Table of Contents

DP Level

Rosemount DP Level Transmitters and Remote Seals

Rosemount 3051S Liquid Level Transmitter

Rosemount 3051L Liquid Level Transmitter

Rosemount 2051L Liquid Level Transmitter

Rosemount 1199 Direct Mount Seal Systems

Rosemount 1199 Remote Mount Seal Systems

Radar Level

Rosemount 5300 Series Superior Performance Guided Wave Radar Level and Interface Transmitter

Rosemount 5301 and 5302 Level and/or interface in Liquids

Rosemount 5303 Level in Solids

Rosemount 3300 Series Versatile Guided Wave Radar Level and Interface Transmitter

Rosemount 3301 and 3302 Level and/or interface in Liquids

Rosemount 5400 Series Superior Two-wire Radar Level Transmitter

Rosemount 5402 High Frequency Radar Level Transmitter

Rosemount 5401 Low Frequency Radar Level Transmitter

Rosemount 5600 Series Four-wire Radar Level Transmitter

Rosemount 5601 Radar Level Transmitter

Ultrasonic Level

Rosemount 3100 Series Ultrasonic Process Level Transmitters

Rosemount 3101 Ultrasonic Level Transmitter

Rosemount 3102 Ultrasonic Level Transmitter with 2 integral relays

Rosemount 3105 Ultrasonic Level Transmitter for hazardous areas

Rosemount 3107 and 3108 Sealed Ultrasonic Level Transmitters

Mobrey MSL600 Sludge Blanket Level Monitoring

Mobrey MSM400 Ultrasonic Sludge Density Measurement System

Level Switches

Rosemount 2160 WirelessHART™ Vibrating Fork Liquid Level Switch

Rosemount 2130 Extreme Temperature Vibrating Fork Liquid Level Switch

Rosemount 2120 Standard Vibrating Fork Liquid Level Switch

Rosemount 2110 Compact Vibrating Fork Liquid Level Switch

Mobrey Magnetic Float Operated Liquid Level Switches

Mobrey Compact Float Operated Liquid Level Switch

Steam/Water Level Gauges

Mobrey Hydrastep and Hydratect Water/Steam Monitoring Systems

Chambers for Process Level Instrumentation

Rosemount 9901 Chambers for External Mounting of Instruments

Links to Other eCatalog Sections

Rosemount Pressure Products

Rosemount Temperature Products

Rosemount Flow Products

Rosemount Wireless Products

Level

Differential Pressure

Rosemount 3051S_L, 3051L, and 2051L DP Liquid Level Transmitters

- Reduce installed cost by 20%, improve performance by 30% and achieve better response time by 80% with Tuned-System[™] Assemblies
- Optimize and quantify total system performance with QZ option
- Operate at higher temperatures and harder vacuums

Rosemount 1199 Seal DP Systems

- Connect to virtually any process with a comprehensive offering of process connections, fill fluids, direct mount or capillary connections, and materials
- Extend life and improve performance with back-up diaphragm pattern
- Protect your investment from installation or gasket damage with recessed diaphragm design

Guided Wave Radar (GWR)

Rosemount 5300 Series Superior Performance GWR Level and Interface Transmitter

- Handles even the most challenging applications reliably including process vessels, control and safety
- Microwave innovations allow use over longer ranges, with lower dielectrics and higher accuracy
- Enhanced configuration and diagnostic information through RadarMaster and EDDL-based user interface and PlantWeb alerts
- Probe end projection function provides reliable measurements during times of low signal strength

Rosemount 3300 Series Versatile GWR Level and Interface Transmitter

- Handles most liquid storage and monitoring applications
- First 2-wire level and interface transmitter with long in field experience

Non-Contacting Radar

Rosemount 5400 Series Superior 2-wire Radar Level Transmitter

- Market leading signal software logic to handle dynamic tank environments
- High and low frequencies available for maximum application coverage
- PlantWeb functionality and enhanced EDDL-based user interface provides visualization of configuration and diagnostic information with PlantWeb alerts
- Innovative design puts more power on the surface than any other 2-wire radar transmitter

Rosemount 5600 Series 4-wire Radar Level Transmitter

- Power of 4-wire provides maximum sensitivity and performance for solids, challenging reactors, rapid level changes and extreme process conditions
- Market leading signal processing capacity to handle challenging tank environments







Ultrasonic

Rosemount 3100 Series Ultrasonic Process Level Transmitters

- Reliable liquid level measurement up to 36 ft. (11 m)
- Top down non-contacting measurement minimizes maintenance costs
- Local operator interface or remote programming for fast and efficient commissioning
- Two on-board relays for control and/or alarm duties
- Inert wetted materials for corrosive liquids and vapors

Rosemount 3107 and 3108 Sealed Ultrasonic Level Transmitters

- Level measurement and pump control in sumps and wet wells up to 39 ft. (12 m) deep
- · Open Channel Flow measurement for flumes and weirs
- Sealed Type 6P (IP68) to survive flooding
- Sophisticated software eliminates false echoes

Mobrey MSL600 Sludge Blanket Level Monitor

- · Continuously monitors sludge blanket level
- Rugged construction with no moving parts
- Remote mounted, microprocessor based

Mobrey MSM400 Ultrasonic Suspended Solids Monitoring and Control System

- · Reliable readout of percentage solids
- · Comprehensive control functionality
- · Automatic de-sludge control routines

Vibrating Fork Switches

Rosemount 2160 WirelessHART[™] Vibrating Fork Level Switch

- World's first WirelessHART liquid level switch ideal in locations previously inaccessible or too costly for wired devices
- Integral power module eliminates the need for any site wiring
- PlantWeb functionality with advanced diagnostics and PlantWeb alerts

Rosemount 2130 Extreme Temperature Vibrating Fork Level Switch

- -94 to 500 °F (-70 to 260 °C) extended operating temperature range
- · Built-in diagnostics continuously monitor instrument health

Rosemount 2120 Standard Vibrating Fork Level Switch

- Choice of switch outputs includes intrinsically safe and relay
- DIBt/WHG Overfill protection certification
- Flanged, threaded and extended length options

Rosemount 2110 Compact Vibrating Fork Level Switch

- Designed to meet the requirements of the high volume OEM market
- Stainless Steel housing and wetted parts
- Fast fit plug and socket wiring connection

















Mobrey Horizontal Float Level Switches

- · For high and low alarm, liquid switching and pump control duties
- · Can be used in almost any liquid
- · Rugged, long life, low cost

Mobrey M-Switch Compact Horizontal Float Level Switch

- For simple liquid level alarm
- · Small in-tank dimensions

Chambers

Rosemount 9901 Chambers

- High quality chambers for external mounting of level measurement and control instrumentation on process vessels
- PED compliant design in accordance with ASME B31.3 or as option ASME B31.1
- Uses only certified and traceable materials and is manufactured using full penetration welds
- Hydro tested on completion, with a full range of NDT or customer inspection options available







Table Level-1. Level Product Selection Chart

Application and Inc	stallati	ion			Recommer	ided
Application and Installation					May be sui	table
Considerations				X Not recomme		mended
	(Continuo	us Level		Point	Level
	Pressure	Radar	Guided Wave Radar	Ultra- sonic	Vibrating Fork	Float Switch
	Pressure	Nauai	Nauai	Sonic	FUIK	SWITCH
Level	•	•	•	•	•	_
Interface (Liquid/Liquid)		Х		X	X	
Volume	_		_		Х	X
Density		X	X	X	Х	Х
Mass		Х	Х	Х	Х	Х
Open Channel Flow	Х		•		Х	X
Process Medium Characteristics						
Changing Density		•	•	•	•	
Changing Dielectric		ě	1	ě	Ŏ	•
Wide pH Variations	ě	ě		ě	•	ě
Pressure and Temperature Changes	ě	•	ě		ě	ě
Condensing Vapors	Ŏ	ě	ě		ě	ě
Bubbling / Boiling Surfaces	ě	•	•		•	
Foam	•					•
Liquid with Dielectric < 1.9	•	•	•	•	•	•
Coating Liquids				•		
Viscous Liquids	•			•		•
Crystallizing Liquids				•		
Solids, Granules, Powders	Χ			Х	Х	Х
Sludge and Slurries		•		•		
Tank Environment Considerations						
Top Down Connection	Х	•	•	•	•	•
Bottom or Side Connections, Direct to Vessel	•	Х	Х	Х	•	•
Stilling Wells or Bypass Connections					•	•
Device can Be Close to Tank Wall /	•		•		•	•
Disturbance Object						
High Turbulence	•		•	Х	•	
Long and Narrow Mounting Nozzles	•			Х	•	
Angled or Slanted Surface	•		•		Х	Х
High Empty and Fill Rates	•	•	•	•	•	•
Internal Obstructions						•
Agitation	•					
Non-metallic Vessel	•			•	•	•
Nozzle in Center of Tank	•	Х	•	Х	•	•
Valves or Isolation Required	•		• ²	Х	● ²	● ²

- (1) For overall level applications a changing dielectric has no affect on the accuracy; for interface applications a changing dielectric in top fluid will degrade accuracy.
- (2) Mount instrument in external Rosemount 9901 Chamber.

00813-0100-4016, Rev JA July 2010

Rosemount DP Level Transmitters and 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



Wireless HART





Contents

Proven, Reliable, and Innovative DP Level Technologiespage 2
Ordering Information
Rosemount 3051S Liquid Level Transmitter page 4
Rosemount 3051L Liquid Level Transmitter page 11
Rosemount 2051L Liquid Level Transmitter page 16
Rosemount 1199 Direct Mount Seal Systemspage 21
Rosemount 1199 Remote Mount Seal Systems page 26
Flanged Seal Assemblies
Threaded Seal Assemblies
Hygienic Seal Assemblies
Specialty Seal Assembliespage 59
Specificationspage 64
Product Certifications page 74
Dimensional Drawings





July 2010

Proven, Reliable, and Innovative DP Level Technologies

To meet your application requirements, the combination of Rosemount level transmitters and remote seals deliver an unsurpassed product offering that is easy to specify, order, and install. The Rosemount 1199 offering defined in this product data sheet highlights the 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.

WHAT IS A SEAL SYSTEM?

A diaphragm seal system consists of a pressure transmitter, one or two diaphragm seals, a fill fluid, and either a direct mount or capillary style connection.

During operation, the thin, flexible diaphragm and fill fluid separate the pressure sensing element of the transmitter from the process medium. The capillary tubing or direct mount flange connects the diaphragm to the transmitter.

When process pressure is applied, the diaphragm is displaced, transferring the measured pressure through the filled system, through the capillary tubing, to the transmitter element. This transferred pressure displaces the sensing diaphragm of the pressure transmitter. This displacement is proportional to the process pressure and is converted electronically to an appropriate 4-20 mA, digital HART, or FOUNDATION fieldbus output signal.

WHY USE DIAPHRAGM SEALS?

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 normal operating ranges of the transmitter and cannot be brought into those limits with impulse piping.
- The process is corrosive and would require frequent transmitter replacement or specific exotic materials of construction.
- The process contains suspended solids or is viscous and may plug the impulse piping.
- The application requires the use of Hygienic connections.
- There is a need for easier cleaning of the process from the connections to avoid contamination between batches.
- There is a need to replace wet/ dry legs to reduce maintenance on applications where the reference leg is not stable or often needs to be refilled/drained.
- There is a need to make density or interface measurements.
- The process medium may freeze or solidify in the transmitter or impulse piping.



Balanced System Tuned-System Assemblies

Proven Best Practices Deliver Tuned-System™ Assemblies for DP-Level Installations

- Reduced installed cost by 20% by eliminating excess capillary and transmitter mounting hardware
- Reduced risk with up-front quantified performance reports
- Improved performance by 30%
- Time response improved by over 80%

Rosemount 3051S L, 3051L, and 2051L Liquid Level **Transmitters**

- Welded system provides best-in-class system reliability
- Flush, 2-in. (50 mm), 4-in. (100 mm), and 6-in. (150 mm) extended diaphragms
- Multiple fill fluids and wetted materials available
- Level and volume units, process alerts



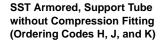
Reliable System Construction that is 100% Helium **Leak Tested**

- Most flexible offering with Tuned-System Assemblies, Balanced System Assemblies, direct mount, capillary, and Thermal Optimizer construction
- Capillary ID sizes: 0.03-in. (0.7 mm), 0.04-in. (1.1 mm), and 0.07-in. (1.75 mm)
- Welded-repairable construction is the industry leading, robust design for most applications.
- All Welded construction designed for high temperature and high vacuum (below 6 psi-a or 414 mbar-a) applications.
- Thermal Optimizer designed for high process temperature and cold ambient temperature applications
- Most variety of fill fluids that meets industry and hygienic applications

Robust Seal Design

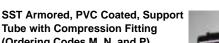
- Backup convolutions on the seal body protect diaphragm integrity and minimize oil volume
- Recessed diaphragms reduce potential for handling damage
- Advanced welding techniques improve reliability
- Advanced manufacturing techniques ensure air-free, leak-tight system that is stable over time

Tube with Compression Fitting (Ordering Codes M, N, and P)



SST Armored, PVC Coated (Ordering Codes E, F, and G)

SST Armored (Ordering Codes B, C and D)













Rosemount 3051S Liquid Level Transmitter



3051S Liquid Level Transmitter

Rosemount 3051S Liquid Level transmitters combine the scalable features and benefits of a high-performance 3051S 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 WirelessHART[™] protocols

Additional Information

Specifications: page 64 Certifications: page 74

Dimensional Drawings: page 87

Table 1. Rosemount 3051S Liquid Level Transmitter Ordering Information

Model	Transmitter Type					
3051S	Liquid Level Transmitter					
Performa	ance Class					
Standard	1			Standard		
1	Ultra: 0.065% span accuracy, 100:1 rar	ngedown, 12-year limited warranty		*		
2	Classic: 0.065% span accuracy, 100:1	rangedown		*		
Connect	ion Type					
Standard	1			Standard		
L	Level			*		
Measure	ement Type					
Standard				Standard		
D Differential						
G	Gage					
A	Absolute					
Pressure	e Range					
	Differential (LD)	Gage (LG)	Absolute (LA)			
Standard	1			Standard		
2A	-250 to 250 inH ₂ O (-623 to 623 mbar)	-250 to 250 inH ₂ O (-623 to 623 mbar)	0 to 150 psia (10 bar)	*		
3A	-1000 to 1000 inH ₂ O (-2,5 to 2,5 bar)	-393 to 1000 inH ₂ O (-0,98 to 2,5 bar)	0 to 800 psia (55 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 (276 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	*		
Transmit	tter Output					
Standard	1			Standard		
Α	4-20 mA with digital signal based on HART protocol					
F ⁽¹⁾	FOUNDATION fieldbus protocol					
X ⁽²⁾	Wireless (Requires wireless options an	d wireless PlantWeb housing)		*		

Table 1. Rosemount 3051S Liquid Level Transmitter Ordering Information

Housing S	tyle	Material	Conduit Entry Size	
Standard			'	Standard
00	None (SuperModule spare part, order of	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	*
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 interface	Aluminum	¹ /2–14 NPT	*
2F	Junction Box housing with output for remote interface	Aluminum	M20 x 1.5	*
2J	Junction Box housing	SST	¹ /2–14 NPT	*
2M	Junction Box housing with output for remote interface	SST	¹ /2–14 NPT	*
5A	Wireless PlantWeb housing	Aluminum	¹ /2–14 NPT	*
5J	Wireless PlantWeb housing	SST	¹ /2–14 NPT	*
7J ⁽³⁾	Quick Connect (A size Mini, 4-pin male termination)	SST		*
Expanded				
1C	PlantWeb housing	Aluminum	G ¹ /2	
1L	PlantWeb housing	SST	G ¹ /2	
2C	Junction Box housing	Aluminum	G ¹ /2	
2G	Junction Box housing with output for remote interface	Aluminum	G ¹ /2	
Seal Syste	em Type			
Standard				Standard
1	Direct-mount seal system			*
High Press	sure Side Extension (Between Transmitt	ter Flange and Seal)		1
Standard	, , , , , , , , , , , , , , , , , , , ,	J,		Standard
0	Direct-Mount (No Extension)			*
	odule Configuration (Low Side)			
	dule Colliguration (Low Side)			0111
Standard 1 ⁽⁴⁾	Turned Custom Assembly One Condition	· Damata Caal (Damiinaa 4	100 madel minches are Teble 7 as seen 07	Standard
•	for seal information)	, ,	199 model number, see Table 7 on page 27	*
2	316L SST isolator / SST transmitter flar			*
3	Alloy C-276 isolator / SST transmitter fl	ange		<u></u>
Capillary L	_ength			
Standard				Standard
0	None			*
Seal Fill Fl	luid (High Side)	Temperature Limits (Am	bient Temperature of 70° F (21° C))	
Standard				Standard
Α	Syltherm XLT	-102 to 293 °F (-75 to 145	°C)	*
С	Silicone 704	32 to 401 °F (0 to 205 °C)		*
D	Silicone 200	-49 to 401 °F (-45 to 205	•	*
Н	Inert (Halocarbon)	-49 to 320 °F (-45 to 160	°C)	*
G	Glycerine and Water	, ,		
N	Neobee M-20			
Р	Propylene Glycol and Water	5 to 203 F (-15 to 95 °C)		*
Process C	onnection Style			
Standard				Standard
FF	Flush Flanged Seal			*
EF	Extended Flanged Seal			*

Table 1. Rosemount 3051S 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.

Process	Connection Size (High Side)					
	Flush Flanged Seal	Extended Flanged Seal				
Standard				Standard		
3	2-in./DN 50	_				
,	3-in.	3-in./DN 80, 2.58-in. diaphragm				
l	DN 80			*		
)	4-in./DN 100	4-in./DN 100, 3.5-in. diaphragm		*		
Flange R	Rating (High Side)					
Standard	1			Standard		
	ANSI/ASME B16.5 Class 150					
	ANSI/ASME B16.5 Class 300			*		
	ANSI/ASME B16.5 Class 600			*		
3	PN 40 per EN 1092-1			*		
Ē	PN 10/16 per EN 1092-1, Available	with DN 100 only		*		
solator,	Flange Material (High Side)					
	Flush Flanged Seal Isolator	Extended Flanged Seal Isolator and Wetted Parts	Flange Material			
Standard				Standard		
A	316L SST	316L SST	CS	*		
PΑ	316L SST	316L SST	SST	*		
В	Alloy C-276	Alloy C-276	CS	*		
)B	Alloy C-276	Alloy C-276	SST	*		
CC	Tantalum - seam welded ⁽⁵⁾	<u> </u>	CS	*		
C	Tantalum - seam welded ⁽⁵⁾	_	SST	*		
ower H	ousing Material for FF, Extension Len	gth for EF (High Side) ⁽⁶⁾				
	Flush Flanged Seal	Extended Flanged Seal				
Standard	<u> </u>			Standard		
)	None	<u> </u>		*		
	_	2-in. (50 mm)		*		
ļ	_	4-in. (100 mm)		*		
5	_	6-in. (150 mm)		*		
١	316 SST			*		
3	Alloy C-276	_		*		
)	Carbon Steel	_		*		
Flushing	Connection Quantity and Size (Lowe	r Housing, High Side)				
	Flush Flanged Seal	Extended Flanged Seal				
Standard		-		Standard		
)	None	None		*		
<u> </u>	1 (¹ /4 - 18 NPT)	_		*		
3	2 (¹ /4 - 18 NPT)	-		*		
7	1 (¹ / ₂ - 14 NPT)	_		*		
9	2 (¹ / ₂ - 14 NPT)	_		*		

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

Update Rat				
Standard				
WA	WA User Configurable Update Rate			
Operating F	requency and Protocol			
Standard		Standard		
3	2.4 GHz DSSS, WirelessHART	*		

Table 1. Rosemount 3051S 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.

Omnidir	ectional Wireless Antenna		
Standar	d	Standard	
WK	Long Range, Integral Antenna	*	
WM	Extended Range, Integral Antenna	*	
SmartPo	ower ^{im}		
Standard	tandard		
1 ⁽⁷⁾	Power Module Adapter, Intrinsically Safe (Power Module separate)	*	

Other Options (Include with selected model number)

	JUDITS (Include with selected model number)	
Diaphragm	Thickness	
Expanded		
SC	0.006-in. (150 μm) available with 316L SST and Alloy C-276	
Flushing Pl	ug, Vent/Drain Valve	
Standard		Standard
SD	Alloy C-276 plug(s) for flushing connection(s)	*
SG	316 SST plug(s) for flushing connection(s)	*
SH	316 SST vent/drain for flushing connection(s)	*
Gasket Mat	erial	
Standard		Standard
SJ	PTFE gasket (for use with flushing connection ring)	*
Expanded		
SN	Grafoil® gasket (for use with flushing connection ring)	
Code Confo	prmance	
Standard		Standard
ST ⁽⁸⁾	Wetted Materials Compliance to NACE MRO175/ISO 15156, MRO103	*
PlantWeb C	ontrol Functionality	
Standard		Standard
A01 ⁽¹¹⁾	FOUNDATION fieldbus Advanced Control Function Block Suite	*
PlantWeb D	iagnostic Functionality	
Standard	,	Standard
D01 ⁽¹¹⁾	FOUNDATION fieldbus Diagnostics Suite	*
DA2 ⁽⁹⁾⁽¹¹⁾	Advanced HART Diagnostics Suite	*
Software Co		
Standard		Standard
C1 ⁽¹⁰⁾	Custom software configuration (Requires Configuration Data Sheet)	*
Gage Press	ure Calibration	
Standard		Standard
C3	Gage Pressure Calibration (3051SxLA4 only)	⇒ Standard
Alarm Limit	1	^
		Ctondond
Standard C4 ⁽¹⁰⁾⁽¹¹⁾	NAMI ID clarm and activistics levels high clarm	Standard
C5 ⁽¹⁰⁾⁽¹¹⁾	NAMUR alarm and saturation levels, high alarm NAMUR alarm and saturation levels. low alarm	*
C6 ⁽¹⁰⁾⁽¹¹⁾	Custom alarm and saturation levels, high alarm (Requires C1 and Configuration Data Sheet)	*
C7 ⁽¹⁰⁾⁽¹¹⁾	Custom alarm and saturation signal levels, low alarm (Requires C1 and Configuration Data Sheet)	*
C8 ⁽¹⁰⁾⁽¹¹⁾	Low alarm (standard Rosemount alarm and saturation levels)	*
Hardware A	, ,	^
Standard	ијионногно	Standard
D1 ⁽¹⁰⁾⁽¹¹⁾⁽¹²⁾	Hardware adjustments (zero, span, alarm, security)	→ tantana
Flange Ada	The artial adjustments (2010) opan, alarm, occarry,	
Standard	,	Standard
D2	1/2-14 NPT flange adapter	*
Expanded	· '	
D9	RC ¹ / ₂ SST flange adapter	

Table 1. Rosemount 3051S Liquid Level Transmitter Ordering Information

	inded offering is subject to additional delivery lead time.	
Custody T	ransfer	
Standard		Standard
D3 ⁽¹³⁾	Measurement Canada Accuracy Approval	*
Ground So	crew	
Standard		Standard
D4	External ground screw assembly	*
Drain/Vent	Valve	
Standard		Standard
D5	Delete transmitter drain/vent valves (install plugs)	*
Conduit P	lug	
Standard		Standard
D0 ⁽¹⁴⁾	316 SST Conduit Plug	*
Product C	ertifications ⁽¹⁵⁾	
Standard		Standard
E1	ATEX Flameproof	*
E2	INMETRO Flameproof	*
E3	China Flameproof	*
E4	TIIS Flameproof	*
E5	FM Explosion-proof, Dust Ignition-proof	*
E6 ⁽¹⁶⁾	CSA Explosion-proof, Dust Ignition-proof, Division 2	*
E7	IECEx Flameproof, Dust Ignition-proof	*
l1	ATEX Intrinsic Safety	*
12	INMETRO Intrinsic Safety	*
13	China Intrinsic Safety	*
I4 ⁽¹⁷⁾	TIIS Intrinsic Safety	*
15	FM Intrinsically Safe, Division 2	*
16	CSA Intrinsically Safe	*
17	IECEx Intrinsic Safety	*
IA	ATEX FISCO Intrinsic Safety (FOUNDATION fieldbus protocol only)	*
IE	FM FISCO Intrinsically Safe (FOUNDATION fieldbus protocol only)	*
IF	CSA FISCO Intrinsically Safe (FOUNDATION fieldbus protocol only)	*
IG	IECEx FISCO Intrinsic Safety (FOUNDATION fieldbus protocol only)	*
K1	ATEX Flameproof, Intrinsic Safety, Type n, Dust	*
K2	INMETRO Flameproof, Intrinsic Safety	*
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	*
K6 ⁽¹⁶⁾	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	*
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, Type n	*
KA ⁽¹⁶⁾	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	*
KB ⁽¹⁶⁾	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	*
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	*
KD ⁽¹⁶⁾	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe	*
N1	ATEX Type n	*
N7	IECEx Type n	*
ND	ATEX Dust	*
Sensor Fil	l Fluid	
Standard		Standard
L1 ⁽¹⁸⁾	Inert sensor fill fluid	*
O-ring		
Standard		Standard
L2	Graphite-filled PTFE o-ring	⇒ Standard
	Graphine filled i 11 E 0-1111g	

Table 1. Rosemount 3051S Liquid Level Transmitter Ordering Information

Bolting Mate	rial	
Standard		Standard
L4	Austenitic 316 SST bolts	*
L5 ⁽⁸⁾	ASTM A193, Grade B7M bolts	*
L6	Alloy K-500 bolts	*
L7 ⁽⁸⁾	ASTM A453, Class D, Grade 660 bolts	*
L8	ASTM A193, Class 2, Grade B8M bolts	*
Display Type	(19)	
Standard		Standard
M5	PlantWeb LCD Display	*
M7 ⁽¹¹⁾⁽²⁰⁾⁽²¹⁾	Remote mount LCD display and interface, PlantWeb housing, no cable, SST bracket	*
M8 ⁽¹¹⁾⁽²⁰⁾	Remote mount LCD display and interface, PlantWeb housing, 50 ft. (15 m) cable, SST bracket	*
M9 ⁽¹¹⁾⁽²⁰⁾	Remote mount LCD display and interface, PlantWeb housing, 100 ft. (31 m) cable, SST bracket	*
Pressure Te		
Expanded		
P1	Hydrostatic testing with certificate	
Special Clea	ning	
Expanded		
P2	Cleaning for special services	
P3	Cleaning for less than 1PPM chlorine/fluorine	
Calibration (Certification	
Standard		Standard
Q4	Calibration certificate	*
QP	Calibration certificate and tamper evident seal	*
Material Trac	ceability Certification	
Standard		Standard
Q8	Material traceability certification per EN 10204 3.1	*
Quality Cert	fication for Safety	
Standard		Standard
QS ⁽¹⁰⁾⁽¹¹⁾	Prior-use certificate of FMEDA data	*
QT ⁽²²⁾	Safety certified to IEC 61508 with certificate of FMEDA data	*
Transient Pr	otection	
Standard		Standard
T1 ⁽²³⁾⁽²⁴⁾	Transient terminal block	*
Toolkit Total	System Performance Reports	
Standard		Standard
QZ	Remote Seal System Performance Calculation Report	*
	etrical Connector	
Standard		Standard
GE ⁽²⁵⁾	M12, 4-pin, Male Connector (eurofast [®])	*
GM ⁽²⁵⁾	A size Mini, 4-pin, Male Connector (minifast [®])	*
Typical Mod	el Number for EF seal: 3051S2LD 2A A 1A 1 0 2 0 D EF 7 1 DA 2 0	

- (1) Requires PlantWeb housing.
- (2) 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).
- (3) Available with output code A only. Available approvals are FM Intrinsically Safe, Division 2 (option code 15), ATEX Intrinsic Safety (option code 17). Contact an Emerson Process Management representative for additional information.
- (4) With option code 1, user must select Seal Location option code M in Table 7.
- (5) Not recommended for use with spiral wound metallic gaskets (see 1199 product data sheet, document 00813-0100-4016 for additional options).
- (6) Standard gasket for lower housing consists of non-asbestos fiber.

Product Data Sheet

00813-0100-4016, Rev JA July 2010

Rosemount DP Level

- (7) Long-life Power Module must be shipped separately, order Part No. 00753-9220-0001.
- (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) Requires PlantWeb housing and output code A. Includes Hardware Adjustments as standard.
- (10) Not available with output code F.
- (11) Not available with output code X.
- (12) Not available with housing style codes 00, 2E, 2F, 2G, 2M, 5A, 5J, or 7J.
- (13) 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.
- (14) Transmitter is shipped with 316 SST conduit plug (uninstalled) in place of standard carbon steel conduit plug.
- (15) Valid when SuperModule Platform and housing have equivalent approvals.
- (16) Not available with M20 or G 1/2 conduit entry size.
- (17) Only available with output code X.
- (18) Only available on differential and gage measurement types. Silicone fill fluid is standard.
- (19) Not available with Housing 7J.
- (20) Not available with output code F, option code DA1, 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 01 or 7J.
- (23) Not available with Housing code 00, 5A, 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) Not available with Housing code 00, 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).

July 2010

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, and Profibus-PA protocols

Additional Information

Specifications: page 64 Certifications: page 79

Dimensional Drawings: page 87

Table 2. Rosemount 3051L Liquid Level Transmitter Ordering Information

Model	Transmitter Type				
3051L	Liquid Level Transmitter				
Pressure	Range				
Standard				Standard	
2	-250 to 250 inH ₂ O (-0,6 to 0,6	bar)		*	
3	-1000 to 1000 inH ₂ O (-2,5 to 2,5 bar)				
4	-300 to 300 psi (-20,7 to 20,7 l	oar)		*	
Transmitte	er Output				
Standard				Standard	
A	4-20 mA with Digital Signal Ba	sed on HART Protocol		*	
F	FOUNDATION fieldbus Protocol			*	
W	Profibus – PA Protocol			*	
Expanded					
M ⁽¹⁾	Low-Power 1–5 V dc with Digita	al Signal Based on HART F	Protocol (See Option Code C2 for 0.8–3.2 V dc Output)		
Process C	connection Size, Material, Extensi	on 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 2. Rosemount 3051L Liquid Level Transmitter Ordering Information

D	Silicone 200	0.93			*
С	Silicone 704	1.07	32 to 401 °F (0 to 2	·	*
A	Syltherm XLT	0.85	, , ,		<u>*</u>
Standard	10 W 30 T		100/ 222.27/		Standard
	ill-High Pressure Side	Specific Gravity	Temperature Limi	its (Ambient Temperature of 70° F (21° C))	
6 ⁽²⁾	<u> -</u>	40K per JIS B2238	1_	316 SST	
5 ⁽²⁾	-	20K per JIS B2238		316 SST	
4 ⁽²⁾	-	10K per JIS B2238		316 SST	
3	_	40K per JIS B2238		CS	
2	_	20K per JIS B2238		CS	
1		10K per JIS B2238		CS	
Expanded					
7 ⁽²⁾	4 in.	ANSI/ASME B16.5 Class	s 600	SST	*
W ⁽²⁾	DN 100	PN 10/16 per EN 1092-1		SST	*
U ⁽²⁾	DN 100	PN 40 per EN 1092-1		SST	*
T ⁽²⁾	DN 80	PN 40 per EN 1092-1		SST	*
K ⁽²⁾	DN 50	PN 10-40 per EN 1092-1		SST	*
V	DN 100	PN 10/16 per EN 1092-1		CS	*
S	DN 100	PN 40 per EN 1092-1		CS	*
R	DN 80	PN 40 per EN 1092-1		CS	*
Q	DN 50	PN 10-40 per EN 1092-1		CS	*
L ⁽²⁾	3-in.	ANSI/ASME B16.5 Class		SST	*
Z ⁽²⁾	2-in.	ANSI/ASME B16.5 Class 600		SST	*
J ⁽²⁾	4-in.	ANSI/ASME B16.5 Class 300		SST	*
H ⁽²⁾	3-in.	ANSI/ASME B16.5 Class		SST	*
Y ⁽²⁾	2-in.	ANSI/ASME B16.5 Class		SST	*
G ⁽²⁾	4-in.	ANSI/ASME B16.5 Class		SST	*
F ⁽²⁾	3-in.	ANSI/ASME B16.5 Class	s 150	SST	*
X ⁽²⁾	2-in.	ANSI/ASME B16.5 Class	s 150	SST	*
E	3-in.	ANSI/ASME B16.5 Class	s 600	CS	*
P	2-in.	ANSI/ASME B16.5 Class	s 600	CS	*
D	4-in.	ANSI/ASME B16.5 Class	s 300	CS	*
С	3-in.	ANSI/ASME B16.5 Class	s 300	CS	*
N	2-in.	ANSI/ASME B16.5 Class	s 300	CS	*
В	4-in.	ANSI/ASME B16.5 Class	s 150	CS	*
A	3-in.	ANSI/ASME B16.5 Class		CS	*
M	2-in.	ANSI/ASME B16.5 Class	s 150	CS	*
Standard					Standard
	Size	Rating		Material	
Mounting	Flange Size, Rating, M	aterial (High Side)			
F0	4-in./DN 100	Tantalum		Flush Mount Only	*
E0	3-in./DN 80 Tant			Flush Mount Only	*
D6 ⁽²⁾	4-in./DN 100 Alloy C-276		6	6-in./150 mm	*
D4 ⁽²⁾	4-in./DN 100 All			4-in./100 mm	*
D2 ⁽²⁾	4-in./DN 100	Alloy C-27		2-in./50 mm	*
D0 ⁽²⁾	4-in./DN 100	Alloy C-27		Flush Mount	<u>^</u>
C6 ⁽²⁾	3-in./DN 80	Alloy C-27		6-in./150 mm	^
C4 ⁽²⁾	3-in./DN 80 3-in./DN 80	Alloy C-270 Alloy C-270		2-in./50 mm 4-in./100 mm	*
C0 ⁽²⁾	3-in./DN 80	Alloy C-27		Flush Mount	*
a a (2)	0 : /DN 00	316L SST		FI I NA /	

Table 2. 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.

G	01	1.40	E 1- 000 0E / 4E 1- 05	- 00)	1	
G	Glycerine and Water	1.13	5 to 203 °F (-15 to 95	5°0)	*	
N	Neobee M-20	0.92	5 to 401 °F (-15 to 20	5 to 401 °F (-15 to 205 °C)		
Р	Propylene Glycol and Water	1.02	5 to 203 F (-15 to 95	°C)	*	
Low Press	sure Side		·			
	Configuration	Flange Adapter	Diaphragm Material	Sensor Fill Fluid		
Standard	l				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 N	Naterial		Conduit Entry Size			
Standard					Standard	
A	Aluminum		½–14 NPT		*	
В	Aluminum		M20 x 1.5		*	
J	SST		½–14 NPT	NPT		
K	SST		M20 × 1.5		*	
Expanded	·					
D	Aluminum		G1/2			
М	SST		G1/2	/2		

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 Ass	emblies	
Standard		Standard
S1 ⁽³⁾	Assembled to One Rosemount 1199 Seal (Requires 1199M)	*
Product (Certifications	
Standard		Standard
E5	FM Explosion-proof, Dust Ignition-proof	*
15	FM Intrinsically Safe, Division 2	*
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	*
I1 ⁽⁴⁾	ATEX Intrinsic Safety and Dust	*
N1 ⁽⁴⁾	ATEX Type n Certification and Dust	*
E8	ATEX Flameproof and Dust Certification	*
E4 ⁽⁴⁾	TIIS Flameproof	*
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	*
K6 ⁽⁴⁾	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 2. Rosemount 3051L Liquid Level Transmitter Ordering Information

	ded offering is subject to additional delivery lead time.	
K7	SAA Flameproof, Dust Ignition-proof, Intrinsic Safety, and Type n (combination of I7, N7 and E7)	*
K8 ⁽⁴⁾	ATEX Flame-proof and Intrinsic Safety Approvals (combination of I1 and E8)	*
KD ⁽⁴⁾	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	*
17	SAA Intrinsic Safety	*
E7	SAA Flameproof, Dust Ignition-proof	*
N7	SAA Type n Certification	*
IA	ATEX FISCO Intrinsic Safety	*
IE	FM FISCO Intrinsically Safe	*
E2	INMETRO Flameproof	*
12	INMETRO Intrinsic Safety	*
K2	INMETRO Flameproof, Intrinsic Safety	*
Bolting Mate	erial	
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		6: 1 :
		Standard
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	*
	ceability Certification	
Standard	······································	Standard
	The same of the sa	
Q8	Material Traceability Certification per EN 10204 3.1	*
Quality Cert	ification for Safety	
Standard		Standard
QS ⁽⁵⁾	Prior-use certificate of FMEDA data	*
Toolkit Total	System Performance Reports	
Standard	,	Standard
	Devicts Oct Onton Defendence October Devict	
QZ	Remote Seal System Performance Calculation Report	*
	ctrical Connector	
Standard		Standard
GE	M12, 4-pin, Male Connector (eurofast®)	*
GM	A size Mini, 4-pin, Male Connector (minifast®)	*
Hardware A	djustments	
Standard		Standard
J1 ⁽⁶⁾⁽⁷⁾	Local Zero Adjustment Only	*
J3 ⁽⁶⁾⁽⁷⁾	No Local Zero or Span Adjustment	*
Transient Pr		^
	OLOGIOTI	
Standard		Standard
T1 ⁽⁸⁾	Transient Protection Terminal Block	*
Software Co	nfiguration	
Standard		Standard
C1 ⁽⁶⁾	Custom Software Configuration (Completed CDS 00806-0100-4001 required with order)	*
	2333 231111410 231111191111111111111111111111111111111	^

Table 2. Rosemount 3051L Liquid Level Transmitter Ordering Information

Low Powe	r Output					
Standard				Standard		
C2 ⁽⁶⁾	0.8–3.2 V dc Output with Digi	tal Signal Based on HART Pro	tocol (Available with Output code M only)	*		
Alarm Lin	iit					
Standard				Standard		
C4 ⁽⁶⁾⁽⁹⁾	C4 ⁽⁶⁾⁽⁹⁾ NAMUR alarm and saturation levels, high alarm					
CN ⁽⁶⁾⁽⁹⁾	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		*		
СТ	Low alarm (standard Rosemo	ount alarm and saturation levels	8)	*		
Conduit P	lug					
Standard				Standard		
D0	316 SST Conduit Plug			*		
Ground S	crew					
Standard				Standard		
V5 ⁽¹⁰⁾	External Ground Screw Asse	mbly		*		
Lower Ho	using Flushing Connection Opti	ons				
	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 Mo	odel Number: 3051L 2 A A0 D 21	A A F1				

- (1) Not available with hazardous certification Option Codes I1, N1, E4, K6, and K8.
- (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) Not available with low-power Option Code M
- (5) Only available with HART 4-20 mA output (output code A).
- (6) Not available with fieldbus (output code F) or profibus protocols (output code W).
- (7) Local zero and span adjustments are standard unless Option Code J1 or J3 is specified.
- (8) 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.
- (9) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.
- (10) 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 64 Certifications: page 84

Dimensional Drawings: page 87

Table 3. Rosemount 2051L Liquid Level Transmitter Ordering Information

Model	Transmitter Type		
2051L	Liquid Level Transmitter		
Pressur	re Range		
Standar	'd		Standard
2	-250 to 250 inH ₂ O (-0,6 to 0,6 bar)		*
3	-1000 to 1000 inH ₂ O (-2,5 to 2,5 bar)		*
4	-300 to 300 psi (-20,7 to 20,7 bar)		*
Transm	itter Output		
Standar	'd		Standard
Α	4–20 mA with Digital Signal Based on H	ART Protocol	*
F	FOUNDATION fieldbus Protocol		*
Expand	ed		
М	Low-Power, 1–5 Vdc with Digital Signal	Based on HART Protocol	
Process	s Connection Size, Diaphragm Material (H	ligh Side)	
	Process Connection Size	Diaphragm	
Standar	rd		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	*
Е	3 in./DN 80	Tantalum	*
F	4 in./DN 100	Tantalum	*

Table 3. Rosemount 2051L Liquid Level Transmitter Ordering Information

	on Length (High Side)					
Standar						Standard
0	None, Flush Mount					*
2	2 in./50 mm					*
4	4 in./100 mm					*
6	6 in./150 mm					*
Mountir	ng Flange Size, Rating, Mater	rial (High Side)				
	Size	Rating		Material		
Standar	rd					Standard
M	2-in.	ANSI/ASME B16.5 Clas	ss 150	CS		*
A	3-in.	ANSI/ASME B16.5 Clas		CS		*
В	4-in.	ANSI/ASME B16.5 Clas		CS		*
N	2-in.	ANSI/ASME B16.5 Clas		CS		*
C	3-in.	ANSI/ASME B16.5 Clas		CS		*
D	4-in.	ANSI/ASME B16.5 Clas		CS		*
X ⁽¹⁾	2-in.	ANSI/ASME B16.5 Clas		SST		*
F ⁽¹⁾	3-in.	ANSI/ASME B16.5 Clas		SST		*
G ⁽¹⁾	4-in.	ANSI/ASME B16.5 Clas		SST		*
Y ⁽¹⁾	2-in.	ANSI/ASME B16.5 Clas		SST		*
H ⁽¹⁾	3-in.	ANSI/ASME B16.5 Clas		SST		*
J ⁽¹⁾	4-in.	ANSI/ASME B16.5 Clas		SST		*
Q	DN50	PN 10-40 per EN 1092-		CS		*
R	DN80	PN 40 per EN 1092-1		CS		<u>^</u>
K ⁽¹⁾	DN50	PN 10-40 per EN 1092-	·			^ *
T ⁽¹⁾	DN80	PN 40 per EN 1092-1			SST	
<u> </u>	21100	1 14 40 pci E14 1002 1		001	Temperature Limits (Ambient	*
Seal Fill	l Fluid (High Side)		Specific G	ravity	Temperature of 70 °F (21 °C))	
Standar	<u> </u>		оросии с	,	Temperature et 10 1 (21 0)	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)	<u>*</u>
D	Silicone 200				-49 to 401 °F (-45 to 205 °C)	
H	1 1 1 1 1 1		0.93 1.85		-49 to 320 °F (-45 to 160 °C)	*
	Inert (Halocarbon)				,	*
G	Glycerin and Water Neobee M-20		1.13		5 to 203 °F (-15 to 95 °C)	*
N P			0.92		5 to 401 °F (-15 to 205 °C)	*
·	Propylene Glycol and Water		1.02		5 to 203 °F (-15 to 95 °C)	*
Sensor	Module Configuration, Flang					
	Configuration	Flange Adapter				
Standar	d					Standard
1 ⁽¹⁾	Gage	SST				*
2 ⁽¹⁾	Differential	SST				*
3 ⁽¹⁾	Tuned-System Assembly	None				*
	with Remote Seal					
Sensor	Module Diaphragm Material,	Sensor Fill Fluid (Low	Side)			
	Diaphragm Material	Sensor Fill Fluid				
Standa-		CONSOL I III I IUIU				Standard
Standar		Ciliaana	I			Standard
2 ⁽¹⁾	316L SST	Silicone				*
	Alloy C-276	Silicone				*
7 ⁽¹⁾	Alloy C-276	Silicone				*
	1.0161 CC1	Inert (Halocarbon)	1			*
	316L SST	1				
A ⁽¹⁾ B ⁽¹⁾ G ⁽¹⁾	Alloy C-276 Alloy C-276	Inert (Halocarbon) Inert (Halocarbon)				*

Table 3. 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.

O-ring			
Standa	rd		Standard
Α	Glass-filled PTFE		*
Housin	ng Material, Conduit Entry Size		
	Housing Material	Conduit Entry Size	
Standa	rd	<u> </u>	Standard
Α	Aluminum	½–14 NPT	*
В	Aluminum	M20 × 1.5	*
J	SST	½–14 NPT	*
K	SST	M20 × 1.5	*
Expand	ded		
D	Aluminum	G1/2	
М	SST	G1/2	

Options (Include with selected model number)

PlantWe	eb Control Functionality	
Standar	d	Standard
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	*
Seal As	semblies	
Standar	d	Standard
S1 ⁽²⁾	Assemble to One Rosemount 1199 Seal (Requires 1199M)	*
Product	t Certifications	
Standar	d	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	*
I1 ⁽³⁾	ATEX Intrinsic Safety	*
I2 ⁽³⁾	INMETRO Intrinsically Safe	*
13 ⁽³⁾	China Intrinsic Safety	*
15	FM Intrinsically Safe, Division 2	*
16	CSA Intrinsically Safe	*
17 ⁽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	*
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	*

Table 3. Rosemount 2051L Liquid Level Transmitter Ordering Information

lay						
ndard LOD trades						
LCD display			*			
djustments						
			Standard			
			*			
pters						
			Standard			
¹ /2-14 NPT Flange Adapters			*			
ıg						
			Standard			
316 SST Conduit Plug			*			
rew						
			Standard			
External Ground Screw Assembly			*			
rotection						
			Standard			
Transient Terminal Block			*			
onfiguration						
			Standard			
Custom Software Configuration (Requires complete	d Configuration Data Sh	neet)	*			
1						
			Standard			
NAMUR alarm and saturation levels, high alarm			*			
NAMUR alarm and saturation levels, low alarm			*			
Certification						
			Standard			
Calibration Certificate			*			
ceability Certification						
			Standard			
Material Traceability Certification per EN 10204 3.1			*			
tification for Safety						
•			Standard			
Prior-use certificate of FMEDA data			*			
I System Performance Reports						
			Standard			
Remote Seal System Performance Calculation Repo	ort		*			
sing Flushing Connection Ring Material	Number	Size (NPT)				
- <u> </u>	1.55	,	Standard			
316 SST	1	1/4-18 NDT	⇒ Standard			
			*			
			*			
			*			
			*			
			*			
			*			
Alloy C-276 Alloy C-276		1/2-14 NPT				
AUUV V-Z/D	2	/2-14 INP	★			
	"1/2-14 NPT Flange Adapters "1/2-14 NPT Flan	Zero and Span Hardware Adjustments pters 1/2-14 NPT Flange Adapters 1/2-14 NPT Flan	Zero and Span Hardware Adjustments piters 1/2-14 NPT Flange Adapters 19 316 SST Conduit Plug ew External Ground Screw Assembly rotection Transient Terminal Block onfiguration Custom Software Configuration (Requires completed Configuration Data Sheet) NAMUR alarm and saturation levels, high alarm NAMUR alarm and saturation levels, low alarm Certification Calibration Certificate ceability Certification Material Traceability Certification per EN 10204 3.1 tification for Safety Prior-use certificate of FMEDA data 1 System Performance Reports Remote Seal System Performance Calculation Report sing Flushing Connection Ring Material Number Size (NPT) 316 SST 1 1 1/4-18 NPT 316 SST 2 1/4-18 NPT 316 SST 1 1 1/2-14 NPT 316 SST 2 1/2-14 NPT			

⁽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) &}quot;Assemble-to" items are specified separately and require a completed model number.

Product Data Sheet

00813-0100-4016, Rev JA July 2010

Rosemount DP Level

- (3) Not available with Low Power output code M.
- (4) Only valid with FOUNDATION fieldbus output code F.
- (5) Not valid with FOUNDATION fieldbus output code F.
- (6) Not available with Remote Mount Seal Assembly option S1.
- (7) Transmitter is shipped with 316 SST conduit plug (uninstalled) in place of standard carbon steel conduit plug
- (8) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.
- (9) 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.
- (10) Only available with HART 4-20 mA output (output code A).
- (11) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.
- (12) Not available with Option Codes A0, B0, and G0.

July 2010

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 73

Dimensional Drawings: page 87

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 4. 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 21. Then, specify a remote seal found on page 23.

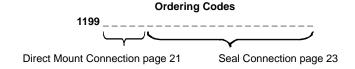


Table 5. Rosemount 1199 Direct Mount Seal Systems Ordering Information

Model	Product Description				
1199	Seal Systems				
Conne	ction Type	Seal System	Seal Location		
Standa	rd			Standard	
3051S	and 2051C Coplanar Transmi	tters (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 5. Rosemount 1199 Direct Mount Seal Systems Ordering Information

	Expanded oπering	•		-	iiie.				
W W	Line Transmitter All Welded	s (30515_1, 3	· · · · · · · · · · · · · · · · · · ·	o Seal Syste		Lligh Cido o	f Transmitter		*
	Coplanar Trans	mittors (2051		U Seal Syste	3111	night Side o	i Hansmillei		<u> </u>
W	Determined by Code			wo Seal System High Side of Transmitter			*		
	<u>'</u>			Temperat	ure Limits (A	mbient Temp	perature of 70 °F	(21 °C))	
Fill Fl	Specific Fill Fluid Gravity		Direct Mount No Extension				Direct Mount 4-inch (100 mm) Extension	Thermal Optimizer	
Stand	ard				I		I		Standard
Α	Syltherm XLT	0.85	-102 to	293 °F	-102 to	293 °F	-102 to 293 °F	–102 to 293 °F	*
				145 °C	-75 to	145 °C	–75 to 145 °C	–75 to 145 °C	
С	Silicone 704	1.07	32 to	401 °F	32 to 4	164 °F	32 to 500 °F	32 to 599 °F	*
			0 to 2	.05 °C	0 to 2	40 °C	0 to 260 °C	0 to 315 °C	
D	Silicone 200	0.93	-49 to	401 °F	-49 to	401 °F	–49 to 401 °F	–49 to 401 °F	*
			-45 to	205 °C	-45 to	205 °C	–45 to 205 °C	–45 to 205 °C	
Н	Halocarbon	1.85	-49 to	320 °F	-49 to	320 °F	–49 to 320 °F	–49 to 320 °F	*
	(Inert)		–45 to	160 °C	–45 to	160 °C	–45 to 160 °C	–45 to 160 °C	
G ⁽²⁾	Glycerin and	1.13		203 °F	5 to 2	03 °F	5 to 203 °F	5 to 203 °F	*
	Water			95 °C	–15 to		−15 to 95 °C	–15 to 95 °C	
N ⁽²⁾	Neobee M-20	0.92		101 °F	5 to 4	-	5 to 437 °F	5 to 437 °F	*
(0)			–15 to 205 °C		–15 to		–15 to 225 °C	–15 to 225 °C	
P ⁽²⁾	Propylene	1.02		5 to 203 °F		03 °F	5 to 203 °F	5 to 203 °F	*
	Glycol/Water		_15 to	95 °C	-15 to	95 °C	_15 to 95 °C	−15 to 95 °C	
Seal C	Connection Type								
Stand									Standard
Α	Direct Mount								*
Direct	Mount Connect	ion Type							
	Extension Ler	ngth		Seal Syste	em		Connection Ty	pe	
Stand	ard								Standard
	planar Transmitte	rs (3051S C. 3	3051C and 2	051C)					Otaniaa. a
94	Direct Mount, N				tem Assembly	two seals	Welded-Repaira	hle	*
93	Direct Mount, N			Tuned-System Assembly, two seals One Seal System		Welded-Repairable		*	
96	Direct Mount, N			Tuned-System Assembly, two seals		All Welded		^ ★	
97	Direct Mount, N			One Seal System		All Welded		*	
B4	Direct Mount, 2		xtension	Tuned-System Assembly, two seals		Welded-Repairable		^ ★	
B3	Direct Mount, 2			One Seal S		,	Welded-Repairable Welded-Repairable		<u>^</u>
B6	Direct Mount, 2				tem Assembly	two spale	All Welded	IDIO	<u> </u>
B7				One Seal S		, wo scals	All Welded		<u></u> ★
D4	, (11				,	two spale	Welded-Repaira	hla	<u> </u>
D3						<u></u> ★			
D6						two seals	All Welded		*
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						<u>^</u>			
	Line Transmitter				2,300111		7.11 VVOIded		
95	Direct Mount, N	•		One Seal S	System		All Welded		*
D5					•				<u> </u>
טט	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⁾ This is a food grade fill fluid.

00813-0100-4016, Rev JA July 2010

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.

				ansmitt Jnavai	ter Avai lable	lability		
					Coplan ctensio			
Flanged Seal As	ssemblies		Inline	0 in.	2-in.	4-in.	Process Connections	
Standard								Standard
6	page 32	FFW Flush Flanged Seal	•	(1)	•	•	2-in. / DN 50 / 50A 3-in. / DN 80 / 80A 4-in. / DN 100 / 100A	*
8	page 35	RFW Flanged Seal	•	_	•	•	¹ / ₂ -in. / DN 15 3/4-in. 1-in. / DN 25 / 25A 1 ¹ / ₂ -in. / DN 40 / 40A	*
7	page 38	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								
B	page 42	FCW Flush Flanged Seal – Ring Type Joint (RTJ) Gasket Surface	•	(1)	•	•	2-in. 3-in.	
6	page 44	RCW Ring Type Joint (RTJ) Flanged Seal	•	_	•	•	½-in. ¾-in. 1-in. 1 ½-in.	
	page 46	FUW and FVW Flush Flanged Type Seals	•	•	•	•	DN 50 DN 80	
					Coplan ctensic			
Threaded Seal	Assemblies		Inline	0 in	2-in.	4-in.	Process Connections	
Standard								Standard
Stationard	page 47	RTW Threaded Seal	•	_	•	•	1/4 –18 NPT 1/4 –18 NPT 1/2 –14 NPT 1/4 –14 NPT 1 – 11.5 NPT 1 1/4 –11.5 NPT 1 1/2 –11.5 NPT G ¹ / ₂ A DIN 16288	*
							R ¹ /2 per ISO 7/1	
Expanded	page 50	HTS Male Threaded Seal	•	•	•	•	G1 G1 ½ G2 1-11.5 NPT 1 ½ -11.5 NPT 2-11.5 NPT	

		Coplanar Extensions						
Hygienic Seal A	ssemblies		Inline	0 in.	0 in. 2-in.		Process Connections	
Standard								Standard
	page 51	SCW Hygienic Tri-Clover Style Tri-Clamp Seal	•	•	•	•	1 ½-in. 2-in. 2 ½-in. 3-in. 4-in.	*
	page 52	SSW Hygienic Tank Spud Seal	•	•	•	•	2-in. Extension 6-in. Extension	*
Expanded								
9	page 53	STW Hygienic Thin Wall Tank Spud Seal	•	_	•	•	0.8 in Extension	
0	page 54	EES Hygienic Flanged Tank Spud Extended Seal	•	•	•	•	DN 50 DN 80	
0	page 55	VCS Tri-clamp [®] In-Line Seal	•	_	_	_	1-in. 1 ½-in. 2-in. 3-in.	
	page 56	SVS Varivent Compatible Hygienic Connection Seal	•	•	•	•	4-in. Tuchenhagen Varivent® Compatible	
0	page 57	SHP Hygienic Cherry-Burrell "I" Line Seal	•	_	_	 -	2-in. 3-in.	
	page 58	SLS Dairy Process Connection - Female Thread Seal per DIN 11851	•	_	_	_	DN 40 DN 50	

					coplan		
Specialty Seal Assemblies			Inline	0 in.	2-in.	4-in.	Process Connections
Expanded							
	page 59	WSP Saddle Seal	•	-	•	•	2-in. 3-in. 4-in. or Larger
	page 60	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 61	CTW Chemical Tee Seal	•	_	•	•	Retro-fit
0	page 62	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 63	WFW Flow-Thru Flanged Seal	•	_	•	•	1-in. 2-in. 3-in.

⁽¹⁾ Available with ANSI Class 300 or less.

July 2010

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 64 Certifications: page 74

Dimensional Drawings: page 87

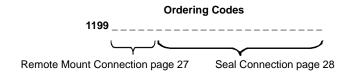
Rosemount 1199 Remote Mount Seal

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 6. 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 27. Then, specify a remote seal found on page 28.



Capillary/Fill Fluid

NOTE:

Use Table 7 for Capillary Type Connections. Use Table 5 for Direct Mount Type Connections.

Table 7. Rosemount 1199 Remote Mount Seal Systems Ordering Information

Model	Product Description			
1199	Seal System			
Conne	ction Type	Seal System	Seal Location	
Standa	rd			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-L	ine Transmitters (3051S_T, 3051T	-		
W	All Welded	One or Two Seal System	High Side of Transmitter	*
3051 C	oplanar 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	*
Fill Flu	id	Specific Gravity	Temperature Limits (Ambient Temperature of 70 °F (21 °C))	
Standa	rd			Standard
A ⁽²⁾	Syltherm XLT	0.85	-75 to 145 °C (-102 to 293 °F)	*
C ⁽²⁾	Silicone 704	1.07	0 to 315 °C (32 to 599 °F)	*
D	Silicone 200	0.93	-45 to 205 °C (-49 to 401 °F)	*
Н	Inert (Halocarbon)	1.85	-45 to 160 °C (-49 to 320 °F)	*
G ⁽³⁾	Glycerin and Water	1.13	-15 to 95 °C (5 to 203 °F)	*
N ⁽³⁾	Neobee M-20	0.92	-15 to 225 °C (5 to 437 °F)	*
P ⁽³⁾	Propylene Glycol and Water	1.02	-15 to 95 °C (5 to 203 °F)	*
Seal Co	onnection Type / Capillary ID, Des		,	
Standa				Standard
В	0.03-in. (0.711 mm) ID, SST Armo	ared		⇒ tandard
C	0.04-in. (1.092 mm) ID, SST Armo			<u>^</u>
D	0.075-in. (1.905 mm) ID, SST Arm			*
E	0.03-in. (0.711 mm) ID, SST Armo			*
F	0.04-in. (1.092 mm) ID, SST Armo			*
<u>'</u> G	0.075-in. (1.905 mm) ID, SST Arm			*
<u>Н</u>	0.03-in. (0.711 mm) ID, SST Armo		out Compression Fitting	*
J	0.04-in. (1.092 mm) ID, SST Armo	<u> </u>		*
K	0.075-in. (1.905 mm) ID, SST Arm		,	*
M ⁽⁴⁾	0.03-in. (0.711 mm) ID, SST Armo		,	*
N ⁽⁴⁾	0.04-in. (1.092 mm) ID, SST Armo		,	*
	0.075-in. (1.905 mm) ID, SST Arm			*
P(+)	1 2.2.2 m. (1.200 mm) 10, 001 Am	iorda, i vo odatou, oupport	Tabo mai comprossion i ming	^
	ry Length / Direct Mount			
Capilla	ry Length / Direct Mount			Standard
P ⁽⁴⁾ Capilla Standa 01	<u> </u>			Standard

Table 7. 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	0.5 m (1.6 ft)	*
52	1.0 m (3.3 ft)	*
53	1.5 m (4.9 ft)	*
54	2.0 m (6.6 ft)	*
55	2.5 m (8.2 ft)	*
56	3.0 m (9.8 ft)	*
57	3.5 m (11.5 ft)	*
58	4.0 m (13.1 ft)	*
59	5.0 m (16.4 ft)	*
60	6.0 m (19.7 ft)	*
Expand	led	
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	7.0 m (23 ft)	
62	8.0 m (26.2 ft)	
63	9.0 m (29.5 ft)	
64	10.0 m (32.8 ft)	
65	11.0 m (36.1 ft)	
66	12.0 m (39.4 ft)	
67	13.0 m (42.6 ft)	
68	14.0 m (45.9 ft)	
69	15.0 m (49.2 ft)	

- (1) All welded system connection types require either a 316L SST or Alloy C-276 isolating diaphragm in the pressure transmitter model codes.
- (2) Not available with Capillary Seal connection inside diameter codes B, E, H, or M.
- (3) This is a food grade fill fluid.
- (4) Compression fitting does not provide a hermetic seal.

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

Flanged Seal Assemblies Process Connections Standard			Process Connections	
		Standard		
9	page 32	FFW Flush Flanged Seal	2-in. / DN 50 / 50A 3-in. / DN 80 / 80A 4-in. / DN 100 / 100A	*
63	page 35	RFW Flanged Seal	¹ / ₂ -in. / DN 15 3/4-in. 1-in. / DN 25 / 25A 1 ¹ / ₂ -in. / DN 40 / 40A	*

		bject to additional delivery lead time.	1 - 1	
	page 38	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 40	PFW Pancake Seal	2-in. / DN50 3-in. / DN 80	*
Expanded	1			
3	page 42	FCW Flush Flanged Seal – Ring Type Joint (RTJ) Gasket Surface	2-in. 3-in.	
	page 44	RCW Ring Type Joint (RTJ) Flanged Seal	½-in. ¾-in. 1-in. 1½-in.	
	page 46	FUW and FVW Flush Flanged Type Seals	DN 50 DN 80	
Threaded Seal A	ssemblies		Process Connections	
Standard				Standard
	page 47	RTW Threaded Seal	14 –18 NPT 3/8 –18 NPT 12 –14 NPT 34 –14 NPT 1 – 11.5 NPT 1 14 –11.5 NPT 1 12 –11.5 NPT G ¹ / ₂ A DIN 16288 R ¹ / ₂ per ISO 7/1	*
Expanded			'	
	page 50	HTS Male Threaded Seal	G1 G1 ½ G2 1-11.5 NPT 1 ½ -11.5 NPT 2-11.5 NPT	

Hygienic Seal As	ssemblies		Process Connections	
Standard				Standard
	page 51	SCW Hygienic Tri-Clover Style Tri-Clamp Seal	1 ½-in. 2-in. 2 ½-in. 3-in. 4-in.	*
	page 52	SSW Hygienic Tank Spud Seal	2-in. Extension 6-in. Extension	*
Expanded				
9	page 53	STW Hygienic Thin Wall Tank Spud Seal	0.8 in Extension	
0	page 54	EES Hygienic Flanged Tank Spud Extended Seal	DN 50 DN 80	
0	page 55	VCS Tri-clamp [®] In-Line Seal	1-in. 1 ½-in. 2-in. 3-in. 4-in.	
	page 56	SVS Varivent Compatible Hygienic Connection Seal	Tuchenhagen Varivent Compatible	
0	page 57	SHP Hygienic Cherry-Burrell "I" Line Seal	2-in. 3-in.	
	page 58	SLS Dairy Process Connection - Female Thread Seal per DIN 11851	DN 40 DN 50	

July 2010

Rosemount DP Level

Specialty Seal A	Assemblies		Process Connections
Expanded			
	page 59	WSP Saddle Seal	2-in. 3-in. 4-in. or Larger
6	page 60	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 61	CTW Chemical Tee Seal	Retro-fit
0	page 62	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 63	WFW Flow-Thru Flanged Seal	1-in. 2-in. 3-in.

Flanged Seal Assemblies



FFW FLUSH FLANGED SEAL

Table 8. 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 Co	nnection Style						
Standard				Standard			
FFW Flush Flanged Seal							
Process Co	nnection Size						
	ANSI/ASME B16.5	EN 1092-1	JIS B2238				
<u> </u>	ANSI/ASIME B10.3	EN 1092-1	JIS B2230	0, 1			
Standard		DNISO		Standard			
G 7	2-in.	DN 50	50 A	*			
7	3-in.		80 A	*			
J	<u> </u>	DN 80		*			
9	4-in.	DN 100	100 A	*			
Flange / Pre	essure 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)	I_				
5	Class 900		1_				
6	Class 1500	_	_				
7	Class 2500		_				
Н	_	PN 63	_				
J	_	PN 100	_				
K	<u> </u>	PN 160					
	and Wetted, Upper Housing, Flange Material						
	Diaphragm and Wetted	Upper Housing	Flange				
Otamala :: :	Diapinagin and Wetted	Opper flousing	i laliye	04			
Standard CA ⁽¹⁾⁽²⁾	316L SST	2461 667	CS	Standard			
DA ⁽²⁾		316L SST		*			
CB ⁽¹⁾⁽³⁾	316L SST	316L SST	316 SST	*			
DB(3)	Alloy C-276, seam welded	316L SST	CS	*			
	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	*			
Expanded							
MB ⁽¹⁾⁽²⁾	Alloy C-276, solid faceplate	Alloy C-276 / 316L SST	CS				

Table 8. 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.

DF 304L SST 316L SST 316 SST	KB ⁽¹⁾⁽²⁾	Alloy C-276, solid faceplate	Alloy C-276 / 316L SST	316 SST			
DV	DJ	Alloy B	316L SST	316 SST			
RH 2 Titanium Grade 4	DF	304L SST 316L SST 316 SST					
DH(5)	DV	Alloy 400	316L SST	316 SST			
DE	RH ⁽²⁾	Titanium Grade 4	Titanium GR.4	316 SST			
DP	DH ⁽⁵⁾	Titanium Grade 4	316L SST	316 SST			
WW(2)(6) 316Ti SST (WNr 1.4571) 316 SST	DE	Alloy 600	316L SST	316 SST			
DZ ⁽⁵⁾ Zirconium 702 316L SST 316 SST	DP	Nickel 201	316L SST	316 SST			
D4	WW ⁽²⁾⁽⁶⁾	316Ti SST (WNr 1.4571)	316Ti SST (WNr 1.4571)	316Ti SST (WNr 1.4571)			
D5	DZ ⁽⁵⁾	Zirconium 702	316L SST	316 SST			
Standard Standard	D4	Alloy C-22	316L SST	316 SST			
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 0 None — 1 1 (³/4-18 NPT) — 3 2 (³/4-18 NPT) — 7 1 (³/2-14 NPT) —	D5	Duplex 2507 SST	316L SST	316 SST			
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 0 None ★ 1 1 (¹/4-18 NPT) ★ 3 2 (¹/4-18 NPT) ★ 7 1 (¹/2-14 NPT) ★	Flushing C	Connection Ring Material (Lower Housing) ⁽⁷⁾					
A 316L SST ★ B Alloy C-276 ★ Expanded 2 Duplex 2205 SST Image: Colspan="2">H H Titanium Grade 4 Image: Colspan="2">Titanium Grade 4 6 Nickel 201 Image: Colspan="2">Titanium Grade 4 6 None Image: Colspan="2">Titanium Grade 4 6 None Image: Colspan="2">Titanium Grade 4 6	Standard				Standard		
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 0 None 1 1 (¹/4-18 NPT) 3 2 (¹/4-18 NPT) 7 1 (¹/2-14 NPT) ★ ★	0	None			*		
Expanded	Α	316L SST			*		
2 Duplex 2205 SST H Titanium Grade 4 6 Nickel 201 V Alloy 400 Flushing Connection Options, Quantity (Size) Standard 0 None 1 1 (¹/4-18 NPT) 3 2 (¹/4-18 NPT) 7 1 (¹/2-14 NPT)	В	Alloy C-276			*		
H Titanium Grade 4 6 Nickel 201 V Alloy 400 Flushing Connection Options, Quantity (Size) Standard 0 None 1 1 (¹/4-18 NPT) 3 2 (¹/4-18 NPT) 7 1 (¹/2-14 NPT) ★ Titanium Grade 4 Standard ★ ★ ★ ★ ★ ★ ★ ★ ★ ★	Expanded						
6 Nickel 201 V Alloy 400 Flushing Connection Options, Quantity (Size) Standard 0 None 1 1 (¹/4-18 NPT) 3 2 (¹/4-18 NPT) 7 1 (¹/2-14 NPT) ★ ★ ★	2	Duplex 2205 SST					
V Alloy 400 Flushing Connection Options, Quantity (Size) Standard 0 None ★ 1 1 (¹/4-18 NPT) ★ 3 2 (¹/4-18 NPT) ★ 7 1 (¹/2-14 NPT) ★	Н	Titanium Grade 4					
Flushing Connection Options, Quantity (Size) Standard 0 None ★ 1 1 (¹/4-18 NPT) ★ 3 2 (¹/4-18 NPT) ★ 7 1 (¹/2-14 NPT) ★	6	Nickel 201					
Standard 0 None ★ 1 1 (¹/4-18 NPT) ★ 3 2 (¹/4-18 NPT) ★ 7 1 (¹/2-14 NPT) ★	V	Alloy 400					
0 None 1 1 (¹/4-18 NPT) 3 2 (¹/4-18 NPT) 7 1 (¹/2-14 NPT) ★ ★	Flushing C	Connection Options, Quantity (Size)					
1 1 (¹/4-18 NPT) 3 2 (¹/4-18 NPT) 7 1 (¹/2-14 NPT) ★	Standard				Standard		
3 2 (¹ / ₄ -18 NPT)	0	None			*		
7 1 (¹ / ₂ -14 NPT)	1	1 (¹ /4-18 NPT)			*		
	3	2 (¹ /4-18 NPT)			*		
9 2 (¹/2-14 NPT) ★	7	1 (¹ / ₂ -14 NPT)			*		
		- 11					

Gasket	Material	
Standa	rd	Standard
J	PTFE gasket (for use with flushing connection ring)	*
Expand	ed	
N	Grafoil gasket (for use with flushing connection ring)	
K	Barium Sulfate filled PTFE gasket (for use with flushing connection ring)	
Flushin	g Plug, Vent/Drain Valve	
Standa	d	Standard
D	Alloy C-276 plug(s) for flushing connection(s)	*
G	316 SST plug(s) for flushing connection(s)	*
Н	316 SST vent/drain for flushing connection(s)	*
Diaphra	ngm Thickness	
Expand	ed	
С	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	
Mounti	ng Flange	
Expand	ed	
4	Flat face, flush flanged	
Code C	onformance	
Standa	rd	Standard
T ⁽⁸⁾	Wetted Materials Compliance to NACE MRO175/ISO 15156, MRO103	*

Product Data Sheet

00813-0100-4016, Rev JA July 2010

Rosemount DP Level

Table 8. 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.

	,	
Cold Temp	Application	
Standard		Standard
В	Extra Fill For Cold Temp Application	*
Diaphragm	Coating	
Expanded		
Π _(a)	0.001-in. (25 μm) gold plated Diaphragm	
V ⁽¹⁰⁾	PTFE coated diaphragm for nonstick purposes only	
Capillary C	nange	
Expanded		
2	Radial capillary connection	
Alternate D	esign	
Expanded		
E ⁽¹¹⁾	One Piece Design	
Typical Mod	lel 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) Operating temperature limited to 150 °C (302 °F).
- (6) Only available with one-piece design, option code E.
- (7) Supplied standard with ThermoTork TN9000.
- (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) Only available on 316LSS, Alloy 400 and Alloy C-276.
- (10) Not available with transmitter option code Q8, for Material Traceability per EN 10204 3.1 of the transmitter / seal assembly.
- (11) 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, and D5.



RFW FLANGED SEAL

Table 9. 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)		•	*				
Expande	1 1							
J	JIS B2238 (Japanese Industrial Standa	ard)						
Process	Connection Style							
Standard	1			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	*				
<u>.</u> D	—	DN 25	<u> </u>	*				
F F	 	DN 40		*				
Expande	ed	<u> </u>	1	-				
1	1/2-in.	-	-					
A	³ /4-in.	_	_					
В	_	DN 15	_					
Flange/P	Pressure Rating		-					
	ANSI/ASME B16.5	EN 1092-1	JIS B2238					
Standard				Standard				
1	Class 150	<u> </u>	10K	*				
2	Class 300		20K	*				
4	Class 600		40K	*				
G	_	PN 40	_	*				
Expande	ed		<u> </u>					
5	Class 900	I—	-					
6	Class 1500	<u> </u>	<u> </u>					
7	Class 2500	<u> </u>	<u> </u>					
Н	<u> </u>	PN 63	<u> </u>					
J	<u> </u>	PN 100	<u> </u>					
K		PN 160						
Diaphrag	gm, Upper Housing, Flange Material							
	Diaphragm	Upper Housing	Flange					
Standard		-	-	Standard				
CA	316L SST	316L SST	CS	*				
DA	316L SST	316L SST	316 SST	*				
СВ	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	*				
Expande								
DF	304L SST	316L SST	316 SST					
DJ	Alloy B	316L SST	316 SST					

Table 9. 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.

	tpariaba biroring io babjeot to addition	an denvery lead time.					
DE	Alloy 600	316L SST	316 SST				
DV	Alloy 400	Alloy 400 316L SST 316 SST					
DP	Nickel 201	201 316L SST 316 SST					
DK	Alloy 20 316L SST 316 SST						
RH	Titanium Grade 4						
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				
Flushin	g Connection Ring Material (Lowe	r Housing) ⁽¹⁾	·				
Standa	rd			Standard			
Α	316L SST			*			
В	Alloy C-276						
D	Plated CS			*			
Expand	led						
2	Duplex 2205						
F	304L SST						
Н	Titanium Grade 4						
V	Alloy 400						
С	Tantalum lined 316L SST (no flus	hing connection allowed)					
Flushin	g Connection Options, Quantity Si	ze					
Standa	rd			Standard			
5	None						
1	1 (¹ / ₄ -18 NPT)						
3	2 (¹ /4-18 NPT)			*			
Expand	led						
7	1 (¹ /2-14 NPT)						
9	2 (¹ /2-14 NPT)						

Gask	et Material						
Stand	lard	Standard					
J							
Expar							
N	Grafoil [®] gasket						
K	Barium Sulfate filled PTFE gasket						
R	Ethylene Propylene gasket						
Flush	ing Plug, Vent/Drain Valve						
Stand	lard	Standard					
D	Alloy C-276 plug(s) for flushing connection(s)	*					
G	316 SST plug(s) for flushing connection(s)	*					
Н	316 SST vent/drain for flushing connection(s)	*					
Diaph	nragm Thickness						
Expar	nded						
С	0.006-in. (150 µm) available with 316L SST, Alloy C-276, and Duplex 2507 SST for abrasive applications						
Bolt I	Material Material						
Expar	nded						
3	304 SST Bolts (Only available for Stud Bolt Design)						
Code	Conformance						
Stand	lard	Standard					
T ⁽²⁾	Wetted Materials Compliance to NACE MRO175/ISO 15156, MRO103	*					

Table 9. 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.

Gasket Su	rface Finish						
Expanded							
1	1 Gasket Surface Ra 125 Max.						
Cold Tem	perature Application						
Standard		Standard					
В	Extra Fill For Cold Temp Application	*					
Diaphragi	n Coating						
Expanded							
U ⁽³⁾	0.001-in. (25 μm) Gold plated diaphragm						
V ⁽⁴⁾	PTFE coated diaphragm for nonstick purposes only						
Large Dia	phragm Size						
Expanded							
9	4.1-in. (104 mm) Diaphragm Diameter						
Typical Mo	odel Number: 1199 W DC 1 0 A RFW 2 1 DA A 5						

- (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) 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.



EFW EXTENDED FLANGED SEAL

Table 10. 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 Stand	Industry Standard ■ = Available — = Unavailable										
Standard	d											Standard
A		ANSI/ASME B16.5 (American National Standards Institute/American Society of Mechanical Engineers)									*	
D	EN 1092-1 (Euro	opean Standard)										*
Expande												
J	JIS B2238 (Japa	anese Industrial Standa	ards)									
Process	Connection Style	•										
Standard	d											Standard
EFW	Extended Flang	ed Seal										*
Process	Connection Size											
	ANSI/ASME B1	6.5	EN 1092-1		JIS E	32238	3	Ext	ensi	on Di	iameters	
Standard	d											Standard
7	3-in.		DN 80		80A			2.58	3-in.	(66 m	nm)	*
9	4-in.		DN 100		100A					(89 m	-	*
Expande	ed		1									
4	1 ¹ /2-in.		DN 40		40A			1.4	5-in.	(37 m	nm)	
G	2-in.		DN 50		50A			1.90	O-in.	(49 m	nm)	
Н	3-in. (Headbox)		DN 80 (Head	box)	1—			2.8	75-in	. (74 ו	mm)	
K	4-in. (Headbox)		DN 100 (Hea	dbox)				3.78	30-in	. (97 ı	mm)	
Flange/F	Pressure Rating											
	ANSI/ASME B1	6.5	EN 1092-1		JIS E	32238	3					
Standard	d d		ı		I							Standard
1	Class 150		10K			10K						*
2	Class 300		_			20K						*
4	Class 600		_			40K						*
G	I —		PN 40 —							*		
Expande	ed											
E	_		PN 10/16 (DN	N 100 only)	<u> </u>							
5	Class 900		- -			_						
6	Class 1500		-									
7	Class 2500		<u> </u>		 -							
H	-		PN 63		<u> </u>							
J	-		PN 100									
K	<u> -</u>		PN 160		<u> </u>							
Diaphra	gm, Extension and	d Gasket Surface, Up	per Housing,	Flange Material		ailab Coni				S		
Code	Diaphragm	Extension/ Gasket Surface	Upper Housing	Mounting Flange	7	9	4	G	н	к		
Standard	d											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	•	•	•	•	•	•		*
СВ	Alloy C-276	Alloy C-276	316L SST	CS	•		•	•	•	•		*

Table 10. 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.

	,	•	,									
Expand	led											
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	•	•	_	•	—	_		
D5	Duplex 2507 SST	Duplex 2205 SST	316L SST	316 SST	•	•	•	•	•	•		
D9	Duplex 2507 SST	316L SST	316L SST	316 SST	•	•	•	•	•	•		
Extensi	ion Length			<u> </u>								
	ANSI/ASME B16.	5	EN 1092-1 /	JIS B2238								
Standar	rd											Standard
0	0-in.		0 mm									*
2	2-in.		50 mm									*
4	4-in.		100 mm						*			
6	6-in.		150 mm									*
Expand	led											
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									
Fraction	nal Extension Length	1										
	ANSI/ASME B16.	5	EN 1092-1 / .	JIS B2238								
Standar	rd [']											Standard
0	0-in.		0 mm									*

Diaphrag	gm Thickness	
Expande	d	
С	0.006-in. (150 μm) available with 316L SST, Alloy C-276, and Duplex 2507 SST for abrasive applications	
Code Co	nformance	
Standard		Standard
T ⁽¹⁾	Wetted Materials Compliance to NACE MRO175/ISO 15156, MRO103	*
Gasket S	Surface Finish	
Expande	d	
1	Gasket Surface Ra 125 Max.	
Cold Ter	nperature Application	
Standard		Standard
В	Extra Fill For Cold Temperature Application	*
Diaphrag	gm Coating	
Expande	d	
U ⁽²⁾	0.001-in. (25 μm) Gold plated diaphragm	
V ⁽³⁾	PTFE coated diaphragm for nonstick purposes only	
Typical N	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 11. 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			
				Ctour doubl
Standard		- National Otandanda In	atitute (American Conintrat Machanical Empire	Standard
<u>A</u>			stitute/American Society of Mechanical Engineers)	*
D	EN 1092-1 (European Stand	аго)		*
	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		*
	ressure Rating			^
i lalige/i	ANSI	EN 4000 4		
	ANSI	EN 1092-1		
Standard				Standard
0	None, Seal Rated to 6,250 p	si or Flange Rating		*
1	Class 150	_		*
2	Class 300	_		*
4	Class 600	_		*
G	-	_		*
Expande	d			
5	Class 900	_		
6	Class 1500	_		
7	Class 2500	_		
Н	-	PN 63		
J	_	PN 100		
Diaphrag	ım and Wetted, Upper Housin	g, 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	*
СВ	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	*
	Connection Ring Material (Lo		<u>'</u>	
Standard				Standard
0	None			→ Standard
A	316L SST			*
В	Alloy C-276			*

Table 11. 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)		
Stand	dard	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)	*

Gasket N	Material Material	
Standard		Standard
J	PTFE gasket	*
Expande	d	
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)	*
Н	316 SST vent/drain for flushing connection(s)	*
Diaphra	gm Thickness	
Expande	d	
С	0.006-in. (150 µm) available with 316L SST, Alloy C-276, and Duplex 2507 SST for abrasive applications	
Code Co	nformance	
Standard	I	Standard
T ⁽³⁾	Wetted Materials Compliance to NACE MRO175/ISO 15156, MRO103	*
Gasket S	Surface Finish	
Expande	d	
1	Gasket Surface Ra 125 Max.	
Cold Ten	nperature Application	
Standard	I	Standard
В	Extra Fill For Cold Temp Application	*
Diaphra	gm Coating	
Expande	d	
U ⁽⁴⁾	0.001-in. (25 μm) Gold plated diaphragm	
V ⁽⁵⁾	PTFE coated diaphragm for nonstick purposes only	
Typical N	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 12. 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	1		
A	ANSI/ASME B16.5 (American National S	tandards Institute/American Society of Me	echanical Engineers)
	connection Style		,
Expanded			
FCW	Flush Flanged Seal - Ring Type Joint Ga	sket Surface	
	Connection Size	SKCT GUITACC	
Expanded			
G 7	2-in.		
	3-in.		
	essure Rating		
Expanded			
1	Class 150		
2	Class 300		
4	Class 600		
5	Class 900		
6	Class 1500		
7	Class 2500		
Diaphragn	n and Wetted, Upper Housing, Flange M	aterial	
	Diaphragm and Wetted	Upper Housing	Flange
Expanded			
DA 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 Housin	g)	<u> </u>
Expanded		<u> </u>	
0	None		
A	316L SST		
В	Alloy C-276		
2	Duplex 2205 SST		
Flushing C	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)		
	Plug, Vent/Drain Valve		
Expanded	— ————————————————————————————————————		
<u>.</u> D	Alloy C-276 plug(s) for flushing connection	on(s)	
G	316 SST plug(s) for flushing connection(s		
Н	316 SST vent/drain for flushing connection		
	n Thickness		
Expanded			
<u>с</u>	0.006-in. (150 µm) available with 316L S	ST, Alloy C-276, and Duplex 2507 SST fo	or abrasive applications
7	0.002-in. (50 µm) available with 316L SS		• • • • • • • • • • • • • • • • • • • •

Table 12. 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 Conf	Code Conformance				
Expanded	Expanded				
T ⁽¹⁾	Wetted Materials Compliance to NACE MRO175/ISO 15156, MRO103				
Cold Temp	Application				
Expanded					
В	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	Expanded				
E	One Piece Design				
Typical Mo	del 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 13. RCW Ring Type Joint Flanged Seal Ordering Information

-		is subject to additional delivery lead time.	
Code	Industry Standard		
Expanded			
Α	ANSI/ASME B16.5 (America	n National Standards Institute/American S	Society of Mechanical Engineers)
Process Cor	nnection Style		
Expanded			
RCW	Flanged Seal - Ring Type Jo	int Gasket Surface	
Process Cor	nnection Size		
Expanded			
1	¹ /2-in.		
Α	³ /4-in.		
2	1-in.		
4	1 ¹ /2-in.		
Flange/Press	sure Rating		
Expanded			
1	Class 150		
2	Class 300		
4	Class 600		
5	Class 900		
6	Class 1500		
7	Class 2500		
Diaphragm,	Upper Housing, Flange Mater	ial	
	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 Co	nnection Ring Material (Lowe	r Housing)	
Expanded			
Α	316L SST		
В	Alloy C-276		
F	304L SST		
Н	Titanium Grade 4		
2	Duplex 2205 SST		
V	Alloy 400		

Table 13. RCW Ring Type Joint Flanged Seal Ordering Information

This seal is part of the Expanded offering and is subject to additional delivery lead time.

Flushing Connection Options			
Expanded	Expanded		
5	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)		

Gasket Material			
	Idi		
Expanded			
J	PTFE gasket		
N	Grafoil® gasket		
K	Barium Sulfate filled PTFE gasket		
R	Ethylene Propylene gasket		
Flushing Plu	g, Vent/Drain Valve		
Expanded			
D	Alloy C-276 plug(s) for flushing connection(s)		
G	316 SST plug(s) for flushing connection(s)		
Н	316 SST vent/drain for flushing connection(s)		
Diaphragm T	hickness		
Expanded			
С	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 Confor	mance		
Expanded			
T ⁽²⁾	Wetted Materials Compliance to NACE MRO175/ISO 15156, MRO103		
Cold Temper	ature Application		
Expanded			
В	Extra Fill For Cold Temp Application		
Diaphragm C	Coating		
Expanded			
U ⁽³⁾	0.001-in. (25 μm) Gold plated diaphragm		
V ⁽⁴⁾	PTFE coated diaphragm for nonstick purposes only		
Large Diaphi	agm Size		
Expanded			
9	4.1-in. (104 mm) Diaphragm Diameter		
Typical Mode	Number: 1199 W DC 1 0 A RCW 2 1 DA A 5		

- (1) Operating temperature is limited to 150 °C (302 °F).
- (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 14. 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.

This sea	I is part of the Expanded offering is subject to additiona	al delivery lead time.		
Code	Industry Standard			
Expand	led			
D	EN 1092-1 (European Standard)			
Proces	s Connection Style			
Expand	led			
FUW	Flush Flanged, EN 1092-1 Type D (Groove)			
FVW	Flush Flanged, EN 1092-1 Type C (Tongue)			
Proces	s Connection Size			
Expand	led			
G	DN50			
J	DN 80			
Flange	/Pressure Rating			
Expand	led			
G	PN 40			
Diaphra	agm and Wetted, Upper Housing, Flange Material			
	Diaphragm and Wetted	Upper Housing	Flange	
Expand	led		l	
DA ⁽¹⁾	316L SST	316L SST	316 SST	
KB ⁽²⁾	Alloy C-276	316L SST	316 SST	
DC ⁽¹⁾	Tantalum	316L SST	316 SST	
Flushir	ng Connection Ring Material (Lower Housing)			
Expand	led			
0	None			
Flushir	ng Connection Options, Quantity (Size)			
Expand	led			
0	None			
	· ·			

Cold Temperature Application			
Expanded			
В	Extra Fill For Cold Temperature Application		
Alternat	Alternate Design		
Expande	Expanded		
E	One Piece Design		
Typical I	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 15. 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
Α	ANSI/ASME B1.20.1 (American National Standards Institute/American Society of Mechanical Engineers)			*
D	EN 10226-1 (European Standa	ard)		*
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	I —		*
4	³ /4-14 NPT	_		*
5	1-11.5 NPT	_		*
7 ⁽¹⁾	1 ¹ /2-11.5 NPT	-		*
Expanded	<u> </u>	1		
1	¹ /4-18 NPT	-		
С		Parallel thread: G ¹ / ₂ A DIN	16288	
2	³ /8-18 NPT	<u> </u>		
6 ⁽¹⁾	1 ¹ /4-11.5 NPT	<u> </u>		
N		Tapered thread: R ¹ /2 per I	SO 7/1	
Pressure	Rating			
	ANSI/ASME B1.20.1	EN 10226-1		
Standard				Standard
0	2500 psi	172 bar		*
Expanded	1	-		
2 ⁽²⁾	5000 psi	344 bar		
3 ⁽²⁾⁽³⁾	10000 psi	<u> </u>		
Diaphrag	m, Upper Housing, Flange Mater	ial		
	Diaphragm	Upper Housing	Flange	
Standard				Standard
CA	316L SST	316L SST	CS	*
DA	316L SST	316L SST	316 SST	*
СВ	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	

Table 15. 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.

DV	Alloy 400 3	16L SST	316 SST	
RH ⁽⁴⁾	Titanium Grade 4 T	ïtanium Grade 4	316 SST	
DH ⁽⁵⁾	Titanium Grade 4 3	16L SST	316 SST	
D4	Alloy 22 3	16L SST	316 SST	
D5	Duplex 2507 SST 3	16L SST	316 SST	
DE	Alloy 600 3	16L SST	316 SST	
DZ ⁽⁵⁾	Zirconium 702 3	16L SST	316 SST	
DK	Alloy 20 3	16L SST	316 SST	
RZ	Zirconium 702 Z	irconium 702	316 SST	
Flushing	Connection Ring Material (Lower Housing	g) ⁽⁶⁾⁽⁷⁾		
Standard				Standard
Α	316L SST			*
В	Alloy C-276			*
Expanded	l '			
D	Plated Carbon Steel			
2	Duplex 2205 SST			
Н	Titanium Grade 4			
V	Alloy 400			
V F	Alloy 400 304L SST			
F	· ·			
F	304L SST			Standard
F Flushing	304L SST			Standard *
F Flushing (304L SST Connection Options			
F Flushing Standard	304L SST Connection Options None			*
F Flushing Standard 5	304L SST Connection Options None 1 (¹ / ₄ -18 NPT) 2 (¹ / ₄ -18 NPT)			*
F Flushing C Standard 5 1 3	304L SST Connection Options None 1 (¹ / ₄ -18 NPT) 2 (¹ / ₄ -18 NPT)			*

Gasket Ma	vanial	
	teriai	
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 I	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)	*
Н	316 SST vent/drain for flushing connection(s)	*
Diaphragr	n Thickness	
Expanded		
С	0.006-in. (150 µm) available with 316L SST, Alloy C-276, and Duplex 2507 SST for abrasive applications	
Bolt Mater	ial	
Standard		Standard
3	304 SST Bolts	*
Expanded		
4	316 SST Bolts	
Code Con	formance	
Standard		Standard
T	Wetted Materials Compliance to NACE MRO175/ISO 15156, MRO103	*

Table 15. 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.

Cold Tempe	rature Application		
Standard		Standard	
В	Extra Fill For Cold Temp Application	*	
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 Mod	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), 1¹/₂-in. (6000 psi/414 bar).
- (4) Not available with welded capillary connections.
- (5) Operating temperature is limited to 150 °C (302 °F).
- (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 16. 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	
Expand	led	
Α	ANSI/ASME B1.20.1 (American National Stand	dards Institute/American Society of Mechanical Engineers)
D	EN 10226-1 (European Standard)	
Proces	s Connection Style	
Expand	led	
HTS	Male Threaded Seal	
Proces	s Connection Size, Pressure Rating	
	ANSI/ASME B1.20.1	EN 10226-1
Expand	led	
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)
Diaphr	agm and Wetted, Upper Housing Material	
	Diaphragm and Wetted	Upper Housing
Expand	led	
LA00	316L SST	316L SST
Typical	Model Number: 1199 W DC 1 0 A HTS 7 A L	A 0 0

⁽¹⁾ Consult an Emerson Process Management representative for use with low calibrated spans.

July 2010

Hygienic Seal Assemblies



SCW HYGIENIC TRI-CLOVER STYLE TRI-CLAMP SEAL

Table 17. 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	y Standard		
Standar	d		Standard
S	Hygienic Seal (Conforms to 3-A Standard 74-0	03)	*
Process	Connection Style		
Standar	d		Standard
SCW ⁽¹⁾	Tri-Clover Style Tri-Clamp Seal		*
Process	Connection Size		
Standar	d		Standard
30 ⁽²⁾	11⁄₂-in.		*
50 ⁽³⁾	2-in.		*
70	3-in.		*
Expande	ed		
60	2½-in.		
90	4-in.		
Diaphra	gm and Wetted, Upper Housing Material		
	Diaphragm and Wetted	Upper Housing	
Standar	d	<u>'</u>	Standard
LA00	316L SST	316L SST	*
Expande	ed		
LB00	Alloy C-276	316L SST	

Surface Finish			
Expanded			
D	10 μin. (0.25 μm) R _a surface finish		
G	15 μin. (0.375 μm) R _a surface finish		
Н	20 μin. (0.50 μm) R _a surface finish		
Non-Hygier	nic Fill Fluid		
Expanded			
Р	Non-Hygienic fill fluid (does not conform to 3-A Standard 74)		
Clamp and Gasket Material			
Expanded			
2	High Pressure Ladish Clamp & Buna N gasket		
3	Buna N gasket		
Polishing	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 18. 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		
Standa	rd		Standard
S	Hygienic Seal (Conforms to 3-A Sta	ndard 74-03)	*
Proces	s Connection Style		
Standa	rd		Standard
SSW ⁽¹⁾	Tank Spud Seal		*
Proces	s Connection Size, Pressure Rating	I	
Standa	rd		Standard
A0	4-in. Sch. 5 Tri-Clamp, 600 psi (41	par)	*
Upper	Housing		
Standa	rd		Standard
A 316L SST			*
Diaphr	agm and Wetted, Extension Materia	I	
	Diaphragm and Wetted	Extension	
Standa	rd		Standard
AL	316L SST ⁽²⁾	316L SST ⁽²⁾	*
Expand			
BB	Alloy C-276	316L SST	*
Extens	ion Length		
Standa	rd		Standard
2	2-in.		*
6	6-in.		*

•	(metade with selected model number)	
Surfac	e Finish	
Expand	ded	
G ⁽³⁾	15 μin. (0.375 μm) diaphragm surface finish	
Н	20 μin.(0.5 μm) diaphragm surface finish	
Diaphr	agm Thickness	
Expand	ded	
С	0.006-in. (150 μm)	
Tanks	Spud	
Standa	rd	Standard
1	Tank Spud Included with Shipment	*
Non-H	ygienic Fill Fluid	
Expand	ded	
Р	Non-Hygienic fill fluid (Does not conform to 3-A Standard 74)	
Non-H	ygienic Fill Fluid	
Expand	ded	
3	Buna N O-ring instead of Standard Ethylene Propylene O-ring (Conforms to 3-A Standard 74)	
4	Viton® O-ring, instead of Standard Ethylene Propylene O-ring (Conforms to 3-A Standard 74)	
Non-H	ygienic Fill Fluid	
Expand	ded	
6	Electro polishing	
Typica	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 19. 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.

<u> </u>	art of the Expanded offering and is subject			
Code	Industry Standard			
Expanded				
S	Hygienic Seal (Conforms to 3-A Standar	d 74-03)		
Process Co	nnection Style			
Expanded				
STW ⁽¹⁾	Thin Wall Tank Spud Seal			
Process Co	nnection Size, Pressure Rating			
Expanded				
B0	4-in. Tri-Clamp, 600 psi (41 bar)			
Diaphragm a	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 Fini	ish			
Expanded				
G ⁽²⁾	15 μin. (0.375 μm) diaphragm surface fir	nish		
Н	20 μin.(0.5 μm) diaphragm surface finish	1		
Non-Hygien	Non-Hygienic Fill Fluid			
Expanded				
Р	Non-Hygienic fill fluid (Does not conform to 3-A Standard 74)			
Non-Hygienic Fill Fluid				
Expanded				
6	Electro polishing			
Typical Mod	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 20. 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.

	part of the Expanded offering and is subject to addition	iai delivery load 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			
Diaphragi	n 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.)			
Option	S (Include with selected model number)			
Surface F	inish			
Expanded				
G ⁽²⁾	15 μ-in. (0.375 μm) Ra surface finish			
Н	20 μ-in. (0.50 μm) Ra surface finish			
Gasket M	aterial			
Expanded	Expanded			
1	Viton O-ring, instead of Standard Ethylene Propylene O-ring (Conforms to 3-A Standard 74)			
Cold Temperature Application				
Expanded	Expanded			
B Extra Fill For Cold Temperature Application				
Cold Tem	perature Application			
Expanded				
6	- g			
Typical M	odel 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 21. VCS Tri-Clamp In-Line Seal Ordering Information

Code	Industry Standard			
Expanded				
S	Hygienic Seal (Conforms to 3-A Standard 74-03)	Hygienic Seal (Conforms to 3-A Standard 74-03)		
Process C	onnection Style			
Expanded				
VCS ⁽¹⁾	In-Line Tri-Clover Style Tri-Clamp Seal			
Process C	onnection Size			
Expanded				
20 ⁽²⁾	1-in.			
30 ⁽³⁾	1½-in.			
50	2-in.			
70	3-in.			
90	4-in.			
Diaphragn	n and Wetted, Upper Housing Material			
	Diaphragm and Wetted	Upper Housing		
Expanded				
LA00	316L SST	316L SST		
Options	(Include with selected model number)			
Surface Fi	nish			
Expanded				
G ⁽⁴⁾	15 μin. (0.375 μm) Ra surface finish			
Н	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 S	Standard 74)		
Polishing				
Expanded				
6	Electro polishing			
Typical Mo	del 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 22. SVS Varivent® Compatible Hygienic Connection Seal Ordering Information This seal is part of the Expanded offering and is subject to additional delivery lead time.

TTIIO OCUI	is part of the Expanded offering and is subject to additi	shall delivery lead time.		
Code	Industry Standard			
Expande	ed			
S	Hygienic Seal (Conforms to 3-A Standard 74-03)			
Process	Connection Style			
Expande	ed			
SVS	Tuchenhagen Varivent Compatible Seal			
Process	Connection Size			
Expande	ed			
V0 ⁽¹⁾	Varivent® Type N DN 40-162			
Diaphra	gm and Wetted, Upper Housing Material			
	Diaphragm and Wetted	Upper Housing		
Expande	ed			
LA00	316L SST	316L SST		
Optio	Options (Include with selected model number)			
Non-Hy	gienic Fill Fluid			
Expande	ed			
Р	Non-Hygienic fill fluid (does not conform to 3-A Stan	dard 74)		
Cold Temperature Application				
Expande	Expanded			
В	Extra Fill For Cold Temperature Application			
Polishin	g			
Expande	ed			
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).

00813-0100-4016, Rev JA July 2010



SHP Hygienic Cherry-Burrell "I" LINE SEAL

Table 23. 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 C	Connection Style				
Expanded					
SHP ⁽¹⁾	Cherry-Burrell "I" Line Style Sea				
Process C	Connection Size				
Expanded					
50 ⁽²⁾	2-in.				
70	3-in.				
Diaphragr	n and Wetted, Upper Housing Mat	erial			
	Diaphragm and Wetted	Upper Housing			
Expanded					
AA00	316L SST	316L SST			
Ontion	Ontions (Color of Color of Col				
Option	Options (Include with selected model number)				
Non-Hygienic Fill Fluid					
Expanded	Expanded				
Р	Non-Hygienic fill fluid (does not conform to 3-A Standard 74)				
Typical Mo	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 24. 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	174-03)			
Process Co	onnection Style				
Expanded					
SLS	Dairy Process Connection - Female Thre	ad			
Process Co	onnection Size, Pressure Rating				
Expanded					
F0 ⁽¹⁾	DIN 11851 with coupling nut DN 40, PN 4	DIN 11851 with coupling nut DN 40, PN 40			
G0 ⁽²⁾	DIN 11851 with coupling nut DN 50, PN 2	DIN 11851 with coupling nut DN 50, PN 25			
Diaphragm	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 Mo	del 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 25. WSP Saddle Seal Ordering Information

Code	Industry Standard				
Expanded					
N	Non-Industry Standard				
Process C	onnection Style				
Expanded					
WSP	Saddle Seal				
Process C	onnection Size				
Expanded					
G	2-in. Pipe size				
7	3-in. Pipe size				
9	4-in. or large Pipe size				
Pressure F	Rating				
Expanded					
1	1500 psig at 100° F (103 bar at 38° C) eight b				
0	1250 psig at 100° F (86 bar at 38° C) six bolt	holes			
Diaphragn	n, Upper Housing Material				
	Diaphragm	Upper Housing			
Expanded					
LA	316L SST	316L SST			
LB	Alloy C-276	316L SST			
LC	Tantalum	316L SST			
Lower Hou	using Material ⁽¹⁾⁽²⁾				
Expanded					
00	None				
L5	316L SST				
B5	Alloy C-276				
D5	Plated Carbon Steel				
Options	(Include with selected model number)				
Gasket Ma					
Expanded					
J	PTFE gasket				
N	Grafoil [®] gasket				
Code Con	formance				
Expanded					
Т	Wetted Materials Compliance to NACE MRO175/ISO 15156, MRO103				
Diaphragn	n Coating				
Expanded					
V ⁽³⁾	V ⁽³⁾ PTFE Coated Diaphragm for nonstick purposes (316L SST and Alloy C-276 diaphragms only)				
Typical Mo	odel Number: 1199 W DC 1 0 N WSP 7 1 LA L				

- (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 26. UCP and PMW Threaded Pipe Mount Seal Ordering Information

Industry Standard					
Expanded					
N	Non-Industry Standard				
Process C	onnection Style				
Expanded					
UCP	Male Threaded Pipe Mount Seal				
PMW	Paper Mill Sleeve				
Process C	onnection Size, Pressure Rating				
Expanded					
30 ⁽¹⁾	1 ¹ /2-in., Threaded Knurled Nut, 600 p	osi 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 Hou	ısing 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 Mo	del 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 27. CTW Chemical Tee Seal Ordering Information

	part of the Expanded offering and is subject to add				
Code	Industry Standard				
Expanded					
N	Non-Industry Standard				
Process C	onnection Style				
Expanded					
CTW	Chemical Tee Seal				
Maximum	Working Pressure (Flange Rating)				
Expanded					
20	300 psi (21 bar)				
Diaphragn	n and Wetted, Upper Housing Material				
	Diaphragm and Wetted	Upper Housing			
Expanded		<u> </u>			
AA	316L SST	316L SST			
BB	Alloy C-276	Alloy C-276			
Lower Hou	using				
Expanded					
00	None				
Options	(Include with selected model number)				
Code Con	formance				
Expanded					
T Wetted Materials Compliance to NACE MRO175/ISO 15156, MRO103					
Diaphragn	n Coating				
Expanded					
V ⁽¹⁾	V ⁽¹⁾ PTFE coated diaphragm for nonstick purposes only				
Typical Mo	odel Number: 1199 W NC 1 0 N CTW 2 0 AA 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 28. TFS Wafer Style In-Line Seal Ordering Information

Code	Industry Standard					
Expanded	inded					
Α	ANSI/ASME B16.5 (American National	Standards Institute/American Society of Mechanical Engineers)				
D	EN 1092-1 (European Standard)					
Process C	Connection Style					
Expanded						
TFS	Wafer Style In-Line Seal					
Process C	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⁾	<u> </u>	DN 40				
K	— DN 100					
Pressure	Rating					
Expanded						
0	Flange not supplied, seal rated to carb	on steel Class 2500, PN 160				
Diaphragr	n and Wetted, Upper Housing Material					
	Diaphragm and Wetted	Upper Housing				
Expanded	ed					
LA	316L SST 316L SST					
LB	Alloy C-276 316L SST					
Housing Body Length						
Expanded						
00	3.54-in. (90 mm)					
Typical Mo	odel 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 29. WFW Flow-Thru Flanged Seal Ordering Information

rnis seai	This seal is part of the Expanded offering and is subject to additional delivery lead time.					
Code	Industry Standard					
Expande	ed					
Α	ANSI/ASME B16.5 (American National Standards Inst	itute/American Society of Mechanical Engineers)				
Process	Connection Style					
Expande						
WFW ⁽¹⁾	Flow-Thru Flanged Seal					
Process	Connection Size ⁽²⁾					
Expande	ed					
G	2-in.					
7	3-in.					
2	1-in.					
Flange I	Rating ⁽²⁾					
Expande	ed					
1	Class 150 ⁽²⁾					
Diaphra	gm, Upper Housing Material					
	Diaphragm	Upper Housing ⁽²⁾				
Expande		1 11 1				
LA	316L SST	316L SST				
Lower F	lousing Material ⁽¹⁾					
Expande	ed					
L	316L SST					
Pipe Sc	hedule ⁽²⁾					
Expande	ed					
N	40/40S					
0::4:-						
Optio	1S (Include with selected model number)					
Gasket	Material					
Expande	ed					
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						
Т						
	Cold Temperature Application					
Expande	Expanded					
В						
Typical	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 (±3 σ (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.

	or i condition i lieutus and wireless devices, use calibrated range in place of span.			
3051S_L	±0.065% of span;			
	For spans less than 10:1,			
	$\pm \left[0.015 + 0.005 \left(\frac{\text{URL}}{\text{span}}\right)\right]\% \text{ of span}$			
3051L				
All Ranges	±0.075% of span			
	For spans less than 10:1, accuracy =			
	- · · · · · · · · · · · · · · · · · · ·			
	$\pm \left[0.025 + 0.005 \left(\frac{URL}{Span}\right)\right] \% \text{ of Span}$			
2051L				
Ranges 2-4	±0.075% of span			
	For spans less than 10:1, accuracy =			
	T (UDI)			
	$\pm \left[0.025 + 0.005 \left(\frac{URL}{Span}\right)\right]\% \text{ of Span}$			

⁽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.

Warranty⁽¹⁾

Models ⁽¹⁾	Ultra	Classic
3051S_L	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

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 $_2$ O (2,49 mbar); with remote mount seal in horizontal plane, zero shift of up to ± 5 inH $_2$ O (12,45 mbar) plus extension length on extended units; all zero shifts can be zeroed; no span effect.

Vibration Effect

3051S_L	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)

3051S_L	Meets IEEE C62.41.2-2002, Location Category B					
	6 kV crest (0.5 μs - 100 kHz)					
	3 kA crest (8 x 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 x 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)					
2051L	Meets IEEE C62.41, Category Location B					
	6 kV crest (0.5 μs - 100 kHz)					
	3 kV crest (8 x 20 microseconds)					
	6 kV crest (1.2 x 50 microseconds)					

Functional Specifications

Range and Sensor Limits

Table 30. 3051S_LD, LG Range and Sensor Limits

o o	Minimum Span		Range Limits			
Range				Lower (LRL)		
œ	Ultra	Classic	Upper (URL)	3051S_LG ⁽¹⁾⁽²⁾	3051S_LD ⁽¹⁾	
2	1.3 inH ₂ O	2.5 inH ₂ O	250.0 inH ₂ O	-250.0 inH ₂ O	-250.0 inH ₂ O	
	(3,11 mbar)	(6,23 mbar)	(0,62 bar)	(-0,62 bar)	(-0,62 bar)	
3	5.0 inH ₂ O	10.0 inH ₂ O	1000.0 inH ₂ O	-393.0 inH ₂ O	-1000.0 inH ₂ O	
	(12,4 mbar)	(24,9 mbar)	(2,49 bar)	(-979 mbar)	(-2,49 bar)	
4	1.5 psi	3.0 psi	300.0 psi	-14.2 psig	-300.0 psi	
	(103,4 mbar)	(206,8 mbar)	(20,7 bar)	(-979 mbar)	(-20,7 bar)	
5	10.0 psi	20.0 psi	2000.0 psi	-14.2 psig	- 2000.0 psi	
	(689,5 mbar)	(1,38 bar)	(137,9 bar)	(-979 mbar)	(-137,9 bar)	

⁽¹⁾ When specifying a 3051S_L Ultra, use Classic minimum span.

Table 31. 3051S_LA Range and Sensor Limits⁽¹⁾

ıge	Minimum Span		Range and Sensor Limits	
Rar	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 3051S_L Ultra, use Classic minimum span.

Table 32. 3051L Range and Sensor Limits

Φ		Range and Sensor Limits			
Range		Upper	Lower (LRL)		
œ	Minimum Span	(URL)	3051L Differential	3051L Gage	
2	2.5 inH ₂ O (6,2 mbar)	250 inH ₂ O (0,62 bar)	-250 inH ₂ O (-0,62 bar)	-250 inH ₂ O (-0,62 bar)	
3	10 inH ₂ O (24,9 mbar)	1000 inH ₂ O (2,49 bar)	-1000 inH ₂ O (-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 33. 2051L Range and Sensor Limits

ge		Range and Sensor Limits		
Rang			Lower (LRL)	
œ	Minimum Span	Upper (URL)	2051L Differential	2051L Gage ⁽¹⁾
2	2.5 inH ₂ O (6,2 mbar)	250 inH ₂ O (0,62 bar)	-250 inH ₂ O (-0,62 bar)	-250 inH ₂ O (-0,62 bar)
3	10 inH ₂ O (24,9 mbar)	1000 inH ₂ O (2,49 bar)	-1000 inH ₂ O (-2,49 bar)	–393 inH ₂ O (–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.

⁽²⁾ Assumes atmospheric pressure of 14.7 psig (1 bar).

July 2010

Rosemount DP Level

Service

Liquid 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.

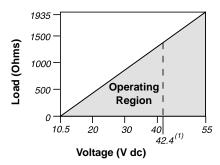
Power Supply

External power supply required. Standard transmitter (4–20 mA) operates on 10.5 to 55 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) Ω



Communication requires a minimum loop resistance of 250 ohms.

(1) For CSA approval, power supply must not exceed 42.4 V.

FOUNDATION fieldbus (output code F) and Profibus (output code W)

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)

FOUNDATION fieldbus Function Block Execution Times

	Execution Time (Milliseconds)			
Block	3051S_L	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.

Product Data Sheet

00813-0100-4016, Rev JA July 2010

Rosemount DP Level

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).

3051S_L 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⁾

 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 34. 3051L and Level Flange Rating Limits

Standard	Туре	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 10	0 °F (38 °C), the	rating decrease	es
with increas	ing temperature,	per ANSI/ASM	E 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 inc	reasing tempera	ature, per DIN 24	401.

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).

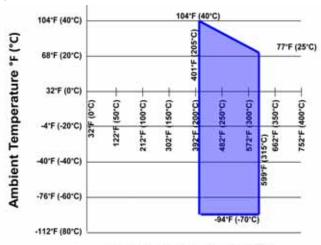
Storage

-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 35. Fill Fluid Specifications

				Temperature limits (Ambient temperature of 70 °F (21 °C))			°C))	
Fill Fluid	Specific Gravity	Coeff. Of therm. Exp. (cc/cc/°C)	Viscosity at 25 °C Centistokes	Direct Mount no extension	Direct Mount 2-in. (50mm) extension	Direct Mount 4-in. (100mm) extension	Thermal Optimizer	Capillary
200 Silicone	0.93	0.00108	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
704 Silicone	1.07	0.00095	44	32 to 401 °F 0 to 205 °C	32 to 464 °F 0 to 240 °C	32 to 500 °F 0 to 260 °C	32 to 599 °F 0 to 315 °C	32 to 599 °F 0 to 315 °C
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
Syltherm [®] XLT Silicone	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
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
Propylene 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
Neobee M–20	0.92	0.001008	9.8	5 to 401 °F -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

Figure 1. Thermal Optimizer with Silicone 704 Fill Fluid Temperature Limits



Process Temperature °F (°C)

Humidity Limits

0-100% relative humidity

Turn-On Time

Turri-On	IIIIIC
3051S_L	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.

Volumetric Displacement

Less than 0.005 in³ (0.08 cm³)

Damping⁽¹⁾

Software damping is in addition to sensor module response time.

Contware dai	imping is in addition to sensor module response time.
3051S_L	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.

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

Physical Specifications

Electrical Connections

 $^{1}\!/_{2}\!-\!14$ NPT, PG 13.5, G $^{1}\!/_{2}$, and M20 x 1.5 conduit. HART interface connections fixed to terminal block.

Non-Wetted Parts

	3051S_L	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, IP68
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	Buna-N	Buna-N	Buna-N
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

Shipping Weights

Table 36. 3051S_L Weights Without SuperModule Platform, Housing, or Transmitter Options

	Flush	2-in. Ext.	4-in. Ext.	6-in. Ext.
Flange	lb. (kg)	lb (kg)	lb (kg)	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 37. 3051S_L 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),	0.8 (0,4)
	LCD Display for SST PlantWeb Housing ⁽¹⁾	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 38. 3051L Weights without Options

Flange	Flush lb. (kg)	2-in. Ext. lb (kg)	4-in. Ext. lb (kg)	6-in. Ext. Ib (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 39. 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 40. 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 41. 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)

00813-0100-4016, Rev JA July 2010

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, Viton, and Buna N 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 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 35.

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_L 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

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. PED-H-100, 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 61326-1:1997 + A1, A2, and A3 – Industrial

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

Emerson Process Management complies with the R&TTE Directive.

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.

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 a 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 (\blacksquare 1180

Input Parameters

Input Parameters		
Loop /		
Power	Groups	
U _i = 30 V	HART / FOUNDATION fieldbus/ Remote Display /	
	Quick Connect / HART Diagnostics	
$U_i = 17.5 \text{ V}$	FISCO	
$I_i = 300 \text{ mA}$	HART / FOUNDATION fieldbus/ Remote Display /	
	Quick Connect / HART Diagnostics	
$I_i = 380 \text{ mA}$	FISCO	
$P_{i} = 1.0 \text{ W}$	HART / Remote Display / Quick Connect /	
	HART Diagnostics	
$P_i = 1.3 W$	FOUNDATION fieldbus	
$P_i = 5.32 \text{ W}$	FISCO	
$C_i = 30 \text{ nF}$	SuperModule Platform	
$C_i = 11.4 \text{ nF}$	HART / HART Diagnostics / Quick Connect	
$C_i = 0$	FOUNDATION fieldbus / Remote Display / FISCO	
$L_i = 0$	HART / FOUNDATION fieldbus/ FISCO / Quick	
	Connect / HART Diagnostics	
$L_i = 60 \mu H$	Remote Display	
RTD Assemb	oly (3051SFx Option T or R)	
$U_i = 5 \text{ Vdc}$		
$I_i = 500 \text{ mA}$		
$P_i = 0.63W$		

Special conditions for safe use (x)

- 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 6.3.12 of EN 60079-11. This must be considered during installation.
- 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 B II 3 G Ex nL IIC T5 (T_a = -40 °C TO 70 °C) Ui = 45 Vdc max Ci = 11.4 nF Li = 0 For remote display, Ci = 0, Li = 60 μ H 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.

NOTE

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

ND ATEX Dust

Certificate No.: BAS01ATEX1374X b II 1 D Ex tD A20 T105°C (-20 °C \leq T_{amb} \leq 85 °C) V_{max} = 42.4 volts max A = 22 mA IP66 $\textcircled{\epsilon}$ 1180

Special conditions for safe use (x)

- Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
- Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
- Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact test.
- The 3051S 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 b II 1/2 G Ex d IIC T6 (-50 °C \leq T_{amb} \leq 65 °C) Ex d IIC T5 (-50 °C \leq T_{amb} \leq 80 °C) \lor T_{max} = 42.4 \lor C€ 1180

Special conditions for safe use (x)

- Appropriate ex d blanking plugs, cable glands, and wiring needs to be suitable for a temperature of 90 °C.
- 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.
- The 3051S does not comply with the requirements of EN 60079-1 Clause 5.2, Table 2 for all joints. Contact Emerson Process Management for information on the dimensions of 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

Product Data Sheet

00813-0100-4016, Rev JA July 2010

Rosemount DP Level

China (NEPSI) Certifications

China Intrinsic Safety, Dust Ignition-proof Certificate No. (manufactured in Chanhassen, MN): GYJ081078 Certificate No. (manufactured in Beijing, China): GYJ06367 Certificate No. (manufactured in Singapore): GYJ06365

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

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	
$P_{i} = 1.3 \text{ W}$	FOUNDATION fieldbus	
$C_{i} = 38 \text{ nF}$	SuperModule Platform	
C _i = 11.4 nF	HART / HART Diagnostics / Quick Connect	
$C_i = 0$	FOUNDATION fieldbus / Remote Display	
$L_i = 0$	HART / FOUNDATION fieldbus / Quick Connect / HART Diagnostics	
$L_i = 60 \mu H$	Remote Display	
RTD Assemi	bly (3051SFx Option T or R)	
$U_i = 5 \text{ Vdc}$ $I_i = 500 \text{ mA}$ $P_i = 0.63 \text{W}$		

China Flameproof, Dust Ignition-proof
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+H₂ 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.

INMETRO Certifications

I2 Brazilian Approval (INMETRO Approval) - 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 6.3.12 of IEC60079-11. This must be considered during installation.

E2 Brazilian Approval (INMETRO Approval) - 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)

- 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 °C, cable wiring must have minimum isolation temperature of 90 °C, to be in accordance to equipment operation temperature.
- The accessory of cable entries or conduit must be certified as flameproof and needs to be suitable for use conditions
- 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 T6 (-50 °C \leq T_{amb} \leq 65 °C) Ex d IIC T5 (-50 °C \leq T_{amb} \leq 80 °C) V_{max} = 42.4V

Special conditions for safe use (x)

- Appropriate ex d blanking plugs, cable glands, and wiring needs to be suitable for a temperature of 90 °C.
- 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.
- The 3051S 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.

IECEx Dust
Certificate No. IECExBAS09.0014X
Ex tD A20 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.
- Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
- Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact test.
- The 3051S 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.)

17/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
$I_i = 300 \text{ mA}$	HART / FOUNDATION fieldbus/ Remote
	Display / Quick Connect / HART
	Diagnostics
$I_i = 380 \text{ mA}$	FISCO
$P_i = 1.0 \text{ W}$	HART / Remote Display / Quick
	Connect / HART Diagnostics
$P_i = 1.3 \text{ W}$	FOUNDATION fieldbus
$P_i = 5.32 \text{ W}$	FISCO
$C_i = 30 \text{ nF}$	SuperModule Platform
$C_i = 11.4 \text{ nF}$	HART / HART Diagnostics / Quick
	Connect
$C_i = 0$	FOUNDATION fieldbus / Remote Display /
	FISCO
$L_i = 0$	HART / FOUNDATION fieldbus/ FISCO /
	Quick Connect / HART Diagnostics
$L_i = 60 \mu\text{H}$	Remote Display
RTD Assembly (3051	SFx Option T or R)
U _i = 5 Vdc	
$I_i = 500 \text{ mA}$	
P _i = 0.63 W	

Special conditions for safe use (x)

- The 3051S HART 4-20 mA, 3051S FOUNDATION fieldbus, 3051S Profibus and 3051S FISCO are not capable of withstanding the 500V test as defined in clause 6.3.12 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 (T_a = -40 °C to 70 °C) Ui = 45 Vdc MAX 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.

Product Data Sheet

00813-0100-4016, Rev JA July 2010

Rosemount DP Level

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

00813-0100-4016, Rev JA July 2010

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. PED-H-100 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: 1997 - A1, A2, and A3 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

- 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
- 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.

- 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.

Product Data Sheet

00813-0100-4016, Rev JA July 2010

Rosemount DP Level

European Certifications

I1 ATEX Intrinsic Safety and Dust

Certification No.: BAS 97ATEX1089X W II 1 GD

Ex ia IIC T4 ($-60 \le T_a \le +70 \degree C$)

Dust Rating: Ex tD A20 T80 °C (–20 $\,\leq\,$ $T_a\,\leq\,$ 40 °C) IP66

C€ 1180

TABLE 42. Input Parameters

•
$U_i = 30V$
I _i = 200 mA
$P_i = 0.9W$
$C_i = 0.012 \mu F$

TABLE 43. 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 if located in Zone 0.

N1 ATEX Type n and Dust

Certification No.: BAS 00ATEX3105X a II 3 GD U_i = 55 Vdc max Ex nA nL T5 (-40°C \leq T_{amb} \leq 70 °C) Dust rating: Ex tD A22 T80 °C (-20 \leq T_a \leq 40 °C) IP66

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

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

Australian Certifications

I7 SAA Intrinsic Safety

Certification No.: AUS Ex 1249X Ex ia IIC T4 (T_{amb} = 70 °C) IP66

When connected per Rosemount drawing 03031-1026

TABLE 44. Input Parameters

$U_i = 30V$
I _i = 200 mA
I _i = 160 mA (output code A with T1)
$P_i = 0.9W$
$C_i = 0.01 \mu F$
C _i = 0.042 μF (output code M)
$L_i = 10 \mu H$
L _i = 1.05 mH (output code A with T1)
L _i = 0.75 mH (output code M with T1)

TABLE 45. 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):

The apparatus may only be used with a passive current limited power source Intrinsic Safety application. The power source must be such that Po \leq (Uo * Io) / 4. Modules using transient protection in the terminal assembly (T1 transient protection models) with 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 mm², minimum cross-sectional area.

E7 SAA Explosion-Proof (Flame-Proof)

Certification No.: AUS Ex 03.1347X Ex d IIC T6 (T_{amb} = 40 °C) T5 (T_{amb} = 80 °C) DIP A21 T6 (T_{amb} = 40 °C) T5 (T_{amb} = 80 °C) IP66

Special Conditions for Safe Use (X):

It is a condition of safe use for transmitter enclosures having cable entry thread other than metric conduit thread that the equipment be utilized with an appropriate certified thread adaptor.

N7 SAA Type n (Non-sparking)
Certification No.: AUS Ex 1249X
Ex n IIC T4 (T_{amb} = 70 °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 effect its removal. Voltage source shall not exceed 55V dc.

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 combinationKB 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

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.
- 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,

For input parameters see control drawing 03031-1024.

European Certifications

factory sealed

I1 ATEX Intrinsic Safety and Dust
Certification No.: BAS 98ATEX1355X ☑ 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
C€ 1180

TABLE 46. Input Parameters

$U_i = 30V$
$I_i = 300 \text{ mA}$
P _i = 1.3 W
$C_i = 0 \mu F$

TABLE 47. 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):

The device 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 if located in Zone 0.

IA ATEX FISCO Intrinsic Safety
Certification No.: BAS 98ATEX1355X □ II 1 G
Ex ia IIC T4 (T_{amb} = −60 to +60 °C)
IP66
C€ 1180

TABLE 48. Input Parameters

U _i = 17.5 V
$I_i = 380 \text{ mA}$
P _i = 5.32 W
$C_i = \leq 5 \mu F$
$L_i = \leq 10 \mu\text{H}$

Special Conditions for Safe Use (X):

The device 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 if located in Zone 0.

N1 ATEX Type n and Dust
Certification No.: BAS 98ATEX3356X ᠍ II 3 GD
U_i = 40 Vdc max
Ex nA 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 500V insulation test required by Clause 6.8.1 of EN60079-15. This must be taken into account when installing the apparatus.

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.

July 2010

Rosemount DP Level

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

Australian Certifications

I7 SAA Intrinsic Safety

Certification No.: AUS Ex 1249X Ex ia IIC T4 (T_{amb} = 60 °C)

IP66

When connected per Rosemount drawing 03031-1026.

TABLE 49. Input Parameters

U _i = 30 V
I _i = 300 mA
P _i = 1.3 W
$C_i = 0 \mu F$
$L_i = 0 \mu H$

TABLE 50. RTD Assembly (3051CFx Option T or R)

U _i = 5 Vdc	
$I_i = 500 \text{ mA}$	
$P_i = 0.63W$	

Special Conditions for Safe Use (X):

The apparatus may only be used with a passive current limited power source Intrinsic Safety application. The power source must be such that $Po \le (Uo * Io) / 4$. 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 mm², minimum cross-sectional area.

E7 SAA Explosion-Proof (Flame-Proof)
Certification No.: AUS Ex 1347X
Ex d IIC T6 (T_{amb} = 40 °C)
DIP A21 T6 (T_{amb} = 40 °C)
T5 (T_{amb} = 80 °C)
IP66

Special Conditions for Safe Use (X):

It is a condition of safe use for transmitter enclosures having cable entry threads other than metric conduit threads that the equipment be utilized with an appropriate certified threaded adaptor.

N7 SAA Type n (Non-sparking)
Certification No.: AUS Ex 1249X
Ex n IIC T4 (T_{amb} = 70 °C)

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 IP40 degree of protection. Any blanking plug used with the equipment shall be of a type which requires the use of a tool to effect its removal. Voltage source shall not exceed 35V dc.

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. PED-H-100 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 IECEN61326:2006 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).

HART PROTOCOL

Hazardous Locations Certifications

North American Certifications

FM Approvals

- 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
- 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.

- 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
- 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.

July 2010

European Certifications

ATEX Intrinsic Safety Certification No. Baseefa08ATEX0129X II 1 G Ex ia IIC T4 ($-60 \le T_a \le +70 \,^{\circ}C$) **IP66 IP68 C€** 1180

TABLE 51. Input Parameters

$U_i = 30V$
I _i = 200 mA
P _i = 1.0W
$C_i = 0.012 \mu F$
L _i = 10 μH

TABLE 52. RTD Assembly (2051CFx 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.

ATEX Type n

Certification No. Baseefa08ATEX0130X II 3 G Ex nAnL IIC T4 ($-40 \le T_a \le +70 \,^{\circ}C$) $U_i = 42.4 \text{ Vdc max}$ **IP66**

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.

ATEX Flame-Proof

Ex d IIC T6 (–50 \leq T_a \leq 65 °C) Ex d IIC T5 ($-50 \le T_a \le 80$ °C) IP66 € 1180

Vmax = 42.4 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.

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 II 1 D Dust Rating: II 1 D Ex tD A20 T115 °C (-20 °C \leq T_a \leq 85 °C) **IP66 IP68**

Vmax = 42.4 V dc

A = 22 mA

€ 1180

Special Conditions for Safe Use (X):

- 1. The user must ensure that the maximum rated voltage and current (42.4 volts, 22 milliampere, 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

IECEx Intrinsic Safety Certification No. IECExBAS08.0045X II 1 G Ex ia IIC T4 (–60 \leq T_a \leq +70 °C) € 1180

TABLE 53. Input Parameters

U _i = 30V	
I _i = 200 mA	
P _i = 1.0W	
C _i = 0.012 μF	
$L_i = 10 \mu H$	

TABLE 54. RTD Assembly (2051CFx Option T or R)

	• (•	,	
$U_i = 5 \text{ Vdc}$				
$I_i = 500 \text{ mA}$				
$P_i = 0.63W$				

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 IEC60079-11. This must be taken into account when installing the apparatus.

Product Data Sheet

00813-0100-4016, Rev JA July 2010

Rosemount DP Level

E7 IECEx Explosion-Proof (Flame-Proof) Certification No. IECEx KEM 08.0024X II $^{1}/_{2}$ G Ex d IIC T6 (–50 \leq T $_{a}$ \leq 65 °C)

Ex d IIC T6 ($-50 \le T_a \le 65 °C$) Ex d IIC T5 ($-50 \le T_a \le 80 °C$)

C€ 1180

Vmax = 42.4 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.

The $\bar{E}x$ 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 \leq T_a \leq +70 °C)

 $U_i = 42.4 \text{ Vdc max}$

CE

Special Conditions for Safe Use (X):

When the optional transient protection terminal block is installed, the apparatus is not capable of withstanding a 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.

TIIS Certifications

E4 TIIS Flame-Proof Ex d IIC T6

TC18872	Coplanar with Display
TC18873	Coplanar no display

Inmetro Certifications

E2 Flame-Proof BR-Ex d IIC T6/T5

Intrinsic Safety BR-Ex ia IIC T4

GOST - Russia Certifications

IM Intrinsic Safety Consult factory for availability

EM Flame-Proof
Consult factory for availability

China (NEPSI) Certifications

Flame-Proof Certificate No.: GYJ081230 Ex d IIC T5/T6 I3 Intrinsic Safety
Certificate No.: GYJ081231X
Ex ia IIC T4

TABLE 55. Input Parameters

$U_i = 30V$
I _i = 200 mA
P _i = 1.0W
$C_i = 0.012 \mu F$
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

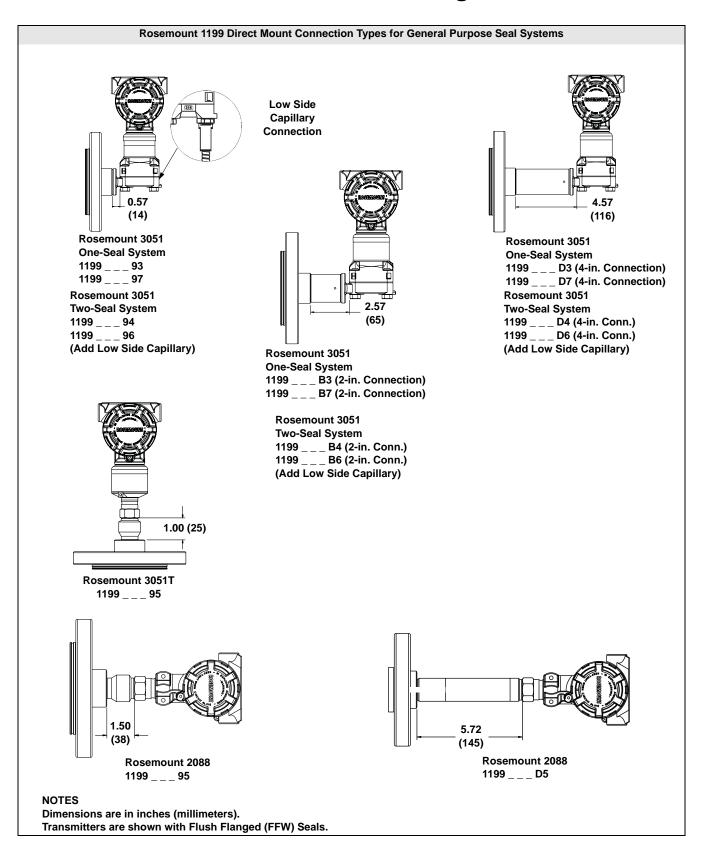


Figure 2. FFW Flush Flanged Seal - Two-Piece Design (shown with flushing ring)

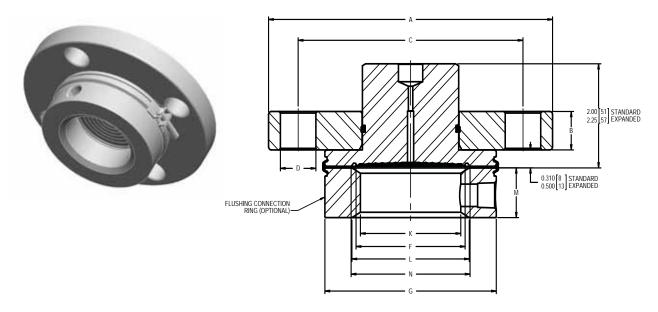


Table 56. Dimensional Table for FFW Flush Flanged Raised Face Seals Two Piece (Upper Housing and Flange) Design⁽¹⁾

							· · · ·	Standard	
	Pipe Size	Class	Flange Diameter "A"	Flange Thickness "B"	Bolt Circle "C"	Bolts	Bolt Hole Diameter "D"	Diaphragm Diameter "F"	Raised Face Diameter "G"
	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)
ANSI/ ASME		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)
	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)
EN1092-1	DN 80	PN 40	7.87 (200)	0.94 (24)	6.30 (160)	8	0.71 (18)	3.50 (89)	5.43 (138)
60		PN 63	8.46 (215)	1.10 (28)	6.69 (170)	8	0.88 (22)	3.50 (89)	5.43 (138)
ž		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 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)
SIC		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"
	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)
ш		2.12 (54)	2.48 (63)	0.97 (25)	1.30 (33)	2.51 (64)
ANSI / ASME	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)
S		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)
	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)
EN1092-1	DN 80	3.60 (91)	_	0.97 (25)	1.30 (33)	3.70 (94)
109		3.60 (91)	_	0.97 (25)	1.30 (33)	3.70 (94)
Ä		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 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)
SIC		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)

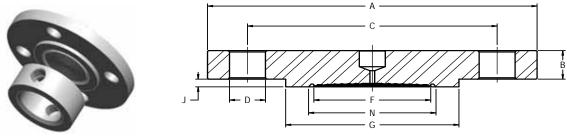


Table 58. Dimensional Table for FFW Flush Flanged Seals One Piece (Upper Housing and Flange) Design (Option code E)⁽¹⁾

								Standard	Raised	Raised	
			Flange Diameter	Flange Thickness	Bolt Circle		Bolt Hole Diameter	Diaphragm Diameter	Face Diameter	Face Height	MINIMUM GASKET
	Pipe Size	Class	"A"	"B"	"C"	Bolts	"D"	"F"	"G"	"J"	I.D. "N"
	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)
ш		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)
ANSI / ASME	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)
S		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)
	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)
2-1	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)
60		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)
EN1092-1		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 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)
SE		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)

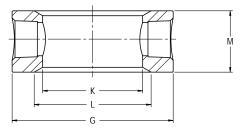


Table 59. Dimensional Table for FFW Flushing Connection Ring (Lower Housing)⁽¹⁾

	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"
		3.62 (92)	2.12 (54)	2.48 (63)	0.97 (25)	1.30 (33)
	2-in.	3.62 (92)	2.12 (54)	2.48 (63)	0.97 (25)	1.30 (33)
ш		3.62 (92)	2.12 (54)	2.48 (63)	0.97 (25)	1.30 (33)
ANSI / ASME		5.00 (127)	3.60 (91)	_	0.97 (25)	1.30 (33)
Y	3-in.	5.00 (127)	3.60 (91)	_	0.97 (25)	1.30 (33)
S		5.00 (127)	3.60 (91)	_	0.97 (25)	1.30 (33)
¥		6.20 (157)	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)
		4.00 (102)	2.40 (61)	_	0.97 (25)	1.30 (33)
	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)
2-1	DN 80	5.43 (138)	3.60 (91)	_	0.97 (25)	1.30 (33)
EN1092-1		5.43 (138)	3.60 (91)	_	0.97 (25)	1.30 (33)
Ä		5.43 (138)	3.60 (91)	_	0.97 (25)	1.30 (33)
		6.20 (157)	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)
	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)
SIC		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)

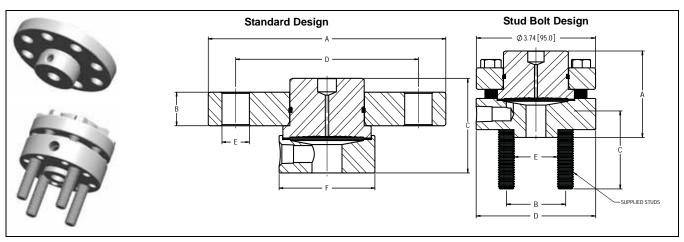


Table 60. RFW Flanged Seal Standard Design Dimensions $^{(1)(2)}$

	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			
	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)
Ž	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)
/ ASME		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)
<u>~</u>		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)
ANSI	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)
Q.		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)
<u>-</u>	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)
EN 1092-1	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)
_									
	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)
S		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)
SIC	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 Heigh	t (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				
Ш	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)
ASME	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)
ANSI/A	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)
7	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)
EN 1092	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)

⁽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

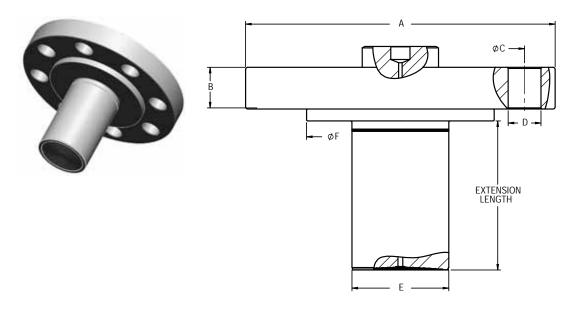


Table 62. EFW Extended Flanged Seal Dimensions⁽¹⁾

	Pipe Size	Class	Flange Diameter "A"	Flange Thickness "B"	Bolt Circle "C"	Bolt s	Bolt Hole Diameter "D"	Raised Face Diameter "F"
		150 lb.	5.00 (127)	0.62 (16)	3.88 (99)	4	0.63 (16)	2.88 (73)
	1 ¹ /2-in.	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)
		150 lb.	6.00 (152)	0.69 (18)	4.75 (121)	4	0.75 (19)	3.62 (92)
ANSI / ASME	2-in.	300 lb.	6.50 (165)	0.82 (21)	5.00 (127)	8	0.75 (19)	3.62 (92)
AS		600 lb.	6.50 (165)	1.00 (25)	5.00 (127)	8	0.75 (19)	3.62 (92)
<u> </u>		150 lb.	7.50 (191)	0.88 (22)	6.00 (125)	4	0.75 (19)	5.00 (127)
ž	3-in.	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)
		150 lb.	9.00 (229)	0.88 (22)	7.50 (191)	8	0.75 (19)	6.20 (158)
	4-in.	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)
		PN 40	6.50 (165)	0.79 (20)	4.92 (125)	4	0.71 (18)	4.00 (102)
	DN 50	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)
1092-1		PN 40	7.87 (200)	0.94 (24)	6.30 (160)	8	0.71 (18)	5.43 (138)
109	DN 80	PN 63	8.46 (215)	1.10 (28)	6.69 (170)	8	0.88 (22)	5.43 (138)
Ä		PN 100	9.06 (230)	1.26 (32)	7.09 (180)	8	1.02 (26)	5.43 (138)
		PN 16	8.66 (220)	0.79 (20)	7.09 (180)	8	0.71 (18)	6.20 (158)
	DN 100	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 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)
SIC		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).

Pro	Process Connection Size ⁽¹⁾									
ANSI B16.5	EN 1092-1	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	<u> </u>	2.875 (74)							
4-in. Headbox	DN100 Headbox	<u> </u>	3.78 (97)							

⁽¹⁾ Dimensions are in inches (millimeters).

Figure 7. PFW Pancake Seal

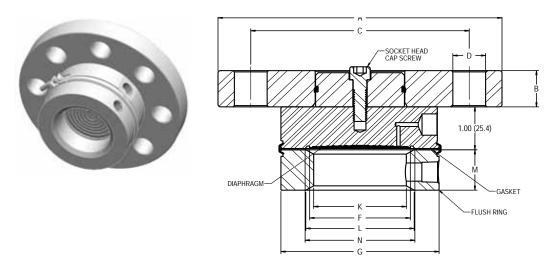


Table 63. PFW Pancake Seal Dimensions⁽¹⁾

ш	Pipe Size	Class	Flange Diameter "A"	Flange Thickness "B"	QTY. of Bolts	Bolt Circle "C"	Bolt Hole Size "D"	Standard Diaphragm Diameter "F"
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)
ANSI		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)
₹	DN 50	PN40	6.50 (165)	0.79 (20)	4	4.92 (125)	0.71 (18))	2.30 (58)
95.		PN63	7.09 (180)	1.02 (26)	4	5.31 (135)	0.87 (22)	2.30 (58)
EN1092	DN 80	PN40	7.87 (200)	0.94 (24)	8	6.30 (160)	0.71 (18)	3.50 (89)
亩		PN63	8.46 (215)	1.10 (28)	8	6.69 (170)	0.87 (22)	3.50 (89)

⁽¹⁾ Dimensions are in inches (millimeters).

ш	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"
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)
ANSI		3.62 (92)	2.12 (54)	2.48 (63)	0.97 (25)	1.30 (33)	2.51 (64)
ব	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)
-	DN 50	4.00 (102)	2.40 (61)	_	0.97 (25)	1.30 (33)	2.51 (64)
95.		4.00 (102)	2.40 (61)	_	0.97 (25)	1.30 (33)	2.51 (64)
EN1092-	DN 80	5.43 (138)	3.60 (91)	_	0.97 (25)	1.30 (33)	3.70 (94)
<u> </u>		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)

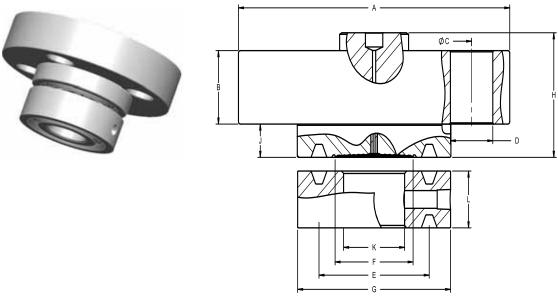


Table 64. Dimensional Table for FCW 2-Piece Flange Type Flush Diaphragm Seal⁽¹⁾

	Pipe Size	Class	Flange Diameter "A"	Flange Thickness "B"	Bolt Circle Diameter "C"	Bolt Hole Diameter "D"	Overall Height "H"	Raised Face Height "J"
	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)
Щ		600 lb.	6.50 (165)	1.00 (25)	5.00 (127)	0.75 (19)	2.43 (61.7)	0.68 (17.3)
ASME		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)
ANSI	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"
	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)
ASME		3.250 (83)	2.30 (58.4)	4.25 (108)	2.12 (54)	1.4 (36)	1.7 (43)
AS		3.750 (95)	2.30 (58.4)	4.88 (124)	2.12 (54)	1.4 (36)	1.7 (43)
ANSI/		4.000 (102)	3.50 (88.9)	5.25 (133)	2.12 (54)	1.4 (36)	1.7 (43)
ž	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

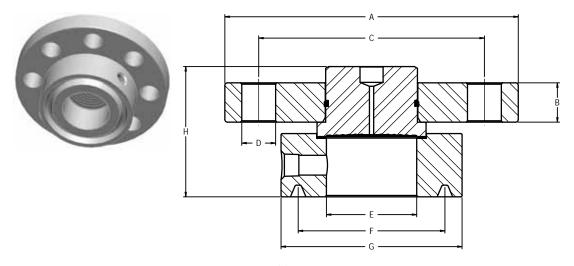


Table 65. RCW Flanged Remote Seal Dimensions⁽¹⁾

	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 (F	•
										No or ¹ /4-in. NPT flush connection	¹ /2-in. NPT flush connection
	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)
ш	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)
ASME	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)
Ž	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)
ANSI/	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)
A	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

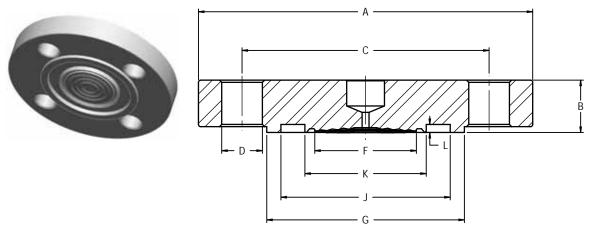


Table 66. FUW Flush Flanged Type Seal Dimensions⁽¹⁾

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"
Z	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

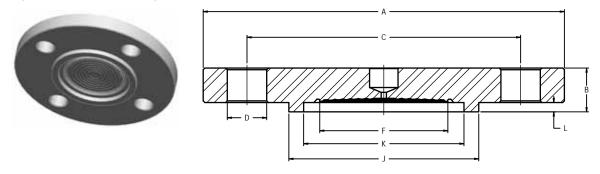


Table 67. FVW Flush Flanged Type Seal Dimensions⁽¹⁾

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"
Z	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

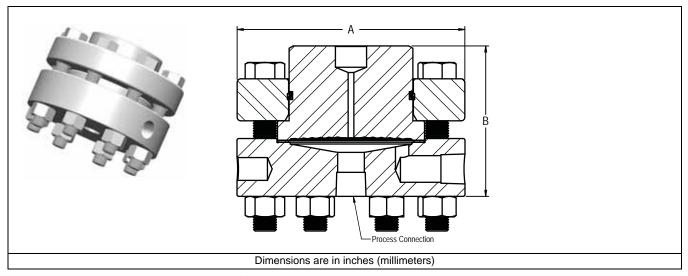


Table 68. RTW Threaded Seal Dimensions⁽¹⁾

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

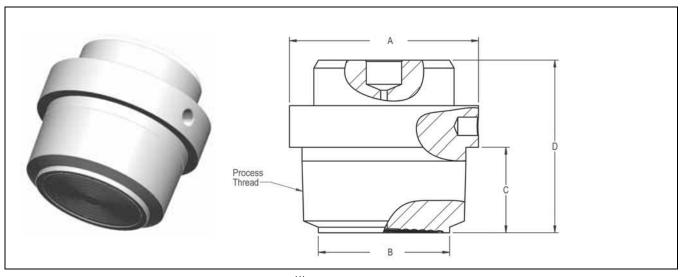


Table 69. HTS Threaded Flush Type Seal Dimensions⁽¹⁾

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

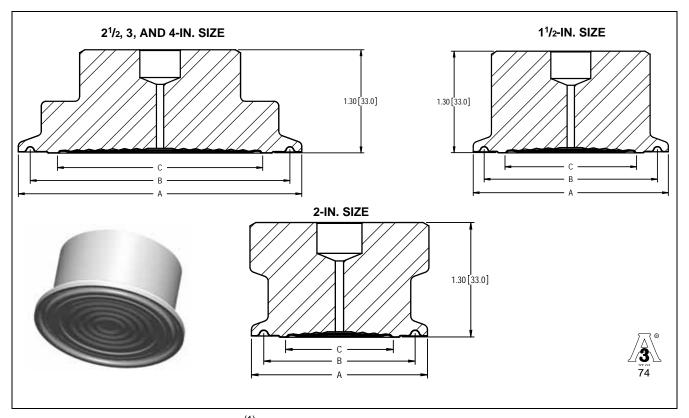


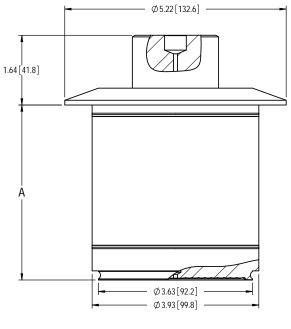
Table 70. SCW Tri-Clamp Seal Dimensions⁽¹⁾

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





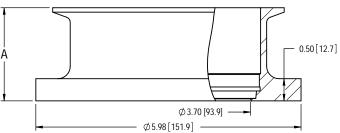




Table 71. SSW Tank Spud Seal Dimensions⁽¹⁾

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

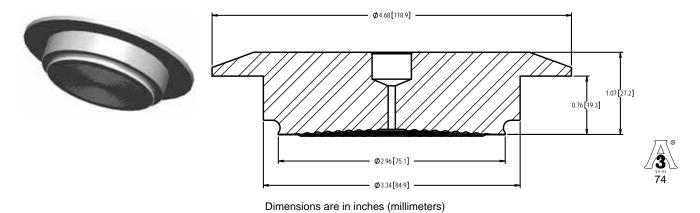


Figure 17. EES Hygienic Flanged Tank Spud Extended Seal

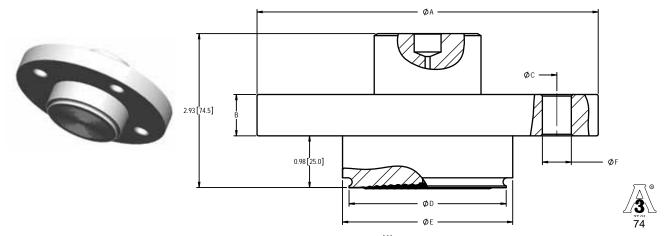


Table 72. EES Hygienic Flanged Tank Spud Extended Seal Dimensions⁽¹⁾

Pipe Size	Α	В	Bolts	С	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

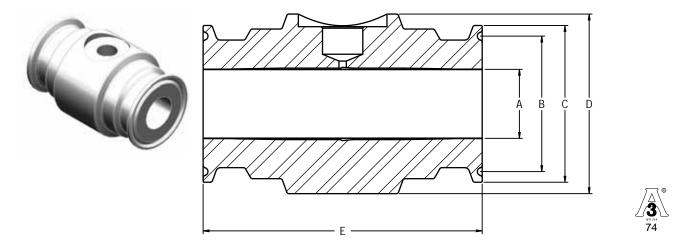


Table 73. VCS Tri-clamp In-Line Seal Dimensions⁽¹⁾

Pipe Size	Α	В	С	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

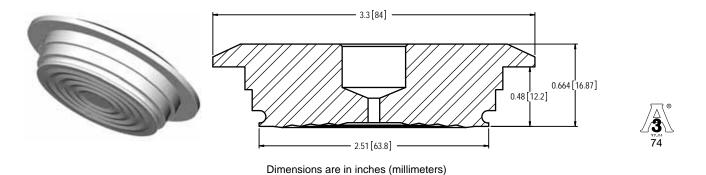


Figure 20. SHP Cherry-Burrell "I" Line Seal



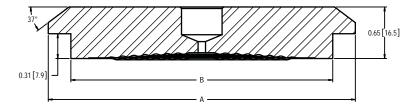




Table 74. SHP Cherry-Burrell "I" Line Seal Dimensions (1)

Size	Α	В
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 21. SLS Hygienic Dairy Process Connection Female Thread Seal per DIN 11851



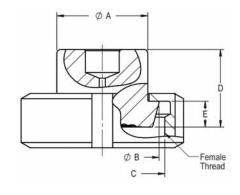


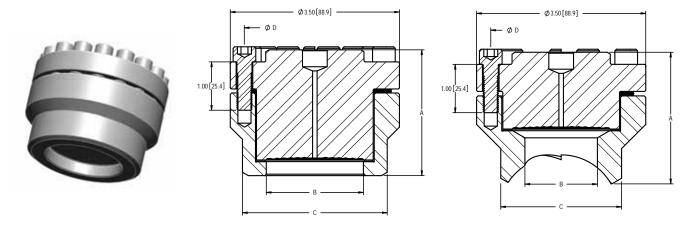


Table 75. SLS Hygienic Dairy Process Connection Female Thread Seal per DIN 11851 Dimensions⁽¹⁾

Female Thread	Process Size / Rating	Α	В	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 22. WSP Saddle Seal



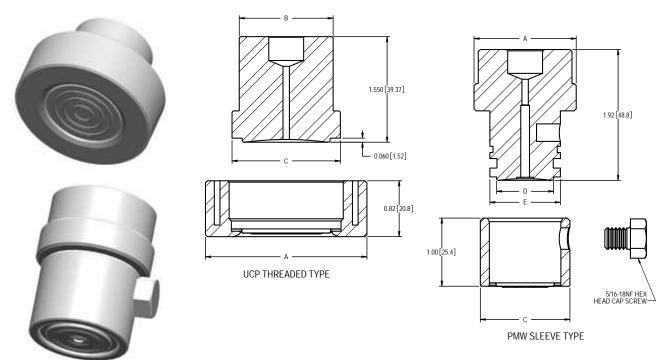
Dimensions are in inches (millimeters)

Table 76. WSP Saddle Seal Dimensions⁽¹⁾

				D	
Size	A	В	С	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 23. UCP and PMW Threaded Pipe Mount Seals



THREADED PIPE MOUNT (UCP AND PMW) 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 24. CTW Chemical Tee Seal

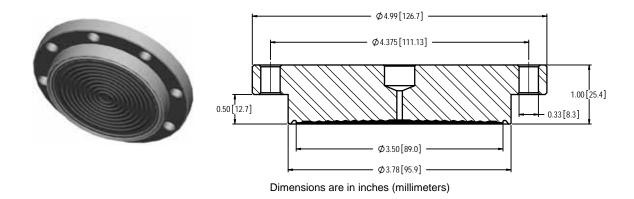


Figure 25. TFS Wafer Style In-Line Seal



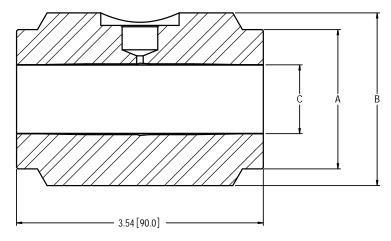
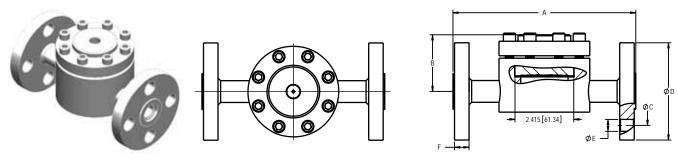


Table 78. TFS Wafer Style In-Line Seal Dimensions⁽¹⁾

Pipe Size	Α	В	С
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 26. WFW Flow-Thru Flanged Seal



Dimensions are in inches (millimeters)

Table 79. WFW Flow-Thru Flanged Seal Dimensions (1)

	Nominal Pipe Size	Overall Length ± 0.05	Upper to Centerline Height	Bolt Circle Diameter	Outside Diameter	Bolt Hole	Flange Thickness
Class (lb.)	(in.)	Α	В	С	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).

Product Data Sheet

00813-0100-4016, Rev JA July 2010

Rosemount DP Level

00813-0100-4016, Rev JA July 2010

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 2051L 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

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 consisits 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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Cherry-Burrell is a trademark of the United Dominion Industries.
The 3-A symbol is a registered trademark of the 3-A Sanitary Standards Symbol Council.

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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April 2010

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 penetration 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







Content

Taking Guided Wave Radar Benefits to the Next Level page 2
Optimized to Suit More Applications page 3
System Integration
Selecting A Guided Wave Radar Transmitter page 7
Measuring Range page 12
Interface page 13
Chambers page 14
Solids page 16
Mechanical Considerations page 17
Ordering Information
Specifications page 31
Product Certifications page 35
Dimensional Drawings page 37





Taking Guided Wave Radar Benefits to the Next Level

MEASUREMENT PRINCIPLE

Rosemount 5300 Series is based on the Time Domain Reflectometry (TDR) technology.

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 to the transmitter. The time difference between the transmitted and the reflected pulse is converted into a distance and the total level or interface level is calculated.

The intensity of the reflection depends on the dielectric constant of the product. The higher the dielectric constant value, the stronger the reflection.

TECHNOLOGY BENEFITS

- No moving parts and no calibration mean minimized maintenance
- Top-down, direct measurement, unaffected by changing process conditions (such as density, conductivity, temperature and pressure)
- Virtually unaffected by dust, vapor and turbulence
- Suitable for small tanks, difficult tank geometry, and interfering obstacles
- Easy upgrade (existing and small openings can be used)

SPECIAL 5300 FEATURES

Direct Switch Technology (DST)

The Rosemount 5300 delivers cutting edge performance with DST, a rapid switch for signal transmission between the transmitter and the receiver. It minimizes signal losses. The result is a better signal-to-noise ratio and an increased ability to handle disturbing factors.

It also enables long measuring ranges of up to 164 ft (50 m) and measurements on low reflective media (dielectrics from 1.4), even with a single lead probe.

Probe End Projection (PEP)

PEP handles long measuring ranges on media with low dielectrics. If the signal is not reflected at the surface, the 5300 uses the probe end as a reference to calculate the actual level.

EchoLogics for Reliable Overfill Detection

A key characteristic feature of a reliable radar transmitter is the ability to detect a full vessel situation always, even when disturbances are present. EchoLogics is the term we use for the capability to determine the correct level. The Rosemount 5300 has an enhanced ability to keep track of the surface at high levels, minimizing the risk of overfill.

Smart Galvanic Interface

Innovative ground plane configuration between electronics, microwave and housing, results in a more stable microwave performance and minimizes unwanted disturbances. This improves the EMC performance and provides a more robust measurement.

Advanced Timing

The Rosemount 5300 uses a timing method that gives ± 3 mm reference accuracy.

Robust Modular Design

The Rosemount 5300 has a dual compartment head that separates electronics from cable connections. It has easy-to-access and robust cable terminals, and an optional easy-to-read display. The head can be rotated 360°, and can be removed while the tank is operational. All of this add up to reduced costs and increased safety.

Full Range of Probe Styles for Application Flexibility

Probes are available in different styles and materials, with options available to handle extreme pressure and temperature. See "Probes" on page 9.

Powerful Configuration Tools

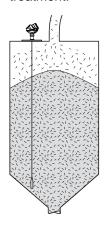
The Rosemount Radar Master™ software with its user-friendly interface is the ultimate setup and troubleshooting tool. See "Configuration" on page 5.

Advanced PlantWeb functionality

The Rosemount 5300 powers the PlantWeb architecture by delivering the best multivariable transmitter (both level and interface from the same 2-wire unit), the best installation practices, and the best field intelligence with advanced diagnostics for HART® and FOUNDATION™ fieldbus.

Optimized to Suit More Applications

The Rosemount 5300 offers reliable level measurement benefits for more applications than ever before. It is suitable for all types of processing industries, oil & gas production, refining, petrochemical, chemical, power, water and waste treatment.

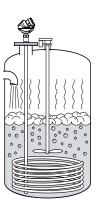


Solids performance

The Rosemount 5303 with a flexible single lead probe measures solids with dielectric constants as low as 1.4.

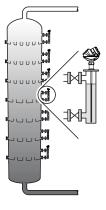
Probes for high physical weight loads are available.

The 5300 measures powders, granules, plastics such as PVC, cement, fly ash, corn etc.
The measuring range is up to 164 ft (50 m).



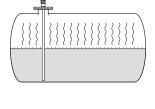
Measure in vessels with turbulence, vapor and mechanical structures

The Rosemount 5300 delivers uninterrupted level data where others fail. Because of the Direct Switch Technology, the received signal is two to five times stronger than other guided wave radars. The result is a superior ability to handle disturbing objects, probe coating, foam, vapor and turbulence.



Minimize risk in the most demanding environments

Innovative technology with robust probes for extreme environments provide reliable performance in high temperature and pressure tanks and chambers. Examples include refinery distillation columns, power feed-water tanks etc. The measurement is unaffected by density variations, low reflectivity media, or the mechanical configuration of the chamber and product inlet.



restrictions.

Improved performance in liquified gas

The probe guided radar signal, combined with

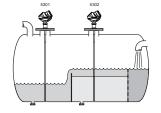
Rosemount 5300 has almost no installation

innovative engineering, makes the 5300 virtually

unaffected by process conditions. Additionally, the

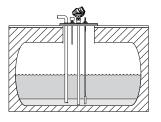
The Rosemount 5300 is well suited for liquid gas applications, since the transmitter head can be serviced without opening the tank.

The superior sensitivity and robust tank seals provide reliable operation in LNG, LPG, NGL, and ammonia tanks. The 5300 transmitter also measures in turbulent products.



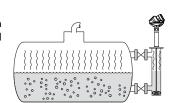
Combine level and interface measurement

In tanks containing two products, one 5300 transmitter measures both the upper surface and the lower product interface. Examples are separators, settling tanks etc. Additional tank penetrations can be avoided. Use the Rosemount 5300 with the single lead probe for reliable measurements in crude oil and other liquids causing product build-up.



Underground benefits

Probes unaffected by high and narrow openings or nearby objects are available. This makes the 5300 an excellent choice for underground tanks where the installation area is limited.



Accuracy in saturated steam applications

The Rosemount 5300 with Dynamic Vapor Compensation will automatically compensate for dielectric changes in high pressure steam applications and maintain the level accuracy. By using a probe with a reference reflector at a fixed distance, the vapor dielectric can be measured. This measurement can be used to automatically compensate for vapor dielectric changes and eliminate error caused by varying pressure and/or temperature.

System Integration

INPUTS / OUTPUTS

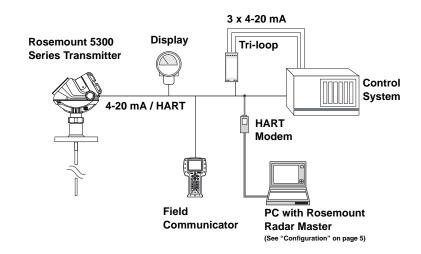
The 5300 Series transmitter uses the same two wires for power supply (see page 34) and communication.

Measurement data is transmitted as an analog 4-20 mA signal with a superimposed digital HART signal or FOUNDATION fieldbus signal.

The HART signal can be used in multidrop mode. By sending the digital HART signal to the optional Rosemount 333 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.

HART



FOUNDATION fieldbus Host / DCS system (e.g. DeltaV™) Maintenance H2 - High Speed Field Bus H1 - Low Speed Field Bus Note: Intrinsically safe 6234 ft (1900 m) max installations may Field **Fieldbus** (depending upon cable allow fewer devices Communicator Modem Display characteristics) per I.S. barrier due to current limitations. Rosemount 5301 Rosemount 5401 Rosemount 5601 **PC** with Rosemount **Radar Master** (See "Configuration" on page 5)

Product Data Sheet

00813-0100-4530, Rev CA April 2010

Rosemount 5300 Series

The transmitter is available with Intrinsically Safe⁽¹⁾ / Non-Incendive or Explosion-proof / Flameproof approvals. A safety isolator, such as a zener barrier, must be used for intrinsic safety. Refer to "Product Certifications" on page 35 and "Ordering Information" on page 19.



The optional HART Tri-loop, HART-to-Analog signal converter.

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).



The integral display is easily configured with Rosemount **Radar Master or the Field** Communicator. The user can choose which variable to display, or if toggling between variables should be applied.

MEASUREMENT PARAMETERS

Multiple process variables can be received by one Rosemount 5300 Series radar transmitter. See information on parameters and transmitter models in the following table.

Rosemount 5301, 5302, and 5303 are described in "Transmitter Housing" on page 7.

(1) Fisco Intrinsic safety is available for Foundation fieldbus. See "Ordering Information" on page 19 for more information on available approvals.

	5301	5302	5303
Level	Х	Х	Х
Distance to Level	Х	Х	Х
Interface Level	(X)*	Х	
Interface Distance	(X)*	Х	
Upper Layer Thickness		Х	
Total Volume	Х	Х	Х
Upper Volume	(X)*	Х	
Lower Volume	(X)*	X	

Interface measurement only for fully submerged probe, see page 13.

CONFIGURATION AMS





Basic configuration can easily be done either with Rosemount Radar Master, a Field Communicator, the AMS™ Suite, DeltaV™ or any other DD (Device Description) compatible host system. For advanced configuration features and extensive diagnostics, Radar Master, or an alternative host that supports enhanced EDDL (such as the AMS Device Manager), is required.

Radar Master is a user-friendly, Windows based software package that provides easy configuration and service for both FOUNDATION fieldbus and HART. A wizard guides the user to enter the required parameters for basic configuration. "Measure & Learn" functionality is accessed through Radar Master and it enables automatic suggestion of level threshold values, making tough applications easy to configure.

Radar Master also includes an echo curve with movie feature, off-line configuration, logging, and extensive on-line help.

The Enhanced EDDL capabilities of the 5300 Series make it possible to view the echo curve from a field communicator or AMS, and to initiate the Measure-and-Learn functionality in the transmitter.



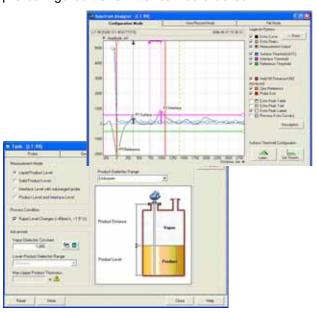
The echo curve can be viewed from a Field Communicator.

For 4-20 mA or HART, a HART modem is required for communication between the transmitter and Radar Master (part number 03300-7004-0001 for RS232 and 03300-7004-0002 for USB interface).

For FOUNDATION fieldbus devices, Radar Master is connected to the fieldbus segment through the fieldbus modem (part number 03095-5108-0001 for PCMCIA). For more information, see the 5300 Reference Manual

(Document No. 00809-0100-4530) or consult the factory.

By filling in the Configuration Data Sheet (CDS), a pre-configured transmitter can be ordered.



Rosemount Radar Master 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.

ADVANCED PLANTWEB FUNCTIONALITY



Rosemount 5300 transmitters support PlantWeb Alerts and power PlantWeb through multivariable and innovative measurement technologies in combination with advanced diagnostics

to provide increased reliability, easier configuration, reduced process downtime, lower installation, maintenance, and operating costs for a better bottom line.

SIGNAL QUALITY METRICS

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.

DYNAMIC VAPOR COMPENSATION

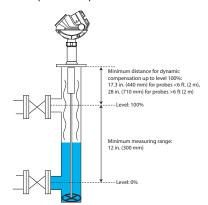
Saturated steam under high pressure can influence radar level transmitter measurements. The Rosemount 5300 with Dynamic Vapor Compensation (probe type 4U, 4V) automatically compensates for this and maintains the level accuracy.

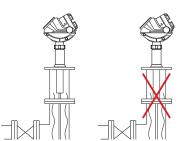
The 5300 should be mounted in a 2, 3, or 4-in bypass chamber with flanges appropriately sized for the pressure and temperature of the application.

A Single lead rigid HTHP probe with a reference reflector for vapor compensation must be used. A centering disk keeps the probe centered in the chamber. Probes up to 13.1 ft. (4 m) in length are supported for Dynamic Vapor Compensation.

Dynamic Vapor Compensation 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.

This minimum distance is 17.3 in. (440 mm) for probe length < 6.6 ft (2 m), and 28 in. (710 mm) for probe length > 6.6 ft (2 m) (see diagram below), to dynamically compensate up to level 100%. The minimum measuring range for this functionality is 12 in. (300 mm).



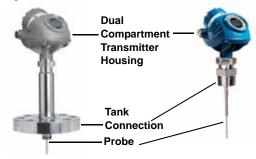


If a spool piece is used, it is important that the reference reflector is not positioned where the spool piece connects to the chamber.

Selecting A Guided Wave Radar Transmitter

A Rosemount 5300 Series transmitter consists of a housing, a tank connection, and a probe. The only parts that contact the tank atmosphere are the probe and the tank connection.

The transmitter can be equipped with different probes to fulfill various application requirements. The 5300 Series is based on a modular design, so there is no matching between probe styles and transmitter housing. Full flexibility is achieved because any probe can be used with any transmitter housing.



TRANSMITTER HOUSING

The transmitter is available in three models:

- Rosemount 5301, for liquid level or submerged interface measurements
- Rosemount 5302, for liquid level and interface measurements
- Rosemount 5303, for solid level measurements

The transmitter can be ordered with Intrinsically Safe / Non-Incendive or Explosion-proof / Flameproof certification (see "Product Certifications" on page 35).

The housing is available in polyurethane covered Aluminium or Stainless Steel (SST). SST housing is preferred for harsh environment applications, such as off-shore platforms or other locations where the housing can be exposed to corrodents such as salt solutions and caustics. The dual compartment transmitter housing can be removed without opening the tank and it has electronics and cabling separated. The housing has two entries for conduit/cable connections.

The 5300 Series is available with standard 1/2 in. NPT cable entry. M20, eurofast or minifast are available as adapter options.

See "Ordering Information" on page 19.

The 5300 Series is also available with a remote housing mounting kit that includes a flexible armored extension cable and a bracket for wall or pipe mounting. See "Remote Housing Measuring Range" on page 48.

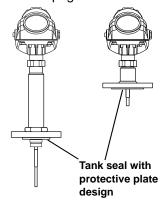


TANK CONNECTION

The tank connection consists of a tank seal, a flange⁽¹⁾, Tri-Clamp⁽²⁾, or NPT or BSP/G threads⁽³⁾. See "Ordering Information" on page 19.

Flange dimensions follow ANSI B 16.5, JIS B2220, and EN 1092-1 standards for blind flanges. Fisher and Masoneilan flanges are also available (see "Special Flanges and Flushing Connection Rings" on page 49).

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, to prevent the 316L / EN 1.4404 SST flange from being exposed to the tank atmosphere. See "Ordering Information" on page 19.



- (1) EN (DIN), ANSI, JIS, Fisher or Masoneilan. See page 49.
- (2) 1.5, 2, 3, or 4 in. for Single Lead probes.
- (3) 1, 1.5, or 2 in. depending on probe type.

Temperature and Pressure Ratings

The following diagrams give process temperature (maximum product temperature at the lower part of the flange) and pressure ratings for tank connections:

- Standard (Std)
- High Pressure (HP)
- High Temperature and High Pressure (HTHP)
- Cryogenic (C)

For Tri-Clamps, the 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 you are using. Tri-Clamp is available for the Standard Temperature and Pressure seal.

For standard tank connection, the final rating depends on flange and O-ring selection.

The following table gives the 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)

The HTHP, HP, and C versions have a ceramic tank seal, and graphite gaskets - no O-rings are used. The final rating depends on flange selection.

A difference between the HP/C and HTHP coaxial versions is material for some parts; PFA/PTFE for HP/C, and ceramics for HTHP. Ceramic spacers allow for usage in applications with higher temperature.

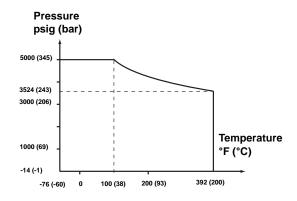
The C version can manage lower temperatures (-321 °F/-196 °C) than the Standard, HP, and HTHP versions.

Max. Rating, Standard Connections

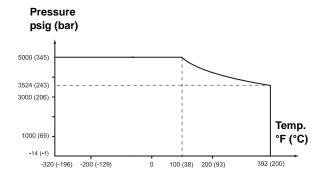
Pressure

psig (par)		
580 (40)	<u> </u>		
232 (16)			PTFE covered probe and flange (model code 7)
-14 (-1)	-40 (-40)	302 (150)	Temperature °F (°C)

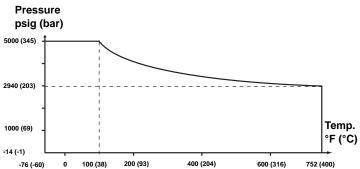
Max. Rating, HP Connections



Max. Rating, C Connections



Max. Rating, HTHP Connections



Product Data Sheet

00813-0100-4530, Rev CA April 2010

Rosemount 5300 Series

Flange Rating

ANSI:

316L SST Flanges according to ANSI B16.5 Table 2-2.3.

Standard: Max. 302 °F/580 psig

(150 °C/40 Bar).

HP/HTHP/C: Up to Class 2500.

Alloy C-276 (UNS N10276) flanges according to ANSI B16.5 Table 2-3.8. HP: Class 1500 up to max 200 °C or max 100 °F/5000 psig (38°C/345 bar) and 392 °F/3500 psig (200 °C/243 bar) HTHP: Class 1500 up to max 400 °C or max 100 °F/5000 psig (38 °C/345 bar) and 752 °F/2940 psig (400 °C/203 bar).

EN:

316L SST according to EN 1092-1 Table 18, material group 13E0.

Standard: Max. 302 °F/580 psig

(150 °C/40 Bar).

HP/HTHP/C: Up to PN 320.

Alloy C-276 flanges according to EN 1092-1 table 18 material group 12E0. HP/HTHP: Up to PN320.

Fisher & Masoneilan:

According to ANSI B16.5 Table 2-2.3. Standard: Max. 302 °F/580 psig (150 °C/40 Bar).

HP/HTHP/C: Up to Class 600.

JIS:

According to JIS B2220 Table 2.3 Standard: 10K/20K/150C. HP/C: 10K/20K/200C.

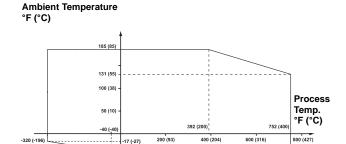
HTHP: 10K/20K/400C

For Alloy C-276 HTHP/HP probes with flange, plate design is available up to Class 600 / PN 63.

Ambient Temperature

The maximum/minimum ambient temperature depends on the process temperature according to the graph below.

Nozzle insulation for the HTHP version should not exceed 4 in. (10 cm).



-17 (-27)

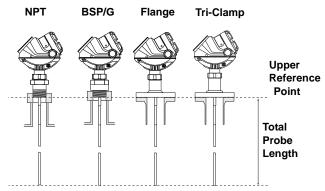
PROBES

Several versions of the probes are available: Rigid Single Lead, Flexible Single Lead, Coaxial (perforated and non-perforated versions), Rigid Twin and Flexible Twin. Probes can be ordered in different materials, and there are options available for extreme temperatures and pressure.

Total probe length is defined from the upper reference point to the end of the probe (weight included if applicable).

For guidance in probe selection, see page 11.

The table on page 10 shows what probe types are available for different materials of construction and for the HTHP, HP and C options.



Total Probe Length and Upper Reference Point (right below flange / thread / Tri-Clamp).

	Rigid Single Lead	Flexible Single Lead	Coaxial	Rigid Twin Lead	Flexible Twin Lead
SST Probe	X	X	X	X	X
Alloy Probe	X		X		
PTFE Covered Probe	X	X ⁽¹⁾			
HTHP Probe (SST)	X	X ⁽¹⁾	X		
HP Probe (SST)	X	X ⁽¹⁾	X		
C Probe (SST)	X	X ⁽¹⁾	X		
HTHP Probe (Alloy)	X		X		
HP Probe (Alloy)	X		X		

⁽¹⁾ For measurements on liquids only. Consult the factory if option is needed for solids.

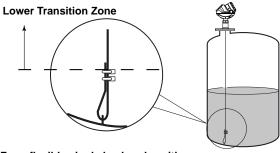
Transition Zones

Transition zones are areas where measurements are non-linear or have reduced accuracy. See picture and table below.

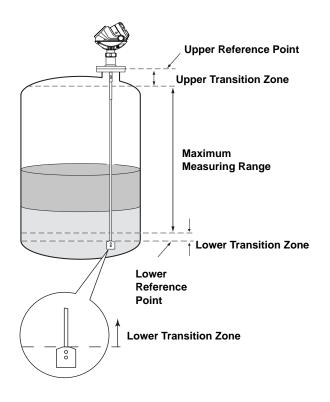
If measurements are desired at the very top of the tank, it is possible to mechanically extend the nozzle and use the coaxial probe. Then the upper transition zone is moved into the extension.

NOTE

The 4-20 mA set points are recommended to be configured between the transition zones, within the measuring range (see picture and diagram).



For a flexible single lead probe with chuck, the lower transition zone is measured upwards from the upper clamp.



	Dielectric Constant	Rigid Single Lead	Flexible Single Lead	Coaxial	Rigid Twin Lead	Flexible Twin Lead
Upper ⁽¹⁾	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)
Transition Zone	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)
	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⁾
Lower ⁽²⁾ Transition Zone	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⁾

- (1) The distance from the upper reference point where measurements have reduced accuracy, see picture above.
- (2) The distance from the lower reference point where measurements have reduced accuracy, see picture above.
- 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 adds to non-measurable area and is not included in the table. See "Dimensional Drawings".
- (5) If using a metal centering disc, the lower transition zone is up to 8 in. (20 cm). If using a PTFE centering disc, the lower transition zone is not affected.

In the table below: G=Good, NR=Not Recommended, AD=Application Dependent (consult the factory).

	Rigid Single Lead	Flexible Single Lead	Coaxial	Rigid Twin Lead	Flexible Twin Lead
This table gives guidelines on probe selection based upon application.					
Measurements					
Level	G	G	G	G	G
Interface (liquid/liquid)	G	G	G	G	G
Process Medium Characteristics					
Changing density	G	G	G	G	G
Changing dielectric ⁽¹⁾	G	G	G	G	G
Wide pH variations	G	G	G	G	G
Pressure changes	G	G	G	G	G
Temperature changes	G	G	G	G	G
Condensing vapors	G	G	G	G	G
Bubbling / boiling surfaces	G	AD	G	G	G
Foam (mechanical avoidance)	NR	NR	AD	NR	NR
Foam (top of foam measurement)	AD	AD	NR	AD	AD
Foam (foam and liquid measurement)	AD	AD	NR	AD	AD
Clean liquids	G	G	G	G	G
Materials with very low dielectric	G	G ⁽²⁾	G	G	G ⁽²⁾
Coating/sticky liquids	AD	AD	NR	NR	NR
Viscous liquids	AD	G	NR	AD	AD
Crystallizing liquids	AD	AD	NR	NR	NR
Solids, granules, powders	AD	G	NR	NR	NR
Fibrous liquids	G	G	NR	NR	NR
Tank Environment Considerations					
Probe is close (< 12 in. / 30 cm) to tank wall/disturbing objects	AD	AD	G	G	G
Probe might touch tank wall, nozzle or disturbing objects	NR	NR	G	NR	NR
Turbulence	G	AD	G	G	AD
Turbulence conditions causing breaking forces	NR	AD	NR	NR	AD
Tall, narrow nozzles	AD	AD	G	AD	AD
Angled or slanted surface (viscous or solids materials)	G	G	NR	AD	AD
Liquid or vapor spray might touch probe above surface	NR	NR	G	NR	NR
Disturbing EMC environment in tank	AD	AD	G	AD	AD
Cleanability of probe	G	G	NR	AD	AD

⁽¹⁾ For overall level applications, a changing dielectric has no affect on the measurement. For interface measurements, a changing dielectric of the top fluid will degrade the accuracy of the interface measurement.

⁽²⁾ With limited measuring range, see page 12.

Measuring Range

In the table below, measuring range information is given for each probe. Since the measuring range depends on the application and on the different factors described in this chapter, the given values are guidelines for clean liquids without remote housing. For "Remote Housing Measuring Range", see page 48.

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 Diel	ectric Constant						
1.4 (1.25 if installed in a metallic bypass or stilling well) ⁽¹⁾ (2)	1.4, up to 49 ft (15 m) ⁽¹⁾ 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	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.

Different parameters 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 has a better reflection and allows for a longer measuring range
- Surface foam and particles in the tank atmosphere might affect measuring performance
- Heavy coating / contamination on the probe may reduce the measuring range and cause erroneous level readings. Consider using a single lead probe or a non-contacting radar transmitter
- Tank material (e.g. concrete or plastic) for measurements with single lead probes (see "Mechanical Considerations" on page 18)

Coating

- 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 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

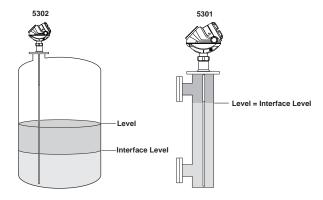
Single Lead	Coaxial	Twin Lead	
	Maximum Viscosity		
8000 cP ⁽¹⁾	500 cP	1500 cP	
	Coating / Build-up		
Coating allowed	Coating not recommended	Thin coating allowed, but no bridging	

⁽¹⁾ Consult the factory if agitation / turbulence and high viscosity.

⁽²⁾ May be lower depending on installation.

Interface

Rosemount 5302 is the ideal choice for measuring the level of oil, and the interface of oil and water, or other liquids with significant dielectric differences. Rosemount 5301 can also be used in applications where the probe is fully submerged in the liquid.



Interface Measurement with a Rosemount 5302 and a Rosemount 5301 (fully submerged probe).

When measuring interface, part of the pulse not reflected at the upper product surface, continues until reflected at the lower product surface. The speed of this pulse depends on the dielectric constant of the upper product.

If the interface is to be measured:

- 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

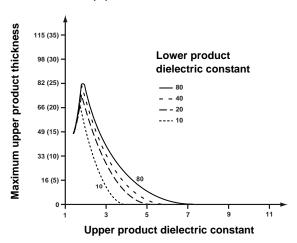
The maximum allowable upper product thickness / measuring range is primarily determined by the dielectric constants of the two liquids.

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.

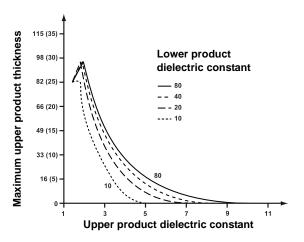
For such applications, the maximum measuring range is only limited by the length of the rigid single lead, coaxial, and rigid twin probes.

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.

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)



Emulsion Layer

Sometimes there is an emulsion layer (mix of the products) between the two products that can affect interface measurements. For assistance with emulsion applications, consult the factory.

Chambers

ROSEMOUNT 9901 CHAMBER

The Rosemount 9901 Chamber can be ordered together with the 5300 Series transmitters (option code XC). Rosemount 9901 allows external mounting of process level instrumentation. Externally mounting an instrument in a chamber means it can be isolated for routine maintenance while keeping the plant operational. It is also used if there are in-tank restrictions that do not allow mounting of the instrument in a vessel and it is ideal for critical area and general purpose applications. 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.

The probe length to use for a certain chamber can be calculated with this formula (not valid for 9901 chambers with probe types 4U or 4V):

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

Centre-to-Centre

Use a centering disc the same diameter as the chamber if the probe length > 3,3 ft. (1 m).

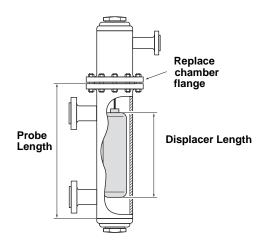
See "Probe Type in Chamber Considerations" on page 15 for which probe type to use.

See "Centering Discs" on page 15 for more information about them.

For additional information, see the Rosemount 9901 Chamber for Process Level Instrumentation Product Data Sheet (Document No. 00813-0100-4601).

REPLACING A DISPLACER IN AN 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.



5300 Benefits

- No moving parts: Less need for maintenance costs dramatically reduced, and improved measurement availability
- Reliable measurement, independent of density, turbulence, and vibrations

Considerations when changing to 5300

When changing from a displacer to a Rosemount 5300 Series transmitter, 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 "Dimensional Drawings" on page 48 to identify the proprietary flanges.

The following are guidelines on the required probe length.

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.

See "Probe Type in Chamber Considerations" and "Centering Discs" on page 15 for which probe and disc to use.

PROBE TYPE IN CHAMBER CONSIDERATIONS

When installing a Rosemount 5300 in a chamber, the single lead probe is recommended. The exception is with liquified gas > 40 bar when the coaxial probe should be used.

The recommended minimum chamber diameter is 4 in. (100 mm) for the Single Flexible probe and 3 in. (75 mm) for the Single Rigid probe. The probe should be centered to prevent it from 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 a probe > 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 disk.

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 wall or pipe, centering discs are available for rigid single, flexible single, and flexible twin lead probes. The disc is attached to the end of the probe. The discs are made of stainless steel, Alloy C-276 or PTFE. The centering disc in PTFE is not available for HTHP probes.



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)

The following table shows which centering disc diameter to choose for a particular pipe.

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.

VENTED FLANGES AND FLUSHING CONNECTION RINGS

The 5300 Series is available with vented flanges designed with threaded connection (model code RA) and ordered as accessories. As an alternative to a vented flange, it is possible to use a flushing connection ring on top of the standard nozzle (see "Special Flanges and Flushing Connection Rings" on page 49).

Solids

Rosemount 5303 is the perfect choice for most solid applications such as powders, granulates, or pellets with a grain size of up to 0.8 in. (20 mm). Materials include plastics, fly-ash, cement, sand, sugar, cereals etc.

Measurements are independent of dust, moisture, and material fluctuations, such as density and temperature. For environments where electrostatic discharges (plastics) are likely to occur, it is recommended that the probe end be grounded. Additional ground wires may be required in tanks with diameter > 10 ft. (3 m).

The measured value is where the probe comes in contact with the material, which means that the shape of the material surface in the silo is not critical for the measurement.

The flexible single lead probe is recommended for solids. It is available in two versions to handle different loads and lengths:

- 0.16 in. (4 mm) in diameter.
 Tensile strength is min. 2698 lb (12 kN).
 Collapse load is max. 3597 lb (16 kN).
- 0.24 in. (6 mm) in diameter.
 Tensile strength is min. 6519 lb (29 kN).
 Collapse load is max. 7868 lb (35 kN).

The following should be kept in mind when planning installation:

- 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, it is better to use a 0.24 in. (6 mm) probe
- 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⁽¹⁾

The table below shows guidelines for the tensile load from free-flowing solids acting on a suspended probe, without a tie-down or weight, in a silo with smooth metallic walls. A safety factor of 2 is included for the calculations. Consult the factory for more information.

NOTE:

Abrasive media can wear out the probe, so consider using non-contacting radar.

 The weight should not be fixed for 100 ft (30 m) or longer probes.

Material	Tensile load for 0.16 in. (4 mm) flexible single lead probe, lb (kN)			Tensile load for 0.24 in. (6 mm) flexible single lead probe, lb (kN)				
	Probe length	49 ft (15 m)	Probe length	115 ft (35 m)	Probe length	49 ft (15 m)	Probe length	115 ft (35 m)
	Tank Ø= 10 ft (3 m)	Tank Ø= 39 ft (12 m)	Tank Ø= 10 ft (3 m)	Tank Ø=	Tank Ø= 10 ft (3 m)	Tank Ø=	Tank Ø=	Tank Ø=
Wheat	670 (3)	1120 (5)	1800 (8)	39 ft (12 m) 4500 (20). Not applicable	900 (4)	39 ft (12 m) 1690 (7.5)	10 ft (3 m) 2810 (12.5)	39 ft (12 m) 6740 (30). Exceeds the tensile strength limit.
Polypropylene Pellets	340 (1.5)	670 (3)	810 (3.6)	2360 (10.5)	450 (2)	920(4.1)	1190 (5.3)	3510 (15.6)
Cement	900 (4)	2020 (9)	2470 (11)	7310 (32.5). Not applicable	1350 (6)	2920 (13)	3600 (16)	10790 (48). Exceeds the tensile strength limit.

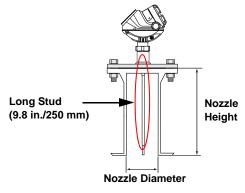
Mechanical Considerations

Typically the transmitter is top mounted with a flanged or threaded tank connection, but the probe can also be installed at an angle of up to 90° from vertical. When the transmitter is installed, the housing can be rotated up to 360°.

To make a measurement, the surface needs to be in contact with the probe and it cannot be nested on top of the surface. It needs to hang straight down.

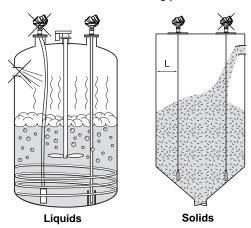
To get the best possible performance, the following should be considered before installing the transmitter:

- Maximum recommended nozzle height is 4 in. (10 cm) + the nozzle diameter for all probes except the coaxial. For the coaxial probe, there are no such restrictions
- When using single flexible probes in tall and narrow nozzles, a Long Stud (LS option) is recommended to prevent the probe from contacting the nozzle

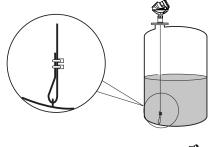


 Probes should be installed so they are not impacted by products from the inlets

Recommended mounting position



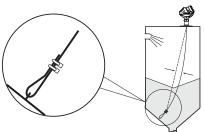
- Contact between probes and agitators should be avoided and applications with strong fluid movements should have the probe anchored. If the probe can move to within 1 ft (30 cm) of any object during operation, the probe should be tied down
- Select a probe length according to the required measuring range. Most probes can be cut in field.
 - However, there are some restrictions for the standard and HP/C coaxial probes: they can be cut up to 2 ft (0.6 m). Probes shorter than 4.1 ft (1.25 m) can be cut to the length of 1.3 ft (0.4 m).
 - The HTHP coaxial probe and the PTFE covered probes cannot be cut in field
- To stabilize the probe from side forces, it is possible to fix, or guide the probe to the tank bottom.
 - For solids, consider using the 0.24 in. (6 mm) probe because of the higher tensile strength (see page 16). The probe should have a sag of \geq 1 in./100 in. (1 cm/m) to prevent probe damage
- Avoid anchoring in solids tanks taller than 98 ft (30 m) in height. See tensile load table in "Solids" on page 16



lead probe with chuck installed in liquids and in solids. For solids, it is recommended that the probe should be slack to prevent high

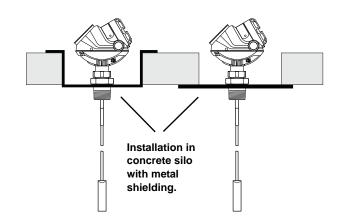
tensile loads.

Flexible single

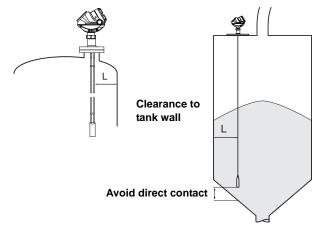


For more anchoring options, see Reference Manual (Document No. 00809-0100-4530).

- 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 screwed into an 8-in. (200 mm), or larger, metal sheet (see the Reference Manual for placement)
- Installation on a thick concrete silo must be made flush with the lower edge, with metal shielding (see illustration to the right)
- If there is a chance the probe may come into contact with a wall, nozzle or other tank obstruction, the coaxial probe is recommended.
 - The minimum clearance is given in the table below
- For solids: probe installation should occur when the silo is empty, and the probe should be regularly inspected for damage
- For single lead probes, avoid 10-in. (250 mm) / DN250 or larger diameter nozzles, especially in applications with low dielectric constant



For more information on mechanical installation, see Reference Manual (Document No. 00809-0100-4530).



	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 15 and "Ordering Information" on page 19) 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.

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
- Full range of probe styles for application flexibility
- HART 4-20 mA, FOUNDATION fieldbus, or WirelessHART™ with the THUM™ adapter
- Prior use SIL 2 suitable (QS Option)
- Advanced Diagnostics (D01 & DA1 Options)

Additional Information

Selecting a GWR: page 7 Measuring range: page 12 Interface: page 13

Chambers: page 14

Mechanical considerations: page 17

Specifications: page 31 Certifications: page 35

Dimensional drawings: page 37.

TABLE 1. 5301 and 5302 Level and/or Interface in Liquids Ordering Information

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 (Dutput			
Standar	d		Standard	
Н	4-20 mA with HART communication		*	
F	FOUNDATION fieldbus		*	
Housing	g Material			
Standar	d		Standard	
Α	Polyurethane-covered Aluminum		*	
Expanded				
S Stainless Steel, Grade CF8M (ASTM A743)				
Condui	t / Cable Threads			
Standar	d		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)		*	
Operati	ng Temperature and Pressure ⁽²⁾	Probe Type		
Standar	d		Standard	
S	- 15 psig (-1bar) to 580 psig (40 bar) @ 302 °F (150 °C)	All	*	
Н	High Temperature / High Pressure ⁽³⁾ : 2940 psi @ 752 °F and 5000 psi @ 100 °F (203 bar @ 400 °C and 345 bar @ 38 °C) according to ANSI Class 2500	3A, 3B, 4A, 4U, 4V, 5A and 5B	*	
Р	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) according to ANSI Class 2500	3A, 3B, 4A, 5A and 5B	*	

TABLE 1. 5301 and 5302 Level and/or Interface in Liquids Ordering Information

Expar	nded			
С	Cryogenic Temperature ⁽³⁾ (4)-321 °F (-196 °C Max 392 °F (200 °C): 3500 psi @ 392 °F and @ 200 °C and 345 bar @ 38 °C) according t	d 5000 psi @ 100 °F (243 bar	3A, 3B, 4A, 5A, 5B (Only SST)	
Mater Probe	ial of Construction ⁽⁵⁾ : Process Connection /	Probe Type	Valid Operation Temperature and Pressure	
Stand	ard			Standard
1	316L SST (EN 1.4404)	All	S, H, P, C	*
Expar	nded			
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	
Н	Alloy C-276 (UNS N10276) process connection, flange and probe ⁽⁶⁾	3A, 3B, 4A	H, P	
Sealir	ng, O-ring Material (Consult the factory for o	ther o-ring materials)		
Stand	ard			Standard
N	None ⁽⁷⁾			*
V	Viton [®] fluoroelastomer			*
Е	Ethylene Propylene			*
K	Kalrez [®] 6375 perfluoroelastomer			*
В	Buna-N			*
Probe	Туре	Process Connection	Probe Lengths	
Stand	ard			Standard
3B	Coaxial, perforated. For level and interface measurement, or easier cleaning.	Flange / 1 in. ⁽¹¹⁾ , 1.5 in., 2 in. ⁽¹¹⁾ 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. ⁽¹¹⁾ , 1.5 in., 2 in. ⁽¹¹⁾ 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	Flange / 1 in. ⁽¹¹⁾ , 1.5 in., 2 in. ⁽¹¹⁾ Thread / Tri-Clamp	Min: 3 ft 4 in. (1 m). Max: 164 ft (50 m)	*
5B	Flexible Single Lead with chuck ⁽⁹⁾	Flange / 1 in. ⁽¹¹⁾ , 1.5 in., 2 in. ⁽¹¹⁾ Thread / Tri-Clamp	Min: 3 ft 4 in. (1 m). Max: 164 ft (50 m)	*
Expar				
1A	Rigid Twin Lead ⁽¹¹⁾	Flange / 1.5 in., 2 in. ⁽¹¹⁾ Thread	Min: 1 ft 4 in. (0.4 m). Max: 9 ft 10 in. (3 m)	
2A	Flexible Twin Lead with weight (11)	Flange / 1.5 in., 2 in. ⁽¹¹⁾ Thread	Min: 3 ft 4 in. (1 m). Max: 164 ft (50 m)	
3A	Coaxial (for level measurement) ⁽¹⁰⁾	Flange / 1 in. ⁽¹¹⁾ , 1.5 in., 2 in. ⁽¹¹⁾ Thread	Min: 1 ft 4 in. (0.4 m). Max: 19 ft 8 in. (6 m)	
4U	Vapor Single Rigid Probe for 2 in. pipes ⁽¹²⁾	Flange / 1.5 in. Thread	Min: 2 ft 5 in. (0.76 m). Max: 13 ft (4 m)	
4V	Vapor Single Rigid Probe for 3-4 in. pipes ⁽¹²⁾	Flange / 1.5 in. Thread	Min: 2 ft 5 in. (0.76 m). Max: 13 ft (4 m)	
		1	()	

TABLE 1. 5301 and 5302 Level and/or Interface in Liquids Ordering Information

Probe	Length Units	
Stand		Standard
E	English (feet, in.)	<u> </u>
	Metric (meters, centimeters)	*
Total	Probe Length ⁽¹³⁾ (feet/m)	
Stand	ard	Standard
XXX	0-164 ft or 0-50 m	*
Total	Probe Length ⁽¹³⁾ (in./cm)	
Stand	ard	Standard
XX	0-11 in. or 0-99 cm	*
Proce	ess Connection - Size / Type (consult the factory for other process connections)	
	Flanges ⁽¹⁴⁾	
Stand		Standard
AA	2 in. ANSI, 150 lb	*
AB	2 in. ANSI, 300 lb	*
AC	2 in. ANSI, 600 lb. HTHP / HP units	*
AD	2 in. ANSI, 900 lb. HTHP / HP units	*
ВА	3 in. ANSI, 150 lb	*
ВВ	3 in. ANSI, 300 lb	*
ВС	3 in. ANSI, 600 lb. HTHP / HP units	*
BD	3 in. ANSI, 900 lb. HTHP / HP units	*
CA	4 in. ANSI, 150 lb	*
СВ	4 in. ANSI, 300 lb	*
CC	4 in. ANSI, 600 lb. HTHP / HP units	*
CD	4 in. ANSI, 900 lb. HTHP / HP units	*
Expar	nded	
AE	2 in. ANSI, 1500 lb. HTHP / HP units	
Al	2 in. ANSI, 600 lb, RTJ (Ring Type Joint). HTHP / HP units	
AJ	2 in. ANSI, 900 lb, RTJ (Ring Type Joint). HTHP / HP units	
AK	2 in. ANSI, 1500 lb, RTJ (Ring Type Joint). HTHP / HP units	
BE	3 in. ANSI, 1500 lb. HTHP / HP units	
BI	3 in. ANSI, 600 lb, RTJ (Ring Type Joint). HTHP / HP units	
BJ	3 in. ANSI, 900 lb, RTJ (Ring Type Joint). HTHP / HP units	
BK	3 in. ANSI, 1500 lb, RTJ (Ring Type Joint). HTHP / HP units	
CE	4 in. ANSI, 1500 lb. HTHP / HP units	
CI	4 in. ANSI, 600 lb, RTJ (Ring Type Joint). HTHP / HP units	
CJ	4 in. ANSI, 900 lb, RTJ (Ring Type Joint). HTHP / HP units	
CK	4 in. ANSI, 1500 lb, RTJ (Ring Type Joint). HTHP / HP units	
DA	6 in. ANSI, 150 lb	
	IN) Flanges ⁽¹⁵⁾	
Stand		
HB	DN50, PN40	*
HC	DN50, PN63. HTHP / HP units	*
HD	DNS0, PN100. HTHP / HP units	*
IA	DN80, PN16	*
IB	DN80, PN40	*
IC	DN80, PN63 . HTHP / HP units	*

April 2010

Rosemount 5300 Series

TABLE 1. 5301 and 5302 Level and/or Interface in Liquids Ordering Information

DN N80, PN100, PN160	I he E	expanded offering is subject to additional delivery lead time.		
JB NN100, PN40	ID	DN80, PN100. HTHP / HP units		*
DN 100, PN63, HTHP / HP units	JA	DN100, PN16		*
D D D D D D D D D D	JB	DN100, PN40		*
Expan=4 HE NN50, PN160, HTHP / HP units	JC	DN100, PN63. HTHP / HP units		*
HE DN50, PN160, HTHP / HP units	JD	DN100, PN100. HTHP / HP units		*
HF	Expan	ded		
E	HE	DN50, PN160. HTHP / HP units		
F	HF	DN50, PN250. HTHP / HP units		
JE DN100, PN160. HTHP / HP units JF DN100, PN250. HTHP / HP units Standard	ΙE	DN80, PN160. HTHP / HP units		
JF DN100, PN250, HTHP / HP units KA DN150, PN16 Standard Standard UA 50A, 10K ★ XA 100A, 10K ★ Expan="4">Expan="4" Colspan="4">Colspa	IF	DN80, PN250. HTHP / HP units		
KA DN 150, PN 16 JIS Planges **Incompanies** Standard UA 50A, 10K *	JE	DN100, PN160. HTHP / HP units		
Standard	JF	DN100, PN250. HTHP / HP units		
Standard UA 50A, 10K ★ XA 80A, 10K ★ XA 100A, 10K ★ Expan=#** 50A, 20K ★ UB 50A, 20K ★ XB 80A, 20K ★ XB 150A, 10K ★ YB 150A, 20K ★ YB 150A, 20K ★ YB 200A, 10K ★ YB 150A, 20K ★ YB 200A, 10K ★ YB 150A, 20K ★ YB 150A, 10K ★ YB 150A, 20K ★ XB 200A, 20K ★ XB 21K XB All ★ RC 15 In XB<				
VA SOA, 10K	JIS Fla	inges ⁽¹⁵⁾		
XA 80A, 10K ★ Expan=2 UB 50A, 20K VB 80A, 20K	Standa	ard		Standard
★ Expan=∀	UA	50A, 10K		*
Expanded SOA, 20K SOA, 20K	VA	80A, 10K		*
UB 50A, 20K VB 80A, 20K	XA	100A, 10K		*
VB 80A, 20K KB 100A, 20K 20A, 2	Expan	ded		
XB 100A, 20K YA 150A, 10K 150A, 20K ZA 200A, 10K 200A, 20K Trieaded Connections(14) Probe Type Standard RA 1½ 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 1½ in. BSP (G 1½ in.) thread All SB 1 in. BSP (G 1½ in.) thread All Tri-Clamp Fittings(14) Probe Type Expanded FT 1½ in. Tri-Clamp 4A, 5A, 5B standard temperature and pressure temperature and pressure AT 2 in. Tri-Clamp 4A, 4B, 5A, 5B standard temperature and pressure temperature and pressure temperature and pressure BT 3 in. Tri-Clamp 4A, 4B, 5A, 5B standard temperature and pressure temperature an	UB	50A, 20K		
YA 150A, 10K 150A, 20K ZA 200A, 10K 200A, 20K Thread=tons(14) Probe Type Standard RA 1½ in. NPT thread All ★ RR All, standard temperature and pressure ★ Expan=tem to the problem of	VB	80A, 20K		
YB 150A, 20K ZA 200A, 10K Threaded Connections ⁽¹⁴⁾ Probe Type Standard Standard RB 1 ½ in. NPT thread All ★ RB 1 in. NPT thread 3A, 3B, 4A, 4B, 5A, 5B, standard temperature and pressure Standard temperature and pressure SA 1 ½ in. BSP (G 1 ½ in.) thread All Standard temperature and pressure SB 1 in. BSP (G 1 in.) thread All, 8A, 4B, 5A, 5B, standard temperature and pressure Standard temperature and pressure Tri-Clamp Fittings ⁽¹⁴⁾ Probe Type Expander 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	XB	100A, 20K		
ZA 200A, 10K ZB 200A, 20K Threaded Connections ⁽¹⁴⁾ Probe Type 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 ⁽¹⁴⁾ Probe Type Expanded 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 CT 4 in. Tri-Clamp 4A, 4B, 5A, 5B standard 4A, 4B, 5A, 5B standard temperature and pressure	YA	150A, 10K		
ZB 200A, 20K Threaded Connections ⁽¹⁴⁾ Probe Type Standard RA 1 ½ in. NPT thread All ★ RC 2 in. NPT thread All, standard temperature and pressure ★ Expander 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 ⁽¹⁴⁾ Prob Expander 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	YB	150A, 20K		
Threaded Connections (14) Probe Type 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 (14) 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	ZA	200A, 10K		
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 ⁽¹⁴⁾ 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	ZB	200A, 20K		
RA 1½ 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 1½ in. BSP (G 1½ in.) thread All SB 1 in. BSP (G 1 in.) thread 3A, 3B, 4A, 4B, 5A, 5B, standard temperature and pressure Tri-Clamp Fittings (14) Probe Type Expanded FT 1½ in. Tri-Clamp 4A, 5A, 5B standard temperature and pressure temperature and pressure BT 3 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 CT 4 in. Tri-Clamp 4A, 4B, 5A, 5B standard	Thread	ded Connections ⁽¹⁴⁾	Probe Type	
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(14) Probe Type Expanded 4A, 5A, 5B standard temperature and pressure 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	Standa	ard		Standard
ExpandedRB1 in. NPT thread3A, 3B, 4A, 4B, 5A, 5B, standard temperature and pressureSA1 ½ in. BSP (G 1 ½ in.) threadAllSB1 in. BSP (G 1 in.) thread3A, 3B, 4A, 4B, 5A, 5B, standard temperature and pressureTri-Clamp Fittings(14)Probe TypeExpandedFT1 ½ in. Tri-Clamp4A, 5A, 5B standard temperature and pressureAT2 in. Tri-Clamp4A, 4B, 5A, 5B standard temperature and pressureBT3 in. Tri-Clamp4A, 4B, 5A, 5B standard temperature and pressureCT4 in. Tri-Clamp4A, 4B, 5A, 5B standard temperature and pressure	RA	1 ½ in. NPT thread	All	*
RB 1 in. NPT thread 3A, 3B, 4A, 4B, 5A, 5B, standard temperature and pressure SA 1½ in. BSP (G 1½ in.) thread All SB 1 in. BSP (G 1 in.) thread 3A, 3B, 4A, 4B, 5A, 5B, standard temperature and pressure Tri-Clamp Fittings(14) Probe Type Expanded FT 1½ 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	RC	2 in. NPT thread		*
SA 1½ in. BSP (G 1½ in.) thread All SB 1 in. BSP (G 1 in.) thread 3A, 3B, 4A, 4B, 5A, 5B, standard temperature and pressure Tri-Clamp Fittings ⁽¹⁴⁾ Probe Type Expanded FT 1½ 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	Expan	ded		
SB 1 in. BSP (G 1 in.) thread 3A, 3B, 4A, 4B, 5A, 5B, standard temperature and pressure Tri-Clamp Fittings ⁽¹⁴⁾ Probe Type Expanded FT 1½ 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	RB	1 in. NPT thread	standard temperature and	
standard temperature and pressure Tri-Clamp Fittings ⁽¹⁴⁾ 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 CT 4 in. Tri-Clamp 4A, 4B, 5A, 5B standard	SA	1 ½ in. BSP (G 1 ½ in.) thread	All	
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			standard temperature and	
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 4A, 4B, 5A, 5B standard temperature and pressure	Tri-Cla	mp Fittings ⁽¹⁴⁾	Probe Type	
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	Expan	ded		
BT 3 in. Tri-Clamp 4A, 4B, 5A, 5B standard temperature and pressure CT 4 in. Tri-Clamp 4A, 4B, 5A, 5B standard 4A, 4B, 5A, 5B standard	FT	1 ½ in. Tri-Clamp		
temperature and pressure CT 4 in. Tri-Clamp 4A, 4B, 5A, 5B standard	AT	2 in. Tri-Clamp		
	ВТ	3 in. Tri-Clamp		
	СТ	4 in. Tri-Clamp		

TABLE 1. 5301 and 5302 Level and/or Interface in Liquids Ordering Information

	Expanded offering is subject to additional delivery lead time.	
Propri	ietary Flanges	
Stand	ard	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	*
Hazar	dous Locations Certifications	
Stand	ard	Standard
NA	No Hazardous Locations Certifications	*
E1	ATEX Flameproof ⁽¹⁶⁾	*
E3	NEPSI Flameproof ⁽¹⁶⁾	*
E5	FM Explosion-proof ⁽¹⁶⁾	*
E6	CSA Explosion-proof ⁽¹⁶⁾	*
E7	IECEx Flameproof ⁽¹⁶⁾	*
I1	ATEX Intrinsic Safety	*
IA	ATEX FISCO Intrinsic Safety ⁽¹⁷⁾	*
I3	NEPSI Intrinsic Safety	*
IC	NEPSI FISCO Intrinsic Safety ⁽¹⁷⁾	*
15	FM Intrinsic Safety and Non-Incendive	*
IE	FM FISCO Intrinsic Safety ⁽¹⁷⁾	*
16	CSA Intrinsic Safety	*
IF	CSA FISCO Intrinsic Safety ⁽¹⁷⁾	*
17	IECEx Intrinsic Safety	*
IG	IECEx FISCO Intrinsic Safety ⁽¹⁷⁾	*
Expan	·	
KA	ATEX, FM, CSA Flameproof/Explosion-proof ⁽¹⁶⁾	
KB	ATEX, FM, IECEx Flameproof/Explosion-proof ⁽¹⁶⁾	
KC	ATEX, CSA, IECEx Flameproof/Explosion-proof ⁽¹⁶⁾	
KD	FM, CSA, IECEX Flameproof/Explosion-proof ⁽¹⁶⁾	
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 ⁽¹⁷⁾	
KJ	FISCO - ATEX, FM, IECEX Intrinsic Safety ⁽¹⁷⁾	
KK	FISCO - ATEX, CSA, IECEX Intrinsic Safety ⁽¹⁷⁾	
KL	FISCO - FM, CSA, IECEX Intrinsic Safety ⁽¹⁷⁾	
Option		
		Ctandand
Stand M1	Integral digital display	Standard
P1	Hydrostatic testing ⁽¹⁸⁾	*
	NACE material recommendation per MR-0175 and MR-0103 ⁽¹⁹⁾	
N2 LS	Long stud ⁽²⁰⁾ 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)	*
Expan		
BR	Mounting Bracket for 1.5 in. NPT Process Connection (RA)	
W2	Short weight for flexible single lead probe ⁽²¹⁾	

TABLE 1. 5301 and 5302 Level and/or Interface in Liquids Ordering Information

	al Configuration (Software)		
Standa	<u> </u>		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 (22) (standard Rosemount alarm and saturation levels)		*
Specia	al Certifications		
Standa			Standard
Q4	Calibration Data Certification		*
Q8	Material Traceability Certification per EN 10204 3.1 ⁽²³⁾		*
QS	Prior-use certificate of FMEDA Data. Only available with HART 4-20	mA output (output code H).	*
Expan	· ·	,	
QG	GOST Primary Verification Certificate		
PlantV	Veb Diagnostic Functionality		
Standa			Standard
D01	FOUNDATION fieldbus Diagnostics Suite		*
DA1	HART Diagnostics Suite		*
Center	ring Discs	Outer Diameter	
Standa	ard	-	Standard
S2	2 in. Centering disc ⁽²⁴⁾	1.8 in. (45 mm)	*
S3	3 in. Centering disc ⁽²⁴⁾	2.7 in. (68 mm)	*
S4	4 in. Centering disc ⁽²⁴⁾	3.6 in. (92 mm)	*
P2	2 in. Centering disc PTFE ⁽²⁵⁾	1.8 in. (45 mm)	*
P3	3 in. Centering disc PTFE ⁽²⁵⁾	2.7 in. (68 mm)	*
P4	4 in. Centering disc PTFE ⁽²⁵⁾	3.6 in. (92 mm)	*
Expan	ded		
S6	6 in. Centering disc ⁽²⁴⁾	5.55 in. (141 mm)	
S8	8 in. Centering disc ⁽²⁴⁾	7.40 in. (188 mm)	
P6	6 in. Centering disc PTFE ⁽²⁵⁾	5.55 in. (141 mm)	
P8	8 in. Centering disc PTFE ⁽²⁵⁾	7.40 in. (188 mm)	
Remot	e Housing Mounting		
Expan	ded		
B1	1m / 3.2 ft. Remote Housing Mounting Cable and Bracket		
B2	2m / 6.5 ft. Remote Housing Mounting Cable and Bracket		
В3	3m / 9.8 ft. Remote Housing Mounting Cable and Bracket		
Conso	lidate to Chamber		
Expan			
XC	Consolidate to Chamber ⁽²⁶⁾		

- (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" on page 7.
- (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) Extra length for fastening is added in factory.
- (10) Requires model 5301.
- (11) Only available with standard temperature and pressure (code S).
- (12) This is an HTHP probe.
- (13) 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 "Mechanical Considerations" on page 17 for more probe length guidance.

Product Data Sheet

00813-0100-4530, Rev CA April 2010

Rosemount 5300 Series

- (14) Available in 316L SST. For other materials consult the factory.
- (15) Available in 316L SST (EN 1.4404). For other materials consult the factory.
- (15) Available in 31bL SST (EN 1.4404). For other materials consult the ractory.
 (16) Probes are intrinsically safe.
 (17) Requires Foundation fieldbus signal output (U_i parameter listed in "Product Certifications" on page 35).
 (18) For standard tank connection, only available with flange.
 (19) For Material SST, Alloy C-276 and Alloy 400; Probe Type 3A, 3B, 4A, 4B, 4U, and 4V.
 (20) Not available with PTFE covered probes.
 (21) Only for Material of Construction code 1 and 3. For other materials, consult the factory.

- (21) Only for Material of Construction code 1 and 3. For other materials, consult the factory.
- (22) The standard alarm setting is high.
- (23) Certificate includes all pressure retaining wetted parts.
- (24) 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
- (25) Available for probe types 2A, 4A, 4B and 5A, except for HTHP.
- (26) 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, or WirelessHART™ with the THUM™ adapter
- Prior use SIL 2 suitable (QS Option)
- Advanced Diagnostics (D01 & DA1 Options)

Additional Information

System integration: page 4 Selecting a GWR: page 7 Measuring range: page 12

Solids: page 16

Mechanical considerations: page 17

Specifications: page 31 Certifications: page 35

Dimensional drawings: page 37.

TABLE 2. 5303 Level for Solids Ordering Information

Model	Product Description		
5303	Guided Wave Solids Level Transmitter		
Signal Out	put		
Standard			Standard
Н	4-20 mA with HART communication		*
F	FOUNDATION fieldbus		*
Housing N	laterial		
Standard			Standard
Α	Polyurethane-covered Aluminum		*
Expanded			
S	Stainless Steel, Grade CF8M (ASTM A743)		
Conduit / 0	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)	All	*
Material of Construction ⁽³⁾ : Process Connection / Probe Probe Type			
Standard		<u> </u>	Standard
	316L SST (EN 1.4404)	All	*
1	310E 331 (EN 1.4404)	7 111	^

TABLE 2. 5303 Level for Solids Ordering Information

	nded offering is subject to additional delivery le			
	ring Material (Consult factory for other o-ri	ng materials)		
Standard				Standard
V	Viton [®] fluoroelastomer		*	
E	Ethylene Propylene			*
K	Kalrez [®] 6375 perfluoroelastomer			*
В	Buna-N			*
Probe Typ	e	Process Connection	Probe Lengths	
Standard				Standard
5A	Flexible Single Lead with weight, 4 mm	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 ⁽⁴⁾	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	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 ⁽⁴⁾	Flange / 1 in., 1.5 in., 2 in. Thread	Min: 3 ft 4 in. (1 m). Max: 164 ft. (50 m)	*
Probe Len	gth Units			
Standard				Standard
E	English (feet, in.)			*
	Metric (meters, centimeters)			*
Total Prob	e Length ⁽⁵⁾ (feet/m)			
Standard				Standard
XXX	0-164 ft or 0-50 m			*
	e Length ⁽⁵⁾ (in./cm)			
Standard	o zong (on)			Standard
XX	0-11 in. or 0-99 cm			→ Standard
	connection - Size / Type (consult the factory	for other process connect	ions)	
ANSI Flan		TOT OTHER PROCESS CONNECT	10113)	
Standard	ges			Standard
AA	2 in. ANSI, 150 lb			Standard ★
AB	2 in. ANSI, 300 lb			*
BA	3 in. ANSI, 150 lb			*
BB	3 in. ANSI, 300 lb			*
CA	4 in. ANSI, 150 lb			*
CB	4 in. ANSI, 300 lb			*
Expanded	I			
DA	6 in. ANSI, 150 lb			
EN (DIN) F				
Standard				Standard
HB	DN50, PN40			*
IA	DN80, PN16			*
IB	DN80, PN40			*
JA	DN100, PN16			*
JB	DN100, PN40			*
Expanded				

April 2010

Rosemount 5300 Series

TABLE 2. 5303 Level for Solids Ordering Information

JIS Flang	res ⁽⁷⁾		
Standard			Standard
UA	50A, 10K		*
VA	80A, 10K		*
XA	100A, 10K		*
Expande	d		
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	All	*
RC	2 in. NPT thread	5A, 5B, 6A, 6B, standard temperature and pressure	*
Expande	d		
RB	1 in. NPT thread	5A, 5B, 6A, 6B, std. temp. and pressure	
SA	1 ½ in. BSP (G 1 ½ in.) thread	All	
SB	1 in. BSP (G 1 in.) thread	5A, 5B, 6A, 6B, std. temp. and pressure	
Hazardo	us 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		*
 1	ATEX Intrinsic Safety		*
IA	ATEX FISCO Intrinsic Safety ⁽⁸⁾		*
13	NEPSI Intrinsic Safety		*
IC	NEPSI FISCO Intrinsic Safety ⁽⁸⁾		*
15	FM Intrinsic Safety and Non-Incendive		*
IE	FM FISCO Intrinsic Safety ⁽⁸⁾		*
16	CSA Intrinsic Safety		*
IF	CSA FISCO Intrinsic Safety ⁽⁸⁾		*
17	IECEx Intrinsic Safety		*
IG	IECEx FISCO Intrinsic Safety ⁽⁸⁾		*
Expande			
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		
	,,,		1

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.

	<u> </u>	
KH	FM, CSA, IECEx Intrinsic Safety	
KI	FISCO - ATEX, FM, CSA Intrinsic Safety ⁽⁸⁾	
KJ	FISCO - ATEX, FM, IECEX Intrinsic Safety (8)	
KK	FISCO - ATEX, CSA, IECEX Intrinsic Safety ⁽⁸⁾	
KL	FISCO - FM, CSA, IECEX Intrinsic Safety ⁽⁸⁾	
Options		
Standard		Standard
M1	Integral digital display	*
P1	Hydrostatic testing ⁽⁹⁾	*
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)	*
Expanded		
BR	Mounting Bracket for 1.5 in. NPT Process Connection (RA) ⁽¹⁰⁾	
Special Co	onfiguration (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 (11) (standard Rosemount alarm and saturation levels)	*
Special Ce	rtifications	
Standard		Standard
Q4	Calibration Data Certification	*
Q8	Material Traceability Certification per EN 10204 3.1 ⁽¹²⁾	*
QS	Prior-use certificate of FMEDA Data. 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 Ho	ousing 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	

- Not available with Flame/Explosion-proof approvals (E1, E3, E5, E6, E7, KA, KB, KC, and KD)
 Process seal rating. Final rating depends on flange and O-ring selection. See "Tank Connection" on page 7.
- (3) For other materials, consult the factory.
- (4) Extra length for fastening is added in the factory.
 (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. See "Mechanical Considerations" on page 17 for more probe length guidance.
- (6) Available in 316L SST. For other materials, consult the factory.
- (7) Available in 316L SST (EN 1.4404). For other materials consult the factory.
- (8) Requires Foundation fieldbus signal output (U_i parameter listed in "Product Certifications" on page 35).
- (9) Available for flanged connection.
- (10) Only for Standard Temperature and Pressure.
- (11) The standard alarm setting is high.
- (12) 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

	solles Ordering information				
	n - Size/Type (consult the factory for other process con	nections)			
Centering discs ⁽¹⁾ (2)	Outer Diameter			
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)			
03300-1655-0004	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)			
03300-1655-0006	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)			
03300-1655-0009	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)			
03300-1655-1001	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)			
03300-1655-1004	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)			
03300-1655-1006	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)			
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⁾					
03300-1811-9001	Fisher 249B				
03300-1811-9002	Fisher 249C				
03300-1811-9003	Masoneilan				
Flushing Connection					
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					
03300-7004-0001	Viatec HART Modem and cables (RS232 connection)				
03300-7004-0002	Viatec 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 24 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) 1}½ in. NPT threaded connection (RA) is required.

Specifications

General	
Product	Rosemount 5300 Series Guided Wave Radar;
110000	Model 5301, Liquid Level or Interface Transmitter (interface available for fully submerged probe).
	Model 5302, Liquid Level and Interface Transmitter.
	Model 5303, Solids Level Transmitter.
Measurement Principle	Time Domain Reflectometry (TDR).
Reference Conditions	Single standard probe, 77°F (25°C) in water and ambient pressure.
Microwave Output Power	Nominal 300 µW, Max. 45 mW.
CE-mark	Complies with applicable directives (EMC, ATEX).
Safety Integrity Level	5300 FMEDA suitable for SIL2: The 5300 Series has been evaluated by Exida per hardware assessment IEC61508. With a SFF > 90% it is Prior-use SIL2 suitable. For more information, go to: http://www.emersonprocess.com/rosemount/safety/. Option code is QS.
Start-up Time	< 40 s
Measuring Performance	
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	± 0.008 in. (0.2 mm) /°K or ± 30 ppm/°K of measured value, whichever is greatest.
Effect	
Update Interval	< 1 per second.
Measuring Range	16 in. (0.4 m) to 164 ft (50 m). See page 12 for further information.
Display / Configuration / 0	Communication
Integral Display	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.
Output Variables	All models: Level, Distance to Level, Volume, Level Rate, Signal Strength, Internal Temperature, Signal Quality,
	Surface/Noise Margin, Vapor DC, Analog Output Current ⁽²⁾ and % of Range ⁽²⁾ , Model 5301 (in addition to the above for the case with fully submerged probe): Interface Level and Interface
	Distance.
	Model 5302 (in addition to the above): Interface Level, Interface Level Rate, Interface Distance, Upper Volume,
	Lower Volume and Upper Product Thickness.
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.
Configuration Tools	HART: Rosemount Radar Master, Field Communicator, AMS Suite or any other DD (Device Description)
	compatible host system. FOUNDATION fieldbus: Rosemount Radar Master, Field Communicator, DeltaV or any other DD (Device
	Description) compatible host system.
FOUNDATION Fieldbus	Resource block, 3 Transducer blocks, 6 Al blocks, PID block, ISEL block, SGCR block, ARTH block, and OS
Blocks	block.
FOUNDATION Fieldbus	Link Master (LAS).
Class (Basic or Link	
Master)	
FOUNDATION Fieldbus	AI-block: 30 ms. PID-block: 40 ms.
Block Execution Time	ARTH-, ISEL-, OSPL-block: 65 ms. CHAR-block: 75 ms.
FOUNDATION Fieldbus Instantiation	No.
Conforming FOUNDATION	ITK 5.0.
Fieldbus	
FOUNDATION Fieldbus PlantWeb Alert Support	Yes.
Damping	0-60 s (2 s, default value).

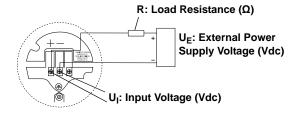
Electric	
Power Supply	HART: 16-42.4 Vdc (16-30 Vdc in IS applications, 20-42.4 Vdc in Explosion-proof / Flameproof applications). FOUNDATION fieldbus: 9-32 Vdc (9-30 Vdc in IS applications, and 16-32 Vdc in Explosion-proof / Flameproof applications). FISCO, IS applications: 9-17.5 Vdc.
Internal Power	< 50 mW in normal operation.
Consumption	
Output	HART 4-20 mA current loop or FOUNDATION fieldbus.
Quiescent Current Draw (FOUNDATION Fieldbus)	21 mA
Signal on Alarm	Standard : Low = 3.75 mA, High = 21.75 mA. Namur NE 43: Low = 3.60 mA, High = 22.50 mA.
Saturation Levels	Standard: Low = 3.9 mA, High = 20.8 mA. Namur NE 43: Low = 3.8 mA, High = 20.5 mA.
IS Parameters	See "Product Certifications" on page 35
Cable Entry	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.
Output Cabling	Twisted shielded pairs, 18-12 AWG.
Mechanical	
Probes	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) For further information, see the probe table on page 11.
Tensile Strength	4 mm Flexible Single Lead probe (model code 5A, 5B): 2698 lb (12 kN) 6 mm Flexible Single Lead probe (model code 6A, 6B): 6519 lb (29 kN) Flexible Twin Lead probe: 2023 lb (9 kN).
Collapse Load	4 mm Flexible Single Lead probe (model code 5A, 5B): 3597 lb (16 kN) 6 mm Flexible Single Lead probe (model code 6A, 6B): 7868 lb (35 kN)
Sideway Capacity	Coaxial: 73.7 ft lbf or 3.7 lb at 19.7 ft (100 Nm or 1.67 kg at 6 m). Rigid Twin Lead: 2.2 ft lbf or 0.22 lb at 9.8 ft (3 Nm or 0.1 kg at 3 m). Rigid Single Lead: 4.4 ft lbf or 0.44 lb at 9.8 ft (6 Nm or 0.2 kg at 3 m).
Material Exposed to Tank Atmosphere	• 316L SST (EN 1.4404), PTFE, PFA ⁽³⁾ and O-ring materials (Standard Probe, Material model code 1) or • Alloy C-276 (UNS N10276), PTFE, PFA ⁽³⁾ and O-ring materials (Standard Probe, Material model code 2) or • Alloy 400 (UNS N04400), PTFE, PFA ⁽³⁾ and O-ring materials (Standard Probe, Material model code 3) • PTFE ⁽⁴⁾ (Standard Probe, Material model code 7) or • PTFE ⁽⁴⁾ , 316 L SST (EN 1.4404) and O-ring materials (Standard Probe, Material model code 8) • 316L SST (EN 1.4404), Ceramic (Al ₂ O ₃), Graphite, Inconel (HTHP Probe, Material model code 1) • Alloy C-276 (UNS N10276), Ceramic (Al ₂ O ₃), Graphite, Inconel (HTHP Probe, Material model code 2 and H) • 316L SST (EN 1.4404), Ceramic (Al ₂ O ₃), Graphite, PFA, PTFE, Inconel (HP Probe, Material model code 1) • Alloy C-276 (UNS N10276), Ceramic (Al ₂ O ₃), Graphite, PFA, PTFE, Inconel (HP Probe, Material model code 2 and H) • 316L SST (EN 1.4404), Ceramic (Al ₂ O ₃), Graphite, PFA, PTFE, Inconel (C Probe, Material model code 1) • See "Ordering Information" on page 19.
Dimensions	See "Dimensional Drawings" on page 37.
Probe Angle	0 to 90 degrees.
Housing / Enclosure	Polyurethane-covered Aluminum or SST Grade CF8M (ASTM A743)
Flanges, Threads	See "Tank Connection" on page 7 and "Ordering Information" on page 19.
Height Above Flange	See "Dimensional Drawings" on page 37.

Transmitter Head (TH): Aluminium 4.4 lbs (2 kg), SST 10.8 lbs (4.9 kg). Flange: depends on flange size.
Coaxial probe: 0.67 lbs/ft (1 kg/m).
Rigid Single Lead probe (0.3 in./8 mm): 0.27 lbs/ft (0.4 kg/m).
Rigid Single Lead probe (0.5 in./13 mm): 0.71 lbs/ft (1.06 kg/m).
Rigid Twin Lead probe: 0.40 lbs/ft (0.6 kg/m).
Flexible Single Lead probe: 0.05 lbs/ft (0.08 kg/m).
Flexible Twin Lead probe: 0.09 lbs/ft (0.14 kg/m).
End weight: 0.88 lbs (0.40 kg) for the 4 mm single lead probe, 1.2 lbs (0.55 kg) for the 6 mm single lead probe
and 1.3 lbs (0.60 kg) for twin lead probes.
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).
-58°F to 194°F (-50°C to 90°C). LCD: -40°F to 185°F (-40°C to 85°C).
Standard: -40°F to +302°F (-40°C to +150°C)
HTHP: -76°F to +752°F (-60°C to +400°C)
HP: -76°F to +392°F (-60°C to +200°C)
C: -320°F to +392°F (-196°C to +200 °C)
See temperature and pressure diagrams on page 8.
Standard: Full vacuum to 580 psig (-1 to 40 Bar).
HTHP: Full vacuum to 5000 psig (-1 to 345 Bar).
HP: Full vacuum to 5000 psig (-1 to 345 Bar).
C: Full vacuum to 5000 psig (-1 to 345 Bar). See temperature and pressure diagrams on page 8.
0 - 100% Relative Humidity.
· · · · · · · · · · · · · · · · · · ·
NEMA 4X, IP 66 and IP67.
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.
Yes.
<u> </u>
Aluminum housing: IEC 60770-1 Level 1. Stainless Steel housing: IACS E10.
Emission and Immunity: EMC directive 89/336/EEC. EN61326-1:1997 incl. A1:1998 and A2:2001. NAMUR recommendations NE21.
EN61326, IEC 801-5, level 1 kV. T1 option: the transmitter complies with IEEE 587 Category B transient
protection and IEEE 472 surge protection
Complies with 97/23/EC article 3.3.

- (1) For probes with spacers, the accuracy may deviate close to the spacers. Accuracy may be affected by remote housing.

- Not applicable for FOUNDATION fieldbus.
 Not applicable for FOUNDATION fieldbus.
 PFA is a fluoropolymer with properties similar to PTFE.
 1 mm PTFE cover.
 Final rating may be lower depending on flange and O-ring selection, See "Tank Connection" on page 7.

POWER SUPPLY



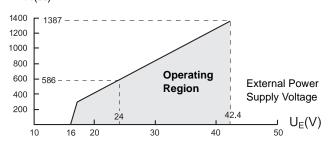
4-20 mA with HART



The input voltage (U_l) for HART is 16-42.4 Vdc (16-30 Vdc in IS applications, and 20-42.4 Vdc in Explosion-proof / Flameproof applications). The maximum load resistance and power supply limitations for typical operating conditions are shown in the following diagrams and table.

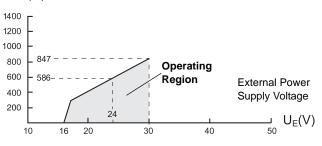
Non-Hazardous Installations

 $R(\Omega)$ Maximum Load Resistance



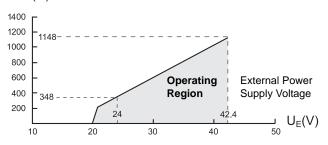
Intrinsically Safe Installations

 $R(\Omega)$ Maximum Load Resistance



Explosion-proof / Flameproof (EEx d) Installations

 $R(\Omega)$ Maximum Load Resistance



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 .

Minimum input voltage (UI) at different currents

	Current				
	3.75 mA 21.75 mA				
Hazardous approval	Minimum inp	Minimum input voltage (U _I)			
Non-Hazardous Installations and Intrinsically Safe Installations	16 Vdc	11 Vdc			
Explosion-proof / Flameproof Installations	20 Vdc	15.5 Vdc			

FOUNDATION Fieldbus



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).

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⁽¹⁾.
Seal not required.

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, Div. 2, Groups A, B, C and D; Suitable for Class II, III, Div. 2, Groups F and G. 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. Max operation:

 $4\mbox{-}20~\mbox{mA}$ / HART model: 42.4 V, 25 mA, FOUNDATION fieldbus model: 32 V, 25 mA.

Temp. Code T4

Ambient temperature limits: -50°C to +70°C⁽¹⁾

ATEX Approval ()

Nemko 04ATEX1073X

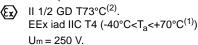
SPECIAL CONDITIONS FOR SAFE USE (X)

The intrinsically safe circuits do not withstand the 500 V ac test as specified in EN 50020 clause 6.4.12.

Probes covered with plastic and/or with plastic discs will have a non-conducting area that exceeds the maximum permissible areas for Group IIC and Category II 1G according to EN 50284 clause 4.4.3 (4 cm²). Therefore, when the antenna is used in a potentially explosive atmosphere, appropriate measures must be taken to prevent electrostatic discharge.

Impact and friction hazards need to be considered according to EN 50284, clause 4.3.1 when the transmitter exposed to the exterior atmosphere of the tank is made of light metal alloys, and is used in Category II 1 G.

E1 Flameproof:



11, IA

Intrinsically Safe:

II 1 GD T73°C⁽²⁾.

EEx ia IIC T4 (-50°C<T_a<+70°C⁽¹⁾). 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. Installation Drawing: 9240 030-938

Canadian Standards Association (CSA) Approval



This product meets the Dual Seal Requirements of ANSI/ISA 12.27.01-2003.

Cert. no. 1514653

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⁽¹⁾

Factory sealed.

16. IF 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=7.3 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: 9240 030-937 Ambient temperature limits -50°C to +70°C $^{(1)}$.

IECEx Approval



IECEx NEM 06.0001X

CONDITIONS OF CERTIFICATION (X)

The intrinsically safe circuits do not withstand the 500 V ac test as specified in EN 50020 clause 6.4.12.

Probes covered with plastic and/or with plastic discs will have a non-conducting area that exceeds the maximum permissible areas for Group IIC according to IEC 60079-01 clause 7.3: 20 cm² for Zone 1, and 4 cm² for Zone 0. Therefore, when the probe is used in a potentially explosive atmosphere, appropriate measures must be taken to prevent electrostatic discharge.

Impact and friction hazards need to be considered according to IEC 60079-0, clause 8.1.2 when the transmitter exposed to the exterior atmosphere of the tank is made of light metal alloys, and is used in Zone 0.

E7 Flameproof:

> Ex iad IIC T4 (-40 °C < T_a < +70 °C⁽¹⁾) $U_m = 250 \text{ V}.$

17, IG Intrinsically Safe Safety:

Ex ia IIC T4 (-50°C<T₂<+70°C⁽¹⁾).

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.

Installation Drawing: 9240 030-938

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 II C T4 and GYJ081130X for Ex iad II C T4.

E3 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)

13 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=130mA, P_i=1.0W,

 C_i =7.25nF, L_i =108 μH

FOUNDATION fieldbus model:

Ex ia IIC T4 (-50 °C<Ta< +60 °C)

 $U_i=30 \text{ V}, I_i=300\text{mA}, P_i=1.5\text{W}, C_i\sim0\text{nF}, L_i\sim0\mu\text{H}$

FOUNDATION fieldbus FISCO model:

Ex ia IIC T4 (-50 °C<Ta< +60 °C)

 $U_i=17.5 \text{ V}, I_i=380\text{mA}, P_i=5.32\text{W}, C_i\sim0\text{nF}, L_i\sim0\mu\text{H}$

Combination Approvals

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

KJ FISCO - ATEX, FM, IECEX Intrinsic Safety

KK FISCO - ATEX, CSA, IECEX Intrinsic Safety

KL FISCO - FM, CSA, IECEX Intrinsic Safety

For detailed information, refer to the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530).

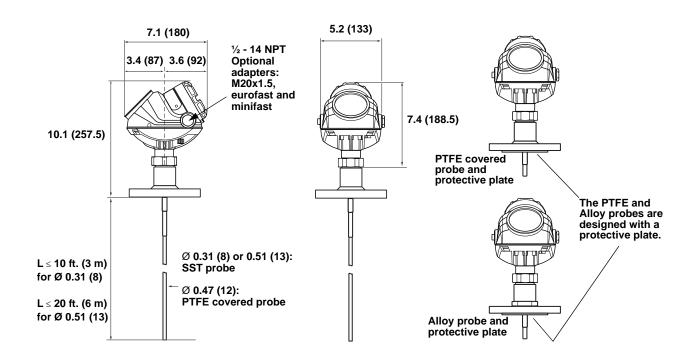
^{(1) +60°}C with FOUNDATION fieldbus or FISCO option

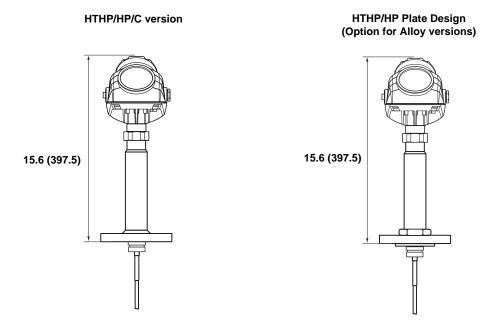
April 2010

Dimensional Drawings

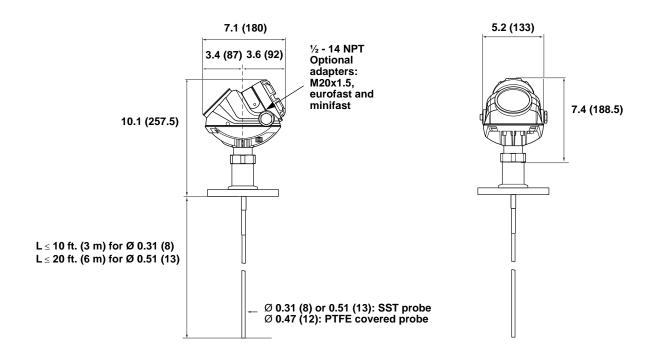
Dimensions are in inches (millimeters)

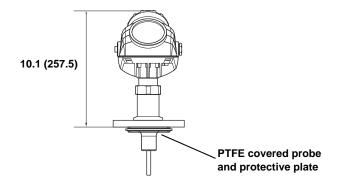
RIGID SINGLE LEAD PROBE WITH FLANGE CONNECTION



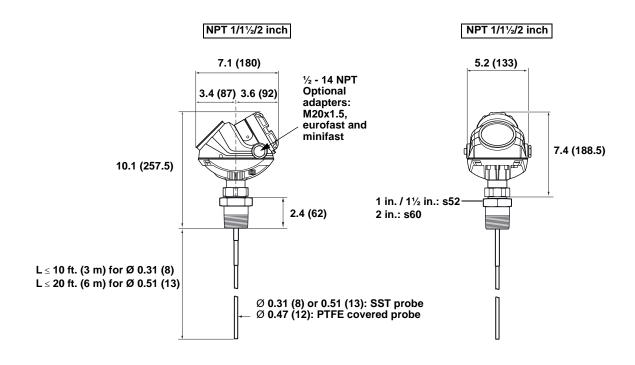


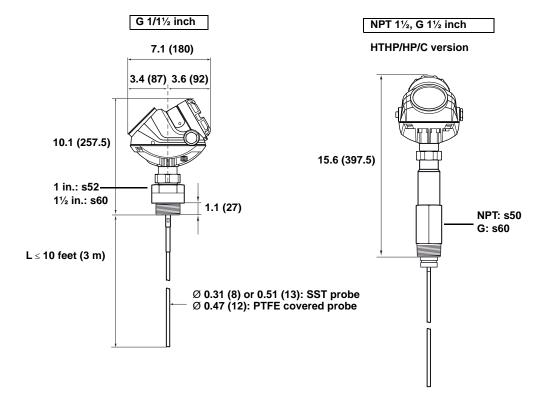
RIGID SINGLE LEAD PROBE WITH TRI-CLAMP CONNECTION



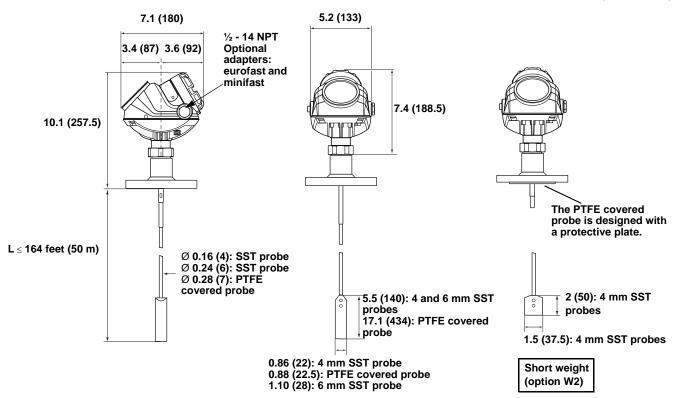


RIGID SINGLE LEAD PROBE WITH THREADED CONNECTION

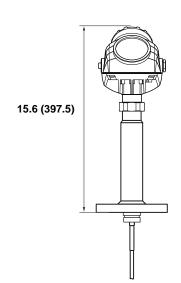




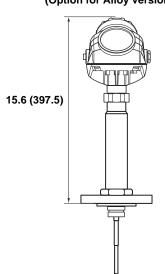
FLEXIBLE SINGLE LEAD PROBE WITH FLANGE CONNECTION





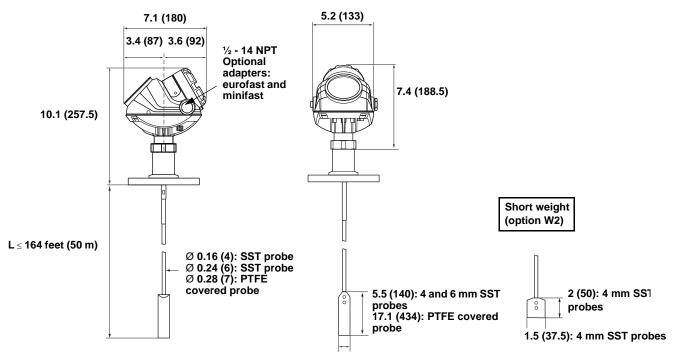


HTHP/HP/C Plate Design (Option for Alloy versions)

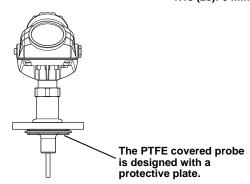


FLEXIBLE SINGLE LEAD PROBE WITH TRI-CLAMP CONNECTION

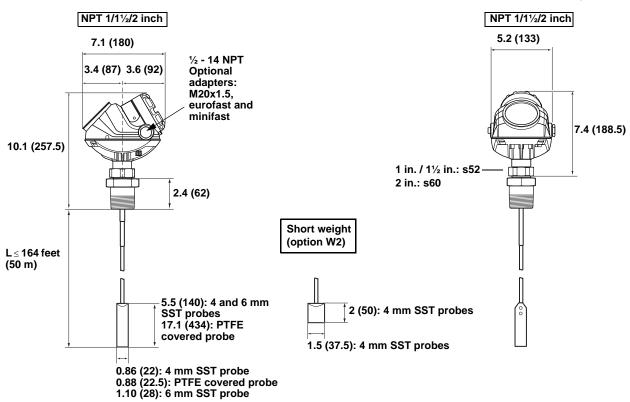
Dimensions are in inches (millimeters)

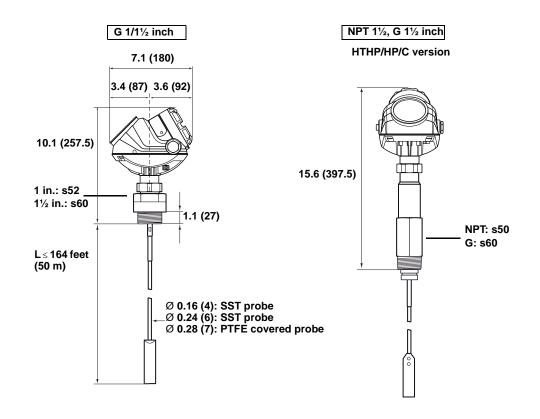


0.86 (22): 4 mm SST probe 0.88 (22.5): PTFE covered probe 1.10 (28): 6 mm SST probe

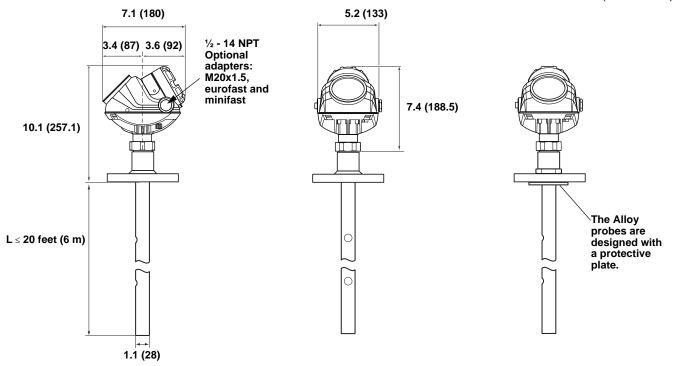


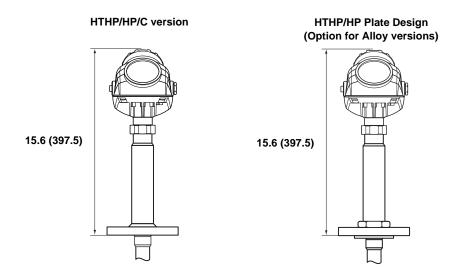
FLEXIBLE SINGLE LEAD PROBE WITH THREADED CONNECTION



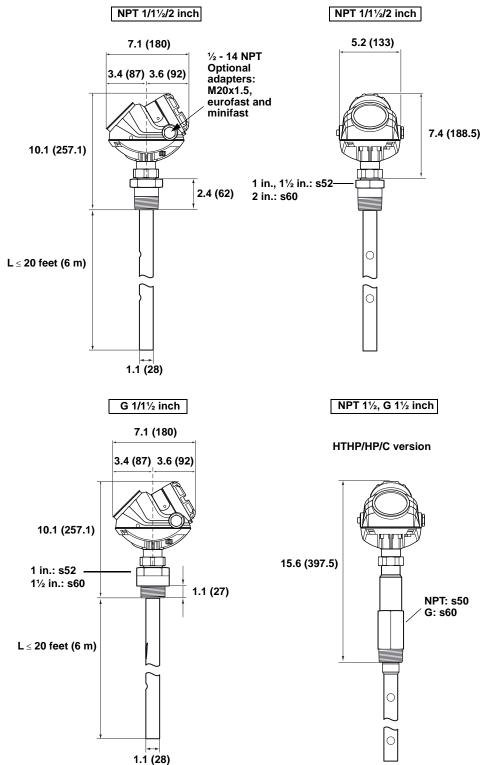


COAXIAL PROBE WITH FLANGE CONNECTION



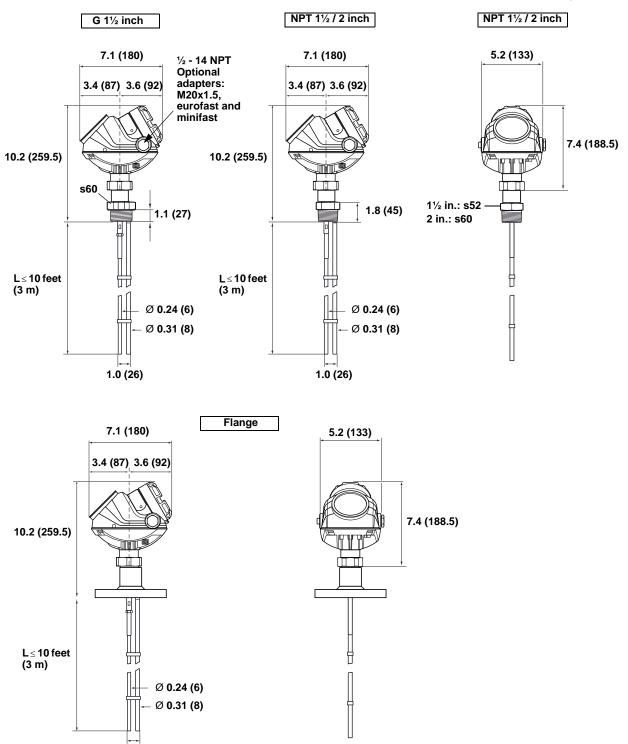


COAXIAL PROBE WITH THREADED CONNECTION

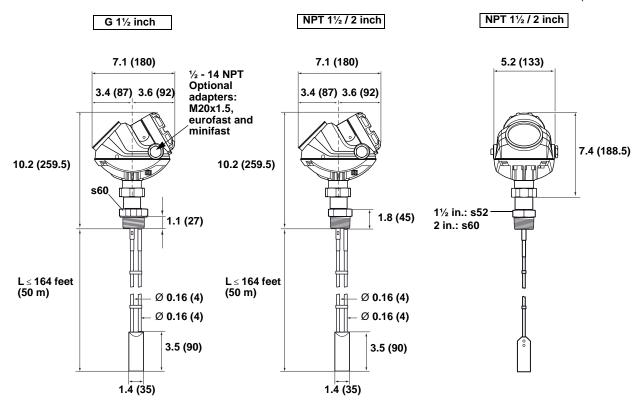


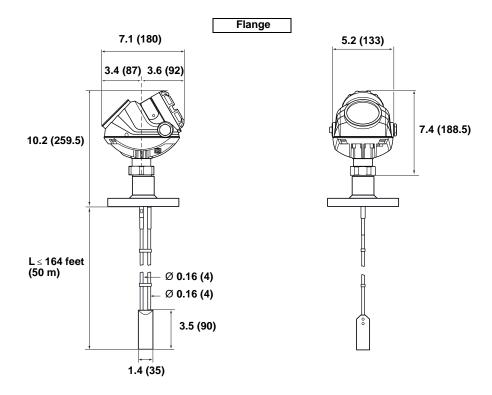
RIGID TWIN LEAD PROBE

1.0 (26)

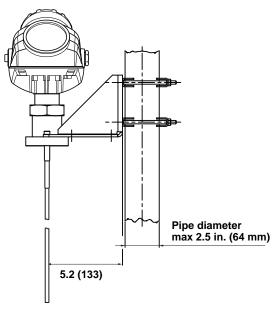


FLEXIBLE TWIN LEAD PROBE

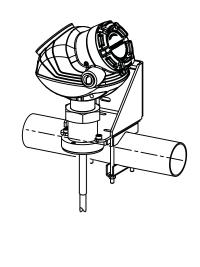




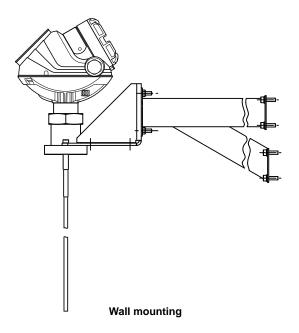
BRACKET MOUNTING

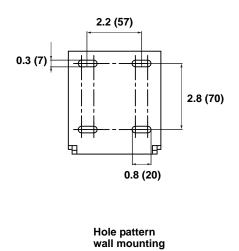


Pipe mounting (vertical pipe)



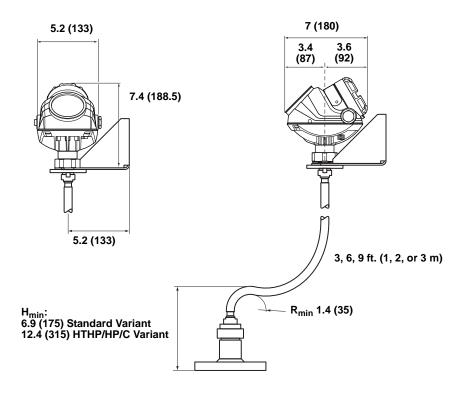
Pipe mounting (horizontal pipe)





REMOTE HOUSING

Dimensions are in inches (millimeters)



Remote Housing Measuring Range

This table shows the maximum recommended measuring range with Remote Housing for different Remote Housing lengths, installation types, Dielectric Constants and probe types.

TABLE 1. Remote Housing measuring range

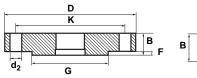
		Dielectric Constant	Rigid Single 8 mm	Rigid Single 13 mm	Flexible Single	Coaxial	Rigid Twin	Flexible Twin
	Chamber / pipe	1.4	4 ft (1.25 m)	15 ft (4.5 m) ⁽¹⁾	33 ft (10 m) ⁽¹⁾ (2)		10 ft (3 m) ⁽¹⁾	33 ft (10 m) ⁽¹⁾ (2)
1 m	installations ≤ 4 in.	2	10 ft (3 m) ⁽¹⁾	15 ft (4.5 m) ⁽¹⁾	33 ft (10 m) ⁽¹⁾ (2)		10 ft (3 m) ⁽¹⁾	33 ft (10 m) ^{(1) (2)}
Remote	(100 mm)	80	10 ft (3 m)	15 ft (4.5 m) ⁽¹⁾	33 ft (10 m) ^{(1) (2)}	19 ft	10 ft (3 m) ⁽¹⁾	33 ft (10 m) ^{(1) (2)}
		1.4	4 ft (1.25 m)	4 ft (1.25 m)	4 ft (1.25 m)	(6 m)	4 ft (1.25 m)	4 ft (1.25 m)
Housing	Tank installations	2	4 ft (1.25 m)	4 ft (1.25 m)	4 ft (1.25 m)		4 ft (1.25 m)	98 ft (30 m) ⁽¹⁾
		80	10 ft (3 m) ⁽¹⁾	10 ft (3 m) ⁽¹⁾	159 ft (48.5 m) ⁽¹⁾		10 ft (3 m) ⁽¹⁾	159 ft (48.5 m) ⁽¹⁾
	Chamber / pipe	1.4	9 ft (2.75 m)	15 ft (4.5 m) ⁽¹⁾	33 ft (10 m) ^{(1) (2)}		10 ft (3 m) ⁽¹⁾	33 ft (10 m) ^{(1) (2)}
2	installations ≤ 4 in.	2	10 ft (3 m) ⁽¹⁾	15 ft (4.5 m) ⁽¹⁾	33 ft (10 m) ^{(1) (2)}		10 ft (3 m) ⁽¹⁾	33 ft (10 m) ^{(1) (2)}
2 m Remote	(100 mm)	80	10 ft (3 m)	15 ft (4.5 m)	33 ft (10 m) ^{(1) (2)}	19 ft	10 ft (3 m) ⁽¹⁾	33 ft (10 m) ^{(1) (2)}
		1.4	9 ft (2.75 m)	9 ft (2.75 m)	9 ft (2.75 m)	(6 m)	9 ft (2.75 m)	9 ft (2.75 m)
Housing	Tank installations	2	9 ft (2.75 m)	9 ft (2.75 m)	9 ft (2.75 m)		9 ft (2.75 m)	98 ft (30 m) ⁽¹⁾
		80	10 ft (3 m) ⁽¹⁾	10 ft (3 m) ⁽¹⁾	154 ft (47 m) ⁽¹⁾		10 ft (3 m) ⁽¹⁾	154 ft (47 m) ⁽¹⁾
	Chamber / pipe	1.4		15 ft (4.5 m)	33 ft (10 m) ^{(1) (2)}			33 ft (10 m) ^{(1) (2)}
2	installations ≤ 4 in.	2		15 ft (4.5 m)	33 ft (10 m) ^{(1) (2)}			33 ft (10 m) ^{(1) (2)}
3 m	(100 mm)	80	10 # (2 m)	15 ft (4.5 m)	33 ft (10 m) ^{(1) (2)}	19 ft	10 ft (3 m) ⁽¹⁾	33 ft (10 m) ^{(1) (2)}
Remote		1.4	10 ft (3 m)	14 ft (4.25 m)	14 ft (4.25 m)	(6 m)	1011 (3111)(1)	14 ft (4.25 m)
Housing	Tank installations	2		14 ft (4.25 m)	14 ft (4.25 m)			98 ft (30 m) ⁽¹⁾
		80		15 ft (4.5 m) ⁽¹⁾	149 ft (45.5 m) ⁽¹⁾			149 ft (45.5 m) ⁽¹⁾

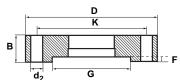
⁽¹⁾ Accuracy may be affected up to ± 1.2 in. (30 mm).
(2) Required chamber/pipe size is 3 or 4 in. (75 -100 mm).

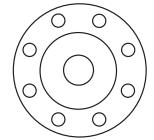
SPECIAL FLANGES AND FLUSHING CONNECTION RINGS

Raised Face

Recessed Face







- D: Outside diameter
- B: Flange thickness
- F: Raised Face
- G: Face diameter
- # Bolts: Number of Bolts
- K: Bolt hole circle diameter
- d₂: Hole 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	N
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)	NA
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)	NA
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)	NA

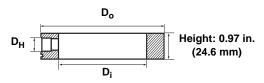
- (1) These flanges are also available in a vented version.
- (2) Flange with raised face.(3) Flange with recessed face.

Masoneilan and Fisher flanges are also available in vented versions (see "Vented Flanges" on page 30), 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 8.

Flushing Connection Ring





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)	1/4 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.

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 2051L 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

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 consisits 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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Service Support Hotline: +65 6770 8711 Email: Enquiries@AP.EmersonProcess.com



Guided Wave Radar Level and Interface Transmitter

- Accurate, direct level measurement virtually unaffected by process conditions
- Minimized maintenance with no moving parts and no calibration required
- Reduced process penetrations and 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, materials, and probe styles









Contents

Proven, Reliable, and Easy to Use Guided Wave Radarpage
Rosemount 3301 and 3302 Level and/or Interface in Liquids page
Specification page 1
Functional Specificationpage 1
Performance Specification
Physical Specification
Product Certifications
Dimensional Drawingspage 2





July 2010

Proven, Reliable, and Easy to Use Guided Wave Radar

Reference pulse Level Interface level

MEASUREMENT PRINCIPAL

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.



GWR TECHNOLOGY BENEFITS

- · No moving parts and no calibration mean minimized 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 MTBF over 170 years
- Advanced signal processing for reliable measurement
- Accurate level with no affect from changing process conditions



- Suitable for most liquid storage and monitoring level and interface applications
- A wide selection of process connections
- · A broad range of probe styles and temperature and pressure ranges
- External mounting using Rosemount 9901 high quality chambers accessories

High application flexibility



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
- Heavy-duty unique probe solution for extreme temperature and pressures with multiple layer of protection

Easy Installation and Plant Integration

- Seamless system integration with HART[®], Modbus, or 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

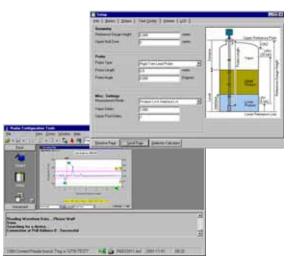
Minimized Maintenance Reduces Cost

- 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 calibration or compensation needed due to changing process conditions

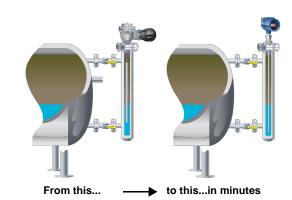
Easy Replacement Of Old Technology And Best Fit For Chambers

- 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 best fit in existing chamber to offering a complete assembly with Rosemount 9901 high quality chambers





Radar Configuration Tool with installation wizard and waveform plot possibilities provides easy configuration and service



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, WirelessHART™ with the THUM™ adapter, or Modbus
- Radar Configuration Tool software package included for easy commissioning and trouble shooting

Additional Information

Specifications: page 11 Certifications: page 23

Dimensional Drawings: page 25.

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	Product Description				
3301	Guided Wave Radar Level Transmitter (i	Guided Wave Radar Level Transmitter (interface available for fully submerged probe)				
3302	Guided Wave Radar Level and Interface	Transmitter				
Signal Out	put					
Standard				Standard		
Н	4-20 mA with communication			*		
M	RS-485 with Modbus communication ⁽¹⁾			*		
Housing M	aterial					
Standard				Standard		
A	Polyurethane-covered Aluminum			*		
S	Stainless Steel, Grade CF8M (ASTM A7	43)		*		
Conduit / C	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) @ 3	302 °F (150 °C)	3301: All 3302: 1A, 2A, 3B, 4A, and 4B	*		
Н	High Temp / High Pressure ⁽³⁾ : 2940 psi (100 °F (203 bar @ 400 °C and 345 bar (ANSI Class 2500		3301: 3A, 3B, 4A, 5A ⁽⁴⁾ , and 5B ⁽⁴⁾ 3302: 3B and 4A	*		
P	High Pressure ⁽³⁾ . Max 500 °F (200 °C): 3500 psi @ 500 °F and 5000 psi @ 100 °F (243 bar @ 200 °C and 345 bar @ 38 °C) according to ANSI Class 2500					
Material of Construction ⁽⁵⁾ : Process Connection / Probe Type Valid Operating Temperature and Pressure						
Standard				Standard		
1	316L SST (EN 1.4404)	3301: All 3302: 1A, 2A, 3B, 4A, and 4B	S, H, P	*		

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.

Expanded	led offering is subject to additional delivery lead tim			
2	Alloy C-276 (UNS N10276). With plate	3301: 3A, 3B, 4A	S, H, P	
	design if flanged version. Up to class 600, PN 63 for HTHP/HP probes.	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	S	
7	PTFE covered probe and flange. With plate design.	3301: 4A and 5A 3302: 4A, Flanged version	S	
8	PTFE covered probe	3301: 4A and 5A 3302: 4A	S	
Н	Alloy C-276 (UNS N10276) process connection, flange and probe ⁽⁶⁾	3301: 3A, 3B, 4A	H, P	
Sealing, O	-ring Material (Consult factory for other o	-ring materials)		
Standard				Standard
N	None ⁽⁷⁾			*
V	Viton® fluoroelastomer			*
E	Ethylene Propylene			*
K	Kalrez® 6375 perfluoroelastomer			*
В	Buna-N			*
	e, model 3301	Process Connection	Probe Lengths	
Standard	.,		Trans Language	Standard
3B	Coaxial, perforated. For level and interface measurement, or easier cleaning.	Flange / 1 in. ⁽⁹⁾ , 1.5 in., 2 in. ⁽⁹⁾ Thread	Min.: 1 ft. 4 in. (0.4 m). Max: 19 ft. 8 in. (6 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	Flange / 1 in. ⁽⁹⁾ , 1.5 in., 2 in. ⁽⁹⁾ Thread / Tri-Clamp	Min.: 3 ft. 4 in. (1 m). Max: 77 ft. (23.5 m)	*
Expanded				
1A	Rigid Twin Lead ⁽⁹⁾	Flange / 1.5 in., 2 in. ⁽⁹⁾ Thread	Min.: 1 ft. 4 in. (0.4 m). Max: 9 ft. 10 in. (3 m)	
2A	Flexible Twin Lead with weight ⁽⁹⁾	Flange / 1.5 in., 2 in. ⁽⁹⁾ Thread	Min.: 3 ft. 4 in. (1 m). Max: 77 ft. (23.5 m)	
3A	Coaxial (for level measurement)	Flange / 1 in. ⁽⁹⁾ , 1.5 in., 2 in. ⁽⁹⁾ 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. ⁽⁹⁾ , 1.5 in., 2 in. ⁽⁹⁾ Thread / Tri-Clamp	Min.: 1 ft. 4 in. (0.4 m). Max: 9 ft. 10 in. (3 m)	
5B	Flexible Single Lead with chuck ⁽¹⁰⁾	Flange / 1 in. ⁽⁹⁾ , 1.5 in., 2 in. ⁽⁹⁾ Thread / Tri-Clamp	Min.: 3 ft. 4 in. (1 m). Max: 77 ft. (23.5 m)	
Probe Typ	e, model 3302	Process Connection	Probe Lengths	
Standard				Standard
3B	Coaxial, perforated. For level and interface measurement, or easier cleaning.	Flange / 1 in. ⁽⁹⁾ , 1.5 in., 2 in. ⁽⁹⁾ Thread	Min.: 1 ft. 4 in. (0.4 m). Max: 19 ft. 8 in. (6 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)	*
Expanded				
1A	Rigid Twin Lead ⁽⁹⁾	Flange / 1.5 in., 2 in. ⁽⁹⁾ Thread	Min.: 1 ft. 4 in. (0.4 m). Max: 9 ft. 10 in. (3 m)	

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.

HD	DN50, PN100 (HTHP / HP units)			*
HC	DN50, PN63 (HTHP / HP units)	*		
НВ	DN50, PN40			*
Standard				Standard
EN (DIN) Fla	inges ⁽¹³⁾			
DA	6 in. ANSI, 150 lb			
CK	4 in. ANSI, 1500 lb, RTJ (Ring Type	Joint). HTHP / HP units		
CJ	4 in. ANSI, 900 lb, RTJ (Ring Type Jo	<u>'</u>		
CI	4 in. ANSI, 600 lb, RTJ (Ring Type Jo	<u> </u>		
CE	4 in. ANSI, 1500 lb (HTHP / HP units	•		
BK	3 in. ANSI, 1500 lb, RTJ (Ring Type			
BJ	3 in. ANSI, 900 lb, RTJ (Ring Type Jo	<u> </u>		
BI	3 in. ANSI, 600 lb, RTJ (Ring Type Jo	·		
BE	3 in. ANSI, 1500 lb (HTHP / HP units	,		
AK	2 in. ANSI, 1500 lb, RTJ (Ring Type	<u>'</u>		
AJ	2 in. ANSI, 900 lb, RTJ (Ring Type Jo			
Al	2 in. ANSI, 600 lb, RTJ (Ring Type Jo			
AE	2 in. ANSI, 1500 lb (HTHP / HP units	<u>, </u>		
Expanded				
CD	4 in. ANSI, 900 lb (HTHP / HP units)			*
CC	4 in. ANSI, 600 lb (HTHP / HP units)			*
СВ	4 in. ANSI, 300 lb			*
CA	4 in. ANSI, 150 lb			*
BD	3 in. ANSI, 900 lb (HTHP / HP units)			*
ВС	3 in. ANSI, 600 lb (HTHP / HP units)			*
BB	3 in. ANSI, 300 lb			*
ВА	3 in. ANSI, 150 lb			*
AD	2 in. ANSI, 900 lb (HTHP / HP units)			*
AC	2 in. ANSI, 600 lb (HTHP / HP units)			*
AB	2 in. ANSI, 300 lb			*
AA	2 in. ANSI, 150 lb			*
Standard				Standard
ANSI Flange	es ⁽¹²⁾			
Process Cor	nnection - Size / Type (consult factory	for other process connection	ons)	
XX	0 - 11 in. or 0-99 cm			*
Standard	·			Standard
Total Probe	Length ⁽¹¹⁾ (inch/cm)			
XX	0 - 77 ft. or 0-23 m			*
Standard				Standard
	Length ⁽¹¹⁾ (feet/m)			
M	Metric (meters, centimeters)			*
E	English (feet, inch)			⇒ Standard
Probe Lengt Standard	iii Ollits			Standard
Dual a Lawre	U. Harita	Tri-Clamp		
	3 - 3	2 in. ⁽⁹⁾ Thread /	Max: 9 ft. 10 in. (3 m)	
4A		Flange / 1 in. ⁽⁹⁾ , 1.5 in.,	Min.: 1 ft. 4 in. (0.4 m).	
	Rigid Single Lead (8 mm)	Thread	Max: 77 ft. (23.5 m)	

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.

THE Expand	led offering is subject to additional delivery lead time.		
IA	DN80, PN16		*
IB	DN80, PN40		*
IC	DN80, PN63 (HTHP / HP units)		
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)		
ΙΕ	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 Flange			
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		
	Connections ⁽¹²⁾	Probe Type	
Standard	Connections	1 Tobe Type	Standard
RA	1 ½ in. NPT thread	3301: All	→ Standard
IVA	1 /2 III. IVI T UIIGAU	3302: 1A, 2A, 3B, 4A, and 4B	_ ^
RC	2 in. NPT thread	3301: 3A, 3B, 4A, 4B, 5A, 5B, standard temperature and pressure	*
		3302: 3B, 4A, 4B standard temperature and pressure	
Expanded		and pressure	
RB	1 in. NPT thread	2201: 2A 2D 4A 4D 5A 5D standard	
Kb	i in. NP i trilead	3301: 3A, 3B, 4A, 4B, 5A, 5B, standard temperature and pressure 3302: 3B, 4A, 4B standard temperature	
		and pressure	
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, 5B, standard temperature and pressure 3302: 3B, 4A, 4B standard temperature and pressure	

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 ⁽¹²⁾		Probe Type	
Expande	d		
FT	1 ½ in. Tri-Clamp	3301: 4A, 4B, 5A, 5B, standard temperature and pressure 3302: 4A, standard temperature and pressure	
AT	2 in. Tri-Clamp	3301: 4A, 4B, 5A, 5B, standard temperature and pressure 3302: 4A, 4B, standard temperature and pressure	
ВТ	3 in. Tri-Clamp	3301: 4A, 4B, 5A, 5B, standard temperature and pressure 3302: 4A, 4B, standard temperature and pressure	
СТ	4 in. Tri-Clamp	3301: 4A, 4B, 5A, 5B, standard temperature and pressure 3302: 4A, 4B, standard temperature and pressure	
Proprieta	ry Flanges ⁽¹⁴⁾		
Standard			Standard
TF	Fisher - proprietary 316 Stainless Steel (for 249B cages) Torque	Tube Flange	*
TT	Fisher - proprietary 316 Stainless Steel (for 249C cages) Torque	Tube Flange	*
TM	Masoneilan - proprietary 316 Stainless Steel Torque Tube Flange		*
Hazardou	us Locations Certifications		
Standard			Standard
NA	No Hazardous Locations Certifications		*
E1	ATEX Flameproof ⁽¹⁵⁾		*
E3	NEPSI Flameproof ⁽¹⁵⁾		*
E4	TIIS Flameproof ⁽¹⁵⁾		*
E5	FM Explosion-proof ⁽¹⁵⁾		*
E6	CSA Explosion-proof ⁽¹⁵⁾		*
E7	IECEx Flameproof ⁽¹⁵⁾		*
l1	ATEX Intrinsic Safety		*
13	NEPSI Intrinsic Safety		*
15	FM Intrinsic Safety and Non-Incendive		*
16	CSA Intrinsic Safety and Non-Incendive		*
17	IECEx Intrinsic Safety		*
Expande			
KA	ATEX and CSA Flameproof/Explosion-proof ⁽¹⁵⁾		
KB	FM and CSA Explosion-proof ⁽¹⁵⁾		
KC	ATEX and FM Flameproof/Explosion-proof ⁽¹⁵⁾		
KD	ATEX and CSA Intrinsic Safety		
KE	FM and CSA Intrinsic Safety		
KF	ATEX and FM Intrinsic Safety		
Options			a
Standard	·		Standard
M1	Integral digital display		*
P1	Hydrostatic testing ⁽¹⁶⁾		*
N2	NACE material recommendation per MR-0175 ⁽¹⁷⁾ , MR-0103		*
LS	Long stud ⁽¹⁸⁾ 9.8 in (250 mm) for flex. single lead probe to prevent Standard height is 3.9 in (100 mm)	nt contact with wall/nozzle.	*

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.

T0	Terminal block without transient protection		*
U1	WHG Overfill Approval		*
Expande	d		
BR	Mounting Bracket for 1.5 in. NPT Process Conne	ection (RA) ⁽¹⁹⁾	
W2	Short weight for flexible single lead probes ⁽²⁰⁾		
Sx and P	x - Centering Discs ⁽²¹⁾	Outer Diameter	
Standard	l	'	Standard
S2	2 in. Centering disc ⁽²²⁾	1.8 in. (45 mm)	*
S3	3 in. Centering disc ⁽²²⁾	2.7 in. (68 mm)	*
S4	4 in. Centering disc ⁽²²⁾	3.6 in. (92 mm)	*
P2	2 in. Centering disc PTFE ⁽²³⁾	1.8 in. (45 mm)	*
P3	3 in. Centering disc PTFE ⁽²³⁾	2.7 in. (68 mm)	*
P4	4 in. Centering disc PTFE ⁽²³⁾	3.6 in. (92 mm)	*
Expande	d	-	
S6	6 in. Centering disc ⁽²²⁾	5.55 in. (141 mm)	
S8	8 in. Centering disc ⁽²²⁾	7.40 in. (188 mm)	
P6	6 in. Centering disc PTFE ⁽²³⁾	5.55 in. (141 mm)	
P8	8 in. Centering disc PTFE ⁽²³⁾	7.40 in. (188 mm)	
Remote H	Housing		
Expande	d		
B1	1m / 3.2 ft. Remote Housing Mounting Cable and	d Bracket	
B2			
B3 3m / 9.8 ft. Remote Housing Mounting Cable and Bracket			
Cx - Spec	cial 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 (24) (standard Rosemount alarm and saturation levels)		*
Qx - Spec	cial Certs		
Standard	ļ		Standard
Q4	Calibration Data Certification		*
Q8	Material Traceability Certification per EN 10204	3.1B ⁽²⁵⁾	*
Expande	d		
QG	GOST Primary Verification Certificate		
Consolid	late to Chamber		
Expande	d		
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) Requires option None for sealing (no O-ring). Only for SST (Material of Construction, model code 1).
- (4) For measurements on liquids only.
- (5) For other materials, consult the factory.
- (6) Consult the factory for this option.
- (7) Requires High Temperature High Pressure (code H) or High Pressure (code P) probe.
- (8) Available in SST. Consult the factory for other materials.
- (9) Only available with standard temperature and pressure (code S).
- (10) Extra length for fastening is added in factory.
- (11) 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.
- (12) Available in 316L SST. For other materials consult the factory.
- (13) Available in 316L SST (EN 1.4404). For other materials consult the factory.

- (14) Available in 316L SST. For pressure and temperature rating, see pages 13 to 15.

- (15) Probes are intrinsically safe.
 (16) Available for flanged connection.
 (17) 3301: valid for probe type 3A, 3B, 4A, and 4B. 3302: valid for probe type 3B and 4A.
- (18) Not available with PTFE covered probes.
 (19) Only for Standard Temperature and Pressure.

- (20) Only for Material of Construction code 1 and Probe Type 5A.
 (21) Valid for probe type 2A, 4A, and 5A.
 (22) Material in accordance with selected material of construction types 2A, 4A, 4B, and 5A.
- (23) Available for all SST probes except for HTHP.
- (24) The standard alarm setting is high.
- (25) Option available for pressure retaining wetted parts.

ACCESSORIES ROSEMOUNT 3301 AND 3302

TABLE 2. Accessories

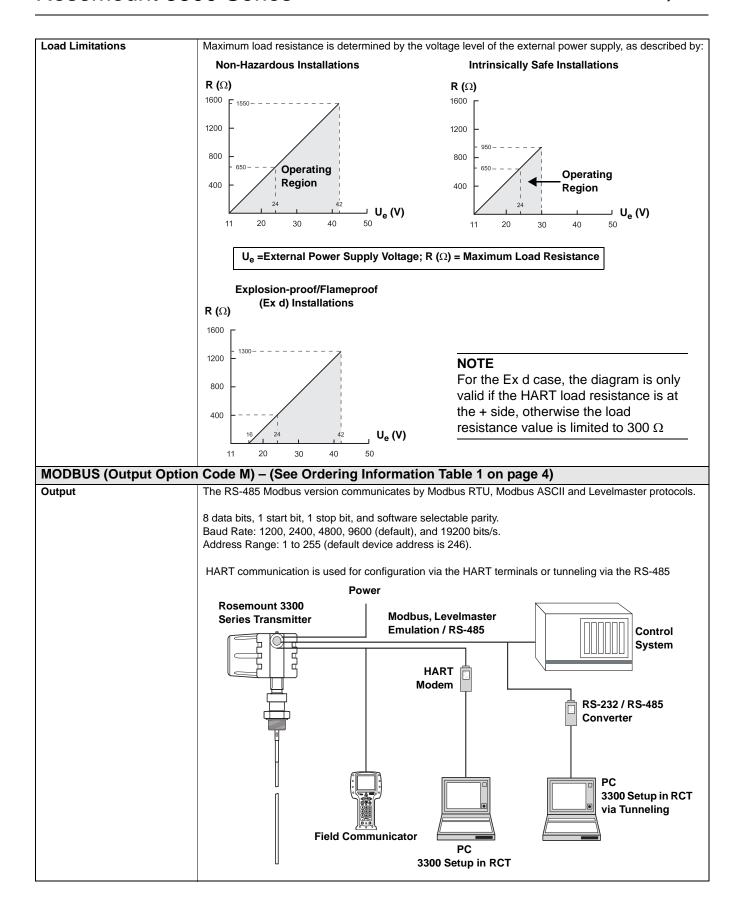
Code	Process Connection - Size/Type (consult factory for o	ther process connections)	
Centering discs ⁽¹⁾	2)	Outer Diameter	
Standard		•	Standard
03300-1655-0001	Kit, 2-in. Centering Disc, SST, Rigid Single	1.8 in. (45 mm)	*
03300-1655-0002	Kit, 3-in. Centering Disc, SST, Rigid Single	2.7 in. (68 mm)	*
03300-1655-0003	Kit, 4-in. Centering Disc, SST, Rigid Single	3.6 in. (92 mm)	*
03300-1655-0004	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)	*
03300-1655-0006	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)	*
03300-1655-0009	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)	*
03300-1655-1001	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)	*
03300-1655-1004	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)	*
03300-1655-1006	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)	*
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			
03300-1811-9001	Fisher 249B/259B ⁽⁴⁾		
03300-1811-9002	Fisher 249C ⁽⁴⁾		
03300-1811-9003	Masoneilan ⁽⁴⁾		
Other	·		
Standard			Standard
03300-7004-0001	Viatec HART Modem and cables (RS232 connection)		*
03300-7004-0002 Viatec HART Modem and cables (USB connection)		*	

If a centering disc is required for a flanged probe the centering disc can be ordered with options Sx or Px on page 9 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.
 To order a centering disc in a different material, consult the factory.
 In NPT threaded connection (RA) is required.

- (4) For pressure and temperature rating, see page "Fisher & Masoneilan Flange Rating" on page 15.

Functional Specification

General			
Field of Application	Liquids and semi-liquids level or liquid/liquid interfaces		
тога от търговиот	Model 3301, for level or submerged probe interface measurement		
	Model 3301, for level of submerged probe interface measurements Model 3302, for level and interface measurements		
Measurement Principle	Time Domain Reflectometry (TDR).		
	(See "Measurement Principal" on page 2 for a description of how it works)		
Microwave Output Power	Nominal 50 μW, Max. 2 mW		
Telecommunication	FCC part 15 (1998) subpart B and R&TTE (EU directive 97/23/EC).		
(FCC and R&TTE)	The 3300 Series is considered to be an <i>unintentional radiator</i> under the Part 15 rules		
Humidity Start-up time	0 to 100% relative humidity		
•	t Option Code H) – (See Ordering Information Table 1 on page 4)		
	, , , , , , , , , , , , , , , , , , , ,		
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.		
	Rosemount 751 3 x 4–20 mA Field Signal		
	Indicator Rosemount		
	333 HART		
	Rosemount 3300 Tri-loop		
	Series Transmitter		
	4-20 mA / HART		
	HART MALLOW		
	// Modem		
	Radar Configuration Tools or AMS Suite		
	Tools or AMS Suite		
	Field Communicator		
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 number 00813-0100-4754) for additional information		
	1 Todact Data Sheet (document number 00013-0100-4734) for additional information		
Smart Wireless HART	The optional Smart Wireless HART THUM™ adapter can be mounted directly on the		
THUM™ Adapter	transmitter or by using a remote mounting kit. WirelessHART™ 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		
	number 00813-0100-4075) and Smart Wireless THUM™ Adapter for Rosemount Process Level Transmitter Applications (document number 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 HART THUM™ adapter is		
	fitted, it adds a maximum drop of 2.5 Vdc in the connected loop		
	connected toop		
	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		
	Standard. 204 - 0.0 High - 20.0 High, Hallian HE-40. EUW - 0.0 High - 20.0 High		

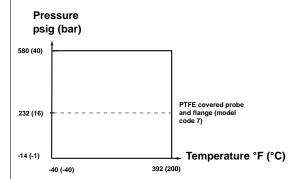


External Power Supply	The input voltage (U _i) for Modbus is 8 to 30 Vdc		
	U _i : Input Voltage (Vdc)		
Display and Configuration	on .		
Integral Display (Options Code M1)	The integral display toggles between the following variables: level, distance, volume, internal temperature, interface distance, 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)	Field Communicator (e.g. Rosemount 375/475), Radar Configuration Tools (RCT) software package for PC (included with delivery of transmitter), or Rosemount AMS™ Suite for PC (visit www.emersonprocess.com/AMS for further information)		
	 Notes: • DTM (compliant with version 1.2 of the FDT/DTM specification) is also available supporting configuration in Fieldmate, FieldCare, and PactWare • To communicate using RCT or AMS™ Suite, a HART modem is required. The HART modem is 		
	 available as an RS232 or USB version (see "Accessories Rosemount 3301 and 3302" on page 10) The transmitter can be pre-configured by selecting Options code C1 (page 9) 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 and Pressu	re Limits		
Ambient Temperature	The maximum and minimum ambient temperature for the electronics depends on the process temperature (as described by the graph below) <i>and</i> on the approval (see "Product Certifications" on page 23).		
	Ambient Temperature °F (°C)		
	185 (85)		
	131 (55)		
	100 (38) -		
	50 (10) -		
	-40 (-40) 392 (200) 752 (400) Process 76 (-60) 200 (93) 400 (204) 600 (316) 800 (427) Temperature °F (°C)		
	-76 (-60) 200 (93) 400 (204) 600 (316) 800 (427) Temperature F (C)		
Notes:			
	 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 to 185 °F (–20 to 85 °C)		
	 To lower the temperature around the electronics, a Remote Mounting Connection can be used to get away from the vessel. 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)		



Standard (Std) tank connection (Operating Temperature and Pressure code S):

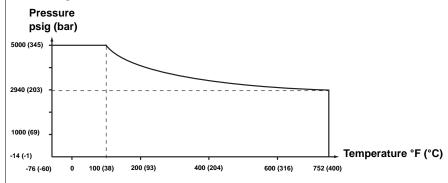
Max. Rating, Standard Tank Connections



Final rating depends on flange and O-ring selection. Table 3 on page 15 gives the temperature ranges for standard tank seals with different O-ring materials.

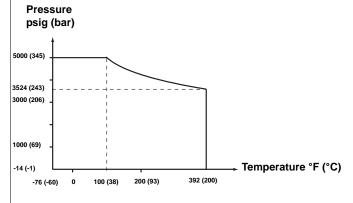
High Temperature and High Pressure (HTHP) tank connection (Operating Temperature and Pressure code H):

Max. Rating, HTHP Tank Connections



High Pressure (HP) tank connection (Operating Temperature and Pressure code P):

Max. Rating, HP Tank Connections



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)

ANSI Flange Rating	316L SST flanges according to ANSI B16.5 Table 2-2.3:		
	Standard: Max. 302 °F/580 psig (150 °C/40 Bar)		
	HP/HTHP: Up to Class 2500		
	Alloy C-276 (UNS N10276) flanges according to ANSI B16.5 Table 2-3.8:		
	HP: Class 1500 up to max 200 °C or max 100 °F/5000 psig (38 °C/345 bar)		
	and 392 °F/3500 psig (200 °C/243 bar)		
	HTHP: Class 1500 up to max 400 °C or max 100 °F/5000 psig (38 °C/345 bar) and 752 °F/2940 psig (400 °C/203 bar)		
	For Alloy C-276 HTHP/HP probes with flange, the plate design (see page 19) is available up to Class 600		
EN Flange Rating	316L SST according to EN 1092-1 Table 18, material group 13E0:		
	• Standard: Max. 302 °F/580 psig (150 °C/40 Bar)		
	HP/HTHP: Up to PN 320		
	Alloy C-276 (UNS N10276) flanges according to EN 1092-1 table 18 material group 12E0:		
	HP/HTHP: Up to PN320		
	For Alloy C-276 HTHP/HP probes with flange, a plate design (see page 19) is available up to PN 63		
Fisher & Masoneilan	316L SST according to ANSI B16.5 Table 2-2.3:		
Flange Rating	• Standard: Max. 302 °F/580 psig (150 °C/40 Bar)		
	HP/HTHP: Up to Class 600		
JIS Flange Rating	316L SST according to JIS B2220 table 1, material group 2.3:		
	• Standard: 10K/20K/150C		
	• HP: 10K/20K/200C		
	• HTHP: 10K/20K/400C		
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. Tri-Clamp is available for		
	the Standard Temperature and Pressure seal.		
Interface Measurements			
Considerations	The Rosemount 3302 is a good choice 3302		
	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:		
	The dielectric constant of the upper		
	product must be known and shouldInterface Level		
	not vary. The Radar Configuration		
	Tools software has a built-in dielectric		
	constant calculator to assist the user in determining the dielectric constant Interface Measurement with a Rosemount 3302 and a		
	of the upper product Rosemount 3301 (fully submerged probe)		
	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 and the HTHP		
	coaxial probes; 4 in. (0.1 m) for the rigid twin lead, the Standard and HP 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

00813-0100-4811, Rev EA July 2010

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 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 4 on page 17.			
	Lower Transition Zone Recommended Measuring Range			
	Lower Transition Zone Lower Reference Point For a flexible single lead probe with			
	chuck, the lower transition zone is			
	measured upwards from the upper part Lower Transition Zone			
	of the clamp.			
Measuring Range and	16 in. (0.4 m) to 77 ft. (23.5 m)			
Minimum Dielectric Constant	See Table 5 on page 17 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			
Interface Measuring Range	Note: See Table 6 on page 18 for the measuring range when using the Remote Housing 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, Flexible Twin Lead Probe, ft. (m)			
	maximum measuring range will be			
	reduced depending on the maximum upper product thickness according to 82.0 (25) 78.7 (24) Upper Product Upper Product			
	Dielectric Constant			
	Example: If the Upper Product			
	Dielectric Constant is 2, and the			
	Upper Product Thickness is 5 ft. Thickness.			
	(1.5 m), the Maximum Measuring Range is 75.5 ft. (23 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. Stainless steel 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 7 on page 18)	 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 4. Transition Zones

	Dielectric Constant	Rigid Single Lead	Flexible Single Lead	Coaxial	Rigid Twin Lead	Flexible Twin Lead
Upper ⁽¹⁾	80	4 in. (10 cm)	5.9 in. (15 cm)	4 in. (10 cm)	4 in. (10 cm)	5.9 in. (15 cm)
Transition Zone	2	4 in. (10 cm)	20 in. (50 cm)	4 in. (10 cm)	4 in. (10 cm)	8 in. (20 cm)
	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⁾)
Lower ⁽²⁾ Transition Zone	2	4 in. (10 cm) ⁽⁵⁾	4.7 in. (12 cm) - long weight or chuck. 6.3 in. (16 cm) - short weight ^{(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 25.
- (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 5. 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. 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)		
	Mi	nimum Dielectric Constar	nt			
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)	1.45 (Std) 2.0 (HTHP/HP/C)	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 i		

- (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 6. 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	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)
14 ft. 9 in. (4.5 m) - for 13 mm probes				
Minimum Dielectric Constant with 1 m l	Remote Housing			
2.7 (2.0 if installed in a metallic bypass or	2.7 up to 36 ft. (11 m)	1.5 (Std)	2.1	1.7 up to 33 ft. (10 m)
stilling well) ⁽¹⁾	6 up to 66 ft. (20 m)	2.4 (HTHP/HP/C)		2.2 up to 66 ft. (20 m)
	10 up to 72 ft. (22 m)			2.6 up to 72 ft. (22 m)
Maximum Measuring Range with 2 m R	emote Housing			
3.3 (2.2 if installed in a metallic bypass or	3.2 up to 36 ft. (11 m)	1.6 (Std)	2.5	1.8 up to 33 ft. (10 m)
stilling well) ⁽¹⁾	8 up to 67 ft. (20.5 m)	2.9 (HTHP/HP/C)		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	3.7 up to 36 ft. (11 m)	1.7 (Std)	2.8	2.0 up to 33 ft. (10 m)
stilling well) ⁽¹⁾	11 up to 62 ft. (19 m)	3.4 (HTHP/HP/C)		2.7 up to 62 ft. (19 m)

⁽¹⁾ May be lower depending on installation.

TABLE 7. Maximum recommended Viscosity and Coating / Build-up

Coaxial	Twin Lead	Single Lead	
Maximum Viscosity	1		
500 cP	1500 cP	8000 cP ^{(1) (2)}	
Coating / Build-up			
Coating not	Thin coating	Coating allowed	
recommended	allowed, but no		
	bridging		

⁽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 Enclosur	'e			
Туре	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	1/2 - 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 lbs (2.5 kg) in Aluminum, 11 lbs (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 1-7 on page 31 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. Protective Plate			
	See "Dimensional Drawings" on page 25. Tank Seal with Plate Design			
Flange Dimensions	Follows ANSI B 16.5, JIS B2220, and EN 1092-1 standards for blind flanges. For Proprietary Fisher [®] and Masoneilan [®] flanges, see "Proprietary Flanges" on page 31			
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 10. 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 Number 00840-2600-4811)			
	For interface measurements Rigid Single probe is the best choice for chamber mounting. The Twin or Coax probe is the preferred choice for clean, low dielectric constant liquids			
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				
	Material model code 7: PTFE			
	Material model code 7: PTFE			
Pressure Equipment	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			

Total Probe Length	This is defined from the upper reference point to the end of the probe (weight included, if applicable).		
2			
	NPT BSP/G Flange Tri-Clamp		
	Upper		
	Defendance		
	Point		
	Total		
	Probe		
	Length		
	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 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	Coaxial: 1.3 ft. (0.4 m) to 19.7 ft. (6 m).		
Probe Length	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 14.7 ft. (4.5 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)		
chaire, capacity	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	4 in. (10 cm) + nozzle diameter		
Nozzle Height			
Minimum Clearance			
(See Table 8 on page 22)			
	된 13		
	Nozzle IIII		
	Height		
	Nozzle Diameter Clearance to tank wall		
Other Mechanical	To get best possible performance, the following must be		
Considerations	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		
	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 Flexible single lead probe with chuck.		
	• In order to stabilize the probe for side forces, it is possible to See the Reference Manual for more		
	fix or guide the probe to the tank bottom anchoring options.		
	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)		
	, , , , , , , , , , , , , , , , , , , ,		
1	See the Reference Manual (document number 00809-0100-4811) for more mechanical installation information		

NA/- !l. /	Floor				
Weight	Flange: according to drawing 9150 077-601				
	Coaxial probe: 0.67 lbs/ft. (1 kg/m) Rigid Single Lead probe (0.3 in./8 mm): 0.27 lbs/ft. (0.4 kg/m)				
	Rigid Single Lead probe (0.5 in./6 him): 0.27 ibs/it. (0.4 kg/li Rigid Single Lead probe (0.5 in./13 mm): 0.71 lbs/ft. (1.06 kg				
	Rigid Twin Lead probe: 0.40 lbs/ft. (0.6 kg/m)	3/111)			
	Flexible Single Lead probe: 0.40 lbs/ft. (0.07 kg/m)				
	Flexible Twin Lead probe: 0.09 lbs/ft. (0.14 kg/m)				
	End weight: 0.88 lbs (0.40 kg) for single probes, 1.3 lbs (0.60 kg) for twin probes				
Chamber / Pipe Install		o kg) for twill probes			
Rosemount 9901 Chamber					
Rosemount 9901 Chamber	Rosemount 9901 allows external mounting of process level instrumentation. It supports a variety of process		Side-and-Bottom		
	connections, and optional drain and vent connections. The	dimension	dimension		
	Rosemount 9901 chamber is designed to the ASME B31.3	COV RO	(OV R)		
	standard, and is Pressure Equipment Directive (PED)				
	compliant. Use option code XC to order together with the		CH POS		
	3300 Series transmitters.				
	The probe length to use for a Rosemount 9901 chamber				
	can be calculated with this formula:		لسسسس		
	Side-and-Side dimension:				
	Probe length=Centre-to-Centre dimension+19 in. (48 cm)				
	Side-and-Bottom dimension:	l ju f €	1 1 2		
	Probe length=Centre-to-Centre dimension+4 in. (10 cm)	9	eut		
		Centre-to-Centre	Centre-to-Centre		
	Use a centering disc the same diameter as the		}		
	chamber if the probe length >3.3 ft. (1 m). See "Probe Type	⊟ ⊔ ক্র	it e		
	in Chamber Considerations" on page 21 and "Centering		ي ا		
	Discs" on page 22 for which probe and disc to use				
	For additional information, see the Rosemount 9901 Chamb	er for Process Level Instrumer	ntation		
	Product Data Sheet (Document Number 00813-0100-4601)				
Existing Chamber	A Rosemount 3300 Series transmitter is the perfect				
	replacement in an existing displacer chamber.	_	1		
	Proprietary flanges are offered, enabling use of existing		⁻ Replace		
	chambers to make installation easy. Considerations when changing to 3300:	ر مام م مام	chamber		
	The 3300 series flange choice and probe length must be		flange		
	correctly matched to the chamber. Both standard ANSI				
	and EN (DIN), as well as proprietary chamber flanges, are		Ì		
	available. See "Proprietary Flanges" on page 31 to identify	Probe	Diamin and		
	the proprietary flanges.	Length	Displacer Length		
			Lengui		
	See "Probe Type in Chamber Considerations" on page 21				
	and "Centering Discs" on page 22 for which probe and				
	disc to use. See Table 9 on page 22 for guidelines on the	+			
	required probe length				
	For additional information, see the Replacing Displacers wit	n Guided Wave Radar Technic	al Note		
	(Document Number 00840-2200-4811)				
Probe Type in Chamber	When installing a Rosemount 3300 in a chamber, the single		An exception is		
Considerations	with liquefied gas > 40 bar where the coaxial probe is recom				
	The recommended minimum chamber diameter is 4 in. (100				
	for the Single Rigid probe. The probe should be centered to	·	of a well.		
	The probe length determines if a Single Rigid or Single Flex	ible probe should be used:			
	• Less than 14.7 ft. (4.5 m):				
	Rigid Single Probe is recommended. Use a centering di		nstallation requires		
	less head-space, use a Flexible Single Probe with a we	gnt and centering disc.			
	More than 14.7 ft. (4.5 m): Her Flouible Single Broke with a weight and contains a	ioo			
	Use Flexible Single Probe with a weight and centering of		to the marks of		
	A short weight is available for the single flexible SST probe.	_			
	and shall be used where the measuring range must be max	mized. 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, or PTFE. The centering disc in PTFE is not available for HTHP probes. See Table 10 for Dimension D. Table 11 shows which centering disc diameter to choose for a particular pipe.	D
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TABLE 8. 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.

- Probe diameter is 1.1 in. (28 mm) for standard probe and 1.3 in. (33 mm) for HTHP/HP probe
 Requires special configuration and setting of Upper Null Zone.
 Minimum clearance from tank bottom for the coaxial and rigid single probes is 0.2 in. (5 mm).
 The center-most lead must be at least 0.6 in. (15 mm) away from the pipe/bypass wall.
 The probe must be centered in the pipe/bypass. A centering disc (see "Centering Discs" on page 22 and "Rosemount 3301 and 3302 Level and/or Interface in Liquids" on page 4) can be used to prevent the probe from contacting the chamber wall.

TABLE 9. 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 10. 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 11. 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

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

Temperature Class T5 @ +85°C. Ambient temperature limits -50°C to +85°C.

Factory Sealed.

Approval valid for Modbus and HART option.

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 Ta=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.

ATEX Approval ()

Flameproof:

⟨ξχ⟩ II 1/2 GD T80°C.

EEx d [ia] IIC T6 (-40°C<T_a<+75°C).

KEMA 01ATEX2220X.

 $U_{m} = 250 \text{ V}.$

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.

Intrinsic Safety: 11



 $\langle E_x \rangle$ II 1 G EEx ia IIC T4 (-50°C<T_a<+70°C).

BAS02ATEX1163X

 $U_i=30 \text{ Vdc}, I_i=130 \text{ mA}, P_i=1.0 \text{ W}, L_i=C_i=0.$

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 6.4.12 of EN 50020. This must be considered during installation.

When used in a potentially explosive atmosphere where the use of equipment-category 1 apparatus is required, appropriate measures must be taken to prevent electrostatic discharge.

Canadian Standards Association (CSA) Approval

Cert. no 2002.1250250.

Explosion-proof: Class I, Div. 1,

Groups C and D.

Dust Ignition Proof:

Class II, Div. 1 and 2, Groups G and coal

Class III, Div. 1, Haz. Loc.

[Ex ia IIC T6].

Ambient temperature limits -50°C to +85°C.

Factory Sealed.

Approval valid for Modbus and HART option.

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 -40°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<Ta<+60°C). DIP A21 TA T6 IP66 U_m =250 V

Approval valid for HART option.

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.

Technology Institution of Industrial Safety (TIIS) Approval

E4 Flameproof with Intrinsically Safe probe: TC18544, TC18545 Transmitter: Ex d [ia] IIB T6 (-20°C<T_a<+60°C) Probe: Ex ia IIB T6 Approval valid for HART option.

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 apparatus metallic enclosure must be electrically bonded to earth. The conductor used for the connection shall be equivalent to a copper conductor of 4 mm² 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 $U_m = 250 \text{ V}.$

Intrinsic Safety: Ex ia IIC T4 ($T_a = 60^{\circ}$ 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 mm² minimum cross-sectional area.

The input parameters stated above must be taken into consideration during the installation of the apparatus.

Combination Approvals

KA ATEX and CSA Flameproof / Explosion-proof

KB FM and CSA Explosion-proof

KC ATEX and FM Flameproof / Explosion-proof

KD ATEX and CSA Intrinsic Safety

KE FM and CSA Intrinsic Safety

KF ATEX and FM Intrinsic Safety

Approval valid for HART option.

For information on hazardous locations installations, refer to the Rosemount 3300 Series Reference Manual (document no. 00809-0100-4811).

Dimensional Drawings

Figure 1-1. Rigid Single Lead

Dimensions are in inches (millimeters) G 1/11/2 inch NPT 1/11/2/2 inch NPT 1/11/2/2 inch NPT 11/2, G 11/2 inch ½ - 14 NPT Optional 6.8 (173) 6.8 (173) HTHP/HP version adapters: M20x1.5 4.1 (104) 4.3 (110) 4.3 (110) PG13.5 4.5 (113) 9.5 (241) 9.5 (241) s52/s60 15 (381) s52 2.4 (62) 1.1 (27) L ≤ 10 ft. $L \le 10 \text{ ft.}$ (3 m) (3 m) NPT: s50 G: s60 L < 20 ft. Ø 0.31 (8) or 0.51 (13): SST and Alloy probes \varnothing 0.31 (8) or 0.51 (13): SST and Alloy probes \varnothing 0.47 (12) for the PTFE (6 m) for Ø 0.51 Ø 0.47 (12) for the (13)PTFE covered probe covered probe

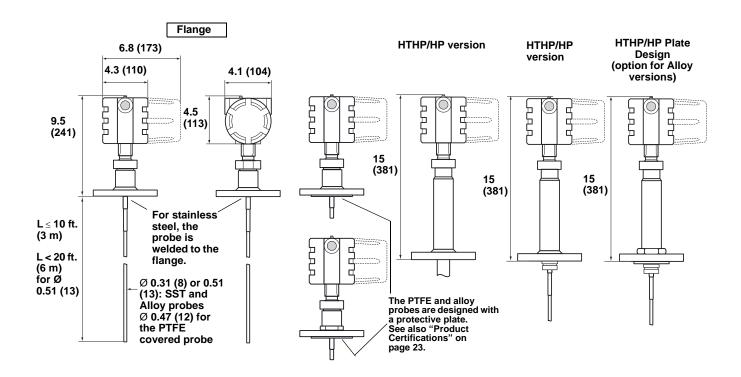


Figure 1-2. Flexible Single Lead

Dimensions are in inches (millimeters) G 1/1½ inch NPT 1/11/2/2 inch ½ - 14 NPT NPT 1/11/2/2 inch NPT 11/2, G 11/2 inch Optional 6.8 (173) 6.8 (173) HTHP/HP version adapters: M20x1.5 4.1 (104) 4.3 (110) 4.3 (110) PG13.5 Ş 4.5 (113) 15 9.5 9.5 (241) (381)(241) s52/s60 1 in. / 11/2 in.: s52 2 in.: s60 2.4 (62)1.1 (27) $L \le 77$ ft. Ø 0.16 (4): (23.5 m) Short weight SST probe Ø 0.24 (6): (option W2) L ≤ **77 ft.** SST probe NPT: s50 Ø 0.16 (4): SST probe (23.5 m) Ø 0.28 (7): Ø 0.24 (6): SST probe G: s60 PTFE covered 2 (50): Ø 0.28 (7): PTFE probe covered probe 4 mm SST probes 5.5 (140): 5.5 (140): 4 and 6 mm 4 and 6 mm SST probes 17.1 (435): SST probes 1.5 (37.5): 17.1 (435): PTFE 4 mm SST PTFÈ covered covered probe probes probe 0.86 (22): 4 mm SST probe 0.88 (22.5): PTFE covered probe 0.86 (22): 4 mm SST probe 0.88 (22.5): PTFE covered probe 1.10 (28): 6 mm SST probe 1.10 (28): 6 mm SST probe

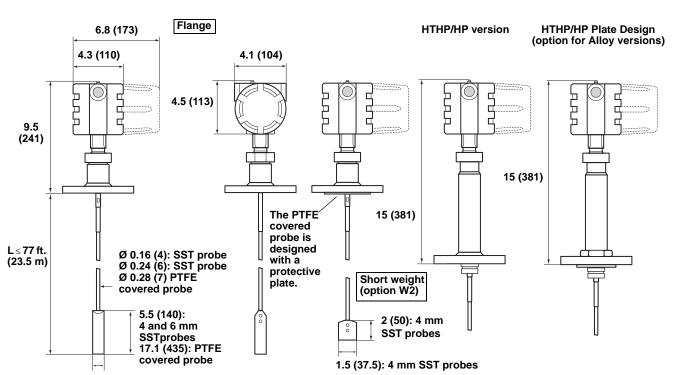
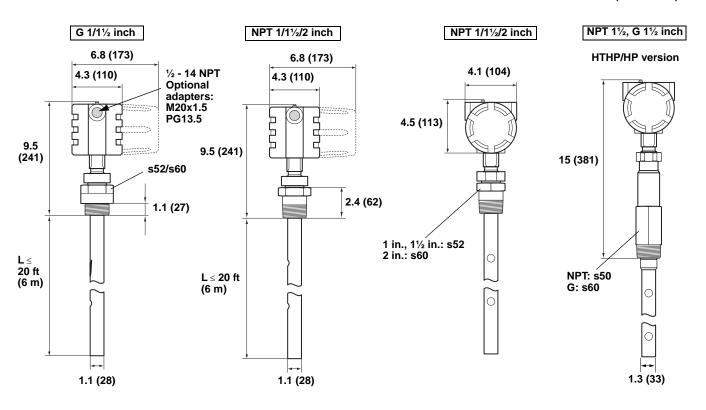


Figure 1-3. Coaxial

Dimensions are in inches (millimeters)



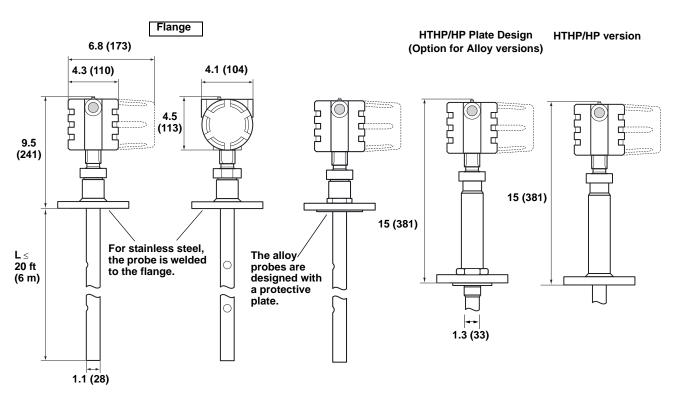


Figure 1-4. Rigid Twin Lead

Dimensions are in inches (millimeters) NPT 11/2 / 2 inch NPT 11/2 / 2 inch G 1½ inch 6.8 (173) 6.8 (173) ½ - 14 NPT 4.3 (110) 4.1 (104) 4.3 (110) Optional adapters: M20x1.5 PG13.5 4.5 (113) 9.6 (244) 9.6 (244) s60 1½ in.: s52-2 in.: s60 1.8 (45) 1.1 (27) $L \le 10$ feet L≤10 feet (3 m) (3 m) Ø 0.31 (8) Ø 0.31 (8) Ø 0.24 (6) Ø 0.24 (6) 1.0 (25) 1.0 (25) Flange 6.8 (173) 4.3 (110) 4.1 (104) 4.5 (113) 9.6 (244) $L \le 10$ feet (3 m) Ø 0.31 (8) Ø 0.24 (6)

1.0 (25)

Figure 1-5. Flexible Twin Lead

Dimensions are in inches (millimeters)

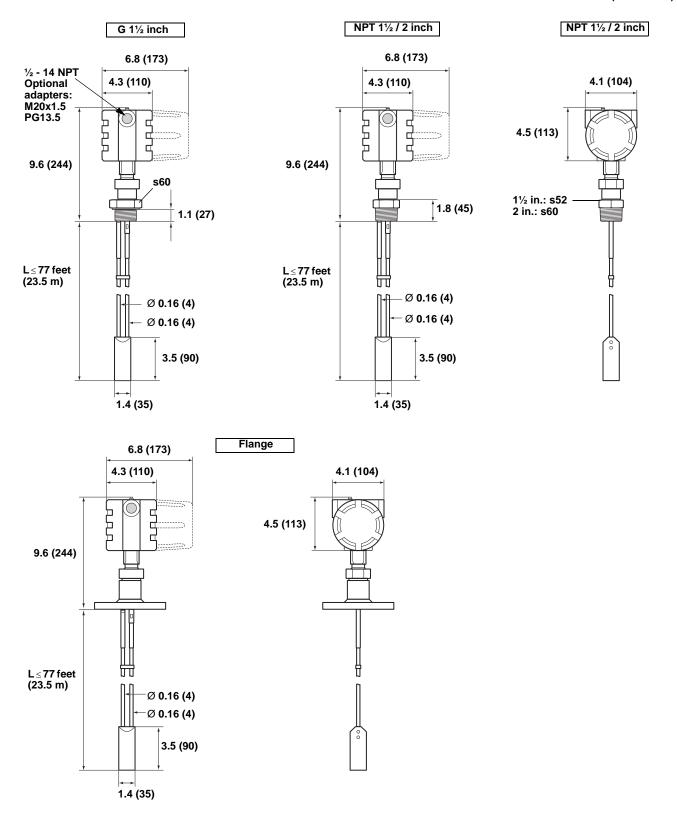
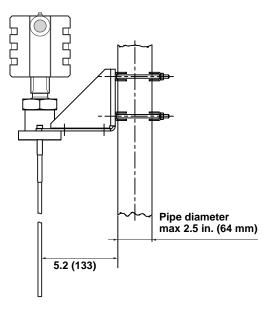
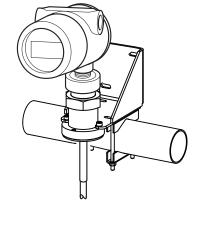


Figure 1-6. Bracket mounting.

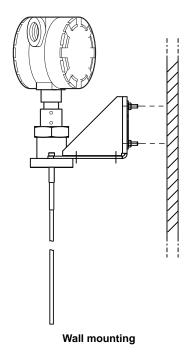
Dimensions are in inches (millimeters)



Pipe mounting (vertical pipe)



Pipe mounting (horizontal pipe)



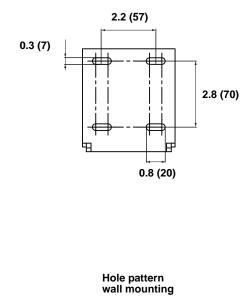
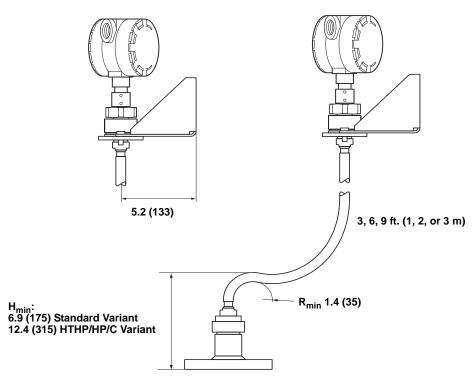
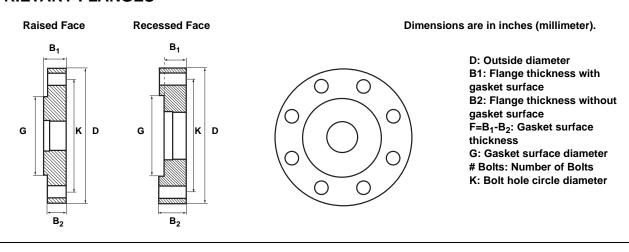


Figure 1-7. Remote housing.

Dimensions are in inches (millimeters)



PROPRIETARY FLANGES



NOTE

Dimensions may be used to aid in the identification of installed flanges. It is not intended for manufacturing use.

TABLE 12. 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 WirelessHART™
- 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
- 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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Two-wire Radar Level Transmitter

The Rosemount 5400 Series is a reliable 2-wire radar level transmitter for liquids and slurries, designed for outstanding performance in a wide range of applications and process conditions. It measures level directly and is unaffected by most fluid property changes, including temperature, pressure, vapor gas mixture, density, turbulence, bubbling/boiling, dielectric, pH, viscosity, crystallization, etc.

- Innovative design. Best-in-class performance
- Non-contacting, making it virtually unaffected by process conditions
- No moving parts, means little or no maintenance
- Application flexibility with full range of antennas, and two models 5402 (26 GHz) and 5401 (6 GHz)
- Less affected by coating with Condensation Resistant Antenna
- Reduced echoes from obstacles / tank walls with Circular Polarization
- Powerful, easy-to-use configuration tool with "Measure-and-Learn" function







Content

"Innovative Measurement Technologies for a Better Bottom Line" page 2
"Reliable Measurements through Advanced Surface Tracking Capability"
"System Integration"
"Transmitter and Antenna Overview"page 8
"Measuring Range"
"Mechanical Mounting Recommendations"
"Ordering Information"
"Specifications"page 23
"Product Certifications"
"Dimensional Drawings and Mechanical Properties"page 29





Innovative Measurement Technologies for a Better Bottom Line

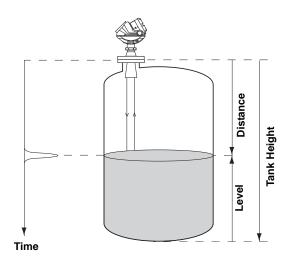
The 5400 Series transmitter is used for level measurements on liquids and slurries with various temperatures, pressures and vapor gas mixtures. Because of its advanced surface tracking capability, the transmitter can detect and evaluate all echoes within the tank.

The Rosemount 5400 Series is easily configured for a wide range of applications and process conditions. In addition, it incorporates advanced signal processing and smart echo tracking features.

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, from which the level, volume and level rate, are calculated.

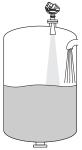


MODELS

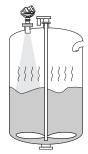
The 5400 Series consists of two models:

- Rosemount 5401, Low Frequency Transmitter (~ 6 GHz).
- Rosemount 5402, High Frequency Transmitter (~ 26 GHz).

The availability of two frequencies allows the user to choose the model that best fit the installation and process conditions, with the 5402 being the preferred choice for most applications.

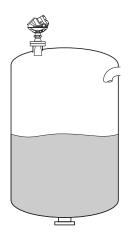


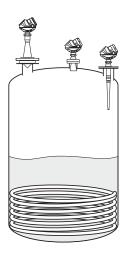
The 5402 transmitter is the preferred choice in most applications because its narrow radar beam offers greater mounting flexibility.

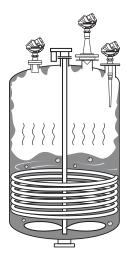


The 5401 transmitter is used in applications with some extreme process conditions.

APPLICATION EXAMPLES FOR THE 5400 SERIES RADAR LEVEL TRANSMITTER







Tanks, vessels, and containers with calm surfaces

Non-contacting radar can also be used in less challenging applications, such as storage and buffer tanks:

- It is easy to mount, maintenance-free, and highly accurate
- Gives precise monitoring and control of the process

Overfill and underfill detection

The 5400 Series can be advantageous in risk reduction systems:

- Continuous measurement may reduce or simplify proof-tests
- Multiple 5400's can be used in the same tank

Corrosives

Radar measurement is ideal for most corrosive products, such as caustics, acids, solvents and many other chemicals:

- Not in contact with process product
- Wide material offering such as PTFE, Alloy C-276, and Alloy 400.
- Works well also in non-metallic tanks

Sticky, viscous and crystallizing products

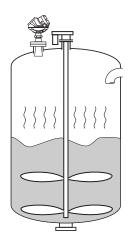
The best-in-class 5400 Series provides an accurate and reliable level reading with difficult products, such as resins and adhesives:

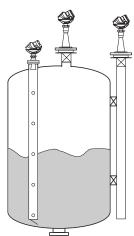
- Non-contacting is best practice
- Almost unaffected by coating and build-up due to the uniquely designed condensation resistant antennas

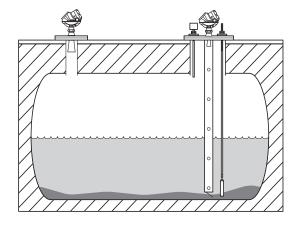
Sludges and slurries

Applications like mud, pulp-stock and lime slurries are ideal for non-contacting measurement:

- Immune to splashing and solids content
- Unaffected by density changes
- No re-calibration, no or little maintenace







Reactor vessels

The innovative design of the 5400 Series makes it an excellent choice for the most difficult applications, such as reactor vessels:

- Unique circular polarization provides greater mounting flexibility – no clearance distance from tank wall is needed!
- Direct measurement independent of most variations in process conditions, such as density, dielectric, vapor, temperature and pressure
- Can handle turbulent conditions, whether created by agitation, top-filling or process reaction

Mounting flexibility

The versatile 5400 Series can be used in mounting configurations other than standard nozzles:

- Fits most existing pipes: 2-8 in.
- Easy to isolate from the process use a ball-valve

Still-pipes and bridles reduce the influence of foam, turbulence and tank obstructions. Ball-valves can be used on both still-pipes and nozzles.

Underground tanks

The mounting flexibility of the 5400 Series makes it an excellent choice for many underground tanks:

- Easy top-mounting
- · Can handle long narrow nozzles, and pipes
- Unaffected by dirty products with solids content

For more information on which model and antenna to use for the applications above, see "Transmitter and Antenna Overview" on page 8 and "Measuring Range" on page 11, or contact your local Emerson Process Management representative.

Reliable Measurements through Advanced Surface Tracking Capability

Different process conditions, such as the tank atmosphere, foam, turbulence and products with low dielectric constants, will decrease the returned signal and the radar transmitter may lose track of the surface. It is important that the transmitter can detect very weak signals.

The Rosemount 5400 Series transmitter incorporates several new innovations to provide the best possible surface tracking capability. These features contribute to more reliable measurements and better performance than with standard 2-wire transmitters.

DUAL PORT TECHNOLOGY

Dual Port Technology, two ports for transmitting and receiving signals, reduces noise. Even with a weak returned signal, the transmitter will be able to detect it.

A transmitter with Dual Port Technology can receive 75% less reflected energy than a standard 2-wire transmitter, and still have equal or better surface tracking capability.

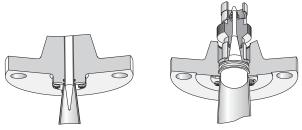
Standard 2-wire radar level transmitters only use one port on the microwave generation module for sending and receiving signals, which introduces significant losses in the microwave generation.

CONDENSATION RESISTANT ANTENNA

The tank seal is the part of the waveguide that protects the transmitter from the process atmosphere. Rosemount 5400 Series has a larger protective surface towards the tank, making the transmitter less sensitive to dirt and condensation.

Standard Transmitter

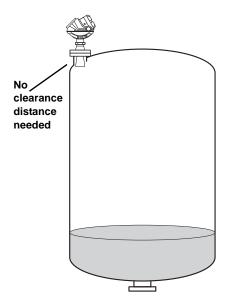
Rosemount 5402



Rosemount 5400 Series transmitters are equipped with an enlarged PTFE tank seal to protect the antenna from contamination and condensation, an especially important feature for high frequency antennas.

CIRCULAR POLARIZATION

Standard radar transmitters utilize linear polarization resulting in greater influence from disturbing objects. The 5400 Series transmitter has circular polarization, which reduces echoes from tank walls and disturbing objects. This means increased installallation flexibility and measurement reliability. The transmitter can be installed without any clearance distance to the tank wall.



Circular polarization allows the transmitter to be installed without any clearance distance to the tank wall.

System Integration

The Rosemount 5400 Series is a loop-powered device (it uses the same two wires for power supply and communication) that supports both FOUNDATION™ fieldbus, and the analog 4-20 mA with superimposed digital HART[®].

EASY INTEGRATION

The 5400 Series supports the latest interoperability standards and can easily be integrated into almost any host system.

Rosemount Radar Master, the included software package, can be used to configure the transmitter in five simple steps.

Any other DD- (Device Description) or enhanced EDDL-compatible configuration tool such as AMS, DeltaV or the Field Communicator, can also be used.

THE FOUNDATION FIELDBUS ADVANTAGE

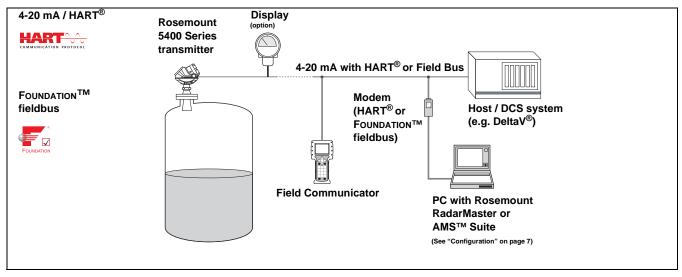
No proprietary connections are required for a complete configuration – not even for the echo-curve! This can be done remotely in the control room over the fieldbus segment using Rosemount Radar Master. Basic Configuration can also be performed using any DD-compatible configuration tool, such as DeltaV.

Additionally, with the strength of eleven function blocks and interoperability certificates from all major host system vendors, the 5400 Series will unleash the true benefits of FOUNDATION™ fieldbus.

INNOVATIVE PLANTWEB CAPABILITIES

If the performance of the microwave board starts to degrade, or if the internal temperature sensor gets too hot, a PlantWeb Alert, categorized as a warning, can be displayed to the operator.

Alerts describe the problem and recommend actions. Precise diagnostics capabilities like this and many more will simplify troubleshooting and enable predictive maintenance.



The 5400 Series can be integrated into almost any new or existing plant. Configure it remotely in the control room over the 4-20 mA/HART® or FOUNDATION™ fieldbus wires. No proprietary connections are needed.

Product Data Sheet

00813-0100-4026, Rev GA July 2010

Rosemount 5400 Series

DISPLAY

Data can be read from the optional integral display or remotely using the Rosemount 751 Field Signal Indicator (see Product Data Sheet, document number 00813-0100-4378) for 4-20 mA / HART[®] or the Rosemount 752 Remote Indicator for Foundation™ fieldbus (see Product Data Sheet, document number 00813-0100-4377).

TRANSMITTER VARIABLES

It is possible to receive information about Level, Distance, Volume, Signal Strength, Level Rate, Analog Output Current, % of Range, and Internal Temperature, from one Rosemount 5400 Series radar level transmitter.

CONFIGURATION

Basic configuration can easily be done with Rosemount RadarMaster, a Field Communicator, the AMS™ Suite, DeltaV® or any other DD compatible host system. For advanced configuration features, RadarMaster is required.

RadarMaster is a user-friendly, Windows based software package that provides easy configuration and service. A wizard guides the user to enter the required parameters for a basic configuration. "Measure & Learn" functionality is accessed through RadarMaster. It enables automatic suggestion of threshold and disturbance echo settings, thereby making tough applications easy to configure. RadarMaster also includes waveform plots, off-line configuration, logging and extensive on-line help.

For 4-20 mA or HART[®], a HART[®] modem is required for communication between the transmitter and RadarMaster (part number 03300-7004-0001 for RS232 and 03300-7004-0002 for USB interface).

For Foundation™ fieldbus devices, RadarMaster is connected to the fieldbus segment via the fieldbus modem (part number 03095-5108-0001 for PCMCIA). For more information, see the 5400 Foundation™ fieldbus Reference Manual (document number 00809-0100-4032) or consult the factory.

Rosemount 5400 transmitters support PlantWeb® Alerts.

It is possible to order a pre-configured transmitter, by filling in the Configuration Data Sheet (CDS).

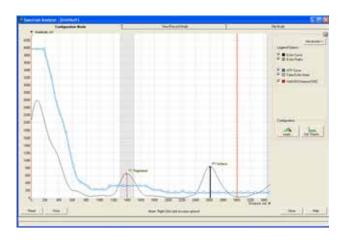


The integral display is easily configured with Rosemount RadarMaster or the Field Communicator. The user can choose which variable to display or if toggling between different variables should be applied.

ADVANCED PLANTWEB® FUNCTIONALITY

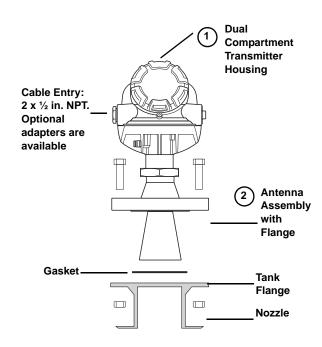


The Rosemount 5400 Series transmitter powers PlantWeb[®] through innovative measurement technologies and advanced diagnostics that provide more reliability, easier configuration, reduced process downtime, and lower installation and operating costs for a better bottom line.



With Rosemount RadarMaster, a noise threshold curve and false echo registration can automatically be created by clicking the Learn button.

Transmitter and Antenna Overview



The Rosemount 5400 Series transmitter consists of the transmitter housing and an antenna assembly. The transmitter housing contains all electronics. The antenna assembly seals off the tank atmosphere from the transmitter housing and its surroundings.

The 5400 Series is delivered as a single assembly for easy out-of-box installation, with no special tools.

The transmitter is available with Intrinsically Safe⁽¹⁾ / Non-Incendive or Explosion-proof / Flameproof approvals.

For more information see "Product Certifications."

TRANSMITTER HOUSING 1

There are two models available with different frequencies: the 5402 (~26 GHz, K-band) and the 5401 (~6 GHz, C-band). The models utilize different frequencies, and antennas, so transmitter housings are not interchangeable.

The transmitter housing has two integral ½-in. NPT cable entries for conduit / cable connections. Adapters to other connection types are available, see "Rosemount 5402 High Frequency Radar Level Transmitter" on page 15 and 15.

The dual-compartment housing separates cabling from the electronics for increased moisture resistance.

The transmitter housing can be rotated and removed from the antenna assembly for service or replacement, without opening the tank.

ANTENNA ASSEMBLY (2)

The antenna assembly is the only part in contact with the tank atmosphere, and it consists of an antenna, an O-ring, a tank seal, a flange (see "Standard Flanges" on page 34) or a thread (NPT).

The antenna focuses the radar beam. The Rosemount 5400 Series Radar Level transmitters are equipped with high performance cone, rod and process seal antennas in various sizes and materials.

It is generally recommended that is to use the largest possible antenna be used to achieve highest gain.

For information on temperature and pressure, see "Temperature and Pressure Ratings" on page 26.

(1) Fisco Intrinsic safety is available for Foundation™ fieldbus. See "Rosemount 5402 High Frequency Radar Level Transmitter" on page 15 and 119 for more information on available approvals.

Model and Antenna Guide	54	102	54	101
This table gives guidelines on which model and antenna to select, depending on application. G=Good AD=Application Dependent (consult your local Emerson representative) NR=Not Recommended	Cone (preferred)	Process Seal	Cone (preferred)	Rod
	Best choice for a broad range of applications, free propagation and pipe installations.	Ideal for small tanks and corrosive applications. Also good for heavy antenna condensation/build-up.	Suitable for some extreme process conditions.	Suitable for small process connections, and corrosive environment.
Accuracy	± 0.1 in (3 mm)	± 0.1 in (3 mm)	± 0.4 in (10 mm)	± 0.4 in (10 mm)
Tank Considerations				
Installation close to smooth tank wall	G	G	G	G
Internal obstructions, directly in path	NR	NR	AD	AD
Internal obstructions, avoidance ⁽¹⁾	G	G	NR	NR
Antenna extends below nozzle	G	G	G	G
Antenna recessed in smooth nozzle up to 6 ft (2 m)	G	G	AD ⁽²⁾	NR ⁽³⁾
Antenna recessed in nozzle with irregularities, such as bad welds	AD ⁽²⁾	AD	AD ⁽²⁾	NR ⁽³⁾
Still-pipe mounting	G	G	G	NR
Valves	G	G	NR	NR
Pressure/Temperature considerations	See pages 26, 29-30	See pages 26 and 32.	See pages 26, 29-30	See pages 26 and 31.
Measuring range considerations	See page 11.	See page 11.	See page 11.	See page 11.
Process Medium Characteristics				
Vapor (light, medium)	G	G	G	G
Vapor (heavy)	NR	AD	G	G
Condensing vapor/product build-up ⁽⁴⁾	AD	G	G	AD
Boiling/Turbulent surface (low/medium)	G	G	G	G
Boiling/Turbulent surface (heavy)	AD	AD	G ⁽⁵⁾	NR
Boiling/Turbulent surface (still-pipe)	G	G	G	NR
Foam ⁽⁶⁾	NR	NR	AD	AD
Foam (still-pipe) ⁽⁶⁾	G	G	G	NR
Corrosive products (options available)	G ⁽⁷⁾	G ⁽⁷⁾	G ⁽⁷⁾	G ⁽⁷⁾
Materials with very low dielectric	G	G	G	AD
Changing density/dielectric/pH/ pressure/temperature	G	G	G	G
Coating/viscous/crystallizing liquids	G	G	G	G
Cleanability of antenna	AD	G	AD	G

- The obstruction should not be within the radar beam. Preferred choices due to more narrow radar beam: Model 5402, and cone antenna.
 An extended cone antenna can be used.
 The active part must protrude beneath the nozzle.
 Build-up can often be avoided or reduced by using heat-tracing or cleaning arrangements.
 Use a 6 or 8 in. cone antenna.
 Foam can either reflect, be invisible or absorb the radar signal. Pipe mounting is advantageous since it reduces the foaming tendancy.
 See wetted material on page 10.

	5402	? (~ 26 GHz)	540	5401 (~ 6 GHz)		
Transmitter model and antenna combination	Cone	Process Seal	Cone	Rod		
Wetted Material	Antenna options: • 316 / 316 L SST (EN 1.4404) • Alloy C-276 (UNS N10276) • Alloy 400 (UNS N04400 • NACE® Tank Seal: • PTFE O-ring ⁽²⁾	Antenna option: • PTFE O-ring ⁽²⁾	Antenna options: • 316 / 316 L SST (EN 1.4404) • Alloy C-276 (UNS N10276) • Alloy 400 • NACE® Tank Seal: • PTFE O-ring(2)	Antenna options: • PFA ⁽¹⁾ • PFA ⁽¹⁾ and 316 / 316 L SST (EN 1.4404) ⁽²⁾		
Process Connection	Flange or Bracket	Flange	Flange or Bracket	Flange, Thread or Bracket		

 ⁽¹⁾ PFA is a fluoropolymer with properties similar to PTFE.
 (2) O-ring options: Viton[®], Kalrez[®], EPDM and Buna-N.

Measuring Range

The measuring range depends on the microwave frequency, antenna size, the dielectric constant (ϵ_r) of the liquid, and process conditions. A higher dielectric constant value means a stronger reflection (see the following tables). The figures below are guidelines for optimum performance. Larger measuring ranges may be possible. For more information, contact your local Emerson Process Management office.

- 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 ($\varepsilon_r = 4.0-10.0$).
- C. Conductive liquids, e.g. water based solutions, dilute acids, and alkalis ($\varepsilon_r > 10.0$).

Rosemount 5402, Maximum Recommended Measuring Range, ft (m) High Frequency Antennas **Dielectric Constant** Α В С Α С Α В С 2-in. Cone / 33 (10) 49 (15) 66 (20) 82 (25) 115 (35) 115 (35) 9.8 (3) 20 (6) 33 (10) **Process Seal** 49 (15) 66 (20) 13 (4) 39 (12) 98 (30) 82 (25) 115 (35) 115 (35) 30 (9) 3-in. Cone / **Process Seal** 66 (20) 82 (25) 115 (35) 82 (25) 115 (35) 115 (35) 23 (7) 39 (12) 49 (15) 4-in. Cone / **Process Seal**

Rosemount 5401, Maximum Recommended Measuring Range, ft (m) Low Frequency Antennas **Dielectric Constant** В С Α В В С 3-in. Cone⁽¹⁾ NA NA NA 82 (25) 115 (35) 115 (35) NA NA NA 23 (7) 39 (12) 49 (15) 82 (25) 115 (35) 115 (35) 13 (4) 26 (8) 39 (12) 4-in. Cone / Rod⁽²⁾ 43 (13) 66 (20) 82 (25) 82 (25) 115 (35) 115 (35) 20 (6) 33 (10) 46 (14) 6-in. Cone 66 (20) 82 (25) 115 (35) 82 (25) 115 (35) 115 (35) 26 (8) 39 (12) 52 (16) 8-in. Cone

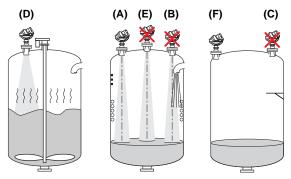
- (1) Pipe installations only. NA=not applicable.
- (2) Pipe installations are not allowed with rod antennas.

Mechanical Mounting Recommendations

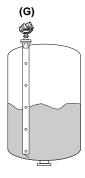
MOUNTING LOCATION

For optimal performance, the transmitter should be installed in locations with a clear and unobstructed view of the level surface (A):

- 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 14 for beamwidth 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 metal bridle / 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 interferring with each other (H)

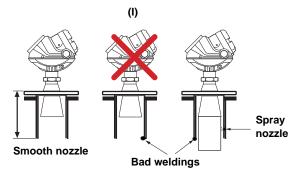


NOZZLE CONSIDERATIONS

Special considerations may have to be taken due to the nozzle, depending on the selection of transmitter model and antenna.

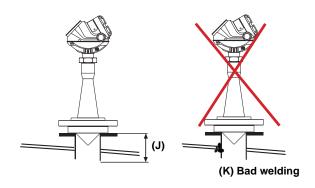
5402 with Cone Antenna

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).



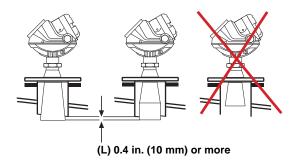
5402 with Process Seal Antenna

The antenna can be used on nozzles up to 6 ft (2 m). (J), but disturbing objects inside the nozzle (K) may impact the measurement, and should not be used. 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.



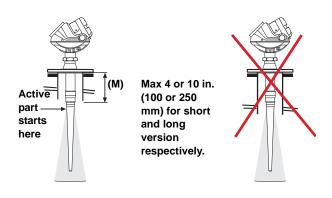
5401 with Cone Antenna

The antenna should extend 0.4 inches (10 mm), or more, below the nozzle (L). If required, use the extended cone solution.



5401 with Rod Antenna

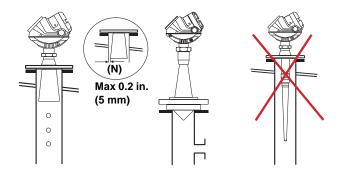
The active part of the rod antenna should be placed under the nozzle (M).



Still-pipes and Bridles in Metallic **Materials**

If used correctly, pipe measurement can be advantageous in many applications:

- 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).



Additional information is available in the Reference Manual (00809-0100-4026), or you can contact your local Emerson representative.

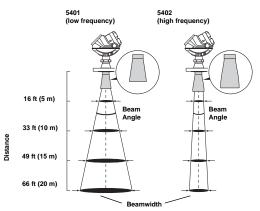
Valves

The 5400 Series transmitter can be isolated from the process by using a valve:

- · Use a full-port ball valve
- The 5402 is required, and the Process Seal Antenna is the preferred choice, since it does not require a spool piece. The cone antenna can also be used
- Ensure there is no edge between the ball valve and the nozzle / pipe, the inside should be smooth

Valves can be combined with pipes.

Beam Angle and Beamwidth



Comparison between the beam angle and beamwidth for the Rosemount 5401 (~6 GHz) and 5402 (~26 GHz) transmitters with antennas of the same size and type.

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.

Beamwidth at different distances from flange for 5402

		Antenna			
	2-in. Cone / Process Seal Seal 4-in. Cone / Process Seal Seal Seal				
Distance	Beamwidth, 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)		

Beamwidth at different distances from flange for 5401

	Antenna			
	4-in. Cone / 6-in. Cone 8-in. Cone Rod			
Distance	Beamwidth, 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)	

For more information, see the Reference Manual (document number 00809-0100-4026).

Rosemount 5402 High Frequency 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:

- 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
- · Dirt resistant cone or process seal antennas

Additional Information

Specifications: page 23 Certifications: page 27

Dimensional Drawings: page 29.

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.

The Expand	ed offering is subject to additional delivery lead time.	
Model	Product Description	
5402	High frequency version (~26 GHz)	
Housing Mat	erial erial	
Standard		Standard
Α	Polyurethane-covered Aluminum	*
Expanded		
S	Stainless Steel, Grade CF8M (ASTM A743)	
Signal Outpu	ıt	
Standard		Standard
Н	4-20 mA with HART® communication	*
F	FOUNDATION™ fieldbus	*
Conduit / Cal	ble Threads	
Standard		Standard
1	1/2 inch - 14 NPT	*
2	M20 x 1.5 adapter	*
E	M12, 4-pin, Male Connector (eurofast®)(1)	*
М	A size Mini, 4-pin, Male Connector (minifast®)(1)	*
Product Cert	ifications	
Standard		Standard
NA	No Product Certificates	*
E1	ATEX Flameproof ⁽¹⁾	*
l1	ATEX Intrinsic Safety	*
IA	ATEX FISCO Intrinsic Safety ⁽²⁾	*
E5	FM Explosion-proof ⁽¹⁾	*
15	FM Intrinsic Safety and Non-incendive	*
IE	FM FISCO Intrinsic Safety ⁽²⁾	*
E6	CSA Explosion-proof ⁽¹⁾	*

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.

16	CSA Intrinsia Sofati.	
IF.	CSA Intrinsic Safety CSA FISCO Intrinsic Safety ⁽²⁾	*
	IECEx Flameproof ⁽¹⁾	*
E7	'	*
17	IECEx Intrinsic Safety	*
IG	IECEx FISCO Intrinsic Safety ⁽²⁾	*
Expanded		
E3	NEPSI Flameproof ⁽¹⁾	
13	NEPSI Intrinsic Safety	
IC	NEPSI FISCO Intrinsic Safety	
E4	TIIS Flameproof ⁽³⁾	
	e and Material (for process connection availability, nsional Drawings and Mechanical Properties" on page 29)	
Cone Antenna	s	
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 wetted flange plate	
3H	3 in. DN 80, Alloy C-276 (UNS N10276) with wetted flange plate	
4H	4 in. DN 100, Alloy C-276 (UNS N10276) with wetted flange plate	
2M	2 in. DN 50, Alloy 400 (UNS N04400) with wetted flange plate	
3M	3 in. DN 80, Alloy 400 (UNS N04400) with wetted flange plate	
4M	4 in. DN 100, Alloy 400 (UNS N04400) with wetted flange plate	
2N	2 in. DN 50, 316L SST (EN 1.4404), with wetted flange plate. Complies with guidelines in NACE®	
	MR0175/ISO 15156 and NACE [®] MR0103.	
3N	3 in. DN 80, 316L SST (EN 1.4404), with wetted flange plate. Complies with guidelines in NACE® MR0175/ISO 15156 and NACE® MR0103.	
4N	4 in. DN 100, 316L SST (EN 1.4404), with wetted flange plate. Complies with guidelines in NACE® MR0175/ISO 15156 and NACE® MR0103.	
Process Seal		
Expanded		
2P	2 in. DN 50, PTFE	
3P	3 in. DN 80, PTFE	
4P	4 in. DN 100, PTFE	
Other Antenna		
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.

тне Ехранс	ded offering is subject to additional delivery lead time.	
	nnection and Material (for antenna availability, nensional Drawings and Mechanical Properties" on page 29)	
ANSI Flange	es (316 / 316L SST)	
Standard		Standard
AA	2 inch, 150 lbs	*
AB	2 inch, 300 lbs	*
BA	3 inch, 150 lbs	*
BB	3 inch, 300 lbs	*
CA	4 inch, 150 lbs	*
СВ	4 inch, 300 lbs	*
DA	6 inch, 150 lbs	*
EA	8 inch, 150 lbs	*
EN (DIN) Fla	nges (EN 1.4404 SST)	
Standard		Standard
НВ	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 Flang	es	
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)	*
Software Co		
Standard	•	Standard
C1	Factory configuration (CDS required with order)	*
	Configuration	^
Standard	oomigaraaon	Standard
C4	NAMUR alarm and saturation levels, high alarm	
C8	Low alarm and saturation levels, riigh alarm Low alarm ⁽⁵⁾ (standard Rosemount alarm and saturation levels)	*
Special Cert		
	IIIvates	0,
Standard		Standard
Q4	Calibration Data Certificate	*
Q8	Material Traceability Certification per EN 10204 3.1 ⁽⁶⁾	*
Expanded		
N2	Certificate of compliance with guidelines in NACE® MR0175/ISO 15156 and NACE® MR0103 ⁽⁷⁾	

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.

Special Pro	ocedures	
Standard		Standard
P1	Hydrostatic testing ⁽⁴⁾	*
Antenna M	odification	
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) ⁽⁸⁾ .	
Typical Mo	del Number: 5402 A H 1 E5 4S PV CA - M1 C1	

- Options E (eurofast[®]) and M (minifast[®]) are not available with Explosion-proof or Flameproof approvals.
 Requires Foundation™ fieldbus signal output (U_i parameter listed in "Product Certifications" on page 27).
 G ½ in. SST cable gland is included in delivery.
 Bracket mounting (BR) is not available with hydrostatic testing (P1).
 The standard alarm setting is high.
 Certificate includes all pressure retaining wetted parts.

- (7) Requires wetted flange plate cone antennas (2H-4H, 2M-4M, 2N-4N) or process seal antennas (2P-4P).
 (8) 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 23 Certifications: page 27

Dimensional Drawings: page 29.

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.

	offering is subject to additional delivery lead time.	
Model	Product Description	
5401	Low frequency version (~6 GHz)	
Housing Materi	al	
Standard		Standard
Α	Polyurethane-covered Aluminum	*
Expanded		
S	Stainless Steel, Grade CF8M (ASTM A743)	
Signal Output		
Standard		Standard
Н	4-20 mA with HART [®] communication	*
F	FOUNDATION™ fieldbus	*
Conduit / Cable Threads		
Standard		Standard
1	1/2 inch - 14 NPT	*
2	M20 x 1.5 adapter	*
E	M12, 4-pin, Male Connector (eurofast®) ⁽¹⁾	*
М	A size Mini, 4-pin, Male Connector (minifast®)(1)	*
Product Certifications		
Standard		Standard
NA	No Product Certificates	*
E1	ATEX Flameproof ⁽¹⁾	*
l1	ATEX Intrinsic Safety	*
IA	ATEX FISCO Intrinsic Safety ⁽²⁾	*
E5	FM Explosion-proof ⁽¹⁾	*
15	FM Intrinsic Safety and Non-incendive	*
IE	FM FISCO Intrinsic Safety ⁽²⁾	*
E6	CSA Explosion-proof ⁽¹⁾	*

00813-0100-4026, Rev GA July 2010

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.

16	CSA Intrinsic Safety	*
IF	CSA FISCO Intrinsic Safety ⁽²⁾	*
E7	IECEx Flameproof ⁽¹⁾	*
17	IECEx Intrinsic Safety	*
IG	IECEx FISCO Intrinsic Safety ⁽²⁾	*
Expanded		
E3	NEPSI Flameproof ⁽¹⁾	
13	NEPSI Intrinsic Safety	
IC	NEPSI FISCO Intrinsic Safety	
E4	TIIS Flameproof ⁽³⁾	
	e and Material (for process connection availability,	
	ensional Drawings and Mechanical Properties" on page 29)	
Cone Antenna	as	
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 wetted flange plate, pipe installations only	
4H	4 in. DN 100, Alloy C-276 (UNS N10276) with wetted flange plate	
6H	6 in. DN 150, Alloy C-276 (UNS N10276) with wetted flange plate	
8H	8 in. DN 200, Alloy C-276 (UNS N10276) with wetted flange plate	
3M	3 in. DN 80, Alloy 400 (UNS N04400) with wetted flange plate, pipe installations only	
4M	4 in. DN 100, Alloy 400 (UNS N04400) with wetted flange plate	
6M	6 in. DN 150, Alloy 400 (UNS N04400) with wetted flange plate	
8M	8 in. DN 200, Alloy 400 (UNS N04400) with wetted flange plate	
3N	3 in. DN 80, 316L SST (EN 1.4404), with wetted flange 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 wetted flange plate. Complies with guidelines in NACE® MR0175/ISO 15156 and NACE® MR0103.	
6N	6 in. DN 150, 316L SST (EN 1.4404), with wetted flange plate. Complies with guidelines in NACE® MR0175/ISO 15156 and NACE® MR0103.	
8N	8 in. DN 200, 316L SST (EN 1.4404), with wetted flange plate. Complies with guidelines in NACE® MR0175/ISO 15156 and NACE® MR0103.	
Rod Antennas	S	
Expanded		
1R	Short version, all-PFA ⁽⁴⁾⁽⁵⁾ , with wetted flange plate, max. nozzle height 4 in. (100 mm), free propagation only	
2R	Long version, all-PFA ⁽⁴⁾⁽⁵⁾ , with wetted flange 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 Antenn	as	
Expanded		

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 Sealin	9	
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)	*
	nnection and Material (for antenna availability, nensional Drawings and Mechanical Properties" on page 29)	
ANSI Flange	es (316 / 316L SST)	
Standard		Standard
AA	2 in. 150 lbs	*
AB	2 in. 300 lbs	*
BA	3 in. 150lbs	*
BB	3 in. 300 lbs	*
CA	4 in. 150 lbs	*
СВ	4 in. 300 lbs	*
DA	6 in. 150 lbs	*
EA	8 in. 150 lbs	*
EN (DIN) Fla	nges (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	*
	16L / EN 1.4404 SST)	
Expanded		
RA	1.5-in. NPT ⁽⁶⁾	
Other	·	
Expanded		
BR	Bracket Mounting, 316L / EN 1.4404 SST ⁽⁶⁾	
XX	Customer specific	
Options		
Standard		Standard
M1	Integral digital display	*
T1	Transient Protection Terminal Block (standard with FISCO options)	*
Expanded	1	
GC	Transparent meter glass protection cover made of PTFE / FEP	
	Hansparent meter glass protection cover made of Fift E/TE	

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.

Software Co	onfiguration	
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 ⁽⁷⁾ (standard Rosemount alarm and saturation levels)	*
Special Cer	tificates	
Standard		Standard
Q4	Calibration Data Certificate	*
Q8	Material Traceability Certification per EN 10204 3.1 ⁽⁸⁾	*
Expanded		
N2	Certificate of compliance with guidelines in NACE® MR0175/ISO 15156 and NACE® MR0103 ⁽⁹⁾	
Special Pro	cedures	
Standard		Standard
P1	Hydrostatic testing ⁽⁶⁾	*
Antenna Mo	dification	
Expanded		
S3	Extended Cone Antenna in 316 / 316L / EN 1.4404 SST. Maximum recommended nozzle height is 20 in. (500 mm). ⁽¹⁰⁾	
Typical Mod	lel Number: 5401 A H 1 NA 4S PV CA - M1 C1	

- Options E (eurofast[®]) and M (minifast[®]) are not available with Explosion-proof or Flameproof approvals.
 Requires Foundation™ fieldbus signal output (U_i parameter listed in "Product Certifications" on page 27).
 G ½ in. SST cable gland is included in delivery.
 PFA is a fluoropolymer with properties similar to PTFE.
 All-PFA Rod antennas (1R or 2R) require all-PFA tank seal (PD).

- (6) Certain process connections are not available with hydrostatic testing (P1).
- (7) The standard alarm setting is high.
- (8) Certificate includes all pressure retaining wetted parts.
- (9) Requires wetted flange plate cone antennas (3H-8H, 3M-8M, 3N-8N) or rod antennas (1R-4R). (10) Requires a SST cone antenna (3S-8S).

Specifications

General			
	December 5400 Carica Dadar Lavel Transmitter		
Product	Rosemount 5400 Series Radar Level Transmitter		
Measurement Principle	Pulsed, free propagating radar 5402: ~26 GHz		
	5401: ~6 GHz		
Microwave Output Power	< 1 mW		
Beam Angle	See table on page 12		
Re-calibration	Not required due to self-adjusting electronics.		
Measuring Performance	Trochoquinos due to con adjusting clockerings.		
-	115 ft /25 m) from flange		
Maximum Measuring Range Instrument Accuracy at reference	115 ft (35 m) from flange 5402: ± 0.1 in. (± 3 mm)		
conditions ⁽¹⁾	5401: ± 0.4 in. (± 3 mm)		
Repeatability	± 0.04 in. (± 1 mm) at 16.4 ft (5 m) distance		
Resolution	0.04 in. (1 mm)		
Near Zone Distance	1.3 ft (0.4 m) from lower end of the antenna		
Near Zone Accuracy	5402: ± 0.6 in. (± 15 mm)		
Treat Zone Accuracy	5401: ± 1.2 in. (± 30 mm)		
Transition Zone ⁽²⁾	6 in. (150 mm) from lower end of the antenna		
Minimum Dielectric Constant	$\varepsilon_{\rm r}$ = 1.4		
Temperature Drift	0.05 %/10 K in temperature range -40°F to 176°F (-40°C to 80°C)		
Update Interval	1 second		
Max Level Rate	1.6 in./s (40 mm/s) as default, adjustable to 7.1 in./s (180 mm/s)		
Display / Configuration / Communication			
Integral Display	5-digit integral display. The process variables listed below can be presented. If more than one		
integral Display	variable is chosen, carousel toggling of data is used. The display also shows diagnostics and		
	error information.		
Output Variables	Level, Distance, Volume, Level Rate, Signal Strength, Internal Temperature, Analog Output Current ⁽³⁾ , and % of Range ⁽³⁾		
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		
Configuration Tools	HART®: Rosemount RadarMaster, Field Communicator, AMS Suite or any other EDDL or enhanced-EDDL host		
	FOUNDATION™ fieldbus: Rosemount RadarMaster, Field Communicator, DeltaV® or any other		
	DD (Device Description) compatible host system. Certificates of interoperability are available		
	from all major host system vendors.		
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	Al-block: 30 ms. PID-block: 40 ms.		
	ARTH-, ISEL-, OSPL-block: 65 ms. CHAR-block: 75 ms		
Conforming FOUNDATION™ fieldbus	ITK 4.6		
FOUNDATION™ fieldbus PlantWeb [®] Alert Support	Yes		
Electric			
Terminal Supply Voltage	See "Power Supply" on page 25		
Internal Power Consumption	< 50 mW in normal operation		
Output	HART [®] 4-20 mA current loop or FOUNDATION™ fieldbus		
Signal on Alarm (configurable), HART®	High=21.75 mA (standard setting)		
	Low=3.75 mA (option, model code C8)		
	Namur NE43: High=22.5 mA (option, model code C4)		

Electric, continued			
Saturation Levels, HART®	Standard: Low=3.9 mA, High=20.8 mA		
	Namur NE43: Low=3.8 mA, High=20.5 mA		
IS Parameters	See "Product Certifications" on page 27		
Cable Entry	Two integrated ½-in. NPT threads. Adapters are available, see "Rosemount 5402 High Frequency Radar Level Transmitter". One metal plug to seal any unused ports is enclosed with the transmitter delivery.		
Output Cabling	24-12 AWG, twisted shielded pairs		
Quiescent Current Draw (FOUNDATION™	21 mA		
fieldbus)	21107		
Mechanical			
Antennas	See pages 8, 15, 19, and 29		
Material Exposed to Tank Atmosphere	Cone Antenna • 316 / 316 L SST (EN 1.4404) or Monel [®] 400 (UNS NO4400) or Hastelloy [®] C-276 (UNS N10276). Monel [®] and Hastelloy [®] antennas have a plate design. • PTFE fluoropolymer • O-ring material.		
	Rod Antenna, Two versions • All-PFA ⁽⁴⁾ fluoropolymer • PFA ⁽⁴⁾ fluoropolymer, 316 / 316 L SST (EN 1.4404) and O-ring material.		
	Process Seal Antenna • PTFE fluoropolymer • O-ring material		
	For more information, see pages 10, 16 and 21.		
Housing / Enclosure	Polyurethane-covered Aluminum		
Dimensions and Weights	See "Dimensional Drawings and Mechanical Properties" on page 29		
Environment			
Ambient Temperature ⁽⁵⁾	-40°F to 176°F (-40°C to 80°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)		
Flange Temperature	See "Temperature and Pressure Ratings" on page 26		
Process Pressure	See "Temperature and Pressure Ratings" on page 26		
Humidity	0 - 100% Relative Humidity, non condensating		
Factory Sealed	Yes		
Ingress Protection	Type 4X, IP66, IP67		
EU Directive compliance	CE mark, 93/68/EEC		
Radio Approvals ⁽⁶⁾⁽⁷⁾	FCC part 15C (1998) ⁽⁸⁾ , R&TTE (EU directive 1999/5/EC), and IC (RSS210-5)		
Electromagnetic Compatibility ⁽⁹⁾	Emission and Immunity: EMC directive 89/336/EEC. EN61326-1:1997 incl. A1:1998 and A2:2001. NAMUR recommendations NE21.		
Transient / Built-in Lightning Protection ⁽⁹⁾	EN61326, IEC 801-5, level 1 kV. T1 option: Additionally, the transmitter complies with IEEE 587 Category B transient protection and IEEE 472 surge protection. The protection includes gas-filled discharge tubes and semiconductor components.		
Pressure Equipment Directive (PED) Vibration Resistance ⁽⁹⁾	97/23/EC		

(1) Ideal metal plate with no disturbing objects.

- (1) Ideal metal piate with no disturbing objects.

 Temperature: + 68 °F (20 °C).

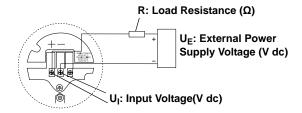
 Pressure: 14-15 psi (960-1060 mbar).

 Humidity: 25-75 % RH.

 (2) Transition Zones are areas where measurements are not recommended.

- (2) Transition Zones are areas where measurements are not recommended.
 (3) Not applicable for FOUNDATION™ fieldbus.
 (4) PFA is a fluoropolymer with properties similar to PTFE.
 (5) Temperature may be limited by the selected product certificate, see "Product Certifications" on page 27.
 (6) Only a limited selection is presented. Contact your local Emerson representative for more information.
 (7) For Japan: "Install device on tanks or pipes made of metal".
 (8) 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.
 (9) The device may also comply with other standards. Consult your local Emerson representative.
- (9) The device may also comply with other standards. Consult your local Emerson representative.

POWER SUPPLY



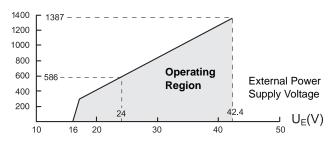
4-20 mA with HART® communication



The input voltage U_I for HART[®] is 16-42.4 V dc (16-30 V dc in IS applications, and 20-42.4 V dc in Explosion-proof / Flameproof applications). Maximum load resistance and power supply limitations for typical operating conditions are given in the diagrams and table below.

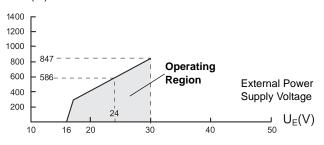
Non-Hazardous Installations

R(Ω) Maximum Load Resistance



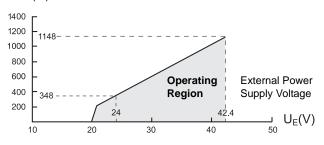
Intrinsically Safe Installations

 $R(\Omega)$ Maximum Load Resistance



Explosion-proof / Flameproof Installations

 $R(\Omega)$ Maximum Load Resistance



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 Ohm.

Minimum input voltage (U_I) at different currents

	Current		
	3.75 mA	21.75 mA	
Hazardous approval	Minimum inp	ut voltage (U _I)	
Non-Hazardous Installations and Intrinsically Safe Installations	16 V dc	11 V dc	
Explosion-proof / Flameproof Installations	20 V dc	15.5 V dc	

FOUNDATION™ fieldbus

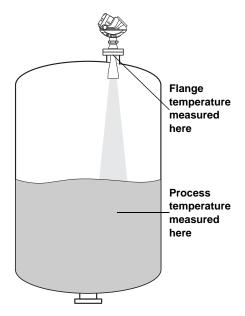


The input voltage U_I for FOUNDATIONTM fieldbus is 9-32 V dc (9-30 V dc in IS applications, 9-17.5 V dc in FISCO applications , and 16-32 V dc in Explosion-proof / Flameproof applications). The quiescent current draw is 21 mA.

TEMPERATURE AND PRESSURE RATINGS

Flange Temperature

The temperature at the flange is limited by the antenna, the tank seal, and O-rings (if applicable). The continuous flange temperature range is presented for each antenna in section "Dimensional Drawings and Mechanical Properties" on page 29.



Temperature rating considerations.

NOTE

Flange temperature depends on process and ambient temperature, and mounting conditions such as nozzle position, distance to max product level, nozzle height, presence of insulation, etc.

Operating Pressure

The pressure in the tank is limited by a combination of the antenna and the process connection.

The following 5400 Series flanges have the same p/T rating as the corresponding blind flanges:

ANSI: according to ANSI B16.5 Table 2-2.3.

EN: according to EN 1092-1 Table 18, material group 13E0.

The continuous operating pressure range is presented for each antenna in section "Dimensional Drawings and Mechanical Properties" on page 29.

Electronics Temperature

There are restrictions on the ambient temperature (see "Specifications" on page 24), and the ambient temperature may also be limited by the selected product certificate (see "Product Certifications" on page 27).

Product Certifications

SAFETY NOTE AND SPECIAL CONDITIONS FOR SAFE USE (X-MARKING IN ATEX, IECEX, AND NEPSI CERTIFICATES)

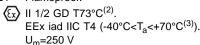
The intrinsically safe circuits do not withstand the 500 V ac test as specified in EN 50020 clause 6.4.12.

Parts of the rod antenna and the process seal antenna are non-conducting and the area of the non-conducting part exceeds the maximum permissible areas for Group IIC according to EN 50014, clause 7.3 (20 cm²) and Category II 1G according to EN 50284, clause 4.4.3 (4 cm²) (20 cm² for zone 1 and 4 cm² for zone 0 according to IEC 60079-0, clause 7.3). Therefore, when the antenna is used in a potentionally explosive atmosphere, appropriate measures must be taken to prevent electrostatic discharge.

Impact and friction hazards need to be considered according to EN 50284, clause 4.3.1 (IEC 60079-0, clause 8.1.2) when the transmitter and part of antennas exposed to the exterior atmosphere of the tank is made of light metal alloys, and used in Category II 1 G (zone 0).

ATEX Approvals (E Nemko 04ATEX1073X

E1⁽¹⁾ Flameproof:



I1⁽¹⁾ Intrinsically Safe:

(Ex) II 1 GD T73°C⁽²⁾.

EEx ia IIC T4 (-50°C<T_a<+70°C $^{(3)}$). 4-20 mA / HART $^{(8)}$ model: U_i=30 V dc, I_i=130 mA, P_i=1.0 W, C_i=7.26 nF, L_i=0 H.

FOUNDATIONTM fieldbus model: U_i =30 V dc, I_i =300 mA, P_i =1.5 W, C_i =0 nF, L_i =0 H.

FISCO model: U_i =17.5 V dc, I_i =380 mA, P_i =5.32 W, L_i = C_i =0.

Installation Drawing: 9150079-907.

Ordering Information code for Product Certificates, see page 19.

- (2) +63°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 GYJ06242X, GYJ06458X

E3⁽¹⁾ Flameproof:

Ex iad IIC T4 (-40°C< T_a <+70°C⁽³⁾). U_m =250 V

13⁽¹⁾ Intrinsically Safe:

Ex ia IIC T4 (-40°C<Ta<+70°C $^{(3)}$). 4-20 mA / HART $^{\otimes}$ model: U $_i$ =30 V dc, I $_i$ =130 mA, P $_i$ =1.0 W, C $_i$ =7.26 nF, L $_i$ =0 H.

FOUNDATIONTM fieldbus model: U_i =30 V dc, I_i =300 mA, P_i =1.5 W, C_i =0 nF, L_i =0 H.

FISCO model: U_i =17.5 V dc, I_i =380 mA, P_i =5.32 W, L_i = C_i =0.

Installation Drawing: 9150079-907.

Technology Institution of Industrial Safety (TIIS) Approval

E4⁽¹⁾ Flameproof:

Transmitter: Ex d [ia] IIC T4 Antenna: Ex ia IIC T4

Installation Drawing: 05400-00375A.

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: -40°C to +70°C⁽³⁾.

Seal not required.

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, Div. 2, Groups A, B, C and D;

Suitable for Class II, III, Div. 2, Groups F and G.

4-20 mA / HART® model: U_i =30 V dc, I_i =130 mA, P_i =1.0 W, C_i =7.26 nF, L_i =0 H.

FOUNDATIONTM fieldbus model: U_i =30 V dc, I_i =300 mA, P_i =1.3 W, C_i =0 nF, L_i =0 H.

FISCO model: U_i=17.5 V dc, I_i=380 mA, P_i=5.32 W, L_i=C_i=0.

Max operation:

4-20 mA / HART[®] model: 42.4 V, 25 mA, FOUNDATION™ fieldbus model: 32 V, 25 mA.

Temp. Code T4

Ambient temperature limits: -40° C to $+70^{\circ}$ C⁽³⁾.

Canadian Standards Association (CSA) Approvals

Project ID: 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 -40°C to +70°(2)

Factory sealed.

16⁽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 V dc, I_i =130 mA, P_i =1.0 W,

 C_i =7.3 nF, L_i =0 H.

Foundation $^{\text{TM}}$ field bus model: U_i =30 V dc, I_i =300 mA,

P_i=1.3 W, C_i=0 nF, L_i=0 H.

FISCO model: U_i=17.5 V dc, I_i=380 mA, P_i=5.32 W, L_i=C_i=0.

Installation Drawing: 9150079-906

Ambient temperature limits -40°C to +70°(2).

IECEx Approval

IECEx NEM 06.0001x

E7⁽¹⁾ Flameproof:

Ex iad IIC T4 (-40°C<T_a<+70°C(2)).

U_m=250 V

17⁽¹⁾ Intrinsically Safe:

Ex ia IIC T4 (-50°C<T_a<+70°C(2)).

4-20 mA / HART® model: U_i=30 V dc, I_i=130 mA, P_i=1.0 W,

C_i=7.26 nF, L_i=0 H.

FOUNDATION TM field bus model: U_i =30 V dc, I_i =300 mA,

 $P_i=1.5 \text{ W}, C_i=0 \text{ nF}, L_i=0 \text{ H}.$

FISCO model: U_i =17.5 V dc, I_i =380 mA, P_i =5.32 W, L_i = C_i =0.

Installation Drawing: 9150079-907.

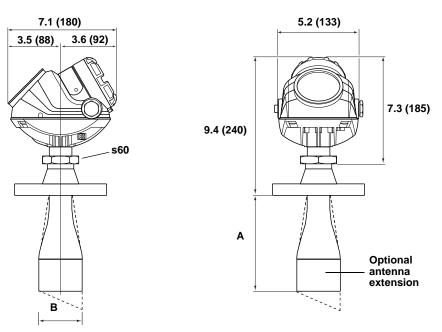
For more information on product certificates, refer to the Reference Manual (document number 00809-0100-4026).

Ordering Information code for Product Certificates, see page 19.

^{(2) +60°}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
- O Available as special, consult factory
- Not available

	Antenna Code	
Process Connection	28	3S, 4S, 6S, 8S
2 in. / DN 50 / 50A	•	0
3 in. / DN 80 / 80A	•	•
4 in. / DN 100 / 100A	•	•
6 in. / DN 150 / 150A	•	•
8 in. / DN 200 / 200A	•	•
Threaded Connection	-	-
Bracket Mounting	•	•

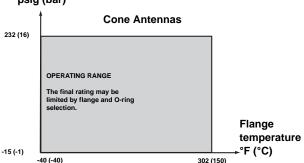
5402 Standard SST Cone

Cone size (inches)	Α	В	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)	Α	В	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

Pressure psig (bar)



Process temperature and pressure diagram.

5402 and 5401 Extended SST Cone⁽¹⁾

Max. nozzle height	Α	Option Code
20 (500)	20.4 (518)	S3

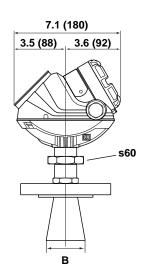
⁽¹⁾ The extended cone antennas are available in 5-inch step increments from 10 to 50 inches. Consult your local Emerson Process Management representative for more information. Expect long lead times for other sizes than the 20 in. (500 mm) version.

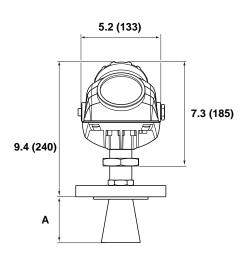
Temperature restrictions due to O-ring selection.

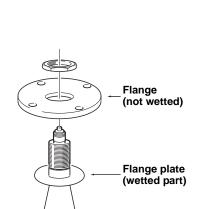
Tank seal with different O-ring materials	Min. Temperature °F (°C) in air	Max. Temperature °F (°C) in air
Viton [®]	-4 (-20)	302 (150)
Ethylene Propylene (EPDM)	-40 (-40)	302 (150)
Kalrez [®] 6375	5 (-15)	302 (150)
Buna-N	-40 (-40)	230 (110)

Drawing: 9240030-970 (www.rosemount.com)

ROSEMOUNT 5402 AND 5401 WITH WETTED FLANGE PLATE CONE ANTENNA (MODEL CODE: 2H-8H, 2M-8M AND 2N-8N)







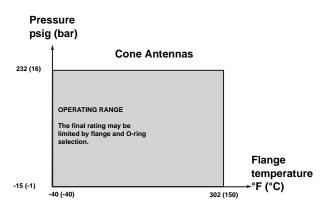
All dimensions are in inches (mm).

5402 Cone Antenna With Wetted Flange Plate

Cone size (inches)	Α	В	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 Wetted Flange Plate

Cone size (inches)	Α	В	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 temperature and pressure diagram.

Process Connection Availability

- Available as standard
- O Available as special, consult factory
- Not available

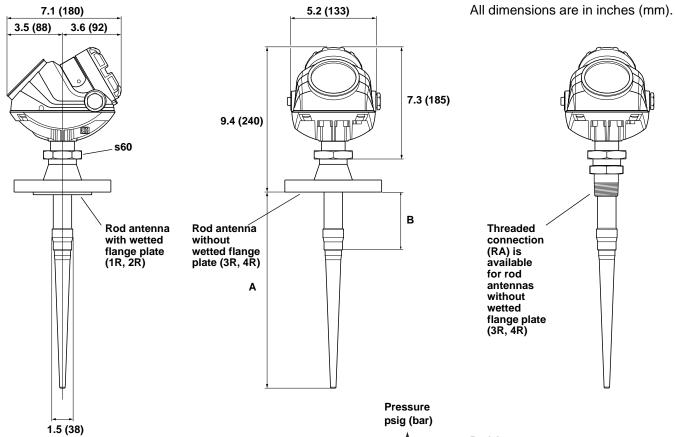
	Antenna Code				
Process Connection	2H, 2M, 3H, 3M, 4H, 4M, 6H, 6M, 8H, 8 2N 3N 4N 6N 8N				
2 in. / DN 50 / 50A	•	0	0	0	0
3 in. / DN 80 / 80A	0	•	0	0	0
4 in. / DN 100 / 100A	0	0	•	0	0
6 in. / DN 150 / 150A	0	0	0	•	0
8 in. / DN 200 / 200A	0	0	0	0	•
Threaded Connection	-	-	-	-	-
Bracket Mounting	-	-	-	-	-

Drawing: 9240030-973 (www.rosemount.com)

Temperature restrictions due to O-ring selection.

Tank seal with different O-ring materials	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)

ROSEMOUNT 5401 WITH ROD ANTENNA (MODEL CODE 1R-4R)



Rod	Α	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
- O 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	0	•	
8 in. / DN 200 / 200A	0	•	
Threaded Connection	-	•	
Bracket Mounting	-	•	

Drawing: 9240030-977 (www.rosemount.com)

psig	(bar)	
	Rod Antennas	
145 (10)		
	OPERATING RANGE	
	The final rating may be limited by flange and O-ring selection.	
		Flange
-15 (-1)		temperature °F (°C)
	40 (-40)	302 (150)

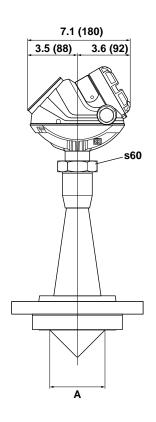
Process temperature and pressure diagram.

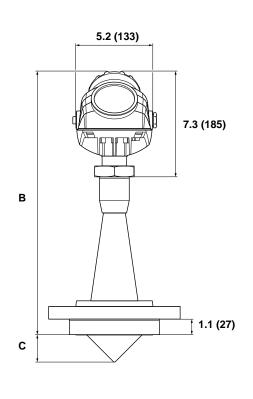
Temperature restrictions due to O-ring selection (not applicable for 1R and 2R where no process O-ring is present).

Tank seal with different O-ring materials	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)

ROSEMOUNT 5402 WITH PROCESS SEAL ANTENNA (MODEL CODE 2P-4P)

All dimensions are in inches (mm).





Process Seal size (inches)	Α	В	С	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
- O 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)

Pressure psig (bar) 120 (8.2) **Process Seal Antenna** 90 (6.2) OPERATING RANGE limited by flange and O-Flange 10 (0.69) temperature -15 (-1) °F (°C)

212 (100)

302 (150)

Process temperature and pressure diagram.

Temperature restrictions due to O-ring selection.

104 (40)

-4 (-20)

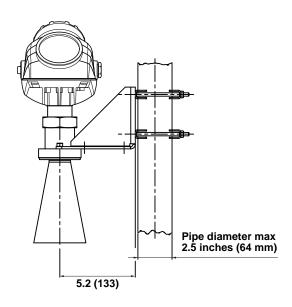
•	•	
Tank seal with different O-ring materials	Min. Temperature °F (°C) in air	Max. Temperature °F (°C) in air
Viton [®]	-4 (-20)	302 (150)
Ethylene Propylene (EPDM)	-4 (-20)	275 (135)
Kalrez [®] 6375	23 (-5)	302 (150)
Buna-N	-4 (-20)	257 (125)

PROCESS CONNECTIONS

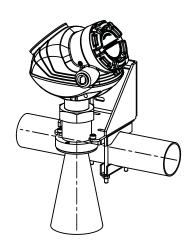
Bracket Mounting (model code BR)

Bracket mounting is available for Rosemount 5401 and 5402 with SST Cone Antenna (2S-8S) and Rosemount 5401 with Rod Antenna (3R-4R)

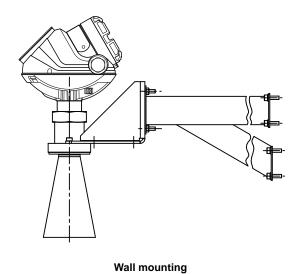
All dimensions are in inches (mm).



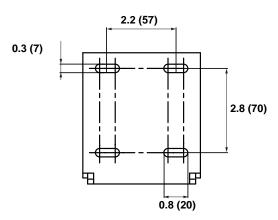
Pipe mounting (vertical pipe)



Pipe mounting (horizontal pipe)



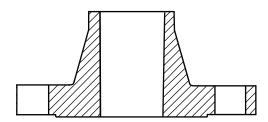
Drawing: 9240030-989 (www.rosemount.com)



Hole pattern wall mounting

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	$R_a = 125-250 \mu in.$	316 / 316L
EN (DIN)	EN 1092-1	2 mm Raised Face (Type B1)	$R_a = 3.2-12.5 \mu m.$	EN 1.4404
JIS	JIS B2220	2 mm Raised Face	$R_a = 3.2-6.3 \mu m$	EN 1.4404

⁽¹⁾ Face gasket surface is serrated per mating standard.

Cone Antennas with Wetted Flange 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	$R_a = 125-250 \mu in.$	316 / 316L
EN (DIN)	EN 1092-1	Flat Face (Type A)	$R_a = 3.2-12.5 \mu m.$	EN 1.4404
JIS	JIS B2220	2 mm Raised Face	$R_a = 3.2-6.3 \mu m$	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

APPROXIMATE WEIGHTS

Transmitter	Weight lbs (kg)
Aluminium housing	4.4 lbs (2.0 kg)
Antenna (Model Code)	Add max lbs (kg)
Cone Antenna (2S-8S, 2H-8H, 2M-8M, 2N-8N)	2.2 lbs (1.0 kg)
Process Seal Antenna (2P-4P)	4.4 lbs (2.0 kg)
Rod Antenna (1R-4R)	2.2 lbs (1.0 kg)
Process Connection (Model Code) ⁽¹⁾	Add max lbs (kg)
ANSI Flange, 2 in. 150 lbs SST (AA)	6.6 lbs (3.0 kg)
EN (DIN) Flange, DN50 PN40 SST (HB)	8.8 lbs (4.0 kg)
JIS Flange 50A 10K SST (UA)	6.6 lbs (3.0 kg)
Bracket Mounting (BR)	4.4 lbs (2.0 kg)
Thread Adapter (RA)	1.1 lbs (0.5 kg)

⁽¹⁾ 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.

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

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 Transmitters with ultra-high sensitivity for measurement of level in liquids and solids, even for the most challenging applications

Non-contacting Ultrasonic - Level Measurement

The Rosemount 3100 Series ultrasonic level transmitters provide continuous non-contacting level measurement of liquids. The range consisits 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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www.rosemount.com



Rosemount 5600 Series Radar Level **Transmitter**

- · Market leading sensitivity and unique signal processing features allow it to handle a wide range of process conditions
- High repeatability ensures an extremely reliable and accurate level transmitter, even in the toughest conditions
- Adjustable power supply, 24-240 V AC/DC, 0-60 Hz
- FOUNDATION[™] fieldbus or analog 4-20 mA superimposed with HART®
- · Interchangeable transmitter heads and antennas
- · No moving parts
- Non-contacting radar eliminates interaction with the product
- Intelligent software support for easy configuration and setup
- Extensive selection of antennas and materials







Contents

Legendary Rosemount Performance Customized For Your Level Process Applications	page 2
System Integration	page 6
Ordering Information	page 7
Specifications	age 17
Product Certifications	age 21
Dimensional Drawings	age 23



Legendary Rosemount Performance Customized For Your Level Process Applications

Introduction

The Rosemount 5600 Series is an intelligent non-contacting radar level transmitter. Its high performance microprocessor allows for advanced signal processing and smart echo-tracking features. Together with its high sensitivity the radar transmitter can detect and evaluate all echoes within the tank or vessel. The 5600 Series support and assist the user to a successful configuration of the transmitter in process level applications, from easy to complex process situations.

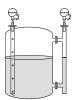
Applications

The Rosemount 5600 uses state-of-the art microwave technology to get highest reliability and precision. It measures the level of liquids, slurries, and solids. The transmitter operates in a wide range of temperatures, pressures, vapor gas mixtures, and various process conditions.

FIGURE 1. Rosemount 5600 Applications



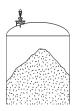
 Applications in process vessels with agitators require a radar transmitter with the 5600's high sensitivity and advanced signal processing to separate the measuring signal from noise created by disturbances.



Still-pipe or bridle mounting is recommended for LPG applications, where
the surface is sometimes boiling, and for some extremely turbulent
conditions. The pipe reduces foam and turbulence and also increases
surface reflection.



 The Rod antenna is suitable for small nozzle openings on tanks with short measuring range.

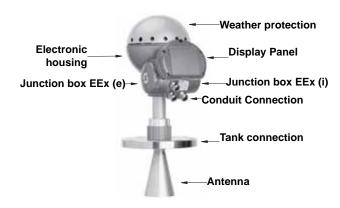


 With the parabolic antenna the 5600 Series is suitable for measurement of various types of solid materials (example: cement). Since solid materials quite often generate dusty environments inside their vessels and tanks, the parabolic antenna can be equipped with a protective PTFE cover which prevents dust from sticking to the transmitting portion of the antenna. 00813-0100-4024, Rev FB July 2010

Interchangeable Head

A 5600 Radar Level Transmitter consists of a Transmitter Head (TH) and a tank connection including antenna. The TH and the electronics inside are interchangeable without opening the tank.

FIGURE 2. Interchangeable Transmitter Head



Antennas

Rod Antenna

- Suitable for tanks with small openings.
- Existing tank flange can be used as the tank connection.

Cone Antenna

- Suitable for free-propagation and pipe mounted installation.
- Cone extensions are available (see Figure 18 on page 1-26 and Table 8 on page 13).
- Optional Cone antennas with cleaning/flushing connection are available (see Figure 18 on page 1-26 and Table 9 on page 14).

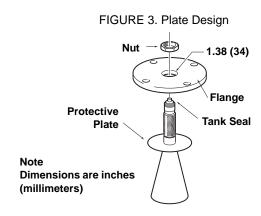
Process Seal Antenna

- The dish of the Process Seal is made of PTFE.
- Only exposes material suitable for hygienic or corrosive applications (see Figure 16 on page 1-25 and Table 6 on page 11).

Parabolic Antenna

- Suitable for solid materials (example: cement)
- Withstand heavy contamination
- Can be equipped with a PTFE protective cover to reduce the effects of dusty environments

Plate Design



Cone and Rod antennas, except the Cone with Flushing Connection, are designed with a protective plate as shown in FIGURE 3.. The plate and antenna (stainless steel 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 available (Table 13 on page 16).

Rosemount 2210 Display Unit

The Rosemount 2210 offers basic configuration using the 4 software keys on the display itself. Data presentation on the LCD can be customized and allows many viewing alternatives. The 2210 is also used if temperature sensors are to be connected to the 5600 Series. See Table 3 on page 7 for available versions.

Electrical Connections

The transmitter has a power supply with an ultra-wide input range from 24 to 240 V AC or DC, 0-60 Hz.

The Transmitter Head has two separate junction boxes. One is for a non-intrinsically safe 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 depending on required options.

Mechanical Mounting

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.

FIGURE 4. Rosemount 5600 Beamwidth

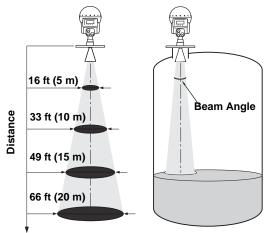
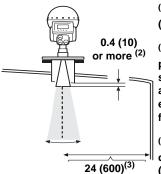


TABLE 1. Rosemount 5600 Beam Diameter and Angle

	Distance, ft (m)			
Antenna Type & Beam	16 (5)	33 (10)	49 (15)	66 (20)
Angle	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)

FIGURE 5. Preferred Mounting (1)

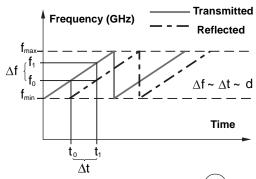


- ⁽¹⁾ Dimensions are inches (millimeters).
- (2) For best measurement performance the nozzle height should be shorter than the antenna or consider an extended cone (FIGURE 18.) for your current transmitter.
- (3) Recommended minimum distance for all antennas. (Shorter distance may apply, consult factory).

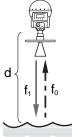
Measurement Principle

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 can be accurately calculated. This method is called FMCW (Frequency Modulated Continuous Wave) and is used in all high performance radar transmitters.

FIGURE 6. Frequency Modulated Continuous Wave



The FMCW method is based on a radar sweep with continuous changes in frequency.



00813-0100-4024, Rev FB July 2010

Measuring Range

The diagrams below show how the measuring range is influenced by the antenna type, dielectric constant of the liquid (ε_r) and the process conditions. For optimum performance the maximum measuring distance should be kept within the range indicated with darker color in the diagrams. Values are valid for free propagation measurement without still-pipes (bridles).

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).

To increase the measuring range further in turbulent tanks, a still-pipe can be used. For still-pipe mounted 5600 transmitters the typical measuring range is 115-160 ft (35-50 m) in turbulent tanks with liquids having ϵ_r less than 1.8.

The 5600 transmitter installed in a pipe can measure products with a dielectric ≥ 1.4 .

TABLE 2	TABLE 2. Categories of liquids			
а	Oil, gasoline and other hydrocarbons, petrochemicals (dielectric constant, ϵ_{r} =1.9-4.0)			
b	Alcohols, concentrated acids, organic solvents, oil/water mixtures and acetone (ε _Γ =4.0-10)			
С	Conductive liquids, e.g. water based solutions, dilute acids and alkalis (ϵ_{r} > 10)			

FIGURE 7. Applications with calm product surface⁽¹⁾

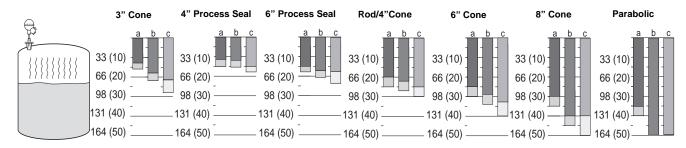


FIGURE 8. Applications where the product is gently stirred, causing minor turbulence⁽¹⁾

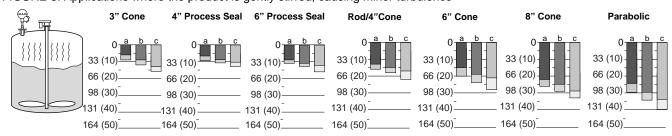
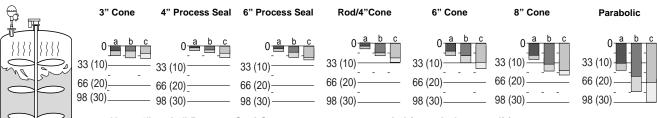


FIGURE 9. Applications with turbulent product surface conditions⁽¹⁾



Note: 4" and 6" Process Seal Cones are not recommended for turbulent conditions

⁽¹⁾ Measuring range in ft (m).

System Integration

Level values are transmitted from the transmitter as analog 4-20 mA signals superimposed with HART or FOUNDATION [™] fieldbus. The analog outputs are either passive for connection to powered cables or active providing signal power for 4-20 mA. Analog outputs can also be specified as intrinsically safe or non-intrinsically safe.

Basic configuration and setup can be done on a HART communicator, via the 2210 Display Unit, AMS, DeltaV, or any other FOUNDATION fieldbus/HART host applications (control systems).

Rosemount Radar Master is a PC based software package which allows for full configuration, including advanced features such as Spectra plots, offline/online configuration capabilities, logging, extensive online help, etcetera. To communicate with the device using Radar Master either a HART or Modbus Modem (RS485 Sensor Bus Port) is required for the PC. For fieldbus devices Radar Master can only be connected to the Sensor Bus Port (see list of Modems on page 16).



The Rosemount 5600 is a core component of the PlantWeb digital plant architecture.

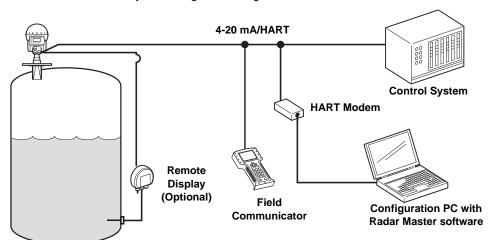
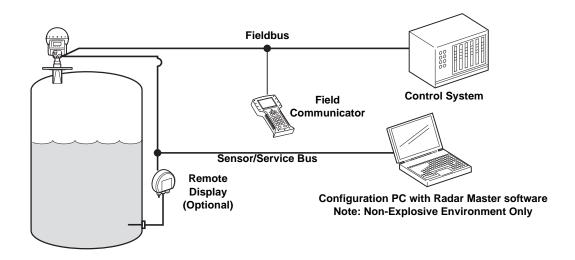


FIGURE 10. System Integration using the HART Communicator

FIGURE 11. System Integration FOUNDATION fieldbus



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 WirelessHART™ with the THUM™ adapter

Additional Information

Specifications: page 17

Product Certifications: page 21 Dimensional Drawings: page 23

TABLE 3. 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)	*
Α	All Other Markets (10 GHz)	*
Product Ce	ertification	
Standard		Standard
NA	None	*
E1	CENELEC/ATEX Flameproof	*
E5	FM Explosion-proof	*
E6	CSA Explosion-proof	*
E7	IECEx Flameproof	*
Power Sup	ply	
Standard		
Р	24-240 V DC/AC 0-60 Hz	*
Primary Ou	utput	
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	*
Expanded		
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)	*

TABLE 3. 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.

3	4-20 mA, Active Output ⁽⁵⁾	*
4	4-20 mA, Active Output, Intrinsically Safe Circuit (1)	*
Display U	Jnit	
Standard		Standard
N	None	*
Р	LOI, Factory mounted on transmitter	*
R	LOI, Remote mounted	*
Expande	d	
Т	LOI, Remote mounted with temp inputs (1-6 spot elements with common returns)	
Volume C	Calculation	
Standard		Standard
E	Basic Volume Equations (Standard)	*
Expande	d	
V	Strapping Table, up to 100 points	
Typical N	lodel 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 4, Table 5, Table 6, Table 8, and Table 9.

TABLE 4. 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		<u>'</u>		
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 Materia				
Expanded				
V	Viton® Fluoroelastomer			
K	Kalrez® 6375			
E	EPDM			
В	Buna-N			
Process Conn	ection			
Expanded				
NR	Antenna with Plate Design			
	NOTE: Customer supplied flang	e or see Table 13 on page 16 for	flange options	
XX	Special Process Connection	, , , , , , , , , , , , , , , , , , ,	Consult Factory	
	Threaded Version		, and the second	
TN	Threaded 1.5 in. NPT			
ТВ	Threaded 1.5 in. G			
Options				
Standard				Standard
Q8	Material Traceability Certification	per EN 10204 3.1.B		*
Typical Model	Number: Selected code from Ta	<u> </u>		

TABLE 5. 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	· ·	Longer Lead-time, Consult Factory	
23T		Alloy C22		
	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 materia	al	Consult Factory	
Tank Seal				
Standard				Standard
Р	PTFE			*
Q	Quartz			*
O-ring Materia	l			
Standard				Standard
V	Viton® Fluoroelastomer			*
K	Kalrez [®] 6375			*
E	EPDM			*
В	Buna-N			*
Process Conn				_ ^
Standard				Standard
	A . W. DI . D .			
NR	Antenna with Plate Design			*
	NOTE: Customer supplied flange	e or see Table 13 on page 16 fo	r tlange options	
Expanded				
XX	Special Process Connection		Consult Factory	
	Tri-clamp connection	Flange Material	Note	
ВТ	3 in. Tri-Clamp Flange	SST 316L	Longer Lead-time, Consult Factory	
СТ	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	

Product Data Sheet

00813-0100-4024, Rev FB July 2010

Rosemount 5600 Series

TABLE 5. 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 Mode	Number: Selected code from Table 3 on page 7 24S P V NR	

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				
Р	PTFE			
O-ring Materia	I			
N	Not Applicable			
Process Conn	ection			
Expanded				
NF	None, Customer to supply flange	per dimensions on FIGURE 16	5.	
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 Ta	ble 3 on page 7 34S P N JA		

TABLE 7. 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		<u>'</u>		
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
Р	PTFE			*
O-ring Materia	l			
Standard				Standard
V Viton [®] Fluoroelastomer				
Process Conn	ections			
Standard				Standard
NF	None, Flange Ready			*
Expanded				
XX	Special Process Connectio	n	Consult Factory	
Options				
Standard				Standard
Q8 Material Traceability Certification per EN 10204 3.1.B				*
Expanded				
PB	PTFE Protective Cover (PT	FE Bag) Not suitable f	or hazardous applications.	
Typical Model	Number: Selected code from	om Table 3 on page 7	45S P V NR	

TABLE 8. 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				
Р	PTFE			
Q	Quartz			
O-ring Materia	ı			
Expanded				
V	Viton [®] Fluoroelastomer			
K	Kalrez® 6375			
E	EPDM			
В	Buna-N			
Process Conn	ections			
Expanded				
NR	Antenna with Plate Design			
	NOTE: Customer supplied flange or see Table 13 on page 16 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 3 on p	page 7 76S P V NR		

TABLE 9. 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 Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Section	n® Fluoroelastomer ez® 6375 DM a-N cial Process Connection	SST 316L SST 316L SST 316L	Consult Factory Consult Factory Consult Factory	
94S 4 in. 96S 6 in. 98S 8 in. Tank Seal Expanded P PTF Q Qua O-ring Material Expanded V Vito K Kalr E EPE B Bun Process Connectior Expanded XX Spe Stai CL 4 in. DL 6 in. FL 8 in.	. (DN150) nozzles . (DN200) no	SST 316L	Consult Factory Consult Factory	
96S 6 in. 98S 8 in. Tank Seal Expanded P PTF Q Qua O-ring Material Expanded V Vito K Kalr E EPE B Bun Process Connectior Expanded XX Spe Stai CL 4 in. DL 6 in. FL 8 in.	. (DN150) nozzles . (DN200) no	SST 316L	Consult Factory Consult Factory	
98S 8 in. Tank Seal Expanded P PTF Q Qua O-ring Material Expanded V Vito K Kalr E EPE B Bun Process Connection Expanded XX Spe Stai CL 4 in. DL 6 in. FL 8 in.	n® Fluoroelastomer rez® 6375 DM a-N cial Process Connection		Consult Factory	
Tank Seal Expanded P PTF Q Qua O-ring Material Expanded V Vito K Kalr E EPE B Bun Process Connection Expanded XX Spe Stai CL 4 in. DL 6 in. FL 8 in.	n® Fluoroelastomer ez® 6375 DM a-N n	SST 316L		
Expanded P PTF Q Qua Coring Material Expanded V V Vito K Kalr E EPE B Bun Process Connection Expanded XX Spe Stai CL 4 in. DL 6 in. FL 8 in.	n® Fluoroelastomer ez® 6375 DM a-N cial Process Connection			
P PTF Q Qua O-ring Material Expanded V Vito K Kalr E EPE B Bun Process Connection Expanded XX Spe Stai CL 4 in. DL 6 in. FL 8 in.	n® Fluoroelastomer ez® 6375 DM a-N cial Process Connection			
Q Qua O-ring Material Expanded V Vito K Kalr E EPE B Bun Process Connection Expanded XX Spe Stai CL 4 in. DL 6 in. FL 8 in.	n® Fluoroelastomer ez® 6375 DM a-N cial Process Connection			
O-ring Material Expanded V Vito K Kalr E EPE B Bun Process Connection Expanded XX Spe Stai CL 4 in. DL 6 in. FL 8 in.	n® Fluoroelastomer ez® 6375 DM a-N tial Process Connection			
V Vito K Kalr E EPE B Bun Process Connection Expanded XX Spe Stai CL 4 in. DL 6 in. FL 8 in.	ez® 6375 DM a-N total Process Connection			
V Vito K Kalr E EPE B Bun Process Connection Expanded XX Spe Stai CL 4 in. DL 6 in. FL 8 in.	ez® 6375 DM a-N total Process Connection			
K Kalr E EPE B Bun Process Connection Expanded XX XX Spe Stai CL DL 6 in. FL 8 in.	ez® 6375 DM a-N total Process Connection			
E	oM a-N n cial Process Connection			
B Bun Process Connection Expanded XX Spe Stai CL 4 in. DL 6 in. FL 8 in.	a-N cial Process Connection			
Process Connection Expanded XX Spe Stai CL 4 in. DL 6 in. FL 8 in.	cial Process Connection			
Expanded XX Spe Stai CL 4 in. DL 6 in. FL 8 in.	cial Process Connection			
XX Spe Stai CL 4 in. DL 6 in. FL 8 in.			0 45	
Stai CL 4 in. DL 6 in. FL 8 in.			0 115 1	
CL 4 in. DL 6 in. FL 8 in.	inless Steel Flance Wolded		Consult Factory	
DL 6 in. FL 8 in.	Stainless Steel Flange Welded to Antenna Note ⁽¹⁾			
FL 8 in.	4 in. ANSI Class 150		Max 101 psig at 392 °F (7 bar at 200 °C)	
	6 in. ANSI Class 150		Max 145 psig at 392 °F (10 bar at 200 °C)	
JL DN1	8 in. ANSI Class 150		Max 145 psig at 392 °F (10 bar at 200 °C)	
	DN100 PN16		Max 72 psig at 392 °F (5 bar at 200 °C)	
KL DN1	DN150 PN16		Max 87 psig at 392 °F (6 bar at 200 °C)	
LL DN2	DN200 PN16		Max 87 psig at 392 °F (6 bar at 200 °C)	
CH 4 IN	4 IN. ANSI Class 150, SST, Higher Pressure		Max 145 psig at 752 °F (10 bar at 400 °C)	
DH 6 IN	-		Max 145 psig at 752 °F (10 bar at 400 °C)	
FH 8 IN	8 IN. ANSI Class 150, SST, Higher Pressure		Max 145 psig at 752 °F (10 bar at 400 °C)	
JH DN1			Max 145 psig at 752 °F (10 bar at 400 °C)	
KH DN1			Max 145 psig at 752 °F (10 bar at 400 °C)	
LH DN2	DN200 PN 16, SST< Higher Pressure Max 145 psig at 752 °F (10 bar at 400 °C)			
Options			·	
Standard				Standard
Q8 Mat	Material Traceability Certification per EN 10204 3.1.B			
Typical Model Number: Selected code from Table 3 on page 7 94S P K KL				

⁽¹⁾ Pressure and Temperature rating may be lower depending on Tank Seal selection

TABLE 10. 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
4 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 11. 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 4-20mA 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 12. 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)		
Antenna Accessories				
05600-5001-0001	PTFE Protective Cover (PTFE Bag)	For Parabolic Antenna only. Not suitable for hazardous applications.		

Rod and Cone Antenna Flanges

TABLE 13. 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 4inch 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.

00813-0100-4024, Rev FB July 2010

Specifications

GENERAL

Product Designation

5600 Series Radar Level Transmitter

Operating Principle

10GHz FMCW radar

Beam Angle

See FIGURE 4. and Table 1 on page 4

Microwave Output Power

Max 1.0 mW

Internal Calibration

Internal digital reference for automatic compensation of radar sweep

Signal Processing

Powerful and advanced digital signal processing using FFT and advanced echo handling software

MEASURING PERFORMANCE

Instrument Accuracy (Under reference conditions)

±0.2 in. (±5 mm)

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)

Resolution

0.04 in (1 mm)

Temperature Stability

 $\pm 500~\text{ppm}$ of measured distance within the ambient temperature range

Repeatability

±0.04 in (±1 mm)

Measuring Range

0-164 ft. (0-50 m) Standard

0 - 324 ft. (0 - 99 m) Optional, requires special configuration

Update Time

100 ms

Processors

32-bit Floating DSP

CONFIGURATION

HART Device

Configure the device using Rosemount Radar Master, a powerful and interactive Windows-based configuration tool, which is enclosed with each order. A HART Modem is required for the PC to communicate with the device.

Recommended PC Hardware Specification: \geq 1 GHz processor, \geq 128 MbRam, and Operating System of Windows 2000, XP, or NT

Alternative Configuration Tools:

Emerson Process Management Field Communicator, Emerson Process Management AMS software, or many of the other HART hosts that supports DD technology.

FOUNDATION[™] fieldbus Device

Configuration of a fieldbus device can be done via DeltaV, or the Field Communicator, or by hosts that support FOUNDATION™ fieldbus and DD technology.

Radar Master may also be used for 5600 fieldbus devices, but only using the Sensor Bus Port connection. See below.

Sensor Bus Port

Configuration is also available with Radar Master via the 5600 device Sensor Bus Port Connection. This port is available for both HART and Fieldbus devices. Connect the PC directly to the transmitter using a RS485 (Modbus) modem.

Note that this connection is only allowed in a Non-Explosive environment. See Figure 11 on page 1-6. A proven RS485 Modem and the part number is listed in Table 12 on page 16.

DISPLAY

Display (factory mounted on transmitter)

Protection class IP67

With weather/dirt protection cover; graphical LCD display 128 by 64 pixels with 4 control soft-keys and 7 text lines with 16 characters/line for display and configuration.

Display (remote mounted)

Same as above, mounted in separate enclosure, protection class IP67; max cable length, display - radar transmitter: 330 ft. (100 m); cable type: 4 wire shielded instrument cable, min. 0.5 mm², (AWG 20).

Display with Temperature Inputs (remote mounted)

Same as above, mounted in separate enclosure, protection class IP67; max cable length, display - radar transmitter: 330 ft (100 m); cable type: 4 wire shielded instrument cable, min. 0.5 mm², (AWG 20); temperature measurement 1-3 spot elements PT100 or CU100, or 6 spot elements with common return.

ELECTRICAL

Power Supply

Ultra wide power supply 24-240 V AC or DC 0-60 Hz

NOTE

Minimum power required at transmitter power terminals is 20 V

Power Consumption

Maximum 10 W, Nominal 5 W

Transmitter Cable Entries

3 3 ¹/₂ inch NPT; for cable glands or conduit entries

Optional: 1/2 inch NPT Cable Gland Kit

Optional: 1/2 inch NPT/ M20 Adapters (Set of 3)

Remote 2210 Display Unit Cable Entries

2x M20 Entries

1x M25 Entry

Output Cabling

Twisted and shielded pair; min. 0.5 mm² (AWG 20)

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)

Secondary Outputs:

Analog 4-20 mA current loop (Optional)

Analog Output Characteristics

Type

Analog 4-20 mA Current Loop, active (with power supplied by the 5600) or passive (for loop-supplied power)

Galvanic Isolation

> 1500 V RMS or DC

Analog Output Characteristics

See Product Certifications on page 1-21

Alarm Level

Standard: Low=3.8 mA, High=22 mA or freeze,

NAMUR NE43: High=22.50 mA,

Rosemount: Low=3.75 mA

Accuracy

±300 μA at 4 mA

±600 μA at 20mA

Resolution

0.5µA (0.003%)

Linearity

±0.01%

Temperature Drift

 \pm 28 ppm/°F (\pm 50 ppm/°C)

Output Impedance

 $>10 \ M\Omega$

Voltage Compliance

7-30 V (passive output)

External Loop Resistance

<700 Ω (passive output with 24 V external supply)

 $<300 \Omega$ (active output)

Fieldbus Output Characteristics

Fieldbus Voltage limits: 9 to 32 V

Current Draw: 12.5 mA For I.S. Applications:

 $U_{i} = 30 \text{ V}$

 $I_{i} = 300 \text{ mA}$

 $P_i = 1.3 \text{ W}$

 $C_i = 0$

 $L_i = 0$

Lift-off Minimum Voltage

9.0 V

Class

Link Master (LAS)

Number of Available VCRs

20

VCR Statistics

Yes

Execution Time

60 ms for Al-block

Instantiation

No (all blocks are instantiated per default)

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

Advanced Diagnostics

Failures

Level, Temperature and Volume measurement failure

Warnings

Empty tank, full tank, Database, Hardware, Software, and Configuration warnings

Database, Hardware, Software, and Configuration warnings

2210 Display Unit Output Characteristics

With Temperature Output

See Product Certifications on page 1-21

Without Temperature Output

See Product Certifications on page 1-21

Temperature Measurement

1-3 spot elements, PT100 or CU100, or 6 spot elements with common return. Input accuracy ±0.9°F (±0.5°C)

Temperature Measurement Output

Average temperature or individual spots (1)

MECHANICAL

Housing/Enclosure

Permanent moulded cast aluminium, chromed and powder painted

Flanges

ANSI, DIN standard,

Material: Stainless steel 316L and Stainless Steel EN 1.4404

Approximate Weights

TABLE 14.

Transmitter	Size in. (mm)	Weight lb. (kg)
5600 Transmitter	N/A	19.8 lbs. (9,0 kg)
Antenna	Size in. (mm)	Add Max Ib. (kg)
Rod Antenna		4.41 lb. (2.,0 kg)
Cone Antenna	3 in (76,2 mm)	2.20 lb. (1,0 kg)
Cone Antenna	4 in. (101,6 mm)	3.31 lb (1,5 kg.)
Cone Antenna	6 in. (152,4 mm)	4.41 lb. (2,0 kg.)
Cone Antenna	8 in. (203,2 mm)	6.61 lb. (3,0 kg.)
Process Seal Antenna	PS 4 in. (101,6 mm)	4.41 lb. (2,5 kg.)
Process Seal Antenna	PS 6 in. (152,4 mm)	5.51 lb. (2,5 kg.)
Parabolic Antenna		17.6 lb. (8,0 kg.)

Height Above Flange

15 in (400 mm)

Antenna Dimensions

Cone: See Figure 13 on page 1-24 Rod: See Figure 12 on page 1-23

Process Seal: See FIGURE 16. and Table 18 on page 25

Extended Cone: See page 26

Cone with Integrated Flushing Connection:

See page 26

- Not applicable

Parabolic: See Figure 19 on page 1-27

TABLE 15. Antenna material and o-ring selection • Applicable

	Rod Antenna	Cone Antenna	Process Seal Antenna	Extended Cone Antenna	Cone with Integrated Flushing Connection	Parabolic Antenna
Material:	1100711101110		7	7	The state of the s	7
Stainless Steel 316L	•*	•	-	•	•	•
Alloy C22	-	•	-	-	-	-
Titanium Gr1/Gr2	-	•	-	-	-	=
Tantalum	-	•	-	-	-	=
Alloy 400	-	•	-	-	-	=
PTFE	•*	-	•	-	-	-
Tank Seal:						
PTFE	-	•	-	•	•	•
Quartz	-	•	-	•	•	-
O-Rings:						
Viton [®]	•	•	-	•	•	•
Fluoroelastomer						
Kalrez [®] 6375	•	•	-	•	•	-
EPDM	•	•	-	•	•	-
Buna-N	•	•	-	•	•	=

⁽¹⁾ Individual spots not available in Foundation fieldbus

Rosemount 5600 Series

00813-0100-4024, Rev FB July 2010

ENVIRONMENTAL

Ambient Temperature

-40 to 70°C (-40 to 158°F)

LCD Readable between: -20 to 70 °C (-4 to 158 °F)

Process Temperature Range (1)

-40 to 752°F (-40 to 400°C)

Flange Temperature Range (1)

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)

Pressure Range (1)

Full vacuum to +798 psig (+55 bar), depending on antenna style

Emission Approvals

FCC: K8CPRO, K8CPROX R&TTE: E813268O-CC

Humidity

IEC 60068-2-3

Climatic Class/Corrosion Class

IEC 68-2-1, IEC 60068-2-52 test KB severity 2

Ingress Protection

IP66, IP 67, and NEMA 4

Vibration

IEC 721-3-4 class 4M4

UV Protection

ISO 4892-2

Electromagnetic Compatibility

EN61326-1: 1997 incl A1:1998 and A2:2001, Immunity 50081-2, Emission 50081-1

Lightning Protection

EN61326, EN61000-4-5, IEC801-5, level 2 kV

Power Supply Fluctuation

IEC 92 Part 504 sec. 3.5

⁽¹⁾ See FIGURE 12., FIGURE 13., FIGURE 16., FIGURE 17., FIGURE 18., and FIGURE 19. for specification of each antenna.

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

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.

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: 🖾 II (2) (1) 1/2 GD T85°C

Safety Coding: EEx de [ib] [ia] IIC T6 (-40°C \leq T_{amb} \leq +70°C)

With Non-IS Primary Output and IS Display Output

ATEX Marking: 🖾 II (1) 1/2 GD T85°C

Safety Coding: EEx de [ia] IIC T6 (-40°C \leq T_{amb} \leq +70°C)

With Non-IS Primary and/or Non-IS Secondary Outputs

ATEX Marking: 🐼 II 1/2 GD T85°C

Safety Coding: EEx de IIC T6 (-40°C \leq T_{amb} \leq +70°C))

Special Conditions for Safe Use: See first paragraph of the

Produce Certifications Chapter

Passive analog output 4-20mA,

Label identification = HART passive.

Voltage compliance 7-30V:

 $U_{i} = 30 \text{ V}$

 $I_i = 200 \text{ mA}$

 $C_i = 0$

 $L_i = 0$

 $U_0 = 0$

 $I_0 = 0$

 $U_{m} = 250 \text{ V}$

Active analog output 4-20mA,

Label identification = HART active.

Max load 300Ω :

 $U_0 = 23.1 \text{ V}$

 $I_0 = 125.7 \text{ mA}$

 $P_0 = 0.726 \text{ W}$

 C_{ext} =0.14 μF

 $L_{ext} = 2.2 \text{ mH}$

 $C_i = 0$

 $L_i = 0$

FOUNDATION Fieldbus,

Label identification = FOUNDATION fieldbus.

 $U_{i} = 30 \text{ V}$

 $I_i = 300 \text{ mA}$

P_i = 1.3 W

 $C_i = 0$

 $L_i = 0$

2210 Display Unit

Certificate Number: Sira 00ATEX2062

Without Temperature Inputs

ATEX Marking: 🐼 II 2 G

Safety Coding: EEx ib IIC T4 (-40°C ≤ T_{amb} ≤+70°C)

With Temperature Inputs

ATEX Marking: (2) II 2 (1) G

Safety Coding: EEx ib [ia] IIC T4 (-40°C ≤ T_{amb} ≤+70°C)

Rosemount 5600 Series

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 \leq T_{amb} \leq +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 $^{\circ}\mathrm{C}$

 $(-40^{\circ}C \le T_{amb} \le +70^{\circ}C)$

With Non-IS Primary Output and IS Display Output

Safety Coding: Ex de [ia] IIC T6 tD A20 IP65 T85 °C

 $(-40^{\circ}C \le T_{amb} \le +70^{\circ}C)$

With Non-IS Primary and/or Non-IS Secondary Outputs

Safety Coding: Ex de IIC T6 tD A20 IP65 T85 °C

 $(-40^{\circ}C \le T_{amb} \le +70^{\circ}C)$

Passive analog output 4-20mA,

Label identification = HART® passive.

Voltage compliance 7-30V:

 $U_{i} = 30 \text{ V}$

 $I_i = 200 \text{ mA}$

 $C_i = 0$

 $L_i = 0$

 $U_0 = 0$

 $I_0 = 0$

 $U_m = 250 \text{ V rms}$

Active analog output 4-20mA,

Label identification = HART® active.

Max load 300Ω :

 $U_0 = 23.1 \text{ V}$

 $I_0 = 125.7 \text{ mA}$

 $P_0 = 0.726 \text{ W}$

 $C_0 = 0.14 \,\mu\text{F}$

 $L_0 = 2.2 \text{ mH}$

 $C_i = 0$

 $L_i = 0$

FOUNDATION[™] Fieldbus.

Label identification = FOUNDATION[™] fieldbus.

 $U_i = 30 \text{ V}$

 $I_{i} = 300 \text{ mA}$

 $P_i = 1.3 \text{ W}$

 $C_i = 0$ $L_i = 0$

Conditions of Certification: See first paragraph of the

Produce Certifications Chapter

2210 Display Unit

Certificate Number: IECEx SIR 05.0021

Without Temperature Inputs

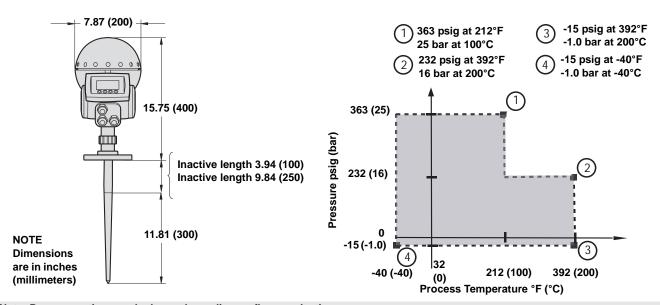
Safety Coding: Ex ib IIC T4 (-40°C \leq T_{amb} \leq +70°C)

With Temperature Inputs

Safety Coding: Ex ib [ia] IIC T4 (-40°C \leq T_{amb} \leq +70°C)

Dimensional Drawings

FIGURE 12. Rod Antenna Dimensions

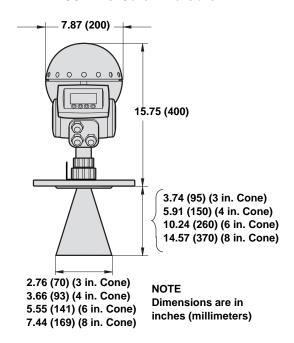


Note: Pressure rating may be lower depending on flange selection.

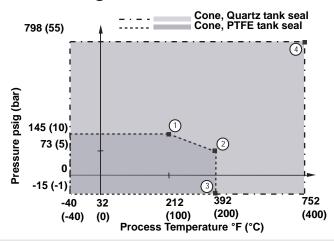
Minimum / maximum flange temperature rating depends on O-ring selection (See Table 17 and page 24).

Rosemount 5600 Series

FIGURE 13. Cone Dimensions



- 1 145 psig at 212°F / 10 bar at 100°C
- (2) 73 psig at 392°F / 5 bar at 200°C
- (3) -15 psig at 392°F / -1.0 bar at 200°C
- (4) 798 psig at 752°F / 55 bar at 400°C



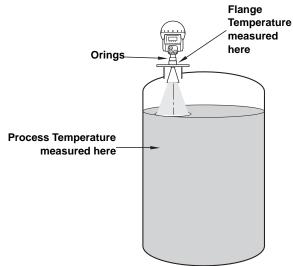
Note: Pressure rating may be lower depending on flange selection.

Minimum / maximum flange temperature rating depends on O-ring selection (See Table 17 and FIGURE 14.).

TABLE 17. 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)

FIGURE 14. Temperature Rating Considerations

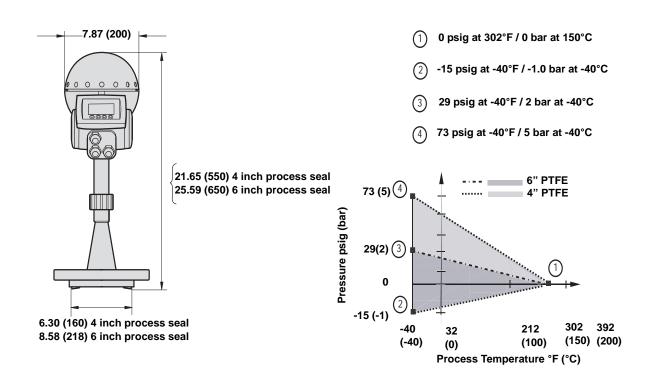


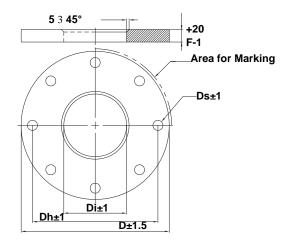
Note

Flange temperature depends on mounting conditions, such as nozzle position, distance to max product level, nozzle height, presence of insulation, etc.

FIGURE 15.

FIGURE 16. Process Seal Antenna Dimensions



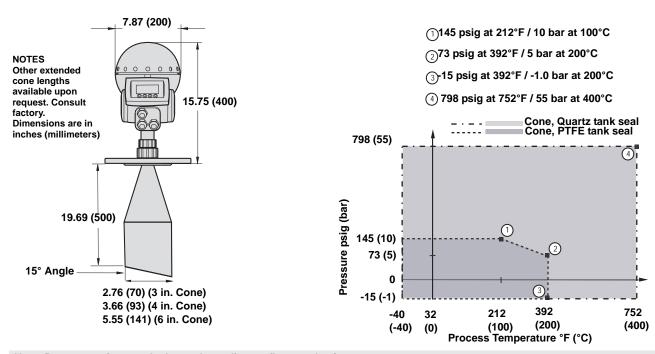


Note Dimensions are in inches (millimeters)

TABLE 18. Dimensions for Stainless Steel Flange and Galvanized Carbon Steel Dimensions 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)	0.87 (22)
ANSI 6 inch Class 150	4.94 (125.5)	10.98 (279)	9.49 (241)	0.87 (22)	0.87 (22)
DN100 PN16	3.78 (96)	8.66 (220)	7.09 (180)	0.71 (18)	0.87 (22)
DN150 PN16	4.94 (125.5)	11.22 (285)	9.45 (240)	0.87 (22)	0.87 (22)

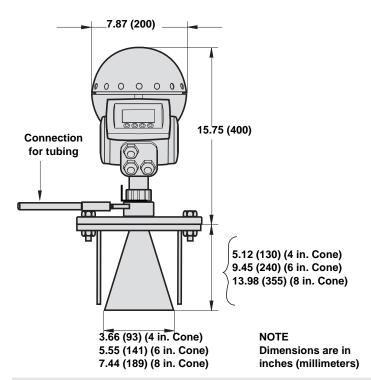
FIGURE 17. Extended Cone Antenna Dimensions



Note: Pressure rating may be lower depending on flange selection.

Minimum / maximum flange temperature rating depends on O-ring selection (See Table 17 and page 24).

FIGURE 18. Cone Antenna with Integrated Flushing Connection Dimensions



Maximum:

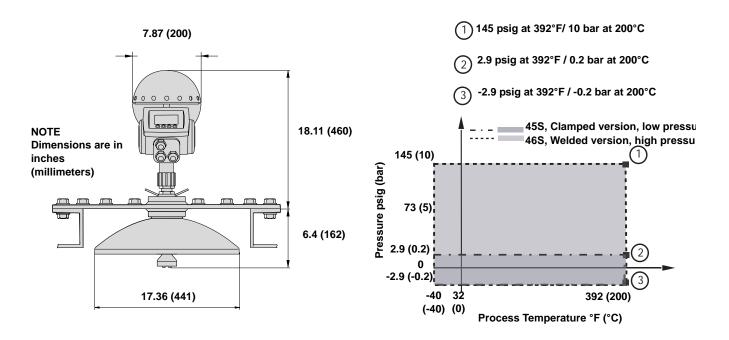
145 psig at 392 °F (10 bar at 200 °C) or up to 145 psig at 752 °F (10 bar at 400 °C). See Table 9 on page 14 for more information.

Maximum pressure and temperature depends on flange and tank seal selection.

Note: Pressure rating may be lower depending on flange selection.

Minimum / maximum flange temperature rating depends on O-ring selection (See Table 17 and page 24).

FIGURE 19. Parabolic Antenna Dimensions



00813-0100-4024, Rev FB July 2010

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July 2010

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





Contents

Rosemount 3101 Level Transmitter	page 2
Rosemount 3102 Level Transmitter	page 3
Rosemount 3105 Level Transmitter	page 4
Specifications	page 6
Product Certifications	page 9
Dimensional Drawings	page 11





Rosemount 3101 Level Transmitter



3101 Level Transmitter

Rosemount 3101 capabilities include:

- 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 5
Specifications: page 6
Certifications: page 9
Dimensions: page 11

TABLE 1. 3101 Ordering Information

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 Threads	
Standard	Standard
1 ½ –14 NPT	*
2 M20 x 1.5 adaptor	*
Wet-side Material	
Standard	Standard
F PVDF	*
Process Connection	
Standard	Standard
RC ⁽¹⁾ 2-in. NPT thread	*
SC ⁽²⁾ 2-in. BSPT thread	*
Certificates	
Standard	Standard
NA No certification	*
G5 FM Ordinary Location	*
G6 CSA Ordinary Location	*
Tag Plate Options	
Standard	Standard
ST 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. 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.

Rosemount 3102 Level Transmitter



3102 Level Transmitter

Rosemount 3102 capabilities include:

- 39 ft. (11 m) operating range
- 4–20mA output, HART
- 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 5
Specifications: page 6
Certifications: page 9
Dimensions: page 11

TABLE 2. 3102 Ordering Information

Model	Product Description	
3102	Ultrasonic level transmitter with 2 integral relays, 1 to 36 ft. (0,3 to 11 m) range	
Signal Ou	tput	
Standard		Standard
Н	4–20 mA with HART communication	*
Housing I	Material	
Standard		Standard
Α	Polyurethane-covered Aluminum	*
Conduit /	Cable Threads	
Standard		Standard
1	½ –14 NPT	*
2	M20 x 1.5 adaptor	*
Wet-side	Material	
Standard		Standard
F	PVDF	*
Process (Connection	
Standard		Standard
RC ⁽¹⁾	2-in. NPT thread	*
SC ⁽²⁾	2-in. BSPT thread	*
Certificate	es	
Standard		Standard
NA	No certification	*
G5	FM Ordinary Location	*
G6	CSA Ordinary Location	*
Special A	larm 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	*
Tag Plate	Options	
Standard		Standard
ST	Stainless Steel engraved tag plate	*
WT	Laminated paper tag plate	*
Typical M	odel 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) See "Electrical" on page 6 for more information about the saturation levels and alarm signal indication.

Rosemount 3105 Level Transmitter



3102 Level Transmitter

Rosemount 3105 capabilities include:

- 39 ft. (11 m) operating range
- 4-20mA output, HART
- · 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 5
Specifications: page 6
Certifications: page 9
Dimensions: page 11

TABLE 3. 3105 Ordering Information

Model	Product Description	
3105	Ultrasonic level transmitter for hazardous areas, 1 to 36 ft. (0,3 to 11 m) range	
Signal Ou	put	
Standard		Standard
Н	H 4–20 mA with HART communication	
Housing N	laterial and the second	
Standard		Standard
Α	Polyurethane-covered Aluminum	*
Conduit /	Cable Threads	
Standard		Standard
1	½ –14 NPT	*
2	M20 x 1.5 adaptor	*
Wet-side I	Material Material	
Standard		Standard
F	PVDF	*
Process C	onnection	
Standard		Standard
RC ⁽¹⁾	2-in. NPT thread	*
SC ⁽²⁾	2-in. BSPT thread	*
Certificate	s	
Standard		Standard
l1	ATEX Intrinsically Safe	*
15	FM Intrinsically Safe and Non-Incendive	*
16	CSA Intrinsically Safe and Non-Incendive	*
17	IECEx Intrinsically Safe	*
Special Al	arm Options ⁽³⁾⁽⁴⁾	
Standard	·	Standard
C4	Namur NE43 current levels, high alarm	*
C5	Namur NE43 current levels, low alarm	*
C8	Standard current levels, low alarm	*
Tag Plate	Options	
Standard		Standard
ST	Stainless Steel engraved tag plate	*
WT	Laminated paper tag plate	*
Typical Mo	odel 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. 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 6 for more information about the saturation levels and alarm signal indication.

Rosemount 3100 Series

Spare Parts and Accessories

TABLE 4. Spare Parts and Accessories

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)	*
03100-0001-0002	¹ /2-14 NPT to M20 x 1.5 Conduit Adaptor (Pack of two)	*

⁽¹⁾ See "Dimensional Drawings" on page 11.

00813-0100-4840, Rev. BA July 2010

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	Rosemount 3101: ± 0.2 in. (5 mm) for < 3.3 ft. (1 m),
Under Reference Conditions ⁽¹⁾	\pm 0.5% of measured distance for > 3.3 ft. (1 m)
	The 3102 and The 3105: \pm 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: I, m ³ , gal, ft ³ , or none For Flow: I/s, I/m, m ³ /hr, gal/s, gal/m, ft ³ /m (cfm), ft ³ /hr, or none
Outrout Variables	Rosemount 3101: Level. or distance-to-surface
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 Rosemount AMS [™] Suite
Electrical	Rosemount AWS Suite
	Loop powered (two wire)
Power Supply	Loop-powered (two-wire) Rosemount 3101: 12 to 30 Vdc
	Rosemount 3102: 12 to 40 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
Signal On Alarm	Rosemount 3105: Analog 4–20 mA, HART Standard: Low = 3.75 mA. High = 21.75 mA
Signal On Alaim	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
Relay Output (Rosemount 3102)	Two integral signal relays, SPST rated 1A @ 30 Vdc (inductive) and 2A @ 30 Vdc (resistive)
Electrical Parameters	$U_i = 30 \text{ V}, I_i = 120 \text{ mA}, P_i = 0.82 \text{ W}, L_i = 108 \mu H, C_i = 0 \text{ nF}$
Cable Entry	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

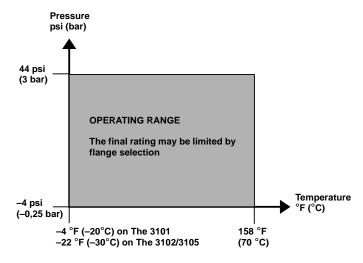
Rosemount 3100 Series

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)

Temperature: 68 °F (20 °C), Pressure: 1013 mbar (atmospheric pressure), and Relative Humidity: 50%.
 See page 5 for optional accessories.
 See page 9 onwards for approval temperature ranges.

Temperature and Pressure Ratings

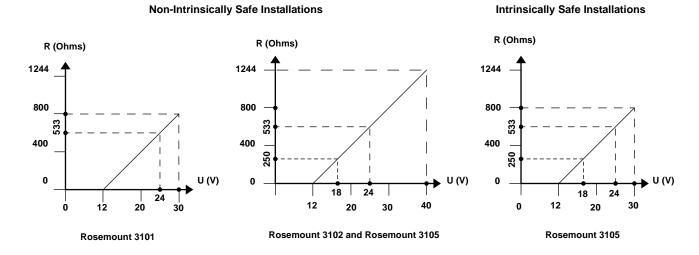
The process temperature/pressure rating depends on the design of the transmitter in combination with the flange materials.



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:



NOTE

R = Maximum Load Resistance U = External Power Supply Voltage

8

Product Certifications

ORDINARY LOCATION CERTIFICATION FOR FM (ROSEMOUNT 3101 AND 3102)

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)

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:

 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)

3100 Series is outside the scope of 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)

Factory Mutual (FM) Approvals

Factory Mutual (FM) Intrinsically Safe Approval

I5 Project ID: 3024095

Intrinsically Safe for Class I, Div. 1, Groups A, B, C and D Intrinsically Safe for Class I, Zone 0, AEx ia IIC Temperature Code: T4 at 60 °C, max ambient Temperature Code: T6 at 55 °C, max ambient

Control Drawing: 71097/1216 Ui = 30 V, Ii = 120 mA, Pi = 0.82 W, Li = 108 $\mu H,$ Ci = 0 μF

Factory Mutual (FM) Non-Incendive Approval

I5 Project ID: 3024095

Non-Incendive for Class I, Div. 2, Groups A, B, C and D Non-Incendive for Class I, Zone 2, AEx nA IIC Temperature Code: T4 at 60 °C, max ambient Temperature Code: T6 at 55 °C, max ambient

Control Drawing: 71097/1216 Ui = 30 V, Ii = 120 mA, Pi = 0.82 W, Li = 108 μ H, Ci = 0 μ F

Canadian Standards Association (CSA) Approvals

Canadian Standards Association (CSA) Intrinsically Safe Approval

I6 Project ID: 07 CSA 1878089

Intrinsically Safe for Class I, Div. 1, Groups A, B, C, and D Intrinsically Safe for Class 1, Zone 0, Ex ia IIC

Temperature Code:

T4 (T_{amb} –40 to 60 °C)

T6 (T_{amb} –40 to 55 °C)

Control Drawing: 71097/1218

Ui = 30 V, li = 120 mA, Pi = 0.82 W, Li = 108 μ H, Ci = 0 μ F

Canadian Standards Association (CSA) Non-Incendive Approval

I6 Project ID: 07 CSA 1878089

Non-Incendive for Class I, Div. 2, Groups A, B, C, and D

Non-Incendive for Class I, Zone 2, Ex nL IIC

Temperature Code:

T4 (T_{amb} –40 to 60 °C)

T6 (T_{amb} -40 to 55 °C)

Control Drawing: 71097/1218

Ui = 30 V, Ii = 120 mA, Pi = 0.82 W, Li = 108 $\mu H,$ Ci = 0 μF

00813-0100-4840, Rev. BA July 2010

ATEX Intrinsically Safe Approval

I1 Certificate: Sira 06ATEX2260X
Intrinsically Safe for II 1 G, Ex ia IIC T4/T6 Ga
Temperature Class:
T4 (T_{amb} -40 to 60 °C)
T6 (T_{amb} -40 to 55 °C)

Ui = 30 V, Ii = 120 mA, Pi = 0.82 W, Li = 108 μ H, Ci = 0 μ F

Special conditions for safe use:

- 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.
- All transmitter models shall only be cleaned with a damp cloth.
- 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

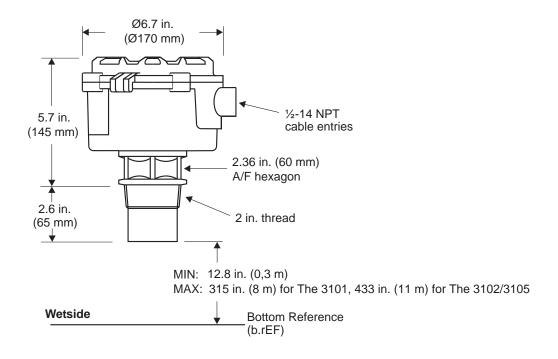
I7 Certificate: IECEx SIR 06.0068X
Intrinsically Safe for Zone 0, Ex ia IIC
Temperature Class:
T4 (T_{amb} -40 to 60 °C)
T6 (T_{amb} -40 to 55 °C)
Ui = 30 V, Ii = 120 mA, Pi = 0.82 W, Li = 108 μH, Ci = 0 μF

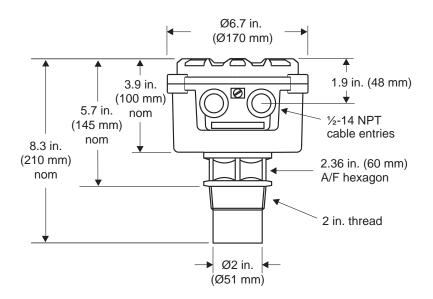
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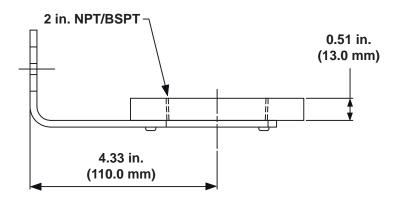
Dimensional Drawings

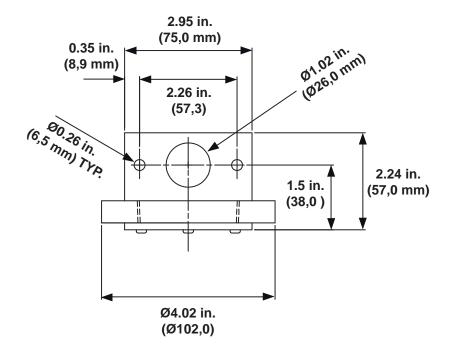
Threaded Mounting





2-in. NPT/BSPT Bracket Kits





Product Data Sheet

00813-0100-4840, Rev. BA July 2010

Rosemount 3100 Series

00813-0100-4840, Rev. BA July 2010

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 WirelessHART[™] Vibrating Fork Liquid Level Switch

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- Rosemount 3105 Intrinsically safe certified version for hazardous areas

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Service Support Hotline: +65 6770 8711 Email: Enquiries@AP.EmersonProcess.com



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











Contents

Rosemount 3107 Level Transmitter	page 2
Rosemount 3108 Flow Transmitter	page 3
Specifications	page 5
Product Certifications	page 7
Dimensional Drawings	page 8





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 5 Certifications: page 7 Dimensions: page 8

TABLE 1. 3107 Ordering Information

	idea offering is subject to additional delivery lead time.	
Model	Product Description	
3107	Ultrasonic level transmitter, 39 ft. (12 m) range	
Signal Out	put	
Standard		Standard
Н	4–20 mA with HART communication	*
Housing N	aterial	
Standard		Standard
Р	UVPC	*
Cable Len	gths	
Standard		Standard
1	10 ft. (3 m)	*
2	65 ft. (20 m)	*
3	164 ft. (50 m)	*
Wet-side N	laterial	
Standard		Standard
Р	UVPC	*
Process C	onnection	
Standard		Standard
N1 ⁽¹⁾	1-in. NPT thread	*
G1 ⁽²⁾	1-in. BSPP thread	*
Certificate		
Standard		Standard
l1	ATEX Intrinsically Safe	*
15	FM Intrinsically Safe	*
16	CSA Intrinsically Safe	*
17	IECEx Intrinsically Safe	*
Special Al	arm Options ⁽³⁾⁽⁴⁾	
Standard		Standard
C4	Namur NE43 alarm and saturation levels, high alarm	*
C5	Namur NE43 alarm and saturation levels, low alarm	*
C8	· ·	
Special Ce	rtification Option	
Standard	•	Standard
Q4	Certificate of functional test	*
Typical Mo	del 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 5 for more information about the saturation levels and alarm signal indication.

Rosemount 3108 Flow Transmitter





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 5 Certifications: page 7 Dimensions: page 8

3108 Flow Transmitter With Conduit Adaptor

TABLE 2. 3108 Ordering Information

Model	Product Description		
3108	Ultrasonic Open Channel Flow Transmitter with remote temperature sensor, 11 ft. (3,3 m) range		
Signal Out	put		
Standard		Standard	
Н	4–20 mA with HART communication	*	
Housing M	aterial		
Standard		Standard	
Р	UVPC	*	
Cable Leng	yths		
Standard		Standard	
2	65 ft. (20 m)	*	
Wet-side M	laterial attention of the state		
Standard		Standard	
Р	UVPC	*	
Process Co	onnection		
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	*	
15	FM Intrinsically Safe	*	
16	CSA Intrinsically Safe	*	
17	IECEx Intrinsically Safe	*	
Special Ala	rm 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 Ce	rtification Option		
Standard		Standard	
Q4	Certificate of functional test	*	
Typical Mo	del 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 5 for more information about the saturation levels and alarm signal indication.

Rosemount 3107 and 3108

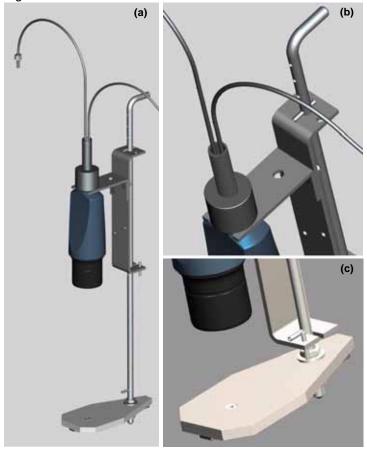
Spare Parts and Accessories

TABLE 3. 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 Access	ories	
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.

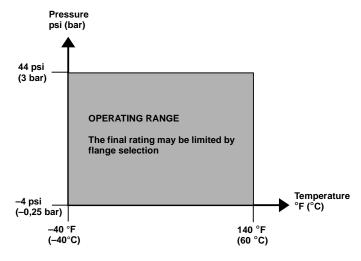
Specifications

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, li = 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 4 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.

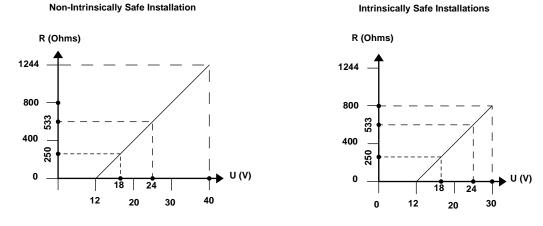


Process Temperature And Pressure Diagram For Rosemount 3107 and 3108

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:



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.

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 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 IIC

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

16 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 μ H IP66, IP68

Rest Of The World Certifications

IECEx Approval

I7 Certificate Number: IECEx SIR 09.0124X

IECEx Intrinsic Safety

Ex ia IIC Ga

T6 ($T_a = -40 \text{ to } 55 \text{ °C}$), T4 ($T_a = -40 \text{ to } 60 \text{ °C}$)

Ui = 30 V, Ii = 120 mA, Pi = 0,82 W, Ci = 5 nF, Li = 27 μH

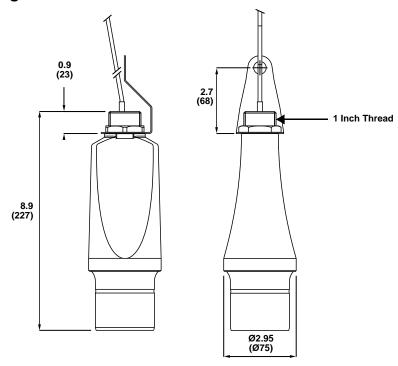
IP66, IP68

00813-0200-4840, Rev AA July 2010

Dimensional Drawings

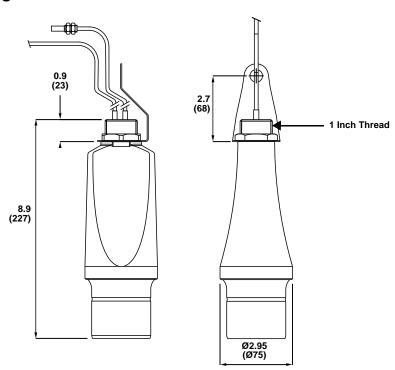
3107 Threaded Mounting

Note: Dimensions are in inches (mm)



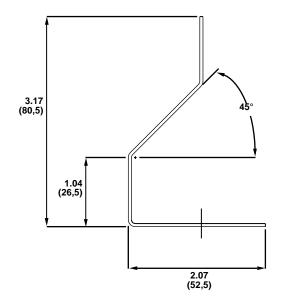
3108 Threaded Mounting

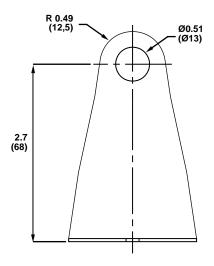
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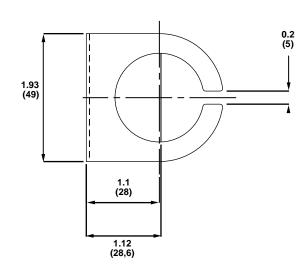


1-inch NPT/BSPP Bracket Kits

Note: Dimensions are in inches (mm)









00813-0200-4840, Rev AA July 2010

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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 2
Specifications	page 3
Dimensional Drawings	h anen



July 2010

MSL600 Control Unit and Transducer



- · System includes a bridge mounted control unit and ultrasonic transducer
- · Easy installation using a handrail mounting bracket
- · Transducer self-cleaning facility
- Optional integral radio telemetry link (not available in USA or Canada)

Additional Information

Specifications: page 3 Dimensions: page 4

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	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. 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	
MSL600 ⁽¹⁾	Controller with integral air clean compressor	
Radio Modu	Radio Module, 115/230 Vac, Bracket/Wall Mount (2)	
Standard		Standard
Z0	No radio module fitted	*
Z2	458 MHz for UK	
Z1	433 MHz for Europe	
Z4	472 MHZ for Australia / Asia / China	
Expanded		
S	Other countries frequencies on request	
Typical Model Number: MSL600 / Z1		

⁽¹⁾ When ordering the MSL600, state clearly the country in which the unit will operate.

TABLE 3. Spares Parts and Accessories

Spares Parts and Accessories		
Standard		Standard
MSL601/Z1	Remote mount unit with integral radio link, 433MHz for Europe	*
MSL601/Z2	Remote mount unit with integral radio link, 458 MHz for UK	*
MSL601/Z4	Remote mount unit with integral radio link, 472 MHZ for Australia / Asia / China	
Expanded		
MSL601/S	Remote mount unit with integral radio link, 433MHz for Europe	
Typical Model Number: MSL601 / Z1		

⁽²⁾ If remote transmission of data is required, the accessory MSL601 must be ordered as well (but this is not available in USA or Canada).

IP261, Rev CA July 2010

Specifications

CONTROL UNIT AND SENSOR

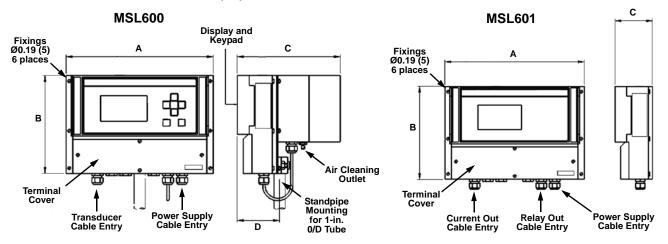
General		
Product	Wall or Bracket Mounted MSL600 Control Unit	
Measurements		
Range	23 ft. (7 m) maximum	
Deadband	1ft. (0.3 m) minimum	
Accuracy	±1.4 in. (±35 mm)	
Resolution	1 in. (25 mm)	
Functional		
Outputs (MSL600/MSL601)	2 x programmable relays SPDT, 1 x fault relay SPDT, and 0/4–20mA isolated	
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	

IP261, Rev CA July 2010

Dimensional Drawings

CONTROLLERS

Note: See Table 4 for Dimensions A to D 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)

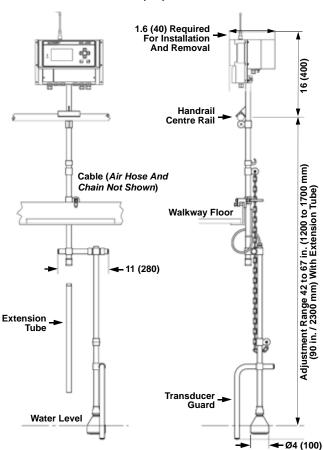


TABLE 4. Dimensions A to D For Controllers

Controller	Α	В	С	D
MSL600	14 (355)	9.3 (237)	9.75 (248)	4 (102)
MSL601	14 (355)	9.3 (237)	3.75 (95)	N/A

Product Data Sheet

IP261, Rev CA July 2010

MSL600

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 WirelessHART™
- 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
- 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 8200 Market Boulevard Chanhassen, MN 55317 USA T (U.S.) 1-800-999-9307 T (International) (952) 906-8888 F (952) 949-7001

Americas:



IP257, Rev CA July 2010

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 2
Specifications	. page 3
Dimensional Drawings	hane 1



July 2010

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 3 Dimensions: page 4

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	MSM400 Control unit, ATEX intrinsically safe certified, IP65	
Typical Mod	el Number: MSM400	

TABLE 2. MSM400 Sensors Ordering Information

Model	Product Description	
Standard		Standard
MSM433	Tank mount	*
MSM448	Pipe mount	*
Approval		
Standard		Standard
Α	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	e	
Standard		Standard
V	Spray valve (pipe section only)	*
Р	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 Mo	del 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	3/4-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

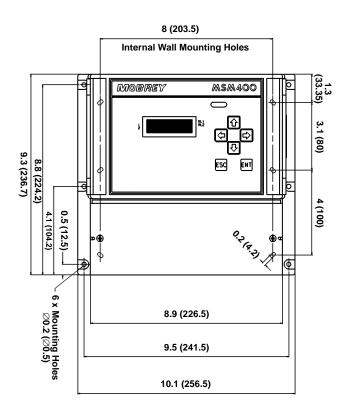
MSM448 SENSOR

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

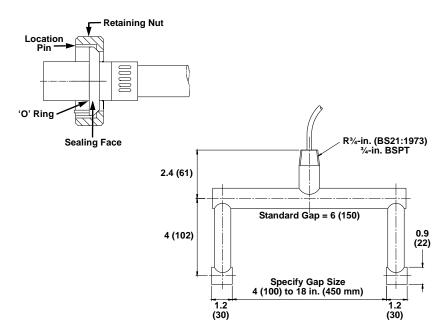
CONTROL UNIT

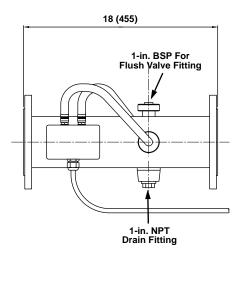
Note: Dimensions are in inches (mm)



SENSORS

Note: Dimensions are in inches (mm)





Product Data Sheet

IP257, Rev CA July 2010

MSM400

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:

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- Rosemount 2120 Full-featured
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- Rosemount 3300 Series Versatile and easy-to-use transmitter in most liquid storage and monitoring applications

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- 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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00813-0100-4160, Rev BA July 2010

Rosemount 2160 WirelessHART[™] Vibrating Fork Liquid Level Switch

- World's First WirelessHART™ liquid level switch for reliable point level detection
- WirelessHART[™] 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

Rosemount 2160 WirelessHART Vibrating Fork Liquid Level Switch	. page 2
Specification	. page 5
Product Certifications	. page 7
Dimensional Drawings	. page 9





Rosemount 2160 WirelessHART Vibrating Fork Liquid Level Switch

2160***S 2160***E

2160 Wireless Level Switches

Rosemount 2160 capabilities include:

- World's first WirelessHART liquid level switch for reliable point level detection
- WirelessHART 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 4
Specifications: page 5
Certifications: page 7
Dimensions: page 9

TABLE 1. 2160 Ordering Information

Model	Product Description / Process Temperature	
2160	WirelessHART™ Vibrating Fork Liquid Level Switch	
Output		
Standard		Standard
Χ	Wireless	*
Housing I	Material	
Standard		Standard
D	Dual Compartment Housing - Aluminum (Aluminium)	*
Conduit E	Entry / Cable Threads	
Standard		Standard
8	¹ / ₂ -in. NPT thread	*
Operating	g Temperature	
Standard		Standard
S	Standard: -40 °F (-40 °C)302 °F (150 °C)	*
Е	Extreme: -94 °F (-70 °C)500 °F (260 °C)	*
Material o	of Construction: Process Connection / Fork	
Standard		Standard
S ⁽¹⁾	316/316L Stainless Steel (1.4401/1.4404) dual certified	*
Expanded	d	
H ⁽²⁾	Alloy C (UNS N10002), Alloy C-276 (UNS N10276), solid	
	Connection Size	
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)	*
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	

00813-0100-4160, Rev BA July 2010

TABLE 1. 2160 Ordering Information

The Expa	anded offering is subject to additional delivery lead time.	
Process	Connection Rating	
Standard	i	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	*
Expande	ed .	
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	*
В	BSPT (R) thread	*
G	BSPP (G) thread	*
N	NPT thread	*
P	BSPP (G) O-ring	*
С	Tri-Clover Clamp	*
Expande	1	
X ⁽³⁾	Customer specific	
Fork Ler	·	
Standard	•	Standard
A	Standard length 1.7 in. (44 mm)	*
H ⁽⁴⁾	Standard length flange 4.0 in. (102 mm)	*
0000	Factory default length (only if fork length A or H is selected)	**
E ⁽⁵⁾	Extended, customer specified length in tenths of Inches	*
M ⁽⁵⁾	Extended, customer specified length in millimeters	*
xxxx ⁽⁵⁾	Specific customer specified length in tenths of inches, or millimeters (only if fork length E or M is selected)	
	Finish (Wetted Parts)	
Standard	· · · ·	Standard
1	Standard surface finish	*
2	Hand polished (Ra < 0.4 µm)	*
Approva		
Standard		Standard
NA	No hazardous locations certifications	<u> </u>
I1	ATEX Intrinsic Safety	*
15	FM Intrinsic Safety and Non-Incendive	
16 ⁽⁶⁾	CSA Intrinsic Safety	*
17	IECEx Intrinsic Safety	*
	S Update Rate, Operating Frequency and Protocol	^
Standard		Standard
WA3	User configurable update rate, 2.4 GHz DSSS, WirelessHART	→ Standard
	ectional Wireless Antenna and SmartPower	^
Standard		Standard
WK1	Long range, integral antenna, power module adapter, intrinsically safe (Power module separate)	→ Standard
	Long range, integral antenna, power module adapter, intrinsically sale (Power module separate)	^
Meter	1	Standard
Standard		
M5	LCD meter	*
	Configuration Option	Ctondord
Standard		Standard
C1	Factory configure Date, Descriptor, Message Fields and Wireless Parameters	*

Rosemount 2160

TABLE 1. 2160 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.

Calibra	tion Data Certification	
Standa	rd	Standard
Q4	Certificate of functional test	*
Materia	al Traceability Certification Option	
Standard		Standard
Q8	Q8 Material traceability certification per EN 10204 3.1B	
Special	I Procedures Option	
Standa	rd	Standard
P1 ⁽⁷⁾	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 5 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************************** 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) 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 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
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	*
02120-2000-0001 ⁽¹⁾	Adjustable clamp gland for 1-in. extended lengths. Material: 316 St. steel, (Si) Silicone rubber seal	*
02120-2000-0002 ⁽¹⁾	Adjustable clamp gland for 1-in. extended lengths. Material: 316 St. steel, (Si) Silicone rubber seal	*

(1) The adjustable clamp gland is not explosion-proof.

00813-0100-4160, Rev BA July 2010

Specification

Physical

Product

The Rosemount 2160 WirelessHART[™] 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: Buna-N

Terminal Block and Power Module Pack

PBT

Antenna

PBT/PC integrated omnidirectional antenna

Connections

See "2160 Ordering Information" on page 2.

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 9.

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.

HART 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

WirelessHART 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).

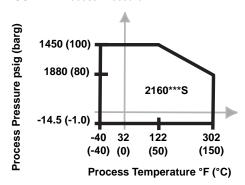
Rosemount 2160

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



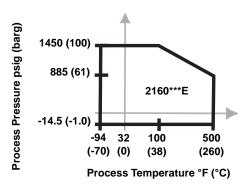


TABLE 4. Maximum Flange Pressure Rating

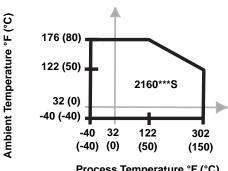
Flange Standard	SST Flanges ⁽¹⁾
ASME B16.5 Class 150	275 psig ⁽²⁾
ASME B16.5 Class 300	720 psig ⁽²⁾
ASME B16.5 Class 600	1440 psig ⁽²⁾
EN1092-1 PN 10/16	9.84/15.75 bar g ⁽³⁾
EN1092-1 PN 25/40	24.6/39.4 bar g ⁽³⁾
EN1092-1 PN 63	62 bar g ⁽³⁾
EN1092-1 PN 100	98.4 bar g ⁽³⁾

- (1) ASTM stainless steel.
- At 100 °F (38 °C), the pressure rating decreases with an increasing process temperature.
- At 248 °F (120 °C), the pressure rating decreases with an increasing process temperature.

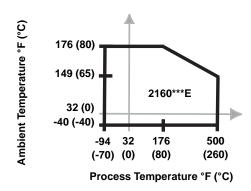
Temperature

See Figure 2 for the maximum and minimum operating temperatures.

FIGURE 2. Temperature



Process Temperature °F (°C)



Liquid Density Range

Minimum liquid density is 31.2 lb/ft³ (500 kg/m³).

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 (264V max), Pollution degree 2, Category III (150V 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 7.9 in. (20 cm) from all persons.

FCC ID: LW2RM2510 IC ID: 2731A-RM2510

Canadian Registration Number

CRN 0F04227.2

NOTE

The requirements of CRN are met when a Rosemount 2160 CSA-approved vibrating fork level switch model 2160****S***************** 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/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 ($T_{amb} = -50 \text{ to } 70 \text{ °C}$)

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

Intrinsically Safe and Non-incendive when installed in accordance with Rosemount drawing 71097/1273.

For use with Rosemount SmartPower® options

P/N 753-9220-0001 only.

Enclosure Type 4X / IP66

Canadian Standards Association (CSA) Approval

16 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.

00813-0100-4160, Rev BA July 2010

European Certifications

ATEX Approval

I1 ATEX Intrinsic Safety

Certificate Number: Baseefa 09ATEX0253X II 1 G, Ex ia IIC T5-T2 ($T_a = -40$ to 70 °C)

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 Certifications

IECEx Approval

17 IECEx Intrinsic Safety

Certificate Number: IECEx BAS 09.0123X Ex ia IIC T5-T2 (Ta = -40 to 70 °C) IP66

For use with Rosemount SmartPower options P/N 753-9220-0001 only.

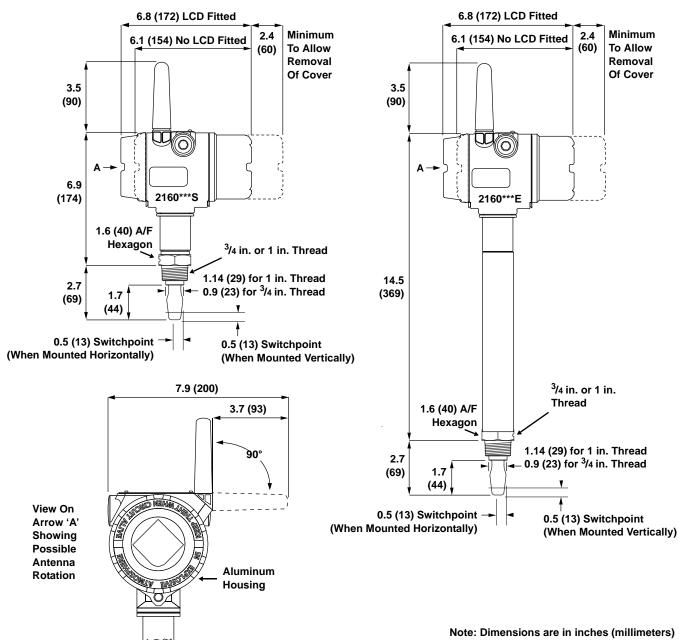
Special conditions for safe use:

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.

Dimensional Drawings

2160 Thread Mounting (Standard Length)	page 9
2160 Thread Mounting (Extended Length)	page 10
2160 Flange Mounting (Standard Length)	page 11
2160 Flange Mounting (Extended Length)	page 12
2160 Hygienic Fitting (Standard Length)	page 13
2160 Hygienic Fitting (Extended Length)	page 15

2160 Thread Mounting (Standard Length)



2160 Thread Mounting (Extended Length)

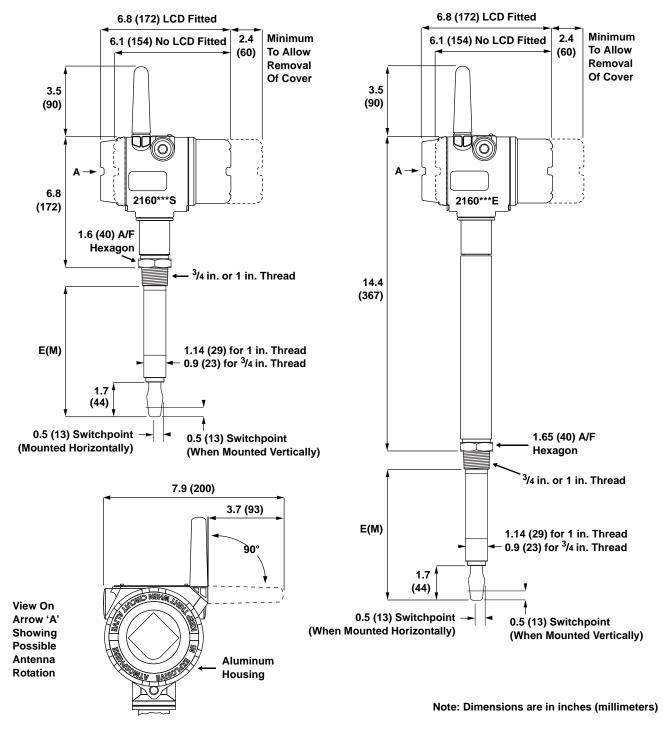


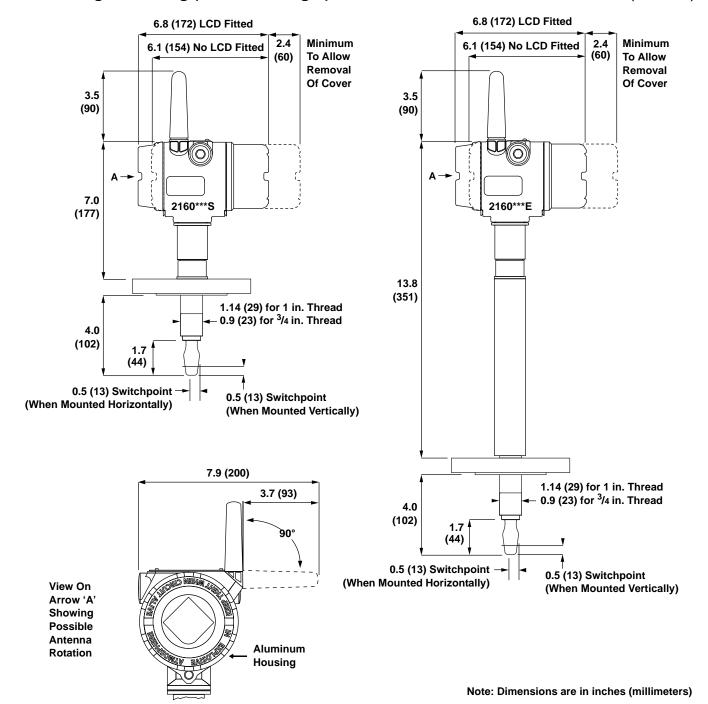
TABLE 5. Thread Mounting Fork Length

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)

Note: Dimensions are in inches (millimeters)



2160 Flange Mounting (Extended Length)

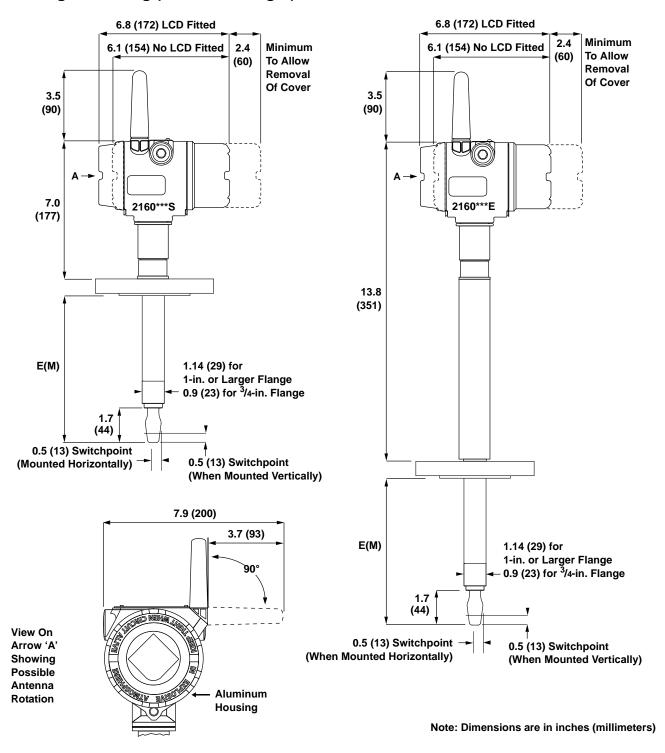
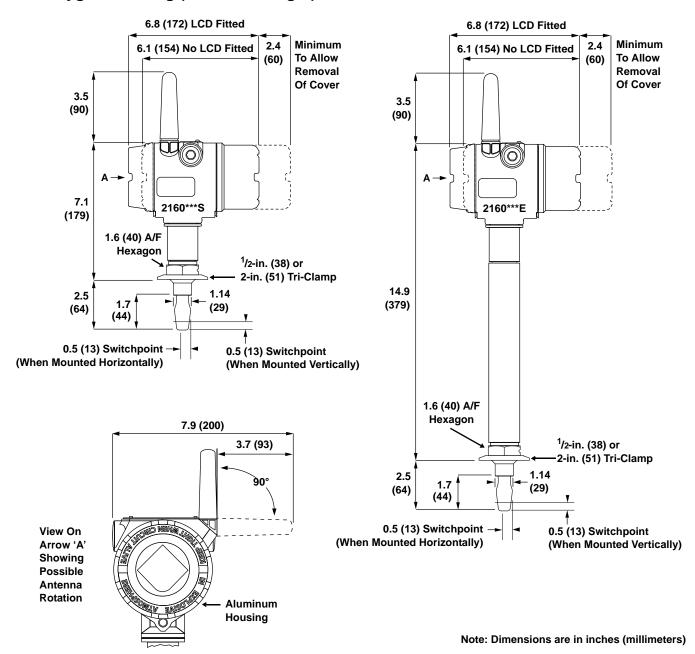


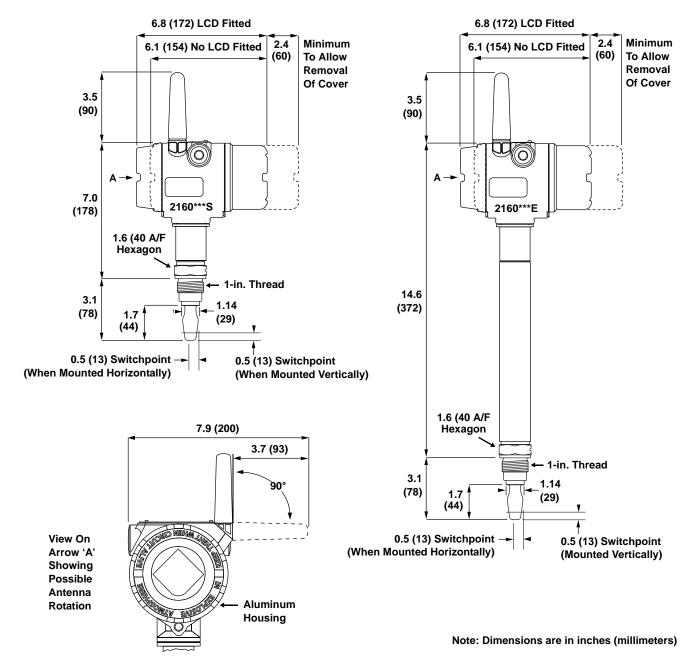
TABLE 6. Flange Mounting Fork Length

Process	Standard Length	Minimum Length	Maximum Length
Connection	Fork Length Code H	Fork Length Code E(M)	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)



2160 Hygienic Fitting (Standard Length) Continued



2160 Hygienic Fitting (Extended Length)

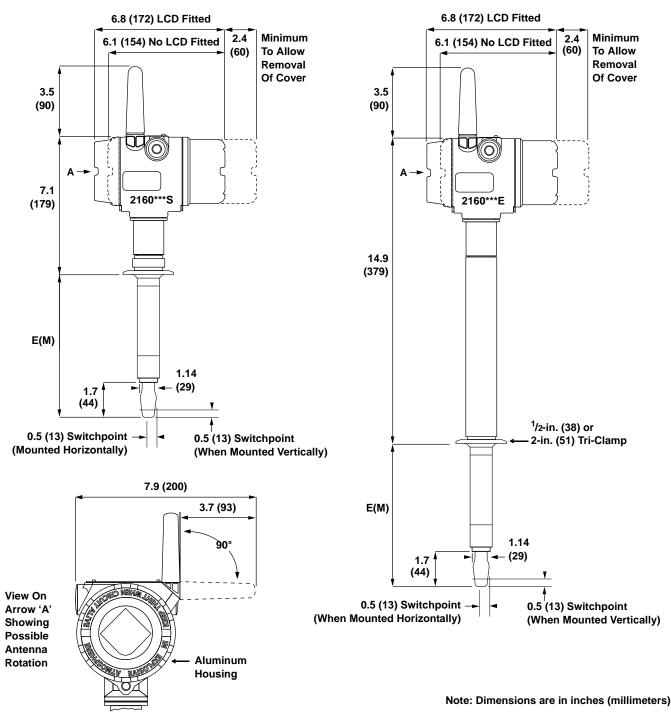


TABLE 7. Hygienic Fitting Fork Length

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.

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 WirelessHART[™] 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 consisits 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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Rosemount 2130 Extreme Temperature Vibrating Fork Liquid Level Switch

- Designed for operation in extreme temperatures of –94 to 500 °F (–70 to 260 °C)
- Electronic self-checking and condition monitoring - Heartbeat LED gives status and instrument health information
- 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

Rosemount 2130 Extreme Temperature Vibrating Fork Liquid Level Switch	. page 2
Specifications	. page 6
Product Certifications	. page 8
Dimensional Drawings.	page 10





Rosemount 2130 Extreme Temperature Vibrating Fork Liquid Level Switch



2130 Level Switch

Rosemount 2130 capabilities include:

- For use in liquids down to -94 °F and up to 500 °F (-70 to 260 °C). Ideal for both high and low level applications
- Stainless steel thermal tube moves the electronics away from the process
- Enhanced instrument health/self-checking diagnostics of the fork and sensor
- User-adjustable mode selection and time delay switch

Additional Information

Spares and Accessories: page 5
Specifications: page 6
Certifications: page 8
Dimensions: page 10

TABLE 1. 2130 Ordering Information

Model	Product Description / Process Temperature	
2130	Extreme Temperature Vibrating Fork Liquid Level Switch / –94 to 500 °F (–70 to 260 °C)	
Material of	Construction: Process Connection / Fork	
Standard		Standard
D ⁽¹⁾	316/316L Stainless Steel (1.4401/1.4404) dual certified	*
N ^{(1) (2) (3)}	316/316L SST (1.4401/1.4404) with NACE compliance to MR 0175:2003 (ISO 15156:2003), MR 0103-2003	*
Expanded		
C ⁽⁴⁾	Alloy C (UNS N10002), Alloy C-276 (UNS N10276), solid	
Process Co	onnection Size / Type	
Standard		Standard
1P	1-in. BSPP (G), O-ring, Hygienic Fitting	*
5R	1 ¹ / ₂ -in. (38 mm) Tri-Clover Clamp, Hygienic Fitting	*
2R	2-in. (51 mm) Tri-Clover Clamp, Hygienic Fitting	*
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	*
1G	1-in. ASME B16.5 Class 150 Raised Face (RF) Flange	*
1H	1-in. ASME B16.5 Class 300 Raised Face (RF) Flange	*
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	*
1K	DN25, EN1092 PN10/16 Flange	*
1L	DN25, EN1092 PN25/40 Flange	*
5K	DN40, EN1092 PN10/16 Flange	*
5L	DN40, EN1092 PN25/40 Flange	*

00813-0100-4130, Rev BA July 2010

TABLE 1. 2130 Ordering Information

2K	ded offering is subject to additional delivery lead time.				
1	DN50, EN1092 PN10/16 Flange				
2L	DN50, EN1092 PN25/40 Flange			*	
7K	DN65, EN1092 PN10/16 Flange				
7L	DN65, EN1092 PN25/40 Flange			*	
3K	DN80, EN1092 PN10/16 Flange			*	
3L	DN80, EN1092 PN25/40 Flange			*	
4K	DN100, EN1092 PN10/16 Flange			*	
4L	DN100, EN1092 PN25/40 Flange			*	
Expanded					
1J	1-in. ASME B16.5 Class 600 Raised Face (RF) Fla	nge			
5J	1 ¹ / ₂ -in. ASME B16.5 Class 600 Raised Face (RF) F	lange			
2J	2-in. ASME B16.5 Class 600 Raised Face (RF) Fla	nge			
3J	3-in. ASME B16.5 Class 600 Raised Face (RF) Fla	nge			
4J	4-in. ASME B16.5 Class 600 Raised Face (RF) Fla	nge			
1M	DN25, EN1092 PN63 Flange				
1N	DN25, EN1092 PN100 Flange				
5M	DN40, EN1092 PN63 Flange				
5N	DN40, EN1092 PN100 Flange				
2M	DN50, EN1092 PN63 Flange				
2N	DN50, EN1092 PN100 Flange				
7M	DN65, EN1092 PN63 Flange				
7N	DN65, EN1092 PN100 Flange				
3M	DN80, EN1092 PN63 Flange				
3N	DN80, EN1092 PN100 Flange				
4M	DN100, EN1092 PN63 Flange				
4N	DN100, EN1092 PN00 Flange				
XX ⁽⁵⁾					
Electronic	Electronic Type				
Standard	• • • • • • • • • • • • • • • • • • • •				
L	Direct Load Switching (Mains 2-wire) 24 to 264 Vac	s, 50/60 Hz, 24 to 60 Vdc, Self-o	checking	*	
Р	PNP/PLC Low Voltage (3-wire) 24 to 60 Vdc, Self-c	hecking		*	
D	Relay (DPCO), Self-checking			*	
N	NAMUR, Self-checking			*	
Surface Fi	nish (Wetted Parts)		Available for Connections		
Standard	,			Standard	
1	Standard surface finish		All		
	otaliaala oaliaoo iiilioli			★	
2	Hand polished (Ra <0.4 µm)		Hygienic Connection Only	*	
2	Hand polished (Ra <0.4 μm) ertifications	Available for Electronic	Hygienic Connection Only Available for Housing		
2		Available for Electronic	, , ,		
2 Product C		Available for Electronic	, , ,	*	
2 Product C Standard	ertifications		Available for Housing	* Standard	
Product C Standard	No Hazardous Locations Certifications	All	Available for Housing All	* Standard *	
Product C Standard NA G5 ⁽⁶⁾ G6 ⁽⁷⁾⁽⁸⁾	No Hazardous Locations Certifications FM Ordinary Locations (unclassified, safe area) CSA Ordinary Locations (unclassified, safe area)	All All	Available for Housing All Y, T Y, T	* Standard *	
Product C Standard NA G5 ⁽⁶⁾	No Hazardous Locations Certifications FM Ordinary Locations (unclassified, safe area) CSA Ordinary Locations (unclassified, safe area) ATEX Flameproof	All All	Available for Housing All Y, T	* Standard * * *	
2 Product C Standard NA G5 ⁽⁶⁾ G6 ⁽⁷⁾⁽⁸⁾ E1 E3	No Hazardous Locations Certifications FM Ordinary Locations (unclassified, safe area) CSA Ordinary Locations (unclassified, safe area) ATEX Flameproof NEPSI Explosion-proof	All All All	Available for Housing All Y, T Y, T X, S X, S	* Standard * * * * * *	
2 Product C Standard NA G5 ⁽⁶⁾ G6 ⁽⁷⁾⁽⁸⁾ E1 E3 E5 ⁽⁶⁾	Pertifications No Hazardous Locations Certifications FM Ordinary Locations (unclassified, safe area) CSA Ordinary Locations (unclassified, safe area) ATEX Flameproof NEPSI Explosion-proof FM Explosion-proof	All All All All	Available for Housing All Y, T Y, T X, S X, S Y, T	* Standard * * * * * * * *	
2 Product C Standard NA G5 ⁽⁶⁾ G6 ⁽⁷⁾⁽⁸⁾ E1 E3 E5 ⁽⁶⁾ E6 ⁽⁷⁾⁽⁸⁾	Pertifications No Hazardous Locations Certifications FM Ordinary Locations (unclassified, safe area) CSA Ordinary Locations (unclassified, safe area) ATEX Flameproof NEPSI Explosion-proof FM Explosion-proof CSA Explosion-proof	All All All All All All All All All	Available for Housing All Y, T Y, T X, S X, S Y, T Y, T	* Standard * * * * * * * * *	
2 Product C Standard NA G5 ⁽⁶⁾ G6 ⁽⁷⁾⁽⁸⁾ E1 E3 E5 ⁽⁶⁾ E6 ⁽⁷⁾⁽⁸⁾ E7	Pertifications No Hazardous Locations Certifications FM Ordinary Locations (unclassified, safe area) CSA Ordinary Locations (unclassified, safe area) ATEX Flameproof NEPSI Explosion-proof FM Explosion-proof CSA Explosion-proof IECEx Explosion-proof	All All All All All All	Available for Housing All Y, T Y, T X, S X, S Y, T	* Standard * * * * * * * * * * * *	
2 Product C Standard NA G5 ⁽⁶⁾ G6 ⁽⁷⁾⁽⁸⁾ E1 E3 E5 ⁽⁶⁾ E6 ⁽⁷⁾⁽⁸⁾ E7 I1	Pertifications No Hazardous Locations Certifications FM Ordinary Locations (unclassified, safe area) CSA Ordinary Locations (unclassified, safe area) ATEX Flameproof NEPSI Explosion-proof FM Explosion-proof CSA Explosion-proof IECEx Explosion-proof ATEX Intrinsic Safety	All	Available for Housing All Y, T Y, T X, S X, S Y, T Y, T X, S	* Standard * * * * * * * * * * * * * * *	
2 Product C Standard NA G5 ⁽⁶⁾ E1 E3 E5 ⁽⁶⁾ E6 ⁽⁷⁾⁽⁸⁾ E7 I1 I3	Pertifications No Hazardous Locations Certifications FM Ordinary Locations (unclassified, safe area) CSA Ordinary Locations (unclassified, safe area) ATEX Flameproof NEPSI Explosion-proof FM Explosion-proof CSA Explosion-proof IECEx Explosion-proof ATEX Intrinsic Safety NEPSI Intrinsic Safety	All	Available for Housing All Y, T Y, T X, S X, S Y, T Y, T X, S All All	* Standard * * * * * * * * * * * * * * * *	
2 Product C Standard NA G5 ⁽⁶⁾ G6 ⁽⁷⁾⁽⁸⁾ E1 E3 E5 ⁽⁶⁾ E6 ⁽⁷⁾⁽⁸⁾ E7 I1 I3	Pertifications No Hazardous Locations Certifications FM Ordinary Locations (unclassified, safe area) CSA Ordinary Locations (unclassified, safe area) ATEX Flameproof NEPSI Explosion-proof FM Explosion-proof CSA Explosion-proof IECEx Explosion-proof ATEX Intrinsic Safety FM Intrinsic Safety FM Intrinsic Safety	All	Available for Housing All Y, T Y, T X, S X, S Y, T Y, T X, S All All All except X and S	* Standard * * * * * * * * * * * * * * * *	
2 Product C Standard NA G5 ⁽⁶⁾ G6 ⁽⁷⁾ (8) E1 E3 E5 ⁽⁶⁾ E6 ⁽⁷⁾ (8) E7 I1 I3	Pertifications No Hazardous Locations Certifications FM Ordinary Locations (unclassified, safe area) CSA Ordinary Locations (unclassified, safe area) ATEX Flameproof NEPSI Explosion-proof FM Explosion-proof CSA Explosion-proof IECEx Explosion-proof ATEX Intrinsic Safety NEPSI Intrinsic Safety	All	Available for Housing All Y, T Y, T X, S X, S Y, T Y, T X, S All All	* Standard * * * * * * * * * * * * * * * *	

Rosemount 2130

TABLE 1. 2130 Ordering Information

Housing		Available for Certifications		
Standard			Standard	
X	Aluminum Alloy, M20 conduits/cable threads	NA, E1, E3, E7, I1, I3, I7	*	
Υ	Aluminum Alloy, ³ /4-in. NPT conduits/cable threads	NA,E5,E6,G5,G6,I1,I3,I5,I6,I7	*	
S	Stainless Steel, M20 conduits/cable threads	NA, E1, E3, E7, I1, I3, I7	*	
Т	Stainless Steel ³ / ₄ -in. NPT conduits/cable threads	NA,E5,E6,G5,G6,I1,I3,I5,I6,I7	*	
Fork Le	ength	Available Connection		
Standar	rd	•	Standard	
Α	Standard length 1.7 in. (44 mm)	All except flanged models	*	
H ⁽³⁾	Standard length flange 4.0 in. (102 mm)	All flanged models	*	
0000	Factory default length (only if fork length A or H is selected)	·	*	
E ⁽⁹⁾	Extended, customer specified length in tenths of Inches	All except code 1P	*	
M ⁽⁹⁾	Extended, customer specified length in millimeters	All except code 1P	*	
xxxx ⁽⁹⁾	Specific customer specified length in tenths of inches, or millimeters (or	nly if fork length E or M is selected)	*	
Calibrat	tion Data Certification Option			
Standar	rd		Standard	
Q4 Certificate of functional test			*	
Materia	I Traceability Certification Option			
Standar	rd		Standard	
Q8 ⁽²⁾⁽³⁾	Material traceability certification per EN 10204 3.1B		*	
Special	Procedures Option			
Standar	rd		Standard	
P1 ⁽¹⁰⁾	Hydrostatic testing with certificate		*	
Low Liq	quid Density Range Option			
Standar	rd		Standard	
LD Low density liquids – minimum density is 31.2 lb/ft ³ (500 kg/m ³)			*	
Tag Plat	tes Options			
Standar	rd		Standard	
ST	Tag plate SST engraved plate (maximum 16 digits)		*	
WT	WT Tag plate laminated paper (maximum 40 digits)			
Typical	Typical Model Number: 2130 D 0A L 1 NA A A 0000 Q8 ST			

- (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 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) See Product Certifications on page 8. E5 includes G5 requirements. G5 is for use in unclassified, safe area locations only.
- (7) See Product Certifications on page page 8. E6 includes G6 requirements. G6 is for use in unclassified, safe area locations only.
- (8) The requirements of CRN are met when a Rosemount 2130 CSA approved vibrating fork level switch (2130***G6**, 2130***E6**, and 2130***I6**) is configured with stainless steel wetted parts and either NPT threaded or ASME B16.5 2-in. to 8-in. flanged process connections.
- (9) Example: Code E1181 is 118.1 inches. Code M3000 is 3000 millimeters. See Extended Lengths on page 6 for minimum and maximum extended lengths.
- (10) Option limited to units with extended lengths up to 59.1 in. (1500 mm).

00813-0100-4130, Rev BA July 2010

Spare Parts and Accessories

TABLE 2. 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 Accesso	ries	
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/ ₄ A). 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⁾	Adjustable clamp gland for 1-in. extended lengths. Material: 316 St. steel, (Si) Silicone rubber seal	*
02120-2000-0002 ⁽¹⁾	Adjustable clamp gland for 1-in. extended lengths. Material: 316 St. steel, (Si) Silicone rubber seal	*
02120-3000-0001 ⁽²⁾	Replacement Cassette: Direct load switching (Red)	*
02120-3010-0001 ⁽³⁾	Replacement Cassette: PNP/PLC low voltage (Yellow)	*
02120-3020-0001 ⁽⁴⁾	Replacement Cassette: NAMUR current switching (Blue)	*
02120-3030-0001 ⁽⁵⁾	Replacement Cassette: Relay (DPCO) (Green)	*
02120-3160-0001 ⁽⁶⁾	Direct load switching, low density range selection (Red)	*
02120-3170-0001 ⁽⁷⁾	PNP/PLC low voltage, low density range selection (Yellow)	*
02120-3180-0001 ⁽⁸⁾	NAMUR current switching, low density range selection (Blue)	*
02120-3190-0001 ⁽⁹⁾	Relay (DPCO), low density range selection (Green)	*

- (1) The adjustable clamp gland is not explosion-proof.
- (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

 The Rosemount 2130 Extreme Temperature Vibrating Fork Liquid Level Switch

Measuring Principle

Vibrating Fork

Applications

 Most liquids including coating liquids, aerated liquids, and slurries

Mechanical

Housing/Enclosure

TABLE 3. Housing and Enclosure Specification

3					
Housing Code	X	Y	S	Т	
Housing material	Al alloy ASTM B26 356-T6 or LM25 TF		316C12 Stainless Steel		
Housing Paint	Polyurethane Powder Coat		Not Applicable		
LED Window	No	ne	No	ne	
Conduit Entry	M20	³ /4-in. NPT	M20 ³ /4-in NPT		
Ingress Protection	·		EN60529, e 4X		

Connections

• See Process Connection on page 6

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)

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 (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 10

Performance

Hysteresis (Water)

• ±0.039-in. (± 1mm) 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

Final rating depends on tank connection

Threaded Connection

• See Figure 1

Note:

Clamp glands (02120-2000-0001 and 02120-2000-0002 on page 16) limit the maximum operating pressure to 18.85 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

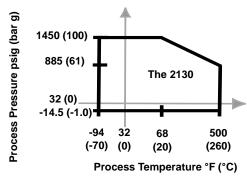


TABLE 5. Maximum Flange Pressure Rating

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	15.7 barg ⁽²⁾
EN1092-1	PN 25/40	39.3 barg ⁽²⁾
EN1092-1	PN 63	62.0 barg ⁽²⁾
EN1092-1	PN 100	98.4 barg ⁽²⁾

- (1) At 100 °F (38 °C), the pressure rating decreases with an increasing process temperature.
- (2) At 248 °F (120 °C), the pressure rating decreases with an increasing process temperature.

Product Data Sheet

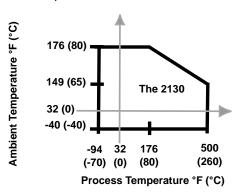
00813-0100-4130, Rev BA July 2010

Rosemount 2130

Temperature

· See Figure 2

FIGURE 2. Temperature



Liquid Density Range

- Minimum standard density is 37.5 lb/ft³ (600 kg/m³)
- Minimum density is 31.2 lb/ft³ (500 kg/m³) 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
- Over-current protection
- Short-circuit protection
- · Load-missing protection
- Surge protection (to IEC61326)

Terminal Connection (Wire Diameter)

Maximum 0.1 in² (2.5 mm²). Note national regulations

Conduit Plugs/Cable Gland

- Metal Ex d Housing: Conduit entries for explosion-proof areas are shipped with two plastic plugs
- Plastic housing with direct load, PNP/PLC and IS electronics are shipped with a PA66 ⁽¹⁾ cable gland and one blanking plug
- Plastic housing with relay electronics are shipped with two PA66 ⁽¹⁾ cable glands

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

⁽¹⁾ Cable diameter 0.2 to 0.3 in. (5 to 8 mm).

00813-0100-4130, Rev BA July 2010

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 1878089

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 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).

Overfill Protection

Option available for DIBt/WHG on the Rosemount 2130 (Pending).

SIL Declaration of Conformity

This approval is pending.

HAZARDOUS LOCATIONS CERTIFICATIONS

American and Canadian 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} -50°C 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 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: 1878089

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

Canadian Standards Association (CSA) Intrinsically Safe Approval

I6 Certificate Number: 06 CSA 1878089

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

Canadian Standards Association (CSA) Non-Incendive Approval

I6 Certificate Number: 06 CSA 1878089

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

Product Data Sheet

00813-0100-4130, Rev BA July 2010

Rosemount 2130

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 (2130***G6**, 2130***E6**, and 2130***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 ☑ 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 ☑ 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) Flameproof Approval

E3 Certificate: GYJ081175 Flameproof:

Exd IIC T2 to T6

Certificate: GYJ081177

Dust:

DIP A21 T_A T2 to T6 IP6X

National Supervision and Inspection Centre for Explosion Protection and Safety Instrumentation (NEPSI) Intrinsically Safe Approval

I3 Certificate: GYJ081176

Intrinsic Safety:

Ex ia IIC T5 to T2

Ui=15 V, Ii=32 mA, Pi=0.1 W, Ci=12 nF, Li=0.06 mH

Certificate: GYJ081177

Dust:

DIP A21 T_A T2 to T6 IP6X

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

17 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

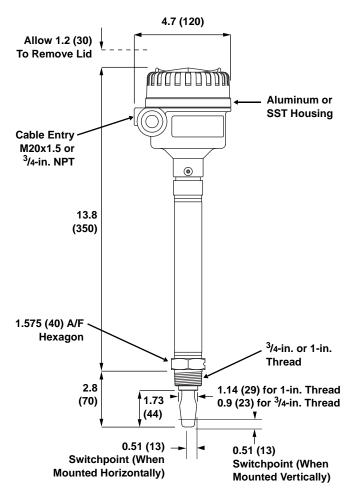
A NAMUR isolating amplifier must be used for intrinsic safety.

Dimensional Drawings

2130 Thread Mounting (Standard Length)	page 10
2130 Thread Mounting (Extended Length)	page 11
2130 Flange Mounting (Standard Length)	page 12
2130 Flange Mounting (Extended Length)	page 13
2130 Hygienic Fitting (Standard Length)	page 14
2130 Hygienic Fitting (Extended Length)	page 15

2130 Thread Mounting (Standard Length)

Note: Dimensions are in inches (millimeters)



2130 Thread Mounting (Extended Length)

Note: Dimensions are in inches (millimeters)

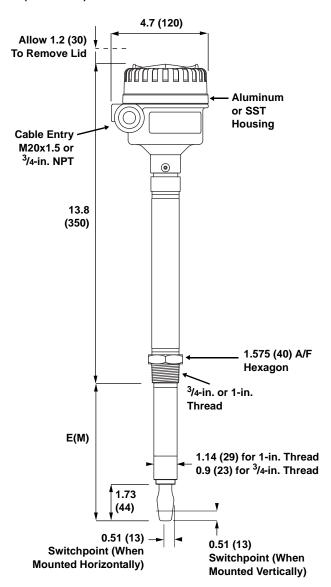
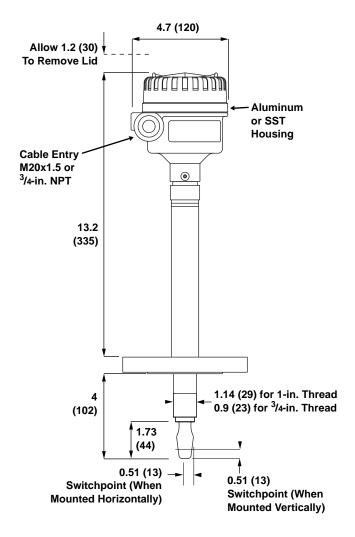


TABLE 7. Thread Mounting Fork Length

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)	3.8 in. (95 mm)	118.1 in. (3000 mm)
1-in. Thread	1.73 in. (44 mm)	3.7 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)



2130 Flange Mounting (Extended Length)

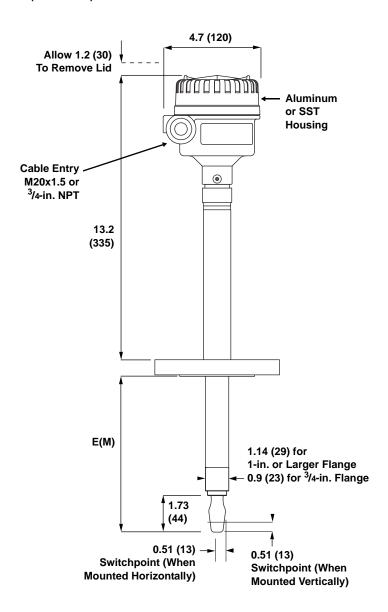
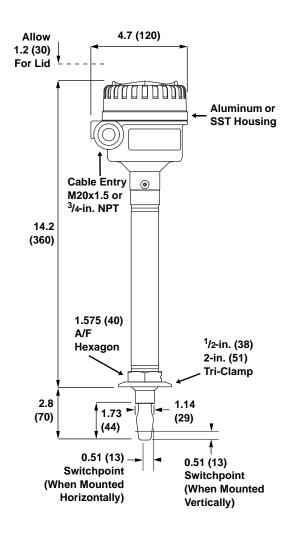


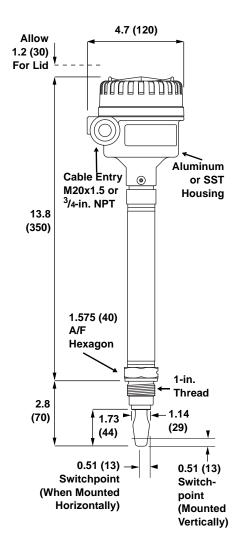
TABLE 8. Flange Mounting Fork Length

Process	Standard Length	Minimum Length	Maximum Length
Connection	Fork Length Code H	Fork Length Code E(M)	Fork Length Code E(M) ⁽¹⁾
3/4 in, 1 in. or larger flange	4.0-in. (102 mm)	3.7 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 Hygienic Fitting (Standard Length)





2130 Hygienic Fitting (Extended Length)

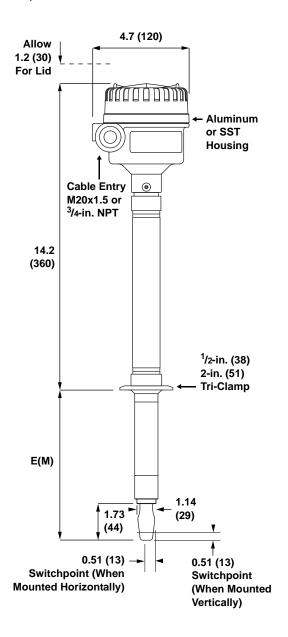


TABLE 9. Hygienic Fitting Fork Length

Process Standard Length Connection Fork Length Code H		Minimum Length Fork Length Code E(M)	Maximum Length Fork Length Code E(M) ⁽¹⁾	
Tri-Clamp	4.0-in. (102 mm)	4.1 in. (105 mm)	118.1 in. (3000 mm)	
1-in. Threaded	4.0-in. (102 mm)	3.7 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.

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 WirelessHART[™] 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 consisits 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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July 2010

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

Rosemount 2120 Vibrating Fork Liquid Level Switch	page 2
Specifications	page 6
Product Certifications	page 8
Dimensional Drawings	. page 10





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 5
Specifications: page 6
Certifications: page 8
Dimensions: page 10

TABLE 1. 2120 Ordering Information

Model	Product Description	
2120	Vibrating Fork Liquid Level Switch / –40302°F (–40150 °C)	
Material o	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 C	onnection Size / Type	
Standard		Standard
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	*
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	*
1G	1-in. ASME B16.5 Class 150 Raised Face (RF) Flange	*
1H	1-in. ASME B16.5 Class 300 Raised Face (RF) Flange	*
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	*
1K	DN25, EN1092 PN10/16 Flange	*
1L	DN25, EN1092 PN25/40 Flange	*
5K	DN40, EN1092 PN10/16 Flange	*

00813-0100-4030, Rev EA July 2010

TABLE 1. 2120 Ordering Information

	nded offering is subject to additional delivery lead tim	e.		*	
5L	DN40, EN1092 PN25/40 Flange				
2K	DN50, EN1092 PN10/16 Flange				
2L	DN50, EN1092 PN25/40 Flange				
7K	DN65, EN1092 PN10/16 Flange			*	
7L	DN65, EN1092 PN25/40 Flange			*	
3K	DN80, EN1092 PN10/16 Flange			*	
3L	DN80, EN1092 PN25/40 Flange			*	
4K	DN100, EN1092 PN10/16 Flange			*	
4L	DN100, EN1092 PN25/40 Flange			*	
Expanded					
1J	1-in. ASME B16.5 Class 600 Raised Face (RF) Flan				
5J	1 ¹ / ₂ -in. ASME B16.5 Class 600 Raised Face (RF) F				
2J	2-in. ASME B16.5 Class 600 Raised Face (RF) Flan				
3J	3-in. ASME B16.5 Class 600 Raised Face (RF) Flan	<u> </u>			
4J	4-in. ASME B16.5 Class 600 Raised Face (RF) Flan	nge			
1M	DN25, EN1092 PN63 Flange				
1N	DN25, EN1092 PN100 Flange				
5M	DN40, EN1092 PN63 Flange				
5N	DN40, EN1092 PN100 Flange				
2M	DN50, EN1092 PN63 Flange				
2N	DN50, EN1092 PN100 Flange				
7M	DN65, EN1092 PN63 Flange				
7N	DN65, EN1092 PN100 Flange				
3M	DN80, EN1092 PN63 Flange				
3N	DN80, EN1092 PN100 Flange				
4M	DN100, EN1092 PN63 Flange				
4N	DN100, EN1092 PN00 Flange				
XX ⁽⁵⁾	Customer specific				
Electronic	Туре		Available for Certifications		
Standard				Standard	
S	Direct load switching (2 wire) 20 to 264 Vac 50/60H		NA, E1, E5, E6, E7, G5, G6	*	
В	PNP/PLC low voltage switching (3 wire) 20 to 60 Vo	dc	NA, E1, E5, E6, E7, G5, G6	*	
R	Relay (SPDT/SPCO)		NA, E1, E5, E6, E7, G5, G6	*	
C ⁽⁶⁾	IS NAMUR (Ex ia)		11, 13, 15, 16, 17	*	
Surface Fi	nish (Wetted Parts)		Available for Connections		
Standard				Standard	
1	Standard surface finish		All	*	
2	Hand polished (Ra <0.4 µm)		Hygienic Connection Only	*	
Product C	ertifications	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⁾	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⁾	CSA Explosion-proof	S, B, R	Y, T	*	
E7	IECEx Explosion-proof	S, B, R	X, S	*	
11	ATEX Intrinsic Safety	С	A, D	*	
l3	NEPSI Intrinsic Safety	С	A, D	*	
15	FM Intrinsic Safety	С	A, D	*	
		С	1 D		
16	CSA Intrinsically Safe and Non-Incendive	C	A, D	★	

Rosemount 2120

TABLE 1. 2120 Ordering Information

Housing		Available for Certifications	
Standard		'	Standard
Α	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	*
Χ	Aluminum Alloy, M20 conduits/cable threads	E1, E7	*
Υ	Aluminum Alloy, ³ / ₄ -in. NPT conduits/cable threads	E5, E6, G5, G6	*
S	Stainless Steel, M20 conduits/cable threads	E1, E7	*
Т	Stainless Steel ³ / ₄ -in. NPT conduits/cable threads	E5, E6, G5, G6	*
Fork Leng	gth	Available Connection	
Standard	-	'	Standard
Α	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 ⁽⁹⁾	Semi-ext 3.9-in. (98 mm)	1A, 1B, and 1D	*
E ⁽¹⁰⁾	Extended, customer specified length in tenths of Inches	All except 1-in. BSPP O-ring 1P	*
M ⁽¹⁰⁾	Extended, customer specified length in millimeters	All except 1-in. BSPP O-ring 1P	*
xxxx ⁽¹⁰⁾	Specific customer specified length in tenths of inches, or millimeters (o	only if fork length E or M is selected)	
Calibratio	n Data Certification Option		
Standard			Standard
Q4	Certificate of functional test		*
Material T	raceability Certification Option		
Standard			Standard
Q8 ⁽¹⁾⁽²⁾	Material traceability certification per EN 10204 3.1B		*
Special P	rocedures Option		
Standard			Standard
P1 ⁽¹¹⁾	Hydrostatic testing with certificate		*
Overfill O	ption		
Standard			Standard
U1 ⁽¹²⁾	DIBt/WHG overfill protection		*
Tag Plates	s Options		
Standard			Standard
ST	Tag plate SST engraved plate (maximum 16 digits)		
WT	Tag plate laminated paper (maximum 40 digits)		*
Typical M	odel 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 8. E5 includes G5 requirements. G5 is for use in unclassified, safe area locations only.
- (8) See Product Certifications on page page 8. E6 includes G6 requirements. G6 is for use in unclassified, safe area locations only.
- (9) Only available with stainless steel material of construction D and glass nylon housing A and D.
- (10) 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.
- (11) Option limited to units with extended lengths up to 59.1-in. (1500 mm). Option is not available for ECTFE/PFA coating.
- (12) Option not available for Stainless Steel housing codes S and T.

Spare Parts and Accessories

TABLE 2. Spare Parts and Accessories

Spares and Accessori	es	
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⁾	Adjustable clamp gland for 1-in. extended lengths. Material: 316 St. steel, (Si) Silicone rubber seal	*
02120-2000-0002 ⁽¹⁾	Adjustable clamp gland for 1-in. extended lengths. Material: 316 St. 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	Α	D	Х	Υ	S	Т	
Housing	Nylor	PA66	Al allo	Al alloy ASTM		316C12	
Material	30%GF			56-T6 or	Stainless		
			LM2	25 TF	St	eel	
Housing Paint	١	lot	Polyurethane		Not		
_	Appl	icable	e Powder		Applicable		
			С	oat			
LED Window	PΝ	1MA	N	one	No	one	
Conduit Entry	M20	¹ /2-in.	M20	³ /4-in.	M20	³ /4-in.	
		NPT		NPT		NPT	
Ingress	IP66	IP66/67 to IP66/67 to		IP66	/67 to		
Protection	EN	0529	EN60529,		EN6	0529,	
			Тур	e 4X	Тур	e 4X	

Connections

See Process Connection Size / Type on page 2

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 10

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

Final rating depends on process connection

Threaded Connection

See Figure 1.

Note:

Clamp glands (02120-2000-0001 and 02120-2000-0002 on page 5) limit the maximum operating 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

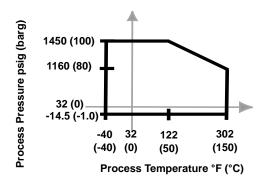


TABLE 3. Maximum Flange Pressure Rating

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	15.7 barg ⁽²⁾
EN1092-1	PN 25/40	39.3 barg ⁽²⁾
EN1092-1	PN 63	62.0 barg ⁽²⁾
EN1092-1	PN 100	98.4 barg ⁽²⁾

At 100 °F (38 °C), the rating decreases with an increasing process temperature.

At 248 °F (120 °C), the rating decreases with an increasing process temperature.

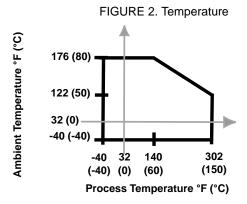
Product Data Sheet

00813-0100-4030, Rev EA July 2010

Rosemount 2120

Temperature

See Figure 2.



Liquid Density Range

Minimum 37.5 lb/ft³ (600 kg/m³)

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 in² (2,5 mm²). Note national regulations

Conduit Plugs/Cable Gland

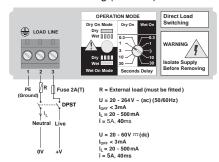
- Metal Ex d Housing: Conduit entries for explosion-proof areas are shipped with two brass conduit plugs
- Plastic housing with direct load, PNP/PLC and IS electronics are shipped with one PA66⁽¹⁾ cable gland and one blanking plug
- Plastic housing with relay electronics are shipped with two PA66⁽¹⁾ cable glands

Grounding

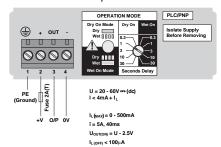
The 2120 should always be grounded either through the terminals or using the external ground connection provided.

Electrical Connections

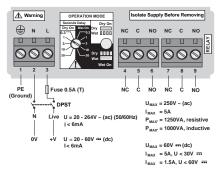
· Direct load switching (two-wire)



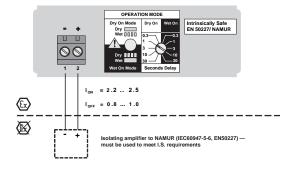
• Solid state PNP output for direct interface to PLC's (three wire)



• SPCO single relay for voltage free contacts



• Intrinsically Safe (IS) NAMUR to DIN 19234, IEC 60947-5-6



⁽¹⁾ Cable diameter 0.2 to 0.3 in. (5 to 8 mm)

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)

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, LVD)

Overfill Protection

Option available for DIBt/WHG

SIL Declaration of Conformity

Rosemount 2120 IS Namur Vibrating Fork Level Sensor Models 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 as a high level alarm⁽¹⁾ in conjunction with a Namur Barrier⁽¹⁾.

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.

Product Data Sheet

00813-0100-4030, Rev EA July 2010

Rosemount 2120

Canadian Standards Association (CSA) Non-Incendive Approval

16 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)</p>

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.

European Approvals

ATEX Flameproof Approval

E1 Certificate: Sira 05ATEX1129
Flameproof:
ATEX Marking II 1/2 G D
EEx d IIC T6 (T_{amb} -40 to 75 °C)

ATEX Intrinsically Safe Approval

I1 Certificate: Sira 05ATEX2130X
Intrinsic Safety:
ATEX Marking ⑤ II 1 G D
EEx ia IIC T5 (T_{amb} −40 to 80 °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 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 06.0051
Flameproof and Dust:
Zone 0/1
Ex d IIC T6 (T_{amb} -40 to 75 °C)
Ex tD A21 T85°C (Tamb -40°C to +75°C) IP6X

International Electrotechnical Commission (IEC) Intrinsically Safe Approval

7 Certificate: IECEx SIR 06.0070X Intrinsically Safe and Dust: Ex ia IIC T5, Ex iaD 20 T85 (T_{amb} -40 to 80 °C) Ui=15 V, Ii=32 mA, Pi=0.1 W, Ci=12 nF, Li=0.06 mH

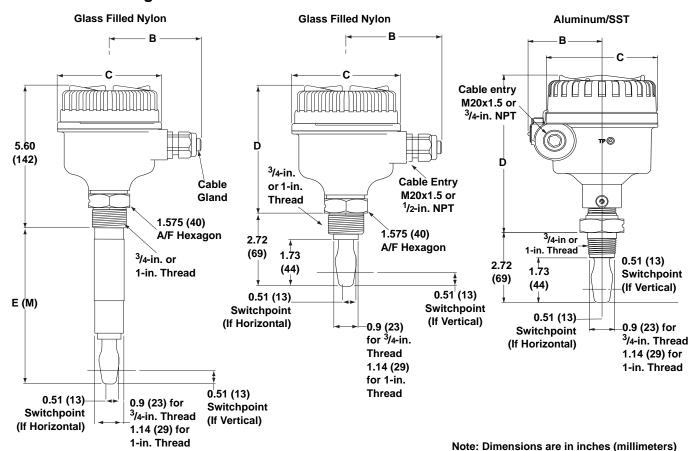
NOTE

A NAMUR isolating amplifier must be used for intrinsic safety.

July 2010

Dimensional Drawings

Threaded Mounting



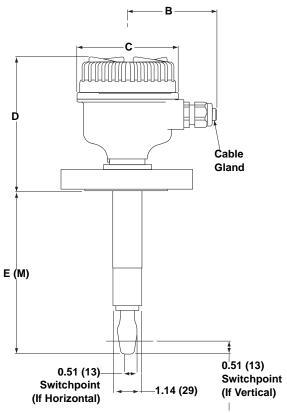
Thread	Standard Length Model Code A	Minimum Length Model Code E (M)	Maximum Length Model Code E (M)
³ /4 in.	1.73 (44)	3.74 (95)	118.11 (3000)
1 in.	1.73 (44)	3.70 (94)	118.11 (3000)

Material	В	С	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)

00813-0100-4030, Rev EA July 2010

Flange Mounting

(Glass filled nylon housing shown)



Note: Dimensions are in inches (millimeters)

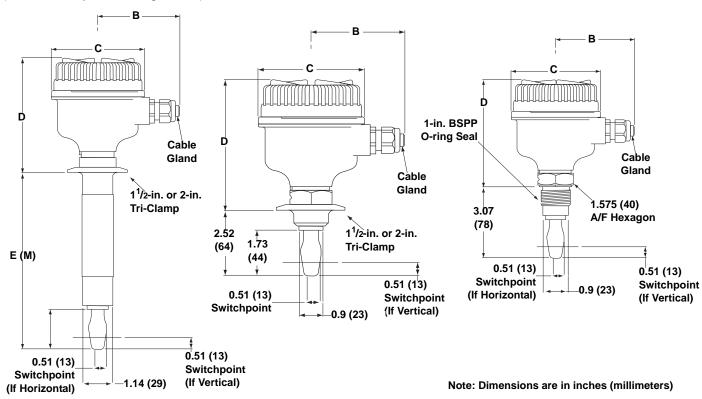
Material	Standard Length Model Code H	Minimum Length Model Code E (M)	Maximum Length Model Code E (M)
Stainless Steel	4 (102)	3.50 (89)	118.11 (3000)
ECTFE/PFA co-polymer coated	4 (102)	3.50 (89)	39.37 (1000)

Material	В	С	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)



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	В	С	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)

Product Data Sheet

00813-0100-4030, Rev EA July 2010

Rosemount 2120

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 WirelessHART[™] 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 consisits 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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July 2010

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



DIBL

Contents

Rosemount 2110 Compact Vibrating Fork Liquid Level Switch	page 2
Specifications	page 3
Product Certifications	page 4
Dimensional Drawing	page 5





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 3
Certifications: page 4
Dimensions: page 5

TABLE 1. 2110 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.

· ·	led offering is subject to additional delivery fead time.	
Model	Product Description	
2110	Compact Vibrating Fork Liquid Level Switch	
Electronic	Туре	
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 C	onnection 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 C	ertificates	
Standard		Standard
NA	No hazardous locations certifications (safe area use only)	*
U1	DIBt/WHG Overfill protection	*
Calibration	n Data Certificate Option	
Standard		Standard
Q4	Certificate of functional test	*
Tag Plate	Options	
Standard		Standard
ST	Tag plate SST engraved plate (maximum 16 digits)	*
WT	Tag plate laminated paper (maximum 40 digits)	*
Typical Mo	del Number: 2110 0 2R NA	

TABLE 2. Spare Parts and Accessories

Spares and Acces	ssories	
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 μ m. 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

- 3/4-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 5

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)

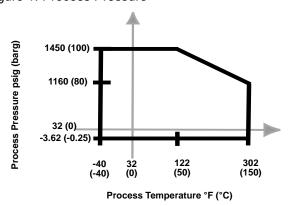
Threaded Connection

See Figure 1

Hygienic Connection

435 psig (30 barg)

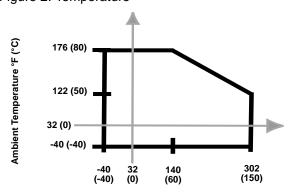
Figure 1. Process Pressure



Temperature

See Figure 2 for the maximum and minimum operating temperatures.

Figure 2. Temperature



Process Temperature °F (°C)

Liquid Density

Minimum 37.5 lb/ft³ (600 kg/m³)

00813-0100-4029, Rev CA July 2010

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 mm²)

Cable Gland

PG9 provided. Cable diameter 0.24 to 0.31 in. (6 to 8 mm)

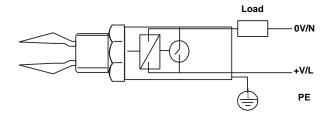
Protection

Polarity insensitive. Over-current, short circuit, and load-missing protection. Surge protection to IEC61326.

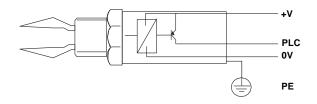
Grounding

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 (50-60Hz)/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 (150V max)

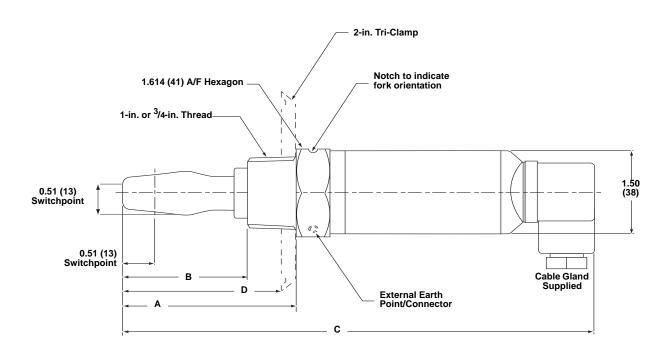
Electro Magnetic Compatibility (EMC) Directive

EN61326

Overfill Protection

Option available for DIBt/WHG

Dimensional Drawing



Process Connections	A	В	С	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

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 WirelessHART[™] 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 consisits 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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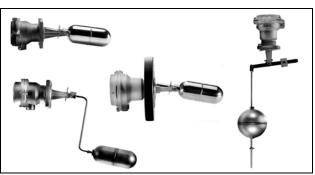
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Magnetic Float Switches For Liquid Level Alarm and Pump Control

- · 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

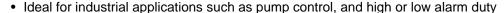
Ordering Information
Float Switches for General Purpose Applications (Aluminum Bronze Wetside) page 3
Float Switches for General Purpose Applications (Stainless Steel Wetside)page
Float Switches for Hazardous Area Applications
Float Switches for Marine Applications
Spare Parts and Accessories
Specificationspage 12
Float Switch Specifications
Switch Mechanism Specifications
Dimensional Drawings
Mobrey 'A' and 'G' Flanges
General Purpose Magnetic Float Switches (Aluminum Bronze Wetside) page 1
General Purpose Magnetic Float Switches (Stainless Steel Wetside) page 18
Hazardous Area Magnetic Float Switches
Marine Magnetic Float Switchespage 20
Nozzle and Stud Lengths
Horizontal F68 Pump Control And Alarm Floatpage 2
Vertical F21 Pump Control And Alarm Float
Cranked Arm Floats F104page 2



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IP101, Rev CA July 2010

Float Switches for General Purpose Applications (Aluminum Bronze Wetside)



- 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



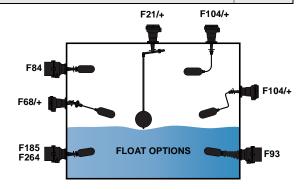
Additional Information

Specification: page 12 Dimensions: page 17

TABLE 1. Ordering Information For General Purpose Magnetic Float Switches (Al Br Wetside)

Model	Product Description					
S	Switch					
Flange (H		D ()	<u> </u>		(2)	
	Size	Rating Fla	ange Standard		Max Process Temp ⁽²⁾	
Standard						Standard
01	Mobrey A	261 psi (18 bar) Mo	obrey		410 °F (210 °C)	*
Switch M	echanism ⁽³⁾					
Standard						Standard
DB ⁽⁴⁾	Electrical: 2 independer	nt Single Pole Single Throw	v (SPST) contact se	ets		*
PB ⁽⁵⁾	As Type DB but with go	ld plated contacts				*
D6B ⁽⁴⁾	Electrical: 2 independent circuits of double pole changeover contact sets					*
P6B ⁽⁵⁾	As Type D6B but with gold plated contacts				*	
APA	Pneumatic air pilot valve on/off for switching air circuits					*
AMA	Pneumatic air pilot valv	e for continuous modulating	g of air controlled ci	rcuits		*
Float ⁽⁶⁾						
	Application Information	on		Float Material	Max Process Temp (2)	
Standard						Standard
F84	General purpose high of	r low alarm or 2 off for pur	np control	316 Stainless Steel	752 °F (400 °C)	*
F185	General purpose high of	r low alarm or 2 off for pur	np control	Alloy 400	410 °F (210 °C)	*
F68/+ ⁽⁷⁾	Horizontal pump control or alarm 316 Stainless Steel 752 °F (400 °C)					*
F264	Horizontal limited differ	ential		Alloy 400	410 °F (210 °C)	*
F21/+ ⁽⁷⁾	Vertical pump control o	alarm		316 Stainless Steel	752 °F (400 °C)	*
F104/+ ⁽⁷⁾	Cranked arm: horizonta	l or vertical		316 Stainless Steel	752 °F (400 °C)	*
F93	Shrouded for dirty liquid	ls. Silicone rubber gaiter w	ith 316SST shroud	316 Stainless Steel	356 °F (180 °C)	*
	odel Number: S 01 DB					

- (1) See page 21 for nozzle and stud lengths.
- (2) The maximum process temperature is dependent on the Flange (Head) and selected Float option.
- (3) See Table 8 and Table 9 on page 16 for switch mechanism ratings.
- (4) Type DB is for alternative make and break circuits. Type D6B is for switching two independent circuits.
- (5) Types PB and P6B are for switching low power (e.g. intrinsically safe) electrical circuits.
- (6) See Table 10 on page 18 for a comparison of the float options listed here.
- (7) See pages 21, 22, and 23 for technical float details and length options.



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 13 Dimensions: page 18

TABLE 2. Ordering Information For General Purpose Magnetic Float Switches (SST Wetside)

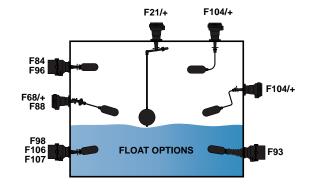
Model	Product Descrip	otion			
S	Switch				
Flange (Head) ⁽¹⁾				
	Size	Rating	Flange Standard	Max Process Temp ⁽²⁾	
Standard	d			·	Standard
36 ⁽³⁾	Mobrey A	490 psi (33.8 bar)	Mobrey	752 °F (400 °C)	*
190 ⁽³⁾⁽⁴⁾	Mobrey A	490 psi (33.8 bar)	Mobrey	356 °F (180 °C)	*
440	3 in.	150 RF	ASME B16.5	752 °F (400 °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	PN 16	EN 1092-1	752 °F (400 °C)	*
429	DN 80	PN 16	EN 1092-1	752 °F (400 °C)	*
430	DN 100	PN 16	EN 1092-1	752 °F (400 °C)	*
431	DN 125	PN 16	EN 1092-1	752 °F (400 °C)	*
417	DN 65	PN 40	EN 1092-1	752 °F (400 °C)	*
418	DN 80	PN 40	EN 1092-1	752 °F (400 °C)	*
419	DN 100	PN 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 N	/lechanism ⁽⁵⁾			·	
				Max Process Temp (2)	
Standard	d				Standard
D ⁽⁶⁾	Electrical: 2 independent Single Pole Single Throw (SPST) contact sets 752 °F (400 °C)			*	
P ⁽⁷⁾	As Type D but wi	th gold plated contacts		752 °F (400 °C)	*
D6 ⁽⁸⁾	Electrical: 2 indep	pendent circuits of double po	ole changeover contact sets	752 °F (400 °C)	*
P6 ⁽⁷⁾	As Type D6 but with <i>gold plated contacts</i> 752 °F (400 °C)				
H6 ⁽⁹⁾	As Type D6 but v	vith gold plated contacts and	h hermetically sealed moving parts	482 °F (250 °C)	*

Horizontal Float Switches

TABLE 2. Ordering Information For General Purpose Magnetic Float Switches (SST Wetside)

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 continuous	rcuits	752 °F (400 °C)	*
Enclosure	/ Housing			
Standard	-			Standard
Α	Aluminum alloy			*
Float (10)				
	Application Information	Float Material	Max Process Temp (2)	
Standard			-	Standard
F84	General purpose high or low alarm or 2 off for pump control	316 Stainless Steel	752 °F (400 °C)	*
F96	General purpose high or low alarm or 2 off for pump control	316 Stainless Steel	752 °F (400 °C)	*
F98	General purpose high or low alarm or 2 off for pump control	316 Stainless Steel	752 °F (400 °C)	*
F106	General purpose high or low alarm or 2 off for pump control	316 Stainless Steel	752 °F (400 °C)	*
F107	General purpose high or low alarm or 2 off for pump control	316 Stainless Steel	752 °F (400 °C)	*
F68/+ ⁽¹¹⁾	Horizontal pump control or alarm	316 Stainless Steel	752 °F (400 °C)	*
F21/+ ⁽¹¹⁾	Vertical pump control or alarm	316 Stainless Steel	752 °F (400 °C)	*
F104/+ ⁽¹¹⁾	Cranked arm: horizontal or vertical	316 Stainless Steel	752 °F (400 °C)	*
F88	Interface duties	316 Stainless Steel	752 °F (400 °C)	*
F93 ⁽⁴⁾	Shrouded for dirty liquids. Silicone rubber gaiter with 316SST shroud	316 Stainless Steel	356 °F (180 °C)	*
Typical Mo	del Number: S 36 D A / F84	ı		

- (1) See page 21 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) The F93 float is only available only with the S190 flange (head).
- (5) See Table 8 and Table 9 on page 16 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) See Table 10 on page 18 for a comparison of the float options listed here.
- (11) See pages 21, 22, and 23 for technical float details and length options.



Float Switches for Hazardous Area Applications



- 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 14 Dimensions: page 19

TABLE 3. Ordering Information For Magnetic Float Switch In Hazardous Areas

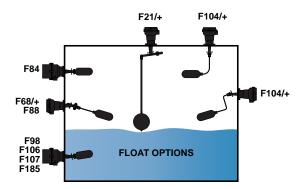
Model	Product Descrip	ption			
S	Switch				
Flange (He	ead) ⁽¹⁾				
	Size	Rating	Wetside	Max. Process Temp ⁽²⁾	
Standard					Standard
250 ⁽³⁾	Mobrey G	304.5 psi (21 bar)	316 Stainless Steel	626 °F (330 °C)	*
275 ⁽³⁾	Mobrey G	304.5 psi (21 bar)	Gunmetal	392 °F (200 °C)	*
256	3 in.	150 RF	ASME B16.5	752 °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 Me	chanism ⁽⁴⁾	·			
				Max Process Temp ⁽²⁾	
Standard	'				Standard
D ⁽⁵⁾	Electrical: 2 inde	pendent Single Pole Single	e Throw (SPST) contact sets	752 °F (400 °C)	*
P ⁽⁶⁾	As Type D but w	ith gold plated contacts		752 °F (400 °C)	*
D6 ⁽⁷⁾	Electrical: 2 inde	pendent circuits of double	pole changeover contact sets	752 °F (400 °C)	*
P6 ⁽⁶⁾	As Type D6 but	with gold plated contacts		752 °F (400 °C)	*
H6 ⁽⁸⁾	As Type D6 but	with gold plated contacts a	nd hermetically sealed moving parts	482 °F (250 °C)	*
Enclosure	/ Housing				
				Max Process Temp ⁽²⁾	
Standard					Standard
A	Aluminum alloy			752 °F (400 °C)	*
G	Gunmetal			662 °F (350 °C)	*
X ⁽⁹⁾	Use 'AX' or 'GX'	for applications with ambie	ent 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

Float (10)				
	Application Information	Float Material	Max Process Temp ⁽²⁾	
Standard				Standard
F84	General purpose high or low alarm or 2 off for pump control	316 Stainless Steel	752 °F (400 °C)	*
F185	General purpose high or low alarm or 2 off for pump control	Alloy 400	410 °F (210 °C)	*
F98	General purpose high or low alarm or 2 off for pump control	316 Stainless Steel	752 °F (400 °C)	*
F106	General purpose high or low alarm or 2 off for pump control	316 Stainless Steel	752 °F (400 °C)	*
F107	General purpose high or low alarm or 2 off for pump control	316 Stainless Steel	752 °F (400 °C)	*
F68/+ ⁽¹¹⁾	Horizontal pump control or alarm	316 Stainless Steel	752 °F (400 °C)	*
F264	Horizontal limited differential	Alloy 400	410 °F (210 °C)	*
F21/+ ⁽¹¹⁾	Vertical pump control or alarm	316 Stainless Steel	752 °F (400 °C)	*
F104/+ ⁽¹¹⁾	Cranked arm: horizontal or vertical	316 Stainless Steel	752 °F (400 °C)	*
F88	Interface duties	316 Stainless Steel	752 °F (400 °C)	*
Typical Mod	lel Number: S 250 D A / F84	·	·	

- (1) See page 21 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 Table 8 and Table 9 on page 16 for switch mechanism ratings.
- (5) Type D is for alternative make and break circuits.
- (6) Types P and P6 are for switching low power (e.g. intrinsically safe) electrical circuits.
- (7) Type D6 is for switching two independent circuits.
- (8) Type H6 is for use in corrosive area and low temperature applications.
- (9) The ATEX certification covering -4 to -76 °F (-20 to -60 °C) requires Mechanism Switch code H6 to be selected.
- (10) See Table 11 on page 19 for a comparison of the float options listed here.
- (11) See pages 21, 22, and 23 for technical float details and length options.



Float Switches for Marine Applications



Aluminum Bronze



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 15 Dimensions: page 20

TABLE 4. Ordering Information For Magnetic Float Switches In Marine Applications

Model	Product Description					
S	Switch					
Flange (H	lead)					
	Size and Rating	Wetside/Enclosure	Duty	IP Rating	Max Process Temp ⁽¹⁾	
Standard	•					Standard
03	Mobrey A, 261 psi/18 bar	Aluminum Bronze	Submersible			*
179	Mobrey A, 261 psi/18 bar	Aluminum Bronze	Hoseproof			*
195	Mobrey A, 261 psi/18 bar	Aluminum Bronze	Submersible	See Tabl	e 5 on page 9	*
163	Mobrey A, 261 psi/18 bar	316 Stainless Steel	Submersible		P Ratings and	*
181	Mobrey A, 261 psi/18 bar	316 Stainless Steel	Hoseproof		cess Temperatures	*
183	Mobrey A, 261 psi/18 bar	Aluminum Bronze	Hazard Submersible			*
187	Mobrey A, 261 psi/18 bar	Aluminum Bronze	Hazard Submersible			*
189	Mobrey A, 261 psi/18 bar	Aluminum Bronze	Hazard Hoseproof			*
Switch M	echanism ⁽²⁾					
					Max Process Temp ⁽¹⁾	
Standard	•					Standard
D ⁽³⁾	Electrical: 2 independent Single Pole Single Throw (SPST) contact sets 752 °F (400 °C)					
P ⁽⁴⁾	As Type D but with <i>gold plated contacts</i> 752 °F (400 °C)					*
D6 ⁽³⁾⁽⁵⁾	Electrical: 2 independent circuits of double pole changeover contact sets 752 °F (400 °C)					*
P6 ⁽⁴⁾⁽⁵⁾	As Type D6 but with <i>gold plated contacts</i> 752 °F (400 °C)					*
Enclosur	e Housing					
Standard						Standard
В	Aluminum bronze (no code	e is required for stainles	ss steel S163 and S181	1 models)		
Cable	•					
					Max Process Temp ⁽¹⁾	
Standard	•					Standard
L	10 ft. (3 m) of fitted cable (code is required for S0	3, S163, S195, S183, a	and S187 models)	See Table 5 on page 9	*
Float (6)						
	Application Information			Float Material	Max Process Temp ⁽¹⁾	
Standard						Standard
F84	General purpose high or lo	w alarm or 2 off for pu	mp control	316 Stainless Steel	752 °F (400 °C)	*
F185	General purpose high or lo	w alarm or 2 off for pur	mp control	Alloy 400	410 °F (210 °C)	*

Horizontal Float Switches

TABLE 4. Ordering Information For Magnetic Float Switches In Marine Applications

	F21/+ ⁽¹⁾ Vertical pump control or alarm 316 Stainless Steel 732 F (400 C) X		F104/+ ⁽⁷⁾	Cranked arm: horizontal or vertical	316 Stainless Steel	752 °F (400 °C)	*
F104/± ⁽⁷⁾ Cranked arm: horizontal or vertical 316 Stainless Steel 752 °F (400 °C)		F21/+ ⁽⁷⁾ Vertical pump control or alarm 316 Stainless Steel 752 °F (400 °C) ★	F104/+ ⁽⁷⁾ F93 ⁽⁸⁾	Cranked arm: horizontal or vertical Shrouded for dirty liquids Silicone rubber gaiter with 316SST shroud	316 Stainless Steel 316 Stainless Steel	752 °F (400 °C) 356 °F (180 °C)	*
			F98	General purpose high or low alarm or 2 off for pump control	316 Stainless Steel	752 °F (400 °C)	<u></u>

- The maximum process temperature is dependent on the Flange (Head), Switch mechanism, Cable (if fitted), and Float options chosen.
- (2) See Table 8 and Table 9 on page 16 for switch mechanism ratings.
- (3) Type D is for alternative make and break circuits. Type D6 is for switching two independent circuits.
- (4) Types P and P6 are for switching low power (e.g. intrinsically safe) electrical circuits.
- (5) Not available for stainless steel enclosure and wetside models S163 and S181.
- (6) See Table 11 on page 19 for a detailed comparison of the float types listed here.
- (7) Refer to pages 21, 22, and 23 for technical float details and length options. See "Nozzle and Stud Lengths" on page 21 for stud lengths.
- (8) Shrouded floats for stainless steel switches S163 and S181 are available only on request. Please contact the factory.

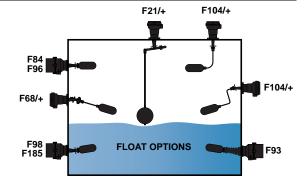


TABLE 5. Switch Type Comparison - Marine Applications

	Maximum Pro	ocess Temperature ⁽¹⁾		
Type Number	Submersed	Non-submersed	Head IP Rating	Cable ⁽²⁾
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) ⁽³⁾	410 °F (210 °C)	66	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) ⁽³⁾	410 °F (210 °C)	66	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) ⁽⁵⁾	410 °F (210 °C)	66	None fitted

- (1) The maximum process temperature is dependent on the Flange (Head), Switch mechanism, and Float options chosen.
- (2) See page 15 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.
- (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.

Spare Parts and Accessories

TABLE 6. Spare Parts and Accessories

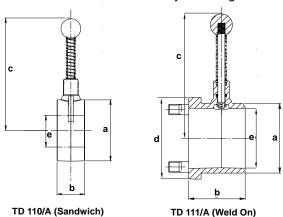
★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Spares and Acc	essories	
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)	*
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)	*

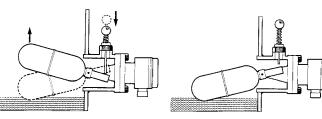
NOTE:

See page 17 for dimensions of Mobrey flanges.

Figure 1. Test Devices for Mobrey 'A' Flanged Switches



Test Devices Allow Mechanical Testing of an Electrical Circuit



MATERIALS

TD110/A: 316 Stainless Steel Fluorocarbon Elastomer Plunger Seal

TD111/A: Carbon Steel STM A216 WCA Fluorocarbon Elastomer Plunger Seal

TABLE 7. Test Device Specification and Dimensions

Туре	Vessel Flange	Maximum Pressure ⁽¹⁾	Max Process Temperature	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) 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.



Horizontal Float Switches

Note: Dimensions are in inches (mm)

Note: Dimensions are in inches (mm)

Figure 2. Companion Flanges for Mobrey 'A' Flange Switches

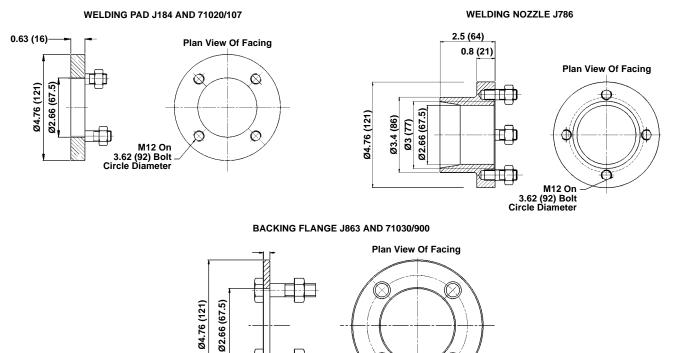
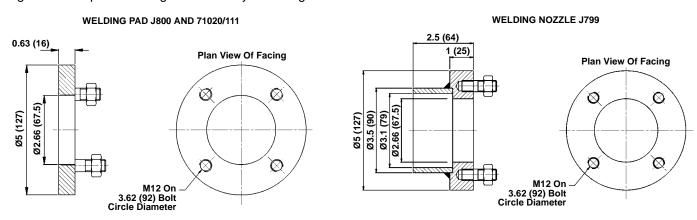


Figure 3. Companion Flanges for Mobrey 'G' Flange Switches



M12 On 3.62 (92) Bolt Circle Diameter

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 17					
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 17					
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	Carbon steel to BS 1501: 224 Grade 430B LT50
(Excludes S36 and S190)	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 18
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 18
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 4 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 \$275: 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
Ambient Temperatures Below 0°C	or steam temperatures above 482 °F (250 °C), then a suitable alternative gasket must be fitted (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 19
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.

Float Switch Specification - Marine Applications

Aluminum Bronze Wetside Mod	lels
Enclosure and Wetside	Aluminum bronze to BS1400 – AB1 maximum iron content 2.5%
End Cap	Brass
Maximum Process Temperature	See Table 5 on page 9
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 20.
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 20
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 9 for marine application switches supplied with a fitted cable.

⁽³⁾ Other approvals available. Please contact us with your requirements.

July 2010

SWITCH MECHANISM SPECIFICATIONS

TABLE 8. Electrical Switch Mechanism

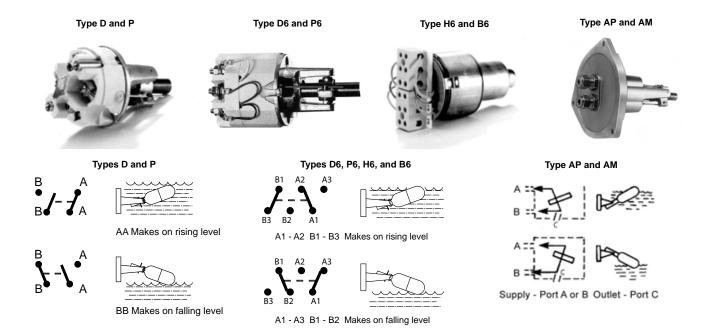
Electrical Switch Specification	D and D6	P and P6	H6 and B6						
Contact Material	Fine Silver	Gold Plated	Gold Plated						
Process Temperature	-22 to 752 °F (-30 to 400 °C)	-22 to 752 °F (-30 to 400 °C)	-148 to 482 °F (-100 to 250 °C)						
Ambient Temperature	-22 to 158 °F (-30 to 70 °C)	-22 to 158 °F (-30 to 70 °C)	-22 to 158 °F (-30 to 70 °C)						
Insulation Value	(live to earth) > 100 MEG OHM								
Terminals	D and P: M4 screws with non-rotat	D and P: M4 screws with non-rotational clamp plates.							
	D6, P6, H6, and B6: 6-way termina	I 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

TABLE 9. Pneumatic Switch Mechanism

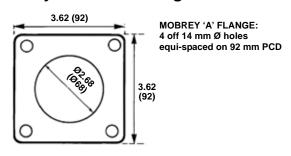
Pneumatic Switch Specification	AP	AM
Purpose	For switching circuits	For modulating air controlled circuits
Function	Change over	Continuous modulation
Air Pressure	Max. air pressure through valve is 100 psi (7 bar)	Max. air pressure through valve is 20 psi (1.4 bar)
	Max. air flow through valve is 66 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)	

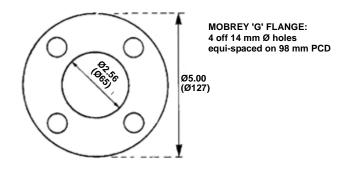


⁽²⁾ Maximum current for Type D is 8 A up to 210 °C.

Dimensional Drawings

Mobrey 'A' and 'G' Flanges



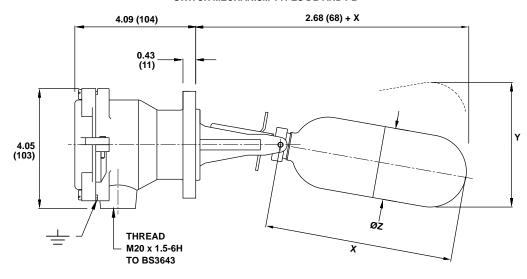


General Purpose Magnetic Float Switches (Aluminum Bronze Wetside)

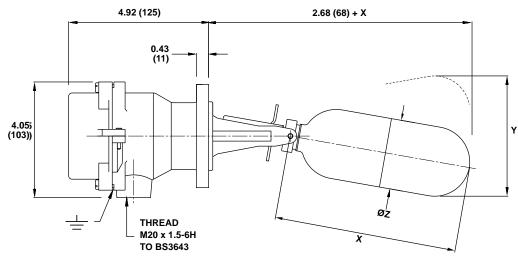
Note: See Table 10 on page 18 for dimensions X, Y, and Z

Note: Dimensions are in inches (mm)

SWITCH MECHANISM TYPES DB AND PB



SWITCH MECHANISM TYPES D6B AND P6B

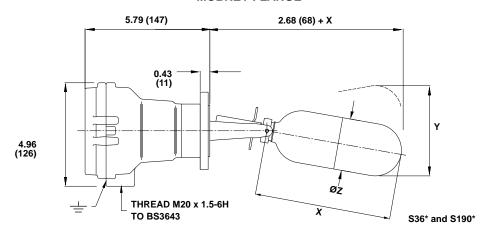


General Purpose Magnetic Float Switches (Stainless Steel Wetside)

Note: See Table 10 for dimensions X, Y, and Z

Note: Dimensions are in inches (mm)

MOBREY FLANGE



ASME B16.5 / EN1092-1 FLANGE

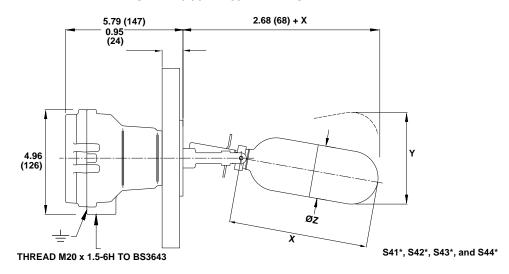


TABLE 10. Float Dimensions X, Y, and Z – General Purpose Switches

Float	Minimum	Max. Press.	Max. Temp.			Dimension	Dimension	Float
Type	S.G.	PSI (Bar) ⁽¹⁾	°F (°C)	in. (mm)	X in. (mm)	Y in. (mm)	øZ in. (mm)	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/+ ⁽²⁾	0.72 to 0.85	500 (34.5)	752 (400)	Var	iable (See page	21)	2.56 (65)	316 SST
F21/+ ⁽²⁾	0.70	435 (30)	752 (400)	Var	iable (See page	22)	5.08 (129)	316 SST
F104/+ ⁽²⁾	Various	500 (34.5)	752 (400)	As O	rdered (See pag	ge 23)	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⁾ Maximum Pressure at 68 °F (20 °C)

⁽²⁾ Refer to pages 21, 22, and 23 for technical float details and length options. See "Nozzle and Stud Lengths" on page 21 for stud lengths.

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)

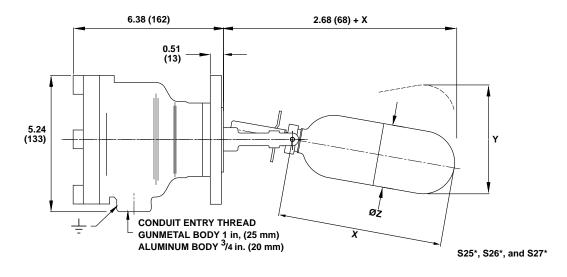


TABLE 11. Float Dimensions X. Y. and Z – Hazardous Area and Marine Switches

.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	TIBLE 11. Float Billiolisions X, 1, and 2 Flazardodo Float and Marine Gwitches									
Float	Minimum	Max. Press.	Max. Temp.	Differential	Differential Dimension Dimension		Dimension	Float		
Type	S.G.	PSI (Bar) ⁽¹⁾	°F (°C)	in. (mm)	X in. (mm)	Y in. (mm)	øZ in.(mm)	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/+ ⁽²⁾	0.72 to 0.85	500 (34.5)	752 (400)	Variable (See page 21)		2.56 (65)	316 SST		
F21/+ ⁽²⁾	0.70	435 (30)	752 (400)	Variable (See page 22)		5.08 (129)	316 SST		
F104/+ ⁽²⁾	Various	500 (34.5)	752 (400)	As Ordered	l (See page 23)		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⁾ Maximum Pressure at 68 °F (20 °C)

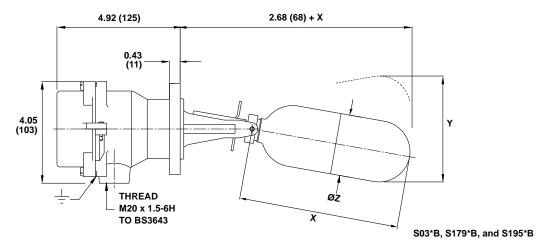
⁽²⁾ Refer to pages 21, 22, and 23 for technical float details and length options. See "Nozzle and Stud Lengths" on page 21 for stud lengths.

Marine Magnetic Float Switches

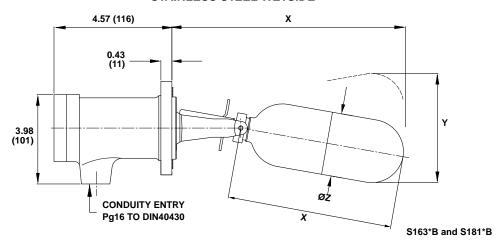
Note: See Table 11 on page 19 for dimensions X, Y, and Z

Note: Dimensions are in inches (mm)

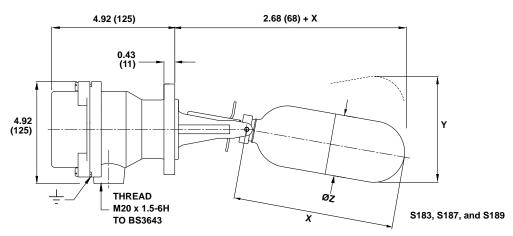
ALUMINUM BRONZE WETSIDE



STAINLESS STEEL WETSIDE



HAZARDOUS SUBMERSIBLE / HOSEPROOF



Nozzle and Stud Lengths

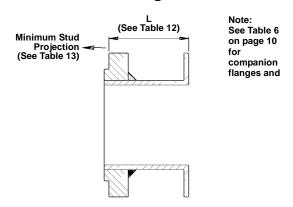


TABLE 12. Max. Length in mm (Dimension L)

	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

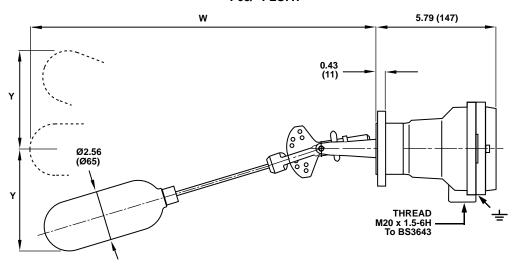
TABLE 13. Minimum Stud Projection (in mm)

Rating	G	Α			PN 16					PN 40				PN	63		15	50	30	00	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)

F68/* FLOAT



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/*

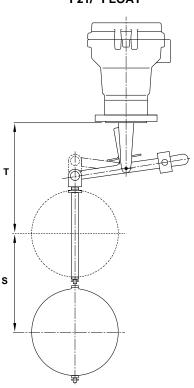
Maximum Intrusions ⁽¹⁾	F68/1	F68/2	F68/3	F68/4
Wetside in. (mm) 'W'	14.2 (360)	18.5 (470)	23.2 (590)	25.3 (643)
Minimum Tank Dimension Above/Below Centre Line (mm) 'Y'	8.5 (216)	11.5 (292)	14.5 (368)	16.0 (406)
Minimum Specific Gravity (S.G.)	0.72	0.8	0.82	0.85
Maximum Differential (mm)	9.72 (247)	14.2 (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.)

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

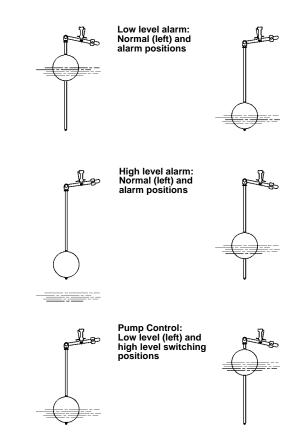
Float roads may be cut to length on site and switches set to operate at required level in either pump control or alarm mode by following the supplied setting instructions.

TABLE 15. Dimensions S and T for F21/+

Pump Differential 'S'	Alarm Lev	el in. (mm)
in. (mm)	Minimum 'T'	Maximum 'S'
0.5 to 174.0 (13 to 4420) ⁽¹⁾	6.77 (172)	173/2 (4400) ⁽¹⁾

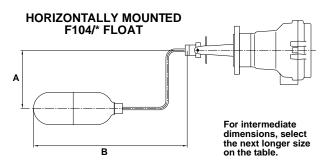
(1) When the maximum rod length is specified.

Figure 4. Pump Control And Alarm Applications



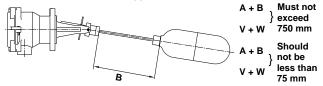
Cranked Arm Floats F104

Note: See Table 16 or Table 17 for dimensions in mm



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.



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)

													В												
	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
Α																									
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)

													В												
	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
Α																									
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														

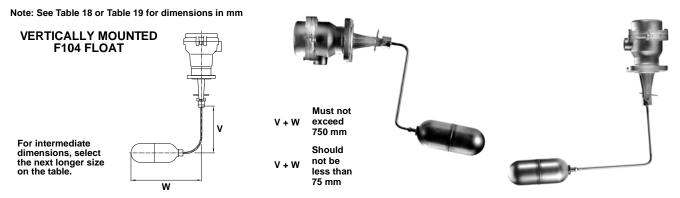


TABLE 18. Dimensions V+W with Minimum S.G. for Vertically Mounted Switches (Land Applications)

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													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
٧																									
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														

Product Data Sheet

IP101, Rev CA July 2010

Horizontal Float Switches

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 WirelessHART™
- · 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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IP116, Rev CA July 2010

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	
M-Switch Specification	page
Dimensional Drawings	nage



M-Switch Float Operated Liquid Level 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

M-Switch

Specifications: page 3 Dimensions: page 4

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	*
В	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 M	odel Number: SM B 1	

- (1) See Table 2 on page 3 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

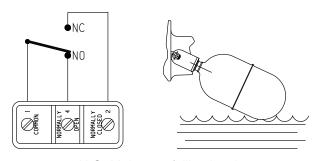
TABLE 2. Maximum Pressure Ratings

			_									
Mounting	Maximum Pressure											
Arrangement	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



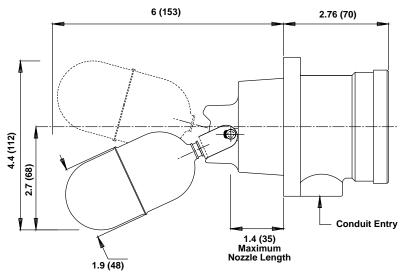
N.O. Makes on falling level

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

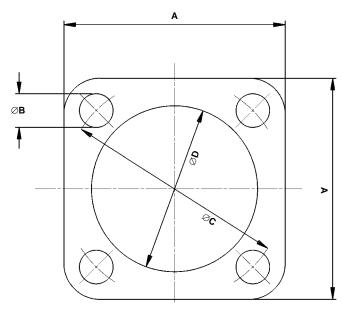


TABLE 4. Mobrey Flange Dimensions $^{(1)}$

Mobrey Flange	Α	В	С	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).

Product Data Sheet

IP116, Rev CA July 2010

M-Switch

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 WirelessHART™
- 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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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







Contents

Hydrastep
-Hydratect
Specifications
Hydrastep Specification
Hydratect Specification
Dimensional Drawingspage 8
Hydrastep Enclosure
Hydratect Enclosurepage 9



Hydrastep



Hydrastep Control Unit

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

Additional Information

Accessories: page 4 Specification: page 6 Dimensions: page 8

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 Su	pply Input Boards	
Standard		Standard
CA	16 point EGS, single power supply (ac mains)	*
СВ	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 M	odel Number: 2468 CB CD	

Hydrastep and Hydratect

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 Desig	n	
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 Bet	ween 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 E	lectrodes	
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	*
	<u>, , , , , , , , , , , , , , , , , , , </u>	+
30	Thirty 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	Carbon Steel ASTM A105/A106	Carbon Steel ASTM A105/A106 GR B	Stainless steel ASTM A312/A182 F316
Construction	GR B	body with SA 479 – 316N electrode mounts	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.

July 2010

Hydrastep and Hydratect

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 III, 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	Style	Material	Max Pressure	Max Temperature	ph
Number			PSI (Bar)	°F (°C)	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:

Dimensions:

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

page 7

page 9

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

The Expansion of the Market of Control of the Contr		
Model	Product Description	
2462	Hydratect Electronic Level Switch	
Power Su	ipply And Input Boards	
Standard		Standard
Α	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		
С	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 III 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: Manifo	ids (up to 4 ports) available for in-line/side-arm applications to special order – ask a local sales office for a manifol	d design shee

⁽¹⁾ Minimum pipe I/D for installation of insert is 1.65 in. (42 mm).

TABLE 9. Hydratect Electrode Selection Data

Part	Style	Material	Max Pressure	Max Temperature	ph
Number			PSI (Bar)	°F (°C)	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

⁽²⁾ See Table 9 for Hydratect electrode selection data. Do not mix electrode types.

Specifications

HYDRASTEP SPECIFICATION

General				
Product	Hydrastep electronic steam/water gauging sy	vstem		
Electrode Channels	8 to 32, in pairs. See Table 5 on page 4 for Hydrastep electrode specifications			
Water/Steam Threshold	0.6 μS/cm in clean water (up to 106 μS/cm);	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 to	for additional remote displays		
Electrical				
Power Supply	Power supply (ac): 94 to 130 V or 187 to 256 Power supply (dc): 20 to 40V negative groun			
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 indicati	on		
	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 125	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 c	ircuit 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 3 for the Hydrastep wat	ter column specifications		
Relative Humidity	Up to 100%			

Hydrastep and Hydratect

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) Class 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

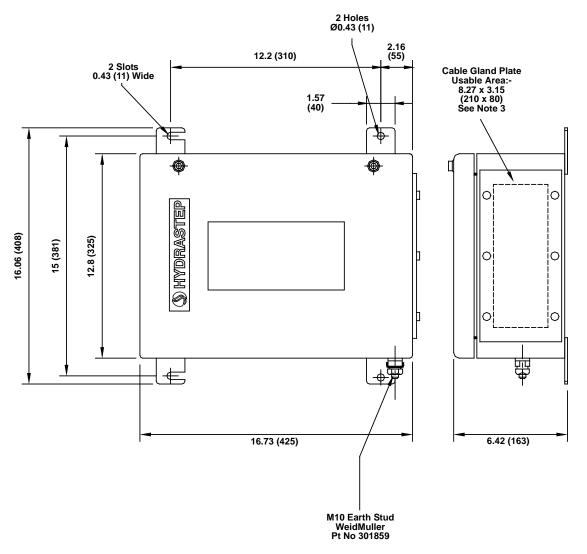
HYDRATECT SPECIFICATION

General	
Product	Hydratect steam/water detection system
Electrode Channels	2 (See Table 9 on page 5 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)

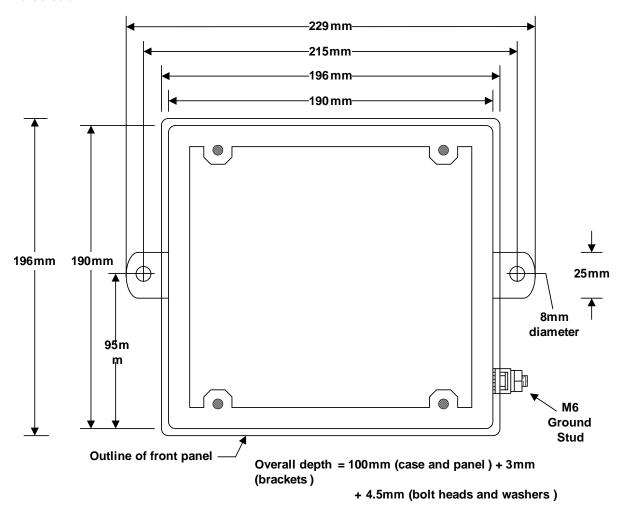


NOTES:

- 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 WirelessHART™
- 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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International:

Emerson Process Management Mobrey Measurement Division 158 Edinburgh Avenue, Slough, Berks UK SL1 4UE T +44 (0)1753 756600 F +44 (0)1753 823589 www.mobrey.com 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



Rosemount 9901 Chamber for Process Level Instrumentation

- Allows external mounting of process level instrumentation
- Enables live maintenance
- Designed to ASME B31.3
- 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
- Custom design service available



Contents

Rosemount 9901 Chamber	page 2
Chambers Technical Specification	page 8
Dimensional Drawings	page 9





Rosemount 9901 Chamber



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 8 Dimensions: page 9

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 subject to additional delivery lead time.

Model	Product Description	
9901	Chamber	
Instrumer	nt 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
С	Carbon Steel	*
S	316/316L Stainless Steel	*
Chamber	Size	
Standard		Standard
3	3 in. / 80 mm (DN80)	*
4	4 in. / 100 mm (DN100)	*
Instrumer	nt 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	I .	
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 subject to additional delivery lead time.

	panded offering is subject to additional delivery lead time.	
	ent Connection Type	
Standard		Standard
R	Raised Face (RF) flange	*
T	Ring Joint (RTJ) flange	*
Expande		
N ⁽⁶⁾	NPT thread (1-in. Bottle Style Chamber)	
Instrume	ent Gasket	
Standard	Ī	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)	*
Expande	ed .	
4	None – select this for NPT thread (1-in. Bottle Style Chamber)	
Process	Connection Orientation	
Standard	3	Standard
В	Side and Side	*
С	Side and Bottom	*
Process	Connection Size	
Standard	t control of the cont	Standard
1	1 in. / 25 mm (DN25)	*
2 ⁽¹⁰⁾	2 in. / 50 mm (DN50)	*
5 ⁽¹⁰⁾	1 ¹ / ₂ in. / 40 mm (DN40)	*
	s Connection Rating	
Standar		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	*
Standar	s Connection Type	Standard
R	Raised Face (RF) flange	
T T	Raised Face (RF) flange Ring Type Joint (RTJ) flange	*
N ⁽¹¹⁾	NPT thread	*
B ⁽¹¹⁾	BSPT thread	*
S	Socket weld	*
Units	.a	Otan de : d
Standar		Standard
E	Imperial (English), feet and inches	*
M Contor t	Metric, meters and millimeters	*
	to-Center [feet or meters] (See dimension B on pages 9 and 12)	<u> </u>
Standar		Standard
XX	Feet or Meters (e.g. 2 ft or 2 m is code 02)	*
	to-Center [inches or millimeters] (See dimension B on pages 9 and 12)	
Standar		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 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.	<u> </u>
9	½ in.	*
1	1 in.	*
4	None	*
Drain Type	Note	
Standard		Standard
R ⁽¹²⁾	Raised Face (RF) flange	→ tandard
T ⁽¹²⁾	Ring Joint (RTJ) flange	*
N ⁽¹³⁾	NPT thread	*
B ⁽¹³⁾	BSPT thread	*
	Socket weld	
S		*
X	None	*
Vent		Cton done
Standard	No years as an insul	Standard
X	No vent required	*
V	Vent required	*
Vent Size		0, 1, 1
Standard	To a second seco	Standard
8	½ in.	*
9	% in.	*
1	1 in.	*
4	None	*
Vent Type		
Standard	D: 15 (DE) (I	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	*
	on (See "Order Options – MUST BE SPECIFIED AT TIME OF ORDER" on page 6)	
Expanded		
L4 ⁽¹⁴⁾⁽¹⁵⁾	316 Stainless Steel Bolting (Restricted Pressure and Temperature – see Table 5 on page 8)	
_	s (See page 6 for full description)	
Expanded		
SP ⁽¹⁶⁾	Standard Primer	
WE ⁽¹⁶⁾	Primer and White Epoxy	
Schedule 80	Chamber Body Piping Option (See "Order Options – MUST BE SPECIFIED AT TIME OF ORDER" on page 6)	
Expanded	· · · · · · · · · · · · · · · · · · ·	
CA ⁽¹⁷⁾	Schedule 80 piping for ASME B16.5 Class 150 or Class 300 flanged connections	
	Compensation Option (See "Order Options – MUST BE SPECIFIED AT TIME OF ORDER" on page 6)	
Standard		Standard
G1 ⁽¹⁸⁾	GWR vapor compensation probe < 78.7 in. (2000 mm)	*
G2 ⁽¹⁸⁾	GWR vapor compensation probe > 78.7 in. (2000 mm)	*
	dication Option (See "Order Options – MUST BE SPECIFIED AT TIME OF ORDER" on page 6)	
Expanded	, , , , , , , , , , , , , , , , , , ,	
MB	Mid-band indication for vertical level switch	+
	e Options (See "Order Options - MUST BE SPECIFIED AT TIME OF ORDER" on page 6)	
Expanded	Topinon (200 a. aux opinono micor de di Edit indi in inite di ditalità di page o)	
Q15	NACE MR0175 / ISO 15156	+
		1
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 subject to additional delivery lead time.

THE Expan	ded offering is subject to additional delivery lead time.	
Weld Inspec	tion (Chamber Body) Option (See "Order Options – MUST BE SPECIFIED AT TIME OF ORDER" on page 6)	
Expanded		
Q81	X-Ray 100% of main chamber body butt welds	
Weld Inspec	tion (Branch Connection) Options (See "Order Options – MUST BE SPECIFIED AT TIME OF ORDER" on page 6)	
Expanded		
Q73	Dye Penetrant (stainless steel material only)	
Q82	Magnetic Particle Inspection (carbon steel material only)	
Hydrostatic	Pressure Test Option (See "Order Options – MUST BE SPECIFIED AT TIME OF ORDER" on page 6)	
Standard		Standard
Q5 ⁽¹⁹⁾	Hydrostatic Pressure Test Certification	*
Material Cer	tification Options (See "Order Options – MUST BE SPECIFIED AT TIME OF ORDER" on page 6)	
Standard		Standard
Q8	Material Traceability Certificate (EN10204 3.1)	*
Assemble-to	Option (See "Order Options – MUST BE SPECIFIED AT TIME OF ORDER" on page 6)	
Standard		Standard
XC	Consolidate to Transmitter/Switch	*
Assemble T	Order Option (See "Order Options – MUST BE SPECIFIED AT TIME OF ORDER" on page 6)	
Expanded		
RXXXX	Specials	
Typical Mo	del 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 1¹/₂-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) Alloy steel bolting is supplied as standard. See Chamber Materials on page 8 for further details.
- (15) When using the option of stainless steel bolting, see Instrument Bolting on page 6.
- (16) Available with chamber material code C only; black paint is used if the paint option is not specified.
- (17) This option is not available for instrument type code $\it V$.
- (18) Available only for instrument type code G. The G1 and G2 option codes ensure the 9901 has correct dimensions for a vapor compensation probe.
- (19) 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

Instrument Bolting

A range of alloy steel bolting is used as standard (see page 8 for details). However, stainless steel bolting is an available option for chamber ratings up to and including ASME B16.5 Class 600 and EN1092 PN100.

NOTE:

When stainless steel bolting is used and the chamber ratings are *below* ASME B16.5 Class 600 and EN1092 PN63, the maximum chamber temperature is 752 °F (400 °C) and the maximum pressure ratings are detailed in Table 2.

When stainless steel bolting is used and the chamber ratings are ASME B16.5 Class 600, EN1092 PN63, or EN1092 PN100, the maximum chamber temperature is limited to 392 °F (200 °C.) and the maximum pressure ratings are detailed in Table 3.

TABLE 2. Maximum Pressure Ratings for Chambers rated below ASME B16.5 Class 600 or EN1092 PN63 - PSI and Bar

Chamber Rating	Carbon Stee	el Chamber (W	ith Stainless S	teel Bolting)	Stainless Steel Chamber (With Stainless Steel Bolting)				
(Max. Class 300/PN40)	PSI (68 °F)	Bar (20 °C)	PSI (752 °F)	Bar (400 °C)	PSI (68 °F)	Bar (20 °C)	PSI (752 °F)	Bar (400 °C)	
ASME B16.5 Class 150	285	19.6	95	6.5	275	19	95	6.5	
ASME B16.5 Class 300	740	51.1	505	34.7	720	49.6	425	29.4	
EN1092 PN16	232	16	137	9.5	227	15.7	134	9.3	
EN1092 PN25	362	25	214	14.8	356	24.6	211	14.6	
EN1092 PN40	580	40	345	23.8	569	39.3	339	23.4	

TABLE 3. Maximum Pressure Ratings for Chambers rated ASME B16.5 Class 600 or EN1092 PN63/PN100 - PSI and Bar

Chamber Rating	Carbon Stee	el Chamber (W	ith Stainless St	teel Bolting)	Stainless Steel Chamber (With Stainless Steel Bolting)				
(Max. Class 600/PN100)	PSI (68 °F)	Bar (20 °C)	PSI (392 °F)	Bar (200 °C)	PSI (68 °F)	Bar (20 °C)	PSI (392 °F)	Bar (200 °C)	
ASME B16.5 Class 600	1480	102.1	1268	87.6	1440	99.3	1032	71.3	
EN1092 PN63	913	63	761	52.5	899	62	645	44.5	
EN1092 PN100	1450	100	1208	83.3	1427	98.4	1025	70.7	

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 or ASME B16.5 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.

July 2010

Chambers Technical Specification

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
Standard Alloy Steel Studbolts	ASTM A193 B7	ASTM A320 L7
Standard Alloy Steel Nuts	ASTM A194 2H	ASTM A194 Grade 7 + S3
Stainless Studbolts (maximum PN40/Class 300)	ASTM A193 B8M CI 1	ASTM A193 B8M CI 1
Stainless Nuts (maximum PN40/Class 300)	ASTM A194 Grade 8M	ASTM A194 Grade 8M
Stainless Studbolts (maximum PN100/Class 600)	ASTM A193 B8M CI 2	ASTM A193 B8M CI 2
Stainless Nuts (maximum PN100/Class 600)	ASTM A194 Grade 8M	ASTM A194 Grade 8M

PRESSURE RATINGS

TABLE 5. Maximum Pressure Ratings for 9901 Chambers with Alloy Steel Bolting - PSI and Bar

		Carbon Ste	el Chamber		Stain			
Chamber Rating ⁽¹⁾	PSI (68 °F)	Bar (20 °C)	PSI (752 °F)	Bar (400 °C)	PSI (68 °F)	Bar (20 °C)	PSI (752 °F)	Bar (400 °C)
ASME B16.5 Class 150	285	19.6	95	6.5	275	19	95	6.5
ASME B16.5 Class 300	740	51.1	505	34.7	720	49.6	425	29.4
ASME B16.5 Class 600	1480	102.1	1015	69.4	1440	99.3	855	58.9
ASME B16.5 Class 900	2220	153.2	1520	104.2	2160	148.9	1280	88.3
ASME B16.5 Class 1500	3705	255.3	2517	173.6	3600	248.2	2135	147.2
EN1092 PN16	232	16	137	9.5	227	15.7	134	9.3
EN1092 PN25	362	25	214	14.8	356	24.6	211	14.6
EN1092 PN40	580	40	345	23.8	569	39.3	339	23.4
EN1092 PN63	913	63	543	37.5	899	62	536	37
EN1092 PN100	1450	100	862	59.5	1427	98.4	851	58.7
EN1092 PN160	2320	160	1380	95.2	2291	158	1361	93.9
EN1092 PN250	3625	250	2157	148.8	3567	246	2132	147

⁽¹⁾ When using the optional stainless steel bolting, see Instrument Bolting on page 6.

TEMPERATURE RATINGS

TABLE 6. Chamber Temperature Ratings

Material	Chamber Temperature Range (1)
Carbon Steel Chamber	14 to 752 °F (-10 to 400 °C)
Stainless Steel Chamber	-148 to 752 °F (-100 to 400 °C)

When using the optional stainless steel bolting, see Instrument Bolting on page 6.

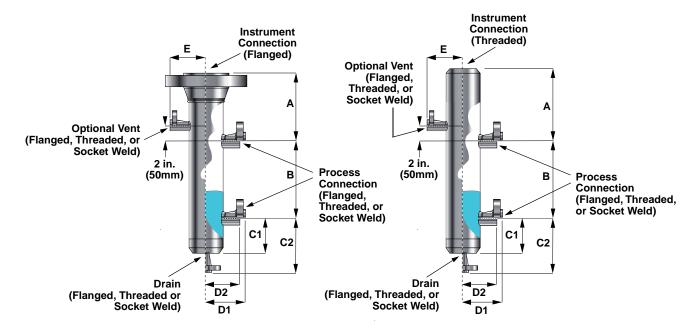
Dimensional Drawings

STANDARD DESIGN

Side-and-Side Chambers

Note

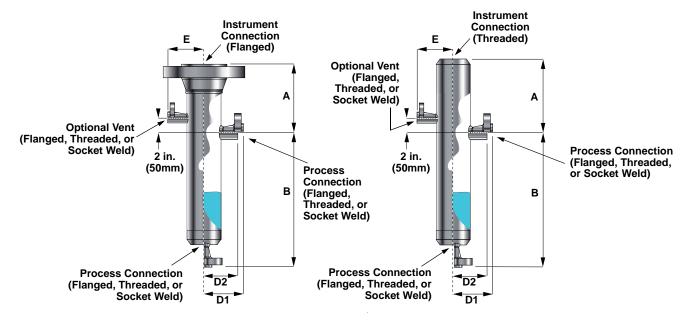
This chamber is available for Instrument Type Codes D, V, and G. See "9901 Ordering Information" on page 2 for an explanation of the codes. Dimensions A, C, D, and E are in the tables on pages 10 to 11. Specify center-to-center dimension B when ordering.



Side-and-Bottom Chambers

Note:

This chamber design is available for Instrument Type Codes D, V, and G. See "9901 Ordering Information" on page 2 for an explanation of the codes. Dimensions A, D, and E are in the tables on pages 10 to 11. Specify center-to-center dimension B when ordering.



Rosemount 9901

TABLE 7. Dimension A for Side-and-Side and Side-and-Bottom Chamber

			3-in. (80-mm) DN80 Chamber				4-in. (100-mm) DN100 Chamber			
Instrument	Instrument		No Ven	t Fitted	Vent	Fitted	No Ven	t Fitted	Vent	Fitted
Connections		Instrument Type Code ⁽¹⁾	ln.	mm	ln.	mm	ln.	mm	ln.	mm
ASME B16.5	RF	D	15.75	400	15.75	400	15.75	400	15.75	400
Class 150	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	G	10.83	275	10.83	275	10.83	275	10.83	275
ASME B16.5	RF	D	15.75	400	15.75	400	15.75	400	15.75	400
Class 300	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	G	10.83	275	10.83	275	10.83	275	10.83	275
ASME B16.5	RF	D	15.75	400	15.75	400	15.75	400	15.75	400
Class 600	RF / RTJ	V	-	_	_	_	7.05 / 6.85	179 / 174	9.02 / 8.82	229 / 224
	RF	G	10.83	275	10.83	275	10.83	275	10.83	275
ASME B16.5	RF	D	15.75	400	15.75	400	15.75	400	15.75	400
Class 900 or	RF	V	-	_	_	_	_	_	_	-
Class 1500	RF	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	RF	D	15.75	400	15.75	400	15.75	400	15.75	400
EN1092 PN40	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	RF	D	15.75	400	15.75	400	15.75	400	15.75	400
or	RF	V	-	-	-	-	-	-	-	_
EN1092 PN250	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 2 for explanation of code.

TABLE 8. Dimensions C1 and C2 for Side-and-Side Chamber

Drain	Instrument	3-in. (80-mm) [ON80 Chamber	4-in. (100-mm) DN100 Chamber		
Connections	Type Code ⁽¹⁾	ln.	mm	ln.	mm	
Dimension C1:	D and V	6.30	160	6.30	160	
SW/Threaded Drain or No Drain	G	11.42	290	11.42	290	
Dimension C2:	D and V	9.45	240	9.45	240	
Flanged Drain	G	14.57	370	14.57	370	

⁽¹⁾ See "Rosemount 9901 Chamber" on page 2 for further information.

TABLE 9. Dimension D1 for Side-and-Side and Side-and-Bottom Chamber (Flanged Process Connections)

Flanged P	rocess	3-in. (80-mm) DN80 Chamber						4-in. (100-mm) DN100 Chamber					
Connection		ln.	mm	ln.	mm	ln.	mm	ln.	mm	ln.	mm	ln.	mm
ASME B16	5.5 ⁽¹⁾	Clas	s 150	Clas	s 300	Clas	s 600	Clas	s 150	Clas	Class 300		s 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 P	rocess		3-in.	(80-mm) I	DN80 Chai	mber		4-in. (100-mm) DN100 Chamber					
Connection		ln.	mm	ln.	mm	ln.	mm	ln.	mm	ln.	mm	ln.	mm
ASME B16.5		Class 900		Class 1500				Clas	s 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 (P	N) ⁽¹⁾	EN PN16		EN PN25		EN PN40		EN F	N16	EN F	N25	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 (P	N) ⁽¹⁾	EN PN63/PN100		EN P	N160	EN P	N250	EN PN63/100		0 EN PN160		EN P	N250
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.

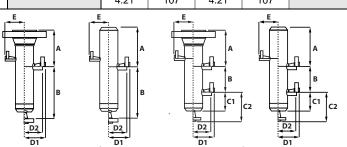
TABLE 10. Dimension D2 for Side-and-Side and Side-and-Bottom Chamber (Threaded/Socket Weld Connections)

Threaded or SW Process Connections	3-in. (80-mm) [ON80 Chamber	4-in. (100-mm) DN100 Chamber			
	ln.	mm	ln.	mm		
1 in. (25 mm)	3.74	95	4.21	107		

TABLE 11. Dimension E for Side-and-Side and Side-and-Bottom Chamber

Vent			3-in. (80-mm) DN80 Chamber							(100-mm)	DN100 Ch	amber			
Connection	ons	ln.	mm	ln.	mm	In.	mm	ln.	mm	ln.	mm	ln.	mm		
ASME B16	6.5 ⁽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	6.5 ⁽¹⁾	Clas	s 900	Class	1500			Clas	s 900	Class	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 (P	PN) ⁽¹⁾	PN	116	PI	N25	PN	140	PI	116	PI	125	PI	N40		
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 (P	092 (PN) ⁽¹⁾ PN63/P		PN63/PN100 PN		PN63/PN100		160	PN	250	PN6	3/100	PN	160	PN	250
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-Flang	jed		BSPT	Socke	t Weld			NPT/	BSPT	Socke	et Weld				
_	n, 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 12. Dimension A for T-Piece Side-and-Side and Side-and-Bottom Chamber

				3-in. (80-mm) I	ON80 Chamber		
Flanged Instrument		Instrument Type	No Ven	t Fitted	Vent Fitted		
Connection	ıs ⁽¹⁾	Code (2)	ln.	mm	In.	mm	
ASME	RF	D	15.75	400	15.75	400	
B16.5	RF/RTJ	V	6.10 / 6.38	155 / 162	10.43 / 10.70	265 / 272	
Class 150	RF	G	10.83	275	10.83	275	
ASME	RF	D	15.75	400	15.75	400	
B16.5 Class 300	RF/RTJ	V	6.50 / 6.81	165 / 173	10.83 / 11.14	275 / 283	
	RF	G	10.83	10.83 275		275	
ASME	RF	D	15.75	400	15.75	400	
B16.5	RF/RTJ	V	-/-	-/-	-/-	-1-	
Class 600	RF	G	10.83	275	10.83	275	
EN1092	RF	D	15.75	400	15.75	400	
PN16	RF/RTJ	V	5.35 / –	136 / –	9.69 / –	246 / –	
	RF	G	10.83	275	10.83	275	
EN1092	RF	D	15.75	400	15.75	400	
PN25	RF/RTJ	V	5.67 / –	144 / –	10.00 / –	254 / –	
or PN40	RF	G	10.83	275	10.83	275	
EN1092	RF	D	15.75	400	15.75	400	
PN63	RF/RTJ	V	-/-	-/-	-/-	-1-	
or PN100	RF	G	10.83	275	10.83	275	

⁽¹⁾ RF = Raised Face flange. RTJ = Ring Type Joint flange.

TABLE 13. Dimension C1 for T-Piece Side-and-Side Chamber

Drain	3-in. (80-mm) DN80 Chamber										
Connections	ln.	mm	In.	mm	ln.	mm					
Threaded or Socket Weld	Instrument Type Code D ⁽¹⁾			ument ode 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					

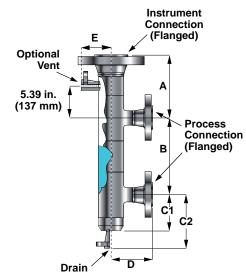
⁽¹⁾ See "Rosemount 9901 Chamber" on page 2 for explanation of code.

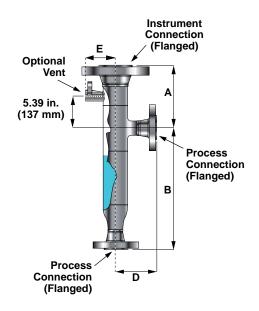
TABLE 14. Dimension C2 for T-Piece Side-and-Side Chamber

Drain			3-in. (80-mm) DN80 Chamber									
Connection	ıs	In.	mm	ln.	mm	ln.	mm					
ASME B16.5 (1)		Instrument Type Code D (2)		Instrument Type Code V ⁽²⁾		Instrument Type Code G (2)						
¹ /2-in.	RF	7.68	195	7.68	195	14.57	370					
Class 150	RTJ	_	_	_	_	14.57	370					
³ /4-in.	RF	7.87	200	7,87	200	14.57	370					
Class 150	RTJ	_	_	_	_	14.57	370					
1-in.	RF	7.99	203	7.99	203	14.57	370					
Class 150	RTJ	8.23	209	8.23	209	14.57	370					
¹ /2 in.	RF	7.87	200	7.87	200	14.57	370					
Class 300 RTJ		8.07	205	8.07	205	14.57	370					
Continued of	n the next	page										

Note:

This chamber design is available for Instrument Type Codes D, V, and G. See "9901 Ordering Information" on page 2 for an explanation of the codes. Dimensions A, C, D, and E are in the tables on pages 12 to 13. Specify center-to-center dimension B when ordering.





Note: Drain and vent can be a flanged, threaded, or socket weld type.

⁽²⁾ See "Rosemount 9901 Chamber" on page 2 for explanation of code.

Drain			3-in. ((80-mm) [DN80 Cha	amber		
Connection	ıs	ln.	mm	ln.	mm	ln.	mm	
ASME B16.	ASME B16.5 ⁽¹⁾		iment ode D ⁽²⁾		iment ode V ⁽²⁾	Instrument Type Code G ⁽²⁾		
³ /4 in.	RF	8.07	205	8.07	205	14.57	370	
Class 300	RTJ	8.31	211	8.31	211	14.57	370	
1-in.	RF	8.23	209	8.23	209	14.57	370	
Class 300	RTJ	8.46	215	8.46	215	14.57	370	
¹ /2 in.	RF	8.11	206	8.11	206	14.57	370	
Class 600	RTJ	8.11	206	8.11	206	14.57	370	
³ /4 in.	RF	8.31	211	8.31	211	14.57	370	
Class 600	RTJ	8.31	211	8.31	211	14.57	370	
1 in.	RF	8.46	215	8.46	215	14.57	370	
Class 600	RTJ	8.46	215	8.46	215	14.57	370	
EN1092 (PN	۱) ⁽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. P63/10	0 RF	8.07	205	8.07	205	14.57	370	

Table 14 continued from previous page

TABLE 15. Dimension D for T-Piece Side-and-Side Chamber

Flanged Prod	cess		3-in. ((80-mm) I	DN80 Cha	mber			
Connections		ln.	mm	ln.	mm	ln.	mm	ln.	mm
ASME B16.5	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)	N 1092 (PN) ⁽¹⁾		PN16		PN25/40		163	PN	100
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 16. Dimension E for T-Piece Side-and-Side and Side-and-Bottom Chamber

Vent			3-	in. (80-mm) l	DN80 Chaml	ber			
Connection	ons	In.	mm	ln.	mm	ln.	mm		
ASME B1	ASME B16.5 (1)		s 150	Clas	s 300	Clas	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 (F	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-Flan	ged	NPT	/BSPT	Socke	t 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.

⁽¹⁾ RF = Raised Face flange. RTJ = Ring Type Joint flange.

⁽²⁾ See "Rosemount 9901 Chamber" on page 2 for explanation of code.

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