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Flow Measurement

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Overview

	Application	Description	Catalog page	Software for parameterization
SITRANS F M electromagnetic flowmeters - Pulsed DC magnetic flowmeter				
	Designed in robust IP67 polyamide enclosures for compact or remote mounting. 19", back of panel and front of panel enclosure program.	**Transmitter MAG 5000/6000** • Superior signal resolution for optimum turn down ratio • Comprehensively self-diagnostic, for error indication and logging • Multi-lingual display and keypad interface • Custody transfer approval: PTB, OIML R 75, OIML R 117, OIML R 49 and MI-001	4/33	SIMATIC PDM
	Designed in robust die-cast aluminum enclosure for demanding applications and where explosion proof protection is necessary.	**Transmitter MAG 6000 I/6000 I Ex de** • Remote and compact mounting with all sensors • Explosion proof design: ATEX II 2(1)(2) GD and FM Class 1, Div. 2 • Multi-lingual display and touchpad keypad • Comprehensively self-diagnostic	4/45	SIMATIC PDM
	Designed for the general industry environment. The obstructionless performance of this sensor is unaffected by the suspended solids, viscosity and temperature challenges.	**Flow sensor MAG 1100** • Metering tube DN 2 ... DN100 (1/12“ ... 4“) flangeless design. • Corrosion-resistant AISI 316 stainless steel housing. • Highly resistant liner (ceramic or PFA) and electrodes fitting most extreme process media. • Temperature rating up to 200 °C (390 °F) • ATEX II 2(1) GD approval version • FM Class, 1 Div 2	4/50	
	Specially designed for the food & beverage and pharmaceutical industry.	**Flow sensor MAG 1100 F** • AISI 316 stainless steel enclosure • Hygienic seal, 3A and EHEDG • Easy to clean • Supplied with connections according to your specification • ATEX II 2(1) GD approval version • FM class 1 Div 2	4/58	
	Designed for all water and waste water applications in water plants and industrial applications.	**Flow sensor MAG 5100 W** • Metering tube DN 15 ... DN 1200 (DN 2000) (½"˙ ... 48" (78“)) • Hard Rubber or EPDM lining • Integral grounding electrodes as standard • Increased low flow accuracy for water leak detection • Drinking water approvals and custody transfer approvals , OIML R 49, MI-001 and PTB	4/69	

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	Application	Description	Catalog page	Software for parameterization
	The MAG 3100 series with its flexibility in the choice of liner, electrode and flange material allows the measurement of even the most extreme process media.	**Flow sensor MAG 3100** • For a wide range of pipe dimensions: DN 15 ... DN 2000 (½" ... 78") • Wide range of liner and electrode materials • High-temperature version for application with temperatures up to 180 °C (355 °F) • High-pressure solutions • Approved according to PTB, OIML R 75, OIML R 117, CSA/FM and ATEX	4/87	
SITRANS F M electromagnetic flowmeters - High-power AC magnetic flowmeter				
	Designed for heavy-duty applications like pulp & paper stock over 3 %; heavy mining slurries and mining slurries with magnetic particles.	**Transmitter TRANSMAG 2** • Magnetic flowmeter with a very strong pulsed AC magnetic field • PROFIBUS PA or HART communication • Self-test function	4/103	SIMATIC PDM
	Designed for heavy-duty applications-like pulp & paper stock over 3 %; heavy mining slurries and mining slurries with magnetic particles.	**Flow sensor 911/E** • Metering tube: DN 15 ... DN 1000 (½" ... 40") • Metering tube liner: Hard Rubber, Linatex, Soft rubber. PTFE and Novolak • Integral smartPLUG for storing of calibration values • Temperature of medium: -20 ... +150 °C (-4 ... +302 °F)	4/103	
SITRANS F M electromagnetic flowmeters - Battery-operated magnetic water meter				
	Battery-operated electromagnetic water meter for water applications within abstraction, distribution network, revenue metering and irrigation.	**Water meter MAG 8000** • Battery-operated water meter • Metering tube DN 25 ... DN 1200 (1" ... 48") • Remote and compact installation IP68/ NEMA 6P enclosure • Custody transfer approval: OIML R 49 and MI-001 • Drinking water approvals	4/113	SIMATIC PDM and Flow Tool

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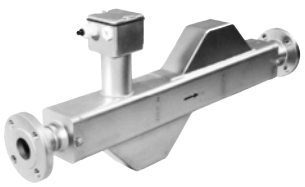
	Application	Description	Catalog page	Software for parameterization
SITRANS F C mass flowmeters				
	Measurement of gases Measurement of mass flow and temperature	**Flow sensor FCS200** • DN 10, DN 15, DN 25 • Flow from 0 ... 30 000 kg/h • Pipe material: Hastelloy C22 • Accuracy: ± 0.5 % of rate • Process temperature: -40 ... +125 °C (-40 ... 257 °F) • Pressure: Up to 350 bar • Approvals: Ex II 1/2G Ex ia IIC T5/T4 and Ex ia IIC T5/T4	4/168	
	Measurement of liquids and gases. Measurement of mass flow, density, temperature and fraction e.g. °Brix or °Plato.	**Flow sensors MASS 2100 (Single tube design) and FC300** • DI 1.5, DI 3, DI 6, DI 15, DI 25, DI 40 and DN 4 • Flow from 0.1 ... 52 000 kg/h (114 640 lb/h) • Pipe material: Stainless steel AISI 316L/ 1.4435; Hastelloy C22/2.4602 • Accuracy, typically: - Flow: ≤ 0.1 % of flow rate - Density: ≤ 0.0005 g/cm^3 • Liquid temp./pressure: -50 ... +180°C (-58 ... +356 °F) / Up to 410 bar (5946 psi) • Approved according to ATEX EEx ia IIC T3 ... T6	4/173, 4/177	
 	Measurement of liquids and gases. Measurement of mass flow, density, temperature and fraction e.g. °Brix or °Plato.	**Flow sensor MC2 (Dual tube design)** • Standard MC2 - DN 50, DN 65, DN 80, DN 100 and DN 150 - Flow from 0 ... 510 000 kg/h (112 400 lb/h) - Tube material: AISI 316Ti/1.4571 and Hastelloy C4/2.4610 • Hygienic MC2 - Approvals: EHEDG - DN 20, DN 25, DN 40, DN 50, DN 65 and DN 80 - Flow from 0 ... 113 600 kg/h (250 000 lb/h) - Tube material: AISI 316L/1.4435 - Connectors: DIN 11851, DIN 32676 and DIN 11864-2A • Accuracy: ≤ 0.15 % of rate • Density: ≤ 0.001 g/cm^3 • Liquid temp.: -50 ... +180 °C (-58 ... +356 °F) • Pressure: < 100 bar (1450 psi) • Approvals: ATEX EEx em [ib] IIC T2 ... T6	4/193	
	Measurement of liquids and gases Multiparameter transmitter for remote or compact mounting measuring mass flow, density, temperature and fraction e.g. °Brix and °Plato	**Transmitters MASS 6000 (IP67, 19“, Ex d) and SIFLOW FC070** • Digital signal processing measuring 30 times a second. • 3 current, 2 freq. and 2 relay outputs • Adaptive batch function • SENSORPROM memory unit making it easy to start up the flowmeter. • Easy retrofitting of communication modules (AOM) • Approved according to ATEX [EEx ia] IIC / EEx de [ia/ib] IIC T6	4/146, 4/164	SIMATIC PDM

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	Application	Description	Catalog page	Software for parameterization
SITRANS F US ultrasonic inline flowmeters				
	SITRANS FUS060 is a time based transmitter designed for ultrasonic flowmetering in pipes for the F US inline industry series up to DN 4000	**SITRANS FUS060 transmitter** • Die cast aluminum enclosure • EEx approved according to ATEX • HART communication + 1 analog output, 1 digital output for frequency or pulse and 1 relay output for alarms and flow direction • PROFIBUS PA communication with 1 digital output for frequency or pulse • Multi-functional output for process control • Easy menu based local operation with two-line display	4/215	SIMATIC PDM
	SITRANS FUS080 is a time based transmitter designed for ultrasonic flowmetering in pipes for the SONOKIT, FUS380 and FUE380 series up to DN 1200	**SITRANS FUS080 transmitter** • Battery or mains powered • Easy one-button operation • Bidirectional measuring • Modbus communication • Robust poyamide enclosure	4/221	SIMATIC PDM
	The main application for SONO 3300 ultrasonic flowmeters is to measure the volume flow of: • Water and treated waste water • Oil and liquefied gases • Hot water/cooling systems	**SONO 3300/FUS060** • ATEX-approved • DN 50 … DN 300 (2" … 12") steel pipes • PN 10 ... PN 40 or class 150 ... class 300 pressure rates • Flow 0.3 … 3200 m^3/h (1.3 ... 14 089 GPM) • No pressure drop • FUS060 transmitter for separate mounting • Signal cables from sensor to transducer are highly protected from aggressive environment by stainless steel pipes	4/227	SIMATIC PDM
	The main application for SONO 3100 ultrasonic flowmeters is to measure the volume flow of: • Water and treated waste water • Oil and liquefied gases • Liquid cryogenic application • District heating systems	**SONO 3100/FUS060** • DN 100 ... DN 1200 (4" ... 48") • Pipe in carbon or stainless steel • Transducers can be replaced under pressure • FUS060 transmitter for separate mounting • ATEX-approved • Measure of all liquids less than 350 Cst, conductive or non-conductive • No pressure drop • 4-track on request • Special material on request	4/234	SIMATIC PDM
	Installation of one, two or four transducer sets in existing concrete or steel pipes.	**SONOKIT** • FUS060 or FUS080 transmitter for separate mounting • DN 100 ... DN 4000 (4" ... 160") • Control and display unit • Temperature of medium: -20 ... +200 °C (-4 ... +395 °F) • Installation on empty pipes or pipes under pressure (hot-tap installation)	4/243	SIMATIC PDM

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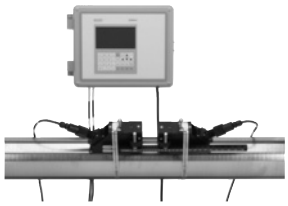
	Application	Description	Catalog page	Software for parameterization
	Battery or mains-powered ultrasonic flowmeter for use within water-based district heating, cooling systems and utility. The FUS380 can also be used for water irrigation systems. SITRANS FUS380/FUE380 are designed to work with the SITRANS FUE950 energy calculator.	**FUS380/FUE380** • *FUS380/FUE380:* DN 50 ... DN 1200 (2" ... 48") • *FUE380:* Approved for custody transfer according to EN 1434 Class 2, OIML R 75 and MID • *FUS380/FUE380:* Red brass or painted carbon steel flanges and metering tube. AISI transducers • Water temperatures 2 … 200 °C (35.6 ... 392 °F) • Battery or mains-powered	4/254, 4/259	SIMATIC PDM
	Universal thermal energy calculator for district heating and cooling applications.	**SITRANS FUE950** • Battery or mains-powered • 24 periods memory • Up to 2 slots for plug-in modules as data output, extra input, M-Bus, RS232/RS485, current output • Complete set with temperature sensors and pockets • MID heating approval, PTB K7.2 cooling approval	4/269	
	Battery-operated ultrasonic retrofit flowmeter for water applications within irrigation. Installation of one or two transducer sets in existing PVC or concrete pipes.	**SITRANS FUS880** • MID custody transfer approval • Irrigation flowmeter FUS880 • Battery or mains-powered • DN 200 ... DN 1200 (8" ... 48") • Wetted transducer technology • Remote installation IP67	4/280	SIMATIC PDM
	Accessories and spare parts for older flowmeter systems type SITRANS F US SONOFLO	Spare parts for sensors and transmitters of older flowmeter type SONOFLO: E.g. transducer type SONO 3200, coaxial cables, SONO 3000 transmitter spare parts, SENSORPROM	4/285	
SITRANS F US ultrasonic clamp-on flowmeters				
	The thickness gauge can be used in any field application where there is a need for flow measurement. Including but not limited to: • Water and waste water • Energy measurement • Oil and gas industries	**Thickness gauge** The hand-held micro-processor controlled gauge is designed to measure the thickness of various metallic or non-metallic pipes. • Materials include steel, aluminum, titanium, plastics and ceramics • Measurements shown in millimeter or inches • Simple-to-read 4-digit LCD display • Weights 150 g (5.3 oz) • Battery operation for 250 h	4/303	
	Dedicated flowmeters are suitable for a wide variety of liquid applications, including those in the: • Water Industry • Wastewater Industry • HVAC Industry • Power Industry • Processing Industry	**SITRANS FUS1010 General purpose** • Suitable for virtually any liquid, even those with high aeration or suspended solids. • Full range of safety approvals, I/O's and enclosure types available • Has wide applicability but not the special functions found in FUH1010, FUG1010 and FUE1010 meters • Hazardous area approvals: FM, CSA, ATEX	4/304	

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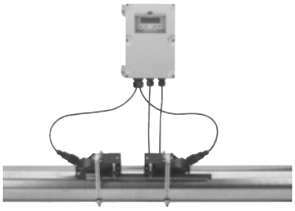
	Application	Description	Catalog page	Software for parameterization
	Dedicated flowmeter is a basic option for many clean liquid applications in the: • Water Industry • Wastewater Industry • HVAC & Power Industries • Processing Industry	**SITRANS FST020 Basic** • Has FUS1010 system function but without the same I/O capability or safety approval ratings • This basic meter is intended for single liquid applications that do not require these features • Not available with hazardous area approvals • Unclassified, ordinary locatons approvals: UL, C-UL, CE and C-TICK	4/314	
	Portable flowmeters are suitable for a wide variety of liquid applications, including those in the: • Water Industry • Wastewater Industry • HVAC Industry • Power Industry • Processing Industry	**SITRANS FUP1010 Portable** • Basic function portable meter • Has all the capabilities of the FUS1010 meter but in a battery-powered, portable configuration • Ideal for high-accuracy flow survey applications • Not available with hazardous area approvals • Unclassified, ordinary location approvals: UL, C-UL, CE	4/318	
	The SITRANS FUP1010 check meter measures practically all conductive or non-conductive clean or moderately aerated liquids or liquids with suspended solids. This basic feature enables the perfomance check and verification of existing meters used in various water and wastewater applications such as: • Water Industry - Raw water - Potable water - Chemicals • Wastewater industry - Raw sewage - Effluent - Sludges - Mixed liquor - Chemicals	**SITRANS FUP1010 Portable Check metering kit** • Pipe sizes 25.4 mm ... 9.14 m (1“ ... 360“) • Current, voltage, frequency and RS 232 outputs • Optional current, voltage and temperature inputs • Zeromatic Path automatically sets zero • Bi-directional flow operation • 1 MByte data logger with both site and data logger storage	4/324	
	Portable and dedicated energy meters are ideal for thermal energy/ power applications: • Chilled & hot water submetering • Condenser water, potable water • Glycol and brine solution • Thermal storage	**SITRANS FUE1010 Energy** • Accurate absolute and differential temperature measurement with two matched 1000 Ω RTD elements installed on supply and return side of the heating or cooling system • Efficiency calculation (kW/ton, EER or COP) available in systems with optional analog input • Dedicated available with hazardous area approvals: FM, CSA • Portable available with unclassified/ ordinary locations approval: UL, C-UL, FM	4/326	

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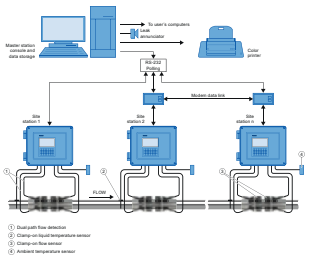
	Application	Description	Catalog page	Software for parameterization
	The SITRANS FUE1010 check metering kit is a highly accurate clamp-on non-intrusive ultrasonic flow display computer for revenue grade thermal energy sub-metering and energy efficiency distribution monitoring, with a real-time coefficient of performance (COP) for HVAC systems. This kit is ideal for applications which include: • Chilled water sub-metering • Condenser water • Potable water • Ammonia and glycol • River and lake water • Lake source cooling	**SITRANS FUE1010 HVAC Check metering kit** • Pipe sizes 25,4 mm ... 9,14 m (1“ ... 360“) • Built-in energy/BTU mode • 4-wire 1000 Ω platinum RTDs for supply and return temperature measurements are precision matched to within 0,01 °C (0.02 °F) • Chiller efficiency analysis: accepts an independent analog input representing kW usage for calculation of the following functions which can be selected for data logging or output purposes: - Cooling load (kW/ton) - Coefficient of performance (COP) - Energy efficiency ratio (EER) • Current, voltage, frequency and RS 232 outputs • 1 MByte data logger with both site and data logger storage	4/334	
	Dedicated hydrocarbon flowmeters are ideal for crude oil, refined petroleum or liquefied gas. There are three application areas: • Viscosity compensated volumetric flowmeters • Standard volume (Net) mass flowmeters • Interface detectors/density meters	**SITRANS FUH1010 Oil** • Volumetric flowmeters output viscosity compensated gross volume to external RTU's or flow computers • Mass flowmeters output standard volume (net) mass flow, API, liquid identification, density, interface & pig detection • Interface Detectors are used for liquid identification and API density output, but do not output flow • Hazardous area approvals: FM, CSA, ATEX	4/336	
	• External pipeline damage (third party intrusion, explosions, corrosion, etc.) • Monitoring of product theft • Meet regulatory requirements for Safety • Safety protection against environmental & contamination issues • Operators can instantly view and entire map of the entire pipeline • No continuous operator monitoring is required. • Intelligent analysis process helps prevent false alarms. • Leak detection and location	**Leak Detection System (LDS)** The Leak Detection System (LDS) offers a complete software and hardware solution for liquid pipelines. The LDS uses customized variations of the FUH1010 and the FUS1010 ultrasonic clamp-on flowmeters. The software monitors all of the flowmeters and the pipeline segments in order to assist the operator with a quick and reliable system that detects and localizes the leakages in the pipeline.	4/343	
	Dedicated gas flowmeters are ideal for most natural and process gas industry applications, including: • Checkmetering • Allocation • Flow survey verification • Lost and unaccounted for (LAUF) gas analysis • Production	**SITRANS FUG1010 Gas** • Suitable for most gases (natural gas, oxygen, nitrogen, carbon monoxide, etc.) with typical minimum operating pressure of 10 bar g (145 psi g). • Standard volume or mass flow output for fixed gas compositions • Analog input for pressure and temperature compensation • Hazardous area approvals: FM, CSA, ATEX	4/345	

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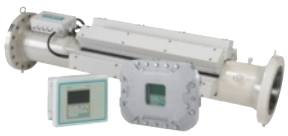
	Application	Description	Catalog page	Software for parameterization
	The clamp-on SITRANS FUG1010 Gas Check Metering Kit is an all-inclusive solution developed especially for verifying the accuracy and performance of any brand or type of flowmeter. The kit is ideal for applications that include: • Check metering • Allocation • Flow survey verification • Lost and unaccounted for (LAUF) gas analysis • Production • Storage	**FUG1010 Check Metering Kit** • Pipe sizes 50 ... 1200 mm (2 ... 48") up to 15,7 mm (0.62") pipe wall thickness • Analog inputs for pressure and temperature • Internal AGA-8 table for fixed gas composition is available for standard volume computation • Upward compatibility and compliance with AGA-10 speed of sound measurement practice • Bi-directional flow operation	4/352	
	Ideal for applications within the liquid and gas hydrocarbon industry capable of providing custody transfer accuracy. Both versions are offered in pipe sizes ranging from 4“ ... 24“ (DN 100 ... DN 600) with flange ratings of ANSI Class 150/300/600 for liquid and 300/600 for gas.	**SITRANS FUT1010 Basic** • WideBeam technology allows for precision flow measurement by reducing the meter's sensitivity to changes in the medium's physical properties • TransLoc permanent mounting system ensures sealing and virtually no maintenance • High viscosity range (up to 2800 Cst) • Completely cavity free design which eliminates any signal degrading build-up or ports to clog • Large bi-directional flow range • Modbus RTU RS232/485 output available. • Dynamic Reynolds number compensation	4/353	
Continuous measurement - Open channel flow				
	High accuracy ultrasonic flow monitor for open channels to complete system studies	**OCM III** • High accuracy on unique or non-standard weirs and flumes • AC and DC operation. • Automatically switches to battery operation for uninterrupted power. • Low-power remote monitoring	4/371	
SITRANS F X Vortex Flowmeter				
	Measurement of steam, gases and liquids in: • Chemical • HVAC/Power plants • Oil & Gas • Food & Beverage • Pharma	**SITRANS FX300** • Flange DN 15 … DN 300 (½" … 12") Sandwich DN 15 … DN 100 (½" … 4") • 2-wire device 4 ... 20 mA, with integrated temperature and pressure sensors for compensation • HART communication • Medium temp.: -40 ... +240 °C (-40 ... +464 °F) • Medium pressure: up to 100 bar (1450 psi) • Hazardous area approvals: FM, CSA, ATEX	4/374	

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	Application	Description	Catalog page	Software for parameterization
SITRANS F VA variable area meters				
	Measurement of flow of liquids and gases, also highly suitable for corrosive media, high temperatures and high pressures.	**FVA250** • All-metal variable area meter with various float materials • Connections: DN 15 ... DN 100 (½" ... 4") • Temperature of medium: -20 °C ... +300 °C (-4 ... +572 °F) • Optionally available with analog output or contacts	4/391	
SITRANS F O delta p - primary differential pressure devices				
	Measurement of flow with orifice plates and metering pipes for mounting between flanges, e.g. together with SITRANS P transmitters, DS III HART, DS III PROFIBUS PA and DS III FOUNDATION Fieldbus series.	• Nominal diameters DN 10 ... DN 1000 (0.4" ... 40") • Temperature of medium: -200 ... +500 °C (-328 ... +932 °F) for vapors, gases and liquids. SITRANS P transmitters • DS III HART series • DS III PROFIBUS PA series • DS III FOUNDATION Fieldbus series	4/399	
SITRANS F R liquid meters				
	Rotary-piston meters Industrial design for measurement of flowing liquids	• DN 15 ... DN 80 (½" ... 3") for industrial requirements • With the required registers and quantity-preset registers • Temperature of medium: -30 ... +300 °C (-22 ... +572 °F)	4/425	
	Automatic batchmeter Any quantity of liquid can be preselected and filled automatically.	• DN 25 ... DN 50 (1" ... 2") • Temperature of medium: -30 ... +300 °C (-22 ... +572 °F)	4/425	

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Overview

Criteria for selection of flowmeter

Each method for measuring flow has specific properties, and each flow measuring point is characterized by specific requirements. The table shown below compares the properties of the various measuring instruments and thus provides assistance in selection of the optimum device.

This section of the field device catalog includes the following instruments for measuring flow:

- Electromagnetic
- Coriolis mass flow
- Ultrasonic
- Vortex volumetric- and mass flow
- Variable area meter
- Orifice plate
- Rotary-piston meters and drum meters

Measuring principle		**Electro-magnetic**	**Coriolis**	**Ultrasonic (inline)**	**Ultrasonic (clamp-on)**	**Vortex**	**Variable area meter**	**Orifice plate**	**Rotary-piston meter**
Medium		Liquid (conductive)	Liquid or gas	Liquid	Liquid or gas	Steam/vapor, gases, liquid	Liquid or gas	Liquid, vapor, gas	Liquid
Nominal diameter		DN 2 … 2000 (0.08" … 78")	1.5…150 mm (0.06" … 6")	DN 50…4000 (2" … 160") optional down to DN 15 (½")	6.4 mm ... 9.14 m (0.25"...360")	DN 15 … 300 (½" … 12")	DN 10 … 100 (0.4" … 4") G½" … G3"	DN 10…1000 (0.4" … 40")	DN 15 … 80 (½" … 3")
Temperature range	°C (°F)	-40 … +200 (-40 … +392)	-50 … +180 (-58 … +356)	-200 ... +250 (-328 ... +482)	-40 ... +120 (-40 ... +248)	-40 ... +240 (-40 ... +464)	-20 … +300 (-4 … +572)	-200 … +500 (-328 … +932)	-30 … +300 (-22 … +572)
Max. pressure	bar (psi)	160 (2 320), optional higher	Up to 410 (Up to 5 950)	40 (580) optionally 430 (6 235)	Unlimited	100 (1 450)	40 (580)	315 (4 569)	63 (914)
Accuracy	%	± 0.2 or ± 0.4	± 0.1 or ± 0.15	± 0.5 … ± 2	0.5 ... 1.0 % of flow, for velocities greater than 0.3 m/s (1 ft/s)	± 0.75 … ± 1	± 2	± 0.5 … ± 2	± 0.2 … ± 0.5
Repeatability	%	0.1/0.2	0.05	0.25	0.15 % of flow, for velocities greater than 0.3 m/s (1 ft/s)	0.1	0.5	0.5	0.005
Dynamic response range		1:100	1:100	1:100	1:100	1:25	1:10	1:6	1:10
Start-of-scale value	m/s (ft/s)	0 (0)	0 (0)	0.1 (0.33)	0 (0)	0.4 (1.31) 2.0 (6.56)	0.2 (0.66)	Re > 500	0.3 (0.98)
Full-scale value					± 36/120			Re < 10^8	
• For liquids	m/s (ft/s)	0.25 … 10 (0.825 … 32.8)	10 (32.8)	10 (32.8)	± 12/40	10 (32.8)	3.5 (11.4)	3 (9.8)	3 (9.8)
• For steam/vapor, gases	m/s (ft/s)		Approx. 300 (1000)		± 12/40	80 (262.5)	60 (197)	50/25 (164/82)	
Measured values									
• Volume flow		•	•	•	•	•	•	•	•
• Sound velocity				•	•				
• Sound amplitude				•	•				
• Density			•		•				
• Mass flow			•	•	•	•			
• Bidirectional measurement		•	•	•	•			•	
Use									
• For custody transfer		•	•	•	•				•
• As batching system		•	•		•				•
• In viscosity range	mPa·s (cp)	0.1 … 100 000 (0.1…100 000)	0 ... 100 000 (0 ... 100 000)	0 ... 350 (0 ... 350)	0.5 ... 2800 (0.5 ... 2800)	0 … 10 (0 … 10)	0.5 … 100 (0.5 … 100)	0 … 10 (0 … 10)	0.3 … 350 000 (0.3… 350 000)
Power supply		Mains or battery	Mains	Mains or battery	90... 240 V AC, 50...60 Hz, 15 VA or 9 ... 36 V DC, 10 W	2-wire	non	2-wire	non

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Communication solutions

Communication solutions

Transmitter	HART	PROFIBUS PA	PROFIBUS DP	FOUNDATION Fieldbus H1	DeviceNet	Modbus RTU
SITRANS F M MAG 5000	• 1) 2) 4)					
SITRANS F M MAG 6000	• 1) 2) 4) 5)	• 1) 5) 6) 7)	• 1) 5) 6) 7)	• 2) 4) 5)	• 5)	• 1) 5) 10)
SITRANS F M MAG 5000/6000 CT[8)]						
SITRANS F M MAG 6000 I	• 1) 2) 4) 5)	• 1) 5) 6) 7)	• 1) 5) 6) 7)	• 2) 4) 5)	• 5)	• 1) 5) 10)
SITRANS F M MAG 6000 I Ex de	• 1) 2) 4) 5)	• 1) 5) 6) 7)		• 2) 4) 5)	• 5)	
SITRANS F M TRANSMAG 2	• 1) 4)	• 1) 6)				
SITRANS F M MAG 8000						• 1) 3) 10) 11) 12)
SITRANS F C MASS 6000	• 1) 2) 4) 5)	• 1) 5) 6) 7)	• 1) 5) 6) 7)	• 2) 4) 5)	• 5)	• 1) 10)
SITRANS F C MASS 6000 Ex d	• 1) 2) 4) 5)	• 1) 5) 6) 7)		• 2) 4) 5)	• 5)	
SIFLOW FC070			• 13)			• 1) 10) 11)
SITRANS FUS060	• 1)	• 1) 6)				
SITRANS FUS080 (FUS380)						• 1) 5) 10) 11) 12)
SITRANS FUE080 (FUE380)						• 1) 5) 8) 10) 11) 12)
SITRANS FUS1010[9)]						• 9) 10) 11)
SITRANS FX300	• 1)					
SITRANS P DS III Differential pressure and flow	• 1) 2)	• 1) 2) 7)		• 2)		

1) Supports SIMATIC PDM
2) Supports AMS
3) Supports Siemens Flow Tool
4) Supports HH275/375
5) Pluggable add-on modules
6) Profile 2
7) Profile 3
8) CT versions are not approved with communication modules.
9) All wall mount models
10) RS485
11) RS232
12) IrDA (Infrared)
13) Connected to ET200M PROFIBUS interface

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Overview

SITRANS F M electromagnetic flowmeters are designed for measuring the flow of electrically conductive mediums.

The full SITRANS F M program consists of three different types of flowmeters making Siemens unique in that it covers all possible applications where electromagnetic flowmeters are a suitable match:

Modular pulsed DC flowmeters cover all ordinary applications within all industries. The wide variety of combinations and versions from the modular system means that ideal adaptation is possible to each measuring task and application.

SITRANS F M products

Battery-operated water meters (fully electronic) are the perfect match for drinking water applications like network distribution, revenue metering and irrigation where mains power is not available. In addition, it complies with the MID (EU) and OIML R 49 water meter standards and has the MCERTS certificate.

SITRANS F M MAG 8000

High-powered flowmeters are used for difficult applications where other flowmeters cannot stand up to the task. This flowmeter can handle liquids and heavy slurries in industries such as mining, cement and pulp and paper.

SITRANS F M 911/TRANSMAG 2

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System information SITRANS F M electromagnetic flowmeters

Benefits

Greater flexibility

- Wide product program
- Compact or remote installation using the same transmitter and sensor
- USM II communication platform for easy integration with all systems

Easier commissioning of MAG 5000, 6000, 6000 I

All SITRANS F M pulsed DC electromagnetic flowmeters feature a unique SENSORPROM memory unit which stores sensor calibration data and transmitter settings for the lifetime of the product.

At commissioning the flowmeter commences measurement without any initial programming.

The factory settings matching the sensor size are stored in the SENSORPROM unit. Also customer specified settings are downloaded to the unit. Should the transmitter be replaced, the new transmitter will upload all previous settings and resume measurement without any need for reprogramming.

Further, the „fingerprint“ used in connection with the SITRANS F M Verificator is stored during the initial sensor calibration.

Easier service

Transmitter replacement requires no programming. SENSORPROM automatically updates all settings after initialization.

Room for growth

USM II the Universal Signal Module with "plug & play" simplicity, makes it easy to access and integrate the flow measurement with almost any system and bus-protocol and it ensures the flowmeter will be easy to upgrade to future communication/bus platforms.

Application

Electromagnetic flowmeters are suitable for measuring the flow of almost all electrically conductive liquids, pastes and slurries.

A prerequisite is that the medium must have a minimum conductivity of 5 µS/cm. The temperature, pressure, density and viscosity have no influence on the result.

The main applications of the electromagnetic flowmeters can be found in the following sectors:

- Water and waste water
- Chemical industries
- Pharmaceutical industries
- Food and beverage industry
- Mining, aggregates and cements industries
- Pulp and paper industry
- Steel industry
- Power; utility and chilled water industry

The wide variety of combinations and versions from the modular system means that ideal adaptation is possible to each measuring task.

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Please see product selector on the Internet, because some constrains might be related to some of the features:
www.pia-selector.automation.siemens.com

	MAG 1100	MAG 1100 HT	MAG 1100 F	MAG 5100 W		MAG 3100 P	MAG 3100	MAG 3100 HT	911/E	MAG 8000/ MAG 8000 CT	MAG 8000 Irrigation
	7ME6110	7ME6120	7ME6140	7ME6520	7ME6580	7ME6340	7ME6310	7ME6320	7ME5610	7ME6810 7ME6820	7ME6880
Industry											
Water / waste water	XX			XXX	XXX	X	XX		X	XXX	XXX
Chemical	XXX	XXX	XX	X	X	XXX	XXX	XXX		X	
Pharmaceutical	XX	XX	XXX	X	X	XX	XX	XX		X	
Food and beverage	XX		XXX	X	X	X	X	X		X	
Mining, aggregates and cement	XX			X	X		XXX		XXX	X	
HPI	XX	X		X	X	XX	XX	X		X	
Other	XX	XX	XX	XX	XX	XX	XX	XX	XXX	X	
Design											
Compact	●		●	●	●	●	●	●		●	●
Remote	●	●	●	●	●	●	●	●	●	●	●
Constant field (DC)	●	●	●	●	●	●	●	●		●	●
Alternating field (AC)									●		
Battery-operated constant field (DC)										●	●
Size											
DN 2 (1/12")	●										
DN 3 (1/8")	●										
DN 6 (1/4")	●										
DN 10 (3/8")	●		●								
DN 15 (½")	●	●	●	●		●	●	●	●		
DN 25 (1")	●	●	●	●	●	●	●	●	●	●	
DN 32 (1¼")			●								
DN 40 (1½")	●	●	●	●	●	●	●	●	●	●	
DN 50 (2")	●	●	●	●	●	●	●	●	●	●	●
DN 65 (2½")	●	●	●	●	●	●	●	●	●	●	●
DN 80 (3")	●	●	●	●	●	●	●	●	●	●	●
DN 100 (4")	●	●	●	●	●	●	●	●	●	●	●
DN 125 (5")				●	●	●	●	●	●	●	●
DN 150 (6")				●	●	●	●	●	●	●	●
DN 200 (8")				●	●	●	●	●	●	●	●
DN 250 (10")				●	●	●	●	●	●	●	●
DN 300 (12")				●	●	●	●	●	●	●	●
DN 400 (16")				●	●		●		●	●	●
DN 450 (18")				●	●		●		●	●	●
DN 500 (20")				●	●		●		●	●	●
DN 600 (24")				●	●		●		●	●	●
DN 700 (28")				●	●		●		●	●	
DN 750 (30")				●	●		●		●	●	
DN 800 (32")				●	●		●		●	●	
DN 900 (36")				●	●		●		●	●	
DN 1000 (40")				●	●		●		●	●	
DN 1050 (42")				●	●		●			●	
DN 1100 (44")				●	●		●			●	
DN 1200 (48")				●	●		●			●	
DN 1400 (54")					●		●				
DN 1500 (60")					●		●				
DN 1600 (66")					●		●				
DN 1800 (72")					●		●				
DN 2000 (78")					●		●				

● = available, **X** = can be used, **XX** = often used, **XXX** = most often used

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System information SITRANS F M electromagnetic flowmeters

Please see product selector on the Internet, because some constrains might be related to some of the features:
www.pia-selector.automation.siemens.com

	MAG 1100	MAG 1100 HT	MAG 1100 F	MAG 5100 W		MAG 3100 P	MAG 3100	MAG 3100 HT	911/E	MAG 8000/ MAG 8000 CT	MAG 8000 Irrigation
	7ME6110	7ME6120	7ME6140	7ME6520	7ME6580	7ME6340	7ME6310	7ME6320	7ME5610	7ME6810 7ME6820	7ME6880
Process connection											
Wafer design	●	●									
Sanitary process connections			●								
Flanges				●	●	●	●	●	●	●	●[4]
Flange norms											
EN 1092-1				●	●	●	●	●	●	●	●[4]
ANSI B 16.5 class 150				●	●	●	●	●	●	●	●[4]
ANSI B 16.5 class 300							●	●	●		
AWWA class D				●	●		●		●	●	
AS 2129							●	●			●[4]
AS 4087, PN 16				●	●		●	●		●	
AS 4087, PN 21							●	●			
AS 4087, PN 35							●	●			
JIS 10K					●		●	●[3]	●		
JIS 20K							●				
Pressure rating [1]											
PN 6					●		●				
PN 10				●	●	●	●	●	●	●	
PN 16	●		●	●	●	●	●	●	●	●	
PN 25							●	●	●		
PN 40	●	●	●	●	●	●	●	●	●	●	
PN 63							●				
PN 100							●				
Accuracy											
0.2 %	●	●	●	●	●	●	●	●		●	
0.4 %	●	●	●	●	●	●	●	●		●	
0.5 %									●		
0.8 %											●
Grounding electrodes, incl. [2]				●	●	●[5]	●		(●)	●	
Grounding rings premounted from factory											●

● = available
[1] Pressure may be limited by the liner material chosen
[2] Not for PTFE liner.
[3] On request
[4] Drilled pattern flange max. 7 bar (107 psi).
[5] Optional on PFA

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Please see product selector on the Internet, because some constrains might be related to some of the features:
www.pia-selector.automation.siemens.com

	MAG 1100	MAG 1100 HT	MAG 1100 F	MAG 5100 W		MAG 3100 P	MAG 3100	MAG 3100 HT	911/E	MAG 8000/ MAG 8000 CT	MAG 8000 Irrigation
	7ME6110	7ME6120	7ME6140	7ME6520	7ME6580	7ME6340	7ME6310	7ME6320	7ME5610	7ME6810 7ME6820	7ME6880
Materials / temperature:											
Liner material / max . temperatures											
NBR Hard Rubber: 70 °C (158 °F)				●							
EPDM: 70 °C (158 °F)				●			●			●	
Soft rubber: 70 °C (158 °F)							●		●		
PTFE: 100 °C (212 °F)							●				
PTFE: 130 °C (266 °F)						●		●	●		
PTFE: 180 °C (356 °F)								●	(●)[1]		
Ebonite Hard Rubber: 95 °C (203 °F)					●[3]		●		●		●[3]
Linatex: 70 °C (158 °F)							●		●		
Ceramic: 150 °C (302 °F)[2]	●		●								
Ceramic: 200 °C (392 °F)		●									
PFA: 100 °C (212 °F)							●				
PFA: 150 °C (302 °F)	●		●			●		●			
Novolak: 130 °C (266 °F)									●		
Electrodes											
Stainless steel							●	●	●		●
Hastelloy C	●		●	●	●	●	●	●	●	●	
Platinum	●	●	●				●	●	●		
Titanium							●	●	●		
Tantalum							●	●	●		
Flange/housing material											
Carbon steel				●	●	●	●	●	●	●	●
Stainless steel / carbon steel							●	●	●		
Polished stainless steel	●	●	●				●	●			

● = available
[1] 150 °C (302 °F)
[2] Ex sensor: 180 °C (356 °F)
[3] 70 °C (158 °F)

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System information SITRANS F M electromagnetic flowmeters

Please see product selector on the Internet, because some constrains might be related to some of the features:
www.pia-selector.automation.siemens.com

	MAG 1100	MAG 1100 HT	MAG 1100 F	MAG 5100 W		MAG 3100 P	MAG 3100	MAG 3100 HT	911/E	MAG 8000/ MAG 8000 CT	MAG 8000 Irrigation
	7ME6110	7ME6120	7ME6140	7ME6520	7ME6580	7ME6340	7ME6310	7ME6320	7ME5610	7ME6810 7ME6820	7ME6880
Approvals:											
Custody transfer											
Cold water - MI-001 (EU)				●						●	
Cold water approval - OIML R 49/OIML R 49 MAA										● 7)	
Cold water pattern approval - OIML R 49 (Denmark)				● 7)							
Cold water pattern approval PTB (Germany)	● 7)		● 7)			● 7)	● 7)				
Heat meter pattern approval - OIML R 75 (Denmark)	● 7)	● 7)				● 7)	● 7)	● 7)			
Hot water pattern approval - PTB (Germany)	● 7)	● 7)	● 7)			● 7)	● 7)	● 7)			
Other media than water pattern approval - OIML R 117 (Denmark)	● 7)		● 7)			● 7)	● 7)				
Chilled water pattern approval PTB K 7.2				● 7)						● 7)	
Hazardous areas											
ATEX - 2 GD (Zone 1)	●	●	●			●	●	●			
IECEx Zone 1						●	●	●			
FM Class I, Div 1						●	●	●			
FM Class I, Zone 1						●	●	●			
FM Class I, Div 2/Zone 2	●	●	●	●	●	●	●	●			
CSA Class I, Zone 1						●	●	●			
CSA Class I, Div 2/Zone 2				●	●	●	●	●			
Hygienic											
EHEDG			●								
3A			●								
Drinking water											
WRAS (WRc) - (UK)				● 4)	●		●			●	●
ANSI / NSF 61 (US)				●	●		● 5)			●	●
ACS (FR) EPDM liner				●			●			●	
Belgaqua (B) EPDM liner				●			●			●	
DVGW-W270 (D) EPDM liner				●			●			●	
MCERTS (UK environmental)				● 4)			● 6)			●	
Other											
GOSS / GOST (Russia)	●	●	●	●		●	●	●		●	
CRN (Canada)	● 1)		● 1)	●			●	●			
VdS				● 3)	● 3)						
Other national approvals, see internet	●	●	●	●	●	●	●	●	●	●	
Verificator compatible 2)	●	●	●	●	●	●	●	●			

● = available
1) Only PFA liner.
2) Only for MAG 5000 and MAG 6000 transmitters.
3) Only valid for DN 50 to DN 300
4) EPDM liner
5) Only EPDM with Hastelloy electrodes
6) EPDM or PTFE liner with AISI 316 or Hastelloy electrodes.
7) For verification submit Product Variation Request

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Please see Product selector on the Internet, because some constrains might be related to some of the features:
www.pia-selector.automation.siemens.com

	MAG 5000	MAG 6000	MAG 6000 I	MAG 6000 I Ex de	MAG 6000 + Ex Safety barrier	TRANSMAG 2	MAG 8000/ MAG 8000 CT	MAG8000 Irrigation
	7ME6910	7ME6920	7ME6930	7ME6930	7ME6920	7ME5034	7ME6810 7ME6820	7ME6880
Industry								
Water / waste water	**XXX**	**XXX**	**XX**	**X**		**X**	**XXX**	**XXX**
Chemical	**X**	**XX**	**XX**	**XXX**	**X**		**X**	
Pharmaceutical	**X**	**XXX**	**XX**	**XXX**	**X**		**X**	
Food and beverage	**XX**	**XXX**	**XX**				**X**	
Mining, aggregates and cement	**XX**	**X**	**XX**	**X**		**XXX**	**X**	
HPI	**X**	**X**	**X**	**XX**			**X**	
Other	**XX**	**XX**	**XX**	**XX**		**XX**	**X**	
Design								
Compact	●	●	●	●			●	●
Remote	●	●	●	●	●	●	●	●
Constant field (DC)	●	●	●	●	●		●	●
Alternating field (AC)						●		
Battery-operated constant field (DC)							●	●
Enclosure transmitter								
Polyamide, IP67	●	●						
Die-cast aluminum			●	●		●		
Stainless steel		●					● [1]	● [1]
19“ rack	●	●			●			
Back of panel	●	●			●			
Panel mounting	●	●			●			
IP67 wall mounting	●	●	●	●	●			
Accuracy								
0.2 %		●	●	●	●		●	
0.4 %	●						●	
0.5 %						●		
0.8 %								●
Communication								
HART	●	●	●	●	●	●		
PROFIBUS PA		●	●	●	●	●		
PROFIBUS DP		●	●		●			
FOUNDATION Fieldbus H1		●	●	●	●			
DeviceNet		●	●		●			
Modbus RTU/RS 485		●	●		●		● [2]	● [2]
Encoder interface module (Sensus protocol) for Itron 200WP radio							●	●
Batching		●	●	●	●			

● = available, **X** = can be used, **XX** = often used, **XXX** = most often used

[1] IP68 enclosure

[2] Modbus RTU also as serial RS232

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System information SITRANS F M electromagnetic flowmeters

Please see Product selector on the Internet, because some constrains might be related to some of the features:
www.pia-selector.automation.siemens.com

	MAG 5000	MAG 6000	MAG 6000 I	MAG 6000 I Ex de	MAG 6000 + Ex Safety barrier	TRANSMAG 2	MAG 8000/ MAG 8000 CT	MAG8000 Irrigation
	7ME6910	7ME6920	7ME6930	7ME6930	7ME6920	7ME5034	7ME6810 7ME6820	7ME6880
Power supply								
24 V	● 1)	● 1)	●	●			● 1) 2)	● 1) 2)
115 V - 230 V	●	●	●	●	●	●	● 2)	● 2)
Battery							●	
Approvals:								
Custody transfer								
Cold water - MI-001 (EU)	●	●					●	
Cold water pattern approval - OIML R 49 (Denmark)	●	●					●	
Cold water approval - OIML R 49/OIML R 49 MAA							●	
Cold water pattern approval PTB (Germany)	●	●						
Chilled water pattern approval PTB K 7.2	●	●					●	
Heat meter pattern approval - OIML R 75 (Denmark)		●						
Hot water pattern approval PTB (Germany)		●						
Other media than water pattern approval - OIML R 117 Denmark		●						
Hazardous areas								
ATEX - 2 GD (Zone 1)				●	(●)3)			
IECEx Zone 1				●				
FM Class I, Div 1				● 4)				
FM Class I, Zone 1				●				
FM Class I, Div 2/Zone 2	●	●	●					
CSA Class I, Zone 1				●				
CSA Class I, Div 2/Zone 2	●	●	●					
UL / C-UL- general safety	●	●			●			
Other								
C - tick (Australia)	●	●	●	●	●			
GOSS / GOST (Russia)	●						●	
VdS	●	●						
Other national approvals, see internet	●	●	●	●	●	●	●	●
Verificator compatible	●	●						

● = available
1) 12/24 V AC/DC
2) Main power with battery backup
3) Only sensor in hazardous area
4) Only with sensors sizes DN 15 to DN 300 (½" to 12") compact

For more national approvals please check our internet page
http://support.automation.siemens.com/WW/view/en/10806954/134200

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Practical examples of ordering

SITRANS F M compact installation

MAG 6000 transmitter | MAG 3100 sensor | MAG 6000 compact mounted on a MAG 3100 sensor

Example

Sensor	**7ME6310-3TC11-1JA1**
Pipe size	DN 100
Liner	Soft rubber
Electrodes	SS 316
Flanges	EN 1092-1, PN 16
Transmitter	**MAG 6000, Polyamide, 115 ... 230 V AC**
Accuracy	± 0.2 % ± 1 mm/s
Supply	230 V AC

Note:
MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place.
Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

SITRANS F M remote installation

Wall bracket | MAG 6000

MAG 3100 | 2 x cable | MAG 3100 remote installation

Example

Sensor	**7ME6310-3TC11-1AA1**
Pipe size	DN 100
Liner	Soft rubber
Electrodes	SS 316
Flanges	EN 1092-1, PN 16
Transmitter	**7ME6920-1AA10-0AA0**
Accuracy	± 0.2 % ± 1 mm/s
Supply	230 V AC
Wall mounting kit	**FDK-085U1018**
Cable kit with sensor cabel and electrode cable	**A5E01181647**

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System information SITRANS F M electromagnetic flowmeters

Function

All electromagnetic flowmeters are based on Faraday's law of induction:

$U_M = B \cdot v \cdot d \cdot k$

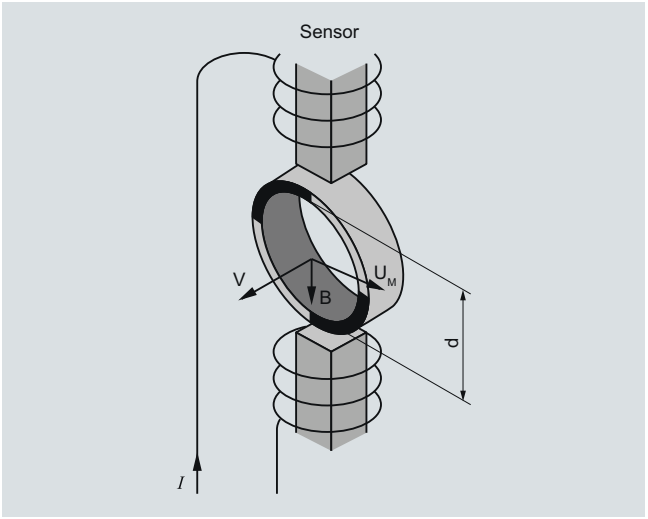
U_M = Measured voltage induced in the medium perpendicular to the magnetic field and the flow direction. The voltage is tapped at two point electrodes.

B = Magnetic flux density which permeates the flowing medium perpendicular to the flow direction.

v = flow velocity of medium

d = internal diameter of metering tube

k = proportionality factor or sensor constant



Function and measuring principle of electromagnetic measurement

An electromagnetic flowmeter generally consists of a magnetically non-conducting metering tube with an internal electrically non-conducting surface, magnet coils connected in series and mounted diametrically on the tube, and at least two electrodes which are inserted through the pipe wall and are in contact with the measured medium. The magnet field coils through which the current passes generate a pulsed electromagnetic field with the magnetic flux density B perpendicular to the pipe axis.

This magnetic field penetrates the magnetically non-conducting metering tube and the medium flowing through it, which must have a minimum electrical conductivity.

According to Faraday's law of induction, a voltage U_M is generated in an electrically conducting medium, and is proportional to the flow velocity v of the medium, the magnetic flux density B, and the distance between the electrodes d (internal diameter of pipe).

The signal voltage U_M is tapped by the electrodes which are in contact with the medium, and passed through the insulating pipe wall. The signal voltage U_M which is proportional to the flow velocity is converted by an associated transmitter into appropriate standard signals such as 4 to 20 mA.

SITRANS F M diagnostics

The diagnostic functions are all internal tools in the meter:

- Identification in clear text and error log
- Error categories: function; warning; permanent and fatal errors
- Transmitter self-check including all outputs and the accuracy
- Sensor check: coil and electrode circuit test
- Overflow
- Empty pipe: partial filling; low conductivity; electrode fouling

SITRANS F M Verificator (MAG 5000 and 6000)

The SITRANS F M Verificator is an external tool designed for MAG 5000 and MAG 6000 with MAG 1100, MAG 1100 F, MAG 3100, MAG 3100 P or MAG 5100 W sensors to verify the entire product, the installation and the application.

The goal is to improve operation, reduce downtime and maintain measurement accuracy as long as possible.

The SITRANS F M Verificator is highly advanced and carries out the complex verification and performance check of the entire flowmeter system, according to unique Siemens patented principles. The whole verification test is automated and easy to operate so there is no opportunity for human error or influence. The system is traceable to international standards and tested by WRc (Water Research Council).

SITRANS F M Verificator

- Stand alone Verificator to measure a number of selected parameters in the flow sensor and a transmitter which affects the integrity of the flow measurement
- Up to 20 measurements can be stored in the Verificator
- The Verificator can be connected via a serial cable to a PC enabling download of the data. A Windows program enables printing and management of verificator reports.

Verification - Steps

Verification of a SITRANS F M flowmeter consists of the following test routines:

1. Transmitter test
2. Flowmeter and cable insulation test
3. Sensor magnetism test

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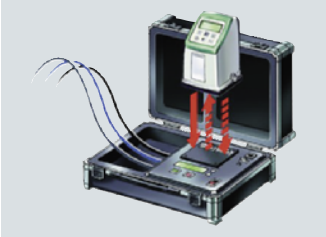
1. Transmitter test

The transmitter test is the traditional way of on-site testing on the market and checks the complete electronic system from signal input to output.

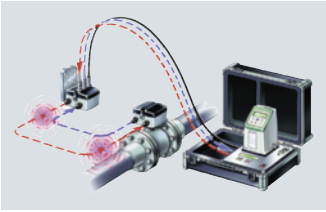


Transmitter test

Using the excitation power output, which is generated to drive the magnetic field of the sensor, the verificator simulates flow signal to the transmitter input. By measuring the transmitter outputs the verificator calculates its accuracy against defined values. Test includes:

- Excitation power to drive the magnetic field
- Signal function from signal input to output
- Signal processing – gain, offset and linearity
- Test of analogue and frequency output

2. Insulation test



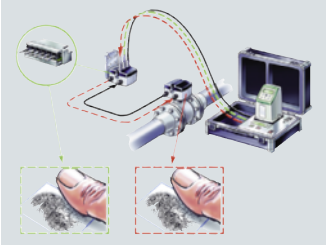
Flowmeter insulation test

The verification test of the flowmeter insulation is a „cross talk“ test of the entire flowmeter which ensures that the flow signal generated in the sensor is not affected by any external influences.

In the "cross-talk" test the verificator generates a high voltage disturbance within the coil circuit and then looks for any "cross-talk" induced in the flow signal circuit. By generating dynamic disturbances close-coupled to the flow signal, the flowmeter is tested for noise immunity to a maximum level:

- EMC influence on the flow signal
- Moisture in sensor, connection and terminal box
- Non-conductive deposit coating the electrodes within the sensor
- Missing or poor grounding, shielding and cable connection.

3. Sensor magnetism test



Sensor magnetism test

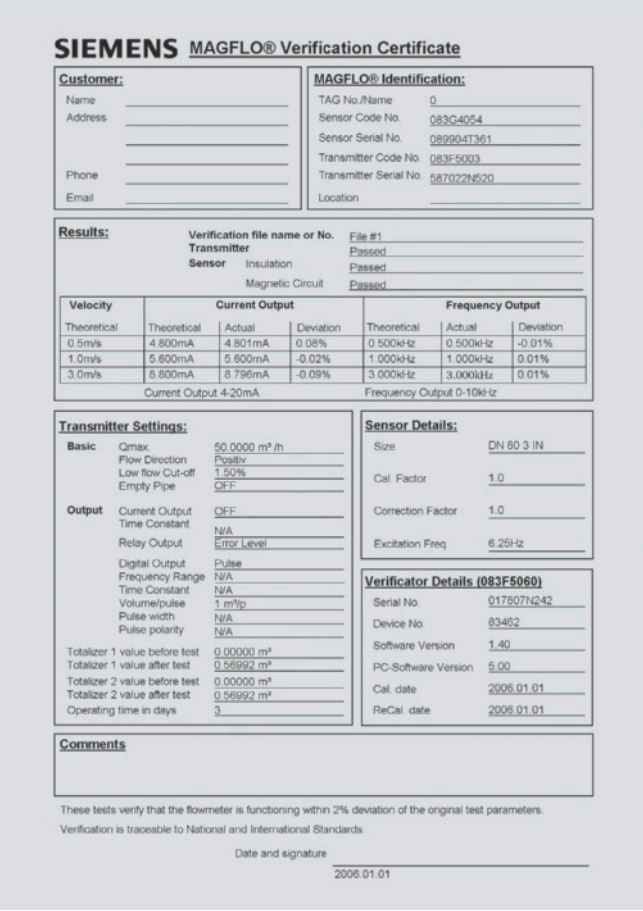
The verification of the sensor magnetism is a "boost" test of the magnetic field coil. The test ensures that the magnetism behaviour is like the first time, by comparing the current sensor magnetism with the "fingerprint" which was determined during initial calibration and stored in the SENSORPROM memory unit.
In the "boost" test the verificator changes the magnetic field in certain pattern and with high voltage to get quick stable magnetic condition. This unique test is fulfilled without any interference or compensation of surrounding temperature or interconnecting cabling.

- Changes in dynamic magnetic behaviour
- Magnetic influence inside and outside the sensor
- Missing or poor coil wire and cable connection

Certificate

The test certificate generated by a PC contains:

- Test result with passed or failed
- Installation specification
- Flowmeter specification and configuration
- Verificator specification with date of calibration ensuring traceability to international standards.



SIEMENS MAGFLO® Verification Certificate

Customer:
Name
Address
Phone
Email

MAGFLO® Identification:
TAG No./Name 0
Sensor Code No. 083G4054
Sensor Serial No. 089904T361
Transmitter Code No. 083F5003
Transmitter Serial No. 587022N520
Location

Results:
Verification file name or No. File #1
Transmitter Passed
Sensor Insulation Passed
Magnetic Circuit Passed

Velocity	Current Output			Frequency Output		
Theoretical	Theoretical	Actual	Deviation	Theoretical	Actual	Deviation
0.5m/s	4.800mA	4.801mA	0.08%	0.500kHz	0.500kHz	-0.01%
1.0m/s	5.600mA	5.600mA	-0.02%	1.000kHz	1.000kHz	0.01%
3.0m/s	8.800mA	8.796mA	-0.09%	3.000kHz	3.000kHz	0.01%
	Current Output 4-20mA			Frequency Output 0-10kHz		

Transmitter Settings:
Basic: Qmax 50.0000 m³/h; Flow Direction Positiv; Low flow Cut-off 1.50%; Empty Pipe OFF
Output: Current Output OFF; Time Constant N/A; Relay Output Error Level; Digital Output Pulse; Frequency Range N/A; Time Constant N/A; Volume/pulse 1 m³/p; Pulse width N/A; Pulse polarity N/A
Totalizer 1 value before test 0.00000 m³
Totalizer 1 value after test 0.56992 m³
Totalizer 2 value before test 0.00000 m³
Totalizer 2 value after test 0.56992 m³
Operating time in days 3

Sensor Details:
Size DN 80 3 IN
Cal. Factor 1.0
Correction Factor 1.0
Excitation Freq. 6.25Hz

Verificator Details (083F5060)
Serial No. 017807N242
Device No. 83462
Software Version 1.40
PC-Software Version 5.00
Cal. date 2006.01.01
ReCal. date 2006.01.01

Comments

These tests verify that the flowmeter is functioning within 2% deviation of the original test parameters.
Verification is traceable to National and International Standards.

Date and signature
2006.01.01

Description	Order No.
SITRANS F M Verificator	
• 11 ... 30 V DC, 11 ... 24 V AC, 115 ... 230 V, 50 Hz	**FDK-083F5060**
• 11 ... 30 V DC, 11 ... 24 V AC, 115 ... 230 V, 60 Hz	**FDK-083F5061**

Note:
It is mandatory to have the Verificator returned to the factory once a year for check and re-verification.

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Technical specifications

Flowmeter Calibration and traceability

To ensure continuous accurate measurement, flowmeters must be calibrated. The calibration is conducted at Siemens flow facilities with traceable instruments referring directly to the physical unit of measurement according to the International System of Units (SI).

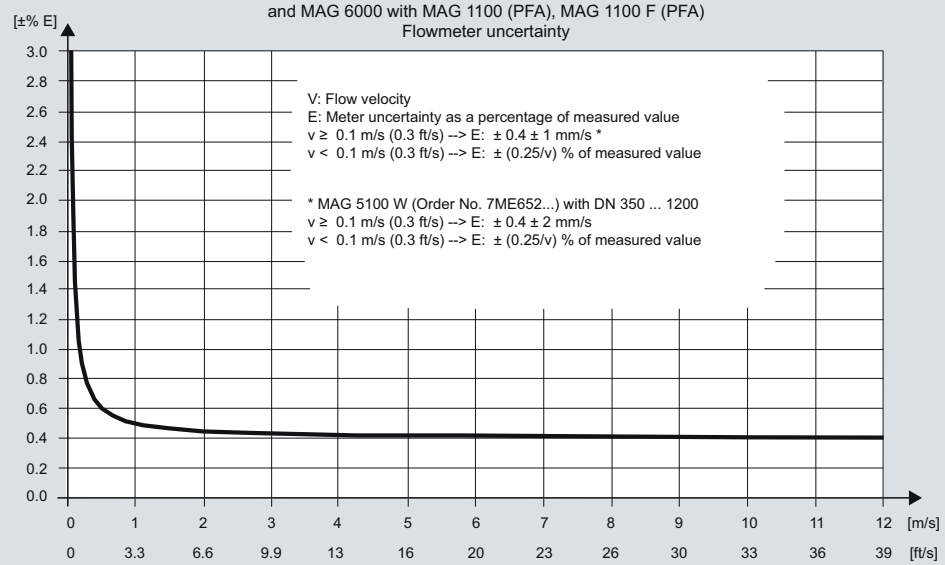
Therefore, the calibration certificate ensures recognition of the test results worldwide, including the US (NIST traceability).

Siemens offers accredited calibrations assured to ISO 17025 in the flow range from 0.0001 m^3/h to 10 000 m^3/h.
Siemens Flow Instruments accredited laboratories are recognized by ILAC MRA (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement) ensuring international traceability and recognition of the test results worldwide.

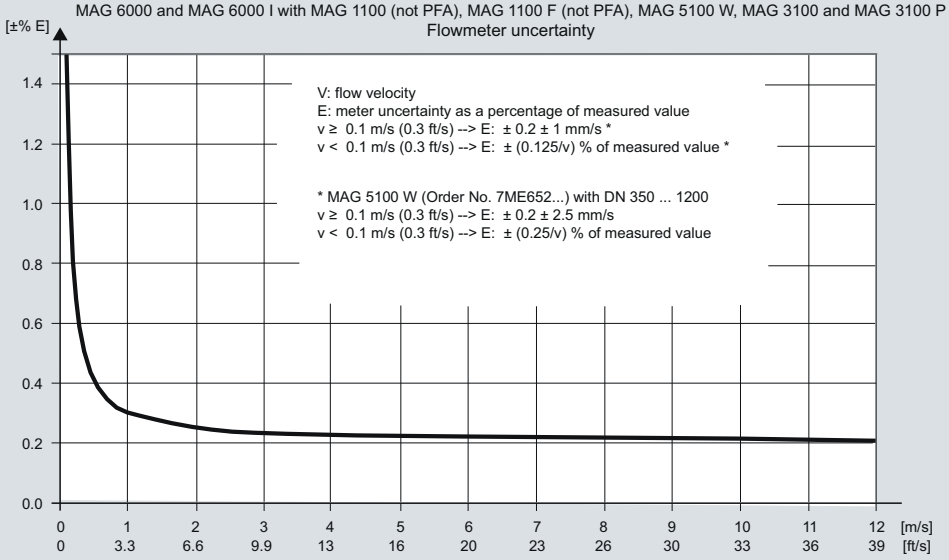
A calibration certificate is shipped with every sensor and calibration data are stored in the SENSORPROM memory unit.

Flowmeter uncertainty

MAG 5000 with MAG 1100, MAG 1100 F, MAG 5100 W, MAG 3100, MAG 3100 P
and MAG 6000 with MAG 1100 (PFA), MAG 1100 F (PFA)
Flowmeter uncertainty



MAG 6000 and MAG 6000 I with MAG 1100 (not PFA), MAG 1100 F (not PFA), MAG 5100 W, MAG 3100 and MAG 3100 P
Flowmeter uncertainty



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Reference conditions

Reference conditions (ISO 9104 and DIN EN 29104)	
Temperature medium	20 °C ± 10 K (68 °F ± 18 °F)
Temperature ambient	25 °C ± 10 K (77 °F ± 18 °F)
Supply voltage	U_n ± 1 %
Warming-up time	30 minutes
Incorporation in conductive pipe section	
• Inlet section	10 x DN (DN ≤ 1200/48") 5 x DN (DN > 1200/48")
• Outlet section	5 x DN (DN ≤ 1200/48") 3 x DN (DN > 1200/48")
Flow conditions	Developed flow profile
Additions in the event of deviations from reference conditions	
Current output	As pulse output (± 0.1 % of actual flow + 0.05 % FSO)
Effect of ambient temperature	
• Display / frequency / pulse output	< ± 0.003 %/K act.
• Current output	< ± 0.005 %/K act.
Effect of supply voltage	< 0.005 % of measuring value on 1% change
Repeatability	± 0.1 % of actual flow for v ≥ 0.5 m/s (1.5 ft/s) and conductivity > 10 µS/cm
Certificates	
• EN 10204 2.1	Certificate of conformity, stating that the delivered parts are made of the material quality that was ordered
• EN 10204 2.2	Test report certificate, a non batch specific material analysis of the ordered material
• EN 10204 3.1	Material analysis certificate, a batch specific analysis of the material issued by an independent inspector

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Technical specifications

General specifications	
PROFIBUS device profile	3.00 Class B
Certified	Yes, according to Profile for process control devices v3.00.
MS0 connections	1
MS1 connections	1
MS2 connections	2

Electrical specification DP

Physical layer specifications	
Applicable standard	EN 50170 vol. 2
Physical Layer (Transmission technology)	RS 485
Transmission speed	≤ 1.5 Mbits/s
Number of stations	Up to 32 per line segment, (maximum total of 126)
Cable specification (Type A)	
Cable design	Two-wire twisted pair
Shielding	CU shielding braid or shielding braid and shielding foil
Impedance	35 up to 165 Ω at frequencies from 3 ... 20 MHz
Cable capacity	< 30 pF per meter
Core diameter	> 0.34 mm², corresponds to AWG 22
Resistance	< 110 Ω per km
Signal attenuation	Max. 9 dB over total length of line section
Max. bus length	200 m at 1500 kbit/s, up to 1.2 km at 93.75 kbit/s. Extendable by repeaters

Electrical specification PA

Physical layer specifications	
Applicable standard	EN 50170
Physical Layer (Transmission technology)	IEC-61158-2
Transmission speed	31.25 Kbits/second
Number of stations	Up to 32 per line segment, (maximum total of 126)
Max. basic current [I_B]	14 mA
Fault current [I_{FDE}]	0 mA
Bus voltage	9 ... 32 V (non Ex)
Preferred cable specification (Type A)	
Cable design	Two-wire twisted pair
Conductor area (nominal)	0.8 mm² (AWG 18)
Loop resistance	44 Ω/km
Impedance	100 Ω ± 20 %
Wave attenuation at 39 kHz	3 dB/km
Capacitive asymmetry	2 nF/km
Bus termination	Passive line termination at both
Max. bus length	Up to 1.9 km. Extendable by repeaters

IS (Intrinsic Safety) data	
Required sensor electronics	Compact or remote mounted SITRANS F M MAG 6000 I Ex de
FISCO	Yes
Max. U_I	17.5 V
Max. I_I	380 mA
Max. P_I	5.32 V
Max. L_I	0 µH
Max. C_I	0 nF
FISCO cable requirements	
Loop resistance R_C	15 ... 150 Ω/km
Loop inductance L_C	0.4 ... 1 mH/km
Capacitance C_C	80 ... 200 nF/km
Max. Spur length in IIC and IIB	30 m
Max. Trunk length in IIC	1 km
Max. Trunk length in IIB	5 km

PROFIBUS parameter support

The following parameters are accessible using a MS0 relationship from a Class 1 Master.
MS0 specifies cyclic Data Exchange between a Master and a Slave.

Cyclic services:		
Input (Master view)	**Parameter**	**MAG 6000/MAG 6000 I**
	Mass flow	
	Volume flow	✓
	Temperature	
	Density	
	Fraction A[1)]	
	Fraction B[1)]	
	Pct Fraction A[1)]	
	Totalizer 1	✓
	Totalizer 2[2)]	✓
	Batch progress[2)]	✓
	Batch setpoint	✓
	Batch compensation	✓
	Batch status (running ...)	✓
Output (Master view)	Set Totalizer 1+2	✓
	Set Mode Totalizer 1+2	✓
	Batch control (start, stop ...)	✓
	Batch setpoint	✓
	Batch compensation	✓

1) Requires a SENSORPROM containing valid fraction data.
2) Value returned is dependent on the BATCH function.
When ON, Batch progress is returned.
When OFF, TOTALIZER 2 is returned.

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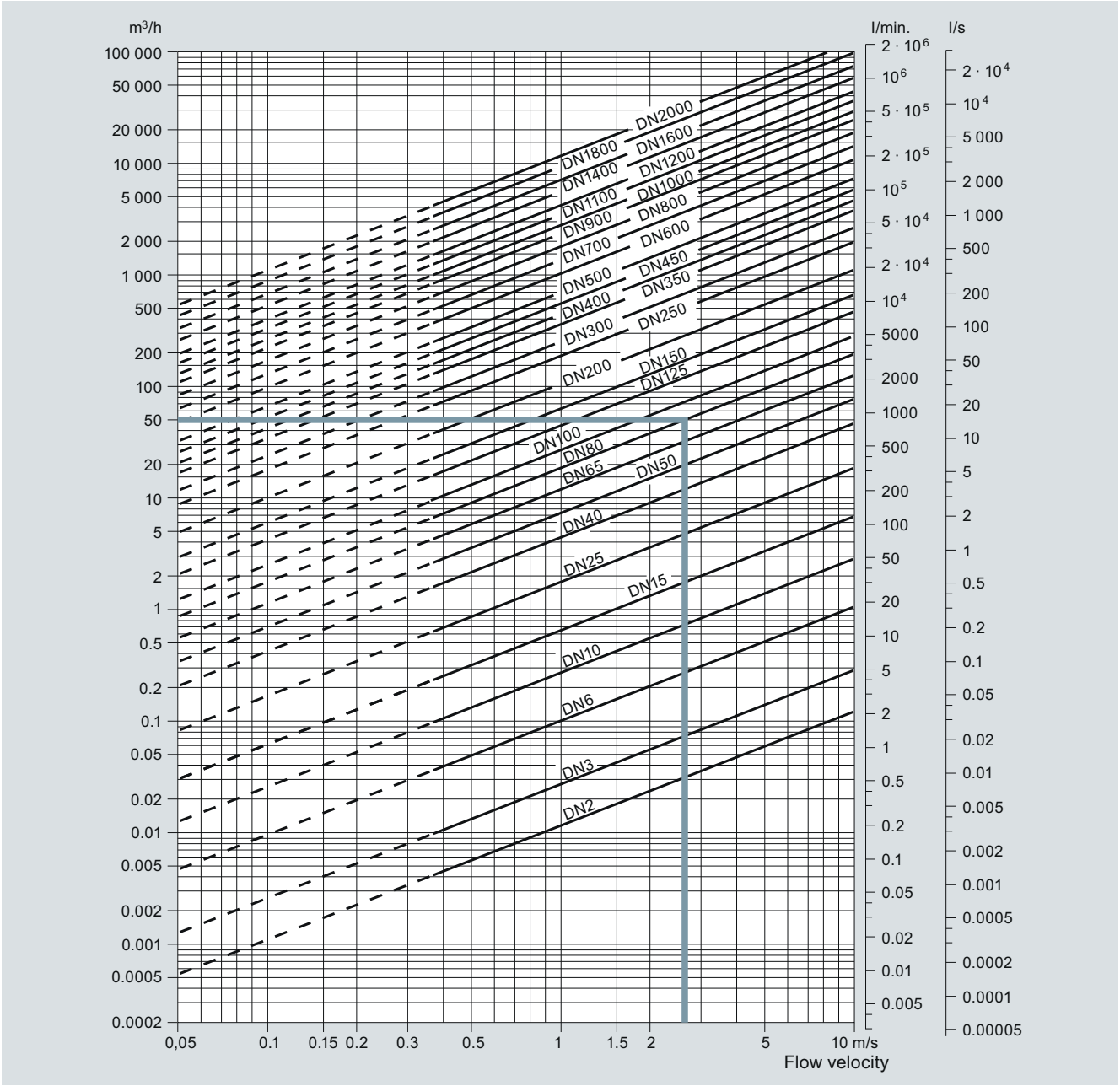
Selection of sensor

Metric



Sizing table (DN 2 … DN 2000)

The table shows the relationship between flow velocity v, flow quantity Q and sensor dimension DN.

Guidelines for selection of sensor

Min. measuring range: 0 to 0.25 m/s

Max. measuring range: 0 to 10 m/s

Normally the sensor size is selected so that the nominal flow velocity v lies within the measuring range 1 to 3 m/s.

Example:

Flow quantity of 50 m^3/h and a sensor dimension of DN 80 gives a flow velocity of 2.7 m/s, which is within the recommended measuring range of 1 to 3 m/s.

Flow velocity calculation formula	Units
$v = 1273.24 \cdot Q / DN^2$ or	v : [m/s], Q : [l/s], DN : [mm]
$v = 353.68 \cdot Q / DN^2$	v : [m/s], Q : [m^3/h], DN : [mm]

Link to "Sizing program":
https://pia.khe.siemens.com/index.aspx?nr=11501

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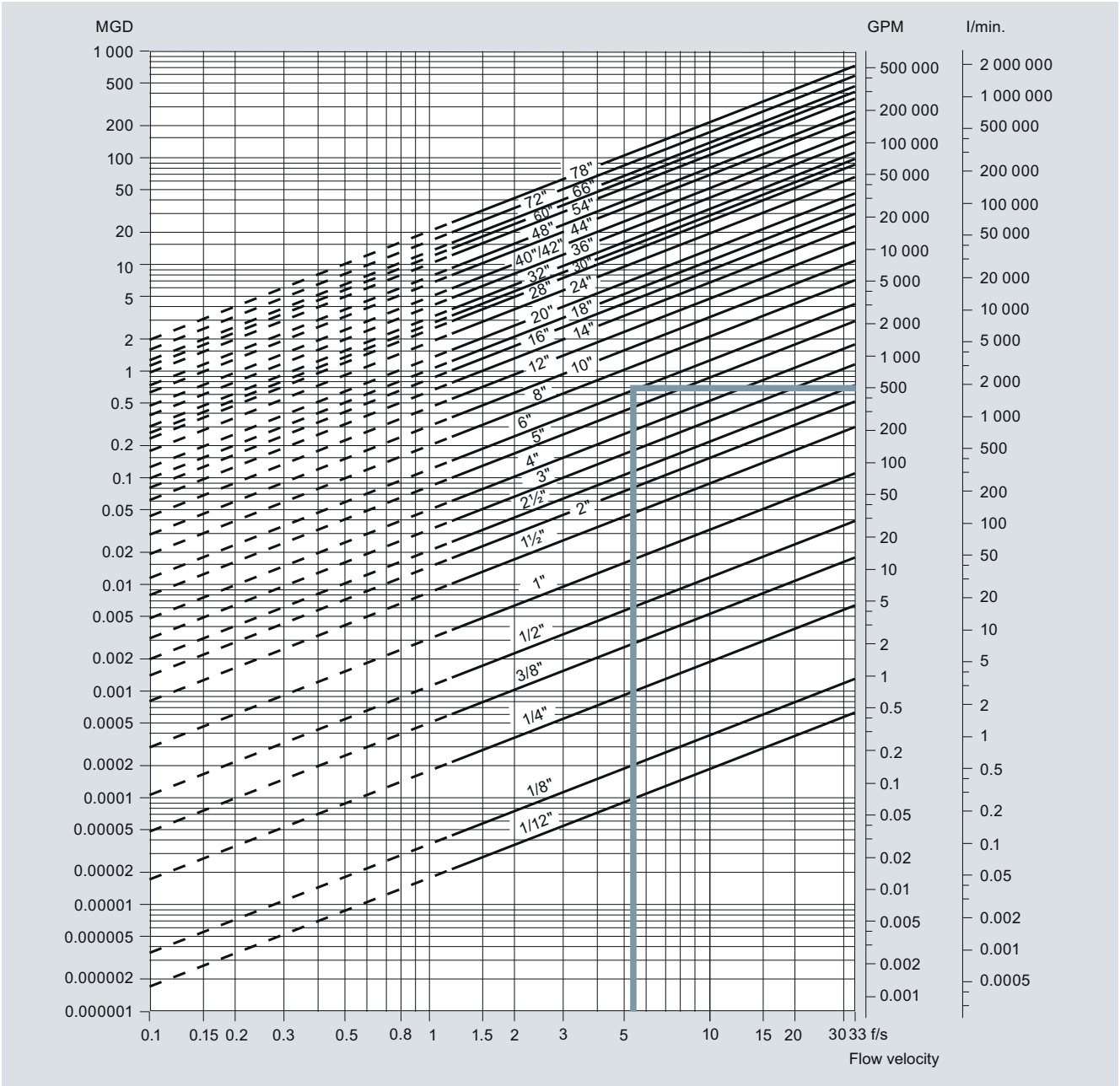
System information SITRANS F M electromagnetic flowmeters

Imperial



Sizing table ($^1/_{12}$" … 78")

The table shows the relationship between flow velocity v, flow quantity Q and sensor dimension size.

Guidelines for selection of sensor

Min. measuring range: 0 to 0.8 ft/s

Max. measuring range: 0 to 33 ft/s

Normally the sensor size is selected so that the nominal flow velocity v lies within the measuring range 3 to 10 ft/s.

Example:

Flow quantity of 500 GPM and a sensor dimension of 6" gives a flow velocity of 5.6 ft/s, which is within the recommended measuring range of 3 to 10 ft/s.

Flow velocity calculation formula	Units
$v = 0.408 \cdot Q / (\text{Pipe I.D.})^2$ or	v : [ft/s], Q : [GPM], Pipe I.D. : [inch]
$v = 283.67 \cdot Q / (\text{Pipe I.D.})^2$	v : [ft/s], Q : [MGD], Pipe I.D. : [inch]

Link to "Sizing program":
https://pia.khe.siemens.com/index.aspx?nr=11501

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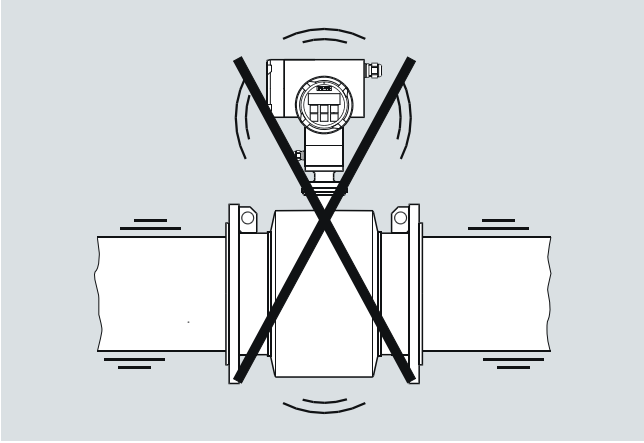
Installation conditions

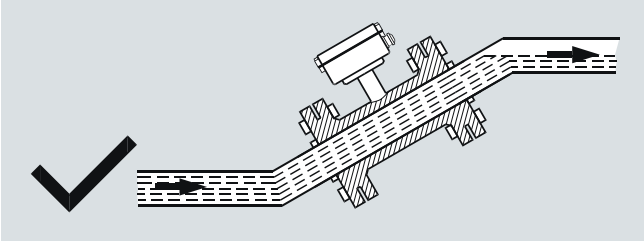
Vibrations

Strong vibrations should be avoided.

In applications with strong vibrations, remote mounting of the transmitter is recommended.



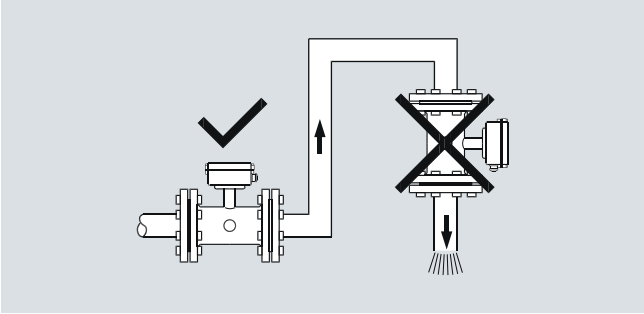
The sensor must always be completely filled with liquid.

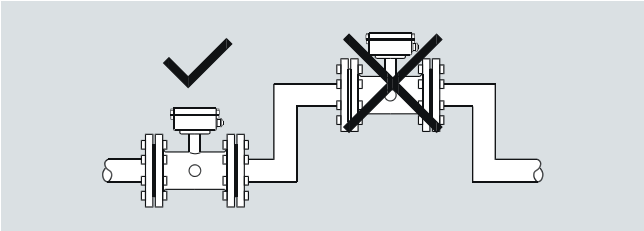


Install in pipelines which are always full

The sensor must always be completely filled with liquid. Therefore avoid:

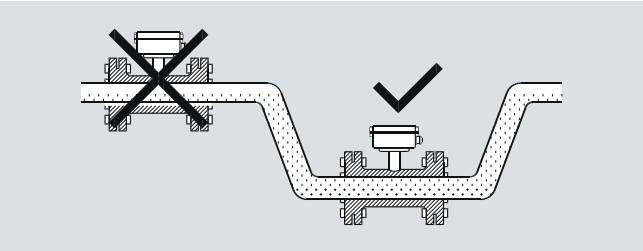
- Installation at the highest point in the pipe system
- Installation in vertical pipes with free outlet





Do not install in pipelines which can run empty

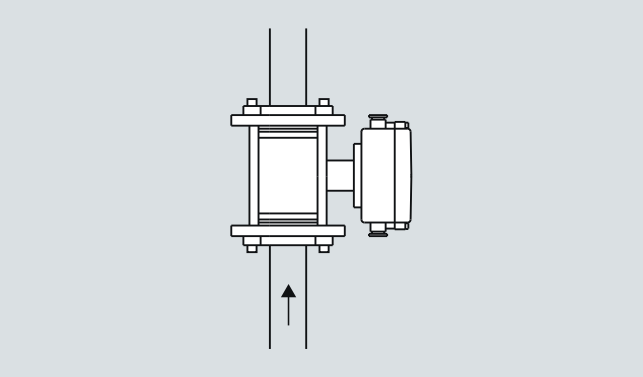
For partially filled pipes or pipes with downward flow and free outlet the flowmeter should be located in a U-Tube.



Install in U-tubes when pipe is partially filled

Installation in vertical pipes

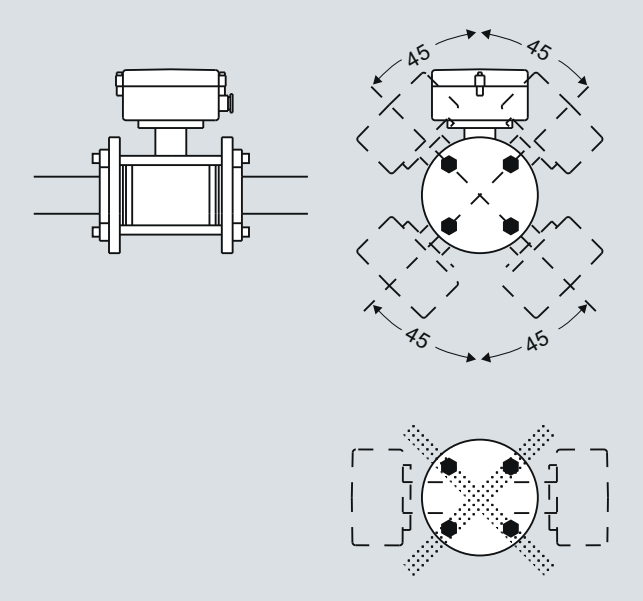
Recommended flow direction: upwards. This minimizes the effect on the measurement of any gas/air bubbles in the liquid.



Install in vertical pipes with upward flow direction

Installation in horizontal pipes

The sensor must be mounted as shown in the below figure. Do not mount the sensor as shown in the lower figure. This will position the electrodes at the top where there is possibility for air bubbles and at the bottom where there is possibility for mud, sludge, sand etc.



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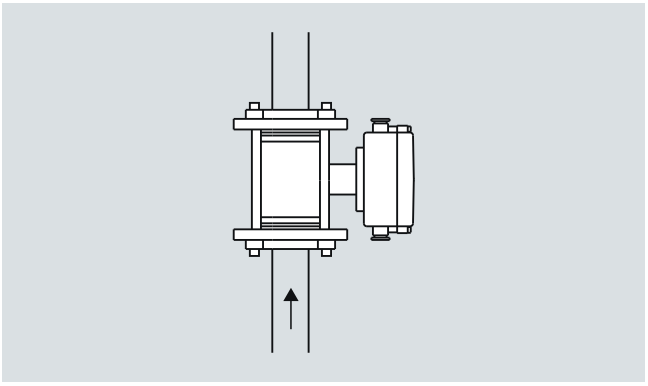
System information SITRANS F M electromagnetic flowmeters

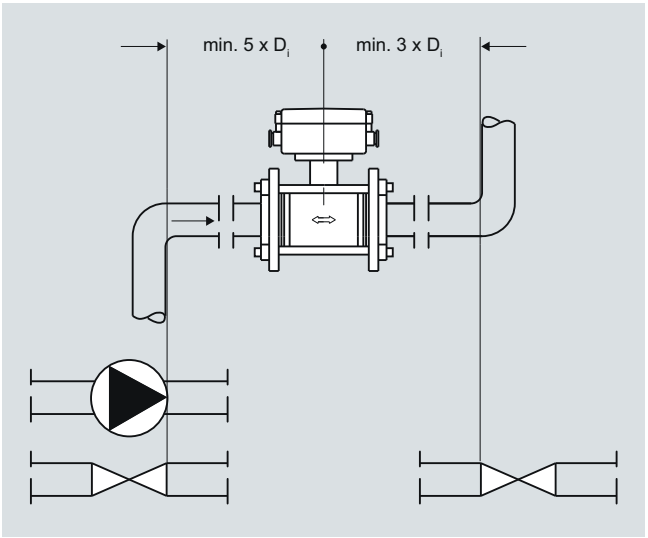
Measuring abrasive liquids and liquids containing particles

Recommended installation is in a vertical/inclined pipe to minimize the wear and deposits in the sensor.



Install in vertical pipelines with upward flow direction if measuring abrasive liquids

Inlet and outlet conditions



Installation between elbows, pumps and valves: standard inlet and outlet pipe sections

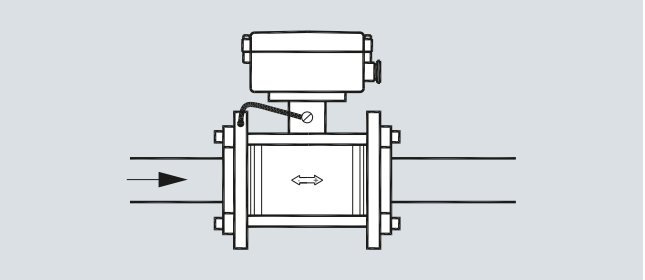
To achieve maximum accurate flow measurement it is essential to have straight length of inlet and outlet pipes and a certain distance between the flowmeter and pumps or valves.

It is also important to center the flowmeter in relation to pipe flange and gaskets.

Ambient temperature-Installation

Temperature changes can cause expansion or contraction in the pipe system. To avoid damage on the sensor use of proper gasket and torque should be ensured. For more information see sensor instruction.

Potential equalization

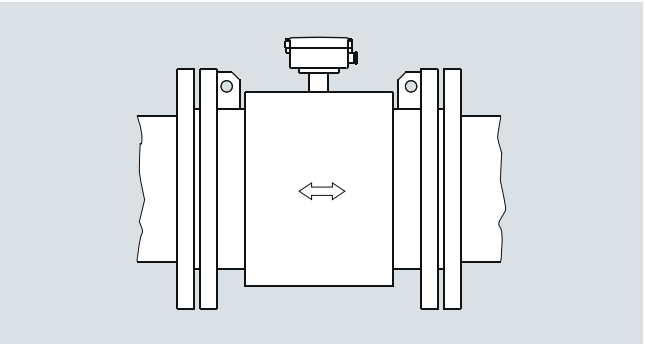


Potential equalization

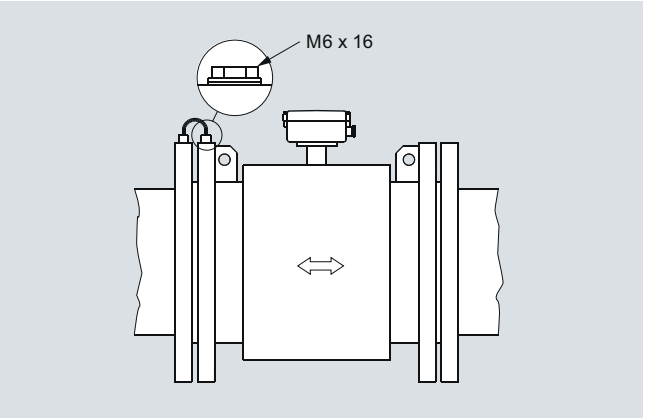
The electrical potential of the liquid must always be equal to the electrical potential of the sensor. This can be achieved in different ways depending on the application:

- Wire jumper between sensor and adjacent flange (MAG 1100, MAG 3100)
- Direct metallic contact between sensor and fittings (MAG 1100 F)
- Build-in grounding electrodes (MAG 3100, MAG 5100 W)
- Optional grounding/protection flanges/rings (MAG 1100, MAG 3100, MAG 8000)
- Optional graphite gaskets on MAG 1100 (standard for MAG 1100 High Temperature)
- MAG 8000 installed in plastic or coated pipes: two grounding rings to be used.

Grounding



MAG 3100 (not PTFE), MAG 5100 W: with earthing electrodes in conductive and non-conductive pipes (no further action necessary)



MAG 1100, MAG 3100 (PTFE): without earthing electrodes in conductive pipes (MAG 1100 use graphite gasket)

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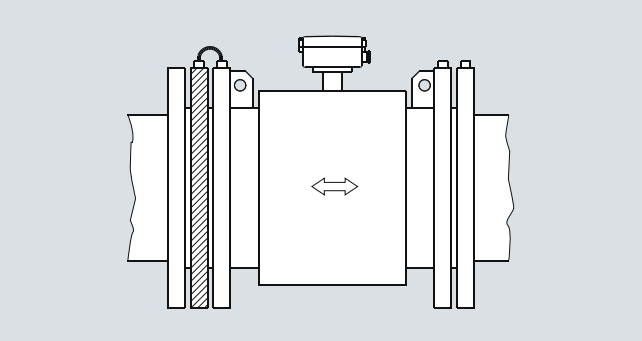
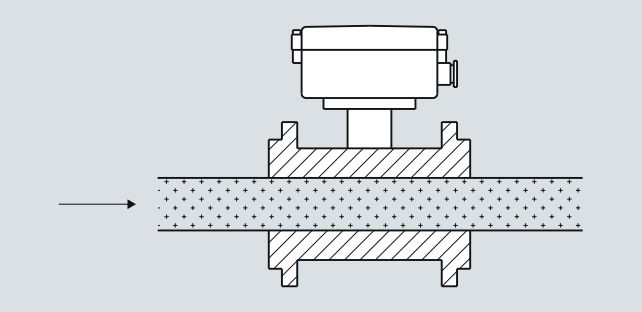


Without earthing electrodes in non-conductive pipes use grounding ring (MAG 1100 use graphite gasket)

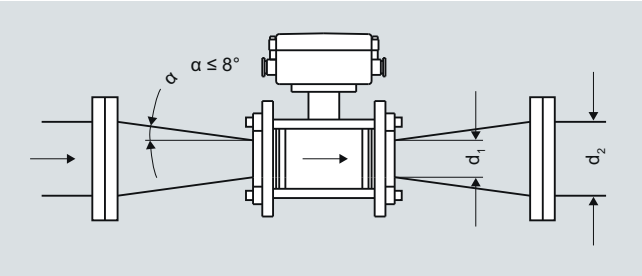
MAG 1100 F grounding via process connections. MAG 8000 grounding see MAG 8000 pages.

Vacuum



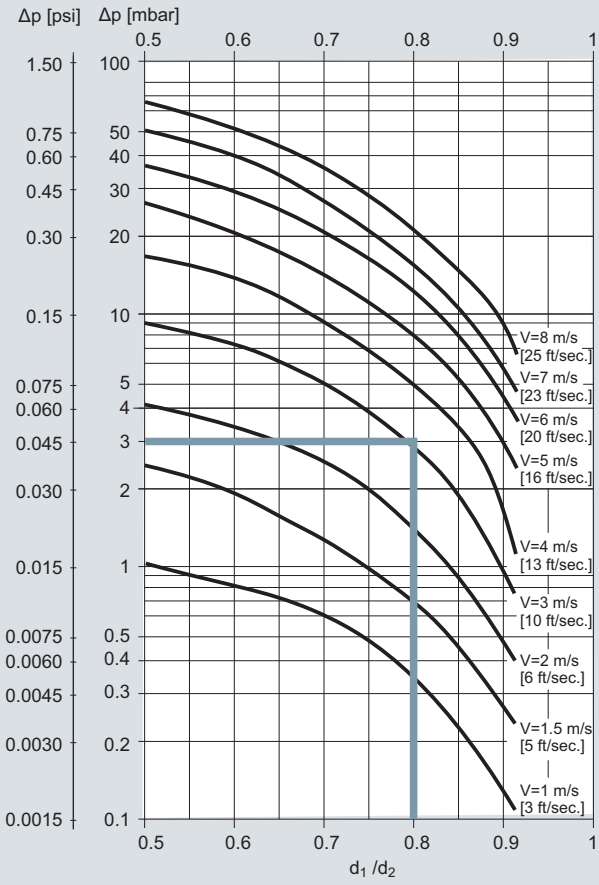
Avoid a vaccum in the measuring pipe, because this can damage certain liners.

Installation in large pipes



Reduction in nominal pipe diameter

The flowmeter can be installed between two reducers (e.g. DIN 28545). Assuming that at 8° the following pressure drop curve applies. The curves are applicable to water.

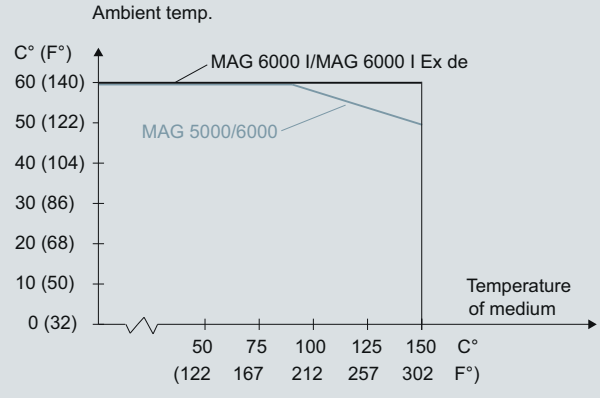


Pressure drop as function of diameter reduction between reducers

Example:

Flow velocity (v) of 3 m/s (10 ft/s) in a sensor with a diameter reduction DN 100 (4") to DN 80 (3") (d_1/d_2 = 0.8) gives a pressure drop of 2.9 mbar (0.04 psi).

Ambient temperature



Max. ambient temperature as a function of temperature of medium

The transmitter can be installed either compact or remote.

With compact installation the temperature of medium must be according to the graph.

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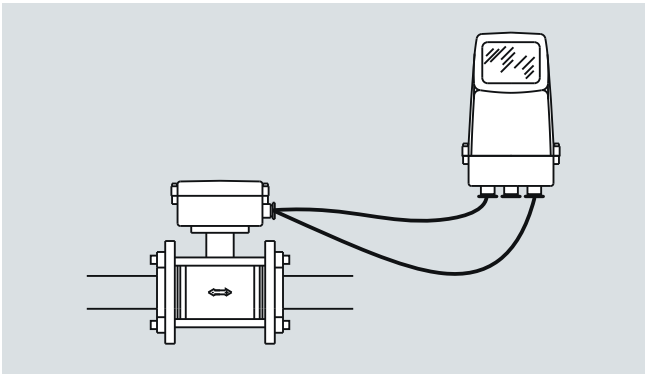
System information SITRANS F M electromagnetic flowmeters

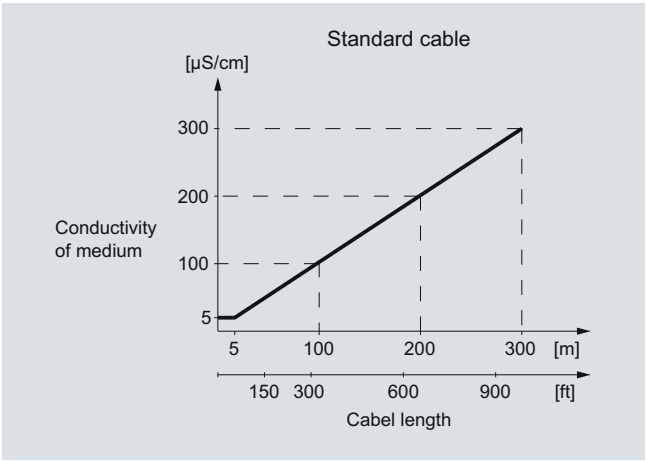
Sensor cables and conductivity of medium

Compact installation:

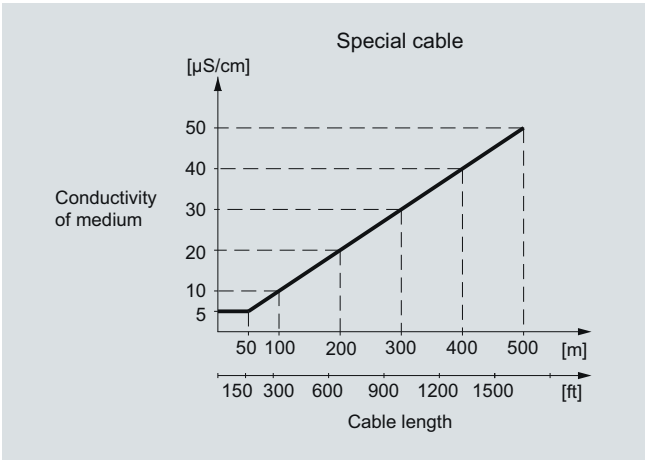
Liquids with an electrical conductivity ≥ 5 µS/cm.



Remote installation



Minimum conductivity of medium (using standard electrode cable)



Minimum conductivity of medium (using special electrode cable)

Note

For detection of empty pipe the minimum sensor conductivity must always be ≥ **20 µS/cm** and the maximum length of electrode cable when remotely mounted is 50 m (150 ft). Special shield cable must be used.

For **DN 2, DN 3** or for 19" safety barrier remote mounting in Ex applications special cable cannot be used, empty sensor cannot be detected and the conductivity must be ≥ **30 µS/cm**.

For remote mounted CT installations the maximum cable length is 200 m (600 ft).

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Overview

Transmitter MAG 5000/6000 compact version (left) and 19“ insert version (right)

The MAG 5000 and 6000 are transmitters engineered for high performance, easy installation, commissioning and maintenance. The transmitters evaluate the signals from the SITRANS F M sensors type MAG 1100, MAG 1100 F, MAG 3100, MAG 3100 P and MAG 5100 W.

Transmitter types:

- MAG 5000: Max. measuring error ± 0.4 % ± 1 mm/s (incl. sensor)
- MAG 6000: Max. measuring error ± 0.2 % ± 1 mm/s (incl. sensor, see also sensor specifications) and with additional features such as: "plug & play" add-on bus modules; integrated batch functions.

Benefits

- Superior signal resolution for optimum turn down ratio
- Digital signal processing with many possibilities
- Automatic reading of SENSORPROM data for easy commissioning
- User configurable operation menu with password protection.
- 3 lines, 20 characters display in 11 languages.
- Flow rate in various units
- Totalizer for forward, reverse and net flow as well as additional information available
- Multiple functional outputs for process control, minimum configuration with analogue, pulse/frequency and relay output (status, flow direction, limits)
- Comprehensive self-diagnostic for error indication and error logging (see under SITRANS F M diagnostics)
- Batch control (MAG 6000 only)
- Custody transfer approval: PTB, OIML R 75, OIML R 117, OIML R 49, MI-001 and PTB K 7.2 for chilled water
- MAG 6000 with add-on bus modules for HART, FOUNDATION Fieldbus H1, DeviceNet, Modbus RTU/RS485, PROFIBUS PA and DP

Application

The SITRANS F M flowmeters are suitable for measuring the flow of almost all electrically conductive liquids, pastes and slurries. The main applications can be found in:

- Water and waste water
- Chemical and pharmaceutical industries
- Food and beverage industries
- Power generation and utility

Design

The transmitter is designed as either IP67 NEMA 4X/6 enclosure for compact or wall mounting or 19" version as a 19” insert as a base to be used in:

- 19" rack systems
- Panel mounting IP20/NEMA 1 (prepared for IP65/NEMA 2 display side)
- Back of panel mounting IP20/NEMA 1
- Wall mounting IP66/NEMA 4X

Several options on 19” versions are available such as:

- Transmitters mounted in safe area for Ex ATEX approved flow sensors (incl. barriers)
- Transmitters with electrode cleaning unit on request

Function

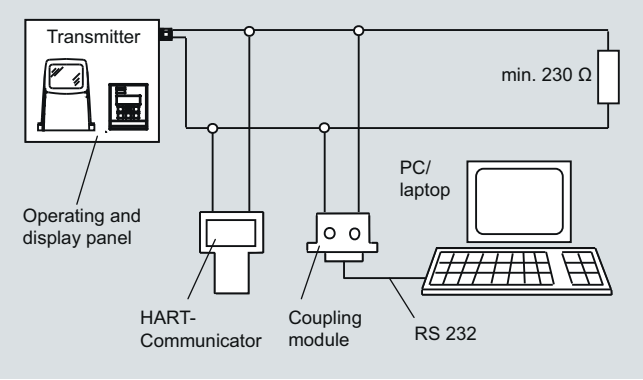
The MAG 5000/6000 are transmitters with a build-in alphanumeric display in several languages. The transmitters evaluate the signals from the associated electromagnetic sensors and also fulfil the task of a power supply unit which provides the magnet coils with a constant current.

Further information on connection, mode of operation and installation can be found in the data sheets for the sensors.

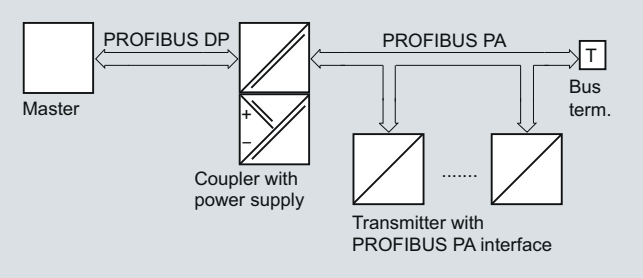
Displays and controls

Operation of the transmitter can be carried out using:

- Control and display unit
- HART communicator
- PC/laptop and SIMATIC PDM software via HART communication
- PC/laptop and SIMATIC PDM software using PROFIBUS or Modbus communication



HART communication



PROFIBUS PA communication

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Transmitter MAG 5000/6000

Technical specifications

Mode of operation and design	
Measuring principle	Electromagnetic with pulsed constant field
Empty pipe	Detection of empty pipe (special cable required in remote mounted installation)
Excitation frequency	Depend on sensor size
Electrode input impedance	> 1 x 10^{14} Ω
Input	
Digital input	11 ... 30 V DC, R_i = 4.4 KΩ
• Activation time	50 ms
• Current	$I_{11\ V\ DC}$ = 2.5 mA, $I_{30\ V\ DC}$ = 7 mA
Output	
Current output	
• Signal range	0 ... 20 mA or 4 ... 20 mA
• Load	< 800 Ω
• Time constant	0.1 … 30 s, adjustable
Digital output	
• Frequency	0 ... 10 kHz, 50 % duty cycle (uni/bidirectional)
• Pulse (active)	24 V DC, 30 mA, 1 KΩ ≤ R_i ≤ 10 KΩ, short-circuit-protected (power supplied from flowmeter)
• Pulse (passive)	3 … 30 V DC, max. 110 mA, 200 Ω ≤ R_i ≤ 10 KΩ (powered from connected equipment)
• Time constant	0.1 … 30 s, adjustable
Relay output	
• Time constant	Changeover relay, same as current output
• Load	42 V AC/2 A, 24 V DC/1 A
Low flow cut off	0 ... 9.9 % of maximum flow
Galvanic isolation	All inputs and outputs are galvanically isolated.
Max. measuring error (incl. sensor and zero point)	
• MAG 5000	0.4 % ±1 mm/s
• MAG 6000	0.2 % ±1 mm/s
Rated operation conditions	
Ambient temperature	
• Operation	• Display version: -20 ... +60 °C (-4 ... +140 °F)[1)] • Blind version: -20 ... +60 °C (-4 ... +140 °F)
• Storage	-40 ... +70 °C (-40 ... +158 °F)
Mechanical load (vibration)	
Compact version	18 ... 1000 Hz, 3.17 g rms, sinusoidal in all directions to IEC 68-2-36
19“ insert	1 ... 800 Hz, 1 g, sinusoidal in all directions to IEC 68-2-36
Degree of protection	
Compact version	IP67/NEMA 4X/6 to IEC 529 and DIN 40050 (1 mH_2O 30 min.)
19“ insert	IP20/NEMA 1 to IEC 529 and DIN 40050
EMC performance	IEC/EN 61326-1 (all environments) IEC/EN 61326-2-5
Display and keypad	
Totalizer	Two eight-digit counters for forward, net or reverse flow
Display	Background illumination with alphanumeric text, 3 x 20 characters to indicate flow rate, totalized values, settings and faults; Reverse flow indicated by negative sign
Time constant	Time constant as current output time constant
Design	
Enclosure material	
• Compact version	Fiber glass reinforced polyamide; stainless steel AISI 316/1.4436 (IP65)
• 19" insert	Standard 19“ insert of aluminum/steel (DIN 41494), width: 21 TE, height: 3 HE
• Back of panel	IP20/NEMA 1; Aluminum
• Panel mounting	IP20/NEMA 1 (prepared for IP65/NEMA 2 display side); ABS plastic
• Wall mounting	IP66/NEMA 4X; ABS plastic
Dimensions	
Compact version	See dimensional drawings
19“ insert	See dimensional drawings
Weight	
Compact version	0.75 kg (2 lb)
19“ insert	See dimensional drawings
Power supply	• 115 ... 230 V AC +10 % -15 %, 50 ... 60 Hz • 11 ... 30 V DC or 11 ... 24 V AC
Power consumption	• 230 V AC: 17 VA • 24 V AC : 9 VA, I_N = 380 mA, I_{ST} = 8 A (30 ms) • 12 V DC : 11 W, I_N = 920 mA, I_{ST} = 4 A (250 ms) I_{ST}= 4 A (250 ms): For solar panel please secure stable current supply
Certificates and approvals	CE, C-UL general purpose, C-tick; FM Class I, Div 2, CSA Class I, Div 2
Custody transfer approval (MAG 5000/6000 CT)	• Cold water: MI-001, PTB/OIML R 49 (pattern approval DE/DK) • Hot water: PTB and DANAK OIML R 75 (pattern approval DE/DK) (MAG 6000 CT) • Chilled water: PTB K 7.2 • Other media than water (milk, beer etc.): PTB and DANAK OIML R 117 (pattern approval DE/DK) (MAG 6000 CT)
Communication	
Standard	
• MAG 5000	Without serial communication or HART as option
• MAG 6000	Prepared for client-mounted add-on modules
Optional (MAG 6000 only)	HART, Modbus RTU/RS485, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS PA, PROFIBUS DP as add-on modules
• MAG 5000/6000 CT	No communication moduls approved

[1)] MAG 5000 CT/MAG 6000 CT: -20 ... +50 °C (-4 ... +122 °F).

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Safety barrier (e/ia)

Application	**For use with MAG 5000/6000 19" and MAG 1100 Ex ATEX/MAG 3100 Ex ATEX**		
Ex approval	MAG 1100 Ex [EEx e ia] IIB ATEX		
	MAG 3100 Ex [EEx e ia] IIC ATEX		
Cable parameter	Group	Capacity in µF	Inductance in mH
Electrode	IIC	≤ 4.1	≤ 80
	IIB	≤ 45	≤ 87
	IIA	≤ 45	≤ 87
Ambient temperature			
• During operation	-20 ... +50 °C (-4 ... +122 °F)		
• During storage	-20 ... +70 °C (-4 ... +158 °F)		
Enclosure			
• Material	Standard 19" insert in aluminum/steel (DIN 41494)		
• Width	21 TE (4.75")		
• Height	3 HE (5.25")		
• Rating	IP20 / NEMA 1 to EN 60529		
• Mechanical load	1 g, 1 … 800 Hz sinusoidal in all directions to EN 60068-2-36		

Electrode cleaning unit for MAG 5000 or 6000 in 19" insert version

The purpose of electrode cleaning is to remove unwanted deposits on the electrodes in water applications by applying either a DC or AC voltage to the electrodes. AC cleaning is used in waste water applications to remove fatty deposits on the electrodes by warming up the electrode. DC cleaning is used in district heating applications to eliminate electrically conductive deposits.

Application for use with transmitters MAG 5000 and 6000 19" to clean the electrodes on sensors MAG 1100 or MAG 3100

- Not to be used with intrinsically safe Ex sensors
- Not to be used with sensors with Hastelloy and Tantalum electrodes

Available on request

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Selection and Ordering data

Transmitter MAG 5000

Description	Order No.	
Transmitter MAG 5000 Blind for compact and wall mounting; IP67/NEMA 4X/6, fibre glass reinforced polyamide		
• 11 ... 30 V DC / 11 ... 24 V AC ◆	**7ME6910-1AA30-0AA0**	
• 115 ... 230 V AC, 50/60 Hz ◆	**7ME6910-1AA10-0AA0**	
Transmitter MAG 5000 Display for compact and wall mounting; IP67/NEMA 4X/6, fibre glass reinforced polyamide		
• 11 ... 30 V DC / 11 ... 24 V AC ◆	**7ME6910-1AA30-1AA0**	
• 115 ... 230 V AC, 50/60 Hz ◆	**7ME6910-1AA10-1AA0**	
• 115 ... 230 V AC, 50/60 Hz, with HART	**7ME6910-1AA10-1BA0**	
Transmitter MAG 5000 CT for compact and wall mounting, approved for custody transfer; IP67/NEMA 4X/6, fibre glass reinforced polyamide		
• 11 ... 30 V DC / 11 ... 24 V AC ◆	**7ME6910-1AA30-1AB0**	
• 115 ... 230 V AC, 50/60 Hz ◆	**7ME6910-1AA10-1AB0**	
Transmitter MAG 5000 for 19" rack and wall mounting		
• 11 ... 30 V DC / 11 ... 24 V AC	**7ME6910-2CA30-1AA0**	
• 115 ... 230 V AC, 50/60 Hz	**7ME6910-2CA10-1AA0**	

◆ Short lead time (details in PMD)

Accessories for MAG 5000 and MAG 6000

Description	Order No.	
Wall mounting unit for IP67/ NEMA 4X/6 version, wall bracket, terminal box in polyamide		
• 4 x M20 cable glands ◆	**FDK-085U1018**	
• 4 x ½" NPT cable glands ◆	**FDK-085U1053**	
Sun lid for MAG 5000/6000 transmitter (Frame and lid)	**A5E02328485**	

Transmitter MAG 6000

Description	Order No.	
Transmitter MAG 6000 Blind for compact and wall mounting; IP67/NEMA 4X/6, fibre glass reinforced polyamide		
• 11 ... 30 V DC / 11 ... 24 V AC ◆	**7ME6920-1AA30-0AA0**	
• 115 ... 230 V AC, 50/60 Hz ◆	**7ME6920-1AA10-0AA0**	
Transmitter MAG 6000 for compact and wall mounting; IP67/NEMA 4X/6, fibre glass reinforced polyamide		
• 11 ... 30 V DC / 11 ... 24 V AC ◆	**7ME6920-1AA30-1AA0**	
• 115 ... 230 V AC, 50/60 Hz ◆	**7ME6920-1AA10-1AA0**	
Transmitter MAG 6000 for compact and wall mounting; IP65/NEMA 4, stainless steel AISI 316/1.4436 (only for sensor with SS terminal box) (for remote installation order SS terminal box separately)		
• 11 ... 30 V DC / 11 ... 24 V AC	**7ME6920-1QA30-1AA0**	
• 115 ... 230 V AC, 50/60 Hz	**7ME6920-1QA10-1AA0**	
Transmitter MAG 6000 CT for compact and wall mounting, approved for custody transfer (no communication modules possible); IP67/NEMA 4X/6, fibre glass reinforced polyamide		
• 11 ... 30 V DC / 11 ... 24 V AC ◆	**7ME6920-1AA30-1AB0**	
• 115 ... 230 V AC, 50/60 Hz ◆	**7ME6920-1AA10-1AB0**	
Transmitter MAG 6000 SV for compact and wall mounting; special excitation 44 Hz settings for Batch application DN ≤ 25/1" IP67/NEMA 4X/6, fibre glass reinforced polyamide		
11 ... 30 V DC / 11 ... 24 V AC	**7ME6920-1AB30-1AA0**	
115 ... 230 V AC, 50/60 Hz	**7ME6920-1AB10-1AA0**	
Transmitter MAG 6000 for 19" rack and wall mounting		
• 11 ... 30 V DC / 11 ... 24 V AC ◆	**7ME6920-2CA30-1AA0**	
• 115 ... 230 V AC, 50/60 Hz ◆	**7ME6920-2CA10-1AA0**	
Transmitter MAG 6000 SV for 19" rack and wall mounting; special excitation 44 Hz settings for Batch application DN ≤ 25/1"		
• 11 ... 30 V DC / 11 ... 24 V AC	**7ME6920-2CB30-1AA0**	
• 115 ... 230 V AC, 50/60 Hz	**7ME6920-2CB10-1AA0**	

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Description	Order No.	
MAG 6000 with IP66/NEMA 4X enclosure; 115 ... 230 V AC, 50/60 Hz; cable gland PG13.5	**7ME6920-2EA10-1AA0**	
MAG 6000 with safety barrier for Ex-approved sensors, complete mounted with IP66/NEMA 4X wall mounting enclosure, ATEX, 115 ... 230 V AC, 50/60 Hz; cable gland PG13.5		
• For ATEX 2G D sensors	**7ME6920-2MA11-1AA0**	
MAG 6000 SV, 19" insert, in IP66/NEMA 4X , ABS plastic enclosure, excitation frequency 44 Hz for Batch application DN ≤ 25/1"; cable gland PG13.5		
• 11 … 30 V DC, 11 … 24 V AC, 50/60 Hz	**7ME6920-2EB30-1AA0**	
• 115 … 230 V AC, 50/60 Hz	**7ME6920-2EB10-1AA0**	

◆ Short lead time (details in PMD)

Operating instructions for SITRANS F M MAG 5000/6000

Description	Order No.
For SITRANS F M MAG 5000/6000 IP67	
• English	**A5E02338368**
• German	**A5E02944982**
• Spanish	**A5E02944995**
• French	**A5E02944990**
For SITRANS F M MAG 5000/6000 19"	
• English	**A5E02082880**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Communication modules for MAG 6000

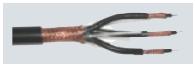
Description	Order No.	
HART (not for MAG 6000 I)	◆ **FDK-085U0226**	
Modbus RTU/RS485	◆ **FDK-085U0234**	
PROFIBUS PA Profile 3	◆ **FDK-085U0236**	
PROFIBUS DP Profile 3	◆ **FDK-085U0237**	
DeviceNet	◆ **FDK-085U0229**	
FOUNDATION Fieldbus H1	◆ **A5E02054250**	

Operating instructions for SITRANS F add-on modules

Description	Order No.
HART	
• English	**A5E03089708**
PROFIBUS PA/DP	
• English	**A5E00726137**
• German	**A5E01026429**
MODBUS	
• English	**A5E00753974**
• German	**A5E03089262**
• Spanish	**A5E03089278**
• French	**A5E03089265**
FOUNDATION Fieldbus	
• English	**A5E02318728**
• German	**A5E02488856**
• Spanish	**A5E02512177**
• French	**A5E02512169**
DeviceNet	
• English	**A5E03089720**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

Accessories for MAG 5000 and MAG 6000

Description	Order No.	
Cable for standard electrode or coil, 3 x 1.5 mm² / 18 gage with shield PVC		
• 10 m (33 ft)	◆ **FDK-083F0121**	
• 20 m (65 ft)	◆ **FDK-083F0210**	
• 40 m (130 ft)	◆ **FDK-083F0211**	
• 60 m (200 ft)	◆ **FDK-083F0212**	
• 100 m (330 ft)	◆ **FDK-083F0213**	
• 150 m (500 ft)	**FDK-083F3052**	
• 200 m (650 ft)	**FDK-083F3053**	
• 500 m (1650 ft)	**FDK-083F3054**	
Electrode cable for empty pipe or low conductivity, double shielded, 3 x 0.25 mm²		
• 10 m (33 ft)	◆ **FDK-083F3020**	
• 20 m (65 ft)	◆ **FDK-083F3095**	
• 40 m (130 ft)	**FDK-083F3094**	
• 60 m (200 ft)	**FDK-083F3093**	
• 100 m (330 ft)	**FDK-083F3092**	
• 150 m (500 ft)	**FDK-083F3056**	
• 200 m (650 ft)	**FDK-083F3057**	
• 500 m (1650 ft)	**FDK-083F3058**	
Low-noise electrode coax cable for low conductivity and high vibration levels of cables, 3 x 0.13 mm²		
• 2 m (6.6 ft)	**A5E02272692**	
• 5 m (16.5 ft)	**A5E02272723**	
• 10 m (33 ft)	**A5E02272730**	

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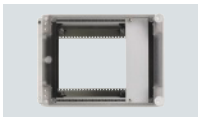
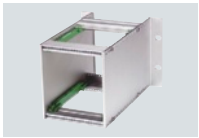
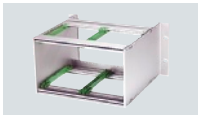
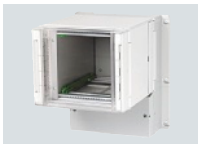
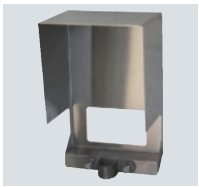
Transmitter MAG 5000/6000

Description		Order No.	
Cable kit with standard coil cable, 3 x 1.5 mm²/18 gage with shield PVC and electrode cable double shielded, 3 x 0.25 mm²			
• 5 m (16.5 ft)	◆	**A5E02296329D)**	
• 10 m (33 ft)	◆	**A5E01181647**	
• 15 m (49 ft)	◆	**A5E02296464D)**	
• 20 m (65 ft)	◆	**A5E01181656**	
• 25 m (82 ft)	◆	**A5E02296490D)**	
• 30 m (98 ft)	◆	**A5E02296494D)**	
• 40 m (130 ft)	◆	**A5E01181686**	
• 50 m (164 ft)	◆	**A5E02296498D)**	
• 60 m (200 ft)		**A5E01181689**	
• 100 m (330 ft)		**A5E01181691**	
• 150 m (500 ft)		**A5E01181699**	
• 200 m (650 ft)		**A5E01181703**	
• 500 m (1650 ft)		**A5E01181705**	
Potting kit for terminal box of MAG sensors for IP68/NEMA 6P (not for Ex sensors)	◆	**FDK-085U0220**	
19“ safety barrier (21 TE) [EEx e ia] IIC for MAG 1100 Ex sensors and MAG 3100 Ex sensors, incl. back plate		**FDK-083F5034**	
Panel mounting enclosure for 19“ insert (21 TE); IP65/NEMA 2 enclosure in ABS plastic for front panel mounting		**FDK-083F5030**	
Panel mounting enclosure for 19“ insert (42 TE); IP65/NEMA 2 enclosure in ABS plastic for front panel mounting		**FDK-083F5031**	
Back of panel mounting enclosure for 19“ insert (21 TE); IP20/NEMA 1 enclosure in aluminum		**FDK-083F5032**	
Back of panel mounting enclosure for 19“ insert (42 TE); IP20/NEMA 1 enclosure in aluminum		**FDK-083F5033**	
IP66/NEMA 4X, wall mounting enclosure for 19“ inserts (without back plates)			
• 21 TE		**FDK-083F5037**	
• 42 TE		**FDK-083F5038**	
Front cover (7TE)		**FDK-083F4525**	

Description	Order No.	
Sun shield for remote MAG 5000/6000 transmitters	**A5E01209496D)**	
Sun Shield for compact MAG 5000/6000 transmitters on MAG 3100 (DN 15 ... 2000 (½" ... 78") or MAG 5100 W (DN 150 ... 1200 (6" ... 48")	**A5E01209500D)**	

◆ Short lead time (details in PMD)

D) Subject to export regulations AL: N, ECCN: EAR99H

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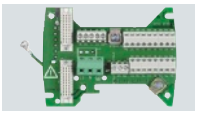
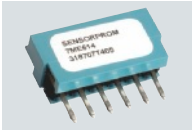
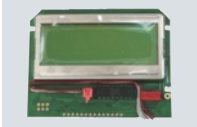
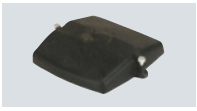
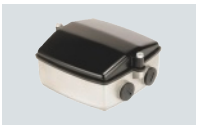
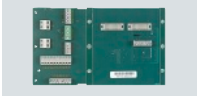
Spare parts

Description	Order No.	
Connection board (for polyamide terminalbox)		
• 12 ... 24 V	**A5E02559817**	
• 115 ... 230 V	**A5E02559816**	
Connection board (for stainless steel terminal-box)		
• 12 ... 24 V	**A5E02604280**	
• 115 ... 230 V	**A5E02604272**	
19“ enclosure, 12 ... 24 V, 115 ... 230 V		
• Connection board for standard 19“ transmitter	**A5E02559809**	
• Connection board for transmitter ia and safety barrier	**A5E02559810**	
• Connection board for transmitter ia/ib and safety barrier (only for sensors produced before October 2007)	**A5E02559811**	
• Connection board for transmitter and cleaning unit	**FDK-083F4123**	
SENSORPROM memory unit (Sensor code and serial numbers must be specified on order)		
• 2 kB (for MAG 5000/6000/ MAG 6000 I)	**FDK-085U1005**	
• 250 B (for MAG 2500/3000)	**FDK-085U1008**	
Display unit for MAG 5000/6000		
• Black neutral front	**FDK-085U1038**	
• Siemens front ◆	**FDK-085U1039**	
Display unit for 19" versions	**FDK-085U3349**	

Description	Order No.	
Cable glands, for above cable, 4 pcs.		½“ NPT M20
• M20 ◆	**A5E00822490**	
• ½“ NPT ◆	**A5E00822501**	
Sealing screws for sensor/ transmitter, 2 pcs	**FDK-085U0221**	
Terminal box, in polyamide, inclusive lid		
• M20 ◆	**FDK-085U1050**	
• ½" NPT ◆	**FDK-085U1052**	
Terminal box lid, in polyamide	**FDK-085U1003**	
Terminal box, in stainless steel, inclusive lid for MAG 6000 in stainless steel and for all Ex sensors		
• M20	**A5E00836867**	
• ½" NPT	**A5E00836868**	
Terminal box (3A) for MAG 1100 F in polyamide, inclusive lid		
• M20	**A5E00822478**	
• ½" NPT	**A5E00822479**	
Wall unit enclosure IP66, 12 ... 24 V, 115 ... 230 V		
• PCB for standard transmitter	**A5E02559813**	
• PCB for transmitter ia/e and safety barrier	**A5E02559814**	
• PCB for transmitter ia/ib and safety barrier (7ME6130, 7ME6150 and 7ME6330)	**A5E02559812**	
• PCB for transmitter and cleaning unit	**A5E02559815**	

◆ Short lead time (details in PMD)

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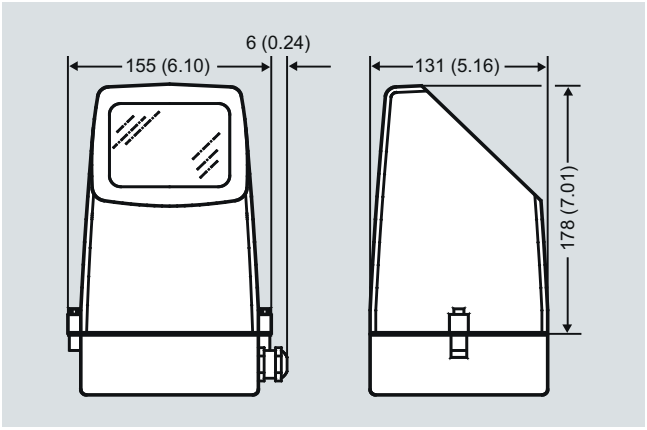
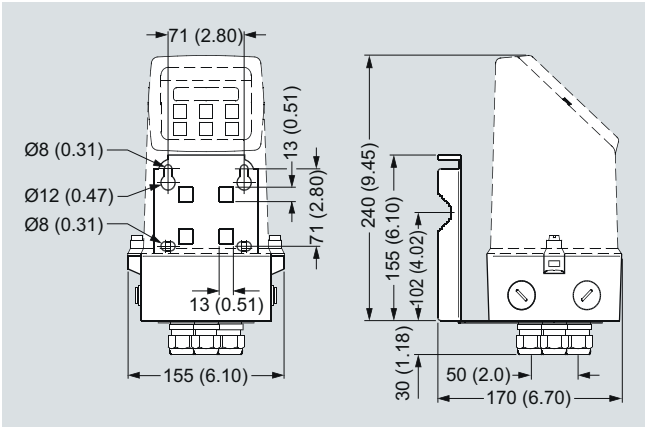
Dimensional drawings

Transmitter IP67/NEMA 4X/6 compact polyamide

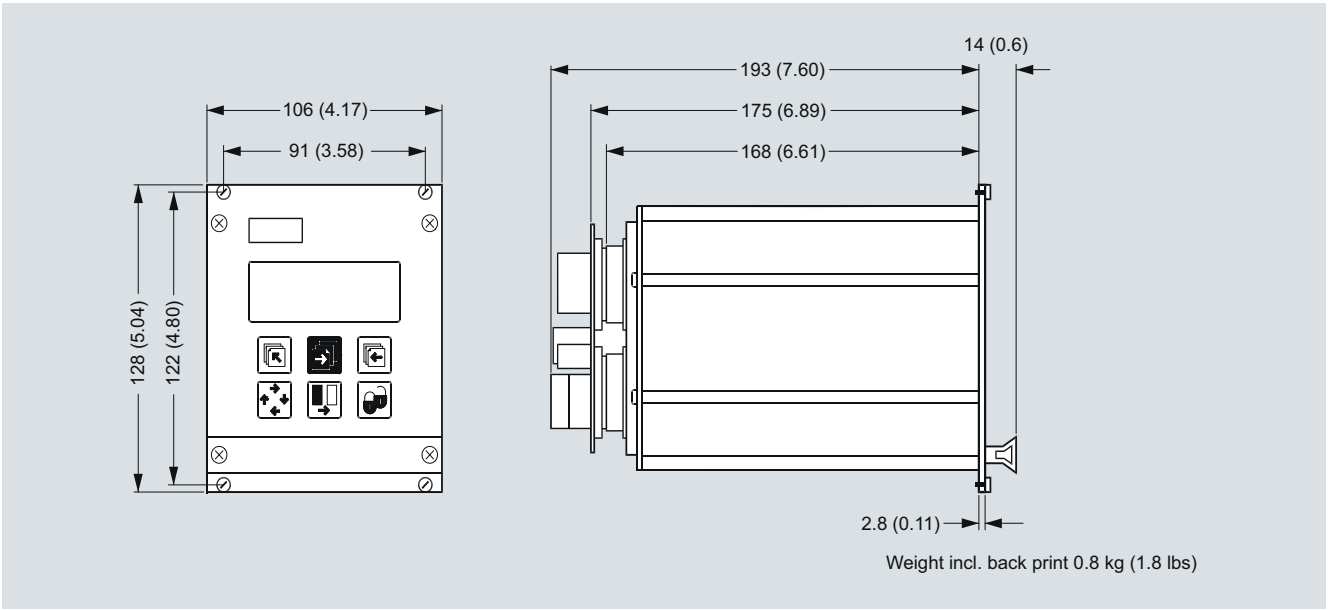


Transmitter compact mounted, dimensions in mm (inch)



Transmitter wall mounted, dimensions in mm (inch)

Transmitter, 19" IP20/NEMA 1 standard unit



Dimensions in mm (inch)

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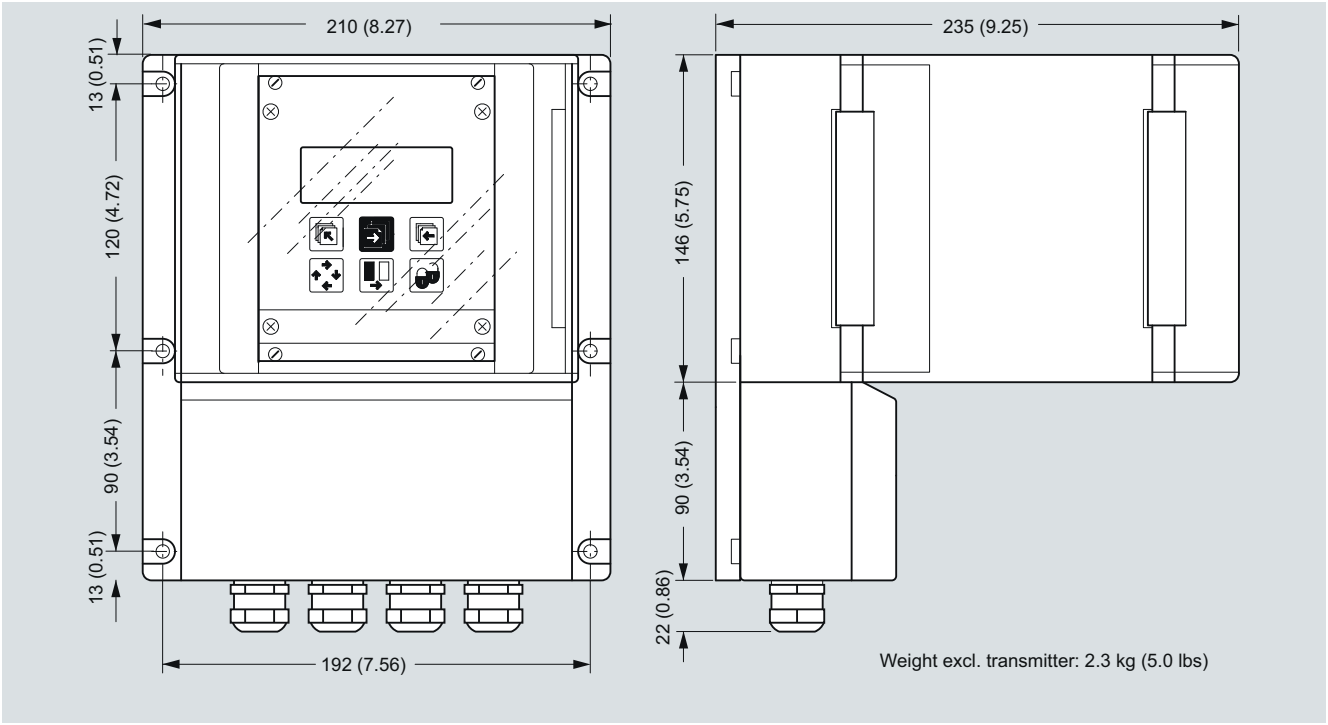
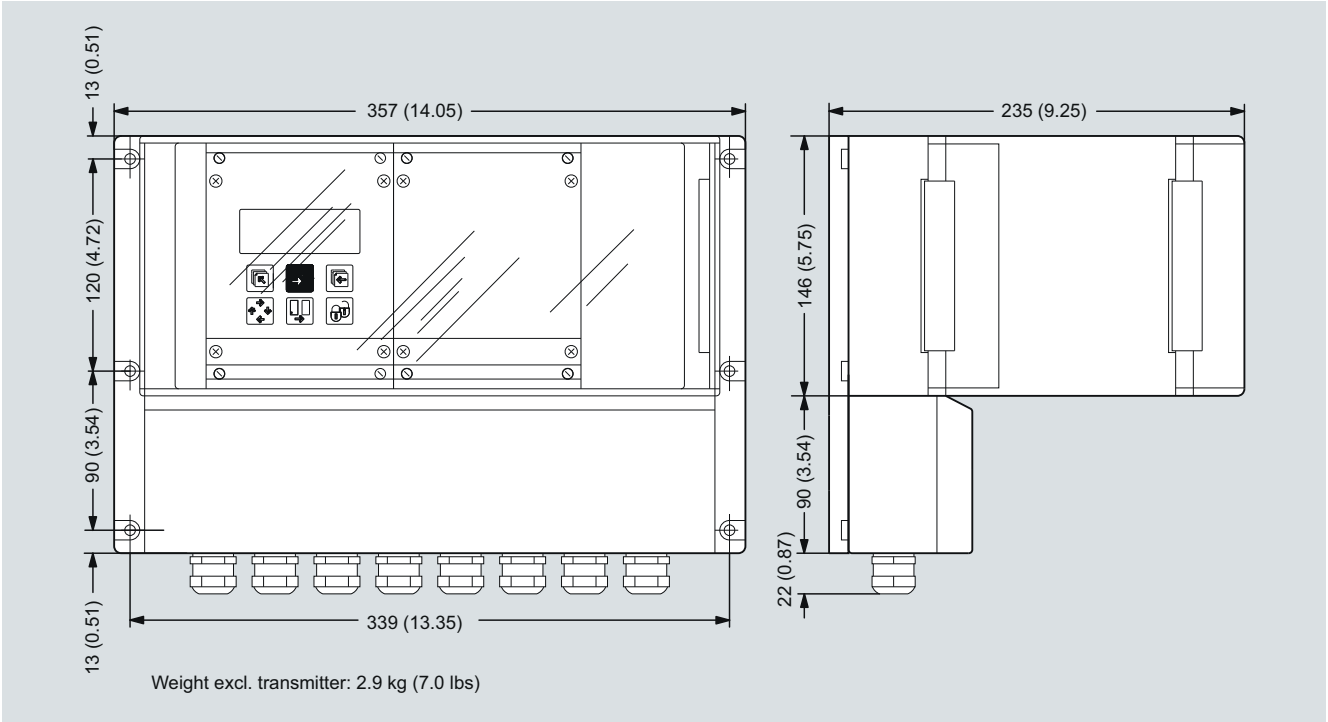
Transmitter, wall mounting IP66/NEMA 4X, 21 TE



Dimensions in mm (inch)

Transmitter, wall mounting IP66/NEMA 4X, 42 TE



Dimensions in mm (inch)

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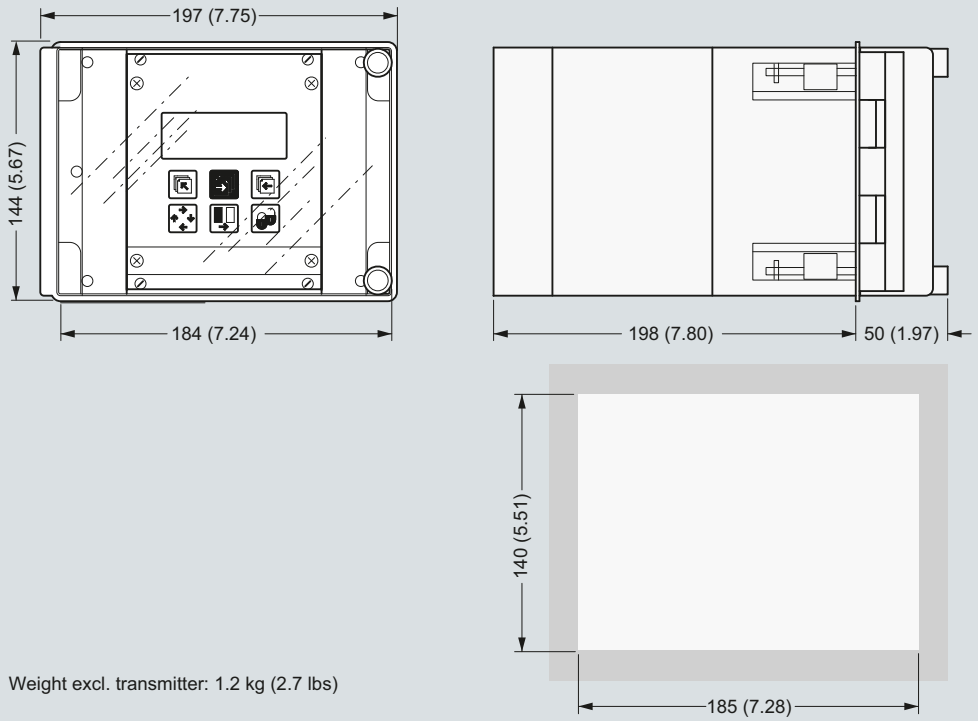
Transmitter MAG 5000/6000

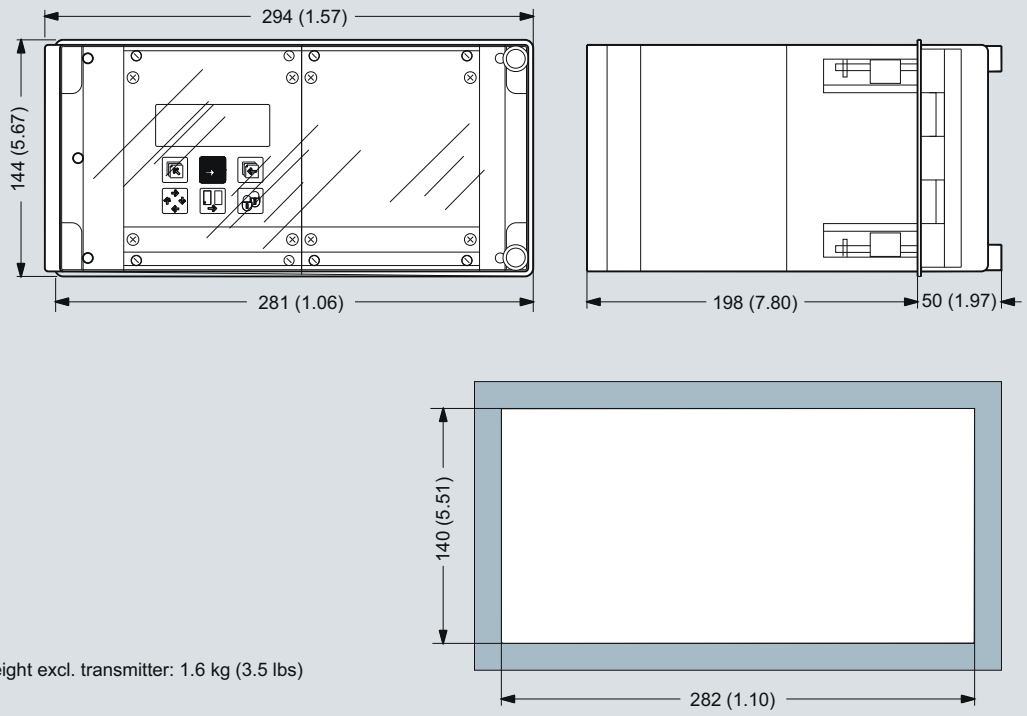
Transmitter, panel front IP20/NEMA 1, 21 TE



Weight excl. transmitter: 1.2 kg (2.7 lbs)

Dimensions in mm (inch)

Transmitter, panel front IP20/NEMA 1, 42 TE



Weight excl. transmitter: 1.6 kg (3.5 lbs)

Dimensions in mm (inch)

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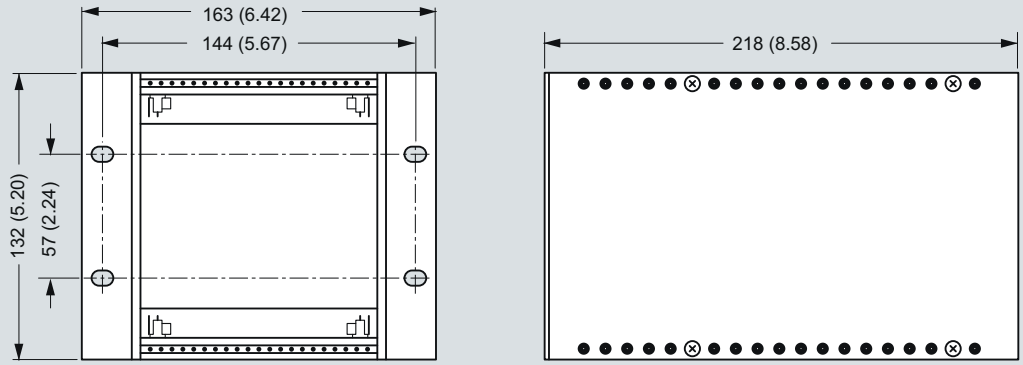
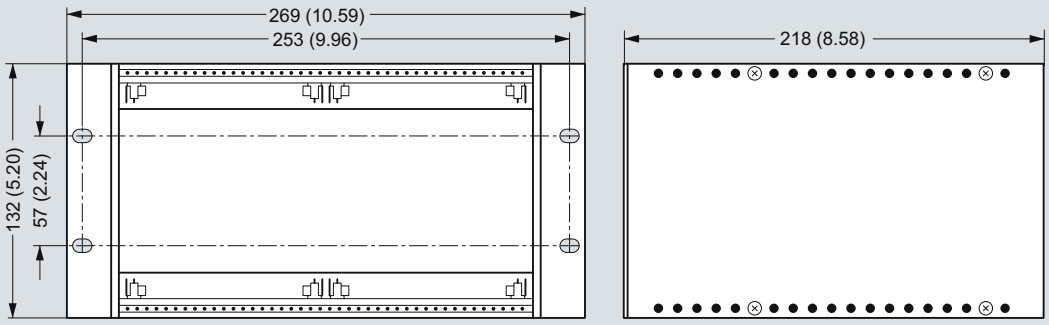
Transmitter, back of panel IP20/NEMA 1, 21 TE



Weight: 0.7 kg (1.6 lbs)

Dimensions in mm (inch)

Transmitter, back of panel IP20/NEMA 1, 42 TE



Weight: 0.9 kg (2.0 lbs)

Dimensions in mm (inch)

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Schematics

Electrical connection

Grounding

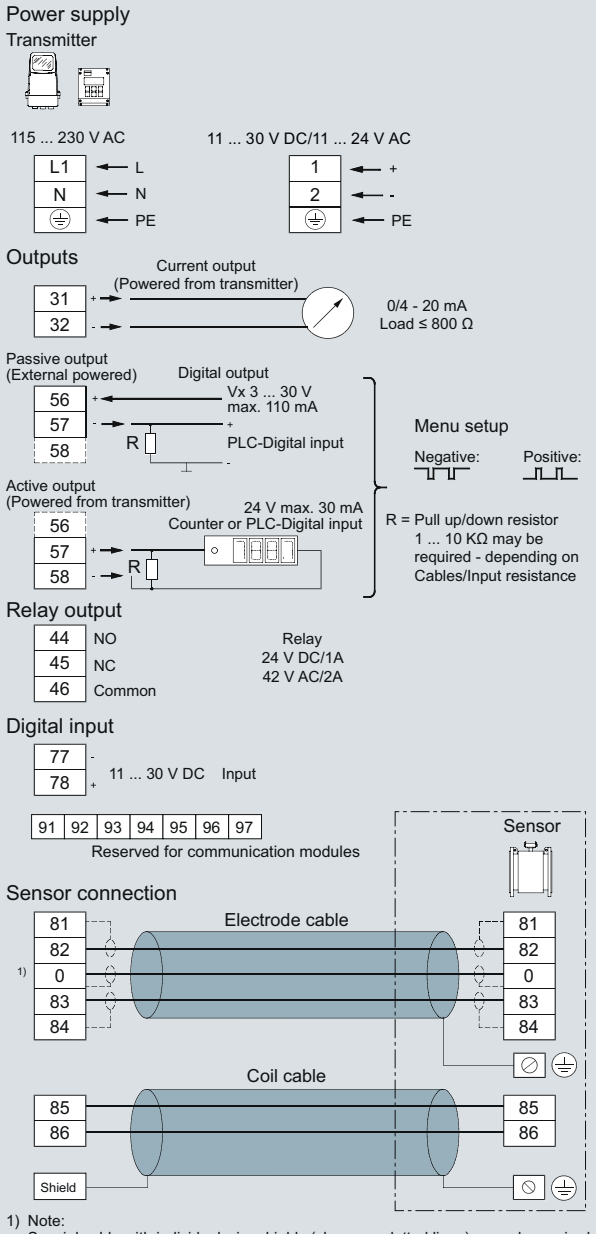
PE must be connected due to safety class 1 power supply.

Mechanical counters

When mounting a mechanical counter to terminals 57 and 58 (active output), a 1000 µF capacitor must be connected to the terminals 56 and 58. Capacitor + is connected to terminal 56 and capacitor - to terminal 58.

Output cables

If the output cable length is long in noisy environment, we recommend to use shielded cable.



1) Note:
Special cable with individual wire shields (shown as dotted lines) are only required when using empty pipe function or long cables.

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Transmitter MAG 6000 I/6000 I Ex de

Overview

The SITRANS F M MAG 6000 I/MAG 6000 I Ex de transmitter is designed for the demands in the process industry. The robust die cast aluminum housing provides superb protection, even in the most harsh industrial environments. Full input and output functionality is given even in the Ex version.

Benefits

- Full range of Ex-rated flowmeters with intrinsically safe rated input and outputs
- For compact or remote installation
- HART, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS PA and DP, Modbus RTU/RS485 add-on communication modules available
- Superior signal resolution for optimum turn down ratio
- Digital signal processing with many possibilities
- Automatic reading of SENSORPROM data for easy commissioning
- User configurable operation menu with password protection
  - 3 lines, 20 characters display in 11 languages
  - Flow rate in various units
  - Totalizer for forward, reverse and net flow as well as much more information available.
- Multiple functional outputs for process control, minimum configuration with analogue, pulse/frequency and relay output (status, flow direction, limits)
- Comprehensive self-diagnostic for error indication and error logging
- Batch control

Design

The transmitter is designed for either compact or remote installation in non-hazardous or hazardous areas (compact mounted transmitter to be ordered together with the sensors).

Function

The following functions are available:

- Flow rate
- 2 measuring ranges
- 2 totalizers
- Low flow cut-off
- Flow direction
- Error system
- Operating time
- Uni-/bidirectional flow
- Limit switches and pulse output
- Batch control

The MAG 6000 I/6000 I Ex de is a microprocessor-based transmitter with a build-in alphanumeric display in several languages. The transmitters evaluate the signals from the associated electromagnetic sensors and also fulfil the task of a power supply unit which provides the magnet coils with a constant current.

Further information on connection, mode of operation and installation can be found in the data sheets for the sensors.

Displays and keypads

Operation of the transmitter can be carried out using:

- Keypad and display unit
- HART communicator
- PC/laptop and SIMATIC PDM software via HART communication
- PC/laptop and SIMATIC PDM software using PROFIBUS or Modbus communication

Technical specifications

Mode of operation and design	
Measuring principle	Electromagnetic with pulsed constant field
Empty pipe	Detection of empty pipe (special cable required in remote mounted installation)
Excitation frequency	Depend on sensor size
Electrode input impedance	> 1 x 10^{14} Ω
Input	
Digital input	11 ... 30 V DC, Ri = 4.4 kΩ
• Activation time	50 ms
• Current	$I_{11\ V\ DC}$ = 2.5 mA, $I_{30\ V\ DC}$ = 7 mA
Output	
Current output	
• Signal range	4 ... 20 mA (active/ passive)
• Load	< 560 Ω
• Time constant	0.1 … 30 s, adjustable
Digital output	
• Frequency	0 … 10 kHz, 50 % duty cycle (uni-/bidirectional)
• Time constant	0.1 … 30 s, adjustable
• Pulse (passive)	3 … 30 V DC, max 110 mA (30 mA Ex version), 200 Ω ≤ Ri ≤ 10 kΩ (powered from connected equipment)
• Time constant	0.1 … 30 s, adjustable
Relay output	
• Time constant	Changeover relay, same as current output
• Load	42 V AC/2 A, 24 V DC/1 A
Low flow cut off	0 … 9.9 % of maximum flow
Galvanic isolation	All inputs and outputs are galvanic isolated
Max. measuring error	
MAG 6000 I/MAG 6000 I Ex de (incl. sensor)	± 0.2 % ± 1 mm/s

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Transmitter MAG 6000 I/6000 I Ex de

Rated operation conditions	
Ambient temperature	
• Operation	
- MAG 6000 I	-20 … +60 °C (-4 … +140 °F)
- MAG 6000 I Ex	-20 … +60 °C (14 … 140 °F)
• Storage	-40 … +70 °C (-40 … +158 °F)
Mechanical load	18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36
	Transmitter: 1.14 grms
Degree of protection	IP67/NEMA 4X to IEC 529 and DIN 40050 (1 mH_2O 30 min.)
EMC performance	IEC/EN 61326-1 (all environments) IEC/EN 61326-2-5 Namur NE21
Display and keypad	
Totalizer	Two eight-digit counters for forward, net or reverse flow
Display	Background illumination with alphanumeric text, 3 x 20 characters to indicate flow rate, totalized values, settings and faults; Reverse flow indicated by negative sign
Keypad	Capacitive touch keypad with LED light for feedback indication
Time constant	Time constant as current output time constant
Design	
Enclosure material	Die cast aluminum, with corrosion resistant Basic Polyester power coating (min. 60 µm)
• Wall mounting	Wall mounting bracket enclosed for remote version
Dimensions	See dimensional drawings
Weight	See dimensional drawings
Power supply	• Standard transmitter: 18 ... 90 V DC; 115 ... 230 V AC; 50 ... 60 Hz • Ex transmitter: 18 ... 30 V DC • Ex transmitter: 115 ... 230 V AC; 50 ... 60 Hz
Power consumption	• 230 V AC: 20 VA • 24 V DC: 9.6 W, I_N = 0.4 A, I_{ST} = 1 A (3 ms)
Certificates and approvals	
MAG 6000 I	• CE • C-tick • FM Class I, Div 2 • FM Class I, Zone 2 • CSA Class I, Div 2 • CSA Class I, Zone 2
MAG 6000 I Ex	• IEC Ex de [ia] [ib] ia IIC T6 Gb Ex tDa 21 IP67 • ATEX II 2(1)(2) GD EEx de [ia] ia [ib] IIC T6 • FM Class I, Div 1 • FM Class I, Zone 1 • CSA Class I, Zone 1

Cable entries	Remote installation
MAG 6000 I	2 x M25 (for supply/output) and 2 x M16 (for sensor connection) or 2 x ½" NPT (for supply/output) and 2 x M16 (for sensor connection)
MAG 6000 I Ex ATEX 2G D	2 x M20 (for supply/output) and 2 x M16 (for sensor connection)
Communication	
Standard versions	HART, Modbus RTU/RS 485, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS PA, PROFIBUS DP add-on modules
Ex versions	HART, PROFIBUS PA, FOUNDATION Fieldbus H1 available as integrated version

Selection and Ordering data	Order No.
SITRANS F M Transmitter MAG 6000 I/Ex de ◆	**7ME6930-**
Remote with standard wall mounting bracket, local display, die cast aluminum	**2BA■■-1■A■**
Supply voltage	
Standard transmitter: 115 ... 230 V AC, 50 ... 60 Hz; 18 ... 90 V DC	**2**
Ex transmitter: 18 ... 30 V DC	**4**
Ex transmitter: 115 ... 230 V AC, 50 ... 60 Hz	**5**
Ex approval	
Standard sensor: FM Class I, Div 2, CSA Class I, Div 2	**0**
Ex sensor: Hazardous area (ATEX 2 GD; FM Class 1, Zone 1; CSA Class 1, Zone 1)	**2**
Communication	
None	**A**
HART	**B**
PROFIBUS PA Profile 3	**F**
PROFIBUS DP Profile 3 (not for Ex version)	**G**
Modbus RTU/RS 485 (not for Ex version)	**E**
FOUNDATION Fieldbus H1	**J**
Cable gland entries	
Metric	**0**
½" NPT	**2**

◆ Short lead time (details in PMD)

Selection and Ordering data	Order code
Further design	
Please add **"-Z"** to Order No. and specify Order code(s) and plain text.	
Tag name plate, stainless steel fixed with SS wire (add plain text)	**Y17**
Tag name plate, plastic (self adhesive)	**Y18**
Other, post-production requirements (add plain text)	**Y99**

Operating instructions for SITRANS F M MAG 6000 I

Description	Order No.
• English	**A5E02083319**
• German	**A5E02210835**
• French	**A5E02342413**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

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Communication modules for MAG 6000 I (All standard outputs can still be used)

Description		Order No.	
HART (only for MAG 6000 I/Ex)	◆	**FDK-085U0321**	
Modbus RTU/RS485	◆	**FDK-085U0234**	
PROFIBUS PA Profile 3	◆	**FDK-085U0236**	
PROFIBUS DP Profile 3	◆	**FDK-085U0237**	
DeviceNet	◆	**FDK-085U0229**	
FOUNDATION Fieldbus H1	◆	**A5E02054250**	

◆ Short lead time (details in PMD)

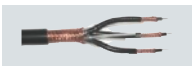
Operating instructions for SITRANS F add-on modules

Description	Order No.
HART	
• English	**A5E03089708**
PROFIBUS PA/DP	
• English	**A5E00726137**
• German	**A5E01026429**
MODBUS	
• English	**A5E00753974**
• German	**A5E03089262**
• Spanish	**A5E03089278**
• French	**A5E03089265**
FOUNDATION Fieldbus	
• English	**A5E02318728**
• German	**A5E02488856**
• Spanish	**A5E02512177**
• French	**A5E02512169**
DeviceNet	
• English	**A5E03089720**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

Accessories MAG 6000 I/MAG 6000 I Ex de

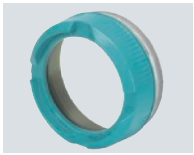
Description		Order No.	
Cable for standard electrode or coil, 3 x 1.5 mm²/18 gage with shield PVC			
• 10 m (33 ft)	◆	**FDK-083F0121**	
• 20 m (65 ft)	◆	**FDK-083F0210**	
• 40 m (130 ft)	◆	**FDK-083F0211**	
• 60 m (200 ft)	◆	**FDK-083F0212**	
• 100 m (330 ft)	◆	**FDK-083F0213**	
• 150 m (500 ft)		**FDK-083F3052**	
• 200 m (650 ft)		**FDK-083F3053**	
• 500 m (1650 ft)		**FDK-083F3054**	
Electrode cable for empty pipe or low conductivity, double shielded, 3 x 0.25 mm²			
• 10 m (33 ft)	◆	**FDK-083F3020**	
• 20 m (65 ft)	◆	**FDK-083F3095**	
• 40 m (130 ft)		**FDK-083F3094**	
• 60 m (200 ft)		**FDK-083F3093**	
• 100 m (330 ft)		**FDK-083F3092**	
• 150 m (500 ft)		**FDK-083F3056**	
• 200 m (650 ft)		**FDK-083F3057**	
• 500 m (1650 ft)		**FDK-083F3058**	

Cable kit with standard coil cable, 3 x 1.5 mm²/18 gage with shield PVC and electrode cable double shielded, 3 x 0.25 mm²			
• 5 m (16.5 ft)	◆	**A5E02296329**[D)]	
• 10 m (33 ft)	◆	**A5E01181647**	
• 15 m (49 ft)	◆	**A5E02296464**[D)]	
• 20 m (65 ft)	◆	**A5E01181656**	
• 25 m (82 ft)	◆	**A5E02296490**[D)]	
• 30 m (98 ft)	◆	**A5E02296494**[D)]	
• 40 m (130 ft)	◆	**A5E01181686**	
• 50 m (164 ft)	◆	**A5E02296498**[D)]	
• 60 m (200 ft)		**A5E01181689**	
• 100 m (330 ft)		**A5E01181691**	
• 150 m (500 ft)		**A5E01181699**	
• 200 m (650 ft)		**A5E01181703**	
• 500 m (1650 ft)		**A5E01181705**	
Low noise electrode coax cable for low conductivity and high vibration levels of cables, 3 x 0.13 mm²			
• 2 m (6.6 ft)		**A5E02272692**	
• 5 m (16.5 ft)		**A5E02272723**	
• 10 m (33 ft)		**A5E02272730**	

◆ Short lead time (details in PMD)

D) Subject to export regulations AL: N, ECCN:EAR99H.

Spare parts

Description	Order No.	
Display	**FDK-085U3122**	
Accessory bag including cable gland inserts coil and electrode connectors	**FDK-085U3144**	
Electronics cover with Ex glass plate	**A5E02593565**	
Cover for connection board incl. gasket (for remote version)	**A5E03636107**	
Cover for mains supply/communication	**A5E03636139**	

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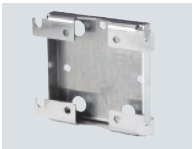
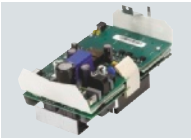
Transmitter MAG 6000 I/6000 I Ex de

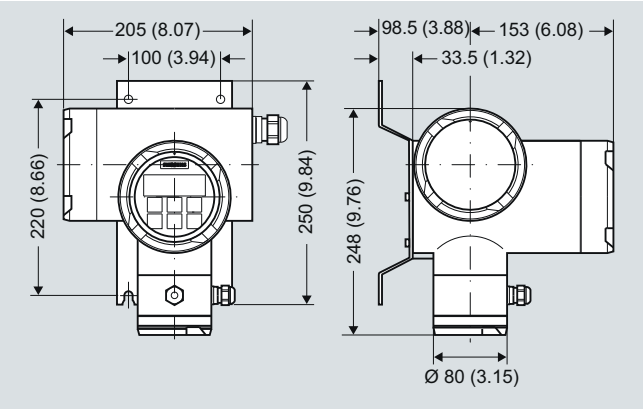
Description	Order No.	
Safety clamp	**A5E03636163**	
Standard wall mounting bracket	**A5E03636182**	
Wall-/pipe mounting bracket kit	**A5E03636159**	

Complete spare part PCB unit

Description	Order No.	
MAG 6000 I PCBA (not for Ex)	**FDK-085U3123**	
MAG 6000 I Ex de, 18 ... 30 V DC Spare PCBA unit for use with Ex sensors with increased safety e (For Ex sensors: 7ME6110, 7ME6120, 7ME6140, 7ME6310, 7ME6320, 7ME6340) (For 7ME6330 > DN300)	**A5E01013340**	
MAG 6000 I Ex de 115 ... 230 V AC Spare PCBA unit for use with Ex sensors with increased safety e (For EX sensors: 7ME6110, 7ME6120, 7ME6140, 7ME6310, 7ME6320, 7ME6340) (For 7ME6330 > DN300)	**A5E01013127**	
Ex de version 18 ... 30 V DC for sensors with intrinsic safety ib 7ME633 and 7ME613 (For sensors ≤ DN 300 (12"): 7ME6130, 7ME6150 and 7ME6330)	**FDK-085U3124**	
Ex de version 115 ... 230 V AC for sensors with intrinsic safety ib 7ME633 and 7ME613 (For sensors ≤ DN 300 (12"): 7ME6130, 7ME6150 and 7ME6330)	**FDK-085U3125**	

Please use online Product selector to get latest updates.
Product selector link:
www.pia-selector.automation.siemens.com
Please also see www.siemens.com/SITRANSFordering
for practical examples of ordering

Dimensional drawings



Dimensions in mm (inch), weight: 6 kg (13.5 lbs)

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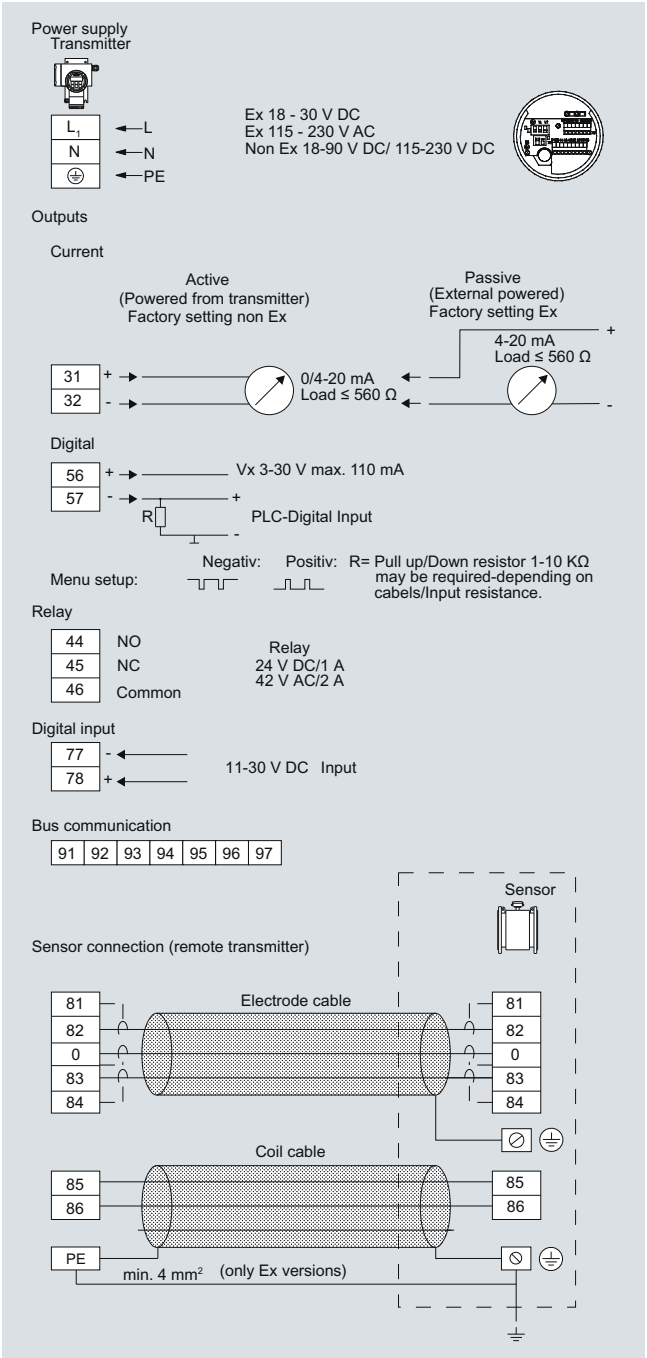
Schematics



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Flow sensor MAG 1100

Overview

The SITRANS F M MAG 1100 is an electromagnetic flow sensor in a compact wafer design designed for flow applications in the process industry.

Benefits

- Sensor sizes: DN 2 to 100 (1/12" to 4")
- Compact wafer design meets EN 1092, DIN and ANSI flange standards
- Corrosion resistant AISI 316 stainless steel sensor housing
- Highly resistant liner and electrodes fitting most extreme process media
- Temperature rating up to 200 °C (392 °F)
- Hose proof IP67/NEMA 4X enclosure rating
- Designed that patented in-situ verification can be conducted. Using SENSORPROM fingerprints.

Application

The main applications of the SITRANS F M electromagnetic flow sensors can be found in the following fields:

- Process industry
- Chemical industry
- Pharmaceutical industry
- Water treatment like e.g. chemical dosing

Design

- Compact or remote mounting possible
- Easy "plug & play" field changeability of transmitter
- Simple on site upgrade to IP68/NEMA 6P terminal box
- Ex ATEX 2G D version
- FM Class I, Div 2

Mode of operation

The flow measuring principle is based on Faraday's law of electromagnetic induction according to which the sensor converts the flow into an electrical voltage proportional to the velocity of the flow.

Integration

The complete flowmeter consists of a flow sensor and an associated transmitter SITRANS F M MAG 5000, 6000 or 6000 I. The flexible communication concept USM II simplifies integration and update to a variety of fieldbus systems such as HART, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS DP and PA, Modbus RTU/RS 485.

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Technical specifications

Version	MAG 1100	MAG 1100 HT (High temperature)
Measuring principle	Electromagnetic induction	Electromagnetic induction
Excitation frequency (Mains supply: 50 Hz/60 Hz)	DN 2 ... 65 (1/12" … 2½"): 12.5 Hz/15 Hz DN 80, 100 (3", 4"): 6.25 Hz/7.5 Hz	DN 15 ... 50 (½" … 2"): 12.5 Hz/15 Hz DN 80, 100 (3", 4"): 6.25 Hz/7.5 Hz
Process connection		
Nominal size		
• MAG 1100 (Ceramic)	DN 2 … DN 100 (1/12" … 4")	DN 15 … DN 100 (½" … 4")
• MAG 1100 (PFA)	DN 10 … DN 100 (3/8" … 4")	
Mating flanges	EN 1092-1 (DIN 2501), ANSI B 16.5 class 150 and 300 or equivalent Option: DN 2 ... 10 (1/12" ... 3/8"): G½" / NPT ½" pipe connection adapters	EN 1092-1 (DIN 2501), ANSI B 16.5 class 150 and 300 or equivalent
Rated operating conditions		
Ambient conditions		
Ambient temperature[1]		
• Standard sensor	-40 … +100 °C (-40 … +212 °F)	-40 … +100 °C (-40 … +212 °F)
• Ex sensor	-20 … +60 °C (-4 … +140 °F)	-20 … +60 °C (-4 … +140 °F)
• Compact transmitter MAG 5000/6000[2]	-20 … +60 °C (-4 … +140 °F)	
• Compact transmitter MAG 6000 I	-20 … +60 °C (-4 … +140 °F)	
• Compact transmitter MAG 6000 I Ex de	-10 … +60 °C (14 … 140 °F)	
Temperature of medium		
• MAG 1100 (Ceramic)	-20 … +150 °C (-4 … +302 °F)	-20 … +200 °C (-4 … +392 °F)
• MAG 1100 Ex (Ceramic)	-20 … +150 °C (-4 … +302 °F)	-20 … +180 °C (-4 … +356 °F)
• MAG 1100 (PFA)	-30 … +130 °C (-22 … +266 °F) Suitable for steam sterilization at 150 °C (302 °F)	
Temperature shock		
• MAG 1100 (Ceramic)		
- Duration ≤ 1 min, followed by 10 min rest	• DN 2, 3 (1/12", 1/8") No limitations • DN 6, 10, 15, 25: Max. ΔT ≤ 80 °C/min (¼", 3/8", ½", 1": Max. ΔT ≤ 144 °F/min) • DN 40, 50, 65: Max. ΔT ≤ 70 °C/min (1½", 2", 2½": Max. ΔT ≤ 126 °F/min) • DN 80, 100: Max. ΔT ≤ 60 °C/min (3", 4": Max. ΔT ≤ 108 °F/min)	• DN 15, 25: Max. ΔT ≤ 80 °C/min (½", 1": Max. ΔT ≤ 144 °F/min) • DN 40, 50: Max. ΔT ≤ 70 °C/min (1½", 2": Max. ΔT ≤ 126 °F/min) • DN 80, 100: Max. ΔT ≤ 60 °C/min (3", 4": Max. ΔT ≤ 108 °F/min)
• MAG 1100 (PFA)	Max. ± 100 °C (212 °F) momentarily	
Operating pressure		
• MAG 1100 (Ceramic)	• DN 2 ... 65: 40 bar (1/12" … 2½": 580 psi) • DN 80: 37.5 bar (3": 540 psi) • DN 100: 30 bar (4": 435 psi) Vacuum: 1 x 10^{-6} bar_{abs} (1.5 x 10^{-5} psi_{abs})	• DN 15 ... 50: 40 bar (½" … 2": 580 psi) • DN 80: 37.5 bar (3": 540 psi) • DN 100: 30 bar (4": 435 psi) Vacuum: 1 x 10^{-6} bar_{abs} (1.5 x 10^{-5} psi_{abs})
• MAG 1100 (PFA)	20 bar (290 psi) Vacuum: 0.02 bar_{abs} (0.3 psi_{abs}) DN 80 ... DN 100: CO_2 pressure max. 7 bar (101.5 psi)	
Mechanical load (vibration)	• 18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 • Sensor: 3.17 grms • Sensor with compact MAG 5000/ 6000 mounted transmitter: 3.17 grms • Sensor with compact MAG 6000 I/ 6000 I Ex mounted transmitter: 1.14 grms • For compact installation with the MAG 6000 I, transmitter to be supported to avoid tension on sensor part.	• 18 ... 1000 Hz random in x, y z, directions for 2 hours according to EN 60068-2-36 • Sensor: 3.17 grms
Enclosure rating (standard)	IP67 to EN 60529 (NEMA 4X), 1 mH_2O for 30 min	IP67 to EN 60529 (NEMA 4X), 1 mH_2O for 30 min
EMC	2004/108/EC	2004/108/EC

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Flow sensor MAG 1100

Version	MAG 1100	MAG 1100 HT (High temperature)
Design		
Weight	See Dimensional drawings	See Dimensional drawings
Material		
• Enclosure		
- MAG 1100	Stainless steel AISI 316L/1.4404	Stainless steel AISI 316L/1.4404
• Terminal box		
- Standard	Fibre glass reinforced polyamide (not for Ex)	Stainless steel AISI 316/1.4436
- Option	Stainless steel AISI 316/1.4436	
• Fixing studs	Stainless steel AISI 304/1.4301, Number and size to EN 1092-1:2001	Stainless steel AISI 304/1.4301, Number and size to EN 1092-1:2001
• Gaskets		
- Standard	EPDM (max. 150 °C, PN 40 (max. 302 °F, 600 psi))	Graphite (max. 200 °C, PN 40 (max. 392 °F, 600 psi))
- Option	• Graphite (max. 200 °C, PN 40 (max. 392 °F, 600 psi))	
	• PTFE (max. 130 °C, PN 25 (max. 266 °F, 300 psi))	
• Pipe connection adapters: DN 2, 3, 6 and 10 (1/12“, 1/8“, ¼” and 3/8”)	• Stainless steel, AISI 316/1.4436	
	• Hastelloy C22/2.4602	
	• PVDF	
Liner		
• MAG 1100 (Ceramic)	• DN 2, 3 (1/12“, 1/8“): Zirconium oxide (ZrO_2) (ceramic)	DN 15 ... 100 (½“ ... 4“): Aluminum oxide Al_2O_3
	• DN 6 ... 100 (¼“ ... 4“): Aluminum oxide Al_2O_3	
• MAG 1100 (PFA)	Reinforced PFA (not for Ex)	
Electrodes		
• MAG 1100 (Ceramic)	• DN10 ... 100 (3/8" ... 4") : Platinum with gold / Titanium brazing alloy	Platinum with gold / Titanium brazing alloy
	• DN 2 ... 6 (1/12“ ... ¼”): Platinium	
• MAG 1100 (PFA)	• DN 10 ... 15 (3/8" ... ½"): Hastelloy C276/2.4819	
	• DN 25 ... 100 (1" ... 4"): Hastelloy C22/2.4602	
Cable entries	• Remote installation 2 x M20 or 2 x ½" NPT	Remote installation 2 x M20 or 2 x ½“ NPT
	• Compact installation	
	- MAG 5000/MAG 6000: 4 x M20 or 4 x ½” NPT	
	- MAG 6000 I: 2 x M25 (for supply/output)	
	- MAG 6000 I Ex de: 2 x M25 (for supply/output)	
Certificates and approvals		
Calibration		
Standard production calibration, calibration report shipped with sensor	Zero-point, 2 x 25 %, 2 x 90 %	Zero-point, 2 x 25 %, 2 x 90 %
Conforms to	• PED – 97/23/EC[3] (Fluid group: Liquid of fluid group 1)	• PED – 97/23/EC[3]
	• CRN (PFA)	• CRN (PFA)
Ex approvals		
MAG 1100 (Ceramic)		
• Ex sensor or Compact with MAG 6000 I Ex	ATEX 2G D sensor Ex de ia IIB T3 - T6	ATEX 2G D sensor Ex de ia IIB T3 - T6
• Sensor with/without MAG 5000/6000 /6000 I	FM Class I, Div 2	FM Class I, Div 2
MAG 1100 (PFA)		
• Sensor with/without MAG 5000/6000/6000 I	FM Class I, Div 2	
Custody transfer approval (MAG 5000/6000 CT)	• Cold water pattern approval PTB (Germany)	• Hot water pattern approval PTB (Germany)
	• Hot water pattern approval PTB (Germany)	• Heat meter pattern approval - OIML R 75 (Denmark)
	• Heat meter pattern approval - OIML R 75 (Denmark)	
	• Other media than water pattern approval- OIML R 117 (Ceramic liner) (Denmark)	

1) Conditions are also dependent on liner characteristics

2) With compact transmitter MAG 5000 CT/6000 CT -20 ... +50 °C

3) For further information on the PED standard and requirements, see page 10/9.

For technical specification for transmitter - see transmitter pages.

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Selection and Ordering data		Order No.
Sensor SITRANS F M MAG 1100 EPDM gaskets included		7 M E 6 1 1 0 - ■ ■ A ■ 0 - ■ ■ ■ ■
Diameter		
DN 2 (1/12“)	◆	1 D
DN 3 (1/8“)	◆	1 H
DN 6 (¼“)	◆	1 M
DN 10 (3/8“)	◆	1 R
DN 15 (½“)	◆	1 V
DN 25 (1“)	◆	2 D
DN 40 (1½“)	◆	2 R
DN 50 (2“)	◆	2 Y
DN 65 (2½“)	◆	3 F
DN 80 (3“)	◆	3 M
DN 100 (4“)	◆	3 T
Liner material		
PFA - DN 10 ... 100 (3/8“ ... 4“) (not for Ex)	◆	1
Ceramic	◆	2
Electrode material		
Hastelloy C (only with PFA liner)	◆	1
Platinum (only with ceramic liner)	◆	2
Transmitter		
Standard sensor for remote transmitter (order transmitter separately)	◆	A
Ex sensor for remote transmitter (order transmitter separately)		B
MAG 6000 I, Aluminum 18 ... 90 V DC, 115 ... 230 V AC		C
MAG 6000 I, Aluminum 18 ... 30 V DC, Ex		D
MAG 6000 I, Aluminum 115 ... 230 V AC, Ex		E
MAG 6000 Polyamide, 11 ... 30 V DC/ 11 … 24 V AC	◆	H
MAG 6000, Polyamide, 115 ... 230 V AC	◆	J
MAG 5000, Polyamide, 11 ... 30 V DC/ 11 ... 24 V AC	◆	K
MAG 5000, Polyamide, 115 ... 230 V AC	◆	L
Communication		
No communication, add-on possible	◆	A
HART	◆	B
PROFIBUS PA Profile 3 (only MAG 6000/MAG 6000 I)	◆	F
PROFIBUS DP Profile 3 (not for Ex) (only MAG 6000/MAG 6000 I)	◆	G
Modbus RTU/RS 485 (not for Ex) (only MAG 6000/MAG 6000 I)	◆	E
FOUNDATION Fieldbus H1 (only MAG 6000/MAG 6000 I)	◆	J
Cable glands/terminal box		
Metric: Polyamide terminal box or 6000 I compact	◆	1
½" NPT: Polyamide terminal box or 6000 I compact	◆	2
Metric: SS terminal box (mandatory for stainless steel MAG 6000 transmitter)		3
½" NPT: SS terminal box (mandatory for stainless steel MAG 6000 transmitter)		4

◆ Short lead time (details in PMD)

Selection and Ordering data	Order code
Additional information	
Please add **“-Z“** to Order No. and specify Order code(s) and plain text.	
Customer-specific converter setup	**Y20**
Tag name plate, stainless steel fixed with SS wire (add plain text)	**Y17**
Tag name plate, plastic (self adhesive)	**Y18**
Factory certificate according to EN 10204-2.1	**C15**
Factory certificate according to EN 10204-2.2	**C14**
Sensor cables wired (specify cable order no.)	**Y40**
Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable order no.) (not for Ex sensors)	**Y41**
Other postproduction requirements (add desired text)	**Y99**
Additional calibrations	
• Matched pair - (Standard production calibration where sensor and transmitter is calibrated together)	**On request**[1)]
• Customer-specified calibration up to 10 points	**On request**[1)]
• Customer-witnessed calibration Any of above calibration	**On request**[1)]

[1)] Ordering On request as dedicated information from the customer on the individual sensors is required. Please fill in the calibration form found on pi.khe.siemens.de/index.aspx?Nr=17460 and send together with the order. (Size dependent restriction on maximum flow rates may apply

Operating instructions for SITRANS F M MAG 1100

Description	Order No.
Handbook	
• English	**A5E02435647**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Accessories

Description		Order No.	
Potting kit for terminal box of SITRANS F M sensors for IP68/NEMA 6P (not for Ex)	◆	**FDK-085U0220**	

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Flow sensor MAG 1100

Selection and Ordering data	Order No.
Sensor SITRANS F M	
MAG 1100 HT High Temperature	**7ME6120-**
Ceramic liner, Platinum electrode, Graphite gaskets included	**■■A20-2■A■**
Diameter	
DN 15 (½")	**1V**
DN 25 (1")	**2D**
DN 40 (1½")	**2R**
DN 50 (2")	**2Y**
DN 80 (3")	**3M**
DN 100 (4")	**3T**
Transmitter	
Standard sensor for remote transmitter (order transmitter separately)	**A**
Ex sensor for remote transmitter (order transmitter separately)	**B**
Cable glands/terminal box	
Metric: SS terminal box	**3**
½" NPT: SS terminal box	**4**

Selection and Ordering data	Order code
Additional information	
Please add **"-Z"** to Order No. and specify Order code(s) and plain text.	
Customer-specific converter setup	**Y20**
Tag name plate, stainless steel fixed with SS wire (add plain text)	**Y17**
Tag name plate, plastic (self adhesive)	**Y18**
Factory certificate according to EN 10204-2.1	**C15**
Factory certificate according to EN 10204-2.2	**C14**
Sensor cables wired (specify cable order no.)	**Y40**
Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable order no.) (not for Ex sensors)	**Y41**
Other postproduction requirements (add desired text)	**Y99**
Additional calibrations	
• Matched pair - (Standard production calibration where sensor and transmitter is calibrated together)	**On request**[1)]
• Customer-specified calibration up to 10 points	**On request**[1)]
• Customer-witnessed calibration Any of above calibration	**On request**[1)]

[1)] Ordering On request as dedicated information from the customer on the individual sensors is required. Please fill in the calibration form found on pi.khe.siemens.de/index.aspx?Nr=17460 and send together with the order. (Size dependent restriction on maximum flow rates may apply

Operating instructions for SITRANS F M MAG 1100

Description	Order No.
Handbook	
• English	**A5E02435647**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place. MAG 6000 I/MAG 6000 I Ex ATEX 2G D transmitters and sensors are delivered compact mounted from factory. Communication module will be premounted in the transmitter.

Please use online Product selector to get latest updates.

Product selector link:
www.pia-selector.automation.siemens.com

Accessories

Description	Order No.	
Potting kit for IP68/NEMA 6P terminal box (not for Ex)	◆ **FDK-085U0220**	

◆ Short lead time (details in PMD)

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Accessories for MAG 1100 sensor		Order No.
Pipe connection ½" external thread		
For DN 2 ... 10 (1/12" ... 3/8") sensor, material: SS 316 2 pipe connections, 2 EPDM gaskets, 12 pcs M4 x 12 screws		
• ½" G, ISO 7-1 tappered thread, SS 316	◆	**FDK-083G0080**
• ½" NPT thread, SS 316	◆	**FDK-083G4330**
For DN 2 ... 10 (1/12" ... 3/8") sensor, material: Hastelloy C 2 pipe connections, 2 PTFE gaskets, 12 pcs M4 x 14 screws		
• ½" G, ISO 7-1 tappered thread	◆	**FDK-083G4332**
• ½" NPT thread	◆	**FDK-083G4331**
For DN 2…10 (1/12"…3/8") sensor 2 PVDF pipe connections (Max. 70 °C, PN 8 bar/max 158 °F, 116 PSI), 1 grounding ring[1], 1 earthing wire, 3 PTFE gaskets, 6 pcs. M4 x 12 and 6 pcs. M4 x 20 screws		
• ½"G, ISO 7-1 tapered thread PVDF incl. grounding ring Hastelloy C22/2.4602		**A5E01018395**
• ½" NPT thread PVDF incl. grounding ring Hastelloy C22/2.4602		**A5E01018400**
EPDM gaskets		
Material: EPDM; each set includes: 2 EPDM gaskets, 1 earthing wire, 1 M6 screw, 1 nut, 1 washer, 1 bolt earthing plate		
• DN 2 ... 10 (1/12" ... 3/8")	◆	**FDK-083G3116**
• DN 15 (½")	◆	**FDK-083G3117**
• DN 25 (1")	◆	**FDK-083G3119**
• DN 40 (1½")	◆	**FDK-083G3121**
• DN 50 (2")	◆	**FDK-083G3122**
• DN 65 (2½")	◆	**FDK-083G3123**
• DN 80 (3")	◆	**FDK-083G3124**
• DN 100 (4")	◆	**FDK-083G3125**
PTFE gaskets		
Material: PTFE; each set includes: 2 gaskets, 2 earthing wires, 3 M6 screws (DN 2 ... DN 10: 12 pcs M4 x 14)		
• DN 2 ... 10 (1/12" ... 3/8")	◆	**FDK-083G0156[F)]**
• DN 15 (½")	◆	**FDK-083G0157[F)]**
• DN 25 (1")	◆	**FDK-083G0159[F)]**
• DN 40 (1½")	◆	**FDK-083G0161[F)]**
• DN 50 (2")		**FDK-083G0162[F)]**
• DN 65 (2½")		**FDK-083G0163[F)]**
• DN 80 (3")		**FDK-083G0164[F)]**
• DN 100 (4")		**FDK-083G0165[F)]**
Graphite gaskets		
Material: Graphite; conductive, each set includes: 2 gaskets (conductive (can also be used as grounding ring))		
• DN 2 ... 10 (1/12" ... 3/8")	◆	**FDK-083G0116**
• DN 15 (½")	◆	**FDK-083G0117**
• DN 25 (1")	◆	**FDK-083G0119**
• DN 40 (1½")	◆	**FDK-083G0121**
• DN 50 (2")		**FDK-083G0122**
• DN 65 (2½")		**FDK-083G0123**
• DN 80 (3")		**FDK-083G0124**
• DN 100 (4")		**FDK-083G0125**

Accessories for MAG 1100 sensor		Order No.
Grounding ring SS		
Material: AISI 316/1.4436; each set includes: 1 grounding ring[1], 3 PTFE gaskets, 1 earth wire, 1 M6 screw		
• DN 2 ... 10 (1/12" ... 3/8")		**FDK-083G0686**
• DN 15 (½")		**FDK-083G0687**
• DN 25 (1")		**FDK-083G0689**
• DN 40 (1½")		**FDK-083G0691**
• DN 50 (2")		**FDK-083G0692**
• DN 65 (2½")		**FDK-083G0693**
• DN 80 (3")		**FDK-083G0694**
• DN 100 (4")		**FDK-083G0695**
Grounding ring (Hastelloy C)		
Material: Hastelloy C22/2.4602; each set includes: 1 grounding ring[1], 3 PTFE gaskets, 1 earth wire, 1 M6 screw		
• DN 2 ... 10 (1/12" ... 3/8")	◆	**FDK-083G3256**
• DN 15 (½")		**FDK-083G3257**
• DN 25 (1")		**FDK-083G3259**
• DN 40 (1½")		**FDK-083G3261**
• DN 50 (2")		**FDK-083G3262**
• DN 65 (2½")		**FDK-083G3263**
• DN 80 (3")		**FDK-083G3264**
• DN 100 (4")		**FDK-083G3265**
Grounding ring (Tantalum)		
Material: Tantalum; each set includes: 1 grounding ring[1], 3 PTFE gaskets, 1 earth wire, 1 M6 screw		
• DN 2 ... 10 (1/12" ... 3/8")	◆	**A5E01181599[F)]**
• DN 15 (½")	◆	**A5E01181606[F)]**
• DN 25 (1")	◆	**A5E01181610[F)]**
• DN 40 (1½")	◆	**A5E01181613[F)]**
• DN 50 (2")		**A5E01181615[F)]**
• DN 65 (2½")		**A5E01181616[F)]**
• DN 80 (3")		**A5E01181619[F)]**
• DN 100 (4")		**A5E01181622[F)]**
Studs and nuts		
for DN 100 PN 25/40, 8 M20 studs, 16 M20 nuts		
Material: AISI 304/1.4305		
• DN 100 (4")		**FDK-083G0226**

[1] Thickness of grounding ring is 2 mm (0.08 inch)

◆ Short lead time (details in PMD)

F) Subject to export regulations AL: 9I999, ECCN: N.

4

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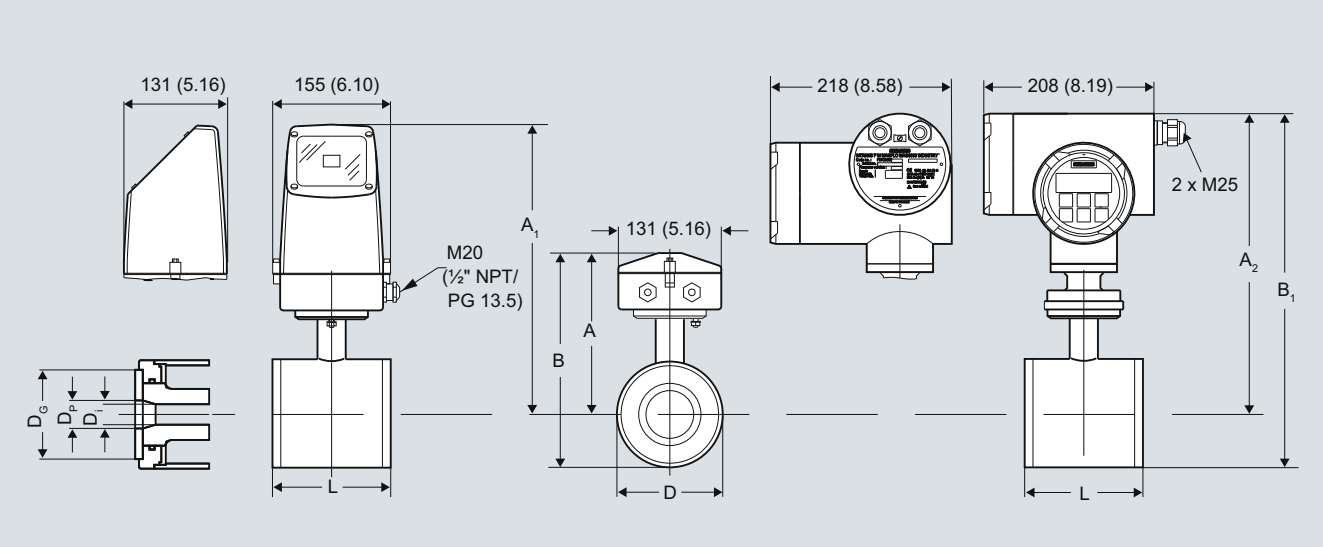
Flow sensor MAG 1100

Dimensional drawings

Sensor MAG 1100, compact/remote



Dimensions in mm (inch)

Important note: For compact installation with MAG 6000 I/Ex - transmitter to be supported to avoid tension on the sensor part

Size DN	A[1] [mm]	B[1] [mm]	A_1/A_2[3] [mm]	B_1 [mm]	D [mm]	D_i [mm]	D_i (PFA) [mm]	D_P [mm]	D_G [mm]	Weight[2] [kg]
2	161	186	315	340	48.7	2		17.3	34	2.2
3	161	186	315	340	48.7	3		17.3	34	2.2
6	161	186	315	340	48.7	6		17.3	34	2.2
10	161	186	315	340	48.7	10	10	13.6	34	2.2
15	161	186	315	340	48.7	15	16	17.3	40	2.2
25	169	201	323	354	63.5	25	26	28.5	56	2.7
40	179	221	333	375	84.0	40	38	43.4	75	3.4
50	188	239	342	393	101.6	50	50	54.5	90	4.2
65	198	258	351	412	120.9	65	66	68.0	112	5.5
80	204	270	357	424	133.0	80	81	82.5	124	7.0
100	217	296	370	450	159.0	100	100	107.1	145	10.0

Size [inch]	A[1] [inch]	B[1] [inch]	A_1/A_2[3] [inch]	B_1 [inch]	D [inch]	D_i [inch]	D_i (PFA) [inch]	D_P [inch]	D_G [inch]	Weight[2] [lbs]
1/12	6.34	7.33	12.40	13.39	1.92	0.08		0.68	1.34	4.8
1/8	6.34	7.33	12.40	13.39	1.92	0.12		0.68	1.34	4.8
¼	6.34	7.33	12.40	13.39	1.92	0.24		0.68	1.34	4.8
3/8	6.34	7.33	12.40	13.39	1.92	0.39	0.39	0.53	1.34	4.8
½	6.34	7.33	12.40	13.39	1.92	0.59	0.63	0.68	1.57	4.8
1	6.66	7.92	12.72	13.94	2.50	0.98	1.02	1.12	2.20	4.9
1½	7.05	8.70	13.11	14.76	3.31	1.57	1.50	1.71	2.95	7.5
2	7.40	9.41	13.47	15.47	4.00	1.97	1.97	2.15	3.54	9.2
2½	7.80	10.16	13.82	16.22	4.76	2.56	2.60	2.68	4.41	12
3	8.03	10.63	14.06	16.70	5.24	3.15	3.19	3.25	4.88	15
4	8.54	11.65	14.57	17.72	6.26	3.94	3.94	4.22	5.91	22

1) 14.5 mm/0.571" shorter when the AISI terminal box is used (Ex or high temperature 200 °C (392 °F) version)
2) With transmitter MAG 5000 or MAG 6000 installed, weight is increased by approximately 0.8 kg (1.8 lb).
With MAG 6000 I weight is increased with 5.5 kg (12.1 lbs).
3) A_2 is 3 mm (0.12") shorter than A_1

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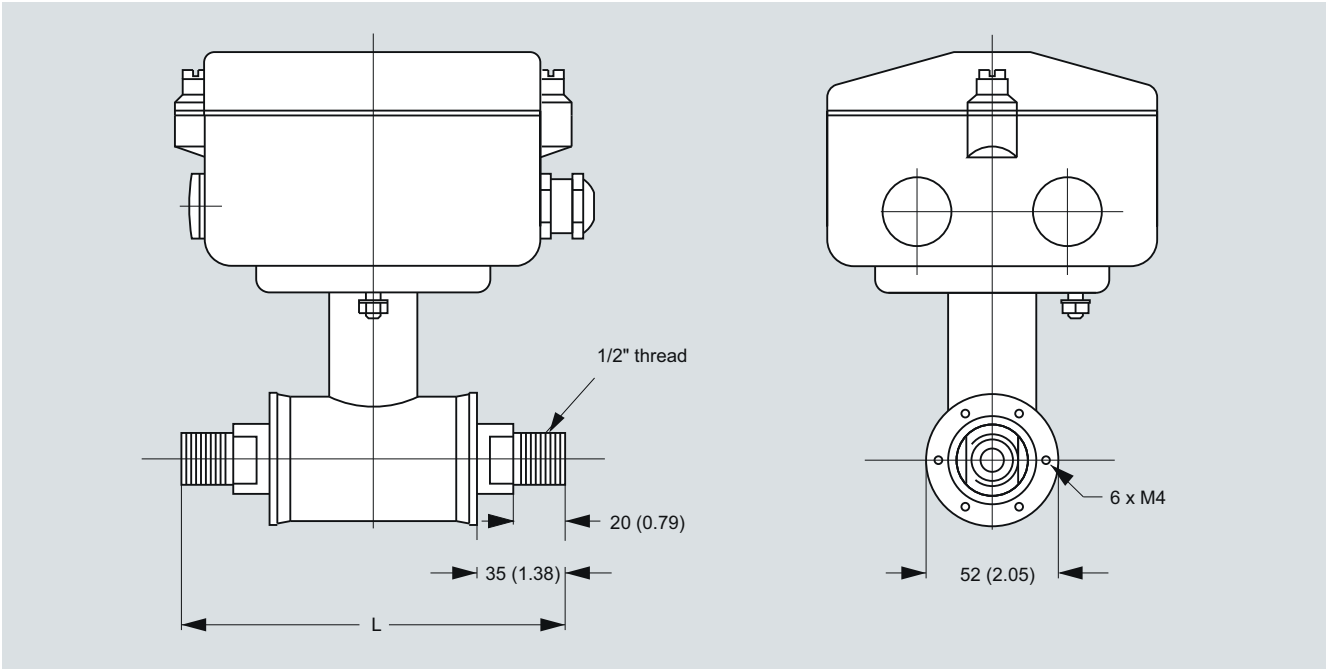
The total build-in length “L” [mm]/[inch] before assembling depends on the gasket selected

Size		EPDM		Graphite		PTFE (Teflon)		Without gasket		Earthing ring	
DN	inch	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
2 ... 10[1)]	1/12 ... 3/8	64	2.52	66	2.60	70	2.75	64	2.52	77	3.03
15	½	65	2.56	66	2.60	70	2.75	64	2.52	77	3.03
25	1	80	3.15	81	3.19	85	3.35	79	3.10	92	3.62
40	1½	95	3.74	96	3.78	100	3.94	94	3.70	107	4.21
50	2	105	4.13	106	4.17	110	4.33	104	4.05	117	4.61
65	2½	130	5.12	131	5.15	135	5.31	129	5.05	142	5.60
80	3	155	6.10	156	6.14	160	6.30	154	6.00	167	6.57
100	4	185	7.28	186	7.31	190	7.48	184	7.20	197	7.76

[1)] Mounting between two flanges

4

Sensor MAG 1100 DN 2 ... 10 (1/12“ ... 3/8“) with adapters



The MAG 1100 DN 2, 3, 6 and 10 (1/12“, 1/8“, ¼” and 3/8”) are prepared for assembly with the ½” pipe connections. Dimensions in mm (inch)

The length “L“ varies dependent on the gasket choice.

Without gasket		EPDM		Graphite		Teflon	
[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
150	5.9	150	5.9	152	6.0	156	6.1

Important note:
For compact installation with the MAG 6000 I, transmitter to be supported to avoid tension on sensor part.

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Flow sensor MAG 1100 F

Overview

The electromagnetic sensor SITRANS F M MAG 1100 F is designed to meet applications in the food and beverage industry.

Benefits

- Sensor sizes: DN 10 to DN 100 (3/8" to 4")
- AISI 316 stainless steel enclosure
- Sensor: Hygienic connection, 3A approval and EHEDG certified
- Sanitary design for CIP / SIP cleaning
- Conforms to FDA
- Easy commissioning, the SENSORPROM unit automatically updates settings
- Hose proof IP67/NEMA 4X enclosure rating
- Designed that patented in-situ verification can be conducted. Using SENSORPROM fingerprints

Application

The main applications of the SITRANS F M electromagnetic sensors can be found in the following fields:

- Food industry
- Beverage industry
- Pharmaceutical industry

Design

- Unique mechanical design with a wide range of customer specified sanitary connection
- Compact or remote mounting possible easy "plug & play" field changeable
- Simple on site upgrade to IP68/NEMA 6P terminal box
- Ex ATEX 2G D version for hazardous areas (ceramic liner)

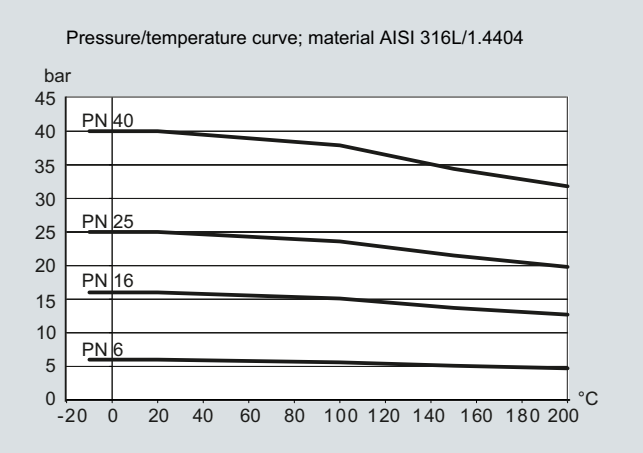
Mode of operation

The flow measuring principle is based on Faraday's law of electromagnetic induction according to which the sensor converts the flow into an electrical voltage proportional to the velocity of the flow.

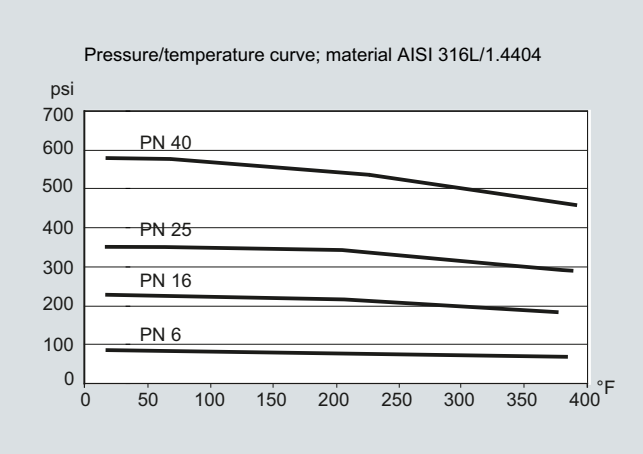
Integration

The complete flowmeter consists of a sensor and an associated transmitter SITRANS F M MAG 5000, 6000 and 6000 I. The flexible communication concept USM II simplifies integration and update to a variety of fieldbus systems such as PROFIBUS DP and PA, Modbus RTU/RS485, HART, FOUNDATION Fieldbus H1, DeviceNet.

Pressure/temperature curve; material AISI 316L/1.4404



Pressure/temperature curve; material AISI 316L/1.4404



For further information on the PED standard and requirements, see page 10/9.

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Technical specifications

Measuring principle	Electromagnetic induction
Excitation frequency (Mains supply: 50 Hz/60 Hz)	DN 10 ... 65 (¼“ … 2½”): 12.5 Hz/15 Hz DN 80 ... 100 (3”, 4”): 6.25 Hz/7.5 Hz
Process connection	
Nominal size	DN 10 … DN 100 (3/8" … 4")
Process connection	Hygienic adapters available for: • Direct welding onto pipe • Clamp fitting • Threaded fitting
Rated operating conditions	
Ambient conditions	
Ambient temperature[1]	
• Sensor	-40 … +100 °C (-40 … +212 °F)
• Ex sensor	-20 … +60 °C (-4 … +140 °F)
• Compact transmitter MAG 5000/6000[2]	-20 … +60 °C (-4 … +140 °F)
• Transmitter MAG 6000 I	-20 … +60 °C (-4 … +140 °F)
• Compact transmitter MAG 6000 I Ex de	-10 … +60 °C (14 … 140 °F)
Temperature of medium	
MAG 1100 F (Ceramic)	-20 … +150 °C (-4 … +302 °F) Suitable for steam sterilization
MAG 1100 F (PFA)	-30 … +130 °C (-22 … +266 °F) Suitable for steam steralization at 150 °C (302 °F)
Temperature shock	
MAG 1100 F	
• Duration ≤ 1 min, followed by 10 min rest	• DN 10, 15, 25: Max. ΔT ≤ 80 °C/min (3/8”, ½”, 1”: Max. ΔT ≤ 144 °F/min) • DN 40, 50, 65: Max. ΔT ≤ 70 °C/min (1½”, 2”, 2½”: Max. ΔT ≤ 126 °F/min) • DN 80, 100: Max. ΔT ≤ 60 °C/min (3”, 4”: Max. ΔT ≤ 108 °F/min)
MAG 1100 F (PFA)	Max. ± 100 °C (212 °F) momentarily
Operating pressure	
MAG 1100 F (Ceramic)	DN 10 ... 65: 40 bar (3/8” … 2½”: 580 psi) DN 80: 25 bar (3”: 363 psi) DN 100: 25 bar (4”: 363 psi) Vacuum: 1 x 10^{-6} bar_{abs} (1.5 x 10^{-5} psi_{abs})
MAG 1100 F (PFA)	20 bar (290 psi) Vacuum: 0.02 bar_{abs} (0.3 psi_{abs}) DN 80 ... DN 100: CO_2 pressure max. 7 bar (101.5 psi)
Mechanical load (vibration)	18 ... 1000 Hz random in x, y z, directions for 2 hours according to EN 60068-2-36 Sensor: 3.17 grms Sensor with compact MAG 5000/ 6000 mounted transmitter: 3.17 gr. Sensor with compact MAG 6000 I/MAG 6000 I Ex mounted transmitter: 1.14 grms For compact installation with the MAG 6000 I/MAG 6000 I Ex, transmitter to be supported to avoid tension on sensor part.
Enclosure rating	IP67 to EN 60529 (NEMA 4X), 1 mH_2O for 30 min
EMC	2004/108/EC

Design	
Weight	See Dimensional drawings
Material	
Enclosure	
• MAG 1100 F	Stainless steel AISI 316L/1.4404
Terminal box (remote version only)	
• Standard	Fibre glass reinforced polyamide
• Option	Stainless steel AISI 316/1.4436
• Ex ATEX (remote version only)	Stainless steel AISI 316/1.4436
Liner	
MAG 1100 F (Ceramic)	Aluminum oxide Al_2O_3 (ceramics)
MAG 1100 F (PFA)	Reinforced PFA (teflon) (not for Ex)
Electrodes	
MAG 1100 F (Ceramic)	Platinum with gold /Titanium brazing alloy
MAG 1100 F (PFA)	• DN 10 ... 15 (3/8" ... ½"): Hastelloy C276/2.4819 • DN 25 ... 100 (1" ... 4"): Hastelloy C22/2.4602
Cable entries	• Remote installation 2 x M20 or 2 x ½" NPT • Compact installation - MAG 5000/MAG 6000: 4 x M20 or 4 x ½" NPT - MAG 6000 I: 2 x M25 (for supply/output) - MAG 6000 I Ex de: 2 x M25 (for supply/output)
Certificates and approvals	
Calibration	
• Standard Production calibration, calibration report shipped with sensor	Zero-point, 2 x 25 %, 2 x 90 %
MAG 1100 F (Ceramic)	3A (sensor with Polyamide terminal box and FKM/FPM gaskets), transmitter not part of the approval
• Ex ATEX approvals for sensor or compact with MAG 6000 I Ex	ATEX 2G D sensor EEx d e ia IIB T3 - T6
• Sensor with/without MAG 5000/6000/6000 I	FM Class I, Div 2
MAG 1100 F (PFA)	3A (sensor with Polyamide terminal box with EPDM gasket), transmitter not part of the approval EHEDG certified (use EPDM P-seal) (DN 25 ... 100 (1 ... 4")) FM Class I, Div 2
Conforms to	• PED – 97/23/EC[3] • CRN (PFA) • FDA
Custody transfer approvals (MAG 5000/6000 CT)	• Cold water pattern approval PTB (Germany) • Hot water pattern approval PTB (Germany) • Other media than water pattern approval- OIML R 117 (Ceramic liner)(Denmark)

1) Conditions are also dependent on liner characteristics.
2) With compact transmitter MAG 5000 CT/6000 CT -20 ... +50 °C
3) For further information on the PED standard and requirements, see page 10/9.

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Flow sensor MAG 1100 F

Accessories

Weld-in adapter	
Adapter for welding onto dairy pipe	Tri-Weld, ISO 2037, DIN 11850, SMS 3008, BS 4825-1
• DN 10, 15, 25, 40, 50 and 65 (3/8", ½", 1", 1½", 2"and 2½")	PN 40 (600 psi)
• DN 80 and DN 100 (3" and 4")	PN 25 (350 psi)
Clamp adapter	Tri-Clamp, ISO 2852, DIN 32676, SMS 3016, BS 4825-3
DN 10, 15, 25, 40 and 50 (3/8", ½", 1", 1½", and 2")	PN 16 (200 psi)
DN 65, 80 and 100 (2½", 3" and 4")	PN 10 (150 psi)
Thread adapter	
DIN 11851	
• DN 10, 15, 25, and 40 (3/8", ½", 1", and 1½")	PN 40 (600 psi)
• DN 50, 65, 80 and 100 (2", 2½", 3" and 4")	PN 25 (350 psi)
ISO 2853, BS 4825-4	
• DN 10, 15, 25, 40, 50, 65 and 80 (3/8", ½", 1", 1½", 2", 2½ and 3")	PN 16 (200 psi)
SMS 1145	
• DN 25, 40, 50, 65 and 80 (1", 1½", 2", 2½" and 3")	PN 6 (80 psi)
Design	
Material	
Adapter	Stainless steel AISI 316/1.4436
Gasket	
• MAG 1100 F (Ceramic)	FKM/FPM with stainless steel insert (AISI 304/1.4301) (-20 ... +150 °C (-4 ... +302 °F))
	EPDM (-20 ... +150 °C (-4 ... +302 °F))
• MAG 1100 F (PFA)	EPDM (-20 ... +150 °C (-4 ... +302 °F))
	NBR (-20 ... +100 °C (-4 ... +212 °F))

Note:

When combined sensor and adapter, the operating pressure is the lower rated of the pair.

Selection and Ordering data	Order No.
Sensor SITRANS F M MAG 1100 F	**7ME6140-**
Diameter	
DN 10 (3/8")	1R
DN 15 (½")	1V
DN 25 (1")	2D
DN 40 (1½")	2R
DN 50 (2")	2Y
DN 65 (2½")	3F
DN 80 (3")	3M
DN 100 (4")	3T
Process connections	
No adaptors (specials see accessories)	A
Weld in	
DIN 11850	B
ISO 2037 (SMS 3008)	C
BS 4825-1	D
Tri-Weld	E
Clamp type	
DIN 32676	G
ISO 2852 (SMS 3016)	H
BS 4825-3	J
Tri-Clamp	K
Threaded type	
DIN 11851	M
SMS 1145	N
Liner material	
PFA (not for Ex)	1
Ceramic	2
Gasket material	
EPDM flat gasket (FDA)	0
FPM/FKM (FDA) (only with ceramic liner)	2
EPDM-P gasket (only for PFA) (FDA, EHEDG certified, 3A pending)	3
Electrode material	
Hastelloy C (only with PFA liner)	1
Platinum (only with ceramic liner)	2
Transmitter	
Standard sensor for remote transmitter (order transmitter separately) 3A	A
Ex sensor for remote transmitter (order transmitter separately) 3A	B
MAG 6000 I, Alu.18 ... 90 V DC, 115 ... 230 V AC	C
MAG 6000 I, Aluminum 18 ... 30 V DC, Ex	D
MAG 6000 I, Aluminum 115 ... 230 V AC, Ex	E
MAG 6000, Polyamide, 11 ... 30 V DC/ 11 ... 24 V AC	H
MAG 6000, Polyamide, 115 ... 230 V AC	J
MAG 5000, Polyamide, 11 ... 30 V DC/ 11 ... 24 V AC	K
MAG 5000, Polyamide, 115 ... 230 V AC	L
Communication	
No communication, add-on possible	A
HART	B
PROFIBUS PA Profile 3 (only MAG 6000/MAG 6000 I)	F
PROFIBUS DP Profile 3 (not for Ex) (only MAG 6000/MAG 6000 I)	G
Modbus RTU/RS 485 (not for Ex) (only MAG 6000/MAG 6000 I)	E
FOUNDATION Fieldbus H1 (only MAG 6000/MAG 6000 I)	J

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Selection and Ordering data	Order No.
Sensor SITRANS F M MAG 1100 F	**7ME6140 -** ■■■■■ - ■■■■
Cable glands/terminal box	
Metric: Polyamide terminal box or 6000 I compact ◆	**1**
½" NPT: Polyamide terminal box or 6000 I compact ◆	**2**
Metric: SS terminal box (mandatory for Stainless steel MAG 6000 Transmitter)	**3**
½" NPT: SS terminal box (mandatory for Stainless steel MAG 6000 Transmitter)	**4**

◆ Short lead time (details in PMD)

Selection and Ordering data	Order code
Additional information	
Please add **"-Z"** to Order No. and specify Order code(s) and plain text.	
Customer-specific converter setup	**Y20**
Tag name plate, stainless steel fixed with SS wire (add plain text)	**Y17**
Tag name plate, plastic (self adhesive)	**Y18**
Factory certificate according to EN 10204-2.1	**C15**
Factory certificate according to EN 10204-2.2	**C14**
Sensor cables wired (specify cable order no.)	**Y40**
Sensor for remote transmitter's junction box potted with wired cable (specify cable order no.) (not for Ex sensors)	**Y41**
Other postproduction requirements (add desired text)	**Y99**
Additional calibrations	
• Matched pair - (Standard production calibration where sensor and transmitter is calibrated together)	**On request**[1)]
• Customer-specified calibration up to 10 points	**On request**[1)]
• Customer-witnessed calibration Any of above calibration	**On request**[1)]

[1)] Ordering "On request" as dedicated information from the customer on the individual sensors is required. Please fill in the calibration form found on http://intranet.automation.siemens.com/w1/automation-technology-flow-measurement-18626.htm#content-19336&para1=Flow%20Measurement and send together with the order. (Size dependent restriction on maximum flow rates may apply

Operating instructions for SITRANS F M MAG 1100F

Description	Order No.
Handbook	
• English	**A5E02435647**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place. MAG 6000 I/MAG 6000 I Ex ATEX 2G D transmitters and sensors are delivered compact mounted from factory. Communication module will be pre-mounted in the transmitter.

Please use online Product selector to get latest updates.
Product selector link:
www.pia-selector.automation.siemens.com

Please also see www.siemens.com/SITRANSFordering
for practical examples of ordering

Accessories

Description	Order No.
Potting kit for IP68/NEMA 6P terminal box (not for Ex) ◆	**FDK-085U0220**

◆ Short lead time (details in PMD)

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Flow sensor MAG 1100 F

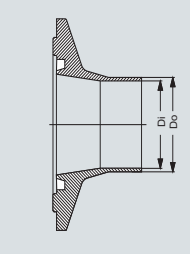
Accessories — Order No.

Weld in connection fittings for MAG 1100 F with P gaskets for EHEDG

Only for sensors with PFA liner.

2 pcs. fittings
2 pcs. clamps (to join flow sensor and fitting)

DIN 11850



Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)		Order No.
10	13	10	10	◆	**A5E02054630**
15	19	16	15	◆	**A5E02054633**
20	23	20	15		**A5E02054634**
25	29	26	25	◆	**A5E02054635**
32	35	32	25		**A5E02054637**
40	41	38	40	◆	**A5E02054638**
50	53	50	50	◆	**A5E02054640**
65	70	66	65	◆	**A5E02054643**
80	85	81	80	◆	**A5E02054644**
100	104	100	100	◆	**A5E02054646**

ISO 2037 (SMS3008)

Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)		Order No.
10	13	10	10	◆	**A5E02054630**
15	19	16	15	◆	**A5E02054633**
25	25.6	22.6	25	◆	**A5E02196073**
28	28.6	25.6	25		**A5E02196074**
38	38.6	35.6	40	◆	**A5E02196075**
40	40.6	37.6	40	◆	**A5E02196076**
51	51.6	48.6	50	◆	**A5E02196077**
63.5	64.1	60.3	65	◆	**A5E02196078**
76.1	76.7	72.9	80	◆	**A5E02196080**
101.6	102.5	97.6	100		**A5E02196082**

Tri-Weld (BS 4825-1)

Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)	Order No.
10	12.7	9.4	10	**A5E02199113**
15.9	19.05	15.75	15	**A5E02199114**
25	25.4	22.1	25	**A5E02199115**
38	38.1	34.8	40	**A5E02199116**
51	50.8	47.5	50	**A5E02199117**
63.5[1)]	63.5	60.2	65	**A5E02199118**
76.1	76.2	72.9	80	**A5E02199119**
102[1)]	101.6	97.38	100	**A5E02199120**

◆ Short lead time (details in PMD)

D_o: outer diameter

D_i: inner diameter

1) For BS 4825-1 see ISO 2037

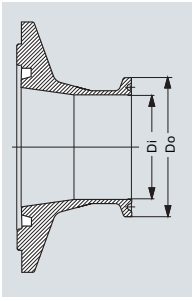
Accessories — Order No.

Clamp-type connection fittings for MAG 1100 F with P gaskets for EHEDG

Only for sensors with PFA liner.

2 pcs. fittings
2 pcs. clamps (to join flow sensor and fitting)

DIN 32676



Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)	Order No.
10	34	10	10	**A5E02211143**
15	34	16	15	**A5E02211144**
25	50.5	26	25	**A5E02211146**
40	50.5	38	40	**A5E02211147**
50	64	50	50	**A5E02211148**
65	91	66	65	**A5E02211151**
80	106	81	80	**A5E02211152**
100	119	100	100	**A5E02211153**

ISO 2852 (SMS 3016, BS 4825-3)

Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)	Order No.
10	34	10	10	**A5E02211143**
15	34	16	15	**A5E02211144**
25	50.5	26	25	**A5E02213581**
33.7	50.5	31.3	25	**A5E02213582**
38	50.5	35.6	40	**A5E02213583**
51	64	48.6	50	**A5E02213584**
63.5	77.5	60.3	65	**A5E02213585**
76.1	91	72.9	80	**A5E02213586**
101.6	119	97.6	100	**A5E02213587**

Tri-Clamp

Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)		Order No.
10	25	10	10		**A5E02213596**
15	25	16	15		**A5E02213597**
25	50.5	22.6	25		**A5E02213598**
38	50.5	35.6	40		**A5E02213599**
51	64	48.6	50	◆	**A5E02213600**
63.5	77.5	60.3	65		**A5E02213601**
76.1	91	72.9	80	◆	**A5E02213602**
101.6	119	97.6	100		**A5E02213603**

◆ Short lead time (details in PMD)

D_o: outer diameter

D_i: inner diameter

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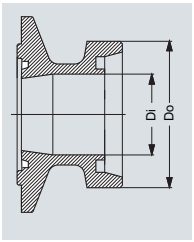
Accessories Order No.

Threaded type connection fittings for MAG 1100 F with P gaskets for EHEDG

Only for sensors with PFA liner.

2 pcs. fittings
2 pcs. clamps (to join flow sensor and fitting)

DIN 11851



Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)		Order No.
10	28	10	10		**A5E02218293**
15	34	16	15		**A5E02218294**
20	44	20	15		**A5E02218295**
25	52	26	25	◆	**A5E02218296**
32	58	32	25		**A5E02218297**
40	65	38	40	◆	**A5E02218298**
50	78	50	50	◆	**A5E02218299**
65	95	66	65		**A5E02218300**
80	110	81	80		**A5E02218301**
100	130	100	100		**A5E02218302**

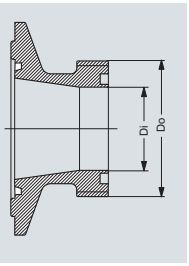
Accessories Order No.

Threaded type connection fittings for MAG 1100 F with P gaskets for EHEDG

Only for sensors with PFA liner.

2 pcs. fittings
2 pcs. clamps (to join flow sensor and fitting)

SMS 1145



Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)	Order No.
25	40	22.6	25	**A5E02218310**
38	60	35.6	40	**A5E02218312**
51	70	48.6	50	**A5E02218313**
63.5	85	60.3	65	**A5E02218314**
76	98	72	65	**A5E02218315**

◆ Short lead time (details in PMD)

D_o: outer diameter

D_i: inner diameter

4

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Flow sensor MAG 1100 F

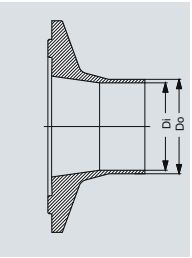
Accessories — Order No.

Weld in connection fittings for MAG 1100 F with flat gaskets for 3A

For sensors with ceramic and PFA liner.

2 pcs. fittings
2 pcs. clamps (to join flow sensor and fitting)

DIN 11850



Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)		Order No.
10	13	10	10	◆	**FDK-083G2116**
15	19	16	15	◆	**FDK-083G2117**
20	23	20	15		**FDK-083G2118**
25	29	26	25	◆	**FDK-083G2119**
32	35	32	25		**FDK-083G2120**
40	41	38	40	◆	**FDK-083G2121**
50	53	50	50	◆	**FDK-083G2122**
65	70	66	65	◆	**FDK-083G2123**
80	85	81	80	◆	**FDK-083G2124**
100	104	100	100	◆	**FDK-083G2125**

ISO 2037 (SMS3008)

Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)		Order No.
10	13	10	10	◆	**FDK-083G2116**
15	19	16	15	◆	**FDK-083G2117**
25	25.6	22.6	25	◆	**FDK-083G2109**
28	28.6	25.6	25		**FDK-083G2100**
38	38.6	35.6	40	◆	**FDK-083G2111**
40	40.6	37.6	40	◆	**FDK-083G2101**
51	51.6	48.6	50	◆	**FDK-083G2112**
63.5	64.1	60.3	65	◆	**FDK-083G2113**
76.1	76.7	72.9	80	◆	**FDK-083G2114**
101.6	102.5	97.6	100		**FDK-083G2115**
114.3	115.6	110.3	100		**FDK-083G2105**

Tri-Weld (BS 4825-1)

Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)	Order No.
10	12.7	9.4	10	**FDK-083G2276**
15.9	19.05	15.75	15	**FDK-083G2277**
25	25.4	22.1	25	**FDK-083G2279**
38	38.1	34.8	40	**FDK-083G2281**
51	50.8	47.5	50	**FDK-083G2282**
63.5[1)]	63.5	60.2	65	**FDK-083G2283**
76.1	76.2	72.9	80	**FDK-083G2284**
102[1)]	101.6	97.38	100	**FDK-083G2285**

◆ Short lead time (details in PMD)

D_o: outer diameter

D_i: inner diameter

1) For BS 4825-1 see ISO 2037

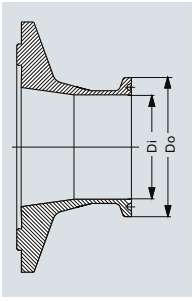
Accessories — Order No.

Clamp-type connection fittings for MAG 1100 F with flat gaskets for 3A

For sensors with ceramic and PFA liner.

2 pcs. fittings
2 pcs. clamps (to join flow sensor and fitting)

DIN 32676



Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)	Order No.
10	34	10	10	**FDK-083G2186**
15	34	16	15	**FDK-083G2187**
25	50.5	26	25	**FDK-083G2179**
40	50.5	38	40	**FDK-083G2181**
50	64	50	50	**FDK-083G2182**
65	91	66	65	**FDK-083G2183**
80	106	81	80	**FDK-083G2184**
100	119	100	100	**FDK-083G2185**

ISO 2852 (SMS 3016, BS 4825-3)

Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)	Order No.
10	34	10	10	**FDK-083G2186**
15	34	16	15	**FDK-083G2187**
25	50.5	26	25	**FDK-083G2179**
33.7	50.5	31.3	25	**FDK-083G2190**
38	50.5	35.6	40	**FDK-083G2191**
51	64	48.6	50	**FDK-083G2192**
63.5	77.5	60.3	65	**FDK-083G2193**
76.1	91	72.9	80	**FDK-083G2194**
101.6	119	97.6	100	**FDK-083G2195**

Tri-Clamp

Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)		Order No.
10	25	10	10		**FDK-083G2286**
15	25	16	15		**FDK-083G2287**
25	50.5	22.6	25		**FDK-083G2289**
38	50.5	35.6	40		**FDK-083G2291**
51	64	48.6	50	◆	**FDK-083G2292**
63.5	77.5	60.3	65		**FDK-083G2293**
76.1	91	72.9	80	◆	**FDK-083G2294**
101.6	119	97.6	100		**FDK-083G2295**

◆ Short lead time (details in PMD)

D_o: outer diameter

D_i: inner diameter

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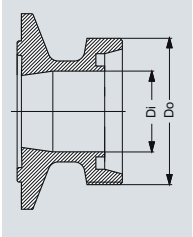
Accessories Order No.

Threaded type connection fittings for MAG 1100 F with flat gaskets for 3A

For sensors with ceramic and PFA liner.

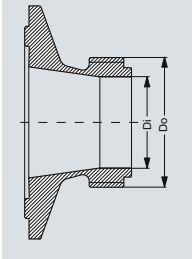
2 pcs. fittings
2 pcs. clamps (to join flow sensor and fitting)

DIN 11851



Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)		Order No.
10	28	10	10		**FDK-083G2156**
15	34	16	15		**FDK-083G2157**
20	44	20	15		**FDK-083G2158**
25	52	26	25	◆	**FDK-083G2159**
32	58	32	25		**FDK-083G2160**
40	65	38	40	◆	**FDK-083G2161**
50	78	50	50	◆	**FDK-083G2162**
65	95	66	65		**FDK-083G2163**
80	110	81	80		**FDK-083G2164**
100	130	100	100		**FDK-083G2165**

ISO 2853



Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)	Order No.
25	37	22.6	25	**FDK-083G2149**
38	51	35.6	40	**FDK-083G2151**
51	64	48.6	50	**FDK-083G2152**
63.5	78	60.3	65	**FDK-083G2153**
76.1	91	72.9	80	**FDK-083G2154**
101.6	118	97.6	100	**FDK-083G2155**

BS 4825-4

Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)	Order No.
25	37	22.6	25	**FDK-083G2149**
38	51	35.6	40	**FDK-083G2151**
51	64	48.6	50	**FDK-083G2152**
63.5	78	60.3	65	**FDK-083G2153**
76.1	91	72.9	80	**FDK-083G2154**
101.6	126	97.6	100	**FDK-083G2145**

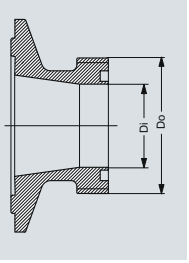
Accessories Order No.

Threaded type connection fittings for MAG 1100 F with flat gaskets for 3A

For sensors with ceramic and PFA liner.

2 pcs. fittings
2 pcs. clamps (to join flow sensor and fitting)

SMS 1145



Adapter DN (mm)	D_o (mm)	D_i (mm)	Sensor DN (mm)	Order No.
25	40	22.6	25	**FDK-083G2139**
38	60	35.6	40	**FDK-083G2141**
51	70	48.6	50	**FDK-083G2142**
63.5	85	60.3	65	**FDK-083G2143**
76	98	72	65	**FDK-083G2144**

◆ Short lead time (details in PMD)

D_o: outer diameter

D_i: inner diameter

4

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Flow sensor MAG 1100 F

Spare parts for MAG 1100 F		Order No.
Gaskets		
(2 pcs., between flow sensor and adapter)		
MAG 1100 F (PFA) - P gaskets		
Rubber: EPDM (FDA)		
• DN 10	◆	**A5E02055286**
• DN 15	◆	**A5E02055287**
• DN 25	◆	**A5E02055290**
• DN 40	◆	**A5E02055291**
• DN 50	◆	**A5E02055292**
• DN 65	◆	**A5E02055293**
• DN 80	◆	**A5E02055295**
• DN 100	◆	**A5E02055297**
MAG 1100 F (ceramic) - flat gaskets		
Rubber: FKM/FPM (FDA)		
• DN 10	◆	**A5E00915707**
• DN 15	◆	**A5E00915764**
• DN 25	◆	**A5E00915771**
• DN 40	◆	**A5E00915773**
• DN 50	◆	**A5E00915775**
• DN 65	◆	**A5E00915780**
• DN 80	◆	**A5E00915782**
• DN 100	◆	**A5E00915784**
MAG 1100 F (PFA) - flat gaskets		
Rubber: EPDM (FDA)		
• DN 10	◆	**FDK-083G2206**
• DN 15	◆	**FDK-083G2207**
• DN 25	◆	**FDK-083G2209**
• DN 40	◆	**FDK-083G2211**
• DN 50	◆	**FDK-083G2212**
• DN 65	◆	**FDK-083G2213**
• DN 80	◆	**FDK-083G2214**
• DN 100	◆	**FDK-083G2215**
Rubber: NBR		
• DN 10		**FDK-083G2216**
• DN 15		**FDK-083G2217**
• DN 25		**FDK-083G2219**
• DN 40		**FDK-083G2221**
• DN 50		**FDK-083G2222**
• DN 65		**FDK-083G2223**
• DN 80		**FDK-083G2224**
• DN 100		**FDK-083G2225**

◆ Short lead time (details in PMD)

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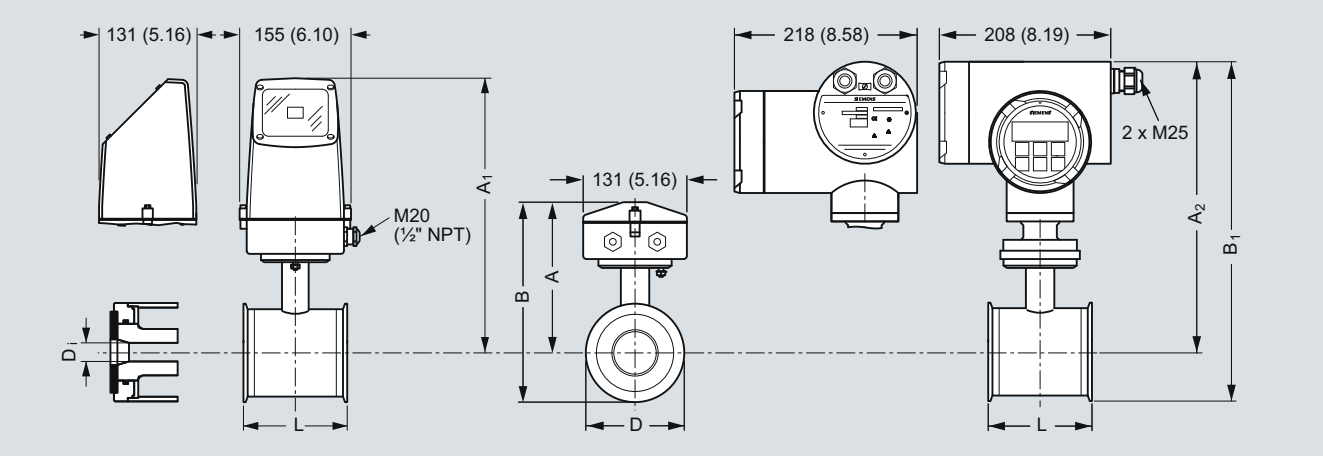
Dimensional drawings

Sensor MAG 1100 F compact/remote



Dimensions in mm (inch)

Important note:
For compact installation with MAG 6000 I/Ex - transmitter to be supported to avoid tension on the sensor part.

Size DN	L [mm]	A [mm]	A_1 3) [mm]	B 2) [mm]	B_1 [mm]	D [mm]	D_i (Al_2O_3) [mm]	D_i PFA [mm]	Weight 1) [kg]
10	64	161	315	193.7	344.7	64.0	10	10	2.2
15	64	161	315	193.7	344.7	64.0	15	16	2.2
25	79	169	323	207.5	359.0	77.5	25	26	2.7
40	94	179	333	228.0	379.0	91.0	40	38	3.4
50	104	188	342	247.7	398.7	119.0	50	50	4.2
65	131	197.5	351	262.6	413.6	130.0	65	66	5.5
80	156	204	357	281.0	432.0	155.0	80	81	7.0
100	186	217	370	308.0	459.0	183.0	100	100	10.0

Size [inch]	L [inch]	A [inch]	A_1 3) [inch]	B 2) [inch]	B_1 [inch]	D [inch]	D_i (Al_2O_3) [inch]	D_i PFA [inch]	Weight 1) [lb]
3/8	2.52	6.34	12.40	7.62	13.57	2.52	0.39	0.39	4.8
½	2.52	6.34	12.40	7.62	13.57	2.52	0.59	0.63	4.8
1	3.11	6.66	12.72	8.17	14.13	3.05	0.98	1.02	4.9
1½	3.70	7.05	13.11	8.98	14.92	3.58	1.57	1.50	7.5
2	4.09	7.40	13.47	9.75	15.70	4.68	1.97	1.97	9.2
2½	5.16	7.78	13.82	10.34	16.28	5.12	2.56	2.60	12.0
3	6.14	8.03	14.06	11.06	17.01	6.10	3.15	3.19	15.0
4	7.32	8.54	14.57	12.13	18.07	7.20	3.94	3.94	22.0

1) With transmitter MAG 5000 or MAG 6000 compact, weight is increased by approximately 0.8 kg (1.8 lb)
With MAG 6000 I weight is increased with 5.5 kg (12.1 lbs)
2) 14.5 mm (0.571“) shorter when the AISI terminal box is used (always Ex version)
3) A_2 is 3 mm (0.12“) shorter than A_1

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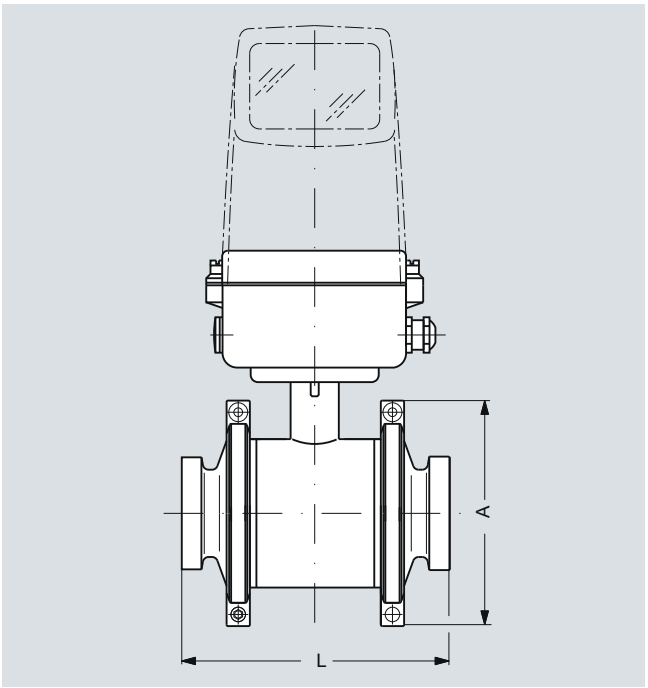
Flow sensor MAG 1100 F

Sensor MAG 1100 F compact/separate – build-in length



Size		A		L[1]	
DN	inch	[mm]	[inch]	[mm]	[inch]
10	3/8	99	3.90	146	5.75
15	½	99	3.90	146	5.75
25	1	113	4.45	161	6.34
40	1½	126	4.96	176	6.93
50	2	154	6.06	186	7.32
65	2½	165	6.50	223	8.78
80	3	200	7.87	258	10.16
100	4	225	8.86	288	11.34

[1] The total build-in length “L” is independent of the adapter type selected.

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Overview

The SITRANS F M MAG 5100 W is an electromagnetic flow sensor designed to meet ground water, drinking water, waste water, sewage or sludge applications.

Benefits

- DN 15 to DN 1200 / 2000 (½" to 48"/78")
- Stock program of MAG 5100 W secures short delivery time
- Connection flanges EN 1092-1 (DIN 2501), ANSI, AWWA, AS and JIS.
- NBR Hard Rubber and Ebonite Hard Rubber liner for all water applications
- EPDM liner with drinking water approvals
- Hastelloy integrated grounding and measuring electrodes
- Increased low flow accuracy for water leak detection, due to coned liner design (Order No. 7ME6520, DN 15 to 300 mm (½" to 12")).
- Drinking water approvals
- Suitable for direct burial and constant flooding
- Custody transfer approvals
- Build-in length according to ISO 13359; the standard includes sizes up to DN 400.
- Easy commissioning, SENSORPROM unit automatically uploads calibration values and settings.
- Designed so patented in-situ verification can be conducted. Using SENSORPROM fingerprint.
- Custody Transfer option for water billing, with type approval after OIML R 49 and verified according to MI-001 for DN 50 (2") to DN 300 (12")
  - pattern approval OIML R 49 (Denmark, Germany)
  - conforms to ISO 4064 and EN 14154 for mechanical flowmeters
  - MI-001 Custody Transfer approval for billing (EU)
- Meets EEC directives: PED, 97/23/EC pressure directive for EN1092-1 flanges
- Simple onsite or factory upgrade to IP68/NEMA 6P of a standard sensor
- MCERTS approval for UK environmental market

Application

The main applications of the SITRANS F M electromagnetic flow sensors can be found in the following fields:

- Water abstraction
- Water treatment
- Water distribution network (leak detection management)
- Custody transfer water meters
- Irrigation
- Waste water treatment
- Filtration plant (e.g. reverse osmosis and ultra filtration)
- Industrial water applications

Mode of operation

The flow measuring principle is based on Faradays law of electromagnetic induction according to which the sensor converts the flow into an electrical voltage proportional to the velocity of the flow.

Integration

The complete flowmeter consists of a flow sensor and an associated transmitter SITRANS F M MAG 5000, MAG 6000 or MAG 6000 I.

The flexible communication concept USM II simplifies integration and update to a variety of fieldbus systems, e.g. HART, DeviceNet, PROFIBUS DP and PA, FOUNDATION Fieldbus H1, Modbus RTU/RS485.

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Flow sensor MAG 5100 W

Technical specifications

Product characteristic	MAG 5100 W (7ME6520) Mainly for the European market EPDM or NBR lining	MAG 5100 W (7ME6580) Mainly for the non-European market Ebonite lining
Design and nominal size	Coned sensor: DN 15 ... 300 (½" ... 12") Full bore sensor: DN 350 ... 1200 (14" ... 48")	Full bore sensor: DN 25 ... 2000 (1" ... 78")
Measuring principle	Electromagnetic induction	Electromagnetic induction
Excitation frequency (Mains supply: 50/60 Hz)	DN 15 ... 65 (½" ... 2½"): 12.5 Hz/15 Hz DN 80 ... 150 (3" ... 6"): 6.25 Hz/7.5 Hz DN 200 ... 300 (8" ... 12"): 3.125 Hz/3.75 Hz DN 350 ... 1200 (14" ... 48"): 1.5625 Hz/1.875 Hz	DN 25 ... 65 (1" ... 2½"): 12.5 Hz/15 Hz DN 80 ... 150 (3" ... 6"): 6.25 Hz/7.5 Hz DN 200 ... 1200 (8" ... 48"): 3.125 Hz/3.75 Hz DN 1400 ... 2000 (54" ... 78"): 1.5625 Hz/1.875 Hz
Process connection		
Flanges		
• EN 1092-1	PN 10 (145 psi) : DN 200 ... 300 (8" ... 12") Flat face PN 10 (145 psi): DN 350 ... 1200 (14" ... 48") Raised face[1)] PN 16 (232 psi): DN 50 ... 300 (2" ... 12") Flat face[2)] PN 16 (232 psi): DN 350 ... 1200 (14" ... 48") Raised face PN 40 (580 psi): DN 15 ... 40 (½" ... 1½") Flat face	Raised face[2)] (EN 1092-1, DIN 2501 and BS 4504 have the same mating dimensions) PN 6 (87 psi): DN 1400 ... 2000 (54" ... 78") PN 10 (145 psi): DN 200 ... 2000 (8" ... 78") PN 16 (232 psi): DN 65 ... 600 (2½" ... 24") PN 40 (580 psi): DN 25 ... 50 (1" ... 2")
• ANSI B16.5	Class 150: ½" ... 12" flat face; 14" ... 24" raised face	Class 150: 1" ... 24"; raised face
• AWWA C-207	Class D: 28" ... 48", flat face	Class D: 28" ... 78", flat face
• AS4087	PN 16 (DN 50 ... 1200), (2" ... 48") 16 bar (232 psi)	PN 16 (DN 50 ... 1200), (2" ... 48") 16 bar (232 psi)
• JIS B 2220:2004	-	K10 (1" ... 24")
Rated Operation conditions		
Ambient temperature		
• Sensor	-40 ... +70 °C (-40 ... +158 °F)	-20 ... +70 °C (-4 ... +158 °F)
• With compact transmitter MAG 5000/6000[3)]	-20 ... +60 °C (-4 ... +140 °F)	-20 ... +60 °C (-4 ... +140 °F)
Operating pressure (Abs) [abs. bar] (Maximum operating pressure depending on flange standard, decreases with increasing operating temperature)	DN 15 ... 40 (½" ... 1½"): 0.01 ... 40 bar (0.15 ... 580 psi) DN 50 ... 300 (2" ... 12"): 0.03 ... 20 bar (0.44 ... 290 psi) DN 350 ... 1200 (14" ... 48"): 0.01 ... 16 bar (0.15 ... 232 psi)	DN 25 ... 50 (1" ... 2"): 0.01 ... 40 bar (0.15 ... 580 psi) DN 65 ... 1200 (2½" ... 48"): 0.01 ... 16 bar (0.15 ... 232 psi) DN 1400 ... 2000 (54" ... 78"): 0.01 ... 10 bar (0.15 ... 145 psi)
Enclosure rating		
• Standard	IP67 to EN 60529/NEMA 4X/6 (1 mH_2O for 30 min)	IP67 to EN 60529/NEMA 4X/6 (1 mH_2O for 30 min)
• Option	IP68 to EN 60529/NEMA 6P (10 mH_2O continuously)	IP68 to EN 60529/NEMA 6P (10 mH_2O continuously)
Pressure drop	DN 15 and 25 (½" and 1"): Max. 20 mbar (0.29 psi) at 1 m/s (3 ft/s). DN 40 ... 300 (1½" ... 12"): Max 25 mbar (0.36 psi) at 3 m/s (10 ft/s) DN 350 ... 1200 (14" ... 48"): Insignificant	Insignificant
Test pressure	1.5 x PN (where applicable)	1.5 x PN (where applicable)
Mechanical load (vibration)	18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 Sensor: 3.17 grms Sensor with compact MAG 5000/6000 mounted transmitter: 3.17 grms Sensor with compact MAG 6000 I mounted transmitter: 1.14 grms	18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 Sensor: 3.17 grms Sensor with compact MAG 5000/6000 mounted transmitter: 3.17 grms Sensor with compact MAG 6000 I mounted transmitter: 1.14 grms

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Product characteristic	Mainly for the European market (7ME6520) EPDM or NBR lining	Mainly for the non-European market (7ME6580) Ebonite lining
Medium conditions		
Temperature of medium		
• NBR	-10 ... +70 °C (14 ... 158 °F)	-
• EPDM	-10 ... +70 °C (14 ... 158 °F)	-
• EPDM (MI-001)	0.1 ... 30 °C (32 ... 76 °F)	-
• Ebonite	-	-10 ... +70 °C (14 ... 158 °F)
EMC	2004/108/EC	2004/108/EC
Design		
Material		
• Housing and flanges	Carbon steel, with corrosion-resistant two-component epoxy coating (min. 150 µm) Corrosivity category C4, according to ISO 12944-2	Carbon steel ASTM A 105, with corrosion-resistant two-component epoxy coating (min. 150 µm) Corrosivity category C4, according to ISO 12944-2
• Measuring pipe	Stainless steel AISI 304/1.4301	Stainless steel AISI 304/1.4301
• Electrode	Hastelloy C	Hastelloy C
• Grounding electrode	Hastelloy C	Hastelloy C
• Terminal box	Fibre glass reinforced polyamide	Fibre glass reinforced polyamide
Certificates and approvals		
Calibration		
• Standard production calibration, calibration report shipped with sensor	Zero-point, 2 x 25 % and 2 x 90 %	Zero-point, 2 x 25 % and 2 x 90 %
Custody Transfer (only together with MAG 6000 CT)	OIML R 49 pattern approval cold water (Denmark and Germany): DN 50 ... 300 (2“ ... 12") MI-001 cold water (EU): DN 50 ... 300 (2“ ... 12") PTB K7.2: Chilled water energy metering DN 50-300 (order as special) Certificate number: 22 76.10 02	
Drinking water approvals	EPDM liner: NSF/ANSI Standard 61 (Cold water, US) WRAS (WRc, BS6920 cold water, GB) ACS (F), DVGW W270 (D) Belgaqua (B)	NSF/ANSI Standard 61 (Cold water, US) WRAS (WRc, BS6920 cold water, GB)
Other approvals	MCERTS	
	PED conforming: All EN1092-1 flanges and ANSI Class 150 (< DN 300 (<12")) – 97/23/EC[4)]	PED conforming: All EN1092-1 flanges (≤ DN 600 (≤ 24") – 97/23/EC[4)]
	CRN	CRN
	CSA Class I, Div 2	CSA Class I, Div 2
	FM Class I, Div 2	FM Class I, Div 2
	VdS: Extinguishing systems DN 50 ... 300	

1) Type 01 (SORF)

2) DN ≤ 600 type 01 (SORF); DN > 600 type 11 (WNRF)

3) With compact transmitter MAG 5000 CT/6000 CT -20 ... +50 °C

4) For sizes larger than 600 mm (24") in PN 16 PED conformity is available as a cost-added option. The basic unit will carry the LVD (Low Voltage Directive) and EMC approval. All products sold outside of EU and EFTA are excluded from the directive, also products sold into certain market sectors are excluded. These include:
a) Meters used in networks for the supply, distribution and discharge of water.
b) Meters used in pipelines for the conveyance of any fluid from offshore to onshore.
c) Meters used in the extraction of petroleum or gas, including Christmas tree and manifold equipment.
d) Any meter mounted on a ship or mobile offshore platform. For further information on the PED standard and requirements see page 10/9.

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Flow sensor MAG 5100 W

MAG 5100 W (7ME6520) with MAG 6000 CT (Revenue program) MI-001

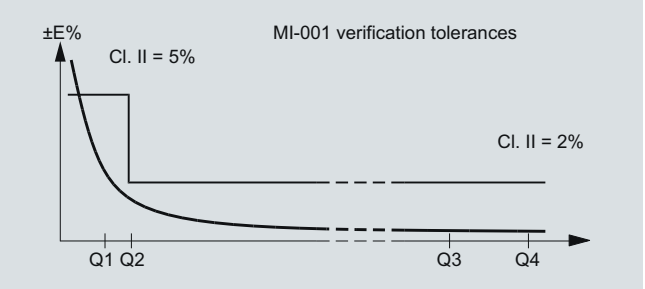
MAG 5100 W CT program is type approved according to international water meter standard OIML R 49. Since the first November 2006 the MI-001 water meter directive is in force, which means that all water meters can be sold across the EU borders if the water meters contain a MI-001 label.

The MAG 5100 W MI-001 verified and labeled products are a Class II approval according to Directive 2004/22/EC of the European Parliament and Council of March 31, 2004 on measuring instruments (MID), Annex MI-001 in the sizes from DN 50 to DN 300 (Order No. 7ME6520).

The MID certification is obtained as a modul B + D module approval according to the above mentioned directive.

Module B : Type approval according to OIML R 49

Module D : Quality insurance approval of production



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MAG 5100 W (7ME6520) MI-001 verified and labeled products at a given Q3 and Q3/Q4 = 1.25 and Q2/Q1 = 1.6 measuring ranges see table below:

Order code: P11	**DN 50 (2“)**	**DN 65 (2½“)**	**DN 80 (3“)**	**DN 100 (4“)**	**DN 125 (5“)**	**DN 150 (6“)**	**DN 200 (8“)**	**DN 250 (10“)**	**DN 300 (12“)**
„R“ Q3/Q1	25	25	25	25	25	25	25	25	25
Q4 [m^3/h]	20	31.25	50	78.75	125	200	312.5	500	787.5
Q3 [m^3/h]	**16**	**25**	**40**	**63**	**100**	**160**	**250**	**400**	**630**
Q2 [m^3/h]	1.02	1.6	2.6	4.03	6.4	10.24	16	25.6	40.32
Q1 [m^3/h]	0.64	1.00	1.60	2.52	4.0	6.4	10.0	16.0	25.2

Order code: P12	**DN 50 (2“)**	**DN 65 (2½“)**	**DN 80 (3“)**	**DN 100 (4“)**	**DN 125 (5“)**	**DN 150 (6“)**	**DN 200 (8“)**	**DN 250 (10“)**	**DN 300 (12“)**
„R“ Q3/Q1	63	63	63	63	63	63	63	63	63
Q4 [m^3/h]	20	31.25	50	78.75	125	200	312.5	500	787.5
Q3 [m^3/h]	**16**	**25**	**40**	**63**	**100**	**160**	**250**	**400**	**630**
Q2 [m^3/h]	0.41	0.63	1.02	1.6	2.54	4.06	6.35	10.2	16.0
Q1 [m^3/h]	0.25	0.40	0.63	1.00	1.59	2.54	3.97	6.35	10.0

Order code: P13	**DN 50 (2“)**	**DN 65 (2½“)**	**DN 80 (3“)**	**DN 100 (4“)**	**DN 125 (5“)**	**DN 150 (6“)**	**DN 200 (8“)**	**DN 250 (10“)**	**DN 300 (12“)**
„R“ Q3/Q1	80	80	80	80	80	80	80	80	80
Q4 [m^3/h]	20	31.25	50	78.75	125	200	312.5	500	787.5
Q3 [m^3/h]	**16**	**25**	**40**	**63**	**100**	**160**	**250**	**400**	**630**
Q2 [m^3/h]	0.32	0.50	0.80	1.20	2.00	3.20	5.0	8.0	12.6
Q1 [m^3/h]	0.20	0.31	0.50	0.75	1.25	2.00	3.13	5.0	7.90

Order code: P16	**DN 50 (2“)**	**DN 65 (2½“)**	**DN 80 (3“)**	**DN 100 (4“)**	**DN 125 (5“)**	**DN 150 (6“)**	**DN 200 (8“)**	**DN 250 (10“)**	**DN 300 (12“)**
„R“ Q3/Q1	160	160	160	160	160	160	160	160	160
Q4 [m^3/h]	50	78.75	125	200	312.5	500	787.5	1250	2000
Q3 [m^3/h]	**40**	**63**	**100**	**160**	**250**	**400**	**630**	**1000**	**1600**
Q2 [m^3/h]	0.40	0.63	1.00	1.60	2.50	4.00	6.3	10.0	16.0
Q1 [m^3/h]	0.25	0.39	0.63	1.00	1.56	2.50	3.94	6.3	10.0

Order code: P17	**DN 50 (2“)**	**DN 65 (2½“)**	**DN 80 (3“)**	**DN 100 (4“)**	**DN 125 (5“)**	**DN 150 (6“)**	**DN 200 (8“)**	**DN 250 (10“)**	**DN 300 (12“)**
„R“ Q3/Q1	200	200	200	200	200	200	200	200	200
Q4 [m^3/h]	50	78.75	125	200	312.5	500	787.5	1250	2000
Q3 [m^3/h]	**40**	**63**	**100**	**160**	**250**	**400**	**630**	**1000**	**1600**
Q2 [m^3/h]	0.32	0.50	0.80	1.28	2.00	3.20	5.0	8.0	12.8
Q1 [m^3/h]	0.20	0.32	0.50	0.80	1.25	2.00	3.15	5.0	8.0

Order code: P18	**DN 50 (2“)**	**DN 65 (2½“)**	**DN 80 (3“)**	**DN 100 (4“)**	**DN 125 (5“)**	**DN 150 (6“)**	**DN 200 (8“)**	**DN 250 (10“)**	**DN 300 (12“)**
„R“ Q3/Q1	250	250	250	250	250	250	250	250	250
Q4 [m^3/h]	50	78.75	125	200	312.5	500	787.5	1250	2000
Q3 [m^3/h]	**40**	**63**	**100**	**160**	**250**	**400**	**630**	**1000**	**1600**
Q2 [m^3/h]	0.26	0.40	0.64	1.02	1.60	2.56	4.0	6.4	10.24
Q1 [m^3/h]	0.16	0.25	0.40	0.64	1.00	1.60	2.52	4.0	6.4

The Label is placed on the side of the encapsulation. An example of the product label is shown below:

OIML R 49/MI-001 approvals valid for:

- DN 50 to 300 mm (2" to 12")
- Horizontal installation
- Compact or remote with max. 3 m cable
- Power supply 115/230 V AC

Other restrictions may apply (see certificate).

Special OIML / MI-001 settings:

- Unit: m^3
- Qmax: Q3
- CutOff: 0.1 %
- Digital output: Frequency

For other factory settings, see Operating Instructions.

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Flow sensor MAG 5100 W

Selection and Ordering data		Order No.
Sensor SITRANS F M MAG 5100 W		**7ME6520-**
Hastelloy electrodes, carbon steel flanges, EU water markets and low flow applications		■■■1■-2■■■
Diameter		
DN 15 (½“)	◆	1V
DN 25 (1“)	◆	2D
DN 40 (1½“)	◆	2R
DN 50 (2“)	◆	2Y
DN 65 (2½“)	◆	3F
DN 80 (3“)	◆	3M
DN 100 (4“)	◆	3T
DN 125 (5“)	◆	4B
DN 150 (6“)	◆	4H
DN 200 (8“)	◆	4P
DN 250 (10“)	◆	4V
DN 300 (12“)	◆	5D
DN 350 (14“)	◆	5K
DN 400 (16“)	◆	5R
DN 450 (18“)	◆	5Y
DN 500 (20“)	◆	6F
DN 600 (24“)	◆	6P
DN 700 (28“)	◆	6Y
DN 750 (30“)		7D
DN 800 (32“)		7H
DN 900 (36“)		7M
DN 1000 (40“)		7R
(42“)		7U
(44“)		7V
DN 1200 (48“)		8B
Flange norm and pressure rating		
to EN 1092-1		
PN 10 (DN 200 ... 1200/8“ ... 48“)	◆	B
PN 16 (DN 50 ... 1200/2“ ... 48“)	◆	C
PN 16, non PED (DN 700 ... 1200/28“ ... 48“)		D
PN 40 (DN 15 ... 40/½“ ... 1½“)	◆	F
to ANSI B16.5		
class 150 (½“ ... 24“)	◆	J
to AWWA C-207		
Class D (28“ ... 48“)		L
to AS 4087		
PN 16 (DN 50 ... 1200/2“ ... 48“)		N
Liner material		
EPDM	◆	2
NBR Hard Rubber	◆	3
Transmitter		
Sensor for remote transmitter (Order transmitter separately)	◆	A
MAG 6000 I, Aluminum, 18 ... 90 V DC, 115 ... 230 V AC	◆	C
MAG 6000, Polyamid, 11 ... 30 V DC/11 ... 24V AC	◆	H
MAG 6000, Polyamid, 115 ... 230 V AC	◆	J
MAG 5000, Polyamid, 11 ... 30 V DC/11 ... 24V AC	◆	K
MAG 5000, Polyamid, 115 ... 230 V AC	◆	L
MAG 6000 CT, Polyamid, 115 ... 230 V AC	◆	M

Selection and Ordering data		Order No.
Sensor SITRANS F M MAG 5100 W		**7ME6520-**
Hastelloy electrodes, carbon steel flanges, EU water markets and low flow applications		■■■1■-2■■■
Communication		
None	◆	A
HART	◆	B
PROFIBUS PA Profile 3 (only MAG 6000/MAG 6000 I)	◆	F
PROFIBUS DP Profile 3 (only MAG 6000/MAG 6000 I)	◆	G
Modbus RTU/RS 485 (only MAG 6000/MAG 6000 I)	◆	E
FOUNDATION Fieldbus H1 (only MAG 6000/ MAG 6000 I)	◆	J
Cable glands/terminal box		
Metric/Polyamid terminal box or 6000 I compact	◆	1
½" NPT/Polyamid terminal box or 6000 I compact	◆	2

◆ Short lead time (details in PMD)

4

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Selection and Ordering data	Order code
Additional information	
Please add **"-Z"** to Order No. and specify Order code(s) and plain text.	
Factory certificate according to EN 10204-2.2	**C14**
Factory certificate according to EN 10204-2.1	**C15**
Approval/Verification[2] (MI-001 : DN 50-300 compact, EPDM liner, EN 1092-1 PN10 and PN16 flanges with MAG 6000 CT)[3]	
• Without verification according to OIML R 49	**P10**
• MI-001 Q3/Q1 = 25	**P11**
• MI-001 Q3/Q1 = 63	**P12**
• MI-001 Q3/Q1 = 80	**P13**
• MI-001 Q3/Q1 = 160	**P16**
• MI-001 Q3/Q1 = 200	**P17**
• MI-001 Q3/Q1 = 250	**P18**
Tag name plate, stainless steel fixed with SS wire (add plain text)	**Y17**
Tag name plate, plastic (self-adhesive)	**Y18**
Customer-specific converter setup	**Y20**
Sensor cables wired (specify cable order no.)	**Y40**
Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable order no.)	**Y41**
Other postproduction requirements (add desired text)	**Y99**
Additional Calibrations	
Matched pair - (Standard production calibration where sensor and transmitter are calibrated together)	**On request**[1]
Accredited Siemens Flow Instruments matched pair Calibration acc. to ISO/IEC 17025:2005	**On request**[1]
Customer-specified calibration up to 10 points	**On request**[1]
Customer-witnessed calibration Any of above calibration	**On request**[1]

[1] Ordering On request as dedicated information from the customer on the individual sensors is required. Please fill in the calibration form found on pi.khe.siemens.de/index.aspx?Nr=17460 and send together with the order. (Size dependent restriction on maximum flow rates may apply)

[2] For more details and references of the ranges please see the tables on page 4/73.

[3] For remote version submit Product Variation Request.

Operating instructions for SITRANS F M MAG 5100 W

Description	Order No.
• English	**A5E03063678**
• German	**A5E03376527**
• Spanish	**A5E00376529**
• French	**A5E03376521**
• Chinese	**A5E03376501**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Accessories

Description	Order No.	
Potting kit for terminal box of SITRANS F M sensors for IP68/NEMA 6P (Not for Ex)	◆ **FDK-085U0220**	

◆ Short lead time (details in PMD)

MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place. MAG 6000 I transmitters and sensors are delivered compact mounted from factory.
Communication module will be pre-mounted in the transmitter.

Please use online Product selector to get latest updates.

Product selector link:
www.pia-selector.automation.siemens.com

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

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Flow sensor MAG 5100 W

Selection and Ordering data		Order No.
Sensor SITRANS F M MAG 5100 W		**7ME6580-**
Hastelloy electrodes, carbon steel flanges, Non EU water markets		■■■■■-■■■■
Diameter		
DN 25 (1“)	◆	**2D**
DN 40 (1½“)	◆	**2R**
DN 50 (2“)	◆	**2Y**
DN 65 (2½“)	◆	**3F**
DN 80 (3“)	◆	**3M**
DN 100 (4“)	◆	**3T**
DN 125 (5“)	◆	**4B**
DN 150 (6“)	◆	**4H**
DN 200 (8“)	◆	**4P**
DN 250 (10“)	◆	**4V**
DN 300 (12“)	◆	**5D**
DN 350 (14“)	◆	**5K**
DN 400 (16“)	◆	**5R**
DN 450 (18“)	◆	**5Y**
DN 500 (20“)		**6F**
DN 600 (24“)		**6P**
DN 700 (28“)		**6Y**
DN 750 (30“)		**7D**
DN 800 (32“)		**7H**
DN 900 (36“)		**7M**
DN 1000 (40“)		**7R**
(42“)		**7U**
(44“)		**7V**
DN 1200 (48“)		**8B**
DN 1400 (54“)		**8F**
DN 1500 (60“)		**8K**
DN 1600 (66“)		**8P**
DN 1800 (72“)		**8T**
DN 2000 (78“)		**8Y**
Flange norm and pressure rating		
to EN 1092-1		
PN 6 (DN 1400 ... 2000 (54“ ... 78“))		**A**
PN 10 (DN 200 ... 2000 (8“ ... 78“))	◆	**B**
PN 16 (DN 65 ... 600 (2½“ ... 24“))	◆	**C**
PN 16, non-PED (DN 700 ... 2000 (28“ ... 78“))		**D**
PN 40 (DN 25 ... 50 (1“ ... 2“))	◆	**F**
to ANSI B16.5		
class 150 (1“ ... 24“)		**J**
to AWWA C-207		
Class D (28“ ... 78“)		**L**
to AS 4087		
PN 16 (DN 50 ... 1200 (2" ... 48"))		**N**
to JIS		
B 2220:2004 K10 (1" ... 24")		**R**
Flange material		
Carbon steel flanges ASTM A 105		**1**
Liner material		
Ebonite Hard Rubber		**4**
Electrode material		
Hastelloy		**2**

Selection and Ordering data		Order No.
Sensor SITRANS F M MAG 5100 W		**7ME6580-**
Hastelloy electrodes, carbon steel flanges, Non EU water markets		■■■■■-■■■■
Transmitter with display		
Sensor for remote transmitter (Order transmitter separately)	◆	**A**
MAG 6000, Polyamid, 11 ... 30 V DC/11 ... 24V AC	◆	**H**
MAG 6000, Polyamid, 115 ... 230 V AC	◆	**J**
MAG 5000, Polyamid, 11 ... 30 V DC/11 ... 24V AC	◆	**K**
MAG 5000, Polyamid, 115 ... 230 V AC	◆	**L**
Communication		
No communication, add-on possible	◆	**A**
HART	◆	**B**
PROFIBUS PA Profile 3 (only MAG 6000)	◆	**F**
PROFIBUS DP Profile 3 (only MAG 6000)	◆	**G**
Modbus RTU/RS 485 (only MAG 6000)	◆	**E**
FOUNDATION Fieldbus H1 (only MAG 6000)	◆	**J**
Cable glands/terminal box		
Metric	◆	**1**
½" NPT	◆	**2**

Selection and Ordering data	Order code
Additional information	
Please add **“-Z“** to Order No. and specify Order code(s) and plain text.	
Factory certificate according to EN 10204-2.2	**C14**
Factory certificate according to EN 10204-2.1	**C15**
Tag name plate, stainless steel fixed with SS wire	**Y17**
Tag name plate, plastic (self-adhesive)	**Y18**
Customer-specific converter setup	**Y20**
Sensor cables wired (specify cable order no.)	**Y40**
Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable order no.)	**Y41**
Other postproduction requirements (add desired text)	**Y99**

Operating instructions for SITRANS F M MAG 5100 W

Description	Order No.
• German	**A5E03376527**
• English	**A5E03063678**
• French	**A5E03376521**
• Spanish	**A5E03376529**
• Chinese	**A5E03376501**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Accessories

Description		Order No.
Potting kit for terminal box of SITRANS F M sensors for IP68/NEMA 6P (Not for Ex)	◆	**FDK-085U0220**

◆ Short lead time (details in PMD)

MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place.
Communication module will be pre-mounted in the transmitter.

Please use online Product selector to get latest updates.

Product selector link: www.pia-selector.automation.siemens.com

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

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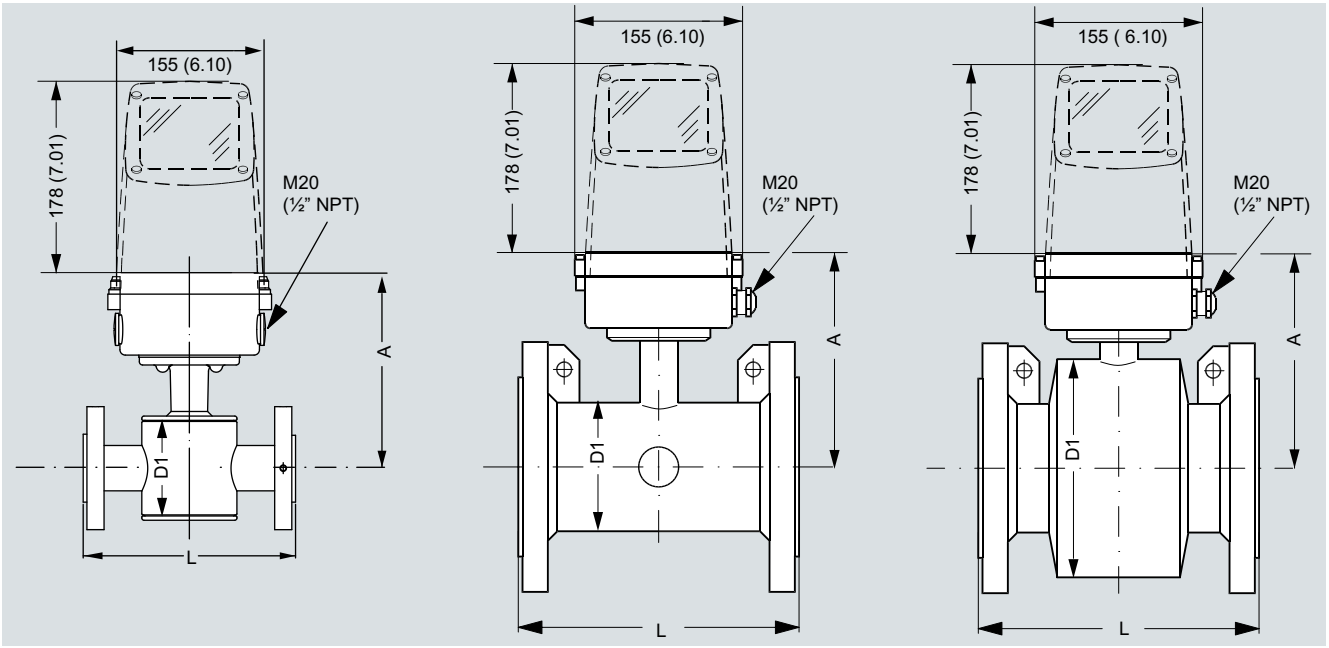
Dimensional drawings



		7ME6520 NBR or EPDM liner						7ME6580 Ebonite liner							
Nominal size		A		A1		D1		A		A1		D1		L	
[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
15	½	177	7.0	331	13.0	77	3.0	-	-	341	13.4	104	4.09	200	7.9
25	1	187	7.4	341	13.4	96	3.8	187	7.4	351	13.8	104	4.09	200	7.9
40	1½	202	8.0	356	14.0	127	5.0	197	7.8	359	14.1	124	4.88	200	7.9
50	2	188	7.4	342	13.5	76	3.0	205	8.1	366	14.4	139	5.47	200	7.9
65	2½	194	7.6	348	13.7	89	3.5	212	8.3	376	14.8	154	6.06	200	7.9
80	3	200	7.9	354	14.0	102	4.0	222	8.7	396	15.6	174	6.85	200	7.9
100	4	207	8.1	361	14.2	114	4.5	242	9.5	409	16.1	214	8.43	250	9.8
125	5	217	8.5	371	14.6	140	5.5	255	10.0	430	16.9	239	9.41	250	9.8
150	6	232	9.1	386	15.2	168	6.6	276	10.9	458	18.0	282	11.1	300	11.8
200	8	257	10.1	411	16.2	219	8.6	304	12.0	486	19.1	338	13.31	350	13.8
250	10	284	11.2	438	17.2	273	10.8	332	13.1	511	20.1	393	15.47	450	17.7
300	12	310	12.2	464	18.3	324	12.8	357	14.1	516	20.3	444	17.76	500	19.7
350	14	382	15.0	536	21.1	451	17.8	362	14.3	541	21.3	502	19.76	550	21.7
400	16	407	16.0	561	22.1	502	19.8	387	15.2	572	22.5	563	22.16	600	23.6
450	18	438	17.2	592	23.3	563	22.2	418	16.5	597	23.5	614	24.17	600	23.6
500	20	463	18.2	617	24.3	614	24.2	443	17.4	648	25.5	715	28.15	600	23.6
600	24	514	20.2	668	26.3	715	28.2	494	19.4	698	27.5	816	32.13	600	23.6
700	28	564	22.2	718	28.3	816	32.1	544	21.4	725	28.5	869	34.21	700	27.6
750	30	591	23.3	745	29.3	869	34.2	571	22.5	760	29.9	927	36.5	750	29.5
800	32	616	24.3	770	30.3	927	36.5	606	23.9	807	31,8	1032	40.63	800	31.5
900	36	663	26.1	817	32.2	1032	40.6	653	25.7	858	33.8	1136	44.72	900	35.4
1000	40	714	28.1	868	34.2	1136	44.7	704	27.7	858	33.8	1136	44.72	1000	39.4
	42	714	28.1	868	34.2	1136	44.7	704	27.7	904	35.6	1238	48.74	1000	39.4
	44	765	30.1	919	36.2	1238	48.7	755	29.7	964	38.0	1348	53.07	1100	43.3
1200	48	820	32.3	974	38.3	1348	53.1	810	31.9	1079	42.5	1675	65.94	1200	47.2
1400	54	-	-	-	-	-	-	925	36.4	1126	44.3	1672	65.83	1400	55.1
1500	60	-	-	-	-	-	-	972	38.2	1179	46.4	1915	75.39	1500	59.1
1600	66	-	-	-	-	-	-	1025	40.4	1277	50.3	1974	77.72	1600	63.0
1800	72	-	-	-	-	-	-	1123	44.2	1377	54.2	2174	85.59	1800	70.9
2000	78	-	-	-	-	-	-	1223	48.1	-	-	-	-	2000	78.7

- not available

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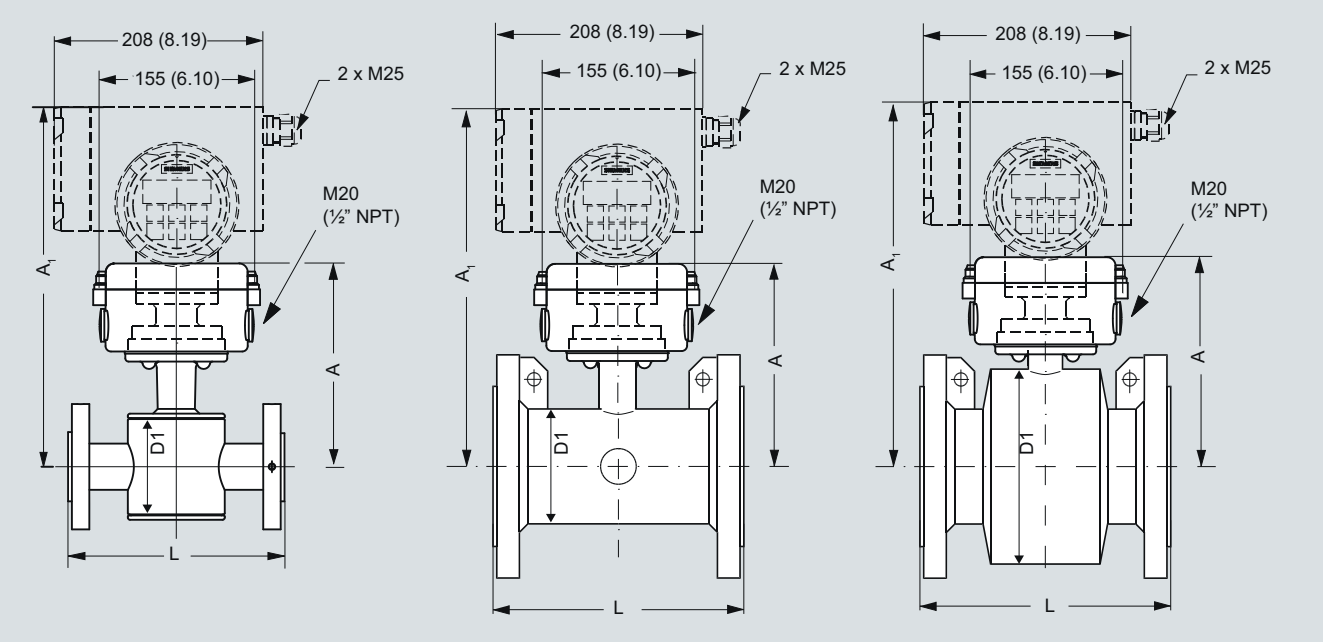
Flow sensor MAG 5100 W

MAG 5100 W/6000 I Compact



		7ME6520 NBR or EPDM liner						7ME6580 Ebonite liner							
Nominal size		A		A1		D1		A		A1		D1		L	
[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
15	½	177	7.0	331	13.0	77	3.0	-	-	341	13.4	104	4.09	200	7.9
25	1	187	7.4	341	13.4	96	3.8	187	7.4	351	13.8	104	4.09	200	7.9
40	1½	202	8.0	356	14.0	127	5.0	197	7.8	359	14.1	124	4.88	200	7.9
50	2	188	7.4	342	13.5	76	3.0	205	8.1	366	14.4	139	5.47	200	7.9
65	2½	194	7.6	348	13.7	89	3.5	212	8.3	376	14.8	154	6.06	200	7.9
80	3	200	7.9	354	14.0	102	4.0	222	8.7	396	15.6	174	6.85	200	7.9
100	4	207	8.1	361	14.2	114	4.5	242	9.5	409	16.1	214	8.43	250	9.8
125	5	217	8.5	371	14.6	140	5.5	255	10.0	430	16.9	239	9.41	250	9.8
150	6	232	9.1	386	15.2	168	6.6	276	10.9	458	18.0	282	11.1	300	11.8
200	8	257	10.1	411	16.2	219	8.6	304	12.0	486	19.1	338	13.31	350	13.8
250	10	284	11.2	438	17.2	273	10.8	332	13.1	511	20.1	393	15.47	450	17.7
300	12	310	12.2	464	18.3	324	12.8	357	14.1	516	20.3	444	17.76	500	19.7
350	14	382	15.0	536	21.1	451	17.8	362	14.3	541	21.3	502	19.76	550	21.7
400	16	407	16.0	561	22.1	502	19.8	387	15.2	572	22.5	563	22.16	600	23.6
450	18	438	17.2	592	23.3	563	22.2	418	16.5	597	23.5	614	24.17	600	23.6
500	20	463	18.2	617	24.3	614	24.2	443	17.4	648	25.5	715	28.15	600	23.6
600	24	514	20.2	668	26.3	715	28.2	494	19.4	698	27.5	816	32.13	600	23.6
700	28	564	22.2	718	28.3	816	32.1	544	21.4	725	28.5	869	34.21	700	27.6
750	30	591	23.3	745	29.3	869	34.2	571	22.5	760	29.9	927	36.5	750	29.5
800	32	616	24.3	770	30.3	927	36.5	606	23.9	807	31,8	1032	40.63	800	31.5
900	36	663	26.1	817	32.2	1032	40.6	653	25.7	858	33.8	1136	44.72	900	35.4
1000	40	714	28.1	868	34.2	1136	44.7	704	27.7	858	33.8	1136	44.72	1000	39.4
	42	714	28.1	868	34.2	1136	44.7	704	27.7	904	35.6	1238	48.74	1000	39.4
	44	765	30.1	919	36.2	1238	48.7	755	29.7	964	38.0	1348	53.07	1100	43.3
1200	48	820	32.3	974	38.3	1348	53.1	810	31.9	1079	42.5	1675	65.94	1200	47.2
1400	54	-	-	-	-	-	-	925	36.4	1126	44.3	1672	65.83	1400	55.1
1500	60	-	-	-	-	-	-	972	38.2	1179	46.4	1915	75.39	1500	59.1
1600	66	-	-	-	-	-	-	1025	40.4	1277	50.3	1974	77.72	1600	63.0
1800	72	-	-	-	-	-	-	1123	44.2	1377	54.2	2174	85.59	1800	70.9
2000	78	-	-	-	-	-	-	1223	48.1	-	-	-	-	2000	78.7

- not available

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Weight

		7ME6520 NBR or EPDM liner										7ME6580 Ebonite liner	
Nominal size		**PN 10**		**PN 16**		**PN 40**		**Class 150/AWWA**		**AS**		**PN 16**	
[mm]	**[inch]**	**[kg]**	**[lbs]**	**[kg]**	**[lbs]**	**[kg]**	**[lbs]**	**[kg]**	**[lbs]**	**[kg]**	**[lbs]**	**[kg]**	**[lbs]**
15	½	-	-	-	-	4	9	4	9	4	9	5	11
25	1	-	-	-	-	6	12	5	11	4	9	5	11
40	1½	-	-	-	-	8	18	7	15	7	15	8	17
50	2	-	-	9	20	-	-	8	20	9	20	9	20
65	2½	-	-	10.7	24	-	-	11	24	10.7	24	11	24
80	3	-	-	11.6	26	-	-	13	28	11.6	26	12	26
100	4	-	-	15.2	33	-	-	19	41	15.2	33	16	35
125	5	-	-	20.4	45	-	-	24	52	-	-	19	42
150	6	-	-	26	57	-	-	29	64	26	57	27	60
200	8	48	106	48	106	-	-	56	124	48	106	40	88
250	10	64	141	69	152	-	-	79	174	69	152	60	132
300	12	76	167	86	189	-	-	110	243	86	189	80	176
350	14	104	229	125	274	-	-	139	307	115	254	110	242
400	16	119	263	143	314	-	-	159	351	125	277	125	275
450	18	136	299	173	381	-	-	182	400	141	311	175	385
500	20	163	359	223	491	-	-	225	495	189	418	200	440
600	24	236	519	338	744	-	-	320	704	301	664	287	633
700	28	270	595	314	692	-	-	273	602	320	704	330	728
750	30	-	-	-	-	-	-	329	725	-	-	360	794
800	32	346	763	396	873	-	-	365	804	428	944	450	992
900	36	432	951	474	1043	-	-	495	1089	619	1362	530	1168
1000	40	513	1130	600	1321	-	-	583	1282	636	1399	660	1455
	42	-	-	-	-	-	-	687	1512	-	-	-	-
	44	-	-	-	-	-	-	763	1680	-	-	1140	2513
1200	48	643	1415	885	1948	-	-	861	1896	813	1789	1180	2601
1400	54	1592	3510	-	-	-	-	-	-	-	-	1600	3528
1500	60	-	-	-	-	-	-	-	-	-	-	2460	5423
1600	66	2110	4652	-	-	-	-	-	-	-	-	2525	5566
1800	72	2560	5644	-	-	-	-	-	-	-	-	2930	6460
2000	78	3640	8025	-	-	-	-	-	-	-	-	3665	8080

- not available

With transmitter MAG 5000 and MAG 6000 compact, weight is increased by approximately 0.8 kg (1.8 lbs), with MAG 6000 I, weight is increased by 5.5 kg (12.1 lb).

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Flow sensor MAG 3100 P

Overview

The SITRANS F M MAG 3100 P is designed to meet the most common specifications within chemical and process industries.

Benefits

- DN 15 to DN 300 (½" to 12")
- Short lead time
- Most used flowmeter in the chemical and process industries with PTFE/PFA liner and Hastelloy electrodes
- Excellent chemical resistance
- Full scope of global approvals for hazardous areas:
  - ATEX, FM, CSA, IEcEx
  - 24 V and 115/230 V Ex compact and remote
  - intrinsically safe ia analog output
- Comprehensive self-diagnostic for error indication and error logging
- Fully welded construction provides a ruggedness that suits the toughest applications and environments
- Easy commissioning, the SENSORPROM unit automatically updates settings.

Application

The main applications of the SITRANS F M electromagnetic flow sensors can be found in the following fields:

- Chemical industry
- Process industry
- Pulp and paper
- Industrial waste water

Design

- Compact or remote mounting possible
- Easy "plug & play" field changeability of transmitter
- High temperature sensor for applications with temperatures up to 150 °C (302 °F)
- Meets EEC directives: PED, 97/23/EC pressure directive for EN1092-1 flanges, and CRN
- Build-in length according to ISO 13359
- Onsite or factory upgrade to IP68/NEMA 6P of a standard sensor.

Mode of operation

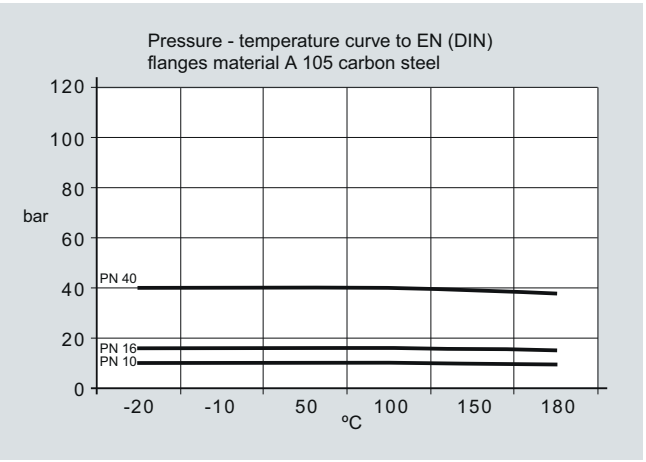
The flow measuring principle is based on Faraday's law of electromagnetic induction according to which the sensor converts the flow into an electrical voltage proportional to the velocity of the flow.

Integration

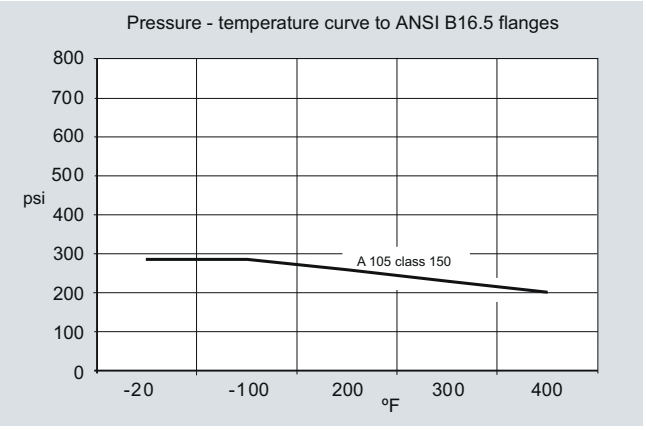
The complete flowmeter consists of a flow sensor and an associated transmitter MAG 5000, 6000 and 6000 I.

The flexible communication concept USM II simplifies integration and update to a variety of fieldbus systems such as HART, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS DP and PA, Modbus RTU/RS485.

Pressure/temperature curve to EN (DIN) flanges, material A 105 carbon steel



Pressure/temperature curve to ANSI B16.5 flanges



Note: The pressure-temperature curves only assist in the selection of a system. No responsibility is taken for the correctness of the information. For further information on the PED standard and requirements, see page 10/9.

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Technical specifications

Product characteristic	Chemical and process industry-oriented (short lead time)
Nominal size	• PTFE: DN 15 ... 300 (½“ … 12”) • PFA: DN 15 ... 150 (½“ … 6”)
Measuring principle	Electromagnetic induction
Excitation frequency (Mains supply: 50 Hz/60 Hz)	• DN 15 ... 65 (½“ … 2½”): 12.5 Hz/15 Hz • DN 80 ... 150 (3” ... 6”): 6.25 Hz/7.5 Hz • DN 200 ... 300 (8” ... 12”): 3.125 Hz/3.75 Hz
Process connection	
Flanges	EN 1092-1, raised face[1] (EN 1092-1, DIN 2501 and BS 4504 have the same mating dimensions) • DN 15 ... 50 (½“ … 2”): PN 40 (580 psi) • DN 65 ... 300 (2½“ … 12”): PN 16 (232 psi) • DN 200 ... 300 (8“ … 12“): PN 10 (145 psi) ANSI B16.5 (~BS 1560), raised face • ½” ... 12”: Class 150 (20 bar (290 psi))
Rated operation conditions	
Ambient temperature (conditions also dependent on liner characteristiques)	
• Standard sensor	-40 … +100 °C (-40 … +212 °F)
• Ex sensor	-20 … +60 °C (-4 … +140 °F)
• With compact transmitter	
- MAG 5000/6000[2]	-20 … +60 °C (-4 … +140 °F)
- MAG 6000 I	-20 … +60 °C (-4 … +140 °F)
- MAG 6000 I Ex de	-20 … +60 °C (-4 … +140 °F)
Operating pressure [abs. bar] (maximum operating pressure decreases with increasing operating temperature and with stainless steel flanges)	• PTFE Teflon - DN 15 ... 300 (½“ … 12”) : 0.3 ... 40 bar (4 ... 580 psi) • PFA - DN 15 ... 150 (½“ … 6”): Vacuum 0.02 ... 50 bar (0.29 ... 725 psi)
Enclosure rating	IP67 to EN 60529/NEMA 4X/6, 1 mH_2O for 30 min Option: IP68 to EN 60529/NEMA 6P, 10 mH_2O cont. (not for Ex)
Pressure drop at 3 m/s	As straigth pipe
Test pressure	1.5 x PN (where applicable)
Mechanical load (vibration)	• 18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 • Sensor: 3.17 grms • Sensor with compact MAG 5000/6000 mounted transmitter: 3.17 grms • Sensor with compact MAG 6000 I/6000 I Ex mounted transmitter: 1.14 grms
Temperature of medium	• PTFE -20 … +130 °C (-4 … +266 °F) • PFA -20 … +150 °C (-4 … +302 °F)
EMC	2004/108/EC

Design	
Weight	See dimensional drawings
Flange and housing material	Carbon steel ASTM A 105, with corrosion resistant two component epoxy coating (min. 150 µm)
Measuring pipe material	AISI 304/1.4301
Electrode material	PTFE: Hastelloy C276/2.4819 PFA: Hastelloy C22/2.4602
Grounding electrode material	PTFE: No grounding electrodes PFA: Hastelloy
Terminal box (remote version only)	• Standard fibre glass reinforced polyamide • Option Stainless steel AISI 316/1.4436 • Ex sensor: Stainless steel AISI 316/1.4436
Cable entries	• Remote installation 2 x M20 or 2 x ½" NPT • Compact installation - MAG 5000/MAG 6000: 4 x M20 or 4 x ½" NPT - MAG 6000 I: 2 x M25 or 2 x ½" NPT (for supply/output) - MAG 6000 I Ex de: 2 x M25 or 2 x ½" NPT (for supply/output)
Certificates and approvals	
Calibration	
Standard production calibration, calibration report shipped with sensor	Zero-point, 2 x 25 % and 2 x 90 %
Conforms to	PED (All EN1092-1 flanges conforms to PED) – 97/23/EC[3] CRN
Material certificate EN 10204 3.1	On request
Ex approvals	Ex sensor • ATEX 2G D: DN 15 ... 300: EEx de ia IIC T3 - T6 • IEC Ex de ia IIC T3-T6 • FM Class I, Div 1 (compact only) • FM Class I, Zone 1 • CSA Class I, Zone 1 Standard sensor • FM Class I, Div 2/Zone 2 • CSA Class I, Div 2/Zone 2
Custody transfer (CT) (only together with MAG 5000/6000 CT), order as special	Heat meter pattern approval - OIML R 75 (Denmark) Hot water pattern approval - PTB (Germany) Other media than water - OIML R 117 (Denmark)

[1] DN ≤ 600 type 01 (SORF); DN > 600 type 11 (WNRF)
[2] With compact transmitter MAG 5000 CT/6000 CT -20 ... +50 °C
[3] For further information on the PED standard and requirements, see page 10/9.

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Flow sensor MAG 3100 P

Selection and Ordering data		Order No.
Sensor SITRANS F M MAG 3100 P (Short delivery time)		7ME6340 - ■■■■■ - ■■■■
Diameter		
DN 15 (½“)	◆	1V
DN 25 (1“)	◆	2D
DN 40 (1½“)	◆	2R
DN 50 (2“)	◆	2Y
DN 65 (2½“)	◆	3F
DN 80 (3“)	◆	3M
DN 100 (4“)	◆	3T
DN 125 (5“)	◆	4B
DN 150 (6“)	◆	4H
DN 200 (8“)	◆	4P
DN 250 (10“)	◆	4V
DN 300 (12“)	◆	5D
Flange norm and pressure rating		
EN 1092-1		
PN 10 (DN 200 ... 300 (8“ … 12“))	◆	B
PN 16 (DN 65 ... 300 (2½“ … 12“))	◆	C
PN 40 (DN 15 ... 50 (½“ … 2“)	◆	F
ANSI B16.5		
Class 150 (½“ ... 12“)	◆	J
Flange material		
Carbon steel flanges ASTM A 105	◆	1
Liner material		
PTFE (130 °C (266 °F))	◆	3
PFA (150 °C (302 °F)) (DN 15 ... 150 (½" ... 6"))	◆	7
Electrode material		
Hastelloy C	◆	2
Hastelloy C incl. grounding electrode, (only PFA)		6
Transmitter		
Standard sensor for remote transmitter (Order transmitter separately)	◆	A
Ex sensor for remote transmitter (Order transmitter separately)	◆	B
MAG 6000 I, Aluminum, 18 ... 90 V DC, 115 ... 230 V AC	◆	C
MAG 6000 I, Aluminum, 18 ... 30 V DC, Ex	◆	D
MAG 6000 I, Aluminum, 115 ... 230 V AC, Ex	◆	E
MAG 6000, Polyamide, 11 … 30 V DC/11 ... 24V AC	◆	H
MAG 6000, Polyamide, 115 ... 230 V AC	◆	J
MAG 5000, Polyamide, 11 ... 30 V DC/11 ... 24 V AC	◆	K
MAG 5000, Polyamide, 115 ... 230 V AC	◆	L
Communication		
No communication, add-on possible	◆	A
HART	◆	B
PROFIBUS PA Profile 3 (only MAG 6000/MAG 6000 I)	◆	F
PROFIBUS DP Profile 3 (not for Ex) (only MAG 6000/MAG 6000 I)	◆	G
Modbus RTU/RS 485 (not for Ex) (only MAG 6000/MAG 6000 I)	◆	E
FOUNDATION Fieldbus H1 (only MAG 6000/MAG 6000 I)	◆	J
Cable glands/terminal box		
Metric: Polyamide terminal box or 6000 I compact	◆	1
½" NPT: Polyamide terminal box or 6000 I compact	◆	2
Metric SS terminal box (mandatory for stainless steel MAG 6000 transmitter)		3
½" NPT SS terminal box (mandatory for stainless steel MAG 6000 transmitter)		4

Selection and Ordering data	Order code
Additional information	
Please add **“-Z“** to Order No. and specify Order code(s) and plain text.	
Factory certificate according to EN 10204-2.2	**C14**
Factory certificate according to EN 10204-2.1	**C15**
Tag name plate, stainless steel fixed with SS wire (add plain text)	**Y17**
Tag name plate, plastic (self adhesive)	**Y18**
Customer-specific converter setup	**Y20**
Power cable wired (specify cable order no.)	**Y40**
Sensor for remote transmitter's junction box IP68 with wired cable (specify cable order no.) (not for ATEX)	**Y41**
Other postproduction requirements (add desired text)	**Y99**
Additional calibrations	
• Matched pair - (Standard production calibration where sensor and transmitter is calibrated together)	**On request[1)]**
• Accredited Siemens Flow Instruments matched pair Calibration acc. to ISO/IEC 17025: 2005	**On request[1)]**
• Customer-specified calibration up to 10 points	**On request[1)]**
• CT verification and authority seal according to: PTB (Denmark and Germany)	**On request[1)]**
• Customer-witnessed calibration Any of above calibration	**On request[1)]**

[1)] Ordering On request as dedicated information from the customer on the individual sensors is required. Please fill in the calibration form found on pi.khe.siemens.de/index.aspx?Nr=17460 and send together with the order. (Size dependent restriction on maximum flow rates may apply)

Operating instructions for SITRANS F M MAG 3100 P

Description	Order No.
• English	**A5E03005599**
• German	**A5E03086288**
• Spanish	**A5E03086291**
• French	**A5E03086290**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place. MAG 6000 I/MAG 6000 I ATEX 2G D transmitters and sensors are delivered compact mounted from factory.
Communication module will be pre-mounted in the transmitter.

Accessories

Description		Order No.
Potting kit for terminal box of SITRANS F M sensors for IP68/NEMA 6P (not for Ex)	◆	**FDK-085U0220**

◆ Short lead time (details in PMD)

Please use online Product selector to get latest updates.

Product selector link:
www.pia-selector.automation.siemens.com

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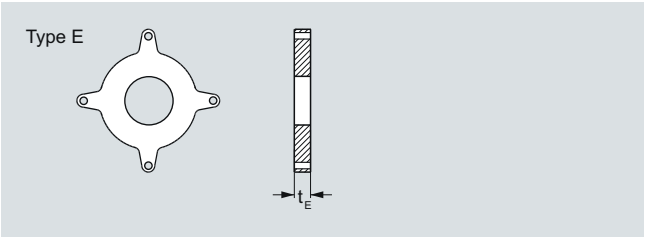
Selection and Ordering data

MAG 3100 P Type E grounding and protection ring

1 pc. **AISI 316** grounding and protection rings **type E** for PTFE liners



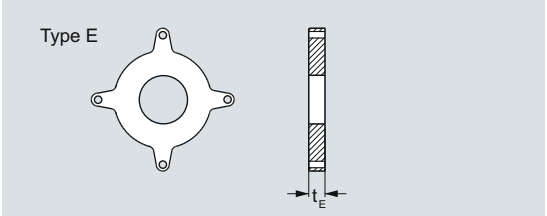
DN	PN 10 Order No.	PN 16 Order No.	PN 40 Order No.	ANSI[1)]	Class 150 Order No.
DN 15			**FDK-083N8365**	½“	**FDK-083N8365**
DN 25			**FDK-083N8271**	1“	**FDK-083N8272**
DN 40			**FDK-083N8278**	1½“	**FDK-083N8279**
DN 50			**FDK-083N8282**	2“	**FDK-083N8283**
DN 65		**FDK-083N8285**		2½“	**FDK-083N8287**
DN 80		**FDK-083N8289**		3“	**FDK-083N8291**
DN 100		**FDK-083N8117**		4“	**FDK-083N8118**
DN 125		**FDK-083N8121**		5“	**FDK-083N8122**
DN 150		**FDK-083N8125**		6“	**FDK-083N8126**
DN 200	**FDK-083N8130**	**FDK-083N8130**		8“	**FDK-083N8370**
DN 250	**FDK-083N8136**	**FDK-083N8137**		10“	**FDK-083N8140**
DN 300	**FDK-083N8144**	**FDK-083N8145**		12“	**FDK-083N8148**

Protection of PTFE liner use 2 pcs.
Earthing of PTFE lined flowmeter use 1 pc.

Selection and Ordering data

MAG 3100 P type E grounding and protecting ring

1 pc. **Hastelloy C276** grounding and protection ring **type E** for PTFE liners



DN	PN 16 Order No.	PN 40 Order No.	Size	ANSI[1)] Class 150 Order No.
DN 15		**FDK-083N8487**	½“	**FDK-083N8487**
DN 25		**FDK-083N8488**	1“	**FDK-083N8489**
DN 40		**FDK-083N8490**	1½“	**FDK-083N8491**
DN 50		**FDK-083N8492**	2“	**FDK-083N8493**
DN 65	**FDK-083N8495**		2½“	**FDK-083N8497**
DN 80	**FDK-083N8499**		3“	**FDK-083N8501**
DN 100	**FDK-083N8504**		4“	**FDK-083N8506**

[1)] For dimensions of MAG 3100 P see table on page 4/85

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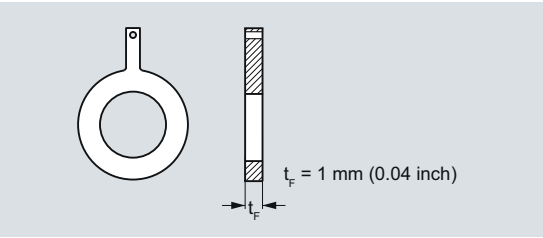
Flow sensor MAG 3100 P

Selection and Ordering data

MAG 3100 P Grounding rings: Flat rings

1 pc. **AISI 316** grounding **flat ring** for all liners

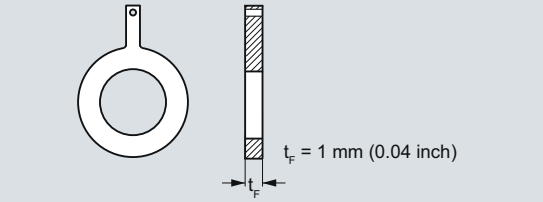


DN	PN 10	PN 16	PN 40	Size	ANSI[1] Class 150
	Order No.	Order No.	Order No.		Order No.
DN 15			**A5E01191969**	½“	**A5E01191968**
DN 25			**A5E01150880**	1“	**A5E01150022**
DN 40			**A5E01191952**	1½“	**A5E01191961**
DN 50			**A5E01150918**	2“	**A5E01151121**
DN 65		**A5E01191940**		2½“	**A5E01191962**
DN 80		**A5E01152876**		3“	**A5E01152910**
DN 100		**A5E01158875**		4“	**A5E01159146**
DN 125		**A5E01191941**		5“	**A5E01191963**
DN 150		**A5E01191943**		6“	**A5E01191964**
DN 200	**A5E01191951**	**A5E01191944**		8“	**A5E01191965**
DN 250	**A5E01191950**	**A5E01191946**		10“	**A5E01191966**
DN 300	**A5E01191949**	**A5E01191947**		12“	**A5E01191967**

Selection and Ordering data

MAG 3100 P Grounding rings : Flat rings

1 pc. **Hastelloy** C276 grounding **flat ring**



DN	PN 10	PN 16	PN 40	Size	ANSI[1] Class 150
	Order No.	Order No.	Order No.		Order No.
DN 15			**A5E01191981**	½“	**A5E01191989**
DN 25			**A5E01150882**	1“	**A5E01150028**
DN 40			**A5E01191982**	1½“	**A5E01191990**
DN 50			**A5E01150922**	2“	**A5E01151124**
DN 65		**A5E01191971**	**A5E01191983**	2½“	**A5E01191991**
DN 80		**A5E01152889**	**A5E01152889**	3“	**A5E01152913**
DN 100		**A5E01158886**	**A5E01159074**	4“	**A5E01159150**
DN 125		**A5E01191973**	**A5E01191984**	5“	**A5E01191992**
DN 150		**A5E01191974**	**A5E01191985**	6“	**A5E01191993**
DN 200	**A5E01191978**	**A5E01191975**	**A5E01191986**	8“	**A5E01191994**
DN 250	**A5E01191979**	**A5E01191976**	**A5E01191987**	10“	**A5E01191995**
DN 300	**A5E01191980**	**A5E01191977**	**A5E01191988**	12“	**A5E01191996**

[1] For dimensions of MAG 3100 P see table on page 4/85

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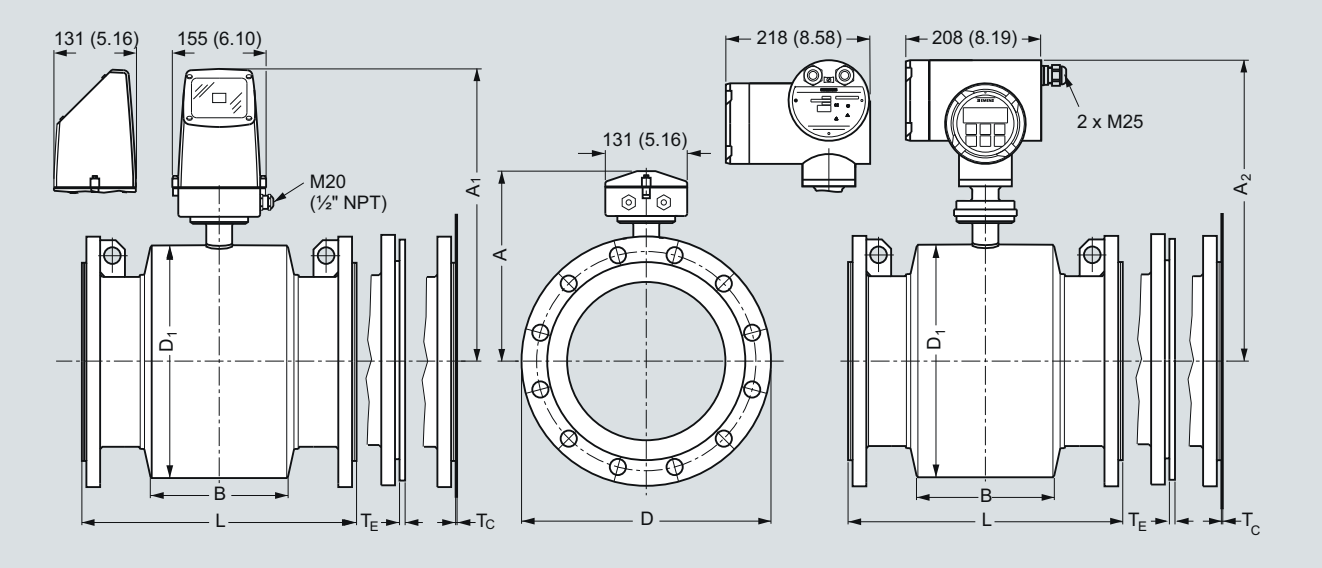
Dimensional drawings

MAG 3100 P sensor with compact or remote transmitter



Dimensions in mm (inch)

Metric

DN	A[1]	A1/A2[5]	B	D1	L[2] EN 1092-1-201 PN 10	L[2] EN 1092-1-201 PN 16	L[2] EN 1092-1-201 PN 40	L[2] ANSI 16.5 Class 150	TE[3]	TF[3]	Wgt.[4]
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
15	187	341	59	104	-	-	200	200	6	2	4
25	187	341	59	104	-	-	200	200	6	2	5
40	197	351	82	124	-	-	200	200	6	2	8
50	205	359	72	139	-	-	200	200	6	2	9
65	212	369	72	154	200	200/-	200	200	6	2	11
80	222	376	72	174	200	200/-	272[6]	272[6]	6	2	12
100	242	396	85	214	250	250/-	250	250	6	2	16
125	255	409	85	239	250	250/-	250	250	6	2	19
150	276	500	85	282	300	300/-	300	300	6	2	27
200	304	458	137	338	350	350/-	350	350	8	2	40
250	332	486	157	393	450	450/-	450	450	8	2	60
300	357	511	157	444	500	500/-	500	500	8	2	80

1) 14.5 mm shorter with AISI terminal box (Ex and high temperature version)
2) When earthing flanges are used, the thickness of the earthing flange must be added to the built-in length
3) T_E = Type E grounding ring (Included and factory mounted on high temperature 180 °C PTFE sensor),
T_F = Flat type grounding rings
4) Weights are approx. (for PN 16) without transmitter
5) A_2 is 3 mm shorter than A_1
6) Not according to ISO 13359

- not available

D = Outside diameter of flange, see flange tables

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Flow sensor MAG 3100 P

MAG 3100 P sensor with compact or remote transmitter

Imperial

Size	A[1]	A_1/A_2[5]	B	D_1	L[2]				T_C[3]	T_E[3]	T_F[3]	Wgt.[4]
					EN 1092-1-201			ANSI 16.5				
					PN 10	PN 16	PN 40	Class 150				
[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[lb]
½	7.36	13.4	2.32	4.09	-	-	7.87	7.87	-	0.24	0.08	9
1	7.36	13.4	2.32	4.09	-	-	7.87	7.87	0.05	0.24	0.08	11
1½	7.76	13.8	3.23	4.88	-	-	7.87	7.87	0.05	0.24	0.08	17
2	8.07	14.1	2.83	5.47	-	-	7.87	7.87	0.05	0.24	0.08	20
2½	8.35	14.4	2.83	6.06	7.87	7.87/-	7.87	7.87	0.05	0.24	0.08	24
3	8.74	14.8	2.83	6.85	7.87	7.87/-	10.71[6]	10.71[6]	0.05	0.24	0.08	26
4	9.53	15.6	3.35	8.43	9.84	9.84/-	9.84	9.84	0.05	0.24	0.08	35
5	10.04	16.1	3.35	9.41	9.84	9.84/-	9.84	9.84	0.05	0.24	0.08	42
6	10.87	16.9	5.39	11.10	11.81	11.81/-	11.81	11.81	0.05	0.24	0.08	60
8	11.97	18.0	5.39	13.31	13.78	13.78/-	13.78	13.78	0.05	0.31	0.08	88
10	13.07	19.1	6.18	15.47	17.72	17.72/-	17.72	17.72	0.05	0.31	0.08	132
12	14.05	20.1	6.18	17.48	19.69	19.69/-	19.69	19.69	0.06	0.31	0.08	176

1) 0.571 inch shorter with AISI terminal box (Ex and high temperature version)
2) When earthing flanges are used, the thickness of the earthing flange must be added to the built-in length
3) T_C = Type C grounding ring, T_E = Type E grounding ring (Included and factory mounted on high temperature 356 °F PTFE sensor), T_F = Flat type grounding rings
4) Weights are for ANSI 150 without transmitter
5) A_2 is 0.06 inch shorter than A_1
6) Not according to ISO 13359

- not available

D = Outside diameter of flange, see flange tables

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Overview

The SITRANS F M MAG 3100 is an electromagnetic flow sensor in a large variety that meets the demands of almost every flow application.

Benefits

- Wide range of sizes: DN 15 to DN 2000 (½" to 78")
- The flexible design is for all applications not covered by the standard industry-specific sensors: MAG 1100, MAG 1100 F, MAG 3100 P and MAG 5100 W
- Wide pressure range: PN 6 to PN 100
  ANSI Class 150 / 300, AS 2129 / AS 4087, JIS K10 and K20.
  On request up to 690 bar (10 000 psi)
- Wide range of electrode and liner material to fit even the most extreme process media
- Fully welded construction provides a ruggedness that suits the toughest applications and environments
- Easy commissioning, the SENSORPROM unit automatically updates settings.
- Designed to allow patented SITRANS F M in-situ verification using the SENSORPROM fingerprints.

Application

The main applications of the SITRANS F M electromagnetic flow sensors can be found in the following fields:

- Process industry
- Chemical industry
- Steel industry
- Mining
- Utility
- Power generation and distribution
- Oil and gas / HPI
- Water and waste water

Design

- Compact or remote mounting possible
- Easy "plug & play" field changeability of transmitter
- Ex ATEX and FM/CSA versions
- High temperature sensor for applications with temperatures up to 180 °C (356 °F)
- Approvals for PTB, OIML R 75 and OIML R 117
- Meets EEC directives: PED, 97/23/EC pressure directive for EN1092-1 flanges
- Build-in length according to ISO 13359, the standard includes sizes up to DN 400
- Onsite or factory upgrade to IP68/NEMA 6P of a standard sensor.

Mode of operation

The flow measuring principle is based on Faraday's law of electromagnetic induction according to which the sensor converts the flow into an electrical voltage proportional to the velocity of the flow.

Integration

The complete flowmeter consists of a flow sensor and an associated transmitter MAG 5000, 6000 and 6000 I.

The flexible communication concept USM II simplifies integration and update to a variety of fieldbus systems such as HART, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS DP and PA, Modbus RTU/RS485.

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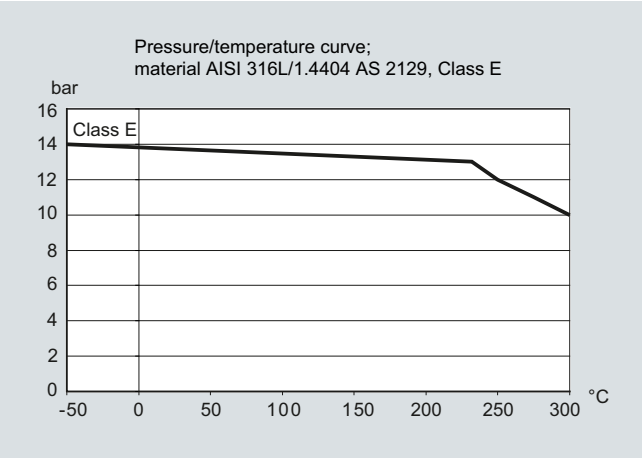
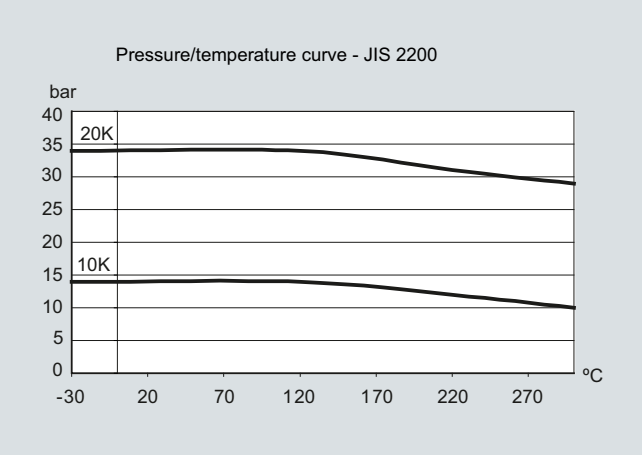
Flow sensor MAG 3100

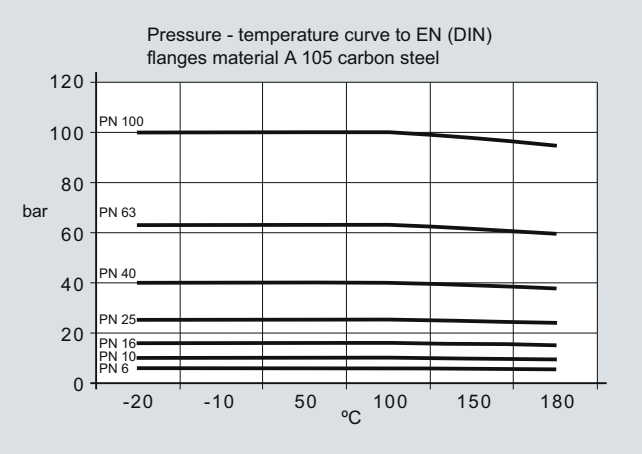
Pressure/temperature curve; material AISI 316L/1.4404 AS 2129, Class E



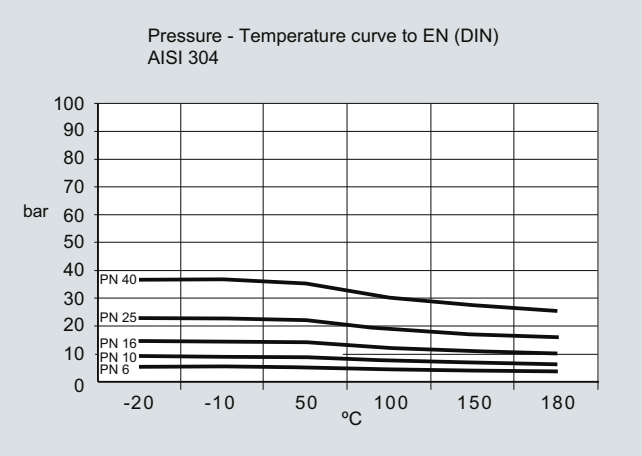
Pressure/temperature curve - JIS 2200



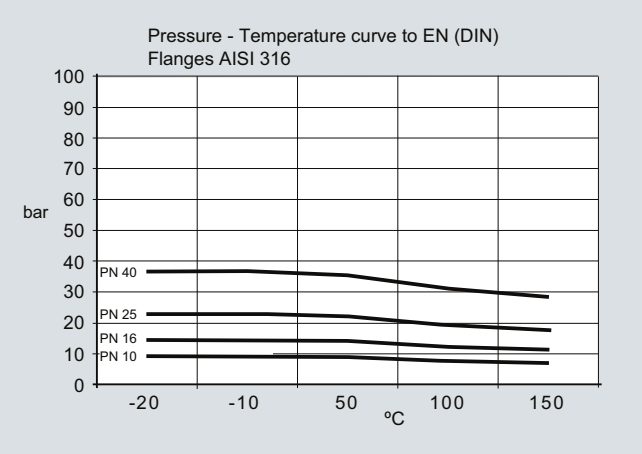
Pressure/temperature curve to EN (DIN) flanges, material A 105 carbon steel



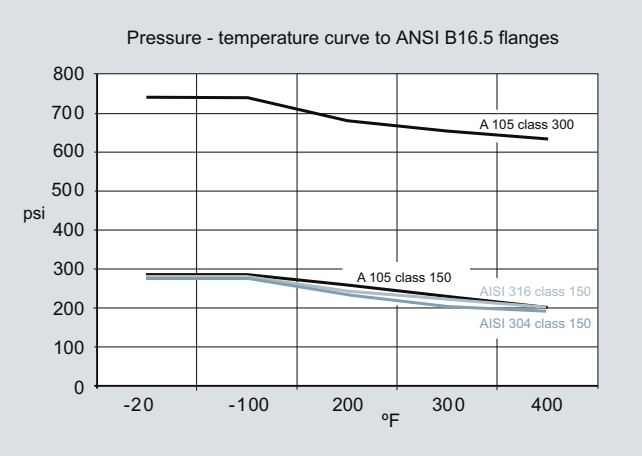
Pressure/temperature curve to EN (DIN) flanges AISI 304



Pressure/temperature curve to EN (DIN) flanges AISI 316



Pressure/temperature curve to ANSI B16.5 flanges



Note: The pressure-temperature curves only assist in the selection of a system. No responsibility is taken for the correctness of the information. For further information on the PED standard and requirements, see page 10/9.

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Technical specifications

Version	MAG 3100	MAG 3100 HT (High Temperature)
Product characteristic	Flexible product program	Flexible product program
Nominal size	DN 15 ... DN 2000 (½" ... 78")	DN 15 … DN 300 (½" ... 12")
Measuring principle	Electromagnetic induction	Electromagnetic induction
Excitation frequency (Mains supply: 50 Hz/60 Hz)	• DN 15 ... 65 (½" … 2½"): 12.5 Hz/15 Hz • DN 80 ... 150 (3" ... 6"): 6.25 Hz/7.5 Hz • DN 200 ... 1200 (8" ... 48"): 3.125 Hz/3.75 Hz • DN 1400 ... 2000 (54" ... 78"): 1.5625 Hz/1.875 Hz	• DN 15 ... 65 (½" … 2½"): 12.5 Hz/15 Hz • DN 80 ... 150 (3" ... 6"): 6.25 Hz/7.5 Hz • DN 200 ... 300 (8" ... 12"): 3.125 Hz/3.75 Hz
Process connection		
Flanges	EN 1092-1, raised face[1)] (EN 1092-1, DIN 2501 and BS 4504 have the same mating dimensions) • DN 65 ... 2000 (2½" … 78"): PN 6 (87 psi) • DN 200 ... 2000 (8" … 78"): PN 10 (145 psi) • DN 65 ... 2000 (2½" … 78"): PN 16 (232 psi) • DN 200 ... 600 (8" … 24"): PN 25 (362 psi) • DN 15 ... 600 (½" … 24"): PN 40 (580 psi) • DN 50 ... 300 (2" … 12"): PN 63 (913 psi) • DN 25 ... 300 (1" … 12"): PN 100 (1450 psi) ANSI B16.5 (~BS 1560), raised face • ½" ... 24": Class 150 (20 bar (290 psi)) • ½" ... 24": Class 300 (50 bar (725 psi)) AWWA C-207, flat face 28" ... 78": Class D (10 bar) AS 2129, raised face ½" ... 48": Table E AS 4087, raised face: • PN 16 (DN 50 ... 1200, 16 bar (232 psi)) • PN 21 (DN 50 ... 600, 21 bar (304 psi)) • PN 35 (DN 50 ... 600, 35 bar (508 psi)) JIS B 2220:2004 • K10 (1" ... 24") • K20 (1" ... 24") Other flanges and pressure ratings on request	EN 1092-1, raised face (EN 1092-1, DIN 2501 and BS 4504 have the same mating dimensions) • DN 15 ... 300 (½" … 12"): PN 40 (580 psi) • DN 65 ... 300 (2½" … 12"): PN 16 (232 psi) • DN 200 ... 300 (8" … 12"): PN 10 (145 psi) • DN 200 ... 300 (8" … 12"): PN 25 (362 psi) ANSI B16.5 (~BS 1560), raised face: • ½" ... 12": Class 150 (20 bar (290 psi)) • ½" ... 12": Class 300 (50 bar (725 psi)) AS 2129, raised face ½" ... 12": Table E Other flanges and pressure ratings on request
Rated operation conditions		
Ambient temperature (conditions also dependent on liner characteristiques)		
• Standard sensor	-40 … +100 °C (-40 … +212 °F)	-40 … +100 °C (-40 … +212 °F)
• Ex sensor	-20 … +60 °C (-4 … +140 °F)	for up to 150 °C (302 °F) temperature of medium: -20 … +60 °C (-4 … +140 °F) for 150 ... 180 °C (302 ... 356 °F) temperature of medium: -20 … +50 °C (-4 … +122 °F)
• With compact transmitter		
- MAG 5000/6000[2)]	-20 … +60 °C (-4 … +140 °F)	-20 … +60 °C (-4 … +140 °F)
- MAG 6000 I	-20 … +60 °C (-4 … +140 °F)	-20 … +60 °C (-4 … +140 °F)
- MAG 6000 I Ex de	-10 … +60 °C (14 … 140 °F)	-10 … +60 °C (14 … 140 °F)

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Flow sensor MAG 3100

Version	MAG 3100	MAG 3100 HT (High Temperature)
Operating pressure [abs. bar] (maximum operating pressure decreases with increasing operating temperature and with stainless steel flanges)	• Soft rubber 0.01 ... 100 bar (0.15 ... 1450 psi) • EPDM 0.01 ... 40 bar (0.15 ... 580 psi) • Linatex 0.01 ... 40 bar (0.15 ... 580 psi) • Ebonite 0.01 ... 100 bar (0.15 ... 1450 psi) • PTFE - DN ≤ 300 (≤ 12“): 0.3 ... 50 bar (4 ... 725 psi) - 350 ≤ DN ≤ 600 (14“ ≤ DN ≤ 24“): 0.3 ... 40 bar (4 ... 580 psi) • PFA - DN 15 ... 150 (½“ … 6”): Vacuum 0.02 ... 50 bar (0.29 ... 725 psi)	• PTFE Teflon - DN 15 ... 300 (½“ … 12”) (130/180 °C (266 °F/356°F)): 0.3/0.6 ... 50 bar (4/8 ... 725 psi) (180 °C (356 °F) PTFE has factory mounted grounding SS rings type E and SS terminal box) • PFA - DN 15 ... 150 (½“ … 6”): Vacuum 0.02 ... 50 bar (0.29 ... 725 psi)
Enclosure rating	IP67 to EN 60529/NEMA 4X/6, 1 mH_2O for 30 min Option: IP68 to EN 60529/NEMA 6P, 10 mH_2O cont. (not for Ex)	IP67 to EN 60529/NEMA 4X/6, 1 mH_2O for 30 min Option: IP68 to EN 60529/NEMA 6P,10 mH_2O cont. (not for Ex)
Pressure drop at 3 m/s	As straigth pipe	
Test pressure	1.5 x PN (where applicable)	
Mechanical load (vibration)	• 18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 • Sensor: 3.17 grms • Sensor with compact MAG 5000/ 6000 mounted transmitter: 3.17 grms • Sensor with compact MAG 6000 I/ 6000 I Ex mounted transmitter: 1.14 grms	• 18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 • Sensor: 3.17 grms • Sensor with compact MAG 5000/ 6000 mounted transmitter: 3.17 grms • Sensor with compact MAG 6000 I/ 6000 I Ex mounted transmitter: 1.14 grms
Temperature of medium	• Soft rubber 0 … +70 °C (32 … 158 °F) • EPDM -10 … +70 °C (14 … 158 °F) • Linatex (rubber) -40 … +70 °C (-40 … +158 °F) (for temperatures below -20 °C (-4 °F) AISI 304 or 316 flanges must be used) • Ebonite 0 … 95 °C (32 … 203 °F) • PTFE -20 … +100 °C (-4 … +212 °F) • PFA -20 … +100 °C (-4 … +212°F)	• PTFE -20 … +130 °C (-4 … +266 °F) • PTFE -20 … +180 °C (-4 ... +356 °F) Factory mounted grounding rings type E in SS and SS terminal box. Can only be used with remote transmitter. • PFA -20 … +150 °C (-4 … +300 °F)
EMC	2004/108/EC	2004/108/EC
Design		
Weight	See dimensional drawings	
Flange and housing material	Carbon steel ASTM A 105, with corrosion resistant two component epoxy coating (min. 150 µm) or Stainless steel AISI 304/1.4301 flanges and carbon steel housing, with corrosion resistant two component epoxy coating (min. 150 µm) or Stainless steel AISI 316L/1.4404 flanges and housing, polished	Carbon steel ASTM A 105, with corrosion resistant two component epoxy coating (min. 150 µm) or AISI 304/1.4301 flanges and carbon steel housing, with corrosion resistant two component epoxy coating (min. 150 µm) or AISI 316L/1.4404 flanges and housing, polished
Measuring pipe material	Stainless steel AISI 304/1.4301	AISI 304/1.4301
Electrode material	• Stainless steel AISI 316Ti/1.4571 • Hastelloy C276/2.4819 (PFA: Hastelloy C22/2.4602) • Platinum/Iridium • Titanium • Tantalum	• AISI 316Ti/1.4571 • Hastelloy C276/2.4819 (PFA: Hastelloy C22/2.4602) • Platinum/Iridium • Titanium • Tantalum
Grounding electrode material	• Soft rubber, EPDM, Linatex, Ebonite: available with measuring electrodes in stainless steel AISI 316Ti/1.4571 or Hastelloy • PTFE: none • PFA: optional in Hastelloy, Tantalum or Platinium	• PTFE: none • PFA: optional in Hastelloy, Tantalum or Platinium

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Version	MAG 3100	MAG 3100 HT (High Temperature)
Design (continued)		
Terminal box (remote version only)	• Standard fibre glass reinforced polyamide • Option Stainless steel AISI 316/1.4436 • Ex Stainless steel AISI 316/1.4436	• Standard fibre glass reinforced polyamide (max. 150 °C (302 °F)) • Stainless steel AISI 316/1.4436 • Ex Stainless steel AISI 316/1.4436
Cable entries	• Remote installation 2 x M20 or 2 x ½" NPT • Compact installation - MAG 5000/MAG 6000: 4 x M20 or 4 x ½" NPT - MAG 6000 I: 2 x M25 or 2 x ½" NPT (for supply/output) - MAG 6000 I Ex de: 2 x M25 or 2 x ½" NPT (for supply/output)	• Remote installation 2 x M20 or 2 x ½" NPT
Certificates and approvals		
Calibration		
Standard production calibration, calibration report shipped with sensor	Zero-point, 2 x 25 % and 2 x 90 %	Zero-point, 2 x 25 % and 2 x 90 %
Conforms to	PED (All EN1092-1 flanges conforms to PED) – 97/23/EC[3] CRN	PED (All EN1092-1 flanges conforms to PED) – 97/23/EC[3] CRN
Material certificate EN 10204 3.1	On request	On request
Ex approvals	Ex sensors • ATEX 2 GD DN 15 ... 300: EEx d e ia IIC T4 - T6 • DN 350 ... 2000: EEx e ia IIC T4 - T6 • IEC Ex de ia IIC T3-T6 • FM Class I, Div 1[4] • FM Class I, Zone 1 • CSA Class I, Zone 1 Standard sensors • FM Class I, Div 2/Zone 2 • CSA Class I, Div 2/Zone 2	Ex sensors • ATEX 2 GD DN 15 ... 300: EEx d e ia IIC T3 - T6 • IEC Ex de ia IIC T3-T6 • FM Class I, Div 1[4] • FM Class I, Zone 1 • CSA Class I, Zone 1 Standard sensors • FM Class I, Div 2/Zone 2 • CSA Class I, Div 2/Zone 2
Drinking water approvals	EPDM lining: • WRAS (WRc, BS690 cold water, GB) • NSF/ANSI Standard 61 (Cold water, US) • ACS listed (F) • DVGW W270 (D) • Belgaqua (B) • MCERTS (GB) (EPDM or PTFE lining with AISI 316 or Hastelloy electrodes)	
Custody transfer (CT) (≤ DN2000) (only together with MAG 5000/6000 CT), order as special	Cold water pattern approval - DANAK TS 22.36.001, PTB (Denmark and Germany) Heat meter pattern approval - OIML R 75 (Denmark) Hot water pattern approval - PTB (Germany) Other media than water - OIML R 117 (Denmark)	Heat meter pattern approval - OIML R 75 (Denmark) Hot water pattern approval - PTB (Germany)

Technical specification for transmitter - see transmitter pages.

1) PN 6-40: DN ≤ 600 type 01 (SORF); DN > 600 type 11 (WNRF); PN 63-100: type 11 (WNRF)
2) With compact transmitter MAG 5000 CT/6000 CT -20 ... +50 °C.
3) For sizes larger than 600 mm (24") in PN 16 PED conformity is available as a cost-added option. The basic unit will carry the LVD (Low Voltage Directive) and EMC approval. All products sold outside of EU and EFTA are excluded from the Pressure Equipment directive, also products sold into certain market sectors are excluded. These include:
a) Meters used in networks for the supply, distribution and discharge of water.
b) Meters used in pipelines for the conveyance of any fluid from offshore to onshore.
c) Meters used in the extraction of petroleum or gas, including christmas tree and manifold equipment.
d) Any meter mounted on a ship or mobile offshore platform. For further information on the PED standard and requirements see page 10/9.
4) Only with sensors sizes DN 15 ... 300 (½" ... 12") compact.

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Flow sensor MAG 3100

Selection and Ordering data	Order No.
Sensor SITRANS F M MAG 3100	**7ME6310-** ■■■■■-■■■■
Diameter	
DN 15 (½“) (PTFE and PFA liner)	1V
DN 25 (1“)	2D
DN 40 (1½“)	2R
DN 50 (2“)	2Y
DN 65 (2½“)	3F
DN 80 (3“)	3M
DN 100 (4“)	3T
DN 125 (5“)	4B
DN 150 (6“)	4H
DN 200 (8“)	4P
DN 250 (10“)	4V
DN 300 (12“)	5D
DN 350 (14“)	5K
DN 400 (16“)	5R
DN 450 (18“)	5Y
DN 500 (20“)	6F
DN 600 (24“)	6P
DN 700 (28“)	6Y
DN 750 (30“) (AWWA and AS 2129 only)	7D
DN 800 (32“)	7H
DN 900 (36“)	7M
DN 1000 (40“)	7R
DN 1050 (42“) (AWWA only)	7U
DN 1100 (44“) (AWWA only)	7V
DN 1200 (48“)	8B
DN 1400 (54“)	8F
DN 1500 (60“)	8K
DN 1600 (66“)	8P
DN 1800 (72“)	8T
DN 2000 (78“)	8Y
Flange norm and pressure rating	
EN 1092-1	
PN 6 (DN 65 ... 2000 (2½“ ... 78“))	A
PN 10 (DN 200 ... 2000 (8“ ... 78“))	B
PN 16 (DN 65 ... 1200 (2½“ ... 48“))	C
PN 16, non-PED (DN 700 ... 2000 (28“ ... 78“))	D
PN 25 (DN 200 ... 600 (8“ ... 24“))	E
PN 40 (DN 15 ... 600 (½“ ... 24“))	F
PN 63 (DN 50 ... 300 (2“ ... 12“))	G
PN 100 (DN 25 ... 300 (1“ ... 12“))	H
ANSI B16.5	
Class 150 (½“ ... 24“)	J
Class 300 (½“ ... 24“)	K
AWWA C-207	
Class D (28“ ... 78“)	L
AS	
2129, table E	M
4087, PN 16 (DN 50 ... 1200 (2“ ... 48“)) (Not PTFE and PFA)	N
4087, PN 21 (DN 50 ... 600 (2“ ... 24“)) (Not PTFE and PFA)	P
4087, PN 35 (DN 50 ... 600 (2“ ... 24“)) (Not PTFE and PFA)	Q
JIS B 2220:2004	
K10 (1" ... 24")	R
K20 (1" ... 24")	S

Selection and Ordering data	Order No.
Sensor SITRANS F M MAG 3100	**7ME6310-** ■■■■■-■■■■
Flange material	
Carbon steel flanges ASTM A 105	1
Stainless steel flanges, AISI 304/1.4301	2
Stainless steel flanges and sensor body, AISI 316L/1.4404, polished	3
Liner material	
Soft rubber	1
EPDM	2
PTFE (DN ≤ 300, PN ≤ 50 bar / ≤ 12“, PN ≤ 725 psi), PTFE (350 ≤ DN ≤ 600, PN ≤ 40 bar / 14“ ≤ DN ≤ 24“, PN ≤ 580 psi)	3
Ebonite	4
Linatex (PN ≤ 40 bar (580 psi) DN ≤ 600 (24“))	5
PFA (DN 15 ... 150 (½" ... 6")) (PN ≤ 40 bar (580 psi))	7
Electrode material (Grounding electrodes not for PTFE liner or Pressure PN 100)	
AISI 316Ti/1.4571 (not for PFA)	1
Hastelloy C276/2.4819 (PFA liner: Hastelloy C22/2.4602)	2
Platinum (DN ≤ 300 (12")) (not ebonite liner)	3
Titanium (not PFA liner) (DN ≤ 600 (24"))	4
Tantalum (DN ≤ 600 (24")) (not ebonite liner)	5
Hastelloy C22/2.4602 incl. grounding electrodes (only PFA)	6
Platinium incl. grounding electrodes (only PFA)	7
Tantalum incl. grounding electrodes (only PFA)	8
Transmitter with display	
Standard sensor for remote transmitter (Order transmitter separately)	A
Ex sensor for remote transmitter (Order transmitter separately)	B
MAG 6000 I, Alu.18 ... 90 V DC, 115 ... 230 V AC	C
MAG 6000 I Alu. 18 ... 30 V DC, Ex	D
MAG 6000 I Alu. 115 ... 230 V, Ex	E
MAG 6000 Polyamide, 11… 30 V DC / 11…24 V AC	H
MAG 6000, Polyamide, 115 ... 230 V AC	J
MAG 5000, Polyamide, 11… 30 V DC / 11…24 V AC	K
MAG 5000, Polyamide, 115 ... 230 V AC	L
Communication	
No communication, add-on possible	A
HART	B
PROFIBUS PA Profile 3 (only MAG 6000/MAG 6000 I)	F
PROFIBUS DP Profile 3 (not for Ex) (only MAG 6000/MAG 6000 I)	G
Modbus RTU/RS 485 (not for Ex) (only MAG 6000/MAG 6000 I)	E
FOUNDATION Fieldbus H1 (only MAG 6000/MAG 6000 I)	J
Cable glands/terminal box	
Metric: Polyamide terminal box or 6000 I compact	1
½" NPT: Polyamide terminal box or 6000 I compact	2
Metric: SS terminal box (mandatory for stainless steel MAG 6000 Transmitter)	3
½" NPT: SS terminal box (mandatory for stainless steel MAG 6000 Transmitter)	4

◆ Short lead time (details in PMD)

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

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Selection and Ordering data	Order code
Additional information	
Please add **"-Z"** to Order No. and specify Order code(s) and plain text.	
Factory certificate according to EN 10204-2.2	**C14**
Factory certificate according to EN 10204-2.1	**C15**
Tag name plate, stainless steel fixed with SS wire (add plain text)	**Y17**
Tag name plate, plastic (self adhesive)	**Y18**
Customer-specific converter setup	**Y20**
Sensor cables wired (specify cable order no.)	**Y40**
Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable order no.) (not for Ex)	**Y41**
Other postproduction requirements (add desired text)	**Y99**
Additional calibrations	
• Matched pair - (Standard production calibration where sensor and transmitter is calibrated together)	**On request**[1)]
• Accredited Siemens Flow Instruments matched pair Calibration acc. to ISO/IEC 17025: 2005	**On request**[1)]
• Customer-specified calibration up to 10 points	**On request**[1)]
• CT verification and authority seal according to: Cold water pattern approval - DANAK TS 22.36.001, PTB (Denmark and Germany)	**On request**[1)]
• Customer-witnessed calibration Any of above calibration	**On request**[1)]

[1)] Ordering On request as dedicated information from the customer on the individual sensors is required. Please fill in the calibration form found on pi.khe.siemens.de/index.aspx?Nr=17460 and send together with the order. (Size dependent restriction on maximum flow rates may apply)

Operating instructions for SITRANS F M MAG 3100

Description	Order No.
• English	**A5E03005599**
• German	**A5E03086288**
• Spanish	**A5E03086291**
• French	**A5E03086290**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Accessories

Description	Order No.	
Potting kit for terminal box of SITRANS F M sensors for IP68/NEMA 6P (not for Ex)	◆ **FDK-085U0220**	

◆ Short lead time (details in PMD)

Please use online Product selector to get latest updates.

Product selector link:
www.pia-selector.automation.siemens.com

MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place. MAG 6000 I/MAG 6000 I ATEX 2G D transmitters and sensors are delivered compact mounted from factory.
Communication module will be pre-mounted in the transmitter.

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Flow sensor MAG 3100

Selection and Ordering data	Order No.
Sensor SITRANS F M MAG 3100 HT (High Temperature)	**7ME6320-** ■■■■■-■■■■
Diameter	
DN 15 (½“)	1V
DN 25 (1“)	2D
DN 40 (1½“)	2R
DN 50 (2“)	2Y
DN 65 (2½“)	3F
DN 80 (3“)	3M
DN 100 (4“)	3T
DN 125 (5“)	4B
DN 150 (6“)	4H
DN 200 (8“)	4P
DN 250 (10“)	4V
DN 300 (12“)	5D
Flange norm and pressure rating	
EN 1092-1	
PN 10 (DN 200 ... 300 (8“ ... 12“))	B
PN 16 (DN 65 ... 300 (2½“ ... 12“))	C
PN 25 (DN 200 ... 300 (8“ ... 12“))	E
PN 40 (DN 15 ... 300 (½“ ... 12“))	F
ANSI B16.5	
Class 150 (½“ ... 12“)	J
Class 300 (½“ ... 12“)	K
AS	
2129, table E	M
Flange material	
Carbon steel flanges ASTM A 105	1
Stainless steel flanges, AISI 304/1.4301	2
Stainless steel flanges and sensor body, AISI 316L/1.4404, polished	3
Liner material	
PTFE (130 °C (266 °F))	2
PTFE including type E protection rings AISI 316/1.4436 (180 °C (356 °F))	3
PFA (150 °C (302 °F)) (DN 15 ... 150 (½" ... 6"))	7
Electrode material	
AISI 316Ti/1.4571 (not for PFA)	1
Hastelloy C276/2.4819 (PFA liner: Hastelloy C22/2.4602)	2
Platinum	3
Titanium (not for PFA)	4
Tantalum	5
Hastelloy C22/2.4602 incl. grounding electrodes (only PFA)	6
Platinium incl. grounding electrodes (only PFA)	7
Tantalum incl grounding electrodes (only PFA)	8
Transmitter with display	
Standard sensor for remote transmitter (Order transmitter separately)	A
Ex sensor for remote transmitter (Order transmitter separately)	B
MAG 6000 I, Alu.18 ... 90 V DC, 115 ... 230 V AC	C
MAG 6000 I, Alu. 18 ... 30 V DC, Ex	D
MAG 6000 I, Alu. 115 ... 230 V AC, Ex	E
MAG 6000, Polyamide, 11 ... 30 V DC/ 11 ... 24 V AC	H
MAG 6000, Polyamide, 115 ... 230 V AC	J
MAG 5000, Polyamide, 11 ... 30 V DC/ 11 ... 24 V AC	K
MAG 5000, Polyamide, 115 ... 230 V AC	L

Selection and Ordering data	Order No.
Sensor SITRANS F M MAG 3100 HT (High Temperature)	**7ME6320-** ■■■■■-■■■■
Communication	
No communication, add-on possible	A
HART	B
PROFIBUS PA Profile 3 (only MAG 6000/MAG 6000 I)	F
PROFIBUS DP Profile 3 (only MAG 6000/MAG 6000 I)	G
Modbus RTU/RS 485 (only MAG 6000/MAG 6000 I)	E
FOUNDATION Fieldbus H1 (only MAG 6000/MAG 6000 I)	J
Cable glands/terminal box	
Metric: Polyamide terminal box (PTFE 130 °C (266 °F)) or 6000 I compact	1
½" NPT: Polyamide terminal box (PTFE 130 °C (266 °F)) or 6000 I compact	2
Metric: SS terminal box (mandatory for Stainless steel MAG 6000 Transmitter)	3
½" NPT: SS terminal box (mandatory for Stainless steel MAG 6000 Transmitter)	4

Selection and Ordering data	Order code
Additional information	
Please add **“-Z“** to Order No. and specify Order code(s) and plain text.	
Factory certificate according to EN 10204-2.2	**C14**
Factory certificate according to EN 10204-2.1	**C15**
Customer-specific converter setup	**Y20**
Tag name made, stainless steel fixed with SS wire (add plain text)	**Y17**
Tag name plate, plastic (self adhesive)	**Y18**
Sensor cables wired (specify cable order no.)	**Y40**
Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable order no.) (not for Ex)	**Y41**
Other postproduction requirements (add desired text)	**Y99**
Additional calibrations	
• Matched pair - (Standard production calibration where sensor and transmitter is calibrated together)	**On request**[1)]
• Accredited Siemens Flow Instruments matched pair Calibration acc. to ISO/IEC 17025: 2005	**On request**[1)]
• Customer-specified calibration up to 10 points	**On request**[1)]
• CT verification and authority seal according to: Cold water pattern approval - DANAK TS 22.36.001, PTB (Denmark and Germany)	**On request**[1)]
• Customer-witnessed calibration Any of above calibration	**On request**[1)]

[1)] Ordering On request as dedicated information from the customer on the individual sensors is required. Please fill in the calibration form found on pi.khe.siemens.de/index.aspx?Nr=17460 and send together with the order. (Size dependent restriction on maximum flow rates may apply)

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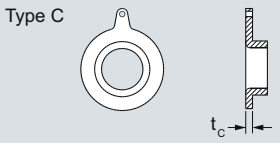
Selection and Ordering data

MAG 3100 and MAG 3100 HT[1] Type C Grounding and protection rings

1 pc. AISI 304 grounding and protection ring **type C** for all liners except PTFE and PFA



DN	PN 6 Order No.	PN 10 Order No.	PN 16 Order No.	PN 25 Order No.	PN 40 Order No.	AS 2129 Table E Order No.
DN 25					**FDK-083N8361**	**FDK-083N8361**
DN 40					**FDK-083N8362**	**FDK-083N8362**
DN 50					**FDK-083N8344**	**FDK-083N8344**
DN 65	**FDK-083N8345**		**FDK-083N8345**		**FDK-083N8345**	**FDK-083N8346**
DN 80	**FDK-083N8347**		**FDK-083N8347**		**FDK-083N8347**	**FDK-083N8347**
DN 100	**FDK-083N8070**		**FDK-083N8025**		**FDK-083N8025**	**FDK-083N8025**
DN 125	**FDK-083N8071**		**FDK-083N8071**		**FDK-083N8071**	**FDK-083N8071**
DN 150	**FDK-083N8072**		**FDK-083N8008**		**FDK-083N8008**	**FDK-083N8008**
DN 200	**FDK-083N8074**	**FDK-083N8011**	**FDK-083N8011**	**FDK-083N8011**	**FDK-083N8075**	**FDK-083N8011**
DN 250	**FDK-083N8078**	**FDK-083N8013**	**FDK-083N8013**	**FDK-083N8013**	**FDK-083N8079**	**FDK-083N8013**
DN 300	**FDK-083N8080**	**FDK-083N8012**	**FDK-083N8012**	**FDK-083N8081**	**FDK-083N8082**	**FDK-083N8012**
DN 350	**FDK-083N8083**	**FDK-083N8039**	**FDK-083N8039**	**FDK-083N8084**	**FDK-083N8085**	**FDK-083N8039**
DN 400	**FDK-083N8099**	**FDK-083N8100**	**FDK-083N8100**	**FDK-083N8101**	**FDK-083N8102**	**FDK-083N8100**
DN 450	**FDK-083N8103**	**FDK-083N8103**	**FDK-083N8104**	**FDK-083N8104**	**FDK-083N8105**	**FDK-083N8104**
DN 500	**FDK-083N8107**	**FDK-083N8107**	**FDK-083N8108**	**FDK-083N8108**	**FDK-083N8109**	**FDK-083N8108**
DN 600	**FDK-083N8111**	**FDK-083N8111**	**FDK-083N8112**	**FDK-083N8112**		**FDK-083N8113**
DN 700	**FDK-083N8300**	**FDK-083N8294**	**FDK-083N8294**			**FDK-083N8372**
DN 750						
DN 800	**FDK-083N8303**	**FDK-083N8304**	**FDK-083N8304**			**FDK-083N8373**
DN 900	**FDK-083N8306**	**FDK-083N8307**	**FDK-083N8307**			**FDK-083N8396**
DN 1000	**FDK-083N8309**	**FDK-083N8310**	**FDK-083N8310**			**FDK-083N8397**
DN 1100		**FDK-083N8367**	**FDK-083N8367**			**FDK-083N8367**
DN 1200	**FDK-083N8312**	**FDK-083N8313**	**FDK-083N8313**			**FDK-083N8398**
DN 1400	**FDK-083N8467**	**FDK-083N8468**	**FDK-083N8469**			
DN 1500	**FDK-083N8471**	**FDK-083N8472**	**FDK-083N8473**			
DN 1600	**FDK-083N8475**	**FDK-083N8476**	**FDK-083N8477**			
DN 1800	**FDK-083N8479**	**FDK-083N8480**	**FDK-083N8481**			
DN 2000	**FDK-083N8483**	**FDK-083N8484**	**FDK-083N8485**			

[1] Also for MAG 5100 W (7ME6520 > DN 300; and 7ME6580).

Size	ANSI Class 150 Order No.	Class 300 Order No.	JIS K10 Order No.	JIS K20 Order No.
1“	**FDK-083N8361**	**FDK-083N8361**	**FDK-083N8361**	**FDK-083N8361**
1½“	**FDK-083N8362**	**FDK-083N8362**	**FDK-083N8362**	**FDK-083N8362**
2“	**FDK-083N8344**	**FDK-083N8344**	**FDK-083N8344**	**FDK-083N8344**
2½“	**FDK-083N8345**	**FDK-083N8345**	**FDK-083N8345**	**FDK-083N8345**
3“	**FDK-083N8347**	**FDK-083N8347**	**FDK-083N8347**	**FDK-083N8347**
4“	**FDK-083N8025**	**FDK-083N8025**	**FDK-083N8070**	**FDK-083N8025**
5“	**FDK-083N8071**	**FDK-083N8071**	**FDK-083N8071**	**FDK-083N8071**
6“	**FDK-083N8008**	**FDK-083N8073**	**FDK-083N8008**	**FDK-083N8008**
8“	**FDK-083N8011**	**FDK-083N8076**	**FDK-083N8011**	**FDK-083N8011**
10“	**FDK-083N8013**	**FDK-083N8079**	**FDK-083N8013**	**FDK-083N8079**
12“	**FDK-083N8012**	**FDK-083N8082**	**FDK-083N8012**	**FDK-083N8081**
14“	**FDK-083N8039**	**FDK-083N8085**	**FDK-083N8083**	**FDK-083N8039**
16“	**FDK-083N8100**	**FDK-083N8102**	**FDK-083N8100**	**FDK-083N8101**
18“	**FDK-083N8104**	**FDK-083N8106**	**FDK-083N8103**	**FDK-083N8104**
20“	**FDK-083N8107**	**FDK-083N8110**	**FDK-083N8107**	**FDK-083N8108**
24“	**FDK-083N8113**	**FDK-083N8114**	**FDK-083N8111**	**FDK-083N8112**

Size	AWWA C-207 Order No.
28“	**FDK-083N8302**
30“	**FDK-083N8366**
32“	**FDK-083N8305**
36“	**FDK-083N8308**
40“	**FDK-083N8311**
42“	**FDK-083N8394**
44“	**FDK-083N8395**
48“	**FDK-083N8314**
54“	**FDK-083N8470**
60“	**FDK-083N8474**
66“	**FDK-083N8478**
72“	**FDK-083N8482**
78“	**FDK-083N8486**

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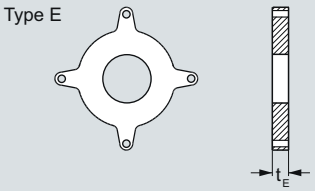
Flow sensor MAG 3100

Selection and Ordering data

MAG 3100 and 3100 HT Type E grounding and protection ring

1 pc. AISI 316 grounding and protection ring **type E** for PTFE liners

Note:
For MAG 3100 HT High temperature version 7ME6320... for PTFE 180 °C (356 °C) versions - grounding ring type E is included and factory mounted.



DN	PN 6 Order No.	PN 10 Order No.	PN 16 Order No.	PN 25 Order No.	PN 40 Order No.
DN 15					**FDK-083N8365**
DN 25					**FDK-083N8271**
DN 40					**FDK-083N8278**
DN 50					**FDK-083N8282**
DN 65	**FDK-083N8284**		**FDK-083N8285**		**FDK-083N8286**
DN 80	**FDK-083N8288**		**FDK-083N8289**		**FDK-083N8290**
DN 100	**FDK-083N8116**		**FDK-083N8117**		**FDK-083N8118**
DN 125	**FDK-083N8120**		**FDK-083N8121**		**FDK-083N8122**
DN 150	**FDK-083N8124**		**FDK-083N8125**		**FDK-083N8126**
DN 200	**FDK-083N8129**	**FDK-083N8130**	**FDK-083N8130**	**FDK-083N8131**	**FDK-083N8132**
DN 250	**FDK-083N8135**	**FDK-083N8136**	**FDK-083N8137**	**FDK-083N8138**	**FDK-083N8139**
DN 300	**FDK-083N8144**	**FDK-083N8144**	**FDK-083N8145**	**FDK-083N8146**	**FDK-083N8147**
DN 350	**FDK-083N8152**	**FDK-083N8153**	**FDK-083N8154**	**FDK-083N8155**	**FDK-083N8156**
DN 400	**FDK-083N8160**	**FDK-083N8161**	**FDK-083N8162**	**FDK-083N8163**	**FDK-083N8164**
DN 450	**FDK-083N8168**	**FDK-083N8169**	**FDK-083N8170**	**FDK-083N8171**	**FDK-083N8172**
DN 500	**FDK-083N8177**	**FDK-083N8178**	**FDK-083N8179**	**FDK-083N8180**	**FDK-083N8181**
DN 600	**FDK-083N8186**	**FDK-083N8187**	**FDK-083N8188**	**FDK-083N8189**	

Protection of PTFE liner use 2 pcs.
Earthing of PTFE lined flowmeter use 1 pc.

Size	ANSI Class 150 Order No.	Class 300 Order No.	JIS K10 Order No.	JIS K20 Order No.
½“	**FDK-083N8365**	**FDK-083N8365**		
1“	**FDK-083N8272**	**FDK-083N8272**	**FDK-083N8271**	**FDK-083N8271**
1½“	**FDK-083N8279**	**FDK-083N8279**	**FDK-083N8278**	**FDK-083N8278**
2“	**FDK-083N8283**	**FDK-083N8283**	**FDK-083N8282**	**FDK-083N8282**
2½“	**FDK-083N8287**	**FDK-083N8287**	**FDK-083N8285**	**FDK-083N8285**
3“	**FDK-083N8291**	**FDK-083N8292**	**FDK-083N8288**	**FDK-083N8289**
4“	**FDK-083N8118**	**FDK-083N8119**	**FDK-083N8116**	**FDK-083N8117**
5“	**FDK-083N8122**	**FDK-083N8123**	**FDK-083N8121**	**FDK-083N8122**
6“	**FDK-083N8126**	**FDK-083N8127**	**FDK-083N8125**	**FDK-083N8126**
8“	**FDK-083N8370**	**FDK-083N8133**	**FDK-083N8130**	**FDK-083N8131**
10“	**FDK-083N8140**	**FDK-083N8141**	**FDK-083N8137**	**FDK-083N8139**
12“	**FDK-083N8148**	**FDK-083N8149**	**FDK-083N8144**	**FDK-083N8146**
14“	**FDK-083N8157**	**FDK-083N8158**	**FDK-083N8152**	**FDK-083N8154**
16“	**FDK-083N8165**	**FDK-083N8166**	**FDK-083N8161**	**FDK-083N8163**
18“	**FDK-083N8173**	**FDK-083N8174**	**FDK-083N8169**	**FDK-083N8171**
20“	**FDK-083N8182**	**FDK-083N8183**	**FDK-083N8178**	**FDK-083N8180**
24“	**FDK-083N8190**	**FDK-083N8191**	**FDK-083N8187**	**FDK-083N8189**

Protection of PTFE liner use 2 pcs.
Grounding of PTFE lined flowmeter use 1 pc.

AS2129, Table E DN	Order No.
DN 15	**FDK-083N8365**
DN 25	**FDK-083N8272**
DN 40	**FDK-083N8280**
DN 50	**FDK-083N8281**
DN 65	**FDK-083N8284**
DN 80	**FDK-083N8293**
DN 100	**FDK-083N8117**
DN 125	**FDK-083N8121**
DN 150	**FDK-083N8128**
DN 200	**FDK-083N8134**
DN 250	**FDK-083N8143**
DN 300	**FDK-083N8151**
DN 350	**FDK-083N8153**
DN 400	**FDK-083N8161**
DN 450	**FDK-083N8176**
DN 500	**FDK-083N8185**
DN 600	**FDK-083N8193**

Protection of PTFE liner use 2 pcs.
Grounding of PTFE lined flowmeter use 1 pcs.

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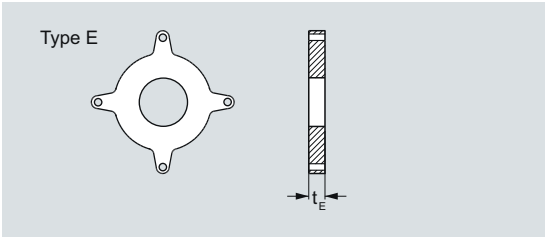
Selection and Ordering data

MAG 3100 and MAG 3100 HT type E grounding and protecting ring

1 pc. Hastelloy C276 grounding and protection ring **type E** for PTFE liners

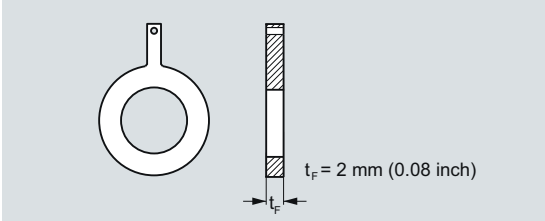


DN	PN 6	PN 16	PN 40	Size	ANSI Class 150	Class 300
	Order No.	Order No.	Order No.		Order No.	Order No.
DN 15			**FDK-083N8487**	½“	**FDK-083N8487**	**FDK-083N8487**
DN 25			**FDK-083N8488**	1“	**FDK-083N8489**	**FDK-083N8489**
DN 40			**FDK-083N8490**	1½“	**FDK-083N8491**	**FDK-083N8491**
DN 50			**FDK-083N8492**	2“	**FDK-083N8493**	**FDK-083N8493**
DN 65	**FDK-083N8494**	**FDK-083N8495**	**FDK-083N8496**	2½“	**FDK-083N8497**	**FDK-083N8497**
DN 80	**FDK-083N8498**	**FDK-083N8499**	**FDK-083N8500**	3“	**FDK-083N8501**	**FDK-083N8502**
DN 100	**FDK-083N8503**	**FDK-083N8504**	**FDK-083N8505**	4“	**FDK-083N8506**	**FDK-083N8507**

Selection and Ordering data

MAG 3100 and MAG 3100 HT[1] Grounding rings: Flat rings

1 pc. **AISI 316** grounding **flat ring** for all liners (PTFE max. 130 °C (266 °F))



DN	PN 10	PN 16	PN 40	Size	ANSI Class 150	Class 300
	Order No.	Order No.	Order No.		Order No.	Order No.
DN 15			**A5E01191969**	½“	**A5E01191968**	
DN 25			**A5E01150880**	1“	**A5E01150022**	**A5E01150378**
DN 40			**A5E01191952**	1½“	**A5E01191961**	
DN 50			**A5E01150918**	2“	**A5E01151121**	**A5E01151194**
DN 65		**A5E01191940**	**A5E01191954**	2½“	**A5E01191962**	
DN 80		**A5E01152876**	**A5E01152876**	3“	**A5E01152910**	**A5E01153422**
DN 100		**A5E01158875**	**A5E01159072**	4“	**A5E01159146**	**A5E01159628**
DN 125		**A5E01191941**	**A5E01191956**	5“	**A5E01191963**	
DN 150		**A5E01191943**	**A5E01191957**	6“	**A5E01191964**	
DN 200	**A5E01191951**	**A5E01191944**	**A5E01191958**	8“	**A5E01191965**	
DN 250	**A5E01191950**	**A5E01191946**	**A5E01191959**	10“	**A5E01191966**	
DN 300	**A5E01191949**	**A5E01191947**	**A5E01191960**	12“	**A5E01191967**	

[1] Also for MAG 5100 W (7ME6520 DN 40 ... 300)

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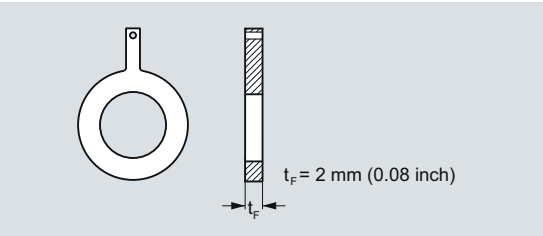
Flow sensor MAG 3100

Selection and Ordering data

MAG 3100 and MAG 3100 HT Grounding rings : Flat rings

1 pc. **Hastelloy** C276 grounding **flat ring** for all liners (PTFE max. 130 °C (266 °F))

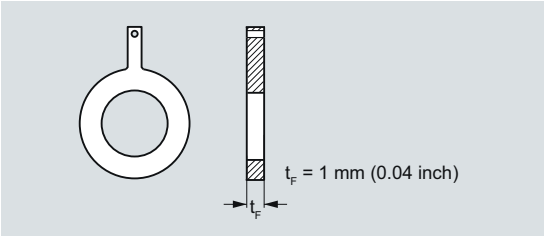


DN	PN 10	PN 16	PN 40	Size	ANSI Class 150	Class 300
	Order No.	Order No.	Order No.		Order No.	Order No.
DN 15			**A5E01191981**	½“	**A5E01191989**	
DN 25			**A5E01150882**	1“	**A5E01150028**	**A5E01150379**
DN 40			**A5E01191982**	1½“	**A5E01191990**	
DN 50			**A5E01150922**	2“	**A5E01151124**	**A5E01151197**
DN 65		**A5E01191971**	**A5E01191983**	2½“	**A5E01191991**	
DN 80		**A5E01152889**	**A5E01152889**	3“	**A5E01152913**	**A5E01153424**
DN 100		**A5E01158886**	**A5E01159074**	4“	**A5E01159150**	**A5E01159629**
DN 125		**A5E01191973**	**A5E01191984**	5“	**A5E01191992**	
DN 150		**A5E01191974**	**A5E01191985**	6“	**A5E01191993**	
DN 200	**A5E01191978**	**A5E01191975**	**A5E01191986**	8“	**A5E01191994**	
DN 250	**A5E01191979**	**A5E01191976**	**A5E01191987**	10“	**A5E01191995**	
DN 300	**A5E01191980**	**A5E01191977**	**A5E01191988**	12“	**A5E01191996**	

Selection and Ordering data

MAG 3100 and MAG 3100 HT Grounding rings : Flat rings

1 pc. **Tantalum** grounding **flat ring** for all liners (PTFE max. 130 °C (266 °F))



DN	PN 16	PN 40	Size	ANSI Class 150	Class 300
	Order No.	Order No.		Order No.	Order No.
DN 15		**A5E01192007**	½“	**A5E01192010**	
DN 25		**A5E01150883**	1“	**A5E01150030**	**A5E01150381**
DN 40		**A5E01192008**	1½“	**A5E01192011**	
DN 50		**A5E01150926**	2“	**A5E01151129**	**A5E01151199**
DN 65	**A5E01192005**	**A5E01192009**	2½“	**A5E01192012**	
DN 80	**A5E01152890**	**A5E01152890**	3“	**A5E01152916**	**A5E01153427**
DN 100	**A5E01158891**	**A5E01159076**	4“	**A5E01159156**	**A5E01159631**

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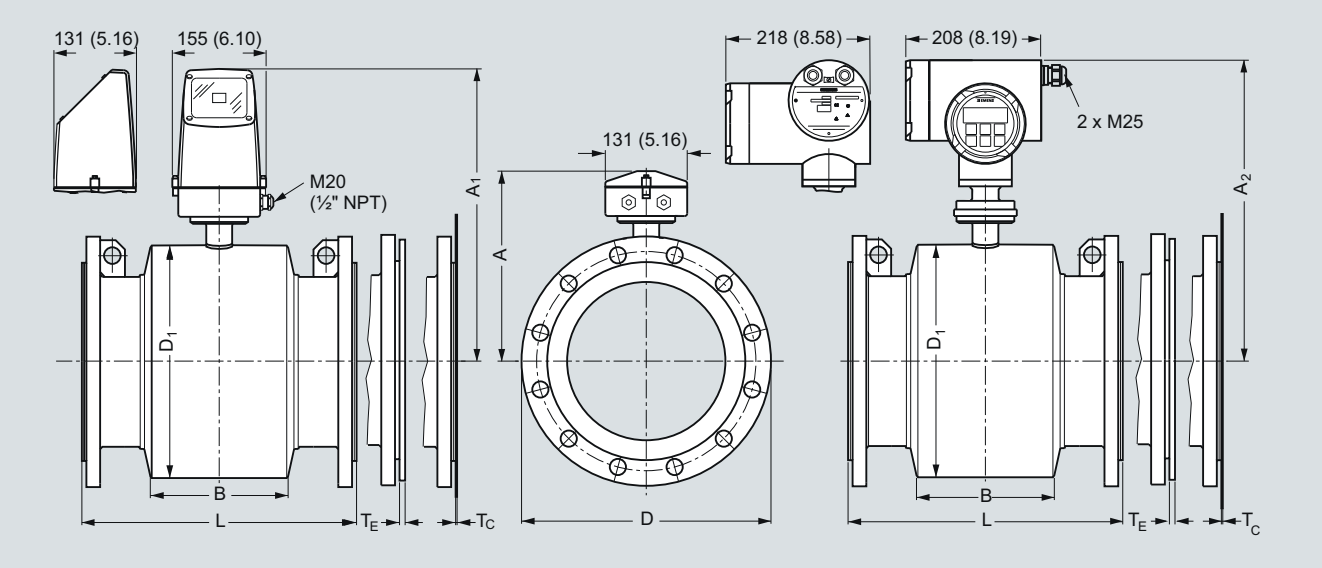
Dimensional drawings

MAG 3100 and MAG 3100 HT sensor with compact or remote transmitter



Dimensions in mm (inch)

Metric

DN	A[1]	A1[2]	B	D1	L[3]							
					EN 1092-1-201						ANSI 16.5	
					PN 6, 10	PN 16/ PN 16 non-PED	PN 25	PN 40	PN 63	PN 100	Class 150	Class 300
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
15	187	341	59	104	-	-	-	200	-	-	200	200
25	187	341	59	104	-	-	-	200	-	260	200	200
40	197	351	82	124	-	-	-	200	-	280	200	200
50	205	359	72	139	-	-	-	200	276	300	200	200
65	212	366	72	154	200	200/-	-	200	320	350	200	272
80	222	376	72	174	200	200/-	-	272[4]	323	340	272[4]	272[4]
100	242	396	85	214	250	250/-	-	250	380	400	250	310
125	255	409	85	239	250	250/-	-	250	420	450	250	335
150	276	430	85	282	300	300/-	-	300	415	450	300	300
200	304	458	137	338	350	350/-	350	350	480	530	350	350
250	332	486	157	393	450	450/-	450	450	550	620	450	450
300	357	511	157	444	500	500/-	500	500	600	680	500	500
350	362	516	270	451	550	550/-	550	550	-	-	550	550
400	387	541	270	502	600	600/-	600	600	-	-	600	600
450	418	572	310	563	600	600/-	600	600	-	-	600	640
500	443	597	350	614	600	600/-	625	680	-	-	600	730
600	494	648	320	715	600	600/-	750	800	-	-	600	860
700	544	698	450	816	700	875/700	-	-	-	-	-	-
750	571	725	556	869	-	-/-	-	-	-	-	-	-
800	606	760	560	927	800	1000/800	-	-	-	-	-	-
900	653	807	630	1032	900	1125/900	-	-	-	-	-	-
1000	704	858	670	1136	1000	1250/1000	-	-	-	-	-	-
1050	704	858	670	1136	-	-/-	-	-	-	-	-	-
1100	755	904	770	1238	-	-/-	-	-	-	-	-	-
1200	810	964	792	1348	1200	1500/1200	-	-	-	-	-	-
1400	925	1079	1000	1675	1400	-/1400	-	-	-	-	-	-
1500	972	1126	1020	1672	1500	-/1500	-	-	-	-	-	-
1600	1025	1179	1130	1915	1600	-/1600	-	-	-	-	-	-
1800	1123	1277	1250	1974	1800	-/1800	-	-	-	-	-	-
2000	1223	1377	1375	2174	2000	-/2000	-	-	-	-	-	-

1) 14.5 mm shorter with AISI terminal box (Ex and high temperature version)
2) A_2 is 3 mm shorter than A_1
3) When earthing flanges are used, the thickness of the earthing flange must be added to the built-in length
4) Not according to ISO 123359

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Flow sensor MAG 3100

DN	L[1] AS 2129 E AS 4087 PN 16, 21, 35	L[1] AWWA C-207 Class D	L[1] JIS K10	L[1] JIS K20	T_C[2]	T_E[2]	T_F[2]	T_T[2]	Wgt.[3]
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
15	200	-	200	200	-	6	2	1	4
25	200	-	200	200	1.2	6	2	1	5
40	200	-	200	240	1.2	6	2	1	8
50	200	-	200	240	1.2	6	2	1	9
65	200	-	200	272	1.2	6	2	1	11
80	200[4]	-	200[8]	272[8]	1.2	6	2	1	12
100	250	-	250	310	1.2	6	2	1	16
125	250	-	250	335	1.2	6	2	-	19
150	300	-	300	300	1.2	6	2	-	27
200	350	-	350	350	1.2	8	2	-	40
250	450	-	450	450	1.2	8	2	-	60
300	500	-	500	500	1.6	8	2	-	80
350	550	-	550	550	1.6	8	-	-	110
400	600	-	600	600	1.6	10	-	-	125
450	600	-	600	640	1.6	10	-	-	175
500	600[5]	-	600	680	1.6	10	-	-	200
600	600[6]	-	600	800	1.6	10	-	-	287
700	700[7]	700	-	-	2.0	-	-	-	330
750	750[7]	750	-	-	2.0	-	-	-	360
800	800[7]	800	-	-	2.0	-	-	-	450
900	900[7]	900	-	-	2.0	-	-	-	530
1000	1000[7]	1000	-	-	2.0	-	-	-	660
1050	-	1050	-	-	2.0	-	-	-	660
1100	1100[7]	1100	-	-	2.0	-	-	-	1140
1200	1200[7]	1200	-	-	2.0	-	-	-	1180
1400	-	1400	-	-	2.0	-	-	-	1600
1500	-	1500	-	-	3.0	-	-	-	2460
1600	-	1600	-	-	3.0	-	-	-	2525
1800	-	1800	-	-	3.0	-	-	-	2930
2000	-	2000	-	-	3.0	-	-	-	3665

1) When earthing flanges are used, the thickness of the earthing flange must be added to the built-in length
2) T_C = Type C grounding ring, T_E = Type E grounding ring (Included and factory mounted on high temperature 180 °C PTFE sensor), T_F = Flat type grounding rings
3) Weights are approx. (for PN 16) without transmitter
4) PN 35 DN 80 = 272 mm (not according to ISO 13359)
5) PN 35 DN 500 = 680 mm
6) PN 35 DN 600 = 750 mm
7) Not AS 4087 PN 21 or PN 35
8) Not according to ISO 13359

- not available

D = Outside diameter of flange, see flange tables

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MAG 3100 and MAG 3100 HT sensor with compact or remote transmitter

Imperial

Size	A[1]	A_1[2]	B	D_1	L[3]							
					EN 1092-1-201						ANSI 16.5	
					PN 6, 10	PN 16/ PN 16 non PED	PN 25	PN 40	PN 63	PN 100	Class 150	Class 300
[in.]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]
½	7.36	13.31	2.32	4.09	-	-	-	7.87	-	-	7.87	7.87
1	7.36	13.31	2.32	4.09	-	-	-	7.87	-	10.24	7.87	7.87
1½	7.76	13.70	3.23	4.88	-	-	-	7.87	-	11.02	7.87	7.87
2	8.07	14.01	2.83	5.47	-	-	-	7.87	10.87	11.81	7.87	7.87
2½	8.35	14.29	2.83	6.06	7.87	7.87/-	-	7.87	12.60	13.78	7.87	10.71
3	8.74	14.69	2.83	6.85	7.87	7.87/-	-	10.71[4]	12.72	13.39	10.71[4]	10.71[4]
4	9.53	15.47	3.35	8.43	9.84	9.84/-	-	9.84	14.96	-	9.84	12.20
5	10.04	15.98	3.35	9.41	9.84	9.84/-	-	9.84	16.54	-	9.84	13.10
6	10.87	16.81	5.39	11.10	11.81	11.81/-	-	11.81	16.34	-	11.81	11.81
8	11.97	17.91	5.39	13.31	13.78	13.78/-	13.78	13.78	18.90	-	13.78	13.78
10	13.07	19.02	6.18	15.47	17.72	17.72/-	17.72	17.72	-	-	17.72	17.72
12	14.05	20.00	6.18	17.48	19.69	19.69/-	19.69	19.69	-	-	19.69	19.69
14	14.25	20.20	10.63	17.76	21.65	21.65/-	21.65	21.65	-	-	21.65	21.65
16	15.24	21.18	10.63	19.76	23.62	23.62/-	23.62	23.62	-	-	23.62	23.62
18	16.45	22.40	12.20	22.16	23.62	23.62/-	23.62	23.62	-	-	23.62	23.62
20	17.44	23.39	13.78	24.17	23.62	23.62/-	24.61	26.77	-	-	23.62	28.70
24	19.45	25.39	12.59	28.15	23.62	23.62/-	29.53	31.50	-	-	23.62	33.80
28	21.42	27.36	17.72	32.13	27.56	34.45/27.56	-	-	-	-	-	-
30	22.48	28.43	21.89	34.21	-	-/-	-	-	-	-	-	-
32	23.86	29.80	22.05	36.50	31.50	39.37/31.50	-	-	-	-	-	-
36	25.71	31.65	24.80	40.63	35.43	44.29/35.43	-	-	-	-	-	-
40	27.72	35.67	26.38	44.72	39.37	49.21/39.37	-	-	-	-	-	-
42	27.72	35.67	26.38	44.72	-	-/-	-	-	-	-	-	-
44	29.72	35.67	30.31	48.74	-	-/-	-	-	-	-	-	-
48	31.89	37.83	31.18	53.07	47.24	59.06/47.24	-	-	-	-	-	-
54	36.42	42.36	39.37	65.94	55.12	-/55.12	-	-	-	-	-	-
60	38.27	44.21	40.15	65.83	59.06	59.06/59.06	-	-	-	-	-	-
66	40.35	46.30	44.49	75.39	62.99	-/62.99	-	-	-	-	-	-
72	44.21	50.16	49.21	77.72	70.87	-/70.87	-	-	-	-	-	-
78	48.15	54.09	54.13	85.59	78.74	-/78.74	-	-	-	-	-	-

1) 0.571 inch shorter with AISI terminal box (Ex and high temperature version)
2) A_2 is 0.06 inch shorter than A_1
3) When earthing flanges are used, the thickness of the earthing flange must be added to the built-in length
4) Not according to ISO 123359

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Flow sensor MAG 3100

Size	L[1]				T_C[2]	T_E[2]	T_F[2]	T_T[2]	Weight[3]
	AS 2129 E AS 4087 PN 16, 21, 35	AWWA C-207 Class D	JIS K10	JIS K20					
[in.]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[lb]
½	7.87	-	7.87	7.87	-	0.24	0.08	0.04	9
1	7.87	-	7.87	7.87	0.05	0.24	0.08	0.04	11
1½	7.87	-	7.87	9.44	0.05	0.24	0.08	0.04	17
2	7.87	-	7.87	9.44	0.05	0.24	0.08	0.04	20
2½	7.87	-	7.87	10.70	0.05	0.24	0.08	0.04	24
3	7.87[4]	-	7.87[8]	10.70[8]	0.05	0.24	0.08	0.04	26
4	9.84	-	9.84	12.20	0.05	0.24	0.08	0.04	35
5	9.84	-	9.84	13.18	0.05	0.24	0.08	-	42
6	11.81	-	11.81	11.81	0.05	0.24	0.08	-	60
8	13.78	-	13.77	13.77	0.05	0.31	0.08	-	88
10	17.72	-	17.71	17.71	0.05	0.31	0.08	-	132
12	19.69	-	19.68	19.68	0.06	0.31	0.08	-	176
14	21.65	-	21.65	21.65	0.06	0.31	-	-	242
16	23.62	-	23.62	23.62	0.06	0.39	-	-	275
18	23.62	-	23.62	25.19	0.06	0.39	-	-	385
20	23.62[5]	-	23.62	26.77	0.06	0.39	-	-	440
24	23.62[6]	-	23.62	31.49	0.06	0.39	-	-	633
28	27.56[7]	27.56	-	-	0.08	-	-	-	728
30	29.53[7]	29.52	-	-	0.08	-	-	-	794
32	31.50[7]	31.50	-	-	0.08	-	-	-	992
36	35.43[7]	35.43	-	-	0.08	-	-	-	1168
40	39.37[7]	39.37	-	-	0.08	-	-	-	1455
42	-	39.37	-	-	0.08	-	-	-	1455
44	43.31[7]	43.31	-	-	0.08	-	-	-	2513
48	47.24[7]	47.24	-	-	0.08	-	-	-	2601
54	-	55.12	-	-	0.12	-	-	-	3528
60	-	59.06	-	-	0.12	-	-	-	5423
66	-	63.00	-	-	0.12	-	-	-	5566
72	-	70.87	-	-	0.12	-	-	-	6460
78	-	78.74	-	-	0.12	-	-	-	8080

1) When earthing flanges are used, the thickness of the earthing flange must be added to the built-in length
2) T_C = Type C grounding ring, T_E = Type E grounding ring (Included and factory mounted on high temperature 356 °F PTFE sensor), T_F = Flat type grounding rings
3) Weights are for ANSI 150 without transmitter
4) PN 35 DN 80 = 10.70 inch
5) PN 35 DN 500 = 26.77 inch
6) PN 35 DN 600 = 29.53 inch
7) Not AS 4087 PN 21 or PN 35
8) Not according to ISO 13359

- not available

D = Outside diameter of flange, see flange tables

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Overview

SITRANS F M TRANSMAG 2 with the SITRANS FM 911/E sensor is a pulsed alternating field magnetic flowmeter where the magnetic field strength is much higher than conventional DC pulsed magnetic flowmeters.

Benefits

- Wide range of sizes DN 15 to DN 1000 (½" to 40")
- Broad range of liner and electrode materials for extreme process medias
- Fully welded construction provides a ruggedness that suits the toughest applications and environments.
- Automatic reading of SmartPLUG for easy commissioning
- Simple menu operation with two-line display
- Comprehensiv self-diagnostic with selfmonitoring and internal simulation

Application

The main applications of the SITRANS F M transmitter TRANSMAG 2 can be found in the following sectors:

- Pulp and Paper industry
- Mining industry

The patented pulse alternating field technology is ideal for difficult applications like:

- High concentrated paper stock > 3 %
- Heavy mining slurries
- Mining slurries with magnetic particles.
- Low conductive medias ≥1 µS/cm (0.1 µS/cm depending on medium)

Design

- Available for remote mounting
- PROFIBUS PA (profile 2.0) / HART communication
- Analog output and digital outputs for pulses, device status, limits, flow direction, frequency output

Mode of operation

The flow measuring principle is based on Faraday's law of electromagnetic induction according to which the sensor converts the flow into an electrical voltage proportional to the velocity of the flow.

Function

The TRANSMAG 2 is a microprocessor-based transmitter with a build-in alphanumeric display in several languages. The transmitters evaluate the signals from the associated electromagnetic sensors and also fulfil the task of a power supply unit which provides the magnet coils with a constant current.

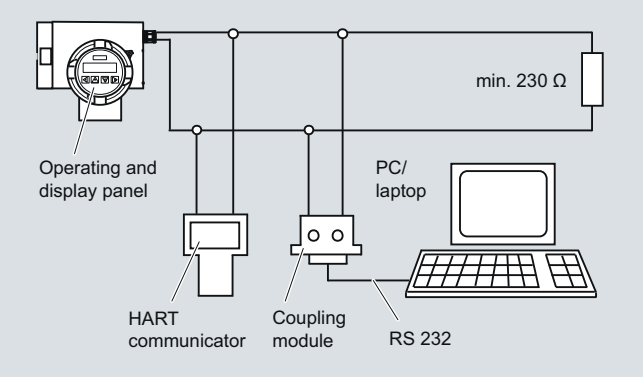
The magnetic flux density in the sensor is additionally monitored by reference coils.

Further information on connection, mode of operation and installation can be found in the data sheets for the sensors.

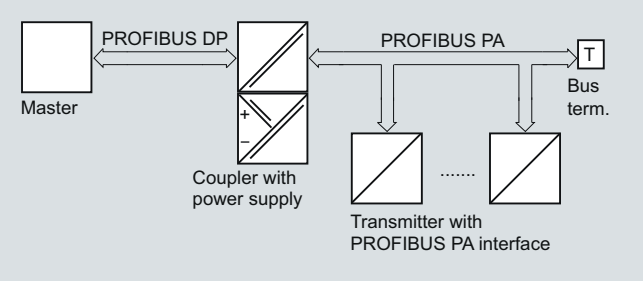
Displays and keypad

Operation of the transmitter can be carried out using:

- Keypad and display unit
- HART communicator
- PC/laptop and SIMATIC PDM software via HART communication
- PC/laptop and SIMATIC PDM software using PROFIBUS PA communication



HART communication



PROFIBUS PA communication

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Transmitter TRANSMAG 2 with sensor 911/E

Technical specifications

Mode of operation and design	
Measuring principle	Electromagnetic with pulsed alternating field (PAC)
Magnetic field excitation	Automatic power supply synchronization
- 50 Hz AC power supply	Bipolar (16.7 Hz) Bipolar with prepulse (10 Hz) Unipolar (8.33 Hz)
- 60 Hz AC power supply	Bipolar (20 Hz) Bipolar with prepulse (12 Hz) Unipolar (10 Hz)
Accuracy under reference conditions	
Measuring tolerance of pulse output	
• With v > 0.25 m/s (0.82 ft/s)	≤ ± 0.5 % of measured value ± 1.2 mm/s (0.05 inch/s)
• With v < 0.25 m/s (0.82 ft/s)	± 2.5 mm/s (0.1 inch/s)
Measuring tolerance of analog output	As pulse output plus ± 0.1 % conversion error ± 20 µA
Repeatability	0.2 % of measured value
Reference conditions	
• Process temperature	25 °C ± 5 °C (77 °F ± 9 °F)
• Ambient temperature	25 °C ± 5 °C (77 °F ± 9 °F)
• Warm-up time	Min. 30 min
• Installation conditions	Inlet pipe section ≥ 10 x DN Outlet pipe section ≥ 5 x DN Installed centered in pipe
• Medium	Water without gaseous or solid components
Calibration	
Standard production calibration, calibration report shipped with sensor	Zero-point, 2 x 25 % and 2 x 90 %
Outputs	
Electrical isolation	Outputs electrically isolated from one another and from the power supply, max. 60 V permissible against PE/equipotential bonding
Current output	0/4 ... 20 mA (7ME5034-0…. or 7ME5034-2….)
• Signal	
- Upper limit	0/4 … 20 mA, selectable
- Failure	20 … 22.5 mA, optional 3.6; 20 or 24 mA
• Load	
- Output	max. 600 Ω, max. load voltage 15 V DC
- For HART communication	≥ 250 Ω
Communication	Via analog output with PC coupling module or HART communicator
• Protocol	HART, version 5.1
Digital output	
Signal	
• Output	Configurable as active or passive signals
- Active signal	24 V DC, ≤ 24 mA, R_i = 170 Ω
- Passive signal	Open collector, max. 30 V DC, 200 mA

Output configuration	
• Pulse	
- Pulse significance	≤ 5000 pulses/s
- Pulse width	≥ 0.1 ms
• Limit frequency	≤ 10000 Hz
• Limits	Limits for flow and quantity, flow direction, alarm
Digital output 2 (relay)	
(only 7ME5034-0….)	
Relay	NC or NO function
• Rating	Max. 5 W, max. 50 V AC/DC, max. 200 mA
• Output configuration	Limits for flow and quantity, flow direction, alarm
Digital input (optional to digital output 2)	
(only 7ME5034-2….)	
• Input function configurable as high-active or low-active	Set measured value or counter to zero
• Signal voltage	Max. 30 V DC, R_i = 3 kΩ: High level: +11 ... +30 V DC Low level: -30 ... +5 V DC
For PROFIBUS devices	
PROFIBUS PA (for PROFIBUS-devices 7ME5034-1….)	
• Communication	Layer 1 and 2 according to PROFIBUS PA Transmission according to IEC 1158-2 Layer 7 (protocol layer) according to PROFIBUS PA and DP V1 (EN 50170) Device class B, device profile 2.0 Max. 4 simultaneous C2 connections
• Bus voltage	9 ... 32 V DC permissible
• Current consumption from bus	10 mA; limited to ≤ 15 mA in event of fault by electrical current limitation
Rated operating conditions	
Installation conditions	See also sensor
Ambient temperature	
• Operation	-20 ... +60 °C (-4 ... +140 °F)
• Display module	0 ... 50 °C (32 ... 122 °F)
Storage	-25 ... +80 °C (-13 ... +176 °F)
Degree of protection	IP67/NEMA 4X
Electromagnetic compatibility (EMC)	
• Emitted interference	To IEC/EN 61326 for use in industrial areas
• Noise immunity	To IEC/EN 61326 for use in industrial areas

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Transmitter TRANSMAG 2 with sensor 911/E

Medium conditions	
• Process temperature	-20 ... +150 °C (-4 ... 302 °F) depending on her liner
Minimum conductivity of medium	
• With SITRANS F M 911/E sensors	≥ 1 µS/cm (0.1 µS/cm depending on medium)
Design	
Weight of transmitter	4.4 kg (9.7 lb)
Remote version	Transmitter must be connected to sensor using shielded cable
Maximum cable length	100 m (328 ft)
Housing	Die-cast aluminum, painted
Displays and keypad	
General display	LCD, backlid, two lines with 16 characters each
Multi-display for	Flow, totalizer, flow velocity
Keypad	4 keys for entering parameters
Power supply	
corresponding to rating plate	
• AC supply	100 ... 250 V AC ± 15 %, 47 ... 63 Hz
• Power consumption	Approx. 120 ... 630 VA, depending on sensor
Line fuse	100 ... 230 V AC: T1.6A
Magnet current fuse	F5A/250 V

Sensor cables between sensor and transmitter

The signal voltage proportional to the flow and present at the electrodes of the EMF is only a few µV to mV. Superimposed on this are electrochemical interferences resulting from the contact between the electrodes and liquid, and which can be up to several Volt. Also frequently superimposed are line frequency interferences, interferences resulting from vibrations on the pipelines or signal cables, as well as strong magnetic fields in the vicinity. Sufficient shielding must therefore be provided, as well as fixed routing of the signal cables (electrode and magnet current cable) in the case of remote versions. This also applies to devices with integral preamplifier (smartPLUG). The cable length between the sensor and transmitter must not exceed 100 m (328 ft).

Attention must also be paid to the cable routing. Signal cables must be routed free of vibration, and protected against strong magnetic and stray fields. In case of doubt, the sensor cables must be routed in earthed steel conduit.

Selection and Ordering data	Order No.
SITRANS F M electromagnetic transmitter TRANSMAG 2 for alternating field, remote version, 110 ... 230 V AC	**7ME5034 - ■AA■1 - ■AA0**
Output/communication	
4 ... 20 mA with HART protocol	**0**
PROFIBUS PA connection	**1**
4 ... 20 mA with HART protocol, digital input	**2**
Operator display and keypad	
Without	**0**
With	**1**
Cable glands	
M20/M16 x 1.5	**1**
½" NPT	**2**

Selection and Ordering data	Order code
Additional information	
Please add **"-Z"** to Order No. and specify Order code(s) and plain text.	
Strengthened mounting bracket for wall and pipeline installation	**A02**
Measuring range, specify in plain text: Y01: 0 to ... m^3/h	**Y01**
Pulse significance, specify in plain text: Y02: 0 to ... pulses/l	**Y02**
Setting of digital outputs, specify in plain text: Y03: Setting of digital outputs: ...	**Y03**
Measuring-point number (max. 8 characters), specify in plain text: Y15:	**Y15**
Measuring-point description (max. 16 characters), specify in plain text: Y16:	**Y16**
Stainless steel tag plate	**Y17**
Other post-production requirements (add plain text)	**Y99**

Operating instructions for SITRANS F M TRANSMAG 2

Description	Order No.
• English	**A5E00102775**
• German	**A5E00192774**
• Spanish	**A5E00135276**
• French	**A5E00135275**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

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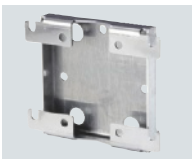
Transmitter TRANSMAG 2 with sensor 911/E

Accessories

Description	Order No.	
Standard wall mounting bracket	**7ME5933-0AC04**	
Special wall-/pipe mounting bracket kit	**7ME5933-0AC05**	
IP68/NEMA 6P potting kit	**FDK-085U0220**	

Spare parts

Description	Order No.	
Operating/Display module	**7ME5933-0AC00**	
Electronics cover with glass plate (non Ex)	**7ME5933-0AC01**	
Cover for sensor cable and gasket	**7ME5933-0AC02**	
Cover for mains supply/communication	**7ME5933-0AC03**	
Safety clamp for electronic cover with glass plate (7ME5933-0AC01)	**7ME5933-0AC06**	
M20 cable gland set for power and output connection, grey PA plastic, 2 pcs. • cables Ø 6 ... 12 mm (0.24" ... 0.47") • -40 ... +100 °C (-40 ... +212 °F)	**A5E02246350**	
1/2" NPT cable gland set for power and output connection, grey PA plastic, 2 pcs. • cables Ø 6 ... 12 mm (0.24" ... 0.47") • -40 ... +100 °C (-40 ... +212 °F)	**A5E02246396**	
M16 x 1.5 cable gland set for sensor connection, brass chrome, 2 pcs. and 2 pcs. blind • cables Ø 5 ... 9 mm (0.20" ... 0.35") • -20 ... +105°C (-4 ... +221 °F)	**A5E02246369**	

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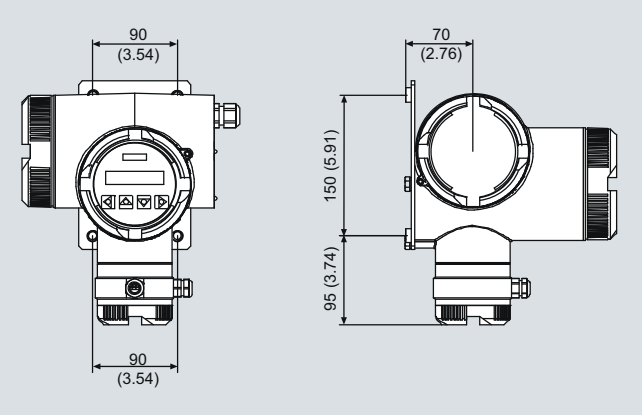
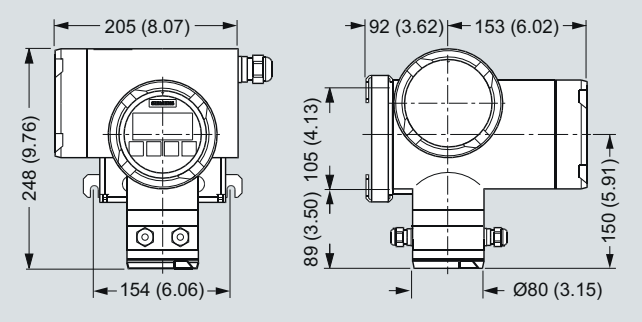
Dimensional drawings

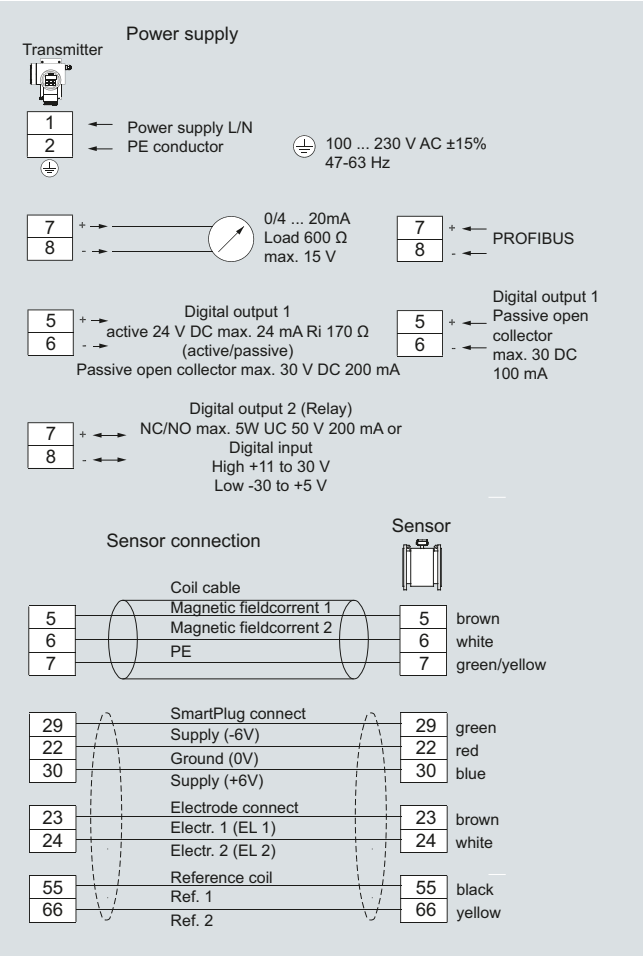


SITRANS F M transmitter TRANSMAG 2 with wall mounting bracket, dimensions in mm (inch)



SITRANS F M transmitter TRANSMAG 2 with wall and pipeline mounting bracket, dimensions in mm (inch)

Schematics



SITRANS F M transmitter TRANSMAG 2, connection diagram

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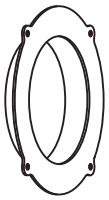
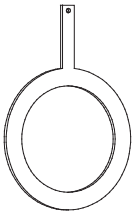
Transmitter TRANSMAG 2 with sensor 911/E

911/E sensor	
Process connection	
Nominal diameters	DN 15 ... 1000 (½" ... 40")
Metering tube connections	EN 1092-1, ANSI B16.5, others on request
Rated operating conditions	
Installation conditions	See system information
• Soft rubber liner	0 ... 70 °C (32 ... 158 °F)
• Hard rubber liner	0 ... 90 °C (32 ... 194 °F) Option: 100 °C (212 °F)
• PTFE liner	• -20 ... +150 °C (-4 ... +302 °F) at 25 bar (363 psi) • -20 ... +100 °C (-4 ... +212 °F) at 40 bar (580 psi)
• Linatex (rubber) liner	-40 ... +70 °C (-40 ... +158 °F) (for temperatures below -20 °C (-4 °F) AISI 316/1.4436 flanges must be used)
• Novolak liner	130 °C (266 °F) at 40 bar (580 psi)
Degree of protection	IP67/NEMA 4X Optional IP68/NEMA 6
Medium conditions	
Maximum flow velocity	12 m/s (39.4 ft/s)
Full scale value of flow velocity	0.15 ... 12 m/s (0.49 ... 39.4 ft/s)
Design	
Weight	See dimensional drawings
Flange and housing material	Mild steel (1.0460/1.0570, with corrosion resistant two component epoxy coating (min. 150 µm) or AISI 316Ti/1.4571 flanges and carbon steel housing, with corrosion-resistant two-component epoxy coating (min. 150 µm)
Measuring pipe material	Stainless steel AISI 304/1.4301
Electrode material	• AISI 316Ti/1.4571 • PTFE: Hastelloy C276/2.4819 • PFA: Hastelloy C276/2.4819 • Platinum head • Titanium • Tantalum
Grounding electrode material	Defined via the order code

Protection rings for liners	
	
Function	To protect the edges of liners from abrasion (e.g. gravel, sand etc.). Used mainly with soft rubber liners and for PTFE liners at high temperatures from 100 to 150 °C (212 to 302 °F).
Contact with medium	Yes, please always check resistance to measured medium.
Material	Stainless steel AISI 316Ti/1.4571, optionally Hastelloy C276/2.4819
Material thickness	The overall length of the sensor is increased by • 6 mm for DN 15 to DN 150 (0.24" for ½" to 6") or • 10 mm for DN 200 to DN 600 (0.4" for 8" to 24")
Standard	No, optional for PTFE and soft rubber liners. They are required for PTFE liners of PN 16 (MWP 232 psi) or more instead of protection washers, and must be ordered separately.
Order No.	**7ME5912-....**

Earthing washers	
	
Function	Electrical reference and earthing of the medium. Required if the pipelines are not electrically conducting or are lined (plastic pipelines, concrete pipelines etc.). All earthing rings must be connected to the earthing screw present on the sensor.
Contact with medium	Yes, please always check resistance to measured medium.
Material	Stainless steel AISI 316Ti/1.4571 or Hastelloy C276/2.4819
Material thickness	The overall length of the sensor is increased by 2 mm (0.08") per earthing ring.
Standard	No, only optional. Required between the medium and sensor for equipotential bonding between non-conducting pipelines or lined pipelines.
Order No.	**7ME5902-....**

Important:

The rings must be ordered together with the sensor.
In case of replacement please include the sensor MLFB code on the order.

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Notes on pressure equipment directive

The devices are designed for liquids of danger group "Gases of fluid group 1". The categories differ according to the version, and are listed in the table below.

The minimum temperature is defined at -10 °C (14 °F) for the flange materials C22.8 (1.0460) and ST52-5 (1.0570).
The minimum temperature is defined at -20 °C (-4 °F) for the flange material 1.4571/316Ti. For further information on the PED standard and requirements, see page 10/9.

Classification according to pressure equipment directive (PED 97/23/EC)					
Nominal diameter		**Nominal pressure**		**Permissible media**	**Category**
DN	**(inch)**	**PN**	**(MWP psi)**		
15 ... 25	(½" ... 1")	10 ... 40	(145 ... 580)	Gases fluid group 1 and liquids fluid group 1	Article 3.3
32 ... 100	(1¼" ... 4")	10	(145)	Gases fluid group 1 and liquids fluid group 1	I
32 ... 50	(1¼" ... 2")	16	(232)	Gases fluid group 1 and liquids fluid group 1	I
32 ... 40	(1¼" ... 1½")	25	(363)	Gases fluid group 1 and liquids fluid group 1	I
100 ... 350	(4" ... 12")	10	(145)	Gases fluid group 1 and liquids fluid group 1	II
65 ... 200	(2½" ... 8")	16	(232)	Gases fluid group 1 and liquids fluid group 1	II
50 ... 125	(2" ... 5")	25	(363)	Gases fluid group 1 and liquids fluid group 1	II
32 ... 80	(1¼" ... 3")	40	(580)	Gases fluid group 1 and liquids fluid group 1	II
350 ... 600	(14" ... 24")	10	(145)	Gases fluid group 1 and liquids fluid group 1	III
250 ... 600	(10" ... 24")	16	(232)	Gases fluid group 1 and liquids fluid group 1	III
150 ... 600	(6" ... 24")	25	(363)	Gases fluid group 1 and liquids fluid group 1	III
100 ... 600	(4" ... 24")	40	(580)	Gases fluid group 1 and liquids fluid group 1	III

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Transmitter TRANSMAG 2 with sensor 911/E

Selection and Ordering data	Order No.
Flowsensor SITRANS F M 911/E	**7 M E 5 6 1 0 -** ■ ■ ■ ■ ■ **-** ■ **A A** ■
Nominal diameter	
DN 15 (½")	**1 V**
DN 25 (1")	**2 D**
DN 40 (1½")	**2 R**
DN 50 (2")	**2 Y**
DN 65 (2½")	**3 F**
DN 80 (3")	**3 M**
DN 100 (4")	**3 T**
DN 125 (5")	**4 B**
DN 150 (6")	**4 H**
DN 200 (8")	**4 P**
DN 250 (10")	**4 V**
DN 300 (12")	**5 D**
DN 350 (14")	**5 K**
DN 400 (16")	**5 R**
DN 450 (18")	**5 Y**
DN 500 (20")	**6 F**
DN 600 (24")	**6 P**
DN 700 (28")	**6 Y**
DN 750 (30")	**7 D**
DN 800 (32")	**7 H**
DN 900 (36")	**7 M**
DN 1000 (40")	**7 R**
Flange norm and pressure rating	
EN 1092-1, PN 10 (DN 200 ... 1000 (8" ... 40"))	**B**
EN 1092-1, PN 16 (DN 65 ... 1000 (2½" ... 40"))	**C**
EN 1092-1, PN 25 (DN 200 ... 600 (8" ... 24"))	**E**
EN 1092-1, PN 40 (DN 15 ... 600 (½" ... 24"))	**F**
ANSI B16.5, Class 150 (½" ... 24"), max 19.6 bar (285 psi) at 20 °C (68 °F)	**J**
ANSI B16.5, Class 300 (½" ... 24"), max 51.1 bar (741 psi) at 20 °C (68 °F)	**K**
AWWA C-207 Class D (28" ... 40")	**L**
JIS 10 K (½" ... 24")	**R**
Flange material	
Mid steel flanges 1.0460/1.0570	**1**
Stainless steel flanges, AISI 316Ti / 1.4571	**3**
Liner material	
Soft rubber	**1**
PTFE (without protection washers)	**3**
Hardrubber	**4**
Linatex	**5**
Novolak (sealing material FFKM)	**6**
Electrode material	
AISI 316Ti/1.4571	**1**
Hastelloy C276/2.4819	**2**
Platinum head with shaft AISI 316Ti/1.4571	**3**
Titanium	**4**
Tantalum	**5**
Cable glands/terminal box	
Metric: Polyamide terminal box	**1**
½" NPT: Polyamide terminal box	**2**

Selection and Ordering data	Order Code
Additional information	
Please add **"-Z"** to Order No. and specify Order code(s) and plain text.	
Two earthing (grounding) electrodes made of stainless steel AISI 316Ti/1.4571	**A02**
Two earthing (grounding) electrodes made of Hastelloy C4/2.4610	**A04**
Two earthing (grounding) electrodes made of Platinum head	**A05**
Two earthing (grounding) electrodes made of Titanum	**A06**
Two earthing (grounding) electrodes made of Tantalum	**A07**
Factory certificate to EN 10204-2.2	**C14**
Acceptance test B to DIN 50049, section 3.1 and EN 10204	**C16**
Silicone-free materials	**Y04**
Tag name plate, stainless steel, add plain text	**Y17**
Other postproduction requirements, add plain text	**Y99**

Selection and Ordering data	Order No.	Order code
SITRANS F M TRANSMAG 2 and sensor 911/E	**7 M E 5 9 3 0 -**	
Cable	**5** ■ **A 0 0 - 0 A A 0**	■ ■ ■
Cable kit for sensor 911/E with alternating field, Magnet current cable 3 x 1.0 mm² (3 x 0.0016 inch²), electrode/reference cable 7 x 0.5 mm² (7 x 0.0008 inch²) with shield PVC		
• Length: 5 m (16.4 ft)	**B**	
• Length: 10 m (32.8 ft)	**C**	
• Length: 20 m (65.6 ft)	**D**	
• Length: 30 m (98.4 ft)	**E**	
• Specify other length: in plain text	**Z**	**J 1 Y**

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Selection and Ordering data	Order No.	Order code
SITRANS F M electromagnetic flowmeter		
Protection rings for flow sensor 911E (per pair)	7ME5912-	
Liner		
Hard rubber/soft rubber		1
Novolak		7
PTFE		0
Nominal diameter		
for PTFE, mat. no. 1.4571/316 Ti		
DN 15 (½")		A A
DN 20 (¾")		B A
DN 25 (1")		C A
DN 32 (1¼")		D A
DN 40 (1½")		E A
DN 50 (2")		F A
DN 65 (2½")		G A
DN 80 (3")		H A
DN 100 (4")		J A
DN 125 (5")		K A
DN 150 (6")		L A
DN 200 (8")		M A
DN 250 (10")		N A
DN 300 (12")		P A
Other nominal diameters: specify in plain text		Z A J 1 Y
for Hard/Soft rubber, Novolak, mat. no. 1.471/316 Ti		
DN 15 (½")		A B
DN 20 (¾")		B B
DN 25 (1")		C B
DN 32 (1¼")		D B
DN 40 (1½")		E B
DN 50 (2")		F B
DN 65 (2½")		G B
DN 80 (3")		H B
DN 100 (4")		J B
DN 125 (5")		K B
DN 150 (6")		L B
DN 200 (8")		M B
DN 250 (10")		N B
DN 300 (12")		P B
Other nominal diameters: specify in plain text		Z B J 1 Y
Flange design		
Flange to DIN		1
Flange to ANSI		2
Flange to JIS		3

Selection and Ordering data	Order No.	Order code
SITRANS F M electromagnetic flowmeter		
Earthing rings for flow sensor 911E (per unit)	7ME5902-	
Liner		
Hard rubber/soft rubber		1
Novolak		7
PTFE		0
Nominal diameter		
Mat. no. 1.4571/316 Ti		
DN 15 (½")		A A
DN 20 (¾")		B A
DN 25 (1")		C A
DN 32 (1¼")		D A
DN 40 (1½")		E A
DN 50 (2")		F A
DN 65 (2½")		G A
DN 80 (3")		H A
DN 100 (4")		J A
DN 125 (5")		K A
DN 150 (6")		L A
DN 200 (8")		M A
DN 250 (10")		N A
DN 300 (12")		P A
DN 350 (14")		Q A
DN 400 (16")		R A
DN 500 (20")		S A
DN 600 (24")		T A
DN 700 (28")		U A
DN 800 (32")		V A
DN 900 (36")		W A
DN 1000 (40")		X A
Other nominal diam.: specify in plain text		Z A J 1 Y
Material Hastelloy C4/2.4610		
DN 15 (½")		A B
DN 20 (¾")		B B
DN 25 (1")		C B
DN 32 (1¼")		D B
DN 40 (1½")		E B
DN 50 (2")		F B
DN 65 (2½")		G B
DN 80 (3")		H B
DN 100 (4")		J B
DN 125 (5")		K B
DN 150 (6")		L B
DN 200 (8")		M B
DN 250 (10")		N B
DN 300 (12")		P B
DN 350 (14")		Q B
DN 400 (16")		R B
DN 500 (20")		S B
DN 600 (24")		T B
Other nominal diam.: specify in plain text		Z B J 1 Y
Flange design		
Flange to DIN		1
Flange to ANSI		2
Flange to JIS		3

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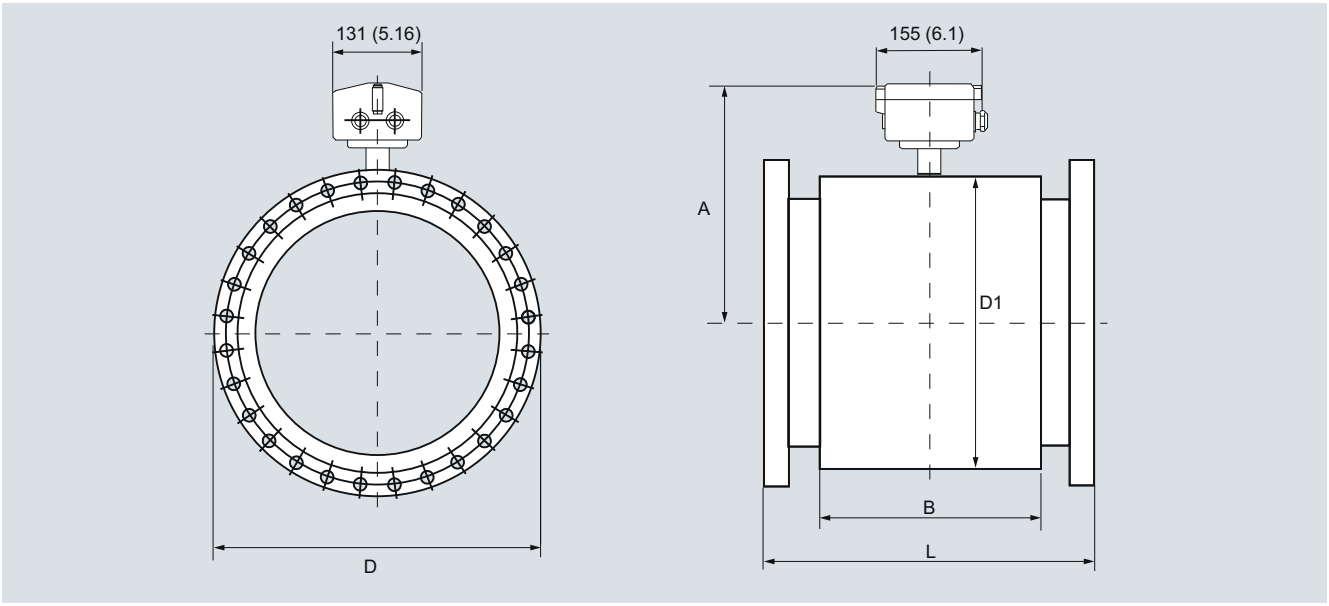
Transmitter TRANSMAG 2 with sensor 911/E

Dimensional drawings



SITRANS F M flow sensor 911/E, remote version, dimensions in mm (inches)

Build-in length 911/E [in mm and inches]

Nominal diameter	DN 15 ½“	DN 25 1“	DN 40 1 ½“	DN 50 2“	DN 65 2 ½“	DN 80 3“	DN 100 4“	DN 125 5“	DN 150 6“	DN 200 8“	DN 250 10“
					Build-in length L[1)]						
Hard rubber version Linatex/soft rubber version	270 (10.63)				330 (12.99)	340 (13.39)		370 (14.57)		410 (16.14)	470 (18.50)
PTFE-liner without protection rings	270 (10.63)				330 (12.99)	340 (13.39)		370 (14.57)		410 (16.14)	470 (18.50)
Novolak-version	-			275 (10.83)	325 (12.79)	335 (13.19)	333 (13.11)	362 (14.25)		401 (15.79)	460 (18.11)
					Dimensions of sensor housing						
Housing width B	170 (6.69)									240 (9.45)	
Height A	206 (8.11)		222 (8.74)	229 (9.02)	262 (10.32)		274 (10.79)	286 (11.26)	299 (11.78)	334 (13.15)	258 (14.10)
Housing diameter D_1	135 (5.35)		167 (6.58)	182 (7.17)	247 (9.73)		272 (10.71)	296 (11.65)	322 (12.68)	392 (15.43)	440 (17.32)
Weight of PN16 version in kg (MWP 232 psi version in lb) approx.	8.0 (17.64)	8.5 (18.74)	11.5 (25.35)	25.0 (55.12)	26 (57.32)	27 (59.53)	28 (61.73)	34 (74.95)	38 (83.78)	68 (149.9)	81 (178.6)

Nominal diameter	DN 300 12“	DN 350 14“	DN 400 16“	DN 450 18“	DN 500 20“	DN 600 24“	DN 700 28“	DN 750 30“	DN 800 32“	DN 900 36“	DN 1000 40“
					Build-in length L[1)]						
Hard rubber version Linatex/soft rubber version	500 (19.68)	550 (21.65)	600 (23.62)	650 (25.59)	650 (25.59)	780 (30.71)	910 (35.83)		1040 (40.95)	1170 (46.06)	1300 (51.18)
PTFE-liner without protection rings	500 (19.68)	550 (21.65)	600 (23.62)	660 (25.98)	650 (25.59)	780 (30.71)	-				
Novolak-version	489 (19.25)	538 (21.18)	592 (23.31)	638 (25.12)	638 (25.12)	772 (30.39)	903 (35.55)		1033 (40.63)	1163 (45.79)	1293 (50.91)
					Dimensions of sensor housing						
Housing width B	240 (9.45)	225 (8.86)	250 (9.84)	270 (10.63)	300 (11.81)	360 (14.17)	420 (16.54)		500 (19.69)	560 (22.05)	620 (24.41)
Height A	383 (15.08)	375 (14.76)	400 (15.75)	433 (17.05)	453 (17.84)	505 (19.88)	558 (21.97)	590 (23.23)	608 (23.94)	658 (25.91)	713 (28.07)
Housing diameter D_1	490 (19.29)	474 (18.66)	524 (20.63)	591 (23.26)	629 (24.76)	734 (28.90)	839 (33.03)	904 (35.59)	939 (36.97)	1039 (40.91)	1150 (45.28)
Weight of PN10 Version in kg (MWP 145 psi version in lb) approx.	95 (209.4)	118 (260.2)	161 (354.9)	185 (407.9)	233 (513.7)	401 (884.1)	420 (925.9)	450 (992.1)	500 (1102.3)	560 (1234.6)	620 (1366.9)

[1)] Tolerance for build-in lenght: L + 0.0 mm (0.00 inches) /- 4.0 mm (-0.157 inches).
With protection rings or washers for > DN25 + 6.0 mm, > DN200 + 10.0 mm (> 1” + 0.236 inches. > 8” + 0.394 inches)

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Battery-operated water meter MAG 8000

Overview

MAG 8000 is a comprehensive meter which intelligent information and high performance measurement as well as the easy to install concept take cost of ownership and customer service to a new level for water meter.

Benefits

Easy to install

- Compact or remote solution with factory mounted cable and customer setting from factory
- IP68/NEMA 6P enclosure. Sensor can be buried
- Flexible power supply - internal or external battery pack or mains power supply with battery back-up possibilities

Superior measurement

- Down to 0.2 % maximum uncertainty
- OIML R 49 type approval
- Bi-directional measurement

Long lasting performance/Low cost of Ownership

- Verification according to Directive 2004/22/EC of the European Parliament and Council of March 31, 2004 on measuring instruments (MID), Annex MI-001
- No moving parts means less wear and tear
- Up to 6 to 10 years maintenance-free operation in typical revenue application
- Robust construction build for the application

Intelligent information, easy to access

- Advanced information on site
- Data logger
- Advanced statistics and diagnostics
- Add-on communication modules

Application

The following MAG 8000 versions are available as stand-alone water meters:

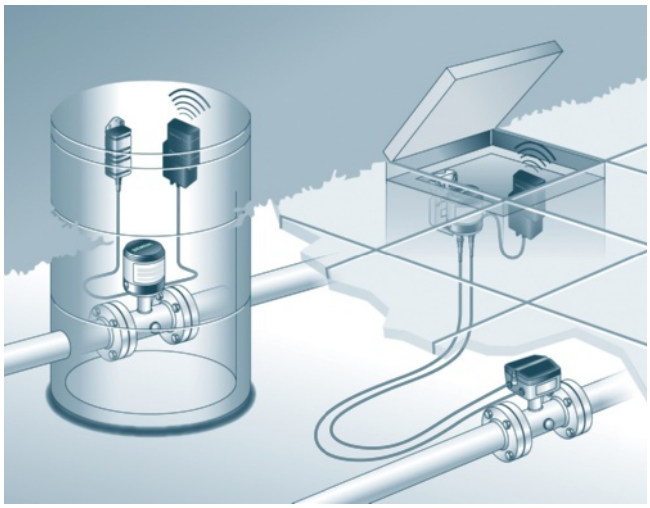
- MAG 8000 (7ME6810) for abstraction and distribution network
- MAG 8000 CT (7ME6820) for revenue and bulk metering
- MAG 8000 (7ME6880) for irrigation

Design

MAG 8000 is designed to minimize power consumption.

The product program consists of

- Basic and advanced version
- Sensor sizes from DN 25 to 1200 (1" to 48")
- Compact and remote installation in IP68/NEMA 6P enclosure and factory-mounted cable
- SIMATIC PDM and Flow Tool PC configuration softwares



Add-on communication module (left), PC-IrDA connection (right)

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Battery-operated water meter MAG 8000

Function

MAG 8000 is a microprocessor-based water meter with graphical display and key for optimum customer operation and information on site. The transmitter drives the magnetic field in the sensor, evaluates the flow signal from the sensor and calculates the volume passing through. It delivers the required information via the integrated pulse output or communication interfaces as part of a system solution. Its intelligent functionality, information and diagnostics ensure optimum meter performance and information to optimize water supply and billing.

MAG 8000 can be ordered as a Basic or an Advanced version.

Features / Version	MAG 8000 Basic/ MAG 8000 Irrigation	MAG 8000 Advanced
Measuring frequency in battery power mode (Manually selected)	1/15, 1/30 or 1/60 Hz	from 6.25 to 1/60 Hz depending of sensor size
Output MAG 8000	2 FW/RV/AI/CA (max. 50 Hz pulse rate)	2 FW/RV/AI/CA (max. 100 Hz pulse rate)
Communication	Add-on	Add-on
Data logger	Yes	Yes
Insulation test	No	Yes
Leakage detection	No	Yes
Meter utilization	No	Yes
Statistics	No	Yes
Tariff	No	Yes
Settle date (Revenue)	No	Yes

Some information is accessible via the display whereas all information is accessible via the IrDA communication interface with the PDM software. Data and parameters are registered in a EEPROM. They can all be read, but changing the information demands a software password or a hardware key attached to the printed circuit board.

The SIMATIC PDM tool gives the possibility of testing and verifying the flowmeter on site and creating a printed "Qualification Certificate" with all specific data that define the quality status of the measurement.

The Qualification Certificate consists of two pages with information about the actual status of the sensor:

Part 1 provides general settings, sensor and battery info, totalizer values and pulse output settings.

Part 2 provides detailed information about electronic and sensor functionality and a main parameter list for evaluating the functionality of the MAG 8000 water meter.

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Technical specifications

Transmitter	
Installation	Compact (integral) Remote with factory-mounted cable 5, 10, 20 or 30 m (16.4, 32.8, 65.6 or 98.4 ft)
Enclosure	Stainl. steel top housing (AISI 316) and coated brass bottom. Remote wall mount bracket in stainless steel (AISI 304).
Cable entries	2 x M20 (one gland for one cable of size 6 … 8 mm (0.02 ... 0.026 ft) is included in the standard delivery)
Display	Display with 8 digits for main information. Index, menu and status symbols for dedicated information
Resolution	Totalized information can be displayed with 1, 2 or 3 decimals or automatic adjustment (default)
Flow unit	
Europe	Volume in m^3 and flow rate in m^3/h
US	Volume in Gallon and flow rate in GPM
Australia	Volume in Ml and flow rate as Ml/d
Optional display units	Volume: m^3 x 100, l x 100, G x 100, G x 1000, MG, CF x 100, CF x 1000, AF, Al, kl Flow: m^3/min, m^3/d, l/s, l/min, GPS, GPH, GPD, MGD, CFS, CFM, CFH
Digital output	2 passive outputs (MOS), individual galvanically isolated Maximum load ± 35 V DC, 50 mA short circuit protected
Output A function	Programmable as pulse volume – forward – reverse – forward/net – reverse/net
Output B function	Programmable as pulse volume (like output A), alarm
Output	Max. pulse rate of 50 Hz (only Basic version) and 100 Hz (only Advanced version), pulse width of 5, 10, 50, 100, 500 ms
Communication	IrDA: Standard integrated infrared communication interface with Modbus RTU protocol
Add-on modules	• RS 232 serial interface with Modbus RTU (Rx/Tx/GND), point to point with max. 15 m cable • RS 485 serial interface with Modbus RTU (+/-/GND), multidrop with up to 32 devices with max. 1000 m cable • Encoder interface module (for Itron 200WP) "Sensus protocol"
Power supply	Auto detection of power source with display symbol for operation power.
Internal battery pack	1 D-Cell 3.6 V/16.5 Ah 2 D-Cell 3.6 V/33 Ah
External battery pack	4 D-Cell 3.6 V/66 Ah

Mains power supply	• 12 ... 24 V AC/DC (10 … 32 V) 2 VA • 115 ... 230 V AC (85 … 264 V) 2 VA Both mains power supply systems are upgradable for battery backup via internal D-Cell (3.6 V 16.5 Ah) or external battery pack.
Cable	3 m (9.8 ft) for external connection to mains supply (without cable plug)

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Battery-operated water meter MAG 8000

Features	
Application identification	Tag number up to 15 characters
Time and date	Real time clock
Totalizer	
MAG 8000	3 totalizer: Configurable to Forward, Reverse and Bidirectional netflow 1 totalizer (following totalizer 1 setting) resetable via display key
Measurement	
Low flow cut-off	0.05 % of Q3 free adjustable
Empty pipe detection	Symbolised in display
Data logger	Logging of 26 records: selectable as daily, weekly or monthly logging
Alarm	Active alarm is indicated on the display
Data protection	All data stored in an EEPROM. Totalizers 1 and 2 are backed up every 10 min, statistic every hour and power consumption and temperature measurement every 4 hour. Password protection of all parameters and hardware protection of calibration and revenue parameters.
Battery power management	Optimal battery information on remaining capacity. Calculated capacity includes all consuming elements and available battery capacity is adjusted related to change in ambient temperature. Numbers of power-ups Date and time registered for first and last time power alarm.
Diagnostic	
Continuous self test including	Coil current to drive the magnetic field Signal input circuit Data calculation, handling and storing
Alarm statistics and logging for fault analyzing	Electrode impedance to check actual media contact Flow simulation to check pulse and communication signal chain for correct scaling Number of sensor measurements (excitations) Transmitter temperature (battery capacity calculation) Low impedance alarm for change in media Flow alarm when defined high flow exceeds Verification mode for fast measure performance check
Insulation test (only Advanced version)	Test of signal immunity against disturbance and bad installation. Test interval is selectable and measurement is interrupted during the test period of 4 min.
Leakage detection (only Advanced version)	Monitoring the lowest flow or volume during selected time window within 24 hours. Leakage is detected over a selectable period where monitored value exceed the possible leakage level. Min and max values are stored with date registration. Last store value visible on the display.
Meter Utilization (only Advanced version)	6 registers for monitoring total time the meter has operated in different flow intervals. Registered intervals are free selectable as % of Q_n (Q3)
Tariff (only Advanced version)	6 tariff registers count the volume delivered within the selected tariff windows, based on time of day or flow rates or a combination. Tariff can also be used for consumption profile where consumption is related to different time intervals or flow rates. Tariff values visible on the display.
Settling date (only Advanced version)	On a predefined date the totalizer 1 index value is stored. Old values are stored to show the latest two totalized 1 index values. Settling values visible on the display.
Statistic (only Advanced version)	Min. flow rate with time and date registration Max. flow rate with time and date registration Min. daily consumption with date registration Max. daily consumption with date registration Latest 7 days total and daily consumption Actual month consumption Latest month consumption
PC Configuration Software PDM	• Meter configuration – online and offline mode • Own parameter settings • Parameter documentation • Print and export of data and parameters PDM 6.0 Service Pack 2 – Basic and Online version

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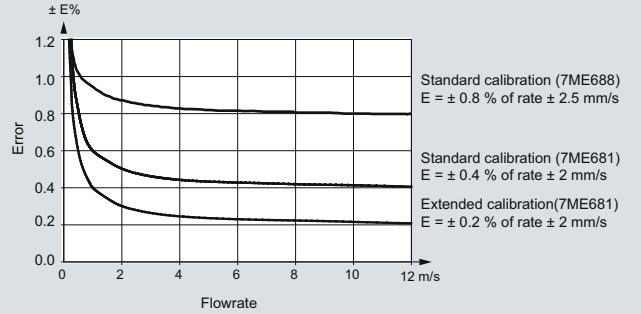
MAG 8000 water meter uncertainty

To ensure continuous accurate measurement, flowmeters must be calibrated. The calibration is conducted at Siemens flow facilities with traceable instruments referring directly to the physical unit of measurement according to the International System of Units (SI).

Therefore, the calibration certificate ensures recognition of the test results worldwide, including the US (NIST traceability).

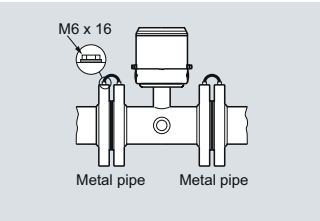
Siemens offers accredited calibrations assured to ISO 17025 in the flow range from 0.0001 m^3/h to 10 000 m^3/h.
Siemens Flow Instruments accredited laboratories are recognized by ILAC MRA (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement) ensuring international traceability and recognition of the test results worldwide.

The selected calibration determines the accuracy of the meter. A standard calibration results in max. ± 0.4 % uncertainty and an extended calibration ± 0.2 % (for MAG 8000 irrigation ± 0.8 %). A calibration certificate follows every sensor and calibration data are stored in the meter unit.



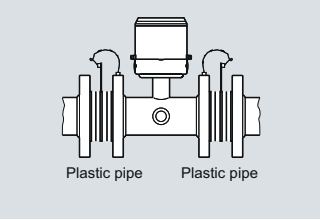
Grounding

The sensor body must be grounded using grounding straps and/or grounding rings to protect the flow signal against stray electrical noise. This ensures that the noise is carried through the sensor body and a noise-free measuring area within the sensor body. For MAG 8000 Irrigation grounding rings on both sides are factory-mounted.



Metal pipes

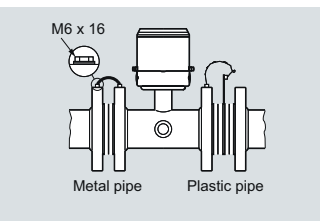
On metal pipes, connect the straps to both flanges.



Plastic pipes

On plastic pipes and lined metal pipes, optional grounding rings must be used at both ends.

Grounding rings has to be ordered separately see „Grounding ring kit“



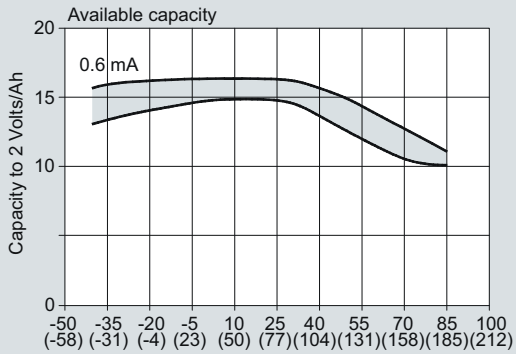
Combination of metal and plastic pipes

A combination of metal and plastic requires straps for metal pipe and grounding rings for plastic pipe.

Battery operation time and calculation

The battery operation time depends on the connected battery pack as well as the operation condition of the meter.

MAG 8000 calculates the remaining capacity every 4 hours and includes all consuming elements. Calculation compensates for temperature influence on battery capacity.



The graphic shows the effect from other temperatures.
A variation in temperature from 15 °C to 55 °C (59 to 131 °F) reduces the capacity by 17 % from 15 Ah to 12.5 Ah.

At typical revenue scenario of expected battery operation time can be seen in the table below.

The measurement for calculating the rest capacity of the battery life time is only completed if the system has no active fatal faults or the empty pipe is active. Maximum battery specification is 10 years operation.

Scenario - Revenue application	
Output A	Pulse rate max. 10 Hz
Output B	Alarm or call-up
Meter dialog	1 hour per month
Add-com	None
Temperature	• 5 % at 0 °C (32 °F) • 80 % at 15 °C (59 °F) • 15 % at 50 °C (122 °F)

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Battery-operated water meter MAG 8000

Battery lifetime (subject to the assumptions mentioned above)

MAG 8000 for abstraction and distribution network applications (7ME6810) and MAG 8000 CT for revenue and bulk metering (7ME6820)								
Excitation frequency (24 h operation)		**1/60 Hz**	**1/30 Hz**	**1/15 Hz**	**1/5 Hz**	**1.5625 Hz**	**3.125 Hz**	**6.25 Hz**
2 D-Cell battery 33 Ah Internal battery pack	DN 25 ... 200 (1" ... 8")	8 years	8 years	6 years	40 months	8 months	4 months	2 months
	DN 250 … 600 (10" ... 24")	8 years	6 years	4 years	20 months	4 months	2 months	N/A
	DN 700 ... 1 200 (28" ... 48")	6 years	4 years	2 years	1 year	2 months	N/A	N/A
4 D-Cell battery 66 Ah External battery pack	DN 25 ... 200 (1" ... 8")	N/A	10 years	10 years	80 months	16 months	8 months	4 months
	DN 250 ... 600 (10" ... 24")	N/A	10 years	10 years	40 months	8 months	4 months	N/A
	DN 700 ... 1 200 (28" ... 48")	10 years	8 years	4 years	2 years	4 months	N/A	N/A

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MAG 8000 for irrigation applications (7ME6880)							
Excitation frequency (24 h operation)		**1/60 Hz**	**1/30 Hz**	**1/15 Hz**	**1/5 Hz**	**1.5625 Hz**	**3.125 Hz**
1 D-Cell battery	DN 50 ... 600 (2" ... 24")	52 months	40 months	25 months	12 months	2 months	1 months
2 D-Cell battery 33 Ah Internal battery pack	DN 50 … 600 (2" ... 24")	8 years	80 months	50 months	24 months	4 months	2 months
4 D-Cell battery 66 Ah Internal battery pack	DN 50 ... 600 (2" ... 24")	10 years	10 years	8 years	48 months	8 months	4 months

MAG 8000 GSM/GPRS battery lifetime scenario	
Transmission once a day and MAG 8000 factory settings	
2 D-Cell battery 33 Ah Internal battery pack	3 years
4 D-Cell battery 66 Ah Internal battery pack	7 years

External battery pack can be used as battery backup for mains power supply (if two cable entries is one cable gland are needed, order cable glands with two entries, see accessories on page 4/133).

Serial RS 232/RS 485 add-on communication modules are designed for mains powered systems as the battery operation time will be reduced. At 1 hour communication per month (all meter data collected 2 times per day) and the module is connected, the operation time is reduced to:

- RS 232 at low excitation frequency to 10 % and at high excitation frequency to 80 % of calculated operation time
- RS 485 at low excitation frequency to 50 % and at high excitation frequency to 90 % of calculated operation time

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MAG 8000 for abstraction and distribution network applications (7ME6810)

Overview

Benefits

- Bury meters, IP 68
- Low cost of ownership
- Long-term stability
- Leak detection
- Low flow measurement

Technical specifications

Meter	
Accuracy	Standard calibration: ± 0.4 % of rate ± 2 mm/s Extended calibration DN 50 ... DN 300 (2" ... 12"): ± 0.2 % of rate ± 2 mm/s
Media conductivity	Clean water > 20 µs/cm
Temperature	
Ambient	-20 ... +60 °C (-4 ... +140 °F)
Media	0 ... 70 °C (32 ... 158 °F)
Storage	-40 ... +70 °C (-40 ... +158 °F)
Enclosure rating	IP68/NEMA 6P; Cable glands mounted requires Sylgard potting kit to remain IP68/NEMA 6P, otherwise IP67/NEMA 4 is obtained; Factory-mounted cable provides IP68/NEMA 6P
Certificates and approvals	
Calibration	2 x 25 % and 2 x 90 %
Drinking water approvals	• NSF/ANSI Standard 61 (cold water) USA • WRAS (BS 6920 cold water) UK • ACS Listed France • DVGW W270 Germany • Belgaqua (B) • MCERTS (GB)
Conformity	• PED: 97/23EC[1)] For pressure/temperature curves see MAG 3100 on page 4/88. • EMC: IEC/EN 61000-6-3, IEC/EN 61000-6-2

Sensor version	DN 25 … 1200 (1" … 48")
Measuring principle	Electromagnetic induction
Excitation frequency	
Basic version	
• Battery-powered	DN 25 ... 150 (1" ... 6"): 1/15 Hz DN 200 … 600 (8" … 24"): 1/30 Hz DN 700 ... 1200 (28“ ... 48“): 1/60 Hz
• Mains-powered	DN 25 ... 150 (1" ... 6"): 6.25 Hz DN 200 … 600 (8" … 24"): 3.125 Hz DN 700 ... 1200 (28“ ... 48“): 1.5625 Hz
Advanced version	
• Battery-powered	DN 25 ... 150 (1" ... 6"): 1/15 Hz (adjustable up to 6.25 Hz; reduced battery lifetime) DN 200 … 600 (8" … 24"): 1/30 Hz (adjustable up to 3.125 Hz; reduced battery lifetime) DN 700 ... 1200 (28“ ... 48“): 1/60 Hz (adjustable up to 1.5625 Hz; reduced battery lifetime)
• Mains-powered	DN 25 ... 150 (1" ... 6"): 6.25 Hz DN 200 … 600 (8" … 24"): 3.125 Hz DN 700 ... 1200 (28“ ... 48“): 1.5625 Hz
Flanges	
EN 1092-1 (DIN 2501)	DN 25 and DN 40 (1" and 1½"): PN 40 (580 psi) DN 50 … 150 (2" … 6"): PN 16 (232 psi) DN 200 … 1200 (8" … 48"): PN 10 or PN 16 (145 psi or 232 psi)
ANSI 16.5 Class 150	1" … 24": 20 bar (290 psi)
AWWA C-207	28" … 48": PN 10 (145 psi)
AS 4087	DN 50 … 1200 (2" … 48"): PN 16 (232 psi)
Liner	EPDM
Electrode and grounding electrodes	Hastelloy C276/2.4819
Grounding straps	Grounding straps are premounted from the factory on each side of the sensor.

[1)] For further information on the PED standard and requirements see page 10/9.

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MAG 8000 for abstraction and distribution network applications (7ME6810)

Selection and Ordering data	Order No.
SITRANS F M MAG 8000 water meter	**7ME6810-** ■■■■■-■■■■
Diameter	
DN 25 (1“)	2D
DN 40 (1½“)	2R
DN 50 (2“)	2Y
DN 65 (2½“)	3F
DN 80 (3“)	3M
DN 100 (4“)	3T
DN 125 (5“)	4B
DN 150 (6“)	4H
DN 200 (8“)	4P
DN 250 (10“)	4V
DN 300 (12“)	5D
DN 350 (14“)	5K
DN 400 (16“)	5R
DN 450 (18“)	5Y
DN 500 (20“)	6F
DN 600 (24“)	6P
DN 700 (28“)[1]	6Y
DN 750 (30“)[1]	7D
DN 800 (32“)[1]	7H
DN 900 (36“)[1]	7M
DN 1000 (40“)[1]	7R
DN 1050 (42“)[1]	7T
DN 1100 (44“)[1]	7V
DN 1200 (48“)[1]	8B
Flange norm and pressure rating	
EN 1092-1	
PN 10 (DN 200 ... 1200 (8" ... 48"))	B
PN 16 (DN 50 ... 1200 (2" ... 48"))	C
PN 16 non-PED (DN 700 .... 1200 (28"... 48"))	D
PN 40 (DN 25 ... 40 (1" ... 1½"))	F
ANSI B16.5	
Class 150	J
AWWA C-207	
Class D (28" ... 48")	L
AS4087	
PN 16 (DN 50 ... 1200 (2" ... 48"))	N
Sensor version	
EPDM liner and Hastelloy electrodes	3
Calibration	
Standard ± 0.4 % of rate ± 2 mm/s	1
Extended ± 0.2 % of rate ± 2 mm/s DN 25... 300 (1" ... 12")	2
Region version	
Europe (m^3, m^3/h, 50 Hz)	1
USA (Gallon, GPM, 60 Hz)	2
Australia (Ml, Ml/d, 50 Hz)	3
Transmitter type and installation	
Basic version integral on sensor	A
Basic version remote, cable mounted on sensor with IP68/NEMA 6P plugs:	
• 5 m (16.4 ft)	B
• 10 m (32.8 ft)	C
• 20 m (65.6 ft)	D
• 30 m (98.4 ft)	E
Advanced version integral on sensor	K
Advanced version remote, cable mounted on sensor with IP68/NEMA 6P plugs:	
• 5 m (16.4 ft)	L
• 10 m (32.8 ft)	M
• 20 m (65.6 ft)	N
• 30 m (98.4 ft)	P

Selection and Ordering data	Order No.
SITRANS F M MAG 8000 water meter	**7ME6810-** ■■■■■-■■■■
Communication interface	
No additional "add-on" communication module installed	A
Serial RS 485 with Modbus RTU (Terminated as end device)	B
Serial RS 232 with Modbus RTU	C
GSM/GPRS module without analog inputs cable	S
GSM/GPRS module with analog inputs cable	T
Power supply	
Internal battery (no battery included)	0
Internal battery pack installed[2]	1
External battery with 1.5 m (4.9 ft) power cable with IP68/NEMA 6P plugs, no battery included	2
12/24 V AC/DC power supply with battery backup and 3 m (9.8 ft) power cable for external connection (no battery included)	3
115 ... 230 V AC power supply with battery backup and 3 m (9.8 ft) power cable for external connection (no battery included)	4

1) The Diameter DN 700 (28") to DN 1200 (48") is only available as remote transmitter type installation.

2) Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs.

Operating instructions for SITRANS F M MAG 8000

Description	Order No.
• English	**A5E03071515**
• German	**A5E00740986**
• Spanish	**A5E00741031**
• French	**A5E00741021**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Operating instructions for MAG 8000 GSM/GPRS communication module

Description	Order No.
• English	**A5E03644134**

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Selection and Ordering data	Order code
Additional information	
Please add **"-Z"** to Order No. and specify Order code(s) and plain text.	
Flow unit	
l/s	**L00**
MGD	**L01**
CFS	**L02**
l/min	**L03**
m^3/min	**L04**
GPM	**L05**
CFM	**L06**
l/h	**L07**
m^3/h	**L08**
GPH	**L09**
CFH	**L10**
GPS	**L11**
Ml/d	**L12**
m^3/d	**L13**
GPD	**L14**
Totalizer Volume calculation (default totalizer 1= forward and totalizer 2 = reverse)	
Totalizer 1 = RV, reverse flow	**L20**
Totalizer 1 = NET, net flow	**L22**
Totalizer 2 = FW, forward flow	**L30**
Totalizer 2 = NET, net flow	**L31**
Volume unit	
m^3	**L40**
Ml	**L41**
G	**L42**
AF	**L43**
l x 100	**L44**
m^3 x 100	**L45**
G x 100	**L46**
CF x 100	**L47**
MG	**L48**
G x 1000	**L49**
CF x 1000	**L50**
Al	**L51**
kl	**L52**
Pulse set up (default pulse A= forward and pulse B = Alarm)	
A function = RV, reverse flow	**L62**
A function = FWnet, forward net flow	**L63**
A function = RVnet, reverse net flow	**L64**
A function = Off	**L65**
Volume per pulse A = x 0.0001	**L70**
Volume per pulse A = x 0.001	**L71**
Volume per pulse A = x 0.01	**L72**
Volume per pulse A = x 0.1	**L73**
Volume per pulse A = x 1	**L74**
B function = FW, forward flow	**L80**
B function = RV, verse flow	**L81**
B function = FWnet, forward net flow	**L82**
B function = RVnet, reverse net flow	**L83**
B function = Alarm	**L84**
B function = Call up	**L85**
Volume per pulse B = x 0.0001	**L90**
Volume per pulse B = x 0.001	**L91**
Volume per pulse B = x 0.01	**L92**
Volume per pulse B = x 0.1	**L93**
Volume per pulse B = x 1	**L94**

Selection and Ordering data	Order code
Additional information	
Please add **"-Z"** to Order No. and specify Order code(s) and plain text.	
Data logger set up (default month logging)	
DataloggerInterval = Daily	**M31**
DataloggerInterval = Weekly	**M32**
Factory mounted cables	
5 m (16.4 ft) pulse cable A+B	**M81**
5 m (16.4 ft) communication cable RS 232/RS 485 terminated as end device	**M82**
20 m (65.6 ft) pulse cable A+B	**M84**
20 m (65.6 ft) communication cable RS 232/RS 485 terminated as end device	**M85**
Cello 2 channel, input cable 3 m (9.84 ft) with Brad Harrison micro-change 3 way connector	**M87**
Cello 2 channel, input cable 5 m (16.4 ft) with MIL-C-26482 spec. connectors	**M89**
SOFREL data logger cable 2 m with connector for SOFREL GSM module	**M92**

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MAG 8000 CT for revenue and bulk metering (7ME6820)

Overview

Benefits

- MI-001, OIML R 49/OIML R49 MAA
- Measurement in both directions
- Bury meters, IP 68
- Long-term stability/accuracy
- No moving parts - no maintenance
- Insignificant pressure drop
- Connectable to most common AMR systems
- Low flow measurement

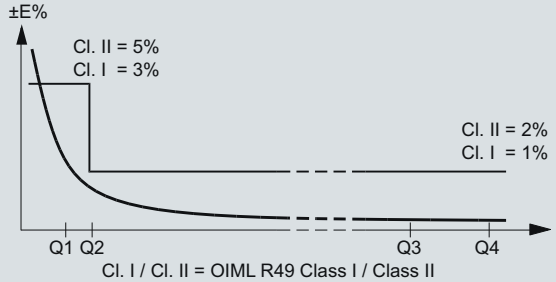
Technical specifications

Meter	
Accuracy (standard calibration)	OIML R 49 for DN 50 ... DN 300 (2" ... 12"), Class I and II with turn down up to Q3/Q1 = 400 at Q2/Q1 =1.6 MI-001 verification for DN 50 … DN 400 (2" ... 16"), Class II with turn down ratio Q3/Q1 = 250, Q3/Q1 = 200 or Q3/Q1 = 160 at Q2/Q1 = 1.6
Media conductivity	Clean water > 20 µs/cm
Temperature	
Ambient	-20 ... +60 °C (-4 ... +140 °F)
Media	0.1 ... 50 °C (32 ... 122 °F)
Storage	-40 ... +70 °C (-22 ... +158 °F)
Enclosure rating	IP68/NEMA 6P Cable glands mounted requires Sylgard potting kit to remain IP68/NEMA 6P, otherwise IP67/NEMA 4 is obtained; Factory-mounted cable provides IP68/NEMA 6P
Certificates and approvals	
Calibration	2 x 25 % and 2 x 90 %
Drinking water approvals	• NSF/ANSI Standard 61 (cold water) USA • WRAS (BS 6920 cold water) UK • ACS Listed France • DVGW W270 Germany • Belgaqua (B) • MCERTS (GB)
Custody transfer approval	• OIML R 49 and OIML R 49 MAA approval (DN 50 ... DN 300 (2" ... 12")) • MI-001 approval (DN 50 ... DN 400 (2" ... 16")) (Number: DK-0200-MI-001-002 and DK-0200-MI-001-011)
Conformity	• CEN EN 14154, ISO 4064 • PED: 97/23/EC[1)] For pressure/temperature curves, see MAG 3100 on page 4/88. • EMC: IEC/EN 61000-6-3, IEC/EN 61000-6-2
Sensor version	DN 50 ... 600 (2" ... 24")
Measuring principle	Electromagnetic induction
Excitation frequency	
Basic version	
• Battery-powered	DN 50 ... 150 (2" ... 6"): 1/15 Hz DN 200 … 600 (8" … 24"): 1/30 Hz
• Mains-powered	DN 50 ... 150 (2" ... 6"): 6.25 Hz DN 200 … 600 (8" … 24"): 3.125 Hz
Advanced version	
• Battery-powered	DN 50 ... 150 (2" ... 6"): 1/15 Hz (adjustable up to 6.25 Hz; reduced battery lifetime) DN 200 … 600 (8" … 24"): 1/30 Hz (adjustable up to 3.125 Hz; reduced battery lifetime)
• Mains-powered	DN 50 ... 150 (2" ... 6"): 6.25 Hz DN 200 … 600 (8" … 24"): 3.125 Hz
Flanges	
EN 1092-1 (DIN 2501)	DN 50 … 150 (2" … 6"): PN 16 (232 psi) DN 200 … 300 (8" … 12"): PN 10 or PN 16 (145 psi or 232 psi) up to DN 600 (24") in preparation
ANSI 16.5 Class 150	2" … 12": 20 bar (290 psi) up to DN 600 (24") in preparation
AWWA C-207	28" … 48": PN 10 (145 psi)
AS 4087	DN 50 … 300 (2" … 12"): PN 16 (232 psi) up to DN 600 (24") in preparation
Liner	EPDM
Electrode and grounding electrodes	Hastelloy C276/2.4819
Grounding straps	Grounding straps are premounted from the factory on each side of the sensor

[1)] For further information on the PED standard and requirements see page 10/9.

MAG 8000 CT (Revenue program) water meter type approval

MAG 8000 CT program is type approved and verified according to international water meter standard OIML R 49. The Custody Transfer program is approved as Class I and Class II, for the sensor program from DN 50 to DN 300, at different Q3 and Q3/Q1. Q2/Q1 = 1.6 and follows OIML R 49 specification.



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OIML R 49 approval specification for Class I (1 %)[1)]

Size	50 (2“)	65 (2½“)	80 (3“)	100 (4“)	125 (5“)	150 (6“)	200 (8“)	250 (10“)	300 (12“)
„R“ Q3/Q1	250	250	250	250	250	250	250	250	160
Q4 [m^3/h]	78.75	125	200	312.5	500	787.5	1250	2000	2000
Q3 [m^3/h]	**63**	**100**	**160**	**250**	**400**	**630**	**1000**	**1600**	**1600**
Q2 [m^3/h]	0.40	0.64	1.00	1.60	2.50	4.00	6.40	10.0	16.0
Q1 [m^3/h]	0.25	0.40	0.63	1.00	1.60	2.50	4.00	6.40	10.0

OIML R 49 approval specification for Class II (2 %)[1)]

Size	50 (2“)	65 (2½“)	80 (3“)	100 (4“)	125 (5“)	150 (6“)	200 (8“)	250 (10“)	300 (12“)
„R“ Q3/Q1	400	400	400	400	400	400	400	400	250
Q4 [m^3/h]	78.75	125	200	312.5	500	787.5	1250	2000	2000
Q3 [m^3/h]	**63**	**100**	**160**	**250**	**400**	**630**	**1000**	**1600**	**1600**
Q2 [m^3/h]	0.25	0.40	0.63	1.00	1.60	2.50	4.00	6.40	10.0
Q1 [m^3/h]	0.16	0.25	0.40	0.63	1.00	1.60	2.50	4.00	6.40

[1)] The product will be delivered according to requested specifications, which may deviate from the specifications of the approval frame described in tables below.

4

MAG 8000 CT (Revenue program) MI-001

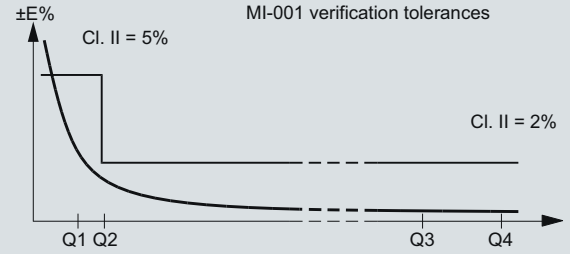
MAG 8000 CT program is type approved according to international water meter standard OIML R 49. Since the first November 2006 the MI-001 water meter directive is in force, which means that all water meters can be sold across the EU borders if the water meters contain a MI-001 label.

The MAG 8000 CT MI-001 verified and labeled products are a Class II aproval according to Directive 2004/22/EC of the European Parliament and Council of March 31, 2004 on measuring instruments (MID), Annex MI-001 in the sizes from DN 50 to DN 400.

The MID certification is obtained as a B + D module approval according to the above mentioned directive.

Module B : Type approval according to OIML R 49

Module D : Quality insurance approval of production



MAG 8000 CT MI-001 verified and labeled products at a given Q3 and Q3/Q4 = 1.25 and Q2/Q1 = 1.6 measuring ranges see below table:

7ME6820-xxx1	DN 50 (2“)	DN 65 (2½“)	DN 80 (3“)	DN 100 (4“)	DN 125 (5“)	DN 150 (6“)	DN 200 (8“)	DN 250 (10“)	DN 300 (12“)	DN 350 (14“)	DN 400 (16“)
„R“ Q3/Q1	25	25	25	25	25	25	25	25	25	25	25
Q4 [m^3/h]	20	31.25	50	78.75	125	200	312.5	500	750	1250	1250
Q3 [m^3/h]	**16**	**25**	**40**	**63**	**100**	**160**	**250**	**400**	**630**	**1000**	**1000**
Q2 [m^3/h]	0.96	1.60	2.60	4.03	6.40	10.24	16.00	25.60	38.4	64.0	64.0
Q1 [m^3/h]	0.60	1.00	1.60	2.52	4.00	6.40	10.00	16.00	24.0	40.0	40.0

7ME6820-xxx2	DN 50 (2“)	DN 65 (2½“)	DN 80 (3“)	DN 100 (4“)	DN 125 (5“)	DN 150 (6“)	DN 200 (8“)	DN 250 (10“)	DN 300 (12“)	DN 350 (14“)	DN 400 (16“)
„R“ Q3/Q1	63	63	63	63	63	63	63	63	63	63	63
Q4 [m^3/h]	20	31.25	50	78.75	125	200	312.5	500	750	1250	1250
Q3 [m^3/h]	**16**	**25**	**40**	**63**	**100**	**160**	**250**	**400**	**630**	**1000**	**1000**
Q2 [m^3/h]	0.41	0.63	1.02	1.60	2.54	4.06	6.35	10.16	16.00	25.4	25.4
Q1 [m^3/h]	0.25	0.40	0.63	1.00	1.59	2.54	3.97	6.35	10.00	15.9	15.9

7ME6820-xxx3	DN 50 (2“)	DN 65 (2½“)	DN 80 (3“)	DN 100 (4“)	DN 125 (5“)	DN 150 (6“)	DN 200 (8“)	DN 250 (10“)	DN 300 (12“)	DN 350 (14“)	DN 400 (16“)
„R“ Q3/Q1	80	80	80	80	80	80	80	80	80	80	80
Q4 [m^3/h]	20	31.25	50	78.75	125	200	312.5	500	750	1250	1250
Q3 [m^3/h]	**16**	**25**	**40**	**63**	**100**	**160**	**250**	**400**	**630**	**1000**	**1000**
Q2 [m^3/h]	0.32	0.50	0.80	1.20	2.00	3.20	5.00	8.00	12.6	20.0	20.0
Q1 [m^3/h]	0.20	0.31	0.50	0.75	1.25	2.00	3.13	5.00	7.88	12.5	12.5

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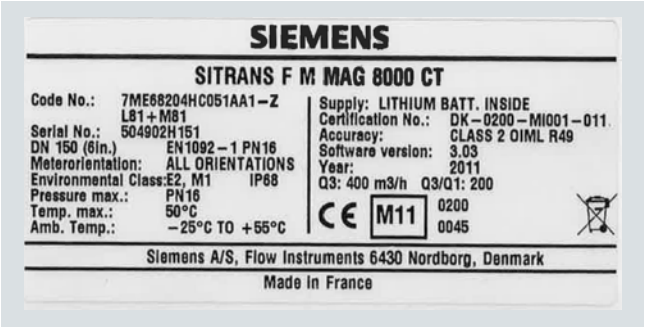
MAG 8000 CT for revenue and bulk metering (7ME6820)

7ME6820-xxx4	DN 50 (2“)	DN 65 (2½“)	DN 80 (3“)	DN 100 (4“)	DN 125 (5“)	DN 150 (6“)	DN 200 (8“)	DN 250 (10“)	DN 300 (12“)	DN 350 (14“)	DN 400 (16“)
„R“ Q3/Q1	160	160	160	160	160	160	160	160	160	160	160
Q4 [m^3/h]	50	78.75	125	200	312.5	500	787.5	1250	2000	2000	2000
Q3 [m^3/h]	**40**	**63**	**100**	**160**	**250**	**400**	**630**	**1000**	**1600**	**1600**	**1600**
Q2 [m^3/h]	0.40	0.63	1.00	1.60	2.50	4.00	6.30	10.00	16.00	16.00	16.00
Q1 [m^3/h]	0.25	0.39	0.63	1.00	1.56	2.50	3.94	6.25	10.00	10.00	10.00

7ME6820-xxx5	DN 50 (2“)	DN 65 (2½“)	DN 80 (3“)	DN 100 (4“)	DN 125 (5“)	DN 150 (6“)	DN 200 (8“)	DN 250 (10“)	DN 300 (12“)	DN 350 (14“)	DN 400 (16“)
„R“ Q3/Q1	200	200	200	200	200	200	200	200	200	200	-
Q4 [m^3/h]	50	78.75	125	200	312.5	500	787.5	1250	2000	2000	-
Q3 [m^3/h]	**40**	**63**	**100**	**160**	**250**	**400**	**630**	**1000**	**1600**	**1600**	**-**
Q2 [m^3/h]	0.32	0.50	0.80	1.28	2.00	3.20	5.04	8.00	12.80	12.80	-
Q1 [m^3/h]	0.20	0.32	0.50	0.80	1.25	2.00	3.15	5.00	8.00	8.00	-

7ME6820-xxx6	DN 50 (2“)	DN 65 (2½“)	DN 80 (3“)	DN 100 (4“)	DN 125 (5“)	DN 150 (6“)	DN 200 (8“)	DN 250 (10“)	DN 300 (12“)	DN 350 (14“)	DN 400 (16“)
„R“ Q3/Q1	250	250	250	250	250	250	250	250	250	-	-
Q4 [m^3/h]	50	78.75	125	200	312.5	500	787.5	1250	2000	-	-
Q3 [m^3/h]	**40**	**63**	**100**	**160**	**250**	**400**	**630**	**1000**	**1600**	**-**	**-**
Q2 [m^3/h]	0.26	0.40	0.64	1.02	1.60	2.56	4.00	6.40	10.24	-	-
Q1 [m^3/h]	0.16	0.25	0.40	0.64	1.00	1.60	2.52	4.00	6.40	-	-

The Label is placed on the side of the encapsulation.
An example of the product label is shown below:



Installation conditions

Please refer to “System information SITRANS F M electromagnetic flowmeters”.

Battery operation time and calculation

The battery operation time depends on the connected battery pack as well as the operation condition of the meter.

MAG 8000 calculates the remaining capacity every 4 hours and includes all consuming elements. Calculation compensates for temperature influence on battery capacity (drawing).

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Selection and Ordering data	Order No.
SITRANS F M	
MAG 8000 CT water meter with EPDM liner and Hastelloy electrodes	**7ME6820-**
	0 -
Diameter	
DN 50 (2")	**2Y**
DN 65 (2½")	**3F**
DN 80 (3")	**3M**
DN 100 (4")	**3T**
DN 125 (5")	**4B**
DN 150 (6")	**4H**
DN 200 (8")	**4P**
DN 250 (10")	**4V**
DN 300 (12")	**5D**
DN 350 (14")	**5K**
DN 400 (16")	**5R**
DN 450 (18")[1]	**5Y**
DN 500 (20")[1]	**6F**
DN 600 (24")[1]	**6P**
Flange norm and pressure rating	
EN 1092-1	
PN 16	**C**
ANSI B16.5	
Class 150	**J**
AS4087	
PN 16	**N**
Approval/Verification[3]	
Without verification according to OIML R 49[4]	**0**
MI-001 Q3/Q1 = 25	**1**
MI-001 Q3/Q1 = 63	**2**
MI-001 Q3/Q1 = 80	**3**
MI-001 Q3/Q1 = 160	**4**
MI-001 Q3/Q1 = 200	**5**
MI-001 Q3/Q1 = 250	**6**
Without verification calibrated to OIML R 49-Class II (Q3/Q1 = 100)	**7**
Without verification calibrated to OIML R 49-Class II (Q3/Q1 = 250)	**8**
Region version	
Europe (m^3, m^3/h, 50 Hz)	**1**
USA (m^3, m^3/h, 60 Hz)	**2**
Transmitter type and installation	
Basic version integral on sensor	**A**
Basic version remote, 5 m (16.4 ft) mounted cable on sensor with IP68/NEMA 6P plugs	**B**
Do - 10 m (32.8 ft)	**C**
Do - 20 m (65.6 ft)	**D**
Do - 30 m (98.4 ft)	**E**
Advanced version integral on sensor	**K**
Advanced version remote, 5 m mounted cable on sensor with IP68/NEMA 6P plugs	**L**
Do - 10 m (32.8 ft)	**M**
Do - 20 m (65.6 ft)	**N**
Do - 30 m (98.4 ft)	**P**

Selection and Ordering data	Order No.
SITRANS F M	
MAG 8000 CT water meter with EPDM liner and Hastelloy electrodes	**7ME6820-**
	0 -
Communication interface	
No additional "add-on" communication module installed	**A**
Serial RS 485 with Modbus RTU (Terminated as end device)	**B**
Serial RS 232 with Modbus RTU	**C**
Encoder interface for ITRON 200WP radio with "Sensus" protocol"	**D**
GSM/GPRS module without analog inputs cable	**S**
GSM/GPRS module with analog inputs cable	**T**
Power supply	
Internal battery (no battery included)	**0**
Internal battery pack installed[2]	**1**
External battery with 1.5 m (4.9 ft) power cable with IP68/NEMA 6P plugs, no battery included	**2**
12/24 V AC/DC power supply with battery backup and 3 m (9.8 ft) power cable for external connection (no battery included)	**3**
115 ... 230 V AC power supply with battery backup and 3 m (9.8 ft) power cable for external connection. (no battery included)	**4**

1) Under preparation.
2) Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs.
3) For more details and references of the ranges please see the tables on pages 4/123 and 4/124.
4) Standard calibration

Operating instructions for SITRANS F M MAG 8000

Description	Order No.
• English	**A5E03071515**
• German	**A5E00740986**
• Spanish	**A5E00741031**
• French	**A5E00741021**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.
All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Operating instructions for MAG 8000 GSM/GPRS communication module

Description	Order No.
• English	**A5E03644134**

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MAG 8000 CT for revenue and bulk metering (7ME6820)

Selection and Ordering data	Order code
Additional information	
Please add **"-Z"** to Order No. and specify Order code(s) and plain text.	
Totalizer Volume calculation (default totalizer 1= forward and totalizer 2 = reverse)	
Totalizer 1 = RV, reverse flow	**L20**
Totalizer 1 = NET, net flow	**L22**
Totalizer 2 = FW, forward flow	**L30**
Totalizer 2 = NET, net flow	**L31**
Pulse set up (default pulse A= forward and pulse B = Alarm)	
A function = RV, reverse flow	**L62**
A function = FWnet, forward net flow	**L63**
A function = RVnet, reverse net flow	**L64**
A function = Off	**L65**
Volume per pulse A = x 0.001	**L71**
Volume per pulse A = x 0.01	**L72**
Volume per pulse A = x 0.1	**L73**
Volume per pulse A = x 1	**L74**
B function = FW, forward flow	**L80**
B function = RV, reverse flow	**L81**
B function = FWnet, forward net flow	**L82**
B function = RVnet, reverse net flow	**L83**
B function = Alarm	**L84**
B function = Call up	**L85**
Volume per pulse B = x 0.001	**L91**
Volume per pulse B = x 0.01	**L92**
Volume per pulse B = x 0.1	**L93**
Volume per pulse B = x 1	**L94**
Data logger set up (default month logging)	
DataloggerInterval = Daily	**M31**
DataloggerInterval = Weekly	**M32**
Factory mounted cables	
5 m (16.4 ft) pulse cable A+B	**M81**
5 m (16.4 ft) communication cable RS 232/RS 485 terminated as end device	**M82**
20 m (65.6 ft) pulse cable A+B	**M84**
20 m (65.6 ft) communication cable RS 232/RS 485 terminated as end device	**M85**
Cello 2 channel, input cable 3 m (9.84 ft) with Brad Harrison micro-change 3 way connector	**M87**
Cello 2 channel, input cable 5 m (16.4 ft) with MIL-C-26482 spec. connectors	**M89**
5 ft. Encoder interface cable with connector for ITRON 200WP radio	**M91**
25 ft. Encoder interface cable with connector for ITRON 200WP radio	**M90**
SOFREL data logger cable 2 m with connector for SOFREL GSM module	**M92**

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Overview

Benefits

- Tamper-proof
- No maintenance
- Long-term stability/accuracy
- Connectable to most common AMR systems
- Custody transfer approval

Technical specifications

Meter	
Accuracy	± 0.8 % ± 2.5 mm/s
Media conductivity	Clean water > 20 µs/cm
Temperature	
Ambient	-20 ... +60 °C (-4 ... +140 °F)
Media	0 ... 70 °C (32 ... 158 °F)
Storage	-40 ... +70 °C (-40 ... +158 °F)
Enclosure rating	IP68/NEMA 6P rating Cable glands mounted requires Sylgard potting kit to remain IP68/NEMA 6P, otherwise IP67/NEMA 4 is obtained; Factory-mounted cable provides IP68/NEMA 6P rating
Approvals	
Drinking water approvals	• ANSI/NSF 61 (cold water) USA • WRAS (BS 6920 cold water) UK
Custody transfer approval	NMI10 Australia (under preparation)
Conformity	IEC/EN 61000-6-3, IEC/EN 61000-6-2
Flanges	
Drilled to:	
• EN 1092-1 (DIN 2501) PN 10	DN 50 ... 600 (2" ... 24") (max. pressure 7 bar (101.5 psi))
• ANSI 16.5 Class 150	2" ... 24" (max. pressure 7 bar (101.5 psi))
• AS 2091-1 Table D	DN 50 ... 600 (2" ... 24") (max. pressure 7 bar (101.5 psi))
Excitation frequency	
Battery-powered	DN 50 … 600 (2" … 24"): 1/15 Hz
Mains-powered	DN 50 … 600 (2" … 24"): 3.125 Hz
Liner	Ebonite
Electrodes	Stainless steel

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MAG 8000 for irrigation applications (7ME6880)

Selection and Ordering data	Order No.
SITRANS F M MAG 8000 water meter including factory-mounted grounding rings	**7ME6880-**
	■■■■**0**-■■■■
Diameter	
DN 50 (2“)	**2Y**
DN 65 (2½“)	**3F**
DN 80 (3“)	**3M**
DN 100 (4“)	**3T**
DN 125 (5“)	**4B**
DN 150 (6“)	**4H**
DN 200 (8“)	**4P**
DN 250 (10“)	**4V**
DN 300 (12“)	**5D**
DN 350 (14“)	**5K**
DN 400 (16“)	**5R**
DN 450 (18“)	**5Y**
DN 500 (20“)	**6F**
DN 600 (24“)	**6P**
Flange norm and pressure rating	
EN 1092-1 drilled pattern PN 10/max. 7 bar (101 psi)	**B**
ANSI B16.5 drilled pattern Cl 150/max. 7 bar (101 psi)	**J**
AS2129 drilled pattern table D/max. 7 bar (101 psi)	**M**
Sensor version	
Ebonite liner and stainless steel electrodes	**4**
Region version	
Europe (m^3, m^3/h, 50 Hz)	**1**
USA (Gallon, GPM, 60 Hz)	**2**
Australia (Ml, Ml/d, 50 Hz)	**3**
Transmitter type and installation	
Basic version integral on sensor	**A**
Basic version remote, 2 m (6.56 ft) mounted cable on sensor with IP68/NEMA 6P plugs	**T**
Do - 5 m (16.4 ft)	**B**
Do - 10 m (32.8 ft)	**C**

Selection and Ordering data	Order No.
SITRANS F M MAG 8000 water meter including factory-mounted grounding rings	**7ME6880-**
	■■■■**0**-■■■■
Communication interface	
No additional "add-on" communication module installed	**A**
Serial RS 485 with Modbus RTU (Terminated as end device)	**B**
Serial RS 232 with Modbus RTU	**C**
Encoder inferface	**D**
Power supply	
Internal battery (no battery included)	**0**
Internal battery pack installed 2 D-cell[1)]	**1**
External battery with 1.5 m (4.9 ft) power cable with IP68/NEMA 6P plugs, no battery included	**2**
12/24 V AC/DC power supply with battery backup and 3 m (9.8 ft) power cable for external connection (no battery included)	**3**
115 ... 230 V AC power supply with battery backup and 3 m (9.8 ft) power cable for external connection (no battery included)	**4**
Internal battery pack installed 1 D-cell[1)]	**5**

[1)] Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs.

Operating instructions for SITRANS F M MAG 8000

Description	Order No.
• English	**A5E03071515**
• German	**A5E00740986**
• Spanish	**A5E00741031**
• French	**A5E00741021**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

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Selection and Ordering data	Order code
Additional information	
Please add **"-Z"** to Order No. and specify Order code(s) and plain text.	
Flow unit	
l/s	**L00**
MGD	**L01**
CFS	**L02**
l/min	**L03**
m^3/min	**L04**
GPM	**L05**
CFM	**L06**
l/h	**L07**
m^3/h	**L08**
GPH	**L09**
CFH	**L10**
GPS	**L11**
Ml/d	**L12**
m^3/d	**L13**
GPD	**L14**
Totalizer Volume calculation (default totalizer 1= forward and totalizer 2 = reverse)	
Totalizer 1 = RV, reverse flow	**L20**
Totalizer 1 = NET, net flow	**L22**
Totalizer 2 = FW, forward flow	**L30**
Totalizer 2 = NET, net flow	**L31**
Volume unit	
m^3	**L40**
Ml	**L41**
G	**L42**
AF	**L43**
l x 100	**L44**
m^3 x 100	**L45**
G x 100	**L46**
CF x 100	**L47**
MG	**L48**
G x 1000	**L49**
CF x 1000	**L50**
Al	**L51**
kl	**L52**
Pulse set up (default pulse A= forward and pulse B = Alarm)	
A function = RV, reverse flow	**L62**
A function = FWnet, forward net flow	**L63**
A function = RVnet, reverse net flow	**L64**
A function = Off	**L65**
Volume per pulse A = x 0.0001	**L70**
Volume per pulse A = x 0.001	**L71**
Volume per pulse A = x 0.01	**L72**
Volume per pulse A = x 0.1	**L73**
Volume per pulse A = x 1	**L74**
B function = FW, forward flow	**L80**
B function = RV, verse flow	**L81**
B function = FWnet, forward net flow	**L82**
B function = RVnet, reverse net flow	**L83**
B function = Alarm	**L84**
B function = Call up	**L85**
Volume per pulse B = x 0.0001	**L90**
Volume per pulse B = x 0.001	**L91**
Volume per pulse B = x 0.01	**L92**
Volume per pulse B = x 0.1	**L93**
Volume per pulse B = x 1	**L94**

Selection and Ordering data	Order code
Additional information	
Please add **"-Z"** to Order No. and specify Order code(s) and plain text.	
Data logger set up (default month logging)	
DataloggerInterval = Daily	**M31**
DataloggerInterval = Weekly	**M32**
Factory mounted cables	
5 m (16.4 ft) pulse cable A+B	**M81**
5 m (16.4 ft) communication cable RS 232/RS 485 terminated as end device	**M82**
20 m (65.6 ft) pulse cable A+B	**M84**
20 m (65.6 ft) communication cable RS 232/RS 485 terminated as end device	**M85**
Cello 2 channel, input cable 3 m (9.84 ft) with Brad Harrison micro-change 3 way connector	**M87**
Cello 2 channel, input cable 5 m (16.4 ft) with MIL-C-26482 spec. connectors	**M89**
5 ft Encoder interface cable with connector for ITRON 200WP radio	**M91**
25 ft Encoder interface cable with connector for ITRON 200WP radio	**M90**
SOFREL data logger cable 2 m with connector for SOFREL GSM module	**M92**

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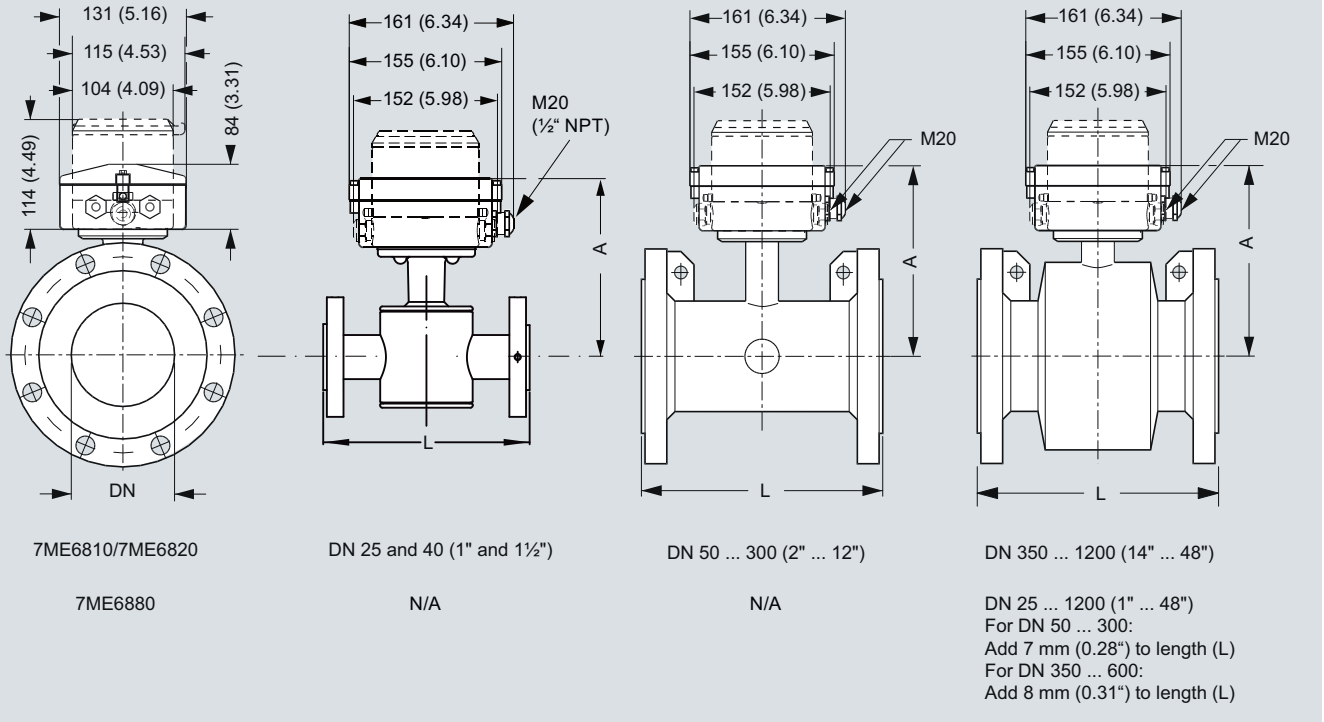
Battery-operated water meter MAG 8000

Dimensional drawings



7ME6810/7ME6820

7ME6880

DN 25 and 40 (1" and 1½")

N/A

DN 50 ... 300 (2" ... 12")

N/A

DN 350 ... 1200 (14" ... 48")

DN 25 ... 1200 (1" ... 48")
For DN 50 ... 300:
Add 7 mm (0.28") to length (L)
For DN 350 ... 600:
Add 8 mm (0.31") to length (L)

Dimensions in mm (inch)

Nominal DN size	A	L, lenghts						Weight[1]	
	EPDM (7ME6810 and 7ME6820)	EN 1092-1 PN 10	EN 1092-1 PN 16/ PN 16 non-PED	EN 1092-1 PN 40	ANSI 16.5 Class 150	AS 4087 PN 16	AWWA C-207 Class D		
mm (inch)	mm (inch)	mm	mm	mm	inch	mm	mm	kg	lbs
25 (1)	194 (7.7)	-	-	200	7.9	200	-	6	13
40 (1½)	204 (8.1)	-	-	200	7.9	200	-	9	20
50 (2)	195 (7.7)	-	200	-	7.9	200	-	11	25
65 (2½)	201 (8)	-	200	-	7.9	200	-	13	29
80 (3)	207 (8.2)	-	200	-	7.9	200	-	15	34
100 (4)	214 (8.5)	-	250	-	9.8	250	-	17	38
125 (5)	224 (8.9)	-	250	-	9.8	250	-	22	50
150 (6)	239 (9.5)	-	300	-	11.8	300	-	28	63
200 (8)	264 (10.5)	350	350	-	13.8	350	-	50	113
250 (10)	291 (11.5)	450	450	-	17.7	450	-	71	160
300 (12)	317 (12.6)	500	500	-	19.7	500	-	88	198
350 (14)	369 (14.6)	550	550	-	21.7	550	-	127	279
400 (16)	394 (15.6)	600	600	-	23.6	600	-	145	318
450 (18)	425 (16.8)	600	600	-	23.6	600	-	175	384
500 (20)	450 (17.8)	600	600	-	26.8	600	-	225	494
600 (24)	501 (19.8)	600	600	-	32.3	600	-	340	747
700 (28)	544 (21.4)	700	875/700	-	N/A	N/A	700	316	694
750 (30)	571 (22.5)	N/A	N/A	-	N/A	N/A	750	N/A	N/A
800 (32)	606 (23.9)	800	1000/800	-	N/A	N/A	800	398	1045
900 (36)	653 (25.7)	900	1125/900	-	N/A	N/A	900	476	1045
1000 (40)	704 (27.7)	1000	1250/1000	-	N/A	N/A	1000	602	1322
1050 (42)	704 (27.7)	N/A	N/A	-	N/A	N/A	1050	N/A	N/A
1100 (44)	755 (29.7)	N/A	N/A	-	N/A	N/A	1100	N/A	N/A
1200 (48)	810 (31.9)	1200	1500/1200	-	N/A	N/A	1200	887	1996

[1] For remote version the sensor weight is reduced with 2 kg (4.5 lb)

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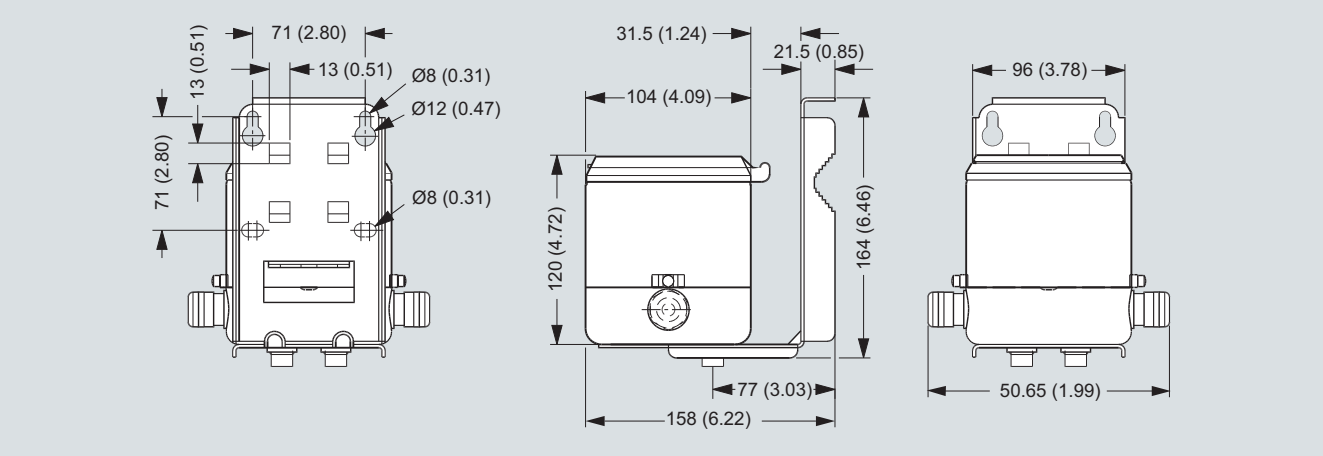
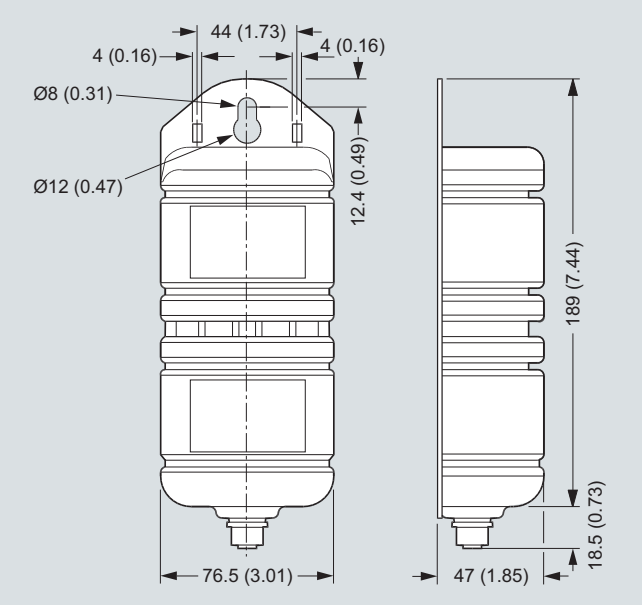
Remote version



Dimensions in mm (inch), weight 3.5 kg (8 lbs)

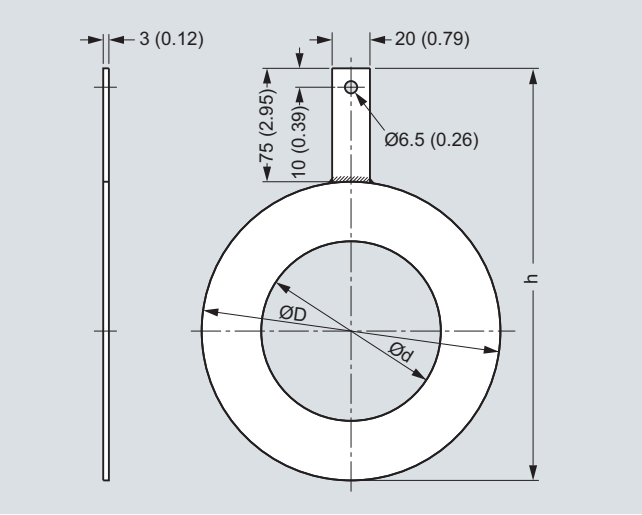
External battery pack



Dimensions in mm (inch), weight 2.0 kg (4.5 lbs)

Battery pack has to be mounted in upwards position to ensure maximum battery capacity.

Grounding rings



Dimensions in mm (inch) for grounding rings MAG 8000 with EPDM lining (7ME6810 and 7ME6820) DN 25 to DN 300

Dimension	Internal diameter (d)	Outside diameter (D)	h
DN 25	27	68	143
DN 40	38	88	163
DN 50	52	100	175
DN 65	64	120	195
DN 80	79	133	208
DN 100	95	158	233
DN 125	115	188	263
DN 150	145	216	336
DN 200	193	268	343
DN 250	246	324	399
DN 300	295	374	449

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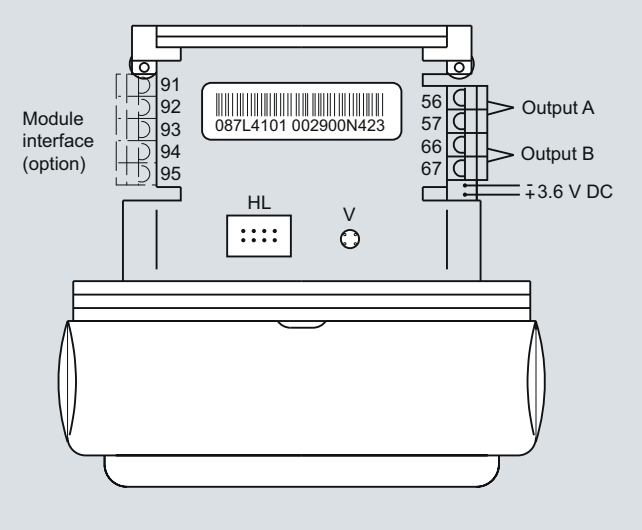
Battery-operated water meter MAG 8000

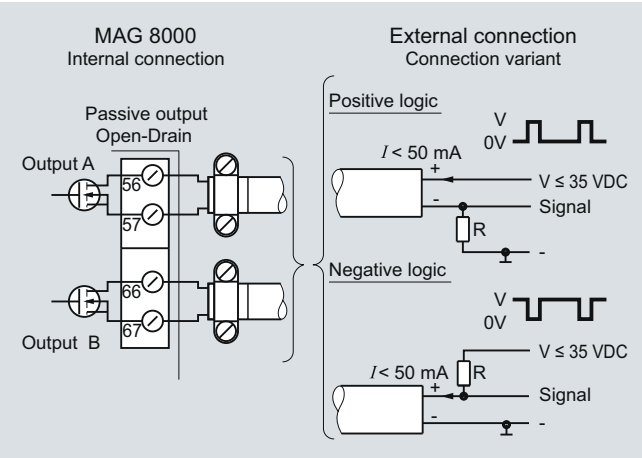
Schematics

Electrical installation and pulse output – Connection diagram



HL = Hardware lock key connection
V = Push button for verification mode

Pulse wire connection



The pulse output can be configured as volume, alarm or call-up. The output can be connected as positive or negative logic. R = pull up/down is selected in relation to the Vx power supply and with a max. current I of 50 mA.

Use shielded cable to avoid EMC problems. Make sure the shield is correctly mounted under the cable clamp (no pig tail).

MAG 8000 GSM/GPRS Wireless Communication Module

The MAG 8000 GSM/GPRS wireless communication module provides the latest mobile technology using a Quad Band (850/900/1800/1900 MHz) module.

The GSM/GPRS module logs data from the MAG 8000 memory and from the two analog inputs (one 4 to 20 mA not powered by the module and one 5 V ratiometric powered by the module) and storage in the internal memory and later transmit it into a system or PC via email or SMS.

An additional synchronization function secures the initial collection time of the data independent of the sample rate used (minimum collection time: 1 per minute).

The package of information retrieved via the csv file includes:

- Time stamp
- Flow rate
- Tot 1
- Tot 2
- Tot 3
- Analog 1
- Analog 2
- Battery
- Alarms

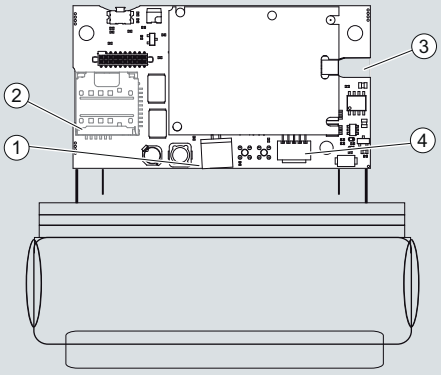
The GPRS technology makes it possible to send a higher amount of data via email. The data is secured using a POP 3 server configuration avoiding encryptions that require additional software. The configuration of the module is performed via SMS commands that allow you to define the users, email accounts, transmission settings, collection, etc.

The GSM/GPRS module is a compact built-in solution which can be installed in the existing MAG 8000 with SW version 3.02 and higher.

The battery lifetime will depend on signal strength and especially on the number of transmissions. Therefore we recommend an optimal setting of transmission once a day (see page 4/118). The module also includes the same power management algorithm that secures a very good calculation of the remaining battery lifetime.

The module has an OPC server to retrieve the data, securing a complete and open integration on any kind of system that the customer may already have.

Schematics



1 Rechargeable battery inlet
2 SIM card slot
3 GSM/GPRS antenna connector
4 Analog inputs inlet

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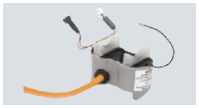
Battery-operated water meter MAG 8000

Accessories

Description	Order No.	
PC Flow Tool on CD (Download for free from www.siemens.com/flow)	◆ **FDK-087L6001**	
IrDA infrared interface adapter with USB for data acquisition with 1.2 m (3.9 ft) cable	◆ **FDK-087L4163**	
Battery backup for mains power supply, 1 pc. D-cell (3.6 V, 16.5 Ah)[1]	◆ **A5E03354392**	
Rechargeable Lithium battery for MAG 8000 GSM/GPRS communication module	◆ **A5E03436686**	
Internal battery pack, one set of 2 D-cell (3.6 V 33 Ah) and accessories for replacement[1]. Order cable FDK-087L4152 separately.	◆ **FDK-087L4150**	
External battery pack IP68/NEMA 6P with connector, 4 D-cell (3.6 V 66 Ah)[1]	◆ **FDK-087L4151**	
Mains power supply 12 ... 24 V AC/DC with battery backup and 3 m (9.8 ft) power cable for external connection (no battery included)	**FDK-087L4210**	
Mains power supply 115 ... 230 V AC with battery backup up and 3 m (9.8 ft) power cable for external connection (no battery included)	◆ **FDK-087L4211**	
RS 232 add-on module, point to point communication interface with Modbus RTU protocol	**FDK-087L4212**	
RS485 add-on module, multidrop communication interface with Modbus RTU protocol	◆ **FDK-087L4213**	
Encoder interface module, with "Sensus" protocol for ITRON 200WP and 100W radio, only for use with 7ME6820 route	**A5E02475650**	
MAG 8000 GSM/GPRS communication module	**A5E03412758**	
One cable entry 6 ... 8 mm (0.24 ... 0.31 ") M20 brass glands package (1 pc)	**FDK-087L4196**	

Description	Order No.	
One cable entry 2 ... 5 mm (0.08 ... 0.20 ") M12 brass glands with M20 reduction. Package of 10 pcs	**FDK-087L4154**	
One cable entry 6 ... 8 mm (0.24 ... 0.31 ") M20 brass glands package (10 pcs)	**FDK-087L4155**	
One cable entry 8 ... 11 mm (0.31 ... 0.43 ") M20 brass glands package (10 pcs)	**FDK-087L4156**	
One cable entry 11 ... 15 mm (0.43 ... 0.59 ") M20 brass glands package (10 pcs)	**FDK-087L4157**	
Two cable entries 3.5 ... 5 mm (0.14 ... 0.20 ") M20 brass glands package (10 pcs)	**FDK-087L4158**	
Two cable entries 5.5 ... 7.5 mm (0.22 ... 0.30 ") M20 brass glands package (10 pcs)	**FDK-087L4159**	
High gain antenna for MAG 8000 GSM/GPRS	◆ **A5E03436689**	
Analog input cable for MAG 8000 GSM/GPRS	**A5E03436698**	
IP68/NEMA 6P potting kit	◆ **FDK-085U0220**	
MAG 8000 Hardware key to access protected parameters	**FDK-087L4165**	
MAG 8000 demo - training unit pack operating on Alkaline batteries. Transmitter with Flow tool CD, IrDA interface adapter and hardware key (No dangerous goods limitations)	**FDK-087L4080**	
Alkaline battery for MAG 8000 demo transmitter (3 V 13 Ah) (No dangerous goods limitations)	**FDK-087L4142**	

◆ Short lead time (details in PMD)

[1] Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs.

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Battery-operated water meter MAG 8000

When MAG 8000 (7ME6810 and 7ME6820) is installed in PVC or coated pipelines, grounding rings must be installed additionally.

Grounding rings, type C must be used for the 7ME6810 and 7ME6820 routes (sizes > DN 300). Please see grounding rings in the section MAG 3100 Grounding rings and be aware that the mentioned MLFB codes include only 1 grounding ring. Grounding rings DN 25 to DN 300 in stainless steel are packed in pairs and sold as a "grounding ring kit".

Dimension	Order No.
DN 25	◆ **A5E01002946**[F)]
DN 40	◆ **A5E01002947**[F)]
DN 50	◆ **A5E01002948**[F)]
DN 65	◆ **A5E01002950**[F)]
DN 80	◆ **A5E01002952**[F)]
DN 100	◆ **A5E01002953**[F)]
DN 125	◆ **A5E01002954**[F)]
DN 150	◆ **A5E01002955**
DN 200	◆ **A5E01002957**[F)]
DN 250	◆ **A5E01002958**[F)]
DN 300	◆ **A5E01002962**[F)]

◆ Short lead time (details in PMD)

F) Subject to export regulations AL: 9I999, ECCN: N.

Spare parts

Description	Order No.	
MAG 8000 transmitter compact replacement kit. No battery included. System number specified by ordering.	**FDK-087L4166**	
MAG 8000 transmitter remote replacement kit. System number specified by ordering.	**FDK-087L4202**	
MAG 8000 (Advanced version) transmitter compact replacement kit. No battery included. No system number required.	**FDK-087L4203**	
MAG 8000 (Advanced version) transmitter remote replacement kit. No battery included. No system number required.	**FDK-087L4204**	
MAG 8000 (Basic version) transmitter PCB replacement kit. No system number required.	**A5E01171569**	
MAG 8000 (Advanced version) transmitter PCB replacement kit. No system number required.	**FDK-087L4168**	
MAG 8000 transmitter PCB replacement kit. System number specified by ordering.	**A5E03636168**	
Enclosure top including plastic lid, screws and blank product label	**FDK-087L4167**	
Cable for external battery pack, 1.5 m (4.92 ft) with IP68/NEMA 6P connector	**FDK-087L4152**	
5 ft. Encoder interface cable with IP68/NEMA 6P plugs included, for ITRON 200WP and 100W radio	**A5E02551263**	
25 ft. Encoder interface cable with IP68/NEMA 6P plugs included, for ITRON 200WP radio	**A5E02551182**	

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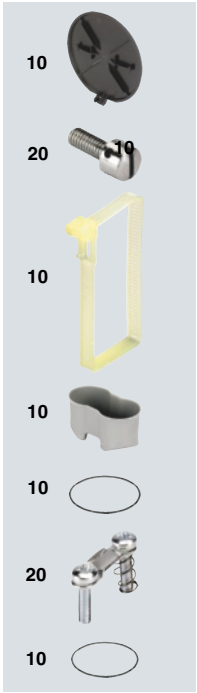
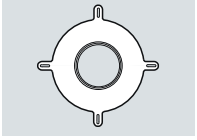
Battery-operated water meter MAG 8000

Description	Order No.	
Service tool kit package with various component for service and replacement.	**FDK-087L4162**	
Remote cable set 5 m (16.4 ft) with IP68/NEMA 6P plugs - PG 13.5[1)]	**FDK-087L4108**	
Remote cable set 5 m (16.4 ft) with IP68/NEMA 6P plugs - M20	**A5E00862482**	
Remote cable set 10 m (32.8 ft) with IP68/NEMA 6P plugs - PG 13.5[1)]	**FDK-087L4109**	
Remote cable set 10 m (32.8 ft) with IP68/NEMA 6P plugs - M20	**A5E00862487**	
Remote cable set 20 m (65.6 ft) with IP68/NEMA 6P plugs - PG 13.5[1)]	**FDK-087L4110**	
Remote cable set 20 m (65.6 ft) with IP68/NEMA 6P plugs - M20	**A5E00862492**	
Remote cable set 30 m (98.4 ft) with IP68/NEMA 6P plugs - PG 13.5[1)]	**FDK-087L4111**	
Remote cable set 30 m (98.4 ft) with IP68/NEMA 6P plugs - M20	**A5E00862497**	

[1)] For sensors produced before October 2007.

MAG 8000 (7ME6880) grounding ring service kit, consisting of 2 pcs. grounding rings, screws and gaskets

Dimension		Order No.
DN 50	2"	◆ **A5E03082907**
DN 65	2½"	◆ **A5E03082908**
DN 80	3"	◆ **A5E03082909**
DN 100	4"	◆ **A5E03082910**
DN 125	5"	◆ **A5E03082911**
DN 150	6"	◆ **A5E03082912**
DN 200	8"	◆ **A5E03082913**
DN 250	10"	◆ **A5E03082914**
DN 300	12"	◆ **A5E03082915**
DN 350	14"	◆ **A5E03082916**
DN 400	16"	◆ **A5E03082917**
DN 450	18"	◆ **A5E03082918**
DN 500	20"	◆ **A5E03082919**
DN 600	24"	◆ **A5E03082920**



◆ Short lead time (details in PMD)

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System information SITRANS F C
Coriolis mass flowmeters

Overview

SITRANS F C Coriolis mass flowmeters are designed for measurement of a variety of liquids and gases. The meter is a multi parameter device offering accurate measurement of mass flow, volume flow, density, temperature and fraction.

Transmitter	Page	Compact	Remote	Ex-Approval	Sensor	Page
MASS 6000 IP67 Polyamide enclosure	4/146	No	Yes	No	FCS200, DN 10 ... DN 25	4/168
		No	Yes	No	FC300, DN 4	4/177
		No	Yes	No	MASS 2100, DI 1.5	4/173
		Yes	Yes	No	MASS 2100, DI 3 ... DI 40	4/182
		No	Yes	No	MASS MC2, DN 50...DN 150	4/193
		No	Yes	Yes	MASS MC2 Ex, DN 50...DN 150	4/193
		No	Yes	No	MASS MC2 Hygienic, DN 20 ... DN 80	4/193
MASS 6000 19"	4/151	No	Yes	No	FCS200, DN 10 ... DN 25	4/168
		No	Yes	No	FC300, DN 4	4/177
		No	Yes	No	MASS 2100, DI 1.5	4/173
		No	Yes	No	MASS 2100, DI 3 ... DI 40	4/182
		No	Yes	No	MASS MC2, DN 50...DN 150	4/193
		No	Yes	Yes	MASS MC2 Ex, DN 50...DN 150	4/193
		No	Yes	No	MASS MC2 Hygienic, DN 20 ... DN 80	4/193
MASS 6000 Ex 19"	4/151	No	Yes	Yes	FCS200, DN 10 ... DN 25	4/168
		No	Yes	Yes	FC300, DN 4	4/177
		No	Yes	Yes	MASS 2100 Ex, DI 1.5	4/173
		No	Yes	Yes	MASS 2100 Ex, DI 3 ... DI 40	4/182
		No	Yes	No	MASS MC2, DN 50...DN 150	4/193
		No	Yes	No	MASS MC2 Hygienic, DN 20 ... DN 80	4/193
MASS 6000 Ex d Stainless steel enclosure	4/158	No	Yes	Yes	FCS200, DN 10 ... DN 25	4/168
		No	Yes	Yes	FC300, DN 4	4/177
		No	Yes	Yes	MASS 2100 Ex, DI 1.5	4/173
		Yes	Yes	Yes	MASS 2100 Ex, DI 3 ... DI 40	4/182
		No	Yes	No	MASS MC2, DN 50 ... DN 150	4/193
		No	Yes	No	MASS MC2 Hygienic, DN 20 ... 80	4/193
SIFLOW FC070 Standard	4/164	No	Yes	No	all	
SIFLOW FC070 CT	4/164	No	Yes	Yes	all except MC2	
		No	Yes	No	MC2	4/193

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Benefits

Greater flexibility

- Wide product program
- Uniform sensor interface enabling "plug & play" for all transmitters
- Compact or remote installation using the same transmitters and sensors

Easier commissioning

All SITRANS F C Coriolis flowmeters feature a SENSORPROM memory unit which stores sensor calibration data and transmitter settings for the lifetime of the product.

At commissioning the flowmeter commences measurement without any initial programming.

The factory settings matching the sensor size are stored in the SENSORPROM unit. Also customer-specified settings are downloaded to the unit.

Easier service

- Comprehensive self-diagnosis and service menu enhances troubleshooting and meter verification.
- Transmitter replacement requires no programming. SENSORPROM automatically updates all settings after initialization.

Room for growth

USM II the Universal Signal Module with "plug & play" simplicity makes it easy to access and integrate the flowmeter with almost any system and bus-protocol and it ensures the flowmeter will be easy to upgrade to future communication/bus platforms.

Application

Coriolis mass flowmeters are suitable for measuring liquids and gases. The measurement is independent of changes in process conditions/parameters such as temperature, density, pressure, viscosity, conductivity and flow profile.

Due to this versatility the meter is easy to install. The Coriolis flowmeter is recognized for its high accuracy in a wide turn-down ratio.

The main applications of the Coriolis flowmeter can be found in all industries, such as:	
Chemical and pharma	Detergents, bulk chemicals, pharmaceuticals, acids, alkalis
Food and beverage	Dairy products, beer, wine, soft-drinks, plato/brix, fruit juices and pulps, bottling, CO_2 dosing, CIP-liquids
Automotive	Fuel injection nozzle and pump testing, filling of AC units, engine consumption, paint robots
Oil and gas	Filling of gas bottles, furnace control, CNG-dispensers, test separators, LPG
Water and waste water	Dosing of chemicals for water treatment

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System information SITRANS F C
Coriolis mass flowmeters

Please see Product selector www.pia-selector.automation.siemens.com **on the Internet, since some constrains might be related to some of the features**

	MASS 2100 DI 1.5	MASS 2100 DI 3 to DI 40	FC300 DN 4	MC2 DN 50 to DN 150	MC2 Hygienic DN 25 to DN 80	FCS200 DN 10 to DN 25	MASS 6000 IP67	MASS 6000 19“	MASS 6000 Ex d	SIFLOW FC070 Std/Ex CT
	7ME4100	7ME4100, 7ME4200, 7ME4210	7ME4400	7ME4300	7ME4310	7ME4500	7ME4110	7ME4110	7ME4110	7ME4120
Design										
Compact		●					●		●	
Remote	●	●	●	●	●	●	●	●	●	●
Transmitter enclosure										
Polyamide, IP67/NEMA 4X							●			
Noryl (SIMATIC S7-300), IP20/NEMA 2										●
Stainless steel IP67/NEMA 4X									●	
19" rack IP20/NEMA 2 aluminum								●		
Back of panel IP20/NEMA 2 aluminum								●		
Wall mounting IP66/NEMA 4 ABS plastic								●		
Front of panel IP66/NEMA 4 ABS plastic								●		
Communication										
HART							●	●	●	
PROFIBUS PA							●	●	●	
PROFIBUS DP							●	●		
MODBUS RTU/RS485							●	●		●
MODBUS RTU/RS232										●
FOUNDATION Fieldbus H1							●	●	●	
DeviceNet							●	●		
Supply voltage										
24 V DC										●
24 V AC/DC							●	●	●	
115/230 V AC							●	●		
Pipe size										
DI 1.5 (1/16")	●									
DI 3 (1/8")		●								
DN 4 (1/6")			●							
DI 6 (¼")		●								
DN 10 (3/8")						●				
DI 15 (½")		●								
DN 15 (½")						●				
DN 20 (¾")					●					
DI 25 (1")		●								
DN 25 (1")					●	●				
DI 40 (1½")		●								
DN 40 (1½")					●					
DN 50 (2")				●	●					
DN 65 (2½")				●	●					
DN 80 (3")				●	●					
DN 100 (4")				●						
DN 150 (6")				●						
Process connection norms and pressure										
Pipe thread										
NPT ANSI/ASME B.20.1; PN 100	●	●	●							
NPT ANSI/ASME B.20.1; PN 350						●				
VCO						●				
ISO 228/1; PN 100	●	●	●							

● = available

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Please see Product selector www.pia-selector.automation.siemens.com **on the Internet, since some constrains might be related to some of the features**

	MASS 2100 DI 1.5	MASS 2100 DI 3 to DI 40	FC300 DN 4	MC2 DN 50 to DN 150	MC2 Hygienic DN 25 to DN 80	FCS200 DN 10 to DN 25	MASS 6000 IP67	MASS 6000 19“	MASS 6000 Ex d	SIFLOW FC070 Std/Ex CT
	7ME4100	7ME4100, 7ME4200, 7ME4210	7ME4400	7ME4300	7ME4310	7ME4500	7ME4110	7ME4110	7ME4110	7ME4120
Flange										
EN 1092-1 PN 40		●		●						
EN 1092-1 PN 100		●		●[1]						
ANSI B16.5 Class 150		●		●						
ANSI B16.5 Class 300				●						
ANSI B16.5 Class 600		●		●[1]						
Dairy										
DIN 11851 PN 25		●		●[1]	●					
DIN 11851 PN 40		●								
DIN 11864-2A					●					
Clamp ISO 2852 PN 16		●								
ISO 2853 PN 16		●								
DIN 32676 Tri-Clamp PN 10/PN 16				●	●					
Others on request	●	●	●	●	●					
Pipe material										
Stainless steel AISI 316L/1.4435	●	●	●		●					
Stainless steel AISI 316Ti/1.4571				●						
Hastelloy C22/2.4602	●	●[5]	●			●[7]				
Hastelloy C4/2.4610				●						
With heating jacket										
Internal U - tube		●								
Pressure rating										
PN 40		●		●	●					
PN 100	●	●	●	●[2]						
PN 214						●				
PN 350						●				
High-pressure version[3]	●	●	●							
Accuracy										
Flow error ≤ 0.1 % of rate	●	●	●	●	●					
Flow error ≤ 0.15 % of rate				●	●					
Flow error ≤ 0.5 % of rate				●	●	●				
Density error ≤ 0.0005 g/cm^3		●								
Density error ≤ 0.001 g/cm^3	●			●	●					
Density error ≤ 0.0015 g/cm^3		●[4]	●							
Cable glands										
PG 13.5								●[6]		
½“ NPT							●			
M20				●	●		●		●	

● = available

1) Not available for DN 150 sensor.
2) Not available for DN 100 and DN 150 sensors.
3) Please see technical specifications.
4) DI 3 and DI 6
5) DI 40 is not available for Hastelloy C22/2.4602.
6) Only when mounted in enclosure.
7) Process connectors in AISI 316Ti/1.4571

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System information SITRANS F C
Coriolis mass flowmeters

Please see Product selector www.pia-selector.automation.siemens.com **on the Internet, since some constrains might be related to some of the features**

	MASS 2100 DI 1.5	MASS 2100 DI 3 to DI 40	FC300 DN 4	MC2 DN 50 to DN 150	MC2 Hygienic DN 25 to DN 80	FCS200 DN 10 to DN 25	MASS 6000 IP67	MASS 6000 19"	MASS 6000 Ex d	SIFLOW FC070 Std/Ex CT
	7ME4100	7ME4100, 7ME4200, 7ME4210	7ME4400	7ME4300	7ME4310	7ME4500	7ME4110	7ME4110	7ME4110	7ME4120
Approvals										
Harzardous locations										
Ex II 1G EEx ia IIC T3 (T4) ... T6 — ATEX	●	●								
Ex ia IIC T3/T4 ... T6 — ATEX			●							
Ex II (1)G [EEx ia] IIC — ATEX								●		
Ex II 2G EEx d e [ia/ib] IIC T6 — ATEX									●	
Ex II (1)G [Ex ia] IIC Ga Ex II 3G Ex nA IIC T4 Gc — ATEX										●[4)5)]
Ex II 1/2 G EEx emd [ib] IIC T6 — ATEX					●[10)]					
Ex II 2 G EEx emd [ib] IIC T6 — ATEX				●[11)]	●[11)]					
Ex II 1/2G Ex ia IIC T5/T4 — ATEX						●				
Ex ia IIC T5/T4 — IECEx						●				
Ex nA [ia] IIC T4 — IECEx										●[5)]
Class I, Div. 2, Gr. A, B, C, D — FM										●
Class I, Div. 1, Gr. A, B, C, D Class I, Zone 0, Aex ia IIC T3 ... T6 Class I, Zone 0, Ex ia IIC T3 ... T6 — C-UL	●[1)]	●[1)]								
Class I, Div. 1, Gr. A, B, C, D Class I, Zone 0, Ex ia IIC T3 ... T6 — C-UL			●							
Class I, Div. 2, Gr. A, B, C, D Class I, Zone 2, Aex nC IIC T4 Class I, Zone 2, Ex nC [nL] IIC T4 — C-UL							●[2)]			
Class I, Div. 1 and 2, Gr. A, B, C, D Class 1, Zone 2 and Zone 0, Aex nC [ia] IIC T4 Class 1, Zone 2 and Zone 0, Ex nC [ia] IIC T4 — C-UL								●[3)]		
Ex nA [ia] IIC T4, Class I, Zone 2, Aex nA [ia] IIC T4 — $_{u}CSA_{us}$										●[5)]
Ordinary locations										
USL, CNL-Flowmeter — C-UL							●[2)]			
USR, CNR-Flowmeter — C-UL								●[6)]		
USR, CNR-Flowmeter — C-UL								●[7)]		
USL, CNL-Flowmeter — C-UL								●[8)]		
PED										
Fluid group 1 Category II, Module H — PED Directive 97/23/EC		●[9)]								
Module B1 + D 0/25 ... 100 bar, -80/200°C, DN 20 ...150 — PED Directive 97/23/EC				●	●					
CRN										
Category F OF10769.5C — CRN	●	●	●							
Pharma										
EHEDG — TUM					●					

Note: Special conditions for safe use might be specified in certificates or operating instructions.

● = available

1) Sensor pressure max. 100 bar (1450 psi)
2) Only compact version
3) Can be placed in zone 2 if mounted in minimum IP65 cabinet.
4) Can be placed in zone 2 if mounted in minimum IP54 cabinet.
5) Only Ex version
6) 24 V; IP20
7) 115 ... 230 V; IP20
8) 115 ... 230 V; IP65
9) Only DI 25 and DI 40
10) For sizes < DN 40 only
11) For sizes ≥ DN 50 only

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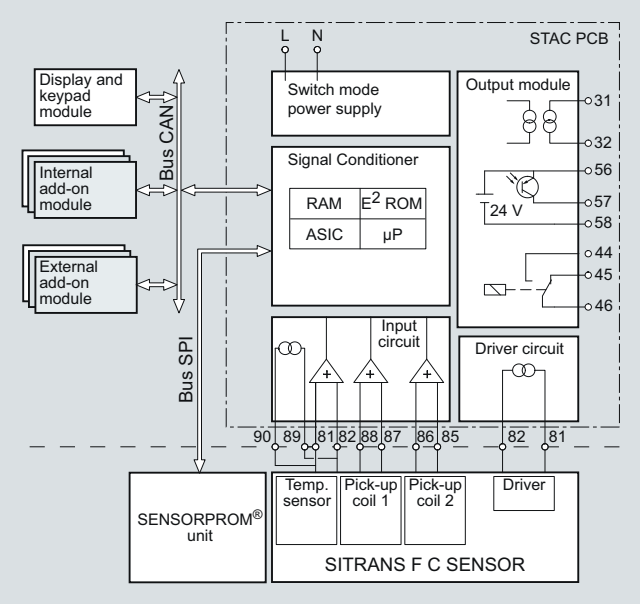
Function

The flow measuring principle is based on the Coriolis effect. The flowmeter consists of a sensor type MASS 2100/FC300 or MC2 and a transmitter MASS 6000/SIFLOW FC070.



The SITRANS F C sensors are energized by an electro-mechanical driver circuit which oscillates the pipe at its resonant frequency.

Two pick-ups, 1 and 2 are placed symmetrically on both sides of the driver. When liquid or gas flows through the sensor, Coriolis force will act on the measuring pipe and cause a pipe deflection which can be measured as a phase shift on pick-up 1 and 2. The phase shift is proportional to the mass flow rate.

The amplitude of the driver is automatically regulated via a „phase locked loop“, to ensure a stable output from the 2 pick-ups in the region of 80 to 120 mV.

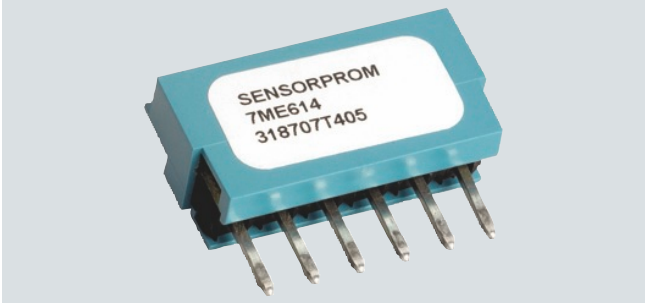
The temperature of the sensor is measured by a Pt1000, in a wheatstone configuration (4-wire). For MC2 the temperature is measured with a Pt100.

The flow-proportional signal from the 2 pick-ups, the temperature measurement and the driver frequency are fed into the SITRANS F C transmitter for calculations of mass, volume, fraction, temperature and density.

The analog to digital conversion takes place in an ultra-low noise ASIC with 23 bit signal resolution. The signal transfer function is based on a patented DFT technology (Discrete Fourier Transformation). The ASIC is constructed as a state machine gate array, which enables fast signal processing and filtering.

The ASIC has a built-in noise filter, which can be used to improve the meters' performance if the installation and application conditions are not ideal. Typically influence from process noise such as pump pulsations, mechanical vibrations, oscillating valves can be reduced considerably.

For communication purposes the SITRANS F C MASS 6000 transmitters have a CAN interface with a Siemens specific protocol. This concept is known as the USM II (Universal Signal Module) concept. The idea is that extra output modules or communication modules can be connected to this bus, making it possible to configure the flowmeter for the precise task in hand. When the internal CAN bus detects the installed module, it is automatically programmed to factory settings via the SENSORPROM memory unit, and the new menu is visible in the MASS 6000 display.



SENSORPROM flow memory unit

Currently the USM platform handles all present and future communication protocols, e.g., PROFIBUS DP, PROFIBUS PA, HART, MODBUS, FOUNDATION Fieldbus H1 and DeviceNet.

Integration

Installation of MASS 2100/FC300 and MC2 sensors

Installation requirements/System design information

The SITRANS F C mass flowmeter is suitable for in- and outdoor installations. The standard instrument meets the requirements of Protection Class IP67/NEMA 4X and IP66/NEMA 4. The flowmeter is bidirectional and can be installed in any orientation, however, the sensor is not self-emptying in all positions.
It is important to ensure that the meter tubes are always completely filled with homogeneous fluid. Otherwise measuring errors may occur.
The corrosion resistance of the fluid-wetted materials must be evaluated.
The pressure drop through the sensor is a function of the properties of the fluid and the flow rate. The **Sizing Program** (download from https://pia.khe.siemens.com/index.aspx?nr=11501) can be used to calculate the pressure drop.
The following points are to be considered during installation:

The preferred flow direction is indicated by the arrow on the flowmeter. Flow in this direction will be indicated as positive.

Installation orientation

- MASS 2100/FC300 – sensors
  The optimal installation orientation is horizontal.
- MC2 – sensors
  The optimal installation orientation is vertical with the flow upwards.

Supports

- In order to support the weight of the flowmeter and to ensure reliable measurements when external effects exist (e.g. vibrations), the sensor should be installed in rigid pipelines. Two supports or hangers should be installed symmetrically and stress-free in close proximity to the process connections.

Shut-off devices

- To conduct a system zero adjustment, shut-off devices are required in the pipeline.
  - In horizontal installations at the outlet for FC300 and MC2 and the inlet for MASS 2100.
  - In vertical installations at the inlet.
- When possible, shut-off devices should be installed both up- and downstream of the flowmeter.

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System information SITRANS F C Coriolis mass flowmeters

Installation: straight run requirements

- The mass flowmeter does not require any flow conditioning straight inlet sections. Care should be exercised to ensure that any valves, gates, sight glasses etc. do not cavitate and are not set into vibration by the flowmeter.

System design information

- The presence of gas bubbles in the fluid may result in erroneous measurements, particularly in the density measurement. Therefore the flowmeter should not be installed at the highest point in the system.
  Advantageous are installations in low pipeline sections, at the bottom of a U-section in the pipeline.
- Long drop lines downstream from the flowmeter should be avoided to prevent the meter tube from draining.
- The flowmeter should not come into contact with any other objects. Avoid attachments to the housing.
- When the cross-section of the connecting pipeline is larger than the sensor size, suitable standard reducers may be installed.
- If strong vibrations exist in the pipeline, they should be damped using elastic pipeline elements. The damping devices must be installed outside the supported flowmeter section and outside the section between the shut-off devices. The direct connection of flexible elements to the sensor should be avoided.
- Make sure that any dissolved gases, which are present in many liquids, do not outgas. The back pressure at the outlet should be at least 0.2 bar (3 psi).
- Assure that operation below the vapor pressure cannot occur when a vacuum exists in the meter tube or for fluids which boil readily.
- The sensor should not be installed in the vicinity of strong electromagnetic fields, e.g. near motors, pumps, transformers etc.
- When operating more than one meter in one or multiple interconnected pipelines, the sensors should be spaced distant from each other or the pipelines should be decoupled to prevent cross talk.

Zero adjustment

- In order to adjust the zero under operating conditions it must be possible to reduce the flow rate to „ZERO“ while the meter tube is completely filled. A bypass line is optimal when the process cannot be shut down. It is important for accurate measurements that during the zero adjustment there are no gas bubbles in the flowmeter. It is also important that the pressure and temperature in the meter tube be the same as that which exists during operation.

Technical specifications

Flowmeter uncertainty/specifications

To ensure continuous accurate measurement, flowmeters must be calibrated. The calibration is conducted at Siemens flow facilities accredited according to ISO/IEC 17025 by DANAK or UKAS.

The accreditation bodies DANAK and UKAS have signed the ILAC MRA agreement (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement). Therefore the accreditation ensures international traceability and recognition of the test results in 39 countries worldwide, including the US (NIST traceability).

A calibration certificate is shipped with every sensor and calibration data are stored in the SENSORPROM memory unit.

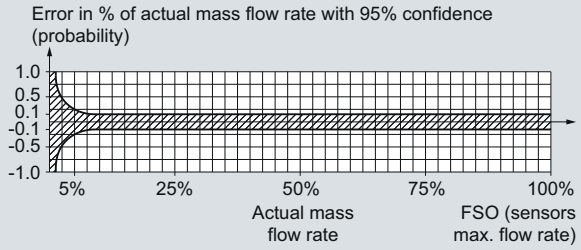
MASS 2100 sensors and MASS 6000 transmitters

	5 %		50 %		100 %	
	kg/h	(lb/h)	kg/h	(lb/h)	kg/h	(lb/h)
DI 1.5 (1/16")	1	(2.2)	32.5	(71.6)	65	(140)
DI 3 (1/8")	12	(26)	125	(275)	250	(550)
DN 4 (1/6")	17.5	(38)	175	(386)	350	(770)
DI 6 (¼")	50	(110)	500	(1 102)	1 000	(2 200)
DI 15 (½")	280	(617)	2 800	(6 173)	5 600	(12 345)
DI 25 (1")	1 250	(2 756)	12 500	(27 558)	25 000	(55 100)
DI 40 (1½")	2 600	(5 732)	26 000	(57 320)	52 000	(114 600)

- Q_{max} is found at a pressure drop of 1 bar (29 psi). With increased counterpressure Q_{max} will increase.
- For flow > 5 % of the sensors max. flow rate, the error can be read directly from the curve.
- For flow < 5 % of the sensors max. flow rate, use the formula to calculate the error.
- The error curve is plotted from the formula:

$$E = \pm\sqrt{(0.10)^2 + \left(\frac{z \times 100}{qm}\right)^2}$$

E = Error [%]
Z = Zero point error [kg/h]
qm = Mass flow [kg/h]



Reference conditions for MASS 2100 (ISO 9104 and DIN/EN 29104)	
Flow conditions	Fully developed flow profile
Temperature, medium	20 °C ± 2 °C (68 °F ± 3.6 °F)
Temperature, ambient	20 °C ± 2 °C (68 °F ± 3.6 °F)
Liquid pressure	2 ± 1 bar
Density	0.997 g/cm^3
Brix	40 °Brix
Supply voltage	U_n ±1 %
Warming-up time	30 min.
Cable length	5 m between transmitter and sensor

Additions in the event of deviations from reference conditions	
Current output	As pulse output ± (0.1% of actual flow +0.05 % FSO)
Effect of ambient temperature	• Display/frequency/pulse output: < ± 0.003%/K act. • Current output: < ± 0.005 %/K act.
Effect of supply voltage	< 0.005 % of measuring value on 1 % alteration

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Sensor type		FC300	MASS 2100					
Sensor size		DN 4 (1/6")	DI 1.5 (1/16")	DI 3 (1/8")	DI 6 (¼")	DI 15 (½")	DI 25 (1")	DI 40 (1½")
Number of measuring pipes		1	1	1	1	1	1	1
Mass flow								
Linearity error	% of rate	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Repeatability error	% of rate	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Max. zero point error	[kg/h]	0.010	0.001	0.010	0.050	0.200	1.500	6.000
Density								
Density error[1)]	[g/cm^3]	0.0015	0.001	0.0015	0.0015	0.0005	0.0005	0.0005
Repeatability error	[g/cm^3]	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001
Range	[g/cm^3]	0 ... 2.9	0 ... 2.9	0 ... 2.9	0 ... 2.9	0 ... 2.9	0 ... 2.9	0 ... 2.9
Temperature								
Error	[°C (°F)]	0.5 (0.9)	0.5 (0.9)	0.5 (0.9)	0.5 (0.9)	0.5 (0.9)	0.5 (0.9)	0.5 (0.9)
Brix								
Error	[°Brix]	0.3	0.2	0.3	0.3	0.1	0.1	0.1

1) Accuracy is only valid when sensor is density-calibrated.

Sensor type		MC2				
Sensor size (standard version)		DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")	DN 150 (6")
Sensor size (hygienic version)		DN 20 (¾") DN 25 (1") DN 40 (1½") DN 50 (2")	DN 65 (2½")	DN 80 (3")		
Number of measuring pipes		2	2	2	2	2
Mass flow:						
Linearity error	% of rate	0.15	0.15	0.15	0.15	0.15
Reproducibility of flowrate at rates > 5 % of Q_{max}	% of rate	0.1	0.1	0.1	0.1	0.1
Max. zero point error	[kg/h (lb/h)]	DN 20 0.6 (1.32), DN 25 0.96 (2.12), DN 40 2.85 (6.28), DN 50 5.52 (12.17)	11.34 (25.00)	14.76 (32.54)	24.96 (55.03)	330 (727.53)
Density						
Density error	(Standard) [g/cm^3]	0.005	0.005	0.005	0.005	0.005
	(Extended) [g/cm^3]	0.001	0.001	0.001	0.001	Not available
Range	[kg/dm^3]	0.5 ... 3.5	0.5 ... 3.5	0.5 ... 3.5	0.5 ... 3.5	0.5 ... 3.5
Repeatability error	[g/l]	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1
Temperature						
Error	[°C (°F)]	1.0 (1.8)	1.0 (1.8)	1.0 (1.8)	1.0 (1.8)	1.0 (1.8)
Brix[2)]						
Error	[°Brix]	0.25	0.25	0.25	0.25	Not available

2) Flow and density calibration (1 kg/m^3) required.

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System information SITRANS F C Coriolis mass flowmeters

Flowmeter uncertainty/specifications

MC2 sensors and MASS 6000 transmitters

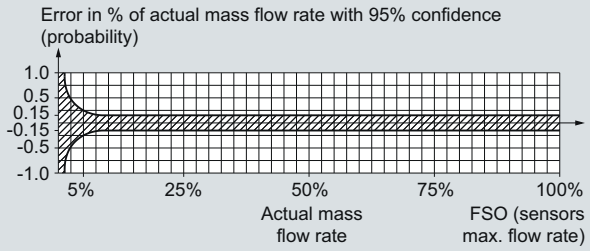
	5 %		50 %		100 %	
	kg/h	(lb/h)	kg/h	(lb/h)	kg/h	(lb/h)
DN 20 (¾")	230	(507)	2 300	(5 071)	4 600	(10 141)
DN 25 (1")	368	(811)	3 680	(8 113)	7 360	(16 226)
DN 40 (1½")	1 093	(2 409)	10 925	(24 085)	21 850	(48 171)
DN 50 (2")	2 130	(4 695)	21 300	(46 958)	42 600	(93 900)
DN 65 (2½")	4 350	(9 590)	43 500	(95 900)	87 000	(191 800)
DN 80 (3")	5 670	(12 500)	56 700	(125 002)	113 400	(250 000)
DN 100 (4")	9 600	(21 164)	96 000	(211 643)	192 000	(423 300)
DN 150 (6")	25 500	(56 217)	255 000	(562 178)	510 000	(1 124 356)

Flow capacity calculated at 1 bar pressure loss on water at 20 °C.

$$E = \pm\sqrt{(0.15)^2 + \left(\frac{z \times 100}{qm}\right)^2}$$

E = Error [%]
Z = Zero point error [kg/h]
qm = Mass flow [kg/h]

$Q_{max.}$ at 2 bar pressure loss at 1 g/cm^3



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Technical specifications PROFIBUS PA/DP

General specifications	
PROFIBUS device profile	3.00 Class B
Certified	Yes, according to Profile for process control devices V3.00.
MS0 connections	1
MS1 connections	1
MS2 connections	2

Electrical specification DP

Physical layer specifications	
Applicable standard	EN 50170 vol. 2
Physical Layer (Transmission technology)	RS485
Transmission speed	≤ 1.5 Mbit/s
Number of stations	Up to 32 per line segment, (maximum total of 126)
Cable specification (Type A)	
Cable design	Two wire twisted pair
Shielding	CU shielding braid or shielding braid and shielding foil
Impedance	35 up to 165 Ω at frequencies from 3 ... 20 MHz
Cable capacity	< 30 pF per meter
Core diameter	> 0.34 mm², corresponds to AWG 22
Resistance	< 110 Ω per km
Signal attenuation	Max. 9 dB over total length of line section
Max. bus length	200 m at 1500 kbit/s, up to 1.2 km at 93.75 kbit/s. Extendable by repeaters

Electrical specification PA

Physical layer specifications	
Applicable standard	EN 50170
Physical Layer (Transmission technology)	IEC-61158-2
Transmission speed	31.25 kbit/s
Number of stations	Up to 32 per line segment, maximum total of 126)
Max. basic current [I_B]	14 mA
Fault current [I_{FDE}]	0 mA
Bus voltage	9 ... 32 V (non Ex)
Preferred cable specification (Type A)	
Cable design	Two wire twisted pair
Conductor area (nominal)	0.8 mm² (AWG 18)
Loop resistance	44 Ω/km
Impedance	100 Ω ± 20 %
Wave attenuation at 39 kHz	3 dB/km
Capacitive asymmetry	2 nF/km
Bus termination	Passive line termination at both
Max. bus length	Up to 1.9 km. Extendable by repeaters

IS (Intrinsic Safety) data	
Required sensor electronics	Compact mounted SITRANS F C MASS 6000 Ex d
FISCO	Yes
Max. U_I	17.5 V
Max. I_I	380 mA
Max. P_I	5.32 V
Max. L_I	10 µH
Max. C_I	5 nF
Max. U_o	1.3 V
Max. I_o	50 µA
FISCO cable requirements	
Loop resistance R_C	15 ... 150 Ω/km
Loop inductance L_C	0.4 ... 1 mH/km
Capacitance C_C	80 ... 200 nF/km
Max. Spur length in IIC and IIB	30 m
Max. Trunk length in IIC	1 km
Max. Trunk length in IIB	5 km

PROFIBUS parameter support

The following parameters are accessible using a MS0 relationship from a Class 1 Master.
MS0 specifies cyclic Data Exchange between a Master and a Slave.

Cyclic services:		
Input (Master view)	**Parameter**	**MASS 6000**
	Mass flow	✓
	Volume flow	✓
	Temperature	✓
	Density	✓
	Fraction A[1)]	✓
	Fraction B[1)]	✓
	Pct Fraction A[1)]	✓
	Totalizer 1	✓
	Totalizer 2[2)]	✓
	Batch progress[2)]	✓
	Batch setpoint	✓
	Batch compensation	✓
	Batch status (running ...)	✓
Output (Master view)	Set Totalizer 1+2	✓
	Set Mode Totalizer 1+2	✓
	Batch control (start, stop ...)	✓
	Batch setpoint	✓
	Batch compensation	✓

1) Requires a SENSORPROM containing valid fraction data.

2) Value returned is dependent on the BATCH function.
When ON, Batch progress is returned.
When OFF, TOTALIZER 2 is returned.

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Transmitter MASS 6000 IP67 compact/remote

Overview

MASS 6000 is based on the latest developments within digital signal processing technology – engineered for high performance, fast flow step response, fast batching applications, high immunity against process noise, easy to install, commission and maintain.

The MASS 6000 transmitter delivers true multiparameter measurements i.e. mass flow, volume flow, density, temperature and fraction.

The MASS 6000 IP67 transmitter can be compact mounted on all sensors of type MASS 2100 DI 3 to DI 40, and can be used in remote version for all types of MASS 2100/MC2 and FC300 sensors.

Benefits

- Dedicated mass flow chip with the latest ASIC technology
- Fast batching and flow step response with an update rate of true 30 Hz
- Superior noise immunity due to a patented DFT (Discrete Fourier Transformation) algorithm.
- Front end resolution better than 0.35 ns improves zero point stability and enhances dynamic turn-down ratio on flow and density accuracy.
- Advanced diagnosis and service menu enhances troubleshooting and meter verification.
- Built-in batch controller with compensation and monitoring comprising 2 built-in totalizers
- Multi-parameter outputs, individual configurable for mass flow, volume flow, density, temperature or fraction flow such as BRIX or PLATO
- Digital input for batch control, remote zero adjust or forced output mode
- All outputs can be forced to preset value for simulation, verification or calibration purposes.
- User-configurable operation menu with password protection
  - 3 lines, 20 characters display in 11 languages
  - Self-explaining error handling/log in text format
  - Keypad can be used for controlling batch as start/stop/hold/reset
- SENSORPROM technology automatically configures transmitter at start-up providing:
  - Factory pre-programming with calibration data, pipe size, sensor type, output settings
  - Any values or settings changed by users are stored automatically
  - Automatically re-programming any new transmitter without loss of accuracy
  - Transmitter replacement in less than 5 minutes.
  - True "plug & play"
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow.
- Fraction flow computation based on a 5th-order algorithm matching all applications.
- USM II platform enables fitting of add-on bus modules without loss of functionality.
  - All modules can be fitted through true "plug & play"
  - Module and transmitter are automatically configured through the SENSORPROM.
- Installation of the transmitter to the sensor is simple "plug & play" via the sensor pedestal.

Application

SITRANS F C mass flowmeters are suitable for all applications within the entire process industry, where there is a demand for accurate flow measurement. The meter is capable of measuring both liquid and gas flow.

The main applications for the MASS 6000 IP67 transmitter can be found in:

- Food and beverage industries
- Pharmaceutical industries
- Automotive industry
- Oil and gas industry
- Power generation and utility industry
- Water and waste water industry

Design

The transmitter is designed in an IP67/NEMA 4X compact polyamide enclosure which can be compact mounted on the MASS 2100 sensor range DI 3 to DI 40 (1/8" to 1½") and remote mounted for the entire sensor series.

The MASS 6000 IP67 is available as standard with 1 current, 1 frequency/pulse and 1 relay output and can be fitted with add-on modules for bus communication.

Function

The following functions are available:

- Mass flow rate, volume flow rate, density, temperature, fraction flow
- 1 current output, 1 frequency/pulse output, 1 relay output, 1 digital input
- All outputs can be individually configured with mass, volume, density etc.
- 2 built-in totalizers which can count positive, negative or net
- Low flow cut-off
- Density cut-off or empty pipe cut-off, adjustable
- Flow direction adjustable
- Error system consisting of error-log, error pending menu
- Display of operating time
- Uni/bidirectional flow measurement
- Limit switches with 1 or 2 limits, programmable for flow, density or temperature
- Noise filter setting for optimization of measurement performance under non-ideal application conditions
- Full batch controller
- Automatic zero adjustment menu, with zero point evaluation feed back
- Full service menu for effective and straight forward application and meter troubleshooting

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Technical specifications

Measurement of	Mass flow [kg/s (lbs/min)], volume flow [l/s (gpm)], fraction [%], °Brix, density [kg/m³, (lbs/ft³)], temperature [°C (°F)]
Current output	
Current	0 ... 20 mA or 4 ... 20 mA
Load	< 800 Ω
Time constant	0 ... 99.9 s adjustable
Digital output	
Frequency	0 ... 10 kHz, 50 % duty cycle
Time constant	0 ... 99.9 s adjustable
Active	24 V DC, 30 mA, 1 KΩ ≤ R_{load} ≤ 10 KΩ, short-circuit-protected
Passive	3 ... 30 V DC, max. 110 mA, 1 KΩ ≤ R_{load} ≤ 10 KΩ
Relay	
Type	Change-over relay
Load	42 V/2 A peak
Functions	Error level, error number, limit, flow direction
Digital input	11 ... 30 V DC (R_i = 13.6 kΩ)
Functionality	Start/hold/continue batch, zero point adjust, reset totalizer 1/2, force output, freeze output
Galvanic isolation	All inputs and outputs are galvanically isolated, isolation voltage 500 V.
Cut-off	
Low-flow	0 ... 9.9 % of maximum flow
Limit function	Mass flow, volume flow, fraction, density, sensor temperature
Totalizer	Two eight-digit counters for forward, net or reverse flow
Display	• Background illumination with alphanumerical text, 3 × 20 characters to indicate flow rate, totalized values, settings and faults. Time constant as current output 1 • Reverse flow indicated by negative sign
Zero point adjustment	Via keypad or remote via digital input
Ambient temperature	
Operation	-20 ... +50 °C (-4 ... +122 °F), max. rel. humidity 80 % at 31 °C (87.8 °F) decreasing to 50 % at 40 °C (104 °F) according to IEC/EN/UL 61010-1
Storage	-40 ... +70 °C (-40 ... +158 °F) (Humidity max. 95 %)
Communication	Add-on modules: HART, PROFIBUS PA and DP, MODBUS RTU RS485, DeviceNet, FOUNDATION Fieldbus H1

Enclosure	
Material	Fibre glass reinforced polyamide
Rating	IP67/NEMA 4X to IEC 529 and DIN 40050 (1 mH_2O for 30 min.)
Mechanical load	18 ... 1000 Hz random, 3.17 Grms, in all directions, to IEC 68-2-36
Supply voltage	
24 V version	
• Supply	24 V DC/AC, 50 ... 60 Hz
• Fluctuation	18 ... 30 V DC 20 ... 30 V AC
• Power consumption	10 W
230 V version	
• Supply	87 ... 253 V AC, 50 ... 60 Hz
• Power consumption	26 VA
Fuse	
• 230 V version	T 400 mA, T 250 V (IEC 127) - not replaceable by operator
• 24 V version	T 1 A, T 250 V (IEC 127) - not replaceable by operator
EMC performance	
Emission	EN/IEC 61000-6-4 (Industry)
Immunity	EN/IEC 61000-6-2 (Industry)
NAMUR	Within the value limits according to "General requirements" with error criteria A in accordance with NE 21
Environment	
Environmental conditions acc. to IEC/EN/UL 61010-1:	• Altitude up to 2000 m • POLLUTION DEGREE 2
Maintenance	The flowmeter has a built-in error log/pending menu which should be inspected on a regular basis.
Cable glands	Two types of cable gland are available in polyamide in the following dimensions: M20 or ½" NPT

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Transmitter MASS 6000 IP67 compact/remote

Selection and Ordering data	Order No.
SITRANS F C MASS 6000 transmitter Transmitter for wall mounting with wall mounting bracket, fibre glass reinforced polyamide (1 current output, 1 frq./pulse output, 1 relay output and connection board/PCB)	**7ME4110-** ■**AA**■**0-**■■**A**■
Version	
Remote IP67/NEMA 4X enclosure	**2**
Supply voltage	
115/230 V AC, 50 ... 60 Hz	**1**
24 V AC/DC	**2**
Display/Keypad	
with display	**1**
Serial communication	
No communication	**A**
HART	**B**
PROFIBUS PA Profile 3	**F**
PROFIBUS DP Profile 3	**G**
MODBUS RTU RS485	**E**
DeviceNet	**H**
FOUNDATION Fieldbus H1	**J**
Cable glands	
M20	**1**
½" NPT	**2**

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

Operating instructions for SITRANS F C MASS 6000 IP67

Description	Order No.
• English	**A5E03071936**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F C literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Accessories

Description	Order No.	
Cable glands, screwed entries type in polyamide (100 °C (212 °F)) black, 2 pcs.		
• M20	**A5E00822490**	
• ½" NPT	**A5E00822501**	
Sun lid for MASS 6000 transmitter (Frame and lid)	**A5E02328485**	

Note: The operating instructions should be ordered as a separate line on the order.

Add-on module

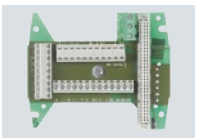
Description	Order No.	
HART (Ex-i)	**FDK-085U0226**	
PROFIBUS PA Profile 3 (Ex-i)	**FDK-085U0236**	
PROFIBUS DP Profile 3	**FDK-085U0237**	
MODBUS RTU RS485	**FDK-085U0234**	
FOUNDATION Fieldbus H1 (Ex-i)	**A5E02054250**	
DeviceNet	**FDK-085U0229**	

Operating instructions for SITRANS F add-on modules

Description	Order No.
HART	
• English	**A5E03089708**
PROFIBUS PA/DP	
• English	**A5E00726137**
• German	**A5E01026429**
MODBUS	
• English	**A5E00753974**
• German	**A5E03089262**
• Spanish	**A5E03089278**
• French	**A5E03089265**
FOUNDATION Fieldbus	
• English	**A5E02318728**
• German	**A5E02488856**
• Spanish	**A5E02512177**
• French	**A5E02512169**
DeviceNet	
• English	**A5E03089720**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F C literature.

Spare parts for compact or remote IP67 version

Description	Order No.	
MASS 6000 transmitter IP67/NEMA 4X Fibre glass reinforced polyamide and without connection board 1 current output 1 frq./pulse output 1 relay output		
• 115/230 V AC, 50/60 Hz	**7ME4110-1AA10-1AA0**	
• 24 V AC/DC	**7ME4110-1AA20-1AA0**	
Wall mounting unit for IP67/NEMA 4X version with wall bracket, without connection board but with		
• 4 x M20 cable glands	**FDK-085U1018**	
• 4 x ½" NPT cable glands	**A5E01164211**	
Connection board/PCB Supply voltage: 115/230 V/24 V AC/DC	**FDK-083H4260**	

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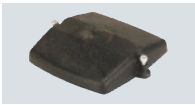
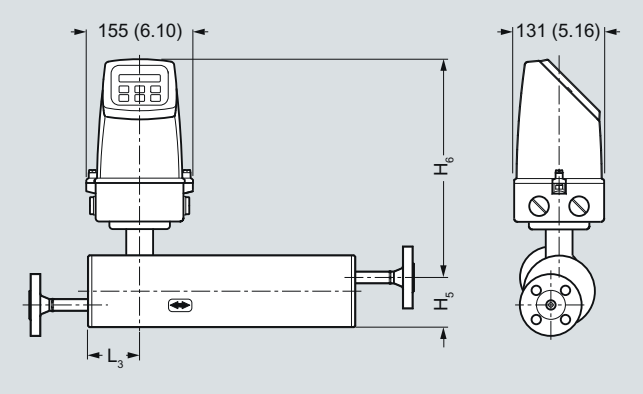
Description	Order No.	
Terminal box kit with		
• M20 cable glands	**A5E00832338**	
• ½" NPT cable glands	**A5E00832342**	
Change from remote to compact mounting of MASS 6000 IP67/NEMA 4X with MASS 2100. The kit consists of a terminal box in polyamide incl. connection board, cable and connector between PCB and sensor pedestal, PCB, seal and screws (4 pcs.) for mounting on sensor		
Terminal box with		
• M20 cable glands	**FDK-085U1050**	
• ½" NPT cable glands	**A5E01164206**	
Terminal box – **lid** in polyamide	**FDK-085U1003**	
Display and keypad	**FDK-085U1039**	
• Siemens Front		

Dimensional drawings

Compact

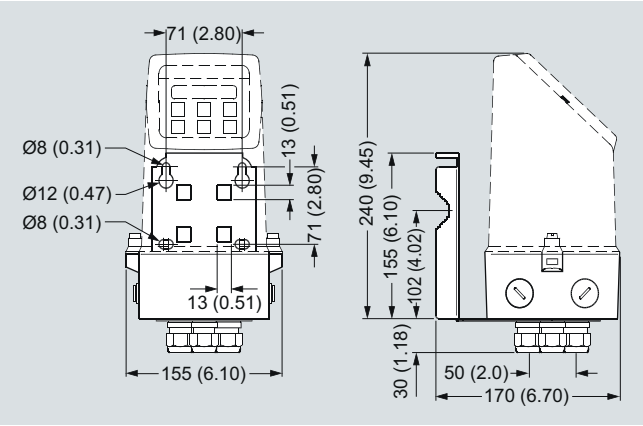


Dimensions in mm (inch)

MASS 2100

Sensor size [Di (inch)]	L_3 [mm (inch)]	H_5 [mm (inch)]	H_6 [mm (inch)]	$H_5 + H_6$ [mm (inch)]
3 (1/8)	75 (2.95)	82 (3.23)	306 (12.04)	388 (15.28)
6 (¼)	62 (2.44)	72 (2.83)	316 (12.44)	388 (15.28)
15 (½)	75 (2.95)	87 (3.43)	326 (12.83)	413 (16.26)
25 (1)	75 (2.95)	173 (6.81)	330 (13.00)	503 (19.80)
40 (1½)	75 (2.95)	227 (8.94)	330 (13.00)	557 (21.93)

Transmitter wall mounted



Dimensions in mm (inch)

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Transmitter MASS 6000 IP67 compact/remote

Schematics

Electrical connection

Grounding

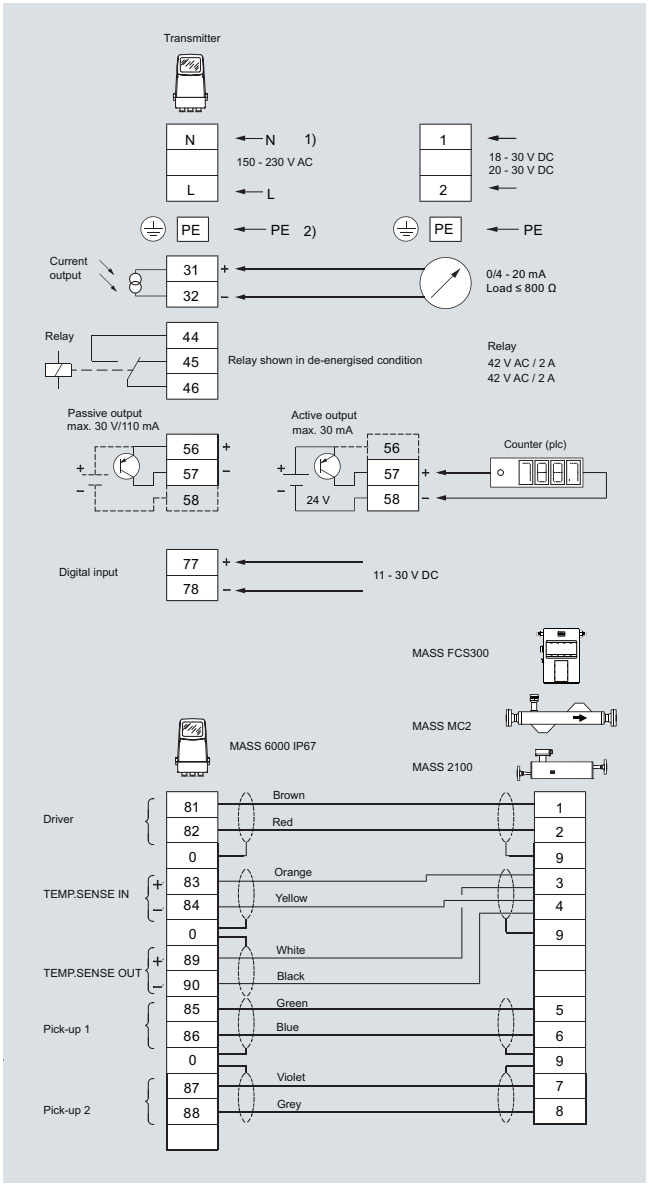
PE must be connected due to safety class 1 power supply.

Mechanical counters

When mounting a mechanical counter to terminals 57 and 58 (active output), a 1000 µF capacitor must be connected to the terminals 56 and 58. Capacitor + is connected to terminal 56 and capacitor - to terminal 58.

Output cables

If long cables are used in a noisy environment, it is recommended to use shielded cables.



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Transmitter MASS 6000 for 19" insert/19" wall mounting

Overview

MASS 6000 is based on the latest developments within digital signal processing technology – engineered for high performance, fast flow step response, fast batching applications, high immunity against process noise, easy to install, commission and maintain.
The MASS 6000 transmitter delivers true multi parameter measurements i.e.: Mass flow, volume flow, density, temperature and fraction.

The MASS 6000 19" transmitter can be connected to all sensors of types MASS 2100/MC2/FC300 and are available in different versions depending of number of output facilities, Ex protection and grade of enclosure.

Benefits

- Dedicated mass flow chip with the latest ASIC technology
- Fast batching and flow step response with an update rate of true 30 Hz
- Superior noise immunity due to a patented DFT (Discrete Fourier Transformation) algorithm.
- Front end resolution better than 0.35 ns improves zero point stability and enhances dynamic turn-down ratio on flow and density accuracy.
- Advanced diagnosis and service menu enhances trouble-shooting and meter verification.
- Built-in batch controller with compensation and monitoring comprising 2 built-in totalizers
- Multi-parameter outputs, individual configurable for mass flow, volume flow, density, temperature or fraction flow such as BRIX or PLATO
- Many output capacities, up to 3 current, 2 frequency/pulse and 2 relay outputs (excludes the possibility of an add-on module)
- Digital input for batch-control, remote zero adjust or forced output mode
- All outputs can be forced to preset value for simulation, verification or calibration purposes.
- User-configurable operation menu with password protection
  - 3 lines, 20 characters display in 11 languages
  - Self-explaining error handling/log in text format
  - Keypad can be used for controlling batch as start/stop/hold/reset
- SENSORPROM technology automatically configures transmitter at start-up providing:
  - Factory pre-programming with calibration data, pipe size, sensor type, output settings
  - Any values or settings changed by users are stored automatically
  - Automatically re-programming any new transmitter without loss of accuracy
  - Transmitter replacement in less than 5 minutes. True "plug & play"
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Fraction flow computation based on a 5th-order algorithm matching all applications
- USM II platform enables fitting of add-on bus modules without loss of functionality.
  - All modules can be fitted as true "plug & play"
  - Module and transmitter automatically configured through the SENSORPROM.
- Transmitter available with ATEX and UL approval
- All electrical connections are easily accessible on the large back plane PCB

Application

SITRANS F C Coriolis mass flowmeters are suitable for all applications within the entire process industry, where there is a demand for accurate flow measurement. The meter can measure both liquids and gases.

The main applications for the MASS 6000 19" transmitter can be found in:

- Chemical and pharmaceutical industries
- Food and beverage industries
- Automotive industry
- Oil and gas industry
- Power generation and utility industry
- Water and waste water industry

Design

The transmitter is designed as a 19" insert as base to be used in:

- 19" rack system
- Panel mounting IP66/NEMA 4
- Back of panel mounting IP20/NEMA 1
- Wall mounting IP66/NEMA 4

The MASS 6000 19" is available as standard or as ATEX-approved transmitter which is to be mounted in the safe area.

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Transmitter MASS 6000 for 19" insert/19" wall mounting

Function

The following functions are available:

- Mass flow rate, volume flow rate, density, temperature, fraction flow
- 2 output versions available as standard:
  - 1 current output, 1 frequency/pulse output, 1 relay output, 1 digital input
  - 3 current outputs, 2 frequency/pulse outputs, 2 relay outputs, 1 digital input
- All outputs can be individually configured with mass, volume, density etc.
- 2 built-in totalizers which can count positive, negative or net
- Low flow cut-off
- Density cut-off or empty pipe cut-off, adjustable
- Flow direction
- Error system consisting of error-log, error pending menu
- Operating time
- Uni/bidirectional flow measurement
- Limit switches with 1 or 2 limits, programmable for flow, density or temperature
- Noise filter setting for optimization of measurement performance under non-ideal application conditions
- Full batch controller
- Automatic zero adjustment menu, with zero point evaluation feed-back
- Full service menu for effective and straight forward application and meter troubleshooting

Technical specifications

Measurement of	Mass flow [kg/s (lbs/min)], volume flow [l/s (gpm)], fraction [%], °Brix, density [kg/m^3 (lbs/ft^3)], temperature [°C (°F)]
Current output	
Current	0 ... 20 mA or 4 ... 20 mA
Load	< 800 Ω
Time constant	0 ... 99.9 s adjustable
Digital output	
Frequency	0 ... 10 kHz, 50 % duty cycle
Time constant	0 ... 30 s adjustable
Active	24 V DC, 30 mA, 1 KΩ ≤ R_{load} ≤ 10 KΩ, short-circuit-protected
Passive	3 ... 30 V DC, max. 110 mA, 1 KΩ ≤ R_{load} ≤ 10 KΩ
Relay	
Type	Change-over relay
Load	42 V/2 A peak
Functions	Error level, error number, limit, direction
Digital input	11 ... 30 V DC
Functionality	Start/hold/continue batch, zero point adjust, reset totalizer 1/2, force output, freeze output
Galvanic isolation	All inputs and outputs are galvanically isolated, isolation voltage 500 V.
Cut-off	
Low-flow	0 ... 9.9 % of maximum flow
Limit function	Mass flow, volume flow, fraction, density, sensor temperature
Totalizer	Two eight-digit counters for forward, net or reverse flow
Display	• Background illumination with alphanumerical text, 3 × 20 characters to indicate flow rate, totalized values, settings and faults • Reverse flow indicated by negative sign
Zero point adjustment	Via keypad or remote via digital input
Ambient temperature	
Operation	-20 ... +50 °C (-4 ... +122 °F)
Storage	-40 ... +70 °C (-40 ... +158 °F) (Humidity max. 95 %)
Communication	Add-on modules: HART, PROFIBUS PA and DP, MODBUS RTU RS485, DeviceNet, FOUNDATION Fieldbus H1
Enclosure 19"	
Material	Aluminum/steel (DIN 41494)
Rating	IP20/NEMA 1 to IEC 529 and DIN 40050 (1 mH_2O for 30 min.)
Mechanical load	18 ... 1000 Hz random, 3.17G rms, in all directions, to IEC 68-2-36
Supply voltage	• 87 ... 253 V AC +10 % ... -10 %, 50 ... 60 Hz • 18 ... 30 V DC or 20 ... 30 V AC
Power consumption	
230 V AC	9 VA max.
24 V DC	6 W I_N = 250 mA, I_{ST} = 2 A (30 ms)
EMC performance	
Emission	EN/IEC 61000-6-4 (Industry)
Immunity	EN/IEC 61000-6-2 (Industry)
Ex approval	[EEx ia] IIC, DEMKO 03 ATEX 135251X
Maintenance	The flowmeter has a built-in error log/pending menu which should be inspected on a regular basis.
Fuse	T 400 mA, T 250 V (IEC 127), not replaceable by operator
Cable	• Max. 300 m • C: max. 300 [pF/m]; L_C/R_C: max. 100 [µH/Ω] • The total cable capacity must be max. 200 nF.
Cable glands	The cable gland is available in polyamide, in dimension: PG 13.5

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Selection and Ordering data	Order No.
SITRANS F C MASS 6000 transmitter	7ME4110-
Transmitter for rack and wall mounting, incl. connection board	2 ■■■ - ■■ A0
Enclosure	
19 inch insert IP20/NEMA 1 (rack)	C
19 inch insert in IP66/NEMA 4 (wall mounting)	E
Output configuration	
1 current, 1 frequency, 1 relay	A
3 current, 2 frequency, 2 relay	C
Supply voltage	
115/230 V AC, 50/60 Hz	1
24 V AC/DC	2
Ex Approvals	
Standard (No Ex-approval)	0
ATEX	1
UL Class 1, Div. 2 (only IP66/NEMA 4 version)	5
Display/Keypad	
With display	1
Serial communication (Only possible to connect to MASS 6000 version with 1 current output)	
No communication	A
HART	B
PROFIBUS PA Profile 3	F
PROFIBUS DP Profile 3	G
MODBUS RTU RS485	E
DeviceNet	H
FOUNDATION Fieldbus H1	J

Attention (Ex applications)!

MC2 Ex version sensors must only be connected to MASS 6000 standard. The MASS 6000 connection board must be replaced by a connection board approved FDK-083H4294 or FDK-083H4295 (see connection boards/PCB for MASS 6000 and MC2 sensors).

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

Operating instructions for SITRANS F C MASS 6000 19"

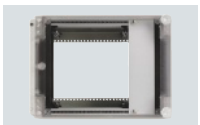
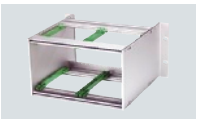
Description	Order No.
• English	**A5E02944875**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Accessories

Enclosure

Description	Order No.	
Enclosure in ABS plastic for front panel mounting IP66/NEMA 4, for one 19" transmitter insert (21 TE)	**FDK-083F5030**	
Enclosure in ABS plastic for front panel mounting IP66/NEMA 4, for two 19" transmitter inserts (42 TE)	**FDK-083F5031**	
Enclosure in aluminum for back of panel mounting IP20/NEMA 1, for one 19" transmitter insert (21 TE)	**FDK-083F5032**	
Enclosure in aluminum for back of panel mounting IP20/NEMA 1, for two 19" transmitter inserts (42 TE)	**FDK-083F5033**	
Front cover (7 TE)	**FDK-083F4525**	

Cable glands

Description	Order No.	
Cable glands, screwed entries type PG 13.5 in nickel-plated brass, 2 pcs.	**FDK-083G3140**	
Cable glands, screwed entries type PG 13.5 in polyamide (100 °C (212 °F)) black, 2 pcs.	**FDK-083G0228**	

Add-on module

Note:
Only possible to connect to MASS 6000 versions with 1 current output.

Description	Order No.	
HART (Ex-i)	**FDK-085U0226**	
PROFIBUS PA Profile 3 (Ex-i)	**FDK-085U0236**	
PROFIBUS DP Profile 3	**FDK-085U0237**	
MODBUS RTU RS485	**FDK-085U0234**	
FOUNDATION Fieldbus H1 (Ex-i)	**A5E02054250**	
DeviceNet	**FDK-085U0229**	

Operating instructions for SITRANS F add-on modules

Description	Order No.
HART	
• English	**A5E03089708**
PROFIBUS PA/DP	
• English	**A5E00726137**
• German	**A5E01026429**
MODBUS	
• English	**A5E00753974**
• German	**A5E03089262**
• Spanish	**A5E03089278**
• French	**A5E03089265**
FOUNDATION Fieldbus	
• English	**A5E02318728**
• German	**A5E02488856**
• Spanish	**A5E02512177**
• French	**A5E02512169**
DeviceNet	
• English	**A5E03089720**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F C literature.

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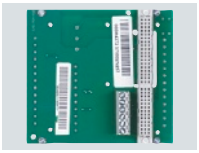
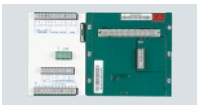
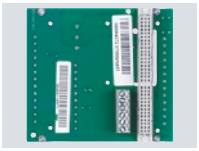
Transmitter MASS 6000 for 19" insert/19" wall mounting

Connection boards/PCB for MASS 6000 and MASS 2100 sensors

Description	Version	Order No.	
Connection board MASS 6000 for 19“ IP20 rack mounting version	24 V 115/230 V	**FDK-083H4272**	
Connection board MASS 6000 EEx [ia] IIC for 19“ IP20 rack mounting version	24 V 115/230 V	**FDK-083H4273**	
Connection board MASS 6000 for 19“ wall mounting version, for enclosure FDK-083F5037/FDK-083F5038	24 V 115/230 V	**FDK-083H4274**	
Connection board MASS 6000 EEx [ia] IIC for 19“ wall mounting version, for enclosure FDK-083F5037/ FDK-083F5038	24 V 115/230 V	**FDK-083H4275**	

Connection boards/PCB for MASS 6000 and MC2 sensors

Description	Version	Order No.	
Connection board MASS 6000 for 19“ IP20 rack mounting version	24 V 115/230 V	**FDK-083H4272**	
Connection board MASS 6000 for Ex application[1] and 19“ IP20 rack mounting version (connection board MASS 6000 to MC2 sensors Ex-approved)	24 V 115/230 V	**FDK-083H4294**	
Connection board MASS 6000 for 19“ wall mounting version, for enclosure FDK-083F5037/FDK-083F5038	24 V 115/230 V	**FDK-083H4274**	
Connection board MASS 6000 for Ex application[1] and 19“ wall mounting version (connection board MASS 6000 to MC2 sensors Ex-approved), for enclosure FDK-083F5037/FDK-083F5038	24 V 115/230 V	**FDK-083H4295**	

[1] Attention (Ex application): MC2 Ex version sensors must only be connected to connection board FDK-083H4294 or FDK-083H4295.

Description	Order No.	
Wall mounting enclosure for MASS 6000 19” version IP66/NEMA 4 (21 TE) with connection board/PCB for Ex application connected to MC2 Ex sensors	**FDK-083H4296**	

Spare parts 19” versions

Enclosure (without PCB, connection board)

Description	Order No.	
Enclosure in ABS plastic for wall mounting IP66/NEMA 4, for one 19” transmitter insert (21 TE), connection board not included	**FDK-083F5037**	
Enclosure in ABS plastic for wall mounting IP66/NEMA 4, for two 19” transmitter inserts (42 TE), connection board not included	**FDK-083F5038**	
Display for MASS 6000 19" insert/19" wall mounting. Order the Display and Keypad accessory from MASS 6000 IP67 compact/remote (FDK-085U1039) and use the display for replacement	**FDK-085U1039**	

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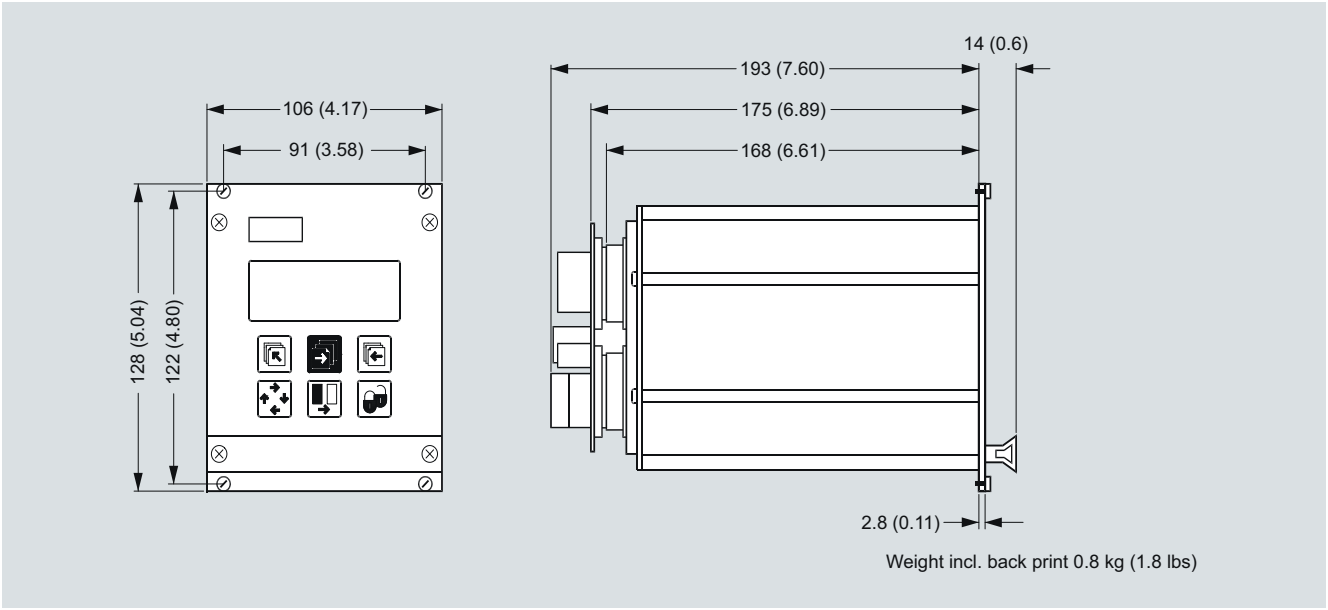
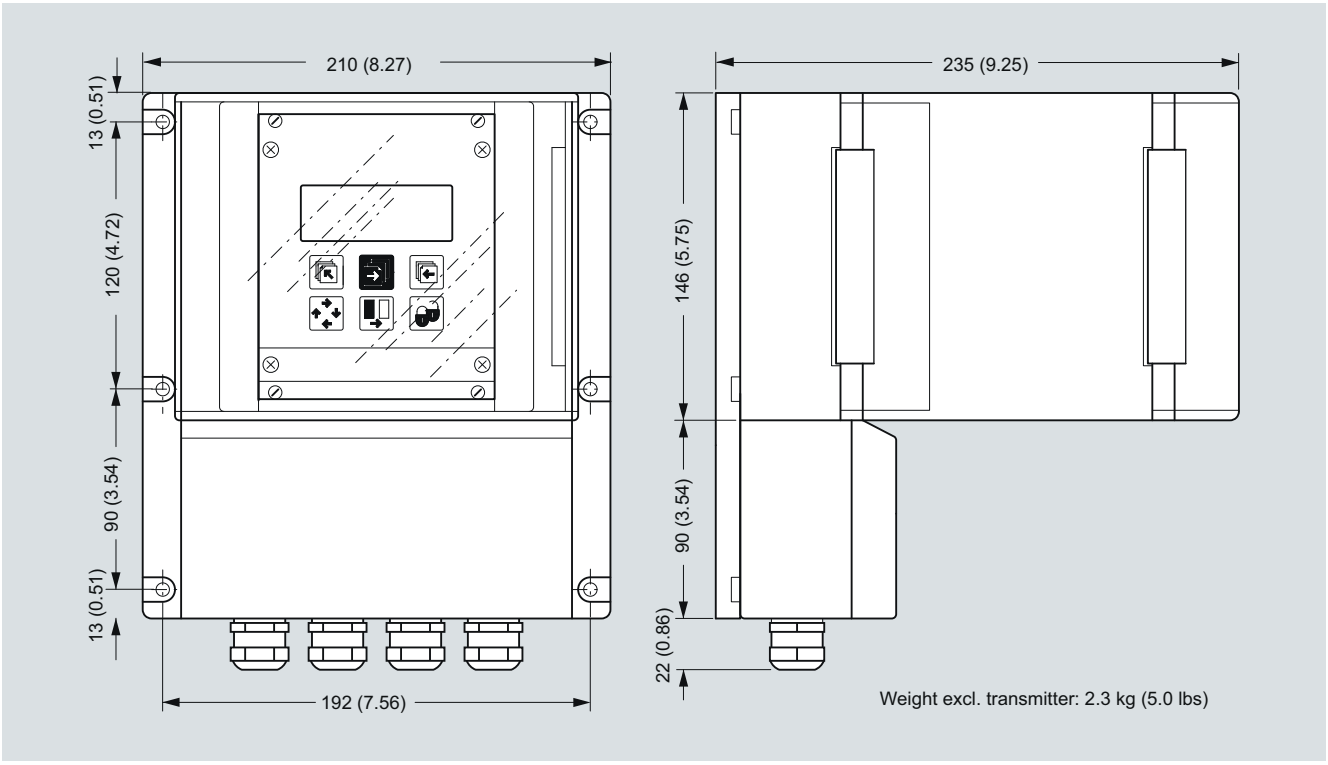
Dimensional drawings

Transmitter 19" insert



Dimensions in mm (inch)

Transmitter 19" wall mounting



Dimensions in mm (inch)

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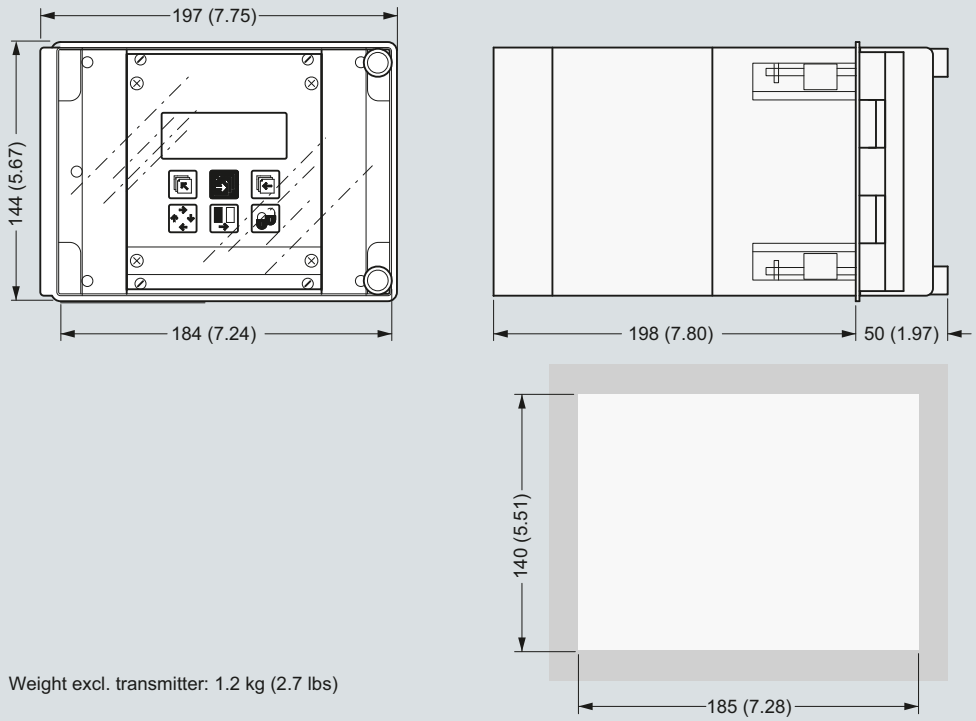
Transmitter MASS 6000 for 19" insert/19" wall mounting

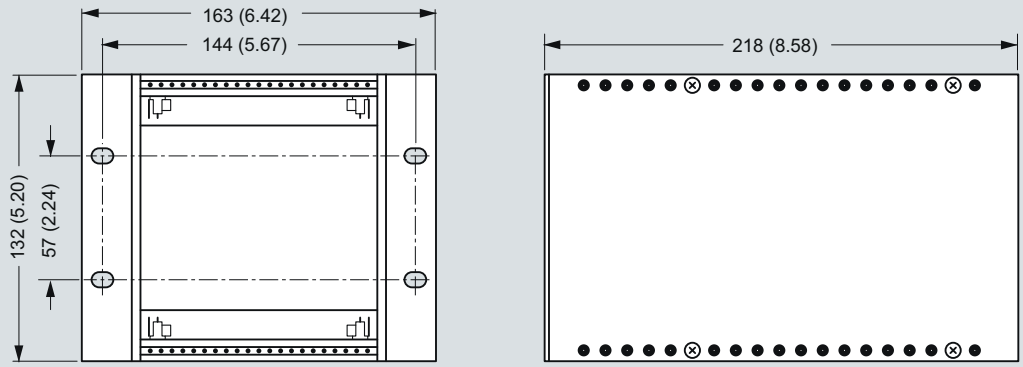
Transmitter 19“ front of panel



Weight excl. transmitter: 1.2 kg (2.7 lbs)

Dimensions in mm (inch)

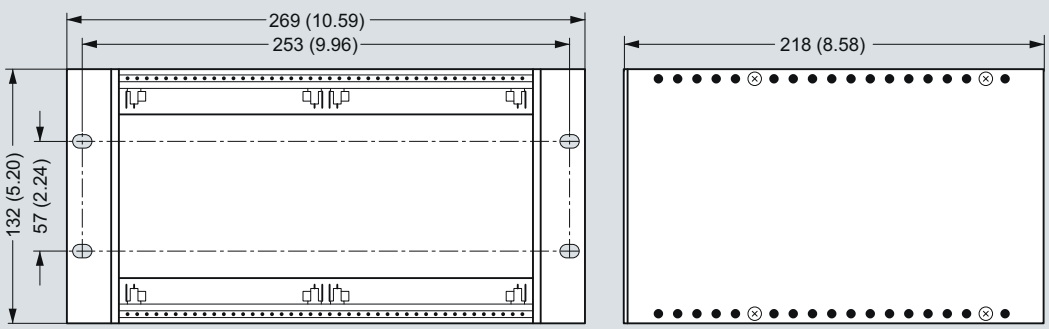
Transmitter back of panel



Weight: 0.7 kg (1.6 lbs)

Dimensions in mm (inch)

Transmitter back of panel, 42 TE



Weight: 0.9 kg (2.0 lbs)

Dimensions in mm (inch)

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Schematics

Electrical connection

Grounding

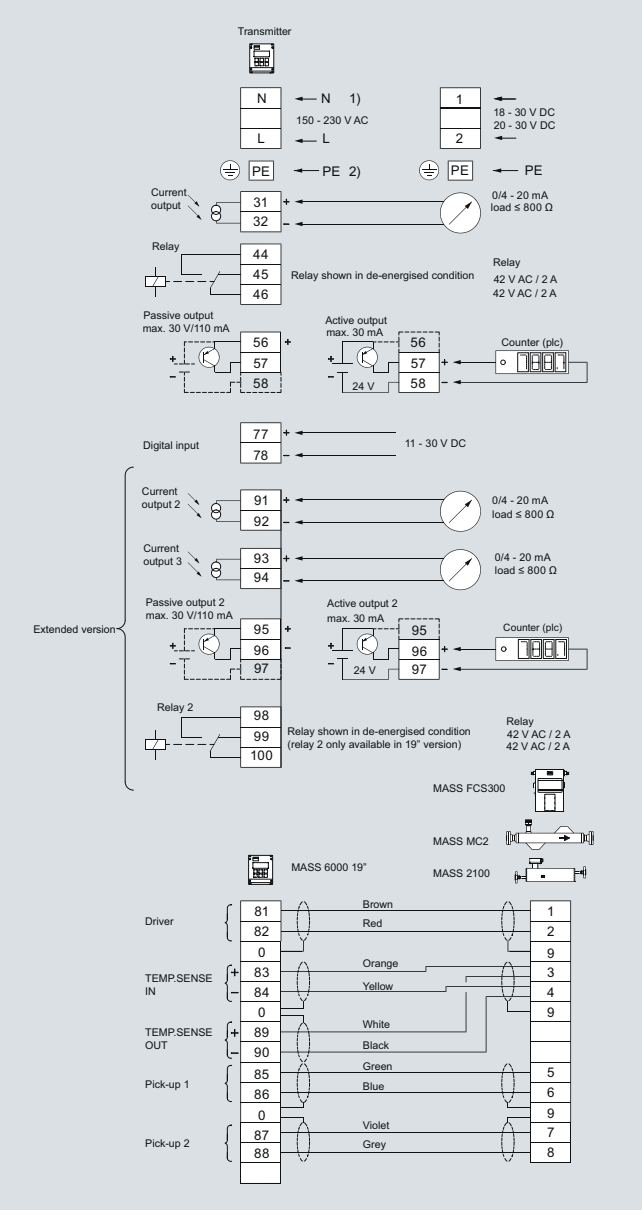
PE must be connected due to safety class 1 power supply.

Mechanical counters

When mounting a mechanical counter to terminals 57 and 58 (active output), a 1000 µF capacitor must be connected to the terminals 56 and 58. Capacitor + is connected to terminal 56 and capacitor - to terminal 58.

Output cables

If long cables are used in noisy environment, it is recommended to use shielded cables.



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Transmitter MASS 6000 Ex d compact/remote

Overview

MASS 6000 is based on the latest developments within digital signal processing technology – engineered for high performance, fast flow step response, fast batching applications, high immunity against process noise, easy to install, commission and maintain.

The MASS 6000 transmitter delivers true multiparameter measurements i.e.: Mass flow, volume flow, density, temperature and fraction flow.

The MASS 6000 Ex d transmitter is manufactured in stainless steel (AISI 316L/1.4404) and able to withstand harsh installation conditions in hazardous applications within the process and chemical industry. The conservative choice of material guarantees the user a low cost of ownership and a long trouble-free lifetime.
The Ex d can be compact mounted on all sensors of type MASS 2100 DI 3 to DI 40, and can be used in remote version for all types of MASS 2100.

Benefits

- Fully stainless steel flameproof EEx d enclosure, ensuring optimum cost of ownership
- Intrinsically safe keypad and display directly programmable in hazardous area
- ATEX-approved transmitter which can be mounted in hazardous area Zone 1 or Zone 2.
- Sensor and transmitter interface intrinsically safe EEx ia IIC
- Exchange of transmitter directly in hazardous area without shut-down of process pipe line due to ia IIC sensor/transmitter interface.
- Dedicated mass flow chip with the latest ASIC technology
- Fast batching and flow step response with an update rate of true 30 Hz
- Superior noise immunity due to a patented DFT (Discrete Fourier Transformation) algorithm
- Front end resolution better than 0.35 ns improves zero point stability and enhances dynamic turn-down ratio on flow and density accuracy.
- Advanced diagnosis and service menu enhances trouble-shooting and meter verification.
- Built-in batch controller with compensation and monitoring comprising 2 built-in totalizers
- Multi-parameter outputs, individual configurable for mass flow, volume flow, density, temperature or fraction flow such as BRIX or PLATO
- 1 current output, 1 frequency/pulse and 1 relay as standard output
- Current output can be selected as passive or active output
- Digital input for batch-control, remote zero adjust or forced output mode
- All outputs can be forced to preset value for simulation, verification or calibration purposes.
- User-configurable operation menu with password protection
  - 3 lines, 20 characters display in 11 languages
  - Self-explaining error handling/log in text format
  - Keypad can be used for controlling batch as start/stop/hold/reset
- SENSORPROM technology automatically configures transmitter at start-up providing:
  - Factory pre-programming with calibration data, pipe size, sensor type, output settings
  - Any values or settings changed by users are stored automatically
  - Automatically re-programming any new transmitter without loss of accuracy
  - Transmitter replacement in less than 5 minutes. True "plug & play"
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Fraction flow computation based on a 5th-order algorithm matching all applications
- USM II platform enables fitting of add-on bus modules without loss of functionality:
  - All modules can be fitted as true "plug & play"
  - Module and transmitter automatically configured through the SENSORPROM
- Installation of the transmitter to the sensor is simple "plug & play" via the sensor pedestal.

Application

SITRANS F C mass flowmeters are suitable for all applications within the entire process industry where there is a demand for accurate flow measurement in hazardous area. The meter can measure both liquids and gases.

The main applications for the MASS 6000 Ex d transmitter can be found in:

- Chemical process industry
- Pharmaceutical industries
- Automotive industry
- Oil and gas industry
- Power generation and utility industry

Design

The transmitter is designed in an Ex d compact stainless steel enclosure which can be compact mounted on the MASS 2100 sensor range DI 3 to DI 40, and remote mounted for the entire sensor series.

The MASS 6000 Ex d is available as standard with 1 current, 1 frequency/pulse and 1 relay output and can be fitted with add-on modules for bus communication.

- Flameproof „d“ enclosure
- Enclosure stainless steel, IP67/NEMA 4X as compact and IP66/NEMA 4 as remote
- Supply voltage 24 V AC/DC
- MASS 6000 Ex d is ATEX approved together with all MASS 2100 sensors, but can **not** be used together with MC2 Ex versions

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Transmitter MASS 6000 Ex d compact/remote

Function

The following functions are available:

- Mass flow rate, volume flow rate, density, temperature, fraction flow
- 1 current output, 1 frequency/pulse output, 1 relay output, 1 digital input
- All outputs can be individually configured with mass, volume, density etc.
- 2 built-in totalizers which can count positive, negative or net
- Low flow cut-off
- Density cut-off or empty pipe cut-off, adjustable
- Flow direction
- Error system consisting of error-log, error pending menu
- Operating time
- Uni/bidirectional flow measurement
- Limit switches with 1 or 2 limits, programmable for flow, density or temperature
- Noise filter setting for optimization of measurement performance under non-ideal application conditions
- Full batch controller
- Automatic zero adjustment menu, with zero point evaluation feed back
- Full service menu for effective and straight forward application and meter troubleshooting

Technical specifications

Measurement of	Mass flow [kg/s (lbs/min)], volume flow [l/s (gpm)], fraction [%], °Brix, density [kg/m^3 (lbs/ft^3)], temperature [°C (°F)]
Current output	Classified EEx ia, selectable as active or passive outputs. Default setting is active mode.
Current	0 ... 20 mA or 4 ... 20 mA
Load	< 350 Ω
Time constant	0 ... 99.9 s adjustable
Current characteristics	
Active mode	U_o = 24 V, I_o = 82 mA, P_o = 0.5 W, C_o = 125 nF, L_o = 2.5 mH
Passive mode (max input from external barrier)	U_i = 30 V, I_i = 100 mA, P_i = 0.75 W, C_i = 52 nF, L_i = 100 µH
Digital output	
Frequency	0 ... 10 kHz, 50 % duty cycle
Time constant	0.1 ... 30 s adjustable
Passive	6 ... 30 V DC, max. 110 mA, 1 KΩ ≤ R_{load} ≤ 10 kΩ
Output characteristics	
Active mode	Not available
Passive mode (max input from external barrier)	U_i = 30 V, I_i = 100 mA, P_i = 0.75 W, C_i = 52 nF, L_i = 100 µH
Relay	
Type	Change-over relay
Load	30 V/100 mA
Functionality	Error level, error number, limit, direction
Output characteristics	U_i = 30 V, I_i = 100 mA, P_i = 0.75 W, C_i = 0 nF, L_i = 0 mH
Digital input	11 ... 30 V DC (R_i = 13.6 kΩ)
Functionality	Start/hold/continue batch, zero point adjust, reset totalizer 1/2, force output, freeze output
Output characteristics	U_i = 30 V, I_i = 3.45 mA, P_i = 0.10 W, C_i = 0 nF, L_i = 0 mH
Galvanic isolation	All inputs and outputs are galvanically isolated, isolation voltage 500 V.
Cut-off	
Low-flow	0 ... 9.9 % of maximum flow
Empty pipe	Detection of empty sensor
Density	0 ... 2.9 g/cm^3
Totalizer	Two eight-digit counters for forward, net or reverse flow
Display	• Background illumination with alphanumerical text, 3 × 20 characters to indicate flow rate, totalized values, settings and faults. Time constant as current output • Reverse flow indicated by negative sign
Zero point adjustment	Via keypad or remote via digital input
Ambient temperature	
Operation	-20 ... +50 °C (-4 ... +122 °F)
Storage	-40 ... +70 °C (-40 ... +158 °F) (Humidity max. 95 %)
Communication	Add-on modules: HART, PROFIBUS PA, FOUNDATION Fieldbus H1
HART	
Active mode	U_o = 6.88 V, I_o = 330 mA, P_o = 0.57 W, C_o = 20 nF, L_o = 100 µH
Passive mode (max input from external barrier)	U_i = 10 V, I_i = 200 mA, P_i = 0.5 W, C_i = 0 nF, L_i = 0 µH
PROFIBUS PA	
Active mode	Not available
Passive mode	U_i = 17.5 V, I_i = 380 mA, P_i = 5.32 W, C_i = 5 nF, L_i = 10 µH
FOUNDATION Fieldbus H1	
Active mode	Not available
Passive mode	U_i = 17.5 V, I_i = 380 mA
Enclosure	
Material	Stainless steel AAISI 316/1.4435
Rating	• Compact mounted on sensor: IP67/NEMA 4X to IEC 529 and DIN 40050 • Remote mounted: IP66/NEMA 4 to IEC 529 and DIN 40050
Load	18 ... 1000 Hz random, 1.14 G rms, in all directions, to IEC 68-2-36, Curve E

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Transmitter MASS 6000 Ex d compact/remote

Supply voltage	
24 V AC	
• Range	20 ... 30 V AC
• Power consumption	6 VA I_N = 250 mA, I_{ST} = 2 A (30 ms)
• Power supply	The power supply shall be from a safety isolating transformer. Maximal cable core is 1.5 mm^2
24 V DC	
• Range	18 ... 30 V DC
• Power consumption	6 VA I_N = 250 mA, I_{ST} = 2 A (30 ms)
• Power supply	The power supply shall be from a safety isolating transformer. Maximal cable core is 1.5 mm^2.
EMC performance	
Emission	EN/IEC 61000-6-4 (Industry)
Immunity	EN/IEC 61000-6-2 (Industry)
NAMUR	Within the value limits according to "Allgemeine Anforderung" with error criteria A in accordance with NE 21
Ex approval	EEx de [ia/ib] IIC T6, DEMKO 03 ATEX 135253X
Temperature class:	Process liquid temperature:
• T6	• T < 85 °C (185 °F)
• T5	• 85 °C < T < 100 °C (185 °F < T < 212 °F)
• T4	• 100 °C < T < 135 °C (212 °F < T < 275 °F)
• T3	• 135 °C < T < 180 °C (275 °F < T < 356 °F)

Selection and Ordering data	Order No.
SITRANS F C MASS 6000 transmitter Transmitter Ex d for remote mounting inclusive of wall mounting kit	**7ME4110-** **2** ■■■■-■■**A**■
Enclosure	
Ex d SS with 5 m (16.5 ft) cable	**G**
Ex d SS with 10 m (32.8 ft) cable	**H**
Ex d SS with 25 m (82.0 ft) cable	**J**
Output configuration	
1 current, 1 frequency, 1 relay	**A**
Supply voltage	
24V AC/DC	**2**
Ex approvals	
ATEX	**1**
Display/Keypad	
With display	**1**
Serial communication	
No communication	**A**
HART	**B**
PROFIBUS PA Profile 3	**F**
FOUNDATION Fieldbus H1	**J**
Cable gland	
M20	**1**

Operating instructions for SITRANS F C MASS 6000 Ex d

Description	Order No.
• English	**A5E02944883**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Note:
Only communication modules with Ex approvals are allowed.

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

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Selection and Ordering data

Accessories

Add-on module for remote and compact MASS 6000 Ex d

Description	Order No.	
HART (Ex-i)	**FDK-085U0226**	
PROFIBUS PA Profile 3 (Ex-i)	**FDK-085U0236**	
FOUNDATION Fieldbus H1 (Ex-i)	**A5E02054250**	

Operating instructions for SITRANS F add-on modules

Description	Order No.
HART	
• English	**A5E03089708**
PROFIBUS PA/DP	
• English	**A5E00726137**
• German	**A5E01026429**
FOUNDATION Fieldbus	
• English	**A5E02318728**
• German	**A5E02488856**
• Spanish	**A5E02512177**
• French	**A5E02512169**

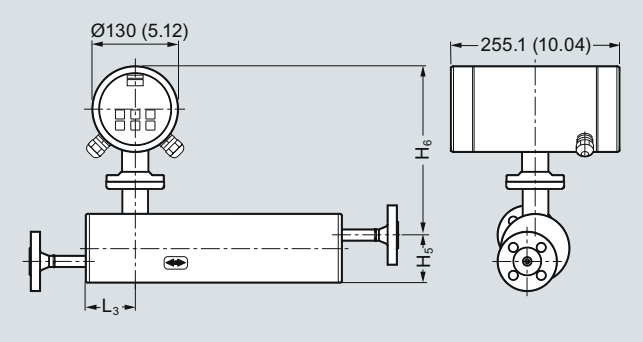
This device is shipped with a Quick Start guide and a CD containing further SITRANS F C literature.

Spare parts for MASS 6000 Ex d

Description	Order No.	
Wall mounting kit for remote Ex d inclusive of sensor cable of		
• 5 m	**FDK-083H0231**	
• 10 m	**FDK-083H0232**	
• 25 m	**FDK-083H0233**	
Ex d transmitter insert	**FDK-083H3061**	
Front lid	**FDK-085U2373**	
Screws and washers between pedestal and sensor (4 pcs.), seal (1 pc.)	**FDK-085U2374**	
Display and keypad	**FDK-083H0235**	

Dimensional drawings

MASS 6000 Ex d compact version



DImensions in mm (inch)

Sensor size [Di (inch)]	L_3 [mm (inch)]	H_5 [mm (inch)]	H_6 [mm (inch)]	$H_5 + H_6$ [mm (inch)]
3 (1/8)	75 (2.95)	82 (3.23)	247 (9.72)	329 (12.95)
6 (¼)	62 (2.44)	72 (2.83)	257 (10.12)	329 (12.95)
15 (½)	75 (2.95)	87 (3.43)	267 (10.51)	354 (13.94)
25 (1)	75 (2.95)	173 (6.81)	271 (10.67)	444 (17.48)
40 (1½)	75 (2.95)	227 (8.94)	271 (10.67)	498 (19.61)

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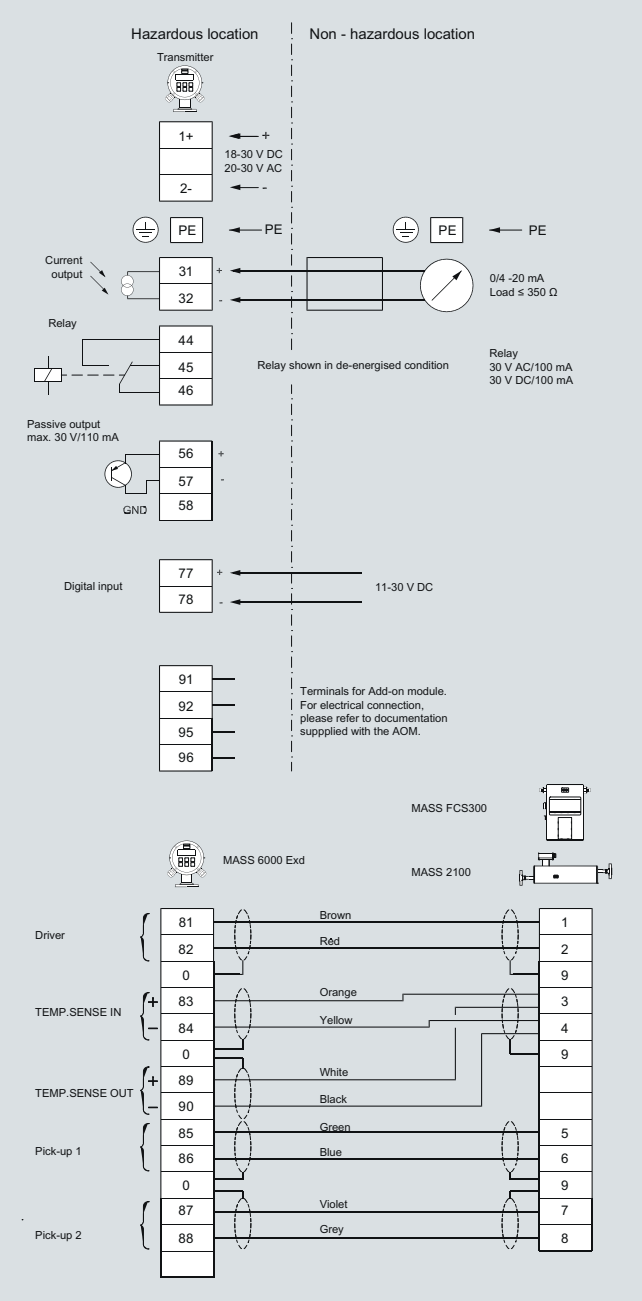
Transmitter MASS 6000 Ex d compact/remote

Schematics

Electrical connection compact or remote



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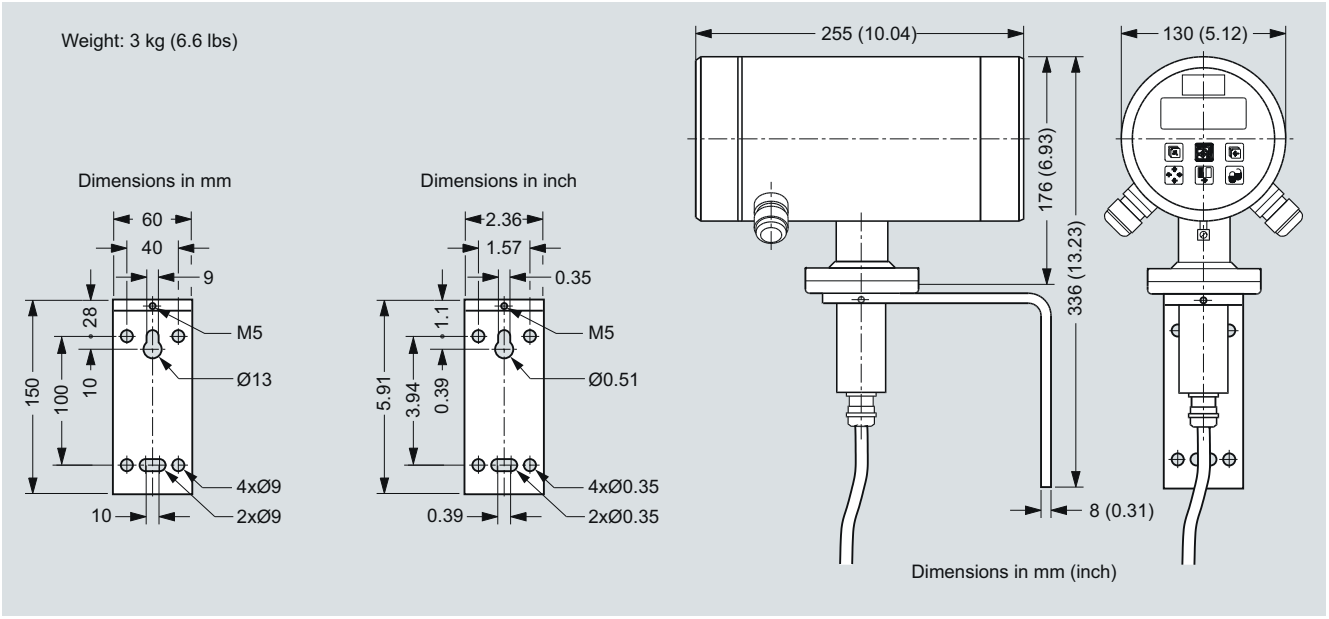
MASS 6000 Ex d remote version

Weight: 3 kg (6.6 lbs)



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Transmitter SIFLOW FC070

Overview

SIFLOW FC070 is based on the latest developments within the digital processing technology – engineered for high performance, fast flow step response, immunity against process generated noise, easy to install, commission and maintain.

SIFLOW FC070 is available in two versions:

- SIFLOW FC070 Standard
- SIFLOW FC070 Ex CT

The SIFLOW FC070 transmitter delivers true multi-parameter measurements i.e. mass flow, volume flow, density, temperature and fraction.

SIFLOW FC070 is designed for integration in a variety of automation systems, i.e.:

- Central mounted in S7-300, C7
- Decentralized in ET 200M for use with S7-300 and S7-400 as PROFIBUS DP/Profinet masters
- Decentralized in ET 200M for use with any automation system using standardized PROFIBUS DP/Profinet masters
- Stand-alone via a MODBUS RTU master, i.e. SIMATIC PDM

The SIFLOW FC070 transmitter can be connected to all sensors of types MASS 2100, MC2, FCS200 and FC300.

Benefits

- Easy integration in SIMATIC S7 and PCS 7
- Support of SIMATIC PDM configuration tool via MODBUS
- Dedicated mass flow chip with high-performance ASIC technology
- True 30 Hz update rate securing fast batching and step response
- Superior noise immunity due to a patented DFT (Discrete Fourier Transformation) algorithm
- Front end resolution better than 0.35 ns improves zero point stability and enhances dynamic turn-down ratio on flow and density accuracy.
- Advanced diagnostics enhancing troubleshooting and meter verification
- Built-in batch controller with two-stage control and compensation
- Digital outputs for direct batch control, frequency/pulse
- MODBUS RTU RS232/RS485 interface for connection to SIMATIC PDM or any other MODBUS master
- Digital input for batch control, zero adjust
- Extensive simulation options for measurement values, I/O and errors easy communication/fault-finding
- Multiple LED's for easy indication of flow, error and I/O state
- SENSORPROM technology automatically configures the transmitter during start-up providing:
  - Factory pre-programming with calibration data, pipe size, sensor type and I/O settings
  - Any values or settings changed by the user is stored automatically
  - Automatically re-programming of a new transmitter, without loss of settings and accuracy
  - Transmitter replacement in less than 30 seconds
- Four-wire Pt1000 measurement ensuring optimum accuracy mass flow, density and fraction flow
- Fraction flow computation based on a 5th-order algorithm matching all applications
- SIFLOW FC070 Ex CT is Custody transfer approved, according to OIML R 139 (Compressed gaseous fuel measuring systems for vehicles), when using the redundant digital output or the encrypted ActiveX component for SIMATIC touch panels.
- Free of charge ActiveX component for SIMATIC touch panels, enables encrypted sensor process values to be communicated between SIFLOW FC070 Ex CT and SIMATIC touch panels

Application

SIFLOW FC070 mass flowmeters are suitable for all applications within the entire process industry, where there is a demand for accurate flow measurement. The meters are suitable for measuring on liquid and gas.

The main applications for the SIFLOW FC070 transmitter can be found in the following industries:

- Food and beverage
- Pharmaceutical
- Automotive
- Oil and gas
- Power generation and utility
- Water and waste water

Design

SIFLOW FC070 is designed in an IP20 SIMATIC S7-300 enclosure and for use in central and de-central cabinets where sensors: FCS200, FC300, MASS 2100 and MC2 are remotely mounted.

Function

The following key functionalities are available:

- Mass flow rate, volume flow rate, density, temperature and fraction flow
- Two built-in totalizers which can freely be set for counting mass, volume or fraction
- 1 frequency/pulse/batch output
- 1 phase shifted 90°/180°/ two stage digital output
- 1 digital input
- Low flow cut-off
- Empty pipe detection
- Noise filter settings for different applications
- Simulation
- Two-stage batch controller
- Automatic zero point adjustment with zero point evaluation feed back
- Limit functionality
- Comprehensive status and error reporting

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Technical specifications

Measurement of	Mass flow, volume flow, density, sensor temperature, fraction A flow, fraction B flow, fraction A in %
Measurement functions	
• Totalizer 1	Totalization of mass flow, volume-flow, fraction A, fraction B
• Totalizer 2	Totalization of mass flow, volume-flow, fraction A, fraction B
• Single and 2-stage batch function	Batching function with the use of one or two outputs for dosing in high and low speed
• 4 programmable limits	4 programmable high/low limits for mass flow, volume flow, density, sensor temperature, fraction A flow, fraction B flow, fraction A in %. Limits will generate an alarm if reached.
Digital input	
Functions	Start batch, stop batch, start/stop batch, hold/continue batch, reset totalizer 1, reset totalizer 2, reset totalizer 1 and 2, zero adjust, force frequency output, freeze frequency output
High signal	• Nominal voltage: 24 V DC • Lower limit: 15 V DC • Upper limit: 30 V DC • Current: 2 ... 15 mA
Low signal	• Nominal voltage: 0 V DC • Lower limit: -3 V DC • Upper limit: 5 V DC • Current: -15 ... 15 mA
Input	Approx. 10 kΩ
Switching	Max. 100 Hz.
Digital output 1 and 2	
Functions	• Output 1: Pulse, frequency, redundancy pulse, redundancy frequency 2-stage batch, batch • Output 2: Redundancy pulse, redundancy frequency, 2-stage batch
Voltage supply	3 ... 30 V DC (passive output)
Switching current	Max. 30 mA at 30 V DC
Voltage drop	≤ 3 V DC at max. current
Leakage current	≤ 0.4 mA at max. voltage 30 V DC
Load resistance	1 ... 10 kΩ
Switching frequency	0 ... 12 kHz 50 % duty cycle
Functions	Pulse, frequency, redundancy pulse, redundancy frequency 2-stage batch, batch
Communication	
MODBUS RS232C	• Max. baudrate: 115 200 baud • Max. line length: 15 m at 115 200 baud • Signal level: according to EIA-RS232C
MODBUS RS485	• Max. baudrate: 115 200 baud • Max. line length: 1200 m at 115 200 baud • Signal level: according to EIA-RS485 • Bus termination: Integrated. Can be enabled by inserting wire jumpers.
Galvanic isolation	All inputs, outputs and communication interfaces are galvanically isolated. Isolation voltage: 500 V
Power	
Supply	24 V DC nominal
Tolerance	20.4 V DC ... 28.8 V DC
Consumption	Max. 6 W
Fuse	T1 A/125 V, not replaceable by operator
Environment	
Ambient temperature	• Storage -40 ... +70 °C (-40 ... +158 °F) • Operation 0 ... 60 °C (32 ... 140 °F)
Operation conditions	Horizontally mounted rail. For vertically mounted rail, the maximum operating temperature is +45 °C (+113 °F).
Altitude	• Operation: -1000 ... 2000 m (pressure 795 ... 1080 hPa)
Enclosure	
Material	Noryl, color: anthracite
Rating	IP20/NEMA 2 according to IEC 60529
Mechanical load	According to SIMATIC standards (S7-300 devices)
Approvals Ex	
SIFLOW FC070 Standard	CE, C-UL, ATEX II 3G EEx nA IIC
SIFLOW FC070 Ex CT	CE, C-UL, UL Haz.Loc., FM, ATEX II (1)G [Ex ia] IIC Ga / II 3G Ex nA IIC T4 Gc and IEC Ex Ex nA [ia] IIC T4
Approvals Custody transfer	
SIFLOW FC070 Ex CT	PTB Germany approval no.: 5.4.11/11.22 OIML R 139 - Compressed gaseous fuel measuring systems for vehicles
Electromagnetic compatibility	Requirements of EMC law; Noise immunity according to IEC 61000-6-2, tested according to: IEC 61000-4-2, 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6 Emitted interference according to EN 50081-2, tested according to EN 55011, class A, group 1
NAMUR	Within the limits according to "Allgemeine Anforderung" with error criteria A in accordance with NE21
Programming tools	
SIMATIC S7	Configuration trough backplane P-BUS and PLC program
SIMATIC PCS7	Configuration trough backplane P-BUS and PLC/WinCC face-plates
SIMATIC PDM	Through MODBUS port RS232C and RS485

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Transmitter SIFLOW FC070

Selection and Ordering data

Description	Order No.
SIFLOW FC070 flow transmitter Remember to order 40 pin front plug connector.	**7ME4120-2DH20-0EA0**
40 pin front plug with screw contacts	**6ES7392-1AM00-0AA0**
40 pin plug with spring contacts	**6ES7392-1BM01-0AA0**
SIFLOW FC070 Ex CT flow transmitter Remember to order 20 pin front plug connector.	**7ME4120-2DH21-0EA0**
20 pin plug with spring contacts	**6ES7392-1BJ00-0AA0**
20 pin front plug with screw contacts	**6ES7392-1AJ00-0AA0**

4

Operating instructions for SITRANS F C SIFLOW FC070

Description	Order No.
SIFLOW FC070 system manual	
• English	**A5E00924779**
• German	**A5E00924776**
SIFLOW FC070 with S7	
• English	**A5E02254228**
• German	**A5E02665536**
• French	**A5E02591639**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Accessories

Description	Order No.
Cable with multiplug for connecting MASS 2100, FCS200 and FC300 sensors	
• 5 m (16.4 ft)	**FDK-083H3015**
• 10 m (32.8 ft)	**FDK-083H3016**
• 25 m (82 ft)	**FDK-083H3017**
• 50 m (164 ft)	**FDK-083H3018**
• 75 m (246 ft)	**FDK-083H3054**
• 150 m (492 ft)	**FDK-083H3055**
Cable without multiplug for connecting MC2 sensors	
• 10 m (32.8 ft)	**FDK-083H3001**
• 25 m (82 ft)	**FDK-083H3002**
• 75 m (246 ft)	**FDK-083H3003**
• 150 m (492 ft)	**FDK-083H3004**
SIMATIC S7-300 rail The mechanical mounting rack of the SIMATIC S7-300	
• 160 mm (6.3")	**6ES7 390-1AB60-0AA0**
• 482 mm (18.9")	**6ES7 390-1AE80-0AA0**
• 530 mm (20.8")	**6ES7 390-1AF30-0AA0**
• 830 mm (32.7")	**6ES7 390-1AJ30-0AA0**
• 2000 mm (78.7")	**6ES7 390-1BC00-0AA0**
Shield connecting element For mounting on S7-300 rail. 80 mm wide with 2 rows for 4 shield terminal elements each (no shield terminal elements included)	**6ES7390-5AA00-0AA0**
Shield terminal element for 1 cable with 3 to 8 mm in dia. 2 pieces	**6ES7390-5BA00-0AA0**
Shield terminal element for 1 cable with 4 to 13 mm in dia. 2 pieces	**6ES7390-5CA00-0AA0**
SIFLOW FC070 Demo suitcase with MASS 2100 DI 1.5 sensor and SIMATIC HMI TP 177B touch panel	**A5E01075465**
Power supply	**6ES7307-1BA01-0AA0**

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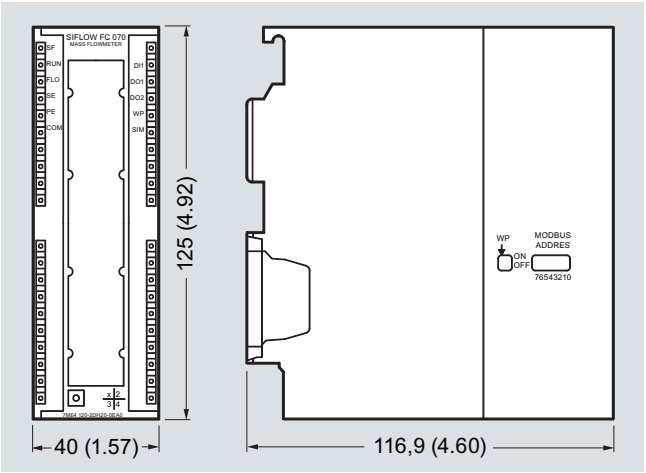
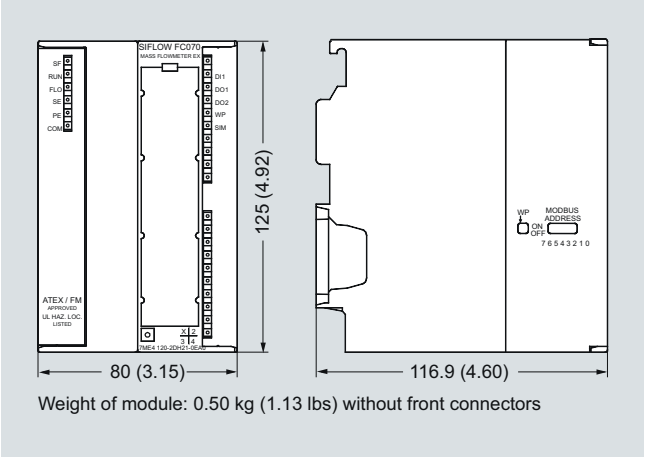
ActiveX component, enables encrypted sensor process values to be communicated between SIFLOW FC070 Ex CT and SIMATIC touch panels

Dimensional drawings



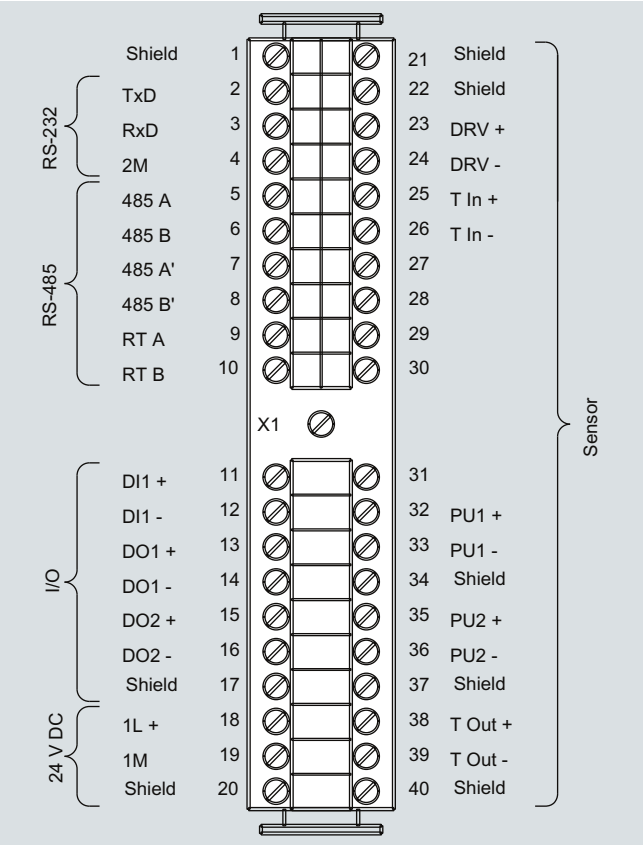
SIFLOW FC070, dimensions in mm (inch)



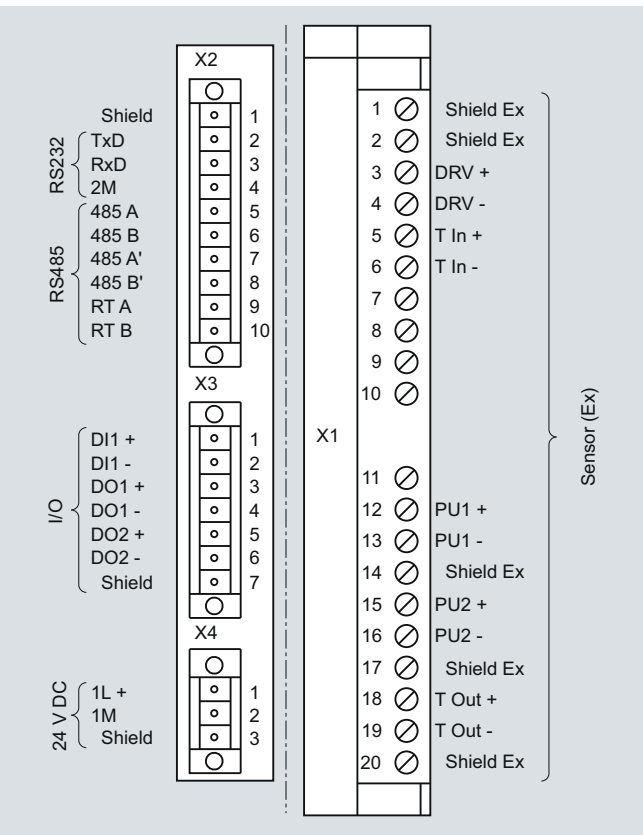
Weight of module: 0.50 kg (1.13 lbs) without front connectors

SIFLOW FC070 Ex CT, dimensions in mm (inch)

Schematics



SIFLOW FC070, electrical connection



SIFLOW FC070 Ex CT, electrical connection

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Flow sensor SITRANS FCS200

Overview

SITRANS FCS200 (DN10, DN 15 and DN 25) is a Coriolis sensor specialized for accurate mass flow measurement of gases.

The sensor offers superior performance in terms of flow accuracy and turn down ratio. The ultra compact sensor design makes installation, replacement and commissioning very straight forward and easy.

Benefits

- High accuracy gas measurement
- Approved for use in hazardous area
- DN 10 and DN 15 is custody transfer approved, according to OIML R 139 (Compressed gaseous fuel measuring systems for vehicles). For custody transfer applications SIFLOW FC070 Ex CT must be used.
- Self-draining in both horizontal and vertical orientation
- Pt1000 temperature measurement for optimum accuracy
- SENSORPROM enabling true "plug & play"
- Rigid enclosure design reducing influence from pipeline vibration and thermal stress
- High-pressure measurement up to 350 bar (5076 psi)
- Ultra compact sensor design with space-saving split flow

Application

SITRANS FCS200 is designed for measurement of gases and is suitable for use in the oil and gas industry:

- Filling of gas bottles
- CNG dispensers
- Metering of general gas applications

Design

SITRANS FCS200 is available in DN 10, DN 15 and DN 25.

The sensor consists of 2 parallel measuring pipes, welded directly onto a flow splitter at each end of the sensor to eliminate a direct coupling to the process connectors and significantly reduce effects from external vibrations. The flow-splitters are welded directly onto a rigid sensor housing which acts as a mechanical low pass filter.

The wetted parts of SITRANS FCS200 are available in Hastelloy C22, while the enclosure is made of stainless steel AISI 304/ 1.4301 with a grade of encapsulation of IP67.

The two black rupture discs are designed to prevent the enclosure from overpressure.

Function

The flow measuring principle is based on the Coriolis effect. See "System information SITRANS F C".

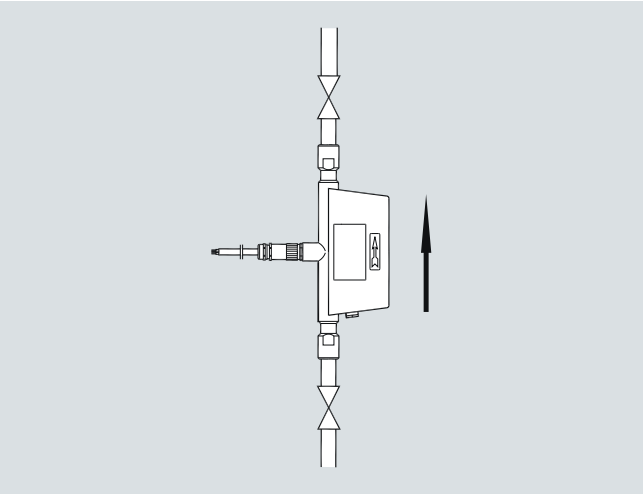
Integration

The complete flowmeter consists of the sensor (SITRANS FCS200) and a transmitter SITRANS F C MASS 6000 or SIFLOW FC070. All communication options are available for MASS 6000.

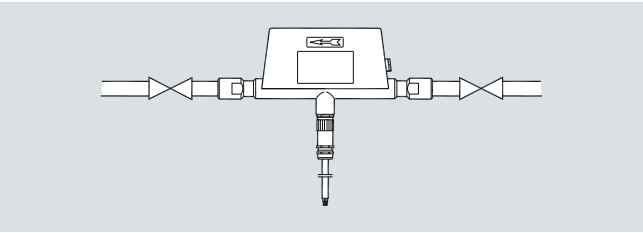
The sensor is shipped with a SENSORPROM memory unit containing all information about calibration data, device identity and factory pre-programming of transmitter settings.

Installation guidelines

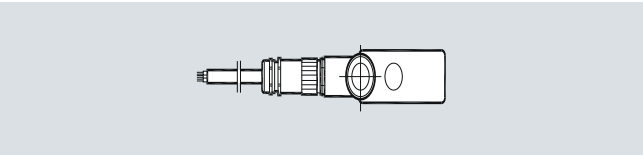
Siemens Flow Instruments recommends installing the sensor in one of the following ways:



Vertical orientation with an upwards flow



Horizontal installation, tubes up



Horizontal installation, tubes sideways

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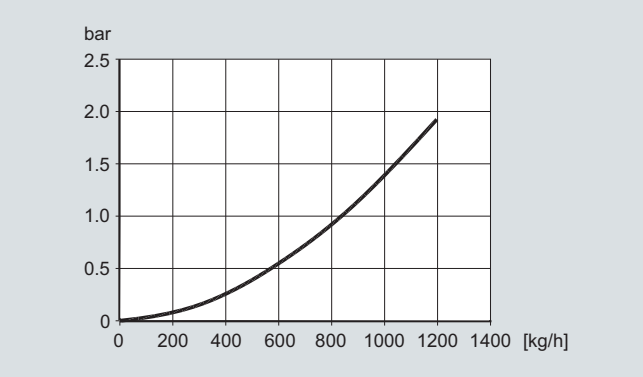
Technical specifications

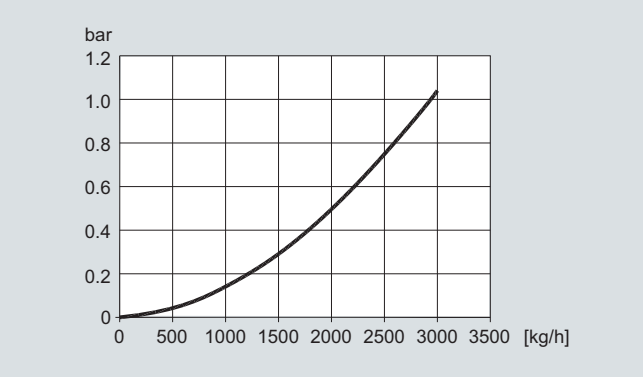
Sensor size	DN 10	DN 15	DN 25
Mass Flow			
Accuracy [% of rate]		± 0.5	
Repeatability [% of rate]		± 0.25	
Max. zero point error [kg/h (lbs/h)]	0.25 (0.55)	1.2 (2.65)	3.0 (6.6)
Measuring range [kg/min (lbs/min)]	0 … 42 (0 … 92.6)	0 … 200 (0 … 440.9)	0 … 500 (0 … 1102.3)
Process temperature		-40 ... +125 °C (-40 ... +257 °F)	
Ambient temperature		-40 ... +60 °C (-40 ... +140 °F)	
Temperature error		0.5 °C (0.9 °F)	
Pressure [bar (psi)]	350 (5076)	350 (5076)	214 (3104)
Enclosure grade		IP66/IP67 (EN 60529)	
Material			
Measuring pipe and splitter	Hastelloy C22/2.4602	Hastelloy C22/2.4602	Stainless steel
Enclosure and connection (flanges)	Stainless steel		
Connection thread	¼" NPT ½" NPT ½" VCO	½" NPT ¾" NPT 1" NPT ¾" VCO	1" NPT 1½" NPT 1" VCO
Ex approval			
• ATEX		II 1/2 G Ex ia IIC T5/T4	
• IECEx		Ex ia IIC T5/T4	
• FM		Class I, Div 1, Groups A, B, C and D	
Weight approx.	2.8 kg (6.2 lb)	6.0 kg (13.2 lb)	11 kg (24.2 lb)
Approvals Custody transfer			
DN 10/DN 15		PTB Germany approval nr: 5.4.11/11.22 OIML R 139 - Compressed gaseous fuel measuring systems for vehicles	

Characteristic curves

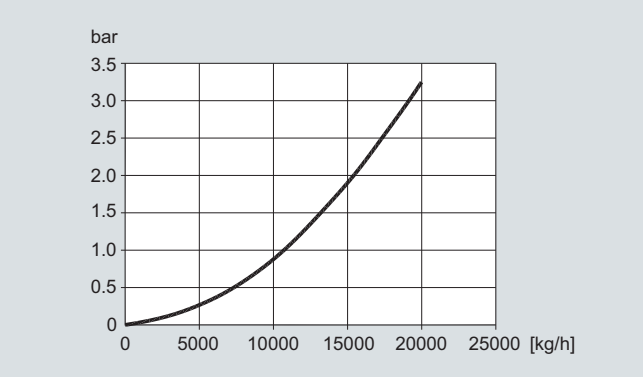
DN 10



DN 15



DN 25



The pressure drop as a function of capacity for CNG with a pressure of 200 bar (2900 psi) and an ambient temperature of 20 °C (68 °F).

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Flow sensor SITRANS FCS200

Selection and Ordering data	Order No.
SITRANS F C Flow sensors	
SITRANS FCS200 sensor, without heating jacket	**7ME4500 -** ■■■■■ - ■■■■
Sensor size and material	
DN 10, Hastelloy C22/2.4602	**2D**
DN 15, Hastelloy C22/2.4602	**2E**
DN 25, Stainless steel AISI 316Ti/1.4571	**1F**
Pressure	
PN 214 (DN 25)	**K**
PN 350 (DN 10 and DN 15)	**N**
Process connection/flange	
½"/VCO	**71**
¾"/VCO	**72**
1"/VCO	**73**
¼"/NPT pipe thread	**81**
½"/NPT pipe thread	**82**
¾"/NPT pipe thread	**83**
1"/NPT pipe thread	**84**
1½"/NPT pipe thread	**85**
Configuration	
Standard	**1**
Transmitter	
None	**A**
Cable	
No cable	**A**
Calibration	
Standard calibration	**1**

Selection and Ordering data	Order code
Additional information Please add "**-Z**" to Order No. and specify Order code(s) and plain text.	
Pressure testing certificate PED: 97/23/EC	**C11**
Material certificate EN 10204-3.1	**C12**
NDT-Penetrant inspection report ISO 3452	**C13**
Factory certificate according to EN 10204 2.2	**C14**
Factory certificate according to EN 10204 2.1	**C15**
Tag name plate, stainless steel	**Y17**

Accessories

Description		Order No.
Cable with multiple plug	5 m (16.4 ft)	**FDK-083H3015**
Standard blue cable between SIFLOW FC070/MASS 6000 and FCS200, 5 x 2 x 0.34 mm^2 twisted and screened in pairs. Temperature range -20 °C ... +110 °C (-4 °F... +230 °F)	10 m (32.8 ft)	**FDK-083H3016**
	25 m (82 ft)	**FDK-083H3017**
	50 m (164 ft)	**FDK-083H3018**
	75 m (246 ft)	**FDK-083H3054**
	150 m (492 ft)	**FDK-083H3055**

Spare parts

Description	Order No.
Multiple plug for cable mounting	**FDK-083H5056**
2 kB SENSORPROM unit (Sensor Serial No. and Order No. must be specified by ordering)	**FDK-083H4410**

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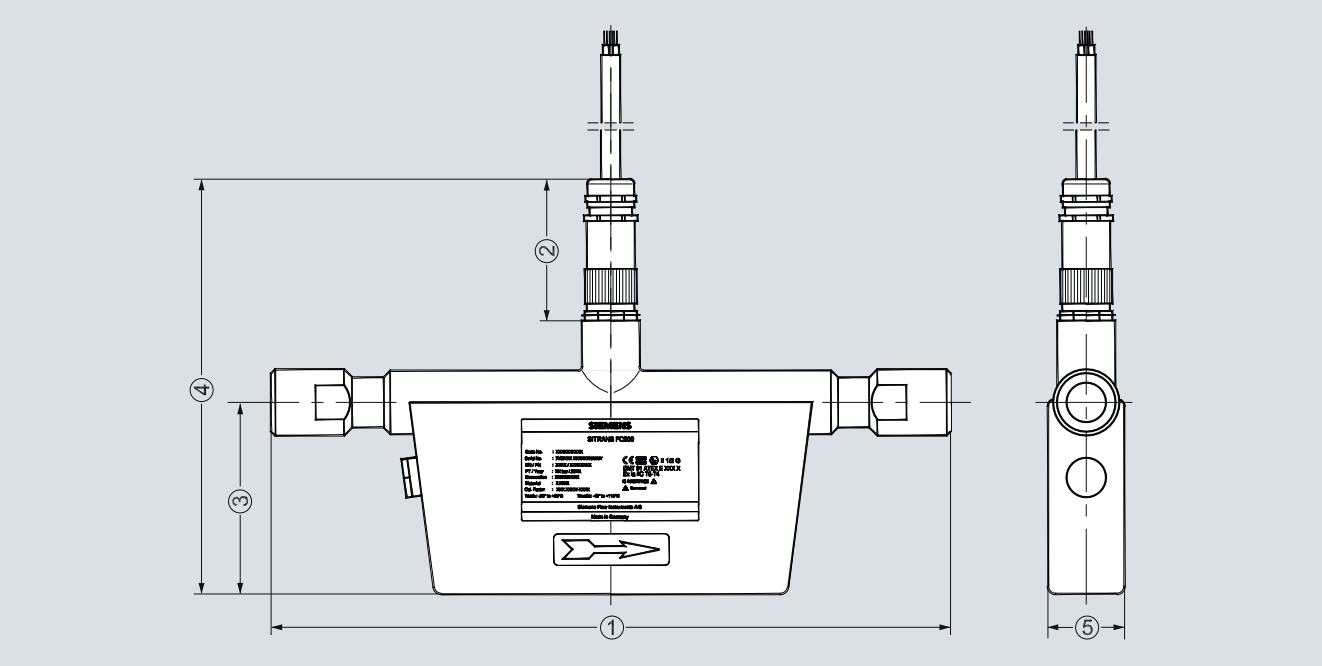
Dimensional drawings

SITRANS FCS200, DN 10 ... DN 15



SITRANS FCS200, DN 10 ... DN 15, dimensions in mm (inch)

Position	DN 10 with NPT connectors mm (inch)	DN 10 with VCO connectors mm (inch)	DN 15 mm (inch)
(1)	350 (13.78)	330 (12.99)	450 (17.72)
(2)	72 (2.84)	72 (2.84)	72 (2.84)
(3)	100 (3.94)	100 (3.94)	148 (5.83)
(4)	204 (8.03)	204 (8.03)	253 (9.96)
(5)	40 (1.57)	40 (1.57)	48 (1.89)

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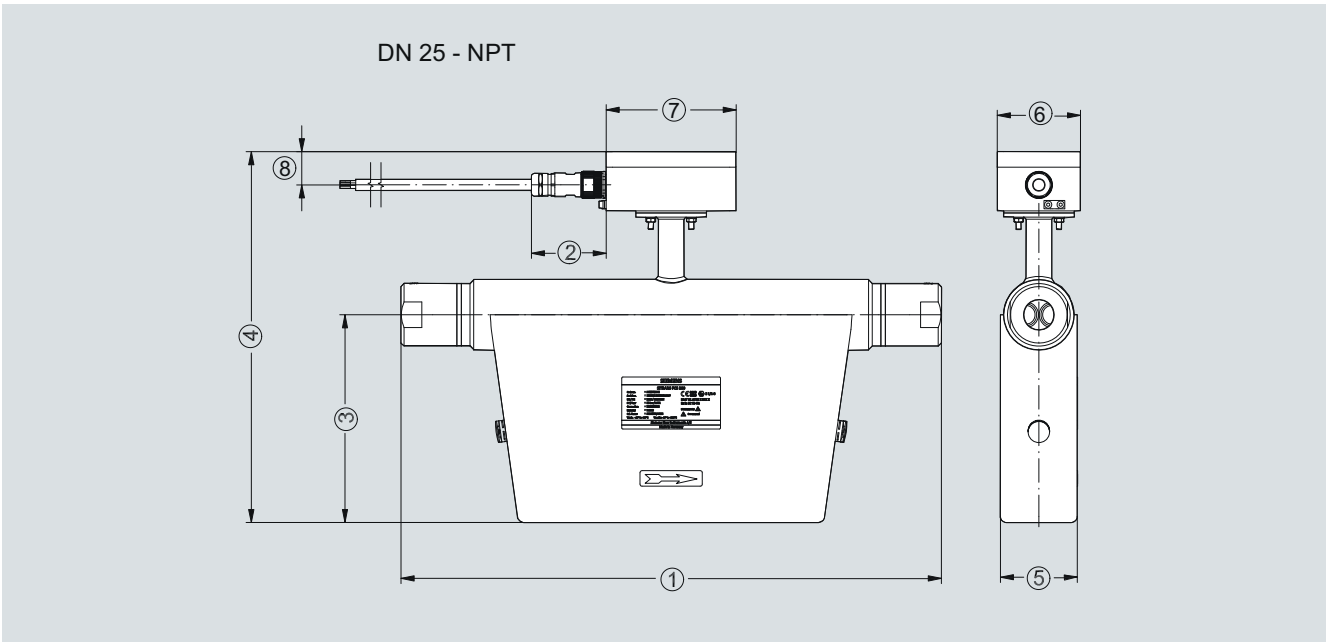
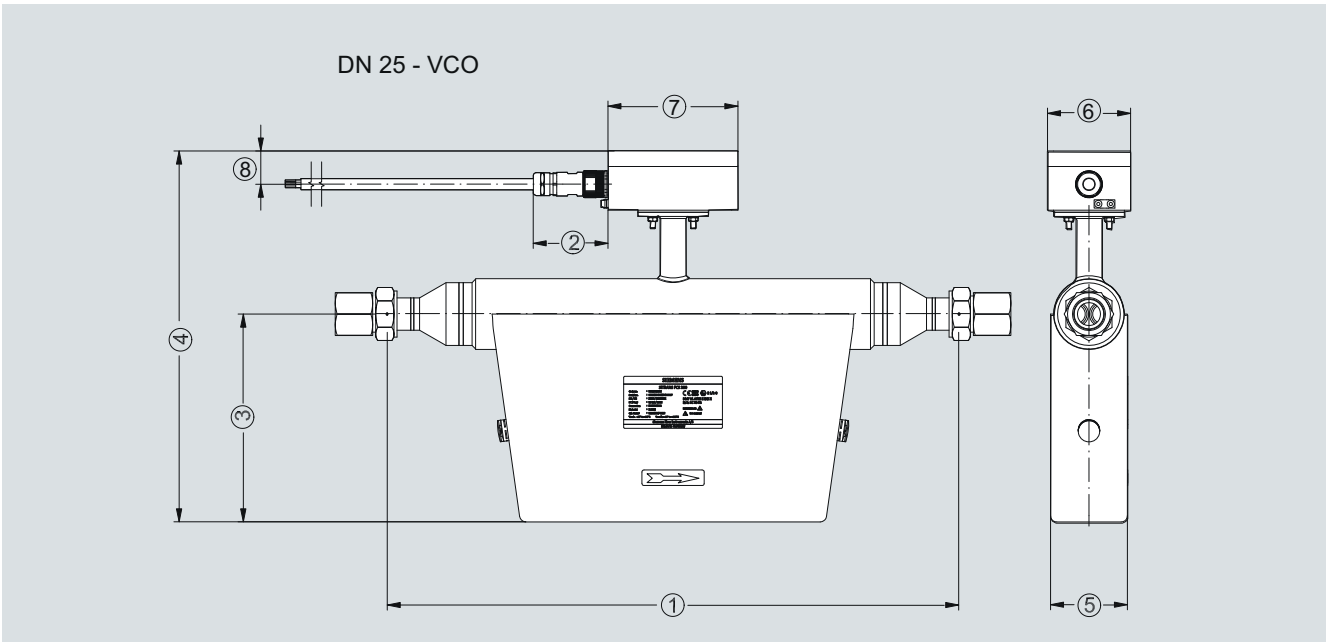
Flow sensor SITRANS FCS200

SITRANS FCS200, DN 25





SITRANS FCS200, DN 25, dimensions in mm (inch)

Position	DN 25 with NPT connection mm (inch)	DN 25 with VCO connection mm (inch)
(1)	520 (20.47)	550 (21.65)
(2)	72 (2.84)	72 (2.84)
(3)	200 (7.87)	200 (7.87)
(4)	357 (14.77)	357 (14.77)
(5)	74 (2.91)	74 (2.91)
(6)	80 (3.15)	80 (3.15)
(7)	125 (4.92)	125 (4.92)
(8)	32 (1.26)	32 (1.26)

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Overview

MASS 2100 DI 1.5 is suitable for low flow measurement applications of a variety of liquids and gases.

The sensor offers superior performance in terms of flow accuracy, turn-down ratio and density accuracy. The ease of installation through a "plug & play" mechanical and electrical interface ensures optimum performance and operation.

The sensor delivers true multi-parameter measurements i.e.: Mass flow, volume flow, density, temperature and fraction.

Benefits

- High accuracy better than 0.1 % of mass flow rate
- Large dynamic turn-down ratio better than 500:1, from 65 kg/h to a few g/h
- Densitometer performance available through a density accuracy better than 0.001 g/cm^3 with a repeatability better than 0.0002 g/cm^3.
- Single continuous tube design, with no internal welds, reductions or flow splitters offers optimal hygiene, safety and CIP cleanability for food and beverage and pharmaceutical applications.
- Market's biggest wall thickness, ensuring optimal life-time and corrosion resistance and high-pressure durability
- Balanced pipe design with little mechanical energy-loss, ensures optimal performance and stability under non-ideal and unstable process conditions (pressure, temperature, density-changes etc.).
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Multi-plug electrical connector and SENSORPROM enables true "plug & play". Installation and commissioning in less than 10 minutes
- Intrinsically safe EEx ia design as standard
- Sensor pipe available in high-quality stainless steel AISI 316L/ 1.4435 or Hastelloy C22/2.4602 offering optimum corrosion resistance
- Dual-drive pick-up and driver construction facilitate ultra low-weight pipe construction giving the markets' smallest and most stable zero point.
- Rugged and space-saving sensor design in stainless steel matching all environments
- High-pressure program as standard
- The sensor calibration factor is also valid for gas measurement.

Application

In many industries such as the food and beverage or pharamceutical industry, accurate recipe control means everything. The MASS 2100 DI 1.5 has demonstrated superiour performance in numerous applications and field trails relating to accuracy and turn-down ratio. It is today the preferred meter for research and development and mini-plant applications for liquid or gas measurement, where measuring small quantities is important.

The main applications for the MASS 2100 DI 1.5 sensor can be found in:	
Chemical industry	Liquid and gas measurement within Miniplant and R & D, dosing of additives and catalysts
Cosmetic industry	Dosing of essence and fragrances
Pharmaceutical industry	High-speed dosing and coating of pills, filling of ampuls/injectors
Food and beverage industry	Dosing of flavourings, colours and additives, density measurement, inline Measurement of liquid or gaseous CO_2
Automotive industry	Fuel injection nozzle and pump testing, filling of AC units, engine consumption, paint robots, ABS test-beds

Design

The MASS 2100 sensor consists of a single bent tube in a double omega pipe configuration, welded directly to the process connectors at each end.

The sensor is available in 2 material configurations, AISI 316L/ 1.4404 or Hastelloy C22/2.4602 with ¼" NPT or ¼" ISO process connections.

The enclosure is made in stainless steel AISI 316L/1.4404 with a grade of encapsulation of IP65/NEMA 4.

The sensor is available in either a standard version with a maximum liquid temperature of 125 °C (257 °F) or a high-temperature version, with raised electrical connector for 180 °C (356 °F).

The sensor can be installed in horizontal or vertical position. The enclosed single quick release clamp fitting which, along with its compact design and single multi-plug electrical connector, will keep installation costs and time to a minimum as shown below.

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Flow sensor MASS 2100 DI 1.5

Function

The measuring principle is based on the Coriolis effect. See "System information SITRANS F C Coriolis mass flowmeters".

Integration

The sensor can be connected to all MASS 6000 transmitters for remote installation only.

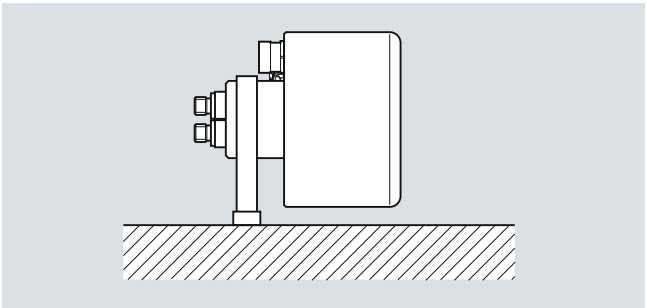
All sensors are delivered with a SENSORPROM containing all information about calibration data, identity and factory pre-programming of transmitter settings

Installation guidelines MASS 2100 DI 1.5 (1/16")

Installation of MASS 2100 sensor

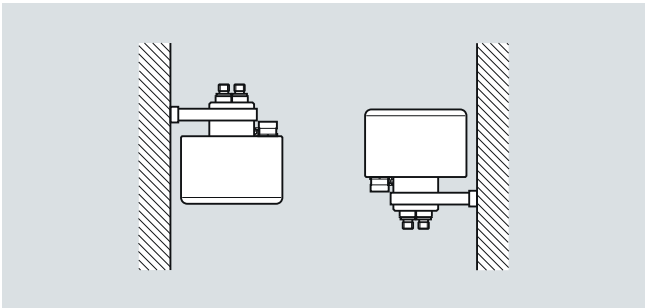
- The optimal installation is horizontal.
  If vertical mounting is necessary, upward flow is recommended to facilitate the removal of air bubbles. To remove the air from the sensor the flow speed in the sensor must be at least 1 m/s.
  If there are solid particles in the liquid, especially in connection with low flow, it is recommended that the sensor be mounted horizontally with inlet flange uppermost so that particles are more easily flushed out. To ensure that the sensor does not become partially empty, there must be sufficient counter-pressure on the unit min. 0.1 to 0.2 bar (1.45 to 2.9 psi).
- Mount the sensor on a vibration-free wall or steel frame.
- Locate the sensor low in the system in order to avoid an underpressure in the sensor separating air/gas in the liquid.
- Ensure that the sensor is not emptied of liquid (during normal operation) otherwise incorrect measurement will occur.

Horizontal



Liquid and gas application

Vertical



Liquid application (left), gas application (right)

Technical specifications

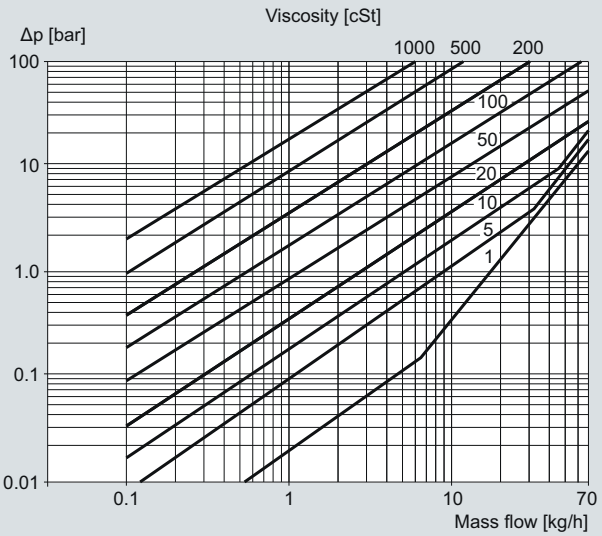
Inside pipe diameter (sensor consists of one continuous pipe)	1.5 mm (0.06")
Pipe wall thickness	0.25 mm (0.010")
Mass flow measuring range	0 ... 65 kg/h (0 ... 143 lb/h)
Density	0 ... 2.9 g/cm^3 (0 ... 0.10 lb/inch^3)
Fraction e.g.	0 ... 100 °Brix
Temperature	
Standard	-50 ... +125 °C (-58 ... +257 °F)
High-temperature version	-50 ... +180 °C (-58 ... +356 °F)
Liquid pressure measuring pipe[1]	
Stainless steel	230 bar (3336 psi) at 20 °C (68 °F)
Hastelloy C22/2.4602	365 bar (5294 psi) at 20 °C (68 °F)
Materials	
Measuring pipe and connection	Stainless steel AISI 316L/1.4435 Hastelloy C22/2.4602
Enclosure and enclosure material[2]	IP66/NEMA 4 and stainless steel AISI316L/1.4404
Connection thread	
ISO 228/1	G¼" male
ANSI/ASME B1.20.1	¼" NPT male
Cable connection	Multiple plug connection to sensor 5 x 2 x 0.35 mm^2 twisted and screened in pairs, ext. Ø 12 mm
Ex-version	EEx ia IIC T3-T6, DEMKO 03 ATEX 135252X
Weight approx.	2.6 kg (5.73 lb)

[1] According to DIN 2413, DIN 17457

[2] Housing is not rated for pressure containment.

For accuracy specifications see "System information SITRANS F C".

Pressure drop



MASS 2100 DI 1.5 (1/16"), pressure drop for density = 1000 kg/m^3

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Selection and Ordering data	Order No.	Order code
SITRANS F C Flow sensors		
MASS 2100 DI 1.5 (1/16“) sensor, without heating jacket[1)]	7ME4100-	
Diameter		
Stainless steel AISI 316L/1.4435		
DI 1.5, max. 125 °C (257 °F)	1A	
DI 1.5, max. 180 °C (356 °F)	1B	
Hastelloy C22/2.4602		
DI 1.5, max. 125 °C (257 °F)	2A	
DI 1.5, max. 180 °C (356 °F)	2B	
Pressure		
PN 100	D	
PN 230 (AISI 316L/1.4404)	L	
PN 365 (C22/2.4602)	P	
Process connection/flange		
Pipe thread		
G ¼“ male	10	
¼“ NPT male	11	
Configuration		
Standard	1	
Density	2	
BRIX/PLATO	3	
Fraction (specification required)	9	N0Y
Transmitter compact mounted on sensor		
No transmitter, sensor and adapter only	A	
MASS 6000, Ex d, stainless steel enclosure, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC with EEx de [ia/ib] T3 -T6 Ex-approval.	B	
MASS 6000, IP67, Polyamide enclosure, cable glands M20, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC.	C	
MASS 6000, IP67, Polyamide enclosure, cable glands M20, 1 current, 1 freq./pulse and 1 relay output, 115/230 V AC 50/60 Hz	D	
MASS 6000, IP67, Polyamide enclosure, cable glands ½" NPT, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC	E	
MASS 6000, IP67, Polyamide enclosure, cable glands ½" NPT, 1 current, 1 freq./pulse and 1 relay output, 115/230 V AC 50/60 Hz, ½" NPT	F	
Cable		
No cable	A	
5 m (16.4 ft) cable	B	
10 m (32.8 ft) cable	C	
25 m (82 ft) cable	D	
50 m (164 ft) cable	E	
75 m (246 ft) cable	F	
150 m (492 ft) cable	G	
Calibration		
Standard calibration 3 flow x 2 points	1	
Standard calibration matched pair 3 flow x 2 points	2	
Accredited calibration matched pair 5 flow x 2 points (DANAK)	3	
Extended calibration customer-specified select Y60, Y61, Y62 or Y63 (see additional information)	8	

[1)] Not possible to order DI 1.5 sensor with heat jacket.

Selection and Ordering data	Order code
Additional information	
Please add “**-Z**“ to Order No. and specify Order code(s) and plain text.	
Pressure testing certificate PED: 97/23/EC	**C11**
Material certificate EN 10204-3.1	**C12**
Welding certificate NDT-Penetrant: ISO 3452	**C13**
Factory certificate according to EN 10204 2.2	**C14**
Factory certificate according to EN 10204 2.1	**C15**
Tag name plate, stainless steel	**Y17**
Tag name plate, plastic	**Y18**
Customer-specific transmitter setup	**Y20**
Customer-specified, matched pair (5 x 2)	**Y60**
Customer-specified calibration (5 x 2)	**Y61**
Customer-specified, matched pair (10 x 1)	**Y62**
Customer-specified calibration (10 x 1)	**Y63**
Cleaned for oil and grease	**Y80**
Special version	**Y99**

Operating instructions for SITRANS F C MASS 2100 DI 1.5

Description	Order No.
• English	**A5E03089952**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

Accessories

Description		Order No.
Cable with multiple plug	5 m (16.4 ft)	**FDK-083H3015**
Standard blue cable between MASS 6000 and MASS 2100, 5 x 2 x 0.34 mm² twisted and screened in pairs. Temperature range -20 °C ... +110 °C (-4 °F ... +230 °F)	10 m (32.8 ft)	**FDK-083H3016**
	25 m (82 ft)	**FDK-083H3017**
	50 m (164 ft)	**FDK-083H3018**
	75 m (246 ft)	**FDK-083H3054**
	150 m (492 ft)	**FDK-083H3055**

Spare parts

Description	Order No.
Multiple plug for cable mounting	**FDK-083H5056**
2 kB SENSORPROM unit (Sensor Serial No. and Order No. must be specified by ordering)	**FDK-083H4410**
Bracket	**A5E02590427**

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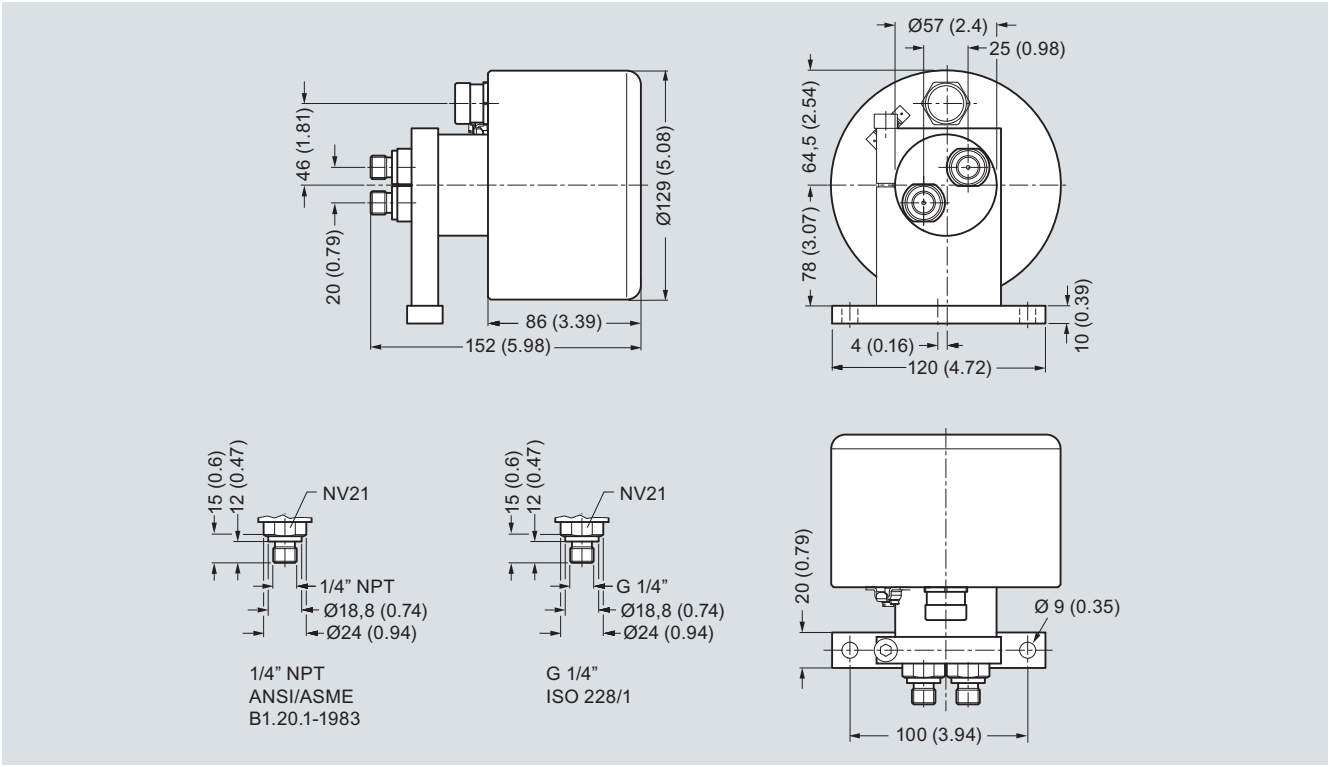
Flow sensor MASS 2100 DI 1.5

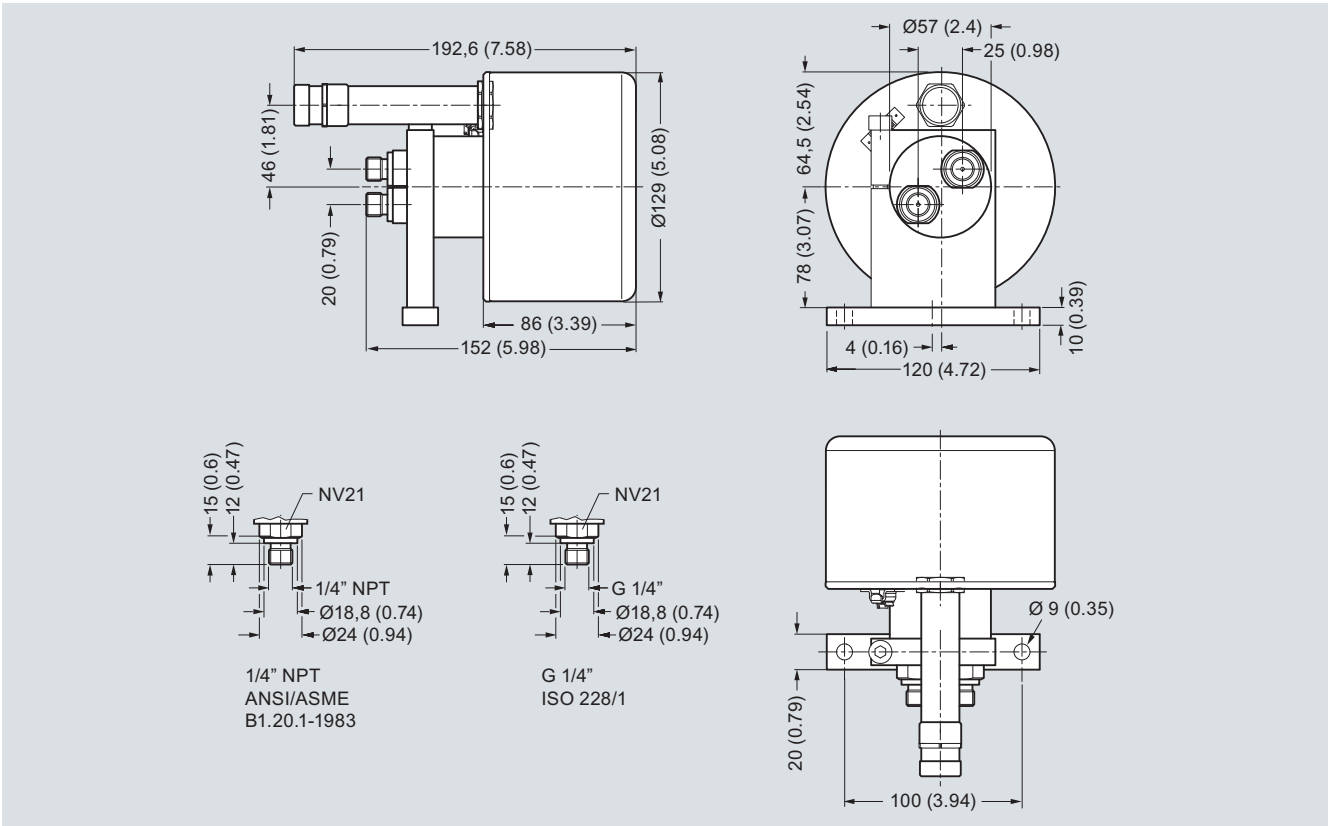
Dimensional drawings

MASS 2100 DI 1.5 (1/16“)



Dimensions in mm (inch)

MASS 2100 DI 1.5 High-temperature version to 180 °C (356 °F)



Dimensions in mm (inch)

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Overview

SITRANS FC300 is a compact Coriolis mass sensor suitable for flow measurement of a variety of liquids and gases.

The sensor offers superior performance in terms of flow accuracy, turn-down ratio and density accuracy. The ease of installation through a „plug & play“ interface ensures optimum performance and operation.

A new designed encapsulation in stainless steel with a surprisingly low weight of only 3.5 kg (7.7 lb), ensures a rigid and robust sensor performance for a wide range of applications.

Benefits

- High accuracy better than 0.1 % of mass flow rate
- Large dynamic turn-down ratio better than 500:1
- Densitometer performance available through a density accuracy better than 0.001 g/cm^3 (0.000036 lb/inch^3) with a repeatability better than 0.0002 g/cm^3 (0.0000072 lb/inch^3)
- One tube without internal welds, reductions or flow splitters offers optimal hygiene, safety and CIP cleanability for food and beverage and pharmaceutical applications
- Larger wall thickness, ensures optimal life-time and corrosion resistance and high-pressure durability
- Balanced pipe design with little mechanical energy loss, ensures optimal performance and stability under non-ideal and unstable process conditions (pressure, temperature, density-changes etc.).
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Multi-plug electrical connector and SENSORPROM enable true „plug & play“. Installation and commissioning in less than 10 minutes.
- Intrinsically safe Ex design ia IIC as standard
- Sensor pipe available in high-quality stainless steel AISI 316L/1.4435 or Hastelloy C22/2.4602 offering optimum corrosion resistance.
- Rugged and space-saving sensor design in stainless steel matching all applications.
- High-pressure program as standard
- The sensor calibration factor is also valid for gas measurement.

Application

The industry today has an increasing demand for mass flowmeters with a reduced physical size without loss of performance. The meters must be suitable for installation in traditional process industry environment as well as OEM equipment for instance within automotive or appliance industry. Independent of industry application the meter must deliver accurate and reliable measurements. The new and versatile design of the FC300 offers this flexibility.

The main applications for the SITRANS FC300 DN 4 can be found in:	
Chemical industry	Liquid and gas measurement in normal as well as corrosive environments
Cosmetic industry	Dosing of essence and fragrances
Pharmaceutical industry	High-speed dosing and coating of pills, filling of ampuls/injectors
Food and beverage industry	Filling, dosing of flavorings, colors and additives, inline density measurement Measurement and dosing of liquid or gaseous CO_2
Automotive industry	Fuel injection nozzle and pump testing, filling of AC units, engine consumption, paint robots, ABS test-beds

Design

The FC300 sensor consists of a single tube bent in double omega pipe geometry, welded directly to the process connectors at each end. The sensor is available in 2 material configurations, AISI 316L/1.4404 or Hastelloy C22/2.4602 with ¼"-NPT or G¼"-ISO process connections.

The enclosure is made of stainless steel AISI 316L/1.4409 with a grade of encapsulation of IP66/NEMA4. The enclosure has a very robust design and with an overall size of 130 x 200 x 60 mm (5.12“ x 7.87“ x 2.36“) the sensor is very compact and requires only little installation space.

The sensor can be delivered in a standard version with a maximum liquid temperature of 115 °C (239 °F) or a high-temperature version, with raised electrical connector for 180 °C (356 °F).

The sensor can be installed in horizontal or vertical position. The sensor can be mounted directly on any given plane surface or if desired with the enclosed quick release clamp fitting which, along with its compact design and multi-plug electrical connector, will keep installation costs and time to a minimum.

Function

The measuring principle is based on the Coriolis effect. See “System information SITRANS F C Coriolis mass flowmeters”.

Integration

The sensor can be connected to all MASS 6000 transmitters for remote installation only.

All sensors are delivered with a SENSORPROM containing all information about calibration data, identity and factory pre-programming of transmitter settings

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Flow sensor SITRANS FC300

Installation guidelines for SITRANS FC300 sensor

Horizontal installation as shown in figure A is recommended with gas or liquid applications.

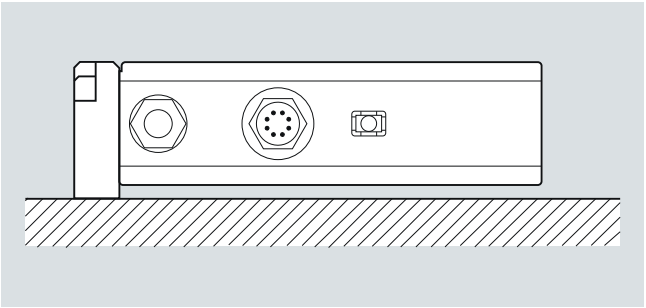
This installation is also recommended when the flow velocity is low (< 1 m/s) or the liquid contains solid particles or air bubbles.

Vertical installation as shown in figure B can be used for liquid or gas applications.

For liquid applications upwards flow is recommended to facilitate the removal of air bubbles and to avoid partly emptying of the sensor.
For gas applications we recommend to place the flow inlet on the sensor high and the outlet low to remove impurities and oil films.

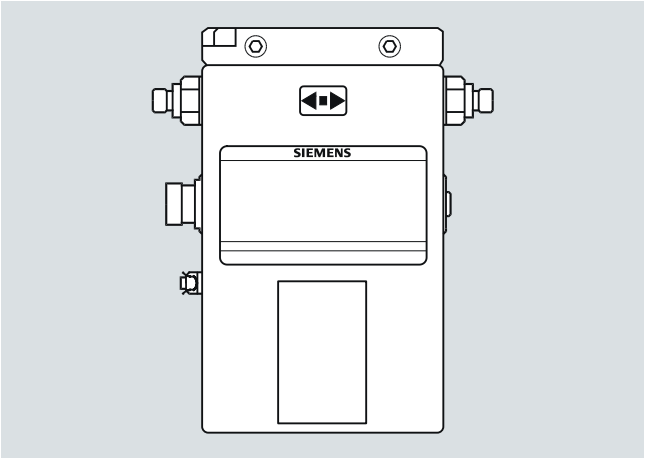
- To ensure that the sensor does not become partly empty, there must be a sufficient counter-pressure on the unit min. 0.1 to 0.2 bar (1.5 to 2.9 psi).
- Mount the sensor on a vibration-free and plane wall or steel frame.
- Locate the sensor low in the system in order to avoid under-pressure in the sensor separating air/gas in the liquid.
- Ensure that the sensor is not emptied of liquid (during normal operation) otherwise incorrect measurement will occur.

Horizontal mounting (recommended) (fig. A)



Liquid or gas (low to high flow)

Vertical mounting (fig. B)



Liquid or gas (medium to high flow)

Technical specifications

Sensor size	DN 4 (1/6“)
Mass flow	
Measuring range	0 ... 350 kg/h (0 ... 772 lb/h)
Accuracy, mass flow	0.1 % of rate
Repeatability	0.05 of rate
Max. zero point error	0.010 kg/h (0.022 lb/h)
Density	
Density range	0 ... 2.9 g/cm^3 (0 ... 0.105 lb/inch^3)
Density error	0.0015 g/cm^3 (0.000036 lb/inch^3)
Repeatability error	0.0002 g/cm^3 (0.0000072 lb/inch^3)
Temperature	
Standard	-40 ... +115 °C (-40 ... +239 °F)
High-temperature version	-40 ... +180 °C (-40 ... +356 °F)
Temperature error	0.5 °C (0.9 °F)
BRIX	
Measuring range	0 ... 100 BRIX
Brix error	0.3 BRIX
Inside pipe diameter	
Stainless steel version	3.5 mm (0.14“)
Hastelloy version	3.0 mm (0.12“)
Pipe wall thickness	
Stainless steel version	0.25 mm (0.0098“)
Hastelloy version	0.5 mm (0.0196“)
Liquid pressure measuring pipe[1)]	
Stainless steel	130 bar (1885 psi) at 20 °C (68 °F)
Hastelloy C22/2.4602	410 bar (5945 psi) at 20 °C (68 °F)
Materials	Stainless steel AISI 316L/1.4435
Measuring pipe and connection	Hastelloy C22/2.4602
Enclosure[2)]	
Material	Stainless steel AISI 316L/1.4404
Enclosure grade	IP67/NEMA4
Connection thread	
ISO 228/1	G¼” male
ANSI/ASME B1.20.1	¼” NPT male
Ex approval	EEx ia IIC T3-T6
	05ATEX138072X
	UL/CSA
Weight	3.5 kg (7.7 lb)
Dimensions	135 x 205 x 58 mm (5.31“ x 8.07“ x 2.28“)

1) According to DIN 2413, DIN 17457

2) Housing is not rated for pressure containment.

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Selection and Ordering data	Order No.	Order code
SITRANS F C Flow sensors		
SITRANS FC300 DN 4 (1/6“) sensor, without heating jacket[1]	7ME4400-	
Pipe material and temperature		
Stainless steel AISI 316L/1.4435		
115 °C (239 °F)	1G	
180 °C (356 °F)	1H	
Hastelloy C22/2.4602		
115 °C (239 °F)	2G	
180 °C (356 °F)	2H	
Pressure		
PN 100	D	
PN 130 (316L)	G	
PN 410 (C22)	Q	
Process connection		
Pipe thread		
G ¼“ male	10	
¼“ NPT male	11	
Configuration		
Standard	1	
Density	2	
BRIX/PLATO	3	
Fraction (specification required)	9	N0Y
Transmitter compact mounted on sensor		
No transmitter, sensor and adapter only	A	
MASS 6000, Ex d, stainless steel enclosure, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC with EEx de [ia/ib] T3 -T6 Ex-approval	B	
MASS 6000, IP67, Polyamide enclosure, cable glands M20, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC	C	
MASS 6000, IP67, Polyamide enclosure, cable glands M20, 1 current, 1 freq./pulse and 1 relay output, 115/230 V AC 50/60 Hz	D	
MASS 6000, IP67, Polyamide enclosure, cable glands ½" NPT, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC	E	
MASS 6000, IP67, Polyamide enclosure, cable glands ½" NPT, 1 current, 1 freq./pulse and 1 relay output, 115/230 V AC 50/60 Hz, ½" NPT	F	
Cable		
No cable	A	
5 m (16.4 ft) cable	B	
10 m (32.8 ft) cable	C	
25 m (82 ft) cable	D	
50 m (164 ft) cable	E	
75 m (246 ft) cable	F	
150 m (492 ft) cable	G	
Calibration		
Standard calibration 3 flow x 2 points	1	
Standard calibration matched pair 3 flow x 2 points	2	
Accredited calibration matched pair 5 flow x 2 points (DANAK)	3	
Extended calibration customer-specified select Y60, Y61, Y62 or Y63 (see additional information)	8	

[1] Not possible to order DN 4 sensor with heating jacket

Selection and Ordering data	Order code
Additional information	
Please add “**-Z**“ to Order No. and specify Order code(s) and plain text.	
Pressure testing certificate PED: 97/23/EC	**C11**
Material certificate EN 10204-3.1	**C12**
Welding certificate NDT-Penetrant: ISO 3452	**C13**
Factory certificate according to EN 10204 2.2	**C14**
Factory certificate according to EN 10204 2.1	**C15**
Tag name plate, stainless steel	**Y17**
Tag name plate, plastic	**Y18**
Customer-specific transmitter setup	**Y20**
Customer-specified, matched pair (5 x 2)	**Y60**
Customer-specified calibration (5 x 2)	**Y61**
Customer-specified, matched pair (10 x 1)	**Y62**
Customer-specified calibration (10 x 1)	**Y63**
Cleaned for oil and grease	**Y80**
Special version	**Y99**

Operating instructions for SITRANS F C FC300

Description	Order No.
• English	**A5E00698213**
• German	**A5E00728101**
• Spanish	**A5E00746629**
• French	**A5E00746625**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Accessories

Description		Order No.
Cable with multiple plug	5 m (16.4 ft)	**FDK-083H3015**
Standard blue cable between MASS 6000 and MASS 2100, 5 x 2 x 0.34 mm^2 twisted and screened in pairs. Temperature range -20 °C ... +110 °C (-4 °F ... +230 °F)	10 m (32.8 ft)	**FDK-083H3016**
	25 m (82 ft)	**FDK-083H3017**
	50 m (164 ft)	**FDK-083H3018**
	75 m (246 ft)	**FDK-083H3054**
	150 m (492 ft)	**FDK-083H3055**

Spare parts

Description	Order No.
Multiple plug for cable mounting	**FDK-083H5056**
2 kB SENSORPROM unit (Sensor Serial No. and Order No. must be specified by ordering)	**FDK-083H4410**
Bracket	**A5E02590439**
Demo suitcase including MASS 6000 and HART module	**A5E00789737**

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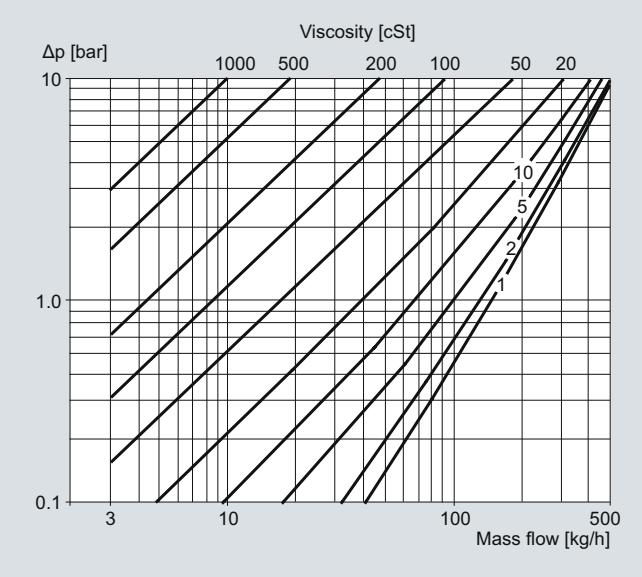
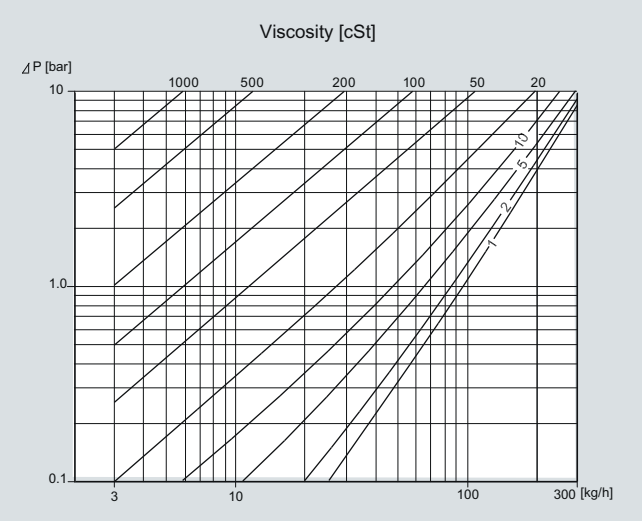
Flow sensor SITRANS FC300

Characteristic curves

Pressure drop



Stainless steel 316L/1.4404



Hastelloy C22/2.4602

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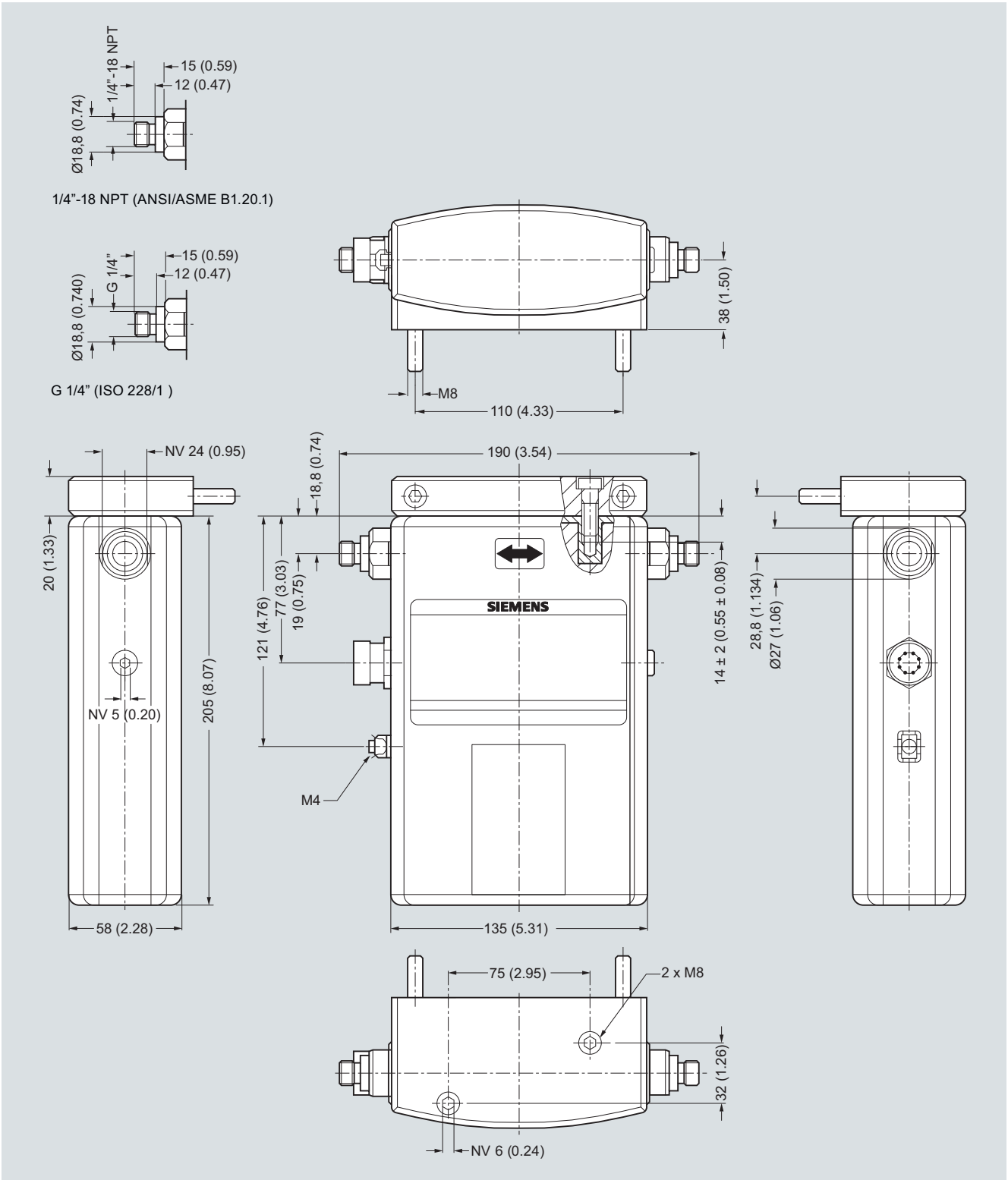
Dimensional drawings

SITRANS FC300 DN 4



SITRANS FC300, dimensions in mm (inch)

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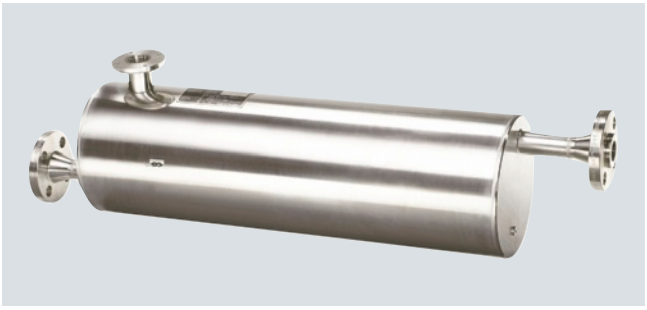
Flow sensor MASS 2100 DI 3 to DI 40

Overview



MASS 2100 DI 3 to DI 40 is suitable for accurate mass flow measurement of a variety of liquids and gases.

The sensor offers superior performance in terms of flow accuracy, turn-down ratio and density accuracy. The ease of installation through a "plug & play" mechanical and electrical interface ensures optimum performance and operation.

The sensor delivers true multi-parameter measurements i.e.: Mass flow, volume flow, density, temperature and fraction.

Benefits

- High accuracy better than 0.1 % of mass flow rate
- Large dynamic turn-down ratio better than 500:1
- Densitometer performance available through a density accuracy better than 0.0005 g/cm^3 with a repeatability better than 0.0001 g/cm^3
- Single continuous tube design, with no internal welds, reductions or flow splitters offers optimal hygiene, safety and CIP cleanability for food and beverage and pharmaceutical applications.
- Markets' biggest wall thickness, ensuring optimal life-time and corrosion resistance and high-pressure durability
- Full bore design provides lower pressure loss due to same internal diameter throughout the entire sensor.
- Balanced pipe design with little mechanical energy loss, ensures optimal performance and stability under non-ideal and unstable process conditions (pressure, temperature, density changes etc.).
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow.
- Multi-plug electrical connector and SENSORPROM enables true "plug & play". Installation and commissioning in less than 10 minutes.
- Intrinsically safe Ex design ia IIC as standard, making service in hazardous area possible without having to demount the sensor if a compact Ex d transmitter needs service.
- Sensor pipe available in high-quality stainless steel AISI 316L/1.4435 or Hastelloy C22/2.4602 offering optimum corrosion resistance
- Centre-block design decouples process noise from the environment such as vibrations, pulsations, pressure shocks etc. making installation flexible and versatile.
- Rugged and space-saving sensor design in stainless steel matching all environments
- High-pressure program as standard
- The sensor calibration factor is also valid for gas measurement.
- Uniform sensor interface matching all transmitter versions at the same time whether it is compact IP67/NEMA 4X, compact Ex d or remote installation, one sensor fits all.

Application

Coriolis mass flowmeters are suitable for measuring all liquids and gases. The measurement is independent of changes in process conditions/parameters such as temperature, density, pressure, viscosity, conductivity and flow profile.

Due to this versatility the meter is easy to install and the Coriolis flowmeter is recognized for its high accuracy in a wide turn-down ratio which is a paramount in many applications.

The main applications of the Coriolis flowmeter can be found in all industries, such as:	
Chemical and pharma	Detergents, bulk chemicals, pharmaceuticals, acids, alkalis
Food and beverage	Dairy products, beer, wine, soft-drinks, BRIX/PLATO, fruit juices and pulps, bottling, CO_2 dosing, CIP-liquids
Automotive	Fuel injection nozzle and pump testing, filling of AC units, engine consumption, paint robots
Oil and gas	Filling of gas bottles, furnace control, CNG-dispensers, test separators, LPG
Water and waste water	Dosing of chemicals for water treatment

The wide varity of combinations and versions from the modular system means that ideal adaptation is possible to each measuring task.

Design

The MASS 2100 sensor consists of a single bent tube in a double bent pipe configuration, welded directly to the process connectors at each end.
The centre-block is brazed onto the sensor pipes from the outside acting as a mechanical low pass filter.

The sensor is available in 2 material configurations, AISI 316L/1.4404 or Hastelloy C22/2.4602 with a wide variety of process connections.

The enclosure is made in stainless steel AISI 316/1.4404 with a grade of encapsulation of IP66/NEMA 4.

The sensor is as standard EEx ia approved, intrinsically safe.

The sensor can be installed in horizontal or vertical position. In horizontal position the sensor is self draining.

Heating Jacket: All the sensors MASS 2100, DI 3 to DI 40, can optionally be equipped with a heating coil to avoid solidification of sensitive fluids during down-time or period between discontinuing processes. This feature gives the user an alternative to the costly electrical heating normally used, as it gives the freedom to choose either hot water, superheated steam or hot oil, to maintain a constant temperature inside the sensor.

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Function

The measuring principle is based on the Coriolis effect. See "System information SITRANS F C Coriolis mass flowmeters".

Integration

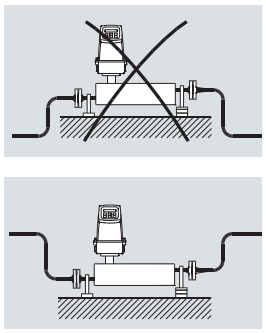
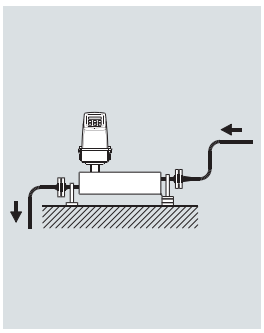
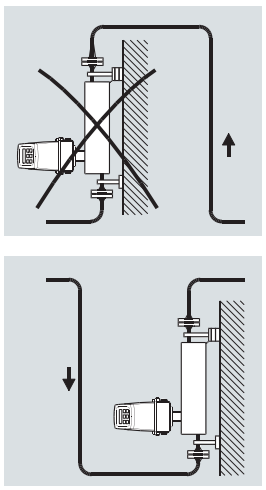
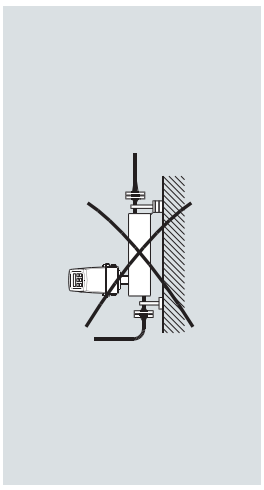
The sensor can be connected to all MASS 6000 transmitters for compact as well as remote installation.

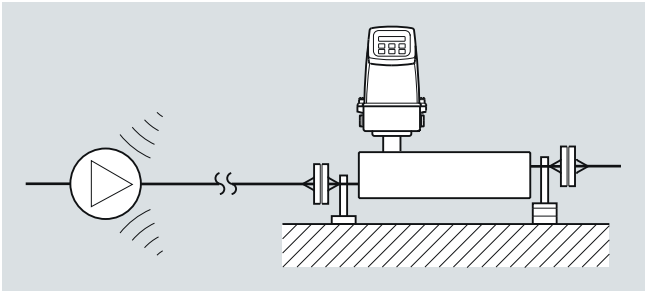
All sensors are delivered with a SENSORPROM containing all information about calibration data, identity and factory pre-programming of transmitter settings.

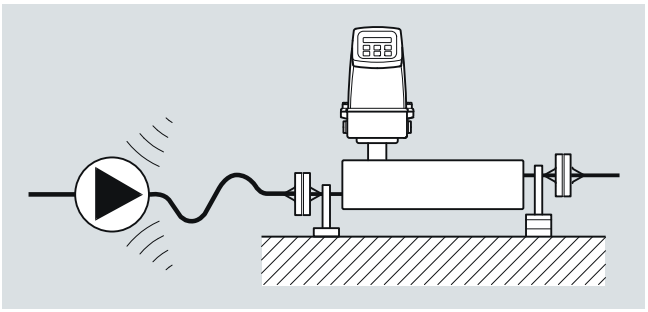
Installation guidelines MASS 2100 DI 3 ... DI 40 (1/8" ... 1½")

Installation of sensor

If the liquid is volatile or contains solid particles, vertical mounting is not recommended.

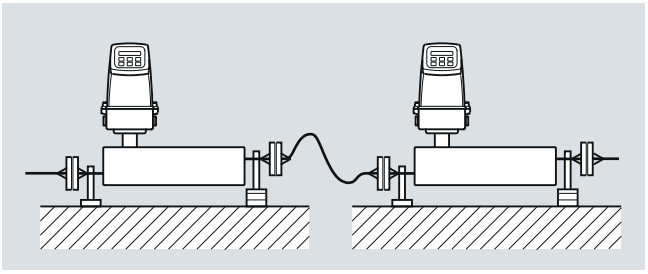
	Liquid	Gas
Horizontal		
Vertical		





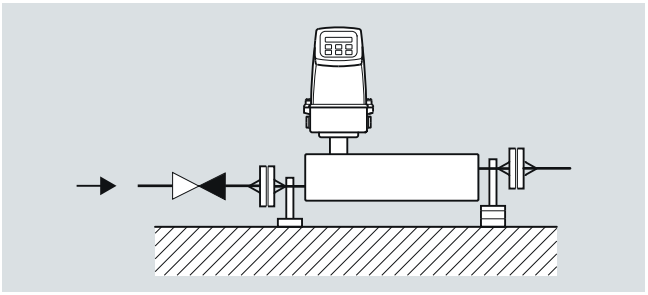
Vibration

Always locate the flowmeter as far away as possible from components that generate mechanical vibration in the piping.



Cross talk

Cross talk between sensors mounted close to each other may disturb the measurement. To avoid cross talk never mount more than one meter on each frame and mount flexible hose connections between the sensors as shown.



Zero point adjustment

To facilitiate zero point adjustment a shut-off valve should always be mounted in connection with the sensor as a proper zero point setting is essential for a good accuarcy.

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Flow sensor MASS 2100 DI 3 to DI 40

Technical specifications

Versions (mm (inch))		DI 3 (1/8)	DI 6 (¼)	DI 15 (5/8)	DI 25 (1)	DI 40 (1½)
Inside pipe diameter (sensor consists of one continuous pipe)	mm (inch)	3.0 (0.12)	6.0 (0.24)	14.0 (0.55)	29.7 (1.17)	43.1 (1.70)
Pipe wall thickness	mm (inch)	0.5 (0.02)	1.0 (0.04)	1.0 (0.04)	2.0 (0.08)	2.6 (0.10)
Mass flow measuring range	kg/h (lb/h)	0 ... 250 (0 ... 550)	0 ... 1000 (0 ... 2200)	0 ... 5600 (0 ... 12345)	0 ... 25000 (0 ... 55100)	0 ... 52000 (0 ... 114600)
Density	g/cm³ (lb/inch³)	0 ... 2.9 (0 ... 0.10)				
Fraction e.g.	°Brix	0 ... 100				
Temperature						
Standard	°C (°F)	-50 ... +180 °C (-58 ... +356 °F)				
Liquid pressure measuring pipe[1]						
Stainless steel	bar (psi)	230 (3336)	265 (3844)	130 (1885)	110 (1595)	105 (1523)
Hastelloy C22/2.4602	bar (psi)	350 (5076)	410 (5946)	200 (2900)	185 (2683)	not available
Materials						
Measuring pipe, flange and thread connection		Stainless steel AISI 316L/1.4435				
		Hastelloy C22/2.4602				not available
Enclosure and enclosure material		IP65 (NEMA 4) and stainless steel AISI 316L/1.4404, **The housing is not rated for pressure containment**				
Process connections[2]						
Flange						
EN 1092-1, PN 40			DN 10	DN 15	DN 25	DN 40
ANSI B16.5, Class 150			½"	½"	1"	1½"
ANSI B16.5, Class 600 (Class 300)			½"	½"	1"	1½"
Dairy screwed connection (PN 16/25/40)[3]						
DIN 11851			DN 10	DN 15	DN 32	DN 40
ISO 2853/BS 4825 part 4 (SS3351)			25 mm	25 mm	38 mm	51 mm
Dairy clamp connection (PN 16)[3]						
ISO 2852/BS 4825 part 3 (SMS3016)			25 mm	25 mm	38 mm	51 mm
Thread						
ISO 228/1, PN 100		G¼" female	G¼" male	G½" male	G1" male	G2" male
ANSI/ASME B1.20.1, PN 100		¼" NPT female	¼" NPT male	½" NPT male	1" NPT male	2" NPT male
Cable connection		Multiple plug connection to sensor 5 x 2 x 0.35 mm² twisted and screened in pairs, ext. Ø 12 mm				
Ex-version		EEx ia IIC T3-T6, DEMKO 03 ATEX 135252X				
Weight approx.	kg (lb)	4 (8.8)	8 (17.6)	12 (26.5)	48 (105.8)	70 (154.5)

1) Max. at 20 °C (68 °F), DIN 2413, DIN 17457

2) Other connections to order, see "Selection and Ordering data"

3) Material, AISI 316/1.4401 or corresponding

For accuracy specification see "System information SITRANS F C".

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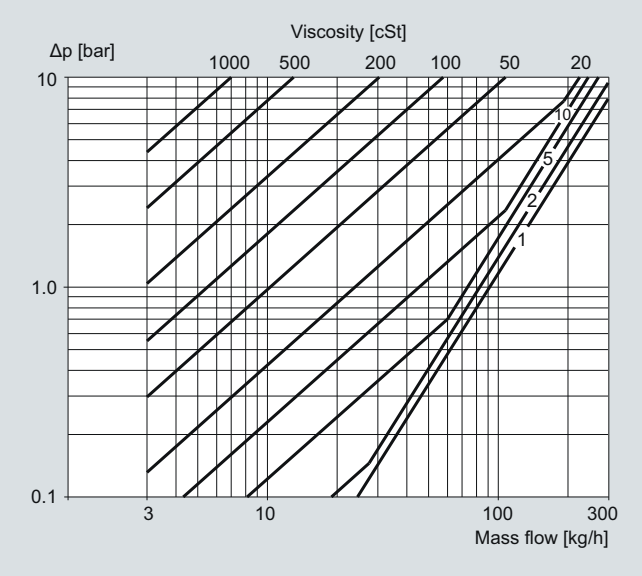
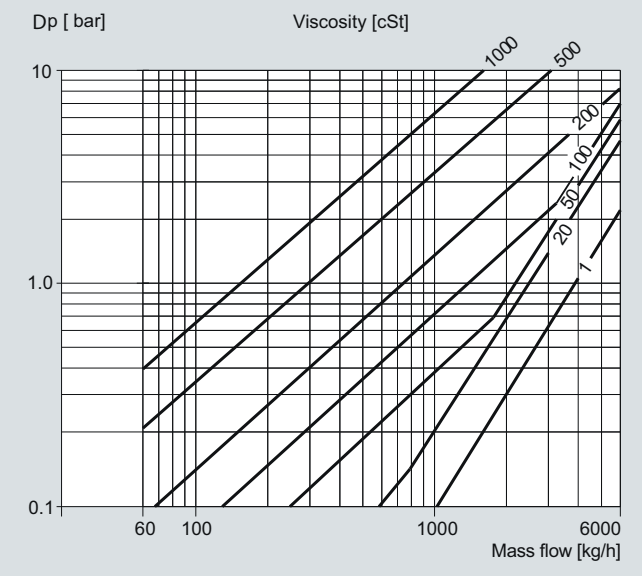
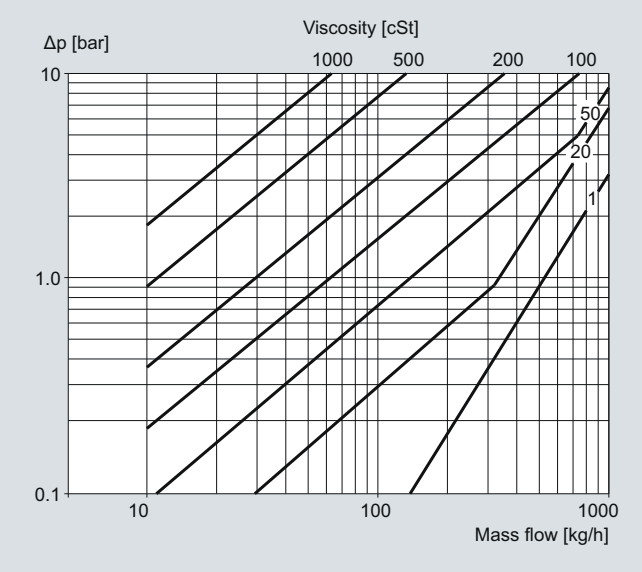
Pressure drop



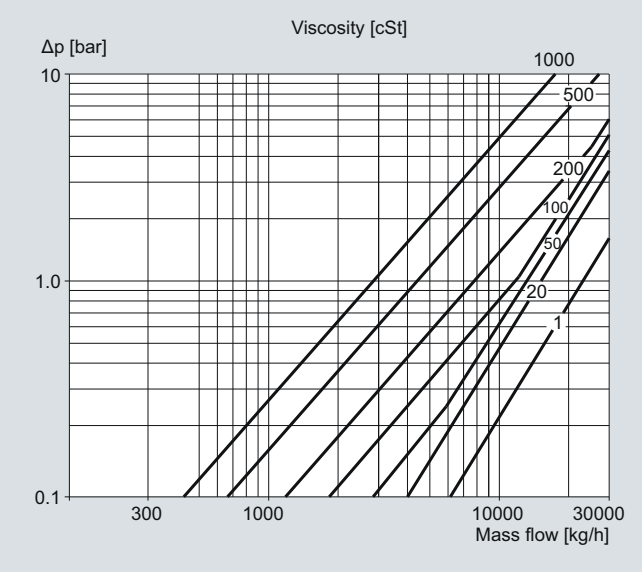
MASS 2100 DI 3 (1/8"), pressure drop for density = 1000 kg/m^3



MASS 2100 DI 15 (½"), pressure drop for density = 1000 kg/m^3



MASS 2100 DI 6 (¼"), pressure drop for density = 1000 kg/m^3



MASS 2100 DI 25 (1"), pressure drop for density = 1000 kg/m^3

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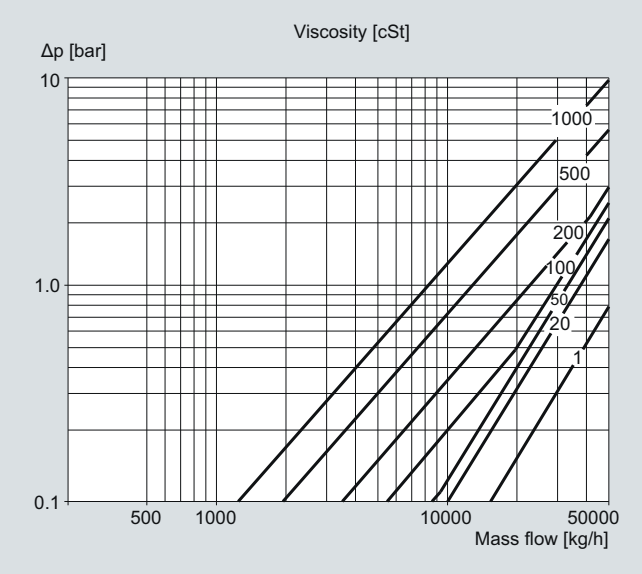
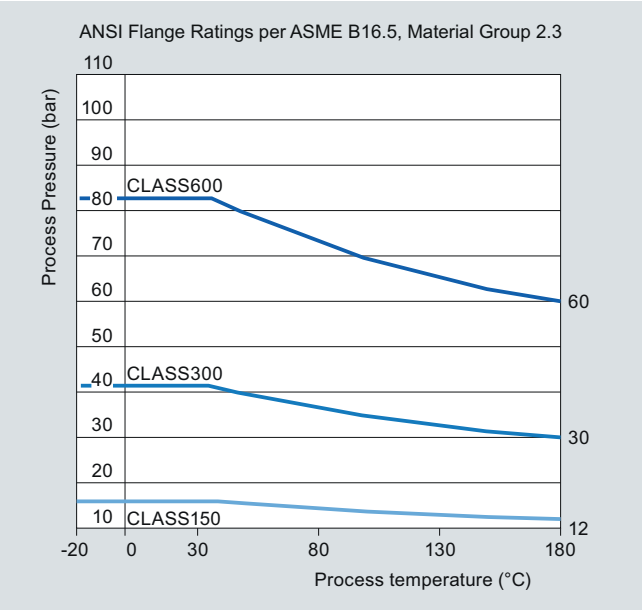
Flow sensor MASS 2100 DI 3 to DI 40

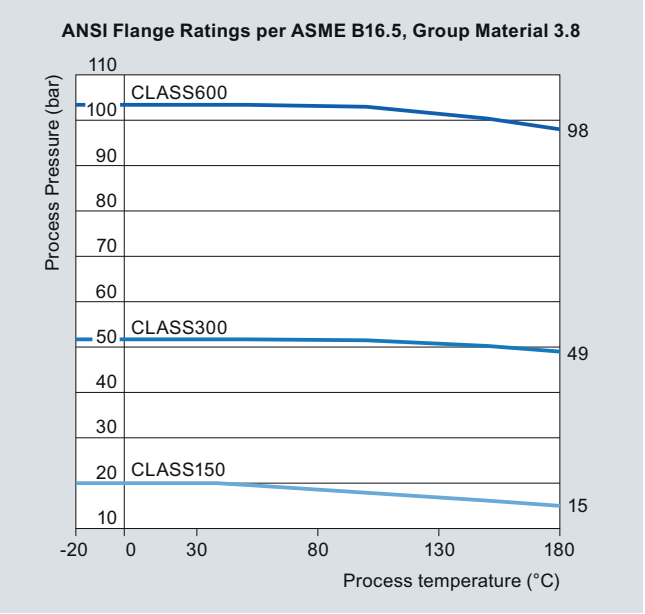


MASS 2100 DI 40 (1½"), pressure drop for density = 1000 kg/m^3

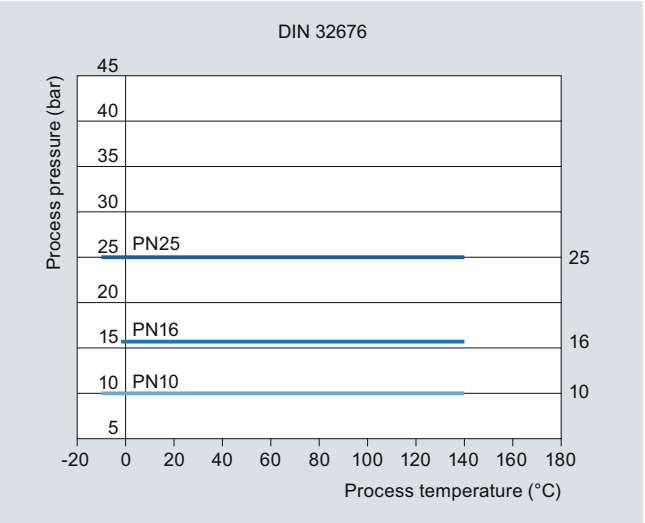
Pressure/temperature curves



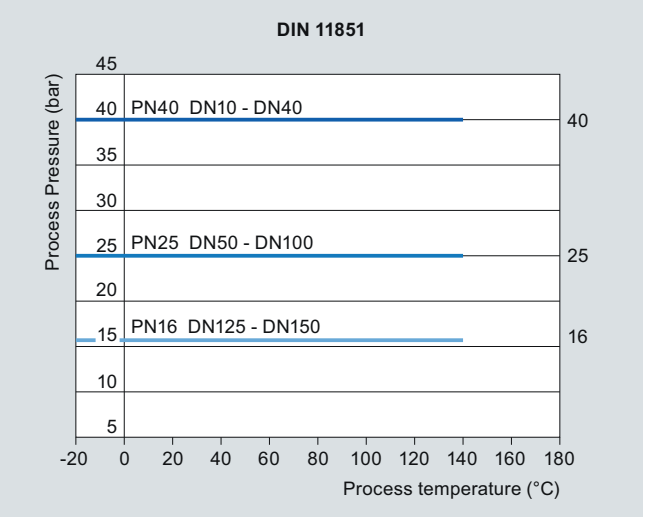
ASME flanges B16.5 stainless steel



ASME flanges B16.5 Hastelloy C22/2.4602



DIN 32676 flanges stainless steel (PN 10 ... PN 25)



DIN 11581 flanges stainless steel (PN 25 ... PN 40)

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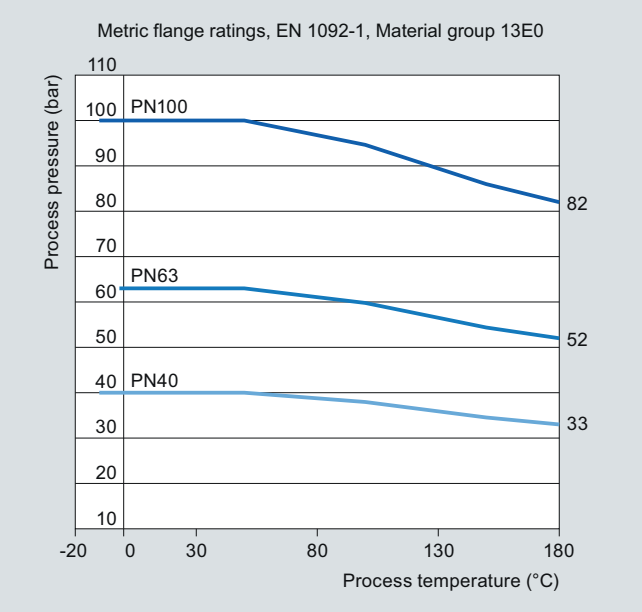
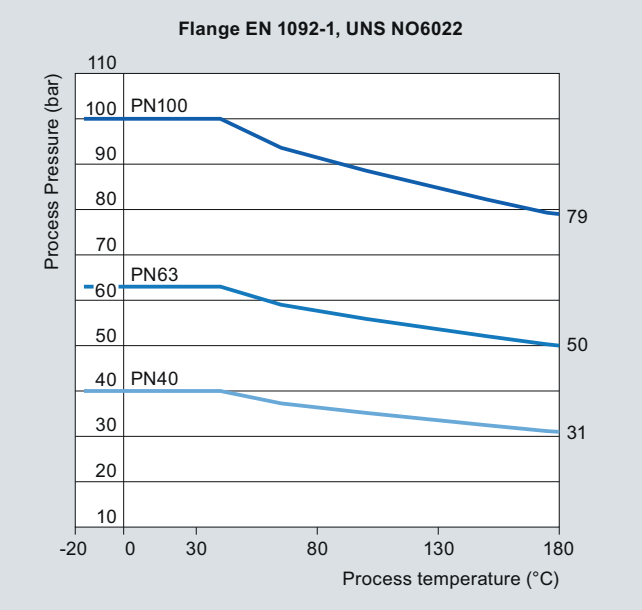
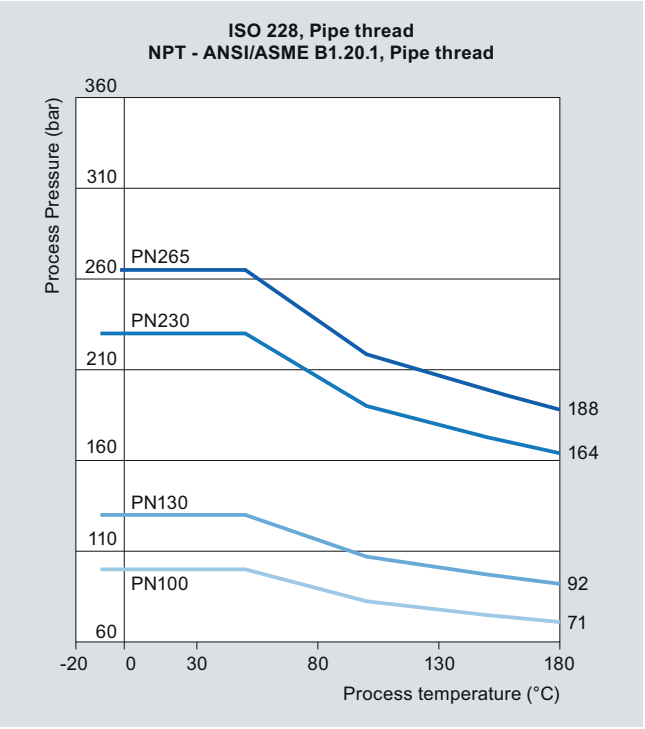


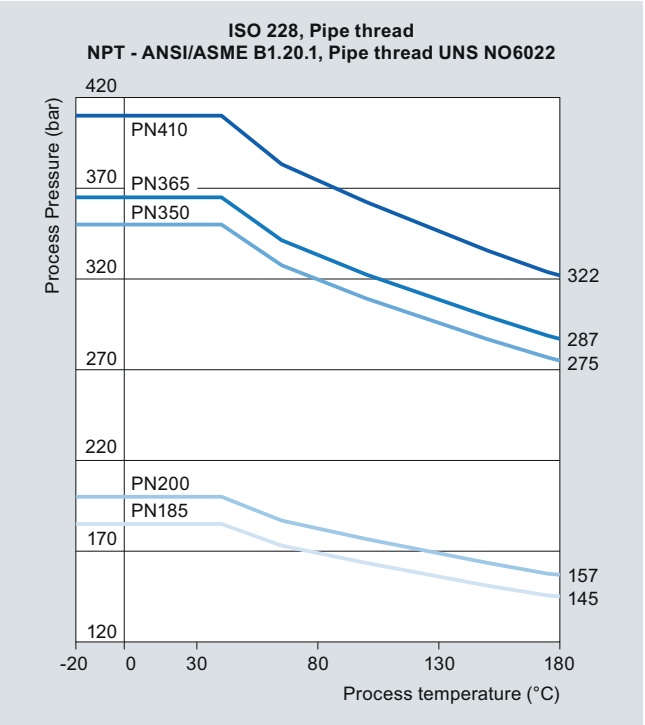
EN 1092 flanges stainless steel (PN 40 ... PN 100)



EN 1092 flanges Hastelloy C22/2.4602 (PN 40 ... PN 100)



ISO 228 and NPT pipe thread stainless steel (PN 100 ... PN 265)



ISO 218 and NPT pipe thread stainless steel (PN 185 ... PN 410)

For further information on the PED standard and requirements, see page 10/9.

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Flow sensor MASS 2100 DI 3 to DI 40

Selection and Ordering data	Order No.	Order code
SITRANS F C sensors		
MASS 2100 without heating jacket	7ME4100-	
MASS 2100 heated, DN 15 connection	7ME4200-	
MASS 2100 heated, ½ inch, ANSI B16.5 connection	7ME4210-	
Diameter		
Stainless steel AISI 316L/1.4435		
DI 3 (PN 100/PN 230)	1C	
DI 6	1D	
DI 15	1E	
DI 25	1F	
DI 40	1G	
Hastelloy C22/2.4602		
DI 3 (PN 100/PN 350)	2C	
DI 6	2D	
DI 15	2E	
DI 25	2F	
Pressure		
PN 16 (DI 6, DI 15, DI 25 and DI 40)	A	
PN 25 (DI 6, DI 15, DI 25 and DI 40)	B	
PN 40 (DI 6, DI 15, DI 25 and DI 40)	C	
PN 100 (DI 3, DI 6, DI 15, DI 25 and DI 40)	D	
PN 105 (DI 40, 2", AISI 316L/1.4404)	E	
PN 110 (DI 25, 1", AISI 316L/1.4404)	F	
PN 130 (DI 15, ½", AISI 316L/1.4404)	G	
PN 185 (DI 25, 1", Hastelloy C22/2.4602)	J	
PN 200 (DI 15, ½", Hastelloy C22/2.4602)	K	
PN 230 (DI 3, ¼", AISI 316L/1.4404)	L	
PN 265 (DI 6, ¼", AISI 316L/1.4404)	M	
PN 350 (DI 3, ¼", Hastelloy C22/2.4602)	N	
PN 410 (DI 6, ¼", Hastelloy C22/2.4602)	Q	
Class 150 (DI 6, DI 15, DI 25 and DI 40)	R	
Class 600 (DI 6, DI 15, DI 25 and DI 40)	S	
Process connection/flange		
Pipe thread		
G ¼"	10	
¼" NPT	11	
G ½"	12	
½" NPT	13	
G 1	14	
1" NPT	15	
G 2"	16	
2" NPT	17	
Flange EN1092-1 Form B		
DN 10 (PN 40/PN 100)	20	
DN 15 (PN 40/PN 100)	21	
DN 25 (PN 40/PN 100)	22	
DN 40 (PN 40/PN 100)	23	
DN 50 (PN 40/PN 100)	24	
Flange ASME/ANSI B 16.5		
½" (class 150/class 600)	30	
¾" (class 150/class 600)	31	
1" (class 150/class 600)	32	
1 ½" (class 150/class 600)	33	
2" (class 150/class 600)	34	

Selection and Ordering data	Order No.	Order code
SITRANS F C sensors		
MASS 2100 without heating jacket	7ME4100-	
MASS 2100 heated, DN 15 connection	7ME4200-	
MASS 2100 heated, ½ inch, ANSI B16.5 connection	7ME4210-	
Dairy screwed connection DIN 11851		
DN 10 (PN 40)	40	
DN 15 (PN 40)	41	
DN 25 (PN 40)	42	
DN 32 (PN 40)	43	
DN 40 (PN 25)	44	
DN 50 (PN 25)	45	
DN 65 (PN 25)	46	
Dairy clamp connection ISO 2852 (DIN 32676) Cone down the sensor in order to obtain self-drainage with connectors ISO 2852		
25 mm (PN 16)	50	
38 mm (PN 16)	51	
51 mm (PN 16)	52	
Dairy screwed connection ISO 2853		
25 mm (PN 16)	60	
38 mm (PN 16)	61	
51 mm (PN 16)	62	
Configuration/calibration type		
Standard	1	
Density	2	
BRIX/PLATO	3	
Fraction (specification required)	9	N0Y
Transmitter compact mounted on sensor		
No transmitter, sensor and adapter only	A	
MASS 6000, Ex d, stainless steel enclosure, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC with EEx de [ia/ib] T3 -T6 Ex-approval	B	
MASS 6000, IP67, Polyamide enclosure, cable glands M20, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC	C	
MASS 6000, IP67, Polyamide enclosure, cable glands M20, 1 current, 1 freq./pulse and 1 relay output, 115/230 V AC 50/60 Hz	D	
MASS 6000, IP67, Polyamide enclosure, cable glands ½" NPT, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC	E	
MASS 6000, IP67, Polyamide enclosure, cable glands ½" NPT, 1 current, 1 freq./pulse and 1 relay output, 115/230 V AC 50/60 Hz	F	
Cable		
No cable	A	
5 m (16.4 ft) cable	B	
10 m (32.8 ft) cable	C	
25 m (82 ft) cable	D	
50 m (164 ft) cable	E	
75 m (246 ft) cable	F	
150 m (492 ft) cable	G	
Calibration/verification		
Standard calibration 3 flow x 2 points	1	
Stand. calibration matched pair 3 flow x 2 points	2	
Accredited calibration matched pair 5 flow x 2 points (DANAK to ISO 17025)	3	
Extended calibration customer-specified select Y60, Y61, Y62 or Y63 (see additional information)	8	

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

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Dairy MLFB example

MASS 2100

7ME4100-1E C 41 1 D A 1

Sensor size DI 15, AISI 316L/1.4435

PN 40

DN 15 connector

Standard configuration/calibration

MASS 6000 IP67 compact mounted

No cable

Standard calibration, 3 flow x 2 points

Selection and Ordering data	Order code
Addtional information	
Please add "**-Z**" to Order No. and specify Order code(s) and plain text.	
Pressure testing certificate PED: 97/23/EC	**C11**
Material certificate EN 10204-3.1	**C12**
Welding certificate NDT X-ray: EN 25817/B DI 3 sensor only: NDT-Penetrant: ISO 3452	**C13**
Factory certificate according to EN 10204 2.2	**C14**
Factory certificate according to EN 10204 2.1	**C15**
Tag name plate, stainless steel	**Y17**
Tag name plate, plastic	**Y18**
Customer-specific transmitter setup	**Y20**
Customer-specified, matched pair (5 x 2)	**Y60**
Customer-specified calibration (5 x 2)	**Y61**
Customer-specified, matched pair (10 x 1)	**Y62**
Customer-specified calibration (10 x 1)	**Y63**
Cleaned for oil and grease	**Y80**
Special version	**Y99**

Operating instructions for SITRANS F C MASS 2100 DI 3 to DI 40

Description	Order No.
• English	**A5E02896535**
• German	**A5E03073519**
• Spanish	**A5E03073549**
• French	**A5E03073539**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Selection and Ordering data

Accessories

Description	Dimension	Order No.
Mating parts for hygienic fittings DIN 11851 Includes: • 2 unions • 2 mating parts (for welding in) • 2 EPDM gaskets	DN 10	**FDK-085U1016**
	DN 15	**FDK-085U1017**
	DN 25	**FDK-085U1019**
	DN 32	**FDK-085U1020**
	DN 40	**FDK-085U1021**
	DN 50	**FDK-085U1022**
	DN 65	**FDK-085U1023**
Mating parts for hygienic clamp ISO 2852 Includes: • 2 clamps • 2 mating parts • 2 EPDM gaskets	25 mm	**FDK-085U1029**
	40 mm	**FDK-085U1031**
	50 mm	**FDK-085U1032**
2 EPDM gaskets with collar for mounting set DIN 11851	DN 10	**FDK-085U1006**
	DN 15	**FDK-085U1007**
	DN 25	**FDK-085U1009**
	DN 32	**FDK-085U1010**
	DN 40	**FDK-085U1011**
	DN 50	**FDK-085U1012**
	DN 65	**FDK-085U1013**

Description	Length	Order No.
Cable with multiple plug Standard blue cable between MASS 6000 and MASS 2100, 5 x 2 x 0.34 mm^2 twisted and screened in pairs. Temperature range -20 °C ... +110 °C (-4 °F ... +230 °F)	5 m (16.4 ft)	**FDK-083H3015**
	10 m (32.8 ft)	**FDK-083H3016**
	25 m (82 ft)	**FDK-083H3017**
	50 m (164 ft)	**FDK-083H3018**
	75 m (246 ft)	**FDK-083H3054**
	150 m (492 ft)	**FDK-083H3055**

Spare parts

Description	Order No.
Adapter for MASS 2100	**FDK-083L8889**
Multiple plug for cable mounting	**FDK-083H5056**
2 kB SENSORPROM unit (Sensor Serial No. and Order No. must be specified by ordering)	**FDK-083H4410**

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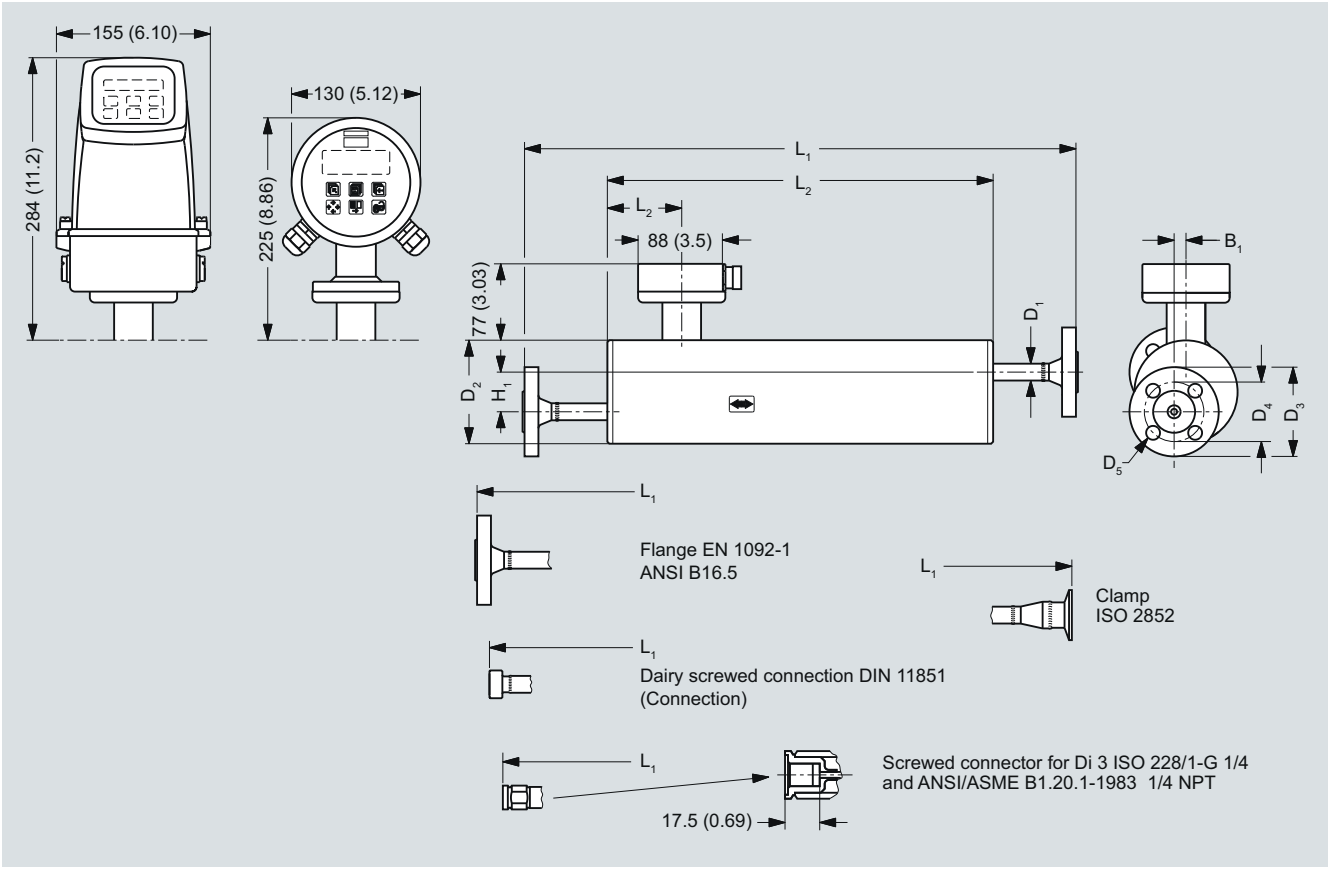
Flow sensor MASS 2100 DI 3 to DI 40

Dimensional drawings

MASS 2100 sensor



Dimension in mm (inch)

Sensor size	Connections			L1 mm	L2 mm	L3 mm	H1 mm	B1 mm	D1 mm	D2 mm	D3 mm	D4 mm	D5 mm
DI (inch)	Type	Pressure rating	Size										
DI 3	Pipe thread ISO 228/1 - G¼	PN 100	¼"	400	280	75.5	60	0	21.3	104	-	-	-
(1/8)	Pipe thread ANSI/ASME B 1.20.1 - ¼" NPT	PN 100	¼"	400	280	75.5	60	0	21.3	104	-	-	-
DI 6	Flange EN 1092-1	PN 100	DN 10	580	390	62.0	40	12	17.0	104	100	70.0	14.0
(¼)	Flange EN 1092-1	PN 40	DN 10	560	390	62.0	40	12	17.0	104	90.0	60.0	14.0
	Flange ANSI B16.5	Class 150	½"	624	390	62.0	40	12	17.0	104	88.9	60.5	15.7
	Flange ANSI B16.5	Class 600	½"	608	390	62.0	40	12	17.0	104	95.3	66.5	15.7
	Screwed connection DIN 11851	PN 40	DN 10	532	390	62.0	40	12	17.0	104	-	-	-
	Clamp ISO 2852	PN 16	25 mm	570	390	62.0	40	12	17.0	104	-	-	-
DI 15	Flange EN 1092-1	PN 100	DN 15	634	444	75.5	44	20	21.3	129	105	75.0	14.0
(½)	Flange EN 1092-1	PN 40	DN 15	620	444	75.5	44	20	21.3	129	95.0	65.0	14.0
	Flange ANSI B16.5	Class 150	½"	639	444	75.5	44	20	21.3	129	88.9	60.5	15.7
	Flange ANSI B16.5	Class 600	½"	660	444	75.5	44	20	21.3	129	95.3	66.5	15.7
	Screwed connection DIN 11851	PN 40	DN 15	586	444	75.5	44	20	21.3	129	-	-	-
	Clamp ISO 2852	PN 16	25 mm	624	444	75.5	44	20	21.3	129	-	-	-
DI 25	Flange EN 1092-1	PN 100	DN 25	970	700	75.5	126	25	33.7	219	140.0	100.0	18.0
(1)	Flange EN 1092-1	PN 40	DN 25	934	700	75.5	126	25	33.7	219	115.0	85.0	14.0
	Flange ANSI B16.5	Class 150	1"	967	700	75.5	126	25	33.7	219	108.0	79.2	15.7
	Flange ANSI B16.5	Class 600	1"	992	700	75.5	126	25	33.7	219	124.0	88.9	19.1
	Screwed connection DIN 11851	PN 40	DN 32	922	700	75.5	126	25	33.7	219	-	-	-
	Clamp ISO 2852	PN 16	38 mm	940	700	75.5	126	25	33.7	219	-	-	-
DI 40	Flange EN 1092-1	PN 100	DN 40	1100	850	75.5	180	0	48.3	273	170.0	125.0	22.0
(1½)	Flange EN 1092-1	PN 40	DN 40	1063	850	75.5	180	0	48.3	273	150.0	110.0	18.0
	Flange ANSI B16.5	Class 150	1½"	1100	850	75.5	180	0	48.3	273	127.0	98.6	15.7
	Flange ANSI B16.5	Class 600	1½"	1128	850	75.5	180	0	48.3	273	155.4	114.3	22.4
	Screwed connection DIN 11851	PN 25	DN 50	1090	850	75.5	180	0	48.3	273	-	-	-
	Clamp ISO 2852	PN 25	51 mm	1062	850	75.5	180	0	48.3	273	-	-	-

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Sensor size	Connections			L1	L2	L3	H1	B1	D1	D2	D3	D4	D5
				inch	inch	inch	inch	inch	inch	inch	inch	inch	inch
DI (inch)	Type	Pressure rating	Size										
DI 3	Pipe thread ISO 228/1 - G¼	PN 100	¼"	15.75	11.02	2.97	2.36	0	0.84	4.09	-	-	-
(1/8)	Pipe thread ANSI/ASME B 1.20.1 - ¼" NPT	PN 100	¼"	15.75	11.02	2.97	2.36	0	0.84	4.09	-	-	-
DI 6	Flange EN 1092-1	PN 100	DN 10	22.83	15.35	2.44	1.57	0.47	0.67	4.09	3.94	2.76	0.55
(¼)	Flange EN 1092-1	PN 40	DN 10	22.05	15.35	2.44	1.57	0.47	0.67	4.09	3.54	2.36	0.55
	Flange ANSI B16.5	Class 150	½"	24.57	15.35	2.44	1.57	0.47	0.67	4.09	3.5	2.38	0.62
	Flange ANSI B16.5	Class 600	½"	23.94	15.35	2.44	1.57	0.47	0.67	4.09	3.75	2.62	0.62
	Screwed connection DIN 11851	PN 40	DN 10	20.94	15.35	2.44	1.57	0.47	0.67	4.09	-	-	-
	Clamp ISO 2852	PN 16	25 mm	22.44	15.35	2.44	1.57	0.47	0.67	4.09	-	-	-
DI 15	Flange EN 1092-1	PN 100	DN 15	24.96	17.48	2.97	1.73	0.79	0.84	5.08	2.95	4.13	0.55
(½)	Flange EN 1092-1	PN 40	DN 15	24.41	17.48	2.97	1.73	0.79	0.84	5.08	3.74	2.56	0.55
	Flange ANSI B16.5	Class 150	½"	25.16	17.48	2.97	1.73	0.79	0.84	5.08	3.5	2.38	0.62
	Flange ANSI B16.5	Class 600	½"	25.98	17.48	2.97	1.73	0.79	0.84	5.08	3.75	2.62	0.62
	Screwed connection DIN 11851	PN 40	DN 15	23.07	17.48	2.97	1.73	0.79	0.84	5.08	-	-	-
	Clamp ISO 2852	PN 16	25 mm	24.57	17.48	2.97	1.73	0.79	0.84	5.08	-	-	-
DI 25	Flange EN 1092-1	PN 100	DN 25	38.19	27.56	2.97	4.96	0.98	1.33	8.62	3.94	5.51	0.71
(1)	Flange EN 1092-1	PN 40	DN 25	36.77	27.56	2.97	4.96	0.98	1.33	8.62	4.53	3.35	0.55
	Flange ANSI B16.5	Class 150	1"	38.07	27.56	2.97	4.96	0.98	1.33	8.62	4.25	3.12	0.62
	Flange ANSI B16.5	Class 600	1"	39.06	27.56	2.97	4.96	0.98	1.33	8.62	4.88	3.50	0.75
	Screwed connection DIN 11851	PN 40	DN 32	36.30	27.56	2.97	4.96	0.98	1.33	8.62	-	-	-
	Clamp ISO 2852	PN 16	38 mm	37.01	27.56	2.97	4.96	0.98	1.33	8.62	-	-	-
DI 40	Flange EN 1092-1	PN 100	DN 40	43.31	33.46	2.97	7.09	0	1.9	10.75	4.92	6.69	0.87
(1½)	Flange EN 1092-1	PN 40	DN 40	41.85	33.46	2.97	7.09	0	1.9	10.75	5.91	4.33	0.71
	Flange ANSI B16.5	Class 150	1½"	43.31	33.46	2.97	7.09	0	1.9	10.75	5	3.88	0.62
	Flange ANSI B16.5	Class 600	1½"	44.41	33.46	2.97	7.09	0	1.9	10.75	6.12	4.50	0.88
	Screwed connection DIN 11851	PN 25	DN 50	42.91	33.46	2.97	7.09	0	1.9	10.75	-	-	-
	Clamp ISO 2852	PN 25	51 mm	41.81	33.46	2.97	7.09	0	1.9	10.75	-	-	-

For not listed variants please contact product support.

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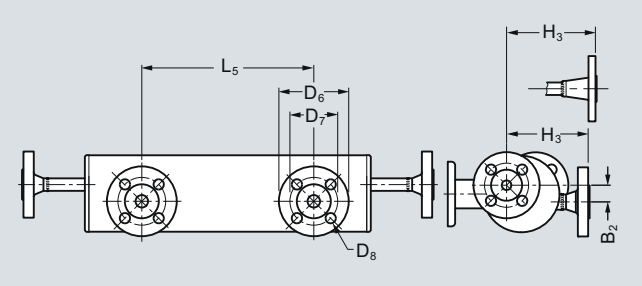
Flow sensor MASS 2100 DI 3 to DI 40

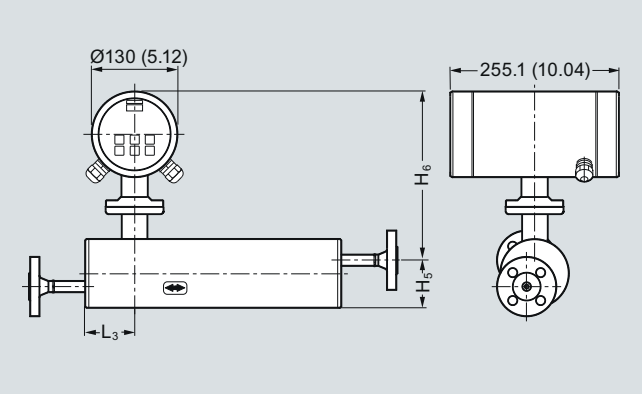
MASS 2100 sensor with “heating jacket”



Dimensions in mm (inch)

Sensor size	Connections heated			L5	H3	B2	D6	D7	D8
DI (inch)	Type	Pressure rating	Size	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)
DI 3 (1/8)	EN 1092-1	PN 40	DN 15	234 (9.21)	122 (4.8)	22 (0.87)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class 150	½"	234 (9.21)	131.6 (5.18)	22 (0.87)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)
DI 6 (¼)	EN 1092-1	PN 40	DN 15	234 (9.21)	112 (4.41)	22.7 (0.89)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class 150	½"	234 (9.21)	121.6 (4.79)	22.7 (0.89)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)
DI 15 (½)	EN 1092-1	PN 40	DN 15	234 (9.21)	126.5 (4.98)	31.5 (1.24)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class150	½"	234 (9.21)	136.1 (5.36)	31.5 (1.24)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)
DI 25 (1)	EN 1092-1	PN 40	DN 15	420 (16.54)	213.6 (8.41)	60 (2.36)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class 150	½"	420 (16.54)	223.2 (8.79)	60 (2.36)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)
DI 40 (1½)	EN 1092-1	PN 40	DN 15	500 (19.68)	267.5 (10.53)	43 (1.69)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class 150	½"	500 (19.68)	277.1 (10.91)	43 (1.69)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)

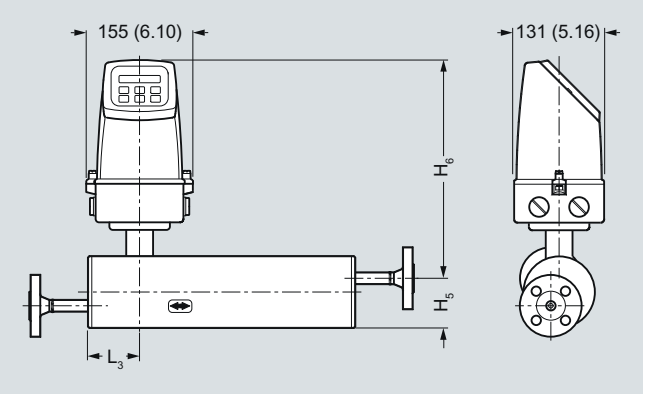
MASS 2100 and MASS 6000 Ex d compact version



Dimensions in mm (inch)

Sensor size [DI (inch)]	L_3 [mm (inch)]	H_5 [mm (inch)]	H_6 [mm (inch)]	$H_5 + H_6$ [mm (inch)]
3 (1/8)	75 (2.95)	82 (3.23)	247 (9.72)	329 (12.95)
6 (¼)	62 (2.44)	72 (2.83)	257 (10.12)	329 (12.95)
15 (½)	75 (2.95)	87 (3.43)	267 (10.51)	354 (13.94)
25 (1)	75 (2.95)	173 (6.81)	271 (10.67)	444 (17.48)
40 (1½)	75 (2.95)	227 (8.94)	271 (10.67)	498 (19.61)

MASS 2100 and MASS 6000 IP67 compact version



Dimensions in mm (inch)

Sensor size [DI (inch)]	L_3 [mm (inch)]	H_5 [mm (inch)]	H_6 [mm (inch)]	$H_5 + H_6$ [mm (inch)]
3 (1/8)	75 (2.95)	82 (3.23)	306 (12.04)	388 (15.28)
6 (¼)	62 (2.44)	72 (2.83)	316 (12.44)	388 (15.28)
15 (½)	75 (2.95)	87 (3.43)	326 (12.83)	413 (16.26)
25 (1)	75 (2.95)	173 (6.81)	330 (13.00)	503 (19.80)
40 (1½)	75 (2.95)	227 (8.94)	330 (13.00)	557 (21.93)

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Overview

SITRANS F C MC2 is available as a:

- Standard version (DN 50 to DN 150 (2" to 6"))
- Hygienic EHEDG-certified version (DN 20 to DN 80 (¾" to 3"))

The MC2 sensor is suitable for accurate mass flow measurement of a variety of liquids and gases.

The sensor offers superior performance in terms of flow accuracy, turn-down ratio and density accuracy and delivers true multi-parameter measurements i.e.: mass flow, volume flow, density, temperature and fraction flow.

The very compact sensor construction makes installation and commissioning of even the largest sizes very straight forward and easy.

Benefits

- High accuracy better than 0.15 % of mass flow rate
- Large dynamic turn-down ratio
- Densitometer performance available through density accuracy better than 0.001 g/cm^3
- Space-saving split-flow sensor design facilitating low pressure loss
- Parallel S-tube design and optimal oriented inductive sensors enhances accuracy and turn-down ratio.
- Self-draining in both horizontal and vertical position
- Rigid enclosure design reduces the influence from pipeline vibration and thermal stress
- 4-wire Pt100 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- SENSORPROM enables true "plug & play" - installed and commissioned in less than 10 minutes.
- Safe Ex design EEx em [ib] IIC
- Sensor pipe available in high-quality stainless steel AISI 316L/1.4571 or Hastelloy C4/2.4610 offering optimum corrosion resistance.
- The sensor calibration is also valid for gas measurement.
- CIP cleanability for food and beverage and pharmaceutical applications

Application

Coriolis mass flowmeters are suitable for measuring all liquids and gases. The measurement is independent of changes in process conditions/parameters such as temperature, density, pressure, viscosity, conductivity, and flow profile.

Due to this versatility the meter is easy to install and the Coriolis flowmeter is recognized for its high accuracy in a wide turndown ratio which is paramount in many applications.

The main applications of the Coriolis flowmeter can be found in all industries, such as:	
Chemical and pharma	Detergents, bulk chemicals, pharmaceuticals, acids, alkalis
Food and beverage	Dairy products, beer, wine, soft-drinks, plato/brix, fruit juices and pulps, bottling, CO_2 dosing, CIP-liquids
Oil and gas	Gas measurement, furnace control, test separators, LPG, oil bunkering
Water and waste water	Dosing of chemicals for water treatment

The wide variety of combinations and versions from the modular system means that ideal adaptation is possible to each measuring task.

The MC2 sensor is also available in a hygienic version which is EHEDG-approved. This is of particular interest for the food and beverage and pharmaceutical markets were the EHEDG approval is often requested for optimum hygienic and process safety.

Design

The MC2 sensor consists of 2 parallel measuring pipes, welded directly onto a flow-splitter at each end to eliminate a direct coupling to the process connectors and significantly reduce effects from external vibrations.

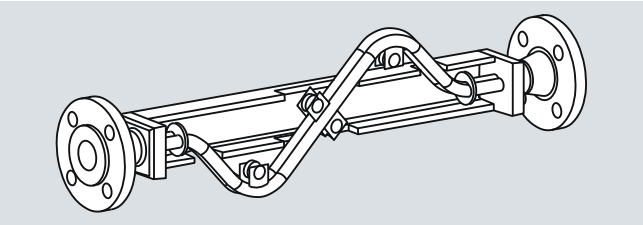
The flow-splitters are welded onto a rigid sensor housing which acts as a mechanical low-pass filter.

The sensor is available in 2 material configurations, AISI 316L/ 1.4436 or Hastelloy C4/2.4610 with a wide variety of process connections.

The enclosure is made of stainless steel AISI 304/1.4301 with an encapsulation grade of IP67/NEMA 4.

The sensor is Ex-approved EEx em [ib] IIC.

It can be installed in horizontal or vertical position, and is self-draining in both positions.



The MC2 sensor is based on a different Ex concept than MASS 6000. Therefore the MC2 sensor can only be connected to MASS 6000 IP67, MASS 6000 19" or SIFLOW FC070 standard versions, which have to be remote mounted in the safe area. MASS 6000 Ex d and SIFLOW FC070 Ex CT can **not** be used with MC2 sensors.

Hazardous area
Zone 1 + 2

Safe area

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Flow sensor MC2

Function

The measuring principle is based on the Coriolis effect. See “System information Coriolis mass flowmeters”.

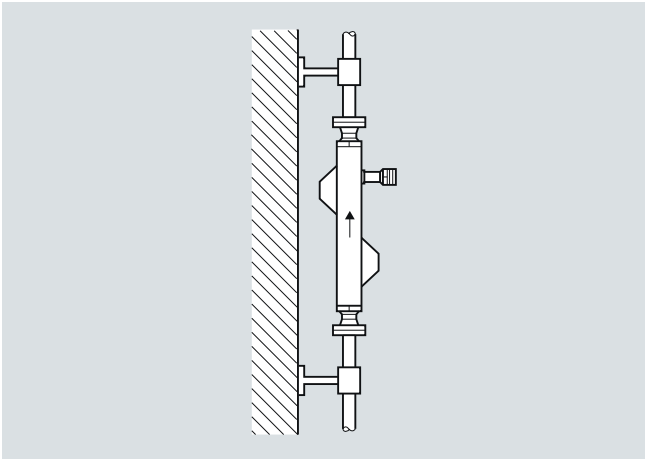
Integration

Installation guidelines MC2 DN 50 ... DN 150

Installation of sensor

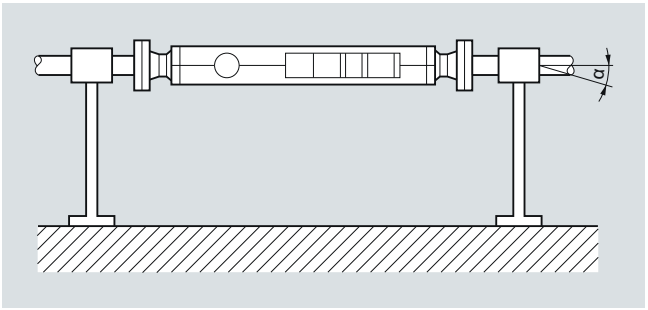
The optimal installation orientation is a vertical installation with an upward flow as shown in the following figure. This has the advantage that any solids contained in the fluid will settle downward and gas bubbles will move upward out of the meter tube when the flow rate is zero. Additionally, it is easy to drain the meter tube. Deposits can thereby be avoided.

Vertical orientation:

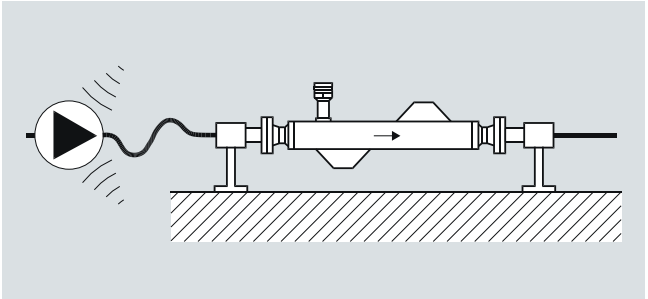


Vertical installation self-draining (upward flow)

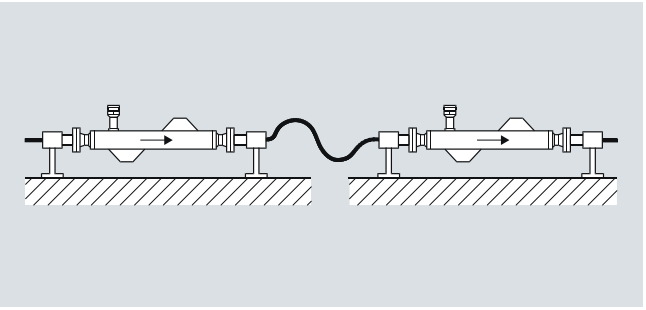
Horizontal orientation, self-draining



Avoid vibrations

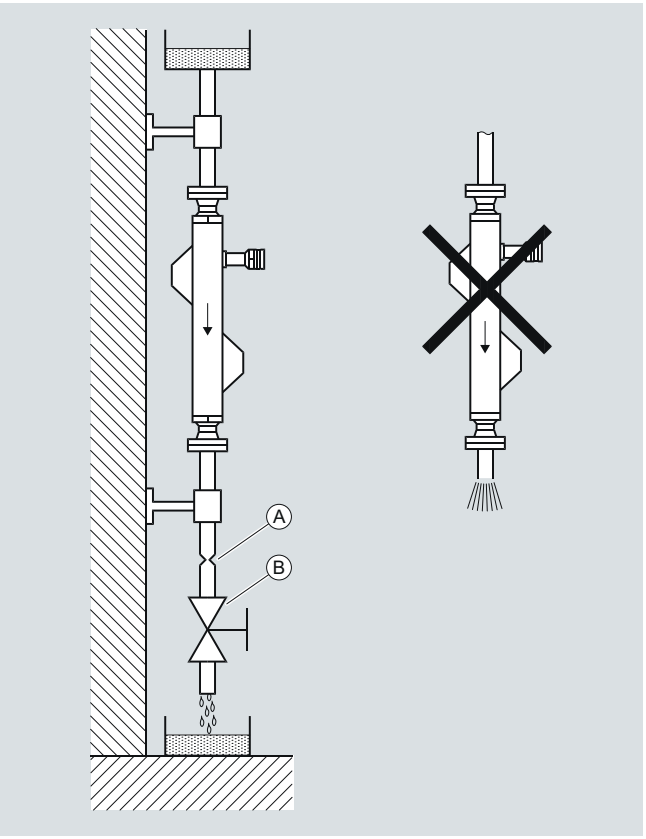


Avoid cross talk



Installation in a drop line

Mount with reduction (A) or orifice (B) to prevent partially draining.



Installation in a drop line

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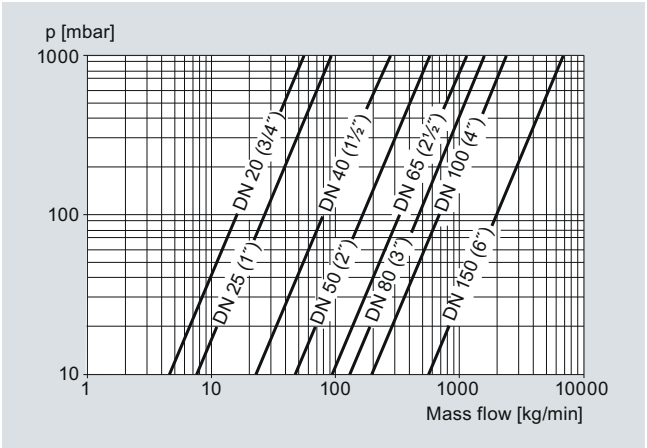
Technical specifications

Versions (mm (inch))		20 (¾)	25 (1)	40 (1½)	50 (2)	65 (2½)	80 (3)	100 (4)	150 (6)
Inside pipe diameter	**mm (inch)**	8.0 (0.31)	10.0 (0.39)	16.0 (0.63)	22.0 (0.87)	29.0 (1.14)	34.0 (1.34)	43.1 (1.69)	76.1 (2.99)
Pipe wall thickness	**mm (inch)**	1.0 (0.04)	1.0 (0.04)	1.0 (0.04)	1.5 (0.06)	1.5 (0.06)	2.0 (0.08)	2.6 (0.10)	3.2 (0.13)
Mass flow measuring range at pressure drop of 2 bar (29 psi) at 1 g/cm³ (0.036 lb/inch³)	**kg/h (lb/h)**	4 600 (10 141)	7 360 (16 226)	21 850 (48 171)	55 200 (121 695)	113 400 (250 000)	147 600 (325 401)	249 600 (550 273)	660 000 (1 455 049)
Density	**g/cm³ (lb/inch³)**	0.5 ... 3.5 (0.18 ... 0.126)							
Fraction e.g. Brix	**°Brix**	0 ... 100							Not possible
Temperature									
Standard-version		-50 ... +200 °C (-58 ... +392 °F)							
Ex-version		-50 ... +200 °C (-58 ... +392 °F)							
Liquid pressure measuring pipe		20	25	40					
Stainless steel (DIN 2413, 20 °C (68 °F))	**bar (psi)**	100 (1450)	100 (1450)	100 (1450)	100 (1450)	100 (1450)	100 (1450)	40 (580)	40 (580)
Materials									
Measuring pipe		Stainless steel AISI 316Ti/1.4571 or Hastelloy C4/2.4610							
Flange		Stainless steel AISI 316Ti/1.4571 or Hastelloy C4/2.4610							
Enclosure		IP67							
Enclosure material/ connection box		AISI 304 (1.4301)/aluminum, max. pressure 40 bar (580 psi)							
Process connections		See dimensional drawings							
Electrical connections		Screw terminals, M 20							
Cable		5 x 2 x 0.35 mm² twisted and screened in pairs, ext. Ø 12 mm							
Cable length		10, 25, 75 or 150 m (32.8, 82, 246 or 492 ft.)							
Ex-version									
ATEX 1443X		≤ DN 40: II 1/2 EEx em [ib] IIC T2-T6 ≥ DN 50: II 2G EEx em [ib] IIC T2-T6							
Weight approx.	**kg (lb)**	13 (28)	14 (31)	18 (40)	34 (75)	47 (104)	58 (128)	91 (201)	261 (573)

For accuracy specifications see „System information Coriolis mass flowmeters“.

Pressure drop



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Flow sensor MC2

Selection and Ordering data	Order No. Order code
SITRANS F C flow sensors MC2	**7ME4300-** ☐☐☐☐☐-☐☐☐ ☐☐☐
Nominal diameter	
Stainless steel AISI 316Ti/1.4571	
DN 50	**1A**
DN 65	**1B**
DN 80	**1C**
DN 100	**1D**
DN 150	**1E**
Hastelloy C4/2.4610	
DN 50	**2A**
DN 65	**2B**
DN 80	**2C**
DN 100	**2D**
DN 150	**2E**
Nominal pressure	
PN 40	**A**
PN 100	**B**
Class 150	**C**
Class 300	**D**
Class 600	**E**
Clamps/screwed-connections	**F**
Process connections	
Flange EN 1092-1	
DN 50 (PN 40/PN 100)	**20**
DN 65 (PN 40/PN 100)	**21**
DN 80 (PN 40/PN 100)	**22**
DN 100 (PN 40)	**23**
DN 150 (PN 40)	**24**
Flange ASME/ANSI	
2" (class 150/300/600)	**30**
2 ½" (class 150/300/600)	**31**
3" (class 150/300/600)	**32**
4" (class 150/300)	**33**
6" (class 150/300)	**34**
Dairy screwed connection to DIN 11851	
DN 50 (PN 25)	**40**
DN 65 (PN 25)	**41**
DN 80 (PN 25)	**42**
DN 100 (PN 25)	**43**
Dairy clamp connection DIN 32676 Tri-clamp	
50 mm clamp (PN 16)	**50**
66 mm clamp (PN 10)	**51**
81 mm clamp (PN 10)	**52**
100 mm clamp (PN 10)	**53**
Aseptic nut flange DIN 11864-2 form A for pipes dimensioned by DIN 11866	
DN 40 (1½")	**60**
DN 50 (2")	**61**
DN 65 (2½")	**62**
DN 80 (3")	**63**
DN 100 (4")	**64**
Configuration	
Flow and density (5 kg/m³ [0.31 lb/ft³])	**1**
Flow, Brix/Plato and density (1 kg/m³ [0.06 lb/ft³])[1]	**2**
Density (1 kg/m³ [0.06 lb/ft³])[1]	**5**
Fraction (specified by customer) and density (1 kg/m³ [0.06 lb/ft³])[1]	**9** **N0Y**

Selection and Ordering data	Order No. Order code
SITRANS F C flow sensors MC2	**7ME4300-** ☐☐☐☐☐-☐☐☐ ☐☐☐
Ex-approval	
Standard, without explosion protection	**A**
With explosion protection: Ex, ATEX	**B**
Cable	
No cable (see accessories)	**A**
Calibration	
Standard	**1**
Matched pair	**2**
Extended calibration customer-specified select Y60, Y61, Y62 or Y63 (see additional information)	**8**

[1] Extended density and fraction not possible with DN 150.

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

Dairy MLFB example	Order No.
MC2 sensor	**7ME4300-** ☐☐☐☐☐-☐☐☐ ☐☐☐
Sensor size DN 80. AISI 316Ti/1.4571	**1C**
Nominal pressure: Clamps	**F**
DIN 11851, DN 80, PN 25	**42**
Configuration/calibration type: flow and density (5 kg/m³ [0.31 lb/ft³])	**1**
Without Ex appproval	**A**
No cable	**A**
Standard calibration	**1**

Selection and Ordering data	Order code
Additional information Please add "**-Z**" to Order No. and specify Order code(s) and plain text.	
Pressure testing certificate PED: 97/23/EC	**C11**
Material certificate EN 10204-3.1	**C12**
Welding certificate NDT X-ray: EN 25817/B	**C13**
Factory certificate according to EN 10204 2.2	**C14**
Factory certificate according to EN 10204 2.1	**C15**
Material certificate according to NACE	**C16**
Tag name plate, stainless steel	**Y17**
Customer-specified, matched pair (5 x 2)	**Y60**
Customer-specified calibration (5 x 2)	**Y61**
Customer-specified, matched pair (10 x 1)	**Y62**
Customer-specified calibration (10 x 1)	**Y63**
Special version	**Y99**

Operating instructions for SITRANS F C MC2

Description	Order No.
• English	**A5E02154544**
• German	**A5E02407329**
• Spanish	**A5E02384868**
• French	**A5E02384945**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

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Accessories

Description	Order No.
Cables from MC2 sensor to MASS 6000 transmitter	
10 m (32.8 ft)	**FDK-083H3001**
25 m (82 ft)	**FDK-083H3002**
75 m (246 ft)	**FDK-083H3003**
150 m (492 ft)	**FDK-083H3004**

Spare parts

Description	Order No.
2 kB SENSORPROM unit (Sensor Serial No. and Order No. must be specified at ordering)	**FDK-083H4410**
Connection board/PCB	**A5E03004110**

Selection and Ordering data	Order No. Order code
SITRANS F C flow sensors	
MC2 for Hygienic applications only	**7ME4310-**
Cable	
No cable (see accessories)	**A**
Calibration	
Standard	**1**
Matched pair	**2**

1) Extended density and fraction not possible with DN 150.

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

Selection and Ordering data	Order code
SITRANS F C flow sensors	
MC2 for Hygienic applications only	**7ME4310-**
Nominal diameter	
AISI 316L/1.4435	
DN 20	**1A**
DN 25	**1B**
DN 40	**1C**
DN 50	**1D**
DN 65	**1E**
DN 80	**1F**
Nominal pressure 40 bar, PN 25	
Clamps/screwed-connections	**F**
Pressure and Process connections	
Dairy screwed connection to DIN 11851	
DN 20, PN 25	**40**
DN 25, PN 25	**41**
DN 40, PN 25	**42**
DN 50, PN 25	**43**
DN 65, PN 25	**44**
DN 80, PN 25	**45**
Dairy clamp connectors for DIN 32676 Tri-clamp	
20 mm clamp	**47**
26 mm clamp	**48**
38 mm clamp	**54**
50 mm clamp	**50**
66 mm clamp	**51**
81 mm clamp	**52**
Aseptic connectors DIN 11864-2 Form A for DIN tubes	
DN 20	**58**
DN 25	**57**
DN 40	**60**
DN 50	**61**
DN 65	**62**
DN 80	**63**
Configuration	
Flow and density (5 kg/m³)	**1**
Flow, BRIX/PLATO and density (1 kg/m³)1)	**2**
Density (1 kg/m³)1)	**5**
Flow, fraction (customer-specified application from the net)	**9**
	N0Y
Ex-approval	
Standard, without explosion protection	**A**
With explosion protection: Ex, FM Class I, Div 2	**D**

Selection and Ordering data	Order code
Additional information	
Please add "**-Z**" to Order No. and specify Order code(s) and plain text.	
Pressure testing certificate PED: 97/23/EC	**C11**
Material certificate EN 10204-3.1	**C12**
Welding certificate NDT X-ray: EN 25817/B	**C13**
Factory certificate according to EN 10204 2.2	**C14**
Factory certificate according to EN 10204 2.1	**C15**
Tag name plate, stainless steel	**Y17**
Tag name plate, plastic	**Y18**
Customer-specific transmitter setup	**Y20**
Customer-specified, matched pair (5 x 2)	**Y60**
Customer-specified calibration (5 x 2)	**Y61**
Customer-specified, matched pair (10 x 1)	**Y62**
Customer-specified calibration (10 x 1)	**Y63**
Special version	**Y99**

Accessories

Description	Order No.
Cables from MC2 sensor to MASS 6000 transmitter	
10 m (32.8 ft)	**FDK-083H3001**
25 m (82 ft)	**FDK-083H3002**
75 m (246 ft)	**FDK-083H3003**
150 m (492 ft)	**FDK-083H3004**

Spare parts

Description	Order No.
2 kB SENSORPROM unit (Sensor Serial No. and Order No. must be specified by ordering)	**FDK-083H4410**

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Flow sensor MC2

Dairy MLFB example	Order No.
MC2 sensor	7ME4310 - ■■■■ - ■■■
Sensor size DN 40 AISI 316L/1.4435	1C
Nominal pressure: Clamp DIN 11851, DN 40, PN 25	F 42
Configuration/calibration type: flow and density (5 kg/m^3 [0.31 lb/ft^3])	1
Without Ex appproval	A
No cable	A
Standard calibration	1

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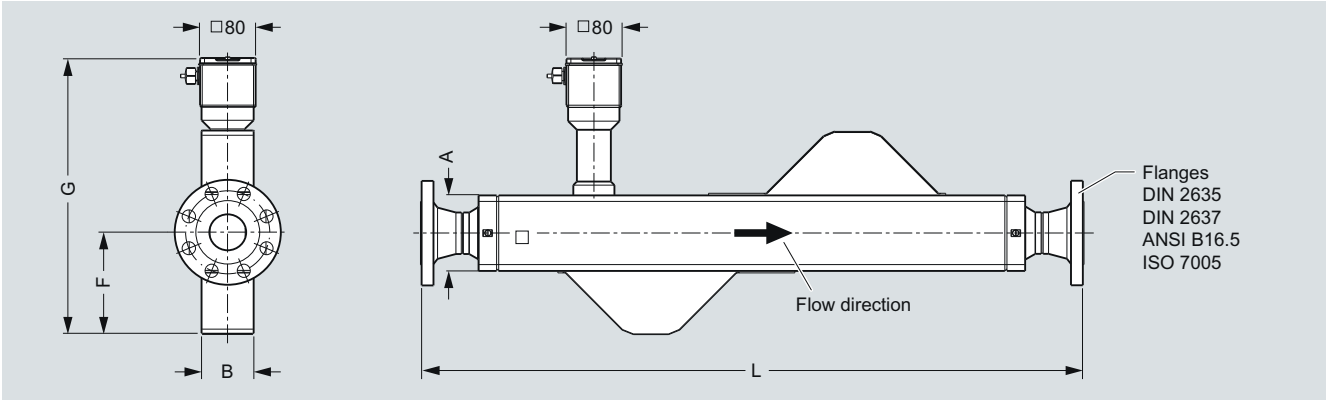
Dimensional drawings

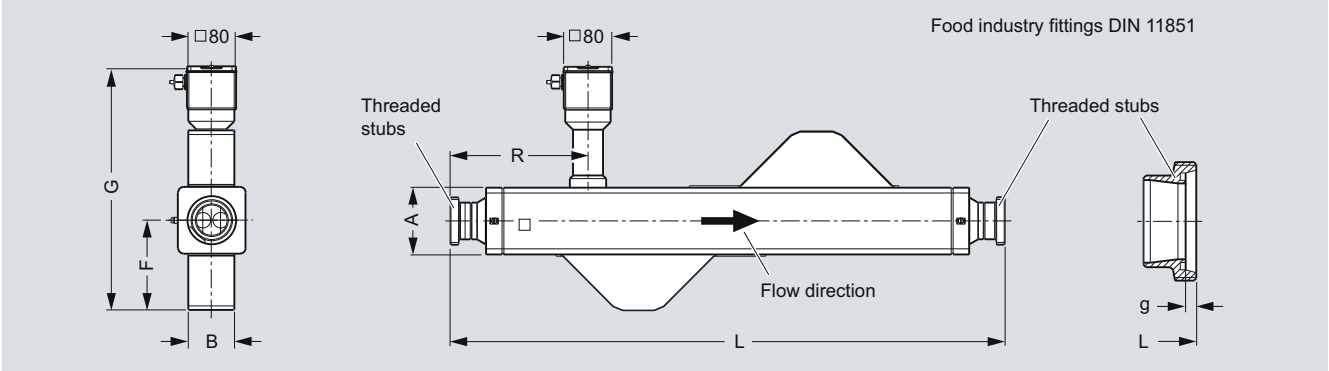
Remote design, flanged construction, DIN/ANSI



Meter size		Process connection size		L [mm (inch)]						G[1] [mm (inch)]	F [mm (inch)]	B [mm (inch)]	A [mm (inch)]	Weight [kg (lb)]
inch	DN	inch	DN	DIN 11864-2 form A	DIN 2635 PN 40	DIN 2637 PN 100	ANSI CL 150	ANSI CL 300	ANSI CL 600					
2	50	2	50	918 (36.14)	940 (37.01)	979 (38.54)	970 (38.19)	980 (38.58)	1001 (39.41)	403 (15.87)	148 (5.83)	80 (3.15)	110 (4.33)	34 (75)
		2½	65	1081 (42.56)	1100 (43.31)	1148 (45.20)	1218 (47.95)	1228 (48.35)	1248 (49.13)					38 (84)
2½	65	2	50	1197 (47.13)	1220 (48.03)	1259 (49.57)	1250 (49.21)	1260 (49.61)	1281 (50.43)	429 (16.89)	164 (6.64)	97 (3.82)	130 (5.12)	43 (95)
		2½	65	1081 (42.56)	1100 (43.31)	1148 (45.20)	1218 (47.95)	1228 (48.35)	1249 (49.17)					47 (104)
		3	80	1200 (47.24)	1220 (48.03)	1260 (49.61)	1240 (48.82)	1260 (49.61)	1282 (50.47)					50 (110)
3	80	2½	65	1310 (51.57)	1330 (52.36)	1378 (54.25)	1365 (53.74)	1375 (54.13)	1396 (54.96)	456 (17.95)	186 (7.32)	108 (4.25)	140 (5.51)	56 (123)
		3	80	1200 (47.24)	1220 (48.03)	1260 (49.61)	1240 (48.82)	1260 (49.61)	1282 (50.47)					58 (128)
		4	100	1463 (57.60)	1480 (58.27)	1530 (60.24)	1500 (59.06)	1520 (59.84)	1568 (61.73)					69 (152)
4	100	3	80	1618 (63.70)	1640 (64.57)	1680 (66.14)	1660 (65.35)	1680 (66.14)	1702 (67.01)	500 (19.69)	215 (8.46)	131 (5.16)	170 (6.69)	84 (185)
		4	100	1463 (57.60)	1480 (58.27)	1530 (60.24)	1500 (59.06)	1520 (59.84)	1568 (61.73)					91 (201)
		6	150	N/A	1778 (69.92)	N/A	1806 (71.10)	1826 (71.89)	N/A					120 (265)
6	150	6	150	N/A	2040 (80.31)	N/A	2070 (81.50)	2090 (82.28)	N/A	613 (24.13)	285 (11.22)	190 (7.84)	260 (9.84)	260 (573)

[1] For EEx add 54 mm

Remote design, food industry fittings, DIN 11851



Meter size		Process connection size			L [mm (inch)]	g [mm (inch)]	G[1] [mm (inch)]	F [mm (inch)]	B [mm (inch)]	A [mm (inch)]	R [mm (inch)]	Weight [kg (lb)]
inch	DN	inch	DN									
2	50	2	50	Rd 78 x 1/6	918 (36.14)	7 (0.28)	403 (15.87)	148 (5.83)	80 (3.15)	110 (4.33)	177 (6.97)	30 (66)
		2½	65	Rd 95 x 1/6	1081 (42.56)	8 (0.31)					254 (10.00)	34 (75)
2½	65	2	50	Rd 78 x 1/6	1197 (47.13)	7 (0.28)	429 (16.89)	164 (6.46)	97 (3.82)	130 (5.12)	291 (11.46)	40 (88)
		2½	65	Rd 95 x 1/6	1081 (42.56)	8 (0.31)					227 (10.91)	44 (97)
		3	80	Rd 110 x 1/6	1200 (47.24)	8 (0.31)					281 (11.06)	47 (104)
3	80	2½	65	Rd 95 x 1/6	1310 (51.57)	8 (0.31)	456 (17.95)	186 (7.32)	108 (4.25)	140 (5.51)	319 (12.56)	54 (119)
		3	80	Rd 110 x 1/6	1200 (47.24)	8 (0.31)					258 (10.16)	56 (123)
		4	100	Rd 110 x 1/6	1463 (57.60)	10 (0.39)					381 (15.00)	60 (132)
4	100	3	80	Rd 110 x 1/6	1618 (63.70)	8 (0.31)	500 (19.69)	215 (8.46)	131 (5.16)	170 (6.69)	401 (15.79)	82 (180)
		4	100	Rd 130 x ¼	1463 (57.60)	10 (0.39)					314 (12.36)	86 (190)

[1] For EEx add 54 mm

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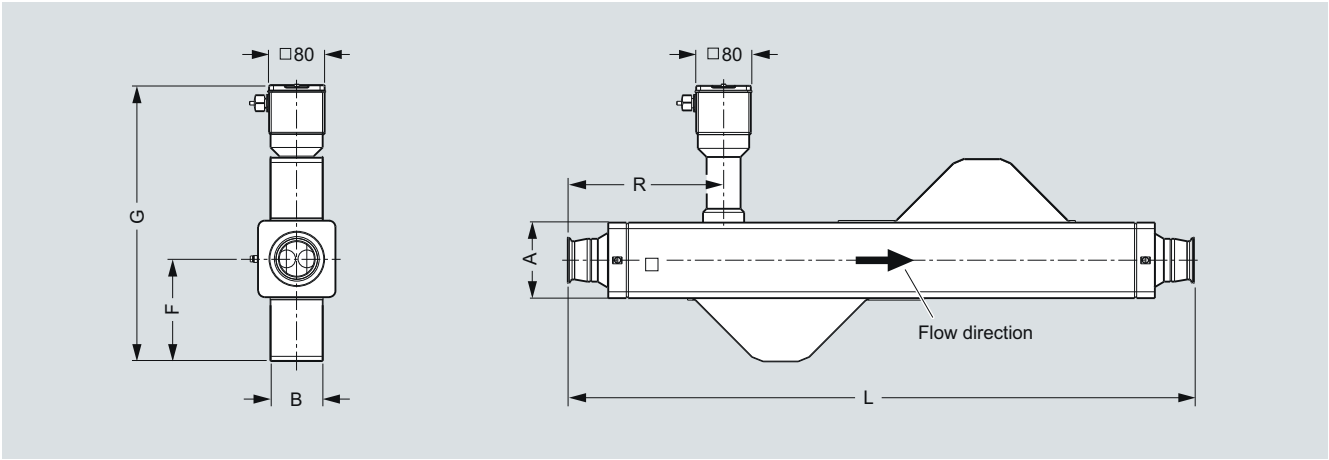
Flow sensor MC2

Remote design, Tri-clamp DIN 32676 (ISO 2852)



Dimensions in mm (inch)

Meter size		Process connection size		L [mm (inch)] ± 3	G[1)] [mm (inch)]	F [mm (inch)]	B [mm (inch)]	A [mm (inch)]	R [mm (inch)]	Weight [kg (lb)]
inch	DN	inch	DN							
2	50	2	50	913 (35.94)	403 (15.87)	148 (5.83)	80 (3.15)	110 (4.33)	225 (8.86)	26 (57)
		2½	65	1073 (42.24)					305 (12.01)	27 (60)
2½	65	2	50	1192 (46.93)	429 (16.89)	164 (6.64)	97 (3.82)	130 (5.12)	335 (13.19)	36 (79)
		2½	65	1073 (42.24)					275 (10.83)	37 (82)
		3	80	1180 (46.46)					328 (12.91)	38 (84)
3	80	2½	65	1302 (51.26)	456 (17.95)	186 (7.32)	108 (4.25)	140 (5.51)	378 (14.88)	45 (99)
		3	80	1180 (46.46)					296 (11.65)	44 (97)
		4	100	1448 (57.01)					430 (16.93)	46 (101)
4	100	3	80	1598 (62.91)	500 (19.69)	215 (8.46)	131 (5.16)	170 (6.69)	440 (17.32)	71 (157)
		4	100	1448 (57.01)					365 (14.37)	69 (152)

1) For EEx add 54 mm

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Process Connections

- Flanges DIN/ASME
- Tri-Clamp DIN 32676
  - DN 15 to DN 50: Series 3
  - DN 65 to DN 100: Series 1
- Food Industry fittings DIN 11851

The max. allowable operating pressure is a function of the process connection type, the fluid temperature, the bolts and the gaskets.

Pressure Rating

- PN 16, PN 40, PN 100 (to DN 80 (3"))
  Class 150, Class 300, Class 600 (to DN 80 (3"))

Housing as secondary containment

- Max. 40 bar

Pressure Equipment Directive 97/23/EG

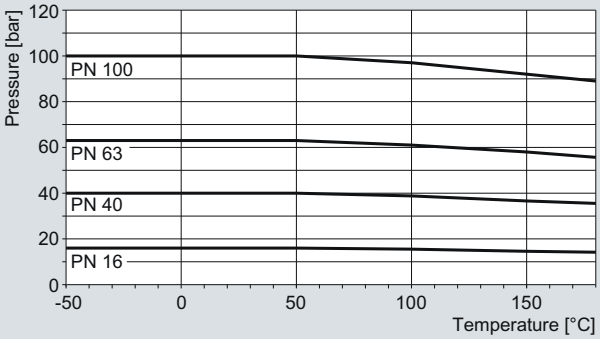
- Conformity evaluation category III, fluid group 1, gas, diagramme 6

Corrosion resistance of measuring pipe material to measuring medium has to be considered.

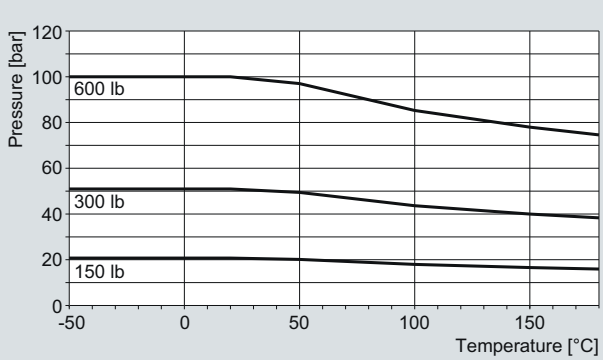
Material strength for process connections

Process connection	Size		$PS_{max.}$ at 20 °C (68 °F)	$TS_{max.}$	$TS_{min.}$
	DN	inch	bar (psi g)	°C (°F)	°C (°F)
Thread acc. DIN 11851	15 ... 40	½ ... 1½	40 (580)	140 (284)	-40 (-40)
	50 ... 100	2 ... 4	25 (363)	140 (284)	-40 (-40)
Tri-Clamp acc. DIN 32676	15 ... 50	½ ... 2	16 (232)	120 (248)	-40 (-40)
	65 ... 100	2½ ... 4	10 (145)	120 (248)	-40 (-40)

Pressure/temperature curves



DIN-Flanges stainless steel AISI 316Ti/1.4571 to DN 100 (4")



ASME-Flanges stainless steel AISI 326Ti/1.4571 to DN 100 (4")

For further information on the PED standard and requirements, see page 10/9.

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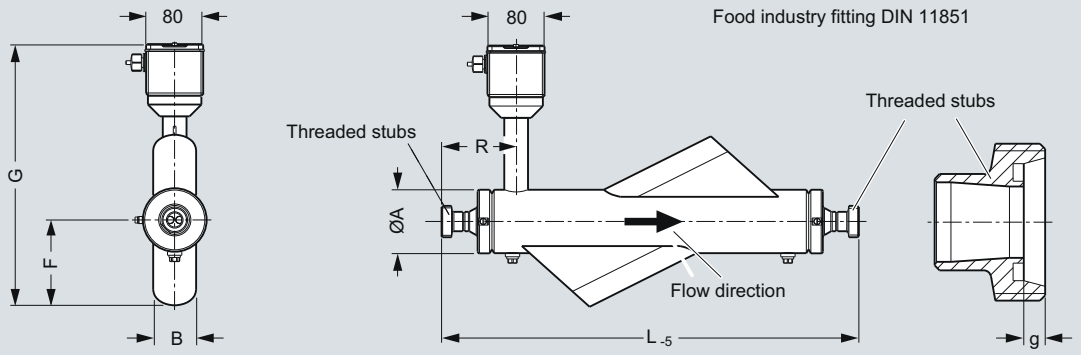
Flow sensor MC2

Remote Design, Food Industry Fitting, DIN 11851



DN (Size)		Process connections			L_{-5}	g	G	F	B	∅A	R	Weight
DN	inch	DN	inch		mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	kg (lb)
20	¾	15	½	Rd34 x 1/8	672 (26.46)	4 (0.16)	358 (14.94)	127 (5.00)	66 (2.60)	89 (3.50)	152 (5.98)	13 (29)
		20	¾	Rd44 x 1/6	583 (22.95)	6 (0.24)					102 (4.02)	
		25	1	Rd52 x 1/6	683 (26.89)	7 (0.28)					152 (5.98)	
25	1	20	¾	Rd44 x 1/6	743 (29.25)	6 (0.24)	358 (14.94)	127 (5.00)	66 (2.60)	89 (3.50)	162 (6.38)	14 (31)
		25	1	Rd52 x 1/6	643 (25.31)	7 (0.28)					112 (4.11)	
		40	1½	Rd65 x 1/6	786 (30.94)	7 (0.28)					185 (7.28)	

If this connection is supplied with an EHEDG-certified device, the device nominal sizes must correspond with the connection nominal sizes!

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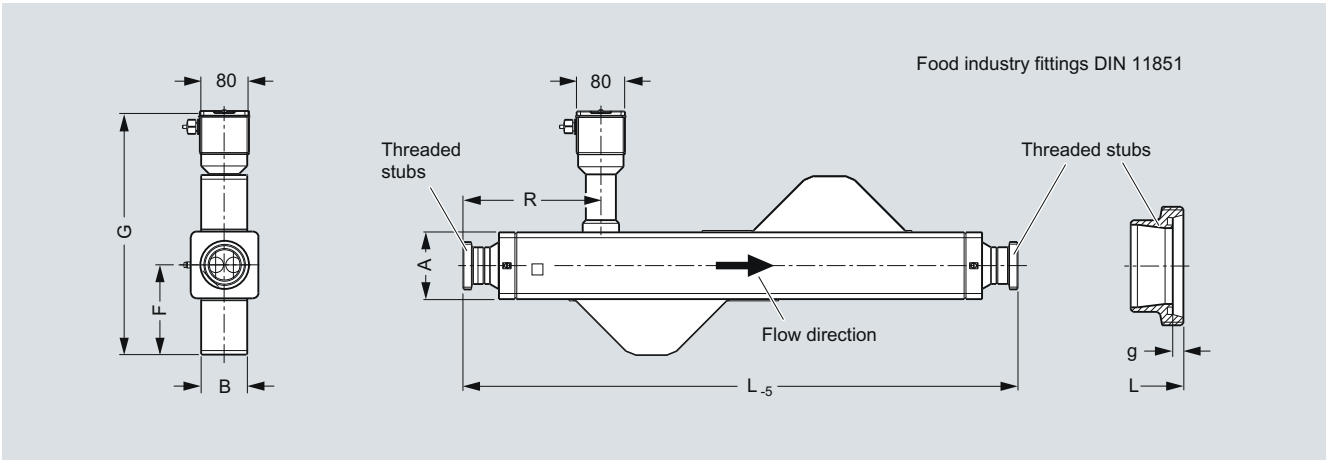
Remote Design, Food Industry Fitting, DIN 11851



DN (Size)		Process connections			L_{-5}	g	G	F	B	∅A	R	Weight
DN	inch	DN	inch		mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	kg (lb)
40	1½	25	1	Rd52 x 1/6	864 (34.02)	7 (0.28)	374 (14.72)	129 (5.08)	64 (2.52)	90 (3.54)	218 (8.58)	16 (35)
		40	1½	Rd65 x 1/6	761 (29.96)	7 (0.28)					164 (6.46)	18 (40)
		50	2	Rd78 x 1/6	918 (36.14)	7 (0.28)					241 (9.49)	19 (42)
50	2	40	1½	Rd65 x 1/6	1025 (40.35)	7 (0.28)	403 (15.87)	148 (5.83)	80 (3.15)	110 (4.33)	233 (9.17)	28 (62)
		50	2	Rd78 x 1/6	918 (36.14)	7 (0.28)					177 (6.97)	30 (66)
		65	2½	Rd95 x 1/6	1081 (42.56)	8 (0.31)					254 (10.00)	34 (75)
65	2½	50	2	Rd78 x 1/6	1197 (47.13)	7 (0.28)	429 (16.89)	164 (6.46)	97 (3.82)	130 (5.12)	291 (11.46)	40 (88)
		65	2½	Rd95 x 1/6	1081 (42.56)	8 (0.31)					227 (8.94)	44 (97)
		80	3	Rd110 x 1/4	1200 (47.24)	8 (0.31)					281 (11.06)	47 (104)
80	3	65	2½	Rd95 x 1/6	1310 (51.57)	8 (0.31)	456 (17.95)	186 (7.32)	108 (4.25)	140 (5.51)	319 (12.56)	54 (119)
		80	3	Rd110 x 1/4	1200 (47.24)	8 (0.31)					258 (10.16)	56 (123)
		100	4	Rd130 x 1/4	1463 (57.60)	10 (0.39)					381 (15.00)	60 (132)

If this connection is supplied with an EHEDG-certified device, the device nominal sizes must correspond with the connection nominal sizes!

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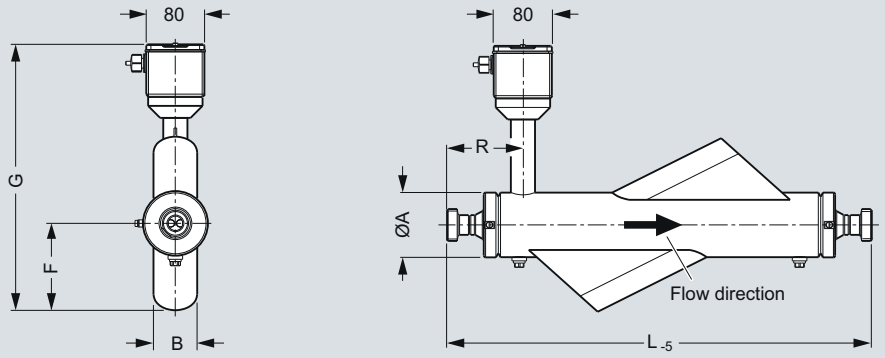
Flow sensor MC2

Remote Design, Tri-Clamp DIN 32676



DN (Size)		Process connections			L_{-5}	G	F	B	∅A	R	Weight
DN	inch	DN	inch		mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	kg (lb)
20	¾	15	½	DIN 32676	656 (25.83)	358 (14.09)	127 (5.00)	66 (2.60)	89 (3.50)	140 (5.51)	12 (26)
		20	¾		561 (22.09)					92 (3.62)	
		25	1		661 (26.02)					142 (5.59)	
25	1	20	¾	DIN 32676	721 (28.39)	358 (14.09)	127 (5.00)	66 (2.60)	89 (3.50)	152 (5.98)	13 (29)
		25	1		621 (24.45)					102 (4.02)	
		40	1½		773 (30.43)					180 (7.09)	

If this connection is supplied with an EHEDG-certified device, the device nominal sizes must correspond with the connection nominal sizes!

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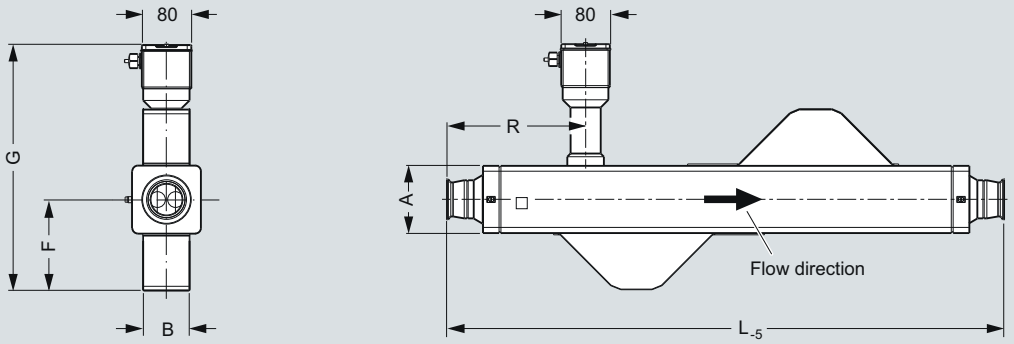
Remote Design, Tri-Clamp DIN 32676



DN (Size)		Process connections		L_{-5}	G	F	B	∅A	R	Weight
DN	inch	DN	inch	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	kg (lb)
40	1½	25	1	842 (33.15)	374 (14.72)	129 (5.08)	64 (2.52)	90 (3.54)	242 (9.53)	17 (37)
		40	1½	748 (29.45)					195 (7.68)	17 (37)
		50	2	913 (35.94)					278 (10.94)	18 (40)
50	2	40	1½	1012 (39.84)	403 (15.87)	148 (5.83)	80 (3.15)	110 (4.33)	275 (10.83)	27 (60)
		50	2	913 (35.94)					225 (8.86)	26 (57)
		65	2½	1073 (42.24)					305 (12.01)	27 (60)
65	2½	50	2	1192 (46.93)	429 (16.89)	164 (6.46)	97 (3.82)	130 (5.12)	335 (13.19)	36 (79)
		65	2½	1073 (42.24)					275 (10.83)	37 (82)
		80	3	1180 (46.46)					328 (12.91)	38 (84)
80	3	65	2½	1302 (51.26)	456 (17.95)	186 (7.32)	108 (4.25)	140 (5.51)	378 (14.88)	45 (99)
		80	3	1180 (46.46)					296 (11.65)	44 (97)
		100	4	1448 (57.01)					430 (16.93)	46 (101)

If this connection is supplied with an EHEDG-certified device, the device nominal sizes must correspond with the connection nominal sizes!

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System information SITRANS F US Ultrasonic flowmeters

Overview

Siemens offers two types of ultrasonic flowmeters, inline flowmeters and clamp-on flowmeters. This offers the end user the maximum flexibility to choose the technology that best fits his needs. This chapter shows the inline versions.

SITRANS F US inline ultrasonic flowmeters measure flow of electrically conductive and non-conductive liquids.

Benefits

- Greater flexibility:
  - Sensor sizes from DN 50 to 1 200 mm (2" to 48"), optional down to DN 25 (1")
  - Inline retrofit as 1 and 2 track up to DN 4 000 (160")
  - Compact and remote transmitter installation
  - HART, PROFIBUS PA and Modbus communication
  - Mains or battery powered solutions
  - Dedicated transmitter portfolio for HVAC, power generation, utility and general industry as well as more demanding applications
- Easier service:
  - Comprehensive self-diagnostic for error indication and logging
  - Exchange of the transducers without interrupting operation
  - Battery lifetime of up to 8 years
- Approvals/certificates:
  - Custody transfer approvals within district heating
  - ATEX
  - Standard with calibration certificate

Application

Inline ultrasonic flowmeters are suitable for measuring the flow of liquids with good acoustic permeability, independent of conductivity, viscosity, temperature, density and pressure.

- max. 3 % solids
- max. 3 % air and gas
- max. 350 cSt

The main applications can be found in the following sectors:

- Raw water intake for water treatment plants
- Treated waste water
- Power generation and utility
- Oil and gas industry and petrochemical industry
- Irrigation systems
- Cooling water plants within the industry and in power stations
- Plants transporting non-conductive liquids
- HART/4 to 20 mA output
- PROFIBUS PA
- ATEX
- Modbus

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Please see Product selector on the Internet, since some constrains might be related to some of the features:
www.pia-selector.automation.siemens.com

	SONO 3300/ FUS060	SONO 3100/ FUS060	SONOKIT/ FUS060 FUS080	FUE380	FUS380	FUS880
	7ME3300...	7ME3100...	7ME3210.../ 7ME3220...	7ME3410...	7ME3400...	7ME3440...
Industry						
Water, treated waste water	**XXX**	**XX**	**XXX**		**XXX**	**XX**
Irrigation	**XX**	**XX**	**XXX**		**XXX**	**XXX**
Utility, district heating water, cooling	**XXX**	**XX**	**XXX**	**XXX**	**XXX**	
Utillity, district heating, CT approvals required				**XXX**		
Oil	**XX**	**XXX**	**XX**		**X**	
Cryogenic fluids (only on request)		**XXX**				
On- and Offshore applications	**XX**	**XXX**	**XX**		**X**	
Chemical	**XXX**	**XXX**	**X**			
Design						
Transmitter compact mounted			●	●	●	
Transmitter remote mounted	●	●	●	●	●	●
Transducers can be replaced under pressure		●	●			
Retrofit on existing steel pipes/non-weldable			●			●
Transmitter enclosure						
Polyamid, IP67			●	●	●	●
Die-cast aluminum (painted), IP65	●	●	●			
Communication						
HART	●	●	●			
PROFIBUS PA	●	●	●			
Modbus RTU/RS232 and RS485			●	●	●	●
Power supply						
3.6 V Battery			●	●	●	●
115 … 230 V AC	●	●	●	●	●	●
115 … 230 V AC and 3.6 V battery backup			●	●	●	●
24 V AC/DC	●	●	●			
Accuracy						
0.25 % (with 4-track system on request)		●				
0.50 %	●	●	●	●	●	●
Sensor design						
1 track ultrasonic measurement (special request)		●[1]	●[3]			●
2 track ultrasonic measurement	●	●	●	●	●	●
4 track ultrasonic measurement (special request)		●	●			
Dimension						
DN 25 ... 40 [2]	1" ... 1½" [2]	●[1]				
DN 50	2"	●	●[1]		●	●	
DN 65	2½"	●	●[1]		●	●	
DN 80	3"	●	●[1]		●	●	
DN 100	4"	●	●	●[3]	●	●	
DN 125	5"	●	●	●[3]	●	●	
DN 150	6"	●	●	●[3]	●	●	
DN 200	8"	●	●	●	●	●	●
DN 225	9"	●	●	●	●	●	●
DN 250	10"	●	●	●	●	●	●
DN 300	12"	●	●	●	●	●	●
DN 350	14"		●	●	●	●	●
DN 400	16"		●	●	●	●	●
DN 500	20"		●	●	●	●	●
DN 600	24"		●	●	●	●	●
DN 700	28"		●	●	●	●	●

X = can be used, **XX** = often used, **XXX** = most often used, ● = available

1) Also available as 1-track solution on request (down to DN 25 (1"))
2) Only SONO 3100 1-track (special request)
3) SONOKIT 1-Track DN 100 to DN 2400 and 2-track DN 200 to DN 4000

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System information SITRANS F US Ultrasonic flowmeters

Please see Product selector on the Internet, since some constrains might be related to some of the features:
www.pia-selector.automation.siemens.com

		SONO 3300/ FUS060	SONO 3100/ FUS060	SONOKIT/ FUS060 FUS080	FUE380	FUS380	FUS880
		7ME3300...	7ME3100...	7ME3210.../ 7ME3220...	7ME3410...	7ME3400...	7ME3440...
Dimension (continued)							
DN 800	32"		●	●	●	●	●
DN 900	36"		●	●	●	●	●
DN 1000	40"		●	●	●	●	●
DN 1200	48"		●	●[7]	●	●	●
DN 1400 ... 4000	54" ... 160"			●[3] [7]			
Process connection							
Flanges		●	●		●	●	
Flangeless (for weld-in)			●				
Flanges Norm							
EN 1092-1		●	●		●	●	
EN 1759-1		●	●				
ANSI B16.5			●				
Pressure rating							
PN 6				●			●
PN 10		●	●	●			
PN 16		●	●	●	●	●	
PN 25			●	●	●	●	
PN 40		●	●	●	●	●	
Class 150		●	●				
Class 300		●	●				
PN 160			●[4]				
Class 2500			●[4]				
Pipe, flange and transducer material							
Carbon steel		●	●	●	●	●	
Stainless steel			●	●			
Die cast bronze					●	●	
Other materials			on request	on request			●
Media temperature							
°C	°F						
-200	-328		●[1] [2] [4]				
-20	-4		●	●			
-10	+14	●	●	●			
+2	+35.6	●	●	●	●[8]	●	●
+60	+140	●	●	●	●	●	●
+120	+248	●	●	●	●[5]	●[5]	
+150	+302	●	●	●	●[6]	●[6]	
+160	+320	●	●	●	●	●	
+190	+374		●	●	●	●	
+200	+392		●	●	●	●	
+250	+482		●[4]				
Measuring principle							
Transit time principle		●	●	●	●	●	●

X = can be used, **XX** = often used, **XXX** = most often used, ● = available

1) Also available as 1-track solution on request (down to DN 25 (1"))
2) Only SONO 3100 1-track (special request)
3) SONOKIT 1-Track DN 100 to DN 2400 and 2-track DN 200 to DN 4000
4) Only on special request
5) Compact
6) Pipe material bronze brass
7) SONOKIT with FUS080 up to DN 1200
8) Min. 5 °C (41 °F)

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Please see Product selector on the Internet, since some constrains might be related to some of the features:
www.pia-selector.automation.siemens.com

	SONO 3300/ FUS060	SONO 3100/ FUS060	SONOKIT/ FUS060 FUS080	FUE380	FUS380	FUS880
	7ME3300...	7ME3100...	7ME3210.../ 7ME3220...	7ME3410...	7ME3400...	7ME3440...
Approvals						
Custody transfer approval for energy metering						
MID class 2				●		
EN 1434 class 2 (Energy meter approval)				●		
OIML R 75 class 2 (Energy meter approval)				●		
PTB, Germany				●		
Other country-specific type approval available for:						
- Russia (GOSS/GOST)	●	●	●	●	●	
- Rumania	●	●	●	●	●	
- China				●		
Ex approval						
Ex d ATEX		●	●			
Ex i ATEX	●	●	●			

X = can be used, **XX** = often used, **XXX** = most often used, ● = available

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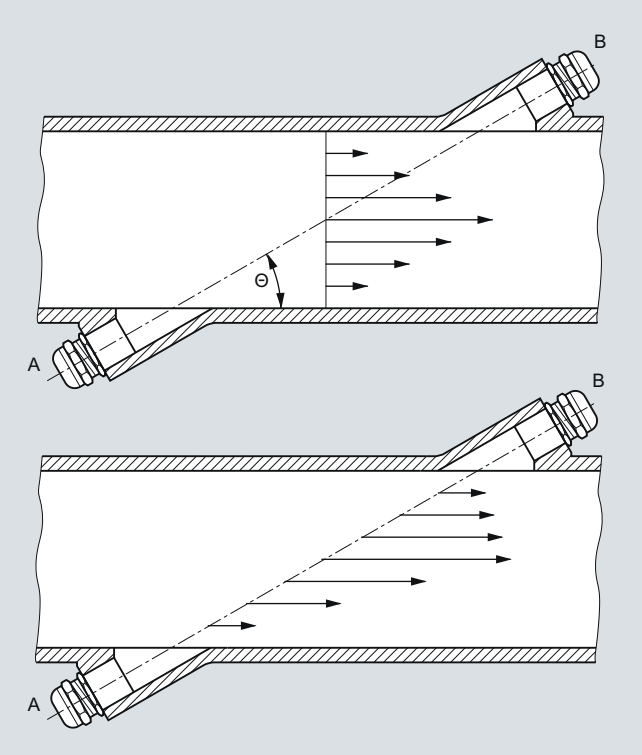
Function

Physical principle



Velocity distribution along sound path

A sound wave traveling in the same direction as the liquid flow arrives at point B from point A in a shorter time than the sound wave traveling against the direction of flow (from point B to A). The difference in sound transit time indicates the flow velocity in the pipe.

Since delay time is measured at short intervals both in and against flow direction, viscosity and temperature have no influence on measurement accuracy.

Measuring principle

In SITRANS F US flowmeters the two ultrasonic transducers are placed at an angle θ in relation to the pipe axis. The transducers function as transmitters and receivers of the ultrasonic signals. Measurement is performed by determining the time the ultrasonic signal takes to travel with and against the flow. The principle can be expressed as follows:

$v = K \cdot (t_{B,A} - t_{A,B}) / (t_{A,B} \cdot t_{B,A}) = K \cdot \Delta t/t^2$

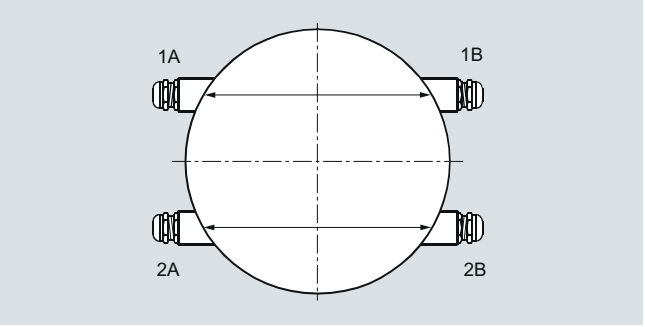
v = Average flow velocity
t = Transit time
K = Proportional pipe geometry factor

This measuring principle offers the advantage that it is independent of variations in the actual sound velocity of the liquid, i.e. independent of the temperature.
Proportional factor K is determined by wet calibration.

Direct signal processing

The ultrasonic signal is sent directly between the transducers. The advantage gained sending signals from point to point is an extremely good signal strength.

2-track solution



Ultrasonic 2-track flowmeter with 4 transducers. In the upper track transducers 1A / 1B and in the lower track 2A / 2B are displayed.

The accuracy of ultrasonic flowmeters depends on the pipe geometry before and after the flowmeter and the number of ultrasonic measuring tracks.

When water flows through a pipe, it has a tendency to swirl and/or flow with different velocities inside the pipe, depending on the pipe design.

A 2-track ultrasonic flowmeter offers:

- less sensitivity to upstream obstruction like bends, pumps or valves.
- high security in the measurements as the meter continues to measure even if, for some reason, one track stops working.

Typical straight inlet requirements are upstream 10 x D_i (D_i = diameter of the flowmeter) and downstream 3 x D_i.

Typical accuracy that can be reached with 2-track ultrasonic flowmetering is ± 0.5 % with installations according to above demands.

4-track ultrasonic flowmeters

Some applications require accuracy under extreme short inlet conditions and swirl that cannot be obtained with 2-track solutions.

For these applications we can offer a 4-track solution – customer-specified – according to actual inlet conditions.

Please contact Siemens Flow Instruments for specific applications.

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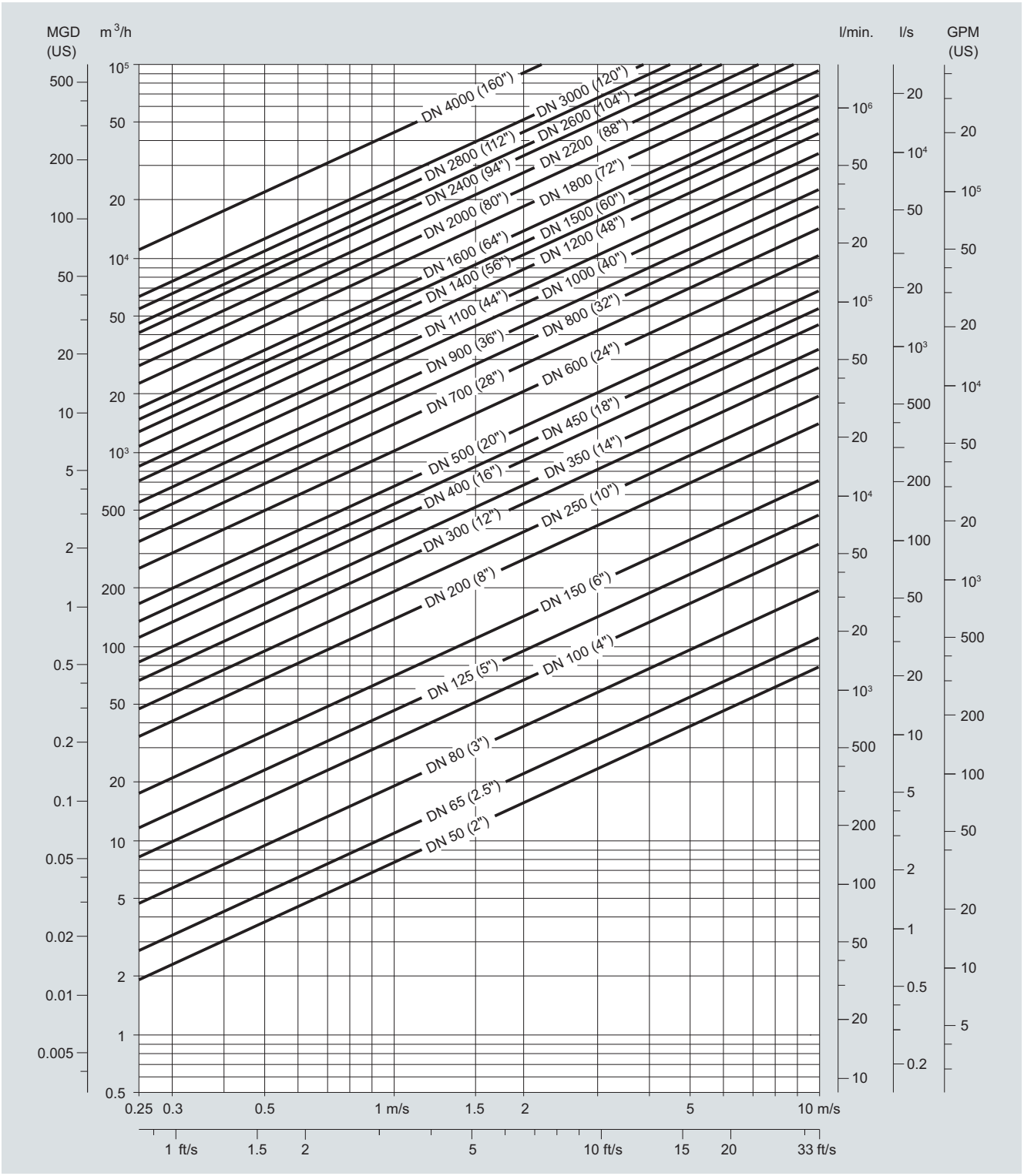
Technical specifications



Nominal size and flow

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System information SITRANS F US Ultrasonic flowmeters

Guidelines for selection of sensor

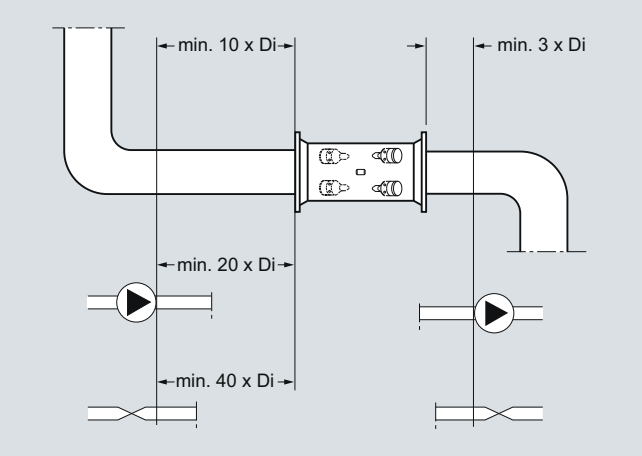
- Min. measuring range: 0 … 0.25 m/s
- Max. measuring range: 0 … 10 m/s

Normally nominal flow velocity is within the measuring range 1 … 3 m/s.

Flow velocity calculation formula:

- $v = (4 \times Q_{max}) / (\pi \times D_i^2 \times 3600)$
- v in m/s, Q_{max} in m^3/h, D_i in m

Inlet and outlet conditions



Recommended inlets and outlets

To maximize performance inlet and outlet must be straight. There must be a certain distance between flowmeter and bends, pumps and valves. It is also important to centre the flowmeter in relation to pipe flanges and gaskets.

Valves must always be installed after the flowmeter. The only exception is installation of the sensor in a vertical pipe. In this case a valve below the sensor is necessary to allow zero point adjustment. It is important to select a valve which does not alter the flow when fully open.

Recommended inlet/outlet			
	SONO 3300, SONO 3100, SONOKIT 2-track	**FUS380/FUE380[1)]**	**SONOKIT 1-track**
90° bend	10 x D_i	10 x D_i	20 x D_i
Fully opened valve	10 x D_i	10 x D_i	20 x D_i
Partially opened valve	40 x D_i	40 x D_i	40 x D_i
2 x 90° bends in same plane	15 x D_i	15 x D_i	25 x D_i
2 x 90° bends in two planes	20 x D_i	20 x D_i	40 x D_i
Reductions (Outlet 0 x D_i)	10 x D_i	10 x D_i	20 x D_i
Pumps	20 x D_i	20 x D_i	40 x D_i
Outlet	3 x D_i	3 x D_i	3 x D_i

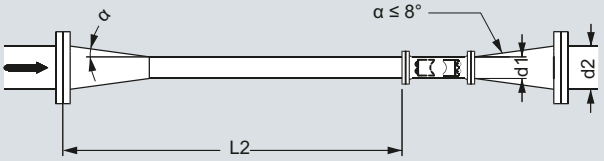
[1)] Inlet for FUE380 with MID approval should be for sizes ≥ DN 80: 1.5 m

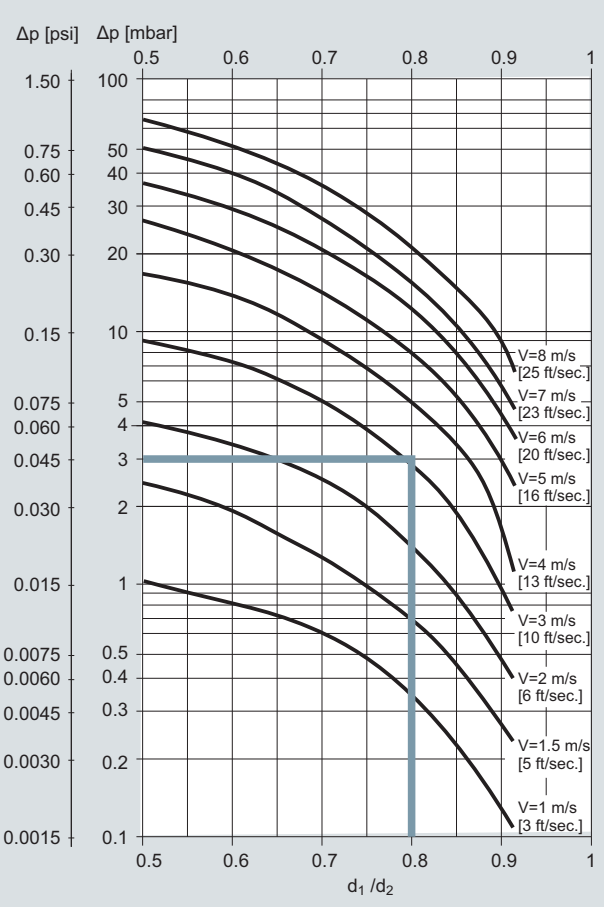
Reductions

The flowmeter can be installed between two reducers (e.g. DIN 28545). At 8° the pressure drop curve below applies.

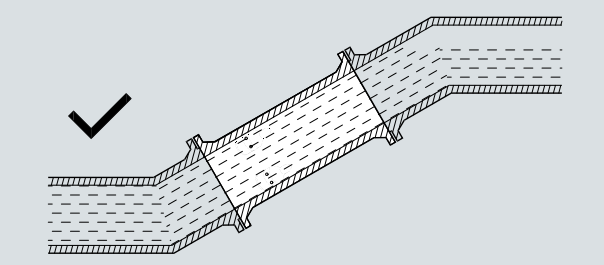
Example:

A flow velocity of 3 m/s (V) in a sensor with a diameter reduction from DN 250 to DN 200 (d_1/d_2 = 0.8) gives a pressure drop of 3 mbar.





The sensor must always be completely filled with liquid:



The following installations must be avoided:

- Installation at the highest point of the pipe system
- Installation in vertical pipes with free outlet

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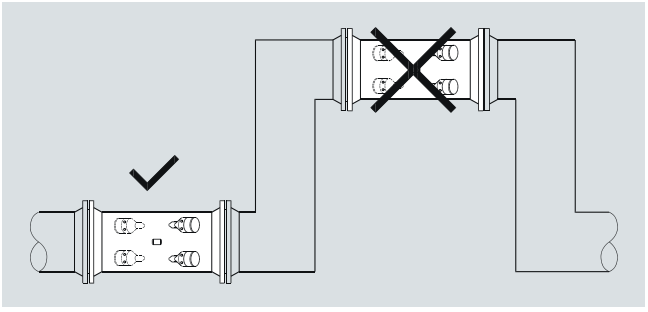
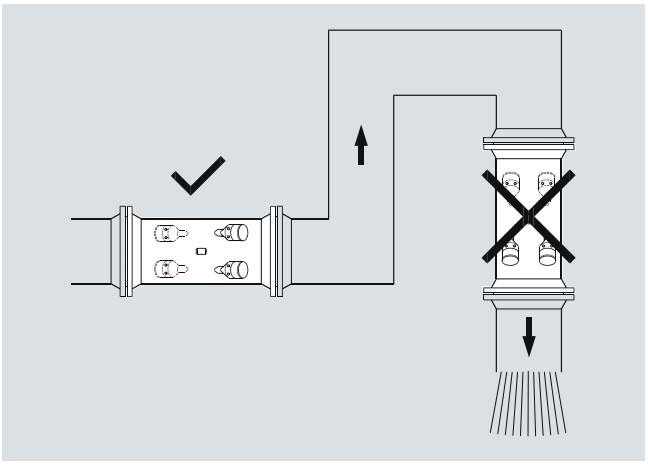
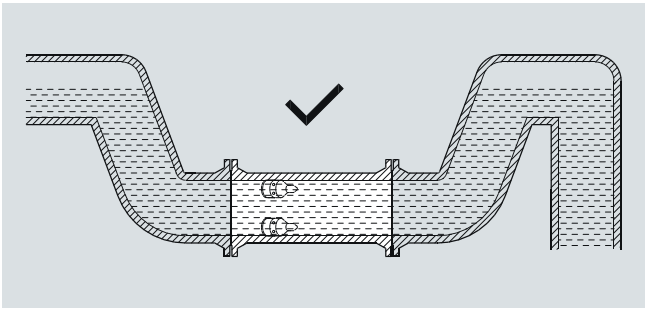
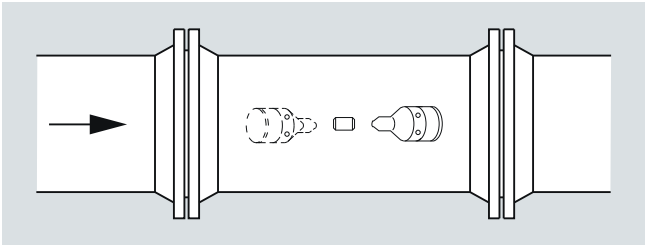




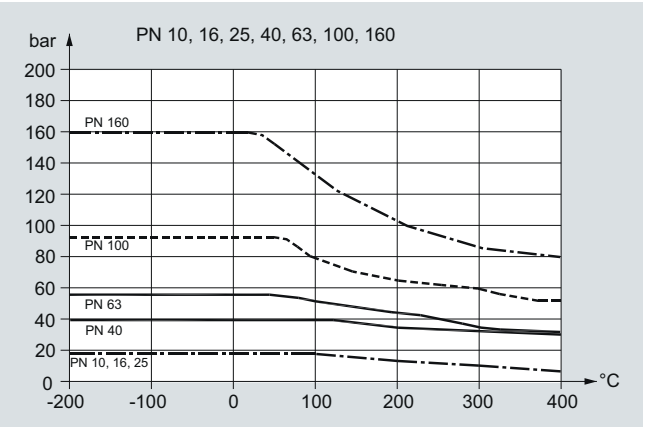
With partially full pipes or pipes with free outlet the flowmeter should be located in a U-shaped tube:



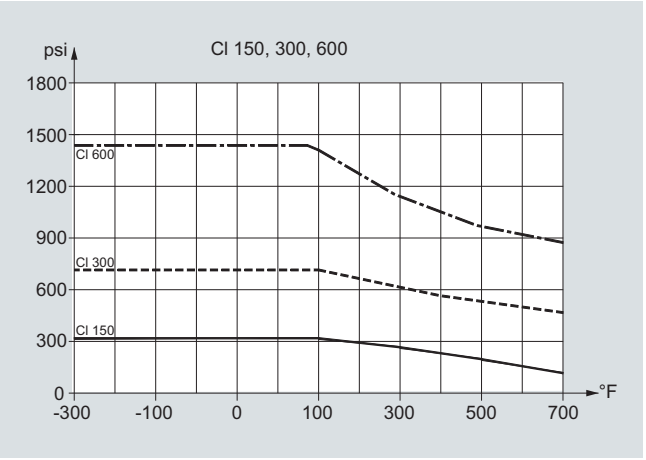
Installing the transducers in horizontal position is recommended:



Pressure/temperature curve to EN (DIN) flanges



Pressure/temperature curve to ANSI B16.5 flanges



Note: The pressure/temperature curves only assist in the selection of a system. No responsibility is taken for the correctness of the information. For further information on the PED standard and requirements, see page 10/9.

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System information SITRANS F US Ultrasonic flowmeters

Reference conditions

To ensure continuous accurate measurement, flowmeters must be calibrated. The calibration is conducted at Siemens flow facilities with traceable instruments referring directly to the physical unit of measurement according to the International System of Units (SI).

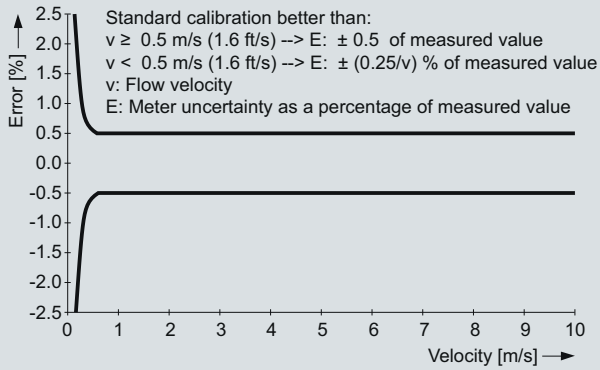
Therefore the calibration certificate ensures recognition of the test results worldwide, including the US (NIST traceability).

Siemens offer accredited calibrations assured to ISO 17025. Siemens Flow Instruments accredited laboratories are recognized by ILAC MRA (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement) ensuring international traceability and recognition of the test results worldwide.

Flowmeter calibration data are stored in the internal EEPROM of the transmitters FUS060 or FUS080.

The system accuracy refers to the following systems:

SONO 3300/FUS060, SONO 3100/FUS060[1)].



Fluid	Water
Fluid temperature	22 ± 5 °C
Ambient temperature	22 ± 5 °C
Supply voltage	AC 115/230 V +10 … -15 % 24 V DC +25 … -15 %, 24 V AC ±15 %
Straight inlet length	20 x D_i
Rangeability	0 … 1 m/s to 0 … 10 m/s
Repeatabilty	Better than 0.25 % in the range 0.5 … 10 m/s
Linearity	
• Reynolds number 1000 < Re < 5000	Better than 1 %
• Reynolds number > 5000	Better than 0.5 %

1) Only systems with transmitter FUS060. For systems with transmitter FUS080 see chapter on FUS380 and FUE380.

Additional effects of deviations from reference conditions

- Current output: As frequency output (± 0.1 % of actual flow +0.05 % FSO)
- Effect of ambient temperature: Frequency/pulse output: < 0.005 % SPAN/K
- Current output: < ± 0.0075 % SPAN/K
- Effect of supply voltage: 0.005 % of measuring value at 1 % change

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Overview

SITRANS FUS060 is a transit time based transmitter designed for ultrasonic flowmetering with any sensor in the FUS inline series up to DN 4000. SITRANS FUS060 is engineered for high performance and is suitable for 1-, 2- and 4-tracks flowmeters.

Benefits

- Superior signal resolution for optimum turn down ratio
- Simple menu-based local operation with two-line display and four optical input elements, for unlimited use in potentially explosive atmospheres
- Self-monitoring and diagnostic
- Operate up to 4-tracks
- ATEX II 2G Ex dem [ia/ib] IIC T6/T4/T3
- Remote installation up to 120 m from sensor
- 1 analog output (4 to 20 mA) standard with HART-protocol, 1 digital frequency or pulse output, 1 relay output for limit, alarms, flow direction
- PROFIBUS PA Profile 2, 1 digital frequency or pulse output

Design

The transmitter type FUS060 is designed for remote installation in non-hazardous or hazardous areas.

The transmitter is designed for use in a flowmeter system together with sensors type SONOKIT, SONO 3300 and SONO 3100.

The FUS060 is ordered as part of a complete flowmeter system. It can be ordered separately as spare part and manually programmed with the sensor data.

Application

The main application for flowmeters with the transmitter SITRANS FUS060 is measurement volume flow within the general, petrochemical and chemical industries, power engineering and water and waste water, as well as various types of oils and liquid gases.

Integration

The transmitter output is often used as input for an automation system or as input for systems of remote reading.

The SITRANS FUS060 transmitter offers current, pulse and relay outputs as standard output functions and supports HART or Profibus PA communication.

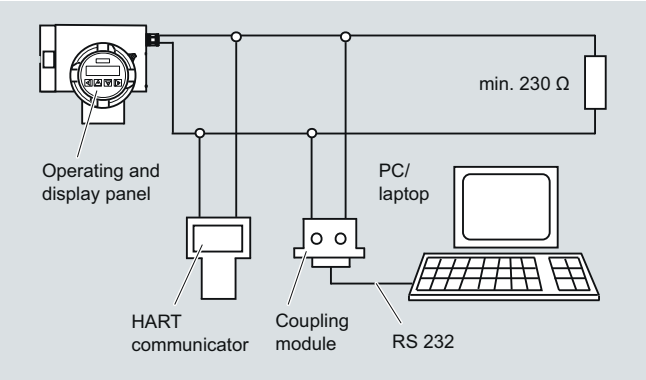
The settings of the transmitter output functions are individually programmed via keypad and display menu.

Function

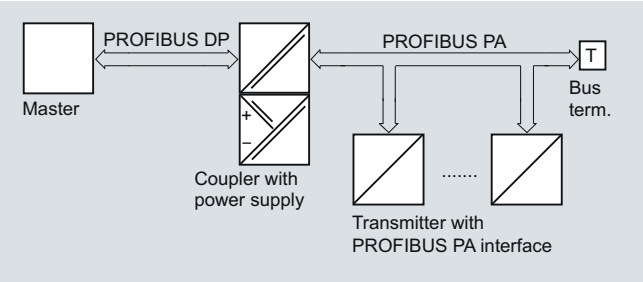
Displays and keypad

Operation of the SITRANS FUS060 transmitter can be carried out using:

- Keypad and display unit
- HART communicator
- PC/laptop and SIMATIC PDM software via HART communication
- PC/laptop and SIMATIC PDM software using PROFIBUS PA communication

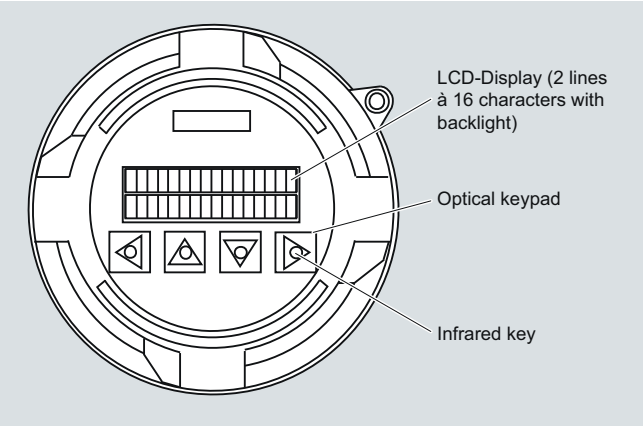


HART communication



PROFIBUS PA communication

The operating and display panel permits simple operation without supplementary equipment. It is not necessary to open the housing. All changes to a setting can therefore also be carried out in the potentially explosive atmosphere.



Operating and display panel

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Transmitter FUS060

The individual functions and parameters are selected using a hierarchical, multi-language input menu and four infrared keys. The parameters can be specifically selected and modified using codes, e.g.:

- Operating parameters such as measuring range, physical dimensions, device information
- Limits for flow, totalizer, ultrasonic velocity or ultrasonic amplitude
- Noise suppression using damping, error stages and hysteresis
- Display parameters (freely-configurable display)
- Display in volume or mass dimensions
- Density as constant input value for conversion of volume into mass dimensions
- Forward/backward measurement
- Flow direction
- Diagnostics functions and control values
- Functions of the PROFIBUS PA output:
  flow, net quantity (volume or mass), ultrasonic velocity, ultrasonic amplitude, forward quantity (volume or mass), backward quantity (volume or mass)
- Functions of the analog output:
  flow, ultrasonic velocity or ultrasonic amplitude
- Functions of digital output 1:
  pulse output, frequency output, limit, flow direction or device status
- Functions of digital output 2:
  limit, flow direction or device status
- Simulation of output signal via analog output, digital output 1 and digital output 2

The HART protocol is implemented via the analog output (current output). Using this communication facility, the device can be parameterized with a PC/laptop and SIMATIC PDM software in addition to local operation.

In the SITRANS F version with PROFIBUS PA, the analog output is replaced by the digital PROFIBUS PA output. The device can then be parameterized via PROFIBUS communication and with SIMATIC PDM in addition to local operation.

Integration

The transmitter output is often used as input for an automation system or as input for systems of remote reading.

The SITRANS FUS060 transmitter offers current, pulse and relay outputs as standard output functions and supports HART or PROFIBUS PA communication.

The settings of the transmitter output functions are individually programmed via keypad and display menu.

Technical specifications

Input	
Measurement	Flow by measuring the transit time difference of ultrasonic signals through ultrasonic transducers in DN 100 ... 4000 2-track sensor pipes (optional, depending on selected size, 1-track or 4-track special solutions are possible).
Nominal diameters and measuring ranges	2-track DN 50 ... DN 4000 (optionally also for 1-track and 4-track)
Max. cable length	120 m (395 ft) (shielded coaxial cable). For Ex version the transducer cable length is restricted to 3 m (9.84 ft) in order to meet requirements for electrical immunity. For 2-track and 4-track systems with sizes ≥ DN 3000 cable length is restricted to 30 m (98.4 ft).
Output	
Analog output	Active current output (13.2 V < open loop voltage < 15.8 V)
• Signal range	4 ... 20 mA
• Upper limit	20 ... 22.5 mA, adjustable
• Signal on alarm	3.6 mA, 22 mA, or 24 mA
• Load	Max. 600 Ω; for non Ex version ≥ 230 Ω for HART communication ≤ 330 Ω for Ex-version
• Only PROFIBUS PA version:	Analog output omitted, is replaced by digital PROFIBUS PA interface
Digital output 1	
• Active or passive signal, can be configured with positive or negative logic	Active: 24 V DC, ≤ 24 mA, R_i = 300 Ω Passive: open collector, 30 V DC, ≤ 200 mA
• For explosion protection (ATEX version)	Passive: open collector 30 V DC, ≤ 100 mA
• Only PROFIBUS PA version:	Only passive signals for digital output 1
• Output function, configurable	Pulse output • Adjustable pulse significance ≤ 5000 pulses/s • Adjustable pulse width ≥ 0.1 ms Frequency response • f_{END} selectable up to 10 kHz Limit for flow, totaliziers,ultrasonic velocity or ultrasonic amplitude device status, flow direction
Digital output 2	
• Relay, NC or NO contact	Switching capacity max. 5 W Max. 50 V DC, max. 200 mA DC Self-resetting fuse, R_i = 9 Ω
• For explosion protection (ATEX version)	Max. 30 V DC, max 100 mA DC, 50 mA AC (cf. EC-Type Examination certificate)
• Output function, configurable	Limit for flow, ultrasonic velocity or ultrasonic amplitude flow direction device status
• Only PROFIBUS PA version:	Digital output 2 omitted

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Communication via analog output 4 ... 20 mA	
• PC/laptop or HART communicator with SITRANS F flowmeter	
- Load with connection of coupling module	min. 230 Ω (max. 330 Ω for Ex-version)
- Load with connection of HART communicator	min. 230 Ω
- Cable	2-wire shielded ≤ 3 km (≤ 1.86 miles) Multi-core shielded ≤ 1.5 km (≤ 0.93 miles)
- Protocol	HART, version 5.1
Communication via PROFIBUS PA interface	Layers 1 + 2 according to PROFIBUS PA Communication system according to IEC 1158-2 Layer 7 (protocol layer) according to PROFIBUS DP, EN 50170 standard
• Power supply	Separate supply, four-wire device Permissible bus voltage 9 ... 32 V See certificates and approvals
• Current consumption from bus	10 mA; ≤ 15 mA in event of error with electronic current limiting
Electrical isolation	Outputs electrically isolated from power supply and from one another
Accuracy	
Error in measurement (at reference conditions)	
• Pulse output	≤ ± 0.5 % of measured value at 0.5 ... 10 m/s or ≤ ± 0.25/V[m/s] % of measured value at flow < 0.5 m/s
• Analog output	As pulse output plus ± 0.1 % of measured value, ± 20 µA
• Repeatability	≤ ± 0.25 % of measured value at 0.5 ... 10 m/s
Reference conditions	
• Process temperature	25 °C ± 5 °C (77 °F ± 9 °F)
• Ambient temperature	25 °C ± 5 °C (77 °F ± 9 °F)
• Warming-up time	30 min.
Installation conditions	Upstream section > 10 x DN and downstream section > 5 x DN
Rated operation conditions	
Ambient conditions	
Ambient temperature	
• Operation	-20 ... +50 °C (-4 ... +122 °F)
• In potentially explosive atmospheres	Observe temperature classes
• Storage	-25 ... +80 °C (-13 ... +176 °F)
Enclosure rating	IP65 (NEMA 4)
Electromagnetic compatibility	For use in industrial environments
• Emitted interference	To EN 61000-6-3 (Light industry)
• Noise immunity	To EN 61000-6-2 (Industry)

Medium conditions	The measuring media must be ultrasonic signal compatible. It must be homogeneous and not two-phased to transfer the acoustic ultrasonic signals.
• Process temperature	-200 ... +250 °C (-328 ... +482 °F) (not directly influenced by medium temperature)
• Gases/solids	Influence accuracy of measurement (approx. max. 3 % gases or solids)
Design	
Separate version	Transmitter is connected to the transducers via 3 ... 120 m (9.8 ... 395 ft) long specially shielded cables (coaxial cable) For ATEX versions mounted in the Ex area only with 3 m (9.8 ft) long cables.
Enclosure material	Die-cast aluminum, painted
Wall mounting bracket (standard and special)	Stainless steel (standard: always incl.)
Weight of transmitter	4.4 kg (9.7 lb)
Electrical connection	Cable glands (always incl.) • Power supply and outputs - 2 x M20 (HART) / M25 (PROFIBUS) or - 2 x ½"-NPT (HART) • Transducers/sensor - 2/4 x M16 or - 2/4 x ½" NPT
Displays and controls	
Display	LCD, two lines with 16 characters each
• Multi-display: 2 freely-selectable values are displayed simultaneously in two lines	Flow, volume, mass flow, mass, flow velocity, speed of sound, ultrasonic signal information, current, frequency, alarm information
Operation	4 infrared keys, hierarchical menu shown with codes
Power supply	
Supply voltage	
• Standard version	120 ... 230 V AC ± 15 % (50/60 Hz) or 19 ... 30 V DC/ 21 ... 26 V AC
• Ex version	19 ... 30 V DC / 21 ... 26 V AC
Power failure	No effect for at least 1 period (> 20 ms)
Power consumption	Approx. 10 VA / 10 W
Certificates and approvals	
Explosion protection	ATEX II 2G Ex dem [ia/ib] IIC T6/T4/T3 T6 for media < 85 °C (185 °F) T5 for media < 100 °C (212 °F) T4 for media < 135 °C (275 °F) T3 for media < 200 °C (392 °F)

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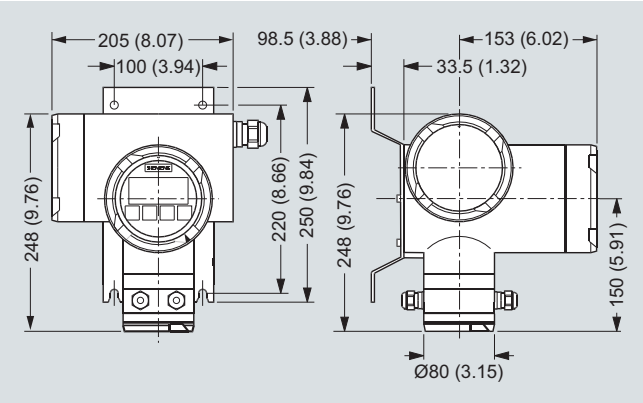
Transmitter FUS060

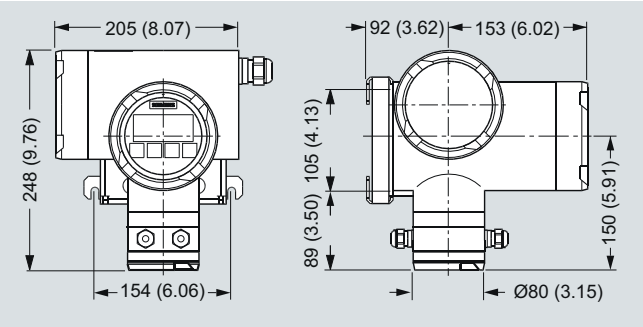
Coaxial cable		
Standard Coaxial cable (75 Ω)	Coaxial cable with SMB straight plug on one end for the FUS060 connector	
Outside diameter	Ø 5.8 mm	
Length	3, 15, 30, 60, 90, 120 m (9.84, 49.21, 98.43, 196.85, 295.28, 393.70 ft) between sensor and transmitter	
Material (outside jacket)	black PE	
Ambient temperature	-10 ... +70 °C (14 ... 158 °F)	
High temperature Coaxial cable (75 Ω)	Coaxial cable with SMB straight plug on one end for the FUS060 connector	
Outside diameter	Ø 5.13 mm (first 0.3 m (0.98 ft) part to the transducer), Ø 5.8 mm (for remaining cable to the transmitter - with SMB plug at the end) and between these is a black hot melt junction Ø 16 mm (length 70 mm)	
Length	3, 15, 30, 60, 90, 120 m (9.84, 49.21, 98.43, 196.85, 295.28, 393.70 ft) between sensor and transmitter (max 3 m 9.84 ft) transducer cable length for Ex area mounted transmitters)	
Material (outside jacket)	Brown PTFE (0.3 m (0.98 ft) part) and black PE (for remaining cable)	
Ambient temperature	-200 ... +200 °C (-328 ... +392 °F) (brown PTFE transducer part) and -10 ... +70 °C (14 ... 158 °F) (black PE for remaining transmitter cable part)	

4

Dimensional drawings

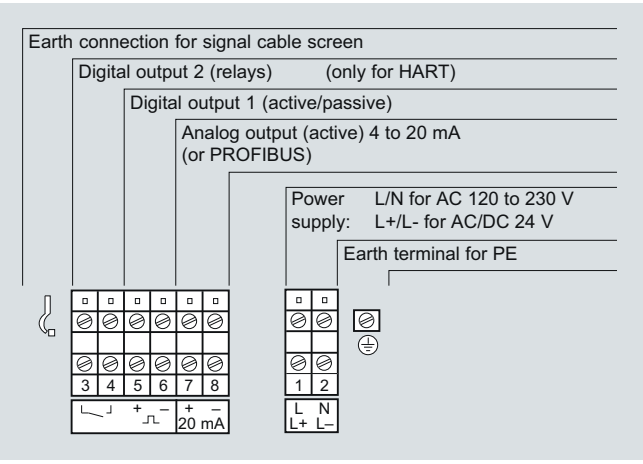


SITRANS FUS060 with standard mounting bracket, dimensions in mm (inch)



SITRANS FUS060 with optional special mounting bracket, dimensions in mm (inch)

Schematics



Electrical connection SITRANS FUS060

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Transmitter FUS060 operating instructions, accessories and spare parts

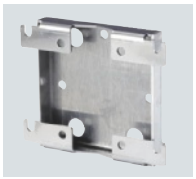
Operating instructions

Description	Order No.
• English	**A5E01204521**
• German	**A5E02123845**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F US literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Accessories

Description	Order No.	
Standard wall mounting bracket	**7ME5933-0AC04**	
Special wall-/pipe mounting bracket kit	**7ME5933-0AC05**	
Safety clamp for electronic cover with glass plate (7ME5933-0AC01)	**7ME5933-0AC06**	

Process Device Manager SIMATIC PDM		
SIMATIC PDM Single Point V6.0 For operation and parameterization of one field device, communication using PROFIBUS DP/PA or HART modem, incl. 1 TAG **Cannot** be expanded by further functions or TAG option/power-pack 5 languages (German, English, French, Spanish, Italian) executes with Windows 2000 Professional or Windows XP Professional	**6ES7658-3HX06-0YA5**	
HART modem for communication with FUS060 HART, PC and SIMATIC PDM		
HART modem		
With RS232 connection	**7MF4997-1DA**[D)]	
With USB connection	**7MF4997-1DB**[D)]	

D) Subject to export regulations AL: N, ECCN: EAR99H.

Spare parts

SITRANS FUS060 transmitter, available standard and Ex versions

The transmitter configuration is made in the flowmeter order codes (together with the sensors).
The information below is for spare part ordering only.

Description	Version	Enclosure	Supply	Order No.	
FUS060, 230 V, HART, Metric cable glands	Transmitter for remote connection	IP65 (NEMA 4)	115 … 230 V AC 50/60 Hz	**7ME3050-2BA10-1BA1**	
FUS060, 230 V, HART, Imperial cable glands	Transmitter for remote connection	IP65 (NEMA 4)	115 … 230 V AC 50/60 Hz	**7ME3050-2BA10-1BA2**	
FUS060, 230 V, PROFIBUS, Metric cable glands	Transmitter for remote connection	IP65 (NEMA 4)	115 … 230 V AC 50/60 Hz	**7ME3050-2BA10-1DA1**	
FUS060, 230 V, PROFIBUS, Imperial cable glands	Transmitter for remote connection	IP65 (NEMA 4)	115 … 230 V AC 50/60 Hz	**7ME3050-2BA10-1DA2**	
FUS060, 24 V, HART, Metric cable glands	Transmitter for remote connection	IP65 (NEMA 4)	19 ... 30 V DC/ 21 ... 26 V AC	**7ME3050-2BA20-1BA1**	
FUS060, 24 V, HART, Imperial cable glands	Transmitter for remote connection	IP65 (NEMA 4)	19 ... 30 V DC/ 21 ... 26 V AC	**7ME3050-2BA20-1BA2**	
FUS060, 24 V, PROFIBUS, Metric cable glands	Transmitter for remote connection	IP65 (NEMA 4)	19 ... 30 V DC/ 21 ... 26 V AC	**7ME3050-2BA20-1DA1**	
FUS060, 24 V, PROFIBUS, Imperial cable glands	Transmitter for remote connection	IP65 (NEMA 4)	19 ... 30 V DC/ 21 ... 26 V AC	**7ME3050-2BA20-1DA2**	
FUS060, ATEX, 24 V, HART, Metric cable glands	Transmitter for remote connection	IP65 (NEMA 4) ATEX approval	19 ... 30 V DC/ 21 ... 26 V AC	**7ME3050-2BA21-1CA1**	
FUS060, ATEX, 24 V, PROFIBUS, Metric cable glands	Transmitter for remote connection	IP65 (NEMA 4) ATEX approval	19 ... 30 V DC/ 21 ... 26 V AC	**7ME3050-2BA21-1EA1**	

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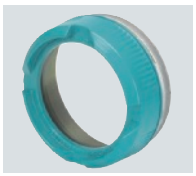
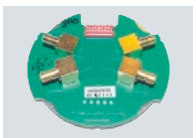
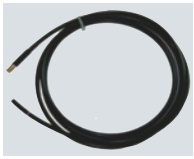
Transmitter FUS060

Description	Order No.	
Operating/Display module	**7ME5933-0AC00**	
Electronics cover with glass plate (non Ex)	**7ME5933-0AC01**	
Cover for sensor cable and gasket	**7ME5933-0AC02**	
Cover for mains supply/communication	**7ME5933-0AC03**	
FUS060 Sensor connection PCBA, Standard versions only, 1 pc.	**A5E02551331**	
FUS060 Sensor connection PCBA, ATEX version only, 1 pc.	**A5E02551334**	

Description	Order No.	
M20 cable gland set for FUS060 (M20) power and output connection, gray PA plastic, 2 pcs. • cables Ø 6 ... 12 mm (0.24" ... 0.47") • -40 ... +100 °C (-40 ... +212 °F)	**A5E02246350**	
M20 cable gland set for FUS060 ATEX version power and output connection, PA plastic, 1 x in blue (ATEX Ex iEx i) and 1 x gray (ATEX Ex-e) • cables Ø 5 ... 9 mm (0.20" ... 0.35") • -20 ... +95 °C (-4 ... +203 °F)	**A5E02246356**	
1/2" NPT cable gland set for FUS060 (NPT) power and output connection, gray PA plastic, 2 pcs. • cables Ø 6 ... 12 mm (0.24" ... 0.47") • -40 ... +100 °C (-40 ... +212 °F)	**A5E02246396**	
M25 cable gland set for the FUS060 PA (M25) power and output connection, gray PA plastic, 2 pcs. • cables Ø 9 ... 16 mm (0.35" ... 0.63") • -40 ... +100 °C (-40 ... +212 °F)	**A5E02246378**	
M16 x 1.5 cable gland set for FUS060 (M16) sensor connection, brass chrome, 2 pcs. and 2 pcs. blind • cables Ø 5 ... 9 mm (0.20" ... 0.35") • -20 ... +105°C (-4 ... +221 °F)	**A5E02246369**	
½" NPT cable gland set for FUS060 (NPT) sensor connection, 4 pcs. M16 bush to ½" NPT and 4 pcs. ½" NPT gray PA plastic glands • cables Ø 5 ... 9 mm (0.20 ... 0.35") • -20 ... +100 °C (-4 ... +212°F)	**A5E02247877**	

Cables for FUS060

Description	Length m (ft)	Order No.	
Coaxial cable for FUS060, (75 Ω, max. 70 °C (158 °F), black PVC) (2 pcs.)	3 (9.84)	**A5E00875101**	
	15 (49.21)	**A5E00861432**	
	30 (98.43)	**A5E01278662**	
	60 (196.85)	**A5E01278682**	
	90 (295.28)	**A5E01278687**	
	120 (393.70)	**A5E01278698**	
High temp. coaxial cable for FUS060; with 0.3 m brown PTFE high temp. transducer part, max. 200 °C (392 °F) and black PVC for remaining transmitter part with SMB plug, max. 70 °C (158 °F); (impedance 75 Ω) (2 pcs.)	3 (9.84)	**A5E00875105**	
	15 (49.21)	**A5E00861435**	
	30 (98.43)	**A5E01196952**	
Low temperature PTFE coaxial cable for FUS060 and cryogenic sensors; PTFE, max. -200 ... +200 °C (-328 ... .+392 °F); (impedance 75 Ω) (2 pcs.)	10 (32.84)	**A5E02085593**	
	30 (98.43)	**A5E02085644**	
	40 (131.23)	**A5E02085649**	

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Transmitter FUS080/FUE080

Overview

SITRANS FUS080 is a transit time based transmitter designed for ultrasonic flowmetering with any sensor in the FUS inline series SONOKIT, FUS380 and FUE380 up to DN 1200.

The ultrasonic flowmeter transmitter SITRANS FUS080 comes as battery or mains powered version.The SITRANS FUS080 is designed to measure flow water applications.

The SONOKIT retrofit flowmeter series are shown from page 4/243. The standard flowmeter series SITRANS FUS380 is described from page 4/254. The type approved flowmeter series for flowmetering in energy meter custody transfer systems are named SITRANS FUE380 - see page 4/259.

Benefits

- Battery powered up to 6 years
- 115/230 V mains powered with back-up battery option in case of mains power failure
- Fast measuring frequency 15 Hz/0.5 Hz (230 V AC/Battery)
- Easy one button straight forward display
- IrDA optical interface for local communication
- 2-track measuring principle for optimum accuracy
- Compact or remote mounting
- Measures on all district water qualities and water conductivities
- No pressure drop
- Long-term stability
- 2 galvanic isolated digital outputs for easy connection to a calculator (potential free)
- Bidirectional measurement, with 2 totalizers and outputs
- Dynamic range Q_i (min) : Q_s (max) up to 1:400
- Modbus RTU/RS232, RS485 communication modules

Application

The main application for flowmeters with the transmitter SITRANS FUS080 is measurement of water flow in district heating plants, local networks, boiler stations, substations, chiller plants, irrigations plants and other general water applications.

Design

The transmitter type SITRANS FUS080 is designed with fiberglass reinforced polyamide enclosure for remote or compact installation in normal areas. The remote versions are available with up to 30 meter distance from flowmeter to transmitter. When ordering as a compact version in the series FUS380 and FUE380 the transducer cables are pre-mounted at the sensor.

The transmitter is available in an IP67/NEMA 4X/6 enclosure and is designed for use in the flowmeters series:

- SONOKIT (1- or 2-track)
- FUS380 (2-track)
- FUE380 (2-track)

The transmitter FUS080 is always ordered as part of a complete flowmeter system.

It can be manually ordered separately as spare part preprogrammed with the given sensor data.

Integration

The flowmeter pulse output is often used as input for an energy meter or as input for digital systems for remote reading.

SITRANS FUS380 has two pulse outputs, with functions that can be individually selected, and optional Modbus RTU communication modules.

The settings of the transmitter, eg. flow and pulse output rate, are defined when ordering the complete flowmeter.

If the flowmeter forms part of an energy meter system for custody transfer, no further approvals are needed, except eventually local approvals on the flowmeter.

Technical specifications

Input	
Measurement	Flow by measuring the transit time difference of ultrasonic signals through ultrasonic transducers in the sensor pipes. Supporting of 1-track or 2-track sensors in sizes DN 50 ... 1200.
Measuring rate	
• Battery mode	0.5 Hz
• Mains supply	up to 15 Hz
• Back-up mode	0.5 Hz (at mains supply drop)
Flow rate	0.02 ... 9 m/s (0.065 ... 29.5 ft/s), bidirectional flow metering
Outputs	2 pulse or status outputs (A and B), individual galvanically isolated MOS relay outputs, passive mode, max. ±35 V AC/DC, max. 50 mA
Max. pulse frequency	100 Hz at Q_s (Q_{max})
Pulse value and length	Selectable with the ordering of the flowmeter
Output A	Pulse: forward, reverse, forward net, reverse net (preset: forward)
Output B	Pulse: forward, reverse, forward net, reverse net (preset: forward) or alarm indication or call-up indication (preset: alarm)
Pulse value A and B	0.1 l/p, 0.25 l/p, 0.5 l/p, 1 l/p, 2.5 l/p, 10 l/p, 25 l/p, 50 l/p, 100 l/p, 250 l/p, 500 l/p, 1 m^3/p, 2.5 m^3/p, 5 m^3/p, 10 m^3/p, 25 m^3/p, 50 m^3/p, 100 m^3/p, 250 m^3/p, 500 m^3/p, 1 000 m^3/p
Pulse length (depending on Q_{max} by DN selection)	5, 10, 20, 50, 100, 200, 500 ms (standard 5 ms)
Alarm indication	Track 1 (F1), track 2 (F2) internal, failure (F3, F4), powers supply warning or low battery indication (F5), Q_{max} overflow (F6), pulse overflow (F7, F8), internal data logger warning (F9)

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Transmitter FUS080/FUE080

Rated operation conditions	
Ambient conditions	
Ambient temperature	
• Operation	-5 ... +60 °C (23 ... 140 °F)
• Storage	-40 ... +85 °C (-40 ... +185 °F) (battery included)
Enclosure rating	IP67/NEMA 4X/6 to EN 60529 and DIN 40050
Electromagnetic compatibility	
• Emitted interference	To EN 61000-6-4
• Immunity	To EN 61000-6-2
• MID approved (FUE380 series)	Environment class E2 and M1
Mechanical vibration	2 g, 1 ... 800 Hz sinusoidal in all directions according to IEC 68-2-6
Weight of transmitter	Approx. 1.5 kg (3.3 lb)
Design	
Enclosure material	Fibre-glass reinforced polyamide, light gray color
Wall mounting kit	IP67/NEMA 4X/6 terminal box for the wall mounting of the transmitter, fiber-glass reinforced polyamide with stainless steel bracket, cable glands entries: 2 x 2 M20 or Pg 13.5 for power supply and outputs and 2 x M20 or Pg 13.5 for the sensor cables, glands (supply and outputs and double cable entries for sensor cables) are included.
Sensor cable	Coaxial cable sets for remote transmitter up to 30 m (98.4 ft) long transducer cable, 75 Ω impedance, cables sets are prepared for the connection to the sensors
Display and controls	
Display	LCD, 8 digits, additional 2 digits and symbols for status information
Resolution	Totalized information can be displayed with 1, 2 or 3 decimals or automatic adjustment (default)
Display setting	Flow unit: Preset: m^3/h Volume unit: Preset: m^3
Push button	One push button for menu selection and display information
Communication (IrDA optical eye)	IrDA – optical communication and control interface with Modbus RTU protocol for read or write transmitter settings and data via PC and PDM tool
Power supply	
Battery	D-cell battery pack, 3.6 V LiSOCl (Lithium Thionyl Chloride, 32 Ah), replaceable, life- and working-time up to 8 years
Mains	87 ... 265 V AC (50 ... 60 Hz) or 87 ... 265 V AC (50 ... 60 Hz) with D-cell single battery backup, 2.6 V LiSOCl (Lithium Thionyl Chloride, 12.5 Ah), replaceable, life time up to 8 years

Power consumption	
Mains version	Approx. 2.5 VA
Add-on modules	• RS232 serial interface with Modbus RTU (Rx/Tx/GND), point to point with max. 15 m cable • RS485 serial interface with Modbus RTU (+/-/GND), multidrop with up to 32 devices with max. 1 000 m cable • Modbus RTU protocol is an open protocol (further information available on request) • Serial speed 1 200, 2 400, 4 800, 9 600, 19 200, 38 400 Baud

SONOKIT, FUS380, FUE380

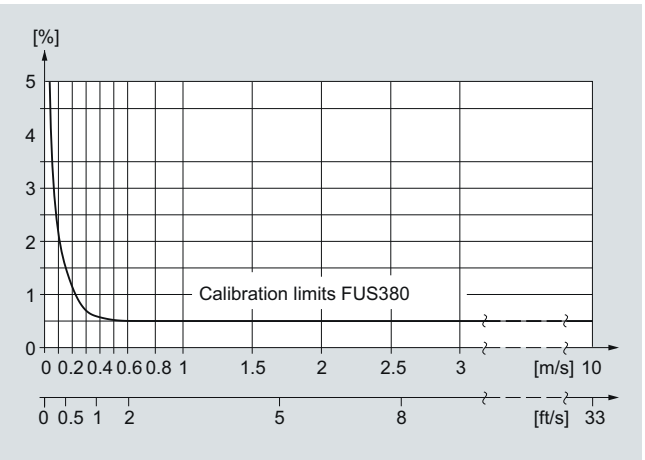
Flow value setting predefined settings according to dimension selection.

The transmitter settings are changeable by using the SW tool PDM (for FUE380 series some of the setting are only readable, restriction of the approval requirements).

Accuracy/Error in measurement:

(at reference conditions for FUS380 and FUS380 series, SONOKIT series will differ in the accuracy)

- Pulse output
  - ≤ ±0.5 % of measured value at 0.5 ... 10 m/s or
  - ≤ ±0.25/V [m/s] % of measured value at flow < 0.5 m/s
- Repeatability ≤ 0.25 % of measured value at 0.5 ... 10 m/s
- Reference conditions
  - Process temperature and ambient temperature: 25 °C ± 5 °C (77 °F ± 9 °F)
  - Warming-up time 30 min.
  - Installation conditions: Upstream section > 10 x DN and downstream section > 5 DN



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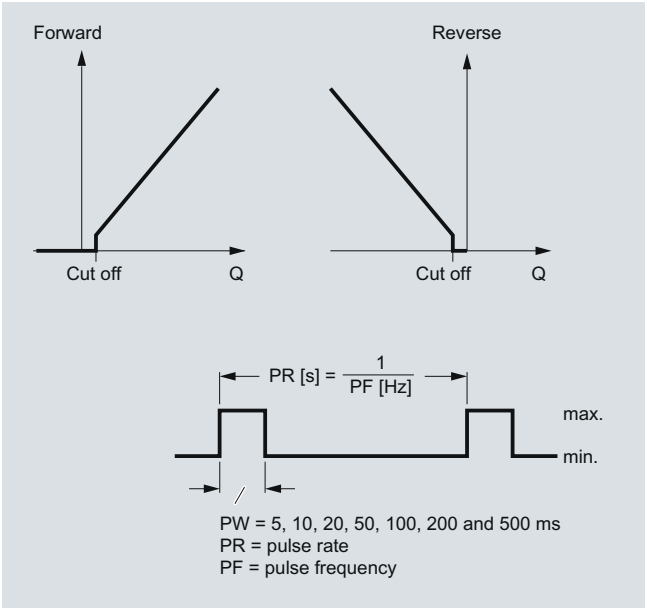
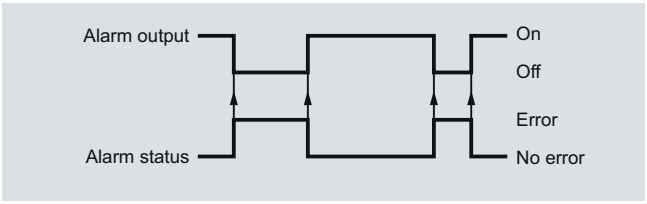
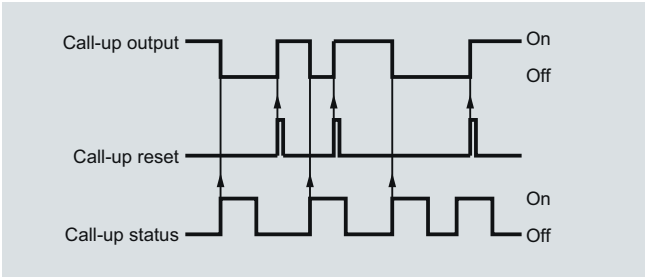
Output configuration



Pulse volume: output A/B configured as volume per pulse, calculated on forward/reverse or net forward/reverse flow. The volume per pulse is free scaleable (via PDM software).

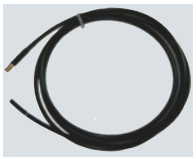


Pulse output B can be used as stated above or as alarm or call-up function.



Call-up: the call-up output is active until manually reset by use of PDM tool. The call-up function is activated when an alarm is activated.

Sensor coaxial cable for SONOKIT series with FUS080

Coaxial cable		
Standard coaxial cable (75 Ω)		
Outside diameter	Ø 5.8 mm	
Length	15, 30 m (49.2, 98.4 ft) between sensor and transmitter	
Material (outside jacket)	black PE	
Ambient temperature	-10 ... +70 °C (14 ... 158 °F)	

Sensor coaxial cable for FUS380/FUE 380 series

Coaxial cable		
High temperature coaxial cable (75 Ω)	With special designed glands for connection in the sensor/transducer	
Outside diameter	Ø 5.13 mm (first 0.3 m (0.98 ft) part to the transducer), Ø 5,8 mm (for remaining cable to the transmitter – black holt melt junction part between (Ø 16 mm, length 70 mm)	
Length	up to 30 m (98.4 ft) between sensor and transmitter	
Material (outside jacket)	Brown PTFE (0.3 m (9.84 ft) part) and black PE (for remaining cable)	
Ambient temperature	-200 ... +200 °C (-328 ... +392 °F) (brown PTFE transducer part) and -10 ... +70 °C (14 ... 158 °F) (black PE for remaining transmitter cable part)	

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Transmitter FUS080 operating instructions, accessories and spare parts

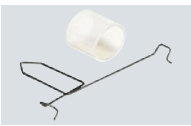
Operating instructions

Description	Order No.
for use with SONOKIT	
• English	**A5E03059912**
integrated in FUS/FUE380	
• English	**A5E00730100**
• German	**A5E00740611**
• Spanish	**A5E00754188**
• French	**A5E00754173**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F US literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Accessories

Description	Order No.	
Sun lid for FUS080 transmitter (frame and lid)	**A5E02328485**	
Brace (holder) for optical IrDA eye	**A5E00695277**	
IrDA infrared interface adapter with USB for data acquisition with 1.2 m (3.9 ft) cable	**FDK:087L4163**	
RS232 add-on module, point to point communication interface with Modbus RTU protocol	**A5E03405537**	
RS485 add-on module, multi-drop communication interface with Modbus RTU protocol	**A5E03405534**	
Process Device Manager SIMATIC PDM		
SIMATIC PDM Single Point V6.0 For operation and parameterization of one field device, communication using PROFIBUS DP/PA or HART modem, incl. 1 TAG **Cannot** be expanded by further functions or TAG option/power-pack 5 languages (German, English, French, Spanish, Italian) executes with Windows 2000 Professional or Windows XP Professional	**6ES7658-3HX06-0YA5**	

Spare parts

Spare part transmitter for FUS380 systems (7ME3400)

Description	Order No.	
FUS080 transmitter 3.6V battery (no battery included, to be ordered separate) as spare part transmitter for FUS380 flowmeter series	**A5E02729700**	
FUS080 transmitter 3.6V battery (battery included) as spare part transmitter for FUS380 flowmeter series	**A5E02729035**	
FUS080 transmitter 230V mains as spare part transmitter for FUS380 flowmeter series	**A5E02699309**	
FUS080 transmitter 230V mains with backup-battery as spare part transmitter for FUS380 flowmeter series	**A5E02729610**	

When ordering: Inform on flowmeter order no. and flowmeter serial no. (e.g. 7ME3400-xxxxx-xxxx-Z, XX.... and xxxxxxNxxx)

Spare part transmitter for FUE380 approved systems (7ME3410)

(only with approval marks, no verification – only a complete flowmeter can be verified, i.e. sensor together with the transmitter)

Description	Order No.	
FUE080 transmitter 3.6V battery (no battery included, to be ordered separate) as spare part transmitter for FUE380 flowmeter series	**A5E02734600**	
FUE080 transmitter 3.6V battery (battery included) as spare part transmitter for FUE380 flowmeter series	**A5E02734568**	
FUE080 transmitter 230V mains as spare part transmitter for FUE380 flowmeter series	**A5E02734539**	
FUE080 transmitter 230V mains with backup-battery as spare part transmitter for FUE380 flowmeter series	**A5E02734585**	

When ordering: Inform on flowmeter order no. and flowmeter serial no. (e.g. 7ME3410-xxxxx-xxxx-Z, XX.... and xxxxxxNxxx)

Spare part transmitter for SONOKIT systems (7ME3210/7ME3220)

Description	Order No.	
FUS080 transmitter 3.6V battery (no battery included, to be ordered separate) as spare part transmitter for SONOKIT flowmeters	**A5E03048726**	
FUS080 transmitter 3.6V battery (battery included) as spare part transmitter for SONOKIT flowmeters	**A5E03048714**	
FUS080 transmitter 230V mains as spare part transmitter for SONOKIT flowmeters	**A5E03048701**	
FUS080 transmitter 230V mains with backup-battery as spare part transmitter for SONOKIT flowmeters	**A5E03048719**	

When ordering: Inform on flowmeter order no. and flowmeter serial no. (e.g. 7ME3220-xxxxx-xxxx-Z, XX.... and xxxxxxNxxx)

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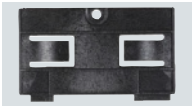
Description	Order No.	
Dual battery pack (6 year lifetime) 33 Ah[1)]		
• 1 pc. pack	**A5E02679676**	
• 24 pcs. pack	**A5E02896941**	
Single battery back-up to main supply 13.5 Ah[1)]	**A5E02679923**	
Battery cover for transmitter FUS080	**A5E00694468**	
PG 13.5 set (2 pcs.) for main cable/pulse cable	**FDK:083G0228**	
PG 13.5 set (2 pcs.) for dual coaxial cable (6 mm)	**A5E00694500**	
SITRANS FUS/FUE380 wall mounting kit for remote transmitter mounting, including connection plate (DN 50 ... DN 1200/2" ... 48")	**A5E00694509**	
SITRANS FUS/FUE380 terminal box for compact transmitter mounting, including connection plate, (bronze sensors only, DN 50 ... DN 80/2" ... 3")	**A5E01208138**	
SITRANS FUS/FUE380 terminal box for compact transmitter mounting, including connection plate, (steel sensors only, DN 100 ... DN 1200/4" ... 48")	**A5E00694660**	
FUS080 display	**A5E0405537**	

1) Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs.

Downloads for DEVICE description FUE380
http:/support.automation.siemens.com/WW/view/en/23036121/133100

Sensor cables for FUS380/FUE380 flowmeters

Description	Order No.	
DN 50 to 80 flowmeters		
5 m (16.4 ft) cable set (4 pcs.) for DN 50 ... DN 80 (2" ... 3") remote mounting	**A5E01208092**	
10 m (32.8 ft) cable set (4 pcs.) for DN 50 ... DN 80 (2" ... 3") remote mounting	**A5E01208114**	
20 m (65.6 ft) cable set (4 pcs.) for DN 50 ... DN 80 (2" ... 3") remote mounting	**A5E01208117**	
30 m (98.4 ft) cable set (4 pcs.) for DN 50 ... DN 80 (2" ... 3") remote mounting	**A5E01208121**	
1 m (3.28 ft) cable set (4 pcs.) for DN 50 ... DN 80 (2" ... 3") for compact version of FUS380/FUE380	**A5E01208126**	
DN 100 to 1200 flowmeters		
5 m (16.4 ft) cable set (4 pcs.) for DN 100 ... DN 1200 (4" ... 48") remote mounting	**A5E00695476**	
10 m (32.8 ft) cable set (4 pcs.) for DN 100 ... DN 1200 (4" ... 48") remote mounting	**A5E00695479**	
20 m (65.6 ft) cable set (4 pcs.) for DN 100 ... DN 1200 (4" ... 48") remote mounting	**A5E00695480**	
30 m (98.4 ft) cable set (4 pcs.) for DN 100 ... DN 1200 (4" ... 48") remote mounting	**A5E00695483**	
1 m (3.28 ft) cable set (4 pcs.) for DN 100 ... DN 1200 (4" ... 48") for compact version of FUS380/FUE380	**A5E00695486**	

Sensor cables for SONOKIT flowmeter with FUS080

Description	Order No.	
15 m (49.2 ft) cable set (2 pcs.) remote mounting with SONOKIT flowmeters	**A5E02478541**[F)]	
30 m (65.6 ft) cable set (2 pcs.) remote mounting with SONOKIT flowmeters	**A5E02478751**[F)]	

F) Subject to export regulations AL: 9I999, ECCN: N.

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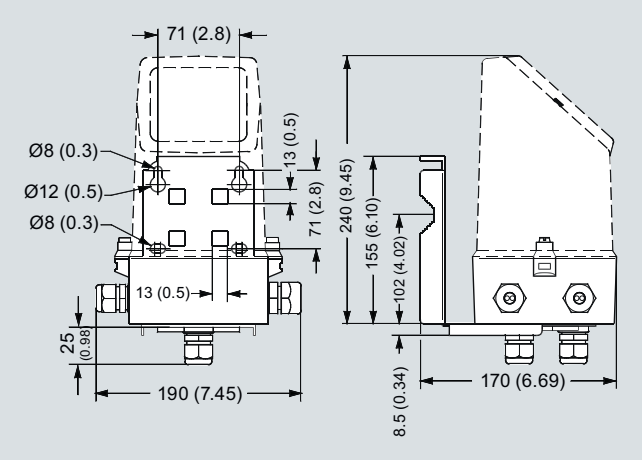
Transmitter FUS080/FUE080

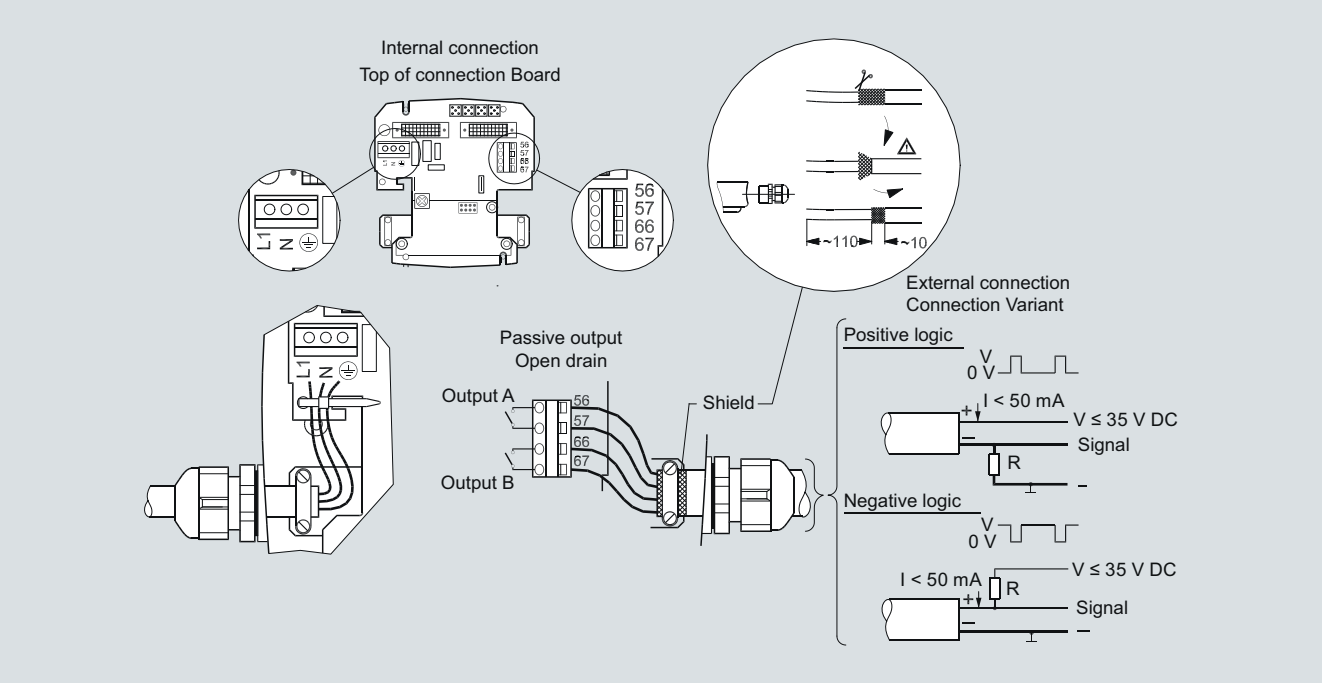
Dimensional drawings

FUS080 transmitter IP67/NEMA 4X/6, wall mounting



DImensions in mm (inch)

Schematics



Electrical connection of SITRANS FUS080

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Overview

The combination of SONO 3300 sensor and FUS060 transmitter is ideal for applications within the general industry. Measurements are independent of liquid temperature, density, pressure and conductivity. Transducers cannot be replaced.

Benefits

- Robust remote transmitter FUS060
- Robust design for industrial applications
- Measures all liquids less than 350 cSt, conductive or non-conductive
- No pressure drop
- Reliable and accurate flow measurements
- Long-time stability
- ATEX approval

Application

The main application for SONO 3300/FUS060 ultrasonic flowmeter is measurement of volume.

SONO 3300/FUS060 can be used for water and treated waste water, oil and liquefied gases, hot water / cooling systems.

Design

The SONO 3300/FUS060 consists of a casted sensor (DN 50 to 150 (2" to 6")), welded pipes (DN 200 to 300 (8" to 12")) and a transmitter FUS060.

The transmitter can only be mounted separately.

The internal signal cables from transducers to sensor connection box are protected from an aggressive environment by stainless steel pipes.

Sensor installation

See system information.

Technical specifications

The transmitter related to this system is the SITRANS FUS060.
Technical specifications to the FUS060 see page 4/216.

2-track sensor with flanges and inline transducers	
Error in measurement	
Error in measurement at reference conditions	v > 0.5...10 m/s, < ± 0.5 % of rate (v=flow speed)
	Sizes DN 50 and DN 65: for Reynolds numbers $1000 < R_e < 5000$: ± 1.5 %
Max. flow velocity	10 m/s (32 ft/s)
Nominal size	DN 50, DN 65, DN 80, DN 100, DN 125, DN 150, DN 200, DN 250, DN 300 (2" … 12")
Media/surface temperature	Separate version: -10 … +160 °C (14 … 320 °F)
Ambient temperature (sensor)	Separate version: -20 ... +60 °C (-4 ... +140 °F)
	Storage: -40 … +85 °C (-40 … +185 °F)
Enclosure	Standard version: IP67 (NEMA 4X/NEMA 6)
	ATEX version: As standard, but with ATEX approval (see below)
Process connections	
PN designated EN 1092-1	• DN 50 ... 300 (2" … 12"), PN 40
	• DN 100 ... 300 (4" … 12"), PN 16
	• DN 200 ... 300 (8" … 12"), PN 10
Class designated EN 1759-1	• DN 50 ... 300 (2" ... 12"), class 150
	• DN 50 ... 300 (2" ... 12"), class 300
Transducer	Inline version welded into pipe
Materials	
Pipe	• DN 50 ... 150 (2" … 6"): Steel EN 1.113145-16Mn5
	• DN 200 ... 300 (8" … 12"): Steel EN 1.0345-P235GH
Flange	• DN 50 ... 300 (2" … 12"): EN 1.0025-S235JRG2
Class	ASTM A105
Transducer	Stainless steel AISI 316 or similar

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Flowmeter SONO 3300/FUS060

Certificates and approvals	
Conformity certificate	The devices are supplied as standard with a Siemens Certificate of Conformity on CD
Material certificate	Material certificate according to EN 10204-3.1 is optionally available
NDT examination report	Extended material certificate is optionally available
Calibration report	A standard calibration report is shipped with each flowmeter.
Extended accredited ISO/IEC 17025 calibration certificates	Optionally available
Approvals	No custody transfer approvals
Ex approval	System ATEX approval for SONO 3300 with remote transmitter FUS060-Ex (ATEX II 2G Ex dem [ia/ib] IIC T6/T4/T3) For Ex version the transducer cable length is restricted to 3 m (9.84 ft), in order to meet requirements.

The sensors are approved according to EU directive 97/23/EC dated 29 May 1997 regarding fluid group 1, classified in category III. Design according to EN 13480 (PED Directive).

Coaxial cable between sensor SONO 3300 and transmitter FUS060

Standard Coaxial cable (75 Ω)	Coaxial cable with SMB straight plug on one end for the FUS060 connector
Outside diameter	Ø 5.8 mm
Length	3, 15, 30, 60, 90, 120 m (9.84, 49.21, 98.43, 196.85, 295.28, 393.70 ft) between sensor and transmitter
Material (outside jacket)	black PE
Ambient temperature	-10 ... +70 °C (14 ... 158 °F)
High temperature Coaxial cable (75 Ω)	Coaxial cable with SMB straight plug on one end for the FUS060 connector
Outside diameter	Ø 5.13 mm (first 0.3 m (0.98 ft) part to the transducer), Ø 5.8 mm (for remaining cable to the transmitter - with SMB plug at the end) and between these is a black hot melt junction Ø 16 mm (length 70 mm)
Length	3, 15, 30, 60, 90, 120 m (9.84, 49.21, 98.43, 196.85, 295.28, 393.70 ft) between sensor and transmitter (max. 3 m (9.84 ft)) transducer cable length for Ex area mounted transmitters)
Material (outside jacket)	Brown PTFE (0.3 m (0.98 ft) part) and black PE (for remaining cable)
Ambient temperature	-200 ... +200 °C (-328 ... +392 °F) (brown PTFE transducer part) and -10 ... +70 °C (14 ... 158 °F) (black PE for remaining transmitter cable part)

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Selection and Ordering data		Order No.	Order code
Sensor SONO 3300 with transmitter FUS060		**7ME3300 -**	
		0 -	
Diameter	**Qn setting [m^3/h]**		
DN 50 (2")	10	**1 A**	
DN 50 (2")	26	**1 B**	
DN 50 (2")	60	**1 D**	
DN 65 (2½")	15	**1 E**	
DN 65 (2½")	42	**1 F**	
DN 65 (2½")	100	**1 H**	
DN 80 (3")	20	**1 J**	
DN 80 (3")	60	**1 K**	
DN 80 (3")	150	**1 M**	
DN 100 (4")	36	**1 N**	
DN 100 (4")	100	**1 P**	
DN 100 (4")	230	**1 R**	
DN 125 (5")	50	**1 S**	
DN 125 (5")	150	**1 T**	
DN 125 (5")	360	**1 V**	
DN 150 (6")	80	**2 A**	
DN 150 (6")	220	**2 B**	
DN 150 (6")	500	**2 D**	
DN 200 (8")	120	**2 E**	
DN 200 (8")	380	**2 F**	
DN 200 (8")	900	**2 H**	
DN 250 (10")	200	**2 J**	
DN 250 (10")	600	**2 K**	
DN 250 (10")	1400	**2 M**	
DN 300 (12")	300	**2 N**	
DN 300 (12")	850	**2 P**	
DN 300 (12")	2200	**2 R**	
Flange norm and pressure rating (All sizes are not available in all pressure ratings)			
EN 1092-1			
PN 10 (DN 200 ... 300 (8" ... 12"))		**B**	
PN 16 (DN 80 ... 300 (3" ... 12"))		**C**	
PN 40 (DN 50 ... 300 (2" ... 12"))		**E**	
ANSI B16.5			
class 150 (DN 50 ... 300 (2" ... 12"))		**H**	
class 300 (DN 50 ... 300 (2" ... 12"))		**J**	
Sensor type (approval) and transmitter mounting			
IP67 standard, remote transmitter		**1**	
IP67 Ex-version (ATEX), remote transmitter (Ex-version)		**3**	
Cable gland entries in FUS060 and SONO 3300			
Cable glands M20 in sensor and in transmitter M25/20/16 x 1.5		**1**	
Transmitter SITRANS FUS060			
IP65 (NEMA 4), 120/230 V AC		**N**	
IP65 (NEMA 4), 24 V AC/DC		**P**	
IP65 (NEMA 4), 24 V AC/DC, Ex-version (ATEX)		**Q**	

Selection and Ordering data	Order No.	Order code
Sensor SONO 3300 with transmitter FUS060	**7ME3300 -**	
	0 -	
FUS060 output module		
HART, 4 ... 20 mA, 1 pulse output, 1 relay		**B**
HART, Ex version, 4 ... 20 mA,1 pulse output, 1 relay		**C**
PROFIBUS PA,1 pulse/frequency		**D**
PROFIBUS PA, Ex version, 1 pulse/frequency		**E**
Transducer coaxial cable		
4 x 3 m, max. 70 °C (158 °F), the only option for Ex i		**0**
4 x 15 m, max. 70 °C (158 °F)		**1**
4 x 30 m, high temp. max.200 °C (392 °F)		**2**
4 x 30 m, max. 70 °C (158 °F)		**3**
4 x 60 m, max. 70 °C (158 °F)		**4**
4 x 90 m, max. 70 °C (158 °F)		**5**
4 x 120 m, max. 70 °C (158 °F)		**6**
4 x 3 m, high temp. max. 200 °C (392 °F), the only option for Ex i		**7**
4 x 15 m, high temp. max. 200 °C (392 °F)		**8**

Please also see www.siemens.com/SITRANSFordering for practical examples of orderin.

Selection and Ordering data	Order code
Additional information	
Please add „**-Z**" to Order No. and specify Order code(s) and plain text.	
Calibration	
Sensor prepared for older SONO 3000 transmitters	**A30**[1) 2)]
Production calibration DN 50 ... DN 300 (with certificate)	**Included**
Accredited Siemens ISO/IEC 17025 calibration for DN50 to DN150 with Qn as selected in Diameter. Verification certificate: 2 x 3 points in 10 %, 25 % and 100 % Qn (max. flow 325 m^3/h).	**D20**
Accredited Siemens ISO/IEC 17025 calibration for DN125 to DN300 with Qn as selected in Diameter. Verification certificate: 2 x 3 points in 10 %, 25 % and 100% Qn (max. flow 1300 m^3/h).	**D21**
Material certificate	
EN 10204-3.1	**F10**
EN 10204-3.1 with 100 % NDT on weldings	**F11**[2)]
Pressure certificate	
EN 10204-2.3	**F21**
Tag name plate	
Stainless steel tag name plate, text length depends on font size: 8 mm up to 10 characters, 4 mm up to 20 characters, or 3 mm up to 30 characters (add plain text)	**Y17**

[1)] In preparation

[2)] On request

Please use online Product selector to get latest updates. Product selector link:

www.pia-selector.automation.siemens.com

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Flowmeter SONO 3300 with FUS060 operating instructions, accessories and spare parts

Operating instructions

Description	Order No.
SITRANS FUS060	
• English	**A5E01204521**
• German	**A5E02123845**
SITRANS F US SONO 3300	
• English	**A5E01365400**
• German	**A5E02690975**
• Spanish	**A5E02690992**
• French	**A5E02690987**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F US literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Accessories

Potting kit

Description	Order No.	
Potting kit, IP68, 10 m (32.81 ft) w.g. rating	**FDK:085L2403**	

Cable connection boxes
(Optional for the connection of individually transducer cables with the FUS060 transducer cables)

Description	Order No.	
Junction box for coaxial cable		
• IP68 metal box for 4 coaxial cables	**FDK:085B1361**	

Spare parts

Cables for SONO 3300 with FUS060 (only as spare parts)

Description	Length m (ft)	Order No.	
Coaxial cable for FUS060, (75 Ω, max. 70 °C (158 °F), black PVC) (2 pcs.)	3 (9.84)	**A5E00875101**	
	15 (49.21)	**A5E00861432**	
	30 (98.43)	**A5E01278662**	
	60 (196.85)	**A5E01278682**	
	90 (295.28)	**A5E01278687**	
	120 (393.70)	**A5E01278698**	
High temp. coaxial cable for FUS060; with 0.3 m brown PTFE high temp. transducer part (max. 200 °C (392 °F)) and black PVC transmitter part with SMB plug (max. 70 °C (158 °F)); impedance 75 Ω (2 pcs.)	3 (9.84)	**A5E00875105**	
	15 (49.21)	**A5E00861435**	
	30 (98.43)	**A5E01196952**	

Cable glands (for the SONO 3300 terminal box) (only as spare parts)

Type	Material	Temperature range [°C (°F)]	Order No.	
M20	Nickel-plated brass, 2x cables Ø 5 ... 6 mm (2 pcs.)	-25 ... +200 (-13 ... +392)	**A5E02246329**	

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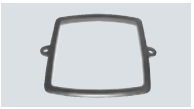
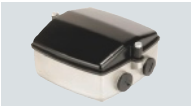
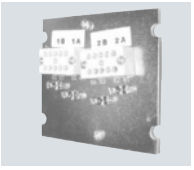
Description	Order No.	
SONO 3300 terminal box lid, in metal (1 pc.)	**A5E02593569**	
Gasket for SONO 3300 terminal lid (1 pc.)	**A5E02593567**	
SONO 3300 SS terminal box (1 pc.), incl. 2 x M20 cable glands, incl. lid and gasket	**A5E02593566**	
Coax cable connecting plate (1 pc.) for the SONO 3300 terminal box and use with transmitter type FUS060	**A5E02593568**	

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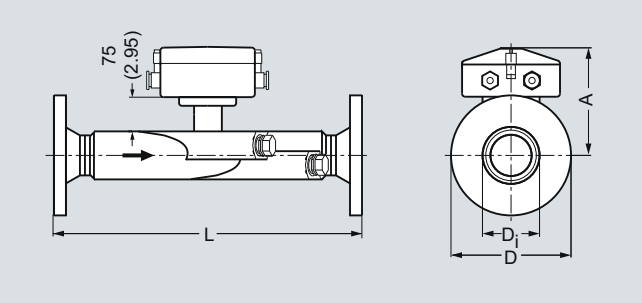
Flowmeter SONO 3300/FUS060

Dimensional drawings



Sensor SONO 3300, dimensions in mm (inch)

DN	EN 1092-1																	
	PN 10						PN 16						PN 40					
	$L^{1)}$		D		D_i		$L^{1)}$		D		D_i		$L^{1)}$		D		D_i	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
50													475	18.70	165	6.50	52.60	2.07
65													475	18.70	185	7.28	62.70	2.47
80							380	14.96	200	7.87	78.00	3.07	400	15.75	200	7.87	78.00	3.07
100							375	14.76	220	8.66	102.40	4.00	400	15.75	235	9.25	102.40	4.00
125							375	14.76	250	9.84	128.30	5.05	400	15.75	270	10.63	128.30	5.05
150							360	14.17	285	11.22	154.20	6.07	400	15.75	300	11.81	154.20	6.07
200	400	15.75	340	13.39	207.30	8.16	400	15.75	340	13.39	207.30	8.16	450	17.72	375	14.76	206.50	8.13
250	400	15.75	395	15.55	260.40	10.25	400	15.75	405	15.94	260.40	10.25	500	19.69	450	17.72	258.80	10.19
300	400	15.75	445	17.52	309.70	12.19	420	16.54	460	18.11	309.70	12.19	500	19.69	515	20.28	307.90	12.12

DN	ANSI														Gewicht[2)]			
	150 lb						300 lb								EN (PN 40)		ANSI CL 300	
	$L^{1)}$		D		D_i		$L^{1)}$		D		D_i		A					
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	kg	lbs	kg	lbs
50 mm/2"	510	20.08	152	5.98	52.6	2.07	520	20.47	165	6.50	52.6	2.07	180	7.09	14	30.9	17	37.5
65 mm/2½"	510	20.08	178	7.01	62.7	2.47	520	20.47	190	7.48	62.7	2.47	186	7.32	16	35.3	20	44
80 mm/3"	420	16.54	191	7.52	78.0	3.07	440	17.32	210	8.27	78.0	3.07	193	7.60	19	42	23	51
100 mm/4"	420	16.54	229	9.01	102.4	4.03	440	17.32	254	10	102.4	4.03	205	8.07	25	55	35	78
125 mm/5"	440	17.32	254	10.00	128.3	5.05	460	18.11	279	10.98	128.3	5.05	218	8.58	29	64	40	89
150 mm/6"	430	16.93	279	10.98	154.2	6.07	450	17.71	318	12.52	154.2	6.07	232	9.13	35	78	50	111
200 mm/8"	480	18.90	343	13.50	202.7	7.98	500	19.69	381	15	202.7	7.98	256	10.08	54	119	72	160
250 mm/10"	490	19.29	406	15.98	254.5	10.02	520	20.47	444	17.48	254.5	10.03	283	11.14	85	189	98	217
300 mm/12"	550	21.65	483	19.02	306.3	12.06	580	22.83	521	20.51	306.3	12.06	309	12.17	115	256	142	322

1) Length tolerance (mm): DN50 ... DN100 +2/-3, DN 125 ... 200 +3/-4, DN 250 ... 300 +4/-5

2) Approximate weights without transmitter FUS060 - weight of FUS060 is 4.4 kg (9.7 lb)

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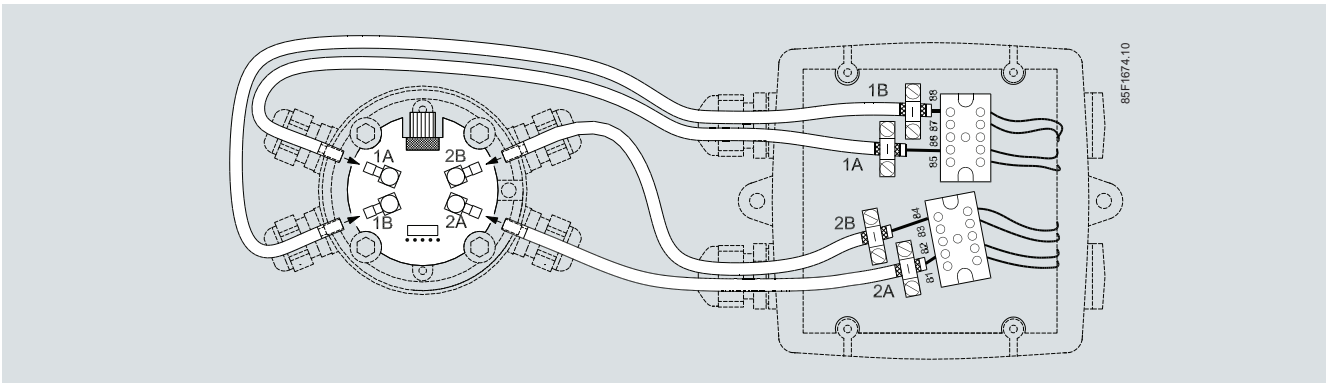
Schematics



Electrical connection of SITRANS FUS060 and SONO 3300

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Flowmeter SONO 3100/FUS060

Overview

The combination of the SONO 3100 sensor and the FUS060 transmitter is ideal for applications where process shut-down is impossible during service and where there is a need for extreme high/low temperatures and pressures.

Transducers can easily be changed without interrupting operation. SONO 3100 can optionally be delivered as a 4-track solution for absolute best performance and accuracy.

Benefits

- Transducers can be replaced under pressure
- Measurement of all liquids less than 350 Cst, conductive or non-conductive
- No pressure drop
- Reliable and accurate flow measurements
- Long-time stability
- On request:
  - Special sensor material, e.g. Duplex
  - High/low temperature sensor version: +250 °C (+482 °F) / -200 °C (-328 °F) sensors
  - Pressure rating 430 bar (6235 psi)
  - 4-track sensor technology

Application

The main application for SONO 3100 in combination with FUS060 ultrasonic flowmeter is to measure volume flow within:

- Petrochemical industry
- Power engineering
- Water and waste water
- Oil and liquefied gases

SITRANS FUS060 holds ATEX for hazardous areas, HART and PROFIBUS PA. SONO 3100 holds ATEX Ex approval.

Design

The SONO 3100 in combination with FUS060 consists of a SONO 3100 sensor, transducers with O-rings or flanges depending on selection - and a FUS060 transmitter.

SONO 3100 is basically supplied in a 2-track solution with and without flanges in sizes from DN 100 to DN 1200.

4-track version is avaible on request.

SONO 3100 is as standard available in carbon/stainless steel from DN 100 to DN 1200.

FUS060 is designed for remote wall mounting only.

Technical specifications

The transmitter related to this system is the SITRANS FUS060. Technical specifications to the FUS060 see page 4/216.

2-track sensor fitted with four SONO 3200 transducers	
Error in measurement	
Error in measurement at reference conditions	v > 0.5 ... 10 m/s, < ± 0.5 % of rate (v=flow velocity)
Max flow velocity	10 m/s (32 ft/s)
Nominal size	DN 100 ... 1200 (4" ... 48")
Media/surface temperature	• Standard: -10 °C ... +200 °C (14 ... 392 °F) • ATEX Ex d version: -20 .... +180 °C (-4 ... +356 °F) • ATEX Ex i version: -10 ... +190 °C (+14 ... +374 °F) • Specials: -200 °C (-328 °F) or up to 250 °C (482 °F)
Ambient temperature	-20 ... +60 °C (-4 ... +140 °F)
Enclosure	IP67 (NEMA 6)/IP68 (NEMA 6X) and ATEX (see below)
Process connections	
PN designated, EN 1092-1	
Pipe material carbon steel	• DN 200 ... 1200 (8" ... 48"), PN 10 • DN 100 … 1200 (4" … 48"), PN 16 • DN 200 … 1000 (8" … 40"), PN 25 • DN 100 … 500 (4" … 20"), PN 40
Pipe material stainless steel	• DN 200 … 300 (8" … 12"), PN 10 and PN 25 • DN 100 … 300 (4" … 12"), PN 16 and PN 40
Class designated, EN 1759-1	•
Pipe material carbon steel	• DN 100 … 600 (4" … 24") Class 150 • DN 100 … 300 (4" … 12") Class 300
Pipe material stainless steel	• DN 100 … 300 (4" … 12") Class 150 and Class 300
Without flanges, (weld-in version) only in carbon steel	• DN 100 … 1200 (4" … 48"), PN 16 • DN 200 … 1000 (8" … 40"), PN 25 • DN 100 … 500 (4" … 20"), PN 40
Transducer SONO 3200	O-ring or flange versions
Materials	
Pipe	Steel EN 1.0345-P235GH or stainless steel AISI 316L/1.4404
Flange	
PN	EN 10025-S235JRG2, 1E1 or stainless steel EN 10222-5-1.4404, 13E0
Class	ASTM A105,1,1 or stainless steel ASTM F316L,2,3
Transducer body	Stainless steel AISI 316 or similar
Transducer terminal house	Stainless steel AISI 316 or plastic PA 6.6

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Certificates and approvals	
System ATEX approval for SONO 3100 together with transmitter FUS060-Ex	ATEX II 2G Ex dem [ia/ib] IIC T6/T4/T3 or ATEX II 2G EEx d IIC T3-T6 with SONO 3200 Exd transducers (for standard FUS060 transmitter, installed outside of Ex zone) For FUS060 Ex version the transducer cable length is restricted to 3 m (9.84 ft), in order to meet requirements for electrical immunity.
Conformity certificate	The devices are supplied as standard with a Siemens Certificate of Conformity on CD
Material certificate	Material certificate according to EN 10204-3.1 is optionally available
NDT examination report	Extended material certificate is optionally available
Pressure certificate	Pressure test according EN 1024-2.3 optionally available
Calibration report	A standard calibration report is shipped with each flowmeter. Optionally available Extended accredited ISO/IEC 17025 calibration certificates
Approvals	No custody transfer approvals

The sensor SONO 3100 with transmitter FUS060 conforms to Product Family Standard EN 61326/A3 appendix A (Title: Electrical Equipment for Measurement control and laboratory use – EMC requirements).

The sensors are approved according to EU directive 97/23/EC dated 29 May 1997 regarding fluid group 1, classified in category III. Design according to EN 13480 (PED Directive).

The SONO 3100 as weld-in version does not include the flanges. Thus, it can neither be tested nor approved according to PED. After the installation, all installation-related activities (welding, pressure test etc.) are the responsibility of the customer.

Selection and Ordering data		Order No.	Order code
SITRANS F US SONO 3100 sensor 2-track		**7ME3100-**	
Diameter	**Qn setting [m^3/h]**		
DN 100 (4")	28	1N	
DN 100 (4")	100	1P	
DN 100 (4")	220	1R	
DN 125 (5")	44	1S	
DN 125 (5")	150	1T	
DN 125 (5")	350	1V	
DN 150 (6")	64	2A	
DN 150 (6")	220	2B	
DN 150 (6")	500	2D	
DN 200 (8")	110	2E	
DN 200 (8")	380	2F	
DN 200 (8")	900	2H	
DN 250 (10")	180	2J	
DN 250 (10")	600	2K	
DN 250 (10")	1300[1)]	2M	
DN 300 (12")	250	2N	
DN 300 (12")	850	2P	
DN 300 (12")	2000[1)]	2R	
DN 350 (14")	350	2S	
DN 350 (14")	1000	2T	
DN 350 (14")	2800[1)]	2V	
DN 400 (16")	450	3A	
DN 400 (16")	1300[1)]	3B	
DN 400 (16")	3600[1)]	3D	
DN 500 (20")	1300[1)]	3J	
DN 500 (20")	2200[1)]	3K	
DN 500 (20")	4200[1)]	3M	
DN 600 (24")	1300	3S	
DN 600 (24")	3200	3T	
DN 600 (24")	4200[1)]	3V	
DN 700 (28")	2000	4E	
DN 700 (28")	4200	4F	
DN 800 (32")	4200	4N	
DN 800 (32")	5500[1)]	4P	
DN 900 (36")	4200	5A	
DN 900 (36")	7500[1)]	5B	
DN 1000 (40")	4200	5J	
DN 1000 (40")	9000[1)]	5K	
DN 1200 (48")	4200	5S	
DN 1200 (48")	13200[1)]	5T	
Flange norm and pressure rating (All sizes are not available in all pressure ratings)			
EN 1092-1			
PN 10 (DN 200 ... DN 1200)		B	
PN 16 (DN 100 ... DN 1200)		C	
PN 25 (DN 200 ... DN 1000)		D	
PN 40 (DN 100 ... DN 500)		E	
ANSI B16.5			
class 150 (DN 100 ... DN 600)		H	
class 300 (DN 100 ... DN 300)		J	
Pipe without flanges (weld-in version)			
PN 10 (DN 200 ... DN 1200)		P	
PN 16 (DN 100 ... DN 1200)		Q	
PN 25 (DN 200 ... DN 1200)		R	
PN 40 (DN 100 ... DN 500)		S	

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Flowmeter SONO 3100/FUS060

Selection and Ordering data	Order No.	Order code
SITRANS F US SONO 3100 sensor 2-track	**7ME3100 -**	
Pipe and flange material		
Carbon steel (DN 100 ... 1200)	**1**	
Stainless steel (DN 100 ... 300)	**2**	
Transducer type and approval		
IP67 (NEMA 4X/6) PA housing, PN 40, O-ring, 50 mm, 100 °C (212 °F) (DN 100 ... 1200; SS and CS sensors)	**1**	
IP68 SS housing, PN 40, O-ring, 50 mm, 200 °C (392 °F) (DN 100 ... 1200; SS and CS sensors)	**2**	
IP68 SS housing, PN 40, O-ring, 50 mm, 180 °C (356 °F), Ex d ATEX approval (only with standard FUS060) (DN 100 ... 1200; SS and CS sensors)	**3**	
IP67 (NEMA 4X/6) PA housing, PN 40, flange, 88 mm, 100 °C (212 °F) (DN 100 ... 300; SS sensors)	**4**	
IP68 SS housing, PN 40, flange, 88 mm, 200 °C (392 °F) (DN 100 ... 300; SS sensors)	**5**	
IP68 SS housing, PN 40, flange, 88 mm, 180 °C (356 °F), Ex d ATEX approval (only with standard FUS060) (DN 100 ... 300; SS sensors)	**6**	
IP67 SS housing, PN 40, O-ring, 50 mm, 190 °C (374 °F), Ex i ATEX approval (only with FUS060 Ex-version)) (DN 100 ... 1200; SS and CS sensors)	**7**	
IP67 SS housing, PN 40, flange, 88 mm, 190 °C (374 °F), Ex i ATEX approval (only with FUS060 Ex-version) (DN 100 ... 300; SS sensors)	**8**	
Cable gland entries		
Cable glands M20 in transducers and in transmitter M25/20/16 x 1.5	**1**	
Cable glands ½" NPT in transducers and in transmitter	**2**	
Transmitter SITRANS FUS060		
IP65 (NEMA 4), 120/230 V AC	**N**	
IP65 (NEMA 4), 24 V AC/DC	**P**	
IP65 (NEMA 4), 24 V AC/DC ATEX Ex version	**Q**	
Module		
HART, 1 pulse output, 1 relay	**B**	
HART Ex, 1 pulse output, 1 relay	**C**	
PROFIBUS PA,1 pulse/frequency	**D**	
PROFIBUS PA, Ex, 1 pulse/frequency	**E**	
Transducer coaxial cable		
4 x 3 m, max. 70 °C (158 °F), the only option for Ex i	**0**	
4 x 15 m, max. 70 °C (158 °F)	**1**	
4 x 30 m, high temp. max. 200 °C (392 °F)	**2**	
4 x 30 m, max. 70 °C (158 °F)	**3**	
4 x 60 m, max. 70 °C (158 °F)	**4**	
4 x 90 m, max. 70 °C (158 °F)	**5**	
4 x 120 m, max. 70 °C (158 °F)	**6**	
4 x 3 m, high temp. max. 200 °C (392 °F), the only option for Ex i	**7**	
4 x 15 m, high temp. max. 200 °C (392 °F)	**8**	

This device is shipped with a Quick Start guide and the SITRANS F manual CD containing the complete manual library. Printed Operating Instructions are available for purchase via PMD.

[1] Reduced Q value during calibration (Qn setting unchanged)

Selection and Ordering data	Order code
Additional information	
Please add „**-Z**" to Order No. and specify Order code(s) and plain text.	
Calibration	
Production calibration DN 100 ... DN 1200 (with certificate)	**Included**
Theoritical calibration DN 500 ... DN 1200	**D03**
Accredited Siemens ISO/IEC 17025 calibration for DN100 to DN500/600 with Qn as selected in diameter. Verification certificate: 2 x 3 points in 10 %, 25 % and 100 % Qn (max. flow 1235/1300 m^3/h).	**D21**
Accredited Siemens ISO/IEC 17025 calibration for DN300 to DN700 with Qn as selected in diameter. Verification certificate: 2 x 3 points in 10 %, 25 % and 100 % Qn (max. flow 4200 m^3/h).	**D22**
Accredited Siemens ISO/IEC 17025 calibration for DN800 to DN1200 with Qn as selected in diameter. Verification certificate: 2 x 3 points in 10 %, 25 % and 100 % Qn (max. flow 4200 m^3/h).	**D23**
Accredited - Third Party ISO/IEC 17025 calibration for DN100 to DN600 with Qn as selected in diameter. Verification certificate: 2 x 3 points in 10 %, 25 % and 100 % Qn (max. flow 1300 m^3/h).	**D31**
Accredited - Third Party ISO/IEC 17025 calibration for DN300 to DN700 with Qn as selected in diameter. Verification certificate: 2 x 3 points in 10 %, 25 % and 100 % Qn (max. flow 4200 m^3/h).	**D32**
Accredited - Third Party ISO/IEC 17025 calibration for DN800 to DN1200 with Qn as selected in diameter. Verification certificate: 2 x 3 points in 10 %, 25 % and 100 % Qn (max. flow 7000 m^3/h).	**D33**
Material certificate	
EN 10204-3.1	**F10**
EN 10204-3.1 and 100 % NDT on weldings, DN 100 ... DN 400	**F11**
EN 10204-3.1 and 100 % NDT on weldings, DN 500 ... DN 700	**F12**
EN 10204-3.1 and 100 % NDT on weldings, DN 800 ... DN 1200	**F13**
Pressure certificate	
EN 10204-2.3	**F21**
Tag name plate	
Stainless steel tag name plate, text length depends on font size: 8 mm up to 10 characters, 4 mm up to 20 characters, or 3 mm up to 30 characters (add plain text)	**Y17**

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

Please use online Product selector to get latest updates. Product selector link:
www.pia-selector.automation.siemens.com

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Flowmeter SONO 3100 with FUS060 operating instructions, accessories and spare parts

Operating instructions

Description	Order No.
SITRANS FUS060	
• English	**A5E01204521**
• German	**A5E02123845**
SITRANS F US SONO 3100	
• English	**A5E00814513**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F US literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Accessories

Description	Order No.
Submersible kit for transducers SONO 3200, IP68 10 m (32.81 ft) w.g. rating	**FDK:085L2403**

Description	Transducer length	Order No.
Extraction tool for replacement of SONO 3200 O-ring transducers under pressure (hot-tap)	50 mm (1.97") transducers	**FDK:085B5331**

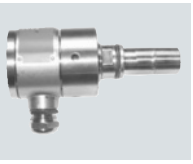
Cable connection boxes
(For the connection of individually transducer cables with the FUS060 transducer cables)

Description	Order No.
Junction box for coaxial cable	
• IP68 metal box for 4 coaxial cables	**FDK:085B1361**
• IP68 EEx e plastic box for 4 coaxial cables, no ATEX approval	**FDK:085B1363**

Spare parts

Transducer SONO 3200 spare parts, complete units

Type	Material	Gasket	Press. rating	Terminal housing	Approv.	Temp. range [°C (°F)]	Length mm (inch)	Order No.
O-ring	316 SS	O-ring	PN 40	Plastic, PA 6.6 M20		-20 ... +100 (-4 ... +212)	50 (1.97)	**FDK:085B5453**
O-ring	316 SS	O-ring	PN 40	316 SS M20		-20 ... +200 (-4 ... +392)	50 (1.97)	**FDK:085B5450**
O-ring	316 SS	O-ring	PN 40	316 SS M20	Ex d[1]	-20 ... +180 (-4 ... +356)	50 (1.97)	**FDK:085B5451**
O-ring	316 SS	O-ring	PN 40	316 SS M20	Ex i[2]	-10 ... +190 (14 ... 374)	50 (1.97)	**A5E00836448**
O-ring	316 SS	O-ring	PN 40	Plastic, PA 6.6 ½" NPT		-20 ... +100 (-4 ... +212)	50 (1.97)	**A5E00839472**
O-ring	316 SS	O-ring	PN 40	316 SS ½" NPT		-20 ... +200 (-4 ... +392)	50 (1.97)	**A5E00839431[F)]**
Flange	316 SS	Graphite	PN 40	Plastic, PA 6.6 M20		-20 ... +100 (-4 ... +212)	88 (3.47)	**FDK:085B5461**
Flange	316 SS	Graphite	PN 40	316 SS M20		-20 ... +200 (-4 ... +392)	88 (3.47)	**FDK:085B5462**
Flange	316 SS	Graphite	PN 40	316 SS M20	Ex d[1]	-20 ... +180 (-4 ... +356)	88 (3.47)	**FDK:085B5463**
Flange	316 SS	Graphite	PN 40	316 SS M20	Ex i[2]	-10 ... +190 (14 ... 374)	88 (3.47)	**A5E00836465**
Flange	316 SS	Graphite	PN 40	Plastic, PA 6.6 ½" NPT		-20 ... +100 (-4 ... +212)	88 (3.47)	**A5E00839479**
Flange	316 SS	Graphite	PN 40	316 SS ½" NPT		-20 ... +200 (-4 ... +392)	88 (3.47)	**A5E00839440[F)]**
Flange	316 SS	Copper ring	PN 40	316 SS PG13.5 (cryogenic version)		-200 ... +100 (-328 ... +212)	88 (3.47)	**FDK:085B5416**
Flange	316 SS	Copper ring	PN 40	316 SS M20 (cryogenic version)		-200 ... +100 (-328 ... +212)	88 (3.47)	**FDK:085B5471**
Flat flange	316 SS	Flat gasket	PN 40	316 SS M20 (cryogenic version)		-200 ... +100 (-328 ... +212)	88 (3.47)	**A5E02593524**



1) ATEX (Ex) IIC 2G EEx d IIC T3 ... T6

2) For systems with FUS060 ATEX IIC 2G Ex dem [ia/ib] T6/T4/T3

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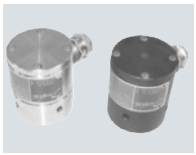
Flowmeter SONO 3100/FUS060

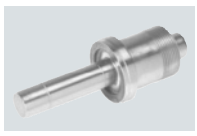
Terminal housing

Type	Pressure rating	Material	Temp. range [°C (°F)]	Order No.	
Terminal housing (M20 cable gland)	N/A	PA 6.6	-20 ... +100 (-4 ... +212)	**FDK:085B5501**	
Terminal housing (M20 cable gland)	N/A	ASTM 316	-20 ... +200 (-4 ... +392)	**FDK:085B5504**	
Terminal housing (½" NPT cable gland)	N/A	PA 6.6	-20 ... +100 (-4 ... +212)	**A5E00839460**	
Terminal housing (½" NPT cable gland)	N/A	ASTM 316	-20 ... +200 (-4 ... +392)	**A5E00839427**	
Ex d[1] terminal housing (M20 cable gland)	N/A	ASTM 316	-20 ... +180 (-4 ... +356)	**FDK:085B5505**	
Ex i[2] terminal housing (M20 cable gland)	N/A	ASTM 316	-10 ... +190 (14 ... 374)	**A5E00835255**[F]	

1) ATEX (Ex) IIC 2G EEx d IIC T3 ... T6

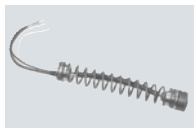
2) For systems with FUS060 ATEX IIC 2G Ex dem [ia/ib] T6/T4/T3

SONO 3200 spare parts, transducer body without terminal housing, including insert

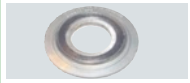
Type	Material	Gasket	Pressure rating	Temp. range [°C (°F)]	Length mm (inch)	Order No.	
O-ring	316 SS	O-ring	PN 40	-20 ... +200 (-4 ... +392)	50 (1.97)	**FDK:085B1405**	
Flange	316 SS	Graphite	PN 40	-20 ... +200 (-4 ... +392)	88 (3.47)	**FDK:085B1464**	

F) Subject to export regulations AL: 9I999, ECCN: N.

SONO 3200 spare parts, transducer insert

Type	Temp. range [°C (°F)]	Length mm (inch)	Order No.	
Insert	-20 ... +200 (-4 ... +392)	50 (1.97)	**FDK:085B1411**	
Insert	-20 ... +200 (-4 ... +392)	88 (3.47)	**FDK:085B1459**	

Transducer SONO 3200 gaskets

Type	Pressure rating	Material	Temperature range [°C (°F)]	Order No.	
Gasket O-ring (3 pcs. for o-ring transducers)	PN 40	FKM	-20 … +200 (-4 ... +392)	**FDK:085B1089**	
Gasket flange	PN 40/160	Graphite	-20 … +200 (-4 ... +392)	**FDK:085B1080**	
Gasket and 12 mm (0.47") bolts and nuts for flange transducers	PN 40	Flat ring type	-20 … +200 (-4 ... +392)	**FDK:085B1083**	
Gasket and 16 mm (0.63") bolts and nuts for flange transducers	PN 160	Graphite, 316 SS	-20 … +200 (-4 ... +392)	**FDK:085B1084**	
Gasket for cryogenics transducer with flat flange (2 pcs.)	PN 40	Graphite/metal	-200 … +100 (-328 ... +212)	**A5E02593522**	
Gasket cryogenics (2 pcs.)	PN 40	Copper, O-ring	-200 … +100 (-328 ... +212)	**A5E02593512**	

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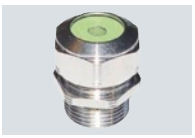
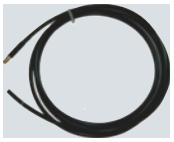
SONO 3200 cable glands

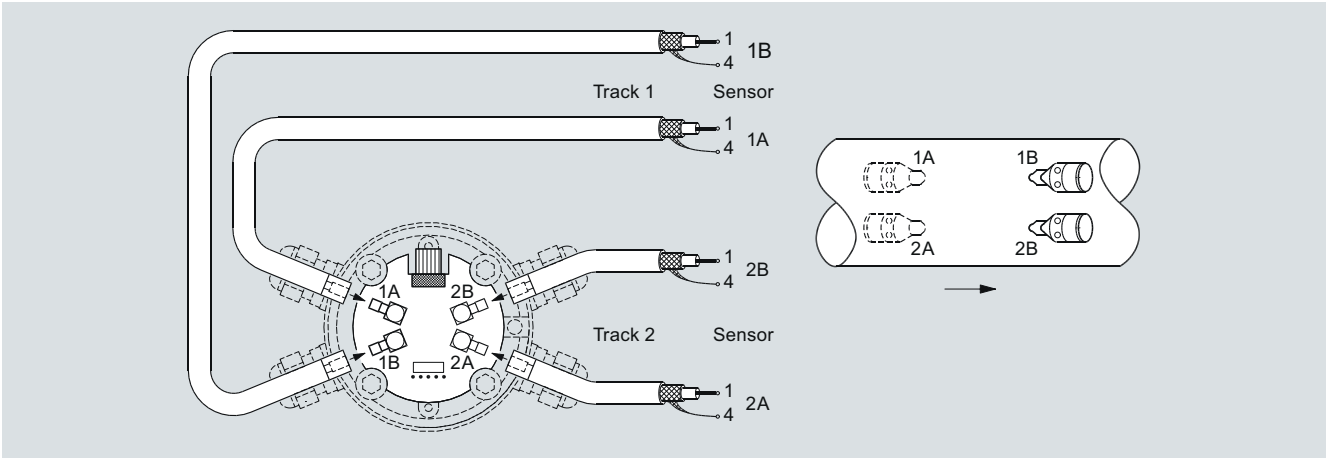
Type/description	Temperature range [°C (°F)]	Appr.	Order No.	
black PA plastic, cable Ø 5 ... 13 mm	-20 ... 100 (-4 ... +212)		**A5E02246304**	
½" NPT gray PA plastic, cable Ø 5 ... 9 mm	-20 ... 100 (-4 ... +212)		**A5E02246309**	
½" NPT crome-plated brass, cable Ø 5 ... 9 mm	-40 ... 100 (-40 ... +212)		**A5E02246258**	
M20 stainless steel, cable Ø 4 ... 6 mm	-25 ... 200 (-13 ... +392)	Ex i	**A5E02246194**	
M20 Stainless steel, cable Ø 5 ... 8 mm	-60 ... 180 (-76 ... +356)	Ex d	**A5E02246311**	

Cables for SONO 3100 with FUS060

Description	Length m (ft)	Order No.	
Coaxial cable for FUS060, (75 Ω, max. 70 °C (158 °F), black PVC) (2 pcs.)	3 (9.84)	**A5E00875101**	
	15 (49.21)	**A5E00861432**	
	30 (98.43)	**A5E01278662**	
	60 (196.85)	**A5E01278682**	
	90 (295.28)	**A5E01278687**	
	120 (393.7)	**A5E01278698**	
High temp. coaxial cable for FUS060; with 0.3 m brown PTFE high temp. transducer part, max. 200 °C (392 °F) and black PVC for remaining transmitter part with SMB plug, max. 70 °C (158 °F); (impedance 75 Ω) (2 pcs.)	3 (9.84)	**A5E00875105**	
	15 (49.21)	**A5E00861435**	
	30 (98.43)	**A5E01196952**	
Low temperature PTFE coaxial cable FUS060 and cryogenic sensors; PTFE, max. -200 ... +200 °C. (-328 ... +392 °F); (impedance 75 Ω) (2 pcs.)	10 (32.84)	**A5E02085593**	
	30 (98.43)	**A5E02085644**	
	40 (131.23)	**A5E02085649**	

4

Schematics



Electrical connection of SITRANS FUS060 and SONO 3100

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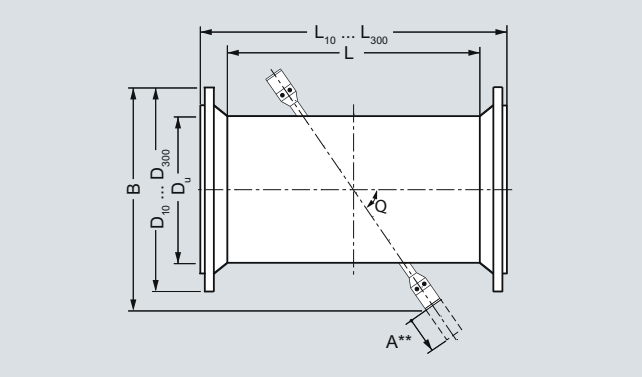
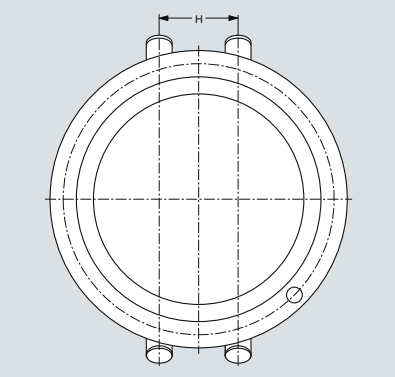
Flowmeter SONO 3100/FUS060

Dimensional drawings of sensor SONO 3100





Sensor SONO 3100 with EN norm

DN	D_U	$L^{1) 4)}$	B	θ	H	PN 10 $W_{10}^{2)}$	PN 10 D_{10}	PN 10 $L_{10}^{1)}$	PN 16 W_{16}^{2}	PN 16 D_{16}	PN 16 $L_{16}^{1)}$	PN 25 $W_{25}^{2)}$	PN 25 D_{25}	PN 25 $L_{25}^{1)}$	PN 40 $W_{40}^{2)}$	PN 40 D_{40}	PN 40 $L_{40}^{1)}$
	[mm]	[mm]	[mm]	[°]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
100	114.3	860	305	45[3)]	42.8	-	-	-	3.6	220	960	-	-	-	3.6	235	990
125	139.7	862	325	45[3)]	64.5	-	-	-	4.0	250	970	-	-	-	4.0	270	990
150	168.3	862	350	45[3)]	78.1	-	-	-	4.5	285	970	-	-	-	4.5	300	1010
200	219.1	668	430	45[3)]	102.1	6.3	340	790	6.3	340	790	6.3	360	820	6.3	375	840
250	273.0	714	480	45[3)]	127.6	6.3	395	850	6.3	405	850	7.1	425	890	7.1	450	920
300	323.9	607	525	45[3)]	151.8	7.1	445	740	7.1	460	760	8.0	485	790	8.0	515	830
350	355.6	639	550	45[3)]	166.4	8.0	405	770	8.0	520	800	8.0	555	840	8.8	580	880
400	406.4	703	600	45[3)]	191.3	8.0	565	850	8.0	580	875	8.8	620	925	11.1	660	975
500	508.0	797	690	45[3)]	241.1	7.1	670	950	8.0	715	980	10.0	730	1050	14.2	755	1080
600	610.0	912	705	60	294.8	7.1	780	1075	8.8	840	1105	11.0	845	1165	-	-	-
700	711.0	937	895	60	340.6	8.0	895	1100	8.8	910	1140	12.5	960	1190	-	-	-
800	813.0	967	985	60	390.4	8.0	1015	1150	10.0	1025	1180	14.2	1085	1240	-	-	-
900	914.0	1007	1070	60	445.9	10.0	1115	1200	10.0	1125	1230	16.0	1185	1300	-	-	-
1000	1016.0	1060	1160	60	490.0	10.0	1230	1250	10.0	1255	1300	17.5	1320	1370	-	-	-
1200	1220.0	1100	1350	60	588.0	8.0	1340	1280	11.0	1455	1360	-	-	-	-	-	-

1) Length tolerance (mm): DN100 +2/-3, DN 125 ... 200 +3/-4, DN 250 ... 400 +4/-5, DN 500 ...1200 +5/-6

2) Wall thickness for pressure rates PN 6 ... 40

3) For all sensors with flange transducers track angle are 60°

4) L is the length of sensor versions without flanges (weld-in version)

A**) Space required for replacement of transducer min. 230 mm (9.1 inch). For replacement with special tool (extraction tool) see more information on page 4/237.

SONO 3100, 2-track				
Nominal diam.	Flange type - Weight [kg (lbs)]			
DN	PN 10	PN 16	PN 25	PN 40
100 (4")	-	32 (70.5)	-	35 (77.2)
125 (5")	-	38 (83.8)	-	44 (97.0)
150 (6")	-	45 (99.2)	-	52 (114.6)
200 (8")	59 (130.0)	58 (127.9)	70 (154.3)	79 (174.2)
250 (10")	73 (161.0)	75 (163.3)	96 (211.6)	117 (257.9)
300 (12")	83 (183.0)	92 (202.8)	114 (251.3)	151 (332.9)
350 (14")	98 (216.0)	113 (249.1)	145 (332.9)	191 (421.1)
400 (16")	119 (262.4)	141 (310.9)	191 (421.1)	275 (606.3)
500 (20")	153 (337.3)	207 (456.4)	284 (626.0)	379 (836.0)
600 (24")	193 (425.5)	276 (608.5)	363 (800.3)	-
700 (28")	262 (577.6)	303 (668.0)	480 (1058)	-
800 (32")	329 (725.3)	400 (881.8)	650 (1433)	-
900 (36")	428 (943.6)	475 (1047)	835 (1841)	-
1000 (40")	500 (1102)	594 (1010)	1078 (2377)	-
1200 (48")	680 (1496)	860 (1892)	-	-

Weight of system incl. process flanges and standard O-ring transducers. For sensors with flange transducer please add approx. 10 kg (22.05 lbs).
For SS terminal housings instead of the standard PA housing add approx. 5 kg (11.03 lbs).

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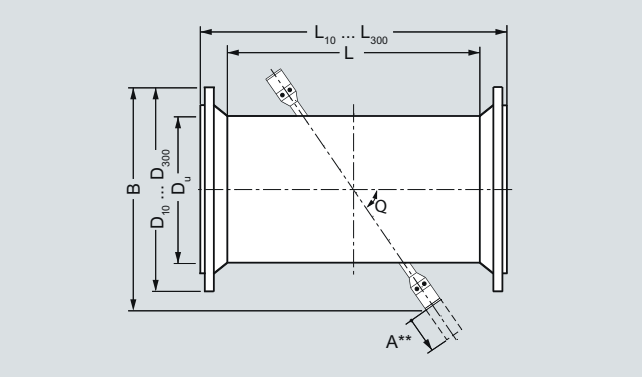

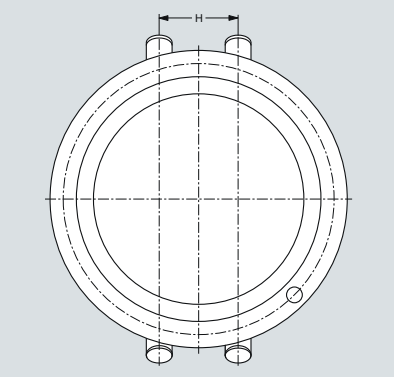

Sensor SONO 3100 with ANSI norm

						Class 150			Class 300		
Size (DN)	**D_U**	**L[1) 4)]**	**B**	**θ**	**H**	**W_{150}[2)]**	**D_{150}**	**L_{150}[1)]**	**W_{300}[2)]**	**D_{300}**	**L_{300}[1)]**
inch (mm)	**[inch]**	**[inch]**	**[inch]**	**[°]**	**[inch]**	**[inch]**	**[inch]**	**[inch]**	**[inch]**	**[inch]**	**[inch]**
4" (100)	4.50	33.86	12.01	45[3)]	1.69	0.14	9.00	39.86	0.25	10.00	40.62
5" (125)	5.50	33.94	12.80	45[3)]	2.54	0.15	10.00	40.94	0.27	11.00	41.70
6" (150)	6.63	33.94	13.78	45[3)]	3.07	0.16	11.00	40.94	0.30	12.50	41.70
8" (200)	8.63	26.30	16.93	45[3)]	4.02	0.16	13.50	34.30	0.29	15.00	35.06
10" (250)	10.75	28.11	18.90	45[3)]	5.02	0.18	16.00	36.11	0.34	17.50	37.35
12" (300)	12.75	23.90	20.67	45[3)]	5.98	0.20	19.00	32.90	0.39	20.50	34.14
14" (350)	14.00	25.16	21.65	45[3)]	6.55	0.21	21.00	35.16	-	-	-
16" (400)	16.00	27.68	23.62	45[3)]	7.53	0.22	23.50	33.74	-	-	-
20" (500)	20.00	31.38	27.17	45[3)]	9.49	0.26	27.50	42.76	-	-	-
24" (600)	24.00	35.91	27.76	60	11.61	0.30	32.00	47.91	-	-	-

1) Length tolerance (mm): 4" +0.08"/-0.12" (+2/-3mm), 5" ... 8" +0.12"/ -0.16" (+3/-4mm), 10" to 16" +0.16"/-0.20" (+4/-5mm), 20" ... 24" +0.20"/ -0.24" (+5/-6mm)

2) Minimum wall thickness for pressure rates Class 150 or Class 300

3) For all sensors with flange transducers track angle are 60°

4) L is the length of sensor versions without flanges (weld-in version)

A**) Space required for replacement of transducer min. 230 mm (9.1 inch). For replacement with special tool (extraction tool) see more information in „Sensor SONO 3100 accessories and spare parts" on page 4/237.

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Flowmeter SONO 3100/FUS060

Approximate weights for SONO 3100 sensor with ANSI B16.5 flanges

Nominal diameter		Weight [kg (lbs)][1]			
DN	DN	CL150		CL300	
[inch]	[mm]	[kg]	[lbs]	[kg]	[lbs]
4"	100	32	70.5	35	77.2
5"	125	38	83.8	44	97.0
6"	150	45	99.2	52	114.6
8"	200	58	127.9	79	174.2
10"	250	75	165.3	117	257.9
12"	300	92	202.8	151	332.9
14"	350	113	249.1	-	-
16"	400	141	310.9	-	-
20"	500	207	456.4	-	-
24"	600	276	608.5	-	-

1) Weight of system incl. process flanges and standard O-ring transducers. For sensors with flange transducer please add approx. 10 kg (22.05 lbs). For SS terminal housings instead of the standard PA housing add approx. 5 kg (11.03 lbs).

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Flowmeter SONOKIT (with FUS060 or FUS080)

Overview

SONOKIT is a transit time based ultrasonic flowmeter for retrofitting on existing pipelines.

The kit includes all necessary parts and special tools to make the installation as 1- or 2-track flowmeter.

The set is made for installation on empty pipes or pipes under pressure without process shut-down (hot-tap).

Please contact Siemens for further information on hot-tap tools and instructions.

SONOKIT has inline transducers (in contact with media) which assure superior accuracy and performance.

Benefits

- Cost-effective solution – contains all the necessary components for retrofitting
- SONOKIT is easy to install in pipeline sizes DN 200 to DN 4000 (8" to 160") 1-track DN 100 to DN 2400 (4" to 96") – without process shut-down or flow interruption.
- No bypass installation necessary – withstands pressures up to 40 bar (580 psi) and media temperatures between -20 °C and +200 °C (-4 °F and +392 °F)
- High accuracy – the bigger the pipe, the more accurate the result
- Solid construction and no moving parts for a 100 % maintenance and obstruction-free flowmeter
- The SONOKIT comes with transducers in IP68 enclosure
- Available in a robust version that can be buried and withstands constant flooding
- Inline transducers assure superior accuracy and performance
- Automatic calculation of the calibration factor when pipe geometry data are entered in the transmitter
- FUS060 transmitter versions with HART or PROFIBUS PA
- FUS080 transmitter, battery or mains-powered

Application

- Raw water intake for water treatment plants
- Water distribution systems
- Irrigation systems
- Power generation (energy and water)
- District heating plants
- Cooling water plants within the industry and in power stations
- Systems within the oil and refinery business
- Sewage treatment plants
- Plants transporting non-conductive liquids

Design

The SONOKIT package box contains all necessary parts to build an ultrasonic flowmeter on existing pipes depending on choices at ordering:

- Papers to wrap around pipes for alignment of sensors
- Transducer alignment tools
- Mounting plates, transducer holders and SONO 3200 transducers
- Transducer cables
- SITRANS FUS060 or FUS080 transmitter for wall mounting
- 4-track version is available on request

Technical specifications

The transmitter related to this system is the SITRANS FUS080 or FUS060.

Technical specifications to the FUS060 see page 4/215 and to FUS080 see page 4/221.

Accuracy	
Typical, depending on accuracy of measurements of installation	• 2-Track: ≤ ± (0.5 … 1.5 %) • 1-Track: ≤ ± (1 … 3 %)

Note:
Accuracy depends on the accuracy of the measurements taken at location. This means that inaccurate measurements of angles, distance between transducers, wall thickness and pipe diameter have a direct effect on the accuracy. Values measured are entered into the memory of the FUS060 or FUS080 transmitter.

Requirements for pipes

Size	FUS060: DN 100 … DN 4000 (4" … 160") FUS080: DN 100 … DN 1200 (4" … 48")
Line pressure	max. 40 bar (580 psi)
Media/surface temperature	• Standard version: -20 … +200 °C (-4 … +392 °F) • ATEX Ex d version (FUS060): -20 ... +180 °C (-4 … +356 °F) • ATEX Ex i version (FUS060): -10 ... +190 °C (14 ... 374 °F)
Ambient temperature sensor	-20 ... +60 °C (-4 ... +140 °F)
Transducer enclosure/ approvals/certificates	
Standard version	IP67 (NEMA 6) / IP68 (NEMA 6X)
Ex approval	System ATEX approval for SONO 3200 Ex i transducers together with transmitter FUS060-Ex: ATEX II 2G Ex dem [ia/Ib] IIC T6/T4/T3 or ATEX II 2G EEx d IIC T3-T6 with SONO 3200 Ex d transducers (for standard FUS060 transmitter, installed outside of Ex zone)
Material certificates	EN 10204-3.1 material certificate on transducer mounting parts
Transducer materials	
Terminal housing	Standard version: PA 6.6, 100 °C (212 °F) or stainless steel AISI 316, 200 °C (392 °F)
Transducer body	Standard version: Stainless steel AISI 316, 200 °C (392 °F)

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Flowmeter SONOKIT (with FUS060 or FUS080)

Materials of existing pipeline	
Steel	Transducer holder: EN 10273 or EN 10216 (P235GH) Mounting plates[1]: EN 10273 or EN 10216 (P235GH)
Concrete	Transducer holder: Stainless steel AISI 316 or similar Mounting plates[1]: (not included)
Stainless steel	Transducer holder: Stainless steel AISI 316 or similar Mounting plates[1]: Stainless steel AISI 316 or similar
Pipe wall thickness	
Steel pipe (AISI 316 and St. 37.2 or corresponding material)	Transducer and holder available in length L = 160, allowing a pipe wall thickness up to 20 mm (0.79")
Concrete pipe	Transducer and holder available in length L = 230, allowing a pipe wall thickness up to 200 mm (7.9") and pipe sizes ≥ DN 600

Dimension of the package box (L x W x H, approx.)	856 x 390 x 344 mm (33.7" x 15.4" x 13.5")
Weight example of a package (standard 2-track with FUS060)	approx. 53 kg (116.8 lb)
Certificates and approvals	
Conformity certificate	The devices are supplied as standard with a Siemens Certificate of Conformity on a CD
Material certificate	Material certificate for the transducer parts according to EN 10204-3.1 is optionally available
Approvals	No custody transfer approvals

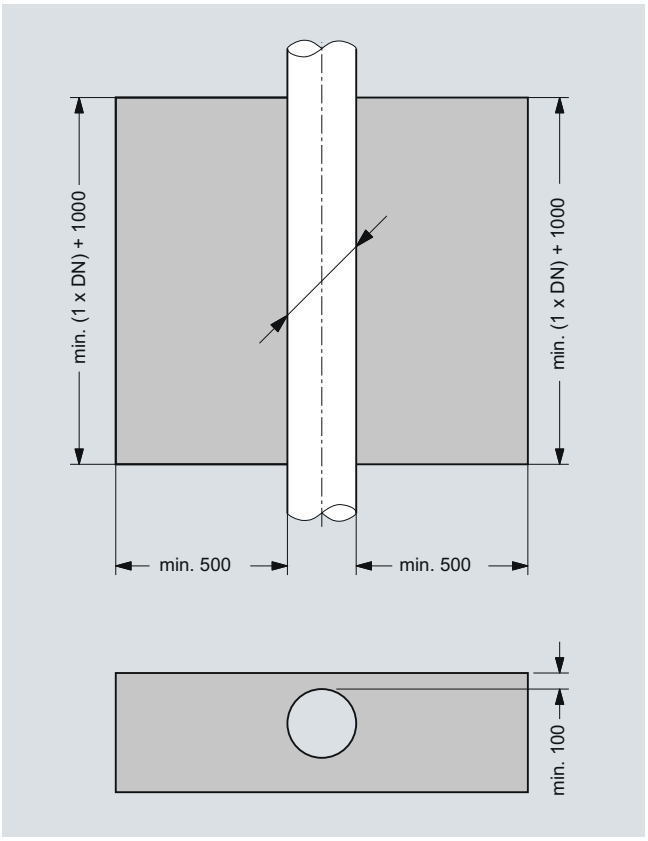
Information on PED approval:

The SONOKIT includes the pipe mounting parts only and therefore it cannot be PED-approved. After the installation, all installation-related activities (welding, pressure test etc.) are the responsibility of the customer.

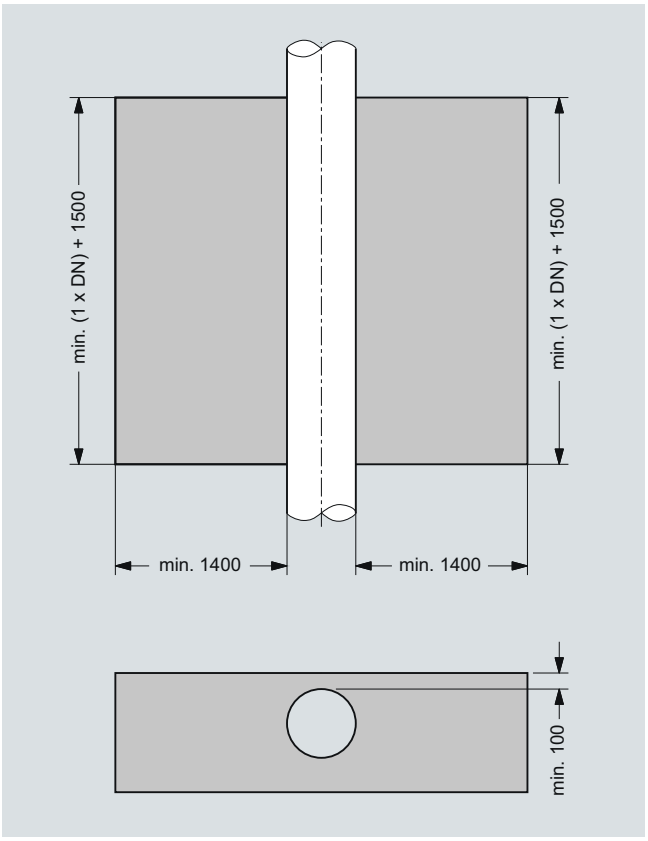
[1] Mounting plates are only included for empty pipe installation types (refer to selection "A"). For tapping-band types holder and mounting plates are not included (refer to selection "C").

Installation requirements

The space requirements (in mm) around the pipe for retrofitting a SITRANS F US ultrasonic flowmeter type SONOKIT are given below:



Empty pipe installation



Hot-tap installation

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Selection and Ordering data		Order No.	Ord. code
SITRANS F US SONOKIT 1-track sensor		**7ME3210 -**	
Diameter	**Qn setting [m^3/h]**		
DN 100 (4")	100	1 P	
DN 125 (5")	150	1 T	
DN 150 (6")	220	2 B	
DN 200 (8")	380	2 F	
DN 250 (10")	600	2 K	
DN 300 (12")	850	2 P	
DN 350 (14")	1000	2 T	
DN 400 (16")	1300	3 B	
DN 450 (18")	1700	3 F	
DN 500 (20")	2200	3 K	
DN 550 (22")	2600	3 P	
DN 600 (24")	3200	3 T	
DN 650 (26")	3600	4 B	
DN 700 (28")	4200	4 F	
DN 750 (30")	4800	4 K	
DN 800 (32")	5500	4 P	
DN 900 (36")	7500	5 B	
DN 1000 (40")	9000	5 K	
DN 1100 (44")	10000	5 P	
DN 1200 (48")	13200	5 T	
Only for FUS060			
DN 1300 (52")	14000	6 A	
DN 1400 (56")	16800	6 C	
DN 1500 (60")	19000	6 E	
DN 1600 (64")	22800	6 G	
DN 1700 (68")	25000	6 J	
DN 1800 (72")	27600	6 L	
DN 1900 (76")	31000	6 N	
DN 2000 (80")	36000	6 Q	
DN 2100 (84")	37000	6 S	
DN 2200 (88")	42000	6 U	
DN 2300 (92")	45000	6 W	
DN 2400 (96")	51000	7 A	
Installation method[3]			
Empty pipe (incl. transducer holder and mounting plates). Alignment rods and tools must be ordered as accessories.		A	
Hot tap, mounting under pressure (mounting plates **not** incl.). Special mounting tools to be ordered separately.		B	
SONOKIT for tapping band (DN 200 ... DN 1800) (trandsducer holder and mounting plates **not** incl., tapping band to be ordered separately)[1]		C	
Transducer holder			
None (for tapping band)		0	
Carbon steel, length = 160 mm, mounting plates in carbon steel		1	
Stainless steel, length = 160 mm, mounting plates in stainless steel		2	
Stainless steel, length = 230 mm, for concrete pipe (DN 600 ... DN 2400)		3	
Transducer type and approval			
IP67 (NEMA 4X/6) PA housing, PN 40, O-ring, 100 °C (212 °F), no approval		1	
IP68 SS housing, PN 40, O-ring, 180 °C (356 °F), Ex d, ATEX approval (only with standard FUS060)		2	
IP68 PA housing, Sylgard potting kit, PN 40, O-ring, 100 °C (212 °F), no approval		3	
IP68 SS housing, Sylgard potting kit, PN 40, O-ring, 200 °C (392 °F), no approval		4	
IP67 SS housing, PN 40, SS, O-ring, 190 °C (374 °F), Ex i type, ATEX approval (only with FUS060 Ex)		5	
Cable gland entries			
Cable glands M20 in transducers and in transmitter M25/20/16 x 1.5 (FUS080 only M20)		1	
Cable glands ½" NPT in transducers and in transmitter (only with FUS060)		2	
Transmitter SITRANS FUS060 (only DN 100 ... 2400 (4" ... 96")			
IP65 (NEMA 4), 120/230 V AC		N	
IP65 (NEMA 4), 24 V AC/DC		P	
IP65 (NEMA 4), 24 V AC/DC Ex version		Q	
Transmitter SITRANS FUS080 (only DN 100 ... 1200 (4" ... 48"))			
PDM software tool and IrDA-adapter, which are needed for settings update, to be ordered separately, see FUS080 accessories			
IP67/NEMA 4X/6 115 ... 230 V AC		U	
IP67/NEMA 4X/6 3.6 V battery version, incl. dual battery pack		V	
IP67/NEMA 4X/6 115 ... 230 V AC, incl. 3.6 V single battery backup		W	
IP67/NEMA 4X/6 3.6 V battery version (no battery pack included)[2]		X	
Module			
No module (FUS080 only)		A	
HART, 1 pulse output, 1 relay		B	
HART Ex version, 1 pulse output, 1 relay		C	
PROFIBUS PA,1 pulse/frequency		D	
PROFIBUS PA, Ex version, 1 pulse/frequency		E	
Transducer coaxial cables (with FUS080 only, 15 and 30 m, 70°C (158 °F) cable types)			
2 x 3 m, max. 70 °C (158 °F), the only option for Ex i		0	
2 x 15 m, max. 70 °C (158 °F)		1	
2 x 30 m, high temp. max. 200 °C (392 °F)		2	
2 x 30 m, max. 70 °C (158 °F)		3	
2 x 60 m, max. 70 °C (158 °F)		4	
2 x 90 m, max. 70 °C (158 °F)		5	
2 x 120 m, max. 70 °C (158 °F)		6	
2 x 3 m, high temp. max. 200 °C (392 °F), the only option for Ex i		7	
2 x 15 m, high temp. max. 200 °C (392 °F)		8	
Special version (add order code):			
No transducer cable, cable length 2 x 3 m, the only option for Ex i		9	R0A
No transducer cable, cable length 2 x 15 m		9	R0B
No transducer cable, cable length 2 x 30 m		9	R0C
No transducer cable, cable length 2 x 60 m		9	R0D
No transducer cable, cable length 2 x 90 m		9	R0E
No transducer cable, cable length 2 x 120 m		9	R0F

[1] Tapping band via special request

[2] Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs."

[3] Mounting tools must be ordered separately as "-Z"-options.

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Flowmeter SONOKIT (with FUS060 or FUS080)

Selection and Ordering data	Order code
Additional information	
Please add „**-Z**" to Order No. and specify Order code(s) and plain text.	
Material certificate	
EN 10204-3.1, transducer body material	**F30**
EN 10204-3.1, transducer holder material	**F31**
EN 10204-3.1, mounting plate material	**F32**
Tag name plate	
Stainless steel tag name plate, text length depends on font size: 8 mm up to 10 characters, 4 mm up to 20 characters, or 3 mm up to 30 characters (add plain text)	**Y17**
Accessories	
Alignment rods-set for DN 100 ... 650 (4" ... 26") ∅ = 25 mm, L = 500 mm, 3 pcs.	**S10**
Alignment rods-set for DN 700 ... 1900 (28" ... 76") ∅ = 25 mm, L = 500 mm, 6 pcs.	**S11**
Alignment rods-set for DN 2000 ... 2400 (80" ... 96") ∅ = 25 mm, L = 500 mm, 8 pcs.	**S12**
Spanner key for tranducer mounting type SONO 3200 O-ring type	**T11**
Tool set with various mounting/spare parts for SONOKIT installation	**T12**

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering.

Operating instructions

Description	Order No.
SITRANS FUS060	
• English	**A5E01204521**
• German	**A5E02123845**
SITRANS FUS080	
• English	**A5E03059912**
SITRANS F US SONOKIT 1-track	
• English	**A5E00814557**
• German	**A5E02610428**
• Spanish	**A5E02608231**
• French	**A5E02610419**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F US literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Please use online Product selector to get latest updates. Product selector link:
www.pia-selector.automation.siemens.com

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Selection and Ordering data		Order No.	Ord. code
SITRANS F US SONOKIT 2-track sensor		**7ME3220-**	
Diameter	**Qn setting [m^3/h]**		
DN 200 (8")	380	**2F**	
DN 250 (10")	600	**2K**	
DN 300 (12")	850	**2P**	
DN 350 (14")	1000	**2T**	
DN 400 (16")	1300	**3B**	
DN 450 (18")	1700	**3F**	
DN 500 (20")	2200	**3K**	
DN 550 (22")	2600	**3P**	
DN 600 (24")	3200	**3T**	
DN 650 (26")	3600	**4B**	
DN 700 (28")	4200	**4F**	
DN 750 (30")	4800	**4K**	
DN 800 (32")	5500	**4P**	
DN 900 (36")	7500	**5B**	
DN 1000 (40")	9000	**5K**	
DN 1100 (44")	10 000	**5P**	
DN 1200 (48")	13 200	**5T**	
Only for FUS060			
DN 1300 (52")	14 000	**6A**	
DN 1400 (56")	16 800	**6C**	
DN 1500 (60")	19 000	**6E**	
DN 1600 (64")	22 800	**6G**	
DN 1700 (68")	25 000	**6J**	
DN 1800 (72")	27 600	**6L**	
DN 1900 (76")	31 000	**6N**	
DN 2000 (80")	36 000	**6Q**	
DN 2100 (84")	37 000	**6S**	
DN 2200 (88")	42 000	**6U**	
DN 2300 (92")	45 000	**6W**	
DN 2400 (96")	51 000	**7A**	
DN 2500 (100")	53 000	**7C**	
DN 2600 (104")	60 000	**7E**	
DN 2700 (108")	62 000	**7G**	
DN 2800 (112")	72 000	**7J**	
DN 2900 (116")	71 000	**7L**	
DN 3000 (120")	78 000	**7N**	
DN 3100 (124")	82 000	**7Q**	
DN 3200 (128")	85 000	**7S**	
DN 3300 (132")	92 000	**7U**	
DN 3400 (136")	100 000	**7W**	
DN 3500 (140")	100 000	**8A**	
DN 3600 (144")	110 000	**8C**	
DN 3700 (148")	120 000	**8E**	
DN 3800 (152")	130 000	**8G**	
DN 3900 (156")	130 000	**8J**	
DN 4000 (160")	144 000	**8L**	
Installation method[2]			
Empty pipe (incl. transducer holder and mounting plates). Alignment rods and tools must be ordered as accessories.		**A**	
Hot tap, mounting under pressure (mounting plates **not** incl.). Special mounting tools to be ordered separately.		**B**	
SONOKIT for tapping band (DN 200 ... DN 1800) (trandsducer holder and mounting plates **not** incl., tapping band to be ordered separately)[1]		**C**	

[1] Tapping band via special request

[2] Mounting tools must be orderd separately as "-Z" options

Selection and Ordering data	Order No.	Ord. code
SITRANS F US SONOKIT 2-track sensor	**7ME3220-**	
Transducer holder		
None (for tapping band)	**0**	
Carbon steel, length = 160 mm, mounting plates in carbon steel	**1**	
Stainless steel, length = 160 mm, mounting plates in stainless steel	**2**	
Stainless steel, length = 230 mm, for concrete pipe (DN 600 ... DN 4000)	**3**	
Transducer type and approval		
IP67 (NEMA 4X/6) PA housing, PN 40, O-ring, 100 °C (212 °F), no approval	**1**	
IP68 SS housing, PN 40, O-ring, 180 °C (356 °F), EEx d, ATEX approval (only with standard FUS060)	**2**	
IP68 PA housing, Sylgard potting kit, PN 40, SS, O-ring, 100 °C (212 °F), no approval	**3**	
IP68 SS housing, Sylgard potting kit, PN 40, SS, O-ring, 200 °C (392 °F), no approval	**4**	
IP67 SS housing, PN 40, O-ring, 190 °C (374 °F), EEx i, ATEX approval (only with FUS060 Ex)	**5**	
Cable gland entires		
Cable glands M20 in transducers and in transmitter M25/20/16 x 1.5 (FUS080 only M20)	**1**	
Cable glands ½" NPT in transducers and in transmitter (only with FUS060)	**2**	
Transmitter SITRANS FUS060 (only DN 200 ... 4000 (8" ... 160"))		
IP65 (NEMA 4), 120/230 V AC	**N**	
IP65 (NEMA 4), 24 V AC/DC	**P**	
IP65 (NEMA 4), 24 V AC/DC Ex version	**Q**	
Transmitter SITRANS FUS080 (only DN 200 ... 1200 (8" ... 48"))		
PDM software tool and IrDA-adapter, which are needed for settings update, to be ordered separately, see FUS080 accessories		
IP67/NEMA 4X/6 115 ... 230 V AC	**U**	
IP67/NEMA 4X/6 3.6 V battery version, incl. dual battery pack	**V**	
IP67/NEMA 4X/6 115 ... 230 V AC, incl. 3.6 V single battery backup	**W**	
IP67/NEMA 4X/6 3.6 V battery version (no battery pack included)[4]	**X**	
Module		
No module (FUS080 only)	**A**	
HART, 1 pulse output, 1 relay	**B**	
HART Ex version, 1 pulse output, 1 relay	**C**	
PROFIBUS PA,1 pulse/frequency	**D**	
PROFIBUS PA, Ex version, 1 pulse/frequency	**E**	

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Flowmeter SONOKIT (with FUS060 or FUS080)

Selection and Ordering data	Order No.	Ord. code	
SITRANS F US SONOKIT 2-track sensor	**7ME3220 -**		
Transducer coaxial cables (with FUS080 only, 15 and 30 m, 70°C (158 °F) cable types)			
4 x 3 m, max. 70 °C (158 °F), the only option for Ex i		**0**	
4 x 15 m, max. 70 °C (158 °F)		**1**	
4 x 30 m, high temp. max. 200 °C (392 °F)		**2**	
4 x 30 m, max. 70 °C (158 °F)		**3**	
4 x 60 m, max. 70 °C (158 °F) (up to DN 3000)		**4**	
4 x 90 m, max. 70 °C (158 °F) (up to DN 3000)		**5**	
4 x 120 m, max. 70 °C (158 °F) (up to DN 3000)		**6**	
4 x 3 m, high temp. max. 200 °C (392 °F), the only option for Ex i		**7**	
4 x 15 m, high temp. max. 200 °C (392 °F)		**8**	
Special version (add order code):			
No transducer cable, cable length 4 x 3 m, the only option for Ex i		**9**	**R0A**
No transducer cable, cable length 4 x 15 m		**9**	**R0B**
No transducer cable, cable length 4 x 30 m		**9**	**R0C**
No transducer cable, cable length 4 x 60 m (up to DN 3000)		**9**	**R0D**
No transducer cable, cable length 4 x 90 m (up to DN 3000)		**9**	**R0E**
No transducer cable, cable length 4 x 120 m (up to DN 3000)		**9**	**R0F**

Selection and Ordering data	Order code
Additional information	
Please add „**-Z**" to Order No. and specify Order code(s) and plain text.	
Material certificate	
EN 10204-3.1, transducer body material	**F30**
EN 10204-3.1, transducer holder material	**F31**
EN 10204-3.1, mounting plate material	**F32**
Tag name plate	
Stainless steel tag name plate, text length depends on font size: 8 mm up to 10 characters, 4 mm up to 20 characters, or 3 mm up to 30 characters (add plain text)	**Y17**
Accessories	
Alignment rods-set for DN 100 ... 750 (4" ... 30") ∅ = 25 mm, L = 500 mm, 3 pcs.	**S10**
Alignment rods-set for DN 800 ... 2100 (32" ... 84") ∅ = 25 mm, L = 500 mm, 6 pcs.	**S11**
Alignment rods-set for DN 2200 ... 4000 (88" ... 160") ∅ = 25 mm, L = 500 mm, 8 or 10 pcs.	**S12**
Spanner key for tranducer mounting type SONO 3200 O-ring type	**T11**
Tool set with various mounting/spare parts for SONOKIT installation	**T12**

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering.

Operating instructions

Description	Order No.
SITRANS FUS060	
• English	**A5E01204521**
• German	**A5E02123845**
SITRANS FUS080	
• English	**A5E03059912**
SITRANS F US SONOKIT 2-track	
• English	**A5E02445496**
• German	**A5E02554972**
• Spanish	**A5E02555037**
• French	**A5E02555044**
• Czech	**A5E02814192**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F US literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Please use online Product selector to get latest updates. Product selector link:
www.pia-selector.automation.siemens.com

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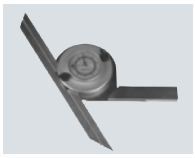
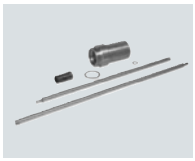
Flowmeter SONOKIT accessories and spare parts

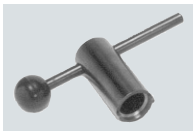
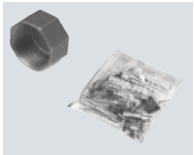
Accessories

Potting kit for SONO 3200 terminal housing

Description	Order No.	
Submersible kit for transducers SONO 3200, IP68 10 m (32.81 ft) w.g. rating	**FDK:085L2403**	

Tools for SONO 3200 transducers and SONOKIT

Description	Order No.	
Extraction tool for replacement of SONO 3200 O-ring transducers under pressure (hot-tap) For transducer length:		
• Up to 160 mm (6.3")	**FDK:085B5333**	
• Up to 230 mm (9.1")	**FDK:085B5335**	
Angle measurement tool for SONOKIT	**FDK:085B5330**	
Hot-tap drilling tool for SONOKIT	**FDK:085B5392**	
Alignment tool for SONOKIT (typically for hot-tapping) For use on pipe sizes in the range DN 300 to DN 1200.	**FDK:085B5393**	

Description	Order No.	
Alignment rods-set for DN 100 ... 650 (4" ... 26"), ∅ = 25 mm, L = 500 mm, 3 pcs.	**A5E02609214**	
Alignment rods-set for DN 700 ... 1900 (28" ... 76"), ∅ = 25 mm, L = 500 mm, 6 pcs.	**A5E02609215**	
Alignment rods-set for DN 2000 ... 4000 (80" ... 160"), ∅ = 25 mm, L = 500 mm, 10 pcs.	**A5E02609216**	
Spanner key for tranducer mounting type SONO 3200 O-ring type	**A5E02609218**	
Tool set with various mounting/spare parts SONIOKIT installation	**A5E02609219**	

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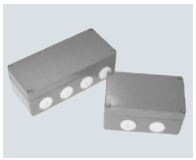
Flowmeter SONOKIT (with FUS060 or FUS080)

Cable connection boxes
(For the connection of individual transducer cables with the FUS060 transducer cables)

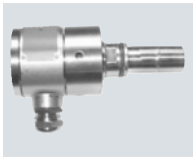
Description	Order No.
Junction box for coaxial cable	
• IP68 metal box for 2 coaxial cables	**FDK:085B1360**
• IP68 metal box for 4 coaxial cables	**FDK:085B1361**
• IP68 EEx e plastic box for 2 coaxial cables, no ATEX approval	**FDK:085B1362**
• IP68 EEx e plastic box for 4 coaxial cables, no ATEX approval	**FDK:085B1363**



Spare parts

Transducer SONO 3200 spare parts, complete transducer with ½"-NPT cable glands

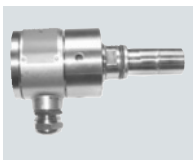
Transducer type	Material	Gasket	Pressure rating	Terminal housing	Approval	Temperature range [°C (°F)]	Length [mm (inch)]	Order No.
O-ring	316 SS	O-ring	PN 40	Plastic PA 6.6		-20 … +100 (-4 ... +212)	160 (6.3)	**A5E00839476**
O-ring	316 SS	O-ring	PN 40	316 SS		-20 … +200[1] (-4 ... +392)	160 (6.3)	**A5E00839435[F]**
O-ring	316 SS	O-ring	PN 40	Plastic PA 6.6		-20 … +100 (-4 ... +212)	230 (9.41)	**A5E00839477**
O-ring	316 SS	O-ring	PN 40	316 SS		-20 … +200[1] (-4 ... +392)	230 (9.41)	**A5E00839437[F]**



[1] 316 SS housing for -20 ... +200 °C (-4 ... +392 °F) media temp. but cable glands only for -20 ... +100 °C (-4 ... +212 °F) ambient temp.

Transducer SONO 3200 spare parts, complete transducer with M20 cable glands

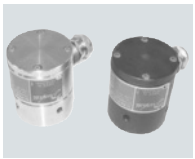
Transducer type	Material	Gasket	Pressure rating	Terminal housing	Approval	Temperature range [°C (°F)]	Length [mm (inch)]	Order No.
O-ring	316 SS	O-ring	PN 40	Plastic PA 6.6		-20 … +100 (-4 ... +212)	160 (6.3)	**FDK:085B5454**
O-ring	316 SS	O-ring	PN 40	316 SS		-20 … +200[1] (-4 ... +392)	160 (6.3)	**FDK:085B5455**
O-ring	316 SS	O-ring	PN 40	Plastic PA 6.6		-20 … +100 (-4 ... +212)	230 (9.41)	**FDK:085B5458**
O-ring	316 SS	O-ring	PN 40	316 SS	Ex d[2]	-20 … +180 (-4 ... +356)	160 (6.3)	**FDK:085B5452**
O-ring	316 SS	O-ring	PN 40	316 SS	Ex i[3]	-10 … +190 (14 ... 374)	160 (6.3)	**A5E00836462**
O-ring	316 SS	O-ring	PN 40	316 SS		-20 … +200[2] (-4 ... +392)	230 (9.41)	**FDK:085B5459**



[1] 316 SS housing for -20 ... +200 °C (-4 ... +392 °F) media temp. but cable glands only for -20 ... +100 °C (-4 ... +212 °F) ambient temp.
[2] ATEX (Ex) IIC 2G EEx d IIC T3 ... T6
[3] For systems with FUS060 ATEX IIC 2G Ex dem [ia/ib] T6/T4/T3

Transducer SONO 3200 spare parts, transducer terminal housing with M20 cable glands

Type	Order No.
Material: PA 6.6, Temperature range: -20 … +100 °C (-4 ... +212 °F)	**FDK:085B5501**
Material: AISI 316, Temperature range: -20 … +200 °C (-4 ... +392 °F)	**FDK:085B5504**
Material: AISI 316, Ex d[1], Temperature range: -20 … +180 °C (-4 ... +356 °F)	**FDK:085B5505**
Material: AISI 316, Ex i[2], Temperature range: -10 … +190 °C (14 ... 374 °F)	**A5E00835255[F]**



[1] ATEX (Ex) IIC 2G EEx d IIC T3 ... T6
[2] For systems with FUS060 ATEX IIC 2G Ex dem [ia/ib] T6/T4/T3

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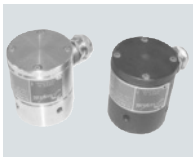
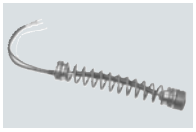
Transducer SONO 3200 spare parts, transducer terminal housing with ½"-NPT cable glands

Type	Order No.	
Material: PA 6.6, Temperature range: -20 … +100 °C (-4 ... +212 °F)	**A5E00839460**	
Material: AISI 316, Temperature range: -20 … +200 °C (-4 ... +392 °F)	**A5E00839427**	

Transducer SONO 3200 spare parts transducer body with insert as well as insert only

Temperature range [°C (°F)]	Gasket	Length [mm (inch)]	Order No.	
-20 … +200 (-4 ... +392)	O-ring	160 (6.3)	**FDK:085B1406**	
-20 … +200 (-4 ... +392)	O-ring	160 (6.3)	**FDK:085B5510**	
-20 … +200 (-4 ... +392)	O-ring	230 (9.41)	**FDK:085B5511**	

F) Subject to export regulations AL: 9I999, ECCN: N.

Temperature range [°C (°F)]	Length [mm (inch)]	Order No.	
-20 … +200 (-4 ... +392)	160 (6.3)	**FDK:085B1419**	
-20 … +200 (-4 ... +392)	230 (9.41)	**FDK:085B1420**	

Transducer SONO 3200 gasket

Type	Pressure rating	Material	Temperature range [°C (°F)]	Order No.	
Gasket O-ring (3 pcs. for O-ring transducers)	PN 40	FKM	-20 … +200 (-4 ... +392)	**FDK:085B1089**	

Cables for SONOKIT SONO 3200 transducers with FUS060

Description	Length [m (ft)]	Order No.	
Coaxial cable for FUS060, (75 Ω, max. 70 °C (158 °F), black PVC) (2 pcs.)	3 (9.84)	**A5E00875101**	
	15 (49.21)	**A5E00861432**	
	30 (98.43)	**A5E01278662**	
	60 (196.85)	**A5E01278682**	
	90 (295.28)	**A5E01278687**	
	120 (393.70)	**A5E01278698**	
High temp. coaxial cable for FUS060; with 0.3 m brown PTFE high temp. transducer part, max. 200 °C (392 °F) and black PVC transmitter part with SMB plug, max. 70 °C (158 °F); (impedance 75 Ω) (2 pcs.)	3 (9.84)	**A5E00875105**	
	15 (49.21)	**A5E00861435**	
	30 (98.43)	**A5E01196952**	

Cables for SONOKIT SONO 3200 transducers with FUS080

Description	Length [m (ft)]	Order No.	
Coaxial cable for FUS080, (75 Ω, max. 70 °C (158 °F), black PVC) (2 pcs.)	15 (49.21)	**A5E02478541**	
	30 (98.43)	**A5E02478751**	

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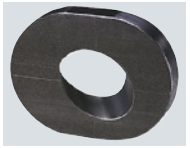
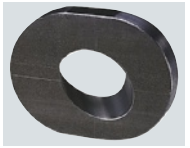
Flowmeter SONOKIT (with FUS060 or FUS080)

Transducer holder for SONOKIT SONO 3200 transducers

Description	Order No.	
1-track (each incl. 1 pc.)		
• 160 mm (6.3") stainless steel 45°, DN 100 … DN 150 (4" ... 6")	**FDK:085L1103**	
• 160 mm (6.3") carbon steel 45°, DN 100 … DN 150 (4" ... 6")	**FDK:085L1102**	
• 230 mm (9.1") for concrete pipe 60°, DN 600 … DN 2400 (24" ... 96")	**FDK:085L1107**	
• 160 mm (6.3") stainless steel 60°, DN 200 … DN 2400 (8" ... 96")	**FDK:085L1105**	
• 160 mm (6.3") carbon steel 60°, DN 200 … DN 2400 (8" ... 96")	**FDK:085L1104**	
2-track (each incl. 1 pc.)		
• 230 mm (9.1") for concrete pipe 60°, DN 600 … DN 4000 (24" ... 160")	**FDK:085L1111**	
• 160 mm (6.3") stainless steel 60°, DN 200 … DN 4000 (8" ... 160")	**FDK:085L1109**	
• 160 mm (6.3") carbon steel 60°, DN 200 … DN 4000 (8" ... 160")	**FDK:085L1108**	

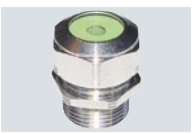
The other transducer holder parts are either completely in stainless steel for the concrete and stainless steel pipes (AISI 316L/1.4404 or similar). For carbon pipes the part welded onto the pipe is in carbon steel (St.37 or similar). Thread part is stainless steel (AISI 316L/1.4404 or similar).

Mounting plate for SONOKIT SONO 3200 transducers

Description	Order No.	
1-track (each incl. 1 pc.)		
• Stainless steel plate, 45°, DN 100 … DN 150 (4" ... 6")	**FDK:085L1113**	
• Carbon steel plate, 45°, DN 100 … DN 150 (4" ... 6")	**FDK:085L1112**	
• Stainless steel plate, 60°, DN 200 … DN 2400 (8" ... 96")	**FDK:085L1115**	
• Carbon steel plate, 60°, DN 200 … DN 2400 (8" ... 96")	**FDK:085L1114**	
2-track (each incl. 1 pc.)		
• Stainless steel plate, 60°, DN 200 … DN 4000 (8" ... 160")	**FDK:085L1119**	
• Carbon steel plate, 60°, DN 200 … DN 4000 (8" ... 160")	**FDK:085L1118**	

The mounting plates are either in stainless steel (AISI 316L/1.4404 or similar) or carbon steel (St.37 or similar).

SONO 3200 cable glands

Type/ description	Temperature range [°C (°F)]	Appr	Order No.	
black PA plastic, cable Ø 5 ... 13 mm	-20 ... 100 (-4 ... +212)		**A5E02246304**	
½" NPT gray PA plastic, cable Ø 5 ... 9 mm	-20 ... 100 (-4 ... +212)		**A5E02246309**	
½" NPT crome-plated brass, cable Ø 5 ... 9 mm	-40 ... 100 (-40 ... +212)		**A5E02246258**	
M20 stainless steel, cable Ø 4 ... 6 mm	-25 ... 200 (-13 ... +392)	Ex i	**A5E02246194**	
M20 stainless s teel, cable Ø 5 ... 8 mm	-60 ... 180 (-76 ... +356)	Ex d	**A5E02246311**	

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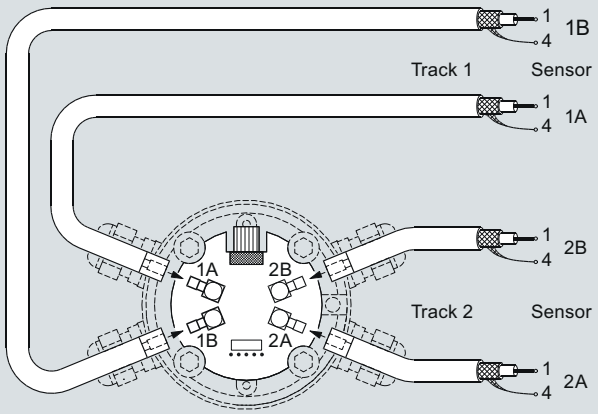
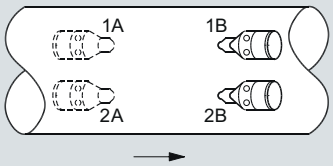
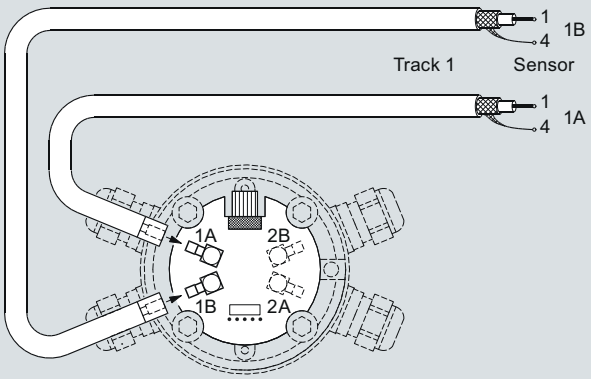
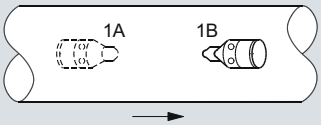
Schematics





Electrical connection of SITRANS FUS060 and SONOKIT 2-track. Max. 30 m transducer cable length for sizes ≥ DN 3000.





Electrical connection of SITRANS FUS060 and SONOKIT 1-track

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Flowmeter SITRANS FUS380 standard

Overview

The 2-track flowmeter SITRANS FUS380 comes as battery or mains-powered and is designed to measure water flow in district heating plants, local networks, boiler stations, substations, chiller plants and other general water applications.
The type-approved flowmeter version is named SITRANS FUE380 - see page 4/259.
Technically, the meter types SITRANS FUS380 and SITRANS FUE380 are completely identical, only difference is the calibration limit and the type approval for custody transfer.

Benefits

- Battery-powered up to 6 years
- 115/230 V mains-powered with back-up battery option in case of mains power failure
- Fast measuring frequency 20 Hz/0.5 Hz (230 V AC/Battery)
- Easy one-button straight forward display
- 2-track measuring principle for optimum accuracy
- Compact or remote mounting
- Measures on all district water qualities and water conductivities
- No pressure drop
- Long-term stability
- 2 galvanically isolated digital outputs for easy connection to a calculator (potential-free)
- Bidirectional measurement, with 2 totalizers and outputs
- Dynamic range Q_i (min) : Q_s (max) up to 1:400
- Modbus RTU/RS232, RS485

Application

The main application for SITRANS FUS380 is measurement of water flow or water flow in energy meter systems in district heating networks or chilled water.

Design

The 2-track design of SITRANS FUS380 ensures maximum accuracy under short inlet conditions. The flowmeter consists of a flow sensor pipe, 4 transducers/transducer cables and a transmitter SITRANS FUS080.

The unit is available in a compact or a remote version with up to 30 meter distance from flowmeter to transmitter. When ordering a compact version the transducer cables are pre-mounted and ready for installation.

Compact mounting is only possible up to 120 °C (248 °F). The sensor must be isolated to protect transmitter from heat. The transmitter is available in an IP67/NEMA 4X/6 enclosure.

Integration

The flowmeter digital output is often used as input for an energy meter or as input for digital systems for remote reading.
SITRANS FUS380 has two digital output functions that can be individually selected, and optional Modbus RTU communication modules.
Pulse output rate is defined when ordering.
If the flowmeter forms part of an energy meter system for custody transfer, no further approvals are needed, except possible local approvals on the flowmeter.

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Configuration SITRANS FUS380

Selection guide SITRANS FUS380, standard version

DN	Q_s (m^3/h)	Q_{max} (m^3/h) (105 % of Q_s)	Q_p (m^3/h)	Q_i (m^3/h) (1:100 of Q_p)	Cut-off (m^3/h)	Cut-off (% of Q_{max})	Typical pulse value[1] (l/pulse)
50	15	15.75	15	0.15	0.075	0.48	1
50	45	47.25	15	0.15	0.075	0.16	1
50	45	47.25	30	0.3	0.150	0.32	1
65	25	26.25	25	0.25	0.125	0.48	1
65	72	75.6	25	0.25	0.125	0.17	1
65	72	75.6	50	0.5	0.250	0.33	1
80	40	42	40	0.4	0.200	0.48	2.5
80	120	126	40	0.4	0.200	0.16	2.5
80	120	126	80	0.8	0.400	0.32	2.5
100	60	63	60	0.6	0.300	0.48	2.5
100	180	189	60	0.6	0.300	0.16	2.5
100	240	252	120	1.2	0.600	0.24	2.5
125	10	10.5	100	1	0.500	4.76	2.5
125	280	294	100	1	0.500	0.17	2.5
125	400	420	200	2	1.000	0.24	2.5
150	150	157.5	150	1.5	0.750	0.48	10
150	420	441	150	1.5	0.750	0.17	10
150	560	588	300	3	1.500	0.26	10
200	250	262.5	250	2.5	1.250	0.48	10
200	700	735	250	2.5	1.250	0.17	10
200	900	945	500	5	2.500	0.26	10
250	400	420	400	4	2.000	0.48	10
250	1120	1176	400	4	2.000	0.17	10
250	1400	1470	800	8	4.000	0.27	10
300	560	588	560	5.6	2.800	0.48	50
300	1560	1638	560	5.6	2.800	0.17	50
300	2100	2205	1120	11.2	5.600	0.25	50
350	750	787.5	750	7.5	3.750	0.48	50
350	2100	2205	750	7.5	3.750	0.17	50
350	2800	2940	1500	15	7.500	0.26	50
400	950	997.5	950	9.5	4.750	0.48	50
400	2660	2793	950	9.5	4.750	0.17	50
400	3600	3780	1900	19	9.500	0.25	50
500	1475	1548.75	1475	14.75	7.375	0.48	100
500	4130	4336.5	1475	14.75	7.375	0.17	100
500	5500	5775	2950	29.5	14.750	0.26	100
600	2150	2257.5	2150	21.5	10.750	0.48	100
600	6020	6321	2150	21.5	10.750	0.17	100
600	8000	8400	4300	43	21.500	0.26	100
700	2900	3045	2900	29	14.500	0.48	100
700	8120	8526	2900	29	14.500	0.17	100
700	10 800	11 340	5800	58	29.000	0.26	100
800	3800	3990	3800	38	19.000	0.48	100
800	10 640	11 172	3800	38	19.000	0.17	100
800	14 200	14 910	7600	76	38.000	0.25	100
900	5000	5250	3800	38	19.000	0.36	100
900	14 000	14 700	5000	50	25.000	0.17	100
900	20 000	21 000	5000	50	25.000	0.12	100
1000	6000	6300	3800	38	19.000	0.30	100
1000	16 800	17 640	6000	60	30.000	0.17	100
1000	24 000	25 200	12 000	120	60.000	0.24	100
1200	9000	9450	3800	38	19.000	0.20	100
1200	25 200	26 460	9000	90	45.000	0.17	100
1200	36 000	37 800	18 000	180	90.000	0.24	100

The values Q_i, Q_p and Q_s are shown on the system label of the FUS380. Q_i (Q_{min}) means the minimal and Q_p (Q_{nom}) the nominal flow rate. Q_s is the highest operatable flow rate. The maxium flow rate (Q_{max}) is 105 % of Q_s. The low flow cut-off is 50 % of Q_i.

In order to obtain best pulse output resolution in the range Q_{min} to Q_s of approx. 100 Hz at Q_s, two or three flow values for every dimension can be selected at ordering. Therefore the ordering data table also shows Q_p (Q_n). This flow rate is between Q_i (Q_{min}) and Q_s and indicates the normal or typical flow.

[1] Typical pulse values for SITRANS FUS380. Other pulse values are possible - see Selection and Ordering data table.

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Flowmeter SITRANS FUS380 standard

Technical specifications

Pipe design	2-track sensor with flanges and inline transducers wet-calibrated from factory
Nominal size welded version (DN 50 ... DN 80 in bronze)	DN 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 500, 600, 700, 800, 900, 1000, 1200
Pressure rate	PN 16, PN 25, PN 40 EN 1092-1
Pipe material	• DN 100 ... DN 1200: Carbon Steel EN 1.0345/P235 GH, painted in light-gray. • DN 50 ... 80: Die-cast bronze G-CuSn10/W2.1050.01 (EN1982)
Transducer design	• DN 100 ... DN 1200: Inline version and welded onto the pipe • DN 50 ... DN 80: Screwed into the pipe
Transducer material	Stainless steel (AISI 316/1.4404)/ brass ($CuZn_{36}Pb_2As$)
Sensor operating conditions	
Storage	-40 … +85 °C (-40 … +185 °F)
Media/surface temperature	DN 100 ... DN 1200: • Remote: 2 … 200 °C (35.6 … 392 °F) DN 50 ... DN 80: • Remote: 2 … 150 °C (35.6 … 302 °F) DN 50 ... DN 1200: • Compact: 2 … 120 °C (35.6 … 248 °F)
Degree of protection	Sensor connection IP67/NEMA 4X/6
Max. flow velocity	DN 50 … DN 1200: 9 m/s (29.5 ft/s)
Electromagnetic compatibility	
• Emitted interference	To EN 61000-6-4
• Noise immunity	To EN 61000-6-2
Transmitter	
The transmitter related to this system is the SITRANS FUS080. Technical specifications to the FUS080 see page 4/221 ff.	
Sensor cable	
Cable length	Max. 30 m (98.4 ft) between transmitter and sensor
Certificates and approvals	
Conformity certificate	The devices are supplied as standard with a Siemens Certificate of Conformity on CD
Material certificate	Material certificate according EN 3.1 is optionally available
Calibration report	A standard calibration report is shipped with every flowmeter. Extended accredited ISO/IEC 17025 calibration certificates optionally available
Approvals	No custody transfer approvals

The sensors are approved according to EU directive 97/23/EC dated 29 May 1997 regarding fluid group 1, classified in category III. Design according to EN 13480 (PED Directive).

SITRANS FUS380 uncertainty

	FUS380
Flow value setting	Predefined settings according to dimension
Approval	No approval
Flow rate v_f	0.02 … 9 m/s (0.065 … 29.5 ft/s)
Output A	Pulse: forward, reverse, forward net, reverse net (Preset: forward)
Output B	Pulse (forward, reverse, forward net, reverse net, alarm, call-up (Preset: alarm)
Pulse value A & B (depending on DN value)	0.1 l/p, 0.25 l/p, 0.5 l/p, 1 l/p, 2.5 l/p, 10 l/p, 25 l/p, 50 l/p, 100 l/p, 250 l/p, 500 l/p, 1 m^3/p, 2.5 m^3/p, 5 m^3/p, 10 m^3/p, 25 m^3/p, 50 m^3/p, 100 m^3/p, 250 m^3/p, 500 m^3/p, 1000 m^3/p
Pulse width	5/10/20/50/100/200/500 ms
Flow unit setup	Preset: m^3/h
Volume unit setup	Preset: m^3

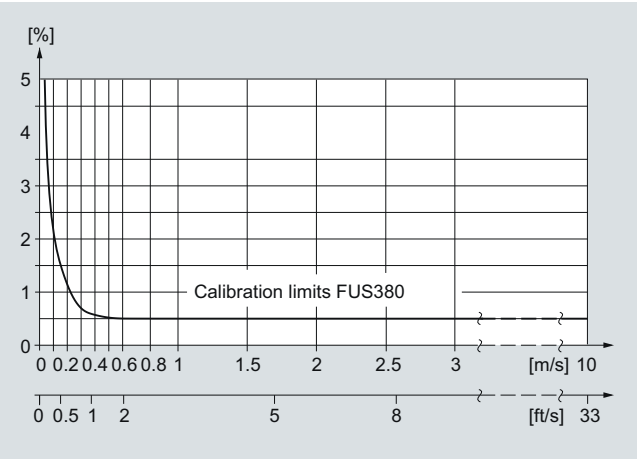
To ensure continuous accurate measurement, flowmeters must be calibrated. The calibration is conducted at Siemens flow facilities accredited according to ISO/IEC 17025 by DANAK or UKAS.

The accreditation bodies DANAK and UKAS have signed the ILAC MRA agreement (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement). Therefore the accreditation ensures international traceability and recognition of the test results in 39 countries worldwide, including the US (NIST traceability).

A standard calibration certificate with Q_n as selected flow is shipped with each SITRANS FUS380. This production calibration protocol consists of 2 x 3 points at Q_i, 10 % Q_p and Q_p (max. 4 200 m^3/h).

Accuracy SITRANS FUS380:

± 0.5 % for 0.5 m/s < v < 10 m/s and ± 0.25/$V_{act.}$ [%] below 0.5 m/s



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Selection and Ordering data			Order No.	Order code
Flowmeter SITRANS FUS380 (standard)			7ME3400-	
			■■■■0-■■A■	■■■
Diameter	**Flow setting [m³/h] Qp (Qn)[1]**	**Qs**		
DN 50 (2")[2]	15	15	1A	
DN 50 (2")[2]	15	45	1C	
DN 50 (2")[2]	30	45	1D	
DN 65 (2½")[2]	25	25	1E	
DN 65 (2½")[2]	25	72	1G	
DN 65 (2½")[2]	50	72	1H	
DN 80 (3")[2]	40	40	1J	
DN 80 (3")[2]	40	120	1L	
DN 80 (3")[2]	80	120	1M	
DN 100 (4")	60	60	1N	
DN 100 (4")	60	180	1Q	
DN 100 (4")	120	240	1R	
DN 125 (5")	100	100	1S	
DN 125 (5")	100	280	1U	
DN 125 (5")	200	400	1V	
DN 150 (6")	150	150	2A	
DN 150 (6")	150	420	2C	
DN 150 (6")	300	560	2D	
DN 200 (8")	250	250	2E	
DN 200 (8")	250	700	2G	
DN 200 (8")	500	900	2H	
DN 250 (10")	400	400	2J	
DN 250 (10")	400	1120	2L	
DN 250 (10")	800	1400	2M	
DN 300 (12")	560	560	2N	
DN 300 (12")	560	1560	2Q	
DN 300 (12")	1120	2100	2R	
DN 350 (14")	750	750	2S	
DN 350 (14")	750	2100	2U	
DN 350 (14")	1500	2800	2V	
DN 400 (16")	950	950	3A	
DN 400 (16")	950	2660	3C	
DN 400 (16")	1900	3600	3D	
DN 500 (20")	1475	1475	3J	
DN 500 (20")	1475	4130	3L	
DN 500 (20")	2950	5500	3M	
DN 600 (24")	2150	2150	3S	
DN 600 (24")	2150	6020	3U	
DN 600 (24")	4300	8000	3V	
DN 700 (28")	2900	2900	4E	
DN 700 (28")	2900	8120	4G	
DN 700 (28")	5800	10 800	4H	
DN 800 (32")	3800	3800	4N	
DN 800 (32")	3800	10 640	4Q	
DN 800 (32")	7600	14 200	4R	
DN 900 (36")	5000	5000	5A	
DN 900 (36")	5000	14 000	5C	
DN 900 (36")	10000	20 000	5D	
DN 1000 (40")	6000	6000	5J	
DN 1000 (40")	6000	16 800	5L	
DN 1000 (40")	12 000	24 000	5M	
DN 1200 (48")	9000	9000	5S	
DN 1200 (48")	9000	25 200	5U	
DN 1200 (48")	18 000	36 000	5V	

This device is shipped with a Quick Start guide and the SITRANS F manual CD containing the complete manual library. Printed Operating Instructions are available for purchase via PMD.

Selection and Ordering data	Order No.	Order code
Flowmeter SITRANS FUS380 (standard)	7ME3400-	
	■■■■0-■■A■	■■■
Flange norm and pressure rating		
System without sensor - only a transmitter FUS080 as spare part - settings as defined with this order no.	A	
EN 1092-1 Flanges		
PN 16 (DN 100 ... DN 1200)	C	
PN 25 (DN 200 ... DN 1000)	D	
PN 40 (DN 50 ... DN 250)[3]	E	
Compact / remote connection		
Compact version, max. 120 °C (248 °F)	0	
Remote version, max. 150/200 °C (302/392 °F)		
5 m (16.4 ft)	2	
10 m (32.8 ft)	3	
20 m (65.6 ft)	4	
30 m (98.4 ft)	5	
Pulse output value setup		
0.1 l/p (option for DN 50 ... DN 65) with 5 ms	1	
1 l/p (typical for DN 50 ... DN 65) with 5 ms	2	
2.5 l/p (typical for DN 80 ... DN 125) with 5 ms	3	
10 l/p (typical for DN 150 ... DN 250) with 5 ms	4	
50 l/p (typical for DN 300 ... DN 400) with 5 ms	5	
100 l/p (typical for DN 500 ... DN 1200) with 5 ms	6	
250 l/pulse	7	
1 m³/pulse	8	
0.25 l/pulse	9	N0A
0.5 l/pulse	9	N0B
5 l/pulse	9	N0C
25 l/pulse	9	N0D
500 l/pulse	9	N0E
2.5 m³/pulse	9	N0F
5 m³/pulse	9	N0G
10 m³/pulse	9	N0H
25 m³/pulse	9	N0J
50 m³/pulse	9	N0K
100 m³/pulse	9	N0L
250 m³/pulse	9	N0M
500 m³/pulse	9	N0N
1000 m³/pulse	9	N0P
Transmitter SITRANS FUS080		
IP67/NEMA 4X/6 115 ... 230 V AC	B	
IP67/NEMA 4X/6 3.6 V battery version, incl. dual battery pack	D	
IP67/NEMA 4X/6 115 ... 230 V AC, including 3.6 V single battery backup	E	
IP67/NEMA 4X/6 3.6 V battery version (no battery pack included)[4]	G	
Pulse width setup		
5 ms (standard)	2	
10 ms	3	
20 ms	4	
50 ms	5	
100 ms	6	
200 ms	7	
500 ms	8	

1) Q_p (Q_n) is the normal or typical flow. Q_p and Q_s is shown on the system label.
2) Pipe material bronze brass.
3) PN 40 standard for DN 50 ... DN 80 die-cast bronze pipes.
4) Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs.

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Flowmeter SITRANS FUS380 standard

Selection and Ordering data	Order code
Additional information	
Please add „**-Z**" to Order No. and following add-on code(s) with plain text.	
Calibration / certificate FUS380	
Production calibration for DN 50 ... DN 1200 with Q_n as selected in diameter. Calibration protocol: 2 x 3 points, Q_i, 10 % Q_p and Q_p (max. 4200 m^3/h).	**Included**
Accredited Siemens ISO/IEC 17025 calibration for DN 50 ... DN 200 with Q_n as selected in diameter. Certificate: 2 x 3 points, Q_i, 10 % Q_p and Q_p (max. 250 m^3/h).	**D20**
Accredited Siemens ISO/IEC 17025 calibration for DN 100 ... DN 500 with Q_n as selected in diameter. Certificate: 2 x 3 points, Q_i, 10 % Q_p and Q_p (max. 1300 m^3/h).	**D21**
Accredited Siemens ISO/IEC 17025 calibration, DN 300 ... DN 1200 with Q_n as selected in diameter. Certificate: 2 x 3 points, Q_i, 10 % Q_p and Q_p (max. 4200 m^3/h).	**D22**
Output B as reverse flow pulses. No calibration/verification.	**E21**
Material certificate	
EN 10204-3.1	**F10**
Tag name plate	
Stainless steel tag name plate, text length depends on font size: 8 mm up to 10 characters, 4 mm up to 20 characters, or 3 mm up to 30 characters (add plain text)	**Y17**

Please use online Product selector to get latest updates. Product selector link:

www.pia-selector.automation.siemens.com

Flowmeter SITRANS FUS380 operating instructions, accessories and spare parts

Operating instructions

Description	Order No.
• English	**A5E00730100**
• German	**A5E00740611**
• Spanish	**A5E00754188**
• French	**A5E00754173**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F US literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

For accessories and spare parts see chapter of transmitter SITRANS FUS080/FUE080 on page 4/224.

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Overview

The 2-track flowmeter SITRANS FUE380 comes as battery or mains-powered and is designed to measure water flow in district heating plants, local networks, boiler stations, substations, chiller plants and other general water applications.
The flowmeter FUE380 is approved according to energy meter standards EN 1434 class 2, OIML R 75 class 2 and MID class 2. Metrological parameters are protected against manipulation.
The type-approved flowmeter version is named SITRANS FUE380. For a standard flowmeter type FUS380 without a type approval, see separate FUS380 chapter.
Technically, the meter types SITRANS FUS380 and SITRANS FUE380 are completely identical, only difference is the calibration limit and the type approval for custody transfer.

Benefits

- Battery-powered up to 6 years
- 115/230 V mains-powered with back-up battery option in case of mains power failure
- Fast measuring frequency 20 Hz/0.5 Hz (230 V AC/Battery)
- Easy one-button straight forward display
- 2-track measuring principle for optimum accuracy
- Compact or remote mounting
- Measures on all district water qualities and water conductivities
- No pressure drop
- Long-term stability
- 2 galvanically isolated digital outputs for easy connection to a calculator (potential-free)
- Bidirectional measurement, with 2 totalizers and outputs
- Dynamic range Q_i:Q_p up to 1:50/100 or max. range Qi:Qs up to 1:400
- Modbus RTU/RS232, RS485

Application

The main application for SITRANS FUE380 is measurement of water flow or water flow in energy meter systems for custody transfer in district heating networks or chilled water.
Combined with an energy calculator and a pair of temperature sensors, SITRANS FUE380 can be used as part of an energy meter system. For this purpose Siemens offers energy calculator SITRANS FUE950.

Design

The 2-track design of SITRANS FUE380 ensures maximum accuracy under short inlet conditions. The flowmeter consists of a flow sensor pipe, 4 transducers/transducer cables and an approved transmitter SITRANS FUE080.

The unit is available in a compact or a remote version with up to 30 meter distance from flowmeter to transmitter. When ordering a compact version the transducer cables are pre-mounted and ready for installation.

Compact mounting is only possible up to 120 °C (248 °F). The sensor must be isolated to protect transmitter from heat. The transmitter is available in an IP67/NEMA 4X/6 enclosure.

FUE380 MI-004 approval

The SITRANS FUE380 program is type-approved according to international energy meter standard EN1434. On 1 November 2006 the MI-004 energy meter directive became effective providing that all energy meters with a MI-004 verification label can be sold across the EU borders.

The FUE380 are MI-004 verified and labeled products according to Directive 2004/22/EC of the European Parliament and Council of March 31, 2004 on measuring instruments (MID), Annex MI-004 in sizes from DN 50 to DN 1200.

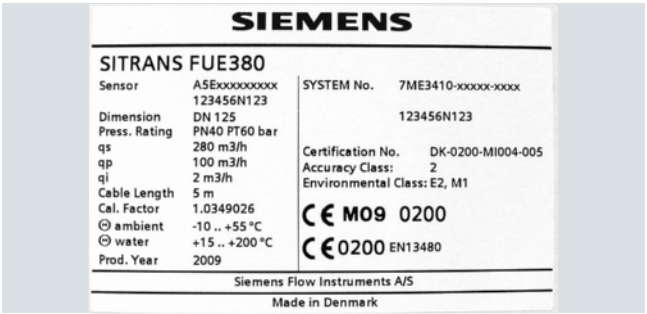
The MID certification is obtained as module B + module D approvals according to the above-mentioned directive.

Module B: Type approval according to EN1434: 2006

Module D: Quality insurance approval of production

The MID system label with the approval information is placed on the side of the transmitter and on the sensor. An example of the product label is shown below:

FUE380 transmitter MID label



FUE380 sensor MID label

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Flowmeter SITRANS FUE380 with approval

Integration

The flowmeter digital output is often used as input for an energy meter or as input for digital systems for remote reading.

SITRANS FUE380 has two digital output functions that can be individually selected, and optional Modbus RTU communication modules.

Pulse output rate is defined when ordering.

If the flowmeter forms part of an energy meter system for custody transfer, no further approvals are needed, except possible local approvals on the flowmeter.

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Configuration SITRANS FUE380 type-approved

Selection guide SITRANS FUE380, type-approved flowmeter

DN	Q_s (m^3/h)	Q_{max} (m^3/h (105 % of Q_s)	Q_p (m^3/h)	Q_i (m^3/h) (1:50 of Q_p)[4]	Q_i (m^3/h) (1:100 of Q_p)[4]	Schleichmengenunterdrückung (m^3/h)	Schleichmengenunterdrückung (% of Q_{max})	Typischer Impulswert[1] (l/pulse)
50	30	31.5	15[2]	0.3	0.15	0.075	0.24	1
50	45	47.25	15[2]	0.3	0.15	0.075	0.16	1
50	45	47.25	30[3]	-	0.30	0.150	0.32	1
65	50	52.5	25[2]	0.5	0.25	0.125	0.24	1
65	72	75.6	25[2]	0.5	0.25	0.125	0.17	1
65	72	75.6	50[3]	-	0.50	0.250	0.33	1
80	80	84	40[2]	0.8	0.40	0.200	0.24	2.5
80	120	126	40[2]	0.8	0.40	0.200	0.16	2.5
80	120	126	80[3]	-	0.80	0.400	0.32	2.5
100	120	126	60[2]	1.2	0.60	0.300	0.24	2.5
100	180	189	60[2]	1.2	0.60	0.300	0.16	2.5
100	180	189	120[3]	-	1.20	0.600	0.32	2.5
125	200	210	100[2]	2.0	1.00	0.500	0.24	2.5
125	280	294	100[2]	2.0	1.00	0.500	0.17	2.5
125	280	294	200[3]	-	2.00	1.000	0.34	2.5
150	300	315	150[2]	3.0	1.50	0.750	0.24	10
150	420	441	150[2]	3.0	1.50	0.750	0.17	10
150	420	441	300[3]	-	3.00	1.500	0.34	10
200	500	525	250[2]	5.0	2.50	1.250	0.24	10
200	700	735	250[2]	5.0	2.50	1.250	0.17	10
200	700	735	500[3]	-	5.00	2.500	0.34	10
250	800	840	400[2]	8.0	4.00	2.000	0.24	10
250	1120	1176	400[2]	8.0	4.00	2.000	0.17	10
250	1120	1176	800[3]	-	8.00	4.000	0.34	10
300	1120	1176	560[2]	11.2	5.60	2.800	0.24	50
300	1560	1638	560[2]	11.2	5.60	2.800	0.17	50
300	1560	1638	1120[3]	-	11.20	5.600	0.34	50
350	1500	1575	750[2]	15.0	7.50	3.750	0.24	50
350	2100	2205	750[2]	15.0	7.50	3.750	0.17	50
350	2100	2205	1500[3]	-	15.00	7.500	0.34	50
400	1900	1995	950[2]	19.0	9.50	4.750	0.24	50
400	2660	2793	950[2]	19.0	9.50	4.750	0.17	50
400	2660	2793	1900[3]	-	19.00	9.500	0.34	50
500	2950	3097.5	1475[2]	29.5	14.75	7.375	0.24	100
500	4130	4336.5	1475[2]	29.5	14.75	7.375	0.17	100
500	4130	4336.5	2950[3]	-	29.50	14.750	0.34	100
600	4300	4515	2150[2]	43.0	21.50	10.750	0.24	100
600	6020	6321	2150[2]	43.0	21.50	10.750	0.17	100
600	6020	6321	4300[3]	-	43.00	21.500	0.34	100
700	5800	6090	2900[2]	58.0	29.00	14.500	0.24	100
700	8120	8526	2900[2]	58.0	29.00	14.500	0.17	100
700	8120	8526	5800[3]	-	58.00	29.000	0.34	100
800	7600	7980	3800[2]	76.0	38.00	19.000	0.24	100
800	10 640	11 172	3800[2]	76.0	38.00	19.000	0.17	100
800	10 640	11 172	7600[3]	-	76.00	38.000	0.34	100
900	10 000	10 500	5000[2]	100.0	50.00	25.000	0.24	100
900	14 000	14 700	5000[2]	100.0	50.00	25.000	0.17	100
900	14 000	14 700	10 000[3]	-	100.00	50.000	0.34	100

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Flowmeter SITRANS FUE380 with approval

DN	Q_s (m^3/h)	Q_{max} (m^3/h (105 % of Q_s)	Q_p (m^3/h)	Q_i (m^3/h) (1:50 of Q_p)[4]	Q_i (m^3/h) (1:100 of Q_p)[4]	Schleichmengenunterdrückung (m^3/h)	Schleichmengenunterdrückung (% of Q_{max})	Typischer Impulswert[1] (l/pulse)
1000	12 000	12 600	6000[2]	120.0	60.00	30.000	0.24	100
1000	16 800	17 640	6000[2]	120.0	60.00	30.000	0.17	100
1000	16 800	17 640	12 000[3]	-	120.00	60.000	0.34	100
1200	18 000	18 900	9000[2]	180.0	90.00	45.000	0.24	100
1200	25 200	26 460	9000[2]	180.0	90.00	45.000	0.17	100
1200	25 200	26 460	18 000[3]	-	180.00	90.000	0.34	100

Dynamic range Q_i:Q_p: better than 1:100 or 1:50 according to EN 1434, OIML R 75 class 2 and MID class 2.

Qi (Q_{min}) means the minimal and Q_p (Q_{nom}) the nominal flow rate according to the approval requirements.
Q_s is the highest operatable flow rate. The maximum flow rate (Q_{max}) is 105 % of Q_s. The low flow cut-off is 50 % of Q_i.
Q_i, Q_p and Q_s are shown on the system nameplate of the FUE380.

In order to obtain best pulse output resolution in the range Q_{min} to Q_s of approx. 100 Hz at Q_s, two or three flow values for every dimension can be selected at ordering. Therefore the ordering data table also shows Q_p (Q_n). This flow rate is between Q_i (Q_{min}) and Q_s and indicates the normal or typical flow according to the approval requirements.

1) In connection with SITRANS FUE950 - other pulse values - see Selection and Ordering data table.

2) EN 1434 and MID flow values

3) OIML R 75 and MID flow values

4) The minimum flow (Q_i) should be checked in the PIA-selector or product master data base (PMD)

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Flowmeter SITRANS FUE380 with approval

Technical specifications

Pipe design	2-track sensor with flanges and inline transducers wet-calibrated from factory
Nominal size welded version (DN 50 ... DN 80 in bronze)	DN 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 500, 600, 700, 800, 900, 1000, 1200
Pressure rate	PN 16, PN 25, PN 40 EN 1092-1
Pipe material	• DN 100 ... DN 1200: Carbon Steel EN 1.0345/P235 GH, painted in light-gray. • DN 50 ... DN 80: Die-cast bronze G-CuSn10/W2.1050.01 (EN1982)
Transducer design	• DN 100 ... DN 1200: Inline version and welded onto the pipe • DN 50 ... DN 80: Screwed into the pipe
Transducer material	Stainless steel (AISI 316/1.4404)/ brass ($CuZn_{36}Pb_2As$)
Sensor operating conditions	
Storage	-40 … +85 °C (-40 … +185 °F)
Media/surface temperature	DN 100 ... DN 1200: • Remote: 2 … 200 °C (35.6 … 392 °F) MID: min. +15 °C/+59 °F DN 50 ... DN 80: • Remote: 2 … 150 °C (35.6 … 302 °F) MID: min. +15 °C/+59 °F DN 50 ... DN 1200: • Compact: 2 … 120 °C (35.6 … 248 °F) MID: min. +15 °C/+59 °F
Degree of protection	Sensor connection IP67/NEMA 4X/6
Electromagnetic compatibility	
• Emitted interference	To EN 61000-6-4
• Noise immunity	To EN 61000-6-2
• MID	Environment class E2 and M1
Max. flow velocity at Q_s	DN 50 … DN 1200: 9 m/s (29.5 ft/s)

Transmitter

The transmitter related to this system is the SITRANS FUE080.
Technical specifications to the FUE080 see page 4/221 ff.

Sensor cable	
Cable length	Max. 30 m (98.4 ft) between transmitter and sensor
Certificates and approvals	
Conformity certificate	The devices are supplied as standard with a Siemens Certificate of Conformity on CD
Material certificate	Material certificate according EN 10204-3.1 is optionally available
Calibration report	A standard calibration report is shipped with every flowmeter. Extended accredited ISO/IEC 17025 calibration certificates optionally available
Approvals	• EN 1434 and OIML R 75 Class 2 (PTB approval based on EN1434) • MID class 2 approval and certification

The sensors are approved according to EU directive 97/23/EC dated 29 May 1997 regarding fluid group 1, classified in category III. Design according to EN 13480 (PED Directive).

Type-dependent settings

Flow value	Predefined according to EN 1434 / OIML R 75 / MID
Approval	Country specific
Flow rate v_f	0.02 … 9 m/s (0.065 … 29.5 ft/s)
Output A	Preset: Forward pulses
Output B	Preset: Alarm
Pulse value A & B (depending on DN value)	Preset: See scheme - previous page Preset for SITRANS FUE950 or free selectable depending on flow rate (Q_s)
Pulse width	Preset: 5 ms
Flow unit setup	Preset: m^3/h
Volume unit setup	Preset: m^3

SITRANS FUE380 uncertainty

To ensure continuous accurate measurement, flowmeters must be calibrated. The calibration is conducted at Siemens flow facilities accredited according to ISO/IEC 17025 by DANAK or UKAS.

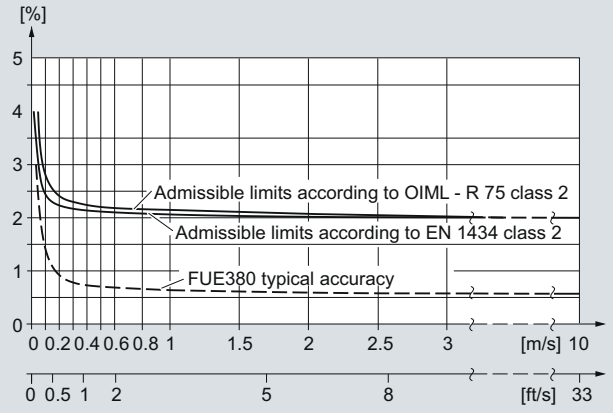
The accreditation body DANAK has signed the ILAC MRA agreement (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement). Therefore the accreditation ensures international traceability and recognition of the test results in 39 countries worldwide, including the US (NIST traceability).

A standard calibration certificate with Q_n as selected flow is shipped with each SITRANS FUS380. This production calibration protocol consists of 2 x 3 points at Q_i, 10 % Q_p and Q_p (max. 4 200 m^3/h).

Typical accuracy SITRANS FUE380:

$\pm(0.5 + 0.02\ Q_p/Q)$ [%]
Q_p according to EN 1434/OIML requirements.

Example: DN 100, Q_p = 60 m^3/h at Q = 1.2 m^3/h:
Accuracy at 1.2 m^3/h = typical 1.5 %



SITRANS FUE380 fulfils the requirements
$E_f = \pm (2 + 0.02\ Q_p/Q_i)$ max. ± 5 %, according to EN 1434 and OIML R 75, class 2 or MID class 2 requirements.

4

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Flowmeter SITRANS FUE380 with approval

Selection and Ordering data			Order No.	Order code
Flowmeter SITRANS FUE380 (type-approved)			**7ME3410-**	
Diameter	**Flow setting [m³/h] Qp[m³/h]1)**	**Qs [m³/h]**		
DN 50 (2")2)	15 3)	30	**1B**	
DN 50 (2")2)	15 3)	45	**1C**	
DN 50 (2")2)	30 4)	45	**1D**	
DN 65 (2½")2)	25 3)	50	**1F**	
DN 65 (2½")2)	25 3)	72	**1G**	
DN 65 (2½")2)	50 4)	72	**1H**	
DN 80 (3")2)	40 3)	80	**1K**	
DN 80 (3")2)	40 3)	120	**1L**	
DN 80 (3")2)	80 4)	120	**1M**	
DN 100 (4")	60 3)	120	**1P**	
DN 100 (4")	60 3)	180	**1Q**	
DN 100 (4")	120 4)	180	**1R**	
DN 125 (5")	100 3)	200	**1T**	
DN 125 (5")	100 3)	280	**1U**	
DN 125 (5")	200 4)	280	**1V**	
DN 150 (6")	150 3)	300	**2B**	
DN 150 (6")	150 3)	420	**2C**	
DN 150 (6")	300 4)	420	**2D**	
DN 200 (8")	250 3)	500	**2F**	
DN 200 (8")	250 3)	700	**2G**	
DN 200 (8")	500 4)	700	**2H**	
DN 250 (10")	400 3)	800	**2K**	
DN 250 (10")	400 3)	1120	**2L**	
DN 250 (10")	800 4)	1120	**2M**	
DN 300 (12")	560 3)	1120	**2P**	
DN 300 (12")	560 3)	1560	**2Q**	
DN 300 (12")	1120 4)	1560	**2R**	
DN 350 (14")	750 3)	1500	**2T**	
DN 350 (14")	750 3)	2100	**2U**	
DN 350 (14")	1500 4)	2100	**2V**	
DN 400 (16")	950 3)	1900	**3B**	
DN 400 (16")	950 3)	2660	**3C**	
DN 400 (16")	1900 4)	2660	**3D**	
DN 500 (20")	1475 3)	2950	**3K**	
DN 500 (20")	1475 3)	4130	**3L**	
DN 500 (20")	2950 4)	4130	**3M**	
DN 600 (24")	2150 3)	4300	**3T**	
DN 600 (24")	2150 3)	6020	**3U**	
DN 600 (24")	4300 4)	6020	**3V**	
DN 700 (28")	2900 3)	5800	**4F**	
DN 700 (28")	2900 3)	8120	**4G**	
DN 700 (28")	5800 4)	8120	**4H**	
DN 800 (32")	3800 3)	7600	**4P**	
DN 800 (32")	3800 3)	10 640	**4Q**	
DN 800 (32")	7600 4)	10 640	**4R**	
DN 900 (36")	5000 3)	10 000	**5B**	
DN 900 (36")	5000 3)	14 000	**5C**	
DN 900 (36")	10 000 4)	14 000	**5D**	
DN 1000 (40")	6000 3)	12 000	**5K**	
DN 1000 (40")	6000 3)	16 800	**5L**	
DN 1000 (40")	12 000 4)	16 800	**5M**	
DN 1200 (48")	9000 3)	18 000	**5T**	
DN 1200 (48")	9000 3)	25 200	**5U**	
DN 1200 (48")	18 000 4)	25 200	**5V**	

This device is shipped with a Quick Start guide and the SITRANS F manual CD containing the complete manual library. Printed Operating Instructions are available for purchase via PMD.

Selection and Ordering data	Order No.	Order code
Flowmeter SITRANS FUE380 (type-approved)	**7ME3410-**	
Flange norm and pressure rating		
System without sensor - only a transmitter		
EN 1092-1		
PN 16 (DN 100 ... DN 1200)	**C**	
PN 25 (DN 200 ... DN 1000)	**D**	
PN 40 (DN 50 ... DN 250)5)	**E**	
Compact/remote connection		
Compact version, max. 120 °C (248 °F)	**0**	
Remote version, max. 200 °C (392 °F)		
5 m (16.4 ft)	**2**	
10 m (32.8 ft)	**3**	
20 m (65.6 ft)	**4**	
30 m (98.4 ft)	**5**	
Approvals/pulse output		
Without approval (neutral) Selectable pulse output (following code can be 1 ... 9)	**0**	
With approval marks Selectable pulse output (following code can be 1 ... 9)	**1**	
With approval marks and seal Selectable pulse output (following code can be 1 ... 9)	**2**	
Without approval (neutral) Preset pulse output for FUE950 energy meter (following code must be 2 ... 6)	**3**	
With approval marks Preset pulse output for FUE950 energy meter (following code must be 2 ... 6, dimension depending)	**4**	
With approval marks and seal Preset pulse output for FUE950 energy meter (following code must be 2 ... 6)	**5**	
Pulse output value setup		
0.1 l/p (option for DN 50 ... DN 65) with 5 ms	**1**	
1 l/p (typical for DN 50 ... DN 65) with 5 ms	**2**	
2.5 l/p (typical for DN 80 ... DN 125) with 5 ms	**3**	
10 l/p (typical for DN 150 ... DN 250) with 5 ms	**4**	
50 l/p (typical for DN 300 ... DN 400) with 5 ms	**5**	
100 l/p (typical for DN 500 ... DN 1200) with 5 ms	**6**	
Optional pulse values		
250 l/pulse	**7**	
1 m³/pulse	**8**	
0.25 l/pulse	**9**	**N0A**
0.5 l/pulse	**9**	**N0B**
5 l/pulse	**9**	**N0C**
25 l/pulse	**9**	**N0D**
500 l/pulse	**9**	**N0E**
2.5 m³/pulse	**9**	**N0F**
5 m³/pulse	**9**	**N0G**
10 m³/pulse	**9**	**N0H**
25 m³/pulse	**9**	**N0J**
50 m³/pulse	**9**	**N0K**
100 m³/pulse	**9**	**N0L**
250 m³/pulse	**9**	**N0M**
500 m³/pulse	**9**	**N0N**
1000 m³/pulse	**9**	**N0P**

For notes 1) to 8) see next page

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Flowmeter SITRANS FUE380 with approval

Selection and Ordering data	Order No.	Order code
Flowmeter SITRANS FUE380 (type-approved)	**7ME3410 -**	
Transmitter SITRANS FUE080		
IP67/NEMA 4X/6 115 ... 230 V AC		**B**
IP67/NEMA 4X/6 3.6 V battery version, incl. dual battery pack		**D**
IP67/NEMA 4X/6 115 ... 230 V AC, including 3.6 V single battery backup		**E**
IP67/NEMA 4X/6 3.6 V battery version (no battery pack included)[6]		**G**
Country/approval type[7]		
Neutral, no approval mark		**A**
China		**C**
Denmark[8], EN 1434/OIML R 75		**E**
Finland[8], EN 1434/OIML R 75		**F**
Germany[8], EN 1434 (PTB approval, DN 80 ... DN 1200)		**G**
Russia, EN 1434/OIML R 75		**M**
Ukraine, EN1434/OIML R 75		**P**
MID-Approval, (EN 1434/OIML R 75), English		**R**
MID-Approval, (EN 1434/OIML R 75), German		**S**
MID-Approval, (EN 1434/OIML R 75), Polish		**T**
MID-Approval, (EN 1434/OIML R 75), French		**U**
Pulse width setup		
5 ms (standard)		**2**
10 ms		**3**
20 ms		**4**
50 ms		**5**
100 ms		**6**
200 ms		**7**
500 ms		**8**

1) Q_p (Q_n) is the normal flow according to the approval requirements. Q_p and Q_s is shown on the system label.

2) Pipe material bronze brass

3) EN 1434 flow values. The minimum flow (Q_i) should be checked in the PIA-selector or product master data base (PMD).

4) OIML R 75 flow values

5) PN 40 standard for DN 50 ... DN 80 die-cast bronze pipes

6) Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs.

7) Other countries in progress

8) In Europe the MID approval is the standard, please use following selections.

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering.

Selection and Ordering data	Order code
Additional information	
Please add „**-Z**" to Order No. and following add-on code(s) with plain text.	
Calibration / certificate FUE380	
Approval, verification and sealing as defined with the order number. See order code.	
Production calibration for DN 50 ... DN 1200 with Q_n as selected in diameter Calibration protocol: 2 x 3 points, Q_i, 10 % Q_p and Q_p (max. 4200 m^3/h).	**Included**
Accredited Siemens ISO/IEC 17025 calibration for DN 50 ... DN 200 with Q_n as selected in diameter. Certificate: 2 x 3 points, Q_i, 10 % Q_p and Q_p (max. 250 m^3/h).	**D20**
Accredited Siemens ISO/IEC 17025 calibration for DN 100 ... DN 500 with Q_n as selected in diameter. Certificate: 2 x 3 points, Q_i, 10 % Q_p and Q_p (max. 1300 m^3/h).	**D21**
Accredited Siemens ISO/IEC 17025 calibration, DN 300 ... DN 1200 with Q_n as selected in diameter. Certificate: 2 x 3 points, Q_i, 10 % Q_p and Q_p (max. 4200 m^3/h).	**D22**
Output B as reverse flow pulses. No calibration/verification.	**E21**
Material certificate	
EN 10204-3.1	**F10**
Tag name plate	
Stainless steel tag name plate, text length depends on font size: 8 mm up to 10 characters, 4 mm up to 20 characters, or 3 mm up to 30 characters (add plain text)	**Y17**

Flowmeter SITRANS FUE380 operating instructions, accessories and spare parts

Operating instructions

Description	Order No.
• English	**A5E00730100**
• German	**A5E00740611**
• Spanish	**A5E00754188**
• French	**A5E00754173**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F US literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

For accessories and spare parts on page 4/224 see chapter of transmitter FUS080/FUE080.

Please use online Product selector to get latest updates.
Product selector link:
www.pia-selector.automation.siemens.com

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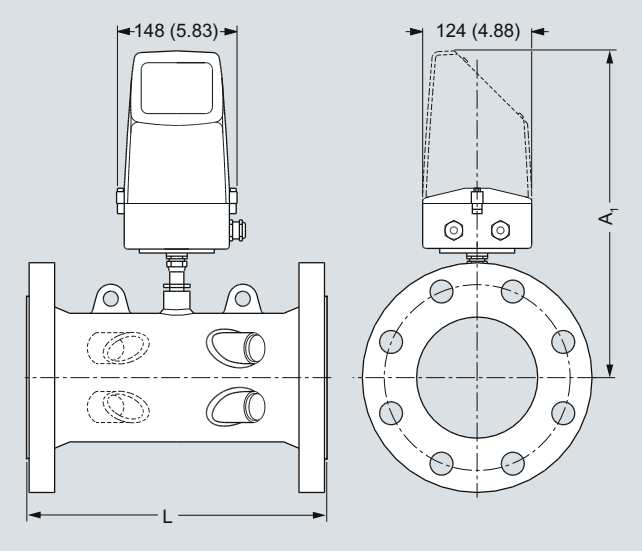
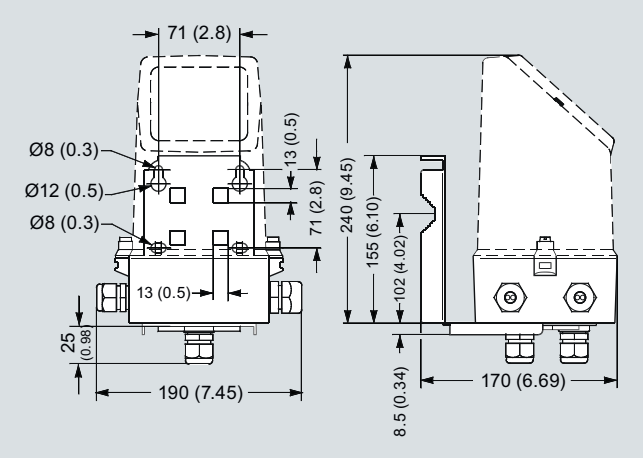
Flowmeter SITRANS FUS380 and FUE380

Dimensional drawings



Transmitter IP67/NEMA 4X/6, wall mounting



DImensions in mm (inch)

Pipe Dimensions for FUS380 and FUE380

Nennweite	PN 16		PN 25		PN 40			
	L	Gewicht	L	Gewicht	L	Gewicht	A1	Hebevorrich-tung
DN	mm	kg	mm	kg	mm	kg	mm	
50	-	-	-	-	300 +0/-2	10	350	No
65	-	-	-	-	300 +0/-2	15	360	No
80	-	-	-	-	350 +0/-3	18	370	No
100	350 +0/-2	15	-	-	350 +0/-3	18	375	No
125	350 +0/-2	18	-	-	350 +0/-3	24	380	No
150	500 +0/-3	28	-	-	500 +0/-3	34	390	No
200	500 +0/-3	38	500 +0/-3	47	500 +0/-3	55	414	No
250	600 +0/-3	60	600 +0/-3	76	600 +0/-3	91	440	No
300	500 +0/-3	66	500 +0/-3	81	-	-	466	Yes
350	550 +0/-3	94	550 +0/-3	121	-	-	495	Yes
400	600 +0/-3	124	600 +0/-3	153	-	-	507	Yes
500	625 +0/-3	176	625 +0/-3	235	-	-	558	Yes
600	750 +0/-3	244	750 +0/-3	292	-	-	609	Yes
700	875 +0/-3	258	875 +0/-3	416	-	-	660	Yes
800	1000 +0/-3	338	1000 +0/-3	562	-	-	710	Yes
900	1230 +6/-6	475	1300 +6/-6	835	-	-	810	No
1000	1300 +6/-6	594	1370 +6/-6	1078	-	-	910	No
1200	1360 +6/-6	860	-	-	-	-	1110	No

Notes:
- Weight for transmitter/electronics 1.5 kg
- - Means not available
- All weigths are **approximate**
- For flange values - see norm EN 1092-1

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Nennweite	PN 16		PN 25		PN 40			
	L	Gewicht	L	Gewicht	L	Gewicht	A1	Hebevor-richtung
inch	inch	lb	inch	lb	inch	lb	inch	
2	-	-	-	-	11.81 +0/-0.08	22	14	No
2½	-	-	-	-	11.81 +0/-0.08	33	14.4	No
3	-	-	-	-	13.78 +0/-0.08	40	14.8	No
4	13.77 +0/-0.08	33	-	-	13.77 +0/-0.12	40	15	No
5	13.77 +0/-0.08	40	-	-	13.77 +0/-0.12	53	15.2	No
6	19.68 +0/-0.12	62	-	-	19.68 +0/-0.12	75	15.6	Yes
8	19.68 +0/-0.12	84	19.68 +0/-0.12	104	19.68 +0/-0.12	121	16.30	Yes
10	23.62 +0/-0.12	132	23.62 +0/-0.12	168	23.62 +0/-0.12	201	17.32	Yes
12	19.68 +0/-0.12	146	19.68 +0/-0.12	179	-	-	18.35	Yes
14	21.65 +0/-0.12	207	21.65 +0/-0.12	267	-	-	19.8	Yes
16	23.62 +0/-0.12	273	23.62 +0/-0.12	337	-	-	19.96	Yes
20	24.61 +0/-0.12	419	24.61 +0/-0.12	538	-	-	21.97	Yes
24	29.53 +0/-0.12	668	29.53 +0/-0.12	805	-	-	23.98	Yes
28	34.45 +0/-0.12	796	34.45 +0/-0.12	1217	-	-	25.98	Yes
32	39.37 +0/-0.12	1089	39.37 +0/-0.12	1698	-	-	27.95	Yes
36	48.43 +0/-0.24	1047	51.18 +0/-0.24	1841	-	-	32.4	No
40	51.18 +0/-0.24	1310	53.94 +0/-0.24	2376	-	-	36.4	No
48	53.54 +0/-0.24	1892	-	-	-	-	44.4	No

Notes:
- Weight for transmitter/electronics 3.3 lb
- - Means not available
- All weigths are **approximate**
- For flange values - see norm EN 1092-1

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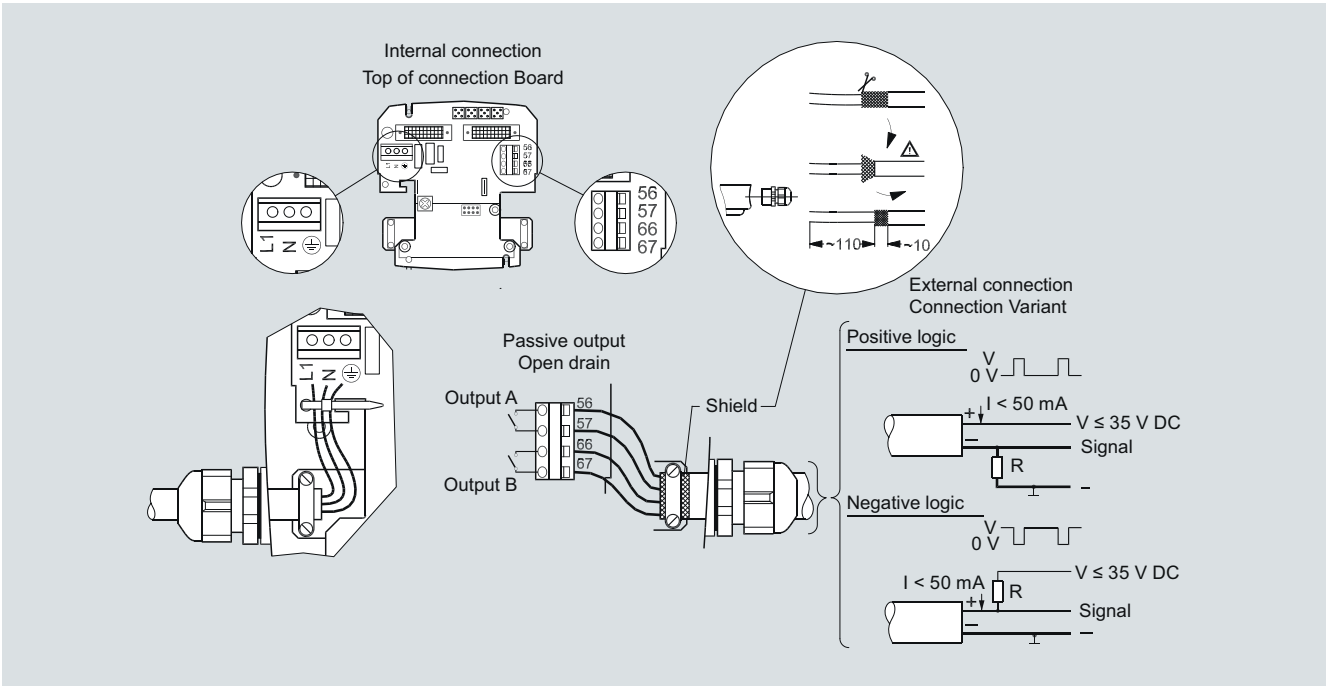
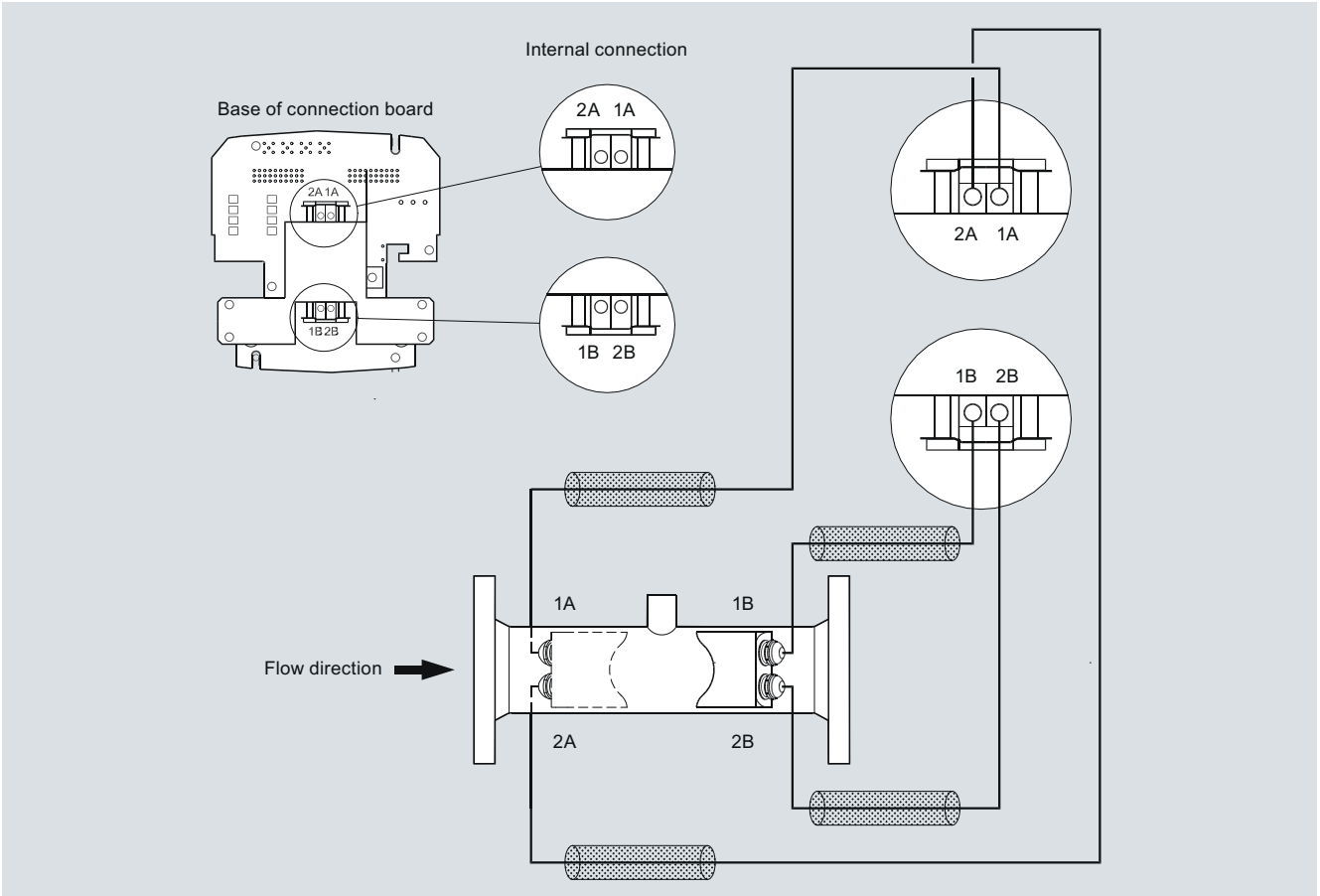
Schematics



Electrical connection of transmitter SITRANS FUS/FUE380



Electrical connection of sensor SITRANS FUS/FUE380

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Overview

SITRANS FUE950 is a universal thermal energy calculator, which meets the requirements EN 1434 and has the MID and PTB K7.2 approval for energy metering with the media water.

SITRANS FUE950 has been developed for the SITRANS FUS380/ FUE380 and alternatively MAG 5000/6000 or FST020. SITRANS FUE950 is modular in construction and can by order be fitted with optional modules depending on the application. The FUE950 supports none of the SITRANS FX, FC products and only some of the FUS clamp-on products.

Benefits

Basic functions

- Prepared for heating, cooling measurement
- Approval for MID for heat metering and PTB K7.2 for cooling
- High-accuracy thermal energy metering, meets EN1434 requirements
- Measured temperature range -20 … +190 °C (-4 … +374 °F)
- Instantaneous values for energy/volume flow
- Battery or mains powered
- Battery version with battery lifetime of typical 10 years
- Optical data interface
- Real date and time
- Auto-detection of 2-wire or 4-wire temperature sensors

Additional functions

- Individual tariff functions
- Advanced functions for cooling/heating applications or the combination
- Memory for 24 periods (months, weeks, days)
- Data logger function
- Expandable functionality with 2 optional plug and play add-on modules
- Communication over M-Bus, RS485 or RS232

Add-on modules

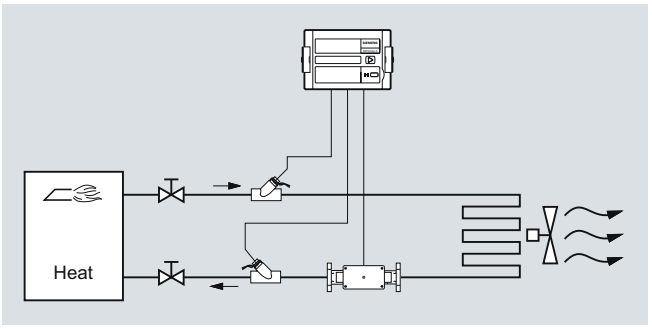
- Plug-in module with 2 extra pulse inputs
- Plug-in module with 2 pulse outputs
- Plug-in module with combination of input and output pulses
- Plug-in module for M-Bus communication
- Plug-in module for RS232 or RS485 communication
- Plug-in module with 2 passive current outputs (4 ... 20 mA)

Application

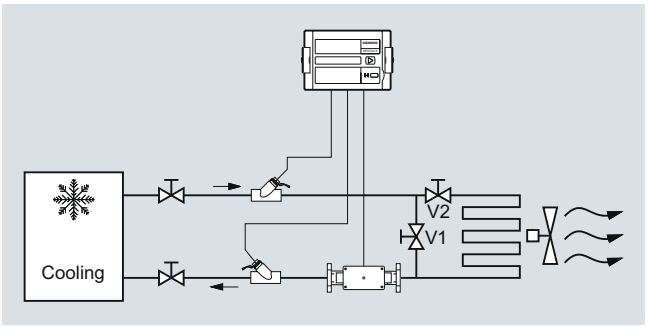
The SITRANS FUE950 is able to handle 3 kinds of applications, means energy calculation in:

- District heating applications
- Chilled water applications
- Combined cooling/heating applications

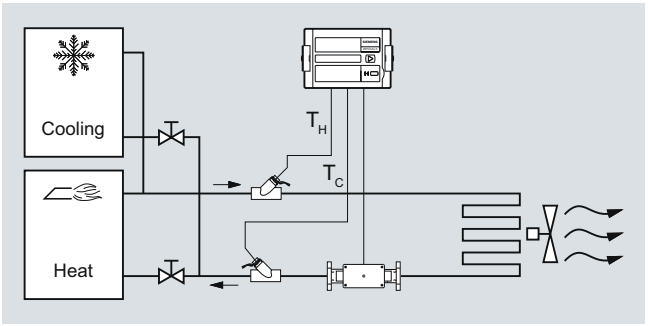
Energy metering in heating, hot water applications (code "A" and "B")



Energy metering in cooling, chilled water applications (code "C" and "D")



Energy metering in combined cooling/heating applications (code "E" and "F")



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SITRANS FUE950 energy calculator

Design

SITRANS FUE950 has an easy-read 8-digit LCD display with associated pictograms for the various functions. As the display has been made for several applications, there will be figures/symbols which are not used for normal district heating applications.

SITRANS FUE950 has a SIMPLE OPERATION push button and provides user-friendly control of various the display menu loops. The display will always be configured for the application chosen, and for the selected display settings.

The integrator has an IP54 plastic housing and is designed for wall or panel mounting. The housing comes with prepared rubber gaskets cable entries for fast and easy installation.

Operation menu loop structure

The FUE950 display has six menu loops and the menus are numbered in the display from 1 to 6. Some display menus consist of two values (to maximum seven) that are shown alternately at 4-second intervals.

The main menu loop no. 1 with the current data, e.g. for energy, volume, flow rate and temperature, is programmed as default setting.

In the combined heating/cooling configuration the menu loop no. 5 (tariff menu loop) will be activated additionally.

Display and output pulses

Units: MWh, GJ, Gcal, MBtu, m^3, gal, m^3/h, GPM, °C, °F and kW; all decimal points are statically (the unit "gal" is shown with factor x 100).

The display unit and the last fractional digit are typical used for the pulse outputs.

Function

Technical principle

Calculation of energy is based on the following formula:

Energy = Volume x (T_{Hot} - T_{Cold}) x K_{factor} (T_i)

Volume: Volume [m^3] of a given amount of volume pulses

T_{Hot}: Measured temperature in the hot line

T_{Cold}: Measured temperature in the cold line

K_{factor} (T_i): Thermal coefficient of media enthalpy and heat content

The energy calculation is made by a counter and depends on temperature difference, pulse input frequency and legal requirements.

The calculator always carries out at least one energy calculation every 2 seconds. If the connected flowmeter has not sent enough pulses the energy calculation and flow indication is also based on the 8 seconds value.

Data memory

The FUE950 has a history memory of 24 periods (months, weeks, days). The following values are stored monthly, weekly or daily in the EEPROM on the programmed day of 1…31 (via software tool).

- Date/Time
- Energy
- Tariff energy 1
- Tariff energy 2
- Tariff definition 1
- Tariff definition 2
- Pulse counter input 1
- Operation hours
- Volume
- Error day counter
- Maximum monthly flow rate
- Maximum monthly power
- Date of maximum monthly flow rate
- Date of maximum monthly power
- Pulse counter input 2

Data logger memory (LOG)

The LOG of the calculator is stored every 24 hours with all cumulative values in the EEPROM. The storage frequency can be selected from various storage intervals (5, 6, 10, 12, 15, 20, 30, 60 minutes or the default setting of 24 hours). The data which are stored in the LOG could be read out using a software tool and can be used for evaluations.

Extract of possible LOG settings

Storage interval	Values	Number of data records	Recording period
5 minutes	• Error status • Overload time temperature • Overload time flow rate • Forward temperature • Return temperature • Date and time • Energy • Tariff energy 1 • Tariff energy 2 • Tariff definition 1 • Tariff definition 2 • Volume • Error day counter	440	36.6 hours
15 minutes		440	110 hours
1 hour		440	18.3 days
24 hours (default setting)		440	440 days

Maximal Values

The integrator creates max. values for power and flow rate based on consumption time, which are stored in the EEPROM. The integration intervals are adjustable to 6, 15, 30 or 60 minutes and 24h. Default setting is 60 minutes.

Tariff/Accounting date function

The calculator includes two independent memories in which the accumulated energy at two programmable tariff dates are stored.

- Last accounting date
- Last but one accounting date

Values stored

- Energy
- Volume
- Tariff counter 1
- Tariff counter 2
- Pulse counter 1
- Pulse counter 2
- Date

The integrator offers two optional tariff memories for monitoring plant load states. Here it concerns threshold value tariffs. Extensive tariff conditions make it possible to adapt the calculator individually to the required customer-specific applications.

Both tariffs are separately configurable and independent from each other. Energy or time can be measured alternatively per tariff register dependent on the tariff mode adjusted in each case.

With the "time triggered tariff function" the switch-on time and the switch-off time are adjustable independent from each other for each day of the week in steps of 15 minutes.

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The following limit types of the tariff function are possible: (This example applies to the display at 1 fractional digits after comma)

Type	Description	Limit	Limit resolution
dT	Temperature difference	1 ... 190 °C	1 °C
-dT	Negative temperature difference	1 ... 190 °C	1 °C
TR	Return temperature (low)	1 ... 190 °C	1 °C
TV	Forward temperature (high)	1 ... 190 °C	1 °C
P	Power	10 ... 2 500 kW	10 kW
Q	Flow	1 ... 255 m^3/h	1 m^3/h
FE	"Theoretically forward energy" with return temperature of 0 °C		
Z	"Time triggered" counting energy		
E	"External" counting energy		

Error handling and memory

Events such as changes and faults are stored in a non-volatile memory with a capacity of up to 127 entries. The following events are recorded:

- Checksum error
- Temperature measurement error
- Error hours
- Start and end of test mode

If SITRANS FUE950 records an error, this will be automatically indicated by a "alarm symbol" on the display.

To protect the reading data, all the relevant data are saved in a non-volatile memory (EEPROM). This memory saves the measured values, device parameters and types of error at regular intervals.

The following events are recorded:

- Temperature sensor error
- Swapped hot and cold temperature sensors
- Battery low warning
- Power supply failure
- Optical communication warning
- RAM checksum error

Outputs/Inputs/Communication

Communication interfaces:

SITRANS FUE950 is fitted with an optical infra-red send/receive port in accordance with EN1434/IEC 61107, protocol standard, EN1434/EN 60870-3 (M-Bus protocol).

A reader head with a permanent magnet (IrDA-adapter) in accordance with EN 1434 can be used for readout data or communication with the parameterization software.

2 ports for optionally plug-in modules

The calculator features 2 ports for the plug-in modules.

One slot is for the function modules and the other for the communication modules.

Communication modules

The following communication modules are available as options: RS232 module, RS485 module and M-Bus module. The RS232 and RS485 communication modules are serial interfaces and permit data exchange with the calculator. For this purpose a special data cable is necessary.

The M-Bus module is a serial interface for communication with external devices (M-Bus Master/Centre). According to the M-Bus structure a number of calculators can be connected to a control centre.

Pulse input module

Two pulse inputs are available. The pulse value and the unit is configurable for energy, water, gas or electrical meter by parameterization software. Data are separate cumulated in different registers and are also stored on the two accounting day's (Tariff registers).

Combined Pulse Input/Output module

Two pulse inputs combined with one pulse output are available on one module. The pulse inputs are configurable with value and the unit by parameterization software.

The pulse output is also programmable using the parameterization software.

Pulse output

The calculator provides levels for two optional external pulse outputs, which can be freely programmed using the parameterization software tool.

Default setting is one pulse occurs per change in the least significant digit in the display with the unit and resolution selected by the device ordering.

Possible pulse output values

- Energy (default setting)
- Volume (default setting)
- Tariff energy 1
- Tariff energy 2
- Tariff condition 1, limit switch
- Tariff condition 2, limit switch
- Energy error
- Volume error
- Volume with specific resolution (0.1, 1.0, 10 or 100)
- Energy with specific resolution (0.1, 1.0, 10 or 100)

Combined current output module

Optional module with 2 passive 4 ... 20 mA outputs.

Possible output values:

- Power (default setting for output #1)
- Flow (default setting for output #2)
- Hot, cold or difference temperature

The settings can be configured by parameterization software. The current output module occupies both ports, means no other plug-in module will possible to plug in.

Module combinations

The calculator has a group of extension modules for communication and another group of extension modules for additional functionality. These modules are available first selected within the calculator, or for retrofitting in the field.

One single function module as well as one single communication module out of following modules is selectable.

Function modules:

- Pulse input module, 2 inputs
- Pulse output module, 2 outputs
- Combined pulse module 2 inputs, 1 output
- Combined current output module, 2 x passive 4 ... 20 mA (occupies both ports)

Communication modules:

- M-Bus (M-Bus protocol according EN 1434-3)
- RS232 (M-Bus protocol according EN 1434-3)
- RS485 (M-Bus protocol according EN 1434-3)

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SITRANS FUE950 energy calculator

Integration

SITRANS FUE950 is a multi-purpose energy calculator for media water which meets the requirements of EN 1434. Further, the energy calculator has been specially developed to work with the volume pulses from SITRANS FUS380/FUE380 or alternatively MAG 5000/6000 or FST020 transmitter.

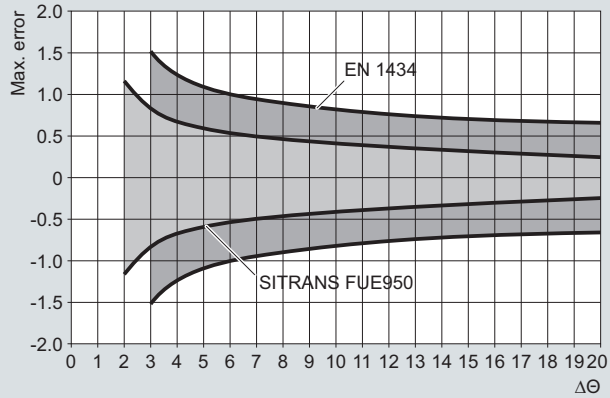
Technical specifications

Approval	MID approved in accordance with energy meter EN 1434 and PTB K7.2 (German national cooling approval)
Approved temperature range	
• Heating	0 ... 180 °C (32 ... 356 °F)
• Cooling	0 ... 105 °C (32 ... 221 °F)
Absolute temperature range	-20 ... +190 °C (-4 ... -374 °F)
Differential temperature	
• Heating	3 ... 177 K (starting at 0.1 K)
• Cooling	3 ... 102 K
Measuring accuracy	Meets requirements of EN1434 Typically max. ± (0.5 + 3K/ΔΘ) [%] of measured value
Flow range	Depends on pulse input value (IN0), see "Selection and Ordering data".
Power range value	Depends on pulse input value as follow:

Pulse input value (l/P or gal/P)	Max power [kW]
1	15 000
2.5	15 000
5	15 000
10	150 000
25	150 000
50	150 000
100	1 500 000
250 *)	1 500 000
500 *)	1 500 000
1 000 *)	15 000 000

*) not available for gal/pulse

Typical accuracy of FUE950



User interface (always included)	
Display	8-digit LCD display with associated pictograms/symbols
Units	MWh, GJ, Gcal, MBtu, m^3, m^3/h, GPM, gal, °C, °F, kW (gal is shown with factor x 100)
Totalizer value range	99 999 999 or 9 999 999.9 (0 and 1 digit after comma). Display digits: Flow in 6 digits; Volume, power and energy in 8 digits
Values	Power, energy, volume, flow rate, temperatures
Push button	Single push button for the menu controlling
Optical interface IrDA interface	ZVEI optical interface with M-Bus protocol as per EN1434, connection via separate IrDA-adapter Baud rate: 300 or 2400
Rated operation conditions	
Enclosure	IP54 in accordance with IEC 529
Material	
• Housing	C Lexan 141R (or similar); colors: light gray (top part) and black (bottom part)
• Pipe/wall fitting	PA 6,6 GF25 (or similar)
• Other plastic parts	ABS Cycolac GPM500 (or similar)
• Gaskets	Neoprene and rubber cable bushings: EPDM 50
• Rubber cable bushings	EPDM 50
Temperature	
• Ambient	0 ... 55 °C (32 … 131 °F)
• Storage	-25 ... +70 °C (-13 … +158 °F)
Environment class	
• Mechanic class	M1
• Electromagnetic class	E1 (MID) or C (DIN EN 1434)
Temperature input (always included)	
Function	The temperature sensors must be connected to terminals 1-5 and 6-2 (TH) and 3-7 and 8-4 (TC) depending on cable type (2-wire or 4-wire).
Temperature range Absolute measuring range	-20 ... 190 °C (-4 … 374 °F) for T_H and T_C
Temperature difference	Start 0.1 K, min. 3 K, max. 177 K
Measurement resolution	0.125 K
Display resolution	T_H and T_C: 1 K ΔT: 0.1 K
Sensor types	Pt100 or Pt500 as 2-wire or 4-wire; Standard is Pt500. Sensor cable length: up to 10 m (according EN 1434 and MID-type approval).
Sensor connection	4-wire or 2-wire; auto detection of connection version
Flow input (In 0) (always included)	
Function	Used as standard for flow input of the external flowmeter. The input is marked as 10 (+ Flow Pulse), 11 (- Gnd) on the terminal strip. Note: The pulse input value selection must be the same as the pulse output setting of the flowmeter.

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Pulse value	1 ... 1 000 l/pulse or 1 ... 100 gal/pulse, selection by order code. Will be shown at the device label
Pulse frequency	≤ 100 Hz (200 Hz)
Pulse ON-time	≥ 3 ms
Pulse OFF-time	≥ 2 ms
Type	Active pulse input
Terminal voltage	3.6 V DC (supplied internally by FUE950)
Flowmeter installation place	The flowmeter installation place can be in the hot line or cold line ("forward or return pipe") selected by order code. The "installation place" will be shown at the device display and nameplate
Connected cable	Max. 10 m (shielded cables recommended)
Ports for option modules	
Type	The calculator features 2 ports for optional plug-in modules. Port 2 for one of the function modules and port 1 for one of the communication modules.
Function modules (Port 2)	• Pulse input module, 2 inputs (In1, In2) • Pulse output module, 2 outputs (Out1, Out2) • Combination module of 2 inputs (In1, In2) and 1 output (Out1)
Current output module (Port 1)	2 passive 4 ... 20 mA (#1, #2) (occupies both port 1 and 2)
Communication modules (Port 1)	M-Bus, RS 232 or RS 485 (M-Bus protocol, according EN 1434-3)
Pulse output (Optional module on port 2)	
Function	The module contains connections for 2 pulse outputs, which can be programmed as desired using a software tool. The pulse outputs are marked as standard as O1, 'gnd' and O2, 'gnd' on the terminal strip and Out1 respectively Out2 in the display.
Type	Passive "open collector" pulse output, outputs potential isolated to each other
Pulse value	Last significant digits of the display (unit/pulse), selection by order code and setting can be read via display menu, settings changeable via software tool
Pulse output 1	
• Pulse frequency	≤ 4 Hz
• Pulse width	100 ... 150 ms
• Pulse duration	125 ms ± 10 %
• Pulse break	125 ms ± 10 %
Pulse output 2	
• Pulse frequency	≤ 100 Hz, depending on the selected pulse length
• Ratio	Pulse duration/pulse break ~1:1
Pulse length	5, 10, 50, 100 ms (default: 5 ms)
External voltage supply	3 … 30 V DC
Current	≤ 20 mA with a residual voltage of ≤ 0.5 V

Possible pulse output selection	• Energy (default setting for 'Out1') • Volume (default setting for 'Out2') • Tariff energy 1 • Tariff energy 2 • Tariff condition 1 (limit switch) • Tariff condition 2 (limit switch) • Energy error • Volume error • Volume with specific display resolution (or with factor 0,1, 10 or 100 thereof) • Energy with specific display resolution (or factor 0.1 thereof)
Pulse input (Optional module on port 2)	
Function	Add-on module for two additional counters. The pulse input 1 is marked as I1, 'gnd' and the input 2 as I2, 'gnd' on the terminal strip and indicated in the display as separate registers IN1 and IN2 and can also be transferred via the communication modules.
Type	Passive "open collector" pulse inputs, outputs not potential isolated to each other, data are separate cumulated in different registers and are also stored on the two accounting day's.
Pulse value	Pulse value and the unit are configurable for energy, water, gas or electrical meter by a software tool Default: Pulse input 0.1 m^3 or 1 gal (if unit 'gal' is ordered with the Z-option "L05")
Pulse frequency	≤ 8 Hz
Pulse length	≥ 10 ms
External voltage supply	3 V DC (supplied internally by FUE950)
Current	based on R_i = 2.2 MΩ
Cable length	< 10 m connection limit
Current output module (Optional on port 1 and 2, both ports are occupied)	
Function	The module contains connections for 2 passive current outputs, which can be programmed individually using the software tool. The outputs are marked „#1" and „#2" with corresponding polarity „+" and „-" on the terminal strip.
Terminal voltage	External supply: 10 … 30 V DC (passive output)
Signal range	4 … 20 mA; 4 mA = 0 value and 20 mA = default maximum values (for #1: Power in kW and for #2: Flow with the max. values and selected unit). Defaults: For power it is the max. selectable value x 100 000 the last digit of display (e. g. 20 mA = 10 000.0 kW (1 digit res.) or 100 000 kW (0 digit res). For flow it is the max. selectable value x 10 000 the last digit of display (e. g. 20 mA = 1 000.0 m^3/h (1 digit res.) or 10 000 m^3/h (0 digit res.).

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SITRANS FUE950 energy calculator

Load	Max. 800 Ω
Upper limit	Up to 20.5 mA (exceed causes the error current value)
Signal on alarm	Errors are indicated with 3.5 mA or 22.6 mA (programmable, default: 3.5 mA)
Output values	Power, flow, temperature (configuring via software tool; default: for #1: Power and for #2: Flow)
M-Bus output (Optional module on port 1)	
Type	The optional M-Bus plug-in module is a serial interface for communication with external devices (M-Bus Repeater)
Protocol	M-Bus according EN1434-3
Connection	The connection is not polarity-conscious and is electrically isolated, connection of 2 x max. 2.5 mm^2 wires, 300 or 2400 baud (auto baud detection), current drawn: one M-Bus load. M-Bus address: Each port has its own primary M-Bus address. The secondary address is unique for each calculator and is factory-set to equal the serial number.
RS232 output (Optional module on port 1)	
Type	The optional module RS232 is a serial interface for data transmission with external devices, e.g. PC; Baud rate: 300 or 2400. The module contains a 3-pole terminal strip with terminals marked 62 (TX), 63 (RX) and 64 (GND). For this purpose a special data cable is necessary.
Protocol	M-Bus according EN1434-3
Connection	The module contains a 3-pole terminal strip with terminals marked 62, 63, 64 (max. 2.5 mm^2); Connected cable length: max 10 m; For communication with a PC a special adapter cable is required (order no. A5E02611774).
RS485 output (Optional on port 1)	
Function	The optional RS 485 module is a serial interface for data transmission with external devices, e.g. PC; Baud rate: 2400. The module contains a 4-pole terminal strip with terminals marked D+, D-, Vcc and GND.
Protocol	M-Bus protocol according EN 1434-3
Connection	Terminals D+ and D-; electrically isolated; 2400 baud only. An external supply of 12 V DC ± 5 V (<5 W) is needed for the module (terminals Vcc and GND). The module terminals are max. for 2.5 mm^2 wires. Connected cable length: max. 10 m
Power consumption	
230 V and 24 V versions	Typical current appr. 0.15 VA
3.6 V D-cell battery	Typical battery lifetime 10 years under normal conditions (no add-on modules, max. 40 °C ambient temperature)
Supply data	Internal voltage 3.6 V by the battery or plug-in power supply module
Battery, 3.6 V type (option)	3.6 V lithium D-cell, battery lifetime typically 16 years with independently powered flowmeter
230 V AC module (option)	Plug-in module for 230 V AC (195 ... 253 V AC), 50/60 Hz (incl. battery backup)
24 V AC module (option)	Plug-in module for 24 V AC (12 ... 30 V AC) (incl. battery backup)
Battery backup (option)	Only with mains supply modules by internal 3.0 V lithium battery (type CR 2032) Displayed values, date and time are still updated, but the measuring functions have stopped, including the flow rate measurement. Communication via optional modules M-Bus, RS485, RS232 or optical interface is maintained, affecting the backup battery lifetime.

Accessories/Software

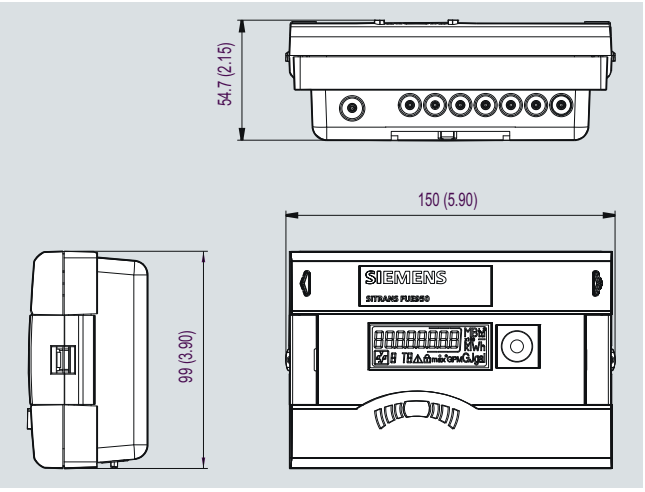
The parameterization software based on the M-Bus is a convenient tool for handling the calculator. It runs on Windows® and is used for:

- Configuration of the calculator functionality, reading out different memories, printing out calculator logs (standard).
- Expert programming of the device (advanced setup).
- Lap test programming of the device (full setup)

Configuration of the calculator functionality, reading out different memories, printing out calculator logs. For further details please contact your local Siemens representative.

A reader head with a permanent magnet in (IrDA adapter with bluetooth) accordance with EN 1434 can be used for programming/altering programming of readout data, configuration data, etc. The reader head can also be used to change measuring data.

Dimensional drawings



SITRANS FUE950, dimensions in mm (inch)

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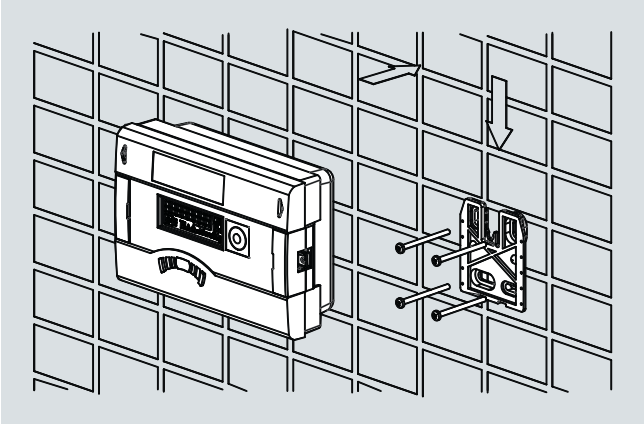
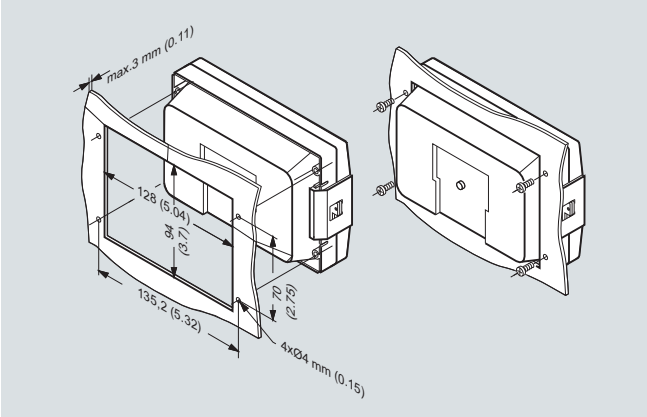


Wall mounting



Panel mounting, dimensions in mm (inch)

Pt500 temperature sensor pairs

Application

The temperature sensor set is designed for use with the Siemens energy calculator type SITRANS FUE950 for measurement of the energy consumption in a district heating or cooling net.

Temperature sensors are one of the integral components of every thermal energy meter in heating or cooling applications. They are used for determining temperature changes in fluids due to energy taken from or supplied to the loop. The temperature is thus measured by mounting temperature sensors upstream and downstream from the point where the exchange in the thermal energy of the system is.

To ensure an accurate measurement of the temperature difference according to MID (EN 1434) or PTB K7.2 the sensors are delivered as matched pairs.

By selection with the order code the Pt500 sensor pair sets can be delivered with heating approval or with approvals for combined heating/cooling applications.

Technical specifications

Temperature sensor pairs:

2-wire Pt500

Pt500 2-wire temperature sensor pair (EN 1434)	
Measuring insert	Pt500 temperature sensor, EN 60751, tolerance class B, 2-wire
Pairing	Paired to EN1434 (10 ... 130 °C/14 ... 266 °F)
Media temperature	0...150 °C (32 ... 302 °F)
Response time $T_{0.5}$	See sensor pocket specifications
Medium	Typically heating water
Pressure rating	See sensor pocket specifications
Protection	IP65
Pipe material	AISI 304Ti/1.4303
Dimension	∅ 6 mm
Sensor tube length	50 mm
Cable length	2, 3, 5 or 10 m (6.56, 9.84, 16.4 or 32.8 ft), fixed connected

4-wire Pt500

Pt500 4-wire temperature sensor pair (with MID and PTB K7.2 approval)	
Measuring insert	Pt500 temperature sensor, EN 60751, tolerance class to ISO 751 Class B; 4-wire
Pairing	Matched paired according to EN 1434 at 10, 75 and 140 °C (50, 167 and 284 °F)
Type approval	MID (DE-06-MI004-PTB011) and PTB K7.2 (PTB 22.77/09.01). Only to be mounted with related sensor pockets according to the type approvals.
Media temperature	0...150 °C (32 ... 302 °F)
Permissible temp. pair range for ΔT	
• Heating	3 ... 150 K
• Cooling	3 ... 85 K
Medium	Approved for heating/cooling water
Protection	IP65
Environment	
• Mechanic class	M3
• Electromagnetic class	E1 (MID)
Pressure rating	See sensor pocket specifications
Material	
• Protective tube	Stainless steel AISI 304Ti/1.4571 (or similar), diameter of protective tube: 6 mm
• Connector cable	Silicon, connection wire terminals Terminal sleeves to DIN 46228
Sensor tube length	140 or 230 mm (5.51 or 9.06 inch)
Cable length	5 m (16.4 ft), fixed connected

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SITRANS FUE950 energy calculator

Sensor pockets

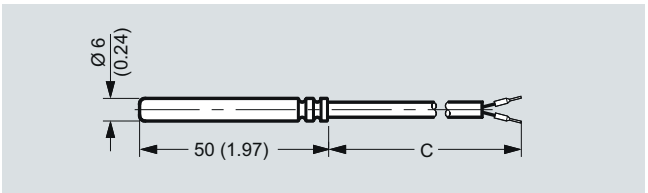
Stainless steel sensor pocket (for 4-wire Pt500 types only)	
Media temperature	0 ... 150 °C (32 ... 302 °F)
Approval	Approved only together with 4-wire sensors
Medium	Approved for heating/cooling water; up to max. 5 m/s flow velocity
Pressure rating	PN 40
Length	Face-to-face length 120/135 and 210/225 mm (4.72"/5.23" and 8.27"/8.86")
External diameter	Protective tube 8/11 mm (0.32"/0.43")
Internal diameter	Protective tube 6 mm (0.24")
Pipe connection	Thread G 1/2" (with sealing screw for sensor)
Material	Protective tube AISI 316Ti/1.4571 (or similar)
Use	• Use with related 4-wire Pt500 sensors only (according type approval) • For flow velocities up to 5 m/s • Recommended to install with welded sleeve (according to EU standard)

Stainless steel sensor pocket (for 2-wire Pt500 types only)					
Media temperature	0 ... 180 °C (32 ... 356 °F)				
Medium	Approved for heating water				
Response time $T_{0.5}$	Typically 13 s at 0.4 m/s with pasta Typically 5 s at 0.4 m/s without pasta				
Pressure rating	PN 25				
Length	L1 (mm)	92	127	168	223
	L (mm)	82	117	155	210
Material	Stainless steel: AISI 316Ti/1.4571				
Use	For 2-wire Pt500 types only				

Brass sensor pocket (for 2-wire Pt500 types only)				
Media temperature	0 ... 150 °C (32 ... 302 °F)			
Medium	Approved for heating water			
Response time $T_{0.5}$	Typically 9 s at 0.4 m/s with pasta Typically 5 s at 0.4 m/s without pasta			
Pressure rating	PN 16			
Length	L1 (mm)	47	92	127
	L (mm)	40	82	117
Material	Brass: $CuZn_{40}Pb_2$ (Ms58)			
Use	For 2-wire Pt500 types only			

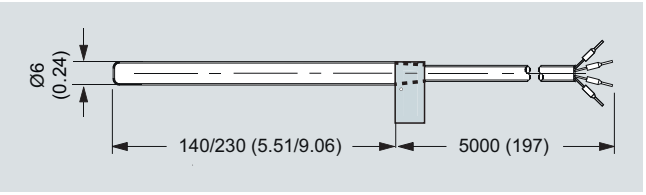
Dimensional drawings

Pt500 2-wire temperature sensor pair (EN 1434)	
Cable length	2, 3, 5 or 10 m ('C' at the dimensional drawing)



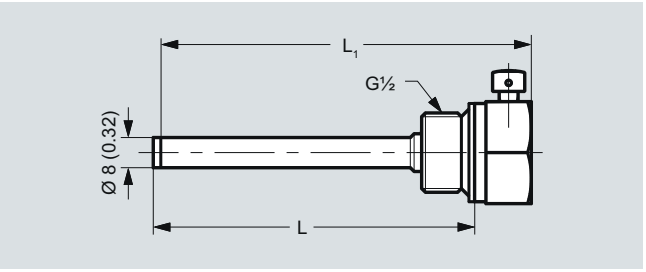
Pt 500 2-wire temperature sensor, dimensions in mm (inch)

Pt500 4-wire temperature sensor pair (with MID and PTB K7.2 approval)



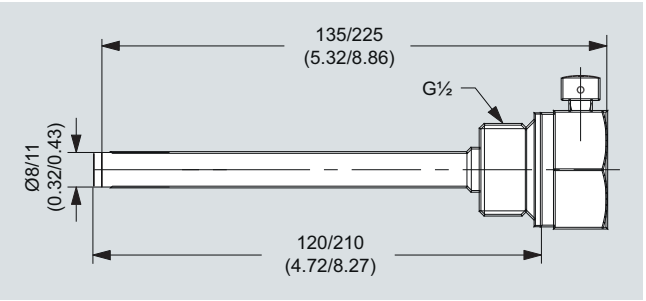
Pt500 4-wire temperature sensor, dimensions in mm (inch)

Stainless steel sensor pocket (for 2-wire Pt500 types only)					
Length	L1 (mm)	92	127	168	223
	L (mm)	82	117	155	210



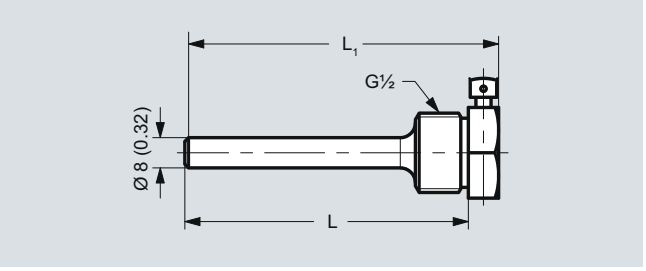
Sensor pocket (for 2-wire Pt500 types only), stainless steel, dimensions in mm (inch)

Stainless steel sensor pocket (for 4-wire Pt500 types only)



Stainless steel sensor pocket, dimensions in mm (inch)

Brass sensor pocket (for 2-wire Pt500 types only)				
Length	L1 (mm)	47	92	127
	L (mm)	40	82	117



Sensor pocket, brass (for 2-wire Pt500 types only), dimensions in mm (inch)

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Selection and Ordering data	Order No.	Order code
Energy calculator SITRANS FUE950, MID or PTB K7.2 custody transfer approved	**7ME3480 -**	

Flow input setting (In 0)
(The pulse input value selection must be the same as the pulse output setting of the selected flowmeter)

Pulse input in l/pulse or in gal/pulse (with option L05)	Flow limit Q_{max} in m^3/h	Flow limit Q_{max} in GPM *) (with option L05)		
1	360	6 000	(In l/p recommended selection for MAG: DN 2 ... 65 and FUS380/FUE380: DN 50 ... 65)	**2 A**
2.5	900	15 000	(In l/p recommended selection for MAG and FUS380/FUE380: DN 80 ... 125)	**2 B**
5	1 800	30 000		**2 C**
10	3 600	60 000	(In l/p recommended selection for MAG and FUS380/FUE380: DN 150 ... 250)	**3 A**
25	9 000	150 000		**3 B**
50	18 000	300 000	(In l/p recommended selection for MAG and FUS380/FUE380: DN 300 ... 400)	**3 C**
100	36 000	600 000	(In l/p recommended selection for MAG and FUS380/FUE380: DN 500 ... 1200)	**4 A**
250	90 000	-	(In gal/pulse and GPM not available)	**4 B**
500	180 000	-	(In gal/pulse and GPM not available)	**4 C**
1 000	360 000	-	(In gal/pulse and GPM not available)	**5 A**

*) GPM = Gallons per minute

Calculator application/Flowmeter installation place	
For heating, flowmeter in return pipe (cold pipe), typical standard	**A**
For heating, flowmeter in forward pipe (hot pipe)	**B**
For cooling, media water, flowmeter in forward pipe (cold pipe)	**C**
For cooling, media water, flowmeter in return pipe (hot pipe)	**D**
For combined cooling/heating, flowmeter in forward pipe (hot pipe as heating) (MID conformity declaration for heating)	**E**
For combined cooling/heating, flowmeter in return pipe (cold pipe as heating) (MID conformity declaration for heating)	**F**
Temperature sensor type	
Pt500 setup, no sensor pair included (standard)	**0**
Pt500 setup and Pt500 sensor pair (6/140 mm), 4-wire with 5 m connection cable, 6 mm sensor diameter and 140 mm sensor length. MID approved DE-06-MI004-PTB011, PTB approved 22.77/09.01 (mentioned approvals are only valid if temp. sensors are used with the applicable temperature sensor pockets).	**3**
Pt500 setup and Pt500 sensor pair (6/230 mm), 4-wire with 5 m connection cable, 6 mm sensor diameter and 230 mm sensor length. MID approved DE-06-MI004-PTB011, PTB approved 22.77/09.01 (mentioned approvals are only valid if temp. sensors are used with the applicable temperature sensor pockets).	**4**
Pt100 setup, no sensor pair included	**5**
Temperature sensor pocket sets: (for 6 mm sensor diameter)	
No pockets (standard)	**0**
Stainless steel pocket, 120/135 mm length for 6 mm sensor diameter, max. PN 40 and max. 5 m/s (2 pcs. for 140 mm 4-wire sensors above)	**5**
Stainless steel pocket, 210/225 mm length for 6 mm sensor diameter, max. PN 40 and max 5 m/s (2 pcs. for 230 mm 4-wire sensors above)	**7**
Voltage supply	
Battery 3.6 V DC (Litium D-cell type) (standard)	**1**
Mains power module for 230 V AC supply (incl. back-up battery)	**2**
Mains power module for 24 V AC supply (incl. back-up battery)	**3**
No power supply module (power supply ordering separate)	**4**

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SITRANS FUE950 energy calculator

Selection and Ordering data	Order No.	Order code
Energy calculator SITRANS FUE950, MID or PTB K7.2 custody transfer approved	**7ME3480-** ■■■■-■■■■	■■■
Option modules at place 1 and 2		
No module at port 1 and 2 (standard)	**A**	
Module on port 1 (communication)		
M-Bus module and no module on port 2	**B**	
RS232 module (M-Bus protocol) and no module on port 2	**C**	
RS485 module (M-Bus protocol) and no module on port 2	**D**	
Module on port 2 (pulse in-/outputs)		
Pulse output, 2x output (Out1 "Energy" and Out2 "Volume") and no module on port 1	**E**	
Pulse input, 2x input (In1 and In2) and no module on port 1	**F**	
Pulse out-/input combination, 2x input and 1x output and no module on port 1	**G**	
Combination of modules on port 1 and 2		
M-Bus module (port 1) and Pulse output, 2x output (Out1 "Energy" and Out2 "Volume") (port 2)	**H**	
M-Bus module (port 1) and Pulse input, 2x input (In1 and In2) (port 2)	**J**	
M-Bus module (port 1) and Pulse out/-input combination, 2x input and 1x output (port 2)	**K**	
RS232 module (M-Bus) (port 1) and Pulse output, 2x output (Out1 "Energy" and Out2 "Volume") (port 2)	**L**	
RS232 module (M-Bus) (port 1) and Pulse input, 2x input (In1 and In2) (port 2)	**M**	
RS232 module (M-Bus) (port 1) and Pulse out/-input combination, 2x input and 1x output (port 2)	**N**	
RS485 module (M-Bus) (port 1) and Pulse output, 2x output (Out1 "Energy" and Out2 "Volume") (port 2)	**P**	
RS485 module (M-Bus) (port 1) and Pulse input, 2x input (In1 and In2) (port 2)	**Q**	
RS485 module (M-Bus) (port 1) and Pulse out/-input combination, 2x input and 1x output (port 2)	**R**	
Combinations current output module, 2x passive 4 ... 20 mA (Out 1 "Power", Out 2 "Flow") (occupies module port 1 and 2)	**S**	
Display units and resolutions		
MWh & kW, m^3, m^3/h in 1 digit resolution; Temperature: no decimal figures	**D**	
MWh & kW, m^3, m^3/h in 0 digit resolution; Temperature: no decimal figures	**E**	
GJ & kW, m^3, m^3/h in 1 digit resolution; Temperature: no decimal figures	**J**	
GJ & kW, m^3, m^3/h in 0 digit resolution; Temperature: no decimal figures	**K**	
Gcal & kW, m^3, m^3/h in 1 digit resolution; Temperature: no decimal figures	**N**	
Gcal & kW, m^3, m^3/h - in 0 digit resolution; Temperature: no decimal figures	**P**	
Mbtu & kW, m^3, m^3/h in 1 digit resolution; Temperature: no decimal figures	**R**	
Mbtu & kW, m^3, m^3/h - in 0 digit resolution; Temperature: no decimal figures	**S**	
Verification/Approval		
Without type approval mark, neutral label (standard))	**0**	
With MID type approval mark (only for heating combinations, selection "A, B, E and F")	**1**	
With MID approval mark and first verfication (only for heating, selection A, B, E and F")	**2**	
Cooling approval mark, German national cooling approval according PTB-TR-K7.2 (only for cooling and media water, selection "C and D")	**7**	
Cooling approval mark, German national cooling approval according PTB-TR-K7.2 and first verification (only for cooling and media water, selection "C and D")	**8**	
Further designs		
Please add "**-Z**" to Order No. and specify Order code		
Certificate		
Including factory test report (certificate) of FUE950	**ALWAYS INCLUDED**	
Cooling, setup for non water		
Water/glycol setting for media type "Tyfocor LS (R)" (only with neutral label, no verification and approval)		**C02**
Optional settings/programming		
Tariff function settings (specify in clear text, up to max. 20 characters)		**D02**
Pulse output setting of option module (specify in clear text, up to max. 20 characters)		**D06**
Pulse input setting of option module (specify in clear text, up to max. 20 characters)		**D08**
Pulse input setting of 4 ... 20 mA option module (please specify 20 mA related type and value in clear text, up to max. 20 characters)		**D10**
Special display units		
Flow in 'GPM' and Volume in 'gal' (x100) (digits/resolution as selected above, only with 0 digit resolution)		**L05**
Temperature in deg. F (digit resolution as selected above)		**L31**

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Flowmeter SITRANS FUE950 operating instructions, accessories and spare parts

Operating instructions

Description	Order No.
• English	**A5E03424739**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F US literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Accessories

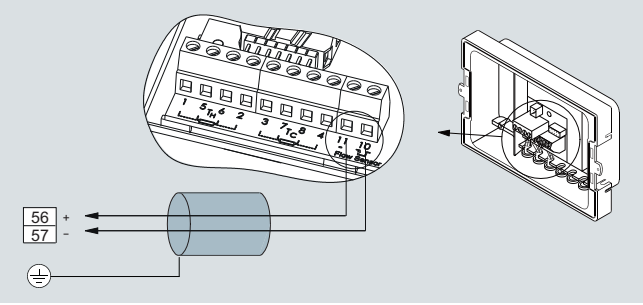
Description	Order No.
Infrared optical head (Bluetooth type) for data acquisition & programming of FUE950	**A5E02611768**
Bracket for SITRANS FUE950 wall mounting (20 pcs.)	**A5E02611769**
Cable for data acquisition via RS232 PC/D-sub 9F/3 wire	**A5E02611774**
Verification equipment for calculator FUE950	**On request**
Basic version of programming software tool for FUE950	**free download from internet**
Expert version of programming software tool for FUE950	**A5E03478951**
Test Lab. version of re-programming software tool for FUE950	**A5E03461778**

Spare parts

Description	Order No.
Add-on modules for FUE950	
Pulse input module (2 inputs)	**A5E03461432**
Pulse output module (2 outputs)	**A5E03461436**
Combined pulse in-/output module (2 inputs and 1 output)	**A5E03461437**
RS232 module (M-Bus protocol)	**A5E03461459**
RS485 module (M-Bus protocol)	**A5E03461512**
M-Bus module	**A5E03461516**
Combined current output module, 2 x passive 4 ... 20 mA	**A5E03461583**
Connection cable for option modules (types: Pulse, RS232/RS485, M-Bus, mA) (special connection cable with 2 plugs)	**A5E03461585**
Power supply for FUE950 (as spare part)	
3.6 V D-cell battery for SITRANS FUE950	**A5E03461708**
230 V AC supply module (incl. internal fuse T50 mA L 250 V and back-up battery) for SITRANS FUE950	**A5E03461717**
24 V AC supply module for SITRANS FUE950, incl. back-up battery	**A5E03461719**
Pocket for temperature sensors Pt500 (for related 4-wire Pt500 type only, 1 pc.)	
Stainless steel pocket (1 pc.), 135 mm length for 6 mm sensor diameter, max. PN 40 and max. 5 m/s (recommended for 140 mm sensor length).	**A5E03462868**
Stainless steel pocket (1 pc.), 225 mm length for 6 mm sensor diameter, max. PN 40 and max. 5 m/s (recommended for 230 mm sensor length).	**A5E03462870**
Pt500 4-wire temperature sensor pair, with MID MI004 and PTB K7.2 approvals and verification (for related 4-wire sensor pocket types only)	
Pt500 sensor pair (6/140 mm), 4-wire with 5 m connection cable, 6 mm sensor diameter and 140 mm sensor length. MID approved DE-06-MI004-PTB011, PTB approved 22.77/09.01 (mentioned approvals are only valid if temp. sensors are used with the applicable temperature sensor pockets).	**A5E03462872**
PT500 sensor pair (6/230 mm), 4-wire with 5 m connection cable, 6 mm sensor diameter and 230 mm sensor length. MID approved DE-06-MI004-PTB011, PTB approved 22.77/09.01 (mentioned approvals are only valid if temp. sensors are used with the applicable temperature sensor pockets).	**A5E03462878**
FUE950 enclosure	
Bottom part of FUE950 enclosure (1 pc.)	**A5E03461508**
Snap fit for FUE950 enclosure (1 pc.)	**A5E30461731**
Pocket for Pt500 temperature sensors (for 2-wire Pt500 types only)	
Brass pocket 6 mm, G½B x 40 mm (PN 16), 1 pc.	**A5E02611778**
Brass pocket 6 mm, G½B x 85 mm (PN 16), 1 pc.	**A5E02611779**
Brass pocket 6 mm, G½B x 120 mm (PN 16), 1 pc.	**A5E02611780**
Stainless steel 6 mm, G½B x 85 mm (PN 25), 1 pc.	**A5E02611781**
Stainless steel 6 mm, G½B x 120 mm (PN 25), 1 pc.	**A5E02611783**
Stainless steel 6 mm, G½B x 155 mm (PN 25), 1 pc.	**A5E02611792**
Stainless steel 6 mm, G½B x 210 mm (PN 25), 1 pc.	**A5E02611793**
Pt500 temperature sensor pair, 2-wire cable, 6 mm sensor diameter, with MID/EN-approval (for 2-wire sensor pocket types only)	
Cable length:	
2 m	**A5E02611794**
3 m	**A5E02611795**
5 m	**A5E02611796**
10 m	**A5E02611798**

Schematics

Electrical connection for SITRANS FUS380/FUE380/FUE950 and MAG 5000/6000/FUE950



The diagram shows the connection between SITRANS FUE950 (terminals 10 and 11) and FUS380/FUE380 and MAG 5000/6000 (terminals 56 and 57). Temperature sensors must be connected to terminals 5 and 6 (T_H) and 7 and 8 (T_C).

Note:
The right flowmeter pulse output value must be equal to the FUE950 pulse input value and must be checked via the user menu of the transmitter MAG 5000/6000 or nameplate of FUE380 or FUS380.

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Flowmeter SITRANS FUS880 (retrofit kit)

Overview

The SITRANS FUS880 is a battery-powered irrigation flowmeter, designed for pipes measuring from DN 200 up to DN 1200 (8" up to 48") in diameter. The SITRANS FUS880 gives you the ability to install the flowmeter underground retrofitting onto existing pipelines. This ultrasonic transient time irrigation flowmeter is used for full pipe flow measurements. Pipe material may be PVC or concrete and pipe construction may be single wall or double wall, smooth or corrugated.

The flowmeter produces a signal proportional to the velocity of the flow (flow rate) as the liquid flows past the ultrasonic sensors.

SITRANS FUS880 has transducers in the flow (inline) which assures superior aides in accuracy and superior performance when compared to doppler or many other types of flow measurement systems.

Benefits

- Cost-effective solution - contains all the necessary components for retrofitting onto existing pipe
- Battery-operated - Maintenance-free up to 6 years
- SITRANS FUS880 is easy to install in pipeline sizes from DN 200 up to DN 1200 (8" up to 48") in diameter
- The transmitter display shows both accumulated volume and instantaneous flow rate.
- The flowmeter provides a digital signal that can be sent directly to a PLC/RTU/DCS
- Solid construction with no moving parts for a 100 % maintenance and obstruction-free flowmeter
- The SITRANS FUS880 transmitter comes within an IP67 enclosure.
- Sensor can easily be buried and withstand constant flooding.
- Automatic calculation of the calibration factor when pipe geometry data are entered in the signal transmitter.
- Pipe material may be polyvinylchloride (PVC) or concrete
- Pipe construction may be single wall or double wall, smooth or corrugated

Application

- Irrigation systems
- Irrigation distribution systems
- Pumping stations
- Canal laterals
- On-farm outlets
- Water well production
- Drip and sprinkler irrigation
- Center pivot systems
- Potable water

Design

The SITRANS FUS880 set contains all necessary parts to build up an ultrasonic flowmeter on existing pipes depending on choices at ordering:

- Templates to wrap around pipes for alignment of sensors
- Transducer threading tool
- Thread adapters
- Transducer alignment tools
- Mounting plugs or saddles as well as FUS880 transmitter dependant upon the specifics at time of ordering and required mounting hardware
- Cables

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Technical specifications

Accuracy

Typical ≤ ± 2.0 %, dependant upon the accuracy of measurements of tube diameter and during installation

Note:

Flow system measurement performance depends on the accuracy of the measurements taken at time of installation. This means that inaccurate measurements of angles, distance between transducers, wall thickness and pipe diameter have a direct effect on the accuracy as these values measured are entered into the memory of the FUS880 transmitter and used in part of the calculation of flow rate.

Requirements for pipes	
Size	DN 200 ... DN 1200 (8" ... 48")
Transmitter Enclosure	
Rating	IP67 rated enclosure
Material	Fibre glass reinforced polyamide
Terminal box	PA 6.6, 100 °C (212 °F)
Transducer element	Stainless steel (AISI 316/1.4404)/ brass ($CuZn_{36}Pb_2As$)200 °C (392 °F)
2000 Corrugated PVC	Transducer holder: Polyvinyl chloride Mounting saddle: Polyvinyl chloride
• Line pressure max.	Pressure rating per spec. ASTM D-1784 (5.5 bar (80 psi))
• Liquid temperature max.	Temperature rating per spec. ASTM D-1784 (60 °C (140 °F))
Pro21 Corrugated PVC	Transducer holder: Polyvinyl chloride Mounting saddle: Polyvinyl chloride
• Line pressure max.	Pressure rating per spec. ASTM D-1784 (5.5 bar (80 psi))
• Liquid temperature max.	Temperature rating per spec. ASTM D-1784 (60 °C (140 °F))
PVC Solid PIP 80	Transducer holder: Polyvinyl chloride Mounting saddle: Polyvinyl chloride
• Line pressure max.	Pressure rating per spec. ASTM D-1784 (5.5 bar (80 psi))
• Liquid temperature max.	Temperature rating per spec. ASTM D-1784 (60 °C (140 °F))
Concrete	Transducer holder: Polyvinyl chloride Mounting saddle: Polyvinyl chloride
• Line pressure max.	Pressure rating per spec. ASTM D-1784 (5.5 bar (80 psi))
• Liquid temperature max.	Temperature rating per spec. ASTM D-1784 (60 °C (140 °F))
	Structural Epoxy joint meets spec. ASTM D1002 (118 bar or 1710 psi)
Pipe wall thickness	
A2000 Corrugated PVC	25 ... 50 mm (1" ... 2")
Pro21 Corrugated PVC	25 ... 50 mm (1" ... 2")
PVC Solid PIP 80	Less than 25 mm (1")
Concrete	• 51 ... 57 mm (2" ... 2.25") • 57 ... 64 mm (2.25" ... 2.5") • 70 ... 76 mm (2.75" ... 3") • 76 ... 83 mm (3" ... 3.25") • 89 ... 95 mm (3.5" ... 3.75") • 95 ... 100 mm (3.75" ... 4") • 108 ... 114 mm (4.25" ... 4.50")

More information

Installation requirement

The space requirements around the pipe for retrofitting an ultrasonic flowmeter type SITRANS FUS880 are given below:

It is important to prepare excavation site for a safe and efficient installation. An underground pipe needs to be exposed so that there is a minimum of 1.52 m (5 ft) or more of working space on either side of the pipe. The length of the trench should exceed the template length by 1.83 m (6 ft) or more.

Pipe support:

Ensure that an unearthed pipe has sufficient support beneath it to prevent deformation or breakage.

Cave-in:

Always brace trench walls. Follow all applicable (e.g. municipal, company, customer, site, union) construction guidelines.

Epoxy:

Follow all safety recommendations listed by the epoxy manufacturer. Use proper protection equipment, such as gloves, safety glasses, clothing, etc. Read the labels on the epoxy cans before mixing. Note all safety related statements and temperature recommendations in particular. For additional information, see the epoxy manufacturer's internet site.

Pipe template:

Templates are printed on a durable material, such as Mylar, and are resistant to normal contaminants. Do not expose the template to excessive moisture or excessive periods of sunlight, heat and cold temperatures. Always roll and store the template in its' shipping tube. Do not stretch or fold as this could permanently damage the template.

Installation overview:

Installation steps

Installation of the SITRANS FUS880 is accomplished with the following steps.

1. Expose and clean the pipe.
2. Mark a centerline on the pipe.
3. Place the template on the pipe and tape it securely to the pipe.
4. Mark the locations of the sensor mounting holes on the pipe.
5. Drill the sensor mounting holes in the pipe.
6. Clean and de-burr the sensor mounting area.
7. Measure up the pipe circumference C, the wall thickness WT and calculate OD and ID.
8. Epoxy and screw the saddle sensor holder to the pipe.
9. Assemble and install the sensors-holders.
10. Measure up the actual sensor-location to see if re-calibration is needed.
11. Assemble and install the sensors.
12. Install sensor wiring and conduit.
13. Install the transmitter and connect the sensor wiring.
14. Check the transmitter configuration.
15. Test the installation thoroughly and run a flow test.
16. Fill in the "Site Acceptance Form".
17. Cover the pipe.

For detailed instruction in installation please refer to User Manual Order no.: FDK:521HAP0553.

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Flowmeter SITRANS FUS880 (retrofit kit)

Selection and Ordering data	Order No.
SITRANS F US **Ultrasonic flowmeters** **SITRANS FUS880 PVC (Solid) (PIP80)** **SONOKIT** **Battery-powered**	**7ME3440-**
Pipe diameter	
DN 200 (8")	**2F**
DN 250 (10")	**2K**
DN 300 (12")	**2P**
DN 380 (15")	**2M**
DN 450 (18")	**3F**
DN 530 (21")	**3M**
DN 600 (24")	**3T**
DN 680 (27")	**4D**
Wall thickness	
Less than 25 mm (1")	**B**
Pipe material	
PVC (Solid) (PIP80)	**1**
Track configuration	
1-track	**1**
2-track X-configuration	**3**
Region version	
EU, US	**2**
Transmitters	
SITRANS FUS080, IP67, Battery-powered	**D**
Template	
Standard	**A**
Cable length	
20 m (65.6 ft) with gland	**4**

Selection and Ordering data	Order code
Further designs	
Please add „**-Z**" to Order No. and specify Order code(s).	
Add on units of measure	
Flow unit GPM	**L01**
Flow unit CFS	**L02**
Flow unit m^3/h	**L03**
Flow unit MGD	**L05**
Volume unit US Gal	**L42**
Volume unit m^3/h	**L44**
Volume unit US Gal x 100	**L46**
Volume unit US Gal x 1000	**L49**
Volume unit US Mgal	**L48**
Volume unit AcF (Acre Feet)	**L43**
Volume unit AcI (Acre inch)	**L51**

Selection and Ordering data	Order No.
SITRANS F US **Ultrasonic flowmeters** **SITRANS FUS880 A2000 Corrugated PVC** **SONOKIT 1-track** **Battery-powered**	**7ME3440-**
Pipe diameter	
DN 380 (15")	**2V**
DN 450 (18")	**3F**
DN 530 (21")	**3M**
DN 600 (24")	**3T**
DN 750 (30")	**4K**
DN 900 (36")	**5B**
Wall thickness	
25 ... 50 mm (1" ... 2")	**C**
Pipe material	
PVC Corrugated A2000	**3**
Track configuration	
1-track	**1**
Region version	
EU, US	**2**
Transmitter	
SITRANS FUS080, IP67, Battery-powered	**D**
Template	
Standard	**A**
Cable length	
20 m (65.6 ft) with gland	**4**

Selection and Ordering data	Order code
Further designs	
Please add „**-Z**" to Order No. and specify Order code(s).	
Add on units of measure	
Flow unit GPM	**L01**
Flow unit CFS	**L02**
Flow unit m^3/h	**L03**
Flow unit MGD	**L05**
Volume unit US Gal	**L42**
Volume unit m^3/h	**L44**
Volume unit US Gal x 100	**L46**
Volume unit US Gal x 1000	**L49**
Volume unit US Mgal	**L48**
Volume unit AcF (Acre Feet)	**L43**
Volume unit AcI (Acre inch)	**L51**

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Flowmeter SITRANS FUS880 (retrofit kit)

Selection and Ordering data	Order No.
SITRANS F US Ultrasonic flowmeters	**7 ME 3 4 4 0 -**
SITRANS FUS880 Pro21 Corrugated PVC SONOKIT 1-track Battery-powered	**-**
Pipe diameter	
DN 750 (30")	**4 K**
DN 840 (33")	**4 P**
DN 900 (36")	**5 B**
DN 1050 (42")	**5 M**
DN 1200 (48")	**5 T**
Wall thickness	
25 ... 50 mm (1" ... 2")	**C**
Pipe material	
PVC Pro21 Corrugated	**2**
Track configuration	
1-track	**1**
Region version	
EU, US	**2**
Transmitter	
SITRANS FUS080, IP67, battery-powered	**D**
Template	
Standard	**A**
Cable length	
20 m (65.6 ft) with gland	**4**

Selection and Ordering data	Order code
Further designs	
Please add „**-Z**" to Order No. and specify Order code(s).	
Add on units of measure	
Flow unit GPM	**L01**
Flow unit CFS	**L02**
Flow unit m^3/h	**L03**
Flow unit MGD	**L05**
Volume unit US Gal	**L42**
Volume unit m^3/h	**L44**
Volume unit US Gal x 100	**L46**
Volume unit US Gal x 1000	**L49**
Volume unit US Mgal	**L48**
Volume unit AcF (Acre Feet)	**L43**
Volume unit AcI (Acre inch)	**L51**

Selection and Ordering data	Order No.
SITRANS F US Ultrasonic flowmeters	**7 ME 3 4 4 0 -**
SITRANS FUS880 Concrete SONOKIT 1-track Battery-powered	**-**
Pipe diameter	
DN 300 (12")	**2 P**
DN 380 (15")	**2 V**
DN 450 (18")	**3 F**
DN 530 (21")	**3 M**
DN 600 (24")	**3 T**
DN 680 (27")	**4 D**
DN 750 (30")	**4 K**
DN 900 (36")	**5 B**
DN 1050 (42")	**5 M**
Wall thickness	
51 ... 57 mm (2" ... 2.25")	**D**
57 ... 64 mm (2.25" ... 2.5")	**E**
70 ... 76 mm (2.75" ... 3")	**F**
76 ... 83 mm (3" ... 3.25")	**G**
89 ... 95 mm (3.5" ... 3.75")	**H**
95 ... 100 mm (3.75" ... 4")	**J**
108 ... 114 mm (4.25" ... 4.5")	**K**
Pipe material	
Concrete	**4**
Track configuration	
1-track	**1**
Region version	
EU, US	**2**
Transmitter	
SITRANS FUS080, IP67, battery-powered	**D**
Template	
Standard	**A**
Cable length	
20 m (65.6 ft) with gland	**4**

Selection and Ordering data	Order code
Further designs	
Please add „**-Z**" to Order No. and specify Order code(s).	
Add on units of measure	
Flow unit GPM	**L01**
Flow unit CFS	**L02**
Flow unit m^3/h	**L03**
Flow unit MGD	**L05**
Volume unit US Gal	**L42**
Volume unit m^3/h	**L44**
Volume unit US Gal x 100	**L46**
Volume unit US Gal x 1000	**L49**
Volume unit US Mgal	**L48**
Volume unit AcF (Acre Feet)	**L43**
Volume unit AcI (Acre inch)	**L51**

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Flowmeter SITRANS FUS880 (retrofit kit)

Selection and Ordering data	Order No.
Accessories and Spare parts	
SITRANS F US Ultrasonic flowmeters	
FUS880 transmitter includes 2 transducers and 20 m (65.6 ft) of cable	**7ME3440-0AA01-2DA4**
FUS880 Installation pipe template	
Template, PVC PIP 80	
DN 250 (10")	**TGX:16347-80**
DN 300 (12")	**TGX:16347-81**
DN 380 (15")	**TGX:16347-82**
DN 450 (18")	**TGX:16347-83**
DN 530 (21")	**TGX:16347-84**
DN 600 (24")	**TGX:16347-85**
DN 680 (27")	**TGX:16347-86**
Template, Concrete	
DN 300 (12")	**TGX:16347-90**
DN 380 (15")	**TGX:16347-91**
DN 400 (16")	**TGX:16347-89**
DN 450 (18")	**TGX:16347-92**
DN 530 (21")	**TGX:16347-93**
DN 600 (24")	**TGX:16347-94**
DN 680 (27")	**TGX:16347-95**
DN 750 (30")	**TGX:16347-96**
DN 900 (36")	**TGX:16347-97**
DN 1050 (42")	**TGX:16347-98**
Template, pipe DN 900 (36") PVC, A2000 corrugated	**TGX:16347-100**
Template, pipe DN 1050 (42") Pro21 corrugated	**TGX:16347-101**
FUS880 Installation spare kit	
Concrete kit, Sensor mounting	
51 ... 57 mm (2" ... 2.25")	**TGX:16347-213K**
57 ... 64 mm (2.25" ... 2.5")	**TGX:16347-214K**
70 ... 76 mm (2.75" ... 3")	**TGX:16347-215K**
76 ... 83 mm (3" ... 3.25")	**TGX:16347-216K**
89 ... 95 mm (3.5" ... 3.75")	**TGX:16347-217K**
95 ... 100 mm (3.75" ... 4")	**TGX:16347-218K**
108 ... 114 mm (4.25" ... 4.5")	**TGX:16347-212K**
PVC kit, Sensor Mounting	
DN 300 (12")	**TGX:16347-219K**
DN 380 (15")	**TGX:16347-220K**
DN 450 (18")	**TGX:16347-221K**
DN 530 (21")	**TGX:16347-222K**
DN 600 (24")	**TGX:16347-223K**
DN 680 (27")	**TGX:16347-224K**
Corrugated PVC kit, DN 900 (36") A2000	**TGX:16347-225K**
Corrugated PVC kit, DN 1050 (42"') Pro21	**TGX:16347-226K**
FUS880 spares	
Holder - Saddle	
DN 250 (10") PIP 80 PVC Saddle	**TGX:16347-165**
DN 300 (12") PIP 80 PVC Saddle	**TGX:16347-166**
DN 380 (15") PIP 80 PVC Saddle	**TGX:16347-168**
DN 450 (18") PIP 80 PVC Saddle	**TGX:16347-170**
DN 530 (21") PIP 80 PVC Saddle	**TGX:16347-174**
DN 600 (24") PIP 80 PVC Saddle	**TGX:16347-175**
DN 680 (27") PIP 80 PVC Saddle	**TGX:16347-177**

Selection and Ordering data	Order No.
Holder - Plug	
51 ... 57 mm (2" ... 2.25") Cement sensor holder, PVC	**TGX:16347-120**
57 ... 64 mm (2.25" ... 2.5") Cement sensor holder, PVC	**TGX:16347-121**
70 ... 76 mm (2.75" ... 3") Cement sensor holder, PVC	**TGX:16347-122**
76 ... 83 mm (3" ... 3.25") Cement sensor holder, PVC	**TGX:16347-123**
89 ... 95 mm (3.5" ... 3.75") Cement sensor holder, PVC	**TGX:16347-124**
102 ... 108 (4" ... 4.25") Cement sensor holder, PVC	**TGX:16347-125**
108 ... 114 mm (4.25" ... 4.5") Cement sensor holder, PVC	**TGX:16347-127**
A2000 - DN 900 (36") ID	**TGX:16347-134**
PRO-21 - DN 1050 (42") ID	**TGX:16347-135**
Straps -Kits	
Strap kit for -134 & -135 plugs	**TGX:16347-235**
Strap kit for -120, -121, -122, -123 plugs	**TGX:16347-236**
Strap kit for -124 & -125 plugs	**TGX:16347-237**
Strap kit for -127 plug	**TGX:16347-238**
Adhesive	
1 lb epoxy	**A6X30004048**
Adapter	
Conduit adapter	**A6X30003981**
Tools	
Sensor Wrench	**TGX:16347-111**
Alignment Tool	**TGX:16347-137**
Documentation	
Manual	**FDK:521HAP0553**
Converter	
FUS880 converter kit for 2 track SYS	**7ME3440-0AA03-2DA4**

Note:
Installation spares kit include:

Concrete kit:
2 transducer mounting plugs, 2 straps, mounting hardware, epoxy, conduit adapter, installation guide

PVC kit:
2 transducer mounting saddles, mounting hardware, epoxy, conduit adapter, installation guide

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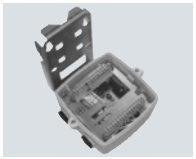
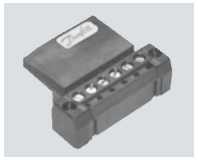
F US SONOFLO spare parts

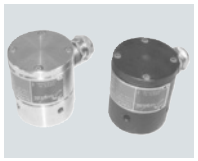
Spare parts

Description	Order No.	
Wall mounting kit for 7ME3150-1AA10-1AA0 and 7ME3150-1AA20-1AA0, using 4 x coaxial sensor cables, wall brackets, PG 13.5 cable glands.	**FDK:085F5027**	

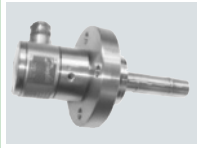
SENSORPROM memory unit for sensors with SONO 3000 transmitters

Description	Order No.	
SENSORPROM memory unit for SITRANS F US systems with transmitter type SONO 3000 When ordering: Inform on sensor Order No. and Serial No.	**FDK:085B5329**	

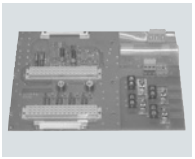
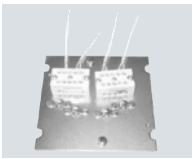
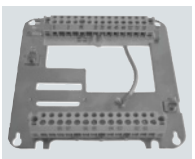
Terminal housing with PG 13.5 cable glands

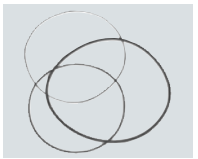
Type	Order No.	
Material: PA 6.6, Temperature range: -20 … +100 °C (-4 ... +212 °F)	**FDK:085B1403**	
Material: AISI 316, Temperature range: -20 … +200 °C (-4 ... +392 °F)	**FDK:085B1402**	

SONO 3200 spare parts, complete units

Type	Material	Gasket	Pressure rating	Terminal housing/ cable gland	Approv.	Temp. range [°C (°F)]	Length mm (inch)	Order No.	
Flange	316 SS	Graphite	PN 40	316 SS/M20		-20 ... +200 (-4 ... +392)	158 (6.22)	**On request**	

Spare parts for transmitter SONO 3000

Description	Order No.	
SONO 3000 19" back print for IP65 (NEMA 4) wall mounting 230 V version	**FDK:085F5327**	
SONO 3000 assembly plate for coaxial connection in the SONO 3300 sensor and wall mounting connection box	**FDK:085L1023**	
SONO 3000 assembly base plate	**FDK:085L1015**	

Description	Order No.	
SONO 3000 EEx d, front glas incl. frame	**FDK:085U2109**	
SONO 3000 EEx d, gaskets for transmitter housing	**FDK:085U2002**	
Connection kit SONO 3300 / FUS060	**On request**	

Description	Order No.
Coaxial cable with transducer connection for sensor type SONO 3300-CT (1 pc.)	
1 x 10 m (32.8 ft)	**FDK:085L2400**
1 x 20 m (65.6 ft)	**FDK:085L2401**
1 x 30 m (98.4 ft)	**FDK:085L2402**

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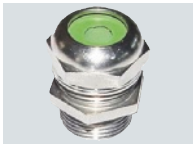
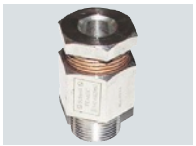
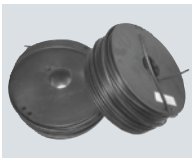
Accessories and spare parts for older flowmeter systems type F US SONOFLO

SONO 3200 / SONO 3000 PG 13.5 cable glands (each 1 pc.)

Type	Material	Temperature range [°C (°F)]	Approval	Order No.	
PG 13.5	Nickel-plated brass, cable Ø 6 ... 8 mm	-20 ... +100 (-4 ... +212)		**A5E02247692**	
PG 13.5	Stainless steel, cable Ø 5 ... 6 mm	-20 ... +200 (-4 ... +392)		**A5E02247682**	
PG 13.5	Stainless steel, cable Ø 6 ... 8 mm	-20 ... +200 (-4 ... +392)	Ex d[1)]	**A5E02247711**	

[1)] No ATEX

Cables

Description	Order No.	
Standard 75 Ω coaxial cable T_{max} = 75 °C (167 °F)		
• 15 m (49.2 ft)	**FDK:085B1373**	
• 30 m (98.4 ft)	**FDK:085B1374**	
• 60 m (196.8 ft)	**FDK:085B1375**	
• 100 m (328 ft)	**FDK:085B1376**	
Teflon 75 Ω coaxial cable T_{max} = 200 °C (392 °F)		
• 15 m (49.2 ft)	**FDK:085B1378**	
• 30 m (98.4 ft)	**FDK:085B1379**	

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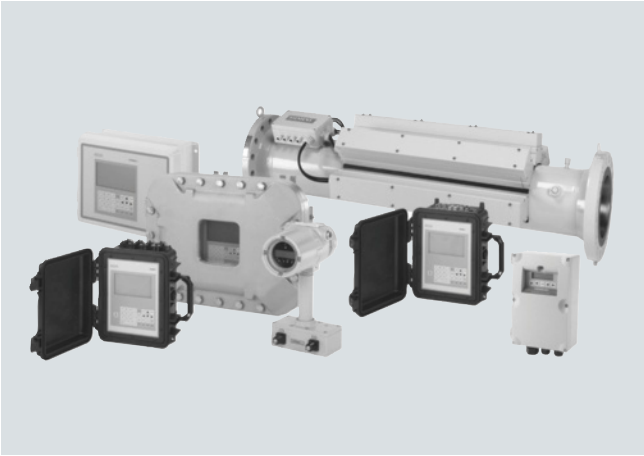
Clamp-on ultrasonic flowmeters

Overview



SITRANS F US clamp-on ultrasonic flowmeters provide highly accurate measurement while minimizing installation time and maintenance expense.

Benefits

- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external sensors do not require periodic cleaning
- No moving parts to foul or wear
- No pressure drop or energy loss
- Wide turn-down ratio
- Choice of single, dual or multiple channel versions and a variety of enclosures - to suit your operating conditions and requirements

Application

SITRANS F US clamp-on ultrasonic flowmeters have seven product families, each targeting specific applications:

SITRANS FUS1010 Standard and SITRANS FUP1010 Portable flowmeters are suitable for a wide variety of liquid applications, including the following:

- Water industry
  - Raw water
  - Potable water
  - Chemicals
- Wastewater industry
  - Raw sewage
  - Effluent
  - Sludges
  - Mixed liquor
  - Chemicals
- HVAC industry
  - Chillers
  - Condensers
  - Hot & cold water systems
- Power industry
  - Nuclear
  - Fossil
  - Hydroelectric
- Processing industry
  - Process control
  - Batching
  - Rate indication
  - Volumetric and mass measurement

SITRANS FUE1010 Energy flowmeters are ideally suited to thermal energy/power industry applications, including:

- Chilled water sub-metering
- Hot water sub-metering
- Condenser water
- Glycol
- Thermal storage
- Lake source cooling

SITRANS FUH1010 Oil flowmeters are ideal for applications carrying crude oil, refined petroleum or liquefied gas. There are three application areas: Interface detection, precision volume and standard volume.

Interface detection

- Precise identification of interfaces on multi-liquid pipelines
- Rapid and precise scraper "pig" indication
- Product identification
- Density indication

Precision volume

- Applications with multiple liquids having a wide viscosity range
- Automatic gross volume compensation due to viscosity changes

Standard volume

- Standard (net) volume flow measurement
- Suitable for use in leak detection systems
- Mass flow output measurement
- Interface detection
- Scraper ("pig") detection
- Chemical and petrochemical processing

SITRANS FUG1010 Gas flowmeters are ideal for most natural and process gas industry applications, including:

- Checkmetering
- Allocation
- Flow survey verification
- Lost and unaccounted for (LAUF) analysis
- Production
- Storage

SITRANS FST020 Basic flowmeters are suitable for most clean liquid applications, including the following:

- Water & wastewater industry
  - Potable water
  - Wastewater, influent & effluent
  - Processed sewage, sludge
- Chemical feed industry
  - Sodium hypochlorite
  - Sodium hydroxide
- HVAC & power industries
  - Coolant flow
  - Fuel flow
- Process control
  - Chemicals
  - Pharmaceuticals

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Clamp-on ultrasonic flowmeters

SITRANS FUT1010 Liquid and gas flowmeters are suitable for liquid and gas applications, including the following:

- Liquid
  Pipeline balancing
  - Terminal transmix metering
  - Refinery blending
  - Airport facility management
  - Petrochemical processing
  - Plant optimization
- Gas
  Production wells
  - Underground storage
  - Transmission
  - Electric power generation
  - Gas processing plants

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System information and selection guide

SITRANS F US Clamp-on flowmeters	FUS1010 (Standard)	FST020 (Basic)	FUP1010 (Portable)	FUE1010 (Energy)	FUH1010 (Oil)	FUG1010 (Gas)	FUT1010 (Liquid/Gas)
Industry/Applications							
Water and aqueous solutions	X	X	X				
Utility district heating, cooling	X	X	X	X			
Chemical	X	X	X				
Hydrocarbons/Petrochemical, multiple products or varying viscosity, liquefied gases, net and gross volume			X		X		X
Hydrocarbons (Single product with limited viscosity range) gross volume	X		X		X		X
Very low flow (<10 lpm) in small pipes	X	X	X				
Natural gas						X	X
Process gas						X	X
Slurries or liquids with high percentage of undissolved gases	X[5)]		X				
High temperature liquids > 120 °C (248 °F)	X[1)]	X[1)]	X[1)]	X[1)]	X[1)]		
Aerospace or hydraulic test	X[2)]		X[2)]				
Refrigeration liquids	X	X	X	X			
Food products	X	X	X				
Design							
Field clamp-on (non-intrusive)	X	X	X	X	X	X	
Doppler (Reflexor) hybrid capability	X[4)]		X	X			
Standard volume or mass flow; per API 2540					X		X
Interface detection					X		X
Density output					X		X
Standard volume or mass flow; per AGA 8						X	X
Differential temperature with energy calculation				X			
Temperature measurement	X		X	X	X	X	X
Analog input	X		X	X	X	X	X
Large graphics display	X		X	X	X	X	X
Diagnostic PC software (Si-Ware)	X	X	X	X	X	X	X
Number of acoustic paths and channels							
1-channel	X	X	X	X	X	X	X
2-path	X		X	X	X	X	X
2-channel w/arithmetic function	X		X	X			
4-path/(special order)	X				X	X	X
4-channel w/ sum of active channels	X						
Transmitter enclosure							
IP65 (NEMA 4X) wall mount	X	X		X	X	X	X
IP67 weatherproof			X				
IP40 (NEMA 1) portable				X[3)]			
IP65 (NEMA 7) compact explosionproof	X				X	X	
IP66 (NEMA 7) wall mount explosion-proof	X				X	X	X

1) Special order high temperature clamp-on sensor
2) Special order Aerospace clip-on sensor recommended
3) Available with portable energy systems
4) Not for NEMA 7 compact explosionproof
5) Not for FUS1010 four channel

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System information and selection guide

SITRANS F US Clamp-on flowmeters	FUS1010 (Standard)	FST020 (Basic)	FUP1010 (Portable)	FUE1010 (Energy)	FUH1010 (Oil)	FUG1010 (Gas)	FUT1010 (Liquid/Gas)
Power Supply							
Internal battery operation			X	X[1)]			
Battery charger (100 ... 240 V AC 50 ... 60 Hz) with country specific line cord			X	X[1)]			
90 ... 240 V AC, 50 ... 60 Hz	X			X	X	X	
9 ... 36 V DC	X			X	X	X	
Size (larger sizes above 1220 mm (48") are available as special order)							
6.5 ... 9150 mm (0.25“ ... 360.24“)	X	X	X				
38 ... 9150 mm (1.5“ ... 360.24“)				X	X	X	
Approvals							
FM/CSA[2)]	X			X[4)]	X	X	X
ATEX	X			X[4)]	X	X	X
UL/ULc/CE[3)]		X	X	X			
INMETRO	X			X	X	X	X
C-TICK	X	X		X	X	X	

1) Available with portable energy systems

2) NEMA 4X associated equipment in DIV 2 connected to DIV 1 sensors, NEMA 7 explosionproof equipment in DIV 1 connected to DIV 1 sensors.

3) Ordinary, unclassified locations only

4) Not for portable enclosure

Sensor type selection guide

	Standard sensor supported in MLFB			
Application condition. Note all that apply before making selection	High precision	Universal	(Reflexor)	Notes
Media				
General survey (clean liquids) on steel and non-steel pipes		X	O	
General survey (clean liquids) on a limited range of steel pipes	X		O	
Moderately aerated liquid or slurry	X			
Highly aerated liquid or slurry	O	O	X	High temperature Doppler sensors also available as special order
Permanent installation on steel pipe (clean liquids)	X		O	
Installation in offshore or corrosive environment	O	X[1)]	O	Sensors available with corrosion resistance as special order
Liquid temperature greater than 120 °C (248 °F)	O	X[1)]	O	High temp metal block sensors available as special order (to 230 °C (446 °F))
Operation on single pipeline flowing multiple products	X	O		
Natural gas or process gas	X	O	O	Consult sales specialist for all gas applications
Pipe material				
Steel	X		O	
Steel pipe with diameter/wall thickness ratio <10	O	X		
Non-steel pipe material (copper, ductile iron, cast iron, etc.)	O	X		High precision sensors can also be used on plastic and aluminum pipes
Wall thickness > 25.4 mm (1“)	O	X		

O = not suitable X = preferred choice

1) Available for special order

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Definitions

Sensor Chart	Description
Standard	Standard system sensor, plastic body with alu housing, FM, CE
Spare	Available for special application and special pipes. Contact factory for application use. Not available as part of a configured product
Gas	Usable for gas application. Available also as corrosion resistant, frame, track or weldseal mounting, T1, T2. FM, ATEX, CE
CE	All flowmeter and sensors are CE - certified
Ex-FM	Standard, corrosion resistant, frames, weldseal, T1, T2, T3
Ex-ATEX	Option for all corrosion resistant, frames, weldseal, T1, T2, T3
Corrosion resistant	SS Housing instead Alu
Trackless	Fixed only by straps, no other mounting (spacer bar as an option)
Tracks	Portable and dedicated for universal size A/B and for HP size A/B. For all size HT only dedicated
Frames	Portable and dedicated for universal size C,D,E, and for HP size C/D. For universal and HP size B available for pipes >125 OD
Portable	BNC insted F-connector. Mounting universal sensor by portable tracks, frames and spacerbar
Transportable	Dedicated sensor including adapter for portable BNC cables.
WeldSeal	Special SS Frames for FUH1010,FUG1010, but also special FUS1010. Corrosion resistant, Liquid and Gas, T1, T2
T1	Usable -40 to 120°C, but best for Ø Temperature <40°C; Standard
T2	Usable -40 to 120°C, but best for Ø Temperature >40°C - <80°C; Named as high temperature high precision
T3	Usable -40 to 120°C, but best for Ø Temperature >80°C; special request
Submersible	Transducers can be used submersible by denso.

Sensor availability guide

	Availability																
Sensor models	**Standard**	**Spare only**	**Gas**	**Ex-ATEX**	**Ex-FM**	**Corrosion restistant**	**Trackless**	**Tracks**	**Frames**	**Portable**	**Transportable**	**WeldSeal**	**T1 (best use -40 ... 65 °C)**	**T2 (best use1 ... 104 °C)**	**T3 (best use 32 ... 120 °C)**	**Submersible**	**Cataloge**
Universal Sensor -40 … 120 °C Alu housing CE IP68																	
A1 Universal for pipe OD – 5,8 … 50,8 mm (0.23" … 2")		X		X[1]	X[1]	X[1]	X[3]	X		X						X[1]	
A2 Universal for pipe OD – 12,7 … 50,8 mm (0.5" … 2")	X			X[1]	X[1]	X[1]	X[3]	X		X						X[1] [2]	X
B1 Universal for pipe OD – 12,7 … 76 mm (0.5" … 3")		X		X[1]	X[1]	X[1]	X[3]	X	X	X						X[1]	
B2 Universal for pipe OD – 12,7 … 76 mm (0.5" … 3")		X		X[1]	X[1]	X[1]	X[3]	X	X	X						X[1]	
B3 Universal for pipe OD – 19 … 127 mm (0.75" … 5")	X			X[1]	X[1]	X[1]	X[3]	X	X	X						X[1] [2]	X
C1 Universal for pipe OD – 51 … 254 mm (2" … 10")		X		X[1]	X[1]	X[1]	X		X	X						X[1]	
C2 Universal for pipe OD – 51 … 254 mm (2" … 10")		X		X[1]	X[1]	X[1]	X		X	X						X[1]	
C3 Universal for pipe OD – 51 … 305 mm (2" … 12")	X			X[1]	X[1]	X[1]	X		X	X						X[1] [2]	X
D1 Universal for pipe OD – 102 … 508 mm (4" … 20")		X		X[1]	X[1]	X[1]	X		X	X						X[1]	
D2 Universal for pipe OD – 152 … 610 mm (6" … 24")		X		X[1]	X[1]	X[1]	X		X	X						X[1]	
D3 Universal for pipe OD – 203 … 610 mm (8" … 24")	X			X[1]	X[1]	X[1]	X		X	X						X[1] [2]	X
*E1 Universal for pipe OD – 254 … 3048 mm (10" … 120")		X		X[1]	X[1]	X[1]	X		X	X						X[1]	
*E2 Universal for pipe OD – 254 … 6096 mm (10" … 240")				X[1]	X[1]	X[1]	X		X	X						X[1] [2]	X
*E3 Universal for pipe OD – 304 … 9144 mm (12" … 360")		X	X[1]	X[1]	X[1]	X[1]	X		X	X		X[1]				X[1]	

[1] Excluding portable
[2] Spare only
[3] Usable but not recommended

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4

Sensor models	Availability																
	Standard	Spare only	Gas	Ex-ATEX	Ex-FM	Corrosion restistant	Trackless	Tracks	Frames	Portable	Transportable	WeldSeal	T1 (best use -40 ... 65 °C)	T2 (best use1 ... 104 °C)	T3 (best use 32 ... 120 °C)	Submersible	Cataloge
High Precision Sensor -40 ... +120 °C Alu T1 (T2, T3) CE																	
A1H (High Precision) for pipe WT - 0.64 ... 1.0 mm (0.025" ... 0.04")		X	X[1]	X[1]	X[1]	X[1]	X[3]	X			X		X	X	X	X[1]	X
A2H (High Precision) for pipe WT - 1.0 ... 1.5 mm (0.04" ... 0.06")	X		X[1]	X[1]	X[1]	X[1]	X[3]	X			X		X	X	X	X[1] [2]	X
A3H (High Precision) for pipe WT - 1.5 ... 2.0 mm (0.06" ... 0.08")	X		X[1]	X[1]	X[1]	X[1]	X[3]	X			X		X	X	X	X[1] [2]	X
B1H (High Precision) for pipe WT - 2.0 ... 3.0 mm (0.08" ... 0.12")	X		X[1]	X[1]	X[1]	X[1]	X[3]	X	X		X		X	X	X	X[1] [2]	X
B2H (High Precision) for pipe WT - 3.0 ... 4.1 mm (0.12" ... 0.16")	X		X[1]	X[1]	X[1]	X[1]	X[3]	X	X		X		X	X	X	X[1] [2]	X
B3H (High Precision) for pipe WT - 2.7 ... 3.3 mm (0.106" ... 0.128")		X	X[1]	X[1]	X[1]	X[1]	X[3]	X	X		X		X	X	X	X[1]	X
C1H (High Precision) for pipe WT - 4.1 ... 5.8 mm (0.16" ... 0.23")	X		X[1]	X[1]	X[1]	X[1]	X		X		X	X[1]	X	X	X	X[1] [2]	X
C2H (High Precision) for pipe WT - 5.8 ... 8.1 mm (0..23" ... 0.32")	X		X[1]	X[1]	X[1]	X[1]	X		X		X	X[1]	X	X	X	X[1] [2]	X
* D1H (High Precision) for pipe WT - 8.1 ... 11.2 mm (0..32" ... 0.44")	X		X[1]	X[1]	X[1]	X[1]	X		X		X	X[1]	X	X	X	X[1] [2]	X
* D2H (High Precision) for pipe WT - 11.2 ... 15.7 mm (0.44" ... 0.62")	X		X[1]	X[1]	X[1]	X[1]	X		X		X	X[1]	X	X	X	X[1] [2]	X
* D3H (High Precision) for pipe WT - 7.4 ... 9.0 mm (0..293" ... 0.354")		X	X[1]	X[1]	X[1]	X[1]	X		X		X	X[1]	X	X	X	X[1]	X
* D4H (High Precision) for pipe WT - 15.7 ... 31.8 mm (0..62" ... 1.25")	X		X[1]	X[1]	X[1]	X[1]	X		X		X	X[1]	X	X	X	X[1] [2]	X
High Temperature Universal Sensor -40 ... +230 °C																	
High Temperature size 1 ... 230 deg C (diam. 12.7 ... 100 mm)		X		X[1]	X[1]			X			X						
High Temperature size 2 ... 230 deg C (diam. 30 ... 200 mm)	X			X[1]	X[1]			X			X						X
High Temperaturer size 3 ... 230 deg C (diam. 150 ... 610 mm)	X			X[1]	X[1]			X			X						X
High Temperature size 4 ... 230 deg C (diam. 400 ... 1200 mm)	X			X[1]	X[1]			X			X						X
High Temperaturer size 2A ... 230 deg C (diam. 30 ... 200 mm)		X		X[1]	X[1]			X			X						
High Temp. size 3A ... 230 deg C (diam. 150 ... 610 mm)		X		X[1]	X[1]			X			X						
High Temp. size 4A ... 230 deg C (diam. 400 ... 1200 mm)		X		X[1]	X[1]			X			X						
Doppler Sensor																	
Doppler Sensor	X			X[1]	X[1]		X			X						X[1]	X
Corrosion Resistant Doppler		X		X[1]	X[1]	X[1]	X										
High Temperature Doppler																	

[1] Excluding portable
[2] Spare Only
[3] Useable but not recommended

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Sensor mounting availability guide

	Sensor							
	Universal NEMA	Universal portable	WeldSeal sensors	Dedicated gas and liquid flow HP sensors	Portable liquid flow HP sensors	High temperature universal sensors	Doppler NEMA	Doppler portable
Montage								
Trackless	X	X		X	X		X	X
Tracks universal dedicated	X	X[1)]						
Tracks universal portable	X[1)]	X						
Tracks HP dedicated				X	X[1)]			
Tracks HP portable				X[1)]	X			
Frames universal dedicated	X	X[1)]						
Frames universal portable	X[1)]	X						
Frames HP dedicated				X	X[1)]			
Frames HP portable				X[1)]	X			
Tracks high temp universal						X		
WeldSeal single enclosure			X					
WeldSeal dual enclosure			X					
SpacerBar	X	X		X	X			
Straps	X	X[1)]		X	X[1)]	X	X	X[1)]
Chains tension hook		X			X			
Chains EZ-Clamp 1	**Size C, D**	**Size C, D**		**Size C**	**Size C**			
Chains EZ-Clamp 2	**Size E**	**Size E**		**Size D**	**Size D**			
Denso	X			X			X	
Doppler-Chains								X

[1)] Useable but not recommended

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System information and selection guide

Input/output and function availability guide

			Output										Input								
			Standard	Additional inputs	Expanded/Enhanced	4 ... 20 mA active	4 ... 20 mA passive	0 ... 10 V	0 ... 5 kHz	p-gen (20 ... 40 kHz)	Relais - Dry reed	Rekay mercury (not Europe)	Status allarm	4 ... 20 mA passive	0 ... 10 V	100 Ohm RTD	NoTot	ClrTot	ATEX	Unimass	Modbus	Doppler
FUS1010	NEMA 4X and NEMA wall mount	Single channel	X			2		2	2		4	option					1	1	X		X	X
			X	X		2		2	2		4	option		4		1	1	1	X	X	X	X
		Dual channel	X			2[3]		2	2		4[4]	option					2	2	X		X	X
			X	X		2[3]		2	2		4[4]	option		4[4]		2	2	2	X	2	X	X
					X	2[3]	4[4]	2	2		4[4]	option					2	2	X		X	X
		Dual path	X			2		2	2		4	option					1	1	X		X	X
			X	X		2		2	2		4	option		4		1	1	1	X	1	X	X
					X	2	4	2	2		4	option					1	1	X		X	X
		Four path	X				4[3]	4[3][1]			4	option					4		X		X	
			X	X			4[3]	4[3][1]			4[3]	option		4		1	4		X	4	X	
		Four path	X				4	4[1]			4[3]	option					4		X		X	
			X	X			4	4[1]			4	option		4		1	4		X	1	X	
	NEMA 7 compact	Single channel	X				2		2				1						X			
				X			2		2				1	1		1			X	X		
		Dual channel	X				2[3]		2[3]				2[3]						X			
				X			2[3]		2[3]				2[3]	2[3]		2			X	X		
		Dual path	X				2		2				4[4]						X			
				X			2		2				4[4]	2		1			X	X		
FST020	FST020	Single channel	X				1		1				1									
FUP1010	IP67	Single channel		X			1	1	1				2									X
		Dual channel/ path		X			2[3]	2[3]	2[3]				4[4]									X
FUE1010	NEMA 4X	Single channel	X	X		2		2	2		4	option		4		2	1	1	FM		X	X
		Dual channel	X	X		2[3]		2[3]	2[3]			option		2[3]		4	2	2	FM		X	X
				X	X	2[3]		2[3]	2[3]		4[4]	option		2[3]		4	2	2	FM		X	X
		Dual path	X	X		2		2	2		4	option		2		4	1	1	FM		X	X
				X	X	2	4	2	2		4	option		2		4	1	1	FM		X	X
	Portable	Dual channel/ path	X	X			2[3]	2[3]	2[3]				4[4]	2		4	2	2				X
FUH1010	NEMA 4X and NEMA 7 wall mount	Single channel	X	X		2		2	2		4	option[2]				1	1	1	X		X	
		Dual path	X	X		2		2		2	4	option[2]		2		1	1	1	X		X	
				X	X[2]	2	2	2		2	4	option		2		1	1	1	X		X	
		Four path[2]		X	X	2	2	2		2	4	option		2		1	1	1	X		X	
	NEMA 7 compact	Single channel	X	X			1			1			1			1	1	1	X			
		Dual path	X	X			2						2			1	1	1	X			
				X	X		2			1			1			1	1	1	X			
FUG1010	NEMA 4X and NEMA 7 wall mount	Single channel	X	X		2		2		2	4	option				1	1	1	X		X	
		Dual path		X	X	2	2	2		2	4	option		2		1	1	1	X		X	
		Four path		X	X	2	2	2		2	4	option		2		1	1	1	X		X	
	NEMA 7 compact	Single channel	X	X			1			1			1			1	1	1	X			
		Dual channel	X	X			2						2			1	1	1	X			
				X	X		2			1			1			1	1	1	X			

[1] Fixed to IO adjustment
[2] Not available for Interface Detector
[3] One per channel
[4] Two per channel

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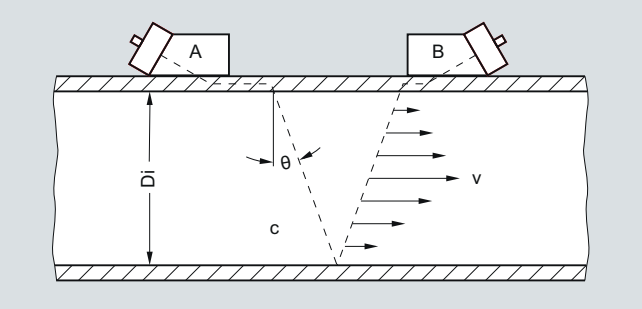
Function

Operating Principle

The SITRANS F US system is a transit-time ultrasonic meter that provides exceptional performance using a non-intrusive clamp-on approach. Ultrasonic sensors transmit and receive acoustic signals directly though the existing pipe wall, where the fluid refraction angle is governed by Snell's law of refraction.



Clamp-on sensor mounted in a reflect configuration

The beam refraction angle is calculated as follows:

$\sin\theta = c / V_\phi$

c = Velocity of sound in fluid

V_φ = Phase velocity (a constant in the pipe wall)

The flowmeter automatically compensates for any change in fluid sound velocity (or beam angle) in response to variations in the average transit time between sensors A and B. By subtracting the computed fixed times (within the sensors and pipe wall) from the measured average transit time, the meter can then infer the required transit time in the fluid (T_{Fluid}).

The sound waves traveling in the same direction as flow ($T_{A,B}$) arrive earlier than sound waves traveling against the direction of flow ($T_{B,A}$). This time difference (Δt) is used to compute the line integrated flow velocity (v) as shown in the equation below:

$v = V_\varphi / 2 \cdot \Delta t / T_{Fluid}$

Once the raw flow velocity is determined, the fluid Reynolds Number (Re) must be determined to properly correct for fully developed flow profile. This requires the entry of the fluid's kinematic viscosity (visc) as shown in the equations below, where Q represents the final flow profile compensated volumetric flow rate.

$Re = Di \cdot v / visc \cdot Q = K(Re) \cdot (\pi / 4 \cdot Di^2) \cdot v$

v = Flow velocity

$visc = \mu / \rho$ = (dynamic viscosity / density)

K(Re) = Reynolds flow profile compensation

In wetted type ultrasonic flowmeters the meter constants are configured prior to leaving the factory. As this is not possible with clamp-on meters, the settings must be made by the customer at the time of installation. These settings include pipe diameter, wall thickness, liquid viscosity, etc.

SITRANS Clamp-On flowmeters that include temperature sensing can be configured to dynamically infer changes in fluid viscosity for the purpose of computing the most accurate flow profile compensation (K_{Re}).

Ultrasonic Sensor Types

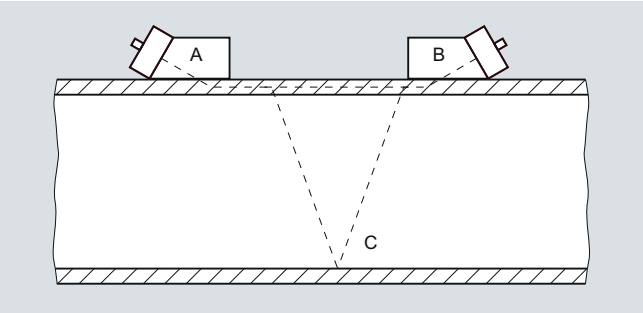
Three basic types of Clamp-On sensors can be selected for use with the SITRANS F US flowmeter. The lower cost "universal" sensor is the most common type in the industry and is suitable for most single liquid applications where the sound velocity does not vary much. This sensor type can be used on any sonically conductive pipe material (including steel) making it well suited for portable survey applications. Universal sensors are selected based on the pipe diameter range alone, so wall thickness is less important to the selection process.

The second sensor type is the patented WideBeam sensor (called high precision), which utilizes the pipe wall as a kind of waveguide to optimize the signal to noise ratio and provide a wider area of vibration. This makes this kind of sensor less sensitive to any change in the fluid medium.

The WideBeam sensor is designed for steel pipes, but can also be used with aluminum, titanium and plastic pipe. It is the preferred sensor for HPI and gas applications. Note that unlike the universal type, this sensor selection is dependent only on the pipe's wall thickness.

Automatic Zero Drift Correction (ZeroMatic Path™)

When WideBeam sensors are installed in the "Reflect" mode shown below, the acoustic signal travels in two different paths between sensors A and B. One path "ACB" travels through the pipe wall and fluid, while the other path "AB" never enters the fluid medium.

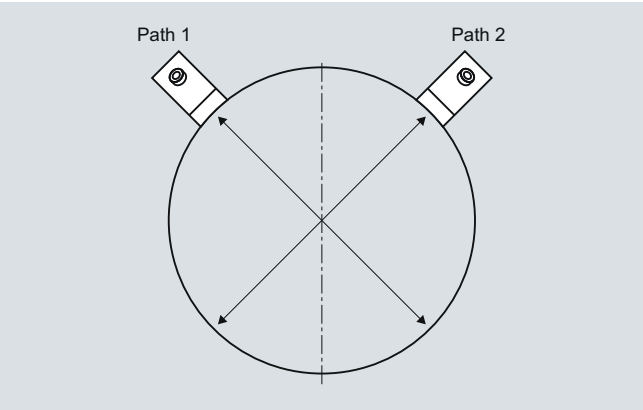


This later path provides the meter with a reference signal that is completely independent of flow rate and can therefore be used as a measure of sensor "mis-match". By continually analyzing this pipe wall signal the SITRANS FUS1010 meter can dynamically correct for flow errors caused by zero drift.

Multi-Channel Flowmeters

For improved flow profile averaging, redundancy or better cost per measurement, Clamp-On meters can be supplied with 1 or 2 measurement channel, with 4 channel meters supplied as special order.

In the standard FUS, FUP, FUE systems, these channels can be installed on separate independent lines or in a multi-beam installation as shown below. This choice is made during meter setup, where either a multi-path (two paths on same pipe) or multi-channel installation can be selected.



Dual path installation example

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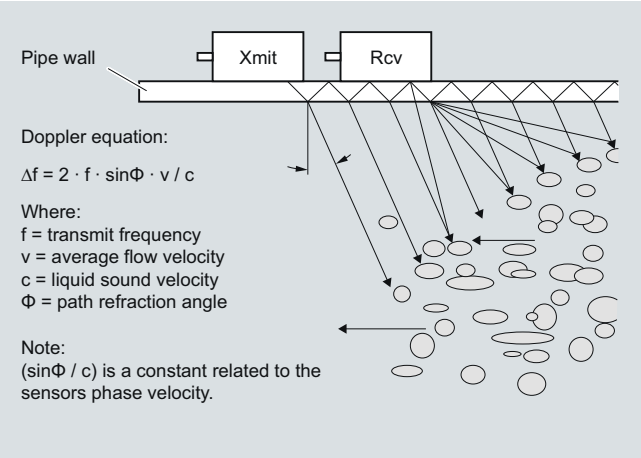
System information and selection guide

Doppler (Reflexor®) Operation

The Doppler measurement technique relies on the reflection of sound energy off tiny gas bubbles or suspended particles to create a doppler shift in the fixed frequency acoustic transmit signal, as shown below.



When de-demodulated using FFT signal processing, this doppler shifted frequency (Δf) can be used to measure the flow rate as described in the associated doppler equations below.

Although the standard transit time measurement system is very tolerant of high levels of liquid aeration and high solids content, there will be cases where insufficient signal will be available for operation with transit time mode. For these cases the FUS, FUP and FUE meters can be ordered with this optional doppler capability, which requires an additional doppler sensor.

SITRANS meter family description

SITRANS FUS1010 Standard flowmeters

The SITRANS FUS1010 system is a basic function permanent (or dedicated) clamp-on meter that is available with a full range of safety approvals, I/Os and enclosure types. This meter can be used in a wide range of applications but does not include the special functions found in the hydrocarbon FUH and energy FUE flowmeters.

The SITRANS FUS1010 meter is typically programmed with a fixed viscosity and specific gravity entry, which can limit the mass flow and volumetric flow accuracy when highly variable (multi-product) liquid properties flow through the same pipeline.

If this meter is ordered with the Type 3 hardware and program configuration, it will have the ability to accommodate clamp-on RTDs, or an analog input from a temperature transmitter. With an active measurement of liquid temperature the meter can then be programmed to compensate for changes in liquid density and viscosity by mean of a “UniMass” table (for advanced users).

SITRANS FST020 Basic flowmeters

The SITRANS FST020 system has the same basic function of the SITRANS FUS1010 system, but does not include the same I/O capability or safety approval rating of the SITRANS FUS1010. This basic meter is intended for single liquid applications that do not require these additional features. Note that the SITRANS FST020 is not available with hazardous area approvals.

SITRANS FUP1010 Portable flowmeters

The SITRANS FUP1010 meter has all the capabilities of the SITRANS FUS1010 meter, but in a battery powered portable configuration. This meter is ideal for general flow survey work where high accuracy is required. Note that the FUP meter is not available with hazardous areas approvals.

SITRANS FUE1010 Energy flowmeters

By combining clamp-on transit time flow measurement with accurate temperature differential measurement, the SITRANS FUE1010 system provides a solution to thermal energy metering with no interruption of service. Energy measurement can be provided for water, ethylene glycol and brine solutions or steam condensate.

Absolute and differential temperature measurement is accomplished with the use of 2 matched 1 kΩ RTD elements installed on the supply and return side of the heating or cooling system. Efficiency calculation (kW/ton, EER or COP) is also available in systems with the optional analog input capability, which allow the meter to accept a power meter output.

The SITRANS FUE1010 system is available in both dedicated (IP65 (NEMA 4X)) and portable configurations (IP40).

SITRANS FUG1010 Gas flowmeters

Be sure to contact a Siemens clamp-on specialist before placing a gas system order.

This unique Clamp-On gas meter uses the same WideBeam transit time operating principle described above. However, due to the very low density and sound velocity characteristics of gases, this meter requires a high gain signal amplifier and the installation of a pipe damping material.

The pipe damping material consists of an adhesive backed viscoelastic film that is designed to attenuate any stray acoustic transmit energy that may otherwise interfere with the transit time gas signal. Damping material installation requires a clean (grease free) pipe surface with well bonded paint.

The Clamp-On gas meter is capable of operation on most gases (natural gas, oxygen, nitrogen, carbon monoxide, etc) with a typical minimum operating pressure of 10 barg (145 psig). Low molecular weight gases such as helium or hydrogen can also be measured, but at a higher minimum pressure.

Standard volume computation: Can provide a standard volume or mass flow output for fixed gas compositions. All SITRANS FUG1010 Gas meters include analog input capability that can be used for pressure and temperature compensation. With the installation of an AGA8 lookup table this meter can dynamically adjust the compressibility factor (Z_{act}) in response to changes in gas pressure and temperature, as indicate below:

Std. Rate = $Q_{act} * P_{act}/P_{base} * T_{base}/T_{act} * Z_{base}/Z_{act}$

SITRANS FUH1010 Oil flowmeters

There are three models of flowmeters included in the SITRANS FUH1010 family, a precision volume model, used for applications that will flow a wide range of viscosity, a standard volume (mass) model, and an interface detection model. All models rely on a variable referred to as “Liquident”, which is used to infer the liquid’s viscosity and optionally the liquid’s density. This variable represents the measured liquid sonic velocity compensated by the operating temperature and pressure, so for a given liquid product the measured Liquident output will remain constant over a wide range of pressure or temperature.

Precision Volume Option:

This is the lower cost SITRANS FUH1010 meter option that uses the Liquident variable to infer only the actual liquid viscosity. This meter does NOT provide the standard volume, mass flow, liquid identification or density output available in the standard volume meter option described below. The precision volume meter is suitable for any petroleum application where actual volume required as the input to an external RTU or flow transmitter.

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Standard Volume Option:

This Liquident variable can also be used to identify the liquid's name (gasoline, fuel oil, crude oil, etc) as well as it's physical properties (specify gravity, API, viscosity and compressibility) at base conditions. With this information the meter can be configured to output a temperature and pressure compensated (standard) volume flow rate using the API 2540 and API MPMS chapter 11.2.1 methods as shown below.

Correction for Temperature:

Compute Thermal Expansion Coefficient (α_b):

$\alpha_b = KO / \rho_b^2 + K1 / \rho_b$

where: KO and K1 are constants dependent on type of liquid and ρb is the liquid density at base conditions

Compute temperature correction factor (K_T):

$K_T = \rho_b * EXP (- \alpha_b \Delta T (1 + 0.8 \alpha_b \Delta T))$

where: ΔT = (T – base temperature)

Correction for Pressure:

Compute Compressibility Factor (F):

$F = EXP(A + B T + (C + D T) / \rho_b^2$

where: A, B, C and D are constants, and "T" is liquid temperature

Compute pressure correction factor (K_p):

$K_p = 1 / (1 – F (P_{act} – P_{base}) * 10^{-4})$

Final Volume Correction: $Q_{std} = Q_{act} * K_t * K_p$

Available outputs from this meter include: API, Density, Mass Flowrate, Standard Volume Flowrate and Liquid Identification.

Interface Detection Option:

This meter option is designed to provide all the Non-Flow capabilities of a DV meter, making it an ideal non-intrusive alternative to a densitometer, interface detector or pig detector. Be aware that this meter does NOT measure flow rate.

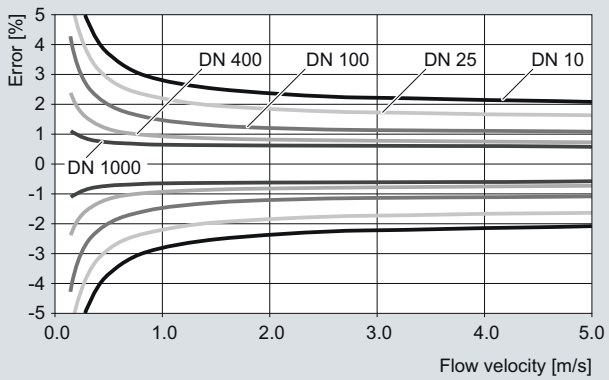
SITRANS FUT1010 Liquid and gas flowmeters

The SITRANS FUT1010 is available in two different configurations; a version for liquid hydrocarbon applications and a version for precise gas measurement. Both versions are offered in pipe sizes ranging from 4 inch to 24 inch (DN100 to DN 600) with flange ratings of ANSI Class gas.

General Installation Guidelines for transit time Clamp-On Sensor

- Minimum measuring range: 0 to ± 0.3 m/s velocity (see meter accuracy graph below for more detail)
- Maximum measuring range: 0 to ± 12 m/s (± 30 m/s for high precision sensors). Final flow range determination requires application review

Typical clamp-on meter accuracy for various pipe sizes



- Pipe must be completely full within the sensor installation volume for accurate flow measurement
- Typical MINIMUM straight pipe requirements are: 10 Diameters upstream / 5 Diameters downstream. Additional straight run is required for double out-of-plane elbows and partially open valves. A minimum of 20 upstream diameters is recommended for clamp-on gas systems
- Sensors should be installed at least 20° off vertical for horizontal pipes. This reduces the chance of beam interference from gas buildup at the top of the pipe
- Operation inside the Reynolds transition region, between 1000 < Re < 5000 should be avoided for best accuracy
- Submersible and direct burial installations can be accommodated. Consult sales representative for details
- Ultrasonic coupling compound is provided with all sensor orders. Insure that a permanent coupling compound is used for long term installations
- Refer to the "Sensor type selection guide" to insure proper application of the equipment

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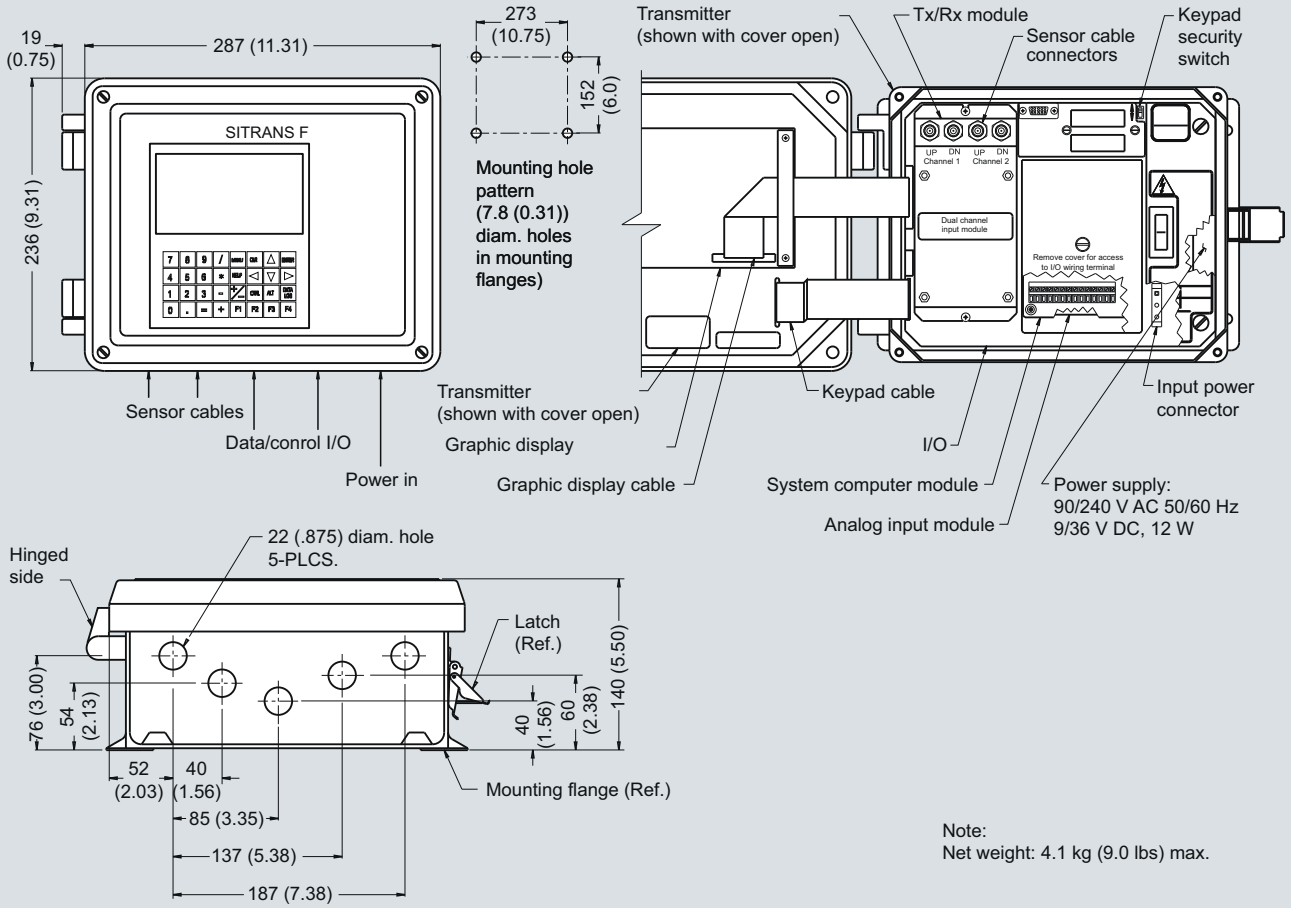
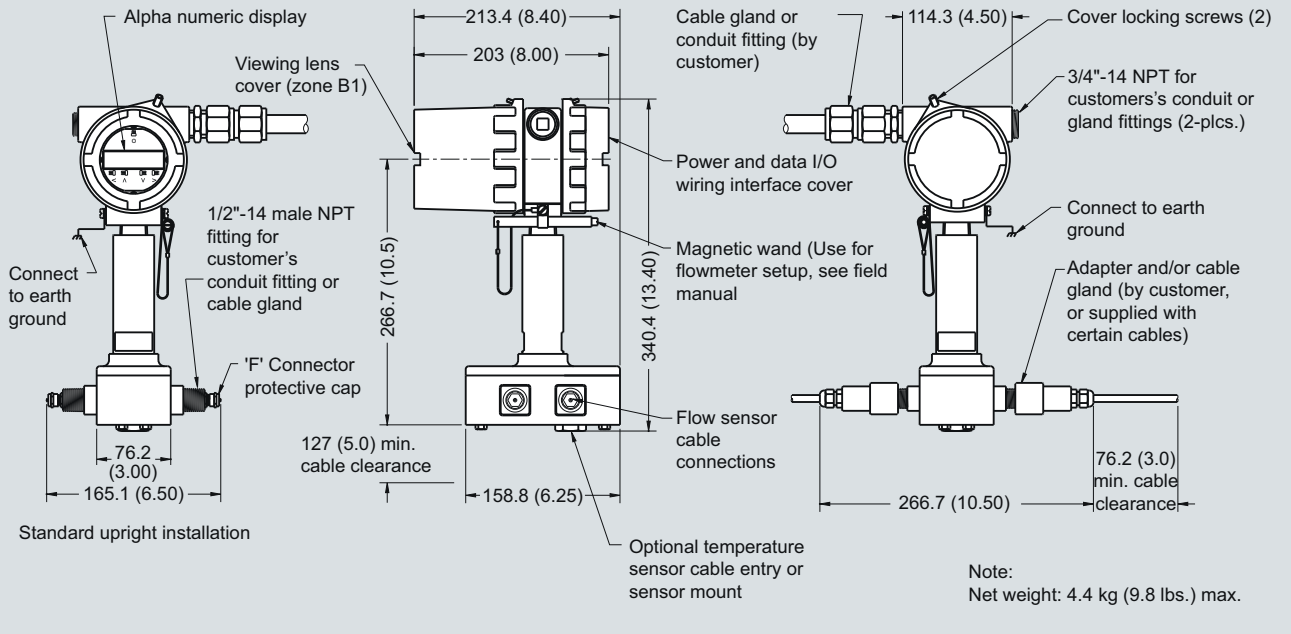
Dimensional drawings

SITRANS FUS1010, FUE1010, FUH1010, FUT1010 and FUG1010 IP65 (NEMA 4X) wall mount enclosure



Dimensions in mm (inch)

SITRANS FUS1010, FUH1010 and FUG1010 IP65 (NEMA 7) compact explosionproof enclosure



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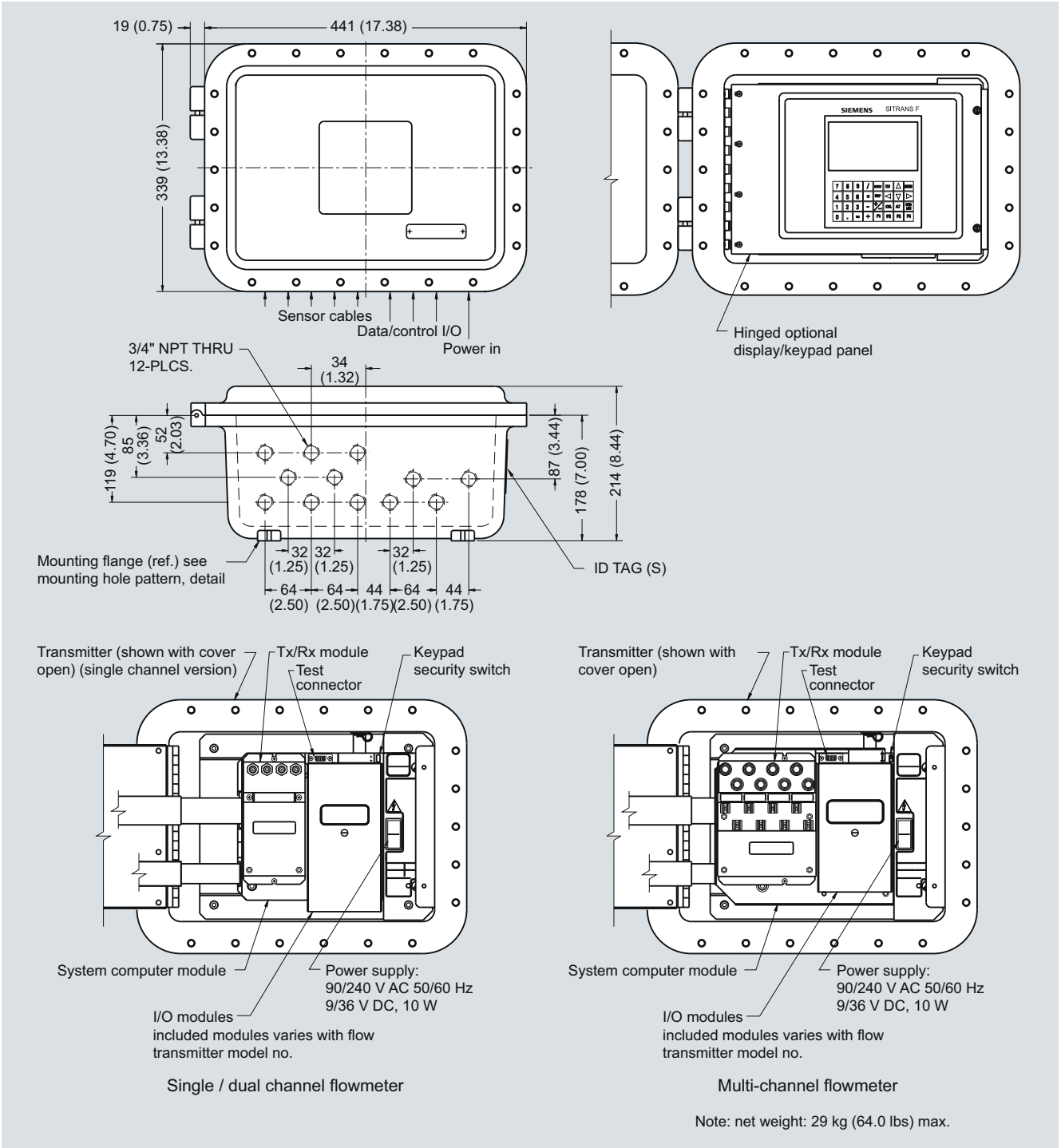
SITRANS FUS1010, FUH1010, FUT1010 and FUG1010 IP66 (NEMA 7) wall mount explosionproof enclosure



DImensions in mm (inch)

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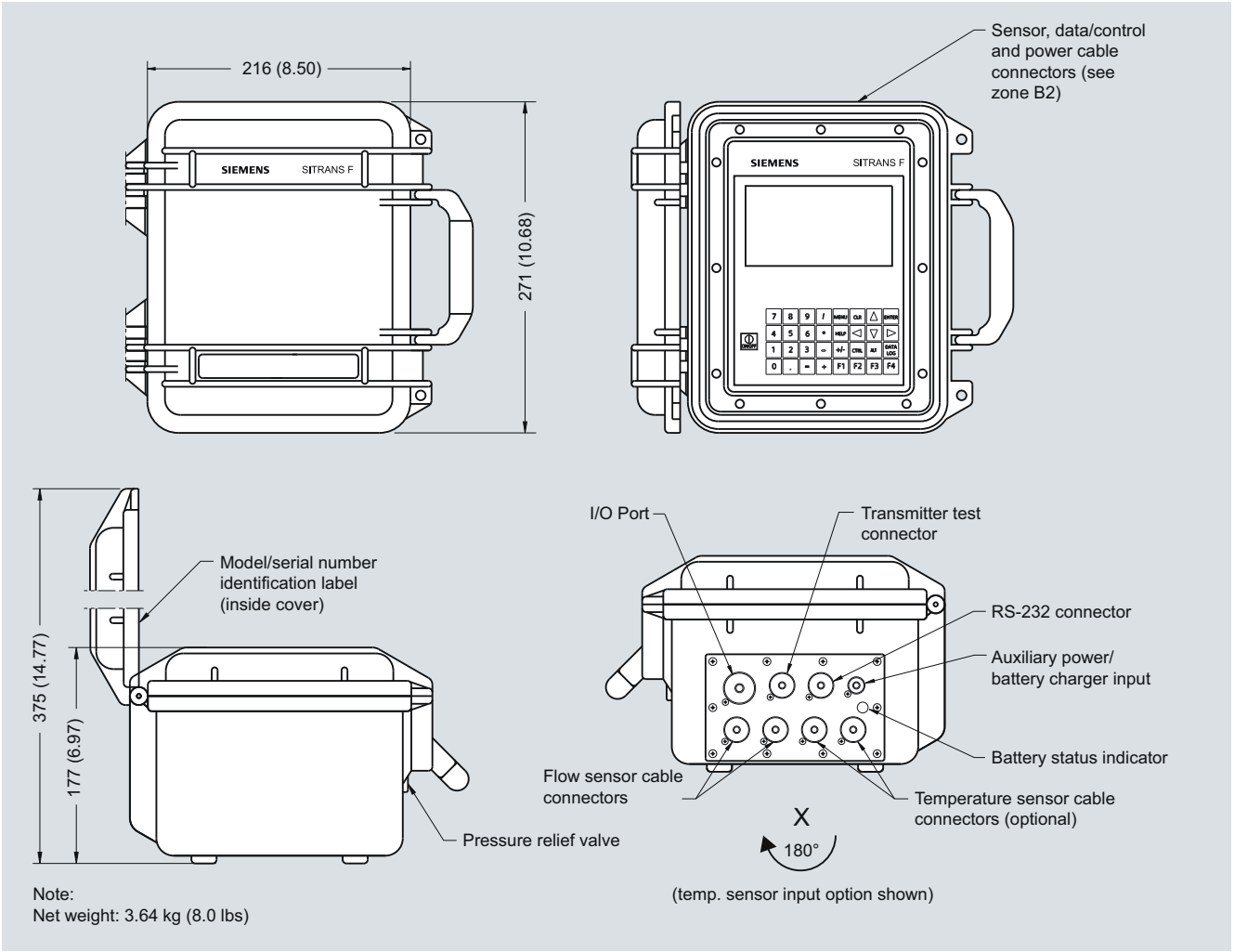
4

SITRANS FUP1010 IP67 Weatherproof impact resistant enclosure



DImensions in mm (inch)

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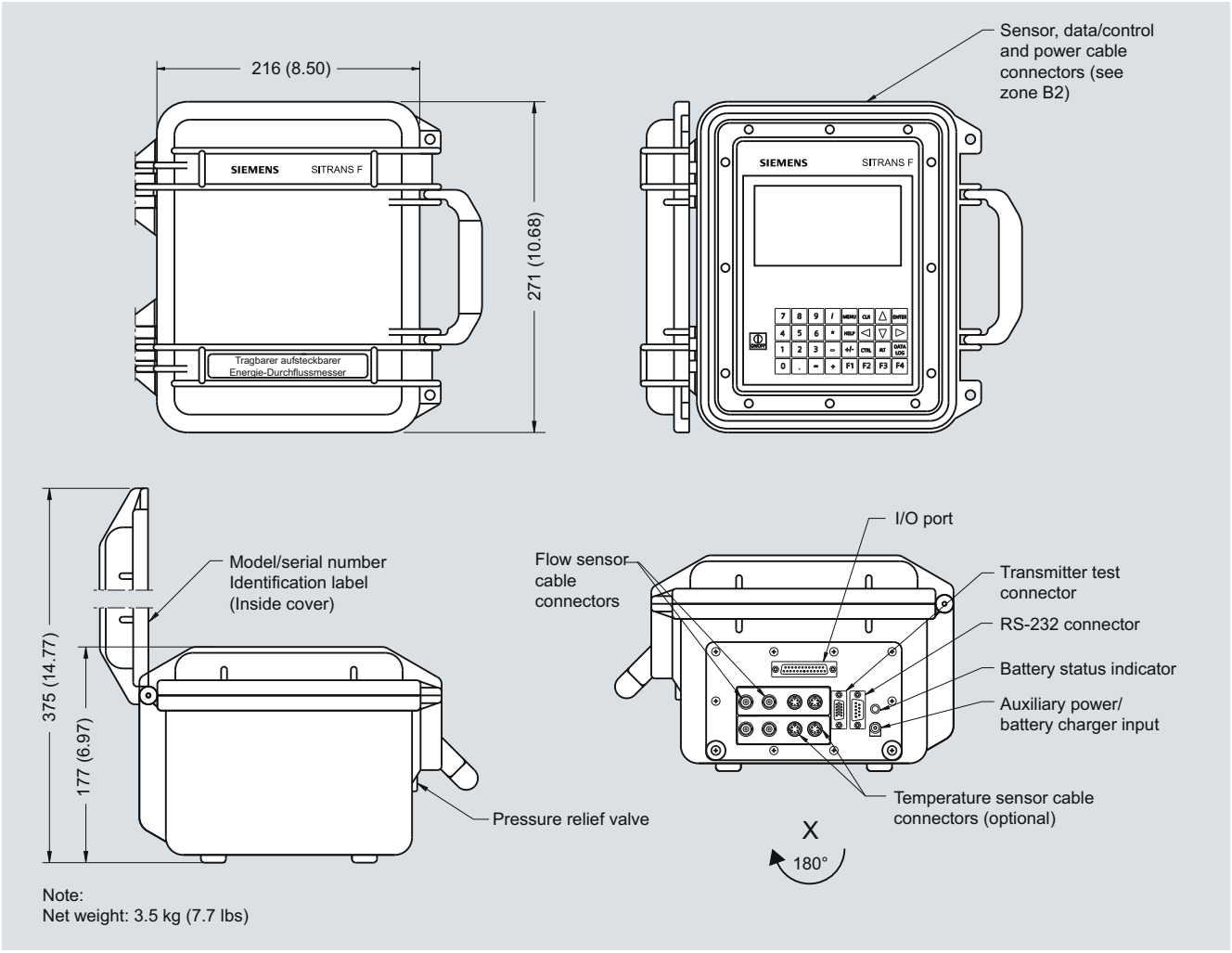
SITRANS FUE1010 IP40 (NEMA 1) Portable impact resistant enclosure



Dimensions in mm (inch)

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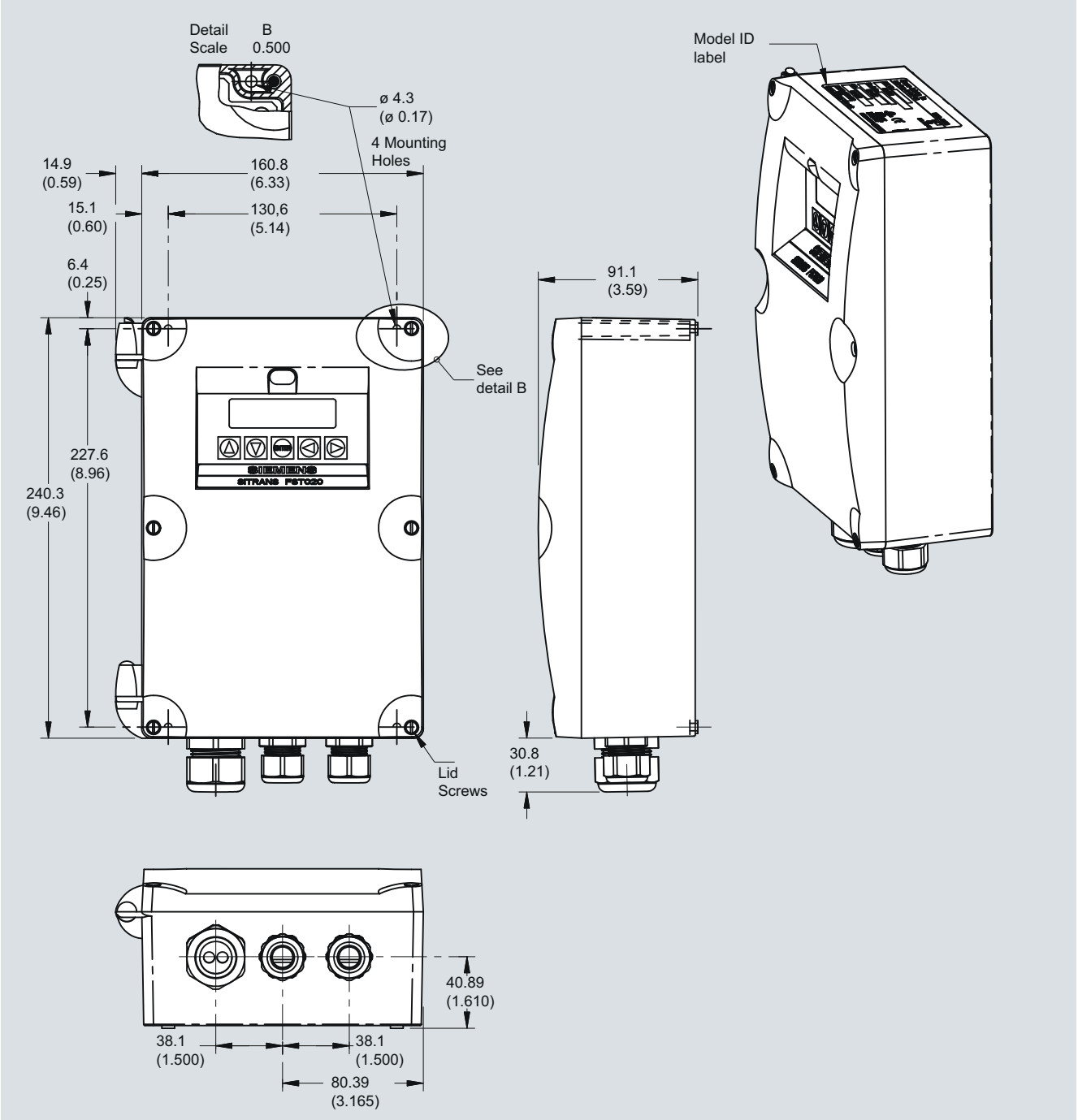
SITRANS FST020 IP65 (NEMA 4X) wall mount enclosure



Dimensions in mm (inch)

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Overview

The thickness gauge is used to measure the wall thickness of the pipe that a clamp-on ultrasonic flowmeter is installed on. The wall thickness value is a vital factor in the flow computation model and a prerequisite for precise clamp-on ultrasonic flow measurement. When measuring any pipe wall thickness the thickness gauge can also be used as a stand-alone tool used to measure the wall thickness of any metallic or non-metallic pipe materials capable of acting as an ultrasonic wave conductor.

Benefits

The thickness gauge is an indispensable tool in accurate clamp-on ultrasonic flow measurement. For a flowmeter to measure correctly it needs to know the exact wall thickness of the pipe it is measuring on. Since even the smallest miscalculation can have a major effect on the flow reading, the pipe thickness gauge has to be extremely precise. This is why the standard probe operates at a 5 MHz frequency making it capable of measuring pipe thickness ranging from 0.1 to 200 mm (0.03“ to 7.9“) with a very high resolution of up to 0.1 mm (0.004“).

Application

The thickness gauge can be used in any field application where there is a need for flow measurement Including but not limited to:

- Water and wastewater
- Energy measurement
- Oil and gas industries

Design

The hand-held micro-processor controlled gauge is designed to measure the thickness of various metallic or non-metallic pipe. Such materials include steel, aluminum, titanium, plastics and ceramics. Measurement results are shown in either inches or millimeter; only a simple pre-calibration to a known thickness or sound velocity is required. The simple-to-read 4-digit LCD display featuring a basic user friendly menu is easily navigable with only three conveniently located push buttons. The lightweight computing unit weighs a mere 150 g (5.3 oz) making it ideal for quick and easy on-site pipe wall thickness measurement and with two AAA alkaline batteries trouble-free operation is ensured for 250 hours.

Function

The thickness gauge measurement is based on the transit time ultrasonic wave propagation principle: a high frequency ultrasonic beam is transmitted into the pipe being measured through a probe acting as a sender and receiver. When the probe subsequently retrieves that same signal, an internal counter calculates the time taken for the signals to be sent and received through the pipe. This value is used to evaluate the speed of sound through the pipe and consequently, the thickness of the pipe wall.

Technical specifications

Display type	4-digit LCD
Display resolution	0.1 mm (0.004“)
Measurement units	Metric and imperial
Sound velocity range	1 000 to 9 999 m/s (3 280 to 32 805 ft/s)
Operating temperature	-10 ... +50 °C (14 ... 122 °F)
Update rate	4 Hz
Frequency	5 MHz
Power source	2 x 1.5 V AAA dry cells
Power consumption	Working current is less than 3 mA
Battery life	Approx. 250 h on a set of batteries
Dimensions (W x H x D)	61 x 108 x 28 mm (2.4 x 4.3 x 1.1“)
Weight	150 g (5.3 oz)

Selection and Ordering data		Order No.
Thickness gauge	D)	**7ME3951-0TG20**

D) Subject to export regulations AL: N; ECCN: EAR99H.

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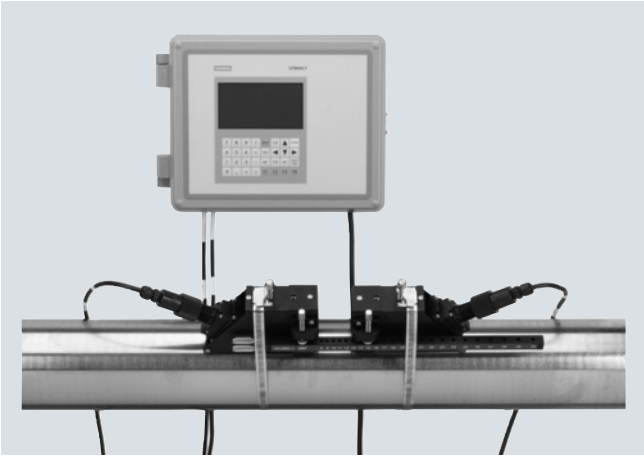
SITRANS FUS1010 (Standard)

Overview



SITRANS FUS1010 is the most versatile clamp-on ultrasonic flow display transmitter available today. It can operate in either Wide-Beam Transit time or Reflexor (Doppler) mode, making it suitable for virtually any liquid, even those with high aeration or suspended solids.

SITRANS FUS1010 is available in single, dual and optional four path configurations, with your choice of IP65 (NEMA 4X) wall mount, IP65 (NEMA7) compact explosionproof enclosures.

Benefits

- Versatility; there is no need to change meters when operating conditions change
- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external sensors do not require periodic cleaning
- No moving parts to foul or wear
- No pressure drop or energy loss
- Wide turn-down ratio
- Choice of single channel or dual channel/dual path, with doppler capability. Four channel/four path optional.
  - Optional four channels allow measurement of four independent pipes at the same time, reducing overall ownership costs
  - Dual mode allows for transit time and reflexor operation at the same time on the same pipe
  - Dual path allows for two sets of sensors to be set up on one pipe and averaged for higher accuracy
- ZeroMatic Path automatically sets zero without stopping flow and reduces zero drift, even at low flow

Application

SITRANS FUS1010 is suitable for a wide variety of liquid applications, including the following:

- Water industry
  - Raw water
  - Potable water
  - Chemicals
- Wastewater industry
  - Raw sewage
  - Effluent
  - Sludges
  - Mixed liquor
  - Chemicals
- HVAC industry
  - Chillers
  - Condensers
  - Hot and cold water systems
- Power industry
  - Nuclear
  - Fossil
  - Hydroelectric
- Processing industry
  - Process control
  - Batching
  - Rate indication
  - Volumetric and mass measurement

Design

SITRANS FUS1010 is available in three configurations:

- IP65 (NEMA 4X) wall mount enclosure constructed of fiberglass reinforced polyester with stainless steel hardware and polyester keypad
  - Single channel
  - Dual channel / dual path
  - Four channel (optional)
- IP65 (NEMA 7) compact explosionproof enclosure constructed of cast aluminum with glass window, stainless steel hardware
  - Single channel
  - Dual channel / dual path
- IP66 (NEMA 7) wall mount explosionproof enclosure constructed of cast aluminum, stainless steel hardware, with glass window
  - Single channel
  - Dual channel / dual path
  - Four channel (optional)

Function

- IP65 (NEMA 4X) and IP66 (NEMA 7) flow display transmitters have integral 33 button keypads and large (128 x 240 pixel) graphic displays visible up to 12 m (40 ft) away
- IP65 (NEMA 7) compact flow display transmitter has a 2 x 16 Alphanumeric LCD display
- Current, voltage, status alarm, frequency and RS232 outputs (see specification section for details)
- Optional current, voltage and temperature inputs (see specification section for details)
- ZeroMatic Path automatically sets zero
- Bidirectional flow operation
- 1 MByte data logger with both site and data logger storage
- English, Spanish, German,Italian and French language selectable on IP65 (NEMA 7) enclosures

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Technical specifications

SITRANS FUS1010IP65 (NEMA 4X) wall mount

Enclosure IP65 (NEMA 4X)	
Input	
Flow range	±12 m/s (±40 ft/s), bidirectional
Pipe size	6.4 mm ... 9.14 m (0.25“ ... 360“)
Optional inputs Single channel	• Current: 2 x 4 … 20 mA DC • Voltage: 2 x 0 … 10 V DC • Temperature: 2 x 4 wire 1 kΩ RTD
Output	
Standard outputs	• Current: 2 x 4 … 20 mA DC (1 kΩ at 30 V DC) • Voltage: 2 x 0 … 10 V DC (5 kΩ min.) • Status Alarm: 4 x SPDT relays • Mercury wetted relays • Frequency: 2 x 0 … 5 kHz • RS232
Optional outputs	• Mercury wetted relays • Expanded I/Os (4 additional 4 ... 20 mA outputs) with form c relays • Expanded I/Os with Mercury wetted relays • uniMass capability with 1 RTD input and 4 x 4 ... 20 mA analog input
Accuracy	
Accuracy	± 0.5 % ... 1.0 % of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0015 ... 0.003 m/s (± 0.005 ... 0.01 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Batch repeatability	± 0.15 % of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Data refresh rate	5 Hz

Rated operation conditions	
Degree of protection	IP65 (NEMA 4X)
Liquid temperature	
• Standard	-40 ... +120 °C (-40 ... +250 °F)
• Optional	-40 ... +230 °C (-40 ... +450 °F)
Ambient temperature	-18 … +60 °C (0 … 140 °F)
Design	
Dimensions	see SITRANS F US Clamp-on "System info and selection guide"
Weight	see diagrams
Power supply	90 ... 240 V AC, 50 ... 60 Hz, 30 VA or 9 ... 36 V DC, 12 W
Indication and operation	
Data logger memory	1 MByte
Display	128 x 240 pixel LCD with back-light
Keypad	33 keypad buttons with tactile feedback
Language options	English, Spanish, German, Italian, French
Certificates and approvals	
FM and CSA ratings	• Transmitter N-I Class I, Div 2 S Class II, Div 2 • Sensor I.S. Class I, II, Div 1
CE	EMC Directive 2004/108/EC ATEX Directive 94/9/EC
C-TICK	
ATEX ratings	• Transmitter: Ex II (1) G [Ex ia] IIC Ex II 3 (1) G Ex nC [ia] IIC T5 • Sensors: Ex II 1 G Ex ia IIC T5
INMETRO Ratings	• Transmitter: [BR-Ex ia] IIC BR-Ex nC [ia] IIC T5 • Sensors: BR-Ex ia IIC T5
IECEx	Pending

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SITRANS FUS1010 (Standard)

SITRANS FUS1010, IP65 (NEMA 7) compact explosionproof

Enclosure IP65 (NEMA 7)	
Input	
Flow range	± 12 m/s (± 40 ft/s), bidirectional
Pipe size	6.4 mm ... 9.14 m (0.25“ ... 360“)
Optional inputs single channel	• Current: 1 x 4 … 20 mA DC • Temperature: 2 x 4 wire 1 kΩ RTD
Output	
Outputs	• Current (externally powered): 1 x 4 … 20 mA DC (1 kΩ at 30 V DC) • Status Alarm: 1 x Isolated open collector • Frequency: 2 x 0 … 5 kHz • RS232
Accuracy	
	± 0.5 % ... 1.0 % of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0015 ... 0.003 m/s (± 0.005 ... 0.01 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Batch repeatability	± 0.15 % of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Data refresh rate	5 Hz
Rated operation conditions	
Degree of protection	IP65 (NEMA 7)
Liquid temperature	
• Standard	-40 ... +120 °C (-40 ... +250 °F)
• Optional	-40 ... +230 °C (-40 ... +450 °F)
Ambient temperature	-18 … +60 °C (0 … 140 °F)
Design	
Dimensions	see SITRANS F US Clamp-on "System info and selection guide"
Weight	see diagrams
Power supply	90 ... 240 V AC, 50 ... 60 Hz, 15 VA or 9 ... 36 V DC, 10 W

Indication and operation	
Data logger memory	1 MByte
Display	2 x 16 alphanumeric LCD display
Keypad	5 Magnetic hall effect switches
Language options	English, Spanish, German, Italian, French
Certificates and approvals	
FM and CSA ratings	• Transmitter XP Class I, Div 1 D-I Class II, Div 1 N-I Class I, Div 2 S Class II, Div 2 • Sensor I.S. Class I, II, Div 1
ATEX ratings	• Flow transmitter: Ex II 2 (1) G Ex d [ia] IIB + H2 T5 • Sensors: Ex II 1 G Ex ia IIC T5
INMETRO ratings (Brazil)	• Transmitter: BR Ex d [ia] IIC T5 • Sensors: BR-Ex ia IIC T5
IECEx	Pending

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SITRANS FUS1010 IP66 (NEMA 7) wall mount explosionproof

Enclosure IP66 (NEMA 7)	
Input	
Flow range	± 12 m/s (± 40 ft/s), bidirectional
Pipe size	6.4 mm ... 9.14 m (0.25“ ... 360“)
Optional Inputs single channel	• Current: 2 x 4 … 20 mA DC • Voltage: 2 x 0 … 10 V DC • Temperature: 2 x 4 wire 1 kΩ RTD
Output	
Outputs single channel	• Current: 2 x 4 … 20 mA DC (1 kΩ at 30 V DC) • Voltage: 2 x 0 … 10 V DC (5 kΩ min.) • Status Alarm: 4 x SPDT Relays • Frequency: 2 x 0 … 5 kHz • RS232
Accuracy	
Accuracy	± 0.5 % ... 1.0 % of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0015 ... 0.003 m/s (± 0.005 ... 0.01 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Batch repeatability	± 0.15 % of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Data refresh rate	5 Hz
Rated operation conditions	
Degree of protection	IP66 (NEMA 7)
Liquid temperature	
• Standard	-40 ... +120 °C (-40 ... +250 °F)
• Optional	-40 ... +230 °C (-40 ... +450 °F)
Ambient temperature	-18 … +60 °C (0 … 140 °F)
Design	
Dimensions	see SITRANS F US Clamp-on "System info and selection guide"
Weight	see diagrams
Power supply	90 ... 240 V AC, 50 ... 60 Hz, 30 VA or 9 ... 36 V DC, 12 W

Indication and operation	
Data logger memory	1 MByte
Display	128 x 240 pixel LCD with back-light
Keypad	33 keypad buttons with tactile feedback
Language options	English, Spanish, German, Italian, French
Certificates and approvals	
FM and CSA ratings	• Transmitter XP Class I, Div 1 D-I Class II, Div 1 N-I Class I, Div 2 S Class II, Div 2 • Sensor I.S. Class I, II, Div 1
CE	EMC Directive 2004/108/EC ATEX Directive 94/9/EC
C-TICK	
ATEX ratings	• Flow tranmitter Ex II (1) G [Ex ia] IIC Ex II 3 (1) G Ex nC [ia] IIC T5 Ex II 2 (1) G Ex d [ia IIC] IIB + H2 T5 • Sensors: Ex II 1 G Ex ia IIC T5
INMETRO ratings (Brazil)	• Flow transmitter: [BR-Ex ia] IIC BR-Ex d [ia IIC] IIB T5 • Sensors: BR-Ex ia IIC T5
IECEx	Pending

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SITRANS FUS1010 (Standard)

Standard MLFB for quick delivery on SITRANS FUS1010 (Dedicated standard)

Selection and Ordering data		Order No.	Order code
SITRANS FUS1010 (Standard)	L)	7ME353 - ■■■■■ - 0■■■	■■■ + K02 + K02 + R02
Design			
IP65 (NEMA 4X) wall mount		0	
Number of channels/ultrasonic paths			
Single channel		1	
Dual channel/Dual path		2	
Flowmeter functions and I/O configurations includes graphic display and Reflexor capability			
Standard outputs • 2 x 0 ... 10 V • 2 x 4 ... 20 mA • 2 x pulse output • 4 x relay C type		A	
Meter power options			
90 ... 240 V AC		A	
9-36 V DC (except NEMA 7 compact)		B	
Communication options			
RS232 (standard)		0	
RTD temperature sensor			
(include mounting hardware for pipes between 1.5" and 24" outer diameter)			
No RTDs		0	
1x standard clamp-on		1	
2x standard clamp-on		2	
1x submersible		3	
2x submersible		4	
Sensor for channel 1 (includes pipe mounting kit and spacer bar for indicated max. OD listed) See "Sensor selection charts" for specifications.			
no sensor			A
A2 universal	Trackmount and straps provided up to 75 mm (3")		B
B3 universal	Trackmount and straps provided up to 125 mm (5")		C
C3 universal	Mounting frame and straps provided up to 300 mm (13")		D
D3 universal	Mounting frame and straps provided up to 600 mm (24")		E
E2 universal	Mounting frame and straps provided up to 1200 mm (48")[1)]		F
C1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[2)]		M
C2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[2)]		N
D1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[2)]		P
D4H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[2)]		R
Doppler	to 12" with strap kit (not for IP65 (NEMA7))		S
D1H	High temperature range 104 °C / 220 °F HP[2)]		Z + P1P

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Selection and Ordering data			Order No.	Order code
SITRANS FUS1010 (Standard)		L)	7ME353 ■ - ■■■■■ - 0 ■■■	■■■ + K02 + K02 + R02
Sensor for channel 2 (includes pipe mounting kit for indicated max. OD listed) See "Sensor selection charts" for specifications.				
No sensor			A	
A2 universal	Trackmount and straps provided up to 75 mm (3")		B	
B3 universal	Trackmount and straps provided up to 125 mm (5")		C	
C3 universal	Mounting frame and straps provided up to 300 mm (13")		D	
D3 universal	Mounting frame and straps provided up to 600 mm (24")		E	
E2 universal	Mounting frame and straps provided up to 1200 mm (48")[1]		F	
C1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[2]		M	
C2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[2]		N	
D1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[2]		P	
D4H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[2]		R	
Doppler	to 12" with strap kit (not for IP65 (NEMA7))		S	
D1H	High temperature range 104 °C / 220 °F HP[2]		Z	Q1P
Approvals				
FM/CSA, CE (default)			1	
ATEX, CE, C-TICK			2	

[1] Supplied spacer bar supports pipes up to 1050 mm (42 inches). For pipes larger than 1050 mm (42 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4)

[2] Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4)

L) Subject to export regulations AL: N, ECCN: 3A991X.

Standard MLFB product offering represents 4 to 6 weeks delivery time.

For sensor and RTD cables for quick delivery see tables at end of section.

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SITRANS FUS1010 (Standard)

Selection and Ordering data		Order No.	Ord. code
SITRANS FUS1010 (Standard)			
• IP65 (NEMA 4X) wall mount	L)	**7ME3530-**	
• IP65 (NEMA 7) compact explosionproof	L)	**7ME3531-**	
• IP66 (NEMA 7) wall mount explosionproof	L)	**7ME3533-**	
		0 -	
Number of channels/ultrasonic paths			
Single channel		**1**	
Dual channel / Dual path		**2**	
Special: Four channel / Four path (NEMA 4X wall mount and NEMA 7 wall mount explosionproof only)		**9**	**H 1 A**
Flowmeter functions and I/O configurations includes graphic or digital display and Reflexor capability for all except IP65 (NEMA 7) compact units			
IP65 (NEMA 4X) wall mount and IP66 (NEMA 7 wall mount explosionsproof) units			
• Standard outputs - 2 x 0 ... 10 V - 2 x 4 ... 20 mA - 2 x pulse output - 4 x relay C type		**A**	
• Standard outputs with optional input adder - UniMass capability with 2 x RTD input and - 4 x 4 ... 20 mA analog input		**C**	
IP65 (NEMA 7) compact explosionproof units			
• Standard outputs - 1 x 4 ... 20 mA (Loop) and 1 x status (open collector) **per channel** - 1 x pulse output for single channel units only		**D**	
• Standard outputs with optional input adder - UniMass capability with 1 RTD input and - 1 x analog input **per channel**		**F**	
• Standard outputs with Mercury wetted relays and optional input adder		**Z**	**J 1 A**
• Extended outputs adder with optional input adder (4 additional 4 ... 20 mA outputs) and form C relay		**Z**	**J 1 B**
• Extended outputs adder with optional input adder (4 additional 4 ... 20mA outputs) and Mercury wetted relays		**Z**	**J 1 C**
• Standard outputs with Mercury wetted relays		**Z**	**J 1 D**
Meter power options			
90 ... 240 V AC		**A**	
9 ... 36 V DC (except compact NEMA 7)		**B**	
9 ... 36 V DC negative GND (compact only)		**J**	
9 ... 36 V DC positive GND (compact only)		**K**	
Communication options			
RS232 (standard)		**0**	
MODBUS (dedicated only, excludes NEMA 7 compact)		**1**	
RTD temperature sensor (includes mounting hardware for pipes between 1.5“ and 24“ outer diameter)			
No RTDs		**0**	
1 x Standard clamp-on RTD		**1**	
2 x Standard clamp-on RTD		**2**	
1 x Submersible clamp-on RTD		**3**	
2 x Submersible clamp-on RTD		**4**	
1 x Insertion style RTD with thermowell and lagging		**9**	**N 1 A**
2 x Insertion style RTD with thermowell and lagging		**9**	**N 1 B**

Selection and Ordering data		Order No.	Ord. code
SITRANS FUS1010 (Standard)			
• IP65 (NEMA 4X) wall mount	L)	**7ME3530-**	
• IP65 (NEMA 7) compact explosionproof	L)	**7ME3531-**	
• IP66 (NEMA 7) wall mount explosionproof	L)	**7ME3533-**	
		0 -	
Sensor for channel 1 Including pipe mounting tracks for sizes A & B sensors indented for pipe with a OD less than 125 mm (5") and mounting frame/spacer bars for sizes C, D & E sensors. Straps provided are for the indicated maximum OD listed below. Strap kits are available to accommodate larger pipes (refer to spare part list). Refer to "Sensor Selection Charts" for the sensor suitability of pipe size and wall thickness".			
no sensor			**A**
A2 universal	Trackmount and straps provided up to 75 mm (3")		**B**
B3 universal	Trackmount and straps provided up to 125 mm (5")		**C**
C3 universal	Mounting frame and straps provided up to 300 mm (13")		**D**
D3 universal	Mounting frame and straps provided up to 600 mm (24")		**E**
E2 universal	Mounting frame and straps provided up to 1200 mm (48")[1]		**F**
For the following A1H to D4H sensors, temperature range is -40 °C to 65 °C (-41 °F to 150 °F), nominal 21 °C (70 °F):			
A2H (high precision)	Trackmount and straps provided up to 75 mm (3")		**H**
A3H (high precision)	Trackmount and straps provided up to 75 mm (3")		**J**
B1H (high precision)	Trackmount and straps provided up to 125 mm (5")		**K**
B2H (high precision)	Trackmount and straps provided up to 125 mm (5")		**L**
C1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")		**M**
C2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")		**N**
D1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[2]		**P**
D2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[2]		**Q**
D4H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[2]		**R**
Doppler	to 12“ with strap kit (not for IP65 (NEMA 7))		**S**

[1] Supplied spacer bar supports pipes up to 1050 mm (42 inches). For pipes larger than 1050 mm (42 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4)

[2] Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4)

L) Subject to export regulations AL: N, ECCN: 5A991X.

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Selection and Ordering data		Order No.	Ord. code
SITRANS FUS1010 (Standard)			
• IP65 (NEMA 4X) wall mount	L)	**7ME3530-**	
• IP65 (NEMA 7) compact explosionproof	L)	**7ME3531-**	
• IP66 (NEMA 7) wall mount explosionproof	L)	**7ME3533-**	
		0 -	
Sensor for channel 1 (continued)			
High temperature sensor size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))			**Z P 1 A**
High temperature sensor size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))			**Z P 1 B**
High temperature sensor size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))			**Z P 1 C**
For the following B1H to D4H sensors, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):			
B1H (high temperature range HP)			**Z P 1 K**
B2H (high temperature range HP)			**Z P 1 L**
C1H (high temperature range HP)			**Z P 1 M**
C2H (high temperature range HP)			**Z P 1 N**
D1H (high temperature range HP)[2]			**Z P 1 P**
D2H (high temperature range HP)[2]			**Z P 1 Q**
D4H (high temperature range HP)[2]			**Z P 1 R**
Sensor for channel 2 (includes pipe mounting kit for indicated max. OD listed) See "Sensor selection charts" for specifications.			
no sensor			**A**
A2 universal	Trackmount and straps provided up to 75 mm (3")		**B**
B3 universal	Trackmount and straps provided up to 125 mm (5")		**C**
C3 universal	Mounting frame and straps provided up to 300 mm (13")		**D**
D3 universal	Mounting frame and straps provided up to 600 mm (24")		**E**
E2 universal	Mounting frame and straps provided up to 1200 mm (48")[1]		**F**
For the following A1H to D4H sensors, temperature range is -40 °C to 65 °C (-41 °F to 150 °F), nominal 21 °C (70 °F):			
A2H (high precision)	Trackmount and straps provided up to 75 mm (3")		**H**
A3H (high precision)	Trackmount and straps provided up to 75 mm (3")		**J**
B1H (high precision)	Trackmount and straps provided up to 125 mm (5")		**K**
B2H (high precision)	Trackmount and straps provided up to 125 mm (5")		**L**
C1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")		**M**

Selection and Ordering data		Order No.	Ord. code
SITRANS FUS1010 (Standard)			
• IP65 (NEMA 4X) wall mount	L)	**7ME3530-**	
• IP65 (NEMA 7) compact explosionproof	L)	**7ME3531-**	
• IP66 (NEMA 7) wall mount explosionproof	L)	**7ME3533-**	
		0 -	
Sensor for channel 2 (continued)			
C2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")		**N**
D1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")e[2]		**P**
D2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[2]		**Q**
D4H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[2]		**R**
Doppler	to 12" with strap kit (not for IP65 (NEMA 7))		**S**
High temperature sensor size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))			**Z Q 1 A**
High temperature sensor size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))			**Z Q 1 B**
High temperature sensor size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))			**Z Q 1 C**
For the following B1H to D4H sensors, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):			
B1H (high temperature range HP)			**Z Q 1 K**
B2H (high temperature range HP)			**Z Q 1 L**
C1H (high temperature range HP)			**Z Q 1 M**
C2H (high temperature range HP)			**Z Q 1 N**
D1H (high temperature range HP)[2]			**Z Q 1 P**
D2H (high temperature range HP)[2]			**Z Q 1 Q**
D4H (high temperature range HP)[2]			**Z Q 1 R**
Approvals			
FM/CSA, CE			**1**
ATEX, CE, C-TICK			**2**
INMETRO (Brazil)			**3**

[1] Supplied spacer bar supports pipes up to 1050 mm (42 inches). For pipes larger than 1050 mm (42 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4).

[2] Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4).

L) Subject to export regulations AL: N, ECCN: 5A991X.

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SITRANS FUS1010 (Standard)

Selection and Ordering data	Order code
Further designs	
Please add "**-Z**" to Order No. and specify Order code(s).	
Cable assembly for sensors (add for No. of channels)	
See "Sensor cable selection chart"	**K..**
Cable assembly for RTDs (add for No. of RTDs)	
See "RTD cable selection chart"	**R..**
Cable termination kit (for one cable pair)	
• Termination for standard, plenum and armored sensor cable	**T01**
• Termination for submersible sensor cable	**T11**
• RTD cable termination kit for standard RTD	**T21**
• RTD cable termination kit for submersible RTD	**T31**
• Insert RTD cable termination kit	**T41**
Languages (Meter and Documentation), English (default)	
• German	**B10**
• French	**B12**
• Spanish	**B13**
• Italian	**B14**
Wet flow transfer calibration (priced on request)	
6 point calibration 2/water (Price per channel)	
• 2SS40 pipe	**D01**
• 3CS40 pipe	**D02**
• 4CS40 pipe	**D03**
• 4SS40 pipe	**D04**
• 6CS40 pipe	**D05**
• 6SS40 pipe	**D06**
• 6CS120 pipe	**D07**
• 8CS40 pipe	**D08**
• 8SS40 pipe	**D09**
• 8CS120 pipe	**D10**
• 10CS Standard pipe	**D11**
• 10CS40 pipe	**D12**
• 10SS40 pipe	**D13**
• 12CS Standard pipe	**D14**
• 12CS40 pipe	**D15**
• 14CS30 pipe	**D16**
• 14CS40 pipe	**D17**
• 16CS Standard pipe	**D18**
• 16CS40 pipe	**D19**
• 18CS Standard pipe	**D20**
• 20CS20 pipe	**D21**
• 20CS30 pipe	**D22**
• 24CS Standard pipe	**D23**
• 24CS20 pipe	**D24**
• 24CS30 pipe	**D25**
• 30CS Standard pipe	**D26**
• 36CS Standard pipe	**D27**
• Other pipe, other liquid, additional points, witness	**Y28**
Tag name plate	
• Stainless steel tag with 3.2 mm (0.13 inch) character size (68 characters max.)	**Y19**
Operating Instructions for SITRANS FUS1010	Order No.
English NEMA 4X wall mount & NEMA 7 wall mount explosionproof	**A5E02951520**
German NEMA 4X & wall mount NEMA 7 wall mount explosionproof	**A5E02951532**
NEMA 7 compact explosionproof	**CQ0:1010XFM-3**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumtenion

MLFB example

Application example

A clamp-on meter is required for a 12“ carbon steel jet fuel line, with a wall thickness of 12.7 mm (0.5“). Meter electronics are to be located in a Class I Div 2 area only 18 m (60 ft) from the pipeline. 12 V DC power is available at the site.

Dual path operation is desired for improved accuracy and redundant measurement.

MLFB Order No.: **7ME3530-2AB00-0QQ1-Z**
K03 + K03

Selection and Ordering data	Order No.	Ord. code
SITRANS FUS1010 meter family	**7 M E 3 5 3 -**	**0 -**
IP65 (NEMA 4X) enclosure	**0**	
Dual Path	**2**	
Standard I/O option	**A**	
9 ... 36 V DC power option	**B**	
RS232 Standard	**0**	
No RTD required		**0**
Sensor code for path 1		**Q**
Sensor code for path 2		**Q**
FM approval required		**1**
30 m (100 ft) sensor cable for path 1		**K 0 3**
30 m (100 ft) sensor cable for path 2		**K 0 3**

Universal sensor selection chart

Based on pipe size (pipes other than steel)					
Sensor	**Order Code**	**Outer diameter range (mm)**		**Outer diameter range (inches)**	
Pipe size		**min.**	**max.**	**min.**	**max.**
A2	**B**	12.7	50.8	0.5	2
B3	**C**	19	127	0.75	5
C3	**D**	51	305	2	12
D3	**E**	203	610	8	24
E2	**F**	254	6 096	10	240

High precision sensor selection chart

Based on pipe wall thickness (steel pipes only)					
Sensor	**Order Code**	**Pipe wall (mm)**		**Pipe wall (inches)**	
Pipe wall		**min.**	**max.**	**min.**	**max.**
A1H	**G**	0.64	1.02	0.025	0.04
A2H	**H**	1.02	1.52	0.04	0.06
A3H	**J**	1.52	2.03	0.06	0.08
B1H	**K**	2.03	3.05	0.08	0.12
B2H	**L**	3.05	4.06	0.12	0.16
C1H	**M**	4.06	5.84	0.16	0.23
C2H	**N**	5.84	8.13	0.23	0.32
D1H	**P**	8.13	11.18	0.32	0.44
D2H	**Q**	11.18	15.75	0.44	0.62
D4H	**R**	15.75	31.75	0.62	1.25

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Sensor cable selection chart

Sensor cable codes for length and type options				
Cable length m (ft)	Standard (PVC jacket) -40…+80 °C (-40…+176 °F)	Submersible (polyethylene jacket) -40…+80 °C (-40…+176 °F)	Plenum Rated (teflon jacket) -40…+200 °C (-40…+392 °F)	Armored -40…+80 °C (-40…+176 °F)
	Order code			
6 (20)	**K01**[1]	**K11**	**K21**	**K31**
15 (50)	**K02**[1]	**K12**[1]	**K22**	**K32**[1]
30 (100)	**K03**[1]	**K13**[1]	**K23**	**K33**
46 (150)	**K04**[1]	**K14**	**K24**	**K34**
61 (200)	**K05**	**K15**	**K25**	**K35**
91 (300)	**K06**[1]	**K16**	**K26**	**K36**

RTD cable selection chart

RTD cable codes for length and type		
Cable length m (ft)	Standard (teflon wrapped) -40 ... +200 °C (-40 … +392 °F)	Submersible (extruded jacket) -40 ... +200 °C (-40 … +392 °F)
	Order code	
6 (20)	**R01**[1]	**R11**
15 (50)	**R02**[1]	**R12**
30 (100)	**R03**[1]	**R13**
46 (150)	**R04**	**R14**
61 (200)	**R05**	**R15**
91 (300)	**R06**	**R16**

[1] Standard MLFB for quick delivery

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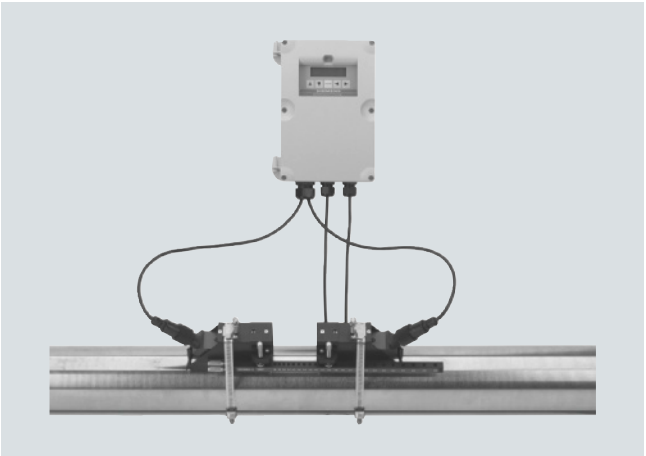
SITRANS FST020 (Basic)

Overview



SITRANS FST020 offers reliable flow measurement at a much lower cost than other clamp-on ultrasonic flowmeters, with flow rate accuracy of ± 0.5 % to 1.0 % for most applications.

Benefits

- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external sensors do not require periodic cleaning
- No moving parts to wear or foul
- No pressure drop or energy loss
- Compact, integral design reduces installation cost
- Wide turn-down ratio
- Optional WideBeam technology ensures high performance.
- ZeroMatic Path automatically sets zero without stopping flow and eliminates zero drift.

Application

SITRANS FST020 is suitable for most clean liquid applications, including the following:

- Water & wastewater industry
  - Potable water
  - Wastewater, influent & effluent
  - Processed sewage, sludge
- Chemical feed industry
  - Sodium hypochlorite
  - Sodium hydroxide
- HVAC & power industries
  - Coolant flow
  - Fuel flow
- Process control
  - Chemicals
  - Pharmaceuticals

The SITRANS FST020 flowmeter is not available with hazardous areas
approval.

Design

- IP65 (NEMA 4X) wall mount constructed of polycarbonate
- Single channel versions only

Function

- 2x16 integral alphanumeric display and 5 key keypad for installation menu and data display
- Pulse rate output
- RS232 digital communication port with a DB9 connector
- Totalizer start/stop and rest control lines.
- Remote PC installation menu
- ZeroMatic Path automatically sets zero
- Bidirectional flow operation
- 1 MByte data logger with both site & data logger storage
- Menu language in English, Spanish, German, Italian and French

Technical specifications

Input	
Flow range	± 12 m/s (± 40 ft/s), bi-directional
Flow sensitivity	0.0003 m/s (0.001 ft/s) flow rate independent
Digital Inputs	
Totalizer Hold	Optically isolated diode Input voltage: 2 … 10 V DC
Totalizer Reset	Optically isolated diode Input voltage: 2 … 10 V DC
Output	
Current	• 4 ... 20 mA (Isolated) • externally powered 10 … 30 V DC
Relay	• Programmable Form C 250 mA • 30 V DC • 3 V A max
Pulse rate[1)]	• Optically isolated transistor 10 mA • 30 V DC max
Accuracy	for velocities ≥ 0.3 m/s (1 ft/s)
• 4 ... 20 mA	± 1.0 % ... 2.0 % of flow
• Pulse, relay output	± 0.5 % ... 1.0 % of flow
Batch repeatability	± 0.15 %
Zero Drift	0.1 % of rate; 0.0003 m/s (0.001 ft/s)
Data refresh rate	5 Hz
Transmitter conditions	
Operating temperature	-10 … +50 °C (14 … +122 °F)
Storage temperature	-20 … +60 °C (-4 … +140 °F)
Degree of protection	IP65 NEMA 4X
Design	
Weight	1,4 kg (3.0 lbs)
Dimensions (W x H x D)	175 x 235 x 92 mm (6.89 x 9.25 x 3.62 inches)
Enclosure material	Polycarbonate
Power supply	100 ... 240 V AC @ 15 VA or 11.5 ... 28.5 V DC @ 10 W
Certificates and approvals	
Unclassified locations	UL, UL_c
Classified locations	
CE	EMC Directive 2004/108/EC ATEX Directive 94/9/EC
C-TICK	

[1)] When used to represent flow rate (PGEN) the frequency can reach as high as 5000 Hz. When used to represent flow total it can reach 50 Hz.

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Standard MLFB for quick delivery on SITRANS FST020 (Basic)

Selection and Ordering data		Order No.
SITRANS FST020 (Basic)		L) 7ME357 - ■■■ 30 - 0 ■■■
Design		
IP65 (NEMA 4X) wall mount		0
Number of channels/ultrasonic paths		
Single channel		1
Flowmeter functions and I/O configurations		
• With display and 1 additional analog output and SPST relay		H
Meter power options		
100 ... 240 V AC		A
11.5 ... 28.5 V DC, 10 W max		B
Sensor (includes pipe mounting kit for indicated max. OD listed) See "Sensor selection charts" for specifications.		
no sensor		A
A2 universal	Trackmount and straps provided up to 75 mm (3")	B
B3 universal	Trackmount and straps provided up to 125 mm (5")	C
C3 universal	Mounting frame and straps provided up to 300 mm (13")	D
D3 universal	Mounting frame and straps provided up to 600 mm (24")	E
E2 universal	Mounting frame and straps provided up to 1200 mm (48")[1)]	F
For the following A1H to D4H sensors, temperature range is -40 ... 65 °C (-41 ... 150 °F), nominal 21 °C (70 °F)		
C1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")	M
C2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")	N
D1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[1)]	P
D4H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[1)]	R
Sensor cables		
No sensor cable		A
6 m (20 ft) PVC Jacket (1 pr)		B
15 m (50 ft) PVC Jacket (1 pr)		C
30 m (100 ft) PVC Jacket		D
46 m (150 ft) PVC Jacket		E
91 m (300 ft) PVC Jacket		G
Approvals		
UL, UL_C, CE, C-TICK		0

Standard MLFB offering represents 2 to 3 weeks delivery time for quantities under 5.

[1)] Supplied spacer bar suppports pipes up to 750 mm (30 inches). For pipes larger than 750 nn (30 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4).

L) Subject to export regulations AL: N, ECCN: 3A991X.

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SITRANS FST020 (Basic)

Selection and Ordering data		Order No.	Ord. code
SITRANS FST020 (Basic) IP65 (NEMA 4x)	L)	**7ME3570-**	**3 0 - 0**
Number of channels/ultrasonic paths			
Single channel			**1**
Flowmeter functions and I/O configurations			
• With display keypad 1x 4 ... 20 mA, 1x relay, 1x pulse/frequency, 2x digital input			**H**
Meter power options			
100 ... 240 V AC			**A**
11.5 ... 28.5 V DC			**B**
Sensor for channel 1[1]			
Including pipe mounting tracks for Sizes A & B universal sensors indented for pipe with a OD less than 125 mm (5") and mounting frame/spacer bars for sizes C, D & E universal sensors. Straps provided are for the indicated maximum OD listed below. Strap kits are available to accommodate larger pipes (refer to spare part list). Refer to "Sensor Selection Charts" for the sensor suitability of pipe size and wall thickness			
no sensor			**A**
A2 universal	Trackmount and straps provided up to 75 mm (3")		**B**
B3 universal	Trackmount and straps provided up to 125 mm (5")		**C**
C3 universal	Mounting frame and straps provided up to 330 mm (13")		**D**
D3 universal	Mounting frame and straps provided up to 600 mm (24")		**E**
E2 universal	Mounting frame and straps provided up to 1200 mm (48")		**F**
For the following A1H to D4H transducers, temperature range is -40 ... 65 °C (-41 ... 150 °F), nominal 21 °C (70 °F)			
A2H (high precision)	Trackmount and straps provided up to 75 mm (3")		**H**
A3H (high precision)	Trackmount and straps provided up to 75 mm (5")		**J**
B1H (high precision)	Trackmount and straps provided up to 125 mm (5")		**K**
B2H (high precision)	Trackmount and straps provided up to 125 mm (5")		**L**
C1H (high precision)	up to 600 min (24") with mounting hardware		**M**
C2H (high precision)	up to 600 min (24") with mounting hardware		**N**
D1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[1]		**P**
D2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[1]		**Q**
D4H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[1]		**R**

Selection and Ordering data		Order No.	Ord. code
SITRANS FST020 (Basic) IP65 (NEMA 4x)	L)	**7ME3570-**	**3 0 - 0**
High temperature sensor size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1 to 8 inch diam.))			**Z P 1 A**
High temperature sensor size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. 6 to 24 inch diam.))			**Z P 1 B**
High temperature sensor size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (16 to 48 inch diam.))			**Z P 1 C**
Sensor cables (pair)			
No sensor cable			**A**
6 m (20 ft) PVC Jacket			**B**
15 m (50 ft) PVC Jacket			**C**
30 m (100 ft) PVC Jacket			**D**
46 m (150 ft) PVC Jacket			**E**
61 m (200 ft) PVC Jacket			**F**
91 m (300 ft) PVC Jacket			**G**
6 m (20 ft) Plenum rated (Teflon jacket)			**H**
15 m (50 ft) Plenum rated (Teflon jacket)			**J**
30 m (100 ft) Plenum rated (Teflon jacket)			**K**
46 m (150 ft) Plenum rated (Teflon jacket)			**L**
61 m (200 ft) Plenum rated (Teflon jacket)			**M**
91 m (300 ft) Plenum rated (Teflon jacket)			**N**
Approvals			
UL, UL_C, CE, C-TiCK			**0**

[1] Supplied spacer bar supports pipes up to 1050 mm (42"). For pipes larger than 1050 mm (42") purchase also, spare part 7ME3960-0MS40 (1012BN-4)

L) Subject to export regulations AL: N, ECCN: 3A991X.

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Selection and Ordering data	Order code
Further designs Please add "**-Z**" to Order No. and specify Order code(s).	
Cable termination kit (for one cable pair)	
• Sensor cable termination for standard and plenum cable	**T01**
Wet flow transfer calibration (priced on request)	
6 point calibration 2/water (Price per channel)	
• 2SS40 pipe	**D01**
• 3CS40 pipe	**D02**
• 4CS40 pipe	**D03**
• 4SS40 pipe	**D04**
• 6CS40 pipe	**D05**
• 6SS40 pipe	**D06**
• 6CS120 pipe	**D07**
• 8CS40 pipe	**D08**
• 8SS40 pipe	**D09**
• 8CS120 pipe	**D10**
• 10CS Standard pipe	**D11**
• 10CS40 pipe	**D12**
• 10SS40 pipe	**D13**
• 12CS Standard pipe	**D14**
• 12CS40 pipe	**D15**
• 14CS30 pipe	**D16**
• 14CS40 pipe	**D17**
• 16CS Standard pipe	**D18**
• 16CS40 pipe	**D19**
• 18CS Standard pipe	**D20**
• 20CS20 pipe	**D21**
• 20CS30 pipe	**D22**
• 24CS Standard pipe	**D23**
• 24CS20 pipe	**D24**
• 24CS30 pipe	**D25**
• 30CS Standard pipe	**D26**
• 36CS Standard pipe	**D27**
• Other pipe, other liquid, additional points, witness	**Y28**
Tag name plate	
• Stainless steel tags with 3.2 mm (0.13 inch) character size (68 characters max.)	**Y19**

MLFB example

Application example

A basic clamp-on meter is required for a DN 150 (6“ schedule 40) carbon steel waste water line, with a pipe wall thickness of 7.1 mm (0.28“). Meter electronics are to be located in an instrumentation shed with available AC power. 36 m (120 ft) of sensor cable is needed to reach pipe location.

MLFB Order No.: **7ME3570-1HA300-0NE0**

Selection and Ordering data	Order No.	Ord. code
SITRANS FST020 meter family D)	**7ME357 - 30 - 0**	**0**
IP65 (NEMA 4X) enclosure	**0**	
Single channel	**1**	
Standard I/O option	**H**	
100 ... 240 V AC power option	**A**	
Sensor code for channel 1	**N**	
46 m (150 ft) sensor cable	**E**	

D) Subject to export regulations AL: N, ECCN: EAR99H.

Selection and Ordering data		Order code
Operating Instructions for SITRANS FST020		
English NEMA 4X	D)	**A5E03086487**
German NEMA 4X		**A5E03086488**

This device is shipped with a Quick Start Guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Universal sensor selection chart

Based on pipe size (pipes other than steel)					
Pipe size	**Order Code**	**Outer diameter range (mm)**		**Outer diameter range (inches)**	
		min.	**max.**	**min.**	**max.**
A2	**B**	12,7	50,8	0.5	2
B3	**C**	19	127	0.75	5
C3	**D**	51	305	2	12
D3	**E**	203	610	8	24
E2	**F**	254	6096	10	249

High precision sensor selection chart

Based on pipe wall thickness (steel pipes only)					
Pipe Wall	**Order Code**	**Pipe Wall [mm]**		**Pipe Wall [inches]**	
		min.	**max.**	**min.**	**max.**
A1H	**G**	0,64	1,02	0.025	0.04
A2H	**H**	1,02	1,52	0.04	0.06
A3H	**J**	1,52	2,03	0.06	0.08
B1H	**K**	2,03	3,05	0.08	0.12
B2H	**L**	3,05	4,06	0.12	0.16
C1H	**M**	4,06	5,84	0.16	0.23
C2H	**N**	5,84	8,13	0.23	0.32
D1H	**P**	8,13	11,18	0.32	0.44
D2H	**Q**	11,18	15,75	0.44	0.62
D4H	**R**	15,75	31,75	0.62	1.25

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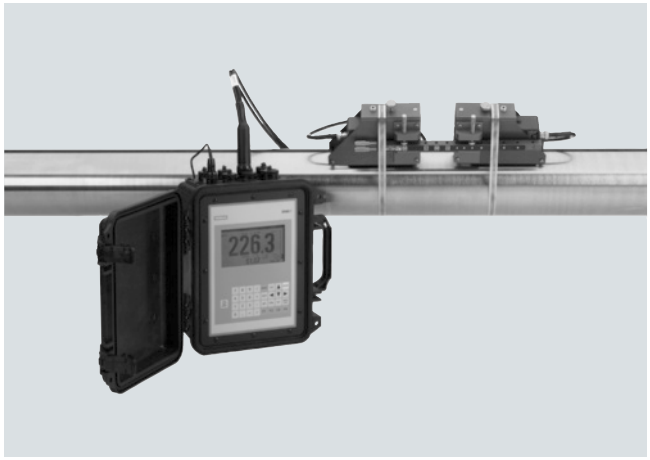
SITRANS FUP1010 (Portable)

Overview



SITRANS FUP1010 clamp-on non-intrusive ultrasonic flow transmitter offers maximum versatility plus battery power for portable field use. It can operate in either WideBeam transit time or reflexor (Doppler) mode, making it suitable for virtually any liquid, even those with high aeration or suspended solids.

SITRANS FUP1010 is available in single and dual channel or dual path configurations, with IP67 weatherproof enclosure.

Benefits

- Battery power facilitates field use; the meter is easily transported from one installation to another – saving time for surveys, monitoring and temporary installations
- Weatherproof enclosure can be used outdoors and left in place without concern for rain damage
- Rugged plastic case enables it to withstand rough treatment that would destroy most other meters
- Versatility - there is no need to change meters when operating conditions change
- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external sensors do not require periodic cleaning
- No moving parts to wear or foul
- No pressure drop or energy loss
- Wide turn-down ratio
- Choice of single or dual channel models minimizes total cost
- ZeroMatic Path automatically sets zero without stopping flow and reduces zero drift, even at low flow
- Note that the SITRANS FUP1010 flow transmitter is not available with hazardous area approvals

Application

SITRANS FUP1010 is suitable for a wide variety of liquid applications, including the following:

- Water industry
  - Raw water
  - Potable water
  - Chemicals
- Wastewater industry
  - Raw sewage
  - Effluent
  - Sludges
  - Mixed liquor
  - Chemicals
- HVAC industry
  - Chillers
  - Condensers
  - Hot and cold water systems
  - Thermal energy rate and total
- Power industry
  - Nuclear
  - Fossil
  - Hydroelectric
- Processing industry
  - Process control
  - Batching
  - Rate indication
  - Volumetric and mass measurement

Design

- IP67 Weatherproof / Impact resistant enclosure constructed of mineral reinforced copolymer polypropylene
  - Single channel
  - Dual channel / dual path

Function

- Integral 33 button keypad and large (128 x 240 pixel) graphic display visible up to 12 m (40 ft) away
- Current, voltage, frequency and RS232 outputs (see specification section for details)
- Optional current, voltage and temperature inputs (see specification section for details)
- ZeroMatic Path automatically sets zero
- Bi-directional flow operation
- 1 MByte data logger with both site and data logger storage
- English, Spanish, German, Italian and French language options

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Technical specifications

Input	
Flow range	± 12 m/s (± 40 ft/s), bidirectional
Pipe size	6.4 mm … 9.14 m (0.25“ … 360“)
Inputs, single channel	• Current: 2 x 4 … 20 mA DC • Voltage: 2 x 0 … 10 V DC • Temperature: 2 x 4 wire 1 kΩ RTD
Output	
Outputs	• Current: 2 x 4 … 20 mA DC (1 kΩ at 30 V DC) • Voltage: 2 x 0 … 10 V DC (5 kΩ minimum) • Status Alarm: 4 x SPDT Relays • Frequency: 2 x 0 … 5000 Hz • RS232
Accuracy	
Accuracy	± 0.5 % … 2 % of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0015 … 0.006 m/s (± 0.005 … 0.02 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Batch repeatability	± 0.15 % of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Rated operation conditions	
Degree of protection	
• Weatherproof/impact resistant	• IP67
Liquid temperature	
• Standard	-40 … +120 °C (-40 … +250 °F)
• Optional	-40 … +230 °C (-40 … +450 °F)
Ambient temperature	-18 … +60 °C (0 … 140 °F)
Design	
Dimensions	see SITRANS F US Clamp-on "System info and selection guide"
Weight	see diagrams
Power supply	
Power	Internal rechargeable battery
Battery operation	7 hours
Indication and operation	
Data logger memory	1 MByte
Site storage memory	50 sites minimum
Display	128 x 240 pixel LCD with back-light
Keypad	33 keypad buttons with tactile feedback
Language options	English, Spanish, German, Italian, French
Certificates and approvals	
Unclassified locations	UL ULc
Classified locations	
CE	EMC Directive 2004/108/EC ATEX Directive 94/9/EC

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SITRANS FUP1010 (Portable)

Standard MLFB for quick delivery on SITRANS FUP1010 Portable (excluding energy)

Selection and Ordering data		Order No.	Order Code
SITRANS FUP1010 (Portable)			
• IP67 weatherproof battery powered	L)	**7ME3510-**	■■■■■ - 0 ■■ 0 ■■■
Number of channels/ultrasonic paths			
Single channel		1	
Dual channel/Dual path		2	
Standard flowmeter types and I/O configurations			
• Standard I/O - 2 x 4 ... 20 mA analog in - 2 x RTD input		C	
Sensor cables			
No sensor cable		A	
1 x PVC Jacket cable, length 6 m/20 ft		B	
2 x PVC Jacket cable, length 6 m/20 ft		C	
1 x PVC Jacket cable, length 15 m/50 ft		D	
2 x PVC Jacket cable, length 15 m/50 ft		E	
RTD temperature Sensor (Mounting hardware & cable included)			
No RTDs		0	
1 x standard clamp-on RTD, 6 m/20 ft cable		5	
2 x standard clamp-on RTD with 6 m/20 ft cable		6	
1 x standard clamp-on RTD with 15 m/50 ft cable		7	
2 x standard clamp-on RTD with 15 m/50 ft cable		8	
Battery charger options			
No battery charger		0	
Charger Type A for Europe (CEE7/7)		1	
Charger Type G for U.S. (NEMA 5-15P)		5	
Sensor for channel 1 (includes pipe mounting kit and spacer bar for indicated max. outer diameter listed) See "Sensor selection charts" for specifications.			
no sensor		A	
A2 universal	Trackmount and straps provided up to 75 mm (3")	B	
B3 universal	Trackmount and straps provided up to 125 mm (5")	C	
C3 universal	Mounting frame and straps provided up to 300 mm (13")	D	
D3 universal	Mounting frame and straps provided up to 600 mm (24")	E	
E2 universal	Mounting frame and straps provided up to 600 mm (24")	F	
C1H (high precision)	Mounting frame and straps provided up to 600 mm (24")	M	
C2H (high precision)	Mounting frame and straps provided up to 600 mm (24")	N	
D1H (high precision)	Mounting frame and straps provided up to 600 mm (24")	P	
D4H (high precision)	Mounting frame and straps provided up to 600 mm (24")	R	
Doppler	to 12" with strap kit (not for IP65 (NEMA 7))	S	
D1H	High temperature range 104 °C/ 220 °F HP[2)]	Z	P 1 P

Selection and Ordering data		Order No.	Order Code
SITRANS FUP1010 (Portable)			
• IP67 weatherproof battery powered	L)	**7ME3510-**	■■■■■ - 0 ■■ 0 ■■■
Sensor for channel 2 (includes pipe mounting kit and spacer bar for indicated max. outer diameter listed) See "Sensor selection charts" for specifications.			
no sensor		A	
A2 universal	Trackmount and straps provided up to 75 mm (3")	B	
B3 universal	Trackmount and straps provided up to 125 mm (5")	C	
C3 universal	Mounting frame and straps provided up to 300 mm (13")	D	
D3 universal	Mounting frame and straps provided up to 600 mm (24")	E	
E2 universal	Mounting frame and straps provided up to 600 mm (24")	F	
C1H (high precision)	Mounting frame and straps provided up to 600 mm (24")	M	
C2H (high precision)	Mounting frame and straps provided up to 600 mm (24")	N	
D1H (high precision)	Mounting frame and straps provided up to 600 mm (24")	P	
D2H (high precision)	Mounting frame and straps provided up to 600 mm (24")	Q	
Doppler	to 12" with strap kit (not for IP65 (NEMA 7))	S	
D1H	High temperature range 104 °C / 220 °F HP[2)]	Z	Q 1 P

Approvals: No options (UL, ULc, CE by default)

Standard MLFB product offering represents 4 to 6 weeks delivery time

L) Subject to export regulations AL: N, ECCN: 3A991X

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Selection and Ordering data	Order No.	Ord. code
SITRANS FUP1010 (Portable)		
• IP67 weatherproof battery powered L)	**7ME3510-**	
	- 0	0
Number of channels/ultrasonic paths		
Single channel	1	
Dual channel/Dual path	2	
Standard flowmeter types and I/O configurations		
• Standard I/O - Reflexor capable - Graphic display - 2 x 0 ... 10 V - 2 x 4 ... 20 mA - 2 x pulse outputs - 4 x status logic - 2 x 4 ... 20 mA analog in - 1 x RTD per channel	C	
Sensor cables (select proper quantity of active channels)		
No sensor cable	A	
IP67 (weatherproof) only		
1 x PVC-jacket, length 6 m (20 ft) (for IP67 NEMA 6)[2]	B	
2 x PVC-jacket, length 6 m (20 ft) (for IP67 NEMA 6)[2]	C	
1 x PVC-jacket, length 15 m (50 ft) (for IP67 NEMA 6)[2]	D	
2 x PVC-jacket, length 15 m (50 ft) (for IP67 NEMA 6)[2]	E	
RTD temperature sensor (for type 3 meter only, mounting hardware and cable included)		
No RTDs	0	
IP67 (weatherproof) only		
1 x standard clamp-on RTD (NEMA 6) with 6 m (20 ft) cable[1]	5	
2 x standard clamp-on RTD (NEMA 6) with 6 m (20 ft) cable[1]	6	
1 x standard clamp-on RTD (NEMA 6) with 15 m (50 ft) cable[1]	7	
2 x standard clamp-on RTD (NEMA 6) with 15 m (50 ft) cable[1]	8	
Battery charger options		
no battery charger	0	
Charger Type A for Europe (CEE7/7)	1	
Charger Type C for Australia (AS3112)	2	
Charger Type D for U.K. (BS1363)	3	
Charger Type J for Japan (JIS8303)	4	
Charger Type G for U.S. (NEMA 5-15P)	5	
Charger Type L for Switzerland (SEV1011)	6	

Selection and Ordering data		Order No.	Ord. code
SITRANS FUP1010 (Portable)			
• IP67 weatherproof battery powered L)		**7ME3510-**	
		- 0	0
Sensor for channel 1 Including pipe mounting tracks for sizes A & B sensors indented for pipe with a OD less than 125 mm (5") and mounting frame/spacer bars for sizes C, D & E sensors. Straps provided are for the indicated maximum OD listed below. Strap kits are available to accommodate larger pipes (refer to spare part list). Refer to "Sensor Selection Charts" for the sensor suitability of pipe size and wall thickness.			
no sensor			A
A2 universal	Trackmount and straps provided up to 75 mm (3")		B
B3 universal	Trackmount and straps provided up to 125 mm (5")		C
C3 universal	Mounting frame and straps provided up to 300 mm (13")		D
D3 universal	Mounting frame and straps provided up to 600 mm (24")		E
E2 universal	Mounting frame and straps provided up to 600 mm (24")		F
For the following A1H to D4H sensors, temperature range is -40 °C to 65 °C (-41 °F to 150 °F), nominal 21 °C (70 °F):			
A2H (high precision)	Trackmount and straps provided up to 75 mm (3")		H
A3H (high precision)	Trackmount and straps provided up to 75 mm (3")		J
B1H (high precision)	Trackmount and straps provided up to 125 mm (5")		K
B2H (high precision)	Trackmount and straps provided up to 125 mm (5)		L
C1H (high precision)	Mounting frame and straps provided up to 600 mm (24")		M
C2H (high precision)	Mounting frame and straps provided up to 600 mm (24")		N
D1H (high precision)	Mounting frame and straps provided up to 600 mm (24")		P
D2H (high precision)	Mounting frame and straps provided up to 600 mm (24")		Q
D4H (high precision)	Mounting frame and straps provided up to 600 mm (24")		R
Doppler	to 12" with chain kit		S
High temperature sensor size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))			Z P 1 A
High temperature sensor size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))			Z P 1 B
High temperature sensor size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))			Z P 1 C

L) Subject to export regulations AL: N, ECCN: 3A991X

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SITRANS FUP1010 (Portable)

Selection and Ordering data		Order No.	Ord. code
SITRANS FUP1010 (Portable)			
• IP67 weatherproof battery powered	L)	**7ME3510-**	■■■■■ - 0 ■■ 0 ■■■
Sensor for channel 1 (continued)			
For the following B1H to D4H sensors, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):			
B1H (high temperature range HP)			**Z P 1 K**
B2H (high temperature range HP)			**Z P 1 L**
C1H (high temperature range HP)			**Z P 1 M**
C2H (high temperature range HP)			**Z P 1 N**
D1H (high temperature range HP)			**Z P 1 P**
D2H (high temperature range HP)			**Z P 1 Q**
D4H (high temperature range HP)			**Z P 1 R**
Sensor for channel 2 (includes pipe mounting kit and spacer bar for indicated max. outer diameter listed) See "Sensor selection charts" for specifications.			
no sensor			**A**
A2 universal	Trackmount and straps provided up to 75 mm (3")		**B**
B3 universal	Trackmount and straps provided up to 125 mm (5")		**C**
C3 universal	Mounting frame and straps provided up to 300 mm (13")		**D**
D3 universal	Mounting frame and straps provided up to 600 mm (24")		**E**
E2 universal	Mounting frame and straps provided up to 600 mm (24")		**F**
For the following A1H to D4H sensors, temperature range is -40 °C to 65 °C (-41 °F to 150 °F), nominal 21 °C (70 °F):			
A2H (high precision)	Trackmount and straps provided up to 75 mm (3")		**H**
A3H (high precision)	Trackmount and straps provided up to 75 mm (3")		**J**
B1H (high precision)	Trackmount and straps provided up to 125 mm (5")		**K**
B2H (high precision)	Trackmount and straps provided up to 125 mm (5")		**L**
C1H (high precision)	Mounting frame and straps provided up to 600 mm (24")		**M**
C2H (high precision)	Mounting frame and straps provided up to 600 mm (24")		**N**
D1H (high precision)	Mounting frame and straps provided up to 600 mm (24")		**P**
D2H (high precision)	Mounting frame and straps provided up to 600 mm (24")		**Q**
D4H (high precision)	Mounting frame and straps provided up to 600 mm (24")		**R**
Doppler	to 12" with chain kit		**S**

Selection and Ordering data		Order No.	Ord. code
SITRANS FUP1010 (Portable)			
• IP67 weatherproof battery powered	L)	**7ME3510-**	■■■■■ - 0 ■■ 0 ■■■
Sensor for channel 2 (continued)			
High temperature sensor size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))			**Z Q 1 A**
High temperature sensor size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))			**Z Q 1 B**
High temperature sensor size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))			**Z Q 1 C**
For the following B1H to D4H sensors, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):			
B1H (high temperature range HP)			**Z Q 1 K**
B2H (high temperature range HP)			**Z Q 1 L**
C1H (high temperature range HP)			**Z Q 1 M**
C2H (high temperature range HP)			**Z Q 1 N**
D1H (high temperature range HP)			**Z Q 1 P**
D2H (high temperature range HP)			**Z Q 1 Q**
D4H (high temperature range HP)			**Z Q 1 R**

Approvals: No options (UL, ULc, CE by default)

1) -40 ... +200 °C (-40 ... +392 °F)

2) -40 ... +80 °C (-40 ... +176 °F)

L) Subject to export regulations AL: N, ECCN: 3A991X.

Selection and Ordering data		Order No.
Operating Instructions for SITRANS FUP1010		
English IP67 Weatherproof	D)	**A5E02951522**
German IP67 Weatherproof	D)	**A5E02951534**

This device is shipped with a Quick Start Guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

D) Subject to export regulations AL: N, ECCN: EAR99H.

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Selection and Ordering data	Order code
Further designs	
Please add "**-Z**" to Order No. and specify Order code(s).	
Languages (Meter and Documentation), English (default). All languages now come standard in all flow-meters	
Wet flow transfer calibration (priced on request)	
6 point calibration 2/water (Price per channel)	
• 2SS40 pipe	**D01**
• 3CS40 pipe	**D02**
• 4CS40 pipe	**D03**
• 4SS40 pipe	**D04**
• 6CS40 pipe	**D05**
• 6SS40 pipe	**D06**
• 6CS120 pipe	**D07**
• 8CS40 pipe	**D08**
• 8SS40 pipe	**D09**
• 8CS120 pipe	**D10**
• 10CS Standard pipe	**D11**
• 10CS40 pipe	**D12**
• 10SS40 pipe	**D13**
• 12CS Standard pipe	**D14**
• 12CS40 pipe	**D15**
• 14CS30 pipe	**D16**
• 14CS40 pipe	**D17**
• 16CS Standard pipe	**D18**
• 16CS40 pipe	**D19**
• 18CS Standard pipe	**D20**
• 20CS20 pipe	**D21**
• 20CS30 pipe	**D22**
• 24CS Standard pipe	**D23**
• 24CS20 pipe	**D24**
• 24CS30 pipe	**D25**
• 30CS Standard pipe	**D26**
• 36CS Standard pipe	**D27**
• Other pipe, other liquid, additional points, witness	**Y28**
1x Insertion RTD with thermowell and lagging	**M1A**
2x Insertion RTD with thermowell and lagging	**M1B**
Tag name plate	
• Stainless steel tag with 3.2 mm (0.13 inch) character size (68 characters max.)	**Y19**

[1] Supplied spacer bar supports pipes up to 1050 mm (42 inches). For pipes larger than 1050 mm (42 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4).

[2] Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4).

MLFB example

Application example

A general survey portable flowmeter is required for pipes sizes ranging from 76 ... 500 mm (3" ... 20") with both cast iron and steel material. Doppler may be required as liquid may be moderately aerated.

Requires language support for German.

MLFB Order No.: **7ME3511-2AB01-0DE0-Z**
B10

Selection and Ordering data	Order No.	Ord. code
SITRANS FUP1010 meter family	**7 M E 3 5 1 -**	**- 0 0**
IP67 weatherproof	**1**	
Dual channel	**2**	
Portable Type 3 I/O with Doppler capable, temperature	**C**	
1 x PVC-Jacket, length 6 m (20 ft)	**B**	
No RTDs required	**0**	
Charger Type A for Europe (CEE7/7)	**1**	
Sensor for DN 50 ... DN 300 (2“ ... 12“) pipes	**D**	
Sensor for DN 200 ... DN 600 (8“ ... 24“) pipes	**E**	
German language support		**B 1 0**

Universal sensor selection chart

Based on pipe size (pipes other than steel)					
Pipe size	**Order Code**	**Outer diameter range (mm)**		**Outer diameter range (inches)**	
		min.	**max.**	**min.**	**max.**
A2	**B**	12,7	50,8	0.5	2
B3	**C**	19	127	0.75	5
C3	**D**	51	305	2	12
D3	**E**	203	610	8	24
E2	**F**	254	6096	10	249

High precision sensor selection chart

Based on pipe wall thickness (steel pipes only)					
Pipe Wall	**Order Code**	**Pipe Wall [mm]**		**Pipe Wall [inches]**	
		min.	**max.**	**min.**	**max.**
A1H	**G**	0,64	1,02	0.025	0.04
A2H	**H**	1,02	1,52	0.04	0.06
A3H	**J**	1,52	2,03	0.06	0.08
B1H	**K**	2,03	3,05	0.08	0.12
B2H	**L**	3,05	4,06	0.12	0.16
C1H	**M**	4,06	5,84	0.16	0.23
C2H	**N**	5,84	8,13	0.23	0.32
D1H	**P**	8,13	11,18	0.32	0.44
D2H	**Q**	11,18	15,75	0.44	0.62
D4H	**R**	15,75	31,75	0.62	1.25

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SITRANS FUP1010
Water and Liquid check metering kits

Overview

There are two check kits available: SITRANS FUP1010 Water check metering kit for water and wastewater applications, and SITRANS FUP1010 Liquid check metering kit for liquid applications other than water. The kits have been developed especially for verifying the accuracy and performance of any brand or type of flowmeter. They can be used to verify the performance of meters based on any existing flow measurement principle: orifice, electromagnetic, ultrasonic, rotary piston, coriolis, etc. In addition, they measure practically all conductive or non-conductive clean or moderately aerated liquids or liquids with suspended solids.

Benefits

- Performance check or verification of any type or brand of flowmeter
- Field use is facilitated by meter portability and 7 hours or normal battery operation.
- Weatherproof enclosure withstands even severe weather conditions
- 1 MByte datalogger capability downloadable to PC via included RS232 cable
- Fast, easy and cost-efficient on-site measurement of any convoluted pipe from 20 to 1200 mm (0.75 to 48“)
- Delivered as an all inclusive kit in a sturdy rolling case that holds all the equipment needed to conduct performance and verification tests (cables, multiple sensors, flow transmitter etc.)

Application

The SITRANS FUP1010 Water and Liquid Check Metering Kits measure practically all conductive or non-conductive clean or moderately aerated liquids or liquids with suspended solids.This basic feature enables the performance check and verification of existing meters used in various water and wastewater applications such as:

Raw Water and sewage

- Potable water
- Chemicals
- Effluent and sludges
- Process control
- Batching
- Rate indication
- Hot and cold water systems

Design

- IP67 weatherproof/impact resistant enclosure, constructed of mineral reinforced copolymer polypropylene
- Single channel

Function

- Integral 33 button keypad and large (128 x 240 pixel) graphic display visible up to 12 m (40 ft) away
- Current, voltage, frequency and RS232 outputs (see Technical specification section for details)
- Optional current, voltage and temperature inputs (see specification section for details)
- ZeroMatic Path automatically sets zero
- Bi-directional flow operation
- 1 MByte data logger with both site and data logger storage
- English, Spanish, German, Italian and French language options

Technical specifications

Pipe sizes	
• Water Check Metering Kit	50 ... 1050 mm (2 ... 42“)
• Liquid Check Metering Kit	20 ... 1200 mm (0.75 ... 48“)
Accuracy	±0.5 % ... ±2.0 % of flow rate
Flow range	12 m/s (40 ft/s) bidirectional
Media temperature	-40 ... +104 °C (-40 ... 220 °F)
Enclosure ratings	IP67 (Weatherproof)

See page 4/319 for complete technical specifications

Cerificates and approvals	
Unclassified locations	UL ULc
Classified locations	
CE	EMV Directive 2004/108/EC ATEX Directive 94/9/EC

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Selection and Ordering data		Order No.
SITRANS FUP1010 Water Check Metering Kit		**CQO:FUPW-WWKIT[D)]**
Content of delivery		
1	Single channel portable submersible flow transmitter	
1 pair	Universal sensor C3	
1 pair	Universal sensor E2	
1 pair	Doppler sensors	
1 pair	Mounting Ezclamp (2 mounting Ezclamp chains)	
1	Ladder chain	
1	Battery charger	
1 pair	20 ft sensor cable	
1	Cable - 1010WP/WDP to PC	
1	PinStop spacer bar (universal)	
1	Flow case	
1	Flowmeter manual	
1	Laminated card set	
1	Certificate of intrinsic calibration	

Selection and Ordering data		Order No.
SITRANS FUP1010 Liquid Check Metering Kit		**CQO:FUS-LIQKIT[D)]**
Content of delivery		
1	Single channel portable submersible transmitter	
1 pair	Universal sensor B3	
1 pair	Universal sensor C3	
1 pair	Universal sensor D3	
1 pair	Universal sensor E2	
1 pair	Doppler sensors	
1 pair	Sensor cables 6m (20 ft)	
1 pair	Mounting track	
1 pair	Mounting Ezclamp	
1	Spacer bar (portable)	
1	Ladder chain	
1	Battery charger	
1	RS232 cable for PC connection	
1	Flow case	
1	Clamp-on flowmeter manual CD	
1	Flowmeter manual	
1	Laminated card set	
1	Certificate of intrinsic calibration	

D) Subject to export regulations AL: N, ECCN: EAR99H.

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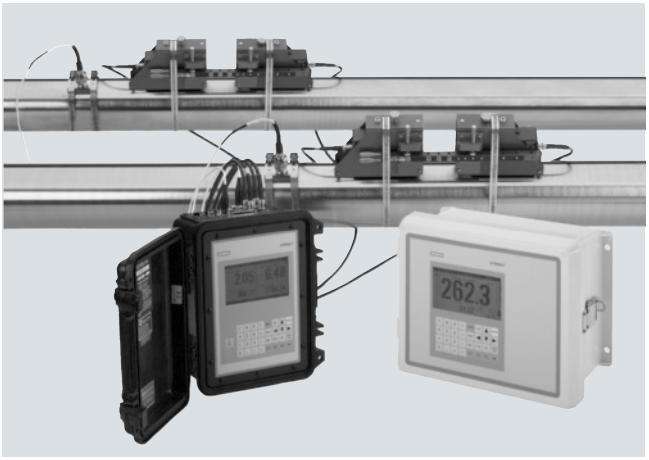
SITRANS FUE1010 (Energy)

Overview



SITRANS FUE1010 is a highly accurate clamp-on non-intrusive ultrasonic flow transmitter for revenue grade thermal energy sub-metering and energy efficiency distribution monitoring, with a real time coefficient of performance (COP) for HVAC systems.

SITRANS FUE1010 is available in single and dual channel or dual path configurations, with your choice of IP65 (NEMA 4X) dedicated wall mount or IP40 (NEMA 1) portable enclosures.

Benefits

- Measures energy rate and total consumption with highest accuracy available
- Accurately measures at both low flow rates and low differential temperatures
- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external sensors do not require periodic cleaning
- No moving parts to foul or wear
- No pressure drop or energy loss
- Wide turn-down ratio
- Choice of single or dual channel / dual path or dual mode operation:
  - Dual channel operation reduces the cost for the system on a per channel measurement basis and permits measuring hot and chilled water lines at the same time
  - Dual path capability insures high flow measurement accuracy on installations with less than desirable piping runs
- Ability to operate in either Wide-Beam Transit-time or reflexor (Doppler) mode for applications with high aeration
- ZeroMatic Path automatically sets zero without stopping flow and reduces zero drift, even at low flow

Application

SITRANS FUE1010 is ideally suited to thermal energy / power industry applications, including:

- Chilled water sub-metering
- Hot water sub-metering
- Condenser water
- Glycol
- Thermal storage
- Lake source cooling

Design

SITRANS FUE1010 is available in three configurations:

- IP65 (NEMA 4X) wall mount enclosure constructed of fiberglass reinforced polyester with stainless steel hardware and polyester keypad
  - Single channel
  - Dual channel / dual path
- IP40 (NEMA 1) Portable impact resistant enclosure constructed of mineral reinforced copolymer polypropylene
  - Dual channel / dual path

Function

- Flow transmitter has an integral 33 button keypad and large (128 x 240 pixel) graphic display visible up to 12 m (40 ft) away
- 4-wire 1000 Ω platinum RTD's for supply and return temperature measurements are precision matched to within 0.01 °C (0.02 °F)
- Temperature is factory calibrated with built-in field calibrator.
- Built-in energy/BTU mode
- Detection of aeration and cavitation caused by worn or damaged impellers, misaligned shafts, etc.
- Reverse flow and empty pipe detection
- Chiller efficiency analysis: accepts an independent analog input representing kW usage for calculation of the following functions which can be selected for data logging or output purposes:
  - Cooling load (kW/ton)
  - Coefficient of performance (COP)
  - Energy efficiency ratio (EER)
- Optional current inputs
- Digital communication options:
  - MODBUS / Metasys N2 (IP65 (NEMA 4X) only)
  - RS232 Serial digital port (standard)
- ZeroMatic Path automatically sets zero
- Bi-directional flow operation
- 1 MByte data logger with both site and data logger storage
- English, Spanish, German, Italian and French language options

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Technical specifications

Input	
Flow range	0 … 12 m/s (0 … 40 ft/s), bi-directional
Flow sensitivity	0.0003 m/s (0.001 ft/s)
Pipe size	6.4 mm … 9.14 m (0.25“ … 360“)
Inputs per channel	• Current: 2 x 4 … 20 mA • Voltage: 2 x 0 … 10 V DC • Temperature: 2 x 4 wire 1 kΩ RTD • Totalizer commands (clear/hold)
Output	
Standard outputs	• Current: 2 x 4 … 20 mA DC (1 kΩ at 30 V DC) • Voltage: 2 x 0 … 10 V DC (5 kΩ minimum) • Status Alarm: 4 x SPDT Relays • Mercury wetted relays • Frequency: 2 x 0 … 5000 Hz • RS232
Optional outputs	• Expanded I/Os (4 additional 4 ... 20 mA outputs) with form c relays • Expanded I/Os with Mercury wetted relays
Accuracy	
Accuracy	± 0.5 % ... 1.0 % of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0015 ... 0.003 m/s (± 0.005 ... 0.01 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Batch repeatability	± 0.15 % of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Rated operation conditions	
Degree of protection	Wall mount enclosure: IP65 (NEMA 4X) Portable enclosure: IP40 (NEMA 1)
Liquid temperature	
• Standard	-40 … +120 °C (-40 … +250 °F)
• Optional	-40 … +230 °C (-40 … +450 °F)
Sensor temperature	
• Standard	-40 … +120 °C (-40 … +250 °F)
• Optional	-62 … +232 °C (-80 … +450 °F)
Ambient temperature	-18 ... +60 °C (0 ... 140 °F)
Design	
Dimensions	see SITRANS F US Clamp-on "System info and selection guide"
Weight	see diagrams
Power supply	
Dedicated	90 … 240 V AC, 50 ... 60 Hz, 30 VA or 14.0 … 18.5 V DC
Portable enclosure	Rechargeable battery

Indication and operation	
Data logger memory	1 Mbyte of storage
Display	128 x 240 pixel LCD with back-light
Keypad	33 keypad buttons with tactile feedback
Language options	English, Spanish, German, Italian, French
Certificates and approvals	
Dedicated enclosures	
FM and CSA ratings	• Transmitter NI Class I, Div 2 S Class II, Div 2 • Sensor I.S. Class I, II, Div 1
CE	EMC Directive 2004/108/EC ATEX Directive 94/9/EC
C-TICK	
ATEX ratings	• Transmitter: Ex II (1) G [Ex ia] IIC Ex II 3 (1) G Ex nC [ia] IIC T5 • Sensors: Ex II 1 G Ex ia IIC T5
INMETRO ratings	• Transmitter: [BR-Ex ia] IIC BR-Ex nc [ia] IIC T5 • Sensors: BR-Ex ia IIC T5
Portable enclosures	UL ULc
CE	EMC Directive 2004/108/EC ATEX Directive 94/9/EC

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SITRANS FUE1010 (Energy)

Standard MLFB for quick delivery on SITRANS FUE1010 (Energy system)

Selection and Ordering data		Order No.	Order code
SITRANS FUE1010 (Energy)	L)	**7ME350 - - 0 + +**	
Design			
Dedicated			
IP65 (NEMA 4X) wall mount		**0**	**K02 + K02 + R02**
Portable			
IP40 (NEMA 1) Battery powered		**2**	**K01 + K01 + R01**
Number of channels/ultrasonic paths			
Dedicated meters			
Single channel		**1**	
Portable meters			
Dual channel/Dual path		**4**	
Flowmeter functions and I/O configurations			
• Portable Standard I/O		**C**	
- Energy efficiency COP/EER output			
- 2x 4-20mA analog input			
• Dedicated Standard I/O		**F**	
- Reflexor Capability			
- Energy efficiency COP/EER output			
- 2x 4-20mA analog input			
Meter power options			
90 ... 240 V AC (Dedicated only)		**A**	
Charger Type A for Europe (CEE7/7)		**C**	
Charger Type K for U.S. (NEMA 5-15P)		**G**	
No charger		**J**	
Communication options			
RS232 (standard)		**0**	
RTD temperature sensor pair			
No RTDs (Note: Temperature input is required for Energy systems)		**0**	
1x Pair Std clamp-on RTD (NEMA 4X only)[3]		**1**	
2x Pair Std clamp-on RTD (For Dual Channel NEMA 4X only)[3]		**2**	
1x Pair Std clamp-on RTD (For NEMA 12 Portable)[3]		**3**	
2x Pair Std clamp-on RTD (For Dual Channel NEMA 1 Portable)[3]		**4**	
1x Insertion RTD with Thermowell and Lagging			**M1A**
2x Insertion RTD with Thermowell and Lagging			**M1B**
Sensor for channel 1			
(includes pipe mounting kit and spacer bar for indicated max. OD listed)			
See "Sensor selection charts" for specifications.			
no sensor		**A**	
A2 universal	Trackmount and straps provided up to 75 mm (3")	**B**	
B3 universal	Trackmount and straps provided up to 125 mm (5")	**C**	
C3 universal	Mounting frame and straps provided up to 300 mm (13")	**D**	
D3 universal	Mounting frame and straps provided up to 600 mm (24")	**E**	
E2 universal	Mounting frame and straps provided up to 1200 mm (48")[1)4)]	**F**	
C1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[4)]	**M**	
C2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[4)]	**N**	
D1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[4)]	**P**	
D2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[4)]	**Q**	
Doppler	to 12" with strap kit (not for IP65 (NEMA7))	**S**	
D1H	High temperature range 104 °C/220 °F HP[2)]	**Z**	**P1P**

L) Subject to export regulations AL: N, ECCN: 3A991X.

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Selection and Ordering data			Order No.	Order code
SITRANS FUE1010 (Energy)		L)	**7ME350** ■ - ■■■■ **0** - ■■■■	■■■ ■■■ + ■■■ + ■■■
Sensor for channel 2 (includes pipe mounting kit and spacer bar for indicated max. OD listed) See "Sensor selection charts" for specifications.				
no sensor			**A**	
A2 universal	Trackmount and straps provided up to 75 mm (3")		**B**	
B3 universal	Trackmount and straps provided up to 125 mm (5")		**C**	
C3 universal	Mounting frame and straps provided up to 300 mm (13")		**D**	
D3 universal	Mounting frame and straps provided up to 600 mm (24")		**E**	
E2 universal	Mounting frame and straps provided up to 1200 mm (48")[1)4)]		**F**	
C1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[4)]		**M**	
C2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[4)]		**N**	
D1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[4)]		**P**	
D4H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[4)]		**R**	
Doppler	to 12" with strap kit (not for IP65 (NEMA7))		**S**	
D1H	High temperature range 104 °C/220 °F HP[2)]		**Z**	**Q 1 P**
Approvals	UL/Portable			**0**
	FM, CSA, CE, Dedicated			**1**

1) Supplied spacer bar supports pipes up to 1050 mm (42 inches). For pipes larger than 1050 mm (42 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4)
2) Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4)
3) Requires two R** cables per one RTD pair
4) 600 mm (24") for portable systems only

L) Subject to export regulations AL: N, ECCN: 3A991X.

Standard MLFB product offering represents 4 to 6 weeks delivery time

For sensor and RTD cables for quick delivery see tables at end of section

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SITRANS FUE1010 (Energy)

Selection and Ordering data		Order No.	Ord. code
SITRANS FUE1010 (Energy)			
• Dedicated IP65 (NEMA 4X) wall mount	L)	**7ME3500-**	
• Portable IP40 (NEMA 1) Battery powered	L)	**7ME3502-**	
		- 0	
Number of channels/ultrasonic paths Dedicated meter			
Dedicated meter			
Single channel		**1**	
Dual channel/Dual path		**2**	
Portables			
Dual channel/Dual path		**4**	
Flowmeter functions and I/O configurations			
• Portable Standard I/O - Reflexor capability - Graphic display - 2 x 0 ... 10 V - 2 x 4 ... 20 mA - 2 x pulse output - 4 x status logic - Energy efficiency COP/EER output - 2 x 4 ... 20 mA analog input		**C**	
• Dedicated Standard I/O - Reflexor capability - Graphic display - 2 x 0 ... 10 V - 2 x 4 ... 20 mA - 2 x pulse output - 4 x relay C type - Energy efficiency COP/EER output - 2 x 4 ... 20 mA analog input		**F**	
• Standard I/O with Mercury wetted relays		**Z**	**J 1 A**
• Extended output adder plus standard inputs (4 additional 4 ... 20 mA outputs) and form C relay		**Z**	**J 1 B**
• Extended output adder plus standard inputs (4 additional 4 ... 20 mA outputs) and Mercury wetted relays		**Z**	**J 1 C**
Meter power options			
90 ... 240 V AC (Dedicated only)		**A**	
9 ... 36 V DC (Dedicated only)		**B**	
Charger Type A for Europe (CEE7/7)		**C**	
Charger Type C for Australia (AS3112)		**D**	
Charger Type D for U.K. (BS1363)		**E**	
Charger Type J for Japan (JIS8303)		**F**	
Charger Type K for U.S. (NEMA 5-15P)		**G**	
Charger Type L for Switzerland (SEV1011)		**H**	
No Charger		**J**	
External 4 hours battery with US plug for Portable		**Z**	**K 1 A**
External 4 hours battery with European plug for Portable		**Z**	**K 1 B**
Communication options			
RS232 (standard)		**0**	
MODBUS (dedicated only)		**1**	

Selection and Ordering data		Order No.	Ord. code
SITRANS FUE1010 (Energy)			
• Dedicated IP65 (NEMA 4X) wall mount	L)	**7ME3500-**	
• Portable IP40 (NEMA 1) Battery powered	L)	**7ME3502-**	
		- 0	
RTD temperature sensor (includes mounting hardware for pipes above 1.5“ outer diameter)			
No RTDs (Note: temperature input is required for energy system)		**0**	
1 x pair standard clamp-on RTD (NEMA 4X only)[3]		**1**	
2 x pair standard clamp-on RTD (for dual channel NEMA 4X only)[3]		**2**	
1 x pair standard clamp-on RTD (NEMA 1 Portable)[3]		**3**	
2 x pair standard clamp-on RTD (for dual channel NEMA 1 Portable)[3]		**4**	
1 x Insertion style RTD with thermowell and lagging[3]		**9**	**M 1 A**
2 x Insertion style RTD with thermowell and lagging[3]		**9**	**M 1 B**
Sensor for channel 1 Including pipe mounting tracks for sizes A & B sensors indented for pipe with a OD less than 125 mm (5") and mounting frame/spacer bars for sizes C, D & E sensors. Straps provided are for the indicated maximum OD listed below. Strap kits are available to accommodate larger pipes (refer to spare part list). Refer to "Sensor Selection Charts" for the sensor suitability of pipe size and wall thickness.			
No sensor		**A**	
A2 universal	Trackmount and straps provided up to 75 mm (3”)	**B**	
B3 universal	Trackmount and straps provided up to 125 mm (5”)	**C**	
C3 universal	Mounting frame and straps provided up to 300 mm (13”)	**D**	
D3 universal	Mounting frame and straps provided up to 600 mm (24”)	**E**	
E2 universal	Mounting frame and straps provided up to 1200 mm (48”)[1][4]	**F**	
For the following A1H to D4H sensors, temperature range is -40 °C ... 65 °C (-41 °F ... 150 °F), nominal 21 °C (70 °F):			
A2H (high precision)	Trackmount and straps provided up to 75 mm (3”)	**H**	
A3H (high precision)	Trackmount and straps provided up to 75 mm (3”)	**J**	
B1H (high precision)	Trackmount and straps provided up to 125 mm (5”)	**K**	

1) Supplied spacer bar supports pipes up to 1050 mm (42 inches). For pipes larger than 1050 mm (42 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4).

2) Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4).

3) Requires two R** cables per one RTD pair

4) 600 mm (24") for portable systems only

L) Subject to export regulations AL: N, ECCN: 3A991X.

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Selection and Ordering data		Order No.	Ord. code
SITRANS FUE1010 (Energy)			
• Dedicated IP65 (NEMA 4X) wall mount	L)	**7ME3500-**	
• Portable IP40 (NEMA 1) Battery powered	L)	**7ME3502-**	
			- 0
Sensor for channel 1 (continued)			
B2H (high precision)	Trackmount and straps provided up to 125 mm (5")		L
C1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[3]		M
C2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[3]		N
D1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[2)3]		P
D2H (high precision)	Trackmount and straps provided up to 1200 mm (48")[2)3]		Q
D4H (high precision)	Trackmount and straps provided up to 1200 mm (48")[2)3]		R
Doppler	to 12" with strap kit		S
High temperature sensor size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))			Z P 1 A
High temperature sensor size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))			Z P 1 B
High temperature sensor size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))			Z P 1 C
For the following B1H to D4H sensors, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):			
B1H (high temperature range HP)			Z P 1 K
B2H (high temperature range HP)			Z P 1 L
C1H (high temperature range HP)			Z P 1 M
C2H (high temperature range HP)			Z P 1 N
D1H (high temperature range HP)[2)]			Z P 1 P
D2H (high temperature range HP)[2)]			Z P 1 Q
D4H (high temperature range HP)[2)]			Z P 1 R
Sensor for channel 2 (includes pipe mounting kit for indicated max. outer diameter listed) See "Sensor selection charts" for specifications.			
no sensor			A
A2 universal	Trackmount and straps provided up to 75 mm (3")		B
B3 universal	Trackmount and straps provided up to 125 mm (5")		C
C3 universal	Mounting frame and straps provided up to 300 mm (13")		D
D3 universal	Mounting frame and straps provided up to 600 mm (24")		E
E2 universal	Mounting frame and straps provided up to 1200 mm (48")[1)3]		F

Selection and Ordering data		Order No.	Ord. code
SITRANS FUE1010 (Energy)			
• Dedicated IP65 (NEMA 4X) wall mount	L)	**7ME3500-**	
• Portable IP40 (NEMA 1) Battery powered	L)	**7ME3502-**	
			- 0
Sensor for channel 2 (continued)			
For the following A1H to D4H sensors, temperature range is -40 °C to 65 °C (-41 °F to 150 °F), nominal 21 °C (70 °F):			
A2H (high precision)	Trackmount and straps provided up to 75 mm (3")		H
A3H (high precision)	Trackmount and straps provided up to 75 mm (3")		J
B1H (high precision)	Trackmount and straps provided up to 125 mm (5")		K
B2H (high precision)	Trackmount and straps provided up to 125 mm (5")		L
C1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[3]		M
C2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[3]		N
D1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[2)3]		P
D2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[2)3]		Q
D4H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[2)3]		R
Doppler	to 12" with strap kit		S
High temperature sensor size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))			Z Q 1 A
High temperature sensor size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))			Z Q 1 B
High temperature sensor size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))			Z Q 1 C
For the following B1H to D4H sensors, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):			
B1H (high temperature range HP)			Z Q 1 K
B2H (high temperature range HP)			Z Q 1 L
C1H (high temperature range HP)			Z Q 1 M
C2H (high temperature range HP)			Z Q 1 N
D1H (high temperature range HP)[2)]			Z Q 1 P
D2H (high temperature range HP)[2)]			Z Q 1 Q
D4H (high temperature range HP)[2)]			Z Q 1 R
Approvals			
FM/CSA/CE Dedicated			1
UL/ULc/CE Portable			0

[1)] Supplied spacer bar supports pipes up to 1050 mm (42 inches). For pipes larger than 1050 mm (42 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4).

[2)] Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4).

[3)] 600 mm (24") for portable systems only

L) Subject to export regulations AL: N, ECCN: 3A991X.

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SITRANS FUE1010 (Energy)

Selection and Ordering data	Order code
Further designs	
Please add "**-Z**" to Order No. and specify Order code(s).	
Cable assembly for sensors (add for # of channels) See "Sensor cable selection chart"	**K..**
Cable assembly for RTDs (add for # of RTDs) See "RTD cable selection chart"	**R..**
Cable termination kit (for one cable pair) dedicated only	
• Termination for standard, plenum and armored sensor cable	**T01**
• Termination for submersible sensor cable	**T11**
• RTD cable termination kit for standard RTD	**T21**
• RTD cable termination kit for submersible RTD	**T31**
• Insert RTD cable termination kit	**T41**
Wet flow transfer calibration (priced on request)	
6 point calibration 2/water (Price per channel)	
• 2SS40 pipe	**D01**
• 3CS40 pipe	**D02**
• 4CS40 pipe	**D03**
• 4SS40 pipe	**D04**
• 6CS40 pipe	**D05**
• 6SS40 pipe	**D06**
• 6CS120 pipe	**D07**
• 8CS40 pipe	**D08**
• 8SS40 pipe	**D09**
• 8CS120 pipe	**D10**
• 10CS Standard pipe	**D11**
• 10CS40 pipe	**D12**
• 10SS40 pipe	**D13**
• 12CS Standard pipe	**D14**
• 12CS40 pipe	**D15**
• 14CS30 pipe	**D16**
• 14CS40 pipe	**D17**
• 16CS Standard pipe	**D18**
• 16CS40 pipe	**D19**
• 18CS Standard pipe	**D20**
• 20CS20 pipe	**D21**
• 20CS30 pipe	**D22**
• 24CS Standard pipe	**D23**
• 24CS20 pipe	**D24**
• 24CS30 pipe	**D25**
• 30CS Standard pipe	**D26**
• 36CS Standard pipe	**D27**
• Other pipe, other liquid, additional points, witness	**Y28**
Tag name plate	
• Stainless steel tag with 3.2 mm (0.13 inch) character size (68 characters max.)	**Y19**

MLFB example

Application example

A dedicated clamp-on energy meter is required for two separate return lines. Both will use clamp-on RTDs for the supply and return lines. AC power is available and data access will be via MODBUS communication.

Pipe 1 is a DN150 (6") schedule 40 carbon steel line
Pipe 2 is a DN 300 (12") ductile iron line

MLFB Order No.: **7ME3500-2DA10-2NE0-Z**
K03 + K05 + R03 + R05 + R02 + R03

Selection and Ordering data	Order No.	Ord. code
SITRANS FUE1010 meter family	**7ME350** -	**0** -
IP65 (NEMA 4X) enclosure	**0**	
Dual channel	**2**	
Dedicated Type 1 I/O option	**D**	
90 ... 230 V AC power option	**A**	
MODBUS option	**1**	
2 pairs of clamp-on RTDs	**2**	
Sensor code for 6" pipe	**N**	
Sensor code for 12" pipe	**E**	
No approval required	**0**	
30 m (100 ft) sensor cable for channel 1		**K03**
61 m (200 ft) sensor cable for channel 1		**K05**
30 m (100 ft) cable for RTD 1		**R03**
61 m (200 ft) cable for RTD 2		**R05**
15 m (50 ft) cable for RTD 3		**R02**
30 m (100 ft) cable for RTD 4		**R03**

Selection and Ordering data		Order code
Operating Instructions for SITRANS FUE1010		
English NEMA 4X Wall mount	D)	**A5E03086491**
German NEMA 4X Wall mount	D)	**A5E03086492**
English IP40 NEMA 1 Battery powered		**A5E02951524**
German IP40 NEMA 1 Battery powered		**A5E02951536**

This device is shipped with a Quick Start Guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

D) Subject to export regulations AL: N, ECCN: EAR99H.

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Universal sensor selection chart

Based on pipe size (pipes other than steel)					
Pipe size	**Order Code**	**Outer diameter range (mm)**		**Outer diameter range (inches)**	
		min.	**max.**	**min.**	**max.**
A2	**B**	12,7	50,8	0.5	2
B3	**C**	19	127	0.75	5
C3	**D**	51	305	2	12
D3	**E**	203	610	8	24
E2	**F**	254	6096	10	249

High precision sensor selection chart

Based on pipe wall thickness (steel pipes only)					
Pipe Wall	**Order Code**	**Pipe Wall [mm]**		**Pipe Wall [inches]**	
		min.	**max.**	**min.**	**max.**
A1H	**G**	0,64	1,02	0.025	0.04
A2H	**H**	1,02	1,52	0.04	0.06
A3H	**J**	1,52	2,03	0.06	0.08
B1H	**K**	2,03	3,05	0.08	0.12
B2H	**L**	3,05	4,06	0.12	0.16
C1H	**M**	4,06	5,84	0.16	0.23
C2H	**N**	5,84	8,13	0.23	0.32
D1H	**P**	8,13	11,18	0.32	0.44
D2H	**Q**	11,18	15,75	0.44	0.62
D4H	**R**	15,75	31,75	0.62	1.25

Sensor cable selection chart

Sensor cable codes for length and type options				
Cable length m (ft)	**Standard (PVC jacket) -40…+80 °C (-40…+176 °F)**	**Submersible[1] (polyethylene jacket) -40…+80 °C (-40…+176 °F)**	**Plenum Rated (teflon jacket) -40…+200 °C (-40…+392 °F)**	**Armored[1] -40…+80 °C (-40…+176 °F)**
	Order code			
6 (20)	**K01**[2]	**K11**	**K21**	**K31**
15 (50)	**K02**	**K12**[2]	**K22**	**K32**[2]
30 (100)	**K03**[2]	**K13**[2]	**K23**	**K33**
46 (150)	**K04**[2]	**K14**	**K24**	**K34**
61 (200)	**K05**	**K15**	**K25**	**K35**
91 (300)	**K06**[2]	**K16**	**K26**	**K36**

1) Submersible and armored sensor cable is not available for portable versions.
2) Standard MLFB for quick delivery

RTD cable selection chart

RTD cable codes for length and type		
Cable length m (ft)	**Standard (teflon wrapped) -40 ... +200 °C (-40 … +392 °F)**	**Insert[1] -40 ... +200 °C (-40 … +392 °F)**
	Order code	
6 (20)	**R01**[2]	**R21**
15 (50)	**R02**[2]	**R22**
30 (100)	**R03**[2]	**R23**
46 (150)	**R04**	**R24**
61 (200)	**R05**	**R25**
91 (300)	**R06**	**R26**

1) Submersible RTD cable is not available for portable versions.
2) Standard MLFB for quick delivery

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SITRANS FUE1010 (Energy) HVAC Check metering kit

Overview

The SITRANS FUE1010 dual channel clamp-on check metering kit is an all inclusive HVAC chilled water kit developed especially for verifying the accuracy and performance of any brand or type of flowmeter. The meter's portability makes it capable of verifying the performance of meters based on any existing flow measurement principle: electromagnetic, vortex, insertion turbine, or ultrasonic. Perfect for areas where no metering exists. Ideal for balancing building performance. It accurately computes flow over an extremely wide range and measures practically all conductive or non-conductive clean or moderately aerated liquids or liquids with suspended solids. Dual channel models can measure two separate applications at the same time.

Benefits

- Performance check or verification of any type or brand of flowmeter
- Measures energy rate and total consumption with highest accuracy available
- Accurately measures at both low flow rates and low differential temperatures
- Field use is facilitated by meter portability charge for 4 hours of normal operation
- 1 MByte datalogger capability downloadable to PC via included RS232 cable
- Performs fast, easy and cost-efficient on-site measurement of any convoluted pipe from 25.4 mm to 9.14 m (1.0" to 360")
- Delivered as an all inclusive kit with all the equipment needed to conduct performance and verification tests (cables, multiple sensors, flow transmitter etc.)
- Comes in a sturdy rolling case with a telescope handle that holds all the equipment needed to conduct performance and verification tests.

Application

The SITRANS FUE1010 Check Metering Kit is a highly accurate clamp-on non-intrusive ultrasonic flow display transmitter or revenue grade thermal energy sub-metering and energy efficiency distribution monitoring, with a real time coefficient of performance (COP) for HVAC systems. This kit is ideal for applications which include:

- Chilled water sub-metering
- Condenser water
- Potable water
- Ammonia and glycol
- River and lake water
- Lake source cooling

Design

- IP40 (NEMA 1) Impact resistant enclosure, constructed of flame retardant ABS with polycarbonate display and polyester keypad
- Dual channel/dual path

Function

- Integral 33 button keypad and large (128 x 240 pixel) graphic display visible up to 12 m (40 ft) away
- 4-wire 1000 Ω platinum RTD's for supply and return temperature measurements are precision matched to within 0.01 °C (0.02 °F)
- Chiller efficiency analysis: accepts an independent analog input representing kW usage for calculation of the following functions which can be selected for data logging or output purposes:
  - Cooling load (kW/ton)
  - Coefficient of performance (COP)
  - Energy efficiency ratio (EER)
- Temperature is factory calibrated with built-in field calibrator
- Built-in energy/BTU mode
- Detection of aeration and cavitation caused by worn or damaged impellers, misaligned shafts, etc.
- Current, voltage, frequency and RS232 outputs (see specification section for details)
- Optional current, voltage and temperature inputs (see specification section for details)
- ZeroMatic Path automatically sets zero
- Bi-directional flow operation
- 1 MByte data logger with both site and data logger storage
- English, Spanish, German, Italian and French language options

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Technical specifications

Pipe sizes	25.4 mm to 9.14 m (1 ... 360“)
Accuracy	± 0.5 % ... ± 2.0 % of flow rate
Flow range	12 m/s (40 ft/s) bidirectional
Media temperature	-40 ... +104 °C (-40 ... 220 °F)
Enclosure ratings	IP40 (NEMA 1) impact resistant

See page 4/327 for complete technical specifications

Cerificates and approvals	
Portable enclosures	
Unclassified locations	UL ULc
Classified locations	
CE	EMC Directive 2004/108/EC ATEX Directive 94/9/EC

Selection and Ordering data		Order No.
Energy check metering kit	D)	**CQO:FUEHVACKIT**
Content of delivery		
1	Dual channel portable submersible flow transmitter	
1 pair	Universal sensors C3	
1 pair	Doppler sensors	
1 pair	High precision sensors C2	
1 pair	High precision sensors D1	
2 pairs	RTDs	
2 pairs	Mounting Ezclamp (4 mounting Ezclamp chains)	
1	Battery charger	
2 pairs	6 m (20 ft) sensor cables	
1	RS232 cable	
4	RTD cable 6 m (20 ft)	
4	Mountings for RTDs	
1	Spacer bar (Portable)	
2	F connector to BNC	
1	Flow case	
1	Flow meter manual	
1	Laminated card set	
1	Certificate of intrinsic calibration	

D) Subject to export regulations AL: N, ECCN: EAR99H.

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SITRANS FUH1010 (Oil)

Overview

SITRANS FUH1010 clamp-on non-intrusive ultrasonic flowmeter is ideal for applications carrying crude oil, refined petroleum or liquefied gas.

SITRANS FUH1010 has three application areas: Interface detectors, precision volume or standard volume flowmeters.

Benefits

For all SITRANS FUH1010 products

- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external sensors do not require periodic cleaning
- No moving parts to foul or wear
- No pressure drop or energy loss
- Wide turn-down ratio, 30:1
- Choice of single, dual, or optional, three or four path versions.
  - Single path version reduces initial investment
  - Two or optional three and four path versions provide higher accuracy, especially where limited straight run or poor flow profile exists
- WideBeam technology
  - Helps provide improved accuracy over a wide range of liquid conditions and flow rates
  - Accommodates pipelines transporting multiple liquid products
- ZeroMatic Path automatically corrects for zero drift without stopping flow

Interface detection

- Outputs liquid density and API as a direct replacement for intrusive densitometers
- Exceptional repeatability is maintained, independent of changes in temperature, pressure or viscosity
- No need for straight run

Precision volume

- Moderate cost
- Precise measurement is maintained with automatic "Reynolds Number" compensation for temperature and viscosity changes.

Standard volume

- Exceptional repeatability is maintained, independent of changes in temperature, density or viscosity
- Batch interface and product quality diagnostics provided
- Density and API outputs provided
- Scraper („pig“) detection provided

Application

Interface detection

- Precise identification of interfaces on multi-liquid pipelines
- Rapid and precise scraper "pig" indication
- Product identification
- Density indication

Precision volume

- Applications with multiple liquids having a wide viscosity range
- Automatic gross volume compensation due to viscosity changes

Standard volume

- Standard (net) volume flow measurement
- Suitable for use in leak detection systems
- Mass flow output measurement
- Interface detection
- "Pig" detection
- Chemical and petrochemical processing

Design

SITRANS FUH1010 is available in three enclosures:

- IP65 (NEMA 4X) wall mount enclosure constructed of fiberglass reinforced polyester with stainless steel hardware and polyester keypad
  - Single path
  - Dual path
  - Optional four path
- IP65 (NEMA 7) compact explosionproof enclosure constructed of cast aluminum with glass window, stainless steel hardware
  - Single path
  - Dual path (option)
- IP66 (NEMA 7) wall mount explosionproof enclosure constructed of cast aluminum, stainless steel hardware, with glass window
  - Single path
  - Dual path
  - Four path (optional)
- There are 2 types of mounting assemblies
  - Aluminum mounting frames (default)
  - Stainless steel weld seal (optional)

Function

- IP65 (NEMA 4X) and IP66 (NEMA 7) flowmeters have integral 33 button keypads and large (128 x 240 pixel) graphic displays visible up to 12 m (40 ft) away
- IP65 (NEMA 7) compact explosionproof flowmeter has a 2 x 16 alpha-numeric LCD display
- Current, voltage, status alarm, frequency and RS232 outputs (see specification section for details)
- Analog inputs (see specification section for details)
- ZeroMatic Path automatically corrects for zero drift
- Bidirectional flow operation
- 1 MByte data logger with both site and data logger storage
- English, Spanish, German, Italian and French language options

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Technical specifications

Specifications for interface detectors	
Accuracy	
Accuracy	± 0.05 of API No.
Repeatability	± 0.01 of API No.

Specifications for volumetric and mass flowmeters	
Input	
Flow range	± 12 m/s (± 40 ft/s), bidirectional
Flow sensitivity	0.0003 m/s (0.001 ft/s), flow rate independent
Accuracy	
Typical accuracy	± 0.5 to 1 % of flow
Calibratable accuracy	± 0.15 % … 0.3 % of flow, depending on version
Batch repeatability	± 0.05 % of flow, maximum

Specifications for all SITRANS FUH1010 products	
Input	
Pipe size	6.4 mm ... 9.14 m (0.25“ ... 360“)
Analog inputs	• Current: 4 x 4 ... 20 mA (IP65 (NEMA 7) enclosure has (2))
Output	
Standard outputs	• Current: 4 x 4 … 20 mA (1 kΩ at 30 VDC) • Voltage: 2 x 0 … 10 V DC (5 kΩ minimum) (None for IP65 (NEMA 7) enclosure) • 1 x 0 ... 5 kHz Pulse Rate, Digital Quad. (None for IP65 (NEMA 7) enclosure) • RS232 Serial Port
Extended outputs	• MODBUS (not for IP65 (NEMA 7) enclosure) • Up to 4 x additional 4 ... 20 mA (not for IP65 (NEMA 7) enclosure) • 4 x Mercury wetted relays (not for IP65 (NEMA 7) enclosure) • Up to 4 x digital pulse (not for IP65 (NEMA 7) enclosure)
Status/Alarm I/O	• 4 x Programmable relays (not for IP65 (NEMA 7) enclosure) • 2 x Optically coupled output logic gates (for IP65 (NEMA 7) enclosure, only) • 1 x Totalizer clear switch input (not for IP65 (NEMA 4X) enclosure)[1)] • 1 x Totalizer hold switch input (not for IP65 (NEMA 7) enclosure)[1)] • 1 x Opto iso. totalizer clear switch input (for IP65 (NEMA 7) enclosure, only)[1)] • 1 x Opto iso. totalizer hold switch input (for IP65 (NEMA 7) enclosure, only)[1)]

Accuracy	
Zero Drift	0.0003 m/s (0.001 ft/s), with ZeroMatic Path active (not provided for interface detector)
Data refresh rate	5 Hz
Rated operation conditions	
Degree of protection	
• Wall mount	IP65 (NEMA 4X)
• Compact explosionproof	IP65 (NEMA 7)
• Wall mount explosionproof	IP66 (NEMA 7)
Liquid temperature	
• Standard	-40 ... +120 °C (-40 ... +250 °F)
• Optional	-40 ... +230 °C (-40 ... +450 °F)
Ambient temperature	-18 ... +60 °C (0 ... 140 °F)
Design	
Dimensions	see SITRANS F US Clamp-on "System info and selection guide"
Weight	see diagrams
Power supply	
• IP65 (NEMA 4X) wall mount and IP66 (NEMA 7) wall mount explosionproof	90 ... 240 V AC, 50 … 60 Hz, 30 VA or 9 ... 36 V DC, 12 W
• IP65 (NEMA 7) compact explosionproof	90 ... 240 V AC, 50 ... 60 Hz, 15 VA or 9 ... 36 V DC, 10 W
Indication and operation	
Data logger memory	1 MByte
Display	
• IP65 (NEMA 4X) and IP66 (NEMA 7) Enclosures	128 x 240 pixel LCD with backlight
• IP65 (NEMA 7) Enclosure	2 x 16 Alphanumeric LCD Display
Keypad	
• IP65 (NEMA 4X) and IP66 (NEMA 7) Enclosures	33 keypad buttons with tactile feedback
• IP65 (NEMA 7) Enclosure	5 Magnetic hall effect switches
Language options	English, Spanish, German, Italian, French

[1)] Totalizer switch inputs are not provided for the interface detector.

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SITRANS FUH1010 (Oil)

Certificates and approvals	
IP65 (NEMA 4X) wall mount enclosure	
FM and CSA	• Transmitter N-I Class I, Div 2 S Class II, Div 2 Sensor • I.S. Class I, II, Div 1
CE	EMC Directive 2004/108/EC ATEX Directive 94/9/EC
C-TICK	
ATEX	• Transmitter: Ex II (1) G [Ex ia] IIC EX II 3 (1) G Ex nC [ia] IIC T5 • Sensors: Ex II 1 G Ex ia IIC T5
INMETRO (Brazil)	• Transmitter: [BR-Ex ia] IIC BR-Ex nC [ia] IIC T5 • Sensors: BR-Ex ia IIC T5
IECEx	Pending
IP65 (NEMA 7) compact explosionproof enclosure ratings	
FM and CSA	• Tranmitter XP Class I, Div 1 D-I Class II, Div 1 N-I Class I, Div 2 S Class II, Div 2 Sensor • I.S. Class I, II, Div 1
	CE • EMC Directive 2004/108/EC • ATEX Directive 94/9/EC
C-TICK	
ATEX	• Transmitter: Ex II 2 (1) G Ex d [ia] IIB + H2 T5 • Sensors: Ex II 1 G Ex ia IIC T5
INMETRO (Brazil)	• Transmitter: BR-Ex d [ia] IIC T5 • Sensors: BR-Ex ia IIC T5
IECEx	Pending

IP66 (NEMA 7) wall mount explosionproof enclosure ratings	
FM and CSA	• Transmitter XP Class I, Div 1 D-I Class II, Div 1 N-I Class I, Div 2 S Class II, Div 2 Sensor • I.S. Class I, II, Div 1
CE	EMC Directive 2004/108/EC ATEX Directive 94/9/EC
ATEX	• Transmitter: Ex II (1) G [Ex ia] IIC Ex II 3 (1) G Ex nC [ia] IIC T5 Ex II 2 (1) G Ex d [ia IIC] IIB + H2 T5 • Sensors: Ex II 1 G Ex ia IIC T5
INMETRO (Brazil)	• Transmitter: [BR-Ex ia] IIC BR-Ex d [ia IIC] IIB T5 • Sensors: BR-Ex ia IIC T5
IECEx	Pending

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Standard MLFB for quick delivery on SITRANS FUH1010 (Oil)

Selection and Ordering data		Order No.	Order code
SITRANS FUH1010 (Oil)	L)	7ME3600 - ■■■■ 0 - ■■■■	■■■ K12 + K12 + R12
Design			
IP65 (NEMA 4X) wall mount		0	
Number of ultrasonic paths/meter type			
Dual path Standard Volume		4	
Flowmeter functions and I/O configurations			
includes graphic or digital display, IP66 (BNB6665 (NEMA 4X)) and IP66 (NEMA 7) wall mount explosionproof units:			
Standard • Graphic display • 4x 4 ... 20 mA analog input • 2x 0 ... 10 V • 2x 4 ... 20 mA • 2x pulse outputs • 4 Mercury wetted relays • 2x RTD input		A	
Meter power options			
90 ... 240 V AC		A	
Communication options			
RS232 (standard)		0	
RTD temperature sensor			
(includes mounting hardware for pipes above 1.5"/38 mm OD)			
No RTDs		0	
1 x standard clamp-on RTD		1	
2 x standard clamp-on RTD		2	
1 x submersible clamp-on RTD		3	
2 x submersible clamp-on RTD		4	
Notes: 1. Temperature input is required for SITRANS FUH1010 systems 2. Only the Interface detector set up as a dual channel can use 2 RTD's			
Sensor for channel 1			
(includes pipe mounting kit and spacer bar for indicated max. outer diam. listed)			
no sensor		A	
C2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")	N	
D1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")	P	
D4H (high precision)	Mounting frame and straps provided up to 1200 mm (48")	R	
D1H (high precision)	High Temperature to 104 °C / 219 °F	Z	P1P
Sensor for channel 2			
(includes pipe mounting kit and spacer bar for indicated max. OD listed) See "Sensor selection charts" for specifications.			
no sensor		A	
C2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")	N	
D1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")	P	
D4H (high precision)	Mounting frame and straps provided up to 1200 mm (48")	R	
D1H (high precision)	High Temperature to 104 °C / 219 °F	Z	Q1P
Approvals			
FM/CSA/CE (default)		1	
ATEX, CE, C-TICK		2	

Standard MLFB product offering represents 4 to 6 weeks delivery time

[1] Supplied spacer bar supports pipes up to 750 mm (30"). For pipes larger than 750 mm (30") also, spare part 7ME3960-0MS40 (1012BN-4).

L) Subject to export regulations AL: N, ECCN: 3A991X.

For sensor and RTD cables for quick delivery see tables at end of section.

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SITRANS FUH1010 (Oil)

Selection and Ordering data		Order No.	Ord. code
SITRANS FUH1010 (Oil)			
• IP65 (NEMA 4X) wall mount	L)	**7ME3600-**	
• IP65 (NEMA 7) compact explosionproof	L)	**7ME3601-**	
• IP66 (NEMA 7) wall mount explosionproof	L)	**7ME3603-**	
		0 -	
Number of ultrasonic paths/meter type			
Single path (precision volume)		**0**	
Single path (interface detector)		**1**	
Dual channel/Dual path (interface detector)		**2**	
Dual path (precision volume)		**3**	
Dual path (standard volume / mass)		**4**	
Special: Four path (standard volume/mass) only		**9**	**H 1 A**
Flowmeter functions and I/O configurations Includes graphic or digital display			
IP65 (NEMA 4X) wall mount and IP66 (NEMA 7 wall mount explosionsproof) units			
• Standard - Graphic display - 4 x 4 ... 20 mA analog input - 2 x 0 ... 10 V - 2 x 4 ... 20 mA analog output - 2 x pulse output - 4 x Mercury wetted relays (form C for interface detector) - 2 x RTD input		**A**	
• Extended I/O option - additional 2 x 4 ... 20 mA outputs - Form C relays - 4 x digital pulse outputs (2 x open collector and 2 x 0 ... 5 V TTL)		**C**	
IP65 (NEMA 7) compact explosionproof units			
• Standard - Digital display - 2 x 4 ... 20 mA (Loop) - 2 x 4 ... 20 mA analog input - 2 x status (open collector) - 1 x RTD input		**D**	
• Digital pulse option - 1 x digital pulse open collector output - 2 x 4 ... 20 mA (Loop) - 2 x 4 ... 20 mA analog input - 1 x status (open collector) - 1 x RTD input		**F**	
• Other version (Mercury wetted or dry contact relays) Add order code and plain text.			
- Dry contact form C relays for standard meter		**Z**	**J 1 A**
- Mercury wetted relays for extended I/O meters		**Z**	**J 1 D**
Meter power options			
90 ... 240 V AC		**A**	
9 ... 36 V DC (except compact NEMA 7)		**B**	
9 ... 36 V DC negative GND (compact only)		**J**	
9 ... 36 V DC positive GND (compact only)		**K**	
Communication options			
RS232 (standard)		**0**	
MODBUS (excludes NEMA 7 compact)		**1**	

Selection and Ordering data		Order No.	Ord. code
SITRANS FUH1010 (Oil)			
• IP65 (NEMA 4X) wall mount	L)	**7ME3600-**	
• IP65 (NEMA 7) compact explosionproof	L)	**7ME3601-**	
• IP66 (NEMA 7) wall mount explosionproof	L)	**7ME3603-**	
		0 -	
RTD temperature sensor (includes mounting hardware for pipes above 1.5“ OD)			
No RTDs (Note: temperature input is required for SITRANS FUH systems)		**0**	
1 x Standard clamp-on RTD		**1**	
2 x Standard clamp-on RTD[2]		**2**	
1 x Submersible clamp-on RTD		**3**	
2 x Submersible clamp-on RTD[2]		**4**	
Sensor for channel/path 1 (includes standard pipe mounting kit and spacer bar for indicated max. outer diameter listed) See "Sensor selection charts" for specifications.			
no sensor		**A**	
For the following A1H to D4H sensors, temperature range is -40 °C to 65 °C (-41 °F to 150 °F), nominal 21 °C (70 °F):			
A2H (high precision) Trackmount and straps provided up to 75 mm (3”)		**H**	
A3H (high precision) Trackmount and straps provided up to 75 mm (3”)		**J**	
B1H (high precision) Trackmount and straps provided up to 125 mm (5”)		**K**	
B2H (high precision) Trackmount and straps provided up to 125 mm (5”)		**L**	
B3H (high precision) Trackmount and straps provided up to 125 mm (5”)		**T**	
C1H (high precision) Mounting frame and straps provided up to 1200 mm (48”)[1]		**M**	
C2H (high precision) Mounting frame and straps provided up to 1200 mm (48”)[1]		**N**	
D1H (high precision) Mounting frame and straps provided up to 1200 mm (48”)[1]		**P**	
D2H (high precision) Mounting frame and straps provided up to 1200 mm (48”)[1]		**Q**	
D3H (high precision) Mounting frame and straps provided up to 1200 mm (48”)[1]		**U**	
D4H (high precision) Mounting frame and straps provided up to 1200 mm (48”)[1]		**R**	

[1] Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4).

[2] Dual channel interface detector only

L) Subject to export regulations AL: N, ECCN: 3A991X.

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Selection and Ordering data		Order No.	Ord. code
SITRANS FUH1010 (Oil)			
• IP65 (NEMA 4X) wall mount	L)	**7ME3600-**	
• IP65 (NEMA 7) compact explosionproof	L)	**7ME3601-**	
• IP66 (NEMA 7) wall mount explosionproof	L)	**7ME3603-**	
		0 -	
Sensor for channel/path 1 (continued)			
For the following B1H to D4H sensors, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):			
B1H (high temperature range HP)			**Z P 1 K**
B2H (high temperature range HP)			**Z P 1 L**
B3H (high temperature range HP)			**Z P 1 T**
C1H (high temperature range HP)			**Z P 1 M**
C2H (high temperature range HP)			**Z P 1 N**
D1H (high temperature range HP)[1]			**Z P 1 P**
D2H (high temperature range HP)[1]			**Z P 1 Q**
D3H (high temperature range HP)[1]			**Z P 1 U**
D4H (high temperature range HP)[1]			**Z P 1 R**
Sensor for channel/path 2 (includes pipe mounting kit and spacer bar for indicated max. outer diameter listed) See "Sensor selection charts" for specifications.			
no sensor			**A**
For the following A1H to D4H sensors, temperature range is -40 °C to 65 °C (-41 °F to 150 °F), nominal 21 °C (70 °F):			
A2H (high precision)	Trackmount and straps provided up to 75 mm (3")		**H**
A3H (high precision)	Trackmount and straps provided up to 75 mm (3")		**J**
B1H (high precision)	Trackmount and straps provided up to 125 mm (5")		**K**
B2H (high precision)	Trackmount and straps provided up to 125 mm (5")		**L**
B3H (high precision)	Trackmount and straps provided up to 125 mm (5")		**T**
C1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[1]		**M**
C2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[1]		**N**
D1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[1]		**P**
D2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[1]		**Q**
D3H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[1]		**U**
D4H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[1]		**R**

Selection and Ordering data		Order No.	Ord. code
SITRANS FUH1010 (Oil)			
• IP65 (NEMA 4X) wall mount	L)	**7ME3600-**	
• IP65 (NEMA 7) compact explosionproof	L)	**7ME3601-**	
• IP66 (NEMA 7) wall mount explosionproof	L)	**7ME3603-**	
		0 -	
For the following B1H to D4H sensors, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):			
B1H (high temperature range HP)			**Z Q 1 K**
B2H (high temperature range HP)			**Z Q 1 L**
B3H (high temperature range HP)			**Z Q 1 T**
C1H (high temperature range HP)			**Z Q 1 M**
C2H (high temperature range HP)			**Z Q 1 N**
D1H (high temperature range HP)[1]			**Z Q 1 P**
D2H (high temperature range HP)[1]			**Z Q 1 Q**
D3H (high temperature range HP)[1]			**Z Q 1 U**
D4H (high temperature range HP)[1]			**Z Q 1 R**
Approvals			
FM/CSA/CE/C-TICK (default), also for non hazardous area			**1**
ATEX			**2**
INMETRO (Brazil)			**3**

[1] Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4).

L) Subject to export regulations AL: N, ECCN: 3A991X.

Selection and Ordering data	Order code
Further designs	
Please add "**-Z**" to Order No. and specify Order code(s).	
Cable assembly for sensors (add for # of paths) See "Sensor cable selection chart"	**K..**
Cable assembly for RTDs (add for # of RTDs) See "RTD cable selection chart"	**R..**
Cable termination kit (for one cable pair)	
• Termination for standard, plenum and armored sensor cable	**T01**
• Termination for submersible cable	**T11**
• RTD cable termination kit for standard RTD	**T21**
• RTD cable termination kit for submersible RTD	**T31**
Languages (Meter and Documentation), English (default)	
• German	**B10**
• French	**B12**
• Spanish	**B13**
• Italian	**B14**
Tag name plate	
• Stainless steel tags with 3.2 mm (0.13 inch) characters (68 characters max.)	**Y19**

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SITRANS FUH1010 (Oil)

Selection and Ordering data		Order No.
Operating Instructions for SITRANS FUH1010		
English NEMA 4X & NEMA 7 wall mount Standard Volume		**A5E02951449**
German NEMA 4X & NEMA 7 wall mount Standard Volume		**A5E02951529**
English NEMA 4X & NEMA 7 wall mount explosionproof Precision Volume	D)	**CQO:1010PVNFM-3**
English NEMA 4X & NEMA 7 wall mount explosionproof Interface Detector		**A5E02951504**
English NEMA 7 compact explosionproof Standard Volume	D)	**CQO:1010DVXFM-3**
English NEMA 7 compact explosionproof Precision Volume	D)	**CQO:1010PVXFM-3**
English NEMA 7 compact explosionproof Interface Detector	D)	**CQO:1010BXFM-3**

This device is shipped with a Quick Start Guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

D) Subject to export regulations AL: N, ECCN: EAR99H.

MLFB example

Application example

A clamp-on meter is required for a 12" carbon steel hydrocarbon line flowing multiple products, with a wall thickness of 12.7 mm (0.5"). Meter electronics are to be located in a Class I Div 2 area only 60 ft from the pipeline. 12 V DC power is available at the site.

Dual path operation is desired for improved accuracy and redundant measurement. Pulse output will be primary flow data source.

MLFB Order No.: **7ME3600-3CB00-3QQ1-Z**
K03 + K03 + R03

Selection and Ordering data	Order No.	Ord. code
SITRANS FUH1010 meter family	**7ME3600-**	**0-**
IP65 (NEMA 4X) enclosure	**0**	
Dual path precision volume	**3**	
Custody Transfer option with digital pulse	**C**	
9 ... 36 V DC power option	**B**	
RS232 Standard	**0**	
RTD required for viscosity comp		**3**
Sensor code for path 1		**Q**
Sensor code for path 2		**Q**
FM approval required		**1**
30 m (100 ft) sensor cable for path 1		**K03**
30 m (100 ft) sensor cable for path 2		**K03**
30 m (100 ft) cable for RTD		**R03**

High precision sensor selection chart

Based on pipe wall thickness (steel pipes only)					
Sensor / **Pipe wall**	**Order Code**	**Pipe wall (mm)** min.	max.	**Pipe wall (inches)** min.	max.
A1H	**G**	0.64	1.02	0.025	0.04
A2H	**H**	1.02	1.52	0.04	0.06
A3H	**J**	1.52	2.03	0.06	0.08
B1H	**K**	2.03	3.05	0.08	0.12
B2H	**L**	3.05	4.06	0.12	0.16
C1H	**M**	4.06	5.84	0.16	0.23
C2H	**N**	5.84	8.13	0.23	0.32
D1H	**P**	8.13	11.18	0.32	0.44
D2H	**Q**	11.18	15.75	0.44	0.62
D4H	**R**	15.75	31.75	0.62	1.25
B3H	**T**	2.7	3.3	0.106	0.128
D3H	**U**	7.4	9.0	0.293	0.354

Sensor Cable Selection Chart

Sensor cable codes for length and type options				
Cable length m (ft)	**Standard (PVC jacket)** -40…+80 °C (-40…+176 °F)	**Submersible (polyethylene jacket)** -40…+80 °C (-40…+176 °F)	**Plenum Rated (teflon jacket)** -40…+200 °C (-40…+392 °F)	**Armored** -40…+80 °C (-40…+176 °F)
	Order code			
6 (20)	**K01**[1]	**K11**	**K21**	**K31**
15 (50)	**K02**	**K12**[1]	**K22**	**K32**[1]
30 (100)	**K03**[1]	**K13**[1]	**K23**	**K33**
46 (150)	**K04**[1]	**K14**	**K24**	**K34**
61 (200)	**K05**	**K15**	**K25**	**K35**
91 (300)	**K06**	**K16**	**K26**	**K36**

RTD Cable Selection Chart

RTD cable codes for length and type		
Cable length m (ft)	**Standard (teflon wrapped)** -40 ... +200 °C (-40 ... +392 °F)	**Submersible (extruded jacket)** -40 ... +200 °C (-40 ... +392 °F)
	Order code	
6 (20)	**R01**[1]	**R11**
15 (50)	**R02**[1]	**R12**
30 (100)	**R03**[1]	**R13**
46 (150)	**R04**	**R14**
61 (200)	**R05**	**R15**
91 (300)	**R06**	**R16**

[1] Standard MLFB for quick delivery

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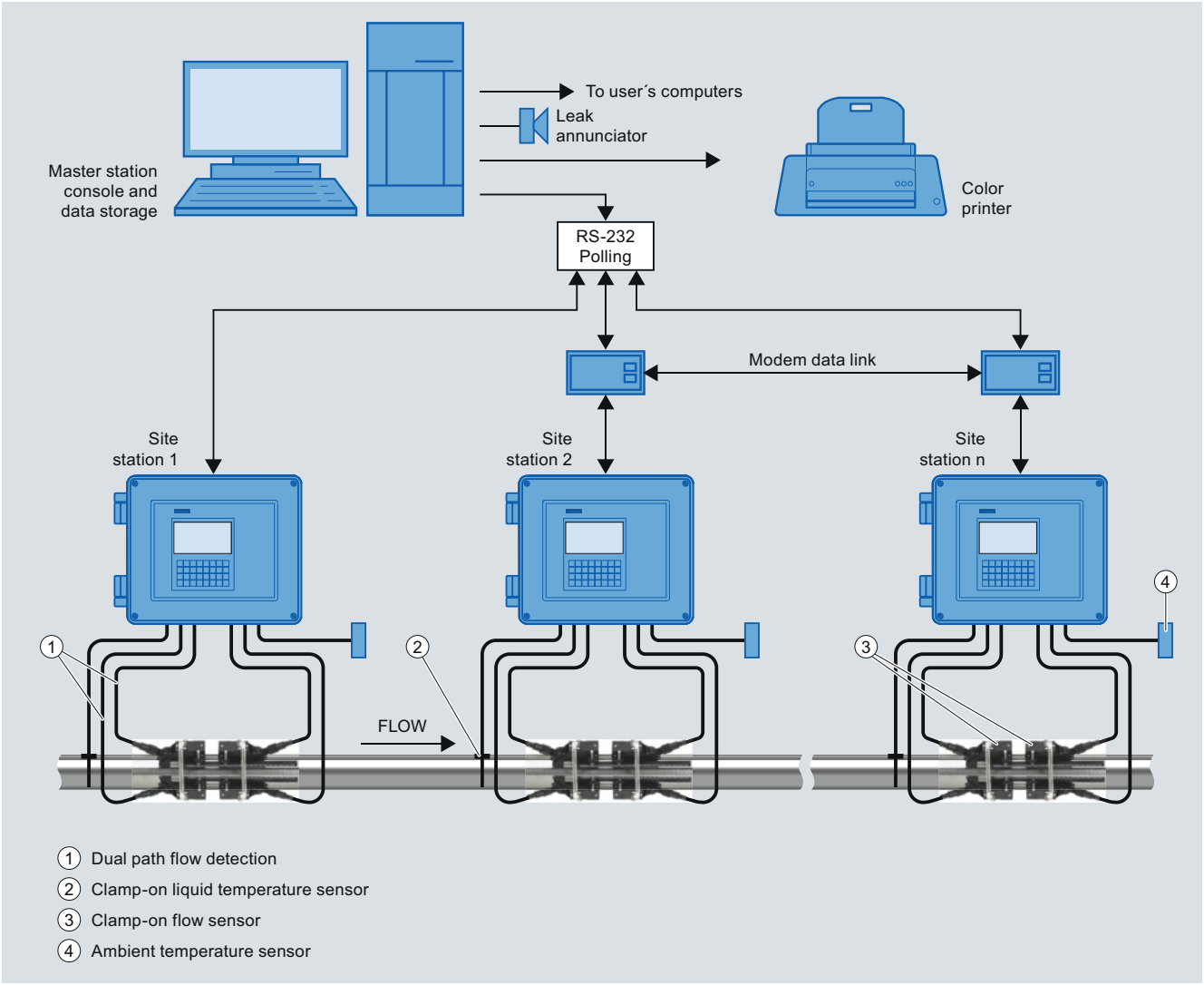
Overview



1. Dual path flow detection
2. Clamp-on liquid temperature sensor
3. Clamp-on flow sensor
4. Ambient temperature sensor

The FUS-LDS Leak Detection System offers a complete software and hardware solution for liquid pipelines. FUS-LDS uses SITRANS FUH1010 clamp-on ultrasonic flowmeters mounted directly onto the pipeline. The software monitors all of the flowmeters and pipeline segments, serving as a quick and reliable way for the pipeline operator to detect and localize leakages.

FUS-LDS does not require continuous operator attention, because the alarm thresholds are preset and alert the operator when attention is needed. The system also has the ability to detect very small leaks by allowing the operator to utilize “visual trending.” A fully optimized system eliminates the occurrence of false alarms.

FUS-LDS lives up to the requirements of pipeline companies while ultimately satisfying one major goal: providing users and the community with peace of mind.

Benefits

- Complete software and hardware solution offering the system user a single supplier responsibility
- Real-time detection of small and large unauthorized product releases for both dynamic and static flow conditions as well as protection against product theft
- WinCC’s advanced Graphic User Interface (GUI) allows for simple pipeline status identification without constant operator monitoring
- Easy accessible pipeline performance data, which allows for multiproduct identification, batch tracking and pig tracking
- Segment feature allows user to highlight specific flowmeter or line segment to gain real-time information via software pop-up screens
- Meets API 1130 “Computational Pipeline Monitoring for Liquid Pipelines” and PHMSA 195.444 CPM Leak Detection regulatory requirements for safety, helping to protect the environment and limit contamination issues

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Leak detection system

Application

Minimizes external pipeline damage (from explosions, corrosion, third-party intrusions, etc.)

- Monitors for product theft
- Protects against contamination and other environmental issues
- Fits numerous pipe sizes (25 mm to 1.52 m (1" to 60"))
- Available in various enclosure types: standard IP65 (NEMA 4X), hazardous area compact IP65 (NEMA 7), and hazardous area wall mount IP66 (NEMA 7)
- Available with FM, CSA, ATEX, C-Tick and INMETRO approvals

Design

SITRANS FUH1010 and SITRANS FUS1010 flowmeters for leak detection are available in two configurations:

- IP65 (NEMA 4X) wall mount enclosure constructed of fiberglass reinforced polyester with stainless steel hardware and polyester keypad
  - Single channel
  - Dual channel / dual path
  - Four channel (optional)
- IP65 (NEMA 7) compact explosionproof enclosure constructed of cast aluminum with glass window, stainless steel hardware
  - Single channel
  - Dual channel / dual path
- IP66 (NEMA 7) wall mount explosionproof enclosure constructed of cast aluminum, stainless steel hardware, with glass window
  - Single channel
  - Dual channel / dual path
  - Four channel (optional)

Minimum Computer Requirements
(may be different depending on commercial availability)

Monitor	19“ flat screen
CPU	Intel Pentium IV
Clock speed	3.0 GHz
Cache	512 KB
Chassis	Desktop/Rack mount
RAM	512 MB
Hard drive	60.0 GB
Optical storage	8X DVD-ROM / CD-RW Drive
USB ports	4 total (2 front / 2 back)
Serial ports	2 DB-9 ports as COM1 and COM2
Operating system	Microsoft Windows XP Professional
Keyboard	USB Standard keyboard
Mouse	USB optical 2-button scroll mouse
AC power cable	5 foot minimum length
Network	Internal RJ45
Modem	Internal 56K V.92 Modem
Audio	Capable

Special requests available on demand.

For addional information contact your Regional Business Developer.

Function

- Master Station Console – Receives all site station data sequentially once per minute. Site stations communicate their digital data via a communication network. The master station processes this data and updates all outputs every minute. These include alarms, graphic and numerical data screens, and both digital and analog data outputs
- Site Stations – Clamp-on ultrasonic flowmeters and RTD temperature sensors are installed on the process pipe. The flowmeter measures and computes the following data: standard volumetric flow rate, liquid temperature, sonic velocity and meter diagnostics including empty pipe detection, signal strength and aeration content
- Flexible Data Communications – Data communication from remote site stations to master station can be accomplished by multiple methods, including hard wired (point-to-point), hard wire with short-haul modems, leased-line telephone, cellular phone, wireless radio, Ethernet, Fiber Optic and satellite, etc.
- Software – Utilizes SIMATIC WinCC software, which creates new possibilities for process visualization. SIMATIC WinCC offers complete operational and monitoring functionality in the Microsoft Windows-based operating system
- Alarms – Automatic application condition (AppConnä) technology provides adaptive alarm threshold parameters enabling maximum system resolution and sensitivity

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Overview

SITRANS FUG1010 clamp-on non-intrusive ultrasonic flow transmitter is ideal for natural and process gas applications, including checkmetering, allocation, production, storage and gas fired power station applications.

SITRANS FUG1010 is available in single, dual and optional four path configurations, with your choice of IP65 (NEMA 4X) wall mount, IP65 (NEMA 7) compact explosionproof, and IP66 (NEMA 7) wall mount explosionproof enclosures.

Benefits

- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external sensors do not require periodic cleaning
- No moving parts to foul or wear as found in turbine and PD meters
- Eliminates the pressure drop or energy loss in orifice metering
- Wide turn-down ratio
- Choice of single, dual or optional four path versions
  - Single path version reduces initial investment
  - Multiple path versions provide higher accuracy, especially with limited straight run and poor flow profile conditions
  - In diametric reflect mode configuration, the meter is less sensitive to crossflow and swirl
- Wide-Beam technology provides improved accuracy over a wide range of flow velocity and operating pressure
- ZeroMatic Path automatically sets zero without stopping flow and reduces zero drift, even at low flow
- Tolerant of most wet gas conditions
- Immune to most pressure reducing valve noise
- Optional rugged stainless steel sensor enclosure permits permanent and direct burial installations
- Easy to use “Si-Ware” diagnostic software

Application

SITRANS FUG1010 is ideal for most natural and process gas industry applications, including:

- Checkmetering
- Allocation
- Flow survey verification
- Lost and unaccounted for (LAUF) gas analysis
- Production
- Storage

Design

SITRANS FUG1010 is available in three enclosures:

- IP65 (NEMA 4X) wall mount enclosure constructed of fiberglass reinforced polyester with stainless steel hardware and polyester keypad
  - Single path
  - Dual path
  - Four path (optional)
- IP65 (NEMA 7) compact explosionproof enclosure constructed of cast aluminum with glass window, stainless steel hardware
  - Single path
  - Dual path
- IP66 (NEMA 7) wall mount explosionproof enclosure constructed of cast aluminum stainless steel hardware, with glass window
  - Single path
  - Dual path
  - Four path (optional)

Function

- IP65 (NEMA 4X) and IP66 (NEMA 7) flow display transmitters have integral 33 button keypads and large (128 x 240 pixel) graphic displays visible up to 12 m (40 ft) away
- IP65 (NEMA 7) compact flow transmitter has a 2 x 16 alphanumeric LCD display
- Current, voltage, frequency and RS232 outputs (see specification section for details)
- Analog inputs for pressure and temperature
- ZeroMatic Path automatically compensates for zero flow drift
- Bidirectional flow operation
- 1 Mbyte data logger with both site and data logger storage
- English, Spanish, German, Italian and French language options
- Internal AGA-8 table for fixed gas composition is available for standard volume computation.
- Complete application and operation diagnostics, to assure calibration and operational integrity
- Upward compatibility and compliance with AGA-10 speed of sound measurement practice

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SITRANS FUG1010 (Gas)

Technical specifications

Input	
Flow range	± 30 m/s (± 100 ft/s), bidirectional
Flow sensitivity	0.0003 m/s (0.001 ft/s), flow rate independent
Minimum pressure	7 … 10 bar (100 … 145 psi), typical (gas composition and application dependent; plastic pipes support operation at atmospheric pressure)
Pipe size	25 mm … 1.52 m (1“ … 48“) (for other sizes, consult factory)
Analog inputs	Current: 4 x 4 … 20 mA, programmable (IP65 (NEMA 7) enclosure has 2 x 4 ... 20 mA, programmable)
Output	
Standard outputs	• Current: 4 x 4 … 20 mA, a programmable, standard Additional 2 x optional, except IP65 (NEMA 7) • Voltage: 4 x 0 … 10 V DC, menu programmable (None for IP65 (NEMA 7) enclosure) • 4 x Open collector digital pulses (quadrature) (None for IP65 (NEMA 7) enclosure) • 2 x 0 … 5 kHz, TTL pulse square wave + (None for IP65 (NEMA 7) enclosure) • 1 x Optically isolated digital pulse & source, IP65 (NEMA 7) enclosure only • RS232 Serial Port
Extended outputs	• MODBUS (RS485/422/232) (not for IP65 (NEMA 7)
Status/Alarm I/O	• 4 x programmable form C relays (not for IP65 (NEMA 7) enclosure) • 4 x programmable N.O. Mer. Wet. Relays optional (not for IP65 (NEMA 7) enclosure) • 2 x Optically coupled output logic gates (for IP65 (NEMA 7) enclosure, only) • 1 Totalizer clear switch input (not for IP65 (NEMA 7)) • 1 Totalizer hold switch input (not for IP65 (NEMA 7) enclosure) • 1 x Opto iso. totalizer clear switch input (for IP65 (NEMA 7) enclosure, only) • 1 x Opto iso. totalizer hold switch input (for IP 65 (NEMA 7) enclosure, only)

Accuracy	
Typical accuracy	1 % … 2 % of actual volume reading (higher accuracy is pipe condition and flow profile dependent)
Calibratable Accuracy	± 0.2 ... 0.5 % of flow
Repeatability	0.05 % … 0.1 %, of actual volume reading, for 1.5 … 30 m/s (5 … 100 ft/s) velocities (pipe condition dependent)
Zero drift	0.0003 m/s (0.001 ft/s), with ZeroMatic Path active
Data refresh rate	5 Hz
Rated operation conditions	
Degree of protection	
• Wall mount	IP65 (NEMA 4X)
• Compact explosionproof	IP65 (NEMA 7)
• Wall mount explosionproof	IP66 (NEMA 7)
Gas temperature	-40 … +60 °C (-40 … +140 °F) (for higher temperatures consult factory)
Ambient temperature	-18 … +60 °C (0 … 140 °F)
Design	
Dimensions	see SITRANS F US Clamp-on "System info and selection guide"
Weight	see diagrams
Power supply	
• For IP65 (NEMA 4X) and IP66 (NEMA 7)	• 90 … 240 V AC, 50 … 60 Hz (30 VA) or 9 … 36 V DC (12 W)
• For IP65 (NEMA 7):	• 90 … 240 V AC, 50 … 60 Hz (15 VA) or 9 … 36 V DC (10 W)
Indication and operation	
Data logger memory	1 Mbyte, programmable for 17 data functions
Display	
• IP65 (NEMA 4X) and IP66 (NEMA 7) enclosures	128 x 240 pixel LCD with backlight
• IP65 (NEMA 7) enclosure	2 x 16 alphanumeric LCD display
Keypad	
• IP65 (NEMA 4X) and IP66 (NEMA 7) Enclosures	33 keypad buttons with tactile feedback
• IP65 (NEMA 7) Enclosure	5 magnetic hall effect switches
Language options	English, Spanish, German, Italian, French

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Certificates and approvals	
IP65 (NEMA 4X) wall mount flow display transmitter ratings	
FM and CSA	• Transmitter N-I Class I, Div 2 S Class II, Div 2 • Sensor I.S. Class I, II, Div 1
CE	EMC Directive 2004/108/EC ATEX Directive 94/9/EC
C-TICK	
ATEX	• Transmitter: Ex II (1) G [Ex ia] IIC Ex II 3 (1) G Ex nC [ia] IIC T5 • Sensors: Ex II 1 G Ex ia IIC T5
INMETRO (Brazil)	• Transmitter: [BR-Ex ia] IIC BR-Ex nC [ia] IIC T5 • Sensors: BR-Ex ia IIC T5 IP65
IECEx	Pending
IP65 (NEMA 7) compact explosion-proof enclosure ratings	
FM and CSA	• Transmitter XP Class I, Div 1 D-I Class II, Div 1 N-I Class I, Div 2 S Class II, Div 2 • Sensor I.S. Class I, II, Div 1
CE	EMC Directive 2004/108/EC ATEX Directive 94/9/EC
C-TICK	
ATEX	• Transmitter: Ex II 2 (1) G Ex d [ia] IIB + H2 T5 • Sensors: Ex II 1 G Ex ia IIC T5
INMETRO (Brazil)	• Transmitter: BR-Ex d [ia] IIB + H2 T5 • Sensors: BR-Ex ia IIC T5
IECEx	Pending
IP66 (NEMA 7) wall mount explo-sionproof enclosure ratings	
FM and CSA	• Tranmitter XP Class I, Div 1 D-I Class II, Div 1 N-I Class I, Div 2 S Class II, Div 2 • Sensor I.S. Class I, II, Div 1
CE	EMC Directive 2004/108/EC ATEX Directive 94/9/EC
C-TICK	
ATEX	• Transmitter: Ex II (1) G [Ex ia] IIC Ex II 3 (1) G Ex nC [ia] IIC T5 Ex II 2 (1) G Ex d [ia IIC] IIB+H2 T5 • Sensors: Ex II 1 G Ex ia IIC T5
INMETRO (Brazil)	• Transmitter: [BR-Ex ia] IIC BR-Ex d [ia IIC] IIB T5 • Sensors: BR-Ex ia IIC T5
IECEx	Pending

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SITRANS FUG1010 (Gas)

Standard MLFB for quick delivery on SITRANS FUG1010 (Gas)

Selection and Ordering data		Order No.	Order code
SITRANS FUG1010 (Gas)	L)	**7ME361 - ■■■■ 0 - ■■■■**	**K12 + K12 + R12**
Design			
IP65 (NEMA 4X) wall mount		**0**	
Number of ultrasonic paths			
Dual path		**2**	
Flowmeter functions and I/O configurations includes graphic or digital display			
• Extended I/O option - additional 2 x 4 ... 20 mA - Mercury wetted relays - 4 x digital pulse outputs (2 x open collector and 2 x 0 ... 5 V TTL)		**B**	
Meter power options			
9 ... 36 V, DC (except compact NEMA 7)		**B**	
Communication options			
RS232 (standard)		**0**	
MODBUS (dedicated only, excludes NEMA 7 compact)		**1**	
RTD temperature sensor (includes mounting hardware for pipes above 1.5“ / 38 mm OD)			
No RTDs		**0**	
1 x standard clamp-on RTD		**1**	
2 x standard clamp-on RTD		**2**	
1 x submersible clamp-on RTD		**3**	
2 x submersible clamp-on RTD		**4**	
Notes: 1. Temperature input is required for FUH systems 2. Only the Interface detector set up as a dual channel can use 2 RTD’s			
Sensor for channel 1 (includes pipe mounting kit and spacer bar for indicated max. OD listed) See "Sensor selection charts" for specifications.			
no sensor		**A**	
C2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")	**N**	
D1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")	**P**	
D2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")	**Q**	
Sensor for channel 2 (includes pipe mounting kit and spacer bar for indicated max. OD listed) See "Sensor selection charts" for specifications.			
no sensor		**A**	
C2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")	**N**	
D1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")	**P**	
D2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")	**Q**	
Approvals			
FM/CSA/CE (default)		**1**	
ATEX, CE, C-TICK		**2**	

Standard MLFB product offering represents 4 to 6 weeks delivery time

For sensor and RTD cables for quick delivery see tables at end of section.

L) Subject to export regulations AL: N, ECCN: 3A991X.

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Selection and Ordering data		Order No.	Ord. code
SITRANS FUG1010 (Gas)			
• IP65 (NEMA 4X) wall mount	L)	**7ME3610-**	
• IP65 (NEMA 7) compact explosionproof	L)	**7ME3611-**	
• IP66 (NEMA 7) wall mount explosionproof	L)	**7ME3613-**	
		■■■■ **0 -**	■■■ ■■■
Number of channels/ultrasonic paths			
Single path		**1**	
Dual path		**2**	
Special: Four path (NEMA 4X and NEMA 7 wall mount only)		**9**	**H 1 A**
Flowmeter functions and I/O configurations (includes graphic or digital display)			
IP65 (NEMA 4X) wall mount and IP66 (NEMA 7) wall mount explosionproof units			
• Standard (all but NEMA 7 compact explosionproof) - Graphic display - 4 x 4 ... 20 mA analog input - 2 x 0 ... 10 V - 2 x 4 ... 20 mA analog output - 2 x pulse output - 4 x relay C type - 2 x RTD input		**A**	
• Extended I/O option - additional 2 x 4 ... 20 mA - Mercury wetted relays - 4 x digital pulse outputs (2 x open collector and 2 x 0 ... 5 V TTL)		**B**	
IP65 (NEMA 7) compact explosionproof units			
• Standard - Digital display - 2 x 4 ... 20 mA (loop) - 2 x 4 ... 20 mA analog input - 2 x status (open collector) - 1 x RTD input		**D**	
• Digital pulse option 1 x digital pulse open collector output		**E**	
• Mercury wetted relays for standard meter		**Z**	**J 1 A**
• Dry contact form C relays for extended I/O meter		**Z**	**J 1 D**
Meter power options			
90 ... 240 V AC		**A**	
9 ... 36 V DC (except NEMA 7 compact explosionproof)		**B**	
9 ... 36 V DC negative GND (Compact only)		**J**	
9 ... 36 V DC positive GND (Compact only)		**K**	
Communication options			
RS232 (standard)		**0**	
MODBUS (excludes NEMA 7 compact explosionproof)		**1**	
RTD temperature sensor (includes mounting hardware for pipes above 1.5“ outer diameter)			
No RTDs		**0**	
1 x standard clamp-on RTD		**1**	
2 x standard clamp-on RTD		**2**	
1 x submersible clamp-on RTD		**3**	
2 x submersible clamp-on RTD		**4**	

Selection and Ordering data		Order No.	Ord. code
SITRANS FUG1010 (Gas)			
• IP65 (NEMA 4X) wall mount	L)	**7ME3610-**	
• IP65 (NEMA 7) compact explosionproof	L)	**7ME3611-**	
• IP66 (NEMA 7) wall mount explosionproof	L)	**7ME3613-**	
		■■■■ **0 -**	■■■ ■■■
Sensor for channel 1 (includes pipe mounting kit and spacer bar for indicated max. outer diameter listed) See "Sensor selection chart" for specifications.			
no sensor		**A**	
For the following A1H to D4H sensors, temperature range is -40 °C to 65 °C (-41 °F to 150 °F), nominal 21 °C (70 °F):			
B1H (high precision) Trackmount and straps provided up to 125 mm (5”)		**K**	
B2H (high precision) Trackmount and straps provided up to 125 mm (5”)		**L**	
B3H (high precision) Trackmount and straps provided up to 125 mm (5”)		**T**	
C1H (high precision) Mounting frame and straps provided up to 1200 mm (48”)[1]		**M**	
C2H (high precision) Mounting frame and straps provided up to 1200 mm (48”)[1]		**N**	
D1H (high precision) Mounting frame and straps provided up to 1200 mm (48”)[1]		**P**	
D2H (high precision) Mounting frame and straps provided up to 1200 mm (48”)[1]		**Q**	
D3H (high precision) Mounting frame and straps provided up to 1200 mm (48”)[1]		**U**	
D4H (high precision) Mounting frame and straps provided up to 1200 mm (48”)[1]		**R**	
For the following B1H to D4H sensors, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):			
B1H (high temperature range HP)		**Z**	**P 1 K**
B2H (high temperature range HP)		**Z**	**P 1 L**
B3H (high temperature range HP)		**Z**	**P 1 T**
C1H (high temperature range HP)		**Z**	**P 1 M**
C2H (high temperature range HP)		**Z**	**P 1 N**
D1H (high temperature range HP)[1]		**Z**	**P 1 P**
D2H (high temperature range HP)[1]		**Z**	**P 1 Q**
D3H (high temperature range HP)[1]		**Z**	**P 1 U**
D4H (high temperature range HP)[1]		**Z**	**P 1 R**

[1] Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4).

L) Subject to export regulations AL: N, ECCN: 3A991X.

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SITRANS FUG1010 (Gas)

Selection and Ordering data		Order No.	Ord. code
SITRANS FUG1010 (Gas)			
• IP65 (NEMA 4X) wall mount	L)	**7ME3610-**	
• IP65 (NEMA 7) compact explosionproof	L)	**7ME3611-**	
• IP66 (NEMA 7) wall mount explosionproof	L)	**7ME3613-**	
			0 -
Sensor for channel 2 (includes pipe mounting kit and spacer bar for indicated max. outer diameter listed) See "Sensor selection chart" for specifications.			
no sensor			**A**
For the following A1H to D4H sensors, temperature range is -40 °C to 65 °C (-41 °F to 150 °F), nominal 21 °C (70 °F):			
B1H (high precision)	Trackmount and straps provided up to 125 mm (5")		**K**
B2H (high precision)	Trackmount and straps provided up to 125 mm (5")		**L**
B3H (high precision)	Trackmount and straps provided up to 125 mm (5")		**T**
C1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[1)]		**M**
C2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[1)]		**N**
D1H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[1)]		**P**
D2H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[1)]		**Q**
D3H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[1)]		**U**
D4H (high precision)	Mounting frame and straps provided up to 1200 mm (48")[1)]		**R**
Other versions (different size, mount, type or pipe larger than DN 1200 (48") or corrosion resistant), add Order code and plain text.			**Z** **Q 1 Y**
For the following B1H to D4H sensors, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):			
B1H (high temperature range HP)			**Z** **Q 1 K**
B2H (high temperature range HP)			**Z** **Q 1 L**
B3H (high temperature range HP)			**Z** **Q 1 T**
C1H (high temperature range HP)			**Z** **Q 1 M**
C2H (high temperature range HP)			**Z** **Q 1 N**
D1H (high temperature range HP)			**Z** **Q 1 P**
D2H (high temperature range HP)			**Z** **Q 1 Q**
D3H (high temperature range HP)			**Z** **Q 1 U**
D4H (high temperature range HP)			**Z** **Q 1 R**
Approvals			
FM/CSA/CE/C-TICK (default)			**1**
ATEX, CE, C-TICK			**2**
INMETRO (Brazil)			**3**

L) Subject to export regulations AL: N, ECCN: 3A991X.

Selection and Ordering data	Order code
Further designs	
Please add "**-Z**" to Order No. and specify Order code(s).	
Cable assembly for sensors (add for # of paths) See "Sensor cable selection chart"	**K..**
Cable assembly for RTDs (add for # of RTDs) See "RTD cable selection chart"	**R..**
Cable termination kit (for one cable pair)	
• Termination for standard, plenum and armored sensor cable	**T01**
• Termination for submersible sensor cable	**T11**
• RTD cable termination kit for standard RTD	**T21**
• RTD cable termination kit for submersible RTD	**T31**
• Insert RTD cable termination kit	**T41**
Languages (Meter and Documentation)	
• German	**B10**
• French	**B12**
• Spanish	**B13**
• Italian	**B14**
Tag name plate	
• Stainless steel tags with 3.2 mm (0.13 inch) characters (68 characters max.)	**Y19**

MLFB example

Application example

A clamp-on meter is required for a 300 mm (12") carbon steel gas line with a wall thickness of 12.7 mm (0.5"). Meter electronics are to be located in a Class I Div 2 area only 18 m (60 ft) from the pipeline. 12 V DC power is available at the site.

Dual path operation is desired for improved accuracy and redundant measurement. Pulse output will be primary flow data source.

MLFB Order No.: **7ME3610-2BB00-0QQ1-Z**
K03 + K03

Selection and Ordering data	Order No.	Ord. code
SITRANS FUG1010 meter family	**7 M E 3 6 1**	**- 0 -**
IP65 (NEMA 4X) wall mount	**0**	
Dual path	**2**	
Custody Transfer option with digital pulse	**B**	
9 ... 36 V DC power option	**B**	
RS232 Standard	**0**	
No RTD required		**0**
Sensor code for path 1		**Q**
Sensor code for path 2		**Q**
FM approval required		**1**
30 m (100 ft) sensor cab. for path 1		**K 0 3**
30 m (100 ft) sensor cab. for path 2		**K 0 3**

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Selection and Ordering data		Order No.
Operating Instructions for SITRANS FUG1010		
English NEMA 4X wall mount & NEMA 7 wall mount explosionproof		**A5E02951519**
German NEMA 4X wall mount & NEMA 7 wall mount explosionproof		**A5E02951531**
English NEMA 7 compact explosionproof	D)	**CQO:1010GCXFM-3**

This device is shipped with a Quick Start Guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

D) Subject to export regulations AL: N, ECCN: EAR99H.

High precision sensor selection chart

Based on pipe wall thickness (steel pipes only)					
Sensor	**Order Code**	**Pipe wall (mm)**		**Pipe wall (inches)**	
Pipe wall		**min.**	**max.**	**min.**	**max.**
B1H	**K**	2.0	3.0	0.08	0.12
B2H	**L**	3.0	4.1	0.12	0.16
B3H	**T**	2.7	3.3	0.106	0.128
C1H	**M**	4.1	5.8	0.16	0.23
C2H	**N**	5.8	8.1	0.23	0.32
D1H	**P**	8.1	11.2	0.32	0.44
D2H	**Q**	11.2	15.7	0.44	0.62
D3H	**U**	7.4	9.0	0.293	0.354
D4H	**R**	15.7	31.8	0.62	1.25

Sensor Cable Selection Chart

Sensor cable codes for length and type options				
Cable length m (ft)	**Standard (PVC jacket) -40…+80 °C (-40…+176 °F)**	**Submersible (polyethylene jacket) -40…+80 °C (-40…+176 °F)**	**Plenum Rated (teflon jacket) -40…+200 °C (-40…+392 °F)**	**Armored -40…+80 °C (-40…+176 °F)**
	Order code			
6 (20)	**K01**[1)]	**K11**	**K21**	**K31**
15 (50)	**K02**	**K12**[1)]	**K22**	**K32**[1)]
30 (100)	**K03**[1)]	**K13**[1)]	**K23**	**K33**
46 (150)	**K04**[1)]	**K14**	**K24**	**K34**
61 (200)	**K05**	**K15**	**K25**	**K35**
91 (300)	**K06**[1)]	**K16**	**K26**	**K36**

RTD Cable Selection Chart

RTD cable codes for length and type		
Cable length m (ft)	**Standard (teflon wrapped) -40 … +200 °C (-40 … +392 °F)**	**Submersible (extruded jacket) -40 … +200 °C (-40 … +392 °F)**
	Order code	
6 (20)	**R01**[1)]	**R11**
15 (50)	**R02**[1)]	**R12**
30 (100)	**R03**[1)]	**R13**
46 (150)	**R04**	**R14**
61 (200)	**R05**	**R15**
91 (300)	**R06**	**R16**

[1)] Standard MLFB for quick deliver

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SITRANS FUG1010 Gas check metering kit

Overview

The clamp-on SITRANS FUG1010 Gas check metering kit is an all-inclusive solution developed especially for verifying the accuracy and performance of any brand or type of flowmeter. The kit is ideal for natural and process gas applications, including check metering, allocation, production, storage and gas fired power station applications. The flowmeter is available with FM/CSA or ATEX approval.

Benefits

- Performance check or verification of any type or brand of flow meter
- WideBeam technology provides improved accuracy over a wide range of flow velocity and operating pressure
- Tolerant of most wet gas conditions
- Immune to most pressure reducing valve noise
- Fast, easy and cost-efficient on-site measurement of any convoluted pipe from 50 ... 1200 mm (2 ... 48") up to 15.7 mm (0.62") pipe wall thickness
- Delivered as an all inclusive kit in a sturdy rolling case that holds all the equipment needed to conduct performance and verification tests (cables, multiple sensors, transmitter, etc.)

Application

The SITRANS FUG1010 Gas check metering kit is ideal for most natural and process gas industry applications, including:

- Check metering
- Allocation
- Flow survey verification
- Lost and unaccounted for (LAUF) gas analysis
- Production
- Storage

Design

- IP65 (NEMA 4X) wall mount enclosure constructed of fiber-glass reinforced polyester with stainless steel hardware and polyester keypad
- Dual channel

Function

- Integral 33 button keypad and large (128 x 240 pixel) graphic display visible up to 12 m (40 ft) away
- Current, voltage, frequency and RS232 outputs (see Technical specification section for details)
- Analog inputs for pressure and temperature
- Internal AGA-8 table for fixed gas composition is available for standard volume computation
- Upward compatibility and compliance with AGA-10 speed of sound measurement practice
- Bi-directional flow operation
- English, Spanish, German, Italian and French language options

Technical specifications

Pipe sizes	50 ... 1200 mm (2 ... 48") up to 15.7 mm (0.62") pipe wall thickness
Accuracy	±0.5 %...1.0 % of flow rate
Flow range	30 m/s (100 ft/s) bidirectional
Media temperature	-40 …+60 °C (-40 … +140 °F)
Enclosure ratings	IP65 (NEMA 4X)

See page 4/346 for complete technical specifications

Cerificates and approvals

FM and CSA	• Transmitter N-I Class I, Div 2 S Class II, Div 2 • Sensor I.S. Class I, II, Div 1
ATEX	• Transmitter: Ex II (1) G [Ex ia] IIC Ex II 3 (1) G Ex nC [ia] IIC T5 • Sensors: Ex II 1 G Ex ia IIC T5

Selection and Ordering data

	Order No.
SITRANS FUG1010 Gas Check Metering Kit	
• FM/CSA approved	D) **CQO:FUG-GASKIT**
• ATEX approved	D) **CQO:FUG-GASAKIT**

Content of delivery

1	Dual channel dedicated transmitter (FM/CSA or ATEX approved)
1 pair	Transportable sensors C1 Pipe: od 3.500 inches, wt 0.216 inches, carbon steel
1 pair	Transportable sensors C2 Pipe: od 6.625 inches, wt 0.280 inches, carbon steel
1 pair	Transportable sensors D1 Pipe: od 10.750 inches, wt 0.365 inches, carbon steel
1 pair	Transportable sensors D2 Pipe: od 16.000 inches, wt 0.500 , carbon steel
2 pairs	Sensor cables 6m (20 ft)
2 pairs	Mounting frames
2	Spacer bar (dedicated)
1	Mounting strap
4	Couplant CC128
1 kit	Couplant/Damping Film
1	Flow case
1	Flowmeter manual
1	Laminated card set

D) Subject to export regulations AL: N, ECCN: EAR99H.

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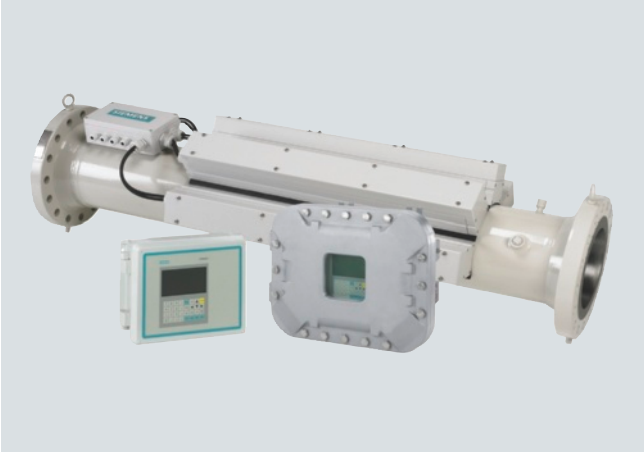
SITRANS FUT1010 (Liquid and Gas)

Overview



SITRANS FUT1010 is the latest ultrasonic flow meter from Siemens. Ideal for applications within the liquid and gas hydrocarbon industry capable of providing custody transfer accuracy. With the newly developed permanent TransLoc™ mounting system, the sensors are permanently mounted on the outside of the pipe, eliminating any contact with the medium.

SITRANS FUT1010 is available in two different configurations; a version for liquid hydrocarbon applications and a version for precise gas measurement. Both versions are offered in pipe sizes ranging from 4 inch to 24 inch (DN 100 to DN 600) with flange ratings of ANSI Class 150/300/600 for liquid and 300/600 for gas.

Benefits

- Calibrated performance that meets custody transfer accuracy
- WideBeam® technology allows for precision flow measurement by reducing the meter's sensitivity to changes in the medium's physical properties
- TransLoc™ permanent mounting system ensures sealing and virtually no maintenance
- Available in a wide range of sizes
- High viscosity range (up to 2800 Cst)
- ZeroMatic Path™ capability automatically corrects for zero drift with no interruption of flow
- Completely cavity free design which eliminates any signal degrading buildup or ports to clog
- Large bi-directional flow range
- MODBUS RTU RS232/485 output available
- Dynamic Reynolds Number compensation

Application

Liquid applications		Gas applications	
Pipelines	Custody transfer, allocation, line balance, interface/densitometer	**Upstream**	Production wells, gathering, separation and dehydration
Terminals	Check metering, transmix metering, product identification	**Midstream**	Underground storage, transmission, compressor stations
Refineries	Process control, blending, tank measurement, ship loading and unloading	**Downstream**	Electric power generation, industrial use, gas processing plants
Transportation	Crude oil pipelines, LPG pipelines, multiple product pipelines, airport facilities, liquid terminals		
Downstream	Petrochemical and processing plants		

Design

SITRANS FUT1010 is available in two different configurations, both featuring the TransLoc mounting system:

- A version for liquid hydrocarbon applications
- A version for precise gas measurement

Transmitter

SITRANS FUT1010 is available with two, three or four paths and IP65 (NEMA 4X) wall mount or IP66 (NEMA 7) wall mount explosionproof enclosures.

Sensor

Available sizes include 4 to 24 inches (DN 100 to DN 600) with flange ratings of ANSI Class 150, 300 and 600 for the liquid meter and ANSI Class 300 and 600 for gas.

If the installation warrants, SITRANS FUT1010 can be delivered with a ten diameter upstream and five diameter downstream tubes and a flow conditioner.

Function

- IP65 (NEMA 4X) and IP66 (NEMA 7) transmitters have integral 33 button keypads and large (128 x 240 pixel) graphic displays readable up to 12 m (40 ft) away
- Current, voltage, status alarm, frequency and RS232 outputs (see specification section for details)
- Analog inputs (see specification section for details)
- 1 MByte data logger with both site and data logger storage
- Standard or actual volume flow outputs
- Standard or actual totalize outputs
- Complete application and operation diagnostics, to ensure operational integrity
- Temperature provided by non-intrusive sensor (¾" tap available for insert temperature sensor)
- Detection of aeration or contamination

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SITRANS FUT1010 (Liquid and Gas)

Technical specifications

Input	
Flow range (Gas)	± 36.5 m/s (± 120 f/s) for DN 100 ... DN 200 (4" ... 8") pipes bi-directional ± 30.5 m/s (± 100 ft/s) for DN 250 ... DN 600 (10" ... 24") pipes bi-directional
Flow range (Liquid)	± 12 m/s (± 40 f/s) including zero flow, bi-directional
Flow sensitivity	0.0003 m/s (0.001 f/s) flow rate independent
Flow temperature range	-28 ... +93 °C (-20 ... +200°F)
Analog inputs	4 x 4 ... 20 mA, (Programmable to Density, Pressure, viscosity or Temperature)
Output	
Standard outputs	• 4x isolated 4 ... 20 mA, programmable • 2x 0 ... 10 V DC, programmable • 4x Digital Pulse outputs (2x open collector and 2x 0-5V TTL) One each for positive flow, one each for negative flow • Standard RS232 Serial Port or Optional RS485/422
Status/Alarm I/O	• Programmable, 4x Form C Relays • Clear Switch Input Totalizer Hold Switch Input
Calibrated accuracy	
Gas	
2-path	0.5 ... 1.0 % (4" ... 6" < 0.25 %)
3-path	< 0.5 %
4-path	< 0.2 %
Liquid	
2-path	0.5 ... 1.0 % (4" ... 6" < 0.25 %)
3-path	< 0.5 %
4-path	< 0.15 %
Repeatability	± 0.05 ... 0.1 %
Data refresh rate	5 Hz
Design	
Design Flow transmitter	
Dimensions	see SITRANS F US Clamp-on "System info and selection guide"
Weight	see diagrams
Power supply	
Power supply	90 ... 240 V AC, 50 … 60 Hz, 30 VA or 9 ... 36 V DC, 12 W
Indication and operation	
Data logger memory	1 MByte, programmable for all available data variables
Display	128 x 240 pixel LCD with backlight
Keypad	33 keypad buttons with tactile feedback
Language options	English, Spanish, German, Italian, French

Design Flow sensor	
Nominal pipe sizes	4" ... 24" (DN 100 ... DN 600)
Pipe material specification	API 5L ERW
Temperature tap	¾"
Pressure tap	¼"
Flange class	
• Liquid	150, 300, 600
• Gas	300, 600
Flange specification	• ASME B16.5 • Liquid 150, 300, 600 • Gas 300, 600
Flange facing	Raised face weld neck
Flange material	A105
Flow sensor paths	Two, three, or four
Sensor length	See diagram
Design temperature	-28 ... +93 °C (-20 ... +200 °F)
Exterior finish	Marine/offshore grade per ASTM B117
Optional pipe sections	• 10 D upstream (with optional flow conditioner) • 5 D downstream
Certificates and approvals	
Flow transmitter IP65 (NEMA 4X)	
FM and CSA	• Transmitter N-I Class I, Div 2 S Class II, Div 2 • Sensor I.S. Class I, II, Div 1
ATEX	Ex II (1) G [Ex ia] IIC EX II 3 (1) G Ex nC [ia] IIC T5
CE markings	EMC 2004/108/EC ATEX 94/9/EC
INMETRO (Brazil)	[BR-Ex ia] IIC BR-Ex nC [ia] IIC T5
IECEx	Pending
Flow Transmitter - IP66 (NEMA 7)	
FM and CSA	• Transmitter Ex Class I, Div 1 D-I Class II, Div 1 N-I Class I, Div 2 S Class II, Div 2 • Sensor I.S. Class I, II, Div 1
ATEX	Ex II (1) G [Ex ia] IIC Ex II 3 (1) G Ex nC [ia] IIC T5 Ex II 2 (1) G Ex d [ia IIC] IIB + H2 T5
CE markings	EMC 2004/108/EC ATEX 94/9/EC
INMETRO (Brazil)	[BR-Ex ia] IIC BR-Ex d [ia IIC] IIB T5
IECEx	Pending
Sensor	
FM and CSA	I.S. Class I, Div 1 N-I Class I, Div 2 S Class II, Div 2
ATEX	Ex II 1 G Ex ia IIC T5
CE markings	EMC 2004/108/EC PED 97/23/EEC ATEX 94/9/EC

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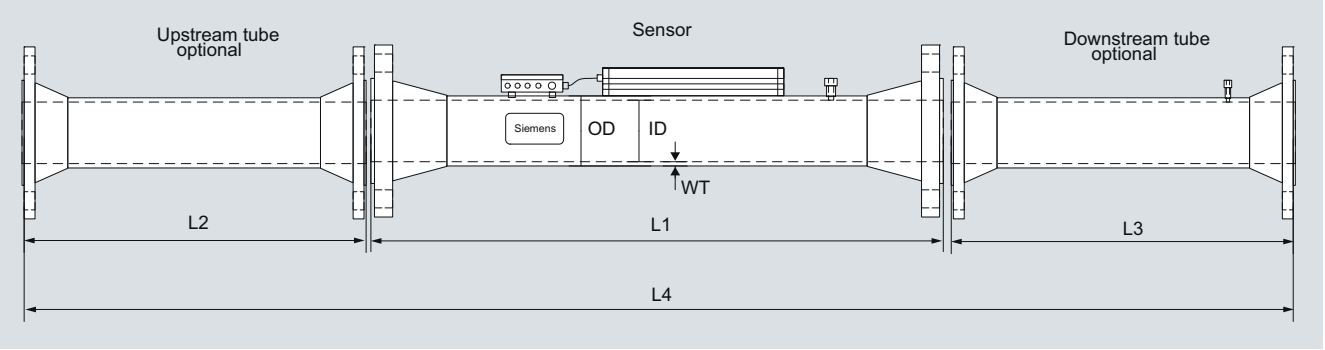
Dimensional drawings



Length																
Liquid Class 150		Nominal O.D.		Nominal I.D.		Max operating pressure (psi)		Mat. Grade	Length L1		Length L2		Length L3		Length L4	
mm	inch	mm	inch	mm	inch	bar	psi		mm	inch	mm	inch	mm	inch	mm	inch
101.6	4.0	114.3	4.5	102.3	4.026	19.7	285.0	B	1828.8	72.0	1023.6	40.3	510.5	20.1	3369.3	132.65
152.4	6.0	168.3	6.625	154.1	6.065	19.7	285.0	B	1828.8	72.0	1541.8	60.7	769.6	30.3	4146.6	163.25
203.2	8.0	219.1	8.625	202.7	7.981	19.7	285.0	B	1828.8	72.0	2026.9	79.8	1013.5	39.9	4875.5	191.95
254.0	10.0	273.1	10.75	254.5	10.02	19.7	285.0	B	2184.4	86.0	2545.1	100.2	1272.5	50.1	6008.4	236.55
304.8	12.0	323.9	12.75	304.8	12.0	19.7	285.0	B	2184.4	86.0	3048.0	120.0	1524.0	60.0	6762.8	266.25
406.4	16.0	406.4	16.0	387.4	15.25	19.7	285.0	B	2184.4	86.0	3873.5	152.5	1938.0	76.3	8002.3	315.05
457.2	18.0	457.2	18.0	438.2	17.25	19.7	285.0	B	2501.9	98.5	4381.5	172.5	2192.0	86.3	9081.8	357.55
508.0	20.0	508.0	20.0	489.0	19.25	19.7	285.0	B	2501.9	98.5	4889.5	192.5	2446.0	96.3	9843.8	387.55
609.6	24.0	609.6	24.0	590.6	23.25	19.7	285.0	B	2501.9	98.5	5905.5	232.5	2954.0	116.3	11367.8	447.55

Length																
Liquid Class 300		Nominal O.D.		Nominal I.D.		Max operating pressure (psi)		Mat. Grade	Length L1		Length L2		Length L3		Length L4	
mm	inch	mm	inch	mm	inch	bar	psi		mm	inch	mm	inch	mm	inch	mm	inch
101.6	4.0	114.3	4.5	102.3	4.026	51.0	740.0	B	1828.8	72.0	1023.6	40.3	510.5	20.1	3369.3	132.65
152.4	6.0	168.3	6.625	154.1	6.065	51.0	740.0	B	1828.8	72.0	1541.8	60.7	769.6	30.3	4146.6	163.25
203.2	8.0	219.1	8.625	202.7	7.981	51.0	740.0	B	1828.8	72.0	2026.9	79.8	1013.5	39.9	4875.5	191.95
254.0	10.0	273.1	10.75	254.5	10.020	51.0	740.0	B	2184.4	86.0	2544.1	100.2	1272.5	50.1	6008.4	236.55
304.8	12.0	323.9	12.75	304.8	12.0	51.0	740.0	B	2184.4	86.0	3048.0	120.0	1524.0	60.0	6762.8	266.25
406.4	16.0	406.4	16.0	381.0	15.0	51.0	740.0	B	2184.4	86.0	3810.0	150.0	1905.0	75.0	7905.8	311.25
457.2	18.0	457.2	18.0	428.7	16.876	51.0	740.0	B	2501.9	98.5	4287.5	168.8	2143.8	84.4	8939.5	351.95
508.0	20.0	508.0	20.0	477.9	18.814	51.0	740.0	X42	2501.9	98.5	4777.7	188.1	2390.1	94.1	9676.1	380.95
609.6	24.0	609.6	24.0	574.7	22.626	51.0	740.0	X42	2501.9	98.5	5748.0	226.3	2872.7	113.1	11129.0	438.15

Length																
Liquid Class 600		Nominal O.D.		Nominal I.D.		Max operating pressure (psi)		Mat. Grade	Length L1		Length L2		Length L3		Length L4	
mm	inch	mm	inch	mm	inch	bar	psi		mm	inch	mm	inch	mm	inch	mm	inch
101.6	4.0	114.3	4.5	102.3	4.026	96.6	1400.0	B	1828.8	72.0	1023.6	40.3	510.5	20.1	3369.3	132.65
152.4	6.0	168.3	6.625	154.1	6.065	81.0	1175.0	B	1828.8	72.0	1541.8	60.7	769.6	30.3	4146.6	163.25
203.2	8.0	219.1	8.625	193.7	7.625	102.1	1480.0	B	1828.8	72.0	1938.0	76.3	967.7	38.1	4740.9	186.65
254.0	10.0	273.1	10.75	247.7	9.75	82.8	1200.0	B	2184.4	86.0	2476.5	97.5	1239.5	48.8	5906.8	232.55
304.8	12.0	323.9	12.75	298.5	11.75	79.3	1150.0	B	2184.4	86.0	2984.5	117.5	1493.5	58.8	6668.8	262.55
406.4	16.0	406.4	16.0	373.1	14.688	82.8	1200.0	B	2184.4	86.0	3731.3	146.9	1864.4	73.4	7786.4	306.55
457.2	18.0	457.2	18.0	419.1	16.5	86.2	1250.0	B	2501.9	98.5	4191.0	165.0	2095.5	82.5	8794.8	346.25
508.0	20.0	508.0	20.0	466.8	18.376	82.8	1200.0	X42	2501.9	98.5	4668.5	183.8	2334.3	91.9	9511.0	374.45
609.6	24.0	609.6	24.0	560.4	22.064	77.6	1125.0	X42	2501.9	98.5	5603.2	220.6	2801.6	110.3	10913.1	429.65

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SITRANS FUT1010 (Liquid and Gas)

Length Gas Class 300		Nominal O.D.		Nominal I.D.		Max operating pressure (psi)		Mat. Grade	Length L1		Length L2		Length L3		Length L4	
mm	inch	mm	inch	mm	inch	bar	psi		mm	inch	mm	inch	mm	inch	mm	inch
101.6	4.0	114.3	4.5	102.3	4.026	51.0	740.0	B	1828.8	72.0	1023.6	40.3	510,5	20.1	3369.3	132.65
152.4	6.0	168.3	6.625	154.1	6.065	51.0	740.0	B	1828.8	72.0	1541.8	60.7	769.6	30.3	4146.6	163.25
203.2	8.0	219.1	8.625	202.7	7.981	51.0	740.0	X42	1828.8	72.0	2026.9	79.8	1013.5	39.9	4875.5	191.95
254.0	10.0	273.1	10.75	254.5	10.020	51.0	740.0	X42	1828.8	72.0	2545.1	100.2	1272.5	50.1	5652.8	222.55
304.8	12.0	323.9	12.75	303.2	11.938	51.0	740.0	X42	1828.8	72.0	3032.8	119.4	1516.4	59.7	6384.3	251.35
406.4	16.0	406.4	16.0	381.0	15.0	51.0	740.0	X42	1981.2	78.0	3810.0	150.0	1905.0	75.0	7702.6	303.25
457.2	18.0	457.2	18.0	428.7	16.876	51.0	740.0	X42	1981.2	78.0	4287.5	168.8	2143.8	84.4	8418.8	331.45
508.0	20.0	508.0	20.0	477.9	18.814	51.0	740.0	B	1981.2	78.0	4777.7	188.1	2390.1	94.1	9155.4	360.45
609.6	24.0	609.6	24.0	574.7	22.626	51.0	740.0	B	1981.2	78.0	5748.0	226.3	2872.7	113.1	10608.3	417.65

Length Gas Class 600		Nominal O.D.		Nominal I.D.		Max operating pressure (psi)		Mat. Grade	Length L1		Length L2		Length L3		Length L4	
mm	inch	mm	inch	mm	inch	bar	psi		mm	inch	mm	inch	mm	inch	mm	inch
101.6	4.0	114.3	4.5	102.3	4.026	102.1	1480.0	X42	1828.8	72.0	1023.6	40.3	510.5	20.1	3369.3	132.65
152.4	6.0	168.3	6.625	154.1	6.065	96.6	1400.0	X42	1828.8	72.0	1541.8	60.7	769.9	30.3	4146.6	163.25
203.2	8.0	219.1	8.625	202.7	7.981	87.9	1275.0	X42	1828.8	72.0	2026.9	79.8	1013.5	39.9	4875.5	191.95
254.0	10.0	273.1	10.75	247.7	9.75	102.1	1480.0	X42	1981.2	78.0	2476.5	97.5	1239.5	48.8	5703.6	224.55
304.8	12.0	323.9	12.75	298.5	11.75	94.8	1375.0	X42	1981.2	78.0	2984.5	117.5	1493.5	58.8	6465.6	254.55
406.4	16.0	406.4	16.0	381.0	15.0	75.9	1100.0	X42	1981.2	78.0	3810.0	150.0	1905.0	75.0	7702.6	303.25
457.2	18.0	457.2	18.0	428.7	16.876	75.9	1100.0	X42	1981.2	78.0	4287.5	168.8	2143.8	84.4	8418.8	331.45
508.0	20.0	508.0	20.0	477.9	18.814	75.9	1100.0	X42	1981.2	78.0	4777.7	188.1	2390.1	94.1	9155.4	360.45
609.6	24.0	609.6	24.0	574.7	22.626	72.4	1050.0	X42	1981.2	78.0	5748.0	226.3	2872.7	113.1	10608.3	417.65

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SITRANS FUT1010 Liquid sizing chart

Nominal diameter		Q_{min}	Q_{max}	Q_{min}	Q_{max}
mm	inch	[m^3/h]	[m^3/h]	[42 GAL BBL/h]	[42 GAL BBL/h]
100	4	14	360	85	2267
150	6	29	818	180	5146
200	8	46	1417	290	8910
250	10	67	2233	421	14045
300	12	80	3203	504	20143
400	16	103	5172	651	32532
450	18	116	6618	728	41625
500	20	124	8241	778	51836
600	24	150	12022	945	75617

SITRANS FUT1010 Gas sizing chart

	SITRANS FUT1010 maximum flow rate (MMSCFD) [Millions of standard cubic feet per day]							
	Meter size and maximum velocity							
	4"	6"	8"	10"	12"	16"	20"	24"
Pressure (psig)	135 ft/s	126 ft/s	117 ft/s	144 ft/s	126 ft/s	99 ft/s	81 ft/s	90 ft/s
100	8.2	17.3	27.9	54.1	67.1	83.3	107.1	174.9
200	15.5	32.9	52.9	102.7	127.6	158.2	203.4	332.3
300	23.1	49.0	78.7	152.8	189.8	235.4	302.6	494.5
400	30.9	65.5	105.3	204.4	253.9	315.0	404.8	661.5
500	39.0	82.6	132.8	257.6	320.0	396.9	510.1	833.6
600	47.3	100.1	161.0	312.4	388.0	481.2	618.5	1010.8
700	55.8	118.2	190.0	368.7	457.9	568.1	730.1	1193.1
800	64.6	136.8	219.8	426.6	529.9	657.3	844.8	1380.5
900	73.6	155.8	250.5	486.1	603.8	749.0	962.6	1573.1
1000	82.8	175.4	282.0	547.2	679.6	843.0	1083.5	1770.6
1100	92.3	195.4	314.1	609.6	757.1	939.2	1207.1	1972.7
1200	101.9	215.9	347.0	673.3	836.3	1037.4	1333.3	2178.9

	SITRANS FUT1010 maximum flow rate (MMSCFD) [Millions of standard cubic feet per day]							
	Meter size and maximum velocity			[Minimum flow rate above which 0.2 % accuracy can be maintained]				
	4"	6"	8"	10"	12"	16"	20"	24"
Pressure (psig)	1.55 ft/s	1.4 ft/s	1.3 ft/s	1.65 ft/s	1.35 ft/s	1.1 ft/s	0.85 ft/s	1 ft/s
100	0.1	0.2	0.3	0.6	0.7	0.9	1.1	1.9
200	0.2	0.4	0.6	1.2	1.4	1.8	2.1	3.7
300	0.3	0.5	0.9	1.8	2.0	2.6	3.2	5.5
400	0.4	0.7	1.2	2.3	2.7	3.5	4.2	7.4
500	0.4	0.9	1.5	3.0	3.4	4.4	5.4	9.3
600	0.5	1.1	1.8	3.6	4.2	5.3	6.5	11.2
700	0.6	1.3	2.1	4.2	4.9	6.3	7.7	13.3
800	0.7	1.5	2.4	4.9	5.7	7.3	8.9	15.3
900	0.8	1.7	2.8	5.6	6.5	8.3	10.1	17.5
1000	1.0	1.9	3.1	6.3	7.3	9.4	11.4	19.7
1100	1.1	2.2	3.5	7.0	8.1	10.4	12.7	21.9
1200	1.2	2.4	3.9	7.7	9.0	11.5	14.0	24.2

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SITRANS FUT1010 (Liquid and Gas)

	SITRANS FUT1010 Maximum Flow Rate (Nm^3/h x 1000) [Thousands of normal cubic meters per hour]							
	DIN meter size and maximum velocity							
	100 mm	150 mm	200 mm	250 mm	300 mm	400 mm	500 mm	600 mm
Pressure (barg)	41.1 m/s	38.4 m/s	35.6 m/s	43.9 m/s	38.4 m/s	30.1 m/s	24.6 m/s	27.4 m/s
10	13.5	28.7	46.1	89.5	111.2	137.9	177.2	289.6
20	26.4	55.9	89.9	174.5	216.7	268.8	345.5	564.6
30	39.8	84.4	135.6	263.2	326.9	405.5	521.2	851.8
40	53.9	114.1	183.4	355.8	441.9	548.2	704.6	1151.4
50	68.5	145.0	233.1	452.4	561.9	697.0	895.9	1464.0
60	83.7	177.2	284.9	552.9	686.7	851.9	1094.8	1789.2
70	99.5	210.7	338.7	657.2	816.3	1012.6	1301.5	2126.9
80	115.8	245.3	394.3	765.1	950.2	1178.7	1514.9	2475.8
90	132.6	280.8	451.4	875.9	1087.8	1349.4	1734.3	2834.3
100	149.7	317.1	509.7	989.1	1228.5	1523.9	1958.6	3200.8
110	167.1	353.8	568.8	1103.8	1370.9	1700.6	2185.7	3571.9
120	184.5	390.8	628.2	1218.9	1514.0	1878.0	2413.7	3944.5

	SITRANS FUT1010 Transition Flow Rate (Nm^3/h x 1000) [Thousands of normal cubic meters per hour]							
	DIN meter size and maximum velocity			Minimum flow rate above which 0.2 % accuracy can be maintained				
	100 mm	150 mm	200 mm	250 mm	300 mm	400 mm	500 mm	600 mm
Pressure (barg)	0.47 m/s	0.42 m/s	0.39 m/s	0.50 m/s	0.41 m/s	0.33 m/s	0.25 m/s	0.30 m/s
10	0.2	0.3	0.5	1.0	1.2	1.5	1.9	3.2
20	0.3	0.6	1.0	2.0	2.3	3.0	3.6	6.3
30	0.5	0.9	1.5	3.0	3.5	4.5	5.5	9.5
40	0.6	1.3	2.0	4.1	4.7	6.1	7.4	12.8
50	0.8	1.6	2.6	5.2	6.0	7.7	9.4	16.3
60	1.0	2.0	3.2	6.3	7.4	9.5	11.5	19.9
70	1.1	2.3	3.8	7.5	8.7	11.3	13.7	23.6
80	1.3	2.7	4.4	8.8	10.2	13.1	15.9	27.5
90	1.5	3.1	5.0	10.0	11.7	15.0	18.2	31.5
100	1.7	3.5	5.7	11.3	13.2	16.9	20.6	35.6
110	1.9	3.9	6.3	12.6	14.7	18.9	22.9	39.7
120	2.1	4.3	7.0	14.0	16.2	20.9	25.3	43.8

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Selection and Ordering data	Order No.	Order Code
SITRANS FUT1010 (Liquid)	K) **7ME362 -** **- 0**	
Transmitter type		
No Transmitter	**0**	
IP65 NEMA 4X (2 path)	**1**	
IP65 NEMA 4X (2 path) with MODBUS	**2**	
IP65 NEMA 4X (3 or 4 path)	**3**	
IP65 NEMA 4X (3 or 4 path) with MODBUS	**4**	
IP66 NEMA 7 wall mount/explosionproof (2 Path)	**5**	
P66 NEMA 7 wall mount/explosionproof (2 Path) with MODBUS	**6**	
P66 NEMA 7 wall mount/explosionproof (3 or 4 Path)	**7**	
P66 NEMA 7 wall mount/explosionproof (3 or 4 Path) Iwith MODBUS	**8**	
Input power		
90 ... 240 V AC	**1**	
9 ... 36 V DC	**2**	
Number of ultrasonic paths		
2 path	**B**	
3 path	**C**	
4 path	**D**	
Pipe size		
DN 100 (4") (Dual Path only)	**A**	
DN 150 (6")(Dual Path only)	**B**	
DN 200 (8")	**C**	
DN 250 (10")	**D**	
DN 300 (12")	**E**	
DN 400 (16")	**F**	
DN 450 (18")	**G**	
DN 500 (20")	**H**	
DN 600 (24")	**J**	
Flange rating		
Class 150 (Raised Face)	**0**	
Class 300 (Raised Face)	**1**	
Class 600 (Raised Face)	**2**	
Upstream/downstream meter run		
None	**0**	
10 pipe diameter upstream Tube only	**1**	
10 pipe diameter upstream Tube with flow conditioner	**2**	
5 pipe diameter downstream tube only	**3**	
10D up and 5D downstream tubes	**4**	
10D up and 5D downstream tubes with flow conditioner	**5**	
Liquid type range (select closest match)		
Water	**A**	
Multiple Crude Oils	**B**	
Light Crude only	**C**	
Heavy Crude only	**D**	
Multiple Finished Products	**E**	
Gasolines Only	**F**	
Kerosene	**G**	
Jet Fuel	**H**	
Diesel	**J**	
Multiple Fuel Oils	**K**	
Heavy Fuel Oils	**L**	
Liquified Gases	**M**	
Liquid temperature range		
-28 ... +65 °C (-20 ... +150 °F)	**A**	
1 ... 93 °C (30 ... 200 °F)	**B**	
Transmitter and sensor approval		
FM/CSA, CE	**1**	
ATEX and PED, CE, C-TICK	**2**	
INMETRO	**3**	

K) Subject to export regulations AL: N, ECCN: 5A991X.

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SITRANS FUT1010 (Liquid and Gas)

Selection and Ordering data	Order code
Further designs Please add "**-Z**" to Order No. and specify Order code(s).	
Cable assembly for flow sensor (add one K.. per flow path)	
• Cable and termination for one sensor path (see "Sensor cable chart for options")	**K..**
• Termination for user supplied cable	**T01**
Cable assembly for temperature sensor (only 1 required)	
• Cable and termination for temperature sensor (see "Transducer cable chart for options").	**R..**
• Termination for user supplied RTD cable	**T31**
Wet flow transfer calibration (priced for 1 pipe calibration) Requires completion of calibration form	
• 6 point for DN 100 (4 inch)	**D10**
• 6 point for DN 125 to DN 200 (5 to 8 inch)	**D11**
• 6 point for DN 250 to DN 300 (10 to 12 inch)	**D12**
• 6 point for DN 350 to DN 400 (14 to 16 inch)	**D13**
• 6 point for DN 450 to DN 500 (18 to 20 inch)	**D14**
• 6 point for DN 550 to DN 600 (22 to 24 inch)	**D15**
Tag name plate	
• Stainless steel tags with 3.2 mm (0.13 inch) character size (68 characters max.)	**Y19**

Selection and Ordering data	Order No.
Operating Instructions for SITRANS FUT1010 (Liquid)	
English NEMA 4X wall mount& NEMA 7 wall mount explosionproof	**A5E02639184**
German NEMA 4X wall mount & NEMA 7 wall mount explosionproof	**A5E03086468**

This device is shipped with a Quick Start Guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

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Selection and Ordering data	Order No.	Order Code
SITRANS FUT1010 (Gas)	K) **7ME363 - - 0**	
Transmitter type		
No meter	**0**	
IP65 NEMA 4X (2 path)	**1**	
IP65 NEMA 4X (2 path) with MODBUS	**2**	
IP65 NEMA 4X (3 or 4 path)	**3**	
IP65 NEMA 4X (3 or 4 path) with MODBUS	**4**	
IP66 NEMA 7 wall mount flame/explosion proof (2 Path)	**5**	
IP66 NEMA 7 wall mount flame/explosion proof (2 Path) with MODBUS	**6**	
IP66 NEMA 7 wall mount flame/explosion proof (3 or 4 Path)	**7**	
IP66 NEMA 7 wall mount flame/explosion proof (3 or 4 Path) with MODBUS	**8**	
Input power		
90 ... 240 V AC	**1**	
9 ... 36 V DC	**2**	
Number of ultrasonic paths		
2 path (standard enclosure material)	**B**	
3 path (standard material)	**C**	
4 path (standard material)	**D**	
Pipe size		
DN 100 (4") (Dual Path only)	**A**	
DN 150 (6")(Dual Path only)	**B**	
DN 200 (8")	**C**	
DN 250 (10")	**D**	
DN 300 (12")	**E**	
DN 400 (16")	**F**	
DN 450 (18")	**G**	
DN 500 (20")	**H**	
DN 600 (24")	**J**	
Flange rating		
Class 300 (Raised Face)	**1**	
Class 600 (Raised Face)	**2**	
Upstream/downstream meter run		
None	**0**	
10 pipe diameter upstream Tube only	**1**	
10 pipe diameter upstream Tube with flow conditioner	**2**	
5 pipe diameter downstream tube only	**3**	
10D up and 5D downstream tubes	**4**	
10D up and 5D downstream tubes with flow conditioner	**5**	
Gas type range (select closest match)		
Natural Gas (mostly CH_4)	**A**	
Process Gases (N_2, O_2, CO, Ar)	**B**	
Helium	**C**	
Hydrogen	**D**	
Gas temperature zange		
-28 ... +65 °C (-20 ... +150 °F)	**A**	
1 ... 93 °C (30 ... 200 °F)	**B**	
Transmitter and sensor approval		
FM/CSA, CE	**1**	
ATEX and PED, CE, C-TICK	**2**	
INMETRO	**3**	

K) Subject to export regulations AL: N, ECCN: 5A991X.

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SITRANS FUT1010 (Liquid and Gas)

Selection and Ordering data	Order code
Further designs Please add "**-Z**" to Order No. and specify Order code(s).	
Cable assembly for flow sensor (Add one K.. per flow path)	
• Cable and termination for one sensor path (see "Transducer cable chart for options")	**K..**
• Termination for user supplied cable	**T01**
Cable assembly for temperature sensor (only 1 required)	
• Cable and termination for temperature sensor (see "Transducer cable chart for options").	**R..**
• Termination for user supplied RTD cable	**T31**
Wet flow transfer calibration (priced for 1 pipe calibration) Requires completion of calibration form	
• 6 point for DN 100 (4 inch)	**D10**
• 6 point for DN 125 to DN 200 (5 to 8 inch)	**D11**
• 6 point for DN 250 to DN 300 (10 to 12 inch)	**D12**
• 6 point for DN 350 to DN 400 (14 to 16 inch)	**D13**
• 6 point for DN 450 to DN 500 (18 to 20 inch)	**D14**
• 6 point for DN 550 to DN 600 (22 to 24 inch)	**D15**
Tag name plate	
• Stainless steel tags with 3.2 mm (0.13 inch) character size (68 characters max.)	**Y19**

Selection and Ordering data	Order No.
Operating Instructions for SITRANS FUG1010	
English NEMA 4X wall mount & NEMA 7 wall mount explosionproof	**A5E02639185**
German NEMA 4X wall mount & NEMA 7 wall mount explosionproof	**A5E03086485**

This device is shipped with a Quick Start Guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

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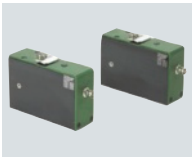
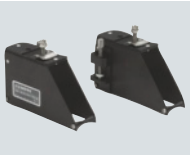
Accessories/Spare parts for clamp-on ultrasonic flowmeters

Description		Order No.	
Universal Portable Sensors Selected generally for portable systems where a wide variety of pipes are to be measured. Since they are selected based on diameter only, a wide range of pipe sizes and materials can be covered with a minimum number of sensors. These can also be selected as a cost savings on applications where standard accuracy is sufficient.	D)	**7ME3951-...**	
High Precision Sensors Selected generally for dedicated meters since the need to cover a range of pipes is not a requirement. They provide the highest accuracy achievable by the meters and therefore should be selected whenever higher accuracy/repeatability is required. They are only applicable to steel pipes but no other metals, and are selected solely by wall thickness.	D)	**7ME3950-...**	
High Temperature Sensors Are selected whenever pipe temperature will exceed 250 °F (120 °C) up to a maximum of 450 °F (232 °C). They are universal type and can therefore be used on any pipe material and are selected by pipe diameter.	D)	**7ME3950-...**	
Weld Seal Mount These provide the most secure and strongest mounting of the flow sensors. They are generally selected for "High End" meter types where maximum performance criteria applies. They accommodate high precision sensors designed to mount inside these enclosures. May be welded to the pipe if so desired by the customer. They come in 2-piece or 1-piece configurations depending upon the application pipe size and type (Liquid/Gas).	D)	**7ME3960-...**	
Mounting tracks Typically used on smaller pipes for easier and more stable mounting for dedicated universal style sensor size A or B, also available for dedicated high precision sensor size A or B.	D)	**7ME3960-...**	

Description		Order No.	
Mounting Frames These items are useful in simplifying sensor installation. They are strapped to the pipe first then the sensors are installed, making the installation less cumbersome and more precise. They also enable easy repeated mounting of the sensors assuring conformation to the original sensor positioning. They may be left in place at each measurement location where periodic flow surveys are conducted to simplify subsequent installations and ensure repeatable results.	D)	**7ME3960-...**	
Spacer Bars Sensors are required to be mounted at a set distance from each other as determined by pipe size and medium being measured. The spacer bar simplifies this requirement by eliminating the need to undertake a precise dimensional measurement. The flowmeter will specify a specific spacing index which is easily accommodated with the marked indices on the bar.	D)	**7ME3960-...**	
Clamp-On RTD's 1000 Ω platinum RTD's for use where temperature is required. Used with Energy Meters to record supply/return temperature. For this purpose precision matched pairs (to 0.02 °C) are supplied. Single RTD's are also used with SITRANS FUH and SITRANS FUG meters to enable live calculations of "Liquident" and Standard Volume Correction.	D)	**7ME3950-...**	
Insert RTD's Are identical to clamp-on RTD's as described above except that they are inserted into the pipe (In a Thermowell). They provide more precise and quicker responding temperature measurement. They are selected when precise temperature measurement of the actual liquid or gas is required as opposed to pipe "skin temperature". Since they project into the pipe they cannot be used in pipeline that undergo periodic "pigging".	D)	**7ME3950-...**	
Standard Cable (Flow Sensor or RTD) Selected for general purpose installations where no special application requirements exist.	D)	**7ME3960-...**	
Submersible Cable (Flow Sensor) Polyethylene jacketed, for locations that experience periodical or continual submersion of the flow sensors.	D)	**7ME3960-...**	

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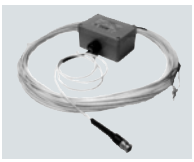
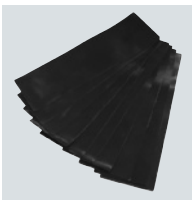
Accessories/Spare parts

Description		Order No.	
Plenum Cable (Flow Sensor or RTD) For temperatures above 180 °F. Teflon jacketed to withstand high temperatures, is used when high temp sensors are specified.	D)	**7ME3960-...**	
Armored Cable (Flow Sensor) Double shielded cable, selected when cable will not be installed in conduit between meter and sensors.	D)	**7ME3960-...**	
Temperature sensor cable Cable to connect field installed RTD to flow meter, available in Teflon wrapped, plenum or submersible grade. Typically used for SITRANS FUE, FUH and FUG series meters where a temperature sensor is employed.	D)	**7ME3960-...**	
Straps Used to fasten sensors or mounting frames to pipe for dedicated meter installations. Stainless steel construction for corrosion resistance.	D)	**7ME3960-...**	
Chains (EZ clamps) Used to fasten portable sensors or mounting frames to pipe. Thumbscrews eliminate need for hand tools when mounting sensors, and allow for easy on/off operations.	D)	**7ME3960-...**	
Ultrasonic Couplant Fills any voids between sensor emitting surface and pipe wall to allow maximum energy transfer between sensor and pipe. Several different types of couplants are employed as determined by the application conditions and type of installation (Temporary or permanent).	D)	**7ME3960-...**	
Dry Couplant The dry coupling pad is intended for use in any liquid, clamp-on transit time or Doppler applications that require a more durable coupling material. Installation is easy by simply placing one strip of material between sensor and pipe. Not intended for clamp-on gas where damping material is used. The temperature range is -34 to +200 °C (-30 to +392 °F).	D)	**7ME3960-...**	
Damping Material Used with gas meters, and required as part of their sensor installation. This material absorbs excess ultrasonic energy from the pipe wall to enable the meter to detect and operate with low amplitude sensor signals normally associated with Clamp-on Gas applications.	D)	**7ME3960-...**	

Description		Order No.	
Test Block Used for checking operation of a meter and sensors prior to a field installation, or as a troubleshooting tool. Selected by sensor size, each block accommodates 2 sensor sizes. Available only for universal sensors.	D)	**7ME3960-...**	
Termination Kit (Flow Sensor or RTD) Provides the connectors, labels and shrink tubing or other associated hardware to complete the termination of a specific cable type. These can be provided in cases where users will be purchasing bulk cable directly and cutting to length at their site, or when existing cable length is to be altered. Selected by cable type.	D)	**7ME3960-...**	

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Selection and Ordering data		Order No.
Spare parts (System)		
SITRANS F US clamp-on		**7ME3940-■■■■■**
Power supplies, batteries and chargers		
Power supply 90 ... 240 V AC		
• for IP65 (NEMA 4X) wall mount or IP66 (NEMA 7) wall mount explosionproof	D)	**0PA00**
• for IP65 (NEMA 7) compact explosionproof	D)	**2PA00**
Power supply 9 ... 36 V DC		
• for IP65 (NEMA 4X) wall mount or IP66 (NEMA7) wall mount explosionproof	K)	**0PB00**
• negative ground for NEMA 7 compact explosionproof	D)	**2PJ00**
• positive ground for NEMA 7 compact explosionproof	D)	**2PK00**
Portable meter batteries and accessories		
• Internal battery (Portable meters only)	D)	**3PP00**
IP67 Portable meter charger		
• Type A for Europe (CEE7/7)	D)	**3PC00**
• Type C for Australia (AS3112)	D)	**3PD00**
• Type D for UK (BS1363)	D)	**3PE00**
• Type J for Japan (JIS8303)	D)	**3PF00**
• Type K for US (NEMA 5-15P)	D)	**3PG00**
• Type L for Switzerland (SEV1011)	D)	**3PH00**
IP40 Portable meter charger		
• Type A for Europe (CEE7/7)	D)	**4PC00**
• Type C for Australia (AS3112)	D)	**4PD00**
• Type D for UK (BS1363)	D)	**4PE00**
• Type J for Japan (JIS8303)	D)	**4PF00**
• Type K for US (NEMA 5-15P)	D)	**4PG00**
• Type L for Switzerland (SEV1011)	D)	**4PH00**
MODBUS system computer modules		
MODBUS converter module	D)	**CQO-1015N-5M**
Mounting kit (type 1) for MODBUS converter module	D)	**CQO-1015N-5M-MK1**
Mounting kit (type 2) for MODBUS converter module	D)	**CQO-1015N-5M-MK2**
Mounting kit (type 3) for MODBUS converter module	D)	**CQO-1015N-5M-MK3**
Field configuration kit with manual, for MODBUS converter module	D)	**CQO-1015N-5M-FK1**
Pipe mounting brackets		
2 inch pipe mounting bracket for IP65 (NEMA 7) compact explosionproof	D)	**CQO-1012XMB-1**
2 inch pipe mounting bracket for IP65 (NEMA 4X) wall mount	D)	**CQO-1012NMB-1**

D) Subject to export regulations AL: N, ECCN: EAR99H.

K) Subject to export regulations AL: N, ECCN: 5A991X.

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Accessories/Spare parts

Selection and Ordering data		Order No.
Spare parts (Sensors)		
SITRANS F US clamp-on		
Meter type		
Dedicated (SITRANS FUS1010, FUG1010, FUH1010, FUE1010)	D)	7ME3950- ■■■■■
Portable (SITRANS FUP1010 or FUE1010)	D)	7ME3951-0■■■■
Approvals		
UL, ULc, CE (Portable only)		0
FM/CSA hazardous (classified) locations		1
ATEX Ex II 1G Ex ia IIC T5 (not for RTDs)		2
INMETRO (not for (RTDs)		3
Spare sensor code		
For liquid flow sensors pipe ranges please refer to sensor selection chart in the SITRANS FUS1010 section		
Liquid flow sensors for use with mounting frames or tracks (including portable)		
A2 universal		LB00
B3 universal		LC00
C3 universal		LD00
D3 universal		LE00
E2 universal		LF00
A1H (high precision)		LG00
A2H (high precision)		LH00
A3H (high precision)		LJ00
B1H (high precision)		LK00
B2H (high precision)		LL00
B3H (high precision)		LT00
C1H (high precision)		LM00
C2H (high precision)		LN00
D1H (high precision)		LP00
D2H (high precision)		LQ00
D3H (high precision)		LU00
D4H (high precision)		LR00
Doppler		LS00
High precision liquid sensor for weld seal enclosures		
C1H (high precision, weld seal)		SM00
C2H (high precision, weld seal)		SN00
D1H (high precision, weld seal)		SP00
D2H (high precision, weld seal)		SQ00
D3H (high precision, weld seal)		SU00
D4H (high precision, weld seal)		SR00

Selection and Ordering data		Order No.
Spare parts (Sensors)		
SITRANS F US clamp-on		
Meter type		
Dedicated (SITRANS FUS1010, FUG1010, FUH1010, FUE1010)	D)	7ME3950- ■■■■■
Portable (SITRANS FUP1010 or FUE1010)	D)	7ME3951-0■■■■
High temperature universal liquid sensors		
Note: not available with INMETRO approval		
High temp. sensor size 1 for up to 230 °C (12.7 to 100 mm diam.)		LA10
High temp. sensor size 2 for up to 230 °C (30 to 200 mm diam.)		LA20
High temp. sensor size 3 for up to 230 °C (150 to 600 diam.)		LA30
High temp. sensor size 4 for up to 230 °C (400 to 1200 diam.)		LA40
For gas flow sensors pipe ranges please refer to sensor selection chart in the SITRANS FUG1010 section		
High precision gas flow sensors for use with mounting frames or tracks		
B1H (high precision)		GK00
B2H (high precision)		GL00
B3H (high precision)		GT00
C1H (high precision)		GM00
C2H (high precision)		GN00
D1H (high precision)		GP00
D2H (high precision)		GQ00
D3H (high precision)		GU00
D4H (high precision)		GR00
High precision gas sensor for weld seal enclosures		
C1H (high precision, weld seal)		HM00
C2H (high precision, weld seal)		HN00
D1H (high precision, weld seal)		HP00
D2H (high precision, weld seal)		HQ00
D3H (high precision, weld seal)		HU00
D4H (high precision, weld seal)		HR00

D) Subject to export regulations AL: N, ECCN: EAR99H

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Selection and Ordering data		Order No.
Spare parts (Sensors)		
SITRANS F US clamp-on		
Meter type		
Dedicated (SITRANS FUS1010, FUG1010, FUH1010, FUE1010)	D)	**7ME3950-**■■■■■
Portable (SITRANS FUP1010 or FUE1010)	D)	**7ME3951-0**■■■■
Standard RTD sensors (not for energy systems)		
Standard clamp-on RTD		**1TA00**
Submersible clamp-on RTD (not for Portable)		**1TB00**
Insertion style RTD pair (size 1), 140 mm (5.5 inch)		**1TJ00**
Insertion style RTD pair (size 2), 216 mm (8.5 inch)		**1TJ01**
Insertion style RTD pair (size 3), 292 mm (11.5 inch)		**1TJ02**
Insertion style RTD pair (size 4), 368 mm (14.5 inch)		**1TJ03**
Standard for energy system (matched pair)		
Standard clamp-on RTD		**1TA10**
Insertion style RTD pair (size 1) for SITRANS FUE1010, 140 mm (5.5 inch)		**1TJ10**
Insertion style RTD pair (size 2) for SITRANS FUE1010, 216 mm (8.5 inch)		**1TJ11**
Insertion style RTD pair (size 3) for SITRANS FUE1010, 292 mm (11.5 inch)		**1TJ12**
Insertion style RTD pair (size 4) for SITRANS FUE1010, 368 mm (14.5 inch)		**1TJ13**

[1] Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-0MS40 (1012-BN-4)

D) Subject to export regulations AL: N, ECCN: EAR99H.

Selection and Ordering data		Order No.
Spare parts (Miscellaneous)		
SITRANS F US clamp-on	D)	**7ME3960-**■■■■■
Meter design		
IP65 (NEMA 4X) wall mount or IP66 (NEMA 7) wall mount explosionproof		**0**
IP65 (NEMA 7) compact		**2**
IP67 weatherproof portable		**3**
IP40 (NEMA 1) Portable		**4**
Dedicated sensor mounting hardware		
Sensor mounting tracks (aluminium with mounting straps) for pipes < 125 mm (5 inch)		
• Universal sensor size A or B		**0MA00**
• High precision sensor size A or B		**0MB00**
Sensor mounting frames for		
• Universal sensor size B (for pipes >125 mm (5 inch)	D)	**CQO-1012FN-PB**
• Universal sensor size C		**0MC00**
• Universal sensor size D		**0MC01**
• Universal sensor size E		**0MC02**
• High precision sensor size B (for pipes >125 mm (5 inch)	D)	**CQO-1012FNH-PB**
• High precision sensor size C		**0MD00**
• High precision sensor size D		**0MD01**
Mounting straps for mounting frames (slotted stainless steel)		
• For pipes from DN 50 to DN 150		**0SM00**
• For pipes from DN 50 to DN 300		**0SM10**
• For pipes from DN 300 to DN 600		**0SM20**
• For pipes from DN 600 to DN 1200		**0SM30**
• For pipes from DN 1200 to DN 1500		**0SM40**
• For pipes from DN 1500 to DN 2100		**0SM50**
• For pipes from DN 2100 to DN 3000		**0SM60**
Spacer bars (for indexing sensors on pipe)		
• Spacer bars for pipes to 200 mm/8 inch (liquid), 600 mm / 24 inch (gas)		**0MS10**
• Spacer bars for pipes to 500 mm/20 inch (liquid), DN 1200 / 48 inch (gas)		**0MS20**
• Spacer bars for pipes to 800 mm/32 inch (liquid)		**0MS30**
• Spacer bars for pipes to 1200 mm/48 inch (liquid) Only use in conjunction with 7ME3960-0MS30		**0MS40**
Weld seal mounting enclosures for liquid and gas sensors		
• Single enclosure for size C high precision		**0WS20**
• Single enclosure for size D high precision		**0WS30**
• Single enclosure for size E universal		**0WS40**
• Dual enclosure for size C high precision		**0WD20**
• Dual enclosure for size D high precision		**0WD30**
• Dual enclosure for size E universal		**0WD40**

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Accessories/Spare parts

Selection and Ordering data		Order No.
Spare parts (Miscellaneous)		
SITRANS F US clamp-on	D)	**7ME3960-** ■■■■■
Stainless steel straps for weld seal enclosure mounting		
• Mounting strap for pipe diameter to 300 mm (13 inch)		**0SM01**
• Mounting strap for pipe diameter to 600 mm (24 inch)		**0SM11**
• Mounting strap for pipe diameter to 1200 mm (48 inch)		**0SM21**
• Mounting strap for pipe diameter to 1500 mm (60 inch)		**0SM31**
• Mounting strap for pipe diameter to 2130 mm (84 inch)		**0SM41**
• Mounting strap for pipe diameter to 3050 mm (120 inch)		**0SM51**
Stainless mounting tracks for high temp 991 sensors		
• Size 1 high temp sensor pair	D)	**CQO-992MTNHMSH-1**
• Size 2 high temp sensor pair	D)	**CQO-992MTNHMSH-2**
• Size 3 high temp sensor pair	D)	**CQO-992MTNHMSH-3**
• Size 4 high temp sensor pair	D)	**CQO-992MTNHMSH-4**
Clamp-on RTD mounting hardware for dedicated systems		
• RTD mounting hardware for dedicated system: 152 to 610 mm (6 to 24 inch)		**0MR00**
• RTD mounting hardware for dedicated system: 12.7 to 50.8 mm (0.5 to 2 inch)		**0MR01**
• RTD mounting hardware for dedicated system: 31.8 to 203.2 mm (1.25 to 8 inch)		**0MR02**
• RTD mounting hardware for dedicated system: 508 to 1219 mm (20 to 48 inch)		**0MR04**
• Junction box for clamp on RTD's	D)	**CQO-992ECJ**
Portable sensor mounting hardware		
Sensor mounting tracks for portable sensors (aluminum with mounting chains) for pipes < 125 mm (5 inch) for		
• Universal sensor size A or B		**3MA00**
• High precision sensor size A or B		**3MB00**
Sensor mounting frames		
• Universal sensor size B (for pipes >125 mm (5 inch)	D)	**CQO-1012FP-PB**
• Universal sensor size C		**3MC00**
• Universal sensor size D		**3MC01**
• Universal sensor size E		**3MC02**
• High precision sensor size B (for pipes > 125 mm (5 inch)	D)	**CQO-1012FPH-PB**
• High precision sensor size C		**3MD00**
• High precision sensor size D		**3MD01**
Spacer bar (for indexing portable sensors		**3MS00**
Mounting chain and EZ clamp hardware		
• EZ clamp hardware set for DN 25 to DN 600 (1 to 24 inch); handles all transducers except "D" size HP and "E" size univ.	D)	**CQO-1012Z-1**
• EZ clamp hardware set for DN 25 to DN 600 (1 to 24 inch) for "D" size HP and "E" size universal	D)	**CQO-1012Z-2**
• Mounting chain for portable sensors: 4 x 760 mm lengths		**3CM10**
• Mounting chain for portable sensors: 2 x 760 mm and 2 x 1500 mm lengths		**3CM20**

Selection and Ordering data		Order No.
Spare parts (Miscellaneous)		
SITRANS F US clamp-on	D)	**7ME3960-** ■■■■■
RTD mounting hardware for portable system		**3MR00**
Sensor connector adaptors		
• "F" connector to BNC adapter (order 2 per sensor set)	D)	**CQO-1012NFPA**
SITRANS FST020 Sensor trackmounts		
• Single enclosure mounting track for "A" size Xdcr pair, Reflect	D)	**CQO-1022A1R**
• Single enclosure mounting track for "B" size Xdcr pair, Reflect	D)	**CQO-1022B1R**
• Dual enclosure mounting track for "B" size Xdcr pair, Reflect/Direct	D)	**CQO-1022B2R**
• Single enclosure mounting track for "C" size Xdcr pair, Reflect	D)	**CQO-1022C1R**
• Dual enclosure mounting track for "C" size Xdcr pair, Reflect/Direct	D)	**CQO-1022C2R**
• Dual enclosure mounting track for "D" size Xdcr pair, Reflect/Direct	D)	**CQO-1022D2R**

D) Subject to export regulations AL: N, ECCN: EAR99H.

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Selection and Ordering data		Order No.
Spare parts (Miscellaneous)		
SITRANS F US clamp-on	D)	**7ME3960-** ■■■■■
Insert RTD Thermowells		
• Thermowell std. duty uninsulated pipe 140 mm (5.5 inch)	D)	**CQO-1012TW-1**
• Thermowell std. duty uninsulated pipe 216 mm (8.5 inch)	D)	**CQO-1012TW-2**
• Thermowell std. duty uninsulated pipe 292 mm (11.5 inch)	D)	**CQO-1012TW-3**
• Thermowell std. duty with lagging 140 mm (5.5 inch)	D)	**CQO-1012TW-1L**
• Thermowell std. duty with lagging 216 mm (8.5 inch)	D)	**CQO-1012TW-2L**
• Thermowell std. duty with lagging 292 mm (11.5 inch)	D)	**CQO-1012TW-3L**
Sensor cables for (Use "Sensor cable selection chart" to complete Order No. with ##)		
• IP65 (NEMA 4X) wall mount or IP 66 (NEMA 7) wall mount explosionproof		**0CK##**
• IP65 (NEMA 7) compact explosionproof		**2CK##**
• IP67 Weatherproof portable		**3CK##**
• IP40 (NEMA 1) Portable		**4CK##**
RTD cables for (Use "Sensor cable selection chart" to complete Order No. with ##)		
• All dedicated systems		**0CR##**
• IP67 Weatherproof portable		**3CR##**
• IP40 (NEMA 1) Portable		**4CR##**
Dedicated cable termination kits		
• Standard, plenum and armored sensor cable (NEMA 4X wall mount and NEMA 7 wall mount explosionproof)		**0CT01**
• Submersible sensor cable (NEMA 4X wall mount and NEMA 7 wall mount explosionproof)		**0CT11**
• Standard and plenum sensor cable (SITRANS FST020)		**1CT01**
• Standard, plenum and armored sensor cable (NEMA 7 compact explosionproof)		**2CT01**
• Submersible sensor cable (NEMA 7 compact explosionproof)		**2CT11**
• Clamp-on RTD cable termination kit for standard RTD		**0CT21**
• Clamp-on RTD cable termination kit for submersible RTD		**0CT31**
• Insert RTD cable termination kit		**0CT41**

Selection and Ordering data		Order No.
Spare parts (Miscellaneous)		
SITRANS F US clamp-on	D)	**7ME3960-** ■■■■■
Ultrasonic couplants		
• Temporary water based for portable systems: 350 ml (12 oz): -34 ... +38 °C (-30 ... +100 °F)		**0UC10**
• Permanent synthetic polymer based: 90 ml (3 oz) -40 ... +190 °C (-40 ... +375 °F)		**0UC20**
• Permanent high temp fluoroether: 12 ml (0.4 oz): -40 ... +230 °C (-40 ... +450 °F)		**0UC30**
• Permanent high temp fluoroether: 163 ml (5.5 oz): -40 ... +230 °C (-40 ... +450 °F)		**0UC50**
• Permanent vulcanizing silicone rubber couplant: 90 ml (3 oz): -40 …+120 °C (-40 …+250 °F)	D)	**CQO-CC112**
• Permanent high temp silicone grease: 12 ml (0.4 oz): -40 ... +230 °C (-40 ... +450 °F)	D)	**CQO-CC117**
• Permanent high temp silicone grease: 150 ml (5 oz): -40 ... +230 °C (-40 ... +450 °F)	D)	**CQO-CC117A**
• Couplant for submersible sensor applications	D)	**CQO-CC120**
• Dry coupling pads (qty of 10): -34 to +200 °C (-30 to +392 °F)		**0UC40**
Pipe damping films for SITRANS FUG gas systems		
• B1, B2, B3, C1 and C2 sensors		**0DM10**
• D1 and D3 sensors		**0DM20**
• D2 sensor		**0DM30**
• D4 sensor		**0DM40**
Serial RS232 Cables and I/O Adapters		
• RS232 Cable for all dedicated meters		**0CS00**
• RS232 Cable for IP66 weatherproof portable meter		**3CS00**
• RS232 Cable for IP40 Portable meter		**4CS00**
• I/O adapter for IP66 Weatherproof portable meter		**3AD00**
Universal Sensor Test Blocks		
• Test block for size A and B universal sensors		**0TB10**
• Test block for size C and D universal sensors		**0TB20**
Field Manuals		
• CD with documentation for SITRANS F US Clamp-on ultrasonic flowmeters (English)	D)	**A5E02830664-03**

D) Subject to export regulations AL: N, ECCN: EAR99H.

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Accessories/Spare parts

Sensor cable selection chart (Dedicated, pair)

Sensor cable codes for length and type options				
Cable length m (ft)	Standard -40…+80 °C (-40…+176 °F)	Submersible -40…+80 °C (-40…+176 °F)	Plenum -40…+200 °C (-40…+392 °F)	Armored -40…+80 °C (-40…+176 °F)
	Order code			
6 (20)	**K01**	**K11**	**K21**	**K31**
15 (50)	**K02**	**K12**	**K22**	**K32**
30 (100)	**K03**	**K13**	**K23**	**K33**
46 (150)	**K04**	**K14**	**K24**	**K34**
61 (200)	**K05**	**K15**	**K25**	**K35**
91 (300)	**K06**	**K16**	**K26**	**K36**

Sensor cable selection chart (SITRANS FUP1010, FUE1010 Portable, pair)

Sensor cable codes for length and type options		
Cable length m (ft)	Standard -40 ... + 80 °C (-40 ... +176 °F)	Plenum -40 ... + 200 °C (-40 ... +392 °F)
	Order Code	
6 (20)	**K01**	**K21**
15 (50)	**K02**	**K22**
30 (100)	**K03**	**K23**

RTD cable selection chart (Dedicated, each)

RTD cable codes for length and type				
Cable length m (ft)	Standard -40 … +200 °C (-40 … +392 °F)	Submersible -40 … +200 °C (-40 … +392 °F)	for insert RTD -40 ... +200 °C (-40 ... 392 °F)	for submersible insert RTD -40 ... +200 °C (-40 ... 392 °F)
	Order code			
6 (20)	**R01**	**R11**	**R21**	**R31**
15 (50)	**R02**	**R12**	**R22**	**R32**
30 (100)	**R03**	**R13**	**R23**	**R33**
46 (150)	**R04**	**R14**	**R24**	**R34**
61 (200)	**R05**	**R15**	**R25**	**R35**
91 (300)	**R06**	**R16**	**R26**	**R36**

RTD cable selection chart (SITRANS FUP1010, FUE1010 Portable, each)

RTD cable codes for length and type options	
Cable length m (ft)	IP67 -40 ... + 200 °C (-40 ... +392 °F)
	Order Code
6 (20)	**R11**
15 (50)	**R12**
30 (100)	**R13**

Accessories - Standard MLFB offering

Description		Order No.
Insert RTD size 1	D)	**7ME3950-1TJ10**
Thermowell size 1 w/lagging	D)	**CQO:1012TW-1L**
EZ Clamp 1 ... 24 inch	D)	**CQO:1012Z-1**
Junction Box for Clamp RTD	D)	**CQO:992ECJ**
Term kit standard, Plenum, Armored sensor cable	D)	**7ME3960-0CT01**
Term kit Submersible sensor cable	D)	**7ME3960-0CT11**
C1 Weld seal	D)	**7ME3960-0WS20**
D1 Weld Seal	D)	**7ME3960-0WS30**
C2 Weld Seal	D)	**7ME3960-0WD20**
D2 Weld Seal	D)	**7ME3960-0WD30**
Straps size 2	D)	**7ME3960-0SM11**
Straps size 3	D)	**7ME3960-0SM21**
Straps size 4	D)	**7ME3960-0SM31**
Weld seal sensors C2 FM	D)	**7ME3950-1SN00**
Weld seal sensors D1 FM	D)	**7ME3950-1SP00**
Weld seal sensors D2 FM	D)	**7ME3950-1SQ00**
Weld seal sensors D4 FM	D)	**7ME3950-1SR00**
Weld seal sensors C2 ATEX	D)	**7ME3950-2SN00**
Weld seal sensors D1 ATEX	D)	**7ME3950-2SP00**
Weld seal sensors D2 ATEX	D)	**7ME3950-2SQ00**
Weld seal sensors D4 ATEX	D)	**7ME3950-2SR00**
Weld seal sensors Gas C2 FM	D)	**7ME3950-1HN00**
Weld seal sensors Gas D1 FM	D)	**7ME3950-1HP00**
Weld seal sensors Gas D2 FM	D)	**7ME3950-1HQ00**
Weld seal sensors Gas D4 FM	D)	**7ME3950-1HR00**
Weld seal sensors Gas C2 ATEX	D)	**7ME3950-2HN00**
Weld seal sensors Gas D1 ATEX	D)	**7ME3950-2HP00**
Weld seal sensors Gas D2 ATEX	D)	**7ME3950-2HQ00**
Weld seal sensors Gas D4 ATEX	D)	**7ME3950-2HR00**

Standard MLFB product offering represents 4 to 6 weeks delivery time.

D) Subject to export regulations AL: N, ECCN: EAR99H.

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Overview

The OCM III is a high accuracy ultrasonic flow monitor for open channels.

Benefits

- Influent and effluent monitor
- BS 3680 calculations provide exceptional accuracy in measuring flow
- 1 to 24 months data log, subject to logging rate
- RS-232 serial communication
- High accuracy on unique or non-standard weirs and flumes
- AC and DC operation. Automatically switches to battery operation for uninterrupted power
- Dual power input
- Low power remote monitoring
- Flow Reporter software available for remote monitoring, configuration and data retrieval

Application

In addition to monitoring flowrate in sewage works, OCM III can monitor industrial discharge, rainfall/storm water studies, inflow/infiltration studies and sewer system evaluations. As well as being compatible with many standard weirs and flumes, the programmable head versus flow curve (up to 16 points) accurately defines flow rate on unique or non-standard weirs and flumes.

The OCM III has data logging and is adjustable from once per minute to once a day. It records the average flow rate for that time period. Daily, it records minimum/maximum of temperature and flow rates, and the time they occurred, as well as the daily total. Advanced functions include variable rate logging. It can be pre-programmed to log at a higher rate when needed. Under steady conditions, the OCM III automatically logs less frequently to conserve data log space.

The OCM III has two-way communication via RS-232 with a modem or a bi-polar current loop with a current-to-voltage communication converter. Data logs can be downloaded to a file that can be manipulated into a spreadsheet or ASCII format.

Technical specifications

Mode of Operation	
Measuring range[1)]	0.3 ... 1.2 m (1 ... 4 ft) or 0.6 ... 3 m (2 ... 10 ft)
Output	
Transducer	Echomax XRS-5, 44 kHz
Relays	3 alarm/control relays, 1 SPDT Form C contact per relay, rated 5 A at 250 V AC non-inductive or 30 V DC
mA output	0/4 ... 20 mA, isolated
• Max. load	1 KΩ max. load
• Resolution	5 uA
• Isolation	300 V AC continuous
• DC output	+24 V DC, 20 mA average to 200 mA at 1/10 duty cycle max. 0 ... 20
Accuracy	
Error in measurement	± 1 mm/m, calculated error less than 0.02 %
Resolution	0.2 mm (0.007")
Rated operating conditions	
Installation conditions	
• Location	Indoor/outdoor
• Installation category	II
• Pollution degree	4
Ambient conditions	
• Ambient temperature (enclosure)	-20 ... +50 °C (-5 ... +122 °F)
Design	
Weight	2.3 kg (5.1 lbs)
Material (enclosure)	Polycarbonate
Degree of protection (enclosure)	IP65/Type 4X/NEMA 4X
Cable	
• Transducer and mA output signal	• Transducer: co-axial to be RG62-A/U low capacity • mA output signal to be 2 copper conductors, twisted, with foil shield/drain wire, 300 V 0.5 ... 0.75 mm² (22 ... 18 AWG) • Relay/power to be copper conductors per local requirements to meet 250 V 5 A contact rating
Max. separation between transducer and transceiver	183 m (600 ft)
Displays and controls	LCD 5 x 7 dot matrix display with 2 lines of 40 characters each
Programming	Via removable programmer and communication link
Memory	3 V battery (NEDA 5003LC or equivalent), operating life 1 year, SuperCap capacitor for back-up during battery replacement
Power supply	
AC version	100/115/200/230 V AC ± 15 %, 50/60 Hz, 20 VA max.
DC version	9 ... 30 V DC, 8 W max.

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OCM III

Certificates and approvals	CE, FM, $CSA_{US/C}$, MCERTS, C-TICK[2)]
Communication	RS-232 or ± 20 mA bipolar current loop, 300, 600, 1200, 2400, 4800, 9600, 19200 baud
Options	
Temperature sensor	TS-2
Remote monitoring	Flow Reporter, a Windows-based configuration software and data extractor
Velocity sensor	Consult with factory

1) Program range is defined as the empty distance to the face of the transducer plus any range extension

2) EMC performance available upon request
Windows is a registered trademark of Microsoft Corporation

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Selection and Ordering data		Order No.
OCM III High accuracy ultrasonic flow monitor for open channels.	C)	**7ML1002-■A■0■**
Input voltage		
AC, voltage selector switch		**0**
Enclosure		
Wall mount, standard enclosure		**A**
Wall mount, 6 entries, M20 holes[1)]		**B**
Approvals		
$CSA_{US/C}$, FM, CE (EN61326), C-TICK		**5**
CE[2)]		**6**

1) Available with approval option 6 only

2) Available with enclosure option B only

C) Subject to export regulations AL: N, ECCN: EAR99.

Selection and Ordering data		Order No.
Operating Instructions		
English	C)	**7ML1998-5AB01**
French	C)	**7ML1998-1AB11**
Spanish	C)	**7ML1998-1AB21**
German	C)	**7ML1998-1AB31**
Note: The Operating Instructions should be ordered as a separate line item on the order.		
This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.		
Required equipment		
TS-2 Temperature Sensor	C)	**7ML1812-1AA1**
TS-2, 1 m cable	C)	**7ML1812-2AA1**
TS-2, 5 m cable	C)	**7ML1812-3AA1**
TS-2, 10 m cable	C)	**7ML1812-4AA1**
TS-2, 30 m cable	C)	**7ML1812-5AA1**
TS-2, 50 m cable	C)	**7ML1812-6AA1**
TS-2, 70 m cable	C)	**7ML1812-7AA1**
TS-2, 90 m cable	C)	**7ML1998-5EW01**
TS-2 Operating Instructions Note: The TS-2 Operating Instructions should be ordered as a separate line item on the order.	C)	**7ML1812-1AA1**
Accessories		
Handheld programmer		**7ML1830-2AA**
Tag, stainless steel, 12 x 45 mm (0.47 x 1.77"), one text line, suitable for enclosure		**7ML1930-1AC**
M20 cable gland kit (6 M20 cable glands, 6 M20 nuts, 3 stop plugs)		**7ML1830-1GM**
Flow Reporter software license	B)	**7ML1930-1AK**
Flow Reporter Kit (includes disk, authorization code and cable)	B)	**7ML1930-1AL**
Spare parts		
Card, Mother, main	C)	**7ML1830-1MG**
Card, daughter/display	C)	**7ML1830-1LT**
Card, LCD		**7ML1830-1KY**
Eprom	C)	**7ML1830-1KW**
Battery	C)	**7ML1830-1JV**
OCM III Lid overlay		**7ML1830-1KV**

B) Subject to export regulations AL: N, ECCN: EAR99S.

C) Subject to export regulations AL: N, ECCN: EAR99.

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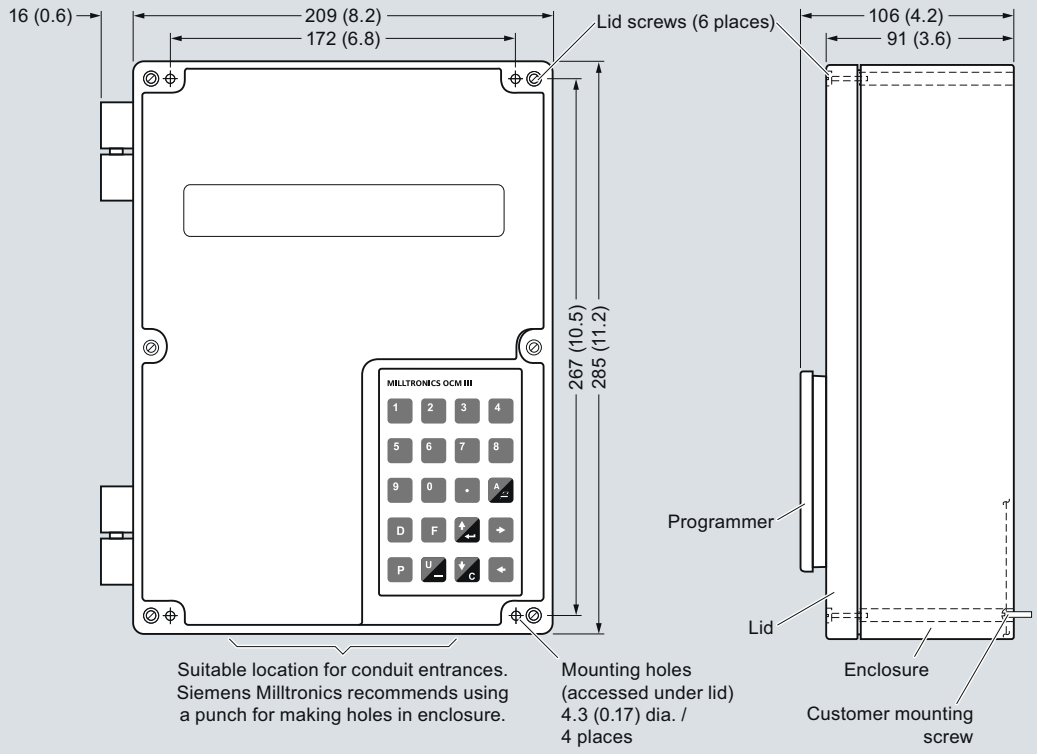
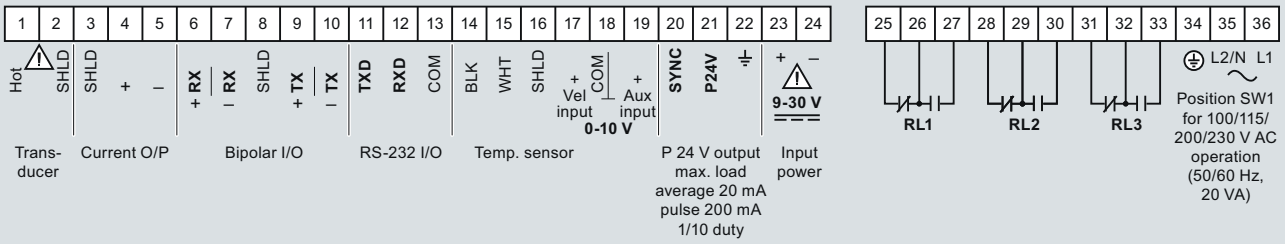
Dimensional drawings



OCM III dimensions

Schematics



Notes:

1. Use RG62-A/U coaxial (or equivalent) for extensions up to 183 m (600 ft). Run in grounded metal conduit, separate from other wiring.
2. Each relay has 1 set of form 'C' (SPDT) contacts, relay rated at 5 A, 250 V AC, non-inductive, when equal or lower rated limiting fuses are installed. Relay de-energized when in alarm conditions and energized for pump control.

OCM III connections

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SITRANS FX300

Overview

SITRANS F X vortex flowmeters provide accurate volumetric and mass flow measurement of steam, gases and liquids as an all-in-one solution with integrated temperature and pressure compensation.

Benefits

- All devices have 2-wire technology and HART communication
- Temperature compensation for saturated steam as standard feature
- Integrated temperature and pressure measurement enabling direct compensation of density
- Pressure, temperature and flow can be read at a single point. No additional installation of pressure and temperature sensors
- Direct measurement of energy or energy consumption
- Optimum process reliability thanks to Intelligent Signal Processing (ISP) - stable readings, free of external perturbations
- Fully welded stainless steel construction with high corrosion, pressure and temperature resistance
- Maintenance-free sensor design
- Ready to use due to plug & play feature. No additional cabling work
- Minimal pressure drop
- Compact or remote design
- Pressure and temperature compensation for fluctuating volume flows
- Measurement of comsumption in compressed air systems
- No risk of deposits or damage (sensor in the turbulent area)
- All units parameterized prior to delivery

Application

The SITRANS FX300 is a flowmeter in a single or dual transmitter version, suitable for measuring industrial steam,
gases, as well as conductive and non-conductive liquids. E.g. steam (saturated steam, superheated steam), industrial gases (compressed air, nitrogen, liquefied gases, flue gases), and conductive and non-conductive liquids (demineralized water, boiler feed water, solvents, heat transfer oil).

Design

The unit is available in a compact or a remote version with up to 30 meter distance from flowmeter to transmitter. When ordering a remote version the transducer cables are pre-mounted and ready for installation.

The main applications of SITRANS FX300 can be found in the following sectors:

- Chemical
- Petrochemical
- Oil & Gas
- Power plants
  - Air
  - Heating
  - Cooling
  - Chilling
- Food & beverage
  - Pharmaceutical
  - Sugar refineries
  - Dairies
  - Breweries
  - Production of soft drinks
- Refining
- Water & waste water

System Overview

Version	Single transmitter			Dual transmitter
Options	Standard	Pressure sensor	Pressure sensor and isolation valve	Standard
Flange				
Sandwich				

Function

Operating Principle

SITRANS F X vortex flowmeters measure flow rate by detecting the frequency at which alternating vortices are shed from a bluff body inserted into the flow stream. This principle of measurement is known as Von Karman's vortex street principle: alternating vortices form behind an object in a stream. The frequency of the alternating vortices is proportional to the flow rate.
The passage of a vortex causes a slight stress on a pick-up placed downstream of the bluff body. The stress is picked up and counted as pressure surges by a dual Piezo crystal placed inside the wing.

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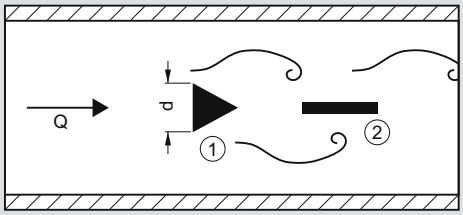

① = Bluff Body, ② = Pick-up

The flowmeter calculates the flow velocity using the following equation:

$Q = A \cdot V = A \cdot d / St \cdot f = 101{,}93 \cdot f / K$ [m^3/h]

Where:

Q = flow rate [m^3/h]
f = vortex shedding frequency [Hz]
K = calibration constant [pulses/m^3]
d = width of the bluff body [m]
St = Strouhal Number
A = cross-section area [m^2]
V = flow velocity [m/s]

Requirements

In order to generate the vortex streets, the medium must have a minimum velocity:

- For steam and gases, the flow velocity must be 2 to 80 m/s (6.6 to 262 ft/s)
- For liquids the flow velocity must be 0.4 to 10 m/s (1.3 to 32.8 ft/s)

Design

SITRANS FX300 volumetric and mass flowmeter is available in the following configurations:

SITRANS FX300 Single transmitter

The single transmitter is available as a flange or sandwich solution in the following versions:

- Vortex standard flowmeter
  Measurement with integrated temperature sensor as standard feature
- Vortex flowmeter with pressure sensor
  Measurement with integrated temperature and pressure sensors for compensation of gases, wet gases, gas mixtures or steam (for engergy measurement).
- Vortex flowmeter with pressure sensor and isolation valve
  Allowing the pressure sensor to be shut off for the purpose of pressure or leak testing of the pipeline or for being exchanged without interrupting the process. Using the built-in two-way valve, the pressure sensor can also be calibrated and tested at a later time.

SITRANS FX300 Dual transmitter

This is a genuine redundant system with two independent sensors and two converters providing twofold functional reliability and availability of the measurement. This variant is optimally suited for measurements in multi-product pipelines.

The dual converter is available as:

- Vortex standard flowmeter
  Measurement with temperature sensor for saturated steam compensation as standard feature

Technical specifications

Input	
Measuring range limits	See „Dimensional Drawings“
Media pressure	1 ... 100 bar (14.5 ... 1450 psi) (Higher pressures on request)
Output	
Current output	
• Measuring range	4 … 20 mA
• Over range	20.8 mA ± 1 % (105 % ± 1 %)
• Load	
- min.	100 Ω
- max.	$R_{max} = (U_{Power\ Supply} - 14\ V)/22\ mA$
• Error signal	NAMUR NE 43
• Maximum output	22 mA (112.5 %)
• Multidrop mode	4 mA
Digital output	
• Communication	HART
• Physical layer	FSK
• Device category	Transmitter
Pulse output	
(Passive pulse output, needs separate power supply. Pulse output has to be defined in the Option menu Y47 totalizer or energy unit has to be entered. E.g.: 1 pulse/kg or 1 pulse/10 m^3)	
• Pulse frequency	Max. 0.5 Hz
• Power supply	Min. 24 V DC as NAMUR or
• Non-Ex version	open < 1 mA, max. 36 V, closed 100 mA, U < 2 V
• Ex version	open < 1 mA, max. 30 V, closed 100 mA, U < 2 V
Accuracy	
Standard version	
• For liquids	
- Re ≥ 20 000	± 0.75 %
• For steam and gases	
- Re ≥ 20 000	± 1 %
• For steam, gases and liquids	
- 10 000 < Re < 20 000	± 2 %
Pressure and temperature-compensated version	
• For liquids	
- 10 000 < Re < 20 000	± 2 %
- Re ≥ 20 000	± 0.75 %
• For gases and steam	
- 10 000 < Re < 20 000	± 2.5 %
- Re ≥ 20 000	± 1.5 %
Repeatability	± 0,1 %
Installation conditions	
(At different conditions, e.g. installation after control valve, bends or reductions, please refer to the operating instructions.)	
• Inlet run	≥ 20 x DN
• Outlet run	≥ 5 x DN

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SITRANS FX300

Software	
Uncompensated for gases, steam and liquids, but temperature-compensated for saturated steam	Order option 1
Density-compensated by temperature and pressure for superheated steam, no energy calculation	Order option 4
Gross heat When the device has to operate as a energy calculation device	Order option 5
In options Y51 to Y56 add information regarding:	• Y51 Variable current output • Y52 Power unit Select one of the following units from power units table in Y52: kJ/h, MJ/h, GJ/h, Btu/h, kcal/h, kW, MW or special (custom) • Y53 Fullscale power value • Y54 Variable pulse output • Y55 Totalizer on/off • Y56 Configures for totalizer select one of the following units from energy units table in Y56: kJ, MJ, GJ, Btu th, kcal, kWh, MWh or special (custom).
Gases and wet gases	Order option 7
Wet gases	Select Y49 and enter relative humidity in %
FAD - Free Air Delivery When the device has to operate close to a compressor	Order option 8
In Y81 to Y87 add information regarding:	• Y81 Inlet suction temperature • Y82 Atmosphere pressure • Y83 Pressure drop at inlet filter • Y84 Inlet relative humidity • Y85 Actual revolutions per minute (of compressor) • Y86 Rated rpm of compressor • Y87 Outlet relative humidity. This information is available from compressor supplier.
Mixed gases	When the fluid is a gas mixture, contact your local Siemens representative and provide gas names and amount in %
Rated operation conditions	
Ambient temperature	
• Non-Ex version	-40 … +85 °C (-40 … +185 °F)
• Ex version	-40 … +65 °C (-40 … +149 °F)
Storage temperature	-50 … +85 °C (-58 … +185 °F)
Media temperature	-40 … +240 °C (-40 … +464 °F)
Density	Taken into consideration when rating
Viscosity	<10 cP
Reynolds number	10 000 … 2 300 000
Media pressure limit	Max. 100 bar (1450 psi) Higher pressure on request (contact your local Siemens representative)

Design	
Material	
• Sensor: house/pick-up	AISI 316L (1.4404)/ AISI 316L (1.4435) Hastelloy C22/2.4602 available on request (contact your local Siemens representative)
• Housing: transmitter	Aluminum for increased requirements
• Sensor gaskets: for pick-up and pressure sensor	AISI 316L (1.4435) / FPM or FFKM FPM (Viton) by steam and non-aggressive gases. FFKM (Kalrez) by chlorine and other aggressive gases (only available together with a pressure sensor).
Process connections	Flange norm EN 1092-1 form B1/B2 or ASME B16.5 RF. Other flanges on request (contact your local Siemens representative)
• Flange version	DN 15 … 300 (½ … 12")
• Sandwich version	DN 15 … 100 (½ … 4")
Degree of protection	IP66/IP67
Dimensions and weights	See „Dimensional Drawings“
Display and operating interface	
Local display	2 lines, 10 characters per line
Languages	German, English, French
Power supply	
• Standard version	14 … 36 V DC
• Ex version	14 … 30 V DC
Certificates and approvals	
Explosion protection	
• ATEX	II 2G EEx d ia [ia] IIC T6
• FM US/C	Class I, II, III, Div. 1 and 2
Calibration	All flowmeters will be delivered with a 3 point calibration certificate
Material Certificate	Certificate of compliance, pressure test, material certificate, material in acc. of NACE and PMI of pressure bearing metal parts.
Cleaning	Choose Cleaning Class1 when fluid is oxygen or contains chloride.
Certificates	X-ray test on pressurized weldings and dye penetration test on pressure bearing weldings Dye penetration test

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Selection and Ordering data		Order No.										
SITRANS FX300 Flanged **Single transmitter and T_{max} = 240 °C (464 °F)**		**7ME2600 -**					-					
Connection size	**Sensor size**											
DN 15 (½")	DN 15	**1**	**A**									
DN 25 (1")	DN 25	**2**	**B**									
DN 40 (1½")	DN 40	**2**	**K**									
DN 50 (2")	DN 50	**2**	**R**									
DN 80 (3")	DN 80	**3**	**L**									
DN 100 (4")	DN 100	**3**	**S**									
DN 150 (6")	DN 150	**4**	**M**									
DN 200 (8")	DN 200	**4**	**T**									
DN 250 (10")	DN 250	**4**	**W**									
DN 300 (12")	DN 300	**5**	**E**									
Flange norm and nominal pressure												
Form B1/B2	**EN 1092-1**											
PN 10	DN 200 ... 300			**A**								
PN 16	DN 50 ... 300			**B**								
PN 25	DN 200 ... 300			**C**								
PN 40	DN 15 ... 300			**D**								
PN 63	DN 50 ... 150			**E**								
PN 100	DN 15 ... 150			**F**								
RF	**ASME B16.5**											
150 lb	½ ... 12"			**J**								
300 lb	½ ... 12"			**K**								
600 lb	½ ... 6"			**L**								
Sensor material/Gasket												
St. steel AISI 316L (1.4404)/AISI 316L (1.4435)/ FPM					**1**							
St. steel AISI 316L (1.4404)/AISI 316L (1.4435)/ FFKM					**5**							
Transmitter design												
Compact version - no cable						**1**						
Remote version:												
5 m (16.4 ft)						**2**						
10m (32.8 ft)						**3**						
15 m (49.2 ft)						**4**						
20 m (65.6 ft)						**5**						
25 m (82.0 ft)						**6**						
30 m (98.4 ft)						**7**						
Approval and cable gland												
Non-Ex, M20 x 1.5							**1**					
Non-Ex, ½" NPT							**2**					
ATEX, M20 x 1.5							**4**					
ATEX, ½" NPT							**5**					
FM US/C, M20 x 1.5							**6**					
FM US/C, ½" NPT							**7**					
Transmitter, display and communication												
With display, HART								**A**				
Pressure sensor and isolation valve												
Without pressure sensor									**A**			
With pressure sensor, range:												
4 bar (58 psi)									**B**			
6 bar (87 psi)									**D**			
10 bar (145 psi)									**E**			
16 bar (232 psi)									**G**			
25 bar (363 psi)									**H**			
40 bar (580 psi)									**K**			
60 bar (870 psi)									**L**			
100 bar (1450 psi)									**N**			
With isolation valve and pressure sensor, range:												
4 bar (58 psi)									**P**			
6 bar (87 psi)									**Q**			
10 bar (145 psi)									**R**			
16 bar (232 psi)									**S**			
25 bar (363 psi)									**U**			
40 bar (580 psi)									**V**			
60 bar (870 psi)									**W**			
100 bar (1450 psi)									**Y**			

Selection and Ordering data	Order No.					
SITRANS FX300 Flanged **Single transmitter and T_{max} = 240 °C (464 °F)**	**7ME2600 -**				-	
Software						
Uncompensated for gases, wet gases, steam and liquids, respectively, temperature compensation for saturated steam						**1**
Density compensation for superheated steam						**4**
Density compensation for superheated steam and setting of Gross heat Opt. Y51 ... Y56 for Energy measuring						**5**
Density compensation for gases and wet gases and setting of Relative humidity at opt. Y49						**7**
Density compensation for gases, wet gases and setting of FAD - free air delivery Opt. Y49 and Y81 ... Y87 for Compressor settings						**8**

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SITRANS FX300

Selection and Ordering data	Order code
Additional information Please add **"-Z"** to Order No. and specify as minimum Order code Y40, Y41, Y42 and Y45 and plain text.	
Input process data	
Medium: Specify steam, gas, liquid or customised	**Y40**
Temperature: Specify max. operating temperature and units	**Y41**
Pressure: Specify max. operating pressure and units	**Y42**
Density (only by customer-specified medium): Specify medium density and units	**Y43**
Viscosity (only by customer-specified medium): Specify medium viscosity and units	**Y44**
Flow rate: Specify min./max. flow rate and units	**Y45**
Setting of pulse output: Specify totalizer or energy unit (1 pulse/unit)	**Y47**
Relative humidity (amount in % of process medium)	**Y49**
Settings of gross heat	
Variable current output	**Y51**
Power unit (specify: kJ/h, MJ/h, GJ/h, Btu/h, kcal/h, kW, MW or special (custom))	**Y52**
Fullscale power value	**Y53**
Variable pulse output	**Y54**
Totalizer on/off	**Y55**
Configure totalizer (specify: kJ, MJ, GJ, Btu th, kcal, kWh, MWh or special (custom))	**Y56**
Settings of FAD	
Inlet suction temperature	**Y81**
Atmosphere pressure	**Y82**
Pressure drop filter	**Y83**
Inlet relative humidity	**Y84**
Actual revolutions per minute (of compressor)	**Y85**
Rated Rpm of compressor	**Y86**
Outlet relative humidity This information is available from compressor supplier.	**Y87**

Operating instructions

Description	Order No.
English	**A5E2100423**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Selection and Ordering data	Order code
Further designs Please add **"-Z"** to Order No. and specify Order code.	
Converter housing material	
Aluminum for increased requirement, color: petrol green	**A10**
Material certificate	
Certificate of compliance EN 10204-2.1	**C10**
Pressure test + 3.1 accordance EN 10204	**C11**
Material certificate pressure parts + certificate 3.1	**C12**
Material in accordance with NACE MR 0175-01	**C13**
PMI of pressure bearing metal parts + certificate 3.1	**C14**
Material certificate pressure parts + PMI/certificate 3.1	**C15**
Calibration certificate FX300 As standard the flow device has a 3-point calibration certificate.	
Calibration certificate (5 point)	**D11**
Hardness test	
Hardness test on pressure bearing parts + 3.1 Equotip LD procedure according to NACE MR 0175-01	**H30**
Cleaning for oil and fat	
Class 1 increased requirement (customer-specified) and 3.1 (EN 10204)	**K46**
Class 2 and 3.1 (EN 10204)	**K48**
Certificates	
X-ray test on ppressure bearing weldings	**M56**
Dye penetration test on pressure bearing weldings	**M58**
Tag name plate	
Stainless steel tag with 3 mm characters, max. 2 x 8 characters (40 x 20 mm, add plain text)	**Y17**
Stainless steel tag with 2.5 mm characters, max. 8 x 40 characters (120 x 46 mm, add plain text)	**Y18**

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Selection and Ordering data		Order No.								
SITRANS FX300 Sandwich **Single transmitter and T_{max} = 240 °C (464 °F)**		**7ME2700 -**								
Connection size	**Sensor size**									
DN 15 (½")	DN 15	**1**	**A**							
DN 25 (1")	DN 25	**2**	**B**							
DN 40 (1½")	DN 40	**2**	**K**							
DN 50 (2")	DN 50	**2**	**R**							
DN 80 (3")	DN 80	**3**	**L**							
DN 100 (4")	DN 100	**3**	**S**							
Nominal pressure										
EN										
PN 16	DN 50 ... 100			**B**						
PN 40	DN 15 ... 100			**D**						
PN 63	DN 50 ... 100			**E**						
PN 100	DN 15 ... 100			**F**						
ASME										
150 lb	½ ... 4"			**J**						
300 lb	½ ... 4"			**K**						
600 lb	½ ... 4"			**L**						
Sensor material/Gasket										
St. steel AISI 316L (1.4404)/AISI 316L (1.4435)/FPM					**1**					
St. steel AISI 316L (1.4404)/AISI 316L (1.4435)/FFKM					**5**					
Transmitter design										
Compact version - no cable						**1**				
Remote version:										
5 m (16.4 ft)						**2**				
10m (32.8 ft)						**3**				
15 m (49.2 ft)						**4**				
20 m (65.6 ft)						**5**				
25 m (82.0 ft)						**6**				
30 m (98.4 ft)						**7**				
Approval and cable gland										
Non-Ex, M20 x 1.5							**1**			
Non-Ex, ½" NPT							**2**			
ATEX, M20 x 1.5							**4**			
ATEX, ½" NPT							**5**			
FM US/C, M20 x 1.5							**6**			
FM US/C, ½" NPT							**7**			
Transmitter, display and communication										
With display, HART								**A**		
Pressure sensor and isolation valve										
Without pressure sensor									**A**	
With pressure sensor, range:										
4 bar (58 psi)									**B**	
6 bar (87 psi)									**D**	
10 bar (145 psi)									**E**	
16 bar (232 psi)									**G**	
25 bar (363 psi)									**H**	
40 bar (580 psi)									**K**	
60 bar (870 psi)									**L**	
100 bar (1450 psi)									**N**	
With isolation valve and pressure sensor, range:										
4 bar (58 psi)									**P**	
6 bar (87 psi)									**Q**	
10 bar (145 psi)									**R**	
16 bar (232 psi)									**S**	
25 bar (363 psi)									**U**	
40 bar (580 psi)									**V**	
60 bar (870 psi)									**W**	
100 bar (1450 psi)									**Y**	

Selection and Ordering data	Order No.	
SITRANS FX300 Sandwich **Single transmitter and T_{max} = 240 °C (464 °F)**	**7ME2700 -**	
Software		
Uncompensated for gases, wet gases, steam and liquids respectively temperature compensation for saturated steam		**1**
Density compensation for superheated steam		**4**
Density compensation for superheated steam and setting of Gross heat Opt. Y51 ... Y56 for Energy measuring		**5**
Density compensation for gases and wet gases and setting of Relative humidity at opt. Y49		**7**
Density compensation for gases, wet gases and setting of FAD - free air delivery Opt. Y49 and Y81 ... Y87 for Compressor settings		**8**

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SITRANS FX300

Selection and Ordering data	Order code
Additional information Please add "**-Z**" to Order No. and specify as minimum Order code Y40, Y41, Y42 and Y45 and plain text.	
Input process data	
Medium: Specify steam, gas, liquid and customised	**Y40**
Temperature: Specify max. operating temperature and units	**Y41**
Pressure: Specify max. operating pressure and units	**Y42**
Density (only by customer-specified medium): Specify medium density and units	**Y43**
Viscosity (only by customer-specified medium): Specify medium viscosity and units	**Y44**
Flow rate: Specify min./max. flow rate and units	**Y45**
Setting of pulse output: Specify totalizer or energy unit (1 pulse/unit)	**Y47**
Relative humidity (amount in % of process medium)	**Y49**
Settings of gross heat	
Variable current output	**Y51**
Power unit (specify: kJ/h, MJ/h, GJ/h, Btu/h, kcal/h, kW, MW or special (custom))	**Y52**
Fullscale power value	**Y53**
Variable pulse output	**Y54**
Totalizer on/off	**Y55**
Configure totalizer (specify: kJ, MJ, GJ, Btu th, kcal, kWh, MWh or special (custom))	**Y56**
Settings of FAD	
Inlet suction temperature	**Y81**
Atmosphere pressure	**Y82**
Pressure drop filter	**Y83**
Inlet relative humidity	**Y84**
Actual revolutions per minute (of compressor)	**Y85**
Rated Rpm of compressor	**Y86**
Outlet relative humidity This information is available from compressor supplier.	**Y87**

Operating instructions

Description	Order No.
English	**A5E2100423**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Selection and Ordering data	Order code
Further designs Please add **"-Z"** to Order No. and specify Order code.	
Converter housing material	
Aluminum for increased requirement, color: petrol green	**A10**
Material certificate	
Certificate of compliance EN 10204-2.1	**C10**
Pressure test + 3.1 accordance EN 10204	**C11**
Material certificate pressure parts + certificate 3.1	**C12**
Material in accordance with NACE MR 0175-01	**C13**
PMI of pressure bearing metal parts + certificate 3.1	**C14**
Material certificate pressure parts + PMI/certificate 3.1	**C15**
Calibration certificate FX300 As standard the flow device has a 3-point calibration certificate.	
Calibration certificate (5-point)	**D11**
Hardness test	
Hardness test on pressure bearing parts + 3.1 Equotip LD procedure according to NACE MR 0175-01	**H30**
Cleaning for oil and fat	
Class 1 increased requirement (customer-specified) and 3.1 (EN 10204)	**K46**
Class 2 and 3.1 (EN 10204)	**K48**
Certificates	
X-ray test on pressure bearing weldings	**M56**
Dye penetration test on pressure bearing weldings	**M58**
Tag name plate	
Stainless steel tag with 3 mm characters, max. 2 x 8 characters (40 x 20 mm, add plain text)	**Y17**
Stainless steel tag with 2.5 mm characters, max. 8 x 40 characters (120 x 46 mm, add plain text)	**Y18**

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Selection and Ordering data		Order No.
SITRANS FX300 Flanged Dual transmitter and T_{max} = 240 °C (464 °F)		**7ME2800 -**
Connection size	**Sensor size**	
DN 40 (1½")	DN 40	**2K**
DN 50 (2")	DN 50	**2R**
DN 80 (3")	DN 80	**3L**
DN 100 (4")	DN 100	**3S**
DN 150 (6")	DN 150	**4M**
DN 200 (8")	DN 200	**4T**
DN 250 (10")	DN 250	**4W**
DN 300 (12")	DN 300	**5E**
Flange norm and nominal pressure		
Form B1/B2	**EN 1092-1**	
PN 10	DN 200 ... 300	**A**
PN 16	DN 50 ... 300	**B**
PN 25	DN 200 ... 300	**C**
PN 40	DN 40 ... 300	**D**
PN 63	DN 50 ... 150	**E**
PN 100	DN 40 ... 150	**F**
RF	**ASME B16.5**	
150 lb	1½ ... 12"	**J**
300 lb	1½ ... 12"	**K**
600 lb	1½ ... 6"	**L**
Sensor material/Gasket		
Stainless steel AISI 316L (1.4404)/ AISI 316L (1.4435)/FPM		**1**
Stainless steel AISI 316L (1.4404)/ AISI 316L (1.4435)/FFKM		**5**
Transmitter design		
Compact version - no cable		**1**
Remote version:		
5 m (16.4 ft)		**2**
10 m (32.8 ft)		**3**
15 m (49.2 ft)		**4**
20 m (65.6 ft)		**5**
25 m (82.0 ft)		**6**
30 m (98.4 ft)		**7**
Approval and cable gland		
Non-Ex, M20 x 1.5		**1**
Non-Ex, ½" NPT		**2**
ATEX, M20 x 1.5		**4**
ATEX, ½" NPT		**5**
FM US/C, M20 x 1.5		**6**
FM US/C, ½" NPT		**7**
Transmitter, display and communication		
With display, HART		**A**
Pressure sensor and isolation valve		
Without pressure sensor		**A**
Software		
Uncompensated for gases, wet gases, steam and liquids respectively temperature compensation for saturated steam		**1**

Selection and Ordering data	Order code
Additional information Please add "**-Z**" to Order No. and specify as minimum Order code Y40, Y41, Y42 and Y45 and plain text.	
Input process data	
Medium: Specify steam, gas, liquid and customised	**Y40**
Temperature: Specify max. operating temperature and units	**Y41**
Pressure: Specify max. operating pressure and units	**Y42**
Density (only by customer-specified medium): Specify medium density and units	**Y43**
Viscosity (only by customer-specified medium): Specify medium viscosity and units	**Y44**
Flow rate: Specify min./max. flow rate and units	**Y45**
Setting of pulse output; Specify totalizer or energy unit (1 pulse/unit)	**Y47**
Relative humidity (amount in % of process medium)	**Y49**

Operating instructions for SITRANS FX300

Description	Order No.
English	**A5E2100423**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Selection and Ordering data	Order code
Further designs Please add "**-Z**" to Order No. and specify Order code.	
Converter housing material	
Aluminum for increased requirement, color: petrol green	**A10**
Material certificate	
Certificate of compliance EN 10204-2.1	**C10**
Pressure test + 3.1 accordance EN 10204	**C11**
Material certificate pressure parts + certificate 3.1	**C12**
Material in accordance with NACE MR 0175-01	**C13**
PMI of pressure bearing metal parts + certificate 3.1	**C14**
Material certificate pressure parts + PMI/certificate 3.1	**C15**
Calibration certificate FX300 As standard the flow device has a 3-point calibration certificate.	
Calibration certificate (5-point)	**D11**
Hardness test	
Hardness test on pressure bearing parts + 3.1 Equotip LD procedure according to NACE MR 0175-01	**H30**
Cleaning for oil and fat	
Class 1 increased requirement (customer-specified) and 3.1 (EN 10204)	**K46**
Class 2 and 3.1 (EN 10204)	**K48**
Certificates	
X-ray test on pressure bearing weldings	**M56**
Dye penetration test on pressure bearing weldings	**M58**
Tag name plate	
Stainless steel tag with 3 mm characters, max. 2 x 8 characters (40 x 20 mm, add plain text)	**Y17**
Stainless steel tag with 2.5 mm characters, max. 8 x 40 characters (120 x 46 mm, add plain text)	**Y18**

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SITRANS FX300

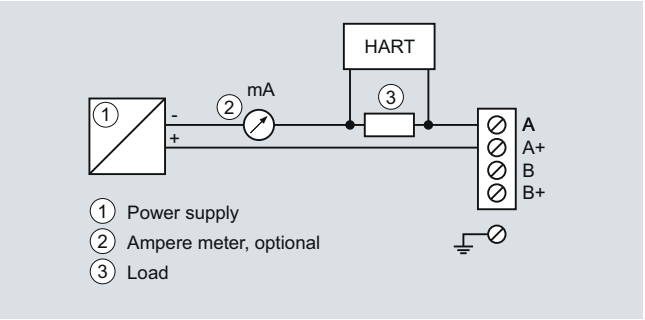
SITRANS FX300 spare parts

Description	Order No.	
Seal disc 21.8-12-0.1	**A5E02181439**	
Socket only for DN 15/25 ; 1/2"	**On request**	
Socket only for DN 15/25 ; 1"	**On request**	
Pickup AISI 316L/1.4404	**On request**	
O-ring pickup	**A5E02181464**	
O-ring for pressure screw 17.13 x 2.62-FPM-70	**A5E02181488**	
Pressure sensor 4/6/10/16/25/40/60/100 bar	**On request**	
Cover gasket O-Ring 91.67 x 3.5	**A5E02181492**	
Converter housing gasket 59,35,5-2-N	**A5E02181495**	
O-ring DIN3771-20 x 1-FPM for sensor	**A5E02181515**	
O-ring 10x2-NBR for lead-through	**A5E02181525**	
DUBOX plug, 5-pole-RM2	**A5E02181527**	
Electronic		
• Basic D-HART	**A5E02181531**	
• Steam D-HART	**A5E02181541**	
• Gas D-HART	**A5E02181544**	
Display	**A5E02181558**	
Cable feedthrough 10-pole (non-Ex). O-ring for cable feedthrough 21.89 x 2.62 10-pole plug	**A5E02181562**	
Sensor replacement (incl. Seal disc, pickup, O-rings for pickup, and pressure screw		
• DN 15 (incl. ½" socket)	**A5E02181087**	
• DN 25 (incl. 1" socket)	**A5E02181116**	
• DN 40 ... 100	**A5E02181152**	
• DN 150 ... 300	**A5E02275105**[F)]	
Pressure sensor replacement (Incl. pressure sensor, DUBOX plug, 2 O-rings and calibration certificate)		
• 4 bar (58 psi)	**A5E02181157**	
• 6 bar (87 psi)	**A5E02181175**	
• 10 bar (145 psi)	**A5E02181180**	
• 16 bar (232 psi)	**A5E02181221**	
• 25 bar (363 psi)	**A5E02181307**	
• 40 bar (580 psi)	**A5E02181316**	
• 60 bar (870 psi)	**A5E02181322**	
• 100 bar (1450 psi)	**A5E02181437**	

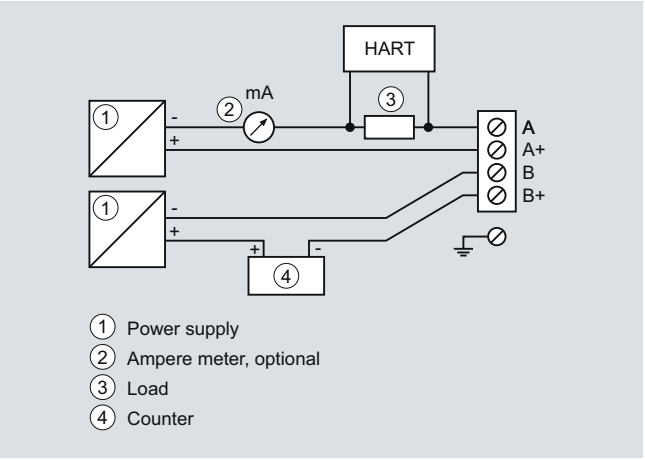
Description	Order No.	
Service Toolbox for changing software (basic, steam and gas) and different settings in the electronic.	**A5E02375819**	

F) Subject to export regulations AL: 9I999, ECCN: N.

Schematics



Load for HART communication



Connection pulse output

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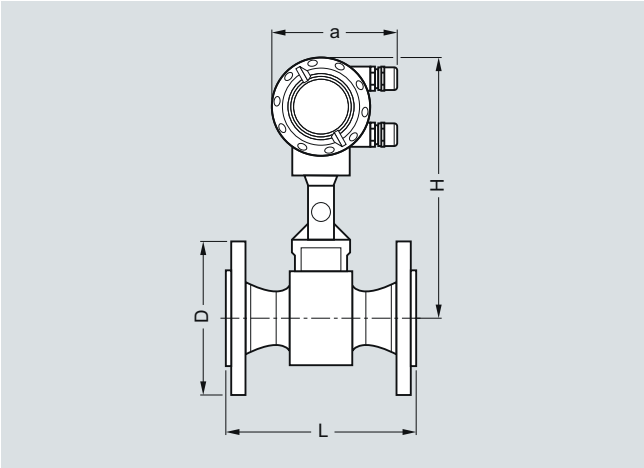
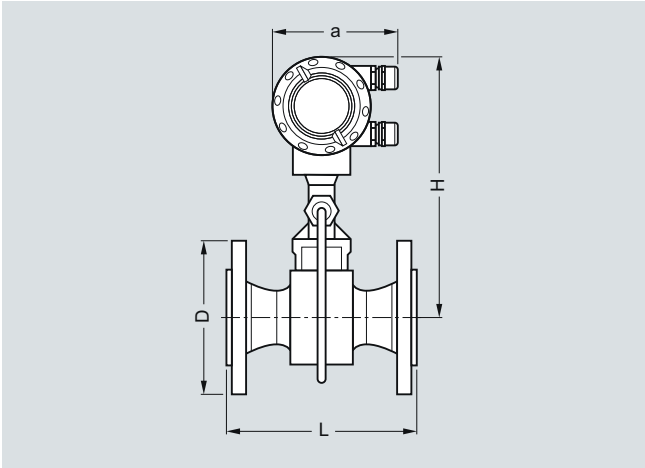
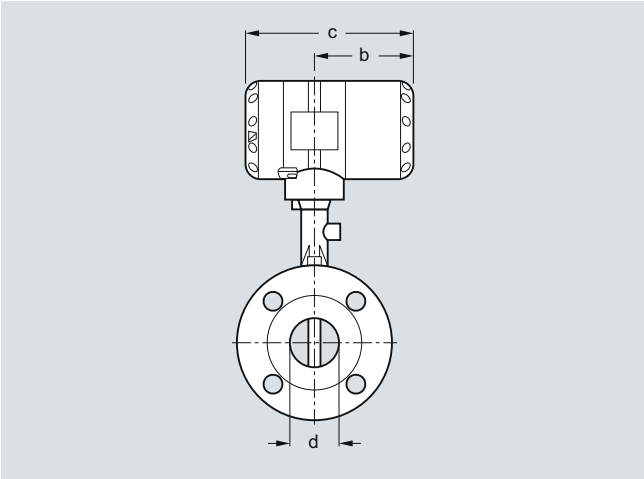
Dimensional drawings



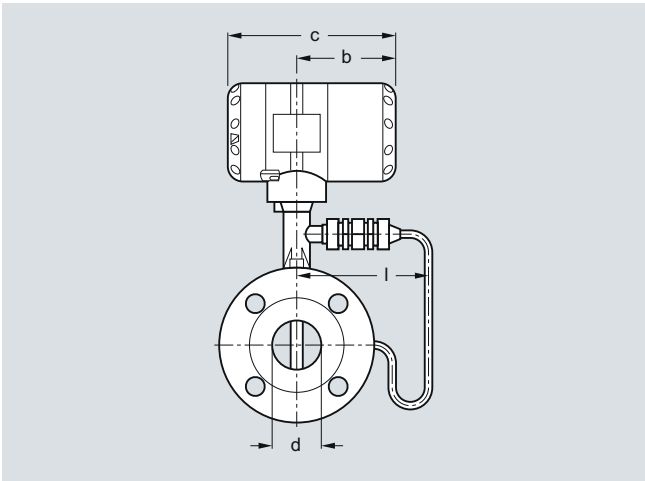
Flange version, frontal view, a = 133 mm (5.24 inch)



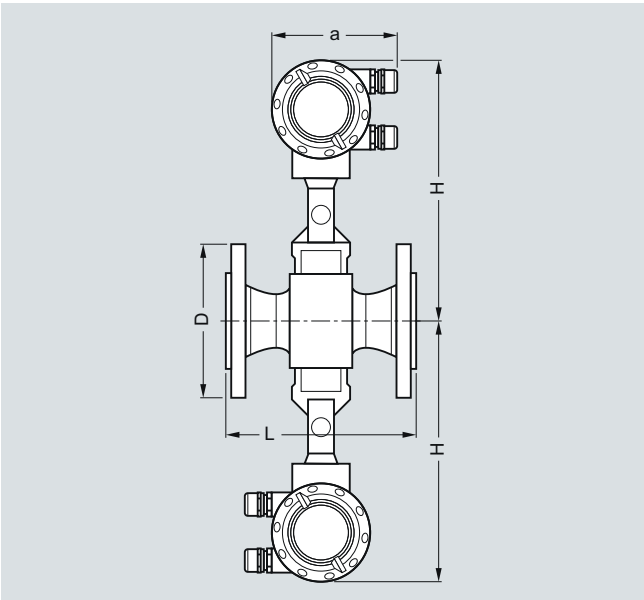
Flange version with pressure sensor, frontal view,
a = 133 mm (5.24 inch)



Flange version, side view, b = 105 mm (4.13 inch),
c = 179 mm (7.05 inch)



Flange version with pressure sensor, side view,
b = 105 mm (4.13 inch), c = 179 mm (7.05 inch)



Flange version, dual converter, specified weight + 2.80 kg (6.17 lb)

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SITRANS FX300

Flange version EN1092-1

Size	Pressure rating	Dimensions [mm (inch)]					Weight [kg (lb)]	
DN	PN	d	D	L	H	I	Flowmeter (without pressure sensor)	Flowmeter (with pressure sensor)
15	40	17.3 (0.68)	95 (3.74)	200 (7.87)	265 (10.43)	144 (5.67)	5.5 (12.13)	6.1 (13.45)
15	100	17.3 (0.68)	105 (4.13)	200 (7.87)	265 (10.43)	144 (5.67)	6.5 (14.33)	7.1 (15.65)
25	40	28.5 (1.12)	115 (4.53)	200 (7.87)	265 (10.43)	144 (5.67)	7.3 (16.09)	7.9 (17.42)
25	100	28.5 (1.12)	140 (5.51)	200 (7.87)	265 (10.43)	144 (5.67)	9.3 (20.50)	9.9 (21.83)
40	40	43.1 (1.70)	150 (5.91)	200 (7.87)	270 (10.63)	144 (5.67)	10.2 (22.49)	10.8 (23.81)
40	100	42.5 (1.67)	170 (6.69)	200 (7.87)	270 (10.63)	144 (5.67)	14.2 (31.31)	14.8 (32.63)
50	16	54.5 (2.15)	165 (6.50)	200 (7.87)	275 (10.83)	144 (5.67)	12.1 (26.68)	12.7 (28.00)
50	40	54.5 (2.15)	165 (6.50)	200 (7.87)	275 (10.83)	144 (5.67)	12.3 (27.12)	12.9 (28.44)
50	63	54.5 (2.15)	180 (7.09)	200 (7.87)	275 (10.83)	144 (5.67)	16.3 (35.94)	16.9 (37.26)
50	100	53.9 (2.12)	195 (7.68)	200 (7.87)	275 (10.83)	144 (5.67)	17.8 (39.24)	18.4 (40.57)
80	16	82.5 (3.25)	200 (7.87)	200 (7.87)	290 (11.42)	154 (6.06)	16.8 (37.04)	17.4 (38.36)
80	40	82.5 (3.25)	200 (7.87)	200 (7.87)	290 (11.42)	154 (6.06)	18.8 (41.45)	19.4 (42.77)
80	63	81.7 (3.22)	215 (8.46)	200 (7.87)	290 (11.42)	154 (6.06)	22.8 (50.27)	23.4 (51.59)
80	100	80.9 (3.19)	230 (9.06)	200 (7.87)	290 (11.42)	154 (6.06)	26.8 (59.08)	27.4 (60.41)
100	16	107.1 (4.22)	220 (8.66)	250 (9.84)	310 (12.20)	164 (6.46)	21.4 (47.18)	22 (48.50)
100	40	107.1 (4.22)	235 (9.25)	250 (9.84)	310 (12.20)	164 (6.46)	24.4 (53.79)	25 (55.12)
100	63	106.3 (4.19)	250 (9.84)	250 (9.84)	310 (12.20)	164 (6.46)	29.4 (64.82)	30 (66.14)
100	100	104.3 (4.11)	265 (10.43)	250 (9.84)	310 (12.20)	164 (6.46)	35.4 (78.04)	36 (79.37)
150	16	159.3 (6.27)	285 (11.22)	300 (11.81)	325 (12.80)	174 (6.85)	35.2 (77.60)	35.8 (78.93)
150	40	159.3 (6.27)	300 (11.81)	300 (11.81)	325 (12.80)	174 (6.85)	41.2 (90.83)	41.8 (92.15)
150	63	157.1 (6.19)	345 (13.58)	300 (11.81)	325 (12.80)	174 (6.85)	59.2 (130.51)	59.8 (131.84)
150	100	154.1 (6.07)	355 (13.98)	300 (11.81)	325 (12.80)	174 (6.85)	67.2 (148.15)	67.8 (149.47)
200	10	206.5 (8.13)	340 (13.39)	300 (11.81)	350 (13.78)	194 (7.64)	37.8 (83.33)	38.4 (84.66)
200	16	206.5 (8.13)	340 (13.39)	300 (11.81)	350 (13.78)	194 (7.64)	37.8 (83.33)	38.4 (84.66)
200	25	206.5 (8.13)	360 (14.17)	300 (11.81)	350 (13.78)	194 (7.64)	46.8 (103.18)	47.4 (104.50)
200	40	206.5 (8.13)	375 (14.76)	300 (11.81)	350 (13.78)	194 (7.64)	54.8 (120.81)	55.4 (122.14)
250	10	260.4 (10.25)	395 (15.55)	380 (14.96)	370 (14.57)	224 (8.82)	57.4 (126.55)	58.0 (127.87)
250	16	260.4 (10.25)	405 (15.94)	380 (14.96)	370 (14.57)	224 (8.82)	58.4 (128.75)	59.0 (130.07)
250	25	258.8 (10.19)	425 (16.73)	380 (14.96)	370 (14.57)	224 (8.82)	74.4 (164.02)	75.0 (165.35)
250	40	258.8 (10.19)	450 (17.72)	380 (14.96)	370 (14.57)	224 (8.82)	92.4 (203.71)	93.0 (205.03)
300	10	309.7 (12.19)	445 (17.52)	450 (17.72)	395 (15.55)	244 (9.61)	75.7 (166.89)	76.3 (168.21)
300	16	309.7 (12.19)	460 (18.11)	450 (17.72)	395 (15.55)	244 (9.61)	82.2 (181.22)	82.8 (182.54)
300	25	307.9 (12.12)	485 (19.09)	450 (17.72)	395 (15.55)	244 (9.61)	98.7 (217.60)	99.3 (218.92)
300	40	307.9 (12.12)	515 (20.28)	450 (17.72)	395 (15.55)	244 (9.61)	127.5 (281.09)	128.1 (282.41)

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Flange version ASME B16.5

Size	Pressure rating	Dimensions [mm (inch)]					Weight [kg (lb)]	
DN	Class	d	D	L	H	I	Flowmeter (without pressure sensor)	Flowmeter (with pressure sensor)
½	150	15.8 (0.62)	90 (3.54)	200 (7.87)	265 (10.43)	144 (5.67)	4.5 (9.92)	5.1 (11.24)
½	300	15.8 (0.62)	95 (3.74)	200 (7.87)	265 (10.43)	144 (5.67)	4.9 (10.80)	5.5 (12.13)
½	600	13.9 (0.55)	95 (3.74)	200 (7.87)	265 (10.43)	144 (5.67)	5.1 (11.24)	5.7 (12.57)
1	150	26.6 (1.05)	110 (4.33)	200 (7.87)	265 (10.43)	144 (5.67)	6.2 (13.67)	6.8 (14.99)
1	300	26.6 (1.05)	125 (4.92)	200 (7.87)	265 (10.43)	144 (5.67)	7.2 (15.87)	7.8 (17.20)
1	600	24.3 (0.96)	125 (4.92)	200 (7.87)	265 (10.43)	144 (5.67)	7.5 (16.53)	8.1 (17.86)
1½	150	40.9 (1.61)	125 (4.92)	200 (7.87)	270 (10.63)	144 (5.67)	8.3 (18.30)	8.9 (19.62)
1½	300	40.9 (1.61)	155 (6.10)	200 (7.87)	270 (10.63)	144 (5.67)	10.4 (22.93)	11 (24.25)
1½	600	38.1 (1.50)	155 (6.10)	200 (7.87)	270 (10.63)	144 (5.67)	11.4 (25.13)	12 (26.46)
2	150	52.6 (2.07)	150 (5.91)	200 (7.87)	275 (10.83)	144 (5.67)	11 (24.25)	11.6 (25.57)
2	300	52.6 (2.07)	165 (6.50)	200 (7.87)	275 (10.83)	144 (5.67)	12.4 (27.34)	13 (28.66)
2	600	49.3 (1.94)	165 (6.50)	200 (7.87)	275 (10.83)	144 (5.67)	13.9 (30.64)	14.5 (31.97)
3	150	78 (3.07)	190 (7.48)	200 (7.87)	290 (11.42)	154 (6.06)	19.8 (43.65)	20.4 (44.97)
3	300	78 (3.07)	210 (8.27)	200 (7.87)	290 (11.42)	154 (6.06)	22.8 (50.27)	23.4 (51.59)
3	600	73.7 (2.90)	210 (8.27)	200 (7.87)	290 (11.42)	154 (6.06)	23.8 (52.47)	24.4 (53.79)
4	150	102.4 (4.03)	230 (9.06)	250 (9.84)	310 (12.20)	164 (6.46)	23.4 (51.59)	24 (52.91)
4	300	102.4 (4.03)	255 (10.04)	250 (9.84)	310 (12.20)	164 (6.46)	31.4 (69.23)	32 (70.55)
4	600	97.2 (3.83)	275 (10.83)	250 (9.84)	310 (12.20)	164 (6.46)	40.4 (89.07)	41 (90.39)
6	150	154.2 (6.07)	280 (11.02)	300 (11.81)	325 (12.80)	174 (6.85)	36.2 (79.81)	36.8 (81.13)
6	300	154.2 (6.07)	320 (12.60)	300 (11.81)	325 (12.80)	174 (6.85)	51.2 (112.88)	51.8 (114.20)
6	600	146.3 (5.76)	355 (13.98)	300 (11.81)	325 (12.80)	174 (6.85)	46.2 (101.85)	76.8 (169.31)
8	150	202.7 (7.98)	345 (13.58)	300 (11.81)	350 (13.78)	194 (7.64)	50.0 (110.23)	50.6 (111.55)
8	300	202.7 (7.98)	380 (14.96)	300 (11.81)	350 (13.78)	194 (7.64)	74.8 (164.91)	75.4 (166.23)
10	150	254.5 (10.02)	405 (15.94)	380 (14.96)	370 (14.57)	224 (8.82)	74.4 (164.02)	75.0 (165.35)
10	300	254.5 (10.02)	455 (17.91)	380 (14.96)	370 (14.57)	224 (8.82)	106.4 (234.57)	107.0 (235.89)
12	150	304.8 (12.00)	485 (19.09)	450 (17.72)	395 (15.55)	244 (9.61)	106.3 (234.35)	106.9 (235.67)
12	300	304.8 (12.00)	520 (20.47)	450 (17.72)	395 (15.55)	244 (9.61)	151.3 (333.56)	151.9 (334.88)

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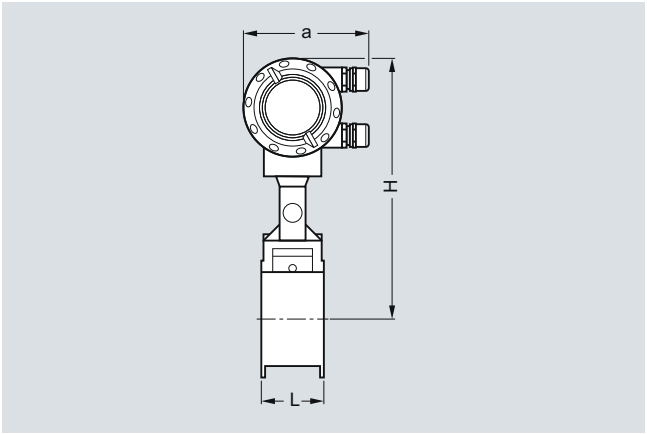
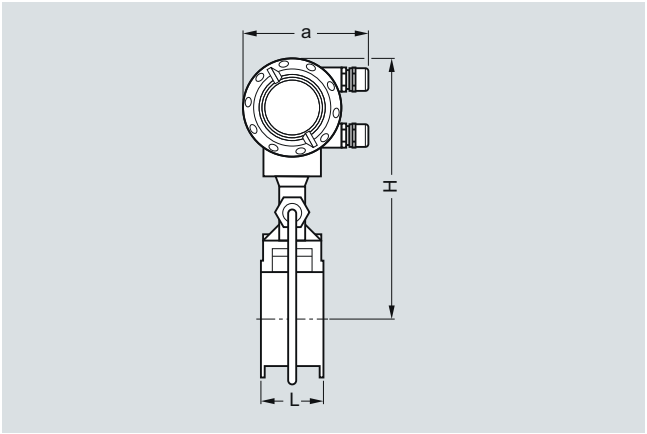
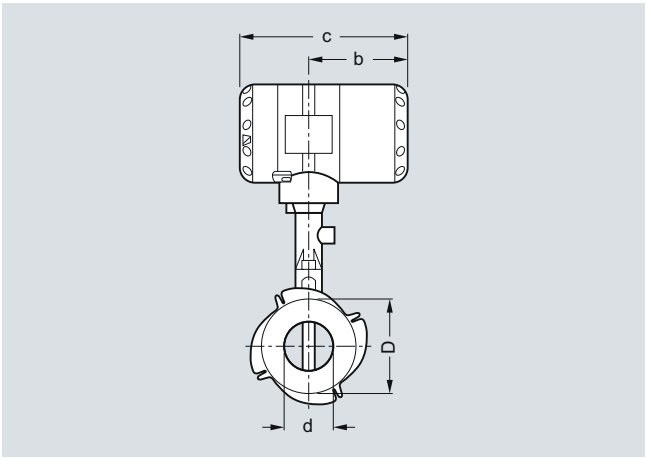


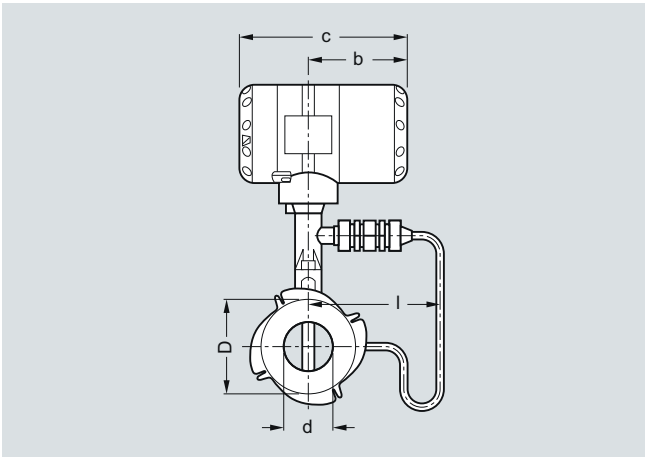
Sandwich version, front view, a = 133 mm (5.24 inch)



Sandwich version with pressure sensor, front view,
a = 133 mm (5.24 inch)



Sandwich version, side view, b = 105 mm (4.13 inch),
c = 179 mm (7.05 inch)



Sandwich version with pressure sensor, side view,
b = 105 mm (4.13 inch), c = 179 mm (7.05 inch)

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Sandwich version EN

Size	Pressure rating	Dimensions [mm (inch)]					Weight [kg (lb)]	
DN	PN	d	D	L	H	I	Flowmeter (without pressure sensor)	Flowmeter (with pressure sensor)
15	16 ... 100	16 (0.63)	45 (1.77)	65 (2.56)	265 (10.43)	144 (5.67)	3.5 (7.72)	4.1 (9.04)
25	16 ... 100	24 (0.94)	65 (2.56)	65 (2.56)	265 (10.43)	144 (5.67)	4.3 (9.48)	4.9 (10.80)
40	16 ... 100	38 (1.50)	82 (3.23)	65 (2.56)	270 (10.63)	144 (5.67)	4.9 (10.80)	5.5 (12.13)
50	16 ... 100	50 (1.97)	102 (4.02)	65 (2.56)	275 (10.83)	144 (5.67)	6 (13.23)	6.6 (14.55)
80	16 ... 100	74 (2.91)	135 (5.31)	65 (2.56)	290 (11.42)	155 (6.10)	8.2 (18.08)	8.8 (19.40)
100	16 ... 100	97 (3.82)	158 (6.22)	65 (2.56)	310 (12.20)	164 (6.46)	9.5 (20.94)	10.1 (22.27)

Sandwich version ASME

Size	Pressure rating	Dimensions [inch]					Weight [lb]	
DN	Class	d	D	L	H	I	Flowmeter (without pressure sensor)	Flowmeter (with pressure sensor)
½"	150, 300, 600	0.63	1.77	2.56	10.43	5.67	7.72	9.04
1"	150, 300, 600	0.94	2.56	2.56	10.43	5.67	9.48	10.80
1½"	150, 300, 600	1.50	3.23	2.56	10.63	5.67	10.80	12.13
2"	150, 300, 600	1.97	4.02	2.56	10.83	5.67	13.23	14.55
3"	150, 300, 600	2.91	5.31	2.56	11.42	6.10	18.08	19.40
4"	150, 300, 600	3.82	6.22	2.56	12.20	6.46	20.94	22.27

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Flow tables

Measuring Range Limits

Water

Size DN to EN 1092-1	DN to ASME B16.5	Q_{min} EN 1092-1 [m^3/h]	Q_{max} EN 1092-1 [m^3/h]	Q_{min} ASME B16.5 [m^3/h]	Q_{max} ASME B16.5 [m^3/h]
15	½"	0.45	5.07	0.44	4.94
25	1"	0.81	11.40	0.81	11.40
40	1½"	2.04	28.58	2.04	28.58
50	2"	3.53	49.48	3.53	49.48
80	3"	7.74	108.37	7.74	108.37
100	4"	13.30	186.22	13.30	186.21
150	6"	30.13	421.86	30.13	421.86
200	8"	56.60	792.42	56.60	792.42
250	10"	90.48	1 266.8	90.48	1 266.8
300	12"	131.41	1 839.8	131.41	1 839.8

Values based on water at 20 °C (68 °F)

Air

Size DN to EN 1092-1	DN to ASME B16.5	Q_{min} EN 1092-1 [m^3/h]	Q_{max} EN 1092-1 [m^3/h]	Q_{min} ASME B16.5 [m^3/h]	Q_{max} ASME B16.5 [m^3/h]
15	½"	6.80	25.33	6.72	24.70
25	1"	10.20	81.43	10.20	81.43
40	1½"	25.35	326.63	25.35	326.63
50	2"	43.89	565.49	43.89	565.49
80	3"	96.14	1 238.64	96.14	1 238.60
100	4"	165.19	2 128.27	165.19	2 128.27
150	6"	374.23	4 821.60	374.23	4 821.60
200	8"	702.95	9 056.8	702.95	9 056.8
250	10"	1 123.7	14 478.0	1 123.7	14 478.0
300	12"	1 632.1	21 028.0	1 632.1	21 028.0

Values based on air at 20 °C (68 °F) and 1.013 bar_{abs} (14.7 psi_{abs})

Flow rate limits

Product	Nominal diameters to EN	Nominal diameters to ASME	Minimum flow rates [m/s]	Maximum flow rates [m/s]
Liquids	DN 15 … DN 300	DN ½"…DN 12"	$0.5 \times (998/\rho)^{0.5}$ 1)	$7 \times (998/\rho)^{0.47}$ 1)
Gas, steam/vapor	DN 15 … DN 300	DN ½"…DN 12"	$6 \times (1.29/\rho)^{0.5}$ 2)	$7 \times (998/\rho)^{0.47}$ 3)

ρ = operating density [kg/m^3]

1) Minimum flow rate 0.3 m/s (0.984 ft/s), maximum flow rate 7 m/s (23 ft/s)
2) Minimum flow rate 2 m/s (6.6 ft/s)
3) Maximum flow rate 80 m/s (262 ft/s); DN 15: 45 m/s (148 ft/s) and DN 25: 70 m/s (230 ft/s)

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Measuring range saturated steam: 1 to 7 bar

Overpressure [bar]		**1**		**3.5**		**5.2**		**7**	
Density [kg/m³]		**1.13498**		**2.4258**		**3.27653**		**4.16732**	
Temperature [°C]		**120.6**		**148.2**		**160.4**		**170.6**	
Flow [kg/h]		**min.**	**max.**	**min.**	**max.**	**min.**	**max.**	**min.**	**max.**
DN to EN 1092-1	**DN to ASME B16.5**								
15	½"	5.87	28.75	7.68	61.46	8.93	83.01	10.06	105.57
25	1"	11.82	92.42	17.28	197.53	20.09	266.81	22.66	339.35
40	1½"	29.64	370.71	43.33	792.33	50.63	1 070.2	56.8	1 361.2
50	2"	51.31	641.82	75.02	1 371.8	87.19	1 852.8	98.33	2 356.6
80	3"	112.41	1 405.8	164.33	3 004.7	191	4 058.4	215.39	5 161.8
100	4"	193.14	2 415.5	282.36	5 162.7	328.16	6 973.3	370.09	8 869.2
150	6"	437.56	5 472.4	639.69	11 696	743.45	15 798	838.44	20 093
200	8"	821.9	10 279.0	1 201.6	21 970.0	1 396.5	29 675.0	1 574.9	37 743
250	10"	1 313.9	16 433.0	1 920.9	35 122.0	2 232.5	47 439.0	2 517.7	60 337
300	12"	1 908.3	23 866.0	2 789.8	51 010.0	3 242.4	68 899.0	3 656.6	87 630

Measuring range saturated steam: 10.5 to 20 bar

Overpressure [bar]		**10.5**		**14**		**17.5**		**20**	
Density [kg/m³]		**5.88803**		**7.60297**		**9.31702**		**10.5442**	
Temperature [°C]		**186.2**		**198.5**		**208.7**		**215**	
Flow [kg/h]		**min.**	**max.**	**min.**	**max.**	**min.**	**max.**	**min.**	**max.**
DN to EN 1092-1	**DN to ASME B16.5**								
15	½"	12.78	149.17	16.51	192.61	20.23	236.04	22.89	267.12
25	1"	26.93	479.46	30.6	619.11	33.87	758.69	36.04	858.62
40	1½"	67.51	1 878.2	76.72	2 150.7	84.93	2 395.3	90.35	2 557.7
50	2"	116.89	3 251.7	132.82	3 723.4	147.03	4 147	156.42	4 428.1
80	3"	256.03	7 122.4	290.93	8 155.8	322.06	9 083.7	342.62	9 699.3
100	4"	439.91	12 238	499.9	14 013	553.38	15 608	588.69	16 666
150	6"	996.62	27 725	1 132.5	31 747	1 253.7	35 359	1 333.7	37 756
200	8"	1 872.1	52 079	2 127.3	59 634	2 354.9	66 419	2 505.2	70 921
250	10"	2 992.7	83 254	3 400.7	95 333	3 764.6	106 180	4 004.9	113 380
300	12"	4 346.5	120 920	4 939.1	138 460	5 467.5	154 210	5 816.5	164 660

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SITRANS FX300

Measuring range saturated steam: 15 to 100 psig

Overpressure [psig]		**15**		**50**		**75**		**100**	
Density [lbs/ft³]		**0.0719**		**0.1497**		**0.2036**		**0.2569**	
Temperature [°F]		**249.98**		**297.86**		**320.36**		**338.184**	
Flow [lbs/h]		**min.**	**max.**	**min.**	**max.**	**min.**	**max.**	**min.**	**max.**
DN to EN 1092-1	**DN to ASME B16.5**								
15	½"	12.95	64.35	16.83	133.87	19.62	182.02	22.04	229.63
25	1"	26.25	206.83	37.86	430.3	44.15	585.06	49.59	738.09
40	1½"	65.81	829.61	94.92	1 726	110.68	2 346.7	124.32	2 960.5
50	2"	113.94	1 436.3	164.34	2 988	191.63	4 062.9	215.23	5 125.6
80	3"	249.57	3 146.1	360	6 545.3	419.74	8 899.4	471.45	11 227
100	4"	428.81	5 405.7	618.51	11 246	721.21	15 291	810.06	19 291
150	6"	971.47	12 246	1 401.2	25 478	1 633.9	34 642	1 835.2	43 703
200	8"	1 824.8	23 004	2 632.1	47 859	3 069.1	65 072	3 447.2	82 092
250	10"	2 917.2	36 774	4 207.7	76 508	4 906.4	104 030	5 510.8	131 230
300	12"	4 236.8	53 410	6 111.1	111 120	7 125.8	151 080	8 003.6	190 600

Measuring range saturated steam: 150 to 300 psig

Overpressure [psig]		**150**		**200**		**250**		**300**	
Density [lbs/ft³]		**0.3627**		**0.4681**		**0.5735**		**0.6792**	
Temperature [°F]		**366.08**		**388.04**		**406.22**		**422.06**	
Flow [lbs/h]		**min.**	**max.**	**min.**	**max.**	**min.**	**max.**	**min.**	**max.**
DN to EN 1092-1	**DN to ASME B16.5**								
15	½"	27.79	324.21	35.86	418.47	43.94	512.66	52.04	607.12
25	1"	58.93	1 042.1	66.94	1 345.1	74.1	1 647.8	80.63	1 951.5
40	1½"	147.72	4 107.2	167.83	4 702.8	185.76	5 237	202.15	5 728
50	2"	255.75	7 111.9	290.56	8 141.9	321.6	9 066.8	350	9 917
80	3"	560.19	15 578	636.44	17 834	704.43	19 860	766.6	21 722
100	4"	962.54	26 766	1 093.5	30 643	1 210.4	34 124	1 317.2	37 324
150	6"	2 180.6	60 639	2 477.4	69 421	2 742.1	77 307	2 984	84 556
200	8"	4 096.1	113 900	4 653.6	130 400	5 150.7	145 210	5 605.2	158 830
250	10"	6 548.1	182 090	7 439.3	208 460	8 234.1	232 140	8 960.6	253 910
300	12"	9 510.2	264 460	10 805	302 760	11 959	337 150	13 014	368 770

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Overview

SITRANS FVA250 variable area meter

Application

The SITRANS FVA250 variable area meters with a standard length of 250 mm (9.84 inch) and their completely metal design can be used to measure many different types of liquids and gases passing through closed piping. The robust design means that they can also be used in harsh conditions. Different types of flanges, liners and float materials satisfy the requirements of the pharmaceutical and chemical industries.

The measured value is displayed directly on the scale, and output via a switch contact or as a current output (HART or PROFIBUS PA).

The SITRANS FVA250 is primarily used in the following industries:

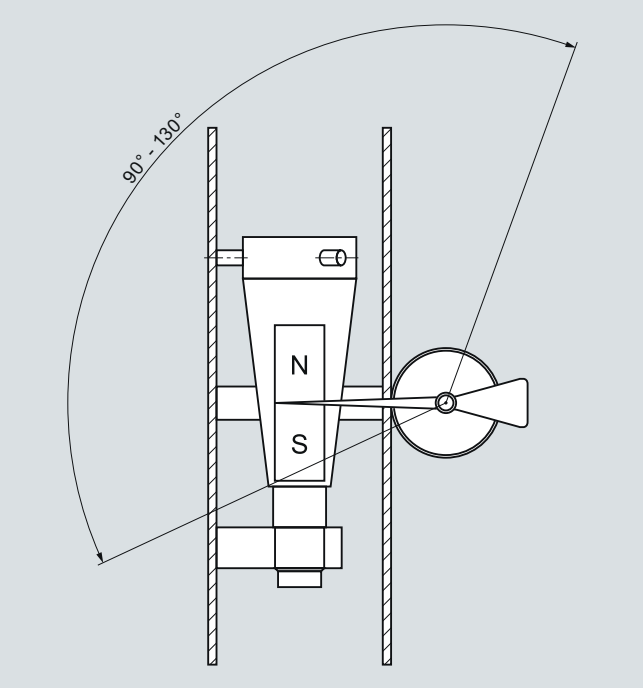
- Chemical industry
- Water
- Power generation and distribution

Special features

- Standard design available at short notice
- Robust all-metal fitting with impact-resistant housing cover
- Can also be used for corrosive and flammable media
- Use possible at high pressures and temperatures
- Product and percentage scales
- Can be optionally fitted with heating and cooling sheaths
- Contamination-insensitive guiding of float

Design and mode of operation

Like the other units in the SITRANS F VA range, the SITRANS FVA250 operates according to the variable-area flow tube principle: the flowing medium lifts the conical float in the flow tube. The annular gap is then increased until there is an equilibrium between the buoyant force of the medium and the force due to the weight of the float. The height of the float is directly proportional to the flow quantity. The movement of the float is transmitted by a magnet to a slave magnet in the display unit outside the flow tube.



Flow tube/tube angle

Float damping

A float damping is generally recommended

- for gas measurements.
- if air pockets cannot be completely prevented in the medium.
- if the pipelines are subject to knocking caused by delays in the flow rate, e.g. due to fast throttling or when the pipe is shut off.
- if turbulence, pulsations or other instabilities cause the float to oscillate.
- when it is not possible to slowly build up the flow pressure.
- when it is not possible to prevent vibrations in the pipeline.

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SITRANS FVA250 variable area meter

Technical specifications

Application	See page 4/391
Design and mode of operation	See page 4/391
Measuring principle	Variable area flowmeter
Input	
Measuring range	See table on page 4/394
Pressure rating	PN 10 ... PN 40 (145 ... 580 psi) depending on version (see table on page 4/394)
Flow	upwards
Dimensions for mesured variables	l/h, from 4000 l/h (17.6 USgpm) in m^3/h
Rated conditions	
Mounting	vertical
Ambient temperature	
• With local display	-40 ... +80 °C (-40 ... +176 °F)
• With limit transmitter	-40 ... +65 °C (-40 ... +149 °F)
• With HART, PA output	-40 ... +70 °C (-40 ... +158 °F)
Medium conditions	
• Messuring accuracy - For liquids - For gases	 ± 1.6 % ± 2.0 %
• Temperature of medium	See page 4/394
Design	
Flanges	EN 1092-1, ANSI
Material	
• Fitting	Stainless steel, mat. No. 1.4404/316L
• Float	Stainless steel, mat. No.1.4404/316L, Hastelloy, PTFE
• Wetted parts materials	Stainless steel mat. No. 1.4404/316L, PTFE, C 22.8, Hastelloy depending on version
Degree of protection (display unit)	
• Display unit made of aluminum	IP65
• Display unit made of stainless steel	IP66
Electromagnetic immunity	
• EN 61000-6-2: 1999	Interference immunity industrial environment
• EN 50081-1	Emitted interference residential environment
• EN 55011: 1998 + A1: 1999	Group 1, Class B
• NAMUR recommendation	NE 21

Classification according to pressure equipment directive (DGRL 97/23/EG)

	Order No. 7ME5822-7ME5823-	Permissible media	Category
DN 15	xAxxx-xxxx	Gases of fluid group 1 and liquids of fluid group 1	Article 3.3
DN 20	xFxxx-xxxx		Article 3.3
DN 25	xBxxx-xxxx		Article 3.3
DN 32	xGxxx-xxxx		III
DN 40	xHxxx-xxxx		III
DN 50	xCxxx-xxxx		III
DN 65	xJxxx-xxxx		III
DN 80	xDxxx-xxxx		III
DN 100	xExxx-xxxx		III

Technical specifications of contacts

Limit transmitter	
Switching principle	Inductive contact, single contact and twin contact
Connection	M20x1.5
Auxiliary power supply	8 V DC
Self-inductance	500 µH
Self-capacitance	80 nF
Ambient temperature	
• When used in non-hazardous locations	-40 ... +65 °C (-40 ... +149 °F)
Explosion protection	II 2G EEx ia IIC T6 - T4
EC-Type Examination Certificate for Directive 94/9/EG	PTB 99 ATEX 2219 X
Electric remote transmitter, signal output HART	
Connection	2 wire connection
Auxiliary power supply	14 ... 30 V DC
Output	4 ... 20 mA
Load	min. 250 Ω
Ambient temperature	
• When used in non-hazardous l ocations	-40 ... +70 °C (-40 ... +158 °F)
Explosion protection	ATEX II 2G EEx ia IIC T6
EC-Type Examination Certificate for Directive 94/9/EG	DMT 00 ATEX E 075
Electric remote transmitter, signal output PROFIBUS PA	
Auxiliary power supply	10 ... 25 V DC
Basic current	< 16.5 mA
Fault current	< 18 mA
Transfer rate	31.25 kBaud
Ambient temperature	
• When used in non-hazardous locations	-40 ... +70 °C (-40 ... +158 °F)
Explosion protection	ATEX II 2G EEx ia IIC T6
EC-Type Examination Certificate for Directive 94/9/EG	DMT 00 ATEX E 075

Function

Device setting

Limit sensor (inductive contact)

The measuring instrument is supplied as ordered ready for operation. Limit sensors are preset to the required values. If you have not stipulated any particular specifications, the basic settings are as follows:

- 1 contact device:
  Min. contact switching point at 10 % falling flow rate.
  (damped/closed-circuit operation)
- 2 contact devices:
  Min. contact switching point at 10 % falling flow rate and max. contact switching point at 90 % rising flow rate

Adjusting the limit sensors

The contacts can be adjusted over the contact position indicator located on the scale. For this purpose, you need to remove the indicator hood, loosen the contact position indicator, set it to the required value and tighten again.

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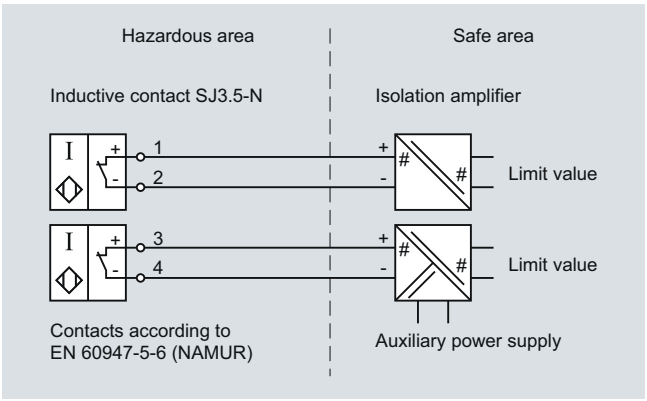
Analog output with magnetoelectrical transmitter

The magnetoelectrical transmitter is factory-calibrated to the scale intervals.

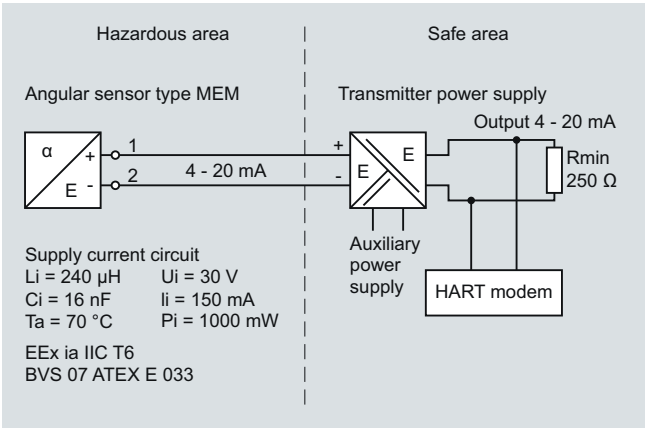
For HART, the signal output is solely available with 2-wire connection with 4 to 20 mA. The signal output and the limit value can be configured over a HART modem using the configuration program SIMATIC PDM.

The PROFIBUS PA is fitted with an interface for a digital communication circuit in accordance with the FISCO model. The signal output is configured using SIMATIC PDM.

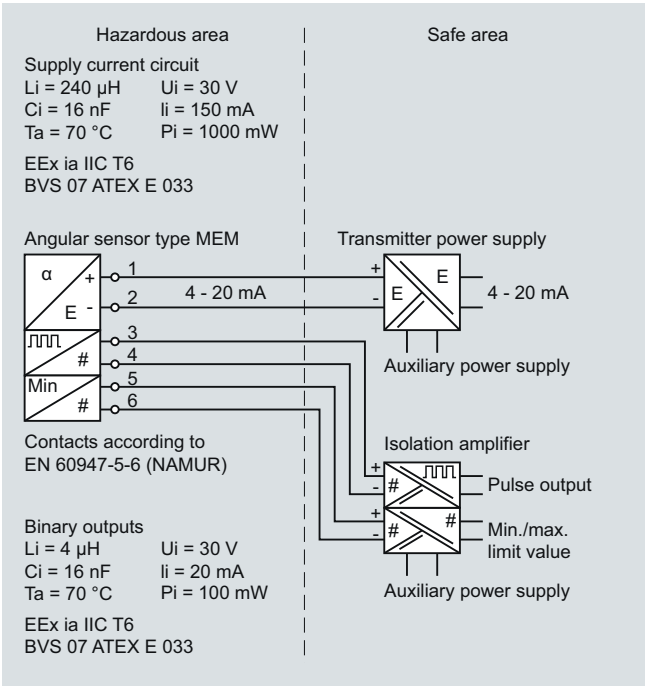


Connection diagram for inductive limit transmitter

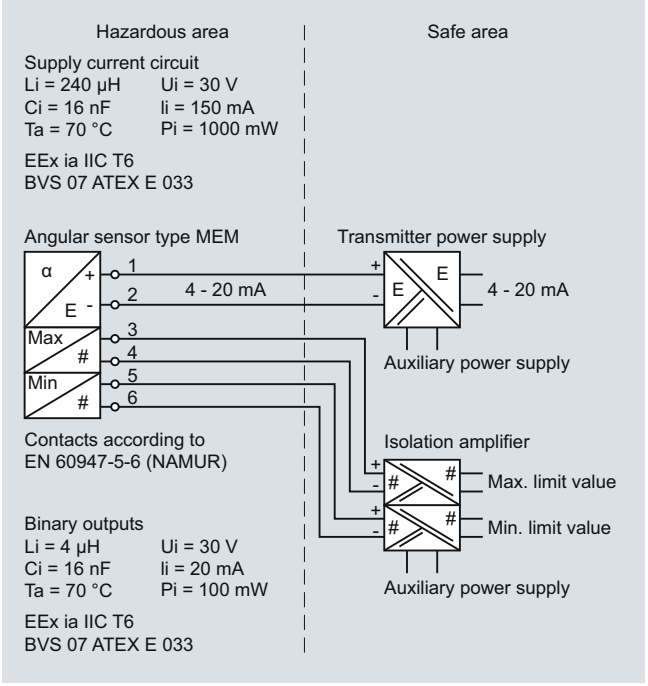
Schematics



Connection diagram for HART magnetoelectrical transmitters



Connection diagram for HART transmitters with 4 to 20 mA output, pulse output and limit contact



Connection diagram for HART transmitters with 4 to 20 mA output, and 2 limit contacts

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SITRANS FVA250 variable area meter

Measuring ranges for liquids/gases

		Design	CF-S	EF-H	FF-P[1]
		Wetted parts materials	Mat. No. 1.4404/316L	Hastelloy C	PTFE
		Fitting	Mat. No. 1.4404/316L	Mat. No. 1.4571/316Ti	Mat. No. 1.4571/316Ti with PTFE liner
		Flange	Mat. No. 1.4404/316L	≤ DN 25: Hastelloy > DN 25: Hastelloy/ stainless steel	Mat. No. 1.4571/316Ti with PTFE liner
		Float/flow tube	Mat. No. 1.4404/316L	Hastelloy	PTFE
		Max. temperature of medium	200 °C (392 °F) optional 350 °C (662 °F)	200 °C (392 °F) optional 350 °C (662 °F)	125 °C (257 °F)
Possible flange connections to EN 1092-1 gray = Type CF-S and Type EF-H X = Type FF-P		Nominal pressure	DN15 ... DN 80 (½ ... 3 inch): PN 40 (580 psi) DN100 (4 inch): PN 16 (232 psi) optional up to 400 bar (5800 psi)	DN15 ... DN 80 (½ ... 3 inch): PN 40 (580 psi) DN100 (4 inch): PN 16 (232 psi) optional up to 400 bar (5800 psi)	PN 16 (232 psi)
		Measuring ranges	Liquids in l/h with density: 1,0 kg/l, temperature 20 °C (68 °F), viscosity: 1 mPa·s Gas in m^3/h with density: 1,293 kg/m^3, temperature 20 °C (68 °F), viscosity: 0,0181 mPa·s, p_e = 0 bar (0 psi)		

DN 15[2]	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100	Pressure loss [mbar] in relation to full-scale value	Order code in MLFB	Liquid l/h	Gas m^3/h	Liquid l/h	Gas m^3/h	Liquid l/h	Gas m^3/h
									40	Z + K1A	5	0.15	–	–	–	–
									40	Z + K1B	10	0.30	–	–	–	–
									40	A	16	0.48	–	–	–	–
									40	B	25	0.75	–	–	–	–
									40	C	40	1.3	–	–	–	–
X		X							40	Z + K1C	50	1.5	50	1.5	50[1]	1.5[1]
X		X							40	D	70	2.1	70	2.1	70[1]	2.1[1]
X		X							60	E	100	3.0	100	3.0	100[1]	3.0[1]
X		X							60	F	160	4.6	160	4.6	160	4.6
X		X							60	G	250	7.0	250	7.0	250	7.0
X		X							70	H	400	11.0	400	11.0	400	11.0
X		X							80	J	600	17.0	600	17.0	600	17.0
		X							60	K	1000	30.0	1000	30.0	1000	30.0
		X							70	L	1600	46.0	1600	46.0	1600	46.0
		X							DN < 40: 100 DN ≥ 40: 50	M	2500	70.0	2500	70.0	2500	70.0
					X				DN < 40: 240 DN ≥ 40: 80	N	4000	110.0	4000	110.0	4000	110.0
					X				DN < 40: 180 DN ≥ 40: 90	P	6000	170.0	6000	170.0	6000	170.0
					X				110	Q	10000	290.0	10000	290.0	10000	290.0
					X		X		DN < 80: 230 DN ≥ 80: 70	R	16000	460.0	16000	460.0	16000	460.0
					X				DN < 80: 230 DN ≥ 80: 70	S	20000	550.0	20000	550.0	–	–
							X		DN < 80: 500 DN ≥ 80: 100	T	25000	700.0	25000	700.0	25000	700.0
								X	DN < 80: 350 DN ≥ 80: 120	U	40000	1100.0	40000	1100.0	40000	1100.0
								X	DN < 80: 350 DN ≥ 80: 120	V	50000	1350.0	50000	1350.0	50000	1350.0
									360	W	60000	1700.0	60000	1700.0	–	–
									600	Z + K1D	80000	2400.0	80000	2400.0	–	–
									600	X	100000	3000.0	100000	3000.0	–	–

[1] The measuring range dynamics is always 1:10. For type FF-P, the measuring range dynamics 1:5 for small flow rates.
[2] Not available in ANSI ½" for type FF-P; rated size available: ANSI ¾".

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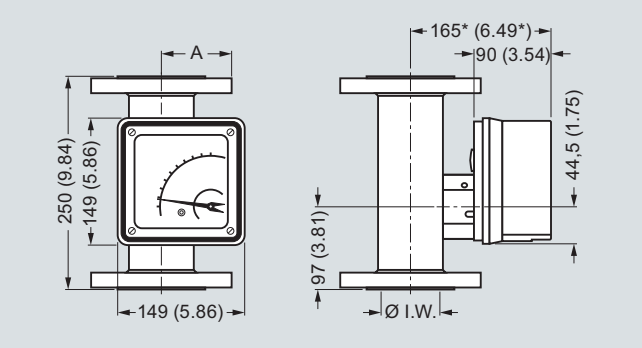
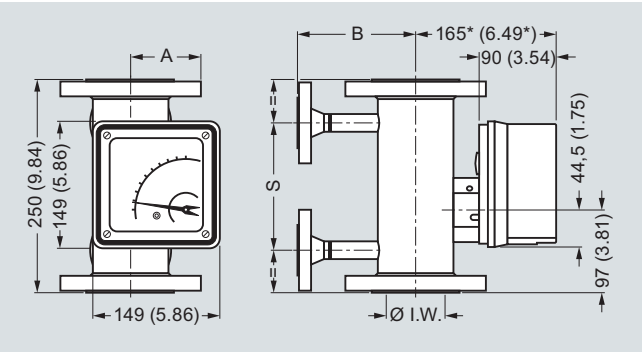
Dimensional drawings



SITRANS FVA250, enclosure of display unit made of aluminum, dimensions in mm (inch)

DN		ANSI		I. W.		A		Weight	
				mm	inch	mm	inch	kg	lbs
15	PN 40	½“	150 lbs	26	1.02	74	2.91	3,0	6.6
20	PN 40	¾“	150 lbs	26	1.02	74	2.91	3,0	6.6
25	PN 40	1“	150 lbs	32	1.26	77	3.03	4,2	9.3
32	PN 40	1¼“	150 lbs	32	1.26	77	3.03	5,2	11.5
40	PN40	1½“	150 lbs	46	1.81	88	3.46	6,0	13.2
50	PN 40	2“	150 lbs	70	2.76	97	3.82	7,5	16.5
65	PN 16	2½“	150 lbs	70	2.76	97	3.82	8,5	18.7
80	PN 16	3“	150 lbs	102	4.02	113	4.45	13	28.7
100	PN 16	4“	150 lbs	125	4.92	126	4.96	18	39.7

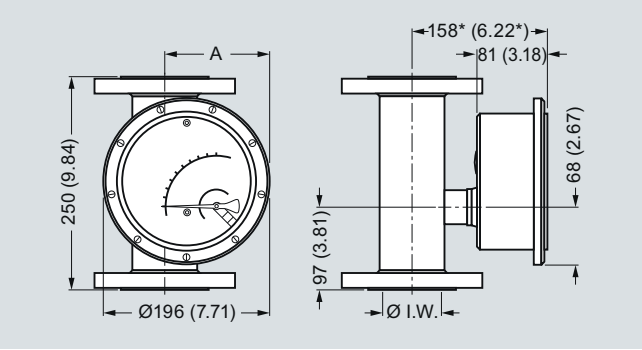
* + 100 mm (3.94 inch) with pulled-out display unit



SITRANS FVA250, enclosure of display unit made of aluminum with heating connection, dimensions in mm (inch)

DN		B (flange)		B (Ermeto)		S		Weight	
		mm	inch	mm	inch	mm	inch	kg	lbs
15	½“	110	4.33	53	2.09	150	5.91	3,0	6.6
20	¾“	110	4.33	53	2.09	150	5.91	3,0	6.6
25	1“	110	4.33	58,5	2.3	150	5.91	4,2	9.3
32	1¼“	110	4.33	58,5	2.3	150	5.91	5,2	11.5
40	1½“	130	5.12	63	2.48	150	5.91	6,0	13.2
50	2“	140	5.51	77,5	3.05	150	5.91	7,5	16.5
65	2½“	140	5.51	77,5	3.05	150	5.91	8,5	18.7
80	3“	160	6.3	93,5	3.68	150	5.91	13	28.7
100	4“	175	6.89	110	4.33	120	4.72	18	39.7

* + 100 mm (3.94 inch) with pulled-out display unit



SITRANS FVA250, enclosure of display unit made of stainless steel, dimensions in mm (inch)

DN		ANSI		I. W.		A		Weight	
				mm	inch	mm	inch	kg	lbs
15	PN 40	½“	150 lbs	26	1.02	103	4.06	3,0	6.6
20	PN 40	¾“	150 lbs	26	1.02	103	4.06	3,0	6.6
25	PN 40	1“	150 lbs	32	1.26	105	4.13	4,2	9.3
32	PN 40	1¼“	150 lbs	32	1.26	105	4.13	5,2	11.5
40	PN 40	1½“	150 lbs	46	1.81	115	4.53	6,0	13.2
50	PN 40	2“	150 lbs	70	2.76	129	5.08	7,5	16.5
65	PN 16	2½“	150 lbs	70	2.76	129	5.08	8,5	18.7
80	PN 16	3“	150 lbs	102	4.02	145	5.71	13	28.7
100	PN 16	4“	150 lbs	125	4.92	158	6.22	18	39.7

* + 100 mm (3.94 inch) with pulled-out display unit

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SITRANS FVA250 variable area meter

Selection and Ordering data	Order No.	Order Code
SITRANS FVA250 variable area meter, made completely of metal		
• for the measurement of liquids	7ME5822-□□□0□-□□□□	□□□
• for the measurement of gases	7ME5823-□□□0□-□□□□	□□□
Design		
Type: CF-S (standard) Fitting: Stainless steel 1.4404/316L, Flange: Stainless steel 1.4404/316L float: Stainless steel 1.4404/316L	2	
Type: EF-H Fitting: Stainless steel 1.4404/316L, Flange: 1.4404/316L with Hastelloy liner float: Hastelloy	4	
Type: FF-P Fitting: Stainless steel 1.4404/316L, Flange: 1.4404/316L with PTFE liner float: PTFE	5	
Nominal diameter/flange connection		
Flange to DIN 2501		
DN 15, PN 40	A	
DN 20, PN 40	F	
DN 25, PN 40	B	
DN 32, PN 40	G	
DN 40, PN 40	H	
DN 50, PN 40	C	
DN 65, PN 16	J	
DN 65, PN 40	Z	J 1 A
DN 80, PN 40	D	
DN 100, PN 16	E	
DN 100, PN 40	Z	J 1 B
Flanges to ASME		
½" ANSI 150 RF B16.5 (not for DN15 with type FF-P)	K	
½" ANSI 300 RF B16.5 (not for DN15 with type FF-P)	Z	J 2 A
¾" ANSI 150 RF B16.5	L	
¾" ANSI 300 RF B16.5	Z	J 2 B
1" ANSI 150 RF B16.5	M	
1" ANSI 300 RF B16.5	Z	J 2 C
1¼" ANSI 150 RF B16.5	N	
1¼" ANSI 300 RF B16.5	Z	J 2 D
1½" ANSI 150 RF B16.5	P	
1½" ANSI 300 RF B16.5	Z	J 2 E
2" ANSI 150 RF B16.5	Q	
2" ANSI 300 RF B16.5	Z	J 2 F
2½" ANSI 150 RF B16.5	R	
2½" ANSI 300 RF B16.5	Z	J 2 G
3" ANSI 150 RF B16.5	S	
3" ANSI 300 RF B16.5	Z	J 2 H
4" ANSI 150 RF B16.5	T	
4" ANSI 300 RF B16.5	Z	J 2 J

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Selection and Ordering data

Order No. | Order Code

SITRANS FVA250 variable area meter, made completely of metal

- for the measurement of liquids — **7ME5822 - ■■■ 0 ■ - ■■■■** | ■■■
- for the measurement of gases — **7ME5823 - ■■■ 0 ■ - ■■■■** | ■■■

Flow tube

Measuring range for liquids l/h	Measuring range for gases m³/h	Nominal diameters FF-P	EF-H	CF-S		Order Code
0.5 ... 5	0.015 ... 0.15	–	–	DN 15 ... 25	Z	K1A
1 ... 10	0.03 ... 0.3	–	–	DN 15 ... 25	Z	K1B
1.6 ... 16	0.045 ... 0.48	–	–	DN 15 ... 25	A	
2.5 ... 25	0.075 ... 0.75	–	–	DN 15 ... 25	B	
4 ... 40	0.13 ... 1.3	–	–	DN 15 ... 25	C	
5 ... 50	0.15 ... 1.5	DN 15 ... 25	DN 15 ... 25	DN 15 ... 25	Z	K1C
7 ... 70	0.2 ... 2.1	DN 15 ... 25	DN 15 ... 25	DN 15 ... 25	D	
10 ... 100	0.3 ... 3.0	DN 15 ... 25	DN 15 ... 25	DN 15 ... 25	E	
16 ... 160	0.5 ... 4.6	DN 15 ... 25	DN 15 ... 25	DN 15 ... 25	F	
25 ... 250	0.7 ... 7.0	DN 15 ... 25	DN 15 ... 25	DN 15 ... 25	G	
40 ... 400	1.0 ... 11	DN 15 ... 25	DN 15 ... 25	DN 15 ... 25	H	
60 ... 600	1.7 ... 17	DN 15 ... 25	DN 15 ... 25	DN 15 ... 40	J	
100 ... 1 000	3 ... 30	DN 25	DN 15 ... 25	DN 15 ... 40	K	
160 ... 1 600	4 ... 46	DN 25	DN 15 ... 25	DN 15 ... 40	L	
250 ... 2 500	7 ... 70	DN 25	DN 15 ... 25	DN 15 ... 40	M	
400 ... 4 000	11 ... 110	DN 50	DN 25 ... 65	DN 25 ... 65	N	
600 ... 6 000	17 ... 170	DN 50	DN 40 ... 65	DN 40 ... 65	P	
1 000 ... 10 000	29 ... 290	DN 50	DN 50 ... 65	DN 50 ... 65	Q	
1 600 ... 16 000	46 ... 460	DN 50 ... 80	DN 50 ... 80	DN 50 ... 80	R	
2 000 ... 20 000	55 ... 550	–	DN 50 ... 80	DN 50 ... 80	S	
2 500 ... 25 000	70 ... 700	DN 80	DN 50 ... 80	DN 50 ... 80	T	
4 000 ... 40 000	110 ... 1 100	DN 100	DN 80 ... 100	DN 80 ... 100	U	
5 000 ... 50 000	135 ... 1 350	DN 100	DN 80 ... 100	DN 80 ... 100	V	
6 000 ... 60 000	170 ... 1 700	–	DN 100	DN 100	W	
8 000 ... 80 000	240 ... 2 400	–	DN 100	DN 100	Z	K1D
10 000 ... 100 000	300 ... 3 000	–	DN 100	DN 100	X	

Temperature shield/degree of protection

Standard up to 150 °C for electric output/200 °C for local display	0
Standard, with displaced display	2
Stainless steel IP66 for process temperature 150 °C	5
Stainless steel IP66 preferred	6

Heating/cooling sheath

Without (standard)	0
H/C with flange connection	2
H/C without flange connection	3

Display

With local display	AA
With local display and an inductive contact, SJ 3.5N (1 NC for downward violation of a limit value)	CJ
With local display and two inductive contacts, SJ 3.5N	CL
With HART protocol, 4 ... 20 mA, EEx ia	FA
With HART protocol, 4 ... 20 mA, EEx ia with two inductive contacts, SJ 3.5N (1 NO contact for downward violation of a limit value, 1 NO contact for upward violation of a limit value)	GL
With HART protocol, 4 ... 20 mA, EEx ia with one inductive contact, SJ 3.5N and a pulse output (1 NC contact for downward violation of a limit value)	HJ
Electric transmitter with PROFIBUS PA, EEx ia	PA

Calibration

Standard calibration

• Without calibration certificate	0
• With calibration certificate	1

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SITRANS FVA250 variable area meter

Selection and Ordering data	Order Code
Further designs for measurement of liquids and gases	
Add "**-Z**" to Order No. and specify Order Code.	
Rating plate in English	**B11**
Factory certificate 2.2	**C11**
Acceptance test B to DIN 50 049, Section 3.1 and EN 10 204	**C12**
Measured medium specify in plain text (always required) Medium, measuring range, dimension, density, density dimension, viscosity, viscosity dimension, operating temperature, operating pressure	**Y01**
Silicone-free version	**Y04**
Stainless steel tag plate	**Y17**
Specify special version in plain text	**Y99**

Note:
For all possible combinations of nominal diameters and flow tubes, see the table on page 4/394

Selection and Ordering data	Order Code								
Further designs for measurement of liquids									
Add "**-Z**" to Order No. and specify Order Code									
Limit stop and damping	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
Type CF-S with liquid damping	**D01**	**D02**	**D03**	**D04**	**D05**	**D06**	**D07**	**D08**	**D09**
Type EF-H with liquid damping	**E01**	**E02**	**E03**	**E04**	**E05**	**E06**	**E07**	**E08**	**E09**
Type FF-P with liquid damping Note: The overall length for the FF-P version is 5 mm (0.2“) longer.	**P01**	**–**	**P03**	**–**	**–**	**P06**	**–**	**P08**	**P09**

Selection and Ordering data	Order Code								
Further designs for measurement of gases									
Add "**-Z**" to Order No. and specify Order Code.									
Limit stop and damping	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
Type CF-S with gas damping	**D11**	**D12**	**D13**	**D14**	**D15**	**D16**	**D17**	**D18**	**D19**
Type EF-H with gas damping	**E11**	**E12**	**E13**	**E14**	**E15**	**E16**	**E17**	**E18**	**E19**
Type FF-P with gas damping Note: The overall length for the FF-P version is 5 mm (0.2“) longer.	**P11**	**–**	**P13**	**–**	**–**	**P16**	**–**	**P18**	**P19**

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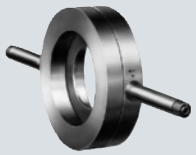
Primary differential pressure devices to DIN EN ISO 5167

		Nominal diameters	Nominal pressure
	Orifice plates with annular chambers	EN: DN 50 ... DN 1000 ASME: 2 inch … 40 inch	EN: PN 6 ... PN 100 ASME: Class 150 … 600
	Orifice plates with single tappings	EN: DN 50 ... DN 500 ASME: 2 inch … 20 inch	EN: PN 6 ... PN 315 ASME: Class 150 … 2500
	Metering pipe • Orifice plate with annular chambers, mounted between flanges	EN: DN 10 ... DN 50 ASME: ½ inch … 2 inch	EN: PN 10 ... PN 100 ASME: Class 150 … 600

Further products for the complete setup for flow measurements with a primary differential pressure device,

e. g. an orifice plate



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For **compensation vessels** (for steam), see chapter 2

For **threaded flange pairs**, see chapter 2

+

For **initial shut-off valves**, see chapter 2

+

For **valve manifolds**, see chapter 2 e. g.

5-spindle valve manifold or

Valve manifold combination DN 8 for vapor measurement

+

For **SITRANS P DS III differential pressure transmitter**, see chapter 2

Measuring cell options:
20, 60, 250, 600 and 1600 mbar

Overview

Primary differential pressure devices are standardized mechanical flow sensors, often also referred to as differential pressure transducers. The primary differential pressure devices are calculated and manufactured according to DIN EN ISO 5167.

Through constriction of the line diameter in the pressure device, the flow rate creates a differential pressure that is converted with the help of a differential pressure transmitter into a proportional current signal or flow value. The assignment of differential pressure to flow is created by means of a "calculation of the primary differential pressure device".

Primary differential pressure devices are suitable for single-phase media such as gas, vapor and liquids without solid components.

Requirement when ordering a primary differential pressure device

Always quote the orifice plate calculation and the classification according to the pressure equipment directive 97/23/EC (PED) when placing an order.

Orifice plate calculation - calculation protocol

For the "orifice plate calculation" service, you need to fill out the "Questionnaire for calculation of a primary differential pressure device according to DIN EN ISO 5167". The intelligent "SITRANS F O questionnaire online" can be found in the PIA Life Cycle Portal at http://www.siemens.com/pia-portal.

For this purpose, you need to specify all the data of the measuring point, medium, process and pipe data, as well as details of installation conditions, flow conditions, permissible pressure losses and accuracy requirements.

We will be unable to carry out the calculation if there are any data missing. A calculation protocol with a consecutive number documents the calculation of the orifice plate. We require this calculation protocol from the customer for manufacturing purposes. It is to be included in the order for the orifice plate.

Important note:

The "Orifice Plate Calculation with Preparation of a Calculation Protocol" service is a separate process, and must be carried out before the orifice plate is ordered.

The calculation protocol issued by the customer is to be included in the order for the orifice plate.

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Technical description

Classification in accordance with pressure equipment directive 97/23/EC (PED)

The pressure equipment directive must also be applied to the Orifice portfolio for use in Europe.

In compliance with the pressure equipment directive, equipment is divided into categories I to III or Article 3 paragraph 3 according to danger potential (medium/pressure/volume/nominal diameter).

Submission of this design data in accordance with pressure equipment directive 97/23/EC is mandatory for ordering and manufacture, and must be specified by customers in the orifice plate order.

The Order No. of the orifice plate contains the relevant Category I, II, III or Article 3 paragraph 3 in the order code.

Detailed information is available under "Pressure equipment directive 97/23/EC".

How to order the "Orifice plate with appended calculation protocol" product

To order an orifice plate, you need to supply the following data:

- Complete Order No. of the orifice plate, including the respective order code "Manufacture according to pressure equipment directive":
  - Category I, II, III or Article 3 paragraph 3 and the design data with Order Codes Y31 to Y35
  - Or without (only available outside Europe!)
- Appended "Calculation Protocol" issued by the customer with Order Code Y21 or Y22, or statement "Orifice plate without calculation" with Order Code Y01

The orifice plate can only be manufactured when it has been passed as a "clean order", i. e. it has been confirmed that the data of the Order No. match the data of the calculation protocol.

Benefits

- Primary differential pressure devices are suitable for universal use across the globe.
- Primary differential pressure devices are very robust and can be used in a wide range of nominal diameters.
- Suitable for high temperature and pressure ranges.
- No wet calibration required as they use an internationally standardized flow rate measurement procedure.
- The differential pressure transmitter can be used over a long distance from the measuring location.
- The differential pressure method is well known and has a large installed base.
- The SITRANS P differential pressure transmitter is easy to parameterize again if process data change. They are adapted by recalculating and assigning new parameters to the transmitter or, in the case of the version orifice plate with annular chamber, by using a new orifice disk.

Application

Power stations

Measurement of steam, condensate and water.

Petrochemical industry/Refineries

Measurement of water, steam and liquid and gas hydrocarbons.

Chemical industry

Measurement of various liquid and gas media.

Oil and gas industries

Measurement of liquid and gas hydrocarbons.

Design

Orifice plate with annular chambers

The version orifice plate with annular chambers comprises two support rings which are connected to the inside of the pipe over an annular chamber and an annular gap. Tapping sockets direct the differential pressure from the support rings to the differential pressure transmitter over shut-off fittings and differential pressure lines.

The orifice disk is inserted between the support rings together with a gasket.

Orifice plate with single tappings

In the version of the orifice plate with single tappings the orifice plate is a single unit. The inside of the tube is connected to the tapping sockets by two single tappings.

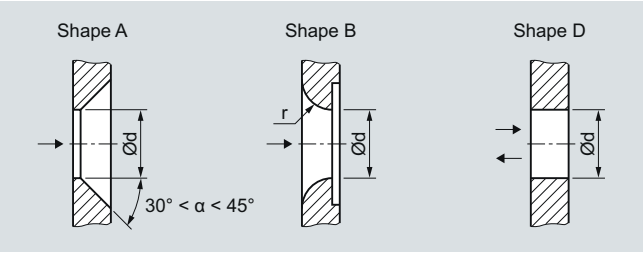
Both types of orifice plate are installed between two flanges in the pipeline.

Function

Mode of operation

The orifice plate creates a differential pressure. The pressure is transferred through the vertical columns of medium in the differential pressure lines to the measuring cell of the differential pressure transmitter. The transmitter converts the pressure signal with square-root characteristic into a flow-proportional current or into a digital signal, e. g. PROFIBUS.

Types of primary differential pressure devices



Shapes of the orifice disk aperture

The primary differential pressure devices are calculated and manufactured according to DIN EN ISO 5167. According to this, the application range of the standard orifice disk aperture form A is limited by the Reynolds number. The limits depend on the diameter ratio $\beta = d/D$. (D: internal diameter of pipe).

In the case of Reynolds numbers from approx. 500 to 2.5×10^5 and DN 40 to DN 150, the orifice disk aperture form B (quarter circle) can be used for slightly less accurate measurements. The profile radius r depends on the diameter ratio ß and results from the calculation of the diameter of the orifice disk aperture d.

The cylindrical orifice disk aperture form D is used for measurements in both flow directions.

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Tapping sockets

Type of threaded connections and welding connections dependent on the measured medium and the nominal pressure of the shut-off fitting

The type of socket connections depends on the measured medium and the nominal pressure of the shut-off fittings; the socket length depends on the nominal diameter (pipe diameter) of the primary differential pressure device and the operating temperature (because of the thermal insulation!). The socket position depends on the measured medium and the flow direction.

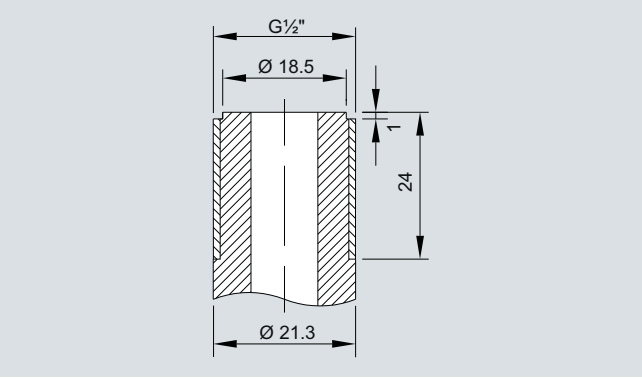
- With threaded connection G½ DIN ISO 228/1, connection dimensions to DIN 19207 Form V, for liquids and gases up to PN 160, for steam up to PN 100
- With threaded connection ½-14 NPT male, for version acc. to ASME up to class 600
- With Ø 12 mm pipe connection for pipe union with ferrule
- With Ø 21.3 mm welding connection for liquids and gases up to PN 400, and for steam up to PN 100, or Ø 24 mm for liquids and gases over PN 400, and for steam over PN 100

Other connections on request.

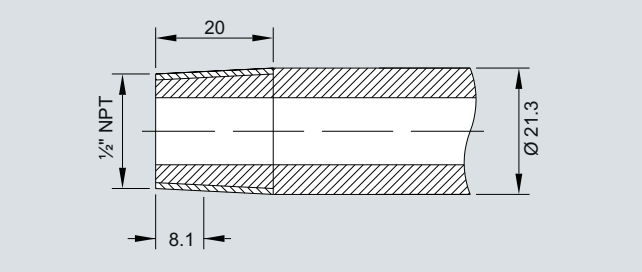
Length of tapping sockets

The length of the tapping sockets are specified in DIN 19205, Part 2.

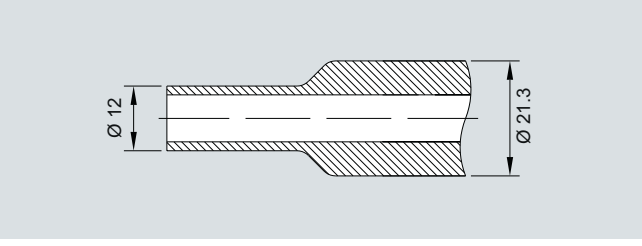
If using with high temperatures and stronger insulations, please quote the insulation thickness and the required length of the tapping sockets when placing an order.



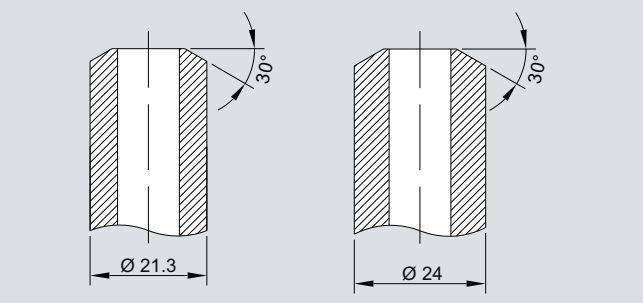
Threaded connections of tapping sockets for liquids and gases up to PN 160, for steam up to PN 100, dimensions in mm



Threaded connection ½-14 NPT male, dimensions in mm



With Ø 12 mm pipe for pipe union with ferrule, dimensions in mm

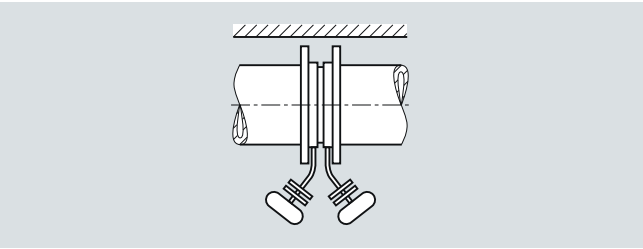


Welding connections of tapping sockets, dimensions in mm

Position of the tapping sockets

When measuring liquids and gases, the position of the tapping sockets must comply with the tables according to DIN 19205; when measuring steam, the compensation vessels must be at the same height.

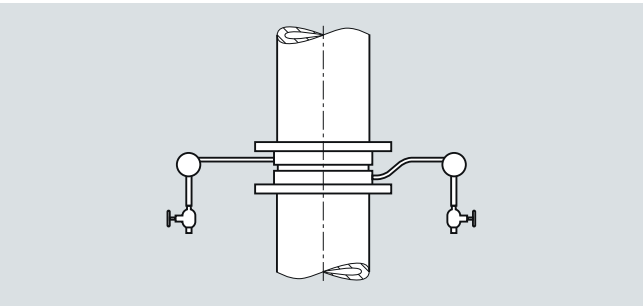
- Horizontal steam lines



Horizontal steam line in front of a wall with primary differential pressure device and valve combination; with annular chamber orifice plate or single part orifice plate with special length of 65 mm

In the case of horizontal steam lines, straight sockets are arranged opposite each other or, if the pipe is close to a wall, with bent sockets on one side.

- Vertical steam lines



Vertical steam line with primary differential pressure device and valve combination

In the case of vertical and inclined steam lines, the lower socket is bent upwards so that the connection flanges and compensation vessels are also at the same height.

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Technical description

Extract from DIN 19205, Part 1, August 1988

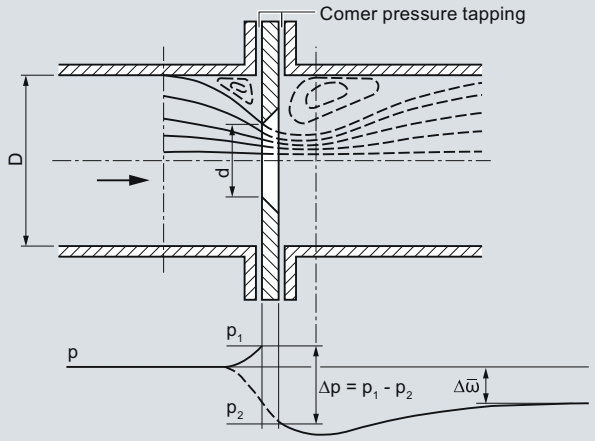
No.	Pipe position and flow direction			Position of the tapping sockets		Application
1	Horizontal		→	180°		With compensation vessels
2 [1)2)]				0°		
3 [1) 2)]						
4	Vertical	Rising	↑	90°		
5		Falling	↓			
6		Rising	↑	180°		
7		Falling	↓			
10	Horizontal		→	<γ [3)]		Without compensation vessels
11	Horizontal, vertical		→↓↑	180°		
13	Vertical		↓↑	90°		

[1)] Not possible with orifice plates with single tappings (overall length 40 mm). Special length of 65 mm is possible.

[2)] Only possible with orifice plates with annular chambers (overall length 65 mm) with bent tapping sockets.

[3)] Angle γ is dependent on the nominal pressure and nominal diameter in accordance with DIN 19 205.

Principle of the differential pressure method



D Internal diameter of pipe
d Diameter of orifice disk aperture
p Pressure in the pipe
p_1 Pressure immediately upstream of primary device
p_2 Pressure immediately downstream of primary device
Δp Differential pressure
$\Delta\bar{\omega}$ Remaining pressure loss

Principle of the differential pressure method: Pressure curve at a pipe restriction

A primary differential pressure device is installed at the measuring point to measure the flow. This restricts the pipe and has two connections for sampling the differential pressure. If the properties of the primary device and the medium are known such that the equation below can be evaluated, the differential pressure is a measure of the absolute flow. No reference measurements are required; the flow measurement can be checked independent of the device manufacturer.

The differential pressure method is based on the law of continuity and Bernoulli's energy equation.

According to the law of continuity, the flow of a moving medium in a pipeline is the same at all points. If the cross-section is reduced at one point, the flow velocity must increase at this point. According to Bernoulli's energy equation, the energy content of a flowing medium is constant and is the total of the static (pressure) and kinetic (movement) energies. An increase in the flow rate therefore results in a reduction in the static pressure (see the figure "Principle of the differential pressure method: Pressure curve at a pipe restriction"). This pressure difference Δp, the so-called differential pressure, is a measure of the flow.

In general the following equation applies: $q = c\sqrt{\Delta p}$

Where:

- q: flow (q_m, q_v) mass flow or volume flow
- Δp: Differential pressure
- c: Factor depending on the dimensions of the pipeline, the type of constriction, the density of the flowing medium etc.

According to this equation, the differential pressure created by the constriction is proportionally equal to the square of the flow (see the figure "Relationship between flow q and differential pressure Δp").

Integration

The orifice plate is installed between two flanges in the pipeline. Using compensation vessels (for steam) and initial shut-off valves, the differential pressure of the high-pressure side and low-pressure side is directed through differential pressure lines to a multiple valve manifold and on to the differential pressure transmitter. For media with extreme pressure and temperature fluctuations it makes sense to take an additional measurement of the pressure and temperature in order to correct the flow signal of the transmitter in a subsequent correction computer.

Selection of mounting point

The flow measuring regulations DIN EN ISO 5167 not only consider the design of primary differential pressure devices, but also assume that their installation is in accordance with the standard so that the specified tolerances can be retained. The required inlet and outlet pipe sections according to ISO 5167 can be found in the calculation protocol of the respective orifice plate. Configuration of the pipeline should allow for standardized installation (required inlet and outlet pipe section). Particular attention must be paid to ensure that the primary device can be fitted in a sufficiently long straight section of pipe. Bends, valves and similar should be fitted sufficiently far upstream of the primary device to prevent them having a detrimental effect. Primary devices with a large diameter ratio are particularly sensitive to interferences.

Design of measuring point

The design of the measuring point depends on the medium and on the spatial conditions. The designs for gas and water only differ with regard to the position of the tapping sockets (see the figure "Measuring setup"); compensation vessels must also be provided for steam.

Metering pipes

On lines with small nominal diameters (DN 10 to DN 50) the measurements are influenced by the wall roughness and diameter tolerances of the pipes, far more so than by large nominal diameters. These influences are counteracted by using metering pipes with fitting inlet and outlet pipe sections made of precision pipes. For exact measurements with metering pipes, the flow coefficient C needs to be determined by means of calibration.

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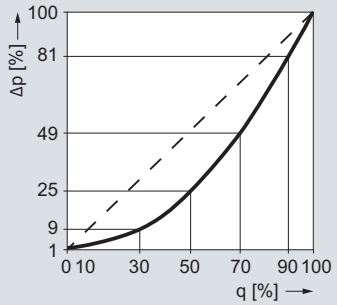
Options

Further versions that are available on request:

- Other types of primary differential pressure device: orifice plates without support rings, measurement flange orifice plates, venturi nozzles, classic venturi tubes etc.
- Other nominal diameters and nominal pressures to EN and ASME
- Other lengths, special lengths
- Other materials
- Sealing face with recess or groove
- Flushing rings
- Other tapping sockets, multiple tappings
- Material acceptance test certificates or cold water pressure tests

Characteristic curves

The orifice plate has a square-law relationship between differential pressure and flow. A square-root transmitter is required therefore to create a linear flow characteristic.



q	0	1	3	5	8	10	15	20	30	40	50	60	70	80	90	100	%
Δp	0	0,01	0,09	0,25	0,64	1	2,25	4	9	16	25	36	49	64	81	100	%

Setting range for application point of square-rooted characteristic for SITRANS P differential pressure transmitter

Relationship between flow q and differential pressure Δp

More information

- Standards
- Instruction Manual SITRANS P
- Installation Instructions

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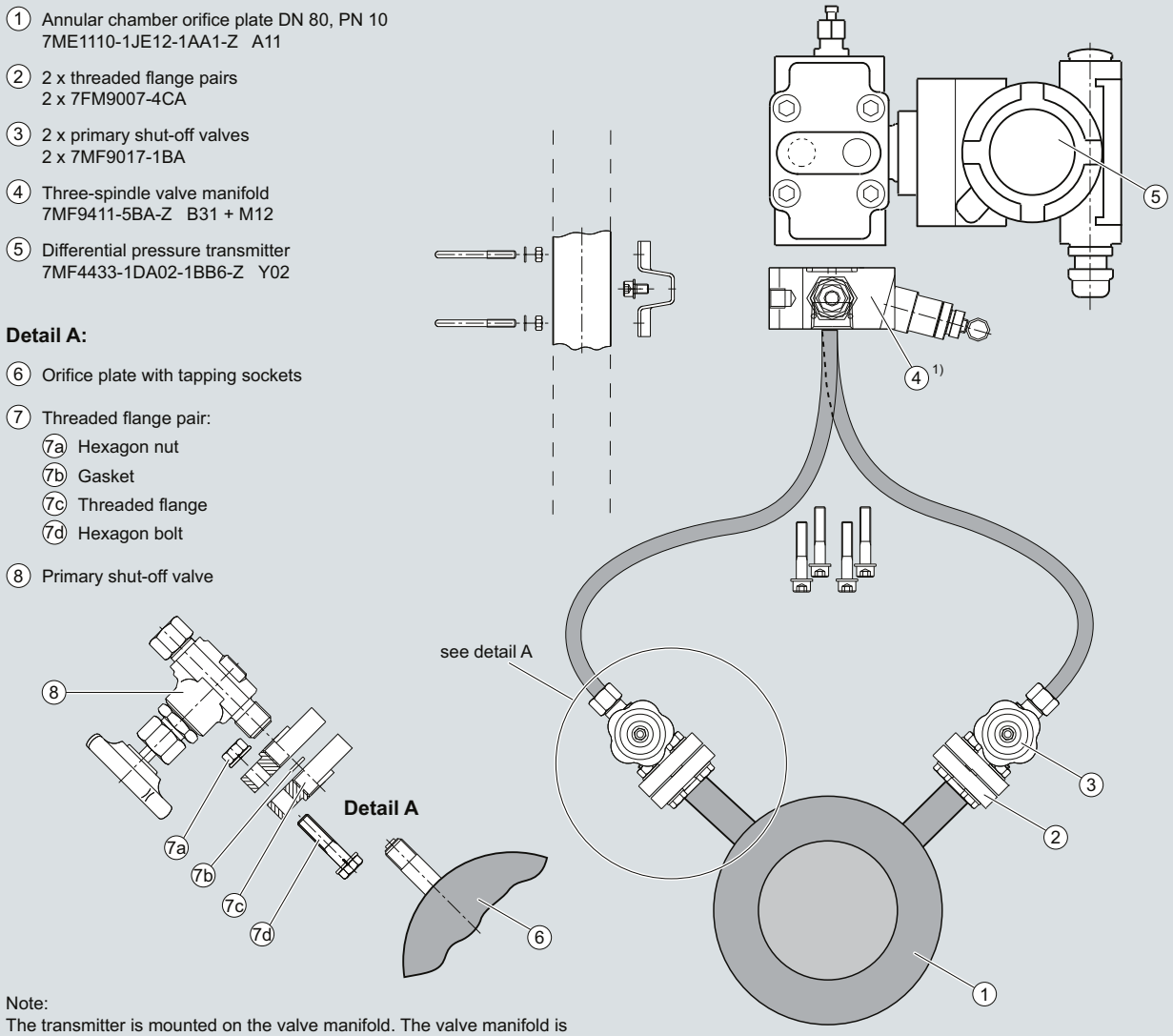
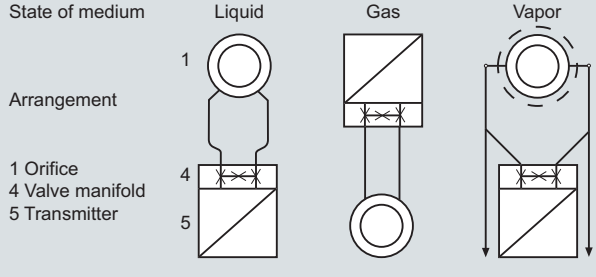
Technical description



Design of measuring point, example: gas measurement (non-corrosive, non-hazardous)



Measuring setup

Technical specifications

The technical properties of the orifice plates depend on the device:

- Nominal diameters
- Nominal pressure
- Materials
- Mass
- Temperature limits

Accessories

- Compensation vessels
- Threaded flange pairs
- Primary shut-offs
- Valve manifold
- Differential pressure lines (to be provided by the plant owner)
- Gaskets, bolts, screws (to be provided by the plant owner)
- Differential pressure transmitter

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Overview

The pressure equipment directive 97/23/EC applies to the alignment of the statutory orders of the European member states for pressure equipment used within its European area of validity. Equipment as defined by the directive includes vessels, pipelines and accessories with a maximum permissible pressure of more than 0.5 bar above atmospheric pressure.

Application of the pressure equipment directive was optional from November 29, 1999 onwards and has been mandatory since May 29, 2002.

Categorization according to danger potential

In compliance with the pressure equipment directive, equipment is divided into categories I to III or Article 3 paragraph 3 according to danger potential (medium/pressure/volume/nominal diameter).

The following criteria are decisive for assessment of the danger potential and are also shown in the diagrams (see "Characteristic curves").

Fluid group	Group 1 or 2
Aggregate state	Liquid or gaseous
Type of pressurized equipment	
• Pipeline	Nominal diameter, pressure or product of pressure and nominal diameter (PS * DN)

Note

Liquids according to Article 3 are those liquids whose steam pressure is not more than 0.5 bar above standard atmospheric pressure (1013 mbar) at the maximum permissible temperature.

The maximum permissible temperature for the liquids used is the user-defined maximum process temperature. This must be within the limits defined for the equipment.

Categorization of media (liquid/gaseous) into fluid groups

In compliance with Article 9, fluids are divided into the following fluid groups:

Group 1

	Explosive R phrases: e. g.: 2, 3 (1, 4, 5, 6, 9, 16, 18, 19, 44)		Very toxic R phrases: e. g.: 26, 27, 28, 39 (32)
	Extremely flammable R phrases: e. g.: 12 (17)		Toxic R phrases: e. g.: 23, 24, 25 (29, 31)
	Highly flammable R phrases: e. g.: 11, 15, 17 (10, 30)		Oxidizing R phrases: e. g.: 7, 8, 9 (14, 15, 19)

Flammable (where the maximum allowable temperature is above flashpoint).

Group 2

All fluids not belonging to Group 1.

Also applies to fluids which are e. g. dangerous to the environment, corrosive, dangerous to health, irritant or carcinogenic (if not highly toxic).

Conformity rating

Pressure equipment of categories I to IV must comply with the safety requirements of the directive and be assigned the CE symbol.

They must comply with a conformity rating procedure according to Appendix III of the directive.

Pressure equipment according to Article 3 paragraph 3 must be designed and manufactured in agreement with the sound engineering practice SEP applicable in a member country, and must not be assigned a CE symbol (CE symbols from other directives are not affected).

The manufacturer issues a declaration of conformity if the orifice plates are produced for use in the area covered by the PED and are assignable to the categories I, II or III. This declaration of conformity is given to the customer. Its contents depend on the design data of the customer's plant. The design data can only be provided by the operator/customer, and must be specified in the product order for the orifice plate.

Submission of the following design data is mandatory:

- Medium (name)
- Aggregate state (liquid or gas)
- Fluid group 1 or 2
- Max. permissible pressure (PS) of the plant (not PN)
- Max. permissible temperature TS of the plant (not operating temperature)
- Nominal diameter DN

Note

Equipment designed for media with a high danger potential (e.g. gases of fluid group 1) may also be used for media with a lower danger potential (e. g. gases of fluid group 2, or liquids of fluid groups 1 and 2).

The pressure equipment directive according to Article 1 paragraph 3 does not apply to equipment such as e. g. mobile offshore plants, ships, aircraft, water supply and waste water networks, nuclear plants, rockets and pipelines outside industrial plants.

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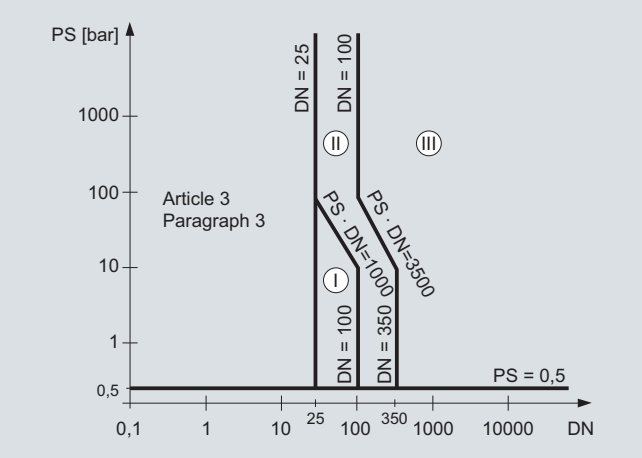
Pressure equipment directive 97/23/EC

Characteristic curves

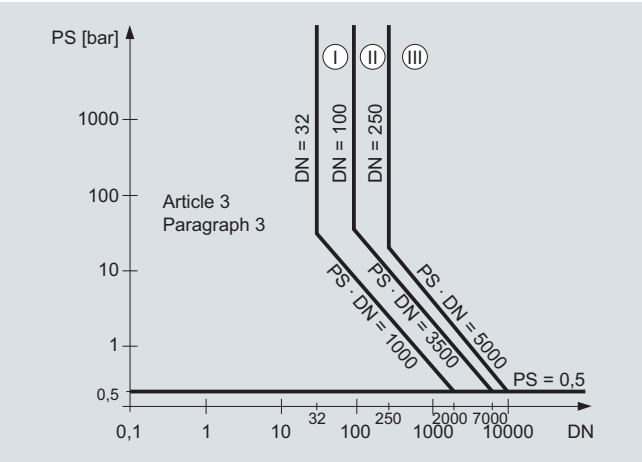
Gases of fluid group 1



Pipelines according to Article 3 Number 1.3 Letter a) First dash

Exception: Unstable gases (e.g. acetylene and ethylene) belonging to Categories I and II, must be included in Category III

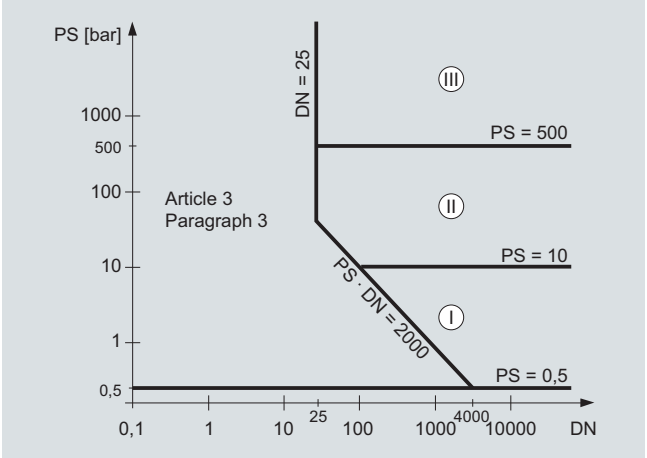
Gases of fluid group 2



Pipelines according to Article 3 Number 1.3 Letter a) Second dash

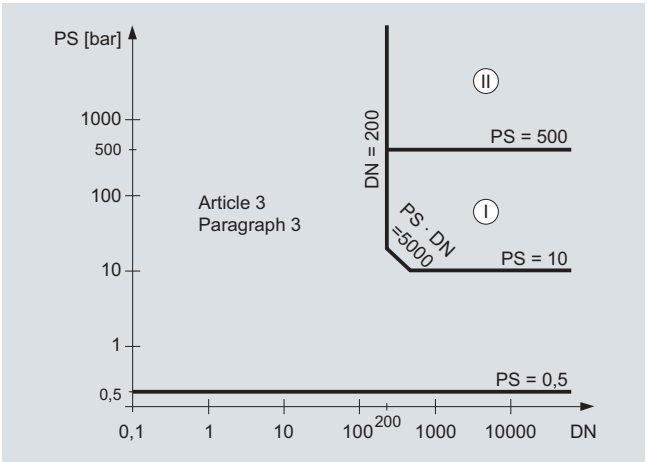
Exception: Liquids and steam, at temperatures > 350 °C belonging to Category II must be included in Category III.

Liquids of fluid group 1



Pipelines according to Article 3 Number 1.3 Letter b) First dash

Liquids of fluid group 2



Pipelines according to Article 3 Number 1.3 Letter b) Second dash

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Design data and product order for orifice plate

If the orifice plate is used in Europe the orifice plate is produced in accordance with the Pressure Equipment Directive 97/23/EC.

In this case the design data are mandatory for the production of an orifice plate and must be specified when ordering.

The required design data are specified in the order number of an orifice plate with the order code Y31 to Y35.

The following design data are mandatory; data can only be provided by the operator/customer:

Data for production according to Pressure Equipment Directive 97/23/EC - for use in Europe		
Order code for ordering	**Design data**	
Y31	• **Medium/measured medium**	**Name** _____
Y32	• **Aggregate state**	Liquid ☐ Gaseous ☐
Y33	• **Fluid group** - Explosive - Highly, extremely flammable - Oxidizing - Toxic, highly toxic	Group 1 ☐ **All others** Group 2 ☐
Y34	• Maximum permissible pressure (*not PN*)	**PS**[1] _____ ☐ bar ☐ psi
Y35	- at the **maximum permissible temperature**	**TS**[2] _____ ☐ °C ☐ °F
	[1] PS: Setting pressure of the safety mechanism (valve, bursting disk) [2] TS: Range of the temperature limits	
The following are already defined by the order number:		
	• **Nominal diameter**	**DN** _____
	• **Assignment of the category** Annex II of the Pressure Equipment Directive contains 4 diagrams with which the associated category of the primary differential pressure devices can be determined (see page 4/406). ☐ Article 3, Paragraph 3 ☐ Category II ☐ Category I ☐ Category III	

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SITRANS F O questionnaire online

Overview

SITRANS F O questionnaire online

For the calculation of a primary differential device in accordance with DIN EN ISO 5167 and for the production of primary differential devices in accordance with the Pressure Equipment Directive 97/23/EC the required data (measuring point and customer-specific data) can be entered in the "SITRANS F O questionnaire online".

The intelligent "SITRANS F O questionnaire online" can be found in the PIA Life Cycle Portal at:
http://www.siemens.com/pia-portal.

All the data required for calculating a primary differential device - orifice plates, nozzles, Venturi nozzles and the classic Venturi tube - can be entered here and attached to the order for calculation of an orifice plate as a Microsoft Excel file.

All the necessary data for calculating a primary differential device are requested menu-driven and can be verified by a check function.

Numerous new features provide the user with essential benefits when using the questionnaire online:

- Clear structure of all necessary parameters
- Menu-driven input of data and values through automatic specification of parameters and units, in accordance with the selected design, the given measured medium and the selected optimization criterion.
- Explanatory and in-depth notes as description and explanation of the parameter
- Numerous input options of customer and measuring point specific supplementary conditions
- Verification of all mandatory input boxes
- Safe data storage of entered customer-specific parameters
- Print preview and print template
- Immediate dispatch of the completed questionnaire online by e-mail

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Application

Suitable for non-corrosive and corrosive gases, vapors and liquids; permissible operating temperature -10 to +400°C.

Design

- Two support rings with replaceable orifice disk form A, B or D (see types of primary differential pressure devices in "Technical description", "Function"); see Ordering data for materials
- Graphite gasket with noncorrosive metal foil insert between orifice disk and support ring outlet

Overall length

65 mm to DIN 19205

Nominal diameters

EN: DN 50 to DN 1000

ASME: 2 inch to 40 inch

Nominal pressure

EN: PN 6 to PN 100

ASME: class 150 to 600

Sealing face to the mating flanges

- Plane, sealing face turned, N10/N12 to DIN ISO 1302
- Plane, sealing face turned, N8 to DIN ISO 1302
- Plane, RF (raised faced) for version to ASME

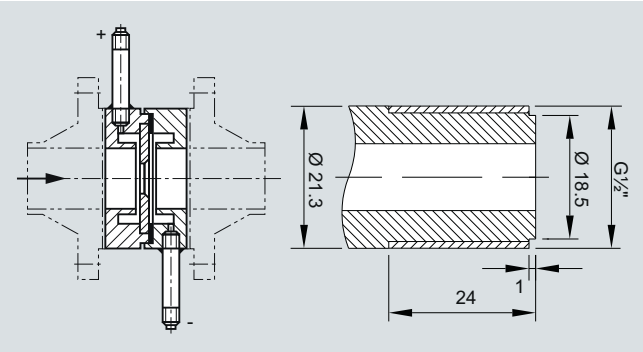
Tapping sockets

For the dimensions of the following tapping sockets, see "Function":

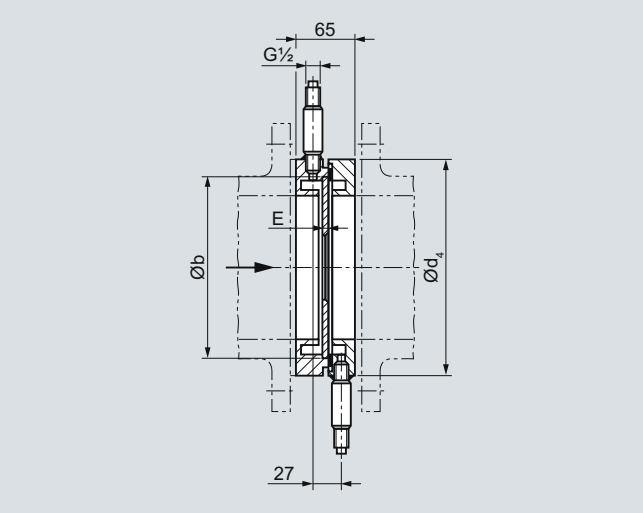
- With connection thread G½ DIN ISO 228/1, connection dimensions to DIN 19207 form V
- With threaded connection ½-14 NPT male, for version to ASME
- With Ø 12 mm pipe connection for pipe union with ferrule
- With welding connection Ø 21.3 mm

See "Technical description" and "Function" for position of the tapping sockets.

Dimensional drawings



Orifice plate with annular chamber (above); tapping socket with threaded connection (below), dimensions in mm



Tapping socket: Socket length is fixed in accordance with the pressure and nominal diameter (DIN 19 205, Part 2).

- Threaded connections of tapping sockets for liquids and gases up to PN 160, for steam up to PN 100, dimensions in mm

Versions for steam lines: See "Technical description", "Function" for position of the tapping sockets.

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Orifice plates with annular chambers

Nominal diameter acc. to EN

DN	Inside diameter	External diameter d_4 / sealing face: plane, with recess or with groove.						
		PN 6	PN 10	PN 16	PN 25	PN 40	PN 63	PN 100
50	43 ... 55	96	107	107	107	107	113	119
65	59 ... 71	116	127	127	127	127	138	144
80	73 ... 85	132	142	142	142	142	148	154
100	90 ... 108	152	162	162	168	168	174	180
125	114 ... 132	182	192	192	194	194	210	217
150	142 ... 160	207	218	218	224	224	247	257
200	185 ... 211	262	273	273	284	290	309	324
250	237 ... 262	317	328	329	340	352	364	391
300	285 ... 314	373	378	384	400	417	424	458
350	328 ... 362	423	438	444	457	474	486	512
400	380 ... 408	473	489	495	514	546	543	–
500	477 ... 514	578	594	617	624	628	–	–
600	581 ... 610	679	695	734	731	–	–	–
700	686 ... 710	784	810	804	833	–	–	–
800	776 ... 810	890	917	911	942	–	–	–
900	876 ... 910	990	1017	1011	1042	–	–	–
1000	976 ... 1010	1090	1124	1128	1154	–	–	–

Orifice plates with annular chambers for installation between EN flanges to EN 1092-1, dimensions in mm and weights

DN	L				E	Weight (approx. in kg)	
	PN 6	PN 10 ... 25	PN 40	PN 63 ... 100	PN 6 ... 100	With smallest nominal pressure	With largest nominal pressure
50	79	79	79	79	2 ± 0.2	2.5	4.5
65	96	96	96	96	2 ± 0.2	3.4	6.4
80	115	115	115	115	4 ± 0.2	4.3	6.9
100	137	137	137	137	4 ± 0.25	4.7	8.6
125	164	164	164	164	4 ± 0.25	6.3	12.4
150	193	193	193	193	4 ± 0.29	7.0	17.0
200	247	247	247	247	4 ± 0.29	10.3	26.2
250	302	302	302	302	4 ± 0.32	13.1	36.6
300	354	354	354	354	4 ± 0.36	17.3	49.0
350	403	403	403	403	4 ± 0.4	25.0	63.0
400	452	452	452	452	4 ± 0.4	28.0	73.8
500	553	563	563	–	6 ± 0.4	36.2	65.9
600	659	659	–	–	6 ± 0.4	42.5	75.6
700	757	762	–	–	8 ± 0.4	51.8	89.5
800	869	875	–	–	8 ± 0.4	61.7	109
900	969	975	–	–	8 ± 0.4	68.3	123
1000	1071	1079	–	–	10 ± 0.4	74.0	148

Orifice plates with annular chambers for installation between EN flanges to EN 1092-1. dimensions in mm and weights (contd.)

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Nominal diameter acc. to ASME

ASME	External diameter d4 / sealing face: Plane. RF (raised faced)			L			E	Weight (approx. in kg)	
	Class 150	Class 300	Class 600	Class 150	Class 300	Class 600	Class 150 ... 600	With smallest nominal pressure	With largest nominal pressure
2 inch	105	111	111	79	79	79	2±0.2	2.5	4.5
2½ inch	124	130	130	96	96	96	2±0.2	3.4	6.4
3 inch	137	149	149	115	115	115	4±0.2	4.3	6.9
4 inch	175	181	194	137	137	137	4±0.2	4.7	8.6
5 inch	197	216	241	164	164	164	4±0.25	6.3	12.4
6 inch	222	251	267	193	193	193	4±0.29	7.0	17.0
8 inch	279	308	321	247	247	247	4±0.29	10.3	26.2
10 inch	340	362	400	302	302	302	4±0.32	13.1	36.6
12 inch	410	422	457	354	354	354	4±0.36	17.3	49.0
14 inch	451	486	492	403	403	403	4±0.4	25.0	63.0
16 inch	514	540	565	452	452	452	4±0.4	28.0	73.8
20 inch	549	597	613	553	563	563	6±0.4	36.2	65.9
24 inch	717	775	790	659	659	–	6±0.4	42.5	75.6

Orifice plates with annular chambers for installation between ASME flanges to ASME B16.5, dimensions in mm and weights

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Orifice plates with annular chambers

Selection and ordering data	Order No.	Order code
Orifice plate with annular chambers	**7ME1110 -** ☐☐☐☐☐ **- 1** ☐☐☐	☐☐☐
for mounting between flanges		
Sealing faces to the mating flanges: plane.		
Nominal diameter acc. to EN		
DN 50		
PN 6	**1GA**	
PN 10 ... PN 40	**1GE**	
PN 63	**1GF**	
PN 100	**1GG**	
DN 65		
PN 6	**1HA**	
PN 10 ... PN 40	**1HE**	
PN 63	**1HF**	
PN 100	**1HG**	
DN 80		
PN 6	**1JA**	
PN 10 ... PN 40	**1JE**	
PN 63	**1JF**	
PN 100	**1JG**	
DN 100		
PN 6	**2AA**	
PN 10 and PN 16	**2AC**	
PN 25 and PN 40	**2AE**	
PN 63	**2AF**	
PN 100	**2AG**	
DN 125		
PN 6	**2BA**	
PN 10 and PN 16	**2BC**	
PN 25 and PN 40	**2BE**	
PN 63	**2BF**	
PN 100	**2BG**	
DN 150		
PN 6	**2CA**	
PN 10 and PN 16	**2CC**	
PN 25 and PN 40	**2CE**	
PN 63	**2CF**	
PN 100	**2CG**	
DN 200		
PN 6	**2EA**	
PN 10 and PN 16	**2EC**	
PN 25	**2ED**	
PN 40	**2EE**	
PN 63	**2EF**	
PN 100	**2EG**	
DN 250		
PN 6	**2FA**	
PN 10	**2FB**	
PN 16	**2FC**	
PN 25	**2FD**	
PN 40	**2FE**	
PN 63	**2FF**	
PN 100	**2FG**	
DN 300		
PN 6	**2GA**	
PN 10	**2GB**	
PN 16	**2GC**	
PN 25	**2GD**	
PN 40	**2GE**	
PN 63	**2GF**	
PN 100	**2GG**	

Selection and ordering data	Order No.	Order code
Orifice plate with annular chambers	**7ME1110 -** ☐☐☐☐☐ **- 1** ☐☐☐	☐☐☐
DN 350		
PN 6	**2HA**	
PN 10	**2HB**	
PN 16	**2HC**	
PN 25	**2HD**	
PN 40	**2HE**	
PN 63	**2HF**	
PN 100	**2HG**	
DN 400		
PN 6	**2JA**	
PN 10	**2JB**	
PN 16	**2JC**	
PN 25	**2JD**	
PN 40	**2JE**	
PN 63	**2JF**	
DN 500		
PN 6	**2KA**	
PN 10	**2KB**	
PN 16	**2KC**	
PN 25	**2KD**	
PN 40	**2KE**	
DN 600		
PN 6	**3AA**	
PN 10	**3AB**	
PN 16	**3AC**	
PN 25	**3AD**	
DN 700		
PN 6	**3BA**	
PN 10	**3BB**	
PN 16	**3BC**	
PN 25	**3BD**	
DN 800		
PN 6	**3CA**	
PN 10	**3CB**	
PN 16	**3CC**	
PN 25	**3CD**	
DN 900		
PN 6	**3DA**	
PN 10	**3DB**	
PN 16	**3DC**	
PN 25	**3DD**	
DN 1000		
PN 6	**3EA**	
PN 10	**3EB**	
PN 16	**3EC**	
PN 25	**3ED**	
Nomin. diameter acc. to ASME		
2 inch		
Class 150	**5GA**	
Class 300	**5GB**	
Class 600	**5GC**	
2½ inch		
Class 150	**5HA**	
Class 300	**5HB**	
Class 600	**5HC**	
3 inch		
Class 150	**5JA**	
Class 300	**5JB**	
Class 600	**5JC**	
4 inch		
Class 150	**6AA**	
Class 300	**6AB**	

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Selection and ordering data	Order No.	Order code
Orifice plate with annular chambers	7ME1110 - ■■■■■ - 1	■■■ ■■■
Class 600	6AC	
5 inch		
Class 150	6BA	
Class 300	6BB	
Class 600	6BC	
6 inch		
Class 150	6CA	
Class 300	6CB	
Class 600	6CC	
8 inch		
Class 150	6EA	
Class 300	6EB	
Class 600	6EC	
10 inch		
Class 150	6FA	
Class 300	6FB	
Class 600	6FC	
12 inch		
Class 150	6GA	
Class 300	6GB	
Class 600	6GC	
14 inch		
Class 150	6HA	
Class 300	6HB	
Class 600	6HC	
16 inch		
Class 150	6JA	
Class 300	6JB	
Class 600	6JC	
20 inch		
Class 150	6KA	
Class 300	6KB	
Class 600	6KC	
24 inch		
Class 150	7AA	
Class 300	7AB	
Class 600	7AC	
Special version		
Specify order code and plain text Nominal diameter: ..., nominal pressure: ..., material no.: ... and material name: ...	9AA00	H1Y
Material for non-corrosive media		
Support rings made of P265GH, material no. 1.0425; tapping sockets made of P235GH, material no. 1.0345; orifice disk made of material no. 1.4404, permissible operating temperature -10 to +400 °C	12	
Material for corrosive media		
Support rings, tapping sockets and orifice disk made of X 2 CrNiMo 17-12-2, material No. 1,4404; permissible operating temp. -10 to +400 °C	15	

Selection and ordering data	Order No.	Order code
Orifice plate with annular chambers	7ME1110 - ■■■■■ - 1	■■■
Tapping sockets		
with threaded connection G½; for liquids and gases PN 160, for steam PN 100		
• Opposite one another, straight	A	
• Opposite one another, bent-up, for vertical pipelines	B	
• Arranged on one side, for horizontal pipelines	C	
With threaded connection ½-14 NPT male		
• Opposite one another, straight	Q	
• Opposite one another, bent-up, for vertical pipelines	R	
• Arranged on one side, for horizontal pipelines	S	
With pipe Ø 12 mm for pipe union with ferrule, max. 200 °C permissible		
• Opposite one another, straight	J	
• Opposite one another, bent-up, for vertical pipelines	K	
• Arranged on one side, for horizontal pipelines	L	
With welding connection Ø 21.3 mm for liquids and gases PN 100 ... PN 400, for steam PN 100		
• Opposite one another, straight	D	
• Opposite one another, bent-up, for vertical pipelines	E	
• Arranged on one side, for horizontal pipelines	F	
Shape of orifice disk aperture		
For flow in one direction (see figure "Shapes of orifice disk aperture")		
• Orifice plate form A	A	
• Quarter-circle nozzle form B	B	
For flow in both directions		
• Cylindrical orifice plate form D	D	
Manufactured according to pressure equipment directive		
None[1]	0	
According to Article 3, Paragraph 3 Design data Y31 to Y35 necessary	1	
According to category 1, 2, 3 with CE marking and EC declaration of conformity Design data Y31 to Y35 necessary	5	

[1] Only possible outside Europe

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Orifice plates with annular chambers

Selection and ordering data	Order code
Further designs Add "**-Z**" to order no. and specify order code(s) and plain text.	
With Siemens calculation protocol Specify in plain text: No.: ... e. g. no.: 110025240101, Attach calculation protocol to the order	**Y21**
With third-party calculation Specify in plain text: No.: ... Attach calculation protocol to the order	**Y22**
Orifice plate without calculation Specify in plain text: Diameter of orifice disk aperture **d = ... mm** Internal diameter of pipe **D=... mm** Radius of quarter-circle nozzle **r = ... mm**	**Y01**
Design data according to Pressure equipment directive 97/23/EC	
Name of medium Specify in plain text: Medium: ..... e. g. natural gas	**Y31**
Aggregate state Specify in plain text: Aggregate state: ..... Liquid or gaseous	**Y32**
Fluid group Specify in plain text: Fluid group: ..... Group 1: hazardous explosive fluid or Group 2: All other fluids	**Y33**
Max. permissible pressure Specify in plain text: PS = ... in bar or PSI	**Y34**
Max. permissible temperature Specify in plain text: TS = … in °C or °F	**Y35**
Orifice plate degreased for oxygen measurements	
• DN 50 (2") ... DN 150 (6")	**A12**
• DN 200 (8") ... DN 400 (16")	**A13**
• DN 500 (20") ... DN 1000 (40")	**A14**
Material certificate Acceptance test certificate to EN 10204-3.1	**C01**
Cold water pressure test 1.5 x PN, with acceptance test certificate EN 10204	**D11**
Orifice disk including gasket	**on request**
Sealing face of orifice plate with recess or groove	**on request**

Note on ordering
The "calculation protocol" released by the customer with order code Y21 or Y22 must be attached to the order as an appendix or the statement "orifice plate without calculation" will be made with order code Y01

Scope of delivery
Two support rings with tapping sockets, one orifice disk, one gasket between orifice disk and support ring.
Graphite (99.85%) flat gasket with foil insert (1.4401, 0.1 mm). Application for liquids, steam, gases, liquid gases, acids, hydrocarbons, oils and oil products.

Accessories
See "SITRANS P measuring instruments for pressure".

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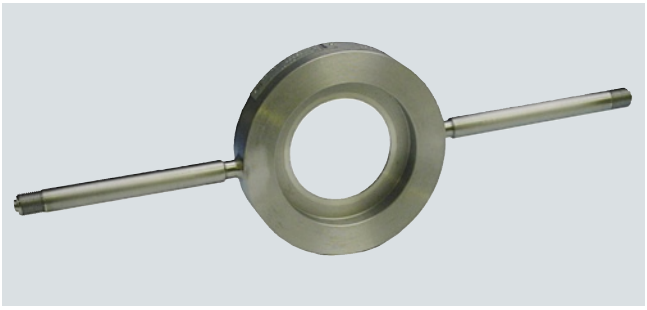
Application



Suitable for non-corrosive and corrosive gases, vapors and liquids; permissible operating temperature -10 to +570 °C.

Design

One-piece orifice plate, orifice disk form A, B or D (see types of primary differential pressure devices in "Technical description", "Function"); see Ordering data for materials.

Overall length

40 mm to DIN 19205

Nominal diameters

EN: DN 50 to DN 500

ASME: 2 inch to 20 inch

Nominal pressure

EN: PN 6 to PN 315

ASME: class 150 to 2500

Sealing face to the mating flanges

- Plane, sealing face turned, N10/N12 to DIN ISO 1302
- Plane, sealing face turned, N8 to DIN ISO 1302
- Plane, RF (raised faced) for versions to ASME

Tapping sockets

- With connection thread G½ DIN ISO 228/1, with connection dimensions to DIN 19207 form V
- With threaded connection ½-14 NPT male, for version to ASME
- With Ø 12 mm pipe connection for pipe union with ferrule
- With welding connection, Ø 21.3 mm

Connection size

The connection size depends on the operating pressure, the temperature of the medium (DIN 19 207 and 19 211) and the medium, e. g.

- For liquids and gases,
  - up to PN 160: Thread G½ or welding connection Ø 21.3 mm
  - from PN 6 and PN 400: Welding connection Ø 21.3 mm
  - > PN 400: Welding connection Ø 24 mm
- For steam
  - up to PN 100: Thread G½ or welding connection Ø 21.3 mm
  - > PN 100: Welding connection Ø 24 mm

See "Technical description" and "Function" for position of the tapping sockets.

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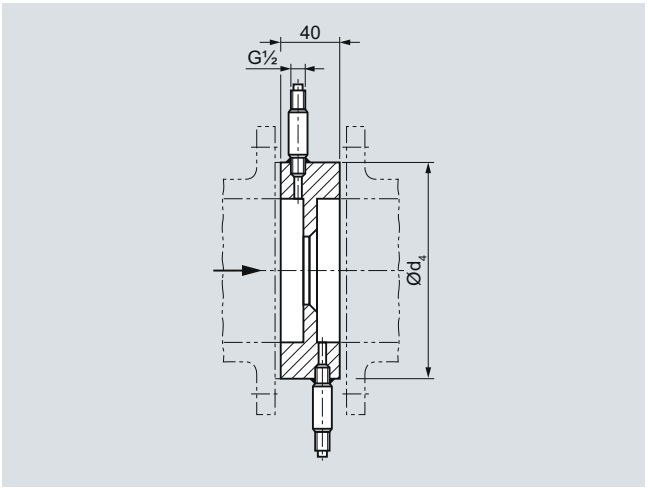
Orifice plates with single tappings

Dimensional drawings



Tapping socket: Socket length is fixed in accordance with the pressure and nominal diameter (DIN 19 205, Part 2), dimensions in mm

- Threaded connections of tapping sockets for liquids and gases up to PN 160, for steam up to PN 100,

Versions for steam lines: See "Technical description", "Function" for position of the tapping sockets.

Nominal diameter acc. to EN

DN	Inside diameter	External diameter d_4 / sealing face: plane, with recess or with groove.										Weight (approx. in kg)	
		PN 6	PN 10	PN 16	PN 25	PN 40	PN 63	PN 100	PN 160	PN 250	PN 315	With smallest nominal pressure	With largest nominal pressure
50	45 ... 55	96	107	107	107	107	113	119	119	124	134	1.6	4.0
65	61 ... 71	116	127	127	127	127	138	144	144	154	170	2.2	6.3
80	77 ... 85	132	142	142	142	142	148	154	154	170	190	2.9	7.8
100	94 ... 108	152	162	162	168	168	174	180	180	202	229	3.2	11.5
125	117 ... 132	182	192	192	194	194	210	217	217	242	274	4.3	15.9
150	144 ... 160	207	218	218	224	224	247	257	257	284	311	4.7	20.6
200	188 ... 211	262	273	273	284	290	309	324	324	358	398	7.0	33.7
250	240 ... 262	317	328	329	340	352	364	391	388	442	488	9.0	50.6
300	292 ... 314	373	378	384	400	417	424	458	458	538	–	12.3	37.3
350	331 ... 362	423	438	444	457	474	486	512	–	–	–	17.7	44.6
400	383 ... 408	473	489	495	514	546	543	–	–	–	–	19.8	43.1
500	480 ... 514	578	594	617	624	628	–	–	–	–	–	25.6	46.6

Orifice plates with single tappings for installation between EN flanges to EN 1092-1, dimensions in mm, weights

Nominal diameter acc. to ASME

ASME	External diameter d4 / sealing face: plane, with recess or with groove.			Weight (approx. in kg)	
	Class 150	Class 300	Class 600	With smallest nominal pressure	With largest nominal pressure
2 inch	105	111	111	1.6	4.0
2½ inch	124	130	130	2.2	6.3
3 inch	137	149	149	2.9	7.8
4 inch	175	181	194	3.2	11.5
5 inch	197	216	241	4.3	15.9
6 inch	222	251	267	4.7	20.6
8 inch	279	308	321	7.0	33.7
10 inch	340	362	400	9.0	50.6
12 inch	410	422	457	12.3	37.3
14 inch	451	486	492	17.7	44.6
16 inch	514	540	565	19.8	43.1
20 inch	549	597	613	25.6	46.6

Orifice plates with single tappings for installation between ASME flanges to ASME B 16.5, dimensions in mm and weights

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Selection and ordering data	Order No.	Order code
Orifice plate with single tappings	**7ME1120 -** ■■■■■ **- 1** ■■■	■■■
for mounting between flanges		
Sealing faces to the mating flanges: plane.		
Nominal diameter acc. to EN		
DN 50		
PN 6	**1GA**	
PN 10 ... PN 40	**1GE**	
PN 63	**1GF**	
PN 100 and PN 160	**1GH**	
PN 250	**1GJ**	
PN 315	**1GK**	
DN 65		
PN 6	**1HA**	
PN 10 ... PN 40	**1HE**	
PN 63	**1HF**	
PN 100 and PN 160	**1HH**	
PN 250	**1HJ**	
PN 315	**1HK**	
DN 80		
PN 6	**1JA**	
PN 10 ... PN 40	**1JE**	
PN 63	**1JF**	
PN 100 and PN 160	**1JH**	
PN 250	**1JJ**	
PN 315	**1JK**	
DN 100		
PN 6	**2AA**	
PN 10 and PN 16	**2AC**	
PN 25 and PN 40	**2AE**	
PN 63	**2AF**	
PN 100 and PN 160	**2AH**	
PN 250	**2AJ**	
PN 315	**2AK**	
DN 125		
PN 6	**2BA**	
PN 10 and PN 16	**2BC**	
PN 25 and PN 40	**2BE**	
PN 63	**2BF**	
PN 100 and PN 160	**2BH**	
PN 250	**2BJ**	
PN 315	**2BK**	
DN 150		
PN 6	**2CA**	
PN 10 and PN 16	**2CC**	
PN 25 and PN 40	**2CE**	
PN 63	**2CF**	
PN 100 and PN 160	**2CH**	
PN 250	**2CJ**	
PN 315	**2CK**	
DN 200		
PN 6	**2EA**	
PN 10 and PN 16	**2EC**	
PN 25	**2ED**	
PN 40	**2EE**	
PN 63	**2EF**	
PN 100 and PN 160	**2EH**	
PN 250	**2EJ**	
PN 315	**2EK**	

Selection and ordering data	Order No.	Order code
Orifice plate with single tappings	**7ME1120 -** ■■■■■ **- 1** ■■■	■■■
DN 250		
PN 6	**2FA**	
PN 10 and PN 16	**2FC**	
PN 25	**2FD**	
PN 40	**2FE**	
PN 63	**2FF**	
PN 100 and PN 160	**2FH**	
PN 250	**2FJ**	
PN 315	**2FK**	
DN 300		
PN 6	**2GA**	
PN 10	**2GB**	
PN 16	**2GC**	
PN 25	**2GD**	
PN 40	**2GE**	
PN 63	**2GF**	
PN 100 and PN 160	**2GH**	
DN 350		
PN 6	**2HA**	
PN 10	**2HB**	
PN 16	**2HC**	
PN 25	**2HD**	
PN 40	**2HE**	
PN 63	**2HF**	
PN 100	**2HG**	
DN 400		
PN 6	**2JA**	
PN 10	**2JB**	
PN 16	**2JC**	
PN 25	**2JD**	
PN 40	**2JE**	
PN 63	**2JF**	
DN 500		
PN 6	**2KA**	
PN 10	**2KB**	
PN 16	**2KC**	
PN 25	**2KD**	
PN 40	**2KE**	
Nominal diameter acc. to ASME		
2 inch		
Class 150	**5GA**	
Class 300	**5GB**	
Class 600	**5GC**	
2½ inch		
Class 150	**5HA**	
Class 300	**5HB**	
Class 600	**5HC**	
3 inch		
Class 150	**5JA**	
Class 300	**5JB**	
Class 600	**5JC**	
4 inch		
Class 150	**6AA**	
Class 300	**6AB**	
Class 600	**6AC**	
5 inch		
Class 150	**6BA**	
Class 300	**6BB**	
Class 600	**6BC**	

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Orifice plates with single tappings

Selection and ordering data	Order No.	Order code
Orifice plate with single tappings	**7ME1120 -** ☐☐☐☐☐ **- 1** ☐☐☐	☐☐☐
6 inch		
Class 150	**6CA**	
Class 300	**6CB**	
Class 600	**6CC**	
8 inch		
Class 150	**6EA**	
Class 300	**6EB**	
Class 600	**6EC**	
10 inch		
Class 150	**6FA**	
Class 300	**6FB**	
Class 600	**6FC**	
12 inch		
Class 150	**6GA**	
Class 300	**6GB**	
Class 600	**6GC**	
14 inch		
Class 150	**6HA**	
Class 300	**6HB**	
Class 600	**6HC**	
16 inch		
Class 150	**6JA**	
Class 300	**6JB**	
Class 600	**6JC**	
20 inch		
Class 150	**6KA**	
Class 300	**6KB**	
Class 600	**6KC**	
Special version		
Specify order code and plain text Nominal diameter: ..., nominal pressure: ... material no.: ... and material name: ...	**9AA00**	**H1Y**
Material for corrosive media		
Orifice plate and tapping socket made of X 2 CrNiMo 17-12-2, material no. 1,4404; permissible operating temp. -10 to +400 °C	**23**	
Material for non-corrosive media		
Orifice plate and tapping socket made of 13 CrMo 4-5, material no. 1,7335; permissible operating temp. -10 to +570, high temperature	**24**	
Orifice plate made of P265GH, material no. 1.0425; tapping sockets made of P235GHTC2, material no. 1.0345; metering edge with X 15 CrNiMn 18-8, material no. 1.4370, deposition welded; permissible operating temperature -10 to +400 °C	**25**	

Selection and ordering data	Order No.	Order code
Orifice plate with single tappings	**7ME1120 -** ☐☐☐☐☐ **- 1** ☐☐☐	☐☐☐
Tapping sockets		
with threaded connection G½; for liquids and gases PN 160, for steam PN 100		
• Opposite one another, straight	**A**	
• Opposite one another, bent-up, for vertical pipelines	**B**	
• Any arrangement of tapping sockets (specify angle in plain text -Z Y02)	**G**	
With threaded connection ½-14 NPT male		
• Opposite one another, straight	**Q**	
• Opposite one another, bent-up, for vertical pipelines	**R**	
• Any arrangement of tapping sockets (specify angle in plain text -Z Y02)	**T**	
With pipe Ø 12 mm for pipe union with ferrule, max. 200 °C permissible		
• Opposite one another, straight	**J**	
• Opposite one another, bent-up, for vertical pipelines	**K**	
• Any arrangement of tapping sockets (specify angle in plain text -Z Y02)	**M**	
With welding connection ∅ 21.3 mm; for liquids and gases PN 100 ... 400, for steam PN 100 or ∅ 24 mm; for liquids and gases over PN 400, for steam over PN 100		
• Opposite one another, straight	**D**	
• Opposite one another, bent-up, for vertical pipelines	**E**	
• Any arrangement of tapping sockets (specify angle in plain text -Z Y02)	**H**	
Shape of orifice disk aperture (see figure "Shapes of orifice disk aperture")		
For flow in one direction		
• Orifice plate form A	**A**	
• Quarter-circle nozzle form B	**B**	
For flow in both directions		
• Cylindrical orifice plate form D	**D**	
Manufactured according to pressure equipment directive		
None[1]	**0**	
According to Article 3, Paragraph 3 Design data Y31 to Y35 necessary	**1**	
According to category 1, 2, 3 with CE marking and EC declaration of conformity Design data Y31 to Y35 necessary.	**5**	

[1] Only possible outside Europe.

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Selection and ordering data	Order code
Further designs Add "**-Z**" to order no. and specify order code(s) and plain text.	
With Siemens calculation protocol Specify in plain text: No.: ... e. g. no.: 110025240101, Attach calculation protocol to the order	**Y21**
With third-party calculation Specify in plain text: No.: ... Attach calculation protocol to the order	**Y22**
Orifice plate without calculation Specify in plain text: Diameter of orifice disk aperture **d = ... mm** Internal diameter of pipe **D=... mm** Radius of quarter-circle nozzle **r = ... mm**	**Y01**
Angle between the tapping sockets Specify in plain text: Angle between the tapping sockets ...°	**Y02**
Design data according to Pressure equipment directive 97/23/EC	
Name of medium Specify in plain text: Medium: ..... e. g. natural gas	**Y31**
Aggregate state Specify in plain text: Aggregate state: ..... Liquid or gaseous	**Y32**
Fluid group Specify in plain text: Fluid group: ..... Group 1: hazardous explosive fluid or Group 2: All other fluids	**Y33**
Max. permissible pressure Specify in plain text: PS = ... in bar or PSI	**Y34**
Max. permissible temperature Specify in plain text: TS = … in °C or °F	**Y35**
Orifice plate degreased for oxygen measurements	
• DN 50 (2") ... DN 150 (6")	**A12**
• DN 200 (8") ... DN 400 (16")	**A13**
• DN 500 (20") ... DN 1000 (40")	**A14**
Material certificate Acceptance test certificate to EN 10204-3.1	**C01**
Cold water pressure test 1.5 x PN, with acceptance test certificate EN 10204	**D11**
Overall length 65 mm (required for tapping sockets arranged on one side)	**on request**
Orifice disk including gasket	**on request**
Sealing face of orifice plate with recess or groove	**on request**

Note on ordering
The "calculation protocol" released by the customer with order code Y21 or Y22 must be attached to the order as an appendix or the statement "orifice plate without calculation" will be made with order code Y01.

Scope of delivery:
One-part orifice plate with tapping sockets

Accessories:
See "SITRANS P measuring instruments for pressure".

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Metering pipes with orifice plate and annular chambers

Application

Suitable for non-corrosive and corrosive gases, vapors and liquids; permissible operating temperature -10 to +400 °C.

Design

Orifice plate with annular chambers consisting of two support rings with replaceable orifice disk form A or B (see types of primary differential pressure devices in "Technical description", "Function"); flanged between inlet and outlet pipe sections with lengths according to DIN 19205.

Nominal diameters

- EN: DN 10 to DN 50
- ASME: ½ inch to 2 inch

Nominal pressure

- EN: PN 10 to PN 100
- ASME: class 150 to 600

Sealing face of the end flanges

- Plane, sealing face turned, N10/N12 to DIN ISO 1302
- Plane, sealing face turned, N8 to DIN ISO 1302
- Plane, RF (raised faced) for versions to ASME

Tapping sockets

(For the dimensions of the following tapping sockets, see page 4/401)

- With connection thread G½ DIN ISO 228/1, connection dimensions to DIN 19207 form V
- With threaded connection ½-14 NPT male, for version to ASME
- With Ø 12 mm pipe connection for pipe union with ferrule
- With welding connection, Ø 21.3 mm

For length of tapping sockets for all metering pipe L = 120 mm and position of tapping socket, see "Technical Description" and "Function".

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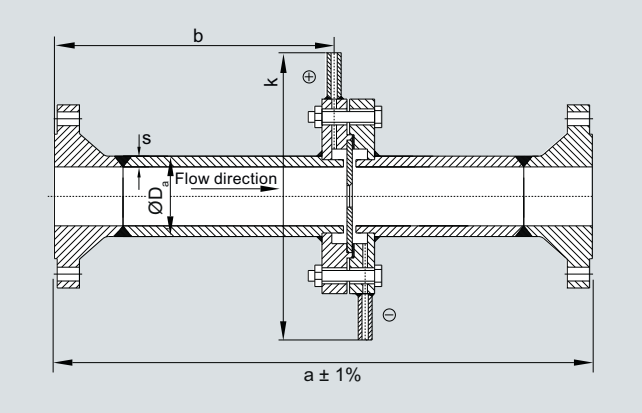
Dimensional drawings



Nominal diameter acc. to EN

DN	PN	a	L	k	Pipe[1] D_a x s	Weight (approx. kg)
10	10 and 16 25 and 40 63 and 100	400	218	320 320 295	16 x 3	4.5 5 6.5
15	10 and 16 25 and 40 63 and 100	550	368	325 325 300	20 x 2.5	5 5.5 7.5
20	10 and 16 25 and 40	700	488	335	25 x 2.5	6.5 7
25	10 and 16 25 and 40 63 and 100	900	638	310	30 x 2.5	8 9 14
32	10 and 16 25 and 40	1100	788	320	38 x 3	11.5 12.5
40	10 and 16 25 and 40 63 and 100	1300	988	330 330 335	48.3 x 3.6 oder 50 x 5	13 15 25
50	10 and 16 25 and 40 63 100	1500	1188	340 340 345 345	60 x 5	20 22 34 34

Metering pipes with orifice plates and annular chambers for installation between EN flanges to EN 1092.1, dimensions in mm and weights

[1] The stated pipe dimensions may vary, depending on availability. The pipe dimensions used can be found in the calculation for primary differential pressure devices and/or in the order confirmation.

Nominal diameter acc. to ASME

ASME	PN	a	L	k	Pipe[1] D_a x s	Weight (approx. kg)
½ inch	Class 150 Class 300 Class 600	550	368	297 307 307	20 x 2.5	5 5.5 7.5
¾ inch	Class 150 Class 300 Class 600	700	488	297 307 307	25 x 2.5	6.5 7 8
1 inch	Class 150 Class 300 Class 600	900	638	307 313 313	30 x 2.5	8 9 14
1¼ inch	Class 150 Class 300 Class 600	1100	788	316 322 322	38 x 3	11.5 12.5 14
1½ inch	Class 150 Class 300 Class 600	1300	988	326 335 335	48.3 x 3.6 or 50 x 5	13 15 25
2 inch	Class 150 Class 300 Class 600	1500	1188	345 371 351	60 x 5	20 22 34

Metering pipes with orifice plates and annular chambers for installation between ASME flanges to ASME B 16.5, dimensions in mm and weights

[1] The stated pipe dimensions may vary, depending on availability. The pipe dimensions used can be found in the calculation for primary differential pressure devices and/or in the order confirmation.

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Metering pipes with orifice plate and annular chambers

Selection and ordering data	Order No.
Metering pipe for mounting between flanges for non-corrosive media	**7ME1310 - - 1**
Orifice plate with annular chambers mounted between flanges	
Sealing faces to the mating flanges: plane	
Nominal diameter acc. to EN	
DN 10	
• PN 10 and PN 16	**1AC**
• PN 25 and PN 40	**1AE**
• PN 63	**1AF**
• PN 100	**1AG**
DN 15	
• PN 10 and PN 16	**1BC**
• PN 25 and PN 40	**1BE**
• PN 63	**1BF**
• PN 100	**1BG**
DN 20	
• PN 10 and PN 16	**1CC**
• PN 25 and PN 40	**1CE**
DN 25	
• PN 10 and PN 16	**1DC**
• PN 25 and PN 40	**1DE**
• PN 63	**1DF**
• PN 100	**1DG**
DN 32	
• PN 10 and PN 16	**1EC**
• PN 25 and PN 40	**1EE**
DN 40	
• PN 10 and PN 16	**1FC**
• PN 25 and PN 40	**1FE**
• PN 63	**1FF**
• PN 100	**1FG**
DN 50	
• PN 10 and PN 16	**1GC**
• PN 25 and PN 40	**1GE**
• PN 63	**1GF**
• PN 100	**1GG**
Nominal diameter acc. to ASME	
½ inch	
• Class 150	**5BA**
• Class 300	**5BB**
• Class 600	**5BC**
¾ inch	
• Class 150	**5CA**
• Class 300	**5CB**
• Class 600	**5CC**
1 inch	
• Class 150	**5DA**
• Class 300	**5DB**
• Class 600	**5DC**
1¼ inch	
• Class 150	**5EA**
• Class 300	**5EB**
• Class 600	**5EC**
1½ inch	
• Class 150	**5FA**
• Class 300	**5FB**
• Class 600	**5FC**
2 inch	
• Class 150	**5GA**
• Class 300	**5GB**
• Class 600	**5GC**
Special version	
Specify order code and plain text Nominal diameter: ..., nominal pressure: ... material no.: ... and material name: ...	**9AA00** **H1Y**
Material for non-corrosive media	
Orifice disk made of material no. 1.4404; support ring and flange made of material no. 1.0460, pipes and tapping sockets made of material number 1.0345; permissible operating temperature -10 to +400 °C	**32**
Material for corrosive media	
Orifice disk, support rings, pipes and flange made of material no. 1.4404; permissible operating temperature -10 to +400 °C	**34**
Tapping sockets	
with threaded connection G½; for liquids and gases PN 160, for steam PN 100	
• Opposite one another, straight	**A**
• Opposite one another, bent-up, for vertical pipelines	**B**
• Arranged on one side, for horizontal pipelines	**C**
With threaded connection ½-14 NPT male; for liquids and gases PN 160, for steam PN 100	
• Opposite one another, straight	**Q**
• Opposite one another, bent-up, for vertical pipelines	**R**
• Arranged on one side, for horizontal pipelines	**S**
With pipe Ø 12 mm for pipe union with ferrule, max. 200 °C permissible	
• Opposite one another, straight	**J**
• Opposite one another, bent-up, for vertical pipelines	**K**
• Arranged on one side, for horizontal pipelines	**L**
With welding connection ∅ 21.3 mm for liquids and gases PN 100 ... PN 400, for steam PN 100	
• Opposite one another, straight	**D**
• Opposite one another, bent-up, for vertical pipelines	**E**
• Arranged on one side, for horizontal pipelines	**F**

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Selection and ordering data	Order No.
Metering pipe for mounting between flanges for non-corrosive media	**7ME1310 -** ■■■■■ **- 1** ■■■ ■■■
Shape of orifice disk aperture	
For flow in one direction (see figure "Shapes of orifice disk aperture")	
• Orifice plate form A	**A**
• Quarter-circle nozzle form B	**B**
For flow in both directions	
• Cylindrical orifice plate form D	**D**
Manufactured according to pressure equipment directive	
None[1]	**0**
According to Article 3, Paragraph 3 Design data Y31 to Y35 necessary	**1**
According to category 1, 2 with CE marking and EC declaration of conformity Design data Y31 to Y35 necessary	**5**

[1] Only possible outside Europe.

Selection and ordering data	Order code
Further designs Add "-**Z**" to order no. and specify order code(s) and plain text.	
With Siemens calculation protocol Specify in plain text: No.: ... e. g. no.: 110025240101, Attach calculation protocol to the order	**Y21**
With third-party calculation Specify in plain text: No.: ... Attach calculation protocol to the order	**Y22**
Orifice plate without calculation Specify in plain text: Diameter of orifice disk aperture **d = ... mm** Internal diameter of pipe **D=... mm** Radius of quarter-circle nozzle **r = ... mm**	**Y01**
Design data according to Pressure equipment directive 97/23/EC	
Name of medium Specify in plain text: Medium: ..... e. g. natural gas	**Y31**
Aggregate state Specify in plain text: Aggregate state: ..... Liquid or gaseous	**Y32**
Fluid group Specify in plain text: Fluid group: ..... Group 1: hazardous explosive fluid or Group 2: All other fluids	**Y33**
Max. permissible pressure Specify in plain text: PS = ... in bar or PSI	**Y34**
Max. permissible temperature Specify in plain text: TS = … in °C or °F	**Y35**
Orifice plate degreased for oxygen measurements	
• DN 10 (½") ... DN 50 (2“)	**A12**
Material certificate Acceptance test certificate to EN 10204-3.1	**C02**
Cold water pressure test 1.5 x PN, with acceptance test certificate EN 10204	**D11**

Note on ordering

The "calculation protocol" released by the customer with order code Y21 or Y22 must be attached to the order as an attachment or the statement "orifice plate without calculation" will be made with order code Y01.

Scope of delivery:
Orifice plate, comprising two support rings with tapping sockets and one orifice disk, with gaskets between orifice disk and support ring, including screws and bolts.
Graphite (99.85%) flat gasket with foil insert (1.4401, 0.1 mm).
Application for liquids, steam, gases, liquid gases, acids, hydrocarbons, oils and oil products.

Accessories:
See "SITRANS P measuring instruments for pressure".

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Calculation of primary devices

Overview

Note on calculation order and product ordering:

Before an orifice plate is ordered, the calculation of the orifice pate must be completed with a calculation protocol.

The calculation protocol issued by the customer is then included in the order for the orifice plate as an attachment.

When ordering the "Primary differential pressure device calculation" service, a completed questionnaire must be enclosed.

This online questionnaire can be found in the PIA Life Cycle Portal at www.siemens.com/pia-portal.

All the data required for the calculation are requested menu-driven and can be verified by a check function.

If the data entered in the questionnaire are incomplete, an extra charge will be made for the additional clarification and calculations required.

Selection and ordering data	Order No.
Calculation of orifice disk aperture an orifice plate, ISA-1932 nozzle, Venturi nozzle, Venturi tube and other primary differential pressure devices (without measuring sheet or sketch)	**7ME1910-0A**
Calculation of differential pressure or flow on an existing primary device	**7ME1910-0D**
Further designs Add "**-Z**" to order no. and specify order code(s) and plain text.	Order code
SITRANS F O - questionnaire online The completed online questionnaire should be attached to the order! (see Online Questionnaire in the PIA Life Cycle Portal)	**Y02**

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Overview

Mechanical registers, automatic batchmeters and digital registers with current and pulse output

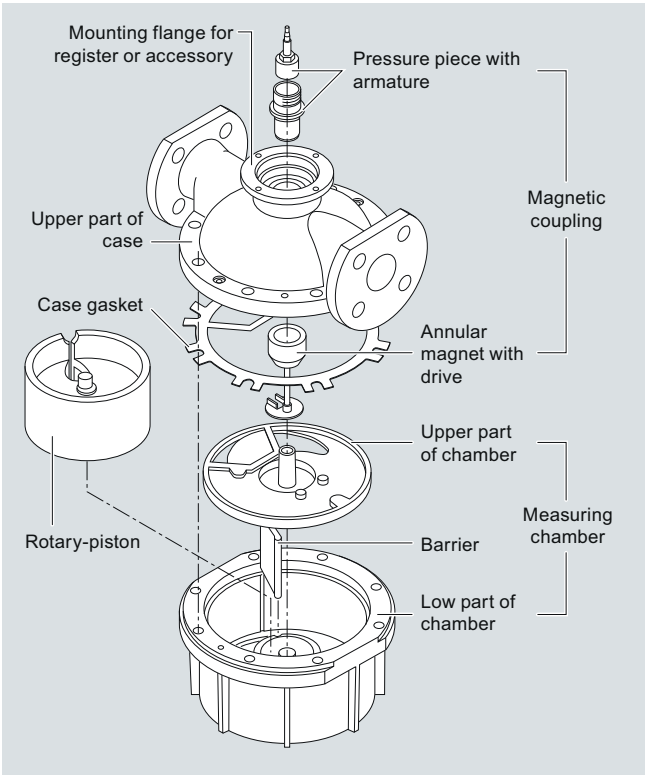
Rotary-piston meter DN 25 (1“) with single-pointer dial type 01

Rotary piston meter with electric flow register in compact form

Rotary-piston meter DN 50 (2") with mech. single-pointer dial type 01, with accessories (here: cooling attachment and pulser)

Automatic batch meter DN 50 (2“), with rotary-piston meter, quantity preset register and shut-off valve

Design



Metering mechanism of a rotary-piston meter DN 25/PN 10 (1“/MWP 145 psi) (industrial model)

The measuring chamber is inserted into the case for the rated pressure classes PN 25, PN 40 and PN 63 (MWP 363, 580 and 914 psi). The meters for rated pressures PN 4, PN 6 and PN 10 (MWP 58, 87 and 145 psi) have a measuring chamber machined to the lower part of the case.

All components of the meters are made of wear-resistant materials. Several materials are available for the parts which come into contact with the metered liquid (see Selection and Ordering data). The most suitable combination can be selected taking into account the corrosion resistance with respect to the liquid to be measured as well as the running characteristics and the permissible temperatures.

Benefits

- High measuring accuracy (approved for custody transfer)
- Suitable for flow rates up to 1000 l/min (264 USgpm)
- Wide flow rate range
- Low dependence on viscosity
- Low pressure drop
- Simple compact design
- High reliability
- Advantages with extremely high viscosity since pressure drops up to 3 bar (43.5 psi) permissible
- Advantages with very low viscosity (e.g. liquefied gas) since only low pressure drops occur because of the light-weight mechanism with good running characteristics
- Wide range of available materials, e.g. plastic lining for particularly corrosive liquids
- Easy service as a result of simple design
- Liquid temperatures up to 300 °C
- Also available with external heater
- Metering and dispensing without a power supply
- No inlet or outlet pipe sections required
- Independent of flow profile, conductivity and damping

Rotary-piston meters are characterized by:

- Accuracy
- Reliability
- Robust design

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Rotary-piston meters and automatic batchmeters - Introduction

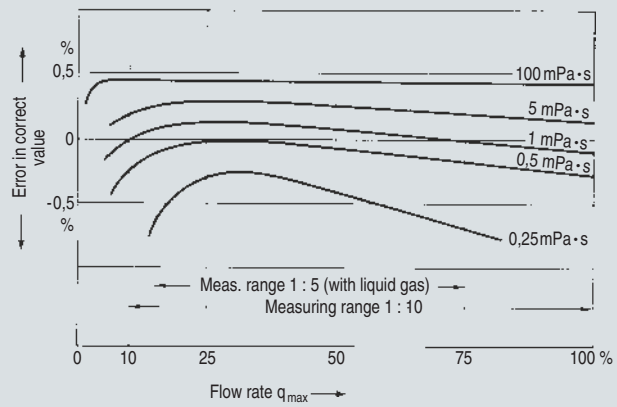
Configuration

Error curves of rotary-piston meters

The shape of the error curve is also affected by the viscosity of the metered liquid. The error in measurement increases with decreasing viscosity, especially at the beginning and towards the end of the flow rate range.

By appropriate regulation, i.e. changing a pair of gear-wheels between the meter mechanism and the register, the position of the error curve can be displaced parallel to the zero line and thus the meter can be optimally calibrated. The appropriate pair of replacement gears can be read off from a table or determined with the aid of a calculating disk.

The illustration “Error curves of volumetric meters” shows error curves without any regulation having been carried out.



Examples of rotary-piston meters DN 25 (1”) and DN 50 (2”)

Error curves of volumetric meters dependent in shape and location on the flow rate and the viscosity of the liquid

Note: 1 mPa·s = 1 cp

Measuring accuracy

The rotary-piston meters are approved in the European Community and in many other countries for the custody transfer.

The following error limits apply between 0.2 % and 0.5 % of the correct value (depending on the liquid, the measuring range and the relevant calibration specifications).

The stated error limits in % of the correct value apply to the whole flow rate and for any delivery quantity greater than the smallest permissible quantity.

This is an important difference compared to other measuring instruments whose errors are related to the full-scale value and thus only reach the stated accuracy at one point - full-scale deflection. The minimum flow rate should not fall below 10% of the maximum flow rate in order to remain within the stated accuracy limit. This explains why the usual flow rate range for volumetric meters is 1:10.

Note: The measuring system of the rotary-piston meter must always be filled with the liquid to be measured in order to achieve a high measuring accuracy.

Note

The material combinations which can be supplied are listed in the Selection and Ordering data.
The maximum permissible liquid temperature is determined by the “weakest link” in the particular combination (the PCTFE rotary-piston, for example, in a meter made of Cranium steel).

Service life (long-term accuracy)

The service life of a volumetric meter, i.e. the operating time until an overhaul or recalibration becomes necessary, is determined by the mechanical abrasion of the moving parts of the mechanisms which occurs because of forces from the metered liquid.

As well as the nature of the materials used (running characteristics), the service life is dependent on the lubricating properties of the metered liquid, the service is dependent on the lubricating properties of the metered liquid, the daily operating time and the cube of the flow rate (speed of rotation). The last factor is one of the reasons why only half of the maximum flow rate specified for the batch operation is permissible for continuous operation.

Since the above factors can hardly be determined exactly with industrial use of the meter, unequivocal statements on the service life (long-term accuracy) are not possible.

Recalibration is required every two years by law (in Germany) for meters used for custody transfer. On the basis of this regulation, it is recommended that meters which are not used for custody transfer be checked and recalibrated if necessary, at intervals of two to three years. Even this recommendation is based on average, “normal” operating conditions. A period of three years is too short, for example, for a meter used for the batch dispensing of lubricating oil, it will still work within the stated error limits even after five years or more.

Further technical specifications	
Materials and max. permissible liquid temperatures	
Housing (also lining with acid resistant meters) and measuring chamber	Temperature range
• Cast iron, spheroidal graphite, cast steel, Cranium steel	-30 ... +300 °C (-22 ... +572 °F)
• Cast iron/enamel, Duroplast measuring chamber	-20 ... +80 °C (-4 ... +176 °F)
General data	
Error limits	Between 0.2 % and 0.5 % of the correct value (depending on the metered fluid, the measuring range and the relevant calibration regulations) except for rotary-piston meters DN 15 (½“) and acid-resistant meters with PCTFE pistons; where 1% of the actual value applies.
Reproducibility	Within 0.05 %
Adjustment	In steps from 0.01 %
Pressure drop	Max. permissible 3 bar (43.5 psi), max. 0.5 bar (7.25 psi) for acid resistant meters
Transmission from wet to dry space	Gland-free, via permanent magnet coupling
Installation position (axis of meter mechanism)	
• Rotary-piston meter for industrial use	
- Automatic batchmeter	Vertical
• Special designs	
- Rotary-piston meter for oil fuels	Any
- Rotary-piston meter for liquid gas	Meter axis vertical
Special inlet and outlet pipe sections	Not necessary
Pipe connection	Flanges drilled to DIN 2501, DIN 2547 (PN 63 only)
Filter size (mesh width)	0.8 mm (0.031 inch) for rotary-piston meter

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Selection overview, rotary piston meters

Version	Rotary piston meters			
Nominal diameter	**DN 15**	**DN 25**	**DN 50**	**DN 80**
Order No.	7MR10..-...	7MR11..-...	7MR14..-...	7MR16..-...
Nominal pressure				
PN 6			●	
PN 10		●		
PN 16		●	●	
PN 25	●	●	●	●
PN 40		●	●	●
PN 63		●	●	
Flow variables				
Max. 20 l/min	●			
Max. 100 l/min		●		
Max. 500 l/min			●	
Max. 1 000 l/min				●
Flange standards				
Drilled acc. to EN	●	●	●	●
Drilled acc. to ASME	●	●	●	●
With raised faces	●	●	●	●
Approvals				
Custody transfer		●	●	●
Material acceptance test EN 10204-3.1	●	●	●	●
ATEX		**in preparation**		
Piston material				
Carbon	●	●	●	●
Cast iron	●	●	●	●
Ni-resist		●	●	●
Hard rubber	●	●	●	●
PTFE 40 °C		●	●	●
PTFE 90 °C		●	●	●
CrNiMo steel with carbon contact surface		●		
CrNiMo steel with PTFE contact surface		●		
PCTFE	●	●	●	
Designs				
Mechanical singe-pointer dial	●	●	●	●
Mechanical double-pointer dial	●	●	●	●
As automatic batchmeter (incl. shut-off valve)		●	●	
With electronic flow register	●	●	●	●
Remote or compact installation	●	●	●	●

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Rotary-piston meters and automatic batchmeters - Introduction

Rotary piston meters - Configurations

		Mechanical display			Digital displays	
		Compact design			As separate model	Compact design
		Without pulse and current output	With pulse and current output		With pulse and current output	With pulse and current output
					Incl. protective cover	Incl. mounting bracket
Registers						
Single-pointer dial type 01		●	●	●		
Double-pointer dial type 11 und 12		●	●	●		
Quantity preset register		●	●	●		
SITRANS F RA110 electric flow registers (7MV1070-...)						
• Without mounting bracket					●	
• With mounting bracket						●
Pulser						
10 pulses/revolution 100 pulses/revolution					●	●
10 pulses/value per revolution 100 pulses/value per revolution			●			
Intermediate gear						
(Part of Order No. of the rotary piston meter)		●	●	●		
Pulser						
10 Impulse/measuring chamber volumes 100 Impulse/measuring chamber volumes (Selection with data position 14 of Order No. of the rotary piston meter)				●		
Cooling attachment						
Up to 80 °C: none (Order No. 7MR1...-.....-....) Up to 180 °C: one (Order No. 7MR1...-.....-.... + 7MV3001-1xx00) Upt to 260 °C: two (Order No. 7MR1...-.....-.... + 7MV3001-2xx00)		●	●	●	●	●
Rotary piston meters and automatic batchmeters						
Rotary piston meters DN 15 7MR10..-.....-.... DN 25 7MR11..-.....-.... DN 50 7MR14..-.....-.... DN 80 7MR16..-.....-.... **Automatic batchmeters** DN 25 7MR111.-.....-.... DN 50 7MR141.-.....-....	 ≤ PN 16 PN 25 ... PN 63	●	●	●	●	●

Measuring chamber volumes:

DN 15 (1/2“)	0,033 l	(0.0087 USgpm)
DN 25 (1“)	0,179 l	(0.0473 USgpm)
DN 50 (2“)	1,5 l	(0.317 USgpm)
DN 80 (3“)	4,32 l	(1.14 USgpm)

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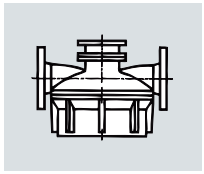
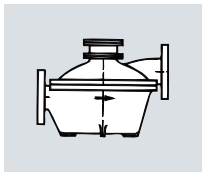
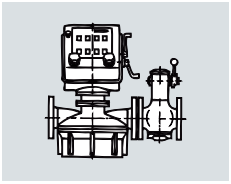
Technical specifications

Meter sizes (DN), pressure stages (PN) and permissible flow rates (q) for rotary-piston meters and automatic batchmeters

Design	DN		PN		Rated flow rate		Permissible flow rate						
							With viscosity[8]	Min.[1] with continuous[2] operation		Max. with intermittent[3][4] operation		Max. with continuous operation	
	mm	(inch)	bar	(psi)	l/min	(USgpm)	mPa·s (cp)	l/min	(USgpm)	l/min	(USgpm)	l/min	(USgpm)
Rotaty-piston meter for industrial use													
 bis PN 16 (MWP 232 psi)	15[5]	(½)[5]	25	(363)	20	(5.3)	≤ 1 < 5 800 2 000	1.5 1.0 0.2 0.2	(0.26) (0.2) (0.05) (0.03)	10[6] 20 20 10	(5.3) (5.3) (5.3) (1.3)	10 10 10 5	(2.6) (2.6) (2.6) (1.3)
	25	(1)	10 16 25 40 63	(145) (232) (363) (580) (914)	100	(26.4)	0.3 0.6 1 5 800	12 6 5 3 1	(3.2) (1.6) (1.3) (0.8) (0.26)	100 100 100 100 100	(26) (26) (26) (26) (26)	80 80 80 80 80	(13) (13) (13) (13) (13)
 bis PN 63 (MWP 914 psi)	50	(2)	6 16 25 40 63	(87) (232) (363) (580) (914)	500	(132)	0.3 0.6 1 5 800	40 20 18 10 2	(11) (5.3) (4.8) (2.6) (0.53)	500 500 500 500 500	(106) (132) (132) (132) (106)	350 350 350 350 350	(44) (44) (44) (44) (44)
	80	(3)	25 40	(363) (580)	1 000	(264)	0.3 0.6 1 5 800	60 35 25 10 5	(16) (9.3) (6.6) (2.6) (1.3)	1 000 1 000 1 000 1 000 1 000	(211) (264) (264) (264) (211)	700 700 700 700 500	(93) (93) (93) (93) (93)
Automatic batchmeter (Rotary-piston meter with quantity preset register and mechanical shut-off valve)													
	25	(1)	10	(145)	100	(26.4)	0.3 0.6 1 5 800[7]	12 6 5 3 1	(3.2) (1.6) (1.3) (0.8) (0.26)	100 100 100 100 100	(26) (26) (26) (26) (26)	–	–
	50	(2)	6 10	(87) (145	500	132	0.3 0.6 1 5 800[7]	40 20 18 10 2	(11) (5.3) (4.8) (2.6) (0.53)	500 500 500 500 400	(106) (132) (132) (132) (106)	–	–

1) For metal rotary-pistons: increase by a factor of 2, for PCTFE and PTFE/graphite filling rotary-pistons: increase by a factor of 3.
2) Continuous operation: over 8 hours a day.
3) For metal pistons: reduce by a factor ≈0.8 to extend service life.
4) Intermittent operation: up to 8 hours a day
5) Note: When using pistons made of carbon, there is danger of break in the case of liquid hammers
6) When using pistons made of carbon.
7) Max. permissible viscosity for exact closing of the shut-off valve and for exact dispensing: viscosities up to 4 000 mPa·s (cp) possible.
8) Higher viscosity on request.

Note:

In order to extend the service life of the pulse sensor, rotary-piston meters with current and/or pulse output (without intermediate gear) should only be operated at max. 60% of the permissible flow.

Piston materials

Piston material	Design	Permissible liquid temperature (°C/°F)	Max. perm. dyn. viscosity mPa·s (cp)	Order No. code
Carbon		-10 ... 300/ 14 ... 572	25	**K**
Cast iron (mat. No. GG 25)		-10 ... 300/ 14 ... 572		**E**
Cast iron (mat. No. GG 25)	with slotting	-10 ... 300/ 14 ... 572		**B**
Ni-Resist (mat. No. 0.6660)		-10 ... 300/ 14 ... 572		**N**
Ni-Resist (mat. No. 0.6660)	with slotting	-10 ... 300/ 14 ... 572		**C**
Hard rubber		-10 ... 40[1]/ 14 ... 104[1]	50	**G**
Hard rubber	with slotting	-10 ... 40[1]/ 14 ... 104[1]	50	**D**
PTFE/graphite filling		0 ... 40 [2]/ 32 ... 104[2]	120	**F**
PTFE/ graphite filling	with slotting	0 ... 40 [2]/ 32 ... 104[2]	120	**L**
PTFE/ graphite filling		0 ... 90 [2]/ 32 ... 194[2]	120	**R**
PTFE/ graphite filling	with slotting	0 ... 90 [2]/ 32 ... 194[2]	120	**M**
PCTFE		-10 ... +40 [2]/ 14 ... 104[2]	120	**H**
PCTFE	with slotting	-10 ... +40 [2]/ 14 ... 104[2]	120	**J**
CrNi steel with carbon contact surface (DN 25 (1“) only)	Collar piston	-10 ... +200/ 14 ... 392	> 10	**S**
CrNi steel with PTFE contact surface (DN 25 (1“) only)		-10 ... +40/ 14 ... 104	> 10	**T**

1) For 120 min max. 65 °C (149 °F); for 20 min max. 90 °C (194 °F), e. g. for cleaning procedures
2) Error limit max. 1%; at 90°C (194 °F) max. 2%

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Rotary-piston meters – Ordering data
DN 15 (½"), rated flow rate 20 l/min (5.3 USgpm)

Selection and Ordering data — Order No. 7MR1020- — Order code

Rotary-piston meter DN 15 (½")

Nom. press.	Materials: Housing	Materials: Meas. chamber	Materials: Rotary piston	Casing gasket	Can be heated using 2 thread connections	Weight appr. kg (lb)	Order code
PN 25 (363 psi)	Cast iron	Cast iron	• •	Flat gasket AFM 34	R 3/4"	9.0 (19.8)	E
	CrNiMo steel	CrNiMo steel	• • • •		no	9.0 (19.8)	S

Rotary piston material

	Max. permissible liquid temperature	Order code
Carbon	300 °C (572 °F)	K
Cast iron	300 °C (572 °F)	E
Hard rubber	40 °C (104 °F)	G
PCTFE	40 °C (104 °F)	H

Flow direction

		Order code
Mechanism shaft vertical	From left to right	1
	From right to left	2
	From front to back	3
	From back to front	4
Mechanism shaft horizontal	From left to right	5
	From right to left	6
	Upwards	7
	Downwards	0

Mechanical registers[1)]

	Order code
Single- pointer dial	
• Type 01	01
Double-pointer dial	
• Type 11, vertical mounting	11
• Type12, horizontal mounting	12

Value per

	Order code
• 1 l (0.26 USg) Fastest pointer or fastest drum	1

Accessories (pulsers, cooling attachments)[1)]

	Order code
• None	A
• Mounted	B
• Pulser already mounted above the intermediate gear:	
- 10 pulses/value per revolution	C
- 100 pulses/value per revolution	D
• Pulser already mounted below the intermediate gear:	
- 10 pulses/measuring chamber volume	G
- 100 pulses/measuring chamber volume	H

For Selection and Ordering data of „**Digital register with current and pulse output**", „**Tests**" und „**Flanges**" see page 4/434.
Heating systems on request.

1) For measuring temperatures over 80 °C, it is always necessary to order one cooling attachment (7MV3001-1XX00).
For measuring temperatures over 180 °C, it is always necessary to order two cooling attachments (7MV3001-2XX00) as separate items.

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Rotary-piston meters – Ordering data
DN 25 (1"), rated flow rate 100 l/min (26.5 USgpm)

Selection and Ordering data — Order No: 7MR1110-[E]...-... 7MR1120-[E]...-... 7MR1130-[E]...-... 7MR1140-[E]...-... — Order code

Rotary-piston meter DN 25 (1")

Nom. press.	Materials: Housing	Meas. chamber	Rotary piston	Casing gasket	Weight appr. kg (lb)	Order No
PN 10 (145 psi)	Cast iron	Cast iron	• • • • • •	Flat gasket AFM 34	10.5 (23.2)	7MR1110-E...-...
PN 16 (232 psi)	CrNiMo steel	CrNiMo steel	• • • • • •			7MR1110-S...-...
PN 25 (363 psi)	Cast iron	Cast iron	• • • • •		20 (44.1)	7MR1120-E...-...
PN 40 (580 psi)	Cast steel	Cast iron	• • • • •	FKM (O-ring)	24 (52.9)	7MR1130-E...-...
PN 63 (914 psi)	Cast steel	Cast iron	• • • • •	Flat gasket AFM 34	30 (66.1)	7MR1140-E...-...

Rotary piston material	Max. permissible liquid temperature	Weight appr. kg (lb)	Order code
Carbon		0.15 (0.33)	K
Cast iron		0.55 (1.21)	E
Cast iron, grooved		0.5 (1.1)	B
Ni-resist		0.55 (1.21)	N
Ni-resist, grooved		0.5 (1.1)	C
Hard rubber	40 °C (104 °F)	0.1 (0.2)	G
Hard rubber, grooved	40 °C (104 °F)		D
PTFE with graphite filling	40 °C (104 °F)	0.3 (0.66)	F
PTFE with graphite filling, grooved	40 °C (104 °F)		L
PTFE with graphite filling	90 °C (194 °F)		R
PTFE with graphite filling, grooved	90 °C (194 °F)		M
CrNiMo steel with carbon bearing surface		0.45 (0.99)	S
CrNiMo steel with PTFE bearing surface		0.46 (1.01)	T
PCTFE		0.16 (0.35)	H
PCTFE, grooved			J

Flow direction		Order code
Mechanism shaft vertical	From left to right	1
	From right to left	2
	From front to back	3
	From back to front	4
Mechanism shaft horizontal	From left to right	5
	From right to left	6
	Upwards	7
	Downwards	0

Mechanical registers/quantity preset registers[1]	Weight approx. kg (lb)	Order code
Single- pointer dial		
• Type 01	0.8 (1.76)	01
Double-pointer dial		
• Type 11, vertical mounting	1.5 (3.3)	11
• Type 12, horizontal mounting	2.5 (5.5)	12
Quantity preset register (only for vertical mechanism shaft, flow direction according to codes 1 ... 4)		
• Type 30	11 (24.3)	30
• Type 30, ex-protected switch	13.2 (29.1)	54

Value per revolution	Weight approx. kg (lb)	Order code
• 1 l (0.26 USg)	11 (24.3)	1
• 10 l (2.65 USg)	13.2 (29.1)	2

Accessories (pulsers, cooling attachments)[1]	Order code
• None	A
• Mounted	B
• Pulser already mounted above the intermediate gear:	
- 10 pulses/value per revolution	C
- 100 pulses/value per revolution	D
• Pulser already mounted below the intermediate gear:	
- 10 pulses/measuring chamber volume	G
- 100 pulses/measuring chamber volume	H

For Selection and Ordering data of „**Digital register with current and pulse output**“, „**Tests**“ und „**Flanges**“ see page 4/434.
Heating systems on request.

[1] For measuring temperatures over 80 °C, it is always necessary to order one cooling attachment (7MV3001-1XX00).
For measuring temperatures over 180 °C, it is always necessary to order two cooling attachments (7MV3001-2XX00) as separate items.

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Rotary-piston meters – Ordering data
DN 50 (2"), rated flow rate 500 l/min (132 USgpm)

Selection and Ordering data — Order No. — Order code

Rotary piston meter DN 50 (2“)

Nom. press.	Materials: Housing	Meas. chamber	Rotary piston	Casing gasket	Weight appr. kg (lb)	Order No.	Order code
PN 6 (87 psi)	Cast iron	Cast iron	• • • • •	Flat gasket AFM 34	31 (68.3)	7MR1410-	E
PN 16 (232 psi)	CrNiMo steel	CrNiMo steel	• • • • •			7MR1410-	S
PN 25 (363 psi)	Spher. cast iron	Cast iron	• • • • •		45 (99.2)	7MR1420-	E
PN 40 (580 psi)	Cast steel	Cast iron	• • • • •	FKM (O-ring)	60 (132)	7MR1430-	E
PN 63 (914 psi)	Cast steel	Cast iron	• • • • •	Flat gasket AFM 34	94 (207)	7MR1440-	E

Rotary piston material	Max. permissible liquid temperature	Weight appr. kg (lb)	Order code
Carbon		0.9 (2.0)	K
Cast iron		3.5 (7.7)	E
Cast iron, grooved		3.4 (7.5)	B
Ni-resist		3.5 (7.7)	N
Ni-resist, grooved		3.4 (7.5)	C
Hard rubber	40 °C (104 °F)	0.7 (1.5)	G
Hard rubber, grooved	40 °C (104 °F)		D
PTFE with graphite filling	40 °C (104 °F)	0.5 (1.1)	F
PTFE with graphite filling, grooved	40 °C (104 °F)		L
PTFE with graphite filling	90 °C (194 °F)		R
PTFE with graphite filling, grooved	90 °C (194 °F)		M

Flow direction		Order code
Mechanism shaft vertical	From left to right	1
	From right to left	2
	From front to back	3
	From back to front	4
Mechanism shaft horizontal	From left to right	5
	From right to left	6
	Upwards	7
	Downwards	0

Mechanical registers/quantity preset registers[1)]	Weight appr. kg (lb)	Order code
Single- pointer dial		
• Type 01	0.8 (1.76)	01
Double-pointer dial	1.5 (3.3)	11
• Type 11, vertical mounting		
• Type 12, horizontal mounting	2.5 (5.5)	12
Quantity preset register (only for vertical mechanism shaft, flow direction according to codes 1 ... 4)		
• Type 30	11 (24.3)	30
• Type 30, ex-protected switch	13.2 (29.1)	54

Value per revolution	Order code
• 10 l (2.65 USg)	2
• 100 l (26.5 USg)	3

Accessories (pulsers, cooling attachments)[1)]	Order code
• None	A
• Mounted	B
• Pulser already mounted above the intermediate gear:	
- 10 pulses/value per revolution	C
- 100 pulses/value per revolution	D
• Pulser already mounted below the intermediate gear:	
- 10 pulses/measuring chamber volume	G
- 100 pulses/measuring chamber volume	H

For Selection and Ordering data of „**Digital register with current and pulse output**“, „**Tests**“ und „**Flanges**“ see page 4/434.
Heating systems on request.

1) For measuring temperatures over 80 °C, it is always necessary to order one cooling attachment (7MV3001-1XX00).
For measuring temperatures over 180 °C, it is always necessary to order two cooling attachments (7MV3001-2XX00) as separate items.

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Rotary-piston meters – Ordering data
DN 80 (3"), rated flow rate 1000 l/min (264 USgpm)

Selection and Ordering data									Order No.	Order code
Rotary piston meter DN 80 (3“)										
Nom. press.	**Materials**						**Casing gasket**	Weight appr. kg (lb)		
	Housing	Meas. chamber								
PN 25 (363 psi)	Spher. cast iron	Cast iron	•	•	•	•		108 (238)	7MR1620-	E
PN 40 (580 psi)	Cast steel	Cast iron	•	•	•	•	FKM (O-ring)	150 (331)	7MR1630-	E
			↓	↓	↓	↓				
Rotary piston material							Max. permissible liquid temperature	Weight appr. kg (lb)		
Carbon						•		2 (4.4)		K
Cast iron					•			9.5 (21)		E
Cast iron, grooved					•			9.4 (20.7)		B
Ni-resist				•				10 (22)		N
Ni-resist, grooved				•				9.6 (21.2)		C
Hard rubber			•				40 °C (104 °F)	2 (4.4)		G
Hard rubber, grooved			•				40 °C (104 °F)	1.8 (4)		D
Flow direction										
Mechanism shaft vertical		From left to right								1
		From right to left								2
		From front to back								3
		From back to front								4
Mechanism shaft horizontal		From left to right								5
		From right to left								6
		Upwards								7
		Downwards								0
Mechanical registers/quantity preset registers[1]								Weight appr. kg (lb)		
Single- pointer dial										
• Type 01								0.8 (1.76)		01
Double-pointer dial										
• Type 11, vertical mounting								1.5 (3.3)		11
• Type 12, horizontal mounting								2.5 (5.5)		12
Quantity preset register (only for vertical mechanism shaft, flow direction according to codes 1 ... 4)										
• Type 30								11 (24.3)		30
• Type 30, ex-protected switch								13.2 (29.1)		54
Value per revolution										
• 100 l (26.5 USg)										3
• 1000 l (265 USg)										4
Accessories (pulsers, cooling attachments)[1]										
• None										A
• Mounted										B
• Pulser already mounted above the intermediate gear:										
- 10 pulses/value per revolution										C
- 100 pulses/value per revolution										D
• Pulser already mounted below the intermediate gear:										
- 10 pulses/measuring chamber volume										G
- 100 pulses/measuring chamber volume										H

For Selection and Ordering data of „**Digital register with current and pulse output**“, „**Tests**“ und „**Flanges**“ see page 4/434.
Heating systems on request.

[1] For measuring temperatures over 80 °C, it is always necessary to order one cooling attachment (7MV3001-1XX00).
For measuring temperatures over 180 °C, it is always necessary to order two cooling attachments (7MV3001-2XX00) as separate items.

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Rotary piston meters – Ordering data
DN 15 (½") to DN 80 (3")

Selection and Ordering data	Order No.	Order code
Rotary piston meter DN 15 (½") to DN 80 (3")	**7MR1 ■■ 0 - ■■■■ - ■■■■**	**■■■**
Digital register with current/pulse output		
As separate model: Pulser mounted on the rotary-piston meter and locked with protective cover; SITRANS F RA110 (order separately)		
10 pulses/revolution		
• max. material temperature 80 °C (176 °F), without cooling attachment	**4 1 0 B**	
• max. material temperature 180 °C (356 °F), one cooling attachment	**4 3 0 B**	
• max. material temperature 260 °C (500 °F), two cooling attachments	**4 5 0 B**	
100 pulses/revolution		
• max. material temperature 80 °C (176 °F), without cooling attachment	**4 6 0 B**	
• max. material temperature 180 °C (356 °F), one cooling attachment	**4 7 0 B**	
• max. material temperature 260 °C (500 °F), two cooling attachments	**4 8 0 B**	
Compact version: Pulser mounted on the rotary-piston meter and locked with mounting bracket; SITRANS F RA110 (order separately) mounted on mounting bracket.		
10 pulses/revolution		
• max. material temperature 80 °C (176 °F), without cooling attachment	**6 1 0 B**	
• max. material temperature 180 °C (356 °F), one cooling attachment	**6 3 0 B**	
• max. material temperature 260 °C (500 °F), two cooling attachments	**6 5 0 B**	
100 pulses/revolution		
• max. material temperature 80 °C (176 °F), without cooling attachment	**6 6 0 B**	
• max. material temperature 180 °C (356 °F), one cooling attachment	**6 7 0 B**	
• max. material temperature 260 °C (500 °F), two cooling attachments	**6 8 0 B**	
Tests		
Works test	**A**	
Works test certificate	**B**	
Preliminary official test (only for vertical mechanism shaft and mech. register and quantity preset register)	**D** [1]	
Preliminary official test (only for vertical mechanism shaft and mech. Register or quantity preset register and pulser (double pick-up) for current/pulse output); (not currently available in connection with SITRANS F RA110	**E** [1]	
Flanges		
Plane, drilled to EN 1092-1	**0**	
Plane, drilled to specification	**9**	**R 1 Y**
With sealing ridge to specification	**9**	**R 2 Y**

[1] Not with PTFE and PCTFE pistons.

Further designs	Order code
Order No. of the rotary-piston meter 7MR1■■■ - ■■■■■ - ■■■■ - Z	
Material acceptance test to EN 10 204-3.1	**E01**

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Selection and Ordering data

Order No. | Order code

Automatic batchmeter DN 25 (1“)

With mechanical shut-off valve **downstream** of metering mechanism

Nominal pressure	Materials Housing	Meas. chamber	Rotary piston							Weight appr. kg (lb)	Order No.	Order code
PN 10 (145 psi)	Cast iron	Cast iron	•			•	•	•	•	38 (83.8)	7MR111 - E	
	CrNiMo steel	CrNiMo steel	•	•	•	•	•		•		7MR111 - S	

Automatic batchmeter DN 50 (2“)

With mechanical shut-off valve **downstream** of metering mechanism

Nominal pressure	Materials Housing	Meas. chamber	Rotary piston							Weight appr. kg (lb)	Order No.	Order code
PN 6 (87 psi)[1]	Cast iron	Cast iron			•	•	•	•		58.5 (129)	7MR141 - E	
PN 10 (145 psi)	CrNiMo steel	CrNiMo steel	•	•	•	•		•			7MR141 - S	

Rotary piston material								Max. permissible liquid temperature	Weight appr. kg (lb)	Order code
Carbon							•		0.15 (0.3)	K
Cast iron						•			0.55 (1.2)	E
Cast iron, grooved						•			0.5 (1.1)	B
Ni-resist					•				0.55 (1.2)	N
Ni-resist, grooved					•				0.5 (1.1)	C
Hard rubber				•				40 °C (104 °F)	0.1 (0.2)	G
Hard rubber, grooved				•				40 °C (104 °F)		D
PTFE with graphite filling			•					40 °C (104 °F)	0.3 (0.7)	F
PTFE with graphite filling, grooved			•					40 °C (104 °F)		L
PTFE with graphite filling			•					90 °C (194 °F)		R
PTFE with graphite filling, grooved			•					90 °C (194 °F)		M
PCTFE (only DN 25)		•						40 °C (104 °F)	0.16 (0.4)	H
PCTFE, grooved (only DN 25)		•						40 °C (104 °F)		J
CrNiMo with carbon contact surface	•								0.4 (0.9)	S
CrNiMo with PTFE contact surface	•									T

	Order code
Tappet bushing	
• With maintenance-free sealed bushing	2
• With bellows[2)3)]	3
Flow direction	
Mechanism shaft always vertical • From left to right, valve right	1
• From right to left, valve left	2
Quantity preset register	
• Type 30	3 0
• Type 30, ex-protected switch	5 4
Value per revolution and adjustment step	
1 l/0,1 : 0,1 l (only DN 25)	1
10 l/1 : 1 l	2
100 l/10 : 1 l (only DN 50)	3
Accessories	
Without	A
Mounted	B
Tests	
Works test	A
Works test certificate	B
Preliminary official test	C
Flanges	
Plane, drilled to EN 1092-1	0
Plane, drilled to specification	9 R 1 Y
With sealing ridge to specification	9 R 2 Y

Note: If pressure impacts are likely, the valve should be before the automatic batchmeter in the direction of flow.

1) Flange connections drilled to PN 10/16 (MWP 145/232 psi)

2) Restricted operating conditions (max. 40 °C (104 °F), max. 3 bar (43.5 psi))

3) Separate Order No. required (see Selection and Ordering data table „Accessories“)

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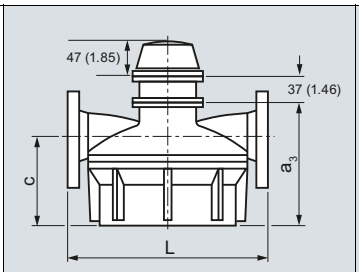
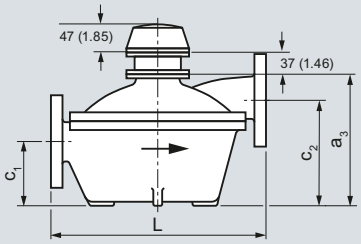
Rotary-piston meters - Ordering data
Automatic batchmeter DN 25 (1")

Dimensional drawings

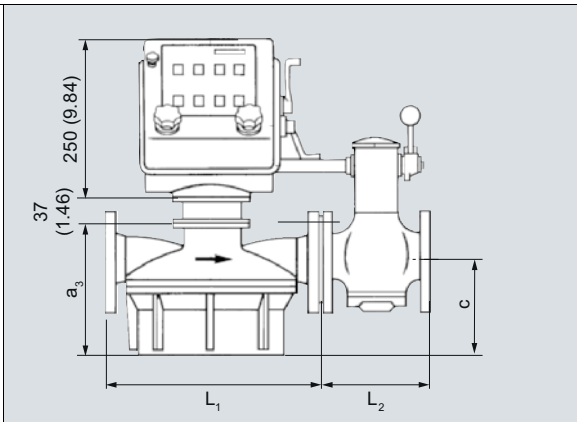
Rotary-piston meter with single pointer dial and intermediate gear





	DN 25	DN 50	DN 80	DN 15		DN 25		DN 50		DN 80	
				PN 25	PN 40	PN 25 and PN 40	PN 63	PN 25 and PN 40	PN 63	PN 25 and PN 40	PN 63
L	210 (8.27)	325 (12.80)	410 (16.14)	200 (7.87)	200 (7.87)	270 (10.63)	300 (11.81)	400 (15.75)	470 (18.50)	540 (21.26)	600 (23.62)
C	90 (3.54)	147 (5.79)	185 (7.28)	-	-	-	-	-	-	-	-
C_1	-	-	-	50 (1.97)	68 (2.68)	80 (3.15)	82 (3.23)	120 (4.72)	120 (4.72)	155 (6.10)	177 (6.97)
C_2	-	-	-	83.5 (5.67)	108 (4.25)	144 (5.67)	157 (6.18)	205 (8.07)	230 (9.06)	271 (10.67)	312 (12.28)
a_3	153 (6.02)	205 (8.07)	244 (9.61)	140 (8.19)	165 (6.50)	208 (8.19)	224 (8.82)	263 (10.35)	285 (11.22)	331 (13.03)	387 (15.24)

Automatic batchmeter with quantity preset register intermediate gear



	DN 25	DN 50
L_1	210 (8.27)	325 (12.80)
L_2	135 (5.31)	175 (6.89)
C	90 (3.54)	147 (5.79)
a_3	153 (6.02)	205 (8.07)

In addition to dimension a_3 the following dimensions need to be added for extra add-on components (dimensions in mm (inch))	
Addition of	**a_3 +**
Intermediate gear	37 (1.46)
Single-pointer dial type 01	47 (1.85)
Double-pointer dial type 11	58 (2.28)
Double-pointer dial type Typ 12	250 (9.84)
Pulser	82 (3.23)
Mounting bracket and electronic flow register	200 (7.87)
1 additional insulation attachment (up to 180°C (176°F))	159 (6.26)
2 additional insulation attachments	318 (12.52)
Quantity preset register	287 (11.30)

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SITRANS F RA110 electric flow register

Overview

Application

The display of the electric flow register is a universal LCD for converting the measured value and displaying the current value, total value and accumulated total. Depending on the design, the flow register can be provided with a scaleable pulse output for the total value and/or a current output of 0/4 to 20 mA.

Design

The electric flow register is fitted with a large, extremely clear LCD (90 x 40 mm in size), where the flow and total value are displayed with seven 17 mm digits and 8 mm digits respectively. Units, time units, flow trend and device status are displayed in addition.

The electronics is fitted in a rugged aluminum housing (IP67) with three large keys. The alphanumeric menu structure in English or German permits simple configuring and can be used for many applications.

Models 61, 63, 65 and 66, 67, 68 are supplied with the electric flow register already mounted on the pulser.

Function

The flow register of the SITRANS F RA110 receives, e.g. from a pulser, information on the current flow. This information is converted into the flow per second, minute, hour or day using a programmable 7-digit K-factor. Conversion is also carried out for the total values and accumulated totals. The units for the flow and accumulated total are completely independent.

The total value can be reset by pressing the "CLEAR" key twice. The accumulated total cannot be reset and is displayed with 11 digits.

The standard configuration displays the total value (17 mm digits) and the flow (8 mm digits) simultaneously. It is also possible to output the current value on the 17 mm digits. In this case, the total value is displayed by pressing "SELECT". The electric register has inputs for Namur sensors. Connection is possible to practically every available sensor system.

The active and passive 0/4 to 20 mA analog output has a resolution of 12 bits and can be connected to a load of 750 Ω.

The pulse output can be exactly defined, e.g. to generate one pulse per 3.5 liters. The pulse lengths can be set to 1 to 9 999 ms. The maximum output frequency is limited to 500 Hz. The transistor can switch max. 50 V DC/ 300 mA.

All configuration parameters are saved in an EEPROM. The total value and the accumulated total are saved once a minute, so that only a minimum amount of information is lost in the event of a power failure.

The SITRANS F RA110 can be ordered with powerful LED background lighting for use under unfavorable viewing conditions. The menu language of the displays can be set to German or English.

Technical specifications

Input	
Pulse input	NAMUR signal
Frequency	NAMUR: 0 ... 500 Hz
Sensor supply	8.2 V or 24 V DC
Output	
Pulse output	Max. frequency 500 Hz, pulse width 1 ... 9999 ms adjustable. Type: Transistor output, max. load 24 V DC/170 mA (active) and 50 V DC/300 mA (passive)
Analog output	Range 0/4 ... 20 mA, accuracy: < ± 0.1 %, resolution 12 bit, response time (10 ... 90 %): 100 ms, load max. 750 Ω, active or passive, function: flow 0/4 ... 20 mA freely adjustable
Functionality	
Operator	The total value and flow are displayed. The total value is deleted by double-pressing the "CLEAR" key. The total value and the accumulated total are displayed by pressing the "SELECT" key.
Total value	17 mm (0.67 inch) high, 7 digits, max. 3 decimal places; the total value can not be deleted. Units: l, m^3, gal, USg, kg, lb, bbl or none K-factor: 7-digit 0.000010 to 9 999 999 Settings independent of flow
Accumulated total	8 mm high (0.31 inch), max. 11 digits, max. 3 decimal places, the accumulated total cannot be reset
Flow rate	8 mm (0.31 inch) or 17 mm (0.65 inch) high, max. 7 digits, max. 3 decimal places Units: ml, l, m^3, mg, g, kg, ton, NI, Nm^3, scf, ref, cf, lb, bbl, gal or none Time units: second, minute, hour, day
Rated conditions	
Operating temperature	-40 ... +80 °C (-40 ... +176 °F)
Degree of protection	IP67 (NEMA 4)
Design	
Material	Housing: aluminum, UV-resistant powder coating Window: Polycarbonate Gasket material: Silicone
Dimensions	See dimensional drawings
Power supply	
Power supply with	24 V AC/DC ± 10 % or 115/230 V AC ± 10 %
Power consumption	Max. 9 W
Certificate and approvals	
Ex protection	EEx ia IIB/IIC T4
For official calibration inspections	In preparation

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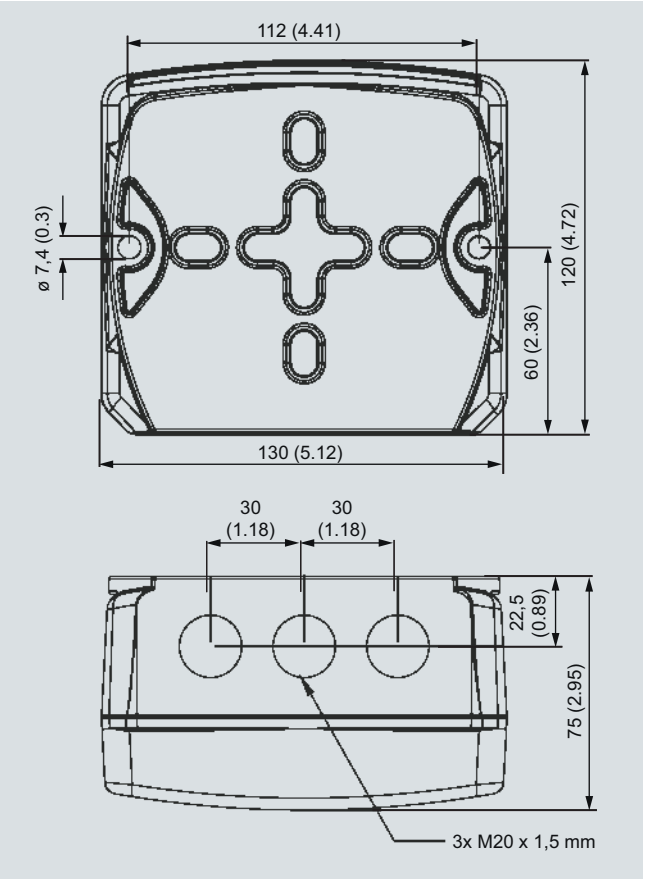
SITRANS F RA110 electric flow register

Selection and Ordering data	Order No.
Electric flow register SITRANS F RA110	**7MV1070-**
Electric register in aluminum housing for display of flow and total quantity, 7-digit LCD, IP67 (NEMA 4), without explosion protection, menu language German/English	■■■■ - ■■ **A 0**
Signal input	
NAMUR signal	**1**
Power supply	
Incl. sensor supply 8.2 V DC	
24 V AC/DC[1]	**A**
230 V AC[1]	**B**
16 ... 30 V DC[2]	**C**
Function (output)	
Display of flow and total value	**A 0**
Additonal active pulse output[1]	**B 1**
Additonal passive pulse output	**B 2**
Additonal active pulse output and current output[1]	**C 1**
Additonal passive pulse output and current output	**C 2**
Installation	
For wall mounting	**0**
For additional mounting at compact version	**1**
Explosion protection	
without	**0**
EEx ia IIB/IIC T4 up to max. 100 °C	**1**
LED background lighting	
without	**A**
with background lighting	**B**

[1] Not for ATEX version
[2] For ATEX version only

Note:
Cable glands for M20 are not included in delivery.

Dimensional drawings



Electric flow register SITRANS F RA110, dimensions in mm (inch)

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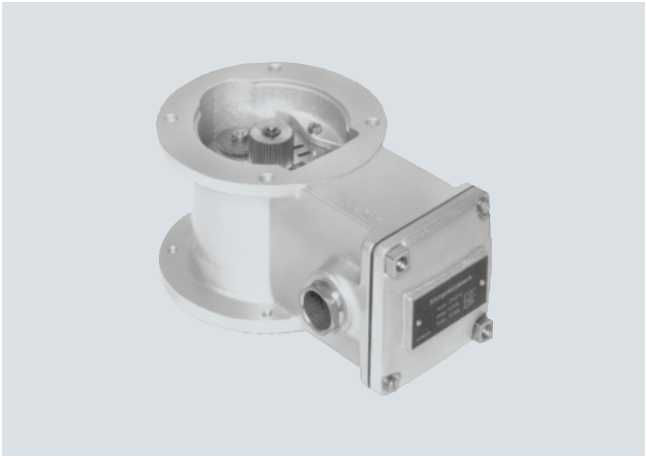
Pulser with inductive pick-up

Overview



Pulser with inductive pick-up

The pulser is used for quantity metering in conjunction with electromechanical pulse counters as a transmitter with output signals for electronic data processing.

Using the pulser, quantity measurements from volumetric meters can be converted into electrical pulses for remote transmission.

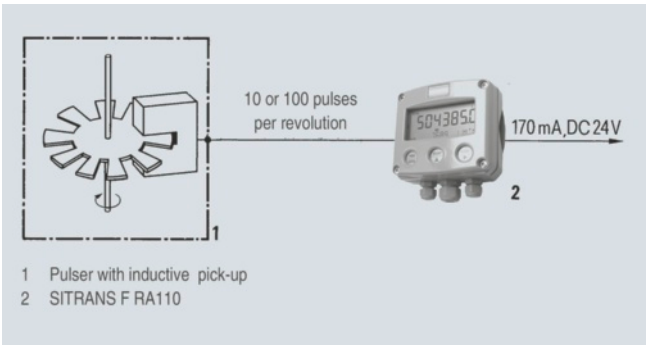
Design

- Electronic design
- High pulse frequency (≤ 3 000 Hz)
- Electronic output
  - 170 mA, 24 V DC (delivering current) for electromechanical pulse counters
  - 2 mA, 24 V DC (absorbing current) for electronic processing

Function

Pulse valence with quantity measurements

Conversion of metered quantities into electrical pulses



Measuring system for remote metering and digital data processing

The metering shaft of the volumetric meter drives a pulse disk. The vanes of the pulse disk successively enter the air gap of an inductive pick-up, thus changing the coupling between two coils. This causes a change in resistance that is converted into a pulse by the subsequent pulse amplifier, which also powers the pick-up.

The pulser operates without contacts. No measurable force is exerted on the disk. Hence the system is free from feed-backs.

Depending on the design, 10 or 100 pulses are produced for each revolution of the drive. The pulse amplifier amplifies the incoming pulses. A timing circuit prevents a continuous output pulse.

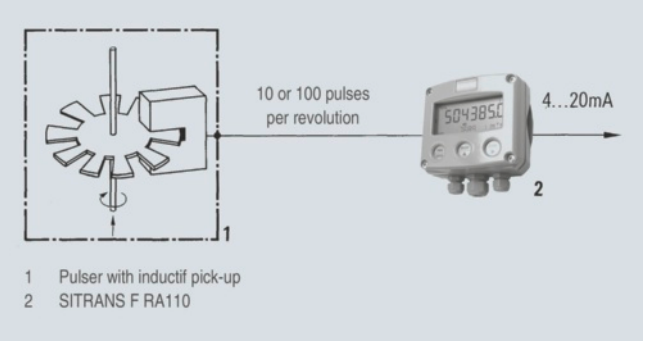
The quantitative value associated with one pulse depends on the value per revolution of the drive (pulses per liter or gallon) or on the respective volume of the measuring chamber of the drive.

The selection of the pulser – whether 10 or 100 pulses per drive revolution – is to be made according to the desired resolution.

Pulsers with two inductive pick-ups are available for systems for custody transfer since at present the PTB regulations specify a duplicated transmission system with pulse comparison.

Pulse valence with flow rate measurements

Conversion of metered quantities into electrical pulses



Measuring system for flow-rate measurement

During flow measurements, the change in resistance is converted to pulses by SITRANS F RA110. Each pulse corresponds to a given quantity of metered liquid. The number of pulses per unit in time (the frequency) is a measure of the flow rate.

SITRANS F RA110 converts the incoming NAMUR signals into load-independent direct current.

The electric pulser is available for 10 or 100 pulses per revolution. The choice depends on the smallest flow rate still to be indicated.

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Pulser with inductive pick-up

Technical specifications

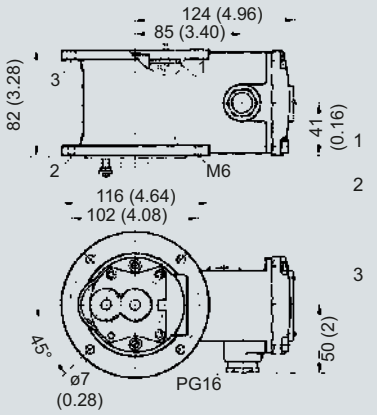
Slot initiator	Sensor SJ 3,5 -N-K37
Power supply (from pulse amplifier)	8 V DC, R_i approx. 1 kΩ (DIN 19234) C_i = 40 nF; L_i = 160 µH
Change in current consumption on pulse	≤ 1 mA/ ≤ 3 mA (DIN 19234)
Permissible line impedance between pick-up and amplifier	≤ 50 Ω (DIN 19234)
Number of pulses per revolution of the drive	10 or 100
Phase position of the channels of the double pick-up	180° : 180° ± 30° Electrically offset 90° ± 30°
Duty factor	1 : 1 ± 17%
Max. pulse frequency	3000 Hz
Pulse valence	Dependent on value per revolution of the drive of the respective meter
Permissible ambient temperature	-25 ... +100 °C (-13 ... +212 °F)
Degree of protection	IP43 to EN 60529 with register
	P65 to EN 60529 with protective cover
	This pulser has the EC-Type Examination Certificate PTB 99 ATEX 2219X.
Mounting position	Any
Weight approx.	1.2 kg (2.65 lb)
Ex approval	IIG EEx ia IIC T6

Selection and Ordering data		Order No.
Pulser with inductive pick-up Weight approx. 1.2 kg (2.65 lb)		
Single pick-up		
• 10 pulses/revolution		**7MV1105-1AA00**
• 100 pulses/revolution		**7MV1105-2AA00**
Double pick-up[1)] (for custody transfer installations)		
• 10 pulses/revolution		**7MV1105-3AA01**
• 100 pulses/revolution		**7MV1105-4AA01**
Instruction Manual		
German/English	F)	**C73000-B5174-C25**

1) Pulse channels electrically offset by 90°

F) Subject to export regulatons AL: 9I999, ECCN: N

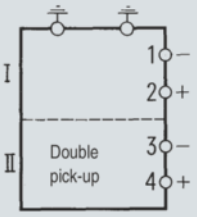
Dimensional drawings



1 Gear wheel supplied (brass)
2 Standard connection for measuring chamber cover, intermediate gear and cooling attachments
3 Standard connection for register, quantity preset register, protective cover or mounting bracket

Pulser with inductive pick-up, dimensions in mm (inch)

Schematics



Pulser with inductive pick-up, connection diagram for clockwise rotation; pick-up I to terminals 3 and 4 for counter-clockwise rotation