure process health
- Open/short sensor diagnostics assist with detecting issues in the sensor loop
- Compensation for ambient temperatures enhances transmitter performance
- Dual-compartment housing provide high reliability in harsh industrial environments

Smart Wireless delivers innovative wireless solutions for temperature measurement and overall transmitter performance



- Self-organizing network delivers information rich data with >99% data reliability and establishes a highly stable network
- Smart Wireless capabilities extend the full benefits of PlantWeb® to previously inaccessible temperature measurement locations
- Emerson SmartPower™ solutions provide an intrinsically safe Power Module, allowing field replacements without removing the transmitter from the process, keeping personnel safe and reducing maintenance costs
- Emerson Process Management's layered approach to wireless network security ensures that data transmissions are secure

Explore the benefits of a Complete Point Solution from Rosemount Temperature Measurement

- An “Assemble To Sensor” option enables Emerson to provide a complete point temperature solution, delivering an installation-ready transmitter and sensor assembly
- Emerson offers a selection of RTDs, thermocouples, and thermowells that bring superior durability and Rosemount reliability to temperature sensing, complementing the Rosemount Transmitter portfolio



Experience global consistency and local support from numerous worldwide Rosemount Temperature manufacturing sites



- World-class manufacturing provides globally consistent product from every factory and the capacity to fulfill the needs of any project, large or small
- Experienced Instrumentation Consultants help select the right product for any temperature application and advise on best installation practices
- An extensive global network of Emerson service and support personnel can be on-site when and where they are needed

- Make wireless installation and configuration easy with the Emerson Smart Wireless Gateway.
- For wireless applications that require superior accuracy, user-configurable alerts, or a local display, consider the Rosemount 648 Wireless temperature transmitter.

Rosemount 248 Wireless Temperature Transmitter



The Rosemount 248 Wireless temperature transmitter has a rugged wireless transmitter design and industry-proven capabilities and specifications.

Transmitter features include:

- IEC-approved *Wireless*HART protocol (Option Code WA3)
- Long Range, Integral Antenna (Option Code WK1)
- 3-Point Calibration Certificate (Option Code Q4)
- Assemble to Sensor options (Option Code XA)

Table 1. Rosemount 248 Wireless Temperature Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Code	Product Description			
248	Temperature Transmitter			
Transmitter Type				
Standard				**Standard**
D	Wireless Field Mount			★
Transmitter Output				
Standard				**Standard**
X	Wireless			★
Product Certifications				
Standard				**Standard**
NA	No Approval			★
I5	FM Intrinsically Safe			★
N5	FM Non-incendive and Dust Ignition-proof			★
I6	CSA Intrinsically Safe			★
I1	ATEX Intrinsic Safety			★
I7	IECEx Intrinsic Safety			★
Enclosure Options		**Material**	**IP Rating**	
Standard				**Standard**
D	Wireless Housing	Aluminum	IP66	★
Conduit Entry Size				
Standard				**Standard**
2	$^{1}/_{2}$-14 NPT			★

Options (Include with selected model number)

Assemble to Options		
Standard		**Standard**
NS	No Sensor	★
XA	Sensor Specified Separately and Assembled to Transmitter	★
Wireless Update Rate, Operating Frequency, and Protocol		
Standard		**Standard**
WA3	User Configurable Update Rate, 2.4GHz DSSS, WirelessHART	★
Omnidirectional Wireless Antenna and SmartPower		
Standard		**Standard**
WK1	Long range, Integral Antenna, Power Module Adapter, Intrinsically Safe (Power Module separate)	★

Table 1. Rosemount 248 Wireless Temperature Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Mounting Bracket		
Standard		**Standard**
B4	Universal Mounting Bracket for 2-in. pipe and panel mounting - SST bracket and bolts	★
B5	Universal “L” Mounting Bracket for 2-in. pipe mounting - SST bracket and bolts	★
Cable Gland		
Standard		**Standard**
G2	Cable Gland (7.5 mm - 11.9 mm)	★
G4	Thin Wire Cable Gland (3 mm - 8 mm)	★
5-Point Calibration		
Standard		**Standard**
C4	5-Point Calibration (Requires the Q4 option code to generate a Calibration Certificate)	★
Calibration Certificate		
Standard		**Standard**
Q4	Calibration Certificate (3-Point Calibration)	★
External Ground		
Standard		**Standard**
G1	External Ground Lug Assembly	★
Line Filter		
Standard		**Standard**
F5	50 Hz Line Voltage Filter	★
F6	60 Hz Line Voltage Filter	★
Software Configuration		
Standard		**Standard**
C1	Custom Configuration of Date, Descriptor, Message, and Wireless Parameters (Requires CDS with order)	★
Typical Model Number: 248 D X NA D 2 WA3 WK1 B4 F6 NS		

Transmitter Specifications

Functional Specifications

Input

Supports Thermocouple, RTD, millivolt, and ohm input types. See “Accuracy” on page 70 for a full listing of sensor options.

Output

WirelessHART 2.4 GHz DSSS.

Humidity Limits

0-99% Non-condensing Relative Humidity

Update Rate

WirelessHART, user selectable 4 sec. to 60 min.

Accuracy (Pt 100 @ reference condition: 20 °C)
±0.45 °C (±0.81 °F)

Radio Frequency Power Output from Antenna

Long Range (WK1 option) antenna: Maximum of 10 mW (10 dBm) EIRP

Physical Specifications

Electrical Connections

Power Module

The Emerson SmartPower Long Life Power Module is field replaceable, featuring keyed connections that eliminate the risk of incorrect installation.

The Power Module is an Intrinsically Safe solution, containing Lithium-thionyl chloride with a polybutadine terephthalate (PBT) enclosure.

The 248 Wireless has a Power Module life time rating of 10 years with a one-minute update rate at reference conditions.(1)

Sensor Terminals

Sensor terminals permanently fixed to terminal block.

Field Communicator Connections

Communication Terminals

Clips permanently fixed to terminal block, designated by the text “COMM.”

Materials of Construction

Enclosure

Housing - Low-copper aluminum

Paint - Polyurethane

Cover O-ring - Buna-N

Terminal Block and Power Module

PBT

Antenna

PBT/Polycarbonate (PC) integrated omnidirectional antenna

Mounting

Transmitters may be attached directly to the sensor. Mounting brackets also permit remote mounting. See “Dimensional Drawings” on page 74.

Weight

3.03 lbs. (1.38 kg)

Enclosure Ratings (248)

Type 4X and IP66/67 rated dual-compartment housing.

Performance Specifications

ElectroMagnetic Compatibility (EMC)

All Models:

Meets all relevant requirements of EN 61326-1; 2006; EN 61326-2-3; 2006.

Transmitter Stability

±0.15% of output reading or 0.15 °C (whichever is greater) for 12 months.

Self Calibration

The analog-to-digital measurement circuitry automatically self-calibrates for each temperature update by comparing the dynamic measurement to extremely stable and accurate internal reference elements.

Vibration Effect

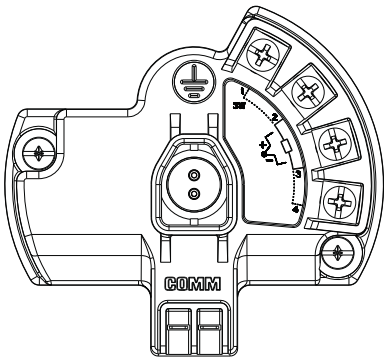
No effect when tested per the requirements of IEC60770-1:

High Vibration Level - field or pipeline (10-60 Hz 0.21mm displacement peak amplitude / 60-2000 Hz 3g).

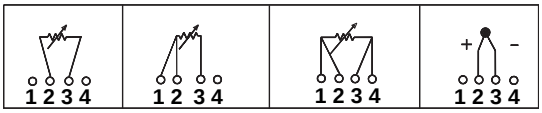
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(1) Reference conditions are 70 °F (21 °C), and routing data for three additional network devices.
NOTE: Continuous exposure to ambient temperature limits (-40 °F or 185 °F) (-40 °C or 85 °C) may reduce specified life by less than 20 percent.

Sensor Connections



248 Wireless Sensor Connections Diagram



2-wire RTD and Ω*	3-wire RTD and Ω*	4-wire RTD and Ω	T/C and mV

* *Rosemount Inc. provides 4-wire sensors for all single element RTDs. You can use these RTDs in 3-wire or 2-wire configurations by leaving the unneeded leads disconnected and insulated with electrical tape.*

Temperature Limits

Operating Limit	Storage Limit
–40 to 185 °F –40 to 85 °C	–40 to 185 °F –40 to 85 °C

Accuracy

Table 2. Rosemount 248 Wireless Input Options and Accuracy.

Sensor Options	Sensor Reference	Input Ranges		Digital Accuracy(1)	
2-, 3-, 4-wire RTDs		°C	°F	°C	°F
Pt 100 (α = 0.00385)	IEC 751	–200 to 850	–328 to 1562	± 0.45	± 0.81
Pt 200 (α = 0.00385)	IEC 751	–200 to 850	–328 to 1562	± 0.45	± 0.81
Pt 500 (α = 0.00385)	IEC 751	–200 to 850	–328 to 1562	± 0.57	± 1.026
Pt 1000 (α = 0.00385)	IEC 751	–200 to 300	–328 to 572	± 0.57	± 1.026
Pt 100 (α = 0.003916)	JIS 1604	–200 to 645	–328 to 1193	± 0.45	± 0.81
Pt 200 (α = 0.003916)	JIS 1604	–200 to 645	–328 to 1193	± 0.81	± 1.458
Ni 120	Edison Curve No. 7	–70 to 300	–94 to 572	± 0.45	± 0.81
Cu 10	Edison Copper Winding No. 15	–50 to 250	–58 to 482	± 4.16	± 7.488
Pt 50 (α = 0.00391)	GOST 6651-94	–200 to 550	–328 to 990	± 0.9	± 1.62
Pt 100 (α = 0.00391)	GOST 6651-94	–200 to 550	–328 to 990	± 0.45	± 0.81
Cu 50 (α =0.00426)	GOST 6651-94	–50 to 200	–58 to 392	± 1.44	± 2.592
Cu 50 (α = 0.00428)	GOST 6651-94	–185 to 200	–301 to 392	± 1.44	± 2.592
Cu 100 (α = 0.00426)	GOST 6651-94	–50 to 200	–58 to 392	± 0.72	± 1.296
Cu 100 (α = 0.00428)	GOST 6651-94	–185 to 200	–301 to 392	± 0.72	± 1.296
Thermocouples(2)					
Type B(3)	NIST Monograph 175, IEC 584	100 to 1820	212 to 3308	± 2.25	± 4.05
Type E	NIST Monograph 175, IEC 584	–50 to 1000	–58 to 1832	± 0.60	± 1.08
Type J	NIST Monograph 175, IEC 584	–180 to 760	–292 to 1400	± 1.05	± 1.89
Type K(4)	NIST Monograph 175, IEC 584	–180 to 1372	–292 to 2501	± 1.46	± 2.628
Type N	NIST Monograph 175, IEC 584	–200 to 1300	–328 to 2372	± 1.46	± 2.628
Type R	NIST Monograph 175, IEC 584	0 to 1768	–32 to 3214	± 2.25	± 4.05
Type S	NIST Monograph 175, IEC 584	0 to 1768	–32 to 3214	± 2.1	± 3.78
Type T	NIST Monograph 175, IEC 584	–200 to 400	–328 to 752	± 1.05	± 1.89
DIN Type L	DIN 43710	–200 to 900	–328 to 1652	± 1.05	± 1.89
DIN Type U	DIN 43710	–200 to 600	–328 to 1112	± 1.05	± 1.89
Type W5Re/W26Re	ASTM E 988-96	0 to 2000	–32 to 3632	± 2.1	± 3.78
GOST Type L	GOST R 8.585-2001	–200 to 800	–328 to 1472	± 1.80	± 3.24
Other Sensor Types					
Millivolt Input		–10 to 100 mV		± 0.045 mV	
2-, 3-, 4-wire Ohm Input		0 to 2000 ohms		± 1.35 ohm	

(1) The published digital accuracy applies over the entire sensor input range. Digital output can be accessed by HART Communications or wireless protocol.

(2) Total digital accuracy for thermocouple measurement: sum of digital accuracy +0.8 °C. (cold junction accuracy).

(3) Digital accuracy for NIST Type B T/C is ±9.0 °C (±16.2 °F) from 100 to 300 °C (212 to 572 °F).

(4) Digital accuracy for NIST Type K T/C is ±2.1 °C (±3.79 °F) from –180 to –90 °C (–292 to –130 °F).

Ambient Temperature Effect

Table 3. Rosemount 248 Wireless Ambient Temperature Effect

Sensor Options	Sensor Reference	Input Range (°C)	Temperature Effects per 1.0 °C (1.8 °F) Change in Ambient Temperature(1)	Range
2-, 3-, 4-wire RTDs				
Pt 100 (α = 0.00385)	IEC 751	–200 to 850	0.009 °C (0.0162 °F)	Entire Sensor Input Range
Pt 200 (α = 0.00385)	IEC 751	–200 to 850	0.012 °C (0.0216 °F)	Entire Sensor Input Range
Pt 500 (α = 0.00385)	IEC 751	–200 to 850	0.009 °C (0.0162 °F)	Entire Sensor Input Range
Pt 1000 (α = 0.00385)	IEC 751	–200 to 300	0.009 °C (0.0162 °F)	Entire Sensor Input Range
Pt 100 (α = 0.003916)	JIS 1604	–200 to 645	0.009 °C (0.0162 °F)	Entire Sensor Input Range
Pt 200 (α = 0.003916)	JIS 1604	–200 to 645	0.012 °C (0.0216 °F)	Entire Sensor Input Range
Ni 120	Edison Curve No. 7	–70 to 300	0.009 °C (0.0162 °F)	Entire Sensor Input Range
Cu 10	Edison Copper Winding No. 15	–50 to 250	0.06 °C (0.162 °F)	Entire Sensor Input Range
Pt 50 (α = 0.003910)	GOST 6651-94	–200 to 550	0.018 °C (0.0324 °F)	Entire Sensor Input Range
Pt 100 (α = 0.003910)	GOST 6651-94	–200 to 550	0.009 °C (0.0162 °F)	Entire Sensor Input Range
Cu 50 (α = 0.00426)	GOST 6651-94	–50 to 200	0.012 °C (0.0216 °F)	Entire Sensor Input Range
Cu 50 (α = 0.00428)	GOST 6651-94	–185 to 200	0.012 °C (0.0216 °F)	Entire Sensor Input Range
Cu 100 (α = 0.00426)	GOST 6651-94	–50 to 200	0.009 °C (0.0162 °F)	Entire Sensor Input Range
Cu 100 (α = 0.00428)	GOST 6651-94	–185 to 200	0.009 °C (0.0162 °F)	Entire Sensor Input Range
Thermocouples				
Type B	NIST Monograph 175, IEC 584	100 to 1820	0.0435 °C	T ≥ 1000 °C
			0.096 °C - (0.0075% of (T - 300))	300 °C ≤ T < 1000 °C
			0.162 °C - (0.033% of (T - 100))	100 °C ≤ T < 300 °C
Type E	NIST Monograph 175, IEC 584	–50 to 1000	0.015 °C + (0.00129% of absolute value T)	All
Type J	NIST Monograph 175, IEC 584	–180 to 760	0.0162 °C + (0.00087% of T)	T ≥ 0 °C
			0.0162 °C + (0.0075% of absolute value T)	T < 0 °C
Type K	NIST Monograph 175, IEC 584	–180 to 1372	0.0183 °C + (0.0027% of T)	T ≥ 0 °C
			0.0183 °C + (0.0075% of absolute value T)	T < 0 °C
Type N	NIST Monograph 175, IEC 584	–200 to 1300	0.0204 °C + (0.00108% of absolute value T)	All
Type R	NIST Monograph 175, IEC 584	0 to 1768	0.048 °C	T ≥ 200 °C
			0.069 °C - (0.0108% of T)	T < 200 °C
Type S	NIST Monograph 175, IEC 584	0 to 1768	0.048 °C	T ≥ 200 °C
			0.069 °C - (0.0108% of T)	T < 200 °C
Type T	NIST Monograph 175, IEC 584	–200 to 400	0.0192 °C	T ≥ 0 °C
			0.0192 °C + (0.0129% of absolute value T)	T < 0 °C
DIN Type L	DIN 43710	–200 to 900	0.0162 °C + (0.00087% of T)	T ≥ 0 °C
			0.0162 °C + (0.0075% of absolute value T)	T < 0 °C
DIN Type U	DIN 43710	–200 to 900	0.0192 °C	T ≥ 0 °C
			0.0192 °C + (0.0129% of absolute value T)	T < 0 °C
Type W5Re/W26Re	ASTM E 988-96	0 to 2000	0.048 °C	T ≥ 200 °C
			0.069 °C - (0.0108% of T)	T < 200 °C
GOST Type L	GOST R 8.585-2001	–200 to 800	0.021 °C	T ≥ 0 °C
			0.0105 °C + (0.0045% of absolute value T)	T < 0 °C
Other Sensor Types				
Millivolt Input		–10 to 100 mV	0.0015 mV	Entire Sensor Input Range
2-, 3-, 4-wire Ohm		0 to 2000 Ω	0.0252 Ω	Entire Sensor Input Range

(1) Change in ambient is with reference to the calibration temperature of the transmitter 68 °F (20 °C) from factory.

Transmitters can be installed in locations where the ambient temperature is between –40 and 85 °C (–40 and 185 °F). In order to maintain excellent accuracy performance, each transmitter is individually characterized over this ambient temperature range at the factory.

Temperature Effects Example

When using a Pt 100 (α = 0.00385) sensor input at 30 °C ambient temperature:

- Digital Temperature Effects: 0.009 °C x (30 - 20) = 0.09 °C
- Worst Case Error: Digital + Digital Temperature Effects = 0.45 °C + 0.09 °C = 0.54 °C
- Total Probable Error: $\sqrt{0.45^2 + 0.09^2} = 0.459$ °C

Product Certifications

Approved Manufacturing Locations

Rosemount Inc. - Chanhassen, Minnesota, USA
Emerson Process Management GmbH & Co. - Karlstein, Germany
Emerson Process Management Asia Pacific Private Limited - Singapore

European Union Directive Information

The most recent revision of the European Union Declaration of Conformity can be found at www.emersonprocess.com.

ATEX Directive (94/9/EC)
Emerson Process Management complies with the ATEX Directive.

Electro Magnetic Compatibility (EMC) (2004/108/EC)
Emerson Process Management complies with EMC Directive.

Radio and Telecommunications Terminal Equipment Directive (R&TTE) (1999/5/EC)
Emerson Process Management complies with the R&TTE Directive.

Telecommunication Compliance

All wireless devices require certification to ensure that they adhere to regulations regarding the use of the RF spectrum. Nearly every country requires this type of product certification. Emerson is working with governmental agencies around the world to supply fully compliant products and remove the risk of violating country directives or laws governing wireless device usage.

FCC and IC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation.

This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.

Ordinary Location Certification for FM

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Hazardous Locations Certificates

North American Certifications

Factory Mutual (FM) Approvals

I5 FM Intrinsically Safe and Non-incendive
Certificate Number: 3039717
Intrinsically Safe for Class I/II/III, Division 1, Groups A, B, C, D, E, F, and G.
Zone Marking: Class I, Zone 0, AEx ia IIC
Temperature Codes T4 (T_{amb} = -50 to 70 °C)
T5 (T_{amb} = -50 to 40 °C)
Non-incendive for Class I, Division 2, Groups A, B, C, and D.
Temperature Codes T4 (T_{amb} = -50 to 70 °C)
T5 (T_{amb} = -50 to 40 °C)
Dust Ignition-proof for Class II/III, Division 1, Groups E, F, and G.
Ambient temperature limits: -50 to 85 °C

Enclosure: Type 4X/IP66/IP67
Intrinsically Safe and Non-incendive when installed in accordance with Rosemount drawing 00249-1000.
For use with Rosemount Power Module P/N 753-9220-XXXX only.

Special Conditions for Safe Use
To avoid electrostatic discharge build up, the enclosure or antenna must not be rubbed or cleaned with solvents or a dry cloth.
The enclosure is made of an aluminum alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in a zone 0 environment.

N5 FM Non-incendive and Dust Ignition-proof
Certificate Number: 3039717
Non-incendive for Class I, Division 2, Groups A, B, C, and D.
Zone Marking: Class I, Zone 0, AEx ia IIC
Temperature Codes T4 (T_{amb} = -50 to 70 °C)
T5 (T_{amb} = -50 to 40 °C)
Dust Ignition-proof for Class II/III, Division 1, Groups E, F, and G.
Ambient temperature limits: -50 to 85 °C

Enclosure: Type 4X/IP66/IP67
For use with Rosemount Power Module P/N 753-9220-XXXX only.

Special Conditions for Safe Use
To avoid electrostatic discharge build up, the enclosure or antenna must not be rubbed or cleaned with solvents or a dry cloth.
The enclosure is made of an aluminum alloy, and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in a zone 0 environment.

CSA - Canadian Standards Association

I6 CSA Intrinsically Safe
Certificate Number: 1091070
Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D.
Temp Code T3C

Enclosure: Type 4X/IP66/IP67
Intrinsically Safe when installed per Rosemount drawing 00249-1020.
For use with Rosemount Power Module P/N 753-9220-XXXX only.

European Certifications

I1 ATEX Intrinsic Safety
Certificate Number: Baseefa10ATEX0121X Ⓔx II 1G
Ex ia IIC Ga T4 (T_{amb} = -60 °C to 70 °C)
Ex ia IIC Ga T5 (T_{amb} = -60 °C to 40 °C)
Enclosure: IP66/IP67
CE 1180

Table 4. Sensor Parameters

Sensor
U_o = 6.6 V
I_o = 26.2 mA
P_o = 42.6 mW
C_o = 11 uF
L_o = 25 mH

For use with Rosemount Power Module P/N 753-9220-XXXX only.

Special Conditions for Safe Use
To avoid electrostatic discharge build up, the enclosure or antenna must not be rubbed or cleaned with solvents or a dry cloth.
The enclosure is made of an aluminum alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in a zone 0 environment.

IECEx Certifications

I7 IECEx Intrinsic Safety
Certificate Number: IECEx BAS 10.0059X
Ex ia IIC Ga T4 (T_{amb} = -60 °C to 50 °C)
Ex ia IIC Ga T5 (T_{amb} = -60 °C to 75 °C)
Enclosure: IP66/IP67

Table 5. Sensor Parameters

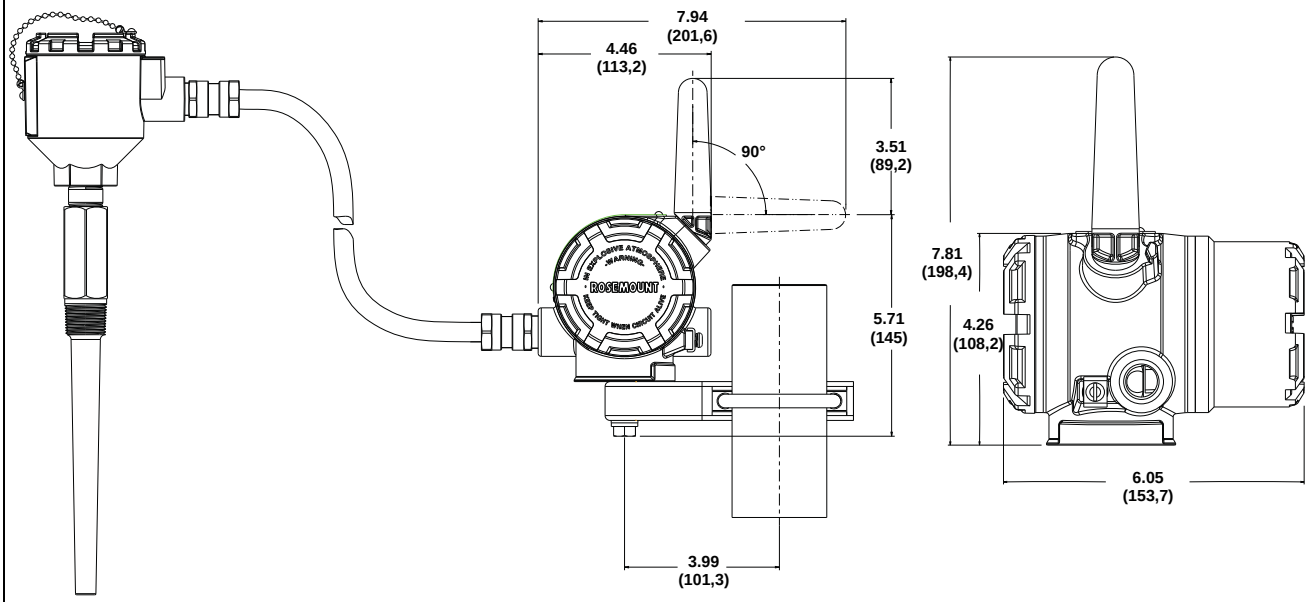
Sensor
U_o = 6.6 V
I_o = 26.2 mA
P_o = 42.6 mW
C_o = 11 uF
L_o = 25 mH

For use with Rosemount Power Module P/N 753-9220-XXXX only.

Special Conditions for Safe Use
To avoid electrostatic discharge build up, the enclosure or antenna must not be rubbed or cleaned with solvents or a dry cloth.
The enclosure is made of an aluminum alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in a zone 0 environment.

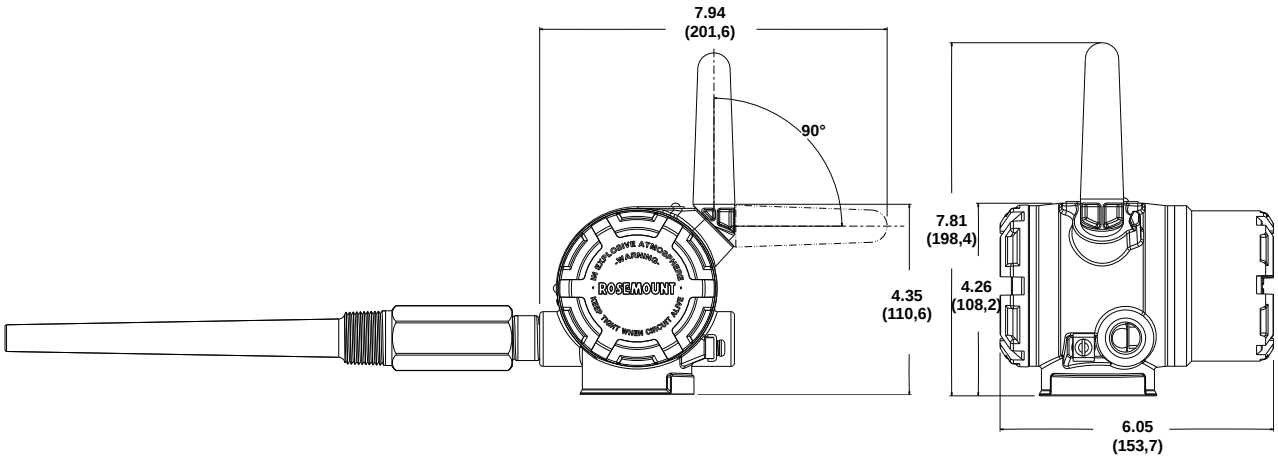
Dimensional Drawings

248 Wireless Remote Mount



Remote mounted temperature sensor specified separately

248 Wireless Direct Mount



Direct mounted temperature sensor specified separately (see ordering option code XA)

Dimensions are in inches (millimeters)

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EMERSON™
Process Management

Rosemount 248 Temperature Transmitter

- *Basic temperature transmitter offers a reliable solution for temperature monitoring points*
- *Standard transmitter design provides flexible and reliable performance in process environments*
- *Experience lower over-all installation costs when compared to wiring sensor directly, reducing the need for expensive extension wires and multiplexers*
- *Explore the benefits of a Complete Point Solution from Rosemount Temperature*



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Rosemount 248 Temperature Transmitter

Basic temperature transmitter offers a cost effective solution for temperature monitoring points



- DIN B style head mount transmitter
- Variety of DIN B enclosure options
- Rail Mount
- HART / 4-20 mA protocol
- Single sensor capability with universal sensor inputs (RTD, T/C, mV, ohms)

Standard transmitter design provides flexible and reliable performance in process environments

- Offers improved measurement accuracy and reliability over direct-wiring a sensor to the digital control system for a lower overall installation cost
- One-year stability rating reduces maintenance costs
- Open/short sensor diagnostics assist with detecting issues in the sensor loop
- Compensation for ambient temperatures enhances transmitter performance

Explore the benefits of a Complete Point Solution from Rosemount Temperature Measurement

- An “Assemble To Sensor” option enables Emerson to provide a complete point temperature solution, delivering an installation-ready transmitter and sensor assembly
- Emerson offers a selection of RTDs, thermocouples, and thermowells that bring superior durability and Rosemount reliability to temperature sensing, complementing the Rosemount Transmitter portfolio



Experience global consistency and local support from numerous worldwide Rosemount Temperature manufacturing sites



- World-class manufacturing provides globally consistent product from every factory and the capacity to fulfill the needs of any project, large or small
- Experienced Instrumentation Consultants help select the right product for any temperature application and advise on best installation practices
- An extensive global network of Emerson service and support personnel can be on-site when and where they are needed

- Looking for a wireless temperature alternative? The Rosemount 248 Wireless temperature transmitter is a cost-effective solution that provides solid performance.
- For a versatile temperature transmitter that delivers proven field reliability and advanced accuracy, consider the Rosemount 644 temperature transmitter.

Rosemount 248 Temperature Transmitter



The Rosemount 248 temperature transmitter has a standard transmitter design that provides flexible and reliable performance in process environments.

Transmitter features include:

- HART / 4-20 mA communication protocol
- DIN B style head mount and Rail Mount transmitter types
- Variety of DIN B enclosure options
- Sanitary Connection Heads available (Option Code F and S)
- 3-Point Calibration Certificate (Option Code Q4)
- Assemble to Sensor options (Option Code XA)

Table 1. 248 Head Mount Temperature Transmitter

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	**Product Description**			
248	Temperature Transmitter			
Transmitter Type				
Standard				**Standard**
H	DIN B Head Mount			★
Transmitter Output				
Standard				**Standard**
A	4–20 mA with digital signal based on *HART* Protocol			★
Product Certifications		**Enclosure Option Codes Permitted**		
Standard				**Standard**
E5	FM Explosion-Proof	A, U, G, H		★
I5	FM Intrinsic Safety and Class I, Division 2	A, B, U, N, C, G, S, H		★
K5	FM Intrinsic Safety, Explosion-Proof, and Class I, Division 2	A, U, G, H		★
I6	CSA Intrinsic Safety and Class I, Division 2	A, B, U, N, C, G, H		★
K6	CSA Intrinsic Safety, Explosion-Proof, and Class I, Division 2	A, U, G, H		★
E1	ATEX Flameproof	A, U, G, H		★
I1	ATEX Intrinsic Safety	A, B, U, N,C, G, S, H		★
ND	ATEX Dust	A, U, G, H		★
N1	ATEX Type n	A, U, G, H		★
NC[(1)]	ATEX Type n Component	N		★
E7	IECEx Flameproof and Dust	A, U, G, H		★
I7	IECEx Intrinsic Safety	A, B, U, N, C, G, S, H		★
N7	IECEx Type n	A, U, G, H		★
NG	IECEx Type n Component	N		★
NA	No Approval	All Options		★
Enclosure		**Material**	**IP Rating**	
Standard				**Standard**
A	Connection Head	Aluminum	IP66/68	★
B	BUZ Head	Aluminum	IP65	★
C	BUZ Head	Polypropylene	IP65	★
G	Connection Head	SST	IP66/IP68	★
H	Universal Head (Junction Box)	SST	IP66/IP68	★
U	Universal Head (Junction Box)	Aluminum	IP66/IP68	★
N	No Enclosure			

Table 1. 248 Head Mount Temperature Transmitter

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded				
F	Sanitary Connection Head, DIN A	Polished SST	IP66/IP68	
S	Sanitary Connection Head, DIN B	Polished SST	IP66/IP68	
Conduit Entry Size(2)				
Standard				**Standard**
1(3)	M20 x 1.5 (CM20)			★
2	1/2-inch NPT			★
0	No Enclosure			★
Assemble To Options				
Standard				**Standard**
XA	Sensor Specified Separately and Assembled to Transmitter			★
NS	No Sensor			★

Options (Include with selected model number)

Alarm Level Configuration		
Standard		**Standard**
A1	NAMUR alarm and saturation levels, high alarm	★
CN	NAMUR alarm and saturation levels, low alarm	★
5-Point Calibration		
Standard		**Standard**
C4	5-Point Calibration (Requires the Q4 option code to generate a Calibration Certificate)	★
Calibration Certificate		
Standard		**Standard**
Q4	Calibration Certificate (3-Point Calibration)	★
External Ground		
Standard		**Standard**
G1	External Ground Lug Assembly	★
Line Filter		
Standard		**Standard**
F6	60 Hz Line Voltage Filter	★
Conduit Electrical Connector		
Standard		**Standard**
GE(4)(2)	M12, 4 pin, Male Connector (eurofast®)	★
GM(2)	A-size Mini, 4 pin, Male Connector (minifast®)	★
External Label		
Standard		**Standard**
EL	External Label for ATEX Intrinsic Safety	★
Cover Chain Option		
Standard		**Standard**
G3	Cover Chain	★
Software Configuration		
Standard		**Standard**
C1	Custom Configuration of Date, Descriptor and Message (Requires CDS with order)	★
Typical Model Number: 248H A I1 A 1 DR N080 T08 EL U250 CN		

(1) The 248H with ATEX Type n Component Approval is not approved as a stand alone unit, additional system certification is required. Transmitter must be installed so it is protected to at least the requirements of IP54.

(2) All process connection threads are 1/2 in. NPT, except for Enclosure Codes H and U with Conduit Entry Code 1 and Sensor Type Code NS

(3) For enclosures H and U with the XA option specified, a 1/2-in. NPT to M20 x 1.5 thread adapter is used.

(4) Available with Intrinsically Safe approvals only for FM Intrinsically Safe or Non-Incendive approval (Option Code I5). To maintain NEMA 4X rating, it must be installed according to Rosemount Drawing 03151-1009.

Rosemount 248



The Rosemount 248 temperature transmitter has a standard transmitter design that provides flexible and reliable performance in process environments.

Transmitter features include:

- HART / 4-20 mA communication protocol
- Rail Mount transmitter type
- 3-Point Calibration Certificate (Option Code Q4)
- Custom Configuration of Software Parameters (Option Code C1)

Table 2. 248R Rail Mount Transmitter

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
248R	Rail Mount Temperature Transmitter	
Output Protocol		
Standard		**Standard**
A	4-20 mA with digital signal based on HART protocol	★
Product Certifications		
Standard		**Standard**
I5	FM Intrinsically Safe and Class I, Division 2	★
I6	CSA Intrinsically Safe and Class I, Division 2	★
I1	ATEX Intrinsic Safety	★
NC	ATEX Type n Component	★
I7(1)	IECEx Intrinsic Safety	★
NA	No Approvals	★

Options (Include with selected model number)

Software Configuration		
Standard		**Standard**
C1	Custom Configuration of enters date, descriptor and message (CDS required with order)	★
Alarm Level Configuration		
Standard		**Standard**
A1	NAMUR alarm and saturation levels, high alarm	★
CN	NAMUR alarm and saturation levels, low alarm	★
5-Point Calibration		
Standard		**Standard**
C4	5-Point Calibration (Requires the Q4 option code to generate a Calibration Certificate)	★
Calibration Certificate		
Standard		**Standard**
Q4	Calibration Certificate (3-Point Calibration)	★
Line Filter		
Standard		**Standard**
F6	60 Hz Line Voltage Filter	★
Mounting Style		
Standard		**Standard**
GR	G-Rail Mounting	★
Typical Model Number: 248R A I1 Q4		

(1) Consult Factory for availability.

Transmitter Specifications

FUNCTIONAL SPECIFICATIONS

Inputs

User-selectable; sensor terminals rates to 42.4 Vdc. See "Transmitter Accuracy and Ambient Temperature Effects" on page 84 for sensor options.

Output

2-wire 4–20 mA, linear with temperature or input; digital output signal superimposed on 4–20 mA signal, available for a Field Communicator or control system interface.

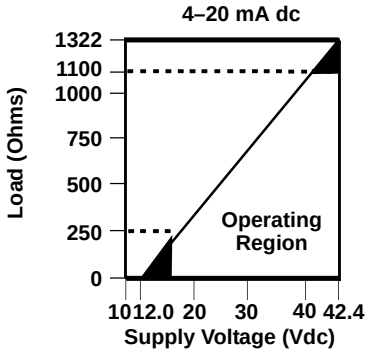
Isolation

Input/output isolation tested to 500 Vac rms (707 Vdc) at 50/60 Hz.

Power Supply

An external power supply is required for *HART* devices. The transmitter operates on 12.0 to 42.4 Vdc transmitter terminal voltage with load resistance between 250 and 1100 ohms. A minimum of 17.75 Vdc power supply is required with a load of 250 ohms. Transmitter power terminals are rated to 42.4 Vdc.

Maximum Load = 40.8 x (Supply Voltage – 12.0)



Humidity Limits

0–99% relative humidity, non-condensing

NAMUR Recommendations

The 248 meets the following NAMUR recommendations:

- NE 21 – Electromagnetic compatibility (EMC) for Process and Laboratory Apparatus
- NE 43 – Standard of the signal level breakdown information of digital transmitters
- NE 89 – Standard of temperature transmitters with digital signal processing

Transient Protection

The optional Rosemount 470 Transient Protector prevents damage from transients induced by lightning, welding, heavy electrical equipment, or switch gears. Refer to the 470 Product Data Sheet (document number 00813-0100-4191) for more information.

Temperature Limits

Operating Limit

- –40 to 85 °C (–40 to 185 °F)

Storage Limit

- –50 to 120 °C (–58 to 248 °F)

Turn-on Time

Performance within specifications in less than 5.0 seconds after power is applied to transmitter, when damping value is set to zero seconds.

Update Rate

Less than 0.5 seconds

Damping

32 seconds maximum. 5 seconds default

Custom Alarm and Saturation Levels

Custom factory configuration of alarm and saturation levels is available with option code C1 for valid values. These values can also be configured in the field using a Field Communicator.

Recommended Minimum Measuring Span

10 K

Software Detected Failure Mode

The values at which the transmitter drives its output in failure mode depends on whether it is configured to standard, custom, or NAMUR-compliant (NAMUR recommendation NE 43) operation. The values for standard and NAMUR-compliant operation are as follows:

Figure 1. Operation Parameters

	Standard (1)	**NAMUR NE43-Compliant(1)**
Linear Output:	$3.9 \leq I \leq 20.5$	$3.8 \leq I \leq 20.5$
Fail High:	$21 \leq I \leq 23$ (default)	$21 \leq I \leq 23$ (default)
Fail Low:	$I \leq 3.75$	$I \leq 3.6$

(1) Measured in milliamperes

Certain hardware failures, such as microprocessor failures, will always drive the output to greater than 23 mA.

PHYSICAL SPECIFICATIONS

Field Communicator Connections

Communication Terminal: Clips permanently fixed to the terminals

Materials of Construction

Electronics Housing

- *Noryl*® glass reinforced

Universal (option code U and H) and Rosemount Connection (option code A and G) Heads

- Housing: Low-copper aluminum (option codes U and A)
  Stainless Steel (option codes G and H)
- Paint: Polyurethane
- Cover O-Ring: Buna–N

BUZ Head (option code B)

- Housing: Aluminum
- Paint: Aluminum lacquer
- O-Ring Seal: Rubber

Mounting

The 248R attaches directly to a wall or a DIN rail. The 248H installs in a connection head or universal head mounted directly on a sensor assembly or apart from a sensor assembly using a universal head. The 248H can also mount to a DIN rail using an optional mounting clip (see Table 13).

Weight

Code	Options	Weight
248H	Headmount Transmitter	42 g (1.5 oz)
248R	Railmount Transmitter	250 g (8.8 oz)
U	Universal Head	520 g (18.4 oz)
B	BUZ Head	240 g (8.5 oz)
C	Polypropylene Head	90 g (3.2 oz.)
A	Rosemount Connection Head	524 g (18.5 oz)
S	Polished Stainless Steel (SST) Head	537 g (18.9 oz)
G	Rosemount Connection Head (SST)	1700 g (60 oz)
H	Universal Head (SST)	1700 g (60 oz)

Enclosure Ratings

The Universal (option code U) and Rosemount Connection (option code A) Heads are NEMA 4X, IP66, and IP68. The Universal Head with $^1/_2$ NPT threads is CSA Enclosure Type 4X. The BUZ head (option code B) is NEMA 4 and IP65.

PERFORMANCE SPECIFICATIONS

EMC (ElectroMagnetic Compatibility) NAMUR NE21 Standard

The 248 meets the requirements for NAMUR NE21 Rating

Susceptibility	Parameter	Influence
ESD	• 6 kV contact discharge • 8 kV air discharge	None
Radiated	• 80 – 1000 MHz at 10 V/m AM	None
Burst	• 1 kV for I.O.	None
Surge	• 0.5 kV line–line • 1 kV line–ground (I.O. tool)	None
Conducted	• 150 kHz to 80 MHz at 10 V	None

CE Mark

The 248 meets all requirements listed under IEC 61326: Amendment 1, 2006.

Power Supply Effect

Less than ±0.005% of span per volt

Vibration Effect

The 248 is tested to the following specifications with no effect on performance:

Frequency	Vibration
10 to 60 Hz	0.21 mm displacement
60 to 2000 Hz	3 g peak acceleration

Stability

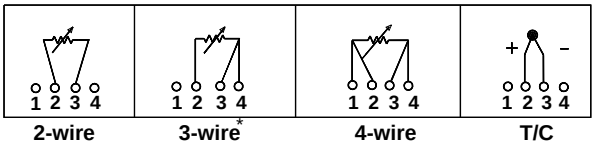
For RTD and thermocouple inputs the transmitter will have a stability of ±0.1% of reading or 0.1 °C (whichever is greater) for twelve months

Self Calibration

The analog-to-digital measurement circuitry automatically self-calibrates for each temperature update by comparing the dynamic measurement to extremely stable and accurate internal reference elements.

Sensor Connections

248 Sensor Connections Diagram



2-wire RTD and Ω | **3-wire* RTD and Ω** | **4-wire RTD and Ω** | **T/C and mV**

* *Rosemount Inc. provides 4-wire sensors for all single element RTDs. You can use these RTDs in 3-wire configurations by leaving the unneeded leads disconnected and insulated with electrical tape.*

Transmitter Accuracy and Ambient Temperature Effects

NOTE
The accuracy and ambient temperature effect is the greater of the fixed and percent of span values (see example below).

Table 3. 248 Transmitter Input Options, Accuracy, and Ambient Temperature Effects

Sensor	Transmitter Input Ranges[1]		Accuracy[13]		Temperature Effects per 1.0 °C (1.8 °F) Change in Ambient Temperature[2][12]	
	°C	°F	Fixed	% of Span	Fixed	% of Span
2-, 3-, 4-wire RTDs						
Pt 100[3] (α = 0.00385)	–200 to 850	–328 to 1562	0.2 °C (0.36 °F)	±0.1	0.006 °C (0.011 °F)	±0.004
Pt 100[4] (α = 0.003916)	–200 to 645	–328 to 1193	0.2 °C (0.36 °F)	±0.1	0.006 °C (0.011 °F)	±0.004
Pt 200[3]	–200 to 850	–328 to 1562	1.17 °C (2.11 °F)	±0.1	0.018 °C (0.032 °F)	±0.004
Pt 500[3]	–200 to 850	–328 to 1562	0.47 °C (0.85 °F)	±0.1	0.018 °C (0.032 °F)	±0.004
Pt 1000[3]	–200 to 300	–328 to 572	0.23 °C (0.41 °F)	±0.1	0.010 °C (0.018 °F)	±0.004
Ni 120[5]	–70 to 300	–94 to 572	0.16 °C (0.29 °F)	±0.1	0.004 °C (0.007 °F)	±0.004
Cu 10[6]	–50 to 250	–58 to 482	2 °C (3.60 °F)	±0.1	0.06 °C (0.108 °F)	±0.004
Cu 50 (α = 0.00428)	–185 to 200	–365 to 392	0.68 °C (1.22 °F)	±0.1	0.012 °C (0.022 °F)	±0.004
Cu 100 (α = 0.00428)	–185 to 200	–365 to 392	0.34 °C (0.61 °F)	±0.1	0.006 °C (0.011 °F)	±0.004
Cu 50 (α = 0.00426)	–50 to 200	–122 to 392	0.68 °C (1.22 °F)	±0.1	0.012 °C (0.022 °F)	±0.004
Cu 100 (α = 0.00426)	–50 to 200	–122 to 392	0.34 °C (0.61 °F)	±0.1	0.006 °C (0.011 °F)	±0.004
PT 50 (α = 0.00391)	–200 to 550	–392 to 1022	0.40 °C (0.72 °F)	±0.1	0.012 °C (0.022 °F)	±0.004
PT 100 (α = 0.00391)	–200 to 550	–392 to 1022	0.20 °C (0.36 °F)	±0.1	0.006 °C (0.011 °F)	±0.004
Thermocouples[7]						
Type B[8] [9]	100 to 1820	212 to 3308	1.5 °C (2.70 °F)	±0.1	0.056 °C (0.101 °F)	±0.004
Type E[8]	–50 to 1000	–58 to 1832	0.4 °C (0.72 °F)	±0.1	0.016 °C (0.029 °F)	±0.004
Type J[8]	–180 to 760	–292 to 1400	0.5 °C (0.90 °F)	±0.1	0.016 °C (0.029 °F)	±0.004
Type K[8] [10]	–180 to 1372	–292 to 2502	0.5 °C (0.90 °F)	±0.1	0.02 °C (0.036 °F)	±0.004
Type N[8]	–200 to 1300	–328 to 2372	0.8 °C (1.44 °F)	±0.1	0.02 °C (0.036 °F)	±0.004
Type R[8]	0 to 1768	32 to 3214	1.2 °C (2.16 °F)	±0.1	0.06 °C (0.108 °F)	±0.004
Type S[8]	0 to 1768	32 to 3214	1 °C (1.80 °F)	±0.1	0.06 °C (0.108 °F)	±0.004
Type T[8]	–200 to 400	–328 to 752	0.5 °C (0.90 °F)	±0.1	0.02 °C (0.036 °F)	±0.004
DIN Type L[11]	–200 to 900	–328 to 1652	0.7 °C (1.26 °F)	±0.1	0.022 °C (0.040 °F)	±0.004
DIN Type U[11]	–200 to 600	–328 to 1112	0.7 °C (1.26 °F)	±0.1	0.026 °C (0.047 °F)	±0.004
Type W5Re/W26Re[12]	0 to 2000	32 to 3632	1.4 °C (2.52 °F)	±0.1	0.064°C (0.115°F)	±0.004
GOST Type L	-200 to 800	-392 to 1472	0.50 °C (0.90 °F)	±0.1	0.003 °C (0.005 °F)	±0.004
Millivolt Input	–10 to 100 mV		0.03 mV	±0.1	0.001 mV	±0.004
2-, 3-, 4-wire Ohm Input	0 to 2000 ohms		0.7 ohm	±0.1	0.028 ohm	±0.004

(1) Input ranges are for transmitter only. Actual sensor (RTD or Thermocouple) operating ranges may be more limited. See "Product Certifications" on page 86 for temperature ranges.

(2) Change in ambient is with reference to the calibration temperature of the transmitter at 68 °F (20 °C) from factory.

(3) IEC 751, 1995.

(4) JIS 1604, 1981.

(5) Edison Curve No. 7.

(6) Edison Copper Winding No. 15.

(7) Total CJC accuracy for thermocouple measurement: ±0.5 °C.

(8) NIST Monograph 175, IEC 584.

(9) Fixed accuracy for NIST Type B is ±5.4 °F (±3.0 °C) from 212 to 572 °F (100 to 300 °C).

(10) Fixed accuracy for NIST Type K is ±1.3 °F (±0.7 °C) from -292 to -130 °F (-130 to -90 °C).

(11) DIN 43710.

(12) ASTME 988-96.

(13) Accuracy and Ambient Temperature Effects are tested and verified down to -51 °C (-60 °F) for LT option.

Transmitter Accuracy Example

When using a Pt 100 (a = 0.00385) sensor input with a 0 to 100 °C span, use the greater of the two calculated values. In this case, the accuracy would be +/-0.2 °C.

Transmitter Temperature Effects Example

Transmitters can be installed in locations where the ambient temperature is between –40 and 85 °C (–40 and 185 °F). In order to maintain excellent accuracy performance, each transmitter is individually characterized over this ambient temperature range at the factory.

When using a Pt 100 (a = 0.00385) sensor input with a 0–100 °C span at 30 °C ambient temperature:

- Temperature Effects: 0.006 °C x (30 - 20) = 0.06 °C

Total Transmitter Error

Worst Case Transmitter Error: Accuracy + Temperature Effects = 0.2 °C + 0.06 °C = 0.26 °C

Total Probable Transmitter Error: $\sqrt{0.2^2 + 0.06^2} = 0.21°C$

Product Certifications

APPROVED MANUFACTURING LOCATIONS

Rosemount Inc. – Chanhassen, Minnesota, USA

Emerson Process Management Temperature GmbH – Germany

Emerson Process Management Asia Pacific – Singapore

EUROPEAN UNION DIRECTIVE INFORMATION

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting your local sales representative.

ATEX Directive (94/9/EC)

Rosemount Inc. complies with the ATEX Directive.

Electro Magnetic Compatibility (EMC) (89/336/EEC)

All Models: EN 50081-1: 1992; EN 50082-2:1995; EN 61326-1. 2006

CE Mark

The 248 meets all requirements listed under IEC 61326:Amendment 1,2006

HAZARDOUS LOCATIONS CERTIFICATIONS(1)

North American Certifications

Factory Mutual (FM)

I5 FM Intrinsic Safety and Non-incendive
Intrinsically Safe for Class I/II/III, Division 1, Groups A, B, C, D, E, F, and G. Non-incendive Field Circuit for Class I, Division 2, Groups A, B, C, and D. Intrinsically Safe and non-incendive when installed in accordance with Rosemount drawing 00248-1055.

Temperature Codes:
T5 (T_{amb} = –50 to 75 °C)
T6 (T_{amb} = –50 to 40 °C)

Table 4. Entity Parameters

Loop/Power	Sensor
U_i = 30 Vdc	U_o = 45 Vdc
I_i = 130 mA	I_o = 26 mA
P_i = 1.0 W	P_o = 290 mW
C_i = 3.6 nF	C_o = 0.4 nF
L_i = 13.8 µH	L_o = 49.2 mH

E5 FM Explosion-Proof
Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust Ignition-Proof for Class II/III, Division 1, Groups E, F, G when installed in accordance with Rosemount drawing 00248-1065.

Temperature Code:
T5 (T_{amb} = –40 to 85 °C)

Combination Certifications

K5 Combination of I5 and E5.

Canadian Standards Association (CSA) Approvals

I6 CSA Intrinsically Safe and Class I, Division 2
Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D when installed in accordance with Rosemount drawing 00248-1056.

Temperature Codes:
T5 (T_{amb} = –50 to 60 °C)
T6 (T_{amb} = –50 to 40 °C)

Suitable for use in Class I, Division 2, Groups A, B, C, and D.

K6 CSA Intrinsically Safe, Explosion-Proof, and Class I, Division 2.
Combination of I6 and Explosion-Proof for Class I, Division 1, Groups B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 hazardous locations, when installed in accordance with Rosemount drawing 00644-1059.

Suitable for Class I, Division 2, Groups A, B, C, and D.
Ambient Temperature Limit: –50 to 85 °C

European Certifications

I1 ATEX Intrinsic Safety
Certificate Number: Baseefa03ATEX0030X
ATEX Marking: ⟨Ex⟩ II 1 G
CE 1180
Ex ia IIC

Temperature Codes:
T5 (–60 ≤ T_{amb} ≤ 80 °C)
T6 (–60 ≤ T_{amb} ≤ 60 °C)

Table 5. Entity Parameters

Loop/Power	Sensor
U_i = 30 Vdc	U_o = 45 Vdc
I_i = 130 mA	I_o = 26 mA
P_i = 1.0 W	P_o = 290 mW
C_i = 3.6 nF	C_i = 2.1 nF
L_i = 0	L_i = 0

Special Conditions for Safe Use (X):
The apparatus must be installed in an enclosure which affords it a degree of protection of at least IP20.
Non-metallic enclosures must have a surface resistance of less than 1 GOHM; light alloy or zirconium enclosures must be protected from impact and friction when installed.

(1) Consult factory for availability.

E1 ATEX Flame-Proof
Certificate Number: KEMA99ATEX8715X
ATEX Marking: ⟨Ex⟩ II 2 G
CE 1180
Ex d IIC T6

Special Conditions for Safe Use (X):

For information on the dimensions of the flameproof joints the manufacturer should be contacted.

Table 6. Entity Parameters

Sensor	Transmitter
U_{max} = 5 V	U_{max} = 55 Vdc
I_{max} = 2.0 mA	I_{max} = 40 mA

Temperature Codes:
T6 (–40 ≤ T_{amb} ≤ 65 °C)

N1 ATEX Type n
Certificate Number: BAS00ATEX3145
ATEX Marking: ⟨Ex⟩ II 3
Ex nL IIC

Table 7. Input Parameters

Transmitter U_i = 45 V
Resistance Element Terminal Block U_i = 5 V
Thermocouple Terminal Block U_i = 0 V

Temperature Codes:
T5 (–40 ≤ T_{amb} ≤ 70 °C)

NC ATEX Type n Component
Certificate Number: Baseefa03ATEX0032U
ATEX Marking: ⟨Ex⟩ II 3G
Ex nA IIC

Table 8. Input Parameters

U_i = 42.4 V

Temperature Codes:
T5 (–60 ≤ T_{amb} ≤ 80 °C)
T6 (–60 ≤ T_{amb} ≤ 60 °C)

ND ATEX Dust
Certificate Number: KEMA99ATEX8715X
ATEX Marking: II 1 D
CE 1180
T95 C (-40 ≤ T_{amb} ≤ 85 °C)
Ex tD A20 IP66

Input Parameters

Sensor	Transmitter
U_{max} = 5 V	U_{max} = 55 Vdc
I_{max} = 2.0 mA	I_{max} = 40 mA

Special Conditions for Safe Use (X):

For information on the dimensions of the flameproof joints the manufacturer should be contacted.

Brazilian Certifications

Centro de Pesquisas de Energia Eletrica (CEPEL) Approval

I2 CEPEL Intrinsic Safety

IECEx Certifications

E7 IECEx Flameproof and Dust
Certificate Number: IECEx KEM 09.0015X
Ex d IIC T6 (Flameproof)
Ex tD A20 IP 66 T 95 °C (Dust)
Vmax = 42.4 V

Special Conditions for Safe Use (X):
For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

Table 9. Electrical Data

Transmitter	Sensor
U_{max} = 42.4 Vdc	U_{max} = 5 V
I_{max} = 24.0 mA	I_{max} = 2.0 mA

NG IECEx Type n Component
Certificate number: IECEx BAS 08.0087U
Ex nA IIC T5 (-60 °C ≤ T_{amb} ≤ 80 °C)
Ex nA IIC T6 (-60 °C ≤ T_{amb} ≤ 60 °C)
Input Parameter: Ui = 42.4 Vdc

Schedule of Limitations:
The component must be housed in a suitably certified enclosure that provides a degree of protection of at least IP54.

I7 IECEx Intrinsic Safety
Certificate Number: IECEx BAS 07.0086X
Ex ia IIC T5 (-60 °C ≤ T_{amb} ≤ 80 °C)
Ex ia IIC T6 (-60 °C ≤ T_{amb} ≤ 60 °C)

Special Conditions for Safe Use (X):

1. The apparatus must be installed in an enclosure which affords it a degree of protection of at least IP20.
2. Non-metallic enclosures must have a surface resistance of less than 1 GΩ; light alloy or zirconium enclosures must be protected from impact and friction when installed.

Table 10. Entity Parameters

Transmitter	Sensor
U_i = 30 Vdc	U_o = 45 Vdc
I_i = 130 mA	I_o = 26 mA
P_i = 1.0 W	P_o = 290 mW
C_i = 3.63 nF	C_i = 2.1 nF
L_i = 0 mH	L_i = 0 mH

N7 IECEx Type n
Certificate Number: IECEx BAS 07.0055
Ex nA nL IIC T5 (-40 °C ≤ T_{amb} ≤ 70 °C)

Table 11. Electrical Data

Transmitter	Sensor	
	RTD	Thermocouple
U_i = 45 V	U_i = 5 V	U_i = 0

GOST Certifications

Russian GOST

PPC 04-9788: (EP Only)

1 Ex d IIC T6

PPC BA-13006:

0 Ex ia IIC T5/T6

Kazakhstan GOST

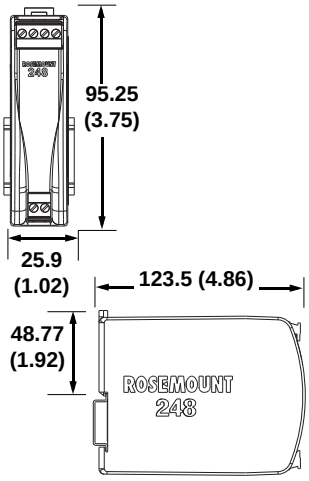
See Certificate

Ukraine GOST

See Certificate

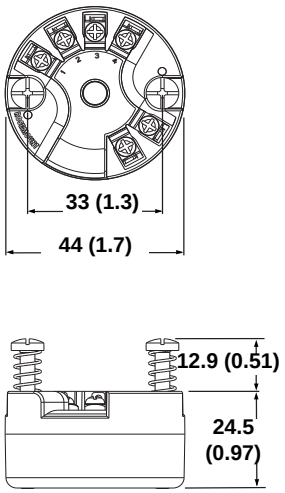
Dimensional Drawings

248R Railmount Transmitter



248H Headmount Transmitter

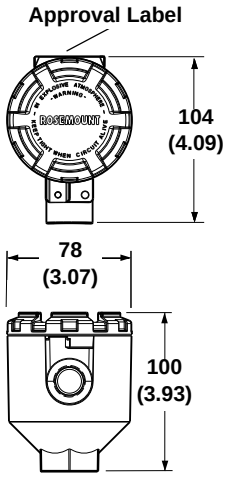
(enlarged)



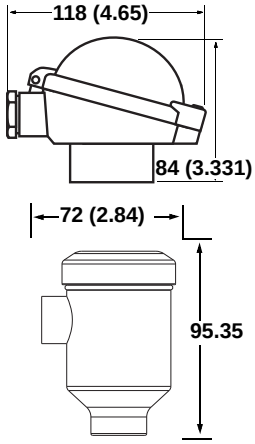
Dimensions are in millimeters (inches)

Enclosures

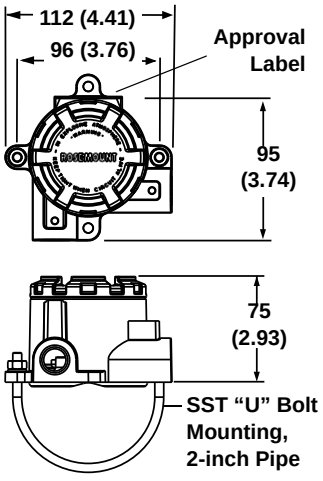
Connection Head(1)



BUZ and Polypropylene Heads (option codes B and C) and Mini SST Head (option code S)



Universal Head(2) (option codes H and U)

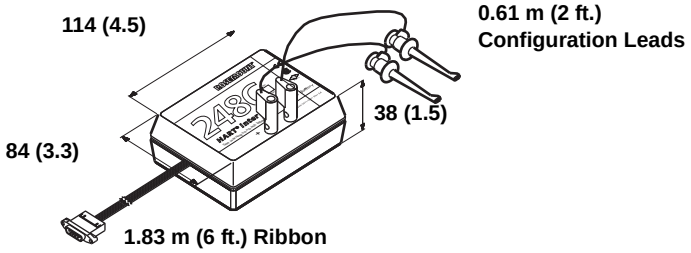


(1) *If ordering the transmitter with a DIN style sensor, it is recommended that the enclosure be ordered within the sensor model (Product Data Sheet doc # 00813-0200-2654) rather than within the transmitter model, in order to drive necessary parts.*

(2) *A "U" Bolt is shipped with each universal head unless a sensor is ordered assembled to the enclosure. However, since the head can be integrally mounted to the sensor, it may not need to be used.*

248C Configuration Interface

Option 1: HART Interface Box



248C Configuration Interface Specifications

CONFIGURATION SOFTWARE

The 248C PC-based configuration software for the Rosemount 248 allows comprehensive configuration of the transmitters. Used in conjunction with various Rosemount or user-supplied hardware modems, the software provides the tools necessary to configure the 248 transmitters including the following parameters:

- Process Variable
- Sensor Type
- Number of Wires
- Engineering Units
- Transmitter Tag Information
- Damping
- Alarming Parameters

CONFIGURATION HARDWARE

The 248C Configuration Interface has 4 hardware options as follows:

Option “0”: Software Only

Customer must provide appropriate communications hardware (modem, power supply, etc.).

Option “1”: HART Interface Box

HART interface box including an integrated serial modem and battery-powered transmitter power supply. Only suitable for off-line transmitter configuration. Requires PC serial port. *Will not work with powered loops.*

Option “2”: Serial HART Modem

Serial HART modem. Customer must provide separate loop power supply and resistor. Requires PC serial port. *Suitable for use with powered loops.*

Option “3”: USB HART Modem

USB (Universal Serial Bus) HART modem. Customer must provide separate loop power supply and resistor. Requires PC with USB port. *Suitable for use with powered loops.*

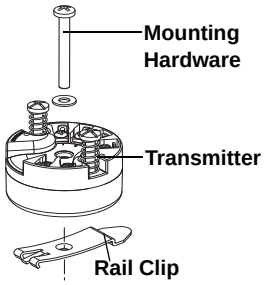
Table 12. 248C Configuration Interface

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
248C(1)	PC-based 248 HART Configuration Software	
Communications Hardware Options		
Standard		**Standard**
0	Software Only (no Modem)	★
1	Software with 248C HART Interface Box (Serial Interface with Transmitter Power Supply)	★
2	Software with Serial HART Modem	★
3	Software with USB HART Modem	★
Typical Model Number: 248C 1		

(1) Consult Factory for availability.

Table 13. 248 Transmitter Accessories



Part Description	Part Number
Aluminum Alloy Universal Head – M20 Entries	00644-4420-0002
Aluminum Alloy Universal Head – 1/2 NPT Entries	00644-4420-0001
Aluminum Alloy Rosemount Connection Head – M20 Conduit Entry, M24 Instrument Entry	00644-4410-0023
Aluminum Alloy Rosemount Connection Head – 1/2 NPT Conduit Entry and M24 Instrument Entry	00644-4410-0013
Aluminum Alloy BUZ Head – M20 Conduit Entry, M24 Instrument Entry	00644-4196-0023
Aluminum Alloy BUZ Head – M20 Conduit Entry and 1/2 NPT Instrument Entry	00644-4196-0021
Aluminum Alloy BUZ Head – 1/2 NPT Conduit Entry	00644-4196-0011
External Ground Screw Assembly Kit	00644-4431-0001
Kit, Hardware for Mounting a 248 to a DIN Rail (see left picture-top hat rail, symmetric)	00248-1601-0001
Standard Cover for Universal or Rosemount Connection Heads	03031-0292-0001
Snap Rings Kit (used for assembly to DIN Plate Style sensor)	00644-4432-0001

Hardware Tag

- no charge
- 20 characters maximum
- transmitter enclosure, sensor, and thermowell if applicable will be tagged in accordance with customer requirements

Software Tag

- no charge
- the transmitter can store up to 8 characters. If no characters are specified, the first 8 characters of the hardware tag are the default.

Configuration

When ordering a transmitter and sensor assembly in one model number, the transmitter will be configured for the sensor that is ordered.

When a transmitter is ordered alone, the transmitter will be shipped as follows (unless specified):

Sensor Type	RTD, Pt 100 (α=0.00385, 4-wire)
4 mA Value	0 °C
20 mA Value	100 °C
Damping	5 seconds
Output	Linear with temperature
Failure Mode	High/Upscale
Line Voltage Filter	50 Hz
Tag	See Hardware Tag

Options

The following table lists the requirements necessary to specify a custom configuration.

Option Code	Requirements/ Specification
C1: Factory Configuration Data (CDS required)	Date: day/month/year Descriptor: 16 alphanumeric characters Message: 32 alphanumeric character Analog Output: Alarm and saturation levels
A1: NAMUR-Compliant, High Alarm	See Table 1 on page 82
CN: NAMUR-Compliant, Low Alarm	See Table 1 on page 82
Q4: Calibration Certificate	Will include 3-Point calibration at 0, 50, and 100% analog and digital output points
C4: Five Point Calibration	Will include 5-point calibration at 0, 25, 50, 75, and 100% analog and digital output points. Use with Calibration Certificate Q4.
F6: 60 Hz Line Filter	Calibrated to a 60 Hz line voltage filter instead of 50 Hz filter

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EMERSON
Process Management

Rosemount 148 Temperature Transmitter

- *Basic temperature transmitter offers a cost-effective solution for temperature monitoring points*
- *Standard transmitter design provides flexible and reliable performance in process environments*
- *Experience lower overall installation costs when compared to wiring sensor directly, reducing the need for expensive extension wires and multiplexers*
- *PC-based HART configuration interface delivers a programmer, cables, and the software needed for transmitter configuration*
- *Explore the benefits of a Complete Point Solution from Rosemount Temperature*



Content

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Transmitter Specifications . . . . . page Temperature-98
Product Certifications . . . . . page Temperature-100
Dimensional Drawings . . . . . page Temperature-102

Rosemount 148 Temperature Transmitter

Basic temperature transmitter offers a cost-effective solution for temperature monitoring points

- DIN B style head mount transmitter
- Variety of DIN B enclosure options
- 4-20 mA analog protocol
- Single sensor capability with universal sensor inputs (RTD, T/C, ohms)
- PC-based configuration

Standard transmitter design provides flexible and reliable performance in process environments

- Offers improved measurement accuracy and reliability over direct-wiring a sensor to the digital control system for a lower overall installation cost
- One-year stability rating reduces maintenance costs
- PC-based configuration interface delivers a programmer, cables, and the software needed for transmitter configuration
- Compensation for ambient temperature enhances transmitter performance

Explore the benefits of a Complete Point Solution from Rosemount Temperature Measurement

- An “Assemble To Sensor” option enables Emerson to provide a complete point temperature solution, delivering an installation-ready transmitter and sensor assembly
- Emerson offers a selection of RTDs, thermocouples, and thermowells that bring superior durability and Rosemount reliability to temperature sensing, complementing the Rosemount Transmitter portfolio



Experience global consistency and local support from numerous worldwide Rosemount Temperature manufacturing sites



- World-class manufacturing provides globally consistent product from every factory and the capacity to fulfill the needs of any project, large or small
- Experienced Instrumentation Consultants help select the right product for any temperature application and advise on best installation practices
- An extensive global network of Emerson service and support personnel can be on-site when and where they are needed

- Looking to measure more temperature points in a cost effective way? Consider a wireless temperature solution. The Rosemount 248 Wireless temperature transmitter is solid performing, yet economical.
- For temperature installations that require reliable measurement and can benefit from HART functionality, the Rosemount 248 temperature transmitter is a cost-effective solution.

Rosemount 148 Temperature Transmitter



The Rosemount 148 temperature transmitter has a standard transmitter design that provides reliable performance in process environments.

Transmitter features include:

- 4-20 mA Analog Output
- Variety of DIN B enclosure options
- 3-Point Calibration Certificate (Option Code Q4)
- Assemble to Sensor options (Option Code XA)

Table 1. Rosemount 148 PC-Programmable Temperature Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description			
148	PC Programmable Temperature Transmitter			
Transmitter Type				
Standard				**Standard**
H	DIN B Head Mount			★
Transmitter Output				
Standard				**Standard**
N	Analog Output			★
Product Certifications				
Standard				**Standard**
I5	FM Intrinsic Safety and Class 1, Division 2			★
E5(1)	FM Explosion-Proof			★
K5(1)	FM Intrinsic Safety, Explosion-Proof, and Class 1, Division 2			★
I6	CSA Intrinsic Safety and Class 1, Division 2			★
K6(1)	CSA Intrinsic Safety, Explosion-Proof, and Class 1, Division 2			★
I1	ATEX Intrinsic Safety			★
E1(1)	ATEX Flameproof			★
N1(1)	ATEX Type n			★
NC	ATEX Type n Component			★
ND(1)	ATEX Dust Ignition-Proof			★
I7	IECEx Intrinsic Safety			★
E7(1)	IECEx Flameproof and Dust			★
N7(1)	IECEx Type n			★
NG	IECEx Type n Component			★
NA	No approvals			★
Enclosure Options		**Material**	**IP Rating**	
Standard				**Standard**
A	Connection Head	Aluminum	IP68	★
U	Universal Head (Junction Box)	Aluminum	IP68	★

Table 1. Rosemount 148 PC-Programmable Temperature Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

B	BUZ Head	Aluminum	IP65	★
C	BUZ Head	Polypropylene	IP65	★
N	No Enclosure			★
Expanded				
G	Connection Head	SST	IP68	
H	Universal Head (Junction Box)	SST	IP68	
S	Sanitary Connection Head, DIN B	Polished SST	IP66	
F	Sanitary Connection Head, DIN A	Polished SST	IP66/IP68	
Conduit Entry Size				
Standard				**Standard**
1	M20 x 1.5 (CM20)			★
2	1/2-14 in. NPT			★
0	No Enclosure			★

Options (Include with selected model number)

Alarm Level Configuration		
Standard		**Standard**
A1	NAMUR alarm and saturation levels, high alarm	★
CN	NAMUR alarm and saturation levels, low alarm	★
Calibration Certificate		
Standard		**Standard**
Q4	Calibration Certificate (3-point Calibration)	★
Line Filter		
Standard		**Standard**
F6	60 Hz Line Voltage Filter	★
External Ground Option (Available w/Enclosures U, H)		
Standard		**Standard**
G1	External Ground Lug Assembly	★
Cover Chain Option (Available w/Enclosures U, H)		
Standard		**Standard**
G3	Cover Chain	★
Cable Gland Option		
Standard		**Standard**
G2	Cable Gland–Explosion Proof–7.5 mm - 11.9 mm	★
G4	Cable Gland–Explosion Proof, Thin Wire - 3.0 mm - 8.0 mm	★
Conduit Electrical Connector		
Standard		**Standard**
GE	M12, 4-pin, Male Connector (eurofast®)	★
GM	A size Mini, 4-pin, Male Connector (minifast®)	★
Assemble To Options		
Standard		**Standard**
XA	Sensor Specified Separately and Assembled to Transmitter	★
Typical Model Number: 148 H N I5 U1 A1 XA		

(1) Approval Codes E1, N1, N7, ND, E5, K5, K6, and E7 require an enclosure

Rosemount 148 PC Programmer

The Rosemount 148 PC Programmer is a portable, self-contained communication link between your PC and the 148 transmitter for use in non-hazardous environments. The 148 PC Programmer contains the following items:

- PC Programmer Unit
- Programming Software (CD-ROM)
- 9V Battery
- Transmitter Connectors

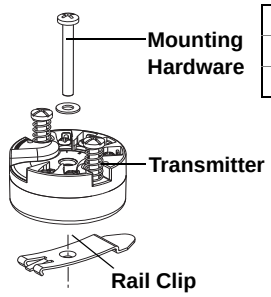
Rosemount 148 PC Programmer Software

The software makes the following parameters available:

- Process Variable
- Sensor Type
- Number of Wires
- Engineering Units
- Transmitter Tag Information
- Damping
- Alarming Parameters

To order the 148 PC Programmer, use Part Number 00148-1601-0001.

Table 2. Rosemount 148 Transmitter Accessories



External Ground Screw Assembly Kit	00644-4431-0001
Kit, Hardware for Mounting a 148 to a DIN Rail (see left picture-top hat rail, symmetric)	00248-1601-0001
Snap Rings Kit (used for assembly to DIN Plate Style sensor)	00644-4432-0001

Transmitter Specifications

FUNCTIONAL SPECIFICATIONS

Inputs

User-selectable; sensor terminals rates to 42.4 Vdc. See “Transmitter Accuracy and Ambient Temperature Effects” on page 99 for sensor options.

Output

2-wire 4–20 mA, linear with temperature or input.

Isolation

Input/Output isolation tested to 500 Vac rms (707 Vdc) at 50/60 Hz.

Supply Voltage DC

Standard: 12 to 35 V

Intrinsic Safety: 12 to 28 V

Minimum Voltage Across Terminals

12 Vdc

Humidity Limits

0 - 95% relative humidity, non-condensing

NAMUR Recommendations

The 148 meets the following NAMUR recommendations:

- NE 21 - Electromagnetic compatibility (EMC) for Process and Laboratory Apparatus
- NE 43 - Standard of the signal level breakdown information of digital transmitters

Transient Protection

The optional Rosemount 470 Transient Protector prevents damage from transients induced by lightning, welding, heavy electrical equipment, or switch gears. Refer to the 470 Product Data Sheet (document number 00813-0100-4191) for more information.

Temperature Limits

Operating Limit

- -40 to 185 °F (-40 to 85 °C)

Storage Limit

- -58 to 248 °F (-50 to 120 °C)

Turn-on Time

Performance within specifications is less than 5.0 seconds after power is applied to the transmitter, when damping value is set to zero seconds.

Update Rate

Less than 0.5 seconds

Damping

32 seconds maximum, 5 seconds default.

Recommended Minimum Measuring Span

18 °F (10 °C)

Software Detected Failure Mode

The values at which the transmitter drives its output in failure mode depends on device configuration. The device can be configured to meet NAMUR-compliant (NAMUR recommendation NE 43) operation. The values for standard and NAMUR-compliant operation are as follows:

Table 3. Operation Parameters

	Standard[(1)]	NAMUR NE43-Compliant[(1)]
Linear Output:	$3.9 \leq I \leq 20.5$	$3.8 \leq I \leq 20.5$
Fail High:	$21 \leq I \leq 23$ (default)	$21 \leq I \leq 23$ (default)
Fail Low:	$I \leq 3.75$	$I \leq 3.6$

(1) Measured in milliamperes

Certain hardware failures, such as microprocessor failures, will always drive the output to greater than 23 mA.

PERFORMANCE SPECIFICATIONS

EMC (ElectroMagnetic Compatibility) NAMUR NE21 Standard

The 148 meets the requirements for NAMUR NE21 Rating

Susceptibility	Parameter	Influence
ESD	• 6 kV contact discharge • 8 kV air discharge	None
Radiated	• 80 – 1000 MHz at 10 V/m AM	None
Burst	• 1 kV for I.O.	None
Surge	• 0.5 kV line–line • 1 kV line–ground (I.O. tool)	None
Conducted	• 150 kHz to 80 MHz at 10 V	None

CE Mark

The 148 meets all of the requirements listed under IEC 61326: Amendment 1, 2006.

Power Supply Effect

Less than ±0.0055 of span per volt.

Vibration Effect

The 148 is tested to the following specifications with no effect on performance:

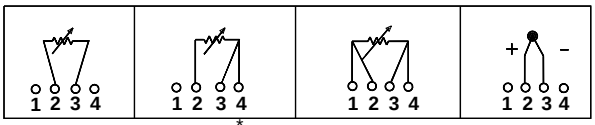
Frequency	Vibration
10 to 60 Hz	0.21 mm displacement
60 to 2000 Hz	3 g peak acceleration

Stability

For RTD and thermocouple inputs, the transmitter will have a stability of ±0.15% of reading or 0.15 °C (whichever is greater) for twelve months.

Sensor Connections

148 Sensor Connections Diagram



2-wire RTD and Ω | **3-wire* RTD and Ω** | **4-wire RTD and Ω** | **T/C**

* *Rosemount Inc. provides 4-wire sensors for all single element RTDs. You can use these RTDs in 3-wire configurations by leaving the unneeded leads disconnected and insulated with electrical tape.*

Transmitter Accuracy and Ambient Temperature Effects

NOTE
The accuracy and ambient temperature effect is the greater of the fixed and percent of span values (see example below).

Table 4. 148 Transmitter Input Options, Accuracy, and Ambient Temperature Effects

Sensor	Transmitter Input Ranges(1)		Accuracy		Temperature Effects per 1.0 °C (1.8 °F) Change in Ambient Temperature(2)	
	°C	°F	Fixed	% of Span	Fixed	% of Span
2-, 3-, 4-wire RTDs						
Pt 100(3) (α = 0.00385)	–200 to 850	–328 to 1562	0.3 °C (0.54 °F)	±0.15	0.009 °C (0.016 °F)	±0.006
Pt 100(4) (α = 0.003916)	–200 to 645	–328 to 1193	0.3 °C (0.54 °F)	±0.15	0.009 °C (0.016 °F)	±0.006
Ni 120(5)	–70 to 300	–94 to 572	0.2 °C (0.36 °F)	±0.15	0.006 °C (0.011 °F)	±0.006
Cu 10(6)	–50 to 250	–58 to 482	3 °C (5.40 °F)	±0.15	0.09 °C (0.16 °F)	±0.006
Thermocouples(7)						
Type B(8) (9)	100 to 1820	212 to 3308	2.3 °C (4.05 °F)	±0.15	0.084 °C (0.150 °F)	±0.006
Type J(8)	–180 to 760	–292 to 1400	0.8 °C (1.35 °F)	±0.15	0.03 °C (0.054 °F)	±0.006
Type K(8) (10)	–180 to 1372	–292 to 2502	0.8 °C (1.35 °F)	±0.15	0.03 °C (0.054 °F)	±0.006
Type N(8)	–200 to 1300	–328 to 2372	1.2 °C (2.16 °F)	±0.15	0.03 °C (0.054 °F)	±0.006
Type R(8)	0 to 1768	32 to 3214	1.8 °C (3.24 °F)	±0.15	0.09 °C (0.16 °F)	±0.006
Type S(8)	0 to 1768	32 to 3214	1.5 °C (2.70 °F)	±0.15	0.09 °C (0.16 °F)	±0.006
2-, 3-, 4-wire Ohm Input	0 to 2000 ohms		1.1 ohm	±0.15	0.042 ohm	±0.009

(1) Input ranges are for transmitter only. Actual sensor (RTD or Thermocouple) operating ranges may be more limited.

(2) Change in ambient is with reference to the calibration temperature of the transmitter at 68 °F (20 °C) from factory.

(3) IEC 751, 1995.
(4) JIS 1604, 1981.
(5) Edison Curve No. 7.
(6) Edison Copper Winding No. 15.
(7) Total accuracy for thermocouple measurement: sum of accuracy +0.5 °C.
(8) NIST Monograph 175, IEC 584.
(9) Fixed accuracy for NIST Type B is ±5.4 °F (±3.0 °C) from 212 to 572 °F (100 to 300 °C).
(10) Fixed accuracy for NIST Type K is ±1.3 °F (±0.7 °C) from -292 to -130 °F (-130 to -90 °C).

Transmitter Accuracy Example

When using a Pt 100 (a = 0.00385) sensor input with a 0 to 100 °C span, use the greater of the two calculated values. In this case, the accuracy would be +/-0.3 °C.

Transmitter Temperature Effects Example

Transmitters can be installed in locations where the ambient temperature is between –40 and 85 °C (–40 and 185 °F). In order to maintain excellent accuracy performance, each transmitter is individually characterized over this ambient temperature range at the factory.

When using a Pt 100 (a = 0.00385) sensor input with a 0–100 °C span at 30 °C ambient temperature:

- Temperature Effects: 0.009 °C x (30 - 20) = 0.09 °C

Total Transmitter Error

Worst Case Transmitter Error: Accuracy + Temperature Effects = 0.3 °C + 0.09 °C = 0.39 °C

Total Probable Transmitter Error: $\sqrt{0.3^2 + 0.09^2} = 0.31°C$

Product Certifications

APPROVED MANUFACTURING LOCATIONS

Rosemount Inc. – Chanhassen, Minnesota, USA

Emerson Process Management Temperature GmbH – Karlstein, Germany

Emerson Process Management Asia Pacific – Singapore

EUROPEAN UNION DIRECTIVE INFORMATION

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting your local sales representative.

ATEX Directive (94/9/EC)

Rosemount Inc. complies with the ATEX Directive.

Electro Magnetic Compatibility (EMC) (89/336/EEC)

All Models: EN 50081-1: 1992; EN 50082-2: 1995; EN 61326-1. 2006

CE Mark

The 148 meets all requirements listed under IEC 61326:Amendment 1, 2006

HAZARDOUS LOCATIONS CERTIFICATIONS(1)

North American Certifications

Factory Mutual (FM)

I5 FM Intrinsic Safety and Non-incendive
Intrinsically Safe for Class I/II/III, Division 1, Groups A, B, C, D, E, F, and G. Non-incendive Field Circuit for Class I, Division 2, Groups A, B, C, and D. Intrinsically Safe and non-incendive when installed in accordance with Rosemount drawing 00148-1055.

Temperature Codes:
T5 (T_{amb} = –50 to 75 °C)
T6 (T_{amb} = –50 to 40 °C)

Table 5. Entity Parameters

Loop/Power	Sensor
U_i = 30 Vdc	U_o = 45 Vdc
I_i = 130 mA	I_o = 26 mA
P_i = 1.0 W	P_o = 290 mW
C_i = 3.6 nF	C_o = 0.4 nF
L_i = 13.8 μH	L_o = 49.2 mH

E5 FM Explosion-Proof
Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust Ignition Proof for Class II/III, Division 1, Groups E, F, G when installed in accordance with Rosemount drawing 00148-1065.

Temperature Code:
T5 (T_{amb} = –40 to 85 °C)

Combination Certifications

K5 Combination of I5 and E5.

Canadian Standards Association (CSA) Approvals

I6 CSA Intrinsically Safe and Class I, Division 2
Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D when installed in accordance with Rosemount drawing 00148-1056.

Temperature Codes:
T5 (T_{amb} = –50 to 60 °C)
T6 (T_{amb} = –50 to 40 °C)

Suitable for use in Class I, Division 2, Groups A, B, C, and D.

K6 CSA Intrinsically Safe, Explosion-Proof, and Class I, Division 2.
Combination of I6 and Explosion-Proof for Class I, Division 1, Groups B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 hazardous locations, when installed in accordance with Rosemount drawing 00644-1059.

Suitable for Class I, Division 2, Groups A, B, C, and D.
Ambient Temperature Limit: –50 to 85 °C

European Certifications

I1 ATEX Intrinsic Safety
Certificate Number: Baseefa080ATEX0030X
ATEX Marking: ⟨Ex⟩ II 1 G
CE 1180
Ex ia IIC

Temperature Codes:
T5 (–60 ≤ T_{amb} ≤ 80 °C)
T6 (–60 ≤ T_{amb} ≤ 60 °C)

Table 6. Entity Parameters

Loop/Power	Sensor
U_i = 30 Vdc	U_o = 45 Vdc
I_i = 130 mA	I_o = 26 mA
P_i = 1.0 W	P_o = 290 mW
C_i = 3.6 nF	C_i = 2.1 nF
L_i = 0	L_i = 0

Special Conditions for Safe Use (X):
The apparatus must be installed in an enclosure which affords it a degree of protection of at least IP20.
Non-metallic enclosures must have a surface resistance of less than 1 GOHM; light alloy or zirconium enclosures must be protected from impact and friction when installed.

(1) Consult factory for availability.

E1 ATEX Flame-Proof
Certificate Number: KEMA99ATEX8715X
ATEX Marking: ⟨Ex⟩ II 2 G
CE 1180
Ex d IIC
Table 7. Input Parameters

U_{max} = 42.4 Vdc
I_{max} = 24 mA

Temperature Codes:
T6 (–50 ≤ T_{amb} ≤ 65 °C)

Special Conditions for Safe Use (X):
For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

N1 ATEX Type n
Certificate Number: BAS00ATEX3145
ATEX Marking: ⟨Ex⟩ II 3
Ex nL IIC
Table 8. Input Parameters

U_{max} = 45 V

Temperature Codes:
T5 (–40 ≤ T_{amb} ≤ 70 °C)

NC ATEX Type n Component
Certificate Number: Baseefa08ATEX0031U
ATEX Marking: ⟨Ex⟩ II 3G
Ex nA IIC
Table 9. Input Parameters

U_i = 42.4 V
C_i = 3.6 nF
L_i = 0

Temperature Codes:
T5 (–60 ≤ T_{amb} ≤ 80 °C)
T6 (–60 ≤ T_{amb} ≤ 60 °C)

ND ATEX Dust Ignition Proof
Certificate Number: KEMA99ATEX8715X
ATEX Marking: II 1 D
CE 1180
T95 C (-40 ≤ T_{amb} ≤ 85 °C)
IP66

Special Conditions for Safe Use (X):

For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

Table 10. Input Parameters

U_{max} = 42.4 Vdc
I_{max} = 24 mA

Brazilian Certifications

Centro de Pesquisas de Energia Eletrica (CEPEL) Approval

I2 CEPEL Intrinsic Safety

IECEx Certifications

E7 IECEx Flameproof and Dust
Certificate Number: IECEx KEM 09.0015X
Ex d IIC T6 (Flameproof)
Ex tD A20 IP 66 T 95 °C (Dust)
Vmax = 42.4 V

Special Conditions for Safe Use (X):
For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

Table 11. Electrical Data

Transmitter	Sensor
U_{max} = 42.4 Vdc	U_{max} = 5 V
I_{max} = 24.0 mA	I_{max} = 2.0 mA

I7 IECEx Intrinsic Safety
Certificate Number: IECEx BAS 08.0011X
Ex ia IIC T5 (-60 °C ≤ T_{amb} ≤ 80 °C)
Ex ia IIC T6 (-60 °C ≤ T_{amb} ≤ 60 °C)

Special Conditions for Safe Use (X):
The apparatus must be installed in an enclosure which affords it a degree of protection of at least IP20.
Non-metallic enclosures must have a surface resistance of less than 1 GΩ; light alloy or zirconium enclosures must be protected from impact and friction when installed.

Table 12. Entity Parameters

Transmitter	Sensor
U_i = 30 Vdc	U_o = 45 Vdc
I_i = 130 mA	I_o = 26 mA
P_i = 1.0 W	P_o = 290 mW
C_i = 3.63 nF	C_i = 2.1 nF
L_i = 0 mH	L_i = 0 mH

N7 IECEx Type n
Certificate Number: IECEx BAS 07.0055
Ex nA nL IIC T5 (-40 °C ≤ T_{amb} ≤ 70 °C)

Table 13. Electrical Data

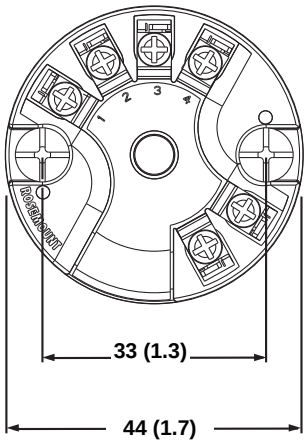
Transmitter	Sensor	
	RTD	Thermocouple
U_i = 45 V	U_i = 5 V	U_i = 0

NG IECEx Type n Component
Certificate number: IECEx BAS08.0012U
Ex nA IIC T5 (-60 °C ≤ T_{amb} ≤ 80 °C)
Ex nA IIC T6 (-60 °C ≤ T_{amb} ≤ 60 °C)
Input Parameter: Ui = 42.4 Vdc

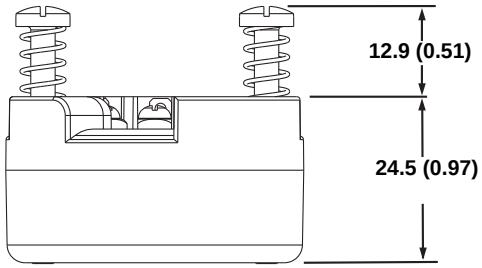
Schedule of Limitations:
The component must be housed in a suitably certified enclosure that provides a degree of protection of at least IP54.

Dimensional Drawings

Rosemount 148 Top View

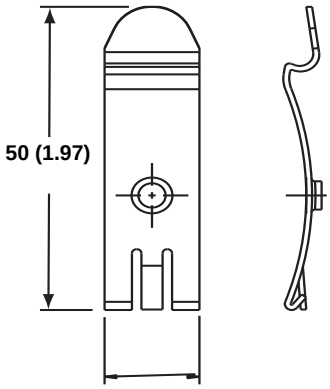


Rosemount 148 Side View



Dimensions are in millimeters (inches)

DIN Rail Mounting Kit



Dimensions are in millimeters (inches)

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Rosemount 848T High Density Temperature Measurement Family

- *Innovative temperature measurement for high density applications that provide installation and operational savings*
- *Independently configurable inputs that support RTD, thermocouple, ohm, mV, and 4–20 mA signals*
- *Enclosure options and intrinsically safe design allows for installation close to any process, including hazardous areas*
- *WirelessHART™ capabilities extends the full benefits of PlantWeb® to previously inaccessible locations*



Contents

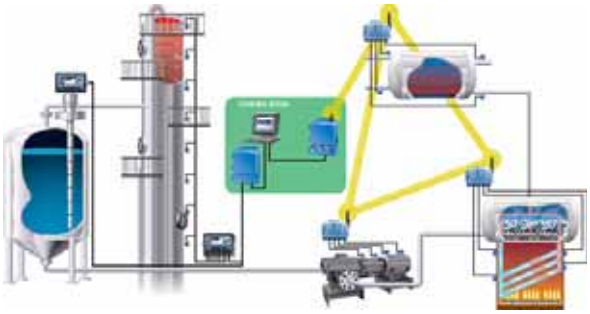
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The Rosemount 848T Foundation fieldbus Temperature Transmitter . . . . . page Temperature-106
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High Density Temperature Measurement



Increase performance with High Density Transmitters

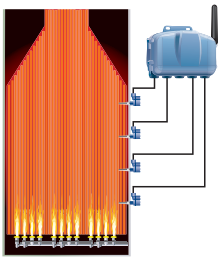
- Transmit multiple measurements with one set of electronics
- Mount close to process to reduce sensor wire length and increase measurement reliability
- Enhance Accuracy with EMI correction, cold junction compensation and device diagnostics
- Reduce installation costs by as much as 70 percent



High Density Temperature Measurement

Ideal solution for taking multiple measurements in close proximity to each other such as:

- Bearing temperature on pumps and motors
- Distillation columns
- Furnaces and boilers
- Reactors, storage tanks, and many more



Simplify Installation and Reduce Wiring Costs

- Eliminate Marshalling
- Less wire routing and fewer terminations
- Faster startups with fewer devices



Access Powerful Information with New Device Dashboards

- Leverage Human Centered Design practices to create an intuitive user interface
- Instantly see status and output of each sensor
- Direct links to graphical diagnostics and troubleshooting help
- Drastically lower configuration time

Smart Wireless Delivers Innovative Wireless Solutions for Temperature Measurement

- Self-organizing network delivers information rich data with >99% data reliability and establishes a highly stable network
- WirelessHART® Internationally recognized as IEC 62591
- Emerson SmartPower™ solutions provide an intrinsically safe Power Module, allowing field replacements without removing the transmitter from the process, keeping personnel safe and reducing maintenance costs
- Emerson Process Management's layered approach to wireless network security ensures that data transmissions are secure



FOUNDATION fieldbus Provides Effective Measurements with Reduced Wiring Costs

- Internationally recognized Digital Network (IEC 61158) supports the connection of up to 16 devices on a single twisted wire pair
- Allows advanced computations through use of function blocks
- Provides continuous measurement status for each measurement point
- Lower costs by reducing wiring, terminations, and required number of I.S. Barriers



Explore the Benefits of a Complete Point Solution from Rosemount Temperature Measurement

- Emerson offers a selection of RTDs and thermocouples that bring superior durability and Rosemount reliability to temperature sensing
- A broad thermowell offering meets the demanding requirements of a variety of process applications



Experience Global Consistency and Local Support from Worldwide Rosemount Temperature Manufacturing sites

- World-class manufacturing provides globally consistent product from every factory and the capacity to fulfill the needs of any project
- Experienced Instrumentation Consultants help select the right products for each temperature application
- An extensive global network of Emerson service and support personnel can be onsite when and where they are needed



The Rosemount 848T FOUNDATION fieldbus Temperature Transmitter



The Rosemount 848T offers a low cost solution for high density measurements. The 848T accepts eight independently configurable sensor inputs, and can be mounted close to the process to improve data quality. FOUNDATION fieldbus architecture allows up to 128 temperature measurements to be transmitted on a single H1 fieldbus line. Additionally, the 848T is bus-powered, further reducing the amount of required wiring to install the device. The robust design has proven itself in thousands of successful installations. Capabilities include:

- Eight independently configurable inputs, including 2- and 3-wire RTDs, thermocouples, mV, 2- and 3-wire ohms, and 4-20mA signals
- Diagnostics, including good, bad, and uncertain measurement status
- Fieldbus functionality with 8 AI blocks, 1 MAI block, 4 ISEL Blocks, and backup LAS Capabilities
- 600 Vdc isolation and integral transient protection

Table 1. Rosemount 848T FOUNDATION fieldbus Ordering Table

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description		
848T	High Density Temperature Measurement Family		
Transmitter Output			
Standard			**Standard**
F	FOUNDATION fieldbus digital signal (includes AI, MAI, and ISEL function blocks, and Backup Link Active Scheduler)		★
Product Certifications[1]		**Rosemount Junction Box required?**	
Standard			**Standard**
I1	ATEX Intrinsic Safety	No	★
I4	TIIS Intrinsically Safety	No	★
I5[2]	FM Intrinsically Safe	No	★
I6[2]	CSA Intrinsically Safe	No	★
I7	IECEx Intrinsic Safety	No	★
IA	ATEX FISCO Intrinsic Safety	No	★
IE	FM FISCO Intrinsically Safe	No	★
IF[2]	CSA FISCO Intrinsically Safe, Division 2	No	★
IG	IECEx FISCO (Intrinsic Safety)	No	★
N1	ATEX Type n (enclosure required)	Yes	★
N5	FM Class I, Division 2, and Dust Ignition-proof (enclosure required)	Yes	★
N6	CSA Class I, Division 2	No	★
N7	IECEx Type n (enclosure required)	Yes	★
NC	ATEX Type n Component (Ex nA nL)	No[3]	★
ND	ATEX Dust (enclosure required)	Yes	★
NJ	IECEx Type n Component (Ex nA nL)	No[3]	★
NK	FM Class 1, Division 2	No	★
NA	No Approval	No	★
Expanded			
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2 (JX3 enclosure required)	Yes[4]	

Table 1. Rosemount 848T FOUNDATION fieldbus Ordering Table

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Options (Include with selected model number)

Input Types		
Standard		**Standard**
S001	RTD, Thermocouple, mV, Ohm Inputs	★
S002(5)	RTDs, Thermocouple, mV, Ohm and 4–20 mA Inputs	★
Transient Protection		
Standard		**Standard**
T1	Integral Transient Protector	★
Mounting Bracket		
B6	Mounting Bracket for 2-in. pipe mounting – SST bracket and bolts	★
Enclosure Options		
Standard		**Standard**
JP1	Plastic Junction Box; No Entries	★
JP2	Plastic Box, Cable Glands (9 x M20 nickel-plated brass glands for 7.5–11.9 mm unarmored cable)	★
JP3	Plastic Box, Conduit Entries (5 Plugged Holes, suitable for installing 1/2-in. NPT fittings)	★
JA1	Aluminum Junction Box; No Entries	★
JA2	Aluminum Cable Glands (9 x M20 nickel-plated brass glands for 7.5–11.9 mm unarmored cable)	★
JA3	Aluminum Conduit Entries (5 Plugged Holes, suitable for installing 1/2-in. NPT fittings)	★
JS1	Stainless Steel Junction Box; No Entries	★
JS2	Stainless Steel Box, Cable Glands (9 x M20 nickel-plated brass glands for 7.5–11.9 mm unarmored cable)	★
JS3	Stainless Steel Box, Conduit Entries (5 Plugged Holes, suitable for installing 1/2-in. NPT fittings)	★
JX3(6)	Explosion-proof Box, Conduit Entries (4 Plugged Holes, suitable for installing 1/2-in. NPT fittings)	★
Software Configuration		
Standard		**Standard**
C1	Custom Configuration of Date, Descriptor, Message and Wireless Parameters (Requires CDS with Order)	★
Line Filter		
Standard		**Standard**
F5	50 Hz Line Voltage Filter	★
Calibration Certificate		
Standard		**Standard**
Q4	Calibration Certificate (3-Point Calibration)	★
Special Temperature Test		
Expanded		
LT	Test to -60 °F (-51.1 °C)	
Conduit Electrical Connector		
Standard		**Standard**
GE(7)	M12, 4-pin, Male Connector (eurofast®)	★
GM(7)	A size Mini, 4-pin, Male Connector (minifast®)	★
Typical Model Number: 848T F I5 S001 T1 B6 JA2		

(1) Consult factory for availability.

(2) Available only with S001 option.

(3) The Rosemount 848T ordered with component approval is not approved as a stand-alone unit. Additional system certification is required.

(4) Enclosure Option JX3 must be ordered with Product Certification Code E6. (O-ring for the JX3 enclosure rated to -20 °C).

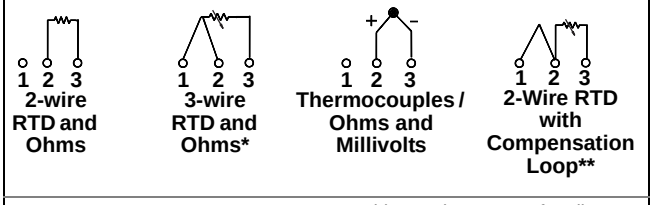
(5) S002 is only available with Product Certification N5, N6, N1, NC, NK, and NA.

(6) JX3 Explosion-proof enclosure rated to -4 °F (-20 °C).

(7) Available with no approval or Intrinsically Safe approvals only. For FM Intrinsically Safe (option code I5), install in accordance with Rosemount drawing 00848-4402.

Wiring

Rosemount 848T Sensor Wiring Diagram



* *Emerson Process Management provides 4-wire sensors for all single-element RTDs. Use these RTDs in 3-wire configurations by clipping the fourth lead or leaving it disconnected and insulated with electrical tape.*

** *The transmitter must be configured for a 3-wire RTD in order to recognize an RTD with a compensation loop.*

Standard Configuration

Unless otherwise specified, the transmitter will be shipped as follows for all eight sensors:

Standard Configuration Settings	
Sensor Type(1)	Thermocouple Type J
Damping(1)	5 seconds
Measurement Units(1)	°C
Output(1)	Linear with Temperature
Line Voltage Filter(1)	60 Hz
Temperature Specific Blocks	• Sensor Transducer Block (1)
FOUNDATION™ fieldbus Function Blocks	• Analog Input (8) • Multiple Analog Input (1) • Input Selector (4)
Input Transient Filter(1)	• Enabled

(1) For all eight sensors.

Specifications

FUNCTIONAL

Inputs

Eight independently configurable channels including combinations of 2- and 3-wire RTDs, thermocouples, mV, and 2- and 3-wire ohm inputs.

4–20 mA inputs using optional connector(s).

Outputs

Manchester-encoded digital signal that conforms to IEC 61158 and ISA 50.02.

Status

If self-diagnostics detect a sensor burnout or a transmitter failure, the status of the measurement will be updated accordingly.

Ambient Temperature Limits

–40 to 185 °F (–40 to 85 °C)

Accuracy (Pt 100 @ reference condition: 20 °C)
±0.30 °C (±0.54 °F) For the complete list see “Accuracy” on page 110.

Isolation

- 600 Vdc channel to channel isolation(1).
- 10 Vdc channel to channel isolation for all operating conditions with maximum 150 meters (500 feet) of sensor lead length 18 AWG.

Power Supply

Powered over FOUNDATION fieldbus with standard fieldbus power supplies. The transmitter operates between 9.0 and 32.0 Vdc, 22 mA maximum. (Transmitter power terminals are rated to 42.4 Vdc.)

(1) Reference conditions are -40 to 60 °C (-40 to 140 °F) with 30 meters (100 feet) of sensor lead length 18 AWG wire.

Transient Protection

The transient protector (option code T1) helps to prevent damage to the transmitter from transients induced on the loop wiring by lightning, welding, heavy electrical equipment, or switch gears. This option is installed at the factory for the Rosemount 848T and is not intended for field installation.

Update Time

Approximately 1.5 seconds to read all 8 inputs.

Humidity Limits

0–99% non-condensing relative humidity.

Turn-on Time

Performance within specifications is achieved in less than 30 seconds after power is applied to the transmitter.

Alarms

The AI and ISEL function blocks allow the user to configure the alarms to HI-HI, HI, LO, or LO-LO with a variety of priority levels and hysteresis settings.

Electromagnetic Compatibility Compliance Testing

- Meets the criteria under European Union Directive 2004/108/EC
- Meets the criteria under IEC 61326: 2006

Stability

- ±0.1% of reading or 0.1 °C (0.18 °F), whichever is greater, for 2 years for RTDs.
- ±0.1% of reading or 0.1 °C (0.18 °F), whichever is greater, for 1 year for thermocouples.

Self Calibration

The transmitter’s analog-to-digital circuitry automatically self-calibrates for each temperature update by comparing the dynamic measurement to extremely stable and accurate internal reference elements.

Vibration Effect

Transmitters are tested to high pipeline vibration specification per IEC 60770-1 1999 with no effect on performance.

Backup Link Active Scheduler (LAS)

The transmitter is classified as a device link master, which means it can function as a Link Active Scheduler (LAS) if the current link master device fails or is removed from the segment.

The host or other configuration tool is used to download the schedule for the application to the link master device. In the absence of a primary link master, the transmitter will claim the LAS and provide permanent control for the H1 segment.

Software Upgrade in the Field

Software for the Rosemount 848T with FOUNDATION fieldbus is easy to upgrade in the field using the FOUNDATION fieldbus Common Device Software Download procedure.

FOUNDATION fieldbus Parameters

Schedule Entries	20
Links	30
Virtual Communications Relationships (VCR)	20

PHYSICAL

Mounting

The Rosemount 848T can be mounted directly onto a DIN rail or it can be ordered with an optional junction box. When using the optional junction box, the transmitter can be mounted onto a panel or a 2-in. pipe stand (with option code B6).

Entries for Optional Junction Box

No Entry

- Used for custom fittings

Cable Gland

- 9 x M20 nickel-plated brass glands for 7.5–11.9 mm unarmored cable

Conduit

- 5 plugged 0.86-in. diameter holes suitable for installing $^1/_2$-in. NPT fittings

Materials of Construction for Optional Junction Box

Junction Box Type	Paint
Aluminum	Epoxy Resin
Plastic	NA
Stainless Steel	NA
Aluminum Explosion-proof	NA

Weight

Assembly	Weight		
	oz	lb	kg
Rosemount 848T only	7.5	.47	.208
Aluminum(1)	78.2	4.89	2.22
Plastic(1)	58.1	3.68	1.65
Stainless Steel (1)	77.0	4.81	2.18
Aluminum Explosion-proof	557	34.8	15.5

(1) Add 35.2 oz (2.2 lb, 0.998 kg) for nickel-plated brass glands.

Environmental Ratings

Type 4X and IP66 with optional junction box. JX3 Explosion-proof enclosure rated to -4 °F (-20 °C).

FUNCTION BLOCKS

Analog Input (AI)

- Processes the measurement and makes it available on the fieldbus segment.
- Allows filtering, alarming, and engineering unit changes.

Input Selector (ISEL)

- Used to select between inputs and generate an output using specific selection strategies such as minimum, maximum, midpoint, or average temperature.
- Since the temperature value always contains the measurement status, this block allows the selection to be restricted to the first “good” measurement.

Multiple Analog Input Block (MAI)

- The MAI block allows the eight AI blocks to be multiplexed together so they serve as one function block on the H1 segment, resulting in greater network efficiency.

ACCURACY

Table 2. Input Options/Accuracy

Sensor Option	Sensor Reference	Input Ranges		Accuracy Over Range(s)	
		°C	°F	°C	°F
2- and 3-Wire RTDs					
Pt 50 (α = 0.00391)	GOST 6651-94	–200 to 550	–328 to 1022	± 0.57	± 1.03
Pt 100 (α = 0.00391)	GOST 6651-94	–200 to 550	–328 to 1022	± 0.28	± 0.50
Pt 100 (α = 0.00385)	IEC 751; α = 0.00385, 1995	–200 to 850	–328 to 1562	± 0.30	± 0.54
Pt 100 (α = 0.003916)	JIS 1604, 1981	–200 to 645	–328 to 1193	± 0.30	± 0.54
Pt 200 (α = 0.00385)	IEC 751; α = 0.00385, 1995	–200 to 850	–328 to 1562	± 0.54	± 0.98
Pt 200 (α = 0.003916)	JIS 1604; α = 0.003916, 1981	–200 to 645	–328 to 1193	± 0.54	± 0.98
Pt 500	IEC 751; α = 0.00385, 1995	–200 to 850	–328 to 1562	± 0.38	± 0.68
Pt 1000	IEC 751; α = 0.00385, 1995	–200 to 300	–328 to 572	± 0.40	± 0.72
Ni 120	Edison Curve No. 7	–70 to 300	–94 to 572	± 0.30	± 0.54
Cu 10	Edison Copper Winding No. 15	–50 to 250	–58 to 482	± 3.20	± 5.76
Cu 100 (a=428)	GOST 6651-94	-185 to 200	-301 to 392	± 0.48	±0.86
Cu 50 (a=428)	GOST 6651-94	-185 to 200	-301 to 392	± 0.96	±1.73
Cu 100 (a=426)	GOST 6651-94	-50 to 200	-58 to 392	± 0.48	±0.86
Cu 50 (a=426)	GOST 6651-94	-50 to 200	-58 to 392	± 0.96	±1.73
Thermocouples—Cold Junction Adds + 0.5 °C to Listed Accuracy					
NIST Type B (Accuracy varies according to input range)	NIST Monograph 175	100 to 300 301 to 1820	212 to 572 573 to 3308	± 6.00 ± 1.54	± 10.80 ± 2.78
NIST Type E	NIST Monograph 175	–200 to 1000	–328 to 1832	± 0.40	± 0.72
NIST Type J	NIST Monograph 175	–180 to 760	–292 to 1400	± 0.70	± 1.26
NIST Type K	NIST Monograph 175	–180 to 1372	–292 to 2502	± 1.00	± 1.80
NIST Type N	NIST Monograph 175	–200 to 1300	–328 to 2372	± 1.00	± 1.80
NIST Type R	NIST Monograph 175	0 to 1768	32 to 3214	± 1.50	± 2.70
NIST Type S	NIST Monograph 175	0 to 1768	32 to 3214	± 1.40	± 2.52
NIST Type T	NIST Monograph 175	–200 to 400	–328 to 752	± 0.70	± 1.26
DIN L	DIN 43710	–200 to 900	–328 to 1652	± 0.70	± 1.26
DIN U	DIN 43710	–200 to 600	–328 to 1112	± 0.70	± 1.26
w5Re26/W26Re	ASTME 988-96	0 to 2000	32 to 3632	± 1.60	± 2.88
Type L	GOST R 8.585-2001	-200 to 800	-328 to 1472	± 0.71	±1.28
Terminal Temperature		-50 to 85	-58 to 185	±0.50	±0.90
Millivolt Input—Not approved for use with CSA Option Code I6		–10 to 100 mV		± 0.05 mV	
2- and 3-Wire Ohm Input		0 to 2000 ohms		± 0.90 ohm	
4–20 mA (Rosemount)(1)		4–20 mA		± 0.01 mA	
4–20 mA (NAMUR)(1)		4–20 mA		± 0.01 mA	

(1) Requires the S002 option code.

Differential Configuration Notes

Differential capability exists between any two sensor types.

For all differential configurations, the input range is X to Y where

X = Sensor A minimum - Sensor B max.
Y = Sensor A maximum - Sensor B min.

Accuracy for Differential Configurations:

If sensor types are similar (for example, both RTDs or both thermocouples), the accuracy = 1.5 times worst case accuracy of either sensor type. If sensor types are dissimilar (for example, one RTD and one thermocouple), the accuracy = Sensor 1 Accuracy + Sensor 2 Accuracy.

Analog Sensors 4–20mA

Two types of 4–20 mA sensors are compatible with the Rosemount 848T. These types must be ordered with the S002 option code complete with an analog connector kit. The alarm levels, accuracy for each type are listed in Table 3.

Table 3. Analog Sensors

Sensor Option	Alarm Levels	Accuracy
4–20mA (Rosemount Standard)	3.9 to 20.8 mA	± 0.01mA
4–20mA (NAMUR)	3.8 to 20.5 mA	± 0.01mA

AMBIENT TEMPERATURE EFFECT

Transmitters may be installed in locations where the ambient temperature is between –40 and 85 °C (–40 and 185 °F).

Table 4. Ambient Temperature Effects

NIST Type	Accuracy per 1.0 °C (1.8 °F) Change in Ambient Temperature(1)	Temperature Range (°C)
RTD		
Pt 50 (α = 0.00391)	• 0.004 °C (0.0072 °F)	NA
Pt 100 (α = 0.00391)	• 0.002 °C (0.0036 °F)	NA
Pt 100 (α = 0.00385)	• 0.003 °C (0.0054 °F)	NA
Pt 100 (α = 0.003916)	• 0.003 °C (0.0054 °F)	NA
Pt 200 (α = 0.003916)	• 0.004 °C (0.0072 °F)	NA
Pt 200 (α = 0.00385)	• 0.004 °C (0.0072 °F)	NA
Pt 500	• 0.003 °C (0.0054 °F)	NA
Pt 1000	• 0.003 °C (0.0054 °F)	NA
Cu 10	• 0.03 °C (0.054 °F)	NA
Cu 100 (a=428)	• 0.002 °C (0.0036 °F)	NA
Cu 50 (a=428)	• 0.004 °C (.0072 °F)	NA
Cu 100 (a=426)	• 0.002 °C (0.0036 °F)	NA
Cu 50 (a=426)	• 0.004 °C (.0072 °F)	NA
Ni 120	• 0.003 °C (0.0054 °F)	NA
Thermocouple (R = the value of the reading)		
Type B	• 0.014 °C • 0.032 °C - (0.0025% of (R - 300)) • 0.054 °C - (0.011% of (R - 100))	• R ≥ 1000 • 300 ≤ R < 1000 • 100 ≤ R < 300
Type E	• 0.005 °C + (0.00043% of R)	• All
Type J, DIN Type L	• 0.0054 °C + (0.00029% of R) • 0.0054 °C + (0.0025% of |R|)	• R ≥ 0 • R < 0
Type K	• 0.0061 °C + (0.00054% of R) • 0.0061 °C + (0.0025% of |R|)	• R ≥ 0 • R < 0
Type N	• 0.0068 °C + (0.00036% of R)	• All
Type R, Type S	• 0.016 °C • 0.023 °C - (0.0036% of R)	• R ≥ 200 • R < 200
Type T, DIN Type U	• 0.0064 °C • 0.0064 °C - (0.0043% of |R|)	• R ≥ 0 • R < 0
GOST Type L	• 0.007 °C • 0.007 °C + (0.003% of IRI)	• R ≥ 0 • R < 0
Millivolt	• 0.0005 mV	NA
2- and 3-wire Ohm	• 0.0084 ohms	NA
4–20 mA (Rosemount)	• 0.0001 mA	NA
4-20 mA (NAMUR)	• 0.0001 mA	NA

(1) Change in ambient is in reference to the calibration temperature of the transmitter (20 °C (68 °F) typical from the factory).

Ambient Temperature Notes

Examples:

When using a Pt 100 (α = 0.00385) sensor input at 30 °C ambient temperature:

- Ambient Temperature Effects: 0.003 °C x (30 - 20) = 0.03 °C
- Worst Case Error: Sensor Accuracy + Ambient Temperature Effects = 0.30 °C + 0.03 °C = 0.33 °C
- Total Probable Error $\sqrt{0.30^2 + 0.03^2} = 0.30°C$

Product Certifications

HAZARDOUS LOCATIONS CERTIFICATIONS

North American Certifications

Factory Mutual (FM) Approvals

I5 Intrinsically Safe and Non-Incendive
Intrinsically Safe for use in Class I, Division 1, Groups A, B,C, D; when installed per Rosemount drawing 00848-4404.
Temperature Code:
T4 (T_{amb} = –40 to 60 °C)
Non-Incendive for use in Class I, Division 2, Groups A, B, C, D (suitable for use with Non-Incendive field wiring) when installed in accordance with Rosemount Drawing 00848-4404.
Temperature Code:
T4A (T_{amb} = -40 to 85 °C)
T5 (T_{amb} = -40 to 70 °C)
Rosemount Enclosure Required.
Indoor Hazardous (Classified) Locations.

Table 5. FM Approved Entity Parameters

Power/Bus	Sensor(1)
V_{max} = 30 V	V_{OC} = 12.5 V
I_{max} = 300 mA	I_{SC}= 4.8 mA
P_i = 1.3 W	P_o = 15 mW
C_i = 2.1 nF	C_A = 1.2 µF
L_i = 0	L_A = 1 H

(1) Entity parameters apply to entire device, not individual sensor channels.

Table 6. Entity Parameters for Non Incendive Field Wiring

Power/Bus	Sensor(1)
V_{max} = 42.4 V	V_{OC} = 12.5 V
C_i = 2.1nF	I_{SC} = 4.8 mA
L_i = 0	P_o = 15 mW
	C_A = 1.2 µF
	L_A = 1 H

(1) Entity parameters apply to entire device, not individual sensor channel.

IE FISCO (Fieldbus Intrinsically Safe Concept) Intrinsic Safety
Intrinsically safe for use in Class I, Division 1, Groups A, B,C, D; when installed in accordance with Rosemount Drawing 00848-4404.
Temperature Code:
T4 (T_{amb} = –40 to 60 °C)
Non-incendive for use in Class I, Division 2, Groups A, B, C, D (suitable for use with non-incendive field wiring); when installed in accordance with Rosemount Drawing 00848-4404.
Temperature Code:
T4A (T_{amb} = –40 to 85 °C)
T5 (T_{amb} = –40 to 70 °C)

Table 7. Entity Parameters

Power/Bus	Sensor(1)
V_{max} = 17.5 V	V_{OC} = 12.5 V
I_{max} = 380 mA	I_{SC} = 4.8 mA
P_i = 5.32 W	P_o = 15 mW
C_i = 2.1nF	C_A = 1.2 µF
L_i = 0	L_A = 1 H

(1) Entity parameters apply to entire device, not individual sensor channels.

N5 Dust Ignition-Proof
For use in Class II, III, Division 1, Groups E, F, G. Class I, Division 2, Groups A, B, C, D;
Non-incendive for Class 1, Division 2, Groups A, B, C, D when installed to Rosemount Control Drawing 00848-4404.
Rosemount Enclosure Required.
Valid with both S001 and S002 options.
Temperature Code:
T4A (T_{amb} = –40 to 85 °C)
T5 (T_{amb} = –40 to 70 °C)

NK Non-Incendive for use in Class I, Division 2, Groups A, B, C, D (suitable for use with Non-Incendive field wiring) when installed in accordance with Rosemount Drawing 00848-4404.
Temperature Code:
T4A (T_{amb} = -40 to 85 °C)
T5 (T_{amb} = -40 to 70 °C)
Rosemount Enclosure Required.
Indoor Hazardous (Classified) Locations.

Table 8. FM Approved Entity Parameters(1)

Power/Bus	Sensor
V_{max} = 42.4 V	V_{OC} = 12.5 V
C_i = 2.1 µF	I_{SC} = 4.8 mA
L_i = 0 H	P_o = 15 mW
	C_A = 1.2 µF
	L_A = 1 H

(1) Intrinsically safe and non-incendive parameters

Canadian Standards Association (CSA) Approvals

E6 Explosion-Proof and Dust Ignition-Proof
Class I, Division 1, Groups B, C, and D.
Class II, Division 1, Groups E, F, and G.
Class III
Must be installed in enclosure option JX3.
Install per drawing 00848-1041.
Conduit seal not required.
Suitable for use in Class I, Division 2, Groups A, B, C, D. when installed per Rosemount drawing 00848-4405.
Temperature Code:
T3C = (– 50 ≤ T_{amb} ≤ 60 °C)
Must be installed in a suitable enclosure as determined acceptable by the local inspection authority.

I6 Intrinsically Safe, Division 2
For use in Class I, Division 1, Groups A, B, C, D; when installed per Rosemount drawing 00848-4405.
Temperature Code:
T3C (T_{amb} = –50 to 60 °C)
Suitable for Class I, Division 2, Groups A, B, C, D. Rated 42.4 VDC max. Not valid with S002 option.

Table 9. CSA Approved Entity Parameters

Power/Bus	Sensor(1)
V_{max} = 30 V	V_{OC} = 12.5 V
I_{max} = 300 mA	I_{SC} = 4.8 mA
C_i = 2.1nF	P_o = 15 mW
L_i = 0	C_A = 1.2 µF
	L_A = 1 H

(1) Entity parameters apply to entire device, not individual sensor channels.

IF FISCO (Intrinsically Safe)
For use in Class I, Division 1, Groups A, B, C, D; when installed per Rosemount drawing 00848-4405.
Temperature Code:
T3C (T_{amb} = –50 to 60 °C)
Suitable for Class I, Division 2, Groups A, B, C, D.Rated 42.4 VDC max. Not valid with S002 option.

Table 10. CSA Approved Entity Parameters

Power/Bus	Sensor(1)
U_i = 17.5 V	V_{OC} = 12.5 V
I_i = 380 mA	I_{SC} = 4.8 mA
P_i = 5.32 W	P_o = 15 mW
C_i = 2.1nF	C_a = 1.2 µF
L_i = 0	L_a = 1 H

(1) Entity parameters apply to entire device, not individual sensor channels.

N6 Class I, Division 2
Suitable for use in Class I, Division 2, Groups A, B, C, D. when installed per Rosemount drawing 00848-4405.
Temperature Code:
T3C = (–50 ≤ T_a ≤ 60 °C)
Must be installed in a suitable enclosure as determined acceptable by the local inspection authority.

European Certifications

ATEX Approvals

I1 Intrinsic Safety
Certification Number: Baseefa09ATEX0093X
ATEX Marking ⟨Ex⟩ II 1 G
Ex ia IIC T4 (T_{amb} = –50 to 60 °C)
CE 1180

Table 11. ATEX Approved Entity Parameters

Power/Bus	Sensor(1)
U_i = 30 V	U_o = 12.5 V
I_i = 300 mA	I_o = 4.8 mA
P_i = 1.3 W	P_o = 15 mW
C_i = 0	C_i = 1.2 µF
L_i = 0	L_i = 1 H

(1) Entity parameters apply to entire device, not individual sensor channels.

SPECIAL CONDITIONS FOR SAFE USE (X):
1. This apparatus must be installed in an enclosure which affords it a degree of protection of at least IP20. Non-metallic enclosures must have a surface resistance of less than 1 Gohm. Light alloy or zirconium enclosures must be protected from impact and friction when installed.
2. The apparatus will not meet the 500 Vrms isolation test required by Clause 6.4.12 in EN 60079-11:2007. This must be taken into account when installing the apparatus.

IA FISCO (Fieldbus Intrinsically Safe Concept) Intrinsic Safety
Certificate Number: BASEEFA09ATEX0093X
ATEX Marking ⟨Ex⟩ II 1 G
Ex ia IIC T4 (T_{amb} = –50 to 60 °C)
CE 1180

Table 12. ATEX Approved Entity Parameters

Power/Bus	Sensor
U_i = 17.5 V	U_o = 12.5 V
I_i = 380 mA	I_o = 4.8 mA
P_i = 5.32 W	P_o = 15 mW
C_i = 0	C_i = 1.2 µF
L_i = 0	L_i = 1 H

SPECIAL CONDITIONS FOR SAFE USE (X):
1. This apparatus must be installed in an enclosure which affords it a degree of protection of at least IP20. Non-metallic enclosures must have a surface resistance of less than 1 Gohm. Light alloy or zirconium enclosures must be protected from impact and friction when installed.
2. The apparatus will not meet the 500 V rms isolation test required by Clause 6.4.12 in EN 60079-11:2007. This must be taken into account when installing the apparatus.

NE ATEX TYPE 'n' APPROVAL
Certification Number: BASEFFA09ATEX0095X
ATEX Marking ⟨Ex⟩ II 3 G
Ex nA nL IIC T5 (T_{amb} = –40 to 65 °C)

Table 13. ATEX Approved Entity Parameters

Power/Bus	Sensor
U_i = 42.4 Vdc	U_o = 5 Vdc
C_i = 0	I_o = 2.5 mA
L_i = 0	C_o = 1000 μF
	L_o = 1 H

SPECIAL CONDITIONS FOR SAFE USE (X):
1. Provisions shall be made, external to the apparatus to prevent the rated voltage (42.4 Vdc) from being exceeded by transient disturbances of more than 40%.
2. The ambient temperature range of use shall be the most restrictive of the apparatus, cable gland, or blanking plug.

NOTE:
NE is valid with S001 Input Type ONLY

N1 ATEX Type n
Certification Number: Baseefa09ATEX0095X
ATEX Marking ⟨Ex⟩ II 3 G
Ex nL IIC T5 (T_{amb} = –40 to 65 °C)

Table 14. Entity Parameters

Power/Bus	Sensor
U_i = 42.4 Vdc	U_o = 12.5 Vdc
C_i = 0	I_o = 4.8 mA
L_i = 0	P_o = 15 mW
	C_o = 1.2 μF
	L_o = 1 H

SPECIAL CONDITIONS FOR SAFE USE (X):
1. Provisions shall be made, external to the apparatus, to prevent the rated voltage of the apparatus supply is not exceeded by transient disturbances of more than 40%
2. The electrical circuit is connected directly to earth; this must be taken into account when installing the apparatus.

NC ATEX Type n Component
Certification Number: Baseefa09ATEX0094U
ATEX Marking ⟨Ex⟩ II 3 G
Ex nA nL IIC T4 (T_{amb} = –50 to 85 °C)
Ex nA nL IIC T5 (T_{amb} = –50 to 70 °C)

NOTE:
NC IS VALID WITH S001 INPUT TYPE ONLY

SPECIAL CONDITIONS FOR SAFE USE (X):
1. The component must be housed in a suitable certified enclosure that provides a degree of protection of at least IP54 and meets the relevant material and environmental requirements of EN 60079-0, and EN-60079-15.
2. Provisions shall be made, external to the apparatus, to prevent the rated voltage (42.4 Vdc) being exceeded by transient disturbances of more than 40%.
3. The electrical circuit is connected directly to earth: this must be taken into account when installing the apparatus.

ND ATEX Dust Ignition Proof
Certification Number: BAS01ATEX1315X
ATEX Marking ⟨Ex⟩ II 1 D
T90C (T_{amb} = – 40 to 65 °C) IP66

SPECIAL CONDITIONS FOR SAFE USE (X):
1. The user must ensure that the maximum rated voltage and current (42.4 Vdc, 22 mA) are not exceeded. All connections to other apparatus or associated apparatus shall have control over this voltage and current equivalent to a category "ib" circuit according to EN 60079-11:2007.
2. Component approved Ex e cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
3. Any unused cable entry holes must be filled with component approved Ex e blanking plugs.
4. The ambient temperature range of use shall be the most restrictive of the apparatus, cable gland, or blanking plug.

IECEx Certifications

I7 IECEx Intrinsic Safety
Certificate No.: IECExBAS09.0030X
Ex ia IIC T4 (T_{amb} = –50 to 60 °C)

Table 15. IECEx Approved Entity Parameters

Power/Bus	Sensor
U_i = 30 V	U_o = 12.5 V
I_i = 300 mA	I_o = 4.8 mA
P_i = 1.3 W	P_o = 15 mW
C_i = 2.1 µF	C_i = 1.2 µF
L_i = 0	L_i = 1 H

SPECIAL CONDITIONS OF SAFE USE (X):

1. The apparatus must be installed in an enclosure that provides a degree of protection of at least IP20. Non-metallic enclosures must be suitable to prevent electrostatic hazards and light alloy or zirconium enclosures must be protected from impact and friction when installed.
2. The apparatus is not capable of withstanding the 500 V isolation test required by IEC 60079-11: 2006 clause 6.3.12. This must be taken into account when installing the apparatus.

IG IECEx FISCO
Certificate No.: IECExBAS09.0030X
Ex ia IIC T4 (T_{amb} = – 50 to 60 °C)

Table 16. IECEx Approved Entity Parameters

Power/Bus	Sensor
U_i =17.5 V	U_o = 12.5 V
I_i = 380 mA	I_o = 4.8 mA
P_i = 5.32 W	P_o = 15 mW
C_i = 2.1 µF	C_i = 1.2 µF
L_i = 0	L_i = 1 H

SPECIAL CONDITIONS OF SAFE USE (X):

1. The apparatus must be installed in an enclosure that provides a degree of protection of at least IP20. Non-metallic enclosures must be suitable to prevent electrostatic hazards and light alloy or zirconium enclosures must be protected from impact and friction when installed.
2. The apparatus is not capable of withstanding the 500 V isolation test required by IEC 60079-11: 2006 clause 6.3.12. This must be taken into account when installing the apparatus.

N7 IECEx Type n Approval
Certificate No.” IECExBAS09.0032X
Ex Na nL IIC T5 (T_{amb} = – 40 to 65 °C)

NOTE:
N7 is valid with S001 and S002 Input Types

Table 17. IECEx Approved Entity Parameters

Power/Bus	Sensor
U_i = 42.4 Vdc	U_o = 5 Vdc
C_i = 0	I_o = 2.5 mA
L_i = 0	C_o = 1000 µF
	L_o = 1000 mH

SPECIAL CONDITIONS OF SAFE USE:

1. The component must be housed in a suitable component certified enclosure that provides a degree of protection of at least IP54 and meets the relevant material and environmental requirements of IEC 60079-0: 2004 & IEC 60079-15: 2005.
2. Provision must be made, external to the component, to ensure the rated voltage of the component supply is not exceeded by transient disturbances of more than 40%.
3. The electrical circuit is connected directly to earth; this must be taken into account when installing the component.

NJ IECEx Type n COMPONENT Approval
Certification Number: IECExBAS09.0031U
EEx nA nL IIC T4 (T_{amb} = -50 to 85 °C)
EEx nA nL IIC T5 (T_{amb} = -50 to 70 °C)

NOTE:
NJ is valid with S001 and S002 Input Types

Table 18. IECEx Approved Entity Parameters

Power/Bus	Sensor
U_i = 42.4 Vdc	U_o = 5 Vdc
C_i = 0	I_o = 2.5 mA
L_i = 0	C_o = 1000 µF
	L_o = 1000 mH

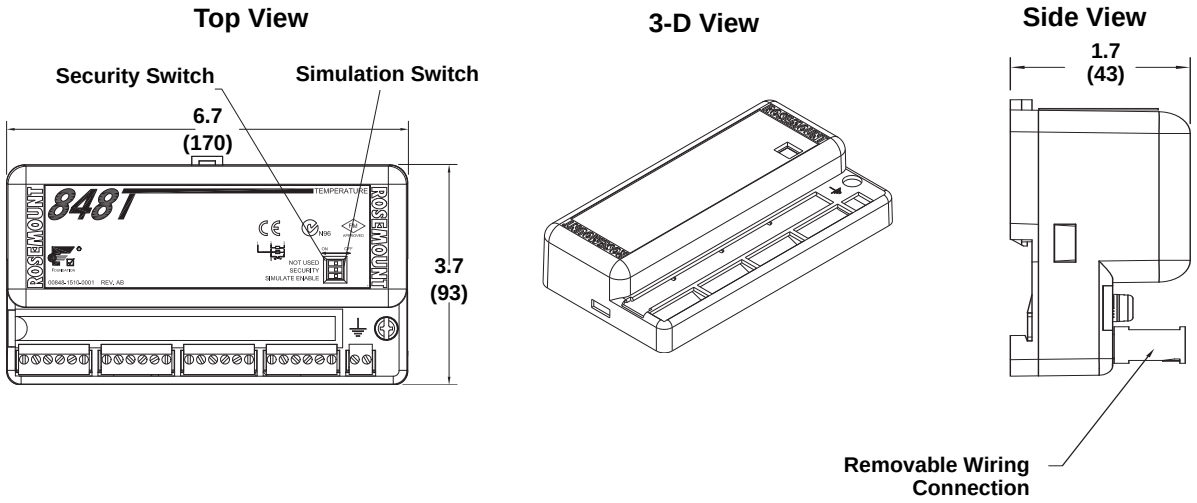
SPECIAL CONDITIONS OF SAFE USE:

1. The component must be housed in a suitable component certified enclosure that provides a degree of protection of at least IP54 and meets the relevant material and environmental requirements of IEC 60079-0: 2004 & IEC 60079-15: 2005.
2. Provision must be made, external to the component, to ensure the rated voltage of the component supply is not exceeded by transient disturbances of more than 40%.
3. The electrical circuit is connected directly to earth; this must be taken into account when installing the component.

Dimensional Drawings

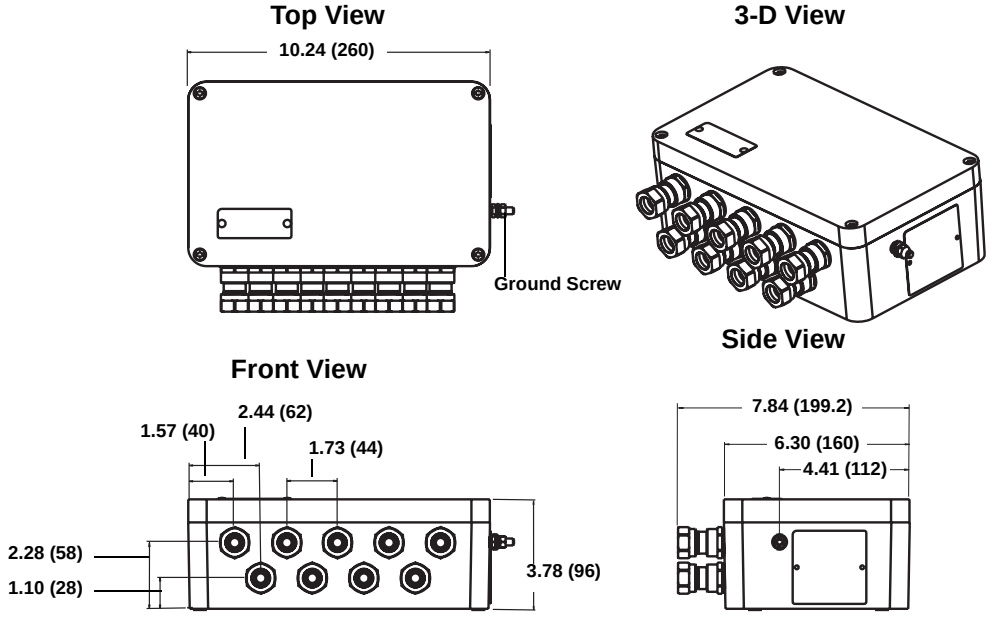
Junction Boxes with no entries (option codes JP1, JA1, and JS1) – external dimensions are the same as those outlined for the other junction box materials in this section.

Rosemount 848T



Dimensions are in inches (millimeters)

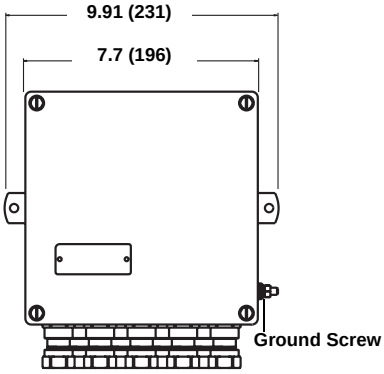
Aluminum/Plastic Junction Box—Cable Gland (option codes JA2 and JP2)



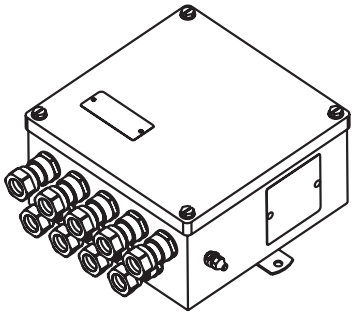
Dimensions are in inches (millimeters)

Stainless Steel Junction Box—Cable Gland (option code JS2)

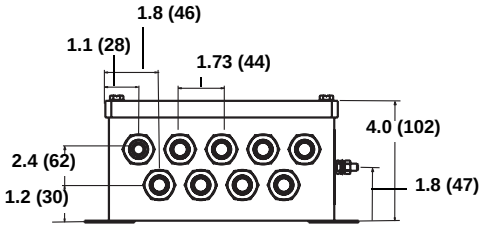
Top View



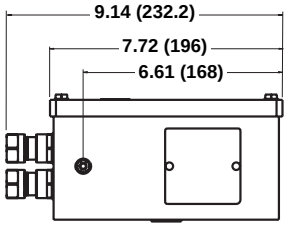
3-D View



Front View



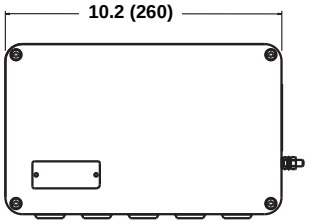
Side View



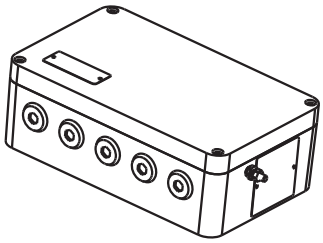
Dimensions are in inches (millimeters)

Aluminum/Plastic Junction Box—Conduit Entry (option codes JA3 and JP3)

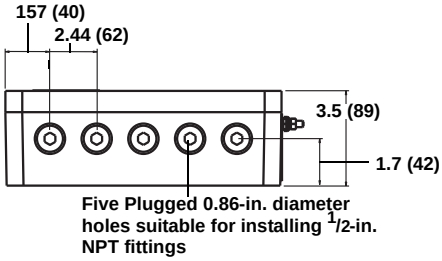
Top View



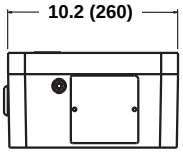
3-D View



Front View

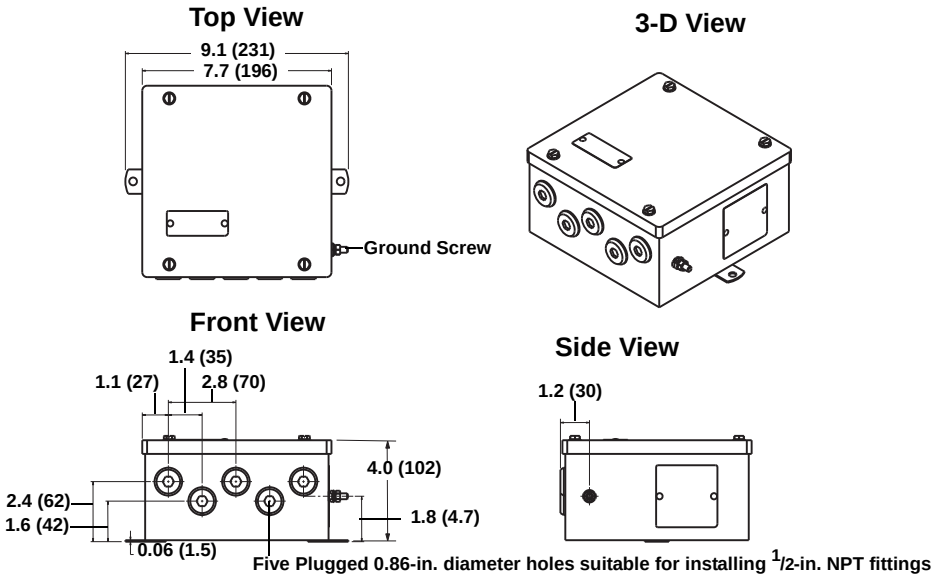


Side View



Dimensions are in inches (millimeters)

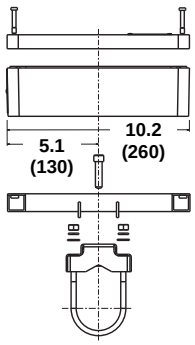
Stainless Steel Junction Box—Conduit Entry (option code JS3)

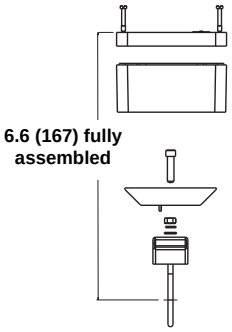


Dimensions are in inches (millimeters)

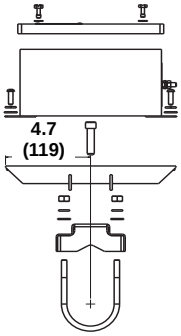
MOUNTING OPTIONS

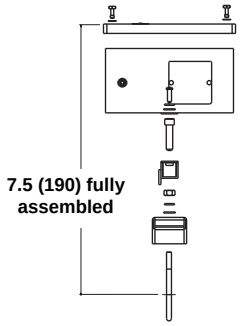
Aluminum/Plastic Junction Box (styles JA and JP)





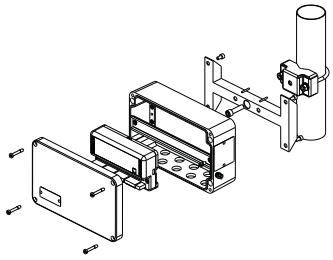
Stainless Steel Junction Box (style JS)



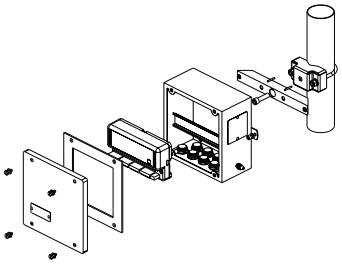


Dimensions are in inches (millimeters)

Aluminum/Plastic Junction Box Mounted on a Vertical Pipe



Stainless Steel Junction Box Mounted on a Vertical Pipe



The Rosemount 848T Wireless Temperature Transmitter



The Rosemount 848T is the premier choice for Wireless High Density measurements. Four independently configurable inputs are transmitted through WirelessHART. Revisions 3 and higher offer voltage inputs up to 1000 mV, allowing for expanded voltage measuring capabilities.Costs per point are dramatically reduced through the use of smart wireless networks, with the same reliability and security of wired solutions. Additionally, the field hardened enclosure is suitable for installation in IS areas. Capabilities include:

- Four independently configurable inputs, including 2-,3-,and 4-wire RTDs, thermocouples, mV, 2-, 3-, and 4-wire ohm, and 4-20mA signals
- Intrinsically safe, long lasting Power Module, which utilizes Emerson's SmartPower™ Technology
- Configurable high and low alerts to improve process performance
- Easy to use Device Dashboard, used to configure, monitor, and troubleshoot the 848T Wireless

Table 19. Rosemount 848T Wireless Transmitter Ordering Table

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
848T	High Density Temperature Measurement Family	
Transmitter Output		
Standard		**Standard**
X	Wireless	★
Product Certifications		
Standard		**Standard**
I1	ATEX Intrinsic Safety	★
I5	FM Intrinsically Safe	★
I6	CSA Intrinsically Safe	★
I7	IECEx Intrinsic Safety	★
N5	FM Class I, Division 2, and Dust Ignition-proof (enclosure required)	★
N6	CSA Class I, Division 2	★
NA	No Approval	★
Input Type		
Standard		**Standard**
S001	RTD, Thermocouple, mV, Ohm Inputs	★
S002(1)	RTD, Thermocouple, mV, Ohm and 4–20 mA Inputs	★

Options (Include with selected model number)

Wireless Burst Rate, Operating Frequency and Protocol		
Standard		**Standard**
WA3(2)	User Configurable Burst Rate, 2.4 GHz DSSS WirelessHART	★
Omnidirectional Wireless Antenna and SmartPower		
WK1(3)	Long Range, Integral Antenna, Power Module Adapter, Intrinsically Safe (Power Module separate)	★
WM1(3)	Extended Range, Integral Antenna, Power Module Adapter, Intrinsically Safe (Power Module separate)	★
Mounting Bracket		
Standard		**Standard**
B6	Mounting Bracket for 2-in. pipe mounting - SST bracket and bolts	★
Enclosure Options		
Standard		**Standard**
HA1(4)	Aluminum with Cable Glands (5 x 1/2-in. NPT for 7.5 - 11.9 mm)	★
HA2(4)	Aluminum with Conduit Entries (5 plugged holes, suitable for installing 1/2-in. NPT fittings)	★

Table 19. Rosemount 848T Wireless Transmitter Ordering Table

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Software Configuration		
Standard		**Standard**
C1	Custom Configuration of Date, Descriptor, Message and Wireless Parameters (Required CDS with order)	★
Line Filter		
Standard		**Standard**
F5	50 Hz Line Voltage Filter	★
5-Point Calibration		
Expanded		
C4	5-Point Calibration (Requires Q4 option code to generate a Calibration Certificate)	
Calibration Certificate		
Standard		**Standard**
Q4	Calibration Certificate (3-Point Calibration)	★
Typical Model Number: 848T X I5 S001 WA3 WK1 B6 HA1		

(1) Only available with product certifications NA and N5. Stable resistors included.

(2) Required for wireless.

(3) WK1 or WM1 required for wireless

(4) HA1 or HA2 required for wireless.

WirelessHART... The Industry Standard

Self-Organizing, Adaptive Mesh Routing

- No wireless expertise required, devices automatically find the best communication paths
- Network continuously monitors paths for degradation and repairs itself
- Adaptive behavior provides reliable, hands-off operation and simplifies network deployments, expansion and reconfiguration
- Supports both star and mesh topologies

Industry Standard Radio with Channel Hopping

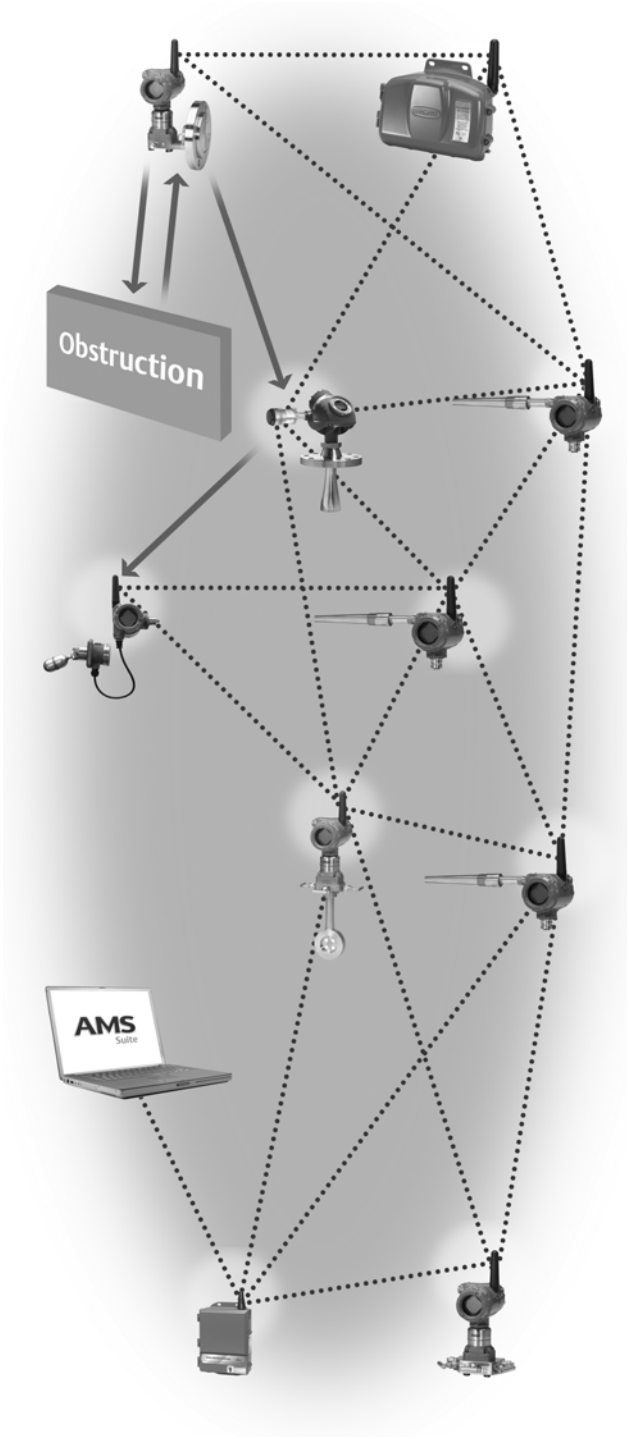
- Standard IEEE 802.15.4 radios
- 2.4 GHz ISM band sliced into 16 radio-channels
- Continually “hop” across channels to avoid interference and increase reliability
- Frequency hopping spread spectrum (FHSS) technology delivers high reliability in challenging radio environment

Self-Healing Network

- If an obstruction is introduced into the mesh network, devices will automatically find the best alternate communication path
- This allows the network to instantly change to the new path without any loss in data

Seamless Integration to Existing Hosts

- Transparent and seamless integration
- Same control system applications
- Gateways connect using industry protocols



Specifications

Functional Specifications

Input

Four independently configurable input channels that supports Thermocouple, RTD, mV, ohm, and 4–20 mA input types. See “Accuracy” on page 123 for sensor options.

Output

WirelessHART 2.4 GHz DSSS.

Ambient Temperature Limits

–40 to 85 °C (–40 to 185 °F)

Humidity Limits

0–99% non-condensing relative humidity

Update Rate

User selectable, 4 sec to 60 min.

Accuracy (Pt 100 @ reference condition: 20 °C)

±0.30 °C (±0.54 °F) For the complete list see “Accuracy” on page 123.

Isolation

Isolation between all sensor channels is rated to 10 Vdc over all operating conditions. No damage will occur to the device with up to 250 Vdc between any sensor channels.

Alerts

Message sent when open or short sensor is detected.

ElectroMagnetic Compatibility (EMC)

- Meets the criteria under European Union Directive 2004/108/EC
- Meets all relevant requirements of EN 61326.

Transmitter Stability

- ±0.15% of reading or 0.15 °C (0.27 °F), whichever is greater, for 2 years for RTDs.
- ±0.15% of reading or 0.15 °C (0.27 °F), whichever is greater, for 1 year for thermocouples.

Self Calibration

The analog-to-digital measurement circuitry automatically self-calibrates for each temperature update by comparing the dynamic measurement to extremely stable and accurate internal reference elements.

Vibration Effect

Tested to high pipeline vibration specifications per IEC 60770-1 1999 with no effect on performance.

Physical Specifications

Electrical Connections

Power Module

Field replaceable, keyed connection eliminates the risk of incorrect installation. Intrinsically Safe Lithium-thionyl chloride Power Module with polybutadine terephthalate (PBT) enclosure. Six-year life at one minute update rate.(1)

Sensor Terminals

Sensor terminals permanently fixed to terminal block

Field Communicator Connections

Communication Terminals

Clips permanently fixed to terminal block

Materials of Construction

Enclosure

Housing - Low-copper aluminum
Paint - Polyurethane
Cover O-ring - Silicone

Terminal Block and Power Module

PBT

Antenna

PBT/Polycarbonate (PC) integrated omnidirectional antenna

Mounting

Transmitter can panel mounted, or be mounted onto a 2-in. pipe stand (with option code B6). Sensors must be remotely mounted, as transmitter conduit entries are not designed for direct sensor mounting.

Weight

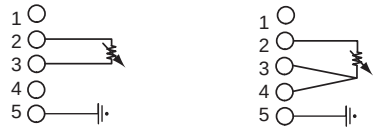
848T Wireless - 4.75 lbs. (2.15 kg)

Enclosure Ratings (848T Wireless)

Housing option codes HA1 or HA2 are Type 4x and IP66.

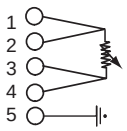
Sensor Connections

848T Wireless Sensor Connections Diagram

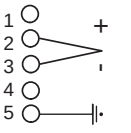


2-wire RTD and Ω

3-wire RTD and Ω



4-wire RTD and Ω



Thermocouple and mV

(1) Reference conditions are 68 °F (20 °C), and routing data for three additional network devices.
NOTE: Continuous exposure to ambient temperature limits (-40 °F or 185 °F) (-40 °C or 85 °C) may reduce specified life to less than 20 percent.

ACCURACY

Table 20. Input Options/Accuracy

Sensor Option	Sensor Reference	Input Ranges		Accuracy Over Range(s)	
		°C	°F	°C	°F
2-, 3-, and 4-Wire RTDs					
Pt 50 (α = 0.00391)	GOST 6651-94	–200 to 550	–328 to 1022	± 0.57	± 1.03
Pt 100 (α = 0.00391)	GOST 6651-94	–200 to 550	–328 to 1022	± 0.28	± 0.50
Pt 100 (α = 0.00385)	IEC 751; α = 0.00385, 1995	–200 to 850	–328 to 1562	± 0.30	± 0.54
Pt 100 (α = 0.003916)	JIS 1604, 1981	–200 to 645	–328 to 1193	± 0.30	± 0.54
Pt 200 (α = 0.00385)	IEC 751; α = 0.00385, 1995	–200 to 850	–328 to 1562	± 0.54	± 0.98
PT 200 (α = 0.003916)	JIS 1604, 1981 (α = 0.003916)	–200 to 645	–328 to 1193	± 0.54	± 0.98
Pt 500 (α = 0.00385)	IEC 751; α = 0.00385, 1995	–200 to 850	–328 to 1562	± 0.38	± 0.68
Pt 1000 (α = 0.00385)	IEC 751; α = 0.00385, 1995	–200 to 300	–328 to 572	± 0.40	± 0.72
Ni 120	Edison Curve No. 7	–70 to 300	–94 to 572	± 0.30	± 0.54
Cu 10	Edison Copper Winding No. 15	–50 to 250	–58 to 482	± 3.20	± 5.76
Cu 100 (a=428)	GOST 6651-94	-185 to 200	-301 to 392	± 0.48	±0.86
Cu 50 (a=428)	GOST 6651-94	-185 to 200	-301 to 392	± 0.96	±1.73
Cu 100 (a=426)	GOST 6651-94	-50 to 200	-58 to 392	± 0.48	±0.86
Cu 50 (a=426)	GOST 6651-94	-50 to 200	-58 to 392	± 0.96	±1.73
Thermocouples—Cold Junction Adds + 0.5 °C to Listed Accuracy					
NIST Type B (Accuracy varies according to input range)	NIST Monograph 175	100 to 300 301 to 1820	212 to 572 573 to 3308	± 6.00 ± 1.54	± 10.80 ± 2.78
NIST Type E	NIST Monograph 175	–200 to 1000	–328 to 1832	± 0.40	± 0.72
NIST Type J	NIST Monograph 175	–180 to 760	–292 to 1400	± 0.70	± 1.26
NIST Type K	NIST Monograph 175	–180 to 1372	–292 to 2502	± 1.00	± 1.80
NIST Type N	NIST Monograph 175	–200 to 1300	–328 to 2372	± 1.00	± 1.80
NIST Type R	NIST Monograph 175	0 to 1768	32 to 3214	± 1.50	± 2.70
NIST Type S	NIST Monograph 175	0 to 1768	32 to 3214	± 1.40	± 2.52
NIST Type T	NIST Monograph 175	–200 to 400	–328 to 752	± 0.70	± 1.26
DIN L	DIN 43710	–200 to 900	–328 to 1652	± 0.70	± 1.26
DIN U	DIN 43710	–200 to 600	–328 to 1112	± 0.70	± 1.26
w5Re/W26Re	ASTME 988-96	0 to 2000	32 to 3632	± 1.60	± 2.88
Type L	GOST R.8.585-2001	–200 to 800	–328 to 1472	±0.71	±1.28
Terminal Temperature		-50 to 85	-58 to 185	±3.50	±6.30
Input Units					
Ohm Input		0 to 2000 ohms		±0.90 ohms	
Millivolt Input		-10 to 100 mV		±0.05 mV	
1000 mV input		-10 to 1000 mV		±1.0 mV	
4–20 mA (Rosemount)(1)		4–20 mA		±0.01 mA	
4–20 mA (NAMUR)(1)		4–20 mA		±0.01 mA	

(1) Requires the S002 option code.

Analog Sensors 4–20mA

Two types of 4–20 mA sensors are compatible with the Rosemount 848T. These types must be ordered with the S002 option code complete with an analog connector kit. The alarm levels, accuracy for each type are listed in Table 3.

Table 21. Analog Sensors

Sensor Option	Alarm Levels	Accuracy
4–20mA (Rosemount Standard)	3.9 to 20.8 mA	± 0.01mA
4–20mA (NAMUR)	3.8 to 20.5 mA	± 0.01mA

AMBIENT TEMPERATURE EFFECT

Transmitters may be installed in locations where the ambient temperature is between –40 and 85 °C (–40 and 185 °F).

Table 22. Ambient Temperature Effects

NIST Type	Accuracy per 1.0 °C (1.8 °F) Change in Ambient Temperature(1)	Temperature Range (°C)
RTD		
Pt 50 (α = 0.003910)	• 0.004 °C (0.0072 °F)	NA
Pt 100 (α = 0.00391)	• 0.002 °C (0.0036 °F)	NA
Pt 100 (α = 0.00385)	• 0.003 °C (0.0054 °F)	NA
Pt 100 (α = 0.003916)	• 0.003 °C (0.0054 °F)	NA
Pt 200 (α = 0.00385)	• 0.004 °C (0.0072 °F)	NA
PT 200 (α = 0.003916)	• 0.004 °C (0.0072 °F)	NA
Cu 10	• 0.03 °C (0.054 °F)	NA
Pt 500	• 0.003 °C (0.0054 °F)	NA
Pt 1000	• 0.003 °C (0.0054 °F)	NA
Cu 100 (a=428)	• 0.002 °C (0.0036 °F)	NA
Cu 50 (a=428)	• 0.004 °C (.0072 °F)	NA
Cu 100 (a=426)	• 0.002 °C (0.0036 °F)	NA
Cu 50 (a=426)	• 0.004 °C (.0072 °F)	NA
Ni 120	• 0.003 °C (0.0054 °F)	NA
Thermocouple (R = the value of the reading)		NA
Type B	• 0.014 °C • 0.032 °C - (0.0025% of (R - 300)) • 0.054 °C - (0.011% of (R - 100))	• R ≥ 1000 • 300 ≤ R < 1000 • 100 ≤ R < 300
Type E	• 0.005 °C + (0.00043% of R)	• All
Type J, Din Type L	• 0.0054 °C + (0.00029% of R) • 0.0054 °C + (0.0025% of |R|)	• R ≥ 0 • R < 0
Type K	• 0.0061 °C + (0.00054% of R) • 0.0061 °C + (0.0025% of |R|)	• R ≥ 0 • R < 0
Type N	• 0.0068 °C + (0.00036% of R)	• All
Type R, Type S	• 0.016 °C • 0.023 °C - (0.0036% of R)	• R ≥ 200 • R < 200
Type T, DIN Type U	• 0.0064 °C • 0.0064 °C - (0.0043% of |R|)	• R ≥ 0 • R < 0
GOST Type L	• 0.007 °C • 0.007 °C + (0.003% of IRI)	• R ≥ 0 • R < 0
Input Units		
Ohm input	• 0.0084 ohms	NA
100 mV Input	• 0.0005 mV	NA
1000 mV Input	• 0.005 mV	NA
4–20 mA (Rosemount)	• 0.0001 mA	NA
4–20 mA (NAMUR)	• 0.0001 mA	NA

(1) Change in ambient is in reference to the calibration temperature of the transmitter (20 °C (68 °F) typical from the factory).

Ambient Temperature Notes

Examples:

When using a Pt 100 (α = 0.00385) sensor input at 30 °C ambient temperature, temperature effects would be:

- Ambient Temperature Effects: 0.003 °C x (30 - 20) = 0.03 °C
- Worst Case Error: Sensor Accuracy + Ambient Temperature Effects = 0.30 °C + 0.03 °C = 0.33 °C
- Total Probable Error $\sqrt{0.30^2 + 0.03^2} = 0.30°C$

Product Certifications

Approved Manufacturing Locations

Rosemount Inc. – Chanhassen, Minnesota, USA
Emerson Process Management GmbH & Co. - Karlstein, Germany
Emerson Process Management Asia Pacific Private Limited - Singapore

European Union Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

*ATEX Directive (94/9/EC***)**

Emerson Process Management complies with the ATEX Directive.

Electro Magnetic Compatibility (EMC) (2004/108/EC)

EN 61326-1:2006
EN 61326-2-3:2006

Radio and Telecommunications Terminal Equipment Directive (R&TTE) (1999/5/EC)

Emerson Process Management complies with the R&TTE Directive.

Telecommunication Compliance

All wireless devices require certification to ensure that they adhere to regulations regarding the use of the RF spectrum. Nearly every country requires this type of product certification. Emerson is working with governmental agencies around the world to supply fully compliant products and remove the risk of violating country directives or laws governing wireless device usage.

FCC and IC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: This device may not cause harmful interference, this device must accept any interference received, including interference that may cause undesired operation.

This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.

Ordinary Location Certification for FM

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Hazardous Locations Certificates

North American Certifications

Factory Mutual (FM) Approvals

I5 FM Intrinsic Safety and Non-incendive
Intrinsically Safe for Class I, Division 1, Groups A, B, and C.
Zone Marking: Class I, Zone 0, AEx ia llC
Temperature Codes T4 (T_{amb} = -50 to 70 °C)
Non-incendive for Class I, Division 2, Groups A, B, C, and D.
Intrinsically Safe and non-incendive when installed in accordance with Rosemount drawing 00849-1000.
For use with Rosemount power module P/N 753-9220-0001 only.
Enclosure Type 4X / IP66

N5 FM Class 1, Division 2, and Dust
Non-Incendive for Class I, Division 2, Groups A, B, C, and D.
Dust Ignition-proof for Class II/III, Division 1, Groups E, F, and G.
Ambient Temperature Limits -50 to 85 °C
Non-incendive when installed in accordance with Rosemount drawing 00849-1000.
For use with Rosemount power module P/N 753-9220-0001 only.
Enclosure Type 4X / IP66

CSA - Canadian Standards Association

I6 CSA Intrinsic Safety
Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D.
Temp Code T3C
Non-incendive for Class I, Division 2, Groups A, B, C, and D.
Enclosure Type 4X / IP66
For use with Rosemount power module P/N 753-9220-0001 only.
Intrinsically Safe and non-incendive when installed in accordance with Rosemount drawing 00849-1016.

N6 CSA Class 1, Division 2
Non-Incendive for Class I, Division 2, Groups A, B, C, and D.
Enclosure Type 4X / IP66.
For use with Rosemount power module P/N 753-9220-0001 only.
Non-incendive when installed per Rosemount drawing 00849-1016.

European Certifications

I1 ATEX Intrinsic Safety
Certificate No.: Baseefa09ATEX0022X ⟨Ex⟩ II 1G
Ex ia IIC T5 (T_a = -60 °C to 40 °C)
Ex ia IIC T4 (T_a = -60 °C to 70 °C)
IP66
For use with Rosemount power module P/N 753-9220-0001 only.
CE 1180

Special Conditions for safe use (X):

1. The surface resistivity of the antenna is greater than 1GΩ. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.
2. The power module may be replaced in a hazardous area. The power module has surface resistivity greater than 1GΩ and must be properly installed in the wireless device enclosure. Care must be taken during transportation to and from the point of installation to prevent electrostatic charge build-up.

Table 23. Sensor Parameters

Sensor
U_o = 6.6 V
I_o = 3.2 mA
P_o = 5.3 mW
C_o = 22 uF
L_o = 1 H

IECEx Certifications

I7 IECEx Intrinsic Safety
Certificate No.: IECEx BAS 09.0004X
Ex ia IIC T6 (T_{amb} = -60 °C to 50 °C)
Ex ia IIC T5 (T_{amb} = -60 °C to 75 °C)
IP66
For use with Rosemount power module P/N 753-9220-0001 only.
Dimensional Drawings

Table 24. Sensor Parameters

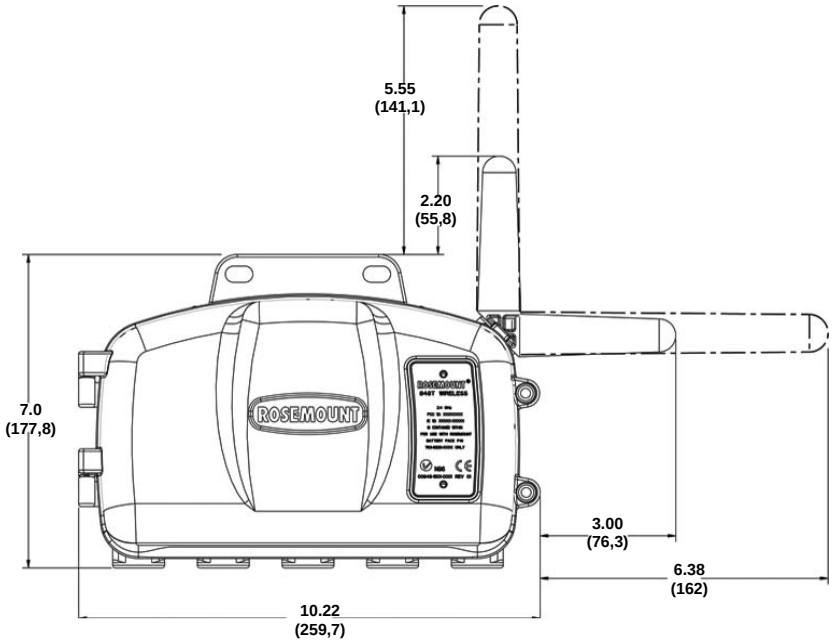
Sensor
U_o = 6.6 V
I_o = 3.2 mA
P_o = 5.3 mW
C_o = 22 uF
L_o = 1 H

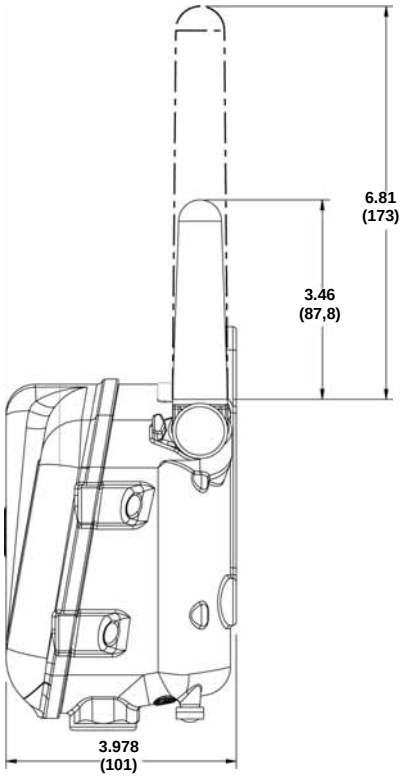
Special Conditions for safe use (X):

1. The surface resistivity of the antenna is greater than 1GΩ. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.
2. The power module may be replaced in a hazardous area. The power module has surface resistivity greater than 1GΩ and must be properly installed in the wireless device enclosure. Care must be taken during transportation to and from the point of installation to prevent electrostatic charge build-up.

Dimensional Drawings

848T Wireless Dimensional Drawings





Dimensions are in inches (millimeters)

Rosemount 848T Family

Product Data Sheet
00813-0100-4697, Rev KA
Catalog 2011 - 2012

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Email: Enquiries@AP.EmersonProcess.com

00813-0100-4697 Rev KA 7/11

EMERSON™
Process Management

Volume 1 Temperature Sensors and Accessories (English)

- *RTD and Thermocouple offering in single and dual sensor models*
- *Barstock Thermowell offering in wide range of materials and process connections*
- *Calibration capabilities for increasing measurement accuracy*
- *Sanitary RTD for hygienic applications*



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Rosemount Volume 1 Temperature Sensor and Thermowells

Optimize plant efficiency and increase measurement reliability with industry-proven design and specifications

- Available in a wide variety of sensing technologies – RTD and Thermocouples
- All sensor styles and lengths are available in 1/4-in. diameter
- State of the art manufacturing procedures provide robust element packaging, increasing reliability
- Industry-leading calibration capabilities allow for Callendar-van-Dusen values to give increased accuracy when paired with Rosemount transmitters
- Optional Class A accuracy for critical temperature measurement points
- Sanitary offering provides sensor assemblies approved for hygienic applications

Streamline operations and maintenance with sensor and thermowell design

- Spring loaded threaded adapter, General-purpose welded, capsule, and bayonet styles offer remote or integral transmitter mounting configuration

Explore the benefits of a Complete Point Solution from Rosemount Temperature Measurement

- An “Assemble Sensor to Specific Transmitter” option enables Emerson to provide a complete point temperature solution, delivering an installation-ready transmitter and sensor assembly
- Emerson has a complete portfolio of Single Point and High Density Temperature Measurement solutions, allowing you to effectively measure and control your processes with the reliability you trust from Rosemount products



Experience global consistency and local support from numerous worldwide Rosemount Temperature manufacturing sites



- World-class manufacturing provides globally consistent product from every factory and the capacity to fulfill the needs of any project, large or small.
- Experienced Instrumentation Consultants help select the right product for any temperature application and advise on best installation practices.
- An extensive global network of Emerson service and support personnel can be on-site when and where they are needed.

Rosemount 68 Sensor and Thermowell



The Rosemount 68 Sensor and Thermowell have designs that provide flexible and reliable temperature measurements in process environments.

Features include:

- Industry-standard Pt-100 RTD
- Variety of enclosure and connection head options
- Global hazardous-location approvals (Option Codes E5, E6, E7)
- Calibration services to give you insight to sensor performance (Option Codes V1-V8, X8, X9)
- Calibration certification documentation to accompany sensor (Option Code Q4)
- Assemble to Transmitter option (Option Code XA)

Table 1. Series 68 RTD Sensor Assemblies WITHOUT Thermowell
★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	Available Safety Approvals					
			FM	ATEX	CSA	IECEx	
0068	Platinum Temperature Sensor WITHOUT thermowell						
Sensor Lead Wire Termination							
Standard							**Standard**
R	Aluminum Connection Head, Six Terminals, Flat Cover, Unpainted		Y	Y	Y	N	★
T	Aluminum Connection Head, Six Terminals, Extended Cover, Unpainted		Y	Y	Y	N	★
P	Aluminum Connection Head, Six Terminals, Flat Cover, Painted		Y	Y	Y	N	★
L	Aluminum Connection Head, Six Terminals, Extended Cover, Painted		Y	Y	Y	N	★
N	Sensor only with 6-in. PTFE-insulated, 22-gauge lead wires		Y	Y	Y	N	★
D	Rosemount Aluminum Connection Head with 1/2-in. Entries		Y	Y	Y	Y	★
Expanded							
C	Polypropylene Connection Head		N	N	N	N	
G	Rosemount SST Connection Head with 1/2-in. Entries		Y	Y	Y	Y	
Sensor Type (single element -50 to 400 °C (-58 to 752 °F))							
Standard							**Standard**
01[1][2]	Capsule Style						★
11[3]	General-purpose style						★
21[4]	Spring-loaded style						★
Expanded							
31[5]	Bayonet spring-loaded style (not available in (X) lengths over 21 inches)						
Extension Type							
Standard							**Standard**
A	Nipple Coupling						★
C	Nipple Union						★
N	None						★
Extension Length (E)							
Standard							**Standard**
00	0.0 in.						★
30	3.0 in.						★
60	6.0 in.						★

Table 1. Series 68 RTD Sensor Assemblies WITHOUT Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Thermowell Material		
Standard		**Standard**
N	No thermowell required	★
Immersion Length (L)		
Standard		**Standard**
010[1][6]	1.0-in.	★
015	1.5-in.	★
020	2.0-in.	★
025	2.5-in.	★
030	3.0-in.	★
035	3.5-in.	★
040	4.0-in.	★
045	4.5-in.	★
050	5.0-in.	★
055	5.5-in.	★
060	6.0-in.	★
065	6.5-in.	★
070	7.0-in.	★
075	7.5-in.	★
080	8.0-in.	★
085	8.5-in.	★
090	9.0-in.	★
Standard		**Standard**
095	9.5-in.	★
100	10.0-in.	★
105	10.5-in.	★
110	11.0-in.	★
115	11.5-in.	★
120	12.0-in.	★
125	12.5-in.	★
130	13.0-in.	★
135	13.5-in.	★
140	14.0-in.	★
145	14.5-in.	★
150	15.0-in.	★
155	15.5-in.	★
160	16.0-in.	★
165	16.5-in.	★
170	17.0-in.	★
175	17.5-in.	★
180	18.0-in.	★
185	18.5-in.	★
190	19.0-in.	★
195	19.5-in.	★
200	20.0-in.	★
205	20.5-in.	★
210	21.0-in.	★
210	21.5-in.	★
220	22.0-in.	★
225	22.5-in.	★
230	23.0-in.	★
235	23.5-in.	★

Table 1. Series 68 RTD Sensor Assemblies WITHOUT Thermowell
★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

240	24.0-in.	★
245	15.5-in.	★
250	25.0-in.	★
260	26.0-in.	★
270	27.0-in.	★
280	28.0-in.	★
290	29.0-in.	★
300	30.0-in.	★
310	31.0-in.	★
320	32.0-in.	★
330	33.0-in.	★
340	34.0-in.	★
350	35.0-in.	★
360	36.0-in.	★
370	37.0-in.	★
380	38.0-in.	★
390	39.0-in.	★
400	40.0-in.	★
410	41.0-in.	★
Standard		**Standard**
420	42.0-in.	★
430	43.0-in.	★
440	44.0-in.	★
450	45.0-in.	★
460	46.0-in.	★
470	47.0-in.	★
480	48.0-in.	★

Options (Include with selected model number)

Approval Options		
Standard		**Standard**
E5	FM Explosion-proof approval (See Figure 24)	★
E6	CSA Explosion-proof approval (See Figure 25)	★
E7(7)	IECEx Flameproof approval (See Figure 28)	★
E1	KEMA/CENELEC Flameproof approval	★
Callendar-Van Dussen Constants		
Standard		**Standard**
V1-V8	V-Callendar-van Dussen Constant (V4 not available with series 68 sensors)	★
Calibration Schedule		
Standard		**Standard**
X8	Customer-Specified Temperature Range Calibration	★
X9	Customer-Specified Single Temperature Point Calibration	★
Calibration Certification		
Standard		**Standard**
Q4	Calibration Certification, Customer-Specified Temperature	★
Mounting Adapters		
Standard		**Standard**
M5-M7	Mounting adapter: Sensor Compression Fitting: M5= 1/8 - 27 NPT, M6 = 1/4 - 18 NPT, M7 = 1/2 - 14 NPT	★
A Leadkit		
Standard		**Standard**
A1-A8	Twisted lead wire extension: A1 = 1.5 ft, A2 = 3.0 ft, A3 = 6.0 ft, A4 = 12 ft, A5 = 24 ft, A6 = 50 ft, A7 = 75 ft, A8 = 100 ft	★
B Leadkit		
Standard		**Standard**
B1-B8(8)	Shielded cable lead wire extension: B1 = 1.5 ft, B2 = 3.0 ft, B3 = 6.0 ft, B4 = 12 ft, B5 = 24 ft, B6 = 50 ft, B7 = 75 ft, B8 = 100 ft	★

Sensors and Accessories (English)

Table 1. Series 68 RTD Sensor Assemblies WITHOUT Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

C Leadkit		
Standard		**Standard**
C1-C8[8]	Armored cable lead wire extension: C1 = 1.5 ft, C2 = 3.0 ft, C3 = 6.0 ft, C4 = 12 ft, C5 = 24 ft, C6 = 50 ft, C7 = 75 ft, C8 = 100 ft	★
D Leadkit		
Standard		**Standard**
D1-D8[8]	Armored cable lead wire extensions with electrical plug: D1 = 1.5 ft, D2 = 3.0 ft, D3 = 6.0 ft, D4 = 12 ft, D5 = 24 ft, D6 = 50 ft, D7 = 75 ft, D8 = 100 ft	★
L Leadkit		
Standard		**Standard**
L1-L8	Armored cable mating plugs with lead wire extension: L1 = 1.5 ft, L2 = 3.0 ft, L3 = 6.0 ft, L4 = 12 ft, L5 = 24 ft, L6 = 50 ft, L7 = 75 ft, L8 = 100 ft	★
F Leadkit		
Standard		**Standard**
F1	4-pin bayonet connector	★
H Leadkit		
Standard		**Standard**
H1-H8	4-pin connector mating plugs with lead wire extension: H1 = 1.5 ft, H2 = 3.0 ft, H3 = 6.0 ft, H4 = 12 ft, H5 = 24 ft, H6 = 50 ft, H7 = 75 ft, H8 = 100 ft	★
J Leadkit		
Standard		**Standard**
J1	Moisture-proof seal assembly for armored cables	★
Assemble to Options		
Standard		**Standard**
XA[9]	Assemble connection head or transmitter to a sensor assembly	★

(1) Capsule style available in 1-in. increments only, starting at 1-in. (i.e. 1, 2, 3-inches, etc.) See "Mounting Adapters for Series 58, 68, 78, and 183" on page 200.

(2) This option must be used with Sensor Lead Wire Termination code N and is not available with assembly code XA or with Approval codes E1, E5, E6, and E7.

(3) General-purpose sensors are only available in (L) lengths of 2.5-in. or greater.

(4) Spring loaded sensors must be installed in a thermowell assembly to meet the requirements of explosion-proof approvals code E6.

(5) Not available with Sensor Lead Wire Termination codes R, P, or C or with approval codes E1, E5, E6, or E7.

(6) 1-in. length without extension is only available in capsule style.

(7) IECEx Flame-proof Approval is only applicable if installed with Rosemount 248, 644, or 3144P transmitters.

(8) These options are not available with Sensor Lead Wire Termination codes R, P, or W.

(9) If ordering code XA with a transmitter, specify the same option on the transmitter model code.

Ordering Example

Typical Model Number	Model	Lead Wire Termination	Sensor Type	Extension Type	Extension Length	Thermowell Material	Immersion Length	Additional Options
	0068	N	11	N	00	N	045	E5

Table 2. Series 68 RTD Sensor Assemblies WITH Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description	Available Safety Approvals						
			FM	ATEX	CSA	IECEx		
0068	Platinum Temperature Sensors WITH Thermowell							
Sensor Lead Wire Termination								
Standard								**Standard**
R	Aluminum Connection Head, Six Terminals, Flat Cover, Unpainted		Y	Y	Y	N		★
T	Aluminum Connection Head, Six Terminals, Extended Cover, Unpainted		Y	Y	Y	N		★
P	Aluminum Connection Head, Six Terminals, Flat Cover, Painted		Y	Y	Y	N		★
L	Aluminum Connection Head, Six Terminals, Extended Cover, Painted		Y	Y	Y	N		★
N	Sensor only with 6-in. PTFE-insulated, 22-gauge lead wires		Y	Y	Y	N		★
D	Rosemount Aluminum Connection Head with 1/2-in. Entries		Y	Y	Y	Y		★
Expanded								
C	Polypropylene Connection Head		N	N	N	N		
G	Rosemount SST Connection Head with 1/2-in. Entries		Y	Y	Y	Y		
Sensor Type (single element -50 to 400 °C (-58 to 752 °F))								
Standard								**Standard**
11	General-purpose style							★
21	Spring-loaded style							★
Expanded								
31(1)(2)	Bayonet spring-loaded style (available in (X) lengths of 1 to 21-in., increments of 1-in.)							
Extension Type								
Standard								**Standard**
A(3)	Nipple Coupling							★
C(3)	Nipple Union							★
N	None							★
Extension Length (E)								
Standard								**Standard**
00	0.0 in.							★
30	3.0 in.							★
60	6.0 in.							★
Thermowell Material								
Standard								**Standard**
A	Type 316 SST(4)							★
B	Type 304 SST							★
C	Carbon Steel							★
D	316L SST							★
E	304L SST							★
Expanded								
F	Alloy 20							
G	Alloy 400							
H	Alloy 600							
J	Alloy C-276							
L	Alloy B							
M	304 SST with PTFE coating							
P	Chrome Molybdenum F22							
R	Nickel 200							
T	Titanium							
U(5)	316 SST with Tantalum Sheath							
V	310 SST							
W	321 SST							
Z	Chrome Molybdenum F11							

Sensors and Accessories (English)

Table 2. Series 68 RTD Sensor Assemblies WITH Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Sensor/Immersion Length (U[6] length in inches)		(L) Length in inches	(T[7]) Length in inches	
Standard				**Standard**
015	1.5-in.	4.0-in.	1.0-in.	★
020	2.0-in.	4.0-in.	0.5-in.	★
025	2.5-in.	4.0-in.	0.0-in.	★
030	3.0-in.	6.0-in.	1.5-in.	★
035	3.5-in.	6.0-in.	1.0-in.	★
040	4.0-in.	6.0-in.	0.5-in.	★
045	4.5-in.	6.0-in.	0.0-in.	★
050	5.0-in.	9.0-in.	2.5-in.	★
055	5.5-in.	9.0-in.	2.0-in.	★
060	6.0-in.	9.0-in.	1.5-in.	★
065	6.5-in.	9.0-in.	1.0-in.	★
070	7.0-in.	9.0-in.	0.5-in.	★
075	7.5-in.	9.0-in.	0.0-in.	★
080	8.0-in.	12.0-in.	2.5-in.	★
085	8.5-in.	12.0-in.	2.0-in.	★
090	9.0-in.	12.0	1.5-in.	★
095	9.5-in.	12.0-in.	1.0-in.	★
100	10.0-in.	12.0-in.	0.5-in.	★
105	10.5-in.	12.0-in.	0.0-in.	★
110	11.0-in.	15.0-in.	2.5-in.	★
115	11.5-in.	15.0-in.	2.0-in.	★
120	12.0-in.	15.0-in.	1.5-in.	★
125	12.5-in.	15.0-in.	1.0-in.	★
130	13.0-in.	15.0-in.	0.5-in.	★
135	13.5-in.	15.0-in.	0.0-in.	★
140	14.0-in.	18.0-in.	2.5-in.	★
145	14.5-in.	18.0-in.	2.0-in.	★
150	15.0-in.	18.0-in.	1.5-in.	★
155	15.5-in.	18.0-in.	1.0-in.	★
160	16.0-in.	18.0-in.	0.5-in.	★
165	16.5-in.	18.0-in.	0.0-in.	★
170	17.0-in.	21.0-in.	2.5-in.	★
175	17.5-in.	21.0-in.	2.0-in.	★
180	18.0-in.	21.0-in.	1.5-in.	★
185	18.5-in.	21.0-in.	1.0-in.	★
190	19.0-in.	21.0-in.	0.5-in.	★
195	19.5-in.	21.0-in.	0.0-in.	★
200	20.0-in.	24.0-in.	2.5-in.	★
205	20.5-in.	24.0-in.	2.0-in.	★
210	21.0-in.	24.0-in.	1.5-in.	★
215	21.5-in.	24.0-in.	1.0-in.	★
220	22.0-in.	24.0-in.	0.5-in.	★
225	22.5-in.	24.0-in.	0.0-in.	★
230	23.0-in.	27.0-in.	2.5-in.	★
240	24.0-in.	27.0-in.	1.5-in.	★
250	25.0-in.	27.0-in.	0.5-in.	★
260	26.0-in.	30.0-in.	2.5-in.	★
270	27.0-in.	30.0-in.	1.5-in.	★

Table 2. Series 68 RTD Sensor Assemblies WITH Thermowell
★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

280	28.0-in.	30.0-in.	0.5-in.	★
290	29.0-in.	33.0-in.	2.5-in.	★
300	30.0-in.	33.0-in.	1.5-in.	★
310	31.0-in.	33.0-in.	0.5-in.	★
320	32.0-in.	36.0-in.	2.5-in.	★
330	33.0-in.	36.0-in.	1.5-in.	★
340	34.0-in.	36.0-in.	0.5-in.	★
350	35.0-in.	39.0-in.	2.5-in.	★
360	36.0-in.	39.0-in.	1.5-in.	★
370	37.0-in.	39.0-in.	0.5-in.	★
380	38.0-in.	42.0-in.	2.5-in.	★
390	39.0-in.	42.0-in.	1.5-in.	★
400	40.0-in.	42.0-in.	0.5-in.	★
410	41.0-in.	45.0-in.	2.5-in.	★
420	42.0-in.	45.0-in.	1.5-in.	★
430	43.0-in.	45.0-in.	0.5-in.	★
440	44.0-in.	48.0-in.	2.5-in.	★
450	45.0-in.	48.0-in.	1.5-in.	★
460	46.0-in.	48.0-in.	0.5-in.	★
470	47.0-in.	51.0-in.	2.5-in.	★
480	48.0-in.	51.0-in.	1.5-in.	★

Thermowell Style		**Mounting**	**Stem**	
Standard				**Standard**
T20[4]	Threaded	1/2-14 ANPT	Stepped	★
T22[4][10]	Threaded	3/4-14 ANPT	Stepped	★
T24[4][10]	Threaded	1-11.5 ANPT	Stepped	★
T26[10]	Threaded	3/4-14 ANPT	Tapered	★
T28[10]	Threaded	1-11.5 ANPT	Tapered	★
T30[10]	Threaded	1 1/2-11 ANPT	Tapered	★
T32[10]	Threaded	1/2-14 ANPT	Straight	★
T34[10][11]	Threaded	3/4-14 ANPT	Straight	★
T36[10][11]	Threaded	1-11.5 ANPT	Straight	★
T38[10][11]	Threaded	3/4-14 ANPT	Straight	★
T44[10]	Threaded	1/2-14 ANPT	Tapered	★
W38	Welded	3/4-in. pipe	Stepped	★
W40	Welded	1-in. pipe	Stepped	★
W42	Welded	3/4-in. pipe	Tapered	★
W44	Welded	1-in. pipe	Tapered	★
W46	Welded	1 1/4-in. pipe	Tapered	★
W48[10]	Welded	3/4-in. pipe	Straight	★
W50[10]	Welded	1-in. pipe	Straight	★
F10[10]	Flanged	2-in., Class 150	Straight	★
F12[10]	Flanged	3-in., Class 150	Straight	★
F52	Flanged	1-in., Class 150	Stepped	★
F54	Flanged	1 1/2-in., Class 150	Stepped	★
F56	Flanged	2-in., Class 150	Stepped	★
F58	Flanged	1-in., Class 150	Tapered	★
F60	Flanged	1 1/2-in., Class 150	Tapered	★
F62	Flanged	2-in. Class 150	Tapered	★
F64[10]	Flanged	1-in., Class 150	Straight	★

Table 2. Series 68 RTD Sensor Assemblies WITH Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

F66[10]	Flanged	1 1/2-in., Class 150	Straight	★
F70	Flanged	1-in., Class 300	Stepped	★
F72	Flanged	1 1/2-in., Class 300	Stepped	★
F74	Flanged	2-in., Class 300	Stepped	★
F76	Flanged	1-in., Class 300	Tapered	★
F78	Flanged	1 1/2-in., Class 300	Tapered	★
F80	Flanged	2-in., Class 300	Tapered	★
F82[10]	Flanged	1-in., Class 300	Straight	★
F84[10]	Flanged	1 1/2-in., Class 300	Straight	★
F86[10]	Flanged	2-in., Class 300	Straight	★
F88[8]	Flanged	1-in., Class 600	Stepped	★
F90[8]	Flanged	1 1/2-in., Class 600	Stepped	★
F92[8]	Flanged	2-in., Class 600	Stepped	★
F94[8]	Flanged	1-in., Class 600	Tapered	★
F96[8]	Flanged	1 1/2-in., Class 600	Tapered	★
F98[8]	Flanged	2-in., Class 600	Tapered	★
F02[10][8]	Flanged	1-in., Class 600	Straight	★
F04[10][8]	Flanged	1 1/2-in., Class 600	Straight	★
F06[10][8]	Flanged	2-in., Class 600	Straight	★
F16[8]	Flanged	1 1/2-in., Class 900	Tapered	★
F34[8]	Flanged	1 1/2-in., Class 1500	Tapered	★
F24[8]	Flanged	2-in., Class 1500	Tapered	★
F08[8]	Flanged	1 1/2-in., Class 2500	Tapered	★
Q02[9]	Sanitary, Tri-Clamp	1-in., Tri-Clamp	Stepped	★
Q04[9]	Sanitary, Tri-Clamp	1 1/2-in., Tri-Clamp	Stepped	★
Q06[9]	Sanitary, Tri-Clamp	2-in., Tri-Clamp	Stepped	★
Q08[9]	Sanitary, Tri-Clamp	3-in., Tri-Clamp	Stepped	★
Q20[9]	Sanitary, Tri-Clamp	3/4-in., Tri-Clamp	Straight	★
Q22[9]	Sanitary, Tri-Clamp	1-in., Tri-Clamp	Straight	★
Q24[9]	Sanitary, Tri-Clamp	1 1/2-in., Tri-Clamp	Straight	★
Q26[9]	Sanitary, Tri-Clamp	2-in., Tri-Clamp	Straight	★
Q28[9]	Sanitary, Tri-Clamp	3-in., Tri-Clamp	Straight	★

Options (Include with selected model number)

Product Certifications		
Standard		**Standard**
E5	FM Explosion-proof approval (See Figure 24)	★
E6	CSA Explosion-proof approval (See Figure 25)	★
E7[10]	IECEx Flameproof approval (See Figure 28)	★
Callendar-Van Dusen Constants		
Standard		**Standard**
V1-V7	V-Callendar-van Dusen Constants (V4 not available with series 68 sensors)	★
Calibration Schedule		
Standard		**Standard**
X8	Customer-Specified Temperature Calibration	★
X9	Customer-Specified Single Temperature Point Calibration	★
Calibration Certification		
Standard		**Standard**
Q4	Calibration Certification, Customer-Specified Temperature	★
Mounting Adapters		
Standard		**Standard**
M5-M7	Mounting adapter; Sensor Compression Fitting: M5= 1/8-27 NPT, M6 = 1/4-18 NPT, M7 = 1/2-14 NPT	★

Table 2. Series 68 RTD Sensor Assemblies WITH Thermowell
★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

A Leadkit		
Standard		**Standard**
A1-A8	Twisted lead wire extension: A1 = 1.5 ft, A2 = 3.0 ft, A3 = 6.0 ft, A4 = 12 ft, A5 = 24 ft, A6 = 50 ft, A7 = 75 ft, A8 = 100 ft	★
B Leadkit		
Standard		**Standard**
B1-B8(1)	Shielded cable lead wire extension: B1 = 1.5 ft, B2 = 3.0 ft, B3 = 6.0 ft, B4 = 12 ft, B5 = 24 ft, B6 = 50 ft, B7 = 75 ft, B8 = 100 ft	★
C Leadkit		
Standard		**Standard**
C1-C8(1)	Armored cable lead wire extension: C1 = 1.5 ft, C2 = 3.0 ft, C3 = 6.0 ft, C4 = 12 ft, C5 = 24 ft, C6 = 50 ft, C7 = 75 ft, C8 = 100 ft	★
D Leadkit		
Standard		**Standard**
D1-D8(1)	Armored cable lead wire extensions with electrical plug: D1 = 1.5 ft, D2 = 3.0 ft, D3 = 6.0 ft, D4 = 12 ft, D5 = 24 ft, D6 = 50 ft, D7 = 75 ft, D8 = 100 ft	★
L Leadkit		
Standard		**Standard**
L1-L8	Armored cable mating plugs with lead wire extension: L1 = 1.5 ft, L2 = 3.0 ft, L3 = 6.0 ft, L4 = 12 ft, L5 = 24 ft, L6 = 50 ft, L7 = 75 ft, L8 = 100 ft	★
F Leadkit		
Standard		**Standard**
F1(1)	4-pin bayonet connector	★
H Leadkit		
Standard		**Standard**
H1-H8	4-pin connector mating plugs with lead wire extension: H1 = 1.5 ft, H2 = 3.0 ft, H3 = 6.0 ft, H4 = 12 ft, H5 = 24 ft, H6 = 50 ft, H7 = 75 ft, H8 = 100 ft	★
J Leadkit		
Standard		**Standard**
J1	Moisture-proof seal assembly for armored cables	★
Special External Pressure Test		
Standard		**Standard**
R01	Special External Pressure Test	★
Material Certification		
Standard		**Standard**
Q8	Material Certification	★
Surface Finish Certification		
Standard		**Standard**
Q16	Surface Finish Certification	★
Dye Penetration Test		
Standard		**Standard**
R03	Dye Penetration Test	★
Thermowell Special Cleaning		
Standard		**Standard**
R04	Thermowell Special Cleaning	★
NACE Approval		
Standard		**Standard**
R05	NACE Approval	★
SST Plug and Chain		
Standard		**Standard**
R06	Stainless steel plug and chain	★
Full Penetration Weld		
Standard		**Standard**
R07(11)	Full penetration weld	★
Thermowell Concentric Serrations		
Standard		**Standard**
R09(11)(12)	Concentric serrations of thermowell flange face	★

Sensors and Accessories (English)

Table 2. Series 68 RTD Sensor Assemblies WITH Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Flat Faced Flange		
Standard		**Standard**
R10 (11)(12)	Flat Faced Flange	★
Vent Hole		
Standard		**Standard**
R11	Vent Hole	★
Thermowell Xray		
Standard		**Standard**
R12	Thermowell Xray	★
Special Surface Finish		
Standard		**Standard**
R14	Special Surface Finish (12 Ra Maximum “U” length = 22.5-in.)	★
Ring Joint Flange		
Standard		**Standard**
R16(11)(12)	Ring joint flange (Not available with 0-in. (T) length)	★
Electropolish		
Standard		**Standard**
R20	Electropolish	★
Wake Frequency		
Standard		**Standard**
R21	Wake Frequency-Thermowell Strength Calculation	★
Internal Pressure Test		
Standard		**Standard**
R22	Internal pressure test	★
Brass Plug & Chain		
Standard		**Standard**
R23	Brass plug & chain	★
Canadian Registration No.		
Expanded		
R24	CRN Marking for British Columbia	
R25	CRN Marking for Alberta	
R26	CRN Marking for Saskatchewan	
R27	CRN Marking for Manitoba	
R28	CRN Marking for Ontario	
R29	CRN Marking for Quebec	
R30	CRN Marking for New Brunswick	
R31	CRN Marking for Nova Scotia	
R32	CRN Marking for Prince Edward Island	
R33	CRN Marking for Yukon Territory	
R34	CRN Marking for Northwest Territory	
R35	CRN Marking for Nunavut	
R36	CRN Marking for Newfoundland and Labrador	
Twell From Hex Stock		
Expanded		
R37	Thermowell from Hex stock	
Assemble to Options		
Standard		**Standard**
XA(13)	Assemble connection head or transmitter to a sensor assembly	★

(1) Not available with Sensor Lead Wire Termination codes R, P, or W.

(2) Not available with option codes E1, E5, E6, and E7.

(3) Codes A and C must be used with an extension length. Additional non-standard (E) lengths are available in $^{1}/_{2}$-in. increments from 2.5 to 9-in.

(4) Standard configuration with best delivery.

(5) Available only with straight stem thermowells.

(6) Thermowells with an overall length ("U" + "T" + 1.75-in.) of 36-in. or less are machined from solid barstock. Thermowells with an overall length larger than 42-in. will be constructed using a welded 3-piece design and are available only with a stepped stem style.

(7) For additional (T) lengths, see Table 15 on page Temperature-168.

(8) F88 to F08 cannot be used with 0-in. (T) length. F08 cannot be used with 0- or 1/2-in. (T) length)

(9) Limited to 24" immersion length and 316 or 304 SST materials only.

(10) IECEx flame-proof approval is only applicable if installed with a Rosemount 248, 644, or 3144P transmitter.

(11) Available on flanged thermowells only.

(12) Only one flange face option allowed.

(13) If ordering option code XA with a transmitter, specify the same option on the transmitter model code.

Table 3. Ordering Example

Typical Model Number	Model	Lead Wire Termination	Sensor Type	Extension Type	Extension Length	Material Code	Immersion Length	Mounting Style	Additional Options
	0068	N	21	A	30	A	075	T22	E5

Rosemount 78 Sensor and Thermowell



The Rosemount 78 Sensor and Thermowell have designs that provide flexible and reliable temperature measurements in process environments.

Features include:

- Industry-standard Pt-100 RTD
- Single Element High Temperature RTD Dual Element RTD
- Variety of enclosure and connection head options
- Global hazardous-location approvals (Option Codes E5, E6, E7)
- Calibration services to give you insight to sensor performance (Option Codes V1-V8, X8, X9)
- Calibration certification documentation to accompany sensor (Option Code Q4)
- Assemble to Transmitter option (Option Code XA)

Table 4. Series 78 RTD Sensor Assemblies WITHOUT Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description	Available Safety Approvals					
			FM	ATEX	CSA	IECEx	
0078	Platinum Temperature Sensor WITHOUT Thermowell						
Sensor Lead Wire Termination							
Standard							**Standard**
R	Aluminum Connection Head, Six Terminals, Flat Cover, Unpainted		Y	Y	Y	N	★
T	Aluminum Connection Head, Six Terminals, Extended Cover, Unpainted		Y	Y	Y	N	★
P	Aluminum Connection Head, Six Terminals, Flat Cover, Painted		Y	Y	Y	N	★
L	Aluminum Connection Head, Six Terminals, Extended Cover, Painted		Y	Y	Y	N	★
N	Sensor only with 6-in. PTFE-insulated, 22-gauge lead wires		Y	Y	Y	N	★
D	Rosemount Aluminum Connection head		Y	Y	Y	Y	★
Expanded							
C	Polypropylene Connection Head		N	N	N	N	
G	Rosemount SST Connection Head with 1/2 in. Entries		Y	Y	Y	Y	
Sensor Type		**Range**					
Single Element Temperature Sensors		**-200 to 500 °C (-328 to 932 °F)**					
Standard							**Standard**
01(1)(2)	Capsule style						★
11	General-purpose style						★
21(3)	Spring-loaded style						★
Expanded							
31(4)	Bayonet spring-loaded style (available in (X) lengths of 1 to 21-in, increments of 1-in.)						
Single Element High Temperature Sensors		**0 to 600 °C (32 to 1112 °F)**					
Standard							**Standard**
03(1)	Capsule style (available in (X) lengths of 3 to 48-in, increments of 1-in.)						★
13	General-purpose style (available in (X) lengths of 3 to 48-in, increments of 1/2-in.)						★
23(3)	Spring-loaded style (available in (X) lengths of 3 to 48-in, increments of 1/2-in.)						★

Table 4. Series 78 RTD Sensor Assemblies WITHOUT Thermowell
★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded			
33[4]	Bayonet spring-loaded style (available in (X) lengths of 3 to 21-in, increments of 1-in.)		
Dual-element Temperature Sensors		**-200 to 500 °C (-328 to 932 °F)**	
Standard			**Standard**
05[1]	Capsule style		★
15	General-purpose style		★
25[3]	Spring-loaded style		★
Expanded			
35[4]	Bayonet spring-loaded style (available in (X) lengths of 1 to 21-in, increments of 1-in.)		

Extension Type		**Material**	
Standard			**Standard**
A[5]	Nipple Coupling	SST	★
C[5]	Nipple Union	SST	★
N	None (Use with extension length option code 00)		★
Extension Length (E)			
Standard			**Standard**
00	0.0 in.		★
30	3.0 in.		★
60	6.0 in.		★
Thermowell Material			
Standard			**Standard**
N	No thermowell required		★
Sensor/ Immersion Length (U length in inches)			
Standard			**Standard**
010	1.0-in.		★
015	1.5-in.		★
020	2.0-in.		★
025	2.5-in.		★
030	3.0-in.		★
035	3.5-in.		★
040	4.0-in.		★
045	4.5-in.		★
050	5.0-in.		★
055	5.5-in.		★
060	6.0-in.		★
065	6.5-in.		★
070	7.0-in.		★
075	7.5-in.		★
080	8.0-in.		★
085	8.5-in.		★
090	9.0-in.		★
095	9.5-in.		★
100	10.0-in.		★
105	10.5-in.		★
110	11.0-in.		★
115	11.5-in.		★
120	12.0-in.		★
125	12.5-in.		★
130	13.0-in.		★
135	13.5-in.		★
140	14.0-in.		★

Sensors and Accessories (English)

Table 4. Series 78 RTD Sensor Assemblies WITHOUT Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

145	14.5-in.	★
150	15.0-in.	★
155	15.5-in.	★
160	16.0-in.	★
165	16.5-in.	★
170	17.0-in.	★
175	17.5-in.	★
180	18.0-in.	★
185	18.5-in.	★
190	19.0-in.	★
195	19.5-in.	★
200	20.0-in.	★
205	20.5-in.	★
210	21.0-in.	★
215	21.5-in.	★
220	22.0-in.	★
225	22.5-in.	★
230	23.0-in.	★
235	23.5-in.	★
240	24.0-in.	★
245	24.5-in.	★
250	25.0-in.	★
260	26.0-in.	★
270	27.0-in.	★
280	28.0-in.	★
290	29.0-in.	★
300	30.0-in.	★
310	31.0-in.	★
320	32.0-in.	★
330	33.0-in.	★
340	34.0-in.	★
350	35.0-in.	★
360	36.0-in.	★
370	37.0-in.	★
380	38.0-in.	★
390	39.0-in.	★
400	40.0-in.	★
410	41.0-in.	★
420	42.0-in.	★
430	43.0-in.	★
440	44.0-in.	★
450	45.0-in.	★
460	46.0-in.	★
470	47.0-in.	★
480[6]	48.0-in.	★

Options (Include with selected model number)

Sensor		
Expanded		
A[7]	IEC – 751 Class A Sensor	

Table 4. Series 78 RTD Sensor Assemblies WITHOUT Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Approval Options		
Standard		**Standard**
E5	FM Explosion-proof approval (See Figure 24)	★
E6	CSA Explosion-proof approval (See Figure 25)	★
E7(8)	IECEx Flameproof approval (See Figure 28)	★
E1	KEMA/CENELEC Flameproof approval	★
Callendar-Van Dusen Constants		
Standard		**Standard**
V1-V7	V-Callendar-van Dusen Constants	★
Calibration Schedule		
Standard		**Standard**
X8	Customer-Specified Temperature Range Calibration	★
X9	Customer-Specified Single Temperature Point Calibration	★
Calibration Certification		
Standard		**Standard**
Q4	Calibration Certification, Customer-Specified Temperature	★
Mounting Adapters		
Standard		**Standard**
M5-M7	Mounting adapter; Sensor Compression Fitting: M5= 1/8-27 NPT, M6 = 1/4-18 NPT, M7 = 1/2-14 NPT	★
A Leadkit		
Standard		**Standard**
A1-A8	Twisted lead wire extension: A1 = 1.5 ft, A2 = 3.0 ft, A3 = 6.0 ft, A4 = 12 ft, A5 = 24 ft, A6 = 50 ft, A7 = 75 ft, A8 = 100 ft	★
B Leadkit		
Standard		**Standard**
B1-B8(9)	Shielded cable lead wire extension: B1 = 1.5 ft, B2 = 3.0 ft, B3 = 6.0 ft, B4 = 12 ft, B5 = 24 ft, B6 = 50 ft, B7 = 75 ft, B8 = 100 ft	★
C Leadkit		
Standard		**Standard**
C1-C8(9)	Armored cable lead wire extension: C1 = 1.5 ft, C2 = 3.0 ft, C3 = 6.0 ft, C4 = 12 ft, C5 = 24 ft, C6 = 50 ft, C7 = 75 ft, C8 = 100 ft	★
D Leadkit		
Standard		**Standard**
D1-D8(9)	Armored cable lead wire extensions with electrical plug: D1 = 1.5 ft, D2 = 3.0 ft, D3 = 6.0 ft, D4 = 12 ft, D5 = 24 ft, D6 = 50 ft, D7 = 75 ft, D8 = 100 ft	★
L Leadkit		
Standard		**Standard**
L1-L8	Armored cable mating plugs with lead wire extension: L1 = 1.5 ft, L2 = 3.0 ft, L3 = 6.0 ft, L4 = 12 ft, L5 = 24 ft, L6 = 50 ft, L7 = 75 ft, L8 = 100 ft	★
F Leadkit		
Standard		**Standard**
F1(9)	4-pin bayonet connector	★
H Leadkit		
Standard		**Standard**
H1-H8	4-pin connector mating plugs with lead wire extension: H1 = 1.5 ft, H2 = 3.0 ft, H3 = 6.0 ft, H4 = 12 ft, H5 = 24 ft, H6 = 50 ft, H7 = 75 ft, H8 = 100 ft	★
J Leadkit		
Standard		**Standard**
J1	Moisture-proof seal assembly for armored cables	★
Assemble to Options		
Standard		**Standard**
XA(10)	Assemble connection head or transmitter to a sensor assembly (PTFE paste where appropriate, fully wired.)	★

(1) Capsule style available in 1-in. increments only. See "Mounting Adapters for Series 58, 68, 78, and 183" on page Temperature-200.

(2) Must be used with Sensor Lead Wire Termination code N and is not available with assembly option XA or with approval option codes E1, E5, E6, or E7.

(3) Spring loaded sensors must be installed in a thermowell assembly to meet the requirements of explosion-proof approval option code E6.

(4) This option is not available with Sensor Lead Wire Termination codes R, P or C or approval code E1, E6, and E7.

(5) Codes A and C must be used with an extension length. Additional non-standard (E) lengths are available in 1/2-in. increments from 2.5 to 9-in.

(6) Additional lengths are available up to 68-in., increments of 1-in.

(7) The IEC 751 Class A option is not available with high-temperature sensors.

(8) IECEx Flameproof approvals only applicable if installed with a Rosemount 248, 644, or 3144P transmitter.

(9) Requires Sensor lead wire termination code N

(10) If ordering option code XA with a transmitter, specify the same option on the transmitter model code.

Table 5. Ordering Example

Typical Model Number	Model	Lead Wire Termination	Sensor Type	Extension Type	Extension Length	Thermowell Material	Immersion Length	Additional Options
	0078	N	21	N	00	N	045	E5

Table 6. Series 78 RTD Sensor Assemblies WITH Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	Available Safety Approvals					
		FM	ATEX	CSA	IECEx		
0078	Platinum Temperature Sensor WITH Thermowell						
Sensor Lead Wire Termination							
Standard							**Standard**
R	Aluminum Connection Head, Six Terminals, Flat Cover, Unpainted	Y	Y	Y	N		★
T	Aluminum Connection Head, Six Terminals, Extended Cover, Unpainted	Y	Y	Y	N		★
P	Aluminum Connection Head, Six Terminals, Flat Cover, Painted	Y	Y	Y	N		★
L	Aluminum Connection Head, Six Terminals, Extended Cover, Painted	Y	Y	Y	N		★
N	Sensor only with 6-in. PTFE-insulated, 22-gauge lead wires	Y	Y	Y	N		★
D	Rosemount Aluminum Connection head with 1/2- in. Entries	Y	Y	Y	Y		★
Expanded							
C	Polypropylene Connection Head	N	N	N	N		
G	Rosemount SST Connection Head with 1/2- in. Entries	Y	Y	Y	Y		
Sensor Type		**Temperature**					
Single Element Temperature Sensors		**-200 to 500 °C (-328 to 932 °F)**					
Standard							**Standard**
11	General-purpose style						★
21	Spring-loaded style						★
Expanded							
31(1)(2)	Bayonet spring-loaded style (available in (X) lengths over 21-in.)						
Single Element High Temperature Sensors		**0 to 500 °C (32 to 1112 °F)**					
Standard							**Standard**
13	General-purpose style (available in (X) lengths of 3 to 24-in., increments of 1/2-in.)						★
23	Spring-loaded style (available in (X) lengths of 3 to 24-in., increments of 1/2-in.)						★
Expanded							
33(1)(2)	Bayonet spring-loaded style (available in (X) lengths of 3 to 21-in., increments of 1-in.)						
Dual-element Temperature Sensors		**-200 to 500 °C (-328 to 932 °F)**					
Standard							**Standard**
15	General-purpose style						★
25	Spring-loaded style						★
Expanded							
35(1)(2)	Bayonet spring-loaded style (available in (X) lengths of 1 to 21-in., increments of 1-in.)						

Extension Type		Material	
Standard			**Standard**
A(3)	Nipple Coupling	SST	★
C(3)	Nipple Union	SST	★
N	None (Use with extension length option code 00)		★
Extension Length (E)			
Standard			**Standard**
00	0.0 in.		★
30	3.0 in.		★
60	6.0 in.		★
Thermowell Material			
Standard			**Standard**
A	Type 316 SST(4)		★
B	Type 304 SST		★
C	Carbon Steel		★
D	316L SST		★
E	304L SST		★

Sensors and Accessories (English)

Table 6. Series 78 RTD Sensor Assemblies WITH Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Expanded				
F	Alloy 20			
G	Alloy 400			
H	Alloy 600			
J	Alloy C-276			
L	Alloy B			
M	304 SST with PTFE coating			
P	Chrome Molybdenum F22			
R	Nickel 200			
T	Titanium			
U[5]	316 SST with Tantalum Sheath			
V	310 SST			
W	321 SST			
Z	Chrome Molybdenum F11			
Sensor/Immersion Length (U) length in inches		**(L) Length in inches**	**(T) Length in inches**	
Standard				**Standard**
015[6]	1.5-in.	4.0-in.	1.0-in.	★
020[6]	2.0-in.	4.0-in.	0.5-in.	★
025[6]	2.5-in.	4.0-in.	0.0-in.	★
030	3.0-in.	6.0-in.	1.5-in.	★
035	3.5-in.	6.0-in.	1.0-in.	★
040	4.0-in.	6.0-in.	0.5-in.	★
045	4.5-in.	6.0-in.	0.0-in.	★
050	5.0-in.	9.0-in.	2.5-in.	★
055	5.5-in.	9.0-in.	2.0-in.	★
060	6.0-in.	9.0-in.	1.5-in.	★
065	6.5-in.	9.0-in.	1.0-in.	★
070	7.0-in.	9.0-in.	0.5-in.	★
075	7.5-in.	9.0-in.	0.0-in.	★
080	8.0-in.	12.0-in.	2.5-in.	★
085	8.5-in.	12.0-in.	2.0-in.	★
090	9.0-in.	12.0-in.	1.5-in.	★
095	9.5-in.	12.0-in.	1.0-in.	★
100	10.0-in.	12.0-in.	0.5-in.	★
105	10.5-in.	12.0-in.	0.0-in.	★
110	11.0-in.	15.0-in.	2.5-in.	★
115	11.5-in.	15.0-in.	2.0-in.	★
120	12.0-in.	15.0-in.	1.5-in.	★
125	12.5-in.	15.0-in.	1.0-in.	★
130	13.0-in.	15.0-in.	0.5-in.	★
135	13.5-in.	15.0-in.	0.0-in.	★
140	14.0-in.	18.0-in.	2.5-in.	★
145	14.5-in.	18.0-in.	2.0-in.	★
150	15.0-in.	18.0-in.	1.5-in.	★
155	15.5-in.	18.0-in.	1.0-in.	★
160	16.0-in.	18.0-in.	0.5-in.	★
165	16.5-in.	18.0-in.	0.0-in.	★
170	17.0-in.	21.0-in.	2.5-in.	★
175	17.5-in.	21.0-in.	2.0-in.	★
180	18.0-in.	21.0-in.	1.5-in.	★
185	18.5-in.	21.0-in.	1.0-in.	★

Table 6. Series 78 RTD Sensor Assemblies WITH Thermowell
★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

190	19.0-in.	21.0-in.	0.5-in.	★
195	19.5-in.	21.0-in.	0.0-in.	★
200	20.0-in.	24.0-in.	2.5-in.	★
205	20.5-in.	24.0-in.	2.0-in.	★
210	21.0-in.	24.0-in.	1.5-in.	★
215	21.5-in.	24.0-in.	1.0-in.	★
220	22.0-in.	24.0-in.	0.5-in.	★
225	22.5-in.	24.0-in.	0.0-in.	★
230	23.0-in.	27.0-in.	2.5-in.	★
240	24.0-in.	27.0-in.	1.5-in.	★
250	25.0-in.	27.0-in.	0.5-in.	★
260	26.0-in.	30.0-in.	2.5-in.	★
270	27.0-in.	30.0-in.	1.5-in.	★
280	28.0-in.	30.0-in.	0.5-in.	★
290	29.0-in.	33.0-in.	2.5-in.	★
300	30.0-in.	33.0-in.	1.5-in.	★
310	31.0-in.	33.0-in.	0.5-in.	★
320	32.0-in.	36.0-in.	2.5-in.	★
330	33.0-in.	36.0-in.	1.5-in.	★
340	34.0-in.	36.0-in.	0.5-in.	★
350	35.0-in.	39.0-in.	2.5-in.	★
360	36.0-in.	39.0-in.	1.5-in.	★
370	37.0-in.	39.0-in.	0.5-in.	★
380	38.0-in.	42.0-in.	2.5-in.	★
390	39.0-in.	42.0-in.	1.5-in.	★
400	40.0-in.	42.0-in.	0.5-in.	★
410	41.0-in.	45.0-in.	2.5-in.	★
420	42.0-in.	45.0-in.	1.5-in.	★
430	43.0-in.	45.0-in.	0.5-in.	★
440	44.0-in.	48.0-in.	2.5-in.	★
450	45.0-in.	48.0-in.	1.5-in.	★
460	46.0-in.	48.0-in.	0.5-in.	★
470	47.0-in.	51.0-in.	2.5-in.	★
480	48.0-in.	51.0-in.	1.5-in.	★
Thermowell Style		**Mounting**	**Stem**	
Standard				**Standard**
T20[4]	Threaded	1/2-14 ANPT	Stepped	★
T22[4]	Threaded	3/4-14 ANPT	Stepped	★
T24[4]	Threaded	1-11.5 ANPT	Stepped	★
T26	Threaded	3/4-14 ANPT	Tapered	★
T28	Threaded	1-11.5 ANPT	Tapered	★
T30	Threaded	1 1/2-11 ANPT	Tapered	★
T32	Threaded	1/2-14 ANPT	Straight	★
T34	Threaded	3/4-14 ANPT	Straight	★
T36	Threaded	1-11.5 ANPT	Straight	★
T38	Threaded	3/4-14 ANPT	Straight	★
T44	Threaded	1/2-14 ANPT	Tapered	★
W38	Welded	3/4-in. pipe	Stepped	★
W40	Welded	1-in. pipe	Stepped	★
W42	Welded	3/4-in. pipe	Tapered	★
W44	Welded	1-in. pipe	Tapered	★
W46	Welded	1 1/4-in. pipe	Tapered	★

Sensors and Accessories (English)

Table 6. Series 78 RTD Sensor Assemblies WITH Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

W48	Welded	3/4-in. pipe	Straight	★
W50	Welded	1-in. pipe	Straight	★
F10	Flanged	2-in., Class 150	Straight	★
F12	Flanged	3-in., Class 150	Straight	★
F52	Flanged	1-in., Class 150	Stepped	★
F54	Flanged	1 1/2-in., Class 150	Stepped	★
F56	Flanged	2-in., Class 150	Stepped	★
F58	Flanged	1-in., Class 150	Tapered	★
F60	Flanged	1 1/2-in., Class 150	Tapered	★
F62	Flanged	2-in. Class 150	Tapered	★
F64	Flanged	1-in., Class 150	Straight	★
F66	Flanged	1 1/2-in., Class 150	Straight	★
F70	Flanged	1-in., Class 300	Stepped	★
F72	Flanged	1 1/2-in., Class 300	Stepped	★
F74	Flanged	2-in., Class 300	Stepped	★
F76	Flanged	1-in., Class 300	Tapered	★
F78	Flanged	1 1/2-in., Class 300	Tapered	★
F80	Flanged	2-in., Class 300	Tapered	★
F82	Flanged	1-in., Class 300	Straight	★
F84	Flanged	1 1/2-in., Class 300	Straight	★
F86	Flanged	2-in., Class 300	Straight	★
F88(7)	Flanged	1-in., Class 600	Stepped	★
F90(7)	Flanged	1 1/2-in., Class 600	Stepped	★
F92(7)	Flanged	2-in., Class 600	Stepped	★
F94(7)	Flanged	1-in., Class 600	Tapered	★
F96(7)	Flanged	1 1/2-in., Class 600	Tapered	★
F98(7)	Flanged	2-in., Class 600	Tapered	★
F02(7)	Flanged	1-in., Class 600	Straight	★
F04(7)	Flanged	1 1/2-in., Class 600	Straight	★
F06(7)	Flanged	2-in., Class 600	Straight	★
F16(7)	Flanged	1 1/2-in., Class 900	Tapered	★
F34(7)	Flanged	1 1/2-in., Class 1500	Tapered	★
F24(7)	Flanged	2-in., Class 1500	Tapered	★
F08(7)	Flanged	1 1/2-in., Class 2500	Tapered	★
Q02(8)	Sanitary, Tri-Clamp	1-in., Tri-Clamp	Stepped	★
Q04(8)	Sanitary, Tri-Clamp	1 1/2-in., Tri-Clamp	Stepped	★
Q06(8)	Sanitary, Tri-Clamp	2-in., Tri-Clamp	Stepped	★
Q08(8)	Sanitary, Tri-Clamp	3-in., Tri-Clamp	Stepped	★
Q20(8)	Sanitary, Tri-Clamp	3/4-in., Tri-Clamp	Straight	★
Q22(8)	Sanitary, Tri-Clamp	1-in., Tri-Clamp	Straight	★
Q24(8)	Sanitary, Tri-Clamp	1 1/2-in., Tri-Clamp	Straight	★
Q26(8)	Sanitary, Tri-Clamp	2-in., Tri-Clamp	Straight	★
Q28(8)	Sanitary, Tri-Clamp	3-in., Tri-Clamp	Straight	★

Options (Include with selected model number)

Sensor		
Expanded		
A(9)	IEC 751 Class A sensor	

Table 6. Series 78 RTD Sensor Assemblies WITH Thermowell
★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Approval Options		
Standard		**Standard**
E5	FM Explosion-proof approval (See Figure 24)	★
E6	CSA Explosion-proof approval (See Figure 25)	★
E7(10)	IECEx Flameproof approval (See Figure 28)	★
E1	KEMA/CENELEC Flameproof approval	★
Callendar-Van Dusen Constant		
Standard		**Standard**
V1-V7	V-Callendar-van Dusen Constants	★
Calibration Schedule		
Standard		**Standard**
X8	Customer-Specified Temperature Range Calibration	★
X9	Customer-Specified Single Temperature Point Calibration	★
Calibration Certification		
Standard		**Standard**
Q4	Calibration Certification, Customer-Specified Temperature	★
Mounting Adapters		
Standard		**Standard**
M5-M7	Mounting adapter; Sensor Compression Fitting: M5= 1/8-27 NPT, M6 = 1/4-18 NPT, M7 = 1/2-14 NPT	★
A Leadkit		
Standard		**Standard**
A1-A8	Twisted lead wire extension: A1 = 1.5 ft, A2 = 3.0 ft, A3 = 6.0 ft, A4 = 12 ft, A5 = 24 ft, A6 = 50 ft, A7 = 75 ft, A8 = 100 ft	★
B Leadkit		
Standard		**Standard**
B1-B8(11)	Shielded cable lead wire extension: B1 = 1.5 ft, B2 = 3.0 ft, B3 = 6.0 ft, B4 = 12 ft, B5 = 24 ft, B6 = 50 ft, B7 = 75 ft, B8 = 100 ft	★
C Leadkit		
Standard		**Standard**
C1-C8(11)	Armored cable lead wire extension: C1 = 1.5 ft, C2 = 3.0 ft, C3 = 6.0 ft, C4 = 12 ft, C5 = 24 ft, C6 = 50 ft, C7 = 75 ft, C8 = 100 ft	★
D Leadkit		
Standard		**Standard**
D1-D8(11)	Armored cable lead wire extensions with electrical plug: D1 = 1.5 ft, D2 = 3.0 ft, D3 = 6.0 ft, D4 = 12 ft, D5 = 24 ft, D6 = 50 ft, D7 = 75 ft, D8 = 100 ft	★
L Leadkit		
Standard		**Standard**
L1-L8	Armored cable mating plugs with lead wire extension: L1 = 1.5 ft, L2 = 3.0 ft, L3 = 6.0 ft, L4 = 12 ft, L5 = 24 ft, L6 = 50 ft, L7 = 75 ft, L8 = 100 ft	★
F Leadkit		
Standard		**Standard**
F1(11)	4-pin bayonet connector	★
H Leadkit		
Standard		**Standard**
H1-H8	4-pin connector mating plugs with lead wire extension: H1 = 1.5 ft, H2 = 3.0 ft, H3 = 6.0 ft, H4 = 12 ft, H5 = 24 ft, H6 = 50 ft,	★
J Leadkit		
Standard		**Standard**
J1	Moisture-proof seal assembly for armored cables	★
Special External Pressure Test		
Standard		**Standard**
R01	Special External Pressure Test	★
Material Certifications		
Standard		**Standard**
Q8	Thermowell material certificate	★
Surface Finish Certification		
Standard		**Standard**
Q16	Surface Finish Certification	★

Sensors and Accessories (English)

Table 6. Series 78 RTD Sensor Assemblies WITH Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Dye Penetration Test		
Standard		**Standard**
R03	Dye Penetration Test	★
Thermowell Special Cleaning		
Standard		**Standard**
R04	Thermowell Special Cleaning	★
NACE Approval		
Standard		**Standard**
R05	NACE Approval	★
SST Plug and Chain		
Standard		**Standard**
R06	SST Plug and Chain	★
Full Penetration Weld		
Standard		**Standard**
R07[(12)]	Full Penetration Weld	★
Thermowell Concentric Serrations		
Standard		**Standard**
R09[(12)(13)]	Concentric Serrations of Thermowell Flange Face	★
Flat Faced Flange		
Standard		**Standard**
R10 [(12)(13)]	Flat Faced Flange	★
Vent Hole		
Standard		**Standard**
R11	Vent Hole	★
Thermowell Xray		
Standard		**Standard**
R12	Thermowell Xray	★
Special Surface Finish		
Standard		**Standard**
R14	Special Surface Finish (12 RA Maximum “U” length = 22.5-in.)	★
Ring Joint Flange		
Standard		**Standard**
R16[(12)(13)]	Ring Joint Flange (not available with 0-in. (T) length)	★
Electropolish		
Standard		**Standard**
R20	Electropolish	★
Wake Frequency		
Standard		**Standard**
R21	Wake Frequency - Thermowell Strength Calculation	★
Internal Pressure Test		
Standard		**Standard**
R22	Internal Pressure Test	★
Brass Plug & Chain		
Standard		**Standard**
R23	Brass Plug & Chain	★
Canadian Registration No.		
Expanded		
R24	CRN Marking for British Columbia	
R25	CRN Marking for Alberta	
R26	CRN Marking for Saskatchewan	
R27	CRN Marking for Manitoba	
R28	CRN Marking for Ontario	
R29	CRN Marking for Quebec	
R30	CRN Marking for New Brunswick	
R31	CRN Marking for Nova Scotia	

Table 6. Series 78 RTD Sensor Assemblies WITH Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

R32	CRN Marking for Prince Edward Island	
R33	CRN Marking for Yukon Territory	
R34	CRN Marking for Northwest Territory	
R35	CRN Marking for Nunavut	
R36	CRN Marking for Newfoundland and Labrador	
Twell From Hex Stock		
Expanded		
R37	Thermowell From Hex Stock	
Assemble to Option		
Standard		**Standard**
XA(2)(14)	Assemble connection head or transmitter to a sensor assembly (PTFE paste where appropriate, fully wired.)	★

(1) Not available with Sensor Lead Wire Termination codes R, P, or W.
(2) Not available with Approval codes E1, E6, or E7.
(3) Codes A and C must be used with an extension length. Additional non-standard (E) lengths are available in 1/2-in. increments from 2.5 to 9-in.
(4) Standard configuration with best delivery.
(5) Available only with straight stem flanged thermowells.
(6) Straight or Tapered stem only.
(7) F88 to F08 cannot be used with 0-in. (T) length. F08 cannot be used with 0- or 1/2-in. (T) length
(8) Limited to 24" immersion length and 316 or 304 SST materials only.
(9) The IEC 751 Class A option is not available with high-temperature sensors.
(10) IECEx Flameproof approvals only applicable if installed with a Rosemount 248, 644, or 3144 transmitter.
(11) These options are not available with Sensor Lead Wire Termination codes R, P, or W.
(12) Available on flanged thermowells only.
(13) Only one flange face option allowed.
(14) If ordering option code XA with a transmitter, specify the same option on the transmitter model code.

Table 7. Ordering Example

Typical Model Number	Model	Lead Wire Termination	Sensor Type	Extension Type	Extension Length	Material Code	Immersion Length	Mounting Style	Additional Options
	0078	N	21	A	30	A	075	T22	E5

Rosemount 183 Sensor and Thermowell



The Rosemount 183 Sensor and Thermowell have designs that provide flexible and reliable temperature measurements in process environments.

Features include:

- Industry-standard sensor types, including J, K, E, and T thermocouple varieties
- Variety of enclosure and connection head options
- Global hazardous-location approvals (Option Codes E5, E6, E7)
- Assemble to Transmitter option (Option Code XA)

Table 8. Series 183 Thermocouple Sensor Assemblies WITHOUT Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description	Available Safety Approvals					
		FM	ATEX	CSA	IECEx		
0183	Thermocouple Sensor WITHOUT Thermowell						
Sensor Lead Wire Termination							
Standard							**Standard**
R	Aluminum Connection Head, Six Terminals, Flat Cover, Unpainted	Y	Y	Y	N		★
T	Aluminum Connection Head, Six Terminals, Extended Cover, Unpainted	Y	Y	Y	N		★
P	Aluminum Connection Head, Six Terminals, Flat Cover, Painted	Y	Y	Y	N		★
L	Aluminum Connection Head, Six Terminals, Extended Cover, Painted	Y	Y	Y	N		★
N	Sensor only with 6-in. PTFE-insulated, 20-gauge lead wires	Y	Y	Y	N		★
D	Rosemount Aluminum Connection Head with 1/2-in. Entries	Y	Y	Y	Y		★
Expanded							
C	Polypropylene Connection Head	N	N	N	N		
G	Rosemount SST Connection Head with 1/2-in. Entries	N	N	N	N		

Sensor Type		Junction	
Capsule Sensor(1)(2)			
Standard			**Standard**
01(1)	Single	Grounded	★
02	Dual	Grounded	★
03	Single	Ungrounded	★
04	Dual, Unisolated	Ungrounded	★
05	Dual, Isolated	Ungrounded	★
General Purpose Sensors			
Standard			**Standard**
11	Single	Grounded	★
12	Dual	Grounded	★
13	Single	Ungrounded	★
14	Dual, Unisolated	Ungrounded	★
15	Dual, Isolated	Ungrounded	★
Spring-Loaded Sensors(3)			
Standard			**Standard**
21	Single	Grounded	★
22	Dual	Grounded	★
23	Single	Ungrounded	★
24	Dual, Unisolated	Ungrounded	★
25	Dual, Isolated	Ungrounded	★

Table 8. Series 183 Thermocouple Sensor Assemblies WITHOUT Thermowell
★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Bayonet Spring-Loaded Sensors[4][5]			★
Expanded			
31	Single	Grounded	
32	Dual	Grounded	
33	Single	Ungrounded	
34	Dual, Unisolated	Ungrounded	
35	Dual, Isolated	Ungrounded	
Thermocouple Type		**Temperature Range**	
Standard			**Standard**
J2	J	0 to 760 °C (32 to 1400 °F)	★
K2	K	0 to 1150 °C (32 to 2102 °F)	★
E2	E	0 to 871 °C (32 to 1600 °F)	★
T2	T	–180 to 371 °C (–292 to 700 °F)	★
Extension Type		**Material**	
Standard			**Standard**
A[6]	Nipple Coupling	SST	★
C[6]	Nipple Union	SST	★
N	None (Use with extension length option code 00)		★
Extension Length (E)			
Standard			**Standard**
00	0.0 in.		★
30	3.0 in.	(X) sensor length = (E) extension length + (L) thermowell length minus 0.25 in. (see Figure 4.)	★
60	6.0 in.		★
Thermowell Material			
Standard			**Standard**
N	No thermowell required		★
Code	**Sensor/Immersion Length (U length in inches)**		
Standard			**Standard**
020	2.0-in.		★
025	2.5-in.		★
030	3.0-in.		★
035	3.5-in.		★
040	4.0-in.		★
045	4.5-in.		★
050	5.0-in.		★
055	5.5-in.		★
060	6.0-in.		★
065	6.5-in.		★
070	7.0-in.		★
075	7.5-in.		★
080	8.0-in.		★
085	8.5-in.		★
090	9.0-in.		★
095	9.5-in.		★
100	10.0-in.		★
105	10.5-in.		★
110	11.0-in.		★
115	11.5-in.		★
120	12.0-in.		★
125	12.5-in.		★
130	13.0-in.		★

Table 8. Series 183 Thermocouple Sensor Assemblies WITHOUT Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

135	13.5-in.	★
140	14.0-in.	★
145	14.5-in.	★
150	15.0-in.	★
155	15.5-in.	★
160	16.0-in.	★
165	16.5-in.	★
170	17.0-in.	★
175	17.5-in.	★
180	18.0-in.	★
185	18.5-in.	★
190	19.0-in.	★
195	19.5-in.	★
200	20.0-in.	★
205	20.5-in.	★
210	21.0-in.	★
215	21.5-in.	★
220	22.0-in.	★
225	22.5-in.	★
230	23.0-in.	★
235	23.5-in.	★
240	24.0-in.	★
245	24.5-in.	★
250	25.0-in.	★
260	26.0-in.	★
270	27.0-in.	★
280	28.0-in.	★
290	29.0-in.	★
300	30.0-in.	★
310	31.0-in.	★
320	32.0-in.	★
330	33.0-in.	★
340	34.0-in.	★
350	35.0-in.	★
360	36.0-in.	★
370	37.0-in.	★
380	38.0-in.	★
390	39.0-in.	★
400	40.0-in.	★
410	41.0-in.	★
420	42.0-in.	★
430	43.0-in.	★
440	44.0-in.	★
450	45.0-in.	★
460	46.0-in.	★
470	47.0-in.	★
480	48.0-in.	★

Table 8. Series 183 Thermocouple Sensor Assemblies WITHOUT Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Options (Include with selected model number)

Product Certifications		
Standard		**Standard**
E5	FM Explosion-proof approval (See Figure 24)	★
E6	CSA Explosion-proof approval (See Figure 25)	★
E7(7)	IECEx Flameproof approval (See Figure 28)	★
E1(8)	KEMA/CENELEC Flameproof approval (See Figure 27)	★
Mounting Adapters, Lead Wire Extensions, Connectors, and Seals		
Standard		**Standard**
M5-M7	Mounting adapters	★
Assembly Options		
Standard		**Standard**
XA(9)	Assemble connection head or transmitter to a sensor assembly	★

(1) This option must be used with Sensor Lead Wire Termination code N and is not available with assembly options XA.

(2) Cannot be used with approval option codes E1, E5, E6, or E7. See "Mounting Adapters for Series 58, 68, 78, and 183" on page Temperature-200.

(3) Spring-loaded sensors must be installed in a thermowell assembly to meet the requirement option code E6.

(4) This option is not available with explosion-proof approval option code E6.

(5) Bayonet spring-loaded style is available to 45-inches but is not available with Sensor Lead Wire Termination codes R, P, or W.

(6) Codes A and C must be used with an extension length. Additional non-standard (E) lengths are available in $^{1}/_{2}$-in. increments from 2.5 to 9-in.

(7) IECEx Flameproof approvals only applicable if installed with a Rosemount 248, 644, or 3144 transmitter.

(8) ATEX Flameproof approval is only applicable if ordered with Sensor Lead Wire Terminator code D, R, P, T, or L (Rosemount connection head) or installed with Rosemount 248, 644, or 3144P transmitters.

(9) If ordering option code XA with a transmitter, specify the same option on the transmitter model code.

Table 9. Ordering Example

Typical Model Number	Model	Lead Wire Termination	Sensor Type	ISA Type	Extension Type	Extension Length	Thermowell Code	Immersion Length	Additional Options
	0183	N	11	J2	N	00	N	045	E5

Sensors and Accessories (English)

Table 10. Series 183 Thermocouple Sensor Assemblies WITH Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	Available Safety Approvals					
		FM	ATEX	CSA	IECEx		
0183	Thermocouple Sensor WITH Thermowell						
Sensor Lead Wire Termination							
Standard							**Standard**
R	Aluminum Connection Head, Six Terminals, Flat Cover, Unpainted	Y	Y	Y	N		★
T	Aluminum Connection Head, Six Terminals, Extended Cover, Unpainted	Y	Y	Y	N		★
P	Aluminum Connection Head, Six Terminals, Flat Cover, Painted	Y	Y	Y	N		★
L	Aluminum Connection Head, Six Terminals, Extended Cover, Painted	Y	Y	Y	N		★
N	Sensor only with 6-in. PTFE-insulated, 22-gauge lead wires	Y	Y	Y	N		★
D	Rosemount Aluminum Connection Head with 1/2-in. Entries	Y	Y	Y	Y		★
Expanded							
C	Polypropylene Connection Head	N	N	N	N		
G	Rosemount SST Connection Head with 1/2-in. Entries	N	N	N	N		

Sensor Type		Junction	
General-Purpose Sensors			
Standard			**Standard**
11	Single	Grounded	★
12	Dual	Grounded	★
13	Single	Ungrounded	★
14	Dual, Unisolated	Ungrounded	★
15	Dual, Isolated		★
Spring-Loaded Sensors			
Standard			**Standard**
21	Single	Grounded	★
22	Dual	Grounded	★
23	Single	Ungrounded	★
24	Dual, Unisolated	Ungrounded	★
25	Dual, Isolated	Ungrounded	★
Bayonet Spring-Loaded Sensors[1][2]			
Expanded			
31	Single	Grounded	
32	Dual	Grounded	
33	Single	Ungrounded	
34	Dual, Unisolated	Ungrounded	
35	Dual, Isolated	Ungrounded	

Thermocouple Type		Temperature Range	
Standard			**Standard**
J2	J	0 to 760 °C (32 to 1400 °F)	★
K2	K	0 to 1150 °C (32 to 2102 °F)	★
E2	E	0 to 871 °C (32 to 1600 °F)	★
T2	T	–180 to 371 °C (–292 to 700 °F)	★

Extension Type		Material	
Standard			**Standard**
A[3]	Nipple Coupling	SST	★
C[3]	Nipple Union	SST	★
N	None	(Use with extension length option code 00)	★

Extension Length (E)		
Standard		**Standard**
00	0.0 in.	★
30	3.0 in.	★
60	6.0 in.	★

Table 10. Series 183 Thermocouple Sensor Assemblies WITH Thermowell
★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Thermowell Material				
Standard				**Standard**
A	Type 316 SST[4]			★
B	Type 304 SST			★
C	Carbon Steel			★
D	316L SST			★
E	304L SST			★
Expanded				
F	Alloy 20			
G	Alloy 400			
H	Alloy 600			
J	Alloy C-276			
L	Alloy B			
M	304 SST with PTFE coating			
P	Chrome Molybdenum F22			
R	Nickel 200			
T	Titanium			
U[5]	316 SST with Tantalum Sheath			
V	310 SST			
W	321 SST			
Z	Chrome Molybdenum F11			
Sensor/Immersion Length (U[6] length in inches)		**(L) Length in Inches**	**T[7] Length in Inches**	
Standard				**Standard**
015[8]	1.5-in.	4.0-in.	1.0-in.	★
020[6]	2.0-in.	4.0-in.	0.5-in.	★
025[6]	2.5-in.	4.0-in.	0.0-in.	★
030	3.0-in.	6.0-in.	1.5-in.	★
035	3.5-in.	6.0-in.	1.0-in.	★
040	4.0-in.	6.0-in.	0.5-in.	★
045	4.5-in.	6.0-in.	0.0-in.	★
050	5.0-in.	9.0-in.	2.5-in.	★
055	5.5-in.	9.0-in.	2.0-in.	★
060	6.0-in.	9.0-in.	1.5-in.	★
065	6.5-in.	9.0-in.	1.0-in.	★
070	7.0-in.	9.0-in.	0.5-in.	★
075	7.5-in.	9.0-in.	0.0-in.	★
080	8.0-in.	12.0-in.	2.5-in.	★
085	8.5-in.	12.0-in.	2.0-in.	★
090	9.0-in.	12.0-in.	1.5-in.	★
095	9.5-in.	12.0-in.	1.0-in.	★
100	10.0-in.	12.0-in.	0.5-in.	★
105	10.5-in.	12.0-in.	0.0-in.	★
110	11.0-in.	15.0-in.	2.5-in.	★
115	11.5-in.	15.0-in.	2.0-in.	★
120	12.0-in.	15.0-in.	1.5-in.	★
125	12.5-in.	15.0-in.	1.0-in.	★
130	13.0-in.	15.0-in.	0.5-in.	★
135	13.5-in.	15.0-in.	0.0-in.	★
140	14.0-in.	18.0-in.	2.5-in.	★
145	14.5-in.	18.0-in.	2.0-in.	★

Table 10. Series 183 Thermocouple Sensor Assemblies WITH Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

150	15.0-in.	18.0-in.	1.5-in.	★
155	15.5-in.	18.0-in.	1.0-in.	★
160	16.0-in.	18.0-in.	0.5-in.	★
165	16.5-in.	18.0-in.	0.0-in.	★
170	17.0-in.	21.0-in.	2.5-in.	★
175	17.5-in.	21.0-in.	2.0-in.	★
180	18.0-in.	21.0-in.	1.5-in.	★
185	18.5-in.	21.0-in.	1.0-in.	★
190	19.0-in.	21.0-in.	0.5-in.	★
195	19.5-in.	21.0-in.	0.0-in.	★
200	20.0-in.	24.0-in.	2.5-in.	★
205	20.5-in.	24.0-in.	2.0-in.	★
210	21.0-in.	24.0-in.	1.5-in.	★
215	21.5-in.	24.0-in.	1.0-in.	★
220	22.0-in.	24.0-in.	0.5-in.	★
225	22.5-in.	24.0-in.	0.0-in.	★
Thermowell Style		**Mounting**	**Stem**	
Standard				**Standard**
T20[4]	Threaded	1/2-14 ANPT	Stepped	★
T22[4]	Threaded	3/4-14 ANPT	Stepped	★
T24[4]	Threaded	1-11.5 ANPT	Stepped	★
T26	Threaded	3/4-14 ANPT	Tapered	★
T28	Threaded	1-11.5 ANPT	Tapered	★
T30	Threaded	1 1/2-11 ANPT	Tapered	★
T32	Threaded	1/2-14 ANPT	Straight	★
T34	Threaded	3/4-14 ANPT	Straight	★
T36	Threaded	1-11.5 ANPT	Straight	★
T38	Threaded	3/4-14 ANPT	Straight	★
T44	Threaded	1/2-14 ANPT	Tapered	★
W38	Welded	3/4-in. pipe	Stepped	★
W40	Welded	1-in. pipe	Stepped	★
W42	Welded	3/4-in. pipe	Tapered	★
W44	Welded	1-in. pipe	Tapered	★
W46	Welded	1 1/4-in. pipe	Tapered	★
W48	Welded	3/4-in. pipe	Straight	★
W50	Welded	1-in. pipe	Straight	★
F10	Flanged	2-in., Class 150	Straight	★
F12	Flanged	3-in., Class 150	Straight	★
F52	Flanged	1-in., Class 150	Stepped	★
F54	Flanged	1 1/2-in., Class 150	Stepped	★
F56	Flanged	2-in., Class 150	Stepped	★
F58	Flanged	1-in., Class 150	Tapered	★
F60	Flanged	1 1/2-in., Class 150	Tapered	★
F62	Flanged	2-in. Class 150	Tapered	★
F64	Flanged	1-in., Class 150	Straight	★
F66	Flanged	1 1/2-in., Class 150	Straight	★
F70	Flanged	1-in., Class 300	Stepped	★
F72	Flanged	1 1/2-in., Class 300	Stepped	★
F74	Flanged	2-in., Class 300	Stepped	★
F76	Flanged	1-in., Class 300	Tapered	★

Table 10. Series 183 Thermocouple Sensor Assemblies WITH Thermowell
★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

F78	Flanged	1 1/2-in., Class 300	Tapered	★
F80	Flanged	2-in., Class 300	Tapered	★
F82	Flanged	1-in., Class 300	Straight	★
F84	Flanged	1 1/2-in., Class 300	Straight	★
F86	Flanged	2-in., Class 300	Straight	★
F88(9)	Flanged	1-in., Class 600	Stepped	★
F90(9)	Flanged	1 1/2-in., Class 600	Stepped	★
F92(9)	Flanged	2-in., Class 600	Stepped	★
F94(9)	Flanged	1-in., Class 600	Tapered	★
F96(9)	Flanged	1 1/2-in., Class 600	Tapered	★
F98(9)	Flanged	2-in., Class 600	Tapered	★
F02(9)	Flanged	1-in., Class 600	Straight	★
F04(9)	Flanged	1 1/2-in., Class 600	Straight	★
F06(9)	Flanged	2-in., Class 600	Straight	★
F16(9)	Flanged	1 1/2-in., Class 900	Tapered	★
F34(9)	Flanged	1 1/2-in., Class 1500	Tapered	★
F24(9)	Flanged	2-in., Class 1500	Tapered	★
F08(9)	Flanged	1 1/2-in., Class 2500	Tapered	★
Q02(10)	Sanitary, Tri-Clamp	1-in., Tri-Clamp	Stepped	★
Q04c	Sanitary, Tri-Clamp	1 1/2-in., Tri-Clamp	Stepped	★
Q06(9)	Sanitary, Tri-Clamp	2-in., Tri-Clamp	Stepped	★
Q08(9)	Sanitary, Tri-Clamp	3-in., Tri-Clamp	Stepped	★
Q20(9)	Sanitary, Tri-Clamp	3/4-in., Tri-Clamp	Straight	★
Q22(9)	Sanitary, Tri-Clamp	1-in., Tri-Clamp	Straight	★
Q24(9)	Sanitary, Tri-Clamp	1 1/2-in., Tri-Clamp	Straight	★
Q26(9)	Sanitary, Tri-Clamp	2-in., Tri-Clamp	Straight	★
Q28(9)	Sanitary, Tri-Clamp	3-in., Tri-Clamp	Straight	★

Options (Include with selected model number)

Product Certifications		
Standard		**Standard**
E5	FM Explosion-proof approval (See Figure 24)	★
E6	CSA Explosion-proof approval (See Figure 25)	★
E7(11)	IECEx Flameproof approval (See Figure 28)	★
E1	KEMA/CENELEC approval (See Figure 27)	★
Mounting Adapters		
Standard		**Standard**
M5-M7	Mounting adapter: Sensor Compression Fitting: M5 = 1/8-27 NPT, M6 = 1/4-18 NPT, M7 = 1/2-14 NPT	★
Special External Pressure Test		
Standard		**Standard**
R01	Special External Pressure Test	★
Material Certification		
Standard		**Standard**
Q8	Material Certification	★
Dye Penetration Test		
Standard		**Standard**
R03	Dye Penetration Test	★
Thermowell Special Cleaning		
Standard		**Standard**
R04	Thermowell Special Cleaning	★
NACE Approval		
Standard		**Standard**
R05	NACE Approval	★

Sensors and Accessories (English)

Table 10. Series 183 Thermocouple Sensor Assemblies WITH Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

SST Plug and Chain		
Standard		**Standard**
R06	SST Plug and Chain	★
Full Penetration Weld		
Standard		**Standard**
R07[12]	Full Penetration Weld	★
Thermowell Concentric Serrations		
Standard		**Standard**
R09[12][13]	Concentric Serrations of Thermowell Flange Face	★
Flat Faced Flange		
Standard		**Standard**
R10 [11][12]	Flat Faced Flange	★
Vent Hole		
Standard		**Standard**
R11	Vent Hole	★
Thermowell Xray		
Standard		**Standard**
R12	Thermowell Xray	★
Special Surface Finish		
Standard		**Standard**
R14	Special Surface Finish (12 Ra Maximum “U” length = 22.5-in.)	★
Ring Joint Flange		
Standard		**Standard**
R16[11][12]	Ring joint flange (Not available with 0-in. (T) length)	★
Electropolish		
Standard		**Standard**
R20	Electropolish	★
Wake Frequency		
Standard		**Standard**
R21	Wake Frequency-Thermowell Strength Calculation	★
Internal Pressure Test		
Standard		**Standard**
R22	Internal Pressure Test	★
Brass Plug & Chain		
Standard		**Standard**
R23	Brass Plug & Chain	★
Canadian Registration No.		
Expanded		
R24	CRN Marking for British Columbia	
R25	CRN Marking for Alberta	
R26	CRN Marking for Saskatchewan	
R27	CRN Marking for Manitoba	
R28	CRN Marking for Ontario	
R29	CRN Marking for Quebec	
R30	CRN Marking for New Brunswick	
R31	CRN Marking for Nova Scotia	
R32	CRN Marking for Prince Edward Island	
R33	CRN Marking for Yukon Territory	
R34	CRN Marking for Northwest Territory	
R35	CRN Marking for Nunavut	
R36	CRN Marking for Newfoundland and Labrador	
Twell From Hex Stock		
Expanded		
R37	Thermowell from Hex stock	

Table 10. Series 183 Thermocouple Sensor Assemblies WITH Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Assemble to Options		
Standard		**Standard**
XA(14)	Assemble connection head or transmitter to a sensor assembly	★

(1) This option is not available with explosion-proof approval option codes E1, E5, E6, or E7.

(2) Bayonet spring-loaded style available to 45 inches. Codes 31 - 35 are not available with Sensor Lead Wire Termination codes R or P.

(3) Codes A and C must be used with an extension length. Additional non-standard (E) lengths are available in 1/2-in. increments from 2.5 to 9-in.

(4) Standard configuration with best delivery.

(5) Available only with straight stem thermowells.

(6) Thermowells with an overall length ("U" + "T" + 1.75-in.) of 36-in. or less are machined from solid barstock. Thermowells with an overall length larger than 42-in. will be constructed using a welded 3-piece design and are available only with a stepped stem style.

(7) For additional (T) lengths, see Table 15 on page Temperature-168.

(8) Straight or Tapered stem thermowells only.

(9) Cannot be used with 0-in. (T) length. F08 cannot be used with 0- or 1/2-in. (T) length

(10) Limited to 24" immersion length and 316 or 304 SST materials only.

(11) IECEx Flameproof approvals only applicable if installed with a Rosemount 248, 644, or 3144P transmitter.

(12) Available on flanged thermowells only.

(13) Only one flange face option allowed.

(14) If ordering option code XA with a transmitter, specify the same option on the transmitter model code.

Table 11. Ordering Example

Typical Model Number	**Model**	**Lead Wire Termination**	**Sensor Type**	**ISA Type**	**Extension Type**	**Extension Length**	**Material Code**	**Immersion Length**	**Mounting Style**	**Additional Options**
	0183	N	21	J2	A	30	A	075	T22	E5

Rosemount 68Q Sanitary Sensor



The Rosemount 68Q Sanitary Sensor has designs that provide flexible and reliable temperature measurements in hygienic process environments.

Features include:

- Industry-standard RTD sensor design
- Tri-Clamp endcap designs for easy installation
- 3-A Standards approval
- Variety of enclosure and connection head options
- Global hazardous-location approvals (Option Code I1)
- Calibration services to give you insight to sensor performance (Option Codes V1-V7)
- Electropolishing Surface Finish (Option Code R20)
- Assemble to Transmitter option (Option Code XA)

Table 12. Series 68Q Sanitary Platinum RTD Sensor Assemblies

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description		
0068Q	Sanitary Platinum RTD Sensor Assembly		
Sensor Lead Wire Termination			
Standard			**Standard**
P	Aluminum Connection Head, Six Terminals, Flat Cover, Painted		★
L	Aluminum Connection Head, Six Terminals, Extended Cover, Painted		★
N	Sensor only		★
D	Rosemount Aluminum Connection Head with 1/2-in. Entries		★
Expanded			
C	Polypropylene Connection Head		
G	Rosemount SST Connection Head with 1/2-in. Entries		
Sensor Type		**Temperature**	
Standard			**Standard**
11	Single Stepped Stem	-50 to 200 °C (-58 to 392 °F)	★
15	Dual Stepped Stem	-50 to 200 °C (-58 to 392 °F)	★
21	Single Straight Stem	-50 to 200 °C (-58 to 392 °F)	★
25	Dual Straight Stem	-50 to 200 °C (-58 to 392 °F)	★
30(1) (2)	Mini General Purpose 6-in. lead with 1/2-in. NPT Threaded Adapter	-50 to 200 °C (-58 to 392 °F)	★
31(1)(2)(3)	Mini General Purpose 6-in. lead with 1/2-in. NPSM Threaded Adapter	-50 to 200 °C (-58 to 392 °F)	★
32(1)(2)(3)	Mini General Purpose 180-in. cable with strain relief	-50 to 200 °C (-58 to 392 °F)	★
33(1)(2)(3)	Mini General Purpose 300-in. cable with strain relief	-50 to 200 °C (-58 to 392 °F)	★
41(4)	Mini Spring Loaded with thermowell replacement sensor	-50 to 200 °C (-58 to 392 °F)	★
Sensor Immersion Length (L) inches			
Standard			**Standard**
U010	1.00 in.		★
U011	1.10 in.		★
U012	1.20 in.		★
U013	1.25 in.		★
U014	1.40 in.		★
U015	1.50 in.		★

Table 12. Series 68Q Sanitary Platinum RTD Sensor Assemblies
★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

U016	1.60 in.	★
U017	1.70 in.	★
U018	1.80 in.	★
U019	1.90 in.	★
U020	2.00 in.	★
U025	2.50 in.	★
U030	3.00 in.	★
U035	3.50 in.	★
U040(5)	4.00 in.	★
U045	4.50 in.	★
U050(5)	5.00 in.	★
U055	5.50 in.	★
U060	6.00 in.	★
U065	6.50 in.	★
U070	7.00 in.	★
U075	7.50 in.	★
U080	8.00 in.	★
U085	8.50 in.	★
U090	9.00 in.	★
U095	9.50 in.	★

Endcap Type		**O.D. Tube Size (inches)**	
Standard			**Standard**
L050(6)	Tri-Clamp	1/2 to 3/4 in.	★
L100	Tri-Clamp	1.00 in.	★
L150(5)	Tri-Clamp	1.50 in.	★
L200(5)	Tri-Clamp	2.00 in.	★
L250	Tri-Clamp	2.50 in.	★
L300	Tri-Clamp	3.00 in.	★

Options (Include with selected model number)

Callendar-Van Dusen Constants		
Standard		**Standard**
V1-V7	V-Callendar-van Dusen Constants (V3, V4, V6 not available with 68Q)	★
Calibration Schedule		
Standard		**Standard**
X8	Customer-Specified Temperature Range Calibration	★
X9	Customer-Specified Single Temperature Point Calibration	★
Calibration Certification		
Standard		**Standard**
Q4	Calibration Certification, Customer-Specified Temperature	★
Special Surface Finish Electro Polish		
Standard		**Standard**
R20(7)	Electropolishing of wetted surfaces	★
Special Surface Finish High Mechanical Polish		
Standard		**Standard**
HP	High Mechanical Polish, 15R_a or better	★
Thermowell Material Certification		
Standard		**Standard**
Q8	Material Certification	★
Surface Finish Certification		
Standard		**Standard**
Q16	Surface Finish Certification	★

Table 12. Series 68Q Sanitary Platinum RTD Sensor Assemblies

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Assemble to Options		
Standard		**Standard**
XA[8]	Assemble connection head or transmitter to a sensor assembly (PTFE paste where appropriate, fully wired.)	★

(1) Only available in immersion lengths between 1-in. and 2-in.

(2) Only available with Tri-Clamp O.D. tube size 1/2 to 3/4-in. (Endcap type code L050).

(3) Only available with Sensor lead Wire Termination code N (sensor only).

(4) Only available in U lengths of 2.0, 2.5, or 3.0 inches.

(5) Standard configuration with best delivery.

(6) Only available in sensor type code 30, 31, 32, 33

(7) If ordering a Mini General Purpose or Mini Spring Loaded Sensor (Sensor Type codes 30, 31, 32, 33, or 41) with Electropolishing, High Mechanical Polish (Option code HP) is also required.

(8) If ordering option code XA with a transmitter, specify the same option on the transmitter model code.

Ordering Example

	Model	Lead Wire Termination	Sensor Type	Immersion Length	Endcap Type, Tube Size	Additional Options
Typical Model Number	0068Q	N	11	U050	L150	V2

Rosemount 58C Cut-to-Fit Sensor

The Rosemount 58C Cut-to-Fit Sensor and has designs that provide flexible and reliable temperature measurements in process environments.

Features include:

- Industry-standard RTD sensor design
- Cut-to-fit eliminates need to stock large selection of sensors in specific lengths
- 12-, 24-, 36-, and 48-in. lengths available

Table 13. Series 58C Cut-to-Fit RTD Sensors
★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
0058C	Platinum Resistance Temperature Sensor	
Sensor Lead Wire Termination		
Standard		**Standard**
D	Rosemount Aluminum Connection Head with 1/2-in. Entries	★
R	Aluminum Connection Head, Six Terminals, Flat Cover, Unpainted	★
T	Aluminum Connection Head, Six Terminals, Extended Cover, Unpainted	★
P	Aluminum Connection Head, Six Terminals, Flat Cover, Painted	★
L	Aluminum Connection Head, Six Terminals, Extended Cover, Painted	★
N	Sensor only with 6-in. PTFE-insulated, 22-gauge lead wires	★
Expanded		
C	Polypropylene Connection Head	
G	Rosemount SST Connection with 1/2-in. Entries	
Sensor Immersion Length		
Standard		**Standard**
1200	12 in.	★
2400	24 in.	★
3600	36 in.	★
4800	48 in.	★
Mounting Adapter		
Standard		**Standard**
NNN	None	★
C01(1)	One-compression fitting 1/2–14 ANPT	★
C02(1)	Two-compression fittings 1/2–14 ANPT	★
SNN	Spring-loaded fitting 1/2–14 ANPT	★

(1) The only difference between C01 and C02 is that the C01 includes one fitting while the C02 option includes two fittings.

Ordering Example

Typical Model Number

Model	Lead Wire Termination	Sensor Length	Mounting Adapter
0058C	R	1200	SNN

Table 14. Series 58C Spare Parts List
(specify spare part number separately when ordering mounting adapters)

Mounting Adapters	Option Code	Spare Part Number
Compression fitting 1/2–14 ANPT	C01 and C02	C07961-0008
Spring loaded fitting 1/2–14 ANPT	SNN	00058-0010-0001

Rosemount 91 Series Thermowells



The Rosemount 91 Series Thermowells have designs that provide flexible and reliable temperature measurements in process environments.

Features include:

- Threaded, Flanged, and Weld-in Styles
- Wake Frequency Calculations (Option Code R21)
- NACE Approval (Option Code R05)
- Internal Pressure Test (Option Code R22)
- External Pressure Test (Option Code R01)

Table 15. Series 91 Thermowells

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Description	
0091	Thermowells	
Thermowell Material		
Standard		**Standard**
A	Type 316 SST	★
B	Type 304 SST	★
C	Carbon Steel	★
D	316L SST	★
E	304L SST	★
Expanded		
F	Alloy 20	
G	Alloy 400	
H	Alloy 600	
J	Alloy C-276	
L	Alloy B	
M	304 SST with PTFE coating	
P	Chrome Molybdenum F22	
R	Nickel 200	
T	Titanium	
U[2]	316 SST with tantalum sheath	
V	310 SST	
W	321 SST	
X	Special Material	
Y	316Ti SST	
Z	Chrome Molybdenum F11	
Sensor/Immersion Length (U) in inches[1]		
Standard		**Standard**
005	0.5 in.	★
007	0.75 in.	★
010	1.0 in.	★
015[2]	1.5 in.	★
020	2.0 in.	★

Table 15. Series 91 Thermowells

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

025	2.5 in.	★
030	3.0 in.	★
035	3.5 in.	★
040	4.0 in.	★
045	4.5 in.	★
050	5.0 in.	★
055	5.5 in.	★
060	6.0 in.	★
065	6.5 in.	★
070	7.0 in.	★
075	7.5 in.	★
080	8.0 in.	★
085	8.5 in.	★
090	9.0 in.	★
095	9.5 in.	★
100	10.0 in.	★
105	10.5 in.	★
110	11.0 in.	★
115	11.5 in.	★
120	12.0 in.	★
125	12.5 in.	★
130	13.0 in.	★
135	13.5 in.	★
140	14.0 in.	★
145	14.5 in.	★
150	15.0 in.	★
155	15.5 in.	★
160	16.0 in.	★
165	16.5 in.	★
170	17.0 in.	★
175	17.5 in.	★
180	18.0 in.	★
185	18.5 in.	★
190	19.0 in.	★
195	19.5 in.	★
200	20.0 in.	★
205	20.5 in.	★
210	21.0 in.	★
215	21.5 in.	★
220	22.0 in.	★
225	22.5 in.	★
230	23.0 in.	★
240	24.0 in.	★
250	25.0 in.	★
260	26.0 in.	★
270	27.0 in.	★
280	28.0 in.	★
290	29.0 in.	★
300	30.0 in.	★
310	31.0 in.	★
320	32.0 in.	★

Table 15. Series 91 Thermowells

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

330	33.0 in.				★
340	34.0 in.				★
350	35.0 in.				★
360	36.0 in.				★
370	37.0 in.				★
380	38.0 in.				★
390	39.0 in.				★
400	40.0 in.				★
410	41.0 in.				★
420	42.0 in.				★
430	43.0 in.				★
440	44.0 in.				★
450	45.0 in.				★
460	46.0 in.				★
470	47.0 in.				★
480	48.0 in.				★
Thermowell Mounting Style		**Stem Style**	**Tip A (in.)**	**Root B (in.)**	
Standard					**Standard**
T20	Thread, 1/2–14 ANPT	Stepped	0.50	0.63	★
T22	Thread, 3/4–14 ANPT	Stepped	0.50	0.75	★
T24	Thread, 1–11.5 ANPT	Stepped	0.50	0.88	★
T26	Thread, 3/4–14 ANPT	Tapered	0.63	0.88	★
T28	Thread, 1–11.5 ANPT	Tapered	0.63	1.06	★
T30	Thread, 1 1/2–11.5 ANPT	Tapered	0.75	1.50	★
T32	Thread, 1/2–14 ANPT	Straight	0.50	0.50	★
T34	Thread, 3/4–14 ANPT	Straight	0.75	0.75	★
T36	Thread, 1–11.5 ANPT	Straight	0.75	0.75	★
T38	Thread, 3/4–14 ANPT	Straight	0.50	0.50	★
T44	Thread, 1/2–14 ANPT	Tapered	0.50	0.63	★
W38	Weld, 3/4-in. pipe	Stepped	0.50	0.75	★
W40	Weld, 1-in. pipe	Stepped	0.50	0.88	★
W42	Weld, 3/4-in. pipe	Tapered	0.63	0.88	★
W44	Weld, 1-inch Pipe,	Tapered	0.75	1.00	★
W46	Weld, 1 1/4-inch Pipe	Tapered	0.75	1.25	★
W48	Weld, 3/4-inch Pipe	Straight	0.75	0.75	★
W50	Weld, 1-inch Pipe	Straight	0.75	0.75	★
F10	Flange, F = 2-inch, Class 150	Straight	0.75	0.75	★
F12	Flange, F = 3-inch, Class 150	Straight	0.75	0.75	★
F52	Flange, F = 1-inch, Class 150	Stepped	0.50	0.75	★
F54	Flange, F = 1½-inch, Class 150	Stepped	0.50	0.75	★
F56	Flange, F = 2-inch, Class 150	Stepped	0.50	0.75	★
F58	Flange, F = 1-inch, Class 150	Tapered	0.75	1.00	★
F60	Flange, F = 1½-inch, Class 150	Tapered	0.75	1.00	★
F62	Flange, F = 2-inch, Class 150	Tapered	0.75	1.25	★
F64	Flange, F = 1-inch, Class 150	Straight	0.75	0.75	★
F66	Flange, F = 1½-inch, Class 150	Straight	0.75	0.75	★
F70	Flange, F = 1-inch, Class 300	Stepped	0.50	0.75	★
F72	Flange, F = 1½-inch, Class 300	Stepped	0.50	0.75	★
F74	Flange, F = 2-inch, Class 300	Stepped	0.50	0.75	★

Table 15. Series 91 Thermowells

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

F76	Flange, F = 1-inch, Class 300	Tapered	0.75	1.00	★
F78	Flange, F = 1½-inch, Class 300	Tapered	0.75	1.00	★
F80	Flange, F = 2-inch, Class 300	Tapered	0.75	1.25	★
F82	Flange, F = 1-inch, Class 300	Straight	0.75	0.75	★
F84	Flange, F = 1½-inch, Class 300	Straight	0.75	0.75	★
F86	Flange, F = 2-inch, Class 300	Straight	0.75	0.75	★
F88(3)	Flange, F = 1-inch, Class 600	Stepped	0.50	0.75	★
F90(3)	Flange, F = 1½-inch, Class 600	Stepped	0.50	0.75	★
F92(3)	Flange, F = 2-inch, Class 600	Stepped	0.50	0.75	★
F94(3)	Flange, F = 1-inch, Class 600	Tapered	0.75	1.00	★
F96(3)	Flange, F = 1½-inch, Class 600	Tapered	0.75	1.00	★
F98(3)	Flange, F = 2-inch, Class 600	Tapered	0.75	1.25	★
F02(3)	Flange, F = 1-inch, Class 600	Straight	0.75	0.75	★
F04(3)	Flange, F = 1½-inch, Class 600	Straight	0.75	0.75	★
F06(3)	Flange, F = 2-inch, Class 600	Straight	0.75	0.75	★
F16(3)	Flange, F = 1½-inch, Class 900	Tapered	0.75	1.00	★
F34(3)	Flange, F = 1½-inch, Class 1500	Tapered	0.75	1.00	★
F24(3)	Flange, F = 2-inch, Class 1500	Tapered	0.75	1.25	★
F08(4)	Flange, F = 1½-inch, Class 2500	Tapered	0.75	1.00	★
Q02(5)	Sanitary, 1-in.,Tri-Clamp	Stepped	0.50	0.75	★
Q04(6)	Sanitary, 1 1/2-in., Tri-Clamp	Stepped	0.50	0.75	★
Q06(6)	Sanitary, 2-in., Tri-Clamp	Stepped	0.50	0.75	★
Q08(6)	Sanitary, 3-in.,Tri-Clamp	Stepped	0.50	0.75	★
Q20(6)	Sanitary, 3/4-in., Tri-Clamp	Straight	0.44	0.44	★
Q22(6)	Sanitary, 1-in.,Tri-Clamp	Straight	0.50	0.50	★
Q24(6)	Sanitary, 1 1/2-in., Tri-Clamp	Straight	0.50	0.50	★
Q26(6)	Sanitary, 2-in., Tri-Clamp	Straight	0.50	0.50	★
Q28(6)	Sanitary, 3-in.,Tri-Clamp	Straight	0.50	0.50	★

Thermowell Lagging Length (T) in.		
Standard		**Standard**
T000	0.0 in.	★
T005	0.5 in.	★
T010	1.0 in.	★
T015	1.5 in.	★
T020	2.0 in.	★
T025	2.5 in.	★
T030	3.0 in.	★
T035	3.5 in.	★
T040	4.0 in.	★
T045	4.5 in.	★
T050	5.0 in.	★
T055	5.5 in.	★
T060	6.0 in.	★
T065	6.5 in.	★
T070	7.0 in.	★
T075	7.5 in.	★
T080	8.0 in.	★
T085	8.5 in.	★
T090	9.0 in.	★
T095	9.5 in.	★

Sensors and Accessories (English)

Table 15. Series 91 Thermowells

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Instrument Connection Thread		
Standard		**Standard**
P	1/2–14 NPSM	★
D	1/2–14 ANPT for CSA	★

Options (Include with selected model number)

Special External Pressure Test		
Standard		**Standard**
R01(6)	Special External Pressure Test	★
Material Certification		
Standard		**Standard**
Q8	Material Certification	★
Dye Penetration Test		
Standard		**Standard**
R03	Dye Penetration Test	★
Thermowell Special Cleaning		
Standard		**Standard**
R04	Thermowell Special Cleaning	★
NACE Approval		
Standard		**Standard**
R05	NACE Approval	★
SST Plug and Chain		
Standard		**Standard**
R06	SST Plug and Chain	★
Full Penetration Weld		
Standard		**Standard**
R07(7)	Full Penetration Weld	★
Thermowell Concentric Serrations		
Standard		**Standard**
R09(7)(8)	Concentric Serration of Thermowell Flange Face	★
Flat Faced Flange		
Standard		**Standard**
R10 (7)(8)	Flat Face Flange	★
Vent Hole		
Standard		**Standard**
R11	Vent Hole	★
Special Surface Finish		
Standard		**Standard**
R14(9)	Thermowell Special Surface Finish (12 R_a Max) (Maximum (U) length = 22.5 in.)	★
Ring Joint Flange		
Standard		**Standard**
R16(3)(7)(8)	Ring Joint Flange (Not available with 0-in. (T) length)	★
Electropolish		
Standard		**Standard**
R20(10)	Electropolish	★
Wake Frequency		
Standard		**Standard**
R21	Wake Frequency-Thermowell Strength Calculation	★
Internal Pressure Test		
Standard		**Standard**
R22	Internal Pressure Test	★
Brass Plug & Chain		
Standard		**Standard**
R23	Brass Plug & Chain	★

Table 15. Series 91 Thermowells

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Canadian Registration No.		
Expanded		
R24	CRN Marking for British Columbia	
R25	CRN Marking for Alberta	
R26	CRN Marking for Saskatchewan	
R27	CRN Marking for Manitoba	
R28	CRN Marking for Ontario	
R29	CRN Marking for Quebec	
R30	CRN Marking for New Brunswick	
R31	CRN Marking for Nova Scotia	
R32	CRN Marking for Prince Edward Island	
R33	CRN Marking for Yukon Territory	
R34	CRN Marking for Northwest Territory	
R35	CRN Marking for Nunavut	
R36	CRN Marking for Newfoundland and Labrador	
Twell From Hex Stock		
Expanded		
R37	Thermowell From Hex stock	

(1) Thermowells with an overall lengths ("U" + "T" + 1.75-in.) of 36-in. or less are machined from solid bar stock. Thermowells with an overall length larger than 42-in. will be constructed using a welded 3-piece design and are available only with a stepped stem style.

(2) Available in straight stem only.

(3) Not available with 0-in. (T) length.

(4) Not available with 0- or 1/2-in. (T) length.

(5) Limited to 24" immersion length and 316 or 304 SST materials only.

(6) Maximum (U) length = 42.0-in.

(7) Available on flanged thermowells only.

(8) Only one flange face option allowed.

(9) Maximum (U) length = 22.5 inches.

(10) Not available on flanged thermowells and L lengths longer than 24".

Ordering Example

Typical Model Number

Model	Material	Immersion Length	Mounting Style	Lagging Length	Connection Thread	Additional Options
0091	A	030	F52	T040	P	R01 R05 R07

Introduction

OVERVIEW

Emerson Process Management offers a wide variety of RTD and thermocouple sensors that are available alone or as complete assemblies including connection heads, thermowells, and extension fittings. In addition to complete assemblies, Emerson Process Management offers heads, coupling/nipple and union/nipple extensions, compression fittings, and thermowells.

Using this Product Data Sheet (PDS)

Use this PDS to order complete temperature sensor assemblies, which include sensors, thermowells, extensions, and connection heads. These options can also be ordered separately. For example, you can order a thermowell, extension, or connection head for use with an existing sensor. In each case it is important to know and understand the sections of this PDS when specifying the items.

Threaded Sensors and Assemblies

- Includes descriptions, specifications, and ordering information for Series 58C, 68, 68Q, and 78 RTDs, and the Series 183 thermocouples.
- Includes information for ordering sensors, connection heads, extensions, and thermowells as complete assemblies.

Calibration

- Includes characterization schedules and information for ordering calibrated Series 68, 68Q, and 78 RTD Sensors.
- Includes information regarding the use of Callendar-Van Dusen constants to match specific Series 68, 68Q, and 78 RTDs to Rosemount Smart Temperature Transmitters.

Mounting Accessories

- Includes descriptions, specifications, and ordering information for temperature accessories such as thermowells, extensions, connection heads, mounting adapters, lead wire extensions, connectors, seals, and thermowells.

Hazardous Area Approvals

- Includes descriptions of the FM, CSA, IECEx, and ATEX approvals for sensors and connection heads.

Configuration Data Sheet

- Provides a form used for thermowell application calculations.

RTD

Series 58C, 68, 68Q, and 78 platinum RTD temperature sensors are primarily used when high accuracy, durability, and long-term stability are required. These sensors conform to international standards: IEC-751, DIN EN 60751, and BS EN 60751.(1)

Series 58C platinum RTD temperature sensors:

- Combine an economical thin-film design with a sheath that can be shortened to any length with tubing cutter.

Series 68Q Quick Response Sanitary RTD sensors:

- Conform to 3–A Sanitary Standards and feature product contact surfaces designed for CIP cleaning.

Series 68 platinum RTD temperature sensors:

- Provide high performance in an economical thin-film design.

Series 78 platinum RTDs temperature sensors:

- Use a wire-wound element which allows for a broader measurement range.

Thermocouples

Series 183 thermocouple temperature sensors conform to ASTM E-230, and are available in types J, K, E, and T.

Series 183 thermocouple temperature sensors are available:

- grounded or ungrounded
- isolated or unisolated
- with immersion lengths from 2 to 48 inches.

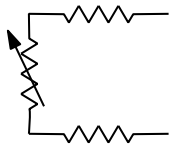
(1) 100 ohms at 0 °C, α = 0.00385 ohms/ohm/°C

The Use of 2-, 3-, and 4- wire RTDs

To help you attain the highest possible temperature measurement accuracy, Rosemount provides 4-wire sensors for all single element RTDs. You can use these RTDs in 2-, 3-, or 4-wire configurations by simply securing the unneeded leads with tape. To properly wire the 4-wire RTD for use in a 2-, 3-, or 4-wire configuration, refer to the following wiring diagrams:

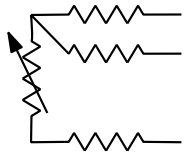
2-wire Configuration

2-wire RTDs provide one connection to each end of the sensor. In a 2-wire configuration, lead wires add resistance to the circuit which cannot be compensated. The 2-wire configuration is rarely used because the added lead wire resistance can cause substantial errors in the temperature reading.



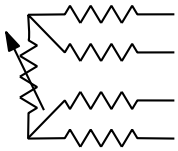
3-wire Configuration

3-wire RTDs provide one connection to one end of the sensor, and two connections to the other end. The 3-wire approach does not eliminate all lead wire effects. However, for sensors with lead wires of the same length, lead wire effects are slight, and the approach provides reasonable accuracy.



4-wire Configuration

The most effective way to eliminate lead wire effects is with two connections at each end of the sensor. 4-wire RTDs fully compensate for lead wire effects.



Benefits and Limitations of RTDs when compared to Thermocouples

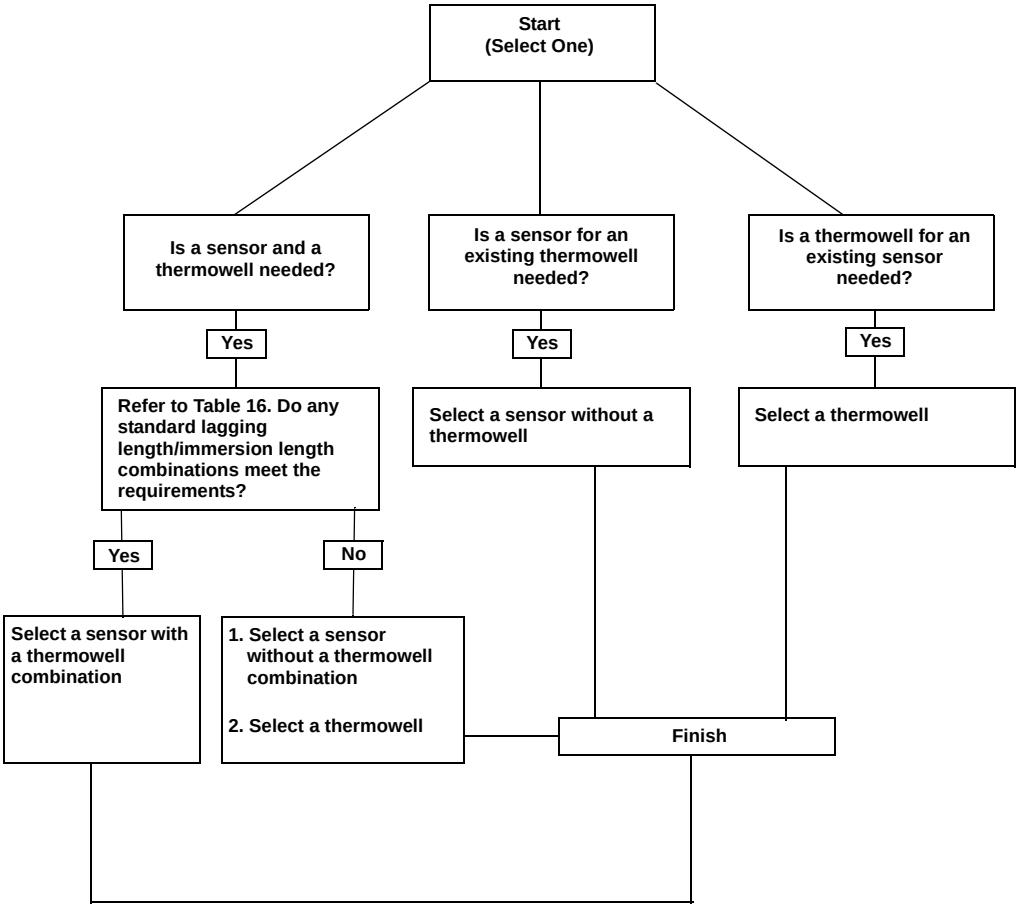
Benefits:

- Higher accuracy
- Better linearity and long-term stability
- Cold junction compensation not required
- Special extension lead wire not required
- Less susceptible to noise
- Can be “matched” to a Rosemount transmitter with transmitter sensor matching

Limitations

- Lower maximum temperature limit
- Slower response time in applications without a thermowell
- Reduced resistance to vibration-induced failure

HOW TO DECIDE WHAT TO ORDER



If Rosemount sensor and model code is visible on the Sensor:

1. If the thermowell is ordered separately (0078P23C30**N**060) 11th digit = 'N'
    a. Start with immersion length - digits 12-14; 060 = 6.0 in.
    b. Add extension length - digits 9 & 10; 30 = 3.0 in. (3 + 6 = 9)

Order the replacement sensor for the total length without connection heads (5th digit **N**) and extension (8th digit **N**) 0078N23N00N**090**

2. If the thermowell is ordered integral to sensor (0078P23C**30A060**W40) 11th digit = not 'N'
    a. Immersion length 'U' is defined by the 12-14th digits; 060 = 6.0 in.
    b. Look up 'L' length from the correct order chart for given 'U' length. This will be 4 inches for short sensors, or a whole number divisible by 3 for sensors longer than 4 inches (4, 6, 9, 12, 15, 18... inches);
    'U' 060 = 9 inches 'L'
    c. Add extension length as defined by 9th and 10th digits; 30 = 3.0 in. to the 'L' length found in table.
    (9" + 3" = 12", Length code 120)
    d. This will be the replacement sensor length 'X'.

Order sensor without connection head (5th digit **N**) or extension (8th digit **N**) 0078**N**23**N**00N**120**

If model code is NOT visible on the sensor, follow one of the three instructions below:

1. Measure the inside depth of the thermowell *preferred*
    a. Measure down the inside of the thermowell hole to the top-most face of the extension used, or the thermowell if no extension
    b. This will be the replacement sensor length if depth = 12.0 in., sensor length will be 12 in.

Order sensor without connection heads (5th digit **N**) or extension (8th digit **N**) 0078**N**23**N**00N**120**

2. Measure the overall outside length of the thermowell from end to end.
    a. Measure down the outside of the thermowell from the tip to the end face of the extension if used, or the thermowell if no extension.
    b. Subtract 1/4 in. to account for thickness of the thermowell at the tip.
    c. This will be the replacement sensor length. Overall length = 12.25 in., the replacement will be 12 in.

Order sensor without connection heads (5th digit **N**) or extension (8th digit **N**) 0078**N**23**N**00N**120**

3. Measure the old sensor length from tip to the flat face of the threaded process connection.
    a. Determine if the sensor is spring loaded or general purpose (welded) where the sensor sheath meets the threaded adaptor.
    b. For spring loaded sensors, the measurement of the exposed sheath from tip of the start of the threaded portion will be the same as the replacement sensor length.
        • Normal spring compression for a Rosemount sensor is assumed to be 1/2 in. and the normal thread engagement is also assumed to be 1/2 in.
        • Round to the nearest whole 1/4 in. increment as the spring will make up any small differences
        • Replacement sensor for a spring loaded sensor measuring 6.5 inches will be 6.5 in. length

Order sensor without connection heads (5th digit **N**) or extension (8th digit **N**) 0078N15N00N**065**

    c. For general purpose sensors with the distance from tip to threaded adapter:
        • Add 1/4 in. to allow clearance, preventing bottoming sensor during installation.
        • Add 1/2 in. for the thread engagement of the sensor in the thermowell.
        • The replacement sensor for a general purpose sensor measuring 5.75 in. from the tip to the threaded adaptor is 6.5 in. (5 3/4 + 1/4 + 1/2 = 6 1/2 in).

Order sensor without connection heads (5th digit **N**) or extension (8th digit **N**) 0078N15N00N**065**

If model code is visible on the thermowell (0091A060W40T015P) follow the instructions below to determine sensor model number:

a. Start with immersion length digits 6-8, 060 = 6.0 in.
b. Add additional lagging length digits 13-15, 015 = 1.5 in.
c. To those lengths add 1.5 in. (this is the additional standard lagging length on all Rosemount thermowells) 1.75 in. minus (0.25 in. thermowell tip thickness) = 1.50 in.
d. 6.0 +1.5 +1.5 = 9 in.

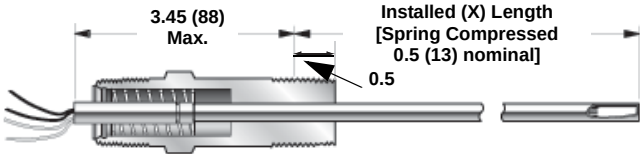
Order replacement sensor 0078N23N00N**090**

SPRING-LOADED SENSOR DIMENSIONS

When a spring-loaded sensor is used properly, the spring should be compressed approximately 1/2-inch. Therefore, all measurements of spring-loaded sensors are made with the spring compressed. If you measure an existing spring-loaded sensor while it is in a relaxed state, you must subtract 1/2-inch to arrive at the installed length (X) that must be ordered. See Figure 1.

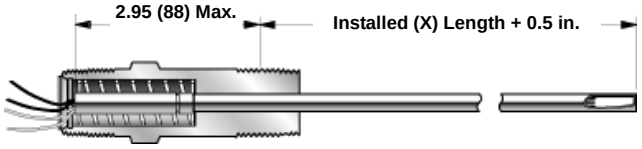
Figure 1. Spring Loaded Sensors Dimensions

Compressed Spring Loaded Sensor



Spring loaded sensor in a compressed state: The actual sensor length is measured when the spring is compressed approximately 1/2-in. shorter than the relaxed sensor.

Relaxed Spring Loaded Sensor



Spring loaded sensor in a relaxed state: Normally, when a spring loaded sensor is measured, it is in a relaxed state. You must subtract 1/2-in. from your measurement to order a replacement sensor. Rosemount Inc. assumes that the sensor length you specify is that of a compressed sensor.

Determining the Length (L) of a spring-loaded sensor to be used with an existing non-Rosemount Thermowell

See Figure 1, Figure 3, and Figure 4.

1. Remove the existing generic sensor from the installed thermowell.
2. Measure the sensor length with the spring in the relaxed state (as shown in Figure 1). Measure from the tip of the sensor to the maximum thread engagement point (0.53 in. into the threads).
3. Subtract 0.5 inches from your measurement. The resulting length is (X).
4. If the sensor is installed with an extension, measure the extension length (E), as shown in Figure 4. If the sensor is not installed with an extension, let (E) = 0.
5. Since (X) = (E) + (L), subtract (E) from (X) to find (L).

Use the resulting length (L) in the Section 2 ordering tables to choose the correct length of sensor.

Length Code Key	
L	Thermowell length minus 0.25 in.
U	Immersion length into process
T	Lagging length
E	Extension fitting length
X	Sensor length

Use the following equations to determine all lengths

L = U + T + 1.5
X = E + L
X = E + U + T + 1.5

Figure 2. Thermowell Dimensions (use with Table 16)

Sensor with Thermowell (no extensions)

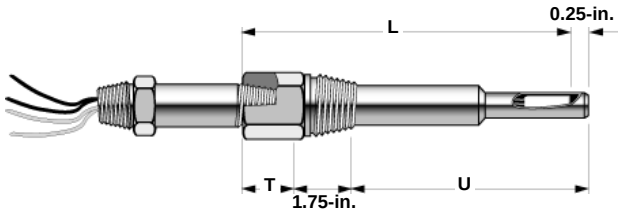


Table 16. Dimensions for thermowells when ordered with sensors (U), (L), and (T). Use with Figure 2.

Dimensions (in.)[1]													
Code	**(U)**	**(L)**	**(T)**		**Code**	**(U)**	**(L)**	**(T)**		**Code**	**(U)**	**(L)**	**(T)**
020	2.0	4.0	0.5		090	9.0	12.0	1.5		160	16.0	18.0	0.5
025	2.5	4.0	0.0		095	9.5	12.0	1.0		165	16.5	18.0	0.0
030	3.0	6.0	1.5		100	10.0	12.0	0.5		170	17.0	21.0	2.5
035	3.5	6.0	1.0		105	10.5	12.0	0.0		175	17.5	21.0	2.0
040	4.0	6.0	0.5		110	11.0	15.0	2.5		180	18.0	21.0	1.5
045	4.5	6.0	0.0		115	11.5	15.0	2.0		185	18.5	21.0	1.0
050	5.0	9.0	2.5		120	12.0	15.0	1.5		190	19.0	21.0	0.5
055	5.5	9.0	2.0		125	12.5	15.0	1.0		195	19.5	21.0	0.0
060	6.0	9.0	1.5		130	13.0	15	0.5		200	20.0	24.0	2.5
065	6.5	9.0	1.0		135	13.5	15.0	0.0		205	20.5	24.0	2.0
070	7.0	9.0	0.5		140	14.0	18.0	2.5		210	21.0	24.0	1.5
075	7.5	9.0	0.0		145	14.5	18.0	2.0		215	21.5	24.0	1.0
080	8.0	12.0	2.5		150	15.0	18.0	1.5		220	22.0	24.0	0.5
085	8.5	12.0	2.0		155	15.5	18.0	1.0		225	22.5	24.0	0.0

(1) L = U + T + 1.5

Ordering a Sensor and a Thermowell

See Figure 2 and Table 16 and Figure 3 and Figure 4. Use the following Procedure to determine if a standard lagging length can be use with the sensor and thermowell.

1. Determine the (U), (T), and (E) lengths necessary for your installation.
   If you do not need an extension, (E) = 0 (zero).
   Note: If your existing sensor/thermowell combination is different than Figure 3, refer to the drawings on the following pages.
2. Find your immersion length (U) on Table 16 above and compare the corresponding lagging length (T) to the lagging length that you previously determined.
3. If your lengths match the values on the line that corresponds to your required immersion length, order your sensor and thermowell together.

   If your lengths do not match the values on the line that corresponds to your measured immersion length, order your sensor and thermowell separately. Solve for (L) using the equation (L) = (U) + (T) + 1.5 (since (L) is required when ordering the sensor separately from the thermowell).

Length Code Key

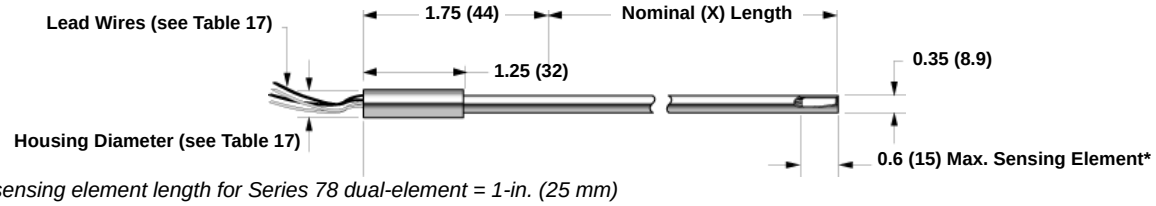
L	Thermowell length minus 0.25 in.
U	Immersion length into process
T	Lagging length
E	Extension fitting length
X	Sensor length

Use the following equations to determine all lengths

L = U + T + 1.5
X = E + L
X = E + U + T + 1.5

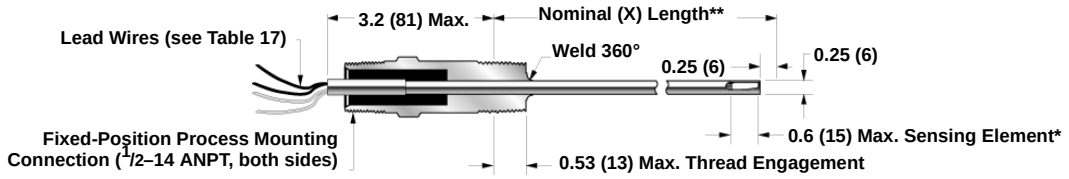
Figure 3. Series 68, 78, and 183 Sensor Assembly Dimensional Drawings

Capsule Sensor Only



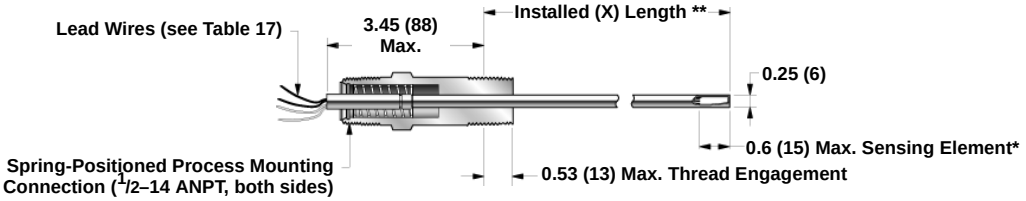
** Maximum sensing element length for Series 78 dual-element = 1-in. (25 mm)*

General Purpose Sensor Assembly



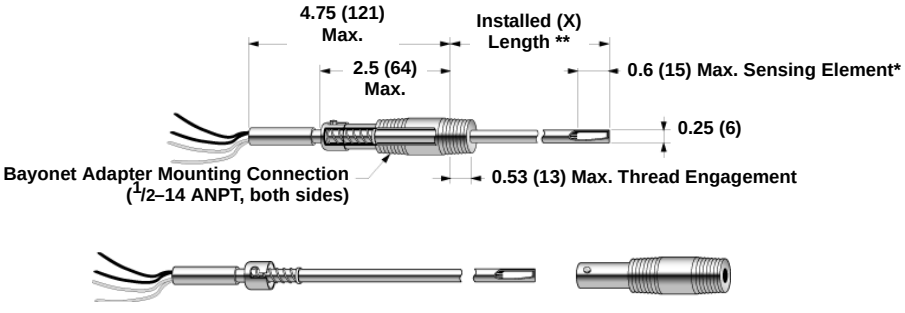
** Maximum sensing element length for Series 78 dual-element = 1-in. (25 mm)*
*** Actual length is 0.25 (6) less to avoid bottoming in thermowell*

Spring Loaded Sensor Assembly



** Maximum sensing element length for Series 78 dual-element = 1-in. (25 mm)*
*** Spring Compressed 0.5 (13)*

Bayonet Spring Loaded Sensor Assembly



** Spring is shown compressed 0.5 -in.(13 mm.) Do not adjust the equations in Table 17 when calculating X, L, U, and T lengths. The equation already accounts for spring compression.*

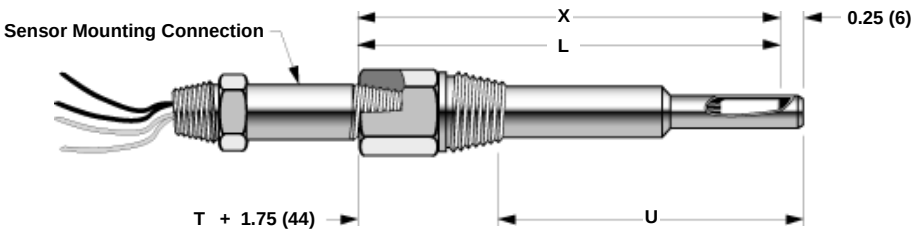
Dimensions are in inches (millimeters)

Table 17. Sensor Series and Dimensions

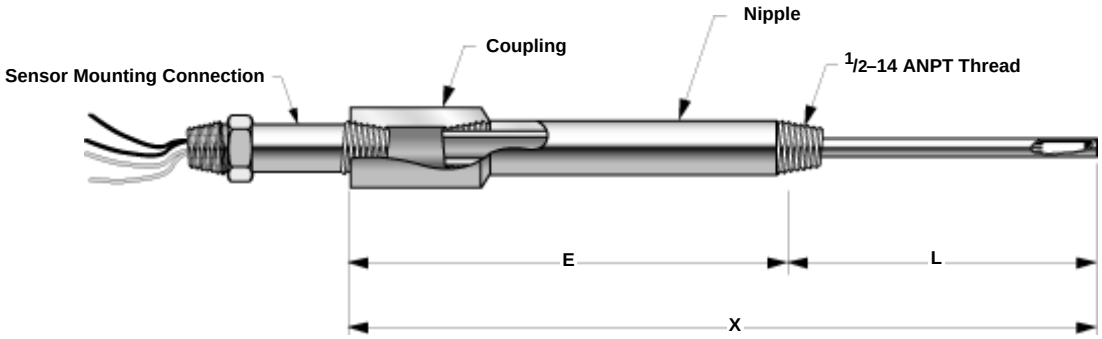
Series	Housing Diameter		Lead Wires	Lead Wire Length		Series	Housing Diameter		Lead Wires	Lead Wire Length	
	in	mm		in	mm		in	mm		in	mm
68	0.350	8.0	4	6.0	152.4	183 single	0.375	9.53	2	6.0	152.4
78 single	0.350	8.0	4	6.0	152.4	183 dual	0.375	9.53	4	12.0	304.8
78 dual	0.350	8.0	6	6.0	152.4						

Figure 4. Series 68, 78, and 183 Sensor Assembly Length Code Drawings

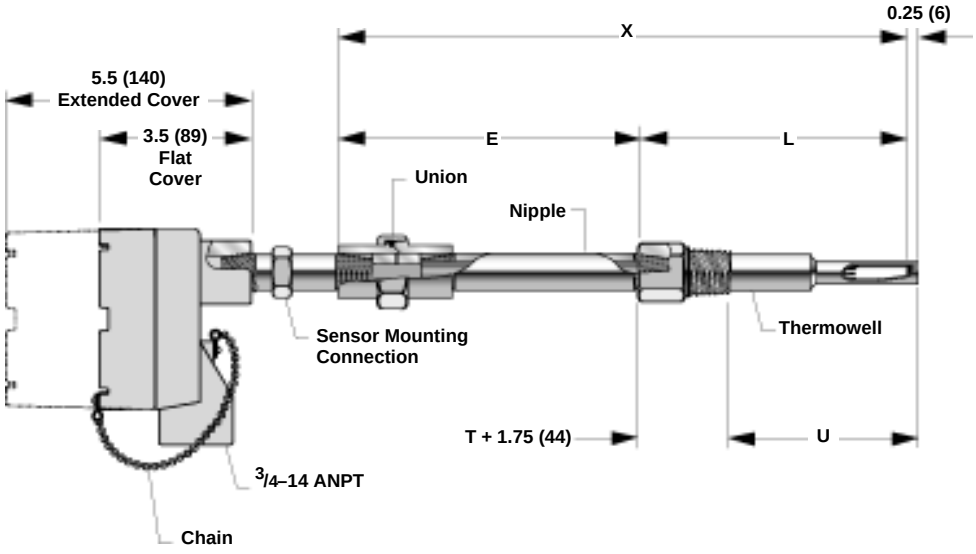
Sensor with Thermowell (No Extension)



Sensor with Extension (No Thermowell)



Sensor Installed in Connection Head (Flat Cover) with Union and Nipple Extensions and Thermowell



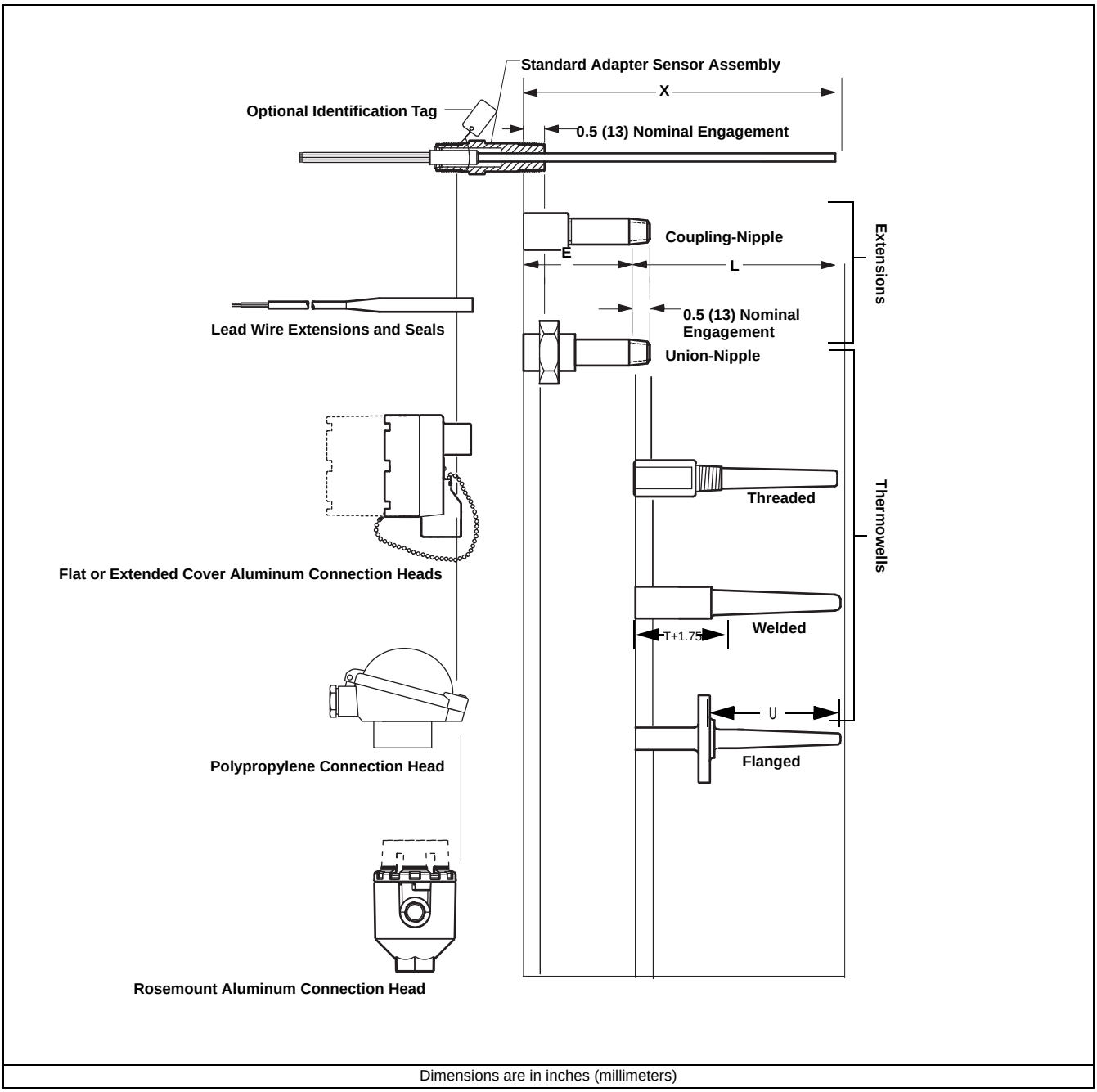
Dimensions are in inches (millimeters)

Threaded Sensors and Assemblies

Series 68, 68Q, and 78 RTD and Series 183 Thermocouple Sensors may be ordered as complete assemblies. These assemblies provide a complete, yet simple means of specifying the proper industrial hardware for most temperature measurements.

One assembly model number, derived from one ordering table, completely defines the type of sensing element, as well as the material, length, and style of both the extension fittings and thermowells. All sensor assemblies are sized and inspected by Rosemount Inc. to ensure complete component compatibility and performance.

Figure 5. Individual Components of a Complete Temperature Assembly



Dimensions are in inches (millimeters)

MOUNTING CONFIGURATIONS

Capsule

Capsules are designed for direct immersion without mounting fittings. Accessory compression fittings are available for adjustable mounting into a thermowell. See Mounting Adapters for Series 58, 68, 78, and 183.

General-Purpose Sensor Assemblies

Designed with a welded, fixed-position 1/2–14 ANPT process connection fitting for direct immersion or thermowell applications, this sensor design provides a moisture-proof and vapor-tight seal. The maximum static working pressure at 20 °C (68 °F) with no vibration or flow condition is 31.59 MPa (3,500 psig). The use of a thermowell is recommended for process pressure containment. Note that standard lengths are 1/4 inch less than nominal dimension to prevent bottoming of the sensor in a thermowell.

Spring-Loaded Sensor Assemblies

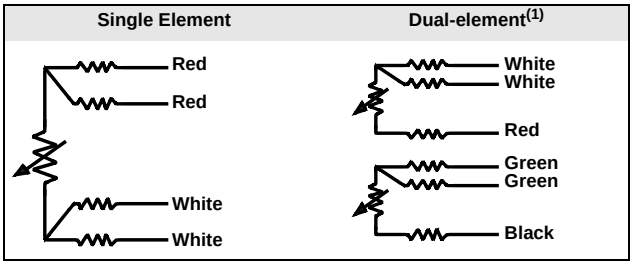
Spring-loaded sensors have a spring-positioned, 1/2–14 ANPT process connection fitting that ensures good surface contact in thermowells for faster time response and vibration resistance. Spring-loaded sensors are not intended to provide a process seal. They must be used in conjunction with a thermowell for this purpose.

NOTE
When a spring-loaded sensor is used properly, the spring should be compressed approximately 1/2-inch.

Bayonet Spring-Loaded Sensor Assemblies

Bayonet assemblies have the same advantages as the spring-loaded sensor. However, the bayonet connector permits the sensor to be easily removed from the process without tools.

FIGURE 6. Series 68, 68Q, 78, and 58C Lead Wire Configurations



(1) Dual-element sensors are only available on Series 68Q and 78 sensors.

SERIES 68 PLATINUM RTD

Rosemount Series 68 Platinum resistance temperature sensors measure from –50 to 400 °C (–58 to 752 °F). Series 68 Class B, Pt100-385 sensors are available in capsule, general purpose, and spring-loaded designs in sensor lengths from 1 to 48 inches.

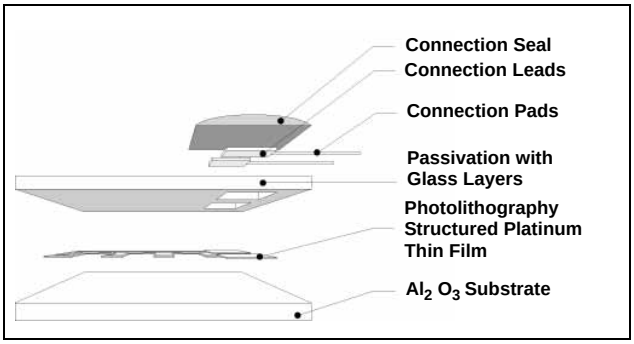
Table 18 shows the interchangeability of the Series 68 RTD. As an option, for maximum system accuracy, Rosemount Inc. can provide sensor calibration. See Sensor Characterization (Calibration) Schedules– Option Code V. In addition, Rosemount Inc. offers optional sensor-to-transmitter matching capability obtainable through the use of Callendar-Van Dusen Constants. See Option Code “V” Callendar-van Dusen Constants.

Table 18. Series 68 Interchangeability

• ±0.55 °C (±0.99 °F) at -50 °C (-58 °F)
• ±0.30 °C (±0.54 °F) at 0 °C (32 °F)
• ±0.80 °C (±1.44 °F) at 100 °C (212 °F)
• ±1.30 °C (±2.34 °F) at 200 °C (392 °F)
• ±1.60 °C (±2.88 °F) at 260 °C (500 °F)
• ±2.30 °C (±4.14 °F) at 400 °C (752 °F)

Construction

FIGURE 7. Construction of a Platinum Thin Film RTD



Design and construction of the Series 68 Platinum Sensors provides the optimum combination of accuracy and durability available for temperature measurements. The construction of the sensor allows for direct immersion in non-corrosive fluids at reasonable static pressures. For corrosive environments or many industrial applications, these sensors are widely used with standard thermowell assemblies.

Platinum Element and Lead Wire Configurations

Single-element temperature sensors have four lead wires and may be used in 2-, 3-, and 4-wire signal conditioning systems.

Sensors and Accessories (English)

Specifications

Performance

Temperature Range

–50 to 400 °C (–58 to 752 °F)

Effect of Temperature Cycling

±0.05% (0.13 °C or 0.23 °F) maximum ice-point resistance shift following 10 cycles over the specified temperature range.

Stability

±0.11% maximum ice-point resistance shift following 1,000 hours at maximum specified temperature (400 °C).

Maximum Hysteresis

±0.1% of operating temperature range.

Time Constant

12 seconds maximum required to reach 63.2% sensor response in water flowing at 3 ft/s (0.91 m/s).

Nominal R0 100 Ohm

Nominal alpha .00385 C-1

Physical Specifications

Sheath Material

316 SST. / 321 SST.

Lead Wire

PTFE insulated, nickel-coated, 22-gauge stranded copper wire.

Identification Data

The model, serial numbers, and up to six lines of permanent tagging information are etched on each sensor. Stainless steel tags are available upon request.

Weight

- Capsule sensors: 5 oz
- General-purpose and spring-loaded sensors: 9 oz

Environmental

Humidity Limits

- Lead seal can withstand 100% relative humidity.

Vibration Limits

- ±0.05% maximum ice-point resistance shift due to 30 minutes of 14 g peak vibration from 5 to 350 Hz at 20 °C (68 °F) for unsupported stem length of less than 6 inches.

Quality Assurance

- Each sensor is subjected to a resistance accuracy test at 0 °C and an insulation resistance test.

Enclosure Ratings

- When installed properly, Rosemount Series 68 sensors are suitable for indoor and outdoor NEMA 4X and CSA Enclosure Type 4X installations. See Hazardous Area Approvals for complete installation information.

Insulation Resistance

1000×10^6 ohms minimum insulation resistance when measured at 500 Vdc at room temperature.

SERIES 78 PLATINUM RTD

Series 78 sensors are intended for applications that require high accuracy, dual-elements, and/or are subjected to high temperatures. Rosemount Series 78 Platinum Resistance temperature sensors measure from –200 to 600 °C (–328 to 1112 °F). These sensors are available in capsule, general-purpose, spring-loaded, and bayonet spring-loaded designs in sensor (X) lengths from 1 to 68 inches.

Table 19 shows the interchangeability of the Series 78 Pt100-385 sensors. The performance of the standard Series 78 sensor conforms to the standard set by IEC 751 Class B. Additionally, IEC-751 Class A accuracy is available as an option. For maximum system accuracy, Rosemount Inc. can provide sensor calibration. See Sensor Characterization (Calibration) Schedules– Option Code V. Rosemount Inc. also offers optional sensor-to-transmitter matching capability obtainable through the use of Callendar-Van Dusen Constants. See Option Code “V” Callendar-van Dusen Constantsand Option X8Q4: Sensor Calibrated to a Customer-Specified Temperature Range.

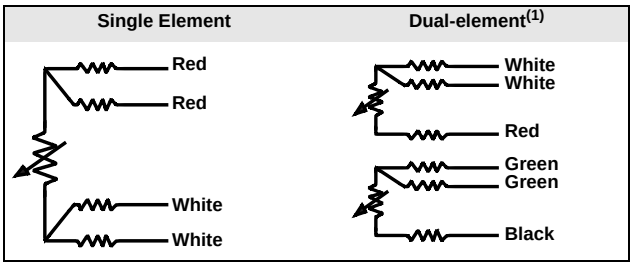
The wire-wound design and construction of the General-Purpose Series 78 sensor allows direct immersion in non-corrosive fluids at reasonable static pressures. For corrosive environments and in many industrial applications, these sensors are commonly used with standard thermowell assemblies.

Platinum Element and Lead Wire Configurations

Single-element high-temperature sensors have four lead wires and may be used in 2-, 3-, and 4-wire signal conditioning systems.

Dual-element sensors have redundant elements to provide separate readout and control signals from a single measurement point. Dual-element sensors have three lead wires for each element and may be used with 2- or 3-wire systems. Dual-element sensors can also be wired to be used as compensation loop sensors (see Figure 8).

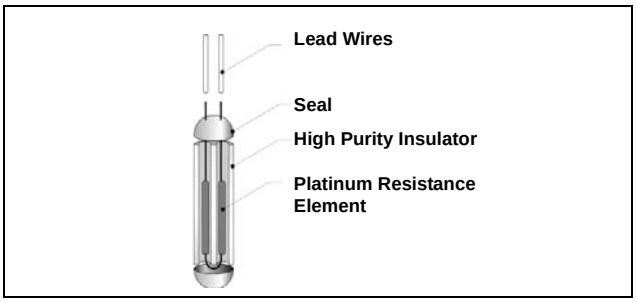
FIGURE 8. Wiring Configuration of a Dual-Element Sensor to Function as a Single Element Sensor with a Compensation Loop



(1) Dual-element sensors are only available on Series 68Q and 78 sensors.

Construction

FIGURE 9. Construction of a Platinum Wire-wound RTD



Specifications

Performance

Temperature Range

Series 78 single- and dual-element sensors may be used in temperatures from –200 to 500 °C (–328 to 932 °F). Series 78 single-element high-temperature sensors are provided for high-temperature service over the range of 0 to 600 °C (32 to 1112 °F).

Effect of Temperature Cycling

±0.04% (0.10 °C or 0.18 °F) maximum ice-point resistance shift following 10 cycles between –200 and 500 °C (–328 to 932 °F).

Stability

±0.05% maximum ice-point resistance shift following 1,000 hours at 400 °C (752 °F).

Accuracy

Table 19. Series 78 Interchangeability

Standard Series 78 IEC-751 Class B	Temperature
±0.80 °C (±1.44 °F)	-100 °C (-148 °F)
±0.30 °C (±0.54 °F)	0 °C (32 °F)
±0.80 °C (±1.44 °F)	100 °C (212 °F)
±1.80 °C (±3.24 °F)	300 °C (572 °F)
±2.30 °C (±4.14 °F)	400 °C (752 °F)
Series 78 with IEC-751 Class A Option	**Temperature**
±0.35 °C (±0.63 °F)	-100 °C (-148 °F)
±0.15 °C (±0.27 °F)	0 °C (32 °F)
±0.35 °C (±0.63 °F)	100 °C (212 °F)
±0.75 °C (±1.35 °F)	300 °C (572 °F)
±0.95 °C (±1.71 °F)	400 °C (752 °F)

Maximum Hysteresis

- Single- and dual-element, Nominal R0 100 Ohm Nominal alpha .00385 Ω/Ω °C.
- Single-element, high temperature: ±0.1% of range.

Time Constant

4 seconds maximum required to reach 63.2% sensor response in water flowing at 3 ft/s (0.91 m/s), 9.5 seconds for single-element high-temperature sensors.

Self Heating

18 mW minimum power dissipation required to cause a 1 °C (1.8 °F) temperature measurement error in water flowing at 3 ft/s, 25 mW for single-element high temperature sensors.

Insulation Resistance

500×10^6 ohms minimum insulation resistance when measured at 500 Vdc at room temperature [20 °C (68 °F)]. Single element high-temperature sensors are measured at 100 Vdc.

Environmental

Humidity Limits

Lead seal is capable of withstanding 100% relative humidity.

Vibration Limits

Standard single- and dual-element sensors:

- ±0.03% maximum ice-point resistance shift due to 30 minutes of 21 g peak vibration from 5 to 350 Hz continuous sweep at 20 °C (68 °F) for unsupported stem length of less than 5.5 inches (140 mm).

Single-element high-temperature sensors:

- Meet ASTM E 1137-95. Cycling time is 3 hours per longitudinal axis, less the time spent at resonant dwells at the axis, from 5 to 500 Hz. The test level is 1.27 mm (0.05 in.) double amplitude displacement or peak g-level of 3, whichever is less.

Quality Assurance

Each sensor is subjected to a resistance accuracy test at 0 °C and an insulation resistance test.

Enclosure Ratings

When installed properly, Rosemount Series 78 sensors are suitable for indoor and outdoor NEMA 4X and CSA Enclosure Type 4X installations. See Hazardous Area Approvals for complete installation information.

Physical Specifications

Sheath Material

316 SST

Lead Wires

PTFE-insulated, nickel-coated, 22-gauge stranded copper wire.

Identification Data

The model and serial numbers and up to six lines of permanent tagging information are etched on each sensor. Stainless steel tags are available upon request.

Weight

- Capsule sensors: 5 oz
  General purpose and spring-loaded sensors: 9 oz

SERIES 183 THERMOCOUPLE

Rosemount Series 183 Thermocouple sensors measure from –180 to 1150 °C (–292 to 2102 °F).

Construction

The Series 183 Thermocouples are manufactured using ISA Type J, K, E, or T wire with “special limits of error” accuracy. The junction of these wires is fusion-welded to form a pure joint, to maintain the integrity of the circuit, and to ensure the highest accuracy. Grounded junctions are available for improved response time and good thermal contact with protection from the environment. The ungrounded and isolated junctions provide electrical isolation from the sensor sheath (see Figure 10).

Rosemount thermocouples are encased in a protective metal sheath. The sheath material is 304 SST for types J, E, and T, used at temperatures up to 871 °C and Inconel for type K, used at temperatures up to 1150 °C. Metallic oxide insulation is compacted into the sheath to mechanically support and electrically insulate the thermocouple wire. See Table 20 for more information on the different types of thermocouples.

FIGURE 10. Series 183 Junction Configurations

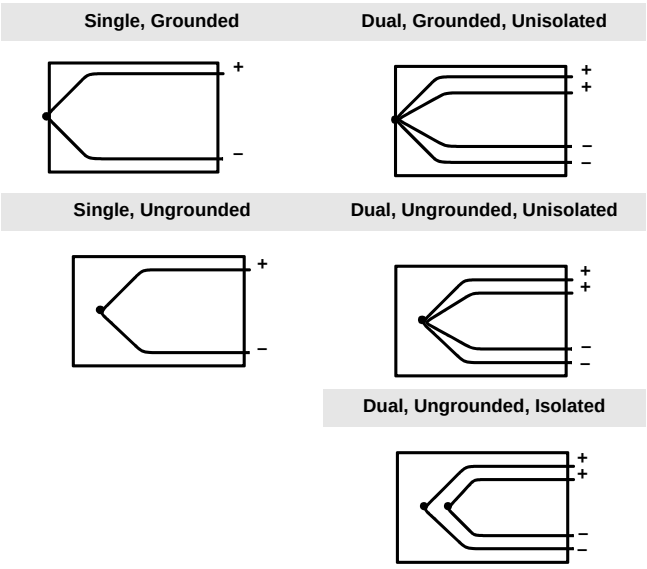
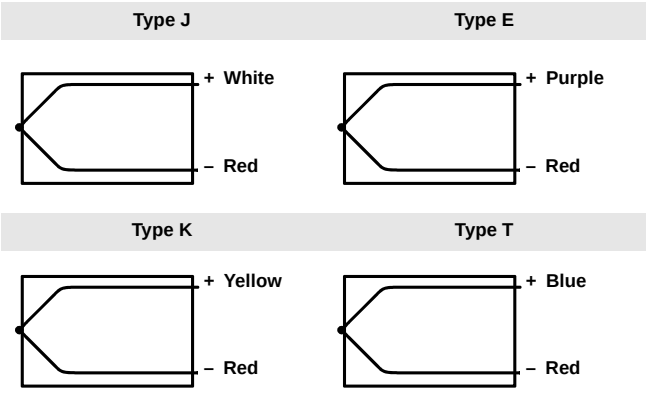


FIGURE 11. Series 183 Lead Wire Configurations



Specifications

Performance Specifications

The thermoelectric current relationship in a thermocouple is standardized and defined by ASTM E-230. All Series 183 Thermocouples conform to these standards with “special limits of error” accuracy. The particular characteristics of each ISA type thermocouple are outlined in Table 20.

Physical

Sheath Material

304 SST for types J, E, and T (used at temperatures up to 871 °C). Inconel for type K (used at temperatures up to 1150 °C).

Lead Wires

Thermocouple, internal—16 AWG solid wire (max), 18 AWG solid wire (min.). External lead wires—20 AWG wire, PTFE-insulated. Color coded per lead wire configuration schematic shown in Figure 11.

Identification Data

The model and serial numbers and up to six lines of permanent tagging information are etched on each sensor. Stainless steel tags are available upon request.

Weight

Capsule sensors: 5 ounces. General-purpose and spring-loaded sensors: 9 ounces.

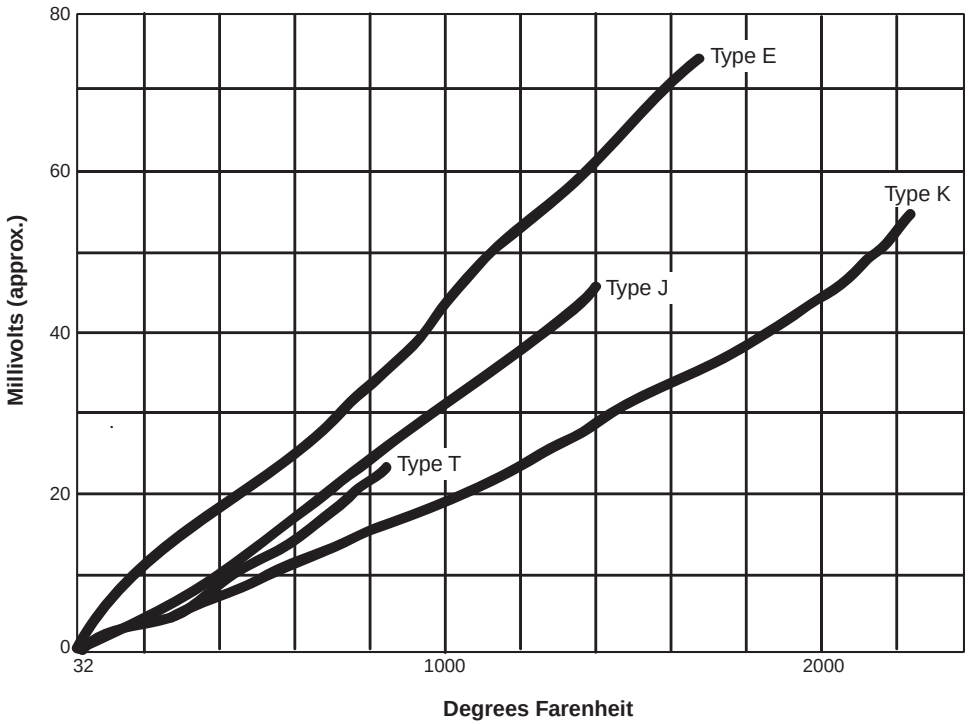
Insulation Resistance

100×10^6 ohms minimum insulation resistance when measured at 100 Vdc at room temperature.

Enclosure Ratings

When installed properly, Rosemount Series 183 sensors are suitable for indoor and outdoor
NEMA 4X and CSA Enclosure Type 4X installations. See Hazardous Area Approvals for complete installation information.

Comparison of Thermocouples



Thermocouple	Conditions for Use
Type J Iron / Constantan	Maximum operating temperature of 760 °C (1400 °F). Used with or without protective tubing where deficiency of free oxygen exists. Protective tube not essential, but desirable for cleanliness and longer service.
Type K Chromel / Alumel	Suitable for extended use in temperature reaching 1150 °C (2102 °F). Use of metal or ceramic protective tube desirable, especially in reducing atmospheres. In oxidizing atmospheres, protective tubing necessary only to promote cleanliness and longer service.
Type E Chromel / Constantan	Suitable for use at temperature up to 900 °C (1652 °F) in vacuum or inert, mildly oxidizing or reducing atmosphere. Not subject to corrosion at cryogenic temperatures. Has highest EMF output per degree of all commonly used thermocouples.
Type T Copper /Constantan	Operating temperature range of –180 to 371 °C (–292 to 700 °F). Use in either oxidizing or reducing atmospheres. Protective tubing necessary only to promote cleanliness and longer service. Stable at lower temperature. Superior for a wide variety of uses in cryogenic temperatures.

Table 20. Characteristics of Series 183 Thermocouple Types

ISA Thermocouple Types	Thermocouple Wire Alloys	Temperature Range		Limits of Error (Interchangeability)
		°C	°F	
J	Iron/Constantan	0 to 760	32 to 1400	±1.1 °C or ±0.4% of measured temperature, whichever is greater
K	Chromel/Alumel	0 to 1150	32 to 2102	±1.1 °C or ±0.4% of measured temperature, whichever is greater
E	Chromel/Constantan	0 to 871	32 to 1600	±1.0 °C or ±0.4% of measured temperature, whichever is greater
T	Copper/Constantan	–180 to 0	–292 to 32	±1.0 °C or ±1.5% of measured temperature, whichever is greater
		0 to 371	32 to 700	±0.5 °C or ±0.4% of measured temperature, whichever is greater

SERIES 68Q SANITARY PLATINUM RTD

Rosemount Series 68Q sanitary RTD temperature sensors measure from –50 to 200 °C (–58 to 392 °F). Series 68Q sensors are available in Tri-Clamp® endcap designs in immersion lengths from 1.0 to 9.5 inches. Table 21 shows the interchangeability of the Series 68Q sensor.

Accuracy

Table 21. Series 68Q Interchangeability (IEC 751 Class B)

±0.55 °C (±0.99 °F) at –50 °C (–58 °F)
±0.30 °C (±0.54 °F) at 0 °C (32 °F)
±0.80 °C (±1.44 °F) at 100 °C (212 °F)
±1.30 °C (±2.34 °F) at 200 °C (392 °F)

Construction

Series 68Q sensors conform to 3-A Sanitary Standards and feature product contact surfaces designed for CIP cleaning. The response times of Series 68Q sensors meet the Grade A Pasteurized Milk Ordinance (PMO) specification for thermometric response of an indicating thermometer on a pipeline.

Series 68Q sensors are offered in a Tri-Clamp sanitary endcap configuration. The sensor capsule is welded into the 316 SST sanitary endcap/stem assembly. The product contact of this assembly is polished to a finish that exceeds No. 4 minimum finish as required by the 3–A Sanitary Council Standard #74-02.

Platinum Element and Lead Wire Configurations

Single-element temperature sensors have four lead wires and may be used in 2-, 3-, and 4-wire signal conditioning systems. Dual-element sensors have six lead wires and may be used in 2- and 3-wire signal conditioning systems.

SPECIFICATIONS

Performance

Temperature Range

–50 to 200 °C (–58 to 392 °F)

Maximum Hysteresis

±0.09% of operating temperature range

Stability

Tri-clamp O.D. Tube Size 1-in. and greater:

±0.04% maximum ice-point resistance shift following 1,000 hours at maximum specified temperature 392 °F (200 °C).

Tri-clamp O.D. Tube Size $^1/_2$ - $^3/_4$-in.:

±0.08% maximum ice-point resistance shift following 1,000 hours at maximum specified temperature 392 °F (200 °C).

Response Time

Tri-clamp O.D. Tube Size 1-in. and greater

Less than 3.5 seconds required to reach 63.2% sensor response in water flowing at 3 ft/s (0.91 m/s). Meets PMO specification

Tri-clamp O.D. Tube Size $^1/_2$ - $^3/_4$-in.:

Less than 1.5 seconds required to reach 63.2% sensor response in water flowing at 3 ft/s (0.91 m/s).

Insulation Resistance

500×10^6 ohms minimum insulation resistance when measured at 100 Vdc at room temperature

Surface Finish

$32R_A$ standard finish on product contact surfaces. Meets 3-A requirements

$15R_A$ high mechanical polish available with option code HP.

Environmental

Humidity Limits

Lead seal is capable of withstanding 100% relative humidity

Quality Assurance

Each sensor is subjected to a resistance accuracy test at 0 °C

Physical Specifications

Sheath Material

316 SST

Lead Wire

PTFE-insulated, nickel-coated, 24-gauge stranded copper wire

Identification Data

The model and serial numbers and up to six lines of permanent tagging information are etched on each sensor. Stainless steel tags are available upon request.

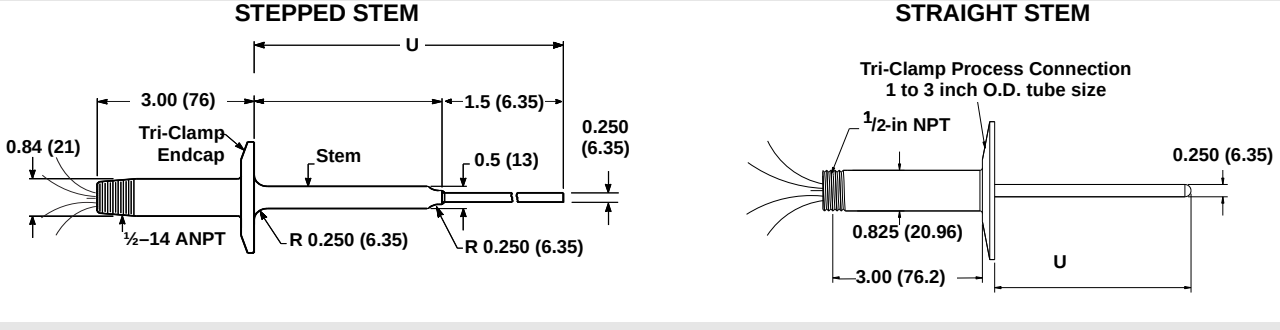
Weight

0.6 to 2.0 lb (0.3 to 0.9 kg)

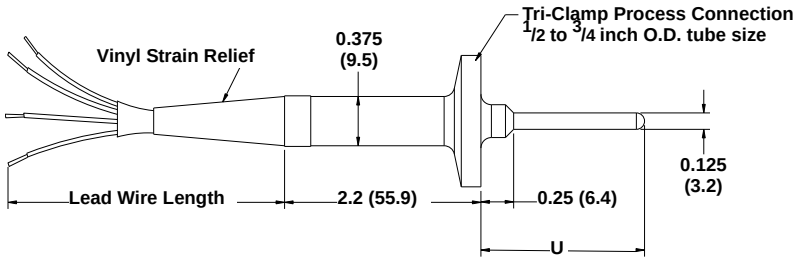
Dimensional Drawings

Figure 12. 68Q Sanitary Sensor and Polypropylene Connection Head Dimensional Drawings

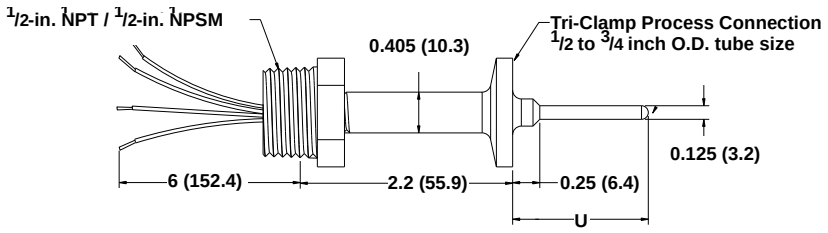
68Q Sanitary Sensor with Tri-Clamp® Endcap



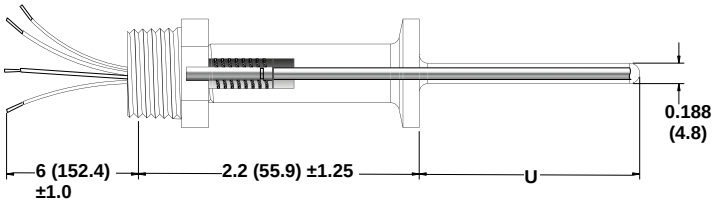
68Q Mini General Purpose Sensor with Cable and Strain Relief



68Q Mini General Purpose Sensor with 1/2-in. NPT Threaded Adapter



68Q Mini Spring Loaded Sensor with Thermowell and Replaceable Sensor



Dimensions are in inches (millimeters)

Table 22. Series 68Q Spare Parts List

Mini Spring-Loaded Sanitary Replacement Sensors and Thermowells		
Immersion Length (U)	**Replacement Sensor Part Number**	**Replacement Thermowell Part Number**
2.0	00068-4035-0020	00068-4035-1020
2.5	00068-4035-0025	00068-4035-1025
3.0	00068-4035-0030	00068-4035-1030

SERIES 58C PLATINUM RTD

Rosemount Series 58C sensors are available in 12-, 24-, 36-, and 48-inch (X) lengths and may be shortened to any desired length with an ordinary tubing cutter. This cut-to-fit feature eliminates the need to stock a large selection of sensors in many specific lengths. Table 23 shows the interchangeability of the Series 58C Sensor.

Table 23. Series 58C Interchangeability (IEC 751 Class B)

±0.55 °C (±0.99 °F) at –50 °C (–58 °F)
±0.30 °C (±0.54 °F) at 0 °C (32 °F)
±0.80 °C (±1.44 °F) at 100 °C (212 °F)
±1.30 °C (±2.34 °F) at 200 °C (392 °F)

Specifications

Performance Specifications

Temperature Range

–50 to 200 °C (–58 to 392 °F)

Maximum Hysteresis

±0.09% of operating temperature range.

Stability

±0.035% maximum ice-point resistance shift following 1,000 hours at maximum specified temperature (200 °C).

Insulation Resistance

500×10^6 ohms minimum insulation resistance when measured at 50 Vdc at room temperature.

Environmental Specifications

Humidity Limits

No permanent rear seal is installed

Quality Assurance

Each sensor is subjected to a resistance accuracy test at 0 °C and an insulation resistance test

Physical Specifications

Sheath Material

316 SST

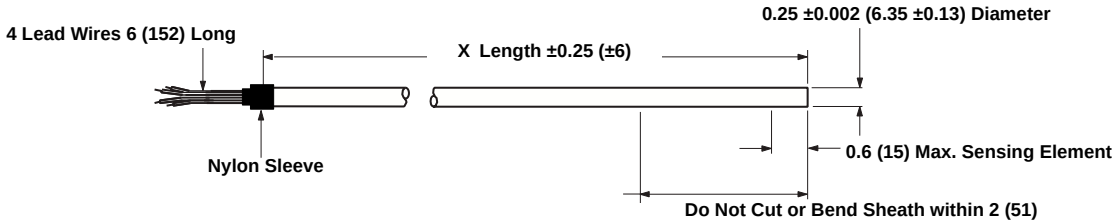
Lead Wires

PTFE-insulated, nickel-coated, 24-gauge stranded copper wire

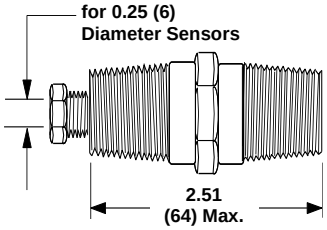
Dimensional Drawings

Series 58C Sensor

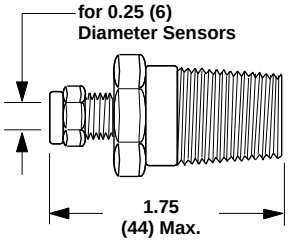
Do not cut all the way through the sensor sheath when cutting the sensor to length. Damage to the sensor wires could result. To prevent damage to the sensor wires, score the sheath considerably with a tubing cutter and gently break off the excess.



Option Code SNN Spring-Loaded Fitting
303 SST. 1/2–14 ANPT



Option Codes C01, C02, Swagelok Compression Fitting
316 SST. 1/2–14 ANPT



Dimensions are in inches (millimeters)

Calibration

CALIBRATION OPTIONS

Sensor calibration may be required for input to quality systems, or for control system enhancement. More frequently, it is used to improve the overall temperature measurement performance by matching the sensor to a temperature transmitter. Transmitter-Sensor matching is available for RTD sensors used with Rosemount 644, 3144P, and 3244MV temperature transmitters where the inherent stability and repeatability of the RTD technology is well established.

Transmitter-Sensor Matching Using Callendar-Van Dusen Constants

Significant temperature measurement accuracy improvement can be attained using a temperature sensor that is matched to a temperature transmitter. This matching process entails *teaching* the temperature transmitter the relationship between resistance and temperature for a specific RTD sensor. This relationship, approximated by the Callendar-Van Dusen equation, is described as:

$R_t = R_o + R_o\alpha[t - \delta(0.01t - 1)(0.01t) - \beta(0.01t - 1)(0.01t)^3]$, where:

R_t = Resistance (ohms) at Temperature t (°C)
R_o = Sensor-Specific Constant (Resistance at t = 0 °C)
α =Sensor-Specific Constant
δ =Sensor-Specific Constant
β =Sensor-Specific Constant (0 at t > 0 °C, 0.11 at t < 0°C)

The exact values for R_0, α, δ, β, – known as Callendar-Van Dusen (CVD) constants – are specific to each RTD sensor, and are established by testing each individual sensor at various temperatures.

The calibration temperature values using the CVD equation are divided into two major temperature areas: above 0 °C and below 0 °C. The calibration for the temperature range between 0 and 660 °C is obtained from the following formula:

$$R_t = R_0\left\{1 + \alpha\left[t - \delta\left(\frac{t}{100}\right)\left(\frac{t}{100} - 1\right)\right]\right\}$$

Note that this is a modification of the fourth-order CVD equation where $\beta = 0$ for temperatures greater than 0 °C. Since this modified equation is a second-order degree equation, at least three distinct temperature values are needed in order to curve fit the behavior of the RTD. For the temperature range from 0 to 100 °C only these two end points are used, and an approximation is made to render the constants.

Once the sensor-specific constants are entered, the transmitter uses them to generate a custom curve to best describe the relationship between resistance and temperature for the particular sensor and transmitter system. Matching a Series 68 or 78 RTD sensor to a 644, 3144P, and 3244MV transmitter typically results in a 3- or 4-fold improvement in temperature measurement accuracy for the total system. This substantial system accuracy improvement is realized as a result of the transmitter's ability to use the sensor's *actual* resistance-vs.-temperature curve instead of an *ideal* curve.

An example of the benefits of using the sensor matching capability of a Rosemount 3144P Temperature transmitter along with a matched Series 68 RTD sensor are shown in Typical Transmitter-Sensor Matching Uncertainty Improvements.

Calibration Uncertainty

Calibration uncertainties of the lab are equal to or better than $^1/_{10}$ IEC 751 Class B interchangeability:

$$\textbf{Uncertainty} = \mathbf{0.03} + \mathbf{0.0005} \times |t|$$

$|t|$ = *absolute value of temperature in °C*

TYPICAL TRANSMITTER-SENSOR MATCHING UNCERTAINTY IMPROVEMENTS

Transmitter: 3144 (has built-in sensor matching capabilities), span of 1 to 200 °C, accuracy = 0.1 °C)

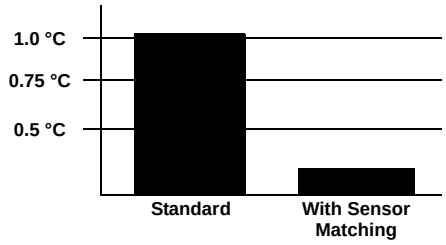
Sensor: Series 68 RTD

Callendar van Dusen Option: V2
Process Temperature: 150 °C

Temperature		Sensor Interchangeability Error		Total Calibrated Sensor Uncertainty(1)	
°C	°F	°C	°F	°C	°F
0	32	±0.30	±0.54	±0.10	±0.18
50	122	±0.55	±0.99	±0.17	±0.31
100	212	±0.80	±1.44	±0.22	±0.40
150	302	±1.05	±1.89	±0.18	±0.32
200	392	±1.30	±2.34	±0.16	±0.29

(1) Includes calibration uncertainties of the lab, hysteresis, and repeatability.

System Uncertainty Comparison at 150 °C:



Standard 68 Sensor	
Rosemount 3144:	± 0.10 °C
Standard Series 68 RTD:	± 1.05 °C
Total System(1):	± 1.05 °C
68 Sensor with V2 Option	
Rosemount 3144:	± 0.10 °C
Standard Series 68 RTD:	± 0.18 °C
Total System(1):	± 0.21 °C

(1) Calculated using RSS statistical method:

$$SystemAccuracy = \sqrt{(TransmitterAccuracy)^2 + (SensorAccuracy)^2}$$

ORDERING INFORMATION

Sensor Characterization (Calibration) Schedules– Option Code V

Series 68, 68Q, and 78 RTD sensors can be ordered with an option (V1, V2,...V7, see Option Code “V” Callendar-van Dusen Constants), that provides Callendar-Van Dusen constants that are shipped with the sensor. When you order this option, the values of all four sensor-specific constants are physically attached to each sensor with a wire-on tag. Rosemount 644, 3144P, and 3244MV have a unique, built-in sensor matching capability. To use this capability, the four sensor-specific constants are programmed into the 644, 3144P, and 3244MV at the factory by ordering a C2 option on the transmitter, or easily entered and changed in the field using a Field Communicator or AMS. When these values are entered into a Rosemount 644, 3144P, and 3244MV, the sensor and transmitter become *matched.*

Each “V” option is specific to a particular temperature range for a given sensor type (see Option Code “V” Callendar-van Dusen Constants). As with option code X8Q4, the accuracies associated with each option code represent worst-case conditions when the sensor is used over the entire temperature range.

For applications requiring the increased accuracy obtainable through a matched sensor and transmitter, order the appropriate “V” option (see Option Code “V” Callendar-van Dusen Constants). To ensure optimal performance, select a “V” option such that the sensor’s range of actual operation is between the minimum and maximum calibration points.

The accuracy (uncertainty) of different calibration points varies because each calibration schedule has specific hysteresis and repeatability characteristics. For example, the accuracy of calibration points at 100 °C for options V1 and V2 differs because of the two different temperature ranges.

NOTE
An RTD ordered with the V option is shipped with CVD constants only; it does not include calibration tables.

OPTION CODE “V” CALLENDAR-VAN DUSEN CONSTANTS

Option Code	Temperature Range		Calibration Points		Uncertainty[1] of Calibration Lab		Total Uncertainty[2] of Calibrated Sensor					
							Series 68		Series 78 Standard		Series 78 High Temperature	
	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F
V1[3]	0 to 100	32 to 212	0	32	±0.03	±0.05	±0.06	±0.11	±0.06	±0.11	±0.06	±0.11
			100	212	±0.08	±0.14	±0.10	±0.18	±0.10	±0.18	±0.10	±0.18
V2[3]	0 to 200	32 to 392	0	32	±0.03	±0.05	±0.10	±0.18	±0.09	±0.16	±0.10	±0.18
			100	212	±0.08	±0.14	±0.22	±0.40	±0.15	±0.27	±0.23	±0.41
			200	392	±0.13	±0.23	±0.16	±0.29	±0.15	±0.27	±0.16	±0.29
V3[3]	0 to 400	32 to 752	0	32	±0.03	±0.05	±0.20	±0.29	±0.16	±0.29	±0.20	±0.29
			200	392	±0.13	±0.23	±0.42	±0.76	±0.29	±0.52	±0.44	±0.79
			400	752	±0.23	±0.41	±0.30	±0.54	±0.28	±0.50	±0.30	±0.54
V4[3][4]	0 to 600	32 to 1112	0	32	±0.03	±0.05	NA	±NA	NA	NA	NA	NA
			200	392	±0.13	±0.23	NA	±NA	NA	NA	NA	NA
			400	752	±0.23	±0.41	NA	±NA	NA	NA	NA	NA
V5[3]	–50 to 100	–58 to 212	0	32	±0.03	±0.05	±0.08	±0.14	±0.06	±0.11	±0.09	±0.16
			100	212	±0.08	±0.14	±0.10	±0.18	±0.10	±0.18	±0.10	±0.18
V6[3]	–50 to 200	–58 to 392	–50	–58	±0.06	±0.10	±0.14	±0.25	±0.11	±0.20	±0.14	±0.25
			0	32	±0.03	±0.05	±0.20	±0.36	±0.14	v0.25	±0.21	±0.38
			100	212	±0.08	±0.14	±0.26	±0.47	±0.18	±0.32	±0.27	±0.49
			200	392	±0.13	±0.23	±0.18	±0.32	±0.16	±0.29	±0.17	±0.3
V7[3]	–50 to 400	–58 to 752	–50	–58	±0.06	±0.10	±0.23	±0.41	±0.19	±0.34	±0.23	±0.41
			0	32	±0.03	±0.05	±0.31	±0.56	±0.22	±0.40	±0.32	±0.58
			200	392	±0.13	±0.23	±0.46	±0.83	±0.31	±0.56	±0.48	±0.86
			400	752	±0.23	±0.41	±0.32	±0.58	±0.29	±0.52	±0.32	±0.58

(1) Includes only the uncertainty of the lab.

(2) Includes the uncertainty of the lab, hysteresis, and repeatability.

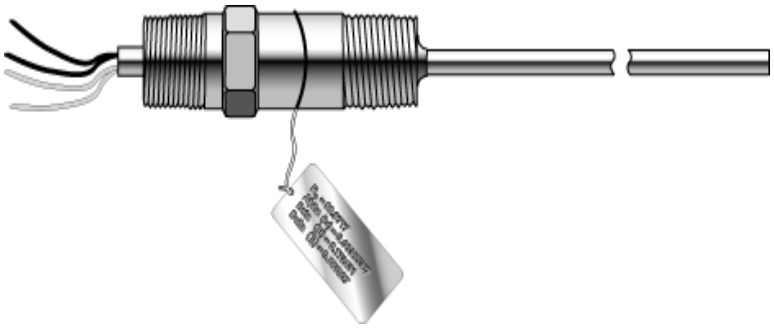
(3) Uncertainties are valid for option code X8Q4 when ordered with the corresponding temperature range. The largest error shown in each temperature range is the worst case error for all points not shown in that range.

(4) Only available with Series 78 High Temperature Sensors 10-in. or longer.

Ordering Information

Specify Sensor Model Number with “V” Option Example								
Sensor Model	0068	N	11	N	00	N	120	V2

Figure 13. Typical Sensor Ordered with Option Code V

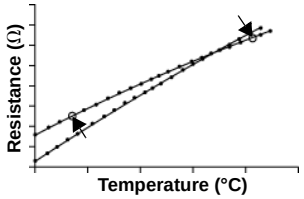


Option Code X8Q4

The X8Q4 option calibrates the sensor to a customer-specified temperature range. The X8Q4 report includes the Callendar-Van Dusen (CVD) constants (R_0, α, δ, β), a resistance-versus-temperature table in one-degree increments, and a graph which includes the maximum errors due to the uncertainty of the calibration equipment, hysteresis, and repeatability. The values in the tables are calculated using Callendar-Van Dusen methodology. Two of the values on this table could be used to perform a two-point trim. The X8Q4 option also provides the CVD constants on a stainless steel tag attached to the sensor.

See Figure 14.

FIGURE 14. Graph of a Typical Two-point Trim



A two-point trim shifts the ideal curve up or down, and changes the slope based on the two characterized points.

Option X8Q4: Sensor Calibrated to a Customer-Specified Temperature Range

When you order an RTD with the X8Q4 option, you must specify a temperature range over which the sensor is to be calibrated. Before specifying the range, take careful note of the sensor temperature limits.

Ordering Example:

	Model	Lead Wire Termination	Sensor Type	Extension Type	Extension Length	Thermowell Material	Immersion Length	Additional Options
Typical Model Number	0068	N	11	N	00	N	045	X8Q4 X8X9Q4

If X8Q4 and X9Q4 are both required, do not repeat the “Q4” code in the model string. Include the following instead:

Calibrate from –10 to 120 °C

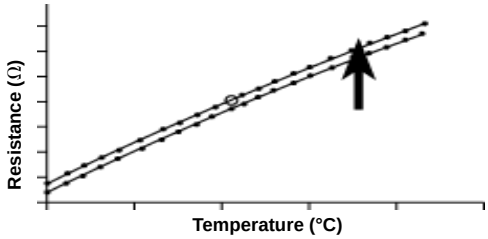
Option Code X9Q4

The X9Q4 option calibrates the sensor at a single customer-specified point. A calibration certificate with the resistance value at this point is supplied. This value could be used to perform a one-point trim on the transmitter. All characterizations are traceable to the National Institute of Standards and Technology (NIST). The calibration table is dated and marked with the sensor series and serial number.

See Figure 15.

NOTE
The X9Q4 option can be ordered and used in conjunction with the X8Q4 option.

FIGURE 15. Graph of a Typical One-point Trim



A one-point trim shifts the ideal curve up or down based on the single characterized point.

Option X9Q4: Sensor Calibrated to a Customer-Specified Single Point

When you order an RTD with the X9Q4 option, you must specify a single temperature point at which the sensor is to be calibrated. Before specifying the point, take careful note of the sensor temperature limits.

Ordering Example:

	Model	Lead Wire Termination	Sensor Type	Extension Type	Extension Length	Thermowell Material	Immersion Length	Additional Options
Typical Model Number	0068	N	11	N	00	N	045	X9Q4

If X8Q4 and X9Q4 are both required, do not repeat the “Q4” code in the model string. Include the following instead: X8X9Q4

Calibrate at 50 °C

Table 24. Option Code X9Q4 Calibration Uncertainties for the Series 68 and 78 Standard and High Temperature

Temperature		Uncertainty of Calibration Lab[1]		Total Uncertainty of Calibrated Sensor[2]	
°C	°F	°C	°F	°C	°F
–50	–58	0.06	0.10	0.07	0.13
0	32	0.03	0.05	0.06	0.11
100	212	0.08	0.14	0.09	0.16
200	392	0.13	0.23	0.14	0.25
400	752	0.23	0.41	0.24	0.43

(1) Includes only the uncertainty of the lab.

(2) Includes uncertainty of the lab and repeatability.

Table 25. Resistance vs. Temperature

IEC 751 Platinum 100, α = 0.00385 RTD														
°F	Ohms		°F	Ohms		°F	Ohms		°C	Ohms		°C	Ohms		°C	Ohms
–330	18.04		210	138.08		690	235.15		–200	18.52		90	134.71		380	240.18
–320	20.44		220	140.19		700	237.09		–190	22.83		100	138.51		390	243.64
–310	22.83		230	142.29		710	239.02		–180	27.10		110	142.29		400	247.09
–300	25.20		240	144.39		720	240.95		–170	31.34		120	146.07		410	250.53
–290	27.57		250	146.49		730	242.87		–160	35.54		130	149.83		420	253.96
–280	29.93		260	148.58		740	244.79		–150	39.72		140	153.58		430	257.38
–270	32.27		270	150.67		750	246.71		–140	43.88		150	157.33		440	260.78
–260	34.61		280	152.75		760	248.62		–130	48.00		160	161.05		450	264.18
–250	36.94		290	154.83		770	250.53		–120	52.11		170	164.77		460	267.56
–240	39.26		300	156.91		780	252.44		–110	56.19		180	168.48		470	270.93
–230	41.57		310	158.98		790	254.34		–100	60.26		190	172.17		480	274.29
–220	43.88		320	161.05		800	256.24		–90	64.30		200	175.86		490	277.64
–210	46.17		330	163.12		810	258.14		–80	68.33		210	179.53		500	280.98
–200	48.46		340	165.18		820	260.03		–70	72.33		220	183.17		510	284.30
–190	50.74		350	167.24		840	263.80		–60	76.33		230	186.84		520	287.62
–180	53.02		360	169.30		850	265.68		–50	80.31		240	190.47		530	290.92
–170	55.29		370	171.35		860	267.56		–40	84.27		250	194.10		540	294.21
–160	57.55		380	173.40		870	269.44		–30	88.22		260	197.71		550	297.49
–150	59.81		390	175.45		880	271.31		–20	92.16		270	201.31		560	300.74
–140	62.06		400	177.49		890	273.17		–10	96.09		280	204.90		570	304.01
–130	64.30		410	179.53		900	275.04		0	100.00		290	208.48		580	307.25
–120	66.54		420	181.56		910	276.90		10	103.90		300	212.05		590	310.49
–110	68.77		430	183.59		920	278.75		20	107.79		310	215.61		600	313.71
–100	71.00		380	173.40		930	280.61		30	111.67		320	219.15		610	316.92
–90	73.22		390	175.45		940	282.46		40	115.54		330	222.68		620	320.12
–80	75.44		400	177.49		950	284.30		50	119.40		340	226.21		630	323.30
–70	77.66		410	179.53		960	286.14		60	123.24		350	229.72		640	326.48
–60	79.86		420	181.56		970	287.98		70	127.08		360	233.21		650	329.64
–50	82.07		430	183.59		980	289.82		80	130.90		370	236.70		660	332.79
–40	84.27		450	187.65		990	291.65									
–30	86.47		460	189.67		1000	293.48									
–20	88.66		470	191.68		1010	295.30									
–10	90.85		480	193.70		1020	297.12									
0	93.03		490	195.71		1030	298.94									
10	95.21		500	197.71		1040	300.75									
20	97.39		510	199.71		1050	302.56									
30	99.57		520	201.71		1060	304.37									
40	101.74		530	203.71		1070	306.17									
50	103.90		540	205.70		1080	307.97									
60	106.07		550	207.69		1090	309.77									
70	108.23		560	209.67		1100	311.56									
80	110.38		570	211.66		1110	313.35									
90	112.53		580	213.63		1120	315.14									
100	114.68		590	215.61		1130	316.92									
110	116.83		600	217.58		1140	318.70									
120	118.97		610	219.55		1150	320.47									
130	121.11		620	221.51		1160	322.24									
140	123.24		630	223.47		1170	324.01									
150	125.37		640	225.42		1180	325.77									
160	127.50		650	227.38		1190	327.53									
170	129.62		660	229.33		1200	329.29									
180	131.74		670	231.27		1210	331.04									
190	133.86		680	233.21												
200	135.97															

Note

To covert from °C to °F: {1.8 X (°C)] + 32 = °F
Example: (1.8 X 100) + 32 = 212 °F

To convert from °F to °C: 0.556 [(°F) – 32] = 100 °F
Example: 0.556 (212 – 32) = 100 °C

Mounting Accessories

ROSEMOUNT CONNECTION HEAD

The Rosemount Connection head is for general-purpose and spring-loaded sensors. The terminal block has six terminals for either single or dual element sensors. If the sensor assembly is ordered assembled to a Rosemount 248 or 644H head mount transmitter, then the terminal block is replaced by the transmitters.

Specifications

Sensor Connection

- 1/2–14 NPT mounting thread. Screw terminals for lead wire connections.

Electrical Connection

- 1/2–14 NPT conduit

Materials of Construction

- Housing: Low copper aluminum
- Paint: Polyurethane
- Cover O-ring: Buna-N

Weight

- 18.5 oz (524 g)

Enclosure Rating

- NEMA 4X, IP66, and IP68

POLYPROPYLENE CONNECTION HEAD

The polypropylene connection head (part number 00644-4198-0011) is designed for use with sanitary sensors. It is FDA-compliant, and is resistant to attack by acids, alkalies, and organic solvents.

Specifications

Sensor Connection

- 1/2–14 NPT mounting thread. Screw terminals for lead wire connections

Electrical Connection

- 1/2–14 NPT conduit

Materials of Construction

- Housing: White polypropylene polymer
- O-Ring Seal: Silicone rubber
- Terminals: Nickel-plated brass

Temperature Limits

- –73 to 104 °C (–100 to 220 °F)

Weight

- 0.5 lb

CONNECTION HEAD

The Extended Cover Connection Head (P/N 00079-0324-xxxx) provides the additional space required by sensors that have bayonet connectors. This model can also be used with general-purpose and spring-loaded sensors. The terminal block has six terminals for either single- or dual-element sensors.

The Flat Cover Connection Head (P/N 00079-0325-xxxx) is for general-purpose and spring-loaded sensors. The terminal block has six terminals for either single- or dual-element sensors.

Specifications

Sensor Connection

- 1/2–14 ANPT mounting thread. Screw terminals for lead wire connections

Electrical Connection

- 3/4–14 ANPT conduit

Materials of Construction

- Housing: Low-copper aluminum alloy
- O-Ring Seal: Silicone rubber
- Terminals: Nickel-plated brass

Temperature Limits

Head Type	Unapproved	E5 option	E6 option	E1 option
Painted	–100 to 100 °C –148 to 212 °F	–50 to 85 °C –58 to 185 °F	–50 to 85 °C –58 to 185 °F	–40 to 65 °C –40 to 149 °F
Unpainted	–100 to 200 °C –148 to 392 °F	–50 to 85 °C –58 to 185 °F	–50 to 200 °C –58 to 392 °F	–40 to 65 °C –40 to 149 °F

Enclosure Ratings

- When installed properly, painted connection heads are suitable for indoor and outdoor NEMA 4X and CSA Enclosure Type 4X installations. When installed properly, unpainted connection heads are suitable for NEMA 4 and CSA Enclosure Type 4 installations. See Hazardous Area Approvals for complete installation information.

Weight

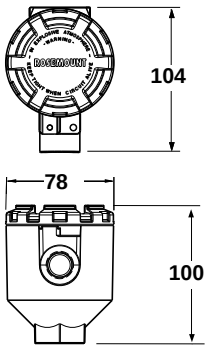
- 2 lb 8 oz (extended cover)
- 1 lb 9 oz (flat cover)

Connection Head Model Numbers

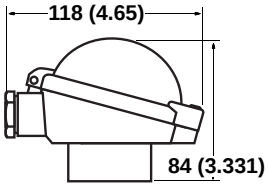
Model	Description
00644-4410-0011	Rosemount Connection Head, painted aluminum
007903252003	Six Terminals with Flat Cover, Unapproved, Unpainted
007903242003	Six Terminals with Extended Cover, Unapproved, Unpainted
007903250002	Six Terminals with Flat Cover, FM Approved, Unpainted
007903240002	Six Terminals with Extended Cover, FM Approved, Unpainted
007903250003	Six Terminals with Flat Cover, CSA Approved, Unpainted
007903240003	Six Terminals with Extended Cover, CSA Approved, Unpainted
007903252005	Six Terminals with Flat Cover, Unapproved, Painted
007903242005	Six Terminals with Extended Cover, Unapproved, Painted
007903250004	Six Terminals with Flat Cover, FM Approved, Painted
007903240004	Six Terminals with Extended Cover, FM Approved, Painted
007903250005	Six Terminals with Flat Cover, CSA Approved, Painted
007903240005	Six Terminals with Extended Cover, CSA Approved, Painted
00644-4198-0011	No Approval Options, White Polypropylene
00065-0305-0001	Round Terminal Block for Rosemount and Polypropylene heads
006444-4431-0001	External ground Screw Assembly for Rosemount Connection Head
00644-4435-0011	Polypropelyne Connection Head with Terminal Block $^{1}/_{2}$ in. NPT entries
00079-0329-0001	Kit of 12 Silicone Rubber O-rings for Flat/Extended Heads

Connection Head Dimensional Drawing

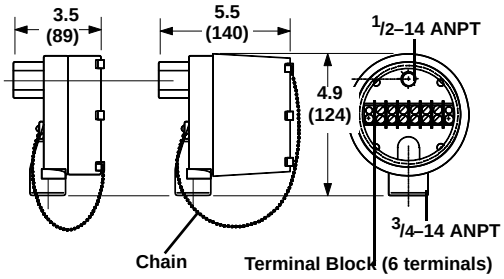
Rosemount Connection Head



Polypropylene



Flat Cover **Extended Cover** **Terminal View**



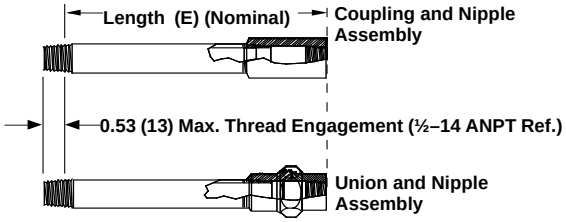
Dimensions are in inches (millimeters)

EXTENSION FITTING ASSEMBLIES

Extension fitting assemblies are available in

- a coupling and nipple assembly
- a union and nipple assembly

FIGURE 16. Extension Fitting



Dimensions are in inches (millimeters)

Table 26. Extension

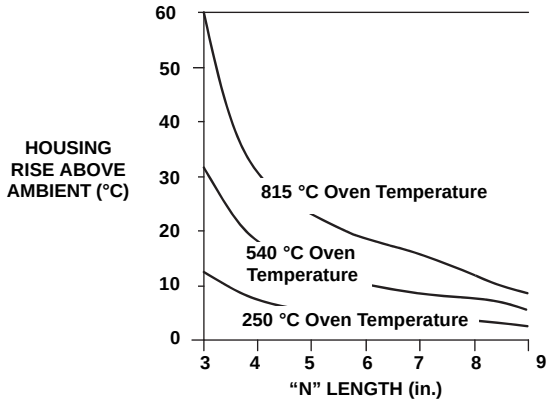
Coupling and Nipple, SST		Union and Nipple, SST	
Model Number	**Length (E)**	**Model Number**	**Length (E)**
007903540250	2.5-in.	007903550250	2.5-in.
007903540300	3.0-in.(1)	007903550300	3.0-in.(1)
007903540350	3.5-in.	007903550350	3.5-in.
007903540400	4.0-in.	007903550400	4.0-in.
007903540450	4.5-in.	007903550450	4.5-in.
007903540500	5.0-in.	007903550500	5.0-in.
007903540550	5.5-in.	007903550550	5.5-in.
007903540600	6.0-in.(1)	007903550600	6.0-in.(1)
007903540650	6.5-in.	007903550650	6.5-in.
007903540700	7.0-in.	007903550700	7.0-in.
007903540750	7.5-in.	007903550750	7.5-in.
007903540800	8.0-in.	007903550800	8.0-in.
007903540850	8.5-in.	007903550850	8.5-in.
007903540900	9.0-in.	007903550900	9.0-in.

(1) Standard configuration with best delivery. Also available for emergency requirements. Consult factory for information.

Choosing an Extension

Aside from ambient temperature variations, the heat from the process is transferred from the thermowell to the transmitter housing. If the process temperature is near or beyond specification limits, consider the use of additional thermowell lagging, an extension nipple, or a remote mounting configuration to isolate the transmitter from the excessive temperatures. Use Figure 17 and the example below to determine an adequate thermowell extension length.

FIGURE 17. 3144 Transmitter Housing Temperature Rise versus Extension Length for a Test Installation



Example

The rated ambient temperature specification is 85 °C. If the maximum ambient temperature is 40 °C and the process temperature to be measured is 540 °C, the maximum allowable housing temperature rise is the rated temperature specification limit minus the existing ambient temperature (85 – 40), or 45 °C.

As shown in Figure 17, an extension (E) dimension of 3.0-in (76 mm) will result in a housing temperature rise of 30 °C. An "E" dimension of 3-in. would therefore be the minimum recommended length, and would provide a safety factor of about 15 °C. A longer "E" dimension, such as 6-in. (152 mm), would be desirable in order to reduce errors caused by transmitter temperature effect, although in that case the transmitter would probably require extra support. If a thermowell with lagging is used, the "E" dimension may be reduced by the length of the lagging.

MOUNTING ADAPTERS FOR SERIES 58, 68, 78, AND 183

M5–M7, Sensor Compression Fittings, 316 SST

- For adjustable sensor length.
- For low pressure applications (100 psig maximum).
- Fits ¼-inch diameter sensors.
- Available with 1/8–27 (M5), ¼–18 (M6), and ½–14 (M7) ANPT process threads.
- Not available on spring-loaded sensors.

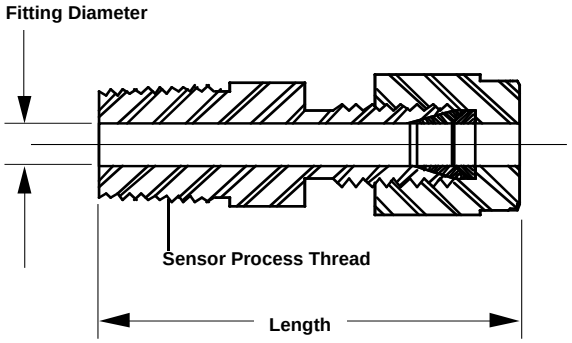


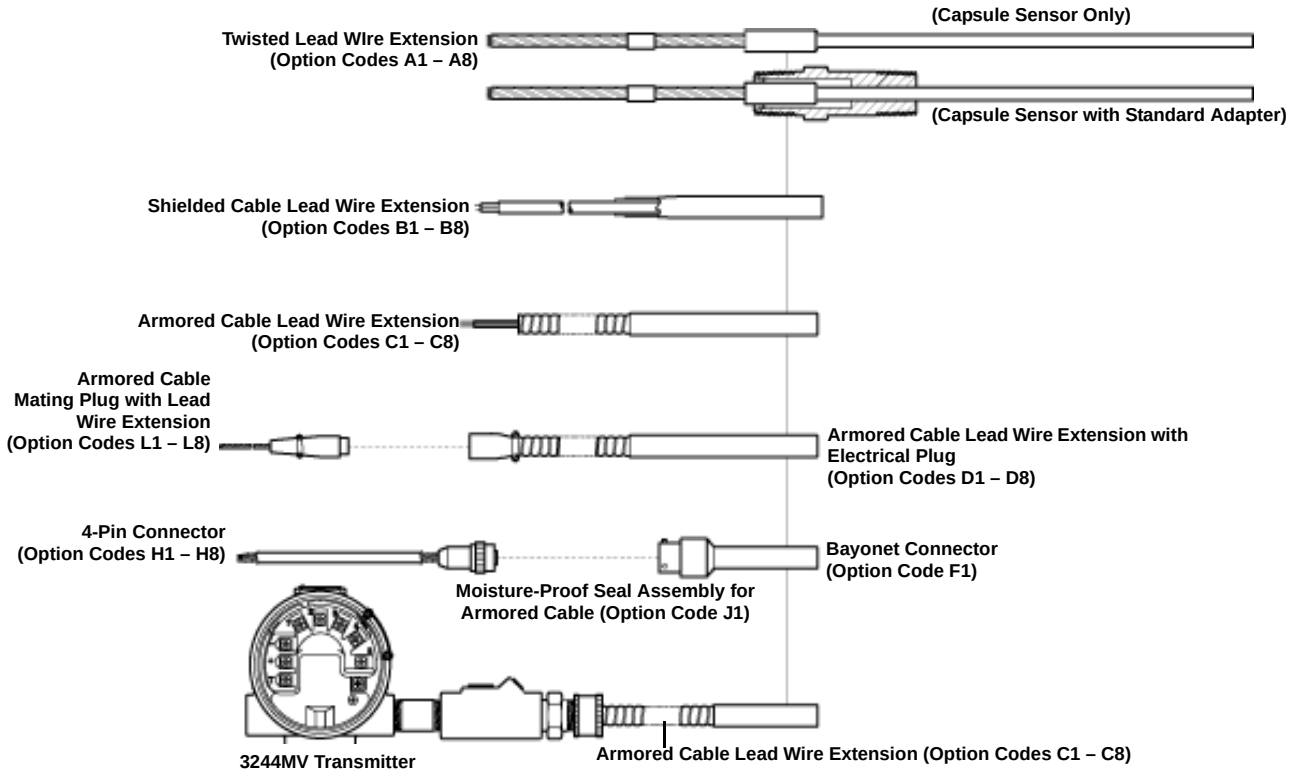
Table 27. Compression Fittings, 316 SST

(for attachment to the stem of the capsule)

Model Number	Option Code	Sensor Process Thread	Fitting Diameter		Length	
			in.	mm	in.	mm
C07961-0005	M5	1/8–27 ANPT	0.25	6.35	1.31	33.27
C07961-0006	M6	1/4–18 ANPT	0.25	6.35	1.5	38.1
C07961-0008	M7	1/2–14 ANPT	0.25	6.35	1.75	44.45

LEAD WIRE EXTENSIONS, CONNECTORS, AND SEALS

The following options are available on most Series 68 and 78 sensors. They are not available for use on Series 58C, 68Q, and 183 sensors or with IECEx or ATEX/ISSeP Flameproof approval (Option Codes E7 or E1).

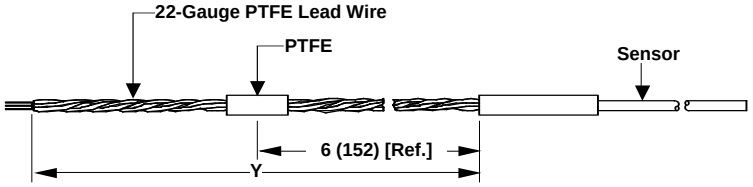


A1–A8, Twisted Lead Wire Extension

- Lead wire connections are silver brazed and individually insulated by shrinkable PTFE tubes
- Withstands 95 percent relative humidity
- 200° C (392° F) maximum temperature
- Available with single or dual-element sensors

Option Code	Y Length (ft)
A1	1 1/2
A2	3
A3	6
A4	12

Option Code	Y Length (ft)
A5	24
A6	50
A7	75
A8	100



Not available for use with Series 68Q Sanitary RTDs and 183 thermocouples or with IECEx or ATEX/ISSeP flameproof approval (option codes E7 or E1).

Dimensions are in inches (millimeters)

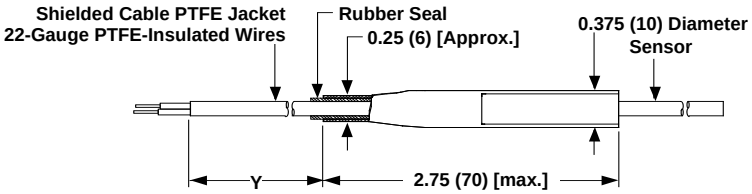
Sensors and Accessories (English)

B1–B8, Shielded Cable Lead Wire Extension

- Copper shielded cable prevents electrical noise distortions to sensor signal output
- Withstands 95 percent relative humidity
- 200 °C (392 °F) maximum temperature

Option Code	Y Length (ft)
B1	1 1/2
B2	3
B3	6
B4	12

Option Code	Y Length (ft)
B5	24
B6	50
B7	75
B8	100



Not available for 58C, 68Q, and 183 sensors or with IECEx or ATEX/ISSeP flameproof approval (option codes E7 or E1)

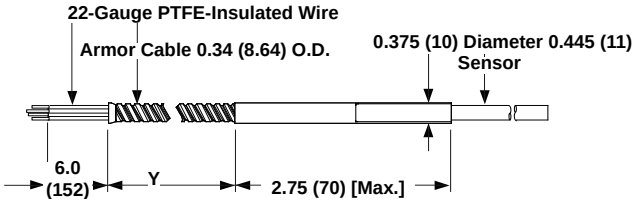
Dimensions are in inches (millimeters)

C1–C8, Armored Cable Lead Wire Extension

- Provides lead wire protection in heavy duty environments.
- Withstands 95 percent relative humidity
- 200 °C (392 °F) maximum temperature
- Available with single or dual-element sensors

Option Code	Y Length (ft)
C1	1 1/2
C2	3
C3	6
C4	12

Option Code	Y Length (ft)
C5	24
C6	50
C7	75
C8	100



Not available for 58C, 68Q, and 183 sensors or with IECEx or ATEX/ISSeP flameproof approval (option codes E7 or E1)

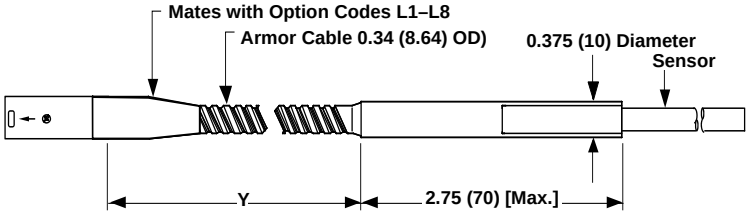
Dimensions are in inches (millimeters)

D1–D8, ARMORED CABLE LEAD WIRE EXTENSION WITH ELECTRICAL PLUG

- Provides lead wire protection in heavy-duty environments
- Provides quick-disconnect capability
- Withstands 95 percent relative humidity

Option Code	Y Length (ft)
D1	1 1/2
D2	3
D3	6
D4	12

Option Code	Y Length (ft)
D5	24
D6	50
D7	75
D8	100



Not available for 58C, 68Q, and 183 sensors or with IECEx or ATEX/ISSeP flameproof approval (option codes E7 or E1)

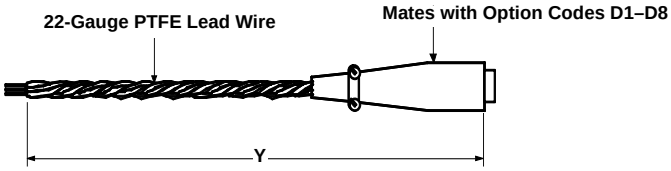
Dimensions are in inches (millimeters)

L1–L8, ARMORED CABLE MATING PLUG WITH LEAD WIRE EXTENSION

- Completes quick-disconnect capability for armored cable
- Withstands 95 percent relative humidity
- Twisted lead wire extension for lowest cost installation

Option Code	Y Length (ft)
L1	1 1/2
L2	3
L3	6
L4	12

Option Code	Y Length (ft)
L5	24
L6	50
L7	75
L8	100

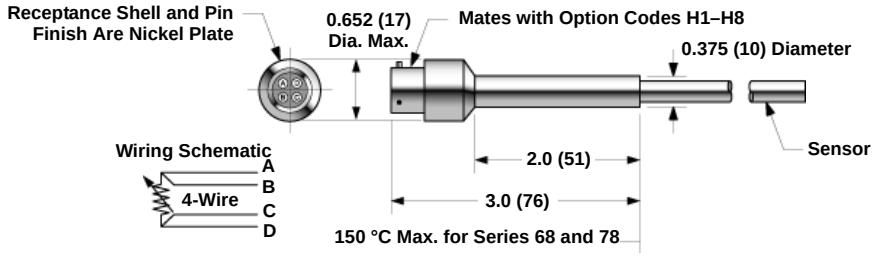


Not available for 58C, 68Q, and 183 sensors or with IECEx or ATEX/ISSeP flameproof approval (option codes E7 or E1)

Dimensions are in inches (millimeters)

F1, 4-PIN BAYONET CONNECTOR

- Provides quick-disconnect capability
- Withstands 100 percent relative humidity with connector mate
- Available for capsule and general purpose with 4-wire lead wire configuration only



Not available for 58C, 68Q, and 183 sensors, or with FM or CSA explosion-proof, or with IECEx or ATEX/ISSeP flameproof approval (option codes E5, E6, E7, or E1)

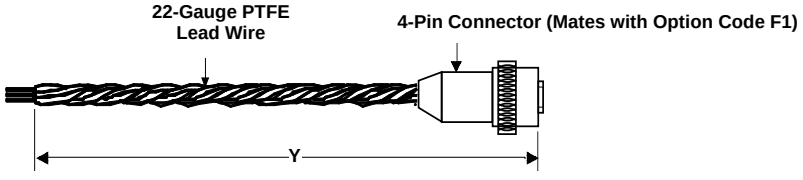
Dimensions are in inches (millimeters)

H1–H8, 4-PIN CONNECTOR MATING PLUG WITH LEAD WIRE EXTENSION

- Completes the quick-disconnect capability of connector
- Provides twisted lead wire extension for remote installations
- Withstands 100 percent relative humidity with connector mate
- F1 connector is required if H1–H8 lead wire extension is used

Option Code	Y Length (ft)
H1	1 1/2
H2	3
H3	6
H4	12

Option Code	Y Length (ft)
H5	24
H6	50
H7	75
H8	100

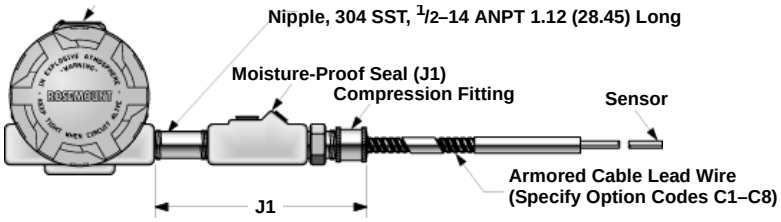


Not available for 58C, 68Q, and 183 sensors, or with FM or CSA explosion-proof, or with IECEx or ATEX/ISSeP flameproof approval (option codes E5, E6, E7, or E1)

Dimensions are in inches (millimeters)

J1, MOISTURE-PROOF SEAL ASSEMBLY FOR ARMORED CABLE

- Prevents moisture migration through armored cable
- For use in humid environments but not for direct liquid immersion
- Non-disconnectable type assembly with armored cable and sensor



Not available for 58C, 68Q, and 183 sensors, or with FM or CSA explosion-proof, or with IECEx or ATEX/ISSeP flameproof approval (option codes E5, E6, E7, or E1).
Moisture-proof seal assembly must be ordered with armored cable lead wire extension (option codes C1 – C8)

Dimensions are in inches (millimeters)

THERMOWELLS

To simplify ordering, the previous Series 79, 80, and 81 thermowell offerings are all included in the new Series 91 thermowell option.

Materials

Rosemount Thermowells are supplied in most materials required for industrial applications. Standard materials are 316 SST, 304 SST, and C1018 carbon steel. For corrosive environments, special materials such as alloy and Inconel 600 are available. Consult factory for other material availability.

Strength (Pressure and Flow Vibration)

The strength of a thermowell depends on several parameters that relate thermowell construction to the installation environment. For most industrial applications, standard Rosemount thermowells provide the necessary strength if the material, style, and length are correct for the application. The proper selection of a thermowell depends on fluid type, temperature, pressure, and fluid velocity. It is important to note that most thermowell failures are caused by vibration that is induced by fluid flow. If static pressure strength is a major consideration, refer to Table 28 for standard material ratings for a 1/2-inch tip. Tapered thermowells are offered for additional strength.

Strength Calculation

Rosemount Inc. has the ability to perform thermowell frequency calculations to verify that the thermowell dimensions you provide are appropriate for your specific application. To take advantage of this calculation, fill out and return the Configuration Data Sheet.

Construction

All thermowell bodies with an overall length less than 42-in. are machined from solid bar stock to ensure water-tightness. Flange mounts are welded to the thermowell body. Standard construction provides immersion lengths (U) from 2½ to 48 inches with overall lengths (L) from 4 to 59 inches respectively. Thermowells with overall lengths larger than 42-in. will be a 3-piece welded construction. Consult the factory for more information on welded 3-piece construction thermowells.

Identification Data

The part number is etched on each thermowell. Additional tagging for specific customer requirements is available.

Installation

For dimensional drawings of Thread Mounted, Weld Mounted, and Flange Mounted Thermowells, refer to Figure 18, 20, and 22.

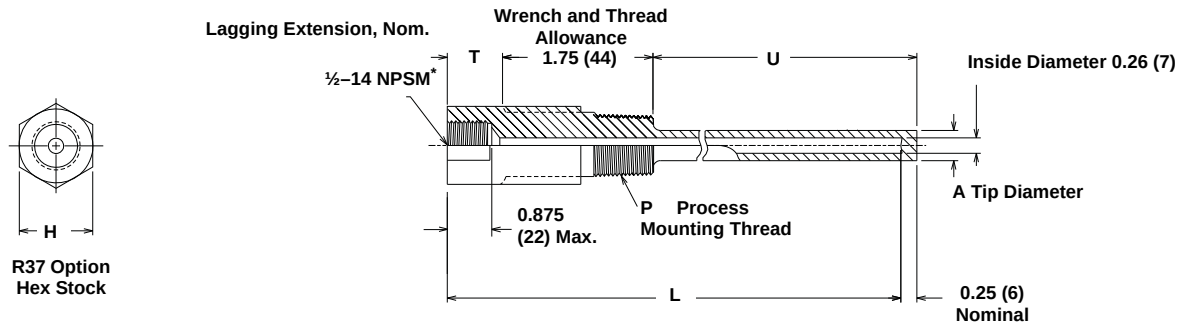
Table 28. Thermowell Material Rating

		Process Rating(1) (psi) at Temperature (°F)						
Material	**Recommended Usage**	**0 °F**	**300 °F**	**500 °F**	**700 °F**	**900 °F**	**1100 °F**	**1300 °F**
304 SST	Good resistance to oxidation	5600	4800	4700	4600	3400	2400	780
316 SST	Good resistance to corrosion. Better resistance to chemical attack than 304 SST	5600	5400	5300	5200	4400	3200	1250
Carbon Steel	For non-corrosive service	3700	3700	3700	3650	2000	—	—

(1) In case of an explosion, the integrity of the thermowell is maintained to the specified pressures.

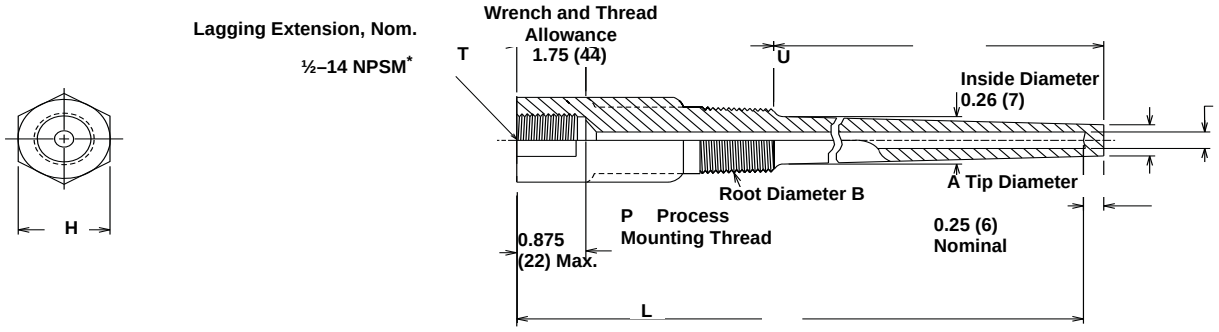
Figure 18. Thread Mounted Thermowells

Straight



Thread (P)	Hex Size Inches (H)
0.5 – 0.75 ANPT	1.125
1–11.5 ANPT	1.375

Tapered



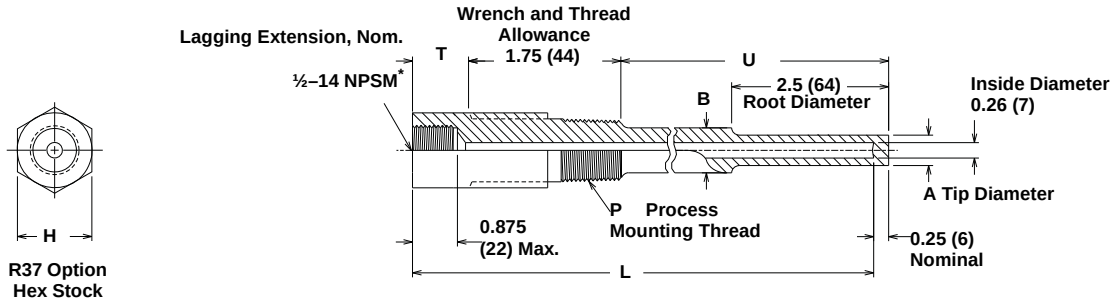
Thread (P)	Hex Size Inches (H)
0.5 – 0.75 ANPT	1.125
1–11.5 ANPT	1.375

** 1/2–14 ANPT threads are available*

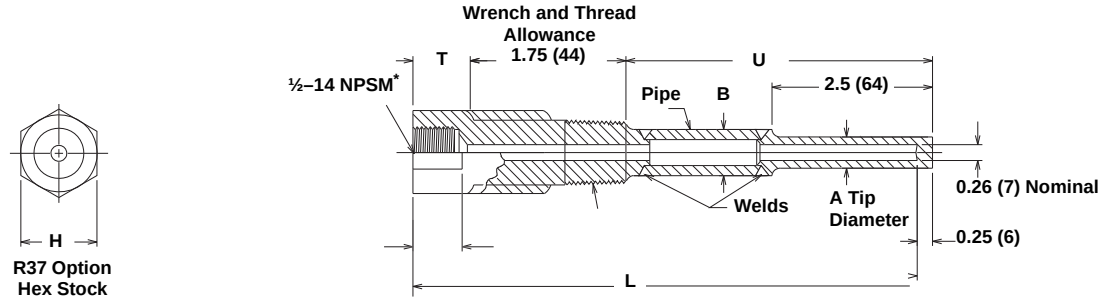
Dimensions are in inches (millimeters)

Figure 19. Thread Mounted Thermowells (continued)

Stepped



Stepped, For Thermowells with Overall Length Greater than 42-in. (3-Piece Construction)



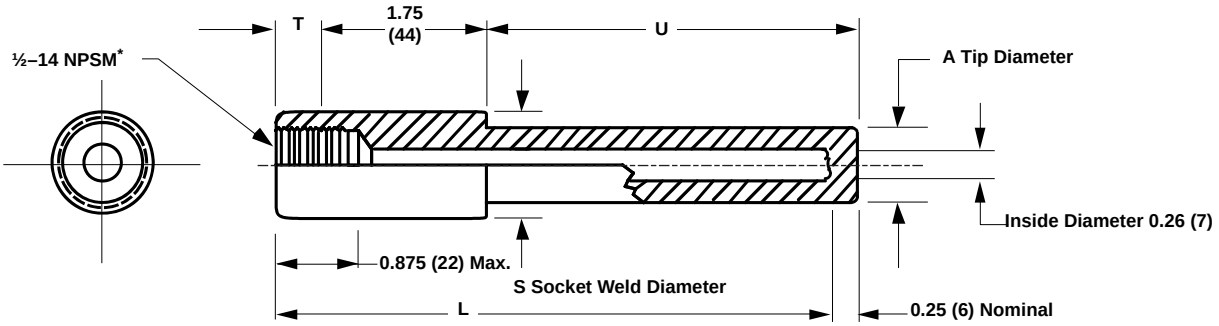
Thread (P)	Hex Size Inches (H)
0.5 – 0.75 ANPT	1.125
1–11.5 ANPT	1.375

** 1/2–14 ANPT threads are available*

Dimensions are in inches (millimeters)

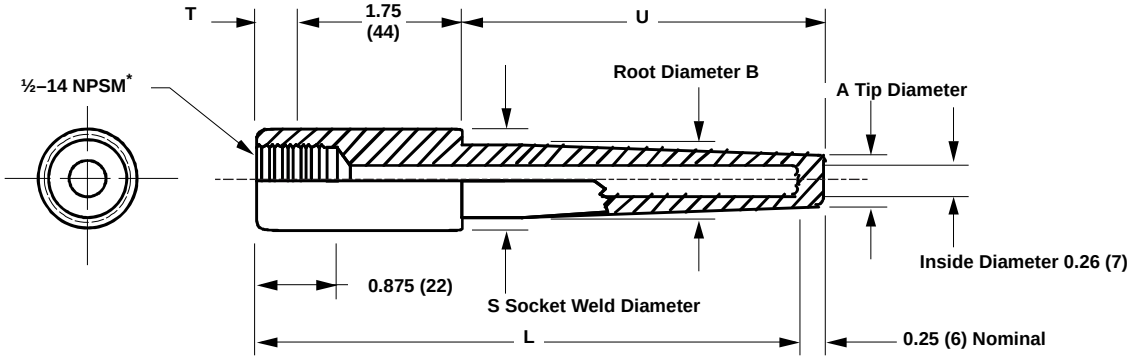
Figure 20. Weld Mounted Thermowells

Straight



Pipe Size	Socket Size (S) Diameter
0.75-in.	1.050 ±0.010
1-in.	1.315 ±0.010

Tapered



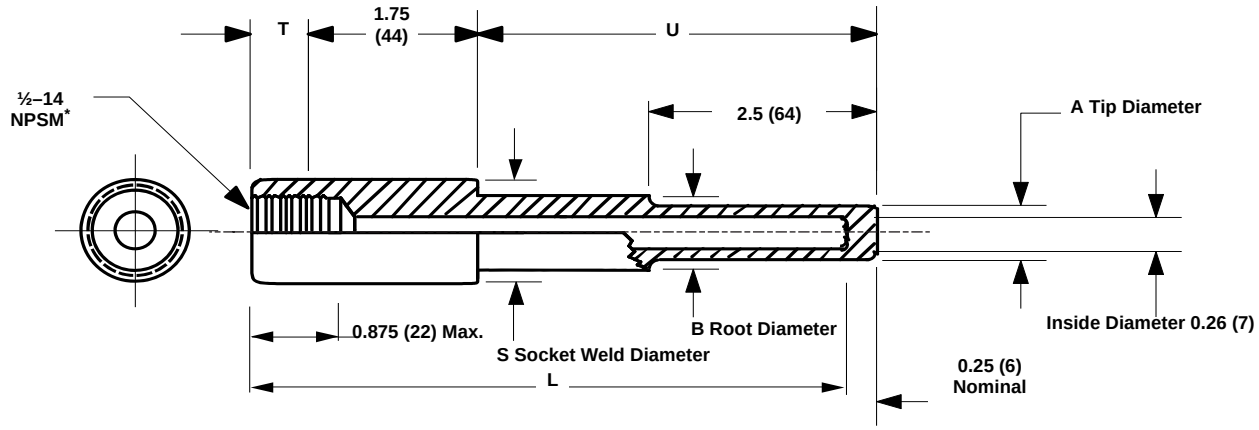
Pipe Size	Socket Size (S) Diameter
0.75-in.	1.050 ±0.010
1-in.	1.315 ±0.010

** 1/2–14 ANPT threads are available*

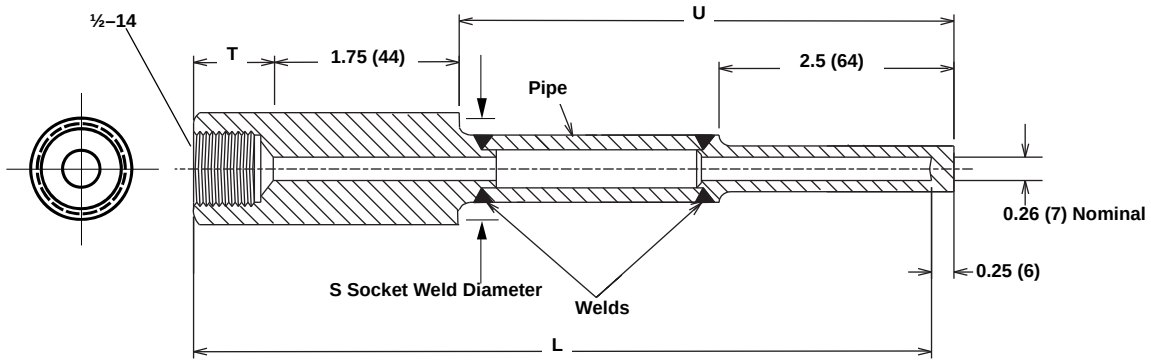
Dimensions are in inches (millimeters)

Figure 21. Weld Mounted Thermowells (continued)

Stepped



Stepped, For Thermowells with Overall Length Greater than 42-in. (3-Piece Construction)



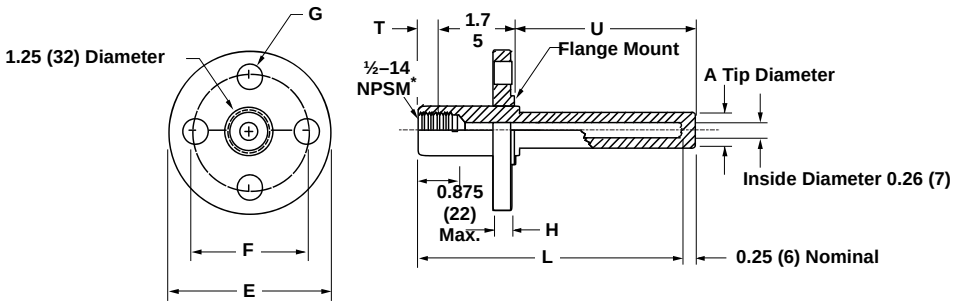
Pipe Size	Socket Size (S) Diameter
0.75-in.	1.050 ±0.010
1-in.	1.315 ±0.010

** 1/2–14 ANPT threads are available*

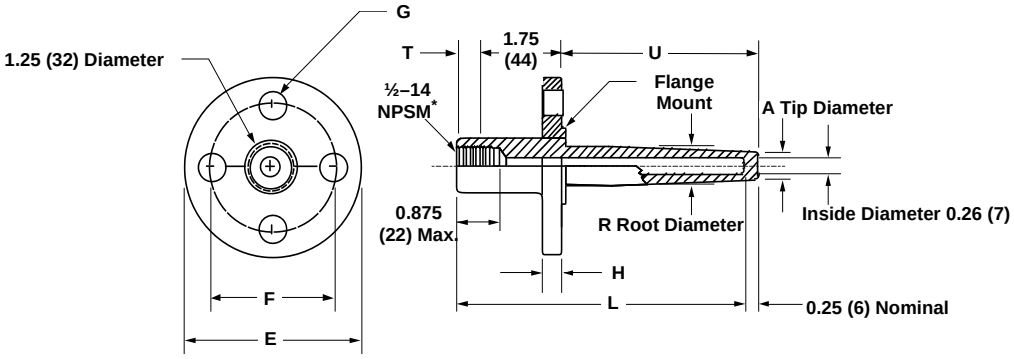
Dimensions are in inches (millimeters)

Figure 22. Flange Mounted Thermowells

Straight



Tapered



Class 150				
Size (in.)	O.D. (E)	Circle (F)	# of holes and dia. (G)	thickness (in.) (H)
1.0	4.25	3.12	four-0.625	0.5625
1.5	5.0	3.88	four-0.625	0.6875
2.0	6.0	4.75	four-0.75	0.75
3.0	7.5	6.00	four-0.75	0.94
Class 300				
1.0	4.88	3.5	four-0.75	0.69
1.5	6.12	4.5	four-0.88	0.81
2.0	6.5	5.0	eight-0.75	0.88

Class 600				
Size (in.)	O.D. (E)	Circle (F)	# of holes and dia. (G)	thickness (in.) (H)
1.0	4.88	3.5	four-0.75	0.94
1.5	6.12	4.5	four-0.88	1.13
2.0	6.5	5.0	eight-0.75	1.25
Class 900 and 1500				
1.5	7.0	4.88	four-1.12	1.5
Class 2500				
1.5	8.0	5.75	four-1.25	2.0

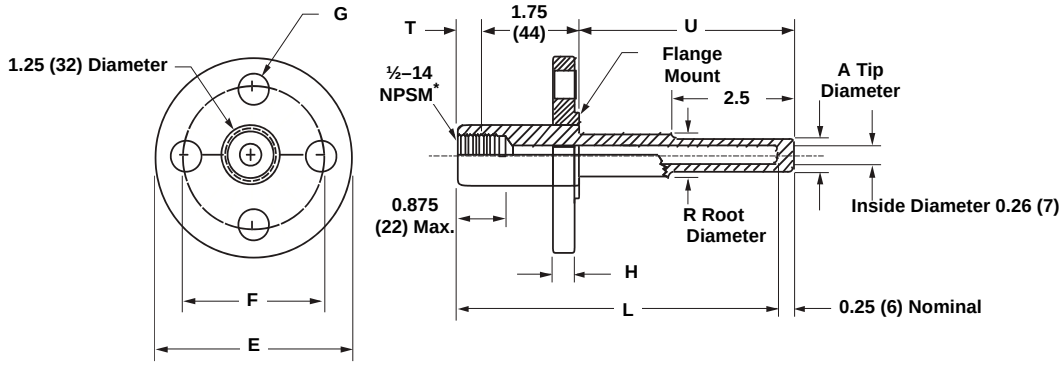
** 1/2–14 ANPT threads are available*

Dimensions are in inches (millimeters)

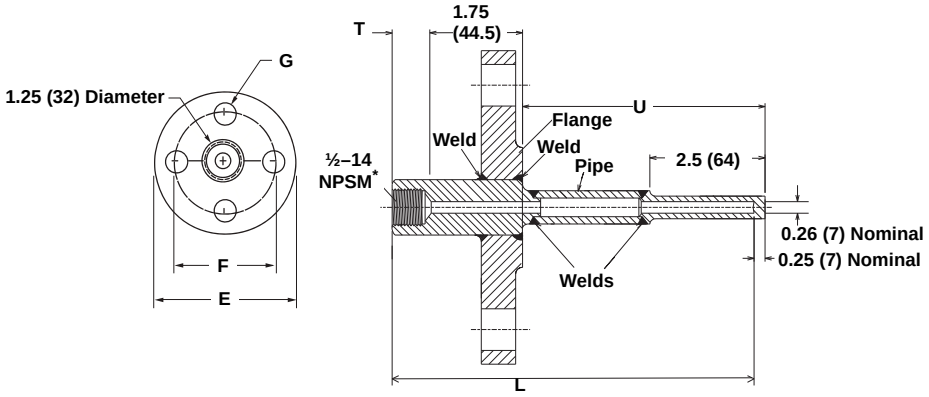
Sensors and Accessories (English)

Figure 23. Flange Mounted Thermowells (continued)

Stepped



Stepped, For Thermowells with Overall Length Greater than 42-in. (3-Piece Construction)



Class 150				
Size (in.)	O.D. (E)	Circle (F)	# of holes and dia. (G)	thickness (in.) (H)
1.0	4.25	3.12	four-0.625	0.5625
1.5	5.0	3.88	four-0.625	0.6875
2.0	6.0	4.75	four-0.75	0.75
3.0	7.5	6.00	four-0.75	0.94
Class 300				
1.0	4.88	3.5	four-0.75	0.69
1.5	6.12	4.5	four-0.88	0.81
2.0	6.5	5.0	eight-0.75	0.88

Class 600				
Size (in.)	O.D. (E)	Circle (F)	# of holes and dia. (G)	thickness (in.) (H)
1.0	4.88	3.5	four-0.75	0.94
1.5	6.12	4.5	four-0.88	1.13
2.0	6.5	5.0	eight-0.75	1.25
Class 900 and 1500				
1.5	7.0	4.88	four-1.12	1.5
Class 2500				
1.5	8.0	5.75	four-1.25	2.0

** 1/2–14 ANPT threads are available*

Dimensions are in inches (millimeters)

Hazardous Area Approvals

SENSORS

Factory Mutual (FM) Approval

E5 Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/III, Division 1, Groups E, F, and G. Suitable for indoor and outdoor (NEMA 4X) hazardous locations. Install in accordance with Rosemount drawing 00068-0013.

Canadian Standards Association (CSA) Approval

E6 Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2, Groups A, B, C, and D. Suitable for indoor and outdoor (CSA Enclosure Type 4X) hazardous locations. Install in accordance with Rosemount drawing 00068-0033.

To ensure approval compliance install sensors in exact accordance with the specified installation drawings (see Figure 25).

CONNECTION HEADS

Factory Mutual (FM) Approval

E5 Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II/III, Division 1, Groups E, F, and G. Painted models are suitable for indoor and outdoor (NEMA 4X) hazardous locations. Unpainted models are suitable for indoor and outdoor (NEMA 4) hazardous locations. When used with temperature sensors, connection heads must be installed in accordance with Rosemount drawing 00068-0013.

Canadian Standards Association (CSA) Approval

E6 Explosion Proof for Class I, Division 1, Groups C, and D. Dust-Ignition Proof for Class II/III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2, Groups A, B, C, and D.
Painted models are suitable for indoor and outdoor (CSA Enclosure Type 4X) hazardous locations. Unpainted models are suitable for indoor and outdoor (CSA Enclosure Type 4) hazardous locations. When used with temperature sensors, connection heads must be installed in accordance with Rosemount drawing 00068-0033.

To ensure approval compliance, install connection heads in exact accordance with the specified installation drawings (see Figure 25).

SENSOR AND TRANSMITTER ASSEMBLIES

ATEX Approval

E1 ATEX Explosion- proof
Certificate Number: KEMA99ATEX8715X
ATEX Marking: ⟨Ex⟩ II 2 G
Ex d IIC T6 (– 40 °C ≤ T_{amb} ≤ +65 °C)

Rosemount Series 68 and 78 RTD and Series 183 thermocouple temperature sensors with spring-loaded or general purpose style sensors are approved only for direct mount to the Rosemount 3144P, 644, 248, and 148 or mounted to the Rosemount Connection Head.

To ensure approval compliance, specify the E1 option on both the sensor and the transmitter at the time of ordering.

Special conditions for safe use (X)

For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

NOTE
Rosemount series 68 and 78 RTD and Series 183 Thermocouple Temperature Sensors can be supplied as a replacement part with the E1 option for installation in an existing temperature measurement assembly.

IECEx Flameproof Approval

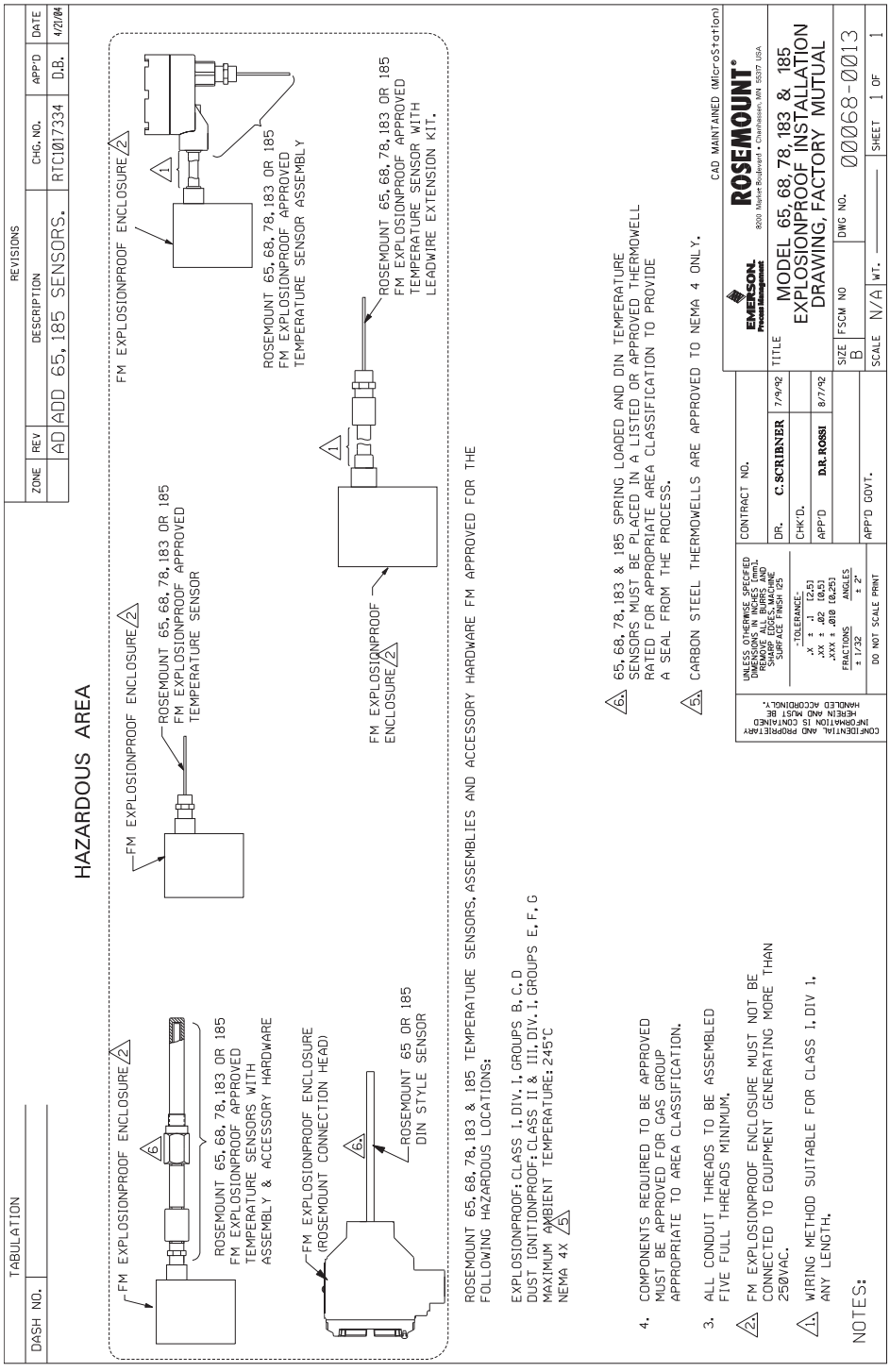
E7 Ex d IIC T6 (T_{amb} = –20 to 60 °C)
Rosemount Series 68 and 78 RTD and Series 183 thermocouple temperature sensors with spring-loaded or general purpose style sensor adapters are approved for direct mount to the Rosemount 148, 248, 644, and 3144P Temperature Transmitters or mounted to the Rosemount Connection Head.

To ensure approval compliance, specify the E7 option on both the sensor and the transmitter at the time of ordering, and install in exact accordance with Rosemount drawing 03144-0225 (see Figure 28).

Sensors and Accessories (English)

Factory Mutual (FM) Explosion-Proof

Figure 24. Installation Drawing 00068-0013, Rev. AD

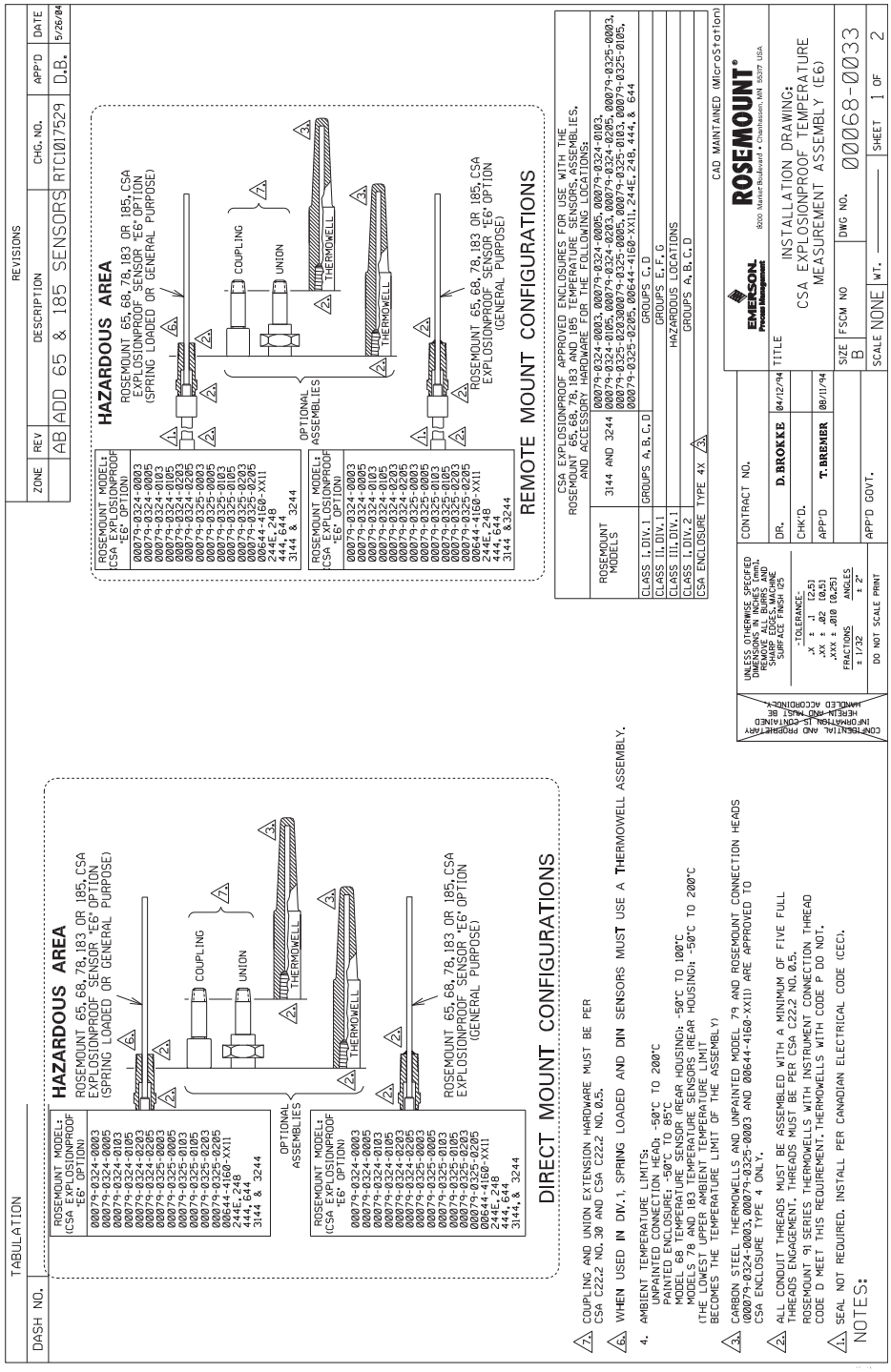


NOTE

For Hand-Tight Assembly Option XA: End-User (installer) must unscrew threaded joints, then reassemble and tighten all joints per installation drawing 00068-0013.

Canadian Standards Association (CSA) Explosion-Proof

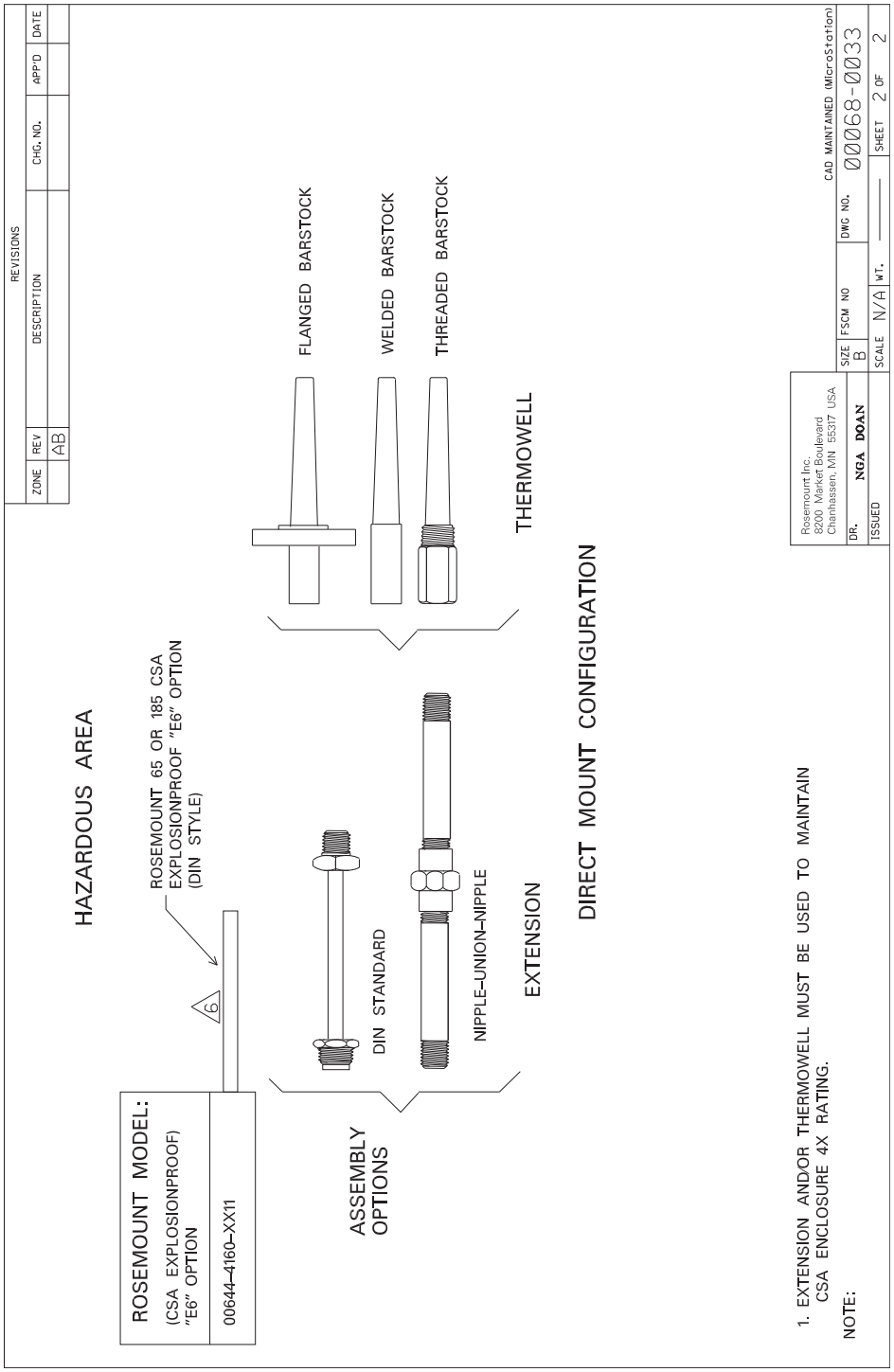
Figure 25. Installation Drawing 00068-0033, Rev. AB Page 1 of 2



NOTE
For Hand-Tight Assembly Option XA: End-User (installer) must unscrew threaded joints, then reassemble and tighten all joints per installation drawing 00068-0033.

Sensors and Accessories (English)

Figure 26. Installation Drawing 00068-0033, Rev. AB Page 2 of 2



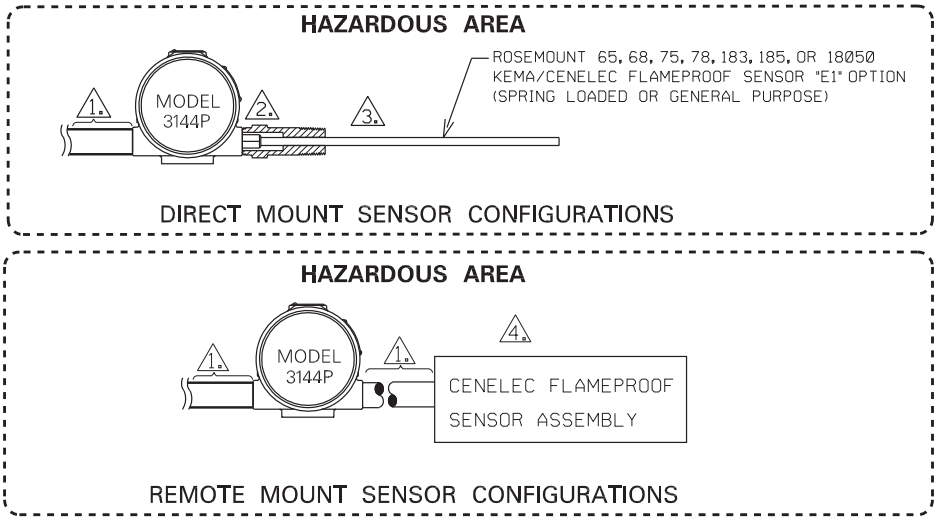
ATEX Flameproof

Figure 27. Installation Drawing 03144-0324, Rev. AB

CONFIDENTIAL AND PROPRIETARY INFORMATION IS CONTAINED HEREIN AND MUST BE HANDLED ACCORDINGLY

REVISIONS

REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AA	NEW RELEASE	RTC1Ø11243	D.B.	7/17/Ø1
AB	CHANGE ISSEP REFERENCES TO KEMA	RTC1Ø11874	D.B.	11/26/Ø1



7. WAIT 1Ø SECONDS AFTER DISCONNECTING POWER BEFORE REMOVING COVER.
6. A CONDUIT PLUG MUST BE INSTALLED INTO ANY UNUSED CONDUIT ENTRIES.
5. ROSEMOUNT MODELS 3144P KEMA/CENELEC FLAMEPROOF APPROVAL Ex II 2 G
   DESCRIPTION: EEx d IIC T6 (Tamb= -40°C TO +70°C) T5 (-40°C TO +80°C).
   IP66

△4. TEMPERATURE SENSOR ASSEMBLY MUST BE CENELEC APPROVED FOR APPROPRIATE AREA CLASSIFICATION.

△3. SPRING LOADED SENSORS MUST USE A THERMOWELL ASSEMBLY.

△2. THREADS MUST BE ASSEMBLED WITH LOCTITE THREAD SEALANT AND HAVE A MINIMUM OF FIVE FULL THREADS ENGAGEMENT AND 8 mm AXIAL LENGTH ENGAGEMENT.

△1. INSTALL PER LOCAL INSTALLATION CODES.
CENELEC APPROVED CABLE ENTRY OR STOPPING BOX REQUIRED.

CAD MAINTAINED (MicroStation)

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125

-TOLERANCE-
.X ± .1 [2,5]
.XX ± .02 [0,5]
.XXX ± .010 [0,25]
FRACTIONS ± 1/32
ANGLES ± 2°

DO NOT SCALE PRINT

CONTRACT NO.

DR. NGA DOAN 6/29/01
CHK'D
APP'D. DIRK BAUSCHKE 7/17/01

APP'D. GOVT.

EMERSON. Process Management
ROSEMOUNT®
8200 Market Boulevard • Chanhassen, MN 55317 USA

TITLE INSTALLATION DRAWING:
KEMA/CENELEC FLAMEPROOF TEMPERATURE MEASUREMENT ASSEMBLY (EI)

SIZE A | FSCM NO | DWG NO. Ø3144-Ø324

SCALE NONE | WT. ——— | SHEET 1 OF 1

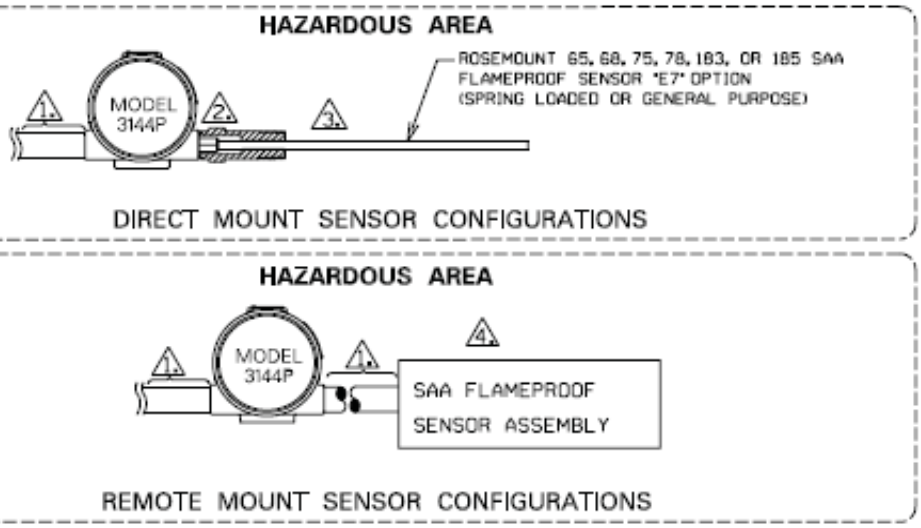
IECEx Flameproof

Figure 28. Drawing 03144-0325, Rev. AD

CONFIDENTIAL AND PROPRIETARY INFORMATION IS CONTAINED HEREIN AND MUST BE HANDLED ACCORDINGLY

REVISIONS

REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AC	ADD NOTES 8 & 9. CHANGE AMBIENT TEMPS IN NOTE 5. ADD TEFLON TAPE TO NOTE 2.	RTC1Ø13713	D.B.	9/4/Ø2
AD	CHANGE IP RATING IN NOTE 5	RTC1Ø138Ø8	D.B.	9/23/Ø2



9. FOR A CERTIFICATION LABEL WITH MORE THAN ONE TYPE OF CERTIFICATION MARKING ON IT, ON COMPLETION OF COMMISSIONING THE APPARATUS, THE IRRELEVANT MARKING CODE(S) SHALL BE PERMANENTLY SCRIBED OFF.
8. COVERS ARE TIGHTENED TO METAL-TO-METAL SEAL WITH A TOOL.
7. WAIT 1Ø SECONDS AFTER DISCONNECTING POWER BEFORE REMOVING COVER.
6. A CONDUIT PLUG MUST BE INSTALLED INTO ANY UNUSED CONDUIT ENTRIES.
5. ROSEMOUNT MODELS 3144P SAA FLAMEPROOF APPROVAL DESCRIPTION: Ex d IIC T6 (Tamb= -2Ø°C TO +6Ø°C) IP66
4. TEMPERATURE SENSOR ASSEMBLY MUST BE SAA APPROVED FOR APPROPRIATE AREA CLASSIFICATION.
3. SPRING LOADED SENSORS MUST USE A THERMOWELL ASSEMBLY.
2. THREADS MUST BE ASSEMBLED WITH LOCTITE THREAD SEALANT OR TEFLON TAPE (PTFE) AND HAVE A MINIMUM OF FIVE FULL THREADS ENGAGEMENT AND 8 mm AXIAL LENGTH ENGAGEMENT.
1. INSTALL PER LOCAL INSTALLATION CODES. SAA APPROVED CABLE ENTRY OR STOPPING BOX REQUIRED.

CAD MAINTAINED (MicroStation)

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125

-TOLERANCE-
.X ± .1 [2,5]
.XX ± .02 [Ø,5]
.XXX ± .Ø1Ø [Ø,25]
FRACTIONS ± 1/32
ANGLES ± 2°

DO NOT SCALE PRINT

CONTRACT NO.

DR. NGA DOAN 8/7/Ø1

CHK'D

APP'D DIRK BAUSCHKE 8/17/Ø1

APP'D. GOVT.

EMERSON Process Management

ROSEMOUNT®
8200 Market Boulevard • Chanhassen, MN 55317 USA

TITLE INSTALLATION DRAWING: SAA FLAMEPROOF TEMPERATURE MEASUREMENT ASSEMBLY (E7)

SIZE A | FSCM NO | DWG NO. Ø3144-Ø325

SCALE N/A | WT. ——— | SHEET 1 OF 1

Sensors and Accessories (English)

Product Data Sheet
00813-0100-2654, Rev GC
Catalog 2011 - 2012

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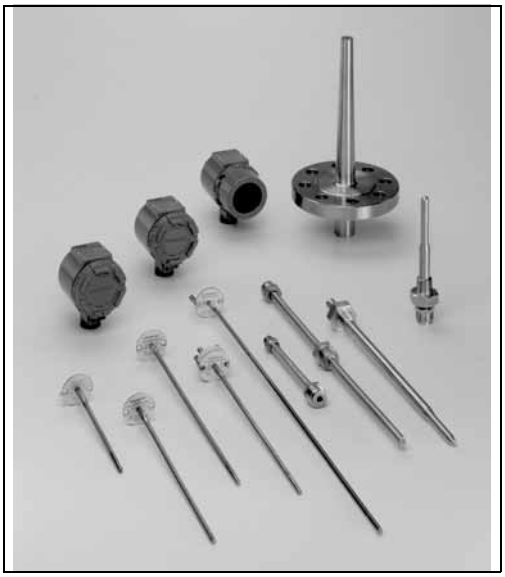
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Singapore 128461
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F (65) 6777 0947
Enquiries@AP.EmersonProcess.com

00813-0100-2654 Rev GC 7/11

EMERSON™
Process Management

Rosemount DIN-Style Temperature Sensors and Thermowells (Metric)

- *RTDs (0065) and Thermocouples (0185) available to meet any process requirement*
- *DIN-style for easy installation and replacement*
- *Integrated temperature assembly with 3144P, 644, or 248 available*



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Rosemount DIN-Style Temperature Sensor and Thermowells

Optimize plant efficiency and increase measurement reliability with industry-proven design and specifications

- Available in a wide variety of sensing technologies – RTD and Thermocouples
- All sensor styles and lengths are available in 6 mm diameter
- State of the art manufacturing procedures provide robust element packaging, increasing reliability
- Industry-leading calibration capabilities allow for Callendar-van-Dusen values to give increased accuracy when paired with Rosemount transmitters
- Optional Class A accuracy for critical temperature measurement points
- Tubular thermowell designs offers faster response time

Streamline operations and maintenance with sensor and thermowell design

- DIN style sensor uses connection heads that allow quick mounting and replacement while maintaining environmental integrity
- Terminal block, flying leads, and spring loaded threaded adapter styles offer remote or integral transmitter mounting configuration

Explore the benefits of a Complete Point Solution from Rosemount Temperature Measurement

- An “Assemble Sensor to Specific Transmitter” option enables Emerson to provide a complete point temperature solution, delivering an installation-ready transmitter and sensor assembly
- Emerson has a complete portfolio of Single Point and High Density Temperature Measurement solutions, allowing you to effectively measure and control your processes with the reliability you trust from Rosemount products



Experience global consistency and local support from numerous worldwide Rosemount Temperature manufacturing sites



- World-class manufacturing provides globally consistent product from every factory and the capacity to fulfill the needs of any project, large or small.
- Experienced Instrumentation Consultants help select the right product for any temperature application and advise on best installation practices.
- An extensive global network of Emerson service and support personnel can be on-site when and where they are needed.

Rosemount DIN-Style Sensor and Thermowell



The Rosemount DIN-Style Sensor and Thermowell have designs that provide flexible and reliable temperature measurements in process environments.

Features include:

- Industry-standard sensor types, including RTD and Thermocouple varieties
- DIN-style design for easy mounting and replacement
- Variety of enclosure and connection head options
- Global hazardous-location approvals (Option Codes I1, N1, E1, ND, E5, E7)
- Calibration services to give you insight to sensor performance (Option Codes V10, V11)
- MID calibration for custody transfer (Option Codes MD1, MD2, MD3)
- Assemble to Transmitter option (Option Code XA)

Table 1. Series 65 Platinum RTD and 185 Thermocouple Without Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model		Product Description			
0065		Resistance Thermometer, Pt 100 Ohm RTD Standard without Thermowell			
0185		Thermocouples, DIN EN 60584 (IEC 584), Class 1, suitable for transmitter mounting			
Connection Head			**IP Rating(1)**	**Connection Thread**	
Standard					**Standard**
C		Rosemount Aluminum	68	M20 x 1.5	★
D		Rosemount Aluminum	68	1/2-in. NPT	★
1		Rosemount Aluminum with LCD Meter cover	68	M20 x 1.5	★
2		Rosemount Aluminum with LCD Meter cover	68	1/2-in. NPT	★
N		No Connection head			★
Expanded					
G		Rosemount Stainless steel	68	M20 x 1.5	
H		Rosemount Stainless steel	68	1/2-in. NPT	
J		GR–A/BL (BUZ) Aluminum w/ Cable Gland	65	M20 x 1.5 (with cable gland)	
L		TZ–A/BL (BUZH) Aluminum w/ Cable Gland	65	M20 x 1.5 (with cable gland)	
Sensor Lead Wire Termination					
Standard					**Standard**
0		Flying leads – No springs on DIN plate			★
2		Terminal block – DIN 43762			★
3		Spring loaded adapter – 1/2-in. NPT			★
Sensor Type			**Temperature Range**		
Standard					**Standard**
65 Only	1	RTD, Single Element, 4-wire	– 50 to 450 °C (–58 to 842 °F)		★
	2	RTD, Dual Element, 3-wire	– 50 to 450 °C (–58 to 842 °F)		★
	3	RTD, Single Element, 4-wire	–196 to 600 °C (–321 to 1112 °F)		★
	4	RTD, Dual Element, 3-wire	–196 to 600 °C (–321 to 1112 °F)		★
185 Only	03J1	Thermocouple, Type J, Single Element, Ungrounded	– 40 to 750 °C (–40 to 1382 °F)		★
	03K1	Thermocouple, Type K, Single Element, Ungrounded	– 40 to 1000 °C (–40 to 1832 °F)		★
	05J1	Thermocouple, Type J, Dual Element, Isolated, Ungrounded	– 40 to 750 °C (–40 to 1382 °F)		★
	05K1	Thermocouple, Type K, Dual Element, Isolated, Ungrounded	– 40 to 1000 °C (–40 to 1832 °F)		★

Sensors and Thermowells (Metric)

Table 1. Series 65 Platinum RTD and 185 Thermocouple Without Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded					
	03N1	Thermocouple, Type N, Single Element, Ungrounded	– 40 to 1000 °C (–40 to 1832 °F)		
	05N1	Thermocouple, Type N, Dual Element, Isolated, Ungrounded	– 40 to 1000 °C (–40 to 1832 °F)		

Extension		**Head Connection**	**Instrument Connection**	**Material**	
Standard					**Standard**
D	DIN Standard 12 x 1.5	M24 x 1.5	1/2-in NPT	Stainless Steel	★
T	DIN Standard 12 x 1.5	M24 x 1.5	M18 x 1.5	Stainless Steel	★
F	Nipple Union Nipple	1/2-in NPT	1/2-in NPT	Stainless Steel	★
J	Nipple Union (M/F)	no head	1/2-in NPT	Stainless Steel	★
N	No Extension (use when ordering the sensor alone, only available with Extension Length (N) code 0000)				★
W	No Extension Head Connection M24 x 1.5				★
L	No Extension Head Connection 1/2-in. NPT				★

Extension Length (N) in Millimeters		
Standard		**Standard**
0000	No extension – use with Extension Type code N	★
0035	35 mm	★
0080	80 mm – standard for Extension Type code J	★
0110	110 mm – standard for Extension Type codes F and J	★
0135	135 mm – standard for DIN Extension used with Rosemount Connection Head Material codes C, D, G, H, 1, and 2	★
0150	150 mm – standard for DIN Extension used with Form B Connection Head Material codes J and L	★
Expanded		
XXXX	Non-standard extension length – available from 35 to 500 mm	

Thermowell Material		
Standard		**Standard**
N	No thermowell	★

Sensor Length (L) in Millimeters		
Standard		**Standard**
0145	145 mm	★
0205	205 mm	★
0275	275 mm	★
0315	315 mm	★
0375	375 mm	★
0405	405 mm	★
0435	435 mm	★
0555	555 mm	★
Expanded		
XXXX	Non-standard sensor length – available from min. 100 mm, max. 9999 mm	

Options (Include with selected model number)

Sensor Options (available with 65 only)		
Standard		**Standard**
A1	Single Element Class A sensor from –50 to 450 °C (–58 to 842 °F) (0 °C to 350 °C for Sensor Types 7,9,0)	★
A2	Dual element Class A sensor from –50 to 450 °C (–58 to 842 °F) (0 °C to 350 °C for Sensor Types 7,9,0)	★
Product Certifications		
Standard		**Standard**
I1	EEx ia – ATEX/IBExU Intrinsic Safety Approval	★
N1(2)(3)	EEx n – ATEX/CENELEC Type n Approval	★
E1(3)	EEx d – ATEX/CENELEC Flameproof Approval	★
ND(3)	ATEX Dust Ignition-proof Approval	★
E7(3)	IECEx Flameproof Approval	★
E5(3)	FM Explosion-proof Approval	★

Table 1. Series 65 Platinum RTD and 185 Thermocouple Without Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Ground Screw		
Standard		**Standard**
G1	External ground screw – only available with Rosemount Connection Head Material codes C, D, G, H, 1, and 2	★
Cover Chain Option		
Standard		**Standard**
G3	Cover Chain – only available with Rosemount Connection Head Material codes C, D, G, and H.	★
Extension Ring		
Standard		**Standard**
G6(4)	Aluminum Extension Ring for Dual Transmitter Mounting – use with Rosemount Connection Head Material Codes C and D.	★
Termination		
Standard		**Standard**
TB	Terminal Block for use with sensor termination code 3 and Rosemount Heads C, D, G, and H	★
Assemble To Option		
Standard		**Standard**
XA(5)	Assemble Sensor to Specific Temperature Transmitter (PTFE paste)	★
V Options (available with 65 only)		
Standard		**Standard**
V10	Works Certificate – Sensor Calibration from –50 to 450 °C (–58 to 842 °F) with A, B, C, and Callendar-Van Dusen Constants	★
V11	Works Certificate – Sensor Calibration from 0 to 100 °C (–32 to 212 °F) with A, B, C, and Callendar-Van Dusen Constants	★
VS System Calibration		
Standard		**Standard**
MD1	MID Custody Transfer (-196 °C to 0 °C)	★
MD2	MID Custody Transfer (-50 °C to 100 °C)	★
MD3	MID Custody Transfer (50 °C to 200 °C)	★
Temperature Range (available with 65 only)		
Standard		**Standard**
X8	Works Certificate – Sensor Calibration Over Specified Temperature Range with A, B, C, and Callendar-Van Dusen Constants	★
Temperature Range Option		
Standard		**Standard**
LT	Special materials to meet extended temperature range of -51 °C	★
Typical Model Number: 0065 C 2 3 D 0150 N 0315 A1		

(1) To maintain IP 68 rating, use a suitable cable gland on the conduit connection thread. All threads must be sealed with a suitable sealing tape.

(2) For complete assemblies or as replacement sensor for N-series, component parts are not approved. If the transmitter is mounted in a connection head, the Sensor Lead Wire Termination code 0 (flying leads) is required.

(3) Not available with Connection Head Material Codes J and L.

(4) Not valid with E5, E7, ND, or E1 Approval.

(5) If ordering Assemble To Option XA with a transmitter, specify the same option on the transmitter model number.

Table 2. Series 65 Platinum RTD and 185 Thermocouple With Tubular Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model		Product Description			
0065		Resistance Thermometer, Pt 100 Ohm RTD Standard with Tubular Thermowell			
0185		Thermocouples, DIN EN 60584 (IEC 584) Class 1 with Tubular Thermowell			
Connection Head			**IP Rating(1)**	**Conduit / Cable Entry**	
Standard					**Standard**
C		Rosemount Aluminum	68	M20 x 1.5	★
D		Rosemount Aluminum	68	1/2-in. NPT	★
1		Rosemount Aluminum with LCD Meter Cover	68	M20 x 1.5	★
2		Rosemount Aluminum with LCD Meter Cover	68	1/2-in. NPT	★
N		No Connection Head			
Expanded					
G		Rosemount Stainless Steel	68	M20 x 1.5	
H		Rosemount Stainless Steel	68	1/2-in. NPT	
J		GR –A/BL (BUZ) Aluminum w/ Cable Gland	65	M20 x 1.5 (with cable gland)	
L		TZ–A/BL (BUZH) Aluminum w/ Cable Gland	65	M20 x 1.5 (with cable gland)	
Sensor Lead Wire Termination					
Standard					**Standard**
0		Flying Leads – No Springs on DIN plate			★
2		Terminal block – DIN 43762			★
3		Spring Loaded Adapter - 1/2-in. NPT (available with 185 only)			★
Sensor Type				**Temperature Range –valid for tolerance Class B Pt 100 only**	
Standard					**Standard**
65 Only	1	RTD, Single Element, 4-wire		– 50 to 450 °C (–58 to 842 °F)	★
	2	RTD, Dual Element, 3-wire		– 50 to 450 °C (–58 to 842 °F)	★
	3	RTD, Single Element, 4-wire		–196 to 600 °C (–321 to 1112 °F)	★
	4	RTD, Dual Element, 3-wire		–196 to 600 °C (–321 to 1112 °F)	★
185 Only	03J1	Thermocouple, Type J, Single Element, Ungrounded		– 40 to 750 °C (–40 to 1382 °F)	★
	03K1	Thermocouple, Type K, Single Element, Ungrounded		– 40 to 1000 °C (–40 to 1832 °F)	★
	05J1	Thermocouple, Type J, Dual Element, Isolated, Ungrounded		– 40 to 750 °C (–40 to 1382 °F)	★
	05K1	Thermocouple, Type K, Dual Element, Isolated, Ungrounded		– 40 to 1000 °C (–40 to 1832 °F)	★
Expanded					
	03N1	Thermocouple, Type N, Single Element, Ungrounded		– 40 to 1000 °C (–40 to 1832 °F)	
	05N1	Thermocouple, Type N, Dual Element, Isolated, Ungrounded		– 40 to 1000 °C (–40 to 1832 °F)	
Extension					
Standard					**Standard**
Y		Tubular, no Extension – form GN			★
Z		Tubular, with Extension – form GB, NAMUR, GC, FC			★
Extension Length (N) in Millimeters					
Standard					**Standard**
0000		No extension – use with Extension Type code Y			★
0050		50 mm			★
0065		65 mm			★
0105		105 mm			★
0115		115 mm			★
0130		130 mm			★
0200		200 mm			★
0250		250 mm			★
Expanded					
XXXX		Non-standard extension length – available from 35 to 500 mm			

Table 2. Series 65 Platinum RTD and 185 Thermocouple With Tubular Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Thermowell Material				
Standard				**Standard**
D[2]	1.4404 (AISI 316L)			★
Y	1.4571 (AISI 316Ti)			★
Immersion Length (U) in Millimeters				
Standard				**Standard**
0050	50 mm			★
0075	75 mm			★
0100	100 mm			★
0115	115 mm			★
0130	130 mm			★
0150	150 mm			★
0160	160 mm			★
0200	200 mm			★
0220	220 mm			★
0225	225 mm			★
0250	250 mm			★
0280	280 mm			★
0300	300 mm			★
0345	345 mm			★
0400	400 mm			★
Expanded				
XXXX	Non-standard Immersion Length – available from 50 to 2500 mm			
Mounting Style		**Process Connections**	**Stem Style**	
Standard				**Standard**
G02	Thread, Tapered	R 1/2-in. (1/2-in. BSPT)	Stepped, NAMUR[3]	★
G04	Thread, Tapered	R 3/4-in. (3/4-in.BSPT)	Stepped, NAMUR[3]	★
G06	Thread, Tapered	R 1-in. (1-in. BSPT)	Stepped, NAMUR[3]	★
G13	Thread, Parallel	M27 x 2	Stepped, NAMUR[3]	★
G20	Thread, Parallel	G 1/2-in. (1/2-in. BSPF)	Stepped, NAMUR[3]	★
G22	Thread, Parallel	G 3/4-in. (3/4-in.BSPF)	Stepped, NAMUR[3]	★
G24	Thread, Parallel	G 1-in. (1-in. BSPF)	Stepped, NAMUR[3]	★
G91	Thread, Parallel	M20 x 1.5	Stepped, NAMUR[3]	★
G31	Thread, Parallel	M33 x 2	Stepped, NAMUR[3]	★
G38	Thread, Tapered	1/2-in. NPT	Stepped, NAMUR[3]	★
G40	Thread, Tapered	3/4-in. NPT	Stepped, NAMUR[3]	★
G42	Thread, Tapered	1-in. NPT	Stepped, NAMUR[3]	★
G52	Thread, Parallel	G 1/2-in. (1/2-in. BSPF)	Straight, GN, D. 9 x 1 mm[4]	★
G92	Thread, Parallel	M20 x 1.5	Straight, GN, D. 9 x 1 mm[4]	★
G63	Thread, Parallel	G 1/2-in. (1/2-in. BSPF)	Straight, GN, D. 11 x 2 mm[4]	★
G94	Thread, Parallel	M20 x 1.5	Straight, GN, D. 11 x 2 mm[4]	★
G72	Thread, Parallel	G 1/2-in. (1/2-in. BSPF)	Straight, GB, D. 9 x 1 mm[4]	★
G95	Thread, Parallel	M20 x 1.5	Straight, GB, D. 9 x 1 mm[4]	★
L02	Flange, RF	1-in. 150 lbs	Stepped, NAMUR[3]	★
L08	Flange, RF	1.5-in. 150 lbs	Stepped, NAMUR[3]	★
L14	Flange, RF	2-in. 150 lbs	Stepped, NAMUR[3]	★
L20	Flange, RF	1-in. 300 lbs	Stepped, NAMUR[3]	★
L26	Flange, RF	1.5-in. 300 lbs	Stepped, NAMUR[3]	★
L32	Flange, RF	2-in. 300 lbs	Stepped, NAMUR[3]	★
H02	Flange, Form B1 according to EN 1092-1	DN 25 PN 16	Stepped, NAMUR[3]	★

Sensors and Thermowells (Metric)

Table 2. Series 65 Platinum RTD and 185 Thermocouple With Tubular Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

H08	Flange, Form B1 according to EN 1092-1	DN 25 PN 25/40	Stepped, NAMUR[3]	★
H14	Flange, Form B1 according to EN 1092-1	DN 40 PN 16	Stepped, NAMUR[3]	★
H20	Flange, Form B1 according to EN 1092-1	DN 40 PN 25/40	Stepped, NAMUR[3]	★
H26	Flange, Form B1 according to EN 1092-1	DN 50 PN 40	Stepped, NAMUR[3]	★

Options (Include with selected model number)

Sensor Options (available with 65 only)		
Standard		**Standard**
A1	Single Element Class A Sensor from –50 to 450 °C (–58 to 842 °F) (0 °C to 350 °C for Sensor Types 7, 9, 0)	★
A2	Dual Element Class A Sensor from –50 to 450 °C (–58 to 842 °F) (0 °C to 350 °C for Sensor Types 7, 9, 0)	★
Product Certifications		
Standard		**Standard**
I1	EEx ia – ATEX / IBExU Intrinsic Safety Approval	★
N1[5][6]	EEx n – ATEX/CENELEC Type n Approval	★
E1[6]	EEx d – ATEX/CENELEC Flameproof Approval	★
ND[6]	ATEX Dust Ignition-proof	★
E7[6]	IECEx Flameproof Approval	★
E5[6]	FM Explosion-proof Approval (consult factory for availability)	★
Ground Screw		
Standard		**Standard**
G1	External ground screws – only available with Rosemount Connection Head Material codes C, D, G, H, 1, and 2	★
Cover Chain Option		
Standard		**Standard**
G3	Cover Chain – only available with Rosemount Connection Head Material codes C, D, G, and H.	★
Extension Ring		
Standard		**Standard**
G6[7]	Aluminum Extension Ring for Dual Transmitter Mounting – use with Rosemount Connection Head Material Codes C and D.	★
Material Certification		
Standard		**Standard**
Q8	Thermowell Material Certification	★
External Pressure Test		
Standard		**Standard**
R01[8]	Thermowell External Pressure Testing	★
Dye Test		
Standard		**Standard**
R03	Thermowell Dye Penetration Testing	★
Special Cleaning		
Standard		**Standard**
R04	Thermowell Special Cleaning	★
Assemble To Options		
Standard		**Standard**
XA[9]	Assemble Sensor to Specific Temperature Transmitter (PTFE paste)	★
V Options (available with 65 only)		
Standard		**Standard**
V10	Works Certificate – Sensor Calibration from –50 to 450 °C (–58 to 842 °F) with A, B, C, and Callendar-Van Dusen Constants	★
V11	Works Certificate – Sensor Calibration from 0 to 100 °C (–32 to 212 °F) with A, B, C, and Callendar-Van Dusen Constants	★
Temperature Range (available with 65 only)		
Standard		**Standard**
X8	Works Certificate – Sensor Calibration Over Specified Temperature Range with A, B, C, and Callendar-Van Dusen Constants	★

Table 2. Series 65 Platinum RTD and 185 Thermocouple With Tubular Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Temperature Range Option		
Standard		**Standard**
LT	Special Materials to meet extended Temperature range of -51 °C	★
Typical Model Number: 0065 L 2 1 Z 0115 Y 0375 G20 XA		

(1) To maintain IP 68 rating, use a suitable cable gland on the conduit connection thread. All threads must be sealed with a suitable sealing tape.
(2) Process thread or process flange to be 316L material with a stem material of 316Ti. Not NAMUR compliant.
(3) NAMUR compliance only applicable with 316Ti material code "Y". Minimum immersion length of 115 mm. For u < 115 mm, use straight thermowell, 8 mm Diameter.
(4) Not available with Thermowell Material code D.
(5) For complete assemblies or as replacement sensor for type N-series, component parts are not approved. If the transmitter is mounted in a connection head, the Sensor Lead Wire Termination code 0 (flying leads) is requested.
(6) Not available with Connection Head Material codes J and L.
(7) Not valid with E5, E7, ND, or E1 Approval.
(8) Not available with welded connection.
(9) If ordering Assemble To Option XA with a transmitter, specify the same option on the transmitter model number.

Sensors and Thermowells (Metric)

Table 3. Series 65 Platinum RTD and 185 Thermocouple With Barstock Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description				
0065	Resistance Thermometer, Pt 100 Ohm Standard with Barstock Thermowell				
0185	Thermocouples, DIN EN 60584 (IEC 584) Class 1 with Barstock Thermowell				
Connection Head Material		**IP Rating(1)**	**Conduit / Cable Entry**		
Standard					**Standard**
C	Rosemount Aluminum	68	M20 x 1.5		★
D	Rosemount Aluminum	68	1/2-in. NPT (cable entry)		★
1	Rosemount Aluminum with LCD Meter Cover	68	M20 x 1.5		★
2	Rosemount Aluminum with LCD Meter Cover	68	1/2-in. NPT		★
N	No Connection head				★
Expanded					
G	Rosemount Stainless Steel	68	M20 x 1.5 (cable entry)		
H	Rosemount Stainless steel	68	1/2-in. NPT (cable entry)		
J	GR –A/BL (BUZ) Aluminum w/ Cable Gland	65	M20 x 1.5 (with cable gland)		
L	TZ–A/BL (BUZH) Aluminum w/ Cable Gland	65	M20 x 1.5 (with cable gland)		
Sensor Lead Wire Termination					
Standard					**Standard**
0	Flying Leads – No Springs on DIN plate				★
2	Terminal Block – DIN 43762				★
3	Spring Loaded Adapter – 1/2-in. NPT – use with Extension Type codes J and N				★
Sensor Type			**Temperature Range –valid for tolerance Class B Pt 100 only**		
Standard					**Standard**
65 Only 1	RTD, Single Element, 4-wire		– 50 to 450 °C (–58 to 842 °F)		★
65 Only 2	RTD, Dual Element, 3-wire		– 50 to 450 °C (–58 to 842 °F)		★
65 Only 3	RTD, Single Element, 4-wire		–196 to 600 °C (–321 to 1112 °F)		★
65 Only 4	RTD, Dual Element, 3-wire		–196 to 600 °C (–321 to 1112 °F)		★
185 Only 03J1	Thermocouple, Type J, Single Element, Ungrounded		– 40 to 750 °C (–40 to 1382 °F)		★
185 Only 03K1	Thermocouple, Type K, Single Element, Ungrounded		– 40 to 1000 °C (–40 to 1832 °F)		★
185 Only 05J1	Thermocouple, Type J, Dual Element, Isolated, Ungrounded		– 40 to 750 °C (–40 to 1382 °F)		★
185 Only 05K1	Thermocouple, Type K, Dual Element, Isolated, Ungrounded		– 40 to 1000 °C (–40 to 1832 °F)		★
Expanded					
03N1	Thermocouple, Type N, Single Element, Ungrounded		– 40 to 1000 °C (–40 to 1832 °F)		
05N1	Thermocouple, Type N, Dual Element, Isolated, Ungrounded		– 40 to 1000 °C (–40 to 1832 °F)		
Extension		**Head Connection**	**Instrument Connection**	**Materials**	
Standard					**Standard**
D	DIN Standard 12 x 1.5	M24 x 1.5	1/2-in NPT	Stainless Steel	★
T(2)	DIN Standard 12 x 1.5	M24 x 1.5	M18 x 1.5	Stainless Steel	★
F	Nipple Union Nipple	1/2-in NPT	1/2-in NPT	Stainless Steel	★
J	Nipple Union (MF)	(No Head)	1/2-in NPT	Stainless Steel	★
N	No Extension (only available with Extension length (N) code 0000)				★
Extension Length (N) in Millimeters					
Standard					**Standard**
0000	No extension – use with Extension Type code N				★
0035	35 mm				★
0080	80 mm– standard for Extension Type code J				★
0110	110 mm – standard for Extension Type codes F and J				★
0135	135 mm – standard for DIN Extension used with Rosemount Connection Head Material codes C, D, G, H, 1, and 2				★
0150	150 mm – standard for DIN Extension used with Form B Connection Head Material codes J and L				★

Table 3. Series 65 Platinum RTD and 185 Thermocouple With Barstock Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded				
XXXX	Non-standard extension length – available from 35 to 500 mm			
Thermowell Material				
Standard				**Standard**
D	1.4404 (AISI 316L)			★
Y	1.4571 (AISI 316Ti)			★
Code	**Immersion Length (U)**			
Standard				**Standard**
0065	65 mm			★
0075	75 mm			★
0115	115 mm			★
0125	125 mm			★
0150	150 mm			★
0225	225 mm			★
0300	300 mm			★
0450	450 mm			★
Expanded				
XXXX	Non-standard immersion length – available from 80 to 1000 mm in 5 mm increments			
Code	**Thermowell Mounting Style**	**Process Connections**	**Stem Style**	
Standard				**Standard**
T08	Threaded	R 1/2-in. (1/2-in. BSPT)	Tapered	★
T10	Threaded	R 3/4-in. (3/4-in.BSPT)	Tapered	★
T12	Threaded	R 1-in. (1-in. BSPT)	Tapered	★
T26	Threaded	G 1/2-in. (1/2-in. BSPF)	Tapered	★
T28	Threaded	G 3/4-in. (3/4-in.BSPF)	Tapered	★
T30	Threaded	G 1-in. (1-in. BSPF)	Tapered	★
T44	Threaded	1/2-in. NPT	Tapered	★
T46	Threaded	3/4-in. NPT	Tapered	★
T48	Threaded	1-in. NPT	Tapered	★
T93	Threaded	M27 x 2	Tapered	★
T95	Threaded	M33 x 2	Tapered	★
T98	Threaded	M20 x 1.5	Tapered	★
F04	Flanged, RF	1-in. 150 lbs	Tapered	★
F10	Flanged, RF	1.5-in. 150 lbs	Tapered	★
F16	Flanged, RF	2-in. 150 lbs	Tapered	★
F22	Flanged, RF	1-in. 300 lbs	Tapered	★
F28	Flanged, RF	1.5-in. 300 lbs	Tapered	★
F34	Flanged, RF	2-in. 300 lbs	Tapered	★
F40	Flanged, RF	1-in. 600 lbs	Tapered	★
F46	Flanged, RF	1.5-in. 600 lbs	Tapered	★
F52	Flanged, RF	2-in. 600 lbs	Tapered	★
F58(3)	Flanged, RF	1-in. 900/1500 lbs	Tapered	★
F64(3)	Flanged, RF	1.5-in. 900/1500 lbs	Tapered	★
F70(3)	Flanged, RF	2-in. 900/1500 lbs	Tapered	★
F82	Flanged, RF	1.5 in., 2500 lbs.	Tapered	★
F88	Flanged, RF	2 in. 2500 lbs.	Tapered	★
D04	Flange, Form B1 according to EN 1092-1	DN 25 PN 16	Tapered	★
D10	Flange, Form B1 according to EN 1092-1	DN 25 PN 25/40	Tapered	★
D16	Flange, Form B1 according to EN 1092-1	DN 40 PN 16	Tapered	★
D22	Flange, Form B1 according to EN 1092-1	DN 40 PN 25/40	Tapered	★
D28	Flange, Form B1 according to EN 1092-1	DN 50 PN 40	Tapered	★
W10	Welded	3/4-in. pipe	Tapered	★

Sensors and Thermowells (Metric)

Table 3. Series 65 Platinum RTD and 185 Thermocouple With Barstock Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

W12	Welded	1-in. pipe	Tapered	★
W14	Welded	1 1/4-in. pipe	Tapered	★
W16	Welded	1 1/2-in. pipe	Tapered	★
E01	D1 welded	24h7	Tapered	★
E02	D2 welded	24h7	Tapered	★
E04	D4 welded	24h7	Tapered	★
E05	D5 welded	24h7	Tapered	★

Options (Include with selected model number)

Sensor Options (available with 65 only)		
Standard		**Standard**
A1	Single Element Class A sensor from –50 to 450 °C (–58 to 842 °F) (0 °C to 350 °C for Sensor Types 7, 9, 0)	★
A2	Dual element Class A sensor from –50 to 450 °C (–58 to 842 °F) (0 °C to 350 °C for Sensor Types 7, 9, 0)	★
Product Certifications		
Standard		**Standard**
I1	EEx ia – ATEX/IBExU Intrinsic Safety Approval	★
N1[4][5]	EEx n – ATEX/CENELEC Type n Approval	★
E1[5]	EEx d – ATEX/CENELEC Flameproof Approval	★
ND[5]	ATEX Dust Ignition-proof Approval	★
E7[5]	IECEx Flameproof Approval	★
E5[5]	FM Explosion-proof Approval (consult factory for availability)	★
Ground Screw		
Standard		**Standard**
G1	External Ground Screw – only available with Rosemount Connection Head Material codes C, D, G, H, 1, and 2	★
Cover Chain Option		
Standard		**Standard**
G3	Cover Chain – only available with Rosemount Connection Head Material codes C, D, G, and H.	★
Extension Ring		
Standard		**Standard**
G6[6]	Aluminum Extension Ring for Dual Transmitter Mounting – use with Rosemount Connection Head Material Codes C and D.	★
Termination		
Standard		**Standard**
TB	Terminal Block for use with sensor termination code 3 and Connection Heads C, D, G, and H	★
Material Certification		
Standard		**Standard**
Q8	Thermowell material certification, DIN EN 10204 3.1	★
External Pressure Test		
Standard		**Standard**
R01	Thermowell External Pressure Testing	★
Internal Pressure Test		
Standard		**Standard**
R22	Thermowell Internal Pressure Testing	★
Dye Test		
Standard		**Standard**
R03	Thermowell Dye Penetration Testing	★
Special Cleaning		
Standard		**Standard**
R04	Thermowell Special Cleaning	★
NACE Approval		
Standard		**Standard**
R05[7]	Thermowell NACE Approval	★

Table 3. Series 65 Platinum RTD and 185 Thermocouple With Barstock Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Plug/Chain		
Standard		**Standard**
R06	Stainless Steel Plug and Chain	★
Weld Options		
Standard		**Standard**
R07	Full Penetration Weld - for flanged thermowells only	★
Wake Frequency		
Standard		**Standard**
R21	Wake Frequency – Thermowell Strength Calculation	★
Assemble To Options		
Standard		**Standard**
XA(8)	Assemble Sensor to Specific Temperature Transmitter (PTFE paste)	★
Temperature Range Option		
Standard		**Standard**
LT	Special Material to meet extended Temperature range of -51 °C	★
Typical Model Number: 0065 G 2 2 D 0135 D 0225 F70 Q8 R01 R07		

(1) To maintain IP 68 rating, use a suitable cable gland on the conduit connection thread. All threads must be sealed with a suitable sealing tape.
(2) Only available with Thermowell Mounting Style codes E01, E02, E04, and E05.
(3) Standard T-length is 80 mm, full penetration option R07 must be ordered.
(4) For complete assemblies or as replacement sensor for type N-series, component parts are not approved. If the transmitter is mounted in a connection head, the Sensor Lead Wire Termination code 0 (flying leads) is requested.
(5) Not available with Connection Head Material codes J and L.
(6) Not valid with E5, E7, ND, or E1 Approval
(7) Valid for thermowell material code D AISI 316L (1.4404) only.
(8) If ordering Assemble To Option XA with a transmitter, specify the same option on the transmitter model number.

Rosemount DIN-Style Sensor and Thermowell



The Rosemount DIN-Style Sensor and Thermowell have designs that provide flexible and reliable temperature measurements in process environments.

Features include:

- Threaded, Flanged, and Weld-in Styles
- Wake Frequency Calculations conforming to ASME PTC 19.3 (Option Code R21)
- NACE Approval (Option Code R05)
- Internal Pressure Test (Option Code R22)
- External Pressure Test (Option Code R01)

Table 4. Series 96 Barstock Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description			
0096	Barstock Thermowell			
Thermowell Material(1)				
Standard				**Standard**
D	1.4404 (AISI 316L)			★
Y	1.4571 (AISI 316Ti)			★
Immersion Length (L) in Millimeters				
Standard				**Standard**
0065	65 mm – standard length for weld-in thermowells, E01 and E04			★
0075	75 mm			★
0115	115 mm			★
0125	125 mm – standard length for weld-in thermowells, E02 and E05			★
0150	150 mm			★
0225	225 mm			★
0300	300 mm			★
0450	450 mm			★
Expanded				
XXXX	Non-standard immersion length			
Thermowell Mounting Style		**Process Connections**	**Stem Style**	
Standard				**Standard**
T08	Thread	R 1/2-in. (1/2-in. BSPT)	Tapered	★
T10	Thread	R 3/4-in. (3/4-in.BSPT)	Tapered	★
T12	Thread	R 1-in. (1-in. BSPT)	Tapered	★
T26	Thread	G 1/2-in. (1/2-in. BSPF)	Tapered	★
T28	Thread	G 3/4-in. (3/4-in.BSPF)	Tapered	★
T30	Thread	G 1-in. (1-in. BSPF)	Tapered	★
T44	Thread	1/2-in. NPT	Tapered	★
T46	Thread	3/4-in. NPT	Tapered	★
T48	Thread	1-in. NPT	Tapered	★
T93	Thread	M27 x 2	Tapered	★
T95	Thread	M33 x 2	Tapered	★
T98	Thread	M20 x 1.5	Tapered	★
F04	Flange, RF	1-in. 150 lbs	Tapered	★

Table 4. Series 96 Barstock Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

F10	Flange, RF	1.5-in. 150 lbs	Tapered	★
F16	Flange, RF	2-in. 150 lbs	Tapered	★
F22	Flange, RF	1-in. 300 lbs	Tapered	★
F28	Flange, RF	1.5-in. 300 lbs	Tapered	★
F34	Flange, RF	2-in. 300 lbs	Tapered	★
F40	Flange, RF	1-in. 600 lbs	Tapered	★
F46	Flange, RF	1.5-in. 600 lbs	Tapered	★
F52	Flange, RF	2-in. 600 lbs	Tapered	★
F58(2)	Flanged, RF	1-in. 900/1500 lbs	Tapered	★
F64(2)	Flanged, RF	1.5-in. 900/1500 lbs	Tapered	★
F70(2)	Flanged, RF	2-in. 900/1500 lbs	Tapered	★
F82	Flanged, RF	1.5 in 2500 lbs	Tapered	★
F88	Flanged, RF	2 in. 2500 lbs	Tapered	★
D04	Flange, Form B1 according to EN 1092-1	DN 25 PN 16	Tapered	★
D10	Flange, Form B1 according to EN 1092-1	DN 25 PN 25/40	Tapered	★
D16	Flange, Form B1 according to EN 1092-1	DN 40 PN 16	Tapered	★
D22	Flange, Form B1 according to EN 1092-1	DN 40 PN 25/40	Tapered	★
D28	Flange, Form B1 according to EN 1092-1	DN 50 PN 40	Tapered	★
W10	Welded	3/4-in. pipe	Tapered	★
W12	Welded	1-in. pipe	Tapered	★
W14	Welded	1 1/4-in. pipe	Tapered	★
W16	Welded	1 1/2-in. pipe	Tapered	★
E01	D1 welded, DIN	24h7	Tapered	★
E02	D2 welded, DIN	24h7	Tapered	★
E04	D4 welded, DIN	24h7	Tapered	★
E05	D5 welded, DIN	24h7	Tapered	★
Lagging Length				
Standard				**Standard**
T040	40 mm – valid for Mounting style codes T26, T28, T30, T93, T95, and T98			★
T060	60 mm			★
T075	75 mm – valid for weld-in thermowells codes E01 and E02			★
T080	80 mm – valid for flanged thermowells codes F58, F64, F70			★
T135	135 mm – valid for weld-in thermowells codes E04 and E05			★
Expanded				
TXXX	Non Standard Lagging Length			
Instrument Connection Thread Type				
Standard				**Standard**
A	M24 x 1.5			★
D	1/2-in. NPT			★
T	M18 x 1.5 – valid for weld-in thermowells codes E01, E02, E04, and E05			★

Options (Include with selected model number)

Material Certification		
Standard		**Standard**
Q8	Thermowell Material Certification	★
External Pressure Test		
Standard		**Standard**
R01	Thermowell External Pressure Testing (flanged thermowells only)	★
Internal Pressure Test		
Standard		**Standard**
R22	Thermowell Internal Pressure Test	★
Dye Test		
Standard		**Standard**
R03	Thermowell Dye Penetration Testing	★

Sensors and Thermowells (Metric)

Table 4. Series 96 Barstock Thermowell

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Special Cleaning		
Standard		**Standard**
R04	Thermowell Special Cleaning	★
NACE Approval		
Standard		**Standard**
R05(3)	Thermowell NACE Approval	★
Plug/Chain		
Standard		**Standard**
R06	Stainless Steel Plug and Chain	★
Weld Options		
Standard		**Standard**
R07	Full Penetration Weld - for flanged thermowells only	★
Flange Type		
Standard		**Standard**
R16	Ring Joint Flange Face	★
Wake Frequency		
Standard		**Standard**
R21	Wake Frequency – Thermowell Strength Calculation	★
Typical Model Number: 0096 D 0300 F04 T060 D Q8 R01		

(1) Additional materials are available upon request.
(2) Standard T-length is 80 mm, full penetration option R07 must be ordered.
(3) Not available with Thermowell Material code Y.

Introduction

Overview

Rosemount integral mount temperature sensors, accessory hardware, and assemblies constitute a complete line of industrial temperature-sensing instruments. A variety of RTD and thermocouple sensors are available alone, or as complete assemblies including connection heads, thermowells, and extension fittings. Emerson Process Management (“Emerson”) offers complete temperature measurement assemblies including Rosemount Smart and Programmable Temperature Transmitters. Please ask your Emerson representative for details.

Series 65 Platinum RTD Temperature Sensors are highly linear and have a stable resistance versus temperature relationship. These sensors are used primarily in industrial environments where high accuracy, durability, and long-term stability are required. Series 65 sensors are designed to meet the most critical parameters of international standards: DIN EN 60751 incorporating Amendments 1 and 2, DIN 43760, and BS 1904.(1) This standardization provides sensor interchangeability without the need for transmitter circuitry adjustment.

Enhanced performance and optimal temperature measurement accuracy is available for Series 65 sensors coupled with a range of smart temperature transmitters through calibration schedules and Callendar van Dusen constants.

Series 185 Thermocouple Temperature Sensors conform to IEC 584 and are available in types J, K and N. Series 185 sensors are available single ungrounded, or dual ungrounded, isolated.

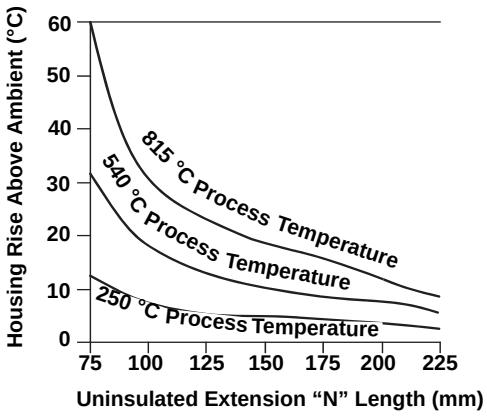
All sensors are available in a variety of lengths(2) and ranges with flying lead, terminal block, or 1/2-inch ANPT spring-loaded adapter lead wire terminations.

In addition to complete assemblies, Emerson offers a selection of separate accessory hardware including connection heads and thermowells.

Choosing an Extension and Thermowell

Aside from ambient temperature variations, heat from the process, in a direct mounting configuration, is transferred from the thermowell to the transmitter housing. If the expected process temperature is near or beyond the transmitter specification limits, consider the use of additional thermowell extension length, an extension nipple, or a remote mounting configuration to isolate the transmitter from these excessive temperatures. Figure 1 provides an example of the relationship between transmitter housing temperature rise and extension length. Use Figure 1 and the accompanying example as a guide for determining adequate thermowell extension length.

Figure 1. Transmitter Housing Temperature Rise vs. Uninsulated Extension Length



Example

The rated ambient temperature specification for the transmitter is 85 °C. If the maximum ambient temperature is 40 °C and the temperature to be measured is 540 °C, the maximum allowable housing temperature rise is the rated temperature specification limit minus the existing ambient temperature (85 – 40), or 45 °C.

As shown in Figure 1, an “N” dimension of 90 mm will result in a housing temperature rise of 22 °C. An “N” dimension of 100 mm would therefore be the minimum recommended length, and would provide a safety factor of about 25 °C. A longer “N” dimension, such as 150 mm, would be desirable in order to reduce errors caused by transmitter temperature effect, although in that case the transmitter may require extra support.

(1) 100 Ω at 0 °C, α = 0.00385 Ω x °C/Ω
(2) Sensors over two meters long will be supplied coiled unless otherwise requested.

Sensors and Thermowells (Metric)

INTEGRAL MOUNT SENSORS AND ASSEMBLIES

Series 65 RTD and Series 185 Thermocouple Temperature Sensors may be ordered as complete assemblies, which provide a complete, yet simple, means of specifying the proper industrial hardware for most temperature measurements. One assembly model number, derived from one ordering table, completely defines the type of sensing element, as well as the material, length, and style of extension fittings and thermowells.

All sensor assemblies are sized and inspected by Emerson to ensure complete component compatibility and performance.

MOUNTING CONFIGURATIONS

Series 65 Platinum RTDs and Series 185 Thermocouples

You may order the Series 65 RTDs and the Series 185 Thermocouples with flying leads, a terminal block, or a 1/2-inch ANPT spring-loaded adapter.

Ordered with flying leads, the sensors are designed to be used with a head-mount temperature transmitter attached directly to the sensor. The flying lead configuration allows the removal of the sensor and transmitter as one assembly.

The BUZH connection head allows terminal block style sensors and transmitters to be mounted together. The transmitters in these assemblies will be mounted in the cover of the BUZH connection head.

The sensors with a 1/2-inch ANPT spring-loaded adapter are used with directly mounted 3144P field-mount temperature transmitters or through the use of Rosemount connection heads. This assembly requires a terminal block to be mounted inside the head.

Hazardous area approvals are available with all three types of sensors, but they are dependent on the configuration of the entire temperature measurement assembly (see “Hazardous Locations Certification” on page 238).

Temperature Considerations

Ambient temperature limits for the connection head are -40 °C to +85 °C. The LT Option may be extended down to a range of -51 °C to +85 °C.

Ambient temperature range addresses the connection head only, and requires suitable cable glands and field wiring provisions to meet the temperature requirements below -40 °C.

Figure 2. Series 65 RTD Lead Wire Configuration

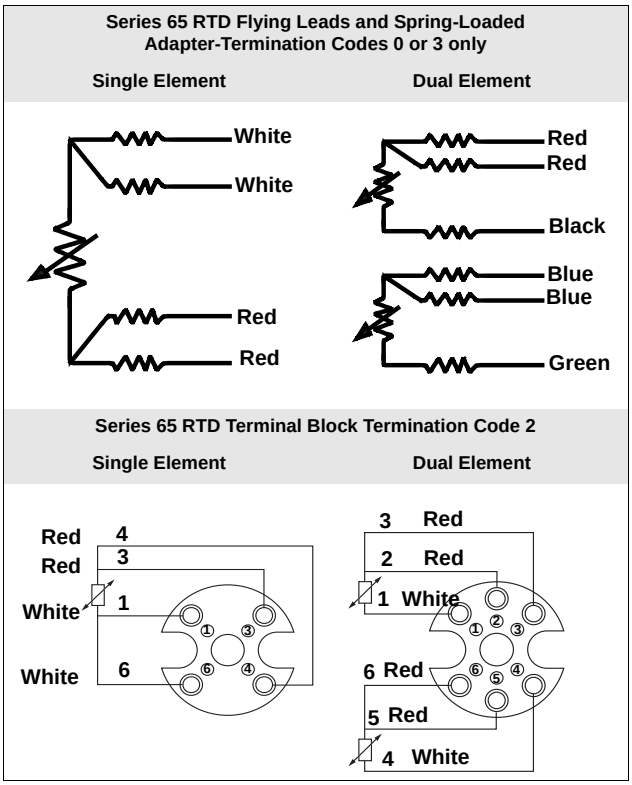
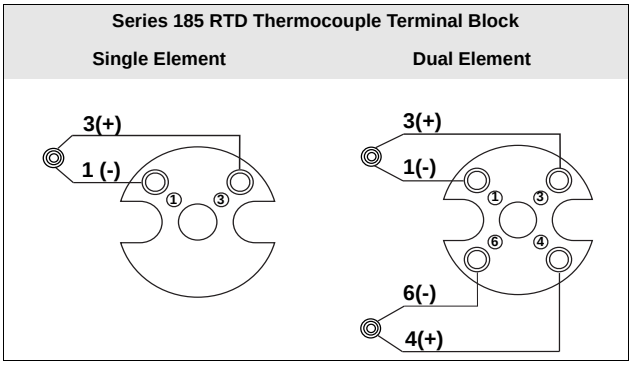


Figure 3. Series 185 Lead Wire Configuration



SPECIFICATIONS

Series 65 Platinum RTD

100 Ω RTD at 0 °C,
α = 0.00385 Ω x °C/Ω.

Temperature Range

–50 to 450 °C or –196 to 600 °C depending on type

Self Heating

0.15 K/mW when measured per method defined in DIN EN 60751:1996

Thermal Response Time

9 seconds maximum required to reach 50% sensor response when tested in flowing water according to IEC 751

Immersion Error

60 mm minimum usable depth of immersion when tested according to IEC 751

Insulation Resistance

1,000 MΩ minimum insulation resistance when measured at 500 Vdc and at room temperature

Sheath Material

316 SST / 321 SST with mineral-insulated cable construction

Lead Wire

PTFE insulated, silver-coated copper wire. See Figure 3 for wire configuration

Identification Data

The model and serial numbers are marked on each sensor

Ingress Protection (IP) Ratings

Rosemount Series 65 sensor assemblies are IP65 / IP68 and NEMA 4X. This rating is applicable only for complete assemblies including either:

- a connection head, extension, and barstock thermowell
- a connection head and tubular thermowell
- a connection head, extension, and sensor

Series 185 Thermocouple

Construction

A thermocouple consists of a junction between two dissimilar metals that produces a change in thermoelectric emf in relationship to a change in temperature. Rosemount Series 185 thermocouple sensors are manufactured from selected materials to meet IEC 584 Tolerance Class 1. The junction of these wires is welded to form a pure joint, maintaining the integrity of the circuit and ensuring the highest accuracy. Ungrounded junctions are protected from the environment by the sensor sheath. The ungrounded and isolated junctions provide electrical isolation from the sensor sheath.

Sheath Material

Rosemount thermocouples are made of a mineral insulated cable design with a variety of sheath materials available to suit both the temperature and the environment. For temperature up to 800 °C in air, AISI 321 is standard. For temperatures from 800 to 1100 °C in air, Inconel 600 is standard. For temperatures above 1100 °C, precious metal or ceramic protective sheaths are available upon request. For strongly oxidising or reducing atmospheres, please consult your local Emerson representative.

Lead Wires

Thermocouple, internal – 18 SWG (16 AWG) solid wire (max), 19 SWG (18 AWG) solid wire (min.). External extension leads, Type J and K – 0.8 mm minimum stranded wire, PTFE insulated. Color coded per IEC 584. See Figure 3 for wire configuration.

Identification Data

The model and serial numbers are marked on each sensor.

Insulation Resistance

1 000 MΩ minimum insulation resistance when measured at 500 Vdc and at room temperature.

Ingress Protection (IP) Ratings

Rosemount Series 65 sensor assemblies are IP65 / IP68 and NEMA 4X. This rating is applicable only for complete assemblies including either:

- a connection head, extension, and barstock thermowell
- a connection head and tubular thermowell
- a connection head, extension, and sensor

Table 5. Characteristics of Series 185 Thermocouples

Type	Alloys (wire colour)	Sheath Material	Temp. Range (°C)	Limits of Error Interchangeability DIN EN 60584-2	Tolerance Class
J	Fe (+ black), CuNi (– white)	1.4541 (AISI 321)	– 40 to 375, 375 to 750	1.5 °C, 0.004 t	1
K	NiCr (+ green), NiAl (– white)	Inconel 600	– 40 to 375, 375 to 1000	1.5 °C, 0.004 t	1
N	NiCrSi (+ rose), NiSi (- white)	Nicrobell B	– 40 to 375, 375 to 1000	1.5 °C, 0.004 t	1

HAZARDOUS LOCATIONS CERTIFICATION

E1 ATEX/CENELEC Flameproof Approval
ATEX Marking ⟨Ex⟩ II 2 G
Certification Number. KEMA99ATEX8715X
Ex d IIC T6 (T_{amb} = –50 to 65 °C).

The ATEX/CENELEC Flameproof approval is dependent on the Rosemount Integral Sensor Connection Head assembled with a Rosemount RTD or thermocouple temperature sensor (see Figure 4). The captive flame arrestor insert must be fully engaged into the connection head for compliance with this approval.

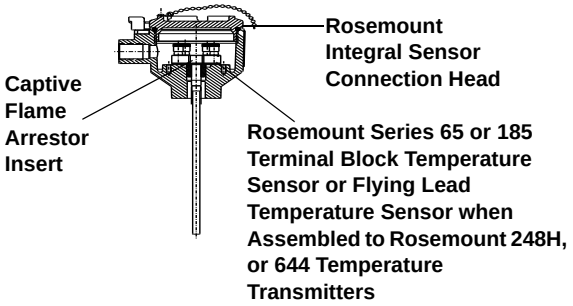
ATEX Flameproof Approval
ATEX Marking ⟨Ex⟩ II 2 G
Certification Number. KEMA01ATEX2181.
Ex d IIC T5 (–50 ≤ T_{amb} ≤ 80 °C)
Ex d IIC T6 (–50 ≤ T_{amb} ≤ 70 °C)

Special conditions for safe use (X)

For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

The Rosemount Series 65 RTD and 185 Thermocouple Temperature Sensors with $^1/_2$-inch ANPT Spring Loaded Adapters are approved for direct mount to the Rosemount 3144P Smart Temperature Transmitters. Refer to the Rosemount Temperature Transmitter Reference Manuals for installation details.

Figure 4. ATEX/CENELEC Flameproof Configuration.



ND ATEX / CENELEC Dust Ignition-Proof
Certification Number: KEMA99ATEX8715
ATEX Marking: ⟨Ex⟩ II 1 D
CE 1180
T95 °C (-40 °C ≤ T_{amb} ≤ 85 °C)
IP66
The ATEX/CENELEC Dust Ignition-Proof approval is dependent on the Rosemount Integral Sensor Connection Head assembled with a Rosemount RTD or thermocouple temperature sensor (see Figure 4). The captive flame arrestor insert must be fully engaged into the connection head for compliance with this approval.

Special conditions for safe use (X)
For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

N1 ATEX/CENELEC Type “n” Approval
ATEX Marking ⟨Ex⟩ II 3 G
Certification Number BAS00ATEX3145
[EEx nL II T5 (T_{amb} = – 40 to 70 °C)]
The ATEX/CENELEC EExn Approval allows equipment, which under normal conditions does not emit sparks or produce hot surfaces, to be installed in Zone 2 areas. The EEx n integrity is achieved by the design and construction that maintains a minimum of IP 54 protection. Individual items are not approved. The Rosemount type n approval applies to complete assemblies only. This approval applies to every combination of thermowell, connection head, extension, and sensor detailed in this Product Data Sheet, except the $^1/_2$-inch ANPT spring-loaded style. In addition, certain thermowells, not designed by Rosemount Inc., are acceptable for the EEx n assembly provided they conform exactly to Rosemount specifications.

I1 ATEX/IBExU Intrinsic Safety Approval
ATEX Marking ⟨Ex⟩ II 2 G
Ex ia IIC T6 (T_{amb} = – 51 to 60 °C)
The Intrinsically Safety Approval is valid for Series 65 RTD Sensors and Series 185 thermocouples.
These certified sensors can only be applied in Zone 1. The marking of intrinsically safe circuits is affected by color codes or print, Ex i. A mounted-on connection head is provided with a ground screw for earth connection and a blue painted cable gland.

E5 FM Explosion-Proof
Explosion-Proof for Class I, Division 1, Groups B, C, D.
Dust-Ignition Proof for Class I, III, Division 1, Groups E, F, G.
Ambient temperature Limits: -40 to 245 °C
When installed per Rosemount Drawing 000068-0013
NEMA Enclosure Type 4X.

E7 IECEx Flameproof Approval
Ex d IIC T6 (T_{amb} = –40 to 65 °C)

The Rosemount Series 65 RTD and Series 185 Thermocouple Temperature Sensors are approved for direct mount to the Rosemount 248H, 644, and 3144P Smart Temperature Transmitters. To ensure approval compliance, specify the E7 option of both the sensor and the transmitter at the time of ordering.

SENSOR-TO-TRANSMITTER MATCHING

Significant measurement accuracy improvements can be attained using a temperature sensor that is matched to a temperature transmitter. This process involves identifying the relationship between resistance and temperature for a specific RTD sensor. This relationship, approximated by the Callendar-van Dusen equation, is described as:

$$R_t = R_o + R_o\alpha[t - \delta(0.01t - 1)(0.01t) - \beta(0.01t - 1)(0.01t)^3],$$

where:

R_t = Resistance (ohms) at Temperature t (°C)
R_o = Sensor-Specific Constant (Resistance at t = 0 °C)
α =Sensor-Specific Constant
δ =Sensor-Specific Constant
β =Sensor-Specific Constant (0 at t > 0 °C)

The exact values for the Callendar-van Dusen constants (Ro, α, δ, β) are specific to each RTD sensor and are established by testing each individual sensor at various temperatures.

Series 65 RTD sensors can be ordered with the Calibration Option codes V10 or V11, where the values of all four sensor-specific constants are supplied with each sensor. To utilize the unique, built-in sensor-matching capability of the Rosemount 644, and 3144P transmitters, the Callendar-van Dusen constants can be programmed into the transmitter at the factory or in the field using a Field Communicator.

The transmitter uses the Callendar-van Dusen constants to generate a sensor curve that describes the relationship between resistance and temperature for this particular sensor and transmitter assembly. By using the sensors actual resistance-vs.-temperature curve, there is a 3- or 4-fold improvement in temperature measurement accuracy for the total system.

Options V10 and V11 are specific to a particular temperature range. As with Calibration Schedules, the accuracies associated with each option code represent worst-case conditions when the sensor is used over the entire temperature range. The accuracy of Series 65 sensors with the “V” option will vary because they have different hysteresis and repeatability characteristics. To ensure optimal performance, select a “V” option where the sensor’s range of actual operation is between the minimum and maximum calibration points. For applications requiring the use of a Resistance vs. Temperature Table, order a temperature range-specific characterization schedule.

IEC 751 Interpretation

The Callendar-van Dusen equation is one method of describing the resistance versus temperature (R vs.T) relationship for platinum RTDs. International standard IEC 751 interprets the R vs. T relationship using an approach similar to the Callendar-van Dusen methodology. The IEC 751 R vs.T relationship standard uses the following equation:

$$R_t = R_o[1 + At + Bt^2 + C\,(t-100)t^3]$$

As in the Callendar-van Dusen method, R_o, A, B, C are specific to each RTD and are established by testing each sensor at various temperatures. The actual values for A, B, and C differ in magnitude from the Callendar-van Dusen constants (R_o, α, β, δ), while R_o is the same in both equations. Either methodology yields the same result in any sensor-to-transmitter matching scenario, since one equation is a simple mathematical interpretation of the other.

Table 6. Series 65 Interchangeability

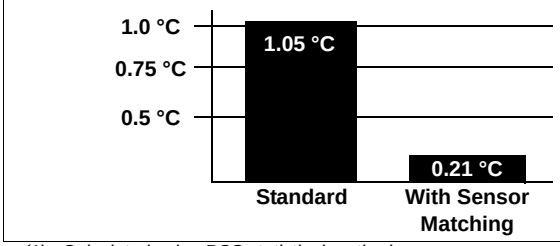
Standard Series 65 IEC-751 Class B	Temperature
±0.80 °C (±1.44 °F)	-100 °C (-148 °F)
±0.30 °C (±0.54 °F)	0 °C (32 °F)
±0.80 °C (±1.44 °F)	100 °C (212 °F)
±1.80 °C (±3.24 °F)	300 °C (572 °F)
±2.30 °C (±4.14 °F)	400 °C (752 °F)
Series 65 with IEC-751 Class A Option	**Temperature**
±0.35 °C (±0.63 °F)	-100 °C (-148 °F)
±0.15 °C (±0.27 °F)	0 °C (32 °F)
±0.35 °C (±0.63 °F)	100 °C (212 °F)
±0.75 °C (±1.35 °F)	300 °C (572 °F)
±0.95 °C (±1.71 °F)	400 °C (752 °F)

Sensors and Thermowells (Metric)

Typical Sensor–to–Transmitter Matching Accuracy Improvements

Transmitter: Rosemount 3144 (has built-in sensor matching capabilities), span of 0 to 200 °C, accuracy = 0.1 °C)
Sensor: Series 65 RTD
Callendar van Dusen Option: V10
Process Temperature: 150 °C

System Uncertainty Comparison at 150 °C:



Standard 65 Sensor	
Rosemount 3144P:	± 0.10 °C
Standard Series 65 RTD:	± 1.05 °C
Total System(1):	± 1.05 °C
65 Sensor with V10 Option	
Rosemount 3144P:	± 0.10 °C
Calibrated Sensor Series 65 RTD:	± 0.18°C
Total System(1):	± 0.21 °C

(1) Calculated using RSS statistical method:

System accuracy = $\sqrt{(\text{Transmitter accuracy})^2 + (\text{Sensor accuracy})^2}$

CALIBRATION

Sensor calibration may be required for input to quality systems, or for control system enhancement. More frequently, it is used to improve the overall temperature measurement performance by matching the sensor to a temperature transmitter. Sensor matching is available for RTD sensors used with Rosemount Smart transmitters where the inherent stability and repeatability of the RTD technology is well established.

Ordering Information

Use the formats presented below to order a calibrated Series 65 RTD. If you fail to specify all of the necessary calibration-related information when you place your order, Emerson will contact you for the information and your order may be delayed slightly.

Measurement Instrument Directive Parts Certification

The Rosemount 3144P Temperature Transmitter and Rosemount 0065 Temperature Sensor have been certified to meet the European Union Measurement Instrument Directive (MID) for Custody Transfer metering of liquids and gases(1). Choosing Rosemount Temperature for a MID solution ensures that critical temperature measurement equipment will meet high expectations for unmatched system accuracy and reliability. For more information, please contact your local Emerson Process Management Representative.

(1) Limited global availability. Consult factory for available ordering locations.

Calibration Options

The X8 option calibrates the sensor to a customer-specific temperature range. The Callendar van Dusen, and A, B, and C-constants are supplied with a works certificate.

Option X8: Sensor Calibrated to a Customer-Specified Temperature Range (see Temperature Range)
When you order an RTD with the X8 option, the temperature range the sensor needs to be calibrated must be specified. Take note of the sensor temperature limits as shown below.

Typical Model Number

Model	Connection Head	Lead Wire Termination	Sensor Type	Extension Type	Extension Length	Thermowell Material	Immersion Length	Mounting Style	Additional Options
0065	C	2	1	D	0135	D	0225	T12	X8

Calibrate from –10 to 120 °C

Option V: Sensor Calibration with Works Certificate

	Code	
	V10	**V11**
Temperature Range (°C)	– 50 to 450	0 to 100
Calibration Points (°C)	–50 0 100 450	0 50 100

Sensors and Thermowells (Metric)

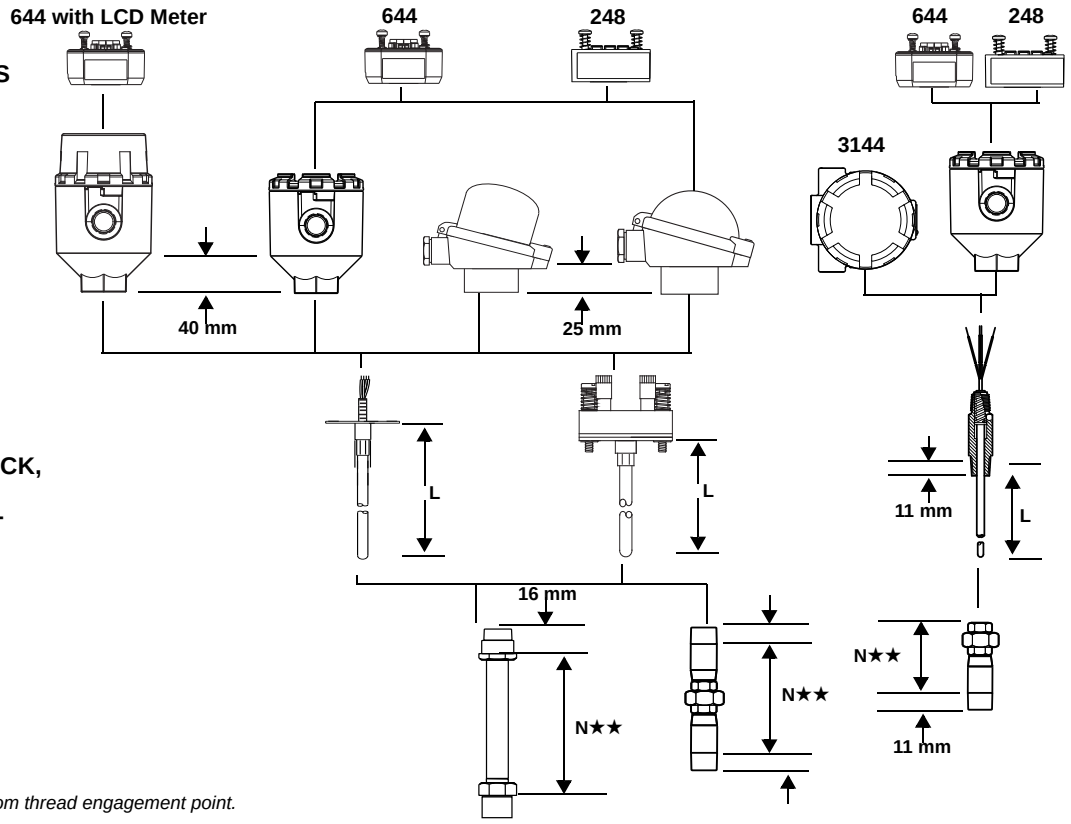
Sensor Assembly without Thermowell

HEAD OR FIELD MOUNT TRANSMITTERS

IP68 OR IP65 CONNECTION HEADS

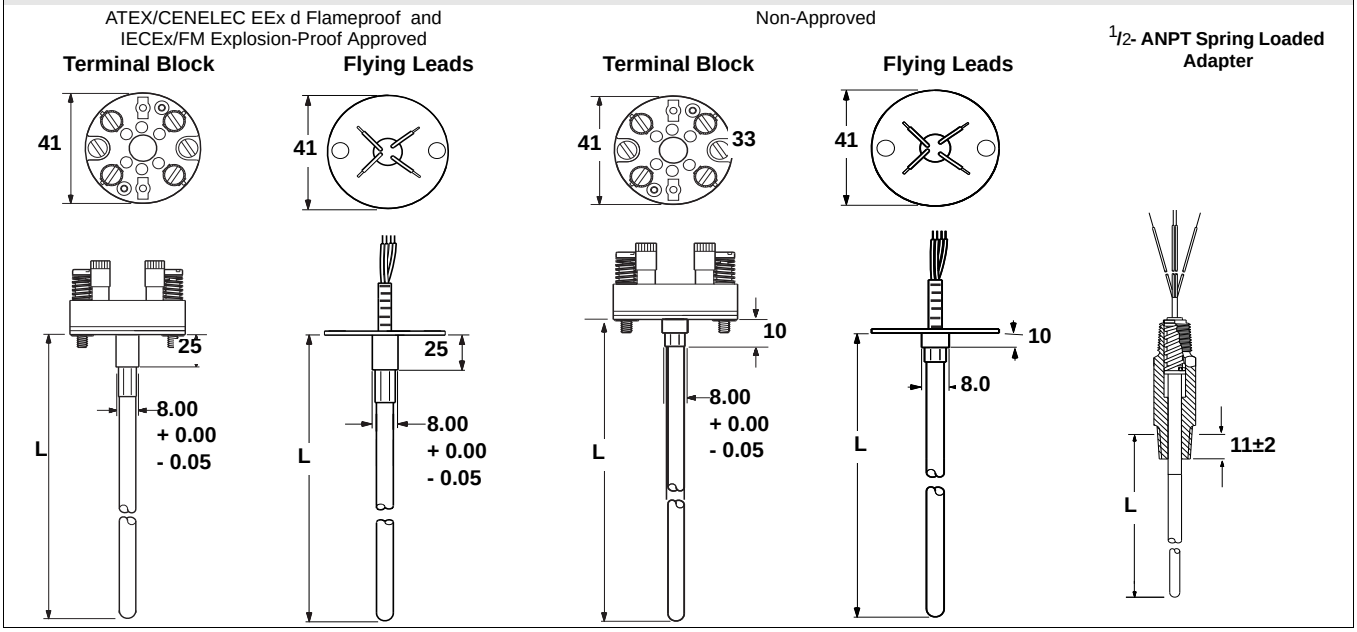
SENSOR WITH FLYING LEADS, TERMINAL BLOCK, OR SPRING-LOADED ADAPTER 2 x 1/2-in. NPT

EXTENSIONS



★★ *N dimension measures from thread engagement point.*

Series 65 RTD and Series 185 Thermocouple Dimensional Drawings



Series	Sensor Diameter	Number of Leads	Lead Wire Length (Flying Leads)		Lead Wire Length (Spring Loaded)	
			Element 1	Element 2	Element 1	Element 2
65 Single Element	6.0	4	100	—	150	—
65 Dual Element	6.0	6	100	200	150	200
185 Single Element	6.0	2	100	—	150	—
185 Dual Element	6.0	4	100	200	150	200

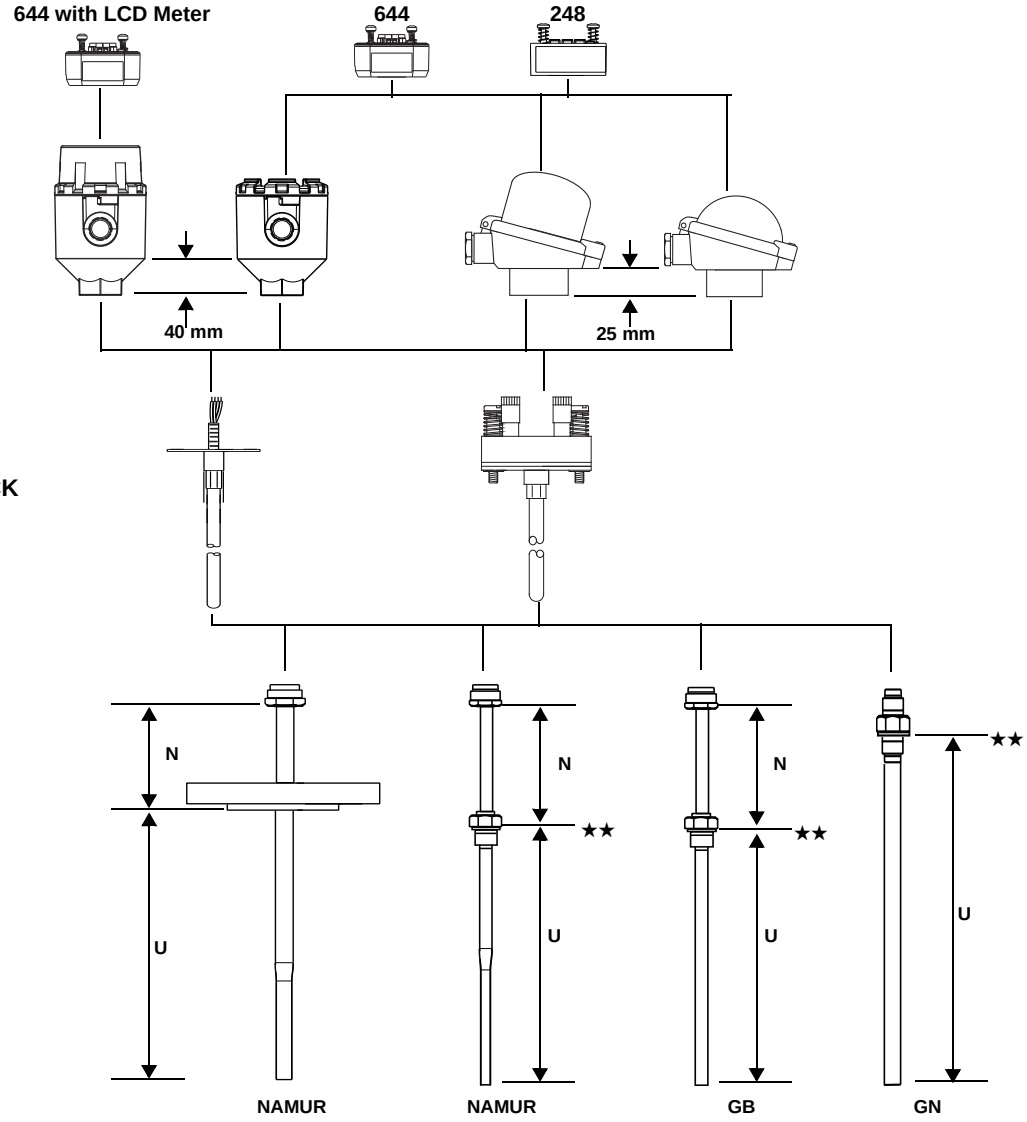
Tubular Thermowell Sensor Assemblies

HEAD OR FIELD MOUNT TRANSMITTERS

IP68 OR IP65, CONNECTION HEADS

SENSOR WITH FLYING LEADS OR TERMINAL BLOCK

THREADED AND FLANGED TUBULAR THERMOWELLS



★★ *For straight threading, N dimension references bottom of hex. For tapered threading, N dimension references thread engagement point (bottom of thread)*

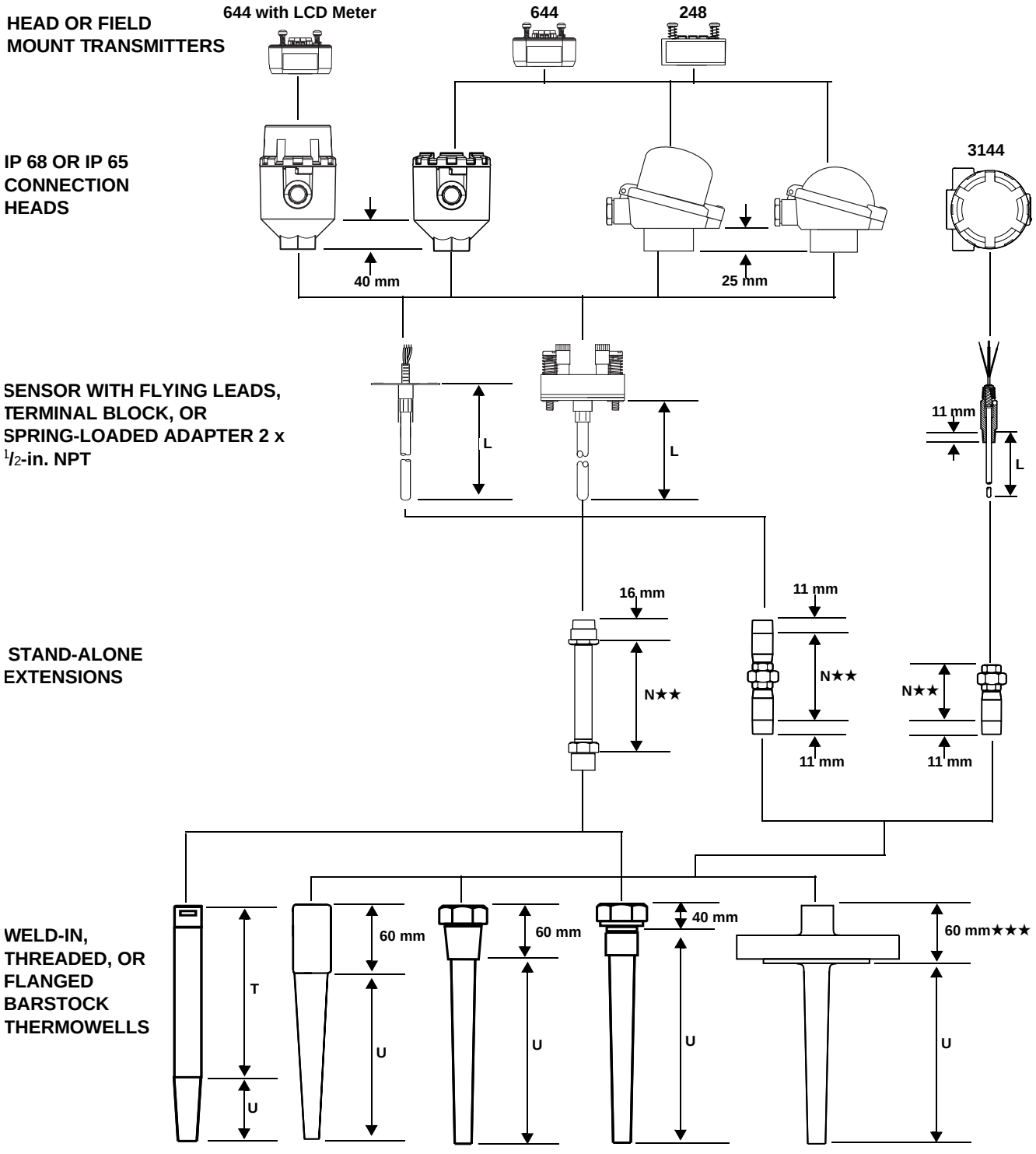
Table 7. Tubular Thermowell Ratings

Type	Dimensions	Process Connection	Max. Flow Velocity (m/s)		Immersion length (mm)	Max. Pressure (bar)(1)	At Temperature (°C)			
			Air	Water		0	100	200	300	400
GN, GB	9 x 1 mm 1.4571 (316 Ti)	Screw Socket G1/2	25	3	160	50	48	44	40	36
					250	40	40	40	40	36
					400	18	18	18	18	18
GN,	11 x 2 mm 1.4571 (316 Ti)	Screw Socket G1	40	5	160	100	95	92	88	80
					250	50	50	50	50	50
					400	18	18	18	18	18
NAMUR	12 x 2.5 mm 1.4571 (316 Ti)	Screw Socket G1	40	5	160	100	100	100	100	100
					220	100	100	100	78	78
					280	100	100	100	55	55

(1) For immersion "U" length (mm)

Sensors and Thermowells (Metric)

Barstock Thermowell Sensor Assemblies



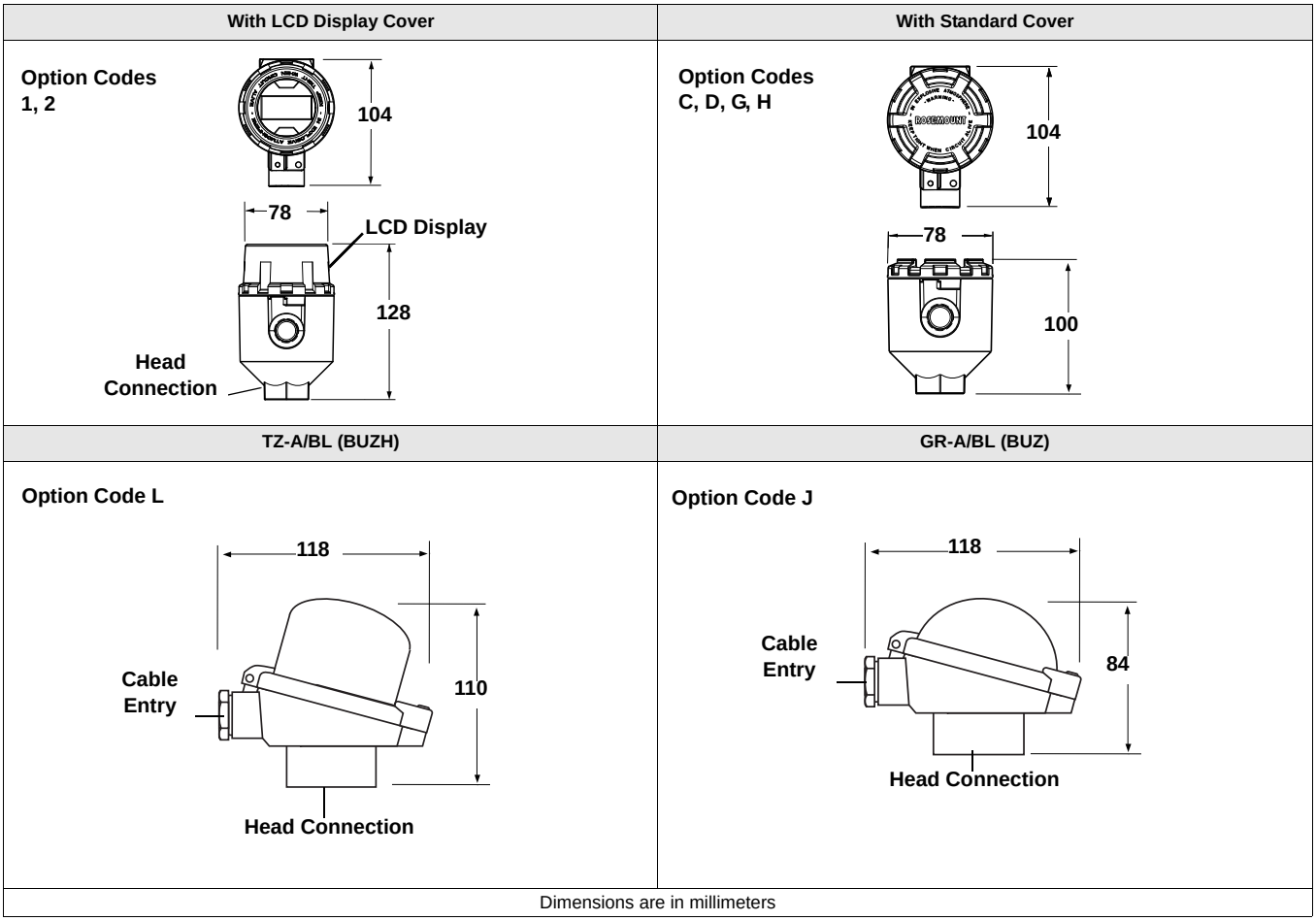
★★ *N dimension measures from thread engagement point.*
★★★ *This dimension is 80 mm for 1500# and 2500# flanges.*

Accessories

Table 8. Connection Head

Part Number	Model/Material	IP Rating	Conduit Connection	Process Connection
00644-4410-0011	Rosemount, Aluminium	68	1/2-inch NPT	1/2-inch NPT
00644-4410-0013	Rosemount, Aluminium	68	1/2-inch NPT	M24 x 1.5
00644-4410-0021	Rosemount, Aluminium	68	M20 x 1.5	1/2-inch NPT
00644-4410-0023	Rosemount, Aluminium	68	M20 x 1.5	M24 x 1.5
00644-4410-0111	Rosemount, Aluminium with LCD Display Cover	68	1/2-inch NPT	1/2-inch NPT
00644-4410-0113	Rosemount, Aluminium with LCD Display Cover	68	1/2-inch NPT	M24 x 1.5
00644-4410-0121	Rosemount, Aluminium with LCD Display Cover	68	M20 x 1.5	1/2-inch NPT
00644-4410-0123	Rosemount, Aluminium with LCD Display Cover	68	M20 x 1.5	M24 x 1.5
00644-4411-0011	Rosemount, Stainless Steel	68	1/2-inch NPT	1/2-inch NPT
00644-4411-0013	Rosemount, Stainless Steel	68	1/2-inch NPT	M24 x 1.5
00644-4411-0021	Rosemount, Stainless Steel	68	M20 x 1.5	1/2-inch NPT
00644-4411-0023	Rosemount, Stainless Steel	68	M20 x 1.5	M24 x 1.5
00644-4196-0023	GR–A/BL (BUZ), Aluminum	65	M20 x 1.5	M24 x 1.5
00644-4197-0023	TZ–A/BL (BUZH), Aluminum	65	M20 x 1.5	M24 x 1.5

Figure 5. Connection Head Dimensional Drawing



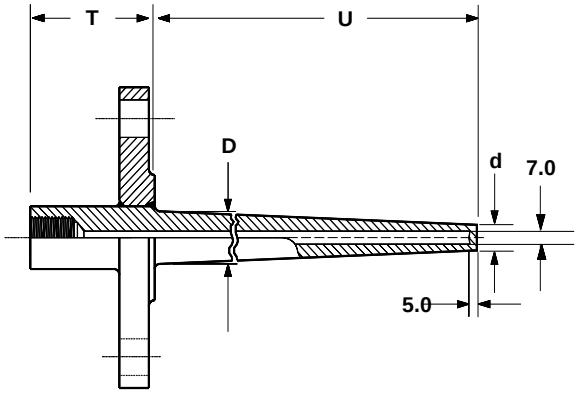
Sensors and Thermowells (Metric)

Series 96 Barstock Thermowells

U = Immersion Length D = Stem Diameter TL = Total Length T = Lagging Length

Dimensions in millimeters

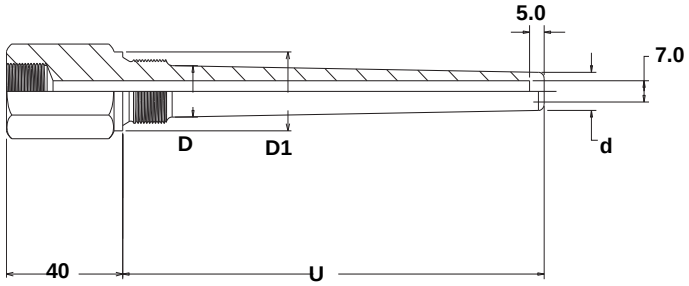
Flanged Barstock Thermowell – Tapered



Flange Size	D	d	T
1-in. 150 – 1500 lbs, DN 25	19	12.5	60
1 1/2 to 2-in. 150 – 600 lbs, DN40 - 50	26.5	18	60
1.5 to 2-in. 900/1500	26.5	18	80

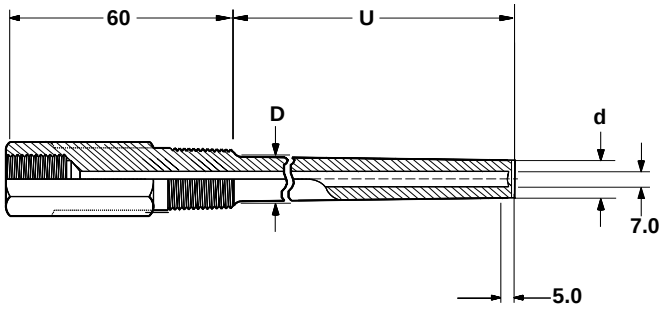
Note: Flanged thermowells generally conform to the specifications of ASME B 16.5 (ANSI) and DIN EN 1092-1.

Threaded Barstock Thermowell – Parallel Thread



Parallel Thread Size	D	D1	d
1/2-in. BSPF (G1/2); M20 x 1.5	17	26	12.5
3/4-in. BSPF (G3/4)	19	32	12.5
1-in. BSPF (G1)	26.5	39	18
M24 x 1.5	19	29	12.5

Threaded Barstock Thermowell – Tapered Thread



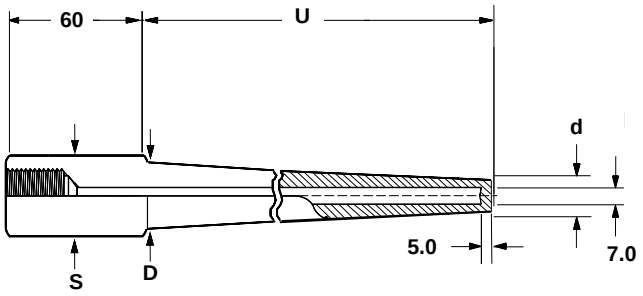
Tapered Thread Size	D	d
1/2-in. NPT ; M20 x 1.5	17	12.5
3/4-in. NPT	19	12.5
1-in. NPT	26.5	18

--

U = Immersion Length D = Stem Diameter TL = Total Length T = Lagging Length

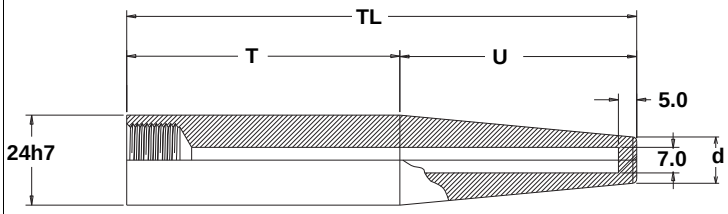
Dimensions in millimeters

Weld-in Barstock Thermowell (codes W10, W12, W14, W16)



Socket Size	S	D	d
3/4-in.	26.7	19.0	12.5
1-in.	33.4	19.0	12.5
1 1/4-in.	42.2	19.0	12.5
1 1/2-in.	48.3	19.0	12.5

Weld-in Barstock Thermowell (codes E01, E02, E04, E05)



Previous DIN Form	D1	D2	D4	D5	d
TL	140	200	200	260	12.5
U	65	125	65	125	12.5
T	75	75	135	135	12.5

Thermowell Strength Calculation

Pressure and Flow Vibration

The strength of a thermowell depends on several parameters relating thermowell construction to the installation environment. For most industrial applications, standard Rosemount thermowells provide the necessary strength if the material, style, and length are correct for the application. The proper selection of a thermowell depends on fluid type, temperature, pressure, and fluid velocity. Most thermowell failures are caused by vibration that is induced by fluid flow.

Emerson has a design system for the correct selection of thermowells. This selection service is available for a nominal charge, and to take advantage of this service, complete and return the Thermowell Strength Calculation to your local Emerson Process Management representative.

Emerson includes three possible failure modes in conjunction with thermowell analysis:

Flow-Induced Vibration

Fluid flow past a thermowell causes vortices to be shed from the well at a wake frequency proportional to the flow velocity. If the wake frequency is at or near the natural frequency of a given thermowell, a resonance condition may cause massive amounts of energy to be absorbed by the thermowell. This results in very high stresses and possible failures. Even if the thermowell does not fail, the sensor capsule may be subjected to severe levels of shock and vibration, resulting in erroneous readings or total sensor failure.

The ASME technique requires that the ratio of wake frequency to the natural frequency of a thermowell be less than 0.8. If the ratio is greater than 0.8, a user has two options:

1. Reducing the flow velocity or use a larger diameter thermowell; or
2. Use a stronger thermowell configuration (a different thermowell type or material, or a shorter length thermowell).

Flow-Induced Stress

Fluid flow, a function of flow velocity and density, causes force to be exerted on the thermowell. The flow-induced stress is calculated and compared with the material strength of the thermowell.

Process Pressure

The maximum static pressure that a thermowell stem can undergo is calculated.

NOTE
The thermowell analysis process is an aid in choosing thermowells for specific applications. It is based upon accepted theoretical methods and not meant to be a guarantee against thermowell failure.

Application Data Sheet

Calculations conducted per ASME/ANSI PTC 19.3 but with Strouhal number varying with Reynolds number. Please complete and fax to appropriate locations at the bottom of this form.

Company Information

Requesting Company: Phone: Fax:

Contact Tag Number

End Customer Date of Request:

Thermowell Information (Information for either (a), (b), (c), or (d) required)

a) Rosemount Thermowell Part Number (example 0096D0300F04T060DQ8R01):

b) Rosemount Sensor Model Number (example 0065C21D0135D0300T12):

c) Customer Drawing Number

d) Generic Thermowell Information:

Thermowell Material:

Stem Style: ❒ Straight ❒ Stepped ❒ Tapered

Mounting Style: ❒ Threaded ❒ Welded ❒ Flanged

If flanged, specify: ❒ ANSI/ASME ❒ DIN

Size: Class:

Thermowell Immersion Length (U):

Thermowell Bore Diameter (D):

Thermowell Lagging Length (T):

Tip Diameter (A):

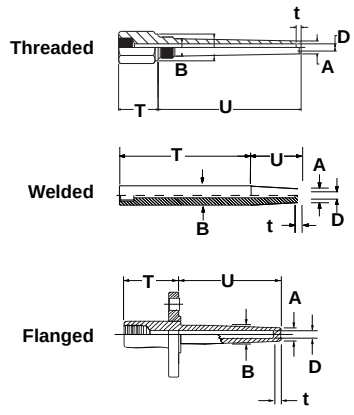
Tip Thickness (t):

Length from Tip to Support (U):

Root Diameter (B)(1):

Length of Tip Diameter (Z):

Mounting Style **Stem Style**



Service: ❒ Liquid ❒ Gas ❒ Steam

Fluid Description:

Operating Fluid Flow Rate: Maximum

Operating Fluid Flow Rate Units:

❒ gal/s ❒ gal/min ❒ gal/hr ❒ l/s ❒ l/min ❒ l/hr ❒ ft/s ❒ ft^3/min

❒ ft^3/hr ❒ bbl/hr ❒ impgal/s ❒ impgal/min ❒ impgal/hr ❒ m/s ❒ m^3/min ❒ m^3/hr

❒ shton/hr ❒ lb/hr ❒ kg/s ❒ kg/hr ❒ other:

Operating Max. Fluid Pressure: ❒Gauge ❒Absolute

Operating Min. Fluid Pressure: ❒Gauge ❒Absolute

Pressure Units: Pressure Units:

Operating Fluid Temperature: ❒°F ❒°C

Viscosity: ❒kg/m•s (Pa•s) ❒Centipoise

Operating Fluid Density: ❒ kg/m^3 ❒ lbm/ft^3

or Specific Volume/Density: ❒at process conditions ❒at standard conditions (STP)

Process Pipe Size:

Process Pipe Size:

Pipe Standoff Height:

Standoff Schedule:

or Standoff Internal Diameter:

For Rosemount Internal Use Only

Rosemount Order/Quotation # Line Item # Ship Set # ID #

Customer Order/Item # Salesperson:

Cont. Admin. Tech. Specialist:

(1) Same as A for straight thermowells.

Sensors and Thermowells (Metric)

Product Data Sheet
00813-0200-2654, Rev HC
Catalog 2011 - 2012

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00813-0200-2654 Rev HC 7/11

EMERSON™
Process Management

Rosemount 1067 Compact Sensor and 1097 Thermowell

- *RTD and Thermocouple single and dual sensor models (1067 Model)*
- *Wide selection of materials available for thermowells (1097 Model)*
- *Integrated temperature assembly is available with Rosemount 248 and 644 Temperature Transmitters*



Content

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Product Certifications . . . . . page Temperature-264
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Rosemount 1067 Compact Sensor and 1097 Thermowell

Optimize plant efficiency and increase measurement reliability with industry proven design and specifications

- Available in a wide variety of sensing technologies – RTD and Thermocouples
- All sensor styles and lengths are available in 6mm (standard) and 3 mm diameters, allowing for quicker response times
- State of the art manufacturing procedures provide robust element packaging, increasing reliability
- Industry-leading calibration capabilities allow for Callendar van Dusen values to give increased accuracy when paired with Rosemount transmitters
- Full penetration weld standard on 1097 thermowells increases thermowell strength
- Tapered tips on 1097 thermowells allow for a faster time response

Streamline operations and maintenance with sensor and thermowell design

- DIN style sensor uses connection heads that allow quick mounting and replacement while maintaining environmental integrity
- Integral thermowell extensions eliminate components to provide a simple configuration and installation

Explore the benefits of a Complete Point Solution from Rosemount Temperature Measurement

- An “Assemble Sensor to Specific Transmitter” option enables Emerson to provide a complete point temperature solution, delivering an installation-ready transmitter and sensor assembly
- Emerson has a complete portfolio of Single Point and High Density Temperature Measurement solutions, allowing you to effectively measure and control your processes with the reliability you trust from Rosemount products



Experience global consistency and local support from numerous worldwide Rosemount Temperature manufacturing sites



- World-class manufacturing provides globally consistent product from every factory and the capacity to fulfill the needs of any project, large or small.
- Experienced Instrumentation Consultants help select the right product for any temperature application and advise on best installation practices.
- An extensive global network of Emerson service and support personnel can be on-site when and where they are needed.

Rosemount 1067 Compact Sensor and 1097 Thermowell



The Rosemount 1067 Compact Sensor and 1097 Thermowell have designs that provide flexible and reliable temperature measurements in process environments.

Features include:

- Industry-standard sensor types, including RTD and Thermocouple varieties
- DIN-style design for easy mounting and replacement
- Variety of enclosure and connection head options
- Global hazardous-location approvals (Option Codes E1, E5, E6)
- Calibration services to give you insight to sensor performance (Option Code V10)
- Assemble to Sensor options (Option Code XA)

Table 1. Rosemount 1067 Compact Sensor Ordering Information

For information on thermowell and sensor sizing and selection, see guide on “Selection of Thermowells and Sensors” on page 265.

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	**Product Description**				
1067	Compact Sensor				
Connection Head		**IP Rating**	**Process Thread**	**Conduit Thread(1)**	
Standard					**Standard**
D	Rosemount Aluminum	66/68	M20x1.5	1/2 in. NPT	★
N	No Connection Head				★
Expanded					
C	Polypropylene (BUZ)	65	M20x1.5	1/2 in. NPT	
Sensor Lead Wire Termination					
Standard					**Standard**
0	Flying Lead - No Springs on DIN plate				★
2	Terminal Block - DIN 43762				★
Sensor Type					
Standard					**Standard**
P1	RTD, PT-100, Single Element, 4 Wire				★
P2	RTD, PT-100, Dual Element, 3 Wire				★
E1	Thermocouple, Type E Single Element, Ungrounded				★
E2	Thermocouple, Type E Dual Element, Isolated, Ungrounded				★
K1	Thermocouple, Type K, Single Element, Ungrounded				★
K2	Thermocouple, Type K Dual Element, Isolated, Ungrounded				★
J1	Thermocouple, Type J, Single Element, Ungrounded				★
J2	Thermocouple, Type J Dual Element, Isolated, Ungrounded				★
T1	Thermocouple, Type T, Single Element, Ungrounded				★
T2	Thermocouple, Type T Dual Element, Isolated, Ungrounded				★
Expanded					
N1	Thermocouple, Type N, Single Element, Ungrounded				
N2	Thermocouple, Type N Dual Element, Isolated, Ungrounded				
R1	Thermocouple, Type R, Single Element, Ungrounded				
R2	Thermocouple, Type R Dual Element, Isolated, Ungrounded				
S1	Thermocouple, Type S, Single Element, Ungrounded				
S2	Thermocouple, Type S Dual Element, Isolated, Ungrounded				

Rosemount 1067 and 1097

Table 1. Rosemount 1067 Compact Sensor Ordering Information

For information on thermowell and sensor sizing and selection, see guide on “Selection of Thermowells and Sensors” on page 265.

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Sheath Diameter		
Standard		**Standard**
3	3 mm	★
6	6 mm	★
Sensor Length (X) in Millimeters		
Standard		**Standard**
0170	170 mm	★
0245	245 mm	★
0325	325 mm	★
0400	400 mm	★
0425	425 mm	★
0475	475 mm	★
0500	500 mm	★
0550	550 mm	★
Expanded		
XXXX	Non-standard Sensor Length (in 1 mm increments from 100 to 875 mm)	
NOTE: The sheath diameter and the sensor length must match the thermowell bore. See “Sensor and Thermowell Sizing” on page 267		

Options (Include with selected model number)

Thermocouple Wire Color Code		
Standard		**Standard**
U1	Wire Color per ISA	★
U2	Wire Color per IEC	★
RTD Options		
Standard		**Standard**
A1	Class A Sensor from -50 °C to 450 °C (-58 to 842 °F)	★
Product Certifications(3)		
Standard		**Standard**
E1	EExd - ATEX/CENELEC Flameproof Approval	★
E5	FM Explosion-Proof Approval	★
E6	CSA Explosion-Proof	★
Assemble To Options		
Standard		**Standard**
XA(2)	Assemble sensor to specific temperature transmitter	★
Callendar-van Dusen Constants		
Standard		**Standard**
V10	Works Cert - sensor calibration from -50 °C to 450 °C (-58 to 848 °F) with A, B, C, and Callendar-van Dusen constants (400 mm minimum length)	★
External Ground Screw(3)		
Standard		**Standard**
G1	External Ground Screw	★
Cover Chain(3)		
Standard		**Standard**
G3	Cover Chain	★

(1) To maintain IP rating, use a suitable cable gland or other conduit connection. All of the threads must be sealed with a suitable sealing tape.

(2) If ordering Assemble to Option XA with a transmitter, specify the same option on the transmitter model number. Connection head must be ordered with the 1067 model.

(3) Not available with polypropylene connection head.

Rosemount 1097 Ordering Table

Table 2. Rosemount 1097 Compact Barstock Thermowell Ordering Information

For information on thermowell and sensor sizing and selection, see guide on “Selection of Thermowells and Sensors” on page 265.

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description			
1097	Compact Barstock Thermowell			
Material		**Available with CRN**	**CRN Temperature LImit (°C)(1)**	
Standard				**Standard**
A2	316L Stainless steel	•	426	★
A5	304L Stainless steel	•	426	★
C1	Carbon steel	•	482	★
Expanded				
A6	304L Stainless steel with carbon steel flange	•	426	
B2	Tantalum sheath over 316L Stainless steel	•	426	
B3	Tantalum sheath over 316L Stainless steel (Permanently Attached)	•	426	
B4	316L Stainless steel with PFA coating	•	426	
D1	Alloy 20			
D2	Alloy C276			
D4	Nickel 200			
D8	Alloy 825	•	317	
F3	Duplex 2205 F51			
G1	Alloy 400	•	482	
H1	Alloy 600			
K1	Titanium Gr 2			
L1	13 Cr Mo 44			
Immersion Length (U) in Millimeters		**Suitable for Sensor Diameter**		
Standard				**Standard**
0025	25 mm	3 mm. (see Figure and Figure)		★
0050	50 mm	3 mm. (see Figure and Figure)		★
0070	70 mm	3 mm. (see Figure and Figure)		★
0130	130 mm	3 mm. (see Figure and Figure)		★
0150	150 mm	6 mm. (see Figure 11 and Figure 13)		★
0225	225 mm	6 mm. (see Figure 11 and Figure 13)		★
0250	250 mm	6 mm. (see Figure 11 and Figure 13)		★
0300	300 mm	6 mm. (see Figure 11 and Figure 13)		★
0325	325 mm	6 mm. (see Figure 11 and Figure 13)		★
0375	375 mm	6 mm. (see Figure 11 and Figure 13)		★
Expanded				
XXXX	Non-standard Immersion Length (in 1 mm increments from 25 50 500 mm). Lengths greater than 130 mm = 6 mm diameter.			
Thermowell Mounting Style(2)				
Standard				**Standard**
F01	Flanged, RF, 3/4 in. 150 lb.			★
F04	Flanged, RF, 1 in. 150 lb.			★
F10	Flanged, RF, 1 1/2 in. 150 lb.			★
F16	Flanged, RF, 2 in. 150 lb.			★
F17	Flanged, RF, 3 in. 150 lb.			★
F22	Flanged, RF, 1 in. 300 lb.			★
F23	Flanged, RF, 3/4 in. 300 lb.			★

Table 2. Rosemount 1097 Compact Barstock Thermowell Ordering Information

For information on thermowell and sensor sizing and selection, see guide on “Selection of Thermowells and Sensors” on page 265.

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

F28	Flanged, RF, 1 1/2 inch 300 lb.	★
F34	Flanged, RF, 2 in. 300 lb.	★
F37	Flanged, RF, 3 in. 300 lb.	★
F39	Flanged, RF, 3/4 in. 600 lb.	★
F40	Flanged, RF, 1 in. 600 lb.	★
F46	Flanged, RF, 1 1/2 in. 600 lb.	★
F52	Flanged, RF, 2 in. 600 lb.	★
F55	Flanged, RF, 3 in. 600 lb.	★
F57	Flanged, RF, 3/4 in. 900 lb.	★
F58	Flanged, RF, 1 in. 900 lb.	★
F64	Flanged, RF, 1 1/2 in. 900 lb.	★
F70	Flanged, RF, 2 in. 900 lb.	★
F73	Flanged, RF, 3 in. 900 lb.	★
W10	Welded, 3/4 in. Pipe (only available with Immersion Lengths 50-130 mm)	★
W12	Welded, 1 in. Pipe	★
Lagging Length		
Standard		**Standard**
T025	25 mm	★
T030	30 mm	★
T035	35 mm	★
T040	40 mm	★
T045	45 mm	★
T050	50 mm	★
T100	100 mm	★
T125	125 mm	★
T000	Flanged Thermowells	★
Expanded		
TXXX	Non-standard Lagging Length (in 1 mm increments from 25 to 250 mm)	

Options (Include with selected model number)

Material Certification		
Standard		**Standard**
Q8	Thermowell material Certification, EN 10204 3.1	★
Flange Type		
Standard		**Standard**
R10	Flat Flanged Face	★
R16	Ring Joint Flange Face	★
Wake Frequency		
Standard		**Standard**
R21	Wake Frequency - Thermowell Strength Calculation	★
Typical Model Number: 1097 A2 0250 F01 T00 Q8 R10 R21		

(1) Consult factory for availability

(2) All flanges are full penetration weld

Overview

Rosemount 1067 Overview

Emerson offers a wide range of RTDs and thermocouples alone, or as complete point solutions including Rosemount Temperature Transmitters, connection heads, and thermowells.

Rosemount 1067 Platinum RTD Temperature Sensors are highly linear and have a stable resistance versus temperature relationship. They are used primarily in industrial environments where high accuracy, durability, and long-term stability are required, and are designed to meet the most critical parameters of international standards: IEC 751 1983/DIN EN 60751 incorporating Amendments 1 and 2.(1) Standardization provides sensor interchangeability with no transmitter circuitry adjustment required. Rosemount 1067 RTD sensors offer enhanced performance and optimal temperature measurement accuracy when coupled with temperature transmitters using Callendar-van Dusen constants.

A thermocouple is a junction between two dissimilar metals that produces a change in thermoelectric emf in relationship to a temperature change. Rosemount 1067 Thermocouple sensors are manufactured from selected materials to meet IEC 60584 Tolerance Class 1 and ASTM E230 Special Limits. The junction is laser welded to form a pure joint that maintains the integrity of the circuit and ensures accuracy. A sensor sheath protects ungrounded junctions from the environment. The ungrounded and isolated junctions provide electrical isolation from the sensor sheath.

Rosemount 1067 Thermocouples conform to IEC 60584 or ASTM E230 and are available in types E, J, K, N, R, S, and T. They are available in two configurations: single sensor ungrounded, or dual sensor ungrounded and isolated.

All of the sensors are available in a variety of lengths and ranges with flying lead or terminal block lead wire terminations.

Rosemount 1097 Overview

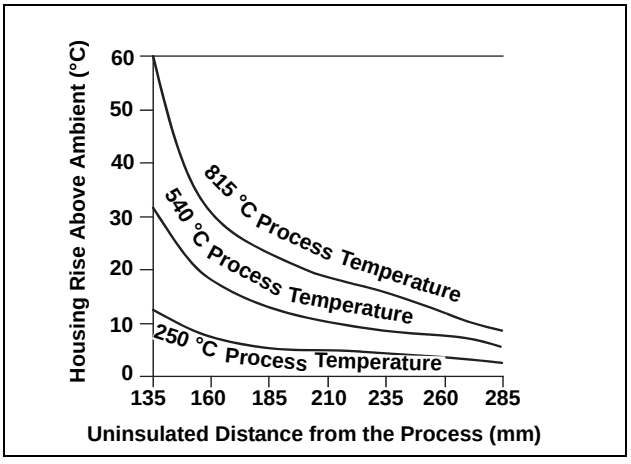
Emerson offers thermowells in a wide range of materials, styles, and lengths for most industrial applications. Standard materials include SST 316L and SST 304L, but other materials are available for corrosive environments. Please consult with your Emerson representative for information on additional material availability.

Emerson also provides engineering services and reports to ensure the proper thermowell is used for your application.

Selecting the Lagging Length for a Thermowell

A direct mounting configuration allows heat from the process, aside from ambient temperature variations, to transfer from the thermowell to the transmitter housing. If the expected process temperature is near or above the transmitter specification limits, consider using additional thermowell lagging length or a remote mounting configuration to isolate the transmitter. Figure 1 provides an example of the relationship between transmitter housing temperature rise and distance from the process. The following example and Figure 1 can be used as a guide to determine adequate thermowell lagging length.

Figure 1. Transmitter Housing Temperature Rise vs. Uninsulated Distance from the Process



(1) *100 Ω at 0 °C, α = 0.00385 Ω x °C/Ω*

Example

The rated ambient temperature specification for the transmitter is 85 °C. If the maximum ambient temperature is 40 °C and the temperature to be measured is 540 °C, the maximum allowable housing temperature rise is the rated temperature specification limit minus the existing ambient temperature (85 – 40), or 45 °C.

As shown in Figure 1, an uninsulated distance from the process of 90 mm will result in a housing temperature rise of 22 °C. Therefore, 100 mm would be the minimum recommended distance from the process providing a safety factor of about 25 °C. A longer length, such as 150 mm, is desired to reduce errors caused by transmitter temperature effect, although in that case the transmitter may require extra support.

THERMOWELL STRENGTH CALCULATION

Pressure and Flow Vibration

Best engineering practices recommend performing an analysis of the thermowell strength for a specific application to prevent thermowell and sensor breakage. Proper selection of a thermowell depends on fluid type, temperature, pressure, and fluid velocity.

There are three possible failure modes considered in an Emerson thermowell analysis:

Flow-Induced Vibration

Fluid flow past a thermowell can cause vortices to be shed from the thermowell as a wake frequency proportional to the flow velocity. If the wake frequency is at, or near, the natural frequency of a given thermowell, a resonance condition may cause large amounts of energy to be absorbed by the thermowell, resulting in very high stress and possible failure. If the thermowell does not fail, the sensor capsule may be subjected to high levels of shock and vibration resulting in erroneous readings, or in total sensor failure.

The ASME technique requires the ratio of wake frequency to natural frequency of a thermowell to be less than 0.8. For a ratio greater than 0.8, two options are available:

1. Shorten the immersion length; or
2. Change the thermowell material.

Flow-Induced Stress

Fluid flow is a function of flow velocity and density, and can cause force to be exerted on the thermowell. The flow-induced stress is calculated and compared with the material strength of the thermowell.

Process Pressure

The maximum static pressure a thermowell stem can undergo is calculated.

NOTE
The thermowell analysis process helps to choose thermowells for specific applications. It is based on accepted theoretical methods and is not a guarantee against thermowell failure.

Specifications

Rosemount 1067 Platinum RTD

100 Ω RTD at 0 °C,
α = 0.00385 Ω/Ω x °C

Temperature Range

–196 to 600 °C (-320.8 to 1112 °F)

Insulation Resistance

1,000 MΩ minimum insulation resistance when measured at 500 Vdc and at room temperature.

Sheath Material

316 SST / 321 SST with mineral-insulated cable construction

Lead Wire

PTFE insulated, 24 AWG, silver-plated copper wire. See Figure 2 for wire configuration.

Ingress Protection (IP) Ratings

For information see Table 10 on page 269.

Self Heating

0.15 K/mW when measured per method defined in DIN EN 60751:1996

Thermal Response Time

Thermal response times for the 1067 sensor only. Tested in accordance to IEC 751 guidelines.

Table 3. Water Flowing at 0.4 m/s

	Pt 100	TC grounded	TC Ungrounded	Deviation
Sensor	t(0.5) [s]	t(0.5) [s]	t(0.5) [s]	
6 mm dia.	7.7	1.8	2.8	± 10%
3 mm dia.	2.5	1.1	1.2	± 10%

Table 4. Air flowing at 3.0 m/s

	Pt 100	TC grounded	TC Ungrounded	Deviation
Sensor	t(0.5) [s]	t(0.5) [s]	t(0.5) [s]	
6 mm dia.	35	38	42	± 10%
3 mm dia.	18	14	14	± 10%

More response time information is available online for other sensor and thermowell configurations

Rosemount 1067 Thermocouple

Temperature Range

See Table and Table .

Insulation Resistance

1,000 MΩ minimum insulation resistance when measured at 500 Vdc and at room temperature.

Sheath Material

Rosemount thermocouples are made of a mineral insulated cable design with a variety of sheath materials available to suit both the temperature and the environment. For temperature up to 800 °C (1472 °F) in air, the sheath is made from 321 SST. For temperatures above 800 °C (1472 °F) in air, the sheath is made from Alloy 600. For strongly oxidizing or reducing atmospheres, consult your local Emerson representative for information.

Lead Wires

Thermocouple, internal – 19 AWG solid wire (max) and 21 AWG solid wire (min.). External extension leads, Type E, J, K, N, R, S, and T. PTFE insulated. 20 AWG (max.) and 24 AWG (min.) Color coded per IEC or ISA standards. Figure shows the wire configuration.

Ingress Protection (IP) Ratings

For information see Table 10 on page 269.

Table 5. Characteristics of 1067 IEC Thermocouples (IEC Standards are typically used in European applications)

Type	Wire Alloys	Sheath Material	Temp. Range	Interchangeability Error IEC 60584-2[1]	Accuracy
E	Chromel/Constantan	321 SST	-40 to 800 °C (-40 to 1472 °F)	±1.5 °C (±2.7 °F) or ±0.4%	Class 1
J	Iron/Constantan	321 SST	-40 to 750 °C (-40 to 1382 °F)	±1.5 °C (±2.7 °F) or ±0.4%	Class 1
K	Chromel/Alumel	Alloy 600	-40 to 1000 °C (-40 to 1832 °F)	±1.5 °C (±2.7 °F) or ±0.4%	Class 1
N	Nicrosil/Nisil	Alloy 600	-40 to 1000 °C (-40 to 1832 °F)	±1.5 °C (±2.7 °F) or ±0.4%	Class 1
R	Platinum-13% Rhodium/Platinum	Alloy 600	0 to 1000 °C (32 to 1832 °F)	±1.0 °C (±1.8 °F) or ±[1+0.3% x (t-1100)] °C	Class 1
S	Platinum-10% Rhodium/Platinum	Alloy 600	0 to 1000 °C (32 to 1832 °F)	±1.0 °C (±1.8 °F) or ±[1+0.3% x (t-1100)] °C	Class 1
T	Copper/Constantan	321 SST	-40 to 350 °C (-40 to 662 °F)	±0.5 °C (±1.0 °F) or ±0.4%	Class 1

(1) Whichever is greater

Table 6. Characteristics of 1067 ASTM Thermocouples (ASTM Standards are typically used in North American applications)

Type	Wire Alloys	Sheath Material	Temp. Range (°C)	Interchangeability Error ASTM E230[1]	Accuracy
E	Chromel/Constantan	321 SST	0 to 900 °C (32 to 1652 °F)	±1.0 °C (±1.8 °F) or ±0.4%	Special Limits
J	Iron/Constantan	321 SST	0 to 750 °C (32 to 1382 °F)	±1.1 °C (±2.0 °F) or ±0.4%	Special Limits
K	Chromel/Alumel	Alloy 600	0 to 1000 °C (32 to 1832 °F)	±1.1 °C (±2.0 °F) or ±0.4%	Special Limits
N	Nicrosil/Nisil	Alloy 600	0 to 1000 °C (32 to 1832 °F)	±1.1 °C (±2.0 °F) or ±0.4%	Special Limits
R	Platinum-13% Rhodium/Platinum	Alloy 600	0 to 1000 °C (32 to 1832 °F)	±0.6 °C (±1.0 °F) or ±0.1%	Special Limits
S	Platinum-10% Rhodium/Platinum	Alloy 600	0 to 1000 °C (32 to 1832 °F)	±0.6 °C (±1.0 °F) or ±0.1%	Special Limits
T	Copper/Constantan	321 SST	0 to 350 °C (32 to 662 °F)	±0.5 °C (±1.0 °F) or ±0.4%	Special Limits

(1) Whichever is greater

WIRING DIAGRAMS

Figure 2. 1067 RTD Lead Wire Configuration

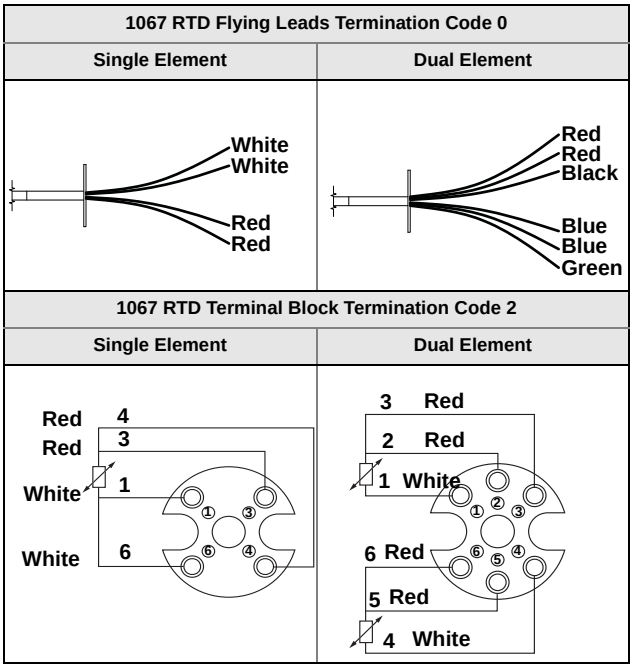
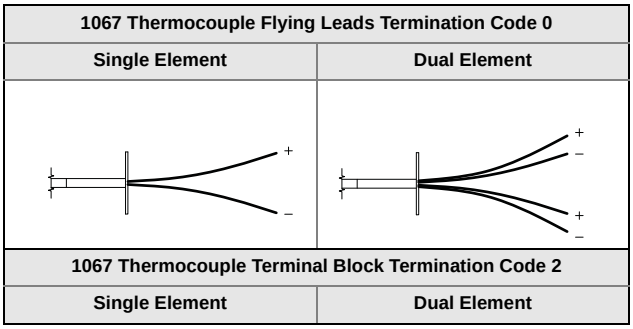
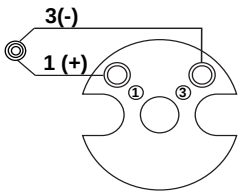
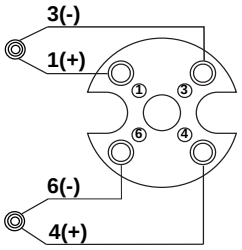


Figure 3. 1067 Thermocouple Lead Wire Configuration

Table 7. 1067 Thermocouple Wire Color

	IEC Wire Color		ISA Wire Color	
Type	Positive (+)	Negative (-)	Positive (+)	Negative (-)
E	Violet	White	Violet	Red
J	Black	White	White	Red
K	Green	White	Yellow	Red
N	Rose	White	Orange	Red
R	Orange	White	Black	Red
S	Orange	White	Black	Red
T	Brown	White	Blue	Red



1067 Thermocouple Flying Leads Termination Code 0	
Single Element	**Dual Element**
	

INTEGRAL MOUNT SENSORS AND ASSEMBLIES

Rosemount 1067 RTD and Thermocouple Temperature Sensors can be ordered as assemblies that provide a complete, yet simple, means of specifying the proper industrial hardware for most temperature measurements. An assembly model number is derived from the ordering table and defines the type of sensing element, the material length, and thermowell style.

Emerson Process Management sizes and inspects all sensor assemblies to ensure complete component compatibility and performance.

Figure 4. Sensor Assembly Without Thermowell

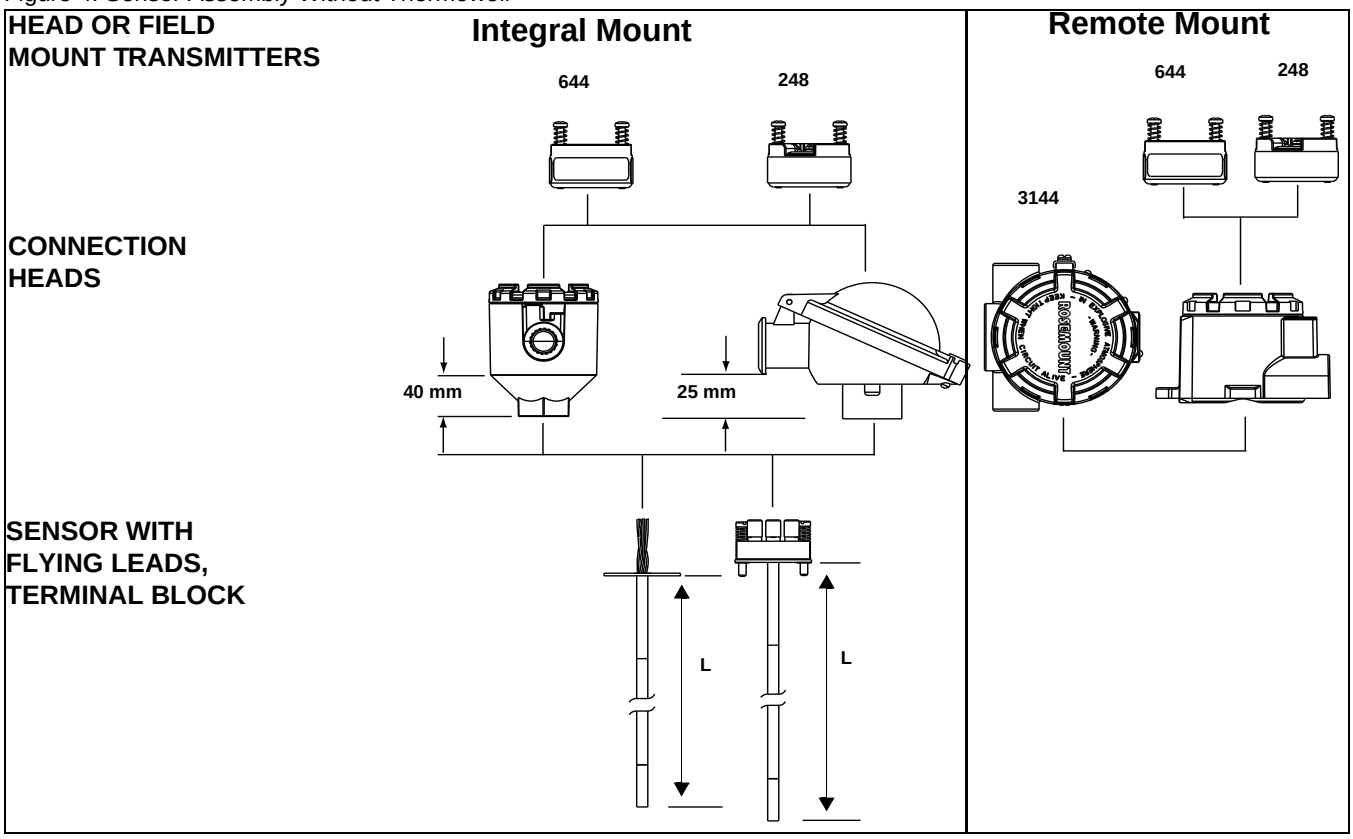


Figure 5. Rosemount 1067 RTD and Thermocouple Dimensional Drawings (All dimensions in mm)

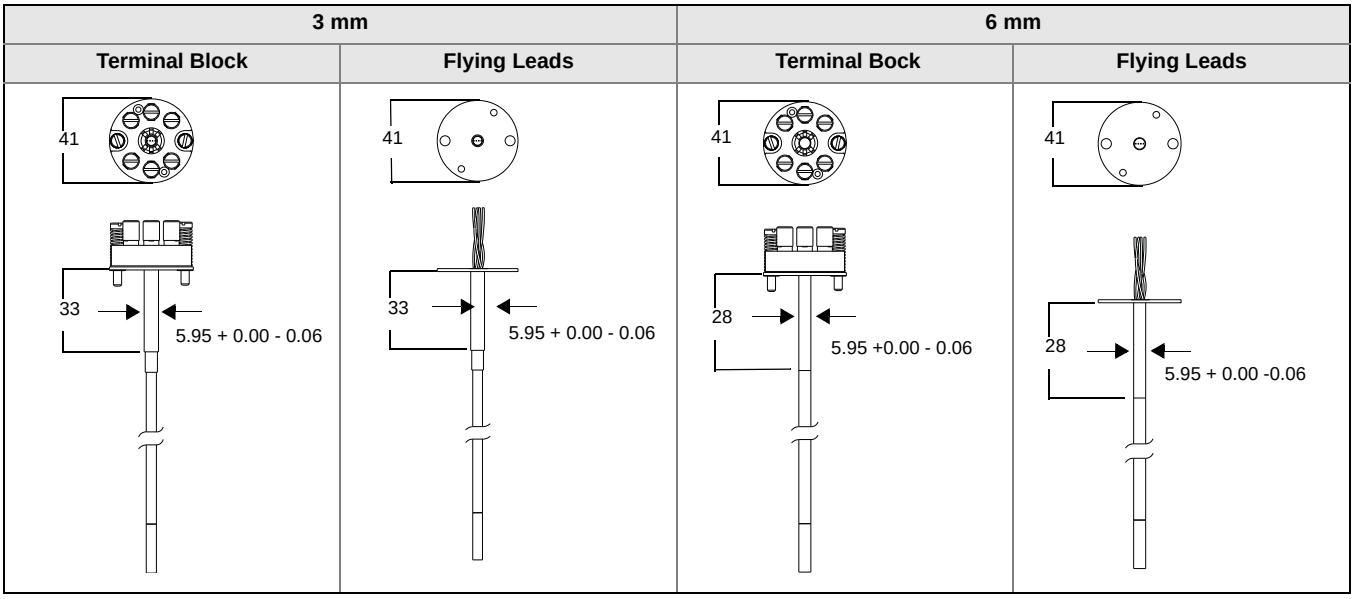


Table 8. Lead Wire Specifications

Rosemount 1067	Sensor Diameter (mm)	Number of Leads	Approximate Lead Wire Length (Flying Leads)	
			Element 1 (mm)	Element 2 (mm)
RTD Single Element	3/6	4	140	---
RTD Dual Element	3/6	6	140	140
Thermocouple Single Element	3/6	2	140	---
Thermocouple Dual Element	3/6	4	140	190

TRANSMITTER-SENSOR MATCHING

By using a temperature sensor matched to a temperature transmitter, significant measurement accuracy improvement can be attained. This involves identifying the relationship between resistance and temperature for a specific RTD sensor. This relationship is approximated by the Callendar-van Dusen equation:

$R_t = R_o + R_o\alpha[t - \delta(0.01t - 1)(0.01t) - \beta(0.01t - 1)(0.01t)^3]$,

where:

R_t = Resistance (ohms) at Temperature t (°C)

R_o = Sensor-Specific Constant (Resistance at t = 0 °C)

α =Sensor-Specific Constant

δ =Sensor-Specific Constant

β =Sensor-Specific Constant (0 at t > 0 °C)

The exact values for the Callendar-van Dusen constants (R_o, α, δ, β) are specific to each RTD sensor and are established by testing each individual sensor at various temperatures.

The transmitter uses the Callendar-van Dusen constants to generate a sensor curve describing the relationship between resistance and temperature for this particular sensor and transmitter assembly. There is a 3- or 4-fold improvement in temperature measurement accuracy for the total system by using the sensor's actual resistance vs. temperature curve.

Rosemount 1067 RTD sensors can be ordered with Calibration Option code V10, where the values of all four sensor-specific constants are supplied with each sensor. To utilize the unique, built-in sensor-matching capability of the Rosemount 644 and 3144P transmitters, the Callendar-van Dusen constants can be programmed into the transmitter at the factory, or in the field using a Field Communicator.

Option V10 is specific to a particular temperature range and, as with calibration schedules, the accuracies associated with this option represent worst case conditions when the sensor is used over the entire temperature range. Accuracy of the Rosemount 1067 sensor with the V10 option varies since they have different hysteresis and repeatability characteristics.

IEC 751 Interpretation

The Callendar-van Dusen equation is one method used to describe the resistance versus temperature (R vs.T) relationship for platinum RTDs. International standard IEC 751 interprets the R vs. T relationship using an approach similar to the Callendar-van Dusen methodology. The IEC 751 R vs.T relationship standard uses the following equation:

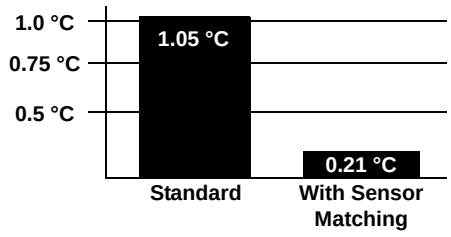
$R_t = R_o[1 + At + Bt^2 + C\,(t-100)t^3]$

As in the Callendar-van Dusen method, R_o, A, B, C are specific for each RTD and are established by testing each sensor at various temperatures. The actual values for A, B, and C differ in magnitude from the Callendar-van Dusen constants (R_o, α, β, δ), while R_o is the same for both equations. Either methodology produces the same result in any Transmitter-Sensor Matching scenario, since one equation is a simple mathematical interpretation of the other.

Typical Transmitter-Sensor Matching Accuracy Improvements

Transmitter: Rosemount 3144P (built-in sensor matching capabilities), span of 0 to 200 °C, accuracy = 0.1 °C)
Sensor: 1067 RTD
Callendar-van Dusen Option: V10
Process Temperature: 150 °C

System Uncertainty Comparison at 150 °C:



Standard 1067 Sensor		
Rosemount 3144P:	± 0.10 °C	
Standard 1067 RTD:	± 1.05 °C	
Total System(1):	± 1.05 °C	
1067 Sensor with V10 Option		
Rosemount 3144P:	± 0.10 °C	
Calibrated Sensor 1067 RTD:	± 0.18 °C	
Total System(1):	± 0.21 °C	

(1) Calculated using RSS statistical method:

$$\text{System accuracy} = \sqrt{(\text{Transmitter accuracy})^2 + (\text{Sensor accuracy})^2}$$

CALIBRATION

Sensor calibration may be needed for input to quality systems, or for control system enhancement. It is used mainly to improve the overall temperature measurement performance by matching the sensor to a temperature transmitter. Sensor matching is available for RTD sensors used with Rosemount transmitters where the inherent stability and repeatability of the RTD technology is well established.

Calibration Options

The Callendar-van Dusen, and A, B, and C-constants are supplied with a calibration certificate.

Table 9. Option V10: Sensor Calibration with Works Certificate

	Code
	V10(1)
Temperature Range (°C)	– 50 to 450
Calibration Points (°C)	–50 0 100 450

(1) Minimum length 400 mm.

Temperature Considerations

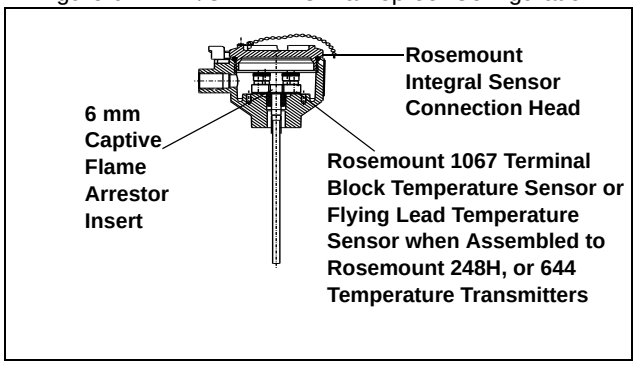
Ambient temperature limits for the connection head are -40 °C to +85 °C.

Product Certifications

HAZARDOUS LOCATIONS CERTIFICATION

E1 ATEX/CENELEC Flameproof Approval
ATEX Marking ⟨Ex⟩ II 2 G
Certificate Number: KEMA99ATEX8715X
Ex d IIC T6 (T_{amb} = -50 to 70 °C)
The ATEX/CENELEC Flameproof approval is dependent on the Rosemount Connection Head assembled with a Rosemount RTD or thermocouple temperature sensor. The captive flame arresor insert must be fully engaged into the connection head for compliance with this approval.
ATEX Flameproof Approval
ATEX Marking ⟨Ex⟩ II 2 G
Certificate Number: KEMA01ATEX2181
Ex d IIC T5 (-50 ≤ Tamb ≤ 80 °C)
Ex d IIC T6 (-50 ≤ Tamb ≤ 70 °C)

Figure 6. ATEX/CENELEC Flameproof Configuration

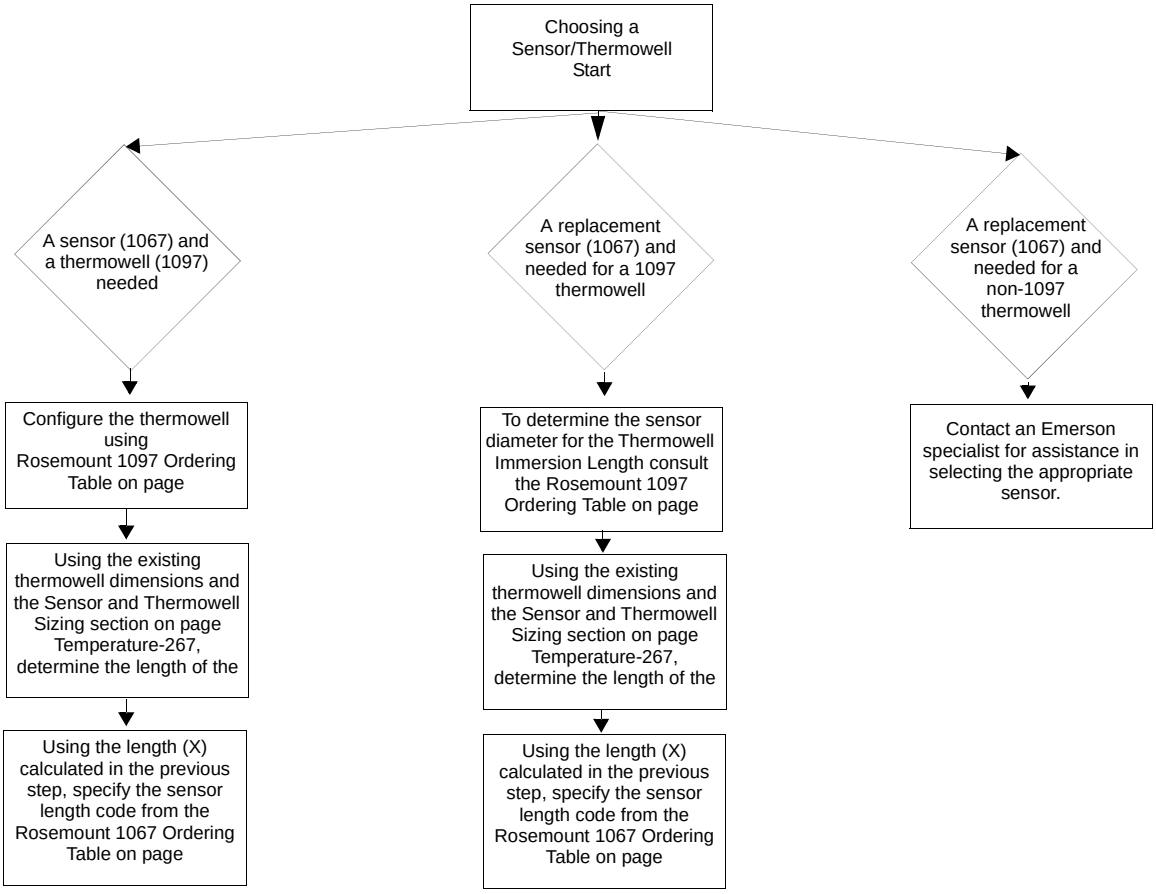


Special Conditions for Safe Use (X)
For information on the dimensions of the flameproof joints, the manufacturer shall be contacted.

E5 FM Explosion-Proof
Explosion-Proof for Class I, Division 1, Groups B, C, D.
Dust-Ignition Proof for Class I, III, Division 1, Groups E, F, G.
Ambient temperature Limits: -40 to 85 °C
When installed per Rosemount Drawing 00068-0013
NEMA Enclosure Type 4X.

E6 CSA Explosion-Proof
Explosion-Proof for Class I, Division 1, Groups B, C, D.
Dust Ignition-Proof for Class II, Division 1, Groups E, F, G.
Dust Ignition-Proof for Class III, Division 1.
Suitable for Class I, Division 2, Groups A, B, C, D.
Must be installed per Rosemount Drawing 00068-0033.
CSA Enclosure Type 4X.

Selection of Thermowells and Sensors



Examples:

1. Rosemount 1067 Sensor and 1097 Thermowell are needed:

   The user needs a thermowell with a 150 mm Immersion Length and a Flanged mounting style.

   Step 1: Configure Thermowell from Table 2 on page 255.

   1097 A2 **0150** F01 **T000**

   Option 0150 indicates the Thermowell Immersion Length of 150 mm with a sensor diameter of 6 mm (specified in the table). Option T000 represents the Flanged mounting style.

   Step 2: Sensor and Thermowell Sizing.

   Select the figure and formula for the 6 mm flange (as determined in Step 1). For a Rosemount connection head, the Throat Length is 20 mm.

   Formula: Length (X) = 150 + 155 + 20 = 325 (mm).

   Step 3: Select the 1067 Sensor options from Table 1 on page 253.

   1067 D 0 E1 6 **0325**

   Option D represents the Rosemount connection head (Step 2). Option 6 is determined from Step 1. Option 0325 is the length calculated in Step 2.

2. Rosemount 1067 Sensor is needed for a 1097 Thermowell

   The user has a 1097 thermowell with a 300 mm Immersion Length, a Welded mounting style, and a Lagging Length of 45.

   Step 1: Consult Thermowell Table 2 on page 255.

   For a Thermowell Immersion Length of 300, a sensor with a diameter of 6 mm is required.

   Step 2: Sensor and Thermowell Sizing.

   Select the figure and formula for the 6 mm welded style (as determined in Step 1). For a polypropylene connection head, the Throat Length is 10 mm.

   Formula: Length (X) = 300 + 45 + 105 + 10 = 460 (mm).

   Step 3: Select the 1067 Sensor options from Table 1 on page 253.

   1067 C 0 E1 6 **0460**

   Option C represents the polypropylene connection head (Step 2). Option 6 is determined from Step 1. Option 0460 is the length calculated in Step 2.

3. Replacement 1067 Sensor is needed for a non-1097 Thermowell

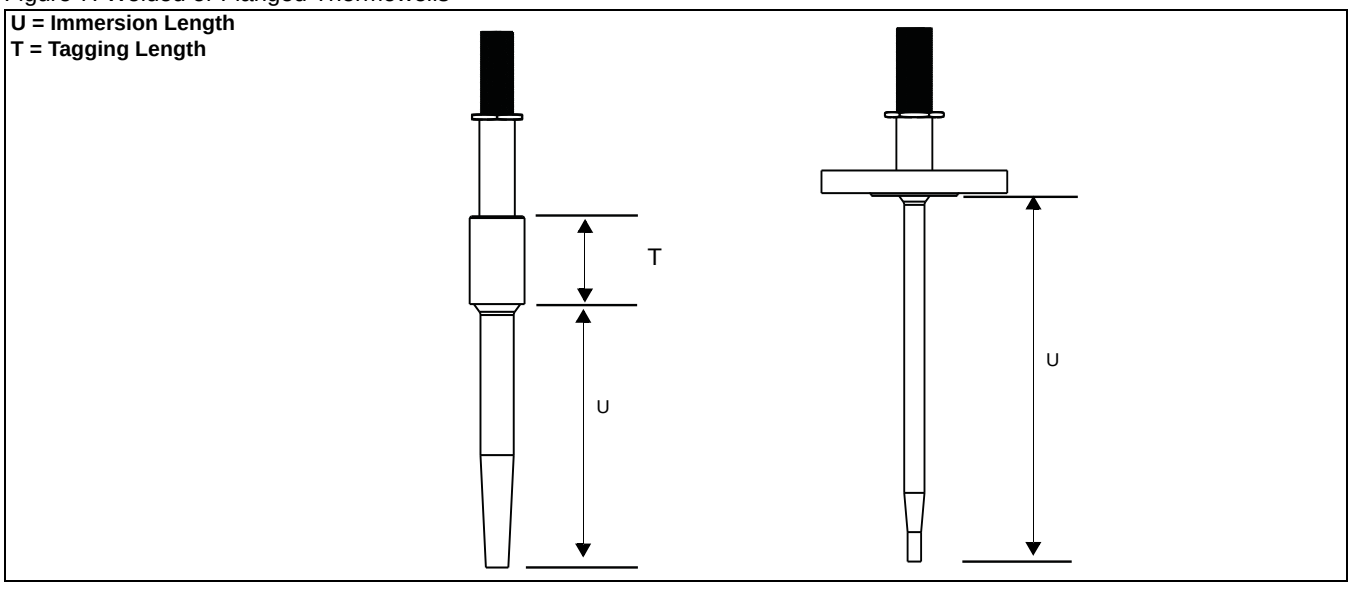
   For this case, please contact an Emerson specialist for assistance in selecting the appropriate sensor.

REORDERING

When reordering just the 1067 sensor, specify the model number of the sensor being replaced and connection head code “N”. See “Rosemount 1067 Compact Sensor Ordering Information” on page Temperature-253. For information on thermowell and sensor sizing and selection, see guide “Selection of Thermowells and Sensors” on page 265.

When reordering only the 1097 thermowell, specify the model number of the thermowell being replaced.

Figure 7. Welded or Flanged Thermowells



Sensor and Thermowell Sizing

To ensure compatibility, specify the thermowell first, The mounting style (flanged or welded) and the sensor diameter (3 mm or 6mm) will determine the formula used to calculate the sensor length.

Formula for Flange Mount:

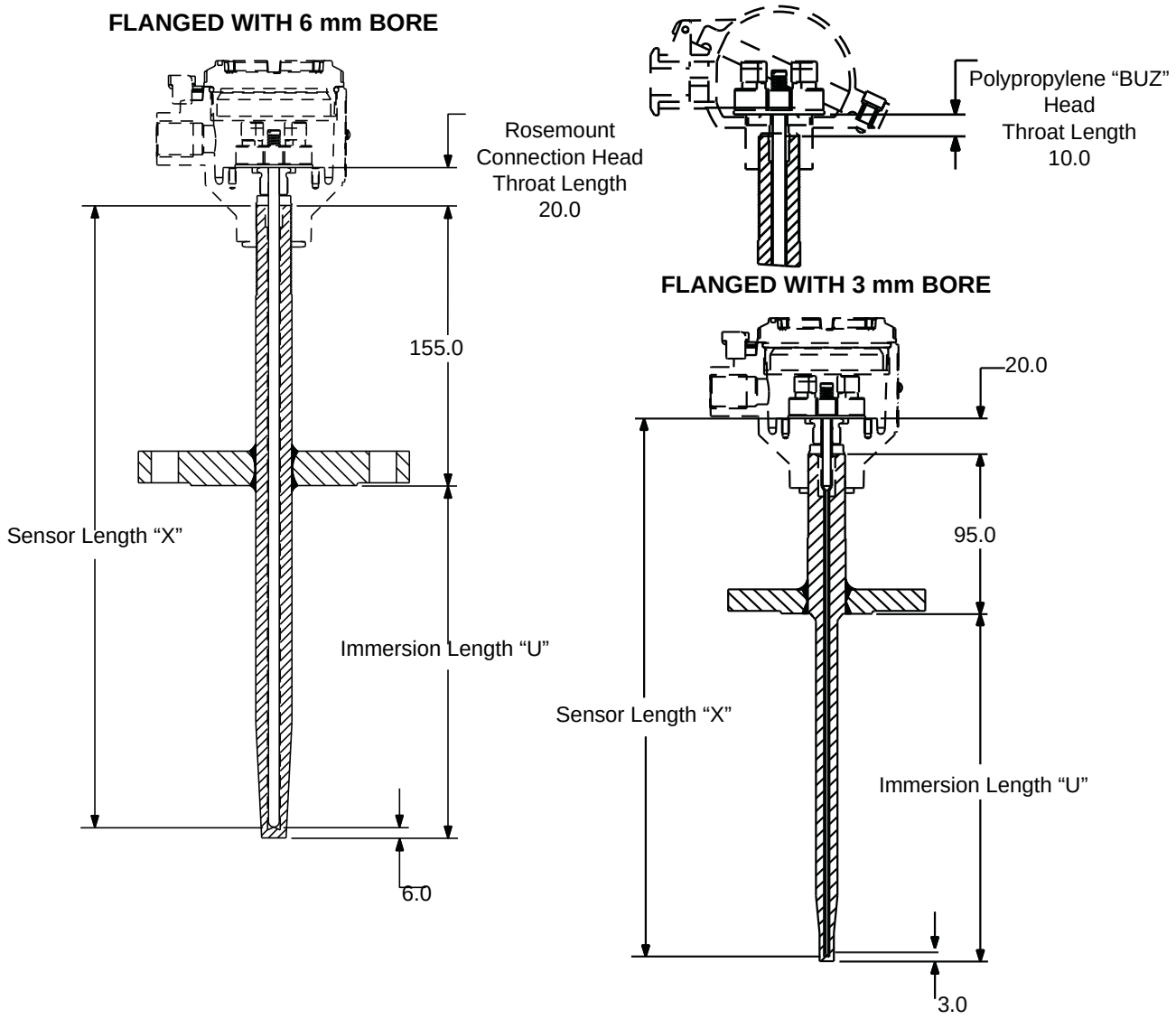
X: Sensor Length (See Figure 8)
U: Immersion Length (See Figure 8)

Throat Length:
Use 20 mm for Rosemount Connection Head
Use 10 mm for polypropylene head

3 mm: X = U + 95 mm + Throat Length

6 mm: X = U + 155 mm + Throat Length

Figure 8. 1097 Flange Mounted Diagram



Formula for Weld Mount:

X: Sensor Length (See Figure 9)
U: Immersion Length (See Figure 9)
T: Tagging Length (See Figure 9))

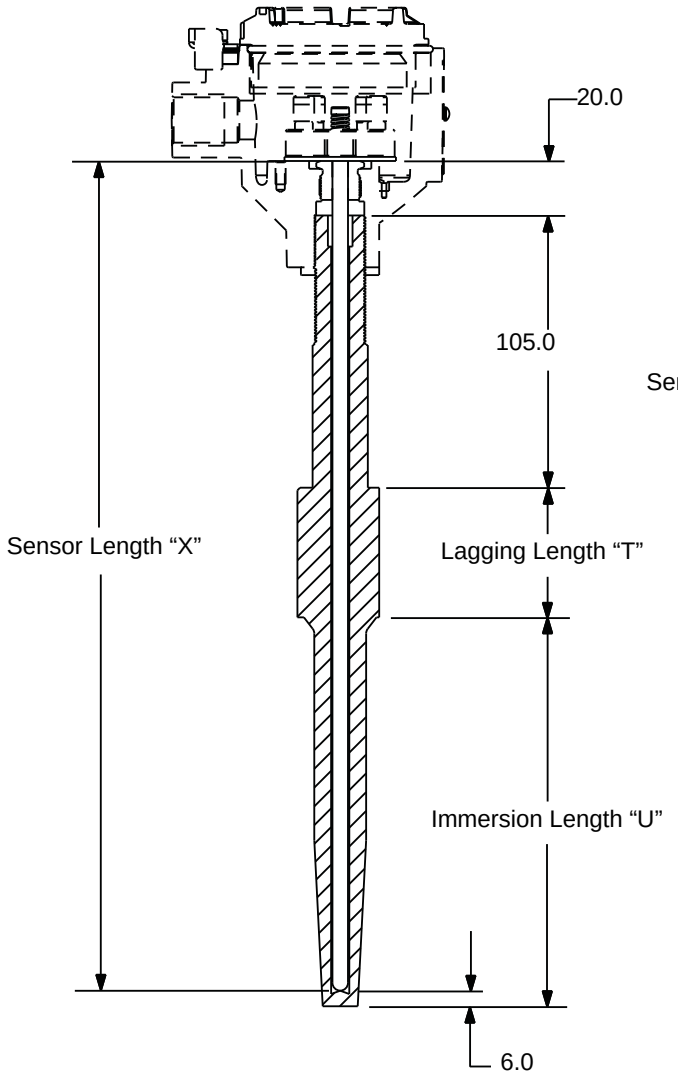
Throat Length:
Use 20 mm for Rosemount Connection Head
Use 10 mm for polypropylene head

3 mm: X = U + T + 55 mm + Throat Length

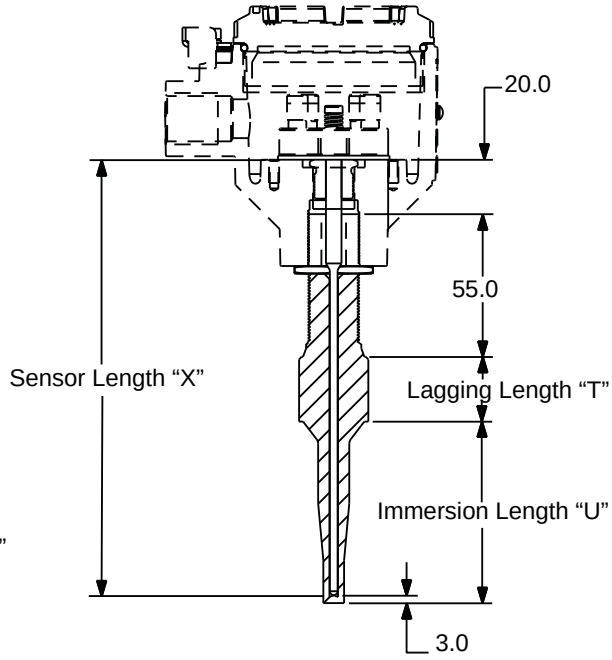
6 mm: X = U + T + 105 mm + Throat Length

Figure 9. 1067 Weld Mounted Diagram

1-IN WELDED WITH 6 mm BORE



3/4-IN WELDED WITH 3 mm BORE

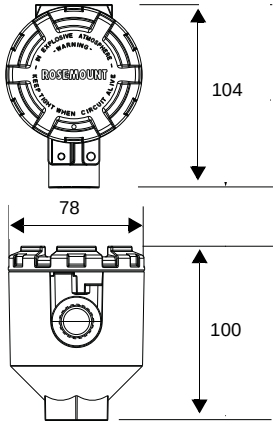
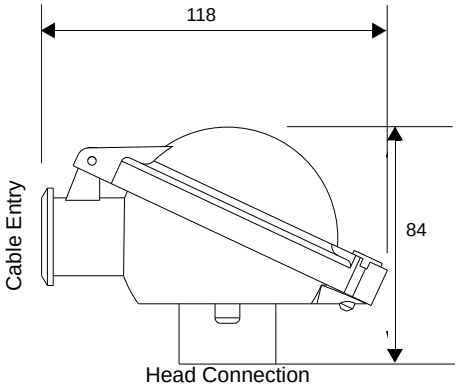


Accessories

Table 10. Connection Head

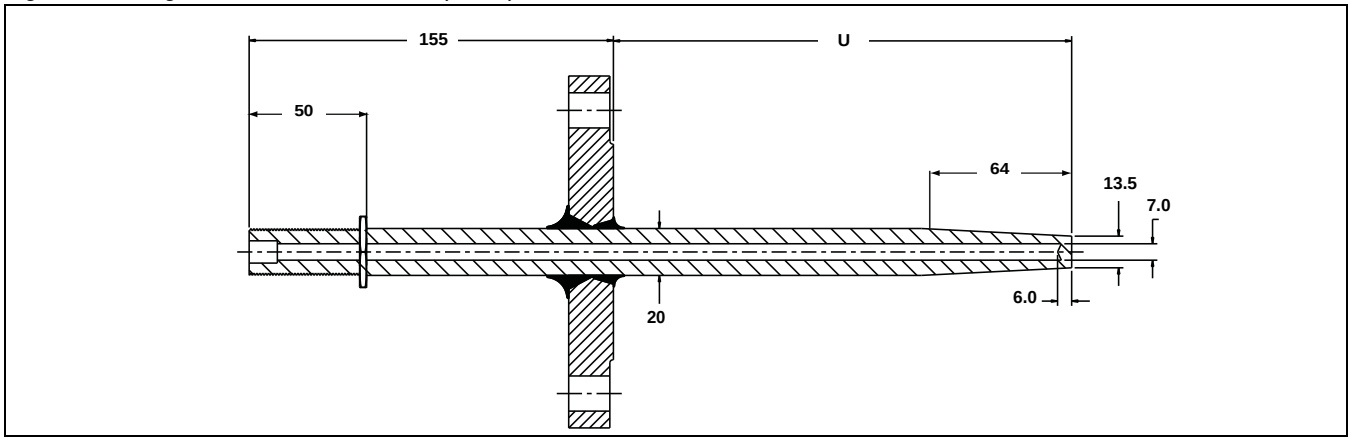
Part Number	Model/Material	IP Rating	Conduit Connection	Process Connection
00644-4190-0014	Rosemount, Aluminum	66/68	1/2 in. ANPT	M20 x 1.5
00644-4198-0014	BUZ, White Polypropylene	65	1/2 in. ANPT	M20 x 1.5

Figure 10. Connection Head Dimensional Drawing

With Standard Cover	Polypropylene (BUZ)
Option Code D	**Option Code C**
	
Dimensions are in millimeters	

Rosemount 1097 Thermowells

Figure 11. Flanged Barstock Thermowell (6 mm)



Rosemount 1067 and 1097

Figure 12. Flanged Barstock Thermowell (3 mm)

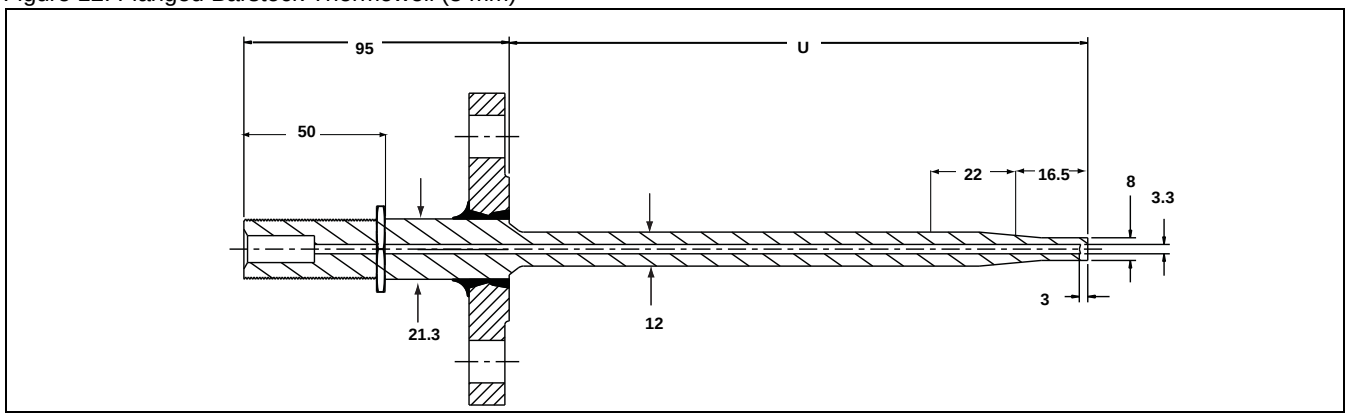


Figure 13. Welded Barstock Thermowell (6 mm)

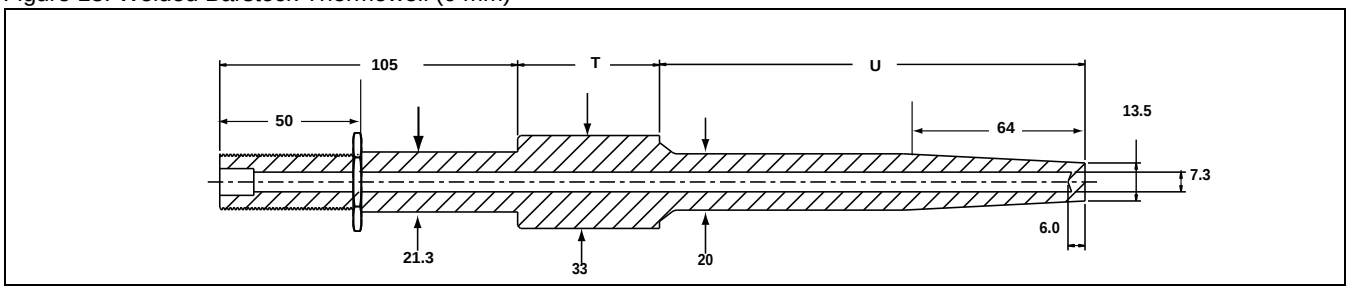
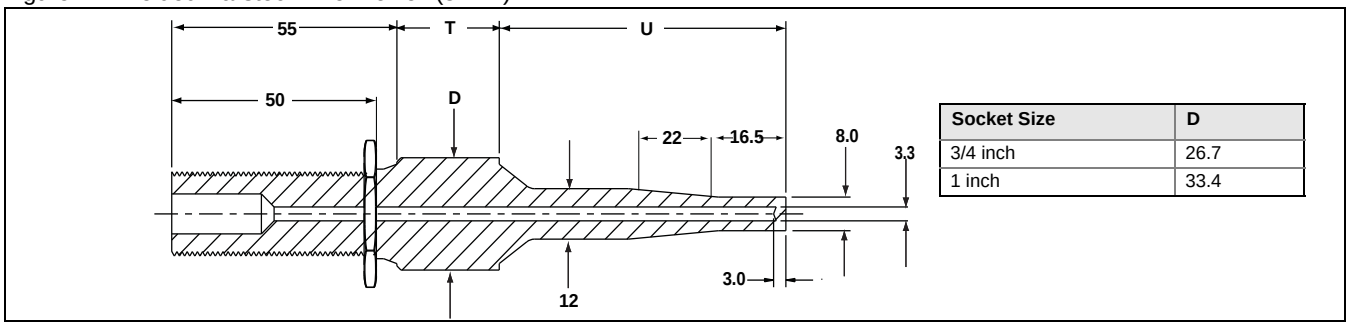


Figure 14. Welded Barstock Thermowell (3 mm)



Socket Size	D
3/4 inch	26.7
1 inch	33.4

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Rosemount 1075 and 1099 Series High Temperature Thermocouples

- *Accurate and reliable measurements in high temperature applications such as heat treatment and combustion processes*
- *Ceramic protection tube materials available for use up to 1800 °C (3272 °F)*
- *Metal protection tube materials for use up to 1200 °C (2192 °F)*
- *Reaction sintered, silicon infiltrated silicon carbide protection tube for use up to 1700 °C (3092 °F)*
- *Wide range of Precious Metal and Base Metal thermocouples*
- *Maximum measurement reliability obtained through calibration services*
- *Integrated temperature assemblies provide time and cost savings*



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Product Data Sheet
00813-0400-2654, Rev DA
Catalog 2011 - 2012

Rosemount 1075 and 1099 High Temperature Sensor

Proven high temperature sensors deliver excellent performance and reliability



- Superior accuracy and stability
- Calibrations according to DKD standards
- Various metal and non-metal protection tubes offer superior performance in various high temperature applications

Easy implementation and installation in existing applications

- Available in a wide variety of process connections exceeding the DIN EN 50446 specifications
- Adjustable process connections allow reduction of engineering, procurement, and stocking costs

Achieve optimal efficiency with advanced Transmitter Diagnostics Coverage

- Detection of sensor drift conditions or hanging wiring conditions decrease risk of unplanned shutdowns due to sensor failure and allow predictive maintenance
- Increased safety by using dual sensor elements and transmitter hot backup function

Explore the benefits of a Complete Point Solution from Rosemount Temperature Measurement

- An “Assemble Sensor to Specific Transmitter” option enables Emerson to provide a complete point temperature solution, delivering an installation-ready transmitter and sensor assembly
- Emerson has a complete portfolio of Single Point and High Density Temperature Measurement solutions, allowing you to effectively measure and control your processes with the reliability you trust from Rosemount products

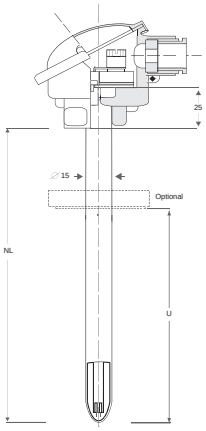


Experience global consistency and local support from numerous worldwide Rosemount Temperature sites



- Experienced Instrumentation Consultants help select the right product for any temperature application and advise on best installation practices.
- An extensive global network of Emerson service and support personnel can be on-site when and where they are needed.

Rosemount 1075 Series Immersion Thermocouples with Metal Protection Tube (Design BM)



The Rosemount 1075 Model 1 is designed to serve high temperature needs for smallest diameters up to 1200 °C (2192 °F).

Features include:

- Ceramic insulated Type K thermocouples for oxidation prevention
- Calibration services to give you insight to sensor performance (Option codes W02, W05, K02, and K05)
- Variety of DIN B connection heads
- Nominal Length (NL) up to 2000 mm
- Design with smallest diameter for metal protection tube
- High temperature resistance steel protection tubes
- Assemble to Transmitter options (Option Code XA)

TABLE 1. Rosemount 1075 Series Immersion Thermocouples with Metal Protection Tube (Design BM) Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description			
1075	High Temperature Thermocouple			
Design				
Standard				**Standard**
1	BM - DIN Form B Style with Metal Protection Tube (Max Temp 1200 °C, Max length 2000 mm)			★
Connection Head (DIN Form B Style) (More info on Figure 3 on page 296)		**IP Rating**	**Conduit Entry**	
Standard				**Standard**
L(1)	TZ-A/BL (BUZH), Aluminum	53	M20 x 1.5	★
U	GN-BL, Aluminum, DIN 43729	53	M20 x 1.5	★
Y	HR-A/BL (BUS), Aluminum	53	M20 x 1.5	★
A(1)	TZ-A/BL (BUZH), Aluminum	53	1/2 in. NPT	★
R	GN-BL, Aluminum, DIN 43729	53	1/2 in. NPT	★
Z	HR-A/BL (BUS), Aluminum	53	1/2 in. NPT	★
Sensor Connection				
Standard				**Standard**
2	Terminal Block DIN Form B Style			★
Number of Elements				
Standard				**Standard**
01	Single			★
02	Dual			★
Thermocouple Type (More info on Table 10 on page 302)		**Tolerance class acc. to IEC 584 (DIN EN 60584-2)**		
Standard				**Standard**
K	K	Class 1		★
Wire Diameter in Millimeters		**Thermocouple Type**	**Max. Temperature (°C)(2)**	
Standard				**Standard**
13	1.38 mm (Use with Dual Element)	K	1200	★
20	2 mm (Use with Single Element)	K	1200	★

Rosemount 1075 and 1099 Series

TABLE 1. Rosemount 1075 Series Immersion Thermocouples with Metal Protection Tube (Design BM) Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Protection Tube Material (More info on Table 12 on page 304)		**Inner Tube Material**	**Max. Temperature (°C)[3]**	
Standard				**Standard**
A	1.4762 (AISI 446), 15 x 2	Not Required	1200 (K)	★
B	1.4841 (AISI 314), 15 x 2	Not Required	1200 (K)	★
Nominal Length (NL) In Millimeters (More info on Figure 4 on page 297)				
Standard				**Standard**
0250	250			★
0500	500			★
0710	710			★
1000	1000			★
XXXX	Other lengths (in 5 mm increments available from 150 to 2000 mm)			★
Process Connection (More info on Table 15 and Table 16 on page 306)		**Material**		
Standard				**Standard**
NN	No Fitting			★
A1	Adjustable stop flange (15 mm)	GTW-35 (cast iron)		★
B1	Adjustable threaded fitting with G 3/4	1.0718 (steel)		★
B4	Adjustable threaded fitting with 3/4 in. NPT	1.0718 (steel)		★
Expanded				
C4	Adjustable Flange 1 in. Class 150 RF	1.4571 (SS316Ti) Flange / 300 series SST fitting		
C5	Adjustable Flange 1 in. Class 300 RF	1.4571 (SS316Ti) Flange / 300 series SST fitting		
C6	Adjustable Flange 1 in. Class 600 RF	1.4571 (SS316Ti) Flange / 300 series SST fitting		
D4	Adjustable Flange 1 1/2 in. Class 150 RF	1.4571 (SS316Ti) Flange / 300 series SST fitting		
D5	Adjustable Flange 1 1/2 in. Class 300 RF	1.4571 (SS316Ti) Flange / 300 series SST fitting		
D6	Adjustable Flange 1 1/2 in. Class 600 RF	1.4571 (SS316Ti) Flange / 300 series SST fitting		
E4	Adjustable Flange 2 in. Class 150 RF	1.4571 (SS316Ti) Flange / 300 series SST fitting		
E5	Adjustable Flange 2 in. Class 300 RF	1.4571 (SS316Ti) Flange / 300 series SST fitting		
E6	Adjustable Flange 2 in. Class 600 RF	1.4571 (SS316Ti) Flange / 300 series SST fitting		
F4[4]	Welded Flange 1 in. Class 150 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		
F5[4]	Welded Flange 1 in. Class 300 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		
F6[4]	Welded Flange 1 in. Class 600 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		
G4[4]	Welded Flange 1 1/2 in. Class 150 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		
G5[4]	Welded Flange 1 1/2 in. Class 300 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		
G6[4]	Welded Flange 1 1/2 in. Class 600 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		
H4[4]	Welded Flange 2 in. Class 150 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		
H5[4]	Welded Flange 2 in. Class 300 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		
H6[4]	Welded Flange 2 in. Class 600 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		

TABLE 1. Rosemount 1075 Series Immersion Thermocouples with Metal Protection Tube (Design BM) Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Holding Tube Material		
Standard		**Standard**
N	No Holding Tube Required	★
Holding Tube Length (RL) in Millimeters		
Standard		**Standard**
000	No Holding Tube Length	★

Options (Include with selected model number)

Flange Immersion Length		
Standard		**Standard**
U1500	Length from Welded flange face to sensor tip (1500 mm)	★
UXXXX	Non-standard length form Welded flange face to sensor (xxxx mm)	★
Drawing		
Standard		**Standard**
M99	Order specific drawing	★
Assemble to Options		
Standard		**Standard**
XA	Fit sensor to temperature transmitter	★
Work Certificates		
Standard		**Standard**
W02	Works Cert: Comparison measurement at 2 temperature points (WERKSZERTIFIKAT)	★
W05	Works Cert: Comparison measurement at 5 temperature points (WERKSZERTIFIKAT)	★
Calibration Certificate		
Standard		**Standard**
K02	DKD Calibration Cert: DKD Cert for 2 temperature points specified by customer	★
K05	DKD Calibration Cert: DKD Cert for 5 temperature points specified by customer	★

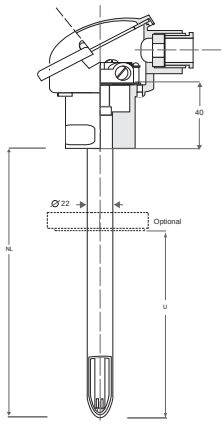
(1) Connection head suitable for mounting a transmitter inside (Rosemount 248 and 644)

(2) Maximum allowable temperature for the protection tube material and thermocouple type combination.

(3) Maximum temperature for Class 1: 1000 °C (1832 °F). Higher temperatures Class 2

(4) Welded-on flange immersion length (U) must be less than the nominal length (NL) minus 50 mm.

Rosemount 1075 Series Immersion Thermocouples with Metal Protection Tube (Design AM)





The Rosemount 1075 Model 2 is designed to serve high temperature needs up to 1200 °C (2192 °F).

Features include:

- Ceramic insulated Type K thermocouples for oxidation prevention
- Calibration services to give you insight to sensor performance (Option codes W02, W05, K02, and K05)
- Variety of DIN A connection heads
- Longest possible 1075 design
- Nominal Length (NL) up to 6000 mm
- High temperature resistance steel protection tubes
- Assemble to Transmitter options (Option Code XA)

TABLE 2. Rosemount 1075 Series Immersion Thermocouples with Metal Protection Tube (Design AM) Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	**Product Description**			
1075	High Temperature Thermocouple			
Model	**Design**			
Standard				**Standard**
2	AM - DIN A with Metal Protection Tube (Max Temp 1200 °C, Max length 6000 mm)			★
Connection Head (DIN Form A Style) (More info on Figure 3 on page 296)		**IP Rating**	**Conduit Entry**	
E	HR-AL (AUS), Aluminum	53	M20 x 1.5	★
G(1)	TZ-AL (AUZH), Aluminum	53	M20 x 1.5	★
P	GN-AL, Aluminum, DIN 43729	53	M20 x 1.5	★
B	HR-AL (AUS), Aluminum	53	1/2 in. NPT	★
F(1)	TZ-AL (AUZH), Aluminum	53	1/2 in. NPT	★
T	GN-AL, Aluminum, DIN 43729	53	1/2 in. NPT	★
Sensor Connection				
Standard				**Standard**
3	Terminal Block DIN Form A Style			★
Number of Elements				
Standard				**Standard**
01	Single			★
02	Dual			★
Thermocouple Type (More info on Table 10 on page 302)		**Tolerance class acc. to IEC 584 (DIN EN 60584-2)**		
Standard				**Standard**
K	K	Class 1		★
Wire Diameter in Millimeters		**Thermocouple Type**	**Max. Temperature (°C)(2)**	
Standard				**Standard**
20	2 mm (Use with Dual Element)	K	1200	★
30	3 mm (Use with Single Element)	K	1200	★

TABLE 2. Rosemount 1075 Series Immersion Thermocouples with Metal Protection Tube (Design AM) Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Code	Protection Tube Material (More info on Table 12 on page 304)	Inner Tube Material	Max. Temperature (°C)[3]	
Standard				**Standard**
C	1.4762 (AISI 446), 22 x 2	Not Required	1200 (K)	★
D	1.4841 (AISI 314), 22 x 2	Not Required	1200 (K)	★
Code	**Nominal Length (NL) in Millimeters (More info on Figure 4 on page 297)**			
Standard				**Standard**
0500	500 mm			★
0710	710 mm			★
1000	1000 mm			★
1400	1400 mm			★
XXXX	Other lengths (in 5 mm increments available from 250 to 6000 mm)			★
Code	**Process Connection (More info on Table 15 and Table 16 on page 306)**	**Material**		
Standard				**Standard**
NN	No Fitting			★
A2	Adjustable stop flange (22 mm)	GTW-35 (cast iron)		★
B2	Adjustable threaded fitting with G 1	1.0718 (steel)		★
B5	Adjustable threaded fitting with 1 in. NPT	1.0718 (steel)		★
Expanded				
C4[4]	Adjustable Flange 1 in. Class 150 RF	1.4571 (SS316Ti) Flange/300 series SST fitting		
C5[4]	Adjustable Flange 1 in. Class 300 RF	1.4571 (SS316Ti) Flange/300 series SST fitting		
C6[4]	Adjustable Flange 1 in. Class 600 RF	1.4571 (SS316Ti) Flange/300 series SST fitting		
D4	Adjustable Flange 1 1/2 in. Class 150 RF	1.4571 (SS316Ti) Flange/300 series SST fitting		
D5	Adjustable Flange 1 1/2 in. Class 300 RF	1.4571 (SS316Ti) Flange/300 series SST fitting		
D6	Adjustable Flange 1 1/2 in. Class 600 RF	1.4571 (SS316Ti) Flange/300 series SST fitting		
E4	Adjustable Flange 2 in. Class 150 RF	1.4571 (SS316Ti) Flange/300 series SST fitting		
E5	Adjustable Flange 2 in. Class 300RF	1.4571 (SS316Ti) Flange/300 series SST fitting		
E6	Adjustable Flange 2 in. Class 600 RF	1.4571 (SS316Ti) Flange/300 series SST fitting		
F4[4][5]	Welded Flange 1 in. Class 150 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		
F5[4][5]	Welded Flange 1 in. Class 300 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		
F6[4][5]	Welded Flange 1 in. Class 600 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		
G4[5]	Welded Flange 1 1/2 in. Class 150 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		
G5[5]	Welded Flange 1 1/2 in. Class 300 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		
G6[5]	Welded Flange 1 1/2 in. Class 600 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		
H4[5]	Welded Flange 2 in. Class 150 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		
H5[5]	Welded Flange 2 in. Class 300 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		
H6[5]	Welded Flange 2 in. Class 600 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		

Rosemount 1075 and 1099 Series

TABLE 2. Rosemount 1075 Series Immersion Thermocouples with Metal Protection Tube (Design AM) Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Holding Tube Material		
Standard		**Standard**
N	No Holding Tube	★
Holding Tube Length (RL) in Millimeters		
Standard		**Standard**
000	No Holding Tube Length	★

Options (Include with selected model number)

Flange Immersion Length		
Standard		**Standard**
U1500	Length from Welded flange face to sensor tip (1500 mm)	★
UXXXX	Non standard length from Welded flange face to sensor tip (xxxx mm)	★
Other		
Standard		**Standard**
M99	Order Specific Drawing	★
Assemble to Options		
Standard		**Standard**
XA	Fit sensor to temperature transmitter	★
Work Certificates		
Standard		**Standard**
W02	Works Cert: Comparison measurement at 2 measurement points (WERKSZERTIFIKAT)	★
W05	Works Cert: Comparison measurement at 5 measurement points (WERKSZERTIFIKAT)	★
Calibration Certificates		
Standard		**Standard**
K02	DKD Calibration Cert: DKD Cert for 2 temperature points specified by customer	★
K05	DKD Calibration Cert: DKD Cert for 5 temperature points specified by customer	★

(1) Connection head suitable for mounting a transmitter inside (Rosemount 248 and 644)

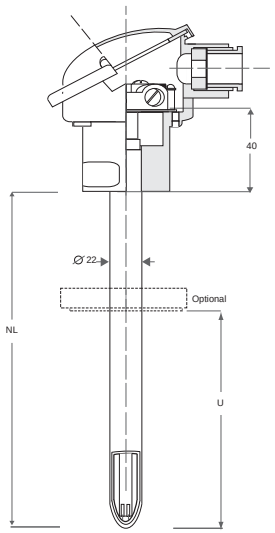
(2) Maximum temperature for Class 1: 1000 °C (1832 °F). Higher temperatures Class 2

(3) Maximum allowable temperature for the protection tube material and thermocouple type combination.

(4) Inner diameter of mating flange (standoff) must be greater then 23 mm.

(5) Welded-on flange immersion length (U) must not be greater than nominal length (NL) minus 50 mm.

Rosemount 1075 Series Immersion Thermocouples with Metal Protection Tube and with Ceramic Inner Tube (Design AMK)



The Rosemount 1075 Model 3 is designed to serve advanced high temperature needs up to 1350°C (2462°F).

Features include:

- Ceramic insulated precious metal R, S, or B thermocouples model 1099
- Dual protection tubes for long sensor lifetimes and combinations of metal and ceramic advantages
- Calibration services to give you insight to sensor performance (Option codes W02, W05, K02, and K05)
- Variety of DIN A connection heads
- Nominal Length (NL) up to 4000 mm
- High temperature resistance steel protection tubes and ceramic inner tubes
- Assemble to Model 1099 precious metal thermocouple option (Option Code XB)
- Assemble to Transmitter options (Option Code XA)

TABLE 3. Rosemount 1075 Series Immersion Thermocouples with Metal Protection Tube and with Ceramic Inner Tube (Design AMK) Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description			
1075	High Temperature Thermocouple			
Design				
Standard				**Standard**
3	AMK - DIN A with Metal Protection Tube and Ceramic Inner Tube (Max Temp 1350 °C, Max length 4000 mm)			★
Connection Head (DIN Form A Style) (More info on Figure 3 on page 296)		**IP Rating**	**Conduit Entry**	
Standard				**Standard**
E	HR-AL (AUS), Aluminum	53	M20 x 1.5	★
G(1)	TZ-AL (AUZH), Aluminum	53	M20 x 1.5	★
P	GN-AL, Aluminum, DIN 43729	53	M20 x 1.5	★
B	HR-AL (AUS), Aluminum	53	1/2 in. NPT	★
F(1)	TZ-AL (AUZH), Aluminum	53	1/2 in. NPT	★
T	GN-AL, Aluminum, DIN 43729	53	1/2 in. NPT	★
Sensor Connection				
Standard				**Standard**
3	Terminal Block DIN Form A Style			★
Number of Elements				
Standard				**Standard**
XX	Specify “XX” here. Choose Number of Elements in 1099 model			★
Thermocouple Type (More info on Table 10 on page 302)				
Standard				**Standard**
X	Specify “X” here. Choose Thermocouple Type in 1099 model			★

Rosemount 1075 and 1099 Series

TABLE 3. Rosemount 1075 Series Immersion Thermocouples with Metal Protection Tube and with Ceramic Inner Tube (Design AMK) Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Wire Diameter (mm)		**Thermocouple Type**	**Max. Temperature (°C)**	
Standard				**Standard**
XX	Specify “XX” here. Choose Wire Diameter in 1099 model	B, R, S	1600 / R, S; 1800 / B	★
Protection Tube Material (More info on Table 12 on page 304)		**Inner Tube Material**	**Max. Temperature (°C)(2)**	
Standard				**Standard**
E	1.4762 (AISI 446), 22 x 2	Type C610, 15 x 2	1200 (B, R, S)	★
F	1.4841 (AISI 314), 22 x 2	Type C610, 15 x 2	1200 (B, R, S)	★
G	1.4767 (Kanthal AF), 22 x 2	Type C610, 15 x 2	1350 (B, R, S)	★
Nominal Length (NL) in Millimeters (More info on Figure 4 on page 297)				
Standard				**Standard**
0500	500 mm			★
0710	710 mm			★
1000	1000 mm			★
1400	1400 mm			★
XXXX	Other lengths (in 5 mm increments available from 250 to 4000)			★
Process Connection (More info on Table 15 and Table 16 on page 306)		**Material**		
Standard				**Standard**
NN	No Fitting			★
A2	Adjustable stop flange (22 mm)	GTW-35 (cast iron)		★
B2	Adjustable threaded fitting with G1	1.0718 (steel)		★
B5	Adjustable threaded fitting with 1 in. NPT	1.0718 (steel)		★
Expanded				
C4(3)	Adjustable Flange 1 in. Class 150 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
C5(3)	Adjustable Flange 1 in. Class 300 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
C6(3)	Adjustable Flange 1 in. Class 600 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
D4	Adjustable Flange 1 1/2 in. Class 150 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
D5	Adjustable Flange 1 1/2 in. Class 300 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
D6	Adjustable Flange 1 1/2 in. Class 600 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
E4	Adjustable Flange 2 in. Class 150 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
E5	Adjustable Flange 2 in. Class 300 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
E6	Adjustable Flange 2 in. Class 600 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
F4(4)	Welded Flange 1 in. Class 150 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		
F5(3)(4)	Welded Flange 1 in. Class 300 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		
F6(3)(4)	Welded Flange 1 in. Class 600 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		
G4(3)	Welded Flange 1 1/2 in. Class 150 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		
G5(3)	Welded Flange 1 1/2 in. Class 300 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		

TABLE 3. Rosemount 1075 Series Immersion Thermocouples with Metal Protection Tube and with Ceramic Inner Tube (Design AMK) Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

G6(3)	Welded Flange 1 1/2 in. Class 600 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange	
H4(3)	Welded Flange 2 in. Class 150 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange	
H5(3)	Welded Flange 2 in. Class 300 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange	
H6(3)	Welded Flange 2 in. Class 600 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange	
Holding Tube Material			
Standard			**Standard**
N	No Holding Tube		★
Holding Tube Length (RL) in MIllimeters			
Standard			**Standard**
000	No Holding Tube Length		★

Options (Include with selected model number)

Flange Immersion Length		
Standard		**Standard**
U1500	Length from Welded flange face to sensor tip (1500 mm)	★
UXXXX	Length from Welded flange face to sensor tip Non-standard length (xxxx mm)	★
Drawing		
Standard		**Standard**
M99	Order Specific Drawing	★
Assemble to Options		
Standard		**Standard**
XA(5)	Fit sensor to temperature transmitter	★
Assemble to Precious Metal Thermocouple Wire		
Standard		**Standard**
XB(6)	Assemble to precious-metal thermocouple wire (B,R,S) Model 1099 on Table 7	★
Work Certificate		
Standard		**Standard**
W02	Works Cert: Comparison measurement at 2 measurement points (WERKSZERTIFIKAT)	★
W05	Works Cert: Comparison measurement at 5 measurement points (WERKSZERTIFIKAT)	★
Calibration Certificate		
Standard		**Standard**
K02	DKD Calibration Cert: DKD Cert for 2 temperature points specified by customer	★
K05	DKD Calibration Cert: DKD Cert for 5 temperature points specified by customer	★

(1) Connection head suitable for mounting a transmitter inside (Rosemount 248 and 644).

(2) Maximum allowable temperature for the protection tube material and thermocouple type combination.

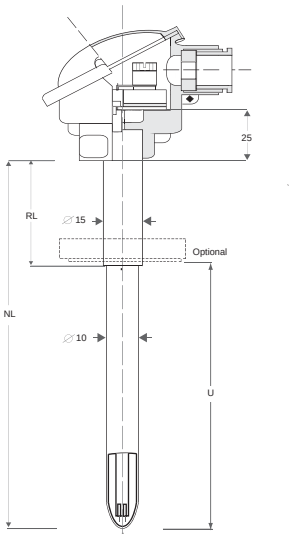
(3) Inner diameter of mating flange (standoff) must be greater then 23 mm.

(4) Welded-on flange immersion length (U) must be less than nominal length (NL) minus 50 mm.

(5) Code "XA" must be specified in the 1075, 1099, and Transmitter model code.

(6) Code "XB" must be specified in both 1075 and 1099 model for proper assembly.

Rosemount 1075 Series Immersion Thermocouples with Ceramic Protection Tube (Design BK)



The Rosemount 1075 Model 4 is designed to serve basic high temperature needs for smallest diameters up to 1800 °C (3272°F).

Features include:

- Ceramic insulated Base metal Type K thermocouples
- Ceramic insulated precious metal R, S, or B thermocouples model 1099
- Calibration services to give you insight to sensor performance (Option codes W02, W05, K02, and K05)
- Variety of DIN B connection heads
- Design with smallest diameter for ceramic protection tube
- Nominal Length (NL) up to 1000 mm
- High temperature resistance ceramic protection tubes
- Assemble to Model 1099 precious metal thermocouple option (Option Code XB)
- Assemble to Transmitter options (Option Code XA)

TABLE 4. Rosemount 1075 Series Immersion Thermocouples with Ceramic Protection Tube (Design BK) Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description			
Standard				**Standard**
1075	High Temperature Thermocouple			★
Product Form				
Standard				**Standard**
4	BK - DIN Form B with Ceramic Protection Tube (Max Temp 1800 °C, Max length 1000 mm)			★
Connection Head (DIN Form B Style) (More info on Figure 3 on page 296)		**IP Rating**	**Conduit Entry**	
Standard				**Standard**
L(1)	TZ-A/BL (BUZH), Aluminum	53	M20 x 1.5	★
U	GN-BL, Aluminum, DIN 43729	53	M20 x 1.5	★
Y	HR-A/BL (BUS), Aluminum	53	M20 x 1.5	★
A(1)	TZ-A/BL (BUZH), Aluminum	53	1/2 in. NPT	★
R	GN-BL, Aluminum, DIN 43729	53	1/2 in. NPT	★
Z	HR-A/BL (BUS), Aluminum	53	1/2 in. NPT	★
Sensor Connection				
Standard				**Standard**
2	Terminal Block DIN Form B Style			★
Number of Elements				
Standard				**Standard**
01	Single (Type K thermocouple only)			★
02	Dual (Type K thermocouple only)			★
XX	Specify “XX” here for Type B, R, S thermocouples. Choose Number of Elements in 1099 model.			★

TABLE 4. Rosemount 1075 Series Immersion Thermocouples with Ceramic Protection Tube (Design BK) Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Thermocouple Type (More info on Table 10 on page 302)		**Tolerance Class acc. to IEC 584 (DIN EN 60584-2)**		
Standard				**Standard**
K	K	Class 1		★
X	Specify “X” here for Type B, R, S thermocouples. Choose Thermocouple Type in 1099 model. See model 1099 Table 7.			★
Wire Diameter (mm)		**Thermocouple Type**	**Max. Temperature (°C)**	
Standard				**Standard**
13	1.38	K	1200[(2)]	★
XX	Specify “XX” here for Type B, R, S thermocouples. Choose Wire Diameter in 1099 model	B, R, S	See model 1099 on Table 7	★
Protection Tube Material (More info on Table 12 on page 304)		**Inner Tube Material**	**Max. Temperature (°C)[(3)]**	
Standard				**Standard**
J	Type C610 / 10 x 1.5	Not Required	1200 (K); 1400 (R, B, S)	★
L	Type C799 / 10 x 1.5	Not Required	1600 (R, S)[(4)]; 1800 (B)[(4)]	★
Nominal Length (NL) (mm) (More info on Figure 4 on page 297)				
Standard				**Standard**
0250	250			★
0500	500			★
0710	710			★
XXXX	Other lengths (in 5 mm increments available from 150 to 1000 mm)			★
Process Connection (More info on Table 15 and Table 16 on page 306)		**Material**		
Standard				**Standard**
NN	No Fitting			★
A1	Adjustable stop flange (15 mm)	GTW-35 (cast iron)		★
B1	Adjustable threaded fitting with G $^3/_4$	1.0718 (steel)		★
B4	Adjustable threaded fitting with $^3/_4$ in. NPT	1.0718 (steel)		★
Expanded				
C4	Adjustable Flange 1 in. Class 150 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
C5	Adjustable Flange 1 in. Class 300 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
C6	Adjustable Flange 1 in. Class 600 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
D4	Adjustable Flange 1 $^1/_2$ in. Class 150 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
D5	Adjustable Flange 1 $^1/_2$ in. Class 300 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
D6	Adjustable Flange 1 $^1/_2$ in. Class 600 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
E4	Adjustable Flange 2 in. Class 150 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
E5	Adjustable Flange 2 in. Class 300 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
E6	Adjustable Flange 2 in. Class 600 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
F4[(5)]	Welded Flange 1 in. Class 150 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		

TABLE 4. Rosemount 1075 Series Immersion Thermocouples with Ceramic Protection Tube (Design BK) Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

F5[5]	Welded Flange 1 in. Class 300 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange	
F6[5]	Welded Flange 1 in. Class 600 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange	
G4[5]	Welded Flange 1 1/2 in. Class RF 150 Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange	
G5[5]	Welded Flange 1 1/2 in. Class 300 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange	
G6[5]	Welded Flange 1 1/2 in. Class 600 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange	
H4[5]	Welded Flange 2 in. Class 150 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange	
H5[5]	Welded Flange 2 in. Class 300 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange	
H6[5]	Welded Flange 2 in. Class 600 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange	
Holding Tube Material			
Standard			**Standard**
A	1.4762 (AISI 446), 15 x 2		★
B	1.4841 (AISI 314), 15 x 2		★
C	1.0305 (AISI A106-A), 15 x 2		★
Holding Tube Length (RL) in Millimeters			
Standard			**Standard**
095	95		★
Expanded			
XXX	Other length (in 5 mm increments, min. length 95 mm)		

Options (Include with selected model number)

Flange Immersion Length		
Standard		**Standard**
U1500	Length from Welded flange face to sensor tip (1500 mm).	★
UXXXX	Length from Welded flange face to sensor tip Non-Standard length (xxxx mm) must be welded to Holding tube	★
Drawing		
Standard		**Standard**
M99	Order Specific Drawing	★
Assemble to Options		
Standard		**Standard**
XA[6]	Assemble sensor to temperature transmitter	★
Assemble to Precious Metal Thermocouple Wire		
Standard		**Standard**
XB[7]	Assemble to precious-metal thermocouple wire (B, R, S) Model 1099 on Table 7	★
Work Certificate		
Standard		**Standard**
W02	Works Cert: Comparison measurement at 2 measurement points (WERKSZERTIFIKAT)	★
W05	Works Cert: Comparison measurement at 5 measurement points (WERKSZERTIFIKATE)	★
Calibration Certificate		
Standard		**Standard**
K02	DKD Calibration Cert: DKD Cert for 2 temperature points specified by customer	★
K05	DKD Calibration Cert: DKD Cert for 5 temperature points specified by customer	★

(1) Connection head suitable for mounting a transmitter inside (Rosemount 248 and 644)

(2) Maximum temperature for Class 1: 1000 °C (1832 °F). Higher temperatures Class 2

(3) Maximum allowable temperature for the protection tube material and thermocouple type combination.

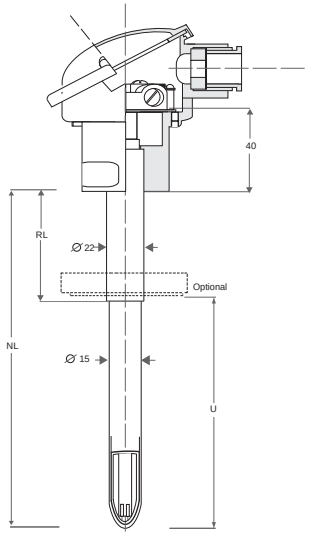
(4) Temperature limit for wire diameter 0.5 mm, wire diameter 0.35 mm has lower limits. See 1099 model.

(5) Welded-on flange immersion length (U) must be less than Nominal length (NL) minus 50 mm. Immersion length (U) must also be greater than Nominal length minus Holding tube length (NL - RL).

(6) Code "XA" must be specified in the 1075, 1099, and Transmitter model code.

(7) Code "XB" must be specified in both 1075 and 1099 model for proper assembly

Rosemount 1075 Series Immersion Thermocouples with Ceramic Protection Tube (Design AK)



The Rosemount 1075 Model 5 is designed to serve basic high temperature needs up to 1800 °C (3272°F).

Features include:

- Ceramic insulated Base metal Type K thermocouples
- Ceramic insulated precious metal R, S, or B thermocouples model 1099
- Calibration services to give you insight to sensor performance (Option codes W02, W05, K02, and K05)
- Variety of DIN A connection heads
- Nominal Length (NL) up to 2000 mm
- High temperature resistance ceramic protection tubes
- Assemble to Model 1099 precious metal thermocouple option (Option Code XB)
- Assemble to Transmitter options (Option Code XA)

TABLE 5. Rosemount 1075 Series Immersion Thermocouples with Ceramic Protection Tube (Design AK)

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description			
1075	High Temperature Thermocouple			
Product Design				
Standard				**Standard**
5	AK - DIN A with Ceramic Protection Tube (Max Temp 1800 °C, Max length 2000 mm)			★
Connection Head (DIN Form A Style) (More info on Figure 3 on page 296)		**IP Rating**	**Conduit Entry**	
Standard				**Standard**
E	HR-AL (AUS), Aluminum	53	M20 x 1.5	★
G(1)	TZ-AL (AUZH), Aluminum	53	M20 x 1.5	★
P	GN-AL, Aluminum, DIN 43729	53	M20 x 1.5	★
B	HR-AL (AUS), Aluminum	53	1/2 in. NPT	★
F(1)	TZ-AL (AUZH), Aluminum	53	1/2 in. NPT	★
T	GN-AL, Aluminum, DIN 43729	53	1/2 in. NPT	★
Sensor Connection				
Standard				**Standard**
3	Terminal Block, DIN Form A Style			★
Number of Elements				
Standard				**Standard**
01	Single (Type K thermocouple only)			★
02	Dual (Type K thermocouple only)			★
XX	Specify “XX” here for Type B, R, S thermocouples. Choose Number of Elements in 1099 model.			★
Thermocouple Type (More info on Table 10 on page 302)		**Tolerance Class acc. to IEC 584 (DIN EN 60584-2)**		
Standard				**Standard**
K	K	Class 1		★
X	Specify “X” here for Type B, R, S thermocouples. Choose Thermocouple Type in 1099 model on Table 7			★

TABLE 5. Rosemount 1075 Series Immersion Thermocouples with Ceramic Protection Tube (Design AK)

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Wire Diameter (in Millimeters)		**Thermocouple Type**	**Max. Temperature (°C)**	
Standard				**Standard**
13	1.38 (Use with Dual Element)	K	1200[2]	★
30	3.0 (Use with Single Element)	K	1200[2]	★
XX	Specify "XX" here for Type B, R, S thermocouples. Choose Wire Diameter in 1099 Model	B, R, S	See model 1099 on Table 7	★
Protection Tube Material (More info on Table 12 on page 304)		**Inner Tube Material**	**Max. Temperature (°C)[3]**	
Standard				**Standard**
P	Type C610, 15 x 2	Not Required	1200 (K); 1400 (R, S, B)	★
R	Type C799, 15 x 2	Not Required	1600 (R, S)[4]; 1800 (B)[4]	★
Nominal Length (NL) in Millimeters (More info on Figure 4 on page 297)				
Standard				**Standard**
0500	500 mm			★
0710	710 mm			★
1000	1000 mm			★
1400	1400 mm			★
XXXX	Other lengths (in 5 mm increments available from 250 to 2000 mm)			★
Process Connection (More info on Table 16 on page 306)		**Material**		
Standard				**Standard**
NN	No fitting			★
A2	Adjustable stop flange (22 mm)	GTW-35 (cast iron)		★
B2	Adjustable threaded fitting with G 1	1.0718 (steel)		★
B5	Adjustable threaded fitting with 1 in. NPT	1.0718 (steel)		★
Expanded				
C4[5]	Adjustable Flange 1 in. Class 150 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
C5[5]	Adjustable Flange 1 in. Class 300 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
C6[5]	Adjustable Flange 1 in. Class 600 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
D4	Adjustable Flange 1 1/2 in. Class 150 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
D5	Adjustable Flange 1 1/2 in. Class 300 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
D6	Adjustable Flange 1 1/2 in. Class 600 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
E4	Adjustable Flange 2 in. Class 150 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
E5	Adjustable Flange 2 in. Class 300 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
E6	Adjustable Flange 2 in. Class 600 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		
F4[5][6]	Welded Flange 1 in. Class 150 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		
F5[5][6]	Welded Flange 1 in. Class 300 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		
F6[5][6]	Welded Flange 1 in. Class 600 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		
G4[5]	Welded Flange 1 1/2 in. Class 150 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		

Rosemount 1075 and 1099 Series

TABLE 5. Rosemount 1075 Series Immersion Thermocouples with Ceramic Protection Tube (Design AK)

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

G5(5)	Welded Flange 1 1/2 in. Class 300 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange	
G6(5)	Welded Flange 1 1/2 in. Class 600 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange	
H4(5)	Welded Flange 2 in. Class 150 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange	
H5(5)	Welded Flange 2 in. Class 300 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange	
H6(5)	Welded Flange 2 in. Class 600 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange	
Holding Tube Material			
Standard			**Standard**
D	1.4762 (AISI 446), 22 x 2		★
E	1.4841 (AISI 316), 22 x 2		★
F	1.0305 (ASTM A106-A), 22 x 2		★
Holding Tube Length (RL) in Millimeters			
Standard			**Standard**
095	95		★
Expanded			
XXX	Other length (in 5 mm increments, min. length 95 mm)		

Options (Include with selected model number)

Flange Immersion Length		
Standard		**Standard**
U1500	Length from Welded flange face to sensor tip (1500 mm). Must be welded to Holding tube	★
UXXXX	Non standard length from Welded flange face to sensor tip (xxxx mm). Must be welded to Holding tube	★
Drawing		
Standard		**Standard**
M99	Order Specific Drawing	★
Assemble to Options		
Standard		**Standard**
XA(7)	Assemble sensor to temperature transmitter	★
Assemble to Options		
Standard		**Standard**
XB(8)	Assembles to precious metal thermocouple wire (B, R, S) Model 1099 Table 7	★
Work Certificate		
Standard		**Standard**
W02	Works Cert: Comparison measurement at 2 measurement points (WERKSZERTIFIKAT)	★
W05	Works Cert: Comparison measurement at 5 measurement points (WERKSZERTIFIKAT)	★
Calibration Certificate		
Standard		**Standard**
K02	DKD Calibration Cert: DKD Cert for 2 temperature points specified by customer	★
K05	DKD Calibration Cert: DKD Cert for 5 temperature points specified by customer	★

(1) Connection head suitable for mounting a transmitter inside (Rosemount 248 and 644)

(2) Maximum temperature for Class 1: 1000 °C (1832 °F). Higher temperatures Class 2

(3) Maximum allowable temperature for the protection tube material and thermocouple type combination.

(4) Temperature limit for wire diameter 0.5 mm, wire diameter 0.35 mm has lower limits. See 1099 model.

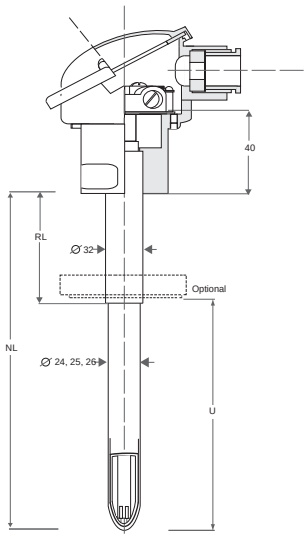
(5) Inner diameter of mating flange (standoff) must be greater then 23 mm.

(6) Welded-on flange immersion length (U) must be less than Nominal Length (NL) minus 50 mm. Immersion length (UL) must also be greater than Nominal length minus Holding tube length (NL - RL).

(7) Code "XA" must be specified in the 1075, 1099, and Transmitter model code.

(8) Code "XB" must be specified in both 1075 and 1099 model for proper assembly.

Rosemount 1075 Series Immersion Thermocouples with Ceramic Protection Tube and Ceramic Inner Tube (Design AKK)



The Rosemount 1075 Model 6 is designed to serve advanced high temperature needs up to 1800 °C (3272°F).

Features include:

- Ceramic insulated Base metal Type K thermocouples
- Ceramic insulated precious metal R, S, or B thermocouples model 1099
- Dual protection tubes for long sensor lifetimes and combinations of metal and ceramic advantages
- Calibration services to give you insight to sensor performance (Option codes W02, W05, K02, and K05)
- Variety of DIN A connection heads
- Nominal Length (NL) up to 2000 mm
- High temperature resistance ceramic protection tubes and inner tubes
- Assemble to Model 1099 precious metal thermocouple option (Option Code XB)
- Assemble to Transmitter options (Option Code XA)

TABLE 6. Rosemount 1075 Series Immersion Thermocouple with Ceramic Protection Tube and Ceramic Inner Tube (Design AKK) Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description			
1075	High Temperature Thermocouple			
Design				
Standard				**Standard**
6	AKK - DIN Form A with Ceramic Protection Tube and Inner Tube (Max Temp 1800 °C, Max length 2000 mm)			★
Connection Head (DIN Form A Style) (More info on Figure 3 on page 296)		**IP Rating**	**Conduit Entry**	
Standard				**Standard**
E	HR-AL (AUS), Aluminum	53	M20 x 1.5	★
G(1)	TZ-AL (AUZH), Aluminum	53	M20 x 1.5	★
P	GN-AL, Aluminum, DIN 43729	53	M20 x 1.5	★
B	HR-AL (AUS), Aluminum	53	1/2 in. NPT	★
F(1)	TZ-AL (AUZH), Aluminum	53	1/2 in. NPT	★
T	GN-AL, Aluminum, DIN 43729	53	1/2 in. NPT	★
Sensor Connection				
Standard				**Standard**
3	Terminal Block DIN Form A Style			★
Number of Elements				
Standard				**Standard**
01	Single (Type K thermocouple only)			★
02	Dual (Type K thermocouple only)			★
XX	Specify “XX” here for Type B, R, S thermocouples. Choose Number of Elements in 1099. See model 1099 on Table 7			★

Rosemount 1075 and 1099 Series

TABLE 6. Rosemount 1075 Series Immersion Thermocouple with Ceramic Protection Tube and Ceramic Inner Tube (Design AKK) Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Thermocouple Type (More info on Table 10 on page 302)		**Tolerance Class acc. to IEC 584 (DIN EN 60584-2)**		
Standard				**Standard**
K	K	Class 1		★
X	Specify “X” here for Type B, R, S thermocouples. Choose Thermocouple Type in 1099 model. See model 1099 on Table 7			★
Wire Diameter (in Millimeters)		**Thermocouple Type**	**Max. Temperature (°C)**	
Standard				**Standard**
20	2 mm (Use with Dual Element)	K	1200[(2)]	★
30	3 mm (Use with Sing Element)	K	1200[(2)]	★
XX	Specify “XX” here for Type R, B, S thermocouples. Choose Wire Diameter in 1099 Model. See model 1099 on Table 7			★
Protection Tube Material (More info on Table 12 on page 304)		**Inner Tube Material**	**Max. Temperature (°C)[(3)]**	
Standard				**Standard**
T	Type C530, 26 x 4	Type C610, 15 x 2	1200 (K) 1400 (R, S)	★
V	Type C530, 26 x 4	Type C799, 15 x 2,5	1600 (R, S, B)[(4)]	★
W	Type C799, 24 x 3	Type C799, 15 x 2,5	1600 (R, S)[(4)]; 1800 (B)[(4)]	★
Expanded				
Y	Protec, 25 x 3.5	Type C799, 15 x 2.5	1600 (R, S)[(4)]; 1700 (B)[(4)]	
Nominal Length (NL) in Millimeters (More info on Figure 4 on page 297)				
Standard				**Standard**
0500	500 mm			★
0710	710 mm			★
1000	1000 mm			★
1400	1400 mm			★
2000	2000 mm			★
XXXX	Other lengths (in 5 mm increments available from 250 to 2000 mm)			★
Process Connection (More info on Table 15 and Table 16 on page 306)		**Material**		
Standard				**Standard**
NN	No fitting			★
A3	Adjustable stop flange (32 mm)	GTW-35 (cast iron)		★
B3	Adjustable threaded fitting with G 1 1/4	1.0711 (steel)		★
B6	Adjustable threaded fitting with 1 1/4 in. NPT	1.0718 (steel)		★
D4	Adjustable Flange 1 1/2 in. Class 150 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		★
D5	Adjustable Flange 1 1/2 in. Class 300 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		★
D6	Adjustable Flange 1 1/2 in. Class 600 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		★
E4	Adjustable Flange 2 in. Class 150 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		★
E5	Adjustable Flange 2 in. Class 300 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		★
E6	Adjustable Flange 2 in. Class 600 RF	1.4571 (SS316Ti) Flange/ 300 series SST fitting		★
G4[(5)]	Welded Flange 1 1/2 in. Class 150 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange		★

TABLE 6. Rosemount 1075 Series Immersion Thermocouple with Ceramic Protection Tube and Ceramic Inner Tube (Design AKK) Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

G5(5)	Welded Flange 1 1/2 in. Class 300 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange	★
G6(5)	Welded Flange 1 1/2 in. Class 600 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange	★
H4(5)	Welded Flange 2 in. Class 150 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange	★
H5(5)	Welded Flange 2 in. Class 300 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange	★
H6	Welded Flange 2 in. Class 600 RF Requires Flange immersion length (UXXXX)	1.4571 (SS316Ti) Flange	★
Holding Tube Material			
Standard			**Standard**
G	1.4762 (AISI 446), 32 x 2		★
H	1.4841 (AISI 316), 32 x 2		★
J	1.0305 (AISI A106-A), 32 x 2		★
Holding Tube Length (RL) in Millimeters			
Standard			**Standard**
095	95		★
Expanded			
XXX	Other length (in 5 mm increments, min. length 95 mm)		

Options (Include with selected model number)

Flange Immersion Length		
Standard		**Standard**
U1500	Length from Welded flange face to sensor tip (1500 mm). Must be welded to Holding tube	★
UXXXX	Non Standard length from Welded flange face to sensor tip (xxxx mm). Must be welded to Holding tube	★
Drawing		
Standard		**Standard**
M99	Order specific drawing	★
Assemble to Option		
Standard		**Standard**
XA(6)	Assemble sensor to temperature transmitter	★
Assemble to Precious Metal Thermocouple Wire		
Standard		**Standard**
XB(7)	Assemble to precious metal thermocouple wire (B, R, S) Model 1099 on Table 7	★
Work Certificate		
Standard		**Standard**
W02	Works Cert: Comparison measurement at 2 measurement points (WERKSZERTIFIKAT)	★
W05	Works Cert: Comparison measurement at 5 measurement points (WERKSZERTIFIKAT)	★
Calibration Options		
Standard		**Standard**
K02	DKD Calibration Cert: DKD Cert for 2 temperature points specified by customer	★
K05	DKD Calibration Cert: DKD Cert for 5 temperature points specified by customer	★

(1) Connection head suitable for mounting a transmitter inside (Rosemount 248 and 644).

(2) Code "XB" must be specified in both 1075 and 1099 model for proper assembly.

(3) Maximum allowable temperature for the protection tube material and thermocouple type combination.

(4) Temperature limit for wire diameter 0.5 mm, wire diameter 0.35 mm has lower limits. See 1099 model.

(5) Welded-on flange immersion length (U) must be less than Nominal length (NL) minus 50 mm. Immersion length (U) must also be greater than Nominal length minus Holding tube length (NL - RL).

(6) Code "XA" must be specified in the 1075, 1099, and Transmitter model code.

(7) Code "XB" must be specified in both 1075 and 1099 model for proper assembly

Rosemount 1099 High Temperature Thermocouple Wire

The Rosemount Model 1099 is designed to specify the precious metal thermocouple

Features include:

- Ceramic insulated precious metal R, S, or B thermocouples
- Single and Dual elements available
- Two diameters allow optimization of the thermocouple and process conditions
- Assemble to Model 1075 High Temperature thermocouple
- Assemble to Transmitter options (Option Code XA)

TABLE 7. Rosemount 1099 Series Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description			
1099	High Temperature Thermocouple Wire			
Product Form				
Standard				**Standard**
A3	Assembled to 1075 Design AMK			★
A4	Assembled to 1075 Design BK			★
A5	Assembled to 1075 Design AK			★
A6	Assembled to 1075 Design AKK			★
Number of Elements				
Standard				**Standard**
01	Single			★
02	Dual			★
Thermocouple Type (More info on Table 10 on page 302)		**Tolerance class acc. to IEC 584 (DIN EN 60584-2)**		
Standard				**Standard**
B	B	Class 2		★
R	R	Class 1		★
S	S	Class 1		★
Wire Diameter (in Millimeters)		**Thermocouple Type**	**Maximum Temperature (°C)**	
Standard				**Standard**
05[1]	0.5	B, R, S	1600 / R, S; 1800 / B[2]	★
03	0.35	B, R, S	1400 / R, S; 1600 / B	★
Nominal Length (NL) in Millimeters (Must match 1075 nominal length)				
Standard				**Standard**
0250[3]	200 mm			★
0500	500 mm			★
0710	710 mm			★
1000	1000 mm			★
1400[4]	1400 mm			★
2000[5]	2000 mm			★
XXXX	Specify same length as 1075 nominal length (NL)			★

Options (Include with selected model number)

Assemble to Options		
Standard		**Standard**
XA[6]	Assemble to Transmitter	★
Assemble to Precious Metal Thermocouple Wire		
Standard		**Standard**
XB[7]	Assemble to Precious Metal Thermocouple Wire	★

(1) Recommended wire diameter is 0.5 mm (0.02 in.) Larger diameter wire allows higher temperatures and is recommended for long-term stability.

(2) Tolerance class for type B thermocouples undefined above 1700 °C (3092 °F).

(3) Not available on Product Form A5 and A6.

(4) Not available on Product Form A4.

(5) Not available on Product Form A3, A4, and A5.

(6) Code "XA" must be specified in the 1075, 1099, and Transmitter model code.

(7) Code "XB" must be specified in both 1075 and 1099 model for proper assembly.

Rosemount 1075 and 1099 Series

Overview

Introduction

The Rosemount 1075 Series thermocouples conform to the DIN EN 50446 standard with an extended process connection offering, and can be ordered as complete thermocouple assemblies. High temperature thermocouples are used for temperature measurements in heat treatment and combustion processes. They are also suitable for hot gas environments including the glass, ceramic, and metal industries. The most frequent applications are temperature monitoring and control of incinerators, industrial furnaces, and reactors.

Design Overview

The Rosemount 1075 Series thermocouples are offered in six different designs with a wide variety of protection tube material combinations. The different forms reflect the variety of the different designs described in DIN EN 50446 and are divided in two major designs differing in the outer protection tube material and connection head form. DIN A connection heads are higher, have bigger terminal blocks and allow wire diameters up to 3 mm, while DIN B connection heads only allow wire diameters up to 2 mm. Rosemount offers three designs with metal outer protection tubes and three designs with ceramic outer protection tubes. See Table 8.

TABLE 8. Rosemount 1075 and 1099 Series High Temperature Thermocouples

DIN EN 50446 Design	Connection Head Form	Outer Protection Tube	Inner Protection Tube	Description
BM	B	Metal	None	This design consists of a base metal thermocouple Type K and a housing with a protection tube design BM, according to DIN EN 50446. The Type K thermocouple legs are insulated with ceramic elements. Standard materials for protection tubes are heat resistance steel 1.4762 (ASTM 446) and 1.4841 (ASTM 314).
AM	A	Metal	None	This design consists of a base metal thermocouple Type K and a housing with a protection tube design AM, according to DIN EN 50446. The Type K thermocouple legs are insulated with ceramic elements. Standard materials for protection tubes are heat resistant steel 1.4762 (ASTM 446) and 1.4841 (ASTM 314).
AMK	A	Metal	Ceramic	The design consists of a precious metal thermocouple Type R, S, or B and a housing with a protection tube design AMK, according to DIN EN 50446. Precious metal thermocouples are insulated with a ceramic insulating rod and have a gas tight inner tube of ceramic Type C610.
BK	B	Ceramic	None	This design consists of a base metal thermocouple Type K or precious metal thermocouples Type R, S, or B and a housing with a protection tube design BK, according to DIN EN 50446. The Type K thermocouple legs are insulated with ceramic elements. Precious metal thermocouples are insulated with a ceramic insulating rod. Standard materials for the protection tubes are ceramic Types C610 and C799 and the holding tube is made of 1.4762 (ASTM 466), 1.4841 (ASTM 314), or 1.0305 (A106-A).
AK	A	Ceramic	None	This design consists of a base metal thermocouple Type K or precious metal thermocouples Type R, S, or B and a housing with a protection tube design AK, according to DIN EN 50446. The Type K thermocouple legs are insulated with ceramic elements. Precious metal thermocouples are insulated with a ceramic insulating rod. Standard materials for the protection tubes are ceramic Types C610 and C799 and the holding tube is made of 1.4762 (ASTM 466), 1.4841 (ASTM 314), or 1.0305 (A106-A).
AKK	A	Ceramic	Ceramic	This design consists of a base metal thermocouple Type K or precious metal thermocouples Type R, S, or B and a housing with a protection tube design AKK, according to DIN EN 50446. The Type K thermocouple legs are insulated with ceramic elements. Precious metal thermocouples are insulated with a 4-hole insulating rod and have a gas tight inner tube. Standard materials for the protection tubes are ceramic Types C530, C610, and C799. Standard materials for inner tubes are ceramic Types C610 or C799.The holding tube is made of 1.4762 (ASTM 466), 1.4841 (ASTM 314), or 1.0305 (A106-A).

Metal Protection Tube design

The Rosemount 1075 Series thermocouple designs BM, AM, and AMK are designed with an outer protection tube made out of heat resistance stainless steel. This design is laid out for temperature up to 1350 °C and allows a direct mount of the process connection to the protection tube. The outer protection tube is clamped directly into the head by two screws.

Ceramic Protection Tube design

The Rosemount 1075 Series thermocouple designs BK, AK, and AKK are designed with an outer protection tube made out of high heat resistance ceramic. This design is ideal for temperatures up to 1800 °C. A metal holding tube is required to mount the connection head to the ceramic protection tube due to the brittle nature of ceramic.

FIGURE 1. Metal Protection Tube Design

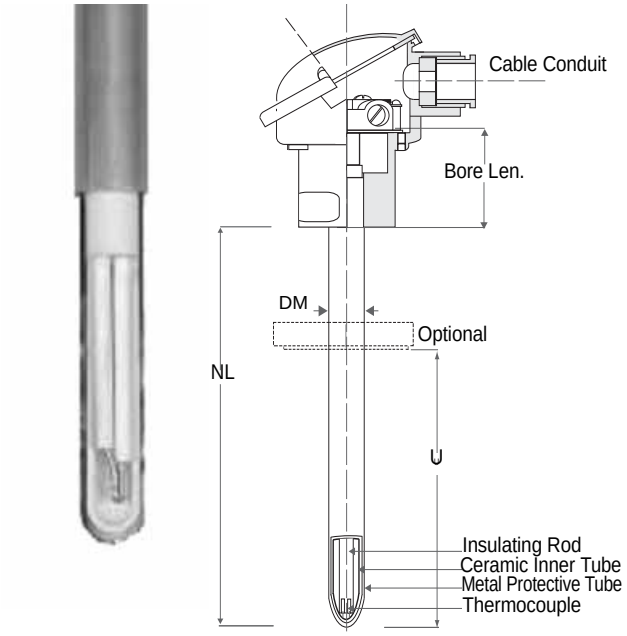
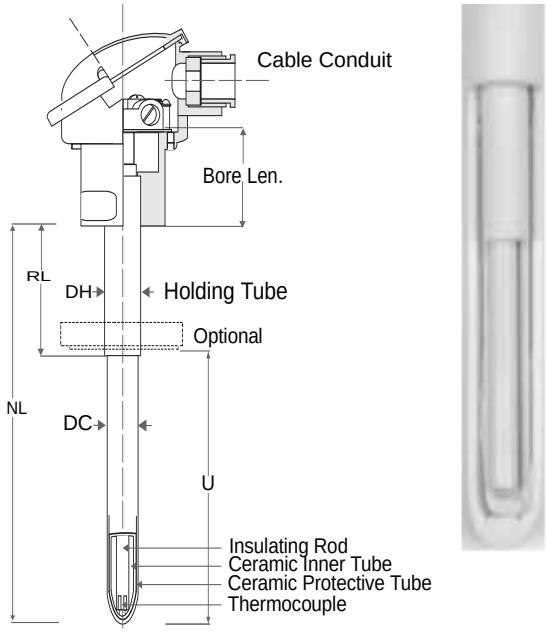


FIGURE 2. Ceramic Protection Tube Design



Connection Heads

DIN A and B

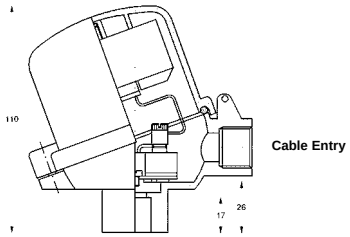
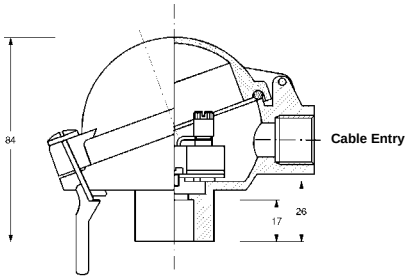
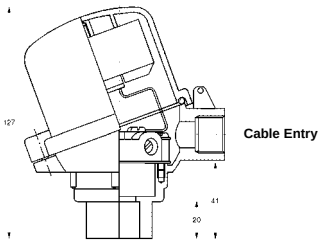
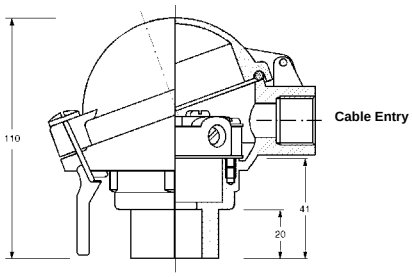
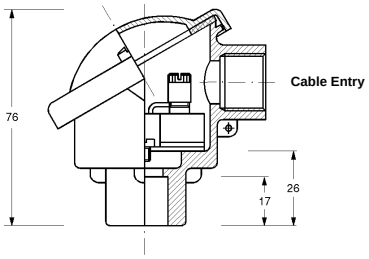
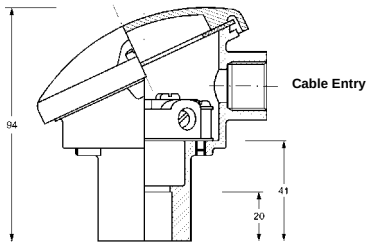
Rosemount offers Connection heads in forms DIN A and DIN B see Figure 3 on page 296. DIN A connection heads allow connection of thermocouple wire diameters up to 3 mm while DIN B connections heads allow thermocouple wire diameters of up to 2 mm due to a smaller hole diameter. DIN A and B connection heads need different terminal blocks to accommodate different mounting screw spacing. The distance from the bottom of the terminal block to the bottom of the connection is 41 mm for DIN A and 26 mm for DIN B connection heads.

Transmitter Mounting

Each form of the Rosemount 1075 Series standard thermocouple has one connection head that allows mounting a transmitter in the head. Only connection heads TZ-AL (AUZH) DIN A (Option G or F for design AM, AMK, AK, AKK) and TZ-A/BL (BUZH) DIN B (Option L or A for design BM and BK) provide enough space to mount a transmitter directly in the connection head Figure 3 on page 296.

Rosemount 1075 and 1099 Series

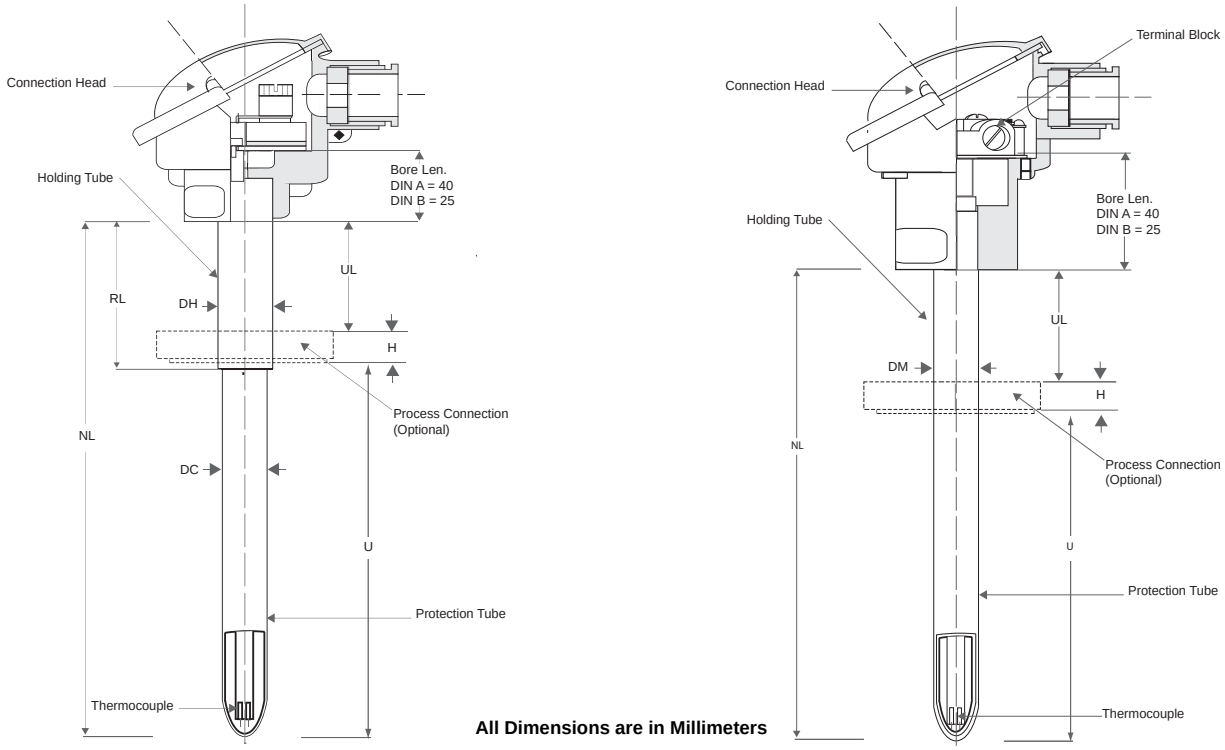
FIGURE 3. Connection Head Dimensional Drawings and Information (All Temperature Limits -40 to 80 °C [-40 to 176 °F])

TZ-A/BL (BUZH) (Option L and A)	HR-A/BL (BUS) (Option Y and Z)
	
Materials: Housing Aluminum; Form B acc. to DIN 43729; Finish Aluminum lacquer; O-Ring Seal Rubber **Weight:** 0.20 kg **Protection Class:** IP 53 **Cable entry:** M20 x1.5 (L) or $^1/_2$ - in. NPT (A) **Cover:** Hinged lid, screw **Transmitter Inst.:** Within cover	**Materials:** Housing Aluminum; Form B acc. to DIN 43729; Finish Aluminum lacquer; O-Ring Seal Rubber **Weight:** 0.24 kg **Protection Class:** IP 53 **Cable entry:** M20 x1.5 (Y) or $^1/_2$ - in. NPT (Z) **Cover:** Hinged lid, with lever lock **Transmitter Inst.:** Not Available
TZ-AL (AUZH) (Option G and F)	**HR-AL (AUS) (Option E and B)**
	
Materials: Housing Aluminum; Form A acc. to DIN 43729; Finish Aluminum lacquer; O-Ring Seal Rubber O-Ring-Seal Rubber **Weight:** 0.22 kg **Protection Class:** IP 53 **Cable entry:** M20 x1.5 (G) or $^1/_2$ - in. NPT (F) **Cover:** Hinged lid, screw **Transmitter Inst.:** Within cover	**Materials:** Housing Aluminum; Form A acc. to DIN 43729; Finish Aluminum lacquer; O-Ring Seal Rubber **Weight:** 0.24 kg **Protection Class:** IP 53 **Cable entry:** M20 x1.5 (E) or $^1/_2$ - in. NPT (B) **Cover:** Hinged lid, with lever lock **Transmitter Inst.:** Not Available
GN-BL (B) (Option U and R)	**GN-AL (A) (Option P and T)**
	
Materials: Housing Aluminum; Form B acc. to DIN 43729; Finish Aluminum lacquer; O-Ring Seal Rubber **Weight:** 0.18 kg **Protection Class:** IP 53 **Cable entry:** M20 x1.5 (U) or $^1/_2$ - in. NPT (R) **Cover:** Loose or removable lid, with 2 screws **Transmitter Inst.:** Not Available	**Materials:** Housing Aluminum; Form A acc. to DIN 43729; Finish Aluminum lacquer; O-Ring Seal Rubber **Weight:** 0.20 kg **Protection Class:** IP 53 **Cable entry:** M20 x1.5 (P) or $^1/_2$ - in. NPT (T) **Cover:** Loose or removable lid, with 2 screws **Transmitter Inst.:** Not Available
Dimensions are in millimeters	

Dimensions

The two basic designs of the Rosemount 1075 Series thermocouples have different dimensions that must be considered when choosing a proper model for the various high temperature applications. Figure 4 and Table 9 are giving an overview and definition of the different dimensions for the designs that are used in the above and following chapters for various calculations.

FIGURE 4. Technical Information



All Dimensions are in Millimeters

TABLE 9. Design Overview

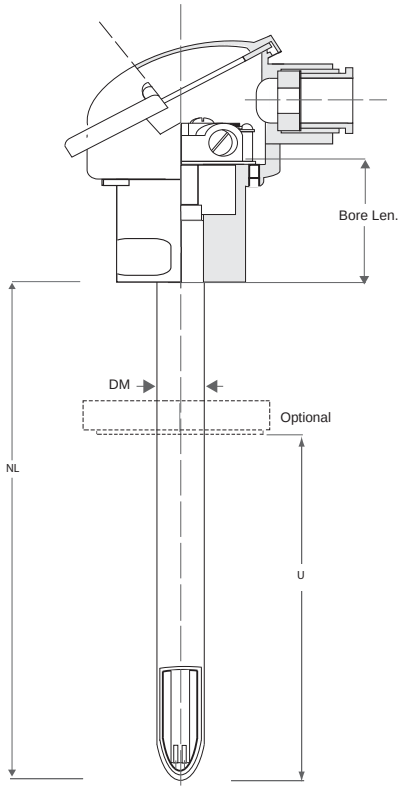
Code	Dimension	Description
NL	Nominal length	Total length of the sensor (from tip of sensor to bottom of connection head) NL = U + H + UL
U	Immersion length	Length of sensor immersed into the process (from tip of sensor to bottom of process connection) (1)
H	Process connection thickness	Used to calculate NL. Accounts for the thickness of the adjustable or welded flange, adjustable stop flange or threaded fitting. See drawings of process connections for more information on page Temperature-304.
UL	Uninsulated length	Used to calculate NL. Additional length, specified by customer, to allow the adjustable connections to have room to move (for adjustment) and any additional length desired outside the process, between the process connection and connection head.
RL	Holding tube length	Required on 1075 Forms 4, 5, and 6. Min. length = 95 mm. When specifying holding tube length also consider that the process connection must be located on the holding tube, so make sure the lengths overlap.
DM	Diameter metal protection tube	Used to calculate adjustable threaded fitting thread and suitable standoff inner diameters.
DH	Diameter holding tube	Used to calculate adjustable threaded fitting thread and suitable standoff inner diameters
DC	Diameter ceramic protection tube	Used to calculate holding tube diameter.
Bore len	Bore length	Bore length of connection head. 40 mm for DIN A head and 25 mm for DIN B head. Automatically added to NL and RL to account for lengths used in connection head.

(1) This value needs to be specified in the Flange Immersion Length Code if a "Welded Flange" process connection is used. U = Uxxxx where the length = xxxx e.g. Immersion length of 750 = U0750. For more information see Figure C.

Metal Protection Tube Dimensions

For Rosemount 1075 Series thermocouples with metal outer protection tube, designs BM, AM, and AMK, only one dimension has to be considered when selecting the proper model without a welded flange process connection. To select the correct nominal length (NL) for the application, consider enough space for process connection (see Process Connections section) and a sufficient uninsulated length (see Uninsulated Length section). When a welded flange is needed for the application, the immersion length U needs to be added to define the position of the flange. The maximum allowed immersion length U can be calculated by subtracting the welded flange height H stated in the Process Connection section from the Nominal Length NL.

FIGURE 5. Metal Protection Tube Dimensions



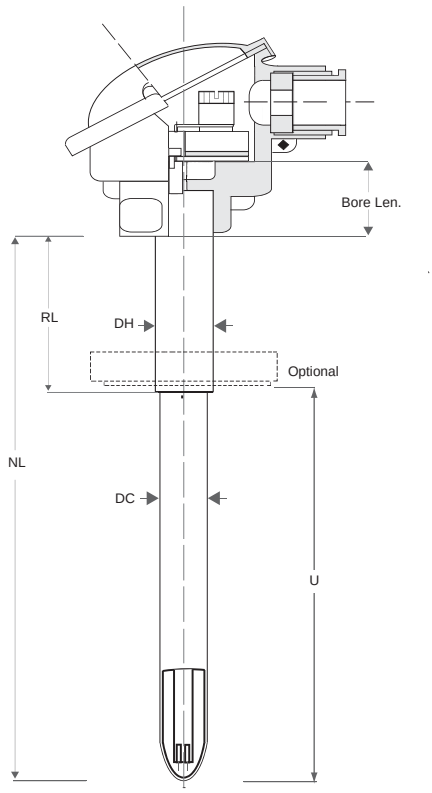
All dimensions are in millimeters

Ceramic Protection Tube Dimensions

For Rosemount 1075 Series thermocouples with ceramic outer protection tube, designs BK, AK, and AKK, the Holding tube length RL and the nominal length NL, must be considered when selecting the proper model without a welded flange process connection. As described in the Holding Tube section, a metal holding tube is needed to connect the ceramic protection tube to the connection head. To select the correct holding tube length for the application consider enough space for process connection, (see Process Connections section) and a sufficient uninsulated length (see Uninsulated Length section). The minimum length of the holding tube RL is restricted to 95 mm and the maximum length is restricted to 999 mm or nominal length NL – 50 mm.

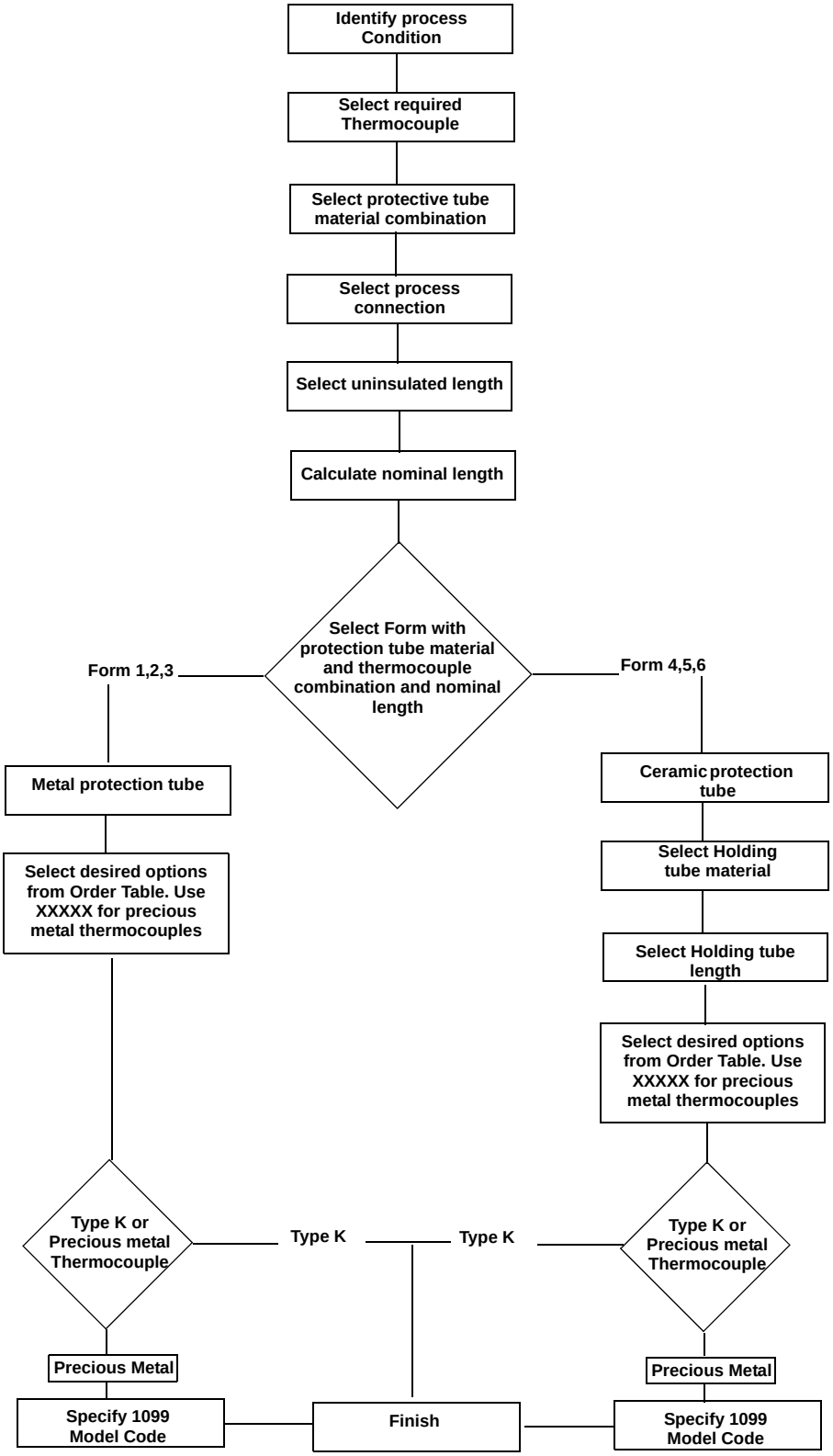
When a welded flange is needed for the application, the immersion length U needs to be added to define the position of the flange on the holding tube. The maximum allowed immersion length U can be calculated by subtracting the holding tube length RL from the nominal length NL.

FIGURE 6. Ceramic Protection Tube Dimension



All dimensions are in millimeters

HOW TO DECIDE WHAT TO ORDER



How to decide what to order

Step 1: Know your process conditions

- Maximum process temperature
- Maximum process pressure
- Danger of thermal shocks (rapid temperature changes)
- Abrasive process medium
- Sulphurous gases in process
- Nitrogenous gases in process
- Required process connection size/type

Step 2: Select the right thermocouple type

- Check maximum temperature
- Consider proper wire diameter for 1099 model code

Step 3: Select protective tube material

- Use process parameters to find best suitable protection tube material
- Combinations of materials possible
- Check column protective tube material code for inner and outer protection tube combinations

Step 4: Select process connection

- Check maximum pressure
- Select proper process connection for application and pressure
- Look up model code and length L1 from appropriate table - if there are more than one L1 available keep all in mind for Step 6

Step 5: Select uninsulated length

- Ensure proper ambient temperature at connection head/transmitter position

Step 6: Calculate nominal length

- Calculate nominal length: Immersion length + process connection height (Step 4) + uninsulated length (Step 5)
- Make two calculations if you have different process connection heights

Step 7: Select 1075 Form

- Use Table 17
- Use protective tube material codes from Step 3 to select possible types
- Use chosen thermocouple type from Step 2 to check if suitable to type
- Check maximum temperature of protection tube/thermocouple combination
- Check maximum length of 1075 design by using the lengths calculated in Step 6
- Check ordering table from information column

Step 8: Select Holding tube material (only for Design BK, AK, and AKK)

- Use Table 18
- Choose proper material for process conditions (Step 1)

Step 9: Select Holding tube length (only for Design BK, AK, and AKK)

- See Dimensions
- Minimum holding tube length 95 mm

Step 10: Select desired options from 1075 ordering tables

- Use ordering table selected in Step 7

Step 11: Select desired options from 1099 ordering table (only for Design AMK, BK, AK, and AKK)

Specification Guide

THERMOCOUPLES

Thermoelectric Effect

A thermocouple is a connection between two different metals that produces a change in Electromagnetic Force (EMF) in comparison to the temperature change that is applied. It provides a thermoelectric voltage in millivolts DC depending on the difference in temperature between the hot (exposed to the measurement temperature) and cold (known temperature) junctions. A thermocouple has two different connected leads (positive and negative). These leads are connected to extension or compensating cables, or directly to the transmitter in a local or remote connection head. The simplest thermocouple consists of two wires welded together at one end which form the measuring tip.

Thermocouple Materials

The IEC 584 (DIN EN 60584) standard defines the basic values and tolerances of the thermocouple types at a temperature range between 0 °C (32 °F) and 1800 °C (3272 °F). For high temperature measurements from 1200 °C (2192 °F) to 1800 °C (3272 °F), a precious-metal thermocouple must be used. Generally, precious-metal (platinum) thermocouples are stable and can be used up to 1800 °C (3272 °F), See Table 10. The most commonly used base metal thermocouple, Type K, covers most industrial applications.

TABLE 10. Characteristics of Standard Thermocouples

Thermocouple Type	Alloy of Leads + / -	Temperature Range	Output [mV d.c.]
K	NiCr-Ni	0 to 1200 °C (32 to 2192 °F)	0 to 48.828
R	PtRh87/13%-Pt	0 to 1600 °C (32 to 2912 °F)	0 to 18.842
S	PtRh90/10%-Pt	0 to 1600 °C (32 to 2912 °F)	0 to 16.771
B	PtRh70/30%-Pt Rh94/6%	0 to 1800 °C (32 to 3272 °F)	0 to 13.585

NOTE
Rosemount 1099 Series precious metal thermocouples (Type B, R, and S) need to be ordered using the model code. For more information, see Table 7 on page 292.

Tolerances

All thermocouples manufactured and supplied by Emerson are in accordance with IEC 584-2 (DIN EN60584-2) limit tolerances. Thermocouples type K, R, and S are supplied in Class1, but thermocouple Type B is supplied in class 2. Calibration of one or more customer-specified measuring points can be provided on request with a DKD-certificate up to 1200 °C (2192 °F) and a works certificate (WERKSZERTIFIKAT from Germany) up to 1300 °C (2372 °F).

TABLE 11. Tolerances of Thermocouples According to DIN EN 60584-2

Type	Alloy	Temperature Range	Tolerance DIN EN 60584-2	Tolerance Class
Base Metal Thermocouples				
K	NiCr-Ni	-40 to 375 °C (-40 to 707 °F) 375 to 1000 °C (707 to 1832 °F)	1.5 °C 0.004 x (t)	1
		-40 to 333 °C (-40 to 631 °F) 333 to 1200 °C (631 to 2192 °F)	2.5 °C 0.0075 x (t)	2
Precious Metal Thermocouples				
R	PtRh87/ 13%-Pt	0 to 1100 °C (32 to 2012 °F) 1100 to 1600 °C (2012 to 2912 °F)	1.0 °C 1 + 0.003 x (t - 1100 °C)	1
		0 to 600 °C (32 to 1112 °F) 600 to 1600 °C (1112 to 2912 °F)	1.5 °C 0.0025 x (t)	2
S	PtRh90/ 10%-Pt	0 to 1100 °C (32 to 2012 °F) 1100 to 1600 °C (2012 to 2912 °F)	1.0 °C 1 + 0.003 x (t - 1100 °C)	1
		0 to 600 °C (32 to 1112 °F) 600 to 1600 °C (1112 to 2912 °F)	1.5 °C 0.0025 x (t)	2
B	PtRh70/ 30%-Pt Rh94/6 %	600 to 1700 °C (1112 to 3092 °F)	0.0025 x (t)	2

Precious metal thermocouples

The Rosemount 1075 and 1099 Series High Temperature Thermocouples offer precious metal thermocouples type B, R, and S. The thermocouple wires of these thermocouple types consist of platinum with various contents of rhodium. These thermocouples are only available for Forms 3, 4, 5, and 6, where ceramic protection tubes are used.

Rosemount 1099 Series Precious Metal Thermocouple Model code

The Rosemount 1099 Series precious metal thermocouples have to be assembled and cannot be ordered as a stand-alone model.

Thermocouple wire diameter

The thermocouple wire diameter varies with the design of the thermocouple. The standard diameter is 0.5 mm (0.02 in.) and is recommended for long-term stability. However, a wire diameter of 0.35 mm (0.01 in.) is also available.

Protection Tube Design

A protection tube shields thermocouples from pressure, flow, corrosion, mechanical and chemical influences. Multiple designs using different materials and alloys were standardized for the use of our thermocouple assemblies. The Rosemount 1075 and 1099 Series offer a wide range of application specific protection tubes dependent on the process conditions.

Outer Protection Tube

Outer protection tubes are exposed directly to all flow, corrosion, mechanical, and chemical influences from the process and are working as a barrier between the thermocouple and the process. Outer protection tubes must be selected for each Form of the Rosemount 1075 Series.

Inner Protection Tube

Inner protections are only available for Form 3 and 6 and are used to increase the lifetime of the thermocouple if the outer protection tube gets damaged or if the outer protection tube can not withstand all the mechanical, corrosive, or chemical influences from the process. In some cases, for the 1075 Type AMK, the metal protection tube protects the inner protection from mechanical damage.

FIGURE 7. Ceramic Protection Tube Design

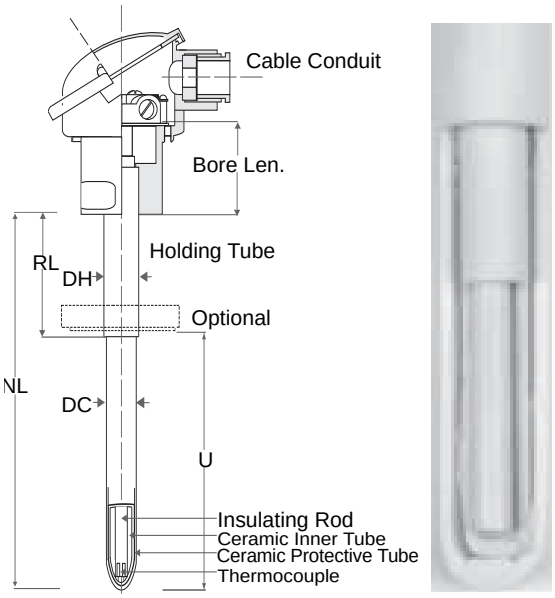


TABLE 12. Protection tube material guide

				Protective Tube Material's Resistance to:					
Protective Tube Material	**Protection Tube material codes outer tube/inner tube**	**Maximum Temperature**	**Suitable for High Pressure (≥ 1 bar)**	**Physical Gas Permeation**	**Thermal shock**	**Chemical Sulfurous Gases**	**Chemical Nitrogenous Gases**	**Abrasion**	**Application Example**
Metal Protective Tubes									
1.4762 ASTM 446	A, C, E	1200 °C	Yes	No	High	High	Low	Low	Combustion exhausts, cement and ceramic furnaces, thermal treatment processes, annealing furnaces
1.4767 Kathal AF™	G	1350 °C	Yes	No	High	High	Low	High	Industrial furnaces, glass, ceramic, and cement industry, refuse incinerators
1.4841 ASTM 314	B, D, F	1200 °C	Yes	No	High	Low	High	Low	Combustion chambers, industrial furnaces, cyanide baths, petrochemical industry, nitrogenous blast heaters
Ceramic Protection Tube (DIN EN 60672)									
Type C530 (AL_2O^3)	T, V	1600 °C	No	Yes	Medium	High	High	High	Electrically heated furnaces up to 1300 °C and other industrial furnaces
Type C610 (60% Al_2O_3)	J, P / T, E, F, G	1400 °C	No	Yes	Low	High	High	High	Gas tight furnaces, diffusion furnaces
Type C799 (99,7% Al^2O_3)	L, R, W / V, W, Y	1800 °C	No	No	Low	High	High	High	Protective gas furnaces as well as gas tight and electrically heated furnaces up to 1700 °C (glass tank furnaces), flue gas desulphurization, chemical industry, cement production
Silicon Carbide Protective Tube (DIN EN 12212)									
Reaction sintered, silicon infiltrated	Y	1700 °C	No	Yes	High	HIgh	High	High	Flue gas desulphurization, coal mill firing rooms

Selecting a suitable protection tube is crucial to the service life of the thermocouple assembly. Heat resistant metal protection tubes, such as Inconel or CrNi-steel, provide high mechanical stress protection and can be used with temperatures up to 1200 °C (2192 °F). Emerson offers, as standard design, protection tubes of the following materials: ASTM 446 (1.4762) and ASTM 314 (1.4841). Protection tubes of Kanthal AF available for temperatures up to 1350 °C (2463 °F) e.g. in corrosive furnace atmospheres. Kanthal protection tubes can be used for multiple applications in refuse incinerators. Ceramic protection tubes are used for high temperature ranges. Table 12 identifies the characteristics and fields of application for standard materials and Ceramic Types C530, C610, and C799. Gas tight protective tube, made of silicon carbide for use in high dust loads and corrosive environments up to 1700 °C (3092 °F) guarantee a high service live under these conditions.

Process Connections

Rosemount offers a wide variety of adjustable and welded mounting elements. The mounting elements, like flanges, thread fittings, and stop flanges are available in different sizes. All flanges are delivered with raised face sealing surface. The adjustable stop flange has no seal. The adjustable and removable flanges and threaded fittings are sealed with a fiber washer that can withstand up to 1 bar of pressure, while the welded-on flange connections are limited to 3 bar process pressure.

The process connection on the metal protective tubes can be moved. The mounting element on ceramic protective tubes with stop and counter flange is situated at the end of the holding tube with a seal on the protective tube. The position of the threaded fitting or welded-on flange on the holding tube can be selected as desired.

Allow enough space for the process connection, by using below tables, when choosing the nominal length (NL) of the Rosemount 1075 Series standard thermocouple.

FIGURE 8. Adjustable Stop Flanges

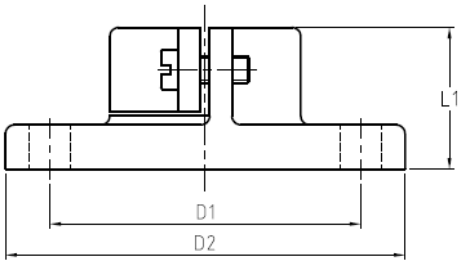


TABLE 13. Adjustable Stop Flanges acc to DIN 43734

Protective or Holding Tube dia. in mm	Option Code	L1 in mm	D1 in mm	D2 in mm
15	A1	32	55	75
22	A2	32	70	90
32	A3	32	70	90

FIGURE 9. Adjustable Gas Tight Threaded Fittings

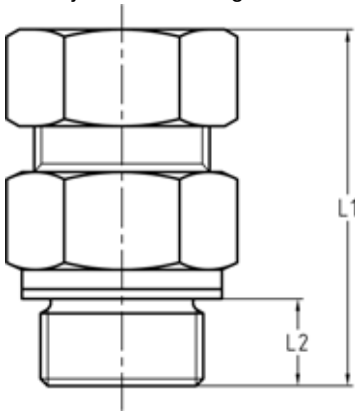


TABLE 14. Adjustable Gas Tight Threaded Fittings (up to 1 bar (14 psi))

Thread	Option Code	L1 in mm	L2 in mm
G 3/4	B1	65	20
G1	B2	75	20
G1 1/4	B3	85	25
3/4-in. NPT	B4	65	20
1-in.NPT	B5	76	25
1 1/4 - in. NPT	B6	85	26

FIGURE 10. Welded-on Flanges

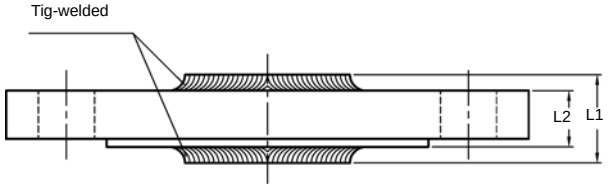


TABLE 15. Welded-on Flanges (up to 3 bar (43 psi))

Flange Size	Option Code	L1 in mm	L2 in mm
1-in. 150 lbs	F4	20	14
1-in. 300 lbs	F5	24	18
1-in. 600 lbs	F6	24	18
1 1/2-in. 150 lbs	G4	24	18
1 1/2-in. 300 lbs	G5	27	21
1 1/2-in. 600 lbs	G6	28	22
2-in. 150 lbs	H4	25	19
2-in. 300 lbs	H5	28	22
2-in. 600 lbs	H6	31	25

FIGURE 11. Adjustable Flanges

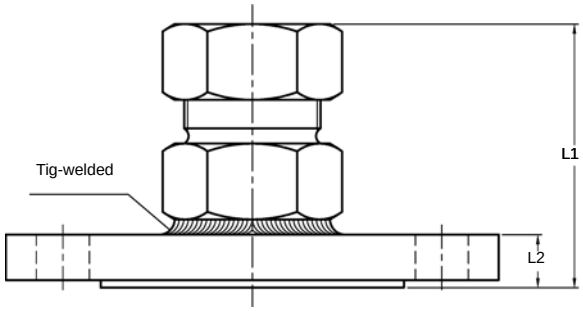


TABLE 16. Adjustable Flanges (up to 1 bar (14 psi))

		L1 in mm						L2 in mm
Flange Size	**Option Code**	**Type BM**	**Type AM**	**Type AMK**	**Type BK**	**Type AK**	**Type AKK**	
1-in. 150 lb. RF	C4	54	64	64	54	64	-	14
1-in. 300 lb. RF	C5	58	68	68	58	68	-	18
1-in. 600 lb. RF	C6	58	68	68	58	68	-	18
1 1/2-in. 150 lb. RF	D4	58	68	68	58	68	83	18
1 1/2-in. 300 lb. RF	D5	61	71	71	61	71	86	21
1 1/2-in. 600 lb. RF	D6	62	72	72	62	72	87	22
2-in. 150 lb. RF	E4	59	69	69	59	69	84	19
2-in. 300 lb. RF	E5	62	72	72	62	72	87	22
2-in. 600 lb. RF	E6	65	75	75	65	75	90	25

Uninsulated Length

In a direct mounting configuration, heat from the process is transferred through the protection tube to the transmitter housing. The uninsulated length is the part of the metal protection or holding tube with no insulation, so the temperature from the process can transfer to the environment. This helps to ensure the temperature limits of the connection head are not exceeded. The connection heads and transmitters of the Rosemount 1075 Series are limited to temperatures of 80 °C (176 °F). If the expected process temperature is near or beyond the transmitter specification limits, consider the use of additional uninsulated length or a remote mounting configuration to isolate the transmitter from these excessive temperatures.

1075 Form Selector

The Rosemount 1075 and 1099 Series High Temperature Thermocouples are divided in 6 different types with different protection tube materials, diameters, and thermocouple types. Please refer to Table 17 to chose the correct form for the application. The maximum temperature in Table 17 results in the maximum allowed temperature for either the thermocouple type or the protection tube.

TABLE 17. Form Selector

Protection Tube Material	Protection Tube Material Code	Maximum Length	Diameter (Outer Dia. x Wall Thickness)	Suitable Thermocouple	Maximum Temperature	Inner Tube	Type	Information Table
1.4762 / ASTM 446	A	2000 mm (78.4-in.)	15 x 2 mm (0.59 x 0.08-in.)	Type K	1200 °C (2192 °F)	Without	BM DIN B with Metal Protection Tube	Table 1 on page 273
1.4841 / ASTM 314	B		15 x 2 mm (0.59 x 0.08-in.)	Type K	1200 °C (2192 °F)			
1.4762 / ASTM 446	C	6000 mm (236.22-in.)	22 x 2 mm (0.87 x 0.08-in.)	Type K	1200 °C (2192 °F)	Without	AM DIN A with Metal Protection Tube	Table 2 on page 276
1.4841 / ASTM 314	D		22 x 2 mm (0.87 x 0.08-in.)	Type K	1200 °C (2192 °F)			
1.4762 / ASTM 446	E	4000 mm (157.48-in.)	22 x 2 mm (0.87 x 0.08-in.)	Type R, S, B	1200 °C (2192 °F)	C610	AMK DIN A with Metal Protection Tube and Ceramic Inner Tube	Table 3 on page 279
1.4841 / ASTM 314	F		22 x 2 mm (0.87 x 0.08-in.)	Type R, S, B	1200 °C (2192 °F)			
1.4767 (Kanthal AF™)	G		22 x 1.38 mm (0.87 x 0.06-in.)	Type R, S, B	1350 °C (2462 °F)			
Type C610	J	1000 mm (39.37-in.)	10 x 1.5 mm (0.39 x 0.06-in.)	Type K	1200 °C (2192 °F)	Without	BK DIN B with Ceramic Protection Tube	Table 4 on page 282
				Type R, S, B	1400 °C (2552 °F)			
Type C799	L		10 x 1.5 mm (0.39 x 0.06-in.)	Type R and S	1600 °C (2912 °F)			
				Type B	1800 °C (3272 °F)			
Type C610	P	2000 mm (78.4-in.)	15 x 2 mm (0.59 x 0.08-in.)	Type K	1200 °C (2192 °F)	Without	AK DIN A with Ceramic Protection Tube	Table 5 on page 286
				Type R, S, B	1400 °C (2552 °F)			
Type C799	R		15 x 2.5 mm (0.59 x 0.10-in.)	Type R and S	1600 °C (2912 °F)			
				Type B	1800 °C (3272 °F)			
Reaction sintered, silicon infiltrated, silicon carbide	Y	2000 mm (78.4-in.)	25 x 3,5 mm (0.98 x 0.14-in.)	Type B	1700 °C (3092 °F)	C799	AKK DIN A with Ceramic Protection Tube and Inner Tube	Table 6 on page 289
				Type R and S	1600 °C (2912 °F)			
Type C530	T		26 x 4 mm (1.02 x 0.16-in.)	Type K	1200 °C (2192 °F)	C610		
				Type R, S, B	1400 °C (2552 °F)			
Type C530	V	2000 mm (78.4-in.)	26 x 4 mm (1.02 x 0.16-in.)	Type R, S, B	1600 °C (2912 °F)	C799		
Type C799	W		24 x 3 mm (0.95 x 0.12-in.)	Type R and S	1600 °C (2912 °F)			
				Type B	1800 °C (3272 °F)			

Rosemount 1075 and 1099 Series

Holding Tube

The Rosemount 1075 Series standard thermocouples Types BK, AK, and AKK are designed with a ceramic outer protection tube (see Design with ceramic protection tube). The holding tube is used to connect the ceramic outer protection tube to the connection head and to mount the process connection. It is also used to ensure the proper uninsulated length to keep the connection head or transmitter cooler and to give some mechanical strength for the thermocouple in the refractory. Rosemount offers the holding tubes in three different steels. See Table 18.

Holding tubes are normally inside the refractory and are not exposed to the higher process temperatures. Because the temperature above the fitting is generally lower, unalloyed steel is acceptable for use. However, if a holding tube is exposed to the surface heat and the process medium, then heat resistant steel is required and resistance to the process medium must be considered to avoid damage. See Table 18 for the material properties.

TABLE 18. Holding Tube Material Information

		Holding Tube Material's Resistance To:				
Holding Tube Material	**Maximum Temperature**	**Physical Gas Permeation**	**Thermal Shock**	**Chemical Sulfurous Gases**	**Chemical Nitrogenous Gases**	**Abrasion**
1.4762 ASTM 446	1200 °C	No	High	High	Low	Low
1.4841 ASTM 314	1200 °C	No	High	Low	High	Low
1.0305 ASTM A106-A	550 °C	No	High	Low	Medium	Low

Calibration and Certificates

Calibration with DKD-Certificate

The calibration of temperature sensors is done in our DKD calibration laboratory accredited according to DIN EN ISO/IEC 17025: 2005.

The Deutscher Kalibrierdienst (DKD) is an association of calibration laboratories including industrial firms, research institutes, technical authorities, inspection and testing institutes.

The DKD calibration certificates provide traceability to national standards as required in the standard's family ISO 9000 and the ISO/IEC 17025 which allow the user to trust the reliability of the measurement results.

While compiling a DKD or works certificate, the thermocouple or measuring system is checked using comparison standards regarding measurement accuracy.

Our laboratory is authorized to issue DKD calibration certificates for temperature in the measurement ranges shown in Table 19 on page 309. The measurement uncertainties are defined in the various calibration points and based on the Dual standard deviation (k = 2), (probable coincidence approximately 95%).

The calibrations carried out by our laboratory are services provided to the customer. Our intention is to meet the quality requirements of the customer in relation to thermocouple calibration, including traceability to national standards and accomplishing the contract commitments with the accreditation authority - DAR (German Accreditation Council). The thermocouple, which provides the measurement result on its own or as a measuring chain, is compared with the national standards. This comparison measurement produces quantitative verification of traceability.

A report is issued in the form of a calibration certificate according to DKD specifications (Figure 13 on page 311).

TABLE 19. DKD Laboratory Accreditation Ranges for Thermocouple Calibration

Subject of Calibration	Temperature Range	Measurement Conditions	Measurement Uncertainty	Remarks
Thermocouples	0 to 1200 °C (32 to 2192 °F)	Comparison with standard thermocouples in tube furnaces	1.5K	
Thermocouples Type S and R	0 to 1100 °C (32 to 2012 °F)		1K	Comparison without protection tube in a PT cap
Transmitter with connected thermocouples	same as for thermocouples	same as for thermocouples	U(TE) + 500mK	U(TE) is the measurement uncertainty of calibrating the thermocouple by itself.

Works Certificates (WERKSZERTIFIKAT)

Thermocouples with a works certificate show documentation of measurements in the service and quality assurance department.

Using the comparison method, the calibrated values are certified on a works certificate. The maximum test temperature is 1300 °C (2372 °F).

The customer must specify the number and values of the calibrated test variables.

NOTE
Before specifying a temperature value, consider the temperature limits of the thermocouple. For individual order options see the Ordering Tables.

FIGURE 12. DAR Accreditation Certificate



Deutscher Kalibrierdienst (DKD)
Accreditation Body
represented in

Deutscher AkkreditierungsRat

Accreditation

The Accreditation Body of **Deutscher Kalibrierdienst** hereby accredits
Emerson Process Management GmbH & Co. OHG
Frankenstraße 21
63791 Karlstein-Dettingen

according to DIN EN ISO/IEC 17025:2005 for calibrations in the field / fields:

Temperature

Part of the certificate is: Annex 11 (1 page), 2005-03-02

DAR registration number: DKD-K-05601
DKD accredited since: 1987-03-24

Braunschweig, 2007-05-25

Head of Accreditation Body
by proxy

Dipl.-Ing. Michael Schaller

DEUTSCHER KALIBRIERDIENST · AKKREDITIERUNGSSTELLE · 2

See overleaf

FIGURE 13. DKD Certificate and Test Report Example

DEUTSCHER KALIBRIERDIENST DKD

Kalibrierlaboratorium für die Messgröße Temperatur
Calibration laboratory for measuring of temperature
Akkreditiert durch die / *accredited by the*
Akkreditierungsstelle des Deutschen Kalibrierdienstes

EMERSON
Process Management

DKD-K-05601

Kalibrierschein
Calibration Certificate

Kalibrierzeichen
Calibration mark

000
DKD-K-05601
00-00

Gegenstand *Object*	Thermocouple assembly
Hersteller *Manufacturer*	Emerson Process Management GmbH & Co. OHG
Typ *Type*	1075BKU201K13X600NNB080R24
Fabrikat/Serien-Nr. *Serial number*	00000000/000/0
Auftraggeber *Customer*	Mustermann
Auftragsnummer *Order No.*	00000000
Anzahl der Seiten des Kalibrierscheines *Number of pages of the certificate*	3
Datum der Kalibrierung *Date of calibration*	00.00.0000

Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).
Der DKD ist Unterzeichner der multilateralen Übereinkommen der European co-operation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierso
Für die Einha
Frist zur Wied
der Benutzer ve
This calibratio
traceability to
realize the unit
to the Internatio
The DKD is s
agreements of
for Accredita
International
Cooperation
recognition of c
The user is o
recalibrated at

Dieser Kalibrierschein darf nur vollständig und unverändert weiterverbreitet werden. Auszüg
der Genehmigung sowohl der Akkreditierungsstelle des DKD als auch des ausstelle
Kalibrierscheine ohne Unterschrift und Stempel haben keine Gültigkeit.
This calibration certificate may not be reproduced other than in full except with the permiss
Body of the DKD and the issuing laboratory. Calibration certificates without signature and sea

Stempel *Seal*	Datum *Date*	Leiter des Kalibrierlaboratoriums *Head of the calibration laboratory*	Bearbeite *Person in*
Deutscher DKD-K 05601 Kalibrierdienst	00.00.0000	A. Meyer	B. Kub

Emerson Process Management GmbH & Co. OHG, Frankenstraße 21, 63791 Karl
Tel.: +49 (6188) 992-182 Telefax: +49 (6188) 992-112, DKD-Kalibrierlaborato

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F +49 (6188) 992-112
www.EmersonProcess.de

Werkszertifikat
Specific Test Report

Kalibriergegenstand	:	Thermoelement
Object	:	*thermocouple assembly*
Typ/type	:	1075AKE302SXXR80OB2E320R24
Seriennummer/ *Serial number*	:	**00000000/000/0**
Hersteller / *Manufacturer*	:	Emerson Process Management Temperature GmbH
Firma / Antragsteller / *Customer*	:	Mustermann
Auftragsnummer / *Order number*	:	**00000000**
Messeinrichtungen / Bezugsnormale	:	Thermoelement 552218 (145DKD08):
Equipment / Reference standards		*reference thermocouple 552218 145DKD08*
Kalibriernummer / *Calibration mark*	:	**A-6064**
Grundwertreihe / *table of basic values*	:	DIN EN 60584-1

Kalibrierverfahren/ *Procedure*

Die Kalibrierung erfolgte nach der Richtlinie DKD-R 5-3 vom Dezember 2000 des Deutschen Kalibrierdienstes (DKD) für die Kalibrierung von Thermoelementen.
The calibration was made in accordance to the guideline DKD-R 5-3 december 2000 for the calibration of thermocouples.

Die Kalibrierung erfolgte bei einer Eintauchtiefe von 365 mm.
The calibration was performed with an immersion depth of 365 mm.

Messergebnisse/ *Results*

Messstelle 1 / *measuring circuit 1*

Temperatur t_{90} *temperature* t_{90} in °C	Thermospannung E (t_{90}) *thermovoltage* $E(t_{90})$ in µV	Abw. gegen *Dev. against* DIN EN 60584 in µV	Abw. gegen *Dev. against* DIN EN 60584 in °C	Messunsicherheit *uncertainty* in K
700	6266.9	-8.3	-0.787	1.5
800	7337.1	-7.9	-0.726	1.5
900	8439.9	-9.3	-0.829	1.5
1000	9577.1	-10.0	-0.870	1.5
1100	10746.3	-10.2	-0.861	1.5
1200	11939.8	-10.7	-0.893	1.5

Messstelle 2 / *measuring circuit 2*

Temperatur t_{90} *temperature* t_{90} in °C	Thermospannung E (t_{90}) *thermovoltage* E (t_{90}) in µV	Abw. gegen *Dev. against* DIN EN 60584 in µV	Abw. gegen *Dev. against* DIN EN 60584 in °C	Messunsicherheit *uncertainty* in K
700	6267.2	-8.0	-0.762	1.5
800	7336.6	-8.4	-0.769	1.5
900	8440.1	-9.1	-0.814	1.5
1000	9577.5	-9.6	-0.834	1.5
1100	10746.3	-10.2	-0.865	1.5
1200	11940.0	-10.5	-0.875	1.5

Messunsicherheit/ *Uncertainty*

Angegeben ist die erweiterte Messunsicherheit, die sich aus der Standardmessunsicherheit durch Multiplikation mit dem Erweiterungsfaktor k = 2 ergibt. Ein Anteil für die Langzeitstabilität ist dabei nicht enthalten.
All uncertainties were determined at the various calibration points and are based on two times the standard deviation (k=2). Possible longterm drifts are not included.

00.00.0000
Datum der Kalibrierung
Date of calibration

Stempel
Emerson Process Management GmbH & Co. OHG Kalibrier-Labor Karlstein

Bearbeiter/in
person in charge

Seite 1 / *page 1 von 3*

Temperature Transmitters

Rosemount head-mounted transmitters 248H and 644H can be assembled to the extended cover of the connection head Types TZ-A/BL (BUZH) or TZ-AL (AUZH). These transmitters have the following common properties:

- Complete installation ready assembly
- Improved accuracy with cold junction, and ambient temperature compensation
- Micro Processor controlled, with user selectable inputs and 4–20 mA/HART or FOUNDATION fieldbus communication protocols
- Meets NAMUR NE21, and is resistant to Radio Frequency and Electro Magnetic Interference
- Epoxy sealed electronics ensure reliable performance

The Rosemount 3144P transmitter can be ordered for remote mounting to the 1075 thermocouple. The 3144P features a sealed dual-compartment housing, an LCD meter display, Hot Backup sensor redundancy, and a Thermocouple Diagnostic function to detect drifting thermocouple conditions.

The Rosemount 848T and 848TX Wireless Temperature Transmitters are capable of accepting up to 8 and 4 (respectively) thermocouple inputs into one transmitter. The 848T is ideally suited for high density temperature measurement applications.

FIGURE 14. Rosemount Temperature Transmitters



Rosemount 1075 and 1099 Series

Product Data Sheet
00813-0400-2654, Rev DA
Catalog 2011 - 2012

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EMERSON™
Process Management

00813-0400-2654 Rev DA 7/11

Resistance Temperature Sensors for Hygienic and Sanitary Applications

- *Resistance temperature sensors for applications in the food and beverage, pharmaceutical and life-science industries*
- *Aseptic process connections suitable for CIP and SIP dead-pocked free measurement applications*
- *Exchangeable measuring insert to ensure process integrity*
- *Enhanced system accuracy with transmitter-sensor matching, meets pharmaceutical industry requirements*



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Rosemount 65Q and 65B Temperature Sensor

Optimize plant efficiency and increase measurement reliability with industry?proven design and specifications

- RTD elements for a reliable and accurate measurement point
- Available in a wide variety of process connections for sanitary and hygienic applications
- Meets EHEDG and 3-A Standard requirements for use in a variety of sanitary
- Flying leads, terminal blocks, and cable connections to suit different wiring needs
- State of the art manufacturing procedures provide robust element packaging, increasing reliability
- Industry-leading calibration capabilities allow for Callendar-van-Dusen values to give increased accuracy when paired with Rosemount transmitters

Streamline operations and maintenance with sensor and thermowell design

- Process connections allow for quick and easy connection to industry-standard sanitary process connection points
- Integral thermowell protection on 65Q allows for ordering sanitary sensor and thermowell together

Explore the benefits of a Complete Point Solution from Rosemount Temperature Measurement

- An “Assemble Sensor to Specific Transmitter” option enables Emerson to provide a complete point temperature solution, delivering an installation-ready transmitter and sensor assembly
- Emerson has a complete portfolio of Single Point and High Density Temperature Measurement solutions, allowing you to effectively measure and control your processes with the reliability you trust from Rosemount products



Experience global consistency and local support from numerous worldwide Rosemount Temperature sites



- World-class manufacturing provides globally consistent product from every factory and the capability to fulfill the needs of any project, large or small.
- Experienced Instrumentation Consultants help select the right product for any temperature application and advise on best installation practices.
- An extensive global network of Emerson service and support personnel can be on-site when and where they are needed.

Rosemount 65Q Sanitary Sensor



The Rosemount 65Q Sanitary Sensor has designs that provide flexible and reliable temperature measurements in hygienic process environments.

Features include:

- Industry-standard RTD sensor design
- 3-A and EHEDG Standards approval
- Variety of enclosure and connection head options
- Global hazardous-location approvals (Option Code I1)
- Calibration services to give you insight to sensor performance (Option Codes V10, V11)
- Electropolishing Surface Finish (Option Code R20)
- Assemble to Transmitter option (Option Code XA)

TABLE 1. 65Q RTD Assembly (Pt 100) for Hygienic and Food and Beverage Applications

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	**Product Description**			
0065Q	65Q RTD Sensor with Twell for Sanitary Applications			
Connection Head		**IP Rating(1)**	**Connection Thread**	
Standard				**Standard**
C	Rosemount Aluminum	68	M20 x 1.5	★
D	Rosemount Aluminum	68	1/2-in. NPT	★
1	Rosemount, Aluminum with LCD Display Cover	68	M20 x 1.5	★
2	Rosemount, Aluminum with LCD Display Cover	68	1/2-in. NPT	★
5	Connection Head DIN A Polished Stainless Steel with LCD Display Cover	68	M20 x 1.5	★
6	Connection Head DIN A Polished Stainless Steel with LCD Display Cover	68	1/2-in. NPT	★
E	Connection Head DIN A Polished Stainless Steel	68	M20 x 1.5	★
F	Connection Head DIN A Polished Stainless Steel	68	1/2-in. NPT	★
R	Connection Head DIN B Polished Stainless Steel	66	M20 x 1.5	★
S	Connection Head DIN B Polished Stainless Steel	66	1/2-in. NPT	★
Expanded				
J	GR-A/BL (BUZ), Aluminum	65	M20 x 1.5 (with cable gland)	
L	TZ-A/BL (BUZH) Aluminum	65	M20 x 1.5 (with cable gland)	
T	TZ-A/BK, Polyamide, Black	65	M20 x 1.5 (with cable gland)	
Sensor Lead Wire Termination				
Standard				**Standard**
0	Flying Leads – No Springs on DIN plate			★
2	Terminal Block – DIN 43762			★
Sensor Type		**Temperature Range**		
Standard				**Standard**
1	RTD, Single Element, 4-wire	– 50 to 450 °C		★
2	RTD, Dual Element, 3-wire	– 50 to 450 °C		★
5	RTD, Single Element, 3-wire	– 50 to 450 °C		★

Rosemount 65Q and 65B Sensors

TABLE 1. 65Q RTD Assembly (Pt 100) for Hygienic and Food and Beverage Applications

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Extension				
S	Tubular with Extension, Welded Screw Bush M24 x 1.5			★
Z	Tubular with Extension, Head Connection Adjustable Loose Screw Nut M24 x 1.5			★
Extension Length (N) in Millimeters				
Standard				**Standard**
0050[2]	50 mm			★
0065[3]	65 mm			★
0130	130 mm			★
Expanded				★
XXXX	Non-standard extension length – non-standard lengths are available from 50 to 990 mm			★
Thermowell Material				
Standard				**Standard**
D	1.4404 (AISI 316L) Stainless Steel, ≤ 0.8 µm electropolishing			★
Immersion Length (L) in MIllimeters				
Standard				**Standard**
0025	25 mm – not available for Mounting Style code T02			★
0050	50 mm			★
0065	65 mm			★
0100	100 mm			★
0150	150 mm			★
0200	200 mm			★
0250	250 mm			★
Expanded				
XXXX	Non-standard immersion length – non-standard lengths are available from 25 to 2500 mm			
Thermowell Mounting Style		**Process Connection**	**Stem Style**	
Standard				**Standard**
C02	Flanged	1-in. Tri-Clamp (Diameter 50.4 mm)	Stepped, 10/6 mm[4]	★
C04	Flanged	1 1/2-in. Tri-Clamp (Diameter 50.4 mm)	Stepped, 10/6 mm[4]	★
C06	Flanged	2-in. Tri-Clamp (Diameter 64 mm)	Stepped, 10/6 mm[4]	★
C08	Flanged	2 1/2-in. Tri-Clamp (Diameter 77.4 mm)	Stepped, 10/6 mm[4]	★
C10	Flanged	3-in. Tri-Clamp (Diameter 91 mm)	Stepped, 10/6 mm[4]	★
C12	Flanged	4-in. Tri-Clamp (Diameter 119 mm)	Stepped, 10/6 mm[4]	★
C14	Flanged	1/2-in. Tri-Clamp (Diameter 24.9 mm)	Stepped, 10/6 mm[4]	★
C16	Flanged	3/4-in. Tri-Clamp (Diameter 37.4 mm)	Stepped, 10/6 mm[4]	★
K02	Weld-in	Ball (adjustable), diameter 25 mm, PEEK Seal	Straight, 6 mm[5]	★
K04	Weld-in	Ball (adjustable), diameter 25 mm, SST Seal	Straight, 6 mm[5]	★
M10	Tapered with Coupling Nut[6]	Suitable connection for tube nominal size DN 10	Stepped, 10/6 mm[4]	★
M25	Tapered Union with Coupling Nut[6]	Suitable connection for tube nominal size DN 25	Stepped, 10/6 mm[4]	★
M32	Tapered Union with Coupling Nut[6]	Suitable connection for tube nominal size DN 32	Stepped, 10/6 mm[4]	★
M40	Tapered Union with Coupling Nut[6]	Suitable connection for tube nominal size DN 40	Stepped, 10/6 mm[4]	★
M50	Tapered Union with Coupling Nut[6]	Suitable connection for tube nominal size DN 50	Stepped, 10/6 mm[4]	★
T02	Threaded Parallel	1/2-in. (1/2-in. BSPF) (G1/2)	Stepped, 10/6 mm[7]	★
T12	Threaded Tapered	1/2-in. NPT	Stepped, 10/6 mm[4]	★
V04	Varivent DN 1 1/2 - 3 inch (Dim. 68 mm) Standard			★

TABLE 1. 65Q RTD Assembly (Pt 100) for Hygienic and Food and Beverage Applications

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Options (Include with selected model number)

Sensor Options			
Expanded			
A3	Single Element Class 1/3 DIN B Sensor	0 to 100 °C (–32 to 212 °F)	
A4	Dual Element Class 1/3 DIN B Sensor	0 to 100 °C (–32 to 212 °F)	
Product Certifications			
Standard			**Standard**
I1	EEx ia ATEX/IBExU Intrinsic Safety Approval		★
Cable Gland Option			
Standard			**Standard**
G2	Cable Gland, EEx d, Brass 7.5 mm - 11.9 mm		★
Cover Chain Option			
Standard			**Standard**
G3	Cover Chain – only available with Connection Head Material codes C and D		★
Extension Ring			
Standard			**Standard**
G6	Aluminum Extension Ring for Dual Transmitter Mounting – only available with Connection Head Material codes C and D)		★
Material Certification			
Standard			**Standard**
Q8	Thermowell Material Certification		★
Extension Ring			
Standard			**Standard**
R20	Electropolishing Surface Finish of wetted parts, R_a = 0.4 μm		
Assemble to Options			
Standard			**Standard**
XA(8)	Assemble Sensor to Specific Temperature Transmitter		★
Standard Calibration (with A, B, C and Callendar-van Dusen constants)			
Standard			**Standard**
V10	Works Certificate – Sensor Calibration from –50 to 450 °C (-58 to 842 F°)		★
V11	Works Certificate – Sensor Calibration from 0 to 100 °C (-32 to 212 °F)		★
Temperature Range			
Standard			**Standard**
X8	Works Certificate – Sensor Calibration Over Specified Temperature Range with A, B, C, and Callendar-van Dusen constants		★
Typical Model Number: 0065Q C 0 1 S 0050 D 0200 C04 XA			

(1) IP 68 rating requires a suitable cable gland on the conduit connection thread. All threads must be sealed.

(2) Standard length for use with Connection Head codes C, D, 1, and 2.

(3) Standard length for use with Connection Head codes E, F, J, L, R, S, T, 5,and 6.

(4) For U < 50 mm, outer diameter 6 mm straight, below part of process connection.

(5) Valid for DIN B connection heads only.

(6) According to DIN 11851.

(7) For $U_p \leq 65$ mm, the outer diameter is 6 mm for straight stem styles.

(8) If ordering XA with a transmitter, specify the same option on the transmitter model number.

Rosemount 65Q and 65B Sensors

TABLE 2. 65Q RTD Sensor without Thermowell (Pt 100) for Hygienic and Food and Beverage Applications

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description			
0065Q	65Q RTD Temperature Sensor without Thermowell for Sanitary Applications			
Connection Head		**IP Rating(1)**	**Conduit / Cable Entry**	
Standard				**Standard**
C	Rosemount Aluminum	68	M20 x 1.5	★
D	Rosemount Aluminum	68	1/2-in. NPT	★
1	Rosemount, Aluminum with LCD Display Cover	68	M20 x 1.5	★
2	Rosemount, Aluminum with LCD Display Cover	68	1/2-in. NPT	★
5	Connection Head DIN A Polished Stainless Steel with LCD Display Cover	68	M20 x 1.5	★
6	Connection Head DIN A Polished Stainless Steel with LCD Display Cover	68	1/2-in. NPT	★
E	Connection Head DIN A Polished Stainless Steel	68	M20 x 1.5	★
F	Connection Head DIN A Polished Stainless Steel	68	1/2-in. NPT	★
R	Connection Head DIN B Polished Stainless Steel	68	M20 x 1.5	★
S	Connection Head DIN B Polished Stainless Steel	68	1/2-in. NPT	★
N	No Connection Head – use when ordering the sensor alone			★
Expanded				
J	GR-A/BL (BUZ), Aluminum	65	M20 x 1.5 (with cable gland)	
L	TZ-A/BL (BUZH) Aluminum	65	M20 x 1.5 (with cable gland)	
T	TZ-A/BK, Polyamide, Black	65	M20 x 1.5 (with cable gland)	
Sensor Lead Wire Termination				
Standard				**Standard**
0	Flying Leads – No Springs on DIN plate			★
2	Terminal Block – DIN 43762			★
Sensor Type		**Temperature Range**		
Standard				**Standard**
1	RTD, Single Element, 4-wire	– 50 to 450 °C		★
2	RTD, Dual Element, 3-wire	– 50 to 450 °C		★
5	RTD, Single Element, 3-wire	– 50 to 450 °C		★
Extension				
Standard				**Standard**
N	No Extension			★
W	No Extension – use when ordering a sensor head and connection head assembly			★
Extension Length (N)				
Standard				**Standard**
0000	No Extension			★
Thermowell Material				
Standard				**Standard**
N	No Thermowell			★
Immersion Length (L) in MIllimeters				
Standard				**Standard**
0100	100 mm			★
0125	125 mm			★
0150	150 mm			★
0175	175 mm			★
0200	200 mm			★
0250	250 mm			★
0275	275 mm			★

TABLE 2. 65Q RTD Sensor without Thermowell (Pt 100) for Hygienic and Food and Beverage Applications

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

0315	315 mm	★
0375	375 mm	★
0435	435 mm	★
Expanded		
XXXX	Non-standard immersion length – non-standard lengths are available from 100 to 2000 mm	

Options (Include with selected model number)

Sensor Options			
Expanded			
A3	Single element Class 1/3 DIN B Sensor	0 to 100 °C (–32 to 212 °F)	
A4	Dual element Class 1/3 DIN B Sensor	0 to 100 °C (–32 to 212 °F)	
Product Certifications			
Standard			**Standard**
I1	EEx ia - ATEX/IBExU Intrinsic Safety Approval		★
Cable Gland Option			
Standard			**Standard**
G2	Cable Gland, EEx d, Brass, 7.5mm - 11.9 mm. – only for use with Connection Head Material codes C, E, R, 1, and 5)		★
Cover Chain Option			
Standard			**Standard**
G3	Cover Chain – only available with Connection Head Material codes C and D		★
Extension Ring			
Standard			**Standard**
G6	Aluminum Extension Ring for Dual Transmitter Mounting – only available with Connection Head Material codes C and D		★
Assemble to Options			
Standard			**Standard**
XA(2)	Assemble Sensor to Specific Temperature Transmitter		★
Standard Calibration (with A, B, C, and Callendar-van Dusen constants)			
Standard			**Standard**
V10	Works Certificate – sensor calibration from –50 to 450 °C (-58 to 842 °F)		★
V11	Works Certificate – sensor calibration from 0 to 100 °C (-32 to 212 °F)		★
Temperature Range			
Standard			**Standard**
X8	Works Certificate – Sensor Calibration Over Specified Temperature Range with A, B, C, and Callendar-van Dusen constants		★
Typical Model Number: 0065Q N 0 1 N 0000 N 0200 V18			

(1) IP 68 rating requires a suitable cable gland on the conduit connection thread. All threads must be sealed.

(2) If ordering XA with a transmitter, specify the same option on the transmitter model number.

Rosemount 65B Sanitary Sensor



The Rosemount 65B Sanitary Sensor has designs that provide flexible and reliable temperature

measurements in hygienic process environments.

Features include:

- Industry-standard RTD sensor design
- 3-A and EHEDG Standards approval
- Variety of enclosure and connection head options
- Global hazardous-location approvals (Option Code I1)
- Calibration services to give you insight to sensor performance (Option Codes V10, V11)
- Electropolishing Surface Finish (Option Code R20)
- Assemble to Transmitter option (Option Code XA)

TABLE 3. 65B RTD Assembly (Pt 100) for BioPharm, Hygienic, and Food and Beverage Applications

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	**Product Description**			
0065B	RTD Sensor for Biopharm, Hygienic and Food & Beverage Applications			
Code	**Connection Head Material**	**IP Rating(1)**	**Conduit / Cable Entry**	
Standard				**Standard**
C	Rosemount Aluminum	68	M20 x 1.5	★
D	Rosemount Aluminum	68	1/2-in. NPT	★
1	Rosemount, Aluminum with LCD Display Cover	68	M20 x 1.5	★
2	Rosemount, Aluminum with LCD Display Cover	68	1/2-in. NPT	★
5	Connection Head DIN A Polished Stainless Steel with LCD Display Cover	68	M20 x 1.5	★
6	Connection Head DIN A Polished Stainless Steel with LCD Display Cover	68	1/2-in. NPT	★
E	Connection Head DIN A Polished Stainless Steel	68	M20 x 1.5	★
F	Connection Head DIN A Polished Stainless Steel	68	1/2-in. NPT	★
R	Connection Head DIN B Polished Stainless Steel	66	M20 x 1.5	★
S	Connection Head DIN B Polished Stainless Steel	66	1/2-in. NPT	★
N	No Connection Head – use with Cable Sensor, Sensor Lead Wire Termination codes 8 and 9			★
Expanded				
J	GR-A/BL (BUZ), Aluminum w/ Cable Gland	65	M20 x 1.5 (with cable gland)	
L	TZ-A/BL (BUZH) Aluminum w/ Cable Gland	65	M20 x 1.5 (with cable gland)	
T	TZ-A/BK, Polyamide w/ Cable Gland	65	M20 x 1.5 (with cable gland)	
Sensor Lead Wire Termination				
Standard				**Standard**
0	Flying leads – No Springs on DIN plate – use with Connection Heads only			★
2	Terminal Block, Form B – DIN 43762 – use with Connection Heads only			★
8	Cable Sensor with 3 m Extension Cable			★
9	Cable Sensor with 5 m Extension Cable			★
Sensor Type		**Temperature Range**		
Standard				**Standard**
1	RTD, Single Element, 4-wire	– 50 to 250 °C		★

TABLE 3. 65B RTD Assembly (Pt 100) for BioPharm, Hygienic, and Food and Beverage Applications

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Extension				
Standard				**Standard**
S	Extension, welded screw bush M24 x 1.5 – use with Connection Heads and Sensor Lead Wire Termination codes 0 and 2 only			★
C	Extension, cable gland – use with Cable Sensors and Sensor Lead Wire Termination codes 8 and 9 only			★
Extension Length (N) in Millimeters				
Standard				**Standard**
0030	30 mm			★
Thermowell Material				
Standard				**Standard**
N	No Thermowell			★
Immersion Length (L) in MIllimeters				
Standard				**Standard**
0016	16 mm			★
0025	25 mm			★
0030	30 mm			★
0033	33 mm			★
0037	37 mm			★
0040	40 mm			★
Mounting Style		**Process Connection**	**Stem Style**	
Standard				**Standard**
H02	Hygienic In-Line System, electropolishing $R_a \leq 0.8$ µm	G1/2-in. (1/2-in. BSPF)	Straight	★
H04	Hygienic In-Line System, electropolishing $R_a \leq 0.8$ µm	G1/2-in. (1/2-in. BSPF)	Elbow	★
Nominal Size of Process Pipe		**Size**		
Standard				**Standard**
DN010	DN10, metric, DIN 11850 Row 2	13 x 1.5 – for use with elbow stem style only		★
DN015	DN15, metric, DIN 11850 Row 2	19 x 1.5		★
DN020	DN20, metric, DIN 11850 Row 2	23 x 1.5		★
DN025	DN25, metric, DIN 11850 Row 2	29 x 1.5 – for use with straight stem style only		★
DN032	DN32, metric, DIN 11850 Row 2	35 x 1.5 – for use with straight stem style only		★
DN040	DN40, metric, DIN 11850 Row 2	41 x 1.5 – for use with straight stem style only		★
DN050	DN50, metric, DIN 11850 Row 2	53 x 1.5 – for use with straight stem style only		★
DN065	DN65, metric, DIN 11850 Row 2	70 x 2.0 – for use with straight stem style only		★
DN080	DN80, metric, DIN 11850 Row 2	85 x 2.0 – for use with straight stem style only		★
IN050	DN 1/2-in., DIN 11866	12.7 x 1.65 – for use with elbow stem style only		★
IN075	DN 3/4-in., DIN 11866	19.05 x 1.65 – for use with elbow stem style only		★
IN100	DN 1-in., DIN 11866	25.4 x 1.65 – for use with straight stem style only		★
IN150	DN 1 1/2-in., DIN 11866	38.1 x 1.65 – for use with straight stem style only		★
IN200	DN 2-in., DIN 11866	50.8 x 1.65 – for use with straight stem style only		★
IN250	DN 2 1/2-in., DIN 11866	63.5 x 1.65 – for use with straight stem style only		★
IN300	DN 3-in., DIN 11866	76.2 x 1.65 – for use with straight stem style only		★
Seal Material				
Standard				**Standard**
N	Without Seal			★

Options (Include with selected model number)

Sensor Options			
Standard			**Standard**
A3	Single Element Class 1/3 DIN B sensor	0 to 100 °C (–32 to 212 °F)	★
Product Certifications			
Standard			**Standard**
I1	EEx ia - ATEX/IBExU Intrinsic Safety Approval		★

Rosemount 65Q and 65B Sensors

TABLE 3. 65B RTD Assembly (Pt 100) for BioPharm, Hygienic, and Food and Beverage Applications

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Ground Screw		
Standard		**Standard**
G1	External Ground Screw	★
Cable Gland Option		
Standard		**Standard**
G2	Cable Gland, EEx d, Brass 7.5 mm - 11.9 mm – only available with Connection Head Material codes C, E, R, 1, and 5)	★
G7	Cable Gland, M20 x 1.5, EEx e, Blue, Polyamide, Diameter 5 - 9 mm	★
Cover Chain Option		
Standard		**Standard**
G3	Cover Chain – only available with Connection Head Material codes C and D	★
Material Certification		
Standard		**Standard**
Q8	Thermowell Material Certification	★
Assemble to Option		
Standard		**Standard**
XA(2)	Assemble Sensor to Specific Temperature Transmitter	★
Standard Calibration (with A, B, C, and Callendar-van Dusen constants)		
Standard		**Standard**
V11	Works Certificate for sensor calibration from 0 to 100 °C (32 to 212 °F)	★
Temperature Range		
Standard		**Standard**
X8	Works Certificate – Sensor Calibration Over Specified Temperature Range with A, B, C, and Callendar-van Dusen constants	★
Typical Model Number: 0065B E 0 1 S 0030 N 0025 H02 DN050 N Q8 XA		

(1) IP 68 rating requires a suitable cable gland on the conduit connection thread. All threads must be sealed.

(2) If ordering XA with a transmitter, specify the same option on the transmitter model number.

Introduction

Rosemount Series 65Q and 65B RTD temperature sensors are designed for use in hygienic and aseptic applications exclusively to meet the stringent quality requirements in the Food and Beverage, and Pharmaceutical industries. Series 65Q sensors represent a hygienic portfolio for applications in Food and Beverage, and low-end Pharmaceutical. Series 65B sterile and aseptic sensor assemblies instead are designed for use in Pharmaceutical and BioTech applications. Quality requirements, that relate to different properties of a measuring instrument. The hygienic design of production plant and thus of the measuring devices as well is a basic requirement of users in food processing, pharmaceuticals, and bio-technology for the production of faultless products. Rosemount temperature products are manufactured according to Good Manufacturing Practice (GMP) guidelines and comply with the standards of the European Hygienic Equipment Design Group (EHEDG) as well as 3A standards.

NATIONAL AND INTERNATIONAL GUIDELINES

Products that may have a direct or indirect impact on public health, must be produced according to national and international guidelines. The guidelines contain rules for the implementation and organization of methods, production, production environments, and inspections.

The European Hygienic Equipment Design Group (EHEDG) is a foundation in which mainly users and manufacturers or hygienic equipment are represented. EHEDG provides guidance of the hygienic engineering aspects of manufacturing of safe and wholesome food, e.g. through production, publication, and updating of guidelines, equipment approval through certification to assist equipment suppliers and food manufacturers and advisory function to legislators and standards groups.

EHEDG Cooperation with 3-A

EHEDG cooperates with 3-A Sanitary Standards, Inc. in the development of hygienic construction material selection and design standards for food and dairy processing equipment. 3-A Sanitary Standards and Practices have been developed for use by the dairy industry, dairy equipment manufacturers, and milk regulatory agencies as voluntary guidelines. These voluntary guidelines are used as a benchmark for product performance, hygienic quality, and ultimately food safety. 3-A Sanitary Standards and Practices are generally accepted by federal, state, and local public health authorities in the United States and other public health authorities around the world.

While 3-A Sanitary Standards have been in development and use since the late 1920's. EHEDG is a fairly recent development that applies test criteria and laboratory test data for determining cleanability and acceptance for equipment use in the processing of foods or comestibles. Both EHEDG and 3-A Sanitary Standards may be applied not only to Food and Beverage processing equipment, but can also be applied to Biotech and Bio-pharm equipment to ensure product acceptance and safety.

MOUNTING CONFIGURATIONS

Series 65Q and 65B RTDs

You may order the Series 65Q and 65B RTDs with flying leads or terminal block. Ordered with flying leads, the sensors are designed with an integral mounting plate, and are for use with a head-mount transmitter attached directly to the sensor. The flying lead configuration facilitates removal of the sensor and transmitter as one assembly. The configuration with terminal block allows only the mounting of transmitter into the cover of several DIN size connection heads or requires the use of field mount transmitter. 65B RTDs may also be ordered with a cable attached to the sensor. This assembly requires the use of field mount transmitters.

Rosemount 65Q and 65B Sensors

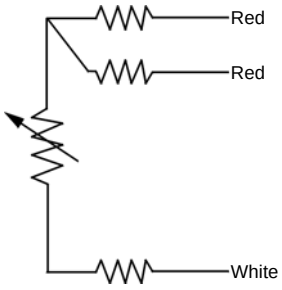
TABLE 4. Differentiation criteria between 65Q and 65B

Design Criteria	Series 65Q	Series 65B
Hygienic Design for Food and beverage Applications	Yes	Yes
Aseptic Design for Pharmaceutical/Biotech Applications	No	Yes
Sensor Lead Wire termination	• Flying leads • Terminal block	• Flying leads • Terminal block • Cable
Connection Head Material	• SST • Aluminum • Polyamide	• SST • Aluminum • Polyamide
Thermowell Material	1.4404 (316 L)	In-Line System with thermowell 1.4435 (316 L)
Thermowell Diameter	• 6 mm straight • 10 mm reduced to 6 mm	• No thermowell • 4.3 mm weld-in pocket as part of In-Line System
Process Connection	• Tri-Clamp • Tapered Union with Coupling Nut according to DIN 11851 (Dairy Connection) • Weld-in ball, adjustable • Threaded Connection • Varivent	• Hygienic In-Line System
Certificates	No EHEDG and 3-A	EHEDG
		3-A

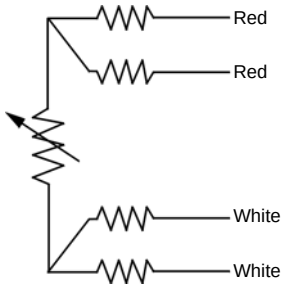
FIGURE 1. Series 65Q and 65B Lead Wire Termination

Series 65 RTD Flying Leads (Code 0)

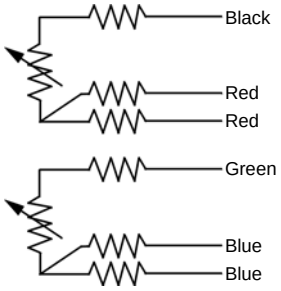
Single Element 3-wire



Single Element 4-wire

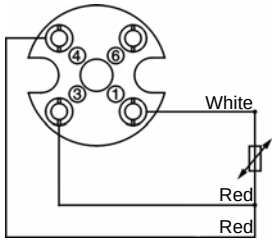


Dual Element 3-wire

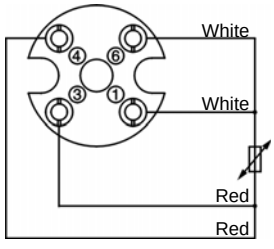


Series 65 RTD Terminal Block Termination (Code 2)

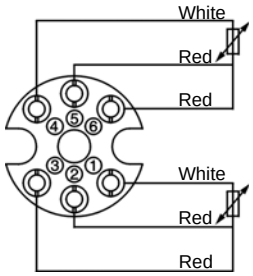
Single Element 3-wire



Single Element 4-wire

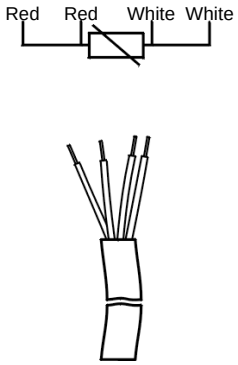


Dual Element 3-wire



Series 65B RTD Cable Sensor

(Codes 8 and 9)



Series 65Q RTD – Sanitary Applications

Rosemount Series 65Q integral mount temperature sensors are designed for use in hygienic, food and beverage applications when fitted with the TriClamp, adjustable Weld-in Ball or Tapered Union with Coupling Nut according to DIN 11851 (Dairy Connection) process connections which do not need to meet as harsh aseptic requirements as requested for BioPharm applications. Alternatively for direct insertion into non-hygienic processes the Series 65Q temperature sensor can be ordered optional with G½-in. (½-in. BSPF) or ½-in. NPT thread mounting.

Those RTD sensors are available alone or as complete assemblies including connection heads, thermowells with weld-on process connections. This offering is designed to be used in complete temperature assemblies including Rosemount Temperature Transmitters. The RTD sensors meet most critical parameters of international standards - DIN EN 60751 incorporating Amendments 1 and 2. All sensors are available in a variety of lengths and ranges with terminal block or flying leads.

SPECIFICATIONS

Nominal Resistance

In accordance with DIN EN 60751, the nominal resistance is defined as follows:

- 100 Ω RTD at 0 °C
- Temperature coefficient α = 0.00385 Ω x °C/Ω), averaged between 0 and 100 °C

Limit Deviations

Tolerance Class A as standard: t = ± (0.15 + 0.002 x t);
valid for the temperature range from 0 to +350 °C

Lead Wire Configuration

As single element (1Pt 100) with 3 or 4 lead wires or dual element (2Pt 100) with 3 lead wires

Response Time

Less than 12 seconds to reach 63% step change in water flowing at 0.4 m/s

Process Temperature Range

-50 to +450 °C
The measurement range can be limited by the gasket in the process connection.

Ambient Temperature

Housing without head-mounted transmitter

- Metal housings: -40 to +130 °C
- Plastic housings: -40 to +85°C

Housing with head-mounted transmitter

- -40 to +85°C

Maximum Process Pressure

Lower maximum pressure can be due to the process connection
Pressure ratings at 20 °C:

- Tri-Clamp: 10 bar
- Weld-in Ball with PEEK-Seal: 6 bar
- Weld-in Ball with SST-Seal: 40 bar
- Threaded: 40 bar
- Tapered Union with Coupling Nut: 10 bar
- Varivent: 10 bar

Shock and Vibration Resistance

According to DIN EN 60751: 2.8 g peak / 10…500 Hz

Self Heating

0.15 °K/mW when measured per method defined in DIN EN 60751

Insulation Resistance

1,000 MΩ minimum insulation resistance when measured at 500 Vdc and at room temperature

Sheath Material

321 Stainless Steel with mineral-insulated cable construction

Lead Wire

PTFE insulated, silver coated copper wire

Identification Data

The model and serial numbers are marked on each sensor

Ingress Protection (IP) Ratings

The particular rating is applicable only for complete assemblies including a connection head and tubular thermowell. IP varies from 65 to 68 due to a wide selection on different connection heads, DIN A and B size, made of different materials such as aluminium, polyamide and stainless steel

Rosemount 65Q and 65B Sensors

SYSTEM COMPONENTS

Sensor

The 65Q sensor consists of an exchangeable mineral-insulated measuring insert, wherein a small, drop-form thin film RTD element is encapsulated. This design protects the relatively strain-free element, thereby maintaining accuracy and long-term stability. The sensor is mounted into a swaged or straight stainless steel sheath. The sensor outer diameter is 3.2 mm. The minimum sensor length for an exchangeable sensor is 100 mm. The RTD sensor is fitted into a housing with connection head and welded thermowell.

Extension

- Standard material Stainless Steel 1.4404 (316 L)
- Standard diameter of 10 mm
- Preferred standard lengths; 50, 65, and 130 mm

Thermowell

Thermowell stem styles:

- Straight thermowell with an outer diameter of 6 mm diameter must be used for immersion lengths less than 50 mm
- More stable Stepped Thermowell with an outer diameter of 10mm reduced to 6 mm must be used for immersion lengths greater than 50 mm (65 mm on parallel thread $G^1/_2$-in. ($^1/_2$-in. BSPF))

Thermowell materials:

- Stainless Steel 1.4404 (316L) for hygienic applications

· Thermowell surface qualities:

- R_a < 0,8 µm as standard, electropolishing
- R_a < 0,4 µm optional, electropolishing

Connection Heads (see Table 5)

The connection heads can be of different types (size DIN A and B) and materials (plastic, aluminium, stainless steel). Its fitting to the rest of the probe and the gland for the cable entry, assure an IP grade of 65 at minimum. All supplied heads have a process connection M24x1.5.

Polished Stainless Steel DIN A (sanitary applications)

- Smoothly contoured design which minimizes crevices for easy wipe-down
- Sanitary Stainless Steel housing for easy-to-clean applications
- Mounting of one DIN A or B sized transmitter on DIN plate
- Local indication with integral LCD Meter

Polished Stainless Steel DIN B (sanitary applications)

- Smoothly contoured design which minimizes crevices for easy wipe-down
- Sanitary Stainless Steel housing for easy-to-clean applications
- Mounting of one DIN B sized transmitter on DIN plate

Rosemount Aluminium DIN A

- Rosemount design
- Mounting of one or two transmitters on DIN plate and for second one optional by the use of extension ring

TZ-A/BL (BUZH)

- DIN B head with enlarger space for mounting a DIN A size (644H) or DIN B size transmitter into the cover by the use of terminal block or two transmitters with flying lead sensors

GR-A/BL (BUZ)

- DIN B head with enlarger space for mounting a DIN A size (644H) or DIN B size transmitter on DIN plates

TZ-A/BK

- DIN B head with enlarger space for mounting a DIN A size (644H) or DIN B size transmitter into the cover by the use of terminal block or two transmitters (248H) with flying lead sensors
- Suggested for use in high humidity environments and at low temperatures to avoid problems due to condensation

TABLE 5. Connection Head Features

Type	Material	IP Rating	Lid Version	Transmitter Mounting	Conduit Connection	LCD Meter Cover
Polished DIN A	SST	68	Threaded	DIN plate, 644, 248	M20 x 1.5, $^1/_2$-in. NPT	Yes
Polished DIN B	SST	66	Threaded	DIN plate, 248	M20 x 1.5, $^1/_2$-in. NPT	No
Rosemount	Aluminum	68	Threaded	DIN plate, 644, 248	M20 x 1.5, $^1/_2$-in. NPT	Yes
TZ-A/BK	Polyamide	65	Screw-on cap	On cover, terminal block 644, 248	M20 x 1.5	No
TZ-A/BL	Aluminum	65	Screw-on camp	On cover, terminal block 644, 248	M20 x 1.5	No
GR-A/BL	Aluminum	65	Screw-on camp	DIN plate, 644, 248	M20 x 1.5	No

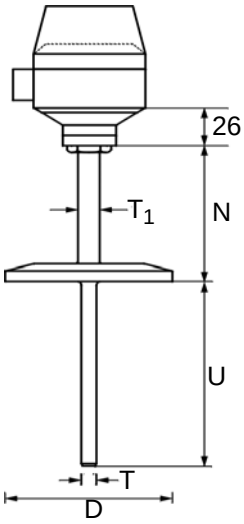
MOUNTING STYLE AND PROCESS CONNECTION

Achieving absolute control through every step of the manufacturing process is essential in order for the production of sanitary fittings to be successful. By achieving such control, each fitting will perform more satisfactorily when incorporated into the process installation, reducing installation time, and ensuring process integrity.

- Process connections are available in several sizes
- Process connection is continuously welded on the thermowell in such a way to obtain a welding radius of 3.2 mm at minimum, between the lower surface of the connection and the sensor stem according to 3A standards
- All process connections are available in material 1.4404 (316L)
- Surface roughness on wetted parts: R_a of ≤ 0.8 µm is available as standard, optional with R_a ≤ 0.4 µm, both electropolishing

Tri-Clamp

- Welded on the thermowell it allows immersion lengths from 25 to 500 mm, they depend on pipe nominal size used; see details on dimension table
- Available in 1/2 -to-4 in. (19 to 10.16 mm) tube OD sizes, larger sizes than 4-in. are available upon request
- available in material 1.4404 (316L), surface finish R_a of ≤ 0.8 µm is available as standard, optional with R_a of ≤ 0.4 µm, both electropolishing
- Can be cleaned in place, fast and easy to take down, provide lead-tight connections and readily adaptable to other forms of piping, allow in-line temperature measurement by the use of counter part and suitable seal o-ring on customer site
- Meet the 3-A Sanitary Standard
- Meets ASME BPE 2002 standards



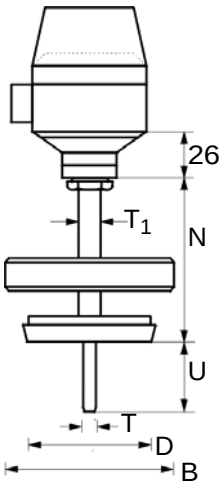
Dimensions (mm)			
Nominal Size	**D**	**T**	**T1**
1/2-in. (12.7 mm)	24.9	6(1)	10
3/4-in. (19 mm)	24.9	6(1)	10
1-in. (25.4 mm)	50.4	6(1)	10
1.5-in. (38 mm).	50.4	6(1)	10
2-in. (50.8 mm)	63.9	6(1)	10
2.5-in. (63.5 mm)	77.4	6(1)	10
3-in. (76.2 mm)	90.9	6(1)	10
4-in. (101.6 mm)	119.1	6(1)	10

(1) Diameter 6 mm as standard for immersion length U ≤ 50 mm. For U ≥ 50 mm Stepped thermowell diameter 10 mm with reduced measuring tip of 6 mm.

D = Process Connection Diameter
T1 = Extension Outer Diameter
T = Thermowell Outer Diameter
U = Immersion Length
N = Extension Length

Tapered Union with Coupling Nut according to DIN 11851 (Dairy Connection)

- Immersion lengths from 25 to 500 mm
- Available in DN10 - DN50 tube OD sizes, larger sizes than 50 DN are available upon request
- Available in material 1.4404 (316L), surface finish R_a of ≤ 0.8 µm is available as standard, optional with R_a of ≤ 0.4 µm, both electropolishing
- Self-centering, external coupling nut can be easily cleaned



Dimensions (mm)				
Nominal Size	**D**	**B**	**T**	**T_1**
DN 10	22.5	38	6(1)	10
DN 25	44	63	6(1)	10
DN 32	50	70	6(1)	10
DN 40	56	78	6(1)	10
DN 50	68.5	92	6(1)	10

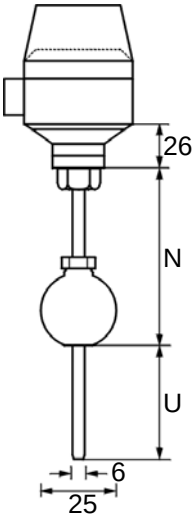
(1) Diameter 6 mm as standard for immersion length U ≤ 50 mm. For U ≥ 50 mm Stepped thermowell diameter 10 mm with reduced measuring tip of 6 mm.

D = Process Connection Diameter
T1 = Extension Outer Diameter
T = Thermowell Outer Diameter
U = Immersion Length
N = Extension Length
B = Coupling Nut Diameter

Rosemount 65Q and 65B Sensors

Weld-in Ball Connection

- Immersion lengths from 25 to 500 mm, mostly used for temperature measurement in vessels
- Available in material 1.4404 (316L), surface finish R_a of ≤ 0.8 µm is available as standard, optional with R_a of ≤ 0.4 µm, both electropolishing
- Used for Food and Beverage applications
- Available with PEEK or SST seal

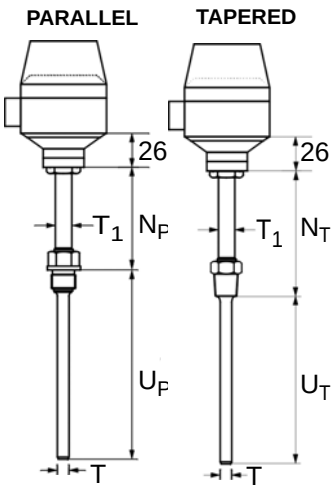


U = Immersion Length (adjustable)

N = Extension Length (adjustable)

Threaded Process Connection

- Immersion lengths from 25 mm (tapered threads) and 40 mm (parallel threads) to 500 mm
- Available in material 1.4404 (316L)
- Used for temperature measurement in non-hygienic processes



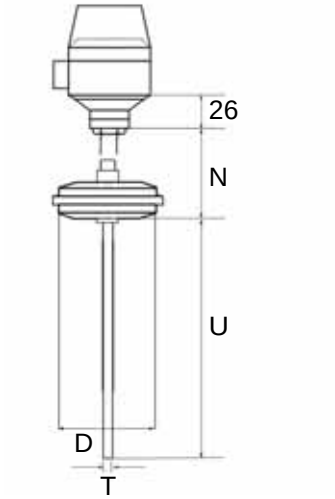
Dimensions (mm)	
T	**T_1**
6(1)	10

(1) Diameter 6 mm as standard for immersion length $U_T \leq 50$ mm or $U_p \leq 65$ mm. For $U_T \geq 50$ mm or $U_p \geq 65$ mm Stepped thermowell diameter 10 mm with reduced measuring tip of 6 mm.

D = Process Connection Diameter
T = Thermowell Outer Diameter
T_1 = Extension Outer Diameter
U_P = Immersion Length (parallel)
U_T = Immersion Length (tapered)
N_P = Extension Length (parallel)
N_T = Extension Length (tapered)

Varivent Process Connection

- Immersion lengths from 35 to 500 mm
- Available in D = 68 mm
- Suitable for hygienic and aseptic applications



Dimensions (mm)	
Nominal Size	**D**
DN 32 - 125	68

D = Process Connection Diameter
T = Thermowell Outer Diameter
U = Immersion Length
N = Extension Length

INSTALLATION

Series 65Q temperature sensors can be mounted on the wall of pipes or vessels. The counterparts for the process connections and the respective gaskets or sealing rings are generally not supplied with the sensors, and are on the customer's responsibility (FDA material certification, EHEDG and 3A requirements shall be observed).

As a general rule, the sensors should be installed in a manner which does not adversely affect their ability to be cleaned.

The immersion length may have an influence on the accuracy of the sensors, If it is too short, an error might be generated in the measured temperature, due to the lower temperatures of the process medium near the walls and the heat transfer which occurs through the sensor stem. To avoid this effect of inaccuracy, the immersion length should be, if possible, at least 90 to 120 mm. In pipes with smaller diameter, the axis line of the duct must be reached, and even slightly exceeded by the sensor tip.

In hygienic applications a strict installation rule exists so as not to leave any dead spaces along the run of process fluid.

In case of disassembling of the sensor, new gaskets equal to the originals and specific torques must be employed for the reassembly procedure, to assure the stated IP grade of the connection heads.

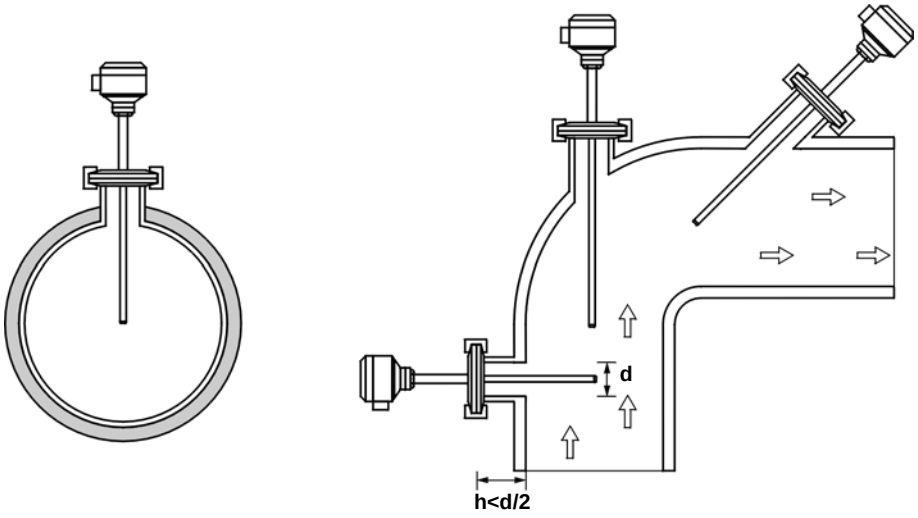
TriClamp Flange fulfills partly this requirement.

For **Weld-in Ball Connection** care should be taken by the user in the execution of the welding on the process side; e.g. suitable weld material, welding radius > 3 mm, absence of pits, crevices etc.)

Tapered Union with Coupling nut according to DIN 11581 (Dairy Process Connection) process connection doesn't meet as harsh aseptic requirements as requested for BioPharm applications.

Alternatively for direct insertion into non-hygienic processes the Series 65Q temperature sensor can be ordered optional with G$^{1}/_{2}$-in. **($^{1}/_{2}$-in. BSPF) or NPT thread mounting**.

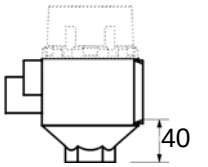
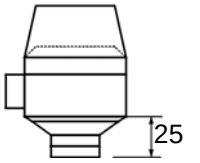
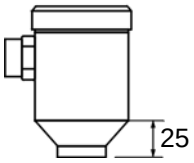
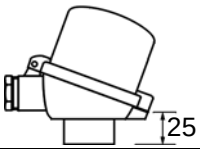
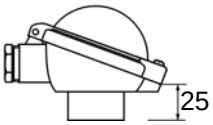
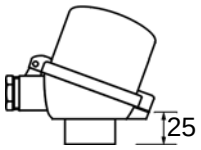
FIGURE 2. Installation Drawings



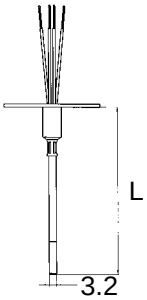
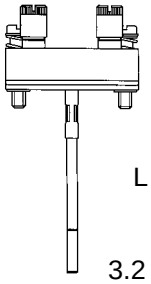
Rosemount 65Q and 65B Sensors

DIMENSIONAL DRAWINGS

Connection Heads

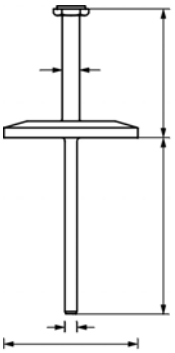
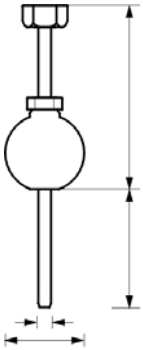
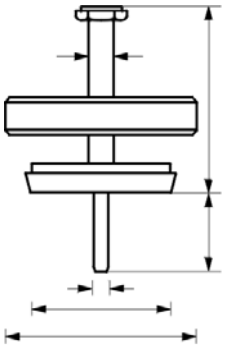
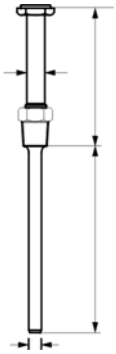
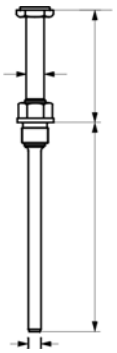
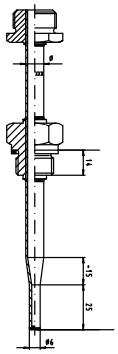
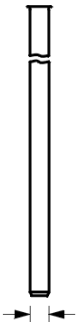
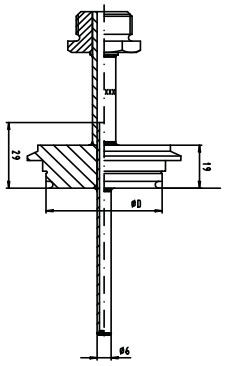
Rosemount Aluminum Codes C, D, 1, 2	DIN A SST Codes, E, F, 5, 6	DIN B Polished SST Codes R, S	TZ-A/BL Aluminum Code L	FR-A/BL Aluminum Code J	TZ-A/BK Polyamide Code T
					

Sensor Lead Wire Terminations

Flying Leads Code 0	Terminal Block Code 2
	

L = Sensor Length
N = Extension Length
N_P = Extension Length (parallel)
N_T = Extension Length (tapered)
U = Immersion Length
U_P = Immersion Length (parallel)
U_T = Immersion Length (tapered)
T = Thermowell Outer Diameter
T_1 = Extension Outer Diameter
D = Process Connection Diameter
B = Coupling Nut Diameter

Thermowells and Process Connections

Tri-Clamp	Weld-in Ball (adjustable)	Tapered Union with Coupling Nut	Threaded Tapered
			
Threaded Parallel	**Stepped Thermowell**	**Straight Thermowell**	**Varivent**
			

All dimensions are in millimeters

Series 65B RTD — Biopharm, Hygienic and Food & Beverage Applications

Rosemount Series 65B integral mount temperature sensors are designed for use in BioPharm and Hygienic applications when fitted with Hygienic In-Line Systems which does meet sterile/aseptic requirements according to EHEDG and 3A guidelines. This Hygienic In-Line System is particularly suitable for temperature measurement in small pipes beginning with DN 10 to DN 15. Larger In-Line housings are also available as standard up to DN 80. The compact and dead-pocket free sensor design is easy to install and allows to maintain process integrity during exchange of sensor for calibration or replacement purposes. The close dimension tolerance of sensor to weld-in pocket inside the In-Line housing reduces the response time obviously.Those RTD sensors are available as complete assemblies including connection heads or extension cable and process connection thread $G^1/_2$-in. (1/2-in. BSPF), thermowells and mounting fittings. All components are made of Stainless Steel for easy-to-clean ability in CIP/SIP applications. The In-Line system housing is electropolished as standard and available with material certificate 3.1B upon request. The use of In-Line system allows a quick mounting by the use orbital welding device. Especially with small pipes or later installations the In-Line System offers important advantages to hygienic mounting in comparison with conventional installation with standard sleeves.

This offering is designed to be used in complete temperature assemblies that include Rosemount 248 and 644 Head Mount Temperature Transmitters built in wide range of connection heads. In addition the sensor can be ordered as a compact, complete assembly with cable as cold end termination. The RTD sensors meet most critical parameters of international standards - DIN EN 60751 incorporating Amendments 1 and 2. All sensors are available in a variety of lengths and ranges with terminal block or flying leads.

SPECIFICATIONS

Nominal Resistance

In accordance with DIN EN 60751, the nominal resistance is defined as follows:

- 100 Ω RTD at 0 °C
- Temperature coefficient α = 0.00385 Ω (°C/Ω), averaged between 0 and 100 °C

Limit Deviations

Tolerance Class A as standard: t = ± (0.15 + 0.002 x t); valid for the temperature range from 0 to +250 °C

Lead Wire Configuration

As single element (1Pt 100) with 4 lead wires

Response Time

Less than 12 seconds to reach 63% step change in water flowing at 0.4 m/s

Process Temperature Range

-50 to +250 °C

Ambient Temperature

Housing without head-mounted transmitter

- Metal housings: -40 to +130 °C

Housing with head-mounted transmitter

- -40 to +85°C

Maximum Process Pressure

16 bar at 0 °C

Shock and Vibration Resistance

According to DIN EN 60751: 2.8 g peak / 10…500 Hz

Self Heating

0.15 °K/mW when measured per method defined in DIN EN 60751

Insulation Resistance

1,000 MΩ minimum insulation resistance when measured at 500 Vdc and at room temperature

Sheath Material

321 SST with mineral-insulated cable construction

Lead Wire

PTFE insulated, silver coated copper wire

Identification Data

The model and serial number are marked on each sensor

Ingress Protection (IP) Ratings

The particular rating is applicable only for complete assemblies including a connection head and tubular thermowell. IP varies from 65 to 68 due to a wide selection on different connection heads, DIN A and DIN B size, made of different materials such as aluminum, polyamide, and stainless steel.

Rosemount 65Q and 65B Sensors

65B SENSOR DESIGN WITH CONNECTION HEAD

System Components

Sensor

The 65B sensor consists of a 3.2 mm exchangeable measuring insert, wherein a small, drop-form thin film RTD element is encapsulated. The single Class A platinum element is firmly secured within the sheath by compacted magnesium oxide. This design protects the relatively strain-free element, thereby maintaining accuracy and long-term stability. The sensor is mounted into a weld-in pocket inside the In-Line system by the use of the G$^{1}/_{2}$-in. ($^{1}/_{2}$-in. BSPF) threaded bush as process connection.

Connection Heads (see Table 6)

The connection heads can be of different types (size DIN A and B) and materials (plastic, aluminium, stainless steel). Its fitting to the rest of the probe and the gland for the cable entry, assure an IP grade of 65 at minimum. All supplied heads have a process connection M24x1.5. Preferred connection head material for the use in hygienic applications due to improved corrosion resistance is stainless steel which is available in both DIN A and DIN B size.

Polished Stainless Steel DIN A (sanitary applications)

- Rosemount design
- Smoothly contoured design which minimizes crevices for easy wipe-down
- Sanitary Stainless Steel housing for easy-to-clean applications
- Mounting of one DIN A or B sized transmitter on DIN plate
- Local indication with integral LCD Meter

Polished Stainless Steel DIN B (sanitary applications)

- Rosemount design
- Smoothly contoured design which minimizes crevices for easy wipe-down
- Sanitary Stainless Steel housing for easy-to-clean applications
- Mounting of one DIN B sized transmitter on DIN plate

Connection head styles in other materials than stainless steel can be used in environments where lower hygienic criteria are present.

Rosemount Aluminium DIN A

- Rosemount design
- Mounting of one or two transmitters on DIN plate and for second one optional by the use of extension ring

TZ-A/BL (BUZH)

- DIN B head with enlarger space for mounting a DIN A size (644H) or DIN B size transmitter into the cover by the use of terminal block or two transmitters with flying lead sensors

GR-A/BL (BUZ)

- DIN B head with enlarger space for mounting a DIN A size (644H) or DIN B size transmitter on DIN plates

TZ-A/BK

- DIN B head with enlarger space for mounting a DIN A size (644H) or DIN B size transmitter into the cover by the use of terminal block or two transmitters (248H) with flying lead sensors
- Suggested for use in high humidity environments and at low temperatures to avoid problems due to condensation

TABLE 6. Connection Head Features

Type	Material	IP Rating	Lid Version	Transmitter Mounting	Conduit Connection	LCD Meter Cover
Polished DIN A	SST	68	Threaded	DIN plate, 644, 248	M20 x 1.5, $^{1}/_{2}$-in. NPT	Yes
Polished DIN B	SST	66	Threaded	DIN plate, 248	M20 x 1.5, $^{1}/_{2}$-in. NPT	No
Rosemount	Aluminium	68	Threaded	DIN plate, 644, 248	M20 x 1.5, $^{1}/_{2}$-in. NPT	Yes
TZ–A/BK	Polyamide	65	Screw-on cap	On cover, terminal block 644, 248	M20 x 1.5	No
TZ–A/BL	Aluminium	65	Screw-on cap	On cover, terminal block 644, 248	M20 x 1.5	No
GR–A/BL	Aluminium	65	Screw-on cap	DIN plate, 644, 248	M20 x 1.5	No

Extension

Standard material: SST

Standard diameter: 12 mm

Standard length: 30 mm

Welded screw bush: M24 x 1.5 for easy to clean applications

Applications

- Monitoring of CIP / SIP processes
- If local indication of process variable and diagnostics required by the use of LCD meter on the transmitter
- Enhanced system accuracy with transmitter-sensor matching with HART and FOUNDATION fieldbus protocol for critical control applications involving temperature measurements fermentation and bio-reactors.

65B CABLE SENSOR

System Components

Sensor

The 65B sensor consists of a 3.2 mm measuring insert, wherein a small, drop-form thin film RTD element is encapsulated. The single, class A platinum element is firmly secured within the sheath by compacted magnesium oxide. This design protects the relatively strain-free element, thereby maintaining accuracy and long-term stability. The sensor is mounted into a weld-in pocket inside the In-Line system by the use of the G$^{1}/_{2}$-in. (1/2-in. BSPF) threaded bush as process connection. The cold end termination is provided with an extension cable.

Cable

- Isolation material PTFE/Wire/PTFE
- Standard cable length: 3 or 5 m
- Cable mounting provided by the use of M12 cable gland made from PVDF (Polyvinylidenfluorid), FDA conform

In-Line System (available for both sensor designs)

The In-Line System housings have a straight or elbow design to meet different installation requirements on site.

- Pipes according DIN 11850 Series 2 available as standard; DN10 to DN80 / $^{1}/_{2}$-in. to 3-in.
- Thread connection to the sensor: G$^{1}/_{2}$-in. ($^{1}/_{2}$-in. BSPF): loose screw bush allows the connection head mounting in any direction
- Housing material: 1.4435 (316L), optional with material certificate 3.1B
- Weld-in pocket immersion length depends on housing size.
- Electropolishing inner and outer the housing with a surface roughness $R_a \leq 0.8$ µm is available as standard
- Sealing method: weld-in pocket without the use of additional seal components
- EHEDG and 3A compliant housing design (pending)

Extension

- Standard material Stainless Steel
- Standard diameter: 12 mm
- Standard length: 30 mm

Applications

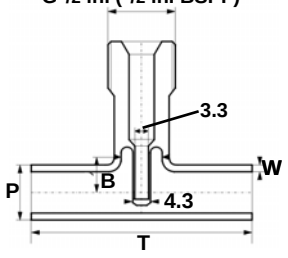
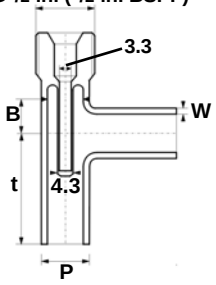
- For use in skid environments connected to 848T Eight Sensor Input Transmitter with Foundation Fieldbus protocol
- For use in fermentors or reactors connected to 3144P Dual Input Transmitter with HART or Foundation Fieldbus protocol

Installation

65B temperature sensors with In-Line system housings can be mounted on pipes according to DIN and ISO standards. As a general rule, the In-line systems should be installed in a manner which does not adversely affect their ability to be cleaned. In hygienic applications a strict installation rule consists in not to leave any dead spaces along the run of process fluid.

Care should be taken by the user in the execution of the welding on the process side e.g. between pipe and weld-in pocket; e.g. suitable weld material, welding radius > 3 mm, absence of pits, crevices etc.

Two installation variants are shown on following drawings:

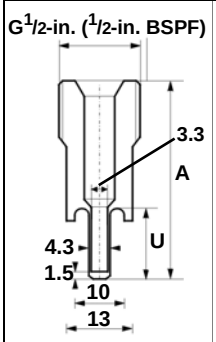
Straight Pipe Design	Elbow Pipe Design
G$^{1}/_{2}$-in. ($^{1}/_{2}$-in. BSPF)  	G$^{1}/_{2}$-in. ($^{1}/_{2}$-in. BSPF) 

Drawings continued on page Temperature-336

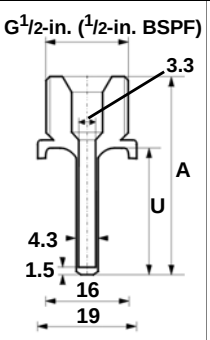
Rosemount 65Q and 65B Sensors

Weld-in Pockets for Straight Pipe Design

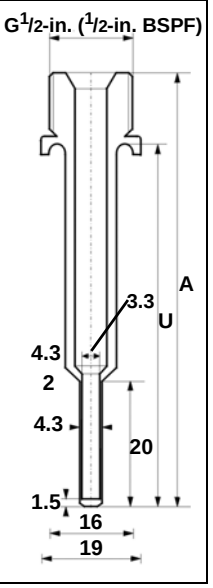
U = 16 mm



U = 25 mm

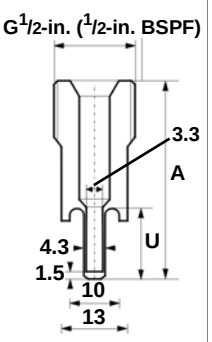


U = 40 mm

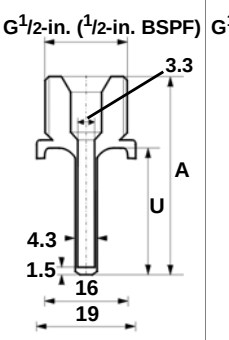


Weld-in Pockets for Elbow Pipe Design

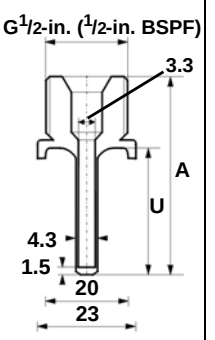
U = 27 mm



U = 33 mm



U = 37 mm



Dimensional Table

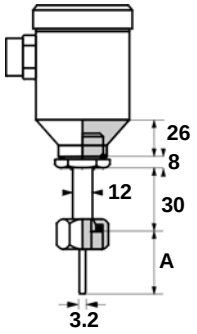
TABLE 7. Immersion Length according to. Standard (dimensions are in millimeters)

	Nominal Size	Pipe Length (T)	Dimensions (B)	Pipe Outer Diameter (P) x Wall Thickness (W)	Immersion Length (U)	Pocket Length (A)
Straight Design	**DIN 11852 in Metric**			**DIN 11850 in Metric, Row 2**		
	DN 15	70	11	19 x 1.5	16	39
	DN 20	80	13	23 x 1.5	16	39
	DN 25	100	16	29 x 1.5	16	39
	DN 32	110	19.5	35 x 1.5	25	43
	DN 40	120	23	41 x 1.5	25	43
	DN 50	160	30	53 x 1.5	25	43
	DN 65	210	40	70 x 2.0	40	60
	DN 80	260	47.5	85 x 2.0	40	60
	DIN 11866 in Inches			**DIN 11866**		
	DN 1	108	14.2	25.4 x 1.65	16	39
	DN $1^1/_2$	120.6	21.1	38.1 x 1.65	25	43
	DN 2	146	28.9	50.8 x 1.65	25	43
	DN $2^1/_2$	158.8	35.3	63.5 x 1.65	25	43
	DN 3	171.4	43.1	76.2 x 1.65	40	60
Elbow Design	**DIN 11865 in Metric**			**DIN 11866**		
	DN 10	35	11	13 x 1.5	30	50
	DN 15	35	11	19 x 1.5	33	51
	DN 20	40	13	23 x 1.5	37	55
	DIN 11865 in Inches			**DIN 11866**		
	DN $^1/_2$	47.6	7.7	12.7 x 1.65	27	50
	DN $^3/_4$	50.8	11	19.05 x 1.65	33	51

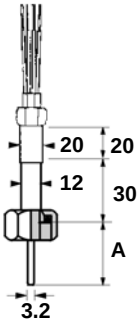
DIMENSIONAL DRAWINGS

Dimensions are in millimeters

Sensor Design with Connection Head

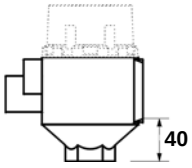


Cable Sensor Design

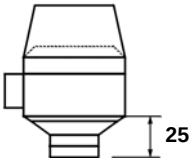


Connection Heads

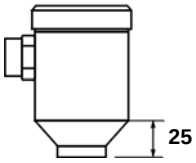
Rosemount
Aluminum
Codes C, D, 1, 2



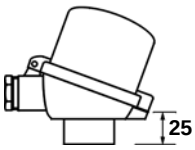
DIN A
SST
Codes E, F, 5, and 6



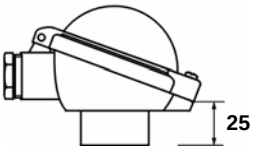
DIN B
Polished SST
Codes R, S



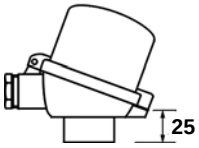
TZ-A/BL
Aluminum
Code L



GR-A/BL
Aluminum
Code J

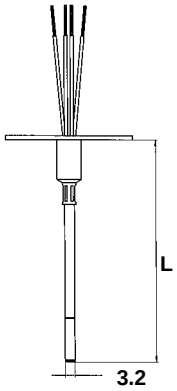


TZ-A/BK
Polyamide
Code T

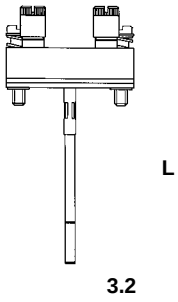


Sensor Lead Wire Terminations

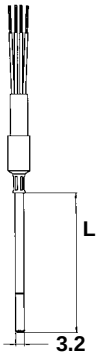
Flying Leads
Code 0



Terminal Block
Code 2

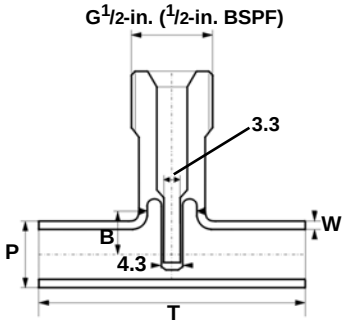


Cable Sensor
Codes 8 and 9

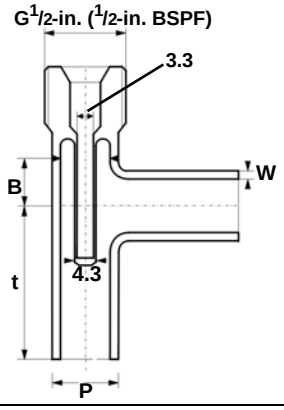


In-Line System

Straight



Elbow



A = Pocket Length
L = Sensor Length
B = Dimension "B"
P = Pipe Outer Diameter
T = Pipe Length
W = Wall Thickness
t = PIpe Length (1/2 T)

Rosemount 65Q and 65B Sensors

Product Data Sheet
00813-0100-4827, Rev CA
Catalog 2011 - 2012

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00813-0100-4827 Rev CA, 7/11

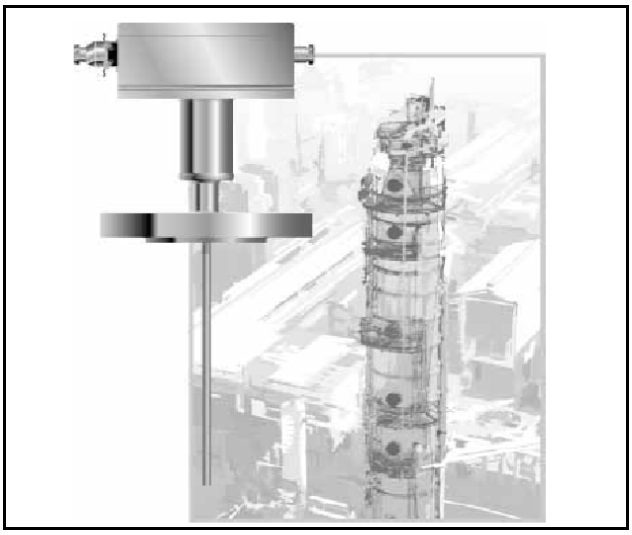
EMERSON
Process Management

Product Data Sheet
00813-0100-4119, Rev AB
Catalog 2011 - 2012

Rosemount Multipoint Thermocouple and RTD Profiling Sensors (Type TX, MTX, WX, MWX)

FEATURES

- *Efficiently monitor a temperature profile for a wide range of applications, including hot-spot detection in reactors*
- *Single process insertion for up to 60 independent measurement points*
- *Compact design of independent measurement points*
- *Reduces cost of individual measurement points*
- *Sensing elements can be individually replaced in the field*
- *Transmitter, enclosure, sensor, and protection tube can be ordered as a complete assembly.*



Content

Rosemount Multipoint Thermocouple and RTD Profiling Sensor . . page Temperature-340
Product Overview . . . . . page Temperature-341
Multipoint Type Specifications . . . . . page Temperature-341
Specification . . . . . page Temperature-342
Design Overview . . . . . page Temperature-343
Model Examples . . . . . page Temperature-347
Typical Applications . . . . . page Temperature-349

Rosemount Multipoint Thermocouple and RTD Profiling Sensor

Optimize plant efficiency and increase measurement reliability with industry proven design

- You can measure reactor profiles with only one temperature probe instead of multiple probes
- Optimized sensor design with more then six basic designs and many variations
- Up to 60 measuring points within one probe
- Designs for single measuring point replacement



Easy implementation and installation in existing application

- Available in a wide variety of process connections, Junction boxes and designs
- Specific designs allow installation without the use of a crane or protection tube

Achieve optimal efficiency with advanced High Density Transmitter technology

- Decrease the installation and engineering costs further by using 848T High density transmitters

Explore the benefits of a Complete Point Solution from Rosemount Temperature Measurement

- If requested Emerson can provide a complete point temperature solution, delivering an installation ready transmitter and sensor assembly
- Emerson has a complete portfolio of Single Point and High Density Temperature Measurement solutions, allowing you to effectively measure and control your processes with the reliability you trust from Rosemount products



Experience global consistency and local support from numerous worldwide Rosemount Temperature sites



- Experienced Instrumentation Consultants help select the right product for any temperature application and advise on best installation practices.
- An extensive global network of Emerson service and support personnel can be on-site when and where they are needed.

Product Overview

The Rosemount Multipoint Thermocouple and RTD Profiling Sensors can be used in almost any temperature profile application. The Models TX, MTX, WX, MWX sensors are constructed using durable mineral insulated (MI) cable or ceramic insulated thermocouples and can be provided with thermocouples or with Pt100 resistance elements (RTDs). Emerson uses highly linear RTD elements with a very stable resistance versus temperature relationship and are designed to meet the parameters of DIN EN 60751, incorporating Amendments 1 and 2. Rosemount Multipoint Thermocouple Profiling Sensors conform to IEC60584. Rosemount has provided flexible model structures for each multipoint sensor base design. Consult the factory and use the Configuration Data Sheet (CDS) provided for Multipoint Sensor models, and Emerson will provide the sensor that will accommodate the process application.

MULTIPOINT TYPE SPECIFICATION

Table 1. Rosemount Multipoint RTD and Thermocouples

Code	
Type Name	
TX	Multipoint thermocouple
WX	Multipoint RTD
MTX	Multipoint thermocouple with protection tube
MWX	Multipoint RTD with protection tube
Process Connection	
D	Weld-in
E	No process connection
F	Flange
G	Thread
S	Special
Protection Tube	
O	Without protection tube
Y	Metal protection tube
Lead Wire Termination	
I	Enclosure
K	Cable Connection (for WX and MWX types)
L	Compensating cable or Thermocouple Cable (for TX and MTX types)
R	Flying leads
S	With Plug
Additional Option	
Additional option codes are defined by quoting. Please consult the factory and use the Configuration Data Sheet (CDS)	
Typical Multipoint Type: MTX-FYI	

NOTE:
Different combinations of codes are possible. Consult the factory and use the Configuration Data Sheet (CDS) provided for Multipoint Temperature Profiling Sensors models, and Emerson will provide an appropriate sensor model that will accommodate the process applications.

Specifications

The tables below provide a quick reference for the performance and physical aspects of the Rosemount TX, MTX, WX, MWX Multipoint Thermocouple and RTD Profiling Sensor designs.

Table 2. Functional Specifications

	TX, MTX	WX, MWX
Measuring Element Type	E, J, N, K, T Thermocouple	Pt100 RTD
Number of Measurement Points	2 minimum, 60 maximum - based on design	2 minimum, 20 maximum - based on design
Temperature Limits	-40 to 1200 °C	-200 to 600 °C
Response Time	Fast or moderate, based on sensor and thermowell design	Moderate

Table 3. Physical Specifications

		TX, MTX	WX, MWX
Required Inner Diameter of Existing Process Thermowell		≥ 3,5 mm	≥ 6 mm
Maximum Insertion Length	With protection tube	16 m	
	Without protection tube	40 m	
Minimum Insertion Length		Depending on design. Min. 20 mm	Depending on design. Min. 30 mm
Sheath Material for MI-Cable		Stainless Steel, High Alloyed Steel	
Sheath Material for Thermowell		Depending on design and process conditions	

Table 4. Performance Specifications

	TX, MTX			WX, MWX
Accuracy	Limits of Error Interchangeability acc. IEC 584 For Thermocouple			In Accordance to IEC 751 Class A±(0.15°C + 0.0020*|t|) Class A valid only in a temperature range from -50°C to 450°C Class B ±(0.30°C + 0.0050*|t|) "t" is the temperature in °C
	Class 1			
	Type E	± 1.5 °C	-40 to 375°C	
		± 0.004 x t [°C]	375 to 800°C	
	Type J	± 1.5 °C	-40 to 375°C	
		± 0.004 x t [°C]	375 to 800°C	
	Type K	± 1.5 °C	-40 to 375°C	
		± 0.004 x t [°C]	375 to 1000°C	
	Type N	± 1.5 °C	-40 to 375°C	
		± 0.004 x t [°C]	375 to 1000°C	
	Type T	± 0.5 °C	-40 to 125°C	
		± 0.005 x t [°C]	125 to 350°C	
	Class 2			
	Type E	± 2.5 °C	-40 to 333°C	
		± 0.0075 x t [°C]	333 to 900°C	
	Type J	± 2.5 °C	-40 to 333°C	
		± 0.0075 x t [°C]	333 to 700°C	
	Type K	± 2.5 °C	-40 to 333°C	
		± 0.0075 x t [°C]	333 to 1200°C	
	Type N	± 2.5 °C	-40 to 333°C	
		± 0.0075 x t [°C]	333 to 1200°C	
	Type T	± 1 °C	-40 to 133°C	
		± 0.0075 x t [°C]	133 to 350°C	
Ambient Temperature Limits	-51 to 80°C			
Ratings	Minimum IP65			
Insulation Resistance for TC not valid for grounded elements	Greater than 1000Mohms at room temperature, test voltage is:			
		100VDC for thermocouple diameter ≤ 2mm	500 VDC for thermocouple diameter > 2mm	Greater than 1000M Ohms at room temperature, test voltage is 500 VDC
Enclosure	The enclosure depends on sensor design, the number of measuring point, presence of transmitters and their type.			

Design Overview

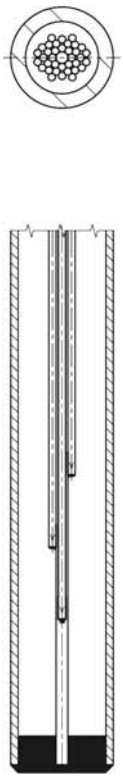
Compact Design

The Compact Multipoint Sensor design is available only with Types TX or MTX, grounded or ungrounded thermocouples, and is available in diameters from 2,5 mm (0.1 in.) to 40 mm (1.6 in.). Up to 60 measuring points can be monitored by this design using small diameter thermocouples in a single sheath. The high number of measurement points allows monitoring of temperature profiles with very good local resolution, making it the perfect solution for hot-spot detection in tall reactors or distillation columns. The compact design is available in two protection options, including bundled or insert tube. Insert tubes position the sensing elements in place and gives mechanical stability to the sensor, but only give limited protection against the process medium.

Table 5. Available Insert Tube Outer Diameters

Diameter		Maximum Measurement Points
mm	inch	
3,5	0.14	25
4,5	0.18	30
5,0	0.20	40
6,0	0.24	60
8,0	0.32	60

Figure 1. Compact Design

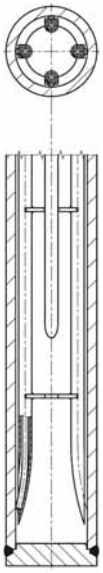


Guiding Tube Design

The Guide Tube Multipoint design is available with Types TX or MTX, grounded or ungrounded thermocouples, and can be used for 1-in. pipes or above. Between 2 and 8 mineral insulated grounded or ungrounded thermocouple sensors are inserted into individual guide tubes and fed to the specified measurement point. A slight bend at the tip of the measuring element ensures contact with the protection tube surface, giving optimum temperature response. Due to the construction of this design a minimum inner protection tube diameter of one inch is required and the maximum immersion length is limited to 10 m (32,8 ft.) even if no protection tube is required. RTD elements cannot be used in this design due to the physical constraints of bending the sheath.

Emerson Process Management offers this design with two different methods of mounting the elements inside the enclosure: sealed or unsealed. To ensure fast response time and a good thermal contact, two designs of spring loaded fittings are available, but the spring loaded fittings do not provide an environmental seal. Compression fittings provide an environment seal but this comes at the expense of good thermal contact. The protection tube size limits the number of measuring points as this design is not flexible and the guide tubes mounting and fixation need space. This makes this sensor a perfect solution for all profiling applications where lower local resolution is acceptable and a high process availability is needed.

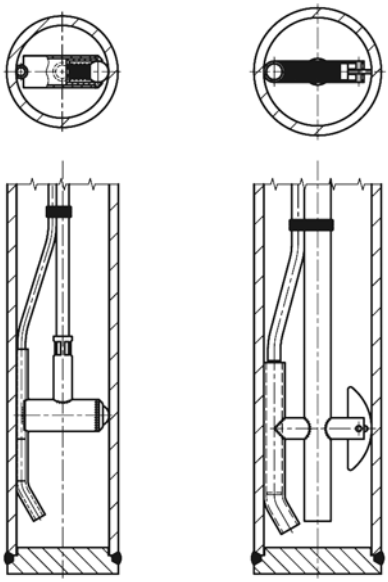
Figure 2. Guiding Tube Design



Radial Spring Design

The Radial Spring Multipoint design is available for all four Multipoint types TX, MTX, WX and MWX, for diameters of 26 mm and above. This design uses between 2 and 20 flattened mineral insulated grounded or ungrounded thermocouple or RTD elements pressed against the inner wall of the protection tube by radial springs to provide better thermal contact with the process and ensure the best possible response time. The design of the spring loaded brace with angled blade and sliding head compensates for tube wall thickness and glides over obstacles in the tube for easy assembly. The head of the spring loaded brace is available in two different versions The design shown in Figure 3 shows a ball at the end of the radial spring and is used if space is limited to inner protective diameters smaller then 30 mm (1.18 in.). This design is limited to a maximum length of 3 m (9.8 ft.). The design shown in Figure 3 uses a semicircular metal plate and is ideal in applications where enough space is available. Neither Radial Spring Multipoint designs does not allow individual thermocouples to be replaced, but the entire sensor assembly can be replaced as one unit. This sensor design can delivered with a maximum length of 30 m (98.4 ft.) as a coil if no protection tube is required. The maximum length is restricted to 10 m (32.8 ft.) if a protection tube is required that does not allow to coil the sensor for shipping.

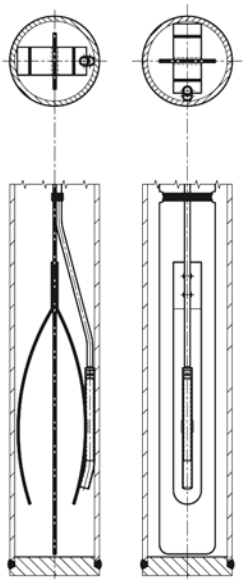
Figure 3. Radial Spring Design



Laminated Spring Design

The Laminated Spring Multipoint design is available for all four Multipoint types TX, MTX, WX and MWX at a maximum of 10 measuring points and is available in diameters of 40 mm (1.58 in.) and above. The laminated spring presses the thermocouple against the inner wall of the protection tube to provide good thermal contact between the thermocouple and the protection tube, enabling a fast time response. The advantage of this design is that the support framework is as flexible as an oil dipstick and can follow the contour of the protection tube even if the mounting flange is at an angle to the protection tube and the design can also be used in applications with high refractory wrapage. The individual thermocouples cannot be replaced in this design, but the entire sensor assembly can be replaced as one unit. This sensor design can delivered with a maximum length of 30 m (98.4 ft.) as a coil if no protection tube is required. The maximum length is restricted to 10 m (32.8 ft.) if a protection tube is required that does not allow to coil the sensor for shipping.

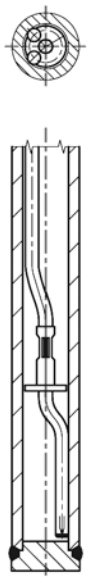
Figure 4. Laminated Spring Design



Spacer Design

The Spacer Multipoint design is available for all four Multipoint types TX, MTX, WX and MWX, available for diameters of 18 mm (0.7 in.) and above making it the perfect solution for diameters where the laminated and radial spring design can not be used. This design uses spacer disks to guide and hold the tip of up to 10 measuring points measuring elements in position. The individual elements are permanently connected to the spacer disk and are not replaceable. The spacer disk design is primarily used in applications where response time is not critical or where the size of the protection tube prevents the use of a different design.

Figure 5. Spacer Design



Freely Bendable Design

The Freely Bendable Multipoint design is available in all four Multipoint types TX, MTX, WX and MWX. This design uses several MI-Cable thermocouple or RTD sensors that are inserted directly into the process or several compact design multipoint sensors inside an annealed protection tube. The individual MI-Cables allow three dimensional temperature measurements at high pressures with only one process penetration by passing the individual elements to any required position inside the reactor or vessel. Once the MI cables are passed through the process penetration, the sensors can be positioned to the desired three-dimensional array by simply bending the MI cable. This eliminates the need to have multiple horizontal or vertical straight-run multipoint sensors installed to accomplish the same effect. The drawback to this design is that it has limited pressure ratings.

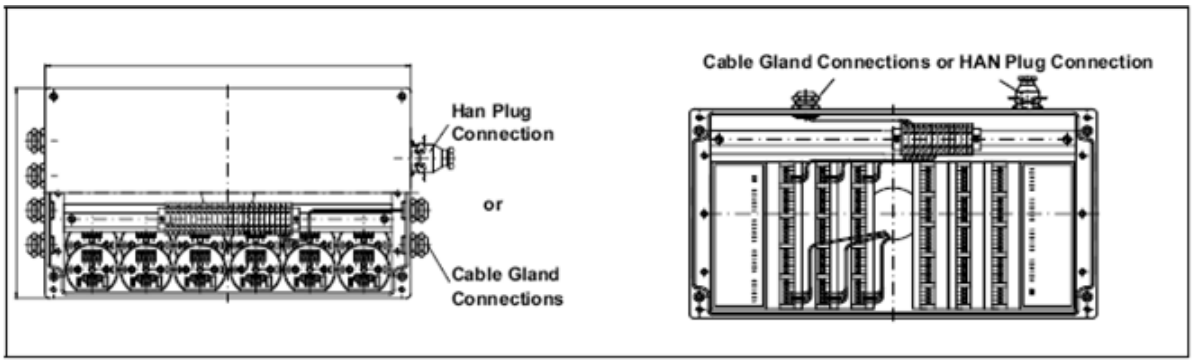
Other Designs

Emerson offers various other designs for all four Multipoint types TX, MTX, WX and MWX that are specifically designed to customer applications. Please contact an Emerson representative for more information.

Enclosures with Transmitters

The drawings in Figure 6 show examples of junction boxes with different transmitter types and plugs. The size of the junction is influenced by the number and type of transmitters or terminal strips needed.

Figure 6. Enclosures

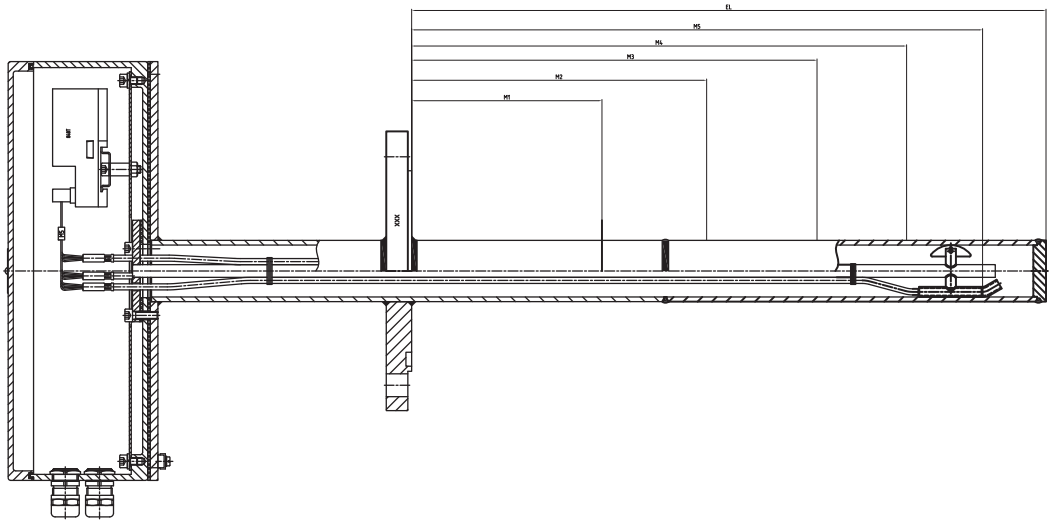


Protection Tube

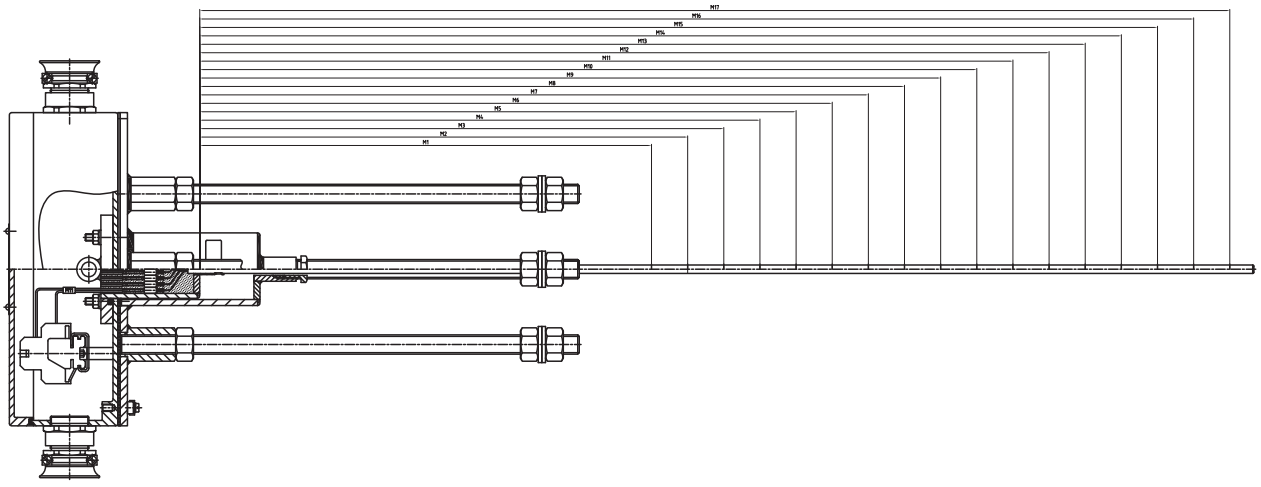
Protection tubes are needed for most of the multipoint designs and function as a barrier between the measuring element and the process. The optimal size depends on the multipoint design and number of measuring points as well as on the process conditions. The choice of the material and wall thickness is absolutely crucial and has to be done according the process pressure, temperature and medium. The choice of the wrong material and sizes can lead to dramatically reduced sensor lifetimes and early failures. Protection tubes can be already installed or can be delivered by Emerson according application specifications.

MODEL EXAMPLES

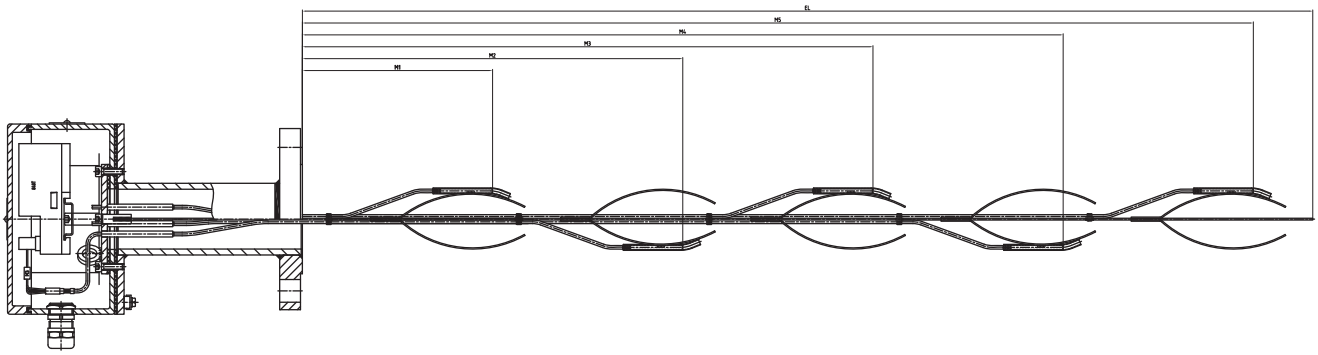
WX-FYI Radial Spring Multipoint Design



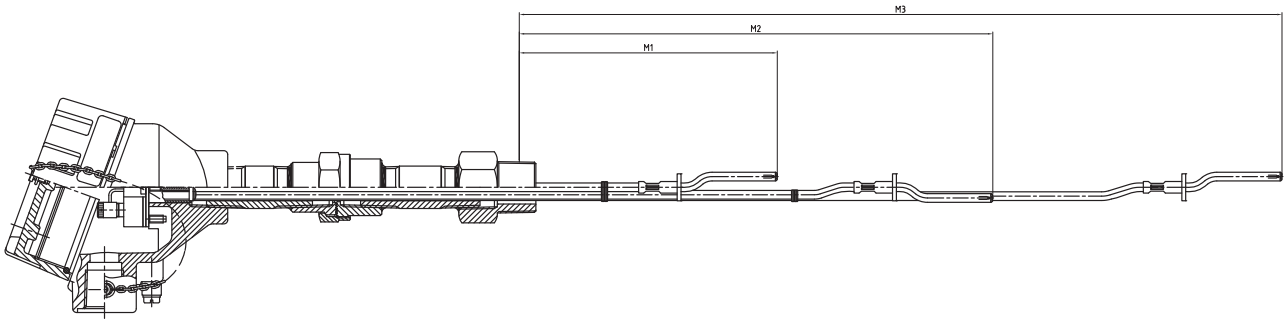
TX-SYI Compact Multipoint Design



MWX-FOI Laminated Spring Multipoint design



MTX-GOI Spacer Multipoint Design

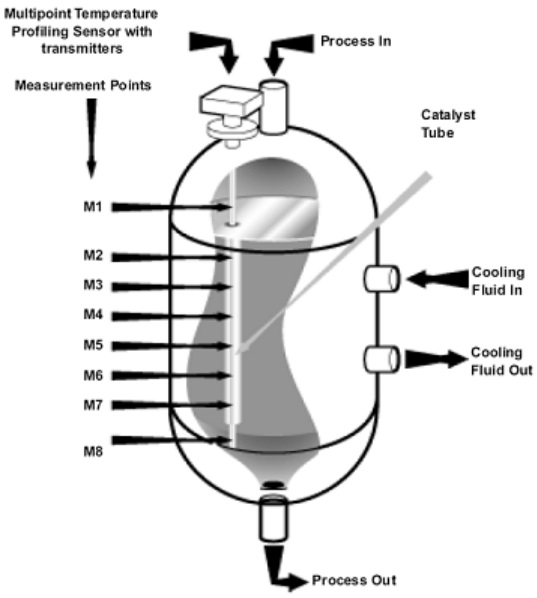


TYPICAL APPLICATIONS

Reactors

Multipoint Temperature Profiling Sensors improve monitoring and control of the reaction process within chemical reactors. A prime example of how Multipoint Temperature Profiling Sensors are used is in the production of organic acid. Many organic acids are produced through an exothermic oxidation process. This chemical reaction takes place in multiple tubes filled with catalysts. The reaction components flow into the tubes, form reactions due to the catalyst, then flow out as an acid. These tubes are cooled by running a coolant around the tubes. A critical process parameter is the control of the operating temperature. A Multipoint Temperature Profiling Sensor can measure the temperature profile inside a reaction tube. Through monitoring the temperature profile the flow of reaction components and coolant can be controlled to maximize the process output and reaction efficiency. A high local resolution of the temperature profile is required to ensure that the hot-spot (maximum measured temperature) does not reach the maximum allowable process temperature.

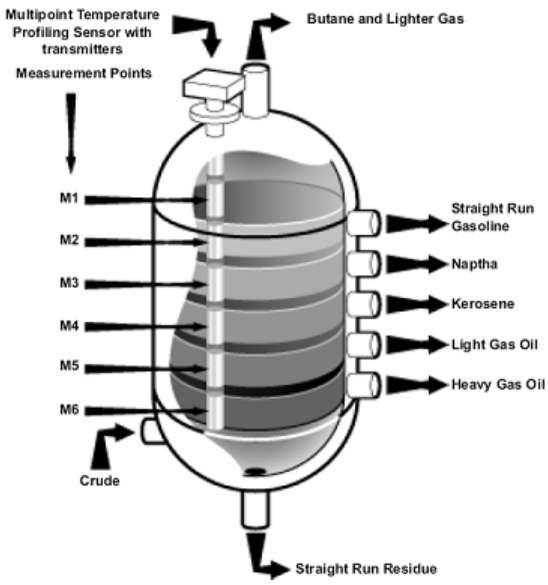
Figure 7. Reactor



Distillation Columns/Fractionators

In crude oil distillation processes, crude oil is heated and run into a distillation column or fractionators, where a significant temperature gradient is observed - high temperatures at the bottom, cooler at the top). Inside the column, crude oil is separated into components or fractions according to weight and boiling point. As these component vapors travel up, they condense to liquid form. These condensed components are captured by strategically mounted trays or “decks,” located at a height where the column temperature matches a specific component’s condensation point. The tray locations, or cut-points, are where products are then drawn from the column. Multipoint Temperature Profiling Sensors can be used to monitor the temperature at these cut-points and therefore control the temperature profile of the distillation column.

Figure 8. Distillation Column/Fractionator



Rosemount AIS Sensors

Product Data Sheet
00813-0100-4119, Rev AB
Catalog 2011 - 2012

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Email : Enquiries@AP.EmersonProcess.com

00813-0100-4119 Rev AB, 7/11

EMERSON
Process Management

Rosemount Pipe Clamp RTD Sensor

- *Non-intrusive design for fast and easy temperature measurement in piping applications*
- *Platinum RTD Temperature Sensors with silver or nickel tip*
- *Non intrusive design for measurement on pipe applications*
- *Temperature-sensor matching provides increased measurement accuracy*
- *Wide range of calibration options provide maximum measurement reliability*
- *Integrated temperature assemblies provide time and cost savings*
- *Integral assembly with 248 or 648 wireless temperature transmitter provides unparalleled mounting flexibility and accuracy for field-mounted pipeline temperature measurements*



CE

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Rosemount Pipe Clamp RTD Sensor

Proven Pipe Clamp sensors deliver excellent performance and reliability

- Superior accuracy and stability
- Decreased response time with silver and nickel tip
- Calibrations according DKD standards



Easy implementation and installation in existing application

- Available in a wide variety of pipe sizes and material
- Installation with only two screws – no welding needed
- Optimized surface contact by spring loaded sensor design

Minimized risk of sensor failure and unplanned shutdowns

- Avoids flow, pressure, chemical, abrasion, vibration and bending stresses, and thus measuring errors
- Maintenance of sensor without shutdown of process

Achieve optimal efficiency with Rosemount wireless transmitter offering

- Measure your temperature where you need it - at well heads, on offshore platforms, or even pipelines

Explore the benefits of a Complete Point Solution from Rosemount Temperature Measurement

- An “Assemble Sensor” option enables Emerson to provide a complete point temperature solution, delivering an installation-ready transmitter and sensor assembly
- Emerson has a complete portfolio of Single Point, High Density and Wireless Temperature Measurement solutions, allowing you to effectively measure and control your processes with the reliability you trust from Rosemount products



Experience global consistency and local support from numerous worldwide Rosemount Temperature sites



- Experienced Instrumentation Consultants help select the right product for any temperature application and advise on best installation practices.
- An extensive global network of Emerson service and support personnel can be on-site when and where they are needed.

Overview

Rosemount Pipe Clamp Overview

Emerson offers a wide range of RTDs and thermocouples alone, or as integrated temperature assemblies including Rosemount Temperature Transmitters and connection heads.

Rosemount Pipe Clamp Platinum RTD Sensors are highly linear and have a stable resistance versus temperature relationship. They are used primarily in industrial environments where high accuracy, durability, and long-term stability are required, and are designed to meet the most critical parameters of international standards: IEC 751 1983/DIN EN 60751 incorporating Amendments 1 and 2.(1)

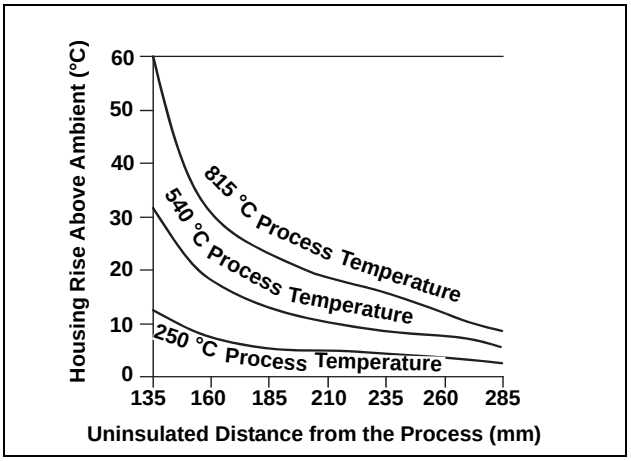
RTD sensors offer enhanced performance and optimal pipe clamp temperature measurement accuracy when coupled with temperature transmitters using Callendar-van Dusen constants. Emerson offers two designs of the Pipe Clamp RTD Sensor. The grated head design is suitable for all above ground applications such as refineries, chemical plants, and oil and gas fields. The Pipe Clamp RTD Design with Cable meets the requirements for underground installation and allows for long wiring distances and for pipe movement in extreme environments.

Rosemount Pipe Clamp Sensors are available with flying lead or terminal block lead wire terminations in a variety of lengths and ranges and are available in single and dual element types. Additionally, spring loaded pipe clamps are offered for most industrial applications in a wide range of materials, styles, and lengths. Standard materials include SST 304 and Duplex, while other materials for corrosive environments are also available. Emerson also offers Pipe Clamp Sensors as cable assemblies. Consult with your Emerson representative for more information.

Selecting the Extension Length for a Pipe Clamp Sensor

A direct mounting configuration allows heat from the process, aside from ambient temperature variations, to transfer from the pipe clamp to the transmitter housing. If the expected process surface temperature is near or above the transmitter specification limits, consider using additional extension length or a remote mounting configuration to isolate the transmitter. Figure 1 provides an example of the relationship between transmitter housing temperature rise and distance from the process.

FIGURE 1. Transmitter Housing Temperature Rise vs. Uninsulated Distance from the Process



Example

The rated ambient temperature specification for the transmitter is 85 °C. If the maximum ambient temperature is 40 °C and the temperature to be measured is 540 °C, the maximum allowable housing temperature rise is the rated temperature specification limit minus the existing ambient temperature (85 – 40), or 45 °C.

As shown in Figure 1, an uninsulated distance from the process of 90 mm will result in a housing temperature rise of 22 °C. Therefore, 100 mm would be the minimum recommended distance from the process providing a safety factor of about 25 °C. A longer length, such as 150 mm, is desired to reduce errors caused by transmitter temperature effect, although in that case the transmitter may require extra support.

(1) 100 Ω at 0 °C, α = 0.00385 Ω x °C/Ω

Rosemount Pipe Clamp RTD Sensor

TRANSMITTER-SENSOR MATCHING

By using a temperature sensor matched to a temperature transmitter, significant measurement accuracy improvement can be attained. This involves identifying the relationship between resistance and temperature for a specific RTD sensor. This relationship is approximated by the Callendar-van Dusen equation:

$R_t = R_o + R_o\alpha[t - \delta(0.01t - 1)(0.01t) - \beta(0.01t - 1)(0.01t)^3]$,

where:

R_t = Resistance (ohms) at Temperature t (°C)
R_o = Sensor-Specific Constant (Resistance at t = 0 °C)
α =Sensor-Specific Constant
δ =Sensor-Specific Constant
β =Sensor-Specific Constant (0 at t > 0 °C)

The exact values for the Callendar-van Dusen constants (R_o, α, δ, β) are specific to each RTD sensor and are established by testing each individual sensor at various temperatures. Rosemount Pipe Clamp RTD Sensors can be ordered Sensor Calibrated to a Fixed Temperature Range, as shown in Table 2 on page 355, where the values of all four sensor specific constants are supplied for each sensor. To utilize the unique, built-in sensor-matching capability of the Rosemount 644 and 3144P transmitters, the Callendar-van Dusen constants can be programmed into the transmitter at the factory, or in the field using a Field Communicator.

The transmitter uses the Callendar-van Dusen constants to generate a sensor curve describing the relationship between resistance and temperature for this particular sensor and transmitter assembly. There is a 3- or 4-fold improvement in temperature measurement accuracy for the total system by using the sensor's actual resistance vs. temperature curve.

The sensor calibrated specific to a particular temperature range and, as with calibration schedules, the accuracies associated with this option represent worst case conditions, when the sensor is used over the entire temperature range.

IEC 751 Interpretation

The Callendar-van Dusen equation is one method used to describe the resistance versus temperature (R vs.T) relationship for platinum RTDs. International Standard IEC 751 interprets the R vs. T relationship using an approach similar to the Callendar-van Dusen methodology. The IEC 751 R vs.T relationship standard uses the following equation:

$R_t = R_o[1 + At + Bt^2 + C(t-100)t^3]$

As in the Callendar-van Dusen method, R_o, A, B, C are specific for each RTD and are established by testing each sensor at various temperatures. The actual values for A, B, and C differ in magnitude from the Callendar-van Dusen constants (R_o, α, β, δ), while R_o is the same for both equations. Either methodology produces the same result in any Transmitter-Sensor Matching scenario, since one equation is a simple mathematical interpretation of the other.

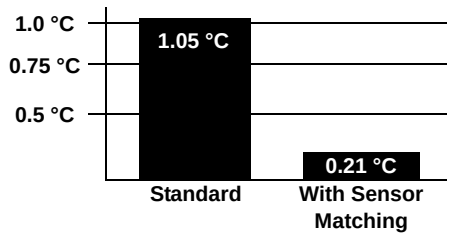
TABLE 1. Pipe Clamp Interchangeability

Pipe Clamp RTD IEC-751 Class B	Temperature
±0.80 °C (±1.44 °F)	-100 °C (-148 °F)
±0.30 °C (±0.54 °F)	0 °C (32 °F)
±0.80 °C (±1.44 °F)	100 °C (-212 °F)
±1.80 °C (±3.24 °F)	300 °C (572 °F)
±2.30 °C (±4.14 °F)	400 °C (752 °F)
Pipe Clamp RTD with IEC-751 Class A Option	**Temperature**
±0.35 °C (±0.63 °F)	-100 °C (-148 °F)
±0.15 °C (±0.27 °F)	-0 °C (32 °F)
±0.35 °C (±0.63 °F)	100 °C (212 °F)
±0.75 °C (±1.35 °F)	300 °C (572 °F)
±0.95 °C (±1.71 °F)	400 °C (752 °F)

Typical Transmitter-Sensor Matching Accuracy Improvements

Transmitter: Rosemount 3144P (built-in sensor matching capabilities), span of 0 to 200 °C, accuracy = 0.1 °C)
Sensor: Pipe Clamp RTD
Callendar-van Dusen Option: -50 to 150 °C
Process Temperature: 150 °C

System Uncertainty Comparison at 150 °C:



Pipe Clamp Sensor		
Rosemount 3144P:	± 0.10 °C	
Standard Pipe Clamp RTD:	± 1.05 °C	
Total System(1):	± 1.05 °C	
Pipe Clamp Sensor Calibrated to a Fixed Temperature Range		
Rosemount 3144P:	± 0.10 °C	
Calibrated Sensor Pipe Clamp RTD:	± 0.18°C	
Total System(1):	± 0.21 °C	

(1) Calculated using RSS statistical method:

System accuracy = $\sqrt{(\text{Transmitter accuracy})^2 + (\text{Sensor accuracy})^2}$

CALIBRATION

Sensor calibration may be needed for input to quality systems, or for control system enhancement. It is used mainly to improve the overall temperature measurement performance by matching the sensor to a temperature transmitter.

Calibration Options

Sensor Calibrated to a Customer-Specified Temperature Range option calibrates the sensor to a customer-specified temperature range. The Callendar-van Dusen, and A, B, and C-constants are supplied with a calibration certificate.

NOTE
When ordering an RTD with this option, the temperature range for the sensor calibration needs to be specified.

Sensor Calibrated to a Customer-Specified Single Measurement Point option refers to the above option when calibrated on a single temperature point.

Sensor Calibrated to a Fixed Temperature Range option is where the RTD sensor is calibrated within standard temperature ranges (Table 2 on page 355). To achieve optimum performance, select the option that corresponds to the operating temperature range for your application.

TABLE 2. Temperature Range Options

Temperature Range	Calibration Points (°C)
0 to 100 °C (32 to 212 °F)	0, 50, 100
-50 to 100 °C (-58 to 212 °F)	-50, 0, 50, 100
-50 to 150 °C (-58 to 302 °F)	-50, 0, 100, 150

SENSOR TIP MATERIAL CONFIGURATION

The mount Pipe Clamp Sensor plate tip is constructed of silver or nickel for better thermal conductivity and to reduce the thermal response time of stainless steel designs. Silver tip plate temperature range is -50 to 350 °C (-58 to 662 °F), and the nickel tip plate temperature range is -110 to 450 °C (-166 to 842 °F).

Product Certifications

HAZARDOUS LOCATIONS CERTIFICATION

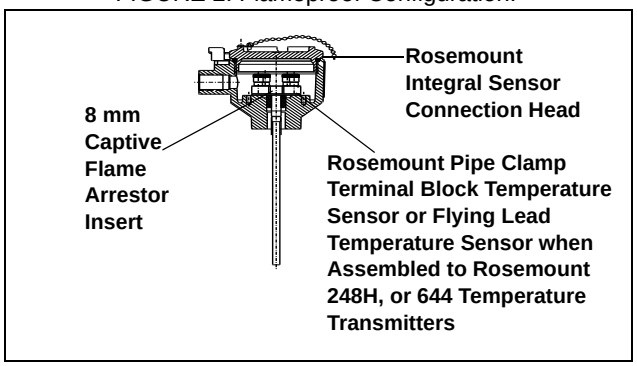
Flameproof Approval
Marking ⟨Ex⟩ II 2 G
Certification Number. KEMA99ATEX8715
Ex d IIC T6 ($-40 \le T_{amb} \le 70$ °C)

The Flameproof approval is dependent on the Rosemount Connection Head assembled with a Rosemount RTD or thermocouple temperature sensor (see Figure 2). The captive flame arrestor insert must be fully engaged into the connection head for compliance with this approval.

Flameproof Approval
Marking ⟨Ex⟩ II 2 G
Certification Number. KEMA01ATEX2181.
Ex d IIC T5 ($-40 \le T_{amb} \le 80$ °C)
Ex d IIC T6 ($-40 \le T_{amb} \le 70$ °C)

The Rosemount Pipe Clamp RTD Temperature Sensor with $^1/_2$-in. ANPT Spring Loaded Adapters are approved for direct mount to the Rosemount 3144P Temperature Transmitter (Reference Manual 00809-0100-4021) or the Rosemount 648 Wireless Temperature Transmitter (Reference Manual 00809-0100-4648). For installation information, see the Reference Manuals cited above.

FIGURE 2. Flameproof Configuration.



Intrinsic Safety Approval
ATEX Marking ⟨Ex⟩ II 2 G
Certificate Number IBExU03ATEX1066X
Ex ia IIC T6 ($-51 \le T_{amb} \le 60$ °C)
The Intrinsic Safety Approval is valid for Rosemount Pipe Clamp RTD Sensors, and can only be applied in Zone 1. The marking of intrinsically safe circuits is by color codes, or print. A mounted on connection head is provided with a grounding screw and a blue cable gland.

Pipe Clamp Assembly with Integrated Connection Head or Head Mounted Transmitter Specifications

Rosemount Pipe Clamp Platinum RTD

Nominal Resistance

In accordance with DIN EN 60751, the nominal resistance is defined:

100 Ω RTD at 0 °C

α = 0.00385 Ω x °C/Ω., averaged between 0 and 100 °C

Limit Deviations

Tolerance Class B, as standard t = ±(0.3 + 0.005 x [t]); temperature range -110 to 450 °C

Tolerance Class A, as option t = (0.15 + 0.002 x [t]); temperature range 0 to 250 °C

Process Temperature Range

-110 to 450 °C (-166 to 842 °F)

Ambient Temperature Range

-51 to 85 °C (-60 to 185 °F)

Self-Heating

0.15 K/mW when measured as defined in DIN EN 60751; 1996.

Insulation Resistance (RTD)

1,000 MΩ minimum insulation resistance when measured at 500 V dc at room temperature

Sheath Material

321 SST with mineral insulated cable construction and silver or nickel plate tip

Lead Wires

PTFE insulated, silver-coated copper wire (Figure 3)

Identification Data

The model and serial numbers are marked on the bottom of the sensor DIN mounting plate or engraved directly on the spring loaded adapter

Ingress Protection (IP) Rating for connection head

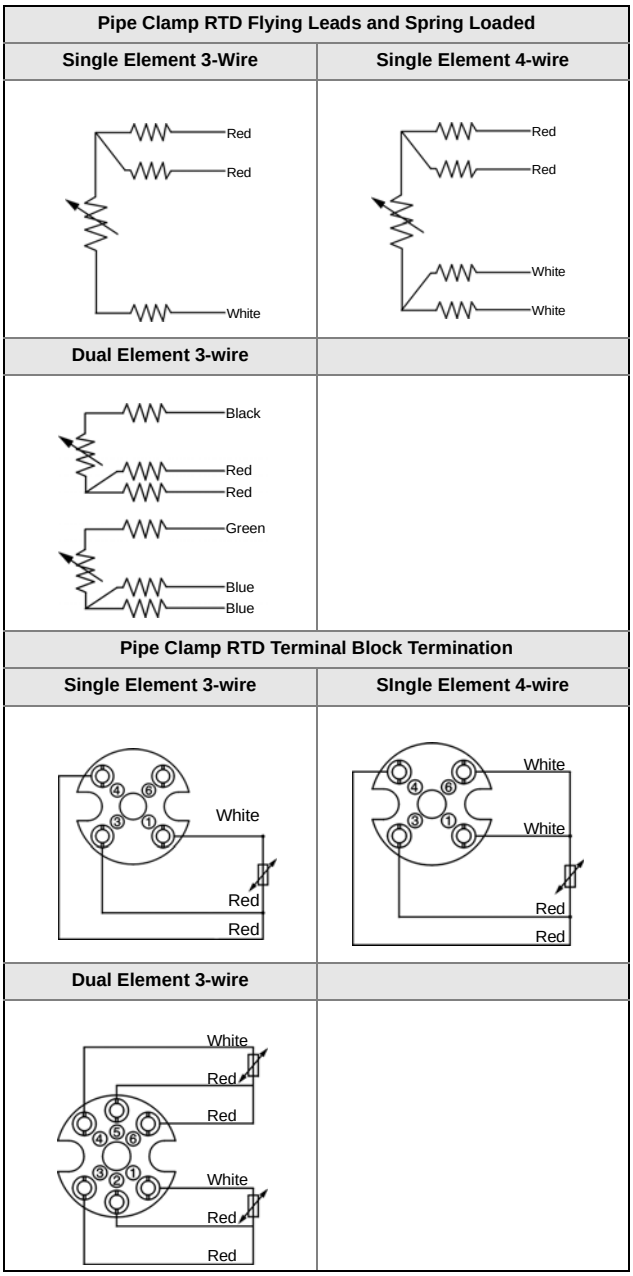
IP65 and NEMA 4X.

Hazardous Locations Certifications

According to Ex ia

Ex d

FIGURE 3. Sensor Lead Wire Termination



Rosemount Pipe Clamp RTD Sensor

FIGURE 4. RTD Sensor Dimensional Drawings

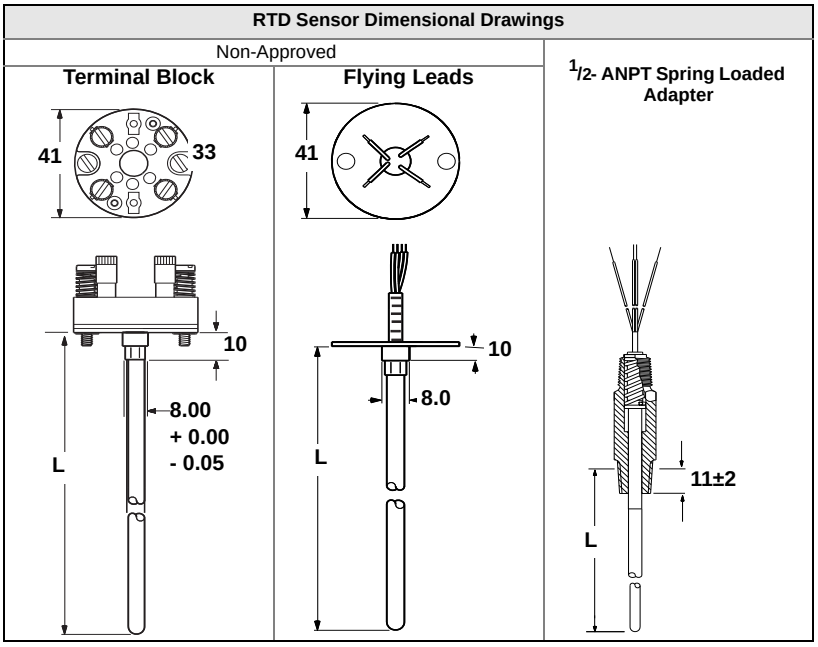
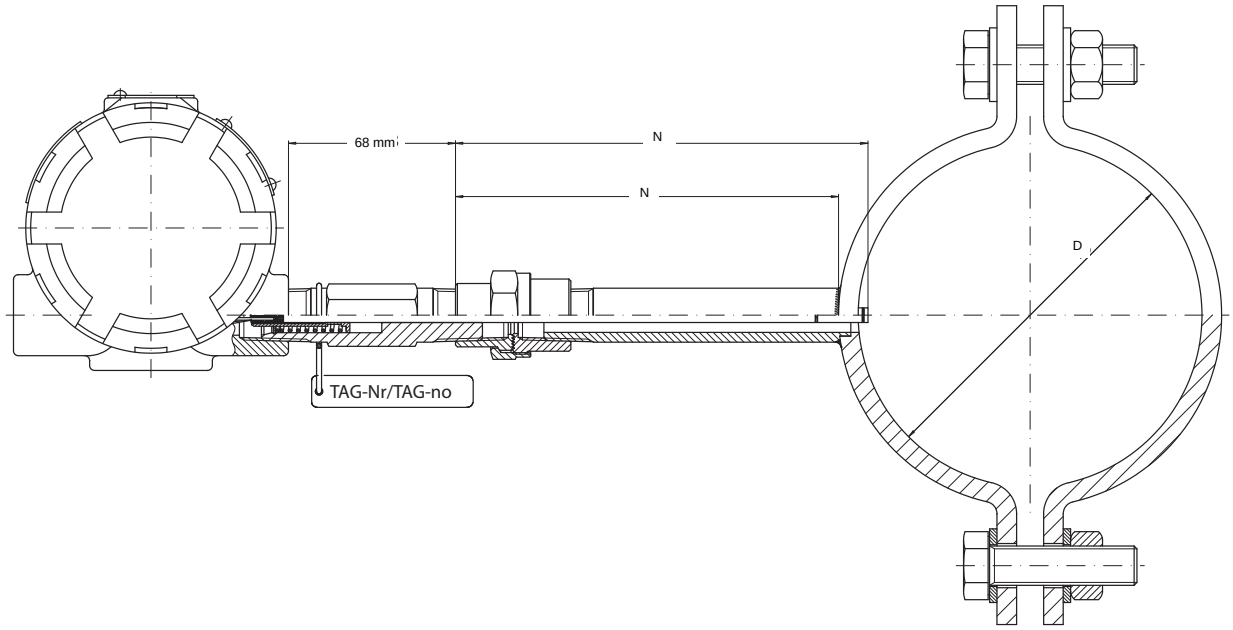


FIGURE 5. Spring Loaded Adapter Sensor Assembly Suitable for Use with Rosemount Transmitter Model 3144P or 648



Customer Data Sheet

Rosemount Pipe Clamp Temperature Sensor
Rosemount Pipe Clamp Assembly with Integrated Connection Head or Transmitter Customer Data Sheet
★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Customer Information

Customer: _____ Phone: _____ Fax:_____
Contact Name _____ Quote No:_____
P.O./Reference No.:_____ P.O. Line Item:_____
Customer Sign Off: _____

Pipe Clamp Information

Device Tag Name: _____

Hazardous Location Certifications: (Select only one)

◯ Ex ia - Intrinsic Safety Approval★
◯ No Approval★
◯ Ex d - Flameproof Approval★

Connection Head: (Select only one)

◯ RMT, Aluminum★
◯ RMT, SST★
◯ RMT, Aluminum with LCD Cover★
◯ RMT, SST with LCD Cover★
◯ No Connection Head★

Conduit/Cable Entry: (Select only one)

◯ M20 x 1.5★
◯ M20 x 1.5 with cable gland★
◯ 1/2-in. NPT★
◯ No Cable Entry (For use with no connection Head)

Sensor Lead Wire Termination: (Select only one)

◯ Flying Leads (For use with spring loaded head mount transmitter)★
◯ Spring Loaded Adapter Design (For direct Transmitter mounting)★
◯ Terminal Block (Captive screws for spring loading)★

Sensor Type: (Select only one)

◯ RTD, Single Element 4-Wire (-50 to 350 °C)★
◯ RTD, Dual Element 3-Wire (-50 to 350 °C)★
◯ RTD, Single Element 4-Wire (-110 to 450 °C)
◯ RTD, Dual Element 3-Wire (-110 to 450 °C)
◯ RTD, Single Element 3-Wire (-50 to 350 °C)★

Extension Type: (Select only one)

◯ Nipple-Union 1/2-in. NPT (for TRX and Spring Loaded) (min. length N = 80 mm)★
◯ Nipple-Union-Nipple 1/2-in. NPT (minimum length N =110 mm)★
◯ None (for replacement only)★

Extension Length (N):

◯ 80 mm ★(Only for Nipple Union)
◯ 110 mm ★
◯ Other _____ mm (80 to 2000 mm)

Clamp and Bolt material: (Select only one)

◯ 1.4301 (SS304)★
◯ 1.4571 (SS316Ti)★
◯ Other _____
◯ Duplex

Rosemount Pipe Clamp RTD Sensor

Product Data Sheet
00813-0100-4952, Rev BA
Catalog 2011 - 2012

Rosemount Pipe Clamp Temperature Sensor
Rosemount Pipe Clamp Assembly with Integrated Connection Head or Transmitter Customer Data Sheet

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Clamp Size (D in mm):

- ◯ 34 (1-in.)
- ◯ 61 (2-in.)★
- ◯ 89 (3-in.)★
- ◯ 115 (4-in.)★
- ◯ 169 (6-in.)
- ◯ 220 (8-in.)
- ◯ 273 (10-in.)
- ◯ Other _____

Options: (May select more than one)

- ◯ RTD Class A
- ◯ Assemble to Transmitter
- ◯ Extension Ring (only for use with 2 Transmitters)
- ◯ Cover Chain
- ◯ NBR Coated Clamp

Sensor Calibrations: (May select more than one)

- ◯ Sensor Calibrated to a Fixed Temperature Range (-0 to 100 °C)
- ◯ Sensor Calibrated to a Fixed Temperature Range (-50 to 150 °C)
- ◯ Sensor Calibrated to Customer Specified Temperature Range
- ◯ Sensor Calibrated to Customer Specified Single Measurement Point
- ◯ Sensor Calibrated to a Fixed Temperature Range (-50 to 100 °C)

Pipe Clamp Sensor Assembly with Cable Specifications

Rosemount Pipe Clamp Platinum RTD

Nominal Resistance

In accordance with DIN EN 60751, the nominal resistance is defined:

100 Ω RTD at 0 °C

α = 0.00385 Ω x °C/Ω., averaged between 0 and 100 °C

Limit Deviations

Tolerance Class B, as standard t = ±(0.3 + 0.005 x [t]); temperature range -110 to 450 °C

Tolerance Class A, as option t = (0.15 + 0.002 x [t]); temperature range 0 to 250 °C

Process Temperature Range

-110 to 450 °C (-166 to 842 °F)

Ambient Temperature Range

-51 to 85 °C (-60 to 185 °F)

Self-Heating

0.15 K/mW when measured as defined in DIN EN 60751; 1996.

Insulation Resistance (RTD)

1,000 MW minimum insulation resistance when measured at 500 Vac at room temperature

Sheath Material

321 SST with mineral insulated cable construction and silver or nickel plate tip

Cable

PVC/PVC insulated, armored, 0.75 sq mm type, cable gland for armored cable is available upon request.

Identification Data

The model and serial numbers are marked on the cable

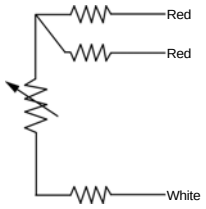
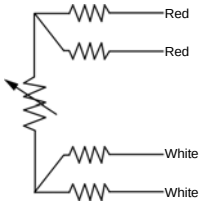
Hazardous Locations Certifications

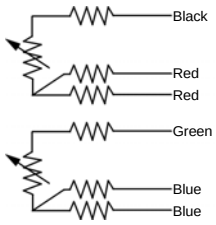
According to EEx ia

Ingress Protection (IP) Rating

Conforms IP65

FIGURE 6. Sensor Lead Wire Termination

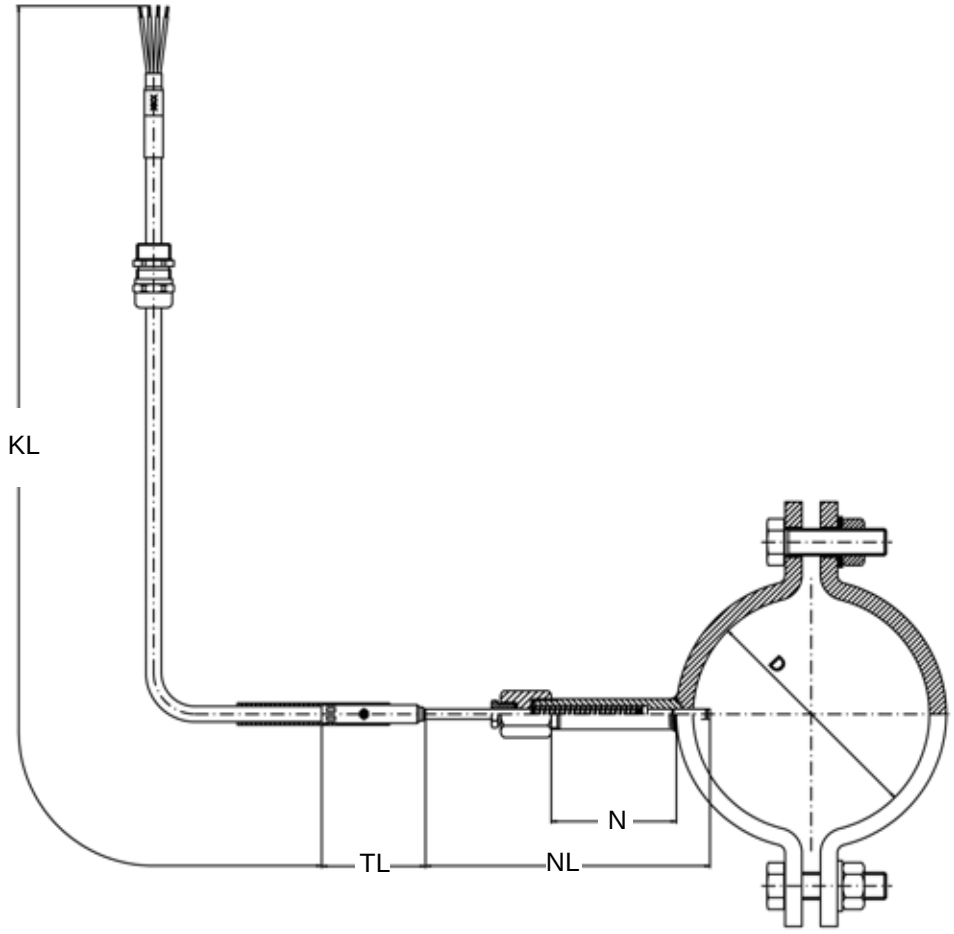
Pipe Clamp RTD Cable Sensor	
Single Element 3-wire	**Single Element 4-wire**
	

Dual Element 3-wire	
	

Rosemount Pipe Clamp RTD Sensor

Design Example Drawings

FIGURE 7. RTD Sensor Dimensional Drawings



Customer Data Sheet

Rosemount Pipe Clamp Temperature Sensor
Rosemount Pipe Clamp Assembly with Cable Customer Data Sheet
★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Customer Information

Customer: _____ Phone: _____ Fax:_____
Contact Name: _____ Quote No.:_____
P.O./Reference No.:_____ P.O. Line Item:_____
Customer Sign Off: _____

Pipe Clamp Information

Device Tag Name: _____

Hazardous Location Certifications: (Select only one)

○ Intrinsic Safety Approval★
○ No Approval★

Sensor Type: (Select only one)

○ RTD, Single Element 4-Wire (-50 to 350 °C)★
○ RTD, Single Element 4-Wire (-110 to 450 °C)
○ RTD, Single Element 3-Wire (-50 to 350 °C)★
○ RTD, Dual Element 3-Wire (-50 to 350 °C)★
○ RTD, Dual Element 3-Wire (-110 to 450 °C)

Nominal Length:

○ NL _____(mm)

Cable Type:

GTMC Standard
○ _____

Cable Length:

○ KL _____(mm)

Cable Gland Thread:

○ M20 x 1.5★
○ Other _____

Clamp and Bolt Material: (Select only one)

○ 1.4301 (SS304)★
○ Duplex
○ Other _____
○ 1.4571 (SS316Ti)★

Clamp Size (D in mm):

○ 34 (1-in.)
○ 61 (2-in.)★
○ 89 (3-in.)★
○ 115 (4-in.)★
○ 169 (6-in.)
○ 220 (8-in.)
○ 273 (10-in.)
○ Other _____

Options: (May select more than one)

○ RTD Class A
○ NBR Coated Clamp

Sensor Calibrations: (May select more than one)

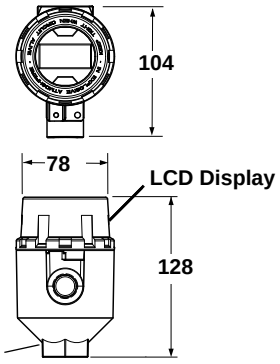
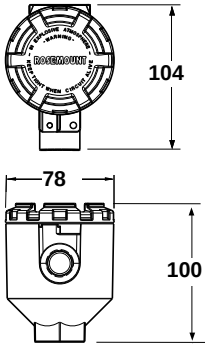
○ Sensor Calibrated to a Fixed Temperature Range (0 to 100 °C)
○ Sensor Calibrated to a Fixed Temperature Range (-50 to 100 °C)
○ Sensor Calibrated to a Customer Specified Single Measurement Point
○ Sensor Calibrated to a Fixed Temperature Range (-50 to 150 °C)
○ Sensor Calibrated to a Customer Specified Temperature Range

Accessories

TABLE 3. Connection Head

Part Number	Model/Material	IP Rating	Conduit Connection	Process Connection
00644-4410-0011	Rosemount, Aluminium	68	1/2-in. NPT	1/2-in. NPT
00644-4410-0013	Rosemount, Aluminium	68	1/2-in. NPT	M24 x 1.5
00644-4410-0021	Rosemount, Aluminium	68	M20 x 1.5	1/2-in. NPT
00644-4410-0023	Rosemount, Aluminium	68	M20 x 1.5	M24 x 1.5
00644-4410-0111	Rosemount, Aluminium with LCD Display Cover	68	1/2-in. NPT	1/2-in. NPT
00644-4410-0113	Rosemount, Aluminium with LCD Display Cover	68	1/2-in. NPT	M24 x 1.5
00644-4410-0121	Rosemount, Aluminium with LCD Display Cover	68	M20 x 1.5	1/2-in. NPT
00644-4410-0123	Rosemount, Aluminium with LCD Display Cover	68	M20 x 1.5	M24 x 1.5
00644-4411-0011	Rosemount, Stainless Steel	68	1/2-in. NPT	1/2-in. NPT
00644-4411-0013	Rosemount, Stainless Steel	68	1/2-in. NPT	M24 x 1.5
00644-4411-0021	Rosemount, Stainless Steel	68	M20 x 1.5	1/2-in. NPT
00644-4411-0023	Rosemount, Stainless Steel	68	M20 x 1.5	M24 x 1.5
00644-4411-0111	Rosemount, Stainless Steel with LCD Display Cover	68	1/2-in. NPT	1/2-in. NPT
00644-4411-0113	Rosemount, Stainless Steel with LCD Display Cover	68	1/2-in. NPT	M24 x 1.5
00644-4411-0121	Rosemount, Stainless Steel with LCD Display Cover	68	M20 x 1.5	1/2-in. NPT
00644-4411-0123	Rosemount, Stainless Steel with LCD DIsplay Cover	68	M20 x 1.5	M24 x 1.5

FIGURE 8. Connection Head Dimensional Drawing

With LCD Display Cover	With Standard Cover
	

Dimensions are in millimeters

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Rosemount 751 Field Signal Indicator

- *Available with an LCD or analog meter*
- *Compact, rugged, and designed for industrial environments*
- *Available with explosion-proof and intrinsic safety certifications*
- *Provides flexible mounting options*



CE

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Dimensional Drawings. . . . . page Temperature-371

Transcend Your Integral Meter Display with the Rosemount 751

The Rosemount 751 Field Signal Indicators provide a means of displaying important process variables. These devices operate with any two-wire transmitter that measures input variables such as pressure, flow, liquid level, or temperature. Rosemount indicators are ideal for installations where an integral meter would be difficult to view.

Rosemount 751 Indicators are designed for use in industrial environments where all-weather performance is necessary. These units are vibration- and corrosion-resistant, and explosion-proof or intrinsically safe. An LCD meter or analog meter may be ordered to meet specific application requirements.

LCD Meter

The LCD meter may be configured from a 4 mA point of –999 to a 20 mA point of 9999 with a linear or square-root response. A 20-segment bar graph at the bottom of the display directly represents the 4–20 mA signal.

Changing the 4 mA and 20 mA points is easy. Just remove the housing and meter covers, and press the meter faceplate buttons. The meter can be rotated in 90-degree increments within the enclosure for convenient viewing.

Analog Meter

With the analog meter, several meter scaling options are available to suit special application requirements with ±2 percent of calibrated span accuracy. Linear 0 to 100 percent meter scaling is adequate for the majority of measurement applications. With a flow transmitter, a logarithmic 0 to 100 percent flow scale is available. As an option, the user can specify special meter scaling for direct readout in psi, gph, °F, °C, or other convenient engineering units.

The large, $2^1/_4$-in. diameter meter face has a 2-in. long scale for easy readability. A zero adjustment is located on the meter faceplate (accessible with the housing cover removed). The meter can be rotated within the enclosure for convenient viewing in 90-degree increments.

Ordering Information

Model	Product Description	
751	Remote Signal Indicator	
Input Signal		
Standard		**Standard**
A	4–20 mA dc	★
B	10–50 mA dc (Not Available with LCD Meter)	★
C	40–200 mV dc (Not Available with LCD Meter)	★
Meter Scale		
Standard		**Standard**
M1	Linear Analog Meter, 0–100% Scale	★
M2	Square Root Analog Meter, 0–100% Flow	★
M6	Square Root Analog Meter, 0–10 √	★
M4(1)	Linear LCD Meter, 0–100% Scale	★
M7(1)	Special Scale LCD Meter (specify range, mode, and engineering units)	★
M8(1)	Square Root LCD Meter, 0–100% Flow	★
M9(1)	Square Root LCD Meter, 0–10 √	★
Product Certificates		
Standard		**Standard**
NA	No Approval Required	★
E3	NEPSI Flameproof	★
E5	FM Explosion-Proof	★
E6	CSA Explosion-Proof	★
E7	SAA Flameproof	★
E8	ATEX Flameproof	★
I5	FM Intrinsic Safety and Non-incendive	★
I6	CSA Intrinsic Safety	★
I7	SAA Intrinsic Safety	★
I8	ATEX Intrinsic Safety	★
N1	ATEX Type N Non-incendive	★
C6	CSA Intrinsic Safety, Non-incendive, and Explosion-proof approval combination	★
K5	FM Intrinsic Safety, Non-incendive, and Explosion-proof approval combination	★

Options (Include with selected model number)

Mounting Bracket		
Standard		**Standard**
B	Mounting Bracket for Flat Surface or 2-in. Pipe	★
Reducer		
Standard		**Standard**
C	Stainless Steel Reducer ¾- to ½-in. for Conduit Connection (See Figure 1 for reference.)	★
Bar Code Tag		
Standard		**Standard**
BT	Customer Specified Barcode Tag	★
Typical Model Number: 751 A M1 NA BC		

(1) May be reconfigured in the field.

Specifications

HOUSING SPECIFICATIONS

Physical Specifications

Materials of Construction

Enclosure
Low-copper aluminum

Paint
Polyurethane

O-rings
Buna N

Meter Mounting Materials
Noryl® plastic

Electrical Connections

3-pole terminal block with 8–32 nickel-plated brass screw terminals, with $^{3}/_{4}$–14 NPT conduit. (Stainless steel $^{3}/_{4}$- to $^{1}/_{2}$-in. reducer available as an option.)

Enclosure Rating

NEMA Type 4x. CSA Type 4x. IP66.

Weight

Indicator only: 1.8 kg (4 lb)

Indicator with optional mounting bracket: 2.27 (5 lb)

Tagging

The indicator will be tagged, at no charge, in accordance with customer requirements. All tags are stainless steel. The standard tag is permanently attached to the indicator. Tag character height is $^{1}/_{16}$ in. (1.6 mm). A wired-on tag is available upon request.

LCD METER SPECIFICATIONS

Functional Specifications

Input Signal

4–20 mA dc

Display

4 mA Point Limits
–999 to 1000

Span limits
200 to 9999

The sum of the 4 mA point and span must not exceed 9999. Adjustments are made using non-interactive zero and span buttons.

Display Options

Standard display response is linear with mA input. Optional square root or filtered response may be selected.

Overload Limitations

666 mA, maximum

Temperature Limits

Storage
–40 to 85 °C (–40 to 185 °F)

Operating
–20 to 70 °C (–4 to 158 °F)
–40 to –20 °C (–40 to –4 °F)
loop is intact and the meter is not damaged

Humidity Limitation

0 to 95 percent non-condensing relative humidity

Update Period

750 ms

Response Time

Responds to changes in input within a maximum of two update periods. If the filter is activated, then the display responds to the change within nine update periods.

Voltage Drop

0.7 Vdc typical, 1.0 Vdc maximum

Performance Specifications

Digital Display Resolution

0.05 percent of calibrated range ± 1 digit

Analog Bar Graph Resolution

5.0 percent of calibrated range

Indication Accuracy

0.25 percent of calibrated range ± 1 digit

Stability

0.1 percent calibrated range ± 1 digit per six months

Temperature Effect

0.01 percent of calibrated range per °C on zero

0.02 percent of calibrated range per °C on span over the operating temperature range

Power Interrupt

All calibration constants are stored in EEPROM memory and are not affected by power loss.

Failure Mode

LCD meter failure will not affect transmitter operation.

Under/Over Range Indication

Input current < 3.5 mA: Display blank

Input current > 22.0 mA: Display flashes 112.5 percent of full scale value or 9999, whichever is less

Physical Specification

Meter Size

$2^{1}/_{4}$-in. diameter face with four $^{1}/_{2}$-in. high characters

ANALOG METER SPECIFICATIONS

Functional Specifications

Input Signal

- 4–20 mA dc
- 10–50 mA dc
- 40–200 mV

NOTE:
Maximum series resistance is ten ohms for ammeters.

Meter Indication

0 to 100 percent linear scale
0 to 100 percent flow scale
Special optional ranges

Overload Limitation

150 percent of rated end scale value for two minutes

Temperature Limits

–40 to 65 °C (–40 to 150 °F)

Humidity Limits

0 to 100 percent relative humidity

Zero Adjustment

Adjustment screw on face of meter

Performance Specifications

Indication Accuracy

±2 percent of calibrated span

Temperature Effect

Less than 2 percent of full scale at any point within the temperature limits

Physical Specification

Meter Size

$2^{1}/_{4}$-in. diameter face with 2-in. long scale

Product Certifications

HAZARDOUS LOCATIONS CERTIFICATIONS

North American Certifications

Factory Mutual (FM) Approvals

E5 Certificate Number: 0T2H8.AE
Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II, Division 1, Groups E, F, and G. Dust-ignition Proof Class III, Division 1

I5 Certificate Number: 0T9H2.AX
Intrinsically safe for Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 when connected per Rosemount Drawing 01151-0214.
Nonincendive for Class I, Division 2, Groups A, B, C, and D.

K5 Combination of E5 and I5
NEMA Enclosure Type 4X
Entity Parameters:

V_{max} = 40 V	A-G
I_{max} = 165 mA	A-G
I_{max} = 225 mA	C,D,E,F,G
C_i = 0	A-G
L_i = 0	A-G

E3 NEPSI Flameproof
Certificate Number: GYJ04107
Ex ia IIC T6 (except acetylene)

Canadian Standards Association (CSA) Approvals

Certificate Number: 33332-225

E6 Explosion-Proof for Class I, Division 1, Groups C and D; Dust-Ignition Proof for Class II, Division 1, Groups E, F, and G; Dust-Ignition Proof for Class III, Division 1; Suitable for Class I, Division 2, Groups A, B, C, and D.
CSA ENCLOSURE TYPE 4X

I6 Intrinsically safe for Class I, Division 1, Groups A, B, C, and D when installed per the Rosemount Drawing 00751-0068.

C6 Combination of E6 and I6

Australian Certifications

E7 **SAA Flameproof**
Certification AUS Ex 494x
Ex d IIB + H2 T6 (Tamb = 40 °C)
Class I, Zone 1
DIP T6 (Tamb = 40 °C)
Class II
IP65

CONDITIONS OF CERTIFICATION (X):
For transmitters having NPT or PG cable entry thread, an appropriate flameproof thread adaptor shall be used to facilitate application of certified flameproof cable glands. Only SAA certified flameproof temperature sensors shall be used with the Model 444 Temperature Transmitter if fitted directly into the tapped entry of the enclosure.

I7 **SAA Intrinsic Safety**
Certification AUS Ex 122x
Ex ia IIC
T6 (T_{amb} = -20° to 40 °C)
T5 (T_{amb} = -20° to 70 °C)
Class I, Zone 0
IP66

CONDITIONS OF CERTIFICATION (X):
The equipment has been assessed to the “Entity” concept and upon installation the barrier/entity parameters must be taken into account.

Entity Parameters:
U_i = 30 V
I_i = 200 mA
C_i = 0.0 uF
C_i = 0
L_i = 0 mH

European Certifications

E8 **ATEX Flameproof**
Certificate Number: CESI03ATEX263
ATEX Marking: Ex II 2 G
EEx d IIC T6 (-20 °C ≤ Tamb ≤ 60 °C)
IP65
Entity Parameters:
V_{max} = 60 Vdc

I8 **ATEX Intrinsic Safety**
Certificate Number: Baseefa03ATEX0448X
ATEX Marking: Ex II 1 G
EEx ia IIC
T5 (-60 ºC ≤ T_{amb} ≤ 80 ºC);
T6 (-60 ºC ≤ T_{amb} ≤ 40 ºC)

SPECIAL CONDITION FOR SAFE USE (X):
The apparatus enclosure may contain light metals. The apparatus must be installed in such a manner as to minimize the risk of impact or friction with other metal surfaces.

Entity Parameters:
U_i = 60 V
I_i = 200 mA
L_i = 0
C_i = 0

N1 **ATEX Type N**
Certificate Number: Baseefa03ATEX0454
ATEX Marking: Ex II 2 G
EEx nA II T6 (-40 ºC ≤ T_{amb} ≤ 70 ºC)
IP54
Rated Voltage = 5 V

Dimensional Drawings

FIGURE 1. Rosemount 751 Field Signal Indicator

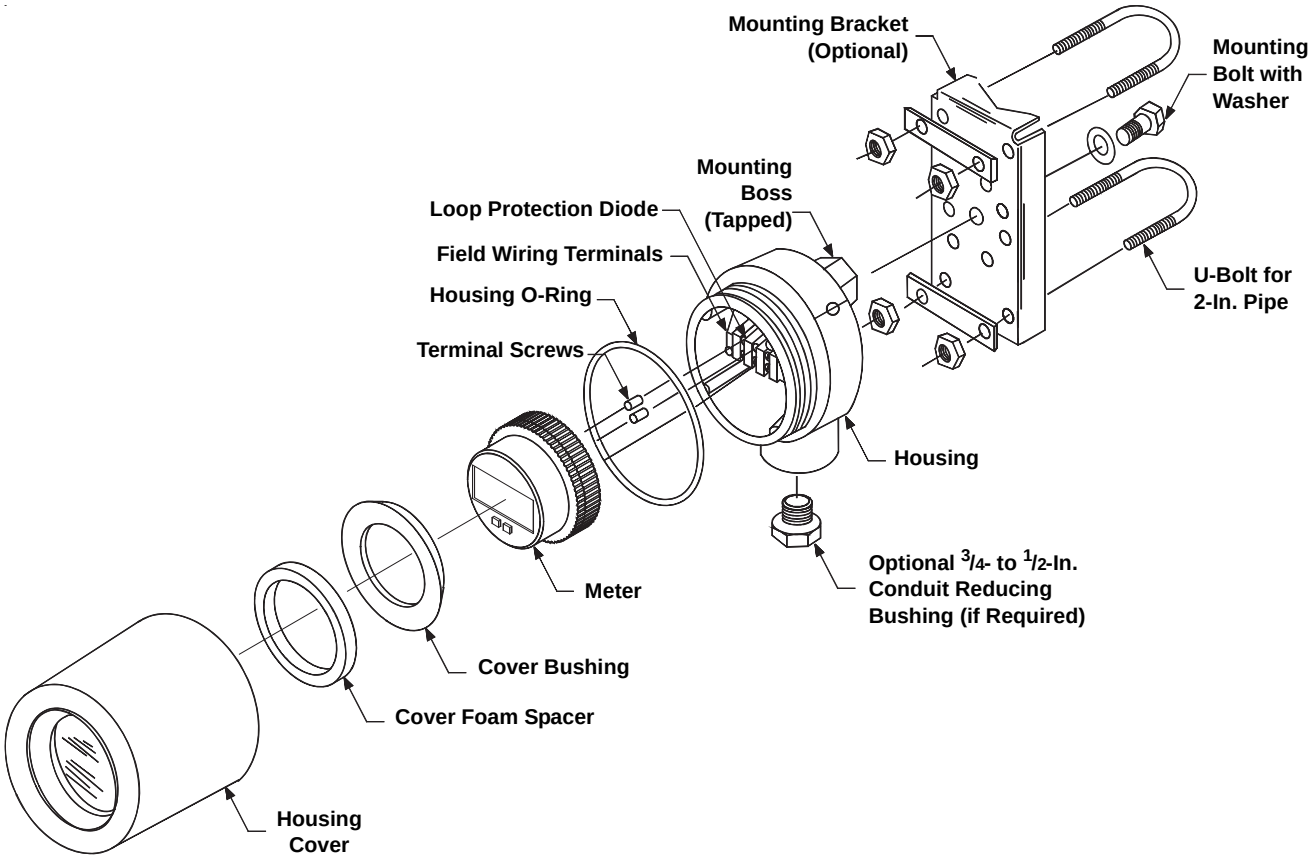
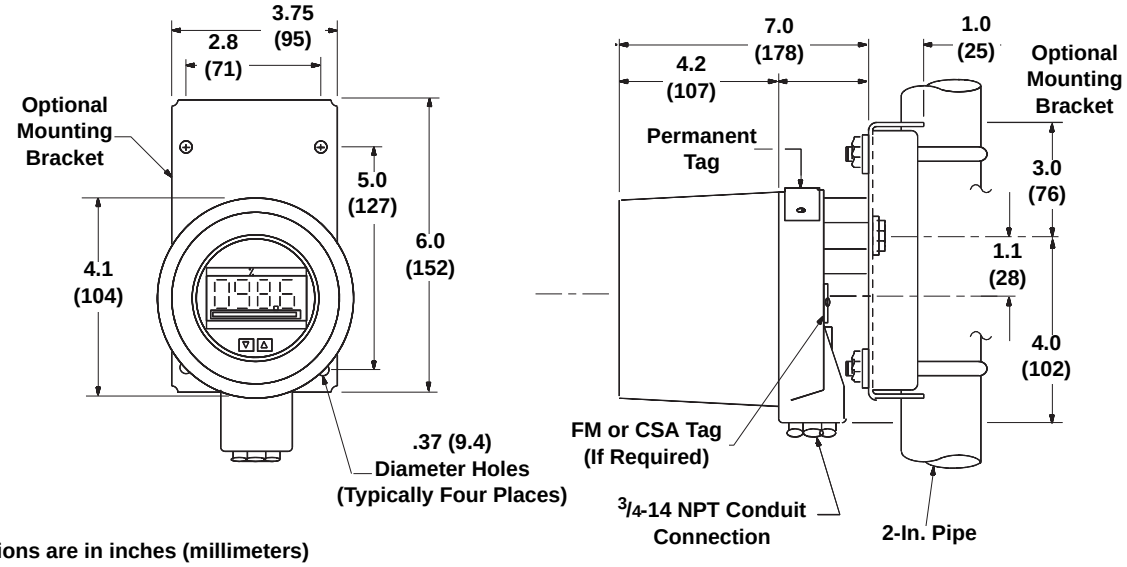


FIGURE 2. Rosemount 751 Dimensional Drawing



NOTE:
Dimensions are in inches (millimeters)

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00813-0100-4378 Rev EB, 12/10

EMERSON
Process Management

Rosemount 752 FOUNDATION™ fieldbus Remote Indicator

ROSEMOUNT 752 DELIVERS:

- *Two-wire segment powered device*
- *Displays up to 8 values*
- *Link Master Capability*
- *Optional PID, Characterizer, Arithmetic, and Integrator Function Blocks*



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Display Data Wherever Needed with the Rosemount 752 Remote Fieldbus Indicator

The Rosemount 752 FOUNDATION fieldbus Remote Indicator is useful for displaying the value of a controlled variable next to a final control device or for displaying information from transmitters mounted in inaccessible locations. The Indicator can be located anywhere along the segment to allow information to be displayed wherever it is needed.

The 752 Remote Indicator can display a function block output from any device on the FOUNDATION™ fieldbus H1 segment. Up to 8 values can be configured with Tag and engineering units. The data is scrolled sequentially in 3-second increments. In addition to displaying values from fieldbus devices, the 752 Remote Indicator can provide advanced calculations and control capability through the optional function block suite. Function blocks provided include Input Selector, Input Characterizer, Arithmetic, Integrator, and PID with autotune.

The Rosemount 752 is a core component of the PlantWeb digital plant architecture. Visit www.plantweb.com to learn how to get the most out of any fieldbus project.

Figure 1. The Rosemount 752 can display up to 8 variables coming from any device on the Fieldbus Segment

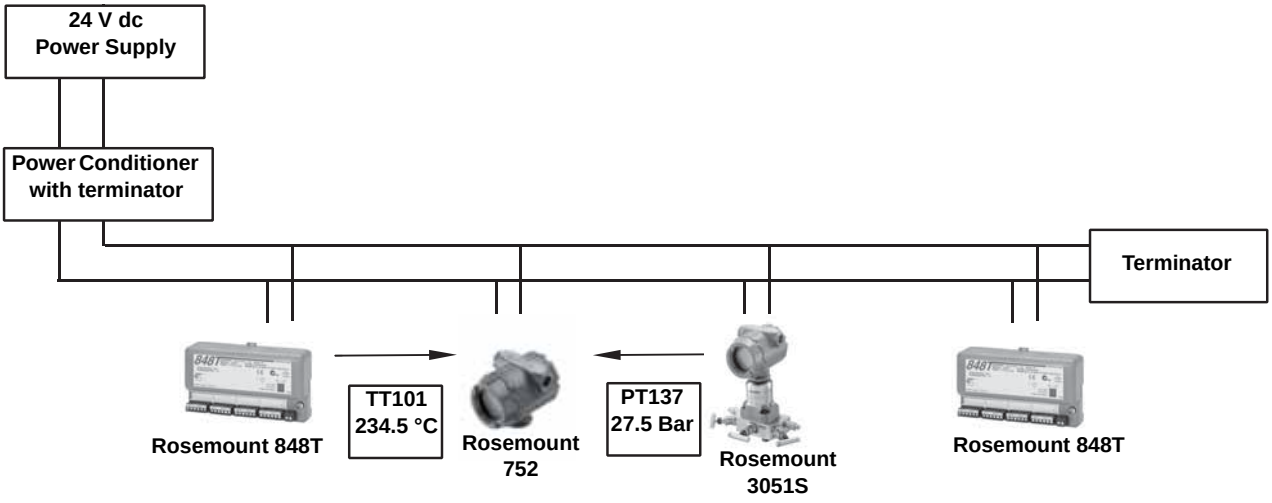
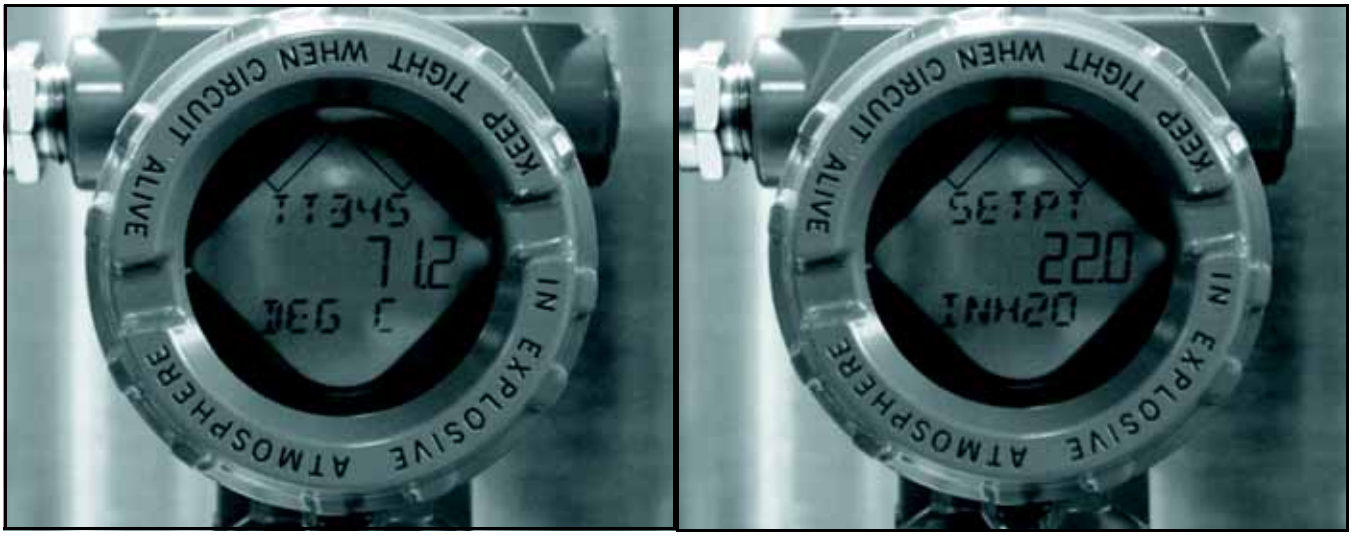


Figure 2. Rosemount 752 Display



Ordering Information

Table 1. Rosemount 752 Fieldbus Remote Indicator Ordering Information
★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Type			
752	Fieldbus Remote Indicator			
Transmitter Output				
Standard				**Standard**
F	FOUNDATION fieldbus digital signal			★
Housing Style		**Material**	**Conduit Entry Size**	
Standard				**Standard**
1A	PlantWeb Housing	Aluminum	1/2-14 NPT	★
1B	PlantWeb Housing	Aluminum	M20 x 1.5 (CM20)	★
1C	PlantWeb Housing	Aluminum	JIS G1/2	★
1J	PlantWeb Housing	SST	1/2-14 NPT	★
1K	PlantWeb Housing	SST	M20 x 1.5 (CM20)	★
1L	PlantWeb Housing	SST	JIS G1/2	★

Options (Include with selected model number)

PlantWeb Control Functionality		
Standard		**Standard**
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	★
Product Certifications		
Standard		**Standard**
E5	FM Explosion-Proof, Dust-Ignition-proof	★
I5	FM Intrinsically Safe, Division 2	★
IE	FM FISCO Intrinsically Safe	★
K5	FM Explosion-proof; Intrinsically Safe; Division 2; Dust Ignition-proof Combination	★
E6	CSA Explosion-proof; Division 2; Dust Ignition-proof	★
I6	CSA Intrinsically Safe	★
IF	CSA FISCO Intrinsically Safe	★
K6	CSA Explosion-proof; Intrinsically Safe; Division 2; Dust Ignition-proof Combination	★
E1	ATEX Flameproof	★
I1	ATEX Intrinsic Safety	★
IA	ATEX FISCO Intrinsic Safety	★
N1	ATEX Type n	★
ND	ATEX Dust	★
K1	ATEX Flameproof; Intrinsic Safety; Type n; Dust Combination	★
I7	IECEx Intrinsic Safety	★
IG	IECEx FISCO Intrinsically Safe	★
N7	IECEx Type n	★
KA	CSA and ATEX: Flameproof; Intrinsically Safe; Division 2 Combination	★
KB	FM and CSA: Explosion-proof; Intrinsically Safe; Division 2;Dust Ignition-proof Combination	★
KC	FM and ATEX: Explosion-proof; Intrinsically Safe; Division 2 Combination	★
Transient Protection		
Standard		**Standard**
T1	Integral Transient Protector	★
Conduit Electrical Connector		
Standard		**Standard**
GE(1)	M12, 4-pin, Male Connector (*eurofast*®)	★
GM(1)	A size Mini, 4-pin, Male Connector (*minifast*®)	★
Typical Model Number: 752 F 1A A01 E1		

(1) Not available with certain hazardous location certifications. Contact your local Emerson Process Management representative for details.

Specifications

Functional Specifications

Current Consumption

17.5 mA

Power Requirements

External power required;
operates on 9.0 to 32.0 Vdc terminal voltage

Temperature Limits

-4 to 175°F (-20 to 80°C)

Ambient Storage

-40 to 185°F (-40 to 85°C)

Humidity Limits

0 - 100% relative humidity

Electrical Connections

$^1/_2$ - 14 NPT, G $^1/_2$, and M20 x 1.5 (CM20) conduit

Performance Specifications

Configurable to display up to eight function block output values.

Display sequences through configured variables at 3 second intervals.

Software Upgrade in the Field

Software for the 752 with FOUNDATION fieldbus is easy to upgrade in the field using the FOUNDATION fieldbus Common Device Software Download procedure.

Block Execution Times

PID: 10 ms

Arithmetic: 10 ms

Input Selection: 10 ms

Signal Characterizer: 10 ms

Integrator: 10 ms

Physical Specifications

Weight

2.5 lb (1.1 kg)

Product Certifications

APPROVED MANUFACTURING LOCATIONS

Rosemount Inc. — Chanhassen, Minnesota USA

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting our local sales office.

Electro Magnetic Compatibility (EMC)

EN 61326: 2006

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

HAZARDOUS LOCATIONS CERTIFICATIONS

North American Certifications

Factory Mutual (FM) Approvals

E5 Explosion-proof for Class I, Division 1, Groups B, C, and D;
Dust Ignition-proof for Class II and Class III, Division 1, Groups E, F, and G hazardous locations;
T5 (-50 °C to 80 °C), conduit seal not required
Enclosure Type 4X

I5/IE Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1; Class I, Zone 0, AEx ia IIC T4; when connected in accordance with Rosemount drawing 00752-1010;
Temperature Code T4 (T_a = 60 °C);
Non-incendive for Class I, Division 2, Groups A, B, C, and D.
Enclosure Type 4X
For entity parameters see control drawing 00752-1010.

Canadian Standards Association (CSA) Approvals

E6 Explosion-proof for Class I, Division 1, Groups B, C, D;
Dust Ignition-proof for Class II, Groups E, F, G;
Dust Ignition-proof for Class III
Temperature Code T5, (T_a = 80 °C)
Suitable for Class I, Division 2, Groups A, B, C,D;
Temperature Code T3C (T_a = 40 °C),
Enclosure Type 4X

I6/IF Intrinsically Safe for Class I, Division 1, Groups A, B, C, D when installed in accordance with Rosemount drawing 00752-1020.
Temperature Code T3C (T_a = 40 °C).
Enclosure Type 4X

European Certifications

E1 ATEX Flameproof
Certificate Number: KEMA 03 ATEX2476X ⟨Ex⟩ II 2 G
Ex d IIC T6 (-50 °C ≤ T_a ≤ 65°C)
Ex d IIC T5 (-20 °C ≤ Ta ≤ 80°C)
V_{max} = 32 V

CE 1180

SPECIAL CONDITIONS FOR SAFE USE (X)
The Ex d blanking elements, cable glands and wirings shall be suitable for a temperature of 90 °C. In case of repair, contact the manufacturer for information on the dimensions of the flame proof joints.

I1/IA ATEX Intrinsic Safety
Certificate Number: Baseefa03ATEX0239X ⟨Ex⟩ II 1G
Ex ia IIC T4 (-20°C ≤ Ta ≤ 60°C)

CE 1180

Table 2. Input Parameters

Fieldbus	FISCO
U_i = 30 V dc	U_i = 17.5 V dc
I_i = 300 mA	I_i = 380 mA
P_i = 1.3 W	P_i = 5.32 W
C_i = 0	C_i = 0
L_i = 0	L_i = 0

SPECIAL CONDITIONS FOR SAFE USE (X)
When fitted with the transient option, the apparatus is not capable of withstanding the 500V test as defined in Clause 6.3.12 of EN 60079-11:2007. This must be taken into account during installation.

The enclosure may be aluminium, protected against low-levels of impact by a coating of epoxy polyester or polyurethane paint. The risk of high-levels of impact must be considered in any installation and protected accordingly.

N1 ATEX Type n
Certificate Number: Baseefa03ATEX0240X ⟨Ex⟩ II 3 G
Ex nA II T5 (Ta = -20 °C ≤ T_a ≤ 70 °C)
Input Parameters:
U_i = 32 V dc
C_i = 0
L_i = 0

SPECIAL CONDITIONS FOR SAFE USE (X)
The apparatus is not capable of withstanding the 500V insulation test required by Clause 6.8.1 of EN 60079-15:2005. This must be taken into account when installing the apparatus.

ND ATEX Dust
Certificate Number: KEMA 03 ATEX2476X ⟨Ex⟩ II 1 D
Ex tD A20 IP66 T105 °C (-20 °C ≤ T_a ≤ 85 °C)
V = 32 V Max

SPECIAL CONDITIONS FOR SAFE USE (X)
The Ex d blanking elements, cable glands and wirings shall be suitable for a temperature of 90 °C. In case of repair, contact the manufacturer for information on the dimensions of the flame proof joints.

International Certifications

I7/IG IECEx Intrinsic Safety
Certificate Number: IECEx BAS 04.0028X
Ex ia IIC T4 (-20 °C ≤ T_a ≤ 60 °C)

Table 3. Input Parameters

Fieldbus	FISCO
U_i = 30 V	U_i = 17.5 V
I_i = 300 mA	I_i = 380 mA
P_i = 1.3 W	P_i = 5.32 W
C_i = 0	C_i = 0
L_i = 0	L_i = 0

SPECIAL CONDITION FOR SAFE USE (X):
1. When fitted with the transient option, the apparatus is not capable of withstanding the 500 V electrical strength test as defined in clause 6.4.12 of IEC 60079-11:1999. This must be taken into account during installation.
2. The enclosure maybe aluminum, protected against low-levels of impact by a coating of epoxy polyester or polyurethane paint. The risk of high-levels of impact must be considered in any installation and protected accordingly.

N7 IECEx Type n
Certificate Number: IECEx BAS 04.0030X
Ex nA II T5 (-40 °C ≤ T_a ≤ 70 °C)

SPECIAL CONDITION FOR SAFE USE (X):
When fitted with the transient option, the apparatus is not capable of withstanding the 500 V electrical strength test as defined in Clause 8 of IEC 60079-15:1987. This must be taken into account when installing the apparatus.

Combination Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K5 FM Combination (E5, I5)
K6 CSA Combination (E6, I6)
K1 ATEX Combination (E1, I1, N1, ND)
KA CSA and ATEX Combination (E6, I6, E1, I1)
KB FM and CSA Combination (E5, I5, E6, I6)
KC FM and ATEX Combination (E5, I5, E1, I1)

Dimensional Drawings

Figure 3. Pipe Mount Installations

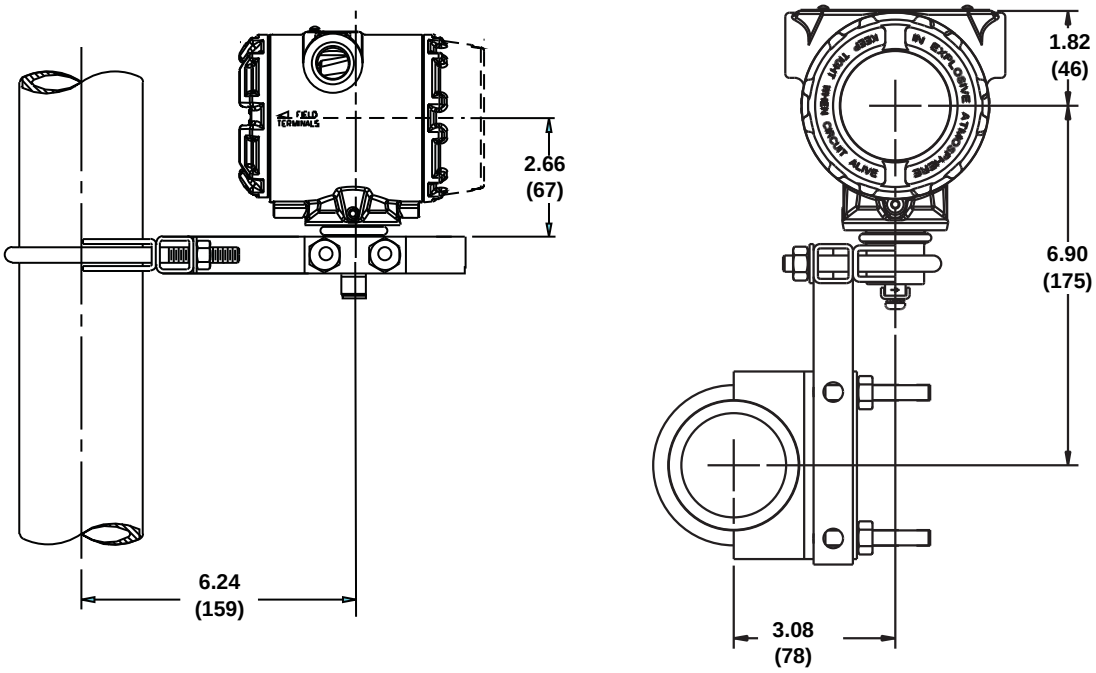
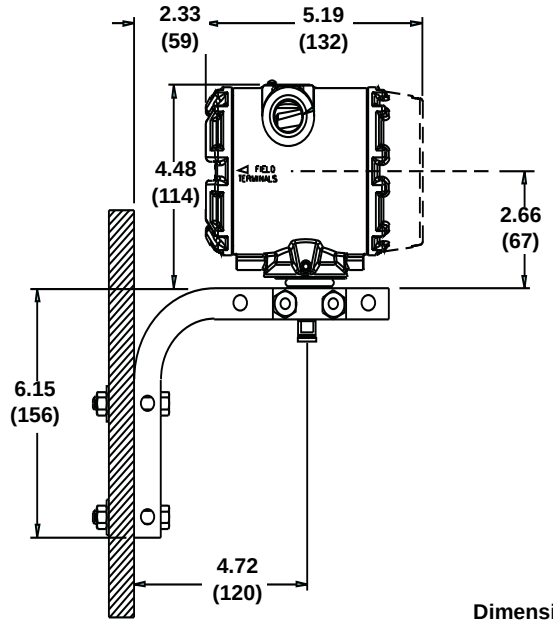


Figure 4. Panel Mount Installations



Dimensions are in inches (millimeters)

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Process Management

DP Flow

Rosemount 3051SF Flowmeters enable best-in-class flow measurement utilizing advanced functionality

- Up to 0.80% mass flow rate accuracy
- Multivariable capabilities allow for real time fully compensated mass and energy flow
- Advanced diagnostics predict and prevent abnormal process conditions
- Installation ready wireless flow solution
- Ultra for Flow measures %-of-reading performance over 14:1 flow turndown
- 10-year stability, 12-year warranty

Rosemount 3051CF Flowmeters combine the proven 3051C pressure transmitter and the latest primary element technology

- Up to 1.65% volumetric flow accuracy at 8:1 turndown
- Available with HART®, FOUNDATION™ fieldbus, and Profibus Protocols
- 5-year stability

Rosemount 2051CF Flowmeters combine the 2051C pressure transmitter and the latest primary element technology

- Up to 2.00% volumetric flow accuracy at 5:1 turndown
- Available with HART, and FOUNDATION fieldbus Protocols
- 2-year stability

Rosemount Annubar Primary Element Technology

- Energy savings gained through minimal permanent pressure loss
- Innovative T-shape design that increases accuracy to ±0.75% of flow rate
- Variety of sensor materials for optimal compatibility with the process fluid
- Handles applications where conditions exceed the structural limitations of other primary elements
- Symmetrical sensor design allows bi-directional flow measurement

Rosemount Conditioning Orifice Plate Technology

- Reduce straight pipe requirements to two diameters upstream and downstream from flow disturbances
- Discharge coefficient uncertainty of ±0.5%
- Integral thermowell enables fully compensated mass flow with a single pipe penetration
- Reduce installation costs compared to traditional orifice plates with the compact design
- Conditioning orifice plate is based on AGA, ASME and ISO industry standards
- Available in various plate styles providing installation flexibility

Rosemount Integral Orifice Plate Technology

- Improves accuracy and repeatability in 1/2-in., 1-in., and 1 1/2-in. line sizes
- Self-centering plate design eliminates installation errors that are magnified in small line sizes
- Precision honed pipe sections allow accuracy of up to ±0.75% of flow rate
- Installation flexibility with numerous process connections
- Integral thermowell enables fully compensated mass flow

Comprehensive Product Catalog

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Rosemount 485 Annubar Primary Element . . . . . **DP Flow-92**

Rosemount 585 Annubar Primary Element . . . . . **DP Flow-99**

Rosemount 405 Compact Primary Element . . . . . **DP Flow-106**

Rosemount 1595 Conditioning Orifice Plate . . . . . **DP Flow-110**

Rosemount 1195 Integral Orifice Primary Element . . . . . **DP Flow-113**

Rosemount 1495 Orifice Plate . . . . . **DP Flow-118**

Rosemount 1496 Orifice Flange Union . . . . . **DP Flow-121**

Rosemount DP Flowmeters and Primary Elements

- *Multivariable capabilities allow for real time fully compensated mass and energy flow*
- *Fully-Integrated Wireless Flowmeters allow for easy installation*
- *Minimize permanent pressure loss and save energy with Annubar® Technology*
- *Reduce straight pipe requirements to two diameters upstream and downstream from flow disturbances with Conditioning Orifice Plate Technology*
- *Improve accuracy and repeatability in small line sizes with Integral Orifice Plate Technology*



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DP Flowmeter Selection Guide

Rosemount integrated DP Flowmeters arrive fully assembled, configured, and leak tested for out-of-the-box installation.



Rosemount 3051SF Flowmeters enable best-in-class flow measurement utilizing advanced functionality

- Up to 0.80% mass flow rate accuracy
- Multivariable capabilities allow for real time fully compensated mass and energy flow
- Advanced diagnostics predict and prevent abnormal process conditions
- Installation ready wireless flow solution
- Ultra for Flow measures %-of-reading performance over 14:1 flow turndown
- 10-year stability, 12-year warranty



Rosemount 3051CF Flowmeters combine the proven 3051C pressure transmitter and the latest primary element technology

- Up to 1.65% volumetric flow accuracy at 8:1 turndown
- Available with HART®, FOUNDATION™ fieldbus, and Profibus Protocols
- 5-year stability



Rosemount 2051CF Flowmeters combine the 2051C pressure transmitter and the latest primary element technology

- Up to 2.00% volumetric flow accuracy at 5:1 turndown
- Available with HART, and FOUNDATION fieldbus Protocols
- 2-year stability

Rosemount Annubar Primary Element Technology



- Energy savings gained through minimal permanent pressure loss
- Innovative T-shape design that increases accuracy to ±0.75% of flow rate
- Variety of sensor materials for optimal compatibility with the process fluid
- Handles applications where conditions exceed the structural limitations of other primary elements
- Symmetrical sensor design allows bi-directional flow measurement

Rosemount Conditioning Orifice Plate Technology



- Reduce straight pipe requirements to two diameters upstream and downstream from flow disturbances
- Discharge coefficient uncertainty of ±0.5%
- Integral thermowell enables fully compensated mass flow with a single pipe penetration
- Reduce installation costs compared to traditional orifice plates with the compact design
- Conditioning orifice plate is based on AGA, ASME and ISO industry standards
- Available in various plate styles providing installation flexibility

Rosemount Integral Orifice Plate Technology



- Improves accuracy and repeatability in 1/2-in., 1-in., and 1 1/2-in. line sizes
- Self-centering plate design eliminates installation errors that are magnified in small line sizes
- Precision honed pipe sections allow accuracy of up to ±0.75% of flow rate
- Installation flexibility with numerous process connections
- Integral thermowell enables fully compensated mass flow

Rosemount 3051SF DP Flowmeters



Rosemount 3051SF Flowmeters integrate industry leading transmitters with industry leading primary elements. Capabilities include:

- Flowmeters are factory configured to meet your application needs (Configuration Data Sheet required)
- MultiVariable capabilities allow scalable flow compensation (Measurement Types 1-7)
- HART 4-20, Wireless, and FOUNDATION fieldbus protocols
- Ultra for Flow for improved flow performance across wider flow ranges
- Integral temperature measurement (Option Code T)
- Advanced Diagnostics (Option Code DA2)
- Direct or remote mount configurations available

Additional Information
Specifications: page DP Flow-28
Dimensional Drawings: page DP Flow-127.



Rosemount 3051SFA Annubar Flowmeter

- Annubar flowmeters reduce permanent pressure loss by creating less blockage in the pipe
- Ideal for large line size installations when cost, size and weight of the flowmeter are concerns

Table 1. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	Measurement Type		• = Available — = Unavailable
		D	1-7	
3051SFA	Annubar Flowmeter	•	•	
Measurement Type				
Standard				**Standard**
1	MultiVariable (Fully Compensated Mass & Energy Flow) – Differential & Static Pressures w/ Temperature	—	•	★
2	MultiVariable (Compensated Flow) – Differential & Static Pressures	—	•	★
3	MultiVariable (Compensated Flow) – Differential Pressure & Temperature	—	•	★
4	MultiVariable (Compensated Flow) – Differential Pressure	—	•	★
5	MultiVariable (Direct Measurement) – Differential & Static Pressures with Temperature	—	•	★
6	MultiVariable (Direct Measurement) – Differential & Static Pressures	—	•	★
7	MultiVariable (Direct Measurement) – Differential Pressure & Temperature	—	•	★
D	Differential Pressure	•	—	★
Fluid Type				
Standard				**Standard**
L	Liquid	•	•	★
G	Gas	•	•	★
S	Steam	•	•	★

Table 1. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Line Size		**D**	**1-7**	
Standard				**Standard**
020	2-in. (50 mm)	•	•	★
025	2 1/2-in. (63.5 mm)	•	•	★
030	3-in. (80 mm)	•	•	★
035	3 1/2-in. (89 mm)	•	•	★
040	4-in. (100 mm)	•	•	★
050	5-in. (125 mm)	•	•	★
060	6-in. (150 mm)	•	•	★
070	7-in. (175 mm)	•	•	★
080	8-in. (200 mm)	•	•	★
100	10-in. (250 mm)	•	•	★
120	12-in. (300 mm)	•	•	★
Expanded				
140	14-in. (350 mm)	•	•	
160	16-in. (400 mm)	•	•	
180	18-in. (450 mm)	•	•	
200	20-in. (500 mm)	•	•	
240	24-in. (600 mm)	•	•	
300	30-in. (750 mm)	•	•	
360	36-in. (900 mm)	•	•	
420	42-in. (1066 mm)	•	•	
480	48-in. (1210 mm)	•	•	
600	60-in. (1520 mm)	•	•	
720	72-in. (1820 mm)	•	•	
780	78-in. (1950 mm)	•	•	
840	84-in. (2100 mm)	•	•	
900	90-in. (2250 mm)	•	•	
960	96-in. (2400 mm)	•	•	
Pipe I.D. Range				
Standard				**Standard**
C	Range C from the Pipe I.D. table	•	•	★
D	Range D from the Pipe I.D. table	•	•	★
Expanded				
A	Range A from the Pipe I.D. table	•	•	
B	Range B from the Pipe I.D. table	•	•	
E	Range E from the Pipe I.D. table	•	•	
Z	Non-standard Pipe I.D. Range or Line Sizes greater than 12-in. (300 mm)	•	•	
Pipe Material / Mounting Assembly Material				
Standard				**Standard**
C	Carbon steel (A105)	•	•	★
S	316 Stainless Steel	•	•	★
0(1)	No Mounting (Customer Supplied)	•	•	★
Expanded				
G	Chrome-Moly Grade F-11	•	•	
N	Chrome-Moly Grade F-22	•	•	
J	Chrome-Moly Grade F-91	•	•	
Piping Orientation				
Standard				**Standard**
H	Horizontal Piping	•	•	★
D	Vertical Piping with Downwards Flow	•	•	★
U	Vertical Piping with Upwards Flow	•	•	★

Table 1. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Annubar Type				**D**	**1-7**	
Standard						**Standard**
P	Pak-Lok			•	•	★
F	Flanged with opposite side support			•	•	★
Expanded						
L	Flange-Lok			•	•	
G	Gear-Drive Flo-Tap			•	•	
M	Manual Flo-Tap			•	•	
Sensor Material						
Standard						**Standard**
S	316 Stainless Steel			•	•	★
Expanded						
H	Alloy C-276			•	•	
Sensor Size						
Standard						**Standard**
1	Sensor size 1 — Line sizes 2-in. (50 mm) to 8-in. (200 mm)			•	•	★
2	Sensor size 2 — Line sizes 6-in. (150 mm) to 96-in. (2400 mm)			•	•	★
3	Sensor size 3 — Line sizes greater than 12-in. (300 mm)			•	•	★
Mounting Type						
Standard						**Standard**
T1	Compression/Threaded Connection			•	•	★
A1	150# RF ANSI			•	•	★
A3	300# RF ANSI			•	•	★
A6	600# RF ANSI			•	•	★
D1	DN PN16 Flange			•	•	★
D3	DN PN40 Flange			•	•	★
D6	DN PN100 Flange			•	•	★
Expanded						
A9[(2)]	900# RF ANSI			•	•	
AF[(2)]	1500# RF ANSI			•	•	
AT[(2)]	2500 # RF ANSI			•	•	
R1	150# RTJ Flange			•	•	
R3	300# RTJ Flange			•	•	
R6	600# RTJ Flange			•	•	
R9[(2)]	900# RTJ Flange			•	•	
RF[(2)]	1500# RTJ Flange			•	•	
RT[(2)]	2500# RTJ Flange			•	•	
Opposite Side Support or Packing Gland						
Standard						**Standard**
0	No opposite side support or packing gland (Required for Pak-Lok and Flange-Lok models)			•	•	★
	Opposite Side Support – Required for Flanged Models					
C	NPT Threaded Opposite Support Assembly – Extended Tip			•	•	★
D	Welded Opposite Support Assembly – Extended Tip			•	•	★
Expanded						
	Packing Gland – Required for Flo-Tap Models					
	Packing Gland Material	*Rod Material*	*Packing Material*			
J	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	PTFE	•	•	
K	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	PTFE	•	•	
L	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	Graphite	•	•	
N	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	Graphite	•	•	
R	Alloy C-276 Packing Gland / Cage Nipple	Stainless Steel	Graphite	•	•	

Table 1. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Isolation Valve for Flo-Tap Models				**D**	**1-7**	
Standard						**Standard**
0[1]	Not Applicable or Customer Supplied			•	•	★
Expanded						
1	Gate Valve, Carbon Steel			•	•	
2	Gate Valve, Stainless Steel			•	•	
5	Ball Valve, Carbon Steel			•	•	
6	Ball Valve, Stainless Steel			•	•	
Temperature Measurement						
Standard						**Standard**
T[3]	Integral RTD – not available with Flanged model greater than class 600#			•	•	★
0[4]	No Temperature Sensor			•	•	★
Expanded						
R[3]	Remote Thermowell and RTD			•	•	
Transmitter Connection Platform						
Standard						**Standard**
3	Direct-mount, Integral 3-valve Manifold– not available with Flanged model greater than class 600			•	•	★
5	Direct -mount, 5-valve Manifold – not available with Flanged model greater than class 600			•	•	★
7	Remote-mount NPT Connections ($^1/_2$-in. FNPT)			•	•	★
Expanded						
6	Direct-mount, High Temperature 5-valve Manifold – not available with Flanged model greater than class 600			•	•	
8	Remote-mount SW Connections ($^1/_2$-in.)			•	•	
Differential Pressure Range						
Standard						**Standard**
1	0 to 25 in H_2O (0 to 62.3 mbar)			•	•	★
2	0 to 250 in H_2O (0 to 623 mbar)			•	•	★
3	0 to 1000 in H_2O (0 to 2.5 bar)			•	•	★
Static Pressure Range						
Standard						**Standard**
A[5]	None			•	•	★
D	Absolute 0 to 800 psia (0 to 55.2 bar)			—	•	★
E[6]	Absolute 0 to 3626 psia (0 to 250 bar)			—	•	★
J	Gage -14.2 to 800 psig (-0.979 to 55.2 bar)			—	•	★
K[6]	Gage -14.2 to 3626 psig (-0.979 to 250 bar)			—	•	★
Transmitter Output						
Standard						**Standard**
A	4–20 mA with digital signal based on HART protocol			•	•	★
F	FOUNDATION fieldbus protocol (requires PlantWeb housing)			•	—	★
X[7]	Wireless (Requires wireless options and Wireless Plantweb housing)			•	—	★
Transmitter Housing Style		**Material**	**Conduit Entry Size**			
Standard						**Standard**
00	None (Customer-supplied electrical connection)			•	—	★
1A	PlantWeb Housing	Aluminum	$^1/_2$-14 NPT	•	•	★
1B	PlantWeb Housing	Aluminum	M20 x 1.5	•	•	★
1J	PlantWeb Housing	SST	$^1/_2$-14 NPT	•	•	★
1K	PlantWeb Housing	SST	M20 x 1.5	•	•	★
2A	Junction Box Housing	Aluminum	$^1/_2$-14 NPT	•	—	★
2B	Junction Box Housing	Aluminum	M20 x 1.5	•	—	★

Table 1. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

2E	Junction Box housing with output for remote display and interface	Aluminum	1/2-14 NPT	•	—	★
2F	Junction Box housing with output for remote display and interface	Aluminum	M20 x 1.5	•	—	★
2J	Junction Box Housing	SST	1/2-14 NPT	•	—	★
2M	Junction Box housing with output for remote display and interface	SST	1/2-14 NPT	•	—	★
5A[8]	Wireless PlantWeb housing	Aluminum	1/2-14 NPT	•	—	★
5J[8]	Wireless PlantWeb housing	SST	1/2-14 NPT	•	—	★
7J[7][9]	Quick Connect (A size Mini, 4-pin male termination)			•	—	★
Expanded						
1C	PlantWeb Housing	Aluminum	G1/2	•	•	
1L	PlantWeb Housing	SST	G1/2	•	•	
2C	Junction Box Housing	Aluminum	G1/2	•	—	
2G	Junction Box housing with output for remote display and interface	Aluminum	G1/2	•	—	
Transmitter Performance Class				**D**	**1-7**	
Standard						**Standard**
3051S MultiVariable SuperModule, Measurement Types 1, 2, 5, and 6						
3	Ultra for Flow: 0.8% flow rate accuracy, 14:1 flow turndown, 10-year stability, limited 12-year warranty			•	•	★
5	Classic MV: 1.15% flow rate accuracy, 8:1 flow turndown, 5-yr. stability			—	•	★
3051S Single Variable SuperModule, Measurement Types 3, 4, 7, and D						
1	Ultra: up to 0.95% flow rate accuracy, 8:1 flow turndown, 10-year stability, limited 12-year warranty			•	—	★
2	Classic: up to 1.4% flow rate accuracy, 8:1 flow turndown, 5-year stability			•	—	★
3[10]	Ultra for Flow: 0.8% flow rate accuracy, 14:1 flow turndown, 10-year stability. limited 12-year warranty			•	•	★

Wireless Options (Requires option code X and wireless PlantWeb housing)

Update Rate, Operating Frequency and Protocol				
Standard				**Standard**
WA	User Configurable Update Rate	•	—	★
Operating Frequency and Protocol				
Standard				
3	2.4 GHz DSSS, IEC 62591 (WirelessHART)	•	—	★
Omnidirectional Wireless Antenna				
Standard				
WK	External Antenna	•	—	★
WM	Extended Range, External Antenna	•	—	★
Expanded				
WN	High-Gain, Remote Antenna	•	—	
SmartPower™				
Standard				
1[11]	Adapter for Black Power Module (I.S. Power Module Sold Separately)	•	—	★

Other Options (Include with selected model number)

Pressure Testing				
Expanded				
P1[12]	Hydrostatic Testing with Certificate	•	•	
PX[12]	Extended Hydrostatic Testing	•	•	
Special Cleaning				
Expanded				
P2	Cleaning for Special Services	•	•	
PA	Cleaning per ASTM G93 level D (section 11.4)	•	•	

Table 1. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Material Testing				
Expanded				
V1	Dye Penetrant Exam	•	•	
Material Examination		**D**	**1-7**	
Expanded				
V2	Radiographic Examination	•	•	
Flow Calibration				
Expanded				
W1	Flow Calibration (Average K)	•	•	
WZ	Special Calibration	•	•	
Special Inspection				
Standard				**Standard**
QC1	Visual & Dimensional Inspection with Certificate	•	•	★
QC7	Inspection & Performance Certificate	•	•	★
Surface Finish				
Standard				**Standard**
RL	Surface finish for Low Pipe Reynolds Number in Gas & Steam	•	•	★
RH	Surface finish for High Pipe Reynolds Number in Liquid	•	•	★
Material Traceability Certification				
Standard				**Standard**
Q8[13]	Material Traceability Certificate per EN 10204:2004 3.1	•	•	★
Code Conformance				
Expanded				
J2[14]	ANSI / ASME B31.1	•	•	
J3[14]	ANSI / ASME B31.3	•	•	
Material Conformance				
Expanded				
J5[15]	NACE MR-0175 / ISO 15156	•	•	
Country Certification				
Standard				**Standard**
J6	European Pressure Directive (PED)	•	•	★
Expanded				
J1	Canadian Registration	•	•	
Installed in Flanged Pipe Spool Section				
Expanded				
H3	150# Flanged Connection with Rosemount Standard Length and Schedule	•	•	
H4	300# Flanged Connection with Rosemount Standard Length and Schedule	•	•	
H5	600# Flanged Connection with Rosemount Standard Length and Schedule	•	•	
Instrument Connections for Remote Mount Option				
Standard				**Standard**
G2	Needle Valves, Stainless Steel	•	•	★
G6	OS&Y Gate Valve, Stainless Steel	•	•	★
Expanded				
G1	Needle Valves, Carbon Steel	•	•	
G3	Needle Valves, Alloy C-276	•	•	
G5	OS&Y Gate Valve, Carbon Steel	•	•	
G7	OS&Y Gate Valve, Alloy C-276	•	•	
Special Shipment				
Standard				**Standard**
Y1	Mounting Hardware Shipped Separately	•	•	★
Attach To				
Expanded				
H1	Attach to Transmitter	•	•	

Table 1. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Special Dimensions				
Expanded				
VM	Variable Mounting	•	•	
VT	Variable Tip	•	•	
VS	Variable length Spool Section	•	•	
Transmitter Calibration Certification				
Standard				**Standard**
Q4	Calibration Certificate for Transmitter	•	•	★
QP	Calibration Certificate & Tamper Evident Seal	•	•	★
Quality Certification For Safety		**D**	**1-7**	
Standard				**Standard**
QS[18][24]	Prior-use Certificate of FMEDA data	•	—	★
QT[17][18][24]	Safety certified to IEC 61508 with certificate of FMEDA data	•	—	★
Product Certifications				
Standard				**Standard**
E1	ATEX Flameproof	•	•	★
I1	ATEX Intrinsic Safety	•	•	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	•	—	★
N1	ATEX Type n	•	•	★
ND	ATEX Dust	•	•	★
K1	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E1, I1, N1, and ND)	•	•	★
E4	TIIS Flameproof	•	•	★
E5	FM Explosion-proof, Dust Ignition-proof	•	•	★
I5	FM Intrinsically Safe, Division 2	•	•	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	•	•	★
E6[16]	CSA Explosion-proof, Dust Ignition-proof, Division 2	•	•	★
I6	CSA Intrinsically Safe	•	•	★
K6[16]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	•	•	★
E7	IECEx Flameproof, Dust Ignition-proof	•	•	★
I7	IECEx Intrinsic Safety	•	•	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	•	•	★
E3	China Flameproof	•	•	★
I3	China Intrinsic Safety	•	•	★
KA[16]	ATEX and CSA Explosion-proof, Intrinsically Safe, Division 2 (combination of E1, I1, E6, and I6)	•	•	★
KB[16]	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)	•	•	★
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2 (combination of E5, E1, I5, and I1)	•	•	★
KD[16]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)	•	•	★
Shipboard Approvals				
Standard				**Standard**
SBS	American Bureau of Shipping	•	•	★
Sensor Fill Fluid and O-ring Options				
Standard				**Standard**
L1	Inert Sensor Fill Fluid	•	•	★
L2	Graphite-Filled (PTFE) O-ring	•	•	★
LA	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	•	•	★
Digital Display[17]				
Standard				**Standard**
M5	PlantWeb LCD display (Requires PlantWeb housing)	•	•	★
M7[18][19][20]	Remote mount LCD display and interface, PlantWeb housing,no cable; SST bracket	•	•	★
M8[18][19]	Remote mount LCD display and interface, PlantWeb housing,50 ft. (15 m) cable; SST bracket	•	•	★
M9[18][19]	Remote mount LCD display and interface, PlantWeb housing,100 ft. (31 m) cable; SST bracket	•	•	★
Transient Protection				
Standard				**Standard**
T1[21]	Transient terminal block	•	•	★

Table 1. Rosemount 3051SFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Manifold for Remote Mount Option				
Standard				**Standard**
F2	3-Valve Manifold, Stainless Steel	•	•	★
F6	5-Valve Manifold, Stainless Steel	•	•	★
Expanded				
F1	3-Valve Manifold, Carbon Steel	•	•	
F3	3-Valve Manifold, Alloy C-276	•	•	
F5	5-Valve Manifold, Carbon Steel	•	•	
F7	5-Valve Manifold, Alloy C-276	•	•	
PlantWeb Control Functionality		**D**	**1-7**	
Standard				**Standard**
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	•	—	★
PlantWeb Diagnostic Functionality				
Standard				**Standard**
D01	FOUNDATION fieldbus Diagnostics Suite	•	—	★
DA2(22)	Advanced HART Diagnostic Suite	•	—	★
PlantWeb Enhanced Measurement Functionality				
Standard				**Standard**
H01(23)	FOUNDATION fieldbus Fully Compensated Mass Flow Block	•	—	★
Cold Temperature				
Standard				**Standard**
BRR	-60 °F (-51 °C) Cold Temperature Start-up	—	•	★
Alarm Limit(18)(24)				
Standard				**Standard**
C4	NAMUR Alarm & Saturation Levels, High Alarm	•	•	★
C5	NAMUR Alarm & Saturation Levels, Low Alarm	•	•	★
C6	Custom Alarm & Saturation Levels, High Alarm	•	•	★
C7	Custom Alarm & Saturation Levels, Low Alarm	•	•	★
C8	Low Alarm (Standard Rosemount Alarm & Saturation Levels)	•	•	★
Hardware Adjustments and Ground Screw				
Standard				**Standard**
D1(18)(24)(25)	Hardware Adjustments (zero, span, alarm, security)	•	—	★
D4	External Ground Screw Assembly	•	•	★
DA(18)(24)(25)	Hardware Adjustments (zero, span, alarm, security) & External Ground Screw Assembly	•	—	★
Conduit Plug				
Standard				**Standard**
DO	316 SST Conduit Plug *(standard for all 3051SF Models)*	•	•	★
Conduit Electrical Connector				
Standard				**Standard**
GE(26)	M12, 4-pin, Male Connector (*eurofast*®)	•	•	★
GM(26)	A size Mini, 4-pin, Male Connector (*minifast*®)	•	•	★
Typical Model Number: 3051SFA D L 060 D C H P S 2 T1 0 0 0 3 2A A 1A 3				

(1) Provide the "A" dimension for Flanged, Flange-Lok, and Threaded Flo-Tap models. Provide the "B" dimension for Flange Flo-Tap models.

(2) Available in remote mount applications only.

(3) Temperature Measurement Option code T or R is required for Measurement Type codes 1, 3, 5, and 7.

(4) Required for Measurement Type codes 2, 4, 6, and D.

(5) Required for Measurement Type codes 3, 4, 7, and D.

(6) For Measurement Type 1, 2, 5, and 6 with DP range 1, absolute limits are 0.5 to 2000 psi (0,03 to 137,9 bar) and gage limits are -14.2 to 2000 psig (-0,98 to 137,9 bar).

(7) Available approvals are FM Intrinsically Safe, Division 2 (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).

(8) Only available with output code X.

(9) Available with output code A only.

(10) Only available with differential pressure ranges 2 and 3, and silicone fill fluid.

(11) Long-life Power Module must be shipped separately, order Part No. 00753-9220-0001.

(12) Applies to assembled flowmeter only, mounting not tested.

(13) Instrument Connections for Remote Mount Options and Isolation Valves for Flo-tap Models are not included in the Material Traceability Certification.

(14) Not available with Transmitter Connection Platform 6.

(15) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(16) Not available with M20 or G ½ conduit entry size.

(17) Not available with housing code 7J.

(18) Not available with output code X.

(19) Not available with output code F, option code DA2, or option code QT.

(20) See the 3051S Reference Manual (document number 00809-0100-4801) for cable requirements. Contact an Emerson Process Management representative for additional information.

(21) Not available with Housing code 5A, 5J, or 7J. External ground screw assembly (option code D4) is included with the T1 option. The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(22) Includes Hardware Adjustments (option code D1) as standard. Not available with output code X.

(23) Requires Rosemount Engineering Assistant version 5.5.1 to configure.

(24) Not available with Output Protocol code F.

(25) Not available with housing style codes 2E, 2F, 2G, 2M, 5A, 5J, or 7J.

(26) Not available with Housing code 5A, 5J, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Division 2 (option code I5) or FM FISCO Intrinsically Safe (option code IE), install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66).



Rosemount 3051SFC Compact Orifice Flowmeter

- Compact Conditioning flowmeters reduce straight piping requirements to 2D upstream and 2D downstream from a flow disturbance
- Simple installation of Compact flowmeters between any existing raised-face flanges

Table 2. Rosemount 3051SFC Compact Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	Measurement Type		• = Available — = Unavailable
		D	1-7	
3051SFC	Compact Orifice Flowmeter	•	•	
Transmitter Feature Board Measurement Type				
Standard				**Standard**
1	MultiVariable (Fully Compensated Mass & Energy Flow) – Differential & Static Pressure w/ Temperature	—	•	★
2	MultiVariable (Compensated Flow) – Differential & Static Pressures	—	•	★
3	MultiVariable (Compensated Flow) – Differential Pressure & Temperature	—	•	★
4	MultiVariable (Compensated Flow) – Differential Pressure	—	•	★
5	MultiVariable (Direct Measurement) – Differential & Static Pressures with Temperature	—	•	★
6	MultiVariable (Direct Measurement) – Differential & Static Pressures	—	•	★
7	MultiVariable (Direct Measurement) – Differential Pressure & Temperature	—	•	★
D	Differential Pressure	•	—	★
Primary Element Technology				
Standard				**Standard**
C	Conditioning Orifice Plate	•	•	★
P	Orifice Plate	•	•	★
Material Type				
Standard				**Standard**
S	316 SST	•	•	★
Line Size				
Standard				**Standard**
005(1)	1/2-in. (15 mm)	•	•	★
010(1)	1-in. (25 mm)	•	•	★
015(1)	1 1/2-in. (40 mm)	•	•	★
020	2-in. (50 mm)	•	•	★
030	3-in. (80 mm)	•	•	★
040	4-in. (100 mm)	•	•	★
060	6-in. (150 mm)	•	•	★
080	8-in. (200 mm)	•	•	★
100	10-in. (250 mm)	•	•	★
120	12-in. (300 mm)	•	•	★
Primary Element Style				
Standard				**Standard**
N	Square Edged	•	•	★
Primary Element Type				
Standard				**Standard**
040	0.40 Beta Ratio (β)	•	•	★
065(2)	0.65 Beta Ratio (β)	•	•	★
Temperature Measurement				
Standard				**Standard**
T(4)	Integral RTD	—	•	★
0(3)	No Temperature Sensor	•	•	★

Table 2. Rosemount 3051SFC Compact Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded						
R[4]	Remote Thermowell and RTD			•	•	
Transmitter Connection Platform				**D**	**1-7**	
Standard						**Standard**
3	Direct-mount, 3-valve Integral Manifold, SST			•	•	★
7	Remote-mount, 1/4-in. NPT Connections			•	•	★
Differential Pressure Range						
Standard						**Standard**
1	0 to 25 inH_2O (0 to 62.3 mbar)			•	•	★
2	0 to 250 inH_2O (0 to 623 mbar)			•	•	★
3	0 to 1000 inH_2O (0 to 2.5 bar)			•	•	★
Static Pressure Range						
Standard						**Standard**
A[5]	None			•	•	★
D	Absolute 0 to 800 psia (0 to 55.2 bar)			—	•	★
E[6]	Absolute 0 to 3626 psia (0 to 250 bar)			—	•	★
J	Gage -14.2 to 800 psig (-0.979 to 55.2 bar)			—	•	★
K[6]	Gage -14.2 to 3626 psig (-0.979 to 250 bar)			—	•	★
Transmitter Output						
Standard						**Standard**
A	4–20 mA with digital signal based on HART protocol			•	•	★
F[7]	FOUNDATION fieldbus protocol			•	—	★
X[8][9]	Wireless			•	—	★
Transmitter Housing Style		**Material**	**Conduit Entry Size**			
Standard						**Standard**
00	None (Customer-supplied electrical connection)			•	—	★
1A	PlantWeb Housing	Aluminum	1/2-14 NPT	•	•	★
1B	PlantWeb Housing	Aluminum	M20 x 1.5	•	•	★
1J	PlantWeb Housing	SST	1/2-14 NPT	•	•	★
1K	PlantWeb Housing	SST	M20 x 1.5	•	•	★
2A	Junction Box Housing	Aluminum	1/2-14 NPT	•	—	★
2B	Junction Box Housing	Aluminum	M20 x 1.5	•	—	★
2E	Junction Box housing with output for remote display and interface	Aluminum	1/2-14 NPT	•	—	★
2F	Junction Box housing with output for remote display and interface	Aluminum	M20 x 1.5	•	—	★
2J	Junction Box Housing	SST	1/2-14 NPT	•	—	★
2M	Junction Box housing with output for remote display and interface	SST	1/2-14 NPT	•	—	★
5A[10]	Wireless PlantWeb housing	Aluminum	1/2-14 NPT	•	—	★
5J[10]	Wireless PlantWeb housing	SST	1/2-14 NPT	•	—	★
7J[8][11]	Quick Connect (A size Mini, 4-pin male termination)			•	—	★
Expanded						
1C	PlantWeb Housing	Aluminum	G1/2	•	•	
1L	PlantWeb Housing	SST	G1/2	•	•	
2C	Junction Box Housing	Aluminum	G1/2	•	—	
2G	Junction Box housing with output for remote display and interface	Aluminum	G1/2	•	—	
Transmitter Performance Class						
Standard						**Standard**
3051S MultiVariable SuperModule, Measurement Types 1, 2, 5, and 6				•	•	
3	Ultra for Flow: 0.75% flow rate accuracy, 14:1 flow turndown, 10-yr stability, limited 12-yr warranty			•	•	★

Table 2. Rosemount 3051SFC Compact Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

5	Classic MV: 1.10% flow rate accuracy, 8:1 flow turndown, 5-yr stability	—	•	★
3051S Single Variable SuperModule, Measurement Types 3, 4, 7, and D		•	•	
1	Ultra: 0.90% flow rate accuracy, 8:1 flow turndown, 10-yr stability, limited 12-yr warranty	•	—	★
2	Classic: 1.40% flow rate accuracy, 8:1 flow turndown, 5-yr stability	•	—	★
3(12)	Ultra for Flow: 0.75% flow rate accuracy, 14:1 flow turndown, 10-yr stability, limited 12-yr warranty	•	•	★

Wireless Options (Requires option code X and wireless PlantWeb housing)

Update Rate, Operating Frequency, and Protocol				
Standard				**Standard**
WA	User Configurable Update Rate	•	—	★
Operating Frequency and Protocol				
Standard				
3	2.4 GHz DSSS, IEC 62591 (WirelessHART)	•	—	★
Omnidirectional Wireless Antenna				
Standard				
WK	External Antenna	•	—	★
WM	Extended Range, External Antenna	•	—	★
Expanded				
WN	High-Gain, Remote Antenna	•	—	
SmartPower™				
Standard				
1(13)	Adapter for Black Power Module (I.S. Power Module Sold Separately)	•	—	★

Other Options (Include with selected model number)

Installation Accessories				
Standard				**Standard**
A	ANSI Alignment Ring (150#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	•	•	★
C	ANSI Alignment Ring (300#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	•	•	★
D	ANSI Alignment Ring (600#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	•	•	★
G	DIN Alignment Ring (PN 16)	•	•	★
H	DIN Alignment Ring (PN 40)	•	•	★
J	DIN Alignment Ring (PN 100)	•	•	★
Expanded				
B	JIS Alignment Ring (10K)	•	•	
R	JIS Alignment Ring (20K)	•	•	
S	JIS Alignment Ring (40K)	•	•	
Remote Adapters				
Standard				**Standard**
E	Flange adapters 316 SST (1/2-in. NPT)	•	•	★
High Temperature Applications				
Expanded				
T	Graphite Valve Packing (Tmax = 850 °F)	•	•	
Flow Calibration				
Expanded				
WC	Discharge Coefficient Verification (3 point)	•	•	
WD	Discharge Coefficient Verification (full 10 point)	•	•	
Pressure Testing				
Expanded				
P1	Hydrostatic Testing with Certificate	•	•	
Special Cleaning				
Expanded				
P2	Cleaning for Special Processes	•	•	
PA	Cleaning per ASTM G93 Level D (section 11.4)	•	•	

Table 2. Rosemount 3051SFC Compact Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Special Inspection				
Standard				**Standard**
QC1	Visual & Dimensional Inspection with Certificate	•	•	★
QC7	Inspection & Performance Certificate	•	•	★
Transmitter Calibration Certification				
Standard				**Standard**
Q4	Calibration Data Certificate for Transmitter	•	•	★
QP	Calibration Certificate and Tamper Evident Seal	•	•	★
Quality Certification for Safety		**D**	**1-7**	
Standard				**Standard**
QS[14][15]	Prior-use certificate of FMEDA data	•	—	★
QT[14][15][18]	Safety Certified to IEC 61508 with certificate of FMEDA data	•	—	★
Material Traceability Certifications				
Standard				**Standard**
Q8	Material Traceability Certification per EN 10204:2004 3.1	•	•	★
Code Conformance				
Expanded				
J2	ANSI / ASME B31.1	•	•	
J3	ANSI / ASME B31.3	•	•	
J4	ANSI / ASME B31.8	•	•	
Material Conformance				
Expanded				
J5[16]	NACE MR-0175 / ISO 15156	•	•	
Country Certification				
Expanded				
J1	Canadian Registration	•	•	
Product Certifications				
Standard				**Standard**
E1	ATEX Flameproof	•	•	★
I1	ATEX Intrinsic Safety	•	•	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	•	—	★
N1	ATEX Type n	•	•	★
ND	ATEX Dust	•	•	★
K1	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E1, I1, N1, and ND)	•	•	★
E4	TIIS Flameproof	•	•	★
E5	FM Explosion-proof, Dust Ignition-proof	•	•	★
I5	FM Intrinsically Safe, Division 2	•	•	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	•	•	★
E6[17]	CSA Explosion-proof, Dust Ignition-proof, Division 2	•	•	★
I6	CSA Intrinsically Safe	•	•	★
K6[17]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	•	•	★
E7	IECEx Flameproof, Dust Ignition-proof	•	•	★
I7	IECEx Intrinsic Safety	•	•	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	•	•	★
E3	China Flameproof	•	•	★
I3	China Intrinsic Safety	•	•	★
KA[17]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2 (combination of E1, I1, E6, and I6)	•	•	★
KB[17]	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)	•	•	★
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2 (combination of E5, E1, I5, and I1)	•	•	★
KD[17]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, E6, E1, I5, I6, and I1)	•	•	★
Shipboard Approvals				
Standard				
SBS	American Bureau of Shipping	•	•	★

Table 2. Rosemount 3051SFC Compact Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Sensor Fill Fluid and O-ring Options		**D**	**1-7**	
Standard				**Standard**
L1	Inert Sensor Fill Fluid	•	•	★
L2	Graphite-filled (PTFE) O-ring	•	•	★
LA	Inert sensor fill fluid and graphite-filled (PTFE) O-ring	•	•	★
Digital Display(18)				
Standard				**Standard**
M5	PlantWeb LCD display	•	•	★
M7(15)(19)(20)	Remote mount LCD display and interface, PlantWeb housing, no cable, SST bracket	•	•	★
M8(15)(19)	Remote mount LCD display and interface, PlantWeb housing, 50 ft. (15m) cable, SST bracket	•	•	★
M9(15)(19)	Remote mount LCD display and interface, PlantWeb housing, 100 ft. (31m) cable, SST bracket	•	•	★
Transient Protection				
Standard				**Standard**
T1(21)	Transient terminal block	•	•	★
Manifold for Remote Mount Option				
Standard				**Standard**
F2	3-Valve Manifold, SST	•	•	★
F6	5-Valve Manifold, SST	•	•	★
PlantWeb Control Functionality				
Standard				**Standard**
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	•	—	★
PlantWeb Diagnostic Functionality				
Standard				**Standard**
D01	FOUNDATION fieldbus Diagnostics Suite	•	—	★
DA2(22)	Advanced HART Diagnostic Suite	•	—	★
PlantWeb Enhanced Measurement Functionality				
Standard				**Standard**
H01(23)	FOUNDATION fieldbus Fully Compensated Mass Flow Block	•	—	★
Cold Temperature				
Standard				**Standard**
BRR	-60 °F (-51 °C) Cold Temperature Start-up	•	•	★
Alarm Limit(14)(15)				
Standard				**Standard**
C4	NAMUR Alarm & Saturation Levels, High Alarm	•	•	★
C5	NAMUR Alarm & Saturation Levels, Low Alarm	•	•	★
C6	Custom Alarm & Saturation Levels, High Alarm	•	•	★
C7	Custom Alarm & Saturation Levels, Low Alarm	•	•	★
C8	Low Alarm (Standard Rosemount Alarm & Saturation Levels)	•	•	★
Hardware Adjustments and Ground Screw				
Standard				**Standard**
D1(14)(15)(24)	Hardware Adjustments (zero, span, alarm, security).	•	—	★
D4	External ground screw assembly	•	•	★
DA(14)(15)(24)	Hardware adjustments (zero, span, alarm, security) and external ground screw assembly	•	—	★
Conduit Plug				
Standard				**Standard**
DO	316 SST Conduit Plug	•	•	★
Conduit Electrical Connector				
Standard				**Standard**
ZE(25)	M12, 4-pin, Male Connector (eurofast)	•	•	★
ZM	A size Mini, 4-pin, Male Connector (minifast)	•	•	★
Typical Model Number: 3051SFC 1 C S 060 N 065 T 3 2 J A 1A 3				

(1) Not available for Primary Element Technology code C.

(2) For 2-in. (50 mm) line sizes the Primary Element Type is 0.6 for Primary Element Technology Code C.

(3) Required for Measurement Type codes 2, 4, 6, and D.

(4) Only available with Transmitter Feature Board Measurement Type: 1, 3, 5, 7.

(5) Required for Measurement Type codes 3, 4, 7, and D.

(6) For Measurement Type 1, 2, 5, and 6 with DP range 1, absolute limits are 0.5 to 2000 psi (0,03 to 137,9 bar) and gage limits are -14.2 to 2000 psig (-0,98 to 137,9 bar).

(7) Requires PlantWeb housing.

(8) Available approvals are FM Intrinsically Safe, Division 2 (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).

(9) Requires wireless options and wireless PlantWeb housing.

(10) Only available with output code X.

(11) Available with output code A only.

(12) Only available with differential pressure ranges 2 and 3, and silicone fill fluid.

(13) Long-life Power Module must be shipped separately, order Part No. 00753-9220-0001.

(14) Not available with Output Protocol code F.

(15) Not available with output code X.

(16) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(17) Not available with M20 or G ½ conduit entry size.

(18) Not available with housing code 7J.

(19) Not available with output code F, option code DA2, or option code QT.

(20) See the 3051S Reference Manual (document number 00809-0100-4801) for cable requirements. Contact an Emerson Process Management representative for additional information.

(21) Not available with Housing code 00, 5A, 5J, or 7J. External ground screw assembly (option code D4) is included with the T1 option. The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(22) Includes Hardware Adjustments (option code D1) as standard. Not available with output code X.

(23) Requires Rosemount Engineering Assistant version 5.5.1 to configure.

(24) Not available with housing style codes 2E, 2F, 2G, 2M, 5A, 5J, or 7J.

(25) Not available with Housing code 5A, 5J, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Division 2 (option code I5) or FM FISCO Intrinsically Safe (option code IE), install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66).



Rosemount 3051SFP Integral Orifice Flowmeter

- Precision honed pipe section for increased accuracy in small line sizes
- Self-centering plate design prevents alignment errors that magnify measurement inaccuracies in small line sizes

Table 3. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	Measurement Type		• = Available — = Unavailable
		D	1-7	
3051SFP	Integral Orifice Flowmeter	•	•	
Measurement Type				
Standard				**Standard**
1	MultiVariable (Fully Compensated Mass & Energy Flow) – Differential & Static Pressures w/ Temperature	—	•	★
2	MultiVariable (Compensated Flow) – Differential and Static Pressures	—	•	★
3	MultiVariable (Compensated Flow) – Differential Pressure and Temperature	—	•	★
4	MultiVariable (Compensated Flow) – Differential Pressure	—	•	★
5	MultiVariable (Direct Measurement) – Differential and Static Pressures with Temperature	—	•	★
6	MultiVariable (Direct Measurement) – Differential and Static Pressures	—	•	★
7	MultiVariable (Direct Measurement) – Differential Pressure and Temperature	—	•	★
D	Differential Pressure	•	—	★
Body Material				
Standard				**Standard**
S	316 SST	•	•	★
Line Size				
Standard				**Standard**
005	1/2-in. (15 mm)	•	•	★
010	1-in. (25 mm)	•	•	★
015	1 1/2-in. (40 mm)	•	•	★
Process Connection				
Standard				**Standard**
T1	NPT Female Body (Not Available with Remote Thermowell and RTD)	•	•	★
S1(1)	Socket Weld Body (Not Available with Remote Thermowell and RTD)	•	•	★
P1	Pipe Ends: NPT threaded	•	•	★
P2	Pipe Ends: Beveled	•	•	★
D1	Pipe Ends: Flanged, DIN PN16, slip-on	•	•	★
D2	Pipe Ends: Flanged, DIN PN40, slip-on	•	•	★
D3	Pipe Ends: Flanged, DIN PN100, slip-on	•	•	★
W1	Pipe Ends: Flanged, ANSI Class 150, weld-neck	•	•	★
W3	Pipe Ends: Flanged, ANSI Class 300, weld-neck	•	•	★
W6	Pipe Ends: Flanged, ANSI Class 600, weld-neck	•	•	★
Expanded				
A1	Pipe Ends: Flanged, RF, ANSI Class 150, slip-on	•	•	
A3	Pipe Ends: Flanged, RF, ANSI Class 300, slip-on	•	•	
A6	Pipe Ends: Flanged, RF, ANSI Class 600, slip-on	•	•	
R1	Pipe Ends: Flanged, RTJ, ANSI Class 150, slip-on	•	•	
R3	Pipe Ends: Flanged, RTJ, ANSI Class 300, slip-on	•	•	
R6	Pipe Ends: Flanged, RTJ, ANSI Class 600, slip-on	•	•	
P9	Special Process Connection	•	•	
Orifice Plate Material				
Standard				**Standard**
S	316 SST	•	•	★

Table 3. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded				
H	Alloy C-276	•	•	
M	Alloy 400	•	•	
Bore Size Option		**D**	**1-7**	
Standard				**Standard**
0066	0.066-in. (1.68 mm) for 1/2-in. pipe	•	•	★
0109	0.109-in. (2.77 mm) for 1/2-in. pipe	•	•	★
0160	0.160-in. (4.06 mm) for 1/2-in. pipe	•	•	★
0196	0.196-in. (4.98 mm) for 1/2-in. pipe	•	•	★
0260	0.260-in. (6.60 mm) for 1/2-in. pipe	•	•	★
0340	0.340-in. (8.64 mm) for 1/2-in. pipe	•	•	★
0150	0.150-in. (3.81 mm) for 1-in. pipe	•	•	★
0250	0.250-in. (6.35 mm) for 1-in. pipe	•	•	★
0345	0.345-in. (8.76 mm) for 1-in. pipe	•	•	★
0500	0.500-in. (12.70 mm) for 1-in. pipe	•	•	★
0630	0.630-in. (16.00 mm) for 1-in. pipe	•	•	★
0800	0.800-in. (20.32 mm) for 1-in. pipe	•	•	★
0295	0.295-in. (7.49 mm) for 1 1/2-in. pipe	•	•	★
0376	0.376-in. (9.55 mm) for 1 1/2-in. pipe	•	•	★
0512	0.512-in. (13.00 mm) for 1 1/2-in. pipe	•	•	★
0748	0.748-in. (19.00 mm) for 1 1/2-in. pipe	•	•	★
1022	1.022-in. (25.96 mm) for 1 1/2-in. pipe	•	•	★
1184	1.184-in. (30.07 mm) for 1 1/2-in. pipe	•	•	★
Expanded				
0010	0.010-in. (0.25 mm) for 1/2-in. pipe	•	•	
0014	0.014-in. (0.36 mm) for 1/2-in. pipe	•	•	
0020	0.020-in. (0.51 mm) for 1/2-in. pipe	•	•	
0034	0.034-in. (0.86 mm) for 1/2-in. pipe	•	•	
Transmitter Connection Platform				
Standard				**Standard**
D3	Direct-mount, 3-valve Manifold, SST	•	•	★
D5	Direct-mount, 5-valve Manifold, SST	•	•	★
R3	Remote-mount, 3-valve Manifold, SST	•	•	★
R5	Remote-mount, 5-valve Manifold, SST	•	•	★
Expanded				
D4	Direct-mount, 3-valve Manifold, Alloy C-276	•	•	
D6	Direct-mount, 5-valve Manifold, Alloy C-276	•	•	
D7	Direct-mount, High Temperature, 5-valve Manifold, SST	•	•	
R4	Remote-mount, 3-valve Manifold, Alloy C-276	•	•	
R6	Remote-mount, 5-valve Manifold, Alloy C-276	•	•	
Differential Pressure Range				
Standard				**Standard**
1	0 to 25 inH_2O (0 to 62.3 mbar)	•	•	★
2	0 to 250 inH_2O (0 to 623 mbar)	•	•	★
3	0 to 1000 inH_2O (0 to 2.5 bar)	•	•	★
Static Pressure Range				
Standard				**Standard**
A[(2)]	None	•	•	★
D	Absolute 0 to 800 psia (0 to 55.2 bar)	—	•	★
E[(3)]	Absolute 0 to 3626 psia (0 to 250 bar)	—	•	★
J	Gage -14.2 to 800 psig (-0.979 to 55.2 bar)	—	•	★
K[(3)]	Gage -14.2 to 3626 psig (-0.979 to 250 bar)	—	•	★

Table 3. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transmitter Output				**D**	**1-7**	
Standard						**Standard**
A	4–20 mA with digital signal based on HART protocol			•	•	★
F	FOUNDATION fieldbus (Requires PlantWeb housing)			•	—	★
X[4]	Wireless (Requires wireless options and wireless PlantWeb housing)			•	—	★
Transmitter Housing Style		**Material**	**Conduit Entry Size**			
Standard						**Standard**
00	None (Customer-supplied electrical connection)			•	—	★
1A	PlantWeb Housing	Aluminum	1/2-14 NPT	•	•	★
1B	PlantWeb Housing	Aluminum	M20 x 1.5	•	•	★
1J	PlantWeb Housing	SST	1/2-14 NPT	•	•	★
1K	PlantWeb Housing	SST	M20 x 1.5	•	•	★
2A	Junction Box Housing	Aluminum	1/2-14 NPT	•	—	★
2B	Junction Box Housing	Aluminum	M20 x 1.5	•	—	★
2E	Junction Box Housing with output for remote display and interface	Aluminum	1/2-14 NPT	•	—	★
2F	Junction Box Housing with output for remote display and interface	Aluminum	M20 x 1.5	•	—	★
2J	Junction Box Housing	SST	1/2-14 NPT	•	—	★
2M	Junction Box Housing with output for remote display and interface	SST	1/2-14 NPT	•	—	★
5A[5]	Wireless PlantWeb Housing	Aluminum	1/2–14 NPT	•	—	★
5J[5]	Wireless PlantWeb Housing	SST	1/2–14 NPT	•	—	★
7J[4][6]	Quick Connect (A size Mini, 4-pin male termination)			•	—	★
Expanded						
1C	PlantWeb Housing	Aluminum	G1/2	•	•	
1L	PlantWeb Housing	SST	G1/2	•	•	
2C	Junction Box Housing	Aluminum	G1/2	•	—	
2G	Junction Box Housing with output for remote display and interface	Aluminum	G1/2	•	—	
Transmitter Performance Class						
Standard						**Standard**
3051S MultiVariable SuperModule, Measurement Types 1, 2, 5, and 6						
3[7]	Ultra for Flow: 0.95% flow rate accuracy, 14:1 flow turndown, 10-year stability, limited 12-year warranty			•	•	★
5	Classic MV: 1.25% flow rate accuracy, 8:1 flow turndown, 5-year stability			—	•	★
3051S Single Variable SuperModule, Measurement Types 3, 4, 7, and D						
1	Ultra: 1.05% flow rate accuracy, 8:1 flow turndown, 10-year stability, limited 12-year warranty			•	•	★
2	Classic: 1.50% flow rate accuracy, 8:1 flow turndown, 5-year stability			•	•	★
3[7]	Ultra for Flow: 0.95% flow rate accuracy, 14:1 flow turndown, 10-year stability, limited 12-year warranty			•	•	★

Wireless Options (Requires option code X and wireless PlantWeb housing)

Update Rate, Operating Frequency and Protocol				
Standard				**Standard**
WA	User Configurable Update Rate	•	—	★
Operating Frequency and Protocol				
Standard				
3	2.4 GHz DSSS, IEC 62591 (WirelessHART)	•	—	★
Omnidirectional Wireless Antenna				
Standard				
WK	External Antenna	•	—	★
WM	Extended Range, External Antenna	•	—	★

Table 3. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded				
WN	High-Gain, Remote Antenna	•	—	
SmartPower™				
Standard				
1[8]	Adapter for Black Power Module (I.S. Power Module Sold Separately)	•	—	★

Other Options (Include with selected model number)

Transmitter / Body Bolt Material		**D**	**1-7**	
Expanded				
G[9]	High temperature Option (850 °F (454 °C))	•	•	
Temperature Sensor				
Standard				**Standard**
T[10]	Thermowell and RTD	•	•	★
Optional Connection				
Standard				**Standard**
G1	DIN 19213 Transmitter Connection	•	•	★
Pressure Testing				
Expanded				
P1[11]	Hydrostatic Testing with Certificate	•	•	
Special Cleaning				
Expanded				
P2	Cleaning for Special Services	•	•	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	•	•	
Material Testing				
Expanded				
V1	Dye Penetrant Exam	•	•	
Material Examination				
Expanded				
V2	Radiographic Examination (available only with Process Connection code W1, W3, and W6)	•	•	
Flow Calibration				
Expanded				
WD[12]	Discharge Coefficient Verification	•	•	
WZ[12]	Special Calibration	•	•	
Special Inspection				
Standard				**Standard**
QC1	Visual & Dimensional Inspection with Certificate	•	•	★
QC7	Inspection & Performance Certificate	•	•	★
Material Traceability Certification				
Standard				**Standard**
Q8	Material certification per EN 10204:2004 3.1	•	•	★
Code Conformance				
Expanded				
J2[13]	ANSI / ASME B31.1	•	•	
J3[13]	ANSI / ASME B31.3	•	•	
J4[13]	ANSI / ASME B31.8	•	•	
Materials Conformance				
Expanded				
J5[14]	NACE MR-0175 / ISO 15156	•	•	
Country Certification				
Standard				**Standard**
J6	European Pressure Directive (PED)	•	•	★
Expanded				
J1	Canadian Registration	•	•	

Table 3. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transmitter Calibration Certification				
Standard				**Standard**
Q4	Calibration Data Certificate for Transmitter	•	•	★
Quality Certification for Safety				
Standard				**Standard**
QS[15][16]	Prior-use Certificate of FMEDA data	•	—	★
QT[15][16][18]	Safety-certified to IEC 61508 with Certificate of FMEDA data	•	—	★
Product Certifications		**D**	**1-7**	
Standard				**Standard**
E1	ATEX Flameproof	•	•	★
I1	ATEX Intrinsic Safety	•	•	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	•	—	★
N1	ATEX Type n	•	•	★
ND	ATEX Dust	•	•	★
K1	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E1, I1, N1, and ND)	•	•	★
E4	TIIS Flameproof	•	•	★
E5	FM Explosion-proof, Dust Ignition-proof	•	•	★
I5	FM Intrinsically Safe, Division 2	•	•	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	•	•	★
E6[17]	CSA Explosion-proof, Dust Ignition-proof, Division 2	•	•	★
I6	CSA Intrinsically Safe	•	•	★
K6[17]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	•	•	★
E7	IECEx Flameproof, Dust Ignition-proof	•	•	★
I7	IECEx Intrinsic Safety	•	•	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	•	•	★
E3	China Flameproof	•	•	★
I3	China Intrinsic Safety	•	•	★
KA[17]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2 (combination of E1, I1, E6, and I6)	•	•	★
KB[17]	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)	•	•	★
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2 (combination of E5, E1, I5, and I1)	•	•	★
KD[17]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)	•	•	★
Shipboard Approvals				
Standard				**Standard**
SBS	American Bureau of Shipping	•	•	★
Sensor Fill Fluid and O-ring Options				
Standard				**Standard**
L1	Inert Sensor Fill Fluid	•	•	★
L2	Graphite-filled (PTFE) O-ring	•	•	★
LA	Inert sensor fill fluid and graphite-filled (PTFE) O-ring	•	•	★
Digital Display[18]				
Standard				**Standard**
M5	PlantWeb LCD display (Requires PlantWeb housing)	•	•	★
M7[15][19][20]	Remote mount LCD display and interface, PlantWeb housing, no cable, SST bracket	•	—	★
M8[15][20]	Remote mount LCD display and interface, PlantWeb housing, 50 ft. (15 m) cable, SST bracket	•	—	★
M9[15][20]	Remote mount LCD display and interface, PlantWeb housing, 100 ft. (31 m) cable, SST bracket	•	—	★
Transient Protection				
Standard				**Standard**
T1[21]	Transient terminal block	•	•	★
PlantWeb Control Functionality				
Standard				**Standard**
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	•	—	★

Table 3. Rosemount 3051SFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

PlantWeb Diagnostic Functionality				
Standard				**Standard**
D01	FOUNDATION fieldbus Diagnostics Suite	•	—	★
DA2[22]	Advanced HART Diagnostics Suite	•	—	★
PlantWeb Enhanced Measurement Functionality				
Standard				**Standard**
H01[23]	FOUNDATION fieldbus Fully Compensated Mass Flow Block	•	—	★
Cold Temperature				
Standard				**Standard**
BRR	-60 °F (-51 °C) Cold Temperature Start-up	—	•	★
Alarm Limit[15][16]		**D**	**1-7**	
Standard				**Standard**
C4	NAMUR Alarm & Saturation Levels, High Alarm	•	•	★
C5	NAMUR Alarm & Saturation Levels, Low Alarm	•	•	★
C6	Custom Alarm & Saturation Levels, High Alarm	•	•	★
C7	Custom Alarm & Saturation Levels, Low Alarm	•	•	★
C8	Low Alarm (Standard Rosemount Alarm & Saturation Levels)	•	•	★
Hardware Adjustments and Ground Screw				
Standard				**Standard**
D1[15][16][24]	Hardware Adjustments (zero, span, alarm, security)	•	—	★
D4	External ground screw assembly	•	•	★
DA[15][16][24]	Hardware adjustments (zero, span, alarm, security) & External Ground Screw Assembly	•	—	★
Conduit Plug				
DO	316 SST Conduit Plug			
Conduit Electrical Connector				
Expanded				
GE [25]	M12, 4-pin, Male Connector (*eurofast*®)	•	•	
GM[25]	A size Mini, 4-pin, Male Connector (*minifast*®)	•	•	
Typical Model Number: 3051SFP 1 S 010 W3 S 0150 D3 1 J A 1A 3 M5				

(1) To improve pipe perpendicularity for gasket sealing, socket diameter is smaller than standard pipe O.D.

(2) Required for Measurement Type codes 3, 4, 7, and D.

(3) For Measurement Type 1, 2, 5, and 6 with DP range 1, absolute limits are 0.5 to 2000 psi (0,03 to 137,9 bar) and gage limits are -14.2 to 2000 psig (-0,98 to 137,9 bar).

(4) Available approvals are FM Intrinsically Safe, Division 2 (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).

(5) Only available with output code X.

(6) Only available with output code A.

(7) Only available with differential pressure ranges 2 and 3, and silicone fill fluid.

(8) Long-life Power Module must be shipped separately, order Part No. 00753-9220-0001.

(9) Not available with 1 1/2-in. (38 mm) line size.

(10) Thermowell material is the same as the body material.

(11) Does not apply to Process Connection codes T1 and S1.

(12) Not available for bore sizes 0010, 0014, 0020, or 0034.

(13) Not available with DIN Process Connection codes D1, D2, or D3.

(14) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(15) Not available with output code X.

(16) Not available with Output Protocol code F.

(17) Not available with M20 or G ½ conduit entry size.

(18) Not available with housing code 7J.

(19) See the 3051S Reference Manual (document number 00809-0100-4801) for cable requirements. Contact an Emerson Process Management representative for additional information.

(20) Not available with output code F, option code DA2, or option code QT.

(21) Not available with Housing code 5A, 5J, or 7J. The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(22) Includes Hardware Adjustments (option code D1) as standard. Not available with output code X.

(23) Requires Rosemount Engineering Assistant version 5.5.1 to configure.

(24) Not available with housing style codes 2E, 2F, 2G, 2M, 5A, 5J, or 7J.

(25) Not available with Housing code 5A, 5J, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Division 2 (option code I5) or FM FISCO Intrinsically Safe (option code IE), install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66).

3051SF Series Specifications

3051SF PERFORMANCE SPECIFICATIONS

Performance assumptions include: measured pipe I.D, transmitter is trimmed for optimum flow accuracy, and performance is dependent on application parameters.

Table 4. MultiVariable Flow Performance - Flow Reference Accuracy (Measurement Type 1)(1)(2)

3051SFA Annubar Flowmeter			
		Classic MV (8:1 flow turndown)	**Ultra for Flow (14:1 flow turndown)**
Ranges 2-3		±1.15% of Flow Rate	±0.80% of Flow Rate
3051SFC Compact Orifice Flowmeter - Conditioning Option C			
		Classic MV (8:1 flow turndown)	**Ultra for Flow (14:1 flow turndown)**
Ranges 2-3	β =0.4	±1.10% of Flow Rate	±0.75% of Flow Rate
	β =0.65	±1.45% of Flow Rate	±1.15% of Flow Rate
3051SFC Compact Orifice Flowmeter - Orifice Option P(3)			
		Classic MV (8:1 flow turndown)	**Ultra for Flow (14:1 flow turndown)**
Ranges 2-3	β =0.4	±1.45% of Flow Rate	±1.30% of Flow Rate
	β =0.65	±1.45% of Flow Rate	±1.30% of Flow Rate
3051SFP Integral Orifice Flowmeter			
		Classic MV (8:1 flow turndown)	**Ultra for Flow (14:1 flow turndown)**
Ranges 2-3	β <0.1	±2.65% of Flow Rate	±2.60% of Flow Rate
	0.1< β <0.2	±1.60% of Flow Rate	±1.40% of Flow Rate
	0.2< β <0.6	±1.25% of Flow Rate	±0.95% of Flow Rate
	0.6< β <0.8	±1.80% of Flow Rate	±1.60% of Flow Rate

(1) Measurement Types 2 - 4 assume that the unmeasured variables are constant. Additional uncertainty will depend on the variation in the unmeasured variables.

(2) Range 1 flowmeters experience an additional uncertainty up to 0.9%. Consult your Emerson Process Management Representative for exact specifications.

(3) For line size less than 2 in. (50 mm) or greater than 8 in. (200 mm), add an additional 0.5% uncertainty.

Table 5. Flow Performance - Flow Reference Accuracy (Measurement Type D)(1)(2)(3)

3051SFA Annubar Flowmeter				
		Classic (8:1 flow turndown)	**Ultra (8:1 flow turndown)**	**Ultra for Flow (14:1 flow turndown)**
Ranges 2-3		±1.4% of Flow Rate	±0.95% of Flow Rate	±0.80% of Flow Rate
3051SFC Compact Orifice Flowmeter – Conditioning Option C				
		Classic (8:1 flow turndown)	**Ultra (8:1 flow turndown)**	**Ultra for Flow (14:1 flow turndown)**
Ranges 2-3	β =0.4	±1.4% of Flow Rate	±0.9% of Flow Rate	±0.75% of Flow Rate
	β =0.65	±1.65% of Flow Rate	±1.25% of Flow Rate	±1.15% of Flow Rate
3051SFC Compact Orifice Flowmeter – Orifice Option P(4)				
		Classic (8:1 flow turndown)	**Ultra (8:1 flow turndown)**	**Ultra for Flow (14:1 flow turndown)**
Ranges 2-3	β =0.4	±1.80% of Flow Rate	±1.35% of Flow Rate	±1.30% of Flow Rate
	β =0.65	±1.80% of Flow Rate	±1.35% of Flow Rate	±1.30% of Flow Rate
3051SFP Integral Orifice Flowmeter				
		Classic (8:1 flow turndown)	**Ultra (8:1 flow turndown)**	**Ultra for Flow (14:1 flow turndown)**
Ranges 2-3	β <0.1	±2.70% of Flow Rate	±2.65% of Flow Rate	±2.60% of Flow Rate
	0.1< β <0.2	±1.80% of Flow Rate	±1.45% of Flow Rate	±1.40% of Flow Rate
	0.2< β <0.6	±1.50% of Flow Rate	±1.05% of Flow Rate	±0.95% of Flow Rate
	0.6< β <0.8	±2.00% of Flow Rate	±1.70% of Flow Rate	±1.60% of Flow Rate

(1) For Measurement Types 5 - 7, refer to the Reference Accuracy specification for the 3051SMV with Measurement Type P.

(2) These flow measurement accuracies assume a constant density, viscosity, and expansibility factor.

(3) Range 1 flowmeters experience an additional uncertainty up to 0.9%. Consult your Emerson Process Management Representative for exact specifications.

(4) For line size less than 2 in. (50 mm) or greater than 8 in. (200 mm), add an additional 0.5% uncertainty.

3051SF Dynamic Performance

Total Time Response at 75 °F (24 °C), includes dead time(1)

3051SF_D	3051SF_1, 2, 5, or 6	3051SF_3, 4, or 7
DP Ranges 2-5: 100 ms Range 1: 255 ms Range 0: 700 ms	DP Range 1: 310 ms DP Range 2: 170 ms DP Range 3: 155 ms AP & GP: 240 ms	DP Ranges 2-5: 145 ms DP Range 1: 300 ms DP Range 0: 745 ms

(1) For FOUNDATION fieldbus (output code F), add 52 ms to stated values (not including segment macro-cycle). For option code DA2, add 45 ms (nominal) to stated values.

Dead Time(1)

3051SF_D	3051SF_1-7
45 ms (nominal)	DP: 100 ms AP & GP: 140 ms RTD Interface: 1 s

(1) For option code DA2, dead time is 90 milliseconds (nominal).

Update Rate(1)

3051SF_D	3051SF_1-7	
22 updates per sec.	DP: 22 updates per sec. AP & GP: 11 updates per sec. RTD Interface: 1 update per sec.	Calculated Variables: Mass / Volumetric Flow Rate: 22 updates per sec. Energy Flow Rate: 22 updates per sec. Totalized Flow: 1 update per sec.

(1) Does not apply to Wireless (output code X). See"Wireless Self-Organizing Networks" on page 33 for wireless update rate.

Mounting Position Effects

Models		Ultra, Ultra for Flow, Classic and Classic MV
3051SF_3, 4, 7, or D		Zero shifts up to ±1.25 inH_2O (3,11 mbar), which can be zeroed Span: no effect
3051SF_1, 2, 5, or 6	DP Sensor:	Zero shifts up to ±1.25 inH_2O (3,11 mbar), which can be zeroed Span: no effect
	GP/AP Sensor:	Zero shifts to ±2.5 inH_2O (6,22 mbar), which can be zeroed Span: no effect

Vibration Effect

Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field or pipeline with high vibration level (10-60 Hz 0.21mm displacement peak amplitude / 60-2000 Hz 3g).

For Housing Style codes 1J, 1K, 1L, 2J, and 2M:
Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field with general application or pipeline with low vibration level (10-60 Hz 0.15mm displacement peak amplitude / 60-500 Hz 2g).

Power Supply Effect

Less than ±0.005% of calibrated span per volt change in voltage at the transmitter terminals

Electromagnetic Compatibility (EMC)

Meets all relevant requirements of EN 61326 and NAMUR NE-21.(1)(2)

(1) NAMUR NE-21 does not apply to wireless output code X.

(2) 3051SMV and 3051SF_1, 2, 3, 4, 5, 6, 7 requires shielded cable for both temperature and loop wiring.

Transient Protection (Option T1)

Meets IEEE C62.41.2-2002, Location Category B
- 6 kV crest (0.5 μs - 100 kHz)
- 3 kA crest (8 × 20 microseconds)
- 6 kV crest (1.2 × 50 microseconds)

Meets IEEE C37.90.1-2002 Surge Withstand Capability
- SWC 2.5 kV crest, 1.0 MHz wave form

3051SF FUNCTIONAL SPECIFICATIONS

Range and Sensor Limits

Flowmeter with Coplanar Sensor Module

Range	DP Sensor (3051SF_3, 4, or 7)	
	Lower (LRL)	Upper (URL)
1	0 inH_2O (0 mbar)	25 inH_2O (62,3 mbar)
2	0 inH_2O (0 bar)	250 inH_2O (0,62 bar)
3	0 inH_2O (0 bar)	1000 inH_2O (2,49 bar)

Flowmeter with MultiVariable Sensor Module

Range	DP Sensor (3051SF1, 2, 5, or 6)	
	Lower (LRL)	Upper (URL)
1	0 inH_2O (0 mbar)	25.0 inH_2O (62,3 mbar)
2	0 inH_2O (0 bar)	250.0 inH_2O (0,62 bar)
3	0 inH_2O (0 bar)	1000.0 inH_2O (2,49 bar)
Range	**Static Pressure Sensor (GP/AP)**	
	Lower (LRL)	**Upper (URL)[1]**
3	GP[2]: -14.2 psig (0,98 bar) AP: 0.5 psia (34,5 mbar)	GP: 800 psig (55,16 bar) AP: 800 psia (55,16 bar)
4	GP[2]: -14.2 psig (0,98 bar) AP: 0.5 psia (34,5 mbar)	GP: 3626 psig (250 bar) AP: 3626 psia (250 bar)

(1) For SP Range 4 with DP Range 1, the URL is 2000 psi (137,9 bar).

(2) Inert Fill: Minimum pressure = 1.5 psia (0,10 bar) or -13.2 psig (-0,91 bar).

Process Temperature RTD Interface (3051SF_1, 3, 5 or 7)[1]

Lower (LRL)	Upper (URL)
-328 °F (-200 °C)	1562 °F (850 °C)

(1) Transmitter is compatible with any Pt 100 RTD sensor. Examples of compatible RTDs include Rosemount Series 68 and 78 RTD Temperature Sensors.

Minimum Span Limits

Transmitter with Coplanar Sensor Module (Single Variable)

Range	DP Sensor (3051SF_D, 3, 4 or 7)	
	Ultra & Ultra for Flow	Classic
1	0.5 inH_2O (1,24 mbar)	0.5 inH_2O (1,24 mbar)
2	1.3 inH_2O (3,11 mbar)	2.5 inH_2O (6,23 mbar)
3	5.0 inH_2O (12,4 mbar)	10.0 inH_2O (24,9 mbar)

Transmitter with MultiVariable Sensor Module

Range	DP Sensor (3051SF_1, 2, 5, or 6)	
	Ultra for Flow	Classic MV
1	0.5 inH_2O (1,24 mbar)	0.5 inH_2O (1,24 mbar)
2	1.3 inH_2O (3,11 mbar)	2.5 inH_2O (6,23 mbar)
3	5.0 inH_2O (12,4 mbar)	10.0 inH_2O (24,9 mbar)
Range	**Static Pressure Sensor (GP/AP)**	
	Ultra for Flow	**Classic MV**
3	4.0 psi (276 mbar)	8.0 psi (522 mbar)
4	18.13 psi (1,25 bar)	36.26 psi (2,50 bar)

Process Temperature RTD Interface (3051SF_1, 3, 5 or 7)

Minimum Span = 50 °F (28 °C)

Service

3051SF_5, 6, 7, or D (Direct Process Variable Output):

Liquid, gas, and steam applications

3051SF_1, 2, 3, or 4 (Mass and Energy Flow Output):

Some fluid types are only supported by certain measurement types

Fluid Compatibility with Pressure and Temperature Compensation • Available — Not available

Ordering Code	Measurement Type	Fluid Types			
		Liquids	Saturated Steam	Superheated Steam	Gas and Natural Gas
1	DP / P/ T (Full Compensation)	•	•	•	•
2	DP / P	•	•	•	•
3	DP / T	•	•	—	—
4	DP only	•	•	—	—

4–20 mA/HART

Zero and Span Adjustment

Zero and span values can be set anywhere within the range. Span must be greater than or equal to the minimum span.

Output

Two-wire 4–20 mA is user-selectable for linear or square root output. Digital process variable superimposed on 4–20 mA signal, available to any host that conforms to the HART protocol.

Power Supply

External power supply required.

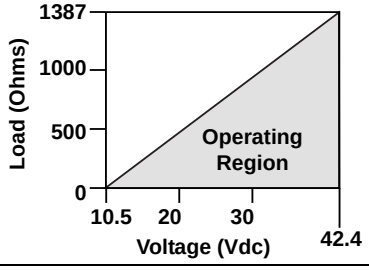
- 3051SF_D: 10.5 to 42.4 Vdc with no load
- 3051SF_D with Advanced HART Diagnostics Suite: 12 to 42.4 Vdc with no load
- 3051SF_1-7: 12 to 42.4 Vdc with no load

Load Limitations

Maximum loop resistance is determined by the voltage level of the external power supply, as described by:

3051SF_D

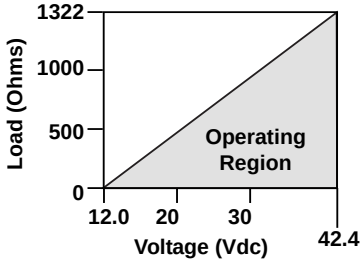
Maximum Loop Resistance = 43.5 * (Power Supply Voltage – 10.5)



The Field Communicator requires a minimum loop resistance of 250Ω for communication.

3051SF_1-7 and 3051SF_D with HART Diagnostics (option code DA2)

Maximum Loop Resistance = 43.5 * (Power Supply Voltage – 12.0)



The Field Communicator requires a minimum loop resistance of 250Ω for communication.

Advanced HART Diagnostics Suite (Option Code DA2)

The 3051SF provides Abnormal Situation Prevention indication for a breakthrough in diagnostic capability. The 3051SF ASP Diagnostics Suite for HART includes Statistical Process Monitoring (SPM), variable logging with time stamp and advanced process alerts. The enhanced EDDL graphic display provides an intuitive and user-friendly interface to better visualize these diagnostics.

The integral SPM technology calculates the mean and standard deviation of the process variable 22 times per second and makes them available to the user. The 3051SF uses these values and highly flexible configuration options for customization to detect many user-defined or application specific abnormal situations (e.g. detecting plugged impulse lines and fluid composition change). Variable logging with time stamp and advanced process alerts capture valuable process and sensor data to enable quick troubleshooting of application and installation issues.

FOUNDATION fieldbus

Power Supply

External power supply required; transmitters operate on 9.0 to 32.0 Vdc transmitter terminal voltage.

Current Draw

17.5 mA for all configurations (including LCD display option)

FOUNDATION fieldbus Parameters

Schedule Entries	14 (max.)
Links	30 (max.)
Virtual Communications Relationships (VCR)	20 (max.)

Standard Function Blocks

Resource Block

- Contains hardware, electronics, and diagnostic information.

Transducer Block

- Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

LCD Block

- Configures the local display.

2 Analog Input Blocks

- Processes the measurements for input into other function blocks. The output value is in engineering or custom units and contains a status indicating measurement quality.

PID Block with Auto-tune

- Contains all logic to perform PID control in the field including cascade and feedforward. Auto-tune capability allows for superior tuning for optimized control performance.

Backup Link Active Scheduler (LAS)

The transmitter can function as a Link Active Scheduler if the current link master device fails or is removed from the segment.

Software Upgrade in the Field

Software for the 3051SF with FOUNDATION fieldbus is easy to upgrade in the field using the FOUNDATION fieldbus Common Device Software Download procedure.

PlantWeb Alerts

Enable the full power of the PlantWeb digital architecture by diagnosing instrumentation issues, communicating advisory, maintenance, and failure details, and recommending a solution.

Advanced Control Function Block Suite (Option Code A01)

Input Selector Block

- Selects between inputs and generates an output using specific selection strategies such as minimum, maximum, midpoint, average, or first “good.”

Arithmetic Block

- Provides pre-defined application-based equations including flow with partial density compensation, electronic remote seals, hydrostatic tank gauging, ratio control and others.

Signal Characterizer Block

- Characterizes or approximates any function that defines an input/output relationship by configuring up to twenty X, Y coordinates. The block interpolates an output value for a given input value using the curve defined by the configured coordinates.

Integrator Block

- Compares the integrated or accumulated value from one or two variables to pre-trip and trip limits and generates discrete output signals when the limits are reached. This block is useful for calculating total flow, total mass, or volume over time.

Output Splitter Block

- Splits the output of one PID or other control block so that the PID will control two valves or other actuators.

Control Selector Block

- Selects one of up to three inputs (highest, middle, or lowest) that are normally connected to the outputs of PID or other control function blocks.

Block	Execution Time
Resource	-
Transducer	-
LCD Block	-
Analog Input 1, 2	20 milliseconds
PID with Auto-tune	35 milliseconds
Input Selector	20 milliseconds
Arithmetic	20 milliseconds
Signal Characterizer	20 milliseconds
Integrator	20 milliseconds
Output Splitter	20 milliseconds
Control Selector	20 milliseconds

Fully Compensated Mass Flow Block (Option Code H01)

Calculates fully compensated mass flow based on differential pressure with external process pressure and temperature measurements over the fieldbus segment. Configuration for the mass flow calculation is easily accomplished using the Rosemount Engineering Assistant.

ASP Diagnostics Suite for FOUNDATION fieldbus (Option Code D01)

The 3051SF ASP Diagnostics Suite for FOUNDATION fieldbus provides Abnormal Situation Prevention indication and enhanced EDDL graphic displays for easy visual analysis.

The integral Statistical Process Monitoring (SPM) technology calculates the mean and standard deviation of the process variable 22 times per second and makes them available to the user. The 3051SF uses these values and highly flexible configuration options for customization to detect many user-defined or application specific abnormal situations (e.g. detecting plugged impulse lines and fluid composition change).

Wireless Self-Organizing Networks

Output

WirelessHART, 2.4 GHz DSSS.

Local Display

The optional five-digit LCD can display user-selectable information such as primary variable in engineering units, percent of range, sensor module temperature, and electronics temperature. Display updates at up to once per minute.

Update Rate

WirelessHART, user selectable 8 sec. to 60 min.

Power Module

Field replaceable, keyed connection eliminates the risk of incorrect installation, Intrinsically Safe Lithium-thionyl chloride Power Module with polybutadine terephthalate (PBT) enclosure. Ten-year life at one minute update rate.(1)

(1) Reference conditions are 70 °F (21 °C), and routing data for three additional network devices.
NOTE: Continuous exposure to ambient temperature limits of -40 °F or 185 °F (-40 °C or 85 °C) may reduce specified life by less than 20 percent.

Overpressure Limits

Transmitters withstand the following limits without damage:

Coplanar Sensor Module (Single Variable)

Range	DP(1)
	3051SF_3, 4, 7, or D
1	2000 psi (137,9 bar)
2	3626 psi (250,0 bar)
3	3626 psi (250,0 bar)

(1) The overpressure limit of a DP Sensor with the P9 option is 4500 psig (310,3 bar). The overpressure limit of a DP Sensor with the P0 option is 6092 psig (420 bar).

Coplanar MultiVariable Sensor Module (3051SF_1, 2, 5, or 6)

Static Pressure	Differential Pressure		
	Range 1	Range 2	Range 3
Range 3 GP/AP	1600 psi (110,3 bar)	1600 psi (110,3 bar)	1600 psi (110,3 bar)
Range 4 GP/AP	2000 psi (137,9 bar)	3626 psi (250 bar)	3626 psi (250 bar)

Static Pressure Limits

Coplanar Sensor Module

Operates within specifications between static line pressures of:

Range	DP Sensor(1)
	3051SF_3, 4, 7, or D
1	0.5 psia to 2000 psig (0,03 to 137,9 bar)
2	0.5 psia to 3626 psig (0,03 to 150 bar)
3	0.5 psia to 3626 psig (0,03 to 150 bar)

(1) The static pressure limit of a DP Sensor with the P9 option is 4500 psig (310,3 bar). The static pressure limit of a DP Sensor with the P0 option is 6092 psig (420 bar).

Coplanar MultiVariable Sensor Module (3051SF_1, 2, 5, or 6)

Operates within specifications between static line pressures of 0.5 psia (0,03 bar) and the values in the table below:

Static Pressure	Differential Pressure		
	Range 1	Range 2	Range 3
Range 3 GP/AP	800 psi (57,91 bar)	800 psi (57,91 bar)	800 psi (57,91 bar)
Range 4 GP/AP	2000 psi (137,9 bar)	3626 psi (250 bar)	3626 psi (250 bar)

Burst Pressure Limits

Coplanar Sensor Module

10000 psig (689,5 bar)

Temperature Limits

Ambient

-40 to 185 °F (-40 to 85 °C)
With LCD display(1): -40 to 175 °F (-40 to 80 °C)
With option code P0: -20 to 185 °F (-29 to 85 °C)

(1) LCD display may not be readable and LCD updates will be slower at temperatures below -4 °F (-20 °C).

Storage

-50 to 185 °F (-46 to 85 °C)
With LCD display: -40 to 185 °F (-40 to 85 °C)
With Wireless Output: -40 to 185 °F (-40 to 85 °C)

Process Temperature Limits

For 3051SFA Temperature Limits, see page DP Flow-96.
For 3051SFC Temperature Limits, see page DP Flow-108.
For 3051SFP Temperature Limits, see page DP Flow-116.

At atmospheric pressures and above:

Humidity Limits

0–100% relative humidity

Turn-On Time(1)

When power is applied to the transmitter during startup, performance will be within specifications per the time period described below:

Transmitter	Turn-On Time (Typical)
3051S, 3051SF_D	2 seconds
Diagnostics	5 seconds
3051SMV, 3051SF_1-7	5 seconds

(1) Does not apply to wireless option code X.

Volumetric Displacement

Less than 0.005 in^3 (0,08 cm^3)

Damping(1)

Analog output response time to a step change is user-selectable from 0 to 60 seconds for one time constant. For 3051SF_1-7, each variable can be individually adjusted. Software damping is in addition to sensor module response time.

(1) Does not apply to wireless option code X.

Failure Mode Alarm

HART 4-20 mA (output option code A)

If self-diagnostics detect a gross transmitter failure, the analog signal will be driven offscale to alert the user. Rosemount standard (default), NAMUR, and custom alarm levels are available (see Alarm Configuration below).

High or low alarm signal is software-selectable or hardware-selectable via the optional switch (option D1).

Alarm Configuration

	High Alarm	Low Alarm
Default	≥ 21.75 mA	≤ 3.75 mA
NAMUR compliant(1)	≥ 22.5 mA	≤ 3.6 mA
Custom levels(2)	20.2 - 23.0 mA	3.4 - 3.8 mA

(1) Analog output levels are compliant with NAMUR recommendation NE 43, see option codes C4 or C5.

(2) Low alarm must be 0.1 mA less than low saturation and high alarm must be 0.1 mA greater than high saturation.

PHYSICAL SPECIFICATIONS

Safety-Certified Transmitter Failure Values(1)

Safety accuracy: 2.0%(2)
Safety response time: 1.5 seconds

(1) Does not apply to wireless option code X.

(2) A 2% variation of the transmitter mA output is allowed before a safety trip. Trip values in the DCS or safety logic solver should be derated by 2%.

Electrical Connections

1/2–14 NPT, G1/2, and M20 × 1.5 conduit. HART interface connections fixed to terminal block for Output code A and X.

Process Connections

Coplanar Sensor Module	
Standard	1/4-18 NPT on 2 1/8-in. centers

Process-Wetted Parts

For 3051SFA wetted parts, see “Annubar Sensor Material” on page 97.
For 3051SFC wetted parts, see “Material of Construction” on page 108.
For 3051SFP wetted parts, see “Material of Construction” on page 116.

Process Isolating Diaphragms

Coplanar Sensor Module
316L SST (UNS S31603), Alloy C-276 (UNS N10276), Alloy 400 (UNS N04400), Tantalum (UNS R05440), Gold-Plated Alloy 400, Gold-plated 316L SST

Drain/Vent Valves

316 SST, Alloy C-276, or Alloy 400/K-500 material
(Drain vent seat: Alloy 400, Drain vent stem: Alloy K-500)

Process Flanges and Adapters

Plated carbon steel
SST: CF-8M (Cast 316 SST) per ASTM A743
Cast C-276: CW-12MW per ASTM A494
Cast Alloy 400: M-30C per ASTM A494

Non-Wetted Parts

Electronics Housing

Low-copper aluminum alloy or CF-8M (Cast 316 SST)
NEMA 4X, IP 66, IP 68 (66 ft (20 m) for 168 hours)
Note: IP 68 not available with Wireless Output.

Paint for Aluminum Housing

Polyurethane

Coplanar Sensor Module Housing

SST: CF-3M (Cast 316L SST)

Bolts

Plated carbon steel per ASTM A449, Type 1
Austenitic 316 SST per ASTM F593
ASTM A453, Class D, Grade 660 SST
ASTM A193, Grade B7M alloy steel
ASTM A193, Class 2, Grade B8M SST
Alloy K-500

Sensor Module Fill Fluid

Silicone or inert halocarbon

Cover O-rings

Nitirile Butadiene (NBR)

Wireless Antenna

PBT/ polycarbonate (PC) integrated omnidirectional antenna

Power Module

Field replaceable, keyed connection eliminates the risk of incorrect installation, Intrinsically Safe Lithium-thionyl chloride Power Module with PBT enclosure

3051SF Measurement Type 1-7 Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA

Emerson Process Management GmbH & Co. — Wessling, Germany

Emerson Process Management Asia Pacific Private Limited — Singapore

Ordinary Location Certification for FM

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

Models with Differential Pressure Ranges = 2 through 5 and/or Static Pressure Range 4 or options P0 and P9.

QS Certificate of Assessment - EC No. 59552-2009-CE-HOU-DNV,

Module H Conformity Assessment — Sound Engineering Practice

Transmitter Attachments: Diaphragm Seal - Process Flange - Manifold — Sound Engineering Practice

Primary Elements, Flowmeter — See appropriate Primary Element QIG

Electro Magnetic Compatibility (EMC) (2004/108/EC)

EN 61326-1:2006 and EN 61326-2-3:2006

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion-proof for Class I, Division 1, Groups B, C, and D; dust-ignition proof for Class II and Class III, Division 1, Groups E, F, and G; T_a = 85 °C; hazardous locations; enclosure Type 4X, conduit seal not required.

I5 Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1; Class I, Zone 0 AEx ia IIC when connected in accordance with Rosemount drawing 03151-1206;
T_a = 70 °C;
Non-incendive for Class I, Division 2, Groups A, B, C, and D
Enclosure Type 4X
For entity parameters see control drawing 03151-1206.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

E6 Explosion-proof for Class I, Division 1, Groups B, C, and D; Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G; suitable for Class I, Division 2, Groups A, B, C, and D, CSA Enclosure Type 4X; conduit seal not required. Dual Seal. T5 (T_a = -40 °C to 85 °C).

I6 Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D, T3C; when connected in accordance with Rosemount drawings 03151-1207; Dual Seal.
For entity parameters see control drawing 03151-1207.

Measurement Canada Approvals

D3 Accuracy Approval to the Electricity and Gas Inspection Act for the purchase and sale of Natural Gas.

European Certifications

I1 ATEX Intrinsic Safety
Certificate No.: Baseefa 08ATEX0064X Ⓔx II 1G
Ex ia IIC T4 (-60 °C ≤ T_{amb} ≤ +70 °C)
CE 1180

Field Connection / 4-20 mA Loop Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.0 W
C_i = 14.8 nF
L_i = 0

RTD Connection Parameters

U_O = 30 V
I_O = 2.31 mA
P_O = 17.32 mW
C_i = 0
L_i = 0

Special conditions for safe use (x)

If the equipment is fitted with the optional 90 V transient suppressor, it is incapable of withstanding the 500 V isolation from earth test and this must be taken into account during installation.

N1 ATEX Type n
Certificate No.: Baseefa 08ATEX0065X Ⓔx II 3 G
Ex nA nL IIC T4 (-40 °C ≤ T_{amb} ≤ +70 °C)
Ui = 45 Vdc max
U_O = 30 V (RTD Connection)
IP66
CE

Special conditions for safe use (x)

If fitted with a 90 V transient suppressor, the equipment is not capable of withstanding the 500 V electrical strength test as defined in Clause 6.8.1 of EN 60079-15:2005. This must be taken into account during installation.

ND ATEX Dust
Certificate No.: BAS01ATEX1374X ⟨Ex⟩ II 1 D
Ex tD A20 IP66 T105°C (-20 °C ≤ T_{amb} ≤ 85 °C)
IP66
CE 1180

Special conditions for safe use (x)

1. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
2. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
3. Cable entries and blanking plugs must be suitable for the ambient temperature range of the apparatus and capable of withstanding a 7J impact test.
4. The 3051S SuperModule must be securely screwed in place to maintain the ingress protection of the enclosure.

E1 ATEX Flameproof
Certificate No.: KEMA00ATEX2143X ⟨Ex⟩ II 1/2 G
Ex d IIC T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
Ex d IIC T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
V_{max} = 42.4V
CE 1180

Special conditions for safe use (x)

1. The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
2. Transmitter Model 3051S contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

Japanese Certifications

E4 TIIS Flameproof
Ex d IIC T6
TC19070 With RTD and LCD Display
TC19071 With LCD
TC19072 RTD without LCD Display
TC19073 Without LCD

Brazil Certifications

E2 INMETRO Flameproof
Certificate number: NCC 5886/09X
BR-Ex d IIC T5/T6 Gb IP66W
T6 (-50 °C to 65 °C)
T5 (-50 °C to 80 °C)

Special conditions for safe use (x)

1. Appropriate ex d blanking plugs, cable glands, and wiring needs to be suitable for a temperature of 90 °C.
2. This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. The 3051SMV does not comply with the requirements of IEC 60079-1 Clause 5.2, Table 2 for all joints. Contact Emerson Process Management for information on the dimensions of flameproof joints.

I2 INMETRO Intrinsic Safety
Certificate No. NCC 5870/09X
BR-Ex ia IIC T4 (-60 °C ≤ T_a ≤ 70 °C) Ga IP66W

Field Connection / 4-20 mA Loop Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.0 W
C_i = 14.8 nF
L_i = 0

RTD Connection Parameters

U_O = 30 V
I_O = 2.31 mA
P_O = 17.32 mW
C_i = 0
L_i = 0

Special conditions for safe use (x)

If the equipment is fitted with the optional 90 V transient suppressor, it is incapable of withstanding the 500 V isolation from earth test and this must be taken into account during installation.

China Certifications

E3 China Flameproof
NEPSI Certificate No.: GYJ091001
Ex d IIC T5/T6
T6 (-50 °C to 65 °C)
T5 (-50 °C to 80 °C)

NOTE
Refer to Appendix B of the 3051S MultiVariable Reference Manual (document number 00809-0100-4803) for Special Conditions for Safe Use.

I3 China Intrinsic Safety
NEPSI Certificate No.: GYJ091002X
Ex ia IIC T4 (-60 °C to 70 °C)

Field Connection / 4-20 mA Loop Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.0 W
C_i = 14.8 nF
L_i = 0

RTD Connection Parameters

U_O = 30 V
I_O = 2.31 mA
P_O = 17.32 mW
C_i = 0
L_i = 0

NOTE
Refer to Appendix B of the 3051S MultiVariable Reference Manual (document number 00809-0100-4803) for Special Conditions for Safe Use.

IECEx Certifications

I7 IECEx Intrinsic Safety
Certificate No.: IECExBAS08.0025X
Ex ia IIC T4(-60 °C ≤ T_a ≤ 70 °C)
IP66

Field Connection / 4-20 mA Loop Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.0 W
C_i = 14.8 nF
L_i = 0

RTD Connection Parameters

U_O = 30 V
I_O = 2.31 mA
P_O = 17.32 mW
C_i = 0
L_i = 0

Special conditions for safe use (x)
If the equipment is fitted with the optional 90 V transient suppressor, it is incapable of withstanding the 500 V isolation from earth test and this must be taken into account during installation.

N7 IECEx Type n
Certificate No.: IECExBAS08.0026X
Ex nAnL IIC T4 (-40 °C ≤ T_a ≤ 70 °C)
Ui = 45 Vdc MAX
U_O = 30 V (RTD Connection)
IP66

Special conditions for safe use (x)
If fitted with a 90 V transient suppressor, the equipment is not capable of withstanding the 500 V electrical strength test as defined in Clause 6.8.1 of EN 60079-15:2005. This must be taken into account during installation.

E7 IECEx Flameproof
Certificate No.: IECExKEM08.0010X
Ex d IIC T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
Ex d IIC T5 (-50 °C ≤ T_{amb} ≤ 80 °C)

Special conditions for safe use (x)

1. The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
2. Transmitter Model 3051S contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K1 Combination of E1, I1, N1, and ND
K4 Combination of E4 and I4
K5 Combination of E5 and I5
K6 Combination of E6 and I6
K7 Combination of E7, I7, and N7
KA Combination of E1, E6, I1, and I6
KB Combination of E5, E6, I5, and I6
KC Combination of E5, E1, I5, and I1
KD Combination of E5, E6, E1, I5, I6, and I1

3051SF Measurement Type D Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA
Emerson Process Management GmbH & Co. — Wessling, Germany
Emerson Process Management Asia Pacific Private Limited — Singapore
Beijing Rosemount Far East Instrument Co., LTD — Beijing, China
Emerson Process Management LTDA — Sorocaba, Brazil
Emerson Process Management (India) Pvt. Ltd. — Mumbai, India
Emerson Process Management, Emerson FZE — Dubai, United Arab Emirates

Ordinary Location Certification for FM

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

Models 3051S_CA4; 3051S_CD2, 3, 4, 5; (also with P9 option)

Pressure Transmitters — QS Certificate of Assessment - EC No. 59552-2009-CE-HOU-DNV, Module H Conformity Assessment

All other Model 3051S Pressure Transmitters — Sound Engineering Practice

Transmitter Attachments: Diaphragm Seal - Process Flange - Manifold — Sound Engineering Practice

Primary Elements, Flowmeter — See appropriate Primary Element QIG

Electro Magnetic Compatibility (EMC) (2004/108/EC)

EN 61326-1:2006
EN 61326-2-3:2006

HART & FOUNDATION Fieldbus Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion-proof for Class I, Division 1, Groups B, C, and D, T5 (T_a = 85 °C); Dust Ignition-proof for Class II and Class III, Division 1, Groups E, F, and G, T5 (T_a = 85 °C); hazardous locations; enclosure Type 4X, conduit seal not required when installed according to Rosemount drawing 03151-1003.

I5/IE Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D, T4 (T_a = 70 °C for output options A or X; T_a = 60 °C for output option F); Class II, Division 1, Groups E, F, and G; Class III, Division 1; Class I, Zone 0 AEx ia IIC T4 (T_a = 70 °C for output options A or X; T_a = 60 °C for output option F) when connected in accordance with Rosemount drawing 03151-1006; Non-Incendive for Class I, Division 2, Groups A, B, C, and D; T4 (T_a = 70 °C for output options A or X; T_a = 60 °C for output option F) Enclosure Type 4X
For entity parameters see control drawing 03151-1006.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

E6 Explosion-proof for Class I, Division 1, Groups B, C, and D; Dust Ignition-proof for Class II and Class III, Division 1, Groups E, F, and G; suitable for Class I, Division 2, Groups A, B, C, and D, when installed per Rosemount drawing 03151-1013, CSA Enclosure Type 4X; conduit seal not required; Dual Seal.

I6/IF Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount drawings 03151-1016; Dual Seal.
For entity parameters see control drawing 03151-1016.

European Certifications

I1/IA ATEX Intrinsic Safety
Certificate No.: BAS01ATEX1303X ⟨Ex⟩ II 1G
Ex ia IIC T4 (T_a = -60 °C to 70 °C) -HART/Remote Display/Quick Connect/HART Diagnostics
Ex ia IIC T4 (T_a = -60 °C to 70 °C) -FOUNDATION fieldbus
Ex ia IIC T4 (T_a = -60 °C to 40 °C) -FISCO
CE 1180

Input Parameters

Loop / Power	Groups
U_i = 30 V	HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics
U_i = 17.5 V	FISCO
I_i = 300 mA	HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics
I_i = 380 mA	FISCO
P_i = 1.0 W	HART / Remote Display / Quick Connect / HART Diagnostics
P_i = 1.3 W	FOUNDATION fieldbus
P_i = 5.32 W	FISCO
C_i = 30 nF	SuperModule Platform
C_i = 11.4 nF	HART / HART Diagnostics / Quick Connect
C_i = 0	FOUNDATION fieldbus / Remote Display / FISCO
L_i = 0	HART / FOUNDATION fieldbus/ FISCO / Quick Connect / HART Diagnostics
L_i = 60 µH	Remote Display
RTD Assembly (3051SFx Option T or R)	
U_i = 5 Vdc	
I_i = 500 mA	
P_i = 0.63 W	

Special conditions for safe use (x)

1. The apparatus, excluding the Types 3051 S-T and 3051 S-C (In-line and Coplanar SuperModule Platforms respectively), is not capable of withstanding the 500V test as defined in Clause 6.4.12 of EN 60079-11. This must be considered during installation.
2. The terminal pins of the Types 3051 S-T and 3051 S-C must be protected to IP20 minimum.

N1 ATEX Type n
Certificate No.: BAS01ATEX3304X ⟨Ex⟩ II 3 G
Ex nL IIC T4 (T_a = -40 °C TO 70 °C)
Ui = 45 Vdc max
Ci = 11.4 nF (Transmitter Output Option A)
Ci = 0 (Transmitter Output Option F)
Li = 0
For remote display, Ci = 0, Li = 60 µH
IP66
CE

Special conditions for safe use (x)

The apparatus is not capable of withstanding the 500V insulation test required by Clause 6.8.1 of EN 60079-15. This must be taken into account when installing the apparatus.

NOTE
RTD Assembly is not included with the 3051SFx Type n Approval.

ND ATEX Dust
Certificate No.: BAS01ATEX1374X ⟨Ex⟩ II 1 D
Ex tD A20 IP66 T105°C (-20 °C ≤ T_{amb} ≤ 85 °C)
V_{max} = 42.4 volts max
IP66
CE 1180

Special conditions for safe use (x)

1. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
2. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
3. Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact test.
4. The 3051S SuperModule must be securely screwed in place to maintain the ingress protection of the enclosure. (The 3051S SuperModule must be properly assembled to the 3051S housing to maintain ingress protection.)

E1 ATEX Flameproof
Certificate No.: KEMA00ATEX2143X ⟨Ex⟩ II 1/2 G
Ex d IIC T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
Ex d IIC T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
V_{max} = 42.4V
CE 1180

Special conditions for safe use (x)

1. The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
2. The 3051S SuperModule contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

Japanese Certifications

E4 TIIS Flameproof
Ex d IIC T6

Certificate	Description
TC15682	Coplanar with Junction Box Housing
TC15683	Coplanar with PlantWeb Housing
TC15684	Coplanar with PlantWeb Housing and LCD Display
TC15685	In-Line SST with Junction Box Housing
TC15686	In-Line Alloy C-276 with Junction Box Housing
TC15687	In-Line SST with PlantWeb Housing
TC15688	In-Line Alloy C-276 with PlantWeb Housing
TC15689	In-Line SST with PlantWeb Housing and LCD Display
TC15690	In-Line Alloy C-276 with PlantWeb Housing and LCD Display
TC17102	Remote Display
TC17099	3051SFA/C/P SST/Alloy C-276 with PlantWeb Housing and LCD Display
TC17100	3051SFA/C/P SST/Alloy C-276 with PlantWeb Housing and Remote Display
TC17101	3051SFA/C/P SST/Alloy C-276 with Junction Box Housing

China Certifications

E3 China Flameproof, Dust Ignition-proof
NEPSI Certificate No. (manufactured in Chanhassen, MN): GYJ091035
Certificate No. (manufactured in Beijing, China): GYJ06366
Certificate No. (manufactured in Singapore): GYJ06364
Certificate No. (3051SFx RTC, BMMC, SMMC): GYJ071086
Ex d IIB+H_2 T3~T5
DIP A21 T_A T3~T5 IP66

NOTE
Refer to Appendix B of the 3051S Reference Manual (document number 00809-0100-4801) for Special Conditions for Safe Use.

I3 China Intrinsic Safety, Dust Ignition-proof
NEPSI Certificate No. (manufactured in Chanhassen, MN): GYJ081078
Certificate No. (manufactured in Beijing, China): GYJ06367
Certificate No. (manufactured in Singapore): GYJ06365
Certificate No. (3051SFx RTC, BMMC, SMMC): GYJ071293
Ex ia IIC T4
DIP A21 T_A T4 IP66

NOTE
Refer to Appendix B of the 3051S Reference Manual (document number 00809-0100-4801) for Special Conditions for Safe Use.

Input Parameters

Loop / Power	Groups
U_i = 30 V	HART / FOUNDATION fieldbus / Remote Display / Quick Connect / HART Diagnostics
I_i = 300 mA	HART / FOUNDATION fieldbus / Remote Display / Quick Connect / HART Diagnostics
P_i = 1.0 W	HART / Remote Display / Quick Connect / HART Diagnostics
P_i = 1.3 W	FOUNDATION fieldbus
C_i = 38 nF	SuperModule Platform
C_i = 11.4 nF	HART / HART Diagnostics / Quick Connect
C_i = 0	FOUNDATION fieldbus / Remote Display
L_i = 0	SuperModule Platform / FOUNDATION fieldbus
L_i = 2.4 µH	HART / Quick Connect / HART Diagnostics
L_i = 58.2 µH	Remote Display
RTD Assembly (3051SFx Option T or R)	
U_i = 5 Vdc	
I_i = 500 mA	
P_i = 0.63 W	

N3 China Type n - Energy Limited
NEPSI Certificate No.: GYJ101112X
Ex nL IIC T5 (-40 °C ≤ Ta ≤ 70 °C)
IP66

Loop / Power	Transmitter Output
U_i = 30 V	HART / FOUNDATION fieldbus
I_i = 300 mA	HART / FOUNDATION fieldbus
P_i = 1.0 W	HART
P_i = 1.3 W	FOUNDATION fieldbus
C_i = 11.4 nF	HART
C_i = 0 nF	FOUNDATION fieldbus
L_i = 0 µH	HART(1) / FOUNDATION fieldbus

(1) For remote meter option (M7, M8, M9), L_i = 60 µH.

NOTE
Refer to Appendix B of the 3051S Reference Manual (document number 00809-0100-4801) for Special Conditions for Safe Use.

Brazil Certifications

I2 INMETRO Intrinsic Safety

Certificate number: CEPEL-EX-0722/05X
(manufacturing in Chanhassen, MN and Singapore)
Certificate number: CEPEL-EX-1414/07X
(manufacturing in Brazil)
INMETRO Marking: BR-Ex ia IIC T4 IP66W

Special conditions for safe use (x)

The apparatus, excluding the Types 3051S-T and 3051S-C (In-line and Coplanar SuperModule Platforms respectively), is not capable of withstanding the 500V test as defined in Clause 6.4.12 of IEC60079-11. This must be considered during installation.

E2 INMETRO Flameproof
Certificate number: CEPEL-EX-140/2003X
(manufacturing in Chanhassen, MN and Singapore)
Certificate number: CEPEL-EX-1413/07X
(manufacturing in Brazil)
INMETRO Marking: BR-Ex d IIC T5/T6 IP66W

Special conditions for safe use (x)

1. This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
2. For ambient temperature above 60 ºC, cable wiring must have minimum isolation temperature of 90 ºC, to be in accordance to equipment operation temperature.
3. The accessory of cable entries or conduit must be certified as flameproof and needs to be suitable for use conditions.
4. Where electrical entry is via conduit, the required sealing device must be assembled immediately close to enclosure.

IECEx Certifications

E7 IECEx Flameproof and Dust (each listed separately)

IECEx Flameproof
Certificate No.: IECExKEM08.0010X
Ex d IIC T5 or T6 Ga/Gb
T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
V_{max} = 42.4V

Special conditions for safe use (x)

1. The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
2. The 3051S SuperModule contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

IECEx Dust
Certificate No. IECExBAS09.0014X
Ex tD A20 IP66 T105 °C (-20 °C ≤ T_a ≤ 85 °C)
Vmax = 42.4 V
A = 22 mA
IP66

Special conditions for safe use (x)

1. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
2. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
3. Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact test.
4. The 3051S SuperModule must be securely screwed in place to maintain the ingress protection of the enclosure. (The 3051S SuperModule must be properly assembled to the 3051S housing to maintain ingress protection.)

I7/IG IECEx Intrinsic Safety
Certificate No.: IECExBAS04.0017X
Ex ia IIC T4 (T_a = -60 °C to 70 °C) -HART/Remote Display/Quick Connect/HART Diagnostics
Ex ia IIC T4 (T_a = -60 °C to 70 °C) -FOUNDATION fieldbus
Ex ia IIC T4 (T_a = -60 °C to 40 °C) -FISCO
IP66

Input Parameters

Loop / Power	Groups
U_i = 30 V	HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics
U_i = 17.5 V	FISCO
I_i = 300 mA	HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics
I_i = 380 mA	FISCO
P_i = 1.0 W	HART / Remote Display / Quick Connect / HART Diagnostics
P_i = 1.3 W	FOUNDATION fieldbus
P_i = 5.32 W	FISCO
C_i = 30 nF	SuperModule Platform
C_i = 11.4 nF	HART / HART Diagnostics / Quick Connect
C_i = 0	FOUNDATION fieldbus / Remote Display / FISCO
L_i = 0	HART / FOUNDATION fieldbus/ FISCO / Quick Connect / HART Diagnostics
L_i = 60 µ H	Remote Display
RTD Assembly (3051SFx Option T or R)	
U_i = 5 Vdc	
I_i = 500 mA	
P_i = 0.63 W	

Special conditions for safe use (x)

1. The 3051S HART 4-20 mA, 3051S FOUNDATION fieldbus, and 3051S FISCO are not capable of withstanding the 500V test as defined in clause 6.4.12 of IEC 60079-11. This must be taken into account during installation.
2. The terminal pins of the Types 3051S-T and 3051S-C must be protected to IP20 minimum.

N7 IECEx Type n
Certificate No.: IECExBAS04.0018X
Ex nC IIC T4 (-40 °C ≤ T_a ≤ +70 °C)
IP66
Special conditions for safe use (x)
The apparatus is not capable of withstanding the 500 V insulation test required by Clause 8 of IEC 60079-15:1987.

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K1 Combination of E1, I1, N1, and ND
K2 Combination of E2 and I2
K5 Combination of E5 and I5
K6 Combination of E6 and I6
K7 Combination of E7, I7, and N7
KA Combination of E1, I1, E6, and I6
KB Combination of E5, I5, I6, and E6
KC Combination of E5, E1, I5, and I1
KD Combination of E5, I5, E6, I6, E1, and I1

3051SF Wireless Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA
Emerson Process Management GmbH & Co. — Wessling, Germany
Emerson Process Management Asia Pacific Private Limited — Singapore
Beijing Rosemount Far East Instrument Co., LTD — Beijing, China
Emerson Process Management LTDA — Sorocaba, Brazil
Emerson Process Management (India) Pvt. Ltd. — Mumbai, India

Telecommunication Compliance

All wireless devices require certification to ensure that they adhere to regulations regarding the use of the RF spectrum. Nearly every country requires this type of product certification. Emerson is working with governmental agencies around the world to supply fully compliant products and remove the risk of violating country directives or laws governing wireless device usage.

FCC and IC Approvals

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: This device may not cause harmful interference and must accept any interference received, including interference that may cause undesired operation.

This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.

Ordinary Location Certification for FM

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

Models 3051S_CA4; 3051S_CD2, 3, 4, 5; *(also with P9 option)*
Pressure Transmitters — QS Certificate of Assessment - EC No. 59552-2009-CE-HOU-DNV, Module H Conformity Assessment

All other Model 3051S Pressure Transmitters — Sound Engineering Practice

Transmitter Attachments: Diaphragm Seal - Process Flange - Manifold — Sound Engineering Practice

Primary Elements, Flowmeter — See appropriate Primary Element QIG

Electro Magnetic Compatibility (EMC) (2004/108/EC)

EN 61326-1:2006
EN 61326-2-3:2006

Radio and Telecommunications Terminal Equipment Directive (R&TTE)(1999/5/EC)

Emerson Process Management complies with the R&TTE Directive.

Hazardous Locations Certifications

North American Certifications

Factory Mutual (FM) Approvals

I5 FM Intrinsically Safe, Non-Incendive, and Dust Ignition-proof.
Intrinsically Safe for Class I/II/III, Division 1, Groups A, B, C, D, E, F, and G.
Zone Marking: Class I, Zone 0, AEx ia llC
Temperature Codes T4 (T_{amb} = -50 to 70 °C)
Non-Incendive for Class I, Division 2, Groups A, B, C, and D.
Dust Ignition-proof for Class II/III, Division 1, Groups E, F, and G.
Ambient temperature limits: -50 to 85 °C
For use with Rosemount SmartPower options 00753-9220-0001 only.
Enclosure Type 4X / IP66

CSA - Canadian Standards Association

Process Sealing

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

I6 CSA Intrinsically Safe
Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D.
Temp Code T3C
Enclosure Type 4X / IP66
For use with Rosemount SmartPower options 00753-9220-0001 only.

European Certifications

I1 ATEX Intrinsic Safety
Certificate No.: BAS01ATEX1303X ⟨Ex⟩ II 1G
Ex ia IIC T4 (T_a = -60 °C to 70 °C)
IP66
For use with Rosemount SmartPower options 00753-9220-0001 only.

Special conditions for safe use (x)

The surface resistivity of the antenna is greater than one gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.
CE 1180IECEx Certifications

CE ⊕

Country	Restriction
Bulgaria	General authorization required for outdoor use and public service
France	Outdoor use limited to 10mW e.i.r.p.
Italy	If used outside of own premises, general authorization is required.
Norway	May be restricted in the geographical area within a radius of 20 km from the center of Ny-Alesund.
Romania	Use on a secondary basis. Individual license required.

I7 IECEx Intrinsic Safety
Certificate No.: IECEx BAS 04.0017X
Ex ia IIC T4 (Ta = -60 °C to 70 °C)
For use with Rosemount SmartPower options 00753-9220-0001 only.
IP66

Special conditions for safe use (x)

The surface resistivity of the antenna is greater than one gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.

Rosemount 3051CF Flowmeter Series



Rosemount 3051CF Flowmeters combine the proven 3051C pressure transmitter and the latest primary element technology: Annubar Averaging Pitot Tube, Compact Conditioning Orifice Plate, and Integral Orifice Plate.

- Flowmeters are factory configured to meet your application needs (Configuration Data Sheet required)
- 4-20 mA HART, FOUNDATION fieldbus, and Profibus PA protocols
- Integral temperature measurement (T option)
- Direct or remote mount configurations available

Additional Information
Specifications: page DP Flow-60
Certifications: page DP Flow-66
Dimensional Drawings: page DP Flow-135



Rosemount 3051CFA
Annubar Flowmeter

Table 6. Rosemount 3051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
3051CFA	Annubar Flowmeter	
Measurement Type		
Standard		**Standard**
D	Differential Pressure	★
Fluid Type		
Standard		**Standard**
L	Liquid	★
G	Gas	★
S	Steam	★
Line Size		
Standard		**Standard**
020	2-in. (50 mm)	★
025	2 1/2-in. (63.5 mm)	★
030	3-in. (80 mm)	★
035	3 1/2-in. (89 mm)	★
040	4-in. (100 mm)	★
050	5-in. (125 mm)	★
060	6-in. (150 mm)	★
070	7-in. (175 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
Expanded		
140	14-in. (350 mm)	
160	16-in. (400 mm)	
180	18-in. (450 mm)	
200	20-in. (500 mm)	
240	24-in. (600 mm)	
300	30-in. (750 mm)	
360	36-in. (900 mm)	
420	42-in. (1066 mm)	

Table 6. Rosemount 3051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

480	48-in. (1210 mm)	
600	60-in. (1520 mm)	
720	72-in. (1820 mm)	
780	78-in (1950 mm)	
840	84-in. (2100 mm)	
900	90-in. (2250 mm)	
960	96-in (2400 mm)	
Pipe I.D. Range (See "Pipe I.D. Range Code" on page 165)		
Standard		**Standard**
C	Range C from the Pipe I.D. table	★
D	Range D from the Pipe I.D. table	★
Expanded		
A	Range A from the Pipe I.D. table	
B	Range B from the Pipe I.D. table	
E	Range E from the Pipe I.D. table	
Z	Non-standard Pipe I.D. Range or Line Sizes greater than 12 inches	
Pipe Material / Mounting Assembly Material		
Standard		**Standard**
C	Carbon steel (A105)	★
S	316 Stainless Steel	★
0	No Mounting (Customer Supplied)	★
Expanded		
G	Chrome-Moly Grade F-11	
N	Chrome-Moly Grade F-22	
J	Chrome-Moly Grade F-91	
Piping Orientation		
Standard		**Standard**
H	Horizontal Piping	★
D	Vertical Piping with Downwards Flow	★
U	Vertical Piping with Upwards Flow	★
Annubar Type		
Standard		**Standard**
P	Pak-Lok	★
F	Flanged with opposite side support	★
Expanded		
L	Flange-Lok	
G	Gear-Drive Flo-Tap	
M	Manual Flo-Tap	
Sensor Material		
Standard		**Standard**
S	316 Stainless Steel	★
Expanded		
H	Alloy C-276	
Sensor Size		
Standard		**Standard**
1	Sensor size 1 — Line sizes 2-in. (50 mm) to 8-in. (200 mm)	★
2	Sensor size 2 — Line sizes 6-in. (150 mm) to 96-in. (2400 mm)	★
3	Sensor size 3 — Line sizes greater than 12-in. (300 mm)	★
Mounting Type		
Standard		**Standard**
T1	Compression or Threaded Connection	★
A1	150# RF ANSI	★

Table 6. Rosemount 3051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

A3	300# RF ANSI			★
A6	600# RF ANSI			★
D1	DN PN16 Flange			★
D3	DN PN40 Flange			★
D6	DN PN100 Flange			★
Expanded				
A9(1)	900# RF ANSI			
AF(1)	1500# RF ANSI			
AT(1)	2500 # RF ANSI			
R1	150# RTJ Flange			
R3	300# RTJ Flange			
R6	600# RTJ Flange			
R9(1)	900# RTJ Flange			
RF(1)	1500# RTJ Flange			
RT(1)	2500# RTJ Flange			
Opposite Side Support or Packing Gland				
Standard				**Standard**
0	No opposite side support or packing gland (Required for Pak-Lok and Flange-Lok models)			★
	Opposite Side Support – Required for Flanged Models			
C	NPT Threaded Opposite Support Assembly – Extended Tip			★
D	Welded Opposite Support Assembly – Extended Tip			★
Expanded				
	Packing Gland – Required for Flo-Tap Models			
	Packing Gland Material	*Rod Material*	*Packing Material*	
J	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	PTFE	
K	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	PTFE	
L	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	Graphite	
N	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	Graphite	
R	Alloy C-276 Packing Gland / Cage Nipple	Stainless Steel	Graphite	
Isolation Valve for Flo-Tap Models				
Standard				**Standard**
0	Not Applicable or Customer Supplied			★
Expanded				
1	Gate Valve, Carbon Steel			
2	Gate Valve, Stainless Steel			
5	Ball Valve, Carbon Steel			
6	Ball Valve, Stainless Steel			
Temperature Measurement				
Standard				**Standard**
T	Integral RTD – not available with Flanged model greater than class 600#			★
0	No Temperature Sensor			★
Expanded				
R	Remote Thermowell and RTD			
Transmitter Connection Platform				
Standard				**Standard**
3	Direct-mount, Integral 3-valve Manifold– not available with Flanged model greater than class 600			★
5	Direct -mount, 5-valve Manifold – not available with Flanged model greater than class 600			★
7	Remote-mount NPT Connections ($^1/_2$-in. NPT)			★
Expanded				
6	Direct-mount, high temperature 5-valve Manifold – not available with Flanged model greater than class 600			
8	Remote-mount SW Connections ($^1/_2$-in.)			

Table 6. Rosemount 3051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Differential Pressure Range			
Standard			**Standard**
1	0 to 25 in H_2O (0 to 62,3 mbar)		★
2	0 to 250 in H_2O (0 to 623 mbar)		★
3	0 to 1000 in H_2O (0 to 2,5 bar)		★
Transmitter Output			
Standard			**Standard**
A	4–20 mA with digital signal based on HART Protocol		★
F	FOUNDATION fieldbus Protocol		★
W(2)	Profibus PA Protocol		★
Expanded			
M	Low-Power, 1-5 Vdc with Digital Signal Based on HART Protocol		
Transmitter Housing Material		**Conduit Entry Size**	
Standard			**Standard**
A	Aluminum	1/2-14 NPT	★
B	Aluminum	M20 x 1.5	★
J	SST	1/2-14 NPT	★
K	SST	M20 x 1.5	★
Expanded			
D	Aluminum	G1/2	
M	SST	G1/2	
Transmitter Performance Class			
Standard			**Standard**
1	1.6% flow rate accuracy, 8:1 flow turndown, 5-yr. stability		★

Options (Include with selected model number)

Pressure Testing		
Expanded		
P1(3)	Hydrostatic Testing with Certificate	
PX(3)	Extended Hydrostatic Testing	
Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Material Testing		
Expanded		
V1	Dye Penetrant Exam	
Material Examination		
Expanded		
V2	Radiographic Examination	
Flow Calibration		
Expanded		
W1	Flow Calibration (Average K)	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection & Performance Certificate	★
Surface Finish		
Standard		**Standard**
RL	Surface finish for Low Pipe Reynolds # in Gas & Steam	★
RH	Surface finish for High Pipe Reynolds # in Liquid	★

Table 6. Rosemount 3051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Material Traceability Certification		
Standard		**Standard**
Q8[4]	Material Traceability Certification per EN 10474:2004 3.1	★
Code Conformance[5]		
Expanded		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
Materials Conformance		
Expanded		
J5[6]	NACE MR-0175 / ISO 15156	
Country Certification		
Standard		**Standard**
J6	European Pressure Directive (PED)	★
Expanded		
J1	Canadian Registration	
Installed in Flanged Pipe Spool Section		
Expanded		
H3	150# Flanged Connection with Rosemount Standard Length and Schedule	
H4	300# Flanged Connection with Rosemount Standard Length and Schedule	
H5	600# Flanged Connection with Rosemount Standard Length and Schedule	
Instrument Connections for Remote Mount Options		
Standard		**Standard**
G2	Needle Valves, Stainless Steel	★
G6	OS&Y Gate Valve, Stainless Steel	★
Expanded		
G1	Needle Valves, Carbon Steel	
G3	Needle Valves, Alloy C-276	
G5	OS&Y Gate Valve, Carbon Steel	
G7	OS&Y Gate Valve, Alloy C-276	
Special Shipment		
Standard		**Standard**
Y1	Mounting Hardware Shipped Separately	★
Special Dimensions		
Expanded		
VM	Variable Mounting	
VT	Variable Tip	
VS	Variable length Spool Section	
PlantWeb Control Functionality		
Standard		**Standard**
A01[7]	FOUNDATION fieldbus Advanced Control Function Block Suite	★
PlantWeb Diagnostic Functionality		
Standard		**Standard**
D01[7]	FOUNDATION fieldbus Diagnostics Suite	★
Product Certifications		
Standard		**Standard**
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E7[8]	IECEx Flameproof, Dust Ignition-proof	★
E8	ATEX Flameproof, Dust	★
I1[8]	ATEX Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	★
K6[8]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	★
K8[8]	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E8, I1 and N1)	★

Table 6. Rosemount 3051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of K5 and C6)	★
KD[8]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★
N1[8]	ATEX Type n	★
Shipboard Approvals		
Standard		**Standard**
SBS	American Bureau of Shipping	★
Sensor Fill Fluid and O-ring Options		
Standard		**Standard**
L1	Inert Sensor Fill Fluid	★
L2	Graphite-Filled (PTFE) O-ring	★
LA	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★
Display and Interface Options		
Standard		**Standard**
M4[9]	LCD Display with Local Operator Interface	★
M5	LCD Display	★
Transmitter Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate for Transmitter	★
Quality Certification for Safety		
Standard		**Standard**
QS[11]	Prior-use certificate of FMEDA data	★
Transient Protection		
Standard		**Standard**
T1[10]	Transient terminal block	★
Manifold for Remote Mount Option		
Standard		**Standard**
F2	3-Valve Manifold, Stainless Steel	★
F6	5-Valve Manifold, Stainless Steel	★
Expanded		
F1	3-Valve Manifold, Carbon Steel	
F3	3-Valve Manifold, Alloy C-276	
F5	5-Valve Manifold, Carbon Steel	
F7	5-Valve Manifold, Alloy C-276	
Low Power Output		
Standard		**Standard**
C2[11]	0.8-3.2 Vdc Output with Digital Signal Based on Hart Protocol	★
Alarm Limit		
Standard		**Standard**
C4[11][12]	NAMUR Alarm and Saturation Levels, High Alarm	★
CN[11][12]	NAMUR Alarm and Saturation Levels, Low Alarm	★
Ground Screw		
Standard		**Standard**
V5[13]	External Ground Screw Assembly	★
Typical Model Number: 3051CFA D L 060 D C H P S 2 T1 0 0 0 3 2 A A 1		

(1) Available in remote mount applications only.

(2) Option code M4 - LCD Display with Local Operator Interface required for local addressing and configuration.

(3) Applies to assembled flowmeter only, mounting not tested.

(4) Instrument Connections for Remote Mount Options and Isolation Valves for Flo-tap Models are not included in the Material Traceability Certification.

(5) Not available with Transmitter Connection Platform 6.

(6) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(7) Only valid with FOUNDATION fieldbus Output Code F.

(8) Not available with Low Power code M.

(9) Available only with output code W - Profibus PA.

(10) The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(11) Not available with FOUNDATION fieldbus (Output Code F) or Profibus (Output Code W).

(12) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(13) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.



Rosemount 3051CFC Compact Flowmeter

Table 7. Rosemount 3051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
3051CFC	Compact Flowmeter	
Measurement Type		
Standard		**Standard**
D	Differential Pressure	★
Primary Element Technology		
Standard		**Standard**
C	Conditioning Orifice Plate	★
P	Orifice Plate	★
Material Type		
Standard		**Standard**
S	316 SST	★
Line Size		
Standard		**Standard**
005(1)	1/2-in. (15 mm)	★
010(1)	1-in. (25 mm)	★
015(1)	1 1/2-in. (40 mm)	★
020	2-in. (50 mm)	★
030	3-in. (80 mm)	★
040	4-in. (100 mm)	★
060	6-in. (150 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
Primary Element Style		
Standard		**Standard**
N	Square Edged	★
Primary Element Type		
Standard		**Standard**
040	0.40 Beta Ratio	★
065(2)	0.65 Beta Ratio	★
Temperature Measurement		
Standard		**Standard**
0	No Temperature Sensor	★
Expanded		
R	Remote Thermowell and RTD	
Transmitter Connection Platform		
Standard		**Standard**
3	Direct-mount, Integral 3-valve Manifold	★
7	Remote-mount, 1/4-in. NPT Connections	★
Differential Pressure Range		
Standard		**Standard**
1	0 to 25 in H_2O (0 to 62,3 mbar)	★
2	0 to 250 in H_2O (0 to 623 mbar)	★
3	0 to 1000 in H_2O (0 to 2,5 bar)	★

Table 7. Rosemount 3051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transmitter Output			
Standard			**Standard**
A	4–20 mA with digital signal based on HART Protocol		★
F	FOUNDATION fieldbus Protocol		★
W(3)	Profibus PA Protocol		★
Expanded			
M	Low-Power, 1-5 Vdc with Digital Signal Based on HART Protocol		
Transmitter Housing Material		**Conduit Entry Size**	
Standard			**Standard**
A	Aluminum	1/2-14 NPT	★
B	Aluminum	M20 x 1.5	★
J	SST	1/2-14 NPT	★
K	SST	M20 x 1.5	★
Expanded			
D	Aluminum	G1/2	
M	SST	G1/2	
Transmitter Performance Class			
Standard			**Standard**
1	Up to ±1.75% flow rate accuracy, 8:1 flow turndown, 5-year stability		★

Options (Include with selected model number)

Installation Accessories		
Standard		**Standard**
AB	ANSI Alignment Ring (150#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	★
AC	ANSI Alignment Ring (300#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	★
AD	ANSI Alignment Ring (600#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	★
DG	DIN Alignment Ring (PN16)	★
DH	DIN Alignment Ring (PN40)	★
DJ	DIN Alignment Ring (PN100)	★
Expanded		
JB	JIS Alignment Ring (10K)	
JR	JIS Alignment Ring (20K)	
JS	JIS Alignment Ring (40K)	
Remote Adapters		
Standard		**Standard**
FE	Flange Adapters 316 SST (1/2-in NPT)	★
High Temperature Application		
Expanded		
HT	Graphite Valve Packing (Tmax = 850 °F)	
Flow Calibration		
Expanded		
WC(4)	Flow Calibration Certification (3 point)	
WD(4)	Discharge Coefficient Verification (full 10 point)	
Pressure Testing		
Expanded		
P1	Hydrostatic Testing with Certificate	
Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection and Performance Certificate	★

Table 7. Rosemount 3051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transmitter Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate for Transmitter	★
Quality Certification for Safety		
Standard		**Standard**
QS[5]	Prior-use Certificate of FMEDA data	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204:2004 3.1	★
Code Conformance		
Expanded		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
J4	ANSI/ASME B31.8	
Materials Conformance		
Expanded		
J5[6]	NACE MR-0175 / ISO 15156	
Country Certification		
Expanded		
J1	Canadian Registration	
Product Certifications		
Standard		**Standard**
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E7[7]	IECEx Flameproof, Dust Ignition-proof	★
E8	ATEX Flameproof, Dust	★
I1[7]	ATEX Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	★
K6[7]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	★
K8[7]	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E8, I1 and N1)	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of K5 and C6)	★
KD[7]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★
N1[7]	ATEX Type n	★
Shipboard Approvals		
Standard		**Standard**
SBS	American Bureau of Shipping	★
Sensor Fill Fluid and O-ring Options		
Standard		**Standard**
L1	Inert Sensor Fill Fluid	★
L2	Graphite-Filled (PTFE) O-ring	★
LA	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★
Display and Interface Options		
Standard		**Standard**
M4[8]	LCD Display with Local Operator Interface	★
M5	LCD Display	★
Transient Protection		
Standard		**Standard**
T1[9]	Transient terminal block	★
Manifold for Remote Mount Option		
Standard		**Standard**
F2	3-Valve Manifold, Stainless Steel	★
F6	5-Valve Manifold, Stainless Steel	★

Table 7. Rosemount 3051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

PlantWeb Control Functionality		
Standard		**Standard**
A01[10]	FOUNDATION fieldbus Advanced Control Function Block Suite	★
PlantWeb Diagnostic Functionality		
Standard		**Standard**
D01[10]	FOUNDATION fieldbus Diagnostic Suite	★
Low Power Output		
Standard		**Standard**
C2[11]	0.8-3.2 Vdc Output with Digital Signal Based on Hart Protocol	★
Alarm Limit		
Standard		**Standard**
C4[11][12]	NAMUR Alarm and Saturation Levels, High Alarm	★
CN[11][12]	NAMUR Alarm and Saturation Levels, Low Alarm	★
Ground Screw		
Standard		**Standard**
V5[13]	External Ground Screw Assembly	★
Typical Model Number: 3051CFC D C S 060 N 065 0 3 2 A A 1 WC E5 M5		

(1) Not available for Primary Element Technology C.

(2) For 2-in. (50 mm) line sizes the Primary Element Type is 0.6 for Primary Element Technology Code C.

(3) Option code M4 - LCD Display with Local Operator Interface required for local addressing and configuration.

(4) Not available with Primary Element Technology P.

(5) Not available with FOUNDATION fieldbus (Output Code F) or Profibus (Output Code W).

(6) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(7) Not available with Low Power code M.

(8) Available only with output code W - Profibus PA.

(9) The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(10) Only valid with FOUNDATION fieldbus Output Code F.

(11) Not available with FOUNDATION fieldbus (Output Code F) or Profibus (Output Code W).

(12) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(13) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.



Rosemount 3051CFP Integral Orifice Flowmeter

Table 8. Rosemount 3051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
3051CFP	Integral Orifice Flowmeter	
Measurement Type		
Standard		**Standard**
D	Differential Pressure	★
Body Material		
Standard		**Standard**
S	316 SST	★
Line Size		
Standard		**Standard**
005	1/2-in. (15 mm)	★
010	1-in. (25 mm)	★
015	1 1/2-in. (40 mm)	★
Process Connection		
Standard		**Standard**
T1	NPT Female Body (Not Available with Remote Thermowell and RTD)	★
S1(1)	Socket Weld Body (Not Available with Remote Thermowell and RTD)	★
P1	Pipe Ends: NPT Threaded	★
P2	Pipe ends: Beveled	★
D1	Pipe Ends: Flanged, DIN PN16, slip-on	★
D2	Pipe Ends: Flanged, DIN PN40, slip-on	★
D3	Pipe Ends: Flanged, DIN PN100, slip-on	★
W1	Pipe Ends: Flanged, RF, ANSI Class 150, weld-neck	★
W3	Pipe Ends: Flanged, RF, ANSI Class 300, weld-neck	★
W6	Pipe Ends: Flanged, RF, ANSI Class 600, weld-neck	★
Expanded		
A1	Pipe Ends: Flanged, RF, ANSI Class 150, slip-on	
A3	Pipe Ends: Flanged, RF, ANSI Class 300, slip-on	
A6	Pipe Ends: Flanged, RF, ANSI Class 600, slip-on	
R1	Pipe Ends: Flanged, RTJ, ANSI Class 150, slip-on	
R3	Pipe Ends: Flanged, RTJ, ANSI Class 300, slip-on	
R6	Pipe Ends: Flanged, RTJ, ANSI Class 600, slip-on	
Orifice Plate Material		
Standard		**Standard**
S	316 SST	★
Expanded		
H	Alloy C-276	
M	Alloy 400	
Bore Size Option		
Standard		**Standard**
0066	0.066-in. (1.68 mm) for 1/2-in. Pipe	★
0109	0.109-in. (2.77 mm) for 1/2-in. Pipe	★
0160	0.160-in. (4.06 mm) for 1/2-in. Pipe	★
0196	0.196-in. (4.98 mm) for 1/2-in. Pipe	★
0260	0.260-in. (6.60 mm) for 1/2-in. Pipe	★

Table 8. Rosemount 3051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

0340	0.340-in. (8.64 mm) for 1/2-in. Pipe		★
0150	0.150-in. (3.81 mm) for 1-in. Pipe		★
0250	0.250-in. (6.35 mm) for 1-in. Pipe		★
0345	0.345-in. (8.76 mm) for 1-in. Pipe		★
0500	0.500-in. (12.70 mm) for 1-in. Pipe		★
0630	0.630-in. (16.00 mm) for 1-in. Pipe		★
0800	0.800-in. (20.32 mm) for 1-in. Pipe		★
0295	0.295-in. (7.49 mm) for 1 1/2-in. Pipe		★
0376	0.376-in. (9.55 mm) for 1 1/2-in. Pipe		★
0512	0.512-in. (13.00 mm) for 1 1/2-in. Pipe		★
0748	0.748-in. (19.00 mm) for 1 1/2-in. Pipe		★
1022	1.022-in. (25.96 mm) for 1 1/2-in. Pipe		★
1184	1.184-in. (30.07 mm) for 1 1/2-in. Pipe		★
Expanded			
0010	0.010-in. (0.25 mm) for 1/2-in. Pipe		
0014	0.014-in. (0.36 mm) for 1/2-in. Pipe		
0020	0.020-in. (0.51 mm) for 1/2-in. Pipe		
0034	0.034-in. (0.86 mm) for 1/2-in. Pipe		
Transmitter Connection Platform			
Standard			**Standard**
D3	Direct-mount, 3-Valve Manifold, SST		★
D5	Direct-mount, 5-Valve Manifold, SST		★
R3	Remote-mount, 3-Valve Manifold, SST		★
R5	Remote-mount, 5-Valve Manifold, SST		★
Expanded			
D4	Direct-mount, 3-Valve Manifold, Alloy C-276		
D6	Direct-mount, 5-Valve Manifold, Alloy C-276		
D7	Direct-mount, High Temperature, 5-Valve Manifold, SST		
R4	Remote-mount, 3-Valve Manifold, Alloy C-276		
R6	Remote-mount, 5-Valve Manifold, Alloy C-276		
Differential Pressure Ranges			
Standard			**Standard**
1	0 to 25 in H_2O (0 to 62,3 mbar)		★
2	0 to 250 in H_2O (0 to 623 mbar)		★
3	0 to 1000 in H_2O (0 to 2,5 bar)		★
Transmitter Output			
Standard			**Standard**
A	4–20 mA with digital signal based on HART Protocol		★
F	FOUNDATION fieldbus Protocol		★
W(2)	Profibus PA Protocol		★
Expanded			
M	Low-Power, 1-5 Vdc with Digital Signal Based on HART Protocol		
Transmitter Housing Material		**Conduit Entry Size**	
Standard			**Standard**
A	Aluminum	1/2-14 NPT	★
B	Aluminum	M20 x 1.5	★
J	SST	1/2-14 NPT	★
K	SST	M20 x 1.5	★
Expanded			
D	Aluminum	G1/2	
M	SST	G1/2	
Transmitter Performance Class			
Standard			**Standard**
1	up to ±1.75% flow rate accuracy, 8:1 flow turndown, 5-year stability		★

Table 8. Rosemount 3051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Options (Include with selected model number)

Transmitter Body / Bolt Material		
Expanded		
GT[3]	High Temperature (850 °F / 454 °C)	
Temperature Sensor		
Expanded		
RT[4]	Thermowell and RTD	
Optional Connection		
Standard		**Standard**
G1	DIN 19213 Transmitter Connection	★
Pressure Testing		
Expanded		
P1[5]	Hydrostatic Testing with Certificate	
Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Material Testing		
Expanded		
V1	Dye Penetrant Exam	
Material Examination		
Expanded		
V2	Radiographic Examination	
Flow Calibration		
Expanded		
WD[6]	Discharge Coefficient Verification	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection and Performance Certificate	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204:2004 3.1	★
Code Conformance		
Expanded		
J2[7]	ANSI/ASME B31.1	
J3[7]	ANSI/ASME B31.3	
J4[7]	ANSI/ASME B31.8	
Materials Conformance		
Expanded		
J5[8]	NACE MR-0175 / ISO 15156	
Country Certification		
Standard		**Standard**
J6	European Pressure Directive (PED)	★
Expanded		
J1	Canadian Registration	
Transmitter Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate for Transmitter	★
Quality Certification for Safety		
Standard		**Standard**
QS[9]	Prior-use Certificate of FMEDA data	★

Table 8. Rosemount 3051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Product Certifications		
Standard		**Standard**
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E7(10)	IECEx Flameproof, Dust Ignition-proof	★
E8	ATEX Flameproof, Dust	★
I1(10)	ATEX Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	★
K6(10)	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	★
K8(10)	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E8, I1 and N1)	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of K5 and C6)	★
KD(10)	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1 and E8)	★
N1(10)	ATEX Type n	★
Shipboard Approvals		
Standard		**Standard**
SBS	American Bureau of Shipping	★
Sensor Fill Fluid and O-ring Options		
Standard		**Standard**
L1	Inert Sensor Fill Fluid	★
L2	Graphite-Filled (PTFE) O-ring	★
LA	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★
Display and Interface Options		
Standard		**Standard**
M4(11)	LCD Display with Local Operator Interface	★
M5	LCD Display	★
Transient Protection		
Standard		**Standard**
T1(12)	Transient terminal block	★
PlantWeb Control Functionality		
Standard		**Standard**
A01(13)	FOUNDATION fieldbus Advanced Control Function Block Suite	★
PlantWeb Diagnostic Functionality		
Standard		**Standard**
D01(13)	FOUNDATION fieldbus Diagnostic Suite	★
Low Power Output		
Standard		**Standard**
C2(14)	0.8-3.2 Vdc Output with Digital Signal Based on Hart Protocol	★
Alarm Limit		
Standard		**Standard**
C4(14)(15)	NAMUR Alarm and Saturation Levels, High Alarm	★
CN(14)(15)	NAMUR Alarm and Saturation Levels, Low Alarm	★
Ground Screw		
Standard		**Standard**
V5(16)	External Ground Screw Assembly	★
Typical Model Number: 3051CFP D S 010 W1 S 0500 D3 2 A A 1 E5 M5		

(1) To improve pipe perpendicularity for gasket sealing, socket diameter is smaller than standard pipe O.D.

(2) Option code M4 - LCD Display with Local Operator Interface required for local addressing and configuration.

(3) Not available with $1^1/_2$-in. (38 mm) line size.

(4) Thermowell Material is the same as the body material.

(5) Does not apply to Process Connection codes T1 and S1.

(6) Not available for bore sizes 0010, 0014, 0020, or 0034.

(7) Not available with DIN Process Connection codes D1, D2, or D3.

(8) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(9) Not available with FOUNDATION fieldbus (Output Code F) or Profibus (Output Code W).

(10) Not available with Low Power code M.

(11) Available only with output code W - Profibus PA.

(12) The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(13) Only valid with FOUNDATION fieldbus Output Code F.

(14) Not available with FOUNDATION fieldbus (Output Code F) or Profibus (Output Code W).

(15) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(16) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.

3051CF Specifications

3051CF PERFORMANCE SPECIFICATIONS

This product data sheet covers both HART, FOUNDATION fieldbus and Profibus PA protocols unless specified.
For zero-based spans, reference conditions, silicone oil fill, glass-filled PTFE o-rings, SST materials, Coplanar flange (3051C) or $^1/_2$ in.- 14 NPT (3051T) process connections, digital trim values set to equal range points.

Conformance To Specification (±3σ (Sigma))

Technology leadership, advanced manufacturing techniques and statistical process control ensure specification conformance to at least ±3σ.

Flow Performance - Flow Reference Accuracy(1)

3051CFA Annubar Flowmeter		
Ranges 2-3		±1.80% of Flow Rate at 8:1 flow turndown
3051CFC Compact Orifice Flowmeter – Conditioning Option C		
Ranges 2-3	β =0.4	±1.75% of Flow Rate at 8:1 flow turndown
	β =0.65	±1.95% of Flow Rate at 8:1 flow turndown
3051CFC Compact Orifice Flowmeter – Orifice Type Option P(2)		
Ranges 2-3	β =0.4	±2.00% of Flow Rate at 8:1 flow turndown
	β =0.65	±2.00% of Flow Rate at 8:1 flow turndown
3051CFP Integral Orifice Flowmeter		
Ranges 2-3	β <0.1	±3.00% of Flow Rate at 8:1 flow turndown
	0.1<β <0.2	±1.95% of Flow Rate at 8:1 flow turndown
	0.2<β <0.6	±1.75% of Flow Rate at 8:1 flow turndown
	0.6<β <0.8	±2.15% of Flow Rate at 8:1 flow turndown

(1) Range 1 flowmeters may experience an additional uncertainty up to 0.9%. Consult your Emerson Process Management Representative for exact specifications.

(2) For smaller line sizes, see Rosemount Compact Orifice.

Total Performance

Total Performance is based on combined errors of reference accuracy, ambient temperature effect, and static pressure effect.

For ±50 °F (28 °C) temperature changes, up to 1000 psi (6,9 MPa) line pressure (CD only), from 1:1 to 5:1 rangedown.

Models	Total Performance
3051CF Ranges 2-5	±0.15% of span

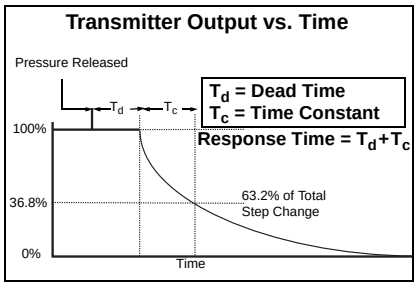
Long Term Stability

Models	Long Term Stability
3051CF Ranges 2-5	±0.125% of URL for 5 years ±50 °F (28 °C) temperature changes, and up to 1000 psi (6,9 MPa) line pressure.
3051CF Low/Draft Range Ranges 0-1	±0.2% of URL for 1 year

Dynamic Performance

	4 - 20 mA HART[1] 1-5 Vdc HART Low Power	FOUNDATION fieldbus and Profibus PA protocols[3]	Typical HART Transmitter Response Time
Total Response Time (T_d + T_c) [2]:			
3051CF, Ranges 2-5:	100 ms	152 ms	
Range 1:	255 ms	307 ms	
Range 0:	700 ms	N/A	
3051T:	100 ms	152 ms	
3051L:	See Instrument Toolkit®	See Instrument Toolkit	
Dead Time (Td)	45 ms (nominal)	97 ms	
Update Rate	22 times per second	22 times per second	

(1) Dead time and update rate apply to all models and ranges; analog output only
(2) Nominal total response time at 75 °F (24 °C) reference conditions.
(3) Transducer block response time, Analog Input block execution time not included.



Vibration Effect

Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field or pipeline with high vibration level (10-60 Hz 0.21 mm displacement peak amplitude / 60-2000 Hz 3g).

Power Supply Effect

Less than ±0.005% of calibrated span per volt.

RFI Effects

±0.1% of span from 20 to 1000 MHz and for field strength up to 30 V/m.

Electromagnetic Compatibility (EMC)

Meets all relevant requirements of EN 61326 and Namur NE-21.

Transient Protection (Option Code T1)

Meets IEEE C62.41, Category Location B

6 kV crest (0.5 μs - 100 kHz)
3 kV crest (8 × 20 microseconds)
6 kV crest (1.2 × 50 microseconds)

NOTE
Calibrations at 68 °F (20 °C) per ASME Z210.1 (ANSI)

3051CF FUNCTIONAL SPECIFICATIONS

Range and Sensor Limits

Table 9. 3051CD, 3051CG, 3051CF, and 3051L Range and Sensor Limits

Range	Minimum Span		Range and Sensor Limits
			Lower (LRL)
	3051CF	Upper (URL)	3051CD Differential 3051CF Flowmeters
0	0.1 inH_2O (0,25 mbar)	3.0 inH_2O (7,47 mbar)	-3.0 inH_2O (-7,47 mbar)
1	0.5 inH_2O (1,2 mbar)	25 inH_2O (62,3 mbar)	-25 inH_2O (-62,1 mbar)
2	2.5 inH_2O (6,2 mbar)	250 inH_2O (0,62 bar)	-250 inH_2O (-0,62 bar)
3	10 inH_2O (24,9 mbar)	1000 inH_2O (2,49 bar)	-1000 inH_2O (-2,49 bar)
4	3 psi (0,20 bar)	300 psi (20,6 bar)	-300 psi (-20,6 bar)
5	20 psi (1,38 bar)	2000 psi (137,9 bar)	- 2000 psi (-137,9 bar)

4-20 mA HART (Output Code A)

Output

Two-wire 4-20 mA, user-selectable for linear or square root output. Digital process variable superimposed on 4-20 mA signal, available to any host that conforms to the *HART* protocol.

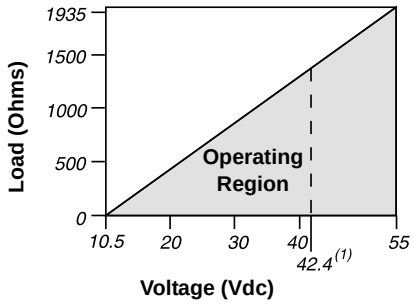
Power Supply

External power supply required. Standard transmitter (4-20 mA) operates on 10.5 to 55 Vdc with no load.

Load Limitations

Maximum loop resistance is determined by the voltage level of the external power supply, as described by:

Max. Loop Resistance = 43.5 (Power Supply Voltage – 10.5)



Communication requires a minimum loop resistance of 250 ohms.

(1) For CSA approval, power supply must not exceed 42.4 V.

Zero and Span Adjustment Requirements

Zero and span values can be set anywhere within the range limits stated in Table 9.

Span must be greater than or equal to the minimum span stated in Table 9.

Indication

Optional two line LCD display

FOUNDATION fieldbus (Output code F)

Power Supply

External power supply required; transmitters operate on 9.0 to 32.0 Vdc transmitter terminal voltage.

Current Draw

17.5 mA for all configurations (including LCD display option)

Indication

Optional two line LCD display

FOUNDATION fieldbus Function Block Execution Times

Block	Execution Time
Resource	-
Transducer	-
LCD Block	-
Analog Input 1, 2	30 milliseconds
PID	45 milliseconds
Input Selector	30 milliseconds
Arithmetic	35 milliseconds
Signal Characterizer	40 milliseconds
Integrator	35 milliseconds

FOUNDATION fieldbus Parameters

Schedule Entries	7 (max.)
Links	20 (max.)
Virtual Communications Relationships (VCR)	12 (max.)

Standard Function Blocks

Resource Block

Contains hardware, electronics, and diagnostic information.

Transducer Block

Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

LCD Block

Configures the local display.

2 Analog Input Blocks

Processes the measurements for input into other function blocks. The output value is in engineering units or custom and contains a status indicating measurement quality.

PID Block

Contains all logic to perform PID control in the field including cascade and feedforward.

Backup Link Active Scheduler (LAS)

The transmitter can function as a Link Active Scheduler if the current link master device fails or is removed from the segment.

Advanced Control Function Block Suite (Option Code A01)

Input Selector Block

Selects between inputs and generates an output using specific selection strategies such as minimum, maximum, midpoint, average or first “good.”

Arithmetic Block

Provides pre-defined application-based equations including flow with partial density compensation, electronic remote seals, hydrostatic tank gauging, ratio control and others.

Signal Characterizer Block

Characterizes or approximates any function that defines an input/output relationship by configuring up to twenty X, Y coordinates. The block interpolates an output value for a given input value using the curve defined by the configured coordinates.

Integrator Block

Compares the integrated or accumulated value from one or two variables to pre-trip and trip limits and generates discrete output signals when the limits are reached. This block is useful for calculating total flow, total mass, or volume over time.

FOUNDATION fieldbus Diagnostics Suite (Option Code D01)

The 3051C FOUNDATION fieldbus Diagnostics provide Abnormal Situation Prevention (ASP) indication. The integral statistical process monitoring (SPM) technology calculates the mean and standard deviation of the process variable 22 times per second. The 3051C ASP algorithm uses these values and highly flexible configuration options for customization to many user-defined or application specific abnormal situations. The detection of plugged impulse lines is the first available predefined application.

Profibus PA (Output Code W)

Profile Version

3.02

Power Supply

External power supply required; transmitters operate on 9.0 to 32.0 Vdc transmitter terminal voltage.

Current Draw

17.5 mA for all configurations (including LCD display option)

Output Update Rate

Four times per second

Standard Function Blocks

Analog Input (AI Block)

The AI function block processes the measurements and makes them available to the host device. The output value from the AI block is in engineering units and contains a status indicating the quality of the measurement.

Physical Block

The physical block defines the physical resources of the device including type of memory, hardware, electronics and diagnostic information.

Transducer Block

Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

Indication

Optional two line LCD display

Local Operator Interface

Optional external configuration buttons

1-5 Vdc HART Low Power (Output Code M)

Output

Three wire 1-5 Vdc or 0.8-3.2 Vdc (Option Code C2) user-selectable output. Also user selectable for linear or square root output configuration. Digital process variable superimposed on voltage signal, available to any host conforming to the *HART* protocol. Low-power transmitter operates on 6-12 Vdc with no load.

Power Consumption

3.0 mA, 18-36 mW

Minimum Load Impedance

100 kΩ (V_{out} wiring)

Indication

Optional 5-digit LCD display

Overpressure Limits

Rosemount 3051CD/CG/CF

- Range 0: 750 psi (51,7 bar)
- Range 1: 2000 psig (137,9 bar)
- Ranges 2-5: 3626 psig (250 bar)
  4500 psig (310,3 bar) for option code P9

Rosemount 3051CA

- Range 1: 750 psia (51,7 bar)
- Range 2: 1500 psia (103,4 bar)
- Range 3: 1600 psia (110,3 bar)
- Range 4: 6000 psia (413,7 bar)

Rosemount 3051TG/TA

- Range 1: 750 psi (51,7 bar)
- Range 2: 1500 psi (103,4 bar)
- Range 3: 1600 psi (110,3 bar)
- Range 4: 6000 psi (413,7 bar)
- Range 5: 15000 psi (1034,2 bar)

For 3051L or Level Flange Option Codes FA, FB, FC, FD, FP, and FQ, limit is 0 psia to the flange rating or sensor rating, whichever is lower.

Table 10. 3051L and Level Flange Rating Limits

Standard	Type	CS Rating	SST Rating
ANSI/ASME	Class 150	285 psig	275 psig
ANSI/ASME	Class 300	740 psig	720 psig
ANSI/ASME	Class 600	1480 psig	1440 psig
At 100 °F (38 °C), the rating decreases with increasing temperature, per ANSI/ASME B16.5.			
DIN	PN 10-40	40 bar	40 bar
DIN	PN 10/16	16 bar	16 bar
DIN	PN 25/40	40 bar	40 bar
At 248 °F (120 °C), the rating decreases with increasing temperature, per DIN 2401.			

Static Pressure Limit

Rosemount 3051CD Only

Operates within specifications between static line pressures of 0.5 psia and 3626 psig (4500 psig (310, 3 bar) for Option Code P9).

Range 0: 0.5 psia and 750 psig (3, 4 bar and 51, 7 bar)

Range 1: 0.5 psia and 2000 psig (3, 4 bar and 137, 9 bar)

Burst Pressure Limits

3051CF

10000 psig (69 MPa)

3051T Inline

Ranges 1-4: 11000 psi (75,8 MPa)

Range 5: 26000 psig (179 MPa)

Failure Mode Alarm

If self-diagnostics detect a sensor or microprocessor failure, the analog signal is driven either high or low to alert the user. High or low failure mode is user-selectable with a jumper on the transmitter. The values to which the transmitter drives its output in failure mode depend on whether it is factory-configured to *standard* or *NAMUR-compliant* operation. The values for each are as follows:

Standard Operation			
Output Code	**Linear Output**	**Fail High**	**Fail Low**
A	3.9 ≤ I ≤ 20.8	I ≥ 21.75 mA	I ≤ 3.75 mA
M	0.97 ≤ V ≤ 5.2	V ≥ 5.4 V	V ≤ 0.95 V

NAMUR-Compliant Operation			
Output Code	**Linear Output**	**Fail High**	**Fail Low**
A	3.8 ≤ I ≤ 20.5	I ≥ 22.5 mA	I ≤ 3.6 mA

Output Code F and W

If self-diagnostics detect a gross transmitter failure, that information gets passed as a status along with the process variable.

Temperature Limits

For 3051CFA Temperature Limits, see page DP Flow-96.
For 3051CFC Temperature Limits, see page DP Flow-108.
For 3051CFP Temperature Limits, see page DP Flow-116.

Table 11. 3051 Transmitter Temperature Limits

3051CF	
Silicone Fill Sensor(1)	
with Coplanar Flange	–40 to 250 °F (–40 to 121 °C)(2)

(1) Process temperatures above 185 °F (85 °C) require derating the ambient limits by a 1.5:1 ratio.

(2) 220 °F (104 °C) limit in vacuum service; 130 °F (54 °C) for pressures below 0.5 psia.

Humidity Limits

0–100% relative humidity

Turn-On Time

Performance within specifications less than 2.0 seconds (10.0 s for Profibus protocol) after power is applied to the transmitter

Volumetric Displacement

Less than 0.005 in^3 (0,08 cm^3)

Damping

4-20 mA HART

Analog output response to a step input change is user-selectable from 0 to 36 seconds for one time constant. This software damping is in addition to sensor module response time.

FOUNDATION fieldbus

Transducer block: 0.4 seconds fixed

AI Block: User configurable

Profibus PA

AI Block only: User configurable

3051CF PHYSICAL SPECIFICATIONS

Electrical Connections

$^1/_2$–14 NPT, PG 13.5, $G^1/_2$, and M20 × 1.5 (CM20) conduit. *HART* interface connections fixed to terminal block.

Process Connections

For 3051CFA, see “Annubar Sensor Material” on page 105.

For 3051CFC, see “Material of Construction” on page 112.

For 3051CFP, see “Material of Construction” on page 116.

Process-Wetted Parts

Drain/Vent Valves

316 SST, Alloy C-276, or Alloy 400 material (Alloy 400 not available with 3051L)

Process Flanges and Adapters

Plated carbon steel, SST cast CF-8M (cast version of 316 SST, material per ASTM-A743), C-Type cast alloy CW12MW, or cast alloy M30C

Wetted O-rings

Glass-filled PTFE or Graphite-filled PTFE

Process Isolating Diaphragms

Isolating Diaphragm Material	3051CD 3051CG
316L SST	•
Alloy C-276	•
Alloy 400	•
Tantalum	•
Gold-plated Alloy 400	•
Gold-plated SST	•

Non-Wetted Parts

Electronics Housing

Low-copper aluminum or CF-8M (Cast version of 316 SST).
Enclosure Type 4X, IP 65, IP 66, IP 68

Coplanar Sensor Module Housing

CF-3M (Cast version of 316L SST, material per ASTM-A743)

Bolts

ASTM A449, Type 1 (zinc-cobalt plated carbon steel)
ASTM F593G, Condition CW1 (Austenitic 316 SST)
ASTM A193, Grade B7M (zinc plated alloy steel)
Alloy K-500

Sensor Module Fill Fluid

Silicone oil (D.C. 200) or Fluorocarbon oil (Halocarbon or Fluorinert® FC-43 for 3051T)

Process Fill Fluid (3051L only)

Syltherm XLT, D.C. Silicone 704,
D.C. Silicone 200, inert, glycerin and water, Neobee M-20 or propylene glycol and water

Paint

Polyurethane

Cover O-rings

Nitirile Butadiene (NBR)

3051CF Product Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA
Emerson Process Management GmbH & Co. — Wessling, Germany
Emerson Process Management Asia Pacific Private Limited — Singapore
Beijing Rosemount Far East Instrument Co., LTD — Beijing, China
Emerson Process Management LTDA — Sorocaba, Brazil
Emerson Process Management (India) Pvt. Ltd. — Daman, India

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

ATEX Directive (94/9/EC)
All 3051 transmitters comply with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)
3051CA4; 3051CG2, 3, 4, 5; 3051CD2, 3, 4, 5
(also with P9 option)
— QS Certificate of Assessment - EC No. 59552-2009-CE-HOU-DNV
Module H Conformity Assessment

All other 3051Pressure Transmitters
— Sound Engineering Practice

Transmitter Attachments: Diaphragm Seal - Process Flange - Manifold
— Sound Engineering Practice

Electro Magnetic Compatibility (EMC) (2004/108/EC)
All 3051 Pressure Transmitters meet all of the requirements of EN61326 and NAMUR NE-21

Ordinary Location Certification for Factory Mutual
As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

3051CF HART PROTOCOL

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II, Division 1, Groups E, F, and G. Dust-Ignition-Proof for Class III, Division 1.
Factory Sealed, Enclosure Type 4X

I5 Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 when connected per Rosemount drawing 03031-1019; Non-incendive for Class I, Division 2, Groups A, B, C, and D.
Temperature Code:T4 (Ta = 40 °C), T3 (Ta = 85 °C), Enclosure Type 4X
For input parameters see control drawing 03031-1019.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

E6 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D for indoor and outdoor hazardous locations. Enclosure type 4X, factory sealed

C6 Explosion-Proof and intrinsically safe approval. Intrinsically safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount drawings 03031-1024. Temperature Code T3C.
Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D hazardous locations. Enclosure type 4X, factory sealed
For input parameters see control drawing 03031-1024.

European Certifications

I1 ATEX Intrinsic Safety and Dust
Certification No.: BAS 97ATEX1089X ⟨Ex⟩ II 1 GD
Ex ia IIC T4 (–60 ≤ T_a ≤ +70 °C)
Dust Rating: Ex tD A20 T80 °C (–20 ≤ T_a ≤ 40 °C) IP66
CE 1180

TABLE 12. Input Parameters

U_i = 30V
I_i = 200 mA
P_i = 0.9W
C_i = 0.012 µF

TABLE 13. RTD Assembly (3051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63W

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the apparatus.
The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact or abrasion located in Zone 0.

N1 ATEX Type n and Dust
Certification No.: BAS 00ATEX3105X ⟨Ex⟩ II 3 GD
U_i = 55 Vdc max
Ex nA nL T5 (–40°C ≤ T_{amb} ≤ 70 °C)
Dust rating: Ex tD A22 T80 °C (–20 ≤ T_a ≤ 40 °C) IP66
CE

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding a 500V r.m.s. test to case. This must be taken into account on any installation in which it is used, for example by assuring that the supply to the apparatus is galvanically isolated.

E8 ATEX Flame-Proof and Dust
Certification No.: KEMA 00ATEX2013X ⟨Ex⟩ II 1/2 GD
Ex d IIC T6 (–50 ≤ T_a ≤ 65 °C)
Dust rating: Ex tD A20/A21 T90 °C, IP66
CE 1180
Vmax = 55 V dc

Special Conditions for Safe Use (X):
This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

IECEx Certifications

I7 IECEx Intrinsic Safety
Certification No.: IECEx BAS 09.0076X
Ex ia IIC T4 (–60 °C ≤ T_a ≤ 70 °C)
IP66

TABLE 14. Input Parameters

U_i = 30V
I_i = 200 mA
P_i = 0.9W
C_i = 0.012 µF

TABLE 15. RTD Assembly (3051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63W

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500V insulation test required by Clause 6.3.12 of IEC 60079-11. This must be taken into account when installing the apparatus.
The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact or abrasion located in Zone 0.

E7 IECEx Explosion-Proof (Flame-Proof)
Certification No.: IECEx KEM 09.0034X
Ga/Gb Ex d IIC T6 or T5
Ex tD A20/A21 IP66 T90 °C
IP66

Special Conditions for Safe Use (X):
This device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

N7 IECEx Type n
Certification No.: IECEx BAS 09.0077X
Ex nA nL IIC T5 (–40 °C ≤ T_a ≤ 70 °C)
IP66

Special Conditions for Safe Use (X):
The apparatus is not capable of withstanding the 500V insulation test required by clause 6.8.1 of IEC 60079-15. This must be taken into account when installing the apparatus.

TIIS Certifications

E4 TIIS Flame-Proof
Ex d IIC T6

Certificate	Description
TC15850	3051C/D/1 4–20 mA HART — no display
TC15851	3051C/D/1 4–20 mA HART — with display
TC15854	3051T/G/1 4–20 mA HART, SST, Silicon — no display
TC15855	3051T/G/1 4–20 mA HART, Alloy C-276, Silicon — no display
TC15856	3051T/G/1 4–20 mA HART, SST, Silicon — with display
TC15857	3051T/G/1 4–20 mA HART, Alloy C-276, Silicon — with display

I4 TIIS Intrinsic Safety
Ex ia IIC T4

Certificate	Description
TC16406	3051CD/CG

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K5 **E5** and **I5** combination
KB **K5** and **C6** combination
KD **K5**, **C6**, **I1**, and **E8** combination
K6 **C6**, **I1**, and **E8** combination
K8 **E8** and **I1** combination
K7 **E7**, **I7**, and **N7** combination

3051CF FOUNDATION FIELDBUS AND PROFIBUS PA PROTOCOLS

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II, Division 1, Groups E, F, and G. Dust-Ignition-Proof for Class III, Division 1.

I5 Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 when connected per Rosemount drawing 03031-1019; Non-incendive for Class I, Division 2, Groups A, B, C, and D.

Temperature Code:T4 (Ta = 60 °C), T3 (Ta = 85 °C), Enclosure Type 4X
For input parameters see control drawing 03031-1019.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

E6 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D for indoor and outdoor hazardous locations. Enclosure type 4X, factory sealed

C6 Explosion-Proof and intrinsically safe approval. Intrinsically safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount drawings 03031-1024. Temperature Code T3C.
Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D hazardous locations. Enclosure type 4X, factory sealed
For input parameters see control drawing 03031-1024.

European Certifications

I1 ATEX Intrinsic Safety and Dust
Certification No.: BAS 98ATEX1355X ⟨Ex⟩ II 1 GD
Ex ia IIC T4 (T_{amb} = –60 to +60 °C)
Ex td A20 IP66 T 70 °C (-20 ≤ T_a ≤ 40 °C)
CE 1180

TABLE 16. Input Parameters

U_i = 30V
I_i = 300 mA
P_i = 1.3 W
C_i = 0 µF

TABLE 17. RTD Assembly (3051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63W

Special Conditions for Safe Use (X):
1. If the apparatus is fitted with an optional 90V transient suppressor, it is not capable of withstanding the 500V insulation test required by clause 6.3.12 of EN 60079-11. This must be taken into account when installing the apparatus.
2. The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in Zone 0.

IA ATEX FISCO Intrinsic Safety
Certification No.: BAS 98ATEX1355X ⟨Ex⟩ II 1 G
Ex ia IIC T4 (T_{amb} = –60 to +60 °C)
IP66
CE 1180

TABLE 18. Input Parameters

U_i = 17.5 V
I_i = 380 mA
P_i = 5.32 W
C_i = ≤ 5 µF
L_i = ≤ 10 µH

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the apparatus.
The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact or abrasion located in Zone 0.

N1 ATEX Type n and Dust
Certification No.: BAS 98ATEX3356X ⟨Ex⟩ II 3 GD
U_i = 40 Vdc max
Ex nL IIC T5 (T_a = –40°C to 70 °C)
Dust rating: Ex tD A22 T80 °C (T_{amb} = –20 to 40 °C) IP66

Special Conditions for Safe Use (X):
The apparatus is not capable of withstanding the 500V insulation test required by clause 6.8.1 of EN 60079-15. This must be taken into account when installing the apparatus.

E8 ATEX Flame-Proof and Dust
Certification No.: KEMA 00ATEX2013X ⟨Ex⟩ II 1/2 GD
Ex d IIC T6 (T_{amb} = –50 to 65 °C)
Dust rating: Ex tD A20/21 T90 °C, IP66
CE 1180
Vmax = 55 V dc

Special Conditions for Safe Use (X):
This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

IECEx Certifications

I7 IECEx Intrinsic Safety
Certification No.: IECEx BAS 09.0076X
Ex ia IIC T4 (–60 °C ≤ T_a ≤ 60 °C)
IP66

TABLE 19. Input Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.3 W
C_i = 0 µF
L_i = 0 µH

TABLE 20. RTD Assembly (3051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63W

Special Conditions for Safe Use (X):

1. If the apparatus is fitted with an optional 90V transient suppressor, it is not capable of withstanding the 500V insulation test required by clause 6.3.12 of IEC 60079-11. This must be taken into account when installing the apparatus.
2. The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in Zone 0.

E7 IECEx Explosion-Proof (Flame-Proof)
Certification No.: IECEx KEM 09.0034X
Ga/Gb Ex d IIC T6 or T5
Ex tD A20/A21 IP66 T90 °C
IP66

Special Conditions for Safe Use (X):
This device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

N7 IECEx Type n
Certification No.: IECEx BAS 09.0077X
Ex nA nL IIC T5 (–40 °C ≤ T_a ≤ 70 °C)
IP66

Special Conditions for Safe Use (X):
The apparatus is not capable of withstanding the 500V insulation test required by clause 6.8.1 of IEC 60079-15. This must be taken into account when installing the apparatus.

TIIS Certifications

E4 TIIS Flame-Proof
Ex d IIC T6

Certificate	Description
TC15852	3051C/D/1 FOUNDATION Fieldbus — no display
TC15853	3051C/D/1 FOUNDATION Fieldbus — with display
TC15858	3051T/G/1 FOUNDATION Fieldbus, SST, Silicon — no display
TC15859	3051T/G/1 FOUNDATION Fieldbus, Alloy C-276, Silicon — no display
TC15860	3051T/G/1 FOUNDATION Fieldbus, SST, Silicon — with display
TC15861	3051T/G/1 FOUNDATION Fieldbus, Alloy C-276, Silicon — with display

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K5 **E5** and **I5** combination
KB **K5** and **C6** combination
KD **K5**, **C6**, **I1**, and **E8** combination
K6 **C6**, **I1**, and **E8** combination
K8 **E8** and **I1** combination
K7 **E7**, **I7**, and **N7** combination

Rosemount 2051CF Flowmeter Series



Rosemount 2051CF Flowmeters combine the 2051 Pressure transmitter and the latest primary element technology: Annubar Averaging Pitot Tube, Compact Conditioning Orifice Plate and Integral Orifice Plate.

Additional Information
Specifications: page DP Flow-83
Product Certifications: page DP Flow-87
Dimensional Drawings: page DP Flow-143
Installation and Flowmeter Orientation: page DP Flow-166



Rosemount 2051CFA Annubar Flowmeter

Table 21. Rosemount 2051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
2051CFA	Annubar Flowmeter	
Measurement Type		
Standard		**Standard**
D	Differential Pressure	★
Fluid Type		
Standard		**Standard**
L	Liquid	★
G	Gas	★
S	Steam	★
Line Size		
Standard		**Standard**
020	2-in. (50 mm)	★
025	$2\frac{1}{2}$-in. (63.5 mm)	★
030	3-in. (80 mm)	★
035	$3\frac{1}{2}$-in. (89 mm)	★
040	4-in. (100 mm)	★
050	5-in. (125 mm)	★
060	6-in. (150 mm)	★
070	7-in. (175 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
Pipe I.D. Range (See “Pipe I.D. Range Code” on page 165)		
Standard		**Standard**
C	Range C from the Pipe I.D. table	★
D	Range D from the Pipe I.D. table	★
Expanded		
A	Range A from the Pipe I.D. table	
B	Range B from the Pipe I.D. table	
E	Range E from the Pipe I.D. table	
Z	Non-standard Pipe I.D. Range or Line Sizes greater than 12 inches	

Table 21. Rosemount 2051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Pipe Material / Mounting Assembly Material		
Standard		**Standard**
C	Carbon steel (A105)	★
S	316 Stainless Steel	★
0[(1)]	No Mounting (Customer Supplied)	
Expanded		
G	Chrome-Moly Grade F-11	
N	Chrome-Moly Grade F-22	
J	Chrome-Moly Grade F-91	
Piping Orientation		
Standard		**Standard**
H	Horizontal Piping	★
D	Vertical Piping with Downwards Flow	★
U	Vertical Piping with Upwards Flow	★
Annubar Type		
Standard		**Standard**
P	Pak-Lok	★
F	Flanged with opposite side support	★
Sensor Material		
Standard		**Standard**
S	316 Stainless Steel	★
Sensor Size		
Standard		**Standard**
1	Sensor size 1 — Line sizes 2-in. (50 mm) to 8-in. (200 mm)	★
2	Sensor size 2 — Line sizes 6-in. (150 mm) to 96-in. (2400 mm)	★
3	Sensor size 3 — Line sizes greater than 12-in. (300 mm)	★
Mounting Type		
Standard		**Standard**
T1	Compression or Threaded Connection	★
A1	150# RF ANSI	★
A3	300# RF ANSI	★
A6	600# RF ANSI	★
D1	DN PN16 Flange	★
D3	DN PN40 Flange	★
D6	DN PN100 Flange	★
Expanded		
R1	150# RTJ Flange	
R3	300# RTJ Flange	
R6	600# RTJ Flange	
Opposite Side Support or Packing Gland		
Standard		**Standard**
0	No opposite side support or packing gland (Required for Pak-Lok and Flange-Lok models)	★
	Opposite Side Support – Required for Flanged Models	
C	NPT Threaded Opposite Support Assembly – Extended Tip	★
D	Welded Opposite Support Assembly – Extended Tip	★
Isolation Valve for Flo-Tap Models		
Standard		**Standard**
0[(1)]	Not Applicable or Customer Supplied	★
Temperature Measurement		
Standard		**Standard**
T	Integral RTD – not available with Flanged model greater than class 600#	★
0	No Temperature Sensor	★

Table 21. Rosemount 2051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded			
R	Remote Thermowell and RTD		
Transmitter Connection Platform			
Standard			**Standard**
3	Direct-mount, Integral 3-valve Manifold– not available with Flanged model greater than class 600		★
5	Direct -mount, 5-valve Manifold – not available with Flanged model greater than class 600		★
7	Remote-mount NPT Connections ($^1/_2$-in. FNPT)		★
Expanded			
8	Remote-mount SW Connections ($^1/_2$-in.)		
Differential Pressure Range			
Standard			**Standard**
1	0 to 25 in H_2O (0 to 62,3 mbar)		★
2	0 to 250 in H_2O (0 to 623 mbar)		★
3	0 to 1000 in H_2O (0 to 2,5 bar)		★
Transmitter Output			
Standard			**Standard**
A	4–20 mA with digital signal based on HART Protocol		★
F	FOUNDATION fieldbus Protocol		★
Expanded			
M	Low-Power, 1-5 Vdc with Digital Signal Based on HART Protocol		
Transmitter Housing Material(2)		**Conduit Entry Size**	
Standard			**Standard**
A	Aluminum	$^1/_2$-14 NPT	★
B	Aluminum	M20 x 1.5	★
J	SST	$^1/_2$-14 NPT	★
K(3)	SST	M20 x 1.5	★
Expanded			
D	Aluminum	G$^1/_2$	
M(3)	SST	G$^1/_2$	
Transmitter Performance Class			
Standard			**Standard**
1	2.0% flow rate accuracy, 5:1 flow turndown, 2-year stability		★

Options (Include with selected model number)

Pressure Testing		
Expanded		
P1(4)	Hydrostatic Testing with Certificate	
PX(4)	Extended Hydrostatic Testing	
Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Material Testing		
Expanded		
V1	Dye Penetrant Exam	
Material Examination		
Expanded		
V2	Radiographic Examination	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection & Performance Certificate	★

Table 21. Rosemount 2051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Surface Finish		
Standard		**Standard**
RL	Surface finish for Low Pipe Reynolds # in Gas & Steam	★
RH	Surface finish for High Pipe Reynolds # in Liquid	★
Material Traceability Certification		
Standard		**Standard**
Q8[5]	Material Traceability Certification per EN 10474:2004 3.1	★
Code Conformance		
Expanded		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
Materials Conformance		
Expanded		
J5[6]	NACE MR-0175 / ISO 15156	
Country Certification		
Standard		**Standard**
J6	European Pressure Directive (PED)	★
Expanded		
J1	Canadian Registration	
Instrument Connections for Remote Mount Options		
Standard		**Standard**
G2	Needle Valves, Stainless Steel	★
G6	OS&Y Gate Valve, Stainless Steel	★
Expanded		
G1	Needle Valves, Carbon Steel	
G3	Needle Valves, Alloy C-276	
G5	OS&Y Gate Valve, Carbon Steel	
G7	OS&Y Gate Valve, Alloy C-276	
Special Shipment		
Standard		**Standard**
Y1	Mounting Hardware Shipped Separately	★
Product Certifications		
Standard		**Standard**
E1[3]	ATEX Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
E7	IECEx Flameproof, Dust Ignition-proof	★
I1[3]	ATEX Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I6	CSA Intrinsically Safe	★
I7[3]	IECEx Intrinsic Safety	★
IA[7]	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	★
IE[7]	FM FISCO Intrinsically Safe	★
IF[7]	CSA FISCO Intrinsically Safe	★
IG[7]	IECEx FISCO Intrinsically Safe	★
K1[3]	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	★
K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	★
K7[3]	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	★
KA[3]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)	★
KC[3]	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[3]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)	★

Table 21. Rosemount 2051CFA Annubar Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

N1[3]	ATEX Type n	★
N7[3]	IECEx Type n	★
ND[3]	ATEX Dust	★
Shipboard Approvals		
Standard		**Standard**
SBS	American Bureau of Shipping	★
Sensor Fill Fluid and O-ring Options		
Standard		**Standard**
L1	Inert Sensor Fill Fluid	★
L2	Graphite-Filled (PTFE) O-ring	★
LA	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★
Display and Interface Options		
Standard		**Standard**
M5	LCD Display	★
Transmitter Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate for Transmitter	★
Quality Certification for Safety		
Standard		**Standard**
QS[8]	Prior-use certificate of FMEDA data	★
Transient Protection		
Standard		**Standard**
T1[9]	Transient terminal block	★
Manifold for Remote Mount Option		
Standard		**Standard**
F2	3-Valve Manifold, Stainless Steel	★
F6	5-Valve Manifold, Stainless Steel	★
Expanded		
F1	3-Valve Manifold, Carbon Steel	
F5	5-Valve Manifold, Carbon Steel	
Hardware Adjustments		
Standard		**Standard**
D4	Zero and Span Hardware Adjustments	★
Alarm Limit		
Standard		**Standard**
C4[8][10]	NAMUR Alarm and Saturation Levels, High Alarm	★
CN[8][10]	NAMUR Alarm and Saturation Levels, Low Alarm	★
Ground Screw		
Standard		**Standard**
V5[11]	External Ground Screw Assembly	★
Typical Model Number: 2051CFA D L 060 D C H P S 2 T1 0 0 0 3 2A A 1A 3		

(1) Provide the "A" dimension for Flanged (page DP Flow-144) and Pak-Lok (page DP Flow-143).

(2) Material specified is cast as follows: CF-8M is the cast version of 316 SST, CF-3M is the cast version of 316L SST. For housing, material is aluminum with polyurethane paint.

(3) Not available with Low Power Output Code M.

(4) Applies to assembled flowmeter only, mounting not tested.

(5) Instrument Connections for Remote Mount Options and Isolation Valves for Flo-tap Models are not included in the Material Traceability Certification.

(6) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(7) Only valid with FOUNDATION fieldbus Output Code F.

(8) Not available with Output Protocol code F.

(9) The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(10) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(11) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.



Rosemount 2051CFC Compact Flowmeter

Table 22. Rosemount 2051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
2051CFC	Compact Flowmeter	
Measurement Type		
Standard		**Standard**
D	Differential Pressure	★
Primary Element Technology		
Standard		**Standard**
C	Conditioning Orifice Plate	★
P	Orifice Plate	★
Material Type		
Standard		**Standard**
S	316 SST	★
Line Size		
Standard		**Standard**
005(1)	1/2-in. (15 mm)	★
010(1)	1-in. (25 mm)	★
015(1)	1 1/2-in. (40 mm)	★
020	2-in. (50 mm)	★
030	3-in. (80 mm)	★
040	4-in. (100 mm)	★
060	6-in. (150 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
Primary Element Style		
Standard		**Standard**
N	Square Edged	★
Primary Element Type		
Standard		**Standard**
040	0.40 Beta Ratio	★
065(2)	0.65 Beta Ratio	★
Temperature Measurement		
Standard		**Standard**
0	No Temperature Sensor	★
Expanded		
R	Remote Thermowell and RTD	
Transmitter Connection Platform		
Standard		**Standard**
3	Direct-mount, Integral 3-valve Manifold	★
7	Remote-mount, 1/4-in. NPT Connections	★
Differential Pressure Range		
Standard		**Standard**
1	0 to 25 in H_2O (0 to 62,3 mbar)	★
2	0 to 250 in H_2O (0 to 623 mbar)	★
3	0 to 1000 in H_2O (0 to 2,5 bar)	★

Table 22. Rosemount 2051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transmitter Output			
Standard			**Standard**
A	4–20 mA with digital signal based on HART Protocol		★
F	FOUNDATION fieldbus Protocol		★
Expanded			
M	Low-Power, 1-5 Vdc with Digital Signal Based on HART Protocol		
Transmitter Housing Material(3)		**Conduit Entry Size**	
Standard			**Standard**
A	Aluminum	1/2-14 NPT	★
B	Aluminum	M20 x 1.5	★
J	SST	1/2-14 NPT	★
K(4)	SST	M20 x 1.5	★
Expanded			
D	Aluminum	G1/2	
M(4)	SST	G1/2	
Transmitter Performance Class			
Standard			**Standard**
1	up to ±2.25% flow rate accuracy, 5:1 flow turndown, 2-year stability		★

Options (Include with selected model number)

Installation Accessories		
Standard		**Standard**
AB	ANSI Alignment Ring (150#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	★
AC	ANSI Alignment Ring (300#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	★
AD	ANSI Alignment Ring (600#) (Only required for 10-in. (250 mm) and 12-in. (300mm) line sizes)	★
DG	DIN Alignment Ring (PN16)	★
DH	DIN Alignment Ring (PN40)	★
DJ	DIN Alignment Ring (PN100)	★
Expanded		
JB	JIS Alignment Ring (10K)	
JR	JIS Alignment Ring (20K)	
JS	JIS Alignment Ring (40K)	
Remote Adapters		
Standard		**Standard**
FE	Flange Adapters 316 SST (1/2-in NPT)	★
High Temperature Application		
Expanded		
HT	Graphite Valve Packing (Tmax = 850 °F)	
Flow Calibration		
Expanded		
WC	Flow Calibration Certification (3 point)	
WD	Discharge Coefficient Verification (full 10 point)	
Pressure Testing		
Expanded		
P1	Hydrostatic Testing with Certificate	
Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection and Performance Certificate	★

Table 22. Rosemount 2051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Transmitter Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate for Transmitter	★
Quality Certification for Safety		
Standard		**Standard**
QS[5]	Prior-use certificate of FMEDA data	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204:2004 3.1	★
Code Conformance		
Expanded		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
J4	ANSI/ASME B31.8	
Materials Conformance		
Expanded		
J5[6]	NACE MR-0175 / ISO 15156	
Country Certification		
Expanded		
J1	Canadian Registration	
Product Certifications		
Standard		**Standard**
E1[4]	ATEX Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
E7[4]	IECEx Flameproof, Dust Ignition-proof	★
I1[4]	ATEX Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I6	CSA Intrinsically Safe	★
I7[4]	IECEx Intrinsic Safety	★
IA[7]	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	★
IE[7]	FM FISCO Intrinsically Safe	★
IF[7]	CSA FISCO Intrinsically Safe	★
IG[7]	IECEx FISCO Intrinsically Safe	★
K1[4]	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	★
K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	★
K7[4]	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	★
KA[4]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)	★
KC[4]	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[4]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)	★
N1[4]	ATEX Type n	★
N7[4]	IECEx Type n	★
ND[4]	ATEX Dust	★
Shipboard Approvals		
Standard		**Standard**
SBS	American Bureau of Shipping	★
Sensor Fill Fluid and O-ring Options		
Standard		**Standard**
L1	Inert Sensor Fill Fluid	★
L2	Graphite-Filled (PTFE) O-ring	★
LA	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★

Table 22. Rosemount 2051CFC Compact Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Digital Display		
Standard		**Standard**
M5	LCD Display	★
Transient Protection		
Standard		**Standard**
T1(8)	Transient terminal block	★
Manifold for Remote Mount Option		
Standard		**Standard**
F2	3-Valve Manifold, Stainless Steel	★
F6	5-Valve Manifold, Stainless Steel	★
Alarm Limit		
Standard		**Standard**
C4(9)(10)	NAMUR Alarm and Saturation Levels, High Alarm	★
CN(9)(10)	NAMUR Alarm and Saturation Levels, Low Alarm	★
Hardware Adjustments		
Standard		**Standard**
D4	Zero and Span Hardware Adjustments	★
Ground Screw		
Standard		**Standard**
V5(11)	External Ground Screw Assembly	★
Typical Model Number: 2051CFC D C S 060 N 065 0 3 2 A A 1 WC E5 M5		

(1) Not available for Primary Element Technology C.

(2) For 2-in. (50 mm) line sizes the Primary Element Type is 0.6 for Primary Element Technology Code C.

(3) Material specified is cast as follows: CF-8M is the cast version of 316 SST, CF-3M is the cast version of 316L SST. For housing, material is aluminum with polyurethane paint.

(4) Not available with Low Power Output Code M.

(5) Not available with Output Protocol code F.

(6) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(7) Only valid with FOUNDATION fieldbus Output Code F.

(8) The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(9) Not available with FOUNDATION fieldbus (Output Code F).

(10) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(11) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.



Rosemount 2051CFP Integral Orifice Flowmeter

Table 23. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
2051CFP	Integral Orifice Flowmeter	
Measurement Type		
Standard		**Standard**
D	Differential Pressure	★
Material Type		
Standard		**Standard**
S	316 SST	★
Line Size		
Standard		**Standard**
005	1/2-in. (15 mm)	★
010	1-in. (25 mm)	★
015	1 1/2-in. (40 mm)	★
Process Connection		
Standard		**Standard**
T1	NPT Female Body (Not Available with Remote Thermowell and RTD)	★
S1(1)	Socket Weld Body (Not Available with Remote Thermowell and RTD)	★
P1	Pipe Ends: NPT Threaded	★
P2	Pipe ends: Beveled	★
D1	Pipe Ends: Flanged, DIN PN16, slip-on	★
D2	Pipe Ends: Flanged, DIN PN40, slip-on	★
D3	Pipe Ends: Flanged, DIN PN100, slip-on	★
W1	Pipe Ends: Flanged, RF, ANSI Class 150, weld-neck	★
W3	Pipe Ends: Flanged, RF, ANSI Class 300, weld-neck	★
W6	Pipe Ends: Flanged, RF, ANSI Class 600, weld-neck	★
Expanded		
A1	Pipe Ends: Flanged, RF, ANSI Class 150, slip-on	
A3	Pipe Ends: Flanged, RF, ANSI Class 300, slip-on	
A6	Pipe Ends: Flanged, RF, ANSI Class 600, slip-on	
R1	Pipe Ends: Flanged, RTJ, ANSI Class 150, slip-on	
R3	Pipe Ends: Flanged, RTJ, ANSI Class 300, slip-on	
R6	Pipe Ends: Flanged, RTJ, ANSI Class 600, slip-on	
Orifice Plate Material		
Standard		**Standard**
S	316 SST	★
Bore Size Option		
Standard		**Standard**
0066	0.066-in. (1.68 mm) for 1/2-in. Pipe	★
0109	0.109-in. (2.77 mm) for 1/2-in. Pipe	★
0160	0.160-in. (4.06 mm) for 1/2-in. Pipe	★
0196	0.196-in. (4.98 mm) for 1/2-in. Pipe	★
0260	0.260-in. (6.60 mm) for 1/2-in. Pipe	★
0340	0.340-in. (8.64 mm) for 1/2-in. Pipe	★
0150	0.150-in. (3.81 mm) for 1-in. Pipe	★
0250	0.250-in. (6.35 mm) for 1-in. Pipe	★
0345	0.345-in. (8.76 mm) for 1-in. Pipe	★
0500	0.500-in. (12.70 mm) for 1-in. Pipe	★

Table 23. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

0630	0.630-in. (16.00 mm) for 1-in. Pipe		★
0800	0.800-in. (20.32 mm) for 1-in. Pipe		★
0295	0.295-in. (7.49 mm) for 1 1/2-in. Pipe		★
0376	0.376-in. (9.55 mm) for 1 1/2-in. Pipe		★
0512	0.512-in. (13.00 mm) for 1 1/2-in. Pipe		★
0748	0.748-in. (19.00 mm) for 1 1/2-in. Pipe		★
1022	1.022-in. (25.96 mm) for 1 1/2-in. Pipe		★
1184	1.184-in. (30.07 mm) for 1 1/2-in. Pipe		★
Expanded			
0010	0.010-in. (0.25 mm) for 1/2-in. Pipe		
0014	0.014-in. (0.36 mm) for 1/2-in. Pipe		
0020	0.020-in. (0.51 mm) for 1/2-in. Pipe		
0034	0.034-in. (0.86 mm) for 1/2-in. Pipe		
Transmitter Connection Platform			
Standard			**Standard**
D3	Direct-mount, 3-Valve Manifold, SST		★
D5	Direct-mount, 5-Valve Manifold, SST		★
R3	Remote-mount, 3-Valve Manifold, SST		★
R5	Remote-mount, 5-Valve Manifold, SST		★
Differential Pressure Ranges			
Standard			**Standard**
1	0 to 25 in H_2O (0 to 62,3 mbar)		★
2	0 to 250 in H_2O (0 to 623 mbar)		★
3	0 to 1000 in H_2O (0 to 2,5 bar)		★
Transmitter Output			
Standard			**Standard**
A	4–20 mA with digital signal based on HART protocol		★
F	FOUNDATION fieldbus protocol		★
Expanded			
M	Low-Power, 1-5 Vdc with Digital Signal Based on HART Protocol		
Transmitter Housing Material(2)		**Conduit Entry Size**	
Standard			**Standard**
A	Aluminum	1/2-14 NPT	★
B	Aluminum	M20 x 1.5	★
J	SST	1/2-14 NPT	★
K(3)	SST	M20 x 1.5	★
Expanded			
D	Aluminum	G1/2	
M(3)	SST	G1/2	
Transmitter Performance Class			
Standard			**Standard**
1	up to ±2.25% flow rate accuracy, 5:1 flow turndown, 2-year stability		★

Options (Include with selected model number)

Temperature Sensor		
Expanded		
RT(4)	Thermowell and RTD	
Optional Connection		
Standard		**Standard**
G1	DIN 19213 Transmitter Connection	★
Pressure Testing		
Expanded		
P1(5)	Hydrostatic Testing with Certificate	

Table 23. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (Section 11.4)	
Material Testing		
Expanded		
V1	Dye Penetrant Exam	
Material Examination		
Expanded		
V2	Radiographic Examination	
Flow Calibration		
Expanded		
WD(6)	Discharge Coefficient Verification	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection and Performance Certificate	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204:2004 3.1	★
Code Conformance		
Expanded		
J2(7)	ANSI/ASME B31.1	
J3(7)	ANSI/ASME B31.3	
J4(7)	ANSI/ASME B31.8	
Materials Conformance		
Expanded		
J5(8)	NACE MR-0175 / ISO 15156	
Country Certification		
Standard		**Standard**
J6	European Pressure Directive (PED)	★
Expanded		
J1	Canadian Registration	
Transmitter Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate for Transmitter	★
Quality Certification for Safety		
Standard		**Standard**
QS(9)	Prior-use Certificate of FMEDA data	★
Product Certifications		
Standard		**Standard**
E1(10)	ATEX Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
E7(10)	IECEx Flameproof, Dust Ignition-proof	★
I1(10)	ATEX Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I6	CSA Intrinsically Safe	★
I7(10)	IECEx Intrinsic Safety	★
IA(11)	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	★
IE(11)	FM FISCO Intrinsically Safe	★
IF(11)	CSA FISCO Intrinsically Safe	★
IG(11)	IECEx FISCO Intrinsically Safe	★
K1(10)	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★

Table 23. Rosemount 2051CFP Integral Orifice Flowmeter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5 and I5)	★
K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E6 and I6)	★
K7(10)	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n (combination of E7, I7, and N7)	★
KA(10)	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2 (combination of E5, E6, I5, and I6)	★
KC(10)	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD(10)	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of E5, I5, E6, I6, E1, and I1)	★
N1(10)	ATEX Type n	★
N7(10)	IECEx Type n	★
ND(10)	ATEX Dust	★
Shipboard Approvals		
Standard		**Standard**
SBS	American Bureau of Shipping	★
Sensor Fill Fluid and O-ring Options		
Standard		**Standard**
L1	Inert Sensor Fill Fluid	★
L2	Graphite-Filled (PTFE) O-ring	★
LA	Inert Sensor Fill Fluid and Graphite-Filled (PTFE) O-ring	★
Digital Display		
Standard		**Standard**
M5	LCD Display	★
Transient Protection		
Standard		**Standard**
T1(12)	Transient terminal block	★
Alarm Limit		
Standard		**Standard**
C4(13)(14)	NAMUR Alarm and Saturation Levels, High Alarm	★
CN(13)(14)	NAMUR Alarm and Saturation Levels, Low Alarm	★
Hardware Adjustments		
Standard		**Standard**
D4	Zero and Span Hardware Adjustments	★
Ground Screw		
Standard		**Standard**
V5(15)	External Ground Screw Assembly	★
Typical Model Number: 2051CFP D S 010 W1 S 0500 D3 2 A A 1 E5 M5		

(1) To improve pipe perpendicularity for gasket sealing, socket diameter is smaller than standard pipe O.D.

(2) Material specified is cast as follows: CF-8M is the cast version of 316 SST, CF-3M is the cast version of 316L SST. For housing, material is aluminum with polyurethane paint.

(3) Not available with Low Power Output Code M.

(4) Thermowell Material is the same as the body material.

(5) Does not apply to Process Connection codes T1 and S1.

(6) Not available for bore sizes 0010, 0014, 0020, or 0034.

(7) Not available with DIN Process Connection codes D1, D2, or D3.

(8) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(9) Not available with Output Protocol code F.

(10) Not available with Low Power Output Code M.

(11) Only valid with FOUNDATION fieldbus Output Code F.

(12) The T1 option is not needed with FISCO Product Certifications, transient protection is included with the FISCO Product Certification code IA.

(13) Not available with FOUNDATION fieldbus (Output Code F).

(14) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(15) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.

2051CF Specifications

2051CF PERFORMANCE SPECIFICATIONS

Performance assumptions include: measured pipe I.D, transmitter is trimmed for optimum flow accuracy, and performance is dependent on application parameters.

Table 24. Flow Performance - Flow Reference Accuracy(1)

2051CFA Annubar Flowmeter		
Ranges 2-3		±2.30% of Flow Rate at 5:1 flow turndown
2051CFC Compact Orifice Flowmeter – Conditioning Option C		
Ranges 2-3	β =0.4	±2.25% of Flow Rate at 5:1 flow turndown
	β =0.65	±2.45% of Flow Rate at 5:1 flow turndown
2051CFC Compact Orifice Flowmeter – Orifice Type Option P(2)		
Ranges 2-3	β =0.4	±2.50% of Flow Rate at 5:1 flow turndown
	β =0.65	±2.50% of Flow Rate at 5:1 flow turndown
2051CFP Integral Orifice Flowmeter		
Ranges 2-3	β <0.1	±3.10% of Flow Rate at 5:1 flow turndown
	0.1< β <0.2	±2.75% of Flow Rate at 5:1 flow turndown
	0.2< β <0.6	±2.25% of Flow Rate at 5:1 flow turndown
	0.6< β <0.8	±3.00% of Flow Rate at 5:1 flow turndown

(1) Range 1 flowmeters may experience an additional uncertainty up to 0.9%. Consult your Emerson Process Management Representative for exact specifications.

(2) For smaller line sizes, see Rosemount Compact Orifice

2051CF FUNCTIONAL SPECIFICATIONS

Range and Sensor Limits

Range	2051CF Minimum Span	Range and Sensor Limits
1	0.5 inH_2O (1,2 mbar)	0 to 25 inH_2O (62,3 mbar)
2	2.5 inH_2O (6,2 mbar)	0 to 250 inH_2O (0,62 bar)
3	10 inH_2O (24,9 mbar)	0 to 1000 inH_2O (2,49 bar)

Service

Liquid, gas, and steam applications

Protocols

4–20 mA HART (Output Code A)

Output

Two-wire 4–20 mA, user-selectable for linear or square root output. Digital process variable superimposed on 4–20 mA signal, available to any host that conforms to the *HART* protocol.

Power Supply

External power supply required. Standard transmitter operates on 10.5 to 42.4 Vdc with no load.

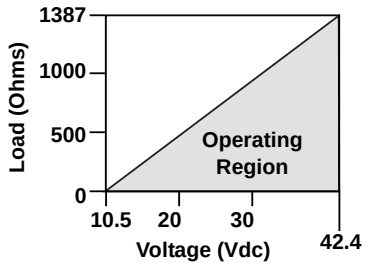
Turn-On Time

Performance within specifications less than 2.0 seconds after power is applied to the transmitter.

Load Limitations

Maximum loop resistance is determined by the voltage level of the external power supply, as described by:

Maximum Loop Resistance = 43.5 * (Power Supply Voltage – 10.5)



The Field Communicator requires a minimum loop resistance of 250Ω for communication.

FOUNDATION fieldbus (Output Code F)

Power Supply

External power supply required; transmitters operate on 9.0 to 32.0 Vdc transmitter terminal voltage.

Current Draw

17.5 mA for all configurations (including LCD display option)

Turn-On Time

Performance within specifications less than 20.0 seconds after power is applied to the transmitter.

FOUNDATION fieldbus Function Block Execution Times

Block	Execution Time
Resource	-
Transducer	-
LCD Block	-
Analog Input 1, 2	30 milliseconds
PID	45 milliseconds

FOUNDATION fieldbus Parameters

Schedule Entries	7 (max.)
Links	20 (max.)
Virtual Communications Relationships (VCR)	12 (max.)

Standard Function Blocks

Resource Block

- Contains hardware, electronics, and diagnostic information.

Transducer Block

- Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

LCD Block

- Configures the local display.

2 Analog Input Blocks

- Processes the measurements for input into other function blocks. The output value is in engineering units or custom and contains a status indicating measurement quality.

PID Block

- Contains all logic to perform PID control in the field including cascade and feedforward.

Backup Link Active Scheduler (LAS)

The transmitter can function as a Link Active Scheduler if the current link master device fails or is removed from the segment.

1-5 Vdc HART Low Power (Output Code M)

Output

Three wire 1–5 Vdc output, user-selectable for linear or square root output. Digital process variable superimposed on voltage signal, available to any host conforming to the *HART* protocol.

Power Supply

External power supply required. Standard transmitter operates on 9 to 28 Vdc with no load.

Power Consumption

3.0 mA, 27–84 mW

Output Load

100 kΩ or greater

Turn-On Time

Performance within specifications less than 2.0 seconds after power is applied to the transmitter.

Overpressure Limits

Transmitters withstand the following limits without damage:

2051CF Flowmeters

- Ranges 2–5: 3626 psig (250 bar)
  4500 psig (310,3 bar) for option code P9
- Range 1: 2000 psig (137,9 bar)

Static Pressure Limit

- Operates within specifications between static line pressures of -14.2 psig (0.034 bar) and 3626 psig (250 bar)
- Range 1: 0.5 psia to 2000 psig (34 mbar and 137,9 bar)

Burst Pressure Limits

2051CF

- 10000 psig (689,5 bar)

Temperature Limits

For 2051CFA Temperature Limits, see page DP Flow-96.
For 2051CFC Temperature Limits, see page DP Flow-108.
For 2051CFP Temperature Limits, see page DP Flow-116.

Transmitter Temperature Limits:

Ambient(1)

–40 to 185 °F (–40 to 85 °C)

With LCD display(2): –40 to 175 °F (–40 to 80 °C)

Storage(1)

–50 to 230 °F (–46 to 110 °C)

With LCD display: –40 to 185 °F (–40 to 85 °C)

(1) Limits for silicone fill fluid only.

(2) LCD display may not be readable and LCD updates will be slower at temperatures below -4 °F (-20 °C).

Process Temperature Limits

At atmospheric pressures and above.

Table 25. 2051 Process Temperature Limits

2051C	
Silicone Fill Sensor(1)	–40 to 250 °F (–40 to 121 °C)
Inert Fill Sensor(1)	–40 to 185 °F (–40 to 85 °C)

(1) Process temperatures above 185 °F (85 °C) require derating the ambient limits by a 1.5:1 ratio.

Humidity Limits

0–100% relative humidity

Volumetric Displacement

Less than 0.005 in^3 (0,08 cm^3)

Damping

Analog output response to a step input change is user-selectable from 0 to 25.6 seconds for one time constant. This software damping is in addition to sensor module response time.

Failure Mode Alarm

If self-diagnostics detect a sensor or microprocessor failure, the analog signal is driven either high or low to alert the user. High or low failure mode is user-selectable with a jumper on the transmitter. The values to which the transmitter drives its output in failure mode depend on whether it is factory-configured to *standard* or *NAMUR-compliant* operation. The values for each are as follows:

Standard Operation			
Output Code	**Linear Output**	**Fail High**	**Fail Low**
A	3.9 ≤ I ≤ 20.8	I ≥ 21.75 mA	I ≤ 3.75 mA
M	0.97 ≤ V ≤ 5.2	V ≥ 5.4 V	V ≤ 0.95 V

NAMUR-Compliant Operation			
Output Code	**Linear Output**	**Fail High**	**Fail Low**
A	3.8 ≤ I ≤ 20.5	I ≥ 22.5 mA	I ≤ 3.6 mA

Output Code F

If self-diagnostics detect a gross transmitter failure, that information gets passed as a status along with the process variable.

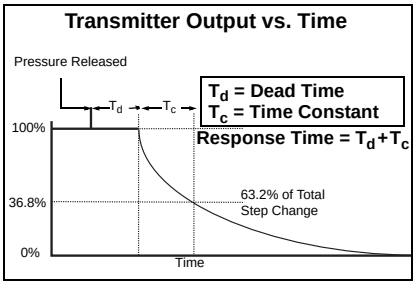
Long Term Stability

Models	**Standard**	**Performance Option, P8**
2051CF		
Range 1 (CF)	±0.2% of URL for 1 year, Reference Stability	
Ranges 2-5	±0.1% of URL for 2 years, Operating Stability	±0.125% of URL for 5 years, Operating Stability

Dynamic Performance

	4-20 mA HART[1] 1-5 Vdc HART Low Power	**FOUNDATION fieldbus[3]**	**Typical HART Transmitter Response Time**
Total Response Time (T_d + T_c)[2]:			
2051CF, Range 3-5:	115 milliseconds	152 milliseconds	
Range 1:	270 milliseconds	307 milliseconds	
Range 2:	130 milliseconds	152 milliseconds	
Dead Time (Td)	60 milliseconds (nominal)	97 milliseconds	
Update Rate	22 times per second	22 times per second	

(1) Dead time and update rate apply to all models and ranges; analog output only
(2) Nominal total response time at 75 °F (24 °C) reference conditions.
(3) Transmitter fieldbus output only, segment macro-cycle not included.



Vibration Effect

Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field or pipeline with high vibration level (10-60 Hz 0.21mm displacement peak amplitude / 60-2000 Hz 3g).

2051CF PHYSICAL SPECIFICATIONS

Electrical Connections

1/2–14 NPT, G1/2, and M20 × 1.5 conduit.

2051CF Process-Wetted Parts

For 2051CFA wetted parts, see “Annubar Sensor Material” on page 97.
For 2051CFC wetted parts, see “Material of Construction” on page 108.
For 2051CFP wetted parts, see “Material of Construction” on page 116.

Process Isolating Diaphragms

316L SST, Alloy C-276, or Tantalum

Non-Wetted Parts for 2051CF

Electronics Housing

Low-copper aluminum or CF-8M (Cast version of 316 SST).
Enclosure Type 4X, IP 65, IP 66, IP68

Coplanar Sensor Module Housing

CF-3M (Cast version of 316L SST)

Bolts

ASTM A449, Type 1 (zinc-cobalt plated carbon steel)
ASTM F593G, Condition CW1 (Austenitic 316 SST)
ASTM A193, Grade B7M (zinc plated alloy steel)

Sensor Module Fill Fluid

Silicone oil (D.C. 200) or Fluorocarbon oil (Halocarbon or Fluorinert® FC-43 for 2051T)

Paint

Polyurethane

Cover O-rings

Nitirile Butadiene (NBR)

2051CF Product Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA
Emerson Process Management GmbH & Co. — Wessling, Germany
Emerson Process Management Asia Pacific Private Limited — Singapore
Beijing Rosemount Far East Instrument Co., LTD — Beijing, China
Emerson Process Management LTDA — Sorocaba, Brazil
Emerson Process Management (India) Pvt. Ltd — Daman, India

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

ATEX Directive (94/9/EC)
All 2051 transmitters comply with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)
2051CG2, 3, 4, 5; 2051CD2, 3, 4, 5 (also with P9 option)
— QS Certificate of Assessment - EC No. 59552-2009-CE-HOU-DNV
Module H Conformity Assessment

All other 2051 Pressure Transmitters
— Sound Engineering Practice

Transmitter Attachments: Diaphragm Seal - Process Flange - Manifold
— Sound Engineering Practice

Electro Magnetic Compatibility (EMC) (2004/108/EC)
All 2051 Pressure Transmitters meet all of the requirements of EN 61326 and NAMUR NE-21.

Ordinary Location Certification for Factory Mutual
As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

2051CF HART PROTOCOL

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II, Division 1, Groups E, F, and G. Dust-Ignition-Proof for Class III, Division 1.
T5 (Ta = 85 °C), Factory Sealed, Enclosure Type 4X

I5 Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 when connected per Rosemount drawing 02051-1009; Non-incendive for Class I, Division 2, Groups A, B, C, and D.
Temperature Code:T4 (Ta = 40 °C), T3 (Ta = 85 °C), Enclosure Type 4X
For input parameters see control drawing 02051-1009.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

E6 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D for indoor and outdoor hazardous locations. Enclosure type 4X, factory sealed

I6 Intrinsically safe approval. Intrinsically safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount drawing 02051-1008. Temperature Code T3C.
Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D hazardous locations. Enclosure type 4X, factory sealed
For input parameters see control drawing 02051-1008.

European Certifications

I1 ATEX Intrinsic Safety
Certification No. Baseefa08ATEX0129X Ex II 1 G
Ex ia IIC T4 ($-60 \leq T_a \leq +70$ °C)
IP66 IP68
CE 1180

Table 26. Input Parameters

U_i = 30 V
I_i = 200 mA
P_i = 1.0 W
C_i = 0.012 µF
L_i = 10 µH

Table 27. RTD Assembly (2051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i =0.63 W

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the apparatus.

N1 ATEX Type n
Certification No. Baseefa08ATEX0130X ⟨Ex⟩ II 3 G
Ex nAnL IIC T4 (–40 ≤ T_a ≤ +70 °C)
U_i = 42.4 Vdc max
IP66
CE

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding a 500 V r.m.s. test to case. This must be taken into account on any installation in which it is used, for example by assuring that the supply to the apparatus is galvanically isolated.
The enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact or abrasion located in Zone 0.

E1 ATEX Flame-Proof
Certification No. KEMA 08ATEX0090X ⟨Ex⟩ II 1/2 G
Ex d IIC T6 (–50 ≤ T_a ≤ 65 °C)
Ex d IIC T5 (–50 ≤ T_a ≤ 80 °C)
IP66
CE 1180
Vmax = 42.4 Vdc

Special Conditions for Safe Use (X):
The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
The device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

ND ATEX Dust
Certification No. Baseefa08ATEX0182X ⟨Ex⟩ II 1 D
Dust Rating: II 1 D Ex tD A20 T115 °C (-20 °C ≤ T_a ≤ 85 °C)
IP66 IP68
Vmax = 42.4 Vdc
A = 22 mA
CE 1180

Special Conditions for Safe Use (X):
If the equipment is fitted with an optional 90 V transient suppressor, it is incapable of isolation from earth test and this must be taken into account during installation.

IECEx Certifications

I7 IECEx Intrinsic Safety
Certification No. IECExBAS08.0045X II 1 G
Ex ia IIC T4 (–60 ≤ T_a ≤ +70 °C)
CE 1180

Table 28. Input Parameters

U_i = 30 V
I_i = 200 mA
P_i = 1.0 W
C_i = 0.012 µF

Table 29. RTD Assembly (2051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63 W

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of IEC60079-11. This must be taken into account when installing the apparatus.

E7 IECEx Explosion-Proof (Flame-Proof)
Certification No. IECEx KEM 08.0024X II 1/2 G
Ex d IIC T6 (–50 ≤ T_a ≤ 65 °C)
Ex d IIC T5 (–50 ≤ T_a ≤ 80 °C)
CE 1180
Vmax = 42.4 Vdc

Special Conditions for Safe Use (X):
The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
The device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

N7 IECEx Type n
Certification No. IECExBAS08.0046X II 3 G
Ex nAnL IIC T4 (–40 ≤ T_a ≤ +70 °C)
U_i = 42.4 Vdc max
CE

Special Conditions for Safe Use (X):

When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding a 500 V r.m.s. test to case. This must be taken into account on any installation in which it is used, for example by assuring that the supply to the apparatus is galvanically isolated.

TIIS Certifications

E4 TIIS Flame-Proof
Ex d IIC T6

Inmetro Certifications

E2 Flame-Proof
BR-Ex d IIC T6/T5

I2 Intrinsic Safety
BR-Ex ia IIC T4

GOST - Russia Certifications

IM Intrinsic Safety
Certificate Pending

EM Flame-Proof
Certificate Pending

China (NEPSI) Certifications

E3 Flame-Proof
Ex d IIC T5/T6

I3 Intrinsic Safety
Ex ia IIC T4

CCOE Certifications

IW Intrinsic Safety
Ex ia IIC T4

EW Flame-Proof
Ex d IIC T5 or T6

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K1 E1, I1, N1, and ND combination
K4 E4 and I4 combination
K5 E5 and I5 combination
K6 I6 and E6 combination
K7 E7, I7, and N7 combination
KA E1, I1, E6, and I6 combination
KB E5, I5, E6, and I6 combination
KC E1, I1, E5, and I5 combination
KD E1, I1, E5, I5, E6, and I6 combination

2051CF FIELDBUS PROTOCOL

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II, Division 1, Groups E, F, and G. Dust-Ignition-Proof for Class III, Division 1.

T5 (Ta = 85 °C), Factory Sealed, Enclosure Type 4X

I5/IE Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 when connected per Rosemount drawing 02051-1009; Non-incendive for Class I, Division 2, Groups A, B, C, and D.

Temperature Code:T4 (Ta = 40 °C), T3 (Ta = 85 °C), Enclosure Type 4X
For input parameters see control drawing 02051-1009.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

E6 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D for indoor and outdoor hazardous locations. Enclosure type 4X, factory sealed

I6/IF Intrinsically safe approval. Intrinsically safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount drawings 02051-1008. Temperature Code T3C.
Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D hazardous locations. Enclosure type 4X, factory sealed
For input parameters see control drawing 02051-1008.

European Certifications

I1 ATEX Intrinsic Safety
Certification No. Baseefa08ATEX0129X ⟨Ex⟩ II 1 G
Ex ia IIC T4 (T_{amb} = –60 to +60 °C)
IP66
CE 1180

Table 30. Input Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.3 W
C_i = 0 µF
L_i = 0 uH

Table 31. RTD Assembly (2051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63 W

Special Conditions for Safe Use (X):
The device is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the apparatus.

IA ATEX FISCO Intrinsic Safety
Certification No. Baseefa08ATEX0129X ⟨Ex⟩ II 1 G
Ex ia IIC T4 (T_{amb} = –60 to +60 °C)
IP66
CE 1180

Table 32. Input Parameters

U_i = 17.5 V
I_i = 380 mA
P_i = 5.32 W
C_i = ≤ 5 µF
L_i = ≤ 10 µH

Special Conditions for Safe Use (X):
The device is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the apparatus.

N1 ATEX Type n
Certification No. Baseefa08ATEX0130X ⟨Ex⟩ II 3 G
Ex nAnL IIC T4 (T_{amb} = –40 to +70 °C)
U_i = 32 Vdc max
IP66

Special Conditions for Safe Use (X):
The device is not capable of withstanding the 500 V insulation test required by Clause 6.8.1 of EN60079-15. This must be taken into account when installing the apparatus.

E1 ATEX Flame-Proof
Certification No. KEMA 08ATEX0090X ⟨Ex⟩ II 1/2 G
Ex d IIC T6 (T_{amb} = –50 to 65 °C)
Ex d IIC T5 (T_{amb} = –50 to 80 °C)
IP66
CE 1180
Vmax = 32 Vdc

Special Conditions for Safe Use (X):
The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
The device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

ND ATEX Dust
Certification No. Baseefa08ATEX0182X ⟨Ex⟩ II 1 D
Dust Rating: II 1 D Ex tD A20 T115 °C (-20 °C ≤ T_a ≤ 85 °C)
IP66 IP68
Vmax = 42.4 Vdc
A = 22 mA
CE 1180

Special Conditions for Safe Use (X):
If the equipment is fitted with an optional 90 V transient suppressor, it is incapable of isolation from earth test and this must be taken into account during installation.

IECEx Certifications

I7 IECEx Intrinsic Safety
Certification No. IECExBAS08.0045X II 1 G
Ex ia IIC T4 (T_{amb} = –60 to +60 °C)
IP66
CE 1180

Table 33. Input Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.3 W
C_i = 0 µF

Table 34. RTD Assembly (2051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63 W

Special Conditions for Safe Use (X):
The device is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of IEC60079-11. This must be taken into account when installing the apparatus.

IG IECEx FISCO Intrinsic Safety
Certification No. IECExBAS08.0045X Ex II 1 G
Ex ia IIC T4 (T_{amb} = –60 to +60 °C)
IP66
CE 1180

Table 35. Input Parameters

U_i = 17.5 V
I_i = 380 mA
P_i = 5.32 W
C_i = ≤ 5 µF
L_i = ≤ 10 µH

Special Conditions for Safe Use (X):
The device is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of IEC 60079-11. This must be taken into account when installing the apparatus.

E7 IECEx Explosion-Proof (Flame-Proof)
Certification No. IECEx KEM 08.0024X II 1/2 GD
Ex d IIC T6 (T_{amb} = –50 to 65 °C)
Ex d IIC T5 (T_{amb} = –50 to 80 °C)
IP66
CE 1180
Vmax = 32 Vdc

Special Conditions for Safe Use (X):
The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
The device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

N7 IECEx Type n
Certification No. IECExBAS08.0046X II 3 G
Ex nAnL IIC T4 (T_{amb} = –40 to +70 °C)
U_i = 32 Vdc max

Special Conditions for Safe Use (X):

The device is not capable of withstanding the 500 V insulation test required by Clause 6.8.1 of IEC60079-15. This must be taken into account when installing the device.

TIIS Certifications

E4 TIIS Flame-Proof
Ex d IIC T6

Inmetro Certifications

E2 Flame-Proof
Certificate No. CEPEL-EX-1767/09X
BR-Ex d IIC T6/T5

I2 Intrinsic Safety
Certificate No. CEPEL-EX-1768/09X
BR-Ex ia IIC T4

IB FISCO Intrinsic Safety
Certificate No. CEPEL-EX-1768/09X
BR-Ex ia IIC T4

GOST - Russia Certifications

IM Intrinsic Safety
Certificate Pending

EM Flame-Proof
Certificate Pending

China (NEPSI) Certifications

E3 Flame-Proof
Ex d IIC T5/T6

I3 Intrinsic Safety
Ex ia IIC T4

CCOE Certifications

IW Intrinsic Safety
Ex ia IIC T4

EW Flame-Proof
Ex d IIC T5 or T6

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K1 **E1, I1, N1,** and **ND** combination

K4 **E4** and **I4** combination

K5 **E5** and **I5** combination

K6 **I6** and **E6** combination

K7 **E7, I7,** and **N7** combination

KA **E1, I1, E6,** and **I6** combination

KB **E5, I5, E6,** and **I6** combination

KC **E1, I1, E5,** and **I5** combination

KD **E1, I1, E5, I5, E6,** and **I6** combination

Rosemount 485 Annubar Primary Element



Rosemount 485 Annubar Primary Element utilizes a T-shaped sensor design that offers best in class accuracy and performance.

- Up to 0.75% Flow Rate Accuracy
- Lowest permanent pressure loss of any DP Flowmeter
- Available in 2 to 96-in. (50 - 2400 mm) line sizes

Additional Information
Specifications: page DP Flow-96
Dimensional Drawings: page DP Flow-148
Installation and Flowmeter Orientation: page DP Flow-166

Table 36. Rosemount 485 Annubar Primary Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	DP Flow Primary Type	
485	Annubar Primary Element	
Fluid Type		
Standard		**Standard**
L	Liquid	★
G	Gas	★
S	Steam	★
Line Size		
Standard		**Standard**
020	2-in. (50 mm)	★
025	2 1/2-in. (63.5 mm)	★
030	3-in. (80 mm)	★
035	3 1/2-in. (89 mm)	★
040	4-in. (100 mm)	★
050	5-in. (125 mm)	★
060	6-in. (150 mm)	★
070	7-in. (175 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
Expanded		
140	14-in. (350 mm)	
160	16-in. (400 mm)	
180	18-in. (450 mm)	
200	20-in. (500 mm)	
240	24-in. (600 mm)	
300	30-in. (750 mm)	
360	36-in. (900 mm)	
420	42-in. (1066 mm)	
480	48-in. (1210 mm)	
600	60-in. (1520 mm)	
720	72-in. (1820 mm)	
780	78-in. (1950 mm)	
840	84-in. (2100 mm)	
900	90-in. (2250 mm)	
960	96-in. (2400 mm)	

Table 36. Rosemount 485 Annubar Primary Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Pipe I.D. Range (See "Pipe I.D. Range Code" on page 165)		
Standard		**Standard**
C	Range C from the Pipe I.D. table	★
D	Range D from the Pipe I.D. table	★
Expanded		
A	Range A from the Pipe I.D. table	
B	Range B from the Pipe I.D. table	
E	Range E from the Pipe I.D. table	
Z	Non-standard Pipe I.D. Range or Above 12-in. Line Size	
Pipe Material / Assembly Material		
Standard		**Standard**
C	Carbon steel (A105)	★
S	316 Stainless Steel	★
0[(1)]	No mounting (Customer Supplied)	★
Expanded		
G	Chrome-Moly Grade F-11	
N	Chrome-Moly Grade F-22	
J	Chrome-Moly Grade F-91	
Piping Orientation		
Standard		**Standard**
H	Horizontal Piping	★
D	Vertical Piping with Downwards Flow	★
U	Vertical Piping with Upwards Flow	★
Annubar Type		
Standard		**Standard**
P	Pak-Lok	★
F	Flanged with opposite side support	★
Expanded		
L	Flange-Lok	
G	Gear-Drive Flo-Tap	
M	Manual Flo-Tap	
Sensor Material		
Standard		**Standard**
S	316 Stainless Steel	★
Expanded		
H	Alloy C-276	
Sensor Size		
Standard		**Standard**
1	Sensor size 1 — Line sizes 2-in. (50 mm) to 8-in. (200 mm)	★
2	Sensor size 2 — Line sizes 6-in. (150 mm) to 96-in. (2400 mm)	★
3	Sensor size 3 — Line sizes greater than 12-in. (300 mm)	★
Mounting Type		
Standard		**Standard**
T1	Compression/Threaded Connection	★
A1	150# RF ANSI	★
A3	300# RF ANSI	★
A6	600# RF ANSI	★
D1	DN PN16 Flange	★
D3	DN PN40 Flange	★
D6	DN PN100 Flange	★

Table 36. Rosemount 485 Annubar Primary Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded				
A9[2]	900# RF ANSI			
AF[2]	1500# RF ANSI			
AT[2]	2500 # RF ANSI			
R1	150# RTJ Flange			
R3	300# RTJ Flange			
R6	600# RTJ Flange			
R9[2]	900# RTJ Flange			
RF[2]	1500# RTJ Flange			
RT[2]	2500# RTJ Flange			
Opposite Side Support or Packing Gland				
Standard				**Standard**
0	No opposite side support or Packing Gland (Required for Pak-Lok and Flange-Lok models)			★
	Opposite Side Support – Required for Flanged Models			
C	NPT Threaded Opposite Support Assembly – Extended Tip			★
D	Welded Opposite Support Assembly – Extended Tip			★
	Packing Gland – Required for Flo-Tap Models			
Expanded				
	Packing Gland Material	*Rod Material*	*Packing Material*	
J	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	PTFE	
K	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	PTFE	
L	Stainless Steel Packing Gland / Cage Nipple	Carbon Steel	Graphite	
N	Stainless Steel Packing Gland / Cage Nipple	Stainless Steel	Graphite	
R	Alloy C-276 Packing Gland / Cage Nipple	Stainless Steel	Graphite	
Isolation Valve for Flo-Tap Models				
Standard				**Standard**
0[1]	Not Applicable or Customer Supplied			★
Expanded				
1	Gate Valve, Carbon Steel			
2	Gate Valve, Stainless Steel			
5	Ball Valve, Carbon Steel			
6	Ball Valve, Stainless Steel			
Temperature Measurement				
Standard				**Standard**
T	Integral RTD – not available with Flanged model greater than class 600#			★
0	No Temperature Sensor			★
Expanded				
R	Remote Thermowell and RTD			
Transmitter Connection Platform				
Standard				**Standard**
3	Direct-mount, Integral 3-valve manifold– not available with Flanged model greater than class 600			★
5	Direct -mount, 5-valve Manifold– not available with Flanged model greater than class 600			★
7	Remote-mount NPT Connections			★
Expanded				
6	Direct-mount, High Temperature 5-valve Manifold– not available with Flanged model greater than class 600			
8	Remote-mount SW Connections			

Options (Include with selected model number)

Pressure Testing		
Expanded		
P1[3]	Hydrostatic Testing with Certificate	
PX[3]	Extended Hydrostatic Testing	

Table 36. Rosemount 485 Annubar Primary Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 level D (section 11.4)	
Material Testing		
Expanded		
V1	Dye Penetrant Exam	
Material Examination		
Expanded		
V2	Radiographic Examination	
Flow Calibration		
Expanded		
W1	Flow Calibration (Average K)	
WZ	Special Calibration	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection & Performance Certificate	★
Surface Finish		
Standard		**Standard**
RL	Surface finish for Low Pipe Reynolds Number in Gas & Steam	★
RH	Surface finish for High Pipe Reynolds Number in Liquid	★
Material Traceability Certification		
Standard		**Standard**
Q8[4]	Material Traceability Certificate per EN 10204:2004 3.1	★
Code Conformance		
Expanded		
J2[5]	ANSI/ASME B31.1	
J3[5]	ANSI/ASME B31.3	
Materials Conformance		
Expanded		
J5[6]	NACE MR-0175 / ISO 15156	
Country Certification		
Standard		**Standard**
J6	European Pressure Directive (PED)	★
Expanded		
J1	Canadian Registration	
Installed in Flanged Pipe Spool Section		
Expanded		
H3	150# Flanged Connection with Rosemount Standard Length and Schedule	
H4	300# Flanged Connection with Rosemount Standard Length and Schedule	
H5	600# Flanged Connection with Rosemount Standard Length and Schedule	
Instrument Connections for Remote Mount Option		
Standard		**Standard**
G2	Needle Valves, Stainless Steel	★
G6	OS&Y Gate Valve, Stainless Steel	★
Expanded		
G1	Needle Valves, Carbon Steel	
G3	Needle Valves, Alloy C-276	
G5	OS&Y Gate Valve, Carbon Steel	
G7	OS&Y Gate Valve, Alloy C-276	
Special Shipment		
Standard		**Standard**
Y1	Mounting Hardware Shipped Separately	★

Table 36. Rosemount 485 Annubar Primary Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Attach To		
Expanded		
H1	Attach to Transmitter	
Special Dimensions		
Expanded		
VM	Variable Mounting	
VT	Variable Tip	
VS	Variable length Spool Section	
V9	Special Dimension	
Typical Model Number: 485 L 060 D C H P S 2 T1 0 0 0 3		

(1) Provide the "A" dimension for Flanged (page DP Flow-150), Flange-Lok (page DP Flow-149), and Threaded Flo-Tap models (page DP Flow-153). Provide the "B" dimension for Flange Flo-Tap models (page DP Flow-151).

(2) Available in remote mount applications only.

(3) Applies to flow element only, mounting hardware not tested.

(4) Instrument Connections for Remote Mount Options and Isolation Valves for Flo-tap Models are not included in the Material Traceability Certification.

(5) Not available with Transmitter Connection Platform 6.

(6) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

485 SPECIFICATIONS

485 Performance Specifications

Performance Statement Assumptions

Measured pipe I.D. (or Measured pipe cross sectional area)

Discharge Coefficient Factor

±0.75% of flow rate

Repeatability

±0.1%

Line Sizes

- Sensor Size 1: 2-in. to 8-in. (50 to 200 mm)
- Sensor Size 2: 6-in. to 96-in. (150 to 2400 mm)
- Sensor Size 3: 12-in. to 96-in. (300 to 2400 mm)

NOTE
Some mounting types are not available in larger line sizes.

Table 37. Reynolds Number and Probe Width

Sensor Size	Minimum Rod Reynolds Number (R_d)	Probe Width ($_d$) (inches)
1	6500	0.590-in. (14.99 mm)
2	12500	1.060-in. (26.92 mm)
3	25000	1.935-in. (49.15 mm)

$$R_d = \frac{d \times v \times p}{\mu}$$

Where
d = Probe width (feet)
v = Velocity of fluid (ft/sec)
p = Density of fluid (lbm/ft^3)
μ = Viscosity of the fluid (lbm/ft-sec)

Sizing

Contact an Emerson Process Management representative for assistance. A Configuration Data Sheet is required prior to order for application verification.

Flow Turndown

10:1 or better

Annubar Sensor Surface Finish

The front surface of the Annubar primary is textured for high Reynolds number applications (typically gas and steam). The surface texture creates a more turbulent boundary layer on the front surface of the sensor. The increased turbulence produces a more predictable and repeatable separation of flow at the edge of the sensor. The appropriate surface finish will be determined for each application by the Emerson Process Management sizing program, Instrument Toolkit software.

485 Functional Specifications

Service

- Liquid
- Gas
- Steam

Process Temperature Limits

Direct Mount Transmitter

- 500 °F (260 °C)
- 750 °F (398 °C) when used with a direct mount, high temperature 5-valve manifold (Transmitter Connection Platform code 6). Maximum temperature limit for steam processes is 650 °F (343 °C).
- 400 °F (204 °C) when top mounted in steam service

Remote Mount Transmitter

- 1250 °F (677 °C) – Alloy C-276 Sensor Material (For superheated steam applications above 1000 °F (538 °C), it is recommended that the Rosemount 585 with Alloy 800H sensor material is used.)
- 850 °F (454 °C) – Stainless Steel Sensor Material

Pressure and Temperature Limits(1)

Direct Mount Transmitter

- Up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C))
- Integral temperature measurement is not available with Flanged mounting type greater than class 600

Remote Mount Transmitter

- Up to 2500# ANSI (6000 psig at 100 °F (416 bar at 38 °C)).

(1) Static pressure selection may effect pressure limitations.

485 Physical Specifications

Temperature Measurement

Integral RTD

- 100 Ohm platinum RTD
- 4-wire RTD (α = 0.00385)

Remote RTD

- 100 Ohm platinum RTD, spring loaded with $^1/_2$-in. NPT nipple and union (078 series with Rosemount 644 housing)

Thermowell

- $^1/_2$-in. x $^1/_2$-in NPT, 316 Stainless Steel with $^1/_2$-in. weld couplet (same as specified pipe material).

Housing Connections

$^1/_2$–14 NPT, G$^1/_2$, and M20 × 1.5 conduit. HART interface connections fixed to terminal block for output code A

Annubar Sensor Material

- 316 Stainless Steel
- Alloy C-276

Mounting Material

- Carbon Steel (A105)
- 316 Stainless Steel
- Chrome-Moly Grade F-11
- Chrome-Moly Grade F-22
- Chrome-Moly Grade F-91

Annubar Type

See “485 Dimensional Drawings” on page 148

Pak-Lok Mode (option P)

- Provided with a compression sealing mechanism rated up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C))
- –150 to 850 °F (–101 to 454 °C)
- Not available for steam above 600°F (315°C)

Flanged with Opposite Side Support Model (option F)

- Provided with opposite side support, which is the same material as the pipe and requires a second pipe penetration
- Sensor flange is the same material as the Annubar sensor and the mounting flange is the same material as the pipe material
- Flanged mounting hardware: nuts, studs and gaskets (DIN units supplied without nuts, studs and gaskets)
- SST: (–300 to 850 °F (–184 to 454 °C))
- Alloy C-276: (–150 to 1250 °F (-101 to 677 °C))

Flange–Lok Model (option L)

- Flange–Lok assembly is supplied in 316 SST material.
- Flange-Lok mounting hardware: nuts, studs and gaskets (DIN units supplied without nuts, studs and gaskets)
- –150 to 850 °F (-101 to 454 °C)
- Not available for steam above 600°F (315°C)

Flo-Tap Models (options G and M)

- Opposite side support is not available
- Threaded connection is not available with Sensor Size 3
- Gear Drive is not available with Sensor Size 1
- Packing gland required
- Packing Gland Material Temperature Limits
  - PTFE: –40 to 400 °F (–40 to 204 °C)
  - Graphite: –150 to 850 °F (-101 to 454 °C)
- Isolation valve included
  - The isolation valve will carry the same pressure rating as the sensor flange and mounting flange specified in the mounting type
  - Isolation vales are not supplied with DIN flanges and must be customer supplied
- For threaded flo-tap models, the isolation valve NPT size is 1$^1/_4$-in. (Sensor Size 1) and 2-in. (Sensor Size 2).

Annubar Type Specification Chart

Option Code	Description	Pak-Lok(1)	Flange-Lok	Flange	Manual and Gear Drive Flo-Tap
T1(1)	Pak-Lok Body	X			
	Threaded connection				X
A1	150# RF ANSI		X	X	X
A3	300# RF ANSI		X	X	X
A6	600# RF ANSI		X	X	X
A9(2)	900# RF ANSI			X	
AF(2)	1500# RF ANSI			X	
AT(2)	2500# RF ANSI			X	
D1	DN PN 16		X	X	X
D3	DN PN 40		X	X	X
D6	DN PN 100		X	X	X
R1	150# RTJ Flange		X	X	X
R3	300# RTJ Flange		X	X	X
R6	600# RTJ Flange		X	X	X
R9(2)	900# RTJ Flange			X	
RF(2)	1500# RTJ Flange			X	
RT(2)	2500# RTJ Flange			X	

(1) Available up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)) rating.

(2) Remote mount only.

RTD Temperature Limits

Integral and Remote Mounted Thermowell:
-100 to 900 °F (-73 to 482 °C)

Instrument Connections Temperature Ranges

Table 38. Minimum / Maximum Temperature Range

Code	Description	Temperature
G1	Needle Valves, Carbon Steel	–20 to 500 °F (–29 to 260 °C)
G2	Needle Valves, Stainless Steel	–40 to 600 °F (–40 to 316 °C)
G3	Needle Valves, Alloy C-276	–40 to 600 °F (–40 to 316 °C)
G5	OS&Y Gate Valve, Carbon Steel	–20 to 775 °F (–29 to 413 °C)
G6	OS&Y Gate Valve, Stainless Steel	–40 to 850 °F (–40 to 454 °C)
G7	OS&Y Gate Valve, Alloy C-276	–40 to 1250 °F (–40 to 677 °C)

Flowmeter Installed in Flanged Pipe Spool Section (option codes H3, H4, and H5)

- All pipe spool sections are flanged pipe sections
- The flanged pipe spool section is constructed from the same material as the Pipe Material / Mounting Assembly Material.
- Consult the factory for remote temperature measurement and ANSI ratings above 600# and DIN flanges.
- Available in carbon steel (A105) and 316 stainless steel

Table 39. Flanged Pipe Spool Section Schedule

ANSI	Schedule
150# ANSI	40
300# ANSI	40
600# ANSI	80

Table 40. Flange Pipe Spool Section Length

Nominal Pipe Size	Length
2-in. (50 mm)	10.52-in. (267.2 mm)
3-in. (80 mm)	11.37-in. (288.8 mm)
4-in. (100 mm)	12.74-in. (323.6 mm)
6-in. (150 mm)	14.33-in. (364.0 mm)
8-in. (200 mm)	16.58-in. (421.1 mm)

Rosemount 585 Annubar Primary Element



Rosemount 585 Annubar Primary Element utilizes a solid sensor construction that offers capabilities for severe service applications.

- Main Steam Line mounting hardware available
- Symmetrical sensor design allows bi-directional flow measurement
- Available in 4 to 96-in. (50 - 2400 mm) line sizes

Additional Information
Specifications: page DP Flow-104
Dimensional Drawings: page DP Flow-154
Installation and Flowmeter Orientation: page DP Flow-166

Table 41. Rosemount 585 Annubar Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	DP Flow Primary Type	
585	Severe Service Annubar Primary Element	
Application Type		
Standard		**Standard**
S[(1)(2)]	Severe Service Annubar	★
Expanded		
M[(3)]	Main Steam Line Annubar	
Fluid Type		
Standard		**Standard**
L	Liquid	★
G	Gas	★
S	Steam	★
Annubar Type		
Standard		**Standard**
F	Flanged with Opposite Side Support	★
Expanded		
L	Main Steam Annubar with Opposite Side Support	
G	Gear-Drive Flo-Tap	
Line Size		
Standard		**Standard**
040	4-in. (100 mm)	★
050	5-in. (125 mm)	★
060	6-in. (150 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
Expanded		
140	14-in. (350 mm)	
160	16-in. (400 mm)	
180	18-in. (450 mm)	
200	20-in. (500 mm)	
240	24-in. (600 mm)	
300	30-in. (750 mm)	
360	36-in. (900 mm)	
420	42-in. (1066 mm)	
480	48-in. (1210 mm)	

Table 41. Rosemount 585 Annubar Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

600	60-in. (1520 mm)	
720	72-in. (1820 mm)	
840	84-in. (2100 mm)	
960	96-in. (2400 mm)	
Mounting Assembly Material		
Standard		**Standard**
C	Carbon Steel (A105)	★
S	316/316L Stainless Steel	★
Expanded		
L	Carbon Steel (A350 LF2)	
G	Chrome-Moly Grade F-11	
N	Chrome-Moly Grade F-22	
J	Chrome-Moly Grade F-91	
0[4]	No Mounting (Customer Supplied)	
Piping Orientation		
Standard		**Standard**
H	Horizontal Piping	★
D	Vertical Piping with Downwards Flow	★
U	Vertical Piping with Upwards Flow	★
Sensor Material		
Standard		**Standard**
S	316/316L Stainless Steel	★
Expanded		
H[5]	Alloy C-276	
W[3][5]	Alloy 800H	
K[5]	PVDF (KYNAR)	
Sensor Size		
Standard		**Standard**
11	Sensor size 11	★
22[6]	Sensor size 22	★
Expanded		
44[2][3]	Sensor size 44	
Mounting Type		
Standard		**Standard**
A	ANSI B16.5 Raised Face Flanges	★
D[7]	DIN Raised Face Flanges	★
Expanded		
R[8]	ANSI B16.5 Ring Type Joint Flanges	
0[3]	Main Steam Packing Gland	
Mounting Pressure Class		
Standard		**Standard**
1	ANSI 150 / DIN PN16	★
3[6]	ANSI 300 / DIN PN40	★
6[6]	ANSI 600 / DIN PN100	★
Expanded		
N[5][6]	ANSI 900	
F[5][6]	ANSI 1500	
T[5][6]	ANSI 2500	
0[3][5][6]	Main Steam Packing Gland	
Opposite Side Support		
Standard		**Standard**
C[9]	NPT Threaded Opposite Support Assembly	★
D[3]	Welded Opposite Support Assembly	★

Table 41. Rosemount 585 Annubar Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded		
E	Flanged Opposite Support Assembly	
0[2]	No Opposite Side Support Required	
Packing Gland/ Packing		
Standard		**Standard**
0[1]	Not Applicable	★
Expanded		
L[2]	SS Packing Gland / Graphite Packing	
T[3]	Main Steam Packing Gland / Graphite Packing	
Insertion Mechanism		
Standard		**Standard**
0[1][3]	Not Applicable	★
Expanded		
C	Alloy Steel Insertion Rods / Nuts	
S	Stainless Steel Insertion Rods / Nuts	
Isolation Valve		
Standard		**Standard**
0[3][1]	Not Applicable or Customer Supplied	★
Expanded		
1	Gate Valve, Carbon Steel	
2	Gate Valve, Stainless Steel	
5	Ball Valve, Carbon Steel	
6	Ball Valve, Stainless Steel	
Temperature Measurement		
Standard		**Standard**
0	No Temperature Sensor Required	★
Expanded		
R[4][6][9]	Remote RTD ($^1/_2$-in. NPT Aluminum Housing) with Thermowell	
S[4][6][9]	Remote RTD ($^1/_2$-in. NPT Stainless Housing) with Thermowell	
Transmitter Connection Platform		
Standard		**Standard**
3[6][10][11]	Direct-Mount, 3-Valve Manifold	★
Expanded		
4[6][10][11]	Direct-Mount, Dual 3-Valve Manifolds	
6[6][10][12]	High Temperature Direct-Mount 5-Valve Manifold	
7	Remote-Mount $^1/_2$-in. Threaded Connections	
8[3]	Remote-Mount $^1/_2$-in. Welded Connections	
Mounting Flange Bolting materials		
Standard		**Standard**
A	193 Gr B7 Studs w/ A194 Gr 2H Nuts	★
0	No Flange Studs/Nuts Supplied	★
Mounting Flange Gasket Materials		
Standard		**Standard**
1	Spiral Wound, 304SS, Flexible-Graphite Filler	★
0	No Flange Gasket Supplied	★
Expanded		
2	Ring-Joint, ANSI B16.20, Hexagonal, 316L	
3	Spiral Wound, B16.20, 316SS, PTFE Filler	

Table 41. Rosemount 585 Annubar Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Options (Include with selected model number)

Optional Mounting for Rectangular Ducts		
Expanded		
RD	Annubar Mounting for rectangular ducts	
Pressure Testing		
Expanded		
P1[13]	Hydrostatic Testing with Certificate	
PX	Extended Hydrostatic Testing	
Special Cleaning		
Expanded		
PA[6][14]	Cleaning per ASTM G93 Level D (section 11.4)	
Material Testing		
Expanded		
V1	Dye Penetrant Weld Exam	
Material Examination		
Expanded		
V2	Radiographic Weld Examination	
Flow Calibration		
Expanded		
W1	Flow Calibration (Average K)	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection w/ Cert.	★
QC7	Inspection & Performance Certificate	★
Material Traceability Certification		
Standard		**Standard**
Q8[5][15]	Material Traceability Certification per EN 10204 :2004 3.1	★
Positive Material Testing		
Expanded		
V4[15]	Positive Material Identification	
Code Conformance		
Expanded		
J2	ANSI/ASME B31.1	
J3	ANSI/ASME B31.3	
Materials Conformance		
Expanded		
J5[16]	NACE MR-0175 / ISO 15156	
Country Certification		
Standard		**Standard**
J6	European Pressure Directive (PED)	★
Expanded		
J1	Canadian Registration Certificate	
Instrument Valves for Remote Mount Option		
Standard		**Standard**
G2	1/2-in. Needle Valves, SS	★
G6	1/2-in. OS&Y Gate Valve, SS	★
Expanded		
G1	1/2-in. Needle Valves, CS	
G3	1/2-in. Needle Valves, Alloy C-276	
G5	1/2-in. OS&Y Gate Valve, CS	

Table 41. Rosemount 585 Annubar Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Instrument Valve Options		
Standard		**Standard**
DV[17]	Double Instrument Valves (4 valves total)	★
Special Shipment		
Standard		**Standard**
Y1	Mounting Hardware Shipped Separately	★
Assemble Mounting Hardware		
Expanded		
WP[18]	Assemble Weldolet to Packing body	
Special Dimensions		
Expanded		
VM	Variable Mounting	
585 Packing Gland Plug		
Expanded		
TP[18]	Packing Gland Plug for Steam Blow Down	
585 Installation Alignment Bar		
Expanded		
A1[18]	Installation Alignment Bar	
Typical Model Number: 585 M S L 120 J H W 44 0 0 0 T 0 0 8 0 0		

(1) Required for Annubar Type F.

(2) Required for Annubar Type G.

(3) Required for Annubar Type L.

(4) Not available with Annubar Type L.

(5) Not available with Annubar Type G.

(6) Not available with Sensor Material K.

(7) Mounting Flange Bolting and Gasket option code 0 must be selected.

(8) Mounting Flange Gasket Material option code 2 or 0 must be selected.

(9) Not available with ANSI 2500 Mounting Pressure Class.

(10) Not available with Mounting Pressure Class N, T, or F.

(11) Not available with Sensor Material W.

(12) Not available with Sensor Material H or W.

(13) Applies to flow element only, mounting not tested.

(14) If selected with Annubar Type F, Mounting Flange Gasket Material option code 3 must be selected.

(15) For pressure retaining parts only, isolation and instrument valves are not included.

(16) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(17) Only available if Instrument Valves for Remote Mount Option are selected.

(18) Only available with Annubar Type L.

585 Specifications

585 PERFORMANCE SPECIFICATIONS

Performance Statement Assumptions
Measured pipe I.D.

Discharge Coefficient Factor
±1.50% of flow rate

Repeatability
±0.10%

Line Sizes
- Sensor Size 11: 4-in. to 24-in. (100 to 600 mm)
- Sensor Size 22: 6-in. to 36-in. (150 to 900 mm)
- Sensor Size 44: 10-in. to 96-in. (250 to 2400 mm)

Table 42. Reynolds Number and Probe Width

Sensor Size	Minimum Rod Reynolds Number (R_d)	Probe Width ($_d$) (inches)
11	6500	0.80-in. (20,32 mm)
22	10000	1.20-in. (30,48 mm)
44	25000	2.28-in. (57,91 mm)

Where

$$R_d = \frac{d \times v \times p}{\mu}$$

d = Probe width (feet)
v = Velocity of fluid (ft/sec)
p = Density of fluid (lbm/ft^3)
μ = Viscosity of the fluid (lbm/ft-sec)

Sizing
Contact an Emerson Process Management representative for assistance. A Configuration Data Sheet is required prior to order for application verification.

Flow Turndown
10:1 or better

585 FUNCTIONAL SPECIFICATIONS

Service
- Liquid
- Gas
- Steam

Process Temperature Limits
Table 43. Direct Mount Transmitter Connection Platform

Transmitter Connection Platform	Temperature Limit
3-valve manifold (Option code 3)	500 °F (260 °C)
5-valve manifold (Option code 6)	750 °F (398 °C)
Note: Specification is 600 °F (315 °C) in steam service	

Table 44. Remote Mount Transmitter Connection Platform

Sensor Material	Temperature Limit
316 Stainless Steel (Option code S)	850 °F (454 °C)
Alloy C-276 (Option code H)	1250 °F (677 °C)
Alloy 800H (Option code W)	1500 °F (816 °C)
PVDF (KYNAR) (Option code K)	250 °F (121 °C)

Pressure and Temperature Limits
Table 45. Main Steam Line Annubar

Mounting Material	Sensor Material	Max. Pressure @ Temp.	Max. Temp.
Chrome-Moly Grade F-11	Alloy 800H	2317 psig @ 1000 °F (160 bar @ 538 °C)	1100 °F (593 °C)
Chrome-Moly Grade F-22	Alloy 800H	2868 psig @ 1000 °F (198 bar @ 538 °C)	1100 °F (593 °C)
Chrome-Moly Grade F-91	Alloy 800H	3788 psig @ 1100 °F (261 bar @ 593 °C)	1200 °F (649 °C)

Table 46. Severe Service Annubar

Annubar Type	Sensor Material	Max. Flange Rating
Flanged (option code F)	316 SST	2500# ANSI
	Alloy C-276	2500# ANSI
	Alloy 800H	2500# ANSI
	PVDF (KYNAR)	150# ANSI
Flanged Flo-Tap (option code G)	316 SST	600# ANSI

585 PHYSICAL SPECIFICATIONS

Temperature Measurement

Remote RTD

- Series 78 with Rosemount 644 housing 100 Ohm platinum RTD
- Spring loaded with 1/2-in. NPT nipple and union

Thermowell

- 1/2-in. NPT x 3/4-in. socket weld
- 316 Stainless Steel and Alloy C-276 Material
- 2.5-in. insertion length provided

Annubar Sensor Material

- 316 Stainless Steel
- Alloy C-276
- Alloy 800H
- PVDF (KYNAR)

Mounting Material

- Carbon Steel (A105)
- 316 Stainless Steel
- Carbon Steel (A350 LF2)
- Chrome-Moly Grade F-11
- Chrome-Moly Grade F-22
- Chrome-Moly Grade F-91

Annubar Type

See “585 Dimensional Drawings” on page 154

Flanged with Opposite Side Support Model (option F)

- Provided with opposite side support, which is the same material as the pipe and requires a second pipe penetration
- Sensor flange is the same material as the Annubar sensor and the mounting flange is the same material as the pipe material
- Flanged mounting hardware: nuts, studs and gaskets (DIN units supplied without nuts, studs and gaskets)
- SST: –325 to 850 °F (–198 to 454 °C)
- Alloy C-276: –325 to 1250 °F (–198 to 677 °C)
- PVDF (KYNAR): -40 to 250 °F (-40 to 121 °C)
- Alloy 800H: -325 to 1500 °F (-198 to 816 °C)

Main Steam Annubar with Opposite Side Support (option L)

- Provided with opposite side support, which is the same material as the pipe and requires a second pipe penetration
- Alloy 800H: -325 to 1500 °F (-198 to 816 °C)
- Only available in sensor size 44

Flanged Flo-Tap Models (option G)

- Opposite side support is not available
- Packing Gland Material Temperature Limits
  - Graphite: –40 to 850 °F (–40 to 454 °C)
- Isolation valve option
  - The isolation valve will carry the same pressure rating as the sensor flange and mounting flange specified in the mounting type
- SST: –325 to 850 °F (–198 to 454 °C)
- Maximum allowable insertion pressure: 1440 psig (99 bar)
- Only available in sensor size 44

Annubar Type Specification Chart

Option Code	Mounting Type/ Pressure Class	Flanged	Main Steam	Gear-Drive Flo-Tap
A1	150# RF ANSI	X		X
A3	300# RF ANSI	X		X
A6	600# RF ANSI	X		X
AN(1)	900# RF ANSI	X		
AF(1)	1500# RF ANSI	X		
AT(1)	2500# RF ANSI	X		
D1	DIN PN 16	X		X
D3	DIN PN 40	X		X
D6	DIN PN 100	X		X
R1	150# RTJ Flange	X		X
R3	300# RTJ Flange	X		X
R6	600# RTJ Flange	X		X
RN(1)	900# RTJ Flange	X		
RF(1)	1500# RTJ Flange	X		
RT(1)	2500# RTJ Flange	X		
00(1)	Main Steam Packing Gland		X	

(1) Remote mount only.

Instrument Connection Temperature Ranges

Table 47. Minimum / Maximum Temperature Range

Code	Description	Temperature
G1	Needle Valves, Carbon Steel	–20 to 550 °F (–29 to 288 °C)
G2	Needle Valves, Stainless Steel	–20 to 1000 °F (–29 to 538 °C)
G3	Needle Valves, Alloy C-276	–20 to 1000 °F (–29 to 538 °C)
G5	OS&Y Gate Valve, Carbon Steel	–20 to 800 °F (–29 to 427 °C)
G6	OS&Y Gate Valve, Stainless Steel	–20 to 850 °F (–29 to 454 °C)

Rosemount 405 Compact Primary Element



Rosemount 405 Compact Primary Element utilizes an easy to install direct mount primary element assembly.

- Available with Conditioning Orifice Plate Technology
- 405P/C orifice primary elements are based on ASME/ISO corner tap design
- Available in 2 to 12-in. (50 - 300 mm) line sizes

Additional Information
Specifications: page DP Flow-108
Dimensional Drawings: page DP Flow-157
Installation and Flowmeter Orientation: page DP Flow-166

Table 48. Rosemount 405 Compact Orifice Primary Element Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
405	Compact Orifice Flowmeter	
Primary Element Technology		
Standard		**Standard**
C	Conditioning Orifice Plate	★
P	Orifice Plate	★
Material Type		
Standard		**Standard**
S	316 SST	★
Line Size		
Standard		**Standard**
005(1)	1/2-in. (15 mm)	★
010(1)	1-in. (25 mm)	★
015(1)	1 1/2-in. (40 mm)	★
020	2-in. (50 mm)	★
030	3-in. (80 mm)	★
040	4-in. (100 mm)	★
060	6-in. (150 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
Temperature Measurement		
Standard		**Standard**
N	No Temperature Measurement	★
Primary Element Type		
Standard		**Standard**
040	0.40 Beta Ratio (β)	★
065(2)	0.65 Beta Ratio (β)	★
Transmitter Connection		
Standard		**Standard**
D3	Coplanar, Direct mount, 3-valve Integral Manifold, SST	★
R3	Remote-mount, 1/4-in. NPT connections	★
Expanded		
A3	Traditional, Direct mount, 3-valve Integral Manifold with adapter plate, SST	

Table 48. Rosemount 405 Compact Orifice Primary Element Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Options (Include with selected model number)

Installation Accessories		
Standard		**Standard**
A	ANSI Alignment Ring (150#)	★
C	ANSI Alignment Ring (300#)	★
D	ANSI Alignment Ring (600#)	★
G	DIN Alignment Ring (PN 16)	★
H	DIN Alignment Ring (PN 40)	★
J	DIN Alignment Ring (PN 100)	★
Expanded		
B	JIS Alignment Ring (10K)	
R	JIS Alignment Ring (20K)	
S	JIS Alignment Ring (40K)	
Remote Adapters		
Standard		**Standard**
E	Flange adapters 316 SST (1/2-in. NPT)	★
High Temperature Application		
Expanded		
T	Graphite valve packing (Tmax = 850 °F)	
Flow Calibration		
Expanded		
WC	Discharge Coefficient Verification (3 point)	
WD	Discharge Coefficient Verification (full 10 point)	
Pressure Testing		
Expanded		
P1	Hydrostatic testing	
Special Cleaning		
Expanded		
P2	Cleaning for Special Processes	
PA	Cleaning per ASTM G93 Level D (section 11.4)	
Special Inspection		
Standard		**Standard**
QC1	Visual & Dimensional Inspection with Certificate	★
QC7	Inspection & Performance Certificate	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN10204:2004 3.1	★
Code Conformance		
Expanded		
J2	ANSI / ASME B31.1	
J3	ANSI / ASME B31.3	
J4	ANSI / ASME B31.8	
Materials Conformance		
Expanded		
J5(3)	NACE MR-0175 / ISO 15156	
Country Certification		
Expanded		
J1	Canadian Registration	
Typical Model Number: 405 C S 040 N 040 D3		

(1) Not available for Primary Element Type code C.

(2) For 2-in. (50 mm) line sizes the Beta Ratio is 0.6 for Primary Element Type code C.

(3) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

405 Specifications

405 PERFORMANCE SPECIFICATIONS

Table 49. 405C Conditioning Orifice Technology

Beta Ratio	Cd Uncertainty
$\beta = 0.40$	±0.50%
$\beta = 0.65$(1)	±1.00%

(1) For 0.65 beta and ReD< 10,000 add an additional 0.5% to the Discharge Coefficient Uncertainty.

Table 50. 405P Compact Orifice Technology

Beta	Discharge Coefficient Uncertainty
1/2-in. line size	
0.4 0.65	±2.25%
1-in. to 1 1/2-in. line size	
0.4 0.65	±1.75%
2-in. to 12-in. line size	
0.4 0.65	±1.25%

Line Sizes

- 1/2-in. (15 mm) – not available for the 405C
- 1-in. (25 mm) – not available for the 405C
- 1 1/2-in. (40 mm) – not available for the 405C
- 2-in. (50 mm)
- 3-in. (80 mm)
- 4-in. (100 mm)
- 6-in. (150 mm)
- 8-in. (200 mm)
- 10-in. (250 mm)
- 12-in. (300 mm)

Sizing

Contact an Emerson Process Management sales representative assistance. A “Configuration Data Sheet” is required prior to order for application verification.

405 FUNCTIONAL SPECIFICATIONS

Service

- Liquid
- Gas
- Vapor

Process Temperature Limits

Direct Mount Transmitter

- -40 to 450 °F (-40 to 232 °C)
- Up to 400 °F (204 °C) when top mounted in steam service

Remote Mount Transmitter

- -148 to 850 °F (-100 to 454 °C) – Stainless Steel

Differential Pressure Limits

Maximum differential pressure (DP) up to 800 inH_2O (2 bar).

NOTE
When the temperature is 400-850 °F (204-454 °C), the DP Limit should be 400 inH2O (1 bar).

Maximum Working Pressure

- Pressure retention per ANSI B16.5 600# or DIN PN100

Vibration Limits

Qualified per IEC61298-3 (1998) for field with high vibration level or pipeline with high vibration level (10-60Hz 0.21mm displacement peak amplitude / 60 - 2000Hz 3g).

The weight and length of the transmitter assembly shall not exceed 5.8 lbs and 7.75-in.

Assembly to a transmitter

Select option code C11 for the Rosemount 3051S transmitter (or option code S3 for the Rosemount 3051C or 3095MV transmitters) to factory assemble the Rosemount 405 to a Rosemount pressure transmitter. If the 405 and transmitter are not factory assembled, they may be shipped separately. For a consolidated shipment, inform the Emerson Process Management representative when placing the order.

405 PHYSICAL SPECIFICATIONS

Temperature Measurement

Integral RTD(1)

- 100 Ohm platinum RTD temperature sensor assembly (316 SST Mineral Insulated Cable) with 1/4-in. NPT connection to wafer side and 1/2-in. NPT connection to transmitter RTD sensor is separated from process fluid by 1/16-in. and is pressure retaining rated for ANSI 600#. Complies with IEC-751 Class B accuracy. Meets Intrinsic Safety certification.

(1) Only available with 3051SFC or 3095MFC Compact Orifice Flowmeter models.

Remote RTD(1)

- 100 Ohm platinum with 1/2-in. NPT nipple and union (078 series with Rosemount 644 housing) Model 0078D21N00A025T32Ex Connection Head: 00644-4410-0011
- Standard RTD cable is shielded armored cable, length is 12 ft. (3.66 m)
- Remote RTD material is SST Thermowell
- 1/2-in. x 1/2-in. NPT, 316 SST

(1) Only available with 3051SFC, 3095MFC, 3051CFC or 2051CFC Compact Orifice Flowmeter models.

Material of Construction

Body/Plate

- 316/316L SST
- 50 micro-inch Ra surface finish

Manifold Head/Valves

- 316 SST

Flange Studs and Nuts

- Customer supplied
- Available as a spare part

Transmitter Connection Studs and Nuts

- Studs– A193 Grade B8M.
- Nuts– A194 Grade 8M.

Gasket and O-rings

- Gaskets are customer supplied.
- Durlon 8500 fiber gaskets are recommended. Consult an Emerson Process Management representative for use with other gaskets.
- Available as a spare part

NOTE
Gaskets and O-rings should be replaced when the 405 is disassembled.

Transmitter Connections

Direct Mount

- Available with 3051SMV, 3051S, 3051, 2051 and 3095 transmitters, ranges 1, 2, and 3.

Remote Mount

- Available with 1/4-in. NPT (standard) or 1/2-in. NPT (option code E) connections

Orifice Type

- Square edged

Orifice Pressure Taps

- Corner

Alignment Rings

Mounts between the following flange configurations:

ASME B16.5 (ANSI)	DIN	JIS
Class 150	PN16 (option code G)	10k (option code B)
Class 300	PN40 (option code H)	20k (option code R)
Class 600	PN100 (option code H)	40k (option code S)

ANSI 150 - 600# alignment ring is included as standard when ordering for up to 8-in. line size. For the 10-in. and 12-in. line size, the alignment ring must be ordered (Installation Accessories).

Typical Orifice Hole Sizes

For 405C, beta is calculated by: $\beta = d_C$ / Pipe ID, where the calculated bore is equal to 2 x typical orifice hole size ($d_C = 2d$). The tables below show the diameter of the typical orifice holes.

Table 51. β = 0.4 (measurement in inches (mm))(1)

Line Size	405C	405P
1/2-in. (15 mm)	Not Available	0.249 (6.325)
1-in. (25 mm)	Not Available	0.420 (10.668)
1 1/2-in. (40 mm)	Not Available	0.644 (16.358)
2-in. (50 mm)	0.413 (10.490)	0.827 (21.006)
3-in. (80 mm)	0.614 (15.596)	1.227 (31.166)
4-in. (100 mm)	0.805 (20.447)	1.610 (40.894)
6-in. (150 mm)	1.971 (50.063)	3.942 (100.127)
8-in. (200 mm)	2.594 (65.888)	5.188 (131.775)
10-in. (250 mm)	3.257 (82.728)	6.513 (165.43)
12-in. (300 mm)	3.900 (99.060)	7.800 (198.120)

(1) Tolerance = ±0.002-in.

Table 52. β = 0.65 (measurement in inches (mm))(1)

Line Size	405C	405P
1/2-in. (15 mm)	Not Available	0.404 (10.262)
1-in. (25 mm)	Not Available	0.682 (17.323)
1 1/2-in. (40 mm)	Not Available	1.047 (26.594)
2-in. (50 mm)	0.620 (15.748)(2)	1.344 (34.138)
3-in. (80 mm)	0.997 (25.324)	1.994 (50.648)
4-in. (100 mm)	1.308 (33.223)	2.617 (66.472)
6-in. (150 mm)	1.213 (30.810)	2.426 (61.620)
8-in. (200 mm)	1.596 (40.538)	3.192 (81.077)
10-in. (250 mm)	2.004 (50.902)	4.008 (101.80)
12-in. (300 mm)	2.400 (60.960)	4.800 (121.92)

(1) Tolerance = ±0.002-in.

(2) For 2-in. (50 mm) line size, the Beta (β) = 0.60.

Table 53. 405 Weight (measurement in lb. (kg))

Line Size	Direct Mount (D3)	Remote Mount (R3)
1/2-in. (15 mm)	3.50 (1.73)	7.5 (3.70)
1-in. (25 mm)	4.25 (2.10)	8.25 (4.07)
1 1/2-in. (40 mm)	4.75 (2.34)	8.75 (4.32)
2-in. (50 mm)	5.00 (2.47)	9.00 (4.44)
3-in. (80 mm)	7.00 (3.45)	11.00 (5.43)
4-in. (100 mm)	9.50 (4.69)	13.50 (6.67)
6-in. (150 mm)	13.00 (6.41)	17.00 (8.40)
8-in. (200 mm)	18.25 (9.00)	22.25 (10.99)
10-in. (250 mm)	23.50 (11.59)	27.50 (13.58)
12-in. (300 mm)	29.50 (14.55)	33.50 (16.54)

Rosemount 1595 Conditioning Orifice Plate



Rosemount 1595 Conditioning Orifice combines a flow conditioner with an orifice plate into a highly accurate primary element.

- Requires only 2 diameters of straight pipe run upstream and downstream from a flow disturbance
- Suitable for most gas, liquid, and steam applications
- Available in 2 to 24-in. (50 - 600 mm) line sizes

Additional Information
Specifications: page DP Flow-112
Dimensional Drawings: page DP Flow-159
Installation and Flowmeter Orientation: page DP Flow-166

TABLE 54. Rosemount 1595 Conditioning Orifice Plate Ordering Table

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
1595	Conditioning Orifice Plate	
Plate Type		
Standard		**Standard**
P	Paddle, Square Edged	★
U[(1)(2)]	Universal, Square Edged	★
Line Size		
Standard		**Standard**
020	2-in. (50 mm)	★
030	3-in. (76 mm)	★
040	4-in. (100 mm)	★
060	6-in. (150 mm)	★
080	8-in. (200 mm)	★
100	10-in. (250 mm)	★
120	12-in. (300 mm)	★
Expanded		
140	14-in. (350 mm)	
160	16-in. (400 mm)	
180	18-in. (450 mm)	
200	20-in. (500 mm)	
240	24-in. (600 mm)	
Flange Rating		
Standard		**Standard**
A1	ANSI Class 150 Raised Face (*Note: Not compatible with standard ASME B16.36 Orifice Flanges)*	★
A3	ANSI Class 300 Raised Face	★
A6	ANSI Class 600 Raised Face	★
A9	ANSI Class 900 Raised Face	★
AF	ANSI Class 1500 Raised Face	★
AT	ANSI Class 2500 Raised Face	★
D1[(1)]	DIN PN 10 (only available with Plate Type P)	★
D2[(1)]	DIN PN 16 (only available with Plate Type P)	★
D3[(1)]	DIN PN 25 (only available with Plate Type P)	★
D4[(1)]	DIN PN40 (only available with Plate Type P)	★
D5[(1)]	DIN PN 63 (only available with Plate Type P)	★
D6[(1)]	DIN PN 100 (only available with Plate Type P)	★
Expanded		
R3[(1)]	ANSI Class 300 Ring Joint (only available with Orifice Plate Type code U and requires Plate Holder code PH)	
R6[(1)]	ANSI Class 600 Ring Joint (only available with Orifice Plate Type code U and requires Plate Holder code PH)	

TABLE 54. Rosemount 1595 Conditioning Orifice Plate Ordering Table

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

R9[(1)]	ANSI Class 900 Ring Joint (only available with Orifice Plate Type code U and requires Plate Holder code PH)			
RF[(1)]	ANSI Class 1500 Ring Joint (only available with Orifice Plate Type code U and requires Plate Holder code PH)			
RT[(1)]	ANSI Class 2500 Ring Joint (only available with Orifice Plate Type code U and requires Plate Holder code PH)			
Material Type				
Standard				**Standard**
S	316/316L Stainless Steel			★
Expanded				
M	Alloy 400			
H	Alloy C-276			
Orifice Plate Thickness		**Plate Type P**	**Plate Type U**	
Standard				**Standard**
A	0.125-in.	Line Sizes 2 to 4-in. (50 to 100 mm)	Line size 2 to 6-in. (50 to 150 mm)	★
B	0.250-in.	Line Sizes 6 to 12-in. (150 to 300 mm)	Line size 8 to 12-in. (200 to 300 mm)	★
Expanded				
C	0.375-in.	Line Sizes 14 to 20-in. (350 to 500 mm)	N/A	
D	0.500-in.	Line Size 24-in. (600 mm)	N/A	
Beta Ratio				
Standard				**Standard**
020	0.20 Beta Ratio			★
040	0.40 Beta Ratio			★
065	0.65 Beta Ratio (0.60 beta ratio for Line Size option 020 only)			★

Options (Include with selected model number)

Flow Calibration	
Standard	**Standard**
WC	Flow Calibration Certification (3 points) ★
Expanded	
WD	Discharge Coefficient Verification (full 10 points)
Plate Holder	
Expanded	
PH[(1)]	Plate Holder for Universal Type Orifice Plate for use with RTJ flange or section
Special Cleaning	
Expanded	
P2	Cleaning for Special Services
Special Inspection	
Standard	**Standard**
QC1	Visual and dimensional Inspection with certification ★
QC7	Inspection and performance certificate ★
Material Traceability Certification	
Standard	**Standard**
Q8	Material Certification per ISO 10474 3.1-B and EN 10204 3.1 ★
Code Conformance	
Expanded	
J5[(3)]	NACE MR-0175 / ISO 15156
Country Certification	
Expanded	
J1	Canadian Registration
Typical Model Number: 1595 P 060 A3 S A 040	

(1) Currently available up to 12-in. (300 mm) line size.

(2) For use with a plate holder device in RTJ type flanges or orifice fittings.

(3) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

1595 Specifications

1595 PERFORMANCE SPECIFICATIONS

Flow Coefficient Uncertainty

Table 55. Discharge Coefficient Uncertainty

Beta Ratio[1]	Cd Uncertainty[2]
$\beta = 0.20$	±0.50%
$\beta = 0.40$	±0.50%
$\beta = 0.65$	±1.00% (applicable for Beta > 0.4)

(1) For 0.65 beta and ReD< 10,000 add an additional 0.5% to the Discharge Coefficient Uncertainty.

(2) When using the Calibration Factor (Fc) supplied.

Sizing

Contact an Emerson Process Management representative for assistance. A Configuration Data Sheet is required prior to order for application verification.

Pressure Tap Orientation

Orient the 1595 Conditioning Orifice Plate so that the pressure taps are centered between any 2 (of 4) orifice bore holes. In addition, the pressure taps should be located at 90° to the plane of the last upstream elbow under these conditions:

- with less than 6 upstream pipe diameters
- with a 0.65 Beta

The 1595 Conditioning Orifice Plate can be used with the following pressure taps:

- Corner pressure taps - all beta sizes
- Flange pressure taps - all beta sizes
- Radius pressure taps (D and D/2) - 0.4 beta size or smaller

Centering Requirements

The 1595 should be installed so that it is centered in the pipes as recommended by ISO-5167.

1595 FUNCTIONAL SPECIFICATIONS

Service and Flow Range

Liquid, gas or steam turbulent flow, for pipe Reynold's Numbers greater than 5,000. For pipe Reynold's Numbers less than 10,000 add an additional +0.5% uncertainty to the discharge coefficient uncertainty.

Pipe Sizes

2 to 24-in. (50 to 600 mm). Contact Emerson Process Management for other pipe sizes.

Operating Limits

For line sizes 2-in. (50 mm) to 24-in. (600 mm)

Temperature Range: –320 to 1200 °F (–196 to 649 °C)

- – 320 to 800 °F (–196 to 427 °C) and differential pressure up to 800 inH_20
- 800 to 1200 °F (427 to 649 °C) and differential pressure up to 400 inH_20

Maximum Working Pressure

- Flange rating per ANSI B16.5 and DIN EN 1092-1.

1595 PHYSICAL SPECIFICATIONS

Material of Construction

Table 56. 1595 Materials of Construction

Code	Description	ASTM	UNS	DIN (W.-Nr.)
S	316/316L SST	A240 Gr 316/316L	S31600 / S31603	1.4401/1.4404 (1.4436/1.4435)
H	Alloy C-276	B575 Gr N10276	N10276	2.4819
M	Alloy 400	B127 Gr N04400	N04400	2.4360

Flange Mounting Hardware

- The 1595 can be used with the Rosemount 1496 Flange Union. See "Rosemount 1496 Orifice Flange Union" on page 121 for more information regarding the Rosemount 1496.

Orifice Type

- Paddle, square-edge
- Universal, square-edge

Typical Orifice Hole Sizes

Beta is calculated by: $\beta = d_C$ / Pipe ID, where the calculated bore is equal to 2 x typical orifice hole size ($d_C = 2d$). The table below shows the diameter of each of the four orifice holes.

Table 57. Typical Orifice Hole Sizes (Measurement in inches (millimeters)

Line Size	Pipe ID	Beta (β) = 0.20 d	Beta (β) = 0.40 d	Beta (β) = 0.65 d
2-in. (50 mm)	2.067-in. (52.502 mm)	0.207 (5.26)	0.413 (10.49)	0.620 (15.75)[1]
3-in. (76 mm)	3.068-in. (77.927 mm)	0.307 (7.80)	0.614 (15.60)	0.997 (25.32)
4-in. (100 mm)	4.026-in. (102.26 mm)	0.403 (10.25)	0.805 (20.45)	1.309 (32.22)
6-in. (150 mm)	6.065-in. (154.051 mm)	0.607 (15.42)	1.213 (30.81)	1.971 (50.06)
8-in. (200 mm)	7.981-in. (202.717 mm)	0.798 (20.27)	1.596 (40.54)	2.594 (65.89)
10-in. (250 mm)	10.02-in. (254.51 mm)	1.002 (25.45)	2.004 (50.90)	3.257 (82.73)
12-in. (300 mm)	12.00-in. (304.80 mm)	1.200 (30.48)	2.400 (60.96)	3.900 (99.06)
14-in. (350 mm)	13.124-in. (333.35 mm)	1.312 (33.32)	2.625 (66.68)	4.265 (108.33)
16-in. (400 mm)	15.000-in. (381.00 mm)	1.500 (38.10)	3.000 (76.20)	4.875 (123.83)
18-in. (450 mm)	16.876-in. (428.65 mm)	1.688 (42.88)	3.375 (85.73)	5.485 (139.32)
20-in. (500 mm)	18.812-in. (477.82 mm)	1.881 (47.78)	3.762 (95.55)	6.114 (155.30)
24-in. (600 mm)	22.624-in. (574.65 mm)	2.262 (57.45)	4.525 (114.94)	7.353 (186.77)

(1) For 2-in. (50.8 mm) line size, the beta (β) is 0.60.

Rosemount 1195 Integral Orifice Primary Element



1195 Integral Orifice Primary Element

Rosemount 1195 Integral Orifice Primary Element utilizes a self centering orifice plate design to eliminate installation error.

- Enables highly accurate flow measurement in small line sizes
- Available with a variety of process connections
- Available in 1/2 to 1 1/2-in. (15 - 40 mm) line sizes

Additional Information
Specifications: page DP Flow-116
Dimensional Drawings: page DP Flow-163
Installation and Flowmeter Orientation: page DP Flow-166

Table 58. Rosemount 1195 Integral Orifice Primary Element Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
1195	Integral Orifice Primary Flow Element	
Body Material		
Standard		**Standard**
S	316 SST	★
Line Size		
Standard		**Standard**
005	1/2-in. (15 mm)	★
010	1-in. (25 mm)	★
015	1 1/2-in. (40 mm)	★
Process Connection		
Standard		**Standard**
T1	NPT Female Body (not available with thermowell and RTD)	★
S1(1)	Socket Weld Body (not available with thermowell and RTD)	★
P1	Pipe Ends: NPT threaded	★
P2	Pipe Ends: Beveled	★
D1	Pipe Ends: Flanged, RF, DIN PN16, slip-on	★
D2	Pipe Ends: Flanged, RF, DIN PN40, slip-on	★
D3	Pipe Ends: Flanged, RF, DIN PN100, slip-on	★
W1	Pipe Ends: Flanged, RF, ANSI Class 150, weld-neck	★
W3	Pipe Ends: Flanged, RF, ANSI Class 300, weld-neck	★
W6	Pipe Ends: Flanged, RF, ANSI Class 600, weld-neck	★
Expanded		
A1	Pipe Ends: Flanged, RF, ANSI Class 150, slip-on	
A3	Pipe Ends: Flanged, RF, ANSI Class 300, slip-on	
A6	Pipe Ends: Flanged, RF, ANSI Class 600, slip-on	
R1	Pipe Ends: Flanged, RTJ, ANSI Class 150, slip-on	
R3	Pipe Ends: Flanged, RTJ, ANSI Class 300, slip-on	
R6	Pipe Ends: Flanged, RTJ, ANSI Class 600, slip-on	
P9	Special Process Connection	
Orifice Plate Material		
Standard		**Standard**
S	316 SST	★

Table 58. Rosemount 1195 Integral Orifice Primary Element Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded		
H	Alloy C-276	
M	Alloy 400	
Bore Size Option		
Standard		**Standard**
0066	0.066-in. (1.68 mm) for 1/2-in. Pipe	★
0109	0.109-in. (2.77 mm) for 1/2-in. Pipe	★
0160	0.160-in. (4.06 mm) for 1/2-in. Pipe	★
0196	0.196-in. (4.98 mm) for 1/2-in. Pipe	★
0260	0.260-in. (6.60 mm) for 1/2-in. Pipe	★
0340	0.340-in. (8.64 mm) for 1/2-in. Pipe	★
0150	0.150-in. (3.81 mm) for 1-in. Pipe	★
0250	0.250-in. (6.35 mm) for 1-in. Pipe	★
0345	0.345-in. (8.76 mm) for 1-in. Pipe	★
0500	0.500-in. (12.70 mm) for 1-in. Pipe	★
0630	0.630-in. (16.00 mm) for 1-in. Pipe	★
0800	0.800-in. (20.32 mm) for 1-in. Pipe	★
0295	0.295-in. (7.49 mm) for 1 1/2-in. Pipe	★
0376	0.376-in. (9.55 mm) for 1 1/2-in. Pipe	★
0512	0.512-in. (13.00 mm) for 1 1/2-in. Pipe	★
0748	0.748-in. (19.00 mm) for 1 1/2-in. Pipe	★
1022	1.022-in. (25.96 mm) for 1 1/2-in. Pipe	★
1184	1.184-in. (30.07 mm) for 1 1/2-in. Pipe	★
Expanded		
0010	0.010-in. (0,25 mm) for 1/2-in. Pipe	
0014	0.014-in. (0,36 mm) for 1/2-in. Pipe	
0020	0.020-in. (0,51 mm) for 1/2-in. Pipe	
0034	0.034-in. (0,86 mm) for 1/2-in. Pipe	
Transmitter / Body Bolt Material		
Standard		**Standard**
C	316 SST (1 1/2-in. transmitter studs)	★
Expanded		
G(2)	High temperature (850 °F (454 °C))	

Options (Include with selected model number)

Temperature Sensor		
Expanded		
S(3)	Thermowell and RTD (SST Temperature Housing)	
T(3)	Thermowell and RTD (Aluminum Temperature Housing)	
Assemble to Transmitter		
Expanded		
S4(4)	Factory assembly – Attach to transmitter and manifold	
Optional Bore Calculation		
Standard		**Standard**
BC	Bore Calculation	★
Optional Connection		
Standard		**Standard**
G1	DIN 19213 Transmitter Connection	★
Adapters for Remote Mounting		
Standard		**Standard**
G2	1/2–14 NPT Remote Adapters – SST	★
Expanded		
G3	1/2–14 NPT Remote Adapters – Alloy C-276	

Table 58. Rosemount 1195 Integral Orifice Primary Element Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Pressure Testing		
Expanded		
P1[5]	Hydrostatic Testing with Certificate	
Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
PA	Cleaning per ASTM G93 Level D (section 11.4)	
Material Testing		
Expanded		
V1	Dye Penetrant Exam	
Material Examination		
Expanded		
V2	Radiographic Examination (available only with Process Connection code W1, W3, and W6)	
Flow Calibration		
Expanded		
WD[6]	Discharge Coefficient Verification	
WZ[6]	Special Calibration	
Special Inspection		
Standard		**Standard**
QC1	Visual and dimensional inspection with certificate	★
QC7	Inspection and performance certificate	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204:2004 3.1	★
Code Conformance		
Expanded		
J2[7]	ANSI / ASME B31.1	
J3[7]	ANSI / ASME B31.3	
J4[7]	ANSI / ASME B31.8	
Materials Conformance		
Expanded		
J5[8]	NACE MR-0175 / ISO 15156	
Country Certification		
Standard		**Standard**
J6	European Pressure Directive (PED)	★
Expanded		
J1	Canadian Registration	
Hardware Adjustments and Ground Screw		
Expanded		
A1	External Ground Screw for Temperature Connection Head	
A2	Cover Clamp and External Ground Screw for Temperature Connection Head	
Typical Model Number: 1195 S 010 W3 S 0150 C		

(1) To improve pipe perpendicularity for gasket sealing, socket diameter is smaller than standard pipe O.D.

(2) Not available with Assemble to Transmitter code S4.

(3) Thermowell material is the same as the body material.

(4) Not available with Process Connection code S1.

(5) Does not apply to Process Connection codes T1 and S1.

(6) Not available for bore sizes 0010, 0014, 0020, or 0034.

(7) Not available with DIN Process Connection codes D1, D2, or D3.

(8) Materials of Construction comply with metallurgical requirements within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

1195 Specifications

1195 PERFORMANCE SPECIFICATIONS

Table 59. Discharge Coefficient Uncertainty(1)

Beta (β)(2)	Discharge Coefficient Uncertainty
$\beta < 0.1$	±2.50%
$0.1 < \beta < 0.2$	±1.25%
$0.2 < \beta < 0.6$	±0.75%
$0.6 < \beta < 0.8$	±1.50%

(1) Without associated straight run piping, discharge coefficient uncertainty can add up to 1.5% - 5% additional error. Consult the factory for additional information.

(2) $\beta = \frac{\text{Orifice Plate Bore}}{\text{body I.D.}}$

Line Sizes

- 1/2-in. (15 mm)
- 1-in. (25 mm)
- 1 1/2-in. (40 mm)

Sizing

Contact a Emerson Process Management sales representative for assistance. A “Configuration Data Sheet” is required prior to order for application verification.

1195 FUNCTIONAL SPECIFICATIONS

Service

- Liquid
- Gas
- Steam

Process Temperature Limits

Standard (direct/remote mount):

- –40 to 450 °F (–40 to 232 °C)

Extended (remote mount only with option code T):

- –148 to 850 °F (–100 to 454 °C)

Maximum Working Pressure

- Pressure retention per ANSI B16.5 600# or DIN PN100

Table 60. 1195 Pressure Limits

Line Size	Process Connection Code	Maximum Working Pressure @ 100 °F(1)(2)
1/2-in. (15 mm)	S1 or P2	3000 psig (207 bar)
	T1 or P1	1500 psig (103 bar)
1-in. (25 mm)	S1 or P2	2000 psig (138 bar)
	T1 or P1	1500 psig (103 bar)
1 1/2-in. (40 mm)	S1 or P2	1500 psig (103 bar)
	T1 or P1	1500 psig (103 bar)
All	Flanged	Meets flange primary pressure rating per ANSI B16.5 (EN-1092-1 for DIN flanges)

(1) For pressure ratings at temperatures less than -20 °F (-29 °C) or above 100 °F (38 °C) consult an Emerson Process Management representative.

(2) Transmitter static pressure range may limit maximum working pressure. Refer to Static Pressure Ranges specification.

1195 PHYSICAL SPECIFICATIONS

Material of Construction

Orifice Plate

- 316/316L SST
- Alloy C-276
- Alloy 400

Body

- 316 SST (CF8M), material per ASTM A351

Pipe Material (If Applicable)

- A312 Gr 316/316L, B622 UNS N10276, Alloy C-276

Flange

- A182 Gr 316/316L, SB-564 UNS N10276, Alloy C-276
- Flange pressure limits are per ANSI B16.5
- Flange face finish per ANSI B16.5, 125 to 250 RMS

Body Bolts/Studs

- ASTM A193 Gr B8M studs
- ASTM A193 Gr B8M Class 2 body studs provided for high temperature option code G

Transmitter Connection Studs

- ASTM A193 Gr B8M studs

Gaskets/O-rings

- Glass filled PTFE
- Inconel® X-750 provided for high temperature option code G
- Gaskets and O-rings must be replaced each time the 3051SFP is disassembled for installation or maintenance.

Orifice Type

Square edge–orifice bore sizes

- 0.066-in. and larger

Quadrant edge–orifice bore sizes
(for 1/2-in. (15 mm) line size only)

- 0.034-in. (0.86 mm)
- 0.020-in. (0.51 mm)
- 0.014-in. (0.35 mm)
- 0.010-in. (0.25 mm)

NOTE
Integral orifice bodies contain corner tapped pressure ports.

Pipe Lengths

Upstream and downstream associated piping sections are available on the 1195. The table below lists the standard overall length (lay length) as a function of end connections and line size.

Transmitter Connections

2 1/8-in. (54 mm) center-to-center. Other transmitter spacing can be accommodated using the optional remote adapters and customer-supplied impulse piping. DIN 19213 connections are available

Table 61. Overall Length Dimension

	Line Size		
Overall Length Dimension	**1/2-in. (15 mm)**	**1-in. (25 mm)**	**1 1/2-in. (40 mm)**
Beveled/Threaded pipe ends	18.27 (464.1)	28.98 (736.1)	40.35 (1024.9)
RF slip-on, RTJ slip-on, RF-DIN slip on	18.43 (468.2)	29.14 (740.2)	40.51 (1029.0)
RF 150#, weld neck	21.94 (557.2)	33.25 (844.5)	45.12 (1146.0)
RF 300#, weld neck	22.32 (566.9)	33.77 (857.7)	45.60 (1158.2)
RF 600#, weld neck	22.81 (579.4)	34.26 (870.3)	46.23 (1174.3)
Dimensions are in inches (millimeters).			

Table 62. Torque Values of Standard Bolts

Stud & Nut Torque Specifications(1)	
Transmitter Bolts	**Torque**
All Line sizes and gasket types	32 lb-ft (44 N-m)
Manifold Bolts	
All Line sizes and gasket types	32 lb-ft (44 N-m)
Orifice Body Bolts(2)	
1/2-in. (15 mm) Line size (all gasket types)	60 lb-ft (82 N-m)
1-in. (25 mm) Line size (all gasket types)	60 lb-ft (82 N-m)
1 1/2-in. (40 mm) Line size (PTFE gasket)	60 lb-ft (82 N-m)
1 1/2-in. (40 mm) Line size (X-750 metal gasket)	75 lb-ft (102 N-m)

(1) Studs and nuts should be tightened to specification in two to three steps alternating between sides.

(2) Never reuse gaskets. Always replace gaskets after disassembly to ensure proper seal.

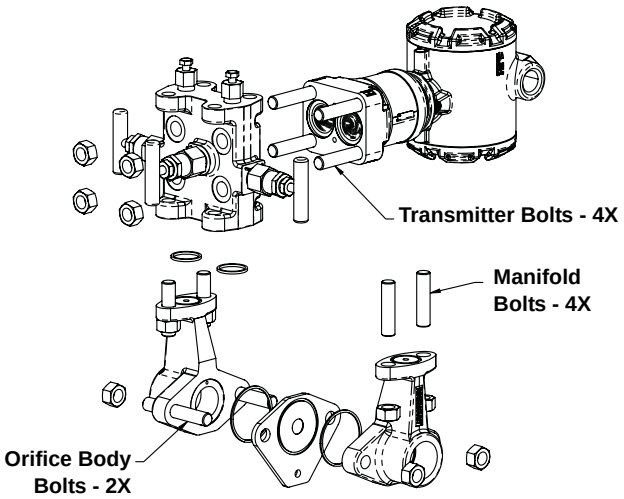


Table 63. Weight (The following weights are approximate.)

Line Size	**1195 Only**		**With Flanged Piping(1)**	
	lb	**kg**	**lb**	**kg**
1/2-in. (15 mm)	4.0	1.8	8	3.6
1-in. (25 mm)	6.0	2.7	12	5.4
1 1/2-in. (40 mm)	8.0	3.6	25	11.3

(1) As supplied with standard lengths, ANSI Class 150 flanges.

Rosemount 1495 Orifice Plate

Standard configuration is with a square-edged concentric bore in both paddle and universal type plates. Also available with a spiral finish. Final inspection reports illustrating plate thickness, concentricity, outside dimensions, inside dimensions, roundness, and flatness are available.

- Bore calculations are available if the Configuration Data Sheet (CDS) is completed and Option BC is selected.

1495 ORDERING INFORMATION

Table 64. Rosemount 1495 Orifice Plate Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
1495	Orifice Plate Primary	
Orifice Plate Type		
Standard		**Standard**
PC	Paddle, Concentric	★
PG	Paddle, Concentric, Spiral finish	★
UC	Universal, Concentric	★
Line Size		
Standard		**Standard**
020	2 in. (DN50)	★
025	2 1/2 in. (DN65)	★
030	3 in. (DN80)	★
040	4 in. (DN100)	★
060	6 in. (DN150)	★
080	8 in. (DN200)	★
100	10 in. (DN250)	★
120	12 in. (DN300)	★
140	14 in. (DN350)	★
160	16 in. (DN400)	★
180	18 in. (DN450)	★
200	20 in. (DN500)	★
240	24 in. (DN600)	★
Flange Rating		
Standard		**Standard**
A1	Flange ANSI Class 150 Raised Face	★
A3	ANSI Class 300 Raised Face	★
A6	ANSI Class 600 Raised Face	★
A9	ANSI Class 900 Raised Face	★
AF	ANSI Class 1500 Raised Face	★
AT(1)	ANSI Class 2500 Raised Face	★
D1	DIN PN10	★
D2	DIN PN16	★
D3	DIN PN25	★
D4	DIN PN40	★
D5	DIN PN63(2)	★
D6	DIN PN100	★

Table 64. Rosemount 1495 Orifice Plate Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded		
R3	Flange ANSI Class 300 Ring Joint	
R6	Flange ANSI Class 600 Ring Joint	
R9	Flange ANSI Class 900 Ring Joint	
RF	Flange ANSI Class 1500 Ring Joint	
RT	Flange ANSI Class 2500 Ring Joint	
Orifice Plate Material Type		
Standard		**Standard**
S	316/316L Stainless Steel	★
T	DIN 1.4571 (316Ti Stainless Steel)	★
L	304/304L Stainless Steel	★
Expanded		
H	Alloy C-276	
M	Alloy 400	
Plate Thickness		
Standard		**Standard**
A	0.125-in. (3.2 mm) – default for line size 2 to 6-in. (50 to 150 mm)	★
B	0.250-in. (6.35 mm) – default for line size 8 to 14-in. (200 to 350 mm)	★
C	0.375 in. (9.53 mm) - default for line size 16 to 20-in. (400 to 500 mm)	★
D	0.500-in. (12.7 mm) – default for line size 24-in. (600 mm)	★
E[3]	Plate Thickness per DIN 19206	★
Bore		
Standard		**Standard**
XXXXX	Bore (XXXXX = XX.XXX)	★

Options (Include with selected model number)

Bore Calculation		
Standard		**Standard**
BC	Bore Calculation	★
Drain / Vent Hole		
Standard		**Standard**
DV[4]	Drain / Vent Hole	★
Plate Holder		
Standard		**Standard**
PH[5]	Plate Holder for RTJ Flanges	★
Alternate Bore Type		
Standard		**Standard**
TC	Conical Entrance Bore	★
TE[4]	Eccentric Bore	★
TS[4]	Segmental Bore	★
TQ	Quandrant Edged Bore	★
RO[6]	Restriction Orifice Plate	★
Alternate Pipe Schedule		
Standard		**Standard**
FA[7]	Schedule 5S	★
FB[7]	Schedule 10	★
FC[7]	Schedule 10S	★
FD[7]	Schedule 20	★

Table 64. Rosemount 1495 Orifice Plate Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

FE[7]	Schedule 30	★
FF[7]	Schedule 40	★
FG[7]	Schedule 40S	★
FH[7]	Schedule Standard (STD)	★
FI[7]	Schedule 60	★
FJ[7]	Schedule 80	★
FK[7]	Schedule 80S	★
FL[7]	Schedule Extra Strong (XS)	★
FM[7]	Schedule 100	★
FN[7]	Schedule 120	★
FP[7]	Schedule 140	★
FQ[7]	Schedule 160	★
FR[7]	Schedule Double Extra Strong (XXS)	★
Special Cleaning		
Expanded		
P2	Cleaning for Special Services	
Special Inspection		
Standard		**Standard**
QC1	Visual & dimensional inspection with certificate	★
QC7	Inspection & performance certificate	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certificate per and EN 10204:2004 3.1	★
Code Conformance		
Expanded		
J5[8]	NACE MR-0175 / ISO 15156	
Country Certification		
Expanded		
J1	Canadian Registration	
Typical Model Number: 1495 PC 040 A3 S A 02125		

(1) Available in line sizes from 2-12 in.

(2) Previously PN64.

(3) Standard Plate Thickness:
DN50 - 65 = 3 mm
DN80 – 450 = 4 mm
DN500 - 600 = 6 mm

(4) This option requires pipe I.D. to be specified. Please select alternate pipe schedule option or specify on order.

(5) Integral Plate Holder (material matches plate material) for line sizes to 3-in., requires minimum $^{1}/_{4}$-in plate thickness. Screw Type Plate Holder in 304SS for line sizes 4-in. and larger.

(6) A standard beveled orifice plate is provided with the "RO" option code.

(7) These options should only be selected if options DV, TE, or TS are selected. These options are not available with flange rating D1-D6.

(8) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

Rosemount 1496 Orifice Flange Union

Standard flange styles are raised face (RF) weld neck, RF slip-on, or RF threaded for paddle type orifice plates, and ring type joint (RTJ) weld neck for universal type plates with plate holders. All flange unions are supplied with studs, nuts, jackscrews, gaskets, and pipe plugs. Table 68 lists standard pipe schedules.

- Meets ASME B16.36
- Meets DIN 19214 part 1
- Threaded tap connection provided 180-degrees apart

The following options are available.

- Socket weld tap connections
- High temperature flange gaskets for temperatures greater than 500 °F (260 °C)
- Stainless Steel flange bolting per ASTM A193 Grade B8M/A194 Grade 8M

1496 ORDERING INFORMATION

Table 65. Rosemount 1496 Orifice Flange Union Ordering Table

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
1496	Orifice Flange Union	
Flange Union Type		
Standard		**Standard**
WN	Raised Face, Weld Neck	★
TH	Raised Face, Threaded	★
SO	Raised Face, Slip-On	★
DN	Raised Face, Weld Neck, DIN 19214 Part 1	★
Expanded		
RJ	Ring Joint, Weld Neck	
Line Size		
Standard		**Standard**
020	2 in. (DN50)	★
025	2½-in. (DN65)	★
030	3 in. (DN80)	★
040	4 in. (DN100)	★
060	6 in. (DN150)	★
080	8 in. (DN200)	★
100	10 in. (DN250)	★
120	12 in. (DN300)	★
140	14 in. (DN350)	★
160	16 in. (DN400)	★
180	18 in. (DN450)	★
200	20 in. (DN500)	★
240	24 in. (DN600)	★
Flange Rating		
Standard		**Standard**
A3	ANSI Class 300	★
A6	ANSI Class 600	★
A9	ANSI Class 900	★
AF	ANSI Class 1500	★
AT(1)	ANSI Class 2500	★
D1	DIN PN10	★
D2	DIN PN16	★
D3	DIN PN25	★

Table 65. Rosemount 1496 Orifice Flange Union Ordering Table

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

D4	DIN PN40	★
D5	DIN PN63[2]	★
D6	DIN PN100	★
Expanded		
R3	Ring-Type Joint (RTJ) Class 300	
R6	Ring-Type Joint (RTJ) Class 600	
R9	Ring-Type Joint (RTJ) Class 900	
RF	Ring-Type Joint (RTJ) Class 1500	
RT	Ring-Type Joint (RTJ) Class 2500	
Flange Union Material Type		
Standard		**Standard**
C	Carbon Steel	★
S	316/316L Stainless Steel	★
T	DIN 1.4571 (316Ti Stainless Steel)	★
L	304/304L Stainless Steel	★
Expanded		
H	Alloy C-276	
M	Alloy 400	

Options (Include with selected model number)

Alternate Pipe Schedule / Wall Thickness[3]		
Standard		**Standard**
FA[4]	Schedule 5S	★
FB[4]	Schedule 10	★
FC[4]	Schedule 10S	★
FD[4]	Schedule 20	★
FE[4]	Schedule 30	★
FF[4]	Schedule 40	★
FG[4]	Schedule 40S	★
FH[4]	Schedule Standard (STD)	★
FI[4]	Schedule 60	★
FJ[4]	Schedule 80	★
FK[4]	Schedule 80S	★
FL[4]	Schedule Extra Strong (XS)	★
FM[4]	Schedule 100	★
FN[4]	Schedule 120	★
FP[4]	Schedule 140	★
FQ[4]	Schedule 160	★
FR[4]	Schedule Double Extra Strong (XXS)	★
High Temperature Gaskets		
Standard		**Standard**
G1[5]	High Temperature Gaskets (spiral wound gaskets)	★
Alternate Bolting Material		
Standard		**Standard**
SS[6]	316SS Studs/Nuts	★
Alternate Pressure Tap Type		
Standard		**Standard**
ST	Socketweld Pressure Taps (not available with Flange Union Type code DN)	★

Table 65. Rosemount 1496 Orifice Flange Union Ordering Table

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Special Cleaning		
Expanded		
P2	Cleaned for Special Services	
Special Inspection		
Standard		**Standard**
QC1	Visual & dimensional inspection with certificate	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certificate per and EN 10204 :2004 3.1	★
Code Conformance		
Expanded		
J5(7)	Materials conforming to NACE MR01-75	
Country Certification		
Standard		**Standard**
J1	Canadian Registration	★
Expanded		
J6	Conformance to European Pressure Equipment Directive (PED) 97/23/EC	
Typical Model Number: 1496 WN 040 A3 S		

(1) Available in line sizes from 2-12 in.

(2) Previously PN64.

(3) Default pipe schedules are listed in Table 68 on page 125 for the 1496 Orifice Flange Unions.

(4) These options are not available with flange type DN. These options should only be selected if the required pipe schedule is different from the default pipe schedule, as shown in Table 68 on page 125. Standard wall thickness for DIN weldneck flanges is per ISO EN 1092-1 (2002). Consult the factory if a different wall thickness is required.

(5) Not available with Flange Union Type code RJ.

(6) Stainless steel bolting (ASTM A193 GR B8M Class 2) is classified as "low strength bolting" by the various ASME B31 piping codes and may not be suitable for all applications requiring code conformance.

(7) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

1495/1496 Specifications

1495/1496 FUNCTIONAL SPECIFICATIONS

Service and Flow Range

Liquid, gas or vapor turbulent flow, for pipe Reynold's Numbers greater than the following(1):

AGA-3: 4,000
ASME MFC-3M(2): 5,000 and 170 β^2 D (whichever is higher)
ISO-5167(2): 5,000 and 170 β^2 D (whichever is higher)

(1) For flange tap applications.

(2) D = pipe I.D. in mm. β = Beta Ratio

Orifice Plate Operating Limitations

Table 66. Temperature Limit (Based on flange rating per ANSI B16.5.)

ANSI Flange Rating	Applicability	Gasket Description	Temperature Rating
300#	Default	Durlon 8500, Compressed Sheet Gasket	-100 °F to 700 °F (-73 °C to 371 °C)
	If "P2" option	Durlon 9000, Compressed Sheet Gasket	-350 °F to 520 °F (-212 °C to 271°C)
	If "G1" option	Flexitallic CGI, Spiral Wound Gasket with Thermiculite 735 Filler	-350 °F to 1000 °F (-212 °C to 538 °C)
600#, 900#, 1500#, 2500#	Default	Flexitallic CGI, Spiral Wound Gasket with Thermiculite 735 Filler	-350 °F to 1000 °F (-212 °C to 538 °C)
	If "P2" option	Flexitallic CGI, Spiral Wound Gasket with PTFE Filler	-300 °F to 500 °F (-184 °C to 260 °C)
	If "G1" option	Flexitallic CGI, Spiral Wound Gasket with Thermiculite 735 Filler	-350 °F to 1000 °F (-212 °C to 538 °C}

Maximum Working Pressure:

Based on flange rating per ANSI B16.5.

Service and Flow Range

Liquid, gas or vapor turbulent flow, for pipe Reynold's Numbers within ISO 5167, AGA Report No. 3/ API 14.3.2, and ASME MFC-3M specifications.

Pipe Sizes

2-in. to 24-in. (50 mm to 600 mm). Contact Emerson Process Management for pipe sizes less than 2-in. (50 mm) or greater than 24-in. (600 mm).

•

Operating Limits

1495 Temperature Range:

- –320 to 1200 °F (–196 to 649 °C)

Table 67. 1496 Temperature Range:

1496 Material	Temperature Rating
Carbon Steel (ASTM A105)	-29 °C to -29°C
316/316L Stainless Steel (ASTM A182)	-198 °C to 538 °C
304/304L Stainless Steel (ASTM A182)	-254 °C to 538 °C
Alloy C-276 (ASTM B462 UNS N10276)	-198 °C to 677°C
Alloy 400 (ASTM B564 UNS N04400)	-198 °C to 482 °C
Carbon Steel (A350-LF2)	-46 °C to 538 °C
DIN 1.4571 (316Ti Stainless Steel)	-198 °C to 538 °C
Alloy C4 (ASTM B574 UNS N06455)	-198 °C to 427 °C

1495/1496 PHYSICAL SPECIFICATIONS

Standard Pipe Schedules

Table 68. Default Pipe Schedules for 1496 Orifice Flange Unions (1)(2)

Nominal Pipe Size(3)	ANSI 300# (WN, TH, SO)	ANSI 600# (WN, RJ)	ANSI 900# (WN, RJ)	ANSI 1500# (WN, RJ)	ANSI 2500# (WN, RJ)
2 (51)	Standard	Standard	XS	XS	160
2½- (64)	Standard	Standard	XS	XS	
3 (76)	Standard	Standard	XS		
4 (102)	Standard	Standard	XS		
6 (152)	Standard	Standard	XS		
8 (203)	Standard	Standard			
10 (254)	Standard	XS			
12 (305)	Standard	XS			
14 (356)	Standard				
16 (406)	Standard				
18 (457)	Standard				
20 (508)	Standard				
24 (610)	XS				

(1) If no default schedule provided - customer must specify pipe schedule.

(2) Standard wall thickness for DIN weldneck flanges is per ISO EN 1092-1 (2002). Consult factory if different wall thickness is required.

(3) Size in inches (millimeters).

NOTE
It is strongly encouraged to use the ordering codes to specify desired pipe schedule.

Table 69. Dimensions of Pipe Inner Diameter(1)

Nominal Pipe Size	Schedule					
	5S	10	10S	20	30	40
2 (51)	2.245 (57.02)	2.157 (54.79)	2.157 (54.79)	–	–	2.067 (52.501)
2½- (64)	2.709 (68.81)	2.635 (66.93)	2.635 (66.93)	–	–	2.469 (62.71)
3 (76)	2.224 (56.49)	3.26 (82.80)	3.26 (82.80)	–	–	3.068 (77.93)
4 (102)	4.334 (110.08)	4.26 (108.20)	4.26 (108.20)	–	–	4.026 (102.26)
6 (152)	6.407 (162.74)	6.357 (161.47)	6.357 (161.47)	–	–	6.065 (154.05)
8 (203)	8.407 (213.54)	8.329 (211.56)	8.329 (211.56)	8.125 (206.38)	8.071 (205)	7.981 (202.72)
10 (254)	10.482 (266.24)	10.42 (264.67)	10.42 (264.67)	10.25 (260.35)	10.136 (257.45)	10.20 (254.51)
12 (305)	12.438 (315.93)	12.39 (314.71)	12.39 (314.71)	12.25 (311.15)	12.09 (307.09)	11.938 (303.23)
14 (356)	–	13.5 (342.90)	13.624 (346.05)	13.376 (339.75)	13.25 (336.55)	13.124 (333.35)
16 (406)	–	15.5 (393.70)	15.624 (396.85)	15.376 (390.55)	15.25 (387.35)	15.0 (381.0)
18 (457)	–	17.5 (444.50)	17.624 (447.65)	17.376 (441.35)	17.126 (435.00)	16.976 (431.19)
20 (508)	–	19.5 (495.30)	19.564 (496.93)	19.25 (488.95)	19.0 (482.60)	18.814 (477.88)
24 (610)	–	23.5 (596.90)	23.5 (596.90)	23.25 (590.55)	22.876 (581.05)	22.626 (574.70)
Nominal Pipe Size	**Schedule**					
	40S	**Standard**	**60**	**80**	**80S**	**XS**
2 (51)	2.067 (52.501)	2.067 (52.50)	–	1.939 (49.25)	1.939 (49.25)	1.939 (49.25)
2½- (64)	2.469 (62.71)	2.469 (62.71)	–	2.323 (59.0)	2.323 (59.0)	2.323 (59.0)
3 (76)	3.068 (77.93)	3.068 (77.93)	–	2.90 (73.66)	2.90 (73.66)	2.90 (73.66)
4 (102)	4.026 (102.26)	4.026 (102.26)	–	3.826 (97.18)	3.826 (97.18)	3.826 (97.18)
6 (152)	6.065 (154.05)	6.065 (154.05)	–	5.761 (146.33)	5.761 (146.33)	5.761 (146.33)
8 (203)	7.981 (202.72)	7.981 (202.72)	7.813 (198.45)	7.625 (193.68)	7.625 (193.68)	7.625 (193.68)
10 (254)	10.02 (254.51)	10.20 (259.08)	9.75 (247.65)	9.564 (242.94)	9.75 (247.65)	9.75 (247.65)
12 (305)	12.0 (304.8)	12.00 (304.80)	11.626 (41.30)	11.376 (288.95)	11.75 (298.45)	11.75 (298.45)
14 (356)	–	13.250 (336.55)	12.814 (325.48)	12.50 (317.50)	–	13.0 (330.20)
16 (406)	–	15.250 (387.35)	14.688 (373.08)	14.314 (363.58)	–	15.0 (381.0)
18 (457)	–	17.250 (438.15)	16.5 (419.10)	16.126 (409.60)	–	17.0 (425.0)
20 (508)	–	19.252 (488.95)	18.376 (466.75)	17.938 (455.63)	–	19.0 (482.60)
24 (610)	–	23.250 (590.55)	22.064 (560.43)	21.564 (547.73)	–	23.0 (584.20)

Table 69. Dimensions of Pipe Inner Diameter(1)

Nominal Pipe Size	Schedule					
	100	120	140	160	XXS	
2 (51)	–	–	–	1.689 (42.9)	1.503 (38.18)	
2½- (64)	–	–	–	2.125 (53.98)	1.771 (44.98)	
3 (76)	–	–	–	2.624 (66.65)	2.30 (58.42)	
4 (102)	–	3.624 (92.005)	–	3.438 (87.33)	3.152 (80.06)	
6 (152)	–	5.501 (139.73)	–	5.189 (131.80)	4.897 (124.38)	
8 (203)	7.437 (188.90)	7.189 (157.15)	7.001 (177.83)	6.813 (173.05)	6.875 (174.63)	
10 (254)	9.314 (236.58)	9.064 (230.23)	8.75 (222.25)	8.50 (215.90)	–	
12 (305)	11.064 (281.03)	10.75 (273.05)	10.5 (266.70)	10.126 (257.20)	–	
14 (356)	12.126 (308.00)	11.814 (300.08)	11.5 (37.50)	11.188 (284.18)	–	
16 (406)	13.938 (354.03)	13.564 (344.53)	13.124 (333.35)	12.814 (325.48)	–	
18 (457)	15.688 (398.27)	15.25 (387.35)	14.876 (377.85)	14.438 (366.73)	–	
20 (508)	17.44 (443.98)	17.0 (431.80)	16.5 (410.10)	16.064 (408.03)	–	
24 (610)	20.938 (531.83)	20.376 (517.55)	19.876 (504.85)	19.314 (490.58)	–	

(1) Measurement is in inches (millimeters).

Materials of Construction

1495 Orifice Plate

304/304L or 316/316L Stainless Steel ASTM A240; DIN 1.4571 (316Ti SST)(1); Alloy C-276 ASTM B575; or Alloy 400 ASTM B127.

(1) May not be available in all world areas.

Orifice Bore Sizes

Standard bore sizes are in 1/8-in. (3.2 mm) increments from ½-in. (12.7 mm) to 4-in. (101.6 mm) and in 1/4-in. (6.3 mm) increments from 4 1/4 to 6-in. (107.95 mm to 152.4 mm).

If required, Emerson Process Management can determine the orifice bore. Basic flow data is required at the time of order, see Calculation Data Sheet.

Bore tolerances are within AGA and ASME specifications. Available options allow the user to have the Rosemount 1495 sized for specific operating conditions. The “1495PC Paddle Type Orifice Plate” on page 175 specifies the physical parameters of the orifice from a detailed sizing calculation.

1496 Flange Unions

Orifice Flanges (ANSI B16.36): Carbon Steel ASTM A105 / A350; Stainless Steel ASTM A182; Alloy C-276 ASTM B564/575; or Alloy 400 ASTM B564/127; DIN 1.4571 (316Ti SST)(1); DIN 1.0460 (carbon steel)(1).

(1) May not be available in all world areas.

Flange Mounting Hardware

- Studs: Carbon Steel ASTM A193 Grade B7M
- Nuts: Carbon Steel ASTM A194 Gr 2H
- Gaskets: Non-asbestos ring type, Durlon® 8500 Green, Klingersil C4400, or equivalent
- Pipe Plugs: Match flange material

Pressure Taps

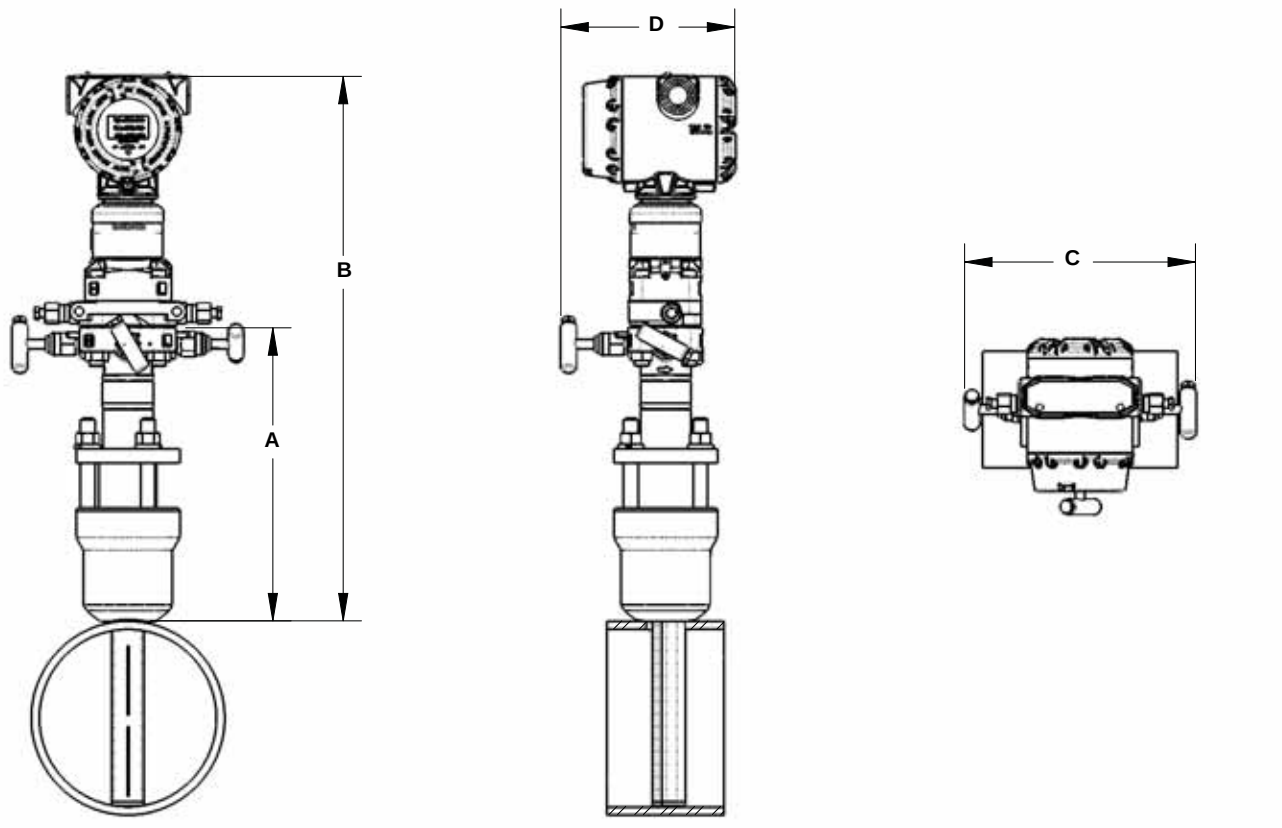
Pressure tap connections are ½ -in. (12.7 mm) NPT and 180° apart as standard. The tap hole diameter is ¼-in. (6.35 mm) for 2-in. (51 mm) and 2 ½ -in. (63.5 mm) size, 3/8-in. (9.6 mm) for 3-in. (76.2 mm) size, and ½-in. (12.7 mm) for 4-in. (101.6 mm) and larger sizes.

Dimensional Drawings

3051SF DIMENSIONAL DRAWINGS

Rosemount 3051SFA Pak-Lok Annubar Flowmeter(1)

Front View	Side View	Top View



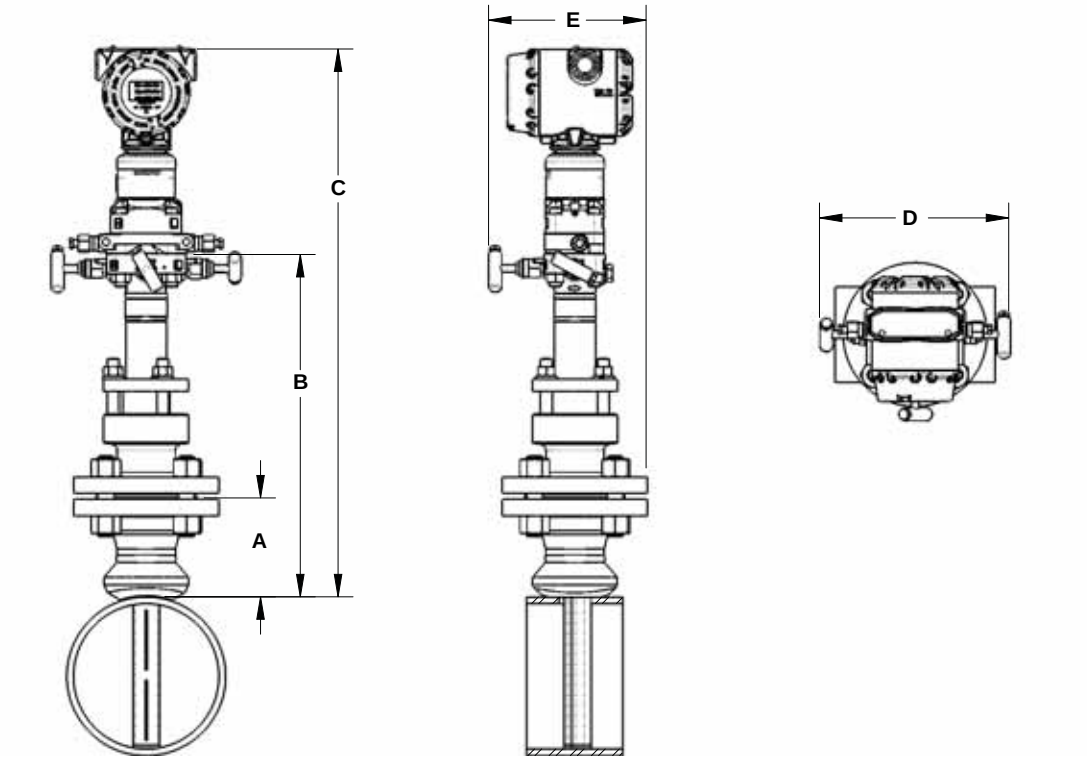
(1) The Pak-Lok Annubar model is rated equivalent to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

Table 70. 3051SFA Pak-Lok Annubar Flowmeter Dimensional Data

Sensor Size	A (Max)	B (Max)	C (Max)	D (Max)
1	8.50 (215.9)	16.03 (407.2)	9.00 (228.6)	6.90 (175.3)
2	11.00 (279.4)	17.78 (451.6)	9.00 (228.6)	6.90 (175.3)
3	12.00 (304.8)	20.53 (521.5)	9.00 (228.6)	6.90 (175.3)
Dimensions are in inches (millimeters)				

Rosemount 3051SFA Flange-Lok Annubar Flowmeter(1)

Front View	Side View	Top View



(1) The Flange-Lok Annubar model is available up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

Table 71. 3051SFA Flange-Lok Annubar Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C (Max)	D (Max)	E (Max)
1	1 1/2 – 150#	3.88 (98.6)	12.25 (311.2)	20.78 (527.8)	9.00 (228.6)	6.30 (160.0)
1	1 1/2 – 300#	4.13 (104.9)	12.25 (311.2)	20.78 (527.8)	9.00 (228.6)	6.86 (174.2)
1	1 1/2 – 600#	4.44 (112.8)	12.25 (311.2)	20.78 (527.8)	9.00 (228.6)	6.86 (174.2)
1	DN40/PN16	3.09 (78.5)	12.25 (311.2)	20.78 (527.8)	9.00 (228.6)	6.86 (174.2)
1	DN40/PN40	3.21 (81.5)	12.25 (311.2)	20.78 (527.8)	9.00 (228.6)	6.86 (174.2)
1	DN40/ PN100	3.88 (98.6)	12.25 (311.2)	20.78 (527.8)	9.00 (228.6)	6.86 (174.2)
2	2 – 150#	4.13 (104.9)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	6.80 (172.7)
2	2 – 300#	4.38 (111.3)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	7.05 (179.1)
2	2 – 600#	4.75 (120.7)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	7.05 (179.1)
2	DN50/PN16	3.40 (86.4)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	7.05 (179.1)
2	DN50/PN40	3.52 (89.4)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	7.05 (179.1)
2	DN50/ PN100	4.30 (109.2)	14.25 (362.0)	22.78 (578.6)	9.00 (228.6)	7.05 (179.1)
3	3 – 150#	4.63 (117.6)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	7.55 (191.8)
3	3 – 300#	5.00 (127.0)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	7.93 (201.3)
3	3 – 600#	5.38 (136.7)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	7.93 (201.3)
3	DN80/PN16	3.85 (97.8)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	7.93 (201.3)
3	DN80/PN40	4.16 (105.7)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	7.93 (201.3)
3	DN80/ PN100	4.95 (125.7)	17.50 (444.5)	26.03 (661.2)	9.00 (228.6)	7.93 (201.3)
Dimensions are in inches (millimeters)						

Rosemount 3051SFA Flanged with Opposite Side Support Annubar Flowmeter

Front View | **Side View** | **Top View**

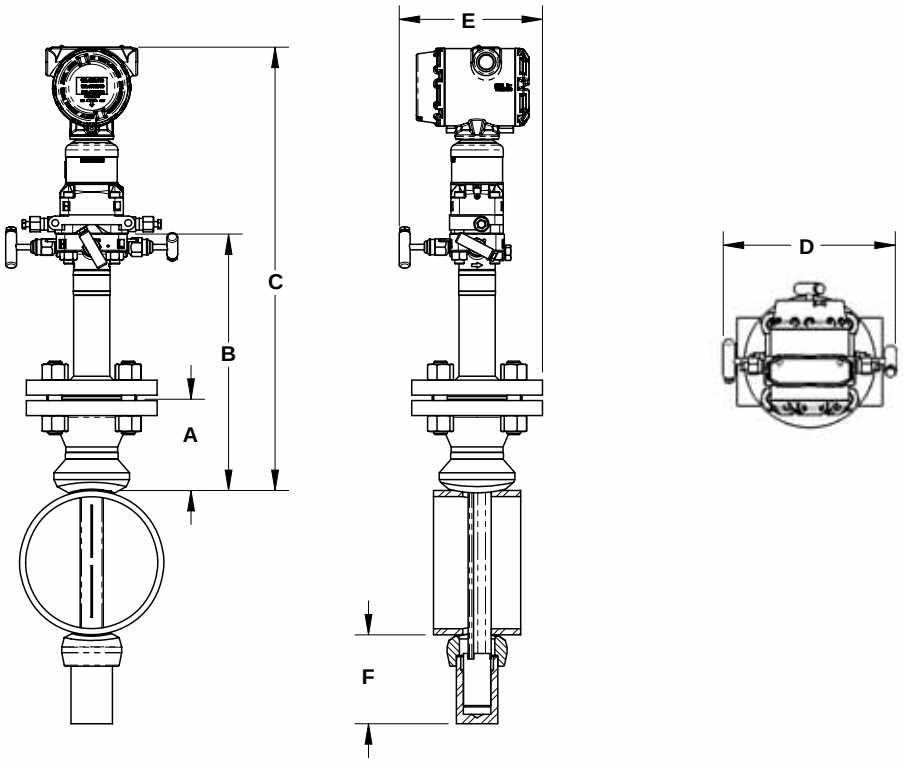


Table 72. 3051SFA Flanged Annubar Flowmeter Dimensional Data

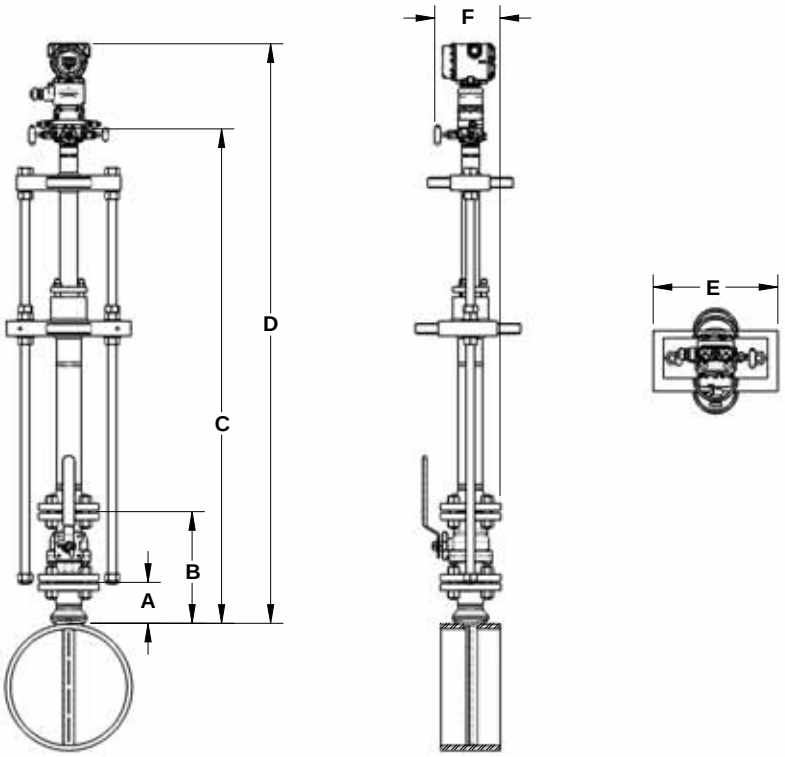
Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C ± 0.25 (6.4)	D (Max)	E (Max)	F (Max)
1	1 1/2 – 150#	3.88 (98.6)	11.00 (279.4)	19.53 (496.1)	9.00 (228.6)	6.30 (160.0)	3.50 (88.9)
1	1 1/2 – 300#	4.13 (104.9)	11.00 (279.4)	19.53 (496.1)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	1 1/2 – 600#	4.44 (112.8)	11.00 (279.4)	19.53 (496.1)	9.00(228.6)	6.86 (174.2)	3.50 (88.9)
1	DN40/PN16	3.09 (78.5)	11.00 (279.4)	19.53 (496.1)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	DN40/PN40	3.21 (81.5)	11.00 (279.4)	19.53 (496.1)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	DN40/ PN100	3.88 (98.6)	11.00 (279.4)	19.53 (496.1)	9.00(228.6)	6.86 (174.2)	3.50 (88.9)
1	1 1/2 – 900#	4.94 (125.5)	9.31 (236.5)	—	—	—	3.50 (88.9)
1	1 1/2 – 1500#	4.94 (125.5)	9.31 (236.5)	—	—	—	3.50 (88.9)
1	1 1/2 – 2500#	6.76 (171.7)	11.63 (295.4)	—	—	—	4.00 (101.6)
2	2 – 150#	4.13 (104.9)	12.00 (304.8)	20.53 (521.5)	9.00 (228.6)	6.80 (172.7)	5.00 (127.0)
2	2 – 300#	4.38 (111.3)	12.00 (304.8)	20.53 (521.5)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	2 – 600#	4.75 (120.7)	12.00 (304.8)	20.53 (521.5)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	DN50/PN16	3.40 (86.4)	12.00 (304.8)	20.53 (521.5)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	DN50/PN40	3.52 (89.4)	12.00 (304.8)	20.53 (521.5)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	DN50/ PN100	4.30 (109.2)	12.00 (304.8)	20.53 (521.5)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	2 – 900#	5.88 (149.4)	10.50 (266.7)	—	—	—	5.00 (127.0)
2	2 – 1500#	5.88 (149.4)	10.50 (266.7)	—	—	—	5.00 (127.0)
2	3 – 2500#	9.88 (251.0)	15.63 (397.0)	—	—	—	4.50 (114.3)
3	3 – 150#	4.63 (117.6)	13.50 (342.9)	22.03 (559.6)	9.00 (228.6)	7.55 (191.8)	4.00 (101.6)
3	3 – 300#	5.00 (127.0)	13.50 (342.9)	22.03 (559.6)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)

Table 72. 3051SFA Flanged Annubar Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C ± 0.25 (6.4)	D (Max)	E (Max)	F (Max)
3	3 – 600#	5.38 (136.7)	13.50 (342.9)	22.03 (559.6)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/PN16	3.85 (97.8)	13.50 (342.9)	22.03 (559.6)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/PN40	4.16 (105.7)	13.50 (342.9)	22.03 (559.6)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/ PN100	4.95 (125.7)	13.50 (342.9)	22.03 (559.6)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	4 – 900#	8.19 (208.0)	13.06 (331.7)	—	—	—	7.00 (177.8)
3	4 – 1500#	8.56 (217.4)	13.81 (350.8)	—	—	—	7.00 (177.8)
3	4 – 2500#	11.19 (284.2)	17.31 (439.7)	—	—	—	7.00 (177.8)
	Dimensions are in inches (millimeters)						

Rosemount 3051SFA Flanged Flo-Tap Annubar Flowmeter(1)

Front View | **Side View** | **Top View**



(1) The Flanged Flo-Tap Annubar Flowmeter is available with either the manual or gear drive options.

Table 73. 3051SFA Flanged Flo-Tap Annubar Flowmeter Dimensional Data

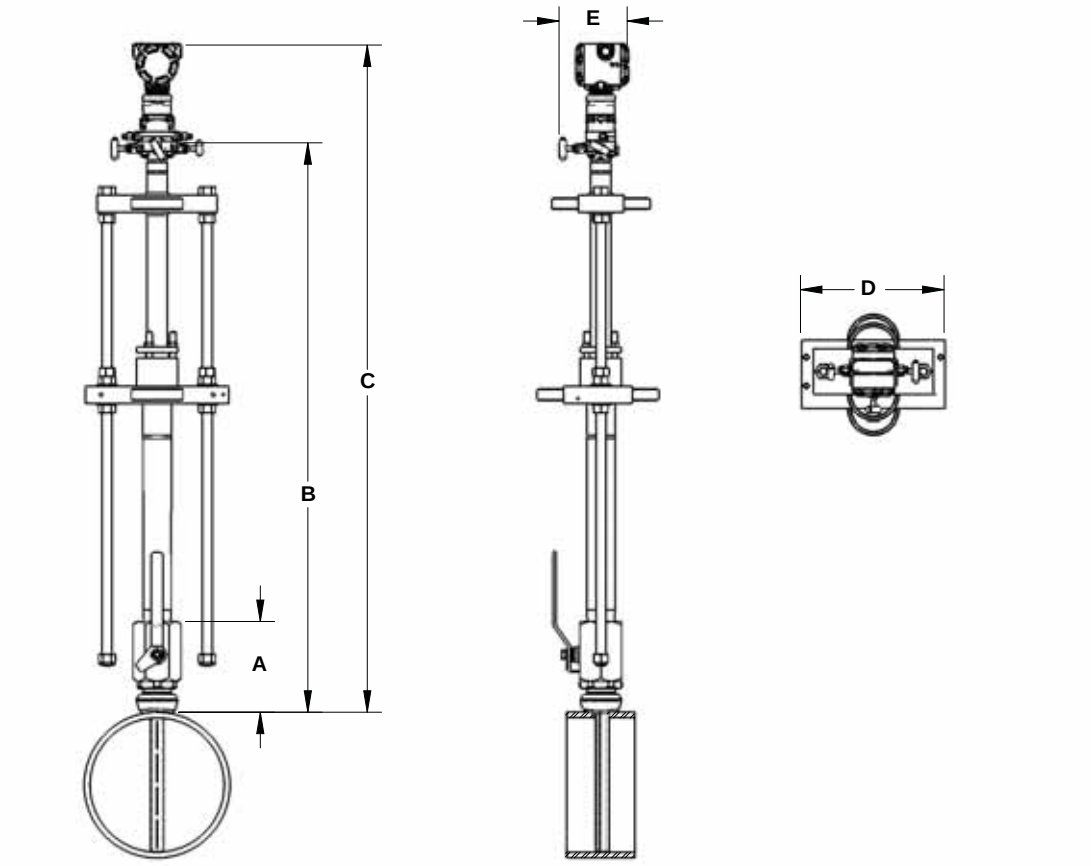
Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C^I (Max) (Gear Drive)	C^I (Max) (Manual)	D (Max)	E (Max)	F (Max)
1	1 1/2 – 150#	3.88 (98.6)	10.50 (266.7)	—	17.77 (451.4)	C + 8.53 (216.7)	10.50 (266.7)	6.30 (160.0)
1	1 1/2 – 300#	4.13 (104.9)	11.75 (298.5)	—	17.77 (451.4)	C + 8.53 (216.7)	10.50 (266.7)	6.86 (174.2)
1	1 1/2 – 600#	4.44 (112.8)	14.06 (357.2)	—	17.77 (451.4)	C + 8.53 (216.7)	10.50 (266.7)	6.86 (174.2)
1	DN40/PN16(1)	3.09 (78.5)	See Note 1.	—	17.77 (451.4)	C + 8.53 (216.7)	10.50 (266.7)	6.86 (174.2)
1	DN40/PN40(1)	3.21 (81.5)	See Note 1.	—	17.77 (451.4)	C + 8.53 (216.7)	10.50 (266.7)	6.86 (174.2)
1	DN40/PN100(1)	3.88 (98.6)	See Note 1.	—	17.77 (451.4)	C + 8.53 (216.7)	10.50 (266.7)	6.86 (174.2)
2	2 – 150#	4.13 (104.9)	11.25 (285.8)	24.44 (620.8)	21.20 (538.5)	C + 8.53 (216.7)	12.56 (319.0)	6.80 (172.7)
2	2 – 300#	4.38 (111.3)	13.00 (330.2)	24.44 (620.8)	21.20 (538.5)	C + 8.53 (216.7)	12.56 (319.0)	7.05 (179.1)
2	2 – 600#	4.75 (120.7)	16.38 (416.0)	24.44 (620.8)	21.20 (538.5)	C + 8.53 (216.7)	12.56 (319.0)	7.05 (179.1)
2	DN50/PN16(1)	3.40 (86.4)	See Note 1.	24.44 (620.8)	21.20 (538.5)	C + 8.53 (216.7)	12.56 (319.0)	7.05 (179.1)
2	DN50/PN40(1)	3.52 (89.4)	See Note 1.	24.44 (620.8)	21.20 (538.5)	C + 8.53 (216.7)	12.56 (319.0)	7.05 (179.1)
2	DN50/PN100(1)	4.30 (109.2)	See Note 1.	24.44 (620.8)	21.20 (538.5)	C + 8.53 (216.7)	12.56 (319.0)	7.05 (179.1)
3	3 – 150#	4.63 (117.6)	12.75 (323.9)	26.37 (669.8)	23.14 (587.8)	C + 8.53 (216.7)	14.13 (358.9)	7.55 (191.8)
3	3 – 300#	5.00 (127.0)	16.25 (412.8)	26.37 (669.8)	23.14 (587.8)	C + 8.53 (216.7)	14.13 (358.9)	7.93 (201.3)
3	3 – 600#	5.38 (136.7)	19.50 (495.3)	26.37 (669.8)	23.14 (587.8)	C + 8.53 (216.7)	14.13 (358.9)	7.93 (201.3)
3	DN80/PN16(1)	3.85 (97.8)	See Note 1.	26.37 (669.8)	23.14 (587.8)	C + 8.53 (216.7)	14.13 (358.9)	7.93 (201.3)
3	DN80/PN40(1)	4.16 (105.7)	See Note 1.	26.37 (669.8)	23.14 (587.8)	C + 8.53 (216.7)	14.13 (358.9)	7.93 (201.3)
3	DN80/PN100(1)	4.95 (125.7)	See Note 1.	26.37 (669.8)	23.14 (587.8)	C + 8.53 (216.7)	14.13 (358.9)	7.93 (201.3)
	Dimensions are in inches (millimeters)							

(1) DIN Valves are not offered

Inserted, C Dimension = Pipe I.D. + Wall Thickness + B + C^I
Retracted, C Dimension = 2 x (Pipe I.D. + Wall Thickness + B) + C^I

Rosemount 3051SFA Threaded Flo-Tap Annubar Flowmeter(1)

Front View | **Side View** | **Top View**



(1) The Threaded Flo-Tap Annubar Flowmeter is available with both the manual and gear drive options.

Table 74. 3051SFA Threaded Flo-Tap Annubar Flowmeter Dimensional Data

Sensor Size	A ± 0.50 (12.7)	B^I (Max) (Gear Drive)	B^I (Max) (Manual)	C (Max)	D (Max)	E (Max)
1	7.51 (190.9)	—	16.96 (430.8)	B + 8.53 (216.7)	10.50 (266.7)	6.90 (175.3)
2	8.17 (207.5)	23.62 (599.9)	20.39 (517.9)	B + 8.53 (216.7)	12.56 (319.0)	6.90 (175.3)
Sensor Size 3 is not available in a Threaded Flo-Tap.						
Dimensions are in inches (millimeters)						

Inserted, B Dimension = Pipe I.D. + Wall Thickness + A + B^I
Retracted, B Dimension = 2 x (Pipe I.D. + Wall Thickness + A) + B^I

Rosemount 3051SFC Compact Orifice Flowmeter

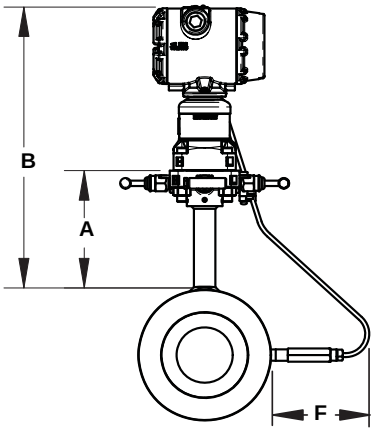
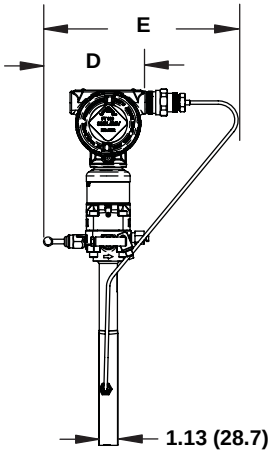
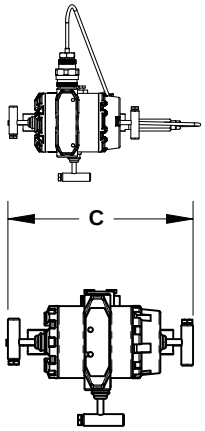
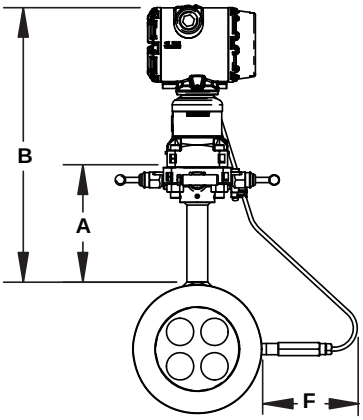
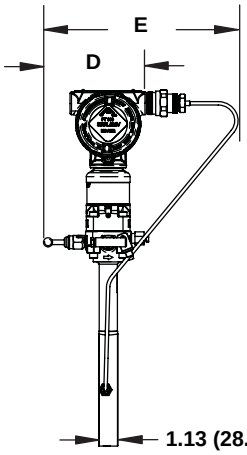
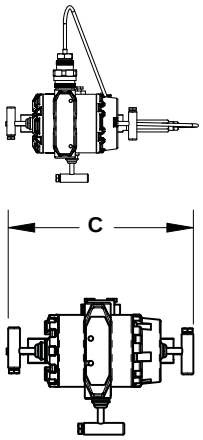
	Orifice Plate Front View	Orifice Plate Side View	Orifice Plate Top View
Compact Orifice Plate (Primary Element Type code P)			
Conditioning Orifice Plate (Primary Element Type code C)			

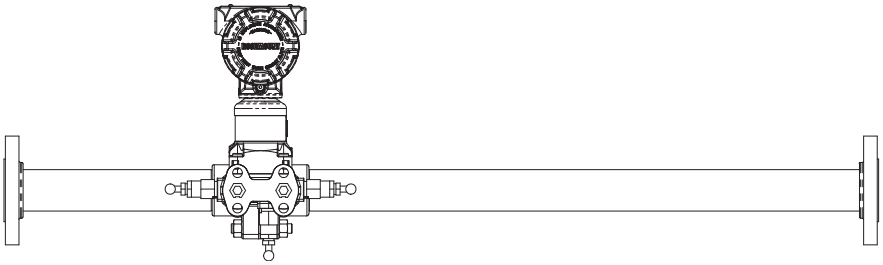
Table 75. 3051SFC Compact Orifice Dimensional Data(1)

Primary Element Type	A	B	Transmitter Height	C	D	E	F
Type P and C	5.62 (143)	Transmitter Height + A	7.70 (196)	7.75 (197) - closed 8.25 (210) - open	6.00 (152) - closed 6.25 (159) - open	10.2 (257.8) - closed 10.4 (264.2) - open	Max of 6.7 (71)

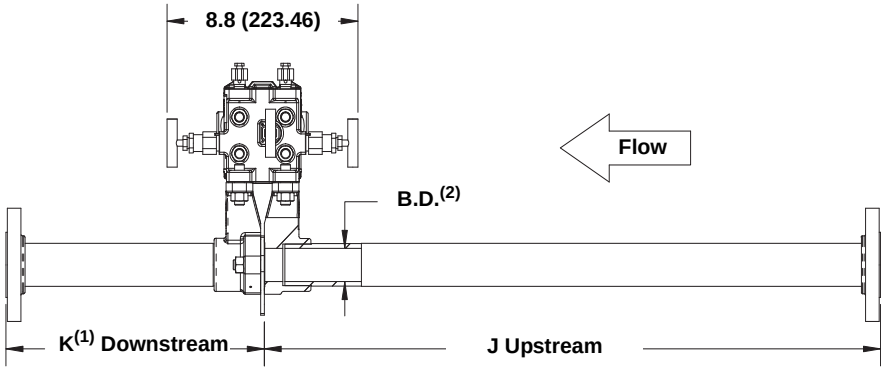
(1) Measurement in inches (millimeters).

Rosemount 3051SFP Integral Orifice Flowmeter

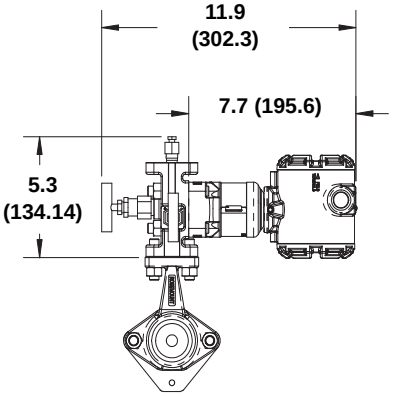
Front View



Bottom View



Side View



Dimensions are in inches (millimeters).

Table 76. 3051SFP Integral Orifice Flowmeter Dimensional Data

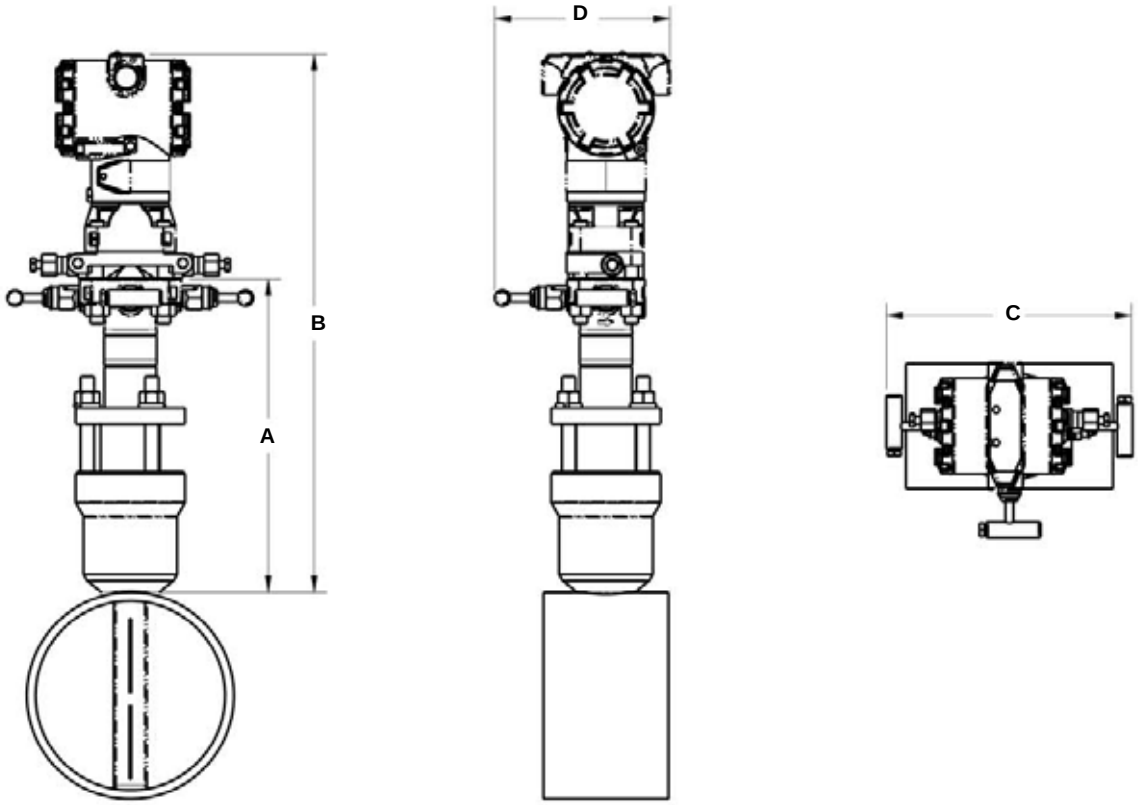
	Line Size		
Dimension	**1/2-in. (15 mm)**	**1-in. (25 mm)**	**1 1/2-in. (40 mm)**
J (Beveled/Threaded pipe ends)	12.54 (318.4)	20.24 (514.0)	28.44 (722.4)
J (RF slip-on, RTJ slip-on, RF-DIN slip on)	12.62 (320.4)	20.32 (516.0)	28.52 (724.4)
J (RF 150#, weld neck)	14.37 (364.9)	22.37 (568.1)	30.82 (782.9)
J (RF 300#, weld neck)	14.56 (369.8)	22.63 (574.7)	31.06 (789.0)
J (RF 600#, weld neck)	14.81 (376.0)	22.88 (581.0)	31.38 (797.1)
K (Beveled/Threaded pipe ends)	5.74 (145.7)	8.75 (222.2)	11.91 (302.6)
K (RF slip-on, RTJ slip-on, RF-DIN slip on)(1)	5.82 (147.8)	8.83 (224.2)	11.99 (304.6)
K (RF 150#, weld neck)	7.57 (192.3)	10.88 (276.3)	14.29 (363.1)
K (RF 300#, weld neck)	7.76 (197.1)	11.14 (282.9)	14.53 (369.2)
K (RF 600#, weld neck)	8.01 (203.4)	11.39 (289.2)	14.85 (377.2)
B.D. (Bore Diameter)	0.664 (16.87)	1.097 (27.86)	1.567 (39.80)
Dimensions are in inches (millimeters).			

(1) Downstream length shown here includes plate thickness of 0.162-in. (4.11 mm).

3051CF DIMENSIONAL DRAWINGS

Rosemount 3051CFA Pak-Lok Annubar Flowmeter(1)

Front View	Side View	Top View



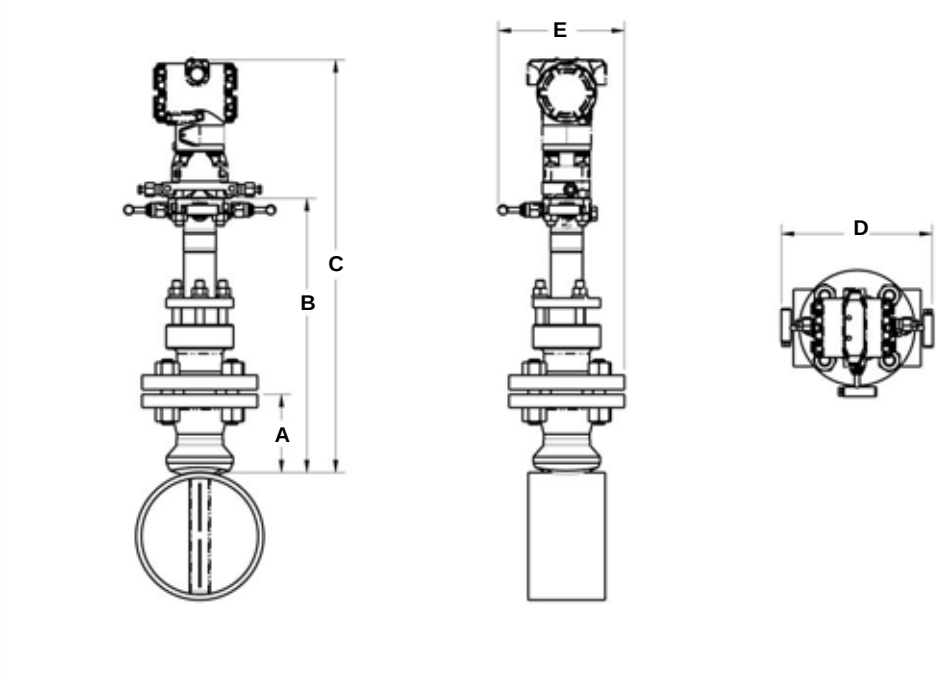
(1) The Pak-Lok Annubar model is available up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

Table 77. 3051CFA Pak-Lok Annubar Flowmeter Dimensional Data

Sensor Size	A (Max)	B (Max)	C (Max)	D (Max)
1	8.50 (215.9)	14.60 (370.8)	9.00 (228.6)	6.00 (152.4)
2	11.0 (279.4)	16.35 (415.3)	9.00 (228.6)	6.00 (152.4)
3	12.00 (304.8)	19.10 (485.1)	9.00 (228.6)	6.00 (152.4)
Dimensions are in inches (millimeters)				

Rosemount 3051CFA Flange-Lok Annubar Flowmeter(1)

Front View	Side View	Top View



(1) The Flange-Lok Annubar model can be direct mounted up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

Table 78. 3051CFA Flange-Lok Annubar Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C (Max)	D (Max)	E (Max)
1	1 1/2 – 150#	3.88 (98.6)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	6.30 (160.0)
1	1 1/2 – 300#	4.13 (104.9)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	6.86 (174.2)
1	1 1/2 – 600#	4.44 (112.8)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	6.86 (174.2)
1	DN40/PN16	3.09 (78.5)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	6.86 (174.2)
1	DN40/PN40	3.21 (81.5)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	6.86 (174.2)
1	DN40/ PN100	3.88 (98.6)	12.25 (311.2)	19.35 (491.5)	9.00 (228.6)	6.86 (174.2)
2	2 – 150#	4.13 (104.9)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	6.80 (172.7)
2	2 – 300#	4.38 (111.3)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	7.05 (179.1)
2	2 – 600#	4.75 (120.7)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	7.05 (179.1)
2	DN50/PN16	3.40 (86.4)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	7.05 (179.1)
2	DN50/PN40	3.52 (89.4)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	7.05 (179.1)
2	DN50/ PN100	4.30 (109.2)	14.25 (362.0)	21.35 (542.3)	9.00 (228.6)	7.05 (179.1)
3	3 – 150#	4.63 (117.6)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	7.55 (191.8)
3	3 – 300#	5.00 (127.0)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	7.93 (201.3)
3	3 – 600#	5.38 (136.7)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	7.93 (201.3)
3	DN80/PN16	3.85 (97.8)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	7.93 (201.3)
3	DN80/PN40	4.16 (105.7)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	7.93 (201.3)
3	DN80/ PN100	4.95 (125.7)	17.50 (444.5)	24.60 (624.8)	9.00 (228.6)	7.93 (201.3)

Dimensions are in inches (millimeters)

Rosemount 3051CFA Flanged Annubar Flowmeter

Front View	Side View	Top View

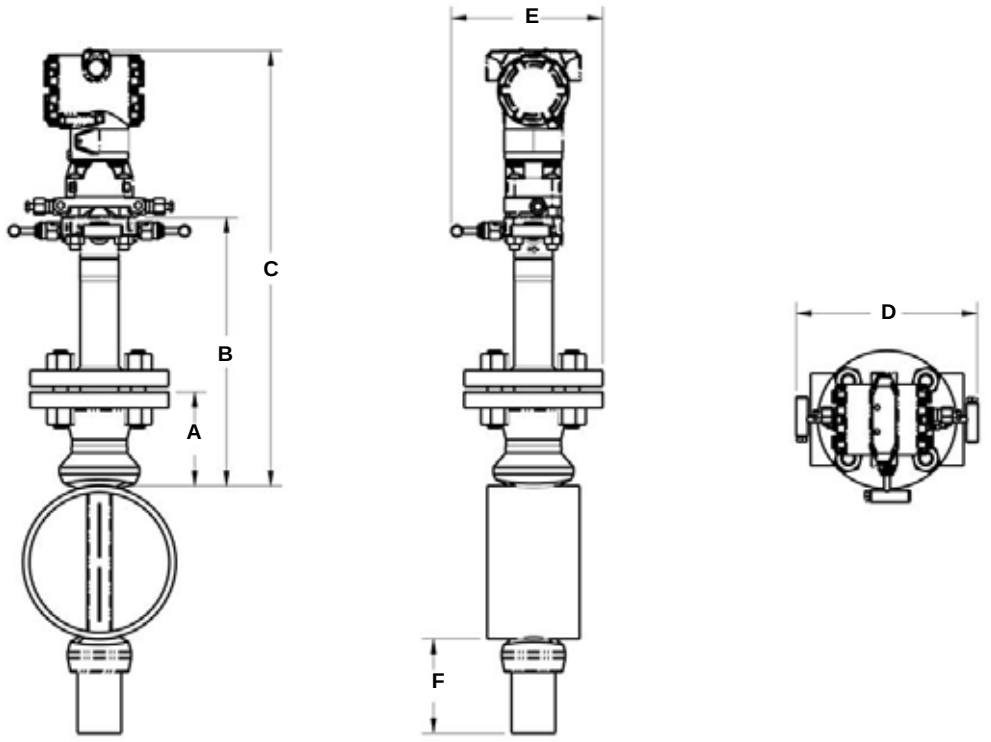


Table 79. 3051CFA Flanged Annubar Flowmeter Dimensional Data

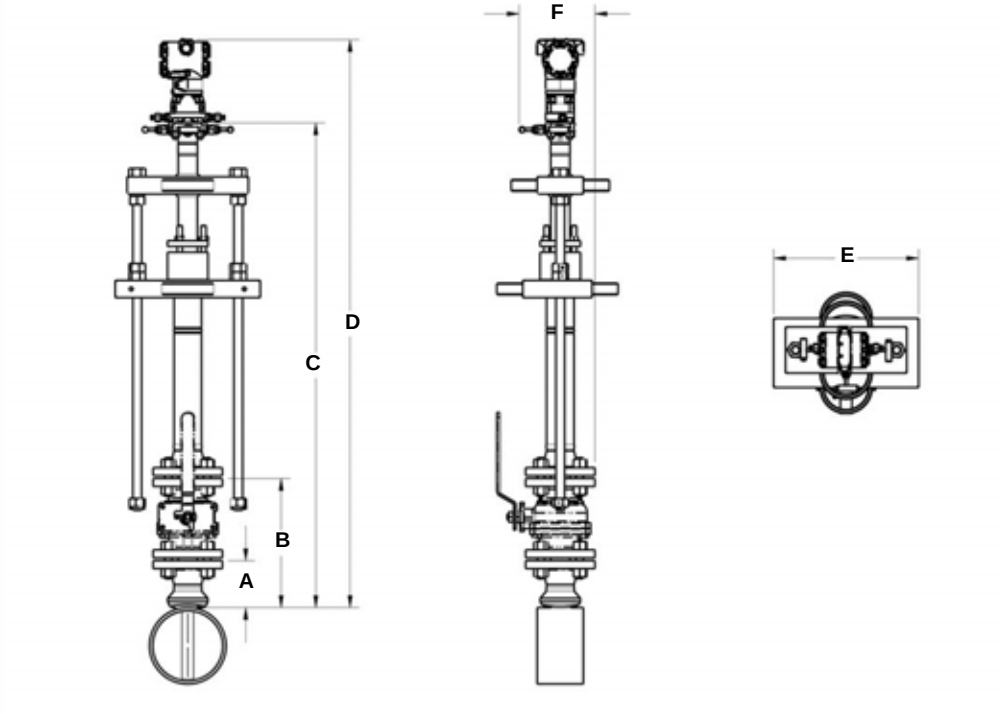
Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C ± 0.25 (6.4)	D (Max)	E (Max)	F (Max)
1	1 1/2 – 150#	3.88 (98.6)	11.00 (279.4)	18.10 (459.7)	9.00 (228.6)	6.30 (160.0)	3.50 (88.9)
1	1 1/2 – 300#	4.13 (104.9)	11.00 (279.4)	18.10 (459.7)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	1 1/2 – 600#	4.44 (112.8)	11.00 (279.4)	18.10 (459.7)	9.00(228.6)	6.86 (174.2)	3.50 (88.9)
1	DN40/PN16	3.09 (78.5)	11.00 (279.4)	18.10 (459.7)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	DN40/PN40	3.21 (81.5)	11.00 (279.4)	18.10 (459.7)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	DN40/ PN100	3.88 (98.6)	11.00 (279.4)	18.10 (459.7)	9.00(228.6)	6.86 (174.2)	3.50 (88.9)
1	1 1/2 – 900#	4.94 (125.5)	9.31 (236.5)	—	—	—	3.50 (88.9)
1	1 1/2 – 1500#	4.94 (125.5)	9.31 (236.5)	—	—	—	3.50 (88.9)
1	1 1/2 – 2500#	6.76 (171.7)	11.63 (295.4)	—	—	—	4.00 (101.6)
2	2 – 150#	4.13 (104.9)	12.00 (304.8)	19.10 (458.1)	9.00 (228.6)	6.80 (172.7)	5.00 (127.0)
2	2 – 300#	4.38 (111.3)	12.00 (304.8)	19.10 (458.1)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	2 – 600#	4.75 (120.7)	12.00 (304.8)	19.10 (458.1)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	DN50/PN16	3.40 (86.4)	12.00 (304.8)	19.10 (458.1)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	DN50/PN40	3.52 (89.4)	12.00 (304.8)	19.10 (458.1)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	DN50/ PN100	4.30 (109.3)	12.00 (304.8)	19.10 (458.1)	9.00 (228.6)	7.05 (179.1)	5.00 (127.0)
2	2 – 900#	5.88 (149.4)	10.50 (266.7)	—	—	—	5.00 (127.0)
2	2 – 1500#	5.88 (149.4)	10.50 (266.7)	—	—	—	5.00 (127.0)
2	3 – 2500#	9.88 (251.0)	15.63 (397.0)	—	—	—	4.50 (114.3)
3	3 – 150#	4.63 (117.6)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	7.55 (191.8)	4.00 (101.6)
3	3 – 300#	5.00 (127.0)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)

Table 79. 3051CFA Flanged Annubar Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C ± 0.25 (6.4)	D (Max)	E (Max)	F (Max)
3	3 – 600#	5.38 (136.7)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/PN16	3.85 (97.8)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/PN40	4.16 (105.7)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	DN80/ PN100	4.95 (125.7)	13.50 (342.9)	20.60 (523.2)	9.00 (228.6)	7.93 (201.3)	4.00 (101.6)
3	4 – 900#	8.19 (208.0)	13.06 (331.8)	—	—	—	7.00 (177.8)
3	4 – 1500#	8.56 (217.4)	13.81 (350.8)	—	—	—	7.00 (177.8)
3	4 – 2500#	11.19 (284.2)	17.31 (439.7)	—	—	—	7.00 (177.8)
Dimensions are in inches (millimeters)							

Rosemount 3051CFA Flanged Flo-Tap Annubar Flowmeter(1)

Front View	Side View	Top View



(1) The Flanged Flo-Tap Annubar Flowmeter is available with both the manual and gear drive options.

Table 80. 3051CFA Flanged Flo-Tap Annubar Flowmeter Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C^I (Max) (Gear Drive)	C^I (Max) (Manual)	D (Max)	E (Max)	F (Max)
1	1 1/2 – 150#	3.88 (98.6)	10.50 (266.7)	—	17.77 (451.4)	C +7.10 (180.3)	10.50 (266.7)	6.30 (160.0)
1	1 1/2 – 300#	4.13 (104.9)	11.75 (298.5)	—	17.77 (451.4)	C +7.10 (180.3)	10.50 (266.7)	6.86 (174.2)
1	1 1/2 – 600#	4.44 (112.8)	14.06 (357.2)	—	17.77 (451.4)	C +7.10 (180.3)	10.50 (266.7)	6.86 (174.2)
1	DN40/PN16(1)	3.09 (78.5)	See Note 1.	—	17.77 (451.4)	C +7.10 (180.3)	10.50 (266.7)	6.86 (174.2)
1	DN40/PN40	3.21 (81.5)	See Note 1.	—	17.77 (451.4)	C +7.10 (180.3)	10.50 (266.7)	6.86 (174.2)
1	DN40/PN100	3.88 (98.6)	See Note 1.	—	17.77 (451.4)	C +7.10 (180.3)	10.50 (266.7)	6.86 (174.2)
2	2 – 150#	4.13 (104.9)	11.25 (285.8)	24.44 (620.8)	21.20 (538.5)	C +7.10 (180.3)	12.56 (319.0)	6.80 (172.7)
2	2 – 300#	4.38 (111.3)	13.00 (330.2)	24.44 (620.8)	21.20 (538.5)	C +7.10 (180.3)	12.56 (319.0)	7.05 (179.1)
2	2 – 600#	4.75 (120.7)	16.38 (416.0)	24.44 (620.8)	21.20 (538.5)	C +7.10 (180.3)	12.56 (319.0)	7.05 (179.1)
2	DN50/PN16	3.40 (86.4)	See Note 1.	24.44 (620.8)	21.20 (538.5)	C +7.10 (180.3)	12.56 (319.0)	7.05 (179.1)
2	DN50/PN40	3.52 (89.4)	See Note 1.	24.44 (620.8)	21.20 (538.5)	C +7.10 (180.3)	12.56 (319.0)	7.05 (179.1)
2	DN50/PN100	4.30 (109.2)	See Note 1.	24.44 (620.8)	21.20 (538.5)	C +7.10 (180.3)	12.56 (319.0)	7.05 (179.1)
3	3 – 150#	4.63 (117.6)	12.75 (323.9)	26.37 (669.8)	23.14 (587.8)	C +7.10 (180.3)	14.13 (358.9)	7.55 (191.8)
3	3 – 300#	5.00 (127.0)	16.25 (412.8)	26.37 (669.8)	23.14 (587.8)	C +7.10 (180.3)	14.13 (358.9)	7.93 (201.3)
3	3 – 600#	5.38 (136.7)	19.50 (495.3)	26.37 (669.8)	23.14 (587.8)	C +7.10 (180.3)	14.13 (358.9)	7.93 (201.3)
3	DN80/PN16	3.85 (97.8)	See Note 1.	26.37 (669.8)	23.14 (587.8)	C +7.10 (180.3)	14.13 (358.9)	7.93 (201.3)
3	DN80/PN40	4.16 (105.7)	See Note 1.	26.37 (669.8)	23.14 (587.8)	C +7.10 (180.3)	14.13 (358.9)	7.93 (201.3)
3	DN80/PN100	4.95 (125.7)	See Note 1.	26.37 (669.8)	23.14 (587.8)	C +7.10 (180.3)	14.13 (358.9)	7.93 (201.3)
	Dimensions are in inches (millimeters)							

(1) DIN Valves are not offered.

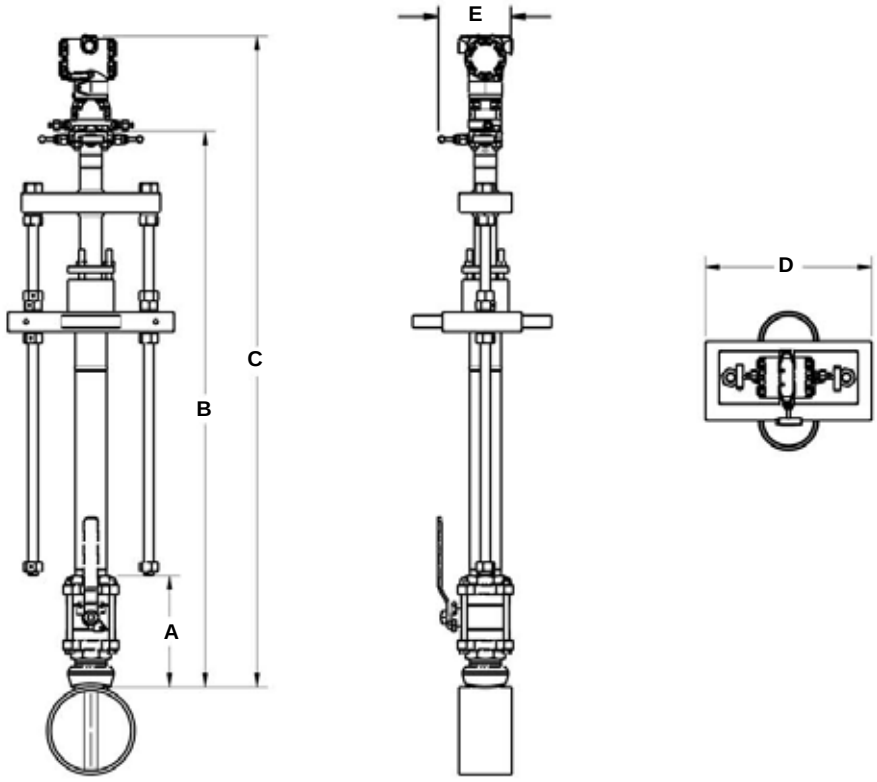
Note: Customer Supplied.

Inserted, C Dimension = Pipe I.D. + Wall Thickness + B + C^I

Retracted, C Dimension = 2 x (Pipe I.D. + Wall Thickness + B) + C^I

Rosemount 3051CFA Threaded Flo-Tap Annubar Flowmeter(1)

Front View | **Side View** | **Top View**



(1) The Threaded Flo-Tap Annubar Flowmeter is available with both the manual and gear drive options.

Table 81. 3051CFA Threaded Flo-Tap Annubar Flowmeter Dimensional Data

Sensor Size	A ± 0.50 (12.7)	B^I (Max) (Gear Drive)	B^I (Max) (Manual)	C (Max)	D (Max)	E (Max)
1	7.51 (190.9)	—	16.96 (430.8)	B + 7.10 (180.3)	10.50 (266.7)	6.00 (152.4)
2	8.17 (207.5)	23.62 (599.9)	20.39 (517.9)	B + 7.10 (180.3)	12.56 (319.0)	6.00 (152.4)
Sensor Size 3 is not available in a Threaded Flo-Tap.						
Dimensions are in inches (millimeters)						

Inserted, B Dimension = Pipe I.D. + Wall Thickness + A + B^I
Retracted, B Dimension = 2 x (Pipe I.D. + Wall Thickness + A) + B^I

Rosemount 3051CFC Compact Orifice Flowmeter

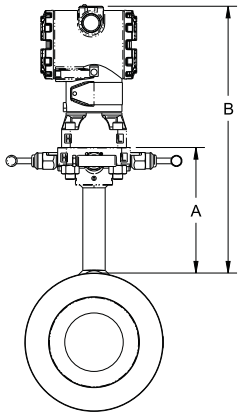
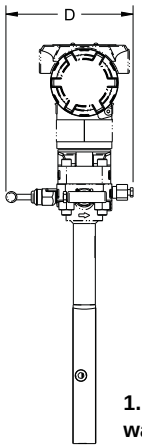
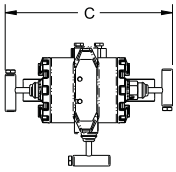
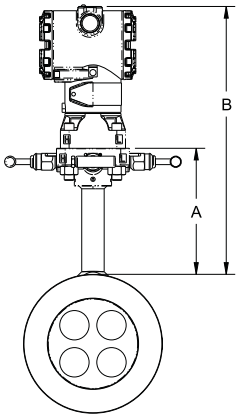
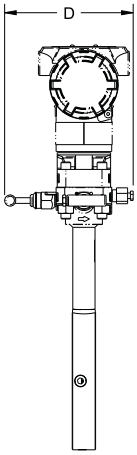
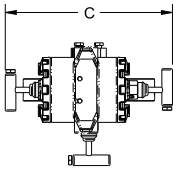
	Orifice Plate Side View	Orifice Plate Front View	Orifice Plate Top View
Compact Orifice Plate (Primary Element Type code P)		 **1.13-in. (28.7 mm) wafer thickness**	
Conditioning Orifice Plate (Primary Element Type code C)			

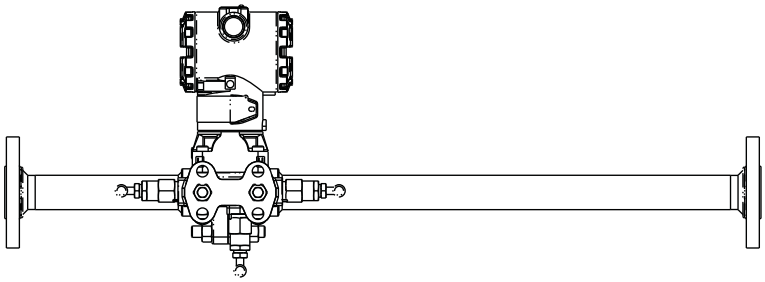
Table 82. 3051CFC Compact Orifice Dimensional Data(1)

Primary Element Type	A	B	Transmitter Height	C	D
Type P and C	5.62 (143)	Transmitter Height + A	6.27 (159)	7.75 (197) - closed 8.25 (210) - open	6.00 (152) - closed 6.25 (159) - open

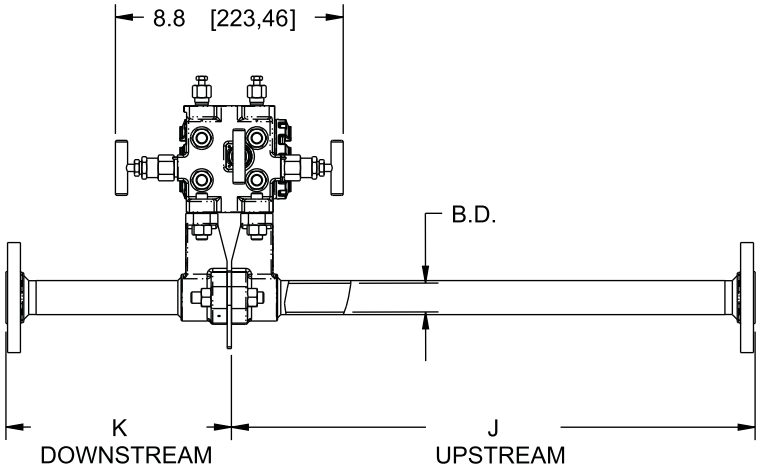
(1) Measurement in inches (millimeters).

Rosemount 3051CFP Integral Orifice Flowmeter

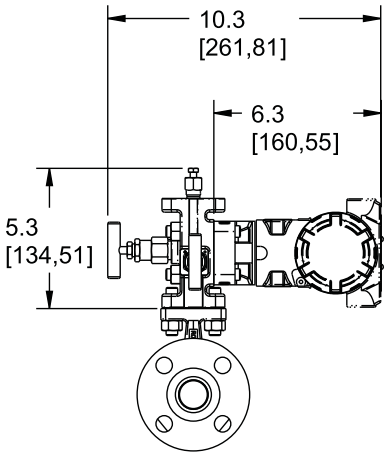
Side View



Bottom View



Front View



Dimensions are in inches (millimeters).

Table 83. 3051CFP Integral Orifice Dimensional Data

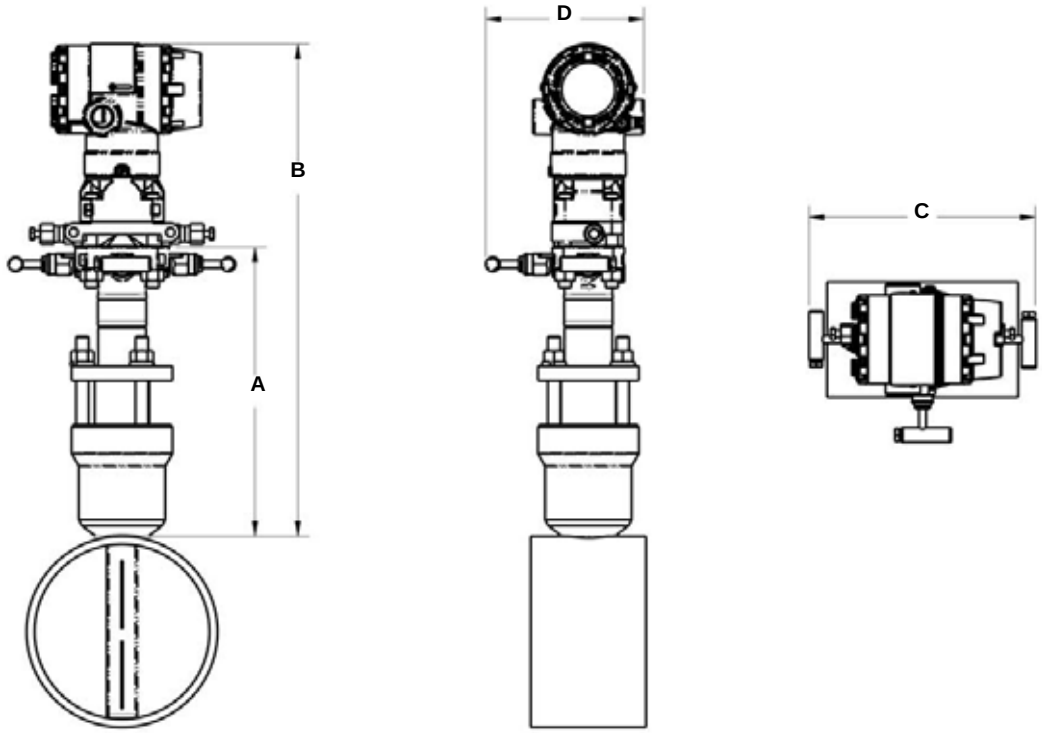
	Line Size		
Dimension	**1/2-in. (15 mm)**	**1-in. (25 mm)**	**1 1/2-in. (40 mm)**
J (Beveled/Threaded pipe ends)	12.54 (318.4)	20.24 (514.0)	28.44 (722.4)
J (RF slip-on, RTJ slip-on, RF-DIN slip on)	12.62 (320.4)	20.32 (516.0)	28.52 (724.4)
J (RF 150#, weld neck)	14.37 (364.9)	22.37 (568.1)	30.82 (782.9)
J (RF 300#, weld neck)	14.56 (369.8)	22.63 (574.7)	31.06 (789.0)
J (RF 600#, weld neck)	14.81 (376.0)	22.88 (581.0)	31.38 (797.1)
K (Beveled/Threaded pipe ends)	5.74 (145.7)	8.75 (222.2)	11.91 (302.6)
K (RF slip-on, RTJ slip-on, RF-DIN slip on)(1)	5.82 (147.8)	8.83 (224.2)	11.99 (304.6)
K (RF 150#, weld neck)	7.57 (192.3)	10.88 (276.3)	14.29 (363.1)
K (RF 300#, weld neck)	7.76 (197.1)	11.14 (282.9)	14.53 (369.2)
K (RF 600#, weld neck)	8.01 (203.4)	11.39 (289.2)	14.85 (377.2)
B.D. (Bore Diameter)	0.664 (16.87)	1.097 (27.86)	1.567 (39.80)
Dimensions are in inches (millimeters).			

(1) Downstream length shown here includes plate thickness of 0.162-in. (4.11 mm).

2051CF DIMENSIONAL DRAWINGS

Rosemount 2051CFA Pak-Lok Annubar Flowmeter(1)

Front View	Side View	Top View



(1) The Pak-Lok Annubar model is available up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

Table 84. 2051CFA Pak-Lok Annubar Dimensional Data

Sensor Size	A (Max)	B (Max)	C (Max)	D (Max)
1	8.50 (215.9)	14.55 (369.6)	9.00 (228.6)	6.00 (152.4)
2	11.00 (279.4)	16.30 (414.0)	9.00 (228.6)	6.00 (152.4)
3	12.00 (304.8)	19.05 (483.9)	9.00 (228.6)	6.00 (152.4)
Dimensions are in inches (millimeters)				

Rosemount 2051CFA Flanged with Opposite Side Support Annubar Flowmeter

Front View | **Side View** | **Top View**

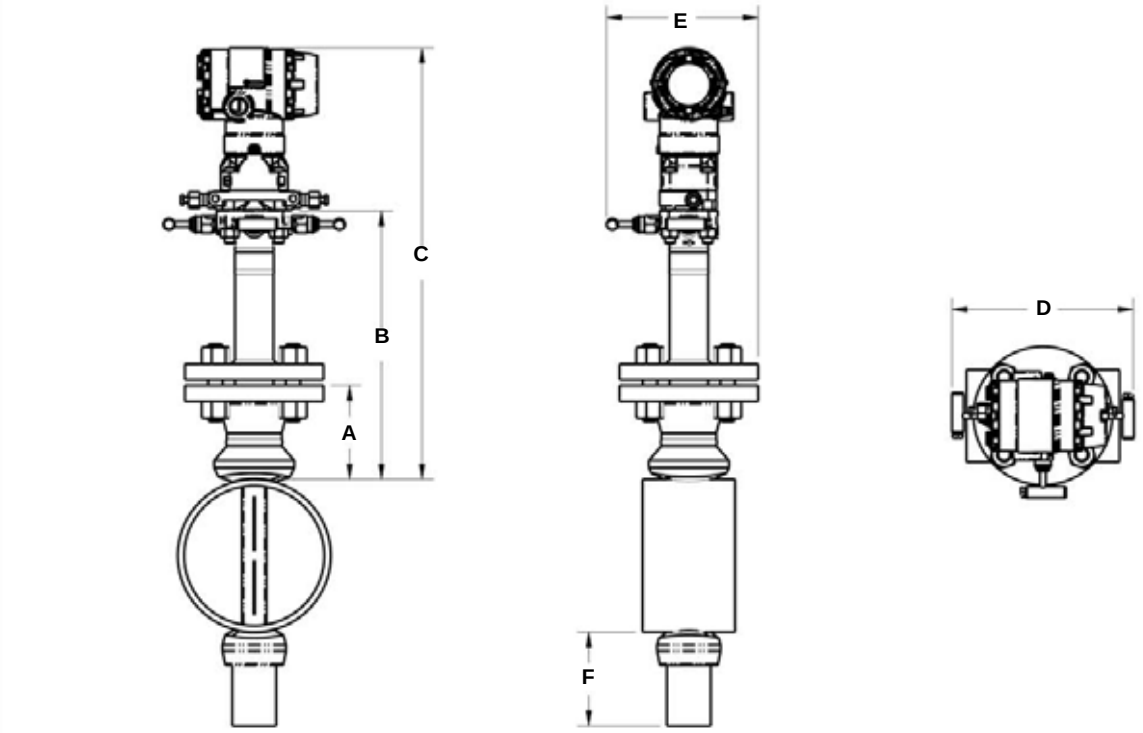


Table 85. 2051CFA Flanged Annubar Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C ± 0.25 (6.4)	D (Max)	E (Max)	F (Max)
1	1 1/2 – 150#	3.88 (98.6)	11.00 (279.4)	18.03 (458.0)	9.00 (228.6)	6.30 (160.0)	3.50 (88.9)
1	1 1/2 – 300#	4.13 (104.9)	11.00 (279.4)	18.03 (458.0)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	1 1/2 – 600#	4.44 (112.8)	11.00 (279.4)	18.03 (458.0)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	DN40/PN16	3.09 (78.5)	11.00 (279.4)	18.03 (458.0)	9.00 (228.6)	6.30 (160.0)	3.50 (88.9)
1	DN40/PN40	3.21 (81.5)	11.00 (279.4)	18.03 (458.0)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	DN40/ PN100	3.88 (98.6)	11.00 (279.4)	18.03 (458.0)	9.00 (228.6)	6.86 (174.2)	3.50 (88.9)
1	1 1/2 – 900#	4.94 (125.5)	9.31 (236.5)	-	-	-	3.50 (88.9)
1	1 1/2 – 1500#	4.94 (125.5)	9.31 (236.5)	-	-	-	3.50 (88.9)
1	1 1/2 – 2500#	6.76 (171.7)	11.63 (295.4)	-	-	-	4.00 (101.6)
2	2 – 150#	4.13 (104.9)	12.00 (304.8)	19.03 (483.4)	9.00 (228.6)	6.30 (160.0)	5.00 (127.0)
2	2 – 300#	4.38 (111.3)	12.00 (304.8)	19.03 (483.4)	9.00 (228.6)	6.86 (174.2)	5.00 (127.0)
2	2 – 600#	4.75 (120.7)	12.00 (304.8)	19.03 (483.4)	9.00 (228.6)	6.86 (174.2)	5.00 (127.0)
2	DN50/PN16	3.40 (86.4)	12.00 (304.8)	19.03 (483.4)	9.00 (228.6)	6.30 (160.0)	5.00 (127.0)
2	DN50/PN40	3.52 (89.4)	12.00 (304.8)	19.03 (483.4)	9.00 (228.6)	6.86 (174.2)	5.00 (127.0)
2	DN50/ PN100	4.30 (109.2)	12.00 (304.8)	19.03 (483.4)	9.00 (228.6)	6.86 (174.2)	5.00 (127.0)
2	2 – 900#	5.88 (149.4)	10.50 (266.7)	-	-	-	5.00 (127.0)
2	2 – 1500#	5.88 (149.4)	10.50 (266.7)	-	-	-	5.00 (127.0)
2	2 – 2500#	9.88 (251.0)	15.63 (397.0)	-	-	-	4.50 (114.3)
3	3 – 150#	4.63 (117.6)	13.50 (342.9)	20.53 (521.5)	9.00 (228.6)	6.30 (160.0)	4.00 (101.6)
3	3 – 300#	5.00 (127.0)	13.50 (342.9)	20.53 (521.5)	9.00 (228.6)	6.86 (174.2)	4.00 (101.6)
3	3 – 600#	5.38 (136.7)	13.50 (342.9)	20.53 (521.5)	9.00 (228.6)	6.86 (174.2)	4.00 (101.6)

Table 85. 2051CFA Flanged Annubar Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C ± 0.25 (6.4)	D (Max)	E (Max)	F (Max)
3	DN80/PN16	3.85 (97.8)	13.50 (342.9)	20.53 (521.5)	9.00 (228.6)	6.30 (160.0)	4.00 (101.6)
3	DN80/PN40	4.16 (105.7)	13.50 (342.9)	20.53 (521.5)	9.00 (228.6)	6.86 (174.2)	4.00 (101.6)
3	DN80/ PN100	4.95 (125.7)	13.50 (342.9)	20.53 (521.5)	9.00 (228.6)	6.86 (174.2)	4.00 (101.6)
3	3 – 900#	8.19 (208.0)	13.06 (331.7)	-	-	-	7.00 (177.8)
3	3 – 1500#	8.56 (217.4)	13.81 (350.8)	-	-	-	7.00 (177.8)
3	3 – 2500#	11.19 (284.2)	17.31 (439.7)	-	-	-	7.00 (177.8)

Dimensions are in inches (millimeters)

Rosemount 2051CFC Compact Orifice Flowmeter

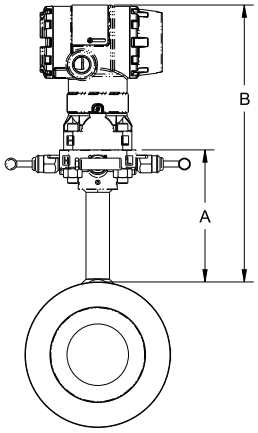
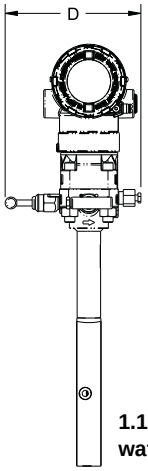
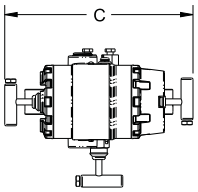
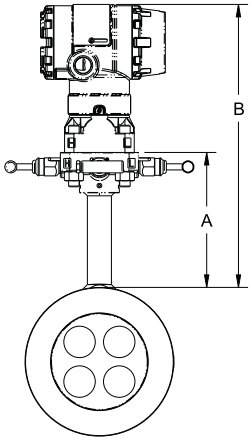
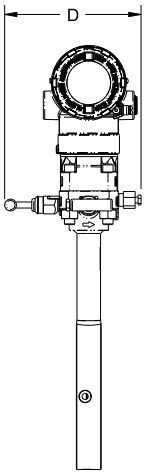
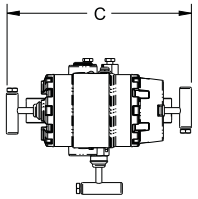
	Orifice Plate Side View	Orifice Plate Front View	Orifice Plate Top View
Compact Orifice Plate (Primary Element Type code P)		 **1.13-in. (28.7 mm) wafer thickness**	
Conditioning Orifice Plate (Primary Element Type code C)			

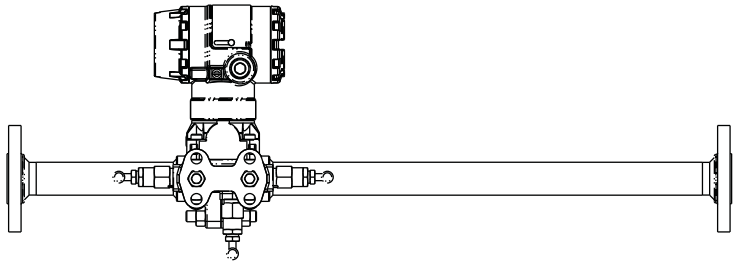
Table 86. 2051CFC Compact Orifice Dimensional Data(1)

Primary Element Type	A	B	Transmitter Height	C	D
Type P and C	5.62 (143)	Transmitter Height + A	6.2 (157)	7.75 (197) - closed 8.25 (210) - open	6.00 (152) - closed 6.25 (159) - open

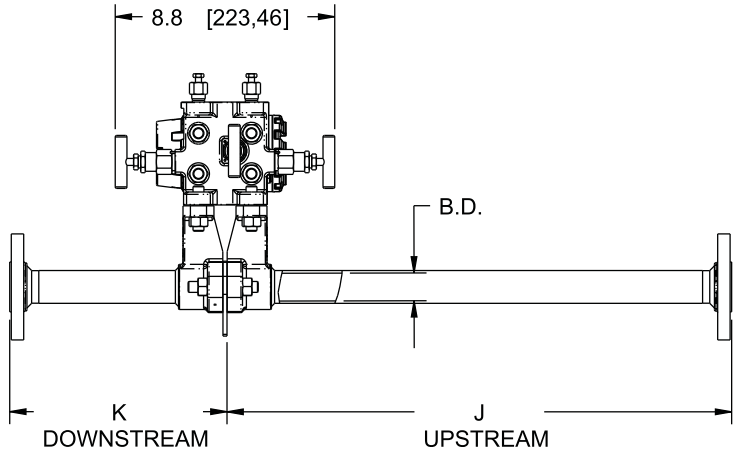
(1) Measurement in inches (millimeters).

Rosemount 2051CFP Integral Orifice Flowmeter

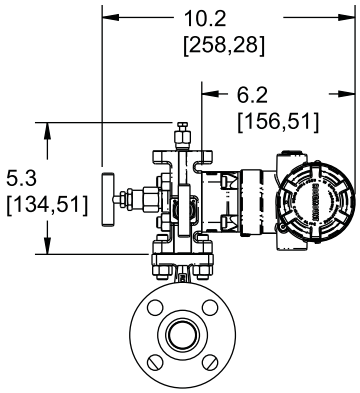
Side View



Bottom View



Front View



Dimensions are in inches (millimeters).

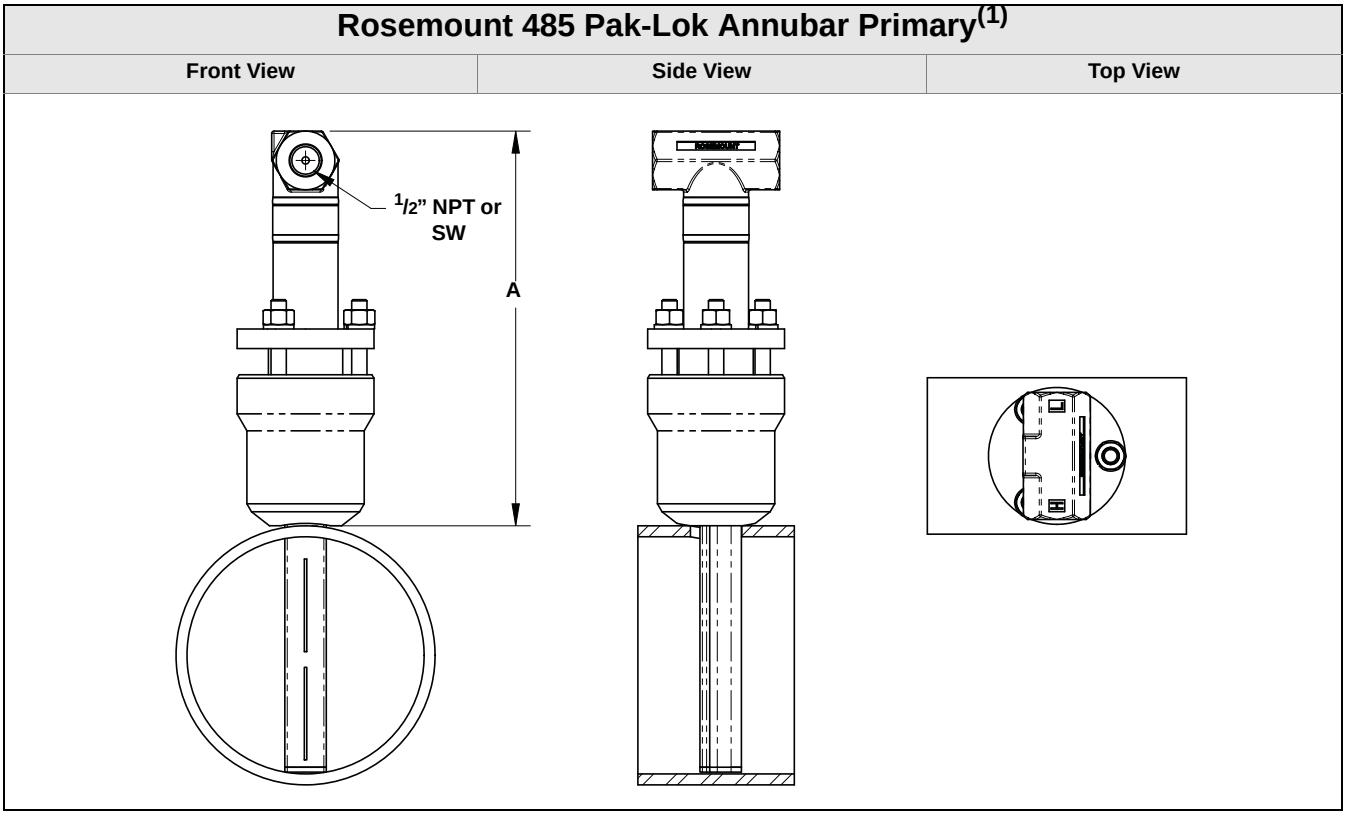
Table 87. 2051CFP Integral Orifice Dimensional Data

	Line Size		
Dimension	**1/2-in. (15 mm)**	**1-in. (25 mm)**	**1 1/2-in. (40 mm)**
J (Beveled/Threaded pipe ends)	12.54 (318.4)	20.24 (514.0)	28.44 (722.4)
J (RF slip-on, RTJ slip-on, RF-DIN slip on)	12.62 (320.4)	20.32 (516.0)	28.52 (724.4)
J (RF 150#, weld neck)	14.37 (364.9)	22.37 (568.1)	30.82 (782.9)
J (RF 300#, weld neck)	14.56 (369.8)	22.63 (574.7)	31.06 (789.0)
J (RF 600#, weld neck)	14.81 (376.0)	22.88 (581.0)	31.38 (797.1)
K (Beveled/Threaded pipe ends)	5.74 (145.7)	8.75 (222.2)	11.91 (302.6)
K (RF slip-on, RTJ slip-on, RF-DIN slip on)(1)	5.82 (147.8)	8.83 (224.2)	11.99 (304.6)
K (RF 150#, weld neck)	7.57 (192.3)	10.88 (276.3)	14.29 (363.1)
K (RF 300#, weld neck)	7.76 (197.1)	11.14 (282.9)	14.53 (369.2)
K (RF 600#, weld neck)	8.01 (203.4)	11.39 (289.2)	14.85 (377.2)
B.D. (Bore Diameter)	0.664 (16.87)	1.097 (27.86)	1.567 (39.80)
Dimensions are in inches (millimeters).			

(1) Downstream length shown here includes plate thickness of 0.162-in. (4.11 mm).

485 DIMENSIONAL DRAWINGS

Rosemount 485 Pak-Lok Annubar Primary(1)



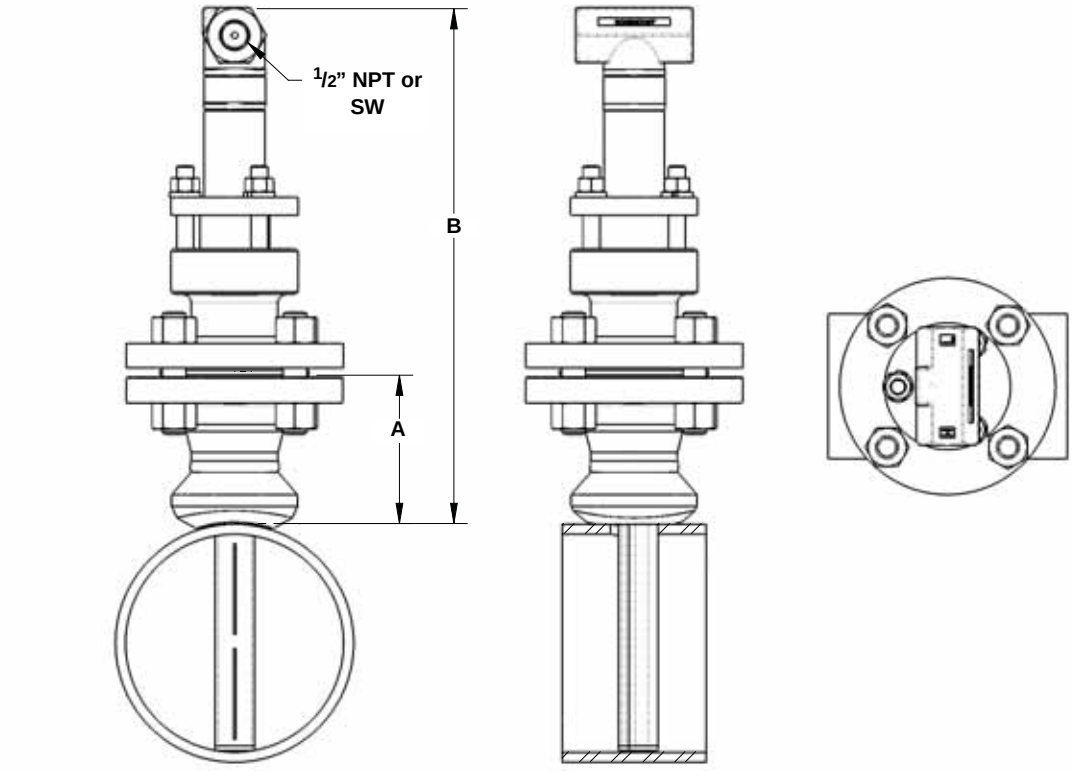
(1) The Pak-Lok Annubar model is available up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

Table 88. 485 Pak-Lok Annubar Primary Dimensional Data

Sensor Size	A (Max)
1	8.50 (215.9)
2	11.00 (279.4)
3	12.00 (304.8)
Dimensions are in inches (millimeters)	

Rosemount 485 Flange-Lok Annubar Primary(1)

Front View	Side View	Top View



(1) The Flange-Lok Annubar model can be direct mounted up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

Table 89. 485 Flange-Lok Annubar Primary Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)
1	1 1/2 – 150#	3.88 (98.6)	12.25 (311.2)
1	1 1/2 – 300#	4.13 (104.9)	12.25 (311.2)
1	1 1/2 – 600#	4.44 (112.8)	12.25 (311.2)
1	DN40/PN16	3.09 (78.5)	12.25 (311.2)
1	DN40/PN40	3.21 (81.5)	12.25 (311.2)
1	DN40/PN100	3.88 (98.6)	12.25 (311.2)
2	2 – 150#	4.13 (104.9)	14.25 (362.0)
2	2 – 300#	4.38 (111.3)	14.25 (362.0)
2	2 – 600#	4.75 (120.7)	14.25 (362.0)
2	DN50/PN16	3.40 (86.4)	14.25 (362.0)
2	DN50/PN40	3.52 (89.4)	14.25 (362.0)
2	DN50/ PN100	4.30 (109.2)	14.25 (362.0)
3	3 – 150#	4.63 (117.6)	17.50 (444.5)
3	3 – 300#	5.00 (127.0)	17.50 (444.5)
3	3 – 600#	5.38 (136.7)	17.50 (444.5)
3	DN80/PN16	3.85 (97.8)	17.50 (444.5)
3	DN80/PN40	4.16 (105.7)	17.50 (444.5)
3	DN80/ PN100	4.95 (125.7)	17.50 (444.5)
Dimensions are in inches (millimeters)			

Rosemount 485 Flanged Annubar Primary

Front View | **Side View** | **Top View**

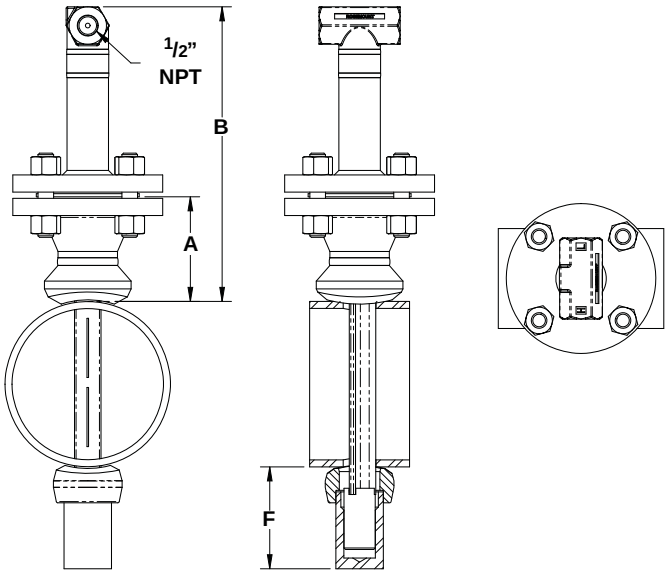
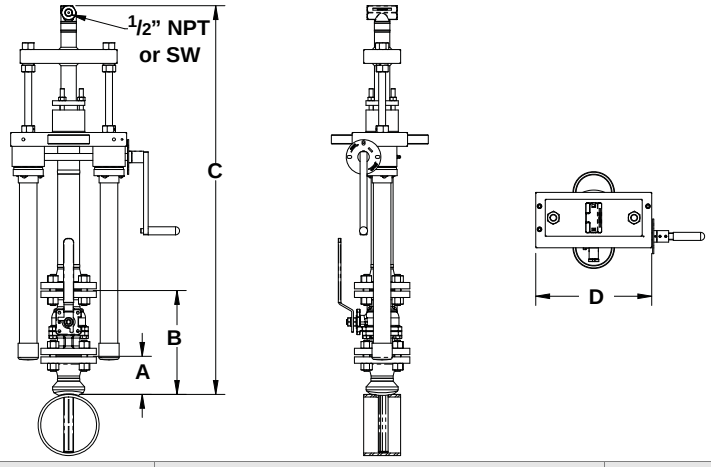


Table 90. 485 Flanged Annubar Primary Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	F (Max)
1	1 1/2 – 150#	3.88 (98.6)	11.00 (279.4)	3.50 (88.9)
1	1 1/2 – 300#	4.13 (104.9)	11.00 (279.4)	3.50 (88.9)
1	1 1/2 – 600#	4.44 (112.8)	11.00 (279.4)	3.50 (88.9)
1	DN40/PN16	3.09 (78.5)	11.00 (279.4)	3.50 (88.9)
1	DN40/PN40	3.21 (81.5)	11.00 (279.4)	3.50 (88.9)
1	DN40/ PN100	3.88 (98.6)	11.00 (279.4)	3.50 (88.9)
1	1 1/2 – 900#	4.94 (125.5)	9.31 (236.5)	3.50 (88.9)
1	1 1/2 – 1500#	4.94 (125.5)	9.31 (236.5)	3.50 (88.9)
1	1 1/2 – 2500#	6.76 (171.7)	11.63 (295.4)	4.00 (101.6)
2	2 – 150#	4.13 (104.9)	12.00 (304.8)	5.00 (127.0)
2	2 – 300#	4.38 (111.3)	12.00 (304.8)	5.00 (127.0)
2	2 – 600#	4.75 (120.7)	12.00 (304.8)	5.00 (127.0)
2	DN50/PN16	3.40 (86.4)	12.00 (304.8)	5.00 (127.0)
2	DN50/PN40	3.52 (89.4)	12.00 (304.8)	5.00 (127.0)
2	DN50/ PN100	4.30 (109.2)	12.00 (304.8)	5.00 (127.0)
2	2 – 900#	5.88 (149.4)	10.50 (266.7)	5.00 (127.0)
2	2 – 1500#	5.88 (149.4)	10.50 (266.7)	5.00 (127.0)
2	3 – 2500#	9.88 (251.0)	15.63 (397.0)	4.50 (114.3)
3	3 – 150#	4.63 (117.6)	13.50 (342.9)	4.00 (101.6)
3	3 – 300#	5.00 (127.0)	13.50 (342.9)	4.00 (101.6)
3	3 – 600#	5.38 (136.7)	13.50 (342.9)	4.00 (101.6)
3	DN80/PN16	3.85 (97.8)	13.50 (342.9)	4.00 (101.6)
3	DN80/PN40	4.16 (105.7)	13.50 (342.9)	4.00 (101.6)
3	DN80/ PN100	4.95 (125.7)	13.50 (342.9)	4.00 (101.6)
3	4 – 900#	8.19 (208.0)	13.06 (331.7)	7.00 (177.8)
3	4 – 1500#	8.56 (217.4)	13.81 (350.8)	7.00 (177.8)
3	4 – 2500#	11.19 (284.2)	17.31 (439.7)	7.00 (177.8)
Dimensions are in inches (millimeters)				

Rosemount 485 Flanged Flo-Tap Annubar Primary

Gear Drive



Manual

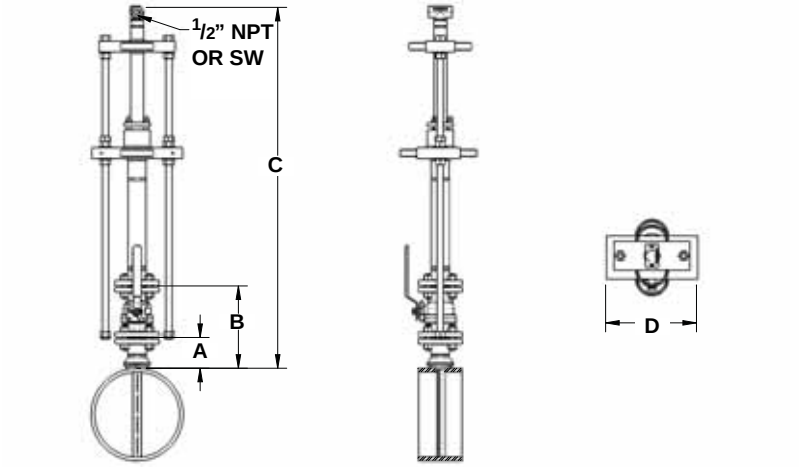


Table 91. 485 Flanged Flo-Tap Annubar Primary Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C^I (Max) (Gear Drive)	C^I (Max) (Manual)	D (Max)
1	1 1/2 – 150#	3.88 (98.6)	10.50 (266.7)	—	**17.77 (451.4)**	10.50 (266.7)
1	1 1/2 – 300#	4.13 (104.9)	11.75 (298.5)	—	**17.77 (451.4)**	10.50 (266.7)
1	1 1/2 – 600#	4.44 (112.8)	14.06 (357.2)	—	**17.77 (451.4)**	10.50 (266.7)
1	DN40/PN16	3.09 (78.5)	See Note (1)	—	**17.77 (451.4)**	10.50 (266.7)
1	DN40/PN40	3.21 (81.5)	See Note (1)	—	**17.77 (451.4)**	10.50 (266.7)
1	DN40/PN100	3.88 (98.6)	See Note (1)	—	**17.77 (451.4)**	10.50 (266.7)
2	2 – 150#	4.13 (104.9)	11.25 (285.8)	24.44 (620.8)	21.20 (538.5)	12.56 (319.0)
2	2 – 300#	4.38 (111.3)	13.00 (330.2)	24.44 (620.8)	21.20 (538.5)	12.56 (319.0)
2	2 – 600#	4.75 (120.7)	16.38 (416.0)	24.44 (620.8)	21.20 (538.5)	12.56 (319.0)
2	DN50/PN16	3.40 (86.4)	See Note (1)	24.44 (620.8)	21.20 (538.5)	12.56 (319.0)
2	DN50/PN40	3.52 (89.4)	See Note (1)	24.44 (620.8)	21.20 (538.5)	12.56 (319.0)
2	DN50/PN100	4.30 (109.2)	See Note (1)	24.44 (620.8)	21.20 (538.5)	12.56 (319.0)
3	3 – 150#	4.63 (117.6)	12.75 (323.9)	26.37 (669.8)	23.14 (587.8)	14.13 (358.9)
3	3 – 300#	5.00 (127.0)	16.25 (412.8)	26.37 (669.8)	23.14 (587.8)	14.13 (358.9)

Table 91. 485 Flanged Flo-Tap Annubar Primary Dimensional Data

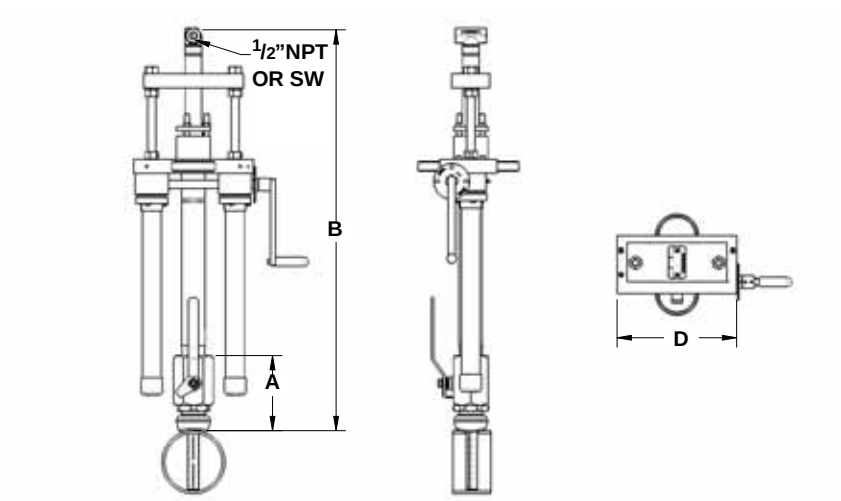
Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C^I (Max) (Gear Drive)	C^I (Max) (Manual)	D (Max)
3	3 – 600#	5.38 (136.7)	19.50 (495.4)	26.37 (669.8)	23.14 (587.8)	14.13 (358.9)
3	DN80/PN16	3.85 (97.8)	See Note (1)	26.37 (669.8)	23.14 (587.8)	14.13 (358.9)
3	DN80/PN40	4.16 (105.7)	See Note (1)	26.37 (669.8)	23.14 (587.8)	14.13 (358.9)
3	DN80/PN100	4.95 (125.7)	See Note (1)	26.37 (669.8)	23.14 (587.8)	14.13 (358.9)
	Use the appropriate formula to determine C value: *Inserted formula:* Pipe I.D. + Wall Thickness + Value B + C^1 (use the Manual Drive or Gear drive values for C^1) *Retracted formula:* [2 x (Pipe I.D. + Wall Thickness + Value B)] + C^1 (use the Manual Drive or Gear drive values for C^1)					
Dimensions are in inches (millimeters)						

(1) DIN Valves are not offered.

Rosemount 485 Threaded Flo-Tap Annubar Primary

Front View	Side View	Top View

Gear Drive



Front View	Side View	Top View

Manual

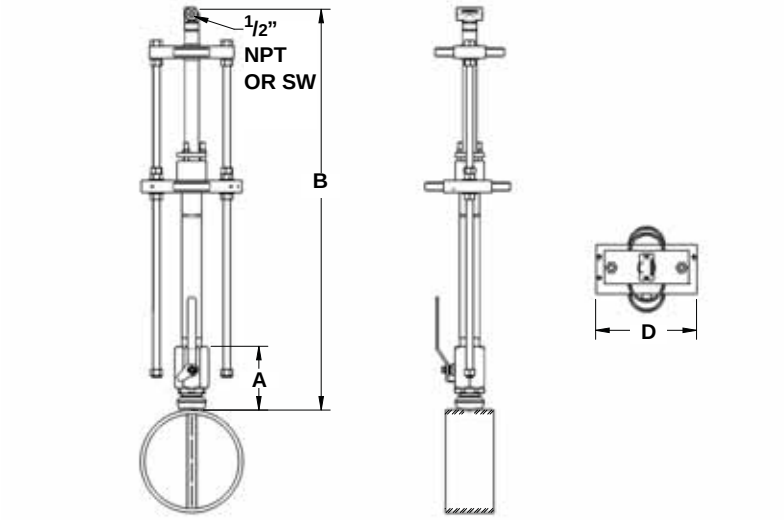


Table 92. 485 Threaded Flo-Tap Annubar Primary Dimensional Data

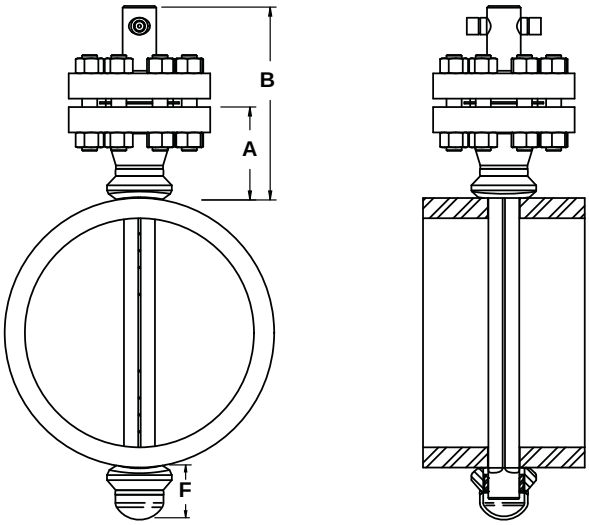
Sensor Size	A ± 0.50 (12.7)	B^I (Max) (Gear Drive)	B^I (Max) (Manual)	D (Max)
1	7.51 (190.9)	—	16.96 (430.8)	10.50 (266.7)
2	8.17 (207.5)	23.62 (599.9)	20.39 (517.9)	12.56 (319.0)
Sensor Size 3 is not available in a Threaded Flo-Tap.				

Inserted, B Dimension = Pipe I.D. + Wall Thickness + A + B^I
Retracted, B Dimension = 2 x (Pipe I.D. + Wall Thickness + A) + B^I

585 DIMENSIONAL DRAWINGS

Rosemount 585 Flanged w/ Opposite Side Support Annubar Primary

Front View | **Side View**



Note: Dimensions are shown with a remote-mount connection. Using direct-mount will add 0.15-in. for sensor size 11 and 22 or 3.15-in. for sensor size 44 to Dimension B.

Table 93. 585 Flanged w/ Opposite Side Support Annubar Dimensional Data

Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	F (Max)
11	1 1/2-in.– 150#	3.88 (98.6)	9.70 (246.4)	3.10 (78.7)
11	1 1/2-in. – 300#	4.13 (104.9)	10.07 (255.8)	3.10 (78.7)
11	1 1/2-in. – 600#	4.44 (112.8)	10.70 (271.8)	3.10 (78.7)
11	DIN40/PN16	3.21 (81.5)	9.05 (229.9)	3.10 (78.7)
11	DIN40/PN40	3.21 (81.5)	9.05 (229.9)	3.10 (78.7)
11	DIN40/ PN100	3.88 (98.6)	10.03 (254.8)	3.10 (78.7)
11	1 1/2-in. – 900#	4.94 (125.5)	11.57 (293.9)	3.60 (91.4)
11	1 1/2-in. – 1500#	4.94 (125.5)	11.57 (293.9)	3.60 (91.4)
11	1 1/2-in. – 2500#	6.75 (171.5)	13.88 (352.6)	3.60 (91.4)
22	2-in. – 150#	4.13 (104.9)	10.01 (254.3)	4.50 (114.3)
22	2-in. – 300#	4.38 (111.3)	10.38 (263.7)	4.50 (114.3)
22	2-in. – 600#	4.75 (120.7)	11.13 (282.7)	4.50 (114.3)
22	DIN50/PN16	3.40 (86.4)	9.24 (234.7)	4.50 (114.3)
22	DIN50/PN40	3.52 (89.4)	9.44 (239.8)	4.50 (114.3)
22	DIN50/ PN100	4.30 (109.2)	10.53 (267.5)	4.50 (114.3)
22	2-in. – 900#	5.88 (149.4)	12.76 (324.1)	4.50 (114.3)
22	2-in. – 1500#	5.88 (149.4)	12.76 (324.1)	4.50 (114.3)
22	3-in. – 2500#	9.88 (250.1)	17.88 (454.2)	4.50 (114.3)
44	3-in. – 150#	4.63 (117.6)	10.69 (271.5)	3.90 (99.1)
44	3-in. – 300#	5.00 (127.0)	11.26 (286.6)	3.90 (99.1)
44	3-in. – 600#	5.38 (136.7)	12.00 (304.8)	3.90 (99.1)
44	DIN80/PN16	3.85 (97.8)	9.77 (248.2)	3.90 (99.1)
44	DIN80/PN40	4.16 (105.7)	10.23 (259.8)	3.90 (99.1)
44	DIN80/ PN100	4.95 (125.7)	11.34 (288.8)	3.90 (99.1)
44	4-in. – 900#	8.19 (208.8)	15.32 (389.1)	6.40 (162.6)
44	4-in. – 1500#	8.56 (217.4)	16.07 (408.2)	6.40 (162.6)
44	4-in. – 2500#	11.19 (284.2)	19.57 (497.1)	6.40 (162.6)

Dimensions are in inches (millimeters)

Rosemount 585 Main Steam Annubar w/ Opposite Side Support Annubar Primary

Front View | **Top View**

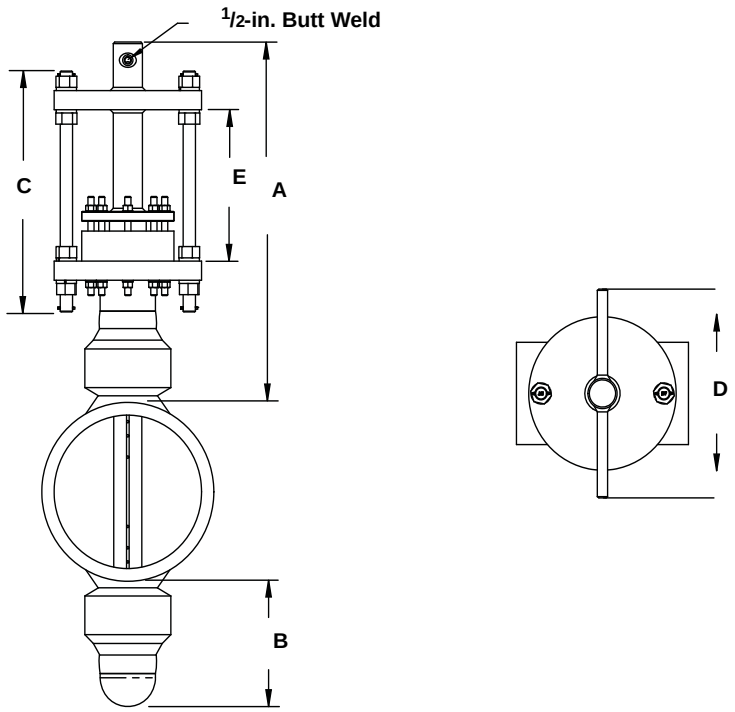


Table 94. 585 Main Steam Annubar w/ Opposite Side Support Annubar Dimensional Data

Sensor Size	A (Max)	B	C	D	E
44	29.67 (753.6)	10.0 (254)	19.0 (483)	16.33 (414.0)	11.0 (279)
Dimensions are in inches (millimeters)					

NOTE
Locking rods are always located 90° from the instrument connections. For horizontal installations, the instrument connections will be parallel to the pipe. For vertical installations, the instrument connections will be perpendicular to the pipe.

Rosemount 585 Flanged Flo-Tap Annubar Primary

Front View | **Top View**

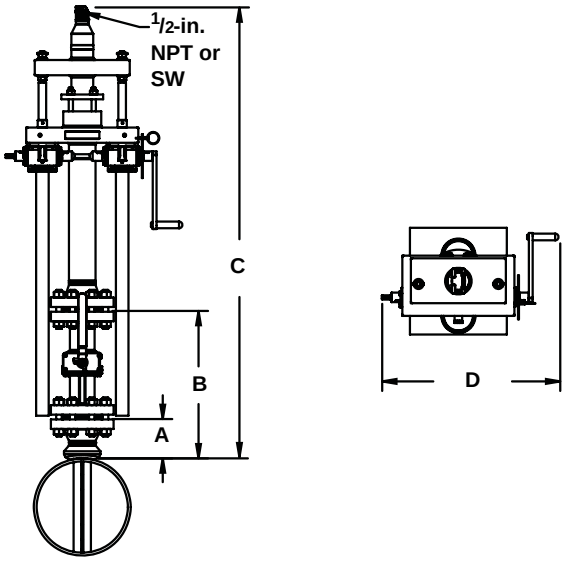
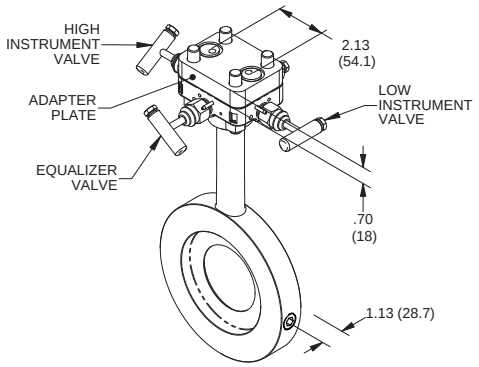
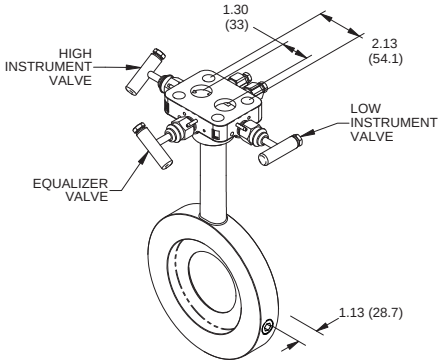
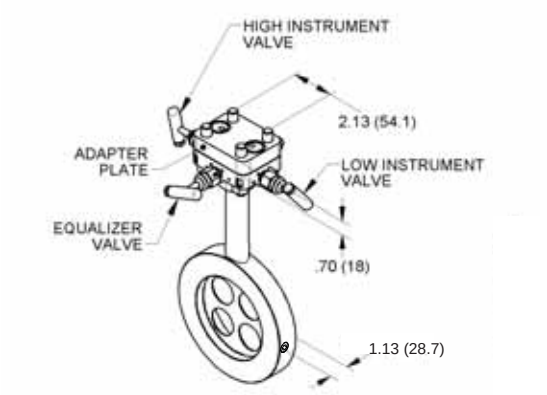
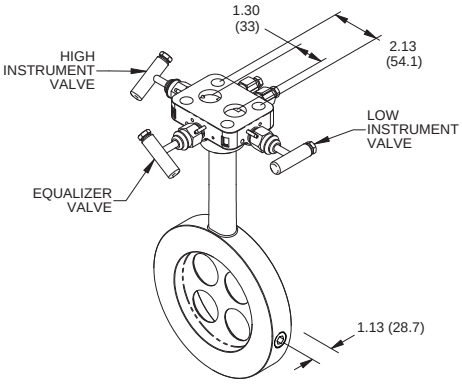


Table 95. 585 Flanged Flo-Tap Annubar Primary Dimensional Data

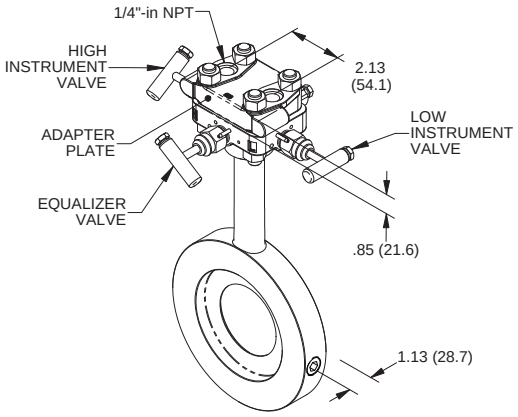
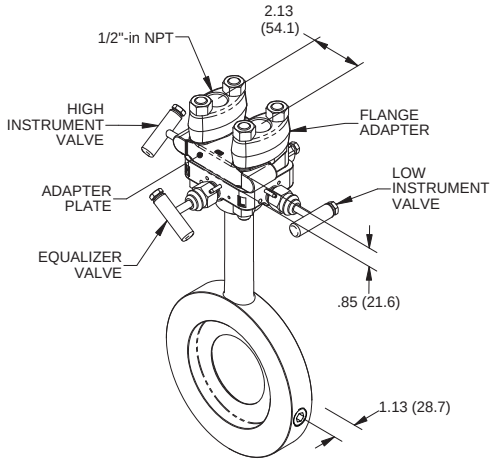
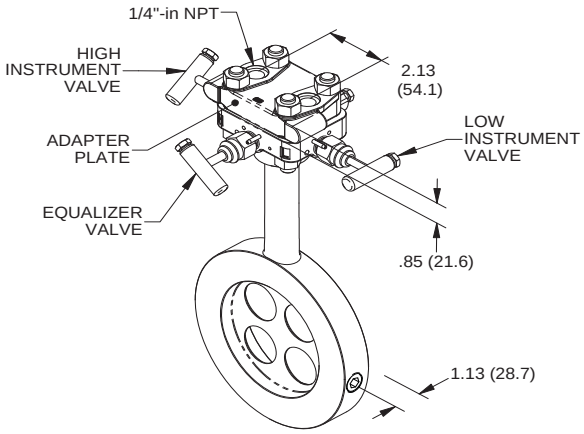
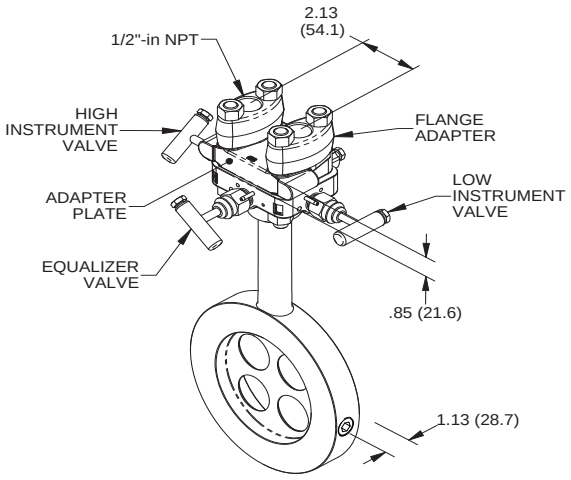
Sensor Size	Flange Size and Rating	A ± 0.125 (3.2)	B ± 0.25 (6.4)	C^1 (Max) (Gear Drive)	D (Max)
44	3 – 150#	4.63 (117,6)	12.75 (323,9)	25.58 (649.7)	23.3 (591,8)
44	3 – 300#	5.00 (127,0)	16.25 (412,8)	25.58 (649.7)	23.3 (591,8)
44	3 – 600#	5.38 (136,7)	19.50 (495,4)	25.58 (649.7)	23.3 (591,8)
	Use the appropriate formula to determine C value: *Inserted formula:* Pipe I.D. + Wall Thickness + Value B + C^1 (use the Gear drive values for C^1) *Retracted formula:* [2 x (Pipe I.D. + Wall Thickness + Value B)] + C^1 (use the Gear drive values for C^1)				
Dimensions are in inches (millimeters)					

405 DIMENSIONAL DRAWINGS

	Rosemount 405 Compact Orifice Plate (Direct Mount)	
	Front View (transmitter connection A3)	**Front View (transmitter connection D3)**
Compact Orifice Plate (Primary Element Type code P)		
Conditioning Orifice Plate (Primary Element Type code C)		

NOTE
Transmitter connection code A3 is to be used with a traditional style transmitter. This is a stainless steel adapter plate for allowing the direct mount of traditional style transmitters.

Rosemount 405 Compact Orifice Plate (Remote Mount Transmitter)

	Adapter Plate (R3)	Flange Adapter (R3 with option E)
Compact Orifice Plate (Primary Element Type code P)		
Conditioning Orifice Plate (Primary Element Type code C)		

1595 DIMENSIONAL DRAWINGS

Rosemount 1595 Conditioning Orifice Plate

(ANSI Flange, Paddle, Square edged)

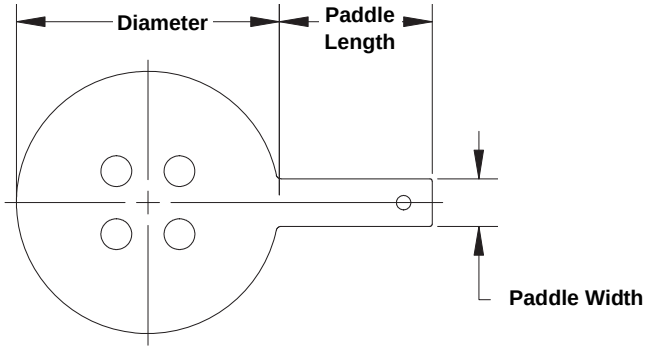


Table 96. Paddle Type Orifice Plate Dimensions in inches (millimeters)

		Diameter for Paddle Type						
Line Size	**150#**	**300#**	**600#**	**900#**	**1500#**	**2500#**	**Paddle Length**	**Paddle Width**
2 -in. (50 mm)	4.125 (104.78)	4.375. (111.13)	4.375 (111.13)	5.625 (142.875)	5.625 (142.875)	5.750 (146.050)	4.0 (101.6)	1.0 (25.4)
3-in. (76 mm)	5.375 (136.53)	5.875 (149.23)	5.875 (149.23)	6.625 (168.275)	6.875 (174.625)	7.750 (196.85)	4.0 (101.6)	1.0 (25.4)
4-in. (100 mm)	6.875 (174.63)	7.125 (180.98)	7.625 (193.68)	8.125 (206.35)	8.250 (209.550)	9.250 (234.95)	4.0 (101.6)	1.0 (25.4)
6-in. (150 mm)	8.750 (222.25)	9.875 (250.83)	10.500 (266.7)	11.375 (288.925)	11.125 (282.575)	12.500 (317.50)	4.0 (101.6)	1.0 (25.4)
8-in. (200 mm)	11.000 (279.4)	12.125 (307.98)	12.625 (320.675)	14.125 (358.775)	13.875 (352.425)	15.250 (387.350)	6.0 (152.4)	1.5 (38.1)
10-in. (250 mm)	13.375 (339.73)	14.250 (361.95)	15.750 (400.05)	17.125 (434.975)	17.125 (434.975)	18.750 (476.25)	6.0 (152.4)	1.5 (38.1)
12-in. (300 mm)	16.125 (409.58)	16.625 (422.26)	18.000 (457.2)	19.625 (498.475)	20.500 (520.7)	21.625 (549.275)	6.0 (152.4)	1.5 (38.1)
14-in. (350 mm)	17.750 (450.85)	19.125 (485.78)	19.375 (492.125)				6.0 (152.4)	1.5 (38.1)
16-in (400 mm)	20.250 (514.35)	21.250 (539.75)	22.250 (565.15)				6.0 (152.4)	1.5 (38.1)
18-in. (450 mm)	21.500 (546.1)	23.375 (593.725)	24.000 (609.6)				6.0 (152.4)	1.5 (38.1)
20-in. (500 mm)	23.750 (603.25)	25.625 (650.875)	26.750 (679.45)				6.0 (152.4)	1.5 (38.1)
24-in. (600 mm)	28.125 (714.375)	30.375 (771.525)	31.000 (787.4)				6.0 (152.4)	1.5 (38.1)

NOTE: Consult factory for availability of line sizes and flange ratings not shown in the above table.

1595U Orifice Universal Type
(Universal, Square edged)

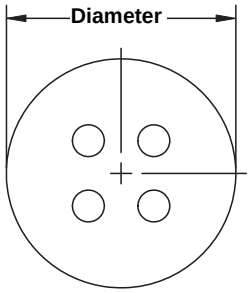


Table 97. A.P.I Ring No.'s and Rating

Line Size	Diameter for Universal Type	A.P.I Ring No.	Rating (lbs.)
2-in. (50 mm)	2.437-in. (61.8998 mm)	R-23	300-600
		R-24	900-1500
		R-26	2500
3-in. (76 mm)	3.437-in. (87.2998 mm)	R-31	300-600 & 900
		R-32	2500
		R-35	1500
4-in. (100 mm)	4.406-in. (111.912 mm)	R-37	300-600 & 900
		R-38	2500
		R-39	1500
6-in. (150 mm)	6.437-in. (163.5 mm)	R-45	300-600 & 900
		R-46	1500
		R-47	2500
8-in. (200 mm)	8.437-in. (214.3 mm)	R-49	300-600 & 900
		R-50	1500
		R-51	2500
10-in. (250 mm)	10.687-in. (271.45 mm)	R-53	300-600 & 900
		R-54	1500
		R-55	2500
12-in. (300 mm)	12.593-in. (319.862 mm)	R-57	300-600 & 900
		R-58	1500
		R-59	2500

NOTE
Refer to Table 96 for line size and pressure rating availability.

Rosemount 1595 Conditioning Orifice Plate
(DIN Flange, Paddle, Square edged)

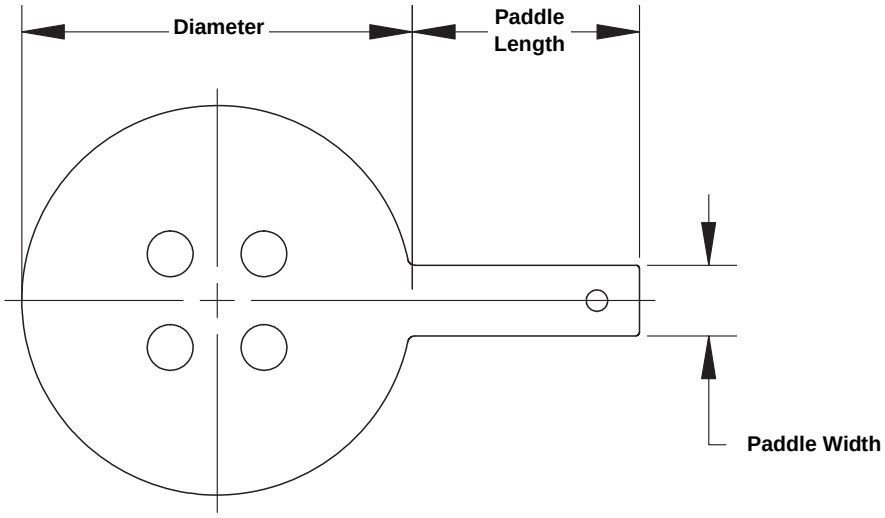


Table 98. 1595 Conditioning Orifice Plate Dimensions in millimeters (inches)

	Diameter (max) – by flange rating							
Line Size	**PN 10**	**PN 16**	**PN 25**	**PN 40**	**PN 63/64**	**PN 100**	**Paddle Length**	**Paddle Width**
DN 50 (2-in.)	107 (4.21)	107 (4.21)	107 (4.21)	107 (4.21)	113 (4.45)	119 (4.69)	101.6 (4.0)	25.4 (1.0)
DN 80 (3-in.)	142 (5.60)	142 (5.60)	142 (5.60)	142 (5.60)	148 (5.82)	154 (6.06)	101.6 (4.0)	25.4 (1.0)
DN 100 (4-in.)	162 (6.38)	162 (6.38)	168 (6.61)	168 (6.61)	174 (6.85)	180 (7.09)	101.6 (4.0)	25.4 (1.0)
DN 150 (6-in.)	218 (8.58)	218 (8.58)	224 (8.82)	224 (8.82)	247 (9.72)	257 (10.12)	101.6 (4.0)	25.4 (1.0)
DN 200 (8-in.)	273 (10.74)	273 (10.74)	284 (11.18)	290 (11.42)	309 (12.17)	324 (12.76)	152.4 (6.0)	38.1 (1.5)
DN 250 (10-in.)	328 (12.91)	329 (12.95)	340 (13.39)	352 (13.86)	364 (14.33)	391 (15.39)	152.4 (6.0)	38.1 (1.5)
DN 300 (12-in.)	378 (14.88)	384 (15.12)	400 (15.75)	417 (16.42)	424 (16.69)	458 (18.03)	152.4 (6.0)	38.1 (1.5)

NOTE: Consult factory for availability of line sizes and flange ratings not shown in the above table.

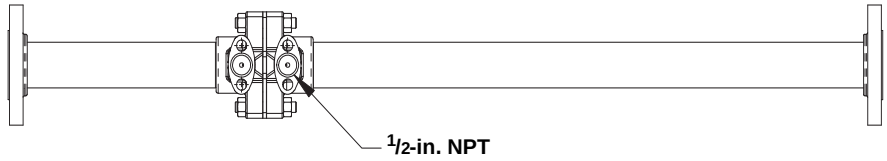
Table 99. Conditioning Orifice Plate Available Beta Ratio (β)
The table below shows the available Beta Ratio (β) for line size vs. pipe schedule

Line Size	Pipe Schedule	Beta (β) Available
2	≤ 80	0.20, 0.40, 0.60
2	160	0.20
3	≤ 80	0.20, 0.40, 0.65
3	160	0.20, 0.40
3	XXS	0.20
4	≤ 80	0.20, 0.40, 0.65
4	120	0.20, 0.40
4	160	0.20, 0.40
4	XXS	0.20
6	≤ 80	0.20, 0.40, 0.65
6	120	0.20, 0.40
6	160	0.20, 0.40
6	XXS	0.20
8	≤ 80	0.20, 0.40, 0.65
8	100	0.20, 0.40, 0.65
8	120	0.20, 0.40
8	140	0.20, 0.40
8	160	0.20, 0.40
8	XXS	0.20, 0.40
10	≤ 80	0.20, 0.40, 0.65
10	100	0.20, 0.40, 0.65
10	120	0.20, 0.40
10	140	0.20, 0.40
10	160	0.20, 0.40
10	XXS	0.20, 0.40
12	≤ 80	0.20, 0.40, 0.65
12	100	0.20, 0.40
12	120	0.20, 0.40
12	140	0.20, 0.40
12	160	0.20, 0.40
12	XXS	0.20, 0.40
14	≤ 80	0.20, 0.40, 0.65
14	100	0.20, 0.40
14	120	0.20, 0.40
14	140	0.20, 0.40
14	160	0.20, 0.40
14	XXS	0.20, 0.40
16	≤ 80	0.20, 0.40, 0.65
16	100	0.20, 0.40
16	120	0.20, 0.40
16	140	0.20, 0.40
16	160	0.20, 0.40
16	XXS	0.20, 0.40
18	≤ 80	0.20, 0.40, 0.65
18	100	0.20, 0.40, 0.65
18	120	0.20, 0.40
18	140	0.20, 0.40
18	160	0.20, 0.40
18	XXS	0.20, 0.40
20	≤ 80	0.20, 0.40, 0.65
20	100	0.20, 0.40, 0.65
20	120	0.20, 0.40
20	140	0.20, 0.40
20	160	0.20, 0.40
20	XXS	0.20, 0.40
24	≤ 80	0.20, 0.40, 0.65
24	100	0.20, 0.40
24	120	0.20, 0.40
24	140	0.20, 0.40
24	160	0.20, 0.40
24	XXS	0.20, 0.40

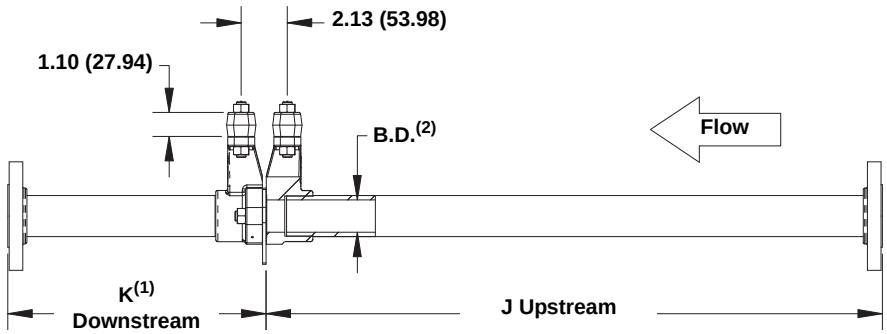
1195 DIMENSIONAL DRAWINGS

Rosemount 1195 Integral Orifice Plate

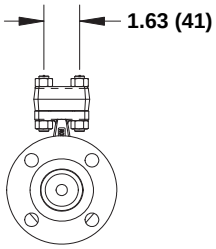
Top View



Bottom View



End View



Dimensions are in inches (millimeters).

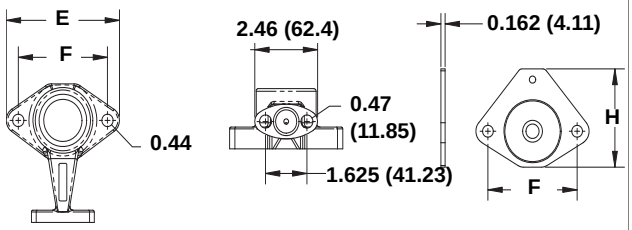
Table 100. 1195 Integral Orifice Plate Dimensional Data

	Line Size		
Dimension	**1/2-in. (15 mm)**	**1-in. (25 mm)**	**1 1/2-in. (40 mm)**
J (Beveled/Threaded pipe ends)	12.54 (318.4)	20.24 (514.0)	28.44 (722.4)
J (RF slip-on, RTJ slip-on, RF-DIN slip-on)	12.62 (320.4)	20.32 (516.0)	28.52 (724.4)
J (RF 150#, weld-neck)	14.37 (364.9)	22.37 (568.1)	30.82 (782.9)
J (RF 300#, weld-neck)	14.56 (369.8)	22.63 (574.7)	31.06 (789.0)
J (RF 600#, weld-neck)	14.81 (376.0)	22.88 (581.0)	31.38 (797.1)
K ((RF slip-on, RTJ slip-on, RF-DIN slip-on)(1)	5.82 (147.8)	8.83 (224.2)	11.99 (304.6)
K (RF 150#, weld-neck)	7.57 (192.3)	10.88 (276.3)	14.29 (363.1)
K (RF 300#, weld-neck)	7.76 (197.1)	11.14 (282.9)	14.53 (369.2)
K (RF 600#, weld-neck)	8.01 (203.4)	11.39 (289.2)	14.85 (377.2)
B.D.(Bore Diameter)(2)	0.664 (16.86)	1.097 (27.86)	1.567 (39.80)
Dimensions are in inches (millimeters).			

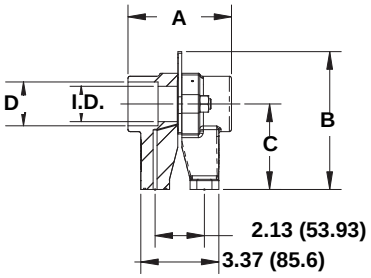
(1) Downstream length shown here includes plate thickness of 0.162-in. (4.11 mm).

(2) B.D is diameter of the precision bored portion of the upstream and downstream piping.

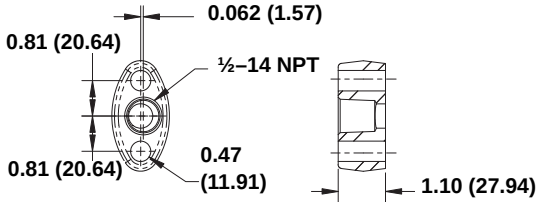
Orifice Plate



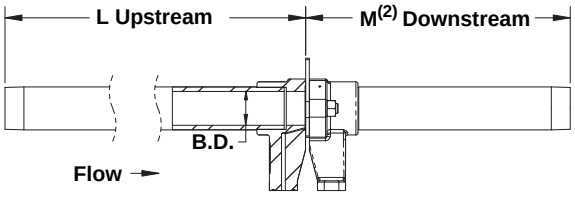
Socket-Weld or Threaded Body



Remote Adapter



NPT / Beveled Piping (Prepared for welding)



Temperature Sensor

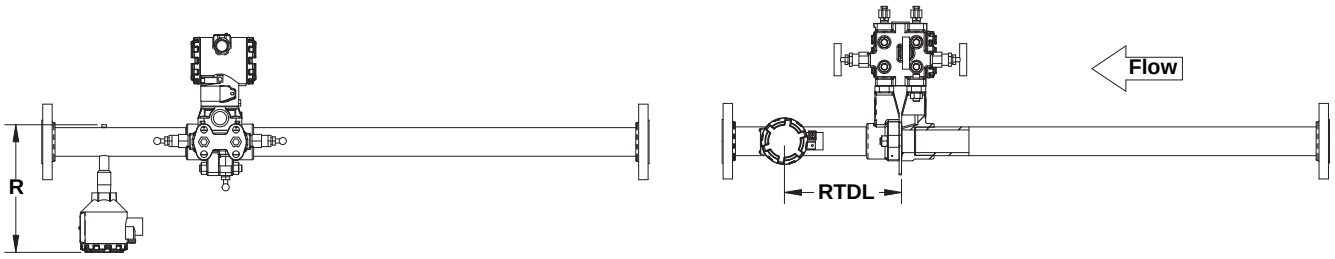


Table 101. 1195 Integral Orifice Dimensional Data

	Line Size					
Dimension	**1/2-in. (12.7 mm)**		**1-in. (25.4 mm)**		**1 1/2-in. (38.1 mm)**	
A	3.4-in.	86 mm	3.8-in.	97 mm	4.5-in.	114 mm
B	4.7-in.	119.4 mm	5.2-in.	132 mm	5.9-in.	149.9 mm
C	3.0-in.	76 mm	3.3-in.	84 mm	3.7-in.	94 mm
D(1)	0.805-in.	20.45 mm	1.280-in.	32.51 mm	1.865-in.	47.37 mm
E	3.6-in.	91 mm	3.9-in.	99 mm	4.4-in.	112 mm
F	2.6-in.	66 mm	3.0-in.	76 mm	3.5-in.	89 mm
H	2.5-in.	64 mm	3.0-in.	76 mm	3.5-in.	89 mm
L	12.54-in.	318.4 mm	20.24-in.	514 mm	28.44-in.	722.4 mm
M	5.74-in.	145.7 mm	8.75-in.	222.2mm	11.91-in.	302.6 mm
R	7.4-in.	187.96 mm	7.8-in.	198.12 mm	8.4-in.	213.36 mm
RTDL	3.11-in.	78.9 mm	5.25-in.	133.4 mm	7.50-in.	190.5 mm
B.D. (Bore Diameter)(2)	0.664-in.	16.87 mm	1.097-in.	27.86 mm	1.567-in.	39.80 mm
I.D. (Inside Diameter)	0.622-in.	15.80 mm	1.049-in.	26.64 mm	1.500-in.	38.10 mm

(1) To improve pipe perpendicularity for gasket sealing, socket diameter "D" is smaller than standard pipe O.D. Pipe O.D. must be machined smaller than socket diameter "D" to ensure proper fit.

(2) B.D is diameter of the precision bored portion of the upstream and downstream piping.

Pipe I.D. Range Code

For pipes with an Inner Diameter (I.D.) Range / Pipe Wall Thickness not found in this table or with a line size greater than 12-in. (300 mm), choose option code Z and specify the exact pipe dimensions (I.D. and Pipe Wall Thickness) on the Configuration Data Sheet (See document 00806-0100-4010). The Emerson process Management sizing program will determine this code, based on the application piping.

	Line Size				Pipe Wall Thickness		I.D. Range Code
	Nominal	Max. O.D.	Option Code	Inner Diameter (I.D.) Range	ANSI Pipes	Non-ANSI Pipes	
	2-in. (50 mm)	2.625-in. (66.68 mm)	020	1.784 to 1.841-in. (45.31 to 46.76 mm)	0.065 to 0.545-in. (1.7 to 13.8 mm)	0.065 to 0.488-in. (1.7 to 12.4 mm)	A
				1.842 to 1.938-in. (46.79 to 49.23 mm)		0.065 to 0.449-in. (1.7 to 11.4 mm)	B
				1.939 to 2.067-in. (49.25 to 52.50 mm)		0.065 to 0.417-in. (1.7 to 10.6 mm)	C
				2.068 to 2.206-in. (52.53 to 56.03 mm)		0.065 to 0.407-in. (1.7 to 10.3 mm)	D
	2 1/2-in. (63.5 mm)	3.188-in. (80.98 mm)	025	2.207 to 2.322-in. (56.06 to 58.98 mm)	0.083 to 0.563-in. (2.1 to 14.3 mm)	0.083 to 0.448-in. (2.1 to 11.4 mm)	B
				2.323 to 2.469-in. (59.00 to 62.71 mm)		0.083 to 0.417-in. (2.1 to 10.6 mm)	C
				2.470 to 2.598-in. (62.74 to 65.99 mm)		0.083 to 0.435-in. (2.1 to 11.0 mm)	D
				2.599 to 2.647-in. (66.01 to 67.23 mm)		0.083 to 0.515-in. (2.1 to 13.1 mm)	E
	3-in. (80 mm)	3.75-in. (95.25 mm)	030	2.648 to 2.751-in. (67.26 to 69.88 mm)	0.083 to 0.563-in. (2.1 to 14.3 mm)	0.083 to 0.460-in. (2.1 to 11.7 mm)	A
				2.752 to 2.899-in. (69.90 to 73.63 mm)		0.083 to 0.416-in. (2.1 to 10.6 mm)	B
				2.900 to 3.068-in. (73.66 to 77.93 mm)		0.083 to 0.395-in. (2.1 to 10.0 mm)	C
				3.069 to 3.228-in. (77.95 to 81.99 mm)		0.083 to 0.404-in (2.1 to 10.3 mm)	D
	3 1/2-in. (89 mm)	4.25-in. (107.95 mm)	035	3.229 to 3.333-in. (82.02 to 84.66 mm)	0.120 to 0.600-in. (3.0 to 15.2 mm)	0.120 to 0.496-in. (3.0 to 12.6 mm)	B
				3.334 to 3.548-in. (84.68 to 90.12 mm)		0.120 to 0.386-in. (3.0 to 9.8 mm)	C
				3.549 to 3.734-in. (90.14 to 94.84 mm)		0.120 to 0.415-in. (3.0 to 10.5 mm)	D
	4-in. (100 mm)	5.032-in. (127.81 mm)	040	3.735 to 3.825-in. (94.87 to 97.16 mm)	0.120 to 0.600-in. (3.0 to 15.2 mm)	0.120 to 0.510-in. (3.0 to 13.0 mm)	B
				3.826 to 4.026-in. (97.18 to 102.26 mm)		0.120 to 0.400-in. (3.0 to 10.2 mm)	C
				4.027 to 4.237-in. (102.29 to 107.62 mm)		0.120 to 0.390-in. (3.0 to 9.9 mm)	D
				4.238 to 4.437-in. (107.65 to 112.70 mm)		0.120 to 0.401-in. (3.0 to 10.2 mm)	E
	5-in. (125 mm)	6.094-in. (154.79 mm)	050	4.438 to 4.571-in. (112.73 to 116.10 mm)	0.134 to 0.614-in. (3.4 to 15.6 mm)	0.134 to 0.481-in. (3.4 to 12.2 mm)	A
				4.572 to 4.812-in. (116.13 to 122.22 mm)		0.134 to 0.374-in. (3.4 to 9.5 mm)	B
				4.813 to 5.047-in. (122.25 to 128.19 mm)		0.134 to 0.380-in. (3.4 to 9.7 mm)	C
				5.048 to 5.249-in. (128.22 to 133.32 mm)		0.134 to 0.413-in. (3.4 to 10.5 mm)	D
Sensor Size 1	6-in. (150 mm)	6.93-in. (176.02 mm)	060	5.250 to 5.472-in. (133.35 to 138.99 mm)	0.134 to 0.614-in. (3.4 to 15.6 mm)	0.134 to 0.3919-in. (3.4 to 9.9 mm)	A
				5.473 to 5.760-in. (139.01 to 146.30 mm)		0.134 to 0.327-in. (3.4 to 8.3 mm)	B
				5.761 to 6.065-in. (146.33 to 154.05 mm)		0.134 to 0.31-in. (3.4 to 7.9 mm)	C
				6.066 to 6.383-in. (154.08 to 162.13 mm)		0.134 to 0.297-in. (3.4 to 7.5 mm)	D
Sensor Size 2	6-in. (150 mm)	6.93-in. (176.02 mm)	060	5.250 to 5.472-in. (133.35 to 139.99 mm)	0.134 to 1.354-in. (3.4 to 34.4 mm)	0.134 to 1.132-in. (3.4 to 28.7 mm)	A
				5.473 to 5.760-in. (139.01 to 146.30 mm)		0.134 to 1.067-in. (3.4 to 27.1 mm)	B
				5.761 to 6.065-in. (146.33 to 154.05 mm)		0.134 to 1.05-in. (3.4 to 26.7 mm)	C
				6.066 to 6.383-in. (154.08 to 162.13 mm)		0.134 to 1.037-in. (3.4 to 26.3 mm)	D
Sensor Size 1	7-in. (180 mm)	7.93-in. (201.42 mm)	070	6.384 to 6.624-in. (162.15 to 168.25 mm)	0.134 to 0.614-in. (3.4 to 15.6 mm)	0.134 to 0.374-in. (3.4 to 9.5 mm)	B
				6.625 to 7.023-in. (168.28 to 178.38 mm)		0.134 to 0.216-in. (3.4 to 5.5 mm)	C
				7.024 to 7.392-in. (178.41 to 187.76 mm)		0.134 to 0.246-in. (3.4 to 6.2 mm)	D
Sensor Size 2	7-in. (180 mm)	7.93-in. (201.42 mm)	070	6.384 to 6.624-in. (162.15 to 168.25 mm)	0.134 to 1.354-in. (3.4 to 34.4 mm)	0.134 to 1.114-in. (3.4 to 28.3 mm)	B
				6.625 to 7.023-in. (168.28 to 178.38 mm)		0.134 to 0.956-in. (3.4 to 24.3 mm)	C
				7.024 to 7.392-in. (178.41 to 187.76 mm)		0.134 to 0.986-in. (3.4 to 25.0 mm)	D
Sensor Size 1	8-in. (200 mm)	9.688-in. (246.08 mm)	080	7.393 to 7.624-in. (187.78 to 193.65 mm)	0.250 to 0.73-in. (6.4 to 18.5 mm)	0.250 to 0.499-in. (6.4 to 12.6 mm)	B
				7.625 to 7.981-in. (193.68 to 202.72 mm)		0.250 to 0.374-in. (6.4 to 9.5 mm)	C
				7.982 to 8.400-in. (202.74 to 213.36 mm)		0.250 to 0.312-in. (6.4 to 7.9 mm)	D
				8.401 to 8.766-in. (213.39 to 222.66 mm)		0.250 to 0.364-in. (6.4 to 9.2 mm)	E
Sensor Size 2	8-in. (200 mm)	9.688-in. (246.08 mm)	080	7.393 to 7.624-in. (187.78 to 193.65 mm)	0.250 to 1.47-in. (6.4 to 37.3 mm)	0.250 to 1.239-in. (6.4 to 31.4 mm)	B
				7.625 to 7.981-in. (193.68 to 202.72 mm)		0.250 to 1.114-in. (6.4 to 28.3 mm)	C
				7.982 to 8.400-in. (202.74 to 213.36 mm)		0.250 to 1.052-in. (6.4 to 26.7 mm)	D
				8.401 to 8.766-in. (213.39 to 222.66 mm)		0.250 to 1.104-in. (6.4 to 28.0 mm)	E
	10-in. (250 mm)	11.75-in. (298.45 mm)	100	8.767 to 9.172-in. (222.68 to 232.97 mm)	0.250 to 1.470-in. (6.4 to 37.3 mm)	0.250 to 1.065-in. (6.4 to 27.1 mm)	A
				9.173 to 9.561-in. (232.99 to 242.85 mm)		0.250 to 1.082-in. (6.4 to 27.5 mm)	B
				9.562 to 10.020-in. (242.87 to 254.51 mm)		0.250 to 1.012-in. (6.4 to 25.7 mm)	C
				10.021 to 10.546-in. (254.53 to 267.87 mm)		0.250 to 0.945-in. (6.4 to 24.0 mm)	D
				10.547 to 10.999-in. (267.89 to 279.37 mm)		0.250 to 1.018-in. (6.4 to 25.9 mm)	E
	12-in. (300 mm)	13.0375-in. (331.15 mm)	120	11.000 to 11.373-in. (279.40 to 288.87 mm)	0.250 to 1.470-in. (6.4 to 37.3 mm)	0.250 to 1.097-in. (6.4 to 27.9 mm)	B
				11.374 to 11.938-in. (288.90 to 303.23 mm)		0.250 to 0.906-in. (6.4 to 23.0 mm)	C
				11.939 to 12.250-in. (303.25 to 311.15 mm)		0.250 to 1.159-in. (6.4 to 29.4 mm)	D

Installation and Flowmeter Orientation

Annubar Installation Considerations

Table 102. Annubar Straight Run Requirements(1)

Upstream (inlet) side	Annubar Products			
	3051SFA, 3051CFA, 2051CFA, 485, 585(2)			
	Without Straightening Vanes(3)		With Straightening Vanes(4)	
	In Plane	Out Plane	From Disturbance	From Straightening Vane
Reducer	12	12	8	4
Expander	18	18	8	4
Single Elbow (90°) or tee	8	10	8	4
Two Elbows in plane	11	16	8	4
Two Elbow out of plane	23	28	8	4
Butterfly Valve (75-100% open)	30	30	8	4
Ball / Gate Valve full open	8	10	8	4
Downstream (outlet) side	4	4	4	4

(1) Consult an Emerson Process Management representative if a disturbance is not listed or if multiple disturbances are present.

(2) Consult the factory for instructions regarding use in square or rectangular ducts.

(3) In Plane means the Annubar is in the same plane as the elbow. Out of Plane means the bar is perpendicular to the plane of the upstream elbow. Refer to Figure 1 on page 166.

(4) Use straightening vane to reduce the required straight run length.

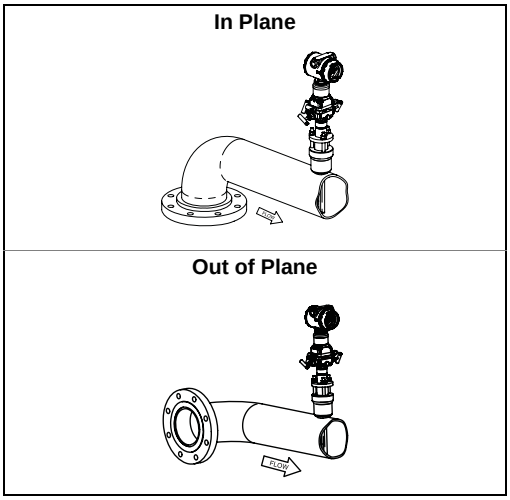
Table 103. 3051SFA, 3051CFA, 2051CFA, 485 Drill Hole Size According to Sensor Size

Sensor Size	Diameter
1	3/4-in. (19 mm)
2	1 5/16-in. (34 mm)
3	2 1/2-in. (64 mm)

Table 104. 585 Drill Hole Size According to Sensor Size

Sensor Size	Hole Diameter	
11	7/8-in. (23 mm)	+ 1/32-in (0,80 mm)
		– 0.00
22	1 5/16-in. (34 mm)	+ 1/16-in. (1,59 mm)
		– 0.00
44	2 1/2-in. (64 mm)	+ 1/16-in. (1,59 mm)
		– 0.00

Figure 1. Annubar In plane and Out of plane



Orifice Plate Installation Considerations

Table 105. Conditioning Orifice Plate and Compact Orifice Plate Straight Run Requirements(1)

Upstream (inlet) side	Conditioning Orifice Plate Products: 3051SFC_C, 3051CFCDC, 2051CFCDC, 1595, 405C(2)		Compact Orifice Plate Products: 3051SFC_P, 3051CFCDP, 2051CFCDP, 405P(3)(4)	
	0.4 Beta	0.65 Beta	0.4 Beta	0.65 Beta
Reducer	2	2	5	12
Expander	6	8	12	28
Single Elbow (90°) or tee	2	2	16	44
Two Elbows in plane	2	2	10	44
Two Elbow out of plane	2	2	50	60
Butterfly Valve (75-100% open)	2	5	16(5)	44(5)
Ball / Gate Valve full open	2	2	12	18
Downstream (outlet) side	2	2	6	7

(1) Consult an Emerson Process Management representative if a disturbance is not listed or if multiple disturbances are present.

(2) For any Beta greater than 0.40, use beta 0.65 recommended lengths. For any Beta ratio less than or equal to 0.40, use beta 0.4 recommended lengths.

(3) Recommended lengths represented in pipe diameters per ISO 5167.

(4) Refer to ISO 5167 for recommended lengths when using flow straighteners.

(5) Recommended lengths not per ISO 5167. Butterfly valves are not listed in the ISO specification.

Table 106. Integral Orifice Plate Straight Run Requirements(1)(2)(3)

Upstream (inlet) side	3051SFP, 3051CFP, 2051CFP, 1195					
	<0.20 Beta	0.40 Beta	0.50 Beta	0.60 Beta	0.70 Beta	0.75 Beta
Reducer	20	20	20	20	23	25
Expander	22	22	23	25	28	30
Single Elbow (90°) or tee	24	25	25	27	32	35
Two Elbows in plane	25	27	28	31	35	38
Two Elbows out of plane	30	31	33	37	42	45
Butterfly Valve fully open	22	22	23	25	28	30
Gate Valve fully open	22	22	23	25	28	30
Downstream (outlet) side	10	10	10	10	10	10

(1) Recommended lengths are guidelines based on ASME MFC-14M.

(2) All straight lengths are expressed as multiples of the pipe inside diameter D and shall be measured from the upstream face of the orifice plate to the disturbance.

(3) Interpolation of intermediate beta values can be used.

Orifice Plate Pipe Orientation

Pipe orientation for both 3051SFC, 3051CFC,2051CFC, 405C, 405P, 3051SFP, 3051CFP, 2051CFP AND 1195.

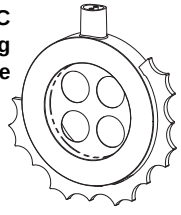
Orientation/ Flow Direction	Process(1)		
	Gas	Liquid	Steam
Horizontal	D/R	D/R	D/R
Vertical Up	R	D/R	R
Vertical Down	D/R	NR	NR

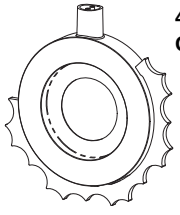
(1) D = Direct mount acceptable (recommended)
R = Remote mount acceptable
NR = Not recommended

Compact Flowmeter Pipe Centering

Improper centering of any orifice type device can cause an error of up to ±5% in small line sizes. A centering mechanism (centering ring) independent of flange rating comes standard with the 405 Compact Flowmeter Series.

405C Conditioning Orifice





405P Compact Orifice

1595 Pressure Tap Orientation

Orient the 1595 Conditioning Orifice Plate so that the pressure taps are centered between any 2 (of 4) orifice bore holes. In addition, the pressure taps should be located at 90° to the plane of the last upstream elbow under these conditions:

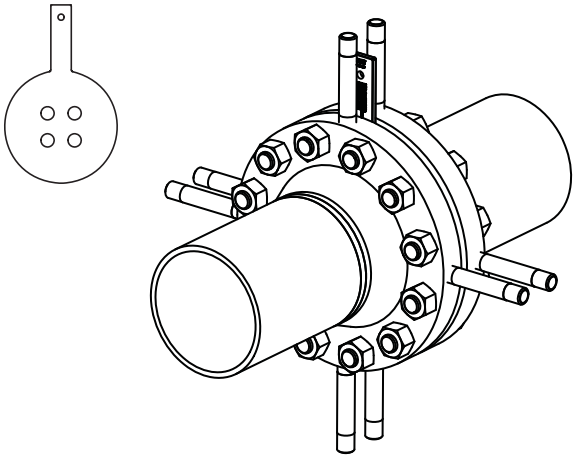
- with less than 6 upstream pipe diameters
- with a .65 Beta

Pressure Tap Locations

At Least Six Upstream Pipe Diameters

If the installation location has at least six upstream pipe diameters, the pressure taps can be located between any two of the four holes of the 1595 Orifice Plate. See Figure 2.

Figure 2. 1595 Pressure Tap Locations



Within Six Diameters Of An Elbow

If the installation location has less than six upstream pipe diameters, the pressure taps can be located between any two of the four holes of the 1595 Orifice Plate. In addition, the pressure taps must be located 90° from the plane of the elbow. See Figure 3 and Figure 4.

Figure 3. 1595 Pressure Tap Locations

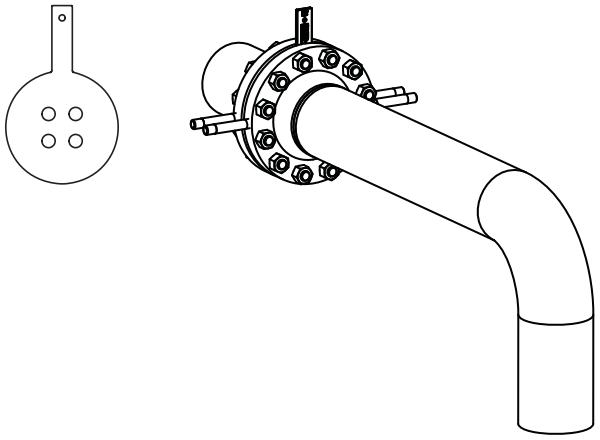
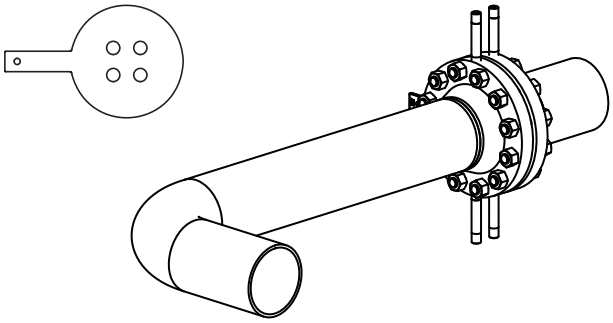


Figure 4. 1595 Pressure Tap Locations

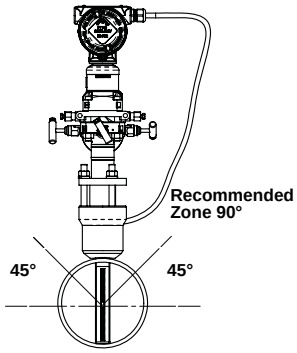


Annubar Flowmeter Orientation

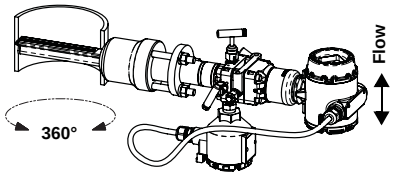
For 3051SFA, 3051CFA, 2051CFA, 485, 585

Annubar Direct Mount Flowmeter Orientation (Recommended)(1)

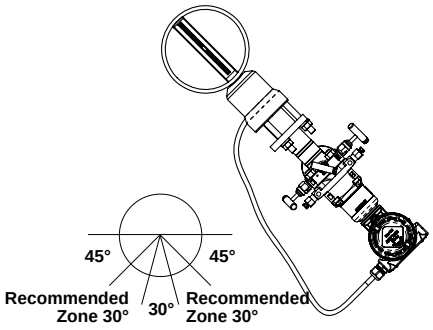
Gas (Horizontal)



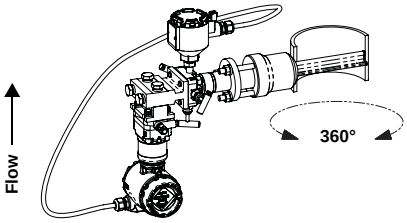
Gas (Vertical)



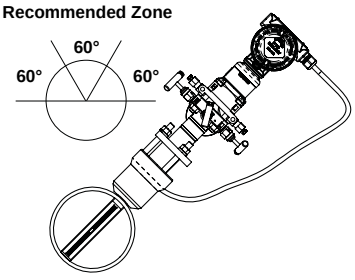
Liquid and Steam (Horizontal)



Steam (Vertical)



Top Mounting for Steam (Horizontal)(2)



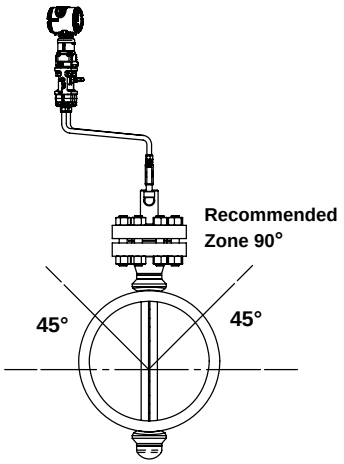
Note: If steam quality is not 100%, mount the Annubar 15° from the vertical position.

(1) The flowmeter orientation recommendations may vary for the Manual and Gear-Drive Flo-Tap Annubar Types.

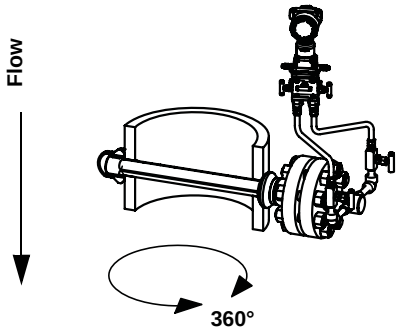
(2) Note: This mounting orientation is not recommended for the 585 Annubar Type L (Main Stream Line). For 585 Main Steam Line, use Liquid and Steam (Horizontal) orientation for mounting recommendations.

Annubar Remount Mount Flowmeter Orientation (Recommended)(1)

Gas (Horizontal)

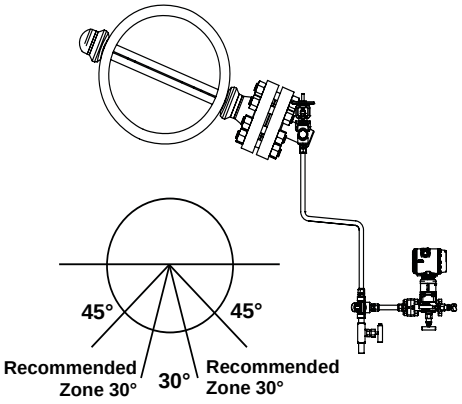


Gas (Vertical)

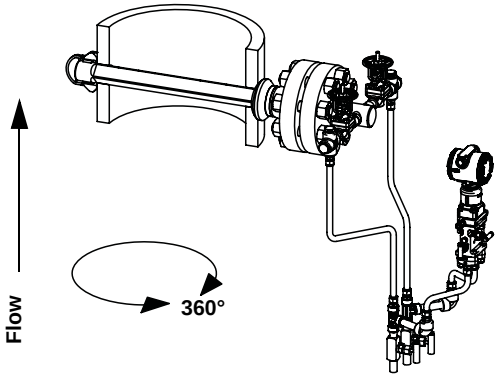


Note: Can also be mounted for Gas Vertical up applications.

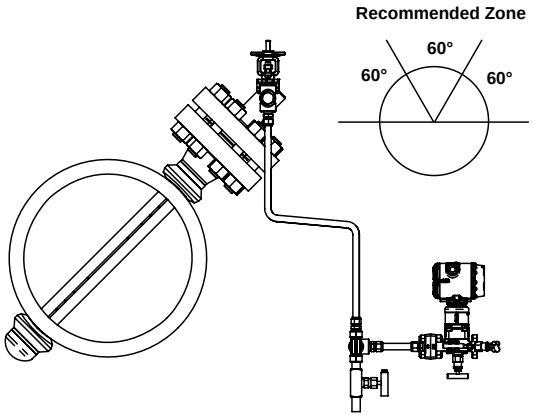
Liquid and Steam (Horizontal)



Steam (Vertical)



Top Mounting for Steam (Horizontal)



Note: This mounting orientation is not recommended for the Annubar Type L (Main Steam Line). For 585 Main Steam Line, use Liquid and Steam (Horizontal) orientation for mounting recommendations.

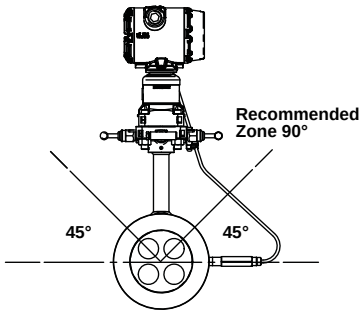
(1) The flowmeter orientation recommendations may vary for the Gear-Drive Flo-Tap Annubar Type.

405 Flowmeter Orientation

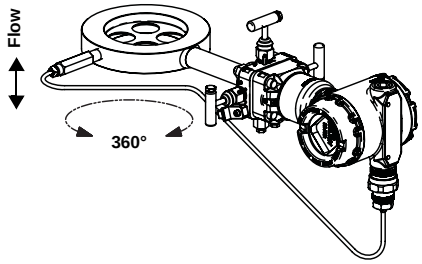
For 3051SFC, 3051CFC, 2051CFC, 405C, 405P

405 Direct Mount Flowmeter Orientation (Recommended)

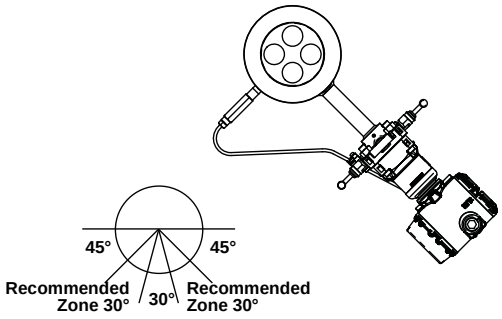
Gas (Horizontal)



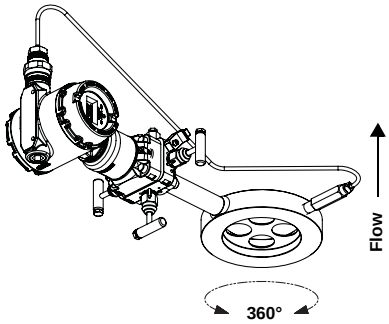
Gas (Vertical)



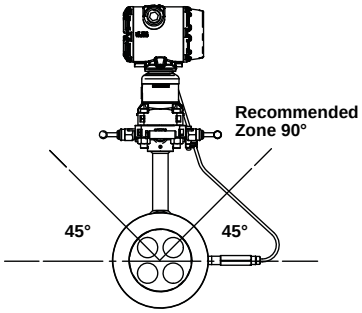
Liquid and Steam (Horizontal)



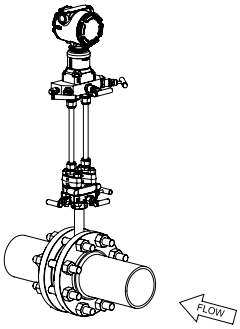
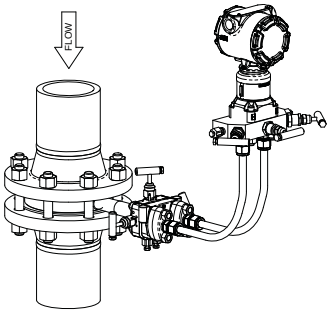
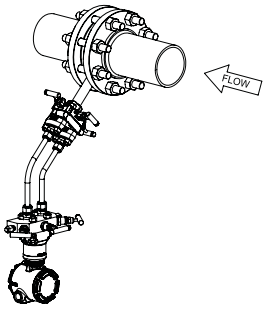
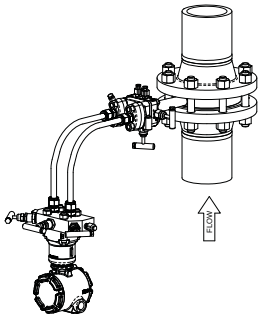
Steam (Vertical)



Top Mounting for Steam (Horizontal)



405 Remote Mount Flowmeter Orientation (Recommended)

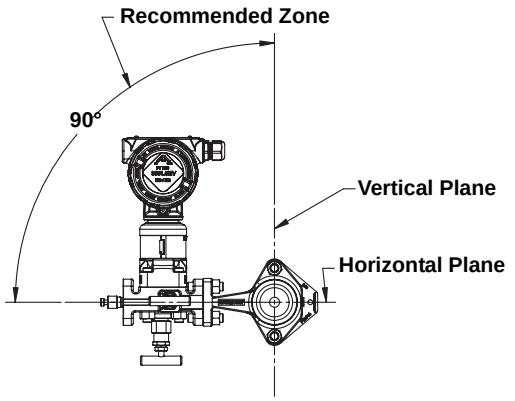
Gas (Horizontal)	Gas (Vertical)
	
Liquid and Steam (Horizontal)	**Liquid and Steam (Vertical)**
	

1195 Integral Orifice Flowmeter Orientation

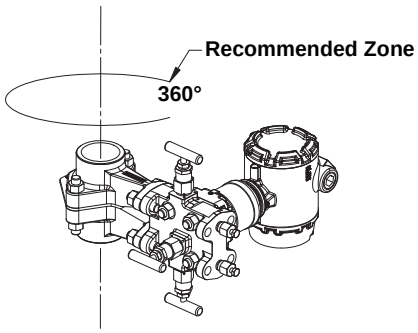
For 3051SFP, 3051CFP, 2051CFP, 1195

1195 Flowmeter Orientation with Traditional Style Manifold (Recommended)

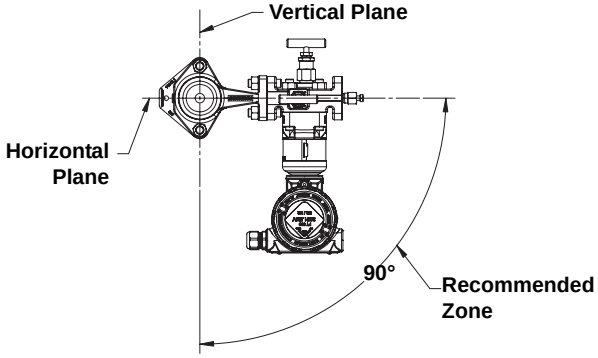
Gas (Horizontal)



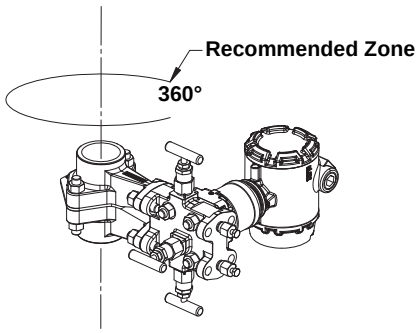
Gas (Vertical)



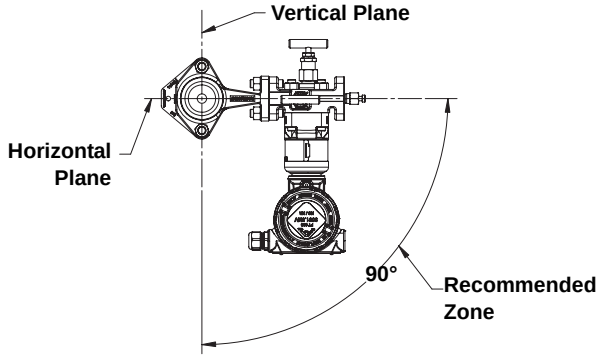
Liquid (Horizontal)



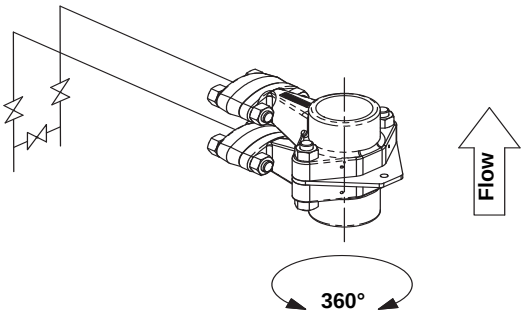
Liquid (Vertical)



Steam (Horizontal)

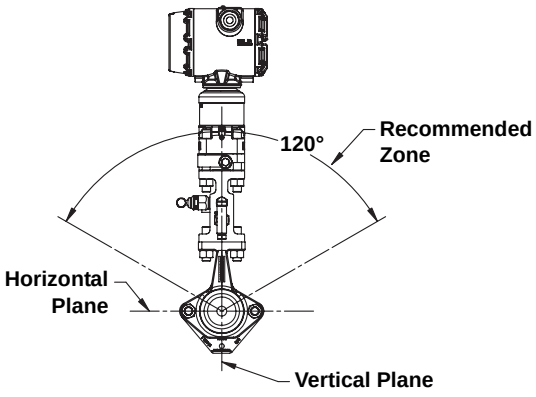


Steam (Vertical)

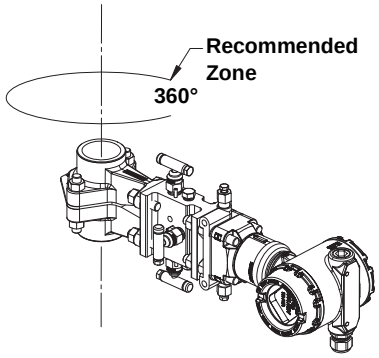


1195 Flowmeter Orientation with H-Pattern Manifold (Recommended)

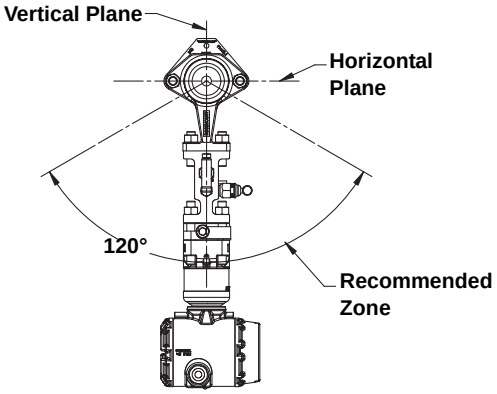
Gas (Horizontal)



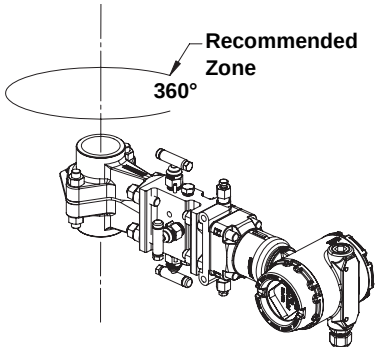
Gas (Vertical)



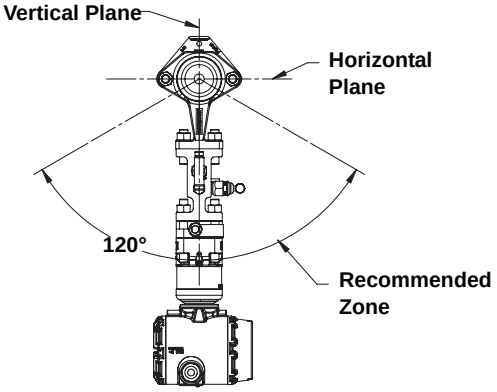
Liquid (Horizontal)



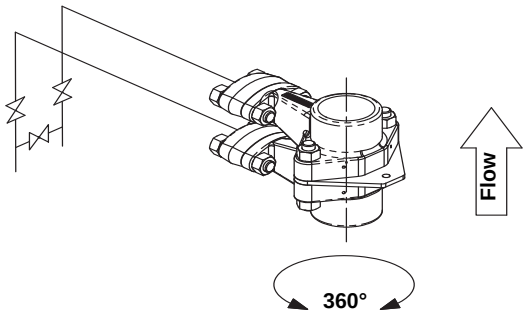
Liquid (Vertical)



Steam (Horizontal)



Steam (Vertical)



1495 DIMENSIONAL DRAWINGS

1495PC Paddle Type Orifice Plate
(DIN, Paddle, Square edged, Concentric)

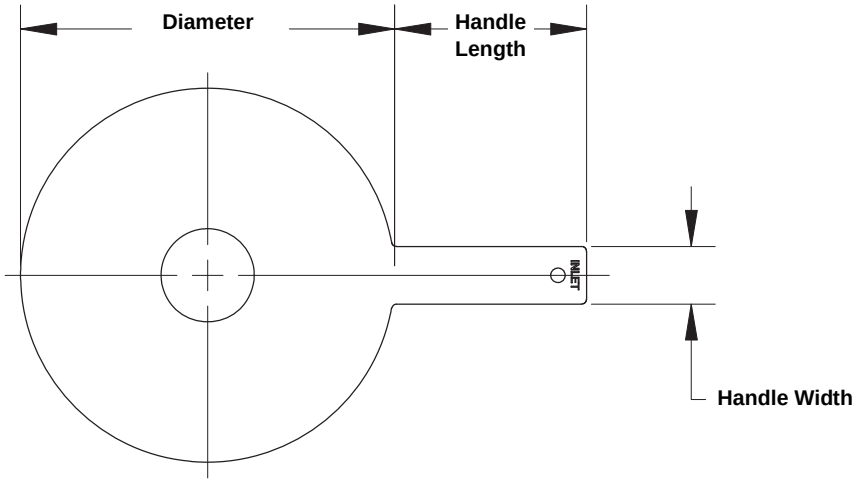
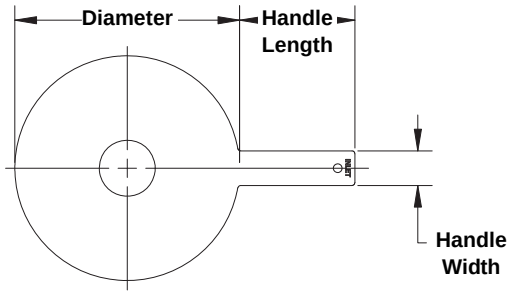


Table 107. 1495 Orifice Plate Dimensions[1]

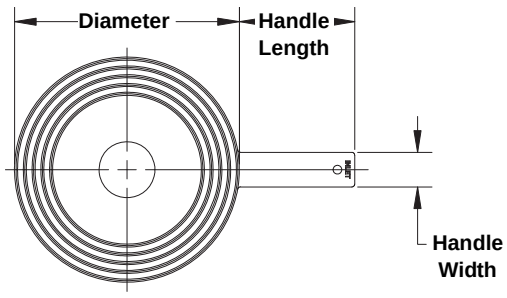
DN	Diameter (max) – by flange rating						Handle Width	Handle Length
	PN 10	PN 16	PN 25	PN 40	PN 63/64	PN 100		
DN 50	4.21 (107)	4.21 (107)	4.21 (107)	4.21 (107)	4.45 (113)	4.69 (119)	1.5 (40)	6.3 (160)
DN 65	5 (127)	5 (127)	5 (127)	5 (127)	5.43 (138)	5.67 (144)	1.5 (40)	6.3 (160)
DN 80	5.6 (142)	5.6 (142)	5.6 (142)	5.6 (142)	5.82 (148)	6.06 (154)	1.5 (40)	6.3 (160)
DN 100	6.38 (162)	6.38 (162)	6.61 (168)	6.61 (168)	6.85 (174)	7.09 (180)	1.5 (40)	6.3 (160)
DN 125	7.56 (192)	7.56 (192)	7.64 (194)	7.63 (194)	8.27 (210)	8.54 (217)	1.5 (40)	6.3 (160)
DN 150	8.58 (218)	8.58 (218)	8.82 (224)	8.82 (224)	9.72 (247)	10.12 (257)	1.5 (40)	6.3 (160)
DN 200	10.74 (273)	10.74 (273)	11.18 (284)	11.42 (290)	12.17 (309)	12.76 (324)	1.5 (40)	6.3 (160)
DN 250	12.91 (328)	12.95 (329)	13.39 (340)	13.86 (352)	14.33 (364)	15.39 (391)	1.5 (40)	6.3 (160)
DN 300	14.88 (378)	15.11 (384)	15.75 (400)	16.42 (417)	16.69 (424)	18.03 (458)	1.5 (40)	6.3 (160)
DN 350	17.24 (438)	17.48 (444)	17.99 (457)	18.66 (474)	19.13 (486)	20.16 (512)	1.5 (40)	6.3 (160)
DN 400	19.25 (489)	19.49 (495)	20.24 (514)	21.49 (546)	21.38 (543)	22.52 (572)	1.5 (40)	6.3 (160)
DN 450	21.22 (539)	21.85 (555)	22.24 (565)	22.48 (571)	Not Applicable	Not Applicable	1.5 (40)	6.3 (160)
DN 500	23.39 (594)	24.29 (617)	24.57 (624)	24.72 (628)	25.87 (657)	27.72 (704)	1.5 (40)	8.0 (200)
DN 600	27.36 (695)	28.9 (734)	28.78 (731)	29.41 (747)	30.08 (764)	32.01(813)	1.5 (40)	8.0 (200)

(1) Measurement is in inches (millimeters)

1495PC Orifice Paddle Type
(Paddle, Square edged, Concentric)



1495PG Orifice Paddle Type
(Paddle, Square edged, Concentric, Spiral finish)

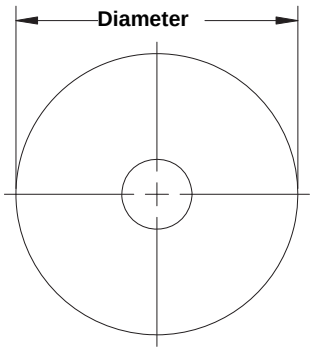


Line Size	Diameter for Paddle Type (1)						Handle Length	Handle Width
	150#	300#	600#	900#	1500#	2500#		
2-in.	4.125 (104.78)	4.375 (111.13)	4.375 (111.13)	5.625 (142.875)	5.625 (142.875)	5.750 (146.05)	4.0 (101.6)	1.00 (25.4)
2 1/2-in.	4.875 (123.82)	5.125 (130.18)	5.125 (130.18)	6.500 (165.1)	6.500 (165.1)	6.625 (168.275)	4.0 (101.6)	1.00 (25.4)
3-in.	5.375 (136.53)	5.875 (149.23)	5.875 (149.23)	6.625 (168.275)	6.875 (174.625)	7.750 (196.85)	4.0 (101.6)	1.00 (25.4)
4-in.	6.875 (174.63)	7.125 (180.98)	7.625 (193.675)	8.125 (206.375)	8.250 (209.55)	9.250 (234.95)	4.0 (101.6)	1.00 (25.4)
6-in.	8.750 (222.25)	9.875 (250.83)	10.500 (266.7)	11.375 (288.925)	11.125 (282.575)	12.500 (317.5)	4.0 (101.6)	1.00 (25.4)
8-in.	11.000 (279.4)	12.125 (307.98)	12.625 (320.675)	14.125 (358.775)	13.875 (352.425)	15.250 (387.35)	6.0 (127)	1.5 (38.1)
10-in.	13.375 (339.73)	14.250 (361.95)	15.750 (400.05)	17.125 (434.975)	17.125 (434.975)	18.750 (476.25)	6.0 (152.4)	1.5 (38.1)
12-in.	16.125 (409.58)	16.625 (422.26)	18.000 (457.2)	19.625 (498.475)	20.500 (520.7)	21.625 (549.275)	6.0 (152.4)	1.5 (38.1)
14-in.	17.750 (450.85)	19.125 (485.78)	19.375 (339.725)	20.500 (520.7)	22.750 (577.85)	—	6.0 (152.4)	1.5 (38.1)
16-in.	20.250 (514.35)	21.250 (539.75)	22.250 (565.15)	22.625 (574.675)	25.250 (641.35)	—	6.0 (152.4)	1.5 (38.1)
18-in.	21.500 (546.1)	23.375 (593.725)	24.000 (609.6)	25.000 (635.00)	27.625 (701.675)	—	6.0 (152.4)	1.5 (38.1)
20-in.	23.750 (603.25)	25.625 (650.875)	26.750 (679.45)	27.375 (695.325)	29.625 (752.475)	—	6.0 (152.4)	1.5 (38.1)
24-in.	28.125 (714.375)	30.375 (771.525)	31.000 (787.4)	32.875 (835.025)	35.500 (901.7)	—	6.0 (152.4)	1.5 (38.1)

(1) Measurement is in inches (millimeters)

1495UC Orifice Universal Type

(Universal, Square edged, Concentric

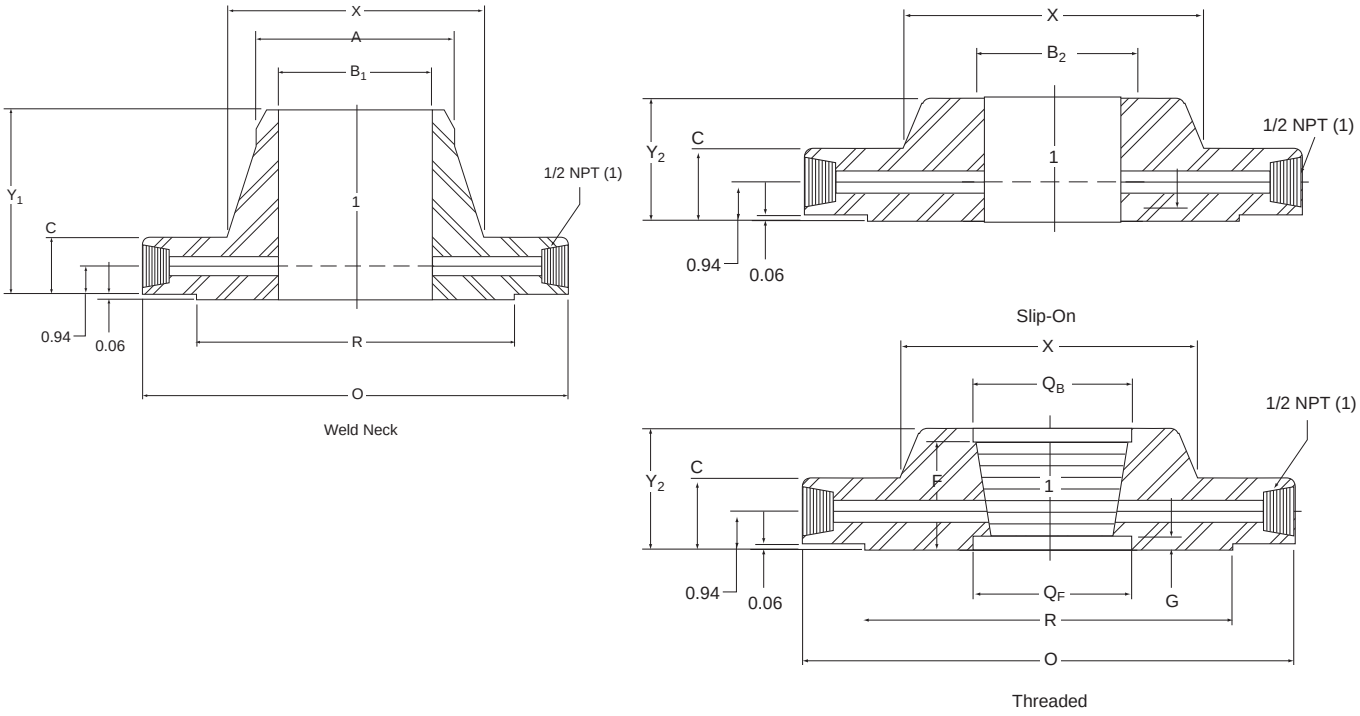


Line Size	Diameter for Universal Type(1)
2-in.	2.437 (61.8998)
2 1/2-in.	2.812 (71.4248)
3-in.	3.437 (87.2998)
4-in.	4.406 (111.912)
6-in.	6.437 (163.5)
8-in.	8.437 (214.3)
10-in.	10.687 (271.45)
12-in.	12.593 (319.862)
14-in.	14.000 (355.6)
16-in.	16.000 (406.4)
18-in.	18.000 (457.2)
20-in.	20.000 (508)
24-in.	24.000 (609.6)

(1) Measurement is in inches (millimeters)

1496 DIMENSIONAL DRAWINGS

Figure 5. Class 300



ASME B16.36-1996

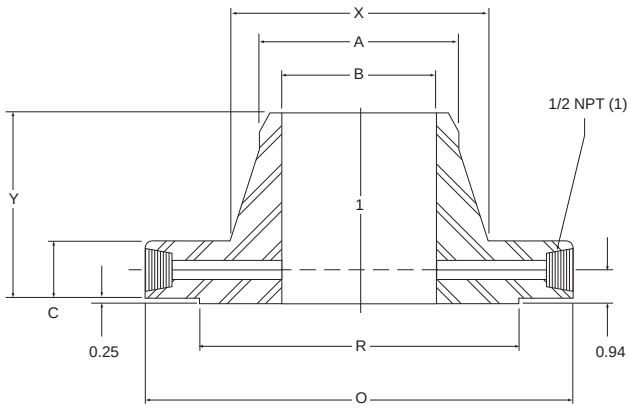
Table 108. Class 300 Orifice Flanges, Welding Neck, Slip-On, and Threaded[(1)(2)]

Nominal Pipe Size	Outside Diameter of Raised Face R	Outside Diameter of Flange O	Thickness of Flange, Min. C	Length Through Hub		Diameter of Hub X	Hub Diameter Beginning of Chamfer (W.N.) A	Diameter of Counter-bore		Counter-bore Depth (From Face)		Bore	
				Slip-On and Threaded Y_2	Weld Neck Y_1			Back Q_B	Face Q_F	F	G	Slip-On B_2	Weld Neck B_1
1	2.00	4.88	1.50	1.88	3.25	2.12	1.32	1.41	1.30	1.44	0.75	1.36	See Note [(5)]
$1\frac{1}{2}$	2.88	6.12	1.50	1.88	3.38	2.75	1.90	1.99	1.89	1.47	0.72	1.95	
2	3.62	6.50	1.50	1.94	3.38	3.31	2.38	2.50	2.36	1.50	0.69	2.44	
$2\frac{1}{2}$	4.12	7.50	1.50	2.00	3.50	3.94	2.88	3.00	2.84	1.75	0.56	2.94	
3	5.00	8.25	1.50	2.06	3.50	4.62	3.50	3.63	3.46	1.81	0.56	3.57	
4	6.19	10.00	1.50	2.12	3.62	5.75	4.50	4.63	4.45	1.88	0.56	4.57	
6	8.50	12.50	1.50	2.12	3.94	8.12	6.63	6.75	6.57	1.88	0.31	6.72	
8	10.62	15.00	1.62	2.44	4.38	10.25	8.63	8.75	8.55	2.19	0.44	8.72	
10	12.75	17.50	1.88	2.62	4.62	1262	10.75	See Note [(6)].				10.88	
12	15.00	20.50	2.00	2.88	5.12	14.75	12.75					12.88	
14	16.25	23.00	2.12	3.00	5.62	16.75	14.00					14.14	
16	18.50	25.50	2.25	3.25	5.75	19.00	16.00					16.16	
18	21.00	28.00	2.38	3.50	6.25	21.00	18.00					18.18	
20	23.00	30.50	2.50	3.75	6.38	23.12	20.00					20.20	
24	27.25	36.00	2.75	4.19	6.62	27.62	24.00					24.25	

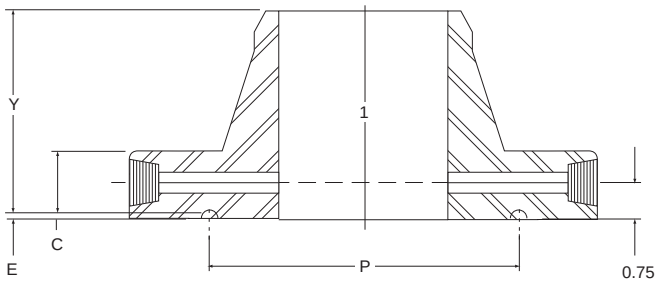
Nominal Pipe Size (1)(2)	Diameter of Pressure Connection TT	Drilling Template				Bolt Length (3)(4)	
		Bolt Circle	Number of Holes	Diameter of Holes	Diameter of Bolts	Machine Bolts	Stud Bolts
1	1/4	3.50	4	0.69	5/8	4.50	5.00
1 1/2	1/4	4.50	4	0.81	3/4	4.75	5.25
2	1/4	5.00	8	0.69	5/8	4.50	5.00
2 1/2	1/4	5.88	8	0.81	3/4	4.75	5.25
3	3/8	6.62	8	0.81	3/4	4.75	5.25
4	1/2	7.88	8	0.81	3/4	4.75	5.25
6	1/2	10.62	12	0.88	3/4	4.75	5.25
8	1/2	13.00	12	1.00	7/8	5.00	5.75
10	1/2	15.25	16	1.12	1	5.75	6.50
12	1/2	17.75	16	1.25	1 1/8	6.25	7.00
14	1/2	20.25	20	1.25	1 1/8	6.50	7.25
16	1/2	22.50	20	1.38	1 1/4	7.00	7.75
18	1/2	24.75	24	1.38	1 1/4	7.25	8.00
20	1/2	27.00	24	1.38	1 1/4	7.50	8.50
24	1/2	32.00	24	1.62	1 1/2	8.25	9.50

(1) Weld neck flanges NPS 3 and smaller are identical to Class 600 flanges and may be so marked.
(2) All other dimensions are in accordance with ASME B16.5.
(3) Bolt lengths include allowance for orifice and gasket thickness of 0.25 in. for NPS 1-12 and 0.38 in. for NPS 14-24.
(4) In conformance with ASME B16.5, stud bolt lengths do not include point heights.
(5) Threaded flanges are furnished in NPS 1-8 only.
(6) Bore diameter of weld neck flanges is to be specified by the purchaser.

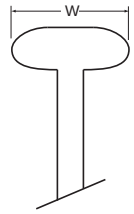
Figure 6. Class 600



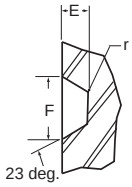
Raised Face



Ring Type Joint



Special One or Two Piece Ring and Orifice Plate Assembly



Groove Detail

Table 109. Class 600 Orifice Flanges, Welding Neck[1][2]

Nominal Pipe Size	Outside Diameter of Raised Face R	Outside Diameter of Flange O	Thickness of Flange, Min. C	Length Through Hub Y	Height of Raised Face H	Ring Type Joint						Diameter of Hub X	Hub Diameter Beginning of Chamfer A
						Groove Number	Pitch Diameter P	Groove Depth E	Groove Width F	Radius at Bottom r_{max}	Special Oval Ring Height W		
1	2.00	4.88	1.44	3.19	0.06	R16	2.000	0.250	0.344	0.03	1.00	2.12	1.32
1 1/2	2.88	6.12	1.44	3.32	0.06	R20	2.688	0.250	0.344	0.03	1.00	2.75	1.90
2	3.62	6.50	1.44	3.32	0.06	R23	3.250	0.312	0.469	0.03	1.06	3.31	2.38
2 1/2	4.12	7.50	1.44	3.44	0.06	R26	4.000	0.312	0.469	0.03	1.06	3.94	2.88
3	5.00	8.25	1.44	3.44	0.06	R31	4.875	0.312	0.469	0.03	1.06	4.62	3.50
4	6.19	10.75	1.50	4.00	0.25	R37	5.875	0.312	0.469	0.03	1.06	6.00	4.50
6	8.50	14.00	1.88	4.62	0.25	R45	8.312	0.312	0.469	0.03	1.06	8.75	6.63
8	10.62	16.50	2.19	5.25	0.25	R49	10.625	0.312	0.469	0.03	1.06	10.75	8.63
10	12.75	20.00	2.50	6.00	0.25	R53	12.750	0.312	0.469	0.03	1.06	13.50	10.75
12	15.00	22.00	2.62	6.12	0.25	R57	15.000	0.312	0.469	0.03	1.06	15.75	12.75
14	16.25	23.75	2.75	6.50	0.25	R61	16.500	0.312	0.469	0.03	1.06	17.00	14.00
16	18.50	27.00	3.00	7.00	0.25	R65	18.500	0.312	0.469	0.03	1.19	19.50	16.00
18	21.00	29.25	3.25	7.25	0.25	R69	21.000	0.312	0.469	0.03	1.19	21.50	18.00
20	23.00	32.00	3.50	7.50	0.25	R73	23.000	0.375	0.531	0.06	1.25	24.00	20.00
24	27.25	37.00	4.00	8.00	0.25	R77	27.250	0.438	0.656	0.06	1.44	28.25	24.00

Nominal Pipe Size[1][2]	Bore B	Diameter of Pressure Conn-ection TT	Drilling Template				Diameter of Bolts	Length of Stud Bolts[3][4]	
			Bolt Circle	Number of Holes	Diameter of Holes				
					Raised Face	Ring Joint		Raised Face	Ring Joint
1	See Note [4].	1/4	3.50	4	0.69	0.75	5/8	5.00	5.50
1 1/2		1/4	4.50	4	0.81	0.88	3/4	5.25	5.50
2		1/4	5.00	8	0.69	0.75	5/8	5.00	5.50
2 1/2		1/4	5.88	8	0.81	0.88	3/4	5.25	5.75
3		3/8	6.62	8	0.81	0.88	3/4	5.25	5.75
4		1/2	8.50	8	1.00	1.00	7/8	6.00	6.50
6		1/2	11.50	12	1.12	1.12	1	7.00	7.50
8		1/2	13.75	12	1.25	1.25	1 1/8	7.75	8.25
10		1/2	17.00	16	1.38	1.38	1 1/4	8.75	9.25
12		1/2	19.25	20	1.38	1.38	1 1/4	9.00	9.50
14		1/2	20.75	20	1.50	1.50	1 3/8	9.50	10.00
16		1/2	23.75	20	1.62	1.62	1 1/2	10.25	10.75
18		1/2	25.75	20	1.75	1.75	1 5/8	11.00	11.50
20		1/2	28.50	24	1.75	1.75	1 5/8	11.75	12.50
24		1/2	33.00	24	2.00	2.00	1 7/8	13.25	13.75

(1) Weld neck flanges NPS 3 and smaller are identical to Class 300 flanges except for bolting and may be used for such service.
(2) All other dimensions are in accordance with ASME B16.5.
(3) Bolt lengths for raised face flanges include allowance for orifice and gasket thickness of 0.25 in. for NPS 1-12 and 0.38 in. for NPS 14-24. Bolt lengths for ring type joint flanges include allowance of 0.62 in. for NPS 1-10, 0.75 in. for NPS 12-18, and 0.88 in. for NPS 20.
(4) In conformance with ASME B16.5, stud bolt lengths do not include point heights.

Figure 7. Class 900

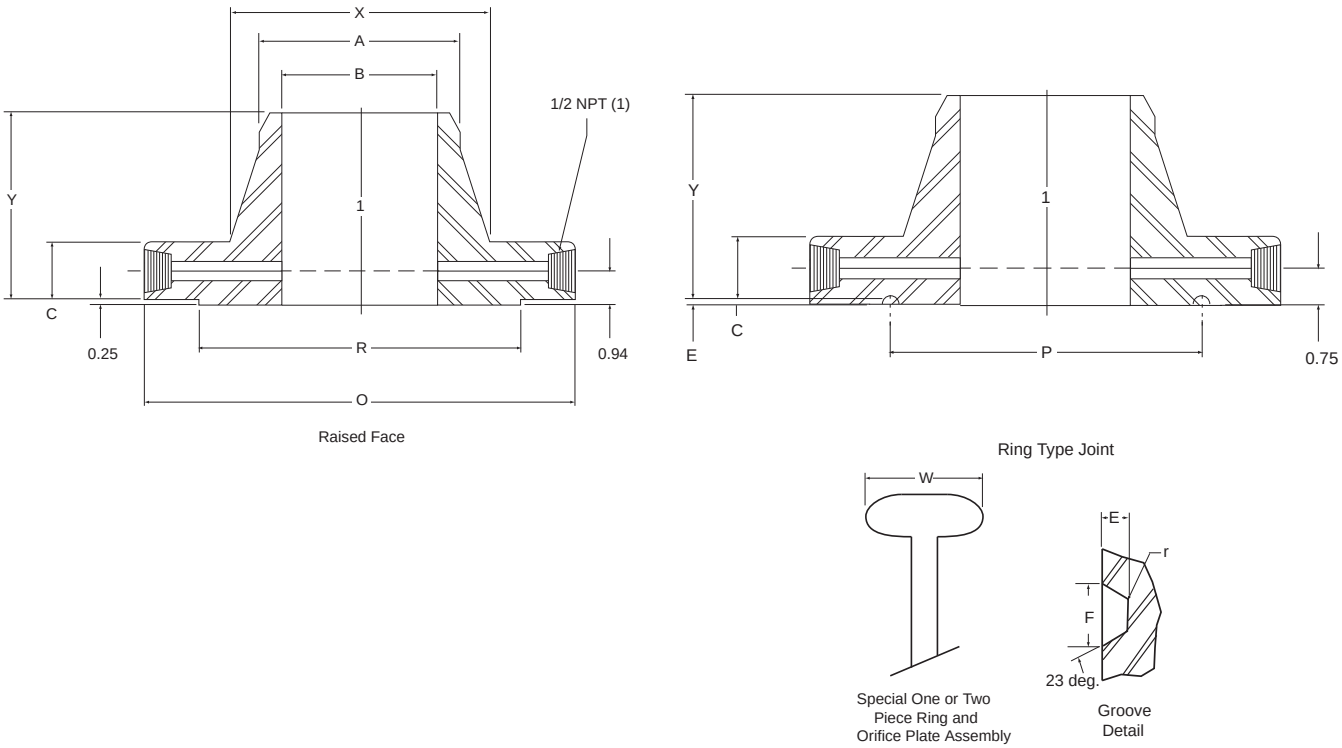


Table 110. Class 900 Orifice Flanges, Welding Neck[(1)]

Nominal Pipe Size	Out-side Diameter of Raised Face R	Out-side Diameter of Flange O	Thickness of Flange, Min. C	Length Through Hub Y	Ring Type Joint						Diameter of Hub X	Hub Diameter Beginning of Chamfer A
					Groove Number	Pitch Diameter P	Groove Depth E	Groove Width F	Radius at Bottom r_{max}	Special Oval Ring Height W		
1	For Nominal Pipe Size (NPS) $2^1/_2$ and smaller, use Class 1500.											
$1^1/_2$												
2												
$2^1/_2$												
3	5.00	9.50	1.50	4.00	R31	4.875	0.312	0.469	0.03	1.06	5.00	3.50
4	6.19	11.50	1.75	4.50	R37	5.875	0.312	0.469	0.03	1.06	6.25	4.50
6	8.50	15.00	2.19	5.50	R45	8.312	0.312	0.469	0.03	1.06	9.25	6.63
8	10.62	18.50	2.50	6.38	R49	10.625	0.312	0.469	0.03	1.06	11.75	8.63
10	12.75	21.50	2.75	7.25	R53	12.750	0.312	0.469	0.03	1.06	14.50	10.75
12	15.00	24.00	3.12	7.88	R57	15.000	0.312	0.469	0.03	1.06	16.50	12.75
14	16.25	25.25	3.38	8.38	R62	16.500	0.438	0.656	0.06	1.31	17.75	14.00
16	18.50	27.75	3.50	8.50	R66	18.500	0.438	0.656	0.06	1.44	20.00	16.00
18	21.00	31.00	4.00	9.00	R70	21.000	0.500	0.781	0.06	1.56	22.25	18.00
20	23.00	33.75	4.25	9.75	R74	23.000	0.500	0.781	0.06	1.56	24.50	20.00
24	27.25	41.00	5.50	11.50	R78	27.250	0.625	1.062	0.09	1.88	29.50	24.00

(1) Nominal Pipe Size	Bore B	Diameter of Pressure Connection TT	Drilling Template				Length of Stud Bolts(2)(3)	
			Diameter of Bolt Circle	Number of Holes	Diameter of Holes	Diameter of Bolts	Raised Face	Ring Joint
1	For Nominal Pipe Size (NPS) 2 1/2 and smaller, use Class 1500.							
1 1/2								
2								
2 1/2								
3	See Note (4).	3/8	7.50	8	7.50	7/8	6.00	6.50
4		1/2	9.25	8	9.25	1 1/8	7.00	7.50
6		1/2	12.50	12	12.50	1 1/8	7.75	8.25
8		1/2	15.50	12	15.50	1 3/8	9.00	9.50
10		1/2	18.50	16	18.50	1 3/8	9.50	10.00
12		1/2	21.00	20	21.00	1 3/8	10.25	10.75
14		1/2	22.00	20	22.00	1 1/2	11.00	11.50
16		1/2	24.25	20	24.25	1 5/8	11.50	12.00
18		1/2	27.00	20	27.00	1 7/8	13.00	13.75
20		1/2	29.50	20	29.50	2	14.00	14.75
24		1/2	35.50	20	35.50	2 1/2	17.50	18.50

(1) All other dimensions are in accordance with ASME B16.5.
(2) In conformance with ASME B16.5, stud bolt lengths do not include point heights.
(3) Bolt lengths for raised face flanges include allowance for orifice and gasket thickness of 0.25 in. for NPS 3-12 and 0.38 in. for NPS 14-24. Bolt lengths for ring type joint flanges include allowance of 0.62 in. for NPS 3-10 and 0.75 in. for NPS 12.
(4) Bore is to be specified by the purchaser.

Figure 8. Class 1500

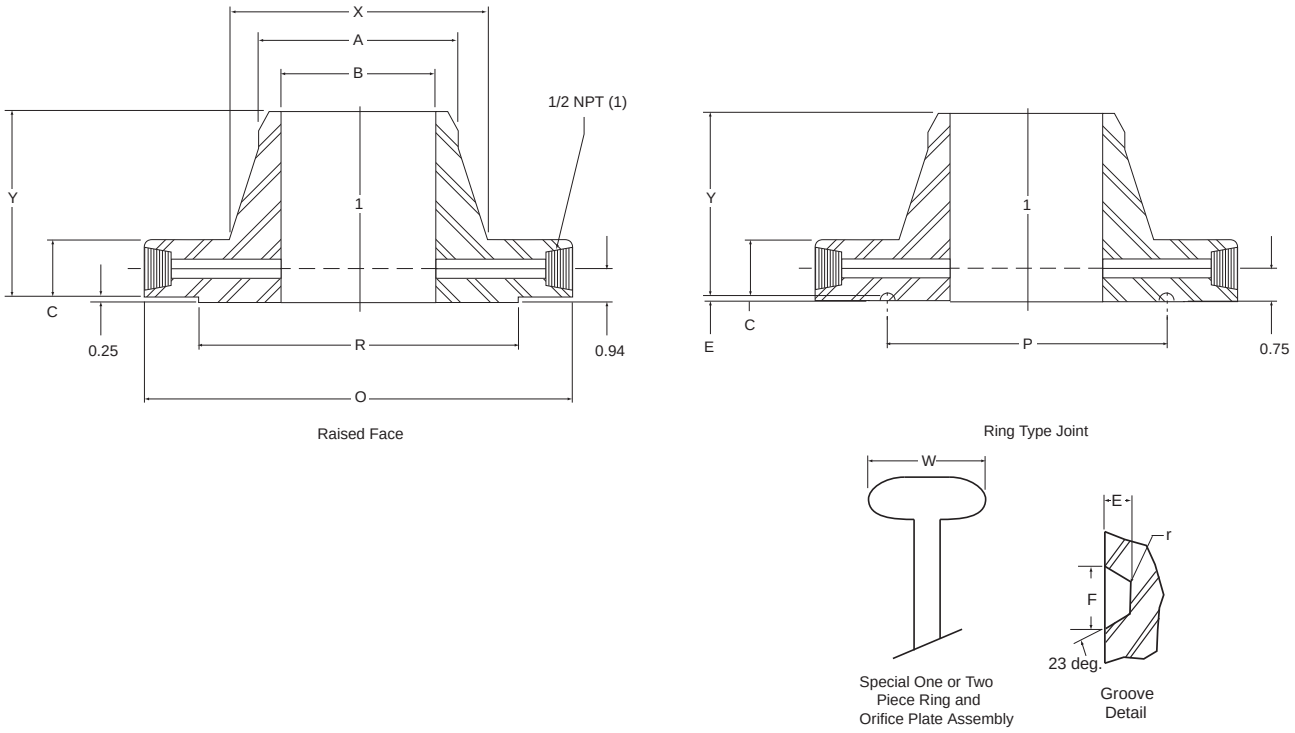


Table 111. Class 1500 Orifice Flanges, Welding Neck[1]

Nominal Pipe Size	Outside Diameter of Raised Face R	Outside Diameter of Flange O	Thickness of Flange, Min. C	Length Through Hub Y	Ring Type Joint						Diameter of Hub X	Hub Diameter Beginning of Chamfer A
					Groove Number	Pitch Diameter P	Groove Depth E	Groove Width F	Radius at Bottom r_{max}	Special Oval Ring Height W		
1	2.00	5.88	1.50	3.25	R16	2.000	0.250	0.344	0.03	1.00	2.06	1.32
1 1/2	2.88	7.00	1.50	3.50	R20	2.688	0.250	0.344	0.03	1.00	2.75	1.90
2	3.62	8.50	1.50	4.00	R24	3.750	0.312	0.469	0.03	1.06	4.12	2.38
2 1/2	4.12	9.62	1.62	4.12	R27	4.250	0.312	0.469	0.03	1.06	4.88	2.88
3	5.00	10.50	1.88	4.62	R35	5.375	0.312	0.469	0.03	1.06	5.25	3.50
4	6.19	12.25	2.12	4.88	R39	6.375	0.312	0.469	0.03	1.06	6.38	4.50
6	8.50	15.50	3.25	6.75	R46	8.312	0.375	0.531	0.06	1.12	9.00	6.63
8	10.62	19.00	3.62	8.38	R50	10.625	0.438	0.656	0.06	1.31	11.50	8.63
10	12.75	23.00	4.25	10.00	R54	12.750	0.438	0.656	0.06	1.31	14.50	10.75
12	15.00	26.50	4.88	11.12	R58	15.000	0.562	0.806	0.06	1.56	17.75	12.75
14	16.25	29.50	5.25	11.75	R63	16.500	0.625	1.062	0.09	1.75	19.50	14.00
16	18.50	32.50	5.75	12.25	R67	18.500	0.688	1.188	0.09	2.00	21.75	16.00
18	21.00	36.00	6.38	12.88	R71	21.000	0.688	1.188	0.09	2.00	23.50	18.00
20	23.00	38.75	7.00	14.00	R75	23.000	0.688	1.312	0.09	2.12	25.25	20.00
24	27.25	46.00	8.00	16.00	R79	27.250	0.812	1.438	0.09	2.31	30.00	24.00

(1) Nominal Pipe Size	Bore B	Diameter of Pressure Connection TT	Drilling Template				Length of Stud Bolts[2][3]	
			Diameter of Bolt Circle	Number of Holes	Diameter of Holes	Diameter of Bolts	Raised Face	Ring Joint
1	See Note [4].	1/4	4.00	4	1.00	7/8	6.00	6.25
1 1/2		1/4	4.88	4	1.12	1	6.25	6.50
2		1/4	6.50	8	1.00	7/8	6.00	6.50
2 1/2		1/4	7.50	8	1.12	1	6.50	7.00
3		3/8	8.00	8	1.25	1 1/8	7.25	7.25
4		1/2	9.50	8	1.38	1 1/4	8.00	8.50
6		1/2	12.50	12	1.50	1 3/8	10.50	11.00
8		1/2	15.50	12	1.75	1 5/8	11.75	12.25
10		1/2	19.00	12	2.00	1 7/8	13.50	14.00
12		1/2	22.50	16	2.12	2	15.00	15.75
14		1/2	25.00	16	2.38	2 1/4	16.25	17.52
16		1/2	27.75	16	2.62	2 1/2	17.75	19.00
18		1/2	30.50	16	2.88	2 3/4	19.75	21.00
20		1/2	32.75	16	3.12	3	21.50	22.50
24		1/2	39.00	16	3.62	3 1/2	24.50	26.00

(1) All other dimensions are in accordance with ASME B16.5.
(2) Bolt lengths for raised face flanges include allowance for orifice and gasket thickness of 0.25 in. for NPS 1-12 and 0.38 in. for NPS 14-24. Bolt lengths for ring type joint flanges include allowance of 0.62 in. for NPS 1-10, 0.75 in. for NPS 12-18, and 0.88 in. for NPS 20.
(3) In conformance with ASME B16.5, stud bolt lengths do not include point heights.

(4) Bore is to be specified by the purchaser.

Figure 9. Class 2500

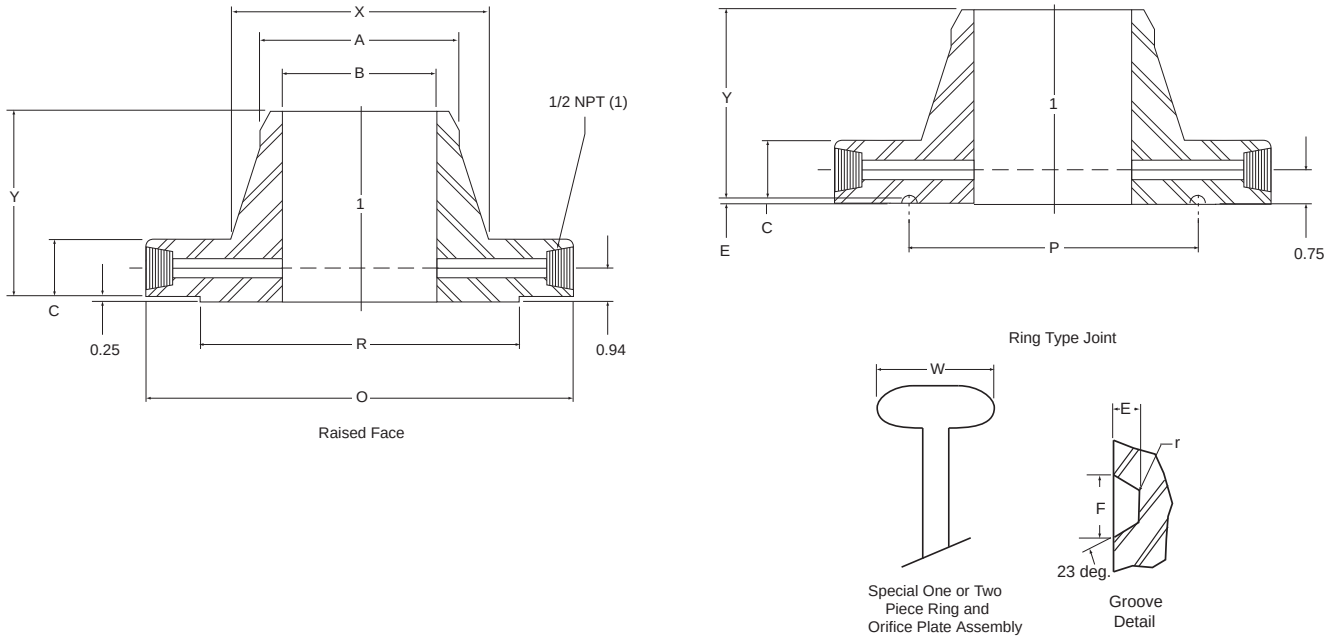


Table 112. Class 2500 Orifice Flanges, Welding Neck[(1)]

Nominal Pipe Size	Outside Diameter of Raised Face R	Outside Diameter of Flange O	Thickness of Flange, Min. C	Length Through Hub Y	Ring Type Joint						Diameter of Hub X	Hub Diameter Beginning of Chamfer A
					Groove Number	Pitch Diameter P	Groove Depth E	Groove Width F	Radius at Bottom r_{max}	Special Oval Ring Height W		
1	2.00	6.25	1.50	3.62	R18	2.375	0.250	0.344	0.03	1.00	2.25	1.32
1.5	2.88	8.00	1.75	4.38	R23	3.250	0.312	0.469	0.03	1.06	3.12	1.90
2	3.62	9.25	2.00	5.00	R26	4.000	0.312	0.469	0.03	1.06	3.75	2.38
2.5	4.12	10.50	2.25	5.62	R28	4.375	0.375	0.531	0.06	1.19	4.50	2.88
3	5.00	12.00	2.62	6.62	R32	5.000	0.375	0.531	0.06	1.19	5.25	3.50
4	6.19	14.00	3.00	7350	R38	6.188	0.438	0.656	0.06	1.31	6.50	4.50
6	8.50	19.00	4.25	10.75	R47	9.000	0.500	0.781	0.06	1.31	6.50	4.50
8	10.62	21.75	5.00	12.50	R51	11.000	0.562	0.906	0.06	1.56	12.00	8.63
10	12.75	26.50	6.50	16.50	R55	13.500	0.688	1.188	0.09	1.88	14.75	10.75
12	15.00	30.00	7.25	18.25	R60	16.000	0.688	1.312	0.09	2.00	17.38	12.75

(1) Nominal Pipe Size	Bore B	Diameter of Pressure Conn-ection TT	Drilling Template				Length of Stud Bolts(2)(3)	
			Diameter of Bolt Circle	Number of Holes	Diameter of Holes	Diameter of Bolts	Raised Face	Ring Joint
1	See Note(4)	1/4	4.25	4	1.00	7/8	6.00	6.25
1.5		1/4	5.75	4	1.25	1 1/8	7.00	7.50
2		1/4	6.75	8	1.12	1	7.25	7.75
2.5		1/4	7.75	8	1.25	1 1/8	8.00	8.50
3		3/8	9.00	8	1.38	1 1/4	9.00	9.50
4		1/2	10.75	8	1.62	1 1/2	10.25	10.75
6		1/2	14.50	8	2.12	2	13.75	14.50
8		1/2	17.25	12	2.12	2	15.25	16.00
10		1/2	21.25	12	2.62	2 1/2	19.25	20.25
12		1/2	24.38	12	2.88	2 3/4	21.25	22.50

(1) All other dimensions are in accordance with ASME B16.5.
(2) Bolt lengths for raised face flanges include allowance for orifice and gasket thickness of 0.25 in. for NPS 1-12 and 0.38 in. for NPS 14-24. Bolt lengths for ring type joint flanges include allowance of 0.62 in. for NPS 1-10, 0.75 in. for NPS 12-18, and 0.88 in. for NPS 20.
(3) In conformance with ASME B16.5, stud bolt lengths do not include point heights.

(4) Bore is to be specified by the purchaser.

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EMERSON
Process Management

Level

Emerson's reliable Rosemount and Mobrey instrumentation can help you optimize all your level applications. Level devices included in this section are based on six different technologies:

Differential Pressure

Pressure transmitters for level, which operate on the principles of hydrostatic pressure, are available with a wide variety of wetted materials and process connections, and can be used on both atmospheric and pressurized vessels containing most liquids.

Guided Wave Radar

Guided Wave Radar (GWR) multivariable level transmitters are used in a wide range of liquid and solid applications and for interface level measurements between two liquids. They are virtually unaffected by process conditions in the vessel.

Non-Contacting Radar

Non-Contacting radar transmitters are used in demanding applications where vapors and turbulence are involved as well as sticky and aggressive products. They are immune to changing process conditions.

Ultrasonic

Ultrasonic level transmitters provide non-contacting measurement of level and contents by measuring the distance to the level surface. Ultrasonic transmitters are generally specified for simple level duties.

Vibrating Fork

It is good practice, and often mandatory, to fit high and low alarm level switches to vessels in addition to level transmitters. Vibrating fork level switches are high integrity devices used in overfill prevention or vessel empty detection applications, and are virtually unaffected by process conditions in the vessel.

Float Switch

Electromechanical float switches are rugged and robust with proven long term reliability in the harshest of environments. They are ideal for alarm and pump control duties, especially in critical applications or hazardous areas.

Specialized Conductivity

Steam/water interface level gauges using specialized, high performance conductivity probes in external bridles, ideal for steam plants where reliable and redundant indication of boiler water level is critical.

Application and Installation Considerations	● Recommended	◌ May be suitable	x Not recommended			
	Continuous Level				Point Level	
	Pressure	Non-Contact Radar	Guided Wave Radar	Ultra-sonic	Vibrating Fork	Float Switch
Level	●	●	●	●	●	●
Interface (Liquid/Liquid)	◌	x	◌	x	x	◌
Volume	●	●	●	●	x	x
Density	●	x	x	x	x	x
Mass	●	x	x	x	x	x
Open Channel Flow	x	◌	●	●	x	x
Process Medium Characteristics						
Changing Density	◌	●	●	●	●	◌
Changing Dielectric	●	●	●	●	●	●
Wide pH Variations	●	●	●(1)	●	●	●
Pressure and Temperature Changes	●	●	●	◌	●	●
Condensing Vapors	●	●	●	◌	●	●
Bubbling / Boiling Surfaces	●	●	●	◌	●	◌
Foam	●	◌	◌	◌	◌	●
Liquid with Dielectric < 1.9	●	●	●	●	●	●
Coating Liquids	◌	●	◌	●	◌	◌
Viscous Liquids	●	●	◌	●	◌	●
Crystallizing Liquids	◌	●	◌	●	◌	◌
Solids, Granules, and Powders	x	◌	◌	x	x	x
Sludge and Slurries	◌	●	◌	●	◌	◌
Tank Environment Considerations						
Top Down Connection	x	●	●	●	●	●
Bottom or Side Connections, Direct to Vessel	●	x	x	x	●	●
Stilling Wells or Bypass Connections	◌	◌	◌	◌	●	●
Device Can Be Close to Tank Wall / Disturbance Object	●	◌	●	◌	●	●
High Turbulence	●	◌	●	x	●	◌
Long and Narrow Mounting Nozzles	●	◌	◌	x	●	◌
Angled or Slanted Surface	●	◌	●	◌	x	x
High Empty and Fill Rates	●	●	●	●	●	●
Internal Obstructions	●	◌	◌	◌	●	●
Agitation	●	◌	◌	◌	●	◌
Non-metallic Vessel	●	◌	◌	●	●	●
Nozzle in Center of Tank	●	x	●	x	●	●
Valves or Isolation Required	●	◌	●(2)	x	●(2)	●(2)

(1) For overall level applications, a changing dielectric has no affect on the accuracy; for interface applications, a changing dielectric in the top fluid will degrade accuracy.

(2) Mount the instrument in an external Rosemount 9901 chamber.

Comprehensive Product Catalog

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Rosemount DP Level Transmitters and 1199 Remote Seals

FOR ROSEMOUNT 3051S, 3051, AND 2051 TRANSMITTERS

APPLICATIONS

- *Level, Flow, Pressure, Interface, Density*
- *Extreme hot and cold temperatures*
- *Corrosive, clogging, or viscous processes*
- *Hygienic requirements*
- *Special process connections*



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Proven, Reliable, and Innovative DP Level Technologies

To meet your application requirements, Rosemount DP level technologies deliver an unsurpassed product offering that is easy to specify, order, and install. The offering includes a wide variety of process connections, direct mount or capillary connections, and materials of construction to address almost any application. If you don't see what you need listed here, ask us. We can create a custom engineered solution to meet your needs.

Rosemount Level Transmitters

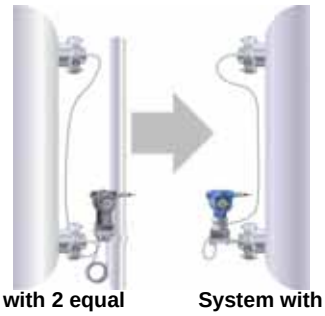
Level transmitters combine world-class Rosemount pressure instrumentation with direct-mount seals, all in a single integrated model number.



Rosemount 3051SAL, 3051L, and 2051L Liquid Level Transmitters

- Achieve best-in-class system reliability with All-Welded systems
- Wireless configurations provide new data access
- Connect to virtually any process with a comprehensive offering of process connections, fill fluids, direct mount or capillary connections, and materials
- Quantify and optimize total system performance with QZ option

Balanced System **Tuned-System Assembly**



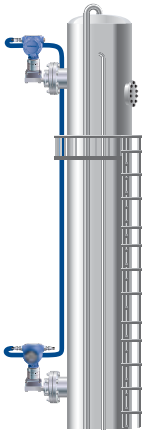
System with 2 equal lengths of capillary **System with direct mount plus capillary**

Tuned-System™ Assemblies Optimize Results

- Reduce installed costs by 20% by eliminating excess capillary and transmitter mounting hardware
- Improve performance by up to 30%
- Increase response time by up to 80%
- Reduce risk with up-front quantified performance reports

Rosemount Electronic Remote Sensors

The Rosemount 3051S ERS System is a new digital DP Level architecture that links two 3051S pressure sensors together electronically. Differential pressure, level, and volume is calculated and transmitted using a standard two-wire 4-20 mA HART signal.



A Digital Upgrade to a Proven Technology

- 90% improvement in time response
- Elimination of temperature effects and measurement drift
- MultiVariable capabilities including DP, P_{LO}, P_{HI}, Volume, and Level
- Proven 3051S sensor technology

Simplified Installations and Maintenance Routines

- Elimination of wet legs or dry legs
- Easy installations without need for heat tracing and insulation
- Proactive maintenance and troubleshooting with sensor alerts and diagnostics
- Simplified inventories with sensors and standard cable

Rosemount 1199 Seal Systems

A seal system consists of a pressure transmitter, one or two seals, a fill fluid, and either a direct mount or capillary style connection. Seal systems provide a reliable process pressure measurement and prevent the process medium from contacting the transmitter diaphragm. Transmitter/diaphragm seal systems should be considered when:

- The process temperature is outside of the operating ranges of the transmitter.
- The process is corrosive and/ or requires specific exotic materials of construction.
- The process contains suspended solids or is viscous and is prone to plugging of connections.
- The application requires the use of flush-mount Hygienic connections that facilitates CIP/SIP service.
- There is a requirement for easier cleaning of the process from the connections to avoid contamination between batches.

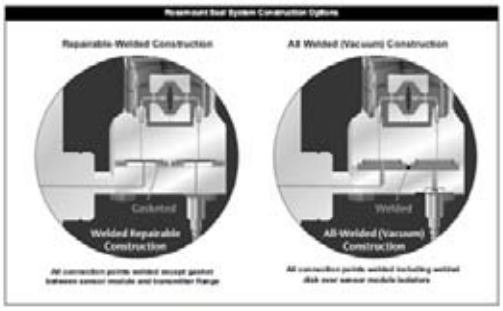
Application Flexibility

- Flanged, threaded, and hygienic process connections
- Meets industry standards such as EN 1092-1, ANSI/ASME B16.5, JIS B2238, ANSI/ASME B1.20.1, EN 10226-1, and 3-A Standard 74-03
- Variety of fill fluids including cold temperature (-102 °F / -75 °C), hot temperature (599 °F / 315 °C), and hygienic & food grade
- Three different capillary diameters allow for optimization of accuracy and time response



Reliable System Construction

- Welded design with no threaded connections
- 100% Helium leak tested
- Advanced manufacturing techniques ensure air-free, leak-tight system that is stable over time
- Reliable operation in full vacuum applications



Robust Seal Design

- Backup convolutions on the diaphragm protect seal integrity
- Recessed diaphragms reduce potential for handling damage
- Advanced welding techniques improve reliability

SST Armored, PVC Coated, Support Tube with Closed End (Ordering Codes M, N, and P)



SST Armored, Support Tube (Ordering Codes H, J, and K)



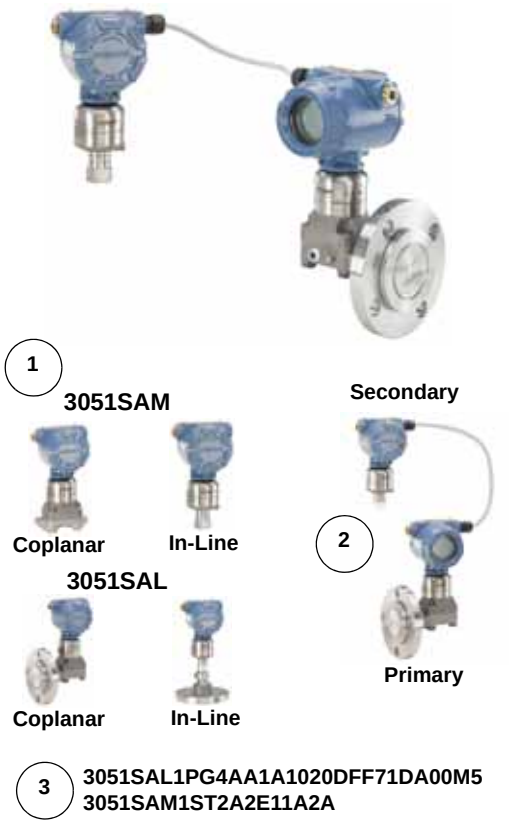
SST Armored, PVC Coated (Ordering Codes E, F, and G)



SST Armored (Ordering Codes B, C, and D)



Rosemount 3051S Electronic Remote Sensors



The 3051S ERS™ System is a flexible, 2-wire 4-20 mA HART architecture that calculates differential pressure (DP) electronically using two pressure sensors that are linked together with a non-proprietary electrical wire.

Ideal applications for the 3051S ERS System include tall vessels and distillation columns that have traditionally required long lengths of capillary or impulse piping. When used in these types of applications, the 3051S ERS System can deliver:

- More accurate and repeatable DP measurements
- Faster time response
- Simplified installations
- Reduced maintenance

How to Order

1. Choose two ERS transmitter models. These may be any combination of 3051SAM and 3051SAL models.
2. Decide which model will be the ERS Primary (4-20 mA loop termination and optional LCD) and which will be the ERS Secondary. This will be specified by the “Configuration Type” code in each model number.
3. Specify two full model numbers per the desired configuration.

Additional Information
Specifications: page Level-81
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Rosemount 3051SAM Transmitter for ERS Applications

- Coplanar and In-Line sensor module platforms
- Variety of process connections including threaded NPT, flanges, manifolds, and 1199 remote seals
- Available with 10-year stability and limited 12-year warranty

Table 1. 3051SAM Scalable Advanced Measurement Transmitter for ERS Applications Ordering Information

★ The Standard offering represents the most common models and options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	**Transmitter Type**	
3051SAM	Scalable Advanced Measurement Transmitter	
Performance Class		
Standard		**Standard**
1	Ultra: 0.025% span accuracy, 200:1 rangedown, 10-year stability, 12-year limited warranty	★
2	Classic: 0.055% span accuracy, 100:1 rangedown, 5-year stability	★
Configuration Type		
Standard		**Standard**
P	Electronic Remote Sensor - Primary	★
S	Electronic Remote Sensor - Secondary	★

Table 1. 3051SAM Scalable Advanced Measurement Transmitter for ERS Applications Ordering Information

★ The Standard offering represents the most common models and options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Pressure Module Type		**Pressure Sensor Type**			
Standard					**Standard**
G	Coplanar	Gage			★
T	In-Line	Gage			★
E	In-Line	Absolute			★
Expanded					
A	Coplanar	Absolute			
Pressure Range(1)					
	Coplanar Gage	**In-Line Gage**	**In-Line Absolute**	**Coplanar Absolute**	
Standard					**Standard**
1A	N/A	-14.7 to 30 psig (-1,0 to 2,06 bar)	0 to 30 psia (0 to 2,06 bar)	0 to 30 psia (0 to 2,06 bar)	★
2A	-250 to 250 inH2O (-623 to 623 mbar)	-14.7 to 150 psig (-1,0 to 10,34 bar)	0 to 150 psia (0 to 10,34 bar)	0 to 150 psia (0 to 10,34 bar)	★
3A	-393 to 1000 inH2O (-0,98 to 2,49 bar)	-14.7 to 800 psig (-1,0 to 55,2 bar)	0 to 800 psia (0 to 55,2 bar)	0 to 800 psia (0 to 55,2 bar)	★
4A	-14.2 to 300 psig (-0,98 to 20,7 bar)	-14.7 to 4000 psig (-1,0 to 275,8 bar)	0 to 4000 psia (0 to 275,8 bar)	0 to 4000 psia (0 to 275,8 bar)	★
5A	-14.2 to 2000 psig (-0,98 to 137,9 bar)	-14.7 to 10000 psig (-1,0 to 689,5 bar)	0 to 10000 psia (0 to 689,5 bar)	N/A	★
Isolating Diaphragm					
Standard					**Standard**
2(2)	316L SST				★
3(2)	Alloy C-276				★
Expanded					
4(3)	Alloy 400				
5(3)(4)	Tantalum				
6(3)	Gold-plated Alloy 400 (includes Graphite-Filled PTFE O-Ring)				
7(3)	Gold-plated 316L SST				
Process Connection					
	Coplanar Module Type		**In-Line Module Type**		
Standard					**Standard**
000	None		N/A		★
A11(5)	Assemble to Rosemount 305 Manifold		Assemble to Rosemount 306 Manifold		★
A12(5)	Assemble to Rosemount 304 or AMF Manifold with SST Traditional Flange		N/A		★
B11(5)(6)	Assemble to One Rosemount 1199 Remote Diaphragm Seal with SST transmitter flange		Assemble to One Rosemount 1199 Remote Diaphragm		★
E11	Coplanar Flange (CS), ¼-18 NPT, 316 SST Drain Vents		½ -14 NPT Female		★
E12	Coplanar Flange (SST), ¼-18 NPT, 316 SST Drain Vents		N/A		★
E13(2)	Coplanar Flange (Cast C-276), ¼-18 NPT, Alloy C-276 Drain Vents		N/A		★
E14	Coplanar Flange (Cast Alloy 400), ¼-18 NPT, Alloy 400/K-500 Drain Vents		N/A		★
E15(2)	Coplanar Flange (SST), ¼-18 NPT, Alloy C-276 Drain Vents		N/A		★
E16(2)	Coplanar Flange (CS), ¼-18 NPT, Alloy C-276 Drain Vents		N/A		★
E21	Coplanar Flange (CS), RC ¼, 316 SST Drain Vents		N/A		★
E22	Coplanar Flange (SST), RC ¼, 316 SST Drain Vents		N/A		★
E23(2)	Coplanar Flange (Cast C-276), RC ¼, Alloy C-276 Drain Vents		N/A		★
E24	Coplanar Flange (Cast Alloy 400), RC ¼, alloy 400/K-500 Drain Vents		N/A		★
E25(2)	Coplanar Flange (SST), RC ¼, Alloy C-276 Drain Vents		N/A		★
E26(2)	Coplanar Flange (CS), RC ¼, Alloy C-276 Drain Vents		N/A		★
F12	Traditional Flange (SST), 1/4-18 NPT, 316 SST Drain Vents		N/A		★

Table 1. 3051SAM Scalable Advanced Measurement Transmitter for ERS Applications Ordering Information

★ The Standard offering represents the most common models and options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

F13[2]	Traditional Flange (Cast C-276), 1/4-18 NPT, Alloy C-276 Drain Vents	N/A		★
F14	Traditional Flange (Cast Alloy 400), 1/4-18 NPT, Alloy 400/K-500 Drain Vents	N/A		★
F15[2]	Traditional Flange (SST), 1/4-18 NPT, Alloy C-276 Drain Vents	N/A		★
F22	Traditional Flange (SST), RC ¼, 316 SST Drain Vents	N/A		★
F23[2]	Traditional Flange (Cast C-276), RC ¼, Alloy C-276 Drain Vents	N/A		★
F24	Traditional Flange (Cast Alloy 400), RC ¼, Alloy 400/K500 Drain Vents	N/A		★
F25[2]	Traditional Flange (SST), RC ¼, Alloy C-276 Drain Vents	N/A		★
F52	DIN-Compliant Traditional Flange (SST), ¼-18 NPT, 316 Drain Vents, 7-16-in. Bolting	N/A		★
G11	Vertical Mount Level Flange (SST), 2-in ANSI Class 150, 316 SST Drain Vents	G ½ A DIN 16288 Male (Range 1-4 Only)		★
G12	Vertical Mount Level Flange (SST), 2-in ANSI Class 300, 316 SST Drain Vents	N/A		★
G21	Vertical Mount Level Flange (SST), 3-in ANSI Class 150, 316 SST Drain Vents	N/A		★
G22	Vertical Mount Level Flange (SST), 3-in ANSI Class 300, 316 SST Drain Vents	N/A		★
G31	Vertical Mount Level Flange (SST), DIN-DN 50 PN 40, 316 SST Drain Vents	N/A		★
G41	Vertical Mount Level Flange (SST), DIN-DN 80 PN 40, 316 SST Drain Vents	N/A		★
Expanded				
F11	Traditional Flange (CS), ¼-18 NPT, 316 SST Drain / Vents	Non-Threaded Instrument Flange (I-Flange)		
F32	Bottom Vent Traditional Flange (SST), ¼-18 NPT, 316 SST Drain Vents	N/A		
F42	Bottom Vent Traditional Flange (SST), RC ¼, 316 SST Drain Vents	N/A		
F62	DIN-Compliant Traditional Flange (316 SST), ¼-18 NPT, 316 Drain Vents, M10 Bolting	N/A		
F72	DIN-Compliant Traditional Flange (316 SST), ¼-18 NPT, 316 Drain Vents, M12 Bolting	N/A		
Transmitter Output				
Standard				**Standard**
A	4–20 mA with digital signal based on HART protocol			★
Housing Style		**Material**	**Conduit Entry Size**	
Standard				**Standard**
Housings for ERS Primary - Configuration Type code P				
1A	PlantWeb Housing	Aluminum	1/2–14 NPT	★
1B	PlantWeb Housing	Aluminum	M20 x 1.5 (CM 20)	★
1J	PlantWeb Housing	SST	1/2–14 NPT	★
1K	PlantWeb Housing	SST	M20 x 1.5 (CM 20)	★
2E	Junction Box with Remote Display Output	Aluminum	1/2–14 NPT	★
2F	Junction Box with Remote Display Output	Aluminum	M20 x 1.5 (CM 20)	★
2M	Junction Box with Remote Display Output	SST	1/2–14 NPT	★
Housings for ERS Secondary - Configuration Type code S				
2A	Junction Box	Aluminum	1/2–14 NPT	★
2B	Junction Box	Aluminum	M20 x 1.5 (CM 20)	★
2J	Junction Box	SST	1/2–14 NPT	★
Expanded				
Housings for ERS Primary - Configuration Type code P				
1C	PlantWeb Housing	Aluminum	G1/2	
1L	PlantWeb Housing	SST	G1/2	
2G	Junction Box with Remote Display Output	Aluminum	G1/2	

Table 1. 3051SAM Scalable Advanced Measurement Transmitter for ERS Applications Ordering Information

★ The Standard offering represents the most common models and options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Housings for ERS Secondary - Configuration Type code S				
2C	Junction Box	Aluminum	G1/2	

Options (Include with selected model number)

Electronic Remote Sensor Connection Cable		
Standard		**Standard**
R05	50 ft. (15.2 m) Spool of Electronic Remote Sensor Cable	★
R10	100 ft. (30.5 m) Spool of Electronic Remote Sensor Cable	★
Mounting Bracket		
Standard		**Standard**
B1(3)	Traditional flange bracket, CS, 2-in. pipe	★
B2(3)	Traditional flange bracket, CS, panel	★
B3(3)	Traditional flange flat bracket, CS, 2-in. pipe	★
B4	Bracket, all SST, 2-in. Pipe and Panel	★
B7(3)	Traditional flange bracket, B1 with SST bolts	★
B8(3)	Traditional flange bracket, B2 with SST bolts	★
B9(3)	Traditional flange bracket, B3 with SST bolts	★
BA(3)	Traditional flange bracket, B1, all SST	★
BC(3)	Traditional flange bracket, B3, all SST	★
Special Configuration (Software)		
Standard		**Standard**
C1(7)	Customer Software Configuration (“Configuration Data Sheet” Must Be Completed)	★
C3	Gage Pressure Calibration on Rosemount 3051SAM_ _A4 only	★
C4(7)	NAMUR Alarm and Saturation Levels, High Alarm	★
C5(7)	NAMUR Alarm and Saturation Levels, Low Alarm	★
C6(7)	Custom Alarm and Saturation Levels, High Alarm (Requires C1 and Configuration Data Sheet)	★
C7(7)	Custom Alarm and Saturation Levels, Low Alarm (Requires C1 and Configuration Data Sheet)	★
C8(7)	Low alarm (standard Rosemount alarm and saturation levels)	★
Special Configuration (Hardware)		
Standard		**Standard**
D2(8)	1/2-14 NPT Flange Adapters	★
D4	External ground screw assembly	★
D5(8)	Delete transmitter drain/vent valves (install plugs)	★
Expanded		
D7(8)	Coplanar flange without drain/vent ports	
D9(8)	RC 1/2 Flange Adapters	
Product Certifications		
Standard		**Standard**
E1	ATEX Flameproof	★
I1	ATEX Intrinsic Safety	★
N1	ATEX Type n	★
K1	ATEX Flameproof and Intrinsically Safe, Type n, Dust	★
ND	ATEX Dust	★
E4	TIIS Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
I5	FM Intrinsically Safe, Division 2	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E6(9)	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
I6	CSA Intrinsically Safe	★
K6(9)	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E7	IECEx Flameproof	★
I7	IECEx Intrinsic Safety	★
N7	IECEx Type n	★
K7	IECEx Flameproof, Intrinsic Safety, Type n	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsically Safe	★
K2	INMETRO Flameproof, Intrinsic Safety, Type n	★
E3	China Flameproof	★

Table 1. 3051SAM Scalable Advanced Measurement Transmitter for ERS Applications Ordering Information

★ The Standard offering represents the most common models and options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

I3	China Intrinsic Safety	★
KA[9]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB[9]	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[9]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe	★
Special Certifications		
Standard		**Standard**
Q4	Calibration certificate	★
QP	Calibration Certificate and Tamper Evident Seal	★
Q8	Material Traceability Certification per EN 10204 3.1B	★
Q16	Surface Finish Certification for Hygienic Remote Seals	★
QZ[10]	Remote Seal System Performance Calculation Report	★
Terminal Blocks		
Standard		**Standard**
T1[7]	Transient Terminal Block	★
Alternate Materials of Construction		
Standard		**Standard**
L1[11]	Inert Sensor Fill Fluid	★
L2	Graphite-Filled PTFE O-Ring	★
L4[8]	Austenitic 316 SST Bolts	★
L5[2][8]	ASTM A 193, Grade B7M Bolts	★
L6[8]	Alloy K-500 Bolts	★
L7[2][8]	ASTM A 453, Class D, Grade 660 Bolts	★
L8[8]	ASTM A 193, Class 2, Grade B8M Bolts	★
Display Type (ERS Primary Only)		
Standard		**Standard**
M5[7]	PlantWeb LCD Display	★
M7[7]	Remote Mount LCD Display and Interface, PlantWeb Housing, No Cable, SST Bracket	★
M8[7]	Remote Mount LCD Display and Interface, PlantWeb Housing, 50 ft. (15.2 m) Cable, SST Bracket	★
M9[7]	Remote Mount LCD Display and Interface, PlantWeb Housing, 100 ft. (30.5 m) Cable, SST Bracket	★
Special Procedures		
Expanded		
P1	Hydrostatic Testing with Certificate	
P2[8]	Cleaning for Special Services	
P3[8]	Cleaning for Less than 1 PPM Chlorine/Fluorine	
Typical Model Number: 3051SAM 1 S T 2A 2 E11 A 2A		

(1) The pressure range should be specified based on the maximum static pressure, not differential pressure.

(2) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(3) Not available with Pressure Sensor / Module codes T or E.

(4) Tantalum diaphragm material is only available with Pressure Sensor / Module code G.

(5) "Assemble to" items are specified separately and require a completed model number.

(6) Consult an Emerson Process Management representative for performance specifications.

(7) Not available with Configuration Type code S.

(8) Not available with Process Connection code A11.

(9) Not available with M20 or G ½ conduit entry size.

(10) The QZ report quantifies the performance of the entire ERS system. One report is provided per ERS system. The QZ option is specified on the Primary Transmitter (Configuration Type code P).

(11) Silicone fill fluid is standard.



Rosemount 3051SAL Level Transmitter for ERS Applications

- Integrated transmitter and remote seal in a single model number
- Variety of process connections including flanged, threaded, and hygienic remote seals
- Available with 10-year stability and limited 12-year warranty

A 3051SAL Transmitter consists of 3 parts. First, specify the transmitter model codes found on page Level-11. Then, specify a remote seal found on page Level-20. Finish the model number by specifying all desired options on page Level-13.

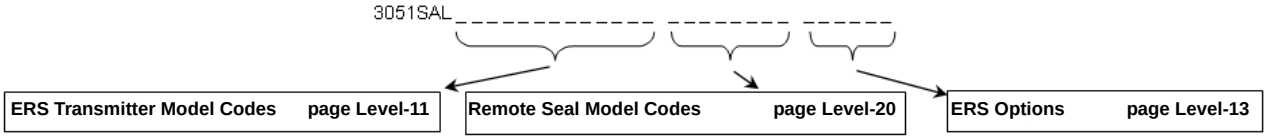


Table 2. 3051SAL Scalable Advanced Level Transmitter for ERS Applications Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	**Transmitter Type**				
3051SAL	Scalable Advanced Level Transmitter				
Performance Class					
Standard					**Standard**
1	Ultra: 0.025% span accuracy, 200:1 rangedown, 10-year stability, 12-year limited warranty				★
2	Classic: 0.055% span accuracy, 100:1 rangedown, 5-year stability				★
Configuration Type					
Standard					**Standard**
P	Electronic Remote Sensor - Primary				★
S	Electronic Remote Sensor - Secondary				★
Pressure Module Type	**Pressure Sensor Type**				
Standard					**Standard**
G	Coplanar	Gage			★
T	In-Line	Gage			★
E	In-Line	Absolute			★
Expanded					
A	Coplanar	Absolute			
Pressure Range[5]					
	Coplanar Gage	**In-Line Gage**	**In-Line Absolute**	**Coplanar Absolute**	
Standard					**Standard**
1A	N/A	-14.7 to 30 psig (-1,0 to 2,06 bar)	0 to 30 psia (0 to 2,06 bar)	0 to 30 psia (0 to 2,06 bar)	★
2A	-250 to 250 inH2O (-623 to 623 mbar)	-14.7 to 150 psig (-1,0 to 10,34 bar)	0 to 150 psia (0 to 10,34 bar)	0 to 150 psia (0 to 10,34 bar)	★
3A	-393 to 1000 inH2O (-0,98 to 2,49 bar)	-14.7 to 800 psig (-1,0 to 55,2 bar)	0 to 800 psia (0 to 55,2 bar)	0 to 800 psia (0 to 55,2 bar)	★
4A	-14.2 to 300 psig (-0,98 to 20,7 bar)	-14.7 to 4000 psig (-1,0 to 275,8 bar)	0 to 4000 psia (0 to 275,8 bar)	0 to 4000 psia (0 to 275,8 bar)	★
5A	-14.2 to 2000 psig (-0,98 to 137,9 bar)	-14.7 to 10000 psig (-1,0 to 689,5 bar)	0 to 10000 psia (0 to 689 bar)	N/A	★
Transmitter Output					
Standard					**Standard**
A	4-20 mA with Digital Signal Based on HART Protocol				★
Housing Style		**Material**		**Conduit Entry Size**	
Standard					**Standard**
Housings for ERS Primary - Configuration Type code P					
1A	PlantWeb Housing	Aluminum	1/2–14 NPT		★
1B	PlantWeb Housing	Aluminum	M20 x 1.5 (CM 20)		★

Table 2. 3051SAL Scalable Advanced Level Transmitter for ERS Applications Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

1J	PlantWeb Housing		SST		1/2–14 NPT		★
1K	PlantWeb Housing		SST		M20 x 1.5 (CM 20)		★
2E	Junction Box with Remote Display Output		Aluminum		1/2–14 NPT		★
2F	Junction Box with Remote Display Output		Aluminum		M20 x 1.5 (CM 20)		★
2M	Junction Box with Remote Display Output		SST		1/2–14 NPT		★
Housings for ERS Secondary - Configuration Type code S							
2A	Junction Box		Aluminum		1/2–14 NPT		★
2B	Junction Box		Aluminum		M20 x 1.5 (CM 20)		★
2J	Junction Box		SST		1/2–14 NPT		★
Expanded							
Housings for ERS Primary - Configuration Type code P							
1C	PlantWeb Housing		Aluminum		G1/2		
1L	PlantWeb Housing		SST		G1/2		
2G	Junction Box with Remote Display Output		Aluminum		G1/2		
Housings for ERS Secondary - Configuration Type code S							
2C	Junction Box		Aluminum		G1/2		
Seal System Type							
Standard							**Standard**
1	Direct-Mount Seal System						★
Direct-Mount Extension (Between Transmitter Flange and Seal)							
Standard							**Standard**
0	No Extension						★
2	2-in. (50 mm) Extension						★
4	4-in. (100 mm) Extension						★
5	4-in. (100 mm) Thermal Optimizer Extension						★
Transmitter Reference Pressure Connection							
Standard							**Standard**
00	None (In-Line Style Sensor)						★
20	316L SST Isolator / SST Transmitter Flange						★
30	Alloy C-276 Isolator / SST Transmitter Flange						★
Seal Fill Fluid		**Specific Gravity at 77 °F (25 °C)**	**Temperature Limits(1)**				
			No Extension	**2-in. (50 mm) Extension**	**4-in. (100 mm) Extension**	**Thermal Optimizer**	
Standard							**Standard**
A	Sylltherm XLT	0.85	-102 to 293 °F (-75 to 145 °C)	-102 to 293 °F (-75 to 145 °C)	-102 to 293 °F (-75 to 145 °C)	-102 to 293 °F (-75 to 145 °C)	★
C	Silicone 704	1.07	32 to 401 °F(2) (0 to 205 °C)	32 to 464 °F(2) (0 to 240 °C)	32 to 500 °F(2) (0 to 260 °C)	32 to 599 °F (0 to 315 °C)	★
D	Silicone 200	0.93	-49 to 401 °F (-45 to 205 °C)	-49 to 401 °F (-45 to 205 °C)	-49 to 401 °F (-45 to 205 °C)	-49 to 401 °F (-45 to 205 °C)	★
H	Inert (Halocarbon)	1.85	-49 to 320 °F (-45 to 160 °C)	-49 to 320 °F (-45 to 160 °C)	-49 to 320 °F (-45 to 160 °C)	-49 to 320 °F (-45 to 160 °C)	★
G(3)(4)	Glycerin and Water	1.13	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	★
N(3)	Neobee M-20	0.92	5 to 401 °F(2) (-15 to 205 °C)	5 to 437 °F (-15 to 225 °C)	5 to 437 °F (-15 to 225 °C)	5 to 437 °F (-15 to 225 °C)	★
P(3)(4)	Propylene Glycol and Water	1.02	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	★

Continue specifying a completed model number by choosing a remote seal type below:

	page Level-20	FF Flush Flanged Seal	Process Connections: 2 in. / DN 50 / 50A 3 in. / DN 80 / 80A 4 in. / DN 100 / 100A
	page Level-22	EF Extended Flanged Seal	Process Connections: 3 in. / DN 80 / 80A 4 in. / DN 100 / 100A
	page Level-23	RF Remote Flanged Seal	Process Connections: 1 in. / DN 25 / 25A 1.5 in. / DN 40 / 40A
	page Level-24	RT Remote Threaded Seal	Process Connections: ¼ - 18 NPT ½ - 14 NPT ¾ - 14 NPT 1 – 11.5 NPT
	page Level-26	SC Hygienic Tri-Clamp Seal	Process Connections: 1.5 in. 2 in. 3 in.
	page Level-27	SS Hygienic Tank Spud Seal	Process Connections: 4 in.

Options (Include with selected model number)

Electronic Remote Sensor Connection Cable		
Standard		**Standard**
R05	50 ft. (15.2 m) Spool of Electronic Remote Sensor Cable	★
R10	100 ft. (30.5 m) Spool of Electronic Remote Sensor Cable	★
Special Configuration (Software)		
Standard		**Standard**
C1[6]	Customer Software Configuration (“Configuration Data Sheet” Must Be Completed)	★
C3	Gage Pressure Calibration on Rosemount 3051SAL_ _A4 only	★
C4[6]	NAMUR Alarm and Saturation Levels, High Alarm	★
C5[6]	NAMUR Alarm and Saturation Levels, Low Alarm	★
C6[6]	Custom Alarm and Saturation Levels, High Alarm (Requires C1 and Configuration Data Sheet)	★
C7[6]	Custom Alarm and Saturation Levels, Low Alarm (Requires C1 and Configuration Data Sheet)	★
C8[6]	Low Alarm (Standard Rosemount Alarm and Saturation Levels)	★
Special Configuration (Hardware)		
Standard		**Standard**
D4	External Ground Screw Assembly	★
Product Certifications		
Standard		**Standard**
E1	ATEX Flameproof	★
I1	ATEX Intrinsic Safety	★
N1	ATEX Type n	★
K1	ATEX Flameproof and Intrinsically Safe, Type n, Dust	★
ND	ATEX Dust	★
E4	TIIS Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
I5	FM Intrinsically Safe, Division 2	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E6[7]	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
I6	CSA Intrinsically Safe	★
K6[7]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★

E7	IECEx Flameproof	★
I7	IECEx Intrinsic Safety	★
N7	IECEx Type n	★
K7	IECEx Flameproof, Intrinsic Safety, Type n	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsically Safe	★
K2	INMETRO Flameproof, Intrinsic Safety, Type n	★
KA(7)	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB(7)	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD(7)	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe	★
Alternate Materials of Construction		
Standard		**Standard**
L1(8)	Inert Sensor Fill Fluid	★
L2	Graphite-Filled PTFE O-Ring	★
L4	Austenitic 316 SST Bolts	★
L5(9)	ASTM A 193, Grade B7M Bolts	★
L6	Alloy K-500 Bolts	★
L7(9)	ASTM A 453, Class D, Grade 660 Bolts	★
L8	ASTM A 193, Class 2, Grade B8M Bolts	★
Display Type (ERS Primary Only)		
Standard		**Standard**
M5(6)	PlantWeb LCD Display	★
M7(6)	Remote Mount LCD Display and Interface, PlantWeb Housing, No Cable, SST Bracket	★
M8(6)	Remote Mount LCD Display and Interface, PlantWeb Housing, 50 ft. (15.2 m) Cable, SST Bracket	★
M9(6)	Remote Mount LCD Display and Interface, PlantWeb Housing, 100 ft. (30.5 m) Cable, SST Bracket	★
Special Procedures		
Expanded		
P1	Hydrostatic Testing with Certificate	
P2	Cleaning for Special Services	
P3	Cleaning for Less than 1 PPM Chlorine/Fluorine	
Special Certifications		
Standard		**Standard**
Q4	Calibration Certificate	★
QP	Calibration certificate with tamper evident seal	★
Q8	Material traceability certification per EN 10204 3.1	★
QZ(10)	Remote Seal System Performance Calculation Report	★
Transient Protection		
Standard		**Standard**
T1(6)	Transient Terminal Block	★
Typical Model Number: 3051SAL 1 P G 4A A 1A 1 0 20 D FF 7 1 DA 0 0 M5		

(1) Temperature limits are reduced in vacuum service and may be limited by seal selection.

(2) Maximum process temperature is limited by heat transfer to the transmitter electronics and must be further derated if ambient, temperature exceeds 70 °F (21 °C).

(3) This is a food grade fill fluid.

(4) Not suitable for vacuum applications.

(5) The pressure range should be specified based on the maximum static pressure, not differential pressure.

(6) Not available with Configuration Type code S.

(7) Not available with M20 or G ½ conduit entry size.

(8) Silicone fill fluid is standard.

(9) Materials of construction comply with metallurgical requirements highlighted within NACE MR0175 / ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(10) The QZ report quantifies the performance of the entire ERS system. One report is provided per ERS system. The QZ option is specified on the Primary Transmitter (Configuration Type code P).

Rosemount 3051S Liquid Level Transmitter



3051SAL In-Line with "FF" Flanged Seal



3051SAL Coplanar with "SS" Hygienic Tank Spud Seal



Tuned-System Assembly Comprised of 3051SAL with 1199 Flanged Seal

Rosemount 3051S liquid level transmitters combine the scalable features and benefits of a high-performance 3051S transmitter with the durability and reliability of a remote diaphragm seal all in a single model number.

Level transmitters can also be ordered with an additional 1199 remote seal to form a Tuned-System Assembly that offers improved performance and reduced costs compared to traditional symmetrical (balanced) assemblies.

Product features and capabilities include:

- Variety of process connections including flanged, threaded, and hygienic seals
- Quantified performance for the entire transmitter / seal assembly (QZ option)
- HART, FOUNDATION fieldbus, and Wireless protocols

Additional Information
Specifications: page Level-93
Dimensional Drawings: page Level-106

Rosemount 3051SAL Liquid Level Transmitter

A 3051SAL Transmitter consists of 3 parts. First, specify the transmitter model codes found on page Level-15. Then, specify a remote seal found on page Level-20. Finish the model number by specifying all desired options on page Level-17.

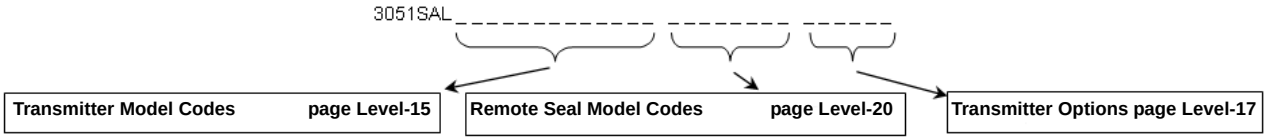


Table 3. Rosemount 3051S Liquid Level Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Transmitter Type		
3051SAL	Scalable Advanced Level Transmitter for Liquid Level Applications		
Performance Class			
Standard			**Standard**
1	Ultra: 0.025% Span Accuracy, 200:1 Rangedown, 10-Year Stability, Limited 12-Year Warranty		★
2	Classic: 0.055% Span Accuracy, 100:1 Rangedown, 5-Year Stability		★
Configuration Type			
Standard			**Standard**
C	Liquid Level Transmitter		★
Pressure Module Type		**Pressure Sensor Type**	
Standard			**Standard**
D	Coplanar	Differential	★
G	Coplanar	Gage	★
T	In-Line	Gage	★
E	In-Line	Absolute	★
Expanded			
A	Coplanar	Absolute	

Table 3. Rosemount 3051S Liquid Level Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Pressure Range						
	Coplanar DP	**Coplanar Gage**	**In-Line Gage**	**In-Line Absolute**	**Coplanar Absolute**	
Standard						**Standard**
1A	N/A	N/A	-14.7 to 30 psig (-1,0 to 2,06 bar)	0 to 30 psia (0 to 2,06 bar)	0 to 30 psia (0 to 2,06 bar)	★
2A	-250 to 250 inH2O (-623 to 623 mbar)	-250 to 250 inH2O (-623 to 623 mbar)	-14.7 to 150 psig (-1,0 to 10,3 bar)	0 to 150 psia (0 to 10,34 bar)	0 to 150 psia (0 to 10,34 bar)	★
3A	-1000 to 1000 inH2O (-2,5 to 2,5 bar)	-393 to 1000 inH2O (-0,98 to 2,5 bar)	-14.7 to 800 psig (-1,0 to 55,2 bar)	0 to 800 psia (0 to 55,2 bar)	0 to 800 psia (0 to 55,2 bar)	★
4A	-300 to 300 psi (-20,7 to 20,7 bar)	-14.2 to 300 psig (-0,98 to 20,7 bar)	-14.7 to 4000 psig (-1,0 to 275,8 bar)	0 to 4000 psia (0 to 275,8 bar)	0 to 4000 psia (0 to 275,8 bar)	★
5A	-2000 to 2000 psi (-137,9 to 137,9 bar)	-14.2 to 2000 psig (-0,98 to 137,9 bar)	-14.7 to 10000 psig (-1,0 to 689 bar)	0 to 10000 psia (0 to 689 bar)	N/A	★

Transmitter Output(2)		
Standard		**Standard**
A	4-20 mA with digital signal based on HART protocol	★
F(10)	FOUNDATION fieldbus protocol	★
X(11)	Wireless (Requires wireless options and wireless PlantWeb housing)	★

Housing Style		**Material(17)**	**Conduit Entry**	
Standard				**Standard**
1A	PlantWeb housing	Aluminum	1/2–14 NPT	★
1B	PlantWeb housing	Aluminum	M20 x 1.5	★
1J	PlantWeb housing	SST	1/2–14 NPT	★
1K	PlantWeb housing	SST	M20 x 1.5	★
2A	Junction Box housing	Aluminum	1/2–14 NPT	★
2B	Junction Box housing	Aluminum	M20 x 1.5	★
2E	Junction Box with output for remote interface	Aluminum	1/2–14 NPT	★
2F	Junction Box with output for remote interface	Aluminum	M20 x 1.5	★
2J	Junction Box housing	SST	1/2–14 NPT	★
5A(5)	Wireless PlantWeb housing	Aluminum	1/2–14 NPT	★
5J(5)	Wireless PlantWeb housing	SST	1/2–14 NPT	★
7J(12)	Quick Connect (A size Mini, 4-pin male termination)	SST		★
Expanded				
1C	PlantWeb housing	Aluminum	G1/2	
1L	PlantWeb housing	316L SST	G1/2	
2C	Junction Box housing	Aluminum	G1/2	
2G	Junction Box with output for remote interface	Aluminum	G1/2	

Direct-Mount Extension (Between Transmitter Flange and Seal)		
Standard		**Standard**
10	No Extension	★
12	2-in. (50 mm) Extension	★
14	4-in. (100 mm) Extension	★
15	4-in. (100 mm) Thermal Optimizer Extension	★

Transmitter Reference Pressure Connection		
Standard		**Standard**
00	None (Inline Module Type Only)	★
10(13)	Tuned-System Assembly, One Capillary Remote Seal (Requires separate 1199 model number)	★
20	316 L SST Isolator with SST Transmitter Flange	★
30	Alloy C-276 Isolator with SST Transmitter Flange	★

Table 3. Rosemount 3051S Liquid Level Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Seal Fill Fluid		Specific Gravity at 77 °F (25 °C)	Temperature Limits[1]				
			No Extension	2-in. (50 mm) Extension	4-in. (100 mm) Extension	Thermal Optimizer	
Standard							**Standard**
A	Syltherm XLT	0.85	-102 to 293 °F (-75 to 145 °C)	-102 to 293 °F	102 to 293 °F (-75 to 145 °C)	102 to 293 °F (-75 to 145 °C)	★
C	Silicone 704	1.07	32 to 401 °F (0 to 205 °C)[2]	32 to 464 °F (0 to 240 °C)[2]	32 to 500 °F (0 to 260 °C)[2]	32 to 599 °F (0 to 315 °C)	★
D	Silicone 200	0.93	-49 to 401 °F (-45 to 205 °C)	-49 to 401 °F (-45 to 205 °C)	-49 to 401 °F (-45 to 205 °C)	-49 to 401 °F (-45 to 205 °C)	★
H	Inert (Halocarbon)	1.85	-49 to 320 °F (-45 to 160 °C)	-49 to 320 °F (-45 to 160 °C)	-49 to 320 °F (-45 to 160 °C)	-49 to 320 °F (-45 to 160 °C)	★
G[3][4]	Glycerine and Water	1.13	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	★
N[3]	Neobee M-20	0.92	5 to 401 °F (-15 to 205 °C)[2]	5 to 437 °F (-15 to 225 °C)	5 to 437 °F (-15 to 225 °C)	5 to 437 °F (-15 to 225 °C)	★
P[3][4]	Propylene Glycol and Water	1.02	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	★

Continue specifying a completed model number by choosing a remote seal type below:

	page Level-20	FF Flush Flanged Seal	Process Connections: 2 in. / DN 50 / 50A 3 in. / DN 80 / 80A 4 in. / DN 100 / 100A
	page Level-22	EF Extended Flanged Seal	Process Connections: 3 in. / DN 80 / 80A 4 in. / DN 100 / 100A
	page Level-23	RF Remote Flanged Seal	Process Connections: 1 in. / DN 25 / 25A 1.5 in. / DN 40 / 40A
	page Level-24	RT Remote Threaded Seal	Process Connections: ¼ - 18 NPT ½ - 14 NPT ¾ - 14 NPT 1 – 11.5 NPT
	page Level-26	SC Hygienic Tri-Clamp Seal	Process Connections: 1.5 in. 2 in. 3 in.
	page Level-27	SS Hygienic Tank Spud Seal	Process Connections: 4 in.

Wireless Options (Requires option code X and wireless PlantWeb housing)

Update Rate		
Standard		**Standard**
WA	User Configurable Update Rate	★
Operating Frequency and Protocol		
Standard		
3	2.4 GHz DSSS, IEC 62591 (WirelessHART)	★

Omnidirectional Wireless Antenna		
Standard		
WK	External Antenna	★
WM	Extended Range, External Antenna	★
Expanded		
WN	High-Gain, Remote Antenna	
SmartPower™		
Standard		
1[6]	Adapter for Black Power Module (I.S. Power Module Sold Separately)	★

Other Options (Include with selected model number)

PlantWeb Control Functionality		
Standard		**Standard**
A01[7][8]	FOUNDATION fieldbus Advanced Control Function Block Suite	★
PlantWeb Diagnostic Functionality		
Standard		**Standard**
D01[7][8]	FOUNDATION fieldbus Diagnostics Suite	★
DA2[9]	Advanced HART Diagnostics Suite	★
Special Configuration (Software)		
Standard		
C1[14]	Custom software configuration (Requires Configuration Data Sheet)	★
C3	Gage pressure calibration on Rosemount 3051SAL_ _A4 only	★
C4[7][14]	NAMUR alarm and saturation levels, high alarm	★
C5[7][14]	NAMUR alarm and saturation levels, low alarm	★
C6[7][14]	Custom alarm and saturation signal levels, high alarm (Requires C1 and Configuration Data Sheet)	★
C7[7][14]	Custom alarm and saturation signal levels, low alarm (Requires C1 and Configuration Data Sheet)	★
C8[7][14]	Low alarm (standard Rosemount alarm and saturation levels)	★
Special Configuration (Hardware)		
Standard		
DO[15]	316 SST Conduit Plug	★
D1[7][14][16]	Hardware adjustments (zero, span, alarm, security)	★
D2	1/2-14 NPT flange adapter	★
D4	External ground screw assembly	★
D5	Delete transmitter drain/vent valves (install plugs)	★
D9	RC 1/2 SST flange adapter	★
Product Certifications[17]		
Standard		
E1	ATEX Flameproof	★
I1	ATEX Intrinsic Safety	★
IA	ATEX FISCO Intrinsic Safety (FOUNDATION fieldbus protocol only)	★
N1	ATEX Type n	★
K1	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
ND	ATEX Dust	★
E4	TIIS Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
I5	FM Intrinsically Safe, Division 2	★
IE	FM FISCO Intrinsically Safe (FOUNDATION fieldbus protocol only)	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
E6[18]	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
I6	CSA Intrinsically Safe	★
IF	CSA FISCO Intrinsically Safe (FOUNDATION fieldbus protocol only)	★
K6[18]	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
D3[19]	Measurement Canada Accuracy Approval	★
E7	IECEx Flameproof, Dust Ignition-proof	★
I7	IECEx Intrinsic Safety	★
IG	IECEx FISCO Intrinsic Safety (FOUNDATION fieldbus protocol only)	★
N7	IECEx Type n	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n	★

E2	INMETRO Flameproof	★
I2	INMETRO Intrinsic Safety	★
K2	INMETRO Flameproof, Intrinsic Safety	★
E3	China Flameproof	★
I3	China Intrinsic Safety	★
KA(18)	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB(18)	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD(18)	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe	★
Alternate Materials of Construction		
Standard		**Standard**
L1(20)	Inert sensor fill fluid	★
L2	Graphite-filled PTFE o-ring	★
L4	Austenitic 316 SST bolts	★
L5(21)	ASTM A193, Grade B7M bolts	★
L6	Alloy K-500 bolts	★
L7(21)	ASTM A453, Class D, Grade 660 bolts	★
L8	ASTM A193, Class 2, Grade B8M bolts	★
Display Type(22)		
Standard		
M5	PlantWeb LCD Display	★
M7(7)	Remote mount LCD display and interface, PlantWeb housing, no cable, SST bracket	★
M8(7)	Remote mount LCD display and interface, PlantWeb housing, 50 ft. (15 m) cable, SST bracket	★
M9(7)	Remote mount LCD display and interface, PlantWeb housing, 100 ft. (31 m) cable, SST bracket	★
Special Procedures		
Expanded		
P1	Hydrostatic testing with certificate	
P2	Cleaning for special services	
P3	Cleaning for less than 1PPM chlorine/fluorine	
Special Certification		
Standard		
Q4	Calibration certificate	★
QP	Calibration certificate and tamper evident seal	★
Q8	Material traceability certification per EN 10204 3.1.B	★
QS(7)(14)	Prior-use certificate of FMEDA Data	★
QT(23)	Safety-certified to IEC 61508 with certificate of FMEDA data	★
QZ	Remote Seal System Performance Calculation Report	★
Transient Protection		
Standard		
T1(24)(25)	Transient terminal block	★
Conduit Electrical Connector		
Standard		
GE(26)	M12, 4-pin, Male Connector (*eurofast*®)	★
GM(26)	A size Mini, 4-pin, Male Connector (*minifast*®)	★
Typical Model Number: 3051SAL 1 C G 2A A 1A 10 20 D FF G 1 DA 0 0		

(1) At ambient pressure of 14.7 psia (1 bar-a) and ambient temperature of 70°F (21°C).

(2) Maximum process temperature is limited by heat transfer to the transmitter and must be further derated if ambient, temperature exceeds 70 °F (21 °C).

(3) This is a food grade fill fluid.

(4) Not suitable for vacuum applications.

(5) Only available with output code X.

(6) Long-Life Power Module must be shipped separately, order Part #00753-9220-0001.

(7) Not available with output code X.

(8) Not available with output code A.

(9) Requires PlantWeb housing and Output code A. Includes Hardware Adjustments as standard.

(10) Requires PlantWeb housing.

(11) Available approvals are FM Intrinsically Safe, Division 2 (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).

(12) Available with output code A only. Available approvals are FM Intrinsically Safe, Division 2 (option code I5), ATEX Intrinsic Safety (option code I1), or IECEx Intrinsic Safety (option code I7). Contact an Emerson Process Management representative for additional information.

(13) With option code 10, user must select Seal Location option code M in Table 7 of Rosemount DP Level PDS.

(14) Not available with output code F.

(15) Transmitter is shipped with 316 SST conduit plug (uninstalled) in place of carbon steel conduit plug.

(16) Not available with housing style codes 2E, 2F, 2G, 2M, 5A, 5J, or 7J.

(17) Valid when SuperModule Platform and housing have equivalent approvals.

(18) Not available with M20 or G ½ conduit entry size.

(19) Requires PlantWeb housing and Hardware Adjustments option code D1. Limited availability depending on transmitter type and range. Contact an Emerson Process Management representative for additional information.

(20) Silicone fill fluid is standard.

(21) Materials of construction comply with metallurgical requirements highlighted within NACE MR0175 / ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(22) Not available with Housing code 01 or 7J.

(23) Not available with output code F or X. Not available with housing code 01 or 7J.

(24) Not available with Housing code 00, 01, 5A, or 7J.

(25) The T1 option is not needed with FISCO Product Certifications; transient protection is included in the FISCO product certification codes IA, IE, IF, and IG.

(26) Not available with Housing code 00, 01, 5A, or 7J. Available with Intrinsically Safe approvals only. For FM Intrinsically Safe, Division 2 (option code I5) or FM FISCO Intrinsically Safe (option code IE), install in accordance with Rosemount drawing 03151-1009 to maintain outdoor rating (NEMA 4X and IP66).

Direct Mount Seals for 3051SAL



Flush Flanged (FF) Seal

- Most common seal
- Good for use in general applications
- Easy installation on flanged connections ranging from 2-in. (DN 50) to 4-in. (DN 100)

Table 4. Flush Flanged (FF) Seal Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	**Process Connection**	
FF	Flush Flanged Seal	
Process Connection Size		
Standard		**Standard**
G	2-in. / DN 50 / 50A	★
7	3-in. / 80A	★
J	DN 80	★
9	4-in. / DN 100 / 100A	★
Flange / Pressure Rating		
Standard		**Standard**
1	Class 150 per ANSI/ASME B16.5	★
2	Class 300 per ANSI/ASME B16.5	★
4	Class 600 per ANSI/ASME B16.5	★
G	PN 40 per EN 1092-1	★

Table 4. Flush Flanged (FF) Seal Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded				
A	10K per JIS B2238			
B	20K per JIS B2238			
D	40K per JIS B2238			
E	PN 10/16 per EN 1092-1 (DN 100 only)			
Materials of Construction				
	Isolating Diaphragm	**Upper Housing**	**Flange**	
Standard				**Standard**
CA	316L SST	316L SST	CS	★
DA	316L SST	316L SST	316 SST	★
CB(1)	Alloy C-276	316L SST	CS	★
DB(1)	Alloy C-276	316L SST	316 SST	★
CC	Tantalum	316L SST	CS	★
DC	Tantalum	316L SST	316 SST	★
Flushing Connection Ring (Lower Housing)(2)				
Standard				**Standard**
0	None			★
A	316 SST			★
B	Alloy C-276			★
Flushing Connection Quantity & Size				
Standard				**Standard**
0	None			★
1	One 1/4-18 NPT Flushing Connection			★
3	Two 1/4-18 NPT Flushing Connections			★
7	One 1/2-14 NPT Flushing Connection			★
9	Two 1/2-14 NPT Flushing Connections			★

Options (Include with selected model number)

Flushing Connection Ring Plugs		
Standard		**Standard**
SD	Alloy C-276 Plug(s) for Flushing Connection(s)	★
SG	SST Plug(s) for Flushing Connection(s)	★
SH	SST Drain / Vent(s) for Flushing Connection(s)	★
Flushing Connection Ring Gaskets		
Expanded		
SK	Barium Sulfate-Filled PTFE Gasket	
SN	Grafoil Gasket	
Additional Options		
Expanded		
SB	Extra Fill Fluid for Cold Temperature Applications	
SJ	PTFE Gasket	
SC(3)	0.006-in. (150 µm) Diaphragm Thickness	
ST(4)	Wetted Materials Compliance to NACE MR 0175 / ISO 1516, MR 0103	
SU(3)	0.001-in. (25 µm) Gold Plated Diaphragm	
SV(5)	PTFE Coated Diaphragm for Non-Stick Purposes	

Complete the 3051SAL model number by specifying options as needed:

page Level-13	ERS Transmitter Options	
page Level-17	Liquid Level Transmitter Options	

(1) Not available with option code SC.

(2) Supplied with Thermo Tork TN9000 gasket.

(3) Not available with Tantalum diaphragms (Material of Construction codes CC and DC).

(4) Materials of construction comply with metallurgical requirements highlighted within NACE MR0175 / ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(5) Not available with transmitter option code Q8 (Material Traceability per EN 10204 3.1)



Extended Flanged (EF) Seal

- Good for use in viscous applications with plugging issues
- Seal diaphragm installed flush with inner tank wall to prevent process plugging
- Easy installation on 3-in. (DN 80) and 4-in. (DN 100) flanged connections

Table 5. Extended Flanged (EF) Seal Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	**Process Connection**			
EF	Extended Flanged Seal			
Process Connection Size				
Standard				**Standard**
7	3-in. / DN 80 / 80A			★
9	4-in. / DN 100 / 100A			★
Flange / Pressure Rating				
Standard				**Standard**
1	Class 150 per ANSI/ASME B16.5			★
2	Class 300 per ANSI/ASME B16.5			★
4	Class 600 per ANSI/ASME B16.5			★
G	PN 40 per EN 1092-1			★
Expanded				
A	10K per JIS B2238			
B	20K per JIS B2238			
D	40K per JIS B2238			
E	PN 10/16 per EN 1092-1 (DN 100 only)			
Materials of Construction				
	Isolating Diaphragm	**Extension / Gasket Surface**	**Mounting Flange**	
Standard				**Standard**
CA	316L SST	316L SST	CS	★
DA	316L SST	316L SST	316 SST	★
CB	Alloy C-276	Alloy C-276	CS	★
DB	Alloy C-276	Alloy C-276	316 SST	★
Seal Extension Length				
Standard				**Standard**
20	2-in. (50 mm)			★
40	4-in. (100 mm)			★
60	6-in. (150 mm)			★

Options (Include with selected model number)

Standard		**Standard**
ST[(1)]	Wetted Materials Compliance per NACE MR 0175 / ISO 1516, MR 0103	★
SB	Extra Fill Fluid for Cold Temperature Applications	★
Expanded		
SC	0.0016-in. (150 µm) Diaphragm Thickness	
SU	0.001-in. (25 µm) Gold Plated Diaphragm	
SV[(2)]	PTFE Coated Diaphragm for Non-Stick Purposes	

Complete the 3051SAL model number by specifying options as needed:

page Level-13	ERS Transmitter Options	
page Level-17	Liquid Level Transmitter Options	

(1) Materials of construction comply with metallurgical requirements highlighted within NACE MR0175 / ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(2) Not available with transmitter option code Q8 (Material Traceability per EN 10204 3.1)



Remote Flanged (RF) Seal

- Designed to improve performance on smaller process connections
- Easy installation on flanged connections ranging from 1-in. to 1.5-in. (DN 50 – DN 40)
- Lower housing / flushing ring required

Table 6. Remote Flanged (RF) Seal Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	**Process Connection**			
RF	Remote Flanged Seal			
Process Connection Size				
Standard				**Standard**
2	1-in. / 25A			★
4	1.5-in. / 40A			★
D	DN 25			★
F	DN 40			★
Flange / Pressure Rating				
Standard				**Standard**
1	Class 150 per ANSI/ASME B16.5			★
2	Class 300 per ANSI/ASME B16.5			★
4	Class 600 per ANSI/ASME B16.5			★
G	PN 40 per EN 1092-1			★
Expanded				
A	10K per JIS B2238			
B	20K per JIS B2238			
D	40K per JIS B2238			
Materials of Construction				
	Isolating Diaphragm	**Upper Housing**	**Flange**	
Standard				**Standard**
CA	316L SST	316L SST	CS	★
DA	316L SST	316L SST	316 SST	★
CB	Alloy C-276	316L SST	CS	★
DB	Alloy C-276	316L SST	316 SST	★
CC	Tantalum	316L SST	CS	★
DC	Tantalum	316L SST	316 SST	★
Flushing Connection Ring Material (Lower Housing)[(1)]				
Standard				**Standard**
A	316L SST			★
B	Alloy C-276			★
D	Plated CS			★
Number of Flushing Connections				
Standard				**Standard**
1	One ¼-18 NPT Flushing Connection			★
3	Two ¼-18 NPT Flushing Connections			★
5	None			★

Options (Include with selected model number)

Flushing Connection Ring Plugs		
Standard		**Standard**
SD	Alloy C-276 Plugs	★
SG	316 SST Plugs	★
SH	316 SST Drain / Vents	★
Flushing Connection Ring Gaskets		
Standard		**Standard**
SJ	PTFE Gasket	★
Expanded		
SK	Barium Sulfate-Filled PTFE Gasket	
SN	Grafoil Gasket	
SR	Ethylene Propylene Gasket	

Table 6. Remote Flanged (RF) Seal Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Additional Options		
Standard		**Standard**
ST(2)	Wetted Materials Compliance per NACE MR 0175 / ISO 1516, MR 0103	★
SB	Extra Fill Fluid for Cold Temperature Applications	★
Expanded		
SC(3)	0.006-in. (150 µm) Diaphragm Thickness	
SU(3)	0.001-in. (25 µm) Gold Plated Diaphragm	
SV(4)	PTFE Coated Diaphragm for Non-Stick Purposes	

Complete the 3051SAL model number by specifying options as needed:

page Level-13	ERS Transmitter Options	
page Level-17	Liquid Level Transmitter Options	

(1) Supplied with C4401 Aramid fiber gasket.

(2) Materials of construction comply with metallurgical requirements highlighted within NACE MR0175 / ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(3) Not available with Tantalum diaphragms (Material of Construction codes CC and DC).

(4) Not available with transmitter option code Q8 (Material Traceability per EN 10204 3.1)



Remote Threaded (RT) Seal

- For use with threaded process connections ($^1/_4$-18 to 1-11.5 NPT)
- Rated for use in high-pressure applications (up to 2500 PSI)
- Optional flushing connections available

Table 7. RT Threaded Seal Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Process Connection Style				
Standard				**Standard**
RT	Remote Threaded Seal			★
Process Connection Size				
Standard				**Standard**
3	$^1/_2$-14 NPT			★
4	$^3/_4$-14 NPT			★
5	1-11.5 NPT			★
Expanded				
1	$^1/_4$-18 NPT			
Pressure Rating				
Standard				**Standard**
0	2500 psi			★
Isolating Diaphragm Material		**Upper Housing Material**	**Flange**	
Standard				**Standard**
CA	316L SST	316L SST	CS	★
DA	316L SST	316L SST	316 SST	★
CB	Alloy C-276	316L SST	CS	★
DB	Alloy C-276	316L SST	316 SST	★
CC	Tantalum	316L SST	CS	★
DC	Tantalum	316L SST	316 SST	★

Table 7. RT Threaded Seal Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Flushing Connection Ring Material (Lower Housing)[1] [2]		
Standard		**Standard**
A	316L SST	★
B	Alloy C-276	★
Expanded		
D	Plated CS	
Number of Flushing Connections		
Standard		**Standard**
1	One 1/4-in. Flushing Connection	★
3	Two 1/4-in. Flushing Connections	★
5	No Flushing Connection	★

Options (Include with selected model number)

Flushing Connection Ring Plugs		
Standard		**Standard**
SD	Alloy C-276 Plugs	★
SG	316 SST Plugs	★
SH	316 SST Drain / Vents	★
Flushing Connection Ring Gaskets		
Standard		**Standard**
SJ	PTFE Gasket	★
SN	Grafoil Gasket	★
SR	Ethylene Propylene Gasket	★
Expanded		
SK	Barium Sulfate-Filled PTFE Gasket	
Bolting		
Standard		**Standard**
S3	304 SST Bolts	★
Expanded		
S4	S16 SST Bolts	
Additional Options		
Standard		**Standard**
ST[3]	Wetted Materials Compliance per NACE MR 0175 / ISO 1516, MR 0103	★
SB	Extra Fill Fluid for Cold Temperature Applications	★
Expanded		
SC[4]	0.006-in. (150 µm) Diaphragm Thickness	
SU[4]	0.001-in. (25 µm) Gold Plated Diaphragm	
SV[5]	PTFE Coated Diaphragm for Non-Stick Purposes	

Complete the 3051SAL model number by specifying options as needed:

page Level-13	ERS Transmitter Options	
page Level-17	Liquid Level Transmitter Options	

(1) Supplied with C4401 aramid fiber gasket.

(2) Flushing Connection Ring/ Lower Housing assembly bolts provided as standard are carbon steel.

(3) Materials of construction comply with metallurgical requirements highlighted within NACE MR0175 / ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(4) Not available with Tantalum diaphragms (Material of Construction codes CC and DC).

(5) Not available with transmitter option code Q8 (Material Traceability per EN 10204 3.1)



Hygienic Tri-Clamp (SC) Seal

- Good for use in hygienic applications
- Easy installation on Tri-Clover style Tri-Clamp connections (1.5-in. to 3-in.)
- Conforms to 3-A standard 74-03

Table 8. SC Hygienic Tri-Clover Style Tri-Clamp Seal Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Process Connection			
Standard			**Standard**
SC(1)	Tri-Clover Style Tri-Clamp Seal		★
Process Connection Size			
Standard			**Standard**
3(2)	1½ in.		★
5(2)	2 in.		★
7	3 in.		★
Maximum Working Pressure			
Standard			**Standard**
0	1000 PSI		★
Isolating Diaphragm Material		**Upper Housing Material**	
Standard			**Standard**
LA00	316L SST	316L SST	★
Expanded			
LB00	Alloy C-276	316L SST	

Options (Include with selected model number)

Diaphragm Surface Finish and Polishing		
Expanded		
R6	Electropolishing	
RD	10 μin. (0.25 μm) R_a Diaphragm Surface Finish	
RG	15 μin. (0.375 μm) R_a Diaphragm Surface Finish	
RH	20 μin. (0.5 μm) R_a Diaphragm Surface Finish	
Certifications		
Standard		**Standard**
Q16	Surface Finish Certification	★

Complete the 3051SAL model number by specifying options as needed:

page Level-13	ERS Transmitter Options
page Level-17	Liquid Level Transmitter Options

(1) Clamp and gasket furnished by user. The maximum working pressure is dependent upon the clamp pressure rating.

(2) Consult factory for calibrated spans lower than 5 psi (345 mbar).



Hygienic Tank Spud (SS) Seal

- Commonly used in hygienic level applications
- Seal diaphragm installed flush with inner tank wall
- Conforms to 3-A standard 74-03

Table 9. SS Hygienic Tank Spud Seal Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Process Connection			
Standard			**Standard**
SS[(1)]	Hygienic Tank Spud Seal		★
Process Connection Size			
Standard			**Standard**
A	4-in. Sch. 5 Tri-Clamp		★
Maximum Working Pressure (Clamp Rating)			
Standard			**Standard**
0	600 PSI (41 bar)		★
Upper Housing			
Standard			**Standard**
A	316L SST		★
Diaphragm and Wetted, Extension Material			
	Diaphragm and Wetted	**Extension**	
Standard			**Standard**
AL	316L SST[(2)]	316L SST[(2)]	★
Expanded			
BB	Alloy C-276	316L SST	
Extension Length			
Standard			**Standard**
2	2 in. (50 mm) Extension		★
6	6 in. (150 mm) Extension		★

Options (Include with selected model number)

Diaphragm Surface Finish and Polishing		
Expanded		
R6	Electropolishing	
RH	20 μin. (0.5 μm) R_a Diaphragm Surface Finish	
RG[(3)]	15 μin. (0.375 μm) R_a Diaphragm Surface Finish	
Additional Options		
Standard		**Standard**
Q16	Surface Finishing Certification	★
S1	Tank Spud Included with Shipment	★
Expanded		
SC	0.006-in. (150 μm) Diaphragm Thickness	

Complete the 3051SAL model number by specifying options as needed:

page Level-13	ERS Transmitter Options
page Level-17	Liquid Level Transmitter Options

(1) Clamp and Ethylene Propylene o-ring (conforms to 3-A standard 74 and USP class VI) supplied.

(2) Diaphragm brazed and TIG-welded to extension.

(3) Require Option code R6 (Electropolishing).

Rosemount 3051L Liquid Level Transmitter



3051L Flange-Mounted Liquid Level Transmitter

Rosemount 3051 liquid level transmitters combine the features and benefits of a 3051 transmitter with the durability and reliability of a direct mount seal all in a single model number.

Level transmitters can also be ordered with an additional 1199 remote seal to form a Tuned-System Assembly that offers improved performance and reduced costs compared to traditional symmetrical (balanced) assemblies.

Product features and capabilities include:

- Variety of process connections
- Quantified performance for the entire transmitter / seal assembly (QZ option)
- 4-20 mA HART, FOUNDATION fieldbus, Profibus-PA, and 1-5 Vdc HART low power protocols

Additional Information
Specifications: page Level-81
Certifications: page Level-99
Dimensional Drawings: page Level-106

Table 10. Rosemount 3051L Liquid Level Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	**Transmitter Type**			
3051L	Liquid Level Transmitter			
Pressure Range				
Standard				**Standard**
2	–250 to 250 inH_2O (–0,6 to 0,6 bar)			★
3	–1000 to 1000 inH_2O (–2,5 to 2,5 bar)			★
4	–300 to 300 psi (–20,7 to 20,7 bar)			★
Transmitter Output				
Standard				**Standard**
A	4–20 mA with Digital Signal Based on *HART* Protocol			★
F	FOUNDATION fieldbus Protocol			★
W(1)	Profibus – PA Protocol			★
Expanded				
M(2)	Low-Power 1–5 Vdc with Digital Signal Based on *HART* Protocol (See Option Code C2 for 0.8–3.2 Vdc Output)			
Process Connection Size, Material, Extension Length (High Side)				
Standard				**Standard**
Code	**Process Connection Size**	**Material**	**Extension Length**	★
G0(3)	2-in./DN 50 / 50A	316L SST	Flush Mount Only	★
H0(3)	2-in./DN 50 / 50A	Alloy C-276	Flush Mount Only	★
J0	2-in./DN 50 / 50A	Tantalum	Flush Mount Only	★
A0(3)	3-in./DN 80 / 80A	316L SST	Flush Mount	★
A2(3)	3-in./DN 80 / 80A	316L SST	2-in./50 mm	★
A4(3)	3-in./DN 80 / 80A	316L SST	4-in./100 mm	★
A6(3)	3-in./DN 80 / 80A	316L SST	6-in./150 mm	★
B0(3)	4-in./DN 100 / 100A	316L SST	Flush Mount	★
B2(3)	4-in./DN 100 / 100A	316L SST	2-in./50 mm	★
B4(3)	4-in./DN 100 / 100A	316L SST	4-in./100 mm	★
B6(3)	4-in./DN 100 / 100A	316L SST	6-in./150 mm	★

Table 10. Rosemount 3051L Liquid Level Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

C0[3]	3-in./DN 80 / 80A	Alloy C-276	Flush Mount	★
C2[3]	3-in./DN 80 / 80A	Alloy C-276	2-in./50 mm	★
C4[3]	3-in./DN 80 / 80A	Alloy C-276	4-in./100 mm	★
C6[3]	3-in./DN 80 / 80A	Alloy C-276	6-in./150 mm	★
D0[3]	4-in./DN 100 / 100A	Alloy C-276	Flush Mount	★
D2[3]	4-in./DN 100 / 100A	Alloy C-276	2-in./50 mm	★
D4[3]	4-in./DN 100 / 100A	Alloy C-276	4-in./100 mm	★
D6[3]	4-in./DN 100 / 100A	Alloy C-276	6-in./150 mm	★
E0	3-in./DN 80 / 80A	Tantalum	Flush Mount Only	★
F0	4-in./DN 100 / 100A	Tantalum	Flush Mount Only	★

Mounting Flange Size, Rating, Material (High Side)				
	Size	**Rating**	**Material**	
Standard				**Standard**
M	2-in.	ANSI/ASME B16.5 Class 150	CS	★
A	3-in.	ANSI/ASME B16.5 Class 150	CS	★
B	4-in.	ANSI/ASME B16.5 Class 150	CS	★
N	2-in.	ANSI/ASME B16.5 Class 300	CS	★
C	3-in.	ANSI/ASME B16.5 Class 300	CS	★
D	4-in.	ANSI/ASME B16.5 Class 300	CS	★
P	2-in.	ANSI/ASME B16.5 Class 600	CS	★
E	3-in.	ANSI/ASME B16.5 Class 600	CS	★
X[3]	2-in.	ANSI/ASME B16.5 Class 150	SST	★
F[3]	3-in.	ANSI/ASME B16.5 Class 150	SST	★
G[3]	4-in.	ANSI/ASME B16.5 Class 150	SST	★
Y[3]	2-in.	ANSI/ASME B16.5 Class 300	SST	★
H[3]	3-in.	ANSI/ASME B16.5 Class 300	SST	★
J[3]	4-in.	ANSI/ASME B16.5 Class 300	SST	★
Z[3]	2-in.	ANSI/ASME B16.5 Class 600	SST	★
L[3]	3-in.	ANSI/ASME B16.5 Class 600	SST	★
Q	DN 50	PN 40 per EN 1092-1	CS	★
R	DN 80	PN 40 per EN 1092-1	CS	★
S	DN 100	PN 40 per EN 1092-1	CS	★
V	DN 100	PN 10 / 16 per EN 1092-1	CS	★
K[3]	DN 50	PN 40 per EN 1092-1	SST	★
T[3]	DN 80	PN 40 per EN 1092-1	SST	★
U[3]	DN 100	PN 40 per EN 1092-1	SST	★
W[3]	DN 100	PN 10 / 16 per EN 1092-1	SST	★
7[3]	4 in.	ANSI/ASME B16.5 Class 600	SST	★
Expanded				
1	—	10K per JIS B2238	CS	
2	—	20K per JIS B2238	CS	
3	—	40K per JIS B2238	CS	
4[3]	—	10K per JIS B2238	316 SST	
5[3]	—	20K per JIS B2238	316 SST	
6[3]	—	40K per JIS B2238	316 SST	

Seal Fill Fluid		**Specific Gravity at 77 °F (25 °C)**	**Temperature Limits[4]**	
Standard				**Standard**
A	Syltherm XLT	0.85	-102 to 293 °F (-75 to 145 °C)	★
C[5]	Silicone 704	1.07	32 to 401 °F (0 to 205 °C)	★
D	Silicone 200	0.93	-49 to 401 °F (-45 to 205 °C)	★
H	Inert (Halocarbon)	1.85	-49 to 320 °F (-45 to 160 °C)	★
G[6][7]	Glycerine and Water	1.13	5 to 203 °F (-15 to 95 °C)	★

Table 10. Rosemount 3051L Liquid Level Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

N[5][6]	Neobee M-20	0.92	5 to 401 °F (-15 to 205 °C)		★
P[6][7]	Propylene Glycol and Water	1.02	5 to 203 °F (-15 to 95 °C)		★
Low Pressure Side					
	Configuration	**Transmitter Flange**	**Diaphragm Material**	**Sensor Fill Fluid**	
Standard					**Standard**
11[3]	Gage	SST	316L SST	Silicone	★
21	Differential	SST	316L SST	Silicone	★
22	Differential	SST	Alloy C-276	Silicone	★
2A	Differential	SST	316L SST	Inert (Halocarbon)	★
2B	Differential	SST	Alloy C-276	Inert (Halocarbon)	★
31[3]	Tuned-System Assembly with Remote Seal	SST	316L SST	Silicone *(Requires Option Code S1)*	★
O-ring					
Standard					**Standard**
A	Glass-filled PTFE				★
Housing Material			**Conduit Entry Size**		
Standard					**Standard**
A	Aluminum		½–14 NPT		★
B	Aluminum		M20 × 1.5		★
J	SST		½–14 NPT		★
K	SST		M20 × 1.5		★
Expanded					
D	Aluminum		G½		
M	SST		G½		

Options (Include with selected model number)

PlantWeb Control Functionality		
Standard		**Standard**
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	★
PlantWeb Diagnostic Functionality		
Standard		**Standard**
D01	FOUNDATION fieldbus Diagnostics Suite	★
Seal Assemblies		
Standard		**Standard**
S1[8]	Assembled to One Rosemount 1199 Seal (Requires 1199M)	★
Product Certifications		
Standard		**Standard**
E5	FM Explosion-proof, Dust Ignition-proof	★
I5	FM Intrinsically Safe, Division 2	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
I1[9]	ATEX Intrinsic Safety and Dust	★
N1[9]	ATEX Type n Certification and Dust	★
E8	ATEX Flameproof and Dust Certification	★
E4[9]	TIIS Flameproof	★
E3	China Flameproof	★
I3	China Intrinsic Safety	★
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
K6[9]	CSA and ATEX Explosion-proof, Intrinsically Safe, and Division 2 (combination of C6 and K8)	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2 (combination of K5 and C6)	★

Table 10. Rosemount 3051L Liquid Level Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, and Type n (combination of I7, N7, and E7)	★
K8[9]	ATEX Flame-proof and Intrinsic Safety Approvals (combination of I1 and E8)	★
KD[9]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★
I7	IECEx Intrinsic Safety	★
E7	IECEx Flameproof, Dust Ignition-proof	★
N7	IECEx Type n Certification	★
IA	ATEX FISCO Intrinsic Safety	★
IE	FM FISCO Intrinsically Safe	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsic Safety	★
K2	INMETRO Flameproof, Intrinsic Safety	★
Bolting Material		
Standard		**Standard**
L4	Austenitic 316 SST Bolts	★
L5	ASTM A 193, Grade B7M bolts	★
L6	Alloy K-500 Bolts	★
L8	ASTM A 193 Class 2, Grade B8M Bolts	★
Display Type		
Standard		**Standard**
M4[10]	LCD Display with Local Operator Interface	★
M5	LCD Display for Aluminum Housing (Housing Codes A, B, C, and D only)	★
M6	LCD Display for SST Housing (Housing Codes J, K, L, and M only)	★
Calibration Certification		
Standard		**Standard**
Q4	Calibration Certificate	★
QP	Calibration Certificate and tamper evident seal	★
QG	Calibration Certificate and GOST Verification Certificate	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204 3.1	★
Quality Certification for Safety		
Standard		**Standard**
QS[11]	Prior-use certificate of FMEDA data	★
Toolkit Total System Performance Reports		
Standard		**Standard**
QZ	Remote Seal System Performance Calculation Report	★
Conduit Electrical Connector		
Standard		**Standard**
GE	M12, 4-pin, Male Connector (eurofast®)	★
GM	A size Mini, 4-pin, Male Connector (minifast®)	★
Hardware Adjustments		
Standard		**Standard**
J1[12][13]	Local Zero Adjustment Only	★
J3[12][13]	No Local Zero or Span Adjustment	★
Transient Protection		
Standard		**Standard**
T1[14]	Transient Protection Terminal Block	★
Software Configuration		
Standard		**Standard**
C1[12]	Custom Software Configuration (Completed CDS 00806-0100-4001 required with order)	★

Table 10. Rosemount 3051L Liquid Level Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Low Power Output				
Standard				**Standard**
C2[12]	0.8–3.2 Vdc Output with Digital Signal Based on HART Protocol (Available with Output code M only)			★
Alarm Limit				
Standard				**Standard**
C4[12][15]	NAMUR alarm and saturation levels, high alarm			★
CN[12][15]	NAMUR alarm and saturation levels, low alarm			★
CR	Custom alarm and saturation signal levels, high alarm			★
CS	Custom alarm and saturation signal levels, low alarm			★
CT	Low alarm (standard Rosemount alarm and saturation levels)			★
Conduit Plug				
Standard				**Standard**
D0	316 SST Conduit Plug			★
Ground Screw				
Standard				**Standard**
V5[16]	External Ground Screw Assembly			★
Lower Housing Flushing Connection Options				
	Ring Material	**Number**	**Size (NPT)**	
Standard				**Standard**
F1	316 SST	1	1/4-18 NPT	★
F2	316 SST	2	1/4-18 NPT	★
F3	Alloy C-276	1	1/4-18 NPT	★
F4	Alloy C-276	2	1/4-18 NPT	★
F7	316 SST	1	1/2-14 NPT	★
F8	316 SST	2	1/2-14 NPT	★
F9	Alloy C-276	1	1/2-14 NPT	★
F0	Alloy C-276	2	1/2-14 NPT	★
Typical Model Number: 3051L 2 A A0 A D 21 A A F1				

(1) Option Code M4 - LCD Display with Local Operator Interface required for local addressing and configuration.

(2) Not available with hazardous certification Option Codes I1, N1, E4, K6, and K8.

(3) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(4) Temperature limits are reduced in vacuum service and may be limited by seal selection.

(5) Maximum process temperature is limited by heat transfer to the transmitter and must be further derated if ambient, temperature exceeds 70 °F (21 °C).

(6) This is a food grade fill fluid.

(7) Not suitable for vacuum applications.

(8) "Assemble-to" items are specified separately and require a completed model number.

(9) Not available with low-power Option Code M

(10) Available only with output code W - Profibus PA

(11) Only available with HART 4-20 mA output (output code A).

(12) Not available with fieldbus (output code F) or profibus protocols (output code W).

(13) Local zero and span adjustments are standard unless Option Code J1 or J3 is specified.

(14) The T1 option is not needed with FISCO Product Certifications; transient protection is included in the FISCO product certification codes IA, IE, IF, and IG.

(15) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(16) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.

Rosemount 2051L Liquid Level Transmitter



Tuned-System Assembly Comprised of 2051L with 1199 Flanged Seal

Rosemount 2051 liquid level transmitters combine the features and benefits of a 2051 transmitter with the durability and reliability of a direct mount seal all in a single model number.

Level transmitters can also be ordered with an additional 1199 remote seal to form a Tuned-System Assembly that offers improved performance and reduced costs compared to traditional symmetrical (balanced) assemblies.

Product features and capabilities include:

- Variety of process connections
- Quantified performance for the entire transmitter / seal assembly (QZ option)
- 4-20 mA HART, FOUNDATION fieldbus, and 1-5 Vdc HART Low-Power outputs

Additional Information
Specifications: page Level-81
Certifications: page Level-103
Dimensional Drawings: page Level-106

Table 11. Rosemount 2051L Liquid Level Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	**Transmitter Type**		
2051L	Liquid Level Transmitter		
Pressure Range			
Standard			**Standard**
2	–250 to 250 inH_2O (–0,6 to 0,6 bar)		★
3	–1000 to 1000 inH_2O (–2,5 to 2,5 bar)		★
4	–300 to 300 psi (–20,7 to 20,7 bar)		★
Transmitter Output			
Standard			**Standard**
A	4–20 mA with Digital Signal Based on HART Protocol		★
F	FOUNDATION fieldbus Protocol		★
Expanded			
M	Low-Power, 1–5 Vdc with Digital Signal Based on HART Protocol		
Process Connection Size, Diaphragm Material (High Side)			
	Process Connection Size	**Diaphragm**	
Standard			**Standard**
G(1)	2 in./DN 50	316L SST	★
H(1)	2 in./DN 50	Alloy C-276	★
J	2 in./DN 50	Tantalum	★
A(1)	3 in./DN 80	316L SST	★
B(1)	4 in./DN 100	316L SST	★
C(1)	3 in./DN 80	Alloy C-276	★
D(1)	4 in./DN 100	Alloy C-276	★
E	3 in./DN 80	Tantalum	★
F	4 in./DN 100	Tantalum	★
Extension Length (High Side)			
Standard			**Standard**
0	None, Flush Mount		★
2	2 in./50 mm		★
4	4 in./100 mm		★
6	6 in./150 mm		★

Table 11. Rosemount 2051L Liquid Level Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Mounting Flange Size, Rating, Material (High Side)				
	Size	**Rating**	**Material**	
Standard				**Standard**
M	2-in.	ANSI/ASME B16.5 Class 150	CS	★
A	3-in.	ANSI/ASME B16.5 Class 150	CS	★
B	4-in.	ANSI/ASME B16.5 Class 150	CS	★
N	2-in.	ANSI/ASME B16.5 Class 300	CS	★
C	3-in.	ANSI/ASME B16.5 Class 300	CS	★
D	4-in.	ANSI/ASME B16.5 Class 300	CS	★
X[1]	2-in.	ANSI/ASME B16.5 Class 150	SST	★
F[1]	3-in.	ANSI/ASME B16.5 Class 150	SST	★
G[1]	4-in.	ANSI/ASME B16.5 Class 150	SST	★
Y[1]	2-in.	ANSI/ASME B16.5 Class 300	SST	★
H[1]	3-in.	ANSI/ASME B16.5 Class 300	SST	★
J[1]	4-in.	ANSI/ASME B16.5 Class 300	SST	★
Q	DN50	PN 40 per EN 1092-1	CS	★
R	DN80	PN 40 per EN 1092-1	CS	★
K[1]	DN50	PN 40 per EN 1092-1	SST	★
T[1]	DN80	PN 40 per EN 1092-1	SST	★

Seal Fill Fluid		**Specific Gravity at 77 °F (25 °C)**	**Temperature Limits[2]**	
Standard				**Standard**
A	Syltherm XLT	0.85	-102 to 293 °F (-75 to 145 °C)	★
C[3]	Silicone 704	1.07	32 to 401 °F (0 to 205 °C)	★
D	Silicone 200	0.93	-49 to 401 °F (-45 to 205 °C)	★
H	Inert (Halocarbon)	1.85	-49 to 320 °F (-45 to 160 °C)	★
G[4][5]	Glycerin and Water	1.13	5 to 203 °F (-15 to 95 °C)	★
N[3]	Neobee M-20	0.92	5 to 401 °F (-15 to 205 °C)	★
P[4][5]	Propylene Glycol and Water	1.02	5 to 203 °F (-15 to 95 °C)	★

Sensor Module Configuration, Flange Adapter (Low Side)				
	Configuration	**Transmitter Flange**		
Standard				**Standard**
1[1]	Gage	SST		★
2	Differential	SST		★
3[1]	Tuned-System Assembly with Remote Seal	SST		★

Sensor Module Diaphragm Material, Sensor Fill Fluid (Low Side)				
	Diaphragm Material	**Sensor Fill Fluid**		
Standard				**Standard**
1[1]	316L SST	Silicone		★
2[1]	Alloy C-276 (SST Valve Seat)	Silicone		★
7[1]	Alloy C-276 (SST Valve Seat)	Silicone		★
A[1]	316L SST	Inert (Halocarbon)		★
B[1]	Alloy C-276 (SST Valve Seat)	Inert (Halocarbon)		★
G[1]	Alloy C-276 (SST Valve Seat)	Inert (Halocarbon)		★

O-ring				
Standard				**Standard**
A	Glass-filled PTFE			★

Housing Material, Conduit Entry Size				
	Housing Material	**Conduit Entry Size**		
Standard				**Standard**
A	Aluminum	½–14 NPT		★

Table 11. Rosemount 2051L Liquid Level Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

B	Aluminum	M20 × 1.5	★
J	SST	½–14 NPT	★
K	SST	M20 × 1.5	★
Expanded			
D	Aluminum	G½	
M	SST	G½	

Options (Include with selected model number)

PlantWeb Control Functionality		
Standard		**Standard**
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	★
Seal Assemblies		
Standard		**Standard**
S1[6]	Assemble to One Rosemount 1199 Seal (Requires 1199M)	★
Product Certifications		
Standard		**Standard**
E1[7]	ATEX Flameproof	★
E2[7]	INMETRO Flameproof	★
E3[7]	China Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	★
E7[7]	IECEx Flameproof	★
I1[7]	ATEX Intrinsic Safety	★
I2[7]	INMETRO Intrinsically Safe	★
I3[7]	China Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I6	CSA Intrinsically Safe	★
I7[7]	IECEx Intrinsic Safety	★
IA[8]	ATEX FISCO Intrinsic Safety	★
IE[8]	FM FISCO Intrinsically Safe	★
IF[8]	CSA FISCO Intrinsically Safe	★
IG[8]	IECEx FISCO Intrinsically Safe	★
K1[7]	ATEX Flameproof, Intrinsic Safety, Type n, Dust	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
K7[7]	IECEx Flameproof, Intrinsic Safety, Type n	★
KA[7]	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	★
KC[7]	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	★
KD[7]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe	★
N1[7]	ATEX Type n	★
N7[7]	IECEx Type n	★
ND[7]	ATEX Dust	★
Digital Display		
Standard		**Standard**
M5	LCD display	★
Hardware Adjustments		
Standard		**Standard**
D4[9]	Zero and Span Hardware Adjustments	★

Flange Adapters		
Standard		**Standard**
DF[10]	1/2-14 NPT Flange Adapters	★

Table 11. Rosemount 2051L Liquid Level Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Conduit Plug				
Standard				**Standard**
DO[11]	316 SST Conduit Plug			★
Ground Screw				
Standard				**Standard**
V5[12]	External Ground Screw Assembly			★
Transient Protection				
Standard				**Standard**
T1[13]	Transient Terminal Block			★
Software Configuration				
Standard				**Standard**
C1[14]	Custom Software Configuration (Requires completed Configuration Data Sheet)			★
Alarm Limit				
Standard				**Standard**
C4[14][15]	NAMUR alarm and saturation levels, high alarm			★
CN[14][16]	NAMUR alarm and saturation levels, low alarm			★
Calibration Certification				
Standard				**Standard**
Q4	Calibration Certificate			★
Material Traceability Certification				
Standard				**Standard**
Q8	Material Traceability Certification per EN 10204 3.1			★
Quality Certification for Safety				
Standard				**Standard**
QS[14]	Prior-use certificate of FMEDA data			★
Toolkit Total System Performance Reports				
Standard				**Standard**
QZ	Remote Seal System Performance Calculation Report			★
Lower Housing Flushing Connection Ring Material		**Number**	**Size (NPT)**	
Standard				**Standard**
F1	316 SST	1	1/4-18 NPT	★
F2	316 SST	2	1/4-18 NPT	★
F3[16]	Alloy C-276	1	1/4-18 NPT	★
F4[16]	Alloy C-276	2	1/4-18 NPT	★
F7	316 SST	1	1/2-14 NPT	★
F8	316 SST	2	1/2-14 NPT	★
F9	Alloy C-276	1	1/2-14 NPT	★
F0	Alloy C-276	2	1/2-14 NPT	★
Typical Model Number:	**2051L 2 A A0 X D 21 A A B4 M5 F1**			

(1) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(2) Temperature limits are reduced in vacuum service and may be limited by seal selection.

(3) Maximum process temperature is limited by heat transfer to the transmitter electronics and must be further derated if ambient temperatures exceed 70°F (21°C).

(4) This is a food grade fill fluid.

(5) Not suitable for vacuum applications.

(6) "Assemble-to" items are specified separately and require a completed model number.

(7) Not available with Low Power output code M.

(8) Only valid with FOUNDATION fieldbus output code F.

(9) Not valid with FOUNDATION fieldbus output code F.

(10) Not available with Remote Mount Seal Assembly option S1.

(11) Transmitter is shipped with 316 SST conduit plug (uninstalled) in place of standard carbon steel conduit plug,

(12) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.

(13) The T1 option is not needed with FISCO Product Certifications; transient protection is included in the FISCO product certification codes IA, IE, IF, and IG.

(14) Only available with HART 4-20 mA output (output code A).

(15) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(16) Not available with Option Codes A0, B0, and G0.

Rosemount 1199 Direct Mount Seal Systems



Tuned-System Assembly Comprised of 3051_L with 1199 Flanged Seal

Rosemount 1199 Direct Mount Seals are used commonly at the bottom of the vessel. Their advanced design minimizes oil volume improving performance and eliminates the need for mounting hardware.

Product features and capabilities include:

- Direct Mount gage or absolute seal system can be used for open or vented to atmosphere tank applications
- Tuned-System Assemblies can be used for DP measurements in closed or pressurized tank applications
- Variety of process connections
- Quantified performance for the entire transmitter / seal assembly (QZ option)

Additional Information
Specifications: page Level-91
Dimensional Drawings: page Level-106

Rosemount 1199 Direct Mount Seal

The 1199 Direct Mount Seal also requires specification of a Rosemount pressure transmitter. See the appropriate Product Data Sheet for the desired transmitter and include the option indicated in the table below for the configuration desired.

Table 12. When ordering Rosemount 1199 Direct and Remote Mount Seals, please make sure to add the correct seal system ordering code to the transmitter model

Transmitter Model	2 Seals	1 Seal
3051S_C	B12	B11
3051C - Welded-Repairable	S2	S1
3051C - All Welded	S8 or S9	S7 or S0
2051C	S2	S1
3051T, 2051T, 2088	—	S1

A 1199 Direct Mount Seal consists of 2 parts. First, specify the direct mount connection model codes found on page Level-38. Then, specify a remote seal found on page Level-40.

Ordering Codes

1199 _

Direct Mount Connection page Level-38 Seal Connection page Level-40

Table 13. Rosemount 1199 Direct Mount Seal Systems Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description			
1199	Seal Systems			
Connection Type		**Seal System**	**Seal Location**	
Standard				**Standard**
3051S and 2051C Coplanar Transmitters (3051S_C and 2051C)				
W	Welded-Repairable	One or Two Seal System	High Side of Transmitter	★
R(1)	All Welded	One Seal System	High Side of Transmitter	★
T(1)	All Welded	Two Seal System	High Side of Transmitter	★

Table 13. Rosemount 1199 Direct Mount Seal Systems Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

All In-Line Transmitters (3051S_T, 3051T, 2051T, 2088)							
W	All Welded		One or Two Seal System		High Side of Transmitter		★
3051C Coplanar Transmitters (3051C)							
W	Determined by Transmitter Code		One or Two Seal System		High Side of Transmitter		★
Seal Fill Fluid		**Specific Gravity at 77 °F (25 °C)**	**Temperature Limits[2]**				
			No Extension	**2-in. (50 mm) Extension**	**4-in. (100 mm) Extension**	**Thermal Optimizer**	**Standard**
Standard							★
A	Syltherm XLT	0.85	-102 to 293 °F (-75 to 145 °C)	-102 to 293 °F	102 to 293 °F (-75 to 145 °C)	102 to 293 °F (-75 to 145 °C)	★
C	Silicone 704	1.07	32 to 401 °F (0 to 205 °C)[3]	32 to 464 °F (0 to 240 °C)[3]	32 to 500 °F (0 to 260 °C)[3]	32 to 599 °F (0 to 315 °C)	★
D	Silicone 200	0.93	-49 to 401 °F (-45 to 205 °C)	-49 to 401 °F (-45 to 205 °C)	-49 to 401 °F (-45 to 205 °C)	-49 to 401 °F (-45 to 205 °C)	★
H	Inert (Halocarbon)	1.85	-49 to 320 °F (-45 to 160 °C)	-49 to 320 °F (-45 to 160 °C)	-49 to 320 °F (-45 to 160 °C)	-49 to 320 °F (-45 to 160 °C)	★
G[4][5]	Glycerine and Water	1.13	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	★
N[4]	Neobee M-20	0.92	5 to 401 °F[3] (-15 to 205 °C)	5 to 437 °F (-15 to 225 °C)	5 to 437 °F (-15 to 225 °C)	5 to 437 °F (-15 to 225 °C)	★
P[4][5]	Propylene Glycol and Water	1.02	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	★
Seal Connection Type							
Standard							**Standard**
A	Direct Mount						★
Direct Mount Connection Type							
	Extension Length		**Seal System**		**Connection Type**		
Standard							**Standard**
All Coplanar Transmitters (3051S_C, 3051C and 2051C)							
94	Direct Mount, No Extension		Tuned-System Assembly, two seals		Welded-Repairable		★
93	Direct Mount, No Extension		One Seal System		Welded-Repairable		★
96	Direct Mount, No Extension		Tuned-System Assembly, two seals		All Welded		★
97	Direct Mount, No Extension		One Seal System		All Welded		★
B4	Direct Mount, 2 in. (50 mm) Extension		Tuned-System Assembly, two seals		Welded-Repairable		★
B3	Direct Mount, 2 in. (50 mm) Extension		One Seal System		Welded-Repairable		★
B6	Direct Mount, 2 in. (50 mm) Extension		Tuned-System Assembly, two seals		All Welded		★
B7	Direct Mount, 2 in. (50 mm) Extension		One Seal System		All Welded		★
D4	Direct Mount, 4 in. (100 mm) Extension		Tuned-System Assembly, two seals		Welded-Repairable		★
D3	Direct Mount, 4 in. (100 mm) Extension		One Seal System		Welded-Repairable		★
D6	Direct Mount, 4 in. (100 mm) Extension		Tuned-System Assembly, two seals		All Welded		★
D7	Direct Mount, 4 in. (100 mm) Extension		One Seal System		All Welded		★
All In-Line Transmitters (3051S_T, 3051T, 2051T, 2088)							
95	Direct Mount, No Extension		One Seal System		All Welded		★
D5	Thermal Optimizer		One Seal System		All Welded		★

(1) All welded system connection types require either a 316L SST or Alloy C-276 isolating diaphragm in the pressure transmitter model codes.

(2) At ambient pressure of 14.7 psia (1 bar-a) and ambient temperature of 70°F and must be further derated if ambient, temperature exceeds 70 °F (21 °C).

(3) Maximum process temperature is limited by heat transfer to the transmitter.

(4) This is a food grade fill fluid.

(5) Not suitable for vacuum applications.

Continue specifying a completed model number by choosing a remote seal type below:

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

● = Transmitter Availability
— = Unavailable

Flanged Seal Assemblies			Inline	Coplanar Extensions 0 in.	Coplanar Extensions 2-in.	Coplanar Extensions 4-in.	Process Connections	
Standard								**Standard**
	page Level-49	FFW Flush Flanged Seal	●	(1)	●	●	2-in. / DN 50 / 50A 3-in. / DN 80 / 80A 4-in. / DN 100 / 100A	★
	page Level-52	RFW Flanged Seal	●	—	●	●	1/2-in. / DN 15 3/4-in. 1-in. / DN 25 / 25A 1 1/2-in. / DN 40 / 40A	★
	page Level-55	EFW Extended Flanged Seal	●	(1)	●	●	1 1/2-in. / DN 40 / 40A 2-in. / DN 50 / 50A 3-in. / Headbox / DN 80 / 80A 4-in. / Headbox / DN 100 / 100A	★
Expanded								
	page Level-59	FCW Flush Flanged Seal – Ring Type Joint (RTJ) Gasket Surface	●	(1)	●	●	2-in. 3-in.	
	page Level-61	RCW Ring Type Joint (RTJ) Flanged Seal	●	—	●	●	½-in. ¾-in. 1-in. 1 ½-in.	
	page Level-63	FUW and FVW Flush Flanged Type Seals	●	●	●	●	DN 50 DN 80	

Threaded Seal Assemblies			Inline	Coplanar Extensions 0 in.	Coplanar Extensions 2-in.	Coplanar Extensions 4-in.	Process Connections	
Standard								**Standard**
	page Level-64	RTW Threaded Seal	●	—	●	●	¼ –18 NPT 3/8 –18 NPT ½ –14 NPT ¾ –14 NPT 1 – 11.5 NPT 1 ¼ –11.5 NPT 1 ½ –11.5 NPT G1/2 A DIN 16288 R1/2 per ISO 7/1	★
Expanded								
	page Level-67	HTS Male Threaded Seal	●	●	●	●	G1 G1 ½ G2 1-11.5 NPT 1 ½ -11.5 NPT 2-11.5 NPT	

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Hygienic Seal Assemblies			Inline	Coplanar Extensions 0 in.	Coplanar Extensions 2-in.	Coplanar Extensions 4-in.	Process Connections	
Standard								**Standard**
	page Level-68	SCW Hygienic Tri-Clover Style Tri-Clamp Seal	●	●	●	●	1 ½-in. 2-in. 2 ½-in. 3-in. 4-in.	★
	page Level-69	SSW Hygienic Tank Spud Seal	●	●	●	●	2-in. Extension 6-in. Extension	★
Expanded								
	page Level-70	STW Hygienic Thin Wall Tank Spud Seal	●	—	●	●	0.8 in Extension	
	page Level-71	EES Hygienic Flanged Tank Spud Extended Seal	●	●	●	●	DN 50 DN 80	
	page Level-72	VCS Tri-clamp® In-Line Seal	●	—	—	—	1-in. 1 ½-in. 2-in. 3-in. 4-in.	
	page Level-73	SVS Varivent® Compatible Hygienic Connection Seal	●	●	●	●	Tuchenhagen Varivent® Compatible	
	page Level-74	SHP Hygienic Cherry-Burrell “I” Line Seal	●	—	—	—	2-in. 3-in.	
	page Level-75	SLS Dairy Process Connection - Female Thread Seal per DIN 11851	●	—	—	—	DN 40 DN 50	

Specialty Seal Assemblies			Inline	Coplanar Extensions 0 in.	Coplanar Extensions 2-in.	Coplanar Extensions 4-in.	Process Connections	
Expanded								
	page Level-76	WSP Saddle Seal	●	—	●	●	2-in. 3-in. 4-in. or Larger	

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

	page Level-77	UCP Male Threaded Pipe Mount Seals and PMW Paper Mill Sleeve Seals	●	●	—	—	1 ½-in. with Threaded Knurled Nut 1-in. with Cap Screw Retainer	
	page Level-78	CTW Chemical Tee Seal	●	—	●	●	Retro-fit	
	page Level-79	TFS Wafer Style In-Line Seal	●	—	—	—	1-in. / DN 25 1 ½-in. / DN 40 2-in. / DN 50 3-in. / DN 80 4-in. / DN 100	
	page Level-80	WFW Flow-Thru Flanged Seal	●	—	●	●	1-in. 2-in. 3-in.	

(1) Available with ANSI Class 300 or EN 1092-1 PN 40 or JIS B2238 20K or lower flange ratings.

Rosemount 1199 Remote Mount Seal Systems



Tuned-System Assembly Comprised of 3051_L with 1199 Flanged Seal

Rosemount 1199 Remote Mount Seals are used commonly at the top of the vessel when a DP measurement is required. They are available in three different diameters to optimize time response and reduce temperature effects.

Product features and capabilities include:

- Remote Mount Seals can be used for high temperature applications
- Remote Mount Seals are used on the low pressure side of the transmitter for Tuned-System Assemblies that can be used for DP measurements in closed or pressurized tank applications
- Variety of process connections
- Quantified performance for the entire transmitter / seal assembly (QZ option)

Additional Information

Specifications: page Level-81
Certifications: page Level-93
Dimensional Drawings: page Level-106

Rosemount 1199 Remote Mount Seal

The 1199 Remote Mount Seal also requires specification of a Rosemount pressure transmitter. See the appropriate Product Data Sheet for the desired transmitter and include the option indicated in the table below for the configuration desired.

Table 14. When ordering Rosemount 1199 Direct and Remote Mount Seals, please make sure to add the correct seal system ordering code to the transmitter model

Transmitter Model	2 Seals	1 Seal
3051S_C	B12	B11
3051C - Welded-Repairable	S2	S1
3051C - All Welded	S8 or S9	S7 or S0
2051C	S2	S1
3051T, 2051T, 2088	—	S1

A 1199 Remote Mount Seal consists of 2 parts. First, specify the capillary model codes found on page Level-44. Then, specify a remote seal found on page Level-45.

Ordering Codes

1199 _

Remote Mount Connection page Level-44 — Seal Connection page Level-45

Capillary/Fill Fluid

NOTE:
Use Table 15 for Capillary Type Connections. Use Table 13 for Direct Mount Type Connections.

Table 15. Rosemount 1199 Remote Mount Seal Systems Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description			
1199	Seal System			
Connection Type		**Seal System**	**Seal Location**	
Standard				**Standard**
3051S and 2051 Coplanar Transmitters (3051S_C and 2051C)				
W	Welded-Repairable	One or Two Seal System	High Side of Transmitter	★
M	Welded-Repairable	One or Two Seal System	Low Side of Transmitter	★
D	Welded-Repairable	Two Seal System	Balanced System - Same Seal on Low and High Side	★
R[(1)]	All Welded	One Seal System	High Side of Transmitter	★
T[(1)]	All Welded	Two Seal System	High Side of Transmitter	★
S[(1)]	All Welded	Two Seal System	Low Side of Transmitter	★
All In-Line Transmitters (3051S_T, 3051T, 2051T, 2088)				
W	All Welded	One or Two Seal System	High Side of Transmitter	★
3051 Coplanar Transmitters (3051C)				
W	Determined by Transmitter Code	One or Two Seal System	High Side of Transmitter	★
M	Determined by Transmitter Code	One or Two Seal System	Low Side of Transmitter	★
D	Determined by Transmitter Code	Two Seal System	Balanced System - Same Seal on Low and High Side	★
Seal Fill Fluid		**Specific Gravity at 77 °F (25 °C)**	**Temperature Limits[(2)]**	
Standard				**Standard**
A[(3)]	Syltherm XLT	0.85	–102 to 293 °F (–75 to 145 °C)	★
C	Silicone 704	1.07	32 to 599 °F (0 to 315 °C)	★
D	Silicone 200	0.93	–49 to 401 °F (–45 to 205 °C)	★
H	Inert (Halocarbon)	1.85	–49 to 320 °F (–45 to 160 °C)	★
G[(4)(5)]	Glycerin and Water	1.13	5 to 203 °F (–15 to 95 °C)	★
N[(4)]	Neobee M-20	0.92	5 to 437 °F (–15 to 225 °C)	★
P[(4)(5)]	Propylene Glycol and Water	1.02	5 to 203 °F (–15 to 95 °)	★
Seal Connection Type / Capillary ID, Description				
Standard				**Standard**
B	0.03-in. (0.711 mm) ID			★
C	0.04-in. (1.092 mm) ID			★
D	0.075-in. (1.905 mm) ID			★
E	0.03-in. (0.711 mm) ID, PVC Coated			★
F	0.04-in. (1.092 mm) ID, PVC Coated			★
G	0.075-in. (1.905 mm) ID, PVC Coated			★
H	0.03-in. (0.711 mm) ID, 4-in. Support Tube			★
J	0.04-in. (1.092 mm) ID, 4-in. Support Tube			★
K	0.075-in. (1.905 mm) ID, 4-in. Support Tube			★
M[(6)]	0.03-in. (0.711 mm) ID, PVC Coated, 4-in. Support Tube with Closed End			★
N[(6)]	0.04-in. (1.092 mm) ID, PVC Coated, 4-in. Support Tube with Closed End			★
P[(6)]	0.075-in. (1.905 mm) ID, PVC Coated, 4-in. Support Tube with Closed End			★
Capillary Length / Direct Mount				
Standard				**Standard**
01	1 ft (0.3 m)			★
05	5 ft (1.5 m)			★

Table 15. Rosemount 1199 Remote Mount Seal Systems Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

10	10 ft (3.0 m)	★
15	15 ft (4.5 m)	★
20	20 ft (6.1 m)	★
51	1.6 ft (0.5 m)	★
52	3.3 ft (1.0 m)	★
53	4.9 ft (1.5 m)	★
54	6.6 ft (2.0 m)	★
55	8.2 ft (2.5 m)	★
56	9.8 ft (3.0 m)	★
57	11.5 ft (3.5 m)	★
58	13.1 ft (4.0 m)	★
59	16.4 ft (5.0 m)	★
60	19.7 ft (6.0 m)	★
Expanded		
25	25 ft (7.6 m)	
30	30 ft (9.1 m)	
35	35 ft (10.7 m)	
40	40 ft (12.2 m)	
45	45 ft (13.7 m)	
50	50 ft (15.2 m)	
61	23 ft (7.0 m)	
62	26.2 ft (8.0 m)	
63	29.5 ft (9.0 m)	
64	32.8 ft (10.0 m)	
65	36.1 ft (11.0 m)	
66	39.4 ft (12.0 m)	
67	42.6 ft (13.0 m)	
68	45.9 ft (14.0 m)	
69	49.2 ft (15.0 m)	

(1) All welded system connection types require either a 316L SST or Alloy C-276 isolating diaphragm in the pressure transmitter model codes.

(2) At ambient pressure of 14.7 psia (1 bar-a) and ambient temperature of 70°F and must be further derated if ambient, temperature exceeds 70 °F (21 °C).

(3) Temperature limits are reduced in vacuum service and may be limited by seal selection.

(4) This is a food grade fill fluid.

(5) Not suitable for vacuum applications.

(6) Compression fitting does not provide a hermetic seal.

Continue specifying a completed model number by choosing a remote seal type below:

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Flanged Seal Assemblies			**Process Connections**	
Standard				**Standard**
	page Level-49	FFW Flush Flanged Seal	2-in. / DN 50 / 50A 3-in. / DN 80 / 80A 4-in. / DN 100 / 100A	★
	page Level-52	RFW Flanged Seal	1/2-in. / DN 15 3/4-in. 1-in. / DN 25 / 25A 1 1/2-in. / DN 40 / 40A	★

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

	page Level-55	EFW Extended Flanged Seal	1 1/2-in. / DN 40 / 40A 2-in. / DN 50 / 50A 3-in. / Headbox / DN 80 / 80A 4-in. / Headbox / DN 100 / 100A	★
	page Level-57	PFW Pancake Seal	2-in. / DN50 3-in. / DN 80	★
Expanded				
	page Level-59	FCW Flush Flanged Seal – Ring Type Joint (RTJ) Gasket Surface	2-in. 3-in.	
	page Level-61	RCW Ring Type Joint (RTJ) Flanged Seal	½-in. ¾-in. 1-in. 1 ½-in.	
	page Level-63	FUW and FVW Flush Flanged Type Seals	DN 50 DN 80	
Threaded Seal Assemblies			**Process Connections**	
Standard				**Standard**
	page Level-64	RTW Threaded Seal	¼ –18 NPT 3/8 –18 NPT ½ –14 NPT ¾ –14 NPT 1 – 11.5 NPT 1 ¼ –11.5 NPT 1 ½ –11.5 NPT G1/2 A DIN 16288 R1/2 per ISO 7/1	★
Expanded				
	page Level-67	HTS Male Threaded Seal	G1 G1 ½ G2 1-11.5 NPT 1 ½ -11.5 NPT 2-11.5 NPT	
Hygienic Seal Assemblies			**Process Connections**	
Standard				**Standard**
	page Level-68	SCW Hygienic Tri-Clover Style Tri-Clamp Seal	1 ½-in. 2-in. 2 ½-in. 3-in. 4-in.	★

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

	page Level-69	SSW Hygienic Tank Spud Seal	2-in. Extension 6-in. Extension	★
Expanded				
	page Level-70	STW Hygienic Thin Wall Tank Spud Seal	0.8 in Extension	
	page Level-71	EES Hygienic Flanged Tank Spud Extended Seal	DN 50 DN 80	
	page Level-72	VCS Tri-clamp® In-Line Seal	1-in. 1 ½-in. 2-in. 3-in. 4-in.	
	page Level-73	SVS Varivent® Compatible Hygienic Connection Seal	Tuchenhagen Varivent Compatible	
	page Level-74	SHP Hygienic Cherry-Burrell “I” Line Seal	2-in. 3-in.	
	page Level-75	SLS Dairy Process Connection - Female Thread Seal per DIN 11851	DN 40 DN 50	
Specialty Seal Assemblies			**Process Connections**	
Expanded				
	page Level-76	WSP Saddle Seal	2-in. 3-in. 4-in. or Larger	
	page Level-77	UCP Male Threaded Pipe Mount Seals and PMW Paper Mill Sleeve Seals	1 ½-in. with Threaded Knurled Nut 1-in. with Cap Screw Retainer	

Rosemount DP Level

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

	page Level-78	CTW Chemical Tee Seal	Retro-fit	
	page Level-79	TFS Wafer Style In-Line Seal	1-in. / DN 25 1 ½-in. / DN 40 2-in. / DN 50 3-in. / DN 80 4-in. / DN 100	
	page Level-80	WFW Flow-Thru Flanged Seal	1-in. 2-in. 3-in.	

Flanged Seal Assemblies



FFW FLUSH FLANGED SEAL

Table 16. FFW Flush Flanged Seal – Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Code	Industry Standards			
Standard				**Standard**
A	ANSI/ASME B16.5 (American National Standards Institute/American Society of Mechanical Engineers)			★
D	EN 1092-1 (European Standard)			★
Expanded				
J	JIS B2238 (Japanese Industrial Standard)			
Process Connection Style				
Standard				**Standard**
FFW	Flush Flanged Seal			★
Process Connection Size				
	ANSI/ASME B16.5	**EN 1092-1**	**JIS B2238**	
Standard				**Standard**
G	2-in.	DN 50	50 A	★
7	3-in.	—	80 A	★
J	—	DN 80	—	★
9	4-in.	DN 100	100 A	★
Flange / Pressure Rating				
	ANSI/ASME B16.5	**EN 1092-1**	**JIS B2238**	
Standard				**Standard**
1	Class 150	—	10K	★
2	Class 300	—	20K	★
4	Class 600	—	40K	★
G	—	PN 40	—	★
Expanded				
E	—	PN 10 / 16 (DN 100 only)	—	
5	Class 900	—	—	
6	Class 1500	—	—	
7	Class 2500	—	—	
H	—	PN 63	—	
J	—	PN 100	—	
K	—	PN 160	—	
Diaphragm and Wetted, Upper Housing, Flange Material				
	Diaphragm and Wetted	**Upper Housing**	**Flange**	
Standard				**Standard**
CA[(1)(2)]	316L SST	316L SST	CS	★
DA[(2)]	316L SST	316L SST	316 SST	★
CB[(1)(3)]	Alloy C-276, seam welded	316L SST	CS	★
DB[(3)]	Alloy C-276, seam welded	316L SST	316 SST	★
CC[(1)]	Tantalum, seam welded	316L SST	CS	★
DC	Tantalum, seam welded	316L SST	316 SST	★
C3[(1)(2)(3)(4)]	Tantalum, brazed	316L SST	CS	★
D3[(1)(2)(3)(4)]	Tantalum, brazed	316L SST	316 SST	★

Table 16. FFW Flush Flanged Seal – Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded				
MB[(1)(2)]	Alloy C-276, solid faceplate	Alloy C-276 / 316L SST	CS	
KB[(1)(2)]	Alloy C-276, solid faceplate	Alloy C-276 / 316L SST	316 SST	
DJ	Alloy B	316L SST	316 SST	
DF	304L SST	316L SST	316 SST	
DV	Alloy 400	316L SST	316 SST	
RH[(2) (5)]	Titanium Grade 4	Titanium GR.4	316 SST	
DH[(6)]	Titanium Grade 4	316L SST	316 SST	
DE	Alloy 600	316L SST	316 SST	
DP	Nickel 201	316L SST	316 SST	
WW[(2)(7)]	316Ti SST (WNr 1.4571)	316Ti SST (WNr 1.4571)	316Ti SST (WNr 1.4571)	
DZ[(6)]	Zirconium 702	316L SST	316 SST	
D4	Alloy C-22	316L SST	316 SST	
D5	Duplex 2507 SST	316L SST	316 SST	
Flushing Connection Ring Material (Lower Housing)[(8)]				
Standard				**Standard**
0	None			★
A	316L SST			★
B	Alloy C-276			★
Expanded				
2	Duplex 2205 SST			
H	Titanium Grade 4			
6	Nickel 201			
V	Alloy 400			
Flushing Connection Options, Quantity (Size)				
Standard				**Standard**
0	None			★
1	1 ($^1/_4$-18 NPT)			★
3	2 ($^1/_4$-18 NPT)			★
7	1 ($^1/_2$-14 NPT)			★
9	2 ($^1/_2$-14 NPT)			★

Options (Include with selected model number)

Gasket Material		
Standard		**Standard**
J	PTFE gasket (for use with flushing connection ring)	★
Expanded		
N	Grafoil gasket (for use with flushing connection ring)	
K	Barium Sulfate filled PTFE gasket (for use with flushing connection ring)	
Flushing Plug, Vent/Drain Valve		
Standard		**Standard**
D	Alloy C-276 plug(s) for flushing connection(s)	★
G	316 SST plug(s) for flushing connection(s)	★
H	316 SST vent/drain for flushing connection(s)	★
Diaphragm Thickness		
Expanded		
C	0.006-in. (150 µm) available with 316L SST, Alloy C-276, and Duplex 2507 SST for abrasive applications	
7	0.002-in. (50 µm) available with 316L SST and Alloy C-276	
Mounting Flange		
Expanded		
4[(9)]	Flat face, flush flanged	

Table 16. FFW Flush Flanged Seal – Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Code Conformance		
Standard		**Standard**
T(10)	Wetted Materials Compliance to NACE MRO175/ISO 15156, MRO103	★
Gasket Surface Finish		
Expanded		
1	Gasket Surface Ra 125 Max.	
Cold Temp Application		
Standard		**Standard**
B	Extra Fill For Cold Temp Application	★
Diaphragm Coating		
Expanded		
U(11)	0.001-in. (25 µm) gold plated Diaphragm	
V(12)	PTFE coated diaphragm for nonstick purposes only	
Capillary Change		
Expanded		
2	Radial capillary connection	
Alternate Design		
Standard		**Standard**
E(12)	One Piece Design	★
Typical Model Number: 1199 W DC 1 0 A FFW 7 1 DA 0 0		

(1) Only available with two piece design.

(2) For use with spiral wound metallic gaskets.

(3) Not available with option code C.

(4) Only available in Process Connection Size code G, 7, and J.

(5) Not available with welded capillary connections or direct mount.

(6) Operating temperature limited to 302 °F (150 °C).

(7) Only available with one-piece design, option code E.

(8) Supplied standard with ThermoTork TN9000.

(9) The mounting flange and upper housing are a single item for the one-piece design. Only available with diaphragm and wetted part material codes DA, DB, DJ, DF, DV, DH, DE, DP, WW, DZ, D4, DC, and D5.

(10) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(11) Only available on 316LSS, Alloy 400 and Alloy C-276.

(12) Not available with transmitter option code Q8, for Material Traceability per EN 10204 3.1 of the transmitter / seal assembly.



RFW FLANGED SEAL

Table 17. RFW Flanged Seal Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Code	Industry Standard			
Standard				**Standard**
A	ANSI/ASME B16.5 (American National Standards Institute/American Society of Mechanical Engineers)			★
D	EN 1092-1 (European Standard)			★
Expanded				
J	JIS B2238 (Japanese Industrial Standard)			
Process Connection Style				
Standard				**Standard**
RFW	Flanged Seal			★
Process Connection Size				
Standard				**Standard**
	ANSI/ASME B16.5	**EN 1092-1**	**JIS B2238**	
2	1-in.	—	25A	★
4	1 1/2-in.	—	40A	★
D	—	DN 25	—	★
F	—	DN 40	—	★
Expanded				
1	1/2-in.	—	—	
A	3/4-in.	DN 10	10A	
B	—	DN 15	15A	
C	—	DN 20	20A	
Flange/Pressure Rating				
	ANSI/ASME B16.5	**EN 1092-1**	**JIS B2238**	
Standard				**Standard**
1	Class 150	—	10K	★
2	Class 300	—	20K	★
4	Class 600	—	40K	★
G	—	PN 40	—	★
Expanded				
5	Class 900	—	—	
6	Class 1500	—	—	
7	Class 2500	—	—	
H	—	PN 63	—	
J	—	PN 100	—	
K	—	PN 160	—	
Diaphragm, Upper Housing, Flange Material				
	Diaphragm	**Upper Housing**	**Flange**	
Standard				**Standard**
CA	316L SST	316L SST	CS	★
DA	316L SST	316L SST	316 SST	★
CB	Alloy C-276	316L SST	CS	★
DB	Alloy C-276	316L SST	316 SST	★
CC	Tantalum	316L SST	CS	★
DC	Tantalum	316L SST	316 SST	★
Expanded				
DF	304L SST	316L SST	316 SST	
DJ	Alloy B	316L SST	316 SST	
DE	Alloy 600	316L SST	316 SST	

Table 17. RFW Flanged Seal Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

DV	Alloy 400	316L SST	316 SST	
DP	Nickel 201	316L SST	316 SST	
DK	Alloy 20	316L SST	316 SST	
RH(1)	Titanium Grade 4	Titanium Grade 4	316 SST	
DH	Titanium Grade 4	316L SST	316 SST	
D4	Alloy C-22	316L SST	316 SST	
D5	Duplex 2507 SST	316L SST	316 SST	
DZ	Zirconium 702	316L SST	316 SST	
Flushing Connection Ring Material (Lower Housing)(2)				
Standard				**Standard**
A	316L SST			★
B	Alloy C-276			★
D	Plated CS			★
Expanded				
2	Duplex 2205			
F	304L SST			
H	Titanium Grade 4			
V	Alloy 400			
C	Tantalum lined 316L SST (no flushing connection allowed)			
Flushing Connection Options, Quantity Size				
Standard				**Standard**
5	None			★
1	1 (1/4-18 NPT)			★
3	2 (1/4-18 NPT)			★
Expanded				
7	1 (1/2-14 NPT)			
9	2 (1/2-14 NPT)			

Options (Include with selected model number)

Gasket Material		
Standard		**Standard**
J	PTFE gasket	★
Expanded		
N	Grafoil® gasket	
K	Barium Sulfate filled PTFE gasket	
R	Ethylene Propylene gasket	
Flushing Plug, Vent/Drain Valve		
Standard		**Standard**
D	Alloy C-276 plug(s) for flushing connection(s)	★
G	316 SST plug(s) for flushing connection(s)	★
H	316 SST vent/drain for flushing connection(s)	★
Diaphragm Thickness		
Expanded		
C	0.006-in. (150 µm) available with 316L SST, Alloy C-276, and Duplex 2507 SST for abrasive applications	
Bolt Material		
Expanded		
3	304 SST Bolts (Only available for Stud Bolt Design)	
Code Conformance		
Standard		**Standard**
T(3)	Wetted Materials Compliance to NACE MRO175/ISO 15156, MRO103	★
Gasket Surface Finish		
Expanded		
1	Gasket Surface Ra 125 Max.	

Table 17. RFW Flanged Seal Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Cold Temperature Application		
Standard		**Standard**
B	Extra Fill For Cold Temp Application	★
Diaphragm Coating		
Expanded		
U[4]	0.001-in. (25 µm) Gold plated diaphragm	
V[5]	PTFE coated diaphragm for nonstick purposes only	
Large Diaphragm Size		
Expanded		
9	4.1-in. (104 mm) Diaphragm Diameter	
Typical Model Number: 1199 W DC 1 0 A RFW 2 1 DA A 5		

(1) Not available with welded capillary connections or direct mount.

(2) Supplied with C4401 Aramid fiber gasket.

(3) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(4) Only available on 316LSS, Alloy 400 and Alloy C-276.

(5) Not available with transmitter option code Q8, for Material Traceability per EN 10204 3.1 of the transmitter / seal assembly.



EFW EXTENDED FLANGED SEAL

Table 18. EFW Extended Flanged Seal Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Code	Industry Standard				● = Available — = Unavailable	
Standard						**Standard**
A	ANSI/ASME B16.5 (American National Standards Institute/American Society of Mechanical Engineers)					★
D	EN 1092-1 (European Standard)					★
Expanded						
J	JIS B2238 (Japanese Industrial Standards)					
Process Connection Style						
Standard						**Standard**
EFW	Extended Flanged Seal					★
Process Connection Size						
	ANSI/ASME B16.5	**EN 1092-1**	**JIS B2238**	**Extension Diameters**		
Standard						**Standard**
7	3-in.	DN 80	80A	2.58-in. (66 mm)		★
9	4-in.	DN 100	100A	3.50-in. (89 mm)		★
Expanded						
4	1 1/2-in.	DN 40	40A	1.45-in. (37 mm)		
G	2-in.	DN 50	50A	1.90-in. (49 mm)		
H	3-in. (Headbox)	DN 80 (Headbox)	—	2.875-in. (74 mm)		
K	4-in. (Headbox)	DN 100 (Headbox)		3.780-in. (97 mm)		
Flange/Pressure Rating						
	ANSI/ASME B16.5	**EN 1092-1**	**JIS B2238**			
Standard						**Standard**
1	Class 150	—	10K			★
2	Class 300	—	20K			★
4	Class 600	—	40K			★
G	—	PN 40	—			★
Expanded						
E	—	PN 10/16 (DN 100 only)	—			
5	Class 900	—	—			
6	Class 1500	—	—			
7	Class 2500	—	—			
H	—	PN 63	—			
J	—	PN 100	—			
K	—	PN 160	—			

Diaphragm, Extension and Gasket Surface, Upper Housing, Flange Material					Available with Process Connection Code							
Code	**Diaphragm**	**Extension/ Gasket Surface**	**Upper Housing**	**Mounting Flange**	**7**	**9**	**4**	**G**	**H**	**K**		
Standard												**Standard**
DA	316L SST	316L SST	316L SST	316 SST	●	●	●	●	●	●		★
CA	316L SST	316L SST	316L SST	CS	●	●	●	●	●	●		★
DB	Alloy C-276	Alloy C-276	316L SST	316 SST	●	●	●	●	●	●		★
CB	Alloy C-276	Alloy C-276	316L SST	CS	●	●	●	●	●	●		★
Expanded												
DM	Alloy C-276	316L SST	316L SST	316 SST	●	●	●	●	●	●		
DD	Tantalum	316L SST	316L SST	316 SST	●	●	—	—	—	—		
DC	Tantalum	Tantalum Lined	316L SST	316 SST	●	●	—	●	—	—		

Table 18. EFW Extended Flanged Seal Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

D5	Duplex 2507 SST	Duplex 2205 SST	316L SST	316 SST	●	●	●	●	●	●		
D9	Duplex 2507 SST	316L SST	316L SST	316 SST	●	●	●	●	●	●		
Extension Length												
	ANSI/ASME B16.5		**EN 1092-1 / JIS B2238**									
Standard												**Standard**
2	2-in.		50 mm									★
4	4-in.		100 mm									★
6	6-in.		150 mm									★
Expanded												
8	8-in.		200 mm									
1	1-in.		25 mm									
3	3-in.		75 mm									
5	5-in.		125 mm									
7	7-in.		175 mm									
9	9-in.		225 mm									
Fractional Extension Length												
	ANSI/ASME B16.5		**EN 1092-1 / JIS B2238**									
Standard												**Standard**
0	0-in.		0 mm									★

Options (Include with selected model number)

Diaphragm Thickness		
Expanded		
C	0.006-in. (150 µm) available with 316L SST, Alloy C-276, and Duplex 2507 SST for abrasive applications	
Code Conformance		
Standard		**Standard**
T[1]	Wetted Materials Compliance to NACE MRO175/ISO 15156, MRO103	★
Gasket Surface Finish		
Expanded		
1	Gasket Surface Ra 125 Max.	
Cold Temperature Application		
Standard		**Standard**
B	Extra Fill For Cold Temperature Application	★
Diaphragm Coating		
Expanded		
U[2]	0.001-in. (25 µm) Gold plated diaphragm	
V[3]	PTFE coated diaphragm for nonstick purposes only	
Typical Model Number: 1199 W DC 1 0 A EFW 7 1 DA 2 0		

(1) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(2) Only available on 316LSS, Alloy 400 and Alloy C-276.

(3) Not available with transmitter option code Q8, for Material Traceability per EN 10204 3.1 of the transmitter / seal assembly.



PFW PANCAKE SEAL

Table 19. PFW Pancake Seal Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Code	Industry Standard			
Standard				**Standard**
A	ANSI/ASME B16.5 (American National Standards Institute/American Society of Mechanical Engineers)			★
D	EN 1092-1 (European Standard)			★
Process Connection Style				
Standard				**Standard**
PFW	Pancake Seal			★
Process Connection Size				
	ANSI	**EN 1092-1**		
Standard				**Standard**
G	2-in.	DN 50		★
7	3-in.	—		★
J	—	DN 80		★
Flange/Pressure Rating				
	ANSI	**EN 1092-1**		
Standard				**Standard**
0	Seal MWP based on customer supplied flange			★
1	Class 150	—		★
2	Class 300	—		★
4	Class 600	—		★
G	—	PN40		★
Expanded				
5	Class 900	—		
6	Class 1500	—		
7	Class 2500	—		
H	—	PN 63		
J	—	PN 100		
Diaphragm and Wetted, Upper Housing, Flange Material				
	Diaphragm and Wetted	**Upper Housing**	**Flange**	
Standard				**Standard**
LA[(1)]	316L SST	316L SST	None	★
CA[(1)]	316L SST	316L SST	CS	★
DA[(1)]	316L SST	316L SST	316 SST	★
LB	Alloy C-276, Seam Welded	316L SST	None	★
CB	Alloy C-276, Seam Welded	316L SST	CS	★
DB	Alloy C-276, Seam Welded	316L SST	316 SST	★
LC	Tantalum, Seam Welded	316L SST	None	★
CC	Tantalum, Seam Welded	316L SST	CS	★
DC	Tantalum, Seam Welded	316L SST	316 SST	★
Flushing Connection Ring Material (Lower Housing)[(2)]				
Standard				**Standard**
0	None			★
A	316L SST			★
B	Alloy C-276			★

Table 19. PFW Pancake Seal Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Flushing Connection Options, Quantity (Size)		
Standard		**Standard**
0	None	★
1	1 ($1/4$-18 NPT)	★
3	2 ($1/4$-18 NPT)	★
7	1 ($1/2$-14 NPT)	★
9	2 ($1/2$-14 NPT)	★

Options (Include with selected model number)

Gasket Material		
Standard		**Standard**
J	PTFE gasket	★
Expanded		
N	Grafoil® gasket	
K	Barium Sulfate filled PTFE gasket	
Flushing Plug, Vent/Drain Valve		
Standard		**Standard**
D	Alloy C-276 plug(s) for flushing connection(s)	★
G	316 SST plug(s) for flushing connection(s)	★
H	316 SST vent/drain for flushing connection(s)	★
Diaphragm Thickness		
Expanded		
C	0.006-in. (150 µm) available with 316L SST, Alloy C-276, and Duplex 2507 SST for abrasive applications	
Code Conformance		
Standard		**Standard**
T(3)	Wetted Materials Compliance to NACE MRO175/ISO 15156, MRO103	★
Gasket Surface Finish		
Expanded		
1	Gasket Surface Ra 125 Max.	
Cold Temperature Application		
Standard		**Standard**
B	Extra Fill For Cold Temp Application	★
Diaphragm Coating		
Expanded		
U(4)	0.001-in. (25 µm) Gold plated diaphragm	
V(5)	PTFE coated diaphragm for nonstick purposes only	
Typical Model Number: 1199 W DC 1 0 A PFW 7 1 DA 0 0		

(1) For use with customer supplied spiral wound metallic gaskets.

(2) Supplied standard with Thermo Torque TN9000 gasket.

(3) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(4) Only available on 316LSS, Alloy 400, and Alloy C-276.

(5) Not available with transmitter option code Q8, for Material Traceability per EN 10204 3.1 of the transmitter / seal assembly.



FCW FLUSH FLANGED SEAL – RING TYPE JOINT (RTJ) GASKET SURFACE

Table 20. FCW Flush Flanged Seal – Ring Type Joint (RTJ) Gasket Surface Ordering Information
This seal is part of the Expanded offering and is subject to additional delivery lead time.

Code	Industry Standards		
Expanded			
A	ANSI/ASME B16.5 (American National Standards Institute/American Society of Mechanical Engineers)		
Process Connection Style			
Expanded			
FCW	Flush Flanged Seal - Ring Type Joint Gasket Surface		
Process Connection Size			
Expanded			
G	2-in.		
7	3-in.		
Flange/Pressure Rating			
Expanded			
1	Class 150		
2	Class 300		
4	Class 600		
5	Class 900		
6	Class 1500		
7	Class 2500		
Diaphragm and Wetted, Upper Housing, Flange Material			
	Diaphragm and Wetted	**Upper Housing**	**Flange**
Expanded			
DA	316L SST	316L SST	316 SST
KB	Alloy C-276	316L SST	316 SST
K5	Duplex 2507 SST/Duplex 2205	316L SST	316 SST
Flushing Connection Ring Material (Lower Housing)			
Expanded			
0	None		
A	316L SST		
B	Alloy C-276		
2	Duplex 2205 SST		
Flushing Connection Options			
Expanded			
0	None		
1	1 ($^1/_4$-18 NPT)		
3	2 ($^1/_4$-18 NPT)		
7	1 ($^1/_2$-14 NPT)		
9	2 ($^1/_2$-14 NPT)		
Options (Include with selected model number)			
Flushing Plug, Vent/Drain Valve			
Expanded			
D	Alloy C-276 plug(s) for flushing connection(s)		
G	316 SST plug(s) for flushing connection(s)		
H	316 SST vent/drain for flushing connection(s)		

Table 20. FCW Flush Flanged Seal – Ring Type Joint (RTJ) Gasket Surface Ordering Information

This seal is part of the Expanded offering and is subject to additional delivery lead time.

Diaphragm Thickness	
Expanded	
C	0.006-in. (150 µm) available with 316L SST, Alloy C-276, and Duplex 2507 SST for abrasive applications
7	0.002-in. (50 µm) available with 316L SST and Alloy C-276
Code Conformance	
Expanded	
T(1)	Wetted Materials Compliance to NACE MRO175/ISO 15156, MRO103
Cold Temp Application	
Expanded	
B	Extra Fill For Cold Temp Application
Diaphragm Coating	
Expanded	
U(2)	0.001-in. (25 µm) Gold plated diaphragm
V(3)	PTFE coated diaphragm for nonstick purposes only
Alternate Design	
Expanded	
E	One Piece Design
Typical Model Number: 1199 W DC 1 0 A FCW 7 1 DA 0 0	

(1) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(2) Only available on 316LSS and Alloy C-276.

(3) Not available with transmitter option code Q8, for Material Traceability per EN 10204 3.1 of the transmitter / seal assembly.



RCW RING TYPE JOINT (RTJ) FLANGED SEAL

Table 21. RCW Ring Type Joint Flanged Seal Ordering Information

This seal is part of the Expanded offering and is subject to additional delivery lead time.

Code	Industry Standard		
Expanded			
A	ANSI/ASME B16.5 (American National Standards Institute/American Society of Mechanical Engineers)		
Process Connection Style			
Expanded			
RCW	Flanged Seal - Ring Type Joint Gasket Surface		
Process Connection Size			
Expanded			
1	1/2-in.		
A	3/4-in.		
2	1-in.		
4	1 1/2-in.		
Flange/Pressure Rating			
Expanded			
1	Class 150		
2	Class 300		
4	Class 600		
5	Class 900		
6	Class 1500		
7	Class 2500		
Diaphragm, Upper Housing, Flange Material			
	Diaphragm	**Upper Housing**	**Flange**
Expanded			
DA	316L SST	316L SST	316 SST
DB	Alloy C-276	316L SST	316 SST
DC	Tantalum	316L SST	316 SST
DE	Alloy 600	316L SST	316 SST
DF	304L SST	316L SST	316 SST
DJ	Alloy B316L SST	316L SST	316 SST
DV	Alloy 400	316L SST	316 SST
DP	Nickel 201	316L SST	316 SST
RH	Titanium Grade 4	Titanium Grade 4	316 SST
DH(1)	Titanium Grade 4	316L SST	316 SST
D4	Alloy 22	316L SST	316 SST
D5	Duplex 2507 SST	316L SST	316 SST
DZ(1)	Zirconium 702	316L SST	316 SST
DK	Alloy 20	316L SST	316 SST
Flushing Connection Ring Material (Lower Housing)			
Expanded			
A	316L SST		
B	Alloy C-276		
F	304L SST		
H	Titanium Grade 4		
2	Duplex 2205 SST		
V	Alloy 400		
Flushing Connection Options			
Expanded			
5	None		
1	1 (1/4-18 NPT)		

Table 21. RCW Ring Type Joint Flanged Seal Ordering Information
This seal is part of the Expanded offering and is subject to additional delivery lead time.

3	2 (1/4-18 NPT)
7	1 (1/2-14 NPT)
9	2 (1/2-14 NPT)

Options (Include with selected model number)

Gasket Material	
Expanded	
J	PTFE gasket
N	Grafoil® gasket
K	Barium Sulfate filled PTFE gasket
R	Ethylene Propylene gasket
Flushing Plug, Vent/Drain Valve	
Expanded	
D	Alloy C-276 plug(s) for flushing connection(s)
G	316 SST plug(s) for flushing connection(s)
H	316 SST vent/drain for flushing connection(s)
Diaphragm Thickness	
Expanded	
C	0.006-in. (150 µm) available with 316L SST, Alloy C-276, and Duplex 2507 SST for abrasive applications
Bolt Material (Optional)	
Expanded	
3	304 SST Bolts (Only available for Stud Bolt Design)
Code Conformance	
Expanded	
T(2)	Wetted Materials Compliance to NACE MRO175/ISO 15156, MRO103
Cold Temperature Application	
Expanded	
B	Extra Fill For Cold Temp Application
Diaphragm Coating	
Expanded	
U(3)	0.001-in. (25 µm) Gold plated diaphragm
V(4)	PTFE coated diaphragm for nonstick purposes only
Large Diaphragm Size	
Expanded	
9	4.1-in. (104 mm) Diaphragm Diameter
Typical Model Number: 1199 W DC 1 0 A RCW 2 1 DA A 5	

(1) Operating temperature is limited to 302 °F (150 °C).

(2) Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(3) Only available on 316LSS, Alloy 400, and Alloy C-276.

(4) Not available with transmitter option code Q8, for Material Traceability per EN 10204 3.1 of the transmitter / seal assembly.



FUW AND FVW FLUSH FLANGED TYPE SEALS

Table 22. FUW and FVW Flush Flanged Type Seals – EN Ordering Information

This seal is part of the Expanded offering is subject to additional delivery lead time.

Code	Industry Standard		
Expanded			
D	EN 1092-1 (European Standard)		
Process Connection Style			
Expanded			
FUW	Flush Flanged, EN 1092-1 Type D (Groove)		
FVW	Flush Flanged, EN 1092-1 Type C (Tongue)		
Process Connection Size			
Expanded			
G	DN 50		
J	DN 80		
Flange/Pressure Rating			
Expanded			
G	PN 40		
Diaphragm and Wetted, Upper Housing, Flange Material			
	Diaphragm and Wetted	**Upper Housing**	**Flange**
Expanded			
DA(1)	316L SST	316L SST	316 SST
KB(2)	Alloy C-276	316L SST	316 SST
DC(1)	Tantalum	316L SST	316 SST
Flushing Connection Ring Material (Lower Housing)			
Expanded			
0	None		
Flushing Connection Options, Quantity (Size)			
Expanded			
0	None		

Options (Include with selected model number)

Cold Temperature Application	
Expanded	
B	Extra Fill For Cold Temperature Application
Alternate Design	
Expanded	
E	One Piece Design
Typical Model Number: 1199 W DC 1 0 A FUW J G DA 0 0	

(1) Only available with one piece design, option code E.

(2) Only available with two-piece design.

Threaded Seal Assemblies



RTW THREADED SEAL

Table 23. RTW Threaded Seal Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Code	Industry Standard			
Standard				**Standard**
A	ANSI/ASME B1.20.1 (American National Standards Institute/American Society of Mechanical Engineers			★
D	EN 10226-1 (European Standard)			★
Process Connection Style				
Standard				**Standard**
RTW	Threaded (standard thread is female, for male select Option code 9)			★
Process Connection Size				
	ANSI/ASME B1.20.1	**EN 10226-1**		
Standard				**Standard**
3	1/2-14 NPT	—		★
4	3/4-14 NPT	—		★
5	1-11.5 NPT	—		★
7(1)	1 1/2-11.5 NPT	—		★
Expanded				
1	1/4-18 NPT	—		
C	—	Parallel thread: G 1/2A DIN 16288		
2	3/8-18 NPT	—		
6(1)	1 1/4-11.5 NPT	—		
N	—	Tapered thread: R 1/2 per ISO 7/1		
Pressure Rating				
	ANSI/ASME B1.20.1	**EN 10226-1**		
Standard				**Standard**
0	2500 psi	172 bar		★
Expanded				
2(2)	5000 psi	344 bar		
3(2)(3)	10000 psi	—		
8	1500 psi (4.1-in. (104 mm) diaphragm	103 bar (4.1-in. (104 mm) diaphragm		
Diaphragm, Upper Housing, Flange Material				
	Diaphragm	**Upper Housing**	**Flange**	
Standard				**Standard**
CA	316L SST	316L SST	CS	★
DA	316L SST	316L SST	316 SST	★
CB	Alloy C-276	316L SST	CS	★
DB	Alloy C-276	316L SST	316 SST	★
CC	Tantalum	316L SST	CS	★
DC	Tantalum	316L SST	316 SST	★
Expanded				
DJ	Alloy B	316L SST	316 SST	
DF	304L SST	316L SST	316 SST	
DP	Nickel 201	316L SST	316 SST	
DV	Alloy 400	316L SST	316 SST	
RH(4)	Titanium Grade 4	Titanium Grade 4	316 SST	
DH(5)	Titanium Grade 4	316L SST	316 SST	

Table 23. RTW Threaded Seal Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

D4	Alloy 22	316L SST	316 SST	
D5	Duplex 2507 SST	316L SST	316 SST	
DE	Alloy 600	316L SST	316 SST	
DZ[5]	Zirconium 702	316L SST	316 SST	
DK	Alloy 20	316L SST	316 SST	
RZ[4]	Zirconium 702	Zirconium 702	316 SST	
Flushing Connection Ring Material (Lower Housing)[6][7]				
Standard				**Standard**
A	316L SST			★
B	Alloy C-276			★
Expanded				
D	Plated Carbon Steel			
2	Duplex 2205 SST			
H	Titanium Grade 4			
V	Alloy 400			
F	304L SST			
Flushing Connection Options				
Standard				**Standard**
5	None			★
1	1 (1/4-18 NPT)			★
3	2 (1/4-18 NPT)			★
Expanded				
7	1 (1/2-14 NPT)			
9	2 (1/2-14 NPT)			

Options (Include with selected model number)

Gasket Material		
Standard		**Standard**
J	PTFE gasket (for use with flushing connection ring)	★
N	Grafoil® gasket (for use with flushing connection ring)	★
R	Ethylene Propylene gasket (for use with flushing connection ring)	★
Expanded		
K	Barium Sulfate filled PTFE gasket (for use with flushing connection ring)	
Flushing Plug, Vent/Drain Valve		
Standard		**Standard**
D	Alloy C-276 plug(s) for flushing connection(s)	★
G	316 SST plug(s) for flushing connection(s)	★
H	316 SST vent/drain for flushing connection(s)	★
Diaphragm Thickness		
Expanded		
C	0.006-in. (150 µm) available with 316L SST, Alloy C-276, and Duplex 2507 SST for abrasive applications	
Bolt Material		
Standard		**Standard**
3	304 SST Bolts	★
Expanded		
4	316 SST Bolts	
Code Conformance		
Standard		**Standard**
T	Wetted Materials Compliance to NACE MRO175/ISO 15156, MRO103	★
Cold Temperature Application		
Standard		**Standard**
B	Extra Fill For Cold Temp Application	★

Table 23. RTW Threaded Seal Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Diaphragm Coating		
Expanded		
U(8)	0.001-in. (25 µm) Gold plated diaphragm	
V(9)	PTFE coated diaphragm for nonstick purposes only	
Special Threads in Lower Housing		
Expanded		
9	Male Threads	
Typical Model Number: 1199 W DC 1 0 A RTW 3 0 DA A 5		

(1) Flushing connection not available.

(2) Consult an Emerson Process Management representative for pricing and availability on Pressure Rating codes 2 or 3.

(3) The following process connection sizes are D rated: 3/4-in (9000 psi/621 bar), 1-in. (8700 psi/600 bar), 1 1/4-in (7000 psi/483 bar), and 1 1/2-in. (6000 psi/414 bar).

(4) Not available with welded capillary connections or direct mount.

(5) Operating temperature is limited to 302 °F (150 °C).

(6) Supplied with C4401 aramid fiber gasket.

(7) Flushing Connection Ring/ Lower Housing assembly bolts provided as standard are carbon steel for ANSI and 304 SST for EN.

(8) Only available on 316LSS, Alloy 400, and Alloy C-276.

(9) Not available with transmitter option code Q8, for Material Traceability per EN 10204 3.1 of the transmitter / seal assembly.



HTS MALE THREADED SEAL

Table 24. HTS Male Threaded Flush Type Seal Ordering Information(1)

This seal is part of the Expanded offering and is subject to additional delivery lead time.

Code	Industry Standard	
Expanded		
A	ANSI/ASME B1.20.1 (American National Standards Institute/American Society of Mechanical Engineers)	
D	EN 10226-1 (European Standard)	
Process Connection Style		
Expanded		
HTS	Male Threaded Seal	
Process Connection Size, Pressure Rating		
	ANSI/ASME B1.20.1	**EN 10226-1**
Expanded		
5A	1-11,5 NPT, 8700 psi (600 bar)	—
7A	1½-11,5 NPT, 6000 psi (414 bar)	—
9A	2-11,5 NPT, 4000 psi (276 bar)	—
EA	—	G1, 455 bar (6598 psi)
GA	—	G1 1/2, BSP, 400 bar (5800 psi)
JA	—	G2, BSP, 280 bar (4060 psi)
Diaphragm and Wetted, Upper Housing Material		
	Diaphragm and Wetted	**Upper Housing**
Expanded		
LA00	316L SST	316L SST
Typical Model Number: 1199 W DC 1 0 A HTS 7 A LA 0 0		

(1) Consult an Emerson Process Management representative for use with low calibrated spans.

Hygienic Seal Assemblies

SCW HYGIENIC TRI-CLOVER STYLE TRI-CLAMP SEAL



Table 25. SCW Hygienic Tri-Clover Style Tri-Clamp Seal Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Industry Standard			
Standard			**Standard**
S	Hygienic Seal (Conforms to 3-A Standard 74-03)		★
Process Connection Style			
Standard			**Standard**
SCW(1)	Tri-Clover Style Tri-Clamp Seal		★
Process Connection Size			
Standard			**Standard**
30(2)	1½-in.		★
50(3)	2-in.		★
70	3-in.		★
Expanded			
60	2½-in.		
90	4-in.		
Diaphragm and Wetted, Upper Housing Material			
	Diaphragm and Wetted	**Upper Housing**	
Standard			**Standard**
LA00	316L SST	316L SST	★
Expanded			
LB00	Alloy C-276	316L SST	

Options (Include with selected model number)

Surface Finish		
Expanded		
D	10 µin. (0.25 µm) R_a surface finish	
G	15 µin. (0.375 µm) R_a surface finish	
H	20 µin. (0.50 µm) R_a surface finish	
Non-Hygienic Fill Fluid		
Expanded		
P	Non-Hygienic fill fluid (does not conform to 3-A Standard 74)	
Clamp and Gasket Material		
Expanded		
2	High-Pressure Ladish Clamp & Nitrile butadiene (NBR) gasket	
3	Nitrile butadiene (NBR) gasket	
Polishing		
Expanded		
6	Electro polishing	
Typical Model Number: 1199 W NC 1 0 S SCW 7 0 LA 0 0		

(1) Clamp and gasket furnished by user. The maximum working pressure is dependent upon the clamp pressure rating.

(2) Consult factory for calibrated spans lower than 15 psi (1034 mbar).

(3) Consult factory for calibrated spans lower than 5 psi (345 mbar).



SSW HYGIENIC TANK SPUD SEAL

Table 26. SSW Hygienic Tank Spud Seal Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Code	Industry Standard		
Standard			**Standard**
S	Hygienic Seal (Conforms to 3-A Standard 74-03)		★
Process Connection Style			
Standard			**Standard**
SSW(1)	Tank Spud Seal		★
Process Connection Size, Pressure Rating			
Standard			**Standard**
A0	4-in. Sch. 5 Tri-Clamp, 600 psi (41 bar)		★
Upper Housing			
Standard			**Standard**
A	316L SST		★
Diaphragm and Wetted, Extension Material			
	Diaphragm and Wetted	**Extension**	
Standard			**Standard**
AL	316L SST(2)	316L SST(2)	★
Expanded			
BB	Alloy C-276	316L SST	★
Extension Length			
Standard			**Standard**
2	2-in.		★
6	6-in.		★

Options (Include with selected model number)

Surface Finish		
Expanded		
G(3)	15 μin. (0.375 μm) diaphragm surface finish	
H	20 μin.(0.5 μm) diaphragm surface finish	
Diaphragm Thickness		
Expanded		
C	0.006-in. (150 μm)	
Tank Spud		
Standard		**Standard**
1	Tank Spud Included with Shipment	★
Non-Hygienic Fill Fluid		
Expanded		
P	Non-Hygienic fill fluid (Does not conform to 3-A Standard 74)	
Non-Hygienic Fill Fluid		
Expanded		
3	Nitrile butadiene (NBR) O-ring instead of Standard Ethylene Propylene O-ring (Conforms to 3-A Standard 74)	
4	Flourocarbon (FMK)® O-ring, instead of Standard Ethylene Propylene O-ring (Conforms to 3-A Standard 74)	
Polishing		
Expanded		
6	Electro polishing	
Typical Model Number: 1199 W NC 1 0 S SSW A 0 AA L 2		

(1) Clamp and Ethylene Propylene o-ring (conforms to 3-A standard 74 and USP class VI) supplied.

(2) Diaphragm brazed and TIG-welded to extension.

(3) Requires Option code 6, Electro polishing.



STW HYGIENIC THIN WALL TANK SPUD SEAL

Table 27. STW Hygienic Thin Wall Tank Spud Seal Ordering Information

This seal is part of the Expanded offering and is subject to additional delivery lead time.

Code	Industry Standard	
Expanded		
S	Hygienic Seal (Conforms to 3-A Standard 74-03)	
Process Connection Style		
Expanded		
STW(1)	Thin Wall Tank Spud Seal	
Process Connection Size, Pressure Rating		
Expanded		
B0	4-in. Tri-Clamp, 600 psi (41 bar)	
Diaphragm and Wetted, Extension Material		
	Diaphragm and Wetted	**Extension**
Expanded		
LA00	316L SST	316L SST
BB00	Alloy C-276	Alloy C-276

Options (Include with selected model number)

Surface Finish		
Expanded		
G(2)	15 μin. (0.375 μm) diaphragm surface finish	
H	20 μin.(0.5 μm) diaphragm surface finish	
Non-Hygienic Fill Fluid		
Expanded		
P	Non-Hygienic fill fluid (Does not conform to 3-A Standard 74)	
Polishing		
Expanded		
6	Electro polishing	
Typical Model Number: 1199 W NC 1 0 S STW B 0 LA 0 0		

(1) For tank walls up to 3/16-in. thick. Clamp and Ethylene Propylene o-ring supplied.

(2) Requires Option code 6, Electro polishing.



EES HYGIENIC FLANGED TANK SPUD EXTENDED SEAL

Table 28. EES Hygienic Flanged Tank Spud Extended Seal Ordering Information

This seal is part of the Expanded offering and is subject to additional delivery lead time.

Code	Industry Standard	
Expanded		
S	Hygienic Seal (Conforms to 3-A Standard 74-03)	
Process Connection Style		
Expanded		
EES	Flanged Tank Spud Seal	
Process Connection Size, Pressure Rating		
Expanded		
GG	DN 50, PN 40	
JG	DN 80, PN 40	
Diaphragm and Wetted, Extension Material		
	Diaphragm and Wetted	**Extension**
Expanded		
LA	316L SST	316L SST
LB	Alloy C-276	316L SST
Extension Length(1)		
Expanded		
10	25 mm (1-in.)	
Options (Include with selected model number)		
Surface Finish		
Expanded		
G(2)	15 µ-in. (0.375 µm) Ra surface finish	
H	20 µ-in. (0.50 µm) Ra surface finish	
Gasket Material		
Expanded		
1	Flourocarbon (FMK) O-ring, instead of Standard Ethylene Propylene O-ring (Conforms to 3-A Standard 74)	
Cold Temperature Application		
Expanded		
B	Extra Fill For Cold Temperature Application	
Polishing		
Expanded		
6	Electro polishing	
Typical Model Number: 1199 W NC 1 0 S EES J G LA 1 0		

(1) Other extension lengths are available upon request.

(2) Requires Option code 6, Electro polishing.



VCS TRI-CLAMP® IN-LINE SEAL

Table 29. VCS Tri-Clamp In-Line Seal Ordering Information

This seal is part of the Expanded offering and is subject to additional delivery lead time.

Code	Industry Standard	
Expanded		
S	Hygienic Seal (Conforms to 3-A Standard 74-03)	
Process Connection Style		
Expanded		
VCS(1)	In-Line Tri-Clover Style Tri-Clamp Seal	
Process Connection Size		
Expanded		
20(2)	1-in.	
30(3)	1½-in.	
50	2-in.	
70	3-in.	
90	4-in.	
Diaphragm and Wetted, Upper Housing Material		
	Diaphragm and Wetted	**Upper Housing**
Expanded		
LA00	316L SST	316L SST

Options (Include with selected model number)

Surface Finish		
Expanded		
G(4)	15 µ-in. (0.375 µm) Ra surface finish	
H	20 µ-in. (0.50 µm) Ra surface finish	
Non-Hygienic Fill Fluid		
Expanded		
P	Non-Hygienic fill fluid (does not conform to 3-A Standard 74)	
Polishing		
Expanded		
6	Electro polishing	
Typical Model Number: 1199 W NC 1 0 S VCS 7 0 LA 0 0		

(1) Gasket and clamp are furnished by the user. The maximum working pressure is dependent upon the clamp pressure rating.

(2) Consult factory for calibrated spans lower than 15 psi (1034 mbar).

(3) Consult factory for calibrated spans lower than 5 psi (345 mbar).

(4) Requires Option code 6, Electro polishing.



SVS VARIVENT® COMPATIBLE HYGIENIC CONNECTION SEAL

Table 30. SVS Varivent® Compatible Hygienic Connection Seal Ordering Information
This seal is part of the Expanded offering and is subject to additional delivery lead time.

Code	Industry Standard	
Expanded		
S	Hygienic Seal (Conforms to 3-A Standard 74-03)	
Process Connection Style		
Expanded		
SVS	Tuchenhagen Varivent Compatible Seal	
Process Connection Size		
Expanded		
V0(1)	Varivent® Type N DN 40-162	
Diaphragm and Wetted, Upper Housing Material		
	Diaphragm and Wetted	**Upper Housing**
Expanded		
LA00	316L SST	316L SST
Options (Include with selected model number)		
Non-Hygienic Fill Fluid		
Expanded		
P	Non-Hygienic fill fluid (does not conform to 3-A Standard 74)	
Cold Temperature Application		
Expanded		
B	Extra Fill For Cold Temperature Application	
Polishing		
Expanded		
6	Electro polishing	
Typical Model Number: 1199 W NC 1 0 S SVS V 0 LA 0 0		

(1) Consult factory for calibrated spans lower than 15 psi (1034 mbar).



SHP Hygienic Cherry-Burrell “I” LINE SEAL

Table 31. SHP Hygienic Cherry-Burrell “I” Line Seal Ordering Information

This seal is part of the Expanded offering and is subject to additional delivery lead time.

Code	Industry Standard	
Expanded		
S	Hygienic Seal (Conforms to 3-A Standard 74-03)	
Process Connection Style		
Expanded		
SHP(1)	Cherry-Burrell “I” Line Style Seal	
Process Connection Size		
Expanded		
50(2)	2-in.	
70	3-in.	
Diaphragm and Wetted, Upper Housing Material		
	Diaphragm and Wetted	**Upper Housing**
Expanded		
AA00	316L SST	316L SST
Options (Include with selected model number)		
Non-Hygienic Fill Fluid		
Expanded		
P	Non-Hygienic fill fluid (does not conform to 3-A Standard 74)	
Typical Model Number: 1199 W NC 1 0 S SHP 7 0 AA 0 0		

(1) Clamp and gasket furnished by user. Maximum working pressure is the lesser of either clamp pressure rating or 500 psi.

(2) Consult factory for calibrated spans lower than 5 psi (345 mbar).



SLS DAIRY PROCESS CONNECTION - FEMALE THREAD SEAL PER DIN 11851

Table 32. SLS Hygienic Dairy Process Connection Female Thread Seal Ordering Information

This seal is part of the Expanded offering and is subject to additional delivery lead time.

Code	Industry Standard	
Expanded		
S	Hygienic Seal (Conforms to 3-A Standard 74-03)	
Process Connection Style		
Expanded		
SLS	Dairy Process Connection - Female Thread	
Process Connection Size, Pressure Rating, Material		
Expanded		
F0[(1)]	DIN 11851 with coupling nut DN 40, PN 40, 304 SST	
G0[(2)]	DIN 11851 with coupling nut DN 50, PN 25, 304 SST	
Diaphragm and Wetted, Upper Housing Material		
	Diaphragm and Wetted	**Upper Housing**
Expanded		
LA00	316L SST	316L SST
Options (Include with selected model number)		
Polishing		
Expanded		
6	Electro polishing	
Typical Model Number: 1199 W HC 1 0 S SLS J 0 LA 0 0		

(1) Consult factory for calibrated spans lower than 15 psi (1034 mbar).

(2) Consult factory for calibrated spans lower than 5 psi (345 mbar).

Specialty Seal Assemblies



WSP SADDLE SEAL

Table 33. WSP Saddle Seal Ordering Information

This seal is part of the Expanded offering and is subject to additional delivery lead time.

Code	Industry Standard	
Expanded		
N	Non-Industry Standard	
Process Connection Style		
Expanded		
WSP	Saddle Seal	
Process Connection Size		
Expanded		
G	2-in. Pipe size	
7	3-in. Pipe size	
9	4-in. or larger Pipe size	
Pressure Rating		
Expanded		
1	1500 psig at 100 °F (103 bar at 38 °C) eight bolt holes	
0	1250 psig at 100 °F (86 bar at 38 °C) six bolt holes	
Diaphragm, Upper Housing Material		
	Diaphragm	**Upper Housing**
Expanded		
LA	316L SST	316L SST
LB	Alloy C-276	316L SST
LC	Tantalum	316L SST
Lower Housing Material[(1)(2)]		
Expanded		
00	None	
L5	316L SST	
B5	Alloy C-276	
D5	Plated Carbon Steel	

Options (Include with selected model number)

Gasket Material		
Expanded		
J	PTFE gasket	
N	Grafoil® gasket	
Code Conformance		
Expanded		
T	Wetted Materials Compliance to NACE MRO175/ISO 15156, MRO103	
Diaphragm Coating		
Expanded		
V[(3)]	PTFE Coated Diaphragm for nonstick purposes (316L SST and Alloy C-276 diaphragms only)	
Typical Model Number: 1199 W DC 1 0 N WSP 7 1 LA L N		

(1) Standard pipe schedule 40/40S, for other pipe schedules consult the factory.

(2) Supplied with C4401 Aramid fiber gasket.

(3) Not available with transmitter option code Q8, for Material Traceability per EN10204 3.1 of the transmitter / seal assembly.





UCP MALE THREADED PIPE MOUNT SEALS AND PMW PAPER MILL SLEEVE SEALS

Table 34. UCP and PMW Threaded Pipe Mount Seal Ordering Information

This seal is part of the Expanded offering and is subject to additional delivery lead time.

Industry Standard		
Expanded		
N	Non-Industry Standard	
Process Connection Style		
Expanded		
UCP	Male Threaded Pipe Mount Seal	
PMW	Paper Mill Sleeve	
Process Connection Size, Pressure Rating		
Expanded		
30(1)	1 1/2-in., Threaded Knurled Nut, 600 psi at 100 °F (41 bar at 38 °C) (UCP only)	
50(2)	1-in., Cap Screw Retainer, 300 psi at 100 °F (21 bar at 38 °C) (PMW only)	
Diaphragm and Wetted, Upper Housing Material		
	Diaphragm and Wetted	**Upper Housing**
Expanded		
AA	316L SST	316L SST
BB	Alloy C-276	Alloy C-276
Lower Housing Material		
Expanded		
00	None	
A0	316L SST	
B0	Alloy C-276	
Options (Include with selected model number)		
Diaphragm Coating		
Expanded		
V(3)	PTFE coated diaphragm for nonstick purposes only	
Typical Model Number: 1199 W DC 1 0 N UCP 3 0 AA A 0		

(1) Only available with UCP process connection size. Consult factory for calibrated spans lower than 50 psi (3,4 bar).

(2) Only available with PMW process connection size. Consult factory for calibrated spans lower than 100 psi (6,9 bar).

(3) Not available with transmitter option code Q8, for Material Traceability per EN10204 3.1 of the transmitter / seal assembly.



CTW CHEMICAL TEE SEAL

Table 35. CTW Chemical Tee Seal Ordering Information

This seal is part of the Expanded offering and is subject to additional delivery lead time.

Code	Industry Standard	
Expanded		
N	Non-Industry Standard	
Process Connection Style		
Expanded		
CTW	Chemical Tee Seal	
Maximum Working Pressure (Flange Rating)		
Expanded		
20	300 psi (21 bar)	
Diaphragm and Wetted, Upper Housing Material		
	Diaphragm and Wetted	**Upper Housing**
Expanded		
AA	316L SST	316L SST
BB	Alloy C-276	Alloy C-276
Lower Housing		
Expanded		
00	None	
Options (Include with selected model number)		
Code Conformance		
Expanded		
T	Wetted Materials Compliance to NACE MRO175/ISO 15156, MRO103	
Diaphragm Coating		
Expanded		
V(1)	PTFE coated diaphragm for nonstick purposes only	
Typical Model Number: 1199 W NC 1 0 N CTW 2 0 AA 0 0		

(1) Not available with transmitter option code Q8, for Material Traceability per EN10204 3.1 of the transmitter / seal assembly.



TFS WAFER STYLE IN-LINE SEAL

Table 36. TFS Wafer Style In-Line Seal Ordering Information

This seal is part of the Expanded offering and is subject to additional delivery lead time.

Code	Industry Standard	
Expanded		
A	ANSI/ASME B16.5 (American National Standards Institute/American Society of Mechanical Engineers)	
D	EN 1092-1 (European Standard)	
Process Connection Style		
Expanded		
TFS	Wafer Style In-Line Seal	
Process Connection Size		
	ANSI/ASME B16.5	**EN 1092-1**
Expanded		
G	2-in.	DN 50
7	3-in.	—
J	—	DN 80
9	4-in.	—
2(1)	1-in.	—
4(2)	1½-in.	—
D(1)	—	DN 25
F(2)	—	DN 40
K	—	DN 100
Pressure Rating		
Expanded		
0	Seal MWP based on customer supplied flange	
Diaphragm and Wetted, Upper Housing Material		
	Diaphragm and Wetted	**Upper Housing**
Expanded		
LA	316L SST	316L SST
LB	Alloy C-276	316L SST
Housing Body Length		
Expanded		
00	3.54-in. (90 mm)	
Typical Model Number: 1199 W DC 1 0 A TFS 7 0 LA 0 0		

(1) Consult factory for calibrated spans lower than 15 psi (1034 mbar).

(2) Consult factory for calibrated spans lower than 5 psi (345 mbar).



WFW FLOW-THRU FLANGED SEAL

Table 37. WFW Flow-Thru Flanged Seal Ordering Information

This seal is part of the Expanded offering and is subject to additional delivery lead time.

Code	Industry Standard	
Expanded		
A	ANSI/ASME B16.5 (American National Standards Institute/American Society of Mechanical Engineers)	
Process Connection Style		
Expanded		
WFW(1)	Flow-Thru Flanged Seal	
Process Connection Size(2)		
Expanded		
G	2-in.	
7	3-in.	
2	1-in.	
Flange Rating(2)		
Expanded		
1	Class 150(2)	
Diaphragm, Upper Housing Material		
	Diaphragm	**Upper Housing(2)**
Expanded		
LA	316L SST	316L SST
Lower Housing Material(1)		
Expanded		
L	316L SST	
Pipe Schedule(2)		
Expanded		
N	40/40S	

Options (Include with selected model number)

Gasket Material	
Expanded	
J	PTFE O-ring
K	Barium Sulfate filled PTFE gasket
N	Grafoil® gasket
R	Ethylene Propylene gasket
Bolt Material	
Expanded	
3	304 SST bolts
Code Conformance	
Expanded	
T	Wetted Materials Compliance to NACE MRO175/ISO 15156, MRO103
Cold Temperature Application	
Expanded	
B	Extra Fill For Cold Temperature Application
Typical Model Number: 1199 W DC 1 0 A TFS 7 0 LA 0 0	

(1) Supplied with C4401 Aramid fiber gasket.

(2) Consult factory for special process connection sizes, flange pressure ratings, diaphragm/lower housing materials, and pipe schedules.

Specifications

LIQUID LEVEL TRANSMITTER SPECIFICATIONS

Performance Specifications

For zero-based spans, reference conditions, silicone oil fill, glass-filled PTFE O-rings, SST materials, Coplanar flange (3051SMV, 3051S_C) or 1/2-in.- 14 NPT (3051S_T) process connections, digital trim values set to equal range points.

Conformance to Specification (±3σ (Sigma))

Technology leadership, advanced manufacturing techniques, and statistical process control ensure measurement specification conformance to ±3σ or better.

Reference Accuracy(1)

Stated reference accuracy equations include terminal based linearity, hysteresis, and repeatability, but does not include analog output reference accuracy of ±0.005% of span.

For FOUNDATION™ fieldbus and wireless devices, use calibrated range in place of span.

3051SAL_C	±0.065% of span; For spans less than 10:1, $\pm\left[0.015 + 0.005\left(\frac{URL}{span}\right)\right]$% of span
3051L All Ranges	±0.075% of span For spans less than 10:1, accuracy = $\pm\left[0.025 + 0.005\left(\frac{URL}{Span}\right)\right]$% of Span
2051L Ranges 2-4	±0.075% of span For spans less than 10:1, accuracy = $\pm\left[0.025 + 0.005\left(\frac{URL}{Span}\right)\right]$% of Span

(1) Stated reference accuracy equations include terminal based linearity, hysteresis, and repeatability, but does not include analog only reference accuracy of ±0.005% of span.

DP Reference Accuracy of 3051S ERS System(1)

Two Coplanar Gage Sensors (3051SAM_ _G)		
	Ultra	**Classic**
Ranges 2-4	±0.035% of DP span	±0.078% of DP span
Range 5	±0.071% of DP span	±0.092% of DP span
Two Coplanar Absolute Sensors (3051SAM_ _A)		
	Ultra	**Classic**
Ranges 1-4	±0.035% of DP span	±0.078% of DP span
Two In-Line Gage Sensors (3051SAM_ _T) **Two In-Line Absolute Sensors (3051SAM_ _E)**		
	Ultra	**Classic**
Ranges 1-4	±0.035% of DP span	±0.078% of DP span
Two Liquid Level Sensors (3051SAL)		
	Ultra	**Classic**
Ranges 1-5	±0.092% of DP span	±0.092% of DP span

(1) DP Accuracy specifications for the 3051S ERS System assume that the configuration contains two sensors with identical ranges that are calibrated 0 – URL, and that the DP Span = 10% of each sensor's URL.

Warranty[1]

Models[1]	Ultra	Classic
3051SAM and 3051SAL	12-year limited warranty[2]	1-year limited warranty[3]

(1) Warranty details can be found in Emerson Process Management Terms and Conditions of Sale, Document 63445, Rev G (10/06).

(2) Rosemount Ultra and Ultra for Flow transmitter have a limited warranty of twelve (12) years from date of shipment. All other provisions of Emerson Process Management standard limited warranty remains the same.

(3) Goods are warranted for twelve (12) months from the date of initial installation or eighteen (18) months from the date of shipment by seller, whichever period expires first.

Dynamic Performance

See Instrument Toolkit®.

Ambient Temperature Effect

See Instrument Toolkit.

Mounting Position Effects

With liquid level remote mount seal in vertical plane, zero shift of up to ±1 inH_2O (2,49 mbar); with remote mount seal in horizontal plane, zero shift of up to ±5 inH_2O (12,45 mbar) plus extension length on extended units; all zero shifts can be zeroed; no span effect.

Vibration Effect

3051SAM **3051SAL**	Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field or pipeline with high vibration level (10-60 Hz 0.21mm displacement peak amplitude / 60-2000 Hz 3g). For Housing Style codes 1J, 1K, 1L, 2J, and 2M: Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field with general application or pipeline with low vibration level (10-60 Hz 0.15mm displacement peak amplitude / 60-500 Hz 2g).
3051L	Measurement effect due to vibrations is negligible except at resonance frequencies. When at resonance frequencies, vibration effect is less than ±0.1% of URL per g when tested between 15 and 2000 Hz in any axis relative to pipe-mounted process conditions.
2051L	Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field or pipeline with high vibration level (10-60 Hz 0.21mm displacement peak amplitude / 60-2000 Hz 3g).

Power Supply Effect

Less than ±0.005% of calibrated span per volt.

Electromagnetic Compatibility (EMC)

Meets all relevant requirements of EN 61326 and NAMUR NE-21.[1]

(1) NAMUR NE-21 does not apply to wireless output code X.

Transient Protection (Option T1)

3051SAM **3051SAL**	Meets IEEE C62.41.2-2002, Location Category B 6 kV crest (0.5 μs - 100 kHz) 3 kA crest (8 × 20 microseconds) 6 kV crest (1.2 × 50 microseconds) Meets IEEE C37.90.1-2002 Surge Withstand Capability SWC 2.5 kV crest, 1.0 MHz wave form
3051L	Meets IEEE C62.41, Category B 6 kV crest (0.5 μs - 100 kHz) 3 kV crest (8 × 20 microseconds) 6 kV crest (1.2 × 50 microseconds)
2051L	Meets IEEE C62.41, Category Location B 6 kV crest (0.5 μs - 100 kHz) 3 kV crest (8 × 20 microseconds) 6 kV crest (1.2 × 50 microseconds)

Functional Specifications

Range and Sensor Limits

Table 38. 3051SAM_ _G, 3051SAL_ _D, 3051SAL_ _G Range and Sensor Limits

Range	Minimum Span		Range Limits		
				Lower (LRL)	
	Ultra	Classic	Upper (URL)	3051S_LG[1][2]	3051S_LD[1]
2	1.3 inH_2O (3,11 mbar)	2.5 inH_2O (6,23 mbar)	250.0 inH_2O (0,62 bar)	-250.0 inH_2O (-0,62 bar)	-250.0 inH_2O (-0,62 bar)
3	5.0 inH_2O (12,4 mbar)	10.0 inH_2O (24,9 mbar)	1000.0 inH_2O (2,49 bar)	-393.0 inH_2O (-979 mbar)	-1000.0 inH_2O (-2,49 bar)
4	1.5 psi (103,4 mbar)	3.0 psi (206,8 mbar)	300.0 psi (20,7 bar)	-14.2 psig (-979 mbar)	-300.0 psi (-20,7 bar)
5	10.0 psi (689,5 mbar)	20.0 psi (1,38 bar)	2000.0 psi (137,9 bar)	-14.2 psig (-979 mbar)	- 2000.0 psi (-137,9 bar)

(1) When specifying a 3051SAL Ultra, use Classic minimum span.

(2) Assumes atmospheric pressure of 14.7 psig (1 bar).

Table 39. 3051SAM_ _A, 3051SAL_ _A Range and Sensor Limits[1]

Range	Minimum Span		Range and Sensor Limits	
	Ultra	Classic	Upper (URL)	Lower (LRL)
1	0.3 psia (20,7 mbar)	0.3 psia (20,7 mbar)	30 psia (2,07 bar)	0 psia (0 bar)
2	0.75 psia (51,7 mbar)	1.5 psia (0,103 bar)	150 psia (10,34 bar)	0 psia (0 bar)
3	4 psia (275,8 mbar)	8 psia (0,55 bar)	800 psia (55,16 bar)	0 psia (0 bar)
4	20 psia (1,38 bar)	40 psia (2,76 bar)	4000 psia (275,8 bar)	0 psia (0 bar)

(1) When specifying a 3051SAL Ultra, use Classic minimum span.

Table 40. 3051SAM_ _T, 3051SAM_ _E, 3051SAL_ _T, 3051SAL_ _E Range and Sensor Limits

Range	Minimum Span		Range and Sensor Limits		
	Ultra	Classic	Upper (URL)	Lower (LRL) (Abs.)	Lower[1] (LRL) (Gage)
1	0.3 psi (20,7 mbar)	0.3 psi (20,7 mbar)	30 psi (2,07 bar)	0 psia (0 bar)	-14.7 psig (-1,01 bar)
2	0.75 psi (51,7 bar)	1.5 psi (0,103 bar)	150 psi (10,34 bar)	0 psia (0 bar)	-14.7 psig (-1,01 bar)
3	4 psi (275,8 mbar)	8 psi (0,55 bar)	800 psi (55,16 bar)	0 psia (0 bar)	-14.7 psig (-1,01 bar)
4	20 psi (1,38 bar)	40 psi (2,76 bar)	4000 psi (175,8 bar)	0 psia (0 bar)	-14.7 psig (-1,01 bar)
5	1000 psi (68,9 bar)	2000 psi (137,9 bar)	10000 psi (689,5 bar)	0 psia (0 bar)	-14.7 psig (-1,01 bar)

(1) Assumes atmospheric pressure of 14.7 psig (1 bar).

Table 41. 3051L Range and Sensor Limits

Range	Minimum Span	Range and Sensor Limits		
		Upper (URL)	Lower (LRL)	
			3051L Differential	3051L Gage
2	2.5 inH_2O (6,2 mbar)	250 inH_2O (0,62 bar)	–250 inH_2O (–0,62 bar)	–250 inH_2O (–0,62 bar)
3	10 inH_2O (24,9 mbar)	1000 inH_2O (2,49 bar)	–1000 inH_2O (–2,49 bar)	0.5 psia (34,5 mbar abs)
4	3 psi (0,20 bar)	300 psi (20,6 bar)	–300 psi (–20,6 bar)	0.5 psia (34,5 mbar abs)
5	20 psi (1,38 bar)	2000 psi (137,9 bar)	NA	NA

Table 42. 2051L Range and Sensor Limits

Range	Minimum Span	Range and Sensor Limits		
		Upper (URL)	Lower (LRL)	
			2051L Differential	2051L Gage(1)
2	2.5 inH_2O (6,2 mbar)	250 inH_2O (0,62 bar)	–250 inH_2O (–0,62 bar)	–250 inH_2O (–0,62 bar)
3	10 inH_2O (24,9 mbar)	1000 inH_2O (2,49 bar)	–1000 inH_2O (–2,49 bar)	–393 inH_2O (–979 mbar)
4	3 psi (0,207 bar)	300 psi (20,6 bar)	–300 psi (–20,7 bar)	–14.2 psig (–979 mbar)

(1) Assumes atmospheric pressure of 14.7 psig.

Service

Liquid, gas, and vapor applications

Protocols

4–20 mA (Output Code A)

Output

Two-wire 4–20 mA, user-selectable for linear or square root output. Digital process variable superimposed on 4–20 mA signal, available to any host that conforms to the HART protocol.

Power Supply

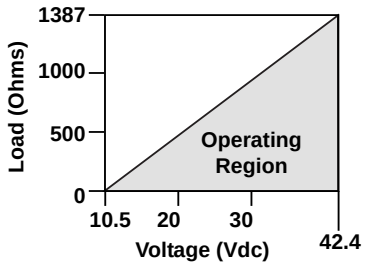
External power supply required. Standard transmitter (4–20 mA) operates on 10.5 to 55 Vdc with no load. The 3051S ERS System operates on 16 - 42.4 Vdc with no load.

Load Limitations

Maximum loop resistance is determined by the voltage level of the external power supplied as described by:

Standard HART Transmitter

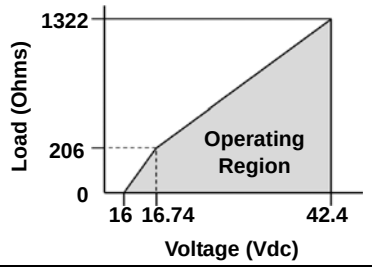
Maximum Loop Resistance = 43.5 * (Power Supply Voltage – 10.5)



The Field Communicator requires a minimum loop resistance of 250Ω for communication.

3051S ERS System

If supply voltage ≤ 16.74 Vdc:
Maximum Loop Resistance = 277 * (Power Supply Voltage – 16.0)
If supply voltage > 16.74 Vdc:
Maximum Loop Resistance = 43.5 * (Power Supply Voltage – 12.0)



The Field Communicator requires a minimum loop resistance of 250Ω for communication.

FOUNDATION fieldbus (output code F)

Power Supply

External power supply required; transmitters operate on 9.0 to 32.0 Vdc transmitter terminal voltage.

Current Draw

17.5 mA for all configurations (including LCD display option)

Indication

Optional two line LCD Display

FOUNDATION fieldbus Function Block Execution Times

Block	Execution Time (Milliseconds)		
	3051SAL_C	3051L	2051L
Resource	-	-	-
Transducer	-	-	-
LCD Block	-	-	-
Analog Input 1, 2	20	30	35
PID	35(1)	45	45
Input Selector	20	30	30
Arithmetic	20	35	35
Signal Characterizer	20	40	40
Integrator	20	35	35
Output Splitter	20	N/A	N/A
Control Selector	20	N/A	N/A

(1) PID with Auto-tune.

FOUNDATION fieldbus Parameters

Schedule Entries	7 (max.)
Links	20 (max.)
Virtual Communications Relationships (VCR)	12 (max.)

Standard Function Blocks

Resource Block

Contains hardware, electronics, and diagnostic information.

Transducer Block

Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

LCD Block

Configures the local display.

2 Analog Input Blocks

Processes the measurements for input into other function blocks. The output value is in engineering units or custom and contains a status indicating measurement quality.

PID Block

Contains all logic to perform PID control in the field including cascade and feedforward.

Backup Link Active Scheduler (LAS)

The transmitter can function as a Link Active Scheduler if the current link master device fails or is removed from the segment.

Advanced Control Function Block Suite (Option Code A01)

Input Selector Block

Selects between inputs and generates an output using specific selection strategies such as minimum, maximum, midpoint, average, or first “good.”

Arithmetic Block

Provides pre-defined application-based equations including flow with partial density compensation, electronic remote seals, hydrostatic tank gauging, ratio control, and others.

Signal Characterizer Block

Characterizes or approximates any function that defines an input/output relationship by configuring up to twenty X, Y coordinates. The block interpolates an output value for a given input value using the curve defined by the configured coordinates.

Integrator Block

Compares the integrated or accumulated value from one or two variables to pre-trip and trip limits and generates discrete output signals when the limits are reached. This block is useful for calculating total flow, total mass, or volume over time.

FOUNDATION fieldbus Diagnostics Suite (Option Code D01)

The FOUNDATION fieldbus Diagnostics provide Abnormal Situation Prevention (ASP) indication. The integral statistical process monitoring (SPM) technology calculates the mean and standard deviation of the process variable 22 times per second. The 3051S_L and 3051L use these values and highly flexible configuration options for customization to detect many user-defined or application specific abnormal situations (e.g. detecting plugged impulse lines and fluid composition change).

Profibus PA (Output Code W)

Profile Version

3.02

Power Supply

External power supply required; transmitters operate on 9.0 to 32.0 Vdc transmitter terminal voltage.

Current Draw

17.5 mA for all configurations (including LCD display option)

Output Update Rate

Four times per second

Standard Function Blocks

Analog Input (AI Block)

The AI function block processes the measurements and makes them available to the host device. The output value from the AI block is in engineering units and contains a status indicating the quality of the measurement.

Physical Block

The physical block defines the physical resources of the device including type of memory, hardware, electronics, and diagnostic information.

Transducer Block

Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

Indication

Optional two line LCD display

Local Operator Interface

Optional external configuration buttons

3051SAL_C Wireless Self-Organizing Networks

Output

WirelessHART, 2.4 GHz DSSS.
Wireless, 2.4 GHz DSSS or 900 MHz FHSS.

Local Display (WirelessHART only)

The optional five-digit LCD can display user-selectable information such as primary variable in engineering units, percent of range, sensor module temperature, and electronics temperature. Display updates at up to once per minute.

Local Display

The optional five-digit LCD can display primary variable in engineering units. Display updates at update rate up to once per minute.

Update Rate

WirelessHART, user selectable 8 sec. to 60 min.
Wireless, user selectable 15 sec. to 60 min.

Power Module (WirelessHART only)

Field replaceable, keyed connection eliminates the risk of incorrect installation, Intrinsically Safe Lithium-thionyl chloride Power Module with polybutadine terephthalate (PBT) enclosure. Ten-year life at one minute update rate.(1)

(1) Reference conditions are 70 °F (21 °C), and routing data for three additional network devices.
NOTE: Continuous exposure to ambient temperature limits of -40 °F or 185 °F (-40 °C or 85 °C) may reduce specified life by less than 20 percent.

Power Module

Field replaceable, keyed connection eliminates the risk of incorrect installation, Intrinsically Safe Lithium-thionyl chloride Power Module with polybutadine terephthalate (PBT) enclosure. Five-year life at one minute update rate, ten-year life at ten minute update rate.(1)

(1) Reference conditions are 70 °F (21 °C), and routing data for three additional network devices.
NOTE: Continuous exposure to ambient temperature limits of -40 °F or 185 °F (-40 °C or 85 °C) may reduce specified life by less than 20 percent.

Overpressure Limits

Limit is 0 psia to the flange rating or sensor rating, whichever is lower.

Table 43. 3051L and Level Flange Rating Limits

Standard	Type	CS Rating	SST Rating
ANSI/ASME	Class 150	285 psig	275 psig
ANSI/ASME	Class 300	740 psig	720 psig
ANSI/ASME	Class 600	1480 psig	1440 psig
At 100 °F (38 °C), the rating decreases with increasing temperature, per ANSI/ASME B16.5.			
DIN	PN 10–40	40 bar	40 bar
DIN	PN 10/16	16 bar	16 bar
DIN	PN 25/40	40 bar	40 bar
At 122 °F (50 °C), the rating decreases with increasing temperature per EN 1092-1 Annex F.			

Temperature Limits

Ambient

-40 to 185 °F (-40 to 85 °C)
With LCD display(1): -40 to 175 °F (-40 to 80 °C)
With option code P0: -20 to 185 °F (-29 to 85 °C)

(1) LCD display may not be readable and LCD updates will be slower at temperatures below -4 °F (-20 °C).

Storage

-50 to 185 °F (-46 to 85 °C)
With LCD display: -40 to 185 °F (-40 to 85 °C)
With Wireless Output: -40 to 185 °F (-40 to 85 °C)

Process Temperature Limits

Table 44. Fill Fluid Specifications

Seal Fill Fluid		Specific Gravity at 77 °F (25 °C)	Coeff. Of Therm. Exp. (cc/cc/°C)	Viscosity at 77 °F (25 °C) (Centistokes)	Temperature Limits(1)				
					No Extension	2-in. (50mm) Extension	4-in. (100mm) Extension	Thermal Optimizer	Capillary
A	Syltherm XLT	0.85	0.001199	1.6	-102 to 293 °F (-75 to 145 °C)	-102 to 293 °F (-75 to 145 °C)	102 to 293 °F (-75 to 145 °C)	102 to 293 °F (-75 to 145 °C)	102 to 293 °F (-75 to 145 °C)
C	Silicone 704	1.07	0.00095	44	32 to 401 °F (0 to 205 °C)(2)	32 to 464 °F (0 to 240 °C)(2)	32 to 500 °F (0 to 260 °C)(2)	32 to 599 °F (0 to 315 °C)	32 to 599 °F (0 to 315 °C)
D	Silicone 200	0.93	0.000108	9.5	-49 to 401 °F (-45 to 205 °C)	-49 to 401 °F (-45 to 205 °C)	-49 to 401 °F (-45 to 205 °C)	-49 to 401 °F (-45 to 205 °C)	-49 to 401 °F (-45 to 205 °C)
H	Inert (Halocarbon)	1.85	0.000864	6.5	-49 to 320 °F (-45 to 160 °C)	-49 to 320 °F (-45 to 160 °C)	-49 to 320 °F (-45 to 160 °C)	-49 to 320 °F (-45 to 160 °C)	-49 to 320 °F (-45 to 160 °C)
G(3)(4)	Glycerin and Water	1.13	0.00034	12.5	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)
N(4)	Neobee M–20	0.92	0.001008	9.8	5 to 401 °F(2) (-15 to 205 °C)	5 to 437 °F (-15 to 225 °C)	5 to 437 °F (-15 to 225 °C)	5 to 437 °F (-15 to 225 °C)	5 to 437 °F (-15 to 225 °C)
P(3)(4)	Proylene Glycol and Water	1.02	0.00034	2.8	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)	5 to 203 °F (-15 to 95 °C)

(1) Temperature limits are reduced in vacuum service and may be limited by seal selection.

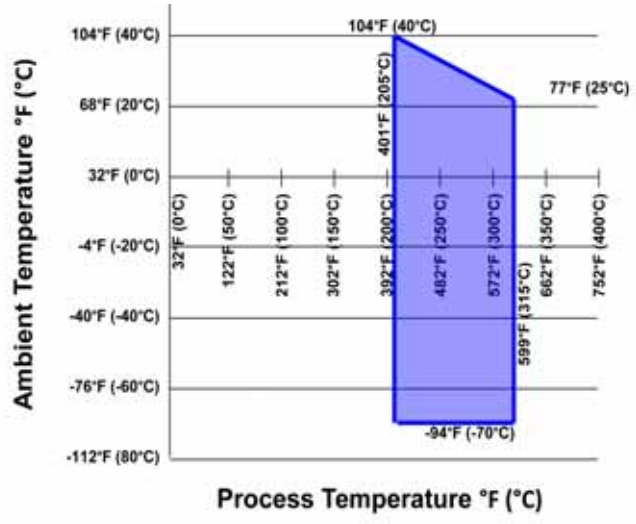
(2) Maximum process temperature is limited by heat transfer to the transmitter electronics and must be further derated if ambient temperatures exceed 70°F (21°C).

(3) Not suitable for vacuum applications.

(4) This is a food grade fill fluid.

For more information on Fill Fluids please see technical note Rosemount 1199 Fill Fluid Specifications 00840-2100-4016.

Figure 1. Thermal Optimizer with Silicone 704 Fill Fluid Temperature Limits



Humidity Limits

0–100% relative humidity

Turn-On Time

3051SAL_C	Performance within specifications less than 2.0 seconds after power is applied to the transmitter.
3051L	Performance within specifications less than 2.0 seconds (10.0 s for Profibus protocol) after power is applied to the transmitter
2051L	Performance within specifications less than 2.0 seconds after power is applied to the transmitter.
ERS System:	Performance within specifications less than 6.0 seconds after power is applied.

Volumetric Displacement

Less than 0.005 in^3 (0.08 cm^3)

Damping(1)

Software damping is in addition to sensor module response time.

3051SAL_C	Analog output response to a step change is user-selectable from 0 to 60 seconds for one time constant.
3051L	Analog output response to a step input change is user-selectable from 0 to 36 seconds for one time constant.
2051L	Analog output response to a step input change is user-selectable from 0 to 25.6 seconds for one time constant.
ERS System:	The PHI and PLO Pressure measurements and the DP calculation may be independently dampened from 0 – 60 seconds for one time constant.

(1) Does not apply to wireless option code X.

Physical Specifications

Electrical Connections

1/2–14 NPT, PG 13.5, G1/2, and M20 × 1.5 conduit. HART interface connections fixed to terminal block.

Non-Wetted Parts

	3051SAL	3051L	2051L
Electrical Housing	Low-copper aluminum alloy or SST: CF-3M (Cast 316L SST) or CF-8M (Cast 316 SST) NEMA 4X, IP 66, IP 68 (66 ft (20 m) for 168 hours) Note: IP 68 not available with Wireless Output.	Low-copper aluminum or CF-3M (Cast version of 316L SST, material per ASTM-A743). NEMA 4X, IP 65, IP 66	Low-copper aluminum or CF-8M (Cast version of 316 SST). Enclosure Type 4X, IP 65, IP 66, IP 68
Coplanar Sensor Module Housing	SST: CF-3M (Cast 316L SST)	CF-3M (Cast version of 316L SST, material per ASTM-A743)	CF-3M (Cast version of 316L SST)
Bolts	Plated carbon steel per ASTM A449, Type 1 Austenitic 316 SST per ASTM F593 ASTM A453, Class D, Grade 660 SST ASTM A193, Grade B7M alloy steel ASTM A193, Class 2, Grade B8M SST Alloy K-500	ASTM A449, Type 1 (zinc-cobalt plated carbon steel) ASTM F593G, Condition CW1 (Austenitic 316 SST) ASTM A193, Grade B7M (zinc plated alloy steel) Alloy K-500	ASTM A449, Type 1 (zinc-cobalt plated carbon steel) ASTM F593G, Condition CW1 (Austenitic 316 SST) ASTM A193, Grade B7M (zinc plated alloy steel)
Sensor Module Fill Fluid	Silicone or inert halocarbon (Inert is not available with 3051S_CA). In-Line series uses Fluorinert® FC-43.	Silicone 200 or Fluorocarbon oil (Halocarbon or Fluorinert® FC-43 for 3051T)	Silicone 200 or Fluorocarbon oil (Halocarbon or Fluorinert® FC-43 for 2051T)
Process Fill Fluid	Syltherm XLT, Silicone 704, Silicone 200, inert, glycerin and water, Neobee M-20, propylene glycol and water.	Syltherm XLT, Silicone 704, Silicone 200, inert, glycerin and water, Neobee M-20 or propylene glycol and water	Syltherm XLT, Silicone 704, Silicone 200, inert, glycerin and water, Neobee M-20 or propylene glycol and water
Paint for Aluminum Housing	Polyurethane	Polyurethane	Polyurethane
Cover O-ring	Nitrile butadiene (NBR)	Nitrile butadiene (NBR)	Nitrile butadiene (NBR)
Wireless Antenna	PBT/ polycarbonate (PC) integrated omnidirectional antenna	N/A	N/A
Power Module	Field replaceable, keyed connection eliminates the risk of incorrect installation, Intrinsically Safe Lithium-thionyl chloride Power Module with PBT enclosure	N/A	N/A

Capillary Armor is SST.

NOTE
If a lower housing is supplied, then the following gaskets are the default gaskets for each seal.

Wetted Materials

Seal	Gaskets
FFW	ThermoTork TN-9000 gasket
FCW	No gasket is supplied
FUW	No gasket is supplied
FVW	No gasket is supplied
RCW	C-4401 gasket
RFW	C-4401 gasket
FTW	C-4401 gasket
PFW	ThermoTork TN-9000 gasket
PCW	No gasket is supplied

Shipping Weights

Table 45. 3051SAL Weights Without SuperModule Platform, Housing, or Transmitter Options

Flange	Flush lb. (kg)	2-in. Ext. lb (kg)	4-in. Ext. lb (kg)	6-in. Ext. lb (kg)
2-in., 150	9.5 (4,3)	—	—	—
3-in., 150	15.7 (7,1)	16.4 (7,4)	17.6 (8,0)	18.9 (8,6)
4-in., 150	21.2 (9,6)	20.9 (9,5)	22.1 (10,0)	23.4 (10,6)
2-in., 300	11.3 (5,1)	—	—	—
3-in., 300	19.6 (8,9)	20.3 (9,2)	21.5 (9,8)	22.8 (10,3)
4-in., 300	30.4 (13.8)	30.3 (13,7)	31.5 (14,3)	32.8 (14,9)
2-in., 600	12.8 (5,8)	—	—	—
3-in., 600	22.1 (10,0)	22.8 (10,3)	24.0 (10,9)	25.3 (11,5)
DN 50 / PN 40	11.3 (5,1)	—	—	—
DN 80 / PN 40	16.0 (7,3)	16.7 (7,6)	17.9 (8,1)	19.2 (8,7)
DN 100 / PN 10/16	11.2 (5,1)	11.9 (5,4)	13.1 (5,9)	14.4 (6,5)
DN 100 / PN 40	12.6 (5,7)	13.3 (6,0)	14.5 (6,6)	15.8 (7,1)

Table 46. 3051SAM and 3051SAL Transmitter Option Weights

Option Code	Option	Add lb (kg)
1J, 1K, 1L	SST PlantWeb Housing	3.5 (1,6)
2J	SST Junction Box Housing	3.4 (1,5)
7J	SST Quick Connect	0.4 (0,2)
2A, 2B, 2C	Aluminum Junction Box Housing	1.1 (0,5)
1A, 1B, 1C	Aluminum PlantWeb Housing	1.1 (0,5)
M5	LCD Display for Aluminum PlantWeb Housing(1), LCD Display for SST PlantWeb Housing(1)	0.8 (0,4) 1.6 (0,7)
	Aluminum Standard Cover	0.4 (0,2)
	SST Standard Cover	1.3 (0,6)
	Aluminum Display Cover	0.7 (0,3)
	SST Display Cover	1.5 (0,7)
	Wireless Extended Cover	0.7 (0,3)
	LCD Display(2)	0.1 (0,04)
	Junction Box Terminal Block	0.2 (0,1)
	PlantWeb Terminal Block	0.2 (0,1)
	Power Module	0.5 (0,2)

(1) Includes LCD display and display cover.

(2) Display only.

Table 47. 3051L Weights without Options

Flange	Flush lb. (kg)	2-in. Ext. lb (kg)	4-in. Ext. lb (kg)	6-in. Ext. lb (kg)
2-in., 150	12.5 (5,7)	—	—	—
3-in., 150	17.5 (7,9)	19.5 (8,8)	20.5 (9,3)	21.5 (9,7)
4-in., 150	23.5 (10,7)	26.5 (12,0)	28.5 (12,9)	30.5 (13,8)
2-in., 300	17.5 (7,9)	—	—	—
3-in., 300	22.5 (10,2)	24.5 (11,1)	25.5 (11,6)	26.5 (12,0)
4-in., 300	32.5 (14,7)	35.5 (16,1)	37.5 (17,0)	39.5 (17,9)
2-in., 600	15.3 (6,9)	—	—	—
3-in., 600	25.2 (11,4)	27.2 (12,3)	28.2 (12,8)	29.2 (13,2)
DN 50/PN 40	13.8 (6,2)	—	—	—
DN 80/PN 40	19.5 (8,8)	21.5 (9,7)	22.5 (10,2)	23.5 (10,6)
DN 100/ PN 10/16	17.8 (8,1)	19.8 (9,0)	20.8 (9,5)	21.8 (9,9)
DN 100/ PN 40	23.2 (10,5)	25.2 (11,5)	26.2 (11,9)	27.2 (12,3)

Table 48. 3051L Transmitter Options Weights

Code	Option	Add lb (kg)
J, K, L, M	Stainless Steel Housing (T)	3.9 (1,8)
J, K, L, M	Stainless Steel Housing (C, L, H, P)	3.1 (1,4)
M5	LCD display for Aluminum Housing	0.5 (0,2)
M6	LCD display for SST Housing	1.25 (0,6)

Table 49. 2051L Weights without Options

Flange	Flush lb. (kg)	2-in. Ext. lb (kg)	4-in. Ext. lb (kg)	6-in. Ext. lb (kg)
2-in., 150	12.5 (5,7)	—	—	—
3-in., 150	17.5 (7,9)	19.5 (8,8)	20.5 (9,3)	21.5 (9,7)
4-in., 150	23.5 (10,7)	26.5 (12,0)	28.5 (12,9)	30.5 (13,8)
2-in., 300	17.5 (7,9)	—	—	—
3-in., 300	22.5 (10,2)	24.5 (11,1)	25.5 (11,6)	26.5 (12,0)
4-in., 300	32.5 (14,7)	35.5 (16,1)	37.5 (17,0)	39.5 (17,9)
DN 50/PN 40	13.8 (6,2)	—	—	—
DN 80/PN 40	19.5 (8,8)	21.5 (9,7)	22.5 (10,2)	23.5 (10,6)
DN 100/ PN 10/16	17.8 (8,1)	19.8 (9,0)	20.8 (9,5)	21.8 (9,9)
DN 100/ PN 40	23.2 (10,5)	25.2 (11,5)	26.2 (11,9)	27.2 (12,3)

Table 50. 2051L Transmitter Options Weights

Code	Option	Add lb (kg)
J, K, L, M	Stainless Steel Housing	3.9 (1,8)
M5	LCD display for Aluminum Housing	0.5 (0,2)

SEAL SPECIFICATIONS

Functional Specifications

Hygienic Seal Approvals

Hygienic Seals: Tri-Clamp, tank spud, thin wall tank spud, Tri-Clamp inline, and Cherry Burrell “I” line seal conform to 3-A Hygienic Standards for Sensor and Sensor Fittings and Connections used on Milk and Milk Product Equipment, Number 74-03.

Hygienic Fill Fluids: The hygienic fill fluids glycerin & water and Propylene Glycol & water meet United States Pharmacopeia (USP) and Food Chemical Codex (FCC) requirements and is Generally Recognized as Safe (GRAS) in accordance with the FDA Code of Federal Regulations Title 21. The hygienic fill fluid Neobee M-20 is approved under 21CFR 172.856 as a direct food additive and under 21 CFR 174.5 as an indirect food additive.

Hygienic O-rings: The EPDM, Flourocarbon (FMK), and Nitrile butadiene (NBR) O-rings for the SSW Tank Spud Seal meet 3-A Hygienic Standard Number 18 Class 1 requirements. The EPDM O-ring also meets USP class VI approval requirements.

Surface Finish Certification (Q16 Option)

When ordering the Q16 option in the pressure transmitter model number, the surface finish of the seal diaphragm is certified per BPE 2002 requirements. This surface finish certification is available for Tri-Clamp, Tri-Clamp Inline, Tank Spud, and Thin Wall Tank Spud seal types.

NACE Standard (T Option)

NACE (National Association of Corrosion Engineers) standard MR0175/ISO 15156 defines metallic material requirements for resistance to sulfide stress cracking when applied on petroleum production, drilling, gathering and flow line equipment, and field processing facilities to be used in H2S bearing hydrocarbon service. MR0103 provides material requirements exclusive to sour petroleum refining environments. Compliance guidelines are intended to include “wetted” materials as recommended by both NACE standards. The option code T in several of the general purpose seal types limits the wetted material offering. Metallurgical requirements for alloys used are virtually identical for the two standards, but application conditions enforced are different and can limit material acceptance. Contact an Emerson Process Management representative to aid in selecting the proper materials to meet the NACE standard.

Material Traceability (Q8 Option)

Material traceability is provided for the seal, upper housing, and if applicable, lower housing/flushing connection or diaphragm extension, upon selecting the option code Q8 in the pressure transmitter model number. Material traceability for the transmitter/seal system is provided per the DIN EN10204 3.1 standard, and is only available for general purpose seal types.

Performance Specifications

Instrument Toolkit calculates the remote seal system performance and validates model number configuration.

Remote Seal System Performance Calculation Report (QZ Option)

When the QZ option code is specified within the pressure transmitter model structure, Emerson will generate a remote seal system calculation report for the given application. This report quantifies all aspects of remote seal system performance including seal temperature effects, head temperature effects, seal response time, and transmitter total probable error.

Physical Specifications

Material of Construction

Remote seal materials of construction (diaphragm, upper housing, flange, lower housing/flushing connection, bolts, and gaskets/O-rings) are listed for each remote seal type. Fill fluids specifications are listed in Table 44.

Tagging

The 1199 remote seal model number is marked on the transmitter nameplate (neck or top label). The pressure transmitter will be tagged in accordance with customer requirements. The standard stainless steel tag is wired to the transmitter. Tag is 0.02-in. (0.051 cm) thick with 0.125-in. (0.318 cm) high letters. A permanently attached tag is available upon request.

Calibration

Transmitters are factory calibrated to customer's specified range. If calibration is not specified, then the transmitters are calibrated at maximum range. Calibration is performed at ambient temperature and pressure.

Custom Configurations

Rosemount 3051S, 3051, and 2051 (Option Code C1)

If code C1 is ordered, the customer may specify the following data in addition to the standard configuration parameters. Refer to the respective configuration data sheet within the device PDS.

Descriptor: 16 alphanumeric characters.
Message: 32 alphanumeric characters.
Date: Day, month, year.
Damping: Sec.

Rosemount 3051S Liquid Level Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA
Emerson Process Management GmbH & Co. — Wessling, Germany
Emerson Process Management Asia Pacific Private Limited — Singapore
Beijing Rosemount Far East Instrument Co., LTD — Beijing, China
Emerson Process Management LTDA — Sorocaba, Brazil
Emerson Process Management (India) Pvt. Ltd. — Mumbai, India
Emerson Process Management, Emerson FZE — Dubai, United Arab Emirates

Ordinary Location Certification for FM

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

Models 3051S_CA4; 3051S_CD2, 3, 4, 5; (also with P9 option)

Pressure Transmitters — QS Certificate of Assessment - EC No. 59552-2009-CE-HOU-DNV, Module H Conformity Assessment

All other Model 3051S Pressure Transmitters — Sound Engineering Practice

Transmitter Attachments: Diaphragm Seal - Process Flange - Manifold — Sound Engineering Practice

Primary Elements, Flowmeter — See appropriate Primary Element QIG

Electro Magnetic Compatibility (EMC) (2004/108/EC)

EN 61326-1:2006
EN 61326-2-3:2006

HART & FOUNDATION Fieldbus Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion-proof for Class I, Division 1, Groups B, C, and D, T5 (T_a = 85 °C); Dust Ignition-proof for Class II and Class III, Division 1, Groups E, F, and G, T5 (T_a = 85 °C); hazardous locations; enclosure Type 4X, conduit seal not required when installed according to Rosemount drawing 03151-1003.

I5/IE Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D, T4 (T_a = 70 °C for output options A or X; T_a = 60 °C for output option F); Class II, Division 1, Groups E, F, and G; Class III, Division 1; Class I, Zone 0 AEx ia IIC T4 (T_a = 70 °C for output options A or X; T_a = 60 °C for output option F) when connected in accordance with Rosemount drawing 03151-1006; Non-Incendive for Class I, Division 2, Groups A, B, C, and D; T4 (T_a = 70 °C for output options A or X; T_a = 60 °C for output option F) Enclosure Type 4X
For entity parameters see control drawing 03151-1006.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

E6 Explosion-proof for Class I, Division 1, Groups B, C, and D; Dust Ignition-proof for Class II and Class III, Division 1, Groups E, F, and G; suitable for Class I, Division 2, Groups A, B, C, and D, when installed per Rosemount drawing 03151-1013, CSA Enclosure Type 4X; conduit seal not required; Dual Seal.

I6/IF Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount drawings 03151-1016; Dual Seal.
For entity parameters see control drawing 03151-1016.

European Certifications

I1/IA ATEX Intrinsic Safety
Certificate No.: BAS01ATEX1303X ⟨Ex⟩ II 1G
Ex ia IIC T4 (T_a = -60 °C to 70 °C) -HART/Remote Display/Quick Connect/HART Diagnostics
Ex ia IIC T4 (T_a = -60 °C to 70 °C) -FOUNDATION fieldbus
Ex ia IIC T4 (T_a = -60 °C to 40 °C) -FISCO
CE 1180

Input Parameters

Loop / Power	Groups
U_i = 30 V	HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics
U_i = 17.5 V	FISCO
I_i = 300 mA	HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics
I_i = 380 mA	FISCO
P_i = 1.0 W	HART / Remote Display / Quick Connect / HART Diagnostics
P_i = 1.3 W	FOUNDATION fieldbus
P_i = 5.32 W	FISCO
C_i = 30 nF	SuperModule Platform
C_i = 11.4 nF	HART / HART Diagnostics / Quick Connect
C_i = 0	FOUNDATION fieldbus / Remote Display / FISCO
L_i = 0	HART / FOUNDATION fieldbus/ FISCO / Quick Connect / HART Diagnostics
L_i = 60 µH	Remote Display
RTD Assembly (3051SFx Option T or R)	
U_i = 5 Vdc	
I_i = 500 mA	
P_i = 0.63 W	

Special conditions for safe use (x)

1. The apparatus, excluding the Types 3051 S-T and 3051 S-C (In-line and Coplanar SuperModule Platforms respectively), is not capable of withstanding the 500 V test as defined in Clause 6.4.12 of EN 60079-11. This must be considered during installation.
2. The terminal pins of the Types 3051 S-T and 3051 S-C must be protected to IP20 minimum.

N1 ATEX Type n
Certificate No.: BAS01ATEX3304X ⟨Ex⟩ II 3 G
Ex nL IIC T4 (T_a = -40 °C TO 70 °C)
Ui = 45 Vdc max
Ci = 11.4 nF (Transmitter Output Option A)
Ci = 0 (Transmitter Output Option F)
Li = 0
For remote display, Ci = 0, Li = 60 µH
IP66
CE

Special conditions for safe use (x)

The apparatus is not capable of withstanding the 500 V insulation test required by Clause 6.8.1 of EN 60079-15. This must be taken into account when installing the apparatus.

NOTE
RTD Assembly is not included with the 3051SFx Type n Approval.

ND ATEX Dust
Certificate No.: BAS01ATEX1374X ⟨Ex⟩ II 1 D
Ex tD A20 IP66 T105°C (-20 °C ≤ T_{amb} ≤ 85 °C)
V_{max} = 42.4 volts max
IP66
CE 1180

Special conditions for safe use (x)

1. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
2. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
3. Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact test.
4. The 3051S SuperModule must be securely screwed in place to maintain the ingress protection of the enclosure. (The 3051S SuperModule must be properly assembled to the 3051S housing to maintain ingress protection.)

E1 ATEX Flameproof
Certificate No.: KEMA00ATEX2143X ⟨Ex⟩ II 1/2 G
Ex d IIC T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
Ex d IIC T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
V_{max} = 42.4 V
CE 1180

Special conditions for safe use (x)

1. The Ex d blanking elements, cable glands, and wiring shall be suitable for a temperature of 90 °C.
2. The 3051S SuperModule contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

Japanese Certifications

E4 TIIS Flameproof
Ex d IIC T6

Certificate	Description
TC15682	Coplanar with Junction Box Housing
TC15683	Coplanar with PlantWeb Housing
TC15684	Coplanar with PlantWeb Housing and LCD Display
TC15685	In-Line SST with Junction Box Housing
TC15686	In-Line Alloy C-276 with Junction Box Housing
TC15687	In-Line SST with PlantWeb Housing
TC15688	In-Line Alloy C-276 with PlantWeb Housing
TC15689	In-Line SST with PlantWeb Housing and LCD Display
TC15690	In-Line Alloy C-276 with PlantWeb Housing and LCD Display
TC17102	Remote Display
TC17099	3051SFA/C/P SST/Alloy C-276 with PlantWeb Housing and LCD Display
TC17100	3051SFA/C/P SST/Alloy C-276 with PlantWeb Housing and Remote Display
TC17101	3051SFA/C/P SST/Alloy C-276 with Junction Box Housing

China Certifications

E3 China Flameproof, Dust Ignition-proof
NEPSI Certificate No. (manufactured in Chanhassen, MN): GYJ091035
Certificate No. (manufactured in Beijing, China): GYJ06366
Certificate No. (manufactured in Singapore): GYJ06364
Certificate No. (3051SFx RTC, BMMC, SMMC): GYJ071086
Ex d IIB+H_2 T3~T5
DIP A21 T_A T3~T5 IP66

NOTE
Refer to Appendix B of the 3051S Reference Manual (document number 00809-0100-4801) for Special Conditions for Safe Use.

I3 China Intrinsic Safety, Dust Ignition-proof
NEPSI Certificate No. (manufactured in Chanhassen, MN): GYJ081078
Certificate No. (manufactured in Beijing, China): GYJ06367
Certificate No. (manufactured in Singapore): GYJ06365
Certificate No. (3051SFx RTC, BMMC, SMMC): GYJ071293
Ex ia IIC T4
DIP A21 T_A T4 IP66

NOTE
Refer to Appendix B of the 3051S Reference Manual (document number 00809-0100-4801) for Special Conditions for Safe Use.

Input Parameters

Loop / Power	Groups
U_i = 30 V	HART / FOUNDATION fieldbus / Remote Display / Quick Connect / HART Diagnostics
I_i = 300 mA	HART / FOUNDATION fieldbus / Remote Display / Quick Connect / HART Diagnostics
P_i = 1.0 W	HART / Remote Display / Quick Connect / HART Diagnostics
P_i = 1.3 W	FOUNDATION fieldbus
C_i = 38 nF	SuperModule Platform
C_i = 11.4 nF	HART / HART Diagnostics / Quick Connect
C_i = 0	FOUNDATION fieldbus / Remote Display
L_i = 0	SuperModule Platform / FOUNDATION fieldbus
L_i = 2.4 µH	HART / Quick Connect / HART Diagnostics
L_i = 58.2 µH	Remote Display
RTD Assembly (3051SFx Option T or R)	
U_i = 5 Vdc	
I_i = 500 mA	
P_i = 0.63 W	

N3 China Type n - Energy Limited
NEPSI Certificate No.: GYJ101112X
Ex nL IIC T5 (-40 °C ≤ Ta ≤ 70 °C)
IP66

Loop / Power	Transmitter Output
U_i = 30 V	HART / FOUNDATION fieldbus
I_i = 300 mA	HART / FOUNDATION fieldbus
P_i = 1.0 W	HART
P_i = 1.3 W	FOUNDATION fieldbus
C_i = 11.4 nF	HART
C_i = 0 nF	FOUNDATION fieldbus
L_i = 0 µH	HART(1) / FOUNDATION fieldbus

(1) For remote meter option (M7, M8, M9), L_i = 60 µH.

NOTE
Refer to Appendix B of the 3051S Reference Manual (document number 00809-0100-4801) for Special Conditions for Safe Use.

Brazil Certifications

I2 INMETRO Intrinsic Safety
Certificate number: CEPEL-EX-0722/05X (manufacturing in Chanhassen, MN and Singapore)
Certificate number: CEPEL-EX-1414/07X (manufacturing in Brazil)
INMETRO Marking: BR-Ex ia IIC T4 IP66W

Special conditions for safe use (x)

The apparatus, excluding the Types 3051S-T and 3051S-C (In-line and Coplanar SuperModule Platforms respectively), is not capable of withstanding the 500 V test as defined in Clause 6.4.12 of IEC60079-11. This must be considered during installation.

E2 INMETRO Flameproof
Certificate number: CEPEL-EX-140/2003X (manufacturing in Chanhassen, MN and Singapore)
Certificate number: CEPEL-EX-1413/07X (manufacturing in Brazil)
INMETRO Marking: BR-Ex d IIC T5/T6 IP66W

Special conditions for safe use (x)

1. This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
2. For ambient temperature above 60 ºC, cable wiring must have minimum isolation temperature of 90 ºC, to be in accordance to equipment operation temperature.
3. The accessory of cable entries or conduit must be certified as flameproof and needs to be suitable for use conditions.
4. Where electrical entry is via conduit, the required sealing device must be assembled immediately close to enclosure.

IECEx Certifications

E7 IECEx Flameproof and Dust (each listed separately)

IECEx Flameproof
Certificate No.: IECExKEM08.0010X
Ex d IIC T5 or T6 Ga/Gb
T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
V_{max} = 42.4 V

Special conditions for safe use (x)

1. The Ex d blanking elements, cable glands, and wiring shall be suitable for a temperature of 90 °C.
2. The 3051S SuperModule contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

IECEx Dust
Certificate No. IECExBAS09.0014X
Ex tD A20 IP66 T105 °C (-20 °C ≤ T_a ≤ 85 °C)
Vmax = 42.4 V
A = 22 mA
IP66

Special conditions for safe use (x)

1. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
2. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
3. Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact test.
4. The 3051S SuperModule must be securely screwed in place to maintain the ingress protection of the enclosure. (The 3051S SuperModule must be properly assembled to the 3051S housing to maintain ingress protection.)

I7/IG IECEx Intrinsic Safety
Certificate No.: IECExBAS04.0017X
Ex ia IIC T4 (T_a = -60 °C to 70 °C) -HART/Remote Display/Quick Connect/HART Diagnostics
Ex ia IIC T4 (T_a = -60 °C to 70 °C) -FOUNDATION fieldbus
Ex ia IIC T4 (T_a = -60 °C to 40 °C) -FISCO
IP66

Input Parameters

Loop / Power	Groups
U_i = 30 V	HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics
U_i = 17.5 V	FISCO
I_i = 300 mA	HART / FOUNDATION fieldbus/ Remote Display / Quick Connect / HART Diagnostics
I_i = 380 mA	FISCO
P_i = 1.0 W	HART / Remote Display / Quick Connect / HART Diagnostics
P_i = 1.3 W	FOUNDATION fieldbus
P_i = 5.32 W	FISCO
C_i = 30 nF	SuperModule Platform
C_i = 11.4 nF	HART / HART Diagnostics / Quick Connect
C_i = 0	FOUNDATION fieldbus / Remote Display / FISCO
L_i = 0	HART / FOUNDATION fieldbus/ FISCO / Quick Connect / HART Diagnostics
L_i = 60 µH	Remote Display
RTD Assembly (3051SFx Option T or R)	
U_i = 5 Vdc	
I_i = 500 mA	
P_i = 0.63 W	

Special conditions for safe use (x)

1. The 3051S HART 4-20 mA, 3051S FOUNDATION fieldbus, and 3051S FISCO are not capable of withstanding the 500 V test as defined in clause 6.4.12 of IEC 60079-11. This must be taken into account during installation.
2. The terminal pins of the Types 3051S-T and 3051S-C must be protected to IP20 minimum.

N7 IECEx Type n
Certificate No.: IECExBAS04.0018X
Ex nC IIC T4 (-40 °C ≤ T_a ≤ +70 °C)
IP66

Special conditions for safe use (x)
The apparatus is not capable of withstanding the 500 V insulation test required by Clause 8 of IEC 60079-15:1987.

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K1 Combination of E1, I1, N1, and ND
K2 Combination of E2 and I2
K5 Combination of E5 and I5
K6 Combination of E6 and I6
K7 Combination of E7, I7, and N7
KA Combination of E1, I1, E6, and I6
KB Combination of E5, I5, I6, and E6
KC Combination of E5, E1, I5, and I1
KD Combination of E5, I5, E6, I6, E1, and I1

3051S ERS System Certifications

Approved Manufacturing Locations

Rosemount Inc. – Chanhassen, Minnesota, USA
Emerson Process Management GmbH & Co. – Wessling, Germany
Emerson Process Management Asia Pacific Private Limited – Singapore
Beijing Rosemount Far East Instrument Co., LTD – Beijing, China

Ordinary Location Certification for FM Approvals

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

European Directive Information

Consult your Emerson Process Management sales representative for more information about the EC declaration of conformity.

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion-proof for Class I, Division 1, Groups B, C, and D; Dust Ignition-proof for Class II and Class III, Division 1, Groups E, F, and G; hazardous locations; enclosure Type 4X, conduit seal not required.

I5 Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1; Class I, Zone 0 AEx ia IIC when connected in accordance with Rosemount drawing 03151-1306; Non-Incendive for Class I, Division 2, Groups A, B, C, and D Enclosure Type 4X

For entity parameters see control drawing 03151-1306.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

E6 Explosion-proof for Class I, Division 1, Groups B, C, and D; Dust Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G; suitable for Class I, Division 2, Groups A, B, C, and D, CSA Enclosure Type 4X; conduit seal not required; Dual Seal.

I6 Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount Drawings 03151-1316; Dual Seal.

For entity parameters see control drawing 03151-1316.

European Certifications

I1 ATEX Intrinsic Safety
Consult factory for availability.

N1 ATEX Type n
Consult factory for availability.

ND ATEX Dust
Certificate No.: BAS01ATEX1374X ⟨Ex⟩ II 1 D
Ex tD A20 IP66 T105 °C (-20 °C ≤ T_{amb} ≤ 85 °C)
V_{max} = 42.4 V max
IP66
CE 1180

Special Conditions for safe use (X):

1. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
2. Unused cable entries must be filled suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
3. Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact test.
4. Each 3051S ERS transmitter must be securely screwed in place to maintain the ingress protection of the enclosure. (The 3051S Super Module must be properly assembled to the 3051S housing to maintain ingress protection.)

E1 ATEX Flameproof
Certificate No.: KEMA00ATEX2143X ⟨Ex⟩ II 1/2 G
Ex d IIC T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
Ex d IIC T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
V_{max} = 42.4 V
CE 1180

Special Conditions for safe use (X):

1. The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
2. Transmitter Model 3051S contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

Japanese Certifications

E4 TIIS Flameproof: Consult factory for availability

INMETRO Certifications

E2 INMETRO Flameproof: Consult factory for availability

I2 INMETRO Intrinsic Safety: Consult factory for availability

China Certifications

E3 China Flameproof: Consult factory for availability

I3 China Intrinsically Safe: Consult factory for availability

IECEx Certifications

I7 IECEx Intrinsic Safety
Consult factory for availability.

N7 IECEx Type n
Consult factory for availability.

E7 IECEx Flameproof and Dust (each listed separately)

IECEx Flameproof
Certificate No.: IECExKEM08.0010X
Ex d IIC T6 (-50 °C ≤ T_{amb} ≤ 65 °C)
Ex d IIC T5 (-50 °C ≤ T_{amb} ≤ 80 °C)
V_{max} = 42.4 V

Special conditions for safe use (X)

1. The Ex d blanking elements, cable glands and wiring shall be suitable for a temperature of 90 °C.
2. Transmitter Model 3051S contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

IECEx Dust
Certificate No. IECExBAS09.0014X
Ex tD A20 IP66 T105°C (-20 °C ≤ T_{amb} ≤ 85 °C)
Vmax = 42.4 V
A = 22 mA
IP66

Special conditions for safe use (x)

1. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
2. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
3. Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact test.
4. Each 3051S ERS sensor must be securely screwed in place to maintain the ingress protection of the enclosure. (Each sensor module must be properly assembled to the housing to maintain ingress protection.)

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K1 Combination of **E1**, **I1**, **N1**, and **ND**
K2 Combination of **E2** and **I2**
K5 Combination of **E5** and **I5**
K6 Combination of **E6** and **I6**
K7 Combination of **E7**, **I7**, and **N7**
KA Combination of **E1**, **E6**, **I1,** and **I6**
KB Combination of **E5**, **E6**, **I1,** and **I6**
KC Combination of **E5**, **E1**, **I5,** and **I1**
KD Combination of **E5, E6, E1, I5, I6,** and **I1**

3051L Product Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA
Emerson Process Management GmbH & Co. — Wessling, Germany
Emerson Process Management Asia Pacific Private Limited — Singapore
Beijing Rosemount Far East Instrument Co., LTD — Beijing, China

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

ATEX Directive (94/9/EC)

All 3051 transmitters comply with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

3051CA4; 3051CG2, 3, 4, 5; 3051CD2, 3, 4, 5 *(also with P9 option)*; 3051HD2, 3, 4, 5; 3051HG2, 3, 4, 5; 3051PD2, 3; and 3051PG2, 3, 4, 5 Pressure Transmitters
— QS Certificate of Assessment - EC No. 59552-2009-CE-HOU-DNV Module H Conformity Assessment

All other 3051/3001 Pressure Transmitters

— Sound Engineering Practice

Transmitter Attachments: Diaphragm Seal - Process Flange - Manifold

— Sound Engineering Practice

Electro Magnetic Compatibility (EMC) (2004/108/EC)

All 3051 Pressure Transmitters meet all of the requirements of EN61326-1:2006 EN61326-2-3: 2006 and NAMUR NE-21

Ordinary Location Certification for Factory Mutual

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

3051L HART PROTOCOL

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II, Division 1, Groups E, F, and G. Dust-Ignition-Proof for Class III, Division 1. Factory Sealed, Enclosure Type 4X

I5 Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 when connected per Rosemount drawing 03031-1019; Non-incendive for Class I, Division 2, Groups A, B, C, and D.
Temperature Code:T4 (Ta = 40 °C), T3 (Ta = 85 °C), Enclosure Type 4X
For input parameters see control drawing 03031-1019.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

E6 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D for indoor and outdoor hazardous locations. Enclosure type 4X, factory sealed

C6 Explosion-Proof and intrinsically safe approval. Intrinsically safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount drawings 03031-1024. Temperature Code T3C.
Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D hazardous locations. Enclosure type 4X, factory sealed
For input parameters see control drawing 03031-1024.

European Certifications

I1 ATEX Intrinsic Safety and Dust
Certification No.: BAS 97ATEX1089X ⟨Ex⟩ II 1 GD
Ex ia IIC T4 ($-60 \leq T_a \leq +70$ °C)
Dust Rating: Ex tD A20 T80 °C ($-20 \leq T_a \leq 40$ °C) IP66
CE 1180

Table 51. Input Parameters

U_i = 30 V
I_i = 200 mA
P_i = 0.9 W
C_i = 0.012 µF

Table 52. RTD Assembly (3051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63 W

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the apparatus.
The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in Zone 0.

N1 ATEX Type n and Dust
Certification No.: BAS 00ATEX3105X ⟨Ex⟩ II 3 GD
U_i = 55 Vdc max
Ex nA nL T5 (–40 °C ≤ T_{amb} ≤ 70 °C)
Dust rating: Ex tD A22 T80 °C (–20 ≤ T_a ≤ 40 °C) IP66
CE

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding a 500 V r.m.s. test to case. This must be taken into account on any installation in which it is used, for example, by assuring that the supply to the apparatus is galvanically isolated.

E8 ATEX Flame-Proof and Dust
Certification No.: KEMA 00ATEX2013X ⟨Ex⟩ II $^1/_2$ GD
Ex d IIC T6 (–50 ≤ T_a ≤ 65 °C)
T5 (–50 ≤ T_a ≤ 80 °C)
Dust rating: Ex tD A20/A21 T90 °C, IP66
CE 1180
Vmax = 55 Vdc

Special Conditions for Safe Use (X):
This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
In case of repair, contact Rosemount for dimensions of the flameproof joints.

Japanese Certifications

E4 TIIS Flame-Proof
Ex d IIC T6

Certificate	Description
C15850	3051C/D/1 4–20 mA HART — no display
C15851	3051C/D/1 4–20 mA HART — with display

IECEx Certifications

I7 IECEx Intrinsic Safety
Certification No.: IECEx BAS 09.0076X
Ex ia IIC T4 (–60 °C ≤ T_a ≤ 70 °C)
IP66

TABLE 53. Input Parameters

U_i = 30 V
I_i = 200 mA
P_i = 0.9 W
C_i = 0.012 µF

TABLE 54. RTD Assembly (3051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63 W

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of IEC 60079-11. This must be taken into account when installing the apparatus.
The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact or abrasion located in Zone 0.

E7 IECEx Explosion-Proof (Flame-Proof)
Certification No.: IECEx KEM 09.0034X
Ga/Gb Ex d IIC T6 or T5
Ex tD A20/A21 IP66 T90 °C
IP66

Special Conditions for Safe Use (X):
This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

N7 IECEx Type n
Certification No.: IECEx BAS 09.0077X
Ex nA nL IIC T5 (–40 °C ≤ T_a ≤ 70 °C)
IP66

Special Conditions for Safe Use (X):
The apparatus is not capable of withstanding the 500 V insulation test required by clause 6.8.1 of IEC 60079-15. This must be taken into account when installing the apparatus.

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K5 **E5** and **I5** combination
KB **K5** and **C6** combination
KD **K5**, **C6**, **I1**, and **E8** combination
K6 **C6**, **I1**, and **E8** combination
K8 **E8** and **I1** combination
K7 **E7**, **I7**, and **N7** combination

3051L FIELDBUS PROTOCOL

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II, Division 1, Groups E, F, and G. Dust-Ignition-Proof for Class III, Division 1. Factory sealed. Enclosure Type 4X.

I5 Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 when connected per Rosemount drawing 03031-1019; Non-incendive for Class I, Division 2, Groups A, B, C, and D.

Temperature Code: T4 (Ta = 60 °C), T3 (Ta = 85 °C), Enclosure Type 4X
For input parameters see control drawing 03031-1019.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

E6 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D for indoor and outdoor hazardous locations. Enclosure type 4X, factory sealed

C6 Explosion-Proof and intrinsically safe approval. Intrinsically safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount drawings 03031-1024. Temperature Code T3C.
Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D hazardous locations. Enclosure type 4X, factory sealed
For input parameters see control drawing 03031-1024.

European Certifications

I1 ATEX Intrinsic Safety and Dust
Certification No.: BAS 98ATEX1355X ⟨Ex⟩ II 1 GD
Ex ia IIC T4 (T_{amb} = –60 to +60 °C)
Dust Rating: Ex tD A20 T70 °C (T_{amb} –20 to 40 °C) IP66
CE 1180

Table 55. Input Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.3 W
C_i = 0 µF

Table 56. RTD Assembly (3051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63 W

Special Conditions for Safe Use (X):
The device is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the apparatus.
The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in Zone 0.

IA ATEX FISCO Intrinsic Safety
Certification No.: BAS 98ATEX1355X ⟨Ex⟩ II 1 G
Ex ia IIC T4 (T_{amb} = –60 to +60 °C)
IP66
CE 1180

Table 57. Input Parameters

U_i = 17.5 V
I_i = 380 mA
P_i = 5.32 W
C_i = ≤ 5 µF
L_i = ≤ 10 µH

Special Conditions for Safe Use (X):
The device is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the apparatus.
The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in Zone 0.

N1 ATEX Type n and Dust
Certification No.: BAS 98ATEX3356X ⟨Ex⟩ II 3 GD
U_i = 40 Vdc max
Ex nL IIC T5 (T_a = –40 °C to 70 °C)
Dust rating: Ex tD A22 T80 °C (T_{amb} = –20 to 40 °C) IP66

Special Conditions for Safe Use (X):
The device is not capable of withstanding the 500 V insulation test required by Clause 6.8.1 of EN60079-15. This must be taken into account when installing the apparatus.

E8 ATEX Flame-Proof and Dust
Certification No.: KEMA 00ATEX2013X ⟨Ex⟩ II $^1/_2$ GD
Ex d IIC T6 (T_{amb} = –50 to 65 °C)
T5 (T_{amb} = –50 to 80 °C)
Dust rating: Ex tD A20/21 T90 °C, IP66
CE 1180
Vmax = 55 Vdc

Special Conditions for Safe Use (X):
This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
In case of repair, contact Rosemount for dimensions of the flameproof joints.

Japanese Certifications

E4 TIIS Flame-Proof
Ex d IIC T6

Certificate	Description
C15852	3051C/D/1 FOUNDATION Fieldbus — no display
C15853	3051C/D/1 FOUNDATION Fieldbus — with display

IECEx Certifications

I7 IECEx Intrinsic Safety
Certification No.: IECEx BAS 09.0076X
Ex ia IIC T4 (–60 °C ≤ T_a ≤ 60 °C)
IP66

TABLE 58. Input Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.3 W
C_i = 0 µF
L_i = 0 µH

TABLE 59. RTD Assembly (3051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63W

Special Conditions for Safe Use (X):

1. If the apparatus is fitted with an optional 90 V transient suppressor, it is not capable of withstanding the 500 V insulation test required by clause 6.3.12 of IEC 60079-11. This must be taken into account when installing the apparatus.
2. The enclosure may be made of aluminium alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in Zone 0.

E7 IECEx Explosion-Proof (Flame-Proof)
Certification No.: IECEx KEM 09.0034X
Ga/Gb Ex d IIC T6 or T5
Ex tD A20/A21 IP66 T90 °C
IP66

Special Conditions for Safe Use (X):
This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

N7 IECEx Type n
Certification No.: IECEx BAS 09.0077X
Ex nA nL IIC T5 (–40 °C ≤ T_a ≤ 70 °C)
IP66

Special Conditions for Safe Use (X):
The apparatus is not capable of withstanding the 500 V insulation test required by clause 6.8.1 of IEC 60079-15. This must be taken into account when installing the apparatus.

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K5 **E5** and **I5** combination
KB **K5** and **C6** combination
KD **K5**, **C6**, **I1**, and **E8** combination
K6 **C6**, **I1**, and **E8** combination
K8 **E8** and **I1** combination
K7 **E7**, **I7**, and **N7** combination

2051L Product Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA
Emerson Process Management GmbH & Co. — Wessling, Germany
Emerson Process Management Asia Pacific Private Limited — Singapore
Beijing Rosemount Far East Instrument Co., LTD — Beijing, China

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

ATEX Directive (94/9/EC)
All 2051 transmitters comply with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)
2051CG2, 3, 4, 5; 2051CD2, 3, 4, 5 (also with P9 option)
— QS Certificate of Assessment - EC No. 59552-2009-CE-HOU-DNV
Module H Conformity Assessment

All other 2051 Pressure Transmitters
— Sound Engineering Practice

Transmitter Attachments: Diaphragm Seal - Process Flange - Manifold
— Sound Engineering Practice

Electro Magnetic Compatibility (EMC) (2004/108/EC)
All 2051 Pressure Transmitters meet all of the requirements of EN61326:2006 and NAMUR NE-21.

Ordinary Location Certification for Factory Mutual
As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

2051L HART PROTOCOL

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II, Division 1, Groups E, F, and G. Dust-Ignition-Proof for Class III, Division 1.
T5 (Ta = 85 °C), Factory Sealed, Enclosure Type 4X

I5 Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class 1, Zone 0 AEx ia T4; Class II, Division 1, Groups E, F, and G; Class III, Division 1 when connected per Rosemount drawing 02051-1009; Non-incendive for Class I, Division 2, Groups A, B, C, and D.
Temperature Code:T4 (Ta = 70 °C),
Enclosure Type 4X
For input parameters see control drawing 02051-1009.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

E6 Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D for indoor and outdoor hazardous locations. Enclosure type 4X, factory sealed

I6 Intrinsically safe approval. Intrinsically safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount drawing 02051-1008.
Temperature Code T3C; Ex ia IIC T3C.
Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D hazardous locations. Enclosure type 4X, factory sealed
For input parameters see control drawing 02051-1008.

European Certifications

I1 ATEX Intrinsic Safety
Certification No. Baseefa08ATEX0129X ⟨Ex⟩ II 1 G
Ex ia IIC T4 ($-60 \leq T_a \leq +70$ °C)
IP66 IP68
CE 1180

Table 60. Input Parameters

U_i = 30 V
I_i = 200 mA
P_i = 1.0 W
C_i = 0.012 µF
L_i = 10 µH

Table 61. RTD Assembly (2051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63 W

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the apparatus.

N1 ATEX Type n
Certification No. Baseefa08ATEX0130X ⟨Ex⟩ II 3 G
Ex nAnL IIC T4 ($-40 \leq T_a \leq +70$ °C)
U_i = 42.4 Vdc max
IP66
CE

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding a 500 V r.m.s. test to case. This must be taken into account on any installation in which it is used, for example by assuring that the supply to the apparatus is galvanically isolated.

E1 ATEX Flame-Proof
Certification No. KEMA 08ATEX0090X Ⓔx II 1/2 G
Ex d IIC T6 (–50 ≤ T_a ≤ 65 °C)
Ex d IIC T5 (–50 ≤ T_a ≤ 80 °C)
IP66
CE 1180
Vmax = 42.4 Vdc

Special Conditions for Safe Use (X):
This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
The Ex d blanking elements, cable glands, and wiring shall be suitable for a temperature of 90 °C.
In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

ND ATEX Dust
Certification No. Baseefa08ATEX0182X Ⓔx II 1 D
Dust Rating: II 1 D Ex tD A20 T115 °C (-20 °C ≤ T_a ≤ 85 °C)
IP66 IP68
Vmax = 42.4 Vdc
A = 22 mA
CE 1180

Special Conditions for Safe Use (X):
1. The user must ensure that the maximum rated voltage and current (42.4 V, 22 mA, DC) are not exceeded. All connections to other apparatus or associated apparatus shall have control over this voltage and current equivalent to a category "ib" circuit according to EN 60079-1.
2. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
3. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
4. Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact test.

IECEx Certifications

I7 IECEx Intrinsic Safety
Certification No. IECExBAS08.0045X II 1 G
Ex ia IIC T4 (–60 ≤ T_a ≤ +70 °C)
CE 1180

Table 62. Input Parameters

U_i = 30 V
I_i = 200 mA
P_i = 1.0 W
C_i = 0.012 µF
L_i = 10 µH

Table 63. RTD Assembly (2051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63 W

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of IEC60079-11. This must be taken into account when installing the apparatus.

E7 IECEx Explosion-Proof (Flame-Proof)
Certification No. IECEx KEM 08.0024X II 1/2 G
Ex d IIC T6 (–50 ≤ T_a ≤ 65 °C)
Ex d IIC T5 (–50 ≤ T_a ≤ 80 °C)
CE 1180
Vmax = 42.4 Vdc

Special Conditions for Safe Use (X):
This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
The Ex d blanking elements, cable glands, and wiring shall be suitable for a temperature of 90 °C.
In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

N7 IECEx Type n
Certification No. IECExBAS08.0046X II 3 G
Ex nAnL IIC T4 (–40 ≤ T_a ≤ +70 °C)
U_i = 42.4 Vdc max
CE

Special Conditions for Safe Use (X):

When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding a 500 V r.m.s. test to case. This must be taken into account on any installation in which it is used, for example by assuring that the supply to the apparatus is galvanically isolated.

TIIS Certifications

E4 TIIS Flame-Proof
Ex d IIC T6

TC18872	Coplanar with Display
TC18873	Coplanar no display

Inmetro Certifications

E2 Flame-Proof
Certificate No. CEPEL EX-1767/09X
BR-Ex d IIC T6/T5

I2 Intrinsic Safety
Certificate No. CEPEL EX-1768/09X
BR-Ex ia IIC T4

Table 64. Input Parameters

U_i = 30 V
I_i = 200 mA
P_i = 1.0 W
C_i = 0.012 µF
L_i = 10 µH

Table 65. RTD Assembly (2051CFx Option T or R)

U_i = 5 Vdc
I_i = 500 mA
P_i = 0.63 W

Special Conditions for Safe Use (X):
When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of IEC60079-11. This must be taken into account when installing the apparatus.

GOST - Russia Certifications

IM Intrinsic Safety
Consult factory for availability

EM Flame-Proof
Consult factory for availability

China (NEPSI) Certifications

NOTE
Refer to Appendix B of the 3051S Reference Manual (document number 00809-0100-4801) for Special Conditions for Safe Use.

E3 Flame-Proof
Certificate No.: GYJ081230
Ex d IIC T5/T6

I3 Intrinsic Safety
Certificate No.: GYJ081231X
Ex ia IIC T4

Table 66. Input Parameters

U_i = 30 V
I_i = 200 mA
P_i = 1.0 W
C_i = 0.012 µF
L_i = 10 µH

CCoE Certifications

IW Intrinsic Safety
Ex ia IIC T4

EW Flame-Proof
Ex d IIC T5 or T6

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K1 **E1, I1, N1,** and **ND** combination

K4 **E4** and **I4** combination

K5 **E5** and **I5** combination

K6 **I6** and **E6** combination

K7 **E7, I7,** and **N7** combination

KA **E1, I1, E6,** and **I6** combination

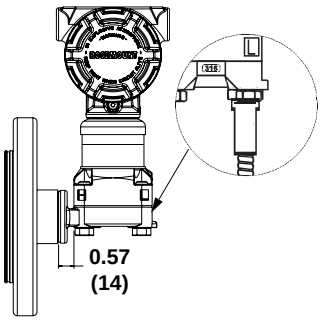
KB **E5, I5, E6,** and **I6** combination

KC **E1, I1, E5,** and **I5** combination

KD **E1, I1, E5, I5, E6,** and **I6** combination

Dimensional Drawings

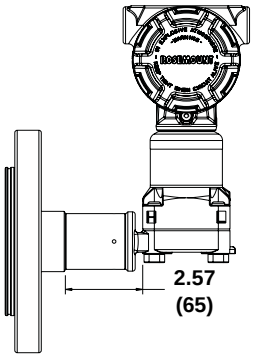
Rosemount 1199 Direct Mount Connection Types for General Purpose Seal Systems



Rosemount 3051
One-Seal System
1199 _ _ _ 93
1199 _ _ _ 97

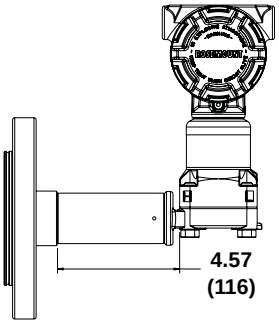
Rosemount 3051
Two-Seal System
1199 _ _ _ 94
1199 _ _ _ 96
(Add Low Side Capillary)

Low Side Capillary Connection



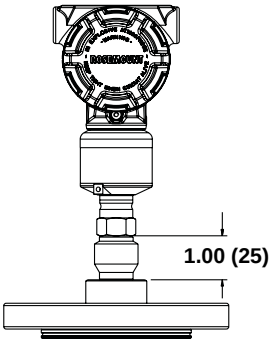
Rosemount 3051
One-Seal System
1199 _ _ _ B3 (2-in. Connection)
1199 _ _ _ B7 (2-in. Connection)

Rosemount 3051
Two-Seal System
1199 _ _ _ B4 (2-in. Conn.)
1199 _ _ _ B6 (2-in. Conn.)
(Add Low Side Capillary)

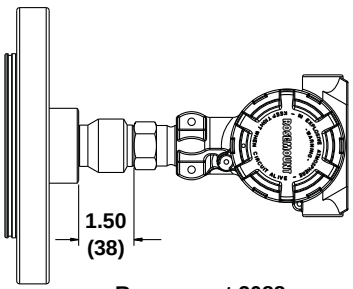


Rosemount 3051
One-Seal System
1199 _ _ _ D3 (4-in. Connection)
1199 _ _ _ D7 (4-in. Connection)

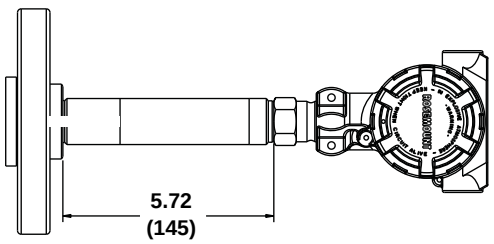
Rosemount 3051
Two-Seal System
1199 _ _ _ D4 (4-in. Conn.)
1199 _ _ _ D6 (4-in. Conn.)
(Add Low Side Capillary)



Rosemount 3051T
1199 _ _ _ 95



Rosemount 2088
1199 _ _ _ 95



Rosemount 2088
1199 _ _ _ D5

NOTES
Dimensions are in inches (millimeters).
Transmitters are shown with Flush Flanged (FFW) Seals.

Figure 2. FFW Flush Flanged Seal - Two-Piece Design (shown with flushing ring)

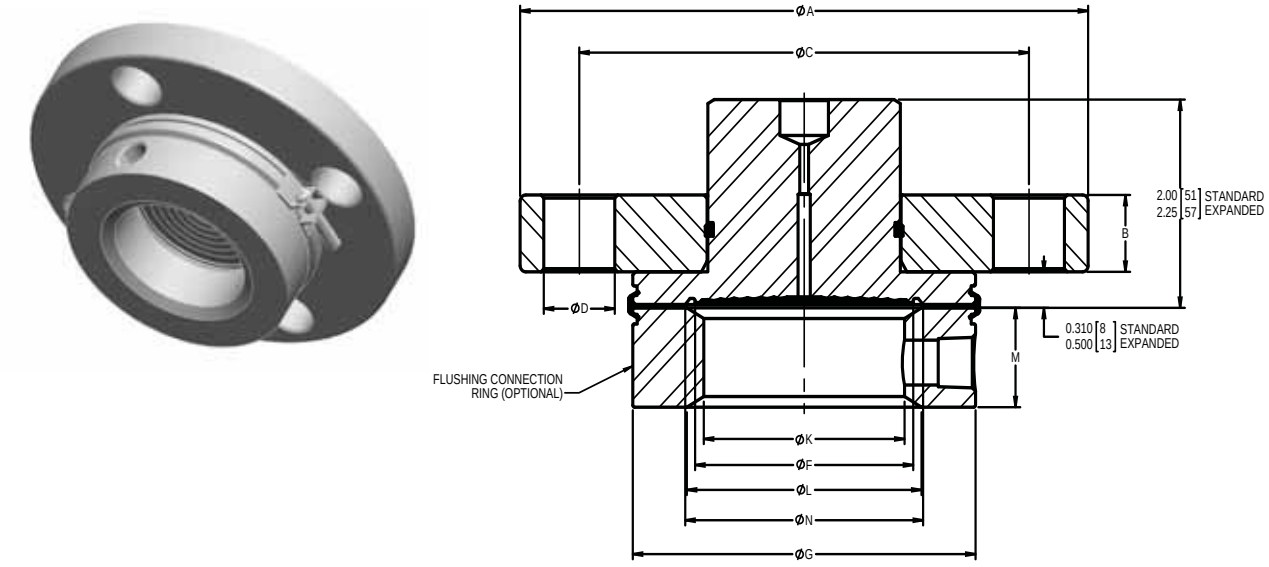


Table 67. Dimensional Table for FFW Flush Flanged Raised Face Seals Two Piece (Upper Housing and Flange) Design(1)

	Pipe Size	Class	Flange Diameter "A"	Flange Thickness "B"	Bolt Circle "C"	Bolts	Bolt Hole Diameter "D"	Standard Diaphragm Diameter "F"	Raised Face Diameter "G"
ANSI/ ASME	2-in.	150 lb.	6.00 (152)	0.69 (18)	4.75 (121)	4	0.75 (19)	2.30 (58)	3.62 (92)
		300 lb.	6.50 (165)	0.82 (21)	5.00 (127)	8	0.75 (19)	2.30 (58)	3.62 (92)
		600 lb.	6.50 (165)	1.00 (25)	5.00 (127)	8	0.75 (19)	2.30 (58)	3.62 (92)
	3-in.	150 lb.	7.50 (191)	0.88 (22)	6.00 (152)	4	0.75 (19)	3.50 (89)	5.00 (127)
		300 lb.	8.25 (210)	1.06 (27)	6.62 (168)	8	0.88 (22)	3.50 (89)	5.00 (127)
		600 lb.	8.25 (210)	1.25 (32)	6.62 (168)	8	0.88 (22)	3.50 (89)	5.00 (127)
	4-in.	150 lb.	9.00 (229)	0.88 (22)	7.50 (191)	8	0.75 (19)	3.50 (89)	6.20 (157)
		300 lb.	10.0 (254)	1.19 (30)	7.88 (200)	8	0.88 (22)	3.50 (89)	6.20 (157)
		600 lb.	10.75 (273)	1.50 (38)	8.50 (216)	8	1.00 (25)	3.50 (89)	6.20 (157)
EN1092-1	DN 50	PN 40	6.50 (165)	0.79 (20)	4.92 (125)	4	0.71 (18)	2.30 (58)	4.00 (102)
		PN 63	7.08 (180)	1.02 (26)	5.31 (135)	4	0.87 (22)	2.30 (58)	4.00 (102)
		PN 100	7.68 (195)	1.10 (28)	5.71 (145)	4	1.02 (26)	2.30 (58)	4.00 (102)
	DN 80	PN 40	7.87 (200)	0.94 (24)	6.30 (160)	8	0.71 (18)	3.50 (89)	5.43 (138)
		PN 63	8.46 (215)	1.10 (28)	6.69 (170)	8	0.88 (22)	3.50 (89)	5.43 (138)
		PN 100	9.06 (230)	1.26 (32)	7.09 (180)	8	1.02 (26)	3.50 (89)	5.43 (138)
	DN 100	PN 16	8.66 (220)	0.79 (20)	7.09 (180)	8	0.71 (18)	3.50 (89)	6.20 (157)
		PN 40	9.25 (235)	0.94 (24)	7.48 (190)	8	0.87 (22)	3.50 (89)	6.20 (157)
		PN 63	9.84 (250)	1.18 (30)	7.87 (200)	8	1.02 (26)	3.50 (89)	6.20 (157)
JIS	JIS 50A	10K	6.10 (155)	0.55 (14)	4.72 (120)	4	0.75 (19)	2.30 (58)	3.62 (92)
		20K	6.10 (155)	0.63 (16)	4.72 (120)	8	0.75 (19)	2.30 (58)	3.62 (92)
		40K	6.50 (165)	0.94 (24)	5.12 (130)	8	0.75 (19)	2.30 (58)	4.00 (102)
	JIS 80A	10K	7.28 (185)	0.63 (16)	5.91 (150)	8	0.75 (19)	3.50 (89)	5.00 (127)
		20K	7.87 (200)	0.79 (20)	6.30 (160)	8	0.91 (23)	3.50 (89)	5.00 (127)
		40K	8.27 (210)	1.18 (30)	6.69 (170)	8	0.91 (23)	3.50 (89)	5.43 (138)
	JIS 100A	10K	8.27 (210)	0.63 (16)	6.89 (175)	8	0.75 (19)	3.50 (89)	6.20 (157)
		20K	8.86 (225)	0.87 (22)	7.28 (185)	8	0.91 (23)	3.50 (89)	6.20 (157)
		40K	9.84 (250)	1.34 (34)	8.07 (205)	8	0.98 (25)	3.50 (89)	6.20 (157)

(1) Dimensions are in inches (millimeters).

Table 57. Dimensional Table for FFW Flush Flanged Raised Face Seals Two Piece (Upper Housing and Flange) Design(1)

	Pipe Size	INNER DIAMETER "K"	BEVELED EDGE "L"	THICKNESS WITH 1/4-NPT F.C. "M"	THICKNESS WITH 1/2-NPT F.C. "M"	MINIMUM GASKET I.D. "N"
ANSI / ASME	2-in.	2.12 (54)	2.48 (63)	0.97 (25)	1.30 (33)	2.51 (64)
		2.12 (54)	2.48 (63)	0.97 (25)	1.30 (33)	2.51 (64)
		2.12 (54)	2.48 (63)	0.97 (25)	1.30 (33)	2.51 (64)
	3-in.	3.60 (91)	—	0.97 (25)	1.30 (33)	3.70 (94)
		3.60 (91)	—	0.97 (25)	1.30 (33)	3.70 (94)
		3.60 (91)	—	0.97 (25)	1.30 (33)	3.70 (94)
	4-in.	3.60 (91)	—	0.97 (25)	1.30 (33)	3.70 (94)
		3.60 (91)	—	0.97 (25)	1.30 (33)	3.70 (94)
		3.60 (91)	—	0.97 (25)	1.30 (33)	3.70 (94)
EN1092-1	DN 50	2.40 (61)	—	0.97 (25)	1.30 (33)	2.51 (64)
		2.40 (61)	—	0.97 (25)	1.30 (33)	2.51 (64)
		2.40 (61)	—	0.97 (25)	1.30 (33)	2.51 (64)
	DN 80	3.60 (91)	—	0.97 (25)	1.30 (33)	3.70 (94)
		3.60 (91)	—	0.97 (25)	1.30 (33)	3.70 (94)
		3.60 (91)	—	0.97 (25)	1.30 (33)	3.70 (94)
	DN 100	3.60 (91)	—	0.97 (25)	1.30 (33)	3.70 (94)
		3.60 (91)	—	0.97 (25)	1.30 (33)	3.70 (94)
		3.60 (91)	—	0.97 (25)	1.30 (33)	3.70 (94)
JIS	JIS 50A	2.12 (54)	2.48 (63)	0.97 (25)	1.30 (33)	2.51 (64)
		2.12 (54)	2.48 (63)	0.97 (25)	1.30 (33)	2.51 (64)
		2.40 (61)	—	0.97 (25)	1.30 (33)	2.51 (64)
	JIS 80A	3.60 (91)	—	0.97 (25)	1.30 (33)	3.70 (94)
		3.60 (91)	—	0.97 (25)	1.30 (33)	3.70 (94)
		3.60 (91)	—	0.97 (25)	1.30 (33)	3.70 (94)
	JIS 100A	3.60 (91)	—	0.97 (25)	1.30 (33)	3.70 (94)
		3.60 (91)	—	0.97 (25)	1.30 (33)	3.70 (94)
		3.60 (91)	—	0.97 (25)	1.30 (33)	3.70 (94)

(1) Dimensions are in inches (millimeters).

Figure 3. FFW Flush Flanged Seal - One-Piece Design (shown with flushing ring)

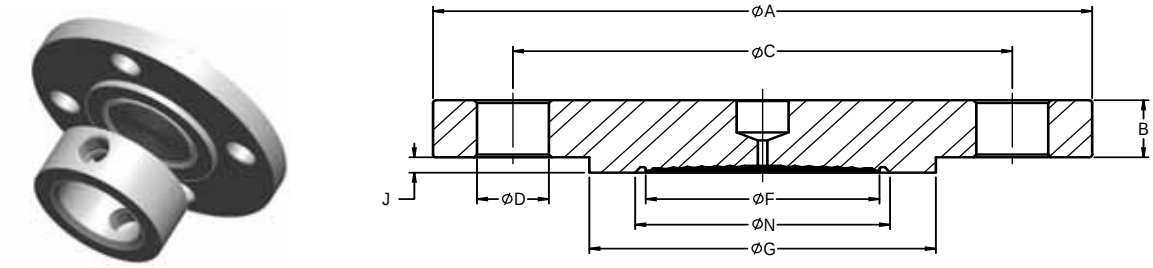


Table 58. Dimensional Table for FFW Flush Flanged Seals One Piece (Upper Housing and Flange) Design (Option code E)(1)

	Pipe Size	Class	Flange Diameter "A"	Flange Thickness "B"	Bolt Circle "C"	Bolts	Bolt Hole Diameter "D"	Standard Diaphragm Diameter "F"	Raised Face Diameter "G"	Raised Face Height "J"	MINIMUM GASKET I.D. "N"
ANSI / ASME	2-in.	150 lb.	6.00 (152)	0.69 (18)	4.75 (121)	4	0.75 (19)	2.30 (58)	3.62 (92)	0.06 (1.5)	2.51 (64)
		300 lb.	6.50 (165)	0.82 (21)	5.00 (127)	8	0.75 (19)	2.30 (58)	3.62 (92)	0.06 (1.5)	2.51 (64)
		600 lb.	6.50 (165)	1.00 (25)	5.00 (127)	8	0.75 (19)	2.30 (58)	3.62 (92)	0.25 (6.4)	2.51 (64)
	3-in.	150 lb.	7.50 (191)	0.88 (22)	6.00 (152)	4	0.75 (19)	3.50 (89)	5.00 (127)	0.06 (1.5)	3.70 (94)
		300 lb.	8.25 (210)	1.06 (27)	6.62 (168)	8	0.88 (22)	3.50 (89)	5.00 (127)	0.06 (1.5)	3.70 (94)
		600 lb.	8.25 (210)	1.25 (32)	6.62 (168)	8	0.88 (22)	3.50 (89)	5.00 (127)	0.25 (6.4)	3.70 (94)
	4-in.	150 lb.	9.00 (229)	0.88 (22)	7.50 (191)	8	0.75 (19)	3.50 (89)	6.20 (157)	0.06 (1.5)	3.70 (94)
		300 lb.	10.00 (254)	1.19 (30)	7.88 (200)	8	0.88 (22)	3.50 (89)	6.20 (157)	0.06 (1.5)	3.70 (94)
		600 lb.	10.75 (273)	1.50 (38)	8.50 (216)	8	1.00 (25)	3.50 (89)	6.20 (157)	0.25 (6.4)	3.70 (94)
EN1092-1	DN 50	PN 40	6.50 (165)	0.79 (20)	4.92 (125)	4	0.71 (18)	2.30 (58)	4.00 (102)	0.12 (3.0)	2.51 (64)
		PN 63	7.08 (180)	1.02 (26)	5.31 (135)	4	0.87 (22)	2.30 (58)	4.00 (102)	0.12 (3.0)	2.51 (64)
		PN 100	7.68 (195)	1.10 (28)	5.71 (145)	4	1.02 (26)	2.30 (58)	4.00 (102)	0.12 (3.0)	2.51 (64)
	DN 80	PN 40	7.87 (200)	0.94 (24)	6.30 (160)	8	0.71 (18)	3.50 (89)	5.43 (138)	0.12 (3.0)	3.70 (94)
		PN 63	8.46 (215)	1.10 (28)	6.69 (170)	8	0.88 (22)	3.50 (89)	5.43 (138)	0.12 (3.0)	3.70 (94)
		PN 100	9.06 (230)	1.26 (32)	7.09 (180)	8	1.02 (26)	3.50 (89)	5.43 (138)	0.12 (3.0)	3.70 (94)
	DN 100	PN 16	8.66 (220)	0.79 (20)	7.09 (180)	8	0.71 (18)	3.50 (89)	6.20 (157)	0.12 (3.0)	3.70 (94)
		PN 40	9.25 (235)	0.94 (24)	7.48 (190)	8	0.87 (22)	3.50 (89)	6.20 (157)	0.12 (3.0)	3.70 (94)
		PN 63	9.84 (250)	1.18 (30)	7.87 (200)	8	1.02 (26)	3.50 (89)	6.20 (157)	0.12 (3.0)	3.70 (94)
JIS	JIS 50A	10K	6.10 (155)	0.55 (14)	4.72 (120)	4	0.75 (19)	2.30 (58)	3.62 (92)	0.08 (2.0)	2.51 (64)
		20K	6.10 (155)	0.63 (16)	4.72 (120)	8	0.75 (19)	2.30 (58)	3.62 (92)	0.08 (2.0)	2.51 (64)
		40K	6.50 (165)	0.94 (24)	5.12 (130)	8	0.75 (19)	2.30 (58)	4.00 (102)	0.08 (2.0)	2.51 (64)
	JIS 80A	10K	7.28 (185)	0.63 (16)	5.91 (150)	8	0.75 (19)	3.50 (89)	5.00 (127)	0.08 (2.0)	3.70 (94)
		20K	7.87 (200)	0.79 (20)	6.30 (160)	8	0.91 (23)	3.50 (89)	5.00 (127)	0.08 (2.0)	3.70 (94)
		40K	8.27 (210)	1.18 (30)	6.69 (170)	8	0.91 (23)	3.50 (89)	5.43 (138)	0.08 (2.0)	3.70 (94)
	JIS 100A	10K	8.27 (210)	0.63 (16)	6.89 (175)	8	0.75 (19)	3.50 (89)	6.20 (157)	0.08 (2.0)	3.70 (94)
		20K	8.86 (225)	0.87 (22)	7.28 (185)	8	0.91 (23)	3.50 (89)	6.20 (157)	0.08 (2.0)	3.70 (94)
		40K	9.84 (250)	1.34 (34)	8.07 (205)	8	0.98 (25)	3.50 (89)	6.20 (157)	0.08 (2.0)	3.70 (94)

(1) Dimensions are in inches (millimeters).

Figure 4. FFW Flush Flanged Seal - Flushing Connection Ring (Lower Housing)

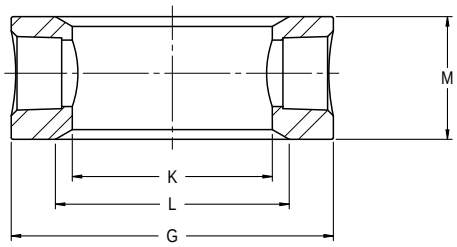


Table 59. Dimensional Table for FFW Flushing Connection Ring (Lower Housing)(1)

	Pipe Size	OUTER DIAMETER "G"	Inner Diameter "K"	Beveled Edge "L"	Thickness with 1/4–NPT F.C. "M"	Thickness with 1/2–NPT F.C. "M"
ANSI / ASME	2-in.	3.62 (92)	2.12 (54)	2.48 (63)	0.97 (25)	1.30 (33)
		3.62 (92)	2.12 (54)	2.48 (63)	0.97 (25)	1.30 (33)
		3.62 (92)	2.12 (54)	2.48 (63)	0.97 (25)	1.30 (33)
	3-in.	5.00 (127)	3.60 (91)	—	0.97 (25)	1.30 (33)
		5.00 (127)	3.60 (91)	—	0.97 (25)	1.30 (33)
		5.00 (127)	3.60 (91)	—	0.97 (25)	1.30 (33)
	4-in.	6.20 (157)	3.60 (91)	—	0.97 (25)	1.30 (33)
		6.20 (157)	3.60 (91)	—	0.97 (25)	1.30 (33)
		6.20 (157)	3.60 (91)	—	0.97 (25)	1.30 (33)
EN1092-1	DN 50	4.00 (102)	2.40 (61)	—	0.97 (25)	1.30 (33)
		4.00 (102)	2.40 (61)	—	0.97 (25)	1.30 (33)
		4.00 (102)	2.40 (61)	—	0.97 (25)	1.30 (33)
	DN 80	5.43 (138)	3.60 (91)	—	0.97 (25)	1.30 (33)
		5.43 (138)	3.60 (91)	—	0.97 (25)	1.30 (33)
		5.43 (138)	3.60 (91)	—	0.97 (25)	1.30 (33)
	DN 100	6.20 (157)	3.60 (91)	—	0.97 (25)	1.30 (33)
		6.20 (157)	3.60 (91)	—	0.97 (25)	1.30 (33)
		6.20 (157)	3.60 (91)	—	0.97 (25)	1.30 (33)
JIS	JIS 50A	3.62 (92)	2.12 (54)	2.48 (63)	0.97 (25)	1.30 (33)
		3.62 (92)	2.12 (54)	2.48 (63)	0.97 (25)	1.30 (33)
		4.00 (102)	2.40 (61)	—	0.97 (25)	1.30 (33)
	JIS 80A	5.00 (127)	3.60 (91)	—	0.97 (25)	1.30 (33)
		5.00 (127)	3.60 (91)	—	0.97 (25)	1.30 (33)
		5.43 (138)	3.60 (91)	—	0.97 (25)	1.30 (33)
	JIS 100A	6.20 (157)	3.60 (91)	—	0.97 (25)	1.30 (33)
		6.20 (157)	3.60 (91)	—	0.97 (25)	1.30 (33)
		6.20 (157)	3.60 (91)	—	0.97 (25)	1.30 (33)

(1) Dimensions are in inches (millimeters).

Figure 5. RFW Flanged Seal (For smaller process connection)

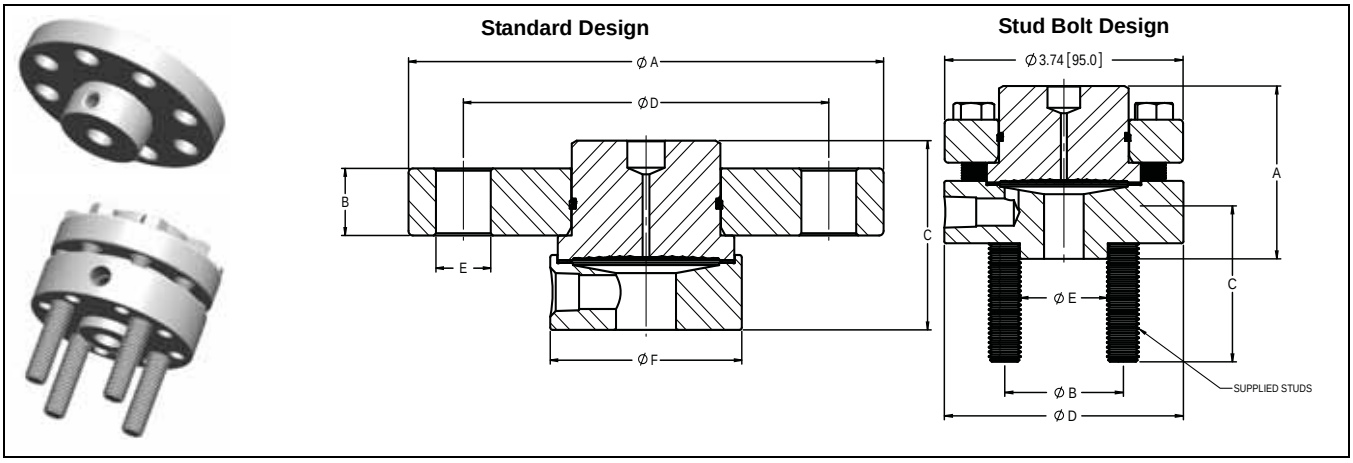


Table 60. RFW Flanged Seal Standard Design Dimensions(1)(2)

	Pipe Size / Class	Class	Flange Diameter (A)	Flange Thickness (B)	Overall Height (C)		Bolt Circle Diameter (D)	Bolt Hole Diameter (E)	Lower Housing Diameter (F)
					No or 1/4-in. NPT flush connection	1/2-in. NPT flush connection			
ANSI / ASME	1/2-in.	2500 lb.	5.25 (133.4)	1.19 (30.2)	2.45 (62.2)	2.79 (70.9)	3.50 (88.9)	0.875 (22.2)	2.62 (66.5)
	3/4-in.	300/600 lb.	4.62 (117.3)	0.62 (15.7)	2.45 (62.2)	2.79 (70.9)	3.25 (82.6)	0.75 (19.5)	2.62 (66.5)
	1-in.	150 lb.	4.25 (107.9)	0.50 (12.7)	2.45 (62.2)	2.79 (70.9)	3.12 (79.3)	0.625 (15.9)	2.62 (66.5)
		300 lb.	4.88 (124.0)	0.62 (15.8)	2.45 (62.2)	2.79 (70.9)	3.50 (88.9)	0.75 (19.5)	2.62 (66.5)
		600 lb.	4.88 (124.0)	0.69 (17.5)	2.45 (62.2)	2.79 (70.9)	3.50 (88.9)	0.75 (19.5)	2.62 (66.5)
	1 1/2-in.	150 lb.	5.00 (127.0)	0.62 (15.8)	2.45 (62.2)	2.79 (70.9)	3.88 (98.6)	0.625 (15.9)	2.88 (73.2)
		300 lb.	6.12 (155.4)	0.75 (19.1)	2.45 (62.2)	2.79 (70.9)	4.50 (114)	0.875 (22.2)	2.88 (73.2)
		600 lb.	6.12 (155.4)	0.88 (22.4)	2.45 (62.2)	2.79 (70.9)	4.50 (114)	0.875 (22.2)	2.88 (73.2)
EN 1092-1	DN 25	PN 40	4.53 (115)	0.71 (18.0)	2.45 (62.2)	2.79 (70.9)	3.35 (85)	0.55 (14)	2.68 (68.1)
	DN 40	PN 40	5.91 (150)	0.71 (18.0)	2.45 (62.2)	2.79 (70.9)	4.33 (110)	0.71 (18)	3.47 (88.1)
JIS	20A	40K	4.72 (120)	0.79 (20)	2.45 (62.2)	2.79 (70.9)	3.35 (85)	0.75 (19)	2.62 (66.5)
	25A	10K	4.92 (125)	0.55 (14)	2.45 (62.2)	2.79 (70.9)	3.54 (90)	0.75 (19)	2.62 (66.5)
		20K	4.92 (125)	0.63 (16)	2.45 (62.2)	2.79 (70.9)	3.54 (90)	0.75 (19)	2.62 (66.5)
		40K	5.12 (130)	0.87 (22)	2.45 (62.2)	2.79 (70.9)	3.74 (95)	0.75 (19)	2.88 (73.2)
	40A	10K	5.51 (140)	0.63 (16)	2.45 (62.2)	2.79 (70.9)	4.13 (105)	0.75 (19)	3.46 (88.0)
		20K	5.51 (140)	0.71 (18)	2.45 (62.2)	2.79 (70.9)	4.13 (105)	0.75 (19)	3.46 (88.0)
		40K	6.30 (160)	0.94 (24)	2.45 (62.2)	2.79 (70.9)	4.72 (120)	0.91 (23)	3.62 (92.0)

(1) Dimensions are in inches (millimeters).

(2) Lower housing is loose on standard design, consult factory for retained lower housing options.

Table 61. RFW Flanged Seal Stud Bolt Design Dimensions(1)

	Pipe Size / Class	Class	Overall Height (A)		Stud Circle Diameter (B)	Stud (Size, Length) (C)	Lower Housing Diameter (D)	Raised Face Diameter (E)
			No or 1/4-in. NPT flush connection	1/2-in. NPT flush connection				
ANSI / ASME	1/2-in.	150 lb.	2.52 (64.0)	2.82 (71.6)	2.38 (60.5)	1/2-13NC, 2.5-in.	3.74 (95.0)	1.38 (35.1)
	1/2-in.	300/600 lb.	2.77 (70.4)	2.87 (72.9)	2.62 (66.5)	1/2-13NC, 2.5-in.	3.75 (95.3)	1.38 (35.1)
	3/4-in.	150 lb.	2.52 (64.0)	2.82 (71.6)	2.75 (69.9)	1/2-13NC, 2.5-in.	3.88 (98.6)	1.69 (42.9)
EN 1092-1	DN 15	PN 40	2.52 (64.0)	2.82 (71.6)	2.56 (65)	M12x1.75, 60mm	3.74 (95.0)	1.77 (45.0)
	DN 15	PN 100/160	2.52 (64.0)	2.82 (71.6)	2.95 (75)	M12x1.75, 60mm	4.13 (105)	1.77 (45.0)
JIS	10A	10K	2.52 (64.0)	2.82 (71.6)	2.56 (65.0)	M10x1.5,60mm	3.74 (95.0)	1.81 (46.0)
		20K	2.52 (64.0)	2.82 (71.6)	2.56 (65.0)	M12x1.75,60mm	3.74 (95.0)	1.81 (46.0)
		40K	2.52 (64.0)	2.82 (71.6)	2.95 (75.0)	M12x1.75,60mm	4.33 (110.0)	2.05 (52.0)
	15A	10K	2.52 (64.0)	2.82 (71.6)	2.76 (70.0)	M10x1.5,60mm	3.74 (95.0)	2.01 (51.0)
		20K	2.52 (64.0)	2.82 (71.6)	2.76 (70.0)	M12x1.75,60mm	3.74 (95.0)	2.01 (51.0)
		40K	2.52 (64.0)	2.82 (71.6)	3.15 (80.0)	M16x2.0,70mm	4.53 (115.0)	2.17 (55.0)
	20A	10K	2.52 (64.0)	2.82 (71.6)	2.95 (75.0)	M10x1.5,60mm	3.94 (100.0)	2.20 (56.0)
		20K	2.52 (64.0)	2.82 (71.6)	2.95 (75.0)	M12x1.75,60mm	3.94 (100.0)	2.20 (56.0)

(1) Upper and lower housing installed bolt torque with CS or SST bolts is 23 ft-lbs. (31 Nm).

Figure 6. EFW Extended Flanged Seal - Extended Flanged Assembly

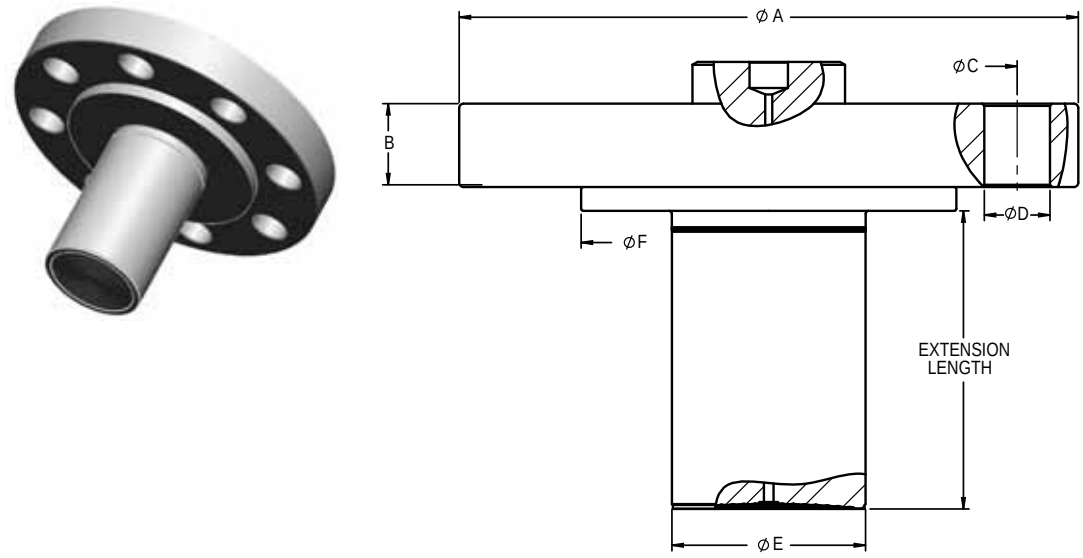


Table 62. EFW Extended Flanged Seal Dimensions(1)

	Pipe Size	Class	Flange Diameter "A"	Flange Thickness "B"	Bolt Circle "C"	Bolts	Bolt Hole Diameter "D"	Raised Face Diameter "F"
ANSI / ASME	1 1/2-in.	150 lb.	5.00 (127)	0.62 (16)	3.88 (99)	4	0.63 (16)	2.88 (73)
		300 lb.	6.12 (156)	0.75 (19)	4.50 (114)	4	0.88 (22)	2.88 (73)
		600 lb.	6.12 (156)	0.88 (22)	4.50 (114)	4	0.88 (22)	2.88 (73)
	2-in.	150 lb.	6.00 (152)	0.69 (18)	4.75 (121)	4	0.75 (19)	3.62 (92)
		300 lb.	6.50 (165)	0.82 (21)	5.00 (127)	8	0.75 (19)	3.62 (92)
		600 lb.	6.50 (165)	1.00 (25)	5.00 (127)	8	0.75 (19)	3.62 (92)
	3-in.	150 lb.	7.50 (191)	0.88 (22)	6.00 (152)	4	0.75 (19)	5.00 (127)
		300 lb.	8.25 (210)	1.06 (27)	6.62 (168)	8	0.88 (22)	5.00 (127)
		600 lb.	8.25 (210)	1.25 (32)	6.62 (168)	8	0.88 (22)	5.00 (127)
	4-in.	150 lb.	9.00 (229)	0.88 (22)	7.50 (191)	8	0.75 (19)	6.20 (158)
		300 lb.	10.00 (254)	1.19 (30)	7.88 (200)	8	0.88 (22)	6.20 (158)
		600 lb.	10.75 (273)	1.50 (38)	8.50 (216)	8	1.00 (25)	6.20 (158)
EN 1092-1	DN 50	PN 40	6.50 (165)	0.79 (20)	4.92 (125)	4	0.71 (18)	4.00 (102)
		PN 63	7.08 (180)	1.02 (26)	5.31 (135)	4	0.87 (22)	4.00 (102)
		PN 100	7.68 (195)	1.10 (28)	5.71 (145)	4	1.02 (26)	4.00 (102)
	DN 80	PN 40	7.87 (200)	0.94 (24)	6.30 (160)	8	0.71 (18)	5.43 (138)
		PN 63	8.46 (215)	1.10 (28)	6.69 (170)	8	0.88 (22)	5.43 (138)
		PN 100	9.06 (230)	1.26 (32)	7.09 (180)	8	1.02 (26)	5.43 (138)
	DN 100	PN 16	8.66 (220)	0.79 (20)	7.09 (180)	8	0.71 (18)	6.20 (158)
		PN 40	9.25 (235)	0.94 (24)	7.48 (190)	8	0.87 (22)	6.20 (158)
		PN 63	9.84 (250)	1.18 (30)	7.87 (200)	8	1.02 (26)	6.20 (158)
JIS	JIS 50A	10K	6.10 (155)	0.55 (14)	4.72 (120)	4	0.75 (19)	3.62 (92)
		20K	6.10 (155)	0.63 (16)	4.72 (120)	8	0.75 (19)	3.62 (92)
		40K	6.50 (165)	0.94 (24)	5.12 (130)	8	0.75 (19)	4.00 (102)
	JIS 80A	10K	7.28 (185)	0.63 (16)	5.91 (150)	8	0.75 (19)	5.00 (127)
		20K	7.87 (200)	0.79 (20)	6.30 (160)	8	0.91 (23)	5.00 (127)
		40K	8.27 (210)	1.18 (30)	6.69 (170)	8	0.91 (23)	5.43 (138)
	JIS 100A	10K	8.27 (210)	0.63 (16)	6.89 (175)	8	0.75 (19)	6.20 (158)
		20K	8.86 (225)	0.87 (22)	7.28 (185)	8	0.91 (23)	6.20 (158)
		40K	9.84 (250)	1.34 (34)	8.07 (205)	8	0.98 (25)	6.20 (158)

(1) Dimensions are in inches (millimeters).

Process Connection Size[1]			
ANSI B16.5	**EN 1092-1**	**JIS B2238**	**Diameter (E)**
3-in.	DN 80	80 A	2.58 (66)
4-in.	DN 100	100 A	3.50 (89)
1 ½-in.	DN 40	40 A	1.45 (37)
2-in.	DN 50	50 A	1.90 (49)
3-in. Headbox	DN 80 Headbox	—	2.875 (74)
4-in. Headbox	DN100 Headbox	—	3.78 (97)

(1) Dimensions are in inches (millimeters).

Figure 7. PFW Pancake Seal

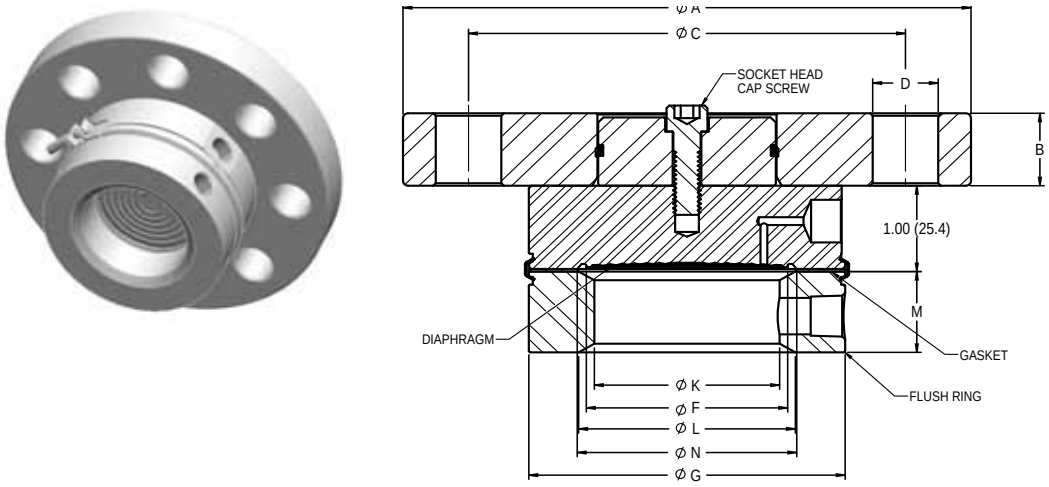


Table 63. PFW Pancake Seal Dimensions(1)

	Pipe Size	Class	Flange Diameter "A"	Flange Thickness "B"	QTY. of Bolts	Bolt Circle "C"	Bolt Hole Size "D"	Standard Diaphragm Diameter "F"
ANSI / ASME	2-in.	150 lb.	6.00 (152.4)	0.69 (17.5)	4	4.75 (120.7)	0.750 (19.05)	2.30 (58.4)
		300 lb.	6.50 (165.1)	0.81 (20.6)	8	5.00 (127.0)	0.750 (19.05)	2.30 (58.4)
		600 lb.	6.50 (165.1)	1.00 (25.4)	8	5.00 (127.0)	0.750 (19.05)	2.30 (58.4)
	3-in.	150 lb.	7.50 (190.5)	0.88 (22.4)	4	6.00 (152.4)	0.750 (19.05)	3.50 (88.9)
		300 lb.	8.25 (209.6)	1.06 (26.9)	8	6.62 (168.1)	0.875 (22.23)	3.50 (88.9)
		600 lb.	8.25 (209.6)	1.25 (31.8)	8	6.62 (168.1)	0.875 (22.23)	3.50 (88.9)
EN1092-1	DN 50	PN40	6.50 (165)	0.79 (20)	4	4.92 (125)	0.71 (18)	2.30 (58)
		PN63	7.09 (180)	1.02 (26)	4	5.31 (135)	0.87 (22)	2.30 (58)
	DN 80	PN40	7.87 (200)	0.94 (24)	8	6.30 (160)	0.71 (18)	3.50 (89)
		PN63	8.46 (215)	1.10 (28)	8	6.69 (170)	0.87 (22)	3.50 (89)

(1) Dimensions are in inches (millimeters).

	Pipe Size	Outer Diameter "G"	Inner Diameter "K"	Beveled Diameter "L"	Thickness with 1/4-NPT F.C. "M"	Thickness with 1/2-NPT F.C. "M"	Minimum Gasket I.D. "N"
ANSI / ASME	2-in.	3.62 (92)	2.12 (54)	2.48 (63)	0.97 (25)	1.30 (33)	2.51 (64)
		3.62 (92)	2.12 (54)	2.48 (63)	0.97 (25)	1.30 (33)	2.51 (64)
		3.62 (92)	2.12 (54)	2.48 (63)	0.97 (25)	1.30 (33)	2.51 (64)
	3-in.	5.00 (127)	3.60 (91)	—	0.97 (25)	1.30 (33)	3.70 (94)
		5.00 (127)	3.60 (91)	—	0.97 (25)	1.30 (33)	3.70 (94)
		5.00 (127)	3.60 (91)	—	0.97 (25)	1.30 (33)	3.70 (94)
EN1092-1	DN 50	4.00 (102)	2.40 (61)	—	0.97 (25)	1.30 (33)	2.51 (64)
		4.00 (102)	2.40 (61)	—	0.97 (25)	1.30 (33)	2.51 (64)
	DN 80	5.43 (138)	3.60 (91)	—	0.97 (25)	1.30 (33)	3.70 (94)
		5.43 (138)	3.60 (91)	—	0.97 (25)	1.30 (33)	3.70 (94)

Figure 8. FCW Flush Flanged Seal – Ring Type Joint (RTJ) Gasket Surface Two-Piece Design (shown with flushing ring)

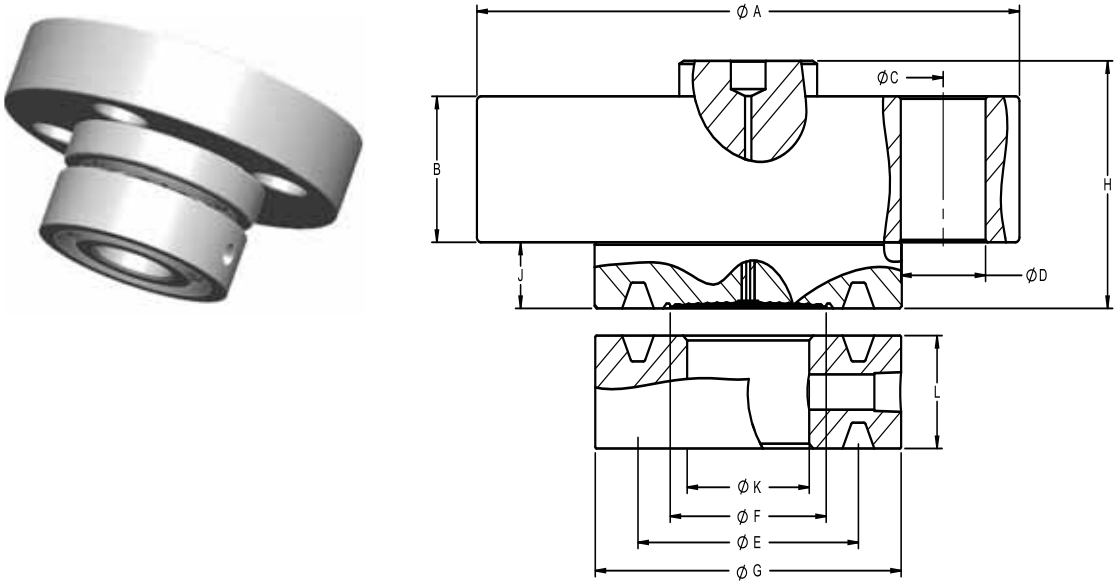


Table 64. Dimensional Table for FCW 2-Piece Flange Type Flush Diaphragm Seal(1)

	Pipe Size	Class	Flange Diameter "A"	Flange Thickness "B"	Bolt Circle Diameter "C"	Bolt Hole Diameter "D"	Overall Height "H"	Raised Face Height "J"
ANSI / ASME	2-in.	150 lb.	6.00 (152)	0.69 (18)	4.75 (121)	0.75 (19)	2.43 (61.7)	0.68 (17.3)
		300 lb.	6.50 (165)	0.82 (21)	5.00 (127)	0.75 (19)	2.43 (61.7)	0.68 (17.3)
		600 lb.	6.50 (165)	1.00 (25)	5.00 (127)	0.75 (19)	2.43 (61.7)	0.68 (17.3)
		1500 lb.	8.50 (216)	1.50 (38)	6.50 (165)	1.00 (25)	2.57 (65.3)	0.82 (20.8)
		2500 lb.	9.25 (235)	2.00 (51)	6.75 (171)	1.12 (28)	3.07 (78.0)	0.82 (20.8)
	3-in.	150 lb.	7.50 (191)	0.88 (22)	6.00 (168)	0.75 (19)	2.43 (61.7)	0.68 (17.3)
		300 lb.	8.25 (210)	1.06 (27)	6.62 (168)	0.88 (22)	2.43 (61.7)	0.68 (17.3)
		600 lb.	8.25 (210)	1.25 (32)	6.62 (168)	0.88 (22)	2.43 (61.7)	0.68 (17.3)
		900 lb.	9.50 (241)	1.50 (38)	7.50 (191)	1.00 (25)	2.57 (65.3)	0.82 (20.8)
		1500 lb.	10.50 (267)	1.88 (48)	8.00 (203)	1.25 (32)	3.07 (78.0)	0.82 (20.8)
		2500 lb.	12.00 (305)	2.62 (67)	9.00 (229)	1.38 (35)	4.07 (103.4)	0.82 (20.8)

(1) Dimensions are in inches (millimeters).

	Pipe Size	RTJ Diameter "E"	Standard Diaphragm Diameter "F"	Outer Diameter "G"	Inner Diameter "K"	Thickness with 1/4-NPT F.C. "L"	Thickness with 1/2-NPT F.C. "L"
ANSI / ASME	2-in.	3.250 (83)	2.30 (58.4)	4.00 (102)	2.12 (54)	1.4 (36)	1.7 (43)
		3.250 (83)	2.30 (58.4)	4.25 (108)	2.12 (54)	1.4 (36)	1.7 (43)
		3.250 (83)	2.30 (58.4)	4.25 (108)	2.12 (54)	1.4 (36)	1.7 (43)
		3.750 (95)	2.30 (58.4)	4.88 (124)	2.12 (54)	1.4 (36)	1.7 (43)
		4.000 (102)	3.50 (88.9)	5.25 (133)	2.12 (54)	1.4 (36)	1.7 (43)
	3-in.	4.500 (114)	3.50 (88.9)	5.25 (133)	3.60 (91)	1.5 (38)	1.8 (46)
		4.875 (124)	3.50 (88.9)	5.75 (146)	3.60 (91)	1.5 (38)	1.8 (46)
		4.875 (124)	3.50 (88.9)	5.75 (146)	3.60 (91)	1.5 (38)	1.8 (46)
		4.875 (124)	3.50 (88.9)	6.12 (155)	3.60 (91)	1.5 (38)	1.8 (46)
		5.375 (137)	3.50 (88.9)	6.62 (168)	3.60 (91)	1.5 (38)	1.8 (46)
		5.000 (127)	3.50 (88.9)	6.62 (168)	3.60 (91)	1.5 (38)	1.8 (46)

Figure 9. RCW Flanged Remote Seal Ring Type Joint (RTJ) and Flushing Connection Ring

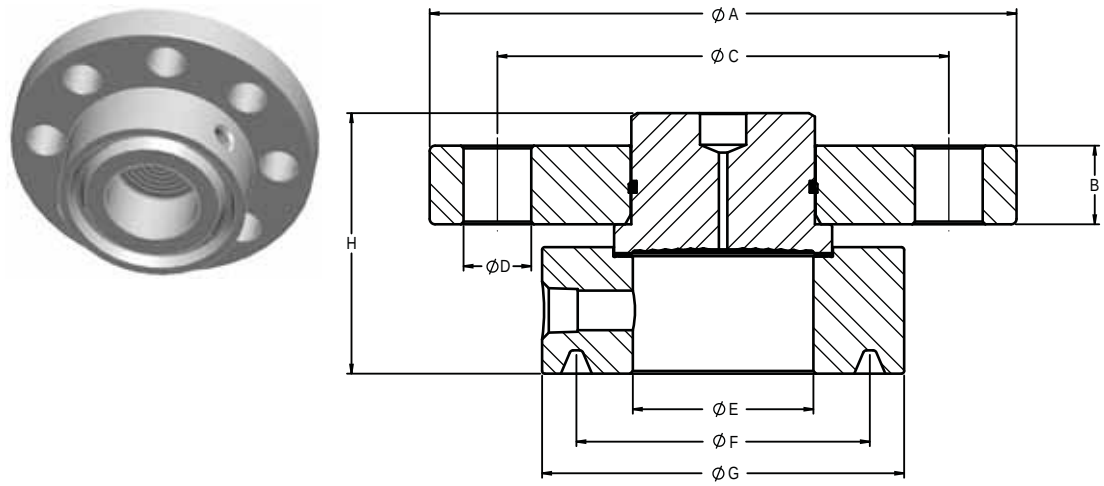


Table 65. RCW Flanged Remote Seal Dimensions(1)

	Pipe Size	Class	Flange Diameter (A)	Flange Thickness (B)	Bolt Circle Diameter (C)	Bolt Hole Diameter (D)	Lower Housing Inner Diameter (E)	RTJ Groove (F)	Lower Housing Outer Diameter (G)	Overall Height (H)	
										No or 1/4-in. NPT flush connection	1/2-in. NPT flush connection
ANSI / ASME	1/2-in.	2500 lb.	5.25 (133.4)	1.19 (30.2)	3.50 (88.9)	0.88 (22.2)	0.62 (15.7)	1.69 (42.9)	2.64 (67.1)	2.88 (73.2)	3.18 (80.8)
	3/4-in.	300/600 lb.	4.62 (117)	0.62 (15.8)	3.25 (82.6)	0.75 (19.1)	0.82 (20.8)	1.69 (42.9)	2.64 (67.1)	2.88 (73.2)	3.18 (80.8)
	3/4-in.	900/1500 lb.	5.12 (130)	1.00 (25.4)	3.50 (88.9)	0.88 (22.2)	0.82 (20.8)	1.75 (44.5)	2.64 (67.1)	2.88 (73.2)	3.18 (80.8)
	3/4-in.	2500 lb.	5.50 (140)	1.25 (31.8)	3.75 (95.3)	0.88 (22.2)	0.82 (20.8)	2.00 (50.8)	2.90 (73.7)	2.88 (73.2)	3.18 (80.8)
	1-in.	150 lb.	4.25 (108)	0.50 (12.7)	3.12 (79.3)	0.625 (15.9)	1.05 (26.7)	1.88 (47.6)	2.64 (67.1)	2.88 (73.2)	3.18 (80.8)
	1-in.	300 lb.	4.88 (124)	0.62 (15.8)	3.50 (88.9)	0.75 (19.1)	1.05 (26.7)	2.00 (50.8)	2.77 (70.4)	2.88 (73.2)	3.18 (80.8)
	1-in.	600 lb.	4.88 (124)	0.69 (17.5)	3.50 (88.9)	0.75 (19.1)	1.05 (26.7)	2.00 (50.8)	2.77 (70.4)	2.88 (73.2)	3.18 (80.8)
	1-in.	900/1500 lb.	5.88 (149)	1.12 (28.5)	4.00 (102)	1.00 (25.4)	1.05 (26.7)	2.00 (50.8)	2.83 (71.9)	2.88 (73.2)	3.18 (80.8)
	1-in.	2500 lb.	6.25 (159)	1.38 (35.1)	4.25 (108)	1.00 (25.4)	1.05 (26.7)	2.38 (60.3)	3.27 (83.1)	2.88 (73.2)	3.18 (80.8)
	1 1/2-in.	150 lb.	5.00 (127)	0.62 (15.8)	3.88 (98.6)	0.63 (15.9)	1.61 (40.9)	2.56 (65.1)	3.27 (83.1)	2.88 (73.2)	3.18 (80.8)
	1 1/2-in.	300 lb.	6.12 (155)	0.75 (19.1)	4.50 (114)	0.88 (22.2)	1.61 (40.9)	2.69 (68.3)	3.58 (90.9)	2.88 (73.2)	3.18 (80.8)
	1 1/2-in.	600 lb.	6.12 (155)	0.88 (22.4)	4.50 (114)	0.88 (22.2)	1.61 (40.9)	2.69 (68.3)	3.58 (90.9)	2.88 (73.2)	3.18 (80.8)
	1 1/2-in.	900/1500 lb.	7.00 (178)	1.25 (31.8)	4.88 (123.9)	1.13 (28.6)	1.61 (40.9)	2.69 (68.3)	3.64 (92.5)	2.88 (73.2)	3.18 (80.8)
	1 1/2-in.	2500 lb.	8.00 (203)	1.75 (44.5)	5.75 (146)	1.25 (31.8)	1.61 (40.9)	3.25 (82.6)	4.52 (115)	2.88 (73.2)	3.18 (80.8)

(1) Dimensions are in inches (millimeters).

Figure 10. FUW Flush Flanged Type Seal - EN1092-1 Type D

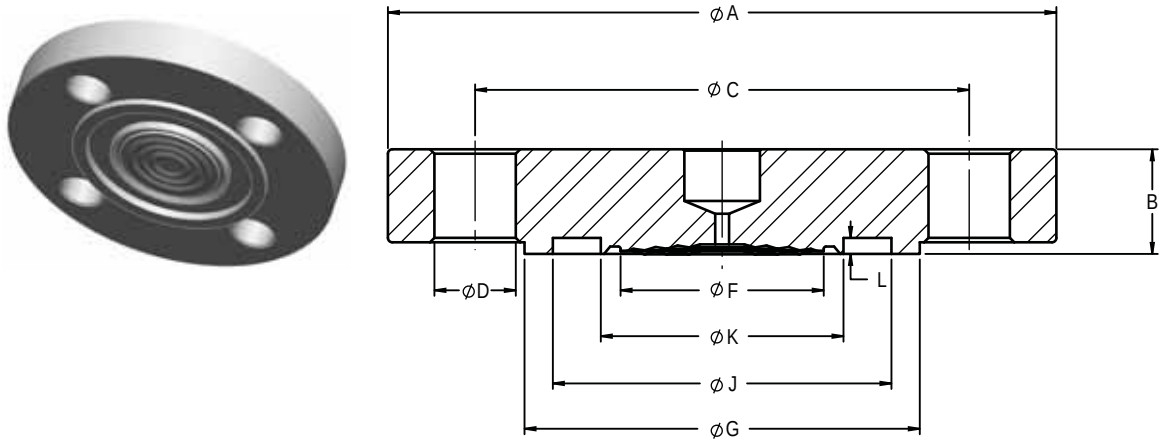


Table 66. FUW Flush Flanged Type Seal Dimensions(1)

EN 1092-1 Pipe Size	Class	Flange Diameter "A"	Flange Thickness "B"	Bolt Circle "C"	Bolt Diameter "D"	Bolts	Standard Diaphragm Diameter "F"	Raised Face Diameter "G"	Groove O.D. "J"	Groove I.D. "K"	Groove Depth "L"
DN 50	PN 40	6.50 (165)	0.79 (20)	4.92 (125)	0.71 (18)	4	2.30 (58)	4.00 (102)	3.46 (88)	2.83 (72)	0.16 (4.0)
DN 80	PN 40	7.87 (200)	0.94 (24)	6.30 (160)	0.71 (18)	8	3.50 (89)	5.43 (138)	4.76 (121)	4.13 (105)	0.16 (4.0)

(1) Measurement in inches (millimeters).

Figure 11. FVW Flush Flanged Type Seal - EN1092-1 Type C

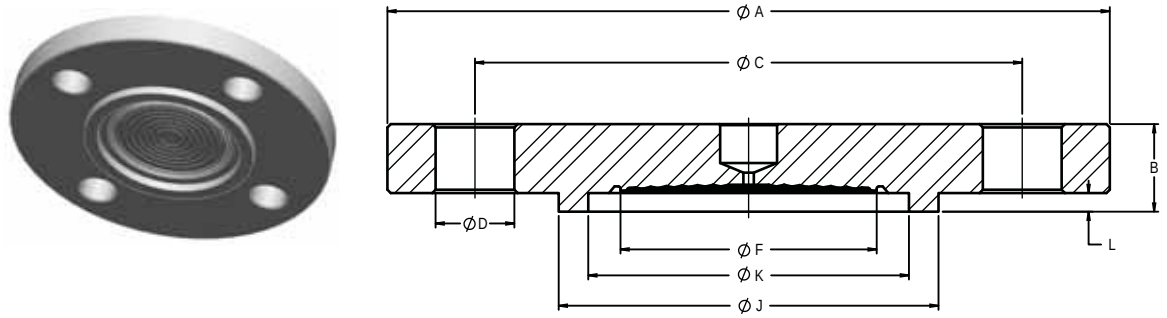
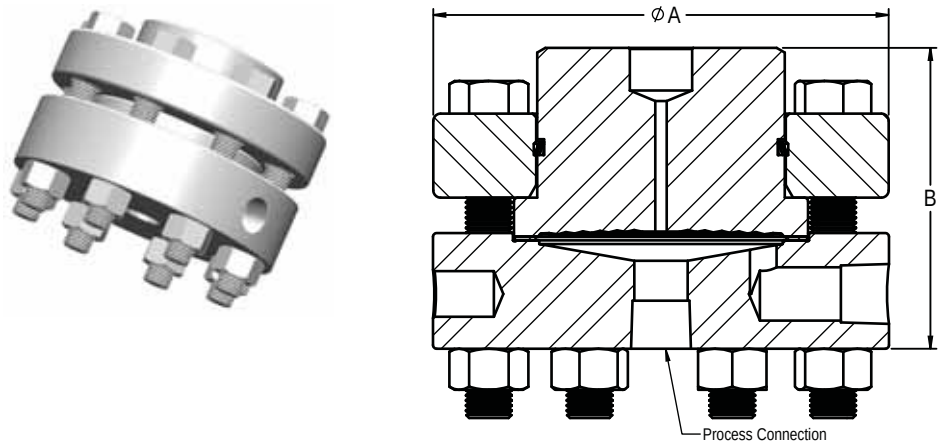


Table 67. FVW Flush Flanged Type Seal Dimensions(1)

EN 1092-1 Pipe Size	Class	Flange Diameter "A"	Flange Thickness "B"	Bolt Circle "C"	Bolt Diameter "D"	Bolts	Standard Diaphragm Diameter "F"	Tongue O.D. "J"	Tongue I.D. "K"	Tongue Height "L"
DN 50	PN 40	6.50 (165)	0.79 (20)	4.92 (125)	0.71 (18)	4	2.30 (58)	3.43 (87)	2.87 (73)	0.18 (4.5)
DN 80	PN 40	7.87 (200)	0.94 (24)	6.30 (160)	0.71 (18)	8	3.50 (89)	4.72 (120)	4.17 (106)	0.18 (4.5)

(1) Measurement in inches (millimeters).

Figure 12. RTW Threaded Seal



Dimensions are in inches (millimeters)

Table 68. RTW Threaded Seal Dimensions(1)

Rating	Overall Diameter (A)	Overall Height (B)	
		No or 1/4-in. NPT flush connection	1/2-in. NPT flush connection
2500 psi (172 bar)	3.74 (95.0)	2.47 (62.7)	2.82 (71.6)
5000 psi (345 bar)	3.74 (95.0)	1.95 (49.5)	2.31 (58.6)
10000 psi (690 bar)	4.00 (101.6)	1.95 (49.5)	—

(1) Dimensions are in inches (millimeters).

Figure 13. HTS Threaded Flush Type Seal

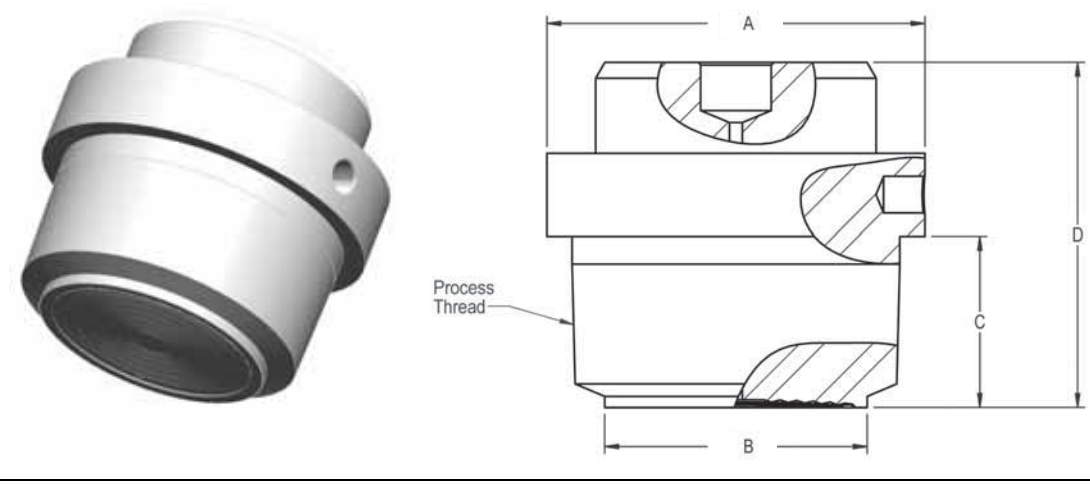


Table 69. HTS Threaded Flush Type Seal Dimensions(1)

Process Type	Connection Size	Outer Diameter (A)	Diaphragm Diameter (B)	Length (C)	Overall Height (D)
ANSI NPT	1-in. NPT	2.03 (51.6)	1.10 (27.9)	1.24 (31.5)	2.50 (63.5)
	1 1/2-in. NPT	2.36 (59.9)	1.70 (43.2)	1.24 (31.5)	2.50 (63.5)
	2-in. NPT	2.74 (69.6)	1.90 (48.3)	1.24 (31.5)	2.50 (63.5)
EN 10226 BSP	G1 BSP	2.03 (51.6)	1.10 (27.9)	0.87 (22.0)	2.15 (54.6)
	G1 1/2 BSP	2.36 (59.9)	1.70 (43.2)	0.98 (24.9)	2.24 (56.9)
	G2 BSP	2.74 (69.6)	1.90 (48.3)	1.24 (31.5)	2.50 (63.5)

(1) Dimensions are in inches (millimeters).

Figure 14. SCW Tri-Clamp Seal

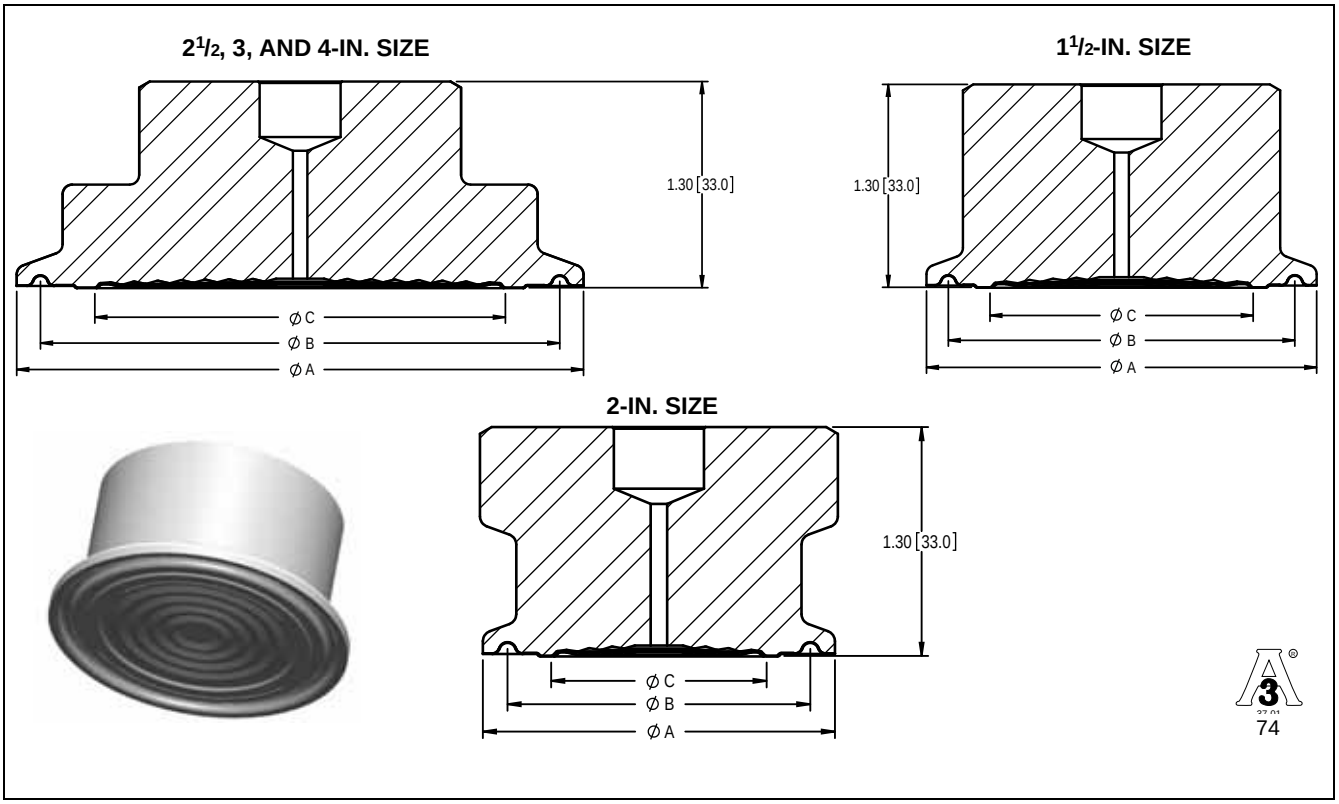


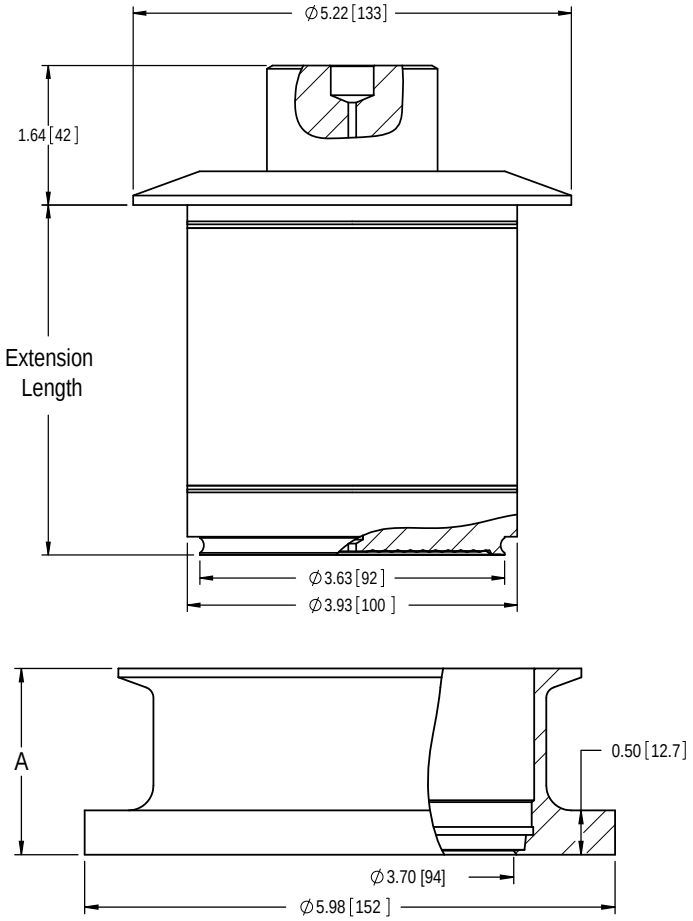
Table 70. SCW Tri-Clamp Seal Dimensions(1)

Pipe Size	Outer Diameter (A)	O-rIng Groove Diameter (B)	Diaphragm Diameter (C)
1 1/2-in.	2.000 (50.80)	1.720 (43.69)	1.214 (30.84)
2-in.	2.500 (63.50)	2.220 (56.39)	1.675 (42.55)
2 1/2-in.	3.047 (77.39)	2.780 (70.61)	2.072 (52.63)
3-in.	3.580 (90.93)	3.280 (83.31)	2.582 (65.58)
4-in.	4.680 (118.87)	4.350 (110.49)	3.662 (93.01)

(1) Dimensions are in inches (millimeters).

Figure 15. SSW Tank Spud Seal





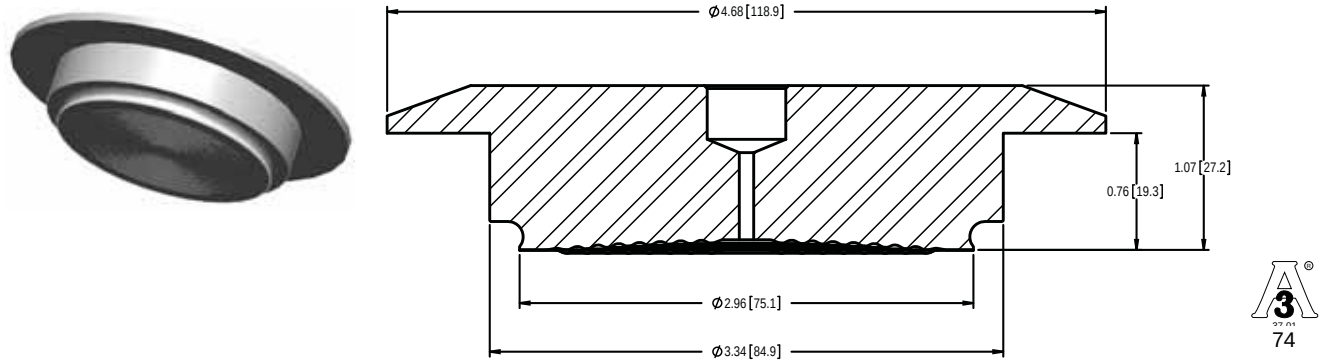
74

Table 71. SSW Tank Spud Seal Dimensions(1)

Pipe Size	Length	A
4-in. SCH 5	2-in. Long	2.10 (53.3)
	6-in. Long	6.10 (154.9)

(1) Dimensions are in inches (millimeters).

Figure 16. STW Hygienic Thin Wall Tank Spud Seal



Dimensions are in inches (millimeters)

Figure 17. EES Hygienic Flanged Tank Spud Extended Seal

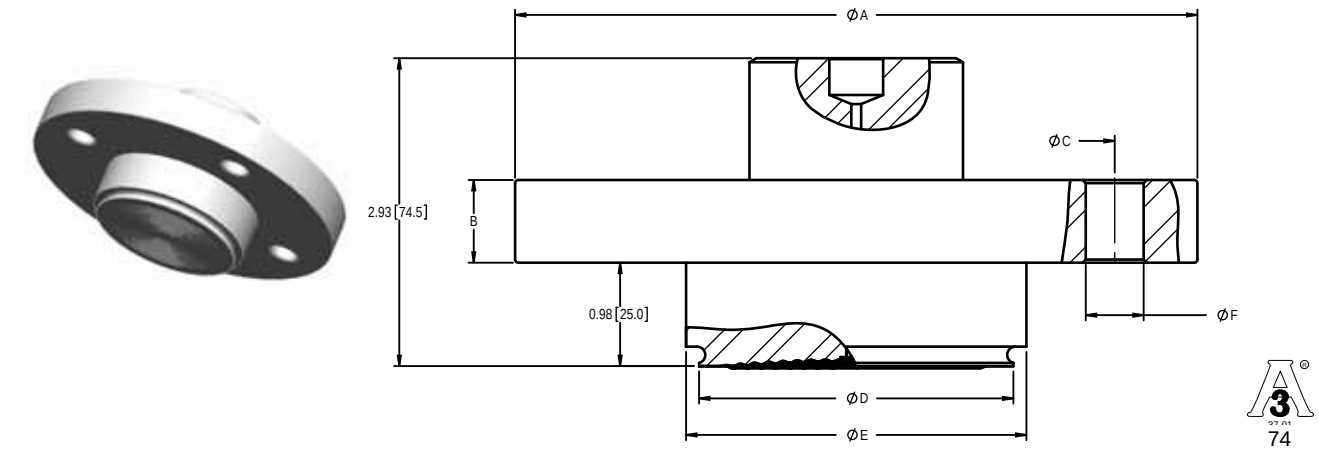


Table 72. EES Hygienic Flanged Tank Spud Extended Seal Dimensions(1)

Pipe Size	A	B	Bolts	C	D	E	F
DN50	6.50 (165.0)	0.79 (20.0)	4	4.92 (125.0)	2.99 (76.0)	3.24 (82.3)	0.55 (14.0)
DN80	7.87 (200.0)	0.94 (24.0)	8	6.30 (160.0)	4.04 (102.7)	4.24 (107.8)	0.55 (14.0)

(1) Dimensions are in inches (millimeters).

Figure 18. VCS Tri-clamp In-Line Seal

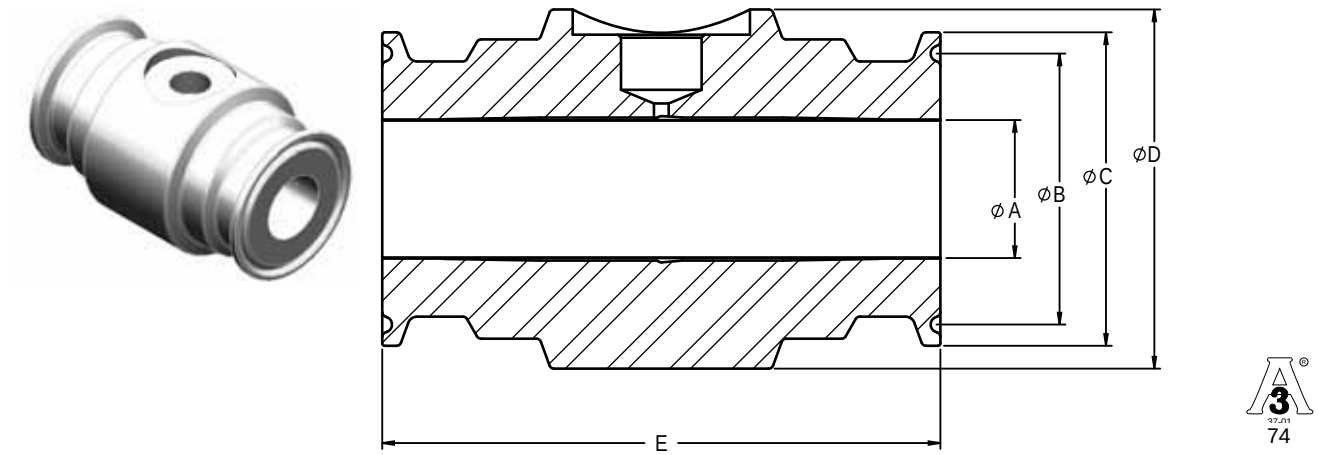
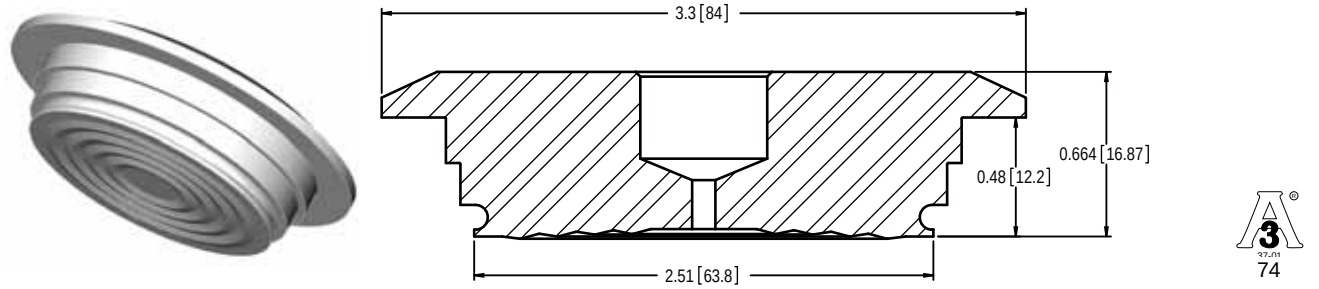


Table 73. VCS Tri-clamp In-Line Seal Dimensions(1)

Pipe Size	A	B	C	D	E
1-in.	0.870 (22.10)	1.720 (43.69)	1.990 (50.55)	2.28 (57.9)	3.54 (90.0)
1½-in.	1.370 (34.80)	1.720 (43.69)	1.990 (50.55)	2.73 (69.3)	3.54 (90.0)
2-in.	1.870 (47.50)	2.220 (56.39)	2.520 (64.01)	3.19 (81.0)	3.54 (90.0)
3-in.	2.870 (72.90)	3.280 (83.31)	3.580 (90.93)	4.14 (105.2)	3.54 (90.0)
4-in.	3.820 (97.03)	4.350 (110.49)	4.690 (119.13)	5.06 (128.5)	3.54 (90.0)

(1) Dimensions are in inches (millimeters).

Figure 19. SVS Varivent Compatible Connection Seal



SHP Cherry-Burrell “I” Line Seal

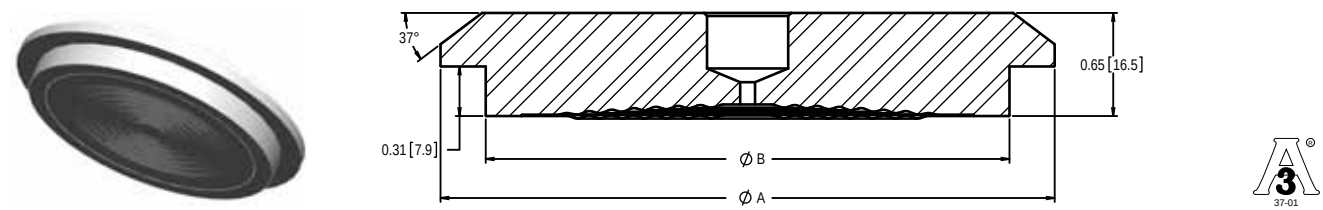


Table 74. SHP Cherry-Burrell “I” Line Seal Dimensions(1)

Size	A	B
2-in.	2.640 (67.06)	2.240 (56.90)
3-in.	3.875 (98.43)	3.305 (83.95)

(1) Dimensions are in inches (millimeters).

Figure 20. SLS Hygienic Dairy Process Connection Female Thread Seal per DIN 11851



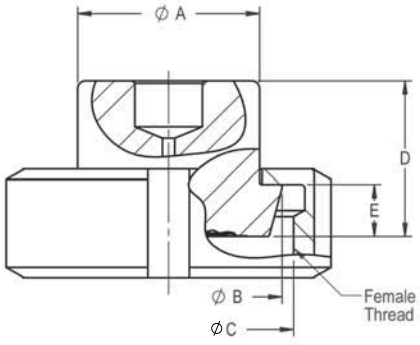


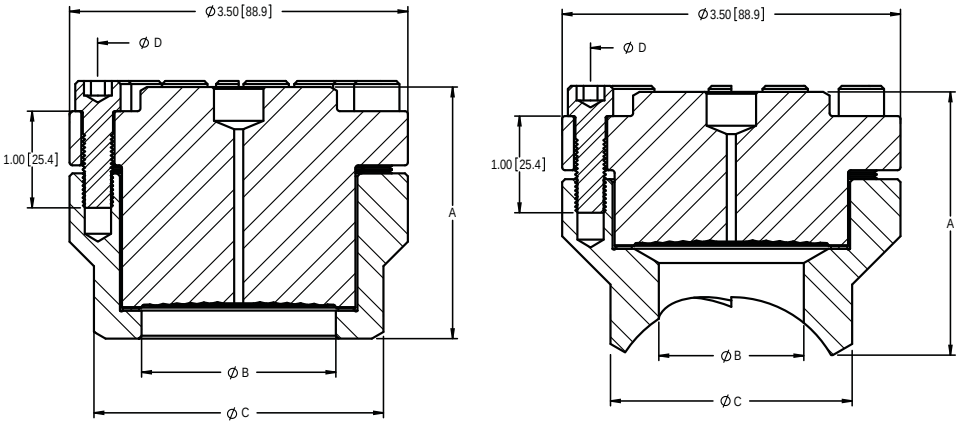
Table 75. SLS Hygienic Dairy Process Connection Female Thread Seal per DIN 11851 Dimensions(1)

Female Thread	Process Size / Rating	A	B	Thread (C)	D	E
DIN 11851	DN 40 PN 40	1.89 (48.0)	2.20 (56.0)	Rd 65 X 1/6-in.	1.18 (30.0)	0.39 (10.0)
	DN 50 PN 25	2.40 (61.0)	2.70 (68.5)	Rd 78 X 1/6-in.	1.22 (31.0)	0.43 (11.0)

(1) Dimensions are in inches (millimeters).

Figure 21. WSP Saddle Seal





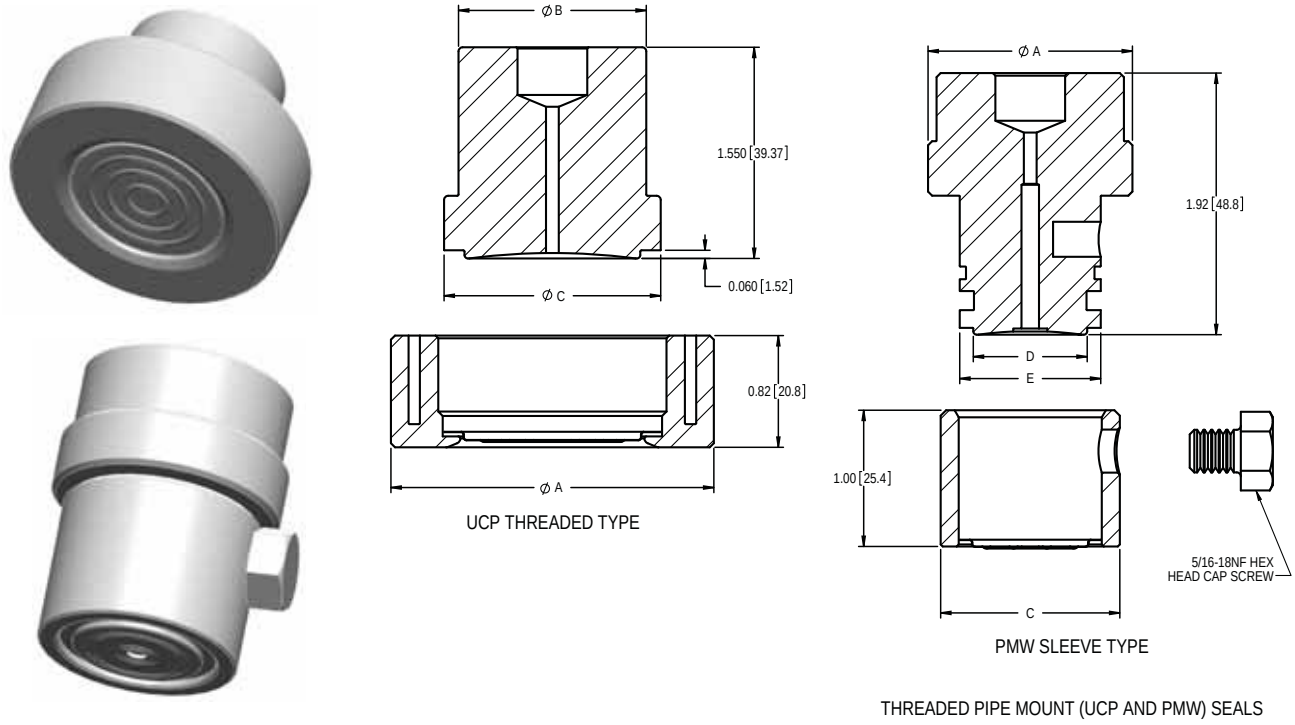
Dimensions are in inches (millimeters)

Table 76. WSP Saddle Seal Dimensions(1)

Size	A	B	C	D	
				6 Bolts	8 Bolts
2-in.	2.72 (69.1)	1.50 (38.1)	2.50 (63.5)	2.99 (75.9)	2.91 (78.0)
3-in.	2.46 (62.5)	2.01 (51.1)	3.02 (76.7)	2.99 (75.9)	2.91 (78.0)
4-in. and larger	2.60 (66.0)	2.01 (51.1)	3.00 (76.1)	2.99 (75.9)	2.91 (78.0)

(1) Dimensions are in inches (millimeters).

Figure 22. UCP and PMW Threaded Pipe Mount Seals



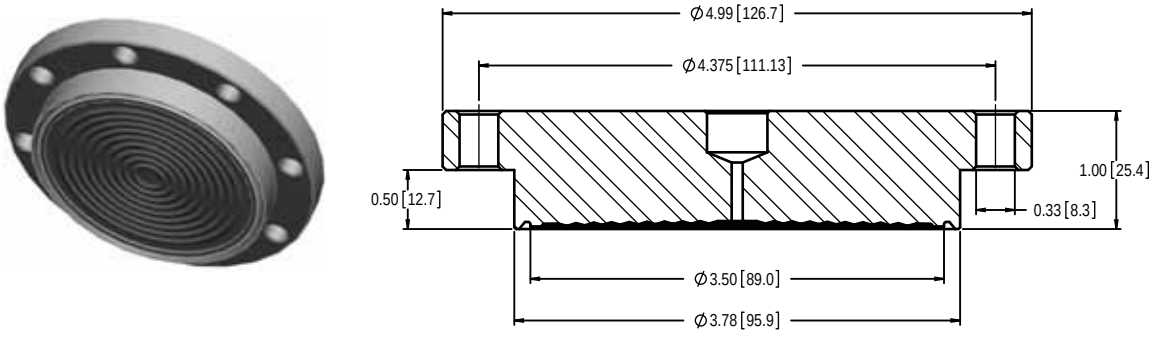
Dimensions are in inches (millimeters)

Table 77. UCP and PMW Threaded Pipe Mount Seals Dimensions(1)

Size	Diameter (A)	Diameter (B)	Diameter (C)	Diameter (D)	Diameter (E)
Sleeve 1-in. Pipe	1.50 (38.1)	—	1.32 (33.5)	0.85 (21.6)	1.05 (26.7)
Threaded M44 X 1.25	2.37 (60.2)	1.38 (35.1)	1.59 (40.4)	—	—

(1) Dimensions are in inches (millimeters).

Figure 23. CTW Chemical Tee Seal



Dimensions are in inches (millimeters)

Figure 24. TFS Wafer Style In-Line Seal

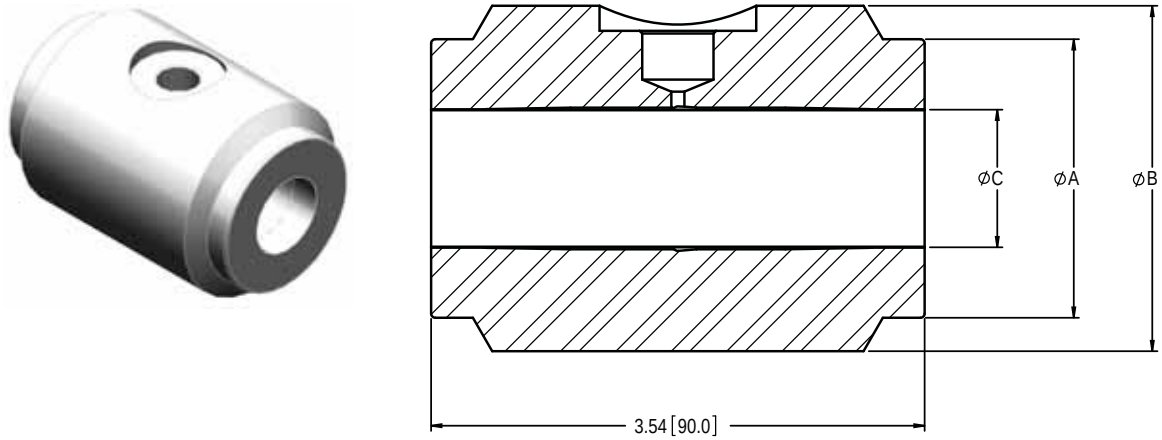
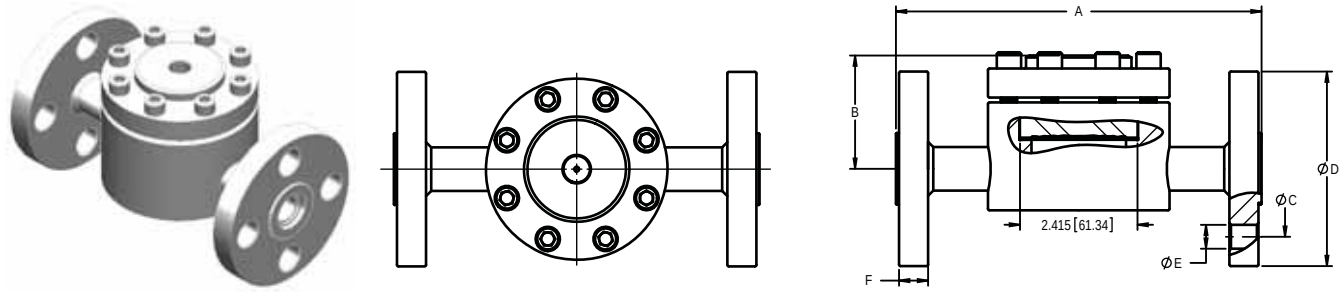


Table 78. TFS Wafer Style In-Line Seal Dimensions(1)

Pipe Size	A	B	C
1-in.	2.00 (50.8)	2.64 (67.0)	1.090 (27.69)
1 1/2-in.	2.88 (73.2)	3.23 (82.0)	1.614 (41.00)
2-in.	3.62 (91.9)	3.74 (95.0)	2.070 (52.58)
2 1/2-in.	4.12 (104.6)	4.21 (107.1)	2.480 (62.99)
3-in.	5.00 (127.0)	5.00 (127.0)	3.070 (77.98)
4-in.	6.00 (152.4)	6.00 (152.4)	4.000 (101.60)
DN25	2.68 (68.0)	2.72 (69.0)	1.090 (27.69)
DN40	3.46 (88.0)	3.46 (88.0)	1.614 (41.00)
DN50	4.02 (102.0)	4.09 (104.0)	1.992 (50.60)
DN80	5.43 (138.0)	5.47 (139.0)	3.236 (82.19)
DN100	6.38 (162.0)	6.46 (164.0)	4.216 (107.09)

(1) Dimensions are in inches (millimeters).

Figure 25. WFW Flow-Thru Flanged Seal



Dimensions are in inches (millimeters)

Table 79. WFW Flow-Thru Flanged Seal Dimensions (1)

Class (lb.)	Nominal Pipe Size (in.)	Overall Length ± 0.05	Upper to Centerline Height	Bolt Circle Diameter	Outside Diameter	Bolt Hole	Flange Thickness
		A	B	C	D	E	F
150	1	7.00 (177.8)	2.28 (57.91)	3.12 (79)	4.25 (108)	0.62 (16)	0.50 (13)
	2	9.00 (228.6)	3.21 (81.6)	4.75 (121)	6.00 (152)	0.75 (19)	0.69 (18)
	3	11.00 (279.4)	3.50 (88.9)	6.00 (152)	7.50 (191)	0.75 (19)	0.88 (22)

(1) Dimensions are in inches (millimeters).

Rosemount DP Level

Product Data Sheet
00813-0100-4016, Rev LA
Catalog 2011 - 2012

Rosemount Level Solutions

Emerson provides a complete range of Rosemount products for level measurement applications.

Pressure – Level or Interface Measurement

Emerson has a complete line of Rosemount pressure transmitters and remote seals for measuring level or interfaces in liquid applications. Optimize performance with direct mount, Tuned Seal systems:

- Rosemount 3051SAL, 3051L, and 2051L Liquid Level Transmitters
- Rosemount 1199 Remote Diaphragm Seals with direct mount or capillary connections

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- Rosemount 2110 Compact Vibrating Fork Liquid Level Switch
- Rosemount 2120 Full-featured Vibrating Fork Liquid Level Switch

Guided Wave Radar – Level and Interface Measurement

Multivariable, loop-powered Guided Wave Radar transmitters with a wide range of probe styles to fit different liquids and solids applications. The product line consists of:

- Rosemount 3300 Series – Versatile and easy-to-use transmitter with proven reliability
- Rosemount 5300 Series – Accurate, superior performance transmitter with FOUNDATION™ fieldbus support

Non-contacting Radar – Level Measurement

The Rosemount non-contacting radar family consists of:

- Rosemount 5400 Series Transmitters – Loop-powered superior performance transmitter with a wide range of antennas, for liquid level measurement in most applications and process conditions.
- Rosemount 5600 Series Transmitters – Power of 4-wire give maximum sensitivity and performance for solids, challenging reactors, rapid level changes and excessive process conditions.

Non-contacting Ultrasonic – Level Measurement

The Rosemount 3100 Series ultrasonic level transmitters provide continuous non-contacting level measurement of liquids. The range consists of:

- Rosemount 3101 for simple continuous level measurement
- Rosemount 3102 for continuous measurement with two integral relays for local control functionality
- Rosemount 3105 Intrinsically safe certified version for hazardous areas

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Many other special order transmitter/seal configurations, materials and fill fluids are available that are not covered in this document. Contact your Rosemount representative or consult factory for additional information.

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00813-0100-4016 Rev LA, 7/11

EMERSON™
Process Management

Product Data Sheet
00813-0100-4530, Rev DA
Catalog 2011 - 2012

Superior Performance Guided Wave Radar Level and Interface Transmitter

- *Industry leading measurement capability and reliability provided by direct switch technology*
- *Increased plant availability with advanced diagnostics and PlantWeb® functionality*
- *Increased safety and proven FMEDA suitable for SIL2 with a SFF>90%*
- *Reduced cost and increased safety from the robust modular design*
- *Reduced instrument count and process penetrations with a MultiVariable™ transmitter*
- *Improved throughput and product quality due to superior performance and accuracy*
- *Reduced startup cost through powerful and easy-to-use configuration tools and seamless plant integration*
- *Improved EMC performance and higher safety with smart galvanic interface*
- *Reduced operating costs with predictive maintenance and easy troubleshooting*

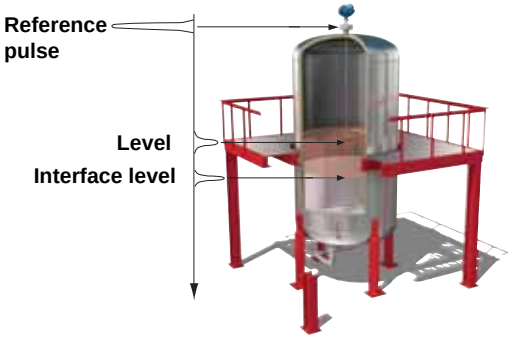


HART COMMUNICATION PROTOCOL · IEC WirelessHART · FOUNDATION · Modbus

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Taking Guided Wave Radar Benefits to the Next Level



MEASUREMENT PRINCIPLE

Low power, nano-second microwave pulses are guided down a probe submerged in the process media. When a microwave pulse reaches a media with a different dielectric constant, part of the energy is reflected back to the transmitter.

The transmitter uses the residual wave of the first reflection for measuring the interface level. Part of the wave, which was not reflected at the upper product surface, continues until it is reflected at the lower product surface. The speed of this wave depends fully on the dielectric constant of the upper product.

The time difference between the transmitted and the reflected pulse is converted into a distance, and the total level or interface level is then calculated. The reflection intensity depends on the dielectric constant of the product. The higher the dielectric constant value, the stronger the reflection is.

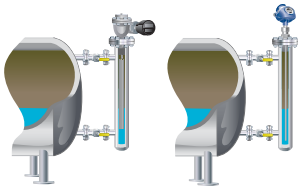
High application flexibility



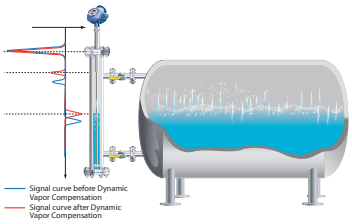
GUIDED WAVE RADAR TECHNOLOGY BENEFITS

- Highly accurate and reliable direct level measurement with no compensation needed for changing process conditions (such as density, conductivity, viscosity, pH, temperature, and pressure)
- No moving parts and no re-calibration result in minimized maintenance
- Handles vapor, dust, turbulence, and foam well
- Suitable for small tanks, difficult tank geometry, internal obstacles, and unaffected by the mechanical design of chambers
- Top down installation minimizes risk for leakages

Displacer **Guided wave radar**



From this... → to this... in minutes



Accuracy in saturated steam

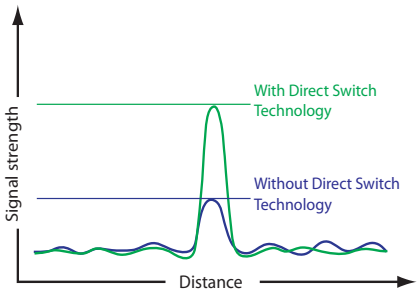
SPECIAL 5300 FEATURES

Optimized to Suit More Applications

- Suitable for most liquid and solids level applications and liquid interface applications
- Innovations to handle even the most challenging applications reliably, including process vessels, control, and safety
- A wide selection of materials, process connections, probe styles, and accessories
- A wide range of options to find the best fit in existing chambers, or a complete assembly with Rosemount 9901 high quality chambers
- The Dynamic Vapor Compensation (DVC) option automatically compensates for changes in the vapor space dielectric

Best Performance and Uptime

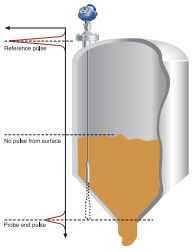
- Unique Direct Switch Technology (DST) and Probe End Projection (PEP) improve measurement capability and reliability
- Ability to use single lead probe for long measuring ranges, obstructions and low dielectrics ensures reliability in more applications, such as viscous media
- PEP provides a backup function for challenging applications such as plastic pellets and boiling hydrocarbons
- Smart Galvanic Interface results in a more stable microwave and EMI performance with minimized effects from outside disturbances



DST provides a signal that is two to five times stronger than other GWR transmitters'

Robust Design Reduces Costs and Increases Safety

- Heavy-duty unique probe solution for extreme temperature and pressures with a multiple layer of protection
- EchoLogics and smart software functions provide enhanced ability to keep track of the surface and detect a full vessel situation
- Third party approved for overfill protection and Safety Integrated System SIL2 suitability
- Electronics and cable connections in separate compartments provides safer handling and improved moisture protection

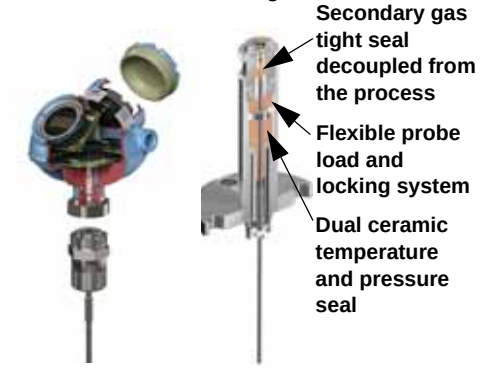


With PEP, the surface position is calculated if the surface echo becomes unavailable

Easy Installation and Plant Integration

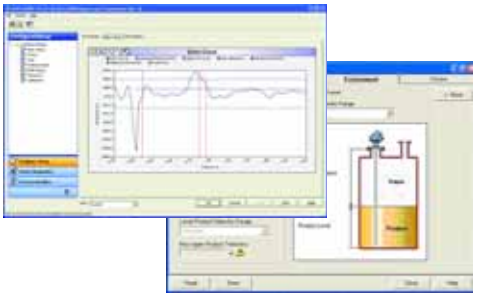
- Easy upgrade by matching existing tank connections and cut-to-fit probes
- MultiVariable™ device reduces the number of process penetrations
- Seamless system integration with HART®, FOUNDATION™ fieldbus, Modbus, or IEC 62591 (*Wireless*HART) with the Smart Wireless THUM™ adapter
- Pre-configured or easy configuration in Rosemount Radar Master with a five-step wizard, auto connect, and online help
- Enhanced DD with step-by-step configuration and echo curve capability (HART) in tools such as AMS Device Manager, and Field Communicator
- DTM with echo curve capability for use in FDT/DTM compatible configuration tools such as PACTWare™, Yokogawa® FieldMate/PRM

Robust modular design



Minimized Maintenance Reduces Cost

- Easy online troubleshooting with user friendly software, utilizing powerful echo curve and logging tools
- Signal Quality Metrics (SQM) diagnostics to detect product build-up on probe or to monitor turbulence, boiling, foam, and emulsions
- Predictive maintenance with advanced diagnostics and PlantWeb alerts
- Modular design for reduced spare parts and easy replacement of the head without opening the tank



Rosemount Radar Master enables easy configuration and service with wizard, online help, echo curve and logging tools, and much more

Rosemount 5301 and 5302 Level and/or Interface in Liquids



Rosemount 5301 and 5302 Guided Wave Radar Level transmitters provide industry leading measurement capabilities and reliability in liquids. Characteristics include:

- Direct Switch Technology and Probe End Projection to handle low reflective media and long measuring ranges
- Wide range of probe styles, materials, and temperatures and pressures for application flexibility
- HART 4-20 mA, FOUNDATION fieldbus, Modbus, or IEC 62591 (*Wireless*HART) with the Smart Wireless THUM adapter
- Prior use SIL 2 suitable (QS Option)
- Advanced Diagnostics (D01 & DA1 Options)

Additional Information

Specifications: page Level-144
Certifications: page Level-164
Dimensional drawings: page Level-167

TABLE 1. 5301 and 5302 Level and/or Interface in Liquids Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description		
5301	Guided Wave Radar Liquid Level or Interface Transmitter (interface available for fully submerged probe)		
5302	Guided Wave Radar Liquid Level and Interface Transmitter		
Signal Output			
Standard			**Standard**
H	4-20 mA with HART communication		★
F	FOUNDATION fieldbus		★
M	RS-485 with Modbus communication		★
Housing Material			
Standard			**Standard**
A	Polyurethane-covered Aluminum		★
Expanded			
S	Stainless Steel, Grade CF8M (ASTM A743)		
Conduit / Cable Threads			
Standard			**Standard**
1	½ - 14 NPT		★
2	M20 x 1.5 adapter		★
E	M12, 4-pin, Male connector (eurofast®)(1)		★
M	A size Mini, 4-pin, Male connector (minifast®)(1)		★
Operating Temperature and Pressure(2)		**Probe Type**	
Standard			**Standard**
S	- 15 psig (-1bar) to 580 psig (40 bar) @ 302 °F (150 °C)	All	★
H	High Temperature / High Pressure(3): 2940 psi @ 752 °F and 5000 psi @ 100 °F (203 bar @ 400 °C and 345 bar @ 38 °C)	3A, 3B, 4A, 4U, 4V, 5A and 5B	★
P	High Pressure(3): Max 392 °F (200 °C): 3500 psi @ 392 °F and 5000 psi @ 100 °F (243 bar @ 200 °C and 345 bar @ 38 °C)	3B, 4A, 5A, and 5B	★

TABLE 1. 5301 and 5302 Level and/or Interface in Liquids Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
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Expanded				
C	Cryogenic Temperature[3] [4]-321 °F (-196 °C) Max 392 °F (200 °C): 3500 psi @ 392 °F and 5000 psi @ 100 °F (243 bar @ 200 °C and 345 bar @ 38 °C)		3A, 3B, 4A, 5A, 5B (Only SST)	
Material of Construction[5]: Process Connection / Probe		**Probe Type**	**Valid Operation Temperature and Pressure**	
Standard				**Standard**
1	316L SST (EN 1.4404)	All	S, H, P, C	★
Expanded				
2	Alloy C-276 (UNS N10276). With plate design if flanged version. Up to class 600, PN 63 for HTHP/HP probes.	3A, 3B, 4A	S, H, P	
3	Alloy 400 (UNS N04400). With plate design if flanged version.	3A, 3B, 4A, 5A, 5B	S	
7	PTFE covered probe and flange. With plate design.	4A and 5A	S	
8	PTFE covered probe	4A and 5A	S	
H	Alloy C-276 (UNS N10276) process connection, flange, and probe[6]	3A, 3B, 4A	H, P	
Sealing, O-ring Material (Consult the factory for other o-ring materials)				
Standard				**Standard**
N	None[7]			★
V	Viton® fluoroelastomer			★
E	Ethylene Propylene			★
K	Kalrez® 6375 perfluoroelastomer			★
B	Buna-N			★
Probe Type		**Process Connection**	**Probe Lengths**	
Standard				**Standard**
3B	Coaxial, perforated. For level and interface measurement, or easier cleaning.	Flange / 1 in.[12], 1.5 in., 2 in.[12] Thread	Min: 1 ft 4 in. (0.4 m). Max: 19 ft 8 in. (6 m)	★
4A	Rigid Single Lead (8 mm)	Flange / 1 in.[12], 1.5 in., 2 in.[12] Thread / Tri-Clamp	Min: 1 ft 4 in. (0.4 m). Max: 9 ft 10 in. (3 m)	★
4B	Rigid Single Lead (13 mm)[8]	Flange / 1 in., 1.5 in., 2 in. Thread / Tri-Clamp	Min: 1 ft 4 in. (0.4 m). Max: 14 ft 9 in. (4.5 m)	★
5A	Flexible Single Lead with weight[9]	Flange / 1 in.[12], 1.5 in., 2 in.[12] Thread / Tri-Clamp	Min: 3 ft 4 in. (1 m). Max: 164 ft (50 m)	★
5B	Flexible Single Lead with chuck[10]	Flange / 1 in.[12], 1.5 in., 2 in.[12] Thread / Tri-Clamp	Min: 3 ft 4 in. (1 m). Max: 164 ft (50 m)	★
Expanded				
1A	Rigid Twin Lead[12]	Flange / 1.5 in., 2 in.[12] Thread	Min: 1 ft 4 in. (0.4 m). Max: 9 ft 10 in. (3 m)	
2A	Flexible Twin Lead with weight [12]	Flange / 1.5 in., 2 in.[12] Thread	Min: 3 ft 4 in. (1 m). Max: 164 ft (50 m)	
3A	Coaxial (for level measurement)[11]	Flange / 1 in.[12], 1.5 in., 2 in.[12] Thread	Min: 1 ft 4 in. (0.4 m). Max: 19 ft 8 in. (6 m)	
4U	Dynamic Vapor Compensation Single Rigid Probe for 2 in. pipes[13]	Flange / 1.5 in. Thread	Min: 2 ft 5 in. (0.76 m). Max: 13 ft (4 m)	
4V	Dynamic Vapor Compensation Single Rigid Probe for 3-4 in. pipes[13]	Flange / 1.5 in. Thread	Min: 2 ft 5 in. (0.76 m). Max: 13 ft (4 m)	

TABLE 1. 5301 and 5302 Level and/or Interface in Liquids Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Probe Length Units		
Standard		**Standard**
E	English (feet, in.)	★
M	Metric (meters, centimeters)	★
Total Probe Length [14] (feet/m)		
Standard		**Standard**
xxx	0-164 ft or 0-50 m	★
Total Probe Length [14] (in./cm)		
Standard		**Standard**
xx	0-11 in. or 0-99 cm	★
Process Connection - Size / Type (consult the factory for other process connections)		
ASME / ANSI Flanges[15] [16]		
Standard		**Standard**
AA	2 in., 150 lb	★
AB	2 in., 300 lb	★
AC	2 in., 600 lb. HTHP / HP units	★
AD	2 in., 900 lb. HTHP / HP units	★
BA	3 in., 150 lb	★
BB	3 in., 300 lb	★
BC	3 in., 600 lb. HTHP / HP units	★
BD	3 in., 900 lb. HTHP / HP units	★
CA	4 in., 150 lb	★
CB	4 in., 300 lb	★
CC	4 in., 600 lb. HTHP / HP units	★
CD	4 in., 900 lb. HTHP / HP units	★
Expanded		
AE	2 in., 1500 lb. HTHP / HP units	
AI	2 in., 600 lb, RTJ (Ring Type Joint). HTHP / HP units	
AJ	2 in., 900 lb, RTJ (Ring Type Joint). HTHP / HP units	
AK	2 in., 1500 lb, RTJ (Ring Type Joint). HTHP / HP units	
BE	3 in., 1500 lb. HTHP / HP units	
BI	3 in., 600 lb, RTJ (Ring Type Joint). HTHP / HP units	
BJ	3 in., 900 lb, RTJ (Ring Type Joint). HTHP / HP units	
BK	3 in., 1500 lb, RTJ (Ring Type Joint). HTHP / HP units	
CE	4 in., 1500 lb. HTHP / HP units	
CI	4 in., 600 lb, RTJ (Ring Type Joint). HTHP / HP units	
CJ	4 in., 900 lb, RTJ (Ring Type Joint). HTHP / HP units	
CK	4 in., 1500 lb, RTJ (Ring Type Joint). HTHP / HP units	
DA	6 in., 150 lb	
EN (DIN) Flanges[17] [18]		
Standard		
HB	DN50, PN40	★
HC	DN50, PN63. HTHP / HP units	★
HD	DN50, PN100. HTHP / HP units	★
IA	DN80, PN16	★
IB	DN80, PN40	★
IC	DN80, PN63. HTHP / HP units	★

TABLE 1. 5301 and 5302 Level and/or Interface in Liquids Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
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ID	DN80, PN100. HTHP / HP units		★
JA	DN100, PN16		★
JB	DN100, PN40		★
JC	DN100, PN63. HTHP / HP units		★
JD	DN100, PN100. HTHP / HP units		★
Expanded			
HE	DN50, PN160. HTHP / HP units		
HF	DN50, PN250. HTHP / HP units		
IE	DN80, PN160. HTHP / HP units		
IF	DN80, PN250. HTHP / HP units		
JE	DN100, PN160. HTHP / HP units		
JF	DN100, PN250. HTHP / HP units		
KA	DN150, PN16		
JIS Flanges[17] [19]			
Standard			**Standard**
UA	50A, 10K		★
VA	80A, 10K		★
XA	100A, 10K		★
Expanded			
UB	50A, 20K		
VB	80A, 20K		
XB	100A, 20K		
YA	150A, 10K		
YB	150A, 20K		
ZA	200A, 10K		
ZB	200A, 20K		
Threaded Connections[15]		**Probe Type**	
Standard			**Standard**
RA	1 ½ in. NPT thread	All	★
RC	2 in. NPT thread	All, standard temperature and pressure	★
Expanded			
RB	1 in. NPT thread	3A, 3B, 4A, 4B, 5A, 5B, standard temperature and pressure	
SA	1 ½ in. BSP (G 1 ½ in.) thread	All	
SB	1 in. BSP (G 1 in.) thread	3A, 3B, 4A, 4B, 5A, 5B, standard temperature and pressure	
Tri-Clamp Fittings[15]		**Probe Type**	
Expanded			
FT	1 ½ in. Tri-Clamp	4A, 5A, 5B standard temperature and pressure	
AT	2 in. Tri-Clamp	4A, 4B, 5A, 5B standard temperature and pressure	
BT	3 in. Tri-Clamp	4A, 4B, 5A, 5B standard temperature and pressure	
CT	4 in. Tri-Clamp	4A, 4B, 5A, 5B standard temperature and pressure	

TABLE 1. 5301 and 5302 Level and/or Interface in Liquids Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Proprietary Flanges		
Standard		**Standard**
TF	Fisher - proprietary 316L SST (for 249B chambers) Torque Tube Flange	★
TT	Fisher - proprietary 316L SST (for 249C chambers) Torque Tube Flange	★
TM	Masoneilan - proprietary 316L SST Torque Tube Flange	★
Hazardous Locations Certifications		
Standard		**Standard**
NA	No Hazardous Locations Certifications	★
E1	ATEX Flameproof[20]	★
E3	NEPSI Flameproof[20]	★
E5	FM Explosion-proof[20]	★
E6	CSA Explosion-proof[20]	★
E7	IECEx Flameproof[20]	★
I1	ATEX Intrinsic Safety	★
IA	ATEX FISCO Intrinsic Safety[21]	★
I3	NEPSI Intrinsic Safety	★
IC	NEPSI FISCO Intrinsic Safety[21]	★
I5	FM Intrinsic Safety and Non-Incendive	★
IE	FM FISCO Intrinsic Safety[21]	★
I6	CSA Intrinsic Safety	★
IF	CSA FISCO Intrinsic Safety[21]	★
I7	IECEx Intrinsic Safety	★
IG	IECEx FISCO Intrinsic Safety[21]	★
Expanded		
E2	INMETRO Flameproof	
I2	INMETRO Intrinsic Safety	
IB	INMETRO FISCO Intrinsic Safety	
E4	TIIS Flameproof	
KA	ATEX, FM, CSA Flameproof/Explosion-proof[20]	
KB	ATEX, FM, IECEx Flameproof/Explosion-proof[20]	
KC	ATEX, CSA, IECEx Flameproof/Explosion-proof[20]	
KD	FM, CSA, IECEx Flameproof/Explosion-proof[20]	
KE	ATEX, FM, CSA Intrinsic Safety	
KF	ATEX, FM, IECEx Intrinsic Safety	
KG	ATEX, CSA, IECEx Intrinsic Safety	
KH	FM, CSA, IECEx Intrinsic Safety	
KI	FISCO - ATEX, FM, CSA Intrinsic Safety[21]	
KJ	FISCO - ATEX, FM, IECEX Intrinsic Safety[21]	
KK	FISCO - ATEX, CSA, IECEX Intrinsic Safety[21]	
KL	FISCO - FM, CSA, IECEX Intrinsic Safety[21]	
Options		
Standard		**Standard**
M1	Integral digital display	★
P1	Hydrostatic testing[22]	★
N2	NACE material recommendation per MR-0175 and MR-0103[23]	★
LS	Long stud[24] 9.8 in (250 mm) for flexible single lead probe to prevent contact with wall/nozzle. Standard height is 3.9 in (100 mm) for probes 5A and 5B.	★
T1	Transient Protection Terminal Block (standard with FISCO options)	★
W3	2.2 lb (1 kg) weight for flexible single lead probe (5A). L=5.5 in. (140 mm)	★

TABLE 1. 5301 and 5302 Level and/or Interface in Liquids Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded			
BR	Mounting Bracket for 1.5 in. NPT Process Connection (RA)		
W2	0.79 lb (0.36 kg) short weight for flexible single lead probe(25). L=2 in. (50 mm)		
Special Configuration (Software)			
Standard			**Standard**
C1	Factory configuration (CDS required with order)		★
C4	Namur alarm and saturation levels, high alarm		★
C5	Namur alarm and saturation levels, low alarm		★
C8	Low alarm (26) (standard Rosemount alarm and saturation levels)		★
Special Certifications			
Standard			**Standard**
Q4	Calibration Data Certification		★
Q8	Material Traceability Certification per EN 10204 3.1(27)		★
QS	Prior-use certificate of FMEDA Data. Only available with HART 4-20 mA output (output code H).		★
U1	WHG Overfill Approval. Only available with HART 4-20 mA output (output code H)		★
Expanded			
QG	GOST Primary Verification Certificate		
PlantWeb Diagnostic Functionality			
Standard			**Standard**
D01	FOUNDATION fieldbus Diagnostics Suite		★
DA1	HART Diagnostics Suite		★
Centering Discs		**Outer Diameter**	
Standard			**Standard**
S2	2 in. Centering disc(28)	1.8 in. (45 mm)	★
S3	3 in. Centering disc(28)	2.7 in. (68 mm)	★
S4	4 in. Centering disc(28)	3.6 in. (92 mm)	★
P2	2 in. Centering disc PTFE(29)	1.8 in. (45 mm)	★
P3	3 in. Centering disc PTFE(29)	2.7 in. (68 mm)	★
P4	4 in. Centering disc PTFE(29)	3.6 in. (92 mm)	★
Expanded			
S6	6 in. Centering disc(28)	5.55 in. (141 mm)	
S8	8 in. Centering disc(28)	7.40 in. (188 mm)	
P6	6 in. Centering disc PTFE(29)	5.55 in. (141 mm)	
P8	8 in. Centering disc PTFE(29)	7.40 in. (188 mm)	
Remote Housing Mounting			
Expanded			
B1	1m / 3.2 ft. Remote Housing Mounting Cable and Bracket		
B2	2m / 6.5 ft. Remote Housing Mounting Cable and Bracket		
B3	3m / 9.8 ft. Remote Housing Mounting Cable and Bracket		
Consolidate to Chamber			
Expanded			
XC	Consolidate to Chamber(30)		

(1) Not available with Flame/Explosion-proof approvals (E1, E3, E5, E6, E7, KA, KB, KC, and KD)
(2) Process seal rating. Final rating depends on flange and O-ring selection. See "Temperature and Pressure Limits" on page 150.
(3) Requires option None for sealing (no O-ring).
(4) Welding Procedure Qualification Record Documentation will be supplied.
(5) For other materials, consult the factory.
(6) Consult the factory for this option.
(7) Requires High Temperature High Pressure (code H), High Pressure (code P), or Cryogenic (code C) probe.
(8) Available in SST. Consult the factory for other materials.

(9) 0.79 lb (0.36 kg) standard weight for flexible single lead probe. L=5.5 in. (140 mm).
For PTFE covered probes: 2.2 lb (1 kg) standard weight for flexible single lead probe. L=17.1 in. (434 mm).
(10) Extra length for fastening is added in factory.
(11) Requires model 5301. 1.3 lb (0.6 kg) standard weight for twin flex lead probe. L=3.5 in. (90 mm).
(12) Only available with standard temperature and pressure (code S).
(13) This is an HTHP probe.
(14) Probe weight included if applicable. Give the total probe length in feet and inches or meters and centimeters, depending on selected probe length unit. If tank height is unknown, please round up to an even length when ordering. Probes can be cut to exact length in field. Maximum allowable length is determined by process conditions. See "Tank Connection and Probe" on page 159 for more probe length guidance.
(15) Available in 316L SST. For other materials consult the factory.
(16) Raised face type for SST flanges up to class 1500.
(17) Available in 316L and EN 1.4404. For other materials consult the factory.
(18) Type A flat face for SST flanges up to PN100 and type B2 raised face for SST flanges PN160 and PN250.
(19) Raised face type for SST flanges.
(20) Probes are intrinsically safe.
(21) Requires FOUNDATION fieldbus signal output (U_i parameter listed in "Product Certifications" on page 164).
(22) For standard tank connection, only available with flange.
(23) For Material SST, Alloy C-276 and Alloy 400; Probe Type 3A, 3B, 4A, 4B, 4U, and 4V.
(24) Not available with PTFE covered probes.
(25) Only for Material of Construction code 1 and 3. For other materials, consult the factory.
(26) The standard alarm setting is high.
(27) Certificate includes all pressure retaining wetted parts.
(28) Available for SST and Alloy C-276 probes, type 2A, 4A, 4B, and 5A. Same disc material as probe material. For more information, see "Centering Discs" on page 163.
(29) Available for probe types 2A, 4A, 4B and 5A, except for HTHP.
(30) Not available for Cryogenic probe.

Example Model String: 5301-H-A-1-S-1-V-1A-M-002-05-AA-I1-M1C1. E-002-05, means 2 ft and 5 in. probe length. M-002-05, means 2.05 m.

Rosemount 5303
Level for Solids



Rosemount 5303 Guided Wave Radar Level transmitter provides industry leading measurement capabilities and reliability on solids. Characteristics include:

- Direct Switch Technology and Probe End Projection to handle low reflective media and long measuring ranges
- Measurement independent of dust, moisture and material fluctuations
- HART 4-20 mA, FOUNDATION fieldbus, Modbus, or IEC 62591 (*Wireless*HART) with the Smart Wireless THUM adapter
- Probes for high physical weight loads (probe type 6A and 6B)
- Long stud available to prevent contact with nozzle (LS option)

Additional Information

Specifications: page Level-144
Certifications: page Level-164
Dimensional drawings: page Level-167

TABLE 2. 5303 Level for Solids Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description		
5303	Guided Wave Solids Level Transmitter		
Signal Output			
Standard			**Standard**
H	4-20 mA with HART communication		★
F	FOUNDATION fieldbus		★
M	RS-485 with Modbus communication		★
Housing Material			
Standard			**Standard**
A	Polyurethane-covered Aluminum		★
Expanded			
S	Stainless Steel, Grade CF8M (ASTM A743)		
Conduit / Cable Threads			
Standard			**Standard**
1	½ - 14 NPT		★
2	M20 x 1.5 adapter		★
E	M12, 4-pin, Male connector (eurofast®)(1)		★
M	A size Mini, 4-pin, Male connector (minifast®)(1)		★
Operating Temperature and Pressure		**Probe Type**	
Standard			**Standard**
S	- 15 psig (-1bar) to 580 psig (40 bar) @ 302 °F (150 °C) (2)	Single Lead Probes only	★
Material of Construction(3): Process Connection / Probe		**Probe Type**	
Standard			**Standard**
1	316L SST (EN 1.4404)	Single Lead Probes only	★
Sealing, O-ring Material (Consult factory for other o-ring materials)			
Standard			**Standard**
V	Viton® fluoroelastomer		★
E	Ethylene Propylene		★

TABLE 2. 5303 Level for Solids Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

K	Kalrez® 6375 perfluoroelastomer			★
B	Buna-N			★
Probe Type		**Process Connection**	**Probe Lengths**	
Standard				**Standard**
5A	Flexible Single Lead with weight, 4 mm(4)	Flange / 1 in., 1.5 in., 2 in.Thread	Min: 3 ft 4 in. (1 m). Max: 115 ft. (35 m)	★
5B	Flexible Single Lead with chuck, 4 mm(5)	Flange / 1 in., 1.5 in., 2 in. Thread	Min: 3 ft 4 in. (1 m). Max: 115 ft. (35 m)	★
6A	Flexible Single Lead with weight, 6 mm(6)	Flange / 1 in., 1.5 in., 2 in. Thread	Min: 3 ft 4 in. (1 m). Max: 164 ft. (50 m)	★
6B	Flexible Single Lead with chuck, 6 mm(5)	Flange / 1 in., 1.5 in., 2 in. Thread	Min: 3 ft 4 in. (1 m). Max: 164 ft. (50 m)	★
Probe Length Units				
Standard				**Standard**
E	English (feet, in.)			★
M	Metric (meters, centimeters)			★
Total Probe Length (7) (feet/m)				
Standard				**Standard**
xxx	0-164 ft or 0-50 m			★
Total Probe Length (7) (in./cm)				
Standard				**Standard**
xx	0-11 in. or 0-99 cm			★
Process Connection - Size / Type (consult the factory for other process connections)				
ASME / ANSI Flanges(8)				
Standard				**Standard**
AA	2 in., 150 lb			★
AB	2 in., 300 lb			★
BA	3 in., 150 lb			★
BB	3 in., 300 lb			★
CA	4 in., 150 lb			★
CB	4 in., 300 lb			★
Expanded				
DA	6 in., 150 lb			
EN (DIN) Flanges(9)				
Standard				**Standard**
HB	DN50, PN40			★
IA	DN80, PN16			★
IB	DN80, PN40			★
JA	DN100, PN16			★
JB	DN100, PN40			★
Expanded				
KA	DN150, PN16			
JIS Flanges(9)				
Standard				**Standard**
UA	50A, 10K			★
VA	80A, 10K			★
XA	100A, 10K			★

TABLE 2. 5303 Level for Solids Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded			
UB	50A, 20K		
VB	80A, 20K		
XB	100A, 20K		
YA	150A, 10K		
YB	150A, 20K		
ZA	200A, 10K		
ZB	200A, 20K		
Threaded Connections[8]		**Probe Type**	
Standard			**Standard**
RA	1 ½ in. NPT thread	5A, 5B, 6A, 6B, std. temp. and pressure	★
RC	2 in. NPT thread	5A, 5B, 6A, 6B, std. temp. and pressure	★
Expanded			
RB	1 in. NPT thread	5A, 5B, 6A, 6B, std. temp. and pressure	
SA	1 ½ in. BSP (G 1 ½ in.) thread	5A, 5B, 6A, 6B, std. temp. and pressure	
SB	1 in. BSP (G 1 in.) thread	5A, 5B, 6A, 6B, std. temp. and pressure	
Hazardous Locations Certifications			
Standard			**Standard**
NA	No Hazardous Locations Certifications		★
E1	ATEX Flameproof		★
E3	NEPSI Flameproof		★
E5	FM Explosion-proof		★
E6	CSA Explosion-proof		★
E7	IECEx Flameproof		★
I1	ATEX Intrinsic Safety		★
IA	ATEX FISCO Intrinsic Safety[10]		★
I3	NEPSI Intrinsic Safety		★
IC	NEPSI FISCO Intrinsic Safety[10]		★
I5	FM Intrinsic Safety and Non-Incendive		★
IE	FM FISCO Intrinsic Safety[10]		★
I6	CSA Intrinsic Safety		★
IF	CSA FISCO Intrinsic Safety[10]		★
I7	IECEx Intrinsic Safety		★
IG	IECEx FISCO Intrinsic Safety[10]		★
Expanded			
E2	INMETRO Flameproof		
I2	INMETRO Intrinsic Safety		
IB	INMETRO FISCO Intrinsic Safety		
E4	TIIS Flameproof		
KA	ATEX, FM, CSA Flameproof/Explosion-proof		
KB	ATEX, FM, IECEx Flameproof/Explosion-proof		
KC	ATEX, CSA, IECEx Flameproof/Explosion-proof		
KD	FM, CSA, IECEx Flameproof/Explosion-proof		
KE	ATEX, FM, CSA Intrinsic Safety		
KF	ATEX, FM, IECEx Intrinsic Safety		
KG	ATEX, CSA, IECEx Intrinsic Safety		
KH	FM, CSA, IECEx Intrinsic Safety		
KI	FISCO - ATEX, FM, CSA Intrinsic Safety[10]		

TABLE 2. 5303 Level for Solids Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

KJ	FISCO - ATEX, FM, IECEX Intrinsic Safety (10)	
KK	FISCO - ATEX, CSA, IECEX Intrinsic Safety(10)	
KL	FISCO - FM, CSA, IECEX Intrinsic Safety(10)	
Options		
Standard		**Standard**
M1	Integral digital display	★
P1	Hydrostatic testing(11)	★
LS	Long stud 9.8 in (250 mm) for flexible single lead probe to prevent contact with wall/nozzle. Standard height is 3.9 in (100 mm) for probes 5A and 5B; 5.9 in. (150 mm) for probes 6A and 6B	★
T1	Transient Protection Terminal Block (standard with FISCO options)	★
W3	2.2 lb (1 kg) weight for flexible single lead probe (5A). L=5.5 in. (140 mm)	★
Expanded		
BR	Mounting Bracket for 1.5 in. NPT Process Connection (RA)(12)	
Special Configuration (Software)		
Standard		**Standard**
C1	Factory configuration (CDS required with order)	★
C4	Namur alarm and saturation levels, high alarm	★
C5	Namur alarm and saturation levels, low alarm	★
C8	Low alarm (13) (standard Rosemount alarm and saturation levels)	★
Special Certifications		
Standard		**Standard**
Q4	Calibration Data Certification	★
Q8	Material Traceability Certification per EN 10204 3.1(14)	★
QS	Prior-use certificate of FMEDA Data. Only available with HART 4-20 mA output (output code H).	★
U1	WHG Overfill Approval. Only available with HART 4-20 mA output (output code H)	★
Expanded		
QG	GOST Primary Verification Certificate	
PlantWeb Diagnostic Functionality		
Standard		**Standard**
D01	FOUNDATION fieldbus Diagnostics Suite	★
DA1	HART Diagnostics Suite	★
Remote Housing Mounting		
Expanded		
B1	1m / 3.2 ft. Remote Housing Mounting Cable and Bracket	
B2	2m / 6.5 ft. Remote Housing Mounting Cable and Bracket	
B3	3m / 9.8 ft. Remote Housing Mounting Cable and Bracket	

(1) Not available with Flame/Explosion-proof approvals (E1, E3, E5, E6, E7, KA, KB, KC, and KD)
(2) Process seal rating. Final rating depends on flange and O-ring selection. See "Tank Connection and Probe" on page 159.
(3) For other materials, consult the factory.
(4) 0.79 lb (0.36 kg) standard weight for flexible single lead probe. L=5.5 in. (140 mm).
(5) Extra length for fastening is added in the factory.
(6) 1.2 lb (0.56 kg) standard weight for flexible single lead probe. L=5.5 in. (140 mm).
(7) Probe weight included if applicable. Give the total probe length in feet and inches or meters and centimeters, depending on selected probe length unit. If tank height is unknown, please round up to an even length when ordering. Probes can be cut to exact length in field. Maximum allowable length is determined by process conditions. See "Tank Connection and Probe" on page 159 for more probe length guidance.
(8) Available in 316L SST. For other materials, consult the factory.
(9) Available in 316L and EN 1.4404. For other materials consult the factory.
(10) Requires FOUNDATION fieldbus signal output (U_i parameter listed in "Product Certifications" on page 164).
(11) Available for flanged connection.
(12) Only for Standard Temperature and Pressure.
(13) The standard alarm setting is high.
(14) Certificate includes all pressure retaining wetted parts.

Example Model String: 5303-H-A-1-S-1-V-6A-M-025-50-AA-I1-M1C1. E-025-05, means 25 ft and 5 in. probe length. M-025-50, means 25.5 m.

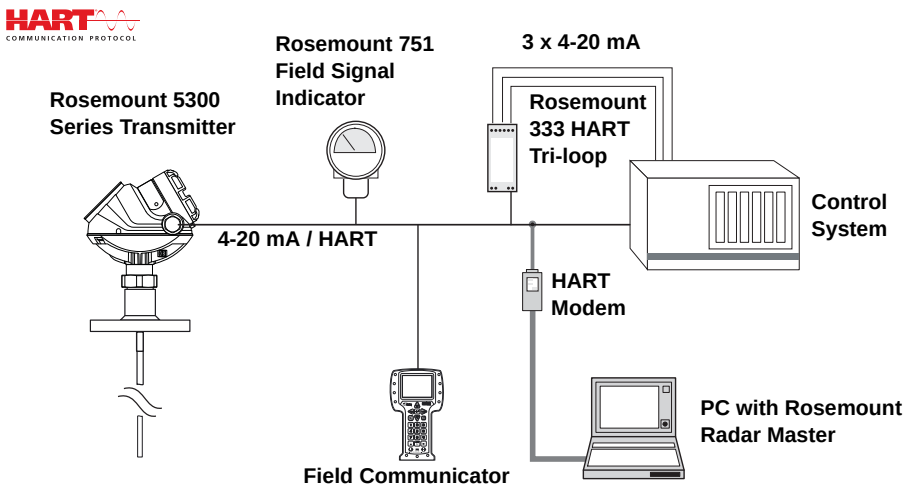
ACCESSORIES

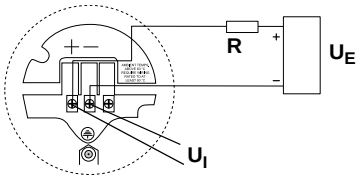
TABLE 3. Accessories Ordering Information

Process Connection - Size/Type (consult the factory for other process connections)			
Centering discs[1] [2]		**Outer Diameter**	
Standard			**Standard**
03300-1655-0001	Kit, 2-in. Centering Disk, SST, Rigid Single	1.8 in. (45 mm)	★
03300-1655-0002	Kit, 3-in. Centering Disk, SST, Rigid Single	2.7 in. (68 mm)	★
03300-1655-0003	Kit, 4-in. Centering Disk, SST, Rigid Single	3.6 in. (92 mm)	★
03300-1655-0006	Kit, 2-in. Centering Disk, PTFE, Rigid Single	1.8 in. (45 mm)	★
03300-1655-0007	Kit, 3-in. Centering Disk, PTFE, Rigid Single	2.7 in. (68 mm)	★
03300-1655-0008	Kit, 4-in. Centering Disk, PTFE, Rigid Single	3.6 in. (92 mm)	★
03300-1655-1001	Kit, 2-in. Centering Disk, SST, Single / Twin Flex Lead	1.8 in. (45 mm)	★
03300-1655-1002	Kit, 3-in. Centering Disk, SST, Single / Twin Flex Lead	2.7 in. (68 mm)	★
03300-1655-1003	Kit, 4-in. Centering Disk, SST, Single / Twin Flex Lead	3.6 in. (92 mm)	★
03300-1655-1006	Kit, 2-in. Centering Disk, PTFE, Single / Twin Flex Lead	1.8 in. (45 mm)	★
03300-1655-1007	Kit, 3-in. Centering Disk, PTFE, Single / Twin Flex Lead	2.7 in. (68 mm)	★
03300-1655-1008	Kit, 4-in. Centering Disk, PTFE, Single / Twin Flex Lead	3.6 in. (92 mm)	★
Expanded			
03300-1655-0004	Kit, 6-in. Centering Disk, SST, Rigid Single	5.55 in. (141 mm)	
03300-1655-0005	Kit, 8-in. Centering Disk, SST, Rigid Single	7.40 in. (188 mm)	
03300-1655-0009	Kit, 6-in. Centering Disk, PTFE, Rigid Single	5.55 in. (141 mm)	
03300-1655-0010	Kit, 8-in. Centering Disk, PTFE, Rigid Single	7.40 in. (188 mm)	
03300-1655-1004	Kit, 6-in. Centering Disk, SST, Single / Twin Flex Lead	5.55 in. (141 mm)	
03300-1655-1005	Kit, 8-in. Centering Disk, SST, Single / Twin Flex Lead	7.40 in. (188 mm)	
03300-1655-1009	Kit, 6-in. Centering Disk, PTFE, Single / Twin Flex Lead	5.55 in. (141 mm)	
03300-1655-1010	Kit, 8-in. Centering Disk, PTFE, Single / Twin Flex Lead	7.40 in. (188 mm)	
Vented Flanges[3]			
Expanded			
03300-1812-9001	Fisher 249B		
03300-1812-9002	Fisher 249C		
03300-1812-9003	Masoneilan		
Flushing Connection Rings			
DP0002-2111-S6	2 in. ANSI, ¼ in. NPT connection		
DP0002-3111-S6	3 in. ANSI, ¼ in. NPT connection		
DP0002-4111-S6	4 in. ANSI, ¼ in. NPT connection		
DP0002-5111-S6	DN50, ¼ in. NPT connection		
DP0002-8111-S6	DN80, ¼ in. NPT connection		
Other			
Standard			**Standard**
03300-7004-0001	Viator HART Modem and cables (RS232 connection)		★
03300-7004-0002	Viator HART Modem and cables (USB connection)		★

(1) If a centering disc is required for a flanged probe, the centering disc can be ordered with options Sx or Px on page 137 in the model code. If a centering disc is required for a threaded connection, or as a spare part, it should be ordered using the item numbers listed below.
(2) To order a centering disc in a different material consult the factory.
(3) 1½ in. NPT threaded connection (RA) is required.

Functional Specification

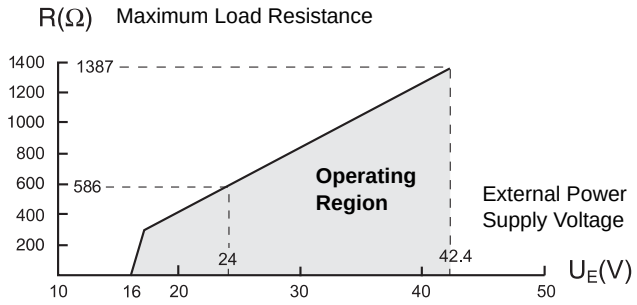
General	
Field of Application	Liquids and semi-liquids level and/or liquid/liquid interfaces or solids level • Model 5301, for liquid level or submerged interface measurements • Model 5302, for liquid level and interface measurements • Model 5303, for solid level measurements
Measurement Principle	Time Domain Reflectometry (TDR) (See “Measurement Principle” on page 130 for a description of how it works)
Microwave Output Power	Nominal 300 µW, Max. 45 mW
Telecommunication (FCC and R&TTE)	FCC part 15 (1998) subpart B and R&TTE (EU directive 99/5/EC). Considered to be an unintentional radiator under the Part 15 rules
Humidity	0 - 100% Relative Humidity
Start-up Time	< 40 s
Internal Power Consumption	< 50 mW in normal operation
4-20 mA HART (Output Option Code H) - (See Ordering Information in Table 1 on page 132 and Table 2 on page 139)	
Output	Two-wire, 4–20 mA. Digital process variable is superimposed on 4–20 mA signal, and available to any host that conforms to the HART protocol. The HART signal can be used in a multidrop mode. 
Signal Wiring	Recommended output cabling is twisted shielded pairs, 18-12 AWG
HART Tri-loop	 By sending the digital HART signal to the optional HART Tri-loop, it is possible to have up to three additional 4–20 mA analog signals. See the Rosemount 333 HART Tri-loop Product Data Sheet (Document No. 00813-0100-4754) for additional information
Smart Wireless THUM Adapter	 The optional Smart Wireless THUM adapter can be mounted directly on the transmitter or by using a remote mounting kit. IEC 62591 (*Wireless*HART) enables access to multi-variable data and diagnostics, and adds wireless to almost any measurement point. See the Rosemount Smart Wireless THUM adapter Product Data Sheet (Document No. 00813-0100-4075) and Smart Wireless THUM Adapter for Rosemount Process Level Transmitter Applications (Document No. 00840-0100-4026)

External Power Supply[1]	The input voltage (U_I) for HART is 16-42.4 Vdc (16-30 Vdc in IS applications, and 20-42.4 Vdc in Explosion-proof / Flameproof applications). For Flameproof/Explosion-proof installations the Rosemount 5300 Series transmitters have a built-in barrier; no external barrier needed. When a Smart Wireless THUM adapter is fitted, it adds a maximum drop of 2.5 Vdc in the connected loop  R = Load Resistance (Ω); U_E = External Power Supply Voltage (Vdc); U_I = Input Voltage (Vdc)
Minimum Input Voltage (U_I) at Different Currents	Current: 3.75 mA Non-Hazardous Installations and Intrinsically Safe Installations: 16 Vdc Explosion-proof / Flameproof Installations: 20 Vdc Current: 21.75 mA Non-Hazardous Installations and Intrinsically Safe Installations: 11 Vdc Explosion-proof / Flameproof Installations: 15.5 Vdc
IS Parameters	See “Product Certifications” on page 164
Signal on Alarm	Standard: Low = 3.75 mA, High = 21.75 mA Namur NE43: Low = 3.60 mA, High = 22.50 mA
Saturation Levels	Standard: Low = 3.9 mA, High = 20.8 mA Namur NE43: Low = 3.8 mA, High = 20.5 mA

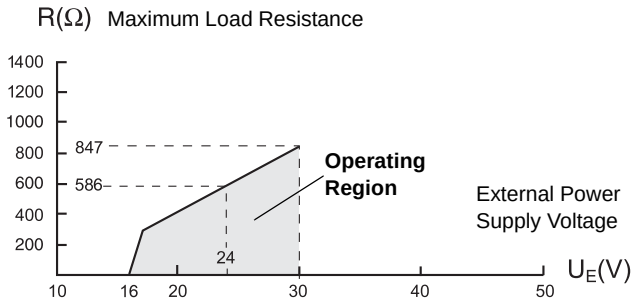
Load Limitations

Maximum load resistance is determined by the voltage level of the external power supply, as described by:

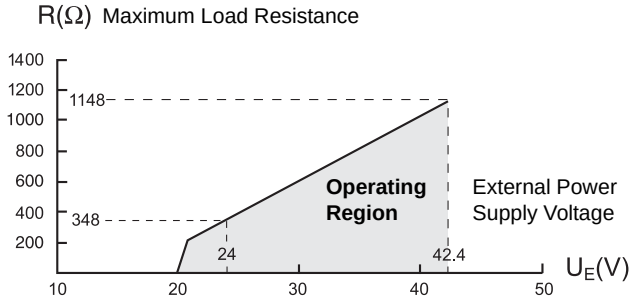
Non-Hazardous Installations



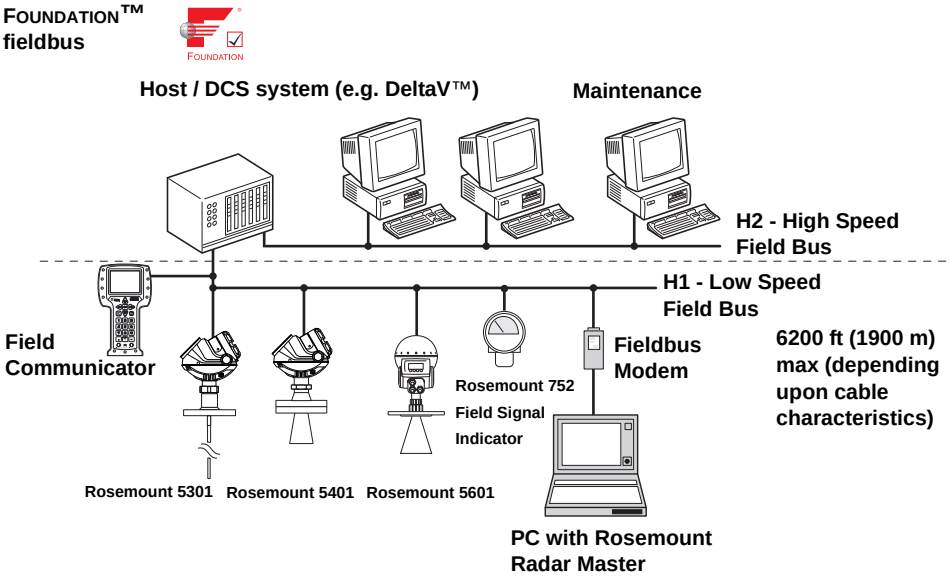
Intrinsically Safe Installations

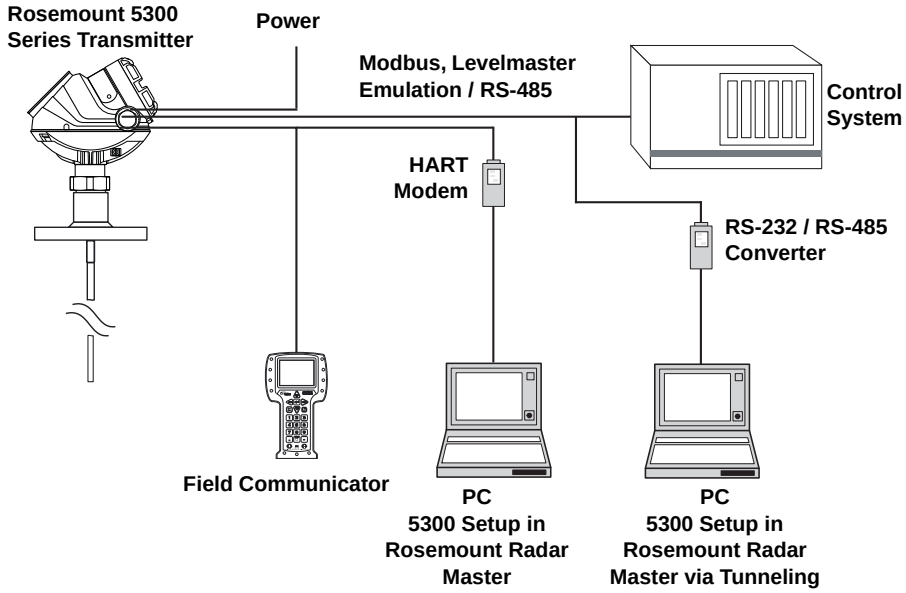
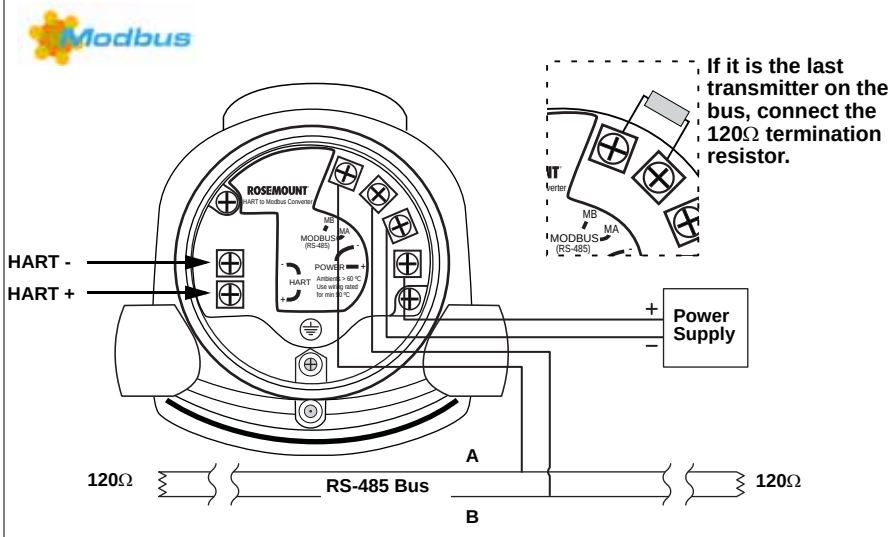


Explosion-proof / Flameproof (EEx d) Installations



NOTE
For the EEx d case, the diagram is only valid if the HART® load resistance is at the + side and if the - side is grounded, otherwise the load resistance value is limited to 435 Ω.

FOUNDATION™ fieldbus (Output Option Code F) - (See Ordering Information in Table 1 on page 132 and Table 2 on page 139)	
Output	**FOUNDATION™ fieldbus** 
External Power Supply[1]	The input voltage for FOUNDATION™ fieldbus is 9-32 Vdc (9-30 Vdc in IS applications, and 16-32 Vdc in Explosion-proof/Flameproof applications) The input voltage for FISCO, IS applications is 9-17.5 Vdc For Flameproof/Explosion-proof installations the Rosemount 5300 Series transmitters have a built-in barrier; no external barrier needed.
Quiescent Current Draw	21 mA
FOUNDATION fieldbus Blocks	Resource block, 3 Transducer blocks, 6 AI blocks, PID block, ISEL block, SGCR block, ARTH block, and OS block
FOUNDATION fieldbus Class (Basic or Link Master)	Link Master (LAS)
FOUNDATION fieldbus Block Execution Time	AI-block: 30 ms. PID-block: 40 ms ARTH-, ISEL-, OSPL-block: 65 ms. CHAR-block: 75 ms
FOUNDATION fieldbus Instantiation	No
Conforming FOUNDATION fieldbus	ITK 5.0
FOUNDATION fieldbus PlantWeb Alert Support	Yes

Modbus (Output Option Code M) - (See Ordering Information in Table 1 on page 132 and Table 2 on page 139)	
Output	The RS-485 Modbus version communicates by Modbus RTU, Modbus ASCII, and Levelmaster protocols. 8 data bits, 1 start bit, 1 stop bit, and software selectable parity. Baud Rate: 1200, 2400, 4800, 9600 (default), and 19200 bits/s. Address Range: 1 to 255 (default device address is 246). HART communication is used for configuration via the HART terminals or tunneling via the RS-485. 
External Power Supply[1]	The input voltage U_i for Modbus is 8-30 Vdc (max. rating) Power Consumption: < 0.5 W (with HART address=1) < 1.2 W (incl. four HART slaves)  For Flameproof/Explosion-proof installations the Rosemount 5300 Series transmitters have a built-in barrier; no external barrier needed.

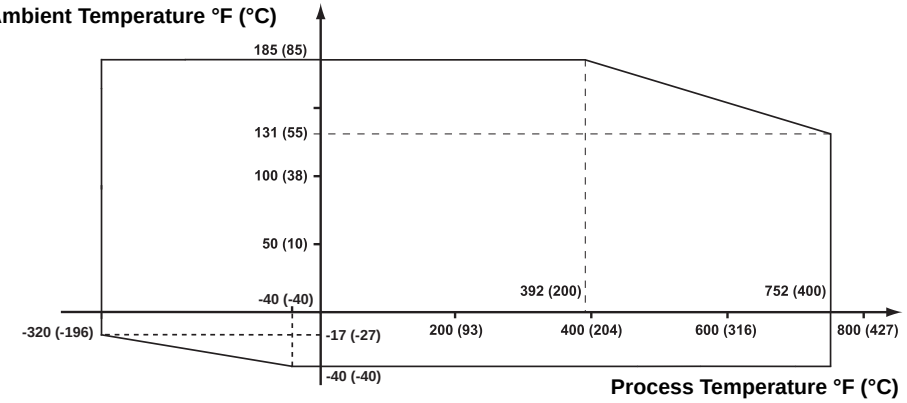
Display and Configuration

Integral Display (Options Code M1)	The integral digital display can toggle between: level, distance, volume, internal temperature, interface distance, interface level, peak amplitudes, interface thickness, percentage of range, analog current out **Note:** The display cannot be used for configuration purposes
Remote Display	Data can be read from the optional integral display or remotely using the Rosemount 751 Field Signal Indicator for 4-20 mA / HART (see Product Data Sheet, Document No. 00813-0100-4378), or the Rosemount 752 Remote Indicator for FOUNDATION™ fieldbus (see Product Data Sheet, Document No. 00813-0100-4377)
Configuration Tools	HART: Rosemount Radar Master, Emerson Field Communicator, AMS Device Manager, or any other DD (Device Description) compatible host system FOUNDATION™ fieldbus: Rosemount Radar Master, Emerson Field Communicator, DeltaV, or any other DD (Device Description) compatible host system DTM (compliant with version 1.2 of the FDT/DTM specification) supporting configuration in for instance Yokogawa Fieldmate/PRM, E+H™ FieldCare, and PactWare™
Output Units	Level, Interface and Distance: ft, inches, m, cm, or mm Level Rate: ft/s, m/s, in./min, m/h Volume: ft^3, $inch^3$, US gals, Imp gals, barrels, yd^3, m^3, or liters Temperature: °F and °C
Output Variables	

	5301	5302	5303	PV, SV, TV, QV
Level	X	X	X	X
Distance to Level (Ullage)	X	X	X	X
Level Rate	X	X	X	X
Signal Strength	X	X	X	X
Volume	X	X	X	X
Internal Temperature	X	X	X	X
Interface Level	(X)(1)	X		X
Interface Distance	(X)(1)	X		X
Interface Level Rate	(X)(1)	X		X
Interface Signal Strength	(X)(1)	X		X
Upper Layer Thickness	X	X		X
Lower Volume	(X)(1)	X		X
Upper Volume	(X)(1)	X		X
Signal Quality	X	X	X	(X)(2)
Surface/Noise Margin	X	X	X	(X)(2)
Vapor DC	X			(X)(2)
Analog Output Current(3)	X	X	X	
% of Range(4)	X	X	X	

(1) Interface measurement only for fully submerged probe, see page Level-153
(2) Not available as primary variable
(3) LCD variable only. Not available for FOUNDATION fieldbus, Modbus Signal Output, or for HART units in fixed current mode
(4) LCD variable only. Not available for FOUNDATION fieldbus Signal Output

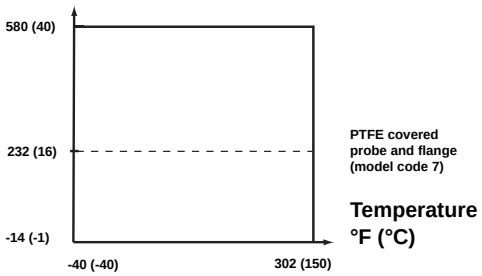
Diagnostics	Transmitter diagnostics with alerts include hardware and software errors, electronics temperature, probe missing, and invalid measurement and configuration error diagnostics. In addition to this, echo curve and variable logging including signal strength facilitate easy on-line troubleshooting
Advanced Diagnostics	Signal Quality Metrics monitors the degradation of level signal relative to excess noise. This can schedule the cleaning of the probe or to detect and monitor turbulence, boiling, foam, and emulsions. It can be ordered by choosing the D01 or DA1 option
Damping	0-60 s (2 s, default value)

Temperature and Pressure Limits	
Ambient Temperature	The maximum and minimum ambient temperature for the electronics depends on the process temperature (as described by the graph below) *and* on the approval (see “Product Certifications” on page 164).  **Note:** • Nozzle insulation for the HTHP version (Operating Temperature and Pressure code H) should not exceed 4 in. (10 cm) • The temperature range for the optional Integral Display is -4 °F to 158 °F (-20 °C to 70 °C) • In applications where the ambient temperature exceeds the limits of the electronics, a Remote Mounting connection can be used. The maximum temperature for the Remote Mounting connection at the vessel connection point is 302 °F (150 °C)
Storage Temperature	-58 °F to 194 °F (-50 °C to 90 °C) With Integral Display: -40 °F to 185 °F (-40 °C to 85 °C)

Process Temperature[2]

Standard (Std) tank connection (Operating Temperature and Pressure code S):

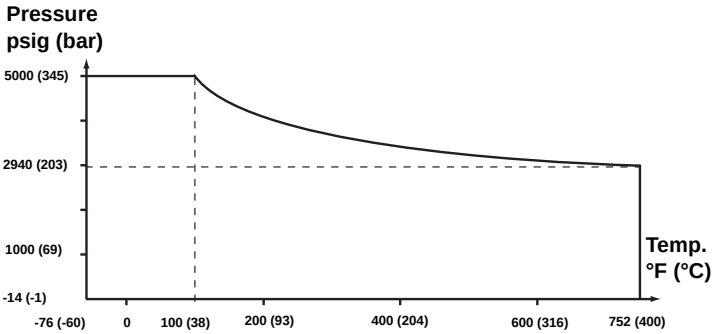
Max. Rating, Standard Connections



Final rating depends on flange and O-ring selection. The table on page Level-154 gives the temperature ranges for standard tank seals with different O-ring materials.

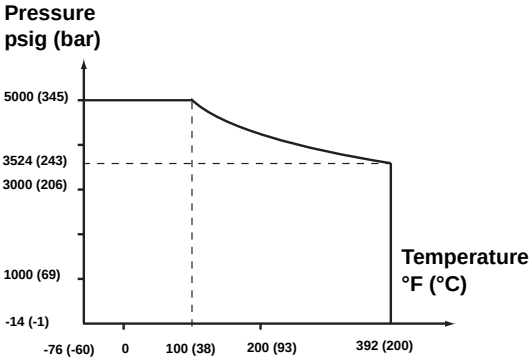
High Temperature and High Pressure (HTHP) tank connection
(Operating Temperature and Pressure code H):

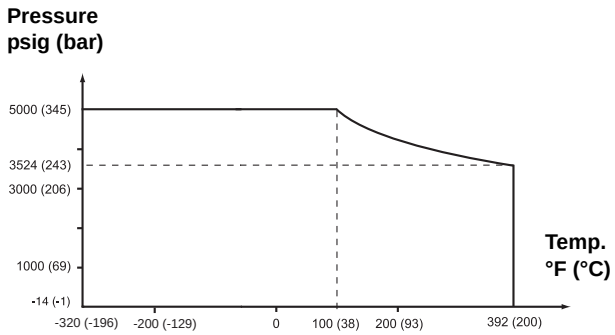
Max. Rating, HTHP Connections



High Pressure (HP) tank connection (Operating Temperature and Pressure code P):

Max. Rating, HP Connections

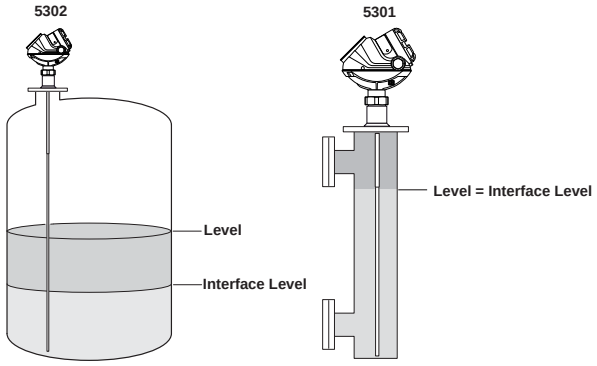


	Cryogenic Temperature tank connection (Operating Temperature and Pressure code C): **Max. Rating, C Connections** 
ASME / ANSI Flange Rating	316L SST flanges according to ASME B16.5 Table 2-2.3: • Standard: Max. 302 °F/580 psig (150 °C/40 Bar) • HP/C: Class 2500 up to max 200 °C • HTHP: Class 2500 up to max 400 °C
	Alloy C-276 (UNS N10276) flanges according to ASME B16.5 Table 2-3.8: • HP/C: Class 1500 up to max 200 °C • HTHP: Class 1500 up to max 400 °C
EN Flange Rating	1.4404 according to EN 1092-1 material group 13E0: • Standard: Max. 302 °F/580 psig (150 °C/40 Bar) • HP/C: PN 320 up to max 200 °C • HTHP: PN 320 up to max 400 °C
	Alloy C-276 (UNS N10276) flanges according to EN 1092-1 material group 12E0
Fisher & Masoneilan Flange Rating	316L SST according to ASME B16.5 Table 2-2.3: • Standard: Max. 302 °F/580 psig (150 °C/40 Bar) • HP/C: Class 600 up to max 200 °C • HTHP: Class 600 up to max 400 °C
JIS Flange Rating	316L SST according to JIS B2220 material group 2.3: • Standard: Max. 302 °F/580 psig (150 °C/40 Bar) • HP/C: Max temp. 200 °C. Final rating depends on flange. • HTHP: Max temp. 400 °C. Final rating depends on flange.
Tri-Clamp Rating	Maximum pressure is 16 bar for 1.5 in. (37.5 mm) and 2 in. (50 mm) housing; and 10 bar for 3 in. (75 mm) and 4 in. (100 mm) housing. The final rating depends on the clamp and gasket. Tri-Clamp is available for the Standard Temperature and Pressure seal.
Plate Design	Certain models of flanged Alloy and PTFE covered probes have a tank connection design with a protective flange plate of the same material as the probe and with a backing flange in 316L / EN 1.4404. The protective flange plate prevents the backing flange from being exposed to the tank atmosphere. Flange rating according to SST backing flange ASME B16.5 Table 2-2.3, EN 1092-1 material group 13E0, and JIS B2220 material group 2.3.
	Alloy C-276 protective plate: • Standard: Max. 302 °F/580 psig (150 °C/40 Bar). Flange plate design is available up to Class 300/PN 40 • HP: Max temp. 200 °C. Flange plate design is available up to Class 600/PN 63 • HTHP: Max temp. 400 °C. Flange plate design is available up to Class 600/PN 63
	Alloy 400 protective plate: • Standard: Max. 302 °F/580 psig (150 °C/40 Bar). Flange plate design is available up to Class 300/PN 40
	PTFE protective plate: • Standard: Max. 302 °F/580 psig (150 °C/40 Bar)
Flange Connection Rating	See Table 5 and Table 6 for the conditions used for flange strength calculations

Interface Measurements

Considerations

The Rosemount 5302 is a good choice for measuring the interface of oil and water, or other liquids with significant dielectric differences. It is also possible to measure interfaces with a Rosemount 5301 in applications where the probe is fully submerged in the liquid. If interface is to be measured, follow these criteria:



Interface Measurement with a Rosemount 5302 and a Rosemount 5301 (fully submerged probe)

- The dielectric constant of the upper product must be known and should not vary. The Radar Master software has a built-in dielectric constant calculator to help the user estimate the upper product dielectric constant
- The dielectric constant of the upper product must have a smaller dielectric constant than the lower product
- The difference between the dielectric constants for the two products must be larger than 6
- The maximum dielectric constant for the upper product is 8 for the single lead probes, 10 for the coaxial, and 7 for the twin lead probes
- The upper product thickness must be larger than 5.1 in. (0.13 m) for all probes, except the HTHP coaxial probe, which requires 8 in. (0.2 m) to distinguish echoes from the two liquids
- Sometimes there is an emulsion layer (mix of the products) between the two products which can affect interface measurements. For guidelines on emulsion situations, consult your local Emerson Process Management representative

For information on the maximum allowable product thickness and measuring range, see “Interface Measuring Range” on page 157.

Solids Measurements

Considerations

Rosemount 5303 with a flexible single lead probe is a good choice for measuring solids, such as powders, granulates, or pellets with a grain size of up to 0.8 in. (20 mm). The measurement is made where the probe comes in contact with the material, which means that the shape of the material surface is not critical for the measurement. Measurements are also independent of moisture and material fluctuations such as density and temperature.

The following should be kept in mind:

- In solid applications, media may cause down-pull forces on silo roofs. The silo roof must be able to withstand the probe collapse load, or at least the maximum probe tensile load
- The tensile load depends on the silo size, material density, and the friction coefficient. Forces increase with the buried length, the silo, and probe diameter. In critical cases, such as products with a risk of build-up, probe for high physical weight loads are available
- Forces on probes, depending on their position, are generally two to ten times greater on probes with a tie-down than on probes with ballast weights
- For environments where electrostatic discharges (plastics) are likely to occur, grounding of the probe and vessel may be required

Note:

Abrasive media can wear out the probe, so consider using non-contacting radar.

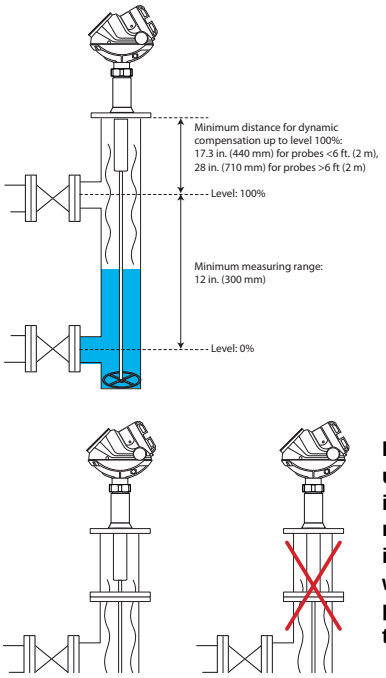
For more information, refer to the Guided Wave Radar in Solid Level Applications Technical Note (Document No. 00840-2300-4811).

High Pressure Steam Applications

Considerations

Saturated steam under high pressure can influence radar level transmitter measurements. Rosemount 5301 with Dynamic Vapor Compensation (DVC) will automatically compensate for this and maintain the level accuracy.
Considerations for DVC:

- A Single lead rigid HTHP probe with a reference reflector for vapor compensation must be used (probe type 4U, 4V)
- Mount in a 2, 3, or 4-in bypass chamber with flanges appropriately sized for the pressure and temperature of the application
- Use a centering disk to keep the probe centered in the chamber see “Chamber / Pipe Installations” on page 162
- Probes up to 13.1 ft (4 m) in length are supported
- Minimum measuring range is 12 in. (300 mm)
- DVC requires a minimum distance from the flange to the surface level in order to measure the change in the vapor dielectric constant. If the level rises within this area, the unit switches over to static compensation, using the last known vapor dielectric constant



If a spool piece is used, it is important that the reference reflector is not positioned where the spool piece connects to the chamber.

For more information, refer to the High Pressure Steam Applications Technical Note (Document No. 00840-0100-4530)

(1) Reverse polarity protection.
(2) Final rating may be lower depending on flange and O-ring selection, See “Tank Connection and Probe” on page 159.

TABLE 4. Temperature ranges for standard tank seals with different O-ring materials

Tank seal with different O-ring material	Min. Temperature °F (°C) in air	Max. Temperature °F (°C) in air
Viton®	5 (-15)	302 (150)
Ethylene Propylene (EPDM)	-40 (-40)	266 (130)
Kalrez® 6375	14 (-10)	302 (150)
Buna-N	-31 (-35)	230 (110)

NOTE!
Always check the chemical compatibility of the o-ring material with your application

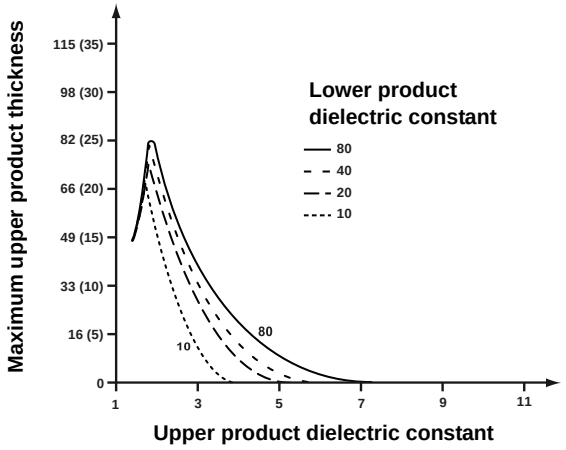
TABLE 5. 316L SST: conditions used for flange strength calculations

	Bolting material	Gasket		Flange material	Hub material
		Standard/HTHP	HP/HTHP/C		
ASME/ ANSI	Stainless steel SA193 B8M C1.2	Soft (1a) with min. thickness 1.6 mm.	Spiral wound gasket with nonmetallic filler (1b)	Stainless steel A182 Gr. F316L and EN 10222-5-1.4404.	Stainless steel A479M 316L, and EN 10272-1.4404.
EN, JIS	EN 1515-1/-2 group 13E0, A4-70.	Soft (EN 1514-1) with min. thickness 1.6 mm.	Spiral wound gasket with nonmetallic filler (EN 1514-2)		

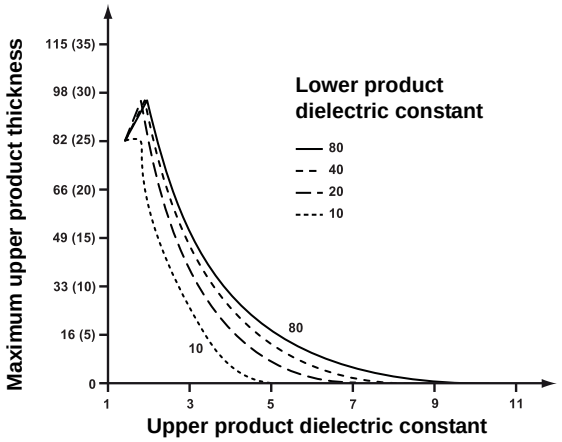
TABLE 6. Alloy C-276: conditions used for flange strength calculations

	Bolting material	Gasket		Flange material	Hub material
		HP/HTHP/C			
ASME/ ANSI	UNS N10276	Soft (1a) with min. Thickness 1.6 mm	Spiral wound gasket with nonmetallic filler (1b)	SB462 Gr. N10276 (solution annealed condition) or SB575 Gr. N10276 (solution annealed condition)	SB574 Gr. N10276
EN, JIS		Soft (EN 1514-1) with min. Thickness 1.6 mm	Spiral wound gasket with nonmetallic filler (EN 1514-2)		

Maximum Upper Product Thickness for the Flexible Single Lead Probe in ft (m)

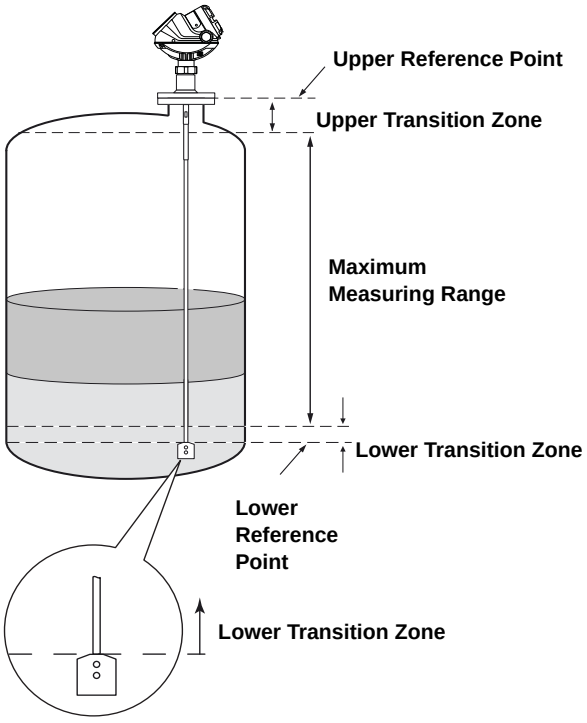


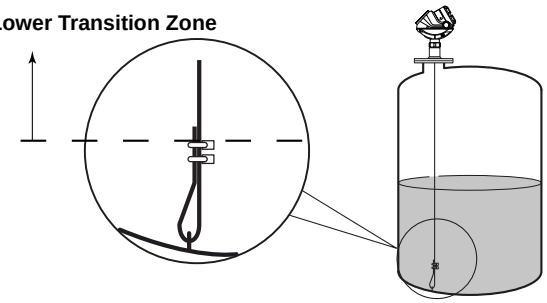
Maximum Upper Product Thickness for the Flexible Twin Lead Probe in ft (m)



Performance Specification

General	
Reference Conditions	Single standard probe, 77 °F (25 °C) in water and ambient pressure
Reference Accuracy	± 0.12 in. (3 mm) or 0.03% of measured distance, whichever is greatest(1)
Repeatability	± 0.04 in. (1 mm)
Ambient Temperature Effect	± 0.008 in. (0.2 mm) /°K or ± 30 ppm/°K of measured value, whichever is greatest
Update Interval	< 1 per second
Measuring Range	
Transition Zones	Transition zones are areas where measurements are non-linear or have reduced accuracy. See picture and Table 7 on page 157 If measurements are desired at the very top of the tank, it is possible to mechanically extend the nozzle and use the coaxial probe. Then the upper transition zone is moved into the extension. **NOTE** The 4-20 mA set points are recommended to be configured between the transition zones, within the measuring range





For a flexible single lead probe with chuck, the lower transition zone is measured upwards from the upper clamp.

Measuring Range and Minimum Dielectric Constant	16 in. (0.4 m) to 164 ft (50 m)
	See Table 8 on page 158 for each probe's measuring range and minimum dielectric constant. Due to the measuring range depending on the application and factors described below, the values are a guideline for clean liquids. For more information, ask your local Emerson Process Management representative
	Different parameters (factors) affect the echo and therefore the maximum measuring range differs depending on application according to: • Disturbing objects close to the probe • Media with higher dielectric constant (ε_r) gives better reflection and allows a longer measuring range • Surface foam and particles in the tank atmosphere may affect measuring performance • Heavy coating or contamination on the probe should be avoided since it can reduce measuring range and might cause erroneous level readings
	Note: For Remote Housing, see Table 9 on page 158 for the maximum recommended measuring range for different Remote Housing lengths, installation types, Dielectric Constants, and probe types
Interface Measuring Range	Target applications include interfaces between oil / oil-like and water / water-like liquids with low (<3) upper product dielectric constant and high (>20) lower product dielectric constant. For such applications, the maximum measuring range is only limited by the length of the rigid single lead, coaxial, and rigid twin probes.
	For the flexible probes, the maximum measuring range will be reduced based on the maximum upper product thickness according to the diagram below. The maximum interface distance is 164 ft (50 m) minus the maximum product thickness.
	For information on the maximum allowable product thickness and measuring range, see graphs on page Level-155
Environment	
Vibration Resistance	Aluminum housing: IEC 60770-1 Level 1. Stainless Steel housing: IACS E10
Electromagnetic Compatibility	Emission and Immunity: EMC directive 89/336/EEC. EN61326-1:1997 incl. A1:1998 and A2:2001. NAMUR recommendations NE21
Built-in Lightning Protection	EN61326, IEC 801-5, level 1 kV. T1 option: the transmitter complies with IEEE 587 Category B transient protection and IEEE 472 surge protection
Coating (See Table 10 on page 158)	• Single lead probes are preferred when there is a risk of contamination (because coating can result in the product bridging across the two leads for twin versions; between the inner lead and outer pipe for the coaxial probe) • For viscous or sticky applications, PTFE probes are recommended. Periodic cleaning may also be required • Signal Quality Metrics (option code D01, or DA1) can be used in determining when to clean the probe Transmitters equipped with the Diagnostics Suite option can calculate Signal Quality Metrics • Maximum error due to coating is 1-10% depending on probe type, dielectric constant, coating thickness and coating height above product surface
CE-mark	Complies with applicable directives (EMC, ATEX)

(1) For probes with spacers, the accuracy may deviate close to the spacers. Accuracy may be affected by remote housing.

TABLE 7. Transition Zones

	Dielectric Constant	Rigid Single Lead	Flexible Single Lead	Coaxial	Rigid Twin Lead	Flexible Twin Lead
Upper(1) Transition Zone	**80**	4.3 in. (11 cm)	4.3 in. (11 cm)	4.3 in. (11 cm)	4.3 in. (11 cm)	4.7 in. (12 cm)
	2	6.3 in. (16 cm)	7.1 in. (18 cm)	4.3 in. (11 cm)	5.5 in. (14 cm)	5.5 in. (14 cm)
Lower(2) Transition Zone	**80**	2 in. (5 cm)	0 in. (0 cm)(4) (3)	0.4 in. (1 cm)	1.2 in. (3 cm)	2 in. (5 cm)(4)
	2	2.8 in. (7 cm)(5)	2 in. (5 cm) - long weight(4) 3.2 in. (8 cm) - short weight(4)	2 in. (5 cm)	4 in. (10 cm)	5.5 in. (14 cm)(4)
	Note: The 4–20 mA set points are recommended to be configured between the transition zones, within the measuring range.					

(1) The distance from the upper reference point where measurements have reduced accuracy.
(2) The distance from the lower reference point where measurements have reduced accuracy.
(3) The measuring range for the PTFE covered Flexible Single Lead probe includes the weight. For low dielectric media, special configuration may be required.
(4) Note that the weight length or chuck fastening length adds to non-measurable area and is not included in the diagram. See "Dimensional Drawings" on page 167.
(5) When using a metallic centering disc, the lower transition zone is 8 in. (20 cm), including weight if applicable. When using a PTFE centering disc, the lower transition zone is not affected.

TABLE 8. Measuring Range and Minimum Dielectric Constant

Rigid Single Lead	Flexible Single Lead[1]	Coaxial	Rigid Twin Lead	Flexible Twin Lead
Maximum Measuring Range				
9 ft. 10 in. (3 m) for 8 mm probes. 14 ft. 9 in. (4.5 m) for 13 mm probes	164 ft (50 m)	19 ft 8 in. (6 m)	9 ft 10 in. (3 m)	164 ft (50 m)
Minimum Dielectric Constant				
1.4 (Std) (1.25 if installed in a metallic bypass or stilling well)[1] [2] 1.6 (HP/HTHP/C) (1.4 if installed in a metallic bypass or stilling well)[1] [2]	1.4 (Std), up to 49 ft (15 m)[1] 1.6 (HP/HTHP/C), up to 49 ft (15 m)[1] (Std/HP/HTHP/C) 1.8, up to 82 ft (25 m)[1] 2.0, up to 115 ft (35 m)[1] 3, up to 138 ft (42 m) 4, up to 151 ft (46 m) 6, up to 164 ft (50 m)	1.2 (Std) 1.4 (HP/C) 2.0 (HTHP)	1.4 (Std)	(Std) 1.4, up to 82 ft (25 m)[1] 2.0, up to 115 ft (35 m)[1] 2.5, up to 131 ft (40 m)[1] 3.5, up to 148 ft (45 m) 6, up to 164 ft (50 m)

(1) Probe end projection software function will improve the minimum measurable dielectric constant. Consult the factory for details.
(2) May be lower depending on installation.

TABLE 9. Remote Housing Measuring Range

		Dielectric Constant	Rigid Single 8 mm	Rigid Single 13 mm	Flexible Single	Coaxial	Rigid Twin	Flexible Twin
1 m Remote Housing	Chamber / pipe installations ≤ 4 in. (100 mm)	1.4 2 80	4 ft (1.25 m) 10 ft (3 m)[1] 10 ft (3 m)	15 ft (4.5 m)[1] 15 ft (4.5 m)[1] 15 ft (4.5 m)[1]	33 ft (10 m)[1] [2] 33 ft (10 m)[1] [2] 33 ft (10 m)[1] [2]	19 ft (6 m)	10 ft (3 m)[1] 10 ft (3 m)[1] 10 ft (3 m)[1]	33 ft (10 m)[1] [2] 33 ft (10 m)[1] [2] 33 ft (10 m)[1] [2]
	Tank installations	1.4 2 80	4 ft (1.25 m) 4 ft (1.25 m) 10 ft (3 m)[1]	4 ft (1.25 m) 4 ft (1.25 m) 10 ft (3 m)[1]	4 ft (1.25 m) 4 ft (1.25 m) 159 ft (48.5 m)[1]		4 ft (1.25 m) 4 ft (1.25 m) 10 ft (3 m)[1]	4 ft (1.25 m) 98 ft (30 m)[1] 159 ft (48.5 m)[1]
2 m Remote Housing	Chamber / pipe installations ≤ 4 in. (100 mm)	1.4 2 80	9 ft (2.75 m) 10 ft (3 m)[1] 10 ft (3 m)	15 ft (4.5 m)[1] 15 ft (4.5 m)[1] 15 ft (4.5 m)	33 ft (10 m)[1] [2] 33 ft (10 m)[1] [2] 33 ft (10 m)[1] [2]	19 ft (6 m)	10 ft (3 m)[1] 10 ft (3 m)[1] 10 ft (3 m)[1]	33 ft (10 m)[1] [2] 33 ft (10 m)[1] [2] 33 ft (10 m)[1] [2]
	Tank installations	1.4 2 80	9 ft (2.75 m) 9 ft (2.75 m) 10 ft (3 m)[1]	9 ft (2.75 m) 9 ft (2.75 m) 10 ft (3 m)[1]	9 ft (2.75 m) 9 ft (2.75 m) 154 ft (47 m)[1]		9 ft (2.75 m) 9 ft (2.75 m) 10 ft (3 m)[1]	9 ft (2.75 m) 98 ft (30 m)[1] 154 ft (47 m)[1]
3 m Remote Housing	Chamber / pipe installations ≤ 4 in. (100 mm)	1.4 2 80	10 ft (3 m)	15 ft (4.5 m) 15 ft (4.5 m) 15 ft (4.5 m)	33 ft (10 m)[1] [2] 33 ft (10 m)[1] [2] 33 ft (10 m)[1] [2]	19 ft (6 m)	10 ft (3 m)[1]	33 ft (10 m)[1] [2] 33 ft (10 m)[1] [2] 33 ft (10 m)[1] [2]
	Tank installations	1.4 2 80		14 ft (4.25 m) 14 ft (4.25 m) 15 ft (4.5 m)[1]	14 ft (4.25 m) 14 ft (4.25 m) 149 ft (45.5 m)[1]			14 ft (4.25 m) 98 ft (30 m)[1] 149 ft (45.5 m)[1]

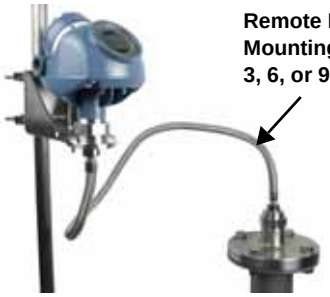
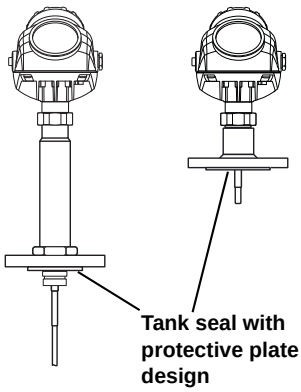
(1) Accuracy may be affected up to ± 1.2 in. (30 mm).
(2) Required chamber/pipe size is 3 or 4 in. (75 -100 mm).

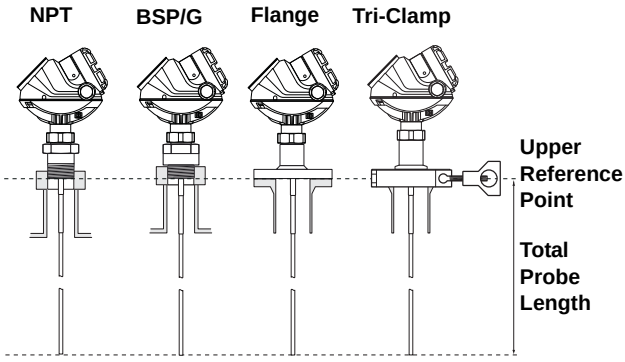
TABLE 10. Maximum recommended Viscosity and Coating / Build-up

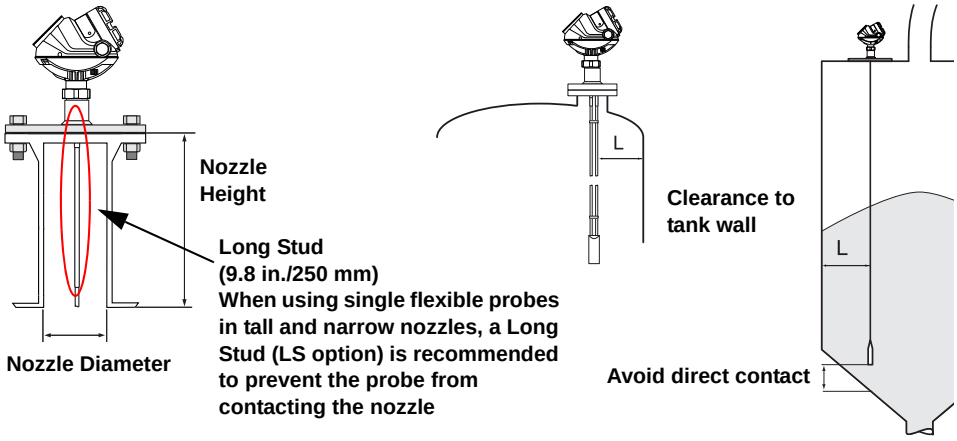
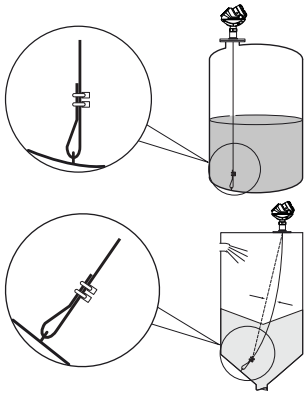
Coaxial	Twin Lead	Single Lead
Maximum Viscosity		
500 cP	1500 cP	8000 cP [1] [2]
Coating / Build-up		
Coating not recommended	Thin coating allowed, but no bridging	Coating allowed

(1) Consult your local Emerson Process Management representative in the case of agitation/turbulence and high viscous products.
(2) Be cautious in HTHP viscous or crystallizing media applications where temperature at instrument connection is significantly lower than process temperature with risk of coating in the upper part of probe that may reduce the measurement signal. Consider using HP or STD probes in such applications.

Physical Specification

Housing and Enclosure	
Type	Dual compartment (terminal compartment and the electronics are completely separated). Two entries for conduit or cable connections. The transmitter housing can be rotated in any direction
Electrical Connection	½ - 14 NPT for cable glands or conduit entries. Optional: M20 x 1.5 conduit / cable adapter, M12 4-pin male eurofast® connector or A size Mini 4-pin male minifast® connector. Recommended output cabling is twisted shielded pairs, 18-12 AWG
Housing Material	Polyurethane-covered Aluminum, or Stainless Steel Grade CF8M (ASTM A743)
Ingress Protection	NEMA 4X, IP 66, IP67
Factory Sealed	Yes
Weight	Transmitter Head (TH): Aluminium 4.4 lb (2 kg), SST 10.8 lb (4.9 kg).
Remote Housing Mounting	Kit that includes a flexible armored extension cable and a bracket for wall or pipe mounting. See “Remote Housing” on page 178 for the dimensions.  **Remote Housing Mounting Cable: 3, 6, or 9 ft (1, 2, or 3 m)**
Tank Connection and Probe	
Tank Connection	The tank connection consists of a tank seal, a flange, Tri-Clamp, or NPT or BSP/G threads. Certain models of flanged Alloy and PTFE covered probes have a tank connection design with a protective plate of the same material as the probe. This is to prevent the 316L / EN 1.4404 SST flange from being exposed to the tank atmosphere. See “Dimensional Drawings” on page 167.  **Tank seal with protective plate design**
Flange Dimensions	Follows ASME B 16.5, JIS B2220, and EN 1092-1 standards for blind flanges. For Proprietary Fisher® and Masoneilan® flanges, see “Special Flanges and Flushing Connection Rings” on page 179
Vented Flanges	Available with Masoneilan and Fisher vented flanges. Vented flanges must be ordered as accessories with a 1½-in. NPT threaded process connection (code RA); see “Special Flanges and Flushing Connection Rings” on page 179. As an alternative to a vented flange, it is possible to use a flushing connection ring on top of the standard nozzle.
Probe Versions	Coaxial, Rigid Twin and Rigid Single Lead, Flexible Twin and Flexible Single Lead. Probes can be ordered in different materials and options for extreme temperatures and pressure
	For guidelines on which probe to select depending on application, see the Technical Note Guided Wave Radar Application Guidelines (Document No. 00840-2600-4811)

Material Exposed To Tank Atmosphere	Standard Probe (Operating Temperature and Pressure code S): • Material model code 1: 316L SST (EN 1.4404), PTFE, PFA, and O-ring materials • Material model code 2: Alloy C-276 (UNS N10276), PTFE, PFA, and O-ring materials • Material model code 3: Alloy 400 (UNS N04400), PTFE, PFA, and O-ring materials • Material model code 7: PTFE • Material model code 8: PTFE, 316 L SST (EN 1.4404), and O-ring materials
	HTHP Probe (Operating Temperature and Pressure code H): • Material model code 1: 316L SST (EN 1.4404), Ceramic (Al2O3), Graphite, and Inconel • Material model code 2 and H: Alloy C-276 (UNS N10276), Ceramic (Al2O3), Graphite, Inconel
	HP Probe (Operating Temperature and Pressure code P): • Material model code 1: 316L SST (EN 1.4404), Ceramic (Al2O3), Graphite, PFA, PTFE, Inconel • Material model codes 2, H: Alloy C-276 (UNS N10276), Ceramic (Al2O3), Graphite, PFA, PTFE, Inconel
	Cryogenic Probe (Operating Temperature and Pressure code C): • Material model code 1: 316L SST (EN 1.4404), Ceramic (Al2O3), Graphite, PFA, PTFE, Inconel
Pressure Equipment Directive (PED)	Complies with 97/23/EC article 3.3
Total Probe Length	This is defined from the upper reference point to the end of the probe (weight included, if applicable).  Select the probe length according to the required measuring range (the probe must be hung and fully extended through the entire distance where level readings are desired). Most of the probes can be cut in field. However, there are some restrictions for the standard and HP/C coaxial probes: these can be cut up to 2 ft. (0.6 m). Probes shorter than 4.1 ft. (1.25 m) can be cut to the minimum length of 1.3 ft. (0.4 m). The HTHP coaxial probe and the PTFE covered probes cannot be cut in the field.
Minimum and Maximum Probe Length	Coaxial: 1.3 ft (0.4 m) to 19.7 ft (6 m). Rigid Twin Lead: 1.3 ft (0.4 m) to 9.8 ft (3 m). Flexible Twin Lead: 3.3 ft (1 m) to 164 ft (50 m). Rigid Single Lead (0.3 in./8 mm): 1.3 ft (0.4 m) to 9.8 ft (3 m) Rigid Single Lead (0.5 in./13 mm): 1.3 ft (0.4 m) to 14.8 ft (4.5 m) Flexible Single Lead: 3.3 ft (1 m) to 164 ft (50 m)
Probe Angle	0 to 90 degrees from vertical axis
Tensile Strength	0.16 in. (4 mm) Flexible Single Lead probe: 2698 lb (12 kN) 0.24 in. (6 mm) Flexible Single Lead probe: 6519 lb (29 kN) Flexible Twin Lead probe: 2023 lb (9 kN)
Collapse Load	0.16 in. (4 mm) Flexible Single Lead probe: 3597 lb (16 kN) 0.24 in. (6 mm) Flexible Single Lead probe: 7868 lb (35 kN)
Sideway Capacity	Coaxial probe: 73.7 ft. lbf, 3.7 lb at 19.7 ft. (100 Nm, 1.67 kg at 6 m) Rigid Twin Lead: 2.2 ft. lbf, 0.22 lb at 9.8 ft. (3 Nm, 0.1 kg at 3 m) Rigid Single Lead: 4.4 ft. lbf, 0.44 lb at 9.8 ft. (6 Nm, 0.2 kg at 3 m)
Maximum Recommended Nozzle Height	4 in. (10 cm) + nozzle diameter For coaxial probes, there are no restrictions

Minimum Clearance (See Table 11 on page 163)	
Other Mechanical Considerations	To get best possible performance, the following must be considered before installing the transmitter: • Inlets should be kept at a distance in order to avoid product filling on the probe • Avoid physical contact between probes and agitators, as well as applications with strong fluid movement unless the probe is anchored • Probe tie-down is recommended if the probe can move to within 1 ft. (30 cm) of any object during operations • In order to stabilize the probe for side forces, it is possible to fix or guide the probe to the tank bottom • For optimal single lead probe performance in non-metallic vessels, the probe must either be mounted with a 2-in. / DN 50 or larger metallic flange, or a metal sheet with an 8-in. diameter (200 mm) or larger must be used (see the Reference Manual for placement)  **Flexible single lead probe with chuck installed in liquids and in solids. For solids, it is recommended that the probe should be slack to prevent high tensile loads.**
	See the Reference Manual (Document No. 00809-0100-4530) for more mechanical installation information
Weight	Flange: depends on flange size Coaxial probe: 0.67 lb/ft (1 kg/m) Rigid Single Lead probe (0.3 in./8 mm): 0.27 lb/ft (0.4 kg/m) Rigid Single Lead probe (0.5 in./13 mm): 0.71 lb/ft (1.06 kg/m) Rigid Twin Lead probe: 0.40 lb/ft (0.6 kg/m) Flexible Single Lead probe: 0.05 lb/ft (0.08 kg/m) Flexible Twin Lead probe: 0.09 lb/ft (0.14 kg/m) End weight: 0.88 lb (0.40 kg) for the 4 mm single lead probe, 1.2 lb (0.55 kg) for the 6 mm single lead probe and 1.3 lb (0.60 kg) for twin lead probes

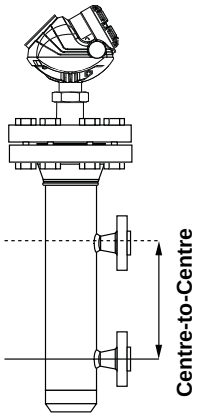
Chamber / Pipe Installations

Rosemount 9901 Chamber

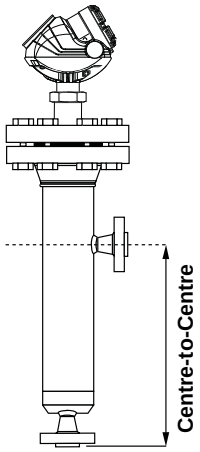
Rosemount 9901 allows external mounting of process level instrumentation. It supports a variety of process connections, and optional drain and vent connections. The Rosemount 9901 chamber is designed to the ASME B31.3 standard, and is Pressure Equipment Directive (PED) compliant. Use option code XC to order together with the 5300 Series transmitters.

The probe length to use for a Rosemount 9901 chamber can be calculated with this formula (only valid for standard 9901 chambers):
Side-and-Side dimension:
Probe length=Centre-to-Centre dimension+19 in. (48 cm)
Side-and-Bottom dimension:
Probe length=Centre-to-Centre dimension+4 in. (10 cm)

Side-and-Side dimension



Side-and-Bottom dimension



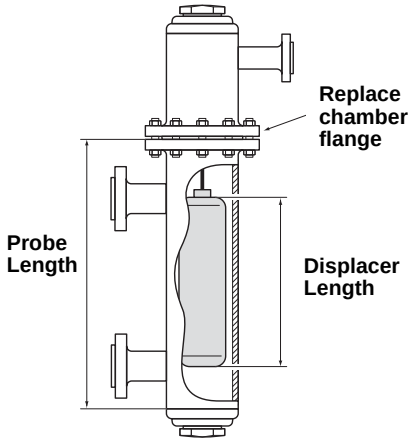
Use a centering disc the same diameter as the chamber if the probe length >3.3 ft (1 m). See “Probe Type in Chamber Considerations” on page 162 and “Centering Discs” on page 163 for which probe and disc to use

For additional information, see the Rosemount 9901 Chamber for Process Level Instrumentation Product Data Sheet (Document Number 00813-0100-4601)

Existing Chamber

A Rosemount 5300 Series transmitter is the perfect replacement in an existing displacer chamber. Proprietary flanges are offered, enabling use of existing chambers to make installation easy.
Considerations when changing to 5300:
The 5300 series flange choice and probe length must be correctly matched to the chamber. Both standard ANSI and EN (DIN), as well as proprietary chamber flanges, are available. See “Special Flanges and Flushing Connection Rings” on page 179 to identify the proprietary flanges.

See “Probe Type in Chamber Considerations” on page 162 and “Centering Discs” on page 163 for which probe and disc to use. See Table 12 on page 163 for guidelines on the required probe length



For additional information, see the Replacing Displacers with Guided Wave Radar Technical Note (Document Number 00840-2200-4811)

Probe Type in Chamber Considerations

When installing a Rosemount 5300 in a chamber, the single lead probe is recommended. An exception is with liquefied gas > 40 bar where the coaxial probe is recommended.

The recommended minimum chamber diameter is 4 in. (100 mm) for Single Flexible probe and 3 in. (75 mm) for the Single Rigid probe. The probe should be centered to prevent it touching the sides of the well.

The probe length determines if a Single Rigid or Single Flexible probe should be used:

- Less than 20 ft (6 m):
  Rigid Single Probe is recommended. Use a centering disc for probe > 3.3 ft (1 m). If installation requires less head-space, use a Flexible Single Probe with a weight and centering disc.
- More than 20 ft (6 m):
  Use Flexible Single Probe with a weight and centering disc.

A short weight is available for the single flexible SST probe. It is used for measuring close to the probe end and shall be used where the measuring range must be maximized. The height is 2 in. (50 mm) and the diameter is 1.5 in. (37.5 mm). The option code is W2.

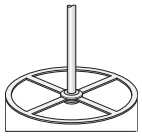
Centering Discs	To prevent the probe from contacting the chamber or pipe wall, centering discs are available for rigid single, flexible single, and flexible twin lead probes. The disc is attached to the end of the probe. Discs are made of stainless steel, Alloy C-276, Alloy 400, or PTFE. The centering disc in PTFE is not available for HTHP probes. See Table 13 for Dimension D. Table 14 shows which centering disc diameter to choose for a particular pipe.	 **D**

TABLE 11. Minimum Clearance

	Rigid Single Lead	Flexible Single Lead	Coaxial	Rigid Twin Lead	Flexible Twin Lead
Recommended nozzle diameter	6 in. (15 cm) or more	6 in. (15 cm) or more	Enough space to fit the probe	4 in. (10 cm) or more	4 in. (10 cm) or more
Min. nozzle diameter (1)	2 in. (5 cm)	2 in. (5 cm)	Enough space to fit the probe	2 in. (5 cm)	2 in. (5 cm)
Min. clearance to tank wall (L) or obstruction(2)	4 in. (10 cm) if smooth metallic wall. 20 in. (50 cm) if disturbing objects, rugged metallic or concrete/plastic wall.	4 in. (10 cm) if smooth metallic wall. 20 in. (50 cm) if disturbing objects, rugged metallic or concrete/plastic wall.	0 in. (0 cm)	4 in. (10 cm)	4 in. (10 cm)
Min. chamber/still pipe diameter	2 in. (5 cm) (3)	Consult the factory	1.5 in. (3.8 cm)	2 in. (5 cm) (4)	Consult the factory

(1) Requires special configuration and setting of Upper Null Zone and may affect the maximum measuring range.
(2) Minimum clearance from tank bottom for the coaxial and rigid single probes is 0.2 in. (5 mm).
(3) The probe must be centered in the pipe/bypass. A centering disc (see "Centering Discs" on page 163 and "Ordering Information" on page 132) can be used to prevent the probe from contacting the chamber wall.
(4) The centermost lead must be at least 0.6 in. (15 mm) away from the pipe/bypass wall.

TABLE 12. Required probe length in chambers

Chamber Manufacturer	Probe Length(1)
Major torque-tube manufacture (249B, 249C, 2449K, 249N, 259B)	Displacer+9 in. (229 mm)
Masoneilan (Torque tube operated), proprietary flange	Displacer+8 in. (203 mm)
Other - torque tube(2)	Displacer+8 in. (203 mm)
Magnetrol (spring operated)(3)	Displacer+between 7.8 in. (195 mm) to 15 in. (383 mm)
Others - spring operated(2)	Displacer+19.7 in. (500 mm)

(1) If flushing ring is used, add 1 in. (25 mm).
(2) For other manufacturers, there are small variations. This is an approximate value, actual length should be verified.
(3) Lengths vary depending on model, SG and rating, and should be verified.

TABLE 13. Centering Disc Dimensions

Disc Size	Actual Disc Diameter
2 in.	1.8 in. (45 mm)
3 in.	2.7 in. (68 mm)
4 in.	3.6 in. (92 mm)
6 in.	5.55 in. (141 mm)
8 in.	7.40 in. (188 mm)

TABLE 14. Centering disc size recommendation for different pipe schedules

	Pipe Schedule					
Pipe Size	5s,5	10s,10	40s,40	80s,80	120	160
2 in.	2 in.	2 in.	2 in.	2 in.	NA(1)	NA(2)
3 in.	3 in.	3 in.	3 in.	3 in.	NA(1)	2 in.
4 in.	4 in.	4 in.	4 in.	4 in.	4 in.	3 in.
5 in.	4 in.	4 in.	4 in.	4 in.	4 in.	4 in.
6 in.	6 in.	6 in.	6 in.	6 in.	4 in.	4 in.
7 in.	NA(1)	NA(1)	5 in.	6 in.	NA(1)	NA(1)
8 in.	8 in.	8 in.	8 in.	8 in.	6 in.	6 in.

(1) Schedule is not available for pipe size.
(2) No centering disc is available.

Product Certifications

SAFETY NOTE

A safety isolator such as a zener barrier is always needed for intrinsic safety.

Probes covered with plastic and/or with plastic discs may generate an ignition-capable level of electrostatic charge under certain extreme conditions. Therefore, when the probe is used in a potentially explosive atmosphere, appropriate measures must be taken to prevent electrostatic discharge.

Factory Mutual (FM) Approval

Project ID: 3020497

E5 Explosion-proof for Class I, Div. 1,
Groups B, C, and D;
Dust Ignition Proof for Class II/III, Div. 1, Groups E, F, and G;
With Intrinsically Safe connections to
Class I, II, III, Div. 1, Groups B, C, D, E, F, and G.
Temp. Code T4
Ambient temperature limits: -50 °C to +70 °C(3).
Seal not required.
Approval valid for HART, FOUNDATION fieldbus, and Modbus options.

I5, IE Intrinsically Safe for Class I, II, III, Div. 1, Groups A, B, C, D, E, F, and G,
Class I, Zone 0, AEx ia IIC T4 when installed per Control Drawing: 9240 030-936.
Non-Incendive Class I, II, Div. 2, Groups A, B, C, D, F, and G;
Suitable for Class III, Div. 2.
4-20 mA / HART model: U_i=30 Vdc, I_i=130 mA, P_i=1.0 W, C_i=7.26 nF, L_i=0 H.
FOUNDATION fieldbus model: U_i=30 Vdc, I_i=300 mA, P_i=1.3 W, C_i=0 nF, L_i=0 H.
FISCO model: U_i=17.5 Vdc, I_i=380 mA, P_i=5.32 W, L_i=C_i=0.
Temp. Code T4
Ambient temperature limits: -50 °C to +70 °C(3)
Approval valid for HART, FOUNDATION fieldbus, and FISCO options.

EU Conformity

The most recent revision of the EC declaration of conformity can be found at www.rosemount.com.

Safety Instrumented Systems (SIS)

The Rosemount 5300 Series has been evaluated by a third party, Exida, against hardware requirements according to IEC 61508. With a FMEDA (Failure Modes, Effects and Diagnostics Analysis) report with a Safe Failure Fraction (SFF) above 90%, 5300 is suitable in SIS according to the Prior Use methodology. For more information, go to: http://www.emersonprocess.com/rosemount/safety/. To order the certificate of FMEDA data use option code QS.

ATEX Approval CE

Nemko 04ATEX1073X

SPECIAL CONDITIONS FOR SAFE USE (X)

The intrinsically safe circuits do not withstand the 500 Vac test as specified in IEC 60079-11 clause 6.4.12.

Impact and friction hazards need to be considered according to EN 60079-0 clause 8.1.2 when the transmitter and part of antennas exposed to the exterior atmosphere of the tank is made with light metal alloys and of category II 1G EPL Ga.

The Ex ia version of model 5300 FISCO field device may be supplied by an [Ex ib] FISCO power supply when the power supply is certified with three separate safety current limiting devices and voltage limitation which meets the requirements for type Ex ia.

E1(1) Flameproof:

II 1/2 G T4
II 1D T79°C(2).
Ex ia/db ia IIC T4 Ga/Gb (-40 °C≤T_a≤+70 °C(3))
Ex ta IIIC T79°C(2) (-40 °C≤T_a≤+70 °C(3))
U_m = 250 V.
Approval valid for HART, FOUNDATION fieldbus, and Modbus options.

I1(1), IA(1)Intrinsically Safe:

II 1 G T4.
II 1/2 G T4
II 1 D T79°C(2)
Ex ia IIC T4 (-50 °C≤T_a≤+70 °C(3)).
Ex ia/ib IIC T4 Ga/Gb (-50 °C≤T_a≤+70 °C(3)).
Ex ta IIIC T79°C(2) (-50 °C≤T_a≤+70 °C(3)).
4-20 mA / HART model: U_i=30 Vdc, I_i=130 mA, P_i=1.0 W, C_i=7.26 nF, L_i=0 H.
FOUNDATION fieldbus model: U_i=30 Vdc, I_i=300 mA, P_i=1.5 W, C_i=0 nF, L_i=0 H.
FISCO model: U_i=17.5 Vdc, I_i=380 mA, P_i=5.32 W, C_i=0 nF, L_i<1 µH.
Installation Drawing: 9240 030-938
Approval valid for HART, FOUNDATION fieldbus, and FISCO options.

(1) Ordering Information Code for Product Certificates, see page Level-136 and page Level-141.
(2) +69 °C with FOUNDATION fieldbus or FISCO option.
(3) +60 °C with FOUNDATION fieldbus or FISCO option.

Canadian Standards Association (CSA) Approval

This product meets the Dual Seal Requirements of ANSI/ISA 12.27.01-2003.

Cert. no. 1514653

E6[1] Explosion-proof with internal Intrinsically Safe Circuits [Exia]
Class I, Div. 1, Groups B, C and D;
Temp Code T4.
Class II, Div. 1 and 2, Groups E, F and G;
Class III, Div. 1
Ambient temperature limits -50 °C to +70 °C[3]
Approval valid for HART, FOUNDATION fieldbus, and Modbus options.

I6, IF[1] Intrinsically Safe Exia:
Class I, Div. 1, Groups A, B, C, and D.
Temp Code T4.
4-20 mA / HART model: U_i=30 Vdc, I_i=130 mA, P_i=1.0 W, C_i=7.26 nF, L_i=0 H.
FOUNDATION fieldbus model: U_i=30 Vdc, I_i=300 mA, P_i=1.3 W, C_i=0 nF, L_i=0 H.
FISCO model: U_i=17.5 Vdc, I_i=380 mA, P_i=5.32 W, L_i=C_i=0.
Approval valid for HART, FOUNDATION fieldbus, and FISCO options.
Installation Drawing: 9240 030-937
Ambient temperature limits -50 °C to +70 °C[3]

IECEx Approval

IECEx NEM 06.0001X

SPECIAL CONDITIONS FOR SAFE USE (X)

The intrinsically safe circuits do not withstand the 500 Vac test as specified in IEC 60079-11 clause 6.4.12.

Impact and friction hazards need to be considered according to EN 60079-0 clause 8.1.2 when the transmitter and part of antennas exposed to the exterior atmosphere of the tank is made with light metal alloys and of category II 1G EPL Ga.

The Ex ia version of model 5300 FISCO field device may be supplied by an [Ex ib] FISCO power supply when the power supply is certified with three separate safety current limiting devices and voltage limitation which meets the requirements for type Ex ia.

E7[1] Flameproof:
Ex ia/db ia IIC T4 Ga/Gb (-40 °C ≤ T_a ≤ +70 °C[3])
Ex ta IIIC T79°C[2] (-40 °C ≤ T_a ≤ +70 °C[3])
U_m = 250 V.
Approval valid for HART, FOUNDATION fieldbus, and Modbus options.

I7[1], IG[1] Intrinsically Safe:
Ex ia IIC T4 (-50 °C≤T_a≤+70 °C[3]).
Ex ia/ib IIC T4 Ga/Gb (-50 °C≤T_a≤+70 °C[3]).
Ex ta IIIC T79°C[2] (-50 °C≤T_a≤+70 °C[3]).
4-20 mA / HART model: U_i=30 Vdc, I_i=130 mA, P_i=1.0 W, C_i=7.26 nF, L_i=0 H.
FOUNDATION fieldbus model: U_i=30 Vdc, I_i=300 mA, P_i=1.5 W, C_i=0 nF, L_i=0 H.
FISCO model: U_i=17.5 Vdc, I_i=380 mA, P_i=5.32 W, C_i=0 nF, L_i<1 µH.
Installation Drawing: 9240 030-938
Approval valid for HART, FOUNDATION fieldbus, and FISCO options.

(1) Ordering Information Code for Product Certificates, see page Level-136 and page Level-141.
(2) +69 °C with FOUNDATION fieldbus or FISCO option.
(3) +60 °C with FOUNDATION fieldbus or FISCO option.

National Supervision and Inspection Center for Explosion Protection and Safety of Instrumentation (NEPSI) Approvals

SPECIAL CONDITIONS FOR SAFE USE (X)

Refer to Certificates:
GYJ081080X for Ex ia ll C T4 and GYJ081130X for Ex iad ll C T4.

E3[1] Flameproof:
HART model:
Ex iad IIC T4 (-40 °C<T_a<+70 °C)
FOUNDATION fieldbus model:
Ex iad IIC T4 (-40 °C<T_a<+60 °C)

I3[1] Intrinsically Safe:
HART model:
Ex ia IIC T4 (-50 °C<T_a<+70 °C)
4-20 mA / HART model: U_i=30 V, I_i=130 mA, P_i=1.0 W, C_i=7.25 nF, L_i=108 µH
FOUNDATION fieldbus model:
Ex ia IIC T4 (-50 °C<Ta< +60 °C)
U_i=30 V, I_i=300 mA, P_i=1.5 W, C_i~0 nF, L_i~0 µH

IC[1] FOUNDATION fieldbus FISCO model:
Ex ia IIC T4 (-50 °C<Ta< +60 °C)
U_i=17.5 V, I_i=380 mA, P_i=5.32 W, C_i~0 nF, L_i~0 µH

NCC/INMETRO Approvals

SPECIAL CONDITIONS FOR SAFE USE (X)

Refer to Certificate:
4205/07X

E2 Flameproof:
BR-Ex d/ia IIC T4 -40 °C≤T_a≤+70 °C[2] Gb/Ga
Approval valid for HART and FOUNDATION fieldbus options.

I2, IB Intrinsically Safe:
BR-Ex ia IIC T4 -40 °C≤T_a≤+70 °C[2] Ga
Approval valid for HART and FOUNDATION fieldbus options.

Overfill Protection

Cert no: Z-65.16-476

U1 TÜV-tested and approved for overfill protection according to the German WHG regulations
Approval valid for HART option.

Technology Institution of Industrial Safety (TIIS) Approval

E4[1] Flameproof:
Transmitter: Ex d [ia] IIC T4
Probe: Ex ia IIC T4
Installation Drawing: 05300-00548.
Approval valid for HART and FOUNDATION fieldbus options.

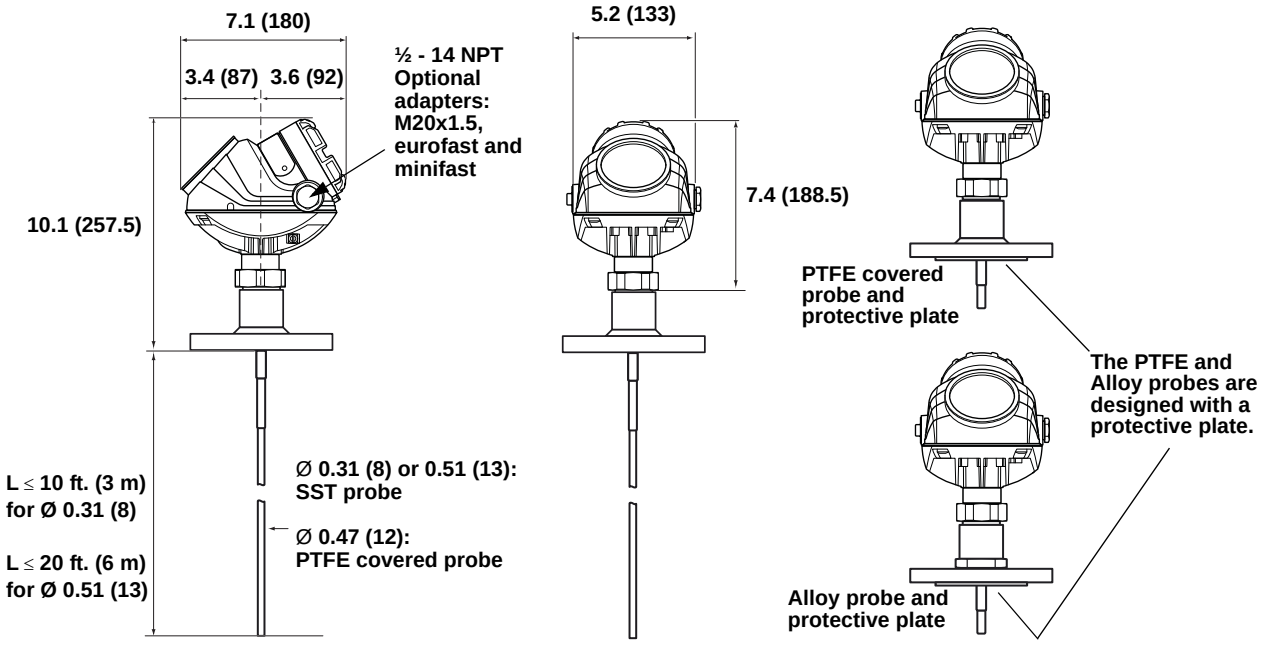
For detailed information, refer to the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530).

(1) Ordering Information Code for Product Certificates, see page Level-136 and page Level-141.
(2) +60 °C with FOUNDATION fieldbus.

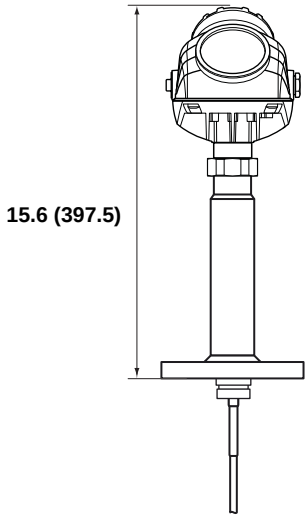
Dimensional Drawings

Dimensions are in inches
(millimeters)

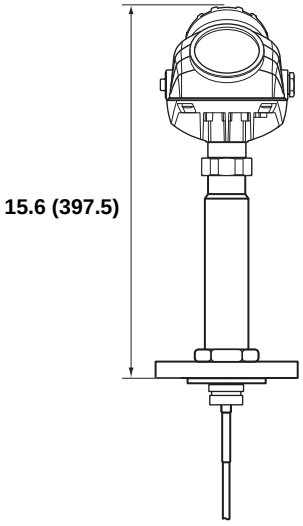
RIGID SINGLE LEAD PROBE WITH FLANGE CONNECTION



HTHP/HP/C version

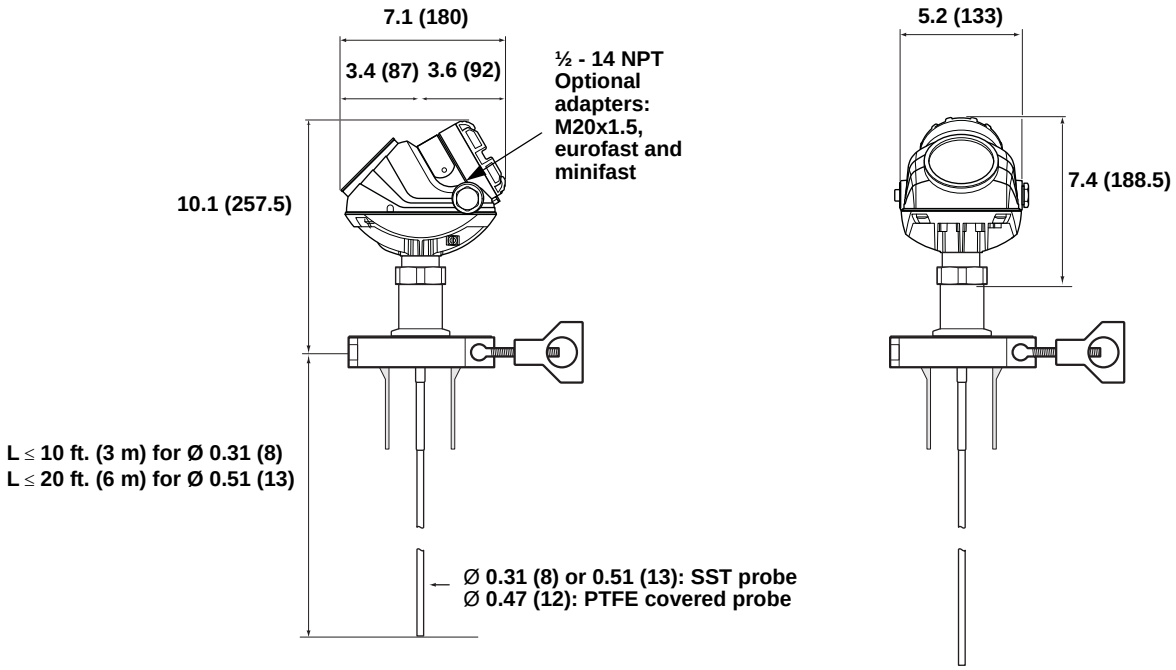


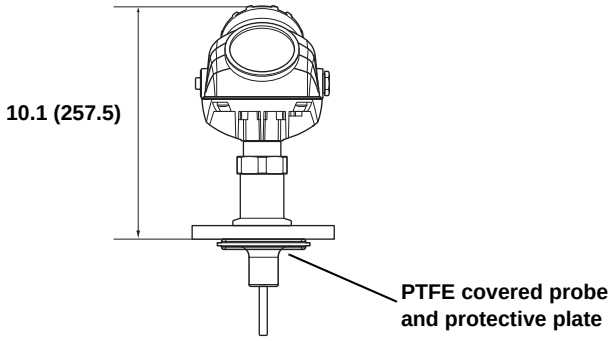
HTHP/HP Plate Design
(Option for Alloy versions)



RIGID SINGLE LEAD PROBE WITH TRI-CLAMP CONNECTION

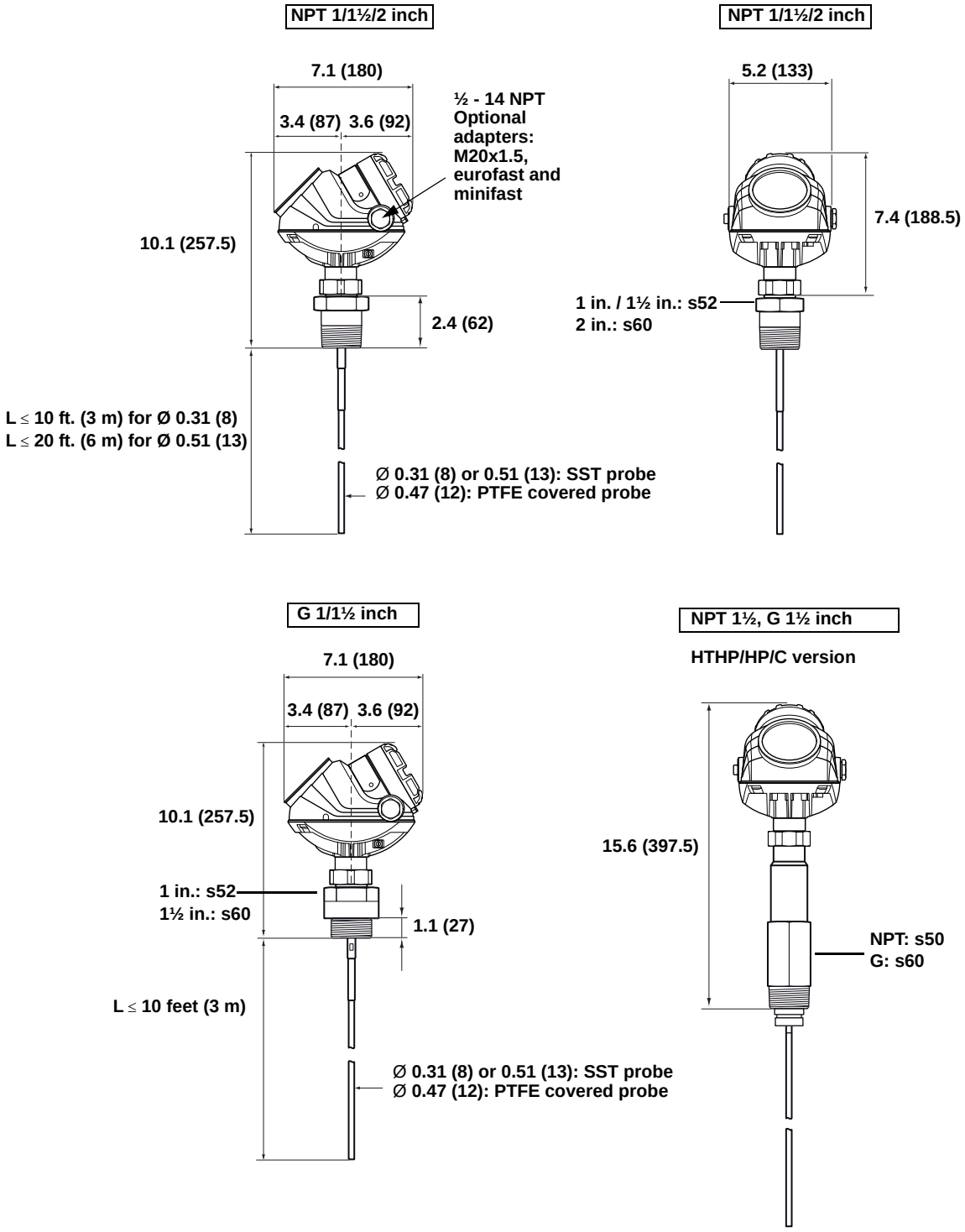
Dimensions are in inches
(millimeters)





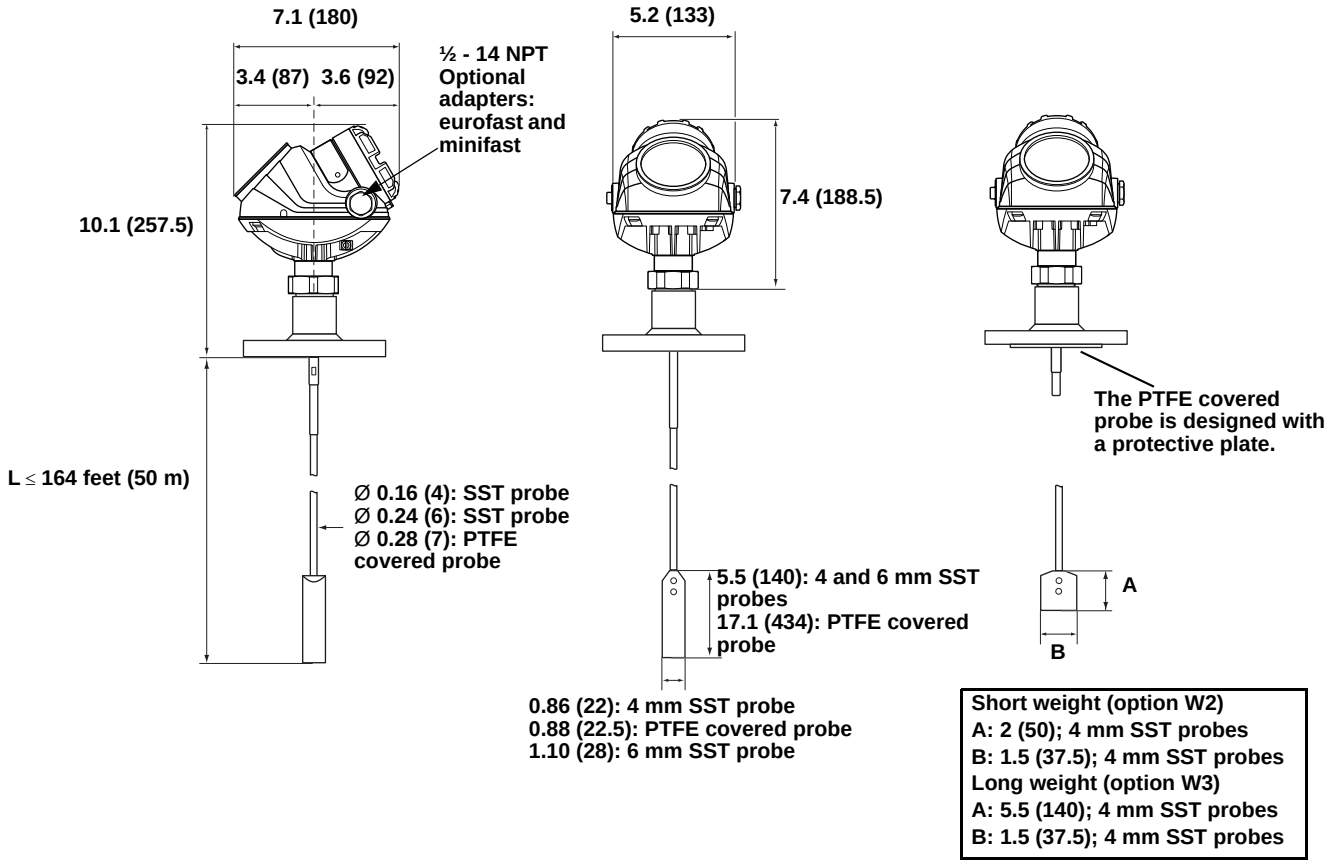
RIGID SINGLE LEAD PROBE WITH THREADED CONNECTION

Dimensions are in inches (millimeters)



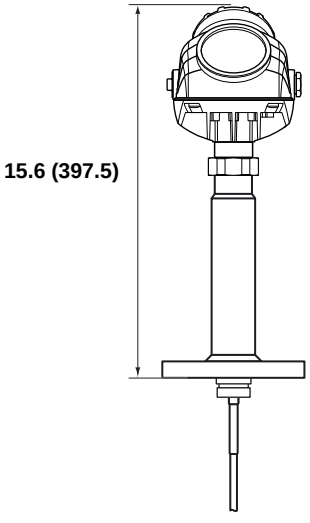
FLEXIBLE SINGLE LEAD PROBE WITH FLANGE CONNECTION

Dimensions are in inches (millimeters)

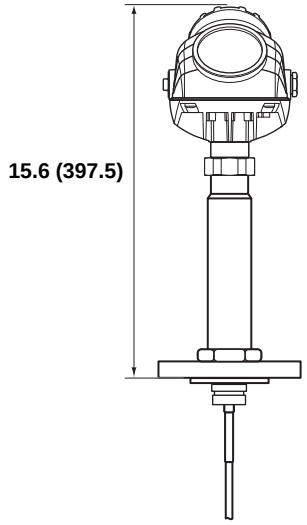


Short weight (option W2)
A: 2 (50); 4 mm SST probes
B: 1.5 (37.5); 4 mm SST probes
Long weight (option W3)
A: 5.5 (140); 4 mm SST probes
B: 1.5 (37.5); 4 mm SST probes

HTHP/HP/C version

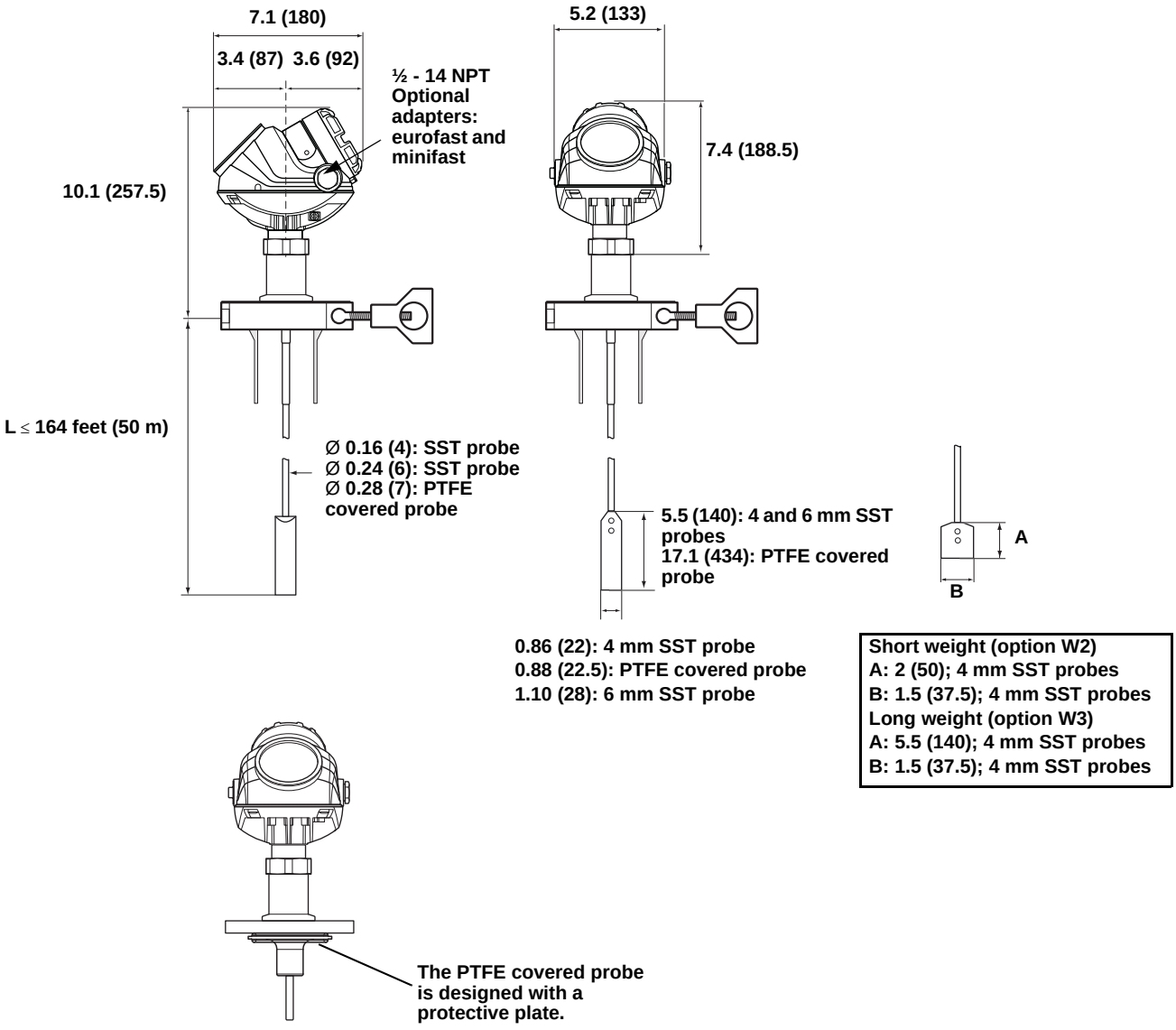


HTHP/HP/C Plate Design (Option for Alloy versions)



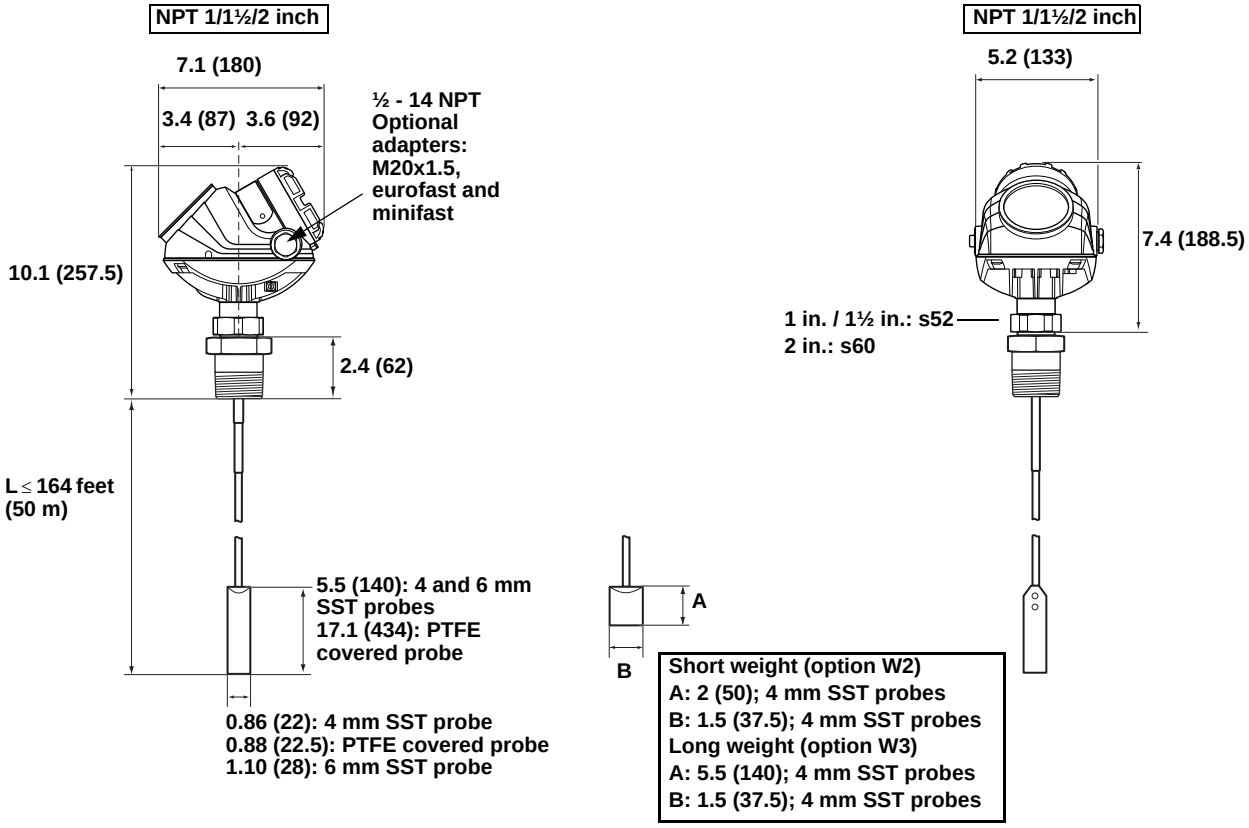
FLEXIBLE SINGLE LEAD PROBE WITH TRI-CLAMP CONNECTION

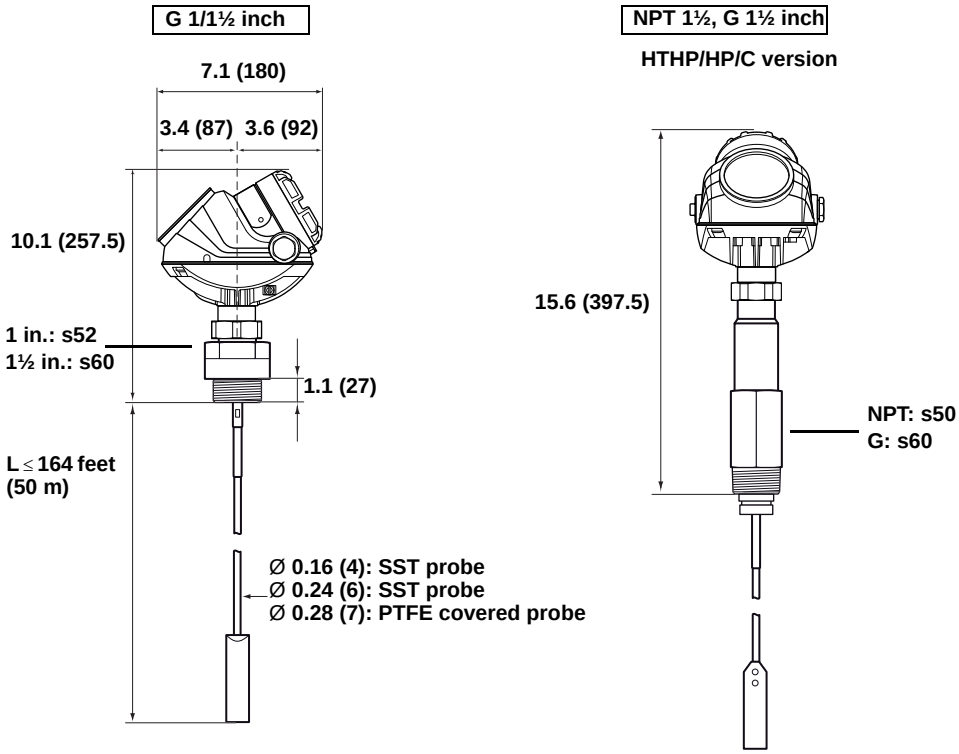
Dimensions are in inches (millimeters)



FLEXIBLE SINGLE LEAD PROBE WITH THREADED CONNECTION

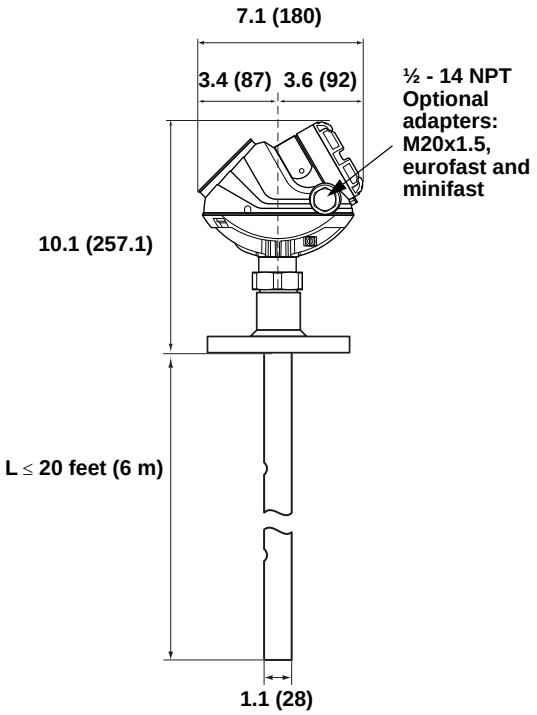
Dimensions are in inches (millimeters)

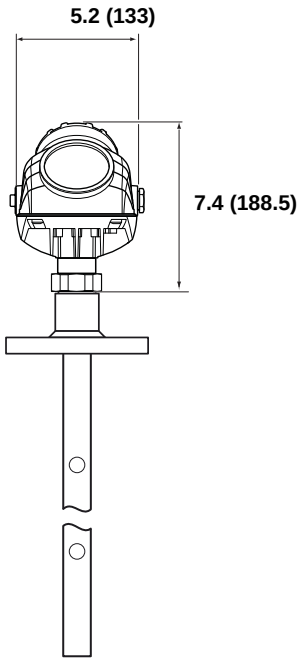


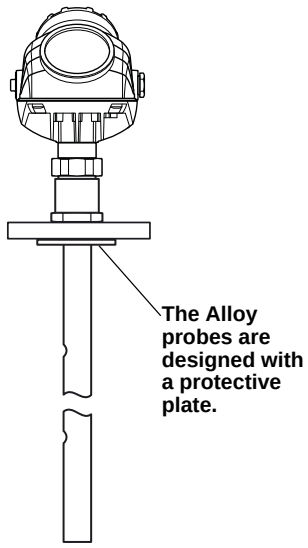


COAXIAL PROBE WITH FLANGE CONNECTION

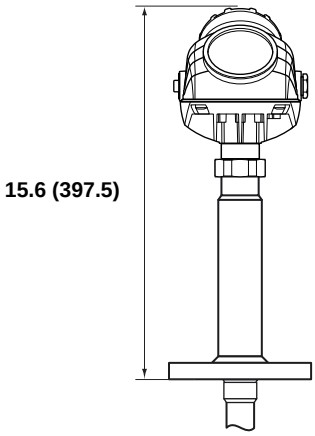
Dimensions are in inches
(millimeters)



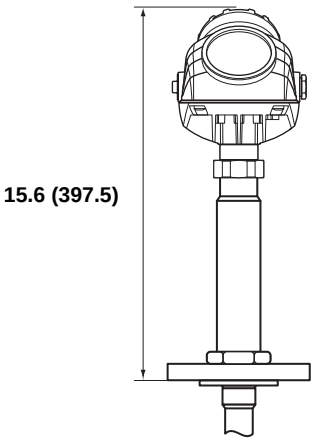




HTHP/HP/C version



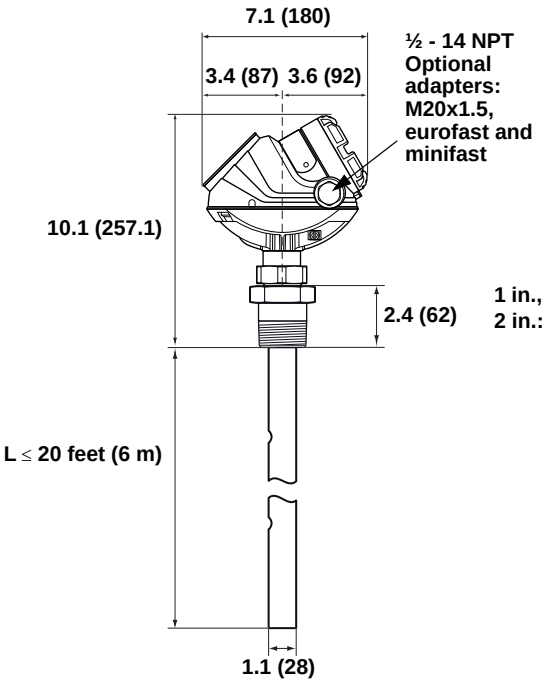
HTHP/HP Plate Design
(Option for Alloy versions)



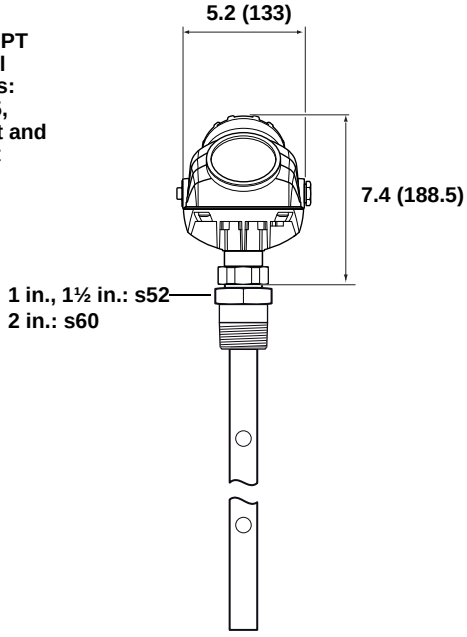
COAXIAL PROBE WITH THREADED CONNECTION

Dimensions are in inches
(millimeters)

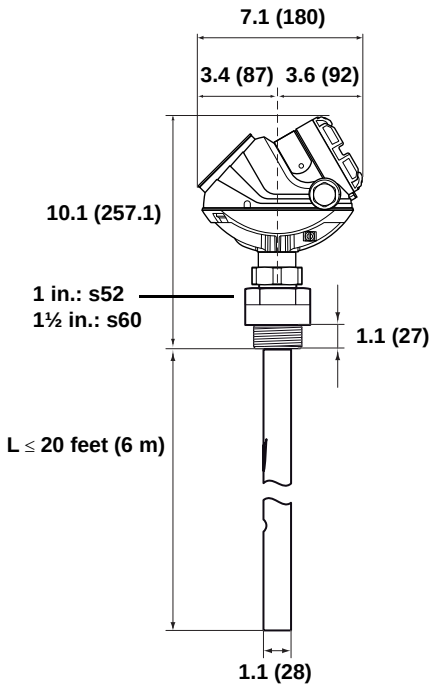
NPT 1/1½/2 inch



NPT 1/1½/2 inch

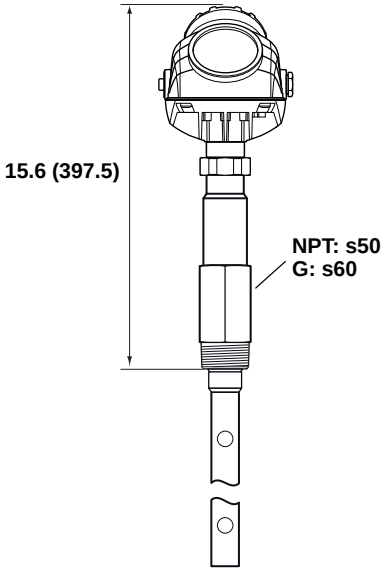


G 1/1½ inch



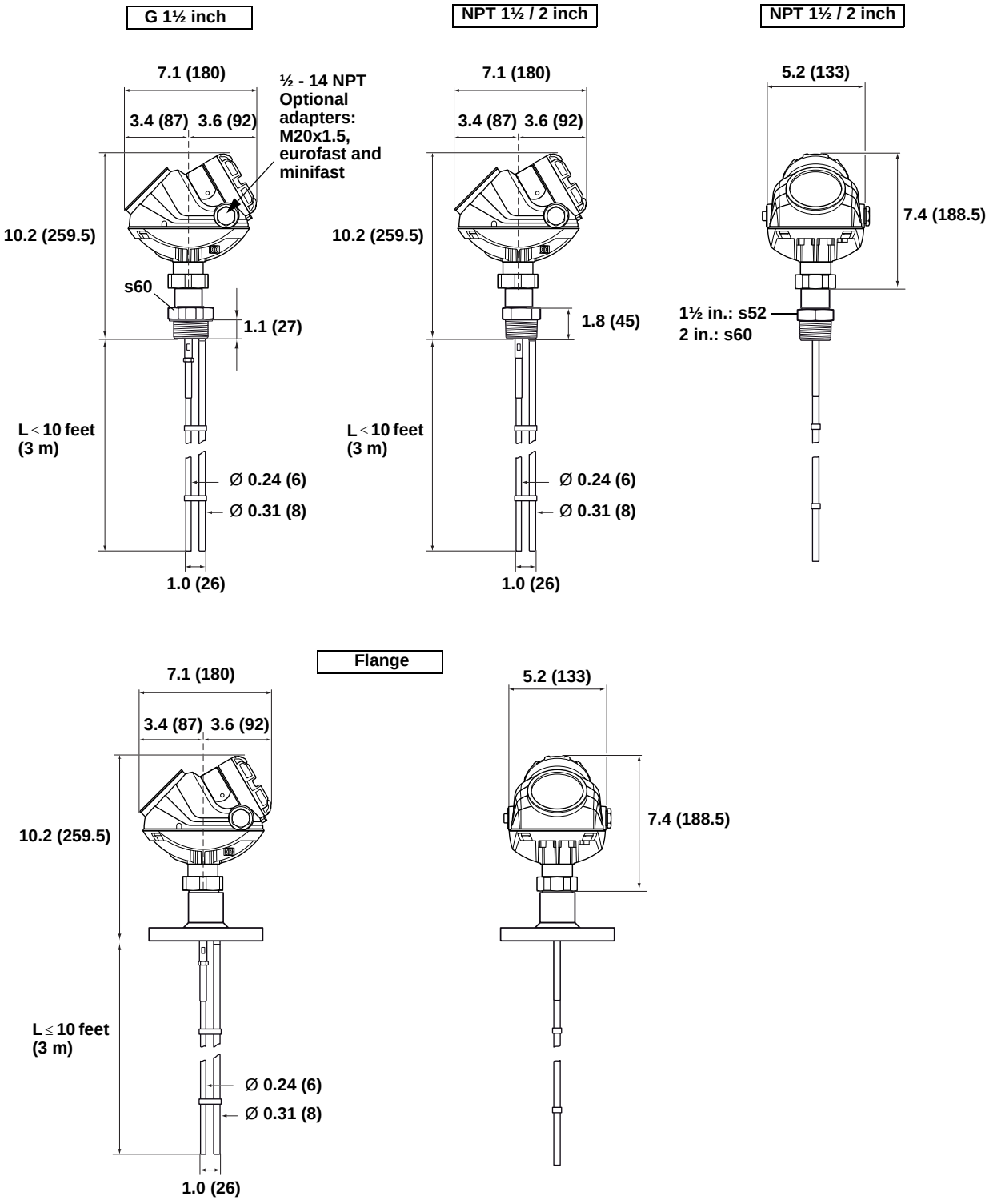
NPT 1½, G 1½ inch

HTHP/HP/C version



RIGID TWIN LEAD PROBE

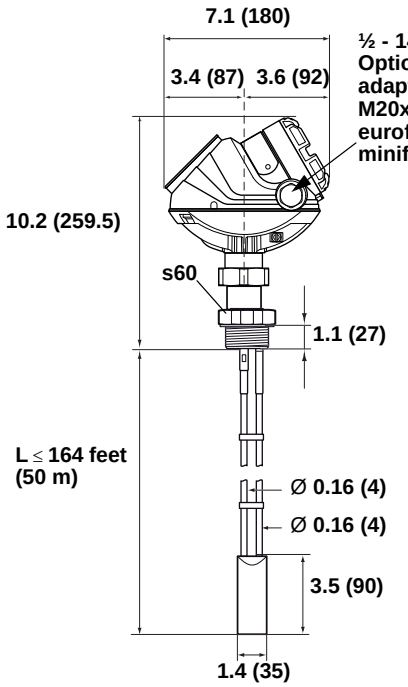
Dimensions are in inches
(millimeters)



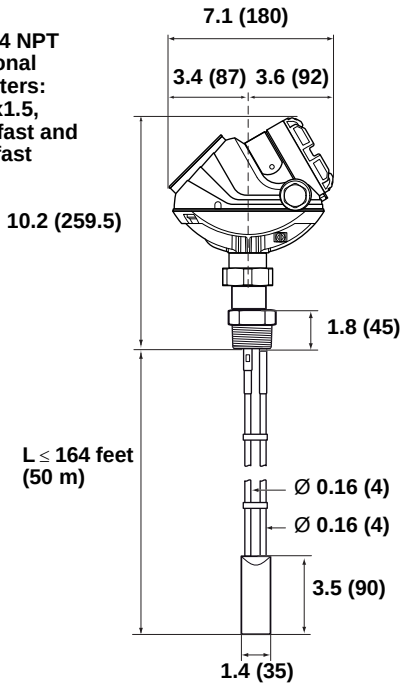
FLEXIBLE TWIN LEAD PROBE

Dimensions are in inches
(millimeters)

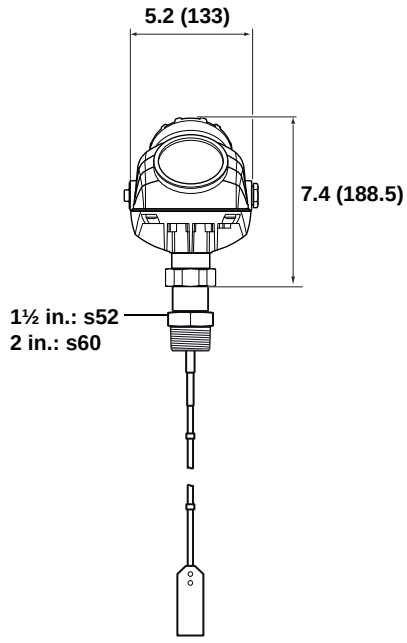
G 1½ inch



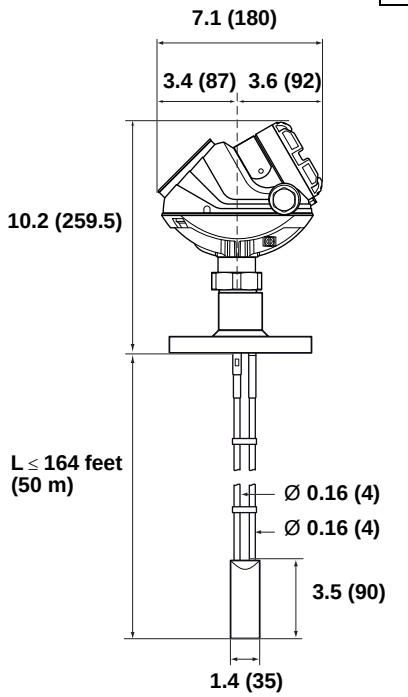
NPT 1½ / 2 inch

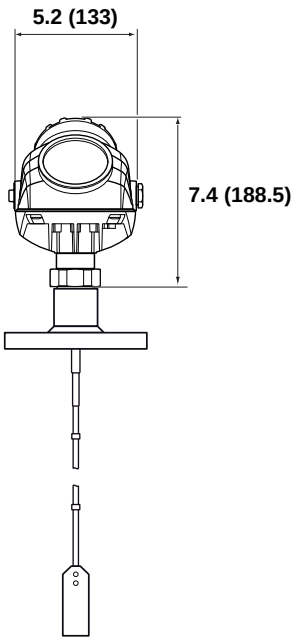


NPT 1½ / 2 inch



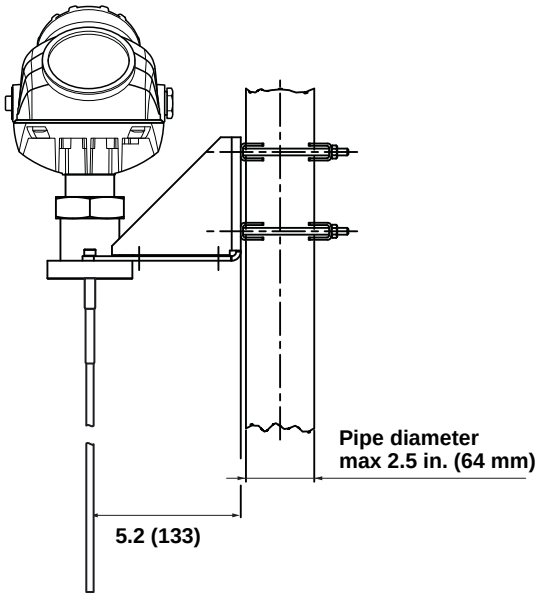
Flange



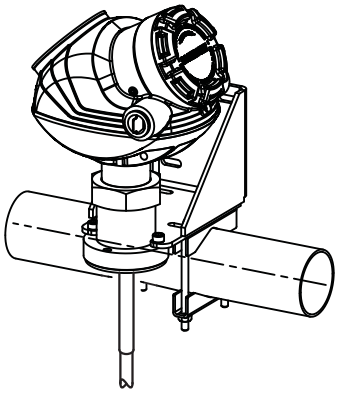


BRACKET MOUNTING

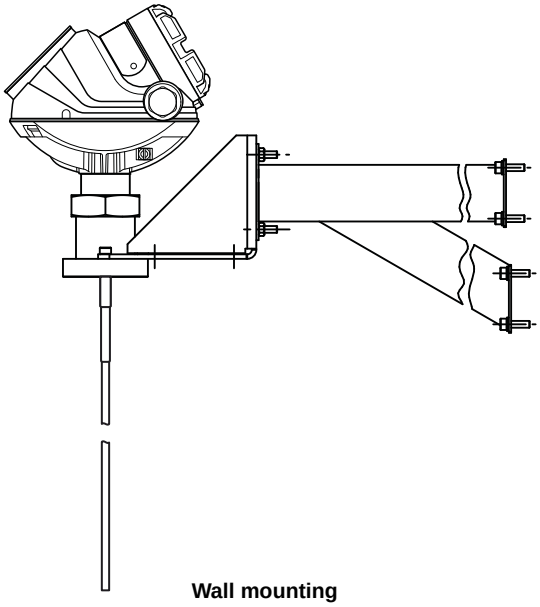
Dimensions are in inches
(millimeters)



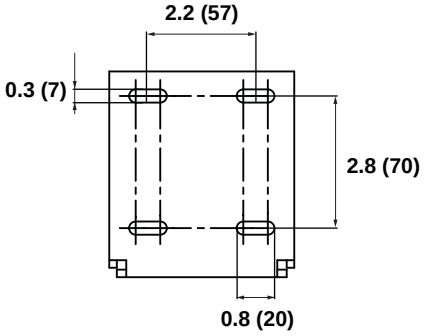
**Pipe mounting
(vertical pipe)**



**Pipe mounting
(horizontal pipe)**



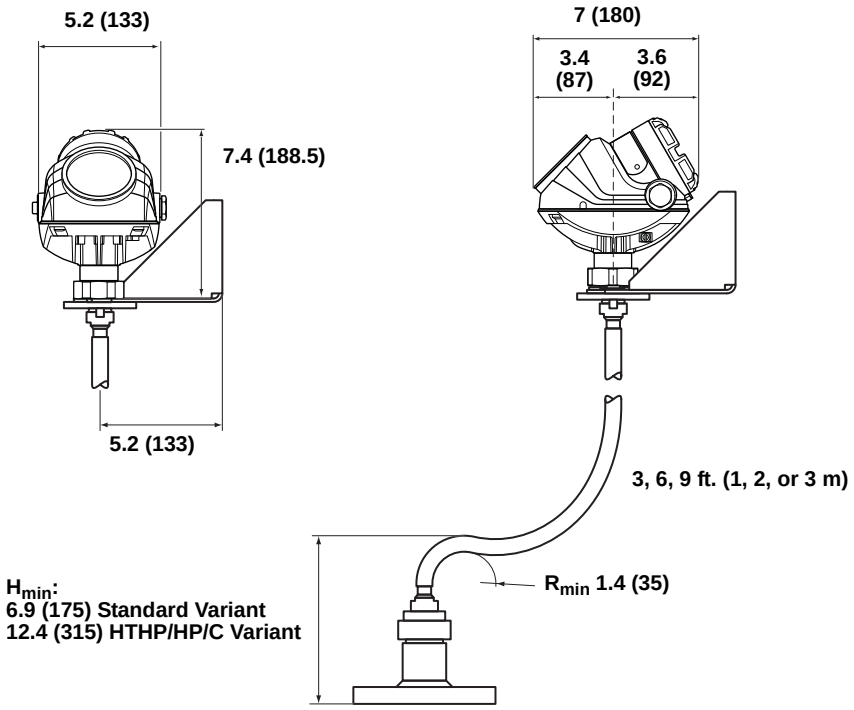
Wall mounting



**Hole pattern
wall mounting**

REMOTE HOUSING

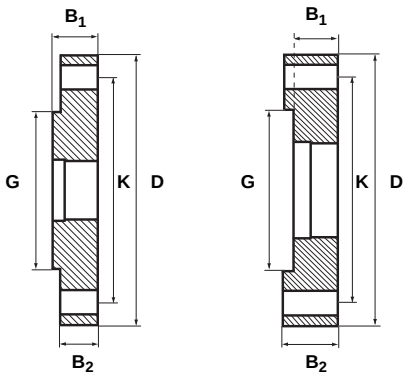
Dimensions are in inches
(millimeters)

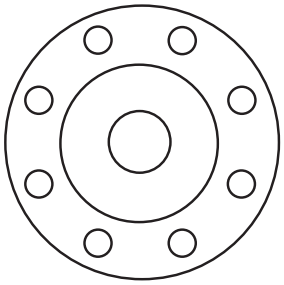


SPECIAL FLANGES AND FLUSHING CONNECTION RINGS

Dimensions are in inches (millimeters)

Raised Face **Recessed Face**





D: Outside diameter
B1: Flange thickness with gasket surface
B2: Flange thickness without gasket surface
F=B_1-B_2: Gasket surface thickness
G: Gasket surface diameter
 # Bolts: Number of Bolts
K: Bolt hole circle diameter

NOTE
Dimensions may be used to aid in the identification of installed flanges. It is not intended for manufacturing use.

Special Flanges[1]	D	B_1	B_2	F	G	# Bolts	K
Fisher 249B/259B[2]	9.00 (228.6)	1.50 (38.2)	1.25 (31.8)	0.25 (6.4)	5.23 (132.8)	8	7.25 (184.2)
Fisher 249C[3]	5.69 (144.5)	0.94 (23.8)	1.13 (28.6)	-0.19 (-4.8)	3.37 (85.7)	8	4.75 (120.65)
Masoneilan[2]	7.51 (191.0)	1.54 (39.0)	1.30 (33.0)	0.24 (6.0)	4.02 (102.0)	8	5.87 (149.0)

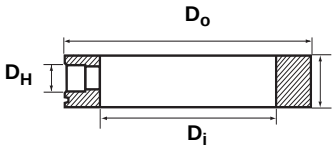
(1) These flanges are also available in a vented version.
(2) Flange with raised face.
(3) Flange with recessed face.

Masoneilan and Fisher flanges are also available in vented versions (see "Vented Flanges" on page 143), with the same dimensions as shown in the table above.

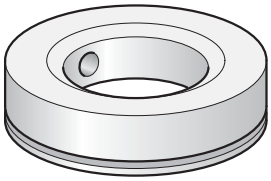
Vented flanges must be ordered with a 1 ½ in. NPT threaded process connection (code RA).

For information about flange temperature and pressure ratings, see page 150.

Flushing Connection Ring



Height: 0.97 in. (24.6 mm)



Flushing Connection Rings	D_i	D_o	D_H
2 in. ANSI	2.12 (53.8)	3.62 (91.9)	¼ in. NPT
3 in. ANSI	3.60 (91.4)	5.00 (127.0)	¼ in. NPT
4 in. ANSI	3.60 (91.4)	6.20 (157.5)	¼ in. NPT
DN50	2.40 (61.0)	4.00 (102.0)	¼ in. NPT
DN80	3.60 (91.4)	5.43 (138.0)	¼ in. NPT

Pressure and temperature rating for flushing ring up to Class 2500.

Rosemount Level Solutions

Emerson provides a complete range of Rosemount products for level measurement applications.

Vibrating Fork Switches – Point Level Detection

For high and low alarms, overfill protection, pump control, including wide pressure and temperature requirements, and hygienic applications. Flexible mounting. Immune to changing process conditions and suitable for most liquids.
The product line consists of:

- Rosemount 2160 Wireless
- Rosemount 2130 Enhanced
- Rosemount 2120 Full-featured
- Rosemount 2110 Compact

Differential Pressure – Level or Interface Measurement

Flexible mounting for liquid tank levels, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by: vapor space changes, surface conditions, foam, corrosive fluids, internal tank equipment. Optimize performance with direct mount, Tuned-System Assemblies:

- Rosemount DP Level Transmitters and Remote Seals
- Rosemount 3051S_L, 3051L, and 2051L Liquid Level Transmitters

Ultrasonic – Level Measurement

Top mounted, non-contacting for simple tank and open air level measurements. Unaffected by fluid properties such as: density, viscosity, dirty coating, and corrosiveness. Appropriate for routine applications outside of explosion proof areas.
The product line consists of:

- Rosemount 3100 Series Ultrasonic Process Level Transmitters

Guided Wave Radar – Level and Interface Measurement

Top mounted, direct level and interface measurement of liquids or solids, including those with wide temperature and pressure requirements. Unaffected by changing process conditions. Good fit for small spaces and easy swap for older technologies.
The product line consists of:

- Rosemount 5300 Series – Accurate, superior performance transmitter in most applications including process vessels and control
- Rosemount 3300 Series – Versatile and easy-to-use transmitter in most liquid storage and monitoring applications

Non-contacting Radar – Level Measurement

Top mounted, direct level measurement for liquids or solids, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by changing process conditions. Good for dirty, coating, and corrosive applications.
The product line consists of:

- Rosemount 5400 Series – Accurate, superior performance 2-wire transmitters for most liquid level applications and process conditions
- Rosemount 5600 Series – 4-wire transmitters with maximum sensitivity and performance for solids, challenging reactors, rapid level changes and excessive process conditions

Chambers for Process Level Instrumentation

- Rosemount 9901 – High quality chambers for external mounting of level measurement and control instrumentation on process vessels

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Fax +65 6777 0947
Service Support Hotline: +65 6770 8711
Email: Enquiries@AP.EmersonProcess.com

EMERSON
Process Management

Guided Wave Radar Level and Interface Transmitter

- *Accurate, direct level measurement virtually unaffected by process conditions*
- *Minimized maintenance with no moving parts and no re-calibration required*
- *Fewer process penetrations and reduced installation costs with a MultiVariable™ level and interface transmitter*
- *Easy installation and commissioning through two-wire technology and user-friendly configuration*
- *Versatile and easy-to-use transmitter with field proven reliability*
- *High application flexibility with a wide range of process connections, probe styles, and accessories*



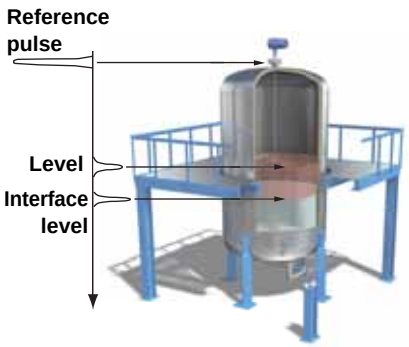
HART COMMUNICATION PROTOCOL · IEC WirelessHART · Modbus

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Proven, Reliable, and Easy to Use Guided Wave Radar



MEASUREMENT PRINCIPLE

Low power, nano-second microwave pulses are guided down a probe submerged in the process media. When a microwave pulse reaches a media with a different dielectric constant, part of the energy is reflected back to the transmitter.

The transmitter uses the residual wave of the first reflection for measuring the interface level. Part of the wave, which was not reflected at the upper product surface, continues until it is reflected at the lower product surface. The speed of this wave depends fully on the dielectric constant of the upper product.

The time difference between the transmitted and the reflected pulse is converted into a distance, and the total level or interface level is then calculated. The reflection intensity depends on the dielectric constant of the product. The higher the dielectric constant value, the stronger the reflection.



High application flexibility

GUIDED WAVE RADAR TECHNOLOGY BENEFITS

- No moving parts and no re-calibration minimizes maintenance
- Direct level measurement means no compensation needed for changing process conditions (i.e. density, conductivity, temperature, and pressure)
- Handles vapor and turbulence well
- Suitable for small tanks, difficult tank geometry, and interfering obstacles
- Allows for easy upgrade
- Top down installation minimizes risk for leakages

SPECIAL 3300 FEATURES

Proven High Reliability Increases Uptime

- First 2-wire level and interface transmitter with field proven reliability
- More than 50,000 units installed
- Field demonstrated Mean Time Between Failure over 170 years
- Advanced signal processing for reliable measurement
- Accurate level unaffected by changing process conditions

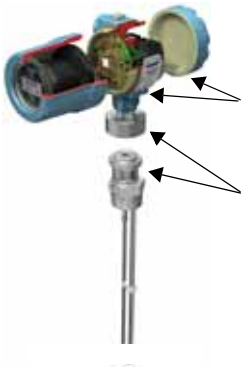


High Application Flexibility

- Suitable for most liquid storage and monitoring level and interface applications
- A wide selection of process connections and probe styles
- Remote mounting, mounting bracket, Smart Wireless THUM™ Adapter, HART® Tri-loop, and probe centering discs accessories
- External mounting using Rosemount 9901 high quality chambers accessories

Robust Design Reduces Costs And Increases Safety

- Leakage prevention and reliable performance under challenging conditions
- Detachable transmitter head allows tank to remain sealed
- Dual Compartment housing separates cable connections and electronics



Electronics and cable connections are located in separate compartments, providing safer handling and improved moisture protection

Modular design for reduced spare parts and easy replacement of the head without opening the tank

Easy Installation and Plant Integration

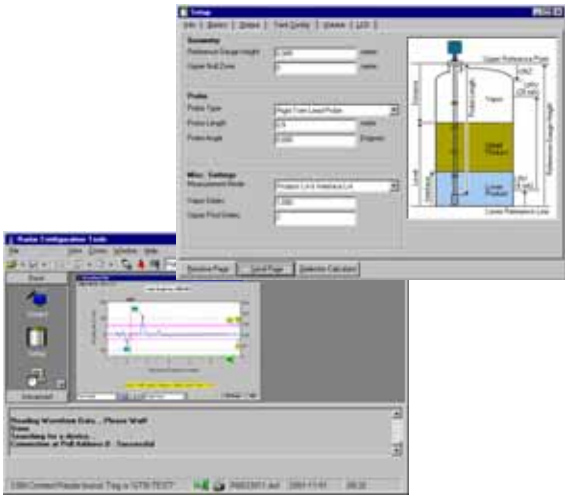
- Seamless system integration with HART, Modbus, or IEC 62591 (*Wireless*HART®) with the THUM adapter
- Allows for easy swap by matching existing tank connections
- Cut-to-fit probes
- Pre-configured or user-friendly configuration with wizard, autoconnect, dielectric calculator, and on-line help
- MultiVariable™ – measures simultaneously level and interface, resulting in fewer process penetrations and reduces installation and wiring cost



Smart Wireless THUM™ Adapter enables access to online configuration, multi-variable data, and diagnostics

Minimized Maintenance Reduces Cost

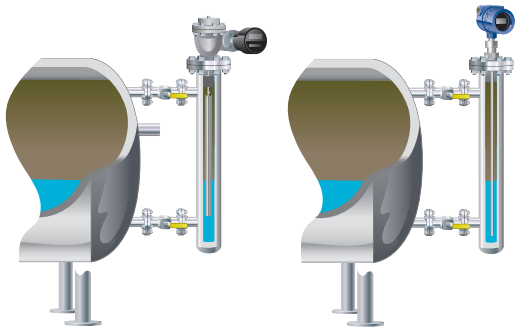
- No mechanical moving parts that require maintenance
- User-friendly software provides easy on-line troubleshooting with echo curve tool and logging
- Adjustments without opening tank
- No re-calibration or compensation needed due to changing process conditions



Radar Configuration Tool with installation wizard and waveform plot possibilities provides easy configuration and service

Easy Replacement Of Old Technology And Best Fit For Chambers

- Less need for maintenance reduces costs and improves measurement availability
- Reliable measurement, independent of density, turbulence, and vibrations
- Unaffected by the mechanical configuration of the chamber
- Wide range of options to find the best fit in existing chamber or a complete assembly with Rosemount 9901 high quality chambers



From this... → to this...in minutes

Rosemount 3301 and 3302
Level and/or Interface in Liquids



Rosemount 3301 and 3302 Guided Wave Radar Level transmitters are versatile and easy-to-use with field proven measurement capabilities. Characteristics include:

- High application flexibility with a wide range of probe styles, process connections, and materials
- HART 4-20 mA, Modbus, or IEC 62591 (*Wireless*HART) with the THUM adapter
- Radar Configuration Tool software package included for easy commissioning and troubleshooting

Additional Information

Specifications: page Level-190
Certifications: page Level-202
Dimensional Drawings: page Level-204

Table 1. 3301 and 3302 Level and/or Interface in Liquids Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description		
3301	Guided Wave Radar Level Transmitter (interface available for fully submerged probe)		
3302	Guided Wave Radar Level and Interface Transmitter		
Signal Output			
Standard			**Standard**
H	4-20 mA with HART® communication		★
M	RS-485 with Modbus communication(1)		★
Housing Material			
Standard			**Standard**
A	Polyurethane-covered Aluminum		★
S	Stainless Steel, Grade CF8M (ASTM A743)		★
Conduit / Cable Threads			
Standard			**Standard**
1	½–14 NPT		★
2	M20 x 1.5 adapter		★
Operating Temperature and Pressure(2)		**Probe Type**	
Standard			**Standard**
S	- 15 psig (-1bar) to 580 psig (40 bar) @ 302 °F (150 °C)	3301: All 3302: 1A, 2A, 3B, 4A, and 4B	★
Material of Construction(3): Process Connection / Probe		**Probe Type**	
Standard			**Standard**
1	316L SST (EN 1.4404)	3301: All 3302: 1A, 2A, 3B, 4A, and 4B	★
Expanded			
2	Alloy C-276 (UNS N10276). With plate design if flanged version.	3301: 3A, 3B, 4A 3302: 3B and 4A	
3	Alloy 400 (UNS N04400). With plate design if flanged version.	3301: 3A, 3B, 4A, 5A, 5B 3302: 3B and 4A	
7	PTFE covered probe and flange. With plate design.	3301: 4A and 5A, Flanged version 3302: 4A, Flanged version	
8	PTFE covered probe	3301: 4A and 5A 3302: 4A	

Table 1. 3301 and 3302 Level and/or Interface in Liquids Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Sealing, O-ring Material (Consult factory for other o-ring materials)				
Standard				**Standard**
V	Viton® fluoroelastomer			★
E	Ethylene Propylene			★
K	Kalrez® 6375 perfluoroelastomer			★
B	Buna-N			★
Probe Type, model 3301		**Process Connection**	**Probe Lengths**	
Standard				**Standard**
3B	Coaxial, perforated. For level and interface measurement, or easier cleaning.	Flange / 1 in., 1.5 in., 2 in. Thread	Min.: 1 ft. 4 in. (0.4 m). Max: 19 ft. 8 in. (6 m)	★
4B	Rigid Single Lead 0.5 in. (13 mm)(4)	Flange / 1 in., 1.5 in., 2 in. Thread / Tri-Clamp	Min.: 1 ft. 4 in. (0.4 m). Max: 19 ft. 8 in. (6.0 m)	★
5A	Flexible Single Lead with weight	Flange / 1 in., 1.5 in., 2 in. Thread / Tri-Clamp	Min.: 3 ft. 4 in. (1 m). Max: 77 ft. (23.5 m)	★
Expanded				
1A	Rigid Twin Lead	Flange / 1.5 in., 2 in. Thread	Min.: 1 ft. 4 in. (0.4 m). Max: 9 ft. 10 in. (3 m)	
2A	Flexible Twin Lead with weight	Flange / 1.5 in., 2 in. Thread	Min.: 3 ft. 4 in. (1 m). Max: 77 ft. (23.5 m)	
3A	Coaxial (for level measurement)	Flange / 1 in., 1.5 in., 2 in. Thread	Min.: 1 ft. 4 in. (0.4 m). Max: 19 ft. 8 in. (6 m)	
4A	Rigid Single Lead 0.3 in. (8 mm)	Flange / 1 in., 1.5 in., 2 in. Thread / Tri-Clamp	Min.: 1 ft. 4 in. (0.4 m). Max: 9 ft. 10 in. (3 m)	
5B	Flexible Single Lead with chuck	Flange / 1 in., 1.5 in., 2 in. Thread / Tri-Clamp	Min.: 3 ft. 4 in. (1 m). Max: 77 ft. (23.5 m)	
Probe Type, model 3302		**Process Connection**	**Probe Lengths**	
Standard				**Standard**
3B	Coaxial, perforated. For level and interface measurement, or easier cleaning.	Flange / 1 in., 1.5 in., 2 in. Thread	Min.: 1 ft. 4 in. (0.4 m). Max: 19 ft. 8 in. (6 m)	★
4B	Rigid Single Lead 0.5 in. (13 mm)(4)	Flange / 1 in., 1.5 in., 2 in. Thread / Tri-Clamp	Min.: 1 ft. 4 in. (0.4 m). Max: 19 ft. 8 in. (6.0 m)	★
Expanded				
1A	Rigid Twin Lead	Flange / 1.5 in., 2 in. Thread	Min.: 1 ft. 4 in. (0.4 m). Max: 9 ft. 10 in. (3 m)	
2A	Flexible Twin Lead with weight	Flange / 1.5 in., 2 in. Thread	Min.: 3 ft. 4 in. (1 m). Max: 77 ft. (23.5 m)	
4A	Rigid Single Lead 0.3 in. (8 mm)	Flange / 1 in., 1.5 in., 2 in. Thread / Tri-Clamp	Min.: 1 ft. 4 in. (0.4 m). Max: 9 ft. 10 in. (3 m)	
Probe Length Units				
Standard				**Standard**
E	English (feet, inch)			★
M	Metric (meters, centimeters)			★
Total Probe Length (5) (feet/m)				
Standard				**Standard**
xx	0 - 77 ft. or 0-23 m			★
Total Probe Length (5) (inch/cm)				
Standard				**Standard**
xx	0 - 11 in. or 0-99 cm			★

Table 1. 3301 and 3302 Level and/or Interface in Liquids Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Process Connection - Size / Type (consult factory for other process connections)			
ASME / ANSI Flanges[6] [7]			
Standard			**Standard**
AA	2 in., 150 lb		★
AB	2 in., 300 lb		★
BA	3 in., 150 lb		★
BB	3 in., 300 lb		★
CA	4 in., 150 lb		★
CB	4 in., 300 lb		★
Expanded			
DA	6 in., 150 lb		
EN (DIN) Flanges[6] [7]			
Standard			**Standard**
HB	DN50, PN40		★
IA	DN80, PN16		★
IB	DN80, PN40		★
JA	DN100, PN16		★
JB	DN100, PN40		★
Expanded			
KA	DN150, PN16		
JIS Flanges[6] [7]			
Standard			**Standard**
UA	50A, 10K		★
VA	80A, 10K		★
XA	100A, 10K		★
Expanded			
UB	50A, 20K		
VB	80A, 20K		
XB	100A, 20K		
YA	150A, 10K		
YB	150A, 20K		
ZA	200A, 10K		
ZB	200A, 20K		
Threaded Connections[6]		**Probe Type**	
Standard			**Standard**
RA	1 ½ in. NPT thread	3301: All 3302: 1A, 2A, 3B, 4A, and 4B	★
RC	2 in. NPT thread	3301: 1A, 2A, 3A, 3B, 4A, 4B, 5A, and 5B 3302: 1A, 2A, 3B, 4A, and 4B	★
Expanded			
RB	1 in. NPT thread	3301: 3A, 3B, 4A, 4B, 5A, and 5B 3302: 3B, 4A, and 4B	
SA	1 ½ in. BSP (G 1 ½ inch) thread	3301: All 3302: 1A, 2A, 3B, 4A, and 4B	
SB	1 in. BSP (G 1 inch) thread	3301: 3A, 3B, 4A, 4B, 5A, and 5B 3302: 3B, 4A, and 4B	

Table 1. 3301 and 3302 Level and/or Interface in Liquids Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Tri-Clamp Fittings[6]		**Probe Type**	
Expanded			
FT	1 ½ in. Tri-Clamp	3301: 4A, 4B, 5A, and 5B 3302: 4A, and 4B	
AT	2 in. Tri-Clamp	3301: 4A, 4B, 5A, and 5B 3302: 4A, and 4B	
BT	3 in. Tri-Clamp	3301: 4A, 4B, 5A, and 5B 3302: 4A, and 4B	
CT	4 in. Tri-Clamp	3301: 4A, 4B, 5A, and 5B 3302: 4A, and 4B	
Proprietary Flanges[8]			
Standard			**Standard**
TF	Fisher - proprietary 316L SST (for 249B cages) Torque Tube Flange		★
TT	Fisher - proprietary 316L SST (for 249C cages) Torque Tube Flange		★
TM	Masoneilan - proprietary 316L SST Torque Tube Flange		★
Hazardous Locations Certifications			
Standard			**Standard**
NA	No Hazardous Locations Certifications		★
E1	ATEX Flameproof[9]		★
E3	NEPSI Flameproof[9]		★
E4	TIIS Flameproof[9]		★
E5	FM Explosion-proof[9]		★
E6	CSA Explosion-proof[9]		★
E7	IECEx Flameproof[9]		★
I1	ATEX Intrinsic Safety		★
I3	NEPSI Intrinsic Safety		★
I5	FM Intrinsic Safety and Non-Incendive		★
I6	CSA Intrinsic Safety and Non-Incendive		★
I7	IECEx Intrinsic Safety		★
Expanded			
KA	ATEX and CSA Flameproof/Explosion-proof[9]		
KB	FM and CSA Explosion-proof[9]		
KC	ATEX and FM Flameproof/Explosion-proof[9]		
KD	ATEX and CSA Intrinsic Safety		
KE	FM and CSA Intrinsic Safety		
KF	ATEX and FM Intrinsic Safety		
Options			
Standard			**Standard**
M1	Integral digital display		★
P1	Hydrostatic testing[10]		★
N2	NACE material recommendation per MR-0175 [11], MR-0103		★
LS	Long stud[12] 9.8 in (250 mm) for flex. single lead probe to prevent contact with wall/nozzle. Standard height is 3.9 in (100 mm)		★
T0	Terminal block without transient protection		★
W3	2.2 lb (1 kg) weight for flexible single lead probe (5A). L=5.5 in. (140 mm). D=1.5 in. (37.5 mm)		★
Expanded			
BR	Mounting Bracket for 1.5 in. NPT Process Connection (RA)		
W2	Short weight for flexible single lead probes[13]. L=2 in. (50 mm). D=1.5 in. (37.5 mm)		

Table 1. 3301 and 3302 Level and/or Interface in Liquids Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Sx and Px - Centering Discs(14)		**Outer Diameter**	
Standard			**Standard**
S2	2 in. Centering disc(15)	1.8 in. (45 mm)	★
S3	3 in. Centering disc(15)	2.7 in. (68 mm)	★
S4	4 in. Centering disc(15)	3.6 in. (92 mm)	★
P2	2 in. Centering disc PTFE(16)	1.8 in. (45 mm)	★
P3	3 in. Centering disc PTFE(16)	2.7 in. (68 mm)	★
P4	4 in. Centering disc PTFE(16)	3.6 in. (92 mm)	★
Expanded			
S6	6 in. Centering disc(15)	5.55 in. (141 mm)	
S8	8 in. Centering disc(15)	7.40 in. (188 mm)	
P6	6 in. Centering disc PTFE(16)	5.55 in. (141 mm)	
P8	8 in. Centering disc PTFE(16)	7.40 in. (188 mm)	
Remote Housing(17)			
Expanded			
B1	1m / 3.2 ft. Remote Housing Mounting Cable and Bracket		
B2	2m / 6.5 ft. Remote Housing Mounting Cable and Bracket		
B3	3m / 9.8 ft. Remote Housing Mounting Cable and Bracket		
Cx - Special Configuration (Software)			
Standard			**Standard**
C1	Factory configuration (CDS required with order)		★
C4	Namur alarm and saturation levels, high alarm		★
C5	Namur alarm and saturation levels, low alarm		★
C8	Low alarm (18) (standard Rosemount alarm and saturation levels)		★
Qx - Special Certs			
Standard			**Standard**
Q4	Calibration Data Certification		★
Q8	Material Traceability Certification per EN 10204 3.1(19)		★
U1	WHG Overfill Approval. Only available with HART 4-20 mA output (output code H)		★
Expanded			
QG	GOST Primary Verification Certificate		
Consolidate to Chamber			
Expanded			
XC	Consolidate to Chamber		

(1) Requires external 8-30 Vdc power supply.
(2) Process seal rating. Final rating depends on flange and O-ring selection.
(3) For other materials, consult the factory.
(4) Available in SST. Consult the factory for other materials.
(5) Probe weight included if applicable. Give the total probe length in feet and inches or meters and centimeters, depending on selected probe length unit. If tank height is unknown, please round up to an even length when ordering. Probes can be cut to exact length in field. Maximum allowable length is determined by process conditions.
(6) Available in material 316L and EN 1.4404. For other materials consult the factory.
(7) ASME/ANSI: Raised face type for SST flanges. EN: Type A flat face for SST flanges. JIS: Raised face type for SST flanges.
(8) Available in material 316L. For pressure and temperature rating, see page 193.
(9) Probes are intrinsically safe.
(10) Available for flanged connection.
(11) 3301: valid for probe type 3A, 3B, 4A, and 4B. 3302: valid for probe type 3B, 4A, and 4B.
(12) Not available with PTFE covered probes.
(13) Only for Material of Construction code 1 and Probe Type 5A.
(14) Valid for probe type 2A, 4A, and 5A.
(15) Material in accordance with selected material of construction for probe types 2A, 4A, 4B, and 5A.
(16) Available for all SST probes.
(17) Requires software version 10 or higher
(18) The standard alarm setting is high.
(19) Option available for pressure retaining wetted parts.

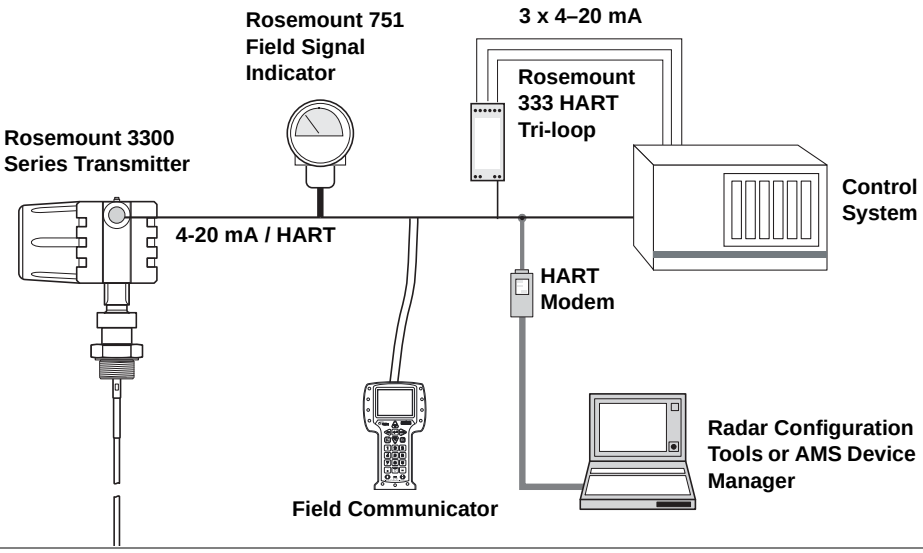
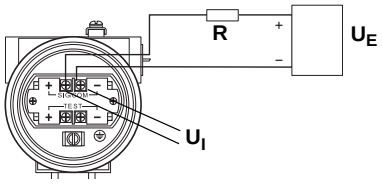
ACCESSORIES ROSEMOUNT 3301 AND 3302

Table 2. Accessories

Code	Process Connection - Size/Type (consult factory for other process connections)		
Centering discs[1] [2]		**Outer Diameter**	
Standard			**Standard**
03300-1655-0001	Kit, 2-in. Centering Disc, SST, Rigid Single	1.8 in. (45 mm)	★
03300-1655-0002	Kit, 3-in. Centering Disc, SST, Rigid Single	2.7 in. (68 mm)	★
03300-1655-0003	Kit, 4-in. Centering Disc, SST, Rigid Single	3.6 in. (92 mm)	★
03300-1655-0006	Kit, 2-in. Centering Disc, PTFE, Rigid Single	1.8 in. (45 mm)	★
03300-1655-0007	Kit, 3-in. Centering Disc, PTFE, Rigid Single	2.7 in. (68 mm)	★
03300-1655-0008	Kit, 4-in. Centering Disc, PTFE, Rigid Single	3.6 in. (92 mm)	★
03300-1655-1001	Kit, 2-in. Centering Disc, SST, Single / Twin Flex Lead	1.8 in. (45 mm)	★
03300-1655-1002	Kit, 3-in. Centering Disc, SST, Single / Twin Flex Lead	2.7 in. (68 mm)	★
03300-1655-1003	Kit, 4-in. Centering Disc, SST, Single / Twin Flex Lead	3.6 in. (92 mm)	★
03300-1655-1006	Kit, 2-in. Centering Disc, PTFE, Single / Twin Flex Lead	1.8 in. (45 mm)	★
03300-1655-1007	Kit, 3-in. Centering Disc, PTFE, Single / Twin Flex Lead	2.7 in. (68 mm)	★
03300-1655-1008	Kit, 4-in. Centering Disc, PTFE, Single / Twin Flex Lead	3.6 in. (92 mm)	★
Expanded			
03300-1655-0004	Kit, 6-in. Centering Disc, SST, Rigid Single	5.55 in. (141 mm)	
03300-1655-0005	Kit, 8-in. Centering Disc, SST, Rigid Single	7.40 in. (188 mm)	
03300-1655-0009	Kit, 6-in. Centering Disc, PTFE, Rigid Single	5.55 in. (141 mm)	
03300-1655-0010	Kit, 8-in. Centering Disc, PTFE, Rigid Single	7.40 in. (188 mm)	
03300-1655-1004	Kit, 6-in. Centering Disc, SST, Single / Twin Flex Lead	5.55 in. (141 mm)	
03300-1655-1005	Kit, 8-in. Centering Disc, SST, Single / Twin Flex Lead	7.40 in. (188 mm)	
03300-1655-1009	Kit, 6-in. Centering Disc, PTFE, Single / Twin Flex Lead	5.55 in. (141 mm)	
03300-1655-1010	Kit, 8-in. Centering Disc, PTFE, Single / Twin Flex Lead	7.40 in. (188 mm)	
Vented Flanges[3]			
Expanded			
03300-1812-9001	Fisher 249B/259B[4]		
03300-1812-9002	Fisher 249C[4]		
03300-1812-9003	Masoneilan[4]		
Other			
Standard			**Standard**
03300-7004-0001	Viator HART Modem and cables (RS232 connection)		★
03300-7004-0002	Viator HART Modem and cables (USB connection)		★

(1) If a centering disc is required for a flanged probe the centering disc can be ordered with options Sx or Px on page 188 in the model code. If a centering disc is required for a threaded connection or as a spare part it should be ordered using the item numbers listed below.
(2) To order a centering disc in a different material, consult the factory.
(3) 1½ in. NPT threaded connection (RA) is required.
(4) For pressure and temperature rating, see "Fisher & Masoneilan Flange Rating" on page 193.

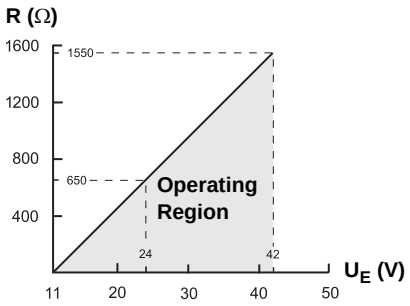
Functional Specification

General	
Field of Application	Liquids and semi-liquids level or liquid/liquid interfaces • Model 3301, for level or submerged probe interface measurement • Model 3302, for level and interface measurements
Measurement Principle	Time Domain Reflectometry (TDR). (See "Measurement Principle" on page 182 for a description of how it works)
Microwave Output Power	Nominal 50 μW, Max. 2 mW
Telecommunication (FCC and R&TTE)	FCC part 15 (1998) subpart B and R&TTE (EU directive 99/5/EC). The 3300 Series is considered to be an *unintentional radiator* under the Part 15 rules
Humidity	0 to 100% relative humidity
Start-up time	< 10 s
4–20 mA HART (Output Option Code H) – (See Ordering Information Table 1 on page 184)	
Output	Two-wire, 4–20 mA. Digital process variable is superimposed on 4–20 mA signal, and available to any host that conforms to the HART protocol (HART rev. 5). The HART signal can be used in a multidrop mode. 
HART Tri-loop	 By sending the digital HART signal to the optional HART Tri-loop, it is possible to have up to three additional 4–20 mA analog signals. See the Rosemount 333 HART Tri-loop Product Data Sheet (Document No. 00813-0100-4754) for additional information.
Smart Wireless THUM™ Adapter	 The optional THUM adapter can be mounted directly on the transmitter or by using a remote mounting kit. IEC 62591 (*Wireless*HART) enables access to multi-variable data and diagnostics, and adds wireless to almost any measurement point. See the Rosemount Smart Wireless THUM adapter Product Data Sheet (Document No. 00813-0100-4075) and Smart Wireless THUM Adapter for Rosemount Process Level Transmitter Applications (Document No. 00840-0100-4026).
External Power Supply	The input voltage (U_i) for HART is 11 to 42 Vdc (11 to 30 Vdc in IS applications, and 16 to 42 Vdc in Explosion-proof/Flameproof applications). When a Smart Wireless THUM adapter is fitted, it adds a maximum drop of 2.5 Vdc in the connected loop.  R = Load Resistance (Ω); U_E = External Power Supply Voltage (Vdc); and U_I = Input Voltage (Vdc)
IS Electrical Parameters	U_i = 30 V, I_i = 130 mA, P_i = 1 W, L_i = 0, C_i = 0
Signal on Alarm	Standard: Low = 3.75 mA. High = 21.75 mA; Namur NE43: Low = 3.6 mA. High = 22.5 mA
Saturation Levels	Standard: Low = 3.9 mA. High=20.8 mA; Namur NE43: Low = 3.8 mA. High = 20.5 mA

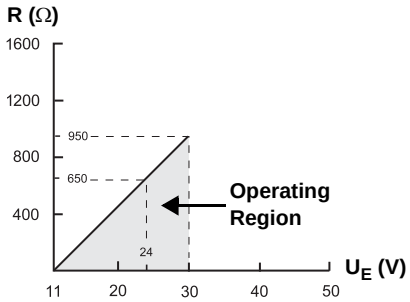
Load Limitations

Maximum load resistance is determined by the voltage level of the external power supply, as described by:

Non-Hazardous Installations

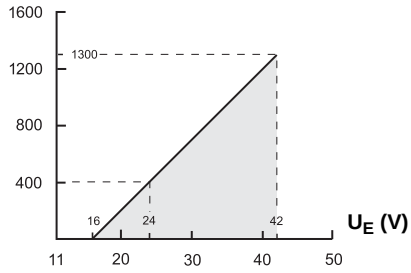


Intrinsically Safe Installations



U_E =External Power Supply Voltage; R (Ω) = Maximum Load Resistance

Explosion-proof/Flameproof (Ex d) Installations



NOTE
For the Ex d case, the diagram is only valid if the HART load resistance is at the + side, otherwise the load resistance value is limited to 300 Ω.

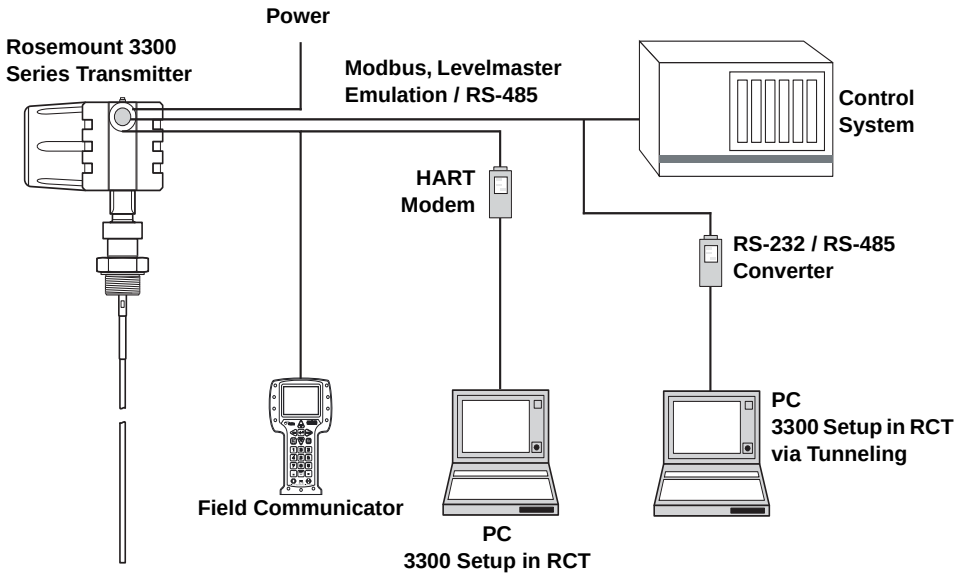
MODBUS (Output Option Code M) – (See Ordering Information Table 1 on page 184)

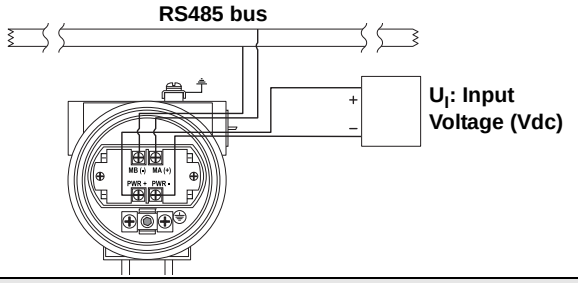
Output

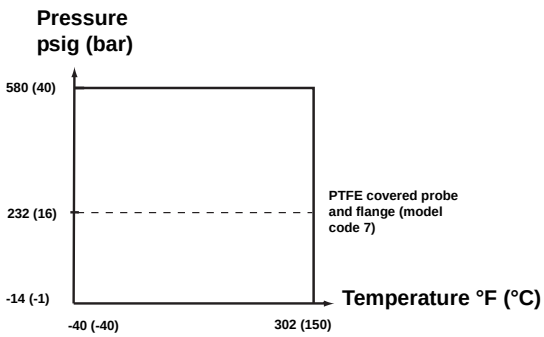
The RS-485 Modbus version communicates by Modbus RTU, Modbus ASCII, and Levelmaster protocols.

8 data bits, 1 start bit, 1 stop bit, and software selectable parity.
Baud Rate: 1200, 2400, 4800, 9600 (default), and 19200 bits/s.
Address Range: 1 to 255 (default device address is 246).

HART communication is used for configuration via the HART terminals or tunneling via the RS-485



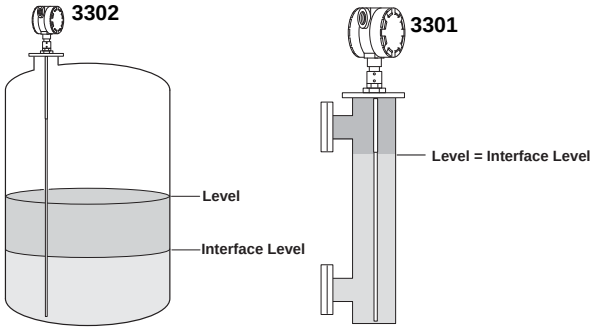
External Power Supply	The input voltage (U_I) for Modbus is 8 to 30 Vdc. Power consumption: < 0.5 W (with HART address=1) < 1.2 W (incl. four HART slaves) 
Display and Configuration	
Integral Display (Options Code M1)	The integral display toggles between the following variables: level, distance, volume, internal temperature, interface distance, interface level, peak amplitudes, interface thickness, percent of range, and analog current output
	Note: The Integral Display cannot be used to configure the transmitter
Remote Display	Data can be read remotely by using the four-digit Rosemount 751 Field Signal Indicator. For further information, see the Rosemount 751 Product Data Sheet (Document Number 00813-0100-4378)
Configuration Tools (See earlier “Output” diagrams)	Emerson Field Communicator (e.g. 375/475 Field Communicator), Radar Configuration Tools (RCT) software package for PC (included with delivery of transmitter), or Emerson AMS™ Device Manager for PC (visit www.emersonprocess.com/AMS for further information), or or DeltaV or any other DD (Device Description) compatible host systems
	Notes: • DTM (compliant with version 1.2 of the FDT/DTM specification) is also available supporting configuration in for instance Yokogawa Fieldmate/PRM, E+H™ FieldCare, and PactWare™ • To communicate using RCT or AMS Device Manager, a HART modem is required. The HART modem is available as an RS232 or USB version (see “Accessories Rosemount 3301 and 3302” on page 189) • The transmitter can be pre-configured by selecting Options code C1 (page 188) and sending a completed Configuration Data Sheet (CDS). The CDS is available from www.rosemount.com
Output Units	For Level, Interface, and Distance: ft, inch, m, cm, or mm For Volume: ft^3, $inch^3$, US gals, Imp gals, barrels, yd^3, m^3, or liters
Output Variables	**Model 3301:** Level, Distance (to product surface), Volume, Internal Temperature, and Peak Amplitudes. (For submerged probe interface measurements: Interface Level and Interface Distance) **Model 3302:** Level, Distance (to product surface), Volume, Interface Level, Interface Distance, Upper Product Thickness, Internal Temperature, and Peak Amplitudes
Damping	0 to 60 s (10 s is the default value)
Temperature Limits	
Ambient Temperature	The maximum and minimum ambient temperature for the electronics depends on the process temperature *and* on the approval (see “Product Certifications” on page 202). • The temperature range for the optional Integral Display is –40 °F (–40 °C) to 185 °F (85 °C) • To lower the temperature around the electronics, a Remote Mounting Connection can be used. The maximum temperature for the Remote Housing Connection at the vessel connection point is 302 °F (150 °C).
Storage Temperature	–40 to 176 °F (–40 to 80 °C)

Process Temperature and Pressure Rating	
Process Temperature	**Max. Rating, Standard Tank Connections**  Final rating depends on flange and O-ring selection. Table 3 on page 194 gives the temperature ranges for standard tank seals with different O-ring materials.
	Notes: • The maximum product temperature is at the lower part of the flange • The maximum temperature for the Remote Housing Connection at the vessel connection point is 302 °F(150 °C)
ASME / ANSI Flange Rating	316L SST Flanges according to ASME B16.5 Table 2-2.3. Max. 302 °F/580 psig (150 °C/40 bar)
EN Flange Rating	1.4404 according to EN 1092-1 material group 13E0. Max. 302 °F/580 psig (150 °C/40 bar)
Fisher & Masoneilan Flange Rating	316L SST Flanges according to ASME B16.5 Table 2-2.3. Max. 302 °F/580 psig (150 °C/40 bar)
JIS Flange Rating	316L SST Flanges according to JIS B2220 material group 2.3. Max. 302 °F/580 psig (150 °C/40 bar)
Tri-Clamps Rating	Maximum pressure is 16 bar for 1.5 in. (37.5 mm) and 2 in. (50 mm) housing; and 10 bar for 3 in. (75 mm) and 4 in. (100 mm) housing. The final rating depends on the clamp and gasket.
Plate Design	Certain models of flanged Alloy and PTFE covered probes have a tank connection design with a protective flange plate of the same material as the probe and with a backing flange in 316L / EN 1.4404. The protective flange plate prevents the backing flange from being exposed to the tank atmosphere For Alloy C-276 and Alloy 400, probes with flange plate design is available up to Class 300/PN 40. For PTFE, probes with flange plate design is available up to Class 150/PN 16
Flange Connection Rating	See Table 4 for the conditions used for flange strength calculations

Interface Measurements

Considerations

The Rosemount 3302 is a good choice for measuring the interface of oil and water, or other liquids with significant dielectric differences. It is also possible to measure interfaces with a Rosemount 3301 in applications where the probe is fully submerged in the liquid. If interface is to be measured, follow these criteria:



Interface Measurement with a Rosemount 3302 and a Rosemount 3301 (fully submerged probe)

- The dielectric constant of the upper product must be known and should not vary. The Radar Configuration Tools software has a built-in dielectric constant calculator to assist the user in determining the dielectric constant of the upper product
- The dielectric constant of the upper product must have a lower dielectric constant than the lower product to have a distinct reflection
- The difference between the dielectric constants for the two products must be larger than 10
- Max. dielectric constant for the upper product is 10 for the coaxial probe and 5 for twin lead probes
- The upper product thickness must be larger than 8 in. (0.2 m) for the flexible twin lead probe; 4 in. (0.1 m) for the rigid twin lead, and coaxial probes in order to distinguish the echoes of the two liquids
- Sometimes there is an emulsion layer (mix of the products) between the two products which can affect interface measurements. For guidelines on emulsion situations, consult your local Emerson Process Management representative

Table 3. Temperature ranges for standard tank seals with different O-ring materials

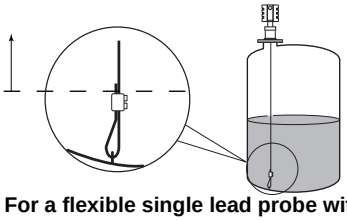
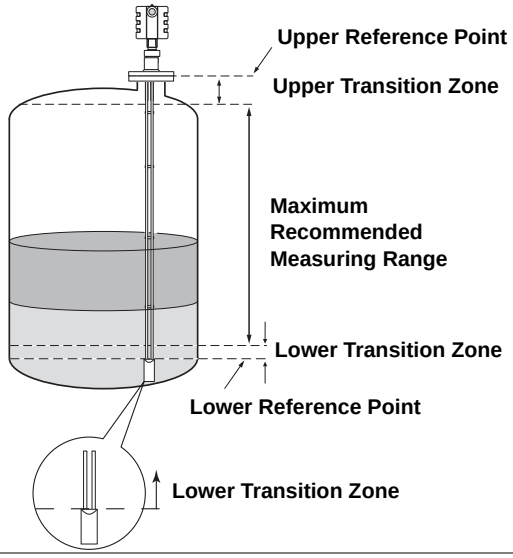
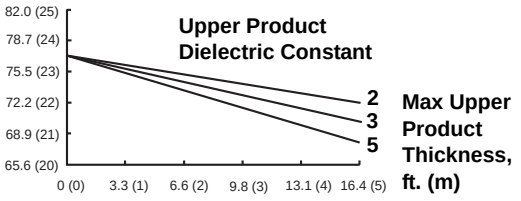
Tank seal with different O-ring material	Min. Temperature °F (°C) in air	Max. Temperature °F (°C) in air
Viton®	5 (-15)	302 (150)
Ethylene Propylene (EPDM)	-40 (-40)	266 (130)
Kalrez® 6375	14 (-10)	302 (150)
Buna-N	-31 (-35)	230 (110)

NOTE!
Always check the chemical compatibility of the o-ring material with your application.

Table 4. Conditions used for flange strength calculations

	Bolting material	Gasket	Flange material	Hub material
ASME / ANSI	SST SA193 B8M Class 2	Soft (1a) with min. thickness 1.6 mm	SST A182 Gr. F316L and EN 10222-5-1.4404	SST SA479M 316L and EN 10272-1.4404
EN, JIS	EN 1515-1/-2 group 13E0, A4-70	Soft (EN 1514-1) with min. thickness 1.6 mm		

Performance Specification

General	
Reference Conditions	Twin Lead probe, 77 °F (25 °C) water
Reference Accuracy	± 0.2 in. (5 mm) for probes ≤16.4 ft. (5 m) ± 0.1% of measured distance for rigid probes >16.4 ft. (5 m) ± 0.15% of measured distance for flexible probes >16.4 ft. (5 m)
Repeatability	± 0.04 in. (1 mm)
Ambient Temperature Effect	Less than 0.01% of measured distance per °C
Update Interval	1 per second
Measuring Range	
Transition Zones	These zones are areas where measurements are non-linear or have reduced accuracy. If measurements are desired at the very top of a tank, it is possible to mechanically extend the nozzle and use a coaxial probe. The upper transition zone is then moved into the extension. See Table 5 on page 196. **Lower Transition Zone**  **For a flexible single lead probe with chuck, the lower transition zone is measured upwards from the upper part of the clamp.** 
Measuring Range and Minimum Dielectric Constant	16 in. (0.4 m) to 77 ft. (23.5 m) See Table 6 on page 196 for each probe's measuring range and minimum dielectric constant. Due to the measuring range depending on the application and factors described below, the values are a guideline for clean liquids. For more information, ask your local Emerson Process Management representative. Different parameters (factors) affect the echo and therefore the maximum measuring range differs depending on application according to: • Disturbing objects close to the probe • Media with higher dielectric constants (ε_r) give better reflection and allow a longer measuring range • Surface foam and particles in the tank atmosphere may affect measuring performance • Heavy coating or contamination on the probe should be avoided since it can reduce measuring range and might cause erroneous level readings **Note:** See Table 7 on page 197 for the measuring range when using the Remote Housing
Interface Measuring Range	Target applications include interfaces between oil; oil-like and water; and water-like liquids with a low (<3) upper product dielectric constant and a high (>20) lower product dielectric constant. For such applications, the max measuring range is only limited by the length of the coaxial, rigid twin and rigid single lead probes. For the flexible twin lead probe, the maximum measuring range will be reduced depending on the maximum upper product thickness according to the diagram (inset, right). **Example:** If the Upper Product Dielectric Constant is 2, and the Upper Product Thickness is 5 ft. (1.5 m), the Maximum Measuring Range is 75.5 ft. (23 m). **Maximum Measuring Range, Flexible Twin Lead Probe, ft. (m)**  However, characteristics vary between different applications. For other product combinations, consult your local Emerson Process Management representative.

Environment	
Vibration Resistance	Polyurethane-covered aluminum housing: IEC 60770-1. SST housing: IACS E10
Electromagnetic Compatibility	Emission and Immunity: meets EN 61326-1 (2006) and amendment A1, class A equipment intended for use in industrial locations if installed in metallic vessels or still-pipes. When rigid/flexible single and twin lead probes are installed in non-metallic or open vessels, influence of strong electromagnetic fields might affect measurements
Built-in Lightning Protection	Meets EN 61000-4-4 Severity Level 4 and EN 61000-4-5 Severity Level 4
Coating (See Table 8 on page 197)	• Single lead probes are preferred when there is a risk for contamination (because coating can result in product bridging across the two leads for twin versions; between the inner lead and outer pipe for the coaxial probe) • PTFE probes are recommended for viscous or sticky applications. Periodic cleaning might be required • Maximum error due to coating is 1 to 10% depending on probe type, dielectric constant, coating thickness, and coating height above product surface
CE-mark	The 4–20 mA HART version (Output Option Code H) complies with applicable directives (EMC and ATEX)

Table 5. Transition Zones

	Dielectric Constant	Rigid Single Lead	Flexible Single Lead	Coaxial	Rigid Twin Lead	Flexible Twin Lead
Upper(1) Transition Zone	**80**	4 in. (10 cm)	5.9 in. (15 cm)	4 in. (10 cm)	4 in. (10 cm)	5.9 in. (15 cm)
	2	4 in. (10 cm)	20 in. (50 cm)	4 in. (10 cm)	4 in. (10 cm)	8 in. (20 cm)
Lower(2) Transition Zone	**80**	2 in. (5 cm)	2 in. (5 cm) (4) (3)	1.2 in. (3 cm)	2 in. (5 cm)	2 in. (5 cm (4))
	2	4 in. (10 cm) (5)	6.3 in. (16 cm) - long weight, short weight, and chuck(4) (5)	2 in. (5 cm)	2.8 in. (7 cm)	5.9 in. (15 cm)(4) (5)
	Note: The 4–20 mA set points are recommended to be configured between the transition zones, within the measuring range.					

(1) The distance from the upper reference point where measurements have reduced accuracy.
(2) The distance from the lower reference point where measurements have reduced accuracy.
(3) The measuring range for the PTFE covered Flexible Single Lead probe includes the weight when measuring on a high dielectric media.
(4) Note that the weight length or chuck fastening length adds to non-measurable area and is not included in the diagram. See "Dimensional Drawings" on page 204.
(5) When using a metallic centering disc, the lower transition zone is 8 in. (20 cm), including weight if applicable. When using a PTFE centering disc, the lower transition zone is not affected.

Table 6. Measuring Range and Minimum Dielectric Constant

Rigid Single Lead	Flexible Single Lead	Coaxial	Rigid Twin Lead	Flexible Twin Lead
Maximum Measuring Range				
9 ft 10 in. (3 m) for 8 mm probes (code 4A) 14 ft 9 in. (4.5 m) for 13 mm probes (code 4B)	77 ft 1 in. (23.5 m)	19 ft 8 in. (6 m)	9 ft 10 in. (3 m)	77 ft 1 in. (23.5 m)
Minimum Dielectric Constant				
2.5 (or 1.7 if installed in a metallic bypass or stilling well)(1)	2.5 up to 36 ft (11 m)(2) 5.0 up to 66 ft (20 m) 7.5 up to 77 ft 1 in. (23.5 m)	1.5	1.9	1.6 up to 33 ft (10 m) 2.0 up to 66 ft (20 m) 2.4 up to 77 ft 1 in. (23.5 m)

(1) May be lower depending on installation.
(2) In pipes with a diameter less than 8 in. (20 cm), the minimum Dielectric Constant is 2.0.

Table 7. Measuring Range When Using Remote Housing

Rigid Single Lead	Flexible Single Lead	Coaxial	Rigid Twin Lead	Flexible Twin Lead
Maximum Measuring Range				
9 ft. 10 in. (3 m) - for 8 mm probes 14 ft. 9 in. (4.5 m) - for 13 mm probes	77 ft. 1 in. (23.5 m)	19 ft. 8 in. (6 m)	9 ft. 10 in. (3 m)	77 ft. 1 in. (23.5 m)
Minimum Dielectric Constant with 1 m Remote Housing				
2.7 (2.0 if installed in a metallic bypass or stilling well)(1)	2.7 up to 36 ft. (11 m) 6 up to 66 ft. (20 m) 10 up to 72 ft. (22 m)	1.5	2.1	1.7 up to 33 ft. (10 m) 2.2 up to 66 ft. (20 m) 2.6 up to 72 ft. (22 m)
Maximum Measuring Range with 2 m Remote Housing				
3.3 (2.2 if installed in a metallic bypass or stilling well)(1)	3.2 up to 36 ft. (11 m) 8 up to 67 ft. (20.5 m)	1.6	2.5	1.8 up to 33 ft. (10 m) 2.4 up to 67 ft. (20.5 m)
Maximum Measuring Range with 3 m Remote Housing				
3.8 (2.5 if installed in a metallic bypass or stilling well)(1)	3.7 up to 36 ft. (11 m) 11 up to 62 ft. (19 m)	1.7	2.8	2.0 up to 33 ft. (10 m) 2.7 up to 62 ft. (19 m)

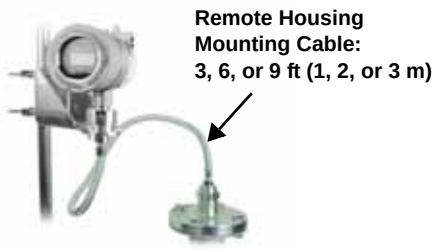
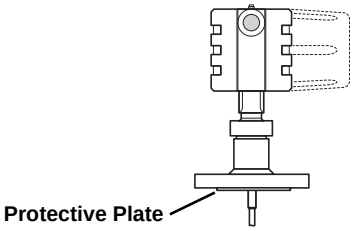
(1) May be lower depending on installation.

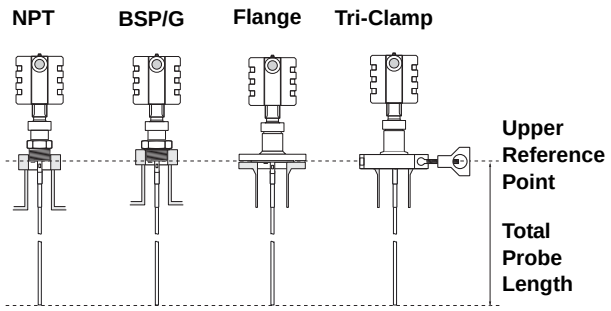
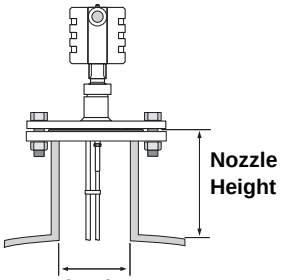
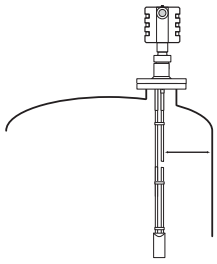
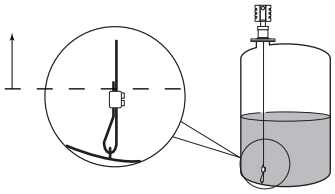
Table 8. Maximum recommended Viscosity and Coating / Build-up

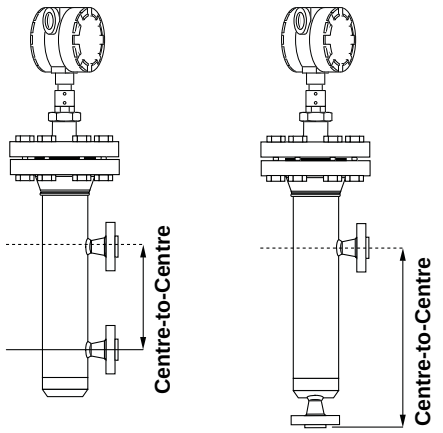
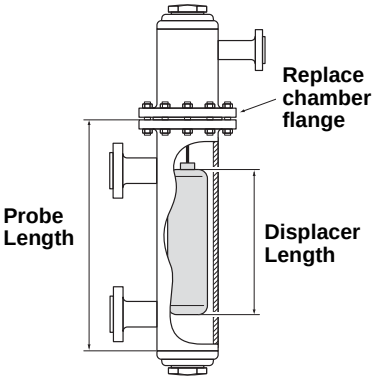
Coaxial	Twin Lead	Single Lead
Maximum Viscosity		
500 cP	1500 cP	8000 cP (1)
Coating / Build-up		
Coating not recommended	Thin coating allowed, but no bridging	Coating allowed

(1) Consult your local Emerson Process Management representative in the case of agitation/turbulence and high viscous products.

Physical Specification

Housing and Enclosure	
Type	Dual compartment (removable without opening the tank). Electronics and cabling are separated. Two entries for conduit or cable connections. The transmitter housing can be rotated in any direction.
Electrical Connection	½ - 14 NPT for cable glands or conduit entries. Optional: M20 x 1.5 conduit/cable adapter or PG 13.5 conduit/cable adapter. Recommended output cabling is twisted shielded pairs, 18-12 AWG.
Housing Material	Polyurethane-covered Aluminium or SST Grade CF8M (ASTM A743)
Ingress Protection	NEMA 4X, IP 66, IP 67
Factory Sealed	Yes
Weight	Transmitter Head (TH): 5.5 lb (2.5 kg) in Aluminum, 11 lb (5 kg) in SST
Remote Housing Mounting	Kit that includes a flexible armored extension cable and a bracket for wall or pipe mounting. See Figure Level-7 on page 210 for the dimensions. 
Tank Connection and Probe	
Tank Connection	The tank connection consists of a tank seal, a flange, Tri-Clamp, or NPT or BSP/G threads. Certain models of flanged Alloy and PTFE covered probes have a tank connection design with a protective flange plate of the same material as the probe and with a backing flange in 316L / EN 1.4404. The protective flange plate prevents the backing flange from being exposed to the tank atmosphere. See “Dimensional Drawings” on page 204.  **Tank Seal with Plate Design**
Flange Dimensions	Follows ASME B 16.5, JIS B2220, and EN 1092-1 standards for blind flanges. For Proprietary Fisher® and Masoneilan® flanges, see “Proprietary Flanges” on page 210
Vented Flanges	Available with Masoneilan and Fisher vented flanges. Vented flanges must be ordered as accessories with a 1½-in. NPT threaded process connection (code RA); see Table 2 on page 189. As an alternative to a vented flange, it is possible to use a flushing connection ring on top of the standard nozzle.
Probe Versions	Coaxial, Rigid Twin and Rigid Single Lead, Flexible Twin and Flexible Single Lead.
	For guidelines on which probe to select depending on application, see the Technical Note Guided Wave Radar Application Guidelines (Document No. 00840-2600-4811)
	For interface measurements Rigid Single probe is the best choice for chamber mounting. The Twin or Coaxial probe is the preferred choice for clean, low dielectric constant liquids
Material Exposed To Tank Atmosphere	• Material model code 1: 316L SST (EN 1.4404), PTFE, PFA, and O-ring materials • Material model code 2: Alloy C-276 (UNS N10276), PTFE, PFA, and O-ring materials • Material model code 3: Alloy 400 (UNS N04400), PTFE, PFA, and O-ring materials • Material model code 7: PTFE • Material model code 8: PTFE, 316 L SST (EN 1.4404), and O-ring materials
Pressure Equipment Directive (PED)	Complies with 97/23/EC article 3.3

Total Probe Length	This is defined from the upper reference point to the end of the probe (weight included, if applicable).  Select the probe length according to the required measuring range (the probe must be hung and fully extended through the entire distance where level readings are desired).
Cut-to-fit probes	Most of the probes can be cut in field. However, there are some restrictions for the standard coaxial probes: these can be cut up to 2 ft. (0.6 m). Probes shorter than 4.1 ft. (1.25 m) can be cut to the minimum length of 1.3 ft. (0.4 m). The PTFE covered probes cannot be cut in the field.
Minimum and Maximum Probe Length	Coaxial: 1.3 ft (0.4 m) to 19.7 ft (6 m). Rigid Twin Lead: 1.3 ft (0.4 m) to 9.8 ft (3 m). Flexible Twin Lead: 3.3 ft (1 m) to 77.1 ft (23.5 m). Rigid Single Lead (0.3 in./8 mm): 1.3 ft (0.4 m) to 9.8 ft (3 m) Rigid Single Lead (0.5 in./13 mm): 1.3 ft (0.4 m) to 19.7 ft (6.0 m) Flexible Single Lead: 3.3 ft (1 m) to 77.1 ft (23.5 m)
Probe Angle	0 to 90 degrees from vertical axis
Tensile Strength	Flexible Single Lead probe: 2698 lb (12 kN). Flexible Twin Lead probe: 2023 lb (9 kN)
Collapse Load	Flexible Single Lead probe: 3597 lb (16 kN)
Sideway Capacity	Coaxial probe: 73.7 ft. lbf, 3.7 lb at 19.7 ft. (100 Nm, 1.67 kg at 6 m) Rigid Twin Lead: 2.2 ft. lbf, 0.22 lb at 9.8 ft. (3 Nm, 0.1 kg at 3 m) Rigid Single Lead: 4.4 ft. lbf, 0.44 lb at 9.8 ft. (6 Nm, 0.2 kg at 3 m)
Maximum Recommended Nozzle Height	4 in. (10 cm) + nozzle diameter For coaxial probes, there are no restrictions
Minimum Clearance (See Table 9 on page 201)	  **Clearance to tank wall**
Other Mechanical Considerations	To get best possible performance, the following must be considered before installing the transmitter: • Inlets should be kept at a distance in order to avoid product filling on the probe • Avoid physical contact between probes and agitators, as well as applications with strong fluid movement unless the probe is anchored • Probe tie-down is recommended if the probe can move to within 1 ft. (30 cm) of any object during operations • In order to stabilize the probe for side forces, it is possible to fix or guide the probe to the tank bottom • For optimal single lead probe performance in non-metallic vessels, the probe must either be mounted with a 2-in. / DN 50 or larger metallic flange, or a metal sheet with an 8-in. diameter (200 mm) or larger must be used (see the Reference Manual for placement)  **Flexible single lead probe with chuck. See the Reference Manual for more anchoring options.**
	See the Reference Manual (Document No. 00809-0100-4811) for more mechanical installation information

Weight	Flange: depends on flange size Coaxial probe: 0.67 lb/ft. (1 kg/m) Rigid Single Lead probe (0.3 in./8 mm): 0.27 lb/ft. (0.4 kg/m) Rigid Single Lead probe (0.5 in./13 mm): 0.71 lb/ft. (1.06 kg/m) Rigid Twin Lead probe: 0.40 lb/ft. (0.6 kg/m) Flexible Single Lead probe: 0.05 lb/ft. (0.07 kg/m) Flexible Twin Lead probe: 0.09 lb/ft. (0.14 kg/m) End weight: 0.88 lb (0.40 kg) for single probes, 1.3 lb (0.60 kg) for twin probes
Chamber / Pipe Installations	
Rosemount 9901 Chamber	Rosemount 9901 allows external mounting of process level instrumentation. It supports a variety of process connections, and optional drain and vent connections. The Rosemount 9901 chamber is designed to the ASME B31.3 standard, and is Pressure Equipment Directive (PED) compliant. Use option code XC to order together with the 3300 Series transmitters. The probe length to use for a Rosemount 9901 chamber can be calculated with this formula: **Side-and-Side dimension:** Probe length=Centre-to-Centre dimension+19 in. (48 cm) **Side-and-Bottom dimension:** Probe length=Centre-to-Centre dimension+4 in. (10 cm) Use a centering disc the same diameter as the chamber if the probe length >3.3 ft. (1 m). See “Probe Type in Chamber Considerations” on page 200 and “Centering Discs” on page 201 for which probe and disc to use. **Side-and-Side dimension** **Side-and-Bottom dimension** 
	For additional information, see the Rosemount 9901 Chamber for Process Level Instrumentation Product Data Sheet (Document Number 00813-0100-4601)
Existing Chamber	A Rosemount 3300 Series transmitter is the perfect replacement in an existing displacer chamber. Proprietary flanges are offered, enabling use of existing chambers to make installation easy. **Considerations when changing to 3300:** The 3300 series flange choice and probe length must be correctly matched to the chamber. Both standard ANSI and EN (DIN), as well as proprietary chamber flanges, are available. See “Proprietary Flanges” on page 210 to identify the proprietary flanges. See “Probe Type in Chamber Considerations” on page 200 and “Centering Discs” on page 201 for which probe and disc to use. See Table 10 on page 201 for guidelines on the required probe length. 
	For additional information, see the Replacing Displacers with Guided Wave Radar Technical Note (Document Number 00840-2200-4811)
Probe Type in Chamber Considerations	When installing a Rosemount 3300 in a chamber, the single lead probe is recommended.
	The recommended minimum chamber diameter is 4 in. (100 mm) for Single Flexible probe and 3 in. (75 mm) for the Single Rigid probe. The probe should be centered to prevent it touching the sides of the well.
	The probe length determines if a Single Rigid or Single Flexible probe should be used: • Less than 19.7 ft. (6.0 m): Rigid Single Probe is recommended. Use a centering disc for probe > 3.3 ft. (1 m). If installation requires less head-space, use a Flexible Single Probe with a weight and centering disc. • More than 19.7 ft. (6.0 m): Use Flexible Single Probe with a weight and centering disc.
	A short weight is available for the single flexible SST probe. It is used for measuring close to the probe end and shall be used where the measuring range must be maximized. The height is 2 in. (50 mm) and the diameter is 1.5 in. (37.5 mm). The option code is W2. If a heavier weight is needed, option code W3 can be used (height is 5.5 in. (140 mm) and the diameter is 1.5 in. (37.5 mm).

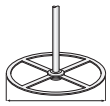
Centering Discs	To prevent the probe from contacting the chamber or pipe wall, centering discs are available for rigid single, flexible single, and flexible twin lead probes. The disc is attached to the end of the probe. Discs are made of stainless steel, Alloy C-276, Alloy 400, or PTFE. See Table 11 for Dimension D. Table 12 shows which centering disc diameter to choose for a particular pipe.  **D**

Table 9. Minimum Clearance

	Coaxial	Rigid Twin Lead	Flexible Twin Lead	Rigid Single Lead	Flexible Single Lead
Recommended nozzle diameter	Enough space to fit the probe(1)	4 in. (10 cm) or more	4 in. (10 cm) or more	6 in. (15 cm) or more	6 in. (15 cm) or more
Min. nozzle diameter(2)	Enough space to fit the probe(1)	2 in. (5 cm)	2 in. (5 cm)	2 in. (5 cm)	2 in. (5 cm)
Min. clearance to tank wall or obstruction(3)	0 in. (0 cm)	4 in. (10 cm)	4 in. (10 cm)	4 in. (10 cm) if smooth metallic wall. 12 in. (30 cm) if disturbing objects, rugged metallic or concrete/plastic wall.	4 in. (10 cm) if smooth metallic wall. 12 in. (30 cm) if disturbing objects, rugged metallic or concrete/plastic wall.
Min. pipe / bypass diameter	1.5 in. (3.8 cm)	2 in. (5 cm) (4)	Consult your local Emerson Process Management representative.	2 in. (5 cm) (5)	Consult your local Emerson Process Management representative.

(1) Probe diameter is 1.1 in. (28 mm) for standard probe.
(2) Requires special configuration and setting of Upper Null Zone.
(3) Minimum clearance from tank bottom for the coaxial and rigid single probes is 0.2 in. (5 mm).
(4) The center-most lead must be at least 0.6 in. (15 mm) away from the pipe/bypass wall.
(5) The probe must be centered in the pipe/bypass. A centering disc (see "Centering Discs" on page 201 and "Rosemount 3301 and 3302 Level and/or Interface in Liquids" on page 184) can be used to prevent the probe from contacting the chamber wall.

Table 10. Required probe length in chambers

Chamber Manufacturer	Probe Length(1)
Major torque-tube manufacture (249B, 249C, 2449K, 249N, 259B)	Displacer+9 in. (229 mm)
Masoneilan (Torque tube operated), proprietary flange	Displacer+8 in. (203 mm)
Other - torque tube(2)	Displacer+8 in. (203 mm)
Magnetrol (spring operated)(3)	Displacer+between 7.8 in. (195 mm) to 15 in. (383 mm)
Others - spring operated(2)	Displacer+19.7 in. (500 mm)

(1) If flushing ring is used, add the ring height to the probe length.
(2) For other manufacturers, there are small variations. This is an approximate value, actual length should be verified.
(3) Lengths vary depending on model, SG and rating, and should be verified.

Table 11. Centering Discs Dimensions

Disc Size	Actual Disc Diameter
2 in.	1.8 in. (45 mm)
3 in.	2.7 in. (68 mm)
4 in.	3.6 in. (92 mm)
6 in.	5.55 in. (141 mm)
8 in.	7.40 in. (188 mm)

Table 12. Centering disc size recommendation for different pipe schedules

	Pipe Schedule					
Pipe Size	5s, 5	10s,10	40s, 40	80s, 80	120	160
2 in.	2 in.	2 in.	2 in.	2 in.	NA(1)	NA(2)
3 in.	3 in.	3 in.	3 in.	3 in.	NA(1)	2 in.
4 in.	4 in.	4 in.	4 in.	4 in.	4 in.	3 in.
5 in.	4 in.	4 in.	4 in.	4 in.	4 in.	4 in.
6 in.	6 in.	6 in.	6 in.	6 in.	4 in.	4 in.
7 in.	NA(1)	NA(1)	6 in.	6 in.	NA(1)	NA(1)
8 in.	8 in.	8 in.	8 in.	8 in.	6 in.	6 in.

(1) Schedule is not available for pipe size.
(2) No centering disc is available.

Product Certifications

SAFETY NOTE

A safety isolator such as a zener barrier is always needed for intrinsic safety.

Probes covered with plastic and/or with plastic discs may generate an ignition-capable level of electrostatic charge under certain extreme conditions. Therefore, when the probe is used in a potentially explosive atmosphere, appropriate measures must be taken to prevent electrostatic discharge.

Factory Mutual (FM) Approval

Project ID: 3013394

E5 Explosion-proof for use in Class I, Div. 1, Groups B, C, and D;
Dust Ignition Proof for use in Class II/III, Div. 1, Groups E, F, and G;
With Intrinsically Safe connections to Class I, II, III, Div. 1, Groups A, B, C, D, E, F, and G.
Temperature Class T5 @ +85 °C.
Ambient temperature limits -50 °C to +85 °C.
Approval valid for Modbus and HART option.

I5 Intrinsically Safe for Class I, II, III, Div. 1, Groups A, B, C, D, E, F, and G,
Class I, Zone 0, AEx ia IIC T4 T_a=70 °C.
Temp code T4 at 70 °C max ambient.
Control Drawing: 9150077-944.
Non-Incendive Class I, Div. 2, Groups A, B, C, and D;
Suitable for Class II, III, Div. 2, Groups F and G.
Non-incendive maximum operating parameters: 42 V, 25 mA.
Temp code T4A at 70 °C max ambient.
Approval valid for HART option.

EU Conformity

The most recent revision of the EC declaration of conformity can be found at www.rosemount.com.

ATEX Approval CE

E1 Flameproof:
II 1/2 GD T80°C.
EEx d [ia] IIC T6 (-40°C<T_a<+75°C).
KEMA 01ATEX2220X.
U_m = 250 V.
Approval valid for HART option.

SPECIAL CONDITIONS FOR SAFE USE (X)

On application of the Rosemount 3300 Series Guided Wave Radar Level and Interface Transmitters equipped with plastic materials in an explosive gas atmosphere, requiring the use of apparatus of equipment category 1G, precaution shall be taken to avoid danger of ignition due to electrostatic charges on the enclosure.

I1 Intrinsic Safety:
II 1 G Ex ia IIC T4 Ga (-50 °C ≤ T_a ≤ +70 °C).
BAS02ATEX1163X
U_i=30 V, I_i=130 mA, P_i=1.0 W, L_i=C_i=0.
Input Voltage range
Loop-powered (2-wire):
Functional voltage range: 11-42 Vdc
Intrinsically safe version: 11-30 Vdc
Max Power rating: 1.0 W

Ambient temperature limit: -50 °C ≤ T_a ≤ +70 °C

Approval valid for HART option.

SPECIAL CONDITIONS FOR SAFE USE (X)

The apparatus is not capable of withstanding the 500 V test as defined in clause 6.3.12 of EN 60079-11:2007. This must be considered in any installation.

The Series 3300 enclosure is made of aluminium alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in zone 0.

N1 Non-Incendive:
II 3G Ex nAnL IIC T4 (-40 °C ≤ T_a ≤ +70 °C).
Baseefa08ATEX0002X
U_N=42.4 V
Approval valid for HART option.

SPECIAL CONDITIONS FOR SAFE USE (X):

The external supply must be provided with transient and over voltage protection.

The apparatus is not capable of withstanding the 500 V test to earth for one minute as defined in Clause 34.2 of EN 60079-15. This must be taken into consideration during installation.

The cable entry to the equipment must use ATEX Certified Cable glands or be blanked to maintain a degree of protection of IP54.

Canadian Standards Association (CSA) Approval

Cert. no 1250250.

E6 Explosion-proof: Class I, Div. 1, Groups C and D.
Dust Ignition Proof: Class II, Div. 1 and 2, Groups G and coal dust.
Class III, Div. 1, Haz. Loc.
[Ex ia IIC T6].
Ambient temperature limits -50 °C to +85 °C.
Approval valid for Modbus and HART option.

I6 Intrinsically Safe: Ex ia IIC T4,
Class I, Div. 1, Groups A, B, C, and D.
Temp code T4.
Installation Drawing: 9150077-945.
Non-Incendive: Class III, Div. 1, Haz. Loc.
Class I, Div 2, Groups A, B, C, and D.
Ambient temperature limits -50 °C to +70 °C.
Approval valid for HART option.

National Supervision and Inspection Center for Explosion Protection and Safety of Instrumentation (NEPSI) Approvals

E3 Flameproof: GYJ071096
Ex dia IIC T6 (-20 °C<T_a<+60 °C). DIP A21 T_A T6 IP66
U_m=250 V
Approval valid for HART and Modbus options.

I3 Intrinsically Safe: GYJ06459X, GYJ06460X
Ex ia IIC T4 (-20 °C<T_a<+60 °C).
U_i=30 Vdc, I_i=130 mA, P_i=1.0 W, C_i=0 nF, L_i=0 H.
Approval valid for HART option.

Overfill Protection

Cert no: Z-65.16-416

U1 TÜV-tested and approved by DIBt for overfill protection according to the German WHG regulations

Technology Institution of Industrial Safety (TIIS) Approval

E4 Flameproof with Intrinsically Safe probe: TC18544, TC18545
Transmitter: Ex d [ia] IIB T6 ($T_{a,\ max}$ = 60 °C)
U_m=250 V
Probe: Ex ia IIB T6
U_o=25.2 V, I_o=159 mA, P_o=1.0 W
Approval valid for HART option.
Installation drawing: 03300-00408.

IECEx Approval

E7 Flameproof:
Ex d [ia] IIC T6 (T_{amb} = -20 °C + 60 °C) IP66
IECEx TSA 04.0013X
Approval valid for HART option.

SPECIAL CONDITIONS FOR SAFE USE (X)

The programming port must not be used in the hazardous area.

The apparatus metallic enclosure must be electrically bonded to earth. The conductor used for the connection shall be equivalent to a copper conductor of 4 mm^2 minimum cross-sectional area.

Where it is required that an unused conduit entry is to be closed by means of the blanking plug, the plug supplied by the equipment manufacturer with this equipment is certified for this purpose under this certification.

Maximum Voltage U_m = 250 V.

I7 Intrinsic Safety:
Ex ia IIC T4 (T_a = 60 °C) IP66
IECEx TSA 04.0006X
U_i = 30 V, I_i = 130 mA, P_i = 1 W, C_i = 0 nF, L_i = 0 mH
Approval valid for HART option.

SPECIAL CONDITIONS FOR SAFE USE (X)

The programming port must not be used in the hazardous area.

The apparatus metallic enclosure must be electrically bonded to the earth. The conductor used for the connection shall be equivalent to a copper conductor of 4 mm^2 minimum cross-sectional area.

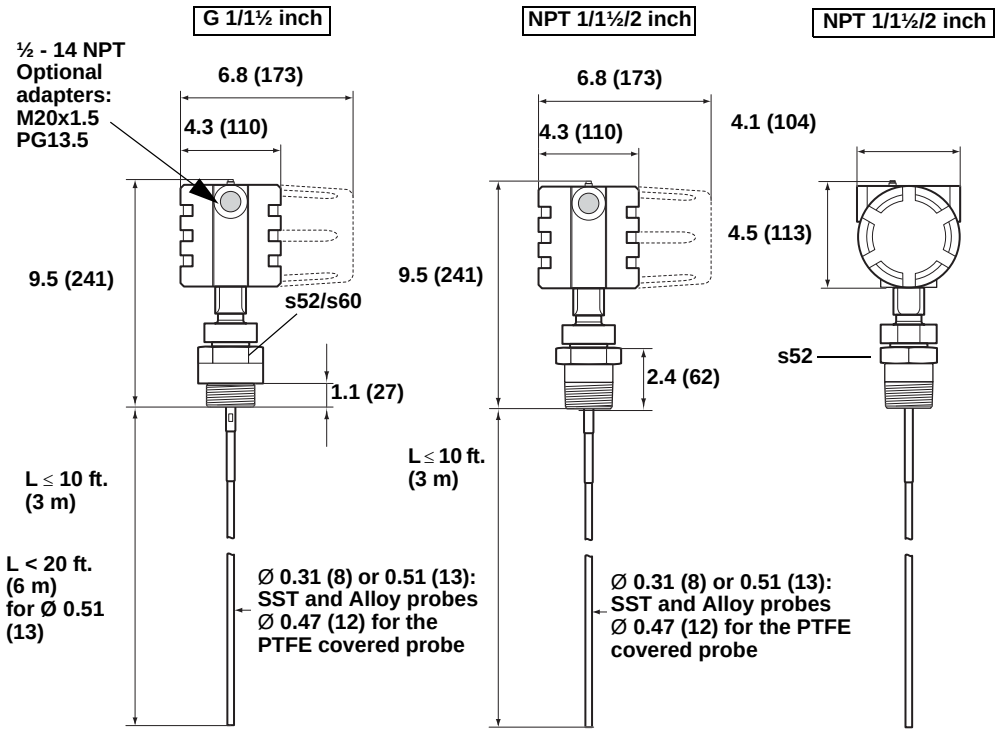
The input parameters stated above must be taken into consideration during the installation of the apparatus.

For information on hazardous locations installations, refer to the Rosemount 3300 Series Reference Manual (Document no. 00809-0100-4811).

Dimensional Drawings

Figure Level-1. Rigid Single Lead

Dimensions are in inches (millimeters)



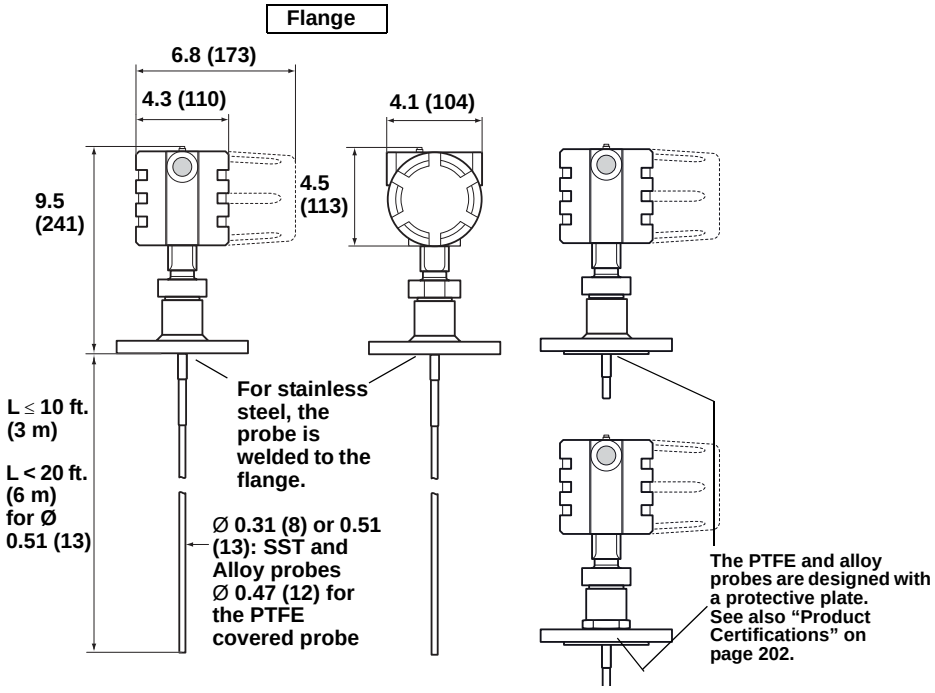


Figure Level-2. Flexible Single Lead

Dimensions are in inches (millimeters)

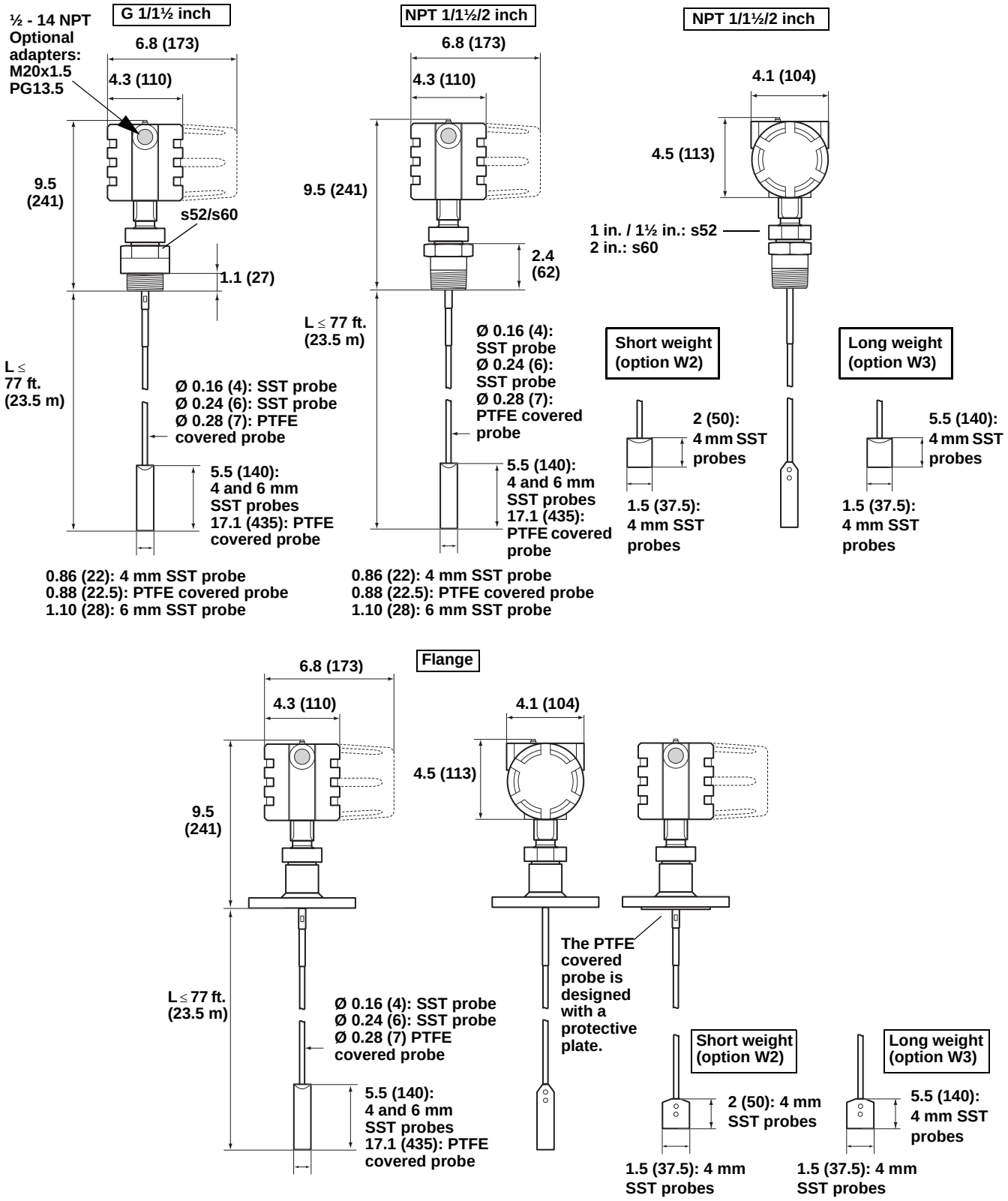
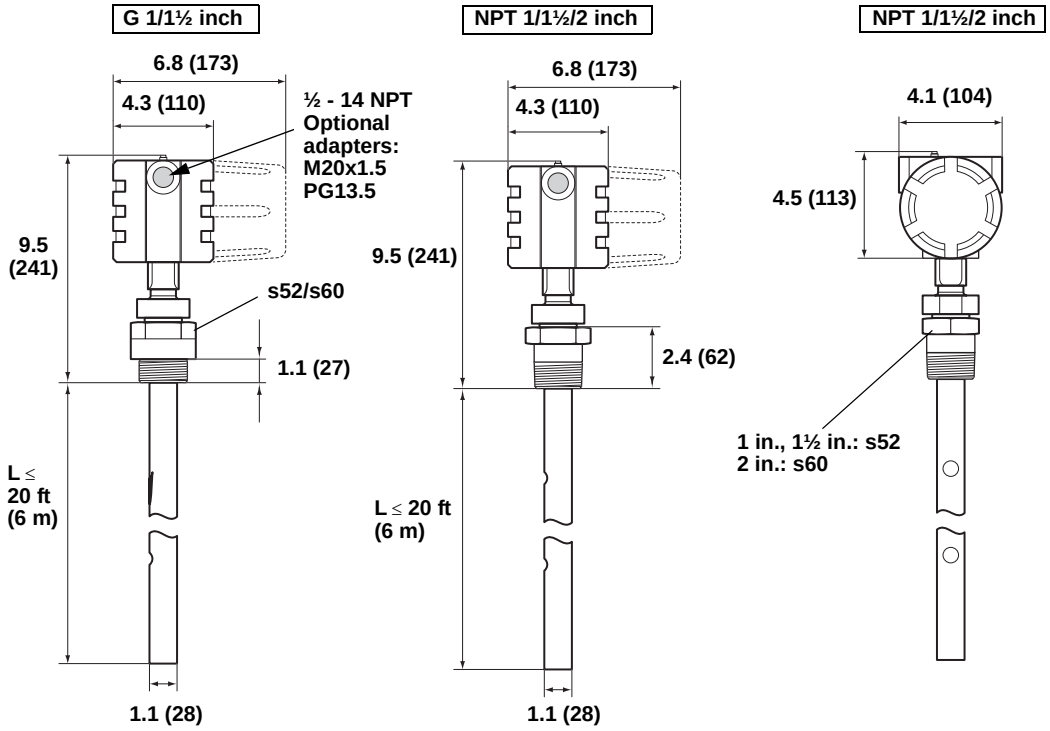


Figure Level-3. Coaxial

Dimensions are in inches (millimeters)



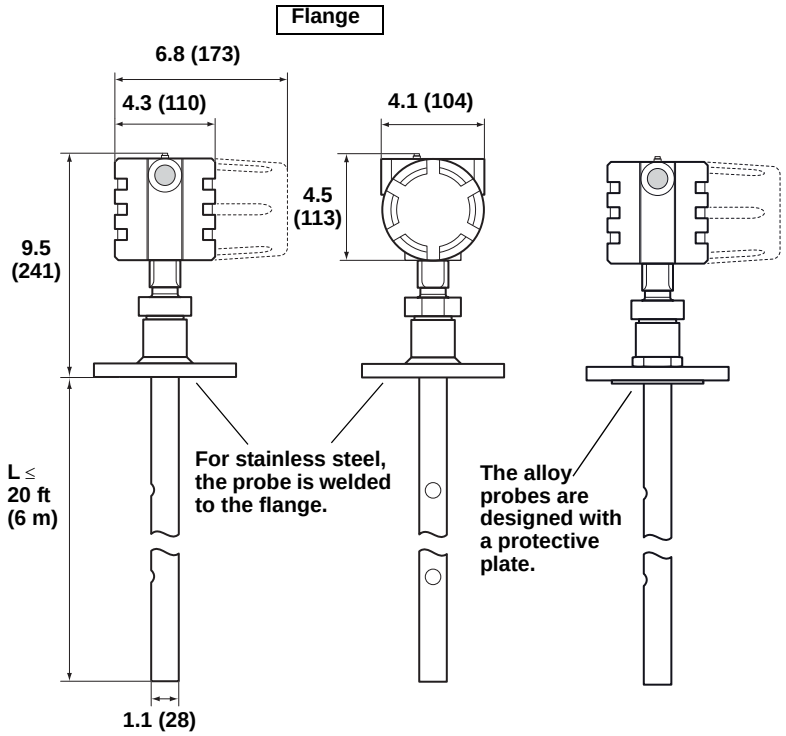


Figure Level-4. Rigid Twin Lead

Dimensions are in inches (millimeters)

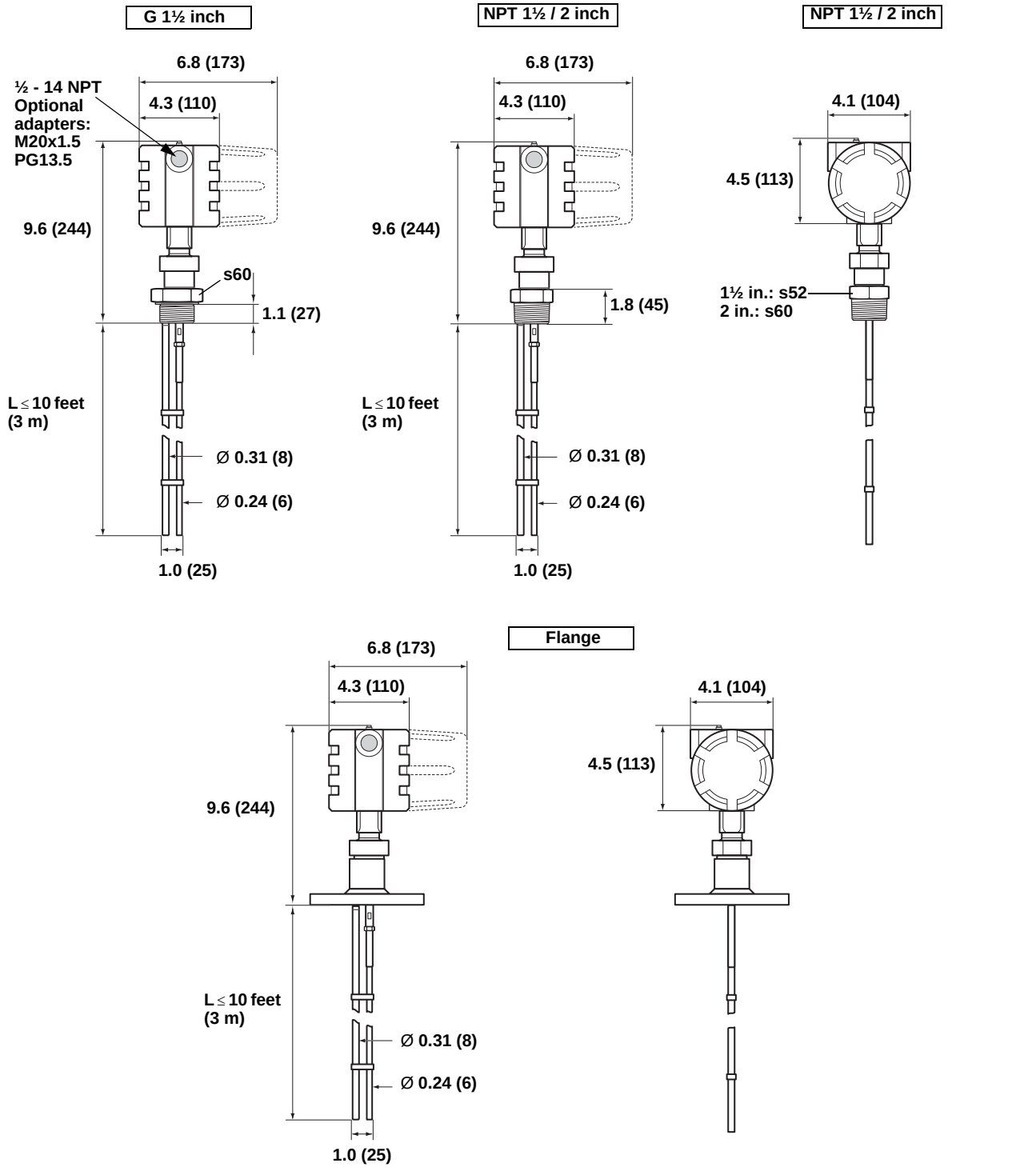


Figure Level-5. Flexible Twin Lead

Dimensions are in inches (millimeters)

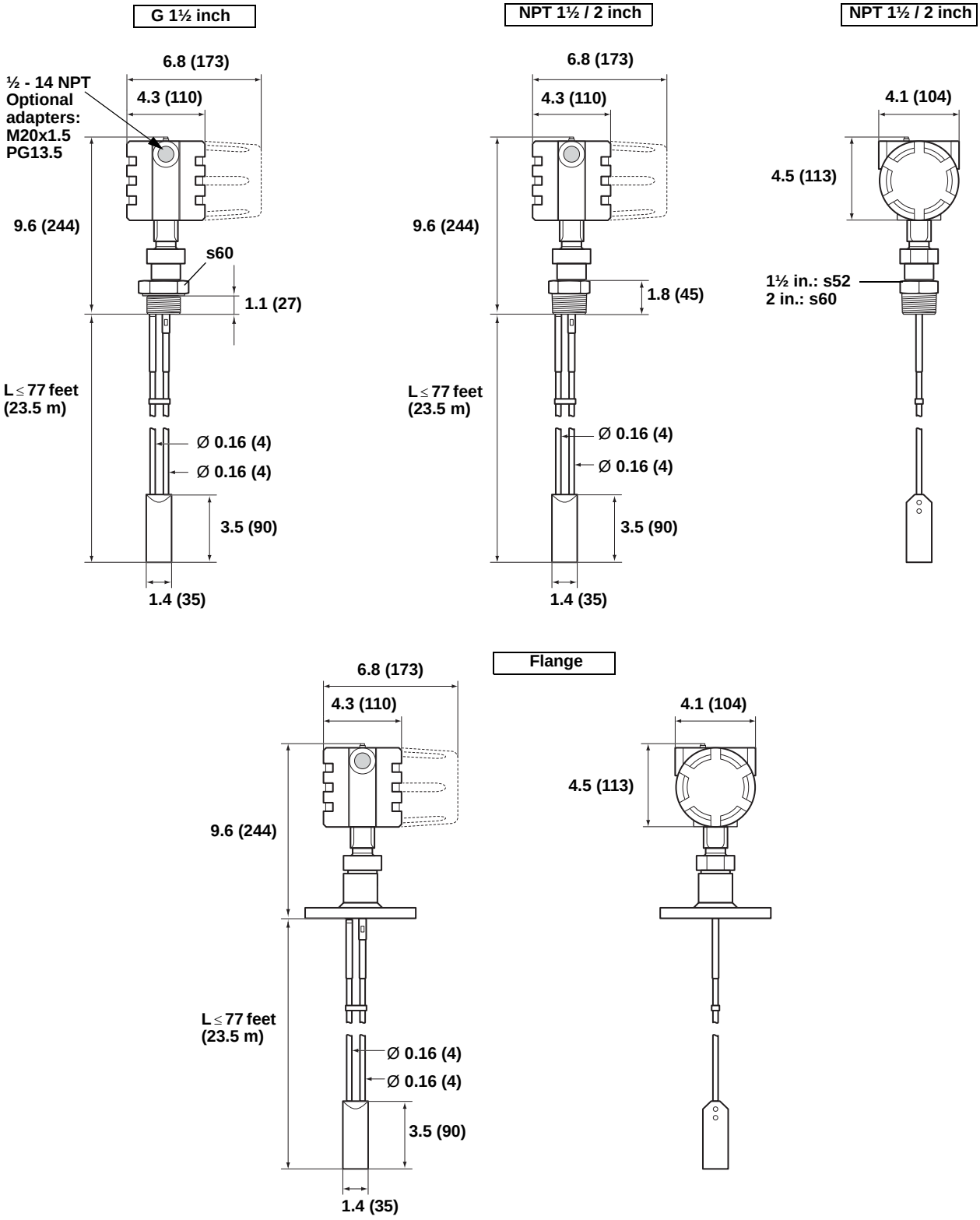
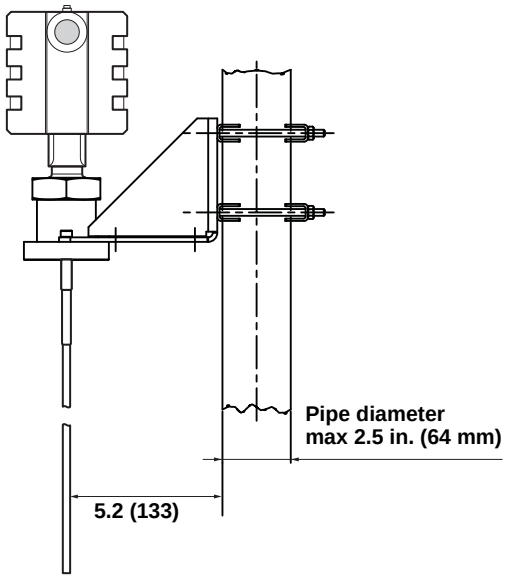
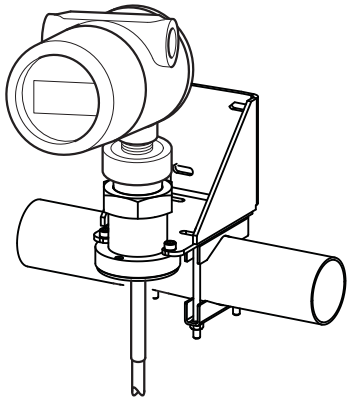


Figure Level-6. Bracket mounting

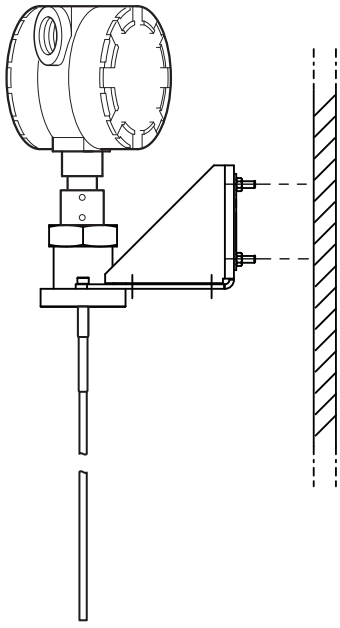
Dimensions are in inches (millimeters)



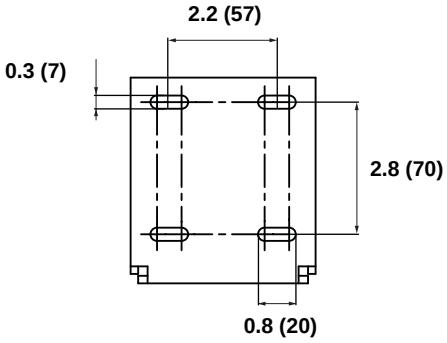
Pipe mounting (vertical pipe)



Pipe mounting (horizontal pipe)



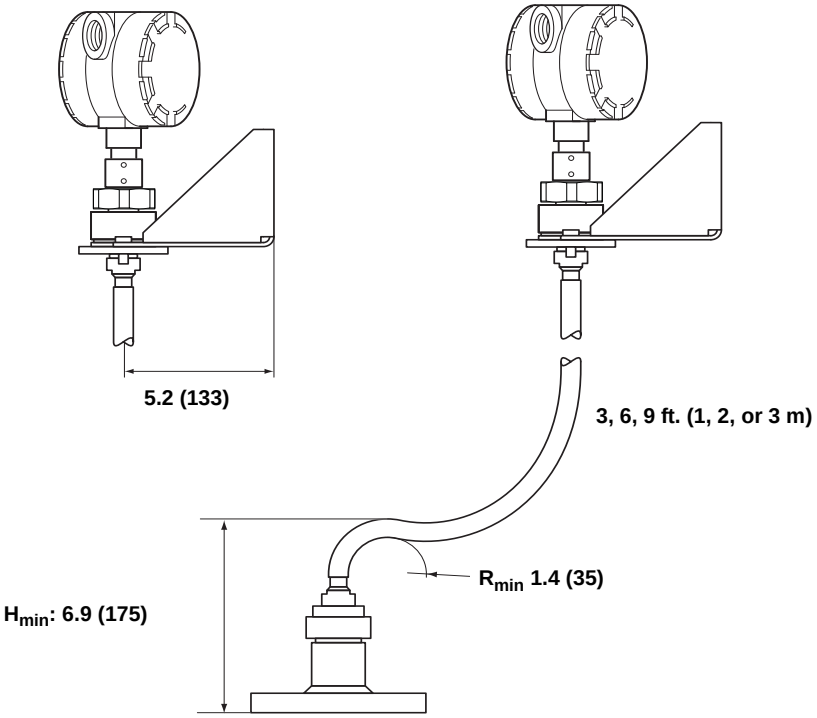
Wall mounting



Hole pattern wall mounting

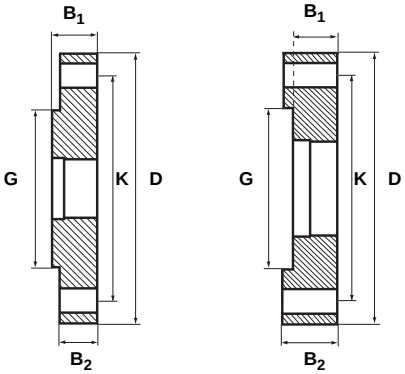
Figure Level-7. Remote housing

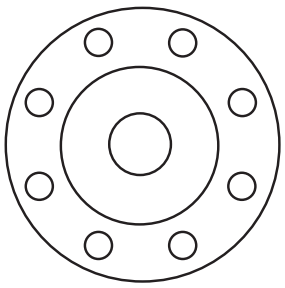
Dimensions are in inches (millimeters)



PROPRIETARY FLANGES

Raised Face **Recessed Face**





Dimensions are in inches (millimeter).

D: Outside diameter
B1: Flange thickness with gasket surface
B2: Flange thickness without gasket surface
F=B_1-B_2: Gasket surface thickness
G: Gasket surface diameter
 # Bolts: Number of Bolts
K: Bolt hole circle diameter

NOTE
Dimensions may be used to aid in the identification of installed flanges. It is not intended for manufacturing use.

Table 13. Dimensions of proprietary flanges

Special Flanges(1)	D	B_1	B_2	F	G	# Bolts	K
Fisher 249B/259B(2)	9.00 (228.6)	1.50 (38.2)	1.25 (31.8)	0.25 (6.4)	5.23 (132.8)	8	7.25 (184.2)
Fisher 249C(3)	5.69 (144.5)	0.94 (23.8)	1.13 (28.6)	-0.19 (-4.8)	3.37 (85.7)	8	4.75 (120.65)
Masoneilan(2)	7.51 (191.0)	1.54 (39.0)	1.30 (33.0)	0.24 (6.0)	4.02 (102.0)	8	5.87 (149.0)

(1) These flanges are also available in a vented version.
(2) Flange with raised face.
(3) Flange with recessed face.

Rosemount Level Solutions

Emerson provides a complete range of Rosemount products for level measurement applications.

Vibrating Fork Switches – Point Level Detection

For high and low alarms, overfill protection, pump control, including wide pressure and temperature requirements, and hygienic applications. Flexible mounting. Immune to changing process conditions and suitable for most liquids.
The product line consists of:

- Rosemount 2160 Wireless
- Rosemount 2130 Enhanced
- Rosemount 2120 Full-featured
- Rosemount 2110 Compact

Differential Pressure – Level or Interface Measurement

Flexible mounting for liquid tank levels, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by: vapor space changes, surface conditions, foam, corrosive fluids, internal tank equipment. Optimize performance with direct mount, Tuned-System Assemblies:

- Rosemount DP Level Transmitters and Remote Seals
- Rosemount 3051S_L, 3051L, and 2051L Liquid Level Transmitters

Ultrasonic – Level Measurement

Top mounted, non-contacting for simple tank and open air level measurements. Unaffected by fluid properties such as: density, viscosity, dirty coating and corrosiveness. Appropriate for routine applications outside of explosion proof areas.
The product line consists of:

- Rosemount 3100 Series Ultrasonic Process Level Transmitters

Guided Wave Radar – Level and Interface Measurement

Top mounted, direct level and interface measurement of liquids or solids, including those with wide temperature and pressure requirements. Unaffected by changing process conditions. Good fit for small spaces and easy swap for older technologies.
The product line consists of:

- Rosemount 5300 Series – Accurate, superior performance transmitter in most applications including process vessels and control
- Rosemount 3300 Series – Versatile and easy-to-use transmitter in most liquid storage and monitoring applications

Non-contacting Radar – Level Measurement

Top mounted, direct level measurement for liquids or solids, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by changing process conditions. Good for dirty, coating and corrosive applications.
The product line consists of:

- Rosemount 5400 Series – Accurate, superior performance 2-wire transmitters for most liquid level applications and process conditions
- Rosemount 5600 Series – 4-wire transmitters with maximum sensitivity and performance for solids, challenging reactors, rapid level changes and excessive process conditions

Chambers for Process Level Instrumentation

- Rosemount 9901 – High quality chambers for external mounting of level measurement and control instrumentation on process vessels

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00813-0100-4811 Rev FA, 12/10

EMERSON
Process Management

Superior Performance Two-Wire Non-Contacting Radar Level Transmitter

- *Accurate and reliable, direct level measurement, virtually unaffected by process conditions*
- *Best performance and uptime provided by dual port technology, advanced surface tracking capability, and condensation- and dirt-resistant antennas*
- *Easy installation and commissioning through circular polarization and powerful, easy-to-use configuration tools*
- *High application flexibility with a wide range of process connections, materials, antennas, and low and high frequency models*
- *Minimized maintenance with no contact and no moving parts; no re-calibration required*
- *Increased safety. Third party approved for overfill protection and safety integrated system suitability*

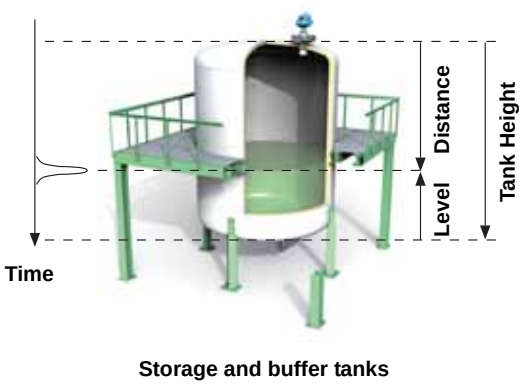


HART COMMUNICATION PROTOCOL · IEC WirelessHART · FOUNDATION · Modbus

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Innovation that Delivers Clear Business Results



Storage and buffer tanks

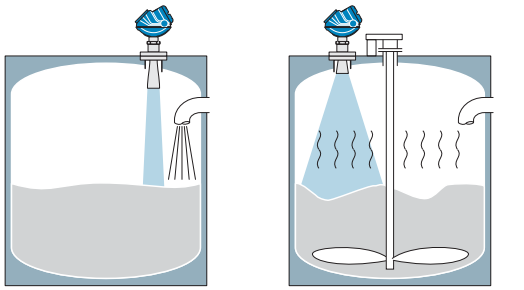


Reactor and mixing tanks



Pipes, stilling wells, and underground tanks

5402 (26 GHz) **5401 (6 GHz)**



Low frequency is preferred when measuring in vapor and foam. High frequency is preferred in most other applications due to greater mounting flexibility.



Cone **Extended Cone** **Process Seal** **Rod Antenna** **Bracket mount**

High application flexibility

MEASUREMENT PRINCIPLE

The distance to the surface is measured by short radar pulses, which are transmitted from the antenna at the tank top. When a radar pulse reaches a media with a different dielectric constant, part of the energy is reflected back to the transmitter. The time difference between the transmitted and the reflected pulse is proportional to the distance to the product surface, from which the level, volume, and level rate are calculated.

Applications with, for example, turbulence, foam, long measuring ranges, disturbing objects, and low dielectric constants can reduce the energy reflecting back, and in worst case eliminate it completely with the result that no surface can be detected. The reflection intensity can however be improved by using a high performance radar with dual port technology, and thereby detect the surface in challenging applications.

RADAR TECHNOLOGY BENEFITS

- Highly accurate and reliable direct level measurement with no compensation needed for changing process conditions (such as density, conductivity, viscosity, pH, dielectric, temperature, and pressure)
- Top down installation minimizes risk for leakages and allows for installation with liquid in the tank
- No moving parts and no re-calibration needed result in minimized maintenance
- Non-contacting technology is ideal for dirty, coating, and corrosive applications

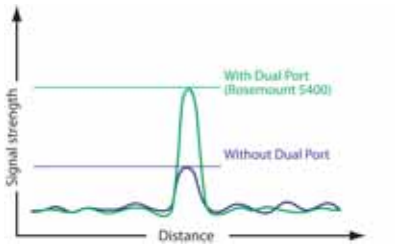
SPECIAL 5400 FEATURES

High Application Flexibility

- Suitable for most liquid and slurry level applications and process conditions from challenging reactor tanks to storage and buffer tanks
- Low and high frequency models
- A wide selection of materials, process connections, antenna styles, and accessories
- Dual port technology to increase the signal strength and provide measurement in challenging applications
- Can be isolated by valves

Best Performance and Uptime

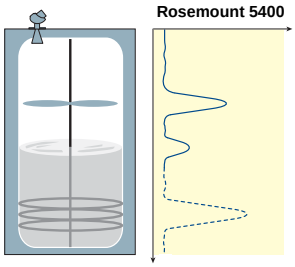
- Dual port technology ensures reliability, even with disturbing factors, longer measuring ranges, and lower dielectrics
- Advanced surface tracking provides the ability to handle weak echoes reliably by identifying the true echo and registering false echoes
- Condensation- and dirt- resistant antennas maximize uptime
- Uninterrupted process monitoring reduces downtime



The unique dual microwave ports for sending and receiving radar signals yield a 75 % stronger signal than single port transmitters.

Robust Design Reduces Costs and Increases Safety

- Robust, shock-resistant, and vibration-proof design
- Detachable transmitter head allows the tank to remain sealed
- Dual Compartment housing separates cable connections and electronics for safer handling and improved moisture protection



Smart surface tracking utilizes advanced mathematical algorithms and EchoLogics to correctly identify the surface.

Easy Installation and Plant Integration

- Circular polarization minimizes installation constraints
- MultiVariable™ device reduces the number of process penetrations
- Seamless system integration with HART®, FOUNDATION™ fieldbus, Modbus®, or IEC 62591 (*Wireless*HART®) with the Smart Wireless THUM™ adapter
- MultiVariable™ output includes the choice of level, distance, volume, and signal strength
- Pre-configured or easy configuration in Rosemount Radar Master with a five-step wizard, auto connect, and online help
- Supports DD compatible configuration tools such as AMS Device Manager, and Field Communicator
- Enhanced DD with step-by-step configuration and echo curve capability (HART)
- DTM with echo curve capability for use in FDT/DTM compatible configuration tools such as PACTWare™, Yokogawa® FieldMate/PRM



Robust Modular Design



Larger sealing surface towards the process connection, making the transmitter less sensitive to condensation and dirt. Circular polarization will automatically reduce the disturbance effect close to tank walls and obstacles.

Minimized Maintenance Reduces Cost

- No contact with media and no mechanical moving parts
- No re-calibration or compensation needed
- Easy online troubleshooting with user friendly software, utilizing powerful echo curve and logging tools
- Predictive maintenance with advanced diagnostics and PlantWeb® alerts



Rosemount Radar Master enables easy configuration and service with a wizard, an echo curve tool with the "Measure and Learn" function, offline/online configuration, an extensive online help, logging capabilities, and more.

Rosemount 5402 High Frequency Radar Level Transmitter



5402 Radar Level Transmitter

Rosemount 5402 High Frequency Radar Level Transmitter is a reliable 2-wire radar level transmitter designed for outstanding performance in a wide range of applications and process conditions. Characteristics include:

- The preferred choice for most applications especially where the nozzle size is 4 in. or less
- High frequency (26 GHz) meaning a concentrated radar beam resulting in smaller antenna diameters
- The narrow beam means suitable for mounting on valves, taller nozzles, smaller openings, and that it is easier to avoid unwanted reflections from mechanical obstacles such as agitators and heating coils
- Build-up resistant cone antenna
- Condensation resistant process seal antenna

Additional Information

Specifications: page Level-224
Certifications: page Level-240
Dimensional Drawings: page Level-243

TABLE 1. 5402 High Frequency Radar Level Transmitter Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
5402	High frequency version (~26 GHz)	
Housing Material		
Standard		**Standard**
A	Polyurethane-covered Aluminum	★
Expanded		
S	Stainless Steel, Grade CF8M (ASTM A743)	
Signal Output		
Standard		**Standard**
H	4-20 mA with HART® communication	★
F	FOUNDATION™ fieldbus	★
M	RS-485 with Modbus communication	★
Conduit / Cable Threads		
Standard		**Standard**
1	½ in. - 14 NPT	★
2	M20 x 1.5 adapter	★
E	M12, 4-pin, Male Connector (eurofast®)(1)	★
M	A size Mini, 4-pin, Male Connector (minifast®)(1)	★
Product Certifications		
Standard		**Standard**
NA	No Product Certificates	★
E1	ATEX Flameproof(1)	★
I1	ATEX Intrinsic Safety	★
IA	ATEX FISCO Intrinsic Safety(2)	★
E5	FM Explosion-proof(1)	★
I5	FM Intrinsic Safety and Non-incendive	★
IE	FM FISCO Intrinsic Safety(2)	★

TABLE 1. 5402 High Frequency Radar Level Transmitter Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

E6	CSA Explosion-proof(1)	★
I6	CSA Intrinsic Safety	★
IF	CSA FISCO Intrinsic Safety(2)	★
E7	IECEx Flameproof(1)	★
I7	IECEx Intrinsic Safety	★
IG	IECEx FISCO Intrinsic Safety(2)	★
Expanded		
E2	INMETRO Flameproof	
I2	INMETRO Intrinsic Safety	
IB	INMETRO FISCO Intrinsic Safety	
E3	NEPSI Flameproof(1)	
I3	NEPSI Intrinsic Safety	
IC	NEPSI FISCO Intrinsic Safety	
E4	TIIS Flameproof(3)	
Antenna - Size and Material (for process connection availability, refer to "Dimensional Drawings and Mechanical Properties" on page 243)		
Cone Antennas		
Standard		**Standard**
2S	2 in. DN 50, 316L SST (EN 1.4404)	★
3S	3 in. DN 80, 316L SST (EN 1.4404)	★
4S	4 in. DN 100, 316L SST (EN 1.4404)	★
Expanded		
2H	2 in. DN 50, Alloy C-276 (UNS N10276) with protective plate	
3H	3 in. DN 80, Alloy C-276 (UNS N10276) with protective plate	
4H	4 in. DN 100, Alloy C-276 (UNS N10276) with protective plate	
2M	2 in. DN 50, Alloy 400 (UNS N04400) with protective plate	
3M	3 in. DN 80, Alloy 400 (UNS N04400) with protective plate	
4M	4 in. DN 100, Alloy 400 (UNS N04400) with protective plate	
2N	2 in. DN 50, 316L SST (EN 1.4404), with protective plate. Complies with guidelines in NACE® MR0175/ISO 15156 and NACE® MR0103.	
3N	3 in. DN 80, 316L SST (EN 1.4404), with protective plate. Complies with guidelines in NACE® MR0175/ISO 15156 and NACE® MR0103.	
4N	4 in. DN 100, 316L SST (EN 1.4404), with protective plate. Complies with guidelines in NACE® MR0175/ISO 15156 and NACE® MR0103.	
Process Seal Antennas		
Expanded		
2P	2 in. DN 50, PTFE	
3P	3 in. DN 80, PTFE	
4P	4 in. DN 100, PTFE	
Other Antennas		
Expanded		
XX	Customer specific	
Tank Sealing		
Standard		**Standard**
PV	PTFE with Viton® fluoroelastomer o-rings	★
PK	PTFE with Kalrez® 6375 perfluoroelastomer o-rings	★
PE	PTFE with EPDM o-rings	★
PB	PTFE with Buna-N o-rings	★

TABLE 1. 5402 High Frequency Radar Level Transmitter Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Process Connection and Material (for antenna availability, refer to "Dimensional Drawings and Mechanical Properties" on page 243)		
ANSI Flanges (316 / 316L SST)		
Standard		**Standard**
AA	2 inch, 150 lb	★
AB	2 inch, 300 lb	★
BA	3 inch, 150 lb	★
BB	3 inch, 300 lb	★
CA	4 inch, 150 lb	★
CB	4 inch, 300 lb	★
DA	6 inch, 150 lb	★
EA	8 inch, 150 lb	★
EN (DIN) Flanges (EN 1.4404 SST)		
Standard		**Standard**
HB	DN 50 PN 40	★
IB	DN 80 PN 40	★
JA	DN 100 PN 16	★
JB	DN 100 PN 40	★
KA	DN 150 PN 16	★
LA	DN 200 PN 16	★
JIS Flanges (EN 1.4404 SST)		
Standard		**Standard**
UA	50A 10K	★
VA	80A 10K	★
XA	100A 10K	★
YA	150A 10K	★
ZA	200A 10K	★
Other Flanges		
Expanded		
BR	Bracket Mounting, 316L / EN 1.4404 SST(4)	
XX	Customer specific	
Options		
Standard		**Standard**
M1	Integral digital display	★
GC	Transparent meter glass protection cover made of PTFE / FEP	★
T1	Transient Protection Terminal Block (standard with FISCO options)	★
Factory Configuration		
Standard		**Standard**
C1	Factory configuration (CDS required with order)	★
Alarm Limit Configuration		
Standard		**Standard**
C4	NAMUR alarm and saturation levels, high alarm	★
C8	Low alarm(5) (standard Rosemount alarm and saturation levels)	★
Overfill		
Standard		**Standard**
U1	WHG Overfill Approval(8)	★
Special Certifications		
Standard		**Standard**
Q4	Calibration Data Certificate	★
Q8	Material Traceability Certification per EN 10204 3.1(6)	★

TABLE 1. 5402 High Frequency Radar Level Transmitter Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded		
N2	Certificate of compliance with guidelines in NACE® MR0175/ISO 15156 and NACE® MR0103(7)	
QG	GOST Primary Verification Certificate	
Safety Certifications		
Expanded		
QS	Prior use certificate of FMEDA data(8)	
Special Procedures		
Standard		**Standard**
P1	Hydrostatic testing(4)	★
Antenna Extension		
Expanded		
S3	Cone antenna extension in 316 / 316L / EN 1.4404 SST. To be used if there are irregularities in the nozzle. Fits nozzles up to 20 in. (500 mm)(9).	
Typical Model Number: 5402 A H 1 E5 4S PV CA - M1 C1		

(1) Options E (eurofast®) and M (minifast®) are not available with Explosion-proof or Flameproof approvals.
(2) Requires FOUNDATION™ fieldbus signal output (U_i parameter listed in "Product Certifications" on page 240).
(3) G ½ in. SST cable gland is included in delivery.
(4) Bracket mounting (BR) is not available with hydrostatic testing (P1).
(5) The standard alarm setting is high.
(6) Certificate includes all pressure retaining wetted parts.
(7) Requires protective plate cone antennas (2H-4H, 2M-4M, 2N-4N) or process seal antennas (2P-4P).
(8) Only available with 4-20 mA HART signal Output.
(9) Requires a SST cone antenna (2S-4S).

Rosemount 5401 Low Frequency Radar Level Transmitter



5401 Radar Level Transmitter

Rosemount 5401 Low Frequency Radar Level Transmitter is a reliable 2-wire radar level transmitter designed for use in applications with some specific process conditions. Characteristics include:

- Low frequency (6 GHz) meaning a wider radar beam resulting in larger cone antenna diameters
- Ideal for applications with obstacles, turbulence, condensation, vapor, dust, contamination, and foam, or where there is a risk of deposits forming on the antenna
- Condensation resistant cone or rod antennas

Additional Information

Specifications: page Level-224
Certifications: page Level-240
Dimensional Drawings: page Level-243

TABLE 2. 5401 Low Frequency Radar Level Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
5401	Low frequency version (~6 GHz)	
Housing Material		
Standard		**Standard**
A	Polyurethane-covered Aluminum	★
Expanded		
S	Stainless Steel, Grade CF8M (ASTM A743)	
Signal Output		
Standard		**Standard**
H	4-20 mA with HART® communication	★
F	FOUNDATION™ fieldbus	★
M	RS-485 with Modbus communication	★
Conduit / Cable Threads		
Standard		**Standard**
1	½ in. - 14 NPT	★
2	M20 x 1.5 adapter	★
E	M12, 4-pin, Male Connector (eurofast®)(1)	★
M	A size Mini, 4-pin, Male Connector (minifast®)(1)	★
Product Certifications		
Standard		**Standard**
NA	No Product Certificates	★
E1	ATEX Flameproof(1)	★
I1	ATEX Intrinsic Safety	★
IA	ATEX FISCO Intrinsic Safety(2)	★
E5	FM Explosion-proof(1)	★
I5	FM Intrinsic Safety and Non-incendive	★
IE	FM FISCO Intrinsic Safety(2)	★
E6	CSA Explosion-proof(1)	★

TABLE 2. 5401 Low Frequency Radar Level Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

I6	CSA Intrinsic Safety	★
IF	CSA FISCO Intrinsic Safety(2)	★
E7	IECEx Flameproof(1)	★
I7	IECEx Intrinsic Safety	★
IG	IECEx FISCO Intrinsic Safety(2)	★
Expanded		
E2	INMETRO Flameproof	
I2	INMETRO Intrinsic Safety	
IB	INMETRO FISCO Intrinsic Safety	
E3	NEPSI Flameproof(1)	
I3	NEPSI Intrinsic Safety	
IC	NEPSI FISCO Intrinsic Safety	
E4	TIIS Flameproof(3)	
Antenna - Size and Material (for process connection availability, refer to "Dimensional Drawings and Mechanical Properties" on page 243)		
Cone Antennas		
Standard		**Standard**
3S	3 in. DN 80, 316L SST (EN 1.4404), pipe installations only	★
4S	4 in. DN 100, 316L SST (EN 1.4404)	★
6S	6 in. DN 150, 316L SST (EN 1.4404)	★
8S	8 in. DN 200, 316L SST (EN 1.4404)	★
Expanded		
3H	3 in. DN 80, Alloy C-276 (UNS N10276) with protective plate, pipe installations only	
4H	4 in. DN 100, Alloy C-276 (UNS N10276) with protective plate	
6H	6 in. DN 150, Alloy C-276 (UNS N10276) with protective plate	
8H	8 in. DN 200, Alloy C-276 (UNS N10276) with protective plate	
3M	3 in. DN 80, Alloy 400 (UNS N04400) with protective plate, pipe installations only	
4M	4 in. DN 100, Alloy 400 (UNS N04400) with protective plate	
6M	6 in. DN 150, Alloy 400 (UNS N04400) with protective plate	
8M	8 in. DN 200, Alloy 400 (UNS N04400) with protective plate	
3N	3 in. DN 80, 316L SST (EN 1.4404), with protective plate, pipe installations only. Complies with guidelines in NACE® MR0175/ISO 15156 and NACE® MR0103.	
4N	4 in. DN 100, 316L SST (EN 1.4404), with protective plate. Complies with guidelines in NACE® MR0175/ISO 15156 and NACE® MR0103.	
6N	6 in. DN 150, 316L SST (EN 1.4404), with protective plate. Complies with guidelines in NACE® MR0175/ISO 15156 and NACE® MR0103.	
8N	8 in. DN 200, 316L SST (EN 1.4404), with protective plate. Complies with guidelines in NACE® MR0175/ISO 15156 and NACE® MR0103.	
Rod Antennas		
Expanded		
1R	Short version, all-PFA(4)(5), with protective plate, max. nozzle height 4 in. (100 mm), free propagation only	
2R	Long version, all-PFA(4)(5), with protective plate, max. nozzle height 10 in. (250 mm), free propagation only	
3R	Short version, SST+PFA(4), max. nozzle height 4 in. (100 mm), free propagation only	
4R	Long version, SST+PFA(4), max. nozzle height 10 in. (250 mm), free propagation only	
Other Antennas		
Expanded		
XX	Customer specific	

TABLE 2. 5401 Low Frequency Radar Level Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Tank Sealing		
Standard		**Standard**
PV	PTFE with Viton® fluoroelastomer o-rings	★
PK	PTFE with Kalrez® 6375 perfluoroelastomer o-rings	★
PE	PTFE with EPDM o-rings	★
PB	PTFE with Buna-N o-rings	★
PD	All-PFA(4) rod antennas (O-rings are not wetted)	★
Process Connection and Material (for antenna availability, refer to "Dimensional Drawings and Mechanical Properties" on page 243)		
ANSI Flanges (316 / 316L SST)		
Standard		**Standard**
AA	2 in. 150 lb	★
AB	2 in. 300 lb	★
BA	3 in. 150 lb	★
BB	3 in. 300 lb	★
CA	4 in. 150 lb	★
CB	4 in. 300 lb	★
DA	6 in. 150 lb	★
EA	8 in. 150 lb	★
EN (DIN) Flanges (EN 1.4404 SST)		
Standard		**Standard**
HB	DN 50 PN 40	★
IB	DN 80 PN 40	★
JA	DN 100 PN 16	★
JB	DN 100 PN 40	★
KA	DN 150 PN 16	★
LA	DN 200 PN 16	★
JIS Flanges (EN 1.4404 SST)		★
Standard		**Standard**
UA	50A 10K	★
VA	80A 10K	★
XA	100A 10K	★
YA	150A 10K	★
ZA	200A 10K	★
Tri-Clamp Connection (316/316L)		
Expanded		
AT	2 in. Tri-Clamp(6)	
BT	3 in. Tri-Clamp(6)	
CT	4 in. Tri-Clamp(6)	
Threaded (316L / EN 1.4404 SST)		
Expanded		
RA	1.5-in. NPT(7)	
Other		
Expanded		
BR	Bracket Mounting, 316L / EN 1.4404 SST(7)	
XX	Customer specific	
Options		
Standard		**Standard**
M1	Integral digital display	★
T1	Transient Protection Terminal Block (standard with FISCO options)	★

TABLE 2. 5401 Low Frequency Radar Level Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Expanded		
GC	Transparent meter glass protection cover made of PTFE / FEP	
Factory Configuration		
Standard		**Standard**
C1	Factory configuration (CDS required with order)	★
Alarm Limit Configuration		
Standard		**Standard**
C4	NAMUR alarm and saturation levels, high alarm	★
C8	Low alarm(8) (standard Rosemount alarm and saturation levels)	★
Overfill		
Standard		**Standard**
U1	WHG Overfill Approval(8)	★
Special Certifications		
Standard		**Standard**
Q4	Calibration Data Certificate	★
Q8	Material Traceability Certification per EN 10204 3.1(9)	★
Expanded		
N2	Certificate of compliance with guidelines in NACE® MR0175/ISO 15156 and NACE® MR0103(10)	
QG	GOST Primary Verification Certificate	
Safety Certifications		
Expanded		
QS	Prior use certificate of FMEDA data(11)	
Special Procedures		
Standard		**Standard**
P1	Hydrostatic testing(7)	★
Antenna Extension		
Expanded		
S3	Extended Cone Antenna in 316 / 316L / EN 1.4404 SST. Maximum recommended nozzle height is 20 in. (500 mm).(12)	
Typical Model Number: 5401 A H 1 NA 4S PV CA - M1 C1		

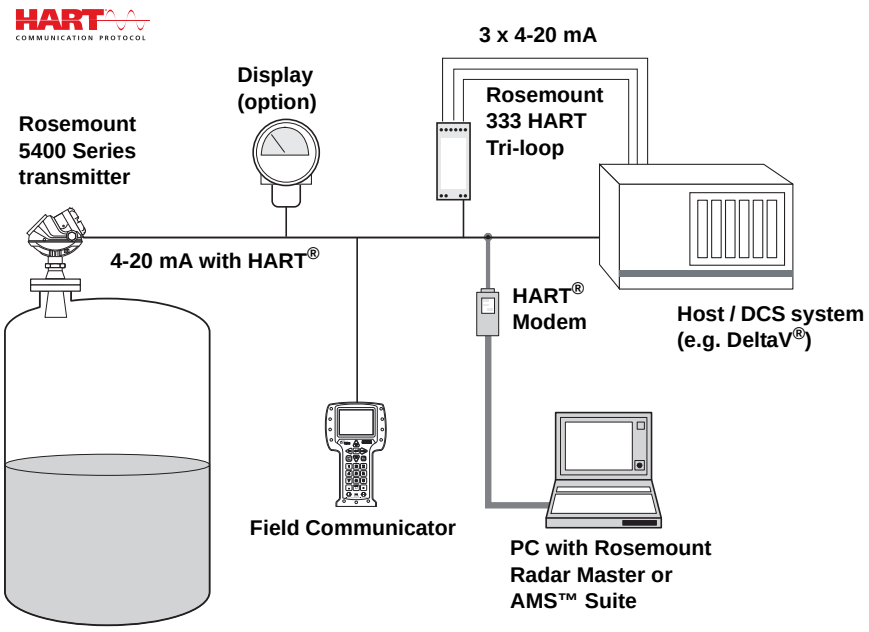
(1) Options E (eurofast®) and M (minifast®) are not available with Explosion-proof or Flameproof approvals.
(2) Requires FOUNDATION™ fieldbus signal output (U_i parameter listed in "Product Certifications" on page 240).
(3) G ½ in. SST cable gland is included in delivery.
(4) PFA is a fluoropolymer with properties similar to PTFE.
(5) All-PFA Rod antennas (1R or 2R) require all-PFA tank seal (PD).
(6) Only available with Rod Antenna (3R and 4R)
(7) Certain process connections are not available with hydrostatic testing (P1).
(8) The standard alarm setting is high.
(9) Certificate includes all pressure retaining wetted parts.
(10) Requires protective plate cone antennas (3H-8H, 3M-8M, 3N-8N) or rod antennas (1R-4R).
(11) Only available with 4-20 mA HART signal Output
(12) Requires a SST cone antenna (4S-8S).

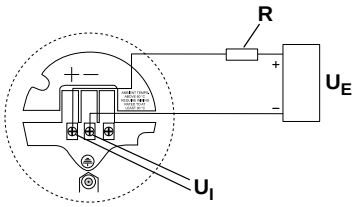
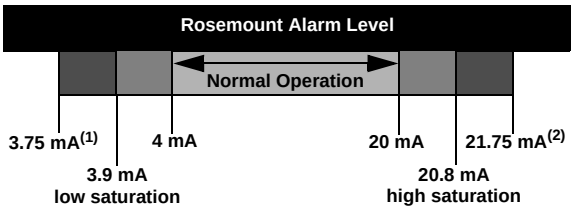
TABLE 3. Accessories

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery**.**
The Expanded offering is subject to additional delivery lead time.

Code		
Standard		**Standard**
03300-7004-0001	Viator HART Modem and cables (RS232 connection)	★
03300-7004-0002	Viator HART Modem and cables (USB connection)	★

Functional Specification

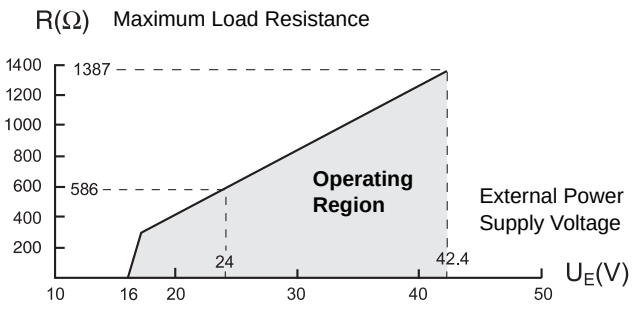
General	
Field of Application	Ideal for liquids and slurries in tanks, vessels, containers, reactor vessels, and underground tanks. Applications with sticky, viscous, corrosive, condensing, and crystallizing product. • Model 5402, best choice for a broad range of applications and suitable for mounting in valves and bridles/stilling wells • Model 5401, suitable for some extreme process conditions such as condensing vapors, product build-up, and heavy turbulence
Measurement Principle	Pulsed, free propagating radar. Low Frequency (Model 5401, 6 GHz) and High Frequency (Model 5402, 26 GHz). (See “Measurement Principle” on page 214 for details)
Microwave Output Power	< 1 mW
Internal Power Consumption	< 50 mW in normal operation
Humidity	0 - 100% Relative Humidity, non-condensating
Start-up Time	< 40 s
4-20 mA HART (Output Option Code H) - (See Ordering Information in Table 1 on page 216 and Table 2 on page 220)	
Output	HART® 4-20 mA current loop. 
Signal Wiring	Recommended output cabling is twisted shielded pairs, 18-12 AWG
HART Tri-loop	 By sending the digital HART signal to the optional HART Tri-loop, it is possible to have up to three additional 4–20 mA analog signals. See the Rosemount 333 HART Tri-loop Product Data Sheet (Document No. 00813-0100-4754) for additional information.
Smart Wireless THUM Adapter	 The optional Smart Wireless THUM adapter can be mounted directly on the transmitter or by using a remote mounting kit. IEC 62591 (*Wireless*HART) enables access to multi-variable data and diagnostics, and adds wireless to almost any measurement point. See the Rosemount Smart Wireless THUM adapter Product Data Sheet (Document No. 00813-0100-4075) and Smart Wireless THUM Adapter for Rosemount Process Level Transmitter Applications (Document No. 00840-0100-4026).

External Power Supply	The input voltage U_I for HART® is 16-42.4 Vdc (16-30 Vdc in IS applications, and 20-42.4 Vdc in Explosion-proof / Flameproof applications).  R = Load Resistance (Ω); U_E = External Power Supply Voltage (Vdc); U_I = Input Voltage (Vdc)
IS Electrical Parameters	See “Product Certifications” on page 240.
Signal on Alarm (configurable)	High = 21.75 mA (standard Rosemount setting) Low = 3.75 mA (Option code C8) Namur NE43: High = 22.5 mA (Option code C4)
Saturation Levels	Standard: Low=3.9 mA, High=20.8 mA Namur NE43: Low=3.8 mA, High=20.5 mA  *(1) Transmitter Failure, hardware or software alarm in Low position.* *(2) Transmitter Failure, hardware or software alarm in High position.*

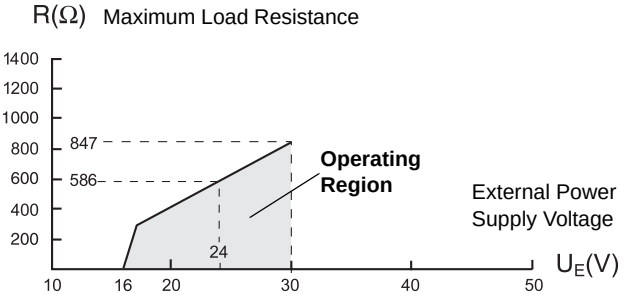
Load Limitations

Maximum load resistance (R) is determined by the voltage level of the external power supply (U_E), as described by:

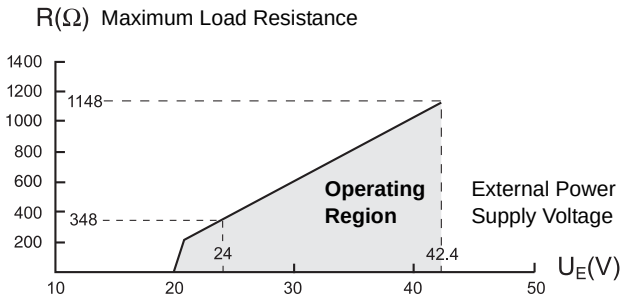
Non-Hazardous Installations



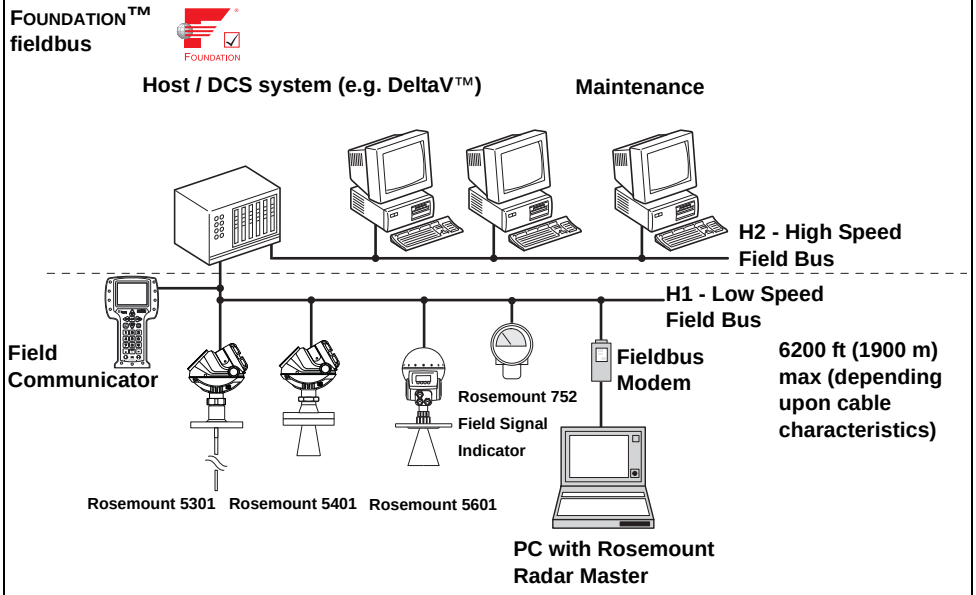
Intrinsically Safe Installations

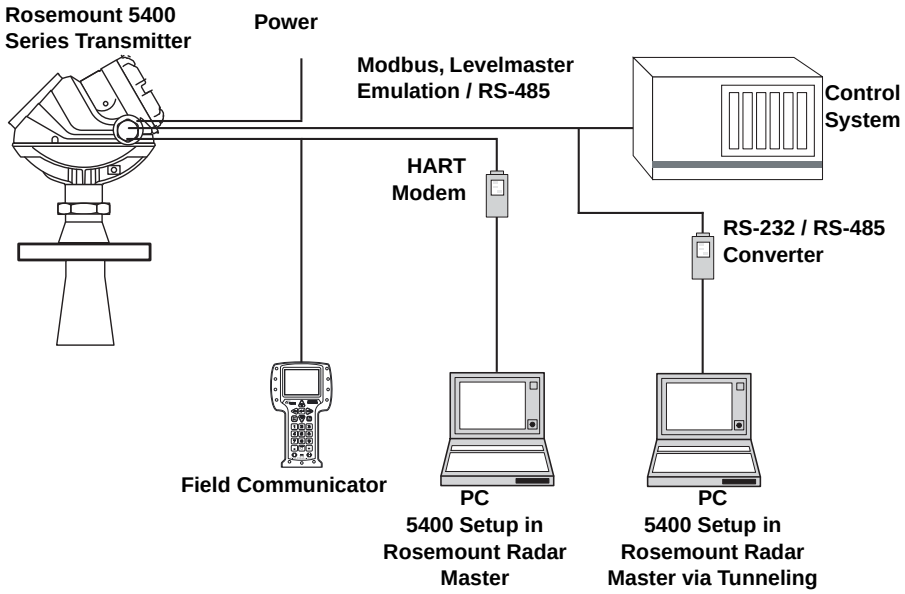
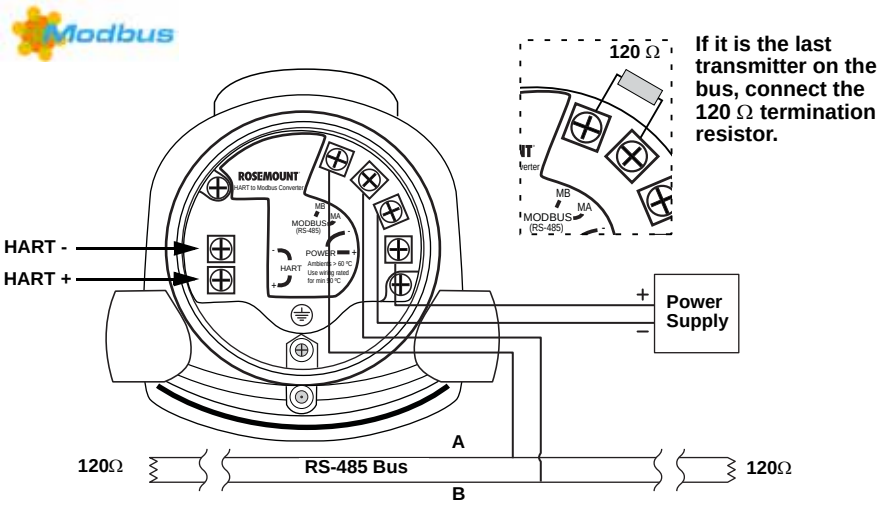


Explosion-proof / Flameproof Installations



NOTE
The diagram is only valid if the HART® load resistance is at the + side and if the - side is grounded, otherwise the load resistance value is limited to 435 Ω.

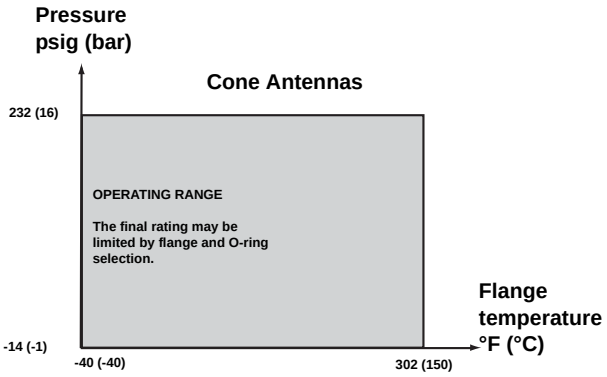
FOUNDATION™ fieldbus (Output Option Code F) - (See Ordering Information in Table 1 on page 216 and Table 2 on page 220)	
Output	**FOUNDATION™ fieldbus** 
Signal Wiring	Recommended output cabling is twisted shielded pairs, 18-12 AWG
External Power Supply	The input voltage U_I for FOUNDATION™ fieldbus is 9-32 Vdc (9-30 Vdc in IS applications, 9-17.5 Vdc in FISCO applications, and 16-32 Vdc in Explosion-proof / Flameproof applications)
Quiescent Current Draw	21 mA
FOUNDATION™ fieldbus Blocks	Resource block, 3 Transducer blocks, 6 Analog Input (AI) blocks, Proportional /Integral/Derivate (PID) block, Input Selector (ISEL) block, Signal Characterizer (SGCR) block, Arithmetic (ARTH) block, and Output Splitter (OS) block
FOUNDATION™ fieldbus Class (Basic or Link Master)	Link Master (LAS)
FOUNDATION™ fieldbus Block Execution Time	AI-block: 30 ms. PID-block: 40 ms. ARTH-, ISEL-, OSPL-block: 65 ms. CHAR-block: 75 ms
Conforming FOUNDATION™ fieldbus	ITK 4.6.1
FOUNDATION™ fieldbus PlantWeb® Alert Support	Yes

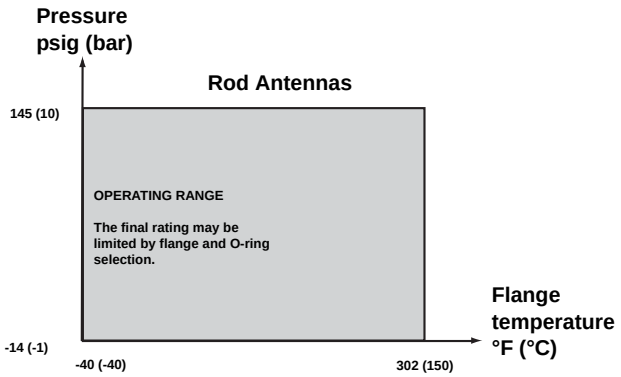
RS-485 with Modbus communication (Output Option Code M) - (See Ordering Information in Table 1 on page 216 and Table 2 on page 220)	
Output	The RS-485 Modbus version communicates by Modbus RTU, Modbus ASCII, and Level Master Protocols. 8 data bits, 1 start bit, 1 or 2 stop bits, and software configured parity Baud Rate: 1200, 2400, 4800, 9600 (default), and 19200 bits/s Address range: 1 to 255 (default device address is 246) HART communication is used for configuration via HART terminals, or tunneling via the RS-485. 
External Power Supply	The input voltage U_i for Modbus is 8-30 Vdc (max. rating) Power Consumption: < 0.5 W (with HART address=1) < 1.2 W (incl. four HART slaves) 
Signal Wiring	Two-wire half duplex RS-485 Modbus. Use shielded twisted pair wiring, preferably with an impedance of 120 Ω (typically 24 AWG), in order to comply with EIA-485 standard and EMC regulations.
Ground (Common Mode) Voltage Limit	± 7 V
Bus Termination	Standard RS-485 bus termination per EIA-485.

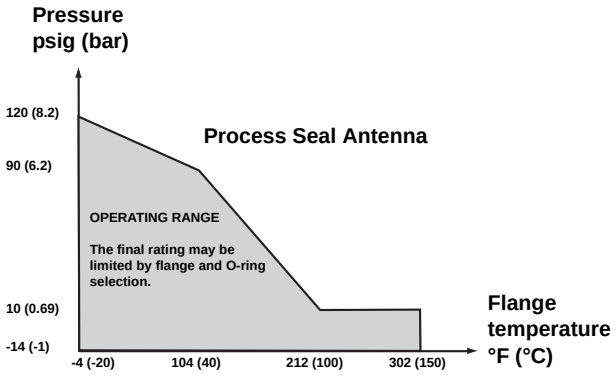
Display and Configuration	
Integral Display (Option code M1)	5-digit integral display. The process variables listed below can be presented. If more than one variable is chosen, carousel toggling of data is used. The display also shows diagnostics and error information.
Remote Display	Data can be read remotely by using the Rosemount 751 Field Signal Indicator (see Product Data Sheet, document number 00813-0100-4378) for 4-20 mA / HART®, or Rosemount 752 Remote Indicator for FOUNDATION™ fieldbus (see Product Data Sheet, document number 00813-0100-4377).
Configuration Tools	Emerson Field Communicator (e.g. 375/475 Field Communicator), Rosemount Radar Master (RRM) software package (included with delivery of transmitter), Emerson AMS™ Device Manager or any other EDDL or enhanced-EDDL host, or DeltaV or any other DD (Device Description) compatible host systems. Certificates are available from all major host system vendors.
	Notes: • DTM (compliant with version 1.2 of the FDT/DTM specification) supporting configuration in for instance Yokogawa Fieldmate/PRM, E+H™ FieldCare, and PactWare™ • To communicate using RRM or AMS Device Manager, a HART modem is required. The HART modem is available as an RS232 or USB version (see Table 3 on page 223) • The transmitter can be pre-configured by selecting option code C1 (see page Level-218), and sending a complete Configuration Data Sheet (CDS). The CDS is available from www.Rosemount.com
Diagnostics	Invalid measurement alerts, Configuration error alerts, Advanced Full / Empty Tank diagnostics, Hardware / Software Failures, Electronic Temperature, Online status report (advisory / warnings / errors), Signal Quality and Signal Strength Monitoring
Output Units	Level and Distance: ft, in., m, cm, or mm Volume: ft^3, $in.^3$, US gals, Imp gals, barrels, yd^3, m^3, or liters Level Rate: ft/s, m/s Temperature: °F, °C
Output Variables	Level, Distance, Volume, Level Rate, Signal Strength, Surface/Noise Margin, Internal Temperature, Analog Output Current(1), and % of Range(1)
Damping	0-60 s (2 s, default value)
Temperature and Pressure Limits	
Ambient Temperature	Non-Hazardous, HART communication: -40 °F to 176 °F (-40 °C to 80 °C) IS/EEx ia and XP/EEx d, HART communication: -40 °F to 158 °F (-40 °C to 70 °C) IS/EEx ia and XP/EEx d, FOUNDATION fieldbus: -40 °F to 140 °F (-40 °C to 60 °C) LCD readable in: -4 °F to 158 °F (-20 °C to 70 °C)
Storage Temperature	-58 °F to 194 °F (-50 °C to 90 °C) LCD: -40 °F to 185 °F (-40 °C to 85 °C)

<table>
<tr><td rowspan="3">Process Temperature and Pressure</td><td>Rosemount 5402 and 5401 with SST Cone Antenna (Model Code 2S-8S),
Rosemount 5402 and 5401 with Protective Plate Cone Antenna (Model Code: 2H-8H, 2M-8M, and 2N-8N)

The final rating depends on the antenna, the tank seal, and O-rings (if applicable). See Table 4, Table 5, and Table 6 on page 231.

 
</td></tr>
<tr><td>Rosemount 5401 with Rod Antenna (Model Code 1R-4R)

 
</td></tr>
<tr><td>Rosemount 5402 with Process Seal Antenna (Model Code (2P-4P)

 
</td></tr>
<tr><td>ASME / ANSI Flange Rating</td><td>316L SST flanges according to ASME B16.5 Table 2-2.3</td></tr>
<tr><td>EN Flange Rating</td><td>1.4404 according to EN 1092-1 material group 13E0</td></tr>
<tr><td>JIS Flange Rating</td><td>316L SST according to JIS B2220 material group 2.3</td></tr>
<tr><td>Flange Connection Rating</td><td>See Table 7 for the conditions used for flange strength calculations</td></tr>
</table>

(1) Not applicable for FOUNDATION™ fieldbus.

TABLE 4. Temperature restrictions due to O-ring selection - Rosemount 5402 and 5401 with SST Cone Antenna (Model Code 2S-8S) and with Protective Plate Cone Antenna (Model Code: 2H-8H, 2M-8M, and 2N-8N)

Tank seal with different O-ring materials[1]	Min. Temperature °F (°C) in air	Max. Temperature °F (°C) in air
Viton®	-4 (-20)	302 (150)
Ethylene Propylene (EPDM)	-40 (-40)	302 (150)
Kalrez® 6375	5 (-15)	302 (150)
Buna-N	-40 (-40)	230 (110)

(1) Always check the chemical compatibility of the o-ring material with your application

TABLE 5. Temperature restrictions due to O-ring selection (not applicable for 1R and 2R where no process O-ring is present) - Rosemount 5401 with Rod Antenna (Model Code 3R-4R)

Tank seal with different O-ring materials[1]	Min. Temperature °F (°C) in air	Max. Temperature °F (°C) in air
Viton®	-4 (-20)	302 (150)
Ethylene Propylene (EPDM)	-40 (-40)	302 (150)
Kalrez® 6375	5 (-15)	302 (150)
Buna-N	-40 (-40)	230 (110)

(1) Always check the chemical compatibility of the o-ring material with your application

TABLE 6. Temperature restrictions due to O-ring selection - Rosemount 5402 with Process Seal Antenna (Model Code 2P-4P)

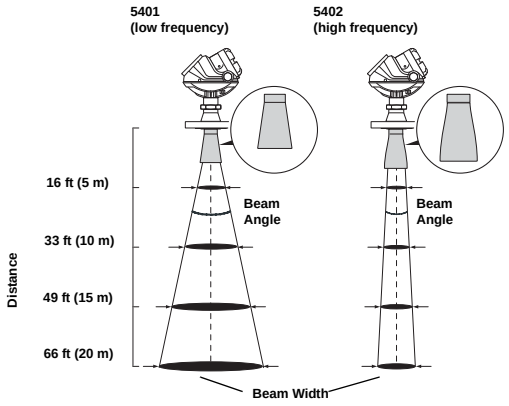
Tank seal with different O-ring materials[1]	Min. Temperature °F (°C) in air	Max. Temperature °F (°C) in air
Viton®	-4 (-20)	302 (150)
Ethylene Propylene (EPDM)	-4 (-20)	275 (135)
Kalrez® 6375	23 (-5)	302 (150)
Buna-N	-4 (-20)	257 (125)

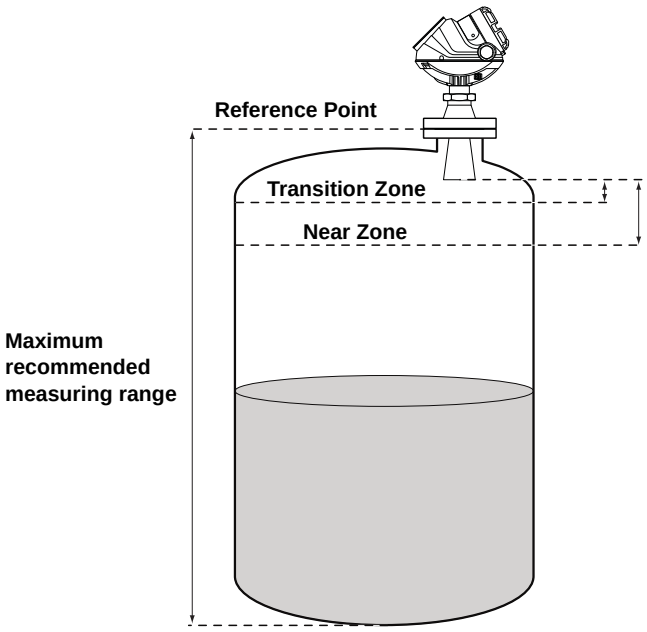
(1) Always check the chemical compatibility of the o-ring material with your application

TABLE 7. Conditions used for flange strength calculations

	Bolting material	Gasket	Flange material
ASME / ANSI	SST SA193 B8M Class 2	Soft (1a) with min. thickness 1.6 mm	SA/A182 316L
EN, JIS	EN 1515-1/-2 group 13E0, A4-70	Soft (EN 1514-1) with min. thickness 1.6 mm	EN 10222-5-1.4404

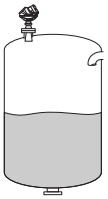
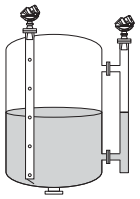
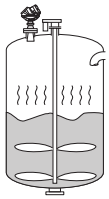
Performance Specification

General	
Reference Conditions	Ideal metal plate with no disturbing objects. Temperature: + 68 °F (20 °C). Pressure: 14-15 psi (960-1060 mbar). Humidity: 25-75 % RH.
Instrument Accuracy at reference conditions	5402: ± 0.1 in. (± 3 mm) 5401: ± 0.4 in. (± 10 mm)
Repeatability	± 0.04 in. (± 1 mm) at 16.4 ft (5 m) distance
Resolution	0.04 in. (1 mm)
Ambient Temperature Effect	0.05 %/10 K in temperature range -40 °F to 176 °F (-40 °C to 80 °C)
Update Interval	1 second
Measuring Range	
Measuring Range and Minimum Dielectric Constant	Maximum measuring range is 115 ft (35 m) from flange. The measuring range depends on: • microwave frequency • antenna size • the dielectric constant (ε_r) of the liquid (min. ε_r=1.4) • process conditions See Table 8 and Table 9 for measuring range and minimum dielectric constant. Due to the measuring range depending on the application and factors described below, the values are a guideline for clean liquids. For more information, ask your local Emerson Process Management representative.
Beam Angle and Beam Width	For a comparison between the beam angle and beam width for the Rosemount 5401 (~6 GHz) and 5402 (~26 GHz) transmitters with antennas of the same size and type, see Table 10 on page 234, Table 11 on page 235, and Table 12 on page 235. 

Transition Zone	Transition zones are areas where measurements are not recommended. Near Zones are areas where the accuracy is reduced. 
Transition Zone	6 in. (150 mm) from lower end of the antenna
Near Zone Distance	1.3 ft (0.4 m) from lower end of the antenna
Near Zone Accuracy	5402: ± 0.6 in. (± 15 mm) 5401: ± 1.2 in. (± 30 mm)
Max Level Rate	1.6 in./s (40 mm/s) as default, adjustable to 7.1 in./s (180 mm/s)
Environment	
Vibration Resistance[1]	Aluminum housing: IEC 60770-1 Level 1. SST housing: IACS E10.
Electromagnetic Compatibility[1]	Emission and Immunity: EMC directive 204/108/EC. EN 61326-1:2006. NAMUR recommendations NE21.
Transient / Built-in Lightning Protection[1]	IEC 61000-4-5:2001 T1 option: C62.41.2-2002 (IEEE), C37.90.1 (IEEE)
Pressure Equipment Directive (PED)	97/23/EC
Radio Approvals[2][3]	FCC part 15C (1998)[4], R&TTE (EU directive 99/5/EC), and IC (RSS210-5)

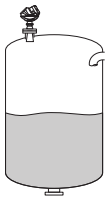
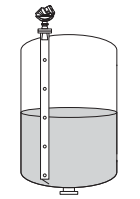
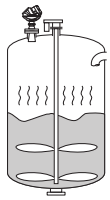
(1) The device may also comply with other standards. Consult your local Emerson Process Management representative.
(2) Only a limited selection is presented. Contact your local Emerson Process Management representative for more information.
(3) For Japan: "Install device on tanks or pipes made of metal".
(4) For 5402: "This device is authorized for use in tank-mounted applications, including metal tanks as well as concrete, plastic, glass, and other non-conductive tanks." No specific restrictions are stated for the 5401.

TABLE 8. Rosemount 5402, Maximum Recommended Measuring Range, ft (m)

High Frequency Antennas									
	Dielectric Constant[1]								
	A	**B**	**C**	**A**	**B**	**C**	**A**	**B**	**C**
2-in. Cone / Process Seal	33 (10)	49 (15)	66 (20)	82 (25)	115 (35)	115 (35)	9.8 (3)	20 (6)	33 (10)
3-in. Cone / Process Seal	49 (15)	66 (20)	98 (30)	82 (25)	115 (35)	115 (35)	13 (4)	30 (9)	39 (12)
4-in. Cone / Process Seal	66 (20)	82 (25)	115 (35)	82 (25)	115 (35)	115 (35)	23 (7)	39 (12)	49 (15)

(1) A. Oil, gasoline or other hydrocarbons, and petrochemicals (ε_r=1.9-4.0)
In pipes or with ideal surface conditions, for some liquefied gases (ε_r=1.4-4.0)
B. Alcohols, concentrated acids, organic solvents, oil/water mixtures, and acetone (ε_r=4.0-10.0)
C. Conductive liquids, e.g. water based solutions, dilute acids, and alkalis (ε_r>10.0)

TABLE 9. Rosemount 5401, Maximum Recommended Measuring Range, ft (m)

Low Frequency Antennas									
	Dielectric Constant[1]								
	A	**B**	**C**	**A**	**B**	**C**	**A**	**B**	**C**
3-in. Cone[2]	NA	NA	NA	82 (25)	115 (35)	115 (35)	NA	NA	NA
4-in. Cone / Rod[3]	23 (7)	39 (12)	49 (15)	82 (25)	115 (35)	115 (35)	13 (4)	26 (8)	39 (12)
6-in. Cone	43 (13)	66 (20)	82 (25)	82 (25)	115 (35)	115 (35)	20 (6)	33 (10)	46 (14)
8-in. Cone	66 (20)	82 (25)	115 (35)	82 (25)	115 (35)	115 (35)	26 (8)	39 (12)	52 (16)

(1) A. Oil, gasoline or other hydrocarbons, and petrochemicals (ε_r=1.9-4.0)
In pipes or with ideal surface conditions, for some liquefied gases (ε_r=1.4-4.0)
B. Alcohols, concentrated acids, organic solvents, oil/water mixtures, and acetone (ε_r=4.0-10.0)
C. Conductive liquids, e.g. water based solutions, dilute acids, and alkalis (ε_r>10.0)
(2) Pipe installations only. NA=not applicable.
(3) Pipe installations are not allowed with rod antennas.

TABLE 10. Beam Angle for Rosemount 5400 Series

Antenna Size	**Beam Angle 5402**	**Beam Angle 5401**
2-in. Cone / Process Seal[1]	19°	–
3-in. Cone / Process Seal[1]	14°	(Pipe only)
4-in. Cone / Process Seal[1], Rod[2]	9°	37°
6-in. Cone	–	23°
8-in. Cone	–	17°

(1) Only with 5402.
(2) Only with 5401.

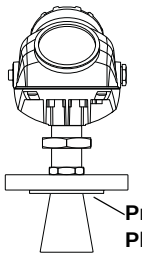
TABLE 11. Beam width at different distances from flange for 5402

Distance	Antenna		
	2-in. Cone / Process Seal	3-in. Cone / Process Seal	4-in. Cone / Process Seal
	Beam width, ft (m)		
16 ft (5 m)	4.9 (1.5)	3.3 (1.0)	3.3 (1.0)
33 ft (10 m)	9.8 (3.0)	6.6 (2.0)	4.9 (1.5)
49 ft (15 m)	14.8 (4.5)	9.8 (3.0)	8.2 (2.5)
66 ft (20 m)	19.7 (6.0)	13.1 (4.0)	9.8 (3.0)

TABLE 12. Beam width at different distances from flange for 5401

Distance	Antenna		
	4-in. Cone / Rod	6-in. Cone	8-in. Cone
	Beam width, ft (m)		
16 ft (5 m)	11.5 (3.5)	6.6 (2.0)	4.9 (1.5)
33 ft (10 m)	23.0 (7.0)	13.1 (4.0)	9.8 (3.0)
49 ft (15 m)	32.8 (10)	19.7 (6.0)	14.8 (4.5)
66 ft (20 m)	42.7 (13)	26.2 (8.0)	19.7 (6.0)

Physical Specification

Housing and Enclosure	
Product	Rosemount 5400 Series, Non-Contacting Radar
Type	Dual compartment (terminal compartment and the electronics are completely separated). Two entries for conduit or cable connections. The transmitter housing can be rotated in any direction
Electrical Connection	½ - 14 NPT for cable glands or conduit entries. Optional: M20 x 1.5 conduit / cable adapter, M12 4-pin male eurofast® connector or A size Mini 4-pin male minifast® connector. Recommended output cabling is twisted shielded pairs, 18-12 AWG.
Housing Material	Polyurethane-covered Aluminum, or Stainless steel Grade CF8M (ASTM A743)
Ingress Protection	Type 4X, IP66, IP67
Factory Sealed	Yes
Weight	Transmitter Head (TH): Aluminium 4.4 lb (2 kg), Stainless steel 10.8 lb (4.9 kg)
Tank Connection and Antennas	
Tank Connection	The tank connection consists of a tank seal, a flange, Tri-Clamp, or NPT thread. Certain models of tank connections have a tank connection design with a protective plate of the same material as the antenna. This is to prevent the 316L / EN1.4404 Stainless steel flange from being exposed to the tank atmosphere. See “Dimensional Drawings and Mechanical Properties” on page 243.  **Protective Plate**
Flange Dimensions	Follows ANSI B16.5, JIS B2220, and EN 1092-1 standards. For more information, see “Standard Flanges” on page 248.
Antennas	Cone, Process Seal, and Rod Antenna. Cone Antennas can be ordered in different materials. Extended Cone Antennas are available in Stainless steel 316L. **5402 Cone Antenna** • Suitable for stilling-well/bridle installation • Can be recessed in smooth nozzles. • Cone extensions are available **5402 Process Seal Antenna** • Ideal for small tanks and corrosive applications • Suitable for applications with heavy condensation/build-up **5401 Cone Antenna** • Suitable for applications with heavy condensation/build-up • Cone extensions are available **5401 Rod Antenna** • Suitable for small process connections and corrosive environments • Two versions; All PFA and PFA+SST
Antenna Dimensions	**Cone Antenna:** see “Rosemount 5402 and 5401 with SST Cone Antenna (model code 2S-8S)” on page 243 and “Rosemount 5402 and 5401 with Protective plate cone antenna (model code: 2H-8H, 2M-8M, and 2N-8N)” on page 244. **Rod Antenna:** see “Rosemount 5401 with Rod Antenna (model code 1R-4R)” on page 245. **Process Seal Antenna:** see “Rosemount 5402 with Process Seal Antenna (model code 2P-4P)” on page 246.

Material Exposed to Tank Atmosphere	**Cone Antenna** • 316 / 316 L SST (EN 1.4404) or Alloy 400 (UNS NO4400) or Alloy C-276 (UNS N10276). Alloy 400 and Alloy C-276 antennas have a protective plate design • PTFE fluoropolymer • O-ring material. **Rod Antenna, Two versions** • All-PFA(1) fluoropolymer • PFA(1) fluoropolymer, 316 / 316 L SST (EN 1.4404) and O-ring material. **Process Seal Antenna** • PTFE fluoropolymer • O-ring material
Weight	**Antennas** Cone Antenna (Model Code 2S-8S, 2H-8H, 2M-8M, 2N-8N): 2.2 lb (1.0 kg) Process Seal Antenna (Model Code 2P-4P): 4.4 lb (2.0 kg) Rod Antenna (Model Code 1R-4R): 2.2 lb (1.0 kg) **Process Connections(2)** ANSI Flange, 2 in. 150 lb SST (AA): 6.6 lb (3.0 kg) EN (DIN) Flange, DN50 PN40 SST (HB): 8.8 lb (4.0 kg) JIS Flange 50A 10K SST (UA): 6.6 lb (3.0 kg) Bracket Mounting (BR): 4.4 lb (2.0 kg) Thread Adapter (RA): 1.1 lb (0.5 kg)
Minimum Clearance	No clearance distance needed.

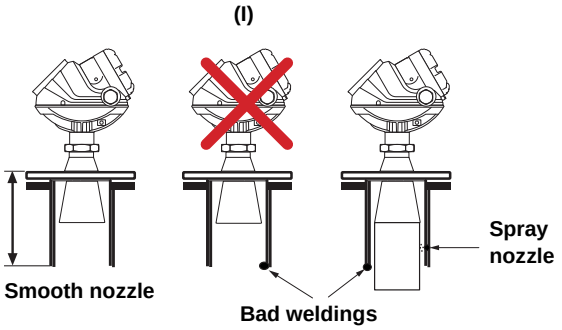
Installation and Mounting Considerations

Tank Installations

Special considerations may have to be taken due to the nozzle, depending on the selection of transmitter model and antenna.

5402 with Cone Antenna

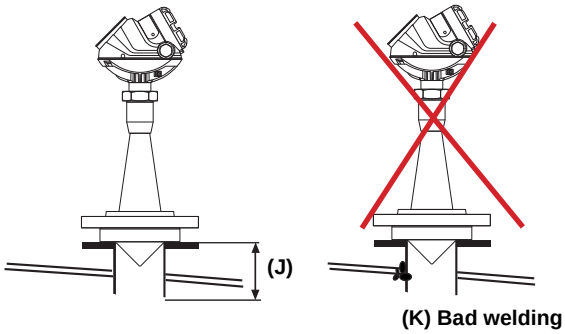
The antenna can be recessed in smooth nozzles up to 6 ft (2 m). If the inside of the nozzle contains disturbing objects, use the extended cone (I).



5402 with Process Seal Antenna

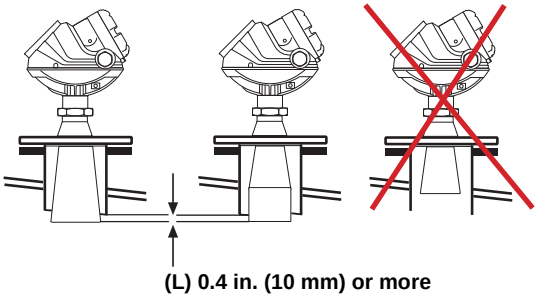
The antenna can be used on nozzles up to 6 ft (2 m), (J). Disturbing objects inside the nozzle (K) may impact the measurement, and should be avoided.

The flange on the tank should have a flat or raised face. Other tank flanges may be possible, please consult your local Emerson representative for advice.



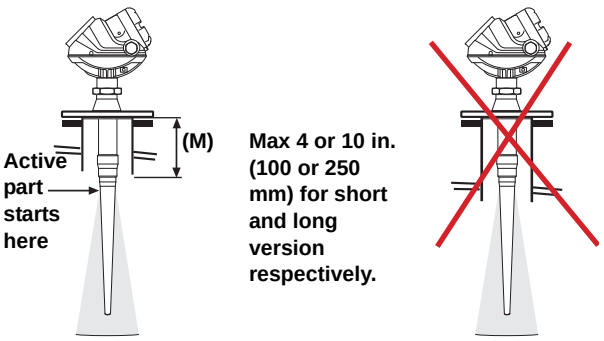
5401 with Cone Antenna

The antenna should extend 0.4 inches (10 mm), or more, below the nozzle (L). Use the extended cone solution.



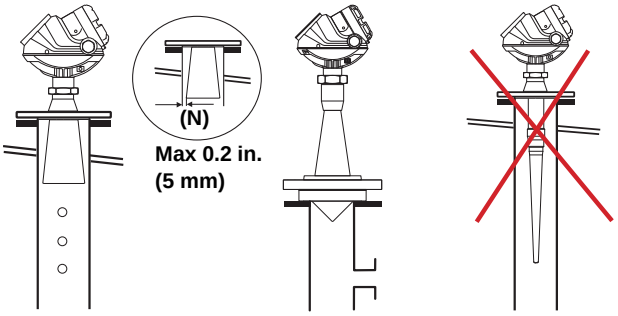
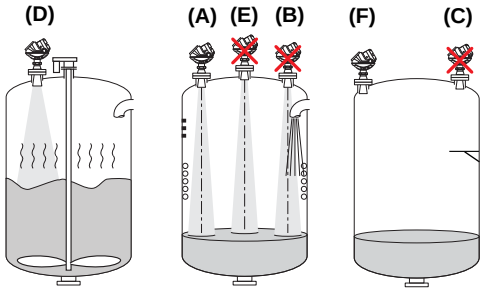
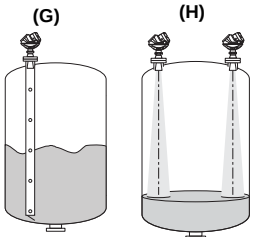
5401 with Rod Antenna

The active part of the rod antenna should be placed under the nozzle (M).



Level

5400

Pipe / Chamber Installations	If used correctly, pipe or chamber measurement can be advantageous in many applications: • The 5402 is the preferred choice for pipe measurements • Use cone or process seal antennas – not the rod antenna • The gap between the cone antenna and the still-pipe is limited to 0.2 in. (5 mm). If required, order an oversized antenna and cut on location (N). • The inside of the chamber shall be of a constant diameter 
Ball-valve Installations	The 5400 Series transmitter can be isolated from the process by using a valve: • The 5402 is the preferred choice for pipe measurement • Use the largest possible antenna • Use a full-port ball valve • Ensure there is no edge between the ball valve and the nozzle / pipe, the inside should be smooth • Valves can be combined with pipes
Mechanical Mounting Considerations	• Filling inlets creating turbulence (B), and stationary metallic objects with horizontal surfaces (C) should be kept at a distance, outside the signal beam – see tables on page 235 for beam width information • Agitators with large horizontal blades may reduce the performance of the transmitter, so install the transmitter in a location where this effect is minimized. Vertical or slanted blades are often invisible to radar, but create turbulence (D) • Do not install the transmitter in the center of the tank (E) • Because of circular polarization, there is no clearance distance requirement from the tank wall if it is flat and free from obstructions such as heating coils and ladders (F). Usually, the optimal location is 1/3 of the radius from the tank wall  • The antenna is normally aligned vertically • A still-pipe can be used to avoid disturbing objects, turbulence, and foam (G) • The walls in non-metallic tanks are invisible to the radar signal, so nearby objects outside the tank may be detected • Choose the largest possible antenna diameter for installation. A larger antenna concentrates the radar beam, and will be less susceptible to obstruction interference. It also assures maximum antenna gain • Multiple 5400 transmitters can be used in the same tank without interfering with each other (H) 

(1) PFA is a fluoropolymer with properties similar to PTFE.
(2) Approximate weights for other 5400 Series process connection sizes than those in this table can be estimated:
First of all, find out the weight of the SST blind flange (slip-on for process seal antennas) that corresponds to the type and size shown in this table.
Find out the weight for the SST blind flange that corresponds to the specific 5400 Series flange size which is not represented in this table.
The 5400 Series flange weight can be estimated by adding the relative weight difference of these SST blind flanges.

Product Certifications

SAFETY NOTE

A safety isolator such as a zener barrier is always needed for intrinsic safety.

EU Conformity

The most recent revision of the EC declaration of conformity can be found at www.rosemount.com.

Safety Instrumented Systems (SIS)

The Rosemount 5400 Series has been evaluated by a third party, the SP (Technical Research Institute of Sweden), against hardware requirements according to IEC 61508. With a FMEDA (Failure Modes, Effects and Diagnostics Analysis) report with a Safe Failure Fraction (SFF) above 80%, 5400 is suitable in SIS according to the Prior Use methodology. For more information, go to: http://www.emersonprocess.com/rosemount/safety/. To order the certificate of FMEDA data use option code QS.

Canadian Registration Number (CRN)

Cert no: 0F06878.2

The product design has been accepted and registered for use in Canada.

ATEX Approvals CE

Nemko 04ATEX1073X

SPECIAL CONDITIONS FOR SAFE USE (X)

The intrinsically safe circuits do not withstand the 500 Vac test as specified in IEC 60079-11 clause 6.4.12.

Impact and friction hazards need to be considered according to EN 60079-0 clause 8.1.2 when the transmitter and part of antennas exposed to the exterior atmosphere of the tank is made with light metal alloys and of category II 1G EPL Ga.

Parts of the rod-antenna and the all PTFE antenna are non-conducting and the area of the non-conducting part exceeds the maximum permissible areas for Group IIC according to IEC 60079-0 clause 7.3: 20 cm^2 for II 2G EPL Gb and 4 cm^2 for II 1G EPL Ga. Therefore, when the antenna is used in a potentially explosive atmosphere, appropriate measures must be taken to prevent electrostatic discharge.

The Ex ia version of model 5400 may be supplied by an Ex ib certified safety barrier. The whole circuit shall then be regarded type Ex ib. The antenna is classified EPL Ga and electrically separated from the Ex ia or ib circuit.

E1(1) Flameproof:

II 1/2 G T4.
II 1D T79°C(2)
Ex ia/db ia IIC T4 Ga/Gb (-40 °C≤T_a≤+70 °C(3)).
Ex ta IIIC T79°C(2) (-40 °C≤T_a≤+70 °C(3))
U_m=250 V
Approval valid for HART, FOUNDATION fieldbus, and Modbus options.

I1(1), IA(1)Intrinsically Safe:

II 1/2 G T4
II 1 D T79°C(2)
Ex ia IIC T4 Ga/Gb (-50 °C≤T_a≤+70 °C(3))
Ex ta IIIC T79°C(2) (-50 °C≤T_a≤+70 °C(3))
4-20 mA / HART model: U_i=30 Vdc, I_i=130 mA, P_i=1.0 W, C_i=7.26 nF, L_i=0 H.
FOUNDATION™ fieldbus model: U_i=30 Vdc, I_i=300 mA, P_i=1.5 W, C_i=0 nF, L_i=0 H.
FISCO model: U_i=17.5 Vdc, I_i=380 mA, P_i=5.32 W, C_i=0 nF, L_i<1 µH.
Installation Drawing: 9150079-907.
Approval valid for HART, FOUNDATION fieldbus, and FISCO options.

National Supervision and Inspection Center for Explosion Protection and Safety of Instrumentation (NEPSI) Approvals

SPECIAL CONDITIONS FOR SAFE USE (X)

Refer to Certificates:
GYJ06242X and GYJ06458X.

E3(1) Flameproof:

Ex iad IIC T4 (-40 °C<T_a<+70 °C(3)).
U_m=250 V

I3(1) Intrinsically Safe:

Ex ia IIC T4 (-40 °C<T_a<+70 °C(3)).
4-20 mA / HART® model: U_i=30 Vdc, I_i=130 mA, P_i=1.0 W, C_i=7.26 nF, L_i=0 H.
FOUNDATION™ fieldbus model: U_i=30 Vdc, I_i=300 mA, P_i=1.5 W, C_i=0 nF, L_i=0 H.
FISCO model: U_i=17.5 Vdc, I_i=380 mA, P_i=5.32 W, L_i=C_i=0.

(1) Ordering Information code for Product Certificates, see page Level-216 and page Level-220.
(2) +69 °C with FOUNDATION™ fieldbus or FISCO option.
(3) +60 °C with FOUNDATION™ fieldbus or FISCO option.

Technology Institution of Industrial Safety (TIIS) Approval

E4[1] Flameproof:
Transmitter: Ex d [ia] IIC T4
Antenna: Ex ia IIC T4
Installation Drawing: 05400-00375.
Approval valid for HART and FOUNDATION fieldbus options.

Factory Mutual (FM) Approvals

Project ID: 3020497

E5[1] Explosion Proof for Class I, Div. 1, Groups B, C, and D;
Dust Ignition Proof for Class II/III, Div. 1, Groups E, F, and G;
With Intrinsically Safe connections to
Class I, II, III, Div. 1, Groups B, C, D, E, F, and G.
Temp. Code T4
Ambient temperature limits: -50 °C to +70 °C[2].
Seal not required.
Approval valid for HART, FOUNDATION fieldbus, and Modbus options.

I5[1], IE[1]Intrinsically Safe for Class I, II, III, Div. 1, Groups A, B, C, D, E, F, and G,
Class I, Zone 0, AEx ia IIC T4 when installed per Control Drawing: 9150079-905.

Non-Incendive Class I, II, Div. 2, Groups A, B, C, D, F, and G
Suitable for Class II, III.

4-20 mA / HART® model: U_i=30 Vdc, I_i=130 mA, P_i=1.0 W, C_i=7.26 nF, L_i=0 H.

FOUNDATION™ fieldbus model: U_i=30 Vdc, I_i=300 mA, P_i=1.3 W, C_i=0 nF, L_i=0 H.
FISCO model: U_i=17.5 Vdc, I_i=380 mA, P_i=5.32 W, L_i=C_i=0.

Temp. Code T4
Ambient temperature limits: -50 °C to +70 °C[2].
Approval valid for HART, FOUNDATION fieldbus, and FISCO options.

Canadian Standards Association (CSA) Approvals

This product meets the Dual Seal Requirements of ANSI/ISA 12.27.01-2003.

Cert. no.: 1514653

E6[1] Explosion-proof with internal Intrinsically Safe Circuits [Exia]
Class I, Div. 1, Groups B, C, and D;

Temp Code T4.

Class II, Div. 1 and 2, Groups E, F, and G;

Class III, Div. 1

Ambient temperature limits -50 °C to +70 °C[2]

Approval valid for HART, FOUNDATION fieldbus, and Modbus options.

I6[1], IF[1]Intrinsically Safe Exia:
Class I, Div. 1, Groups A, B, C, and D.

Temp Code T4.

4-20 mA / HART® model: U_i=30 Vdc, I_i=130 mA, P_i=1.0 W, C_i=7.26 nF, L_i=0 H.

FOUNDATION™ fieldbus model: U_i=30 Vdc, I_i=300 mA, P_i=1.3 W, C_i=0 nF, L_i=0 H.
FISCO model: U_i=17.5 Vdc, I_i=380 mA, P_i=5.32 W, L_i=C_i=0.

Installation Drawing: 9150079-906
Ambient temperature limits -50 °C to +70 °C[2].
Approval valid for HART, FOUNDATION fieldbus, and FISCO options.

(1) Ordering Information code for Product Certificates, see page Level-216 and page Level-220.
(2) +60 °C with FOUNDATION™ fieldbus or FISCO option.

IECEx Approval

IECEx NEM 06.0001X

SPECIAL CONDITIONS FOR SAFE USE (X)

The intrinsically safe circuits do not withstand the 500 V AC test as specified in IEC 60079-11 clause 6.4.12.

Impact and friction hazards need to be considered according to EN 60079-0 clause 8.1.2 when the transmitter and part of antennas exposed to the exterior atmosphere of the tank is made with light metal alloys and of category II 1G EPL Ga.

Parts of the rod-antenna and the all PTFE antenna are non-conducting and the area of the non-conducting part exceeds the maximum permissible areas for Group IIC according to IEC 60079-0 clause 7.3: 20 cm^2 for II 2G EPL Gb and 4 cm^2 for II 1G EPL Ga. Therefore, when the antenna is used in a potentially explosive atmosphere, appropriate measures must be taken to prevent electrostatic discharge.

The Ex ia version of model 5400 may be supplied by an Ex ib certified safety barrier. The whole circuit shall then be regarded type Ex ib. The antenna is classified EPL Ga and electrically separated from the Ex ia or ib circuit.

E7(1) Flameproof:
Ex ia/db ia IIC T4 Ga/Gb (-40 °C ≤ T_a ≤ +70 °C(2)).
Ex ta IIIC T79°C(3) (-40 °C ≤ T_a ≤ +70 °C(2))
U_m=250 V
Approval valid for HART, FOUNDATION fieldbus, and Modbus options.

I7(1), IG(1) Intrinsically Safe:
Ex ia IIC T4 Ga/Gb (-50 °C<T_a<+70 °C(2)).
Ex ta IIIC T79°C(3) (-50 °C<T_a<+70 °C(2)).
4-20 mA / HART model: U_i=30 Vdc, I_i=130 mA, P_i=1.0 W, C_i=7.26 nF, L_i=0 H.
FOUNDATION fieldbus model: U_i=30 Vdc, I_i=300 mA, P_i=1.5 W, C_i=0 nF, L_i=0 H.
FISCO model: U_i=17.5 Vdc, I_i=380 mA, P_i=5.32 W, C_i=0 nF, L_i<1 µH.
Installation Drawing: 9150079-907.
Approval valid for HART, FOUNDATION fieldbus, and FISCO options.

NCC/INMETRO Approvals

SPECIAL CONDITIONS FOR SAFE USE (X)

Refer to Certificate:
3815/07X

E2 Flameproof:
BR-Ex ia Ga d Gb IIC T4 (-40 °C≤T_a≤+70 °C(2))
Approval valid for HART, FOUNDATION fieldbus, and Profibus options.

I2, IB Intrinsically Safe:
BR-Ex ia IIC T4 (-40 °C≤T_a≤+70 °C(2)) Ga
Approval valid for HART, FOUNDATION fieldbus, and Profibus options.

Overfill Protection

Cert no: Z-65.16-475

U1 TÜV-tested and approved by DIBt for overfill protection according to the German WHG regulations.
Approval valid for HART option.

Suitability for Intended Use

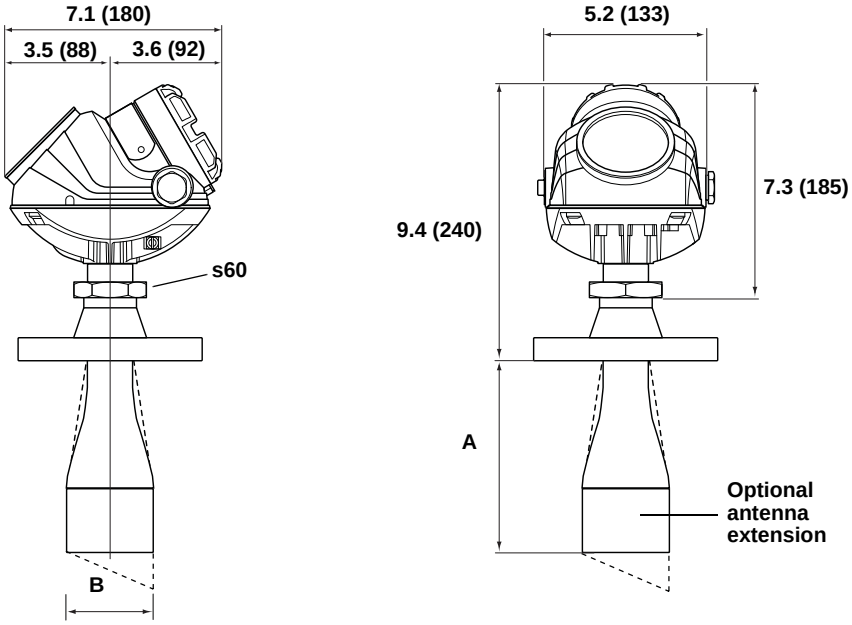
Compliant with NAMUR NE 95, version 07.07.2006 “Basic Principles of Homologation”

For more information on product certificates, refer to the Reference Manual (document number 00809-0100-4026).

(1) Ordering Information code for Product Certificates, see page Level-216 and page Level-220.
(2) +60 °C with FOUNDATION™ fieldbus or FISCO option.
(3) +69 °C with FOUNDATION™ fieldbus or FISCO option.

Dimensional Drawings and Mechanical Properties

ROSEMOUNT 5402 AND 5401 WITH SST CONE ANTENNA (MODEL CODE 2S-8S)



All dimensions are in inches (mm).

Process Connection Availability
● Available as standard
❍ Available as special, consult factory
– Not available

	Antenna Code	
Process Connection	**2S**	**3S, 4S, 6S, 8S**
2 in. / DN 50 / 50A	●	❍
3 in. / DN 80 / 80A	●	●
4 in. / DN 100 / 100A	●	●
6 in. / DN 150 / 150A	●	●
8 in. / DN 200 / 200A	●	●
Threaded Connection	-	-
Bracket Mounting	●	●

5402 Standard SST Cone

Cone size (inches)	A	B	Antenna Code
2	6.5 (165)	2.0 (50)	2S
3	5.9 (150)	2.6 (67)	3S
4	8.8 (225)	3.6 (92)	4S

5401 Standard SST Cone

Cone size (inches)	A	B	Antenna Code
3	3.3 (84)	2.6 (67)	3S
4	5.9 (150)	3.6 (92)	4S
6	7.3 (185)	5.5 (140)	6S
8	10.6 (270)	7.4 (188)	8S

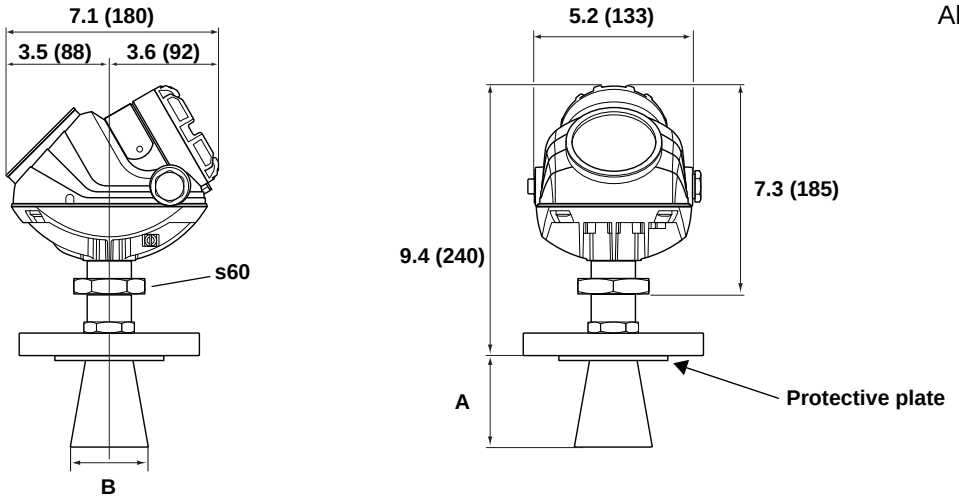
5402 and 5401 Extended SST Cone(1)

Max. nozzle height	A	Option Code
20 (500)	20.4 (518)	S3

(1) The extended cone antennas are available in 5-inch step increments from 10 to 50 inches. Consult your local Emerson Process Management representative for more information. Expect long lead times for other sizes than the 20 in. (500 mm) version.

Drawing: 9240030-970 (www.rosemount.com)

ROSEMOUNT 5402 AND 5401 WITH PROTECTIVE PLATE CONE ANTENNA (MODEL CODE: 2H-8H, 2M-8M, AND 2N-8N)



All dimensions are in inches (mm).

5402 Cone Antenna With Protective Plate

Cone size (inches)	A	B	Antenna Code
2	5.9 (150)	2.0 (50)	2H, 2M, 2N
3	6.9 (175)	2.6 (67)	3H, 3M, 3N
4	9.8 (250)	3.6 (92)	4H, 4M, 4N

5401 Cone Antenna With Protective Plate

Cone size (inches)	A	B	Antenna Code
3	3.3 (84)	2.6 (67)	3H, 3M, 3N
4	5.9 (150)	3.6 (92)	4H, 4M, 4N
6	7.3 (185)	5.5 (140)	6H, 6M, 6N
8	10.6 (270)	7.4 (188)	8H, 8M, 8N

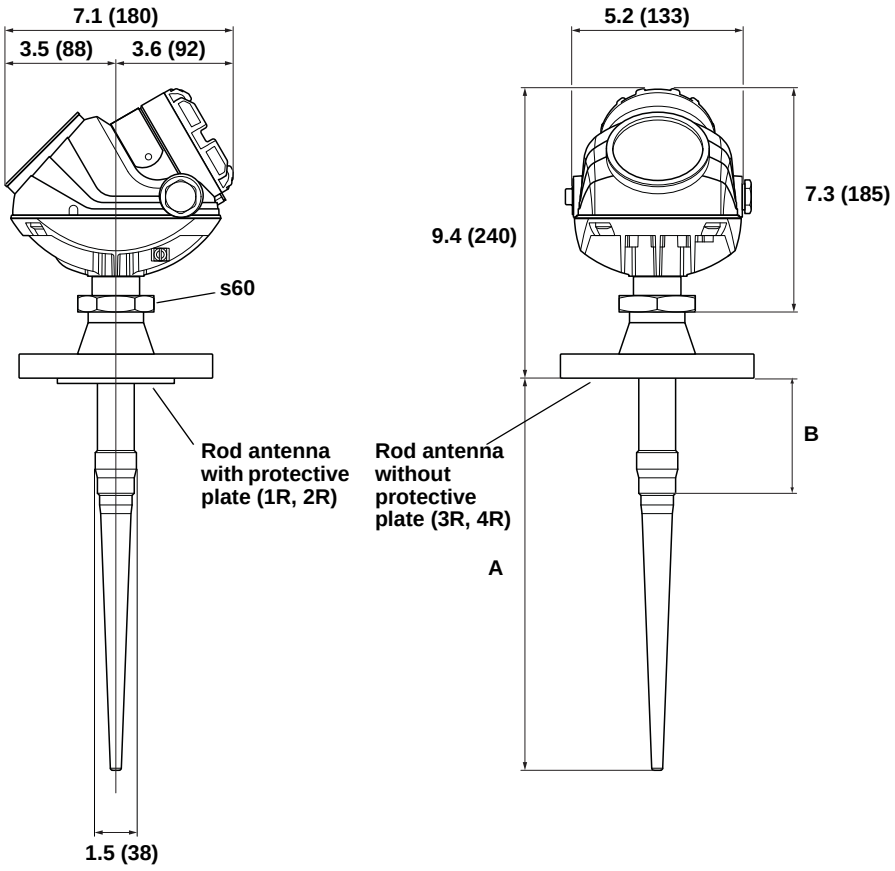
Process Connection Availability
● Available as standard
❍ Available as special, consult factory
– Not available

	Antenna Code				
Process Connection	2H, 2M, 2N	3H, 3M, 3N	4H, 4M, 4N	6H, 6M, 6N	8H, 8M, 8N
2 in. / DN 50 / 50A	●	❍	❍	❍	❍
3 in. / DN 80 / 80A	❍	●	❍	❍	❍
4 in. / DN 100 / 100A	❍	❍	●	❍	❍
6 in. / DN 150 / 150A	❍	❍	❍	●	❍
8 in. / DN 200 / 200A	❍	❍	❍	❍	●
Threaded Connection	-	-	-	-	-
Bracket Mounting	-	-	-	-	-

Drawing: 9240030-973 (www.rosemount.com)

ROSEMOUNT 5401 WITH ROD ANTENNA (MODEL CODE 1R-4R)

All dimensions are in inches (mm).



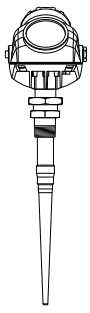
Rod	A	B(1)	Antenna Code
Short	14.4 (365)	4 (100)	1R, 3R
Long	20.3 (515)	10 (250)	2R, 4R

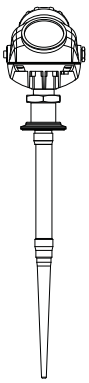
(1) The active part of the antenna must protrude into the tank. B is the maximum nozzle height.

Process Connection Availability
● Available as standard
❍ Available as special, consult factory
– Not available

	Antenna Code	
Process Connection	1R, 2R	3R, 4R
2 in. / DN 50 / 50A	●	●
3 in. / DN 80 / 80A	●	●
4 in. / DN 100 / 100A	●	●
6 in. / DN 150 / 150A	●	●
8 in. / DN 200 / 200A	❍	●
2 in. Tri-clamp	❍	●
3 in. Tri-clamp	❍	●
4 in. Tri-clamp	❍	●
Threaded Connection	-	●
Bracket Mounting	-	●

Threaded connection (RA) is available for rod antennas without protective plate (3R, 4R)



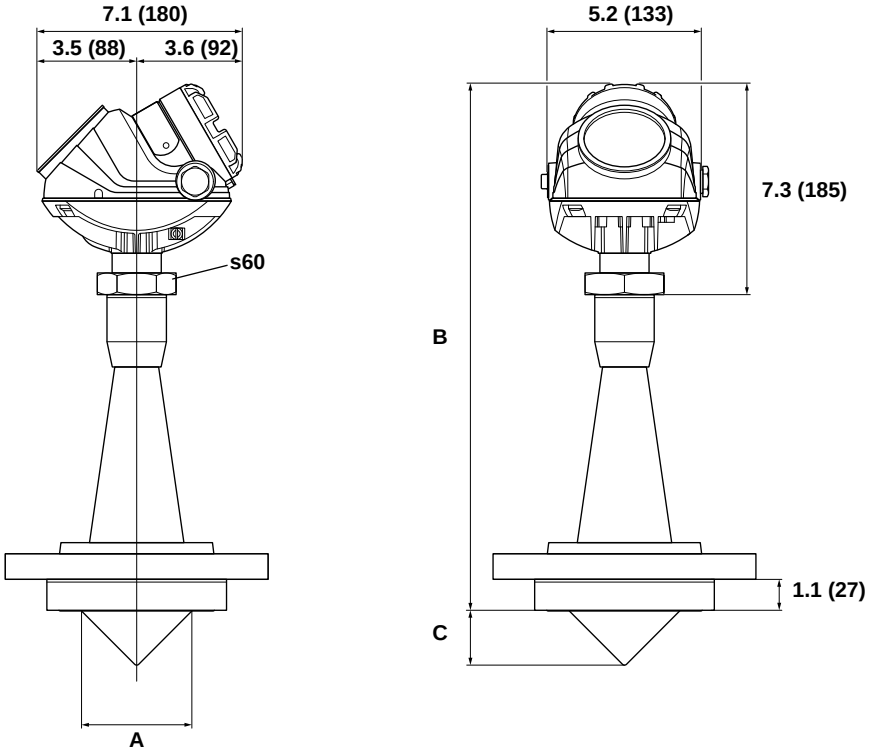


Tri-clamp connections (AT, BT, CT) are available for rod antennas without protective plate (3R, 4R)

Drawing: 9240030-977 (www.rosemount.com)

ROSEMOUNT 5402 WITH PROCESS SEAL ANTENNA (MODEL CODE 2P-4P)

All dimensions are in inches (mm).



Process Seal size (inches)	A	B	C	Antenna Code
2	1.8 (46)	14.2 (360)	0.9 (22)	2P
3	2.8 (72)	17.3 (440)	1.4 (35)	3P
4	3.8 (97)	18.9 (480)	1.9 (48)	4P

Process Connection Availability
● Available as standard
❍ Available as special, consult factory
– Not available

	Antenna Code		
Process Connection	2P	3P	4P
2 in. / DN 50 / 50A	●	-	-
3 in. / DN 80 / 80A	-	●	-
4 in. / DN 100 / 100A	-	-	●
6 in. / DN 150 / 150A	-	-	-
8 in. / DN 200 / 200A	-	-	-
Threaded Connection	-	-	-
Bracket Mounting	-	-	-

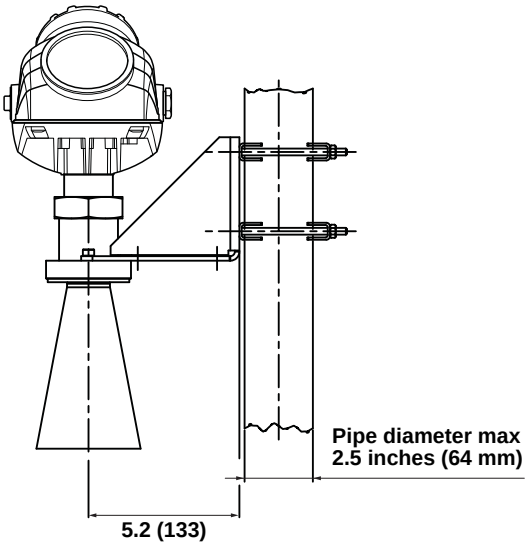
Drawing: 9240030-976 (www.rosemount.com)

PROCESS CONNECTIONS

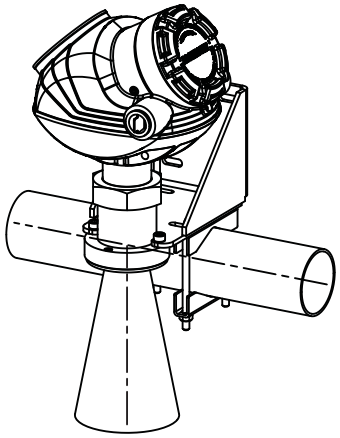
Bracket Mounting (model code BR)

Bracket mounting is available for Rosemount 5401 and 5402 with SST Cone Antenna (2S-8S) and Rosemount 5401 with Rod Antenna (3R-4R)

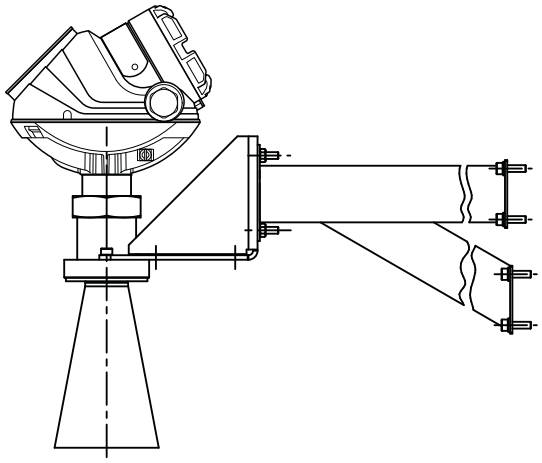
All dimensions are in inches (mm).



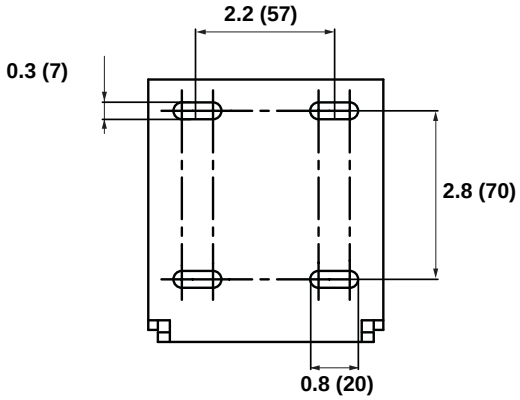
Pipe mounting (vertical pipe)



Pipe mounting (horizontal pipe)



Wall mounting

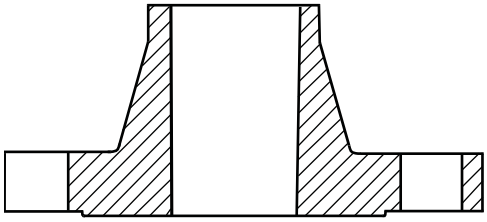


Hole pattern wall mounting

Drawing: 9240030-989 (www.rosemount.com)

Standard Flanges

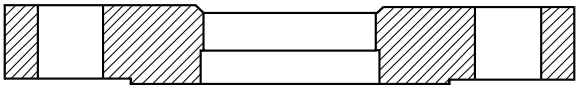
Cone and Rod Antennas (model code: 2S-8S and 1R-4R)



Designation	Mating Standard	Face Style(1)	Face Surface Finish	Material
ANSI	ASME B16.5	0.06 in. Raised Face	R_a = 125-250 µin	316 / 316L
EN (DIN)	EN 1092-1	2 mm Raised Face (Type B1)	R_a = 3.2-12.5 µm	EN 1.4404
JIS	JIS B2220	2 mm Raised Face	R_a = 3.2-6.3 µm	EN 1.4404

(1) Face gasket surface is serrated per mating standard.

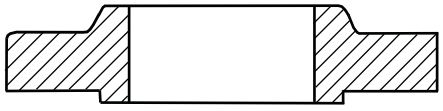
Cone Antennas with Protective Plate (model code: 2H-8H, 2M-8M, and 2N-8N)



Designation	Mating Standard	Face Style(1)	Face Surface Finish	Material
ANSI	ASME B16.5	0.06 in. Raised Face	R_a = 125-250 µin	316 / 316L
EN (DIN)	EN 1092-1	Flat Face (Type A)	R_a = 3.2-12.5 µm	EN 1.4404
JIS	JIS B2220	2 mm Raised Face	R_a = 3.2-6.3 µm	EN 1.4404

(1) Face gasket surface is serrated per mating standard.

Process Seal Antennas



Designation	Standard	Style	Material
ANSI	ASME B16.5	Slip-on	316 / 316L
EN (DIN)	EN 1092-1	Slip-on (Type 01)	EN 1.4404
JIS	JIS B2220	Slip-on plate (SOP)	EN 1.4404

Rosemount Level Solutions

Emerson provides a complete range of Rosemount products for level measurement applications.

Vibrating Fork Switches – Point Level Detection

For high and low alarms, overfill protection, pump control, including wide pressure and temperature requirements, and hygienic applications. Flexible mounting. Immune to changing process conditions and suitable for most liquids.
The product line consists of:

- Rosemount 2160 Wireless
- Rosemount 2130 Enhanced
- Rosemount 2120 Full-featured
- Rosemount 2110 Compact

Differential Pressure – Level or Interface Measurement

Flexible mounting for liquid tank levels, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by: vapor space changes, surface conditions, foam, corrosive fluids, internal tank equipment. Optimize performance with direct mount, Tuned-System Assemblies:

- Rosemount DP Level Transmitters and Remote Seals
- Rosemount 3051S_L, 3051L, and 2051L Liquid Level Transmitters

Ultrasonic – Level Measurement

Top mounted, non-contacting for simple tank and open air level measurements. Unaffected by fluid properties such as: density, viscosity, dirty coating, and corrosiveness. Appropriate for routine applications outside of explosion proof areas.
The product line consists of:

- Rosemount 3100 Series Ultrasonic Process Level Transmitters

Guided Wave Radar – Level and Interface Measurement

Top mounted, direct level and interface measurement of liquids or solids, including those with wide temperature and pressure requirements. Unaffected by changing process conditions. Good fit for small spaces and easy swap for older technologies.
The product line consists of:

- Rosemount 5300 Series – Accurate, superior performance transmitter in most applications including process vessels and control
- Rosemount 3300 Series – Versatile and easy-to-use transmitter in most liquid storage and monitoring applications

Non-contacting Radar – Level Measurement

Top mounted, direct level measurement for liquids or solids, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by changing process conditions. Good for dirty, coating, and corrosive applications.
The product line consists of:

- Rosemount 5400 Series – Accurate, superior performance 2-wire transmitters for most liquid level applications and process conditions
- Rosemount 5600 Series – 4-wire transmitters with maximum sensitivity and performance for solids, challenging reactors, rapid level changes and excessive process conditions

Chambers for Process Level Instrumentation

- Rosemount 9901 – High quality chambers for external mounting of level measurement and control instrumentation on process vessels

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EMERSON
Process Management

Superior Performance Four-Wire Non-Contacting Radar Level Transmitter

- *Best performance and uptime provided by market leading sensitivity*
- *Unique signal processing allows for challenging process conditions*
- *Extremely reliable and accurate level transmitter due to its high repeatability*
- *Easy connection with adjustable power supply, 24-240 Vac/dc, 0-60 Hz*
- *Easy configuration and setup with intelligent software support*
- *High application flexibility with an extensive selection of antennas and materials*
- *Minimized maintenance costs with no contact and no moving parts; no re-calibration required*
- *Interchangeable transmitter heads and antennas*

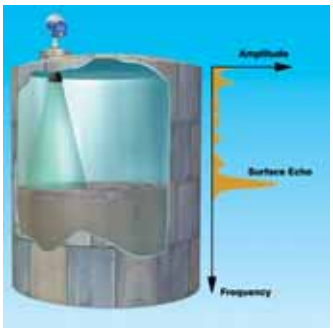


HART COMMUNICATION PROTOCOL · FOUNDATION · IEC WirelessHART · Modbus

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Superior Performance, When Applications Get Tough





Challenging reactor and mixing tanks, and tanks with rapid level changes



Low DK solids including lime, cement, fly ash, corn, and many more



Full range of antenna styles

MEASUREMENT PRINCIPLE

The level of the product in the tank is measured by radar signals transmitted from the antenna at the tank top. After the radar signal is reflected by the product surface, the echo is picked up by the antenna. As the signal is varying in frequency, the echo has a slightly different frequency compared to the signal transmitted at that moment. The difference in frequency is proportional to the distance to the product surface, and level can be accurately calculated. This method is called Frequency Modulated Continuous Wave (FMCW).

Applications with, for example, turbulence, foam, long measuring ranges, disturbing objects, and low dielectric constants can reduce the energy reflecting back and, in worst case, eliminate it completely with the result that no surface can be detected. The reflection intensity can however be improved by using a highly sensitive radar, the optimal antenna type, and as large antenna as possible.

RADAR TECHNOLOGY BENEFITS

- Direct level measurement means that virtually no compensation is needed for changing process conditions (such as density, conductivity, temperature, pressure, viscosity, pH, dielectric etc.) which results in high application flexibility
- Accurate, reliable measurement that requires no re-calibration, meaning improved uptime
- The non-contacting radar transmitter with no moving parts means minimized maintenance
- Good for dirty, coating, crystallizing, and corrosive applications
- Top down measurement means simple installation with no empty tank requirements, and minimized risk for leakages

SPECIAL 5600 FEATURES

For the most challenging applications

- 4-wire transmitters with maximum sensitivity and performance
- Suitable for solids, liquids, and slurries in challenging reactors, with rapid level changes and excessive process conditions
- Manages high pressures and temperature
- Handles long measuring ranges
- Application flexibility with a wide selection of materials, process connections, antenna styles, and accessories

Best Performance and Uptime

- The power of 4 wires provides the highest sensitivity and the ability to detect weak radar echoes in challenging process environments
- Smart EchoLogic with registration of disturbance echoes provides the ability to handle weak echoes reliably and identifies the true echo from the clutter
- Ability to handle disturbing factors, longer measuring ranges, and lower dielectrics
- Greater measurement reliability margins result in less downtime, higher safety, and better quality

Robust Design Reduces Costs and Increases Safety

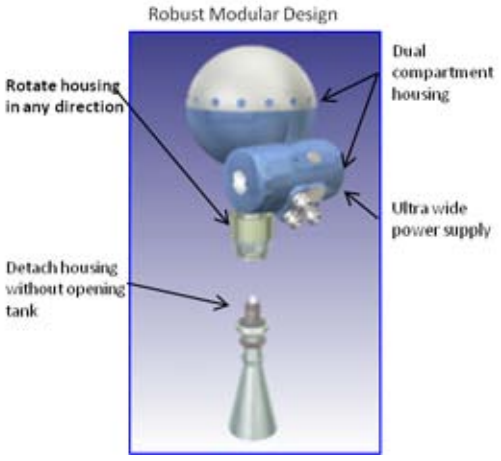
- The detachable transmitter head allows the tank to remain sealed
- The dual compartment housing separates cable connections and electronics, which provides safer handling and improved moisture protection
- Adjustable power supply, 24-240 Vac/dc, 0-60 Hz
- Interchangeable transmitter heads and antennas
- Allows for easy replacement by standard tank connections

Easy Installation and Plant Integration

- Seamless system integration with HART®, FOUNDATION™ fieldbus, Modbus®, or IEC 62591 (*Wireless*HART®) with the Smart Wireless THUM™ adapter
- Secondary analog 4-20 mA output
- MultiVariable™ output includes the choice of level, distance, volume, and signal strength
- Pre-configured or easy, user-friendly configuration in Rosemount RadarMaster with a five-step wizard, auto connect, and online help
- Any DD-compatible configuration tool such as AMS, or Field Communicator can be used
- Fully configurable with the remote- or factory-mounted LOI Rosemount 2210 with temperature input option

Minimized Maintenance Reduces Cost

- Non-contacting, no mechanical moving parts that require maintenance
- No re-calibration or compensation needed due to changing process conditions
- The user-friendly software provides easy online troubleshooting with the echo curve tool, registration of disturbance echoes, and logging
- Predictive maintenance with advanced diagnostics and PlantWeb® alerts
- Adjustments without opening the tank

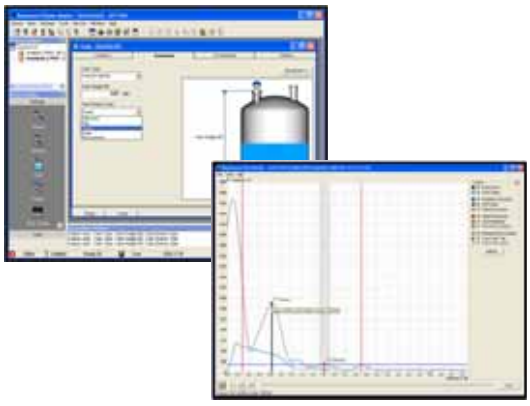




The Smart Wireless THUM adapter enables level communication with previously inaccessible and remote tanks



Rosemount 2210 configurable display with temperature input



The Rosemount RadarMaster enables easy configuration and service with a user-friendly interface including wizards, echo curve with movie feature, offline/online configuration, extensive online help, logging capabilities, and much more.

Rosemount 5601 Radar Level Transmitter



Rosemount 5601 Radar Level Transmitter is a reliable 4-wire radar level transmitter designed for outstanding performance in a wide range of applications and process conditions. Characteristics include:

- Handles a wide range of process conditions
- Extensive selection of antennas and materials
- HART 4-20 mA, FOUNDATION fieldbus, Modbus, or IEC 62591 (*Wireless*HART) with the Smart Wireless THUM adapter

Additional Information
Specifications: page 264
Product Certifications: page 275
Dimensional Drawings: page 277

TABLE 1. Rosemount 5601 Radar Level Transmitter Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
5601	Radar Level Transmitter for Process Applications	
Frequency Band		
Standard		**Standard**
U	US Market Only (10 GHz)	★
S	Switzerland Market Only (10 GHz)	★
A	All Other Markets (10 GHz)	★
Product Certification		
Standard		**Standard**
NA	None	★
E1	CENELEC/ATEX Flameproof	★
E5	FM Explosion-proof	★
E6	CSA Explosion-proof	★
E7	IECEx Flameproof	★
Power Supply		
Standard		
P	24-240 Vdc/ac 0-60 Hz	★
Primary Output		
Standard		**Standard**
5A	4-20 mA with HART communication, Passive Output	★
5B	4-20 mA with HART communication, Passive Output, Intrinsically Safe Circuit (1)	★
5C	4-20 mA with HART communication, Active Output	★
5D	4-20 mA with HART communication, Active Output, Intrinsically Safe Circuit (1)	★
7A	FOUNDATION Fieldbus	★
7B	FOUNDATION Fieldbus, Intrinsically Safe Circuit (1)	★
8A	RS 485 Protocol - Modbus	★
Secondary Output(2)(3)		
Standard		**Standard**
0	None	★
1(4)	4-20 mA, Passive Output (5)	★
2(4)	4-20 mA, Passive Output, Intrinsically Safe Circuit (1)	★
3	4-20 mA, Active Output (5)	★
4	4-20 mA, Active Output, Intrinsically Safe Circuit (1)	★

TABLE 1. Rosemount 5601 Radar Level Transmitter Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Display Unit		
Standard		**Standard**
N	None	★
P	LOI, Factory mounted on transmitter	★
R	LOI, Remote mounted	★
T	LOI, Remote mounted with temp inputs (1-6 spot elements with common returns)	★
Volume Calculation		
Standard		**Standard**
E	Basic Volume Equations (Standard)	★
V	Strapping Table, up to 100 points	★
Typical Model Number: 5601 S E1 P 5A 0 P E Antenna Selection (6)		

(1) Intrinsically safe circuit only applicable if product certificate codes E1, E5, E6, or E7 is selected.
(2) Secondary output codes are not available in a combination of E6 CSA and *Primary Output codes 5A, 5B, 5C, or 5D.*
(3) Secondary output codes 1, 2, 3, and 4 require an isolator when used in combination with 7A, 7B, or 8A.
(4) Not available in combination with Primary Output codes 5A, 5B, 5C, or 5D.
(5) Not allowed in combination with Display Unit codes P, R, or T.
(6) Select the antenna type and options using Table 2, Table 3, Table 4, Table 6, and Table 7.

TABLE 2. Cone Antenna Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Antenna Type	Antenna Size	Antenna Material	Note	
Cone				
Standard				**Standard**
23S	3 in. (DN80) nozzles	SST 316L	Pipe Installation Only	★
24S	4 in. (DN100) nozzles	SST 316L	Free propagation or 4” pipe	★
26S	6 in. (DN150) nozzles	SST 316L	Free propagation or 6” pipe	★
28S	8 in. (DN200) nozzles	SST 316L	Free propagation only	★
Expanded				
2AS	10 in. (DN250) nozzles	SST 316L	Free propagation only	
23H	3 in. (DN80) nozzles	Alloy C22	Longer Lead-time, Consult Factory	
24H	4 in. (DN100) nozzles	Alloy C22	Longer Lead-time, Consult Factory	
26H	6 in. (DN150) nozzles	Alloy C22	Longer Lead-time, Consult Factory	
28H	8 in. (DN200) nozzles	Alloy C22	Longer Lead-time, Consult Factory	
23T	3 in. (DN80) nozzles	Titanium Gr 1/2	Longer Lead-time, Consult Factory	
24T	4 in. (DN100) nozzles	Titanium Gr 1/2	Longer Lead-time, Consult Factory	
26T	6 in. (DN150) nozzles	Titanium Gr 1/2	Longer Lead-time, Consult Factory	
28T	8 in. (DN200) nozzles	Titanium Gr 1/2	Longer Lead-time, Consult Factory	
23M	3 in. (DN80) nozzles	Alloy 400	Longer Lead-time, Consult Factory	
24M	4 in. (DN100) nozzles	Alloy 400	Longer Lead-time, Consult Factory	
26M	6 in. (DN150) nozzles	Alloy 400	Longer Lead-time, Consult Factory	
28M	8 in. (DN200) nozzles	Alloy 400	Longer Lead-time, Consult Factory	
23Z	3 in. (DN80) nozzles	Tantalum	Longer Lead-time, Consult Factory	
24Z	4 in. (DN100) nozzles	Tantalum	Longer Lead-time, Consult Factory	
26Z	6 in. (DN150) nozzles	Tantalum	Longer Lead-time, Consult Factory	
28Z	8 in. (DN200) nozzles	Tantalum	Longer Lead-time, Consult Factory	
2XX	Customer specific cone or material		Consult Factory	
Tank Seal				
Standard				**Standard**
P	PTFE			★
Q	Quartz			★
O-ring Material				
Standard				**Standard**
V	Viton® Fluoroelastomer			★
K	Kalrez® 6375			★
E	EPDM			★
B	Buna-N			★
Process Connection				
Standard				**Standard**
NR	Antenna with Plate Design *NOTE: Customer supplied flange or see Table 11 on page 263 for flange options*			★
Expanded				
XX	Special Process Connection		Consult Factory	
	Tri-clamp connection	**Flange Material**	**Note**	
BT	3 in. Tri-Clamp Flange	SST 316L	Longer Lead-time, Consult Factory	
CT	4 in. Tri-Clamp Flange	SST 316L	Longer Lead-time, Consult Factory	
DT	6 in. Tri-Clamp Flange	SST 316L	Longer Lead-time, Consult Factory	
ET	8 in. Tri-Clamp Flange	SST 316L	Longer Lead-time, Consult Factory	

TABLE 2. Cone Antenna Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Options		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204 3.1.B	★
Typical Model Number: Selected code from Table 1 on page 254 24S P V NR		

TABLE 3. Extended Cone Antenna Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Antenna Type	**Antenna Size**	**Antenna Material**	**Note**	
Expanded				
73S	3 in. (DN80) nozzles	SST 316L	Standard length 20 inch (500 mm)	
74S	4 in. (DN100) nozzles	SST 316L	Standard length 20 inch (500 mm)	
76S	6 in. (DN150) nozzles	SST 316L	Standard length 20 inch (500 mm)	
7XX	Customer specific extended cone or material		Consult Factory	
Tank Seal				
Expanded				
P	PTFE			
Q	Quartz			
O-ring Material				
Expanded				
V	Viton Fluoroelastomer			
K	Kalrez 6375			
E	EPDM			
B	Buna-N			
Process Connections				
Expanded				
NR	Antenna with Plate Design *NOTE: Customer supplied flange or see Table 11 on page 263 for flange options*			
XX	Special Process Connection		Consult Factory	
Options				
Standard				**Standard**
Q8	Material Traceability Certification per EN 10204 3.1.B			★
Typical Model Number: Selected code from Table 1 on page 254 76S P V NR				

TABLE 4. Cone Antenna with Integrated Flushing Connection Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Antenna Type	Antenna Size	Antenna Material	Note	
Cone with Integrated Flushing Connection				
Expanded				
94S	4 in. (DN100) nozzles	SST 316L	Consult Factory	
96S	6 in. (DN150) nozzles	SST 316L	Consult Factory	
98S	8 in. (DN200) nozzles	SST 316L	Consult Factory	
Tank Seal				
Expanded				
P	PTFE			
Q	Quartz			
O-ring Material				
Expanded				
V	Viton Fluoroelastomer			
K	Kalrez 6375			
E	EPDM			
B	Buna-N			
Process Connection				
Expanded				
XX	Special Process Connection		Consult Factory	
	Stainless Steel Flange Welded to Antenna		**Note(1)**	
CL	4 in. ANSI Class 150		Max 101 psig at 392 °F (7 bar at 200 °C)	
DL	6 in. ANSI Class 150		Max 145 psig at 392 °F (10 bar at 200 °C)	
FL	8 in. ANSI Class 150		Max 145 psig at 392 °F (10 bar at 200 °C)	
JL	DN100 PN16		Max 72 psig at 392 °F (5 bar at 200 °C)	
KL	DN150 PN16		Max 87 psig at 392 °F (6 bar at 200 °C)	
LL	DN200 PN16		Max 87 psig at 392 °F (6 bar at 200 °C)	
CH	4 in. ANSI Class 150, SST, Higher Pressure		Max 145 psig at 752 °F (10 bar at 400 °C)	
DH	6 in. ANSI Class 150, SST, Higher Pressure		Max 145 psig at 752 °F (10 bar at 400 °C)	
FH	8 in. ANSI Class 150, SST, Higher Pressure		Max 145 psig at 752 °F (10 bar at 400 °C)	
JH	DN100 PN 16, SST< Higher Pressure		Max 145 psig at 752 °F (10 bar at 400 °C)	
KH	DN150 PN 16, SST< Higher Pressure		Max 145 psig at 752 °F (10 bar at 400 °C)	
LH	DN200 PN 16, SST< Higher Pressure		Max 145 psig at 752 °F (10 bar at 400 °C)	
Options				
Standard				**Standard**
Q8	Material Traceability Certification per EN 10204 3.1.B			★
Typical Model Number: Selected code from Table 1 on page 254 94S P K KL				

(1) Pressure and Temperature rating may be lower depending on Tank Seal selection

TABLE 5. Parabolic Antenna Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Antenna Type	Antenna Size	Antenna Material	Note	
Parabolic				
Standard				**Standard**
45S	ø18 in. (440mm)	SST	Clamped with Integrated Inclination, Low pressure version	★
46S	ø18 in. (440mm)	SST	Welded with Integrated Inclination, High pressure version	★
Expanded				
4XX	Customer Specific	Customer Specific	Consult Factory	
Tank Seal				
Standard				**Standard**
P	PTFE			★
O-ring Material				
Standard				**Standard**
V	Viton Fluoroelastomer			★
Process Connections				
Standard				**Standard**
NF	None, Flange Ready			★
Expanded				
XX	Special Process Connection		Consult Factory	
Options				
Standard				**Standard**
Q8	Material Traceability Certification per EN 10204 3.1.B			★
Expanded				
PB	PTFE Protective Cover (PTFE Bag) Not suitable for hazardous applications[(1)].			
Typical Model Number: Selected code from Table 1 on page 254 45S P V NR				

(1) Not suitable for use in Ex environments.

TABLE 6. Process Seal Antenna Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Antenna Type	Antenna Size	Antenna Material	Note	
Process Seal				
Expanded				
34S	4 in. (DN100) nozzles	PTFE		
36S	6 in. (DN150) nozzles	PTFE		
Tank Seal				
Expanded				
P	PTFE			
O-ring Material				
N	Not Applicable			
Process Connection				
Expanded				
NF	None, Customer to supply flange per dimensions on FIGURE 6.			
XX	Special Process Connection		Consult Factory	
	Stainless Steel Flange	**Flange Material**		
CA	4 in. ANSI Class 150	SST 316L		
DA	6 in. ANSI Class 150	SST 316L		
JA	DN100 PN16	SST 316L		
KA	DN150 PN16	SST 316L		
Options				
Standard				**Standard**
Q8	Material Traceability Certification per EN 10204 3.1.B			★
Typical Model Number: Selected code from Table 1 on page 254 34S P N JA				

TABLE 7. Rod Antenna Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Antenna Type	Antenna Size	Antenna Material	Note	
Rod				
Expanded				
11S	1.5 in. threaded version	SST 316L and PTFE	Inactive Length 4 inch (100 mm)	
12S	2 in. (DN50) nozzles	SST 316L and PTFE	Inactive Length 4 inch (100 mm)	
13S	3 in. (DN80) nozzles	SST 316L and PTFE	Inactive Length 4 inch (100 mm)	
14S	4 in. (DN100) nozzles	SST 316L and PTFE	Inactive Length 4 inch (100 mm)	
11L	1.5 in. threaded version	SST 316L and PTFE	Inactive Length 10 inch (250 mm)	
12L	2 in. (DN50) nozzles	SST 316L and PTFE	Inactive Length 10 inch (250 mm)	
13L	3 in. (DN80) nozzles	SST 316L and PTFE	Inactive Length 10 inch (250 mm)	
14L	4 in. (DN100) nozzles	SST 316L and PTFE	Inactive Length 10 inch (250 mm)	
1XX	Customer specific rod or material		Consult Factory	
Tank Seal				
N	Not Applicable			
O-ring Material				
Expanded				
V	Viton Fluoroelastomer			
K	Kalrez 6375			
E	EPDM			
B	Buna-N			
Process Connection				
Expanded				
NR	Antenna with Plate Design *NOTE: Customer supplied flange or see Table 11 on page 263 for flange options*			
XX	Special Process Connection		Consult Factory	
	Threaded Version			
TN	Threaded 1.5 in. NPT			
TB	Threaded 1.5 in. G			
Options				
Standard				**Standard**
Q8	Material Traceability Certification per EN 10204 3.1.B			★
Typical Model Number: Selected code from Table 1 on page 254 11S N F TN				

TABLE 8. Transmitter Options Ordering Information (multiple selections allowed)

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Options		
Material Traceability Certification		
Standard		**Standard**
Q8	Material Traceability Certification per EN 10204 3.1B	★
Calibration Data Certification		
Standard		**Standard**
Q4	Calibration Data Certificate	★
Software Configuration		
Standard		**Standard**
C1	Custom Software Configuration (CDS required with order)	★
Alarm Limits		
Standard		**Standard**
C4	NAMUR Alarm Level, High Alarm	★
C8	Low Alarm (Standard Rosemount Alarm)	★
Conduit Adapters		
Standard		**Standard**
G1	1/2 inch NPT Cable Gland Kit	★
G2	1/2 inch NPT/ M20 Adapters (Set of 3)	★
Conduit Electrical Connector(1)		
Expanded		
GE	M12, 4-pin, Male Connector (eurofast®)	
GM	A size Mini, 4-pin, Male Connector (minifast®)	
Protective Cover		
Expanded		
PB(2)	PTFE Protective Cover (PTFE Bag)	
Special Procedures		
Standard		**Standard**
U1(3)	TÜV Overfill Protection	★
Expanded		
P1(4)	Hydrostatic Testing	
QG	GOST Primary Verification Certificate	

(1) Not available with certain hazardous location certifications. Contact an Emerson Process Management Representative for details.
(2) For Parabolic Antenna only. Not suitable for hazardous applications.
(3) Requires Secondary Output Code 3 or 4 (Active Output).
(4) Not available in combination with Parabolic Antenna option codes.

TABLE 9. Typical Model Code Examples

5601 A E1 P 5A 0 P E 24S P V NR
ATEX approval, passive HART primary output and display mounted on transmitter. Basic Volume calculation. Antenna is a 4 inch Cone, SST with PTFE Seal and Viton Fluoroelastomer O-rings. No options.
5601 U E5 P 7A 2 T V 94S P K CL C1
FM approval, FOUNDATION fieldbus output and remote mounted display with temp inputs and a secondary 4-20 mA passive IS output. Volume table with up to 100 points. 4 inch Cone Antenna with integrated cleaning, PTFE seal and Kalrez o-rings for high temperature and pressure. Flange is ANSI 4 inch Class 150 stainless steel. Custom configuration selected.

Accessories

TABLE 10. Accessories Part Numbers

Part Number	Description	Note
Modems		
03300-7004-0001	HART Modem and cables	Viator by MACTek®
03300-7004-0002	HART USB Modem and cables	Viator by MACTek®
05600-5004-0001	K2 RS485 Modbus Modem	For Sensor Bus Port connection (requires PC with 9-pin Serial port)

Rod and Cone Antenna Flanges

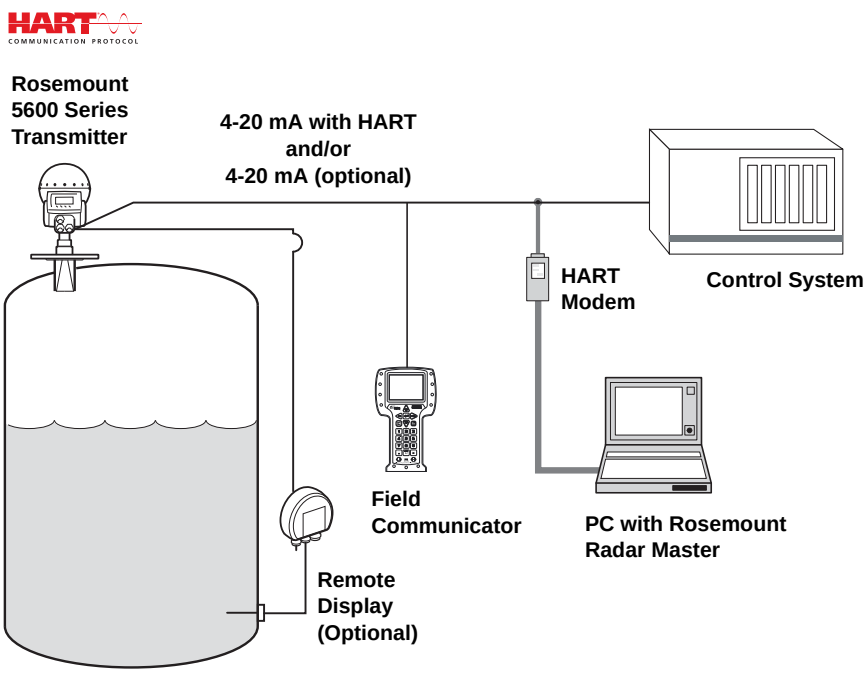
TABLE 11. Non-welded Flange Part Numbers

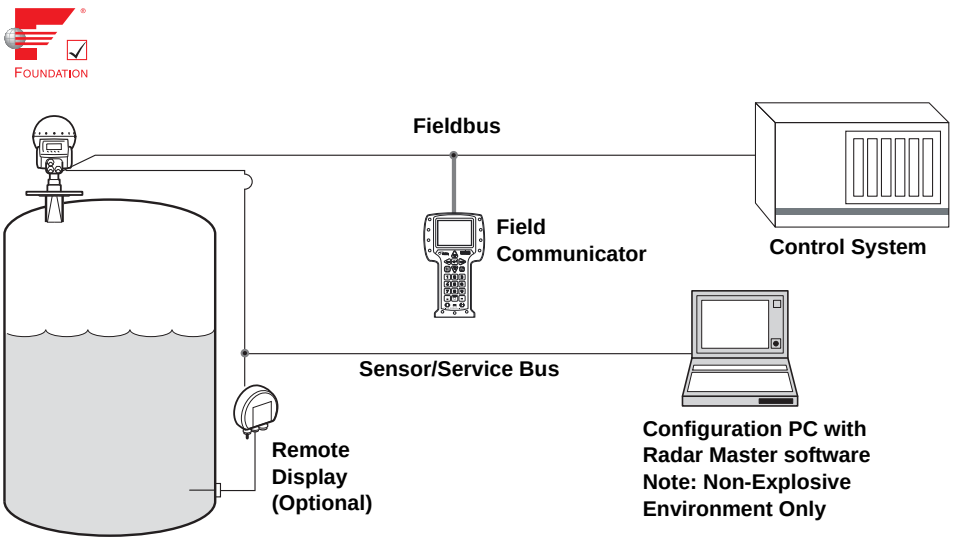
Stainless Steel Flanges			
Part Number	**Flange Size**	**Dimensions**	**Material**
05600-1811-0211	ANSI 2 inch Class 150	Acc. To ANSI B16.5	SST 316L (1)
05600-1811-0231	ANSI 2 inch Class 300	Acc. To ANSI B16.5	SST 316L (1)
05600-1811-0311	ANSI 3 inch Class 150	Acc. To ANSI B16.5	SST 316L
05600-1811-0331	ANSI 3 inch Class 300	Acc. To ANSI B16.5	SST 316L
05600-1811-0411	ANSI 4 inch Class 150	Acc. To ANSI B16.5	SST 316L
05600-1811-0431	ANSI 4 inch Class 300	Acc. To ANSI B16.5	SST 316L
05600-1811-0611	ANSI 6 inch Class 150	Acc. To ANSI B16.5	SST 316L
05600-1811-0811	ANSI 8 inch Class 150	Acc. To ANSI B16.5	SST 316L
05600-1810-0231	DN50 PN40	Acc. To EN 1092-1	EN 1.4404 (2)
05600-1810-0311	DN80 PN16	Acc. To EN 1092-1	EN 1.4404 (2)
05600-1810-0331	DN80 PN40	Acc. To EN 1092-1	EN 1.4404 (2)
05600-1810-0411	DN100 PN16	Acc. To EN 1092-1	EN 1.4404 (2)
05600-1810-0431	DN100 PN40	Acc. To EN 1092-1	EN 1.4404 (2)
05600-1810-0611	DN150 PN16	Acc. To EN 1092-1	EN 1.4404 (2)
05600-1810-0811	DN200 PN16	Acc. To EN 1092-1	EN 1.4404 (2)

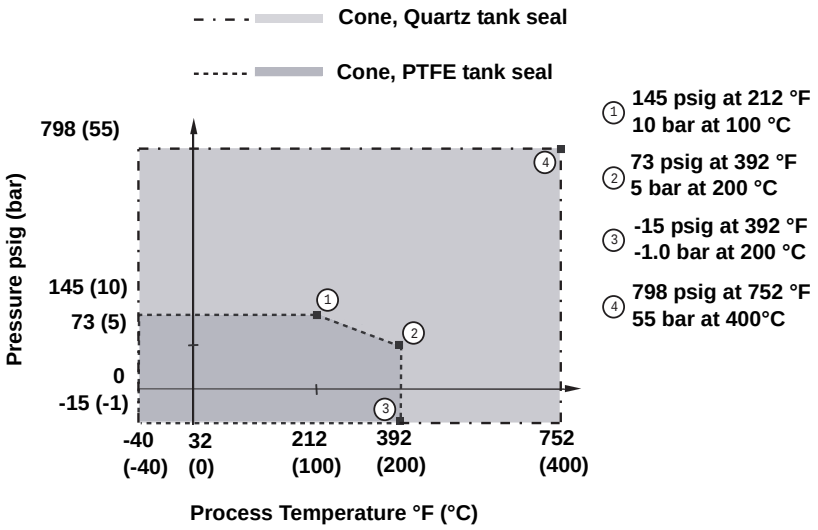
(1) Use gasket type la.
(2) Gasket type according to EN 1514-1 and bolting according to EN1515-2.

Functional Specification

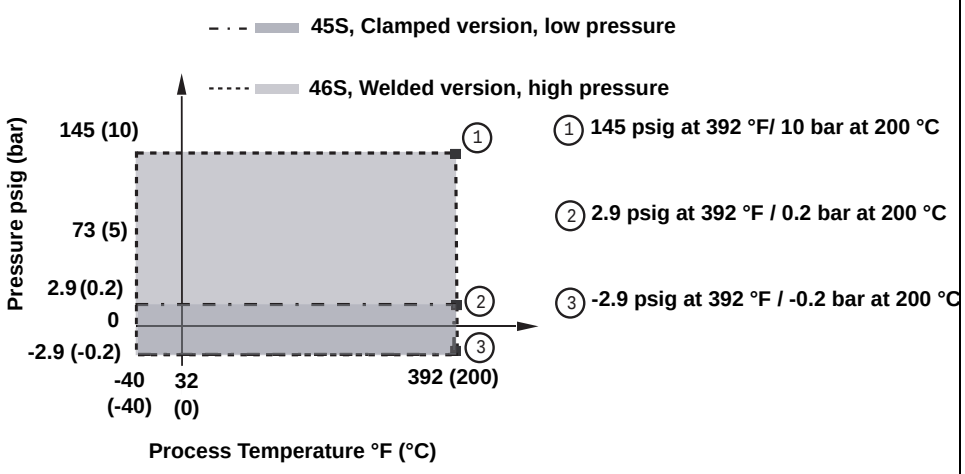
General	
Field of Application	Liquids, slurries, and solids: • Process vessels with agitators • Still-pipe or bridle-pipe mounting • Small nozzle openings on tanks with short measuring range • Various types of solid materials
Measurement Principle	10 GHz Frequency Modulated Continuous Wave (FMCW) radar (see Measurement Principle on page 252 for details).
Microwave Output Power	Max 1.0 mW
Power Consumption	Maximum 10 W, Nominal 5 W
Beam Angle	See Table 14 on page 271.
Internal Calibration	Internal digital reference for automatic compensation of radar sweep
Signal Processing	Powerful and advanced digital signal processing using Fast Fourier Transform (FFT) and advanced echo handling software.
External Power Supply	Ultra wide 24-240 Vac or dc 0-60 Hz The transmitter head has two separate junction boxes. One is for a Non-Intrinsically Safe (Non-IS) primary signal output and power supply cables. The other is normally used for Intrinsically Safe (IS) HART/analog outputs, or optionally, for a non-IS secondary analog output. Primary Outputs can be HART or FOUNDATION fieldbus, either IS or Non-IS. The HART and secondary analog outputs can be either active or passive.
	Note: The minimum power required at the transmitter power terminals is 20 V.
Outputs	**Primary Output:** Alternative 1: HART + 4-20 mA current loop (non-IS or IS option) Alternative 2: FOUNDATION fieldbus (non-IS or IS option) Alternative 3: RS-485 with Modbus communication **Secondary Outputs:** Analog 4-20 mA current loop, active (with power supplied by the Rosemount 5600) or passive (for loop-supplied power) (Optional - see page 254)
Temperature Measurement (optional)	1-3 spot elements, PT100 or Cu90, or 6 spot elements with common return. Input accuracy ±0.9 °F (±0.5 °C). Average temperature or individual spots as output.

4-20 mA HART and Secondary Outputs (Optional) (Output Option Code 5A - 5D) - (See Ordering Information in Table 1 on page 254)	
Output	HART analog 4-20 mA current loop, and Secondary 4-20 mA Output (Optional, active or passive) 
Smart Wireless THUM Adapter	 The optional Smart Wireless THUM adapter can be mounted directly on the transmitter or by using a remote mounting kit. IEC 62591 (*Wireless*HART) enables access to multi-variable data and diagnostics, and adds wireless to almost any measurement point. See the Rosemount Smart Wireless THUM adapter Product Data Sheet (Document No. 00813-0100-4075) and Smart Wireless THUM Adapter for Rosemount Process Level Transmitter Applications (Document No. 00840-0100-4026).
Galvanic Isolation	> 1500 V RMS or DC
IS Electrical Parameters	See Product Certifications on page 275.
Signal on Alarm (configurable)	Standard: Low=3.8 mA, High=22 mA or freeze, NAMUR NE43: High=22.50 mA, Rosemount: Low=3.75 mA
Output Impedance	>10 MΩ
Analog Output Characteristics (Passive or Active Out Options)	7-30 V
Load Limitations	<700 Ω (passive output with 24 V external supply) <300 Ω (active output)

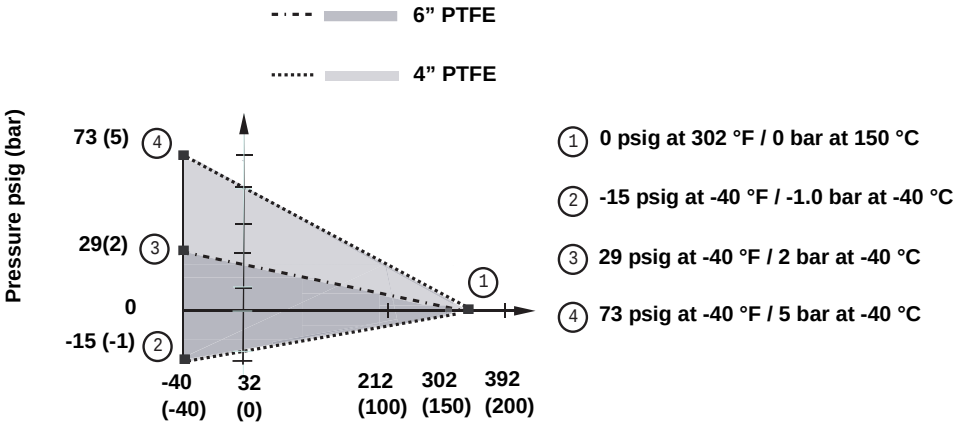
FOUNDATION fieldbus (Output Option Code 7A) - (See Ordering Information in Table 1 on page 254)	
Output	**FOUNDATION fieldbus** 
IS Electrical Parameters	See Product Certifications on page 275.
Quiescent Current Draw	12.5 mA
External Power Supply	9-32 V
FOUNDATION fieldbus Class (Basic or Link Master)	Link Master (LAS)
Number of Available VCRs	20
VCR Statistics	Yes
FOUNDATION fieldbus Block Execution Time	AI-block: 60 ms
FOUNDATION fieldbus Function Blocks	6 Analog Input (AI) blocks, 2 Transducer blocks, 1 Resource block
FOUNDATION fieldbus PlantWeb Alert Support	No
Available Menus and Methods	**Transducer Block** Configure Gauge, Restart Device, Set to Factory Defaults, Sensor Bus **Resource Function Block** Master Reset
Conforming FOUNDATION Fieldbus	ITK 4.6
Display and Configuration	
Display	**Factory Mounted (Option code P)** The Rosemount 2210 offers basic configuration using the 4 soft keys on the display. Data presentation on the LCD can be customized and allows many viewing alternatives by: • 6-digit graphical LCD display, 128 x 64 pixels • 7 text lines with 16 characters/line
	Remote Mounted (Option Code R and T for temperature inputs) The Rosemount 2210 is available as remote mounted and has optional temperature inputs (1-3 spot elements PT100 or CU90)
Diagnostics	Failures: level, temperature, and volume measurement failure Warnings: empty tank, full tank, database, hardware, software, and configuration warnings Errors: database, hardware, software, and configuration warnings

Configuration Tools	Emerson Field Communicator (e.g. 375/475 Field Communicator), Rosemount Radar Master (RRM) software package (included with delivery of transmitter), Emerson AMS™ Device Manager or DeltaV® or any other Device Description (DD) compatible host systems. Certificates are available from all major host system vendors.
	Notes: • To communicate using RRM or AMS Device Manager, a HART modem is required. The HART modem is available as an RS232 or USB version (see Accessories on page 263). • The transmitter can be pre-configured by selecting option code C1 (see page 262) and sending a complete Configuration Data Sheet (CDS). The CDS is available from www.rosemount.com.
Output Units	Level and Distance: ft, inch, m, cm, or mm Volume: ft^3, $inch^3$, US gals, Imp gals, barrels, yd^3, m^3, or liters Level Rate: ft/s, m/s Temperature: °F, °C
Output Variables	Level, Distance, Volume, Level Rate, Signal Strength, Used defined, Temperature (1-6), and Average Temperature
Damping	0-60 s (2 s, default value)
Temperature and Pressure Limits	
Ambient Temperature	-40 to 70 °C (-40 to 158 °F) LCD Readable between: -20 to 70 °C (-4 to 158 °F)
Process Temperature and Pressure	The final rating depends on antenna, tank seal, and O-ring selection. See Table 16 on page 279 for further details. **Rosemount 5600 with Cone Antenna and Extended Cone Antenna(1)** 
	Rosemount 5600 with Cone Antenna - Integrated Flushing Connection(1) Maximum 145 psig at 392 °F (10 bar at 200 °C) or up to 145 psig at 752 °F (10 bar at 400 °C). See Table 4 on page 258 for more information.

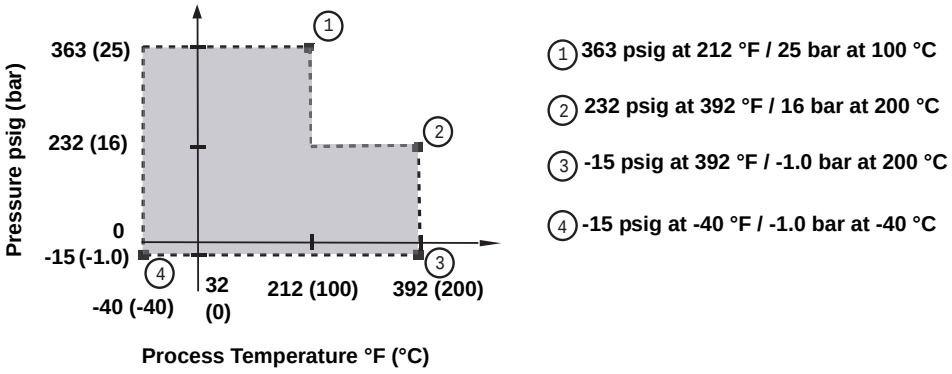
Rosemount 5600 with Parabolic Antenna



Rosemount 5600 with Process Seal Antenna



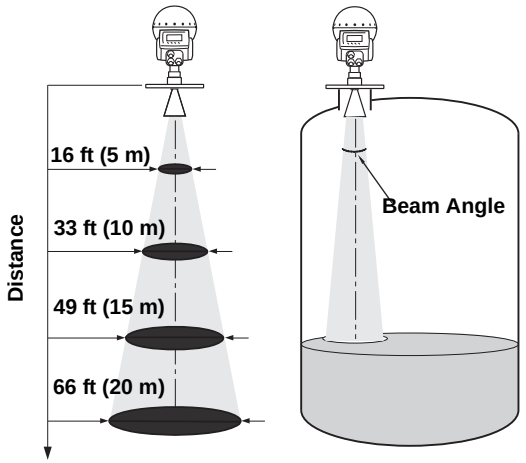
Rosemount 5600 with Rod Antenna(1)



ANSI Flange Rating	According to ANSI B16.5
EN Flange Rating	According to EN 1092-1

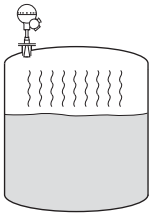
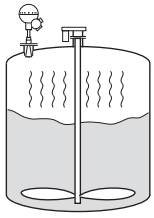
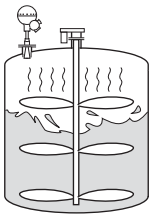
(1) Pressure rating may be lower depending on flange selection.
Minimum / maximum flange temperature rating depends on O-ring selection. For further information, see Table 16 and Table 17 on page 279.

Performance Specification

General	
Reference Conditions	Metal plate with no disturbing objects Temperature: 68 °F (20 °C). Pressure: 14 - 15 psi (960 - 1060 mbar). Humidity: 25 - 75% RH. Reference Measuring Range: 1.64 - 98 ft. (0.5 - 30 m)
Instrument Accuracy (under reference conditions)	±0.2 in. (±5 mm)
Repeatability	±0.04 in. (±1 mm)
Resolution	0.04 in. (1 mm)
Ambient Temperature Effect	±500 ppm of measured distance within the ambient temperature range
Update Interval	100 ms
Linearity	±0.01%
Analog Out Temperature Drift	± 28 ppm/°F (±50 ppm/°C)
Analog Out Accuracy	±300 μA at 4 mA ±600 μA at 20 mA
Analog Out Resolution	0.5 μA (0.003%)
Measuring Range	
Measuring Range and Minimum Dielectric Constant	0-164 ft. (0-50 m) Standard 0-324 ft. (0-99 m) Optional, requires special configuration The measuring range depends on: • antenna type, • the dielectric constant of the liquid (ε_r) (min. ε_r=1.4) • process conditions See Table 12 and Table 13 on page 271 for measuring range and minimum dielectric constant values. For more information, ask your local Emerson Process Management representative. For liquids with ε_r that are smaller than 1.8 such as liquefied gases, an 8-inch or bigger diameter antenna is recommended if measurement is done with free propagation. In this case, the measuring range in calm surface tanks is 50 ft (15 m). The 5600 transmitter installed in a pipe can measure products with a dielectric ≥1.4.
Beam Angle and Beamwidth	For detailed information on the beam angle and beam width for the Rosemount 5600 Series, see Table 14 on page 271. 
Environment	
Vibration Resistance	IEC 721-3-4 class 4M4
Electromagnetic Compatibility	Emission and Immunity: EMC directive 204/108/EC. EN 61326-1:2006. Immunity 50081-2. Emission 50081-1.
EU Directive Compliance	Complies with 93/98/EEC

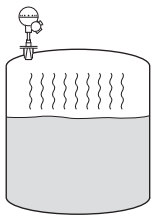
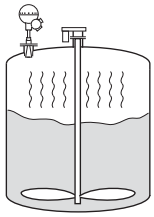
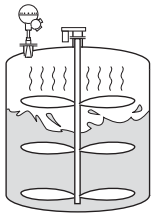
Transient / Built-in Lightning Protection	EN61326, EN61000-4-5, IEC801-5, level 2 kV
Humidity	IEC 60068-2-3
Radio Approvals	FCC: K8CPRO, K8CPROX R&TTE: E813268O-CC
Climatic Class/Corrosion Class	IEC 68-2-1, IEC 60068-2-52 test KB severity 2
UV Protection	ISO 4892-2
Power Supply Fluctuation	IEC 92 Part 504 sec. 3.5

TABLE 12. Rosemount 5600 Recommended Measuring Range for Optimum Performance, ft (m)

Rosemount 5600 Series									
	Dielectric Constant(1)								
	A	**B**	**C**	**A**	**B**	**C**	**A**	**B**	**C**
3-in. Cone	41 (12.5)	57 (17.5)	69 (21)	20 (6)	30 (9)	34 (10.5)	8 (2.5)	8 (2.5)	11 (3.5)
4-in. Process Seal	36 (11)	38 (11.5)	49 (15)	23 (7)	30 (9)	33 (10)	3 (1)(2)	7 (2)(2)	11 (3.5)(2)
6-in. Process Seal	49 (15)	56 (17)	57 (17.5)	30 (9)	36 (11)	39 (12)	5 (1.5)(2)	10 (3)(2)	20 (6)(2)
Rod/4-in. Cone	66 (20)	72 (22)	82 (25)	43 (13)	49 (15)	56 (17)	7 (2)(2)	16 (5)(2)	25 (7.5)(2)
6-in. Cone	82 (25)	95 (29)	107 (32.5)	49 (15)	62 (19)	69 (21)	15 (4.5)(2)	21 (6.5)(2)	33 (10)(2)
8-in. Cone	99 (30)	131 (40)	131 (40)	72 (22)	82 (25)	95 (29)	21 (6.5)	36 (11)	46 (14)
Parabolic	115 (35)	164 (50)	164 (50)	80 (24.5)	97 (29.5)	113 (34.5)	33 (10)	56 (17)	66 (20)
3-6-in. Cone in Still-Pipe	-	-	-	-	-	-	99 (30)	99 (30)	99 (30)

(1) A. Oil, gasoline and other hydrocarbons, petrochemicals (dielectric constant, ε_r=1.9-4.0), in pipes ($\varepsilon_r \geq 1.4$)
B. Alcohols, concentrated acids, organic solvents, oil/water mixtures, and acetone (ε_r=4.0-10)
C. Conductive liquids, e.g. water based solutions, dilute acids, and alkalis (ε_r > 10)
(2) Not recommended.

TABLE 13. Rosemount 5600, Maximum Recommended Measuring Range, ft (m)

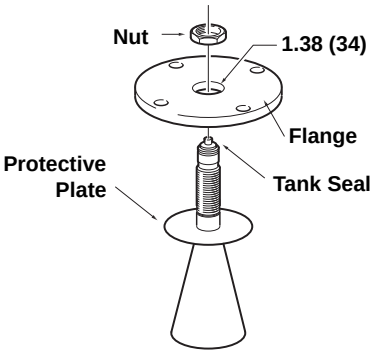
Rosemount 5600 Series									
	Dielectric Constant(1)								
	A	**B**	**C**	**A**	**B**	**C**	**A**	**B**	**C**
3-in. Cone	52 (16)	72 (22)	92 (28)	30 (9)	39 (12)	52 (16)	16 (5)	20 (6)	21 (6.5)
4-in. Process Seal	49 (15)	51 (15.5)	59 (18)	31 (9.5)	34 (10.5)	41 (12.5)	8 (2.5)(2)	11 (3.5)(2)	20 (6)(2)
6-in. Process Seal	59 (18)	67 (20.5)	80 (24.5)	36 (11)	41 (12.5)	54 (16.5)	10 (3)(2)	20 (6)(2)	23 (7)(2)
Rod/4-in. Cone	82 (25)	89 (27)	98 (30)	52 (16)	59 (18)	71 (21.5)	10 (3)	21 (6.5)	33 (10)
6-in. Cone	98 (30)	112 (34)	131 (40)	66 (20)	80 (24.5)	92 (28)	21 (6.5)	33 (10)	43 (13)
8-in. Cone	115 (35)	148 (45)	164 (50)	85 (26)	95 (29)	107 (32.5)	26 (8)	46 (14)	52 (16)
Parabolic	131 (40)	164 (50)	164 (50)	98 (30)	115 (35)	131 (40)	46 (14)	82 (25)	98 (30)
3-6-in. Cone in Still-Pipe	-	-	-	-	-	-	164 (50)	164 (50)	164 (50)

(1) A. Oil, gasoline and other hydrocarbons, petrochemicals (dielectric constant, ε_r=1.9-4.0), in pipes ($\varepsilon_r \geq 1.4$)
B. Alcohols, concentrated acids, organic solvents, oil/water mixtures, and acetone (ε_r=4.0-10)
C. Conductive liquids, e.g. water based solutions, dilute acids, and alkalis (ε_r > 10)
(2) Not recommended.

TABLE 14. Rosemount 5600 Beam Diameter and Angle

Antenna Type & Beam Angle	**Distance, ft (m)**			
	16 (5)	**33 (10)**	**49 (15)**	**66 (20)**
	Beam Diameter, ft (m)			
Cone 3 in 25°	7.2 (2.2)	14 (4.4)	22 (6.7)	29 (8.9)
Rod/Cone 4 in/ Process Seal 4 inch 21°	6.2 (1.9)	12 (3.7)	18 (5.6)	24 (7.4)
Cone 6 in/ Process Seal 6 inch 18°	5.2 (1.6)	10 (3.1)	15 (4.7)	21 (6.3)
Cone 8 inch 15°	4.3 (1.3)	8.5 (2.6)	13 (3.9)	17 (5.3)
Parabolic 10°	3.0 (0.9)	5.6 (1.7)	8.5 (2.6)	11 (3.5)

Physical Specification

Housing and Enclosure	
Type	Two separate junction boxes that separate electronics from cabling. The transmitter housing can be rotated in any direction, and has interchangeable electronics without opening the tank.
Electrical Connections	3 X 1/2 inch NPT; for cable glands or conduit entries Optional: 1/2 inch NPT Cable Gland Kit, 1/2 inch NPT / M20 Adapters (Set of 3) Optional remote display (option code R and T): 2 x M20 Entries, 1 x M25 Entry; max. cable length display - radar transmitter: 330 ft (100 m) The recommended output cabling is a 4-wire, twisted and shielded instrument cable, min. 0.5 mm^2 (AWG 20).
Housing Material	Permanent moulded cast aluminium, chromed and powder painted
Ingress Protection	IP66, IP 67, and NEMA 4
Ingress Protection - Remote Display	IP 67, mounted in separate enclosure with weather/dirt protection cover
Factory Sealed	See CSA Approvals information on page 276.
Weight	Transmitter Head (TH): 19.8 lb (9.0 kg)
Tank Connection and Antennas	
Tank Connection	The tank connection consists of a tank seal and a flange: Cone and Rod antennas, except for the Cone antennas with Integrated Flushing Connection, are designed with a protective plate. The plate and antenna (SST or optional material) together with the tank seal and o-rings (PTFE or Quartz) are the wetted parts exposed to the tank atmosphere. This allows the use of an existing flange, or a lower cost flange alternative. Loose flanges are also available (see Table 11 on page 263).  **Dimensions are inches (millimeters)**
Flange Dimensions	Follow ANSI, DIN standard Material: Stainless steel 316L and Stainless Steel EN 1.4404
Antennas	Cone, Parabolic, Process Seal, and Rod Antennas. Extended Cone Antennas are available in SST 316L. Cone Antennas are available with flushing connections (1/2-in. NPT). **Cone Antenna** • Suitable for free-propagation and pipe-mounted installation • Cone extensions are available (see Table 3 on page 257) • Optional Cone antennas with cleaning/flushing connection are available (see Table 4 on page 258) **Parabolic Antenna** • Suitable for solid materials (for example, cement) • Withstand heavy contamination • Can be equipped with a PTFE protective cover to reduce the effects of dusty environments **Rod Antenna** • Suitable for tanks with small openings • Existing tank flange can be used as the tank connection **Process Seal Antenna** • The dish of the Process Seal is made of PTFE • Only exposes material suitable for hygienic or corrosive applications (see Figure 6 on page 278 and Table 6 on page 260)

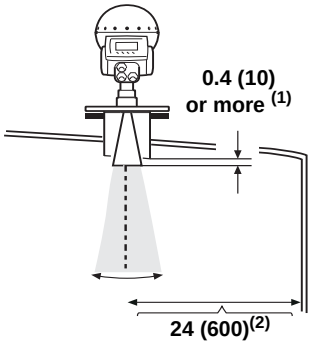
Antenna Dimensions	**Cone Antenna:** See Figure 1 on page 277 **Extended Cone Antenna:** See Figure 2 on page 277 **Cone Antenna with Integrated Flushing Connection:** See Figure 3 on page 277 **Parabolic Antenna:** See Figure 4 on page 277 **Rod Antenna:** See Figure 5 on page 278 **Process Seal Antenna:** See Figure 6 on page 278 and Table 17 on page 279
Antenna Weight	3-in. Cone Antenna: 2.20 lb. (1.0 kg) 4-in. Cone Antenna: 3.31 lb. (1.5 kg) 6-in. Cone Antenna: 4.41 lb. (2.0 kg) 8-in. Cone Antenna: 6.61 lb. (3.0 kg) Parabolic Antenna: 17.6 lb. (8.0 kg) Rod Antenna: 4.41 lb. (2.0 kg) 4-in. Process Seal Antenna: 4.41 lb. (2.0 kg) 6-in. Process Seal Antenna: 5.51 lb. (2.5 kg)
Material Exposed to Tank Atmosphere	**Cone Antenna (PTFE sealing)** • Antenna: 316L SST (EN1.4404) or Alloy C-22 or Tantalum or Alloy 400 • Sealing: PTFE fluoropolymer • O-rings: Viton fluoroelastomer or Kalrez perfluoroelastomer **Cone Antenna (Quartz sealing)** • Antenna: 316L SST (EN1.4404) or Alloy C-22 or Tantalum or Alloy 400 • Sealing: Quartz • O-rings: Viton fluoroelastomer or Kalrez perfluoroelastomer **Parabolic Antenna** • 316L SST • FEP/PTFE fluoropolymer **Rod Antenna** • Antenna: 316L SST and PTFE fluoropolymer • Sealing: PTFE fluoropolymer • O-rings: Viton fluoroelastomer or Kalrez perfluoroelastomer **Process Seal Antenna** • PTFE fluoropolymer or Al_2O_3 (Aluminium oxide)
Installation and Mounting Considerations	
Mechanical Mounting Considerations	The 5600 radar transmitter is easily carried to the tank top and mounted on a suitable nozzle or pipe. The radar transmitter should be installed as follows: • Antenna oriented perpendicular to a horizontal surface. • The transmitter should be mounted with as few fittings as possible within the beam angle. • Filling inlets creating turbulence should preferably be kept at a distance. • Choose as large antenna diameter as possible. A larger diameter concentrates the radar beam and ensures maximum antenna gain. Increased antenna gain offers greater reflection of weak surface echoes.  **Dimensions are inches (millimeters).** **(1) For best measurement performance the nozzle height should be shorter than the antenna or consider an extended cone (FIGURE 3.) for your current transmitter.** **(2) Recommended minimum distance for all antennas. (Shorter distance may apply, consult factory).**
Pipe/Chamber Installations	If used correctly, pipe or chamber measurement can be advantageous in many applications: • Use cone antennas (3 to 6 in.) - not the rod antenna • The gap between the cone antenna and the still-pipe is limited to 0.4 in. (10 mm)

TABLE 15. Antenna material and o-ring selection ● Applicable - Not applicable

	Cone Antenna	Extended Cone Antenna	Cone with Integrated Flushing Connection	Parabolic Antenna	Rod Antenna	Process Seal Antenna
Material						
Stainless Steel 316L	●	●	●	●	●(1)	-
Alloy C22	●	-	-	-	-	-
Titanium Gr1/Gr2	●	-	-	-	-	-
Tantalum	●	-	-	-	-	-
Alloy 400	●	-	-	-	-	-
PTFE	-	-	-	-	●(1)	●
Tank Seal						
PTFE	●	●	●	●	-	-
Quartz	●	●	●	-	-	-
O-Rings						
Viton Fluoroelastomer	●	●	●	●	●	-
Kalrez 6375	●	●	●	-	●	-
EPDM	●	●	●	-	●	-
Buna-N	●	●	●	-	●	-

(1) The Rod antenna is a combination of 316L SST and PTFE.

Product Certifications

SAFETY NOTE AND SPECIAL CONDITIONS FOR SAFE USE (X-MARKINGS IN ATEX, AND IECEX CERTIFICATES)
As light alloys may be used as the enclosure (or other parts) they may be at the accessible surface of this equipment, in the event of rare incidents, ignitions sources due to impact and friction sparks could occur. This shall be considered when the equipment is being installed in locations that specifically require Group II, Category 1G equipment.
Under certain extreme circumstances, the non-metallic parts of the equipment may be capable of generating an ignition-capable level or electrostatic charge. Therefore, when used for applications that specifically require Group II, Category 1 equipment, the equipment shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. Additionally, the equipment non-metallic parts shall only be cleaned with a damp cloth

Approved Manufacturing Locations

Rosemount Tank Radar AB – Gothenburg, Sweden

EU Conformity

Complies with 93/98/EEC. The most recent version of the EC declaration of conformity can be found at www.rosemount.com.

ATEX Directive (94/9/EC)

Rosemount Inc. complies with the ATEX Directive.

Ordinary Location Certification for Factory Mutual

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

5600 Series Radar Level Transmitter European ATEX Directive Information

This document lists specific requirements which have to be fulfilled to secure a safe installation and use of 5600 Series Radar Level Transmitter in a hazardous area. Omission may jeopardize safety, and Rosemount will not take any responsibility if requirements as listed below are not fulfilled.

Canadian Registration Number (CRN)

The product design of the Cone Antenna has been accepted and registered for use in Canada.
CRN: 0F1015.9C

Hazardous Locations Certifications

ATEX Approvals

5600 Series Level Transmitter

E1 Certificate Number: Sira 03ATEX1294X

With Intrinsically Safe Outputs (only)

ATEX Marking: ⟨Ex⟩ II (2) (1) 1/2 GD T85°C

Safety Coding: EEx de [ib] [ia] IIC T6 (-40 °C ≤ T_{amb} ≤+70 °C)

With Non-IS Primary Output and IS Display Output

ATEX Marking: ⟨Ex⟩ II (1) 1/2 GD T85 °C

Safety Coding: EEx de [ia] IIC T6 (-40 °C ≤ T_{amb} ≤ +70 °C)

With Non-IS Primary and/or Non-IS Secondary Outputs

ATEX Marking: ⟨Ex⟩ II 1/2 GD T85°C

Safety Coding: EEx de IIC T6 (-40 °C ≤ T_{amb} ≤ +70 °C)

Special Conditions for Safe Use: See first paragraph of the Produce Certifications Chapter

Passive analog output 4-20 mA,

Label identification = HART passive.

Voltage compliance 7-30 V:

U_i = 30 V
I_i = 200 mA
C_i = 0
L_i = 0
U_o = 0
I_o = 0
U_m = 250 V

Active analog output 4-20 mA,

Label identification = HART active.

Max load 300Ω:

U_o = 23.1 V
I_o = 125.7 mA
P_o = 0.726 W
C_{ext} =0.14 µF
L_{ext} = 2.2 mH
C_i = 0
L_i = 0

FOUNDATION Fieldbus,
Label identification = FOUNDATION fieldbus.

U_i = 30 V
I_i = 300 mA
P_i = 1.3 W
C_i = 0
L_i = 0

2210 Display Unit

Certificate Number: Sira 00ATEX2062

Without Temperature Inputs

ATEX Marking: ⟨Ex⟩ II 2 G

Safety Coding: EEx ib IIC T4 (-40 °C ≤ T_{amb} ≤ +70 °C)

With Temperature Inputs

ATEX Marking: ⟨Ex⟩ II 2 (1) G

Safety Coding: EEx ib [ia] IIC T4 (-40 °C ≤ T_{amb} ≤ +70 °C)

Factory Mutual (FM) Approvals

5600 Series Level Transmitter

E5 Certificate Number: 4D5A9.AX

With Intrinsically safe outputs
(all versions except those listed below)

Explosion proof with IS outputs for HAZLOC

Class I, Division 1, Group A, B, C, and D, T6

Max operating temperature +70 °C

Dust ignition proof for use in Class II/III, Division 1, Groups E, F, and G, T5.

Use conductors rated at least 85 °C

Shall be installed in accordance with System control drawing 9150074-994.

With Non-IS Secondary Outputs (codes 1 and 3)

Explosion proof

Class I, Division 1, Group A, B, C, and D, T6

Max operating temperature +70 °C

Dust ignition proof for use in Class II/III, Division 1, Groups E, F, and G, T5.

Use conductors rated at least 85 °C

2210 Display Unit

Certificate Number: 3008356

All Versions

Intrinsic Safe for HAZLOC

Class I, Division 1, Group A, B, C, and D T4

Max operating temperature +70 °C

Shall be installed in accordance with System control drawing 9150074-997.

Canadian Standards Association (CSA Approvals)

5600 Series Level Transmitter

E6 Certificate Number: 2003.153280-1346169

With Non-IS Primary and/or Secondary Outputs

Explosion proof Ex de IIC T6

Shall be installed in accordance with System control drawing 9150074-937.

Factory seal, conduit seal not required.

With IS Display Outputs, IS Primary and/or Secondary Outputs

Explosion proof Ex de [ib/ia] IIC T6

Shall be installed in accordance with System control drawing 9150074-939.

Factory seal, conduit seal not required.

2210 Display Unit

Certificate Number: 2003.153280-1346165

Without Temperature Inputs

Intrinsically safe EEx ib IIC T4 (-40 °C ≤ T_{amb} ≤ +70 °C) With Temperature Inputs

Intrinsically safe EEx ib [ia] IIC T4 (-40 °C ≤ T_{amb} ≤ +70 °C)

Shall be installed in accordance with System control drawing 9150074-944.

IECEx Approvals

5600 Series Level Transmitter

E7 Certificate Number: IECEx SIR 05.0024X

With Intrinsically Safe Outputs (only)

Safety Coding: Ex de [ib] [ia] IIC T6 tD A20 IP65 T85 °C (-40 °C ≤ T_{amb} ≤ +70 °C)

With Non-IS Primary Output and IS Display Output

Safety Coding: Ex de [ia] IIC T6 tD A20 IP65 T85 °C (-40 °C ≤ T_{amb} ≤ +70 °C)

With Non-IS Primary and/or Non-IS Secondary Outputs

Safety Coding: Ex de IIC T6 tD A20 IP65 T85 °C (-40 °C ≤ T_{amb} ≤ +70 °C)

Passive analog output 4-20 mA,

Label identification = HART passive.

Voltage compliance 7-30 V:

U_i = 30 V
I_i = 200 mA
C_i = 0
L_i = 0
U_o = 0
I_o = 0
U_m = 250 V rms

Active analog output 4-20 mA,

Label identification = HART active.

Max load 300 Ω:

U_o = 23.1 V
I_o = 125.7 mA
P_o = 0.726 W
C_o = 0.14 µF
L_o = 2.2 mH
C_i = 0
L_i = 0

FOUNDATION Fieldbus,

Label identification = FOUNDATION fieldbus.

U_i = 30 V
I_i = 300 mA
P_i = 1.3 W
C_i = 0
L_i = 0

Conditions of Certification: See first paragraph of the Produce Certifications Chapter

2210 Display Unit

Certificate Number: IECEx SIR 05.0021

Without Temperature Inputs

Safety Coding: Ex ib IIC T4 (-40 °C ≤ T_{amb} ≤ +70 °C)

With Temperature Inputs

Safety Coding: Ex ib [ia] IIC T4 (-40 °C ≤ T_{amb} ≤ +70 °C)

Overfill Protection

Cert no: Z-65.16-417

U1 TÜV-tested and approved for overfill protection according to the German WHG regulations

Dimensional Drawings

FIGURE 1. Cone Antenna Dimensions(1)

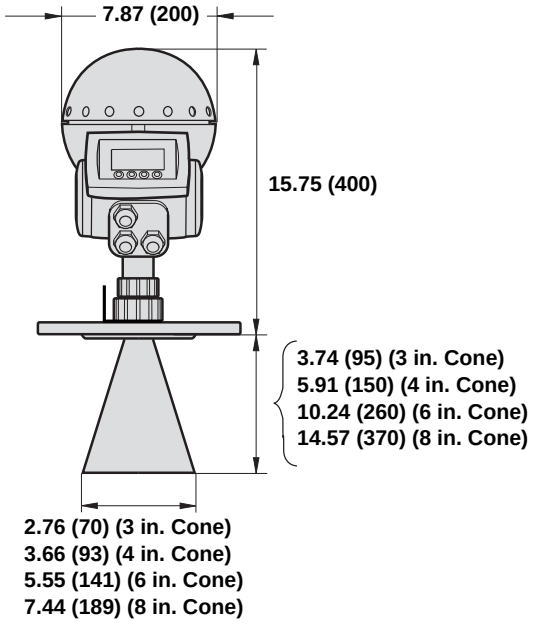


FIGURE 2. Extended Cone Antenna Dimensions(1)

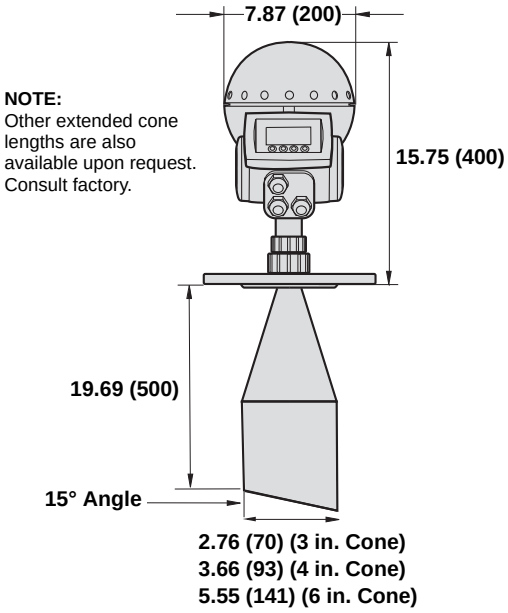


FIGURE 3. Cone Antenna with Integrated Flushing Connection Dimensions(1)

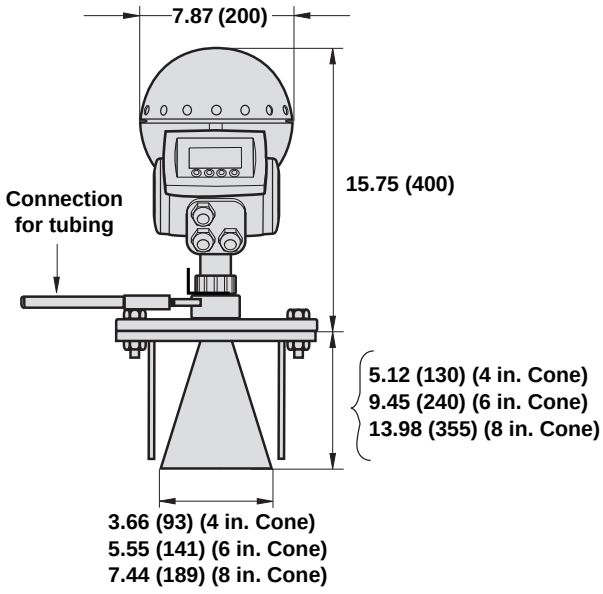
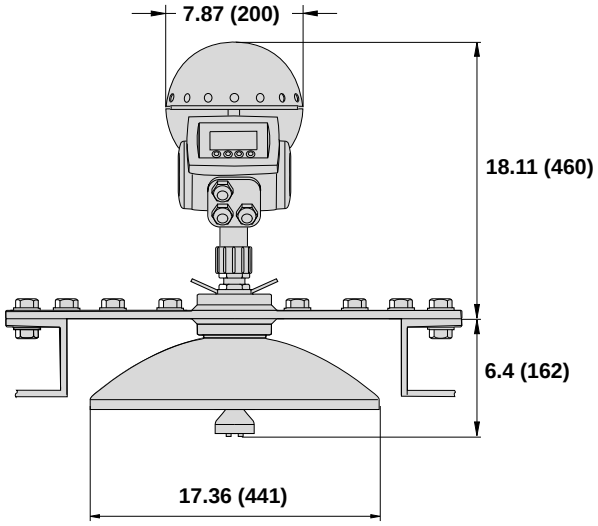


FIGURE 4. Parabolic Antenna Dimensions(1)



(1) Dimensions are in inches (millimeters)

FIGURE 5. Rod Antenna Dimensions(1)

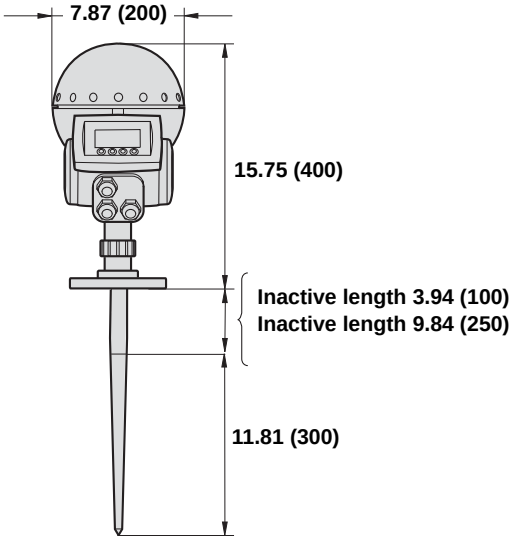


FIGURE 6. Process Seal Antenna Dimensions(1)

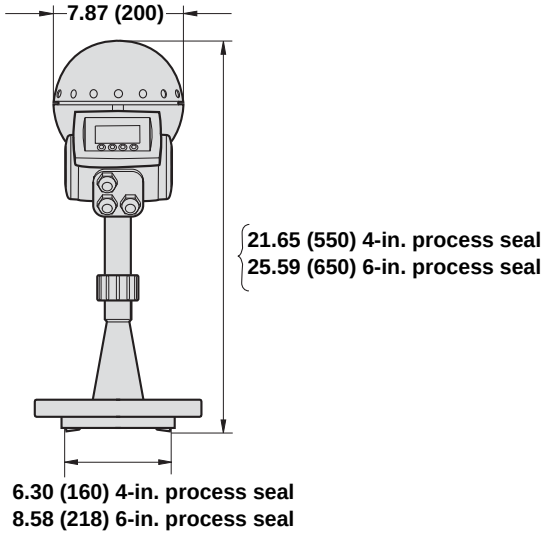
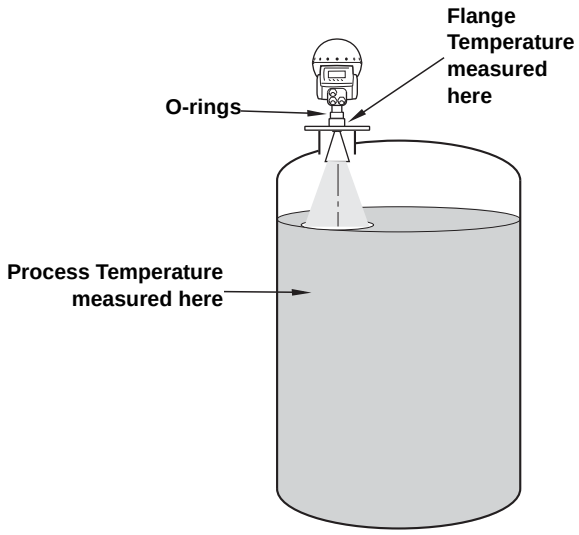
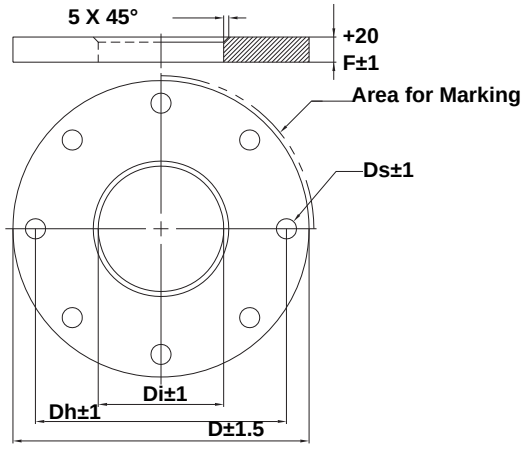


FIGURE 7. Temperature Rating Considerations



NOTE:
Flange temperature depends on mounting conditions, such as nozzle position, distance to maximum product level, nozzle height, presence of insulation, etc.

FIGURE 8. Flange Dimensions(1)



(1) Dimensions are in inches (millimeters)

TABLE 16. Flange Temperature Range depending on O-ring selection

O-ring Material	Minimum Temperature °F (°C) in air	Maximum Temperature F (°C) in air
Viton Fluoroelastomer	5 (-15)	392 (200)
Ethylene Propylene (EPDM)	-40 (-40)	266 (130)
Kalrez 6375	-4 (-20)	527 (275)
Buna-N	-31 (-35)	230 (110)

TABLE 17. Dimensions for Stainless Steel Flange are in inches (millimeters)

Flange	Di	D	Dh	Ds	F
ANSI 4 inch Class 150	3.78 (96)	9.02 (229)	7.52 (191)	0.87 (22)	0.94 (23.8)
ANSI 6 inch Class 150	4.94 (125.5)	10.98 (279)	9.49 (241)	0.87 (22)	1.0 (25.4)
DN100 PN16	3.78 (96)	8.66 (220)	7.09 (180)	0.71 (18)	0.79 (20.0)
DN150 PN16	4.94 (125.5)	11.22 (285)	9.45 (240)	0.87 (22)	0.87 (22.0)

Rosemount Level Solutions

Emerson provides a complete range of Rosemount products for level measurement applications.

Vibrating Fork Switches – Point Level Detection

For high and low alarms, overfill protection, pump control, including wide pressure and temperature requirements, and hygienic applications. Flexible mounting. Immune to changing process conditions and suitable for most liquids.
The product line consists of:

- Rosemount 2160 Wireless
- Rosemount 2130 Enhanced
- Rosemount 2120 Full-featured
- Rosemount 2110 Compact

Differential Pressure – Level or Interface Measurement

Flexible mounting for liquid tank levels, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by: vapor space changes, surface conditions, foam, corrosive fluids, internal tank equipment. Optimize performance with direct mount, Tuned-System Assemblies:

- Rosemount DP Level Transmitters and Remote Seals
- Rosemount 3051S_L, 3051L, and 2051L Liquid Level Transmitters

Ultrasonic – Level Measurement

Top mounted, non-contacting for simple tank and open air level measurements. Unaffected by fluid properties such as: density, viscosity, dirty coating, and corrosiveness. Appropriate for routine applications outside of explosion proof areas.
The product line consists of:

- Rosemount 3100 Series Ultrasonic Process Level Transmitters

Guided Wave Radar – Level and Interface Measurement

Top mounted, direct level and interface measurement of liquids or solids, including those with wide temperature and pressure requirements. Unaffected by changing process conditions. Good fit for small spaces and easy swap for older technologies.
The product line consists of:

- Rosemount 5300 Series – Accurate, superior performance transmitter in most applications including process vessels and control
- Rosemount 3300 Series – Versatile and easy-to-use transmitter in most liquid storage and monitoring applications

Non-contacting Radar – Level Measurement

Top mounted, direct level measurement for liquids or solids, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by changing process conditions. Good for dirty, coating, and corrosive applications.
The product line consists of:

- Rosemount 5400 Series – Accurate, superior performance 2-wire transmitters for most liquid level applications and process conditions
- Rosemount 5600 Series – 4-wire transmitters with maximum sensitivity and performance for solids, challenging reactors, rapid level changes and excessive process conditions

Chambers for Process Level Instrumentation

- Rosemount 9901 – High quality chambers for external mounting of level measurement and control instrumentation on process vessels

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EMERSON™
Process Management

Rosemount 3100 Series
Ultrasonic Level Transmitters

- *Non-contacting measurement with no moving parts*
- *Integral LCD and push-buttons as standard for on-site programming*
- *Continuous measurement of level or distance-to-surface.*
- *Volume or open channel flow calculations for the Rosemount 3102 and Rosemount 3105*
- *Two integral signal relays for the Rosemount 3102*
- *Easy to install and configure*
- *Rugged aluminum housing, and PVDF wetted material*
- *Two-wire direct current loop-powered*



HART COMMUNICATION PROTOCOL

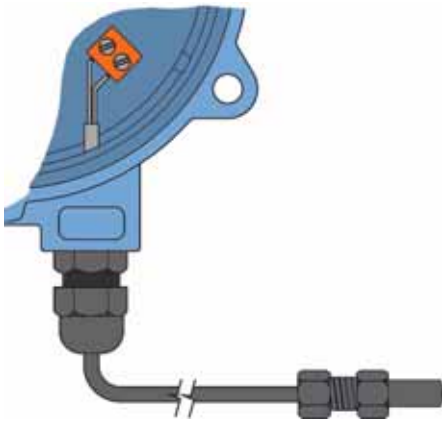
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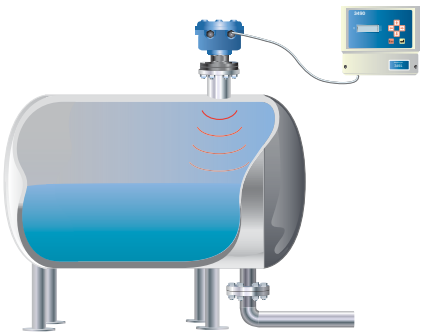
Reliable Performance...In Challenging Applications



Rosemount 3100 Series Ultrasonic Level Transmitter



Remote Temperature Sensor Option (For The 3102 And The 3105)



Level Measurement With Rosemount 3100 Series Transmitter And Rosemount 3490 Controller Unit

MEASUREMENT PRINCIPLE

The Rosemount 3100 Series is a liquid level transmitter based on ultrasonic technology that is suitable for many liquid applications.

Ultrasonic pulse signals are transmitted and reflected from the liquid surface. The transmitter 'listens' for reflected signals (echoes) and measures the time-delay between transmitting and receiving.

The distance to the liquid surface is automatically calculated using the computed time-delay.

An integral temperature sensor continuously measures the air temperature around the transmitter. It then computes the speed of sound in air, automatically compensating the Distance for temperature effects. The 3102 and 3105 have a Remote Temperature Sensor option.

The distance measurement can be sent through the 4–20 mA or HART® output.

FEATURES AND BENEFITS

- Eliminates problems experienced with contacting instrumentation
- Simple set-up and operation
- Minimal maintenance after installed
- Low cost of installation and commissioning
- Process downtime minimized
- Non-contacting measurement with no moving parts
- Two integral signal relays
- Corrosion resistant PVDF wetted material
- Two-wire 24 V direct current loop-powered
- Operating range to 36 ft. (11 m)
- Measures liquid height, distance to liquid, volume, or flow in open channels
- Simple push button programming
- Built-in LCD display
- Automatic temperature compensation

SPECIAL FEATURES

Advanced Software Features

- Learn routine (false echo registration)

  The transmitter can learn to ignore up to four false echoes, caused by the pulse signal reflecting off obstructions, until the actual level is seen.

- Empty tank mapping

  When a tank is empty, the transmitter can learn to ignore up to four false echoes, without the need for user interaction.

- Present depth

  The bottom reference can be automatically set using a known user-entered depth.

- Set as empty

  When the tank is empty, the bottom reference can be automatically reset to the measured distance.

- Distance offset

  The distance to the surface can be adjusted by a user-entered positive or negative offset value.

- Level offset

  The level can be adjusted by a user-entered positive or negative offset value.

- Bottom blanking

  The transmitter can be set to ignore an area of the tank bottom to avoid false echoes from obstructions.



Easy Programming Using Built-in Push Buttons And LCD Display



The 3100 Series Is HART Compatible And Can Be Accessed Remotely Using a Field Communicator Or AMS™ Suite: Intelligent Device Manager

CHOOSING THE RIGHT MODEL

- Each model of the 3100 Series has been designed for a specific purpose, as shown below:

TABLE 1. Choosing The Right 3100 Series Transmitter

	Model	Range
Simple level measurement	3101 3102	26-ft. (8 m) range 36-ft. (11 m) range
Level measurement and local relays	3102	36-ft. (11 m) range
Level measurement in hazardous areas	3105	36-ft. (11 m) range
Open channel flow or volume measurement	3102 3105	Non-hazardous area Hazardous area

APPLICATIONS

- Storage tank levels
- Open channel flow
- Effluent pits
- Reservoir level
- Buffer tanks
- Filter bed level

Rosemount 3101 Level Transmitter



3101 Level Transmitter

- 26 ft. (8 m) operating range
- Two-wire loop powered, 4–20mA output
- Integral LCD display and simple push button programming
- PVDF transducer housing wetside
- NEMA 4X, IP66 aluminium housing

Additional Information

Spares and Accessories: page Level-287
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Specifications: page Level-288
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TABLE 2. 3101 Ordering Information

★The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is manufactured after receipt of order and is subject to additional delivery lead time.

Model	Product Description	
3101	Ultrasonic level transmitter, 1 to 26 ft. (0,3 to 8 m) range	
Signal Output		
Standard		**Standard**
L	4–20 mA	★
Housing Material		
Standard		**Standard**
A	Polyurethane-covered Aluminum	★
Conduit / Cable Thread		
Standard		**Standard**
1	½ –14 NPT	★
2	M20 x 1.5 adaptor	★
Wetted Material		
Standard		**Standard**
F	PVDF	★
Process Connection		
Standard		**Standard**
RC(1)	2-in. NPT thread	★
SC(2)	2-in. BSPT thread	★
Product Certificates		
Standard		**Standard**
NA	No certification	★
G5	FM Ordinary Location	★
G6	CSA Ordinary Location	★
OPTIONS		
Tag Plates		
Standard		**Standard**
ST(3)	Stainless Steel engraved tag plate	★
WT	Laminated paper tag plate	★
Typical Model Number: 3101 L A 1 F RC G5 ST		

(1) Choosing this option implies US (Imperial) units of measurement are required for the default configuration. The configuration can be changed on-site.
(2) Choosing this option implies Metric units of measurement are required for the default configuration. The configuration can be changed on-site.
(3) The maximum number of characters that can be engraved is 16.

Rosemount 3102 Level Transmitter



3102 Level Transmitter

- 36 ft. (11 m) operating range
- 4–20 mA HART output, and two integral signal relays (SPST)
- Integral LCD display and simple push button programming
- Measures Level, distance, Tank volume, and Open Channel Flow

Additional Information

Spares and Accessories: page Level-287
Certifications: page Level-291
Specifications: page Level-288
Dimensions: page Level-293

TABLE 3. 3102 Ordering Information

★The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is manufactured after receipt of order and is subject to additional delivery lead time.

Model	Product Description	
3102	Ultrasonic level transmitter with 2 integral relays, 1 to 36 ft. (0,3 to 11 m) range	
Signal Output		
Standard		**Standard**
H	4–20 mA with HART communication	★
Housing Material		
Standard		**Standard**
A	Polyurethane-covered Aluminum	★
Conduit / Cable Thread		
Standard		**Standard**
1	½ –14 NPT	★
2	M20 x 1.5 adaptor	★
Wetted Material		
Standard		**Standard**
F	PVDF	★
Process Connection		
Standard		**Standard**
RC(1)	2-in. NPT thread	★
SC(2)	2-in. BSPT thread	★
Product Certificates		
Standard		**Standard**
NA	No certification	★
G5	FM Ordinary Location	★
G6	CSA Ordinary Location	★
OPTIONS		
Special Alarm Options(3)		
Standard		**Standard**
C4	Namur NE43 alarm and saturation levels, high alarm	★
C5	Namur NE43 alarm and saturation levels, low alarm	★
C8	Standard Rosemount alarm and saturation levels, low alarm	★
Special Certification Option		
Standard		**Standard**
Q4	Certificate of functional test	★
Tag Plates		
Standard		**Standard**
ST(4)	Stainless Steel engraved tag plate	★
WT	Laminated paper tag plate	★
Typical Model Number: 3102 H A 1 F RC G5 C4 ST		

(1) Choosing this option implies US (Imperial) units of measurement are required for the default configuration. Configuration can be changed on-site.
(2) Choosing this option implies Metric units of measurement are required for the default configuration. Configuration can be changed on-site.
(3) When no Special Alarm option code is selected, the configuration is a high alarm, and standard Rosemount alarm and saturation levels.
(4) The maximum number of characters that can be engraved is 16.

Rosemount 3105 Level Transmitter



3105 Level Transmitter

- 36 ft. (11 m) operating range, and 4–20 mA HART output
- Integral LCD display and simple push button programming
- Measures Level, distance, Tank volume, and Open Channel Flow
- Intrinsically Safe, approved FM, CSA, ATEX, and IECEx

Additional Information

Spares and Accessories: page Level-287
Certifications: page Level-291
Specifications: page Level-288
Dimensions: page Level-293

TABLE 4. 3105 Ordering Information

★The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is manufactured after receipt of order and is subject to additional delivery lead time.

Model	Product Description	
3105	Ultrasonic level transmitter for hazardous areas, 1 to 36 ft. (0,3 to 11 m) range	
Signal Output		
Standard		**Standard**
H	4–20 mA with HART communication	★
Housing Material		
Standard		**Standard**
A	Polyurethane-covered Aluminum	★
Conduit / Cable Thread		
Standard		**Standard**
1	½ –14 NPT	★
2	M20 x 1.5 adaptor	★
Wetted Material		
Standard		**Standard**
F	PVDF	★
Process Connection		
Standard		**Standard**
RC(1)	2-in. NPT thread	★
SC(2)	2-in. BSPT thread	★
Product Certificates		
Standard		**Standard**
I1	ATEX Intrinsically Safe	★
I5	FM Intrinsically Safe and Non-Incendive	★
I6	CSA Intrinsically Safe and Non-Incendive	★
I7	IECEx Intrinsically Safe	★
OPTIONS		
Special Alarm Options(3)		
Standard		**Standard**
C4	Namur NE43 alarm and saturation levels, high alarm	★
C5	Namur NE43 alarm and saturation levels, low alarm	★
C8	Standard Rosemount alarm and saturation levels, low alarm	★
Special Certification Option		
Standard		**Standard**
Q4	Certificate of functional test	★
Tag Plates		
Standard		**Standard**
ST	Stainless Steel engraved tag plate – *The maximum number of characters that can be engraved is 16*	★
WT	Laminated paper tag plate	★
Typical Model Number: 3105 H A 1 F RC I5 ST		

(1) Choosing this option implies US (Imperial) units of measurement are required for the default configuration. The configuration can be changed on-site.
(2) Choosing this option implies Metric units of measurement are required for the default configuration. The configuration can be changed on-site.
(3) When no Special Alarm option code is selected, the configuration is a high alarm, and standard Rosemount alarm and saturation levels.

Spare Parts and Accessories

TABLE 5. Spare Parts and Accessories

★The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is manufactured after receipt of order and is subject to additional delivery lead time.

Spares and Accessories		
Standard		**Standard**
03100-1001-0001	Flange Mounting, 2-in. NPT to 2-in. ASME B16.5 Class 150, PVC	★
03100-1001-0002	Flange Mounting, 2-in. NPT to 3-in. ASME B16.5 Class 150, PVC	★
03100-1001-0003	Flange Mounting, 2-in. NPT to 4-in. ASME B16.5 Class 150, PVC	★
03100-1001-0004	Flange Mounting, 2-in. NPT to 6-in. ASME B16.5 Class 150, PVC	★
03100-1002-0001	Flange Mounting, 2-in. BSPT to PN16 DN50, PVC	★
03100-1002-0003	Flange Mounting, 2-in. BSPT to PN16 DN80, PVC	★
03100-1002-0004	Flange Mounting, 2-in. BSPT to PN16 DN100, PVC	★
03100-1002-0005	Flange Mounting, 2-in. BSPT to PN16 DN150, PVC	★
03100-1003-0001(1)	2-in. NPT Mounting Bracket	★
03100-1003-0002(1)	2-in. BSPT Mounting Bracket	★
03100-0001-0001	Remote Temperature Sensor (Rosemount 3102 and Rosemount 3105 only)	★
03100-0002-0002	1/2–14 NPT to M20 x 1.5 Conduit Adaptor (Pack of two)	★

(1) See “Dimensional Drawings” on page 293.

Specifications

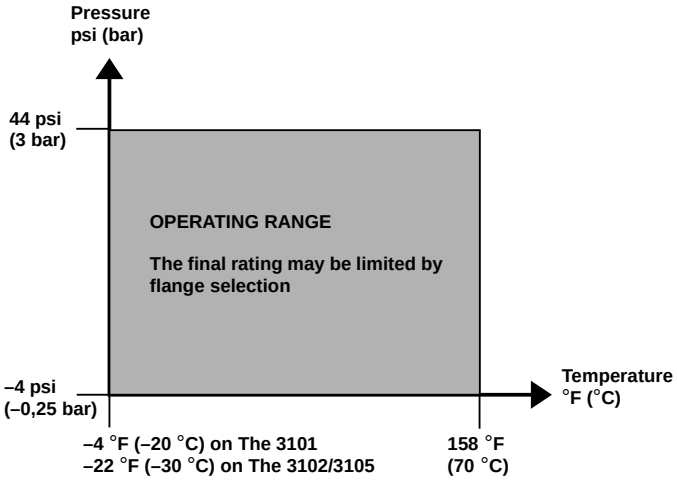
General	
Product	Rosemount 3100 Series level transmitters: The 3101: Level and Distance measurement The 3102: Level, Distance, Content (Volume), and Flow measurement, with two integral signal relays The 3105: Level, Distance, Content (Volume), and Flow measurement, for hazardous locations
Measurement Principle	Ultrasonic, time-of-flight
Measuring Performance	
Measurement Range	Rosemount 3101: 1 to 26 ft. (0,3 to 8 m) Rosemount 3102: 1 to 36 ft. (0,3 to 11 m) Rosemount 3105: 1 to 36 ft. (0,3 to 11 m)
Level Resolution	Better than 0.06 in. (1 mm)
Level Accuracy Under Reference Conditions[1]	Rosemount 3101: ± 0.2 in. (5 mm) for < 3.3 ft. (1 m), ± 0.5% of measured distance for > 3.3 ft. (1 m) The 3102 and The 3105: ± 0.1 in. (2,5 mm) < 3.3 ft (1 m), ±0.25% of measured distance for > 3.3 ft. (1 m)
Blanking Distance (Dead Zone)	12 in. (0,3 m)
Update Interval	Display: 500 ms; Current Output: 200 ms
Display / Configuration	
Integral Display	4/5 digit display for live measurement, and for configuration purposes
Output Units	For Level or distance-to-surface: m, ft, in, or none For Contents: l, m^3, gal, ft^3, or none For Flow: l/s, l/m, m^3/hr, gal/s, gal/m, ft^3/m (cfm), ft^3/hr, or none
Output Variables	Rosemount 3101: Level, or distance-to-surface Rosemount 3102: Level (or distance-to-surface), Content (Volume), and Flow Rosemount 3105: Level (or distance-to-surface), Content (Volume), and Flow
Configuration Tools	Standard integral push-buttons with LCD Field Communicator Rosemount 3490 Series Universal Control Unit AMS Suite: Intelligent Device Manager
Electrical	
Power Supply	Loop-powered (two-wire) Rosemount 3101: 12 to 30 Vdc Rosemount 3102: 12 to 30 Vdc Rosemount 3105: 12 to 40 Vdc (non-hazardous area), 12 to 30 Vdc (hazardous area)
Earthing	None required
Current Output	Rosemount 3101: Analog 4–20 mA Rosemount 3102: Analog 4–20 mA, HART Rosemount 3105: Analog 4–20 mA, HART
Signal On Alarm	3101: Low = 3.6 mA. High = 21 mA 3102/3105: *Standard*: Low = 3.75 mA. High = 21.75 mA; *Namur NE43*: Low = 3.6 mA. High = 22.5 mA
Saturation Levels	3101: Low = 3.8 mA. High = 20.5 mA 3102/3105: *Standard*: Low = 3.9 mA. High = 20.8 mA; *Namur NE43*: Low = 3.8 mA. High = 20.5 mA
Relay Output (Rosemount 3102)	Two integral signal relays, SPST rated 1A @ 30 Vdc (inductive) and 2A @ 30 Vdc (resistive)
Electrical Parameters	U_i = 30 V, I_i = 120 mA, P_i = 0,82 W, L_i = 108 μH, C_i = 0 nF
Cable Entry	Two ½–14 NPT conduit entries for cable glands. Option: M20 x 1.5 conduit/cable adaptor
Output Cabling	Single twisted-pair and shielded, min. 0,22 mm^2 (24 AWG), max. 1,5 mm^2 (15 AWG)
Materials of Construction	
Wet-side Material	PVDF
Body And Cover Material	Polyurethane-covered aluminum
Cover Seal	Silicone rubber
Cover Screws	316 Stainless Steel
Transducer Body Seal	EPDM

Mechanical	
Mounting Thread Size	2-in. NPT, or 2-in. BSP. Optional flange accessories available
Weight of Transmitter	Rosemount 3101: 3.1 lb (1,4 kg) Rosemount 3102: 3.3 lb (1,5 kg) Rosemount 3105: 4.4 lb (2,0 kg)
Measuring	
Temperature Compensation(2)	Rosemount 3101: Automatic Integral temperature compensation Rosemount 3102: Automatic Integral temperature compensation. Optional remote temperature sensor for dynamic temperature compensation Rosemount 3105: Automatic Integral temperature compensation. Optional remote temperature sensor for dynamic temperature compensation
Environment	
Ambient Temperature(3)	Rosemount 3101: –4 to 158 °F (–20 to 70 °C) Rosemount 3102 and Rosemount 3105: –40 to 158 °F (–40 to 70 °C)
Process Temperature	Rosemount 3101: –4 to 158 °F (–20 to 70 °C) Rosemount 3102 and Rosemount 3105: –22 to 158 °F (–30 to 70 °C)
Process Pressure	–4 to 44 psi (–0,25 to 3,0 bar)
Ingress Protection	NEMA 4X, IP 66
Electromagnetic Compatibility	EN61326 (Class B)
Certifications	CE-mark, FM, CSA, ATEX, or IECEx (dependent on order code)

(1) Temperature: 68 °F (20 °C), Pressure: 1013 mbar (atmospheric pressure), and Relative Humidity: 50%.
(2) See page Level-287 for optional accessories.
(3) See page Level-291 onwards for approval temperature ranges.

Temperature and Pressure Ratings

The process temperature/pressure rating depends on the design of the transmitter in combination with the flange materials.

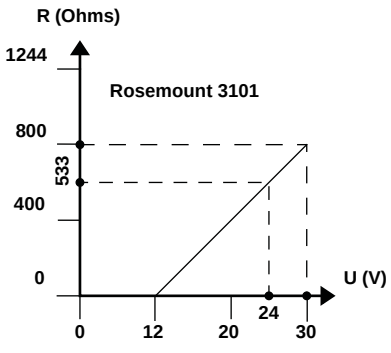


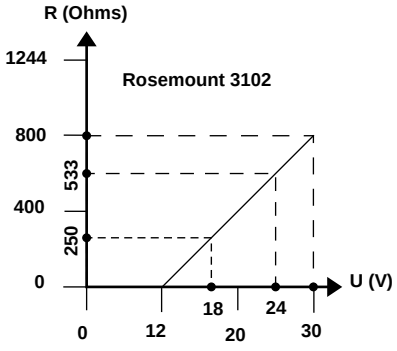
Process Temperature And Pressure Diagram For Rosemount 3100 Series

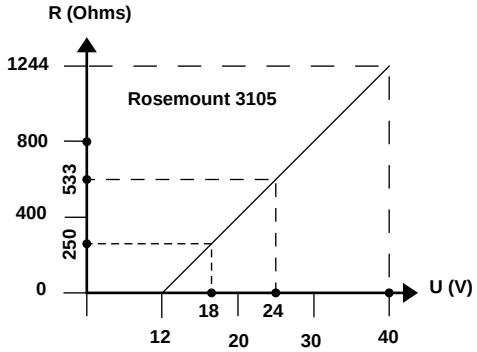
Load Limitations

A Field Communicator requires a minimum load resistance of 250 Ohm within the loop in order to function properly. Communication with Rosemount 3490 Universal Controller does not require additional resistance. The maximum load resistance can be determined from these diagrams:

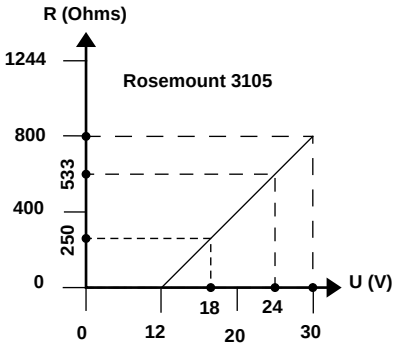
Non-Intrinsically Safe Installations







Intrinsically Safe Installations



NOTE
R = Maximum Load Resistance
U = External Power Supply Voltage

Product Certifications

Approved Manufacturing Locations

Rosemount Inc.
– Chanhassen, Minnesota, USA
Mobrey Limited
– Slough, United Kingdom
Emerson Process Management Asia Pacific Private Limited
– Singapore

Ordinary Location Certification for FM *(Rosemount 3101 and 3102 Only)*

G5 Project ID: 3024095
The transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Ordinary Location Certification for CSA *(Rosemount 3101 and 3102 Only)*

G6 Project ID: 1878089
The transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by CSA, a nationally recognized testing laboratory as accredited by the Standards Council of Canada (SCC).

Special Conditions For Safe Use:

1. For this CSA approval, the power for the Rosemount 3100 Series must be supplied from a Rosemount 3490 Series Control Unit, or from a class 2 or SELV source.

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting your local sales office.

ATEX Directive (94/9/EC)

The 3105 complies with the ATEX directive.

Pressure Equipment Directive (PED) (97/23/EC)

The 3100 Series is outside the scope of the PED directive.

Electro Magnetic Compatibility (EMC) Directive

EN 61326-1:2006, EN 61326-2.3:2006

CE-mark

Complies with applicable directives:
The 3101 (EMC)
The 3102 (EMC)
The 3105 (EMC, ATEX)

Hazardous Locations Certifications *(Rosemount 3105 Only)*

American and Canadian Approvals

Factory Mutual (FM) Intrinsically Safe Approval

I5 FM Instrinsic Safety
Project ID: 3024095
Intrinsically Safe for Class I, Div. 1, Groups A, B, C, and D
Zone Marking: Class I, Zone 0, AEx ia IIC
Temperature Code: T6 (T_a = 55 °C)
Temperature Code: T4 (T_a = 60 °C)
Control Drawing: 71097/1216
Ui = 30 V, Ii = 120 mA, Pi = 0.82 W, Li = 108 µH, Ci = 0 µF

Factory Mutual (FM) Non-Incendive Approval

I5 FM Non-Incendive
Project ID: 3024095
Non-Incendive for Class I, Div. 2, Groups A, B, C, and D
Zone Marking: Class I, Zone 2, AEx nA IIC
Temperature Code: T6 (T_a = 55 °C)
Temperature Code: T4 (T_a = 60 °C)
Control Drawing: 71097/1216
Ui = 30 V, Ii = 120 mA, Pi = 0.82 W, Li = 108 µH, Ci = 0 µF

Canadian Standards Association (CSA) Intrinsically Safe Approval

I6 CSA Intrinsic Safety
Project ID: 07 CSA 1878089
Intrinsically Safe for Class I, Div. 1, Groups A, B, C, and D
Zone Marking: Class 1, Zone 0, Ex ia IIC
Temperature Code:
T4 (T_a –40 to 60 °C)
T6 (T_a –40 to 55 °C)
Control Drawing: 71097/1218
Ui = 30 V, Ii = 120 mA, Pi = 0.82 W, Li = 108 µH, Ci = 0 µF

Canadian Standards Association (CSA) Non-Incendive Approval

I6 CSA Non-Incendive
Project ID: 07 CSA 1878089
Non-Incendive for Class I, Div. 2, Groups A, B, C, and D
Zone Marking: Class I, Zone 2, Ex nL IIC
Temperature Code:
T4 (T_a –40 to 60 °C)
T6 (T_a –40 to 55 °C)
Control Drawing: 71097/1218
Ui = 30 V, Ii = 120 mA, Pi = 0.82 W, Li = 108 µH, Ci = 0 µF

ATEX Intrinsically Safe Approval

I1 Certificate Number: SIRA 06ATEX2260X
ATEX Intrinsic Safety
II 1 G
Ex ia IIC T6 Ga (T_a –40 to 55 °C)
Ex ia IIC T4 Ga (T_a –40 to 60 °C)
Ui = 30 V, Ii = 120 mA, Pi = 0.82 W, Li = 108 μH, Ci = 0 μF

Special Conditions For Safe Use:

1. All transmitter models have external plastic parts, which could present a risk of ignition due to electrostatic charge build-up. They shall not be directly installed in any process where its enclosure might be charged by the rapid flow of non-conductive media.
2. All transmitter models shall only be cleaned with a damp cloth.
3. When the transmitter housing uses aluminum alloy in its construction, this presents a risk of ignition due to impact and shall be taken into consideration on installation and use.

IECEx Approval

I7 Certificate: IECEx SIR 06.0068X
IECEx Intrinsic Safety
Zone 0
Ex ia IIC T6 (T_a –40 to 55 °C)
Ex ia IIC T4 (T_a –40 to 60 °C)
Ui = 30 V, Ii = 120 mA, Pi = 0.82 W, Li = 108 μH, Ci = 0 μF

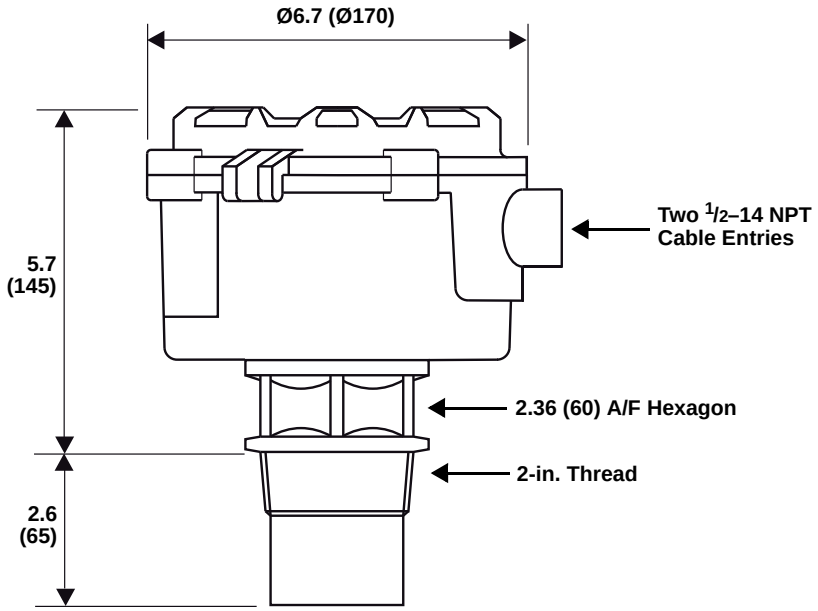
Special Conditions For Safe Use:

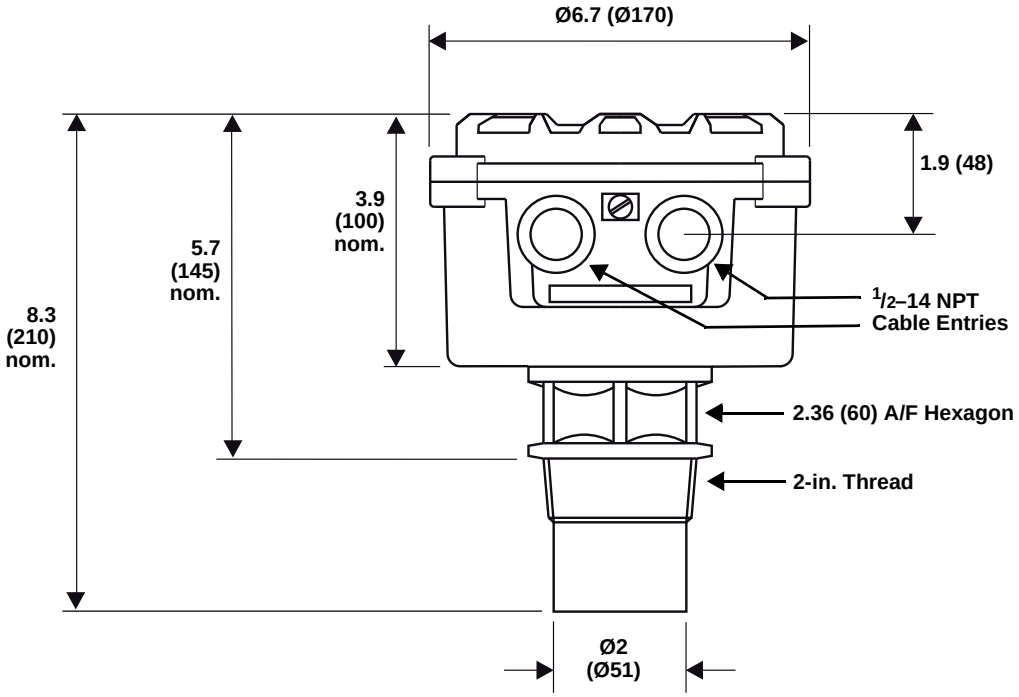
1. All transmitter models have external plastic parts, which could present a risk of ignition due to electrostatic charge build-up. They shall not be directly installed in any process where its enclosure might be charged by the rapid flow of non-conductive media.
2. All transmitter models shall only be cleaned with a damp cloth.
3. When the transmitter housing uses aluminum alloy in its construction, this presents a risk of ignition due to impact and shall be taken into consideration on installation and use.

Dimensional Drawings

Threaded Mounting (Aluminum Housing)

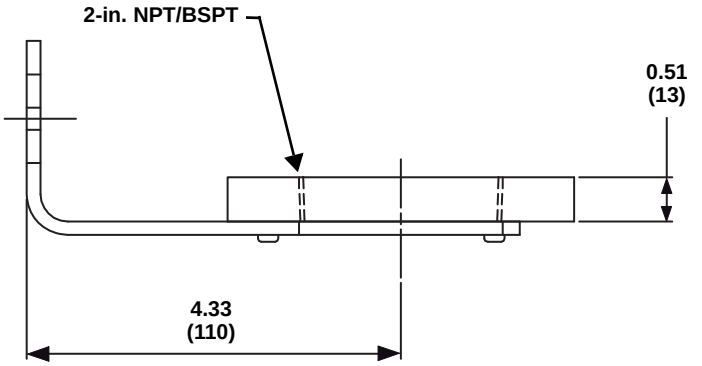
Note: Dimensions are in inches (mm)

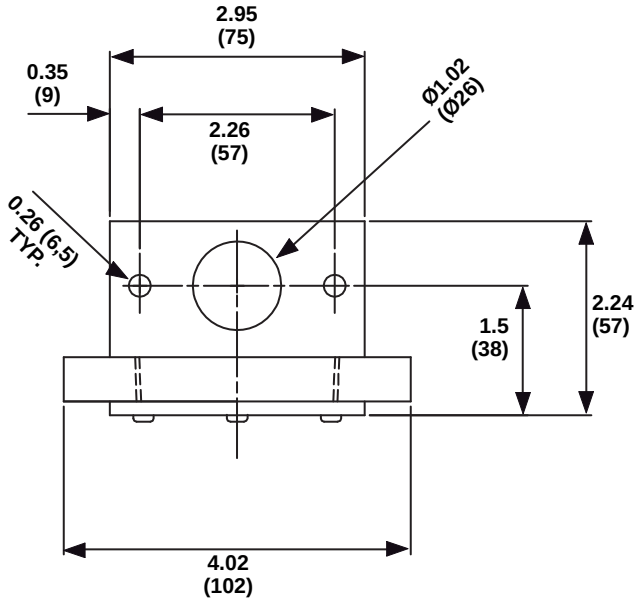




2-in. NPT/BSPT Bracket Kits

Note: Dimensions are in inches (mm)





Rosemount Level Solutions

Emerson provides a complete range of Rosemount products for level measurement applications.

Vibrating Fork Switches – Point Level Detection

For high and low alarms, overfill protection, pump control, including wide pressure and temperature requirements, and hygienic applications. Flexible mounting. Immune to changing process conditions and suitable for most liquids.
The product line consists of:

- Rosemount 2160 Wireless
- Rosemount 2130 Enhanced
- Rosemount 2120 Full-featured
- Rosemount 2110 Compact

Differential Pressure – Level or Interface Measurement

Flexible mounting for liquid tank levels, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by: vapor space changes, surface conditions, foam, corrosive fluids, internal tank equipment. Optimize performance with direct mount, Tuned-System Assemblies:

- Rosemount DP Level Transmitters and Remote Seals
- Rosemount 3051S_L, 3051L, and 2051L Liquid Level Transmitters

Ultrasonic – Level Measurement

Top mounted, non-contacting for simple tank and open air level measurements. Unaffected by fluid properties such as: density, viscosity, dirty coating, and corrosiveness. Appropriate for routine applications outside of explosion proof areas.
The product line consists of:

- Rosemount 3100 Series Ultrasonic Process Level Transmitters

Guided Wave Radar – Level and Interface Measurement

Top mounted, direct level and interface measurement of liquids or solids, including those with wide temperature and pressure requirements. Unaffected by changing process conditions. Good fit for small spaces and easy swap for older technologies.
The product line consists of:

- Rosemount 5300 Series – Accurate, superior performance transmitter in most applications including process vessels and control
- Rosemount 3300 Series – Versatile and easy-to-use transmitter in most liquid storage and monitoring applications

Non-contacting Radar – Level Measurement

Top mounted, direct level measurement for liquids or solids, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by changing process conditions. Good for dirty, coating, and corrosive applications.
The product line consists of:

- Rosemount 5400 Series – Accurate, superior performance 2-wire transmitters for most liquid level applications and process conditions
- Rosemount 5600 Series – 4-wire transmitters with maximum sensitivity and performance for solids, challenging reactors, rapid level changes, and excessive process conditions

Chambers for Process Level Instrumentation

- Rosemount 9901 – High quality chambers for external mounting of level measurement and control instrumentation on process vessels

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EMERSON
Process Management

Rosemount Ultrasonic 3107 Level and 3108 Flow Transmitters

- *Non-contacting measurement with no moving parts*
- *Fast and simple to install and configure*
- *Continuous measurement of level, contents (volume), or open channel flow*
- *MCERTS certified version for use with Rosemount 3490 Series Control Unit*
- *Loop-powered 4-20mA with HART® output*
- *Factory sealed (IP68) for use in wet-wells and sumps up to 39 ft. (12 m) deep*
- *Rugged all UPVC construction ideal for application on exposed sites such as reservoirs, rivers, remote works, and effluent treatment plants*



HART COMMUNICATION PROTOCOL

FM

mCERTS

Contents

Reliable Performance...In Challenging Applications . . . . . page Level-298
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Product Certifications . . . . . page Level-305
Dimensional Drawings. . . . . page Level-306

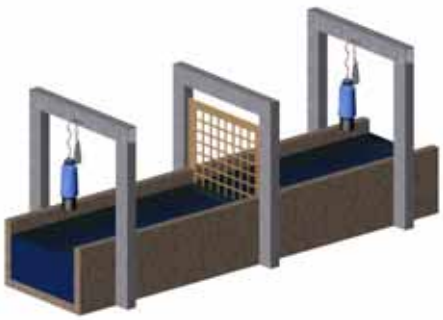
Reliable Performance...In Challenging Applications



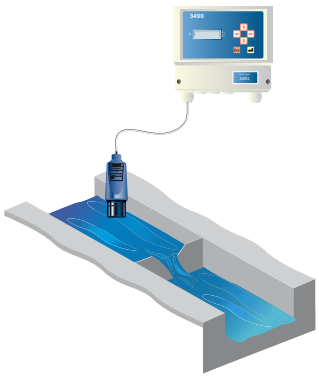
Rosemount 3107 Level Transmitter



Rosemount 3108 Flow Transmitter



Differential Measurement With Two Rosemount 3107 Transmitters



Open Channel Flow Measurement With A Rosemount 3107 Transmitter And Rosemount 3490 Controller Unit

MEASUREMENT PRINCIPLE

The 3107 and the 3108 are based on ultrasonic technology. Ultrasonic pulse signals are transmitted and reflected from the liquid surface. The transmitter 'listens' for reflected signals (echoes) and measures the time-delay between transmitting and receiving.

The distance to the liquid surface is automatically calculated using the computed time-delay.

The 3107 has an integrated sensor for automatically compensating the Distance for temperature effects.

The 3108 has a factory fitted remote temperature sensor to continuously measure the air temperature around the transmitter. It then computes the speed of sound in air, automatically compensating Distance for temperature effects.

The level measurement (Bottom Reference minus Distance) is sent through the 4–20 mA and HART output.

FEATURES AND BENEFITS

- Eliminates problems experienced with contacting instrumentation
- Simple set-up and operation
- Minimal maintenance after installed
- Low cost of installation and commissioning
- Process downtime minimized
- Non-contacting measurement with no moving parts
- Sealed rugged UPVC housing
- Corrosion resistant PVDF wetted material
- Factory fitted with up to 164 ft. (50 m) of two-core cable
- 4–20 mA loop-powered
- Operating range to 39 ft. (12 m)
- Measures liquid height, distance to liquid, volume, or flow in open channels
- Certified Intrinsically Safe and used for level (or distance) measurements in hazardous areas
- Automatic temperature compensation

SPECIAL FEATURES

Advanced Software Features

- Learn routine (false echo registration)

  The transmitter can learn to ignore up to four false echoes, caused by the pulse signal reflecting off obstructions, until the actual level is seen.

- Empty tank mapping

  When a tank is empty, the transmitter can learn to ignore up to four false echoes, without the need for user interaction.

- Present depth

  The bottom reference can be automatically set using a known user-entered depth.

- Set as empty

  When the tank is empty, the bottom reference can be automatically reset to the measured distance.

- Distance offset

  The distance to the surface can be adjusted by a user-entered positive or negative offset value.

- Level offset

  The level can be adjusted by a user-entered positive or negative offset value.

- Bottom blanking

  The transmitter can be set to ignore an area of the tank bottom to avoid false echoes from obstructions.



Easy Programming Using A Field Communicator Or AMS™ Suite: Intelligent Device Manager

CHOOSING THE RIGHT MODEL

- Each model of the 3100 Series has been designed for a specific purpose, as shown below:

TABLE 1. Choosing The Right 3100 Series Transmitter

	Model	Range
Simple level measurement within a tank, sump, or reservoir	3107	39-ft. (12 m) range
Differential level measurement (2 x Transmitters and 1 x Rosemount 3490)	3108	11-ft. (3,3 m) range
Open channel flow or volume measurement	3108	11-ft. (3,3 m) range

APPLICATIONS

- Storage tank levels
- Open channel flow
- Effluent pits
- Reservoir level
- Buffer tanks
- Filter bed level

Rosemount 3107 Level Transmitter



3107 Level Transmitter

Rosemount 3107 capabilities include:

- HART 4-20 protocol
- Continuous measurement of level, or contents (volume)
- Configure using a Field Communicator or Rosemount 3490 Series Control Unit
- Factory sealed with standard lengths of fitted cable
- Simple installation using stainless steel mounting bracket

Additional Information

Specifications: page Level-303
Certifications: page Level-305
Dimensions: page Level-306

TABLE 2. 3107 Ordering Information

★The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
3107	Ultrasonic level transmitter, 39 ft. (12 m) range	
Signal Output		
Standard		**Standard**
H	4–20 mA with HART communication	★
Housing Material		
Standard		**Standard**
P	UVPC	★
Cable Lengths		
Standard		**Standard**
1	10 ft. (3 m)	★
2	65 ft. (20 m)	★
3	164 ft. (50 m)	★
Wet-side Material		
Standard		**Standard**
P	UVPC	★
Process Connection		
Standard		**Standard**
N1[(1)]	1-in. NPT thread	★
G1[(2)]	1-in. BSPP thread	★
Certificates		
Standard		**Standard**
I1	ATEX Intrinsically Safe	★
I5	FM Intrinsically Safe	★
I6	CSA Intrinsically Safe	★
I7	IECEx Intrinsically Safe	★
Special Alarm Options[(3)(4)]		
Standard		**Standard**
C4	Namur NE43 alarm and saturation levels, high alarm	★
C5	Namur NE43 alarm and saturation levels, low alarm	★
C8	Standard Rosemount alarm and saturation levels, low alarm	★
Special Certification Option		
Standard		**Standard**
Q4	Certificate of functional test	★
Typical Model Number: 3107 H P 1 P G1 I1		

(1) Choosing this option implies US (Imperial) units of measurement are required for the default configuration. Configuration can be changed on-site.
(2) Choosing this option implies Metric units of measurement are required for the default configuration. Configuration can be changed on-site.
(3) When no Special Alarm option code is selected, the configuration is a high alarm, and standard Rosemount alarm and saturation levels.
(4) See "Electrical" on page 303 for more information about the saturation levels and alarm signal indication.

Rosemount 3108 Flow Transmitter

Sira Certificate No. MC080131



3108 Flow Transmitter With Conduit Adaptor

Rosemount 3108 capabilities include:

- Enhanced accuracy for open channel flow
- Remote temperature sensor for accurate speed of sound compensation
- Simple installation using optional Rosemount Head Verification Device (HVD)
- IP68 submersible rated PVC housing

Additional Information

Specifications: page Level-303
Certifications: page Level-305
Dimensions: page Level-306

TABLE 3. 3108 Ordering Information

★The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
3108	Ultrasonic Open Channel Flow Transmitter with remote temperature sensor, 11 ft. (3,3 m) range	
Signal Output		
Standard		**Standard**
H	4–20 mA with HART communication	★
Housing Material		
Standard		**Standard**
P	UVPC	★
Cable Lengths		
Standard		**Standard**
2	65 ft. (20 m)	★
Wet-side Material		
Standard		**Standard**
P	UVPC	★
Process Connection		
Standard		**Standard**
N1(1)	1-in. NPT thread	★
N2(1)	1-in. NPT thread with 1-in. NPT to 3/4-in. NPT female conduit adaptor	★
G1(2)	1-in. BSPP thread	★
G2(2)	1-in. BSPP thread with 1-in. BSPP to M20 female conduit adaptor	★
Certificates		
Standard		**Standard**
I1	ATEX Intrinsically Safe	★
I5	FM Intrinsically Safe	★
I6	CSA Intrinsically Safe	★
I7	IECEx Intrinsically Safe	★
Special Alarm Options(3)(4)		
Standard		**Standard**
C4	Namur NE43 alarm and saturation levels, high alarm	★
C5	Namur NE43 alarm and saturation levels, low alarm	★
C8	Standard Rosemount alarm and saturation levels, low alarm	★
Special Certification Option		
Standard		**Standard**
Q4	Certificate of functional test	★
Typical Model Number: 3108 H P 2 P N1 I5		

(1) Choosing this option implies US (Imperial) units of measurement are required for the default configuration. Configuration can be changed on-site.
(2) Choosing this option implies Metric units of measurement are required for the default configuration. Configuration can be changed on-site.
(3) When no Special Alarm option code is selected, the configuration is a high alarm, and standard Rosemount alarm and saturation levels.
(4) See "Electrical" on page 303 for more information about the saturation levels and alarm signal indication.

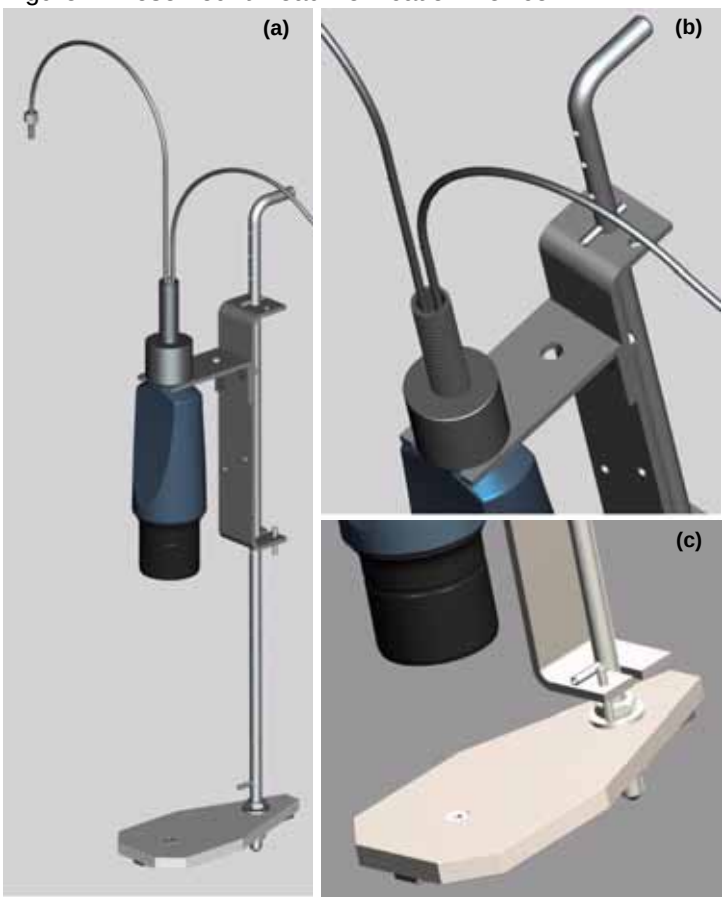
Spare Parts and Accessories

TABLE 4. Spare Parts and Accessories

★The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Spares and Accessories		
Standard		**Standard**
03107-7001-0001	Flange Mounting, 1-in. NPT to 3-in. ASME B16.5 Class 150, PVC	★
03107-7001-0002	Flange Mounting, 1-in. NPT to 4-in. ASME B16.5 Class 150, PVC	★
03107-7002-0001	Flange Mounting, 1-in. BSPP to PN10 DN80, PVC	★
03100-7002-0002	Flange Mounting, 1-in. BSPP to PN10 DN100, PVC	★
03107-7003-0001	Submersion shield for the 3107/3108	★
03107-7003-0002	316 Stainless Steel Suspension Bracket and 1-in. locknut (supplied with the 3107 and the 3108)	★
03107-7003-0003	Conduit adaptor boss, 1-in. BSPP female to M20 x 1.5 female	★
03107-7003-0004	Conduit adaptor boss, 1-in. NPT female to $^{3}/_{4}$-in. NPT female	★
03107-7003-0005	Head Verification Device (HVD), 304 stainless steel for use with 3107 or 3108 transmitters (Figure 1)	★

Figure 1. Rosemount Head Verification Device



The HVD is recommended for open channel flow applications to allow checking and certification of the transmitter. It features a target plate at a fixed distance from the transmitter face. The target plate is moved under the transmitter to verify the transmitter accuracy.

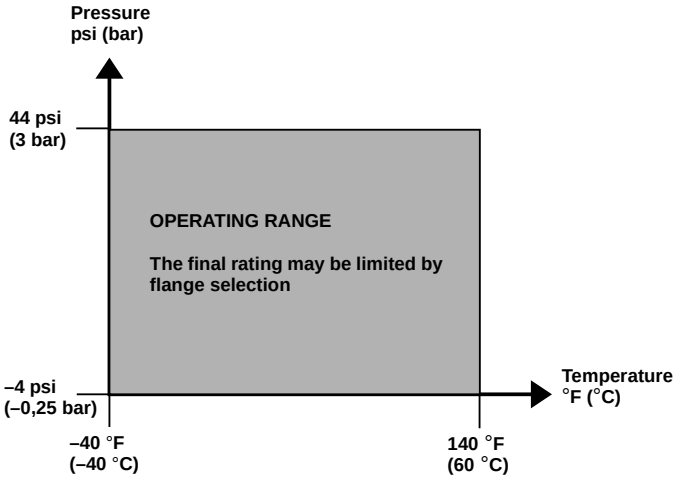
Specifications

General	
Product	Rosemount 3107 and 3108 Ultrasonic Transmitters: Level, Content (Volume), and Open channel flow measurement
Measurement Principle	Ultrasonic, time-of-flight
Measuring Performance	
Measurement Range	3107: 1 to 39 ft (0,3 to 12 m) 3108: 1 to 11 ft (0,3 to 3,3 m)
Blanking Distance (Dead Zone)	12 in. (0,3 m)
Level Resolution	Better than 0.06 in. (1 mm)
Level Accuracy Under Reference Conditions(1)	± 0.1 in. (2,5 mm) for measured distance < 3.3 ft. (1 m) ± 0.25% of distance for measured distance > 3.3 ft. (1 m)
Ultrasonic Pulse Rate	1 per second (user configurable 0.5 to 2.0 seconds)
Configuration	
Output Process Variable (PV)	Level (Linear or Scaled), Content (Volume), or Open Channel Flow
Configuration Tools(2)	Field Communicator, Rosemount 3490 Series Universal Control Unit, or Rosemount AMS™ Suite
Electrical	
Cable	Factory fitted 2-core shielded cable for **external power supply** and **communication**
Cable Sheath	PVC
Cable Length	10, 65, or 164 ft. (3, 20, or 50 m). All cables may be shortened or extended on site
External Power Supply	12 to 40 Vdc (non-hazardous area), 12 to 30 Vdc (hazardous area)
Earthing	Connect the cable screen to earth
Communication (Signal Output)	Analog 4–20 mA, HART
Signal on Alarm	Standard: Low = 3.75 mA. High = 21.75 mA; Namur NE43: Low = 3.6 mA. High = 22.5 mA
Saturation Levels	Standard: Low = 3.9 mA. High=20.8 mA; Namur NE43: Low = 3.8 mA. High = 20.5 mA
Electrical parameters	Ui = 30 V, Ii = 120 mA, Pi = 0,82 W, Ci = 5 nF, Li = 27 µH
Materials of Construction	
Body	UPVC (stabilized)
Lock Nut	Glass filled nylon
Mechanical	
Mounting Thread Size	1-in. NPT or 1-in. BSPP. See Spare Parts and Accessories on page 302 for optional mounting accessories
Weight of Transmitter	3.1 lb with 10 ft. cable, 4.1 lb with 65 ft. cable, and 5.8 lb with 164 ft. cable (1,4 kg with 3 m cable, 1,9 kg with 20 m cable, and 2,6 kg with 50 m cable)
Measuring	
Temperature compensation	3107: Automatic with integral temperature compensation 3108: Automatic with factory fitted remote temperature sensor for dynamic temperature compensation
Environment	
Ambient Temperature	–40 to 140 °F (–40 to 60 °C)
Process Temperature	–40 to 140 °F (–40 to 60 °C)
Process Pressure	–4 to 44 psi (–0,25 to 3,0 bar)
Ingress Protection	IP68 to 33 ft. (10 m)
Electromagnetic Compatibility	EN 61326-1:2006
Certifications	CE-mark, FM, CSA, ATEX, or IECEx, dependent on order code. The 3108 is MCERTS(3) certified.

(1) Temperature: 68 °F (20 °C), Pressure: 1013 mbar (atmospheric pressure), Relative Humidity: 50%, calm and stable water surface.
(2) The Rosemount 3490 Series Control Unit software must be version 3.40 (or later).
(3) The Rosemount 3108 forms part of an MCERTS certified system when used with a Rosemount 3490 Series Control Unit.

TEMPERATURE AND PRESSURE RATINGS

The process temperature and pressure rating depends on the design of the transmitter in combination with the flange materials.



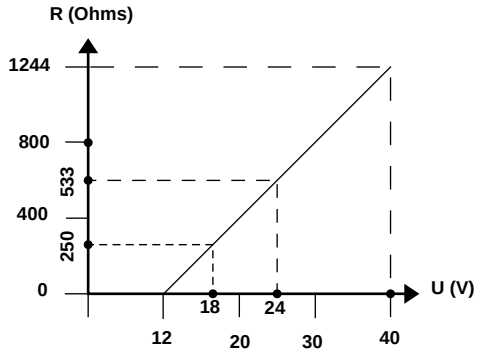
Process Temperature And Pressure Diagram For Rosemount 3107 and 3108

LOAD LIMITATIONS

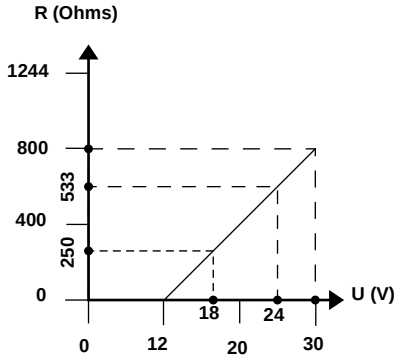
A Field Communicator requires a minimum load resistance of 250 Ohm within the loop in order to function properly. Communication with a Rosemount 3490 Universal Controller does not require additional resistance.

The maximum load resistance can be determined from these diagrams:

Non-Intrinsically Safe Installation



Intrinsically Safe Installations



Rosemount 3107 and Rosemount 3108

NOTE
R = Maximum Load Resistance
U = External Power Supply Voltage

Product Certifications

Approved Manufacturing Locations

Rosemount Inc.

– Chanhassen, Minnesota, USA

Mobrey Limited

– Slough, United Kingdom

Emerson Process Management Asia Pacific Private Limited

– Singapore

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting your local sales office.

ATEX Directive (94/9/EC)

- Emerson Process Management complies with the ATEX Directive

Pressure Equipment Directive (PED) (97/23/EC)

- The 3107 and 3108 are outside the scope of PED Directive

Electro Magnetic Compatibility (EMC) (2004/108/EC)

- EN 61326-1:2006

MCERTS Certification

MCERTS Certificate Number (3108 Only)

- Sira Certificate No. MC080131

Hazardous Locations Certifications

American and Canadian Approvals

Factory Mutual (FM) Approvals

I5 FM Intrinsic Safety
Intrinsically Safe for Class 1, Division 1, Groups A, B, C, D
Zone Marking: Class I, Zone 0, AEx ia llC
Temperature Code T6 (T_a = 55 °C)
Temperature Code T4 (T_a = 60 °C)
Intrinsically Safe when installed in accordance with Rosemount drawing 71097/1300
IP66, IP68

Canadian Standards Association (CSA) Approval

I6 Certificate Number: 02 CSA 1352094 X
CSA Intrinsic Safety
Ex ia IIC
Intrinsically Safe when installed with certified barriers meeting transmitter entity parameters:
Ui = 30 V, Ii = 120 mA, Pi = 0,82 W, Ci = 5 nF, Li = 27 µH
Temperature Codes:
T4 at Ta = –40 to 60 °C or T6 at Ta = –40 to 55 °C

European Certifications

ATEX Approval

I1 Certificate Number: SIRA 09ATEX2299X
ATEX Intrinsic Safety
Intrinsically Safe for II 1 G, Ex ia IIC Ga
T6 (T_{amb} –40 to 55 °C), T4 (T_{amb} –40 to 60 °C)
Ui = 30 V, Ii = 120 mA, Pi = 0,82 W, Ci = 5 nF, Li = 27 µH
IP66, IP68

Rest Of The World Certifications

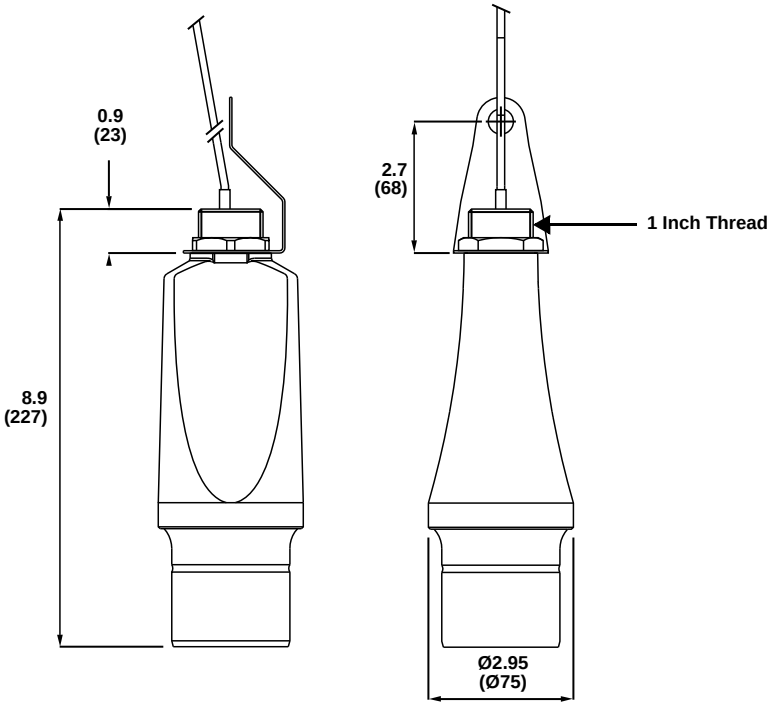
IECEx Approval

I7 Certificate Number: IECEx SIR 09.0124X
IECEx Intrinsic Safety
Ex ia IIC Ga
T6 (T_a = –40 to 55 °C), T4 (T_a = –40 to 60 °C)
Ui = 30 V, Ii = 120 mA, Pi = 0,82 W, Ci = 5 nF, Li = 27 µH
IP66, IP68

Dimensional Drawings

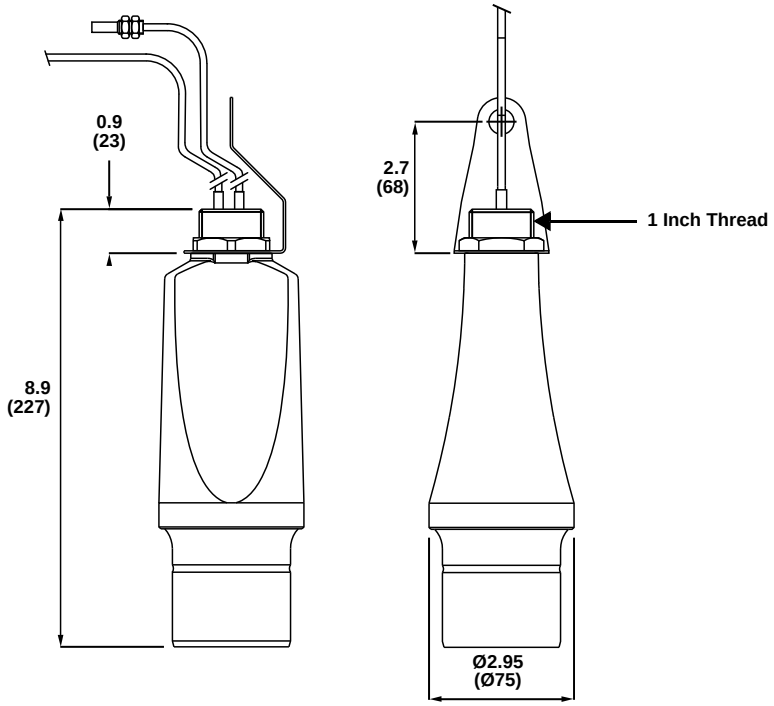
3107 Threaded Mounting

Note: Dimensions are in inches (mm)



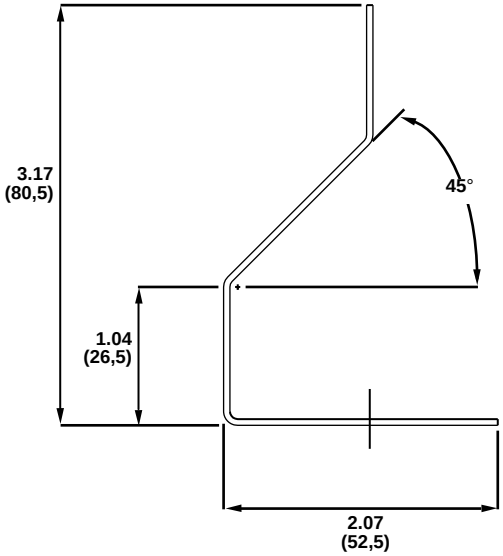
3108 Threaded Mounting

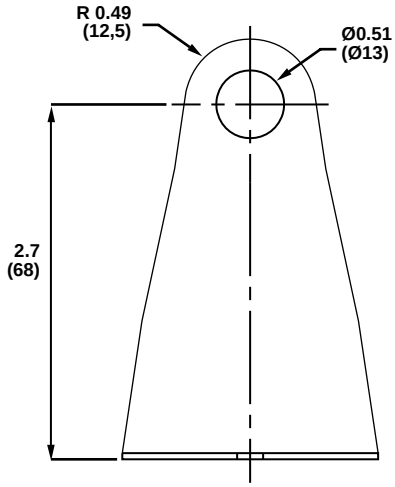
Note: Dimensions are in inches (mm)

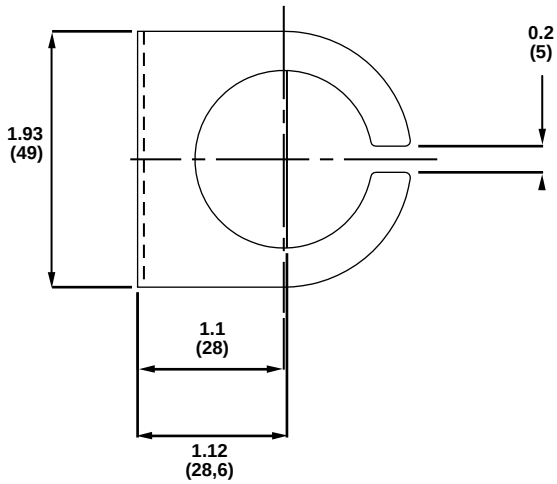


1-inch NPT/BSPP Bracket Kits

Note: Dimensions are in inches (mm)







Rosemount Level Solutions

Emerson provides a complete range of Rosemount products for level measurement applications.

Vibrating Fork Switches – Point Level Detection

For high and low alarms, overfill protection, pump control, including wide pressure and temperature requirements, and hygienic applications. Flexible mounting. Immune to changing process conditions and suitable for most liquids.
The product line consists of:

- Rosemount 2160 Wireless
- Rosemount 2130 Enhanced
- Rosemount 2120 Full-featured
- Rosemount 2110 Compact

Differential Pressure – Level or Interface Measurement

Flexible mounting for liquid tank levels, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by: vapor space changes, surface conditions, foam, corrosive fluids, internal tank equipment. Optimize performance with direct mount, Tuned-System Assemblies:

- Rosemount DP Level Transmitters and Remote Seals
- Rosemount 3051S_L, 3051L, and 2051L Liquid Level Transmitters

Ultrasonic – Level Measurement

Top mounted, non-contacting for simple tank and open air level measurements. Unaffected by fluid properties such as: density, viscosity, dirty coating, and corrosiveness. Appropriate for routine applications outside of explosion proof areas.
The product line consists of:

- Rosemount 3100 Series Ultrasonic Process Level Transmitters

Guided Wave Radar – Level and Interface Measurement

Top mounted, direct level and interface measurement of liquids or solids, including those with wide temperature and pressure requirements. Unaffected by changing process conditions. Good fit for small spaces and easy swap for older technologies.
The product line consists of:

- Rosemount 5300 Series – Accurate, superior performance transmitter in most applications including process vessels and control
- Rosemount 3300 Series – Versatile and easy-to-use transmitter in most liquid storage and monitoring applications

Non-contacting Radar – Level Measurement

Top mounted, direct level measurement for liquids or solids, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by changing process conditions. Good for dirty, coating, and corrosive applications.
The product line consists of:

- Rosemount 5400 Series – Accurate, superior performance 2-wire transmitters for most liquid level applications and process conditions
- Rosemount 5600 Series – 4-wire transmitters with maximum sensitivity and performance for solids, challenging reactors, rapid level changes, and excessive process conditions

Chambers for Process Level Instrumentation

- Rosemount 9901 – High quality chambers for external mounting of level measurement and control instrumentation on process vessels

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EMERSON™
Process Management

Rosemount 3490 Series Universal Control Unit

- *Intrinsically Safe power supply to transmitter*
- *4–20mA HART input*
- *Isolated 4–20mA output*
- *Five control relays*
- *Multi-function back lit display*
- *Wall or panel mount*
- *Pre-programmed linearization: volume and open channel flow*
- *Configurable by using the integral keypad*



CE

HART COMMUNICATION PROTOCOL

Contents

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Rosemount 3491 Standard Control Unit . . . . . .page Level-312
Rosemount 3492 Differential Control Unit . . . . . .page Level-313
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Reliable Performance...In Challenging Applications



Wall Mount, IP65 Model Of The Rosemount 3490 Series Controller Unit



Wall Mount, NEMA 4X Model Of The Rosemount 3490 Series Controller Unit



Panel Mount Model Of The Rosemount 3490 Series Controller Unit

OVERVIEW OF THE 3490 SERIES

The 3490 Series of wall and panel mounting control units provide comprehensive control functionality for any 4–20 mA or HART compatible transmitter. A back-lit display gives clear visual indication of the measured value and status of all inputs and outputs.

FEATURES AND BENEFITS

- Tough weatherproof wall mount enclosure for internal and external mounting
- Accepts any 4–20 mA or HART compatible input
- Five voltage-free SPDT relays for alarm and control duties
- Supports two voltage-free contact closure inputs
- 4–20 mA 12-bit isolated current output proportional to calculated value
- Bright local display of measured value and input/output status
- Pre-programmed tank shapes, flow algorithms, and control control routines simplify configuration. A 20-point strapping table facility is provided for non-standard applications
- Real-time clock allows energy saving routines and pump efficiency calculations

Intrinsically Safe Power Supply To transmitter

The 3490 Series is mounted in a non-hazardous area, and provides a protected (intrinsically safe) 24 volts direct current supply to a transmitter in a hazardous area.

Ideal For Programming And Control Of Rosemount Transmitters

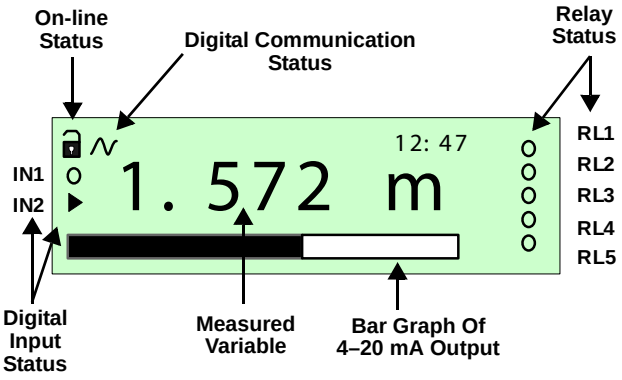
It is ideal for programming and control of Rosemount 3100 Series level and flow transmitters, and Rosemount 3300 Guided Wave Radar level and interface transmitters (*non-explosion-proof only*).

Other HART transmitters can be connected. The 3490 Series recognizes the transmitters as an “unknown instruments” but allows access to programming of Universal and Common Practice HART commands.

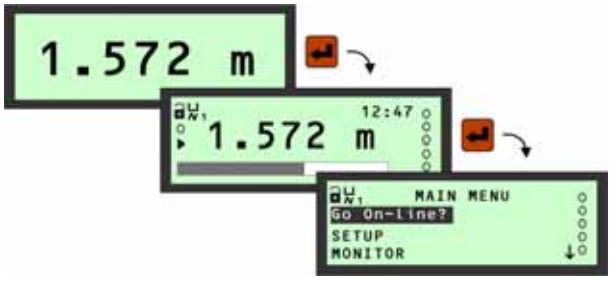
SPECIAL FEATURES

- Configured and interrogated using an integral six-button keypad
- Easy to navigate menu structure
- Wizard assisted programming, with password protection to prevent unauthorized access

  Many popular configurations are “Wizard assisted”, enabling fast and accurate programming. Typical applications include level, volume, distance measurement, and open channel flow measurement
- The HART digital or 4–20 mA analog signal from the transmitter may be offset, dampened, scaled, and linearized. A range of pre-programmed linearization algorithms are user-selectable
- The 4–20 mA output signal may be scaled to re-transmit all or just part of the transmitter’s input signal or calculated value
- Five relays are fully field programmable to perform a variety of control, fault indication, and alarm duties
- Two digital inputs can be individually set-up to perform various control actions (e.g. raise an alarm) whenever activated



Typical Display Of The Rosemount 3491



Easy To Navigate Menu Structure

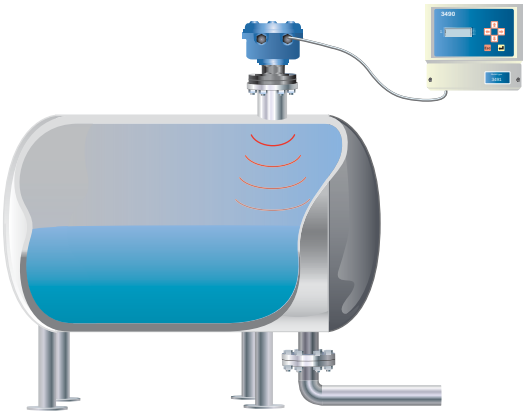
CHOOSING THE RIGHT MODEL

Each model of the 3490 Series has been designed for a specific purpose, as shown below:

TABLE 1. Choosing The Right Control Unit

	Model	Ordering Information
Standard Control Unit	3491	Page 2
Differential Measurement Control Unit	3492	Page 3
Logging Measurement Control Unit	3492	Page 4

- The Standard Control Unit accepts input from one transmitter
- The Rosemount 3492 Differential Measurement Control Unit accepts input from two transmitters and performs sum or differential calculations, providing a single current output proportional to the answer
- The Rosemount 3493 Logging Measurement Control Unit provides on-board logging of the process/primary value (PV), and totalized open channel flow



Level or Volume Measurement With A Rosemount 3490 Series Control Unit And Rosemount 3100 Series Level Transmitter

Rosemount 3491 Standard Control Unit



(Wall Mount, IP65)





(Panel Mount)

(Wall Mount, NEMA 4X)

Rosemount 3491 capabilities include:

- Wall mount or Panel mount versions
- Powers any HART or two wire 4–20mA transmitter
- Backlit LCD three line display
- Simple push button programming
- Wizard programming for Level, Tank volume, and Open Channel flow
- Five SPDT relays, and a 4–20mA output
- Intrinsically Safe (associated equipment) approved UL, CSA, ATEX, and IECEx

Additional Information

Specifications: page Level-315
Certifications: page Level-317
Dimensions: page Level-318

TABLE 2. 3491 Ordering Information

★The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is manufactured after receipt of order and is subject to additional delivery lead time.

Model	Product Description	
3491	Standard Control Unit	
Signal Output		
Standard		**Standard**
L	4–20 mA	★
Power Supply		
Standard		**Standard**
1	115/230 Vac	★
2	24 Vdc	★
Enclosure / Mounting		
Standard		**Standard**
P6	Wall mounting, IP65	★
P7	Panel mounting	★
P4	Wall mounting, NEMA 4X	★
Product Certificates		
Standard		**Standard**
I1	ATEX Intrinsically Safe	★
I6(1)	CSA Intrinsically Safe	★
I7	IECEx Intrinsically Safe	★
I5(2)(3)	UL Intrinsically Safe	★
Typical Model Number: 3491 L 1 P4 I5		

(1) Enclosure/Mounting codes P4 or P7 are required for this option.

(2) Enclosure/Mounting code P4 is required for this option.

(3) Power supply code 1 is required for this option.

Rosemount 3492 Differential Control Unit



(Wall Mount, IP65)



(Wall Mount, NEMA 4X)



(Panel Mount)

Rosemount 3492 capabilities include:

- Dual HART inputs for Differential level
- Powers any HART or two wire 4–20mA transmitter
- Backlit LCD three line display
- Simple push button programming
- Wizard programming for Level, Tank volume, and Open Channel flow
- Five SPDT relays, and a 4–20mA output
- Intrinsically Safe (associated equipment) approved UL, CSA, ATEX, and IECEx

Additional Information

Specifications: page Level-315
Certifications: page Level-317
Dimensions: page Level-318

TABLE 3. 3492 Ordering Information

★The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is manufactured after receipt of order and is subject to additional delivery lead time.

Model	Product Description	
3492	Differential Control Unit	
Signal Output		
Standard		**Standard**
L	4–20 mA	★
Power Supply		
Standard		**Standard**
1	115/230 Vac	★
2	24 Vdc	★
Enclosure / Mounting		
Standard		**Standard**
P6	Wall mounting, IP65	★
P7	Panel mounting	★
P4	Wall mounting, NEMA 4X	★
Product Certificates		
Standard		**Standard**
I1	ATEX Intrinsically Safe	★
I6(1)	CSA Intrinsically Safe	★
I7	IECEx Intrinsically Safe	★
I5(2)(3)	UL Intrinsically Safe	★
Typical Model Number: 3492 L 1 P4 I5		

(1) Enclosure/Mounting codes P4 or P7 are required for this option.

(2) Enclosure/Mounting code P4 is required for this option.

(3) Power supply code 1 is required for this option.

Rosemount 3493 Logging Control Unit



(Wall Mount, IP65)





(Panel Mount)

(Wall Mount, NEMA 4X)

Rosemount 3493 capabilities include:

- Powers any HART or two wire 4–20mA transmitter
- Backlit LCD three line display
- Simple push button programming
- Wizard programming for Open Channel flow
- Cumulative and Daily totals, five SPDT relays, and a 4-20mA output
- Integral data logger 7000 flow events
- Intrinsically Safe (associated equipment) approved UL, CSA, ATEX, and IECEx

Additional Information

Specifications: page Level-315
Certifications: page Level-317
Dimensions: page Level-318

TABLE 4. 3493 Ordering Information

★The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is manufactured after receipt of order and is subject to additional delivery lead time.

Model	Product Description	
3493	Logging Control Unit	
Signal Output		
Standard		**Standard**
L	4–20 mA	★
Power Supply		
Standard		**Standard**
1	115/230 Vac	★
2	24 Vdc	★
Enclosure / Mounting		
Standard		**Standard**
P6	Wall mounting, IP65	★
P7	Panel mounting	★
P4	Wall mounting, NEMA 4X	★
Product Certificates		
Standard		**Standard**
I1	ATEX Intrinsically Safe	★
I6(1)	CSA Intrinsically Safe	★
I7	IECEx Intrinsically Safe	★
I5(2)(3)	UL Intrinsically Safe	★
Typical Model Number: 3493 L 1 P4 I5		

(1) Enclosure/Mounting codes P4 or P7 are required for this option.

(2) Enclosure/Mounting code P4 is required for this option.

(3) Power supply code 1 is required for this option.

Specification

General	
Product	Rosemount 3490 Series Universal Control Unit: 3491 Standard Control Unit 3492 Differential Control Unit 3493 Logging Control Unit
Mounting Styles	Wall mount or panel mount
Power Options	AC Mains or DC
Display	
Type	Dot matrix LCD, 32 x 122 pixels, back lit
Location	Integrated into enclosure
Indicators	Red LED for health status
Electrical	
AC Mains Power Supply Input	115 or 230 Vac ±10% (switch selectable) Power consumption: 10 VA nominal, 18 VA maximum Fuse: 200 mA(T), 5 x 20 mm, 250 V
DC Power Supply Input	15 to 30 Vdc, 30 Vdc maximum Power consumption: 9 W maximum
Current Input	4–20mA (Earth referenced in control unit) or HART digital communications (Rev. 5) (Supplies 23 volts from 400 Ohm source resistance)
Trigger Inputs	2 voltage-free contact closures
Current Output	Signal range (nominal): 4–20 mA Output range (linear): 3.8 to 20.5 mA (Alarm current of 3.6 mA, 21 mA, or 22.5 mA user-selectable) or 3.9 to 20.8 mA (Alarm current of 3.75 mA, or 21.75mA user-selectable) Load: Rmax is 1 K Ohm Resolution: 12-bit Regulation: < 0.1% over load change from 0 to 600 Ohms Isolation: Isolated from other terminals to 500 Vdc Update rate (software): 5 times per second
Relays	5 x SPDT, 5 A at 240 Vac
Cable Entry	IP-rated wall mount enclosure: 5 positions pre-drilled, 2 glands and 3 blanking plugs supplied NEMA-4X-rated wall mount enclosure: Positions require drilling by user, glands/conduits and blanking plugs are not supplied Panel enclosure: Direct wiring to terminal blocks at rear
Cable Connection	Wall mount enclosure: Cage clamp terminal blocks in separate terminal compartment Panel mount enclosure: 2-part cage clamp terminal blocks at rear
Mechanical	
Materials Of Construction (Wall Mount)	Polycarbonate enclosure and cover IP-rated wall mount: 304SST cover fixing screws NEMA-4X-rated wall mount: Polyester and Alloy 400 fastening UV resistant Polycarbonate membrane keypad Nylon cable glands and blanking plugs (IP-rated wall mount version only)
Materials Of Construction (Panel Mount)	Noryl PPO enclosure and cover Carbon Steel / Zinc plated fascia fixing screws UV resistant Noryl PPO membrane keypad Nylon + PBT terminal blocks with plated fittings
Dimensions	See Dimensional Drawings on pages 318 to 320
Weight	IP-rated wall mount: 1.4 kg (mains unit) or 1.0 kg (DC unit) NEMA-4X-rated wall mount: 3.5 kg (mains unit) or 3.1 kg (DC unit) Panel mount 1.2 kg (mains unit) or 0.8 kg (DC unit)

Environment	
Ambient Temperature(1)	–40 to 55 °C (–40 to 131 °F)
Relative Humidity	Wall mount: 100% Panel mount: 90% non-condensing
Electrical Safety	EN61010-1
Ingress Protection	IP-rated wall mount: IP65 indoor/outdoor. NEMA-4X-rated wall mount: NEMA 4X indoor/outdoor. Panel mount: IP40 indoor mount (or IP65 if with optional hood)
Vibration	Control Room: 0.1 to 9 Hz 1.5 mm displacement peak amplitude / 9 to 200 Hz 0.5 g
Installation Category	III : Supply voltage < 127Vac (IEC60664) II : Supply voltage < 254Vac (IEC60664)
Pollution Degree	2 (IEC60664)
Maximum Altitude	2000 m
Electromagnetic Compatibility	Emissions and Immunity (for IP-rated wall mount and panel mount): EN61326-1:2006
Certifications	CE-mark, ATEX, IECEx, CSA, or UL (dependent on order code)

(1) See Product Certifications on page 317 for approval temperatures ranges.

Product Certifications

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting your local sales office.

ATEX Directive (94/9/EC)

Complies with the ATEX Directive

Low Voltage Directive (2006/95/EC)

EN61010 Part 1: 2001

Pressure Equipment Directive (PED) (97/23/EC)

The Rosemount 3490 Series is outside the scope of PED Directive

Electro Magnetic Compatibility (EMC) Directive

EN61326-1: 2006

CE-mark

The Rosemount 3490 Series complies with EMC, ATEX, and LVD directives

Restriction of Hazardous Substances (ROHS)

The Rosemount 3490 Series is exempt

Hazardous Locations Certifications

ATEX Intrinsically Safe Approval

I1 Certificate Numbers:
SIRA 06ATEX7128 (Wall Mount),
SIRA 06ATEX7129X (Panel Mount)
Intrinsically Safe for II(1) G D,
[Ex ia] IIC, [Ex ia Da] IIIC
Ambient Temperature: -40°C to +55°C
Uo = 27,3 V, Io = 96,9 mA, Po = 0,66 W,
Li = 0,22 mH, Ci = 0,6 nF

Special conditions for safe use (Certificate SIRA 06ATEX7129X):

1. Terminal 30 must be earthed in the safe area to a high integrity earth.

Underwriters Laboratories Inc. (UL) Intrinsically Safe Approval

I5 Project IDs: E308780, E308781
Intrinsically Safe for:
Class I, Division 1, Groups A, B, C, D
Intrinsically Safe for:
Class 1, Zone 0, Group IIC
Ambient Temperature: -40°C to +55°C
Control Drawing: 71097/1210
Uo = 27,3 V, Io = 96,9 mA, Po = 0,66 W,
La = 2,26 mH, Ca = 70 nF

Canadian Standards Association (CSA) Intrinsically Safe Approval

I6 Project ID: 1834150
Intrinsically Safe for:
Class I, Division 1, Groups A, B, C, and D
Intrinsically Safe for:
Class 1, Zone 0, Group IIC [Ex ia]
Ambient Temperature: -40°C to +55°C
Control Drawing: 71097/1201
Uo = 27,3 V, Io = 96,9 mA, Po = 0,66 W,
La = 2,26 mH, Ca = 70 nF

IECEx Intrinsically Safe Approval

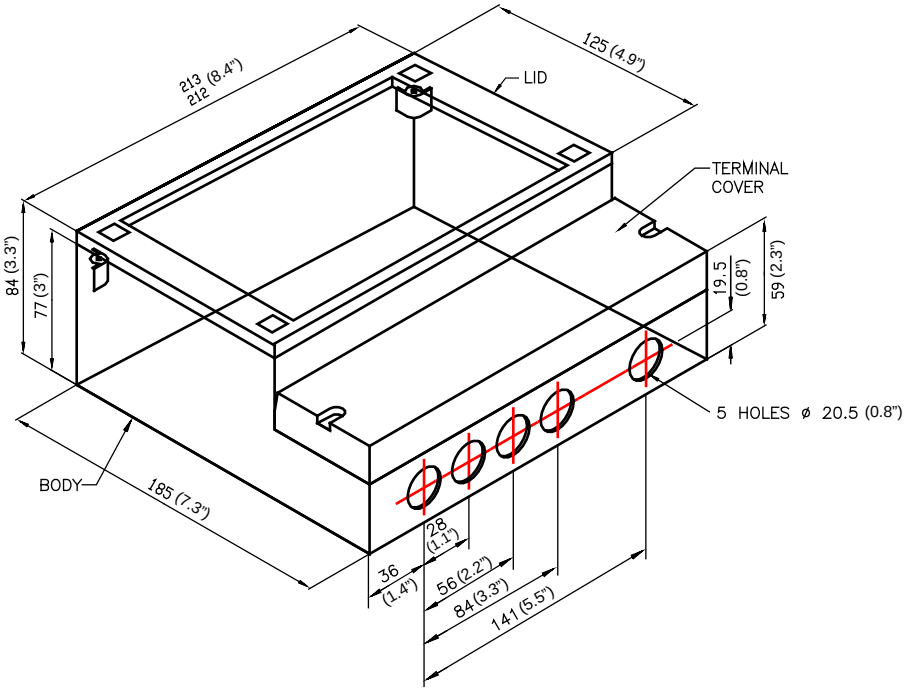
I7 Certificate Number: IECEx SIR 06.0104X
Intrinsically Safe for:
Zone 0, 20, [Ex ia] IIC, [Ex iaD 20]
Ambient Temperature: -40°C to +55°C
Uo = 27,3 V, Io = 96,9 mA, Po = 0,66 W,
Li = 0,22 mH, Ci = 0,6 nF

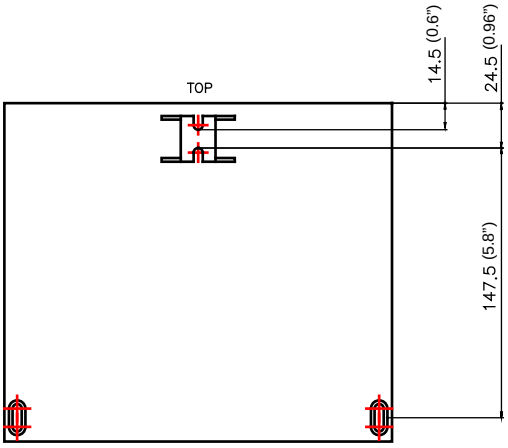
Conditions of Certification (Panel Mount):

1. Terminal 30 must be earthed in the safe area to a high integrity earth.

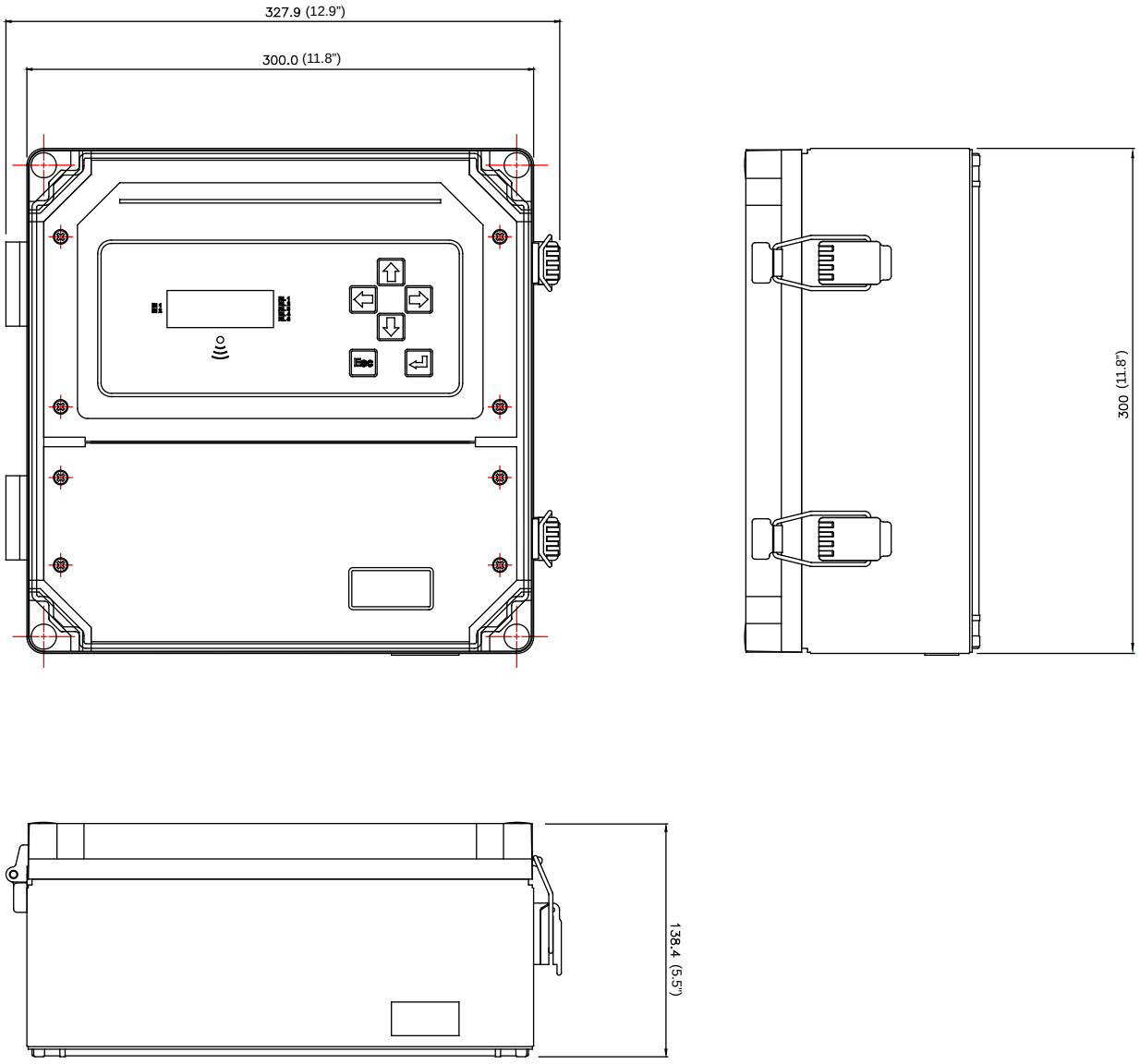
Dimensional Drawings

Dimensions for IP-rated Wall Mount Box

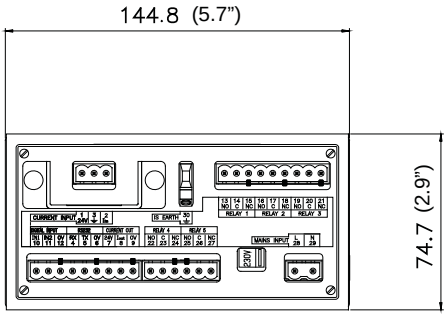


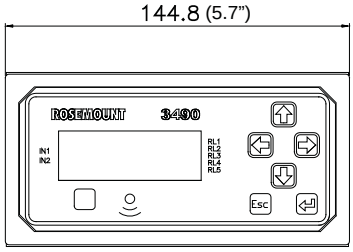


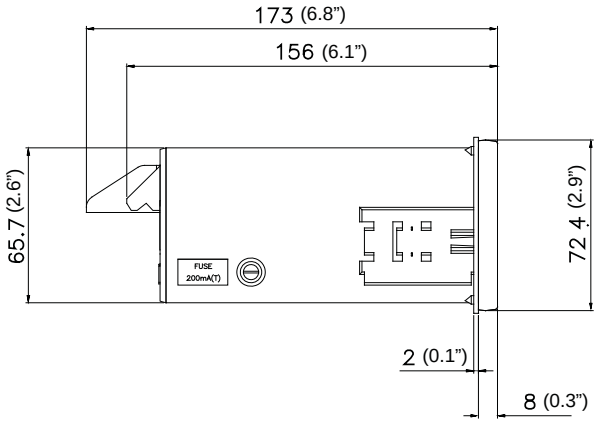
Dimensions for NEMA-4X-rated Wall Mount Box



Dimensions for Panel Mount







Rosemount Level Solutions

Emerson provides a complete range of Rosemount products for level measurement applications.

Vibrating Fork Switches – Point Level Detection

For high and low alarms, overfill protection, pump control, including wide pressure and temperature requirements, and hygienic applications. Flexible mounting. Immune to changing process conditions and suitable for most liquids.
The product line consists of:

- Rosemount 2160 Wireless
- Rosemount 2130 Enhanced
- Rosemount 2120 Full-featured
- Rosemount 2110 Compact

Differential Pressure – Level or Interface Measurement

Flexible mounting for liquid tank levels, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by: vapor space changes, surface conditions, foam, corrosive fluids, internal tank equipment. Optimize performance with direct mount, Tuned-System Assemblies:

- Rosemount DP Level Transmitters and Remote Seals
- Rosemount 3051S_L, 3051L, and 2051L Liquid Level Transmitters

Ultrasonic – Level Measurement

Top mounted, non-contacting for simple tank and open air level measurements. Unaffected by fluid properties such as: density, viscosity, dirty coating, and corrosiveness. Appropriate for routine applications outside of explosion proof areas.
The product line consists of:

- Rosemount 3100 Series Ultrasonic Process Level Transmitters

Guided Wave Radar – Level and Interface Measurement

Top mounted, direct level and interface measurement of liquids or solids, including those with wide temperature and pressure requirements. Unaffected by changing process conditions. Good fit for small spaces and easy swap for older technologies.
The product line consists of:

- Rosemount 5300 Series – Accurate, superior performance transmitter in most applications including process vessels and control
- Rosemount 3300 Series – Versatile and easy-to-use transmitter in most liquid storage and monitoring applications

Non-contacting Radar – Level Measurement

Top mounted, direct level measurement for liquids or solids, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by changing process conditions. Good for dirty, coating, and corrosive applications.
The product line consists of:

- Rosemount 5400 Series – Accurate, superior performance 2-wire transmitters for most liquid level applications and process conditions
- Rosemount 5600 Series – 4-wire transmitters with maximum sensitivity and performance for solids, challenging reactors, rapid level changes, and excessive process conditions

Chambers for Process Level Instrumentation

- Rosemount 9901 – High quality chambers for external mounting of level measurement and control instrumentation on process vessels

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EMERSON
Process Management

MSL600
Sludge Blanket Level Monitoring

- *Continuous measurement of sludge blanket level interface*
- *Integral air purge cleaning system ensures reliable measurement and minimal maintenance*
- *Optimized for use with clarifiers and thickeners containing municipal and industrial wastewater treatment sludge*
- *An abundant range of built-in display, control and alarm features*
- *Easy to use menu driven programming allows complete configuration of the unit in just a few minutes*



Contents

MSL600 Control Unit and Transducer . . . . . page Level-324
Specifications . . . . . page Level-325
Dimensional Drawings. . . . . page Level-326

MSL600 Control Unit and Transducer



MSL600

- System includes a bridge mounted control unit and ultrasonic transducer
- Easy installation using a handrail mounting bracket
- Transducer self-cleaning facility
- Display shows trend and sludge profile

Additional Information

Specifications: page Level-325
Dimensions: page Level-326

TABLE 1. MSL600 Transducer Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model[(1)]	Product Description	
Standard		**Standard**
MSL603	MSL600 transducer with integral galvanized mild steel mounting bracket and 33 ft. (10 m) cable/hose	★
MSL603/SS	MSL600 transducer with integral 316L stainless steel mounting bracket and 33 ft. (10 m) cable/hose	★
MSL603/1	MSL600 transducer with 33 ft. (10 m) cable / hose, ¾-in. BSP to 1¼-in. BSP adaptor, no mounting bracket	★
Typical Model Number: MSL603		

(1) The MSL603 transducer replaces the MSL602. To replace an old style MSL602 transducer, order MSL603/1.

TABLE 2. MSL600 Control Unit Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
MSL600	Controller with integral air clean compressor	
115/230 Vac, Bracket/Wall Mount		
Standard		**Standard**
Z0	Standard bracket and wall mount version of the control unit	★
Typical Model Number: MSL600 / Z0		

Specifications

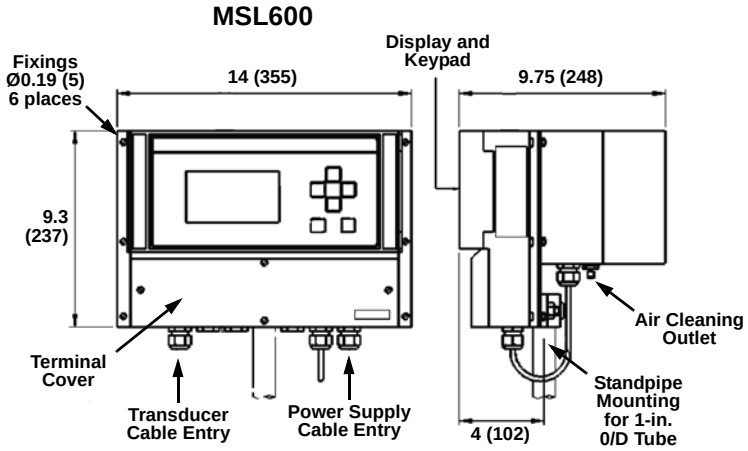
CONTROL UNIT AND SENSOR

General	
Product	Wall or Bracket Mounted MSL600 Control Unit
Measurements	
Range	23 ft. (7 m) maximum
Deadband	1ft. (0.3 m) minimum
Accuracy	±1.4 in. (±35 mm)
Resolution	1 in. (25 mm)
Functional	
Outputs	2 x programmable relays SPDT, 1 x fault relay SPDT, and 0/4–20mA isolated
Cleaning	Transducer self cleaning facility – automatic timed air-purge using the integral air compressor
Physical	
Sensor Material	Ceramic face, PTFE cleaning nozzle, UPVC body
Sensor Cable	Fully encapsulated with 10m / 33ft cable and air clean polyurethane hose
Mounting Thread	$1^{1}/_{4}$-in. BSPT. Supplied with $^{3}/_{4}$-in. BSP adaptor
Electrical	
External Power Supply	115 or 230 Vac (50/60Hz)
Environment	
Operating Temperature	Control Unit: –4 to 130 °F (–20 to 55 °C)
	Sensor: –40 to 150 °F (–40 to 65 °C)
Enclosure Rating	IP66
Sensor Rating	IP68

Dimensional Drawings

MSL600 CONTROLLER

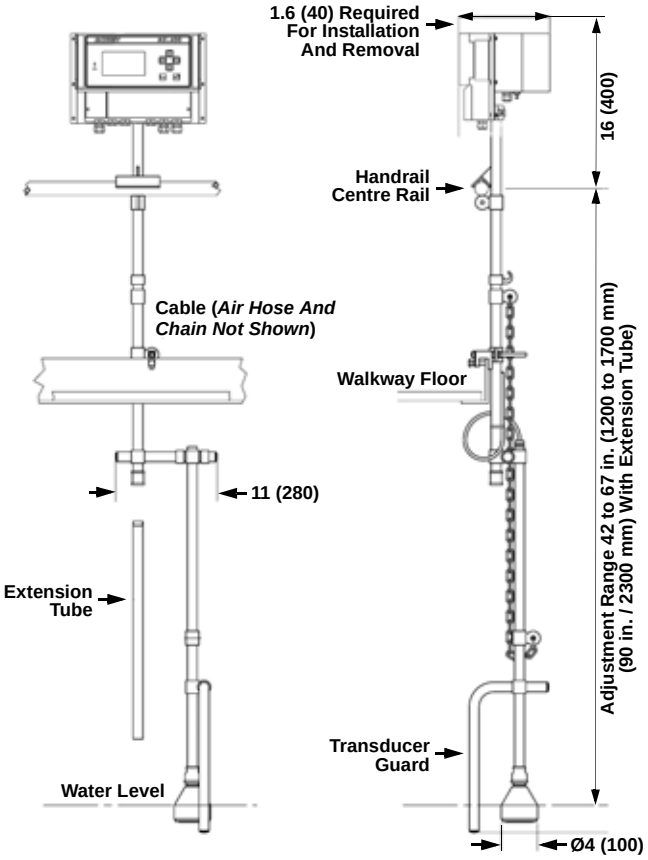
Note: Dimensions are in inches (mm)



M20 cable glands fitted into 0.8-in. (20 mm) entries are supplied as standard, suitable for Ø0.3-in (8 mm) cable

MOUNTING ASSEMBLY

Note: Dimensions are in inches (mm)



Rosemount Level Solutions

Emerson provides a complete range of Rosemount products for level measurement applications.

Vibrating Fork Switches – Point Level Detection

For high and low alarms, overfill protection, pump control, including wide pressure and temperature requirements, and hygienic applications. Flexible mounting. Immune to changing process conditions and suitable for most liquids.
The product line consists of:

- Rosemount 2160 Wireless
- Rosemount 2130 Extreme Temperature
- Rosemount 2120 Full-featured
- Rosemount 2110 Compact

Differential Pressure – Level or Interface Measurement

Flexible mounting for liquid tank levels, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by: vapor space changes, surface conditions, foam, corrosive fluids, internal tank equipment. Optimize performance with direct mount, Tuned-System Assemblies:

- Rosemount DP Level Transmitters and Remote Seals
- Rosemont 3051S_L, 3051L, and 2051L Liquid Level Transmitters

Ultrasonic – Level Measurement

Top mounted, non-contacting for simple tank and open air level measurements. Unaffected by fluid properties such as: density, viscosity, dirty coating and corrosiveness. Appropriate for routine applications outside of explosion proof areas.
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Non-contacting Radar – Level Measurement

Top mounted, direct level measurement for liquids or solids, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by changing process conditions. Good for dirty, coating and corrosive applications.
The product line consists of:

- Rosemount 5400 Series – Accurate, superior performance 2-wire transmitters for most liquid level applications and process conditions
- Rosemount 5600 Series – 4-wire transmitters with maximum sensitivity and performance for solids, challenging reactors, rapid level changes and excessive process conditions

Chambers for Process Level Instrumentation

- Rosemount 9901 – High quality chambers for external mounting of level measurement and control instrumentation on process vessels

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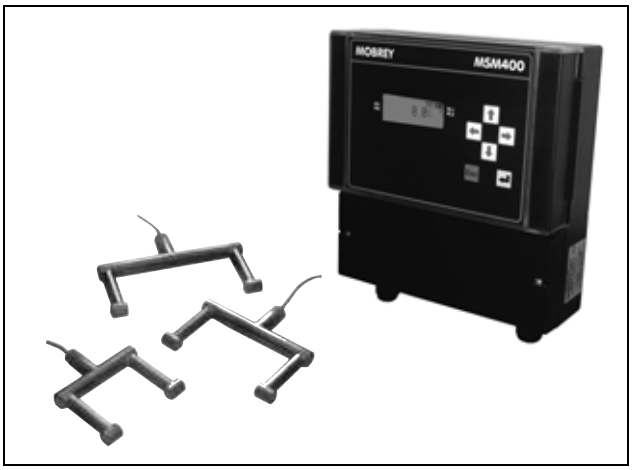
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Mobrey Measurement Division
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Berks UK SL1 4UE
T +44 (0)1753 756600
F +44 (0)1753 823589
www.mobrey.com

Americas:
Emerson Process Management
8200 Market Boulevard
Chanhassen, MN 55317 USA
T (U.S.) 1-800-999-9307
T (International) (952) 906-8888
F (952) 949-7001

EMERSON
Process Management

MSM400 Ultrasonic Suspended Solids Monitoring and Control System

- *Continuous sludge discharge monitor for up to 50% suspended solid*
- *The MSM400 system contains a control unit and either a tank mounted sensor or pipe section with integral sensors*
- *Rugged 316 stainless steel sensors for in-tank or pipe section mounting*
- *Simple keypad operation, and intuitive menu based programming*
- *Dual operating frequency sensors 1MHz to 3.3MHz*



Contents

MSM400 Control Unit and Sensors . . . . . page Level-330
Specifications . . . . . page Level-331
Dimensional Drawings. . . . . page Level-332

MSM400 Control Unit and Sensors



MSM400 Control Unit

- Measuring range up to 50% solids
- Configurable display and output functions
- 4–20 mA HART output, and 2 x SPDT control relays
- Automatic de-sludge control routines

Additional Information

Specifications: page Level-331
Dimensions: page Level-332

TABLE 1. MSM400 Control Unit Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
Standard		**Standard**
MSM400	Control unit, ATEX intrinsically safe certified, IP65	★
Typical Model Number: MSM400		

TABLE 2. MSM400 Sensors Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
Standard		**Standard**
MSM433	Tank mount	★
MSM448	Pipe mount	★
Approval		
Standard		**Standard**
A	Intrinsically safe (ATEX)	★
Size(1)		
Standard		**Standard**
100T	1 / 3.3 MHz 4 in. (100 mm) gap tank sensor	★
150T	1 / 3.3 MHz 6 in. (150 mm) gap tank sensor	★
200T	1 / 3.3 MHz 8 in. (200 mm) gap tank sensor	★
300T	1 / 3.3 MHz 12 in. (300 mm) gap tank sensor	★
450T	1 / 3.3 MHz 18 in. (450 mm) gap tank sensor	★
100	1 / 3.3 MHz flanged PN10/PN16 DN100 pipe sensor	★
150	1 / 3.3 MHz flanged PN10/PN16 DN150 pipe sensor	★
200	1 / 3.3 MHz flanged PN10 DN200 pipe sensor	★
A10	1 / 3.3 MHz flanged ASME B16.5 Class 150 4 in. (100 mm) pipe sensor	★
A15	1 / 3.3 MHz flanged ASME B16.5 Class 150 6 in. (150 mm) pipe sensor	★
A20	1 / 3.3 MHz flanged ASME B16.5 Class 150 8 in. (200 mm) pipe sensor	★
Spray Valve		
Standard		**Standard**
V	Spray valve (pipe section only)	★
P	No spray valve (pipe section only)	★
Cable		
Standard		**Standard**
7	23 ft. (7 m) cable	★
D	Customer specified cable length up to 330 ft. (100 m) – *length must be clearly stated on order*	★
Typical Model Number: MSM448 A 150 V 7		

(1) Sensor size is specified depending on the application. Please contact the sales office to ensure that the size is suitable for the application.

Specifications

CONTROL UNIT

General	
Product	Wall Mounted MSM400 Control Unit
Connections	
Conduit Entry	3 x M20 glands and 2 x M16 glands
Cable Termination	Captive screw terminal block. Maximum cable size 2.5mm^2 / 12 AWG
Sensor Frequency	1 MHz or 3.3 MHz auto selection
Current Input	4–20mA
Trigger Input	Volt free contact 5V logic
mA Output	4–20mA into 1000 ohms max.
Relay output	2 x SPDT rated up to 5 A, 250 Vac resistive
Electrical	
External Power Supply	115 or 230 Vac (50/60Hz), or 24 Vdc
Environment	
Operating Temperature	–22 to 130 °F (–30 to 55 °C)
Enclosure Rating	IP65
Approval	
Hazardous Area	ATEX II (1) G, EEx ia IIC

MSM433 SENSOR

General	
Product	MSM433 Tank Mounted Gap Sensor, 316 Stainless steel
Connections	
Mounting connection	¾-in. BSPT. Gap size 4, 6, 8, 12, or 18 in (100, 150, 200, 300, or 450 mm)
Sensor Cable	23 ft. (7m) dual screened twisted pair (*others upon request)*
	Cable junction box: Sensor IP68
Environment	
Operating Temperature	–40 to 130 °F (–40 to 55 °C) -- *212 °F (100 °C) upon request*
Operating Pressure	1522 psi (105 bar)
Approval	
Hazardous Area	ATEX II 1 G EEx ia IIC T6

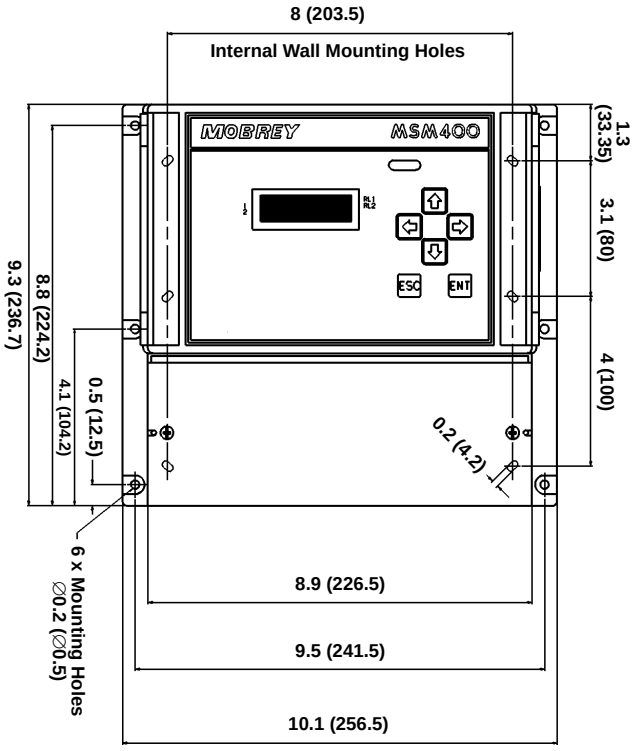
MSM448 SENSOR

General	
Product	MSM448 Pipe Section Gap Sensor
Pipe Section Material	Epoxy coated carbon steel
Drain Fitting	1-in. NPT
Connections	
Mounting connection	Flanged in-line installation
	DN100, DN150, DN200 to BS4772, PN10 rated or 4 in., 6 in., 8 in. ASME B16.15 Class 150
Sensor Cable	23 ft. (7m) from junction box, oil hose protected, dual screened twisted pair (*others upon request)*
Cable Junction Box	IP65 Aluminium alloy
Environment	
Operating Temperature	–40 to 158 °F (–40 to 78 °C)
Operating Pressure	145 psi (10 bar)
Approval	
Hazardous Area	ATEX II 1 G EEx ia IIC T6

Dimensional Drawings

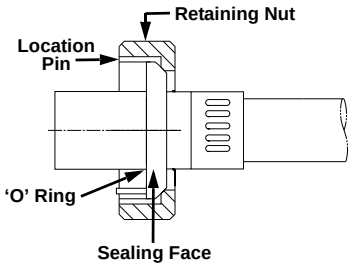
CONTROL UNIT

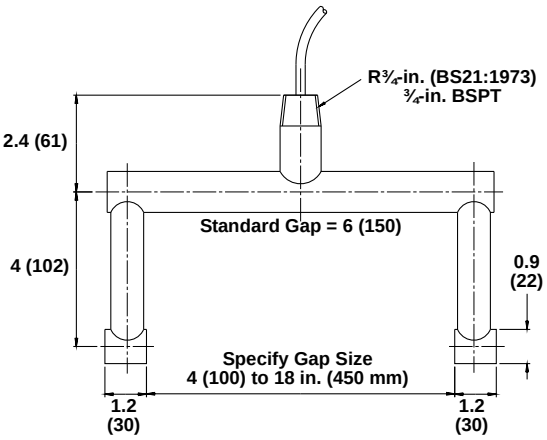
Note: Dimensions are in inches (mm)

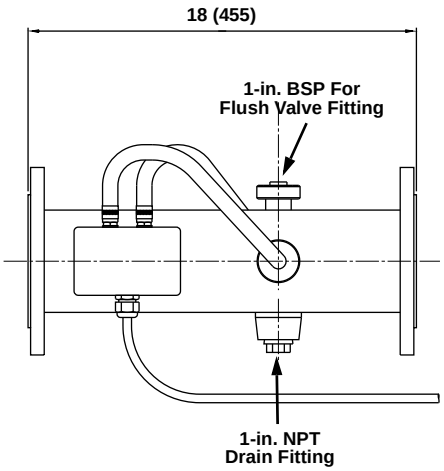


SENSORS

Note: Dimensions are in inches (mm)







Rosemount Level Solutions

Emerson provides a complete range of Rosemount products for level measurement applications.

Vibrating Fork Switches – Point Level Detection

For high and low alarms, overfill protection, pump control, including wide pressure and temperature requirements, and hygienic applications. Flexible mounting. Immune to changing process conditions and suitable for most liquids.
The product line consists of:

- Rosemount 2160 Wireless
- Rosemount 2130 Extreme Temperature
- Rosemount 2120 Full-featured
- Rosemount 2110 Compact

Differential Pressure – Level or Interface Measurement

Flexible mounting for liquid tank levels, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by: vapor space changes, surface conditions, foam, corrosive fluids, internal tank equipment. Optimize performance with direct mount, Tuned-System Assemblies:

- Rosemount DP Level Transmitters and Remote Seals
- Rosemont 3051S_L, 3051L, and 2051L Liquid Level Transmitters

Ultrasonic – Level Measurement

Top mounted, non-contacting for simple tank and open air level measurements. Unaffected by fluid properties such as: density, viscosity, dirty coating and corrosiveness. Appropriate for routine applications outside of explosion proof areas.
The product line consists of:

- Rosemount 3100 Series Ultrasonic Process Level Transmitters

Guided Wave Radar – Level and Interface Measurement

Top mounted, direct level and interface measurement of liquids or solids, including those with wide temperature and pressure requirements. Unaffected by changing process conditions. Good fit for small spaces and easy swap for older technologies.
The product line consists of:

- Rosemount 5300 Series – Accurate, superior performance transmitter in most applications including process vessels and control
- Rosemount 3300 Series – Versatile and easy-to-use transmitter in most liquid storage and monitoring applications

Non-contacting Radar – Level Measurement

Top mounted, direct level measurement for liquids or solids, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by changing process conditions. Good for dirty, coating and corrosive applications.
The product line consists of:

- Rosemount 5400 Series – Accurate, superior performance 2-wire transmitters for most liquid level applications and process conditions
- Rosemount 5600 Series – 4-wire transmitters with maximum sensitivity and performance for solids, challenging reactors, rapid level changes and excessive process conditions

Chambers for Process Level Instrumentation

- Rosemount 9901 – High quality chambers for external mounting of level measurement and control instrumentation on process vessels

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EMERSON
Process Management

Rosemount 2160 Wireless Vibrating Fork Liquid Level Switch

- *World's first wireless liquid level switch for reliable point level detection*
- *Wireless capabilities extend the full benefits of PlantWeb® to previously inaccessible locations*
- *Self-organizing network delivers information rich data with >99% data reliability*
- *Designed for operation in temperature extremes of –94 to 500 °F (–70 to 260 °C)*
- *Virtually unaffected by flow, bubbles, turbulence, foam, vibration, solids content, coating, properties of the liquid, and product variations*
- *"Fast Drip" fork design gives quicker response time, especially with viscous liquids*
- *Intrinsically Safe certification option*



Contents

Reliable Performance...In Challenging Applications . . . . . page Level-336
Rosemount 2160 Wireless Vibrating Fork Liquid Level Switch . . . . . page Level-338
Specification . . . . . page Level-341
Product Certifications . . . . . page Level-343
Dimensional Drawings. . . . . page Level-345

Reliable Performance...In Challenging Applications



2160*S**

2160*E**



'Fast Drip' Forks

MEASUREMENT PRINCIPLE

The Rosemount 2160 is designed using the principle of a tuning fork. A piezo-electric crystal oscillates the forks at their natural frequency. Changes to this frequency are continuously monitored. The frequency of the vibrating fork sensor changes depending on the medium in which it is immersed. The denser the liquid, the lower the frequency.

When used as a **low level alarm**, the liquid in the tank or pipe drains down past the fork, causing a change of natural frequency that is detected by the electronics and switches the output state to DRY.

When the 2160 is used as a **high level alarm**, the liquid rises in the tank or pipe, making contact with the fork which then causes the output state to switch to WET.

KEY FEATURES AND BENEFITS

- Virtually unaffected by turbulence, foam, vibration, solids content, coating, or liquid properties
- The *mid-range temperature* 2160 is designed for operation in temperatures from –40 to 302 °F (–40 to 150 °C)
- The *extreme temperature* 2160 is designed for operation in temperatures from –94 to 500 °F (–70 to 260 °C). It has a stainless steel thermal tube to move the electronics away from the process
- Electronic self-checking and condition monitoring, and alerts using Field Communicator or AMS
- Software adjustable switching delay prevents false switching in turbulent or splashing applications
- Wireless and encrypted digital communication of the switch output state and other variables
- Optional integral LCD for indicating the switch output state and diagnostics
- 'Fast Drip' fork design gives quicker response time, especially with viscous liquids
- Rapid wet-to-dry time for highly responsive switching
- Fork shape is optimized for hand polishing to meet hygienic requirements
- No moving parts or crevices for virtually no maintenance

Superior Diagnostics

- Built-in diagnostics continuously check electronic and mechanical health
- Fork conditions detected including internal and external damage, coated or blocked, and extreme corrosion
- Ideal for critical alarm duties

Fit and Forget

- Once installed, the 2160 is ready to go.
  It needs no calibration and requires minimum installation
- You can install, and forget it



AMS Suite: Intelligent Device Manager

Wireless Power Module

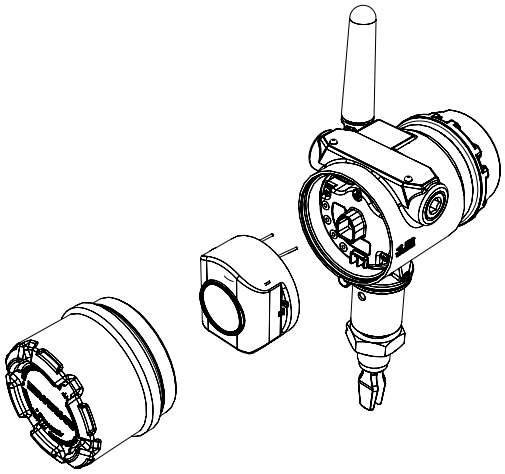
- The 2160 is powered by a replaceable wireless Power Module
- The fork sensor requires very little power, and the Power Module life remains long even with fast update rates

Extended High and Low Temperature Performance

- The *extreme temperature* 2160 enables standardization of Rosemount vibrating fork switches across a wide range of process environments, and is ideally suited for harsh conditions where high reliability is essential

Wireless Capability

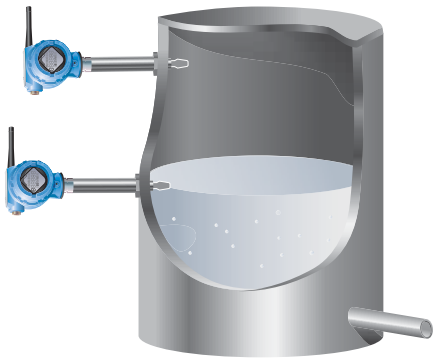
- The 2160 is the world's first wireless liquid level switch
- Includes all the features of our wired level switches, but without the complications and cost of wiring
- Ideal for level detection in locations previously inaccessible, or too costly for wired devices



Powered By A Replaceable Power Module

APPLICATIONS

- Overfill protection
- High and low level alarms
- Pump control or limit detection
- Run dry or pump protection
- Hygienic applications
- High temperature applications



High And Low Level Alarm

Rosemount 2160 Wireless Vibrating Fork Liquid Level Switch

2160*S** **2160***E**



2160 Wireless Level Switches

- World's first wireless liquid level switch for reliable point level detection
- Wireless capabilities extend the full benefits of PlantWeb to previously inaccessible locations
- Enhanced instrument health/self-checking diagnostics of the fork and sensor
- Self-checking condition monitoring and alerts using Field Communicator or AMS
- Suitable for most liquids

Additional Information

Spares and Accessories: page Level-340
Specifications: page Level-341
Certifications: page Level-343
Dimensions: page Level-345

Table 1. 2160 Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
2160	Wireless Vibrating Fork Liquid Level Switch	
Output		
Standard		**Standard**
X	Wireless	★
Housing Material		
Standard		**Standard**
D	Dual Compartment Housing - Aluminum (Aluminium)	★
Conduit Entry / Cable Threads		
Standard		**Standard**
8	1/2-in. NPT thread	★
Operating Temperature		
Standard		**Standard**
S	Standard: –40 °F (–40 °C)...302 °F (150 °C)	★
E	Extreme: –94 °F (–70 °C)...500 °F (260 °C)	★
Material of Construction: Process Connection / Fork		
Standard		**Standard**
S(1)	316/316L Stainless Steel (1.4401/1.4404)	★
Expanded		
H(2)	Alloy C (UNS N10002), Alloy C-276 (UNS N10276), solid	
Process Connection Size		
Standard		**Standard**
9	3/4 in. / 19 mm	★
1	1 in. / 25 mm (DN25)	★
2	2 in. / 50 mm (DN50)	★
5	1 1/2 in. / 40 mm (DN40)	★
3	3 in. / 80 mm (DN80)	★
4	4 in. / 100 mm (DN100)	★
6	6 in. / 150 mm (DN150)	★
8	8 in. / 200 mm (DN200)	★
7	2 1/2-in. / 65 mm (DN65)	★
Expanded		
X(3)	Customer specific	

Table 1. 2160 Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Process Connection Rating		
Standard		**Standard**
AA	ASME B16.5 Class 150 flange	★
AB	ASME B16.5 Class 300 flange	★
DB	EN1092-1 PN25/40 flange	★
NN	For use with non-flange process connection type	★
Expanded		
AC	ASME B16.5 Class 600 flange	
DA	EN1092-1 PN10/16 flange	
DC	EN1092-1 PN63 flange	
DD	EN1092-1 PN100 flange	
XX(3)	Customer specific	
Process Connection Type		
Standard		**Standard**
R	Raised Face (RF) flange	★
B	BSPT (R) thread	★
G	BSPP (G) thread	★
N	NPT thread	★
P	BSPP (G) O-ring	★
C	Tri-Clover Clamp	★
Expanded		
X(3)	Customer specific	
Fork Length		
Standard		**Standard**
A	Standard length 1.7-in. (44 mm)	★
H(4)	Standard length flange 4.0-in. (102 mm)	★
E(5)	Extended, customer specified length in tenths of inches	★
M(5)	Extended, customer specified length in millimeters	★
Specific Extended Fork Length		
Standard		**Standard**
0000	Factory default length (only if fork length A or H is selected)	★
xxxx(5)	Specific customer specified length in tenths of inches, or millimeters (xxxx mm or xxx.x inches)	★
Surface Finish		
Standard		**Standard**
1	Standard surface finish	★
2	Hand polished (Ra < 0.4 µm)	★
Product Certifications		
Standard		**Standard**
NA	No Hazardous Locations Certifications	★
I1	ATEX Intrinsic Safety	★
I3	NEPSI Intrinsic Safety	★
I5	FM Intrinsic Safety	★
I6(6)	CSA Intrinsic Safety	★
I7	IECEx Intrinsic Safety	★
Wireless Update Rate, Operating Frequency and Protocol		
Standard		**Standard**
WA3	User configurable update rate, 2.4 GHz DSSS, Wireless	★
Omnidirectional Wireless Antenna and SmartPower		
Standard		**Standard**
WK1(7)	Long range, integral antenna, long-life power module adapter, intrinsically safe (Power module separate)	★

Table 1. 2160 Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

OPTIONS		
Meter		
Standard		**Standard**
M5	LCD meter	★
Factory Configuration		
Standard		**Standard**
C1	Factory configure Date, Descriptor, Message Fields and Wireless Parameters	★
Calibration Data Certification		
Standard		**Standard**
Q4	Certificate of functional test	★
Material Traceability Certification		
Standard		**Standard**
Q8	Material traceability certification per EN 10204 3.1	★
Special Procedures		
Standard		**Standard**
P1(8)	Hydrostatic testing with certificate	★
Typical Model Number: 2160 X D 8 S S 1 NN N A0000 1 I5 WA3 WK1 M5 Q8		

(1) Flanges are dual certified 316 and 316L Stainless Steel (1.4401 and 1.4404).

(2) Only available for BSPT and NPT threaded process connection types as standard, other upon request.

(3) Other process connections available upon request.

(4) Not available for hand polished wet side.

(5) Example: Code E1181 is 118.1 inches. Code M3000 is 3000 millimeters. See "Extended Lengths" on page 341 for minimum and maximum extended lengths.

*(6) The requirements of CRN are met when a Rosemount 2160 CSA-approved vibrating fork level switch model 2160****S**********I6****** is configured with 316/316L stainless steel (1.4401/1.4404) wetted parts and either NPT threaded or 2-in. to 8-in. ASME B16.5 flanged process connections.*

(7) The long-life Power Module must be shipped separately. Order part number 00753-9220-0001.

(8) Option limited to units with extended lengths up to 59.1-in. (1500 mm).

Spare Parts and Accessories

Table 2. Spare Parts and Accessories

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Spares and Accessories		
Standard		**Standard**
02100-1000-0001	Seal for 1-in. BSPP (G1A). Material: Non-asbestos BS7531 grade X carbon fiber with rubber binder	★
02100-1040-0001	Seal for 3/4-in. BSPP (G3/4A). Material: Non-asbestos BS7531 grade X carbon fiber with rubber binder	★
02100-1010-0001	Hygienic adaptor boss 1-in. BSPP. Material: 316 Stainless steel fitting. FPM/FKM o-ring	★
02100-1020-0001	2-in. (51 mm) Tri-clamp kit (vessel fitting, clamp ring and seal). Material: 316 Stainless steel, NBR Nitrile	★
02120-2000-0001(1)	1 1/2-in. BSPP adjustable clamp gland for 1-in. extended lengths. Material: 316 Stainless steel, (Si) Silicone rubber seal	★
02120-2000-0002(1)	1 1/2-in. NPT adjustable clamp gland for 1-in. extended lengths. Material: 316 Stainless steel, (Si) Silicone rubber seal	★

(1) The adjustable clamp gland is not explosion-proof.

Specification

Physical

Product
The Rosemount 2160 Wireless
Vibrating Fork Liquid Level Switch

Measuring Principle
Vibrating Fork

Applications
Most liquids including coating liquids, aerated liquids, and slurries.

Enclosure
Housing: Low-copper aluminum
Paint: Polyurethane
Cover O-ring: Nitrile butadiene

Terminal Block and Power Module Pack
PBT

Antenna
PBT/PC integrated omnidirectional antenna

Connections
See “2160 Ordering Information” on page 338.

Extended Lengths
Table 3. Minimum Extended Lengths

Process Connection	Minimum Extended Length
3/4–in. Threaded	3.8 in. (95 mm)
1–in. Threaded	3.7 in. (94 mm)
Flanged	3.5 in. (89 mm)
Tri-Clamp	4.1 in. (105 mm)

The maximum extended length is 118.1 in. (3000 mm) except for:

- Hand-polished process (maximum length is 39.4 in./1000 mm)

Process Material
316/316L Stainless Steel (1.4401/1.4404) dual certified, or Alloy C (UNS N10002) and Alloy C-276 (UNS N10276).

Hand-polished to better than 0.4 μm option available for hygienic connections.

Gasket material for 3/4-in. and 1-in. BSPP (G) is non-asbestos BS7531 Grade X carbon fiber with rubber binder.

Dimensional Drawings
See Dimensional Drawings on page 345.

Mounting
Suitable for horizontal and vertical installations.

Rotatable housing allows correct alignment of both the forks and the omnidirectional antenna for optimal signal and best viewing position of the LCD integral display.

Enclosure Ratings
Housing is NEMA 4X and IP66 compliant.

Electrical

Wireless Power Module
Replaceable, Intrinsically Safe Lithium-Thionyl Chloride power module with PBT enclosure.

Ten year life at one minute transmit rate (1).

(1) Reference conditions are 70 °F (21 °C), and routing data for three additional network devices. NOTE: Continuous exposure to ambient temperature limits (-40 °F or 185 °F) (-40 °C or 85 °C) may reduce specified power module life by 20 percent.

Field Communicator Connections
Clips are permanently fixed to terminal block.

Performance

Electromagnetic Compatibility (EMC)
All models meet all relevant requirements of EN 61326.

Hysteresis (Water)
±0.039 in. (±1 mm) nominal

Switching Point (Water)
0.5 in. (13 mm) from fork tip if mounted vertically.

0.5 in. (13 mm) from the fork edge if mounted horizontally.

The switch point varies with different liquid densities.

Functional

Output
Wireless 2.4 GHz DSSS

Local Display
The optional five-digit integral LCD display can indicate the switch state (Dry or Wet) and diagnostic information.

Humidity Limits
0 to 100% relative humidity

Transmit Rate
User-selectable: from 4 seconds up to 60 minutes.

The optional integral LCD display updates at the transmit rate up to once per minute.

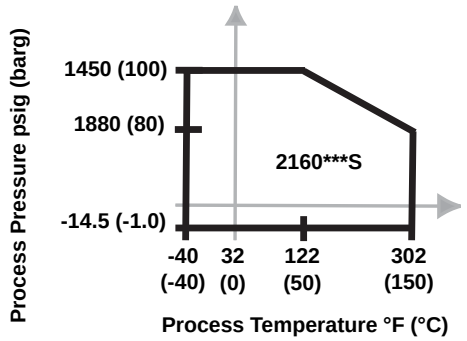
Maximum Operating Pressure
Threaded connection: See Figure 1.

Hygienic connection: 435 psig (30 bar g)

Flanged connection:
The maximum operating pressure is the lower of the process pressure (Figure 1) and flange pressure rating (Table 4).

NOTE:
The final maximum operating pressure rating depends on the process (tank) connection.
Clamp glands (order #02120-2000-0001 or 02120-2000-0002) limit the maximum operating pressure to 18.85 psig (1.3 bar g).

Figure 1. Process Pressure



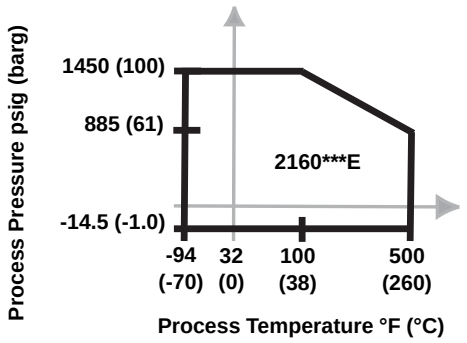


Table 4. Maximum Flange Pressure Rating

Flange Standard	SST Flanges (1)
ASME B16.5 Class 150	275 psig (2)
ASME B16.5 Class 300	720 psig (2)
ASME B16.5 Class 600	1440 psig (2)
EN1092-1 PN 10/16	10/16 bar g (3)
EN1092-1 PN 25/40	25/40 bar g (3)
EN1092-1 PN 63	63 bar g (3)
EN1092-1 PN 100	100 bar g (3)

(1) ASTM stainless steel.

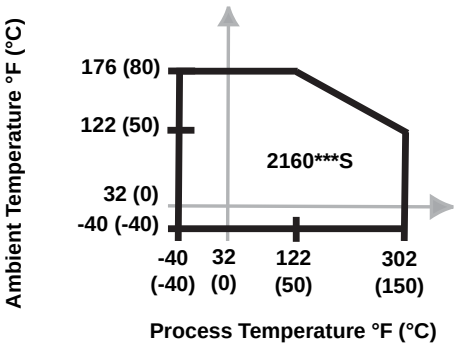
(2) At 100 °F (38 °C), the pressure rating decreases with an increasing process temperature.

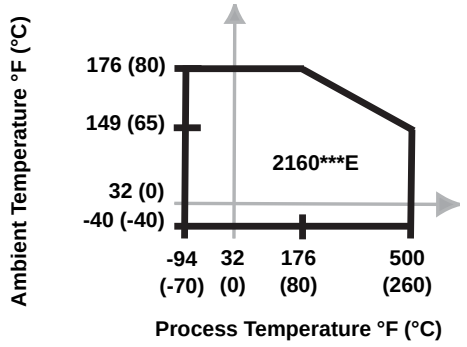
(3) At 122 °F (50 °C), the pressure rating decreases with an increasing process temperature.

Temperature

See Figure 2 for the maximum and minimum operating temperatures.

Figure 2. Temperature





Liquid Density Range

Minimum liquid density is 31.2 lb/ft^3 (500 kg/m^3).

Liquid Viscosity Range

0.2 to 10000 cP (centiPoise).

Solids Content and Coating

The maximum recommended diameter of solid particles in the liquid is 0.2 in. (5 mm).

For coating products, avoid bridging of forks (fork-to-fork).

CIP (Clean In Place) Cleaning

The 2160 withstands steam cleaning.

Product Certifications

ROSEMOUNT 2160

Approved Manufacturing Locations

Rosemount Inc.

– Chanhassen, Minnesota, USA

Mobrey Limited

– Slough, United Kingdom

Emerson Process Management Asia Pacific Private Limited

– Singapore

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

ATEX Directive (94/9/EC)

- Emerson Process Management complies with the ATEX Directive

European Pressure Equipment Directive (PED) (97/23/EC)

- The 2160 is outside the scope of PED Directive

L.V. Directive

- EN61010-1 Pollution degree 2, Category II (264 V max), Pollution degree 2, Category III (150 V max).

Electro Magnetic Compatibility (EMC) (2004/108/EC)

- EN 61326-1:2006

Radio and Telecommunications Terminal Equipment Directive (R&TTE) (1999/5/EC)

- Emerson Process Management complies with the R&TTE Directive

Telecommunication Compliance

All wireless devices require certification to ensure that they adhere to regulations regarding the use of the RF spectrum. Nearly every country requires this type of product certification. Emerson is working with governmental agencies around the world to supply fully compliant products and remove the risk of violating country directives or laws governing wireless device usage. To see which countries our devices have received certification for use in, see www.rosemount.com/smartwireless.

FCC and IC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This device must be installed to ensure a minimum antenna separation distance of 8 in. (20 cm) from all persons.

FCC ID: LW2RM2510

IC ID: 2731A-RM2510

Canadian Registration Number

CRN 0F04227.25

NOTE
The requirements of CRN are met when a Rosemount 2160 CSA-approved vibrating fork level switch model 2160****S*********I6****** is configured with 316/316L stainless steel (1.4401/1.4404) wetted parts and either NPT threaded or 2-in. to 8-in. ASME B16.5 flanged process connections.

Hazardous Locations Certificates

American and Canadian Approvals

Factory Mutual (FM) Approvals

I5 Project ID: 3036541

FM Intrinsic Safety, Non-incendive, and Dust Ignition-proof Intrinsically Safe for Class I, Division 1, Groups A, B, C, D

Zone Marking: Class I, Zone 0, AEx ia IIC

Temperature Codes T4 (T_{amb} = –50 to 70 °C)

Non-incendive for Class I, Division 2, Groups A, B, C, and D

Dust Ignition-proof for Class II/III, Division I, Groups E, F, G

Ambient temperature limits: –50 to 70 °C

For use with Rosemount SmartPower® options P/N 753-9220-0001 only.

Enclosure Type 4X / IP66

Canadian Standards Association (CSA) Approval

I6 Certificate Number: 06 CSA 1786345

CSA Intrinsic Safety

Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D

Temperature Code T3C

Enclosure Type 4X / IP66

For use with Rosemount SmartPower options P/N 753-9220-0001 only.

Intrinsically Safe when installed in accordance with Rosemount drawing 71097/1271.

European Approvals

ATEX Approval

I1 ATEX Intrinsic Safety

Certificate Number: Baseefa 09ATEX0253X

II 1 G, Ex ia IIC T5-T2 (T_a = –40 to 70 °C)

IP66

For use with Rosemount SmartPower options P/N 753-9220-0001 only.

Special Conditions For Safe Use:

The surface resistivity of the antenna is greater than 1 gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.

Rest Of The World Approvals

IECEx Approval

I7 IECEx Intrinsic Safety

Certificate Number: IECEx BAS 09.0123X

Ex ia IIC T5-T2 (T_a = –40 to 70 °C)

IP66

For use with Rosemount SmartPower options P/N 753-9220-0001 only.

Special Conditions For Safe Use:

The surface resistivity of the antenna is greater than 1 gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.

National Supervision and Inspection Centre (NEPSI) Approvals

I3 NEPSI Intrinsic Safety

Certificate: GYJ101138X

Ex ia IIC T5-T2

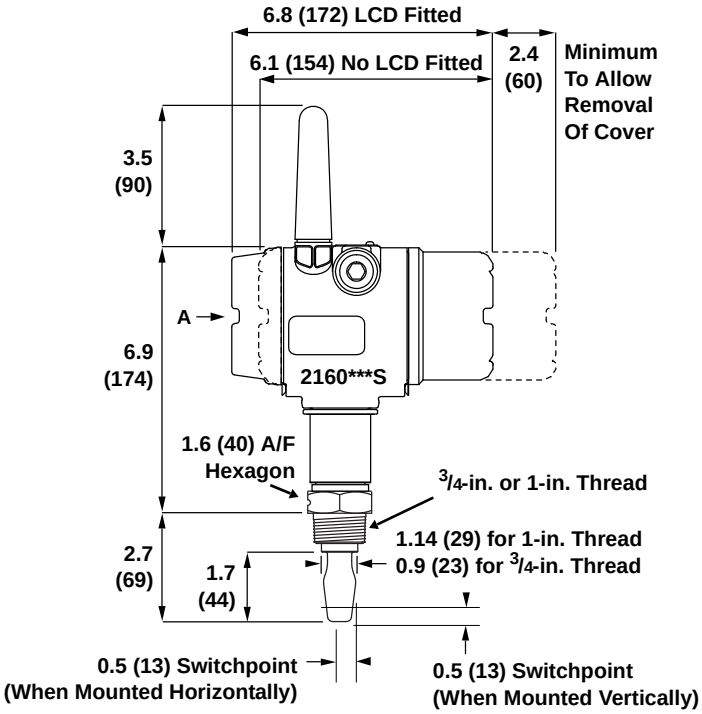
Special Conditions For Safe Use:

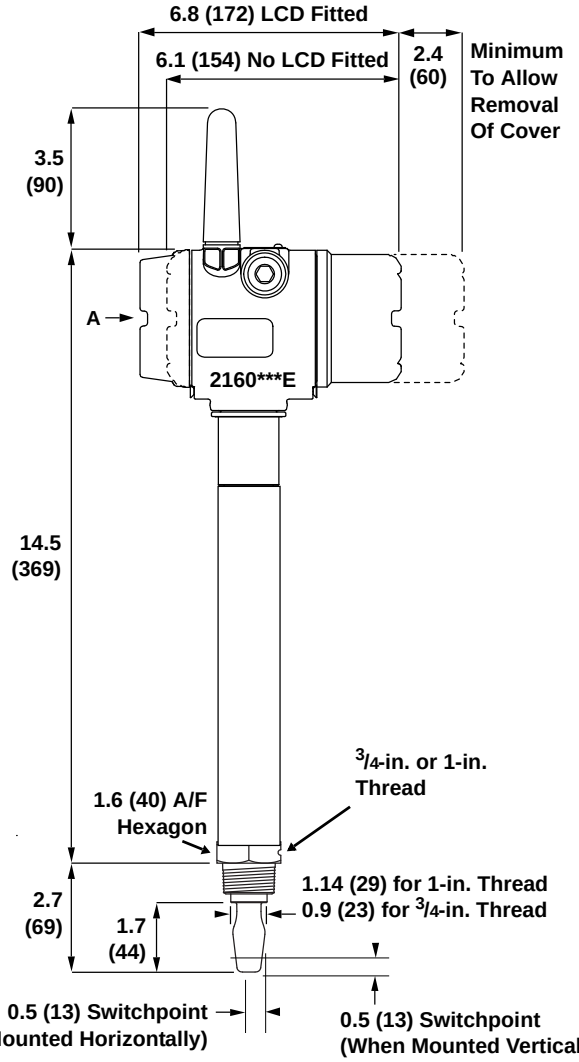
1. Symbol “X” is used to denote specific conditions of use:
   a. Model 648 WTT or Model 3051S WPT type battery pack provided by the manufacturer should be used
   b. The surface resistivity of the antenna is greater than 1 gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth
   c. The Rosemount 2160 enclosure is made of aluminum alloy and given a protective epoxy coating. However, care should be taken to protect it from impact or abrasion if located in a Zone 0

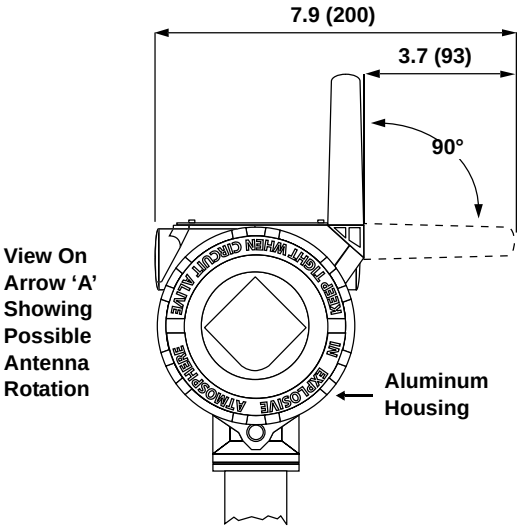
Dimensional Drawings

2160 Thread Mounting (Standard Length) . . . . . page Level-345
2160 Thread Mounting (Extended Length) . . . . . page Level-346
2160 Flange Mounting (Standard Length) . . . . . page Level-347
2160 Flange Mounting (Extended Length) . . . . . page Level-348
2160 Hygienic Fitting (Standard Length) . . . . . page Level-349
2160 Hygienic Fitting (Extended Length) . . . . . page Level-351

2160 Thread Mounting (Standard Length)

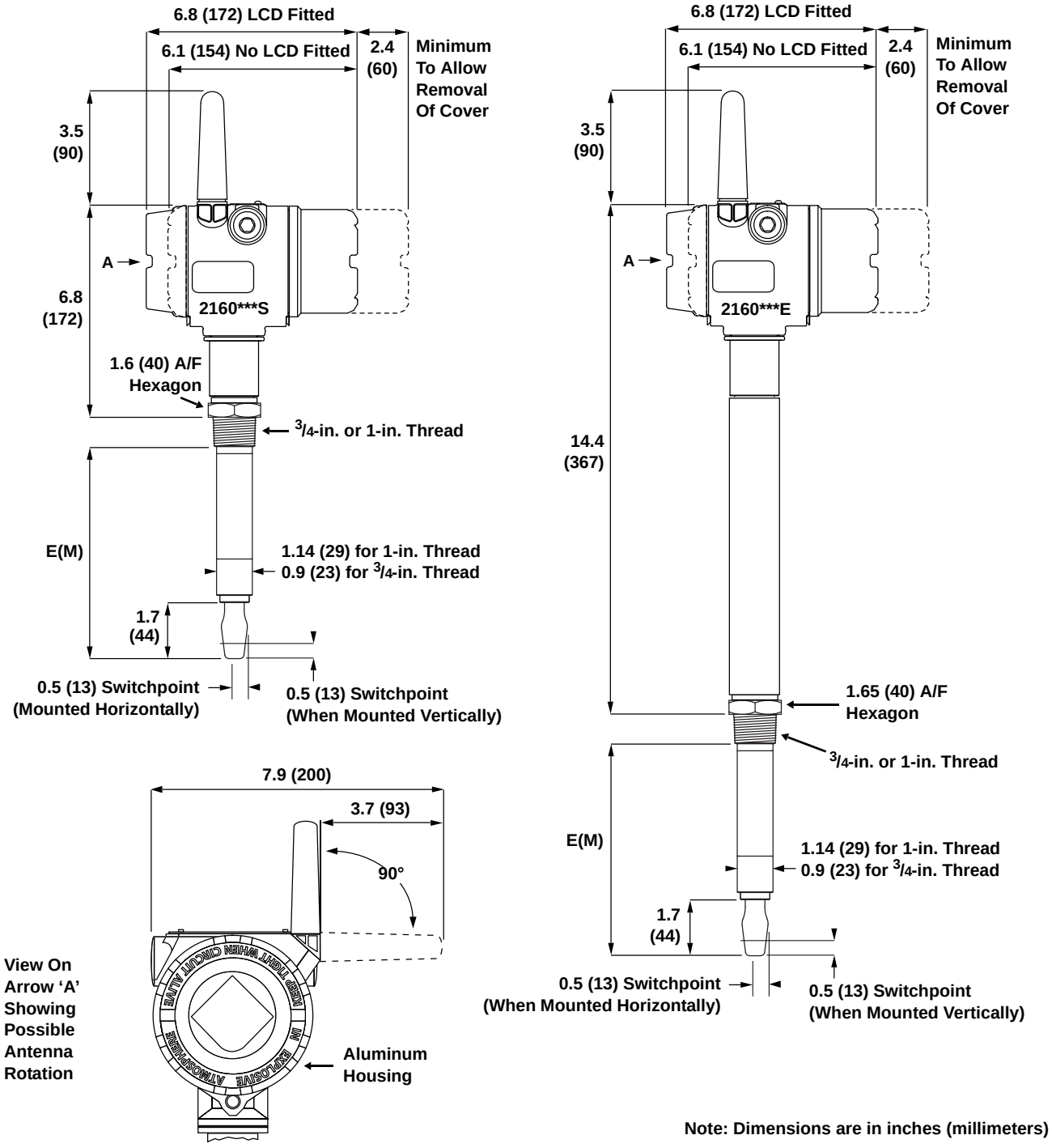






Note: Dimensions are in inches (millimeters)

2160 Thread Mounting (Extended Length)



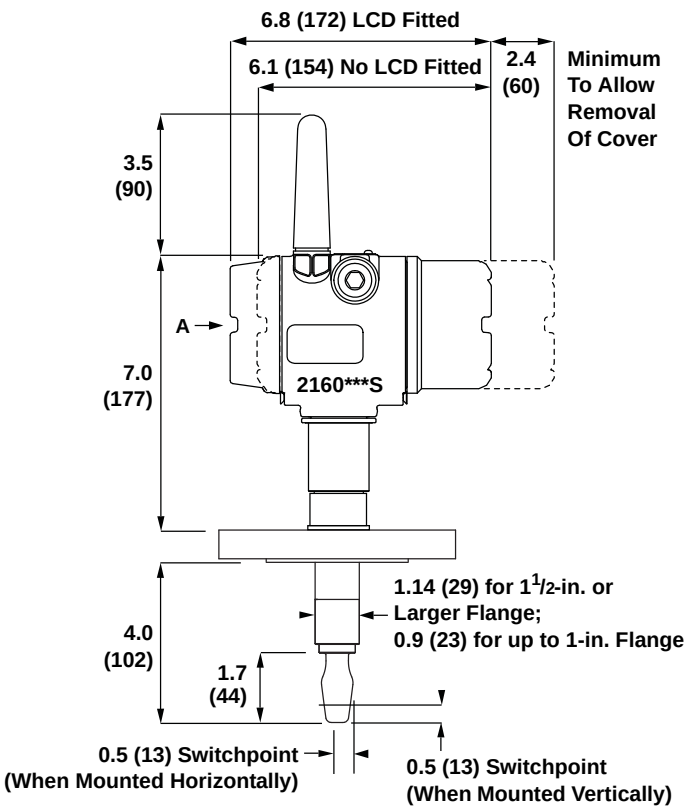
Note: Dimensions are in inches (millimeters)

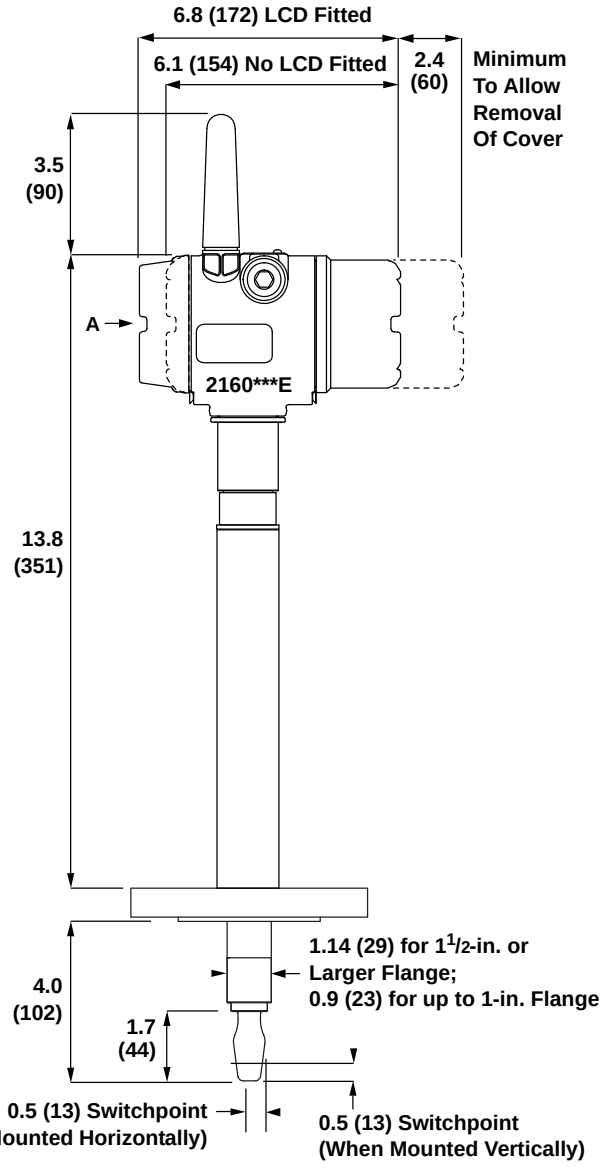
Table 5. Thread Mounting Fork Length

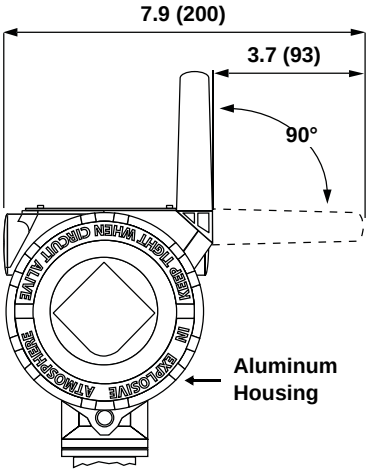
Process Connection	Standard Length Model Code A	Minimum Length Model Code E (M)	Maximum Length Model Code E (M)(1)
3/4-in. Thread	1.73 in. (44 mm)	3.75 in. (95 mm)	118.1 in. (3000 mm)
1-in. Thread	1.73 in. (44 mm)	3.74 in. (94 mm)	118.1 in. (3000 mm)

(1) Maximum extended length of fork with hand-polished option is 39.4 in. (1000 mm).

2160 Flange Mounting (Standard Length)



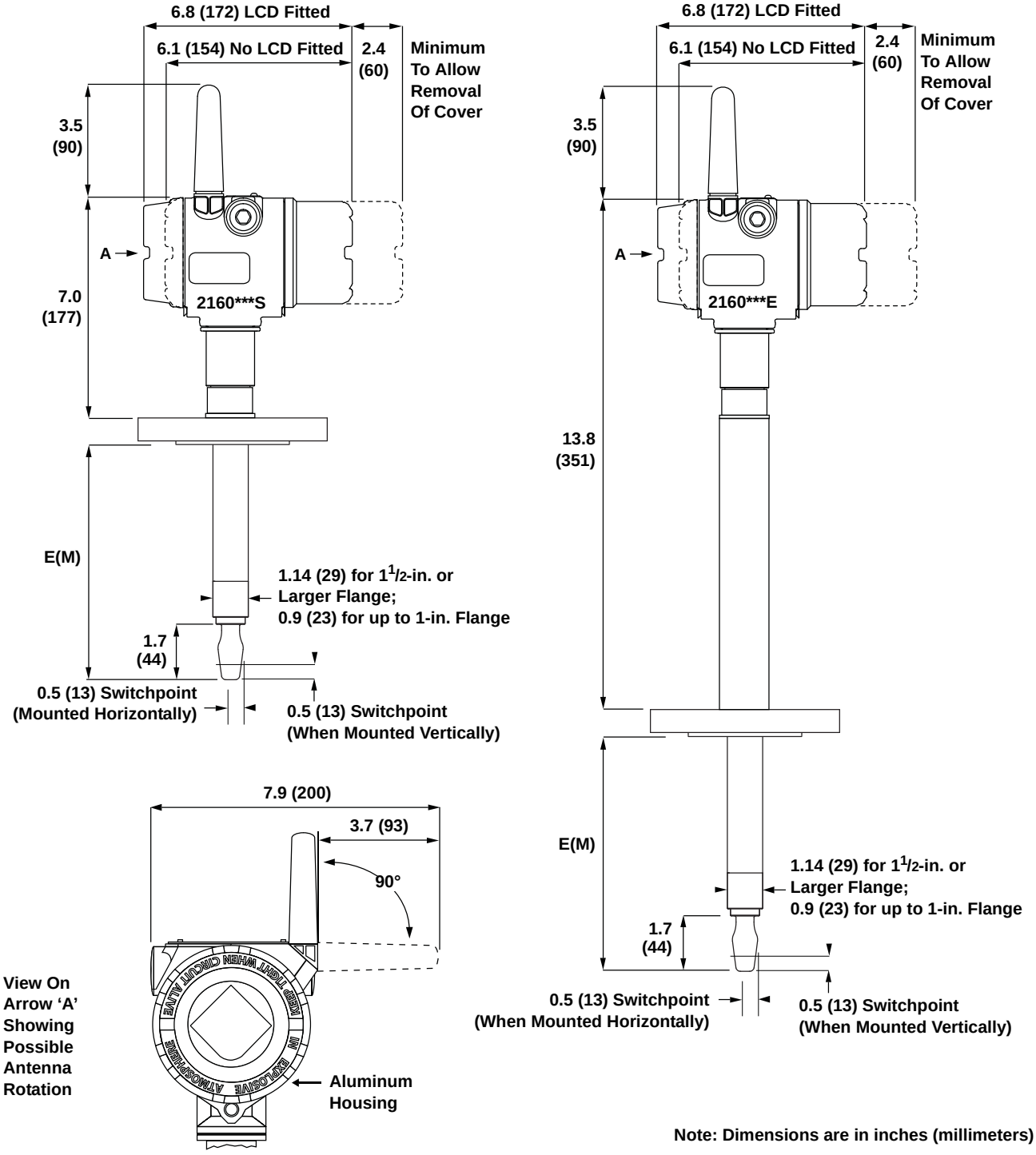




View On Arrow 'A' Showing Possible Antenna Rotation

Note: Dimensions are in inches (millimeters)

2160 Flange Mounting (Extended Length)

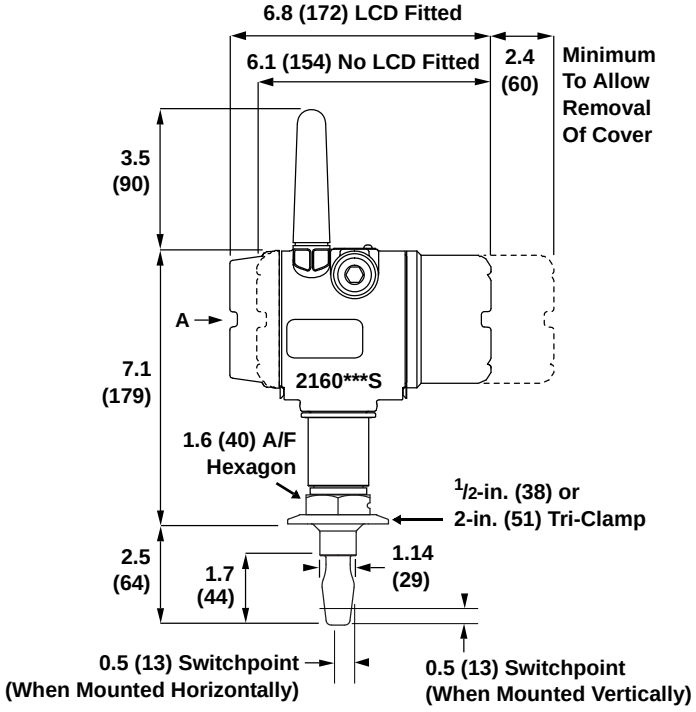


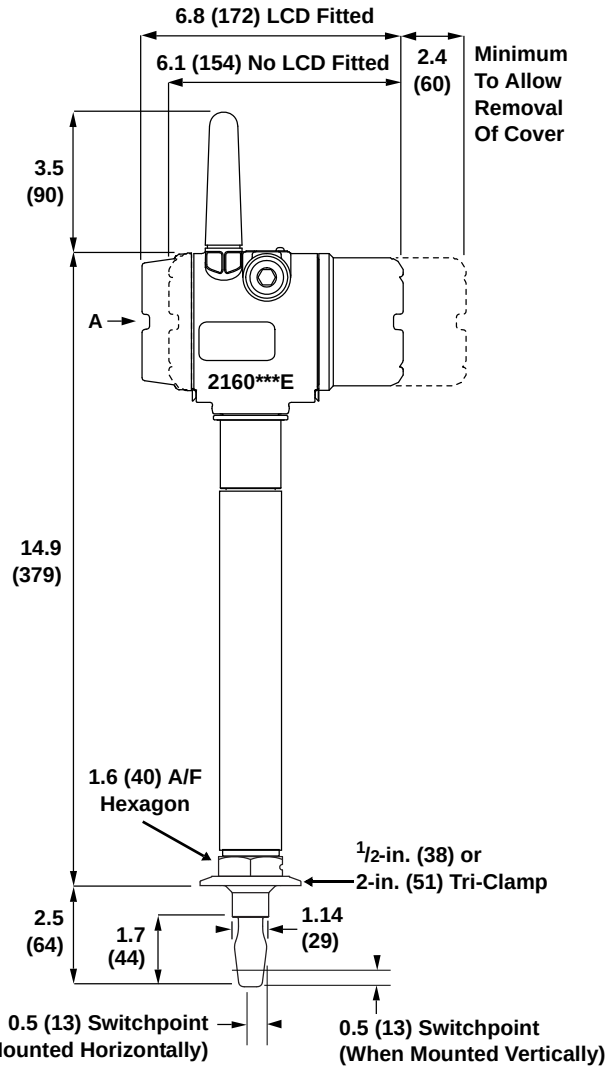
Note: Dimensions are in inches (millimeters)

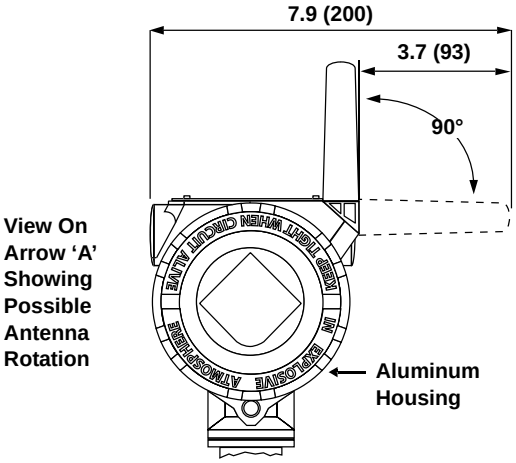
Table 6. Flange Mounting Fork Length

Process Connection	Standard Length Fork Length Code H	Minimum Length Fork Length Code E(M)	Maximum Length Fork Length Code E(M)
3/4-in., 1-in. or larger flange	4.0 in. (102 mm)	3.7 in. (94 mm)	118.1 in. (3000 mm)

2160 Hygienic Fitting (Standard Length)

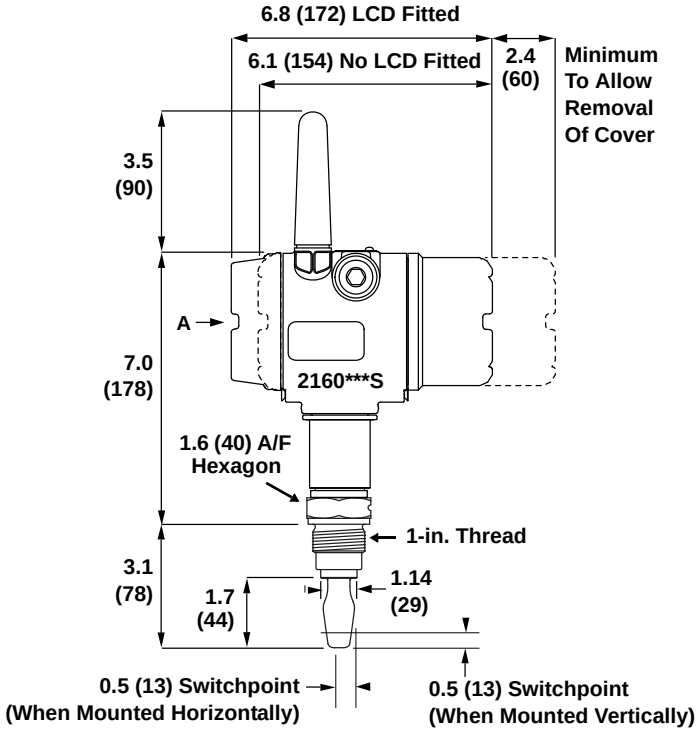


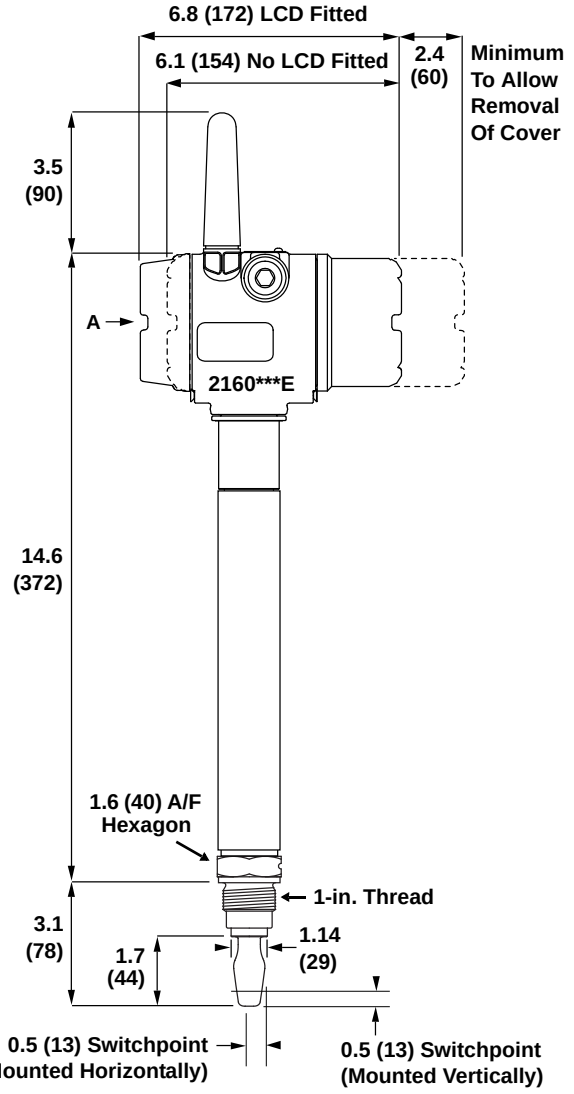


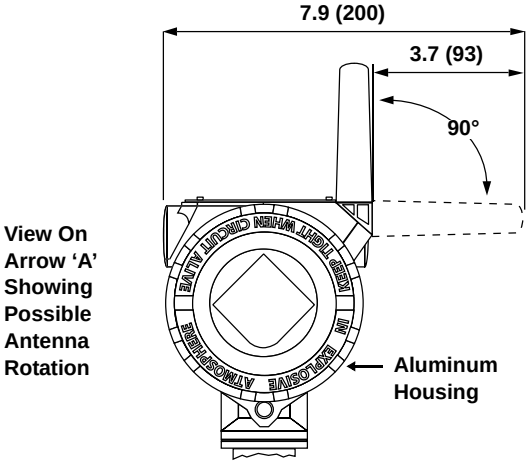


Note: Dimensions are in inches (millimeters)

2160 Hygienic Fitting (Standard Length) Continued

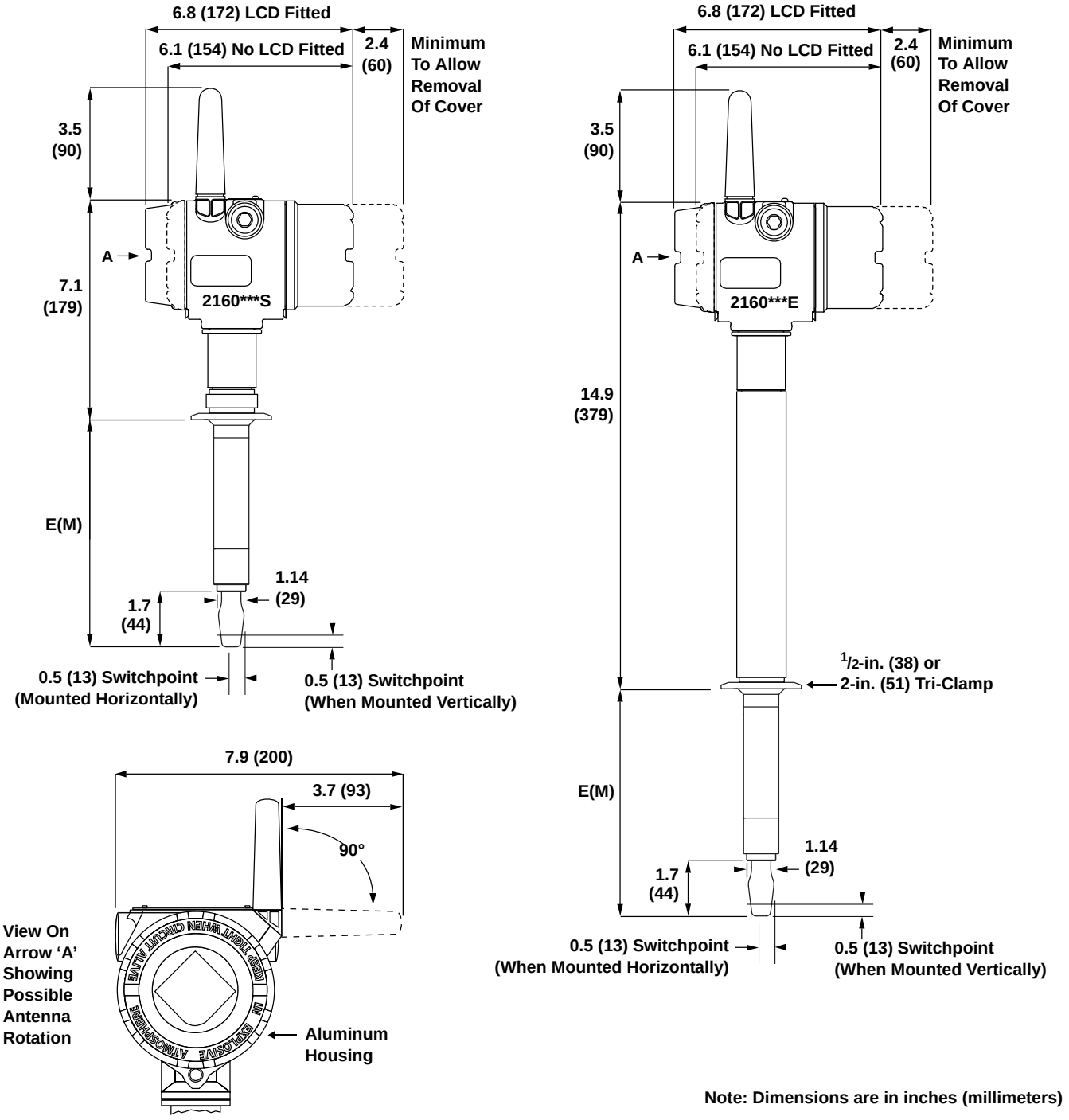






Note: Dimensions are in inches (millimeters)

2160 Hygienic Fitting (Extended Length)



Note: Dimensions are in inches (millimeters)

Table 7. Hygienic Fitting Fork Length

Process Connection	Standard Length Fork Length Code H	Minimum Length Fork Length Code E(M)	Maximum Length Fork Length Code E(M)(1)
Tri-Clamp	1.73 in. (44 mm)	4.13 in. (105 mm)	118.1 in. (3000 mm)
1-in. Threaded	1.73 in. (44 mm)	3.74 in. (94 mm)	118.1 in. (3000 mm)

(1) Maximum extended length of fork with hand-polished option is 39.4 in. (1000 mm).

Rosemount Level Solutions

Emerson provides a complete range of Rosemount products for level measurement applications.

Vibrating Fork Switches – Point Level Detection

For high and low alarms, overfill protection, pump control, including wide pressure and temperature requirements, and hygienic applications. Flexible mounting. Immune to changing process conditions and suitable for most liquids.
The product line consists of:

- Rosemount 2160 Wireless
- Rosemount 2130 Enhanced
- Rosemount 2120 Full-featured
- Rosemount 2110 Compact

Differential Pressure – Level or Interface Measurement

Flexible mounting for liquid tank levels, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by: vapor space changes, surface conditions, foam, corrosive fluids, internal tank equipment. Optimize performance with direct mount, Tuned-System Assemblies:

- Rosemount DP Level Transmitters and Remote Seals
- Rosemount 3051S_L, 3051L, and 2051L Liquid Level Transmitters

Ultrasonic – Level Measurement

Top mounted, non-contacting for simple tank and open air level measurements. Unaffected by fluid properties such as: density, viscosity, dirty coating, and corrosiveness. Appropriate for routine applications outside of explosion proof areas.
The product line consists of:

- Rosemount 3100 Series Ultrasonic Process Level Transmitters

Guided Wave Radar – Level and Interface Measurement

Top mounted, direct level and interface measurement of liquids or solids, including those with wide temperature and pressure requirements. Unaffected by changing process conditions. Good fit for small spaces and easy swap for older technologies.
The product line consists of:

- Rosemount 5300 Series – Accurate, superior performance transmitter in most applications including process vessels and control
- Rosemount 3300 Series – Versatile and easy-to-use transmitter in most liquid storage and monitoring applications

Non-contacting Radar – Level Measurement

Top mounted, direct level measurement for liquids or solids, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by changing process conditions. Good for dirty, coating, and corrosive applications.
The product line consists of:

- Rosemount 5400 Series – Accurate, superior performance 2-wire transmitters for most liquid level applications and process conditions
- Rosemount 5600 Series – 4-wire transmitters with maximum sensitivity and performance for solids, challenging reactors, rapid level changes, and excessive process conditions

Chambers for Process Level Instrumentation

- Rosemount 9901 – High quality chambers for external mounting of level measurement and control instrumentation on process vessels

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EMERSON
Process Management

Rosemount 2130 Enhanced Vibrating Fork Liquid Level Switch

- *Designed for operation in temperatures of –94 to 500 °F (–70 to 260 °C)*
- *Electronic self-checking and condition monitoring - Heartbeat LED gives status and instrument health information*
- *Increased safety and proven FMEDA suitable for SIL2*
- *Virtually unaffected by flow, bubbles, turbulence, foam, vibration, solids content, coating, properties of the liquid, and product variations*
- *Adjustable Switching Delay for turbulent or splashing applications*
- *“Fast Drip” fork design gives quicker response time especially with viscous liquids*
- *General area, Explosion-proof/Flameproof, and Intrinsically Safe options*



Contents

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Rosemount 2130 Enhanced Vibrating Fork Liquid Level Switch . . . . . page Level-356
Specifications . . . . . page Level-360
Product Certifications . . . . . page Level-363
Dimensional Drawings . . . . . page Level-365

Reliable Performance...In Challenging Applications



2130*M**

2130*E**



Adjustable Switching Delay



'Fast Drip' Forks

MEASUREMENT PRINCIPLE

The Rosemount 2130 is designed using the principle of a tuning fork. A piezo-electric crystal oscillates the forks at their natural frequency. Changes to this frequency are continuously monitored. The frequency of the vibrating fork sensor changes depending on the medium in which it is immersed. The denser the liquid, the lower the frequency.

When used as a **low level alarm**, the liquid in the tank or pipe drains down past the fork, causing a change of natural frequency that is detected by the electronics and switches the output state.

When the 2130 is used as a **high level alarm**, the liquid rises in the tank or pipe, making contact with the fork which then causes the output state to switch.

KEY FEATURES AND BENEFITS

- Virtually unaffected by turbulence, foam, vibration, solids content, coating, or liquid properties
- The *mid-range temperature* 2130 is designed for operation in temperatures from –40 to 356 °F (–40 to 180 °C)
- The *extreme temperature* 2130 is designed for operation in temperatures from –94 to 500 °F (–70 to 260 °C). It has a stainless steel thermal tube to move the electronics away from the process
- Electronic self-checking and condition monitoring. The 'heartbeat' LED gives status and health information on the 2130
- Adjustable switching delay prevents false switching in turbulent or splashing applications
- 'Fast Drip' fork design gives quicker response time, especially with viscous liquids
- Rapid wet-to-dry time for highly responsive switching
- Fork shape is optimized for hand polishing to meet hygienic requirements
- No moving parts or crevices for virtually no maintenance

Superior Diagnostics

- Built-in diagnostics continuously check electronic and mechanical health
- Fork conditions detected including internal and external damage, coated or blocked, and extreme corrosion
- Ideal for critical alarm duties

Fit and Forget

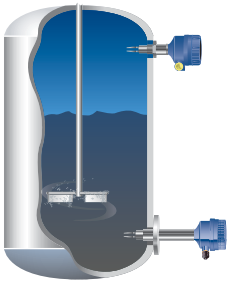
- Once installed, the 2130 is ready to go.
  It needs no calibration and requires minimum installation
- The ‘heartbeat’ LED gives an instant visual indication that the unit is operational
- Functional testing of the instrument and system is easy with a magnetic test point
- You can install, and forget it

Extended High and Low Temperature Performance

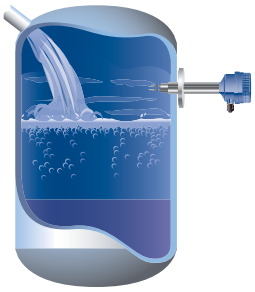
- The *extreme temperature* 2130 enables standardization of Rosemount vibrating fork switches across a wide range of process environments, and is ideally suited for harsh conditions where high reliability is essential

APPLICATIONS

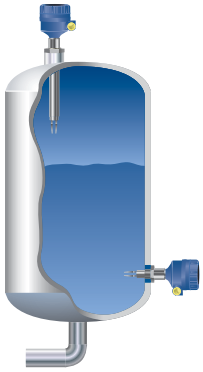
- Overfill protection
- High and low level alarms
- Pump control or limit detection
- Run dry or pump protection
- Hygienic applications
- High temperature applications
- Wireless applications



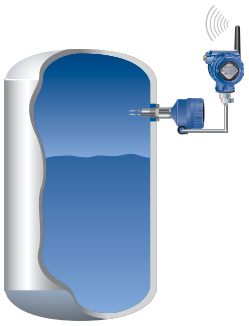
High And Low Level Alarm



High Temperature Applications



Pump Control / Limit Detection



Wireless Applications

Rosemount 2130 Enhanced Vibrating Fork Liquid Level Switch



2130 Level Switches

- Use the 2130***E in liquids down to –94 °F and up to 500 °F (–70 to 260 °C) or the mid-range 2130***M for liquids within –40 to 356 °F (–40 to 180 °C). They are both ideal for high and low level applications
- Stainless steel thermal tube moves the electronics away from the process
- Enhanced instrument health and self-checking diagnostics of the fork and sensor
- SIL 2 suitable (QS Option)
- User-adjustable mode selection and time delay switch

Additional Information

Spares and Accessories: page Level-359
Certifications: page Level-363
Specifications: page Level-360
Dimensions: page Level-365

TABLE 1. 2130 Ordering Information

★The Standard offering represents the most common options. The starred (★) options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description		
2130	Enhanced Vibrating Fork Liquid Level Switch		
Output			
Standard			**Standard**
L	Direct Load Switching (Mains 2-wire) 20 to 264 Vac, 50/60 Hz, 20 to 60 Vdc, Self-checking		★
P	PNP/PLC Low Voltage (3-wire) 20 to 60 Vdc, Self-checking		★
D	Relay (DPCO), 20 to 264 Vac, 50/60 Hz, 20 to 60 Vdc, Self-checking		★
N	NAMUR, 8 Vdc, Self-checking		★
Housing Material			
Standard			**Standard**
A	Aluminum		★
S	Stainless Steel		★
Conduit Entry / Cable Threads			
		Product Certifications	
Standard			**Standard**
9	3/4 inch NPT	NA, E5, E6, G5, G6, I1, I5, I6, I7	★
2	M20	NA, E1, E7, I1, I5, I6, I7	★
Operating Temperature			
Standard			**Standard**
M	Mid-Range: –40 °F (–40 °C) ... 356 °F (180 °C)		★
E	Extreme: –94 °F (–70 °C) ... 500 °F (260 °C)		★
Materials of Construction: Process Connection / Fork			
Standard			**Standard**
S(1)	316/316L Stainless Steel (1.4401/1.4404)		★
F(1)(2)(3)	ECTFE/PFA Copolymer, Coated 316/316L Stainless Steel (1.4401/1.4404)		★
Expanded			
H(4)	Alloy C (UNS N10002), Alloy C-276 (UNS N10276), solid		
Process Connection Size(5)			
Standard			**Standard**
9	3/4 in.		★
1	1 in. / 25 mm (DN25)		★
2	2 in. / 50 mm (DN50)		★
5	1 1/2 in. / 40 mm (DN40)		★

TABLE 1. 2130 Ordering Information

★The Standard offering represents the most common options. The starred (★) options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

3	3 in. / 80 mm (DN80)			★
4	4 in. / 100 mm (DN100)			★
6	6 in. / 150 mm (DN150)			★
8	8 in. / 200 mm (DN200)			★
7	$2^1/_2$ in. / 65 mm (DN65)			★
Process Connection Rating[5]				
Standard				**Standard**
AA	ASME B16.5 Class 150 flange			★
AB	ASME B16.5 Class 300 flange			★
AC	ASME B16.5 Class 600 flange			★
DA	EN1092-1 PN 10/16 flange			★
DB	EN1092-1 PN 25/40 flange			★
DC	EN1092-1 PN 63 flange			★
DD	EN1092-1 PN 100 flange			★
NN	For use with non-flange process connection type			★
Process Connection Type[5]				
Standard				**Standard**
R	Raised Face (RF) Flange			★
B	BSPT (R) Thread			★
G	BSPP (G) Thread			★
N	NPT Thread			★
P	BSPP (G) O-ring			★
C	Tri-Clover Clamp			★
Fork Length				
			Process Connection	
Standard				**Standard**
A	Standard length 1.7-in. (44 mm)		All except flanged models	★
H[3]	Standard length flange 4.0-in. (102 mm)		All flanged models	★
E[6]	Extended, customer specified length in tenths of inches		All except connection 1-NN-P	★
M[6]	Extended, customer specified length in millimeters		All except connection 1-NN-P	★
Specific Extended Fork Length				
Standard				**Standard**
0000	Factory default length (only if Fork Length A or H is selected)			★
XXXX[6]	Specific customer specified length in tenths of inches, or millimeters (XXXX mm or XXX.X inches)			★
Surface Finish			**Process Connection**	
Standard				**Standard**
1	Standard surface finish		All	★
2	Hand polished (Ra < 0.4 µm)		Hygienic Connections P or C	★
Product Certifications				
		Output	**Conduit Entry/Cable Threads**	
Standard				**Standard**
NA	No Hazardous Locations Certifications	All models	All models	★
G5[7]	FM Ordinary Locations (unclassified, safe area)	All models	$^3/_4$-in. NPT models only	★
G6[8][9]	CSA Ordinary Locations (unclassified, safe area)	All models	$^3/_4$-in. NPT models only	★
E1	ATEX Flameproof	All models	M20 models only	★
E5[7]	FM Explosion-proof	All models	$^3/_4$-in. NPT models only	★
E6[8][9]	CSA Explosion-proof	All models	$^3/_4$-in. NPT models only	★
E7	IECEx Explosion-proof	All models	M20 models only	★
I1	ATEX Intrinsic Safety	Namur only	All models	★
I5	FM Intrinsic Safety	Namur only	All models	★
I6[9]	CSA Intrinsic Safety	Namur only	All models	★
I7	IECEx Intrinsic Safety	Namur only	All models	★

TABLE 1. 2130 Ordering Information

★The Standard offering represents the most common options. The starred (★) options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

OPTIONS		
Calibration Data Certification		
Standard		**Standard**
Q4	Certificate of functional test	★
Material Traceability Certification		
Standard		**Standard**
Q8(2)(3)	Material traceability certification per EN 10204 3.1	★
Material Certification		
Standard		**Standard**
Q15	NACE MR0175 / ISO 15156	★
Q25	NACE MR0103	★
Safety Certifications		
Standard		**Standard**
QS(10)	Prior-use certificate of FMEDA Data	★
Special Procedures		
Standard		**Standard**
P1(11)	Hydrostatic testing with certificate	★
Low Liquid Density Range		
Standard		**Standard**
LD	Low density liquids – minimum density is 31.2 lb/ft^3 (500 kg/m^3)	★
Typical Model Number: 2130 L A 2 E S 9 NN B A 0000 1 NA Q8		

(1) Flanges are dual certified 316 and 316L Stainless Steel (1.4401 and 1.4404).

(2) Only available for wetted parts.

(3) Option is not available for hand polished wet side as standard.

(4) Only available for BSPT and NPT threaded process connection codes 9-NN-B, 9-NN-N, 1-NN-B, and 1-NN-N as standard, other upon request.

(5) Other process connections available upon request.

(6) Example Fork Length code E1181 is 118.1 inches. Code M3000 is 3000 millimeters. See "Extended Lengths" on page 360 for minimum and maximum extended lengths.

(7) See "Product Certifications" on page 363. E5 includes G5 requirements. G5 is for use in unclassified, safe area locations only.

(8) See "Product Certifications" on page 363. E6 includes G6 requirements. G6 is for use in unclassified, safe area locations only.

(9) The requirements of CRN are met when a Rosemount 2130 CSA approved vibrating fork level switch (with Product Certifications code G6, E6, or I6) is configured with stainless steel wetted parts and either NPT threaded or ASME B16.5 2-in. to 8-in. flanged process connections.

(10) Available for all output types.

(11) Option limited to units with extended lengths up to 59.1 in. (1500 mm).

Spare Parts and Accessories

TABLE 2. Spare Parts and Accessories

★The Standard offering represents the most common options. The starred (★) options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Spares and Accessories		
Standard		**Standard**
02100-1000-0001	Seal for 1-in. BSPP (G1A). Material: Non-asbestos BS7531 grade X carbon fiber with rubber binder	★
02100-1040-0001	Seal for $^{3}/_{4}$-in. BSPP (G3/4A). Material: Non-asbestos BS7531 grade X carbon fiber with rubber binder	★
02100-1010-0001	Hygienic adaptor boss 1-in. BSPP. Material: 316 SS fitting. FPM/FKM 'O' ring	★
02100-1020-0001	2-in. (51 mm) Tri-clamp kit (vessel fitting, clamp ring, and seal). Material: 316 St. steel, NBR Nitrile	★
02100-1030-0001	Telescopic test magnet	★
02120-2000-0001(1)	316 SST adjustable clamp gland for 1-in threaded extended length. $1^{1}/_{2}$-in. BSPP male connection	★
02120-2000-0002(1)	316 SST adjustable clamp gland for 1-in threaded extended length. $1^{1}/_{2}$-in. NPT male connection	★
02130-7000-0001(2)	Replacement Cassette: Direct load switching (Red)	★
02130-7000-0002(3)	Replacement Cassette: PNP/PLC *low voltage* (Yellow)	★
02130-7000-0003(4)	Replacement Cassette: NAMUR current switching (Blue)	★
02130-7000-0004(5)	Replacement Cassette: Relay (DPCO) (Green)	★
02130-7000-0005(6)	Direct load switching, low density range selection (Red)	★
02130-7000-0006(7)	PNP/PLC *low voltage*, *low density range selection* (Yellow)	★
02130-7000-0007(8)	NAMUR current switching, *low density range selection* (Blue)	★
02130-7000-0008(9)	Relay (DPCO), *low density range selection* (Green)	★

(1) The adjustable clamp gland is not explosion-proof. It has a silicone rubber seal. Maximum pressure is 1.3 barg. Maximum temperature is 257 °F (125 °C).

(2) Available for Electronic Type Code L only.

(3) Available for Electronic Type Code P only.

(4) Available for Electronic Type Code N only.

(5) Available for Electronic Type Code D only.

(6) Available for Electronic Type Code L and requires units with option LD.

(7) Available for Electronic Type Code P and requires units with option LD.

(8) Available for Electronic Type Code N and requires units with option LD.

(9) Available for Electronic Type Code D and requires units with option LD.

NOTE:
I.S. cassettes can only be replaced with I.S. cassettes. Non-I.S. cassette types can be interchanged with other non-I.S. cassettes, but the new label must be fitted and the original part number transferred to the new label.

Specifications

Physical

Product
Rosemount 2130 *Enhanced* Vibrating Fork Liquid Level Switch

Measuring Principle
Vibrating Fork

Applications
Most liquids including coating liquids, aerated liquids, and slurries

Mechanical

Housing/Enclosure
Non-rotational housing/enclosure

TABLE 3. Housing and Enclosure Specification

Housing Code	A-2	A-9	S-2	S-9
Housing Material	Al Alloy ASTM B85 A360.0		316C12 Stainless Steel	
Housing Paint	Polyurethane Paint, Rosemount Blue to PS-29		Not Applicable	
LED Window	None		None	
Conduit Entry	M20	3/4-in. NPT	M20	3/4-in. NPT
Ingress Protection	IP66/67 to EN60529, Type 4X		IP66/67 to EN60529, Type 4X	

Connections
See Table 1 on page 356 for Conduit Entry/Cable Thread and Process Connection options

Extended Lengths
The maximum extended length is 118.1 in. (3000 mm) except for a hand-polished 2130 that is limited to 39.4 in. (1000 mm), and the ECTFE/PFE copolymer coated flange 2130 that is limited to 59.1 in. (1500 mm)

TABLE 4. Minimum Extended Lengths

Process Connection	Minimum Extended Length
3/4–in Threaded	3.8 in. (95 mm)
1–in Threaded	3.7 in. (94 mm)
Flanged	3.5 in. (89 mm)
Tri-Clamp	4.1 in. (105 mm)

Process Material
316/316L Stainless Steel,
ECTFE/PFA copolymer coated 316/316L Stainless Steel, or solid Alloy C (UNS N10002) and Alloy C-276 (UNS N10276)

Hand-polished to better than 0.4 μm option available for hygienic connections

Gasket material for 3/4-in. and 1-in. BSPP (G) is non-asbestos BS7531 Grade X carbon fiber with rubber binder

Dimensional Drawings
See “Dimensional Drawings” on page 365

Performance

Hysteresis (Water)
0.1 in. (2.5 mm)

Switching Point (Water)
0.5 in. (13 mm) from tip of fork (if vertical installation) or from edge of fork (if horizontal installation) – this will vary with different liquid densities

Functional

Maximum Operating Pressure
The final rating depends on the type of process connection:

Threaded Connection

- See Figure 1

  Note:
  Clamp glands 02120-2000-0001 and 02120-2000-0002 (see page Level-359) limit the maximum operating pressure to
  19 psig (1.3 bar g)

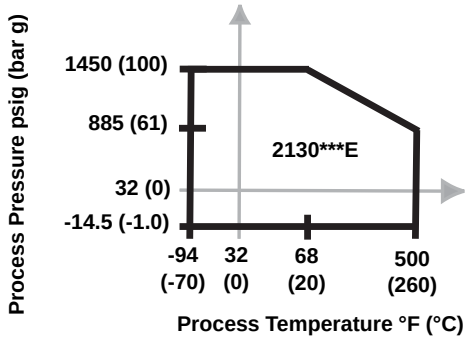
Hygienic Connection

- 435 psig (30 bar g)

Flanged Connection

- See Figure 1 or Table 5 (whichever one is the lowest)

FIGURE 1. Process Pressure



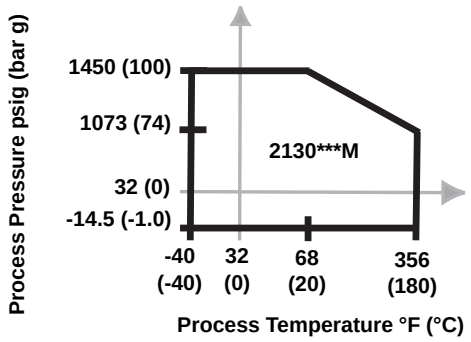


TABLE 5. Maximum Flange Pressure Rating

Standard	Class/Rating	SST Flanges
ASME B16.5	Class 150	275 psig (1)
ASME B16.5	Class 300	720 psig (1)
ASME B16.5	Class 600	1,440 psig (1)
EN1092-1	PN 10/16	10/16 barg (2)
EN1092-1	PN 25/40	25/40 barg (2)
EN1092-1	PN 63	63 barg (2)
EN1092-1	PN 100	100 barg (2)

(1) At 100 °F (38 °C), the pressure rating decreases with an increasing process temperature.

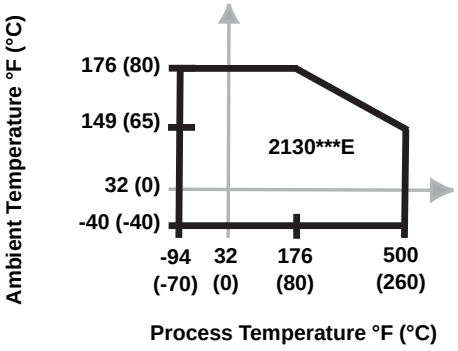
(2) At 122 °F (50 °C), the pressure rating decreases with an increasing process temperature.

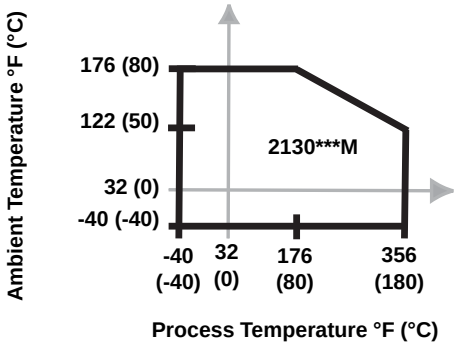
Minimum and Maximum Operating Temperatures

See Figure 2 for operating temperatures

Note:
Clamp glands 02120-2000-0001 and 02120-2000-0002 (page Level-359) limit the maximum temperature to 257 °F (125 °C)

FIGURE 2. Temperature





Liquid Density Range

Minimum standard density is 37.5 lb/ft^3 (600 kg/m^3)

Minimum density is 31.2 lb/ft^3 (500 kg/m^3) when ordered with the Low Density Range option

Liquid Viscosity Range

0.2 to 10000 cP (centiPoise) when operating in Normal mode

0.2 to 1000 cP (centiPoise) when operating in Self-check mode

Solids Content and Coating

The maximum recommended diameter of solid particles in the liquid is 0.2 in. (5 mm) when used in normal mode only.

For coating products, avoid bridging of forks.

Switching Delay

There is a user-selectable 0.3, 1, 3, 10, 30 seconds delay for dry-to-wet and wet-to-dry switching

CIP (Clean In Place) Cleaning

The 2130 withstands steam cleaning routines

Electrical

Switching Mode

User-selectable switching mode (Dry = on or Wet = on)

Protection

- Polarity insensitive
  – *Direct Load and Relay electronics*
- Over-current protection
  – *Direct Load and PNP/PLC electronics*
- Short-circuit protection
  – *Direct Load and PNP/PLC electronics*
- Load-missing protection
  – *Direct Load and PNP/PLC electronics*
- Surge protection (to IEC61326)
  – *Direct Load and PNP/PLC electronics*

Terminal Connection (Wire Diameter)

Minimum 26 AWG and maximum 14 AWG (0.13 to 2.5 mm^2)
Note national regulations.

Conduit Plugs/Cable Gland

Metal Ex d Housing: Conduit entries for explosion-proof areas are shipped with two plastic dust caps. Use a suitably rated blanking plug for the unused conduit entry.

See Table 1 on page 2 for Conduit Entry/Cable Thread options

Grounding

The 2130 should always be grounded either through the terminals or using the provided external ground connection

Operating Modes

TABLE 6. Operating Modes

Fault Conditions Detected	Normal Mode	Self-Check Mode
PCB Control Circuit Corruption	Yes	Yes
External Damage to Fork	No	Yes
Internal Damage to Sensor	No	Yes
Excessive Corrosion	No	Yes
Over-temperature	No	Yes

Safety Integrity Level (Option code QS)

The Rosemount 2130 FMEDA is suitable for SIL2. It has been evaluated by Exida as per hardware assessment IEC61508.

For more information, go to:
http://www.emersonprocess.com/rosemount/safety/

Product Certifications

APPROVED MANUFACTURING LOCATIONS

Rosemount Inc.
– Chanhassen, Minnesota, USA
Mobrey Limited
– Slough, United Kingdom
Emerson Process Management Asia Pacific Private Limited
– Singapore

ORDINARY LOCATION CERTIFICATION FOR FM

G5 Project ID: 3021776
The switch has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

ORDINARY LOCATION CERTIFICATION FOR CSA

G6 Certificate Number: 06 CSA 1805769
The switch has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by CSA, a nationally recognized testing laboratory as accredited by the Standards Council of Canada (SCC).
Single Seal

EUROPEAN DIRECTIVE INFORMATION

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting your local sales office.

ATEX Directive (94/9/EC)

Complies with the ATEX Directive.

Pressure Equipment Directive (PED) (97/23/EC)

The 2130 is outside the scope of PED Directive.

L.V. Directive

EN61010-1 Pollution degree 2, Category II (264V max), Pollution degree 2, Category III (150V max)

Electro Magnetic Compatibility (EMC) Directive

EN61326 Emissions to Class B.

Immunity to industrial location requirements.

CE-mark

Complies with applicable directives (EMC, ATEX, LVD).

HAZARDOUS LOCATIONS CERTIFICATIONS

American and Canadian Approvals

Factory Mutual (FM) Explosion-proof Approval

E5 Project ID: 3012658
Explosion-proof for Class I, Div. 1, Groups A, B, C, and D
Temperature Class: T6 (T_{amb} -50°C to +75°C)
Enclosure: Type 4X

Factory Mutual (FM) Intrinsically Safe Approval

I5 Project ID: 3011456
Intrinsically Safe for Class I, Div. 1, Groups A, B, C, and D
Class I, Zone 0, AEx ia IIC
Temperature Code: T5 to T2
Control Drawing: 71097/1154
Ui=15 V, Ii=32 mA, Pi=0.1 W, Ci=211 nF, Li=0.06 mH

NOTE
A NAMUR isolating amplifier must be used for intrinsic safety.

Canadian Standards Association (CSA) Explosion-proof Approvals

E6 Project ID: 1786345
Explosion-proof for Class I, Div. 1, Groups A, B, C, and D
Temperature Class:
T6 (T_{amb} -50°C to +75°C, Tproc < 80°C)
Enclosure: Type 4X
Single Seal

Canadian Standards Association (CSA) Intrinsically Safe Approval

I6 Certificate Number: 06 CSA 1786345
Intrinsically Safe for Class I, Div. 1, Groups A, B, C, and D
Class 1, Zone 0, Ex ia IIC
Temperature Code: T5 (T_{amb} -50°C to +80°C, Tproc < 80°C)
Control Drawing: 71097/1179
Ui=15 V, Ii=32 mA, Pi=0.1 W, Ci=211 nF, Li=0.06 mH
Single Seal

Canadian Standards Association (CSA) Non-Incendive Approval

I6 Certificate Number: 06 CSA 1786345
Non-Incendive for Class I, Div. 2, Groups A, B, C, and D
Temperature Code:
T5 (T_{amb} -50°C to +80°C, Tproc < 80°C)
Control Drawing: 71097/1179
Ui=15 V, Ii=32 mA, Pi=0.1 W, Ci=211 nF, Li=0.06 mH
Single Seal

NOTE
A NAMUR isolating amplifier must be used for intrinsic safety.

Canadian Registration Number

CRN 0F04227.2C

NOTE
The requirements of CRN are met when a Rosemount 2130 CSA approved vibrating fork level switch (with Product Certifications code G6, E6, or I6) is configured with stainless steel wetted parts and either NPT threaded or ASME B16.5 2-in. to 8-in. flanged process connections.

European Approvals

ATEX Flameproof Approval

E1 Certificate: Sira 05ATEX1129X
flameproof and Dust:
ATEX Marking Ⓔx II 1/2 G D
Ex d IIC T6 to T2
Ex tD A21 (T85°C to 265°C) IP6X

ATEX Intrinsically Safe Approval

I1 Certificate: Sira 05ATEX2130X
Intrinsic Safety and Dust:
ATEX Marking Ⓔx II 1 G D
Ex ia IIC T5 to T2
Ex iaD 20 (T85°C to 265°C) IP6X
Ui=15 V, Ii=32 mA, Pi=0.1 W, Ci=12 nF, Li=0.06 mH

NOTE
A NAMUR isolating amplifier must be used for intrinsic safety.

International Approvals

International Electrotechnical Commission (IEC) Flameproof Approval

E7 Certificate: IECEx SIR 06.0051X
Flameproof and Dust:
Zone 0/1
Ex d IIC T6 to T2
Ex tD A21 (T85°C to 265°C) IP6X

International Electrotechnical Commission (IEC) Intrinsically Safe Approval

I7 Certificate: IECEx SIR 06.0070X
Intrinsically Safe and Dust:
Ex ia IIC T5 to T2
Ex iaD 20 (T85°C to 265°C) IP6X
Ui=15 V, Ii=32 mA, Pi=0.1 W, Ci=12 nF, Li=0.06 mH

NOTE
A NAMUR isolating amplifier must be used for intrinsic safety.

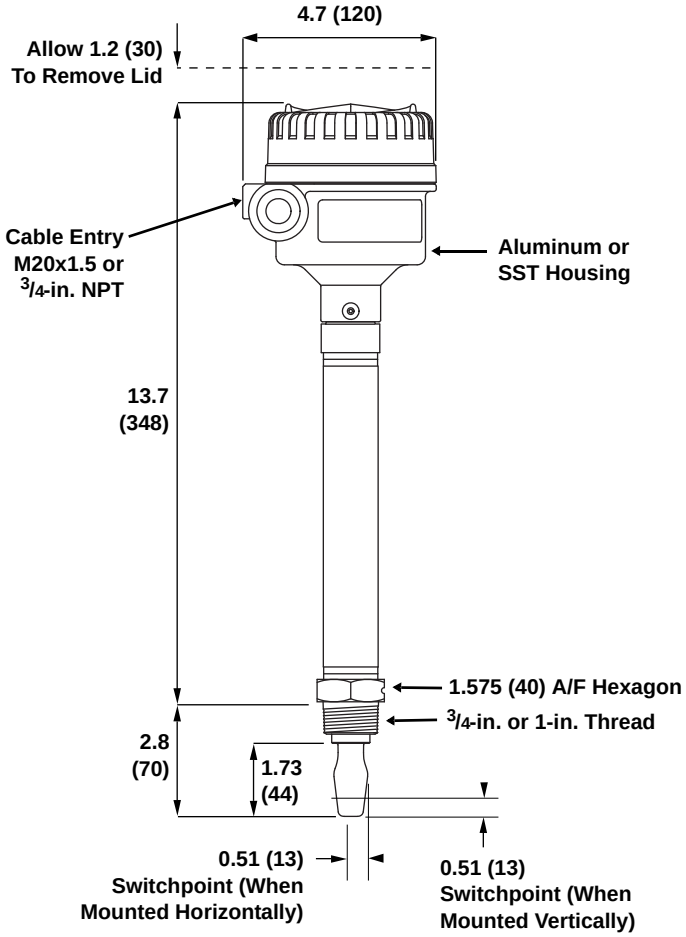
Dimensional Drawings

2130 Thread Mounting (Standard Length) . . . . . page Level-365
2130 Thread Mounting (Extended Length) . . . . . page Level-366
2130 Flange Mounting (Standard Length) . . . . . page Level-367
2130 Flange Mounting (Extended Length) . . . . . page Level-368

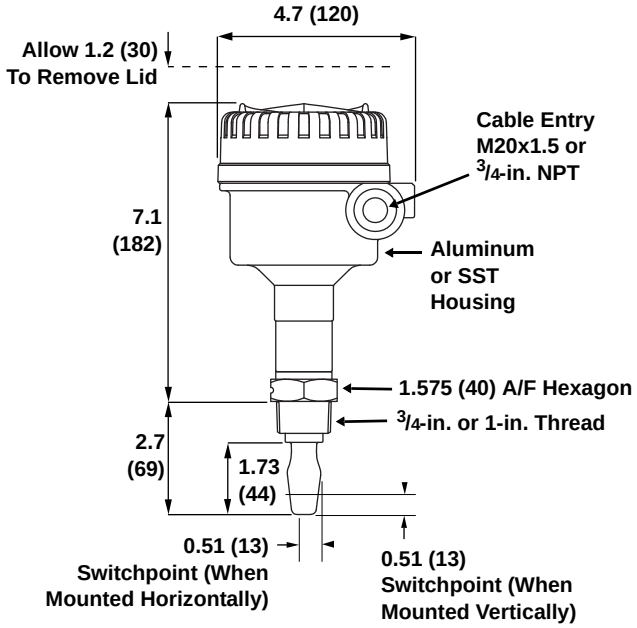
2130 Thread Mounting (Standard Length)

Note: Dimensions are in inches (millimeters)

2130*E**



2130*M**

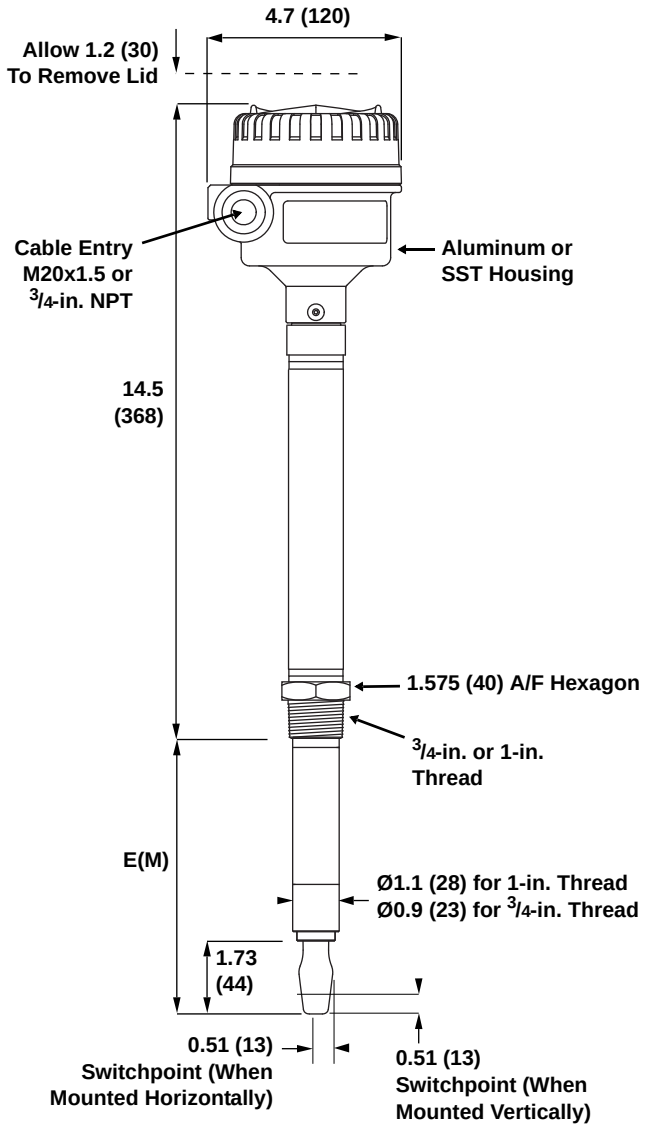


NOTE: FOR HYGIENIC 2130 DIMENSIONS, SEE TYPE 1 DRAWING DOWNLOADS ON WEB SITE

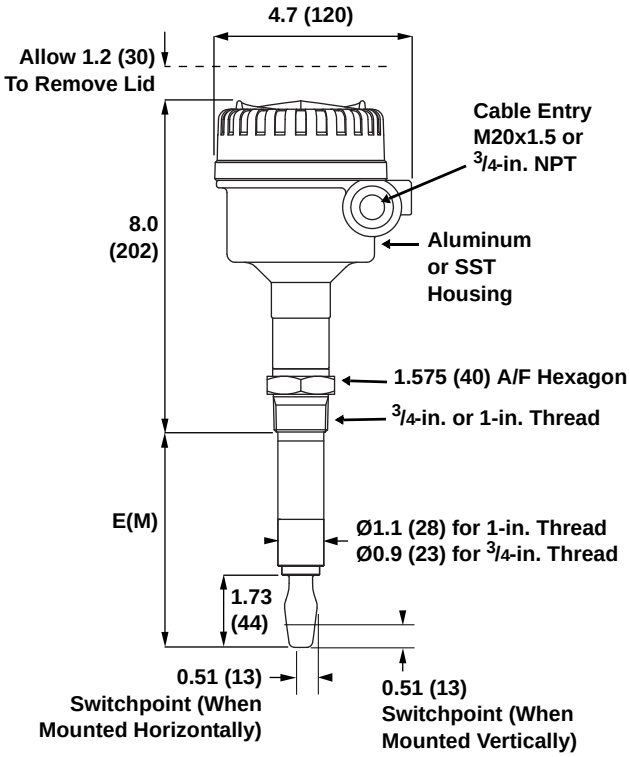
2130 Thread Mounting (Extended Length)

Note: Dimensions are in inches (millimeters)

2130*E**



2130*M**



NOTE: FOR HYGIENIC 2130 DIMENSIONS, SEE TYPE 1 DRAWING DOWNLOADS ON WEB SITE

TABLE 7. Thread Mounting Fork Length

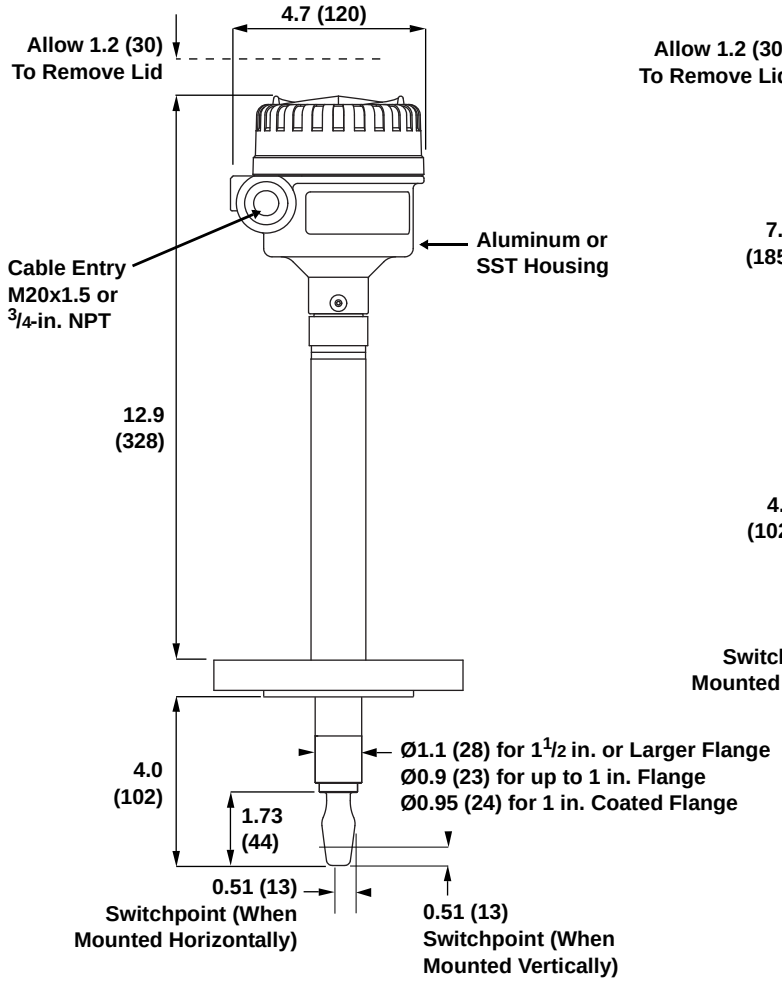
Process Connection	Standard Length Fork Length Code A	Minimum Length Fork Length Code E (M)	Maximum Length Fork Length Code E (M)(1)
3/4-in. Thread	1.73 in. (44 mm)	3.75 in. (95 mm)	118.1 in. (3000 mm)
1-in. Thread	1.73 in. (44 mm)	3.74 in. (94 mm)	118.1 in. (3000 mm)

(1) Maximum extended length of fork with hand-polished option is 39.4 in. (1000 mm).

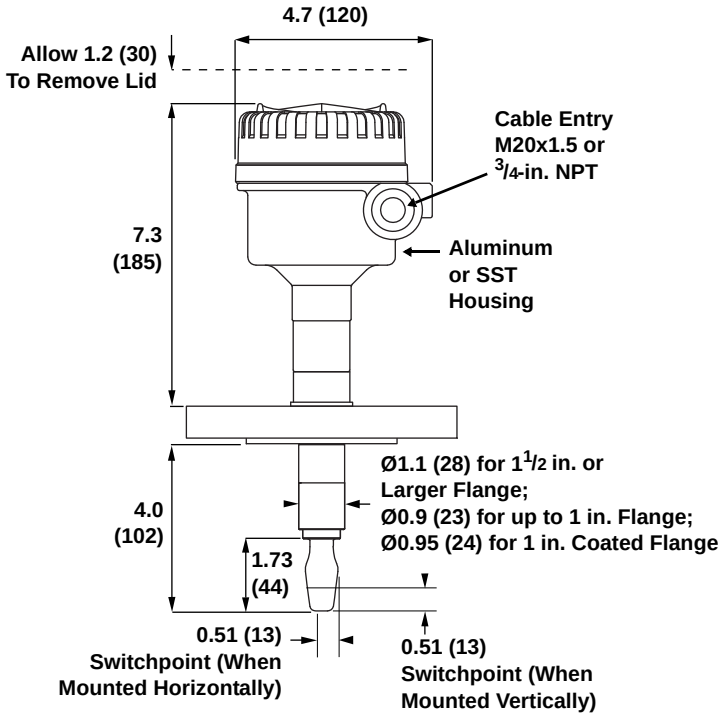
2130 Flange Mounting (Standard Length)

Note: Dimensions are in inches (millimeters)

2130*E**



2130*M**



2130 Flange Mounting (Extended Length)

Note: Dimensions are in inches (millimeters)

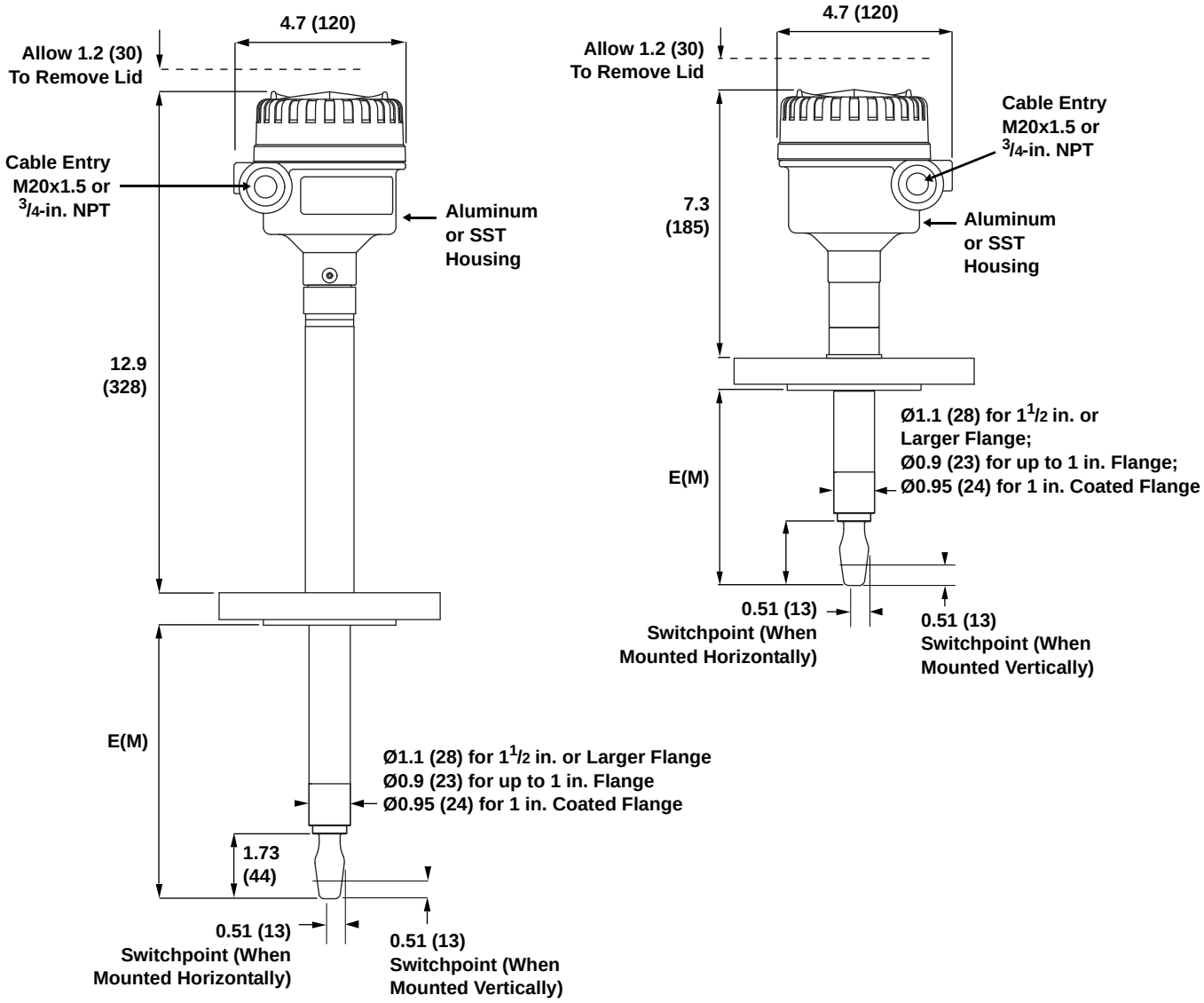


TABLE 8. Flange Mounting Fork Length

Material	Standard Length Fork Length Code H	Minimum Length Fork Length Code E(M)	Maximum Length Fork Length Code E(M)(1)
Stainless Steel	4.0-in. (102 mm)	3.5 in. (89 mm)	118.1 in. (3000 mm)
ECTFE/PFA Copolymer Coated	4.0-in. (102 mm)	3.5 in. (89 mm)	59.1 in. (1500 mm)

(1) Maximum extended length of fork with hand-polished option is 39.4 in. (1000 mm).

Rosemount Level Solutions

Emerson provides a complete range of Rosemount products for level measurement applications.

Pressure – Level or Interface Measurement

Emerson has a complete line of Rosemount pressure transmitters and remote seals for measuring level or interfaces in liquid applications. Optimize performance with direct mount, Tuned Seal systems:

- Rosemount 3051S_L, 3051L, and 1151LT Liquid Level Transmitters
- Rosemount 1199 Remote Diaphragm Seals with direct mount or capillary connections

Vibrating Fork Switches – Point Level Detection

The Rosemount 2100 Series is developed for reliable point level detection of liquids and consists of:

- Rosemount 2110 Compact Vibrating Fork Liquid Level Switch
- Rosemount 2120 Full-featured Vibrating Fork Liquid Level Switch
- Rosemount 2130 Extreme Temperature Vibrating Fork Liquid Level Switch
- Rosemount 2160 Wireless Vibrating Fork Liquid Level Switch

Guided Wave Radar – Level and Interface Measurement

Multivariable, loop-powered Guided Wave Radar transmitters with a wide range of probe styles to fit different liquids and solids applications. The product line consists of:

- Rosemount 3300 Series – Versatile and easy-to-use transmitter with proven reliability
- Rosemount 5300 Series – Accurate, high performance transmitter with FOUNDATION™ fieldbus support

Non-contacting Radar – Level Measurement

The Rosemount non-contacting radar family consists of:

- Rosemount 5400 Series Transmitters – Loop-powered transmitter with a wide range of antennas, for liquid level measurement in most applications and process conditions
- Rosemount 5600 Series Transmitters – 4-wire loop-powered transmitter giving maximum sensitivity and performance for solids, challenging reactors, rapid level changes and excessive process conditions.

Non-contacting Ultrasonic – Level Measurement

The Rosemount 3100 Series ultrasonic level transmitters provide continuous non-contacting level measurement of liquids. The range consists of:

- Rosemount 3101 for simple continuous level measurement
- Rosemount 3102 for continuous measurement with two integral relays for local control functionality
- Rosemount 3105 Intrinsically safe certified version for hazardous areas

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EMERSON™
Process Management

Rosemount 2120 Vibrating Fork Liquid Level Switch

- *Function virtually unaffected by flow, bubbles, turbulence, foam, vibration, solids content, coating, properties of the liquid, and product variations*
- *No need for calibration and requires minimum installation procedures*
- *Easy terminal access, polarity insensitive and short circuit protection*
- *No moving parts or crevices means virtually no maintenance*
- *Electronic, self-checking, and condition monitoring - Heartbeat LED gives status and health information*
- *Adjustable Switching Delay for turbulent/splashing applications*
- *Magnetic test point makes functional test easy*
- *Small in size and weight*
- *"Fast Drip" Fork Design gives quicker response time especially with viscous liquids*
- *Explosion-proof/Flameproof and Intrinsically Safe options*
- *SIL 2 of IEC 61508*
- *DIBt/WHG overfill protection*



Contents

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Product Certifications . . . . . page Level-381
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Reliable Performance...In Challenging Applications



Threaded Process Connection



Flanged Process Connection



Adjustable Switching Delay



'Fast Drip' Forks

MEASUREMENT PRINCIPLE

The Rosemount 2120 is designed using the principle of a tuning fork. A piezo-electric crystal oscillates the forks at their natural frequency. Changes to this frequency are continuously monitored. The frequency of the vibrating fork sensor changes depending on the medium in which it is immersed. The denser the liquid, the lower the frequency.

When used as a **low level alarm**, the liquid in the tank or pipe drains down past the fork, causing a change of natural frequency that is detected by the electronics and switches the output state.

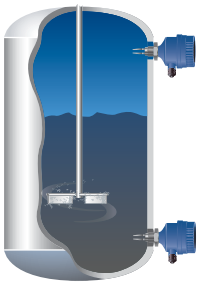
When the 2120 is used as a **high level alarm**, the liquid rises in the tank or pipe, making contact with the fork which then causes the output state to switch.

KEY FEATURES AND BENEFITS

- Virtually unaffected by turbulence, foam, vibration, solids content, coating, or liquid properties
- The 2120 is designed for operation in temperatures from –40 to 302 °F (–40 to 150 °C)
- DIBt/WHG overfill protection certification
- Electronic self-checking and condition monitoring. The 'heartbeat' LED gives status and health information on the 2120
- Adjustable switching delay prevents false switching in turbulent or splashing applications
- 'Fast Drip' fork design gives quicker response time, especially with viscous liquids
- Rapid wet-to-dry time for highly responsive switching
- Fork shape is optimized for hand polishing to meet hygienic requirements
- No moving parts or crevices for virtually no maintenance

Fit and Forget

- Once installed, the 2120 is ready to go.
  It needs no calibration and requires minimum installation
- The ‘heartbeat’ LED gives an instant visual indication that the unit is operational
- Functional testing of the instrument and system is easy with a magnetic test point
- You can install, and forget it



High And Low Level Alarm

Superior Performance

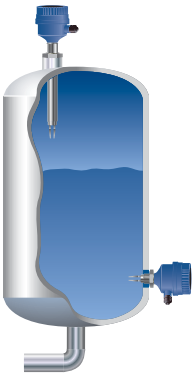
- The 2120 is a popular choice for high and low level alarm and pump control duties for its simplicity, ease of use, and reliability
- Functionality is virtually unaffected by flow, turbulence, bubbles, foam, or vibration
- The ‘Fast Drip’ design allows the liquid to be quickly drawn away from the fork tip, making the 2120 quicker and more responsive in high density or viscous liquid applications
- With a user-selectable time delay feature, the risk of false switching is minimized in turbulent or splashing applications



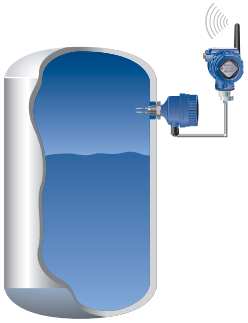
High Temperature Applications

APPLICATIONS

- Overfill protection
- High and low level alarms
- Pump control or limit detection
- Run dry or pump protection
- Hygienic applications
- High temperature applications
- Wireless applications



Pump Control / Limit Detection



Wireless Applications

Rosemount 2120
Vibrating Fork Liquid Level Switch



2120 Level Switches

Rosemount 2120 capabilities include:

- Ideal for almost all liquid applications
- Wide choice of materials, process connections, and switching mechanisms configurable for your application
- Electronic, self-checking, and condition monitoring
- User-adjustable mode selection and time delay switch
- SIL2 suitable

Additional Information

Spares and Accessories: page Level-377
Specifications: page Level-378
Certifications: page Level-381
Dimensions: page Level-383

TABLE 1. 2120 Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
2120	Vibrating Fork Liquid Level Switch / –40…302 °F (–40...150 °C)	
Materials of Construction: Process Connection/Fork		
Standard		**Standard**
D	316/316L Stainless Steel (1.4401/1.4404) dual certified	★
N(1)(2)	316/316L SST (1.4401/1.4404) with NACE compliance to MR 0175:2003 (ISO 15156:2003), MR 0103-2003	★
Expanded		
F(3)	ECTFE/PFA copolymer, coated 316/316L SST (1.4401/1.4404)	
C(4)	Alloy C (UNS N10002), Alloy C-276 (UNS N10276), Solid	
Process Connection Size / Type		
Standard		**Standard**
0A	3/4-in. BSPT (R) Thread	★
0B	3/4-in. BSPP (G) Thread	★
0D	3/4-in. NPT Thread	★
1A	1-in. BSPT (R) Thread	★
1B	1-in. BSPP (G) Thread	★
1D	1-in. NPT Thread	★
1P	1-in. BSPP (G), O-ring, Hygienic Fitting	★
5R	1 1/2-in. (38 mm) Tri-Clamp, Hygienic Fitting	★
2R	2-in. (51 mm) Tri-Clamp, Hygienic Fitting	★
5G	1 1/2-in. ASME B16.5 Class 150 Raised Face (RF) Flange	★
5H	1 1/2-in. ASME B16.5 Class 300 Raised Face (RF) Flange	★
2G	2-in. ASME B16.5 Class 150 Raised Face (RF) Flange	★
2H	2-in. ASME B16.5 Class 300 Raised Face (RF) Flange	★
3G	3-in. ASME B16.5 Class 150 Raised Face (RF) Flange	★
3H	3-in. ASME B16.5 Class 300 Raised Face (RF) Flange	★
4G	4-in. ASME B16.5 Class 150 Raised Face (RF) Flange	★
4H	4-in. ASME B16.5 Class 300 Raised Face (RF) Flange	★
5K	DN40, EN1092 PN 10/16 Flange	★
5L	DN40, EN1092 PN 25/40 Flange	★
2K	DN50, EN1092 PN 10/16 Flange	★
2L	DN50, EN1092 PN 25/40 Flange	★
7K	DN65, EN1092 PN 10/16 Flange	★

TABLE 1. 2120 Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

7L	DN65, EN1092 PN 25/40 Flange			★
3K	DN80, EN1092 PN 10/16 Flange			★
3L	DN80, EN1092 PN 25/40 Flange			★
4K	DN100, EN1092 PN 10/16 Flange			★
4L	DN100, EN1092 PN 25/40 Flange			★
Expanded				
5J	1 1/2-in. ASME B16.5 Class 600 Raised Face (RF) Flange			
2J	2-in. ASME B16.5 Class 600 Raised Face (RF) Flange			
3J	3-in. ASME B16.5 Class 600 Raised Face (RF) Flange			
4J	4-in. ASME B16.5 Class 600 Raised Face (RF) Flange			
5M	DN40, EN1092 PN 63 Flange			
5N	DN40, EN1092 PN 100 Flange			
2M	DN50, EN1092 PN 63 Flange			
2N	DN50, EN1092 PN 100 Flange			
7M	DN65, EN1092 PN 63 Flange			
7N	DN65, EN1092 PN 100 Flange			
3M	DN80, EN1092 PN 63 Flange			
3N	DN80, EN1092 PN 100 Flange			
4M	DN100, EN1092 PN 63 Flange			
4N	DN100, EN1092 PN 100 Flange			
XX(5)	Customer Specific			
Electronic Type			**Available for Certifications**	
Standard				**Standard**
S	Direct load switching (2-wire) 20 to 264 Vac 50/60Hz, 20 to 60 Vdc		NA, E1, E5, E6, E7, G5, G6	★
B	PNP/PLC low voltage (3-wire) 20 to 60 Vdc		NA, E1, E5, E6, E7, G5, G6	★
R	Relay (SPDT / SPCO)		NA, E1, E5, E6, E7, G5, G6	★
C(6)	IS NAMUR (Ex ia)		I1, I3, I5, I6, I7	★
Surface Finish			**Available for Connections**	
Standard				**Standard**
1	Standard surface finish		All	★
2	Hand polished (Ra < 0.4 µm)		Hygienic Connection Only	★
Product Certifications		**Available for Electronic**	**Available for Housing**	
Standard				**Standard**
NA	No Hazardous Locations Certifications	S, B, R	A, D	★
G5(7)	FM Ordinary Locations (unclassified, safe area)	S, B, R	Y, T	★
G6(8)(9)	CSA Ordinary Locations (unclassified, safe area)	S, B, R	Y, T	★
E1	ATEX Flameproof	S, B, R	X, S	★
E5(7)	FM Explosion-proof	S, B, R	Y, T	★
E6(8) (9)	CSA Explosion-proof	S, B, R	Y, T	★
E7	IECEx Explosion-proof	S, B, R	X, S	★
I1	ATEX Intrinsic Safety	C	A, D	★
I3	NEPSI Intrinsic Safety	C	A, D	★
I5	FM Intrinsic Safety	C	A, D	★
I6(9)	CSA Intrinsically Safe	C	A, D	★
I7	IECEx Intrinsic Safety	C	A, D	★
Housing			**Available for Certifications**	
Standard				**Standard**
A	Glass Filled Nylon, M20 conduits/cable threads		NA, I1, I3, I5, I6, I7	★
D	Glass Filled Nylon, 1/2-in. NPT conduits/cable threads		NA, I1, I3, I5, I6, I7	★
X	Aluminum Alloy, M20 conduits/cable threads		E1, E7	★
Y	Aluminum Alloy, 3/4-in. NPT conduits/cable threads		E5, E6, G5, G6	★
S	Stainless Steel, M20 conduits/cable threads		E1, E7	★
T	Stainless Steel 3/4-in. NPT conduits/cable threads		E5, E6, G5, G6	★

TABLE 1. 2120 Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Fork Length		**Available Connection**	
Standard			**Standard**
A	Standard length 1.7-in. (44 mm)	All except flanged models	★
H(2)	Standard length flange 4.0-in. (102 mm)	All flanged models	★
B(2)	Ext 5.9-in. (150 mm)	All except Tri-clamp 5R & 2R	★
C(2)	Ext 11.8-in. (300 mm)	All except Tri-clamp 5R & 2R	★
D(2)	Ext 19.7-in. (500 mm)	All except Tri-clamp 5R & 2R	★
L(10)	Semi-ext 3.9-in. (98 mm)	1A, 1B, and 1D	★
E(11)	Extended, customer specified length in tenths of inches	All except 1-in. BSPP O-ring 1P	★
M(11)	Extended, customer specified length in millimeters	All except 1-in. BSPP O-ring 1P	★
OPTIONS			
Specific Extended Fork Length			
Standard			**Standard**
XXXX(11)	Specific customer specified length in tenths of inches, or millimeters (only if fork length E or M is selected)		★
Calibration Data Certification			
Standard			**Standard**
Q4	Certificate of functional test		★
Material Traceability Certification			
Standard			**Standard**
Q8(1)(2)	Material traceability certification per EN 10204 3.1		★
Special Procedures			
Standard			**Standard**
P1(12)	Hydrostatic testing with certificate		★
Overfill			
Standard			**Standard**
U1(13)	WHG/DIBt Overfill Protection		★
Tag Plates			
Standard			**Standard**
ST	Tag plate SST engraved plate (maximum 16 digits)		★
WT	Tag plate laminated paper (maximum 40 digits)		★
Typical Model Number: 2120 D 0A C 1 I1 A A Q8 ST			

(1) Only available for wetted parts.

(2) Not available for hand polished wet side.

(3) ECTFE/PFA copolymer coating is not available on threaded options.

(4) Only available of BSPT and NPT threaded process connection code 0A, 0D, 1A, and 1D as standard, other upon request.

(5) Other process connections available upon request.

*(6) Rosemount 2120 IS Namur Vibrating Fork Level Sensor models 2120***C*I** has demonstrated proven reliability. It is suitable for applications up to SIL 2 of IEC 61508 as a Type B Safety Related Subsystem when configured as a high level alarm in conjunction with a Namur Barrier.*

(7) See Product Certifications on page 381. E5 includes G5 requirements. G5 is for use in unclassified, safe area locations only.

(8) See Product Certifications on page page Level-381. E6 includes G6 requirements. G6 is for use in unclassified, safe area locations only.

(9) The requirements of CRN are met when a Rosemount 2120 CSA-approved vibrating fork level switch model is configured with 316/316L stainless steel (1.4401/1.4404) wetted parts and either NPT threaded or 2-in. to 8-in. ASME B16.5 flanged process connections.

(10) Only available with stainless steel material of construction D and glass nylon housing A and D.

(11) Minimum length available for 3/4-in. threaded connection is 3.8 in. (95 mm); for 1-in. threaded, it is 3.7 in. (94 mm); for flanged, it is 3.5 in. (89 mm); and for Tri-Clamp, it is 4.1 in. (105 mm). Maximum length is 118.1 in. (3000 mm), except for ECTFE/PFA copolymer coating and hand polished process where the maximum length is 39.4 in. (1000 mm). Examples: Code E1181 is 118.1 inches. Code M3000 is 3000 millimeters.

(12) Option limited to units with extended lengths up to 59.1-in. (1500 mm). Option is not available for ECTFE/PFA coating.

(13) Option not available for Stainless Steel housing codes S and T.

Spare Parts and Accessories

TABLE 2. Spare Parts and Accessories

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Spares and Accessories		
Standard		**Standard**
02100-1000-0001	Seal for 1-in. BSPP (G1A). Material: Non-asbestos BS7531 grade X carbon fiber with rubber binder	★
02100-1040-0001	Seal for 3/4-in. BSPP (G3/4A). Material: Non-asbestos BS7531 grade X carbon fiber with rubber binder	★
02100-1010-0001	Hygienic adaptor boss 1-in. BSPP. Material: 316 Stainless fitting. FPM/FKM O-ring	★
02100-1020-0001	2-in. (51 mm) Tri-clamp kit (vessel fitting, clamp ring, and seal). Material: 316 SST, NBR Nitrile	★
02100-1030-0001	Telescopic test magnet	★
02120-2000-0001(1)	1 1/2-in. BSPP adjustable clamp gland for 1-in. extended lengths. Material: 316 Stainless steel, (Si) Silicone rubber seal	★
02120-2000-0002(1)	1 1/2-in. NPT adjustable clamp gland for 1-in. extended lengths. Material: 316 Stainless steel, (Si) Silicone rubber seal	★
02120-3000-0001(2)	Replacement Cassette: Direct load switching (2 Wire) (Red)	★
02120-3010-0001(2)	Replacement Cassette: PNP/PLC cassette (Yellow)	★
02120-3020-0001(2)(3)	Replacement Cassette: Intrinsically Safe cassette (Blue)	★
02120-3030-0001(2)	Replacement Cassette: Relay output cassette (Green)	★
02120-3040-0001(4)	Replacement Cassette: FM Direct load switching (2 Wire) (Red)	★
02120-3050-0001(4)	Replacement Cassette: FM PNP/PLC cassette (Yellow)	★
02120-3060-0001(4)	Replacement Cassette: FM Relay output cassette (Green)	★

(1) The adjustable clamp gland is not explosion-proof.

(2) Available for Housing codes A and D.

(3) I.S. cassettes can only be replaced with I.S. cassettes. Non-I.S. cassette types can be interchanged with other non-I.S. cassettes, but the new label must be fitted and the original part number transferred to the new label.

(4) Available for Housing codes X, Y, S, and T.

Specifications

Physical

Product
Rosemount 2120 Vibrating Fork Liquid Level Switch

Measuring principle
Vibrating Fork

Applications
Most liquids including coating liquids, aerated liquids, and slurries

Mechanical

Housing and Enclosure

Housing Code	A	D	X	Y	S	T
Housing Material	Nylon PA66 30%GF		Al alloy ASTM B26 356-T6 or LM25 TF		316C12 Stainless Steel	
Housing Paint	Not Applicable		Polyurethane Powder Coat		Not Applicable	
LED Window	PMMA		None		None	
Conduit Entry	M20	1/2-in. NPT	M20	3/4-in. NPT	M20	3/4-in. NPT
Ingress Protection	IP66/67 to EN60529		IP66/67 to EN60529, Type 4X		IP66/67 to EN60529, Type 4X	

Connections
See Process Connection Size / Type on page 374

Extended Lengths
The maximum extended length is 118.1 in. (3000 mm) except for a hand-polished 2120 that is limited to 39.4 in. (1000 mm)

Process Material
316/316L Stainless Steel (1.4401/1.4404 dual certified), Alloy C (UNS N10002) and Alloy C-276 (UNS N10276), or ECTFE/PFA co-polymer coated 316/316L Stainless Steel (1.4401/1.4404 dual certified)

Hand polished to better than 0.4 μm option available for hygienic connections

Gasket material for 3/4-in. and 1-in. BSPP (G) is Non-asbestos BS7531 Grade X carbon fiber with rubber binder

Dimensional Drawings
See Dimensional Drawings on page 383

Performance

Hysteresis (water)
±0.039-in. (±1 mm) nominal

Switching Point (water)
0.5 in. (13 mm) from tip (vertical) / from edge (horizontal) of fork (this will vary with different liquid densities)

Functional

Maximum Operating Pressure
The final rating depends on the selected process connection.

Threaded Connection
See Figure 1 for operating pressures.

NOTE:
Clamp glands 02120-2000-0001 and 02120-2000-0002 (page Level-377) limit the maximum pressure to 18.85 psig (1,3 bar g)

Hygienic Connection
435 psig (30 bar g)

Flanged Connection
See Figure 1 or Table 3 (whichever one is the lowest)

FIGURE 1. Process Pressure

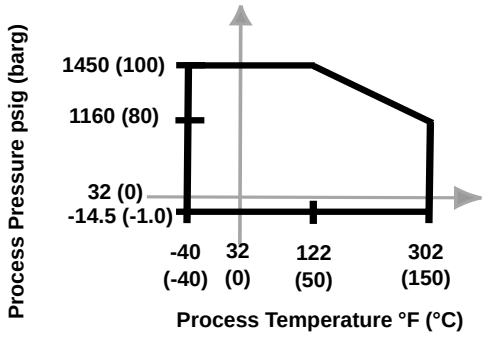


TABLE 3. Maximum Flange Pressure Rating

Standard	Class/Rating	SST Flanges
ASME B16.5	Class 150	275 psig(1)
ASME B16.5	Class 300	720 psig(1)
ASME B16.5	Class 600	1440 psig(1)
EN1092-1	PN 10/16	10/16 barg(2)
EN1092-1	PN 25/40	25/40 barg(2)
EN1092-1	PN 63	63 barg(2)
EN1092-1	PN 100	100 barg(2)

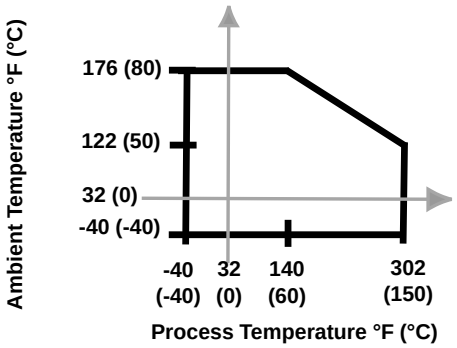
(1) At 100 °F (38 °C), the rating decreases with an increasing process temperature.

(2) At 122 °F (50 °C), the rating decreases with an increasing process temperature.

Minimum and Maximum Operating Temperature
See Figure 2 for operating temperatures.

NOTE:
Clamp glands 02120-2000-0001 and 02120-2000-0002 (page Level-377) limit the maximum temperature to 257 °F (125 °C).

FIGURE 2. Temperature



Liquid Density Range
Minimum 37.5 lb/ft^3 (600 kg/m^3)

Liquid Viscosity Range
0.2 to 10000 cP (centiPose)

Solids Content and Coating
Maximum recommended diameter of solid particles in the liquid is 0.2 in. (5 mm)

For coating product, avoid bridging of forks

Switching Delay
User selectable 0.3, 1, 3, 10, 30 seconds delay for dry-to-wet and wet-to-dry switching

CIP (Clean In Place) Cleaning
Withstands steam cleaning routines up to 302 °F (150 °C)

Electrical

Switching Mode
User selectable switching mode (Dry=on or Wet=on)

Protection
Polarity insensitive. Over-current, short-circuit and load-missing protection. Surge protection to IEC61326.

Terminal Connection (wire diameter)
Max. 0.1 in^2 (2,5 mm^2). Note national regulations.

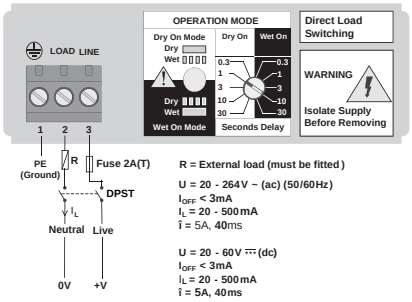
Conduit Plugs/Cable Gland
- Metal Ex d Housing: Conduit entries for explosion-proof areas are shipped with two brass conduit plugs
- Plastic housing with direct load, PNP/PLC and IS electronics are shipped with one PA66(1) cable gland and one blanking plug
- Plastic housing with relay electronics are shipped with two PA66(1) cable glands

Grounding
The 2120 should always be grounded either through the terminals or using the external ground connection provided.

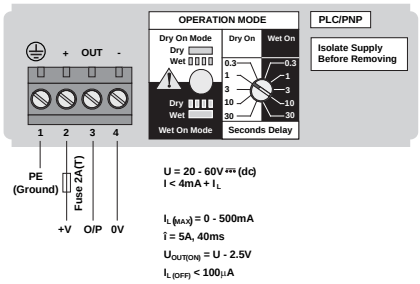
(1) Cable diameter 0.2 to 0.3 in. (5 to 8 mm)

Electrical Connections

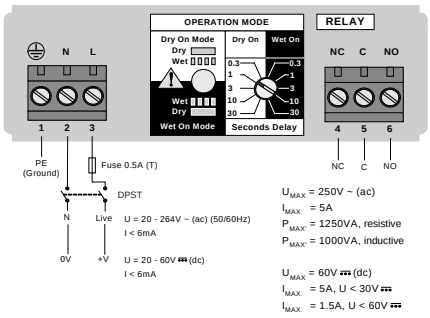
- Direct load switching (two-wire)



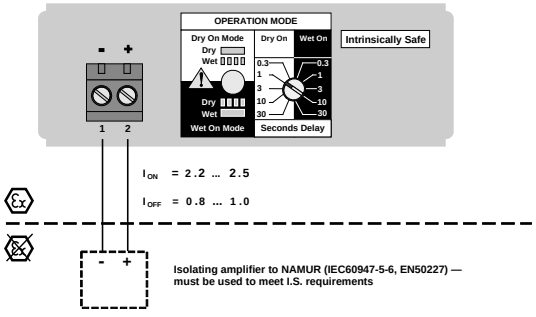
- Solid state PNP output for direct interface to PLC's (three wire)



- SPCO single relay for voltage free contacts



- Intrinsically Safe (IS) NAMUR to DIN 19234, IEC 60947-5-6



Level

2120

Product Certifications

ORDINARY LOCATION CERTIFICATION FOR FM

G5 Project ID: 3024095
The switch has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

ORDINARY LOCATION CERTIFICATION FOR CSA

G6 Certificate Number: 06 CSA 1796535
The switch has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by CSA, a nationally recognized testing laboratory as accredited by the Standards Council of Canada (SCC).

EUROPEAN DIRECTIVE INFORMATION

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting your local sales office.

ATEX Directive (94/9/EC)

Complies with the ATEX Directive.

Pressure Equipment Directive (PED) (97/23/EC)

The Rosemount 2120 is outside the scope of PED Directive.

L.V. Directive

EN61010-1 Pollution degree 2, Category II (264V max), Pollution degree 2, Category III (150V max)

Electro Magnetic Compatibility (EMC) Directive

EN61326 Emissions to Class B.

Immunity to industrial location requirements.

Vibration Resistance

EN60721 level 3M6/4M6

CE-mark

Complies with applicable directives (EMC, ATEX, and LVD)

Overfill Protection

If required, select Product Certificates code U1 for WHG/DIBt overfill protection. The approval number is Z-65.11-236.

SIL Declaration of Conformity

The Rosemount 2120 IS Namur Vibrating Fork Level Sensor (2120***C*I**) has demonstrated proven reliability. It is manufactured and supported in a manner suitable for applications up to SIL 2 of IEC 61508 as a Type B Safety Related Subsystem when configured(1) as a high level alarm in conjunction with a Namur Barrier.

HAZARDOUS LOCATIONS CERTIFICATIONS

North American Approvals

Factory Mutual (FM) Explosion-proof Approval

E5 Project ID: 3024095
Explosion-proof for Class I, Div. 1, Groups A, B, C, and D
Temperature Class:
T6 (T_{amb} –40 to 75 °C)
Enclosure: Type 4X

Factory Mutual (FM) Intrinsically Safe Approval

I5 Project ID: 3024095
Intrinsically Safe for Class I, Div. 1, Groups A, B, C, and D
Class I, Zone 0, AEx ia IIC
Temperature Code:
T5 (T_{amb} –40 to 80 °C, Tproc < 80 °C)
Control Drawing: 71097/1154
Ui=15 V, Ii=32 mA, Pi=0.1 W, Ci=211 nF, Li=0.06 mH

NOTE
A NAMUR isolating amplifier must be used for intrinsic safety.

Canadian Approvals

Canadian Standards Association (CSA) Explosion-proof Approvals

E6 Project ID: 1796535
Explosion-proof for Class I, Div. 1, Groups A, B, C, and D
Temperature Class:
T6 (T_{amb} –40 to 75 °C)
Enclosure: Type 4X

Canadian Standards Association (CSA) Intrinsically Safe Approval

I6 Certificate Number: 06 CSA 1796535
Intrinsically Safe for Class I, Div. 1, Groups A, B, C, and D
Class 1, Zone 0, Ex ia IIC
Temperature Code:
T5 (T_{amb} –40 to 80 °C, Tproc < 80 °C)
Control Drawing: 71097/1179
Ui=15 V, Ii=32 mA, Pi=0.1 W, Ci=211 nF, Li=0.06 mH

(1) Refer to manual for IEC 61508 configuration details.

Canadian Standards Association (CSA) Non-Incendive Approval

I6 Certificate Number: 06 CSA 1796535
Non-Incendive for Class I, Div. 2, Groups A, B, C, and D
Temperature Code:
T5 (T_{amb} –40 to 80 °C, Tproc < 80 °C)
Control Drawing: 71097/1187
Ui=15 V, Ii=32 mA, Pi=0.1 W, Ci=211 nF, Li=0.06 mH

NOTE
A NAMUR isolating amplifier must be used for intrinsic safety.

Canadian Registration Number (CRN)

CRN 0F04227.2C

NOTE
The requirements of CRN are met when a Rosemount 2120 CSA-approved vibrating fork level switch model is configured with 316/316L stainless steel (1.4401/1.4404) wetted parts and either NPT threaded or 2-in. to 8-in. ASME B16.5 flanged process connections.

European Approvals

ATEX Flameproof Approval

E1 Certificate: Sira 05ATEX1129X
Flameproof and Dust:
ATEX Marking ⟨Ex⟩ II 1/2 G D
Ex d IIC T6 to T2
Ex tD A21 (T85°C to 265°C) IP6X

ATEX Intrinsically Safe Approval

I1 Certificate: Sira 05ATEX2130X
Intrinsic Safety and Dust:
ATEX Marking ⟨Ex⟩ II 1 G D
Ex ia IIC T5 to T2
Ex iaD 20 (T85 °C to 265 °C) IP6X
Ui=15 V, Ii=32 mA, Pi=0.1 W, Ci=12 nF, Li=0.06 mH

NOTE
A NAMUR isolating amplifier must be used for intrinsic safety.

International Approvals

National Supervision and Inspection Centre for Explosion Protection and Safety Instrumentation (NEPSI) Intrinsically Safe Approval

I3 Certificates:
GYJ06530 (when manufactured in Slough, UK)
GYJ06531 (when manufactured in Singapore, Singapore)
Intrinsic Safety:
Ex ia IIC T5 (T_{amb} –40 to 60 °C)
Ui=15 V, Ii=32 mA, Pi=0.1 W, Ci=12 nF, Li=0.06 mH

NOTE
A NAMUR isolating amplifier must be used for intrinsic safety.

International Electrotechnical Commission (IEC) Flameproof Approval

E7 Certificate: IECEx SIR 06.0051X
Flameproof and Dust:
Zone 0/1
Ex d IIC T6 to T2
Ex tD A21 (T85 °C to 265 °C) IP6X

International Electrotechnical Commission (IEC) Intrinsically Safe Approval

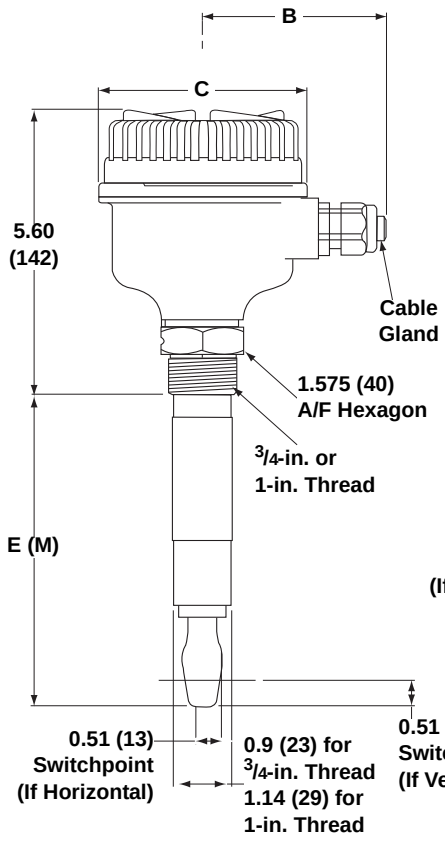
I7 Certificate: IECEx SIR 06.0070X
Intrinsically Safe and Dust:
Ex ia IIC T5 to T2
Ex iaD 20 (T85 °C to 265 °C) IP6X
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NOTE
A NAMUR isolating amplifier must be used for intrinsic safety.

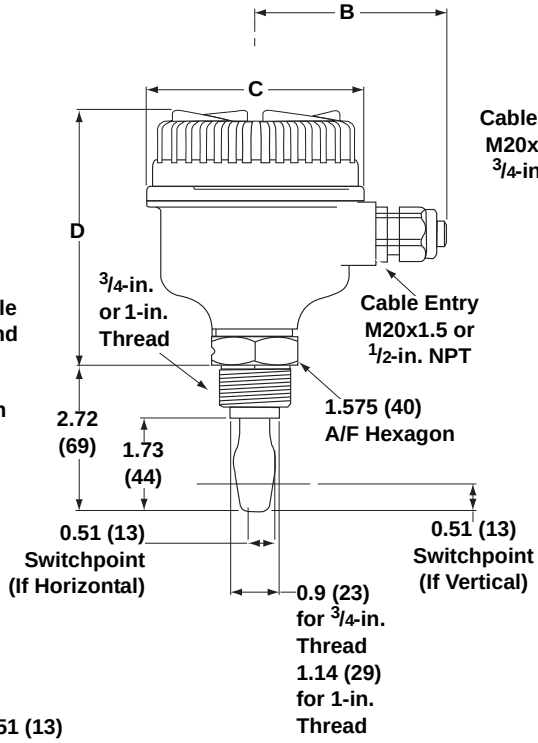
Dimensional Drawings

Threaded Mounting

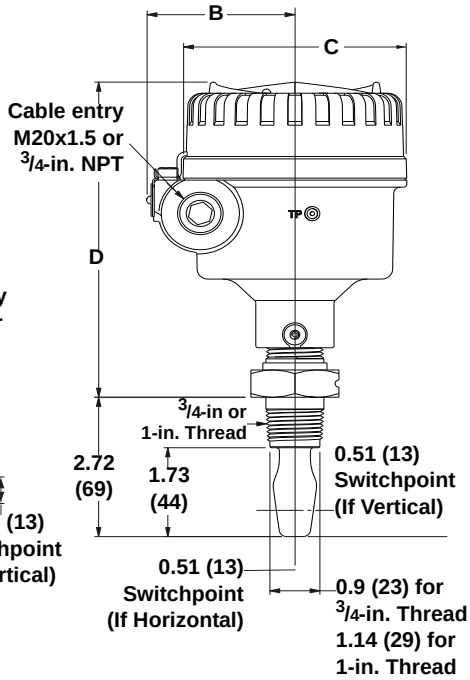
Glass Filled Nylon



Glass Filled Nylon



Aluminum/SST



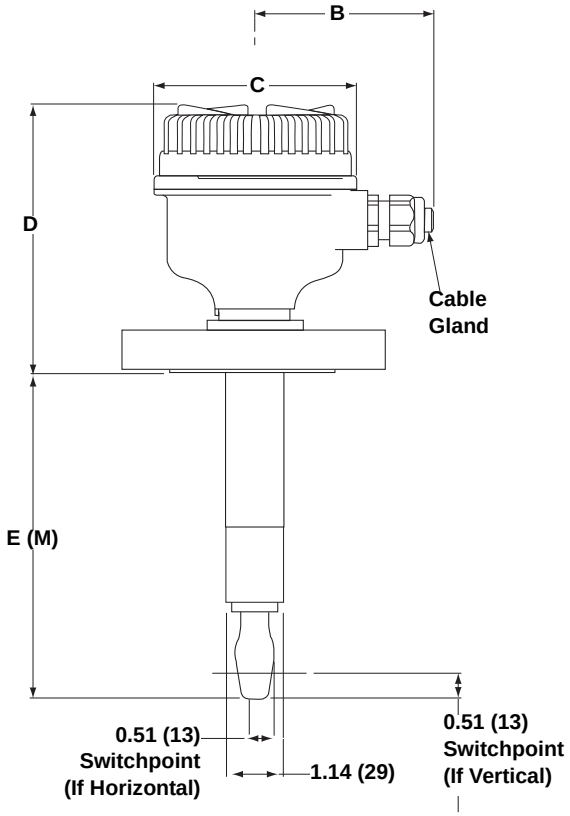
Note: Dimensions are in inches (millimeters)

Thread	Standard Length Model Code A	Minimum Length Model Code E (M)	Maximum Length Model Code E (M)
3/4 in.	1.73 (44)	3.74 (95)	118.11 (3000)
1 in.	1.73 (44)	3.70 (94)	118.11 (3000)

Material	B	C	D
Glass Nylon	3.52 (90)	4.02 (102)	4.72 (120)
Aluminum	2.68 (68)	4.02 (102)	6.14 (156)
Stainless Steel	2.76 (70)	4.13 (105)	6.30 (160)

Flange Mounting

(Glass filled nylon housing shown)



Note: Dimensions are in inches (millimeters)

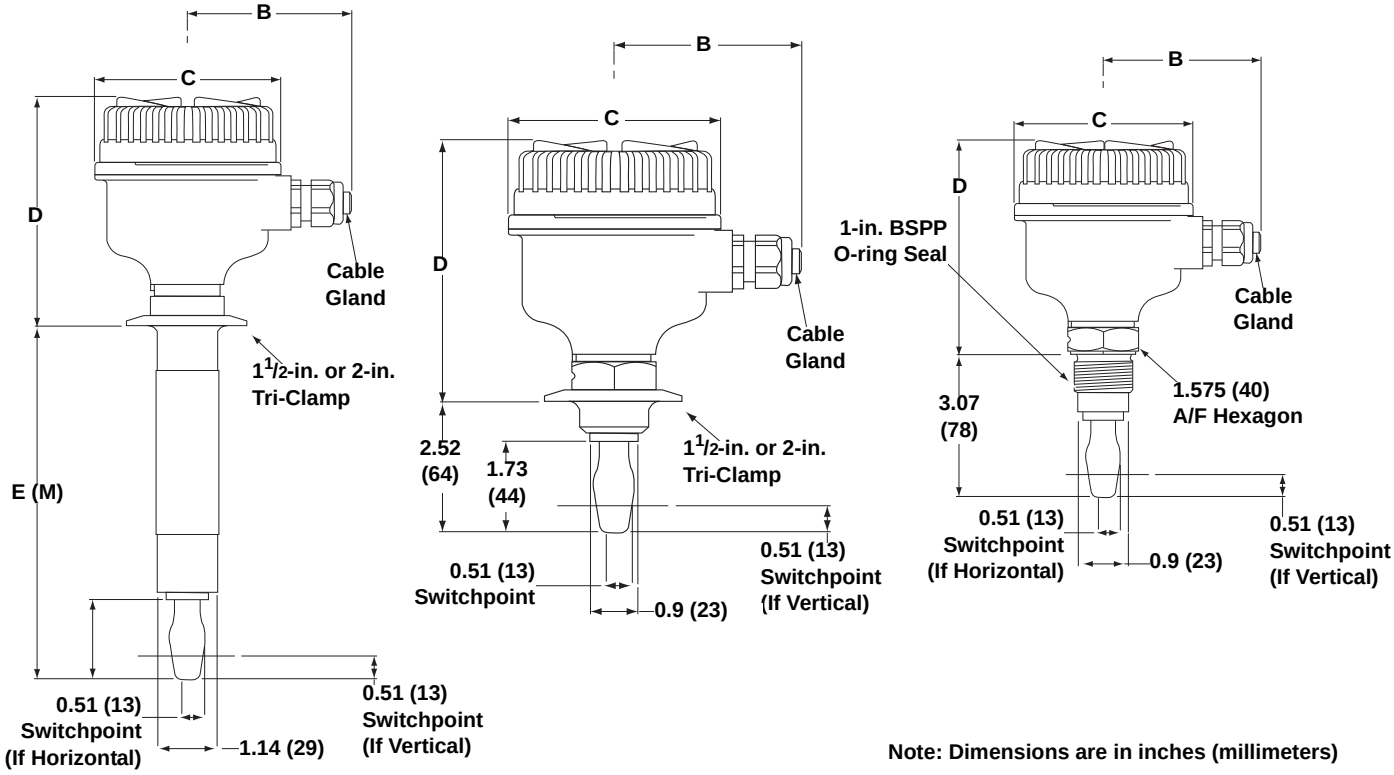
Material	Standard Length Model Code H	Minimum Length Model Code E (M)	Maximum Length Model Code E (M)
Stainless Steel	4 (102)	3.50 (89)	118.11 (3000)
ECTFE/PFA co-polymer coated	4 (102)	3.50 (89)	39.37 (1000)

Material	B	C	D(1)
Glass Nylon	3.52 (90)	4.02 (102)	6.30 (160)
Aluminum	2.68 (68)	4.02 (102)	6.14 (156)
Stainless Steel	2.76 (70)	4.13 (105)	7.87 (200)

(1) Varies with flange rating and thickness. "D" is the nominal maximum thickness and allows a flange up to 1.77 in. (45 mm) thick. This equates to a 4-in. ASME B16.5 Class 600 Raised Face flange.

Hygienic Fitting

(Glass filled nylon housing shown)



Note: Dimensions are in inches (millimeters)

Connection	Standard Length Model Code A	Minimum Length Model Code E (M)	Maximum Length Model Code E (M)
Tri-Clamp	1.7 (44)	4.13 (105)	118.11 (3000)
O-ring Seal (1-in. BSPP)	1.7 (44)	Not Applicable	Not Applicable

Material	B	C	D
Glass Nylon	3.52 (90)	4.02 (102)	4.96 (126)
Aluminum	2.68 (68)	4.02 (102)	6.14 (156)
Stainless Steel	2.76 (70)	4.13 (105)	6.54 (166)

Rosemount Level Solutions

Emerson provides a complete range of Rosemount products for level measurement applications.

Vibrating Fork Switches – Point Level Detection

For high and low alarms, overfill protection, pump control, including wide pressure and temperature requirements, and hygienic applications. Flexible mounting. Immune to changing process conditions and suitable for most liquids.
The product line consists of:

- Rosemount 2160 Wireless
- Rosemount 2130 Enhanced
- Rosemount 2120 Full-featured
- Rosemount 2110 Compact

Differential Pressure – Level or Interface Measurement

Flexible mounting for liquid tank levels, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by: vapor space changes, surface conditions, foam, corrosive fluids, internal tank equipment. Optimize performance with direct mount, Tuned-System Assemblies:

- Rosemount DP Level Transmitters and Remote Seals
- Rosemount 3051S_L, 3051L, and 2051L Liquid Level Transmitters

Ultrasonic – Level Measurement

Top mounted, non-contacting for simple tank and open air level measurements. Unaffected by fluid properties such as: density, viscosity, dirty coating, and corrosiveness. Appropriate for routine applications outside of explosion proof areas.
The product line consists of:

- Rosemount 3100 Series Ultrasonic Process Level Transmitters

Guided Wave Radar – Level and Interface Measurement

Top mounted, direct level and interface measurement of liquids or solids, including those with wide temperature and pressure requirements. Unaffected by changing process conditions. Good fit for small spaces and easy swap for older technologies.
The product line consists of:

- Rosemount 5300 Series – Accurate, superior performance transmitter in most applications including process vessels and control
- Rosemount 3300 Series – Versatile and easy-to-use transmitter in most liquid storage and monitoring applications

Non-contacting Radar – Level Measurement

Top mounted, direct level measurement for liquids or solids, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by changing process conditions. Good for dirty, coating, and corrosive applications.
The product line consists of:

- Rosemount 5400 Series – Accurate, superior performance 2-wire transmitters for most liquid level applications and process conditions
- Rosemount 5600 Series – 4-wire transmitters with maximum sensitivity and performance for solids, challenging reactors, rapid level changes, and excessive process conditions

Chambers for Process Level Instrumentation

- Rosemount 9901 – High quality chambers for external mounting of level measurement and control instrumentation on process vessels

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EMERSON
Process Management

Rosemount 2110 Compact Vibrating Fork Liquid Level Switch

- *Function virtually unaffected by flow, turbulence, bubbles, foam, vibration, solids content, coating, properties of the liquid, and product variations*
- *No need for calibration and requires minimum installation procedures*
- *Polarity insensitive and short circuit protection*
- *Industry standard plug/socket connection*
- *No moving parts or crevices means virtually no maintenance*
- *Electronic, self-checking, and condition monitoring - Heartbeat LED gives status and health information*
- *Magnetic test point makes functional test easy*
- *Compact design, small in size and weight*
- *"Fast Drip" Fork Design gives quicker response time especially with viscous liquids*
- *Hygienic connections*



DIBt

Contents

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Rosemount 2110 Compact Vibrating Fork Liquid Level Switch. . . . . page Level-390
Specifications . . . . . page Level-391
Product Certifications . . . . . page Level-392
Dimensional Drawing . . . . . page Level-393

Reliable Performance...In Challenging Applications



Threaded Process Connection **Tri-Clamp Process Connection**



Compact And Lightweight



‘Fast Drip’ Forks

MEASUREMENT PRINCIPLE

The Rosemount 2110 is designed using the principle of a tuning fork. A piezo-electric crystal oscillates the forks at their natural frequency. Changes to this frequency are continuously monitored. The frequency of the vibrating fork sensor changes depending on the medium in which it is immersed. The denser the liquid, the lower the frequency.

When used as a **low level alarm**, the liquid in the tank or pipe drains down past the fork, causing a change of natural frequency that is detected by the electronics and switches the output state.

When the 2110 is used as a **high level alarm**, the liquid rises in the tank or pipe, making contact with the fork which then causes the output state to switch.

KEY FEATURES AND BENEFITS

- Virtually unaffected by turbulence, foam, vibration, solids content, coating, or liquid properties
- Stainless steel housing and plug/socket connection for the fast fit, high volume user
- Compact and lightweight design for side or top mounting
- The industry standard DIN 43650 plug/socket is used for a fast connection. The polarity insensitivity and short circuit protection make electrical hook-up safe and easy
- The 2110 is designed for operation in temperatures from –40 to 302 °F (–40 to 150 °C)
- The ‘heartbeat’ LED gives status and health information on the 2110
- ‘Fast Drip’ fork design gives quicker response time, especially with viscous liquids
- Rapid wet-to-dry time for highly responsive switching
- Fork shape is optimized for hand polishing to meet hygienic requirements
- No moving parts or crevices for virtually no maintenance

Fit and Forget

- Once installed, the 2110 is ready to go.
  It needs no calibration and requires minimum installation
- The ‘heartbeat’ LED gives an instant visual indication that the unit is operational
- Functional testing of the instrument and system is easy with a magnetic test point
- You can install, and forget it

Superior Performance

- Functionality is virtually unaffected by flow, turbulence, bubbles, foam, or vibration
- The ‘Fast Drip’ design allows the liquid to be quickly drawn away from the fork tip, making the 2110 quicker and more responsive in high density or viscous liquid applications
- With a user-selectable time delay feature, the risk of false switching is minimized in turbulent or splashing applications

APPLICATIONS

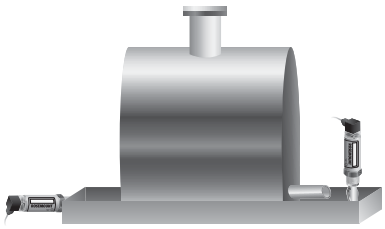
- Overfill protection
- High and low level alarms
- Leak detection
- Run dry or pump protection
- Pump control or limit detection
- Hygienic applications



Overfill Protection



High And Low Level Alarm



Leak Detection



Pump Protection

Rosemount 2110
Compact Vibrating Fork Liquid Level Switch



2110 Level Switch

Rosemount 2110 capabilities include:

- Rugged stainless steel body and fork, the ideal choice for OEM applications
- Compact design, small and lightweight, perfect for small tank or pipe installations
- Short fork or semi-extended lengths
- Direct load switching or PNP/PLC electronics
- Safe area only

Additional Information

Specifications: page Level-391
Dimensions: page Level-393
Certifications: page Level-392

TABLE 1. 2110 Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
2110	Compact Vibrating Fork Liquid Level Switch	
Electronic Type		
Standard		**Standard**
0	Direct load switching with plug connection (2 wire) 21 to 264 Vac 50/60Hz, 21 to 264 Vdc	★
1	PNP/PLC low voltage switching with plug connection 18 to 60 Vdc	★
Process Connection Size / Type		
Standard		**Standard**
0A	3/4-in. BSPT (R) thread	★
1A	1-in. BSPT (R) thread	★
0D	3/4-in. NPT thread	★
2R	2-in. (51 mm) Tri-clamp	★
1B	1-in. BSPP (G) thread	★
1L	1-in. BSPP (G) Semi-extended 4.6 in. (116 mm)	★
Product Certificates		
Standard		**Standard**
NA	No hazardous locations certifications (safe area use only)	★
U1	DIBt/WHG Overfill protection	★
OPTIONS		
Calibration Data Certificate		
Standard		**Standard**
Q4	Certificate of functional test	★
Tag Plate		
Standard		**Standard**
ST	Tag plate SST engraved plate (maximum 16 digits)	★
WT	Tag plate laminated paper (maximum 40 digits)	★
Typical Model Number: 2110 0 2R NA		

TABLE 2. Spare Parts and Accessories

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Spares and Accessories		
Standard		**Standard**
02100-1000-0001	Seal for 1-in. BSPP (G1A). Material: Non-asbestos BS7531 grade X carbon fiber with rubber binder	★
02100-1010-0001	Hygienic adaptor boss for 1-in. BSPP model. Material: 316 SST fitting. Fluorocarbon (FPM/FKM) O-ring	★
02100-1020-0001	Hygienic mounting kit for 2-in. (51 mm) Tri-clamp model. Includes vessel fitting, clamp ring, and seal. Material: 316 SST and NBR Nitrile	★
02100-1030-0001	Telescopic test magnet	★

Specifications

PHYSICAL

Product
Rosemount 2110 Compact Liquid Level Switch

Measuring principle
Vibrating Fork

Applications
Most liquids including coating liquids, aerated liquids, and slurries

Mechanical

Process Material
316L Stainless Steel (1.4404)
For Tri-Clamp connection, hand polished to better than 0.8 μm. Gasket material for 1 in. BSPP (G1) is Non-asbestos BS7531 Grade X carbon fiber with rubber binder.

Housing Materials
Body: 304 SST with polyester label
LED window:
Flame retardant Polyamide (Pa12) UL94 V2
Plug: Polyamide glass reinforced
Plug seals: Nitrile butadiene rubber

Mounting
- ¾-in. BSPT (R) or NPT
- 1-in. BSPT (R) or BSPP (G) thread, or
- Hygienic 2-in. (51 mm) Tri-clamp fitting

Dimensional Drawings
See “Dimensional Drawing” on page 393

Ingress of Protection Rating
IP66/67 to EN60529

PERFORMANCE

Hysteresis (water)
±0.039-in. (± 1 mm) nominal.

Switching Point (water)
0.5 in. (13 mm) from fork tip if mounted vertically.
0.5 in. (13 mm) from the fork edge if mounted horizontally.
The switch point varies with different liquid densities.

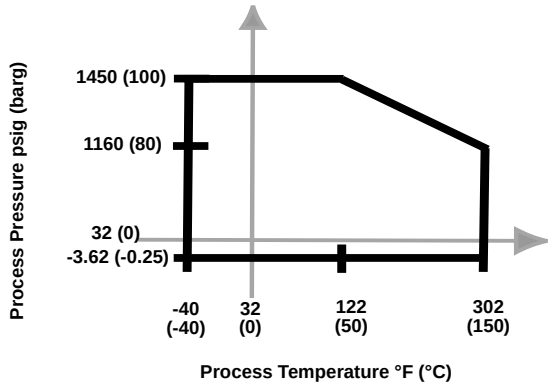
FUNCTIONAL

Maximum Operating Pressure
(The final rating depends on the process connection)

Threaded Connection
See Figure 1

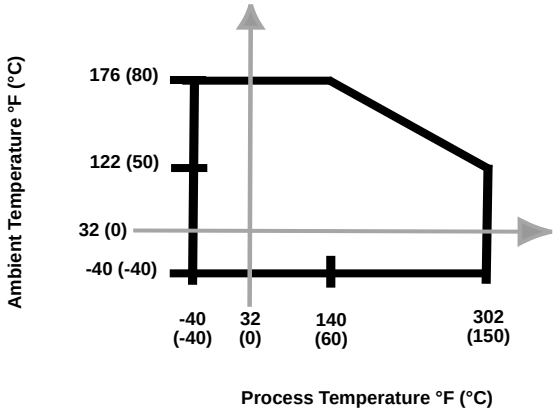
Hygienic Connection
435 psig (30 barg)

Figure 1. Process Pressure



Temperature
See Figure 2 for the maximum and minimum operating temperatures.

Figure 2. Temperature



Liquid Density
Minimum 37.5 lb/ft^3 (600 kg/m^3)

Liquid Viscosity Range
0.2 to 10000 cP (centiPoise)

Solids Content and Coating
Maximum recommended diameter of solid particles in the liquid is 0.2 in. (5 mm).

For coating product, avoid 'bridging' of forks.

Switching Delay
1 second dry-to-wet or wet-to-dry

CIP (Clean In Place) Cleaning
Withstands steam cleaning routines up to 302 °F (150 °C)

Electrical

Switching Mode
User selectable (Dry=on or Wet=on) by selecting plug wiring

Cable Connection
Via 4-way plug provided (DIN43650).

Max. conductor size is 15AWG.

4-position orientation (90/180/270/360 deg).

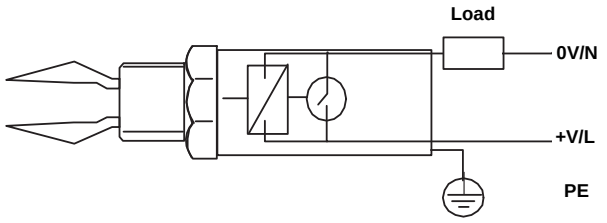
Conductor Size
Maximum 0.06 in.^{2} (1,5 mm^2)

Cable Gland
PG9 provided. Cable diameter 0.24 to 0.31 in. (6 to 8 mm)

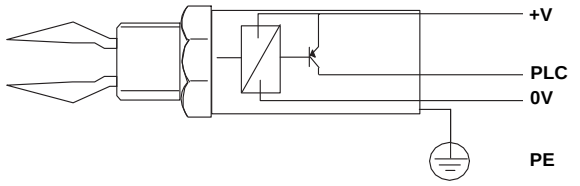
Protection
Polarity insensitive. Over-current, short circuit, and load-missing protection. Surge protection to IEC61326.

Grounding
The 2110 should always be grounded either through the terminals or using the external ground connection provided.

Direct Load Switching (Electronics Type Code 0)	
Operating Voltage	21 to 264 Vac (50 to 60 Hz)/dc
Maximum switched load	500 mA
Maximum peak load	5 A for 40 ms max.
Minimum switched load	20 mA continuous
Voltage drop	6.5 V @ 24 Vdc / 5 V @ 240 Vac
Current draw (load off)	<3.0 mA continuous



PNP Switching (Electronics Type Code 1)	
Operating Voltage	18 to 60 Vdc
Maximum switched load	500 mA
Maximum peak load	5 A for 40 ms max.
Voltage drop	<3 V
Supply Current	3 mA nominal
Output current (load off)	<0.5 mA



Product Certifications

L.V. Directive
EN61010-1 Pollution degree 2,
Category II (264V max),
Pollution degree 2, Category III (150 V maximum)

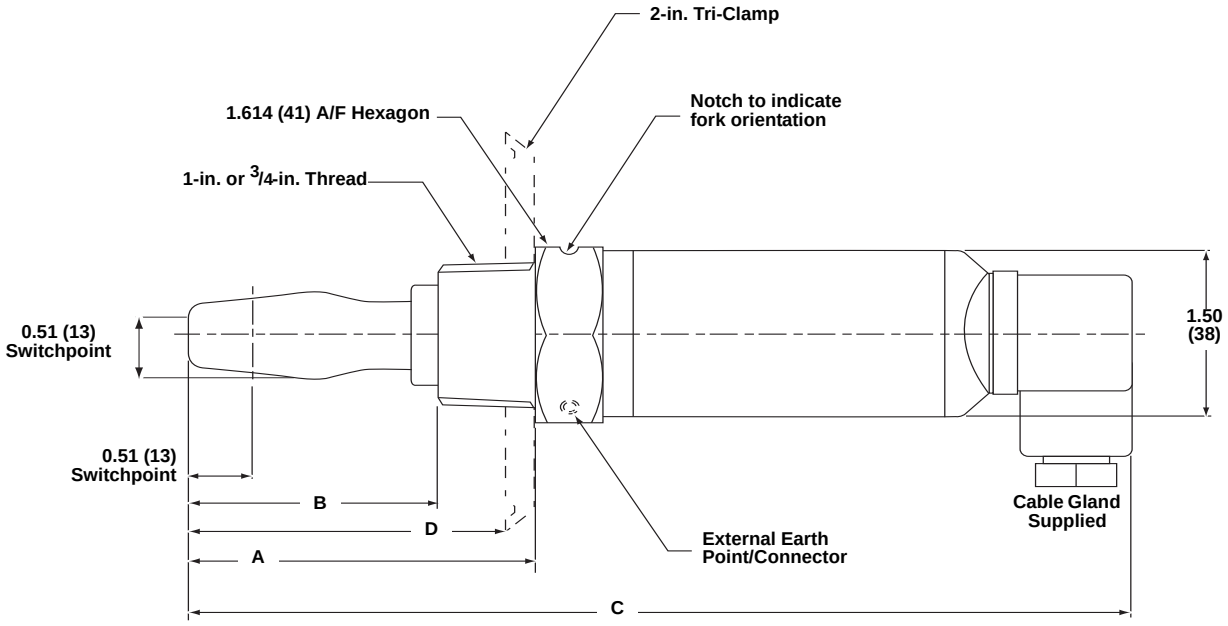
Electro Magnetic Compatibility (EMC) Directive
EN61326

Overfill Protection
If required, select Product Certificates code U1 for DIBt/WHG overfill protection.

The approval number is Z-65.11-236.

Canadian Registration Number (CRN)
The CRN is 0F04227.2C for model numbers with a NPT threaded process connection selected.

Dimensional Drawing



Process Connections	A	B	C	D
3/4-in. BSPT (R)	2.72 (69)	1.97 (50)	7.40 (188)	N/A
3/4-in. NPT	2.72 (69)	1.97 (50)	7.40 (188)	N/A
1-in. BSPT (R)	2.72 (69)	1.97 (50)	7.40 (188)	N/A
1-in. BSPP (G)	3.07 (78)	2.36 (60)	7.91 (201)	N/A
2-in. (51 mm) Tri-Clamp	2.72 (69)	1.97 (50)	7.40 (188)	2.52 (64)
1-in. Semi-extended	4.57 (116)	3.86 (98)	9.41 (239)	N/A

Rosemount Level Solutions

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Vibrating Fork Switches – Point Level Detection

For high and low alarms, overfill protection, pump control, including wide pressure and temperature requirements, and hygienic applications. Flexible mounting. Immune to changing process conditions and suitable for most liquids.
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- Rosemount 2160 Wireless
- Rosemount 2130 Enhanced
- Rosemount 2120 Full-featured
- Rosemount 2110 Compact

Differential Pressure – Level or Interface Measurement

Flexible mounting for liquid tank levels, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by: vapor space changes, surface conditions, foam, corrosive fluids, internal tank equipment. Optimize performance with direct mount, Tuned-System Assemblies:

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- Rosemount 3051S_L, 3051L, and 2051L Liquid Level Transmitters

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Top mounted, non-contacting for simple tank and open air level measurements. Unaffected by fluid properties such as: density, viscosity, dirty coating, and corrosiveness. Appropriate for routine applications outside of explosion proof areas.
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Chambers for Process Level Instrumentation

- Rosemount 9901 – High quality chambers for external mounting of level measurement and control instrumentation on process vessels

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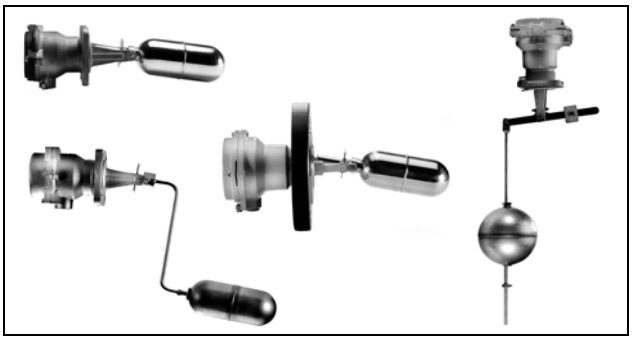
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EMERSON
Process Management

Magnetic Float Switches For Liquid Level Alarm and Pump Control

- *Ideal for industrial applications such as pump control and high or low alarm duty on tanks and pressure vessels*
- *Simple, rugged, and reliable. Low cost of ownership*
- *Direct (side or top) or chamber mounting*
- *Variety of switch mechanisms for electrical or pneumatic switching*
- *Operates in most liquids*
- *ATEX and marine approvals*



Contents

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Float Switches for General Purpose Applications (Aluminum Bronze Wetside)



- Ideal for industrial applications such as pump control, and high or low alarm duty
- Weatherproof To IEC60529 (IP66)
- Ordinary location certification for CSA available – contact factory
- Marine approvals: Lloyds Register of Shipping (LRS), Germanischer Lloyd, DNV, ABS, BV, RINA, and RMRS

Additional Information

Specification: page Level-405
Dimensions: page Level-410

TABLE 1. Ordering Information For General Purpose Magnetic Float Switches (Al Br Wetside)

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	**Product Description**					
S	Switch					
Flange (Head) (1)		**Rating**	**Flange Standard**		**Max. $T_{Process}$ (2)**	
Standard						**Standard**
01	Mobrey A (3)	261 psi (18 bar)	Mobrey		410 °F (210 °C)	★
Switch Mechanism(4)						
Standard						**Standard**
DB(5)	Electrical: 2 independent Single Pole Single Throw (SPST) contact sets					★
PB(6)	As Type DB but with *gold plated contacts*					★
Expanded						
D6B(5)	Electrical: 2 independent circuits of double pole changeover contact sets					
P6B(6)	As Type D6B but with *gold plated contacts*					
APA	Pneumatic air pilot valve on/off for switching air circuits					
AMA	Pneumatic air pilot valve for continuous modulating of air controlled circuits					
Float(7)			**Max. $T_{Process}$ (2)**	**Max. P @ T_{Room}**	**Max. P @ T_{Max}**	
Standard						**Standard**
F84(8)	General purpose e.g. high/low alarm, 316 SST		752 °F (400 °C)	500 psi (34.5 bar)	290 psi (20 bar)	★
F68/+(9)	Horizontal pump control or alarm, 316 SST		752 °F (400 °C)	500 psi (34.5 bar)	290 psi (20 bar)	★
F21/+(9)	Vertical pump control or alarm, 316 SST		752 °F (400 °C)	435 psi (30 bar)	255 psi (17.6 bar)	★
F104/+(9)	Cranked arm: horizontal or vertical, 316 SST		752 °F (400 °C)	500 psi (34.5 bar)	290 psi (20 bar)	★
F93(10)	Shrouded for dirty liquids, 316 SST		356 °F (180 °C)	Atmospheric	Atmospheric	★
Expanded						
F185(8)	General purpose e.g. high/low alarm, Alloy 400		410 °F (210 °C)	500 psi (34.5 bar)	427 psi (29.5 bar)	
F264	Horizontal limited differential, Alloy 400		410 °F (210 °C)	464 psi (32 bar)	398 psi (27.5 bar)	
Typical Model Number: S 01 DB / F84						

(1) See page Level-414 for nozzle and stud lengths.

(2) The maximum process temperature is dependent on the Flange (Head) and selected Float option.

(3) See page Level-410 for Mobrey flange information.

(4) See Table 8 and Table 9 on page 409 for switch mechanism ratings.

(5) Type DB is for alternative make and break circuits. Type D6B is for switching two independent circuits.

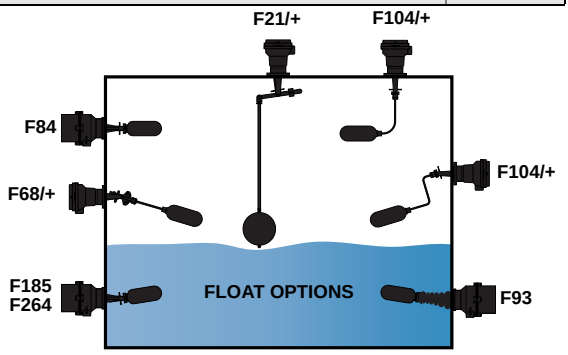
(6) Types PB and P6B are for switching low power (e.g. intrinsically safe) electrical circuits.

(7) See Table 10 on page 411 for a comparison of the float options listed here.

(8) Two off general purpose level switches can be used for pump control.

(9) See pages 414, 415, and 416 for technical float details and length options.

(10) A silicone rubber gaiter is supplied with the 316 SST shroud



Float Switches for General Purpose Applications (Stainless Steel Wetside)



S440DA/F84

- Weatherproof to IEC60529 (IP66)
- Carbon steel back flange (*excluding S36 and S190*) with guaranteed properties at high (752 °F/400 °C) and low (–58 °F/–50 °C) temperatures
- Ordinary location certification for CSA available – contact factory
- Marine approvals: Lloyds Register of Shipping (LRS), Germanischer Lloyd, DNV, ABS, and RMRS

Additional Information

Specifications: page Level-406
Dimensions: page Level-411

TABLE 2. Ordering Information For General Purpose Magnetic Float Switches (SST Wetside)

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description					
S	Switch					
Flange (Head) (1)		**Rating**	**Flange Standard**		**Max. $T_{Process}$ (2)**	
Standard						**Standard**
36(3)	Mobrey A (4)	490 psi (33.8 bar)	Mobrey		752 °F (400 °C)	★
Expanded						
190(3)(5)	Mobrey A (4)	490 psi (33.8 bar)	Mobrey		356 °F (180 °C)	
440	3 in.	150 RF	ASME B16.5		752 °F (400 °C)	
441	4 in.	150 RF	ASME B16.5		752 °F (400 °C)	
424	3 in.	300 RF	ASME B16.5		752 °F (400 °C)	
425	4 in.	300 RF	ASME B16.5		752 °F (400 °C)	
489	3 in.	600 RF	ASME B16.5		752 °F (400 °C)	
490	3 in.	900 RF	ASME B16.5		752 °F (400 °C)	
428	DN 65	EN 1092-1 PN 16	ASME B16.5		752 °F (400 °C)	
429	DN 80	EN 1092-1 PN 16	EN 1092-1		752 °F (400 °C)	
430	DN 100	EN 1092-1 PN 16	EN 1092-1		752 °F (400 °C)	
431	DN 125	EN 1092-1 PN 16	EN 1092-1		752 °F (400 °C)	
417	DN 65	EN 1092-1 PN 40	EN 1092-1		752 °F (400 °C)	
418	DN 80	EN 1092-1 PN 40	EN 1092-1		752 °F (400 °C)	
419	DN 100	EN 1092-1PN 40	EN 1092-1		752 °F (400 °C)	
433	DN 125	PN 40	EN 1092-1		752 °F (400 °C)	
434	DN 150	PN 40	EN 1092-1		752 °F (400 °C)	
488	DN 80	PN 63	EN 1092-1		752 °F (400 °C)	
435	DN 100	PN 63	EN 1092-1		752 °F (400 °C)	
436	DN 125	PN 63	EN 1092-1		752 °F (400 °C)	
437	DN 150	PN 63	EN 1092-1		752 °F (400 °C)	
Switch Mechanism(6)					**Max. $T_{Process}$ (2)**	
Standard						**Standard**
D(7)	Electrical: 2 independent Single Pole Single Throw (SPST) contact sets				752 °F (400 °C)	★
P(8)	As Type D but with *gold plated contacts*				752 °F (400 °C)	★
Expanded						
D6(9)	Electrical: 2 independent circuits of double pole changeover contact sets				752 °F (400 °C)	
P6(8)	As Type D6 but with *gold plated contacts*				752 °F (400 °C)	
H6(10)	As Type D6 but with *gold plated contacts* and *hermetically sealed moving parts*				482 °F (250 °C)	

Horizontal Float Switches

TABLE 2. Ordering Information For General Purpose Magnetic Float Switches (SST Wetside)

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

B6	As Type H6 but *approved for Zone 2 areas*			482 °F (250 °C)	
AP	Pneumatic air pilot valve on/off for switching air circuits			752 °F (400 °C)	
AM	Pneumatic air pilot valve for continuous modulating of air controlled circuits			752 °F (400 °C)	
Enclosure / Housing					
Standard					**Standard**
A	Aluminum alloy				★
Float (11)		**Max. $T_{Process}$ (2)**	**Max. P @ T_{Room}**	**Max. P @ T_{Max}**	
Standard					**Standard**
F84(12)	General purpose e.g. high/low alarm, 316 SST	752 °F (400 °C)	500 psi (34.5 bar)	290 psi (20 bar)	★
F68/+(13)	Horizontal pump control or alarm, 316 SST	752 °F (400 °C)	500 psi (34.5 bar)	290 psi (20 bar)	★
F21/+(13)	Vertical pump control or alarm, 316 SST	752 °F (400 °C)	435 psi (30 bar)	255 psi (17,6 bar)	★
F104/+(13)	Cranked arm: horizontal or vertical, 316 SST	752 °F (400 °C)	500 psi (34.5 bar)	290 psi (20 bar)	★
F93(5)(14)	Shrouded for dirty liquids, 316 SST	356 °F (180 °C)	Atmospheric	Atmospheric	★
Expanded					
F96(12)	General purpose e.g. high/low alarm, 316 SST	752 °F (400 °C)	1073 psi (74 bar)	616 psi (42.5 bar)	
F98(12)	General purpose e.g. high/low alarm, 316 SST	752 °F (400 °C)	500 psi (34.5 bar)	290 psi (20 bar)	
F106(12)	General purpose e.g. high/low alarm, 316 SST	752 °F (400 °C)	1073 psi (74 bar)	616 psi (42.5 bar)	
F107(12)	General purpose e.g. high/low alarm, 316 SST	752 °F (400 °C)	2900 psi (200 bar)	1667 psi (115 bar)	
F88	Interface duties, 316 SST	752 °F (400 °C)	1075 psi (74 bar)	623 (43 bar)	
Typical Model Number: S 36 D A / F84					

(1) See page Level-414 for nozzle and stud lengths.

(2) The maximum allowed process temperature is dependent on Flange (Head), Switch mechanism, and Float options chosen.

(3) There is no back flange fitted to the S36 and S190 flange (head).

(4) See page Level-410 for Mobrey flange information.

(5) The F93 float and S190 flange (head) can only be used together.

(6) See Table 8 and Table 9 on page 409 for switch mechanism ratings.

(7) Type D is for alternative make and break circuits.

(8) Types P and P6 are for switching low power (e.g. intrinsically safe) electrical circuits.

(9) Type D6 is for switching two independent circuits.

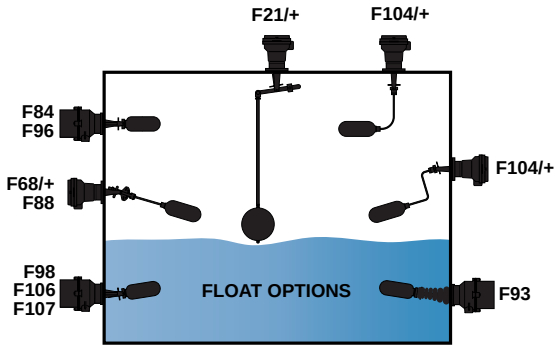
(10) Type H6 is for use in corrosive area and low temperature applications.

(11) See Table 10 on page 411 for a comparison of the float options listed here.

(12) Two off general purpose level switches can be used for pump control.

(13) See pages 414, 415, and 416 for technical float details and length options.

(14) A silicone rubber gaiter is supplied with the 316 SST shroud



Float Switches for Hazardous Area Applications



S250DA/F84

- ATEX/IECEx Zone 1 Gas Group IIC, CSA Class 1: Group CD (*contact factory*), and Lloyds Register of Shipping (LRS) approvals
- Carbon steel back flange (*excluding S250 and S275*) with guaranteed properties at high 752 °F (400 °C) and low –58 °F (–50 °C) temperatures.
- Weatherproof to IEC60529 (IP66)

Additional Information

Specifications: page Level-407
Dimensions: page Level-412

TABLE 3. Ordering Information For Magnetic Float Switch In Hazardous Areas

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description					
S	Switch					
Flange (Head) (1)		**Rating**	**Wetside**		**Max. $T_{Process}$ (2)**	
Standard						**Standard**
250(3)	Mobrey G (4)	304.5 psi (21 bar)	316 Stainless Steel		626 °F (330 °C)	★
275(3)	Mobrey G (4)	304.5 psi (21 bar)	Gunmetal		392 °F (200 °C)	★
Expanded						
256	3 in.	150 RF	ASME B16.5		752 °F (400 °C)	
257	4 in.	150 RF	ASME B16.5		752 °F (400 °C)	
278	6 in.	150 RF	ASME B16.5		752 °F (400 °C)	
251	3 in.	300 RF	ASME B16.5		752 °F (400 °C)	
254	4 in.	300 RF	ASME B16.5		752 °F (400 °C)	
260	3 in.	600 RF	ASME B16.5		752 °F (400 °C)	
261	3 in.	900 RF	ASME B16.5		752 °F (400 °C)	
253	DN 80	PN 40	EN 1092-1		752 °F (400 °C)	
255	DN 100	PN 40	EN 1092-1		752 °F (400 °C)	
269	DN 125	PN 40	EN 1092-1		752 °F (400 °C)	
272	DN 80	PN 63	EN 1092-1		752 °F (400 °C)	
268	DN 100	PN 63	EN 1092-1		752 °F (400 °C)	
270	DN 125	PN 63	EN 1092-1		752 °F (400 °C)	
271	DN 150	PN 63	EN 1092-1		752 °F (400 °C)	
Switch Mechanism(5)					**Max. $T_{Process}$ (2)**	
Standard						**Standard**
D(6)	Electrical: 2 independent Single Pole Single Throw (SPST) contact sets				752 °F (400 °C)	★
P(7)	As Type D but with *gold plated contacts*				752 °F (400 °C)	★
Expanded						
D6(8)	Electrical: 2 independent circuits of double pole changeover contact sets				752 °F (400 °C)	
P6(7)	As Type D6 but with *gold plated contacts*				752 °F (400 °C)	
H6(9)	As Type D6 but with *gold plated contacts* and *hermetically sealed moving parts*				482 °F (250 °C)	
Enclosure / Housing					**Max. $T_{Process}$ (2)**	
Standard						**Standard**
A	Aluminum alloy				752 °F (400 °C)	★
Expanded						
G	Gunmetal				662 °F (350 °C)	
X(10)	Use ‘AX’ or ‘GX’ for applications with ambient temperatures –4 to –76 °F (–20 to –60 °C)				*As ‘A’ or ‘G’ codes*	

Horizontal Float Switches

TABLE 3. Ordering Information For Magnetic Float Switch In Hazardous Areas

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Float (11)		Max. $T_{Process}$ (2)	Max. P @ T_{Room}	Max. P @ T_{Max}	
Standard					**Standard**
F84(12)	General purpose e.g. high/low alarm, 316 SST	752 °F (400 °C)	500 psi (34.5 bar)	290 psi (20 bar)	★
F185(12)	General purpose e.g. high/low alarm, Alloy 400	410 °F (210 °C)	500 psi (34.5 bar)	427 psi (29.5 bar)	★
F68/+(13)	Horizontal pump control or alarm, 316 SST	752 °F (400 °C)	500 psi (34.5 bar)	290 psi (20 bar)	★
F21/+(13)	Vertical pump control or alarm, 316 SST	752 °F (400 °C)	435 psi (30 bar)	255 psi (17.6 bar)	★
F104/+(13)	Cranked arm: horizontal or vertical, 316 SST	752 °F (400 °C)	500 psi (34.5 bar)	290 psi (20 bar)	★
Expanded					
F98(12)	General purpose e.g. high/low alarm, 316 SST	752 °F (400 °C)	500 psi (34.5 bar)	290 psi (20 bar)	
F106(12)	General purpose e.g. high/low alarm, 316 SST	752 °F (400 °C)	1073 psi (74 bar)	616 psi (42.5 bar)	
F107(12)	General purpose e.g. high/low alarm, 316 SST	752 °F (400 °C)	2900 psi (200 bar)	1667 psi (115 bar)	
F264	Horizontal limited differential, Alloy 400	410 °F (210 °C)	464 psi (32 bar)	398 psi (27.5 bar)	
F88	Interface duties, 316 SST	752 °F (400 °C)	1073 psi (74 bar)	623 (43 bar)	
Typical Model Number: S 250 D A / F84					

(1) See page Level-414 for nozzle and stud lengths.

(2) The maximum allowed process temperature is dependent on the Flange (Head), Switch mechanism, Enclosure/Housing, and Float options chosen.

(3) There is no back flange fitted to the S250 and S275 flange (head).

(4) See page Level-410 for Mobrey flange information.

(5) See Table 8 and Table 9 on page 409 for switch mechanism ratings.

(6) Type D is for alternative make and break circuits.

(7) Types P and P6 are for switching low power (e.g. intrinsically safe) electrical circuits.

(8) Type D6 is for switching two independent circuits.

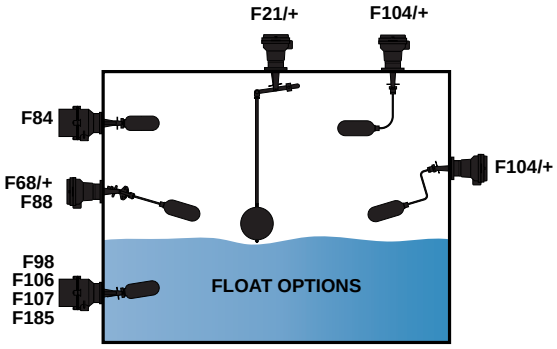
(9) Type H6 is for use in corrosive area and low temperature applications.

(10) The ATEX certification covering –4 to –76 °F (–20 to –60 °C) requires Mechanism Switch code H6 to be selected.

(11) See Table 11 on page 412 for a comparison of the float options listed here.

(12) Two off general purpose level switches can be used for pump control.

(13) See pages 414, 415, and 416 for technical float details and length options.



Float Switches for Marine Applications



Aluminum Bronze



316 Stainless Steel



Hazardous Area

- **Submersible** (S03, S163 and S195)
- **Hoseproof** (S179 and S181)
- **Hazardous Area Submersible/Hoseproof** (S183, S187, and S189), designed for submersion in vented tanks, and mounting in an outside tank
- Aluminum bronze or stainless steel enclosure and wetside
- May be submerged to 100 ft. (30 m) head of water (IP68)
- Hazardous Area ATEX approval for Zone 1, Gas Group IIC
- Marine approvals: Lloyds Register of Shipping (LRS), Germanischer Lloyd, DNV, ABS, BV, RINA, and RMRS

Additional Information

Specification: page Level-408
Dimensions: page Level-413

TABLE 4. Ordering Information For Magnetic Float Switches In Marine Applications

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	**Product Description**					
S	Switch					
Flange (Head)		**Wetside/Enclosure**	**Duty**	**IP Rating**	**Max. $T_{Process}$ (1)**	
Standard						**Standard**
179(2)	Mobrey A, 261 psi/18 bar	Aluminum Bronze	Hoseproof	*See Table 5 on page 402*		★
Expanded						
03(2)	Mobrey A, 261 psi/18 bar	Aluminum Bronze	Submersible	*See Table 5 on page 402 for the **IP Ratings** and **Maximum Process Temperatures***		
195(2)	Mobrey A, 261 psi/18 bar	Aluminum Bronze	Submersible			
163(2)	Mobrey A, 261 psi/18 bar	316 Stainless Steel	Submersible			
181(2)	Mobrey A, 261 psi/18 bar	316 Stainless Steel	Hoseproof			
183(2)	Mobrey A, 261 psi/18 bar	Aluminum Bronze	Hazard Submersible			
187(2)	Mobrey A, 261 psi/18 bar	Aluminum Bronze	Hazard Submersible			
189(2)	Mobrey A, 261 psi/18 bar	Aluminum Bronze	Hazard Hoseproof			
Switch Mechanism(3)					**Max. $T_{Process}$ (1)**	
Standard						**Standard**
D(4)	Electrical: 2 independent Single Pole Single Throw (SPST) contact sets				752 °F (400 °C)	★
P(5)	As Type D but with *gold plated contacts*				752 °F (400 °C)	★
Expanded						
D6(4)(6)	Electrical: 2 independent circuits of double pole changeover contact sets				752 °F (400 °C)	
P6(5)(6)	As Type D6 but with *gold plated contacts*				752 °F (400 °C)	
Enclosure Housing						
Standard						**Standard**
B	Aluminum bronze (*no code is required for stainless steel S163 and S181 models*)					★
Cable					**Max. $T_{Process}$ (1)**	
Standard						**Standard**
L	10 ft. (3 m) of fitted cable (*code is required for S03, S163, S195, S183, and S187 models*)				*See Table 5*	★
Float (7)			**Max. $T_{Process}$ (1)**	**Max. P @ T_{Room}**	**Max. P @ T_{Max}**	
Standard						**Standard**
F84(8)	General purpose e.g. high/low alarm, 316 SST		752 °F (400 °C)	500 psi (34.5 bar)	290 psi (20 bar)	★
F185(8)	General purpose e.g. high/low alarm, Alloy 400		410 °F (210 °C)	500 psi (34.5 bar)	427 psi (29.5 bar)	★
F68/+(9)	Horizontal pump control or alarm, 316 SST		752 °F (400 °C)	500 psi (34.5 bar)	290 psi (20 bar)	★

Horizontal Float Switches

TABLE 4. Ordering Information For Magnetic Float Switches In Marine Applications

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

F21/+[9]	Vertical pump control or alarm, 316 SST	752 °F (400 °C)	435 psi (30 bar)	255 psi (17.6 bar)	★
F104/+[9]	Cranked arm: horizontal or vertical, 316 SST	752 °F (400 °C)	500 psi (34.5 bar)	290 psi (20 bar)	★
F93[10][11]	Shrouded for dirty liquids, 316 SST	356 °F (180 °C)	Atmospheric	Atmospheric	★
Expanded					
F98[8]	General purpose e.g. high/low alarm, 316 SST	752 °F (400 °C)	500 psi (34.5 bar)	290 psi (20 bar)	
F264	Horizontal limited differential, Alloy 400	410 °F (210 °C)	464 psi (32 bar)	398 psi (27.5 bar)	
Typical Model Number: S 03 D B L / F84					

(1) The maximum process temperature is dependent on the Flange (Head), Switch mechanism, Cable (if fitted), and Float options chosen.

(2) See page Level-410 for Mobrey flange information.

(3) See Table 8 and Table 9 on page 409 for switch mechanism ratings.

(4) Type D is for alternative make and break circuits. Type D6 is for switching two independent circuits.

(5) Types P and P6 are for switching low power (e.g. intrinsically safe) electrical circuits.

(6) Not available for stainless steel enclosure and wetside models S163 and S181.

(7) See Table 11 on page 412 for a detailed comparison of the float types listed here.

(8) Two off general purpose level switches can be used for pump control.

(9) Refer to pages 414, 415, and 416 for technical float details and length options. See "Nozzle and Stud Lengths" on page 414 for stud lengths.

(10) A silicone rubber gaiter is supplied with the 316 SST shroud

(11) Shrouded floats for stainless steel switches S163 and S181 are available only on request. Please contact the factory.

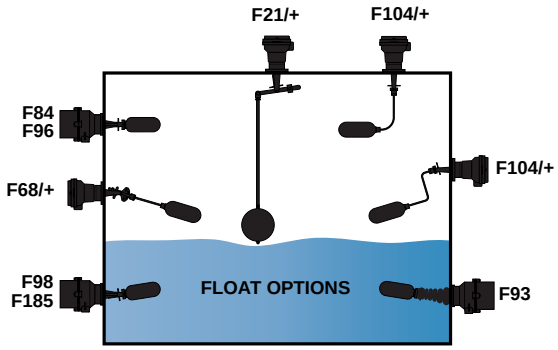


TABLE 5. Switch Type Comparison – *Marine Applications*

Type Number	Maximum $T_{Process}$[1]		Head IP Rating	Cable[2]
	Submersed	Non-submersed		
S03	176 °F (80 °C)	410 °F (210 °C)	66/68 (100 ft. / 30 m)	MICC (10 ft. / 3 m)
S179	212 °F (100 °C)	410 °F (210 °C)	66[3]	*None fitted*
S195	122 °F (50 °C)	410 °F (210 °C)	66/68 (100 ft. / 30 m)	CSP (10 ft. / 3 m)
S163	176 °F (80 °C)	410 °F (210 °C)	66/68 (100 ft. / 30 m)	MICC (10 ft. / 3 m)
S183	122 °F (50 °C)	410 °F (210 °C)	66/68 (100 ft. / 30 m)	CSP (10 ft. / 3 m)
S181	212 °F (100 °C)	410 °F (210 °C)	66[3]	*None fitted*
S187	122 °F (50 °C)[4]	410 °F (210 °C)	66/68 (100 ft. / 30 m)	MICC (10 ft. / 3 m)
S189	140 °F (60 °C)	410 °F (210 °C)	66[5]	*None fitted*

(1) The maximum process temperature is dependent on the Flange (Head), Switch mechanism, and Float options chosen.

(2) See page Level-408 for cable specification.

(3) S179 and S181 may be submersed to 100 ft. (30 m) head of water with temperatures between 34 and 212 °F (1 and 100 °C). Fitting and testing of customer supplied cable and cable gland is the customer's responsibility. The cable and cable gland may limit the temperature further.

(4) The maximum process temperature for submersed S187 is 176 °F/80 °C (for non-approved) or 122 °F/50 °C (for ATEX approved).

(5) S189 may be submersed to 100 ft. (30 m) head of water with temperatures between 34 and 140 °F (1 and 60 °C). Fitting and testing of customer supplied cable and cable gland is the customer's responsibility. The cable and cable gland may limit the temperature further.

Spare Parts and Accessories

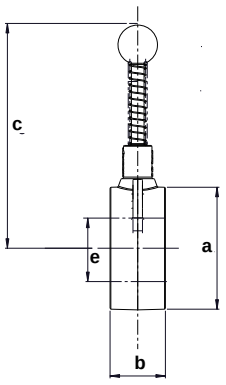
TABLE 6. Spare Parts and Accessories

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

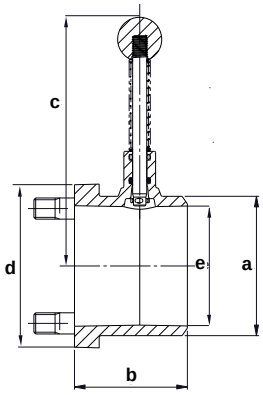
Spares and Accessories		
Standard		**Standard**
TD 110/A	316 stainless steel **test device** for Mobrey 'A' flanged switches, sandwich (*see Figure 1*)	★
TD 111/A	Carbon steel **test device** for Mobrey 'A' flanged switches, weld on (*see Figure 1*)	★
Expanded		
71020/107	316 stainless steel **welding pad** for Mobrey 'A' flanged switches (*see Figure 2*)	
J184	Carbon steel **welding pad** for Mobrey 'A' flanged switches (*see Figure 2*)	
J786	Carbon steel **welding nozzle** for Mobrey 'A' flanged switches (*see Figure 2*)	
71030/900	316 stainless steel **backing flange** for Mobrey 'A' flanged switches (*see Figure 2*)	
J863	Carbon steel **backing flange** for Mobrey 'A' flanged switches (*see Figure 2*)	
J800	Carbon steel **welding pad** for Mobrey 'G' flanged switches (*see Figure 3*)	
71020/111	316 stainless steel **welding pad** for Mobrey 'G' flanged switches (*see Figure 3*)	
J799	Carbon steel **welding nozzle** for Mobrey 'G' flanged switches (*see Figure 3*)	

NOTE:
See page Level-410 for dimensions of Mobrey flanges.

Figure 1. Test Devices for Mobrey 'A' Flanged Switches

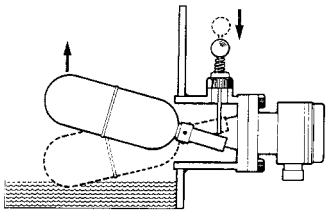


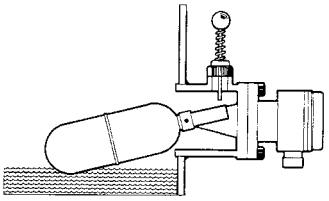
TD 110/A (Sandwich)



TD 111/A (Weld On)

Test Devices Allow Mechanical Testing of an Electrical Circuit





MATERIALS

TD110/A:
316 Stainless Steel
Fluorocarbon Elastomer
Plunger Seal

TD111/A:
Carbon Steel ASTM A216 WCA
Fluorocarbon Elastomer
Plunger Seal

TABLE 7. Test Device Specification and Dimensions

Type	Vessel Flange	Maximum Pressure(1)	Maximum $T_{Process}$	øa in. (mm)	øb in. (mm)	øc in. (mm)	d^2 in. (mm)	øe in. (mm)
TD 110/A	Mobrey 'A'	261 psi (18 bar)	410 °F (210 °C)	3.02 (77)	1.38 (35)	5.59 (142)	N/A	2.64 (67)
TD 111/A	Weld on	261 psi (18 bar)	410 °F (210 °C)	3.11 (79)	2.52 (64)	5.59 (142)	3.62^2 (92^2)	2.64 (67)

(1) 182 psi (12.6 bar) at maximum temperature of 410 °F (210 °C)

Float Chambers

Float chambers are used to facilitate the external mounting of a Mobrey Magnetic Level Switch onto a tank or pressure vessel, particularly where space inside the vessel is restricted or where the control must be isolated for routine maintenance whilst the plant is in operation.

A wide range of **cast** or **fabricated** chambers is available. Exotic materials are also available.

Process connections may be specified as top-and-bottom or side-and-side, and can be flanged, screwed or butt welded in a choice of sizes to suit most plant installations.

Please contact the factory for further information.

Fabricated Chamber



Cast Chamber



Horizontal Float Switches

Figure 2. Companion Flanges for Mobrey ‘A’ Flange Switches

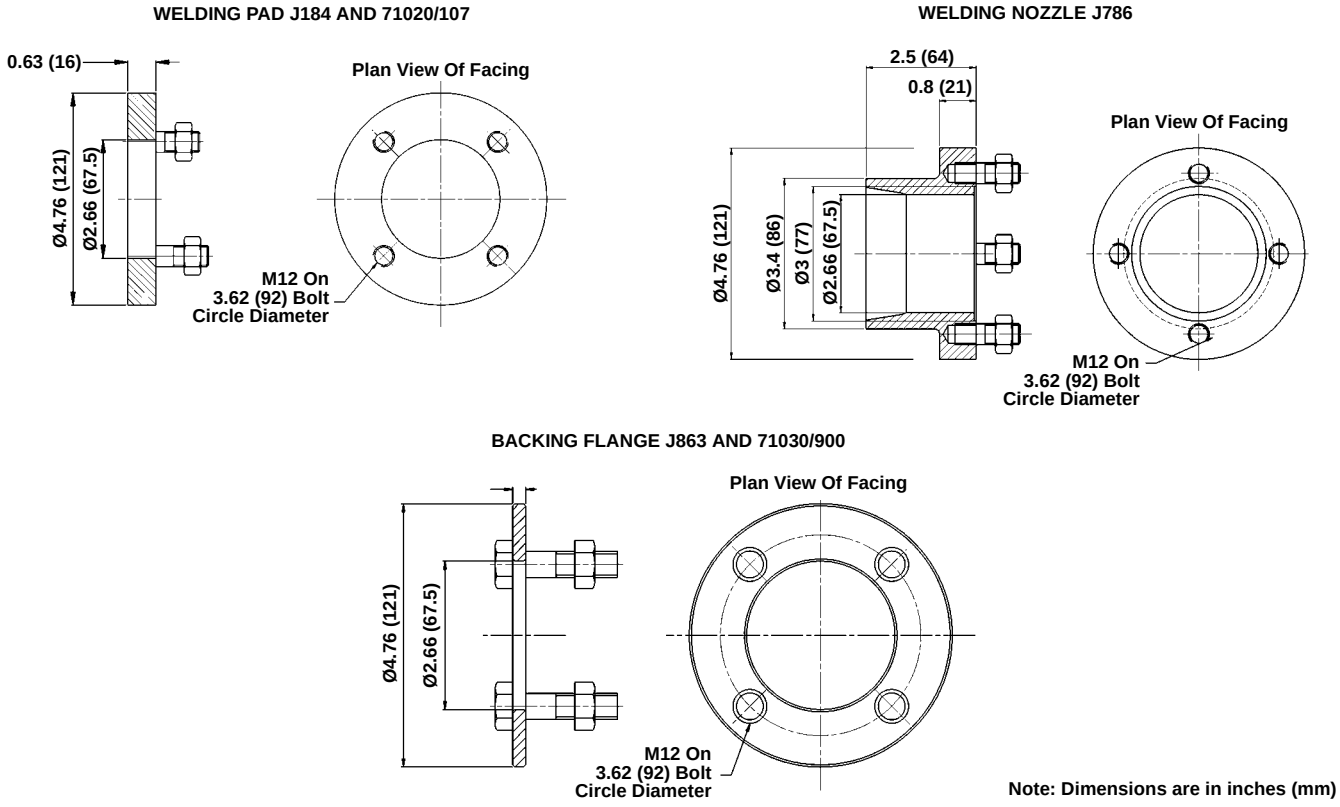
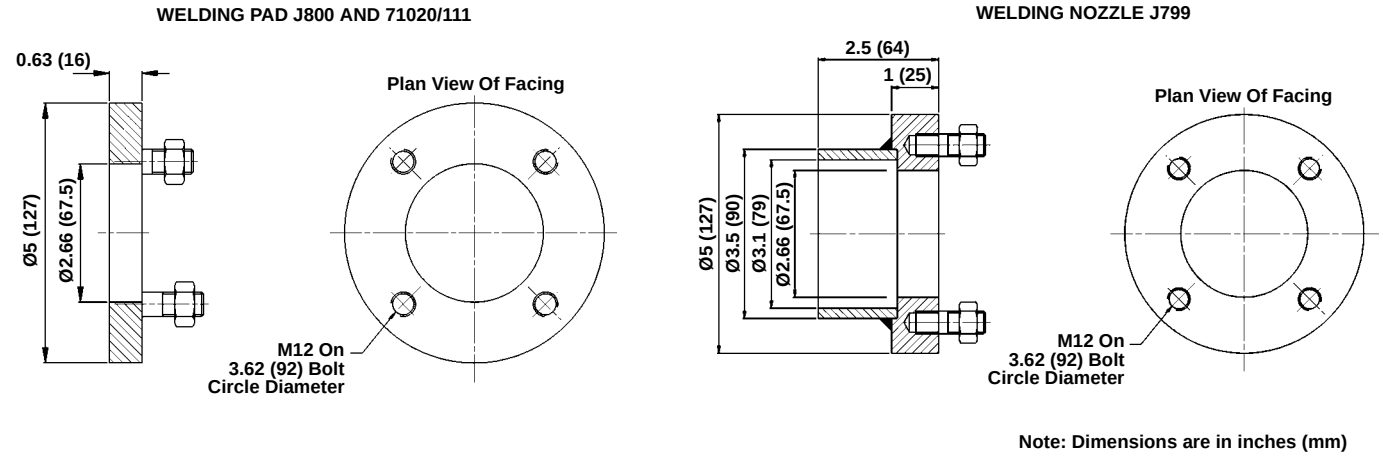


Figure 3. Companion Flanges for Mobrey ‘G’ Flange Switches



NOTE:

- Backing flange J863 is zinc plated and passivated
- Welding types supplied complete with studs and nuts
- Backing type supplied complete with bolts, sealing washers, and full face gasket
- Other materials available upon request

Specifications

FLOAT SWITCH SPECIFICATIONS

Float Switch Specification – General Applications (Aluminum Bronze Wetside)

Electrical Models	
Enclosure and Wetside	Aluminum bronze to BS1400 – AB1 maximum iron content 2.5%
End Cap	Short (4 contacts) e.g. S01DB, Aluminum BS1490 – grade LM24
	Long (6 contacts) e.g. S01D6B, Brass BS1400 – DCB3
Cable Gland (*Supplied With S01DB Only*)	Nickel-plated brass gland with a fully insulated polychloroprene-nitrile rubber CR/NBR gasket seal. Clamping range for 8 to 13 mm OD cable
	Maximum ambient temperature is 176 °F (80 °C)
Maximum Process Temperature	410 °F (210 °C). *If shrouded float F93 used, maximum is 356 °F (180 °C)*
Gasket Material	Non-asbestos sheet material gaskets to BS 7531 Grade X, which has upper temperature limits of 482 °F (250 °C) for gas, vapor, and steam, and 824 °F (440 °C) for liquids
Dimensions	See “General Purpose Magnetic Float Switches (Aluminum Bronze Wetside)” on page 410
Air Pilot Valve Models	
Enclosure	Aluminum Alloy to BS 1490: Grade LM24
Valve Block	Aluminum Alloy to BS 1490: Grade LM25
Finish	All external aluminum surfaces are chromate phosphate treated, and then externally painted
Maximum Process Temperature	410 °F (210 °C). *If shrouded float F93 used, maximum is 356 °F (180 °C)*
Gasket Material	Non-asbestos sheet material gaskets to BS 7531 Grade X, which has upper temperature limits of 482 °F (250 °C) for gas, vapor, and steam, and 824 °F (440 °C) for liquids
Dimensions	See “General Purpose Magnetic Float Switches (Aluminum Bronze Wetside)” on page 410
Approvals(1)	
UK	Lloyds Register of Shipping (LRS)
Germany	Germanischer Lloyd
Canada	CSA (Special order, contact factory)
USA	ABS
France	BV
Italy	Rina
Russia	RMRS
Norway	DNV

(1) Other approvals available. Please contact us with your requirements.

Float Switch Specification – General Purpose Applications (Stainless Steel Wetside)

Electrical Models	
Enclosure Housing Material	Aluminum alloy to BS 1490: Grade LM24
Wetside material	316 Stainless steel (to Mobrey Standard) 316S33 Stainless steel for S489 and S490 switch types
Back Flange (*Excludes S36 and S190*)	Carbon steel to BS 1501: 224 Grade 430B LT50
	This material has guaranteed properties at high 752 °F (400 °C) and low –58 °F (–50 °C) temperatures
Cable Gland (*Supplied With S36 only*)	Nickel-plated brass gland with a fully insulated polychloroprene-nitrile rubber CR/NBR gasket seal. Clamping range for 8 to 13 mm OD cable
	Maximum ambient temperature is 176 °F (80 °C)
Maximum Process Temperature	Dependent upon Flange (Head), Switch mechanism, and Float options chosen(1). **Note:** See “Gasket Material” below for gasket temperature limits
Gasket Material	Float switches with AMSE B16.5 Class 600 and Class 900 flanges are fitted with spiral wound non-asbestos filled gaskets rated to 752 °F (400 °C)
	Otherwise non-asbestos sheet material gaskets to BS 7531 Grade X, which has upper temperature limits of 482 °F (250 °C) for gas, vapor, and steam, and 824 °F (440 °C) for liquids. If the switch experiences gas vapor or steam temperatures above 482 °F (250 °C), then a suitable alternative gasket must be fitted
Dimensions	See “General Purpose Magnetic Float Switches (Stainless Steel Wetside)” on page 411
Air Pilot Valve Models	
Enclosure	Aluminum Alloy to BS 1490: Grade LM24
Valve Block	Aluminum Alloy to BS 1490: Grade LM25
Finish	All external aluminum surfaces are chromate phosphate treated, and then externally painted
Maximum Process Temperature	Dependent upon Flange (Head), Switch mechanism, and Float options chosen(1). **Note:** See “Gasket Material” below for gasket temperature limits
Connection	Brass compression couplings to suit 0.02 in. (6 mm) copper or nylon pipe (coupling thread $^3/_4$-in BSP)
Gasket Material	Float switches with AMSE B16.5 Class 600 and Class 900 flanges are fitted with spiral wound non-asbestos filled gaskets rated to 752 °F (400 °C)
	Otherwise non-asbestos sheet material gaskets to BS 7531 Grade X, which has upper temperature limits of 482 °F (250 °C) for gas, vapor, and steam, and 824 °F (440 °C) for liquids. If the switch experiences gas vapor or steam temperatures above 482 °F (250 °C), then a suitable alternative gasket must be fitted
Dimensions	See “General Purpose Magnetic Float Switches (Stainless Steel Wetside)” on page 411
Approvals(2)	
UK	Lloyds Register of Shipping (LRS)
Germany	Germanischer Lloyd
Canada	CSA (Special order, contact factory)
USA	ABS
Russia	RMRS
Norway	DNV

(1) See “Float Switches for General Purpose Applications (Stainless Steel Wetside)” on page 397 for maximum process temperature ratings of these options.

(2) Other approvals available. Please contact us with your requirements.

Float Switch Specification – Hazardous Area Applications

General	
Enclosure/Housing Materials	Aluminum Alloy to BS 1490: Grade LM24 All external aluminum surfaces are chromate phosphate treated, and then externally stove painted
	Gunmetal to BS1400: LG2 Natural finish
Wetside Material	316 Stainless steel to Mobrey Standard (316S33 Stainless steel for S260 and S261 switches)
	Gunmetal to BS1400: LG2
Back Flange (*Excludes S250 and S275*)	Carbon steel to BS 1501: 224 Grade 430B LT50
	This material has guaranteed properties at high (752 °F/400 °C) and low (–58 °F/–50 °C) temperatures
Maximum Process Temperatures	Aluminum enclosure: 752 °F (400 °C); Gunmetal enclosure: 662 °F (350 °C) **Note:** See “Gasket Material” below for gasket temperature limits
	S275: 392 °F (200 °C)
Gasket Material	Float switches with AMSE B16.5 Class 600, Class 900, and EN 1092-1 PN 63 flanges are fitted with spiral wound non-asbestos filled gaskets rated to 752 °F (400 °C)
	Otherwise non-asbestos sheet material gaskets to BS 7531 Grade X, which has upper temperature limits of 482 °F (250 °C) for gas, vapor, and steam, and 440 °C for liquids. If the switch experiences gas vapor or steam temperatures above 482 °F (250 °C), then a suitable alternative gasket must be fitted
Ambient Temperatures Below 0°C	(i) Down to –4 °F (–20 °C) Standard enclosure/housing codes A or G are suitable
	(ii) Down to –76 °F (–60 °C) Specify Enclosure/Housing order codes “AX” or “GX” which are as standard but with ATEX certification to use down to –76 °F (–60 °C). **Note:** This is downrated to –76 °F (–50 °C) unless a Mobrey ‘G’ flange is fitted or low temperature back flange is specified
Dimensions	See “Hazardous Area Magnetic Float Switches” on page 412
Approvals[1]	
ATEX	II 1/2 G, Exd IIC T6 (Ta = –20 °C to 60 °C) Housing code AX or GX II 1/2 G, Ex d IIC T6 (Ta = –60 °C to 60 °C)
IECEx	Ex d IIC T6 (Ta = –20 °C to 60 °C) Housing code AX or GX, Ex d IIC T6 (a = –60 °C to 60 °C)
CSA[2]	Canadian Standards Association, Class 1: Group CD
LRS	Lloyds Register of Shipping

(1) Other approvals available. Please contact us with your requirements.

(2) CSA certified products are available to special order.

Horizontal Float Switches

Float Switch Specification – Marine Applications

Aluminum Bronze Wetside Models	
Enclosure and Wetside	Aluminum bronze to BS1400 – AB1 maximum iron content 2.5%
End Cap	Brass
Maximum Process Temperature	See Table 5 on page 402
Gasket Material	Non-asbestos sheet material gaskets to BS 7531 Grade X, which has upper temperature limits of 482 °F (250 °C) for gas, vapor, and steam, and 824 °F (440 °C) for liquids. If the switch experiences gas vapor or steam temperatures above 482 °F (250 °C), then a suitable alternative gasket must be fitted
Dimensions	See “Marine Magnetic Float Switches” on page 413.
Stainless Steel Wetside Models	
Enclosure and Wetside	Type 316 Stainless steel
End Cap	Aluminum bronze to BS1400 – AB1/C
Maximum Process Temperature	410 °F (210 °C) **Note:** See “Gasket Material” and “Cable” below for further temperature limits
Cable Gland(1)	Nickel-plated brass gland with a fully insulated polychloroprene-nitrile rubber CR/NBR gasket seal. Clamping range for 8 to 13 mm OD cable
	Maximum ambient temperature is 176 °F (80 °C)
Gasket Material	Non-asbestos sheet material gaskets to BS 7531 Grade X, which has upper temperature limits of 482 °F (250 °C) for gas, vapor, and steam, and 824 °F (440 °C) for liquids. If the switch experiences gas vapor or steam temperatures above 482 °F (250 °C), then a suitable alternative gasket must be fitted
Dimensions	See “Marine Magnetic Float Switches” on page 413
Cable(2)	
MICC	Maximum Process Temperature limit: 176 °F (80 °C). 600V light duty grade mineral insulated copper clad cable
CSP	Maximum Process Temperature limit: 122 °F (50 °C). 600V/1000V grade ethylene-propylene rubber insulated flexible cable
Hazardous Area Approvals	
ATEX	II 2 G, Ex d IIC T6 (Ta = –20 °C to 60 °C) when submersed, in a vented tank application
	II 1/2 G, Ex d IIC T6 (Ta = –20 °C to 60 °C) when outside, in a tank mounted application
Approvals(3)	
UK	Lloyds Register of Shipping
Germany	Germanischer Lloyd
USA	ABS
France	BV
Italy	RINA
Russia	RMRS
Norway	DNV

(1) For S279 only, cable gland is supplied loose in the box. Fitting of the gland is the customer's responsibility. Types S03, S195, S163, S183, and S187 are supplied with a pre-fitted cable gland

(2) See Table 5 on page 402 for marine application switches supplied with a fitted cable.

(3) Other approvals available. Please contact us with your requirements.

SWITCH MECHANISM SPECIFICATIONS

TABLE 8. Electrical Switch Mechanism

Electrical Switch Specification	D and D6	P and P6	H6 and B6
Contact Material	Fine Silver	Gold Plated	Gold Plated
Process Temperature	–22 to 752 °F (–30 to 400 °C)	–22 to 752 °F (–30 to 400 °C)	–148 to 482 °F (–100 to 250 °C)
Ambient Temperature	–22 to 158 °F (–30 to 70 °C)	–22 to 158 °F (–30 to 70 °C)	–76 to 158 °F (–60 to 70 °C)
Insulation Value	(live to earth) > 100 MEG OHM		
Terminals	D and P: M4 screws with non-rotational clamp plates.		
	D6, P6, H6, and B6: 6-way terminal block with pressure plates		

Electrical Specification	AC	DC Inductive(1)	DC Resistive(1)
Maximum Voltage V	440	240	240
Maximum Current A	5.0(2)	1.0	2.0
Maximum Power	2000VA	35 Watts	70 Watts
	Power Factor 0.4 Minimum	Time Constant 40 ms Maximum	

(1) WARNING: The plating of gold contact switches may be permanently damaged if the mechanism is used to switch circuits above the following limits: 300V:12mA Resistive; 24V: 2mH/200mA Inductive; 24V: 250mA Resistive; and 24V: 750mH/10mA Inductive

(2) Maximum current for Type D is 8 A up to 210 °C.

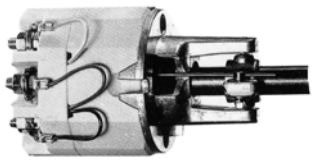
TABLE 9. Pneumatic Switch Mechanism

Pneumatic Switch Specification	AP	AM
Purpose	For switching circuits	For modulating air controlled circuits
Function	Change over	Continuous modulation
Air Pressure	Max. air pressure through valve is 100 psi (7 bar)	Max. air pressure through valve is 20 psi (1.4 bar)
	Max. air flow through valve is 66 l/m at 7 bar	
	Air must be clean and dry. Nom. leakage rate 0.2%	
Other	Brass compression couplings to suit 0.02 in. (6 mm) copper or nylon pipe (coupling thread is 1/4-in. BSP) Process Temperature: 34 to 752 °F (1 to 400 °C) Ambient Temperature: 34 to 140 °F (1 to 60 °C)	

Type D and P



Type D6 and P6



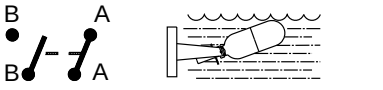
Type H6 and B6



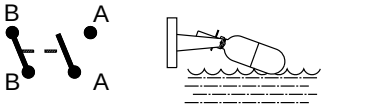
Type AP and AM



Types D and P

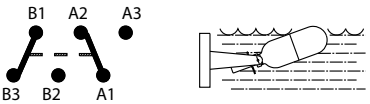


AA Makes on rising level

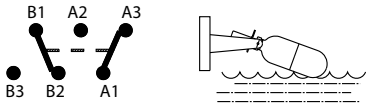


BB Makes on falling level

Types D6, P6, H6, and B6

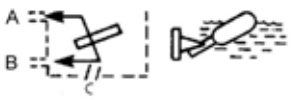


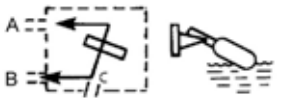
A1 - A2 B1 - B3 Makes on rising level



A1 - A3 B1 - B2 Makes on falling level

Type AP and AM

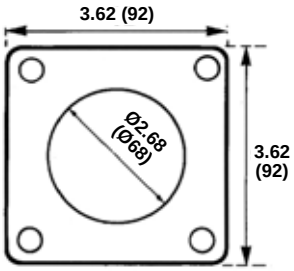




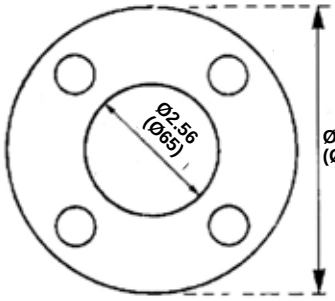
Supply - Port A or B Outlet - Port C

Dimensional Drawings

Mobrey ‘A’ and ‘G’ Flanges



MOBREY ‘A’ FLANGE:
4 off 14 mm Ø holes
equi-spaced on 92 mm PCD



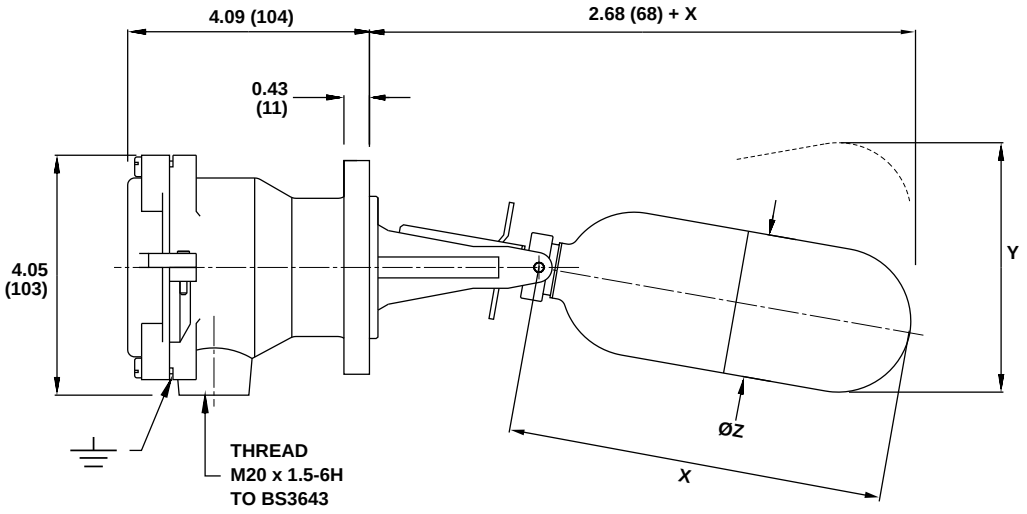
MOBREY 'G' FLANGE:
4 off 14 mm Ø holes
equi-spaced on 98 mm PCD

General Purpose Magnetic Float Switches (Aluminum Bronze Wetside)

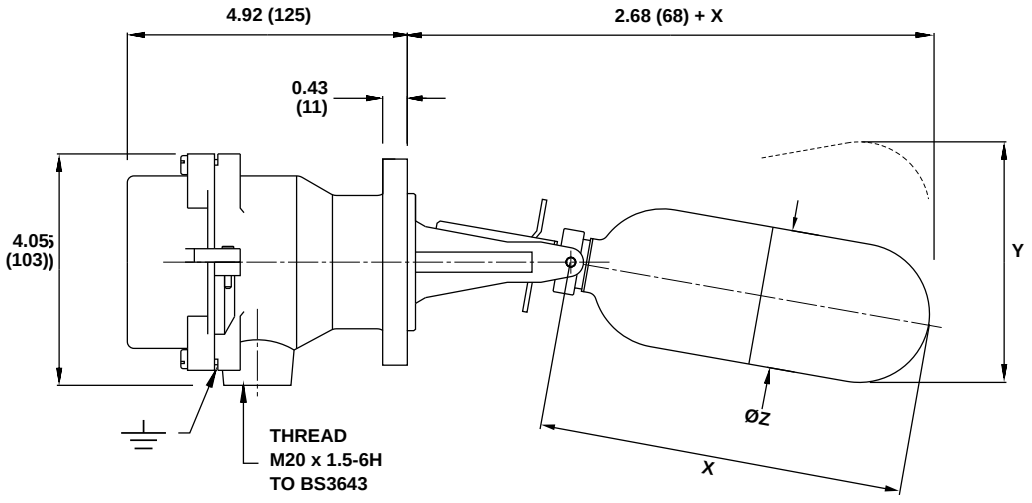
Note: See Table 10 on page 411 for dimensions X, Y, and

Note: Dimensions are in inches (mm)

SWITCH MECHANISM TYPES DB AND PB



SWITCH MECHANISM TYPES D6B AND P6B

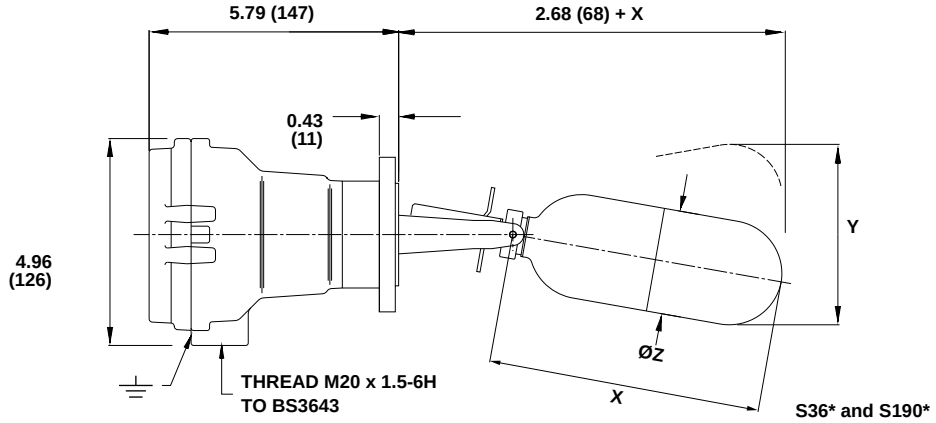


General Purpose Magnetic Float Switches (Stainless Steel Wetside)

Note: See Table 10 for dimensions X, Y, and Z

Note: Dimensions are in inches (mm)

MOBREY FLANGE



ASME B16.5 / EN1092-1 FLANGE

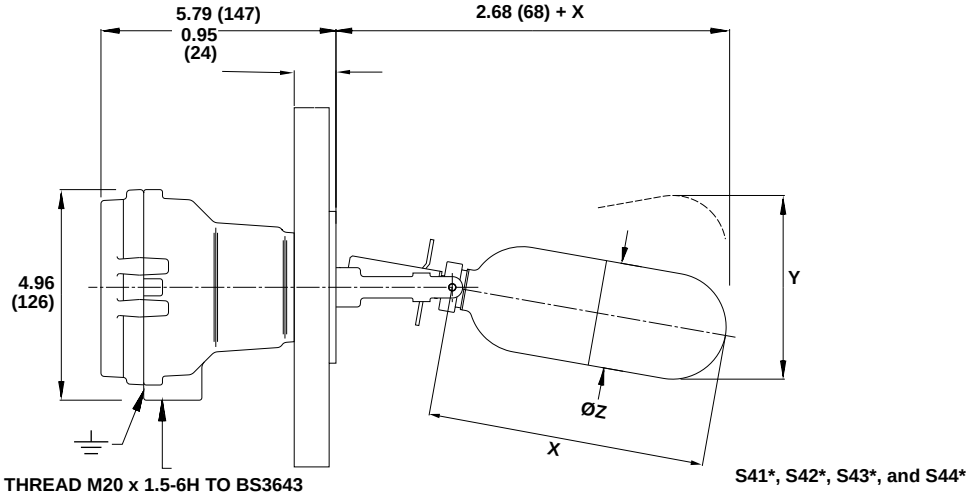


TABLE 10. Float Dimensions X, Y, and Z – *General Purpose Switches*

Float Type	Minimum S.G.	Max. P@T_{Room} PSI (Bar)	Max. $T_{Process}$ °F (°C)	Differential in. (mm)	Dimension X in. (mm)	Dimension Y in. (mm)	Dimension ØZ in. (mm)	Float Material
F84	0.65	500 (34.5)	752 (400)	0.51 (13)	6.45 (164)	4.68 (119)	2.56 (65)	316 SST
F96	0.60	1073 (74)	752 (400)	0.51 (13)	6.45 (164)	4.68 (119)	2.56 (65)	316 SST
F98	0.45	500 (34.5)	752 (400)	0.55 (14)	7.24 (184)	5.00 (127)	2.56 (65)	316 SST
F106	0.51	1073 (74)	752 (400)	0.51 (13)	7.28 (185)	4.25 (108)	2.56 (65)	316 SST
F107	0.71	2900 (200)	752 (400)	0.51 (13)	6.77 (172)	4.72 (120)	2.56 (65)	316 SST
F68/+(1)	0.72 to 0.85	500 (34.5)	752 (400)	*Variable (See page Level-414)*			2.56 (65)	316 SST
F21/+(1)	0.70	435 (30)	752 (400)	*Variable (See page Level-415)*			5.08 (129)	316 SST
F104/+(1)	*Various*	500 (34.5)	752 (400)	*As Ordered (See page Level-416)*			2.56 (65)	316 SST
F93	0.75	Atmospheric	356 (180)	0.51 (13)	7.20 (183)	124	2.56 (65)	316 SST
F185	0.67	500 (34.5)	410 (210)	0.51 (13)	6.45 (164)	4.68 (119)	2.56 (65)	Alloy 400

(1) Refer to pages 414, 415, and 416 for technical float details and length options. See "Nozzle and Stud Lengths" on page 414 for stud lengths.

Horizontal Float Switches

Hazardous Area Magnetic Float Switches

Note: See Table 11 for dimensions X, Y, and Z

Note: Dimensions are in inches (mm)

HAZARDOUS AREA
(CSA CLASS 1, GROUP CD; ZONE 1 GAS GROUP IIC)

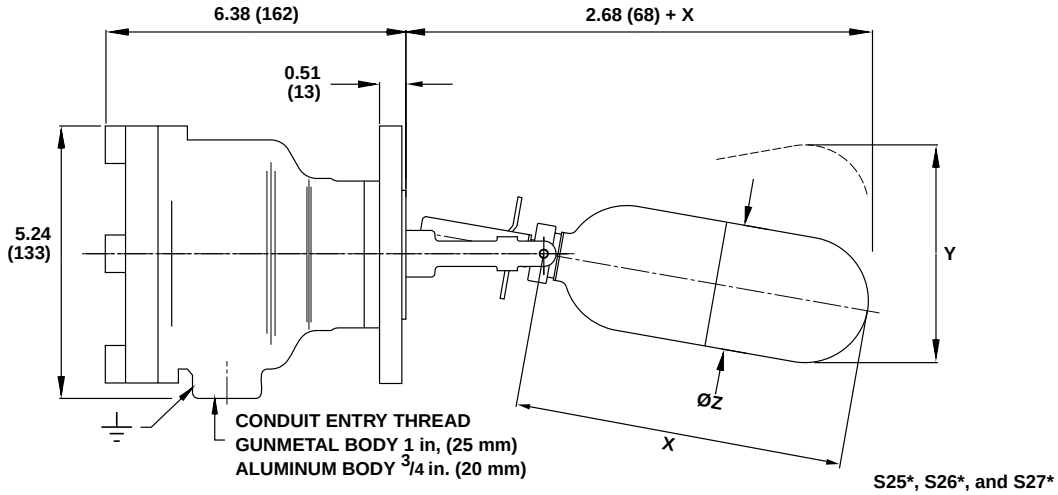


TABLE 11. Float Dimensions X, Y, and Z – *Hazardous Area and Marine Switches*

Float Type	Minimum S.G.	Max. P@T_{Room} PSI (Bar)	Max. $T_{Process}$ °F (°C)	Differential in. (mm)	Dimension X in. (mm)	Dimension Y in. (mm)	Dimension ØZ in.(mm)	Float Material
F84	0.65	500 (34.5)	752 (400)	0.51 (13)	6.45 (164)	4.68 (119)	2.56 (65)	316 SST
F98	0.45	500 (34.5)	752 (400)	0.51 (14)	7.24 (184)	5.00 (127)	2.56 (65)	316 SST
F106	0.51	1073 (74)	752 (400)	0.51 (13)	7.28 (185)	4.25 (108)	2.56 (65)	316 SST
F107	0.71	2900 (200)	752 (400)	0.51 (13)	6.77 (172)	4.72 (120)	2.56 (65)	316 SST
F68/+(1)	0.72 to 0.85	500 (34.5)	752 (400)	*Variable (See page Level-414)*			2.56 (65)	316 SST
F21/+(1)	0.70	435 (30)	752 (400)	*Variable (See page Level-415)*			5.08 (129)	316 SST
F104/+(1)	*Various*	500 (34.5)	752 (400)	*As Ordered (See page Level-416)*			2.56 (65)	316 SST
F88	0.8/1.0	1073 (74)	752 (400)	1.02 (26)	14.13 (359)	7.79 (198)	2.56 (65)	316 SST
F93	0.75	Atmospheric	356 (180)	0.51 (13)	7.20 (183)	4.88 (124)	2.56 (65)	316 SST
F185	0.67	500 (34.5)	410 (210)	0.51 (13)	6.45 (164)	4.68 (119)	2.56 (65)	Alloy 400
F264	0.85	464 (32.0)	410 (210)	0.9 (23)/1.14 (29)/1.3 (33)	7.05 (179)	*Variable*	2.5 (63.5)	Alloy 400

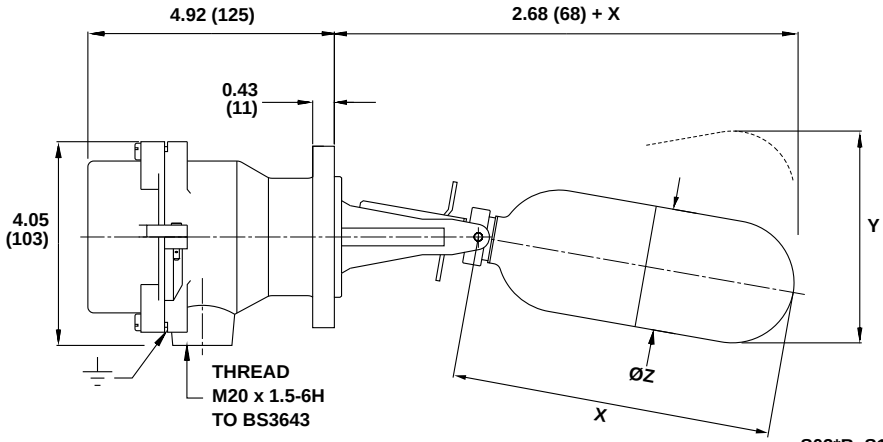
(1) Refer to pages 414, 415, and 416 for technical float details and length options. See "Nozzle and Stud Lengths" on page 414 for stud lengths.

Marine Magnetic Float Switches

Note: See Table 11 on page 412 for dimensions X, Y, and

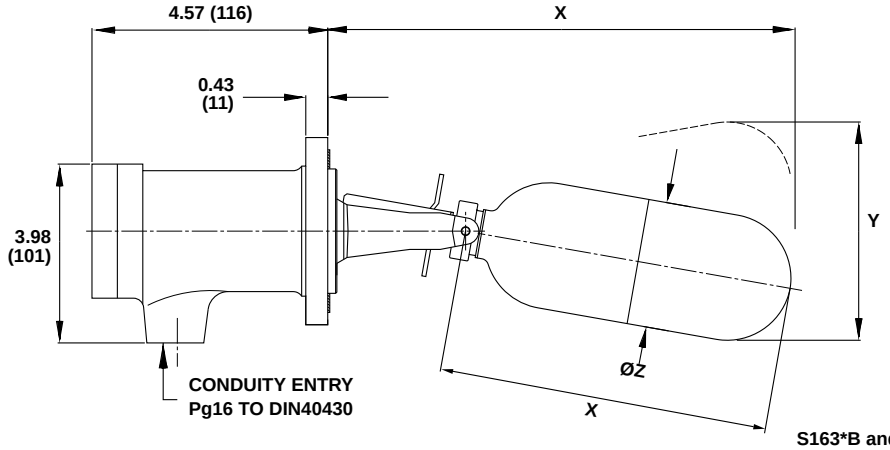
Note: Dimensions are in inches (mm)

ALUMINUM BRONZE WETSIDE



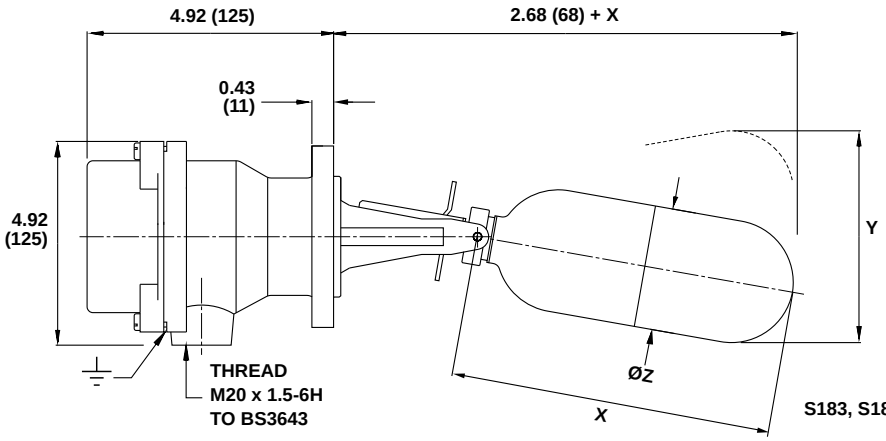
S03*B, S179*B, and S195*B

STAINLESS STEEL WETSIDE



S163*B and S181*B

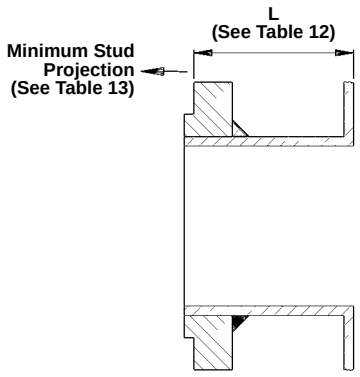
HAZARDOUS SUBMERSIBLE / HOSEPROOF



S183, S187, and S189

Horizontal Float Switches

Nozzle and Stud Lengths



Note:
See Table 6 on page 403 for companion flanges and

TABLE 12. Max. Length in mm (Dimension L)

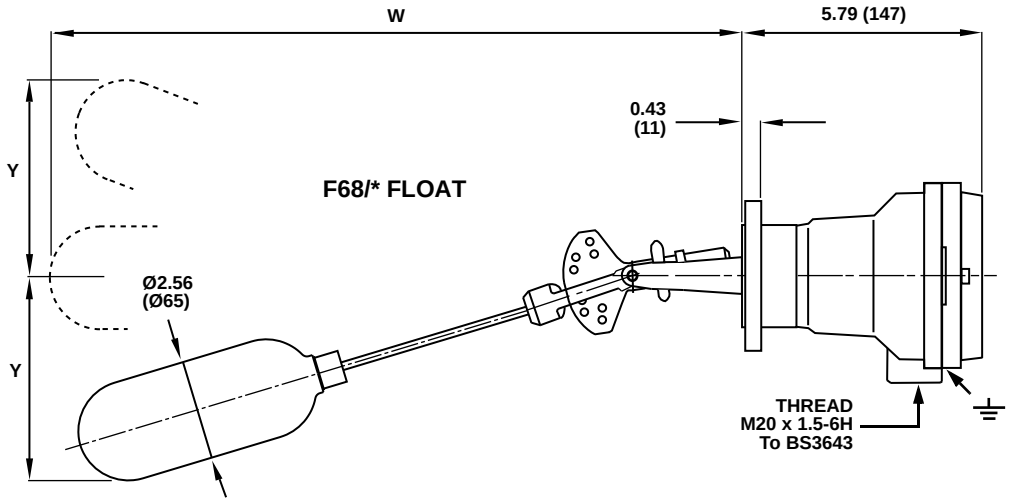
	F68/*	F84	F185	F88	F93	F96	F98	F107	F106	F264
Mobrey A	65	75	75	135	75	75	90	-	92	75
DN65	65	75	75	135	-	75	90	-	92	75
DN80	70	80	80	170	-	75	90	-	98	90
DN100	95	105	105	200	-	105	105	-	110	100
DN125	105	140	140	200	-	140	140	-	140	140
DN150	224	180	180	200	-	180	170	-	200	190
3 in. 300/150	70	80	80	170	-	80	90	-	98	90
4 in. 300/150	95	105	105	200	-	105	105	-	110	100
3 in. 600	62	70	70	130	-	70	85	-	89	70
3 in. 900	62	70	70	130	-	70	85	118	89	70
Mobrey A	65	75	75	135	-	75	90	-	92	75
6 in. 150	224	-	-	200	-	-	-	-	-	190

TABLE 13. Minimum Stud Projection (in mm)

Rating	G	A	PN 16					PN 40					PN 63				150		300		600	900
Size	-	-	65	80	100	125	150	65	80	100	125	150	80	100	125	150	3 in.	4 in.	3 in.	4 in.	3 in.	3 in.
Stud	35	30	40	40	40	40	44	42	42	46	52	54	52	55	62	67	46	46	54	56	64	73

Horizontal F68 Pump Control And Alarm Float

Note: Dimensions are in inches (mm)



NOTE:
Switches fitted with the F68/+ type float may be adjusted on site to meet pump control differentials. The float is available as F68/1 or F68/4. The F68/4 has pre-drilled holes along the rod to allow the user to achieve the /2 and /3 differentials in Table 14.

NOTE:
Full details of the operating levels and differentials are in the product manual (Mobrey Document Number M310).

TABLE 14. Dimensions and Specifications for F68/*

Maximum Intrusions[(1)]	F68/1	F68/2	F68/3	F68/4
Wetside in. (mm) 'W'	14.2 (360)	18.5 (470)	23.2 (590)	25.3 (643)
Minimum Tank Dimension Above/Below Centre Line (mm) 'Y'	8.5 (216)	11.5 (292)	14.5 (368)	16.0 (406)
Minimum Specific Gravity (S.G.)	0.72	0.8	0.82	0.85
Maximum Differential (mm)	9.72 (247)	14.2 (360)	19.0 (483)	21.9 (555)

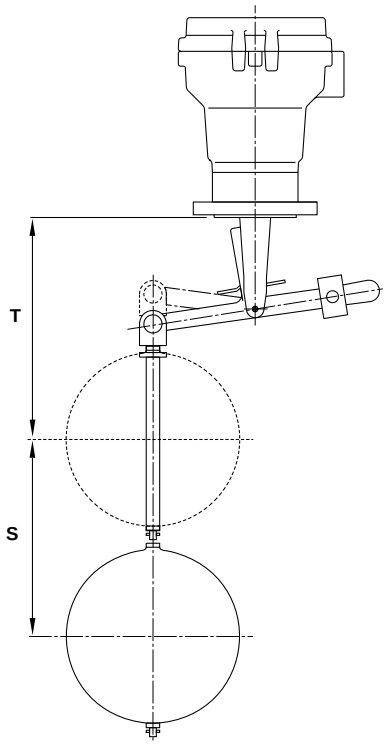
(1) These dimensions in inches (mm) are approximate for cold water and will vary for liquids with a different specific gravity (SG.)

Horizontal Float Switches

Vertical F21
Pump Control And Alarm Float

Note: See Table 15 for dimensions S and T

F21/* FLOAT





NOTE:
Float assembly must be fitted from inside if for use in a vessel, or complete switch and float assembly may be mounted on a suitable bracket or manhole cover.

Float rod lengths available:

F21/1 5 ft. (1524 mm)

F21/2 10 ft. (3048 mm)

F21/3 15 ft. (4570 mm) maximum

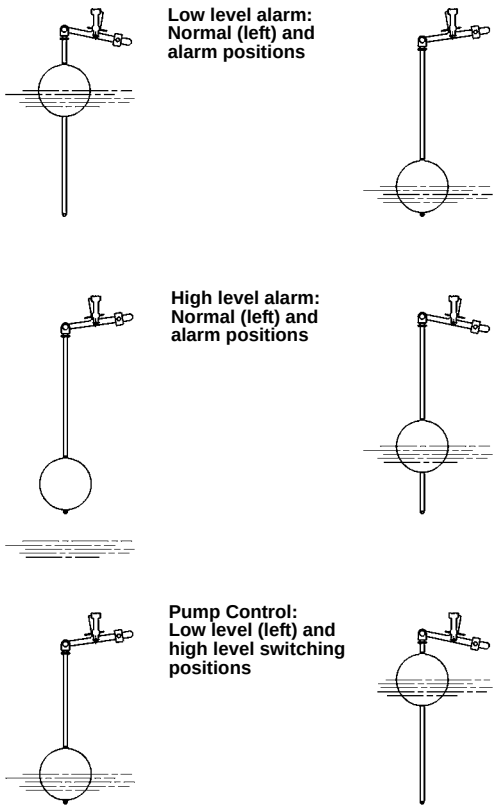
Float roads may be cut to length on site and switches set to operate at required level in either pump control or alarm mode by following the supplied setting instructions.

TABLE 15. Dimensions S and T for F21/+

Pump Differential 'S' in. (mm)	Alarm Level in. (mm)	
	Minimum 'T'	Maximum 'S'
0.5 to 174.0 (13 to 4420)(1)	6.77 (172)	173/2 (4400)(1)

(1) When the maximum rod length is specified.

Figure 4. Pump Control And Alarm Applications

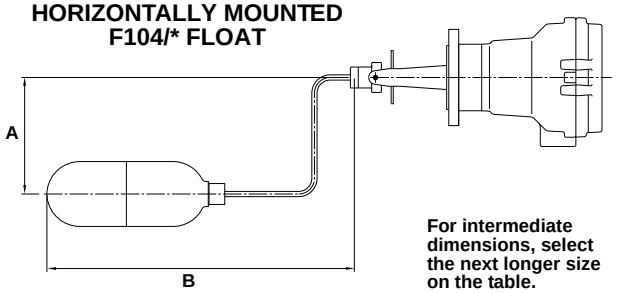


Horizontal Float Switches

Cranked Arm Floats F104

Note: See Table 16 or Table 17 for dimensions in mm

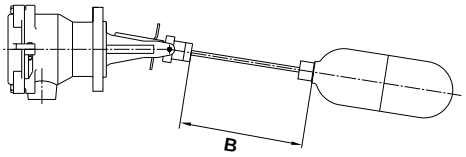
HORIZONTALLY MOUNTED F104/* FLOAT



For intermediate dimensions, select the next longer size on the table.

To order, specify the F104 float with these details:

1. A and B or V and W dimensions.
2. Liquid in contact.
3. Specific Gravity (S.G.) of liquid.
4. Magnetic switch head type number (e.g. S01DB/F)
5. State land or marine application.



A + B, V + W } **Must not exceed 750 mm**

A + B, V + W } **Should not be less than 75 mm**

For a straight arm float, suffix float number with 'B' dimension.

TABLE 16. Dimensions A+B with Minimum S.G. for Horizontal Mounted Switches (Land Applications)

	B																								
	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675
A																									
0&75	.64	.64	.65	.66	.67	.67	.68	.69	.70	.71	.72	.73	.73	.74	.75	.76	.77	.78	.79	.80	.81	.81	.82	.83	.84
100	.64	.65	.66	.67	.68	.69	.70	.70	.71	.72	.73	.74	.75	.76	.77	.78	.79	.79	.80	.81	.82	.83	.84	.85	
125	.65	.66	.67	.68	.69	.70	.71	.72	.73	.74	.75	.75	.76	.77	.78	.79	.80	.81	.82	.83	.84	.85	.86		
150	.65	.67	.68	.69	.70	.71	.72	.73	.74	.75	.76	.77	.78	.79	.80	.81	.82	.83	.84	.85	.85	.86			
175	.66	.67	.69	.70	.71	.72	.73	.74	.75	.76	.77	.78	.79	.80	.81	.82	.83	.84	.85	.86	.87				
200	.66	.68	.70	.71	.72	.73	.75	.76	.77	.78	.79	.80	.81	.82	.83	.84	.85	.86	.87	.88					
225	.67	.69	.70	.72	.73	.75	.76	.77	.78	.79	.80	.81	.82	.84	.85	.86	.87	.88	.89						
250	.67	.69	.71	.73	.74	.76	.77	.78	.80	.81	.82	.83	.84	.85	.86	.87	.88	.89							
275	.68	.70	.72	.74	.76	.77	.78	.80	.81	.82	.83	.85	.86	.87	.88	.89	.90								
300	.68	.71	.73	.75	.77	.78	.80	.81	.82	.84	.85	.86	.87	.88	.89	.90									
325	.69	.71	.74	.76	.78	.80	.81	.83	.84	.85	.86	.88	.89	.90	.91										
350	.69	.72	.75	.77	.79	.81	.82	.84	.85	.87	.88	.89	.90	.92											
375	.70	.72	.76	.78	.80	.82	.84	.85	.87	.88	.90	.91	.92												
400	.71	.73	.76	.79	.81	.83	.85	.87	.88	.90	.91	.92													
425	.71	.74	.77	.80	.83	.85	.87	.88	.90	.91	.93														
450	.72	.74	.78	.81	.84	.86	.88	.90	.91	.93															
475	.72	.75	.79	.82	.85	.87	.89	.91	.93																
500	.73	.76	.80	.83	.86	.89	.91	.93																	
525	.74	.77	.81	.85	.88	.90	.92																		
550	.74	.77	.81	.86	.89	.92																			
575	.75	.78	.82	.87	.90																				
600	.76	.79	.83	.88																					
625	.76	.80	.84																						
650	.77	.80																							
675	.78																								

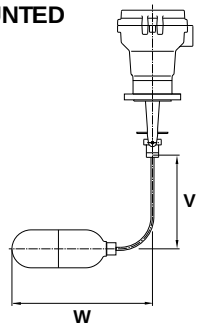
TABLE 17. Dimensions A+B with Minimum S.G. for Horizontal Mounted Switches (Marine Applications)

	B																								
	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675
A																									
0&75	.67	.67	.68	.68	.69	.69	.70	.71	.72	.73	.73	.74	.75	.76	.77	.78	.79	.79	.80	.81	.82	.83	.84	.85	.86
100	.68	.68	.69	.70	.70	.71	.72	.73	.74	.74	.75	.76	.77	.78	.79	.80	.81	.81	.82	.83	.84	.85	.86	.87	
125	.69	.70	.71	.71	.72	.73	.74	.75	.76	.76	.77	.78	.79	.80	.81	.82	.83	.84	.84	.85	.86	.87	.88		
150	.71	.71	.72	.73	.74	.75	.76	.77	.78	.78	.79	.80	.81	.82	.83	.84	.85	.86	.87	.88	.89	.89			
175		.73	.74	.75	.76	.77	.78	.79	.80	.81	.82	.83	.83	.84	.85	.86	.87	.88	.89	.90	.91				
200			.76	.77	.78	.79	.80	.81	.82	.83	.84	.85	.86	.87	.88	.89	.90	.90	.91	.92					
225			.79	.80	.81	.82	.83	.84	.85	.86	.86	.87	.88	.89	.90	.91	.92	.93	.94						
250				.83	.84	.85	.86	.87	.87	.88	.89	.90	.91	.92	.93	.94	.95	.95							
275					.88	.88	.89	.90	.91	.91	.92	.93	.94	.95	.96	.96	.97								
300					.93	.93	.93	.93	.94	.95	.95	.96	.97	.98	.99	.99									
325						.98	.98	.98	.98	.98	.99	1.0	1.0	1.01	1.02										
350							1.04	1.03	1.02	1.03	1.03	1.03	1.04	1.04											
375								1.09	1.08	1.07	1.07	1.07	1.08												
400									1.15	1.13	1.12	1.12													
425										1.20	1.18														

Horizontal Float Switches

Note: See Table 18 or Table 19 for dimensions in mm

VERTICALLY MOUNTED F104 FLOAT



For intermediate dimensions, select the next longer size on the table.

V + W **Must not exceed 750 mm**

V + W **Should not be less than 75 mm**





TABLE 18. Dimensions V+W with Minimum S.G. for Vertically Mounted Switches (Land Applications)

	W																								
	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675
V																									
75	.67	.67	.66	.66	.66	.66	.67	.67	.68	.68	.68	.70	.70	.71	.72	.73	.73	.74	.75	.76	.77	.77	.78	.79	.80
100	.67	.66	.66	.66	.66	.66	.67	.67	.68	.68	.69	.70	.70	.71	.72	.73	.73	.74	.75	.76	.77	.77	.78	.79	
125	.67	.66	.66	.66	.66	.66	.67	.67	.68	.68	.69	.70	.70	.71	.72	.73	.74	.74	.75	.76	.77	.78	.78		
150	.67	.66	.66	.66	.66	.66	.67	.67	.68	.68	.69	.70	.71	.71	.72	.73	.74	.74	.75	.76	.77	.78			
175	.67	.66	.66	.66	.66	.66	.67	.67	.68	.69	.69	.70	.71	.71	.72	.73	.74	.75	.75	.76	.77				
200	.67	.66	.66	.66	.66	.67	.67	.68	.68	.69	.69	.70	.71	.72	.72	.73	.74	.75	.75	.76					
225	.66	.66	.66	.66	.66	.67	.67	.68	.68	.69	.70	.70	.71	.72	.72	.73	.74	.75	.76						
250	.66	.66	.66	.66	.67	.67	.67	.68	.68	.69	.70	.70	.71	.72	.73	.73	.74	.75							
275	.67	.66	.66	.67	.67	.67	.68	.68	.69	.69	.70	.71	.71	.72	.73	.73	.74								
300	.67	.67	.66	.67	.67	.67	.68	.68	.69	.69	.70	.71	.71	.72	.73	.74									
325	.67	.67	.67	.67	.67	.67	.68	.68	.69	.70	.70	.71	.72	.72	.73										
350	.67	.67	.67	.67	.67	.68	.68	.69	.69	.70	.70	.71	.72	.72											
375	.68	.67	.67	.67	.67	.68	.68	.69	.69	.70	.71	.71	.72												
400	.68	.67	.67	.67	.68	.68	.68	.69	.70	.70	.71	.71													
425	.68	.68	.68	.68	.68	.68	.69	.69	.70	.70	.71														
450	.68	.68	.68	.68	.68	.68	.69	.69	.70	.71															
475	.69	.68	.68	.68	.68	.69	.69	.70	.70																
500	.69	.69	.68	.68	.69	.69	.69	.70																	
525	.69	.69	.69	.69	.69	.69	.70																		
550	.70	.69	.69	.69	.69	.70																			
575	.70	.70	.69	.69	.70																				
600	.70	.70	.70	.70																					
625	.71	.70	.70																						
650	.71	.71																							
675	.72																								

TABLE 19. Dimensions V+W with Minimum S.G. for Vertically Mounted Switches (Marine Applications)

	W																								
	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675
V																									
75	.75	.72	.70	.69	.68	.68	.68	.68	.68	.69	.70	.71	.71	.72	.73	.74	.74	.75	.76	.77	.78	.79	.79	.80	.81
100	.76	.72	.70	.68	.67	.68	.68	.68	.69	.70	.70	.71	.72	.73	.73	.74	.75	.76	.77	.77	.78	.79	.80	.81	
125	.77	.72	.69	.67	.67	.68	.68	.69	.69	.70	.71	.72	.72	.73	.74	.75	.75	.76	.77	.78	.79	.80	.80		
150	.79	.72	.68	.67	.67	.68	.69	.69	.70	.71	.71	.72	.73	.74	.74	.75	.76	.77	.78	.78	.79	.80			
175		.71	.67	.67	.68	.68	.69	.70	.70	.71	.72	.73	.73	.74	.75	.76	.76	.77	.78	.79	.80				
200			.67	.68	.68	.69	.70	.70	.71	.72	.72	.73	.74	.75	.75	.76	.77	.78	.79	.79					
225				.68	.69	.70	.70	.71	.72	.72	.73	.74	.74	.75	.76	.77	.78	.78	.78						
250				.69	.70	.70	.71	.71	.72	.73	.74	.74	.75	.76	.77	.77	.78	.78							
275					.70	.71	.71	.72	.73	.73	.74	.75	.76	.76	.77	.78	.79								
300						.71	.73	.73	.73	.74	.75	.76	.76	.77	.78	.79									
325							.73	.73	.74	.75	.75	.76	.77	.78	.78										
350								.74	.75	.75	.76	.77	.78	.78											
375									.75	.76	.77	.77	.78												
400										.77	.77	.78													
425											.78														

Horizontal Float Switches

Product Data Sheet
IP101, Rev CB
Catalog 2011 - 2012

Rosemount Level Solutions

Emerson provides a complete range of Rosemount products for level measurement applications.

Vibrating Fork Switches – Point Level Detection

For high and low alarms, overfill protection, pump control, including wide pressure and temperature requirements, and hygienic applications. Flexible mounting. Immune to changing process conditions and suitable for most liquids.
The product line consists of:

- Rosemount 2160 Wireless
- Rosemount 2130 Extreme Temperature
- Rosemount 2120 Full-featured
- Rosemount 2110 Compact

Differential Pressure – Level or Interface Measurement

Flexible mounting for liquid tank levels, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by: vapor space changes, surface conditions, foam, corrosive fluids, internal tank equipment. Optimize performance with direct mount, Tuned-System Assemblies:

- Rosemount DP Level Transmitters and Remote Seals
- Rosemont 3051S_L, 3051L, and 2051L Liquid Level Transmitters

Ultrasonic – Level Measurement

Top mounted, non-contacting for simple tank and open air level measurements. Unaffected by fluid properties such as: density, viscosity, dirty coating and corrosiveness. Appropriate for routine applications outside of explosion proof areas.
The product line consists of:

- Rosemount 3100 Series Ultrasonic Process Level Transmitters

Guided Wave Radar – Level and Interface Measurement

Top mounted, direct level and interface measurement of liquids or solids, including those with wide temperature and pressure requirements. Unaffected by changing process conditions. Good fit for small spaces and easy swap for older technologies.
The product line consists of:

- Rosemount 5300 Series – Accurate, superior performance transmitter in most applications including process vessels and control
- Rosemount 3300 Series – Versatile and easy-to-use transmitter in most liquid storage and monitoring applications

Non-contacting Radar – Level Measurement

Top mounted, direct level measurement for liquids or solids, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by changing process conditions. Good for dirty, coating and corrosive applications.
The product line consists of:

- Rosemount 5400 Series – Accurate, superior performance 2-wire transmitters for most liquid level applications and process conditions
- Rosemount 5600 Series – 4-wire transmitters with maximum sensitivity and performance for solids, challenging reactors, rapid level changes and excessive process conditions

Chambers for Process Level Instrumentation

- Rosemount 9901 – High quality chambers for external mounting of level measurement and control instrumentation on process vessels

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F (952) 949-7001

EMERSON
Process Management

M-Switch
Float Operated Liquid Level Switch

- *Reliably detects the liquid level to give a voltage free contact operation for alarm signalling or as part of a pump control system*
- *Small in-tank dimensions, suitable for use where space in a vessel is limited*
- *Available for side mounting with either a flanged or 2 in. threaded connection*
- *Tough industrial build quality with 316 Stainless steel construction throughout*
- *European Directive compliance*
- *ATEX Flameproof models Exd*



Contents

M-Switch Float Operated Liquid Level Switch . . . . . page Level-420
M-Switch Specification . . . . . page Level-421
Dimensional Drawings. . . . . page Level-422

M-Switch
Float Operated Liquid Level Switch



M-Switch

M-Switch features include:

- Small in-tank dimensions
- Simple liquid level alarm
- Traditional high reliability switching
- Side mounting, either direct into a vessel or in an external chamber

Additional Information

Specifications: page Level-421
Dimensions: page Level-422

TABLE 1. M-Switch Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
SM	M-Switch, 316 Stainless steel construction	
Mounting Arrangement(1)		
Standard		**Standard**
A	Mobrey 'A' Flange	★
D(2)	Mobrey 'D' Flange	★
B	2-in. BSPT Threaded	★
N	2-in. NPT Threaded	★
Enclosure		
Standard		**Standard**
1	Weatherproof NEMA 4 (IP66/67)	★
2	Flameproof ATEX 11 1/2G Exd IIcT6 NEMA 4 (IP66/IP67)	★
Typical Model Number: SM B 1		

(1) See Table 2 on page 421 for the maximum pressure rating of each mounting arrangement.
(2) Not available on the flameproof version of the M-Switch.

M-Switch Specification

General	
Product	M-Switch Float Operated Liquid Level Switch
Minimum Specific Gravity (SG)	0.75
Differential	1 in. (25 mm)
Length Into Tank	6 in. (153 mm)
Float Diameter	1.9 in. (48 mm)
Maximum Float Swing	4.4 in. (112 mm)
Switching Function (See Figure 1)	SPCO
Construction Materials	
Wetside Material	316 Stainless steel
Body material	316 Stainless steel
End cover material	316 Stainless steel
Gasket	Non-Asbestos for A flange
	Ethylene Propylene for D flange
Electrical	
Conduit Entry	M20 for A and D flanged and BSPT threaded versions
	½-in. NPT for NPT threaded versions
Maximum Voltage and Current	See Table 3 for the maximum voltage and current
	The microswitch contacts are gold plated and are suitable for use in low power circuits.Switching high power circuits will permanently damage the gold plating. Not suitable for the direct starting of large motors.
Environment	
Operating Temperature	32 to 266 °F (0 to 130 °C)
Ambient Temperature	32 to 140 °F (0 to 60 °C)
Operating Pressure	See Table 2 for the maximum pressure ratings
Approvals	
Enclosure Rating	Weatherproof M-Switch: IP66/67 (NEMA 4)
	Flameproof M-Switch: ATEX 11 1/2G EExd IIcT6 (IP66/IP67) (NEMA 4)
Marine	Germanischer Lloyd

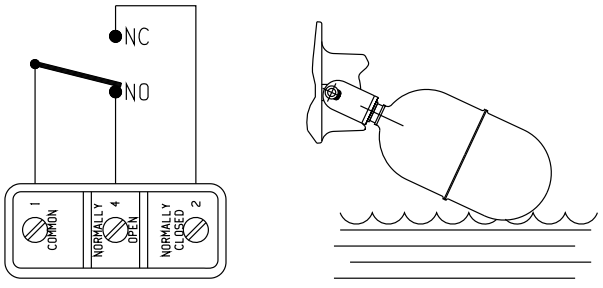
TABLE 2. Maximum Pressure Ratings

Mounting Arrangement	Maximum Pressure			
	68 °F	20 °C	266 °F	130 °C
Mobrey 'A' Flange	275 psi	19 bar	223 psi	15.4 bar
Mobrey 'D' Flange	43 psi	3 bar	43 psi	3 bar
2-in. BSPT Threaded	275 psi	19 bar	223 psi	15.4 bar
2-in. NPT Threaded	275 psi	19 bar	223 psi	15.4 bar

TABLE 3. Maximum Voltage and Current

Maximum Voltage & Current	AC	DC (Resistive)	DC (Conductive)
Max. Voltage (V)	250	250	250
Max. Current (A)	15	0.25	15

Figure 1. Switching Function



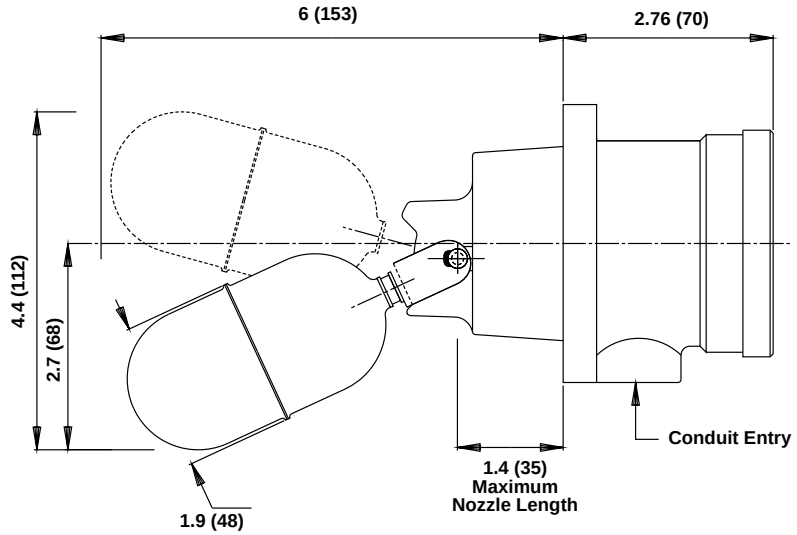
N.O. Makes on falling level

N.C. Makes on rising level

Dimensional Drawings

M-SWITCH DIMENSIONS

Note: Dimensions are in inches (mm)



MOBREY FLANGE DIMENSIONS

Note: See Table 4 for dimensions

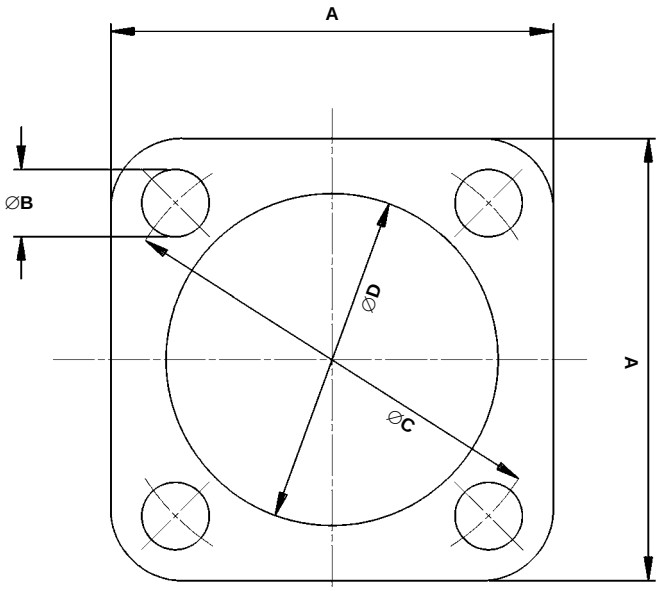


TABLE 4. Mobrey Flange Dimensions(1)

Mobrey Flange	A	B	C	D(2)
Mobrey 'A' Flange	3.6 (92)	0.55 (14)	3.6 (92)	2.6 (66)
Mobrey 'D' Flange	3.6 (92)	0.35 (9)	3.3 (83)	2.0 (50)

(1) Dimensions are in inches (mm)
(2) Mounting hole diameter D to be ±0.4 in. (1 mm).

Rosemount Level Solutions

Emerson provides a complete range of Rosemount products for level measurement applications.

Vibrating Fork Switches – Point Level Detection

For high and low alarms, overfill protection, pump control, including wide pressure and temperature requirements, and hygienic applications. Flexible mounting. Immune to changing process conditions and suitable for most liquids.
The product line consists of:

- Rosemount 2160 Wireless
- Rosemount 2130 Extreme Temperature
- Rosemount 2120 Full-featured
- Rosemount 2110 Compact

Differential Pressure – Level or Interface Measurement

Flexible mounting for liquid tank levels, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by: vapor space changes, surface conditions, foam, corrosive fluids, internal tank equipment. Optimize performance with direct mount, Tuned-System Assemblies:

- Rosemount DP Level Transmitters and Remote Seals
- Rosemont 3051S_L, 3051L, and 2051L Liquid Level Transmitters

Ultrasonic – Level Measurement

Top mounted, non-contacting for simple tank and open air level measurements. Unaffected by fluid properties such as: density, viscosity, dirty coating and corrosiveness. Appropriate for routine applications outside of explosion proof areas.
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- Rosemount 3300 Series – Versatile and easy-to-use transmitter in most liquid storage and monitoring applications

Non-contacting Radar – Level Measurement

Top mounted, direct level measurement for liquids or solids, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by changing process conditions. Good for dirty, coating and corrosive applications.
The product line consists of:

- Rosemount 5400 Series – Accurate, superior performance 2-wire transmitters for most liquid level applications and process conditions
- Rosemount 5600 Series – 4-wire transmitters with maximum sensitivity and performance for solids, challenging reactors, rapid level changes and excessive process conditions

Chambers for Process Level Instrumentation

- Rosemount 9901 – High quality chambers for external mounting of level measurement and control instrumentation on process vessels

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EMERSON
Process Management

Hydrastep and Hydratect Water/Steam Monitoring Systems

- *High clarity electronic gauging system for steam drums with options of local and remote indication*
- *4–20mA output proportional to drum level*
- *High reliability, low water level shutdown system*
- *Superior quality electrodes manufactured for long life and reliability*
- *Each system custom designed for your application to ensure minimum installation costs*
- *“Sole gauge” and ASME compliance with International approvals*
- *Hydratect for use as a Turbine Water Ingress Protection (TWIP) system*



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Hydratect Enclosure . . . . . page Level-433

Hydrastep



Hydrastep Control Unit

Additional Information

Accessories: page Level-428
Specification: page Level-430
Dimensions: page Level-432

A Hydrastep electronic steam/water gauging system comprises:-

- Control unit (see Table 1)
- Water column (see Table 2)
- Electrodes and electrode cables (see Table 4)
- Remote display (optional – see Table 6)

Hydrastep capabilities include:

- Replacement of hard-to-read gauge glasses with a highly visual indication of drum level. Multiple remote displays up to 3280 ft. (1000 m) away from drum
- 4–20mA signal for re-transmission
- Up to 16 trip/alarm relays for low water warning and boiler shut down
- No single fault will disable the system. Fault indication is on all displays
- Dual power supplies and continuous monitoring of electrodes and wiring provide high levels of reliability

TABLE 1. Hydrastep Control Unit Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
2468	Hydrastep Control Unit	
Power Supply Input Boards		
Standard		**Standard**
CA	16 point EGS, single power supply (ac mains)	★
CB	32 point EGS, dual power supplies (2 x ac mains)	★
CC	16 point EGS, single power supply (24 Vdc)	★
CD	32 point EGS, dual power supplies (2 x 24 Vdc)	★
CE	32 point EGS, dual power supplies (1 x ac, 1 x dc)	★
Optional Output Boards		
Standard		**Standard**
AD	No output boards	★
BD	1 Relay output board (4 relays)	★
CD	2 Relay output boards (8 relays)	★
DD	4 Relay output boards (16 relays)	★
Expanded		
ED	1 Relay output board with time delay (4 relays)	
FD	2 Relay output boards with time delay (8 relays)	
GD	4 Relay output boards with time delay (16 relays)	
HD	1 Opto isolated output board (4 outputs)	
JD	2 Opto isolated output boards (8 outputs)	
KD	4 Opto isolated output boards (16 outputs)	
Typical Model Number: 2468 CB CD		

TABLE 2. Water Column Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
Standard		**Standard**
120	Low Pressure (up to 1740psi / 120 bar) Water Column (Schedule 80 Process Connections) – *See Table 3*	★
210	High Pressure (up to 3045 psi / 210 bar) Water Column (Schedule 160 Process Connections) – *See Table 3*	★
Expanded		
300(1)	Super Critical (up to 4350 psi / 300 bar) Water Column (Schedule XXS Process Connections) – *See Table 3*	
In-line Design		
Standard		**Standard**
L(2)	In-line design (top-and-bottom process connections)	★
No Code(2)(3)	Side-arm design (side-and-side process connections with hanger)	★
Distance Between Top and Bottom Tappings		
Standard		**Standard**
TTTT(4)	TTTT = Distance between top and bottom tappings (mm or inches)	★
Site Range		
Standard		**Standard**
SSSS(5)	SSSS = Distance between top and bottom electrodes (mm or inches)	★
Number Of Electrodes		
Standard		**Standard**
8	Eight electrode ports	★
10	Ten electrode ports	★
12	Twelve electrode ports	★
14	Fourteen electrode ports	★
16	Sixteen electrode ports	★
18	Eighteen electrode ports	★
20	Twenty electrode ports	★
22	Twenty two electrode ports	★
24	Twenty four electrode ports	★
26	Twenty six electrode ports	★
28	Twenty eight electrode ports	★
30	Thirty electrode ports	★
32	Thirty two electrode ports	★
Typical Model Numbers: 120-1250-900-24 (*Low Pressure Water Column*, *Side-and-side, 1250 mm Process Connection Centers*) **210-L-43-37-16 (*High Pressure Water Column*, *Top-and-bottom, 37 in. Process Connection Centers)***		

(1) Available to special order only.
(2) Specify the process connection size (25, 32, 38, or 50 mm) on the column design sheet, which is available from your local sales office.
(3) Water column with hanger design has side arm/side-and-side process connections. Specify the drain connection size (20 or 25 mm) on the column design sheet, which is available from your local sales office.
(4) Maximum tap-to-tap distance is 138 in. (3500 mm).
(5) Refer to water column design sheet available from your local sales office.

TABLE 3. Water Column Selection Data

Parameter	LP Rectangular Section	HP Series 3	HP Super 3
Design Pressure	1740 psi (120 bar)	3045 psi (210 bar)	4350 psi (300 bar)
Test Pressure	2610 psi (180 bar)	4567 psi (315 bar)	6525 psi (450 bar)
Design Temp.	650 °F (343 °C)	698 °F (370 °C)	1040 °F (560 °C)
Design Code(1)	ASME B31.1 Power Piping	ASME B31.1 Power Piping	ASME B31.1 Power Piping
Maximum Length	138 in. (3500 mm)	138 in. (3500 mm)	138 in. (3500 mm)
Materials of Construction	Carbon Steel ASTM A105/A106 GR B	Carbon Steel ASTM A105/A106 GR B body with SA 479 – 316N electrode mounts	Stainless steel ASTM A312/A182 F316 with SA 479 – 316N electrode mounts
Protective Covers	18 SWG (17 AWG) Stainless steel	18 SWG (17 AWG) Stainless steel	18 SWG (17 AWG) Stainless steel
Gross Weight(2)	26.5 lb (12 kg)	37.5 lb (17 kg)	37.5 lb (17 kg)
Electrode Types	459600602 or 459600802	246781ZA, 246782AC, or 246784AA	246785A

(1) Manufactured and tested in accordance with ASME Boiler and Pressure Vessel Code: Section 1.
(2) Typical for (610 mm / 24 in.) steam/water range, 12 port, with electrodes and covers.

TABLE 4. Electrodes And Electrode Cables Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
Standard		**Standard**
459600602	Low pressure (LP) electrode – Zirconia insulator (see Table 5 for electrode data)	★
459600802	Low pressure (LP) electrode – PTFE insulator (see Table 5 for electrode data)	★
246781ZA	High pressure (HP) electrode – Series III, Zirconia insulator (see Table 5 for electrode data)	★
246782AC	High pressure (HP) electrode – Series III, PTFE insulator (see Table 5 for electrode data)	★
246784AA	High pressure (HP) electrode – Series III, Zirconia insulator, PTFE coated (see Table 5 for electrode data)	★
246785A	Super critical electrode – Series lll, ZTA Insulator (see Table 5 for electrode data), 1 in. (25 mm) fitting	★
24680204A	18-core electrode cable – 10 ft. (3 m). *One cable is required for every multiple of eight electrodes*	★
24680205A	18-core electrode cable – 33 ft. (10 m). *One cable is required for every multiple of eight electrodes*	★
24680206A	18-core electrode cable – 60 ft. (18 m). *One cable is required for every multiple of eight electrodes*	★
24680207A	18-core electrode cable – 98 ft. (30 m). *One cable is required for every multiple of eight electrodes*	★
Note: Do not mix electrode types. See Table 5 for further Hydrastep electrode data.		

TABLE 5. Hydrastep Electrodes Selection Data

Part Number	Style	Material	Max Pressure PSI (Bar)	Max Temperature °F (°C)	ph Range
459600802	Threaded (LP column)	PTFE	725 (50)	500 (260)	7 to 13.5
459600602	Threaded (LP column)	Zirconia	1740 (120)	698 (370)	7 to 11
247682AC	Union (HP column)	PTFE	725 (50)	500 (260)	7 to 13.5
2467 84AA	Union (HP column)	Ceramic PTFE coated	4350 (300)	500 (260)	7 to 13.5
246781ZA	Union (HP column)	Zirconia	3045 (210)	698 (370)	7 to 11

TABLE 6. Hydrastep Accessories Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
Standard		**Standard**
24683C	32 point remote display, large panel mount	★
24683D	32 point remote display, IP65 wall mount (Type NEMA 4)	★
480121230	Armoured cable, 5-pair shielded (order per ft. or m). Maximum length is 820 ft. (250 m)	★
Expanded		
24683BB	32 point remote display, DIN panel mount	

Hydratect



Hydratect Control Unit

Additional Information

Specification: page Level-431
Dimensions: page Level-433

A Hydratect steam/water detection system comprises:-

- Control unit (see Table 7)
- Two electrodes, two electrode cables, two inserts, and two covers (see Table 8)
- Manifold (see Table 8 note), if user is not mounting electrodes in own manifold or pipework

Hydratect capabilities include:

- Fault tolerance and continuous monitoring ensure a high reliability water ingress protection system
- Trips are fully validated by the twin electrode configuration before action is taken
- Can be supplied with a factory manufactured manifold or as components for local mounting in existing pipework or condensate pots

TABLE 7. Hydratect Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
2462	Hydratect Electronic Level Switch	
Power Supply And Input Boards		
Standard		**Standard**
A	2 point level switch, ac mains, single pole single throw relay outputs	★
E	2 point level switch, ac mains, two pole changeover relay outputs	★
Expanded		
C	2 point level switch, 24 Vdc, single pole single throw relay outputs	
Typical Model Number: 2462 A		

TABLE 8. Shrouded Insert, Cover, Electrode, and Cable Ordering Information

★The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
Standard		**Standard**
24673540B	Series lll Insert, stainless steel (300 bar, 560 °C) (1) – *one insert for each electrode*	★
24673547B	Series III Insert PTFE Electrode (50 bar 260 °C) (1) – *one insert for each electrode*	★
24670118A	Series III cover – *one cover for each electrode*	★
246785Z(2)	Hydratect electrode – Series III, Zirconia insulator (see Table 9), 1 in. (25 mm) fitting – *one electrode per port*	★
246785A(2)	Hydratect electrode – Series III, ZTA insulator (see Table 9), 1 in. (25 mm) fitting – *one electrode per port*	★
246785P(2)	Hydratect electrode – Series III, PTFE insulator (see Table 9), 1 in. (25 mm) fitting – *one electrode per port*	★
24620204A	4-core electrode cable – 10 ft. (3 m) – *one cable per electrode*	★
24620205A	4-core electrode cable – 33 ft. (10 m) – *one cable per electrode*	★
24620206A	4-core electrode cable – 60 ft. (18 m) – *one cable per electrode*	★
24620207A	4-core electrode cable – 98 ft. (30 m) – *one cable per electrode*	★
Note: Manifolds (up to 4 ports) available for in-line/side-arm applications to special order – ask a local sales office for a manifold design sheet		

(1) Minimum pipe I/D for installation of insert is 1.65 in. (42 mm).
(2) See Table 9 for Hydratect electrode selection data. Do not mix electrode types.

TABLE 9. Hydratect Electrode Selection Data

Part Number	Style	Material	Max Pressure PSI (Bar)	Max Temperature °F (°C)	ph Range
246785Z	Union Hydratect insert	Zirconia	3045 (210)	698 (370)	7 to 11
246785A	Union Hydratect insert	ZTA	4350 (300)	1040 (560)	7 to 11
246785P	Union Hydratect insert	PTFE	725 (50)	500 (260)	7 to 13.5

Specifications

HYDRASTEP SPECIFICATION

General	
Product	Hydrastep electronic steam/water gauging system
Electrode Channels	8 to 32, in pairs. See Table 5 on page 428 for Hydrastep electrode specifications
Water/Steam Threshold	0.6 μS/cm in clean water (up to 106 μS/cm); 1.6 μS/cm in dirty water (up to 300 μS/cm) Models for highly contaminated water, up to 1600 μS/cm, available to special order
Display And Fault Indication	
Integral Display	Red/green bar graph, 32 LED segments. Display blanking from the bottom with less than 32 electrodes in use. Channel fault indication by flashing display segment. General fault indication by amber LED
Remote Display	Indication same as Integral Display
	Powered from main unit (1 display only). Local power 20 to 54 Vdc, 240 mA required for additional remote displays
Electrical	
Power Supply	Power supply (ac): 94 to 130 V or 187 to 256V, 48Hz to 65 Hz, 60 VA max. Power supply (dc): 20 to 40V negative ground or isolated
Analog Output	Signal is proportional to the water level Range: 0–20mA or 4–20mA, forward or reverse Accuracy: ± 0.2 mA Drive capability 600 ohms at nominal supply voltage, or 500 ohms at minimum supply voltage
Relay Outputs (Optional)	Maximum of 4 can be fitted for alarm indication
	Relay Board: Four independent change-over relays Relay contact rating (ac powered): *Maximum voltage of 250 Vac* *Maximum current of 8A* *Maximum switching power: 1500VA* Relay contact rating (dc powered): *Maximum voltage of 125 Vdc* *Maximum current of 8A* *Maximum switching power:* *40 W < 30 V, 65 W < 60 V, 25 W < 125 V* Type N safety: *5A at 12Vdc, 100mA at 30Vdc, 20mA at 125Vdc* **Delayed Relay Board** (*Specification as per Relay Board*) Delay range: 0 to 25s ±1s **Opto-coupled Board** Solid state relays: Four independent outputs Rating: 30 Vdc, 1A Maximum voltage drop: 1.1 V @ 1A Maximum leakage current: 1 mA @ 30 Vdc
Remote Display Output	Drive to remote displays (maximum 6 units). 3280 ft. (1000 m) maximum distance
Opto-isolated Fault Output	Detects fault in electrode connection (open circuit and short-circuit to ground)
Mechanical	
Weight	26.4 lb (12 kg)
Control Unit Enclosure	Brushed stainless steel, wall mounting (four point), IP65 / NEMA4X 16.7 in. high x 12.8 in. wide x 6.4 in. deep (425 mm x 325 mm x 163 mm)
Remote Display Unit Enclosure	2468 3BB (Case style: DIN Panel Mount) *Dimensions: 5.67 in. x 2.38 in. x 7.87 in. deep (144 mm x 72 mm x 200mm)* *Panel cutout: 5.41 in. x 2.60 in. (137.5mm x 66mm)* 2468 3C (Case style: Large Panel Mount) *Dimensions: 7.56 in. x 3.78 in. x 8.23 in. deep (192mm x 96mm x 209mm)* *Panel cutout: 7.32 in. x 3.62 in. (186mm x 92mm)* 2468 3D (Case style: Rugged enclosure, NEMA 4X (IP65)) *Dimensions: 11.89 in. x 7.32 in. x 6.89 in. deep (302mm x 186mm x 175mm)*
Environment	
Operating Temperature	–4 to 158 °F (–20 to 70 °C)
Operating Pressure	See Table 3 on page 427 for the Hydrastep water column specifications
Relative Humidity	Up to 100%

Hydrastep Approvals	
LVD	EN 61010-1
ATEX	II3 G EEx nA IIC, T4 (–20 °C < ta < +70 °C)
CSA	(Canada) Ex nA [nL] nL IIC T4, (USA) CIass 1 Zone 2, AEx nA IIC with relay output connected only to energy limited circuits
Electromagnetic Compatibility	EN 61326-1:2006
Pressure Equipment Directive	Safety accessory

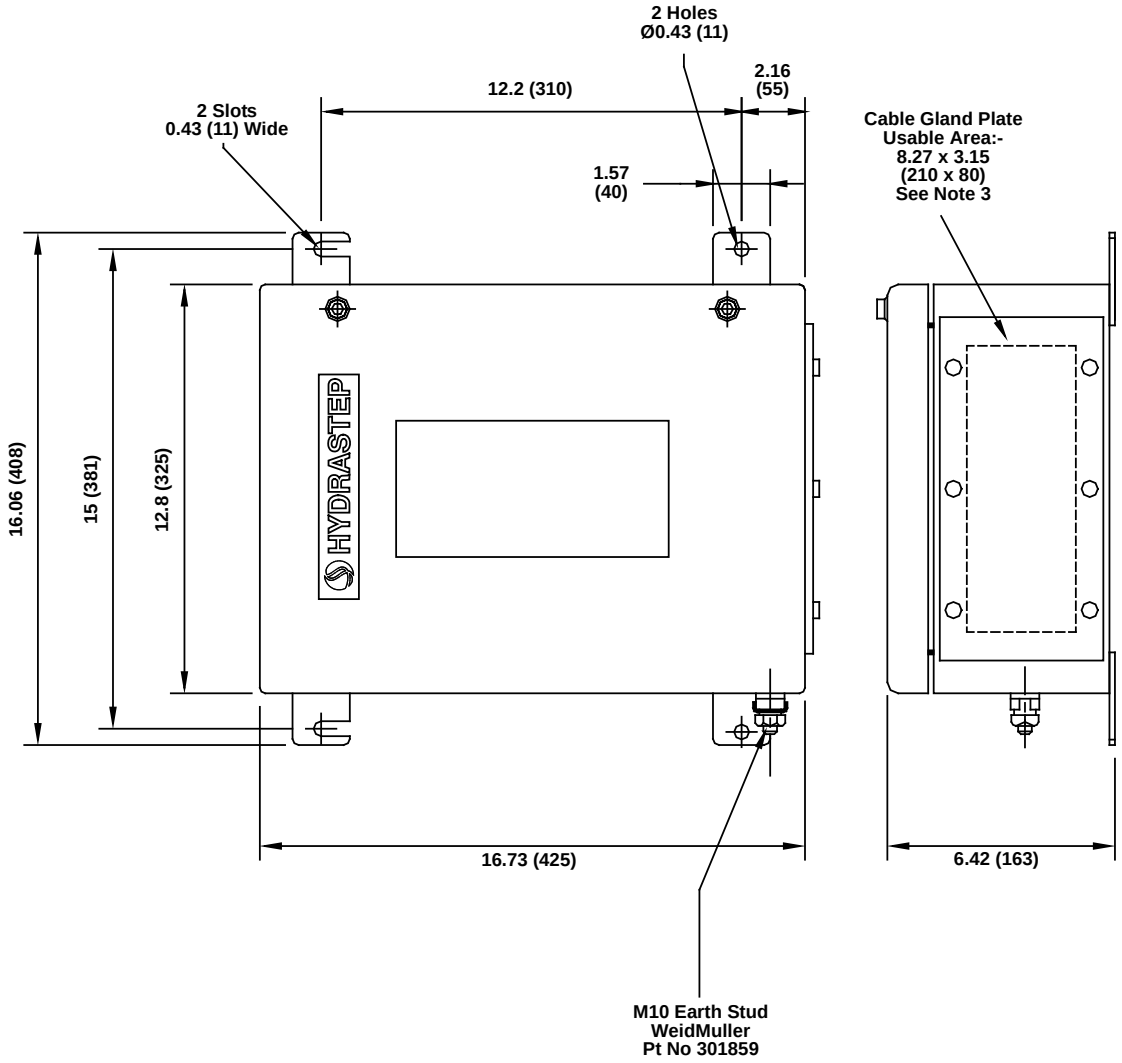
HYDRATECT SPECIFICATION

General	
Product	Hydratect steam/water detection system
Electrode Channels	2 (See Table 9 on page 429 for Hydrastep electrode specifications)
Water/Steam Threshold	0,6 μS/cm (normal) or 1,6 μS/cm (alternate) depending on water purity
Display	
Integral Display	One Red LED for indication of steam One Green LED for indication of water One Amber LED for indication of fault
Electrical	
Power Supply	Power supply (ac): 94 to 130 V or 187 to 256 V, 48 Hz to 65 Hz, 2 x 10 VA maximum Power supply (dc): 20 to 60 V, 2 x 200 mA maximum, +ve or –ve ground
Status Relay Output (One Per Channel)	Water normal: Energized in water Steam normal: Energized in steam Separate normally open and normally closed contacts: • Maximum voltage: 250 Vac, 125 Vdc • Maximum current: 8 A • Maximum Switching Power (ac): 1500 VA • Maximum Switching Power (dc): 240 W < 30 V, 65 W < 60 V, 25 W < 125 V
Opto-isolated Fault Output	Detects fault in electrode connection (open circuit and short-circuit to ground) Output rating “off”: 30 Vdc max, leakage <1 mA Output rating “on”: 1 A dc, voltage <1.1 V @ 1 A
Fault Relay Output (One Per Channel)	Energized during normal operation (fail-safe). *Specification as status relay output above*
Mechanical	
Enclosure	Stainless steel, grade 304, wall mounting (two point) Finish - natural IP65 / NEMA4X 7.5 in. x 7.5 in. x 3.5 in. (190 mm x 190 mm x 90 mm)
Weight	6.2 lb (2.8 kg)
Environment	
Operating Temperature	–4 to 158 °F (–20 to 70 °C)
Operating Pressure	Manifolds are available with 1 to 4 electrode ports. Various materials depending on required pressure and temperature rating. Design sheets are available on request.
	A selection of electrode types are available for pressures up to 4350 psi (300 bar) at 1040 °F (560 °C): • The low pressure type, up to 1740 psi (120 bar) has a threaded style fitting (metaflex gasket seal). Choice of PTFE or ceramic insulator • The high pressure type, up to 4350 psi (300 bar), uses a union fitting (metal-to-metal seal). Choice of insulators
Relative Humidity	Up to 100%

Dimensional Drawings

Hydrastep Enclosure

Note: Dimensions are in inches (mm)



NOTES:

1. Weight: 12 kg

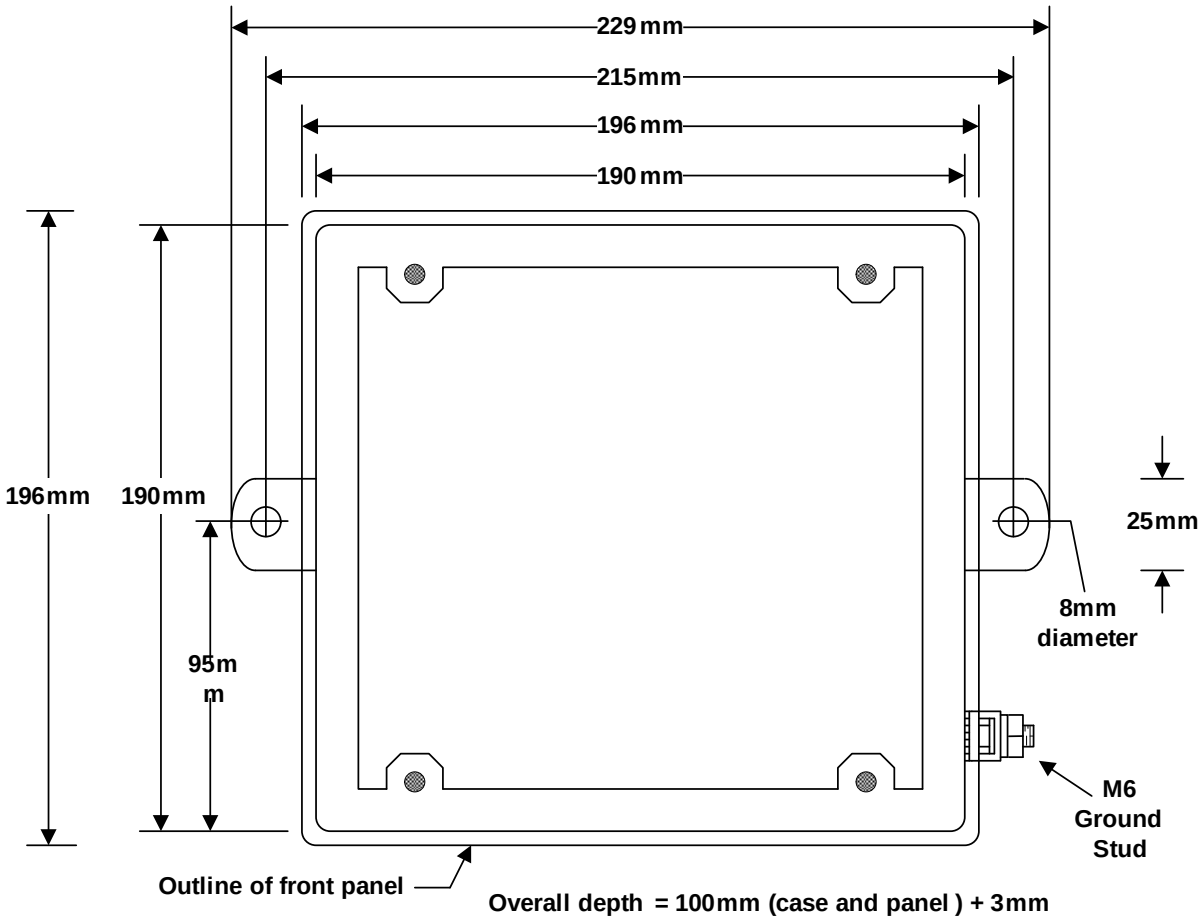
2. IP Rating: IP65 / NEMA4X

3. Material Thickness Between Cable Gland Holes Must Be 9 mm Minimum.

4. Enclosure: Brushed Stainless Steel

Hydratect Enclosure

Note: Dimensions are in mm



Hydrastep and Hydratect

Rosemount Level Solutions

Emerson provides a complete range of Rosemount products for level measurement applications.

Vibrating Fork Switches – Point Level Detection

For high and low alarms, overfill protection, pump control, including wide pressure and temperature requirements, and hygienic applications. Flexible mounting. Immune to changing process conditions and suitable for most liquids.
The product line consists of:

- Rosemount 2160 Wireless
- Rosemount 2130 Extreme Temperature
- Rosemount 2120 Full-featured
- Rosemount 2110 Compact

Differential Pressure – Level or Interface Measurement

Flexible mounting for liquid tank levels, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by: vapor space changes, surface conditions, foam, corrosive fluids, internal tank equipment. Optimize performance with direct mount, Tuned-System Assemblies:

- Rosemount DP Level Transmitters and Remote Seals
- Rosemont 3051S_L, 3051L, and 2051L Liquid Level Transmitters

Ultrasonic – Level Measurement

Top mounted, non-contacting for simple tank and open air level measurements. Unaffected by fluid properties such as: density, viscosity, dirty coating and corrosiveness. Appropriate for routine applications outside of explosion proof areas.
The product line consists of:

- Rosemount 3100 Series Ultrasonic Process Level Transmitters

Guided Wave Radar – Level and Interface Measurement

Top mounted, direct level and interface measurement of liquids or solids, including those with wide temperature and pressure requirements. Unaffected by changing process conditions. Good fit for small spaces and easy swap for older technologies.
The product line consists of:

- Rosemount 5300 Series – Accurate, superior performance transmitter in most applications including process vessels and control
- Rosemount 3300 Series – Versatile and easy-to-use transmitter in most liquid storage and monitoring applications

Non-contacting Radar – Level Measurement

Top mounted, direct level measurement for liquids or solids, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by changing process conditions. Good for dirty, coating and corrosive applications.
The product line consists of:

- Rosemount 5400 Series – Accurate, superior performance 2-wire transmitters for most liquid level applications and process conditions
- Rosemount 5600 Series – 4-wire transmitters with maximum sensitivity and performance for solids, challenging reactors, rapid level changes and excessive process conditions

Chambers for Process Level Instrumentation

- Rosemount 9901 – High quality chambers for external mounting of level measurement and control instrumentation on process vessels

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EMERSON™
Process Management

Rosemount 9901 Chamber for Process Level Instrumentation

- *Allows external mounting of process level instrumentation*
- *Enables live maintenance*
- *Designed to ASME B31.3 Process Piping Code. ASME B31.1 Power Piping Code is available upon request*
- *Pressure Equipment Directive (PED) compliant*
- *Used worldwide by major industries: Power, Petro-Chemical, Refining, Oil & gas, Chemical, and Process Steam Raising sectors*
- *Ideal for critical area and general purpose applications*
- *Variety of process connections and optional drain and vent connections*
- *More than 50 years of experience in designing and manufacturing chambers in accordance with international codes*
- *For use in applications up to ASME B16.5 Class 1500 and EN1092 PN250*
- *Available in carbon steel and stainless steel. Other materials upon request*
- *Custom design service available*



Contents

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Chambers Technical Specification. . . . . page Level-443
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Reliable Performance...In Challenging Applications



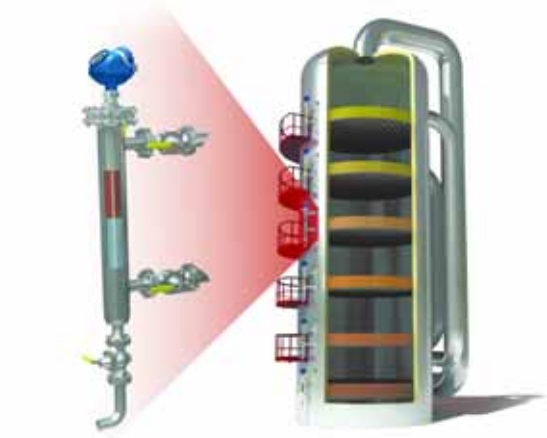
Threaded Process Connections



Flanged Process Connections



Horizontal Tank With Rosemount 9901 And Process Level Instrument



Silo With Rosemount 9901 And Rosemount 5300 Guided Wave Radar

OVERVIEW OF THE ROSEMOUNT 9901

The Rosemount 9901 is a self-contained chamber for externally mounting the Rosemount range of process level instruments to a vessel.

Externally mounting an instrument in a chamber means it can be isolated for routine maintenance while keeping the plant operational. It is also useful for in-tank restrictions that do not allow mounting of the instrument in a vessel.

This approach offers many advantages when solving application challenges:

In-tank constraints:

- agitator
- heat exchanger
- internal structures

Isolation of instrument:

- live maintenance
- safety
- hazardous liquids
- high pressure
- high temperature

Turbulent vessel conditions:

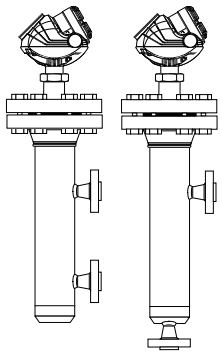
- chamber acts as a stilling tube

FEATURES AND BENEFITS

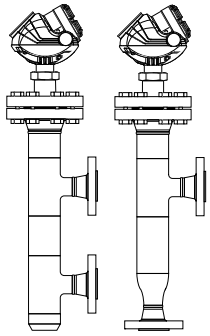
- Global quality assured design and manufacturing
- Designed to the ASME B31.3 Process Piping Code. ASME B31.1 Power Piping Code is available upon request
- Conforms to Pressure Equipment Directive (PED) 97/23/EC for gases and liquids in Groups 1 and 2
- Industry preferred weld neck flanges are used throughout, increasing safety by minimizing stress levels and the number of welds. All welds are full penetration to increase integrity and reduce crevice corrosion
- Independently assessed by a third party organization
- Optimized for use with Rosemount 3300 and 5300 Guided Wave Radar, and Mobrey Vertical Level Float Switches
- Drain options for even easier maintenance of the instrument. Optional vent allows gas in the upper zone above the liquid to be vented off

CHAMBER DESIGN

- Weld Neck Flanges And Full Penetration Welds are in accordance with EN ISO 15614-1:2004, and ASME Boiler and Pressure Vessel Code Section IX
- All welders are qualified to EN 287-1:2004 and ASME Boiler and Pressure Vessel Code Section IX
- All construction materials have full traceability in accordance with the EN 10204 type 3.1 certificate
- Hydrostatic tests performed as standard
- There are two designs available: *Standard Design* and T-*piece Design*



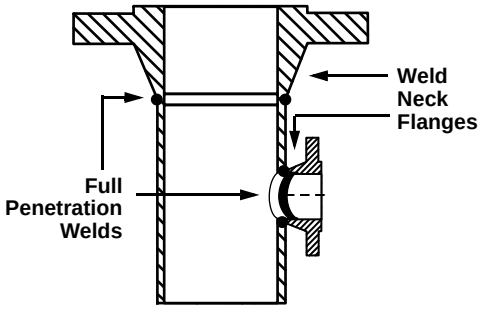
Standard Design With Rosemount 5300



T-Piece Design With Rosemount 5300

Standard Design

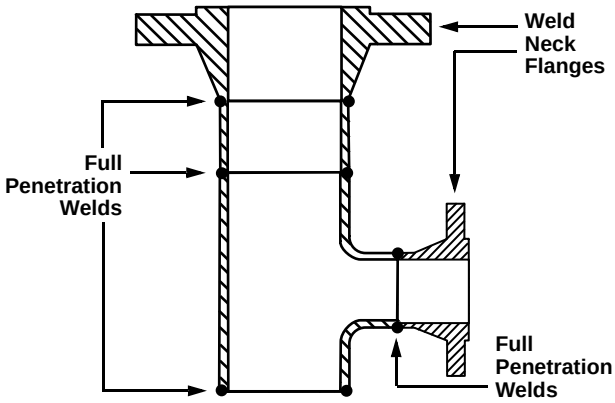
- Process connections are welded directly onto the chamber body, minimizing the number of welds for increased safety
- Available with a 3-in. (80 mm) chamber body and 1-in. (25 mm) process connection
- Available with a 4-in. (100 mm) chamber body with 1-in. (25 mm), 1½-in. (40 mm), or 2-in. (50 mm) process connection
- Pressure ratings up to and including ASME B16.5 Class 1500 and EN1092 PN250



Standard Design Flanges And Welds

T-Piece Design

- Used when a 1½-in. (40 mm) or 2-in. (50 mm) process connection is required on a 3-in. (80 mm) chamber
- Unequal T's are used so that the larger process connections can fit on the smaller chamber body
- Pressure ratings of up to and including ASME B16.5 Class 600 and EN1092 PN100



T-Piece Design Flanges And Welds

Rosemount 9901 Chamber



9901 Chambers

Rosemount 9901 capabilities include:

- Allows external mounting of process level instrumentation
- Enables live maintenance of process level instrumentation
- Designed to ASME B31.3
- Pressure Equipment Directive (PED) compliant
- Variety of process connections and optional drain and vent connections

Additional Information

Specifications: page Level-443
Dimensions: page Level-445

TABLE 1. 9901 Ordering Information

★The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is manufactured after receipt of order and is subject to additional delivery lead time.

Model	Product Description	
9901	Chamber	
Instrument Type		
Standard		**Standard**
G	Rosemount 3300/5300 Guided Wave Radar Level Transmitter	★
Expanded		
D(1)	Mobrey MLT Displacer Transmitter	
V	Mobrey Vertical Float Level Switch	
Design		
Standard		**Standard**
1	Standard Design – Pressure Equipment Directive (PED) compliant	★
3(2)	Standard Design – Not Pressure Equipment Directive (PED) compliant	★
Expanded		
5(3)	T-Piece Design – Pressure Equipment Directive (PED) compliant	
6(2)(3)	T-Piece Design – Not Pressure Equipment Directive (PED) compliant	
Chamber Material		
Standard		**Standard**
C	Carbon Steel	★
S	316/316L Stainless Steel	★
Chamber Size		
Standard		**Standard**
3	3 in. / 80 mm (DN80)	★
4	4 in. / 100 mm (DN100)	★
Instrument and Chamber Rating		
Standard		**Standard**
AA	ASME B16.5 Class 150 Flange	★
AB	ASME B16.5 Class 300 Flange	★
AC	ASME B16.5 Class 600 Flange	★
AD(4)	ASME B16.5 Class 900 Flange	★
AE(4)	ASME B16.5 Class 1500 Flange	★
DA	EN1092 PN16 Flange	★
DB	EN1092 PN40 Flange	★
DC(5)	EN1092 PN63 Flange	★
DD(5)	EN1092 PN100 Flange	★
DE(5)	EN1092 PN160 Flange	★
DF(5)	EN1092 PN250 Flange	★
Expanded		
DH(4)	EN1092 PN25 Flange	

TABLE 1. 9901 Ordering Information

★The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is manufactured after receipt of order and is subject to additional delivery lead time.

Instrument Connection Type		
Standard		**Standard**
R	Raised Face (RF) flange	★
T	Ring Joint (RTJ) flange	★
Expanded		
N(6)	NPT thread (1-in. Bottle Style Chamber)	
Instrument Gasket		
Standard		**Standard**
1(7)	Flat Ring (Sheet)	★
2(8)	Spiral Wound (Stainless Steel 316 Inner Ring and Windings, Flexicarb Filler, Carbon Steel Outer Ring)	★
3(9)	Ring Joint (ASME B16.5 Soft Iron or 316 Stainless Steel)	★
Expanded		
4	None – *select this for NPT thread (1-in. Bottle Style Chamber)*	
Process Connection Orientation		
Standard		**Standard**
B	Side and Side	★
C	Side and Bottom	★
Process Connection Size		
Standard		**Standard**
1	1 in. / 25 mm (DN25)	★
2(10)	2 in. / 50 mm (DN50)	★
5(10)	1 1/2 in. / 40 mm (DN40)	★
Process Connection Rating		
Standard		**Standard**
AA	ASME B16.5 Class 150 Flange	★
AB	ASME B16.5 Class 300 Flange	★
AC	ASME B16.5 Class 600 Flange	★
AD	ASME B16.5 Class 900 Flange	★
AE	ASME B16.5 Class 1500 Flange	★
DA	EN1092 PN16 Flange	★
DB	EN1092 PN40 Flange	★
DC	EN1092 PN63 Flange	★
DD	EN1092 PN100 Flange	★
DE	EN1092 PN160 Flange	★
DF	EN1092 PN250 Flange	★
DH	EN1092 PN25 Flange	★
NN	For use with NPT, BSPT, or Socket Weld process connection type	★
Process Connection Type		
Standard		**Standard**
R	Raised Face (RF) flange	★
T	Ring Type Joint (RTJ) flange	★
N(11)	NPT thread	★
B(11)	BSPT thread	★
S	Socket weld	★
Units		
Standard		**Standard**
E	Imperial (English), feet and inches	★
M	Metric, meters and millimeters	★
Center-to-Center [feet or meters] (See dimension B on pages 445 and 448)		
Standard		**Standard**
XX	Feet or Meters (e.g. 2 ft or 2 m is code 02)	★
Center-to-Center [inches or millimeters] (See dimension B on pages 445 and 448)		
Standard		**Standard**
XXX	Inches (to 1/10 in.) or millimeters (e.g. 2 in. or 20 mm is code 020)	★

TABLE 1. 9901 Ordering Information

★The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is manufactured after receipt of order and is subject to additional delivery lead time.

Drain		
Standard		**Standard**
X	No drain required – *select this for Side and Bottom orientations*	★
D	Drain required	★
Drain Size		
Standard		**Standard**
8	½ in.	★
9	¾ in.	★
1	1 in.	★
4	None	★
Drain Type		
Standard		**Standard**
R[12]	Raised Face (RF) flange	★
T[12]	Ring Joint (RTJ) flange	★
N[13]	NPT thread	★
B[13]	BSPT thread	★
S	Socket weld	★
X	None	★
Vent		
Standard		**Standard**
X	No vent required	★
V	Vent required	★
Vent Size		
Standard		**Standard**
8	½ in.	★
9	¾ in.	★
1	1 in.	★
4	None	★
Vent Type		
Standard		**Standard**
R[12]	Raised Face (RF) flange	★
T[12]	Ring Joint (RTJ) flange	★
N[13]	NPT thread	★
B[13]	BSPT thread	★
S	Socket weld	★
X	None	★
OPTIONS		
Paint (See “Paint” on page 441)		
Expanded		
SP[14]	Standard Primer	
WE[14]	Primer and White Epoxy	
Schedule 80 Chamber Body Piping (See “Schedule 80 Piping for ASME B16.5 Class 150/Class 300 Rated Chambers” on page 441)		
Expanded		
CA[15]	Schedule 80 piping for ASME B16.5 Class 150 or Class 300 flanged connections	
GWR Vapor Compensation (See “GWR Vapor Compensation Probe” on page 442)		
Standard		**Standard**
G1[16]	GWR vapor compensation probe < 78.7 in. (2000 mm)	★
G2[16]	GWR vapor compensation probe > 78.7 in. (2000 mm)	★
Mid-band Indication (See “Mid-band Indication” on page 442)		
Expanded		
MB	Mid-band indication for vertical level switch	
Sour Service (See “Sour Service” on page 442)		
Expanded		
Q15	NACE MR0175 / ISO 15156	
Q25	NACE MR0103	

TABLE 1. 9901 Ordering Information

★The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is manufactured after receipt of order and is subject to additional delivery lead time.

Weld Inspection (Chamber Body) Option (See "Test and Inspection" on page 442)		
Expanded		
Q81	X-Ray 100% of main chamber body butt welds	
Weld Inspection (Branch Connection) (See "Test and Inspection" on page 442)		
Expanded		
Q73	Dye Penetrant (stainless steel material only)	
Q82	Magnetic Particle Inspection (carbon steel material only)	
Hydrostatic Pressure Test (See "Test and Inspection" on page 442)		
Standard		**Standard**
Q5(17)	Hydrostatic Pressure Test Certification	★
Material Certification (See "Test and Inspection" on page 442)		
Standard		**Standard**
Q8	Material Traceability Certificate (EN10204 3.1)	★
Assemble-to		
Standard		**Standard**
XC	Consolidate to Transmitter/Switch	★
Assemble To Order		
Expanded		
RXXXX	Specials	
Typical Model Number: 9901 G 1 C 3 AB R 1 B 1 AB R E 02 080 D1N V1N Q8		

(1) Not available for The Americas.

(2) Available only for The Americas.

(3) Available only for instrument type codes D and G. Select when $1^1/2$-in. or 2-in. process connections are required on a 3-in. (80-mm) chamber.

(4) Not available for instrument type code V.

(5) Not available for instrument type code D.

(6) 1-in. bottle-style for use with instrument type code V only. The pressure rating is ASME B16.5 Class 600.

(7) Available only for instrument connection type code R (flanges up to and including ASME B16.5 Class 300 and EN1092 PN40).

(8) Available only for instrument connection type code R (ASME B16.5 Class 600, EN1092 PN63, or EN1092 PN100 flanges only).

(9) Available for instrument connection type code T only.

(10) Select T-Piece Design if 3-in. (80-mm) chamber is required for Mobrey MLT Displacer or Rosemount 3300/5300 Guided Wave Radar Level Transmitter.

(11) Rating #3000 for chamber up to and including maximum pressure rating of ASME 600.

(12) Ratings are dependent on the selection of chamber and process connections.

(13) The pressure rating is #3000 for chambers up to and including the maximum pressure rating ASME B16.5 Class 600; for above 600, the rating is #6000.

(14) Available with chamber material code C only; black paint is used if the paint option is not specified.

(15) This option is not available for instrument type code V.

(16) Available only for instrument type code G. The G1 and G2 option codes ensure the 9901 has correct dimensions for a vapor compensation probe.

(17) The hydrostatic pressure test is included as standard; select option Q5 if the certificate is required.

ORDER OPTIONS – MUST BE SPECIFIED AT TIME OF ORDER

Paint

The standard is high quality, general purpose stoving black paint. White epoxy paint is an available option and consists of a primer, two undercoats of a two-pack high-build undercoat, and a final coat of a two-pack epoxy full gloss finish. The chamber can also be provided with just a primer for on-site painting.

Upon request, the 9901 can be painted to a customer specification.

Schedule 80 Piping for ASME B16.5 Class 150/Class 300 Rated Chambers

The standard pipe schedule for these ratings is Schedule 40. An option is available to increase this to Schedule 80 except for the Vertical Level Float Switch, where the diameter of the float limits the chamber body to Schedule 40.

GWR Vapor Compensation Probe

Saturated steam under high pressure can influence radar level transmitter measurements. A Rosemount Guided Wave Radar (GWR) level transmitter, with a Dynamic Vapor Compensation probe fitted, automatically compensates for this and maintains the level accuracy.

Mid-band Indication

The standard switch point for a Vertical Level Float Switch (instrument type code V) is 2 in. (50 mm) below the center line of the top process flange, and is indicated on the chamber.

A mid-point switch point is also available halfway between the process connections. This option should be selected if a mid-band level switch is being installed.

Sour Service

Materials can be conditioned and tested for use in H_2S environments with options for NACE MR0175/ISO 15156 (Materials for use in H_2S-containing environments in oil and gas production) and MR0103 (Materials Resistant to Sulfide Stress Cracking in Corrosive Petroleum Refining Environments).

Test and Inspection

All chambers have standard inspection and testing as required by the codes and standards. The testing documentation is provided as applicable to the selected model option codes.

Chambers can be subjected to rigorous testing and inspection. The following testing is available upon request:

- **Weld Inspection**

  X-Ray can be used to inspect welds on the chamber body. Inspection of the branch connection welds is available using Dye Penetrate Inspection (DPI) on stainless steel, and Magnetic Particle Inspection (MPI) is used for carbon steel welds.

- **Hydrostatic Pressure Test**

  Hydrostatic pressure tests are performed as standard on all 9901's with certification available upon request.

- **Material Certification**

  Material traceability certification conforming to EN 10204 3.1 is available, and Positive Material Identification (PMI) can also be ordered. PMI is a process to identify the composition of the material of the chamber and can be requested to support any material certificates that have been supplied. Requests for PMI should be made when making an enquiry.

- **Documentation**

  The following documents are available:

  - Outline dimensional drawings can be supplied for approval prior to construction
  - Weld procedures and welder qualifications
  - Quality control plans define the activities planned to deliver the product while meeting the quality expectation of the customer

  We can accommodate any request for inspections by a customer or third party organizations. This normally takes place prior to shipping.

Valves

Valves are commonly mounted on the drain or vent connection to allow draining or venting of the chamber. It is common practice to also mount valves on the process connection to allow isolation of the chamber. Valves can be supplied with the 9901, and details are available upon request.

Chambers Technical Specification

PRESSURE RATINGS

TABLE 2. Chamber Pressure and Temperature Ratings

Class / Rating		Working Pressure (Psi and Bar) For The 9901 Chambers			
		Carbon Steel Chamber (1)		Stainless Steel Chamber (2)	
		Psi	Bar	Psi	Bar
ASME B16.5 Class 150	Ps max (RT) (3)	285	19.6	275	19.0
	Ps max (752 °F) / (400 °C)	95	6.5	95	6.5
	Pt	428	30	413	29
ASME B16.5 Class 300	Ps max (RT)	740	51.1	720	49.6
	Ps max (752 °F) / (400 °C)	505	34.7	425	29.4
	Pt	1110	77	1080	75
ASME B16.5 Class 600	Ps max (RT)	1480	102.1	1440	99.3
	Ps max (752 °F) / (400 °C)	1015	69.4	855	58.9
	Pt	2220	154	2160	149
ASME B16.5 Class 900	Ps max (RT)	2220	153.2	2160	148.9
	Ps max (752 °F) / (400 °C)	1520	104.2	1280	88.3
	Pt	3330	230	3240	224
ASME B16.5 Class 1500	Ps max (RT)	3705	255.3	3600	248.2
	Ps max (752 °F) / (400 °C)	2535	173.6	2135	147.2
	Pt	5558	383	5400	373
EN1092 PN16	Ps max (RT)	232	16	227	15.7
	Ps max (752 °F) / (400 °C)	137	9.5	134	9.3
	Pt	348	24	348	24
EN1092 PN25	Ps max (RT)	362	25	356	24.6
	Ps max (752 °F) / (400 °C)	214	14.8	211	14.6
	Pt	543	37.5	536	37
EN1092 PN40	Ps max (RT)	580	40	569	39.3
	Ps max (752 °F) / (400 °C)	345	23.8	339	23.4
	Pt	870	60	855	59
EN1092 PN63	Ps max (RT)	913	63	899	62
	Ps max (752 °F) / (400 °C)	543	37.5	536	37
	Pt	1377	95	1348	93
EN1092 PN100	Ps max (RT)	1450	100	1427	98.4
	Ps max (752 °F) / (400 °C)	862	59.5	851	58.7
	Pt	2175	150	2146	148
EN1092 PN160	Ps max (RT)	2320	160	2291	158
	Ps max (752 °F) / (400 °C)	1380	95.2	1361	93.9
	Pt	3480	240	3437	237
EN1092 PN250	Ps max (RT)	3625	250	3567	246
	Ps max (752 °F) / (400 °C)	2158	148.8	2132	147
	Pt	5438	375	5351	369

(1) Ts min is 14 °F (–10 °C)

(2) Ts min is –148 °F (–100 °C)

(3) RT is Room Temperature of 68 °F (20 °C)

TEMPERATURE RATINGS

TABLE 3. Chamber Temperature Ratings

Material	Chamber Temperature Range
Carbon Steel Chamber	14 to 752 °F (–10 to 400 °C)
Stainless Steel Chamber	–148 to 752 °F (–100 to 400 °C)

MATERIALS OF CONSTRUCTION

Only materials suitable for pressure use and certified to ASME B31.3 are used in the construction of chambers. Other materials are available to special order.

TABLE 4. Chamber Materials

Component	Carbon Steel	Stainless Steel
Instrument Mounting Flange	ASTM A105	ASTM A182 F316/F316L
Chamber Body Tube	ASTM A106 Grade B	ASTM A312 TP316/TP316L
Chamber End Cap	ASTM A105	ASTM A182 F316/F316L
Process Flange / Fitting	ASTM A105	ASTM A182 F316/F316L
T-Pieces and Reducers	ASTM A234 WPB	ASTM A403 WP316/WP316L–S
Stainless Studbolts (1)	ASTM A193 B8M Cl 2	ASTM A193 B8M Cl 2
Stainless Nuts(1)	ASTM A194 Grade 8M	ASTM A194 Grade 8M
Alloy Steel Studbolts(2)	ASTM A193 B7	ASTM A320 L7
Alloy Steel Nuts(2)	ASTM A194 2H	ASTM A194 Grade 7 + S3

*(1) Stainless steel bolting is **always** supplied for Instrument Type code G, and available upon request for Instrument Type codes D and V.*

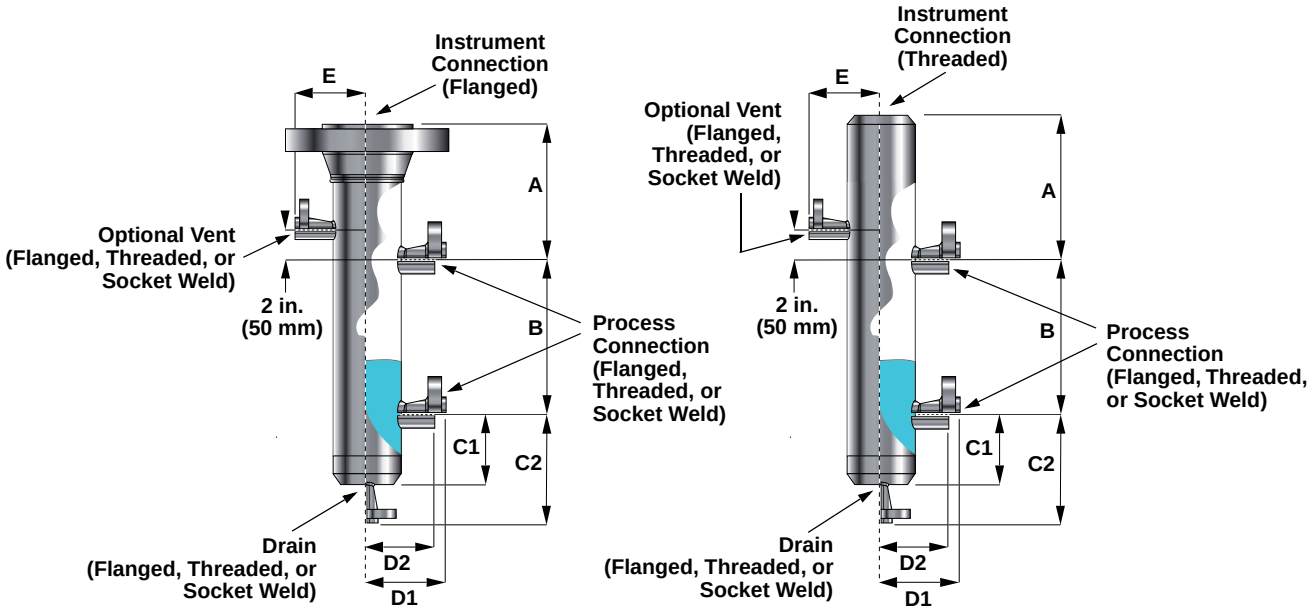
(2) Alloy steel bolting is supplied as standard for Instrument Type codes D and V.

Dimensional Drawings

STANDARD DESIGN

Side-and-Side Chambers

Note:
This chamber is available for Instrument Type Codes D, V, and G. See "9901 Ordering Information" on page 438 for an explanation of the codes. Dimensions A, C, D, and E are in the tables on pages 446 to 447. Specify center-to-center dimension B when ordering.



Side-and-Bottom Chambers

Note:
This chamber design is available for Instrument Type Codes D, V, and G. See "9901 Ordering Information" on page 438 for an explanation of the codes. Dimensions A, D, and E are in the tables on pages 446 to 447. Specify center-to-center dimension B when ordering.

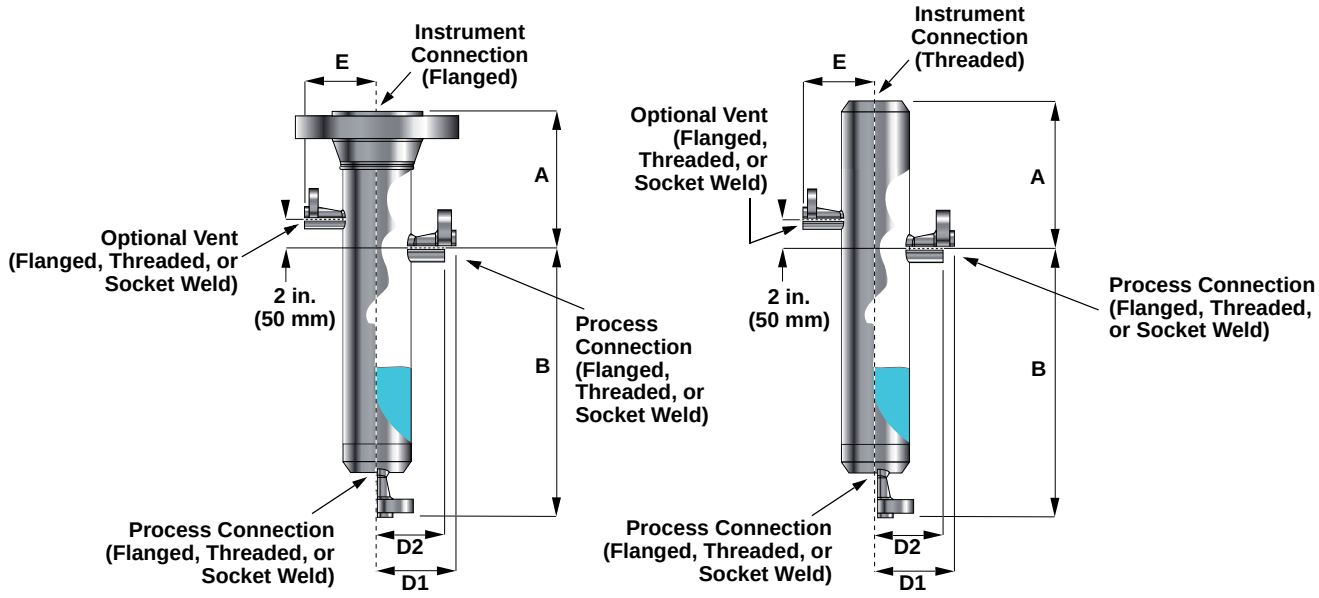


TABLE 5. Dimension A for Side-and-Side and Side-and-Bottom Chamber

Instrument Connections		Instrument Type Code (1)	3-in. (80-mm) DN80 Chamber				4-in. (100-mm) DN100 Chamber			
			No Vent Fitted		Vent Fitted		No Vent Fitted		Vent Fitted	
			In.	mm	In.	mm	In.	mm	In.	mm
ASME B16.5 Class 150	RF / RTJ	D	15.75	400	15.75	400	15.75	400	15.75	400
	RF / RTJ	V	7.87 / 7.56	200 / 192	9.84 / 9.53	250 / 242	7.87 / 7.56	200 / 192	9.84 / 9.53	250 / 242
	RF / RTJ	G	10.83	275	10.83	275	10.83	275	10.83	275
ASME B16.5 Class 300	RF / RTJ	D	15.75	400	15.75	400	15.75	400	15.75	400
	RF / RTJ	V	7.68 / 7.24	195 / 184	9.65 / 9.21	245 / 234	7.56 / 7.13	192 / 181	9.53 / 9.09	242 / 231
	RF / RTJ	G	10.83	275	10.83	275	10.83	275	10.83	275
ASME B16.5 Class 600	RF / RTJ	D	15.75	400	15.75	400	15.75	400	15.75	400
	RF / RTJ	V	–	–	–	–	7.05 / 6.85	179 / 174	9.02 / 8.82	229 / 224
	RF / RTJ	G	10.83	275	10.83	275	10.83	275	10.83	275
ASME B16.5 Class 900 or Class 1500	RF / RTJ	D	15.75	400	15.75	400	15.75	400	15.75	400
	RF / RTJ	V	–	–	–	–	–	–	–	–
	RF / RTJ	G	10.83	275	10.83	275	10.83	275	10.83	275
EN 1092 PN16	RF	D	15.75	400	15.75	400	15.75	400	15.75	400
	RF	V	8.03	204	10.00	254	8.03	204	10.00	254
	RF	G	10.83	275	10.83	275	10.83	275	10.83	275
EN1092 PN25 or EN1092 PN40	RF	D	15.75	400	15.75	400	15.75	400	15.75	400
	RF	V	7.87	200	9.84	250	7.87	200	9.84	250
	RF	G	10.83	275	10.83	275	10.83	275	10.83	275
EN1092 PN63	RF	D	15.75	400	15.75	400	15.75	400	15.75	400
	RF	V	–	–	–	–	7.56	192	9.53	242
	RF	G	10.83	275	10.83	275	10.83	275	10.83	275
EN1092 PN100	RF	D	15.75	400	15.75	400	15.75	400	15.75	400
	RF	V	–	–	–	–	7.32	186	9.29	236
	RF	G	10.83	275	10.83	275	10.83	275	10.83	275
EN1092 PN160 or EN1092 PN250	RF	D	15.75	400	15.75	400	15.75	400	15.75	400
	RF	V	–	–	–	–	–	–	–	–
	RF	G	10.83	275	10.83	275	10.83	275	10.83	275
Threaded / SW	–	V	6.30	160	6.30	160	6.30	160	6.30	160

(1) See "Rosemount 9901 Chamber" on page 438 for explanation of code.

TABLE 6. Dimensions C1 and C2 for Side-and-Side Chamber

Drain Connections	Instrument Type Code(1)	3-in. (80-mm) DN80 Chamber		4-in. (100-mm) DN100 Chamber	
		In.	mm	In.	mm
Dimension C1: SW/Threaded Drain or No Drain	D and V	6.30	160	6.30	160
	G	11.42	290	11.42	290
Dimension C2: Flanged Drain	D and V	9.45	240	9.45	240
	G	14.57	370	14.57	370

(1) See "Rosemount 9901 Chamber" on page 438 for further information.

TABLE 7. Dimension D1 for Side-and-Side and Side-and-Bottom Chamber (Flanged Process Connections)

Flanged Process Connections		3-in. (80-mm) DN80 Chamber						4-in. (100-mm) DN100 Chamber					
		In.	mm	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm
ASME B16.5 (1)		Class 150		Class 300		Class 600		Class 150		Class 300		Class 600	
1 in.	RF	3.86	98	4.09	104	4.37	111	4.33	110	4.61	117	4.84	123
	RTJ	4.06	103	4.33	110	4.37	111	4,57	116	4.84	123	4.84	123
$1^1/_2$ in.	RF	–	–	–	–	–	–	4.53	115	4.76	121	5.12	130
	RTJ	–	–	–	–	–	–	4.76	121	5.00	127	5.12	130
2 in.	RF	–	–	–	–	–	–	4.49	114	4.72	120	5.20	132
	RTJ	–	–	–	–	–	–	4.72	120	4.96	126	5.20	132
1 in.	RF	4.80	122	4.80	122			5.31	135	5.31	135		
	RTJ	4.80	122	4.80	122			5.31	135	5.31	135		

Flanged Process Connections		3-in. (80-mm) DN80 Chamber						4-in. (100-mm) DN100 Chamber					
		In.	mm	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm
ASME B16.5		**Class 900**		**Class 1500**				**Class 900**		**Class 1500**			
1 1/2 in.	RF	–	–	–	–	–	–	5.63	143	5.63	143	–	–
	RTJ	–	–	–	–	–	–	5.63	143	5.63	143	–	–
2 in.	RF	–	–	–	–	–	–	6.34	161	6.34	161	–	–
	RTJ	–	–	–	–	–	–	6.34	161	6.34	161	–	–
EN1092 (PN) (1)		**EN PN16**		**EN PN25**		**EN PN40**		**EN PN16**		**EN PN25**		**EN PN40**	
1 in.	RF	3.23	82	3.23	82	3.23	82	3.78	96	3.78	96	3.78	96
1 1/2 in.	RF	–	–	–	–	–	–	3.82	97	3.82	97	3.82	97
2 in.	RF	–	–	–	–	–	–	3.74	95	3.86	98	3.86	98
EN1092 (PN) (1)		**EN PN63/PN100**		**EN PN160**		**EN PN250**		**EN PN63/100**		**EN PN160**		**EN PN250**	
1 in.	RF	3.98	101	3.98	101	4.25	108	4.49	114	4.49	114	4.76	121
1 1/2 in.	RF	–	–	–	–	–	–	4.49	114	4.57	116	5.20	132
2 in.	RF	–	–	–	–	–	–	4.41/4.7	113/119	4.96	126	5.35	136

(1) RF = Raised Face flange. RTJ = Ring Type Joint flange.

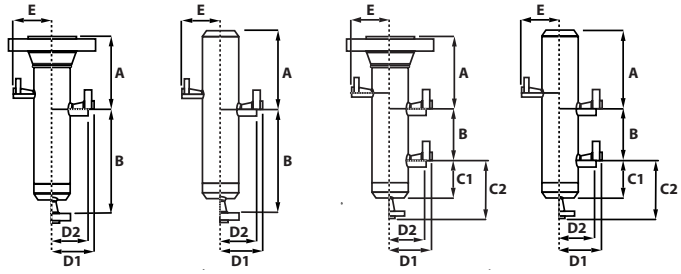
TABLE 8. Dimension D2 for Side-and-Side and Side-and-Bottom Chamber (Threaded/Socket Weld Connections)

Threaded or SW Process Connections	3-in. (80-mm) DN80 Chamber		4-in. (100-mm) DN100 Chamber	
	In.	mm	In.	mm
1 in. (25 mm)	3.74	95	4.21	107

TABLE 9. Dimension E for Side-and-Side and Side-and-Bottom Chamber

Vent Connections		3-in. (80-mm) DN80 Chamber						4-in. (100-mm) DN100 Chamber					
		In.	mm	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm
ASME B16.5 (1)		**Class 150**		**Class 300**		**Class 600**		**Class 150**		**Class 300**		**Class 600**	
1/2 in.	RF	3.62	92	3.78	96	4.06	103	4.09	104	4.29	109	4.53	115
	RTJ	–	–	3.94	100	4.02	102	–	–	4.41	112	4.45	113
3/4 in.	RF	3.78	96	3.98	101	4.25	108	4.29	109	4.49	114	4.72	120
	RTJ	–	–	4.17	106	4.25	108	–	–	4.65	118	4.69	119
1 in.	RF	3.86	98	4.09	104	4.37	111	4.33	110	4.57	116	4.84	123
	RTJ	4.06	103	4.33	110	4.37	111	4.57	116	4.84	123	4.84	123
ASME B16.5 (1)		**Class 900**		**Class 1500**				**Class 900**		**Class 1500**			
1/2 in.	RF	4.37	111	4.37	111			4.84	123	4.84	123		
	RTJ	4.37	111	4.37	111			4.80	122	4.80	122		
3/4 in.	RF	4.72	120	4.72	120			5.24	133	5.24	133		
	RTJ	4.72	120	4.72	120			5.20	132	5.20	132		
1 in.	RF	4.80	122	4.80	122			5.31	135	5.31	135		
	RTJ	4.80	122	4.80	122			5.31	135	5.31	135		
EN1092 (PN) (1)		**PN16**		**PN25**		**PN40**		**PN16**		**PN25**		**PN40**	
1/2 in.	RF	3.19	81	3.19	81	3.19	81	3.70	94	3.70	94	3.70	94
3/4 in.	RF	3.27	83	3.27	83	3.27	83	3.78	96	3.78	96	3.78	96
1 in.	RF	3.23	82	3.23	82	3.23	82	3.78	96	3.78	96	3.78	96
EN1092 (PN) (1)		**PN63/PN100**		**PN160**		**PN250**		**PN63/100**		**PN160**		**PN250**	
1/2 in.	RF	3.50	89	3.50	89	4.09	104	3.98	101	3.98	101	4.57	116
3/4 in.	RF	3.62	92	–	–	–	–	4.09	104	–	–	–	–
1 in.	RF	3.98	101	3.98	101	4.25	108	4.49	114	4.49	114	4.76	121
Non-Flanged		**NPT/BSPT**		**Socket Weld**				**NPT/BSPT**		**Socket Weld**			
1/2 in., 3/4 in, and 1 in.		3.74	95	3.74	95			4.21	107	4.21	107		

(1) RF = Raised Face flange. RTJ = Ring Type Joint flange.



T-PIECE DESIGN

Side-and-Side and Side-and-Bottom Chambers

TABLE 10. Dimension A for T-Piece Side-and-Side and Side-and-Bottom Chamber

Flanged Instrument Connections (1)		Instrument Type Code (2)	3-in. (80-mm) DN80 Chamber			
			No Vent Fitted		Vent Fitted	
			In.	mm	In.	mm
ASME B16.5 Class 150	RF/RTJ	D	15.75	400	15.75	400
	RF/RTJ	V	6.10 / 6.38	155 / 162	10.43 / 10.70	265 / 272
	RF/RTJ	G	10.83	275	10.83	275
ASME B16.5 Class 300	RF/RTJ	D	15.75	400	15.75	400
	RF/RTJ	V	6.50 / 6.81	165 / 173	10.83 / 11.14	275 / 283
	RF/RTJ	G	10.83	275	10.83	275
ASME B16.5 Class 600	RF/RTJ	D	15.75	400	15.75	400
	RF/RTJ	V	–	–	–	–
	RF/RTJ	G	10.83	275	10.83	275
EN1092 PN16	RF	D	15.75	400	15.75	400
	RF	V	5.35	136	9.69	246
	RF	G	10.83	275	10.83	275
EN1092 PN25 or PN40	RF	D	15.75	400	15.75	400
	RF	V	5.67	144	10	254
	RF	G	10.83	275	10.83	275
EN1092 PN63 or PN100	RF	D	15.75	400	15.75	400
	RF	V	–	–	–	–
	RF	G	10.83	275	10.83	275

(1) RF = Raised Face flange. RTJ = Ring Type Joint flange.

(2) See "Rosemount 9901 Chamber" on page 438 for explanation of code.

Note:
This chamber design is available for Instrument Type Codes D, V, and G. See "9901 Ordering Information" on page 438 for an explanation of the codes. Dimensions A, C, D, and E are in the tables on pages 448 to 449. Specify center-to-center dimension B when ordering.

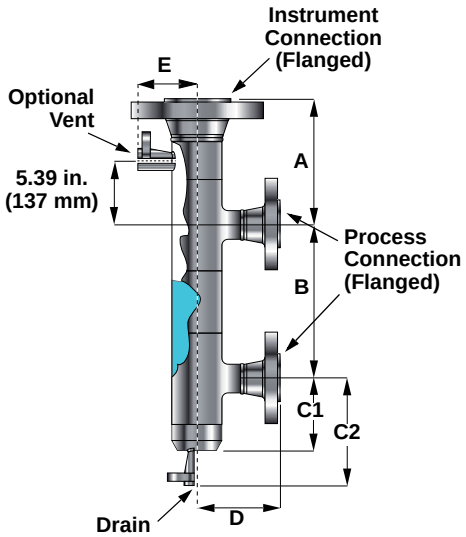


TABLE 11. Dimension C1 for T-Piece Side-and-Side Chamber

Drain Connections	3-in. (80-mm) DN80 Chamber					
	In.	mm	In.	mm	In.	mm
Threaded or Socket Weld	Instrument Type Code D (1)		Instrument Type Code V (1)		Instrument Type Code G (1)	
1/2-in.	5.79	147	5.79	147	11.42	290
3/4-in.	5.79	147	5.79	147	11.42	290
1-in.	5.79	147	5.79	147	11.42	290

(1) See "Rosemount 9901 Chamber" on page 438 for explanation of code.

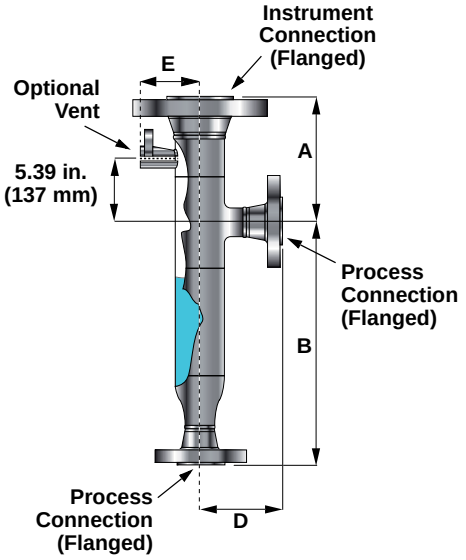


TABLE 12. Dimension C2 for T-Piece Side-and-Side Chamber

Drain Connections		3-in. (80-mm) DN80 Chamber					
		In.	mm	In.	mm	In.	mm
ASME B16.5 (1)		Instrument Type Code D (2)		Instrument Type Code V (2)		Instrument Type Code G (2)	
1/2-in. Class 150	RF	7.68	195	7.68	195	14.57	370
	RTJ	–	–	–	–	14.57	370
3/4-in. Class 150	RF	7.87	200	7,87	200	14.57	370
	RTJ	–	–	–	–	14.57	370
1-in. Class 150	RF	7.99	203	7.99	203	14.57	370
	RTJ	8.23	209	8.23	209	14.57	370
1/2 in. Class 300	RF	7.87	200	7.87	200	14.57	370
	RTJ	8.07	205	8.07	205	14.57	370

Continued on the next page

Note:
Drain and vent can be a flanged, threaded, or socket weld type.

Drain Connections		3-in. (80-mm) DN80 Chamber					
		In.	mm	In.	mm	In.	mm
ASME B16.5 (1)		Instrument Type Code D (2)		Instrument Type Code V (2)		Instrument Type Code G (2)	
3/4 in. Class 300	RF	8.07	205	8.07	205	14.57	370
	RTJ	8.31	211	8.31	211	14.57	370
1-in. Class 300	RF	8.23	209	8.23	209	14.57	370
	RTJ	8.46	215	8.46	215	14.57	370
1/2 in. Class 600	RF	8.11	206	8.11	206	14.57	370
	RTJ	8.11	206	8.11	206	14.57	370
3/4 in. Class 600	RF	8.31	211	8.31	211	14.57	370
	RTJ	8.31	211	8.31	211	14.57	370
1 in. Class 600	RF	8.46	215	8.46	215	14.57	370
	RTJ	8.46	215	8.46	215	14.57	370
EN1092 (PN) (1)							
1/2-in. PN16/25/40 RF		7.28	185	7.28	185	14.57	370
3/4-in. PN16/25/40 RF		7.36	187	7.36	187	14.57	370
1-in. PN16/25/40 RF		7.36	187	7.36	187	14.57	370
1/2-in. PN63/100 RF		7.56	192	7.56	192	14.57	370
3/4-in. PN63/100 RF		7.68	195	7.68	195	14.57	370
1-in. P63/100 RF		8.07	205	8.07	205	14.57	370

(1) RF = Raised Face flange. RTJ = Ring Type Joint flange.

(2) See "Rosemount 9901 Chamber" on page 438 for explanation of code.

Table 12 continued from previous page

TABLE 13. Dimension D for T-Piece Side-and-Side Chamber

Flanged Process Connections		3-in. (80-mm) DN80 Chamber							
		In.	mm	In.	mm	In.	mm	In.	mm
ASME B16.5 (1)		Class 150		Class 300		Class 600			
1 1/2 in.	RF	5,32	135	5.55	141	5.87	149		
	RTJ	5.47	139	5.79	147	5.87	149		
2 in.	RF	5.51	140	5.75	146	6.10	155		
	RTJ	5.67	144	5.98	152	6.18	157		
EN 1092 (PN) (1)		PN16		PN25/40		PN63		PN100	
1 1/2 in.	RF	4.65	118	4.65	118	5.32	135	5.32	135
2 in.	RF	4.76	121	4.88	124	5.43	138	5.67	144

(1) RF = Raised Face flange. RTJ = Ring Type Joint flange.

TABLE 14. Dimension E for T-Piece Side-and-Side and Side-and-Bottom Chamber

Vent Connections		3-in. (80-mm) DN80 Chamber					
		In.	mm	In.	mm	In.	mm
ASME B16.5 (1)		Class 150		Class 300		Class 600	
1/2 in.	RF	3.62	92	3.78	96	4.06	103
	RTJ	–	–	3.94	100	4.02	102
3/4 in.	RF	3.78	96	3.98	101	4.25	108
	RTJ	–	–	4.17	106	4.25	108
1 in.	RF	3.86	98	4.09	104	4.37	111
	RTJ	4.06	103	4.33	110	4.37	111
EN1092 (PN) (1)		PN16/25/40		PN63/100			
1/2 in.	RF	3.20	81	3.50	89		
3/4 in.	RF	3.27	83	3.62	92		
1 in.	RF	3.23	82	3.98	101		
Non-Flanged		NPT/BSPT		Socket Weld			
1/2 in.		3.74	95	3.74	95		
3/4 in.		3.74	95	3.74	95		
1 in.		3.74	95	3.74	95		

(1) RF = Raised Face flange. RTJ = Ring Type Joint flange.

Rosemount Level Solutions

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- Realize a decade of virtually maintenance-free performance with a 10-year stability and 12-year limited warranty
- SuperModule Platform delivers the highest field reliability with all-welded hermetic SST design
- Installation-ready integrated wireless pressure, flow, and level solutions
- Implement wireless using existing tools and practices

Rosemount 648 Wireless Temperature Transmitter

- Industry-leading temperature transmitter delivers field reliability as a wireless measurement solution
- Achieve optimal efficiency with Best-in-Class product specifications and capabilities
- Smart Wireless delivers innovative wireless solutions for temperature measurement and overall transmitter performance

Rosemount 248 Wireless Temperature Transmitter

- Standard temperature transmitter offers a wireless solution for process monitoring
- Optimize plant efficiency and increase measurement reliability with industry-proven capabilities and specifications
- Smart Wireless delivers innovative wireless solutions for temperature measurement

Rosemount 848T Wireless Temperature Transmitter

- Four independently configurable inputs, including 2-, 3-, and 4-wire RTDs, thermocouples, mV, 2-, 3-, and 4-wire ohm, and 4-20 mA signals
- Intrinsically safe, long lasting Power Module, which utilizes Emerson's SmartPower™ Technology
- Configurable high and low alerts to improve process performance
- Easy to use Device Dashboard, used to configure, monitor, and troubleshoot the 848T Wireless

Rosemount 2160 Wireless Vibrating Fork Liquid Level Switch

- World's first wireless liquid level switch for reliable point level detection
- Wireless capabilities extend the full benefits of PlantWeb® to previously inaccessible locations
- Designed for operation in temperature extremes of –94 to 500 °F (–70 to 260 °C)

Smart Wireless Gateway

- Gateway connects wireless self-organizing networks with any host system
- Easy configuration and management of self-organizing networks
- Easy integration into control systems and data applications through serial and Ethernet connections
- Seamless integration into AMS® Device Manager and DeltaV™ automation system
- Smart Wireless capabilities extends the full benefit of PlantWeb® architecture to previously inaccessible locations

Smart Wireless THUM™ Adapter

- 2- or 4-wire HART™ devices
- Flexibility to meet your most demanding applications
- Gain access to additional HART information, such as diagnostics or multivariable data
- Add wireless to almost any measurement point
- Smart Wireless capabilities extend the full benefits of PlantWeb® to previously inaccessible locations

Rosemount 702 Wireless Discrete Transmitter

- An installation-ready solution that provides dual discrete, or leak detection input options
- Discrete single or dual switch input with logic for limit contact and opposing contact applications
- Flexibility to meet your most demanding applications
- WirelessHART™ capabilities extend the full benefits of PlantWeb® to previously inaccessible locations

Rosemount 708 Wireless Acoustic Transmitter

- Acoustic monitoring of steam traps and pressure relief valves improves energy efficiency and environmental compliance
- Simple non-intrusive installation works for any application

Comprehensive Product Catalog

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Smart Wireless THUM™ Adapter Wireless-13

Rosemount 702 Wireless Discrete Transmitter Wireless-23

Rosemount 708 Wireless Acoustic Transmitter Wireless-35

Smart Wireless Gateway

- *Gateway connects wireless self-organizing networks with any host system*
- *Easy configuration and management of self-organizing networks*
- *Easy integration into control systems and data applications through serial and Ethernet connections*
- *Seamless integration into AMS® Device Manager and DeltaV™ automation system*
- *Greater than 99% reliability with industry proven security*
- *Smart Wireless capabilities extends the full benefit of PlantWeb® architecture to previously inaccessible locations*



IEC

WirelessHART

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Smart Wireless Gateway

Flexible Connectivity Options and Easy Device Configuration





Host Integration with DeltaV™ and Ovation®

- Gain real-time information on process and assets with intuitive operator interface
- Native interface between control system and gateway

Flexible Integration

- Smart Wireless Gateway connects legacy hosts, Serial Modbus®, and Ethernet or OPC output



Complete Asset Management with AMS Device Manager

- Manage predictive diagnostics from wired and wireless field devices to identify problems before the process is affected
- Streamline wireless device configuration through Smart Wireless Gateway

Other Interfaces

- Web interface and AMS Wireless Configurator are standard with every gateway for set-up and initial configuration of wireless devices
- Data historian connectivity for documentation and compliance information

Device Specifications

- Update rate: User Selectable 1, 4, 8, 16, 32 second or 1 to 60 minutes
- Network Size: Up to 100 devices
- Output: Ethernet, Modbus, OPC, Serial, HART-IP
- Approvals: FM, CSA, ATEX, IECEx

IEC

WirelessHART

Emerson's Smart Wireless Solution

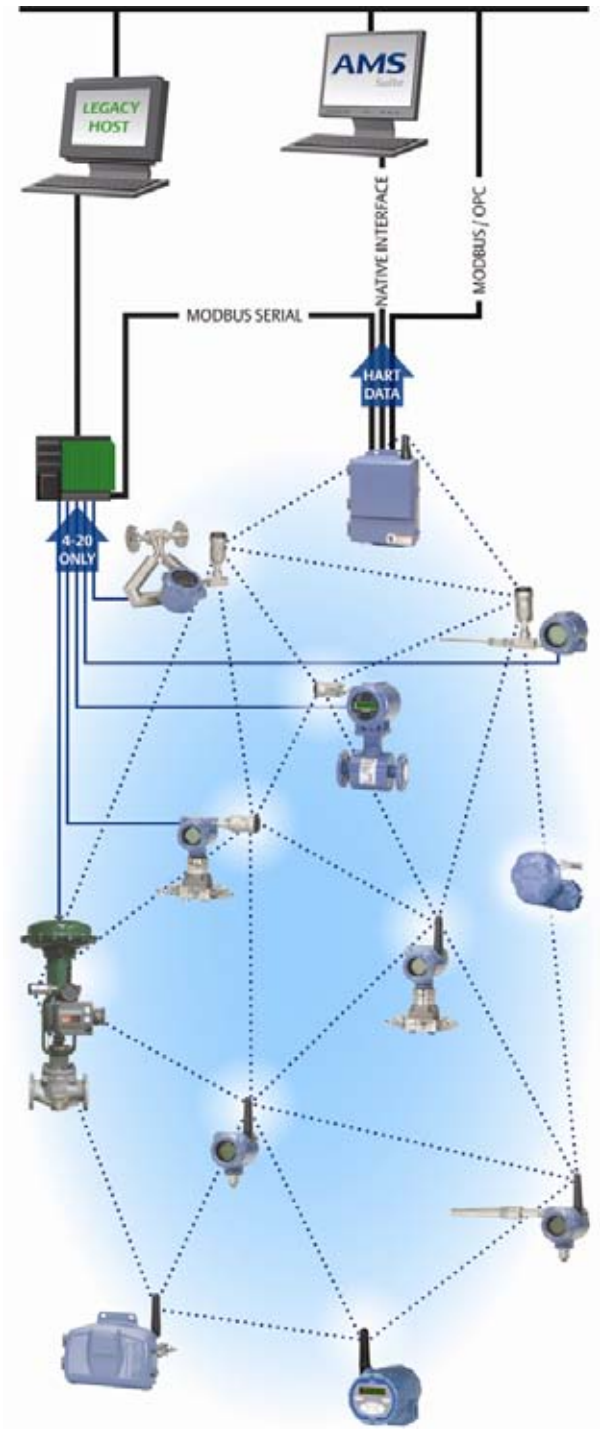
IEC 62591 (*Wireless*HART™)... The Industry Standard

Self-Organizing, Adaptive Mesh Routing

- No wireless expertise required, network automatically finds the best communication paths
- The self-organizing, self-healing network manages multiple communication paths for any given device. If an obstruction is introduced into the network, data will continue to flow because the device already has other established paths. The network will then lay in more communication paths as needed for that device.

Reliable Wireless Architecture

- Standard IEEE 802.15.4 radios
- 2.4 GHz ISM band sliced into 15 radio-channels
- Time Synchronized Channel Hopping to avoid interference from other radios, WiFi, and EMC sources and increase reliability
- Direct sequence spread spectrum (DSSS) technology delivers high reliability in challenging radio environment



Emerson's Smart Wireless

Seamless Integration to All Existing Host Systems

- Native integration into DeltaV and Ovation is transparent and seamless
- Gateways interface with existing host systems using industry standard protocols including OPC, Modbus TCP/IP, and Modbus RTU

Layered Security Keeps Your Network Safe

- Ensures that data transmissions are received only by the Smart Wireless Gateway
- Network devices implement industry standard Encryption, Authentication, Verification, Anti-Jamming, and Key Management
- Third party security verification including Achilles and FIPS197.

SmartPower™ Solutions

- Optimized Emerson instrumentation, both hardware and software, to extend power module life
- SmartPower technologies enable predictable power life

Ordering Information

Table 1. 1420 Smart Wireless Gateway Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
1420	Smart Wireless Gateway	
Power Input		
Standard		**Standard**
A	10.5-30 Vdc	★
Ethernet Communications - Physical Connection		
Standard		**Standard**
1[(1)(2)]	Ethernet	★
2[(3)(4)]	Dual Ethernet	★
Expanded		
3[(5)(6)]	Fiber Optic Ethernet	
Wireless Update Rate, Operating Frequency, and Protocol		
Standard		**Standard**
A3	User Configurable Update Rate, 2.4 GHz DSSS, WirelessHART	★
Serial Communication		
Standard		**Standard**
N	None	★
A[(7)]	Modbus RTU via RS485	★
Ethernet Communication - Data Protocols		
Standard		**Standard**
2	Webserver, Modbus TCP/IP, AMS Ready	★
4	Webserver, Modbus TCP/IP, AMS Ready, OPC	★
5[(8)]	DeltaV Ready	★
6[(8)]	Ovation Ready	★
7[(9)]	HART-IP	★

Options (Include with selected model number)

Product Certifications		
Standard		**Standard**
N5	FM Division 2, Non-incendive	★
N6	CSA Division 2, Non-incendive	★
N1	ATEX Type n	★
ND	ATEX Dust	★
N7	IECEx Type n	★
NF	IECEx Dust	★
KD	FM & CSA Division 2, Non-incendive and ATEX Type n	★
N3	China Type n	★
N4	TIIS Type n	★
Adapters		
Standard		**Standard**
J1	CM 20 Conduit Adapters	★
J2	PG 13.5 Conduit Adapters	★
J3	3/4 NPT Conduit Adapters	★

Table 1. 1420 Smart Wireless Gateway Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Antenna Options(10)		
Standard		**Standard**
WL2	Remote Antenna Kit, 50 ft. (15.2 m) cable, Lightning Arrestor	★
WL3	Remote Antenna Kit, 20 ft. (6.1 m) and 30 ft. (9.1 m) cables, Lightning Arrestor	★
WL4	Remote Antenna Kit, 10 ft. (3.0 m) and 40 ft. (12.2 m) cables, Lightning Arrestor	★
Expanded		
WN2	High-Gain, Remote Antenna Kit, 25 ft. (7.6m) cable, Lightning Arrestor	
Typical Model Number: 1420 A 2 A3 A 2 N5		

(1) Single active 10/100 baseT Ethernet port with RJ45 connector.

(2) Additional ports disabled.

(3) Dual active 10/100 baseT Ethernet ports with RJ45 connectors.

(4) Multiple active ports have separate IP addresses, firewall isolation, and no packet forwarding.

(5) 1300 nm Multimode Optical fiber connection with separate SC connectors for Rx and Tx.

(6) Includes features of Option 1.

(7) Convertible to RS232 via adaptor, not included with Gateway.

(8) Includes Webserver, Modbus TCP, AMS Ready, and OPC.

(9) Includes Webserver, Modbus TCP, and AMS Ready.

(10) The Remote Antenna Kit options require minor assembly.

ACCESSORIES AND SPARE PARTS

Table 2. Accessories

Item Description	Part Number
AMS® Wireless SNAP-ON™, 1 Gateway License	01420-1644-0001
AMS Wireless SNAP-ON, 5 Gateway Licenses	01420-1644-0002
AMS Wireless SNAP-ON, 10 Gateway Licenses	01420-1644-0003
AMS Wireless SNAP-ON, 5-10 Upgrade Licenses	01420-1644-0004
Serial Port HART Modem and Cables only	03095-5105-0001
USB Port HART Modem and Cables only	03095-5105-0002

Table 3. Spare Parts

Item Description	Part Number
Spare Kit, WL2 Replacement(1), Remote Antenna, 50 ft. (15.2 m) Cable, and Lightning Arrestor	01420-1615-0302
Spare Kit, WL3 Replacement(1), Remote Antenna, 20/30 ft. (6.1/9.1 m) Cables, and Lightning Arrestor	01420-1615-0303
Spare Kit, WL4 Replacement(1), Remote Antenna, 10/40 ft. (3.0/12.2 m) Cables, and Lightning Arrestor	01420-1615-0304
Spare Kit, WN2 Replacement(1), High Gain, Remote Antenna, 25 ft. (7.6 m) Cable, and Lightning Arrestor	01420-1615-0402

(1) Can not upgrade from integral to remote antenna.

Specifications

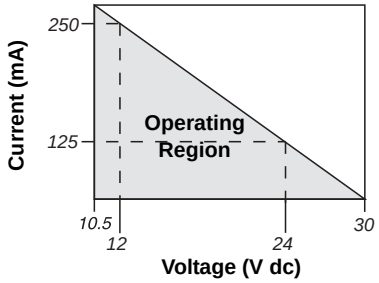
Functional Specifications

Input Power

10.5 - 30 Vdc

Current Draw

Operating Current Draw is based on 3 Watts average power consumption. Momentary startup Current Draw up to twice Operating Current Draw.



Radio Frequency Power Output from Antenna

Maximum of 10 mW (10 dBm) EIRP

Maximum of 40 mW (16 dBm) EIRP for WN2 High Gain option

Environmental

Operating Temperature Range:
-40 to 158 °F (-40 to 70 °C)

Operating Humidity Range:
10-90% relative humidity

EMC Performance

Complies with EN61326-1:2006.

Antenna Options

Integrated Omnidirectional Antenna
Optional remote mount Omnidirectional Antenna

Physical Specifications

Weight

10 lb (4.54 kg)

Material of Construction

Housing
Low-copper aluminum, NEMA 4X

Paint
Polyurethane

Cover Gasket
Silicone Rubber

Antenna
PBT/PC integrated Omnidirectional Antenna

Certifications

Class I Division 2 (U.S.)

Equivalent Worldwide

Communication Specifications

Isolated RS485

2-wire communication link for Modbus RTU multidrop connections

Baud rate: 57600, 38400, 19200, or 9600

Protocol: Modbus RTU

Wiring: Single twisted shielded pair, 18 AWG. Wiring distance up to 4,000 ft. (1,524 m)

Ethernet

10/100base-TX Ethernet communication port
Protocols: Modbus TCP, OPC, HART-IP, https (for Web Interface)
Wiring: Cat5E shielded cable. Wiring distance 328 ft. (100 m).

Fiber Optic Ethernet (optional)

100BaseFx optical Ethernet communication port
Wavelength: 1300 nm center
Multimode

SC connectors
Protocols: Modbus, TCP, OPC, HART-IP, https (for Web Interface)
Wiring: 50/125 um or 62.5/125 um fiber, 2.48 miles (4.0 k,) maximum distance.

Modbus

Supports Modbus RTU and Modbus TCP with 32-bit floating point values, integers, and scaled integers.
Modbus Registers are user-specified.

OPC

OPC server supports OPC DA v2, v3

Self-Organizing Network Specifications

Protocol

IEC 62591 (WirelessHART), 2.4 - 2.5 GHz DSSS.

Maximum Network Size

100 wireless devices @ 8 sec.

50 wireless devices @ 4 sec.

Supported Device Update Rates

1 sec. to 60 min.

Network Size/Latency

100 Devices: less than 10 sec.
50 Devices: less than 5 sec.

Data Reliability

>99%

System Security Specifications

Ethernet

Secure Sockets Layer (SSL)- enabled (default) TCP/IP communications

Smart Wireless Gateway Access

Role-based Access Control (RBAC) including Administrator, Maintenance, Operator, and Executive. Administrator has complete control of the gateway and connections to host systems and the self-organizing network.

Self-Organizing Network

AES-128 Encrypted WirelessHART, including individual session keys. Drag and Drop device provisioning, including unique join keys and white listing.

Internal Firewall

User Configurable TCP ports for communications protocols, including Enable/Disable and user specified port numbers. Inspects both incoming and outgoing packets.

Product Certifications

Approved Manufacturing Locations

Rosemount Inc. – Chanhassen, Minnesota, USA
Emerson Process Management GmbH & Co. - Karlstein, Germany
Emerson Process Management Asia Pacific Private Limited - Singapore
Beijing Rosemount Far East Instrument Co., Limited - Beijing, China

Telecommunication Compliance

All wireless devices require certification to ensure that they adhere to regulations regarding the use of the RF spectrum. Nearly every country requires this type of product certification. Emerson is working with governmental agencies around the world to supply fully compliant products and remove the risk of violating country directives or laws governing wireless device usage.

FCC and IC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions. This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation. This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.

Ordinary Location Certification for FM

As standard, the Gateway has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

North American Certifications

N5 FM Division 2, Non-Incendive
Certificate Number: 3028321
Nonincendive for Class I, Division 2, Groups A, B, C, and D.
Suitable for Class II, III, Division 1,
Groups E, F, and G; Indoors/outdoor locations;
Type 4X
Temperature Code: T4 (-40 °C < T_a < 60 °C)

Canadian Standards Association (CSA)

N6 CSA Division 2, Non-Incendive
Certificate Number: 1849337
Suitable for Class I, Division 2, Groups A, B, C, and D.
Dust Ignition-proof for Class II, Groups E, F, and G;
Suitable for Class III Hazardous Locations.;
Install per Rosemount drawing 01420-1011.
Temperature Code: T4 (-40 °C < T_a < 60 °C)
CSA Enclosure Type 4X

European Union Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting your local sales representative.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

*Electro Magnetic Compatibility (EMC) (2004/108/EC***)**

Emerson Process Management complies with the EMC Directive.

Radio and Telecommunications Terminal Equipment Directive (R&TTE)(1999/5/EC)

Emerson Process Management complies with the R&TTE Directive

CE

European Certification

N1 ATEX Type n
Certificate Number: Baseefa 07ATEX0056X
ATEX Marking: Ex II 3 G
Ex nA nL IIC T4 (-40 °C < T_a < 60 °C)

Special condition for safe use (X):

The surface resistivity of the antenna is greater than one gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.

The Apparatus is not capable of withstanding the 500V insulation test required by Clause 9.4 of EN 60079-15: 2005. This must be taken into account when installing the apparatus.

ND ATEX Dust
Certificate Number: Baseefa 07ATEX0057
ATEX Marking: Ex II 3 G
Ex tD A 22 IP66 T135 (-40 °C < T_a < 60 °C)
Maximum working Voltage = 28 V

N7 IECEx Type n
Certificate Number: IECEx BAS 07.0012X
Ex nA nL IIC T4 (-40 °C =< T_a <=60 °C)
Maximum working voltage = 28 V

Special condition for safe use (X):

The surface resistivity of the antenna is greater than one gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.

The Apparatus is not capable of withstanding the 500 V insulation test required by Clause 9.4 of EN 60079-15: 2005. This must be taken into account when installing the apparatus.

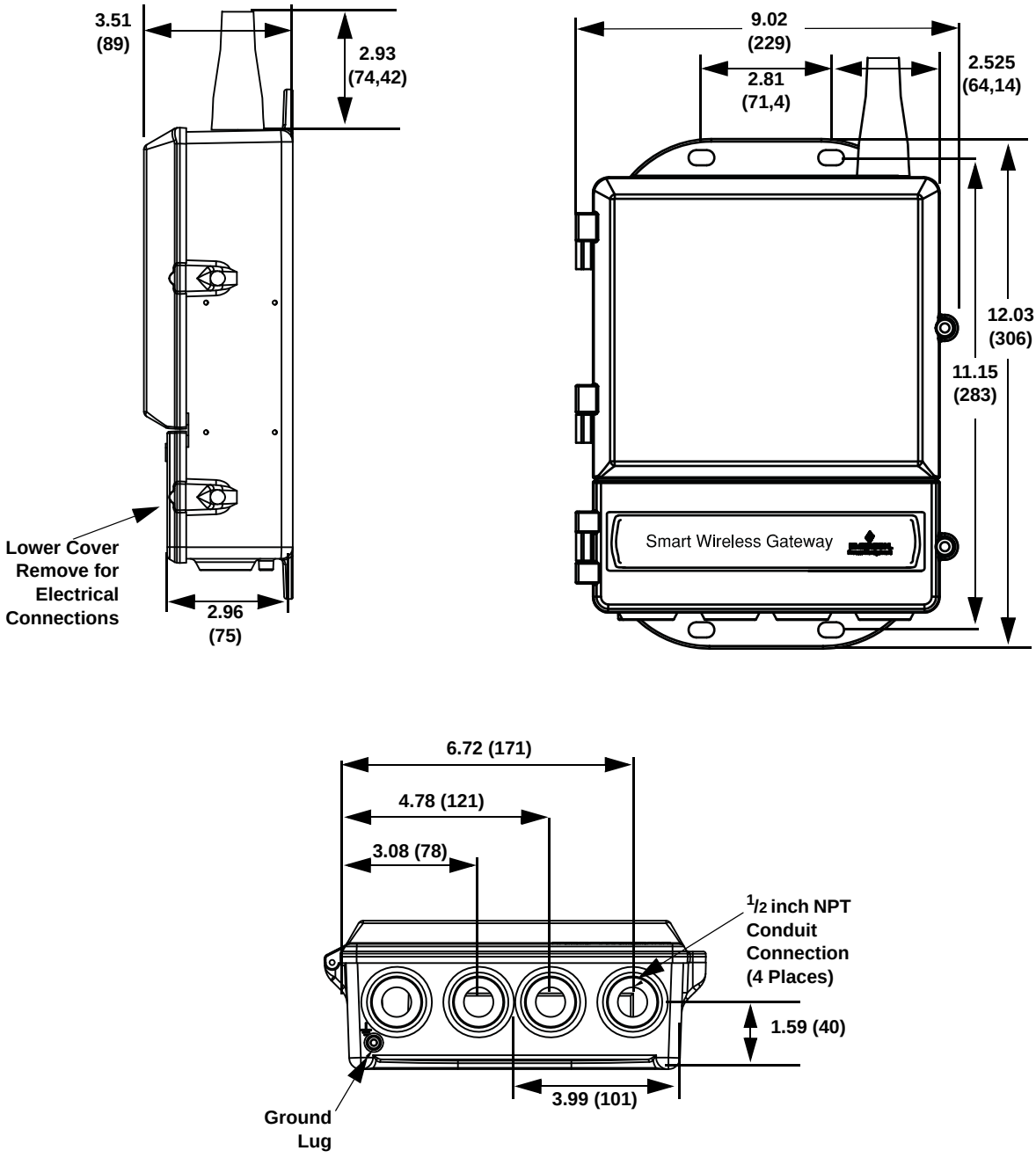
NF IECEx Dust
Certification Number: IECEx BAS 07.0013
Ex tD A22 IP66 T135 (-40 °C < T_a < 60 °C)
Maximum working voltage = 28 V

Combinations of Certifications

KD Combination of N5, N6, and N1.

Dimensional Drawings

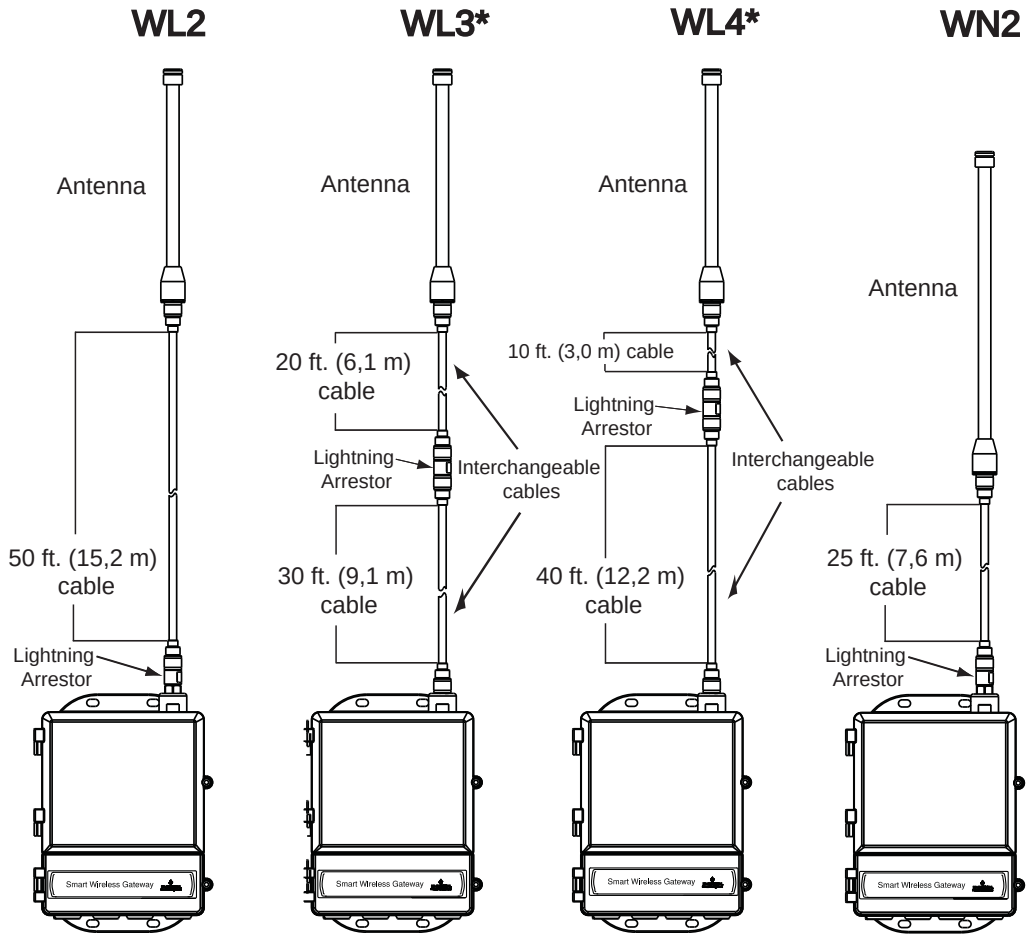
Figure 1. Smart Wireless Gateway
(Dimensions are in inches (millimeters)



Smart Wireless Gateway

Product Data Sheet
00813-0200-4420, Rev DA
Catalog 2011 - 2012

Remote Antenna Kit



The Remote Antenna kit includes sealant tape for remote antenna connection, as well as mounting brackets for the antenna, Lightning Arrestor, and the Smart Wireless Gateway.

Lightning protection is included on all the options.

****Note that the cables lengths on the remote antenna options WL3 and WL4 are interchangeable for installation convenience.***

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EMERSON
Process Management

Smart Wireless THUM™ Adapter

- *2- or 4-wire HART™ devices*
- *Flexibility to meet your most demanding applications*
- *Wireless output with >99% data reliability delivers rich HART data, protected by industry leading security*
- *Gain access to additional HART information, such as diagnostics or multivariable data*
- *Add wireless to almost any measurement point*
- *Smart Wireless capabilities extend the full benefits of PlantWeb® to previously inaccessible locations*



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IEC 62591 (WirelessHART™)... The Industry Standard

Self-Organizing, Adaptive Mesh Routing

- No wireless expertise required, devices automatically find the best communication paths
- Network continuously monitors paths for degradation and repairs itself
- Adaptive behavior provides reliable, hands-off operation and simplifies network deployments, expansion, and reconfiguration
- Supports both star and mesh topologies

Industry Standard Radio with Channel Hopping

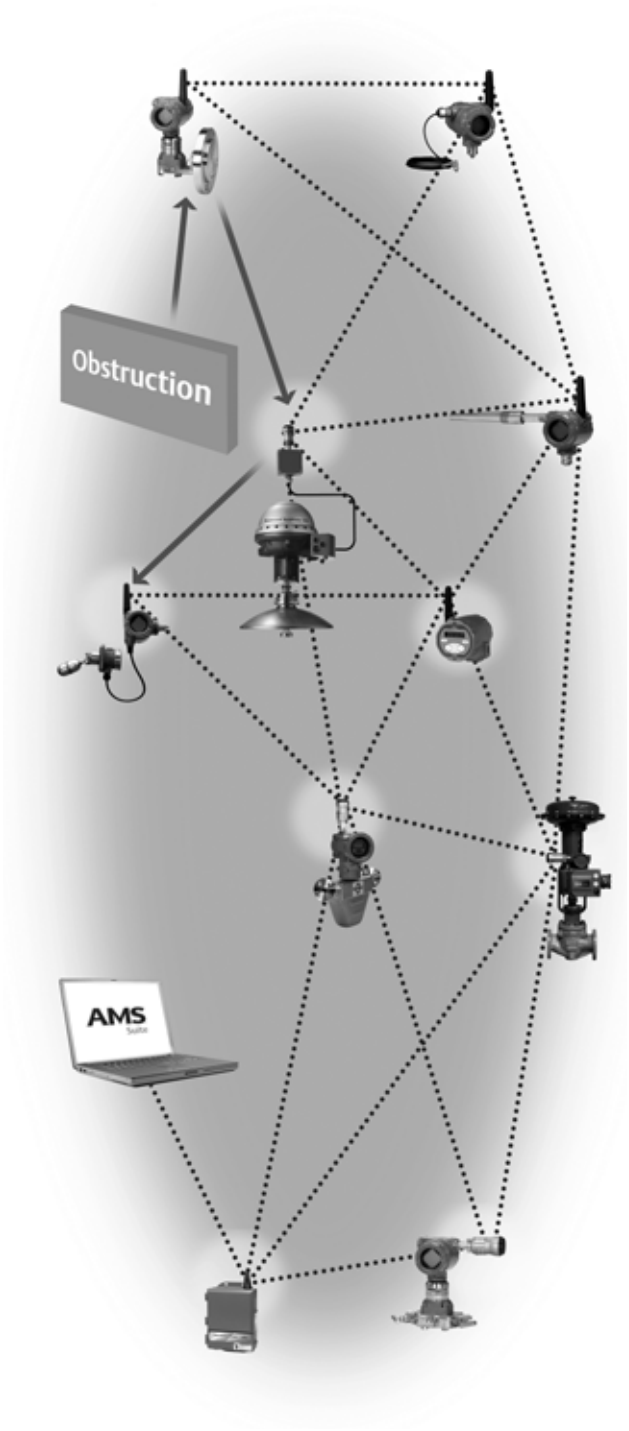
- Standard IEEE 802.15.4 radios
- 2.4 GHz ISM band sliced into 16 radio-channels
- Continually “hop” across channels to avoid interference and increase reliability
- Direct Sequence Spread Spectrum (DSSS) technology delivers high reliability in challenging radio environment

Self-Healing Network

- The self-organizing, self-healing network manages multiple communication paths for any given device. If an obstruction is introduced into the network, data will continue to flow because the device already has other established paths. The network will then lay in more communication paths as needed for that device.

Seamless Integration to Existing Hosts

- Transparent and seamless integration
- Same control system applications
- Gateways connect using industry protocols



Smart Wireless THUM Adapter



Device Specifications

- Approvals: FM, CSA, ATEX, IECEx
- Input: Either 2- or 4-wire HART 5.0 device
- SmartPower™: Power scavenging technology (no battery required)



Enable Enhanced Valve Capabilities

- Online, in-service valve testing through AMS ValveLink SNAP-ON Application
- Monitor alerts such as travel deviation with AMS Device Manager, supply pressure, and electronics health
- Trend actual valve position

Gain Access to Advanced Instrument Diagnostics

- Rosemount 3051S with Advanced Process Diagnostics
- Micro Motion™ Coriolis Meter Verification with optional AMS Meter Verification SNAP-ON
- Rosemount Radar Echo Curve
- Rosemount Magnetic Flow Meter Verification™ with AMS Device Manager

Efficiently Gather Data from Multivariable Devices

- Rosemount 3051S MultiVariable™ Transmitter and 3095 Mass Flow Transmitters
- Rosemount 3300 and 5300 Radar Level Transmitters
- Micro Motion Coriolis Meters
- Rosemount TankRadar Rex and TankRadar Pro
- Rosemount Magnetic Flowmeter
- Rosemount MultiVariable Vortex Flowmeter

Make any HART Device Wireless to Enable New Measurement Points

- Level
- Flow
- Valves
- Liquid and Gas Analytical
- Pressure
- Temperature

Remotely Manage Devices and Monitor Health with AMS Device Manager

- Reduce troubleshooting time
- As found, as left data
- Calibration tracking

Ordering Information

Table 1. Smart Wireless THUM Adapter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
775	Smart Wireless THUM Adapter	
Output		
X	Wireless	
Housing		
Standard		**Standard**
D	Aluminum	★
Expanded		
E	SST	
Mounting Connection		
Standard		**Standard**
1	1/2 - 14 NPT	★
2	M20-Conduit Adapter	★
PlantWeb Functionality		
Standard		**Standard**
1	HART® Data	★
Certification		
Standard		**Standard**
NA	No Approval	★
I5	FM Intrinsically Safe, Non-incendive	★
I6	CSA Intrinsically Safe	★
I1	ATEX Intrinsic Safety	★
N1	ATEX Type n	★
I7	IECEx Intrinsic Safety	★
N7	IECEx Type n	★
I2	INMETRO Intrinsic Safety	★
N2	INMETRO Type n	★
I3	China Intrinsic Safety	★
IP	Korea (KOSHA) Intrinsic Safety	★
IW	India (CCOE) Intrinsic Safety	★
IM	GOST (Russia) Intrinsically Safe	★
Wireless Update Rate, Operating Frequency, and Protocol		
Standard		**Standard**
WA3	User Configurable Update Rate, 2.4 GHz DSSS, WirelessHART	★
Omnidirectional, Wireless Antenna and SmartPower™ Options		
Standard		**Standard**
WK9	Long range, Integral Antenna, Power Scavenging	★
Typical Model Number: 775XD11I5WA3WK9		

ACCESSORIES AND SPARE PARTS

Table 2. Accessories

Item Description	Part Number
Remote Mount Kit - AI	00775-9000-0001
Remote Mount Kit - SST	00775-9000-0011
M20-Conduit Adapter	00775-9001-0001

Specifications

Functional Specifications

Input

Any 2- or 4-wire HART powered device

Output

IEC 62591 (WirelessHART)

Humidity Limits

0–100% relative humidity

Update Rate

User selectable, 8 sec. to 60 min.

Physical Specifications

Electrical Connections

The THUM Adapter is connected into a powered 4–20 mA loop, powering itself by scavenging power. The THUM Adapter causes a voltage drop across the loop. The drop is linear from 2.25 V at 3.5 mA to 1.2 V at 25 mA, but does not effect the 4–20 mA signal on the loop. Under fault conditions, the maximum voltage drop is 2.5 V.

Power Supply

Minimum load on loop 250 Ohms

To maintain normal operating functions of the sub-device, the power in the loop must have at least a 2.5 V margin at a 250 Ω load.

Limit power supply to 0.5 Amps maximum.

Limit power supply to 55 Vdc maximum.

Field Communicator Connections

Utilize wired device HART connections.

Materials of Construction

Enclosure

Housing option D - Low-copper aluminum

Housing option E - 316 SST

Paint - Polyurethane

M20-Conduit Adapter - SST
M20-Conduit Adapter O-ring - Buna-n

Antenna

Poly butadine terephthalate (PBT) / Polycarbonate (PC) integrated omnidirectional antenna

Weight

THUM Adapter only AL - 0.65 lbs. (0.29 kg)

THUM Adapter only SST - 1.1 lbs. (0.5 kg)

AL THUM Adapter with AL remote kit - 3.2 lbs. (1.45 kg)

SST THUM Adapter with SST remote kit - 5.8 lbs. (2.65 kg)

AL THUM Adapter with M20 conduit adapter - 0.85 lbs. (.038 kg)

SST THUM Adapter with M20 conduit adapter - 1.3 lbs. (0.59 kg)

Enclosure Ratings

Housing option code D and remote mount kits are NEMA 4X and IP66.

Mounting

The THUM Adapter may be attached directly to the conduit of any 2- or 4-wire HART device or mounted remotely by using remote mount kit.

Performance Specifications

ElectroMagnetic Compatibility (EMC)

All Models:

Meets all relevant requirements of EN 61326-1 (2006) when installed with shielded wiring. The sub-device must also use shielded wiring for installation.

Vibration Effect

Output unaffected when tested per the requirements of IEC60770-1 field with general application or pipeline with low vibration level (10-60 Hz 0.15 mm displacement peak amplitude / 60-500 Hz 2g).

When the THUM Adapter is used on wired devices that are subject to vibration levels greater than 2g, it is recommended that the THUM Adapter be remotely mounted using the remote mount kit.

Temperature Limits

Operating Limit	Storage Limit
–40 to 185 °F –40 to 85 °C	–40 to 185 °F –40 to 85 °C

Product Certifications

Approved Manufacturing Locations

Rosemount Inc. – Chanhassen, Minnesota, USA

Emerson Process Management GmbH & Co. - Karlstein, Germany

Emerson Process Management Asia Pacific Private Limited - Singapore

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

ATEX Directive (94/9/EC)

Emerson Process Management complies with the ATEX Directive.

Electro Magnetic Compatibility (EMC) (2004/108/EC)

Emerson Process Management complies with the EMC Directive.

Radio and Telecommunications Terminal Equipment Directive (R&TTE) (1999/5/EC)

Emerson Process Management complies with the R&TTE Directive.

Telecommunication Compliance

All wireless devices require certification to ensure that they adhere to regulations regarding the use of the RF spectrum. Nearly every country requires this type of product certification. Emerson is working with governmental agencies around the world to supply fully compliant products and remove the risk of violating country directives or laws governing wireless device usage.

FCC and IC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation.This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.

Ordinary Location Certification for FM

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Hazardous Locations Certificates

North American Certifications

Factory Mutual (FM) Approvals

I5 FM Intrinsically Safe and Non-incendive
Intrinsically Safe for Class I/II/III, Division 1, Groups A, B, C, D, E, F, and G.
Zone Marking: Class I, Zone 0, AEx ia IIC
Temperature Codes T4 (-50 °C ≤ T_{amb} ≤ 70 °C)
Non-incendive for Class I, Division 2, Groups A, B, C, and D.
Intrinsically safe and non-incendive when installed according to Rosemount Drawing 00775-0010.
Enclosure Type 4X/IP66

CSA - Canadian Standards Association

I6 CSA Intrinsically Safe
Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D.
T3C (-50 °C ≤ T_{amb} ≤ 70 °C)
Intrinsically safe when installed according to Rosemount Drawing 00775-0012.
Suitable for Class I, Division 2, Groups A, B, C, and D.
Enclosure Type 4X/IP66

European Certifications

I1 ATEX Intrinsic Safety
Certificate No.: Baseefa09ATEX0125X ⟨Ex⟩ II 1G
Ex ia IIC T4 (-50 °C ≤ T_{amb} ≤ 70 °C)
IP66
CE 1180

Table 3. Input Parameters

Loop Power
Ui = 30 V
Ii = 200 mA
Pi = 1.0 W
Ci = 0
Li = 0

Special conditions for safe use (X)

The surface resistivity of the antenna is greater than one gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.

The enclosure is made of aluminium alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in a zone 0.

N1 ATEX Type n
Certificate No.: Baseefa09ATEX0131 ⟨Ex⟩ II 3 G
Ex nA IIC T4 (-50 °C ≤ T_{amb} ≤ 70 °C)
Ui = 45 Vdc MAX
IP66
CE 1180

IECEx Certifications

I7 IECEx Intrinsic Safety
Certificate No.: IECEx BAS 09.0050X
Ex ia IIC T4 (-50 °C ≤ T_{amb} ≤ 70 °C)
IP66

Table 4. Input Parameters

Loop Power
Ui = 30 V
Ii = 200 mA
Pi = 1.0 W
Ci = 0
Li = 0

Special conditions for safe use (X)
The surface resistivity of the antenna is greater than one gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.

The enclosure is made of aluminium alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in a zone 0.

N7 IECEx Type n
Certificate No.: IECEx BAS 09.0058
Ex nA IIC T4 (-50 °C ≤ T_{amb} ≤ 70 °C)
Ui = 45 Vdc MAX
IP66

INMETRO Certifications

I2 Intrinsic Safety
BR-Ex ia IIC T4 (-50 °C ≤ T_{amb} ≤ 70 °C) Ga

N2 INMETRO Type 'n'
BR-Ex nA IIC T4 Gc (-50 °C ≤ T_{amb} ≤ 70 °C)

China (NEPSI) Certifications

I3 China (NEPSI) Intrinsic Safety
Ex ia IIC T4

CCoE Certifications

IW Intrinsic Safety
Ex ia IIC T4

KOSHA Certifications

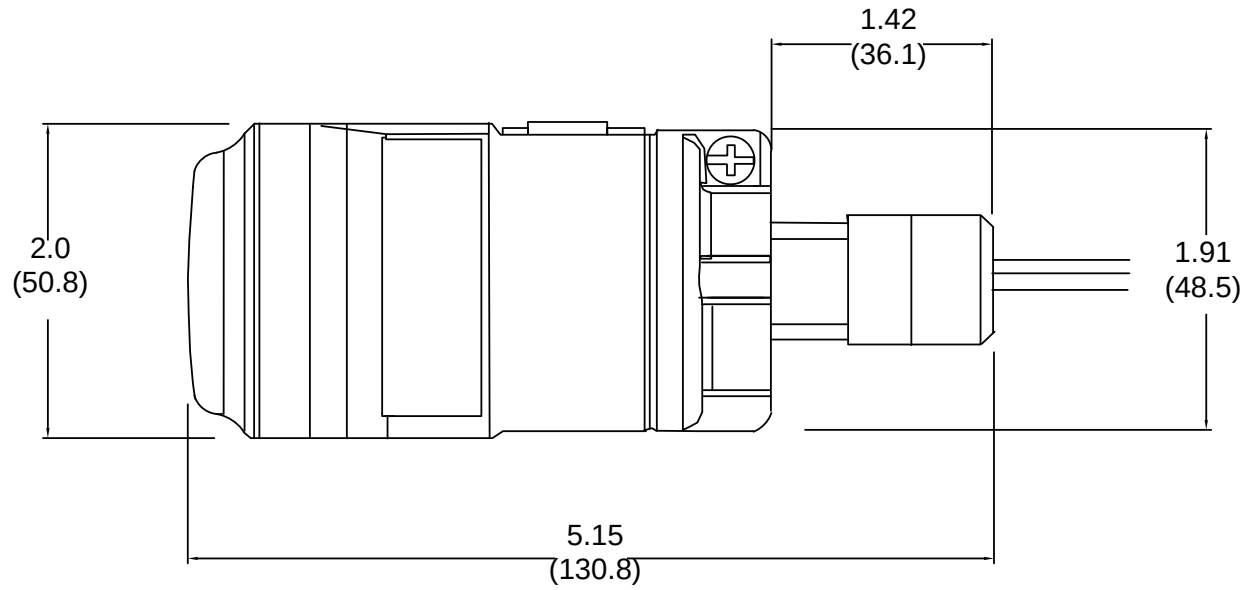
IP Intrinsic Safety
Ex ia IIC T4

GOST Certifications

IM Intrinsically Safe
Ex ia IIC T4 (-50 °C ≤ T_{amb} ≤ 70 °C)
Ex nA IIC T4 (-50 °C ≤ T_{amb} ≤ 70 °C)
IP66

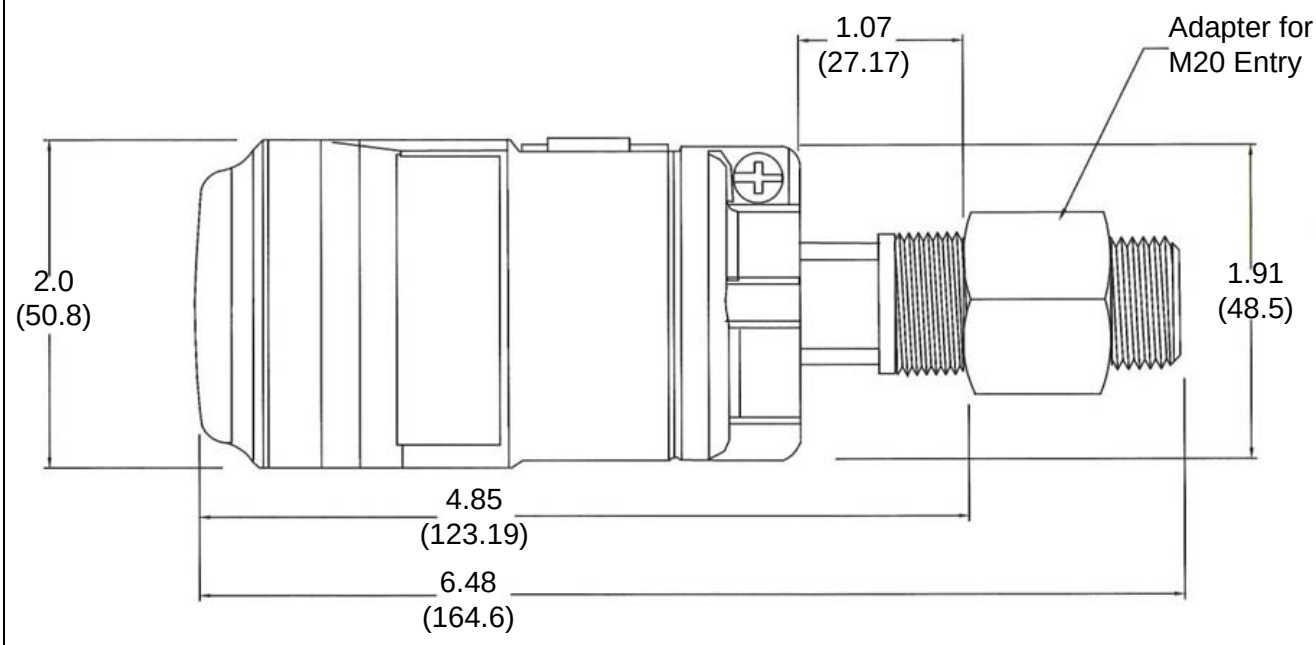
Dimensional Drawings

THUM Adapter ½ NPT



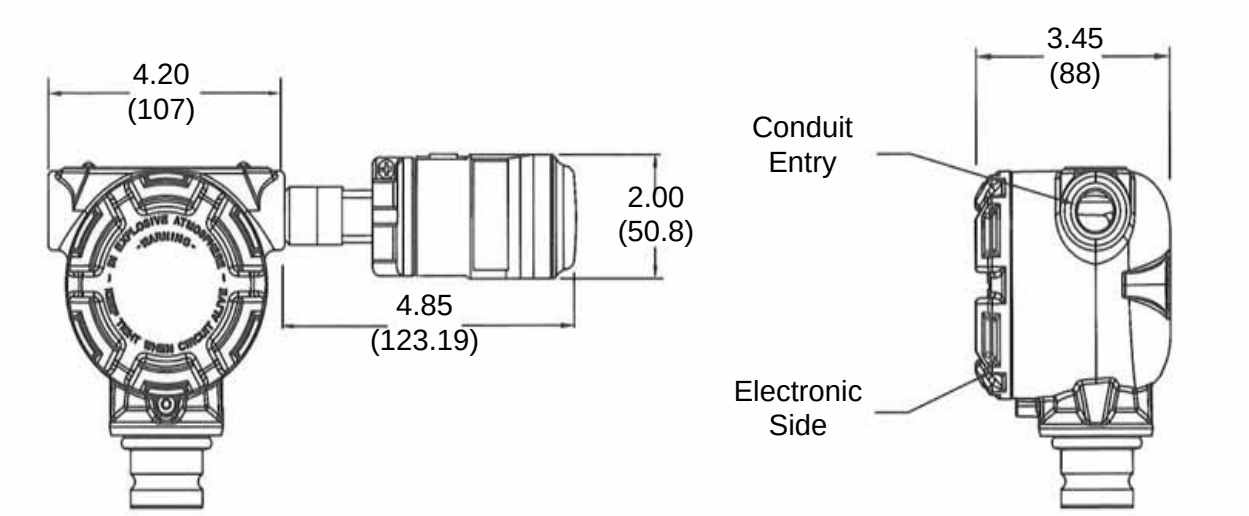
Dimensions are in inches (millimeters)

THUM Adapter with M20 Conduit Adapter



Dimensions are in inches (millimeters)

THUM Adapter with Remote Mount Kit



Dimensions are in inches (millimeters)

Smart Wireless THUM Adapter

Product Data Sheet
00813-0100-4075, Rev CA
Catalog 2011 - 2012

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00813-0100-4075 Rev CA, 7/11

EMERSON
Process Management

Rosemount 702 Wireless Discrete Transmitter

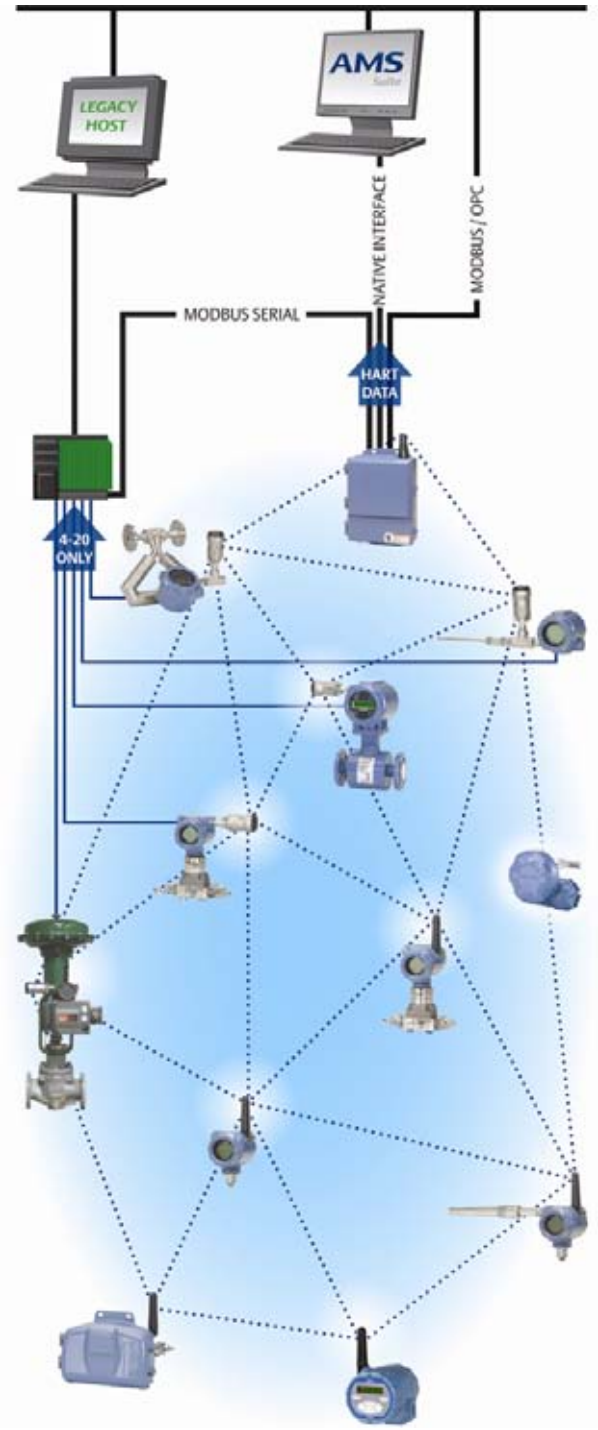
- *An installation-ready solution that provides dual channel, discrete input, discrete output, or leak detection input options*
- *Discrete single or dual switch input with logic for limit contact and opposing contact applications*
- *Dual channels are each configurable for discrete input or discrete output*
- *Self-organizing network delivers information rich data with >99% data reliability*



Contents

Emerson's Smart Wireless Solution . . . . . page Wireless-24
Ordering Information . . . . . page Wireless-25
Specifications . . . . . page Wireless-27
Product Certifications . . . . . page Wireless-31
Dimensional Drawings. . . . . page Wireless-33

Emerson's Smart Wireless Solution



IEC 62591 (*Wireless*HART™)... The Industry Standard

Self-Organizing, Adaptive Mesh Routing

- No wireless expertise required, network automatically finds the best communication paths
- The self-organizing, self-healing network manages multiple communication paths for any given device. If an obstruction is introduced into the network, data will continue to flow because the device already has other established paths. The network will then lay in more communication paths as needed for that device.

Reliable Wireless Architecture

- Standard IEEE 802.15.4 radios
- 2.4 GHz ISM band sliced into 15 radio-channels
- Time Synchronized Channel Hopping to avoid interference from other radios, WiFi, and EMC sources and increase reliability
- Direct sequence spread spectrum (DSSS) technology delivers high reliability in challenging radio environment

Emerson's Smart Wireless

Seamless Integration to All Existing Host Systems

- Native integration into DeltaV and Ovation is transparent and seamless
- Gateways interface with existing host systems using industry standard protocols including OPC, Modbus TCP/IP, and Modbus RTU

Layered Security Keeps Your Network Safe

- Ensures that data transmissions are received only by the Smart Wireless Gateway
- Network devices implement industry standard Encryption, Authentication, Verification, Anti-Jamming, and Key Management
- Third party security verification including Achilles and FIPS197.

SmartPower™ Solutions

- Optimized Emerson instrumentation, both hardware and software, to extend power module life
- SmartPower technologies enable predictable power life

Ordering Information

Table 1. 702 Wireless Discrete Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Product Description						
Standard						**Standard**
702	DiscreteTransmitter					★
Transmitter Type						
Standard						**Standard**
D	Wireless Field Mount					★
Output						
Standard						**Standard**
X	Wireless					★
Measurement						
Standard						**Standard**
22	Dual Discrete Inputs (Dry Contact)					★
32	Discrete Dual Input (Dry Contact), Detects Momentary Inputs and Counts					★
42	Discrete Dual Input or Output, Configurable					★
61(1)	Liquid Hydrocarbon Detection (For use with TraceTek Fast Fuel Sensor or TraceTek sensing cable)					★
Housing						
Standard						**Standard**
D	Dual Compartment Housing - Aluminum					★
E	Dual Compartment Housing - SST					★
Conduit Threads						
Standard						**Standard**
1	1/2 - 14 NPT					★
Certifications			**Measurement Option Codes**			
Standard						**Standard**
I5	FM Intrinsically Safe, Non-Incendive, and Dust Ignition-Proof		22, 32, 61			★
I6	CSA Intrinsically Safe		22, 32, 61			★
I1	ATEX Intrinsic Safety		22, 32, 61			★
IU	ATEX Intrinsic Safety for Zone 2		22, 32, 42, 61			★
I7	IECEx Intrinsic Safety		22, 32, 61			★
IY	IECEx Intrinsic Safety for Zone 2		22, 32, 42, 61			★
I4	TIIS Intrinsic Safety		22			★
I3	China Intrinsic Safety		22			★
N5	FM Division 2, Non-Incendive		22, 32, 42, 61			★
N6	CSA Division2, Non-Incendive		22, 32, 42, 61			★
NA	No Approval		22, 32, 42, 61			★

Wireless Options

Wireless Update Rate, Operating Frequency and Protocol		
Standard		**Standard**
WA3	User Configurable Update Rate, 2.4 GHz DSSS, IEC 62591 (WirelessHART)	★
Omnidirectional Wireless Antenna and SmartPower Solutions		
Standard		**Standard**
WK1	External Antenna, Adapter for Black Power Module (I.S. Power Module Sold separately)	★
WM1	Extended Range, External Antenna, Adapter for Black Power Module (I.S. Power Module Sold separately)	★
Expanded		**Expanded**
WN1	High-Gain, Remote Antenna, Adapter for Black Power Module (I.S. Power Module Sold separately)	

Table 1. 702 Wireless Discrete Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Other Options (Include with selected model number)

Meter		
Standard		**Standard**
M5[1]	LCD Meter	★
Mounting Bracket		
Standard		**Standard**
B4	Universal L mounting bracket for 2-inch pipe mounting - SST bracket and bolts	★
Configuration		
Standard		**Standard**
C1	Factory Configure Date, Descriptor, Message Fields, and Wireless Parameters	★
Cable Gland		
Standard		**Standard**
G2	Cable gland (7.5 mm - 11.9 mm)	★
G4[2]	Thin Wire Cable Gland (3 mm - 8 mm)	★
Typical Model Number: 702 D X 22 D 1 NA WA3 WK1 M5		

(1) LCD Display not available for option code 61.

(2) Thin wire cable gland is preferred for measurement option 61.

Specifications

Functional Specifications

Discrete Input

Single or dual SPST dry contacts, single SPDT dry contacts or leak detection. To maintain I.S. ratings, contacts must be limited to simple switches or leak detection only.

Discrete Output

Maximum Rating: 24 Vdc, 100 mA

Wireless Output

IEC 62591 (WirelessHART) 2.4 GHz DSSS.

Radio Frequency Power Output from Antenna

External (WK option) antenna: Maximum of 10 mW (10 dBm) EIRP

Extended Range, External (WM option) antenna: Maximum of 18 mW (12.5 dBm) EIRP

Local Display(1)

The optional integral LCD can display discrete state and diagnostic information. Display updates at transmit rate up to once per minute.

(1) The option for a local display is not available with option 61, Liquid Hydrocarbon Leak Detection.

Humidity Limits

0–100% relative humidity

Update Rate

User selectable, 1 sec. to 60 min.

Physical Specifications

Electrical Connections

Wireless Power Module

Replaceable, Intrinsically Safe Lithium-Thionyl Chloride power module with PBT polymer enclosure. Ten year life at one minute update rate.(1)

(1) Reference conditions are 70° F (21° C), and routing data for three additional network devices.

NOTE: Continuous exposure to ambient temperature limits (-40 °F or 185 °F) (-40 °C or 85 °C) may reduce specified power module life by less than 20 percent.

Switch Terminals

Screw terminals permanently fixed to terminal block

Field Communicator Connections

Communication Terminals

Clips permanently fixed to terminal block

Materials of Construction

Enclosure

Housing - Low-copper aluminum, or stainless steel

Paint - Polyurethane

Cover O-ring - Buna-N

Terminal Block and Power Module Pack

PBT

Antenna

PBT/PC integrated omnidirectional antenna

Weight

Low - Copper Aluminum:
702 without LCD - 4.6 lbs. (2.0 kg)
702 with M5 LCD - 4.7 lbs (2.1 kg)

Stainless Steel:
702 without LCD - 8.0 lbs. (3.6 kg)
702 with M5 LCD - 8.1 lbs (3.7 kg

Enclosure Ratings (702)

NEMA 4X, and IP66/67.

Mounting

Transmitters may be attached directly to switch, brackets also permit remote mounting. See “Dimensional Drawings” on page 33.

Performance Specifications

ElectroMagnetic Compatibility (EMC)

All Models:

Meets all relevant requirements of EN 61326-2-3:2006

Vibration Effect

Output unaffected when tested per the requirements of IEC60770-1 field or pipeline with high vibration level (10-60 Hz 0.21mm displacement peak amplitude / 60-2000 Hz 3g).

Output unaffected when tested per the requirements of IEC60770-1 field with general application or pipeline with low vibration level (10-60 Hz 0.15mm displacement peak amplitude / 60-500 Hz 2g).

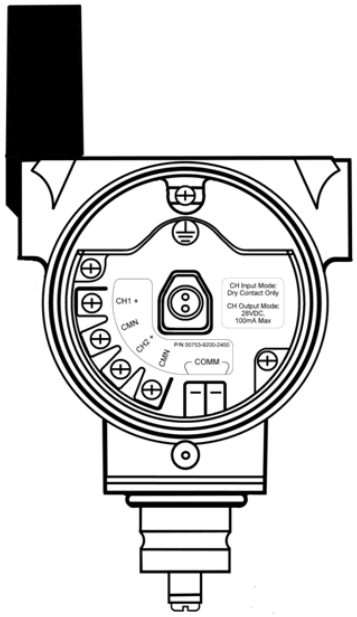
Temperature Limits

Description	Operating Limit	Storage Limit
Without LCD Display	–40 to 185 °F –40 to 85 °C	–40 to 185 °F –40 to 85 °C
With LCD Display	–4 to 175 °F –20 to 80 °C	–40 to 185 °F –40 to 85 °C

Dry Contact Switch Inputs, Measurement option code 22

Terminal Block Connections

Figure 1. 702 Sensor Connections



Wireless Output Specifications

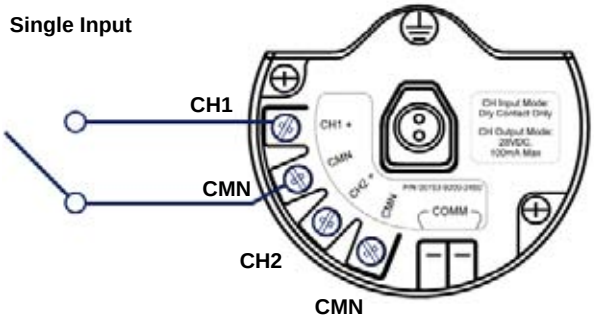
Dry Contact Switch Inputs, Measurement option code 22

Dual Input, No Logic

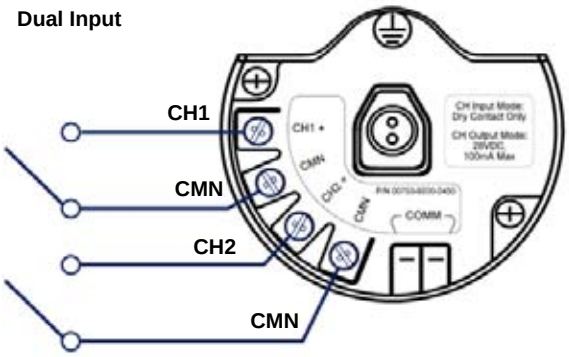
The 702 Discrete Transmitter will accept the input from one or two single pole single throw switches on inputs CH1 and CH2. The wireless output of the transmitter will be both a primary variable (PV) and a secondary variable (SV). The PV is determined by the CH1 input. The SV is determined by the CH2 input. A closed switch drives a TRUE output. An Open switch drives a FALSE output.

Figure 2. Single, Dual Input

Single Input



Dual Input



Single or Dual Input, No Logic			
Switch Input	**Wireless Output**	**Switch Input**	**Wireless Output**
CH1	**PV**	**CH2**	**SV**
Closed	TRUE (1.0)	Closed	TRUE (1.0)
Open	FALSE (0.0)	Open	FALSE (0.0)

If inverted output is selected, any outputs will be inverted, as shown below.

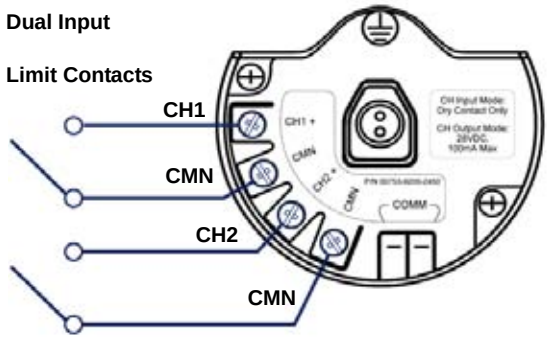
Single or Dual Input, No Logic, Inverted Output			
Switch Input	**Wireless Output**	**Switch Input**	**Wireless Output**
CH1	**PV**	**CH2**	**SV**
Closed	FALSE (0.0)	Closed	FALSE (0.0)
Open	TRUE (1.0)	Open	TRUE (1.0)

Dry Contact Switch Inputs (Continued)...

Dual Input, Limit Contact Logic

When configured for Limit Contact Logic, the 702 Discrete Transmitter will accept the input from two single pole single throw switches on inputs CH1 and CH2, and will use limit contact logic for the determination of the wireless outputs.

Figure 3. Dual Input, Limit Contacts



Dual Input, Limit Contact Logic			
Switch Input	**Wireless Output**	**Switch Input**	**Wireless Output**
CH1	**PV**	**CH2**	**SV**
Open	Open	TRAVEL (0.5)	TRAVEL (0.5)
Open	Closed	FALSE (0.0)	FALSE (0.0)
Closed	Open	TRUE (1.0)	TRUE (1.0)
Closed	Closed	FAULT(NaN)	FAULT(NaN)

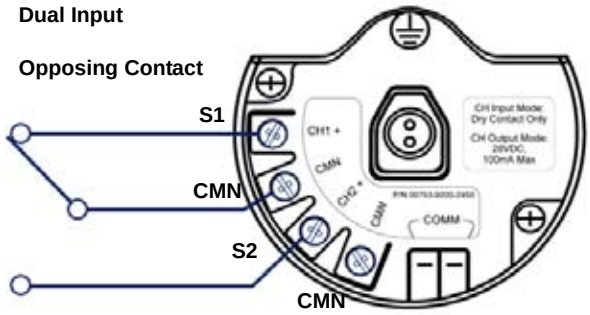
If inverted output is selected, any outputs will be inverted, as shown below.

Dual Input, Limit Contact Logic			
Switch Inputs		**Wireless Outputs**	
CH1	**PV**	**CH2**	**SV**
Open	Open	FAULT(NaN)	FAULT(NaN)
Open	Closed	TRUE (1.0)	TRUE (1.0)
Closed	Open	FALSE (0.0)	FALSE (0.0)
Closed	Closed	TRAVEL (0.5)	TRAVEL (0.5)

Dual Input, Opposing Contact Logic

When configured for Opposing Contact Logic, the 702 Discrete Transmitter will accept the input from a double pole single throw switches on inputs CH1 and CH2, and will use opposing contact logic for the determination of the wireless outputs.

Figure 4. Dual Input, Opposing Contact



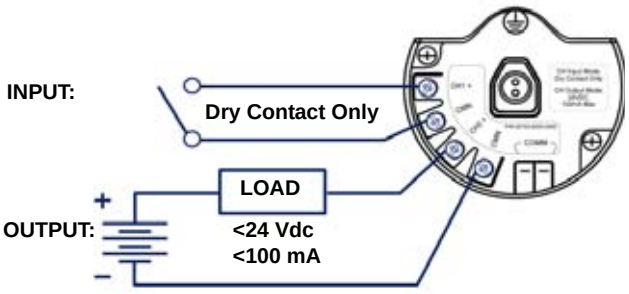
Dual Input, Opposing Contact Logic			
Switch Inputs		**Wireless Outputs**	
S1	**S2**	**PV**	**SV**
Open	Open	FAULT(NaN)	FAULT(NaN)
Open	Closed	FALSE (0.0)	FALSE (0.0)
Closed	Open	TRUE (1.0)	TRUE (1.0)
Closed	Closed	FAULT(NaN)	FAULT(NaN)

If inverted output is selected, any outputs will be inverted, as shown below.

Dual Input, Opposing Contact Logic, Inverted Output			
Switch Inputs		**Wireless Outputs**	
CH1	**CH2**	**PV**	**SV**
Open	Open	FAULT(NaN)	FAULT(NaN)
Open	Closed	TRUE (1.0)	TRUE (1.0)
Closed	Open	FALSE (0.0)	FALSE (0.0)
Closed	Closed	FAULT(NaN)	FAULT(NaN)

Output Circuits

Figure 5. Terminal Wiring Diagram

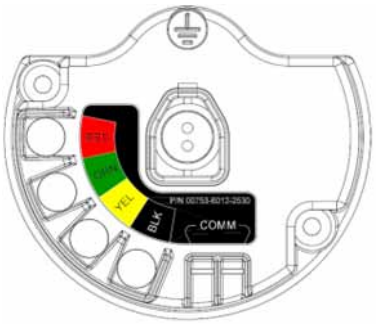


The Rosemount 702 Wireless Discrete Transmitter has two channels that can each be configured for discrete input or output. Inputs must be dry contact switch inputs and these were described in the preceding section of this document. Outputs are a simple switch closure and has maximum capacities of 24 volts DC and 100 mA per channel.

Leak Sensors, Liquid Hydrocarbon Detection, Measurement option code 61

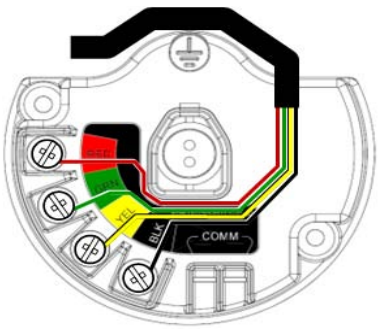
Terminal Block Connections

Figure 6. Fuel Sensor Terminal Diagram



The Liquid Hydrocarbon Detection configuration is intended for use with the Tyco® TraceTek® Fast Fuel Sensor, or TraceTek sensing cable.

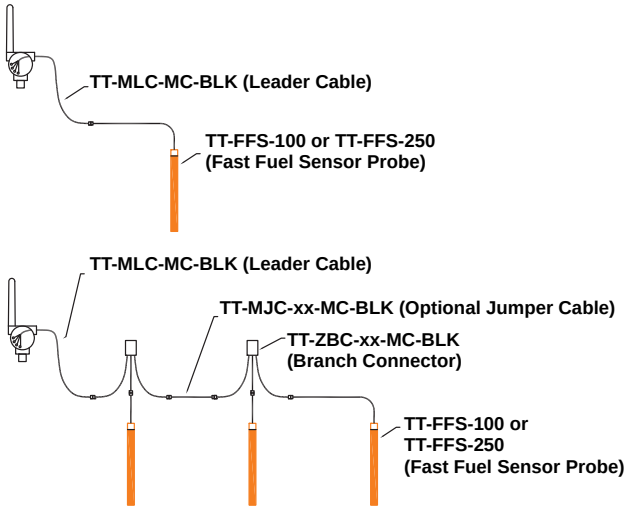
Figure 7. Fuel Sensor Connection Diagram



The connections to the Fast Fuel Sensor TraceTek sensing cable are made by matching the appropriately colored wires to the matching colored termination lugs.

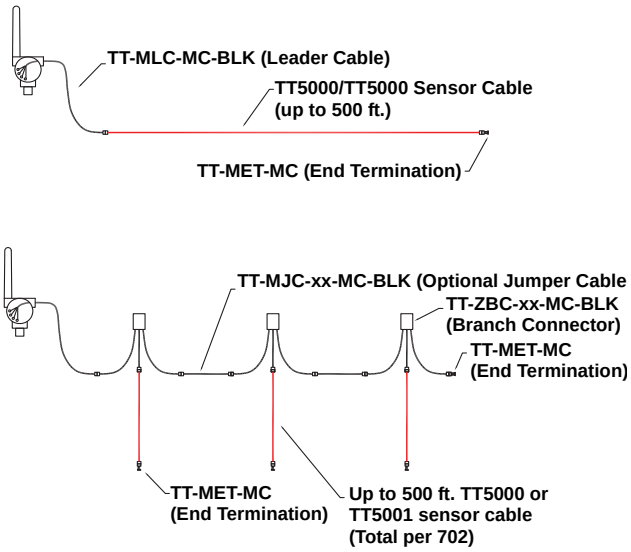
- The Emerson Smart Wireless 702 Discrete Transmitter can support up to 3 Fast Fuel sensors. These Fast Fuel sensors are connected using TraceTek Modular Leader Cable (TT-MLC-MC-BLK), optional modular jumper cables (TT-MJC-xx-MC-BLK) and branching connectors (TT-ZBC-MC-BLK) as suggested in Figure 8.

Figure 8. Fuel Sensor wiring



- The Emerson Smart Wireless 702 Discrete Transmitter can support up to 500 feet of TraceTek hydrocarbon or solvent sensor cable (TT5000 or TT5001 series). The total amount of sensor cable connected to a single 702 transmitter is not to exceed 500 ft. However leader cable, jumper cables (if used), and branch connectors are not included in the 500 foot limit. See Figure 9 for typical configurations.

Figure 9. Fuel Sensor sensor cable wiring



Product Certifications

ROSEMOUNT 702

Approved Manufacturing Locations

Rosemount Inc. – Chanhassen, Minnesota, USA
Emerson Process Management GmbH & Co. - Karlstein, Germany
Emerson Process Management Asia Pacific Private Limited - Singapore

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

Telecommunication Compliance

All wireless devices require certification to ensure that they adhere to regulations regarding the use of the RF spectrum. Nearly every country requires this type of product certification. Emerson is working with governmental agencies around the world to supply fully compliant products and remove the risk of violating country directives or laws governing wireless device usage.

FCC and IC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation.

This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.

Ordinary Location Certification for FM Approvals

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM Approvals, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Hazardous Locations Certificates

North American Certifications

FM Approvals

I5 FM Intrinsically Safe, Non-Incendive and Dust Ignition-Proof
Intrinsically Safe for Class I/II/III, Division 1, Groups A, B, C, D, E, F, and G.
Zone Marking: Class I, Zone 0, AEx ia llC
Temperature Codes T4 (-50 °C ≤ T_{amb} ≤ 70 °C)
Non-incendive for Class I, Division 2, Groups A, B, C, and D.
Dust Ignition-proof for Class II/III, Division 1, Groups E, F, and G.
Intrinsically Safe and non-incendive when installed in accordance with Rosemount drawing 00702-1000.
For use with Rosemount SmartPower® power module part number 753-9220-0001, or Emerson Smart Power™ power module model number 701PBKKF only.
Enclosure Type 4X / IP66 / IP67

N5 FM Division 2, Non-Incendive
Certificate number: XXXXX
Non-incendive for Class I, Division 2, Groups A, B, C, and D.
Suitable for Class II, III, Division 1
Groups E, F, and G; indoor/outdoor locations
Type 4X
Temperature Code: T4 (-50 °C ≤ Tamb ≤ 70 °C)

CSA International

I6 CSA Intrinsically Safe
Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D.
Temp Code T3C
Enclosure Type 4X / IP66 / IP67
For use with Rosemount SmartPower power module part number 753-9220-0001, or Emerson Smart Power™ power module model number 701PBKKF only.
Intrinsically Safe when installed per Rosemount drawing 00702-1020

N6 CSA Division 2, Non-Incendive
Certificate number: XXXXX
Non-incendive for Class I, Division 2, Groups A, B, C, and D.
Suitable for Class II, III, Division 1
Groups E, F, and G; indoor/outdoor locations
Type 4X
Temperature Code: T4 (-50 °C ≤ Tamb ≤ 70 °C)

European Certifications

I1 ATEX Intrinsic Safety
Certificate No.: BASEEFA07ATEX0239X ⟨Ex⟩ II 1G
Ex ia IIC T4 (-60 °C ≤ T_{amb} ≤ 70 °C)
CE 1180
IP66 / IP67
For use with Rosemount SmartPower ™ power module part number 753-9220-0001, or Emerson Smart Power™ power module model number 701PBKKF only.
Special conditions for safe use (X)
The surface resistivity of the antenna is greater than 1 gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.

TABLE 2. Sensor Parameters

Dry Contact Inputs Option Code 22 and 32	Liquid Hydrocarbon Detection Option Code 61
U_0 = 6.51 V	U_0 = 7.8 V
I_0 = 26 mA	I_0 = 92 mA
P_0 = 42.6 mW	P_0 = 180 mW
C_0 = 10.9 uF	C_0 = 9.2 uF
L_0 = 25 mH	L_0 = 5 mH

IU ATEX Intrinsic Safety for Zone 2
Certificate number: XXXX
Ex ia IIC T4 (-60 °C ≤ Tamb ≤ 70 °C)
CE 1180
IP66 / IP67

For use with Rosemount Smart Power™ power module part number 753-9220-0001, or Emerson Smart Power™ power module model number 701PBKKF only.

IECEx System Certifications

I7 IECEx Intrinsic Safety
Certificate No.: IECExBAS07.0082X
Ex ia IIC T4 (-60 °C ≤ T_{amb} ≤ 70 °C)
IP66 / IP67
For use with Rosemount SmartPower power module part number 753-9220-0001, or Emerson Smart Power™ power module model number 701PBKKF only.
Special conditions for safe use (X)
The surface resistivity of the antenna is greater than 1 gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.

TABLE 3. Sensor Parameters

Dry Contact Inputs Option Code 22 and 32	Liquid Hydrocarbon Detection Option Code 61
U_o = 6.51 V	U_o = 7.8 V
I_o = 26 mA	I_o = 92 mA
P_o = 42.6 mW	P_o = 180 mW
C_o = 10.9 uF	C_o = 9.2. uF
L_o = 25 mH	L_o = 5 mH

IY IECEx Intrinsic Safety for Zone 2
Certificate number: XXXX
Ex ia IIC T4 (-60 °C ≤ Tamb ≤ 70 °C)
IP66 / IP67
For use with Rosemount Smart Power™ power module part number 753-9220-0001, or Emerson Smart Power™ power module model number 701PBKKF only.

Japanese Certifications

I4 TIIS Intrinsic Safety
Ex ia IIC T4

Certificate Option Code 22	Description
TC18457	Frequency/Protocol Option WA1
TC18640	Frequency/Protocol Option WA3

China (NEPSI) Certifications

I3 China Intrinsic Safety
Certificate No. (Manufactured in Chanhassen or Singapore): GYJ081015
Ex ia IIC T4/T5

Special Condition for Safe Use

1. The temperature class depends on ambient temperature range as follows:

Temperature Class	Ambient Temperature Range
T4	(-60 ~ +70) °C
T5	(-60 ~ +40) °C

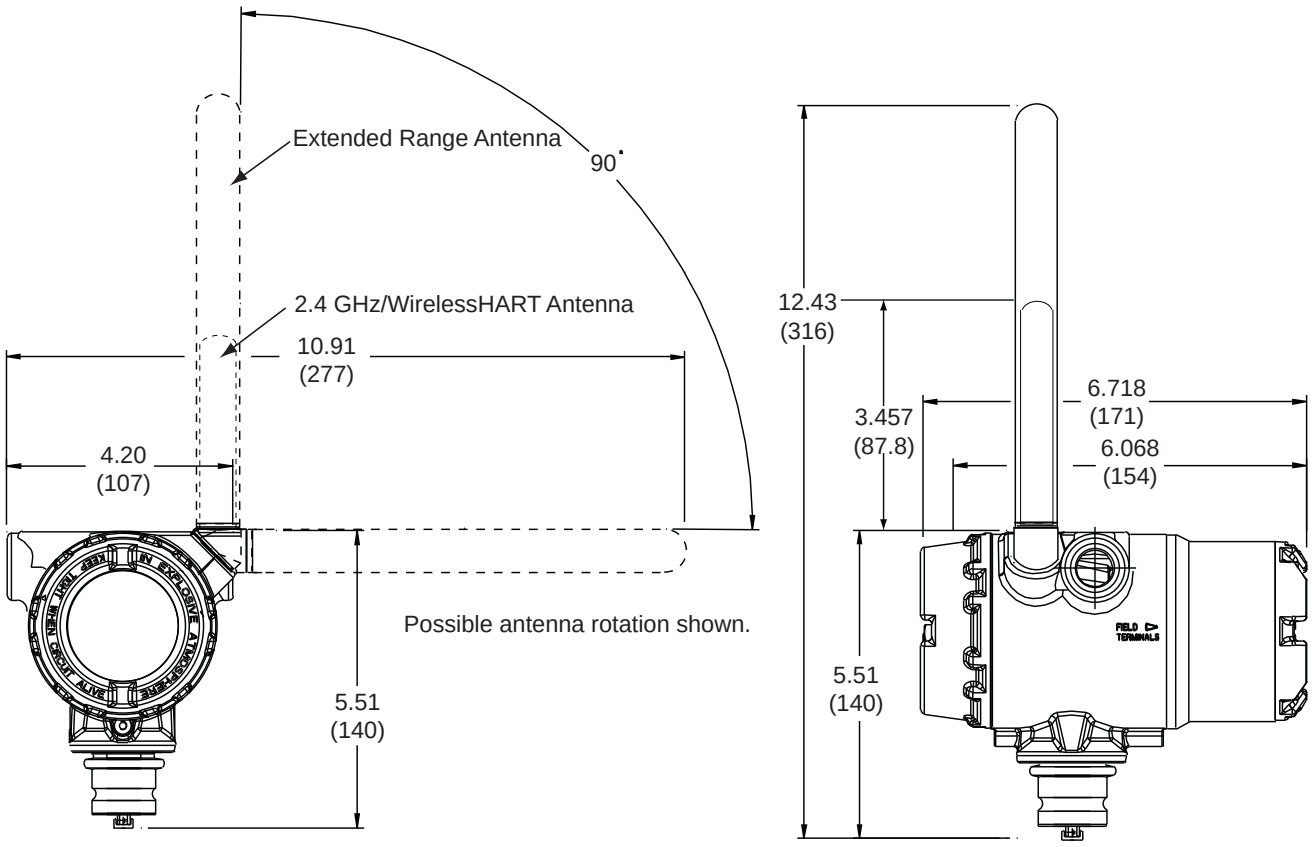
2. Safety Parameters:

Dry Contact Inputs Option Code 22	
U_o = 6.6 V	
I_o = 26.2 mA	
P_o = 42.6 mW	
C_o = 10.9 uF	
L_o = 25 uH	

3. The cable entry of transmitter should be protected to ensure the degree of protection of the enclosure IP 20 (GB4208-1993) at least.The cables between transmitter and associated apparatus should be shielded cables (the cables must have insulated shield). The cable core section area should be more than 0.5 mm^2. The shield has to be grounded reliably. The wiring has to not be affected by electromagnetic disturbance.
4. COMM interface is forbidden to use in hazardous location.
5. Associated apparatus should be installed in a safe location, and during installation, operation, and maintenance, the regulations of the instruction manual have to be strictly observed.
6. End users are not permitted to change any components insides.
7. During installation, use, and maintenance of the transmitter, observe the following standards.
   a. GB3836.13-1997 “Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres”
   b. GB3836.15-2000 “Electrical apparatus for explosive gas atmospheres Part 15: Electrical installations in hazardous area (other than mines)”
   c. GB3836.16-2006 “Electrical apparatus for explosive gas atmospheres Part 16: Inspection and maintenance of electrical installation (other than mines)”
   d. GB50257-1996 “Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering”
8. Note all installation practices must be followed and if connected to a device that doesn't meet these same approval requirements, the overall system installed approval may be affected.

Dimensional Drawings

702 Direct Mount



Dimensions are in inches (millimeters)

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Rosemount 708 Wireless Acoustic Transmitter

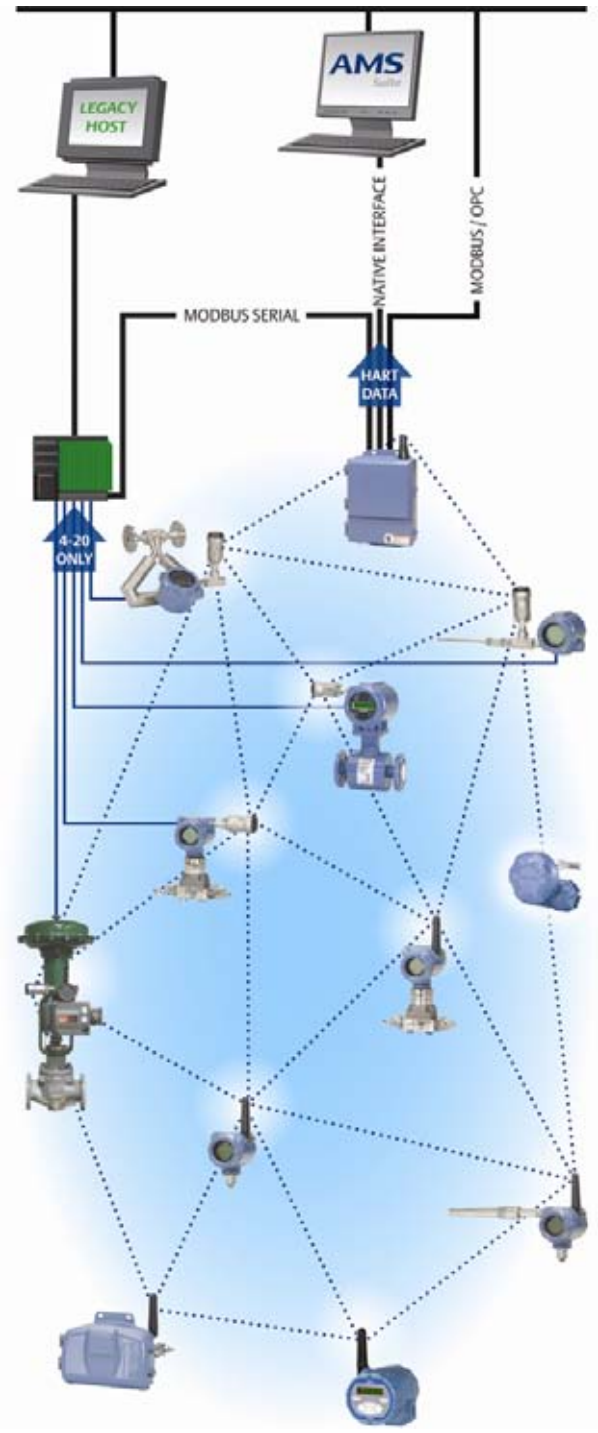
- *Acoustic monitoring of steam traps and pressure relief valves improves energy efficiency and environmental compliance*
- *Simple non-intrusive installation works for any application*
- *IEC 62591 (WirelessHART™) output with >99% data reliability delivers rich HART® data, protected by industry leading security*



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Emerson's Smart Wireless Solution



IEC 62591 (*Wireless*HART™)... The Industry Standard

Self-Organizing, Adaptive Mesh Routing

- No wireless expertise required, network automatically finds the best communication paths
- The self-organizing, self-healing network manages multiple communication paths for any given device. If an obstruction is introduced into the network, data will continue to flow because the device already has other established paths. The network will then lay in more communication paths as needed for that device.

Reliable Wireless Architecture

- Standard IEEE 802.15.4 radios
- 2.4 GHz ISM band sliced into 15 radio-channels
- Time Synchronized Channel Hopping to avoid interference from other radios, WiFi, and EMC sources and increase reliability
- Direct sequence spread spectrum (DSSS) technology delivers high reliability in challenging radio environment

Emerson's Smart Wireless

Seamless Integration to All Existing Host Systems

- Native integration into DeltaV and Ovation is transparent and seamless
- Gateways interface with existing host systems using industry standard protocols including OPC, Modbus TCP/IP, and Modbus RTU

Layered Security Keeps Your Network Safe

- Ensures that data transmissions are received only by the Smart Wireless Gateway
- Network devices implement industry standard Encryption, Authentication, Verification, Anti-Jamming, and Key Management
- Third party security verification including Achilles and FIPS197.

SmartPower™ Solutions

- Optimized Emerson instrumentation, both hardware and software, to extend power module life
- SmartPower technologies enable predictable power life

Rosemount 708 Wireless Acoustic Transmitter

Ultrasonic Acoustic Event Detection



- Reliably detects and transmits information about acoustic events such as leaks
- Transmitter output includes acoustic level (0-255 counts) and temperature (-40 to 260 °C)
- Transmitter communicates process variable and status information via the wireless network for integration into existing host systems

Monitor Steam Traps

- Armstrong SteamLogic™ software provides critical, real-time information on the condition of your monitored steam trap population
- Armstrong SteamLogic™ delivers immediate notification of a failed steam trap and its location
- Real-time monitoring provides instantaneous feedback for system maintenance and optimization

Monitor Pressure Relief Valves or Pressure Safety Valves



- Turbulence generated by a leaky valve can be detected using the acoustic transmitter
- Notification when release is occurring and when the release has stopped
- Emerson Smart Wireless network provides time stamped information to the host
- Automated data enables reporting of a tamper-proof data log

Mounting Flexibility

The wireless acoustic transmitter can be directly mounted to process piping without cutting pipes or changing pipe configurations allowing for a flexible, easy installation.

Reliable Transmitter Performance

The rugged and robust design of the transmitter ensures reliable performance in harsh environments.

Ordering Information

Table 1. 708 Acoustic Transmitter Ordering Information
★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
Standard		**Standard**
708	Acoustic Transmitter	★
Output Protocol		
Standard		**Standard**
X	Wireless	★
Measurement		
Standard		**Standard**
1	Steam Traps with Armstrong SteamLogic software	★
2	Other Measurements	★
Housing		
Standard		**Standard**
P	Engineered Polymer	★
Waveguide Configuration		
Standard		**Standard**
A1	Acoustic Waveguide	★
Product Certifications		
Standard		**Standard**
NA	No Approval	★
I1	ATEX Intrinsic Safety	★
I2	INMETRO Intrinsic Safety	★
I3	China Intrinsic Safety	★
I4	TIIS Intrinsic Safety	★
I5	FM Intrinsically Safe	★
I6	CSA Intrinsically Safe	★
I7	IECEx Intrinsic Safety	★
Mounting Hardware		
Standard		**Standard**
NA00	No Mounting Hardware	★
HC01	Stainless Steel Mounting Band, Pipe size $^{1}/_{2}$ to 2-$^{1}/_{2}$-in.	★
HC02	Stainless Steel Mounting Band, Pipe size 3-in. to 4-in.	★
HC03	Stainless Steel Mounting Band, Pipe size 4-in. to 10-in.	★

Wireless Options (Include with selected model number)

Wireless Update Rate, Operating Frequency and Protocol		
Standard		**Standard**
WA3	User Configurable Update Rate, 2.4 GHz DSSS, IEC 62591 (WirelessHART)	★
Omnidirectional Wireless Antenna and SmartPower Solutions		
Standard		**Standard**
WP5[(1)]	Internal Antenna, Compatible with Green Power Module (I.S. Power Module Sold Separately)	★
Typical Model Number: 708 X 1 P A1 NA HC01 WA3 WP5		

(1) Power module must be shipped separately, order 701PGNKF.

Specifications

Functional Specifications

Output
WirelessHART 2.4 GHz DSSS

Humidity Limits
0–100% relative humidity

Transmit Rate
User selectable 8 seconds to 60 minutes

Radio Frequency Power Output from Antenna
Internal (WP option) antenna: Maximum of 10 mW (10 dBm) EIRP

Physical Specifications

Electrical Connections/Power Module
- Replaceable, non-rechargeable, Intrinsically Safe Lithium-Thionyl Chloride power module pack with PBT/PC enclosure
- Ten year power module life at reference conditions(1)

Field Communicator Connections
Communication Terminals - Clips permanently fixed to power module

Materials of Construction

Housing
PBT/PC

Cover O-ring
Buna-N

Power Module Housing
PBT/PC

Wave Guide
Machined 316L SST

Mounting
Transmitters are directly attached to process piping using two stainless steel mounting bands.

Weight
708 with power module -1.31 lbs. (0.595 kg)
708 without power module - 0.98 lbs. (0.445 kg)

Enclosure ratings
NEMA 4X, and IP65.

(1) Reference conditions are 70 °F (21 °C), transmit rate of once per minute, and routing data for three additional network devices.

Performance Specifications

Vibration Effect

Tested per the requirements of IEC60770-1 field or pipeline with high vibration level (10-60 Hz 0.21 mm displacement peak amplitude/60-2000 Hz 3g).

Ambient Temperature Limits
-40 °C to 85 °C

Temperature Derating

Process Temperature (°C)	Max Ambient (°C)
260	41
240	45
220	49
200	53
180	57
160	61
140	64
120	68
100	72
85	75

ElectroMagnetic Compatibility (EMC)
All Models:
Meets all relevant requirements of EN 61326-2-3:2006

Wireless Output Specifications

Acoustic Level
0-255 counts

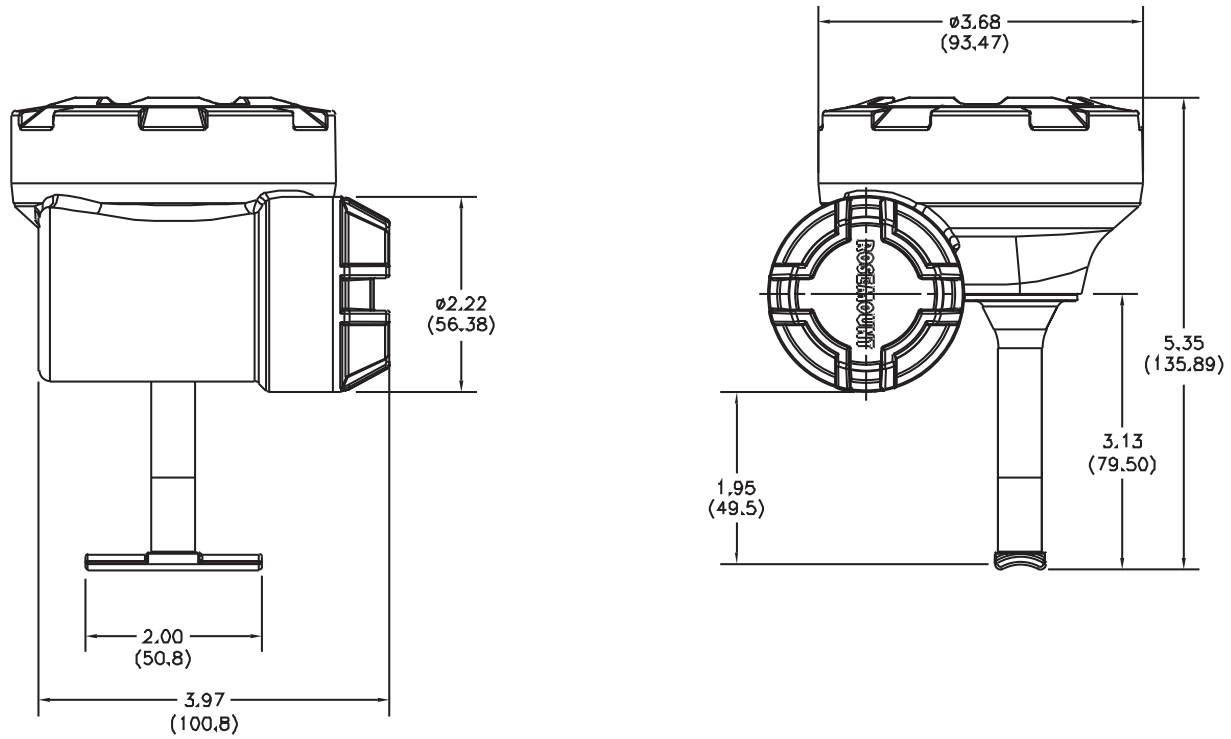
Temperature
-40 to 260 °C

Product Certifications

Product Certifications pending, consult the factory for updated information.

Dimensional Drawings

708



Dimensions are in inches (millimeters)

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00813-0100-4708 Rev AA, 7/11

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AMS Suite – Improving Availability and Performance

Rosemount Devices in AMS Suite

AMS Suite provides a comprehensive and integrated family of predictive and proactive maintenance applications, including a common interface to device diagnostics. Through AMS Suite: Intelligent Device Manager, all Rosemount intelligent devices are supported, as well as all HART® and FOUNDATION™ fieldbus devices registered with their foundations. The analysis and reporting tools in AMS Suite presents a single application for predictive diagnostics, documentation, calibration management and device configuration.



AMS Suite: Intelligent Device Manager Options

Audit Trail

The Audit Trail option automatically generates a historical record for each device. Events recorded in the Audit Trail include device configuration records, as-found/as-left test records, diagnostic information, and system maintenance information.

Handheld Communicator Interface

The application allows uploading and downloading of field device information between the 475 Field Communicator, 375 Field Communicator, or the 275 HART Communicator and the AMS Device Manager database.

MV Engineering Assistant SNAP-ON™ Application

The MV Engineering Assistant SNAP-ON application allows you to perform extended configuration and test calculation functions on HART and FOUNDATION fieldbus multivariable transmitters.

Calibration Assistant SNAP-ON Application

The Calibration Assistant SNAP-ON application allows you to easily group devices into calibration routes and interfaces directly with a documenting calibrator.

AMS Wireless SNAP-ON Application

The AMS Wireless SNAP-ON application helps you design and validate your wireless network based on best practices. Once your network is live, you can monitor the health of your network.

Wireless Interface

The AMS Device Manager Wireless Interface connects to your IEC 62591 (WirelessHART) devices through the Smart Wireless Gateway. Configure, calibrate, document and diagnose your wireless devices.

High Speed Ethernet (HSE) Interface

The HSE Interface uses fieldbus linking devices to connect AMS Device Manager to FOUNDATION fieldbus devices when your current control system does not support fieldbus, allowing you to communicate directly with your devices.

Commitment to Openness

Emerson's commitment to openness allows you to use one software platform to monitor all the devices in your plant. This includes HART, FOUNDATION fieldbus, WirelessHART, Profibus DP, and conventional devices.

Interface Options

Connect to devices online for maximum benefits, connect offline to access the historical information in the plant database, and use tools to communicate to one device at a time.

Ordering Information

For information and assistance on ordering AMS Suite, please contact your Emerson Sales Representative.

475 Field Communicator

The 475 Field Communicator builds on the industry-leading technology of the 375 Field Communicator while adding innovative new capabilities including color display, Bluetooth communication, and advanced field diagnostics with applications like ValveLink Mobile.

What you get is the most powerful handheld available – universal, user upgradeable, intrinsically safe, rugged and reliable. Only the 475 Field Communicator can deliver all this in a single handheld communicator.



Designed for Work

The 475 Field Communicator is designed to simplify your work in the field. The intuitive full color user interface allows you to leverage the same practices for both HART and FOUNDATION fieldbus devices. It includes a larger touch screen than PDAs or Pocket PCs, supports HART versions 5, 6, and 7 (including WirelessHART™) devices, and allows you to upgrade your 475 Field Communicator onsite using the Internet.

Easy to Interpret Diagnostics

The full color graphics capability is provided as standard with every 475 Field Communicator. It uses powerful EDDL technology to allow you to read data from field devices in a graphical manner. Charts, graphs, gauges, and product images are just a few of the ways in which important device data can be displayed using the 475 Field Communicator's color LCD display.

Device Configuration Management

Using the Easy Upgrade Utility, you can back up hundreds of device configurations and can transfer them between your communicator and a PC. This library of device configurations is easy to view and print for analysis.

Field Accessory Kit

The Field Accessory Kit provides you with key accessories that deliver even more productivity from your 475 Field Communicators. The following accessories are included:

- Protective Rubber Boot
- Ruggedized 250 Ohm Load Resistor
- Magnetic Hanger
- Stylus (set of 2)
- Technical Training CD

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TERMS AND CONDITIONS OF SALE

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2. **DELIVERY, ORDER ACCEPTANCE AND DOCUMENTATION:** All shipping dates are approximate and are based upon Seller's prompt receipt of all necessary information from Buyer to properly process the order. Notwithstanding any provisions to the contrary in this or other documents related to this transaction, and regardless of how price was quoted, whether FOB, FAS, CIF or otherwise, legal title to the Goods and risk of loss thereto shall transfer to Buyer as follows: for sales in which the end destination of the Goods is within the United States, upon delivery to the freight carrier at the shipping point; for sales in which the end destination of the Goods is outside of the United States, immediately after the Goods have passed beyond the territorial limits of the United States. If additional copies of data/documentation or non-standard data/documentation are to be provided by Seller, they shall be provided to Buyer at Seller's price then in effect. Data/documentation marked as confidential or proprietary may not be reproduced or used for any purpose other than the purpose for which it was provided and may not be disclosed to third parties without the prior written permission of Seller.

3. **EXCUSE OF PERFORMANCE:** Seller shall not be liable for delays in performance or for non-performance due to failure or interruption of computer or telecommunication systems, acts of God, war, riot, fire, terrorism, labor trouble, unavailability of materials or components, explosion, accident, compliance with governmental requests, laws, regulations, orders or actions, or other unforeseen circumstances or causes beyond Seller's reasonable control. In the event of such delay, the time for performance or delivery shall be extended by a period of time reasonably necessary to overcome the effect of the delay.

4. **TERMINATION AND SUSPENSION BY BUYER:** Buyer may terminate or suspend its order for any or all of the Goods/Services covered by the Agreement only upon Seller's written consent or pursuant to Seller's applicable policy or practices covering such termination or suspension.

5. **LIMITED WARRANTY:** Subject to the limitations contained in Section 6 herein, Seller warrants that the licensed firmware embodied in the Goods will execute the programming instructions provided by Seller, and that the Goods manufactured by Seller will be free from defects in materials or workmanship under normal use and care and Services will be performed by trained personnel using proper equipment and instrumentation for the particular Service provided. The foregoing warranties will apply until the expiration of the applicable warranty period. Goods are warranted for twelve (12) months from the date of initial installation or eighteen (18) months from the date of shipment by Seller, whichever period expires first. Consumables and Services are warranted for a period of 90 days from the date of shipment or completion of the Services. Products purchased by Seller from a third party for resale to Buyer ("Resale Products") shall carry only the warranty extended by the original manufacturer. Buyer agrees that Seller has no liability for Resale Products beyond making a reasonable commercial effort to arrange for procurement and shipping of the Resale Products. If Buyer discovers any warranty defects and notifies Seller thereof in writing during the applicable warranty period, Seller shall, at its option, correct any errors that are found by Seller in the firmware or Services or repair or replace F.O.B. point of manufacture that portion of the Goods or firmware found by Seller to be defective, or refund the purchase price of the defective portion of the Goods/Services. All replacements or repairs necessitated by inadequate maintenance, normal wear and usage, unsuitable power sources or environmental conditions, accident, misuse, improper installation, modification, repair, use of unauthorized replacement parts, storage or handling, or any other cause not the fault of Seller are not covered by this limited warranty, and shall be at Buyer's expense. Seller shall not be obligated to pay any costs or charges incurred by Buyer or any other party except as may be agreed upon in writing in advance by Seller. All costs of dismantling, reinstallation and freight and the time and expenses of Seller's personnel and representatives for site travel and diagnosis under this warranty clause shall be borne by Buyer unless accepted in writing by Seller. Goods repaired and parts replaced by Seller during the warranty period shall be in warranty for the remainder of the original warranty period or ninety (90) days, whichever is longer. This limited warranty is the only warranty made by Seller and can be amended only in a writing signed by Seller. THE WARRANTIES AND REMEDIES SET FORTH ABOVE ARE EXCLUSIVE. THERE ARE NO REPRESENTATIONS OR WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, AS TO MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE OR ANY OTHER MATTER WITH RESPECT TO ANY OF THE GOODS OR SERVICES.

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7. **PATENTS:** Subject to the limitations contained in Section 6, Seller shall defend any suits brought against Buyer based on a claim that use of the Goods manufactured by Seller constitutes an infringement of a valid patent of the United States, and shall pay any damages awarded therein against Buyer, provided that Buyer: promptly notifies Seller in writing of the filing of such suit or the threat thereof; permits Seller to control completely the defense or compromise of such claim of infringement; and provides all reasonable assistance and cooperation requested by Seller for the defense of such suit. In the event that only the Goods manufactured by Seller are held to be infringing in such suit and their use is enjoined, Seller shall, at its sole option and expense, provide a commercially reasonable alternative, including, but not limited to, procuring for Buyer the right to continue using the Goods, replacing them with a non-infringing product or modifying them so they become non-infringing. Buyer agrees that Seller shall not be liable for infringement, and that Buyer shall fully indemnify Seller therefore, if infringement is based upon the use of Goods in connection with goods not manufactured by Seller or in a manner for which the Goods were not designed by the Seller or if the Goods were not designed by the Seller or if the Goods were designed by the Buyer or were modified by or for the Buyer in a manner to cause them to become infringing.

8. **TAXES:** Any tax or governmental charge payable by the Seller because of the manufacture, sale or delivery of the Goods, or provision of Services, may at Seller's option be added to the price herein specified. The foregoing shall not apply to taxes based upon Seller's net income.

9. **TERMS OF PAYMENT:** Unless otherwise agreed by Seller, and subject to the approval of Seller's Credit Department, terms are F.O.B. shipping point, net 30 days from date of Seller's invoice in U.S. currency, except for applicable milestone payments or export shipments for which Seller may require other arrangements. Freight charges may include shipping and handling charges, and Buyer shall pay all such charges. If any payment owed to Seller hereunder is not paid when due, it shall bear interest, at a rate to be determined by Seller which shall not exceed the maximum rate permitted by law, from the date on which it is due until it is received. Seller shall have the right, among other remedies, either to terminate the Agreement or to suspend further deliveries under this and/or other agreements with Buyer in the event Buyer fails to make any payment hereunder when due. Buyer shall be liable for all expenses attendant to collection of past due amounts, including attorneys' fees.

10. **SOFTWARE AND FIRMWARE:** Notwithstanding any other provision herein to the contrary, Seller or applicable third party owner shall retain all rights of ownership and title in its respective firmware and software, including all copyrights relating to such firmware and software and all copies of such firmware and software. Except as otherwise provided herein, Buyer is hereby granted a nonexclusive, royalty free license to use firmware and software, and copies of firmware and software, incorporated into the Goods only in conjunction with such Goods and only at the Buyer's plant site where the Goods are first used. Buyer's use of certain firmware (as specified by Seller) and all other software shall be governed exclusively by Seller's and/or third party owner's applicable license terms.

11. **BUYER SUPPLIED DATA:** To the extent that Seller has relied upon any data or information supplied by Buyer to Seller ("Data") in the selection or design of the Goods and/or provision of the Services and the preparation of Seller's quotation, and the Data is inadequate or inaccurate, any warranties or other provisions contained herein which are affected by such conditions shall be null and void.

12. **EXPORT/IMPORT:** Buyer agrees to comply with all applicable import and export control laws, regulations, orders and requirements, including without limitation those of the United States and the European Union, and the jurisdictions in which the Seller and Buyer are established or from which items may be supplied.

13. **GENERAL PROVISIONS:** (a) Buyer shall not assign its rights or obligations under the Agreement without Seller's prior written consent. (b) There are no understandings, agreements or representations, express or implied, not specified in the Agreement. (c) No action, regardless of form, arising out of transactions under the Agreement, may be brought by either party more than two [2] years after the cause of action has accrued. (d) Any modification of these terms and conditions must be set forth in a written instrument signed by a duly authorized representative of Seller. (e) The Agreement is formed and shall be construed, performed and enforced under the laws of the State of Missouri. However, Buyer and Seller agree that the proper venue for all actions arising under the Agreement shall be only in the USA and in the State where the Goods involved in such actions were manufactured. (f) UNLESS OTHERWISE SPECIFICALLY PROVIDED IN SELLER'S QUOTATION, GOODS AND SERVICES HEREUNDER ARE NOT INTENDED FOR USE IN ANY NUCLEAR OR NUCLEAR RELATED APPLICATIONS. Buyer (i) accepts Goods and Services in accordance with the restriction set forth in the immediately preceding sentence, (ii) agrees to communicate such restriction in writing to any and all subsequent purchasers or users and (iii) agrees to defend, indemnify and hold harmless Seller from any and all claims, losses, liabilities, suits, judgments and damages, including incidental and consequential damages, arising from use of Goods and Services in any nuclear or nuclear related applications, whether the cause of action be based in tort, contract or otherwise, including allegations that the Seller's liability is based on negligence or strict liability. (g) The 1980 United Nations Convention on Contracts for the International Sale of Goods does not apply to this Agreement. (h) If any provision of the Agreement is invalid under any statute or rule of law, such provision, to that extent only, shall be deemed to be omitted without affecting the validity of the remainder of the Agreement (i) Seller specifically objects to the application of any Federal Acquisition Regulation ("FAR") provision or clause to the Agreement.

NOTES

Comprehensive Product Catalog

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