

Flow Measurement

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You can download all instructions, catalogs and certificates for SITRANS F free of charge at the following Internet address:
www.siemens.com/sitransf

Flow Measurement

Product overview

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 <ul style="list-style-type: none"> • 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 K7.2, OIML R 117, OIML R 49 and MI-001 	3/33	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 <ul style="list-style-type: none"> • Remote and compact mounting with all sensors • Communication modules: HART, Modbus, PROFIBUS, FOUNDATION Fieldbus, DeviceNet • Ex Approval: ATEX, IECEx, FM, UL, CSA • Multi-lingual display and touchpad keypad • Comprehensively self-diagnostic 	3/45	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 <ul style="list-style-type: none"> • Metering tube DN 2 ... DN 100 (1/12" ... 4") flangeless design. • Communication modules: HART, Modbus, PROFIBUS, FOUNDATION Fieldbus, DeviceNet • 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) • Ex Approval: ATEX, FM 	3/50	
	Specially designed for the food & beverage and pharmaceutical industry 	Flow sensor MAG 1100 F <ul style="list-style-type: none"> • AISI 316 stainless steel enclosure • Hygienic seal, 3A and EHEDG • Easy to clean • Supplied with connections according to your specification • Ex Approval: ATEX, FM 	3/58	
	Designed for all water and waste water applications in water plants and industrial applications	Flow sensor MAG 5100 W <ul style="list-style-type: none"> • Metering tube DN 15 ... DN 1200 (DN 2000) (1/2" ... 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 K7.2 	3/92	





	Application	Description	Catalog page	Software for parameterization
	<p>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.</p>	<p>Flow sensor MAG 3100</p> <ul style="list-style-type: none"> • 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 • Custody transfer approval: PTB, OIML R 117 	3/69	
SITRANS F M electromagnetic flowmeters - High-power AC magnetic flowmeter				
	<p>Designed for heavy-duty applications like pulp & paper stock over 3 %; heavy mining slurries and mining slurries with magnetic particles</p>	<p>Transmitter TRANSMAG 2</p> <ul style="list-style-type: none"> • Magnetic flowmeter with a very strong pulsed AC magnetic field • PROFIBUS PA or HART communication • Comprehensive self-test function • Ex approval: ATEX, IECEx, FM, UL, CSA 	3/104	SIMATIC PDM
	<p>Designed for heavy-duty applications like pulp & paper stock over 3 %; heavy mining slurries and mining slurries with magnetic particles</p>	<p>Flow sensor 911/E</p> <ul style="list-style-type: none"> • 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 • Multi-lingual display and touchpad keypad • Only remote version 	3/104	
SITRANS F M electromagnetic flowmeters - Battery-operated magnetic water meter				
	<p>Battery-operated electromagnetic water meter for water applications within abstraction, distribution network, revenue metering and irrigation</p>	<p>Water meter MAG 8000</p> <ul style="list-style-type: none"> • Battery- and/or mains power operated water meter • Metering tube DN 25 ... DN 1200 (1" ... 48") • Remote and compact installation IP68/ NEMA 6P enclosure • Custody transfer approval: PTB K7.2, OIML R 49 and MI-001 • Drinking water approvals • Communication modules: GSM/GPRS, Modbus, Encoder 	3/114	SIMATIC PDM and Flow Tool

Flow Measurement

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	Application	Description	Catalog page	Software for parameterization
	Designed for a variety of liquid and gas applications Measurement of mass flow, density, temperature and fraction 	Flowmeters FC430 (Dual tube design) <ul style="list-style-type: none"> • DN 15, DN 25, DN 50 and DN 80 • Flow from 0.2 ... 181 000 kg/h (400 000 lb/h) - water • Pipe material: AISI 316L • Accuracy, typically: Flow: $\leq 0.1\%$, Density: $\leq 0.005 \text{ g/cm}^3$ • Liquid temp./pressure: $-50 \dots +200 \text{ }^\circ\text{C}$ ($-58 \dots +392 \text{ }^\circ\text{F}$)/up to 100 bar (1450 psi) • Approvals: ATEX, IECEx, FM CSA, NEPSI, OIML R 117, SIL 2/3, EHEDG, 3A 	3/150	
	Designed for accurate mass flow measurement of gases in high pressure applications	Flow sensor FCS200 <ul style="list-style-type: none"> • DN 10, DN 15, DN 25 • Flow from 0 ... 30 000 kg/h • Pipe material: Hastelloy C22 • Accuracy: $\pm 0.5\%$ of rate • Process temperature: $-40 \dots +125 \text{ }^\circ\text{C}$ ($-40 \dots 257 \text{ }^\circ\text{F}$) • Pressure: Up to 350 bar • Ex approvals: ATEX, IECEx, FM • Custody transfer approval: PTB - OIML R 139 	3/192	
	Designed for a variety of liquid and gas applications	Flow sensors MASS 2100 (Single tube design) and FC300 <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> - Flow: $\leq 0.1\%$ of flow rate - Density: $\leq 0.0005 \text{ g/cm}^3$ • Liquid temp./pressure: $-50 \dots +180 \text{ }^\circ\text{C}$ ($-58 \dots +356 \text{ }^\circ\text{F}$) / Up to 410 bar (5946 psi) • Approved according to ATEX, UL 	3/197, 3/201	
	Measurement of liquids. Measurement of mass flow, density and temperature.	Flow sensor MC2 Standard (Dual tube design) <ul style="list-style-type: none"> • 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 • Accuracy: $\leq 0.15\%$ of rate • Density: $\leq 0.001 \text{ g/cm}^3$ • Liquid temp.: $-50 \dots +180 \text{ }^\circ\text{C}$ ($-58 \dots +356 \text{ }^\circ\text{F}$) • Pressure: $< 100 \text{ bar}$ (1450 psi) • Approvals: ATEX EEx em [ib] IIC T2 ... T6 	3/217	






	Application	Description	Catalog page	Software for parameterization
	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) <ul style="list-style-type: none"> • Superior signal resolution for optimum-turn down ratio • Comprehensively self-diagnostic, for error indication and logging • Adaptive batch function • Multi-lingual display and keypad interface • Approvals: ATEX [EEx ia] IIC T6 • Ex Approval: ATEX, IECEX, C-UL • Communication modules: HART, Modbus, PROFIBUS, FOUNDATION Fieldbus, DeviceNet 	3/173, 3/183	SIMATIC PDM
	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 SIFLOW FC070 Standard and Ex CT <ul style="list-style-type: none"> • 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. • Direct integration into SIMATIC S7 and SIMATIC PCS7 • Automation systems • Ex approval: Ex Approval: ATEX, IECEX, FM • Custody transfer approval: PTB - OIML R 139 	3/188	SIMATIC PDM SIMATIC STEP 7 SIMATIC PCS 7
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 <ul style="list-style-type: none"> • 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 	3/233	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 <ul style="list-style-type: none"> • Battery or mains-powered • Easy one-button operation • Bidirectional measuring • IrDA optical eye communication • Robust polyamide enclosure 	3/240	SIMATIC PDM

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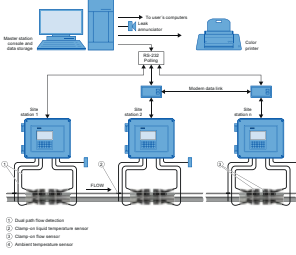
	Application	Description	Catalog page	Software for parameterization
	<p>The main application for SONO 3300 ultrasonic flowmeters is to measure the volume flow of:</p> <ul style="list-style-type: none"> • Water and treated waste water • Oil and liquefied gases • Hot water/cooling systems 	<p>SONO 3300/FUS060</p> <ul style="list-style-type: none"> • 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 m³/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 	3/247	SIMATIC PDM
	<p>The main application for SONO 3100 ultrasonic flowmeters is to measure the volume flow of:</p> <ul style="list-style-type: none"> • Water and treated waste water • Oil and liquefied gases • Liquid cryogenic application • District heating systems 	<p>SONO 3100/FUS060</p> <ul style="list-style-type: none"> • DN 100 ... DN 600 (4" ... 24") • Pipe in carbon • 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 • 1-path; 4-path on request • Special material on request 	3/254	SIMATIC PDM
	<p>Installation of one, two or four transducer sets in existing concrete or steel pipes. Typically installed in pipes with large diameters or in hot/cold water applications</p>	<p>SONOKIT</p> <ul style="list-style-type: none"> • 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) • Standard 1-path or 2-path (4-path on request) 	3/263	SIMATIC PDM
	<p>Battery or mains-powered ultrasonic flowmeter for use within water-based district heating, cooling systems and utility.</p> <p>The FUS380 can also be used for water irrigation systems.</p> <p>SITRANS FUS380/FUE380 are designed to work with the SITRANS FUE950 energy calculator.</p>	<p>FUS380/FUE380</p> <ul style="list-style-type: none"> • <i>FUS380/FUE380</i>: DN 50 ... DN 1200 (2" ... 48") • <i>FUE380</i>: Approved for custody transfer according to EN 1434 Class 2, OIML R 75, MID and MI004 • <i>FUS380/FUE380</i>: 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 	3/274, 3/279	SIMATIC PDM
	<p>Universal thermal energy calculator for district heating and cooling applications.</p>	<p>SITRANS FUE950</p> <ul style="list-style-type: none"> • Battery or mains-powered • 24 periods memory • 2 ports for plug-in modules as data output, extra input, M-Bus, RS 232/RS 485, current output • Complete set with temperature sensors and pockets • MID heating approval, PTB K7.2 cooling approval, MI004 type approval 	3/289	

	Application	Description	Catalog page	Software for parameterization
SITRANS F US ultrasonic clamp-on flowmeters				
	<p>The thickness gauge can be used in any field application where there is a need for flow measurement. Including but not limited to:</p> <ul style="list-style-type: none"> • Water and waste water • Energy measurement • Oil and gas industries 	<p>Thickness gauge</p> <p>The hand-held micro-processor controlled gauge is designed to measure the thickness of various metallic or non-metallic pipes.</p> <ul style="list-style-type: none"> • 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 	3/316	
	<p>Dedicated flowmeters are suitable for a wide variety of liquid applications, including those in the:</p> <ul style="list-style-type: none"> • Water Industry • Wastewater Industry • HVAC Industry • Power Industry • Processing Industry 	<p>SITRANS FUS1010 General purpose</p> <ul style="list-style-type: none"> • 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 	3/317	
	<p>Dedicated flowmeter is a basic option for many clean liquid applications in the:</p> <ul style="list-style-type: none"> • Water Industry • Wastewater Industry • HVAC & Power Industries • Processing Industry 	<p>SITRANS FST020 Basic</p> <ul style="list-style-type: none"> • 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 locations approvals: UL, C-UL, CE and C-TICK 	3/327	
	<p>Portable flowmeters are suitable for a wide variety of liquid applications, including those in the:</p> <ul style="list-style-type: none"> • Water Industry • Wastewater Industry • HVAC Industry • Power Industry • Processing Industry 	<p>SITRANS FUP1010 Portable</p> <ul style="list-style-type: none"> • 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 	3/331	
	<p>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 performance check and verification of existing meters used in various water and wastewater applications such as:</p> <ul style="list-style-type: none"> • Water Industry <ul style="list-style-type: none"> - Raw water - Potable water - Chemicals • Wastewater industry <ul style="list-style-type: none"> - Raw sewage - Effluent - Sludges - Mixed liquor - Chemicals 	<p>SITRANS FUP1010 Portable Check metering kit</p> <ul style="list-style-type: none"> • 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 	3/337	

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	Application	Description	Catalog page	Software for parameterization
	<p>Portable and dedicated energy meters are ideal for thermal energy/power applications:</p> <ul style="list-style-type: none"> • Chilled & hot water submetering • Condenser water, potable water • Glycol and brine solution • Thermal storage 	<p>SITRANS FUE1010 Energy</p> <ul style="list-style-type: none"> • 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 	3/339	
	<p>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:</p> <ul style="list-style-type: none"> • Chilled water sub-metering • Condenser water • Potable water • Ammonia and glycol • River and lake water • Lake source cooling 	<p>SITRANS FUE1010 HVAC Check metering kit</p> <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> - 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 	3/347	
	<p>Dedicated hydrocarbon flowmeters are ideal for crude oil, refined petroleum or liquefied gas. There are three application areas:</p> <ul style="list-style-type: none"> • Viscosity compensated volumetric flowmeters • Standard volume (Net) mass flowmeters • Interface detectors/density meters 	<p>SITRANS FUH1010 Oil</p> <ul style="list-style-type: none"> • 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 	3/349	
	<ul style="list-style-type: none"> • 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 	<p>Leak Detection System (LDS)</p> <p>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.</p>	3/356	

	Application	Description	Catalog page	Software for parameterization
	<p>Dedicated gas flowmeters are ideal for most natural and process gas industry applications, including:</p> <ul style="list-style-type: none"> • Checkmetering • Allocation • Flow survey verification • Lost and unaccounted for (LAUF) gas analysis • Production 	<p>SITRANS FUG1010 Gas</p> <ul style="list-style-type: none"> • 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 	3/358	
	<p>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:</p> <ul style="list-style-type: none"> • Check metering • Allocation • Flow survey verification • Lost and unaccounted for (LAUF) gas analysis • Production • Storage 	<p>FUG1010 Check Metering Kit</p> <ul style="list-style-type: none"> • 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 	3/365	
	<p>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.</p>	<p>SITRANS FUT1010 Basic</p> <ul style="list-style-type: none"> • 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 RS 232/485 output available. • Dynamic Reynolds number compensation 	3/366	
SITRANS F X Vortex Flowmeter				
	<p>Measurement of steam, gases and liquids in:</p> <ul style="list-style-type: none"> • Chemical • HVAC/Power plants • Oil & Gas • Food & Beverage • Pharma 	<p>SITRANS FX300</p> <ul style="list-style-type: none"> • 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 • Compact or remote mounted transmitter 	3/384	

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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.	SITRANS FVA250 <ul style="list-style-type: none"> 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 	3/401	
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.	<ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> DS III HART series DS III PROFIBUS PA series DS III FOUNDATION Fieldbus series 	3/410	
SITRANS F R liquid meters				
	Rotary-piston meters Industrial design for measurement of flowing liquids	<ul style="list-style-type: none"> 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) 	3/436	
	Automatic batchmeter Any quantity of liquid can be preselected and filled automatically.	<ul style="list-style-type: none"> DN 25 ... DN 50 (1" ... 2") Temperature of medium: -30 ... +300 °C (-22 ... +572 °F) 	3/436	

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 160 (2 320)	Unlimited	100 (1 450)	100 (1 450)	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	± 1.6 ... ± 2.0	± 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 (0)	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 ^B	
• 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

Flow Measurement

Introduction

Communication solutions

Communication solutions

Transmitter	HART	PROFIBUS PA	PROFIBUS DP	FOUNDATION Fieldbus H1	DeviceNet	Modbus RTU	GSM/GPRS
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	• 1) 2) 4) 5)	• 1) 5) 6) 7)					
SITRANS F M TRANSMAG 2	• 1) 4)	• 1) 6)					
SITRANS F M MAG 8000						• 1) 3) 10) 11) 12)	• 14)
SITRANS F C FCT030	• 1) 2) 4) 8)						
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 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) RS 485
- 11) RS 232
- 12) IrDA (Infrared)
- 13) Connected to ET200M PROFIBUS interface
- 14) Only with 7ME6810

Flow Measurement

SITRANS F M

System information SITRANS F M electromagnetic flowmeters

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

Flow Measurement

SITRANS F M

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 $\mu\text{S}/\text{cm}$. 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.

Flow Measurement SITRANS F M

System information SITRANS F M electromagnetic flowmeters

Please see product selector on the Internet, because some constraints might be related to some of the features:

www.pia-selector.automation.siemens.com



MAG 1100	MAG 1100 HT	MAG 1100 F	MAG 3100	MAG 3100 HT	MAG 3100 P	MAG 5100 W	911/E	MAG 8000/ MAG 8000 CT	MAG 8000 Irrigation	
7ME6110	7ME6120	7ME6140	7ME6310	7ME6320	7ME6340	7ME6520	7ME6580	7ME5610	7ME6810 7ME6820	7ME6880

Industry

Water / waste water	XX			XX		X	XXX	XXX	X	XXX	XXX
Chemical	XXX	XXX	XX	XXX	XXX	XXX	X	X		X	
Pharmaceutical	XX	XX	XXX	XX	XX	XX	X	X		X	
Food and beverage	XX		XXX	X	X	X	X	X		X	
Mining, aggregates and cement	XX			XXX			X	X	XXX	X	
HPI	XX	X		XX	X	XX	X	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 (1/2")	●	●	●	●	●	●	●		●		
DN 25 (1")	●	●	●	●	●	●	●	●	●	●	
DN 32 (1 1/4")			●								
DN 40 (1 1/2")	●	●	●	●	●	●	●	●	●	●	
DN 50 (2")	●	●	●	●	●	●	●	●	●	●	●
DN 65 (2 1/2")	●	●	●	●	●	●	●	●	●	●	●
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

3

Flow Measurement

SITRANS F M

System information SITRANS F M electromagnetic flowmeters

Please see product selector on the Internet, because some constraints might be related to some of the features:

www.pia-selector.automation.siemens.com



	MAG 1100	MAG 1100 HT	MAG 1100 F	MAG 3100	MAG 3100 HT	MAG 3100 P	MAG 5100 W	911/E	MAG 8000/ MAG 8000 CT	MAG 8000 Irrigation	
	7ME6110	7ME6120	7ME6140	7ME6310	7ME6320	7ME6340	7ME6520	7ME6580	7ME5610	7ME6810 7ME6820	7ME6880

Process connection

Wafer design	●	●									
Sanitary process connections			●								
Flanges				●	●	●	●	●	●	●	● ³⁾

Flange norms

EN 1092-1				●	●	●	●	●	●	●	● ³⁾
ANSI B 16.5 class 150				●	●	●	●	●	●	●	● ³⁾
ANSI B 16.5 class 300				●	●				●		
ASME B 16.47 class 150				●							
AWWA class D				●			●	●	●	●	
AS 2129				●	●						● ³⁾
AS 4087, PN 16				●	●		●	●		●	
AS 4087, PN 21				●	●						
AS 4087, PN 35				●	●						
JIS 10K				●				●	●		
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⁾

				●		● ⁴⁾	●	●	(●)	●	
--	--	--	--	---	--	-----------------	---	---	-----	---	--

Grounding rings premounted from factory

● = available

¹⁾ Pressure may be limited by the liner material chosen

²⁾ Not for PTFE liner.

³⁾ Drilled pattern flange max. 7 bar (107 psi).

⁴⁾ Optional on PFA

Flow Measurement

SITRANS F M

System information SITRANS F M
electromagnetic flowmeters

Please see product selector on the Internet, because some constraints might be related to some of the features:

www.pia-selector.automation.siemens.com



MAG 1100	MAG 1100 HT	MAG 1100 F	MAG 3100	MAG 3100 HT	MAG 3100 P	MAG 5100 W	911/E	MAG 8000/ MAG 8000 CT	MAG 8000 Irrigation	
7ME6110	7ME6120	7ME6140	7ME6310	7ME6320	7ME6340	7ME6520	7ME6580	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)

Ebonite Hard Rubber: 95 °C (203 °F)

Linatex: 70 °C (158 °F)

Ceramic: 150 °C (302 °F)

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

Approvals

Custody transfer

Cold water - MI-001 (EU)

Cold water approval - OIML R 49/OIML R 49 MAA

Cold water pattern approval - OIML R 49 (Denmark)

Cold water pattern approval PTB (Germany)

Hot water pattern approval - PTB (Germany)

Other media than water pattern approval - OIML R 117 (Denmark)

Chilled water pattern approval PTB K 7.2

OE12/C 040 (Austria)
Chilled water pattern approval

● = available

¹⁾ 150 °C (302 °F)

²⁾ Ex sensor: 180 °C (356 °F)

³⁾ 70 °C (158 °F)

Flow Measurement

SITRANS F M

System information SITRANS F M electromagnetic flowmeters

Please see product selector on the Internet, because some constraints might be related to some of the features:

www.pia-selector.automation.siemens.com



MAG 1100	MAG 1100 HT	MAG 1100 F	MAG 3100	MAG 3100 HT	MAG 3100 P	MAG 5100 W	911/E	MAG 8000/ MAG 8000 CT	MAG 8000 Irrigation	
7ME6110	7ME6120	7ME6140	7ME6310	7ME6320	7ME6340	7ME6520	7ME6580	7ME5610	7ME6810 7ME6820	7ME6880

Approvals (continued)

Hazardous areas

ATEX - 2 GD (Zone 1/21)	●	●	●	●	●	●				
IECEX Gb Zone 1/21				●	●	●				
FM Class I, Div 1				● ¹⁰⁾	● ¹⁰⁾	● ¹⁰⁾				
FM Class I, Zone 1				●	●	●				
FM Class I, Div 2	●	●	●	●	●	●	●	●		
CSA Class I, Zone 1/21				●	●	●				
CSA Class I, Div 2				●	●	●	●	●		

Hygienic

EHEDG			●							
3A			●							
EC 1925:2003 European food contact material			●							

Drinking water

WRAS (WRc) - (UK)				●			● ⁴⁾	●		●	●
ANSI/NSF 61 (US) ⁹⁾				● ⁵⁾			●	●		●	●
ACS (FR) EPDM liner				●			●			●	
Belgaqua (B) EPDM liner				●			●			●	
DVGW-W270 (D) EPDM liner				●			●			●	
MCERTS (UK environmental)				● ⁶⁾			● ⁴⁾			●	

Other

FM Fire Service (class number 1044)							● ⁸⁾			● ⁸⁾	
GOSS/GOST (Russia)	●	●	●	●	●	●	●			●	
CRN (Canada)	● ¹⁾		● ¹⁾	●	●		●				
PED 97/23 EC	●	●	●	●	●	●	●	●	●	●	
VdS							● ³⁾				
Other national approvals, see internet	● ⁹⁾	● ⁹⁾	● ⁹⁾	● ⁹⁾	● ⁹⁾	● ⁹⁾	● ⁹⁾	● ⁹⁾	● ⁹⁾	● ⁹⁾	● ⁹⁾
Verificator compatible	● ²⁾	● ²⁾	● ²⁾	● ²⁾	● ²⁾	● ²⁾	● ²⁾	● ²⁾			

● = available

¹⁾ Only PFA liner.

²⁾ Only in combination with MAG 5000 and MAG 6000 transmitters.

³⁾ Only valid for DN 50 to DN 300 (2" to 12")

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

⁸⁾ Sizes: DN 50, DN 80, DN 100, DN 150, DN 200, DN 250, and DN 300 (2", 3", 4", 6", 8", 10", and 12") with ANSI B16.5 Class 150 flanges

⁹⁾ Including Annex G

¹⁰⁾ Only DN 15 to DN 300 (½" to 12") with MAG 6000 I Ex, compact mounted

Flow Measurement

SITRANS F M

System information SITRANS F M
electromagnetic flowmeters

Please see Product selector on the Internet, because some constraints 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	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							●	●
GSM/GPRS module							●	
Batching								
		●	●	●	●			

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

¹⁾ IP68 enclosure

²⁾ Modbus RTU also as serial RS 232

Flow Measurement

SITRANS F M

System information SITRANS F M electromagnetic flowmeters

Please see Product selector on the Internet, because some constraints 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	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								
<u>Custody transfer</u>								
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	●	●					●	
Hot water pattern approval PTB (Germany)		●						
Other media than water pattern approval - OIML R 117 Denmark		●						
OE12/C 040 (Austria) Chilled water pattern approval	●	●						
<u>Hazardous areas</u>								
ATEX - 2 GD (Zone 1/21)				●	(●) ³⁾			
IECEX Gb Zone 1/21				●				
FM Class I, Div 1				● ⁴⁾				
FM Class I, Zone 1				●				
FM Class I, Div 2/Zone 2	●	●	●					
CSA Class I, Zone 1/21				●				
CSA Class I, Div 2	●	●	●					
UL / C-UL- general safety	●	●			●			
<u>Other</u>								
FM Fire Service (1044)	●	●					●	
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

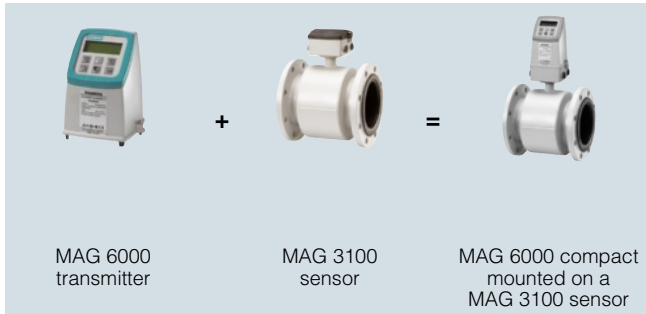
⁴⁾ Only with sensors sizes DN 15 to DN 300 (1/2" to 12") compact

For more national approvals please check our internet page

<http://support.automation.siemens.com/WW/view/en/10806954/134200>

Practical examples of ordering

SITRANS F M compact installation



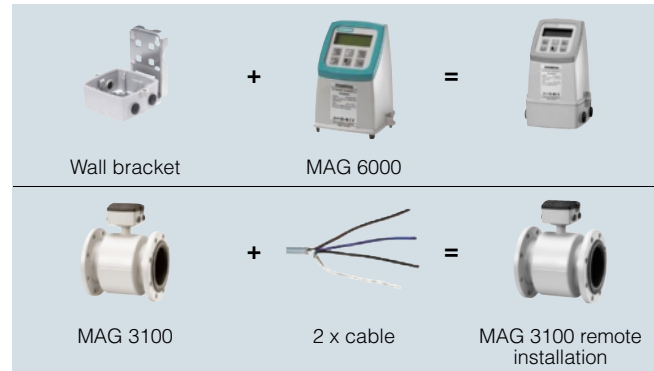
Example

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.

SITRANS F M 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 cable and electrode cable	A5E01181647

Flow Measurement

SITRANS F M

System information SITRANS F M electromagnetic flowmeters

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).

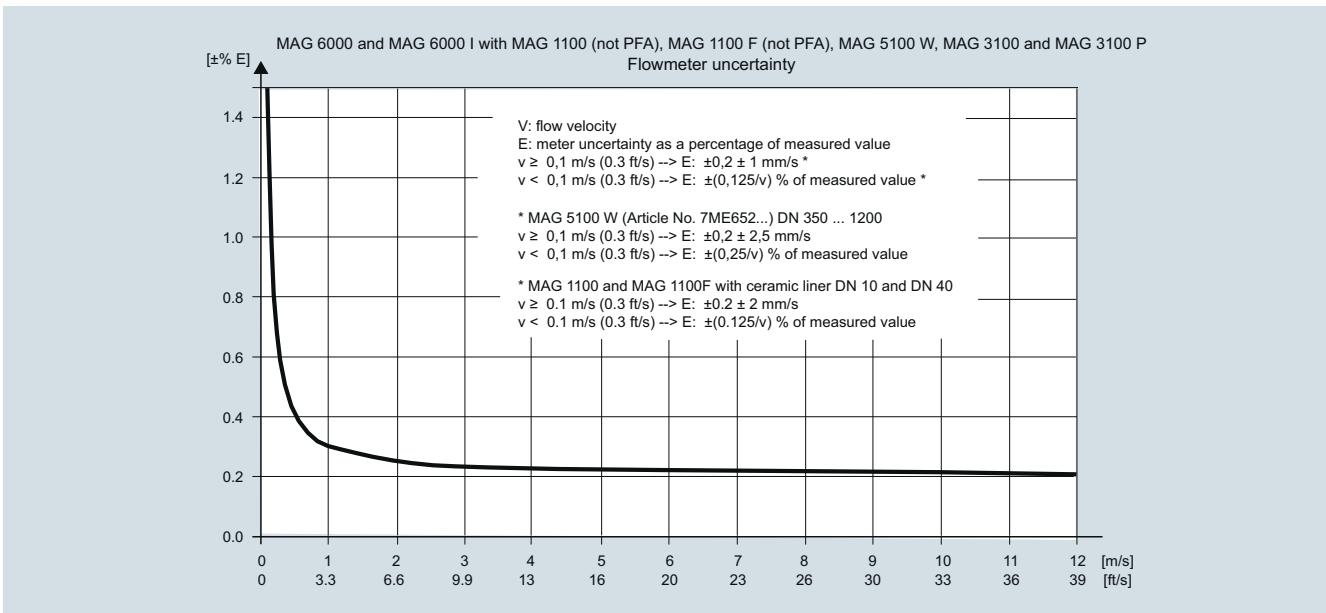
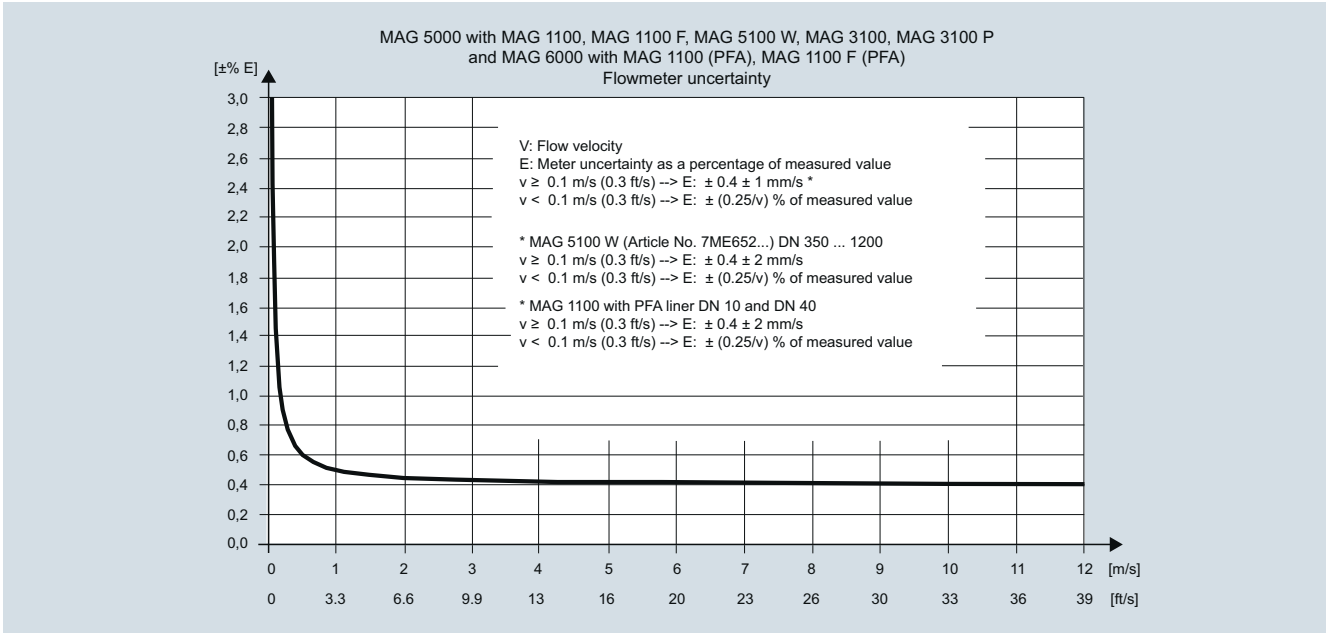
Siemens offers accredited calibrations assured to ISO 17025 in the flow range from 0.0001 m³/h to 10 000 m³/h.

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

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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	$U_n \pm 1\%$
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 ($\pm 0.1\%$ of actual flow + 0.05 % FSO)
Effect of ambient temperature	
• Display / frequency / pulse output	$< \pm 0.003\%/K$ act.
• Current output	$< \pm 0.005\%/K$ act.
Effect of supply voltage	$< 0.005\%$ of measuring value on 1% change
Repeatability	$\pm 0.1\%$ of actual flow for $v \geq 0.5$ m/s (1.5 ft/s) and conductivity > 10 μ S/cm

Certificates

• EN 10204-2.1	Certificate of conformity, stating that the delivered parts are made of the material quality that was ordered. Available as Z option C15.
• EN 10204-2.2	Test report certificate, a non batch specific material analysis of the ordered material. Available as Z option C14.
• EN 10204-3.1	Material analysis certificate, a batch specific analysis of the material issued by an independent inspector. Certification covers all pressure containing and wetted parts.

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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	IEC 61158/EN 50170
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 mm ² , 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	IEC 61158/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 mm ² (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
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.

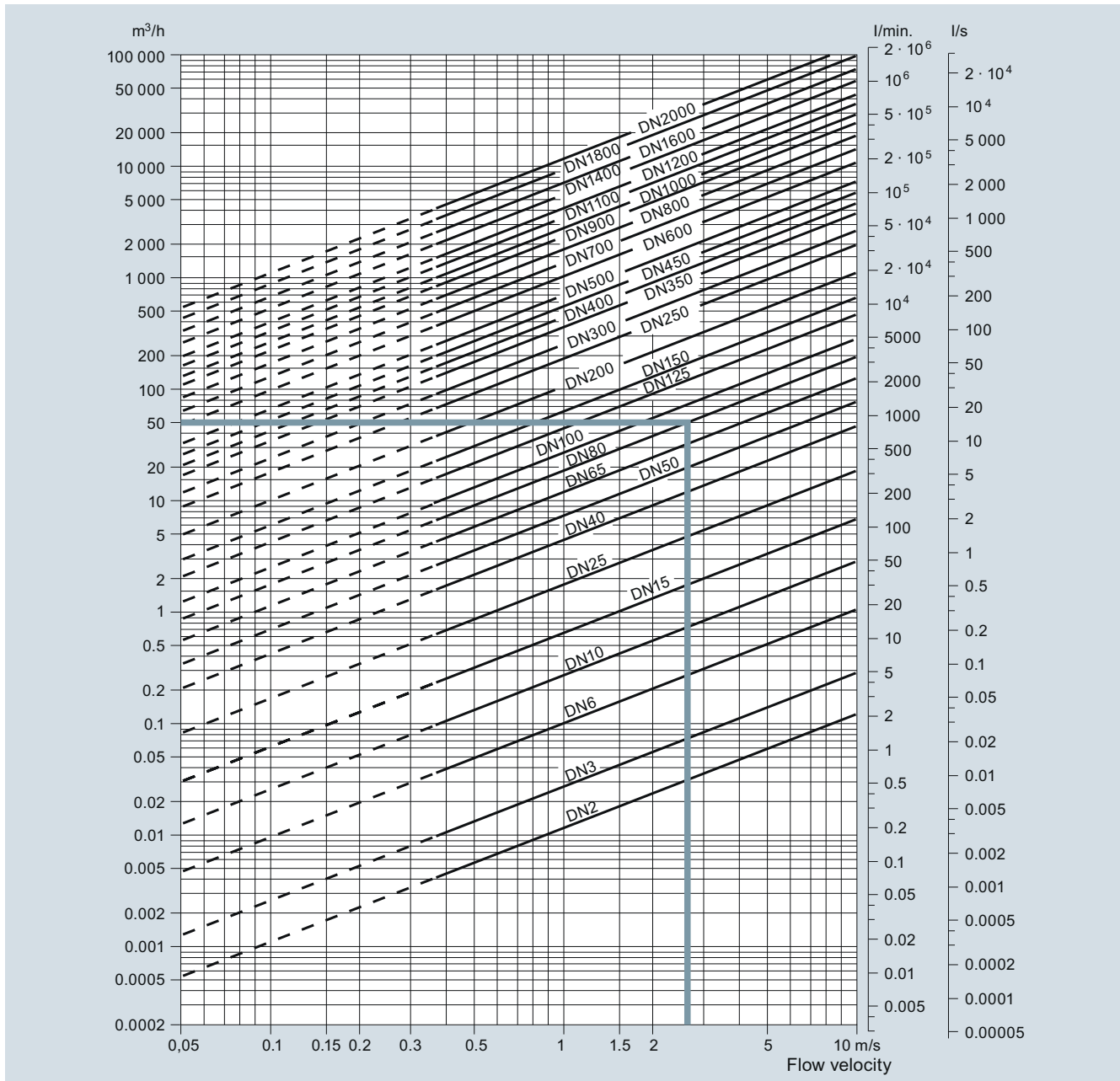
²⁾ Value returned is dependent on the BATCH function.

When ON, Batch progress is returned.

When OFF, TOTALIZER 2 is returned.

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

$$v = 1273.24 \cdot Q / DN^2 \text{ or}$$

$$v = 353.68 \cdot Q / DN^2$$

$$v : [m/s], Q : [l/s], DN : [mm]$$

$$v : [m/s], Q : [m^3/h], DN : [mm]$$

Link to "Sizing program":

<https://pia.khe.siemens.com/index.aspx?nr=11501>

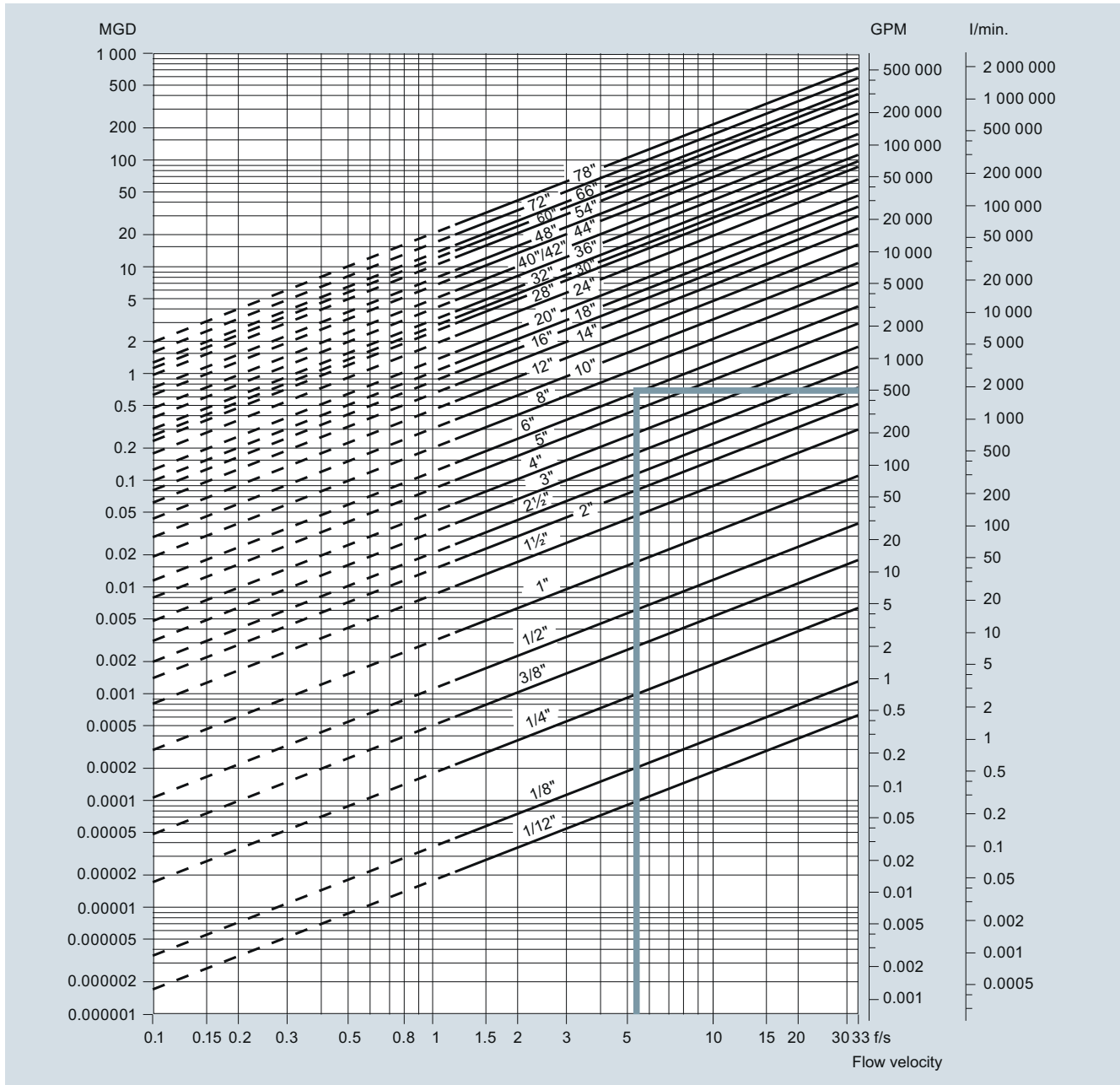
Flow Measurement

SITRANS F M

System information SITRANS F M electromagnetic flowmeters

Imperial

3



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>

Flow Measurement

SITRANS F M

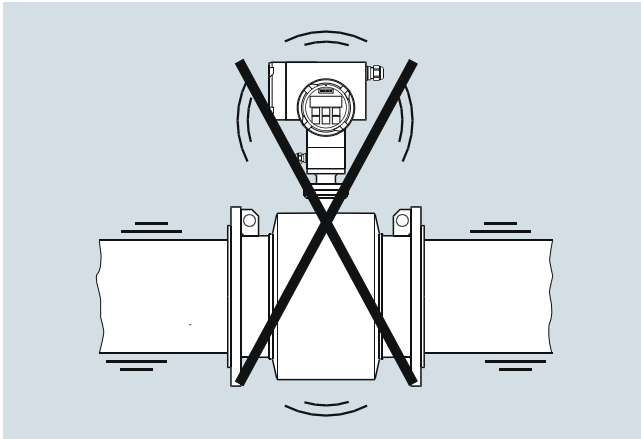
System information SITRANS F M electromagnetic flowmeters

Installation conditions

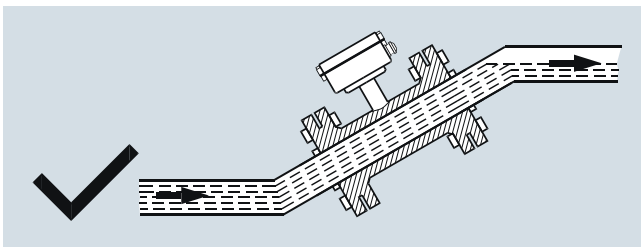
Vibrations

Strong vibrations should be avoided.

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



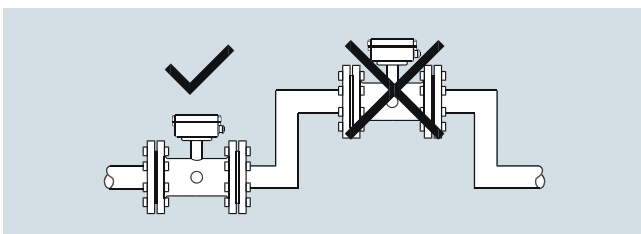
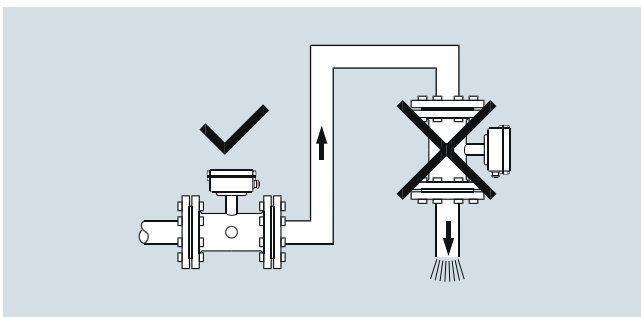
The sensor must always be completely filled with liquid.



Install in pipelines which are always full

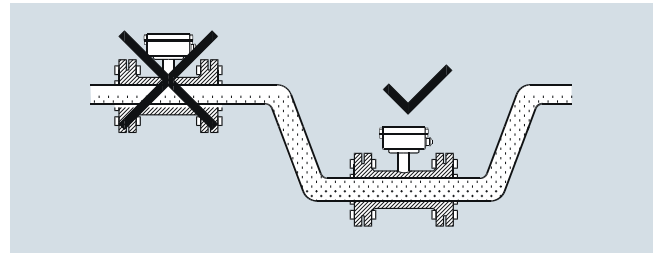
The sensor must always be completely filled with liquid. Therefore avoid:

- 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

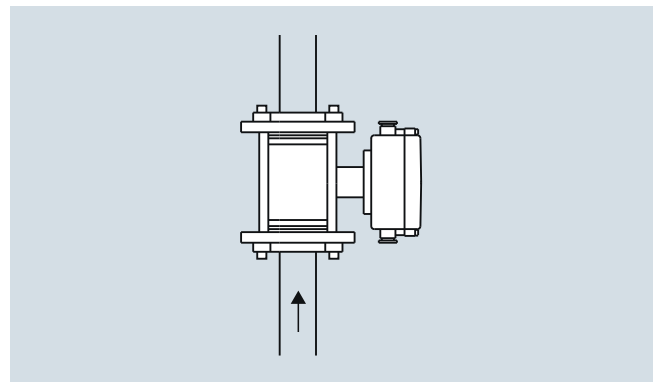
For partially filled pipes or pipes with downward flow and free outlet the flowmeter should be located in a U-Tube.



Install in U-tubes when pipe is partially filled

Installation in vertical pipes

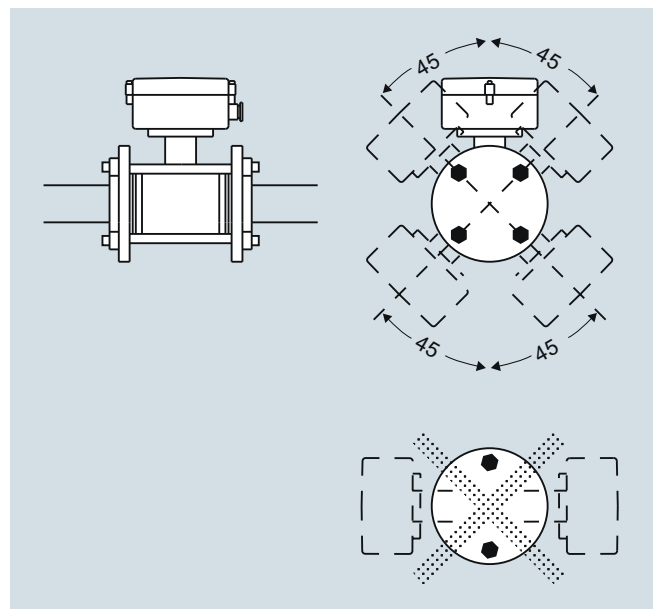
Recommended flow direction: upwards. This minimizes the effect on the measurement of any gas/air bubbles in the liquid.



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.



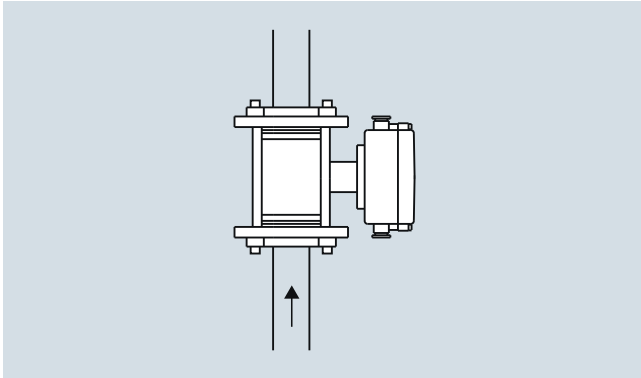
Flow Measurement

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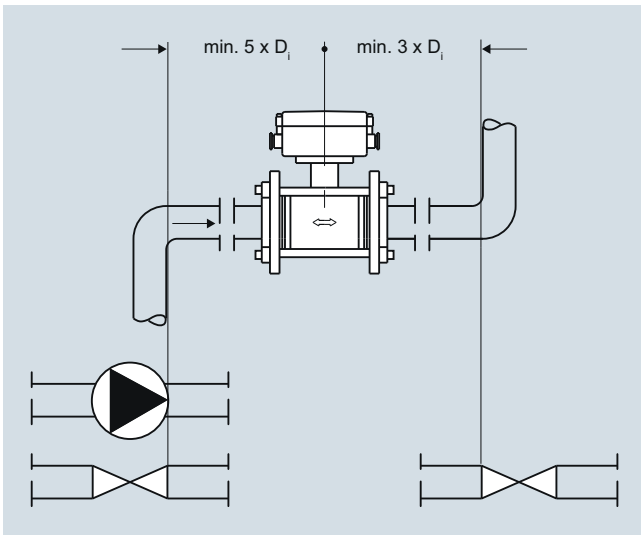
Measuring abrasive liquids and liquids containing particles

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

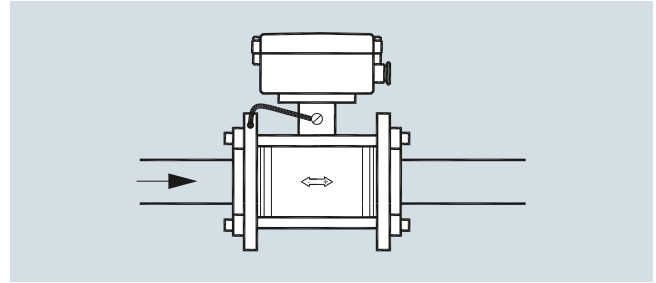
To achieve maximum accurate flow measurement it is essential to have straight length of inlet and outlet pipes and a certain distance between the flowmeter and pumps or valves.

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

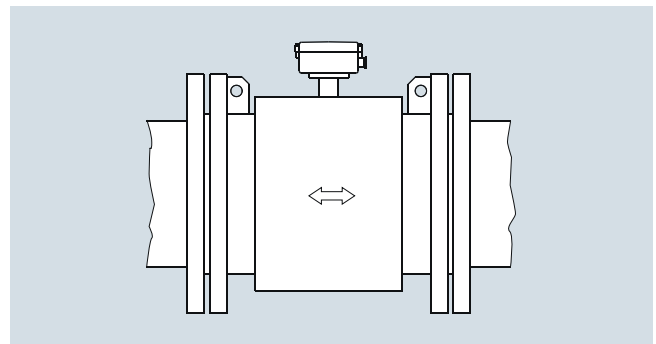


Potential equalization

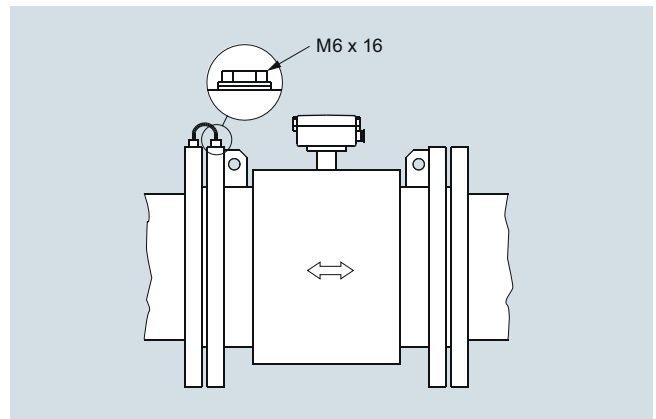
The electrical potential of the liquid must always be equal to the electrical potential of the sensor. This can be achieved in different ways depending on the application:

- 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



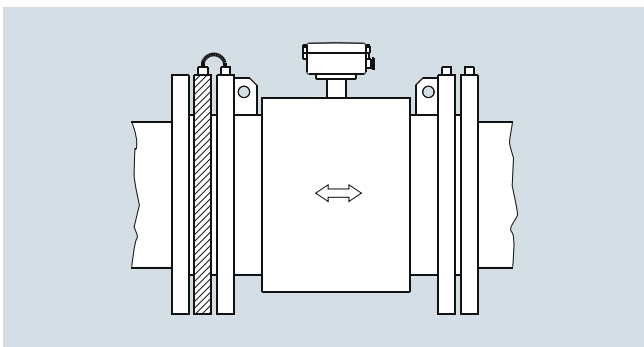
MAG 3100 (not PTFE), MAG 5100 W: with earthing electrodes in conductive and non-conductive pipes (no further action necessary)



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

Flow Measurement SITRANS F M

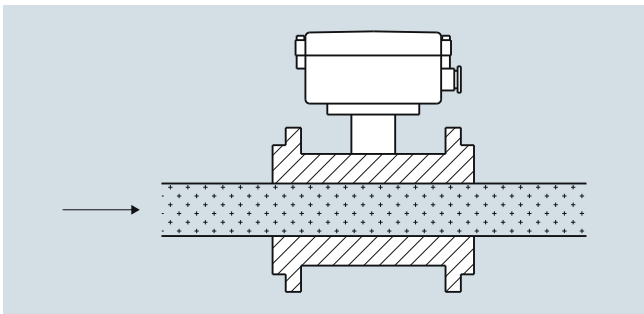
System information SITRANS F M electromagnetic flowmeters



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

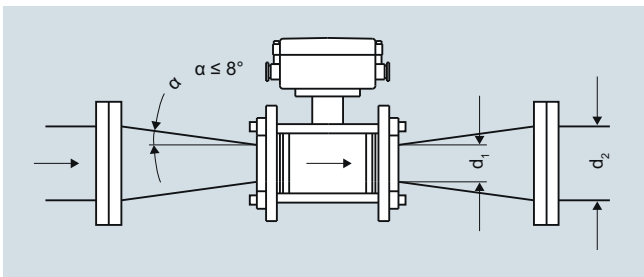
MAG 1100 F grounding via process connections. MAG 8000 grounding see MAG 8000 pages.

Vacuum



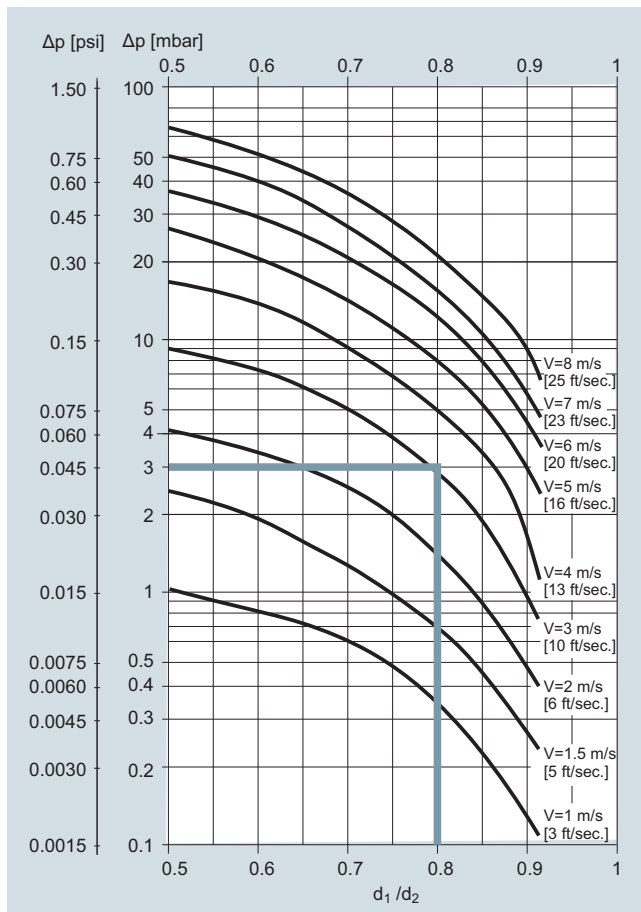
Avoid a vacuum in the measuring pipe, because this can damage certain liners.

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.

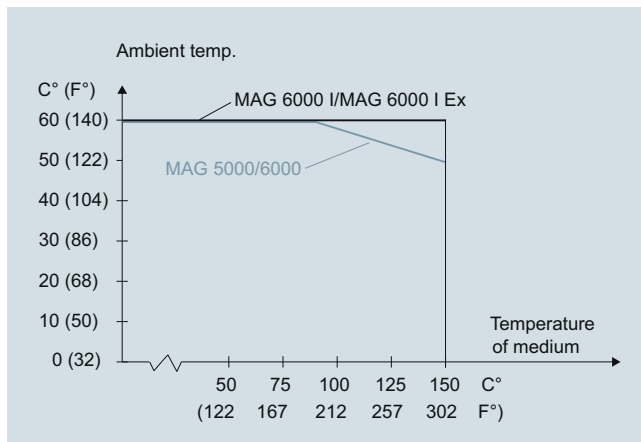


Pressure drop as function of diameter reduction between reducers

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.

Flow Measurement

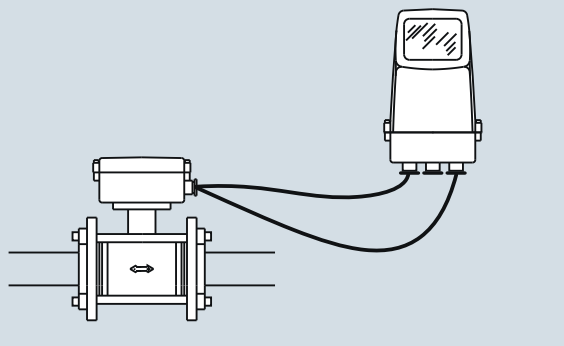
SITRANS F M

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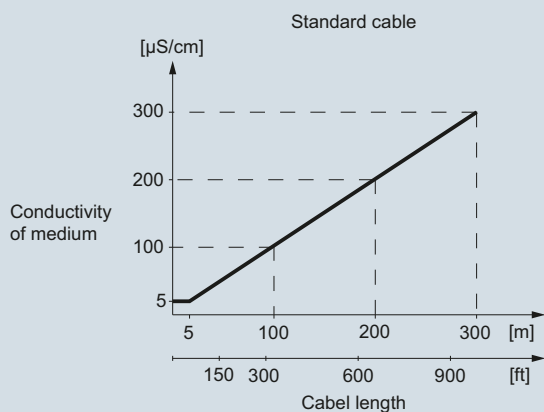
Sensor cables and conductivity of medium

Compact installation:

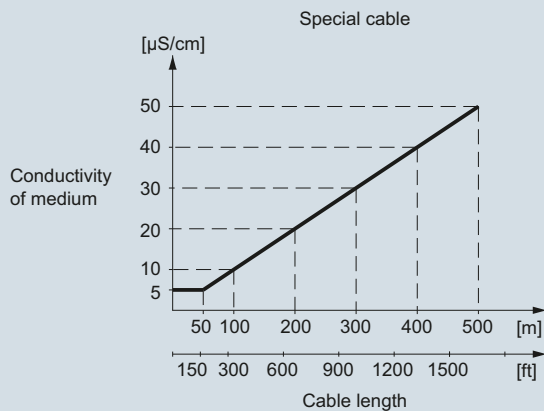
Liquids with an electrical conductivity $\geq 5 \mu\text{S/cm}$.



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 $\geq 20 \mu\text{S/cm}$ and the maximum length of electrode cable when remotely mounted is 50 m (150 ft). Special shield cable must be used.

For **DN 2 and DN 3** empty sensor cannot be detected, and the minimum conductivity must be $\geq 30 \mu\text{S/cm}$.

For **19" safety barrier** no special cables can be used.

Function

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

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

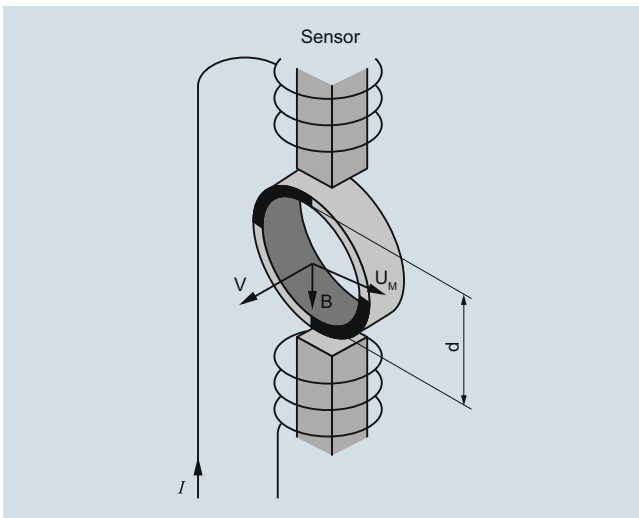
U_M = Measured voltage induced in the medium perpendicular to the magnetic field and the flow direction. The voltage is tapped at two point electrodes.

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

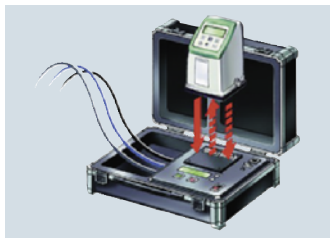
Flow Measurement

SITRANS F M

SITRANS F M Verificator

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.

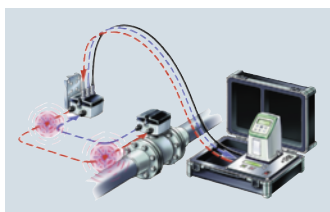


Transmitter test

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



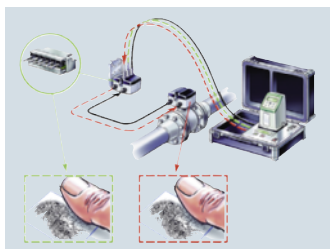
Flowmeter insulation test

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:			MAGFLO® Identification:			
Name			TAG No./Name	0		
Address			Sensor Code No.	083C4054		
			Sensor Serial No.	089904T361		
Phone			Transmitter Code No.	083F5003		
Email			Transmitter Serial No.	587022N620		
			Location			
Results:						
Verification file name or No.			File #1			
Transmitter			Passed			
Sensor			Passed			
Magnetic Circuit			Passed			
Velocity	Current Output			Frequency Output		
	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:			Sensor Details:			
Basic:			Size			
Qmax	50.0000 m³/h		DN 80 3 IN			
Flow Direction	Positiv		Cal. Factor			
Low flow Cut-off	1.50%		1.0			
Empty Pipe	OFF		Correction Factor			
Output:			Excitation Freq			
Current Output	OFF		1.0			
Time Constant	N/A		6.25kHz			
Relay Output	Error Level					
Digital Output	Pulse		Verificator Details (083F5060)			
Frequency Range	N/A		Serial No.			
Time Constant	N/A		017807N242			
Volume/pulse	1 m³/p		Device No.			
Pulse width	N/A		83452			
Pulse polarity	N/A		Software Version			
Totalizer 1 value before test	0.00000 m³		1.40			
Totalizer 1 value after test	0.58992 m³		PC-Software Version			
Totalizer 2 value before test	0.00000 m³		5.00			
Totalizer 2 value after test	0.58992 m³		Cal. date			
Operating time in days	3		2006.01.01			
Comments			ReCal date			
			2006.01.01			
<p>These tests verify that the flowmeter is functioning within 2% deviation of the original test parameters. Verification is traceable to National and International Standards.</p> <p>Date and signature _____ 2006.01.01</p>						

Description

SITRANS F M Verificator

Article No.

- 11 ... 30 V DC, 11 ... 24 V AC, 115 ... 230 V, 50 Hz
- 11 ... 30 V DC, 11 ... 24 V AC, 115 ... 230 V, 60 Hz

FDK:083F5060

FDK:083F5061

Note:

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

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 $\pm 0.4 \% \pm 1 \text{ mm/s}$ (incl. sensor)
- MAG 6000: Max. measuring error $\pm 0.2 \% \pm 1 \text{ mm/s}$ (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 117, OIML R 49, MI-001, PTB K 7.2 and OE12/C 040 for chilled water
- MAG 6000 with add-on bus modules for HART, FOUNDATION Fieldbus H1, DeviceNet, Modbus RTU/RS 485, 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

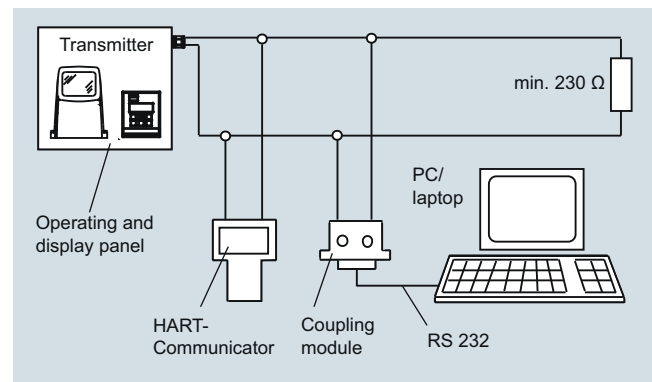
The MAG 5000/6000 are transmitters with a built-in alphanumeric display in several languages. The transmitters evaluate the signals from the associated electromagnetic sensors and also fulfil the task of a power supply unit which provides the magnet coils with a constant current.

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

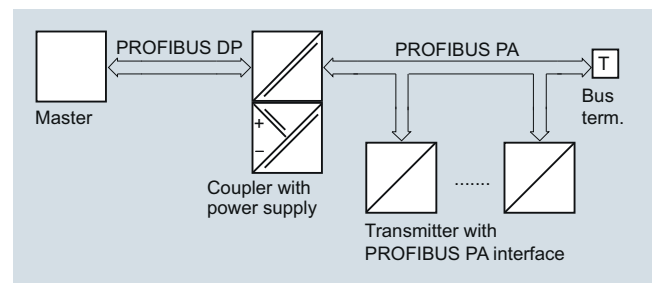
Displays and controls

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

Flow Measurement

SITRANS F M

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	$> 1 \times 10^{14} \Omega$

Input

Digital input	11 ... 30 V DC, $R_i = 4.4 \text{ K}\Omega$
• Activation time	50 ms
• Current	$I_{11 \text{ V DC}} = 2.5 \text{ mA}$, $I_{30 \text{ V DC}} = 7 \text{ mA}$

Output

Current output	0 ... 20 mA or 4 ... 20 mA
• Signal range	$< 800 \Omega$
• Load	0.1 ... 30 s, adjustable
• Time constant	
Digital output	0 ... 10 kHz, 50 % duty cycle (uni/bidirectional)
• Frequency	24 V DC, 30 mA, $1 \text{ K}\Omega \leq R_i \leq 10 \text{ K}\Omega$, short-circuit-protected (power supplied from flowmeter)
• Pulse (active)	3 ... 30 V DC, max. 110 mA, $200 \Omega \leq R_i \leq 10 \text{ K}\Omega$ (powered from connected equipment)
• Pulse (passive)	0.1 ... 30 s, adjustable
• Time constant	
Relay output	Changeover relay, same as current output
• Time constant	42 V AC/2 A, 24 V DC/1 A
• Load	

Low flow cut off	0 ... 9.9 % of maximum flow
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Galvanic isolation	All inputs and outputs are galvanically isolated.
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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	<ul style="list-style-type: none"> Display version: -20 ... +60 °C (-4 ... +140 °F) Blind version: -20 ... +60 °C (-4 ... +140 °F) MI-001 version: -25 ... +55 °C (-13 ... +131 °F) Custody Transfer (CT) version: -20 ... +50 °C (-4 ... +122 °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 ₂ O 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
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Display and keypad

Totalizer	Two eight-digit counters for forward, net or reverse flow
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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
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Time constant	Time constant as current output time constant
---------------	---

Design

Enclosure material	Fiber glass reinforced polyamide; stainless steel AISI 316/1.4436 (IP65)
• Compact version	
• 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	<ul style="list-style-type: none"> 115 ... 230 V AC +10 % -15 %, 50 ... 60 Hz 11 ... 30 V DC or 11 ... 24 V AC
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Power consumption	<ul style="list-style-type: none"> 230 V AC: 17 VA 24 V AC: 9 VA, $I_N = 380 \text{ mA}$, $I_{ST} = 8 \text{ A}$ (30 ms) 12 V DC: 11 W, $I_N = 920 \text{ mA}$, $I_{ST} = 4 \text{ A}$ (250 ms) 24 V DC: 8.4 VA, $I_N = 350 \text{ mA}$, $I_{ST} = 4 \text{ A}$ (10 ms) <p>$I_{ST} = 4 \text{ A}$ (250 ms): For solar panel please secure stable current supply</p>
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Certificates and approvals

Custody transfer approval (MAG 5000/6000 CT)	<p>CE, C-UL general purpose, C-tick; FM Class I, Div 2, CSA Class I, Div 2</p> <ul style="list-style-type: none"> Cold water: MI-001, PTB/OIML R 49 (pattern approval DE/DK) Hot water: PTB and DANAK (MAG 6000 CT) Chilled water: PTB K 7.2; OE12/C 040 Other media than water (milk, beer etc.): PTB and DANAK OIML R 117 (pattern approval DE/DK) (MAG 6000 CT)
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Communication

Standard	Without serial communication or HART as option
• MAG 5000	Prepared for client-mounted add-on modules
• MAG 6000	HART, Modbus RTU/RS 485, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS PA, PROFIBUS DP as add-on modules
Optional (MAG 6000 only)	No communication modules approved
• MAG 5000/6000 CT	

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		





Flow Measurement

SITRANS F M

Transmitter MAG 5000/6000







Selection and Ordering data

Transmitter MAG 5000





Description	Article No.	
Transmitter MAG 5000 Blind for compact and wall mounting; IP67/NEMA 4X/6, fibre glass reinforced polyamide <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz 	<ul style="list-style-type: none"> • 7ME6910-1AA30-0AA0 • 7ME6910-1AA10-0AA0 	
Transmitter MAG 5000 Display for compact and wall mounting; IP67/NEMA 4X/6, fibre glass reinforced polyamide <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz • 115 ... 230 V AC, 50/60 Hz, with HART 	<ul style="list-style-type: none"> • 7ME6910-1AA30-1AA0 • 7ME6910-1AA10-1AA0 • 7ME6910-1AA10-1BA0 	
Transmitter MAG 5000 CT for compact and wall mounting, approved for custody transfer (only with approval marks, no verification – only a complete flowmeter can be verified, i.e. sensor together with the transmitter); IP67/NEMA 4X/6, fibre glass reinforced polyamide <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz 	<ul style="list-style-type: none"> • 7ME6910-1AA30-1AB0 • 7ME6910-1AA10-1AB0 	
Transmitter MAG 5000 for 19" rack and wall mounting <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz 	<ul style="list-style-type: none"> • 7ME6910-2CA30-1AA0 • 7ME6910-2CA10-1AA0 	

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Transmitter MAG 6000

Description	Article No.	
Transmitter MAG 6000 Blind for compact and wall mounting; IP67/NEMA 4X/6, fibre glass reinforced polyamide <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz 	<ul style="list-style-type: none"> • 7ME6920-1AA30-0AA0 • 7ME6920-1AA10-0AA0 	
Transmitter MAG 6000 for compact and wall mounting; IP67/NEMA 4X/6, fibre glass reinforced polyamide <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz 	<ul style="list-style-type: none"> • 7ME6920-1AA30-1AA0 • 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) <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz 	<ul style="list-style-type: none"> • 7ME6920-1QA30-1AA0 • 7ME6920-1QA10-1AA0 	
Transmitter MAG 6000 CT for compact and wall mounting, approved for custody transfer (no communication modules possible; only with approval marks, no verification – only a complete flowmeter can be verified, i.e. sensor together with the transmitter); IP67/NEMA 4X/6, fibre glass reinforced polyamide <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz 	<ul style="list-style-type: none"> • 7ME6920-1AA30-1AB0 • 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 <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz 	<ul style="list-style-type: none"> • 7ME6920-1AB30-1AA0 • 7ME6920-1AB10-1AA0 	
Transmitter MAG 6000 for 19" rack and wall mounting <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz 	<ul style="list-style-type: none"> • 7ME6920-2CA30-1AA0 • 7ME6920-2CA10-1AA0 	

Transmitter MAG 5000/6000

Description	Article No.	
Transmitter MAG 6000 SV for 19" rack and wall mounting; special excitation 44 Hz settings for Batch application DN ≤ 25/1" <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz 	7ME6920-2CB30-1AA0 7ME6920-2CB10-1AA0	
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 <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 11 ... 30 V DC, 11 ... 24 V AC, 50/60 Hz • 115 ... 230 V AC, 50/60 Hz 	7ME6920-2EB30-1AA0 7ME6920-2EB10-1AA0	

- ◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.


Operating instructions for SITRANS F M MAG 5000/6000

Description	Article No.
For SITRANS F M MAG 5000/6000 IP67 <ul style="list-style-type: none"> • English • German • Spanish • French 	A5E02338368 A5E02944982 A5E02944995 A5E02944990
For SITRANS F M MAG 5000/6000 19" <ul style="list-style-type: none"> • 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	Article No.	
HART (not for MAG 6000 I)	◆ FDK:085U0226	
Modbus RTU/RS 485	◆ 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	Article No.
HART <ul style="list-style-type: none"> • English 	A5E03089708
PROFIBUS PA/DP <ul style="list-style-type: none"> • English • German 	A5E00726137 A5E01026429
MODBUS <ul style="list-style-type: none"> • English • German • Spanish • French 	A5E00753974 A5E03089262 A5E03089278 A5E03089265
FOUNDATION Fieldbus <ul style="list-style-type: none"> • English • German • Spanish • French 	A5E02318728 A5E02488856 A5E02512177 A5E02512169
DeviceNet <ul style="list-style-type: none"> • 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






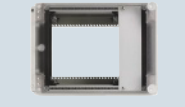
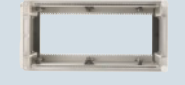
Description	Article No.	
Wall mounting unit for IP67/ NEMA 4X/6 version, wall bracket, terminal box in polyamide <ul style="list-style-type: none"> • 4 x M20 cable glands • 4 x 1/2" NPT cable glands 	FDK:085U1018 FDK:085U1053	
Sun lid for MAG 5000/6000 transmitter (Frame and lid)	A5E02328485	
Cable for standard electrode or coil, 3 x 1.5 mm ² / 18 gage with shield PVC; Temperature range: -30 ... +70 °C (-22 ... +158 °F) <ul style="list-style-type: none"> • 10 m (33 ft) • 20 m (65 ft) • 40 m (130 ft) • 60 m (200 ft) • 100 m (330 ft) • 150 m (500 ft) • 200 m (650 ft) • 500 m (1650 ft) 	FDK:083F0121 FDK:083F0210 FDK:083F0211 FDK:083F0212 FDK:083F0213 FDK:083F3052 FDK:083F3053 FDK:083F3054	


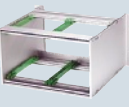




- ◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Flow Measurement

SITRANS F M

Transmitter MAG 5000/6000

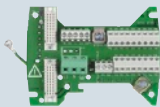


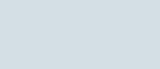




Description	Article No.	
<p>Electrode cable for empty pipe or low conductivity¹⁾, double shielded, 3 x 0.25 mm². Temperature range : -30 ... +70 °C (-22 ... +158 °F)</p> <ul style="list-style-type: none"> • 10 m (33 ft) ◆ FDK:083F3020 • 20 m (65 ft) ◆ FDK:083F3095 • 40 m (130 ft) FDK:083F3094 • 60 m (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 		
<p>Low-noise electrode coax cable for low conductivity and high vibration levels of cables, 3 x 0.13 mm²</p> <ul style="list-style-type: none"> • 2 m (6.6 ft) A5E02272692 • 5 m (16.5 ft) A5E02272723 • 10 m (33 ft) A5E02272730 		
<p>Cable kit with standard coil cable¹⁾, 3 x 1.5 mm²/18 gage with shield PVC and electrode cable double shielded, 3 x 0.25 mm² Temperature range: -30 ... +70 °C (-22 ... +158 °F)</p> <ul style="list-style-type: none"> • 5 m (16.5 ft) ◆ A5E02296329 • 10 m (33 ft) ◆ A5E01181647 • 15 m (49 ft) ◆ A5E02296464 • 20 m (65 ft) ◆ A5E01181656 • 25 m (82 ft) ◆ A5E02296490 • 30 m (98 ft) ◆ A5E02296494 • 40 m (130 ft) ◆ A5E01181686 • 50 m (164 ft) ◆ A5E02296498 • 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 		
<p>Potting kit for terminal box of flow sensors for IP68/NEMA 6P (not for Ex sensors)</p>	◆ FDK:085U0220	
<p>19" safety barrier (21 TE) [EEx e ia] IIC for MAG 1100 Ex sensors and MAG 3100 Ex sensors, incl. back plate</p>	FDK:083F5034	
<p>Panel mounting enclosure for 19" insert (21 TE); IP65/NEMA 2 enclosure in ABS plastic for front panel mounting</p>	FDK:083F5030	
<p>Panel mounting enclosure for 19" insert (42 TE); IP65/NEMA 2 enclosure in ABS plastic for front panel mounting</p>	FDK:083F5031	





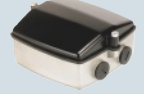



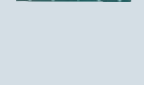
Description	Article No.	
<p>Back of panel mounting enclosure for 19" insert (21 TE); IP20/NEMA 1 enclosure in aluminum</p>	FDK:083F5032	
<p>Back of panel mounting enclosure for 19" insert (42 TE); IP20/NEMA 1 enclosure in aluminum</p>	FDK:083F5033	
<p>IP66/NEMA 4X, wall mounting enclosure for 19" inserts (without back plates). Use with PCB A5E02559813 or A5E02559814</p> <ul style="list-style-type: none"> • 21 TE FDK:083F5037 • 42 TE FDK:083F5038 		
<p>Front cover (7TE) for panel mounting enclosure</p>	FDK:083F4525	
<p>Sun shield for remote MAG 5000/6000 transmitters</p>	A5E01209496	
<p>Sun Shield for compact MAG 5000/6000 transmitters on MAG 3100 (DN 15 ... 2000 (1/2" ... 78") or MAG 5100 W (DN 150 ... 1200 (6" ... 48"))</p>	A5E01209500	

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

1) Not for MAG 6000 with safety barrier

Spare parts

Description	Article No.	
Connection board (for polyamide terminalbox) <ul style="list-style-type: none"> • 12 ... 24 V • 115 ... 230 V 	A5E02559817 A5E02559816	
Connection board (for stainless steel terminal- box) <ul style="list-style-type: none"> • 12 ... 24 V • 115 ... 230 V 	A5E02604280 A5E02604272	
19" enclosure, 12 ... 24 V, 115 ... 230 V <ul style="list-style-type: none"> • Connection board for stan- dard 19" transmitter 	A5E02559809	
<ul style="list-style-type: none"> • Connection board for transmitter ia and safety barrier 	A5E02559810	
<ul style="list-style-type: none"> • Connection board for transmitter ia/ib and safety barrier (only for sensors produced before October 2007) 	A5E02559811	
<ul style="list-style-type: none"> • Connection board for transmitter and cleaning unit 	FDK:083F4123	
SENSORPROM memory unit (Sensor code and serial numbers must be specified on order) <ul style="list-style-type: none"> • 2 kB (for MAG 5000/6000/ MAG 6000 I) - 1 pc. - 10 pcs. 	FDK:085U1005 FDK:083F5052 FDK:085U1008	
Display unit for MAG 5000/6000 <ul style="list-style-type: none"> • Black neutral front 	FDK:085U1038	
<ul style="list-style-type: none"> • Siemens front 	FDK:085U1039	
Display unit for 19" versions	FDK:085U3349	

Description	Article No.	
Cable glands, for above cable, 4 pcs. <ul style="list-style-type: none"> • M20 • ½" NPT • PG 13.5, 2 pcs. 	A5E00822490 A5E00822501 FDK:083G0228	 ½" NPT M20
Sealing screws for sensor/ transmitter, 2 pcs	FDK:085U0221	
Terminal box, in polyamide, inclusive lid <ul style="list-style-type: none"> • M20 • ½" NPT 	FDK:085U1050 FDK:085U1052	
Terminal box lid, in polyam- ide	FDK:085U1003	
Terminal box, in stainless steel, inclusive lid for MAG 6000 in stainless steel and for all Ex sensors <ul style="list-style-type: none"> • M20 • ½" NPT 	A5E00836867 A5E00836868	
Terminal box (3A) for MAG 1100 F in polyamide, inclusive lid <ul style="list-style-type: none"> • M20 • ½" NPT 	A5E00822478 A5E00822479	
Wall unit enclosure IP66, 12 ... 24 V, 115 ... 230 V <ul style="list-style-type: none"> • PCB for standard transmitter 	A5E02559813	
<ul style="list-style-type: none"> • PCB for transmitter ia/e and safety barrier 	A5E02559814	
<ul style="list-style-type: none"> • PCB for transmitter ia/ib and safety barrier (7ME6130, 7ME6150 and 7ME6330) 	A5E02559812	
<ul style="list-style-type: none"> • PCB for transmitter and cleaning unit 	A5E02559815	

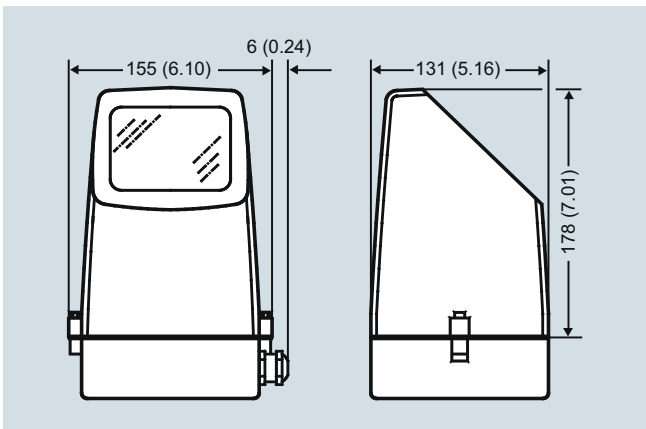
◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Flow Measurement SITRANS F M

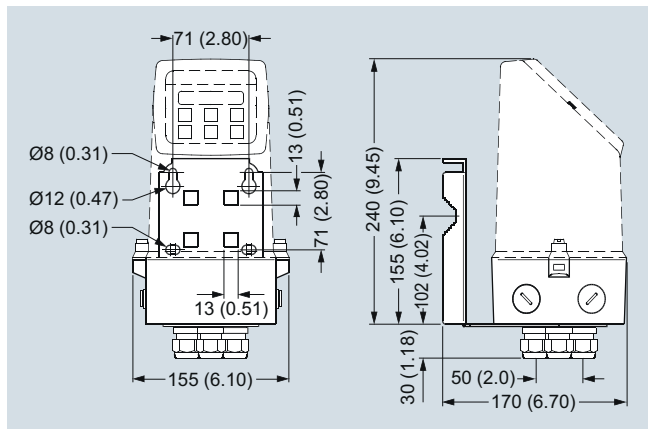
Transmitter MAG 5000/6000

Dimensional drawings

Transmitter IP67/NEMA 4X/6 compact polyamide

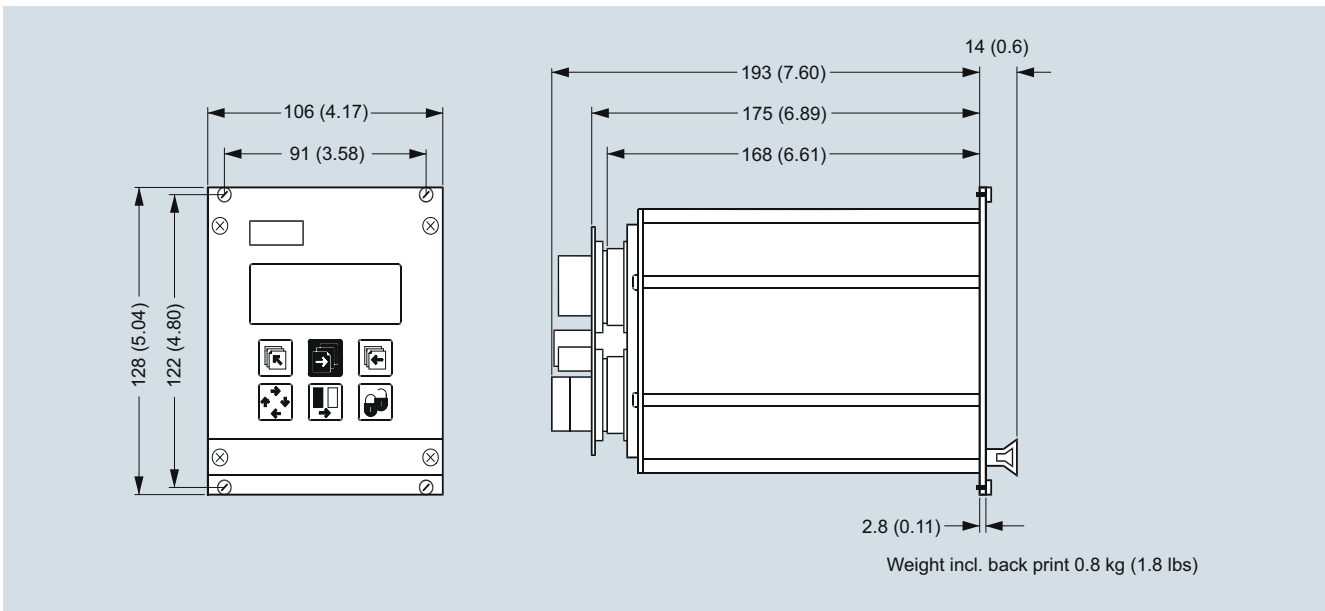


Transmitter compact mounted, dimensions in mm (inch)



Transmitter wall mounted, dimensions in mm (inch)

Transmitter, 19" IP20/NEMA 1 standard unit

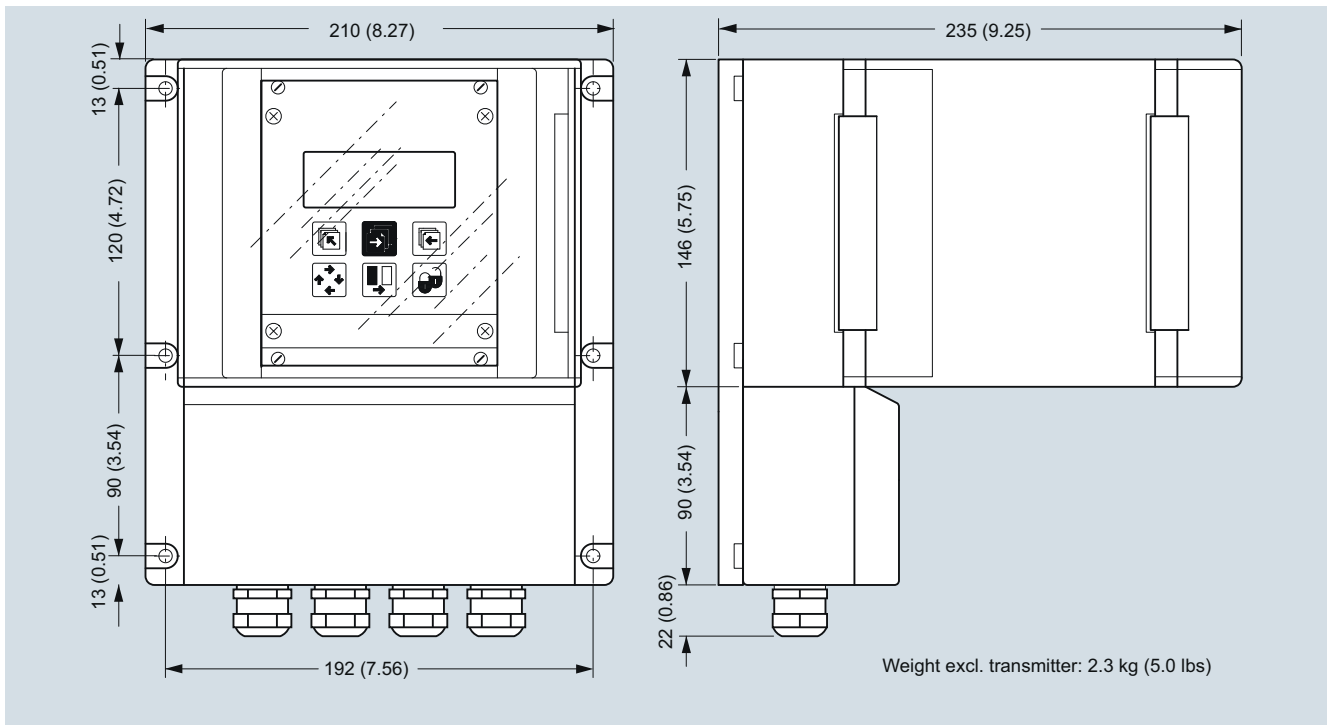


Dimensions in mm (inch)

3

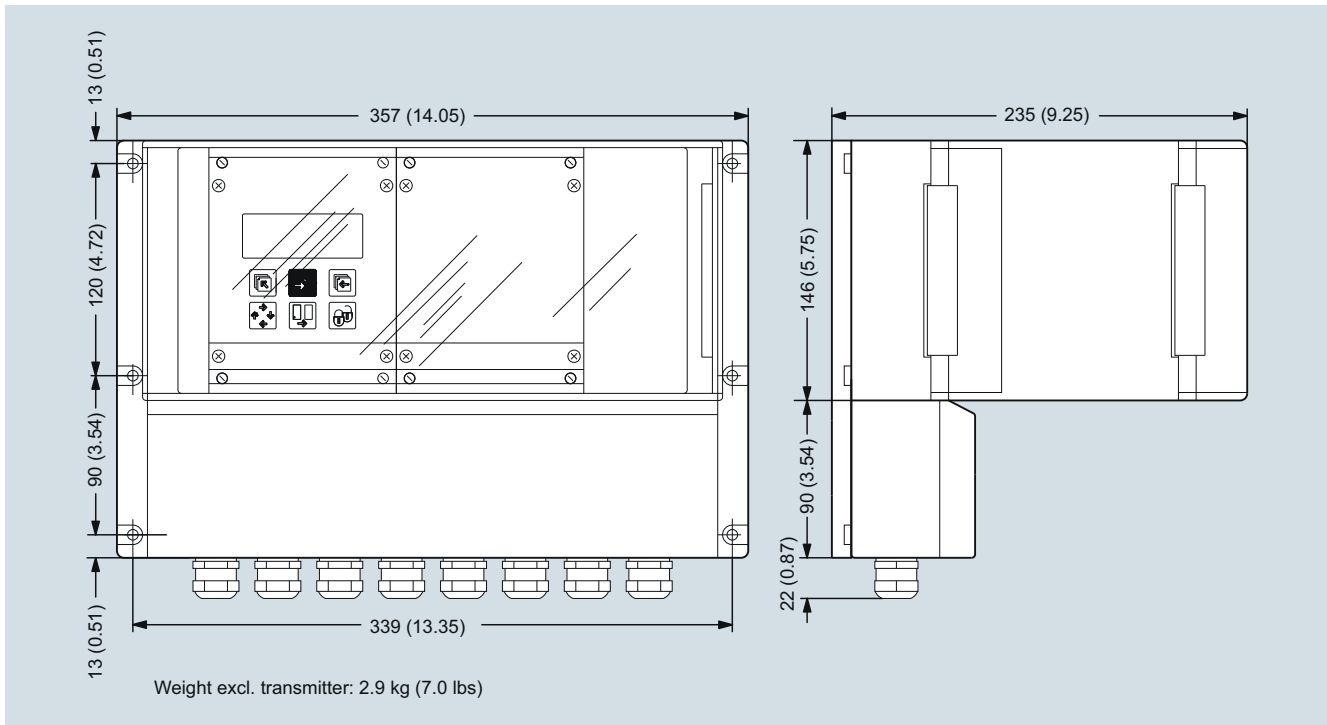
Transmitter MAG 5000/6000

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



Dimensions in mm (inch)

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



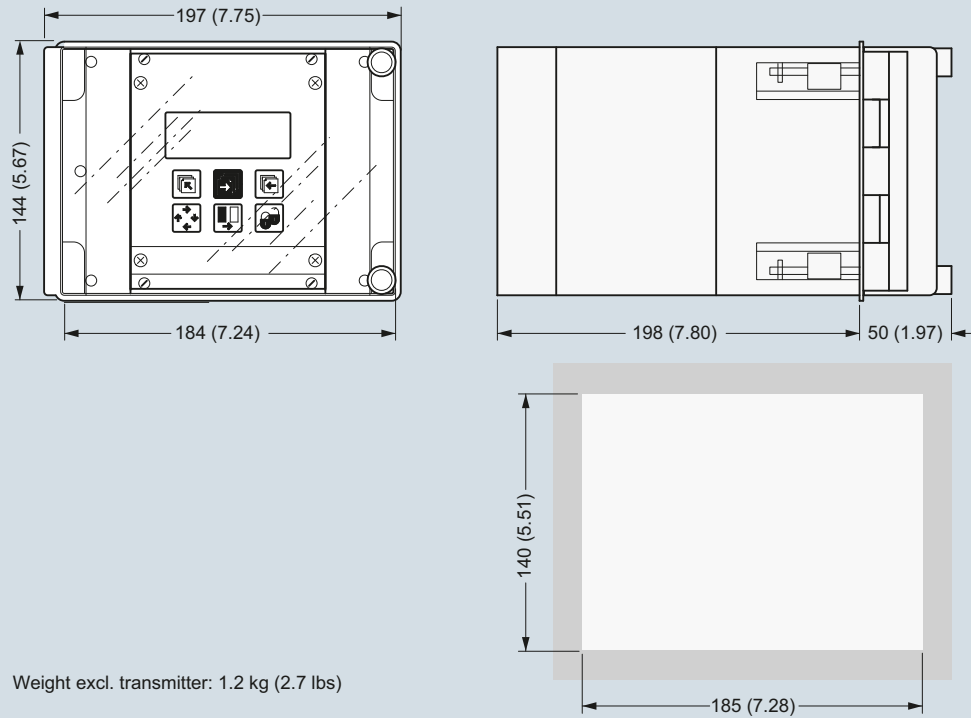
Dimensions in mm (inch)

Flow Measurement

SITRANS F M

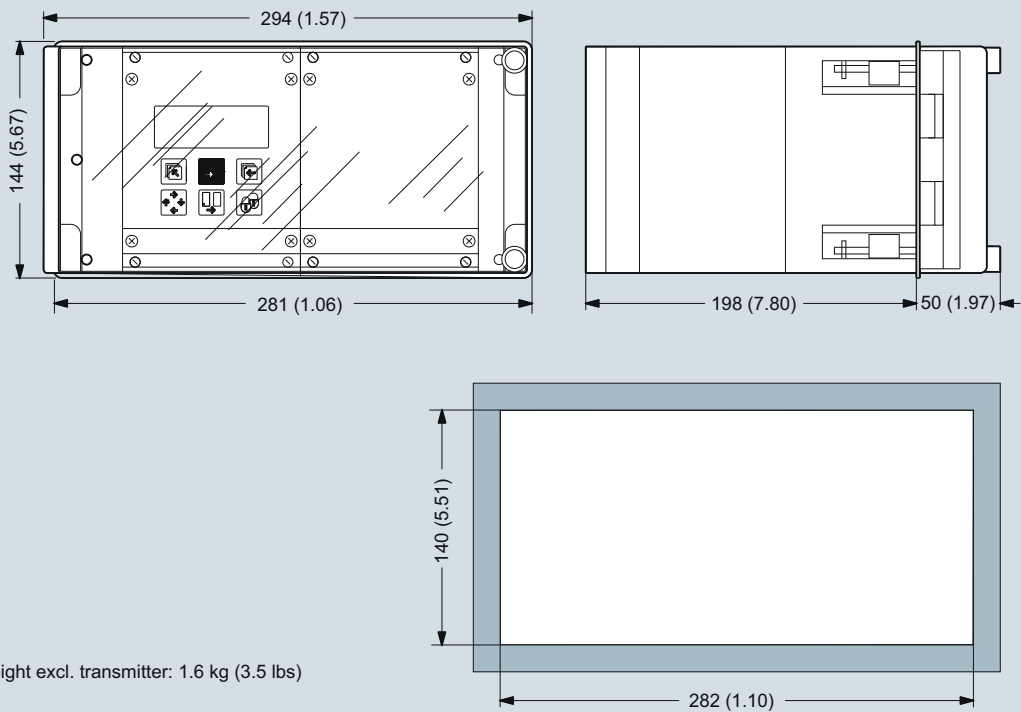
Transmitter MAG 5000/6000

Transmitter, panel front IP20/NEMA 1, 21 TE



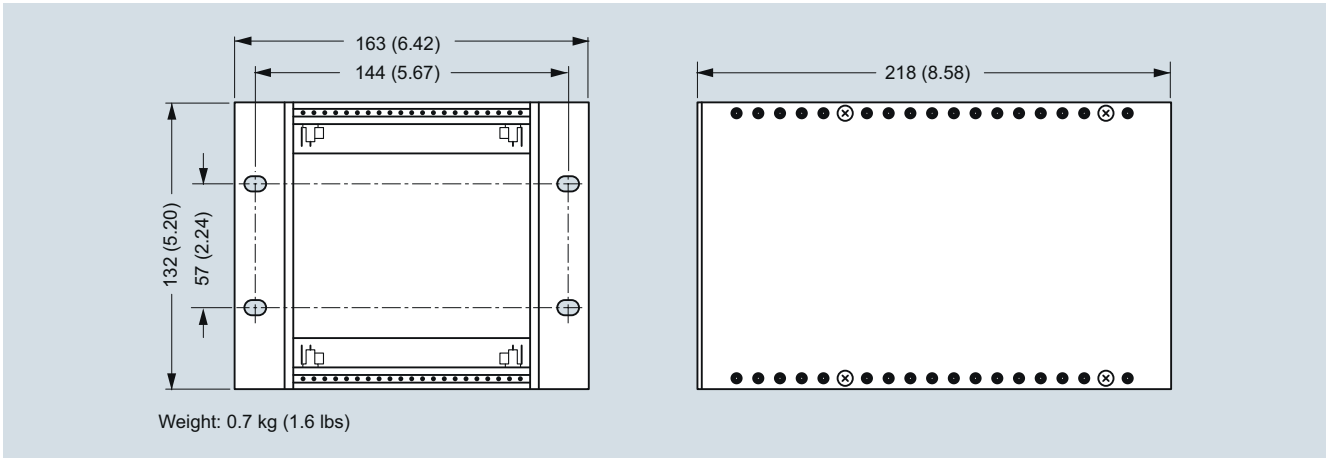
Dimensions in mm (inch)

Transmitter, panel front IP20/NEMA 1, 42 TE



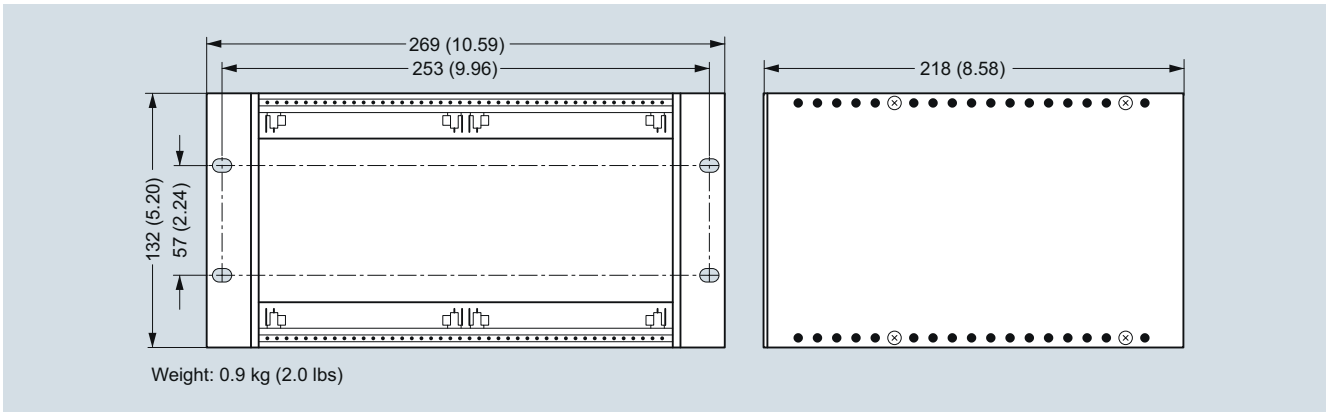
Dimensions in mm (inch)

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



Dimensions in mm (inch)

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



Dimensions in mm (inch)

Flow Measurement SITRANS F M

Transmitter MAG 5000/6000

Schematics

Electrical connection

Grounding

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

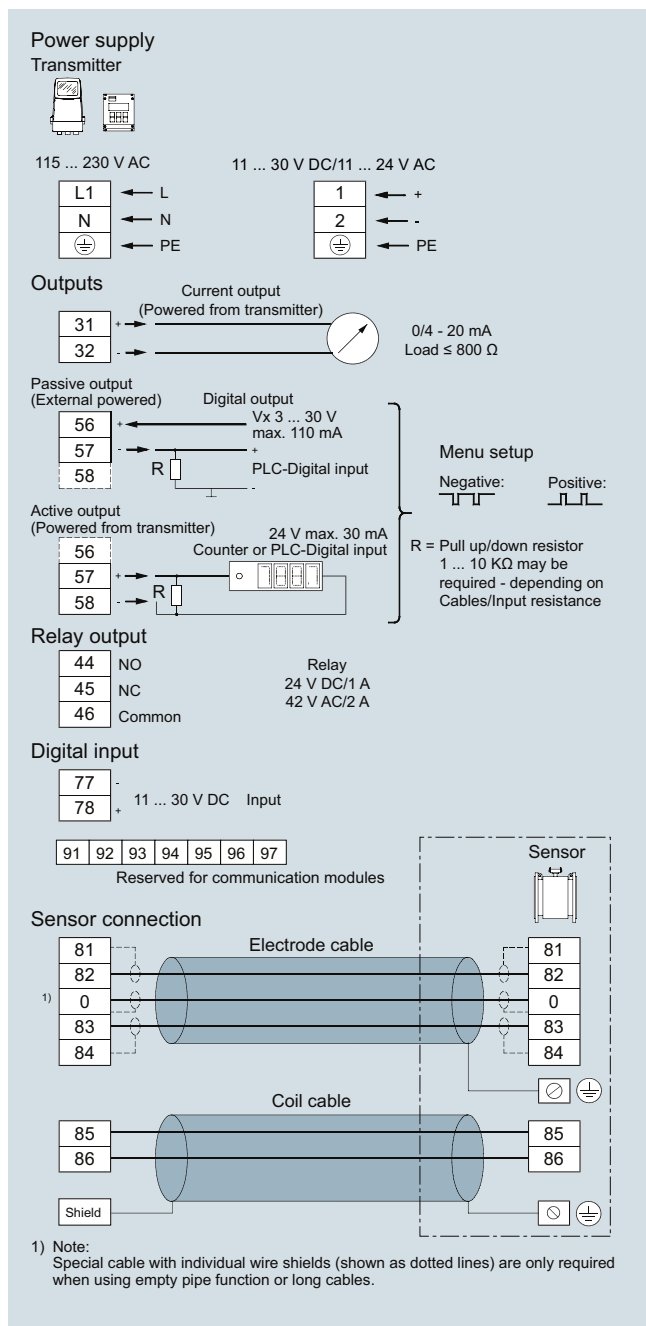
Mechanical counters

When mounting a mechanical counter to terminals 57 and 58 (active output), a 1000 μ F 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.

3



Overview



The SITRANS F M MAG 6000 I/MAG 6000 I Ex 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/RS 485 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
- MAG 6000 I NAMUR: compliant with NAMUR NE 21, NE 32, NE 43, NE 53 and NE 70

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 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	$> 1 \times 10^{14} \Omega$
Input	
Digital input	11 ... 30 V DC, $R_i = 4.4 \text{ k}\Omega$
• Activation time	50 ms
• Current	$I_{11 \text{ V DC}} = 2.5 \text{ mA}$, $I_{30 \text{ V DC}} = 7 \text{ mA}$
Output	
Current output	
• Signal range	4 ... 20 mA (active/ passive)
• Load	$< 560 \Omega$
• 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), $200 \Omega \leq R_i \leq 10 \text{ k}\Omega$ (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 (incl. sensor)	$\pm 0.2 \% \pm 1 \text{ mm/s}$

Flow Measurement

SITRANS F M

Transmitter MAG 6000 I/6000 I Ex

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 ₂ O 30 min.)
EMC performance	IEC/EN 61326-1 (all environments) IEC/EN 61326-2-5 NAMUR NE 21

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	
	<ul style="list-style-type: none"> 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 Ex transmitter NAMUR: 18 ... 30 V DC; 115 ... 230 V AC; 50 ... 60 Hz
Power consumption	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> CE C-tick FM Class I, Div 2 FM Class I, Zone 2 CSA Class I, Div 2
MAG 6000 I Ex	<ul style="list-style-type: none"> 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 1¹⁾ FM Class I, Zone 1 CSA Class I, Zone 1/21

Cable entries	
MAG 6000 I	Remote installation 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,

¹⁾ Applicable for: Compact mounted MAG 6000 I Ex on MAG 3100 (sizes DN 15 ... DN 300 (½" ... 12"))

Selection and Ordering data	Article No.
SITRANS F M Transmitter MAG 6000 I/Ex	7 ME 6 9 3 0 -
Remote with standard wall mounting bracket, local display, die cast aluminum	2 B A - 1 A
Supply voltage	
Standard transmitter: 18 ... 90 V DC; 115 ... 230 V AC, 50 ... 60 Hz	2
Standard transmitter (NAMUR): 18 ... 30 V DC; 115 ... 230 V AC, 50 ... 60 Hz	3
Ex transmitter: 18 ... 30 V DC	4
Ex transmitter: 115 ... 230 V AC, 50 ... 60 Hz	5
Ex transmitter (NAMUR): 18 ... 30 V DC; 115 ... 230 V AC, 50 ... 60 Hz	6
Ex approval	
Standard sensor: FM Class I, Div 2, CSA Class I, Div 2	0
Ex sensor: Hazardous area (ATEX 2G D; 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

• We can offer shorter delivery times for configurations designated with the Quick Ship Symbol •. For details see page 9/5 in the appendix.

Selection and Ordering data	Order code
Further design	
Please add "-Z" to Article 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	Article 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>

Flow Measurement SITRANS F M

Transmitter MAG 6000 I/6000 I Ex

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

Description	Article No.
HART (only for MAG 6000 I/Ex)	◆ FDK:085U0321
Modbus RTU/RS 485 ¹⁾	◆ FDK:085U0234
PROFIBUS PA Profile 3	◆ FDK:085U0236
PROFIBUS DP Profile 3 ¹⁾	◆ FDK:085U0237
DeviceNet ¹⁾	◆ FDK:085U0229
FOUNDATION Fieldbus H1 ¹⁾	A5E02054250



◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

¹⁾ Not for Ex versions

Operating instructions for SITRANS F add-on modules

Description	Article 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.

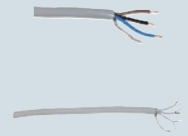
Accessories MAG 6000 I/MAG 6000 I Ex

Description	Article No.
Cable for standard electrode or coil, 3 x 1.5 mm ² /18 gage with shield PVC. Temperature range: -30 ... +70 °C (-22 ... +158 °F)	
• 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 mm ² . Temperature range: -30 ... +70 °C (-22 ... +158 °F)	
• 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

- ◆ **A5E02296329**
- ◆ **A5E01181647**
- ◆ **A5E02296464**
- ◆ **A5E01181656**
- ◆ **A5E02296490**
- ◆ **A5E02296494**
- ◆ **A5E01181686**
- ◆ **A5E02296498**
- A5E01181689**
- A5E01181691**
- A5E01181699**
- A5E01181703**
- A5E01181705**



Low noise electrode coax cable for low conductivity and high vibration levels of cables, 3 x 0.13 mm²

- ◆ **A5E02272692**
- ◆ **A5E02272723**
- ◆ **A5E02272730**



◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Spare parts



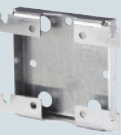
Description	Article No.
MAG 6000 I Display	FDK:085U3122
Accessory bag including cable gland inserts coil and electrode connectors	FDK:085U3144
Electronics cover with Ex glass plate. Die cast aluminum, with corrosion-resistant Basic Polyester powder coating (min. 60 µm).	7ME5933-0AC01
Cover for connection board incl. gasket (for remote version). Die cast aluminum, with corrosion-resistant Basic Polyester powder coating (min. 60 µm).	7ME5933-0AC02
Cover for mains supply/communication. Die cast aluminum, with corrosion-resistant Basic Polyester powder coating (min. 60 µm).	7ME5933-0AC03



Flow Measurement

SITRANS F M

Transmitter MAG 6000 I/6000 I Ex

Description	Article No.	
Safety clamp	7ME5933-0AC06	
Standard wall mounting bracket. Steel AISI 316L/EN10088-2-1.4404	7ME5933-0AC04	
Wall-/pipe mounting bracket kit, BI 2,5 DIN59382 X6Cr17	7ME5933-0AC05	

Complete spare part PCB unit

Description	Article No.	
MAG 6000 I PCBA (not for Ex)	FDK:085U3123	
MAG 6000 I std. (NAMUR), 18 ... 30 V DC; 115 ... 230 V AC Spare PCBA unit	A5E31426892	
MAG 6000 I Ex (NAMUR), 18 ... 30 V DC; 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)	A5E31426877¹⁾	

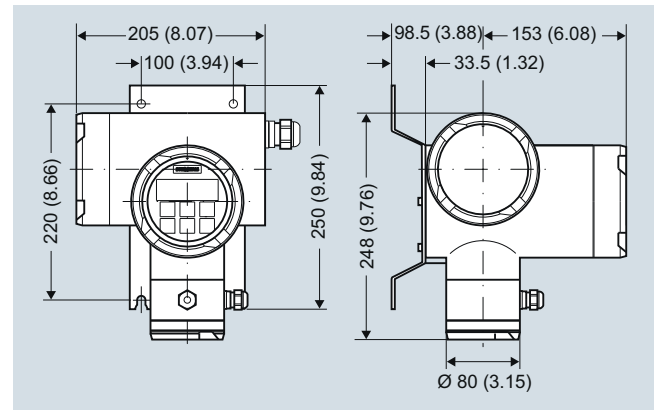
¹⁾ Ex spare parts may only be exchanged by "Siemens Ex Authorized personnel".

Please use online Product selector to get latest updates.

Product selector link:

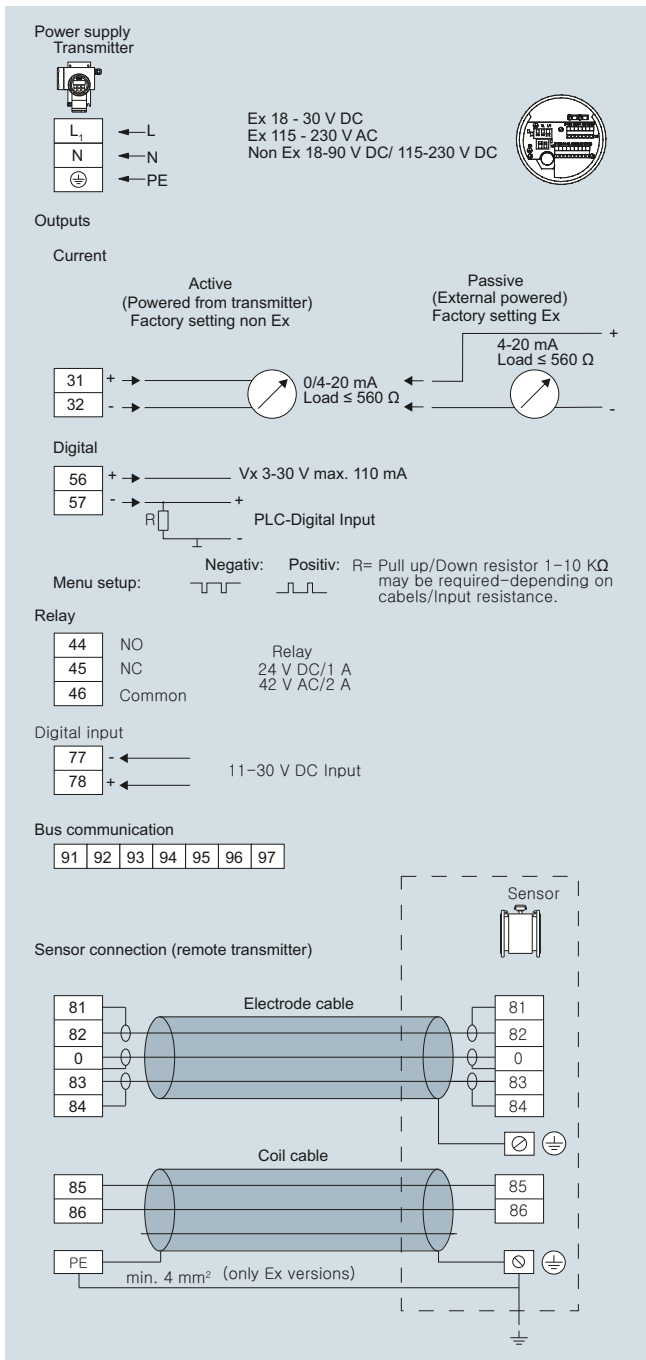
www.pia-selector.automation.siemens.com

Dimensional drawings



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

Schematics



Flow Measurement

SITRANS F M

Flow sensor MAG 1100 and MAG 1100 HT

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.

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		
<u>Ambient conditions</u>		
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	-20 ... +60 °C (-4 ... 140 °F)	
<u>Temperature of medium</u>		
• 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)	
<u>Temperature shock</u>		
• MAG 1100 (Ceramic)		
- Duration ≤ 1 min, followed by 10 min rest	<ul style="list-style-type: none"> • 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) 	<ul style="list-style-type: none"> • 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	
<u>Operating pressure</u>		
• MAG 1100 (Ceramic)	<ul style="list-style-type: none"> • 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})	<ul style="list-style-type: none"> • 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)	
<u>Mechanical load (vibration)</u>		
	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 • Sensor: 3.17 grms
<u>Enclosure rating (standard)</u>	IP67 to EN 60529 (NEMA 4X), 1 mH ₂ O for 30 min	IP67 to EN 60529 (NEMA 4X), 1 mH ₂ O for 30 min
EMC	2004/108/EC	2004/108/EC

Flow Measurement

SITRANS F M

Flow sensor MAG 1100 and MAG 1100 HT

Version	MAG 1100	MAG 1100 HT (High temperature)
Design		
Weight	See Dimensional drawings	See Dimensional drawings
Material		
<ul style="list-style-type: none"> Enclosure <ul style="list-style-type: none"> MAG 1100 Terminal box <ul style="list-style-type: none"> Standard Option Fixing studs Gaskets <ul style="list-style-type: none"> Standard Option Pipe connection adapters: <ul style="list-style-type: none"> DN 2, 3, 6 and 10 (1/12", 1/8", 1/4" and 3/8") 	Stainless steel AISI 316L/1.4404 Fibre glass reinforced polyamide (not for Ex) Stainless steel AISI 316/1.4436 Stainless steel AISI 304/1.4301, Number and size to EN 1092-1:2001 EPDM (max. 150 °C, PN 40 (max. 302 °F, 600 psi)) <ul style="list-style-type: none"> Graphite (max. 200 °C, PN 40 (max. 392 °F, 600 psi)) PTFE (max. 130 °C, PN 25 (max. 266 °F, 300 psi)) Stainless steel, AISI 316/1.4436 <ul style="list-style-type: none"> Hastelloy C22/2.4602 PVDF 	Stainless steel AISI 316L/1.4404 Stainless steel AISI 316/1.4436 Stainless steel AISI 304/1.4301, Number and size to EN 1092-1:2001 Graphite (max. 200 °C, PN 40 (max. 392 °F, 600 psi))
Liner		
<ul style="list-style-type: none"> MAG 1100 (Ceramic) MAG 1100 (PFA) 	<ul style="list-style-type: none"> DN 2, 3 (1/12", 1/8"): Zirconium oxide (ZrO₂) (ceramic) DN 6 ... 100 (1/4" ... 4"): Aluminum oxide Al₂O₃ Reinforced PFA (not for Ex)	DN 15 ... 100 (1/2" ... 4"): Aluminum oxide Al ₂ O ₃
Electrodes		
<ul style="list-style-type: none"> MAG 1100 (Ceramic) MAG 1100 (PFA) 	<ul style="list-style-type: none"> DN10 ... 100 (3/8" ... 4"): Platinum with gold / Titanium brazing alloy DN 2 ... 6 (1/12" ... 1/4"): Platinum DN 10 ... 15 (3/8" ... 1/2"): Hastelloy C276/2.4819 DN 25 ... 100 (1" ... 4"): Hastelloy C22/2.4602 	Platinum with gold / Titanium brazing alloy
Cable entries		
	<ul style="list-style-type: none"> Remote installation 2 x M20 or 2 x 1/2" NPT Compact installation <ul style="list-style-type: none"> MAG 5000/MAG 6000: 4 x M20 or 4 x 1/2" NPT MAG 6000 I: 2 x M25 (for supply/output) MAG 6000 I Ex: 2 x M25 (for supply/output) 	Remote installation 2 x M20 or 2 x 1/2" NPT
Certificates and approvals		
<u>Calibration</u>		
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	<ul style="list-style-type: none"> PED – 97/23/EC³⁾ (Fluid group: Liquid of fluid group 1) CRN (PFA) 	<ul style="list-style-type: none"> PED – 97/23/EC³⁾ CRN (PFA)
<u>Ex approvals</u>		
MAG 1100 (Ceramic)		
<ul style="list-style-type: none"> Ex sensor or Compact with MAG 6000 I Ex Sensor with/without MAG 5000/6000 /6000 I 	ATEX 2G D sensor Ex de ia IIB T3 - T6 FM Class I, Div 2	ATEX 2G D sensor Ex de ia IIB T3 - T6 FM Class I, Div 2
MAG 1100 (PFA)		
<ul style="list-style-type: none"> Sensor with/without MAG 5000/6000/6000 I 	FM Class I, Div 2	
Custody transfer approval (MAG 5000/6000 CT) ²⁾	<ul style="list-style-type: none"> Cold water pattern approval PTB (Germany) Hot water pattern approval PTB (Germany) Other media than water pattern approval- OIML R 117 (Ceramic liner) (Denmark) 	<ul style="list-style-type: none"> Hot water pattern approval PTB (Germany)

¹⁾ Conditions are also dependent on liner characteristics

²⁾ With compact transmitter MAG 5000 CT/6000 CT -20 ... +50 °C (-4 ... +122 °F)

³⁾ For further information on the PED standard and requirements, see page 9/6.

For technical specification for transmitter - see transmitter pages.

Selection and Ordering data	Article No.
Sensor SITRANS F M MAG 1100 EPDM gaskets included	7ME6110- A 0 -
Diameter	
DN 2 (1/12")	1 D
DN 3 (1/8")	1 H
DN 6 (1/4")	1 M
DN 10 (3/8")	1 R
DN 15 (1/2")	1 V
DN 25 (1")	2 D
DN 40 (1 1/2")	2 R
DN 50 (2")	2 Y
DN 65 (2 1/2")	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
1/2" NPT: Polyamide terminal box or 6000 I compact	2
Metric: SS terminal box (mandatory for stainless steel MAG 6000 transmitter)	3
1/2" NPT: SS terminal box (mandatory for stainless steel MAG 6000 transmitter)	4

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.
 1) Quick ship only in combination with Ceramic liner

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Article 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 10204-2.2	C14
Factory certificate according to EN 10204-2.1	C15
Sensor cables wired (specify cable Article No.)	Y40
Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable Article 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 request¹⁾
• Customer-specified calibration up to 10 points	On request¹⁾
• Customer-witnessed calibration	On request¹⁾
Any of above calibration	

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://www.automation.siemens.com/mcms/automation/en/sensor-systems/process-instrumentation/Pages/Default.aspx> and send together with the order. (Size dependent restriction on maximum flow rates may apply)

Operating instructions for SITRANS F M MAG 1100


Description	Article 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	Article No.
Potting kit for terminal box of flow sensors for IP68/NEMA 6P (not for Ex sensors)	◆ FDK:085U0220



◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Flow Measurement

SITRANS F M

Flow sensor MAG 1100 and MAG 1100 HT

Selection and Ordering data	Article No.
Sensor SITRANS F M	
MAG 1100 HT High Temperature	7 ME 6 1 2 0 -
Ceramic liner, Platinum electrode, Graphite gaskets included	A 2 0 - 2 A
Diameter	
DN 15 (½")	1 V
DN 25 (1")	2 D
DN 40 (1½")	2 R
DN 50 (2")	2 Y
DN 80 (3")	3 M
DN 100 (4")	3 T
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 Article 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 10204-2.2	C14
Factory certificate according to EN 10204-2.1	C15
Sensor cables wired (specify cable Article No.)	Y40
Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable Article 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 request¹⁾
• Customer-specified calibration up to 10 points	On request¹⁾
• Customer-witnessed calibration Any of above calibration	On request¹⁾

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://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	Article 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	Article No.
Potting kit for terminal box of flow sensors for IP68/NEMA 6P (not for Ex sensors)	◆ FDK:085U0220



◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Accessories for MAG 1100 sensor	Article No.	Accessories for MAG 1100 sensor	Article No.
Pipe connection 1/2" external thread		Grounding ring SS	
For DN 2 ... 10 (1/12" ... 3/8") sensor, material: SS 316 2 pipe connections, 2 EPDM gaskets, 12 pcs M4 x 12 screws		Material: AISI 316/1.4436; each set includes: 1 grounding ring ¹⁾ , 3 PTFE gaskets, 1 earth wire, 1 M6 screw	
• 1/2" G, ISO 7-1 tapered thread, SS 316	◆ FDK:083G0080	• DN 2 ... 10 (1/12" ... 3/8")	◆ FDK:083G0686
• 1/2" NPT thread, SS 316	◆ FDK:083G4330	• DN 15 (1/2")	◆ FDK:083G0687
For DN 2 ... 10 (1/12" ... 3/8") sensor, material: Hastelloy C 2 pipe connections, 2 PTFE gaskets, 12 pcs M4 x 14 screws		• DN 25 (1")	◆ FDK:083G0689
• 1/2" G, ISO 7-1 tapered thread	◆ FDK:083G4332	• DN 40 (1 1/2")	FDK:083G0691
• 1/2" NPT thread	◆ FDK:083G4331	• DN 50 (2")	FDK:083G0692
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		• DN 65 (2 1/2")	FDK:083G0693
• 1/2" G, ISO 7-1 tapered thread PVDF incl. grounding ring Hastelloy C22/2.4602	A5E01018395	• DN 80 (3")	FDK:083G0694
• 1/2" NPT thread PVDF incl. grounding ring Hastelloy C22/2.4602	A5E01018400	• DN 100 (4")	FDK:083G0695
EPDM gaskets		Grounding ring (Hastelloy C)	
Material: EPDM; each set includes: 2 EPDM gaskets, 1 earthing wire, 1 M6 screw, 1 nut, 1 washer, 1 bolt earthing plate		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:083G3116	• DN 2 ... 10 (1/12" ... 3/8")	◆ FDK:083G3256
• DN 15 (1/2")	◆ FDK:083G3117	• DN 15 (1/2")	◆ FDK:083G3257
• DN 25 (1")	◆ FDK:083G3119	• DN 25 (1")	◆ FDK:083G3259
• DN 40 (1 1/2")	◆ FDK:083G3121	• DN 40 (1 1/2")	◆ FDK:083G3261
• DN 50 (2")	◆ FDK:083G3122	• DN 50 (2")	◆ FDK:083G3262
• DN 65 (2 1/2")	◆ FDK:083G3123	• DN 65 (2 1/2")	FDK:083G3263
• DN 80 (3")	◆ FDK:083G3124	• DN 80 (3")	FDK:083G3264
• DN 100 (4")	◆ FDK:083G3125	• DN 100 (4")	FDK:083G3265
PTFE gaskets		Grounding ring (Tantalum)	
Material: PTFE; each set includes: 2 gaskets, 2 earthing wires, 3 M6 screws (DN 2 ... DN 10: 12 pcs M4 x 14)		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")	◆ FDK:083G0156	• DN 2 ... 10 (1/12" ... 3/8")	A5E01181599
• DN 15 (1/2")	◆ FDK:083G0157	• DN 15 (1/2")	A5E01181606
• DN 25 (1")	◆ FDK:083G0159	• DN 25 (1")	A5E01181610
• DN 40 (1 1/2")	◆ FDK:083G0161	• DN 40 (1 1/2")	A5E01181613
• DN 50 (2")	◆ FDK:083G0162	• DN 50 (2")	A5E01181615
• DN 65 (2 1/2")	◆ FDK:083G0163	• DN 65 (2 1/2")	A5E01181616
• DN 80 (3")	◆ FDK:083G0164	• DN 80 (3")	A5E01181619
• DN 100 (4")	◆ FDK:083G0165	• DN 100 (4")	A5E01181622
Graphite gaskets		Studs and nuts	
Material: Graphite; conductive, each set includes: 2 gaskets (conductive (can also be used as grounding ring))		for DN 100 PN 25/40, 8 M20 studs, 16 M20 nuts	
• DN 2 ... 10 (1/12" ... 3/8")	◆ FDK:083G0116	Material: AISI 304/1.4305	
• DN 15 (1/2")	◆ FDK:083G0117	• DN 100 (4")	◆ FDK:083G0226
• DN 25 (1")	◆ FDK:083G0119		
• DN 40 (1 1/2")	◆ FDK:083G0121		
• DN 50 (2")	◆ FDK:083G0122		
• DN 65 (2 1/2")	◆ FDK:083G0123		
• DN 80 (3")	◆ FDK:083G0124		
• DN 100 (4")	◆ FDK:083G0125		

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

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

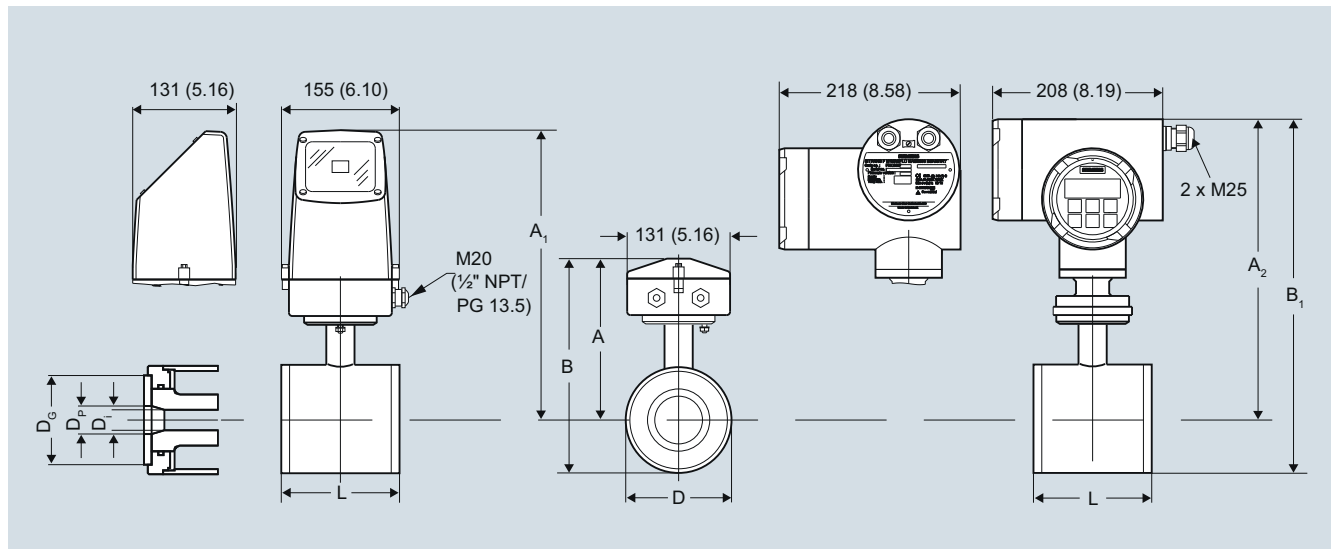
Flow Measurement

SITRANS F M

Flow sensor MAG 1100 and MAG 1100 HT

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	150	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⁾ [lb]
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
1/4	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
1/2	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
1 1/2	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
2 1/2	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 lb).

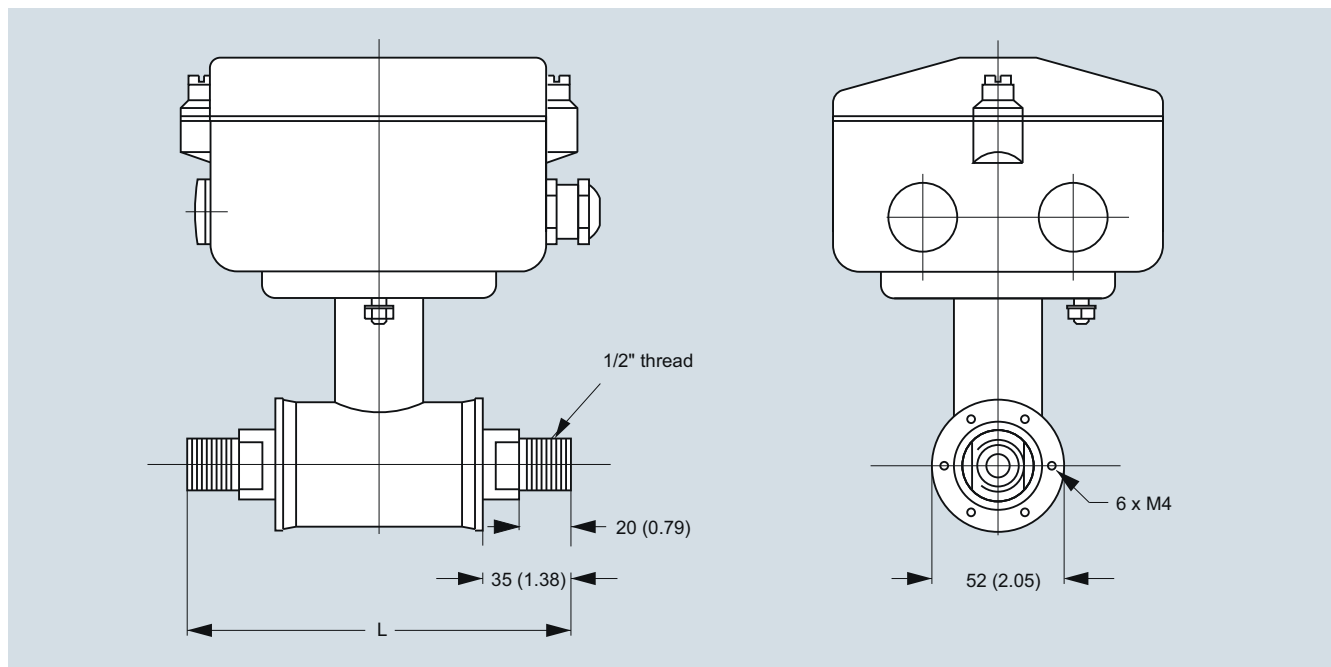
³⁾ A₂ is 3 mm (0.12") shorter than A₁

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

Size DN	inch	EPDM		Graphite		PTFE (Teflon)		Without gasket		Earthing ring	
		[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	1/2	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	1 1/2	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	2 1/2	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

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", 1/4" and 3/8") are prepared for assembly with the 1/2" pipe connections. Dimensions in mm (inch)

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

Stainless steel and Hastelloy pipe connections								PVDF pipe connections	
Without gasket		EPDM		Graphite		PTFE		PTFE	
[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
150	5.9	150	5.9	152	6.0	156	6.1	133	5.2

Important note:

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

Flow Measurement

SITRANS F M

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)

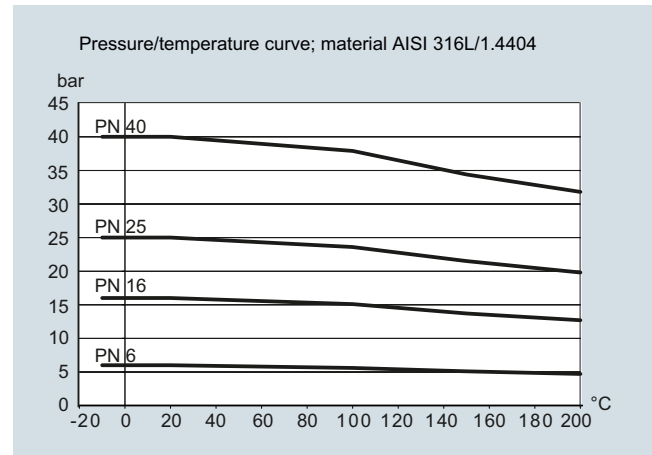
Mode of operation

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.

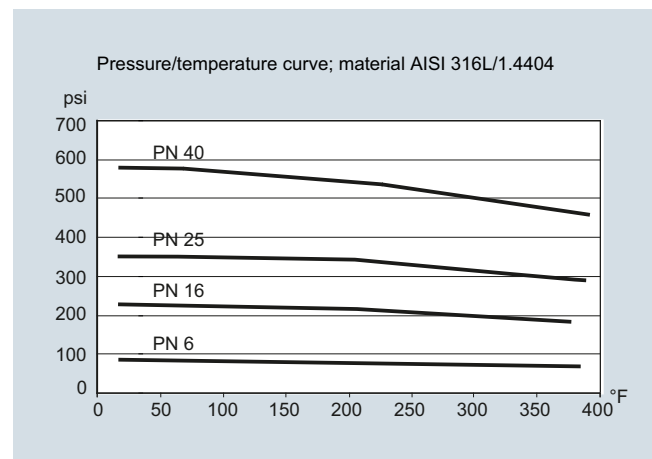
Integration

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/RS 485, 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 9/6.

Technical specifications

Measuring principle Excitation frequency (Mains supply: 50 Hz/60 Hz)	Electromagnetic induction DN 10 ... 65 (1/4" ... 2 1/2"): 12.5 Hz/15 Hz DN 80 ... 100 (3", 4"): 6.25 Hz/7.5 Hz
Process connection Nominal size Process connection	DN 10 ... DN 100 (3/8" ... 4") Hygienic adapters available for: • Direct welding onto pipe • Clamp fitting • Threaded fitting
Rated operating conditions <u>Ambient conditions</u> Ambient temperature ¹⁾ • Sensor • Ex sensor • Compact transmitter MAG 5000/6000 ²⁾ • Transmitter MAG 6000 I • Compact transmitter MAG 6000 I Ex <u>Temperature of medium</u> MAG 1100 F (Ceramic) MAG 1100 F (PFA) <u>Temperature shock</u> MAG 1100 F • Duration ≤ 1 min, followed by 10 min rest MAG 1100 F (PFA) <u>Operating pressure</u> MAG 1100 F (Ceramic) MAG 1100 F (PFA) <u>Mechanical load (vibration)</u> <u>Enclosure rating</u>	-40 ... +100 °C (-40 ... +212 °F) -20 ... +60 °C (-4 ... +140 °F) -20 ... +60 °C (-4 ... +140 °F) -20 ... +60 °C (-4 ... +140 °F) -20 ... +60 °C (-4 ... +140 °F) -20 ... +150 °C (-4 ... +302 °F) Suitable for steam sterilization -30 ... +130 °C (-22 ... +266 °F) Suitable for steam sterilization at 150 °C (302 °F) • DN 10, 15, 25: Max. ΔT ≤ 80 °C/min (3/8", 1/2", 1"): Max. ΔT ≤ 144 °F/min) • DN 40, 50, 65: Max. ΔT ≤ 70 °C/min (1 1/2", 2", 2 1/2"): Max. ΔT ≤ 126 °F/min) • DN 80, 100: Max. ΔT ≤ 60 °C/min (3", 4"): Max. ΔT ≤ 108 °F/min) Max. ± 100 °C (212 °F) momentarily DN 10 ... 65: 40 bar (3/8" ... 2 1/2"): 580 psi) DN 80: 25 bar (3": 363 psi) DN 100: 25 bar (4": 363 psi) Vacuum: $j \times 10^{-6}$ bar _{abs} (1.5×10^{-5} psi _{abs}) 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) 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, trans- mitter to be supported to avoid tension on sensor part. IP67 to EN 60529 (NEMA 4X), 1 mH ₂ O for 30 min 2004/108/EC

Design Weight <u>Material</u> Enclosure • MAG 1100 F Terminal box (remote version only) • Standard • Option • Ex ATEX (remote version only)	See Dimensional drawings Stainless steel AISI 316L/1.4404 Fibre glass reinforced polyamide Stainless steel AISI 316/1.4436 Stainless steel AISI 316/1.4436
Liner MAG 1100 F (Ceramic) MAG 1100 F (PFA)	Aluminum oxide Al ₂ O ₃ (ceramics) Reinforced PFA (teflon) (not for Ex)
Electrodes MAG 1100 F (Ceramic) MAG 1100 F (PFA)	Platinum with gold /Titanium brazing alloy • DN 10 ... 15 (3/8" ... 1/2"): Hastelloy C276/2.4819 • DN 25 ... 100 (1" ... 4"): Hastelloy C22/2.4602
Cable entries	• Remote installation 2 x M20 or 2 x 1/2" NPT • Compact installation - MAG 5000/MAG 6000: 4 x M20 or 4 x 1/2" NPT - MAG 6000 I: 2 x M25 (for sup- ply/output) - MAG 6000 I Ex: 2 x M25 (for supply/output)
Certificates and approvals Calibration • Standard Production calibration, calibration report shipped with sen- sor MAG 1100 F (Ceramic) • Ex ATEX approvals for sensor or compact with MAG 6000 I Ex • Sensor with/without MAG 5000/6000/6000 I MAG 1100 F (PFA) Conforms to Custody transfer approvals (MAG 5000/6000 CT)	Zero-point, 2 x 25 %, 2 x 90 % 3A (sensor with Polyamide termi- nal box and FKM/FPM or EPDM gaskets), transmitter not part of the approval ATEX 2G D sensor EEx d e ia IIB T3 - T6 FM Class I, Div 2 3A (sensor with Polyamide termi- nal box with EPDM gasket), trans- mitter not part of the approval EHEDG certified (use EPDM gasket) (DN 25 ... 100 (1 ... 4")) FM Class I, Div 2 Hygienic EC 1925:2003 European food contact material • PED – 97/23/EC ³⁾ • CRN (PFA) • FDA • 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
(-4 ... +122 °F)

3) For further information on the PED standard and requirements, see
page 9/6.

Flow Measurement

SITRANS F M

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", 1/2", 1", 1 1/2", 2" and 2 1/2") 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", 1/2", 1", 1 1/2", and 2") PN 16 (200 psi)
- DN 65, 80 and 100 (2 1/2", 3" and 4") PN 10 (150 psi)

Thread adapter

DIN 11851

- DN 10, 15, 25, and 40 (3/8", 1/2", 1", and 1 1/2") PN 40 (600 psi)

- DN 50, 65, 80 and 100 (2", 2 1/2", 3" and 4") PN 25 (350 psi)

ISO 2853, BS 4825-4

- DN 10, 15, 25, 40, 50, 65 and 80 (3/8", 1/2", 1", 1 1/2", 2", 2 1/2" and 3") PN 16 (200 psi)

SMS 1145

- DN 25, 40, 50, 65 and 80 (1", 1 1/2", 2", 2 1/2" 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))
- 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

Article No.

Sensor SITRANS F M MAG 1100 F

7ME6140-

Diameter

DN 10 (3/8")	1 R
DN 15 (1/2")	1 V
DN 25 (1")	2 D
DN 40 (1 1/2")	2 R
DN 50 (2")	2 Y
DN 65 (2 1/2")	3 F
DN 80 (3")	3 M
DN 100 (4")	3 T

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 ¹⁾	N

Liner material

PFA (not for Ex)	1
Ceramic	2

Gasket material¹⁾

EPDM flat gasket (FDA, 3A)	0
FPM/FKM (FDA, 3A) (only with ceramic liner)	2
EPDM-P gasket (only for PFA) (FDA, EHEDG certified, 3A)	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

¹⁾ SMS 1145 standard is not approved by 3A

Flow Measurement

SITRANS F M

Flow sensor MAG 1100 F

Selection and Ordering data	Article No.
Sensor SITRANS F M MAG 1100 F	7 ME 6 1 4 0 -
	
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
 We can offer shorter delivery times for configurations designated with the Quick Ship Symbol  . For details see page 9/5 in the appendix.	

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Article 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 10204-2.2	C14
Factory certificate according to EN 10204-2.1	C15
Sensor cables wired (specify cable Article No.)	Y40
Sensor for remote transmitter's junction box potted with wired cable (specify cable Article No.) (not for Ex sensors)	Y41
Other postproduction requirements (add desired text)	Y99
Additional calibrations	
<ul style="list-style-type: none"> Matched pair - (Standard production calibration where sensor and transmitter is calibrated together) 	On request¹⁾
<ul style="list-style-type: none"> Customer-specified calibration up to 10 points 	On request¹⁾
<ul style="list-style-type: none"> Customer-witnessed calibration Any of above calibration 	On request¹⁾

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¶1=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	Article 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

Accessories

Description	Article No.
Potting kit for terminal box of flow sensors for IP68/NEMA 6P (not for Ex sensors) 	FDK:085U0220
	

 We can offer shorter delivery times for configurations designated with the Quick Ship Symbol . For details see page 9/5 in the appendix.

Flow Measurement

SITRANS F M

Flow sensor MAG 1100 F

Accessories

Article No.

Weld-in connection fittings for MAG 1100 F with P gaskets for EHEDG³⁾

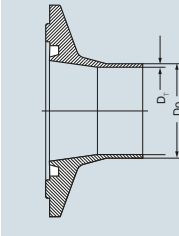
Only for sensors with PFA liner.

2 pcs. fittings

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

DIN 11850

Adapter			Sensor
DN (mm)	D _o (mm)	D _T (mm)	DN (mm)



10 ²⁾	13	1.5	10	◆ A5E02054630
15 ²⁾	19	1.5	15	◆ A5E02054633
20	23	1.5	15	◆ A5E02054634
25	29	1.5	25	◆ A5E02054635
32	35	1.5	25	◆ A5E02054637
40	41	1.5	40	◆ A5E02054638
50	53	1.5	50	◆ A5E02054640
65	70	2.0	65	◆ A5E02054643
80	85	2.0	80	◆ A5E02054644
100	104	2.0	100	◆ A5E02054646

ISO 2037

Adapter			Sensor
DN (mm)	D _o (mm)	D _T (mm)	DN (mm)

12.7	12.7	1.0	10	◆ A5E03727946
17.2	17.2	1.0	15	◆ A5E03728098
25	25	1.6	25	◆ A5E02196073
33	33.7	1.6	25	◆ A5E02196074
38	38	1.6	40	◆ A5E02196075
40	40	1.6	40	◆ A5E02196076
51	51	1.6	50	◆ A5E02196077
63.5	63.5	1.6	65	◆ A5E02196078
76.1	76.1	1.6	80	◆ A5E02196080
101.6	101.6	2.0	100	◆ A5E02196082

Tri-Weld (BS 4825-1)

Adapter			Sensor
DN (mm)	D _o (mm)	D _T (mm)	DN (mm)

12.7	12.7	1.2	10	◆ A5E02199113
19.05	19.05	1.2	15	◆ A5E02199114
25.4	25.4	1.6	25	◆ A5E02199115
38.1	38.1	1.6	40	◆ A5E02199116
50.8	50.8	1.6	50	◆ A5E02199117
63.5 ¹⁾	63.5	1.6	65	◆ A5E02199118
76.2	76.2	1.6	80	◆ A5E02199119
101.6 ¹⁾	101.6	2.0	100	◆ A5E02199120

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

D_o: Outer diameterD_i: Inner diameter¹⁾ For BS 4825-1 see ISO 2037²⁾ Not EHEDG approved³⁾ P gaskets not included

Accessories

Article No.

Clamp-type connection fittings for MAG 1100 F with P gaskets for EHEDG³⁾

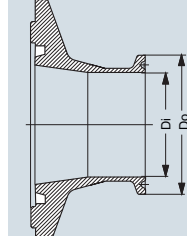
Only for sensors with PFA liner.

2 pcs. fittings

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

DIN 32676

Adapter			Sensor
DN (mm)	D _o (mm)	D _i (mm)	DN (mm)



10	34	10	10	◆ A5E02211143
15	34	16	15	◆ A5E02211144
25	50.5	22.6	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

Adapter			Sensor
DN (mm)	D _o (mm)	D _i (mm)	DN (mm)

25	50.5	22.6	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 (BS 4825-3)

Adapter			Sensor
DN (mm)	D _o (mm)	D _i (mm)	DN (mm)

12.7	25.4	9.5	10	◆ A5E02213596
19.05	25.4	15.85	15	◆ A5E02213597
25.4	50.5	22.2	25	◆ A5E02213598
38.1	50.5	34.9	40	◆ A5E02213599
50.8	64	47.6	50	◆ A5E02213600
63.5	77.5	60.3	65	◆ A5E02213601
76.2	91	73	80	◆ A5E02213602
101.6	119	97.6	100	◆ A5E02213603

D_o: Outer diameterD_i: Inner diameter

Accessories

Article No.

Threaded type connection fittings for MAG 1100 F with P gaskets for EHEDG²⁾

Only for sensors with PFA liner.

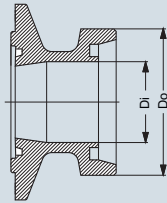
2 pcs. fittings

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

DIN 11851

Adapter

Sensor

DN (mm) D_o (mm) D_i (mm) DN (mm)

10	28	10	10
15	34	16	15
20	44	20	15
25	52	26	25
32	58	32	25
40	65	38	40
50	78	50	50
65	95	66	65
80	110	81	80
100	130	100	100

A5E02218293
A5E02218294
A5E02218295
 ◆ **A5E02218296**
A5E02218297
 ◆ **A5E02218298**
 ◆ **A5E02218299**
A5E02218300
A5E02218301
A5E02218302

Accessories

Article No.

Threaded type connection fittings for MAG 1100 F with P gaskets for EHEDG²⁾

Only for sensors with PFA liner.

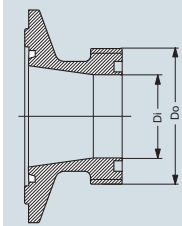
2 pcs. fittings

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

SMS 1145¹⁾

Adapter

Sensor

DN (mm) D_o (mm) D_i (mm) DN (mm)

25	40	22.6	25
38	60	35.6	40
51	70	48.6	50
63.5	85	60.3	65
76	98	72	65

A5E02218310
A5E02218312
A5E02218313
A5E02218314
A5E02218315

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

D_o: Outer diameterD_i: Inner diameter

1) SMS 1145 standard is not approved by 3A

2) P gaskets not included

Flow Measurement

SITRANS F M

Flow sensor MAG 1100 F

Accessories

Article No.

Weld in connection fittings for MAG 1100 F with flat gaskets for 3A²⁾

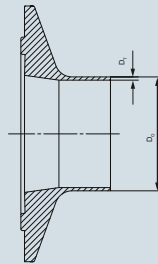
For sensors with ceramic and PFA liner.

2 pcs. fittings

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

DIN 11850

Adapter		Sensor	
DN (mm)	D _o (mm)	D _T (mm)	DN (mm)



10	13	1.5	10	◆ FDK:083G2116
15	19	1.5	15	◆ FDK:083G2117
20	23	1.5	15	◆ FDK:083G2118
25	29	1.5	25	◆ FDK:083G2119
32	35	1.5	25	◆ FDK:083G2120
40	41	1.5	40	◆ FDK:083G2121
50	53	1.5	50	◆ FDK:083G2122
65	70	2.0	65	◆ FDK:083G2123
80	85	2.0	80	◆ FDK:083G2124
100	104	2.0	100	◆ FDK:083G2125

ISO 2037

Adapter		Sensor	
DN (mm)	D _o (mm)	D _T (mm)	DN (mm)

12.7	12.7	1.0	10	A5E03720273
17.2	17.2	1.0	15	◆ FDK:083G2107
25	25.6	1.6	25	◆ FDK:083G2109
33.7	33.7	1.6	25	◆ FDK:083G2100
38	38	1.6	40	◆ FDK:083G2111
40	40	1.6	40	◆ FDK:083G2101
51	51	1.6	50	◆ FDK:083G2112
63.5	63.5	1.6	65	◆ FDK:083G2113
76.1	71.1	1.6	80	◆ FDK:083G2114
101.6	101.6	2.0	100	◆ FDK:083G2115
114.3	118.3	2.0	100	◆ FDK:083G2105

Tri-Weld (BS 4825-1)

Adapter		Sensor	
DN (mm)	D _o (mm)	D _T (mm)	DN (mm)

12.7	12.7	1.2	10	◆ FDK:083G2276
19.05	19.05	1.2	15	◆ FDK:083G2277
25.4	25.4	1.6	25	◆ FDK:083G2279
38	38.1	1.6	40	◆ FDK:083G2281
50.8	50.8	1.6	50	◆ FDK:083G2282
63.5 ¹⁾	63.5	1.6	65	◆ FDK:083G2283
76.2	76.2	1.6	80	◆ FDK:083G2284
101.6 ¹⁾	101.6	2.0	100	◆ FDK:083G2285

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

D_o: Outer diameterD_i: Inner diameter

1) For BS 4825-1 see ISO 2037

2) Flat gaskets not included

Accessories

Article No.

Clamp-type connection fittings for MAG 1100 F with flat gaskets for 3A²⁾

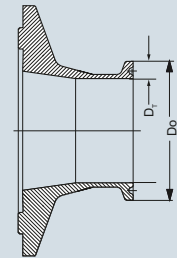
For sensors with ceramic and PFA liner.

2 pcs. fittings

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

DIN 32676

Adapter		Sensor	
DN (mm)	D _o (mm)	D _T (mm)	DN (mm)



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

Adapter		Sensor	
DN (mm)	D _o (mm)	D _T (mm)	DN (mm)

25	50.5	22.6	25	◆ FDK:083G2189
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 (BS 4825-3)

Adapter		Sensor	
DN (mm)	D _o (mm)	D _T (mm)	DN (mm)

12.7	25.4	9.5	10	◆ FDK:083G2286
19.05	25.4	15.85	15	◆ FDK:083G2287
25.4	50.5	22.2	25	◆ FDK:083G2289
38.1	50.5	34.9	40	◆ FDK:083G2291
50.8	64	47.6	50	◆ FDK:083G2292
63.5	77.5	60.3	65	◆ FDK:083G2293
76.2	91	73	80	◆ FDK:083G2294
101.6	119	97.6	100	◆ FDK:083G2295

D_o: Outer diameterD_i: Inner diameter

Accessories

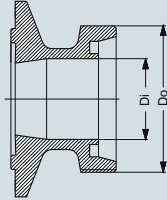
Article No.

Threaded type connection fittings for MAG 1100 F with flat gaskets for 3A²⁾

For sensors with ceramic and PFA liner.

2 pcs. fittings
2 pcs. clamps (to join flow sensor and fitting)**DIN 11851**

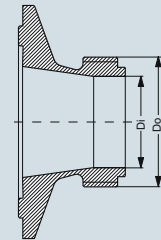
Adapter		Sensor	
DN (mm)	D _o (mm)	D _i (mm)	DN (mm)



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		Sensor	
DN (mm)	D _o (mm)	D _i (mm)	DN (mm)



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

BS 4825-4

Adapter		Sensor	
DN (mm)	D _o (mm)	D _i (mm)	DN (mm)

25.4	37	22.2	25	A5E03732429
38.1	51	34.9	40	A5E03732431
50.8	64	47.6	50	A5E03732433
63.5	78	60.3	65	A5E03732434
76.2	91	73	80	A5E03732435
101.6	126	97.6	100	FDK:083G2145

Accessories

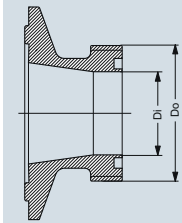
Article No.

Threaded type connection fittings for MAG 1100 F with flat gaskets for 3A²⁾

For sensors with ceramic and PFA liner.

2 pcs. fittings
2 pcs. clamps (to join flow sensor and fitting)**SMS 1145¹⁾**

Adapter		Sensor	
DN (mm)	D _o (mm)	D _i (mm)	DN (mm)



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

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

D_o: Outer diameterD_i: Inner diameter¹⁾ SMS 1145 standard is not approved by 3A²⁾ Flat gaskets not included.

Flow Measurement

SITRANS F M

Flow sensor MAG 1100 F

Spare parts for MAG 1100 F

Article No.

Gaskets

(delivered in pairs, to be placed 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**

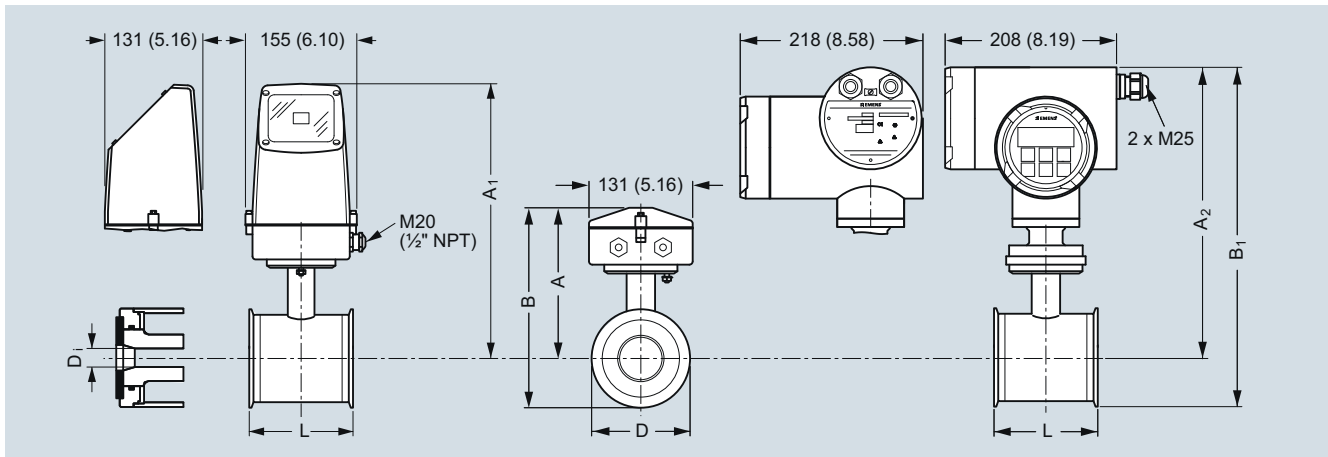
Rubber: NBR

- 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**

- ◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Dimensional drawings

Sensor MAG 1100 F compact/remote



Dimensions in mm (inch)

Important note:

For compact installation with MAG 6000 I/Ex - Supports the transmitter to avoid tension on the sensor part.

Size	L	A	A ₁ ³⁾	B ²⁾	B ₁	D	D ₁ (Al ₂ O ₃)	D ₁ PFA	Weight ¹⁾
DN	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[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	L	A	A ₁ ³⁾	B ²⁾	B ₁	D	D ₁ (Al ₂ O ₃)	D ₁ PFA	Weight ¹⁾
[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[lb]
3/8	2.52	6.34	12.40	7.62	13.57	2.52	0.39	0.39	4.8
1/2	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
1 1/2	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
2 1/2	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 lb)

²⁾ 14.5 mm (0.571") shorter when the AISI terminal box is used (always Ex version)

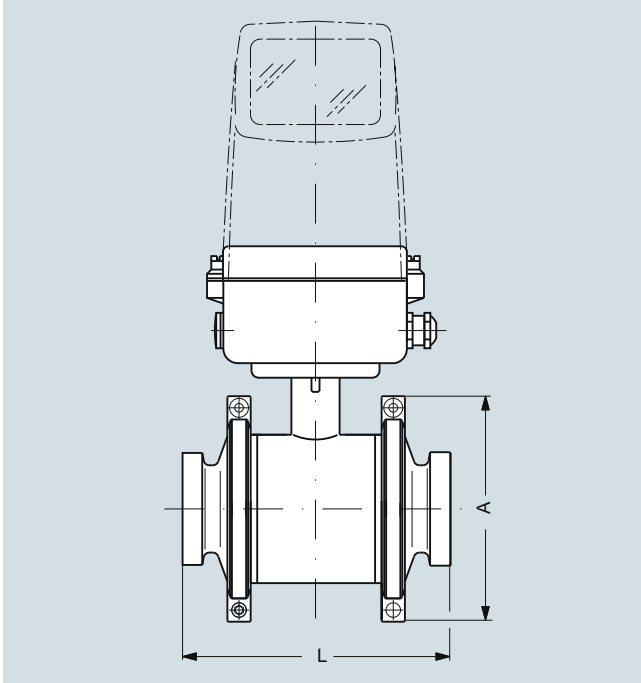
³⁾ A₂ is 3 mm (0.12") shorter than A₁

Flow Measurement

SITRANS F M

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	1/2	99	3.90	146	5.75
25	1	113	4.45	161	6.34
40	1 1/2	126	4.96	176	6.93
50	2	154	6.06	186	7.32
65	2 1/2	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.

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 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

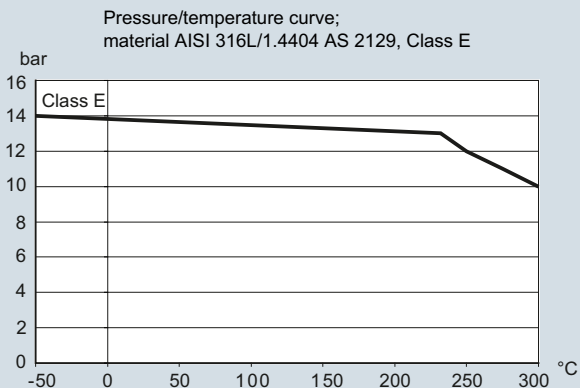
The complete flowmeter consists of a flow sensor and an associated transmitter MAG 5000, 6000 and 6000 I.

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/RS 485.

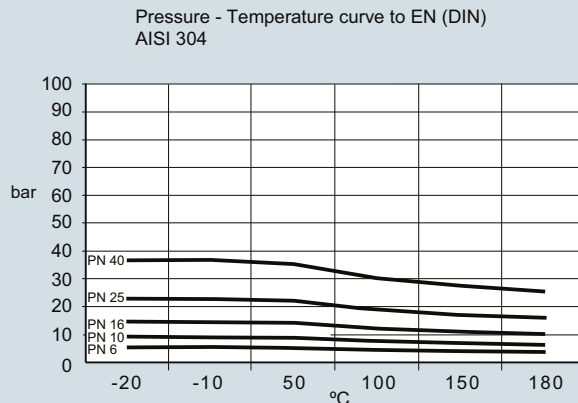
Flow Measurement SITRANS F M

Flow sensor MAG 3100 and MAG 3100 HT

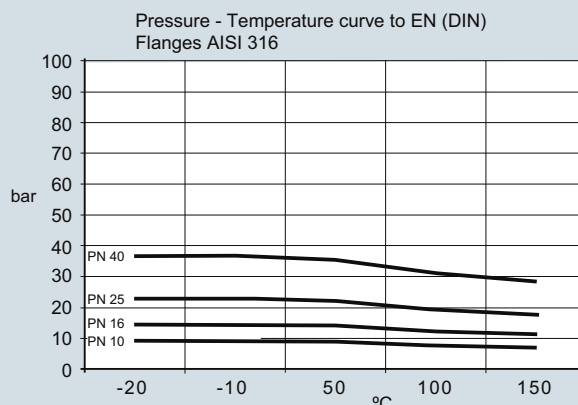
**Pressure/temperature curve;
material AISI 316L/1.4404 AS 2129, Class E**



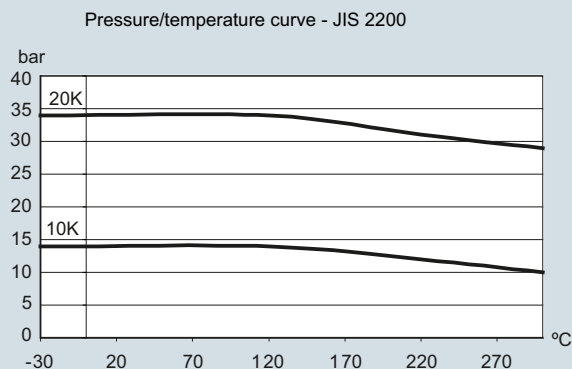
Pressure/temperature curve to EN (DIN) flanges AISI 304



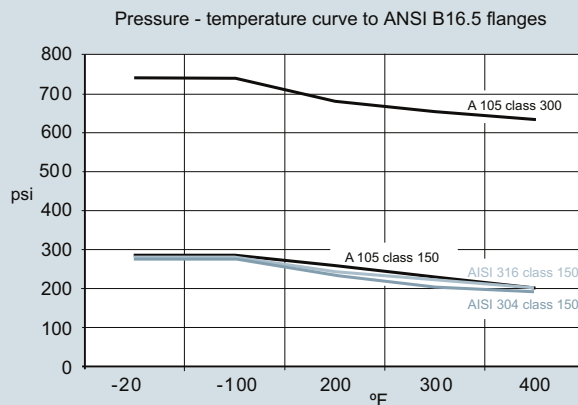
Pressure/temperature curve to EN (DIN) flanges AISI 316



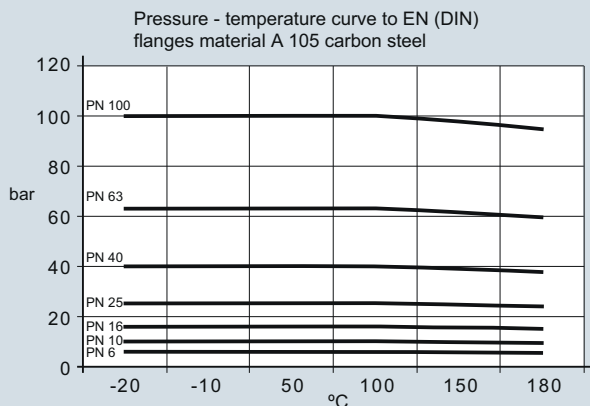
Pressure/temperature curve - JIS 2200



Pressure/temperature curve to ANSI B16.5 flanges



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



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 9/6.

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)	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 mat- ing dimensions) <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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 mat- ing dimensions) <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • ½" ... 12": Class 150 (20 bar (290 psi)) • ½" ... 12": Class 300 (50 bar (725 psi)) AS 2129, raised face ½" ... 12": Table E
Rated operation conditions		
Ambient temperature (conditions also dependent on liner characteristics)		
<ul style="list-style-type: none"> • Standard sensor • Ex sensor 	-40 ... +100 °C (-40 ... +212 °F) -20 ... +60 °C (-4 ... +140 °F)	-40 ... +100 °C (-40 ... +212 °F) For medium temperature up to 150 °C (302 °F): -20 ... +60 °C (-4 ... +140 °F) For medium temperature 150 ... 180 °C (302 ... 356 °F): -20 ... +50 °C (-4 ... +122 °F)
<ul style="list-style-type: none"> • With compact transmitter <ul style="list-style-type: none"> - MAG 5000/6000²⁾ - MAG 6000 I - MAG 6000 I Ex 	-20 ... +60 °C (-4 ... +140 °F) -20 ... +60 °C (-4 ... +140 °F) -20 ... +60 °C (-4 ... +140 °F)	-20 ... +60 °C (-4 ... +140 °F) -20 ... +60 °C (-4 ... +140 °F) -20 ... +60 °C (-4 ... +140 °F)

Flow Measurement

SITRANS F M

Flow sensor MAG 3100 and MAG 3100 HT

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)	<ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> - DN ≤ 300 (≤ 12"): 0.3 ... 50 bar (4 ... 725 psi) - 350 ≤ DN ≤ 600 (14" ≤ DN ≤ 24"): 0.3 ... 40 bar (4 ... 580 psi) PFA <ul style="list-style-type: none"> - DN 15 ... 150 (½" ... 6"): Vacuum 0.02 ... 50 bar (0.29 ... 725 psi) 	<ul style="list-style-type: none"> PTFE Teflon <ul style="list-style-type: none"> - 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 <ul style="list-style-type: none"> - 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 ₂ O for 30 min Option: IP68 to EN 60529/NEMA 6P, 10 mH ₂ O cont. (not for Ex)	IP67 to EN 60529/NEMA 4X/6, 1 mH ₂ O for 30 min Option: IP68 to EN 60529/NEMA 6P, 10 mH ₂ O cont. (not for Ex)
Pressure drop at 3 m/s	As straight pipe	
Test pressure	1.5 x PN (where applicable)	
Mechanical load (vibration)	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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) 	<ul style="list-style-type: none"> 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	See dimensional drawings	
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	<ul style="list-style-type: none"> Stainless steel AISI 316Ti/1.4571 Hastelloy C276/2.4819 (PFA: Hastelloy C22/2.4602) Platinum/Iridium Titanium Tantalum 	<ul style="list-style-type: none"> AISI 316Ti/1.4571 Hastelloy C276/2.4819 (PFA: Hastelloy C22/2.4602) Platinum/Iridium Titanium Tantalum
Grounding electrode material	<ul style="list-style-type: none"> 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 Platinum 	<ul style="list-style-type: none"> PTFE: none PFA: optional in Hastelloy, Tantalum or Platinum

Version	MAG 3100	MAG 3100 HT (High Temperature)
Design (continued)		
Terminal box (remote version only)	<ul style="list-style-type: none"> • Standard fibre glass reinforced polyamide • Option Stainless steel AISI 316/1.4436 • Ex Stainless steel AISI 316/1.4436 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Remote installation 2 x M20 or 2 x ½" NPT • Compact installation <ul style="list-style-type: none"> - 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: 2 x M25 or 2 x ½" NPT (for supply/output) 	<ul style="list-style-type: none"> • 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 % (default)	Zero-point, 2 x 25 % and 2 x 90 % (default)
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	<p>Ex sensors</p> <ul style="list-style-type: none"> • 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 1⁴⁾ • FM Class I, Zone 1 • CSA Class I, Zone 1 <p>Standard sensors</p> <ul style="list-style-type: none"> • FM Class I, Div 2/Zone 2 • CSA Class I, Div 2/Zone 2 	<p>Ex sensors</p> <ul style="list-style-type: none"> • ATEX 2 GD DN 15 ... 300: EEx d e ia IIC T3 - T6 • IEC Ex de ia IIC T3-T6 • FM Class I, Div 1⁴⁾ • FM Class I, Zone 1 • CSA Class I, Zone 1 <p>Standard sensors</p> <ul style="list-style-type: none"> • FM Class I, Div 2/Zone 2 • CSA Class I, Div 2/Zone 2
Drinking water approvals	<p>EPDM lining:</p> <ul style="list-style-type: none"> • WRAS (WRc, BS690 cold water, GB) • NSF/ANSI Standard 61⁵⁾ (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	<p>Cold water pattern approval - DANAK TS 22.36.001, PTB (Denmark and Germany)</p> <p>Hot water pattern approval - PTB (Germany)</p> <p>Other media than water - OIML R 117 (Denmark)</p>	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 (-4 ... +122 °F).

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 9/6.

⁴⁾ Only with sensors sizes DN 15 ... 300 (½" ... 12") compact.

⁵⁾ Including Annex G

Flow Measurement

SITRANS F M

Flow sensor MAG 3100 and MAG 3100 HT

Selection and Ordering data

Sensor SITRANS F M MAG 3100

Article No.

7 ME 6 3 1 0 -

Diameter

DN 15 (½") (PTFE and PFA liner)	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") (AWWA and AS 2129 only)	7 D
DN 800 (32")	7 H
DN 900 (36")	7 M
DN 1000 (40")	7 R
DN 1050 (42") (AWWA only)	7 U
DN 1100 (44") (AWWA only)	7 V
DN 1200 (48")	8 B
DN 1400 (54")	8 F
DN 1500 (60")	8 K
DN 1600 (66")	8 P
DN 1800 (72")	8 T
DN 2000 (78")	8 Y

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")) ¹⁾	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

Sensor SITRANS F M MAG 3100

Article No.

7 ME 6 3 1 0 -

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
Platinum incl. grounding electrodes (only PFA)	7
Tantalum incl. grounding electrodes (only PFA)	8

Transmitter with display

Standard sensor for remote transmitter (Order transmitter separately)

Ex sensor for remote transmitter (Order transmitter separately)

MAG 6000 I, Alu. 18 ... 90 V DC, 115 ... 230 V AC	A
MAG 6000 I Alu. 18 ... 30 V DC, Ex	B
MAG 6000 I Alu. 115 ... 230 V, Ex	C
MAG 6000 Polyamide, 11... 30 V DC / 11...24 V AC	D
MAG 6000, Polyamide, 115 ... 230 V AC	E
MAG 5000, Polyamide, 11... 30 V DC / 11...24 V AC	H
MAG 5000, Polyamide, 115 ... 230 V AC	J
MAG 5000, Polyamide, 115 ... 230 V AC	K
MAG 5000, Polyamide, 115 ... 230 V AC	L

Communication

No communication, add-on possible

HART

PROFIBUS PA Profile 3
(only MAG 6000/MAG 6000 I)PROFIBUS DP Profile 3 (not for Ex)
(only MAG 6000/MAG 6000 I)Modbus RTU/RS 485 (not for Ex)
(only MAG 6000/MAG 6000 I)FOUNDATION Fieldbus H1
(only MAG 6000/MAG 6000 I)

Cable glands/terminal box

Metric: Polyamide terminal box or 6000 I compact

½" NPT: Polyamide terminal box or 6000 I compact

Metric: SS terminal box (mandatory for stainless
steel MAG 6000 Transmitter)½" NPT: SS terminal box (mandatory for stainless
steel MAG 6000 Transmitter)¹⁾ Under preparation

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Selection and Ordering data	Order code
Additional information	
Please add “-Z” to Article 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 Article No.)	Y40
Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable Article No.) (not for Ex)	Y41
Other postproduction requirements (add desired text)	Y99
Additional calibrations	
• Accredited Siemens Flow Instruments matched pair Calibration acc. to ISO/IEC 17025: 2005	On request¹⁾
• CT verification and authority seal according to: Cold water pattern approval - DANAK TS 22.36.001, PTB (Denmark and Germany)	On request¹⁾
• Customer-witnessed calibration Any of above calibration	On request¹⁾
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	Article 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	Article No.
Potting kit for terminal box of flow sensors for IP68/NEMA 6P (not for Ex sensors) 	FDK:085U0220

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

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.

Flow Measurement

SITRANS F M

Flow sensor MAG 3100 and MAG 3100 HT

Selection and Ordering data	Article No.
Sensor SITRANS F M MAG 3100 HT (High Temperature)	7 ME 6 3 2 0 -
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
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
Platinum 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	Article No.
Sensor SITRANS F M MAG 3100 HT (High Temperature)	7 ME 6 3 2 0 -
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 Article 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 Article No.)	Y40
Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable Article 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 request¹⁾
• Accredited Siemens Flow Instruments matched pair Calibration acc. to ISO/IEC 17025: 2005	On request¹⁾
• Customer-specified calibration up to 10 points	On request¹⁾
• CT verification and authority seal according to: Cold water pattern approval - DANAK TS 22.36.001, PTB (Denmark and Germany)	On request¹⁾
• Customer-witnessed calibration Any of above calibration	On request¹⁾

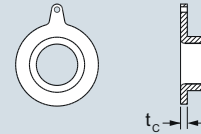
¹⁾ Ordering On request as dedicated information from the customer on the individual sensors is required. Please fill in the calibration form found on <http://pi.khe.siemens.de/index.aspx?Nr=17460> and send together with the order. (Size dependent restriction on maximum flow rates may apply)

Selection and Ordering data

MAG 3100 and MAG 3100 HT¹⁾ Type C Grounding and protection rings

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

Type C



DN	PN 6 Article No.	PN 10 Article No.	PN 16 Article No.	PN 25 Article No.	PN 40 Article No.	AS 2129 Table E Article 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 Article No.	Class 300 Article No.	JIS K10 Article No.	JIS K20 Article No.	Size	AWWA C-207 Article No.
1"	FDK:083N8361	FDK:083N8361	FDK:083N8361	FDK:083N8361	28"	FDK:083N8302
1½"	FDK:083N8362	FDK:083N8362	FDK:083N8362	FDK:083N8362	30"	FDK:083N8366
2"	FDK:083N8344	FDK:083N8344	FDK:083N8344	FDK:083N8344	32"	FDK:083N8305
2½"	FDK:083N8345	FDK:083N8345	FDK:083N8345	FDK:083N8345	36"	FDK:083N8308
3"	FDK:083N8347	FDK:083N8347	FDK:083N8347	FDK:083N8347	40"	FDK:083N8311
4"	FDK:083N8025	FDK:083N8025	FDK:083N8070	FDK:083N8025	42"	FDK:083N8394
5"	FDK:083N8071	FDK:083N8071	FDK:083N8071	FDK:083N8071	44"	FDK:083N8395
6"	FDK:083N8008	FDK:083N8073	FDK:083N8008	FDK:083N8008	48"	FDK:083N8314
8"	FDK:083N8011	FDK:083N8076	FDK:083N8011	FDK:083N8011	54"	FDK:083N8470
10"	FDK:083N8013	FDK:083N8079	FDK:083N8013	FDK:083N8079	60"	FDK:083N8474
12"	FDK:083N8012	FDK:083N8082	FDK:083N8012	FDK:083N8081	66"	FDK:083N8478
14"	FDK:083N8039	FDK:083N8085	FDK:083N8083	FDK:083N8039	72"	FDK:083N8482
16"	FDK:083N8100	FDK:083N8102	FDK:083N8100	FDK:083N8101	78"	FDK:083N8486
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		

Flow Measurement

SITRANS F M

Flow sensor MAG 3100 and MAG 3100 HT

Selection and Ordering data

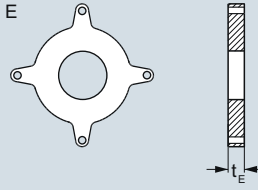
MAG 3100 and 3100 HT Type E grounding and protection ring

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.

Type E



DN	PN 6 Article No.	PN 10 Article No.	PN 16 Article No.	PN 25 Article No.	PN 40 Article 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 Article No.	Class 300 Article No.	JIS K10 Article No.	JIS K20 Article 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:083N8370
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:083N8160	FDK:083N8165
18"	FDK:083N8173	FDK:083N8174	FDK:083N8169	FDK:083N8171
20"	FDK:083N8182	FDK:083N8183	FDK:083N8178	FDK:083N8180
24"	FDK:083N8190	FDK:083N8191	A5E32709738	A5E32710253

Protection of PTFE liner use 2 pcs.

Grounding of PTFE lined flowmeter use 1 pc.

AS2129, Table E

DN	Article 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	A5E32710253

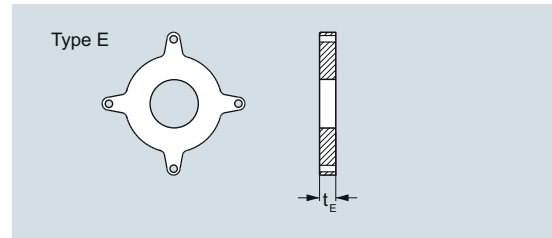
Protection of PTFE liner use 2 pcs.

Grounding of PTFE lined flowmeter use 1 pcs.

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

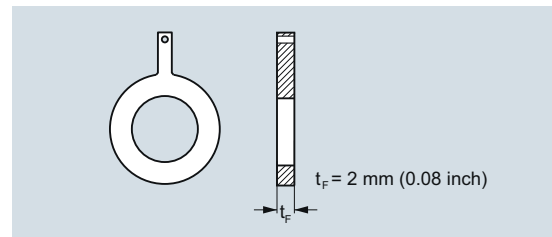


DN	PN 6	PN 16	PN 40	Size	ANSI Class 150	ANSI Class 300
	Article No.	Article No.	Article No.		Article No.	Article No.
DN 15			FDK:083N8487	½"	FDK:083N8487	FDK:083N8487
DN 25			FDK:083N8488	1"	FDK:083N8489	FDK:083N8489
DN 40			FDK:083N8490	1½"	FDK:083N8491	FDK:083N8491
DN 50			FDK:083N8492	2"	FDK:083N8493	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 HT¹⁾ 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	ANSI Class 300
	Article No.	Article No.	Article No.		Article No.	Article 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)

Flow Measurement

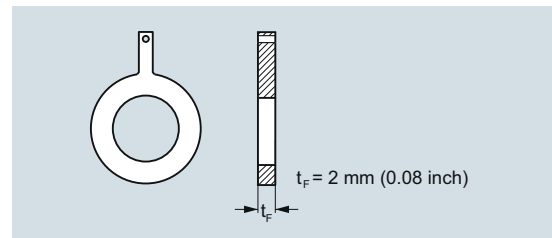
SITRANS F M

Flow sensor MAG 3100 and MAG 3100 HT

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))

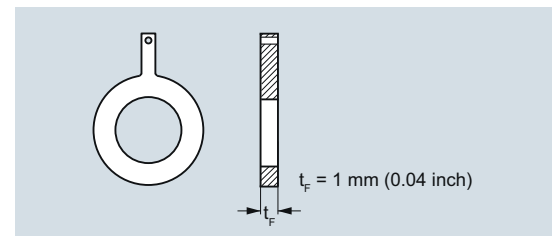


DN	PN 10 Article No.	PN 16 Article No.	PN 40 Article No.	Size	ANSI Class 150 Article No.	Class 300 Article No.
DN 15			A5E01191981	½"	A5E01191989	
DN 25			A5E01150882	1"	A5E01150028	A5E01150379
DN 40			A5E01191982	1½"	A5E01191990	
DN 50			A5E01150922	2"	A5E01151124	A5E01151197
DN 65		A5E01191971	A5E01191983	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

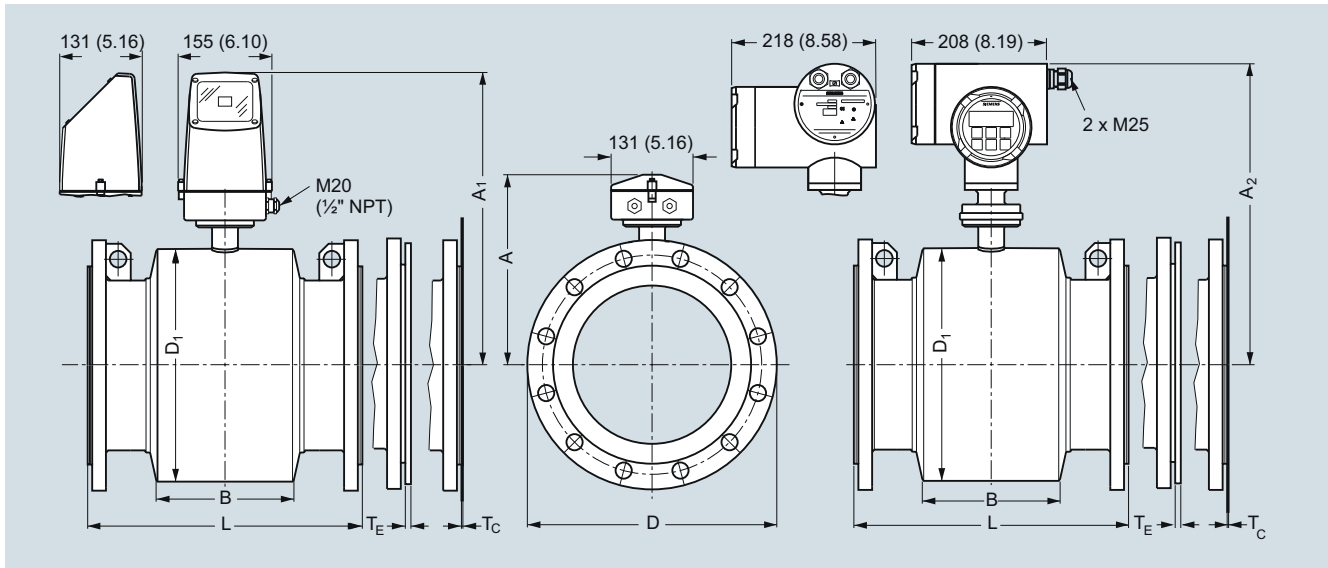
1 pc. **Tantalum** grounding **flat ring** for all liners (PTFE max. 130 °C (266 °F))



DN	PN 16 Article No.	PN 40 Article No.	Size	ANSI Class 150 Article No.	Class 300 Article 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

Dimensional drawings

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



Dimensions in mm (inch)

Metric

DN	A ¹⁾	A ₁	A ₂	B	D ₁	L ²⁾						ANSI 16.5/ASME B16.47 ³⁾		
						EN 1092-1-201		PN 25	PN 40	PN 63	PN 100	Class 150	Class 300	Class 600
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]					[mm]	[mm]	[mm]
15	187	341	338	59	104	-	-	-	200	-	-	200	200	-
25	187	341	338	59	104	-	-	-	200	-	260	200	200	280
40	197	351	348	82	124	-	-	-	200	-	280	200	200	320
50	205	359	356	72	139	-	-	-	200	276	300	200	200	330
65	212	366	363	72	154	200	200/-	-	200	320	350	200	272	on request
80	222	376	373	72	174	200	200/-	-	272 ⁴⁾	323	340	272 ⁴⁾	272 ⁴⁾	350
100	242	396	393	85	214	250	250/-	-	250	380	400	250	310	460
125	255	409	406	85	239	250	250/-	-	250	420	450	250	335	480
150	276	430	427	85	282	300	300/-	-	300	415	450	300	300	500
200	304	458	455	137	338	350	350/-	350	350	480	530	350	350	600
250	332	486	483	157	393	450	450/-	450	450	550	620	450	450	600
300	357	511	508	157	444	500	500/-	500	500	600	680	500	500	700
350	362	516	513	270	451	550	550/-	550	550	-	-	550	550	-
400	387	541	538	270	502	600	600/-	600	600	-	-	600	600	-
450	418	572	569	310	563	600	600/-	600	600	-	-	600	640	-
500	443	597	594	350	614	600	600/-	625	680	-	-	600	730	-
600	494	648	645	320	715	600	600/-	750	800	-	-	600	860	-
700	544	698	695	450	816	700	875/700	800	-	-	-	800	-	-
750	571	725	722	556	869	-	-/-	-	-	-	-	950	-	-
800	606	760	757	560	927	800	1000/800	900	-	-	-	900	-	-
900	653	807	804	630	1032	900	1125/900	1000	-	-	-	1100	-	-
1000	704	858	855	670	1136	1000	1250/1000	1100	-	-	-	1100	-	-
1050	704	858	855	670	1136	-	-/-	-	-	-	-	-	-	-
1100	755	904	901	770	1238	-	-/-	-	-	-	-	-	-	-
1200	810	964	961	792	1348	1200	1500/1200	1300	-	-	-	1400	-	-
1400	925	1079	1076	1000	1574	1400	-/1400	-	-	-	-	-	-	-
1500	972	1126	1123	1020	1672	1500	-/1500	-	-	-	-	-	-	-
1600	1025	1179	1176	1130	1774	1600	-/1600	-	-	-	-	-	-	-
1800	1123	1277	1274	1250	1974	1800	-/1800	-	-	-	-	-	-	-
2000	1223	1377	1374	1375	2174	2000	-/2000	-	-	-	-	-	-	-

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) ANSI 16.5 for DN ≤ 600; ASME B16.47 for DN ≥ 700

4) Not according to ISO 13359

Flow Measurement

SITRANS F M

Flow sensor MAG 3100 and MAG 3100 HT

DN	L ¹⁾				T _C ²⁾	T _E ²⁾	T _F ²⁾	T _I ²⁾	Wgt. ³⁾
	AS 2129 E AS 4087 PN 16, 21, 35	AWWA C-207 Class D	JIS K10	JIS K20					
[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	-	-	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

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

Imperial

Size	A ¹⁾	A ₁	A ₂	B	D ₁	L ²⁾						ANSI 16.5/ASME B16.47 ³⁾		
						EN 1092-1-201		PN 25	PN 40	PN 63	PN 100	Class 150	Class 300	Class 600
[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]							
½	7.36	13.31	13.25	2.32	4.09	-	-	-	7.87	-	-	7.87	7.87	-
1	7.36	13.31	13.25	2.32	4.09	-	-	-	7.87	-	10.24	7.87	7.87	11.02
1½	7.76	13.70	13.64	3.23	4.88	-	-	-	7.87	-	11.02	7.87	7.87	12.60
2	8.07	14.01	13.95	2.83	5.47	-	-	-	7.87	10.87	11.81	7.87	7.87	12.99
2½	8.35	14.29	14.23	2.83	6.06	7.87	7.87/-	-	7.87	12.60	13.78	7.87	10.71	on request
3	8.74	14.69	14.63	2.83	6.85	7.87	7.87/-	-	10.71 ⁴⁾	12.72	13.39	10.71 ⁴⁾	10.71 ⁴⁾	13.78
4	9.53	15.47	15.41	3.35	8.43	9.84	9.84/-	-	9.84	14.96	-	9.84	12.20	18.11
5	10.04	15.98	15.92	3.35	9.41	9.84	9.84/-	-	9.84	16.54	-	9.84	13.10	18.90
6	10.87	16.81	16.75	5.39	11.10	11.81	11.81/-	-	11.81	16.34	-	11.81	11.81	19.68
8	11.97	17.91	17.85	5.39	13.31	13.78	13.78/-	13.78	13.78	18.90	-	13.78	13.78	23.62
10	13.07	19.02	18.96	6.18	15.47	17.72	17.72/-	17.72	17.72	-	-	17.72	17.72	23.62
12	14.05	20.00	19.94	6.18	17.48	19.69	19.69/-	19.69	19.69	-	-	19.69	19.69	27.56
14	14.25	20.20	20.14	10.63	17.76	21.65	21.65/-	21.65	21.65	-	-	21.65	21.65	-
16	15.24	21.18	21.12	10.63	19.76	23.62	23.62/-	23.62	23.62	-	-	23.62	23.62	-
18	16.45	22.40	22.34	12.20	22.16	23.62	23.62/-	23.62	23.62	-	-	23.62	23.62	-
20	17.44	23.39	23.33	13.78	24.17	23.62	23.62/-	24.61	26.77	-	-	23.62	28.70	-
24	19.45	25.39	25.33	12.59	28.15	23.62	23.62/-	29.53	31.50	-	-	23.62	33.80	-
28	21.42	27.36	27.30	17.72	32.13	27.56	34.45/27.56	31.50	-	-	-	31.50	-	-
30	22.48	28.43	28.37	21.89	34.21	-	-/-	-	-	-	-	37.41	-	-
32	23.86	29.80	29.74	22.05	36.50	31.50	39.37/31.50	35.44	-	-	-	35.44	-	-
36	25.71	31.65	31.59	24.80	40.63	35.43	44.29/35.43	39.38	-	-	-	43.32	-	-
40	27.72	35.67	35.61	26.38	44.72	39.37	49.21/39.37	43.32	-	-	-	43.32	-	-
42	27.72	35.67	35.61	26.38	44.72	-	-/-	-	-	-	-	-	-	-
44	29.72	35.67	35.61	30.31	48.74	-	-/-	-	-	-	-	-	-	-
48	31.89	37.83	37.77	31.18	53.07	47.24	59.06/47.24	51.19	-	-	-	55.12	-	-
54	36.42	42.36	42.30	39.37	61.97	55.12	-/55.12	-	-	-	-	-	-	-
60	38.27	44.21	44.15	40.15	65.83	59.06	59.06/59.06	-	-	-	-	-	-	-
66	40.35	46.30	46.24	44.49	69.84	62.99	-/62.99	-	-	-	-	-	-	-
72	44.21	50.16	50.10	49.21	77.72	70.87	-/70.87	-	-	-	-	-	-	-
78	48.15	54.09	54.03	54.13	85.59	78.74	-/78.74	-	-	-	-	-	-	-

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) ANSI 16.5 for DN ≤ 24"; ASME B16.47 for DN ≥ 28"

4) Not according to ISO 13359

Flow Measurement

SITRANS F M

Flow sensor MAG 3100 and MAG 3100 HT

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	-	-	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

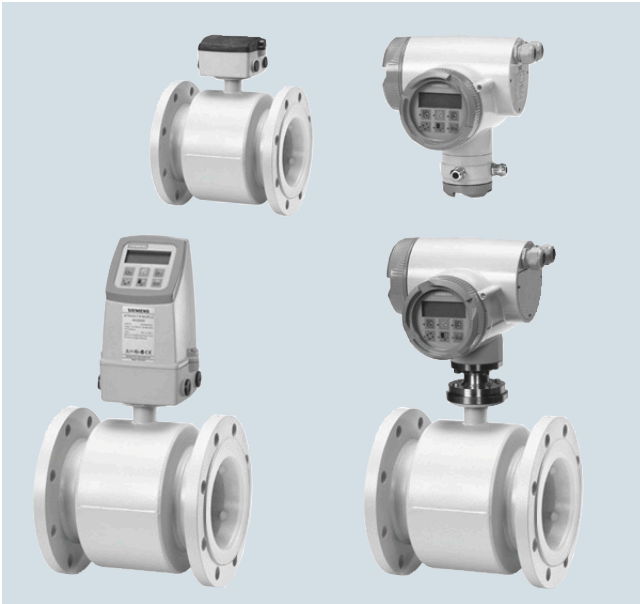
7) Not AS 4087 PN 21 or PN 35

8) Not according to ISO 13359

- not available

D = Outside diameter of flange, see flange tables

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")
- Included in Quick Ship Program (delivery time see PIA LCP)
- 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.
- MAG 6000 I full NAMUR compliance
 - compliant with NE 21, NE 32, NE 43, NE 53 and NE 70

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

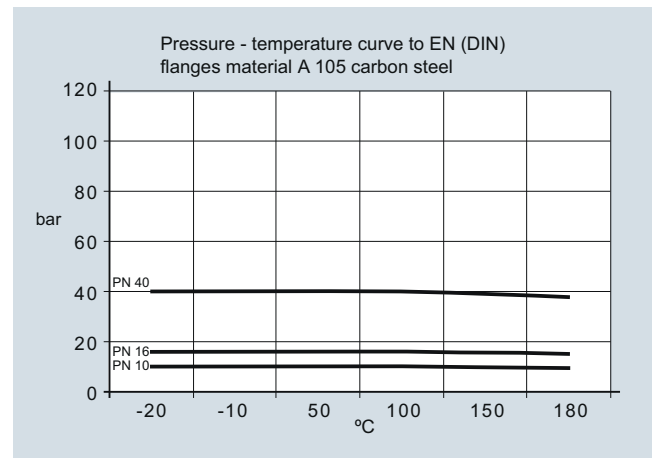
The flow measuring principle is based on Faraday's law of electromagnetic induction according to which the sensor converts the flow into an electrical voltage proportional to the velocity of the flow.

Integration

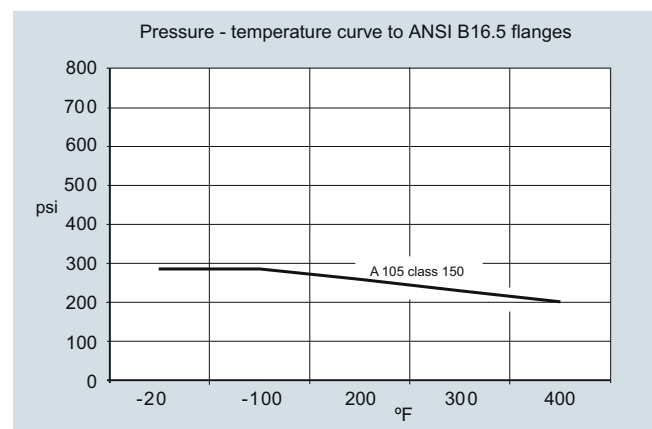
The complete flowmeter consists of a flow sensor and an associated transmitter MAG 5000, 6000 and 6000 I.

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/RS 485.

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 9/6.

Flow Measurement

SITRANS F M

Flow sensor MAG 3100 P

Technical specifications

Product characteristic	Chemical and process industry-oriented (Included in Quick Ship Program (delivery time see PIA LCP))
Nominal size	<ul style="list-style-type: none"> • PTFE: DN 15 ... 300 (½" ... 12") • PFA: DN 15 ... 150 (½" ... 6")
Measuring principle	Electromagnetic induction
Excitation frequency (Mains supply: 50 Hz/60 Hz)	<ul style="list-style-type: none"> • 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) <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • ½" ... 12": Class 150 (20 bar (290 psi))
Rated operation conditions	
Ambient temperature (conditions also dependent on liner characteristics)	
• 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	-20 ... +60 °C (-4 ... +140 °F)
Operating pressure [abs. bar] (maximum operating pressure decreases with increasing operating temperature and with stainless steel flanges)	<ul style="list-style-type: none"> • PTFE Teflon <ul style="list-style-type: none"> - DN 15 ... 300 (½" ... 12") : 0.3 ... 40 bar (4 ... 580 psi) • PFA <ul style="list-style-type: none"> - 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 ₂ O for 30 min Option: IP68 to EN 60529/NEMA 6P, 10 mH ₂ O cont. (not for Ex)
Pressure drop at 3 m/s	As straight pipe
Test pressure	1.5 x PN (where applicable)
Mechanical load (vibration)	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • Standard fibre glass reinforced polyamide • Option Stainless steel AISI 316/1.4436 • Ex sensor: Stainless steel AISI 316/1.4436
Cable entries	<ul style="list-style-type: none"> • Remote installation 2 x M20 or 2 x ½" NPT • Compact installation <ul style="list-style-type: none"> - 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: 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 <ul style="list-style-type: none"> • 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 1/2/1 Standard sensor <ul style="list-style-type: none"> • FM Class I, Div 2 • CSA Class I, Div 2
Custody transfer (CT) (only together with MAG 5000/6000 CT), order as special	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 (-4 ... +122 °F)	
3) For further information on the PED standard and requirements, see page 9/6.	

Flow Measurement

SITRANS F M

Flow sensor MAG 3100 P

3

Selection and Ordering data	Article No.
Sensor SITRANS F M MAG 3100 P (Short delivery time)	7 ME 6 3 4 0 -
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
Flange norm and pressure rating	
EN 1092-1	B
PN 10 (DN 200 ... 300 (8" ... 12"))	C
PN 16 (DN 65 ... 300 (2½" ... 12"))	F
PN 40 (DN 15 ... 50 (½" ... 2"))	
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 I (NAMUR), Aluminum, 18 ... 30 V DC, 115 ... 230 V AC	F
MAG 6000 I (NAMUR), Aluminum, 18 ... 30 V DC, 115 ... 230 V AC, Ex	G
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

¹⁾ Only for ANSI flanges

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Article 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 Article No.)	Y40
Sensor for remote transmitter's junction box IP68 with wired cable (specify cable Article 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 request¹⁾
• Accredited Siemens Flow Instruments matched pair Calibration acc. to ISO/IEC 17025: 2005	On request¹⁾
• Customer-specified calibration up to 10 points	On request¹⁾
• CT verification and authority seal according to: PTB (Denmark and Germany)	On request¹⁾
• Customer-witnessed calibration Any of above calibration	On request¹⁾

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://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	Article 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>


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	Article No.
Potting kit for terminal box of flow sensors for IP68/NEMA 6P (not for Ex sensors)	FDK:085U0220



• We can offer shorter delivery times for configurations designated with the Quick Ship Symbol . For details see page 9/5 in the appendix.

Please use online Product selector to get latest updates.

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

Flow Measurement

SITRANS F M

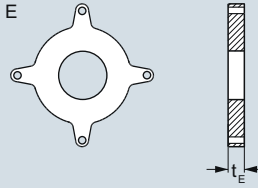
Flow sensor MAG 3100 P

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

Type E



DN	PN 10 Article No.	PN 16 Article No.	PN 40 Article No.	ANSI ¹⁾	Class 150 Article No.
DN 15			FDK:083N8365	1/2"	FDK:083N8365
DN 25			FDK:083N8271	1"	FDK:083N8272
DN 40			FDK:083N8278	1 1/2"	FDK:083N8279
DN 50			FDK:083N8282	2"	FDK:083N8283
DN 65		FDK:083N8285		2 1/2"	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.

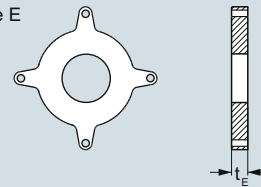
Earthing of PTFE lined flowmeter use 1 pc.

Selection and Ordering data

MAG 3100 P type E grounding and protecting ring

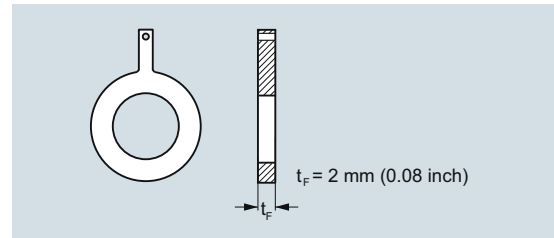
1 pc. **Hastelloy C276** grounding and protection ring **type E** for PTFE liners

Type E

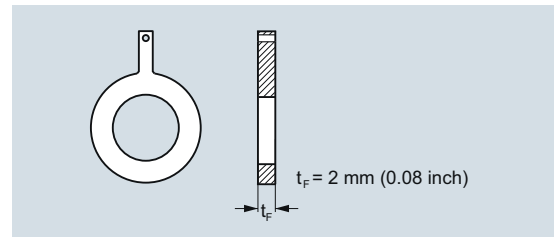


DN	PN 16 Article No.	PN 40 Article No.	Size	ANSI ¹⁾ Class 150 Article No.
DN 15		FDK:083N8487	1/2"	FDK:083N8487
DN 25		FDK:083N8488	1"	FDK:083N8489
DN 40		FDK:083N8490	1 1/2"	FDK:083N8491
DN 50		FDK:083N8492	2"	FDK:083N8493
DN 65	FDK:083N8495		2 1/2"	FDK:083N8497
DN 80	FDK:083N8499		3"	FDK:083N8501
DN 100	FDK:083N8504		4"	FDK:083N8506

¹⁾ For dimensions of MAG 3100 P see table on page 3/90

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 Article No.
	Article No.	Article No.	Article 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 Article No.
	Article No.	Article No.	Article No.		
DN 15			A5E01191981	½"	A5E01191989
DN 25			A5E01150882	1"	A5E01150028
DN 40			A5E01191982	1½"	A5E01191990
DN 50			A5E01150922	2"	A5E01151124
DN 65		A5E01191971		2½"	A5E01191991
DN 80		A5E01152889		3"	A5E01152913
DN 100		A5E01158886		4"	A5E01159150
DN 125		A5E01191973		5"	A5E01191992
DN 150		A5E01191974		6"	A5E01191993
DN 200	A5E01191978	A5E01191975		8"	A5E01191994
DN 250	A5E01191979	A5E01191976		10"	A5E01191995
DN 300	A5E01191980	A5E01191977		12"	A5E01191996

1) For dimensions of MAG 3100 P see table on page 3/90

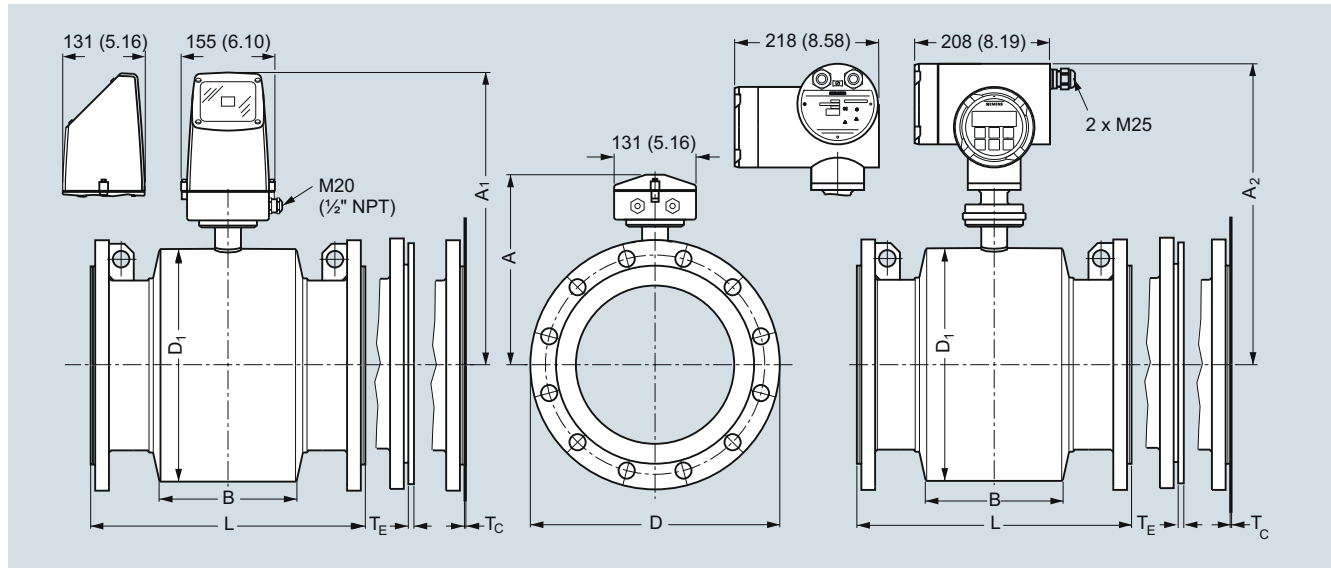
Flow Measurement

SITRANS F M

Flow sensor MAG 3100 P

Dimensional drawings

MAG 3100 P sensor with compact or remote transmitter



Dimensions in mm (inch)

Metric

DN	A ¹⁾	A ₁	A ₂	B	D ₁	L ²⁾			ANSI 16.5 Class 150	T _E ³⁾	T _F ³⁾	Wgt. ⁴⁾
						EN 1092-1-201 PN 10	PN 16	PN 40				
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]	
15	187	341	338	59	104	-	-	200	200	6	2	4
25	187	341	338	59	104	-	-	200	200	6	2	5
40	197	351	348	82	124	-	-	200	200	6	2	8
50	205	359	356	72	139	-	-	200	200	6	2	9
65	212	369	366	72	154	-	200/-	-	200	6	2	11
80	222	376	373	72	174	-	200/-	-	272 ⁵⁾	6	2	12
100	242	396	393	85	214	-	250/-	-	250	6	2	16
125	255	409	406	85	239	-	250/-	-	250	6	2	19
150	276	430	427	85	282	-	300/-	-	300	6	2	27
200	304	458	455	137	338	350	350/-	-	350	8	2	40
250	332	486	483	157	393	450	450/-	-	450	8	2	60
300	357	511	508	157	444	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, T_F = Flat type grounding rings

⁴⁾ Weights are approx. (for PN 16) without transmitter

⁵⁾ Not according to ISO 13359

- not available

D = Outside diameter of flange, see flange tables

MAG 3100 P sensor with compact or remote transmitter

Imperial

Size	A ¹⁾	A ₁	A ₂	B	D ₁	L ²⁾				T _C ³⁾	T _E ³⁾	T _F ³⁾	Wgt. ⁴⁾
						EN 1092-1-201		ANSI 16.5					
[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	PN 10	PN 16	PN 40	Class 150	[inch]	[inch]	[inch]	[lb]
½	7.36	13.4	13.34	2.32	4.09	-	-	7.87	7.87	-	0.24	0.08	9
1	7.36	13.4	13.34	2.32	4.09	-	-	7.87	7.87	0.05	0.24	0.08	11
1½	7.76	13.8	13.74	3.23	4.88	-	-	7.87	7.87	0.05	0.24	0.08	17
2	8.07	14.1	14.04	2.83	5.47	-	-	7.87	7.87	0.05	0.24	0.08	20
2½	8.35	14.4	14.34	2.83	6.06	-	7.87/-	-	7.87	0.05	0.24	0.08	24
3	8.74	14.8	14.74	2.83	6.85	-	7.87/-	-	10.71 ⁵⁾	0.05	0.24	0.08	26
4	9.53	15.6	15.54	3.35	8.43	-	9.84/-	-	9.84	0.05	0.24	0.08	35
5	10.04	16.1	16.04	3.35	9.41	-	9.84/-	-	9.84	0.05	0.24	0.08	42
6	10.87	16.9	16.84	5.39	11.10	-	11.81/-	-	11.81	0.05	0.24	0.08	60
8	11.97	18.0	17.94	5.39	13.31	13.78	13.78/-	-	13.78	0.05	0.31	0.08	88
10	13.07	19.1	19.04	6.18	15.47	17.72	17.72/-	-	17.72	0.05	0.31	0.08	132
12	14.05	20.1	20.04	6.18	17.48	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, T_F = Flat type grounding rings

4) Weights are for ANSI 150 without transmitter

5) Not according to ISO 13359

- not available

D = Outside diameter of flange, see flange tables

Flow Measurement

SITRANS F M

Flow sensor MAG 5100 W

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 (Article 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
 - pattern approval OIML R 49 (Denmark, Germany)
 - conforms to ISO 4064 and EN 14154 for mechanical flowmeters
 - PTB K7.2
- FM Fire Service Meter (Class Number 1044) for automatic fire protection systems
- 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 or Modbus RTU/RS 485.

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 ⁶⁾		
• 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 ₂ O for 30 min)	IP67 to EN 60529/NEMA 4X/6 (1 mH ₂ O for 30 min)
• Option	IP68 to EN 60529/NEMA 6P (10 mH ₂ O continuously)	IP68 to EN 60529/NEMA 6P (10 mH ₂ O 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) FM Fire Service: 2 x PN	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

Flow Measurement

SITRANS F M

Flow sensor MAG 5100 W

Product characteristic	Mainly for the European market (7ME6520)	Mainly for the non-European market (7ME6580)
	EPDM or NBR lining	Ebonite lining
<u>Medium conditions</u>		
Temperature of medium		
• NBR	-10 ... +70 °C (14 ... 158 °F)	-
• EPDM	-10 ... +70 °C (14 ... 158 °F)	-
• EPDM/NBR (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 ASTM A 105, 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 % (default)	Zero-point, 2 x 25 % and 2 x 90 % (default)
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 ⁵⁾ (Cold water, US) WRAS (WRc, BS6920 cold water, GB) ACS (F), DVGW W270 (D) Belgaqua (B)	NSF/ANSI Standard 61 ⁵⁾ (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⁾ CRN (DN 50 - DN 1200 (2" ... 48")) CSA Class I, Div 2 FM Class I, Div 2 FM Fire Service Approval according to class 1044 ⁷⁾ VdS: Extinguishing systems DN 50 ... 300	PED conforming: All EN1092-1 flanges (<= DN 600 (<= 24") – 97/23/EC ⁴⁾ CRN CSA Class I, Div 2 FM Class I, Div 2

¹⁾ Type 01 (SORF)

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

³⁾ With compact transmitter MAG 5000 CT/6000 CT -20 ... +50 °C (-4 ... +122 °F); with compact MI-001 approved transmitter -25 ... +55 °C (-13 ... +131 °F)

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 9/6.

⁵⁾ Including Annex G

⁶⁾ DN 750, DN 1050 and DN 1100 (30", 42" and 44") not available with EN 1092-1 (PN 10 and PN 16) and AS4087 flanges

⁷⁾ DN 50, DN 80, DN 100, DN 150, DN 200, DN 250, and DN 300 (2", 3", 4", 6", 8", 10", and 12") with ANSI B16.5 Class 150 flanges

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

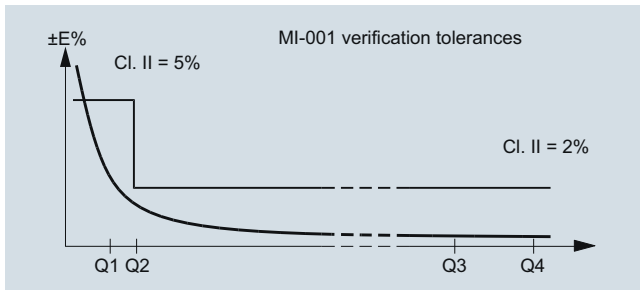
MAG 5100 W CT program is type approved according to international water meter standard OIML R 49. Since the first November 2006 the MI-001 water meter directive is in force, which means that all water meters can be sold across the EU borders if the water meters contain a MI-001 label.

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 (Article No. 7ME6520).

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

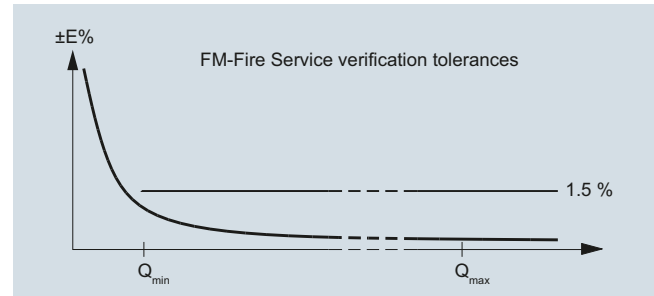
Module B : Type approval according to OIML R 49

Module D : Quality insurance approval of production



MAG 5100 W (7ME6520) with MAG 5000/MAG 6000 or MAG 6000 CT for Fire Service applications

MAG 5100 W (7ME6520) is FM Fire Service approved for automatic fire protection systems. The approval is applicable for the sizes DN 50, DN 80, DN 100, DN 150, DN 200, DN 250 and DN 300 (2", 3", 4", 6", 8", 10" and 12") with ANSI B16.5 Class 150 flanges. The FM Fire Service approved product can be ordered via the Z-options P20, P21 and P22.



Flow Measurement

SITRANS F M

Flow sensor MAG 5100 W

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 [m³/h]	20	31.25	50	78.75	125	200	312.5	500	787.5
Q3 [m³/h]	16	25	40	63	100	160	250	400	630
Q2 [m³/h]	1.02	1.6	2.6	4.03	6.4	10.24	16	25.6	40.32
Q1 [m³/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 [m³/h]	20	31.25	50	78.75	125	200	312.5	500	787.5
Q3 [m³/h]	16	25	40	63	100	160	250	400	630
Q2 [m³/h]	0.41	0.63	1.02	1.6	2.54	4.06	6.35	10.2	16.0
Q1 [m³/h]	0.25	0.40	0.63	1.00	1.59	2.54	3.97	6.35	10.0

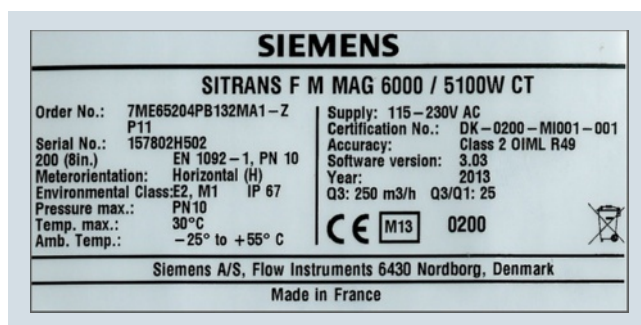
Order code: P13	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")	DN 125 (5")	DN 150 (6")	DN 200 (8")	DN 250 (10")	DN 300 (12")
„R“ Q3/Q1	80	80	80	80	80	80	80	80	80
Q4 [m³/h]	20	31.25	50	78.75	125	200	312.5	500	787.5
Q3 [m³/h]	16	25	40	63	100	160	250	400	630
Q2 [m³/h]	0.32	0.50	0.80	1.20	2.00	3.20	5.0	8.0	12.6
Q1 [m³/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 [m³/h]	50	78.75	125	200	312.5	500	787.5	1250	2000
Q3 [m³/h]	40	63	100	160	250	400	630	1000	1600
Q2 [m³/h]	0.40	0.63	1.00	1.60	2.50	4.00	6.3	10.0	16.0
Q1 [m³/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 [m³/h]	50	78.75	125	200	312.5	500	787.5	1250	2000
Q3 [m³/h]	40	63	100	160	250	400	630	1000	1600
Q2 [m³/h]	0.32	0.50	0.80	1.28	2.00	3.20	5.0	8.0	12.8
Q1 [m³/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 [m³/h]	50	78.75	125	200	312.5	500	787.5	1250	2000
Q3 [m³/h]	40	63	100	160	250	400	630	1000	1600
Q2 [m³/h]	0.26	0.40	0.64	1.02	1.60	2.56	4.0	6.4	10.24
Q1 [m³/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: m³
- Qmax: Q3
- CutOff: 0.1 %
- Digital output: Frequency

For other factory settings, see Operating Instructions.

Flow Measurement

SITRANS F M

Flow sensor MAG 5100 W

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
Sensor SITRANS F M MAG 5100 W	7 ME 6 5 2 0 -	Sensor SITRANS F M MAG 5100 W	7 ME 6 5 2 0 -
Hastelloy electrodes, carbon steel flanges, EU water markets and low flow applications	1 - 2	Hastelloy electrodes, carbon steel flanges, EU water markets and low flow applications	1 - 2
Diameter		Communication	
DN 15 (½")	1 V	None	A
DN 25 (1")	2 D	HART	B
DN 40 (1½")	2 R	PROFIBUS PA Profile 3 (only MAG 6000/MAG 6000 I)	F
DN 50 (2")	2 Y	PROFIBUS DP Profile 3 (only MAG 6000/MAG 6000 I)	G
DN 65 (2½")	3 F	Modbus RTU/RS 485 (only MAG 6000/MAG 6000 I)	E
DN 80 (3")	3 M	FOUNDATION Fieldbus H1 (only MAG 6000/MAG 6000 I)	J
DN 100 (4")	3 T		
DN 125 (5")	4 B	Cable glands/terminal box	
DN 150 (6")	4 H	Metric/Polyamid terminal box or 6000 I compact	1
DN 200 (8")	4 P	½" NPT/Polyamid terminal box or 6000 I compact	2
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		
(42")	7 U		
(44")	7 V		
DN 1200 (48")	8 B		
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 ... 24 V AC		H	
MAG 6000, Polyamid, 115 ... 230 V AC		J	
MAG 5000, Polyamid, 11 ... 30 V DC/11 ... 24 V AC		K	
MAG 5000, Polyamid, 115 ... 230 V AC		L	
MAG 6000 CT, Polyamid, 115 ... 230 V AC		M	

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Flow Measurement

SITRANS F M

Flow sensor MAG 5100 W

Selection and Ordering data	Order code
Additional information	
Please add “-Z” to Article 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
FP2E marking (only France)	C17
Approval/Verification ²⁾ (MI-001 : DN 50-300 compact, 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
FM Fire Service Approval (with ANSI B16.5 Class 150 flanges)	
• DN 50, DN 80 and DN 100 (2", 3" and 4")	P20
• DN 150 and DN 200 (6" and 8")	P21
• DN 250 and DN 300 (10" and 12")	P22
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 Article No.)	Y40
Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable Article No.)	Y41
Other postproduction requirements (add desired text)	Y99
Additional Calibrations	
Accredited Siemens Flow Instruments matched pair Calibration acc. to ISO/IEC 17025:2005	On request¹⁾
Customer-witnessed calibration Any of above calibration	On request¹⁾

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://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 3/96.

³⁾ For remote version submit Product Variation Request.

Operating instructions for SITRANS F M MAG 5100 W

Description	Article 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	Article No.
Potting kit for terminal box of flow sensors for IP68/NEMA 6P (not for Ex sensors)	◆ FDK:085U0220



◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

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


Flow Measurement

SITRANS F M

Flow sensor MAG 5100 W

Selection and Ordering data	Article No.
Sensor SITRANS F M MAG 5100 W	7 ME 6 5 8 0 -
Hastelloy electrodes, carbon steel flanges, Non EU water markets	
Diameter	
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
(42")	7 U
(44")	7 V
DN 1200 (48")	8 B
DN 1400 (54")	8 F
DN 1500 (60")	8 K
DN 1600 (66")	8 P
DN 1800 (72")	8 T
DN 2000 (78")	8 Y
Flange norm and pressure rating	
to <u>EN 1092-1</u>	
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 <u>ANSI B16.5</u>	
class 150 (1" ... 24")	J
to <u>AWWA C-207</u>	
Class D (28" ... 78")	L
to <u>AS 4087</u>	
PN 16 (DN 50 ... 1200 (2" ... 48"))	N
to <u>JIS</u>	
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	Article No.
Sensor SITRANS F M MAG 5100 W	7 ME 6 5 8 0 -
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 Article 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 Article No.)	Y40
Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable Article No.)	Y41
Other postproduction requirements (add desired text)	Y99
<ul style="list-style-type: none"> We can offer shorter delivery times for configurations designated with the Quick Ship Symbol . For details see page 9/5 in the appendix. 	

Flow Measurement

SITRANS F M

Flow sensor MAG 5100 W


Operating instructions for SITRANS F M MAG 5100 W

Description	Article 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	Article No.
Potting kit for terminal box of flow sensors for IP68/NEMA 6P (not for Ex sensors)	 FDK:085U0220

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

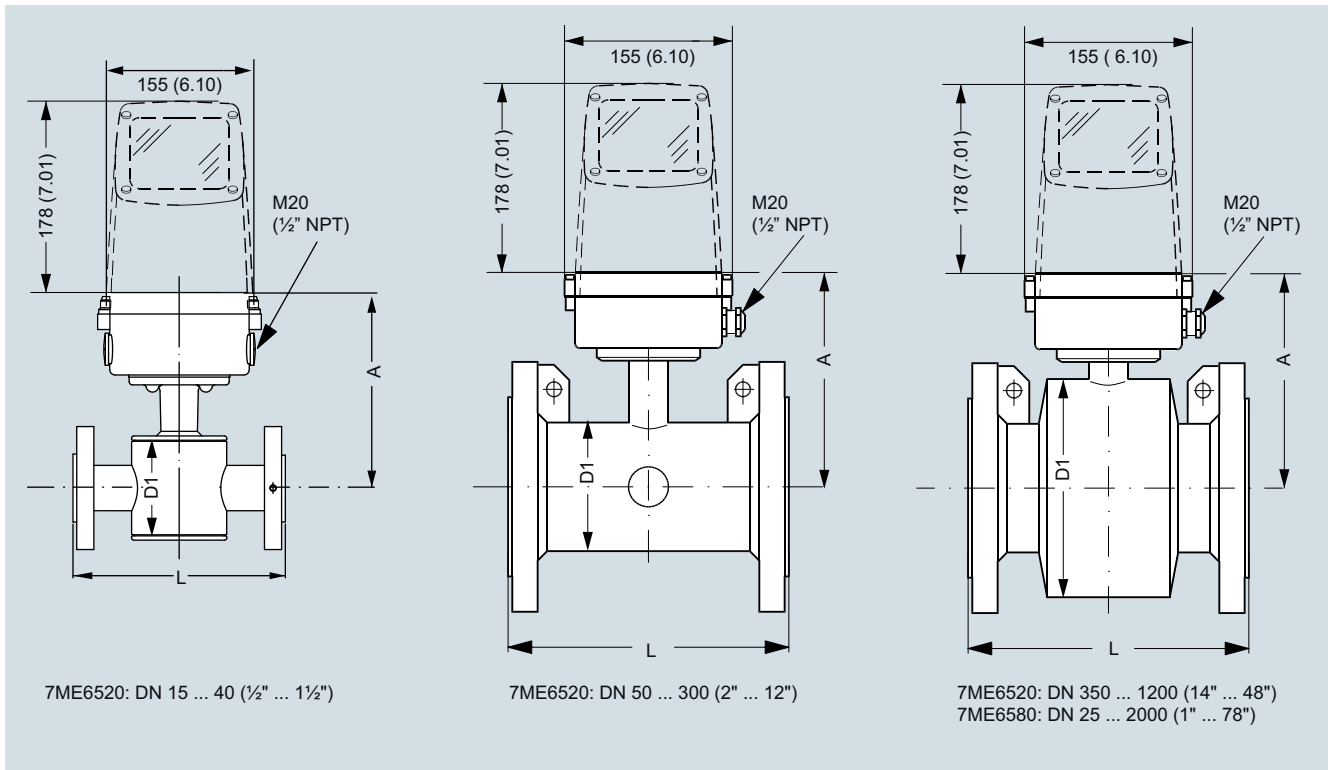
MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place.

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

Dimensional drawings



7ME6520 NBR or EPDM liner						7ME6580 Ebonite liner							
Nominal size A				D1		A				D1		L	
[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
15	½	177	7.0	77	3.0	-	-	-	-	200	7.9		
25	1	187	7.4	96	3.8	187	7.4	104	4.09	200	7.9		
40	1½	202	8.0	127	5.0	197	7.8	124	4.88	200	7.9		
50	2	188	7.4	76	3.0	205	8.1	139	5.47	200	7.9		
65	2½	194	7.6	89	3.5	212	8.3	154	6.06	200	7.9		
80	3	200	7.9	102	4.0	222	8.7	174	6.85	200	7.9		
100	4	207	8.1	114	4.5	242	9.5	214	8.43	250	9.8		
125	5	217	8.5	140	5.5	255	10.0	239	9.41	250	9.8		
150	6	232	9.1	168	6.6	276	10.9	282	11.1	300	11.8		
200	8	257	10.1	219	8.6	304	12.0	338	13.31	350	13.8		
250	10	284	11.2	273	10.8	332	13.1	393	15.47	450	17.7		
300	12	310	12.2	324	12.8	357	14.1	444	17.48	500	19.7		
350	14	382	15.0	451	17.8	362	14.3	451	17.76	550	21.7		
400	16	407	16.0	502	19.8	387	15.2	502	19.76	600	23.6		
450	18	438	17.2	563	22.2	418	16.5	563	22.16	600	23.6		
500	20	463	18.2	614	24.2	443	17.4	614	24.17	600	23.6		
600	24	514	20.2	715	28.2	494	19.4	715	28.15	600	23.6		
700	28	564	22.2	816	32.1	544	21.4	816	32.13	700	27.6		
750	30	591	23.3	869	34.2	571	22.5	869	34.21	750	29.5		
800	32	616	24.3	927	36.5	606	23.9	927	36.5	800	31.5		
900	36	663	26.1	1032	40.6	653	25.7	1032	40.63	900	35.4		
1000	40	714	28.1	1136	44.7	704	27.7	1136	44.72	1000	39.4		
	42	714	28.1	1136	44.7	704	27.7	1136	44.72	1000	39.4		
	44	765	30.1	1238	48.7	755	29.7	1238	48.74	1100	43.3		
1200	48	820	32.3	1348	53.1	810	31.9	1348	53.07	1200	47.2		
1400	54	-	-	-	-	925	36.4	1574	65.94	1400	55.1		
1500	60	-	-	-	-	972	38.2	1672	65.83	1500	59.1		
1600	66	-	-	-	-	1025	40.4	1774	75.39	1600	63		
1800	72	-	-	-	-	1123	44.2	1974	77.72	1800	70.9		
2000	78	-	-	-	-	1223	48.1	2174	85.59	2000	78.7		

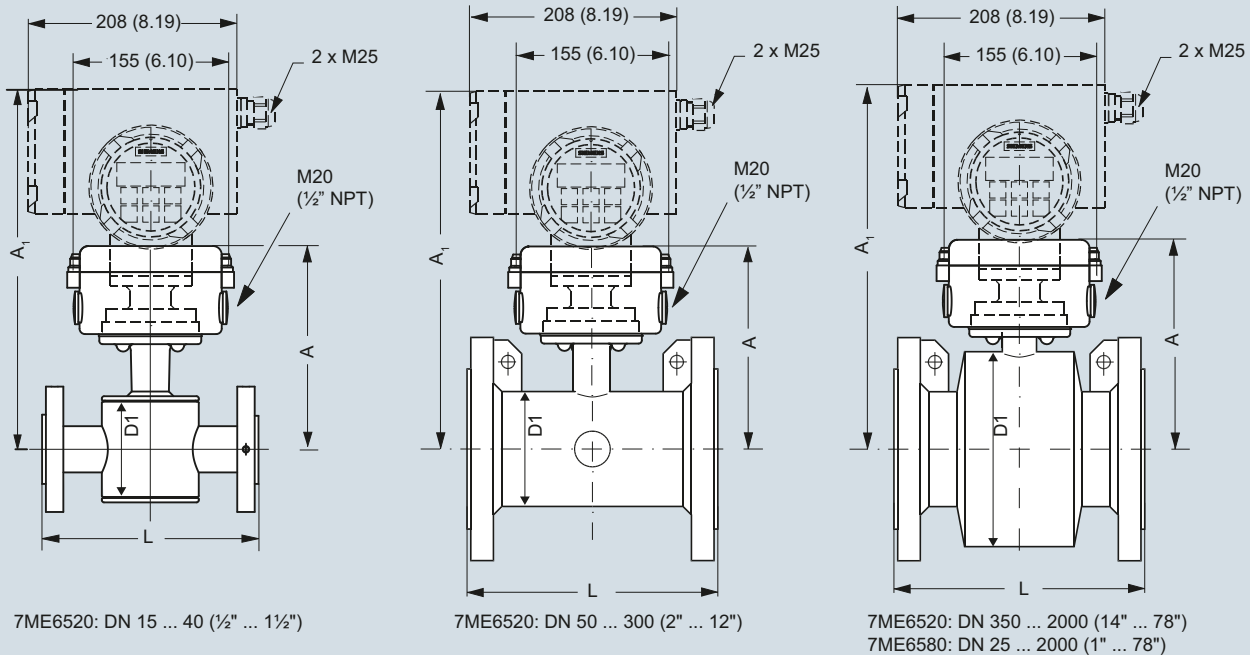
- not available

Flow Measurement

SITRANS F M

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]	[mm] [inch]	[mm] [inch]	[mm] [inch]	[mm] [inch]	[mm] [inch]	[mm] [inch]		
15 ½	177	7.0	331	13.0	77	3.0	187	7.4	-	-	-	-	200	7.9	
25 1	187	7.4	341	13.4	96	3.8	187	7.4	341	13.4	104	4.09	200	7.9	
40 1½	202	8.0	356	14.0	127	5.0	197	7.8	351	13.8	124	4.88	200	7.9	
50 2	188	7.4	342	13.5	76	3.0	205	8.1	359	14.1	139	5.47	200	7.9	
65 2½	194	7.6	348	13.7	89	3.5	212	8.3	366	14.4	154	6.06	200	7.9	
80 3	200	7.9	354	14.0	102	4.0	222	8.7	376	14.8	174	6.85	200	7.9	
100 4	207	8.1	361	14.2	114	4.5	242	9.5	396	15.6	214	8.43	250	9.8	
125 5	217	8.5	371	14.6	140	5.5	255	10.0	409	16.1	239	9.41	250	9.8	
150 6	232	9.1	386	15.2	168	6.6	276	10.9	430	16.9	282	11.1	300	11.8	
200 8	257	10.1	411	16.2	219	8.6	304	12.0	458	18.0	338	13.31	350	13.8	
250 10	284	11.2	438	17.2	273	10.8	332	13.1	486	19.1	393	15.47	450	17.7	
300 12	310	12.2	464	18.3	324	12.8	357	14.1	511	20.1	444	17.48	500	19.7	
350 14	382	15.0	536	21.1	451	17.8	362	14.3	516	20.3	451	17.76	550	21.7	
400 16	407	16.0	561	22.1	502	19.8	387	15.2	541	21.3	502	19.76	600	23.6	
450 18	438	17.2	592	23.3	563	22.2	418	16.5	572	22.5	563	22.16	600	23.6	
500 20	463	18.2	617	24.3	614	24.2	443	17.4	597	23.5	614	24.17	600	23.6	
600 24	514	20.2	668	26.3	715	28.2	494	19.4	648	25.5	715	28.15	600	23.6	
700 28	564	22.2	718	28.3	816	32.1	544	21.4	698	27.5	816	32.13	700	27.6	
750 30	591	23.3	745	29.3	869	34.2	571	22.5	725	28.5	869	34.21	750	29.5	
800 32	616	24.3	770	30.3	927	36.5	606	23.9	760	29.9	927	36.5	800	31.5	
900 36	663	26.1	817	32.2	1032	40.6	653	25.7	807	31.8	1032	40.63	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	858	33.8	1136	44.72	1000	39.4	
44	765	30.1	919	36.2	1238	48.7	755	29.7	904	35.6	1238	48.74	1100	43.3	
1200 48	820	32.3	974	38.3	1348	53.1	810	31.9	964	38.0	1348	53.07	1200	47.2	
1400 54	-	-	-	-	-	-	925	36.4	1079	42.5	1574	61.97	1400	55.1	
1500 60	-	-	-	-	-	-	972	38.2	1126	44.3	1672	65.83	1500	59.1	
1600 66	-	-	-	-	-	-	1025	40.4	1179	46.4	1774	69.84	1600	63.0	
1800 72	-	-	-	-	-	-	1123	44.2	1277	50.3	1974	77.72	1800	70.9	
2000 78	-	-	-	-	-	-	1223	48.1	1377	54.2	2174	85.59	2000	78.7	

- not available

Weight

Nominal size		7ME6520 NBR or EPDM liner										7ME6580 Ebonite liner	
		PN 10		PN 16		PN 40		Class 150/AWWA		AS		PN 16	
[mm]	[inch]	[kg]	[lb]	[kg]	[lb]	[kg]	[lb]	[kg]	[lb]	[kg]	[lb]	[kg]	[lb]
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 lb), with MAG 6000 I, weight is increased by 5.5 kg (12.1 lb).

Flow Measurement

SITRANS F M

Transmitter TRANSMAG 2 with sensor 911/E

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
- Comprehensive 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 $\geq 1 \mu\text{S/cm}$ (0.1 $\mu\text{S/cm}$ 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.

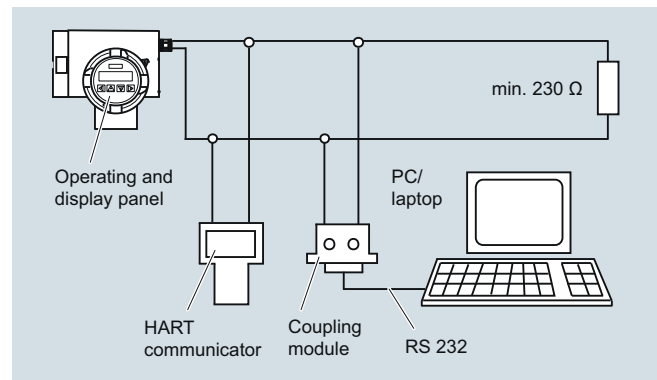
The magnetic flux density in the sensor is additionally monitored by reference coils.

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

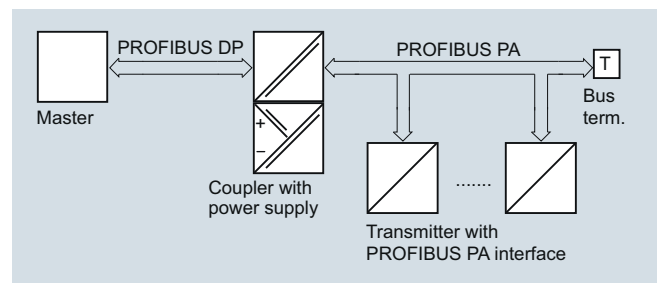
Displays and keypad

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

Technical specifications

Transmitter TRANSMAG 2

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)	$\leq \pm 0.5$ % 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 μ A
Repeatability	0.2 % of measured value

Reference conditions

• Process temperature	25 °C \pm 5 °C (77 °F \pm 9 °F)
• Ambient temperature	25 °C \pm 5 °C (77 °F \pm 9 °F)
• Warm-up time	Min. 30 min
• Installation conditions	Inlet pipe section $\geq 10 \times$ DN Outlet pipe section $\geq 5 \times$ 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 %
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Output

Electrical isolation	Outputs electrically isolated from one another and from the power supply, max. 60 V permissible against PE/equipotential bonding
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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

• Rating	NC or NO function 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, $R_i = 3$ k Ω : 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

Flow Measurement

SITRANS F M

Transmitter TRANSMAG 2 with sensor 911/E

Medium conditions	
• Process temperature	-20 ... +150 °C (-4 ... 302 °F) depending on the 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, depend- ing 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	Article No.
SITRANS F M electromagnetic transmitter TRANSMAG 2 for alternating field, remote version, 110 ... 230 V AC	7ME5034-AA1-AA0
Output/communication 4 ... 20 mA with HART protocol PROFIBUS PA connection 4 ... 20 mA with HART protocol, digital input	0 1 2
Operator display and keypad Without With	0 1
Cable glands M20/M16 x 1.5 ½" NPT	1 2

Selection and Ordering data	Order code
Additional information Please add "-Z" to Article 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	Article 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>









Transmitter TRANSMAG 2 with sensor 911/E

Accessories

Description	Article No.	
Standard wall mounting bracket. Steel AISI 316L/ EN10088-2-1.4404	7ME5933-0AC04	
Special wall-/pipe mounting bracket kit. BI 2,5 DIN59382 X6Cr17	7ME5933-0AC05	
Potting kit for terminal box of flow sensors for IP68/NEMA 6P (not for Ex sensors)	FDK:085U0220	

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

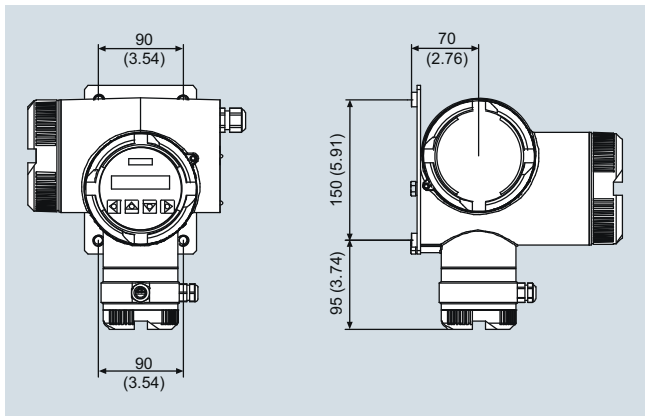
Spare parts

Description	Article No.	
Operating/Display module	7ME5933-0AC00	
Electronics cover with glass plate (non Ex). Die cast aluminum, with corrosion-resistant Basic Polyester powder coating (min. 60 µm)	7ME5933-0AC01	
Cover for sensor cable and gasket. Die cast aluminum, with corrosion-resistant Basic Polyester powder coating (min. 60 µm)	7ME5933-0AC02	
Cover for mains supply/communication. Die cast aluminum, with corrosion-resistant Basic Polyester powder coating (min. 60 µm)	7ME5933-0AC03	
Safety clamp for electronic cover with glass plate (7ME5933-0AC01)	7ME5933-0AC06	
M20 cable gland set for 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	
1/2" NPT cable gland set for 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	
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	

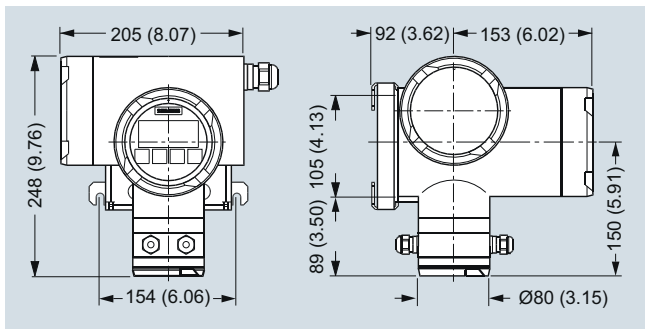
Flow Measurement SITRANS F M

Transmitter TRANSMAG 2 with sensor 911/E

Dimensional drawings

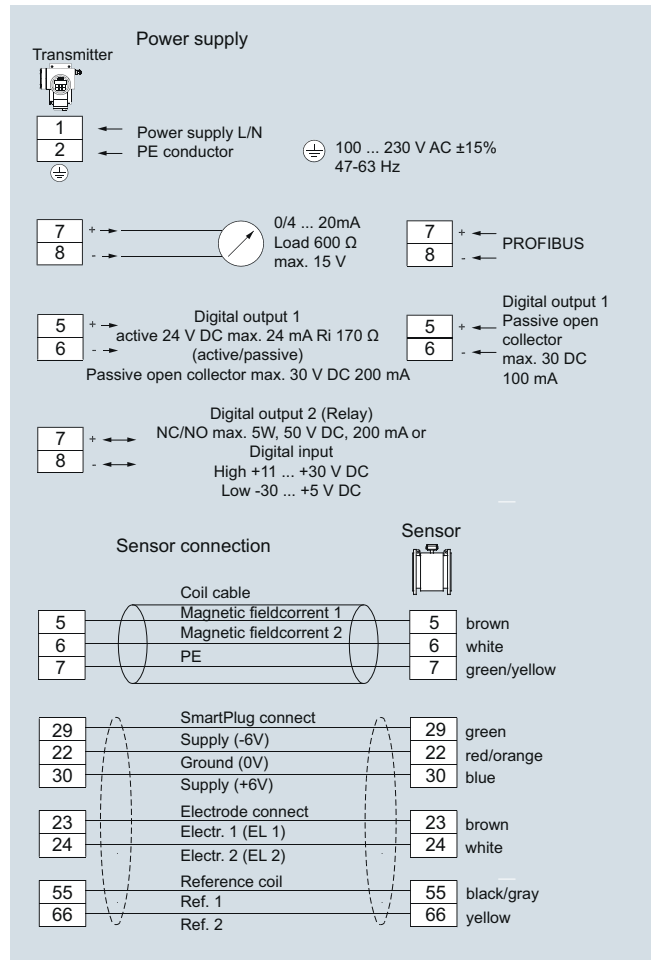


SITRANS F M transmitter TRANSMAG 2 with wall mounting bracket, dimensions in mm (inch)



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

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

<u>Installation conditions</u>	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	<ul style="list-style-type: none"> • -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 316L/1.4404 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

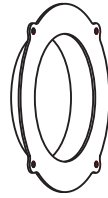
Medium conditions

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 316Ti/1.4571
Electrode material	<ul style="list-style-type: none"> • AISI 316Ti/1.4571 • PTFE: 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 <ul style="list-style-type: none"> • 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.
Article 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 C4/2.4610
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.
Article 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.

Flow Measurement

SITRANS F M

Transmitter TRANSMAG 2 with sensor 911/E

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).

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 9/6.

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")	40	(580)	Gases fluid group 1 and liquids fluid group 1	Article 3.3
200 ... 300	(8" ... 12")	10	(145)	Gases fluid group 1 and liquids fluid group 1	II
65 ... 250	(2½" ... 10")	16	(232)	Gases fluid group 1 and liquids fluid group 1	II
40 ... 100	(1½" ... 4")	40	(580)	Gases fluid group 1 and liquids fluid group 1	II
350 ... 1000	(14" ... 40")	10	(145)	Gases fluid group 1 and liquids fluid group 1	III
300 ... 1000	(12" ... 40")	16	(232)	Gases fluid group 1 and liquids fluid group 1	III
200 ... 600	(8" ... 24")	25	(363)	Gases fluid group 1 and liquids fluid group 1	III
125 ... 600	(5" ... 24")	40	(580)	Gases fluid group 1 and liquids fluid group 1	III

Flow Measurement

SITRANS F M

Transmitter TRANSMAG 2 with sensor 911/E

Selection and Ordering data	Article No.
Flowsensor SITRANS F M 911/E	7ME5610 -
	AA
Nominal diameter	
DN 15 (1/2")	1 V
DN 25 (1")	2 D
DN 40 (1 1/2")	2 R
DN 50 (2")	2 Y
DN 65 (2 1/2")	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 (2 1/2" ... 40"))	C
EN 1092-1, PN 25 (DN 200 ... 600 (8" ... 24"))	E
EN 1092-1, PN 40 (DN 15 ... 600 (1/2" ... 24"))	F
ANSI B16.5, Class 150 (1/2" ... 24"), max 19.6 bar (285 psi) at 20 °C (68 °F)	J
ANSI B16.5, Class 300 (1/2" ... 24"), max 51.1 bar (741 psi) at 20 °C (68 °F)	K
AWWA C-207 Class D (28" ... 40")	L
JIS 10 K (1/2" ... 24")	R
Flange material	
Mid steel flanges 1.0460/1.0570	1
Stainless steel flanges, AISI 316L/1.4404	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
1/2" NPT: Polyamide terminal box	2

Selection and Ordering data	Order Code
Additional information	
Please add "-Z" to Article 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 C276/2.4819	A04
Two earthing (grounding) electrodes made of Platinum head	A05
Two earthing (grounding) electrodes made of Titanium	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
Tag name plate, stainless steel, add plain text	Y17
Other postproduction requirements, add plain text	Y99

Selection and Ordering data	Article No.	Order code
SITRANS F M TRANSMAG 2 and sensor 911/E	7ME5930 -	
Cable	5 A00 - 0AA0	
Cable kit for sensor 911/E with alternating field, Magnet current cable 3 x 1.0 mm ² (3 x 0.0016 inch ²), electrode/reference cable 7 x 0.5 mm ² (7 x 0.0008 inch ²) 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

Flow Measurement

SITRANS F M

Transmitter TRANSMAG 2 with sensor 911/E

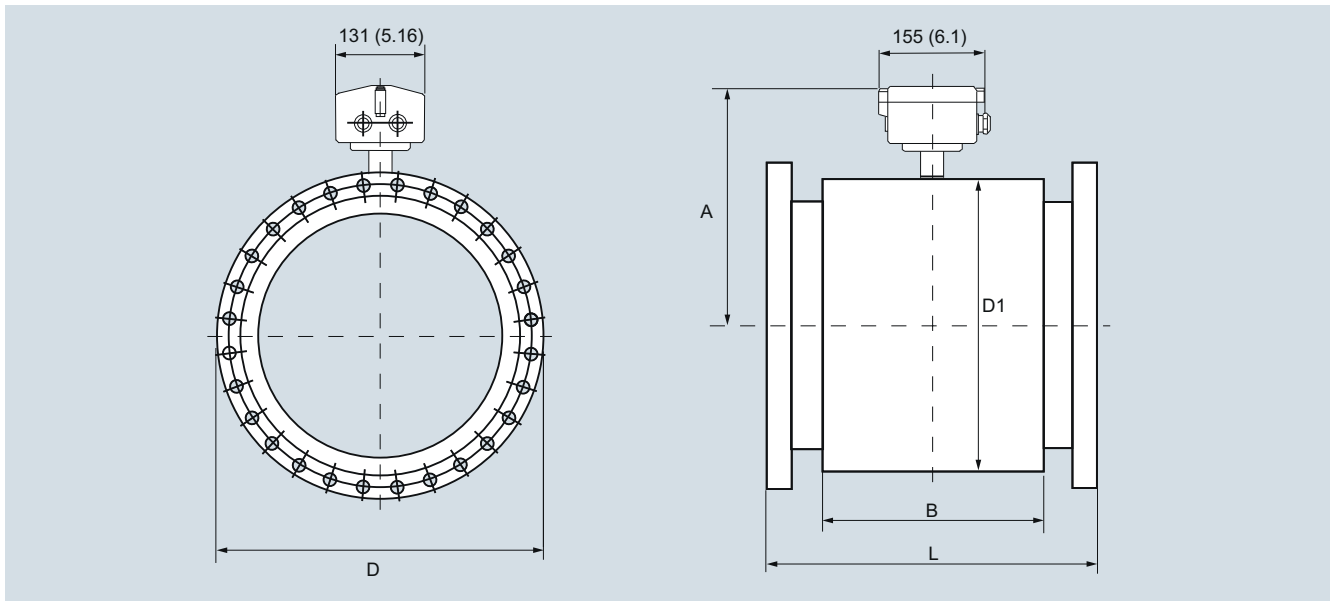
Selection and Ordering data

Selection and Ordering data	Article 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		
<i>for PTFE, mat. no. 1.4571/316 Ti</i>		
DN 15 (1/2")		AA
DN 25 (1")		CA
DN 40 (1 1/2")		EA
DN 50 (2")		FA
DN 65 (2 1/2")		GA
DN 80 (3")		HA
DN 100 (4")		JA
DN 125 (5")		KA
DN 150 (6")		LA
DN 200 (8")		MA
DN 250 (10")		NA
DN 300 (12")		PA
Other nominal diameters: specify in plain text		ZA J 1 Y
<i>for Hard/Soft rubber, Novolak, mat. no. 1.471/316 Ti</i>		
DN 15 (1/2")		AB
DN 25 (1")		CB
DN 40 (1 1/2")		EB
DN 50 (2")		FB
DN 65 (2 1/2")		GB
DN 80 (3")		HB
DN 100 (4")		JB
DN 125 (5")		KB
DN 150 (6")		LB
DN 200 (8")		MB
DN 250 (10")		NB
DN 300 (12")		PB
Other nominal diameters: specify in plain text		ZB J 1 Y
Flange design		
Flange to DIN		1
Flange to ANSI		2
Flange to JIS		3

Selection and Ordering data

Selection and Ordering data	Article 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		
<i>Mat. no. 1.4571/316 Ti</i>		
DN 15 (1/2")		AA
DN 25 (1")		CA
DN 40 (1 1/2")		EA
DN 50 (2")		FA
DN 65 (2 1/2")		GA
DN 80 (3")		HA
DN 100 (4")		JA
DN 125 (5")		KA
DN 150 (6")		LA
DN 200 (8")		MA
DN 250 (10")		NA
DN 300 (12")		PA
DN 350 (14")		QA
DN 400 (16")		RA
DN 500 (20")		SA
DN 600 (24")		TA
DN 700 (28")		UA
DN 800 (32")		VA
DN 900 (36")		WA
DN 1000 (40")		XA
Other nominal diam.: specify in plain text		ZA J 1 Y
<i>Material Hastelloy C4/2.4610</i>		
DN 15 (1/2")		AB
DN 25 (1")		CB
DN 40 (1 1/2")		EB
DN 50 (2")		FB
DN 65 (2 1/2")		GB
DN 80 (3")		HB
DN 100 (4")		JB
DN 125 (5")		KB
DN 150 (6")		LB
DN 200 (8")		MB
DN 250 (10")		NB
DN 300 (12")		PB
DN 350 (14")		QB
DN 400 (16")		RB
DN 500 (20")		SB
DN 600 (24")		TB
Other nominal diam.: specify in plain text		ZB J 1 Y
Flange design		
Flange to DIN		1
Flange to ANSI		2
Flange to JIS		3

Dimensional drawings



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

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

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 L¹⁾											
Hard rubber version			270 (10.63)		330 (12.99)	340 (13.39)		370 (14.57)	410 (16.14)	470 (18.50)	
Linatex/soft rubber version											
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)	358 (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 L¹⁾											
Hard 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)	
Linatex/soft rubber version											
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 length: L + 0.0/-4.0 mm (+0.00/-0.157 inch)
With protection rings for > DN25 + 6.0 mm, > DN200 + 10.0 mm (> 1" + 0.236 inch, > 8" + 0.394 inch)

Flow Measurement

SITRANS F M

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
- PTB K7.2
- FM Fire Service 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

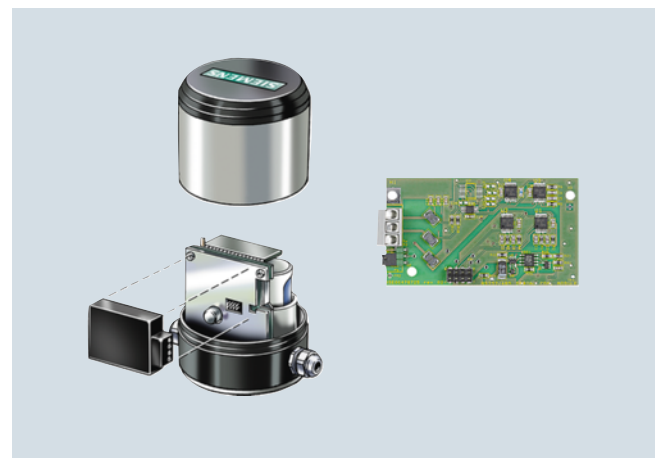
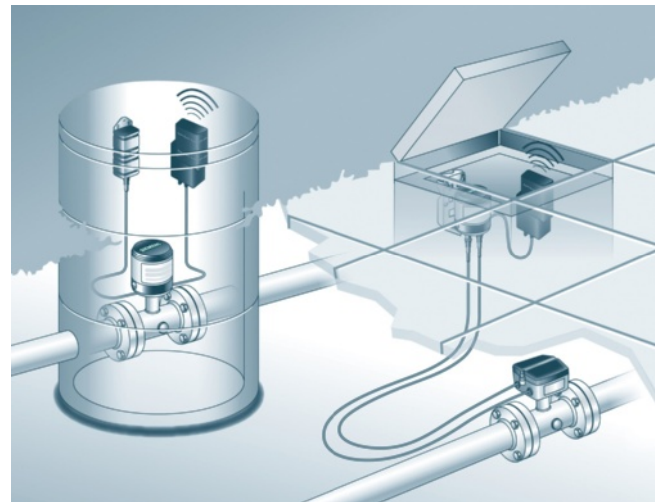
The following MAG 8000 versions are available as stand-alone water meters:

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

Design

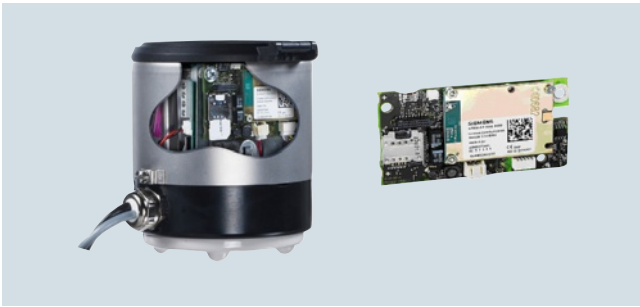
MAG 8000 is designed to minimize power consumption. The product program consists of

- 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



Modbus/Encoder module

Battery-operated water meter MAG 8000



GSM/GPRS communication module



PC-IrDA connection

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 (mA)
- Analog 2 (V)
- Battery lifetime
- Alarm list (as decimal format)

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 3/119). The module also includes the same power management algorithm that secures a very good calculation of the remaining battery lifetime.

The OPC server specifically designed for the MAG 8000 GSM/GPRS module is offered free of charge. With this value-added package, the opportunity for measurement data collection and further processing/analyzing for system integration and automation is offered.

Flow Measurement

SITRANS F M

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.



SIMATIC PDM

Details about the SIMATIC PDM tool can be found in chapter "Communication and Software" (see page 8/11).

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 MI and flow rate as MI/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	<ul style="list-style-type: none"> • 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" • GSM/GPRS module with or without analog input cable
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
External battery pack	2 D-Cell 3.6 V/33 Ah 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)

Flow Measurement

SITRANS F M

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) resettable 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	<ul style="list-style-type: none"> • 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

Flow Measurement SITRANS F M

Battery-operated water meter MAG 8000

3

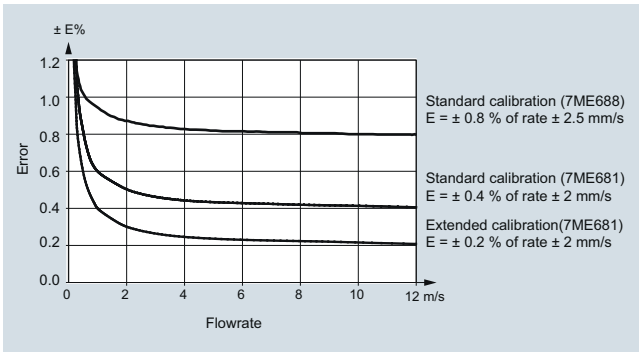
MAG 8000 water meter uncertainty

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).

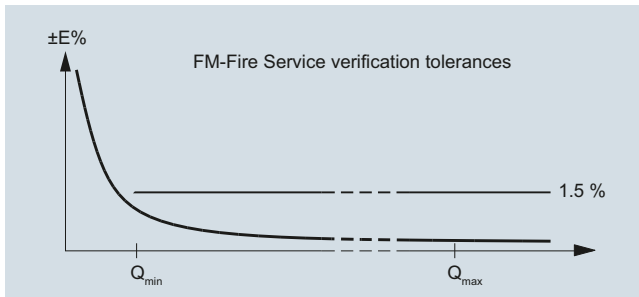
Siemens offers accredited calibrations assured to ISO 17025 in the flow range from 0.0001 m³/h to 10 000 m³/h. Siemens Flow Instruments accredited laboratories are recognized by ILAC MRA (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement) ensuring international traceability 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.



MAG 8000 (7ME6810) for Fire Service applications

MAG 8000 (7ME6810) is FM Fire Service approved for automatic fire protection systems according to the Fire Service Meters Standard, Class Number 1044. The approval is applicable for the sizes DN 50, DN 80, DN 100, DN 150, DN 200, DN 250, and DN 300 (2", 3", 4", 6", 8", 10", and 12") with ANSI B16.5 Class 150 flanges. The FM Fire Service approved product can be ordered via the Z-options P20, P21 and P22



Grounding

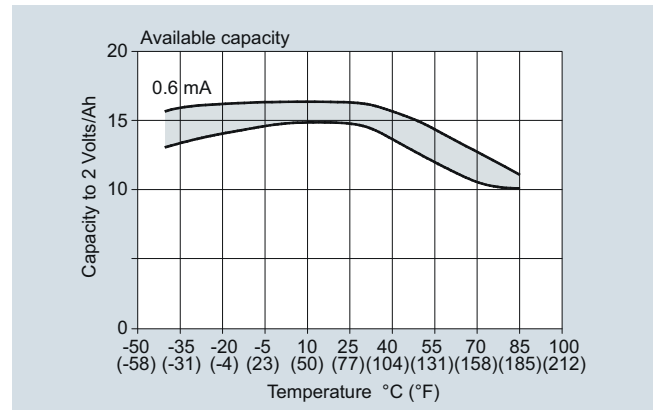
The sensor body must be grounded using grounding straps and/or grounding rings to protect the flow signal against stray electrical noise. This ensures that the noise is carried through the sensor body and a noise-free measuring area within the sensor body. For MAG 8000 Irrigation grounding rings on both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

<p>M6 x 16</p> <p>Metal pipe Metal pipe</p>	<p>Metal pipes</p> <p>On metal pipes, connect the straps to both flanges.</p>
<p>Plastic pipe Plastic pipe</p>	<p>Plastic pipes</p> <p>On plastic pipes and lined metal pipes, optional grounding rings must be used at both ends.</p> <p>Grounding rings has to be ordered separately see „Grounding ring kit“</p>
<p>M6 x 16</p> <p>Metal pipe Plastic pipe</p>	<p>Combination of metal and plastic pipes</p> <p>A combination of metal and plastic requires straps for metal pipe and grounding rings for plastic pipe.</p>

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.

Flow Measurement

SITRANS F M

Battery-operated water meter MAG 8000

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	<ul style="list-style-type: none"> • 5 % at 0 °C (32 °F) • 80 % at 15 °C (59 °F) • 15 % at 50 °C (122 °F)

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

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 in one cable gland are needed, order cable glands with two entries, see accessories on page 3/137).

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

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

Overview



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

Long-term stability/Low cost of ownership

- No moving parts in a robust construction means less wear and tear
- Basic and advanced transmitter versions with different optional add-on communication modules fulfil various customer requirements for high cost efficiency
- Up to 0.2 % maximum uncertainty
- Bi-directional measurement with an outstanding low flow performance
- Up to 10 years maintenance-free operation in typical applications

Intelligent information, easy to access

- Advanced information on site
- Advanced statistics and diagnostics
- Optional high-performance GSM/GPRS module offers an efficient solution for remote measurement and monitor via wireless communication.

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 (factory-mounted cable also provides IP68/NEMA 6P)
Certificates and approvals	
Calibration (standard)	2 x 25 % and 2 x 90 % (default)
Drinking water approvals	<ul style="list-style-type: none"> • NSF/ANSI Standard 61¹⁾ (cold water) USA • WRAS (BS 6920 cold water) UK • ACS Listed France • DVGW W270 Germany • Belgaqua (B) • MCERTS (GB)
Fire Service Approvals	FM Fire Service Meter (Class Number 1044)
Conformity	<ul style="list-style-type: none"> • PED: 97/23EC²⁾ For pressure/temperature curves see MAG 3100 on page 3/70. <ul style="list-style-type: none"> • EMC: IEC/EN 61326
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

Flow Measurement

SITRANS F M

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

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⁾ Including Annex G

²⁾ For further information on the PED standard and requirements see page 9/6.

Flow Measurement SITRANS F M

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

3

Selection and Ordering data	Article No.
SITRANS F M MAG 8000 water meter	7 ME 6 8 1 0 -
Diameter	
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") ¹⁾	6 Y
DN 750 (30") ¹⁾	7 D
DN 800 (32") ¹⁾	7 H
DN 900 (36") ¹⁾	7 M
DN 1000 (40") ¹⁾	7 R
DN 1050 (42") ¹⁾	7 U
DN 1100 (44") ¹⁾	7 V
DN 1200 (48") ¹⁾	8 B
Flange norm and pressure rating	
EN 1092-1	B
PN 10 (DN 200 ... 1200 (8" ... 48"))	C
PN 16 (DN 50 ... 1200 (2" ... 48"))	D
PN 16 non-PED (DN 700 ... 1200 (28"... 48"))	F
ANSI B16.5	J
Class 150	L
AWWA C-207	N
Class D (28" ... 48")	
AS4087	
PN 16 (DN 50 ... 1200 (2" ... 48"))	
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	Article No.
SITRANS F M MAG 8000 water meter	7 ME 6 8 1 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
GSM/GPRS communication module with remote antenna; 5 m (16.4 ft) cable	S
GSM/GPRS communication module with analog inputs and remote antenna; 5 m (16.4 ft) cable	T
Power supply	
Internal battery (no battery included)	0
Internal battery pack installed ²⁾	1
Power cable (1.5 m (4.9 ft)) with IP68/NEMA 6P plugs for external battery (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

- The Diameter DN 700 (28") to DN 1200 (48") is only available as remote transmitter type installation.
 - 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.
- We can offer shorter delivery times for configurations designated with the Quick Ship Symbol . For details see page 9/5 in the appendix.

Operating instructions for SITRANS F M MAG 8000

Description	Article 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	Article No.
• English	A5E03644134

Flow Measurement

SITRANS F M

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

Selection and Ordering data

Order code

Additional information

Please add “-Z” to Article 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
MI/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
MI	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
AI	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, 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 0.0001	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 Article 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
FM Fire Service Approval (with ANSI B16.5 Class 150 flanges) DN 50, DN 80 and DN 100 (2", 3" and 4") DN 150 and DN 200 (6" and 8") DN 250 and DN 300 (10" and 12")	P20 P21 P22

Overview



Benefits

Approvals

- MI-001, OIML R 49/OIML R 49 MAA
- PTB K7.2
- FM Fire Service

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

Long-term stability/Low cost of ownership

- No moving parts in a robust construction means less wear and tear
- Basic and advanced transmitter versions with different optional add-on communication modules fulfil various customer requirements for high cost efficiency
- Bi-directional measurement with an outstanding low flow performance
- Up to 10 years maintenance-free operation in typical applications
- Insignificant pressure drop

Intelligent information, easy to access

- Advanced information on site
- Advanced statistics and diagnostics
- Connectable to common AMR systems

Technical specifications

Meter	
Accuracy	OIML R 49/OIML R 49 MAA 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 FM Fire Service for DN 50, DN 80, DN 100, DN 150, DN 200, DN 250, and DN 300 (2", 3", 4", 6", 8", 10", and 12") ± 1,5% (Q _{min} to Q _{max})
Media conductivity	Clean water > 20 µs/cm
Temperature	
Ambient	-20 ... +60 °C (-4 ... +140 °F) MI-001: -25 ... +55 °C (-13 ... +131 °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 (standard)	2 x 25 % and 2 x 90 %
Drinking water approvals	<ul style="list-style-type: none"> • NSF/ANSI Standard 61¹⁾ (cold water) USA • WRAS (BS 6920 cold water) UK • ACS Listed France • DVGW W270 Germany • Belgaqua (B) • MCERTS (GB)
Fire Service approval	FM Fire Service (1044)
Custody transfer approval	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • CEN EN 14154, ISO 4064 • PED: 97/23/EC²⁾ For pressure/temperature curves, see MAG 3100 on page 3/70. <ul style="list-style-type: none"> • EMC: IEC/EN 61326
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

Flow Measurement

SITRANS F M

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

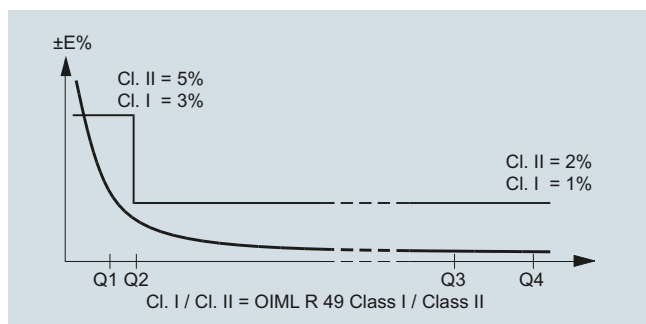
Flanges	
EN 1092-1 (DIN 2501)	DN 50 ... 150 (2" ... 6"): PN 16 (232 psi) DN 200 ... 300 (8" ... 12"): PN 10 or PN 16 (145 psi or 232 psi) up to DN 600 (24") in preparation
ANSI 16.5 Class 150	2" ... 12": 20 bar (290 psi) up to DN 600 (24") in preparation
AWWA C-207	28" ... 48": PN 10 (145 psi)
AS 4087	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) Including Annex G

2) For further information on the PED standard and requirements see page 9/6.

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.



OIML R 49/2006-DK2-10.01 Revision 1 approval specification for Class I (1 %) ¹⁾

Size	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")	DN 450 (18")	DN 500 (20")	DN 600 (24")
„R“ Q3/Q1	250	250	250	250	250	250	250	250	125	-	-	-	-	-
Q1 [m³/h]	0.25	0.40	0.63	1.00	1.60	2.50	4.00	6.40	12.8	-	-	-	-	-
Q2 [m³/h]	0.40	0.64	1.00	1.60	2.60	4.00	6.40	10.24	20.48	-	-	-	-	-
Q3 [m³/h]	63	100	160	250	400	630	1000	1600	1600	-	-	-	-	-
Q4 [m³/h]	78.75	125	200	312.5	500	787.5	1250	2000	2000	-	-	-	-	-

OIML R 49/2006-DK2-10.01 Revision 1 approval specification for Class II (2 %) ¹⁾

Size	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")	DN 450 (18")	DN 500 (20")	DN 600 (24")
„R“ Q3/Q1	400	400	400	400	400	400	400	400	200	-	-	-	-	-
Q1 [m³/h]	0.16	0.25	0.40	0.63	1.00	1.60	2.50	4.00	10.00	-	-	-	-	-
Q2 [m³/h]	0.25	0.40	0.63	1.00	1.60	2.50	4.00	6.40	16.00	-	-	-	-	-
Q3 [m³/h]	63	100	160	250	400	630	1000	1600	1600	-	-	-	-	-
Q4 [m³/h]	78.75	125	200	312.5	500	787.5	1250	2000	2000	-	-	-	-	-

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

MAG 8000 CT (Revenue program) MI-001

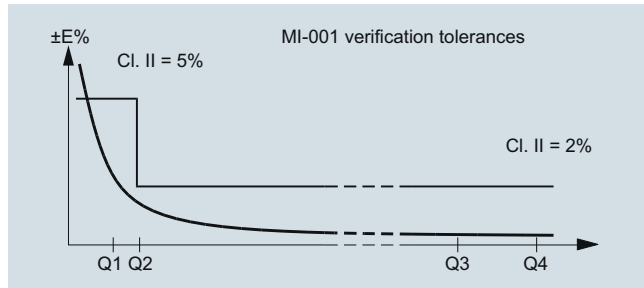
MAG 8000 CT program is type approved according to international water meter standard OIML R 49. Since the first November 2006 the MI-001 water meter directive is in force, which means that all water meters can be sold across the EU borders if the water meters contain a MI-001 label.

The MAG 8000 CT MI-001 verified and labeled products are a Class II 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 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 $Q4/Q3 = 1.25$ and $Q2/Q1 = 1.6$ measuring ranges see below table:

7ME6820-xxxx1	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")	DN 450 (18")	DN 500 (20")	DN 600 (24")
„R“ Q3/Q1	25	25	25	25	25	25	25	25	25	25	25	-	-	-
Q4 [m³/h]	20	31.25	50	78.75	125	200	312.5	500	750	1250	1250	-	-	-
Q3 [m³/h]	16	25	40	63	100	160	250	400	630	1000	1000	-	-	-
Q2 [m³/h]	0.96	1.60	2.60	4.03	6.40	10.24	16	25.60	38.4	64	64	-	-	-
Q1 [m³/h]	0.60	1	1.60	2.52	4	6.40	10	16	24	40	40	-	-	-

7ME6820-xxxx2	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")	DN 450 (18")	DN 500 (20")	DN 600 (24")
„R“ Q3/Q1	63	63	63	63	63	63	63	63	63	63	63	-	-	-
Q4 [m³/h]	20	31.25	50	78.75	125	200	312.5	500	750	1250	1250	-	-	-
Q3 [m³/h]	16	25	40	63	100	160	250	400	630	1000	1000	-	-	-
Q2 [m³/h]	0.41	0.63	1.02	1.60	2.54	4.06	6.35	10.16	16	25.4	25.4	-	-	-
Q1 [m³/h]	0.25	0.40	0.63	1	1.59	2.54	3.97	6.35	10	15.9	15.9	-	-	-

7ME6820-xxxx3	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")	DN 450 (18")	DN 500 (20")	DN 600 (24")
„R“ Q3/Q1	80	80	80	80	80	80	80	80	80	80	80	-	-	-
Q4 [m³/h]	20	31.25	50	78.75	125	200	312.5	500	750	1250	1250	-	-	-
Q3 [m³/h]	16	25	40	63	100	160	250	400	630	1000	1000	-	-	-
Q2 [m³/h]	0.32	0.50	0.80	1.20	2	3.20	5	8	12.6	20	20	-	-	-
Q1 [m³/h]	0.20	0.31	0.50	0.75	1.25	2	3.13	5	7.88	12.5	12.5	-	-	-

7ME6820-xxxx4	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")	DN 450 (18")	DN 500 (20")	DN 600 (24")
„R“ Q3/Q1	160	160	160	160	160	160	160	160	160	160	160	-	-	-
Q4 [m³/h]	50	78.75	125	200	312.5	500	787.5	1250	2000	2000	2000	-	-	-
Q3 [m³/h]	40	63	100	160	250	400	630	1000	1600	1600	1600	-	-	-
Q2 [m³/h]	0.40	0.63	1	1.60	2.50	4	6.30	10	16	16	16	-	-	-
Q1 [m³/h]	0.25	0.39	0.63	1	1.56	2.50	3.94	6.25	10	10	10	-	-	-

7ME6820-xxxx5	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")	DN 450 (18")	DN 500 (20")	DN 600 (24")
„R“ Q3/Q1	200	200	200	200	200	200	200	200	200	200	-	-	-	-
Q4 [m³/h]	50	78.75	125	200	312.5	500	787.5	1250	2000	2000	-	-	-	-
Q3 [m³/h]	40	63	100	160	250	400	630	1000	1600	1600	-	-	-	-
Q2 [m³/h]	0.32	0.50	0.80	1.28	2	3.20	5.04	8	12.80	12.80	-	-	-	-
Q1 [m³/h]	0.20	0.32	0.50	0.80	1.25	2	3.15	5	8	8	-	-	-	-

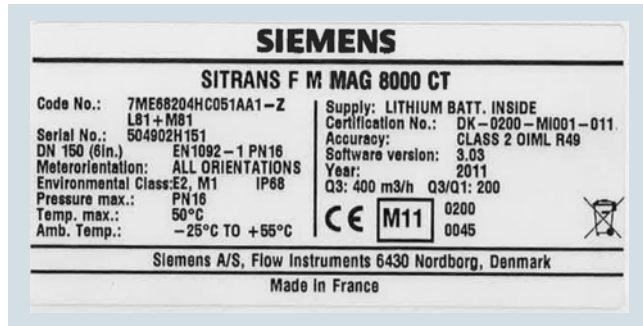
Flow Measurement

SITRANS F M

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

7ME6820-xxxx6	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")	DN 450 (18")	DN 500 (20")	DN 600 (24")
„R“ Q3/Q1	250	250	250	250	250	250	250	250	250	-	-	-	-	-
Q4 [m³/h]	50	78.75	125	200	312.5	500	787.5	1250	2000	-	-	-	-	-
Q3 [m³/h]	40	63	100	160	250	400	630	1000	1600	-	-	-	-	-
Q2 [m³/h]	0.26	0.40	0.64	1.02	1.60	2.56	4	6.40	10.24	-	-	-	-	-
Q1 [m³/h]	0.16	0.25	0.40	0.64	1	1.60	2.52	4	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".

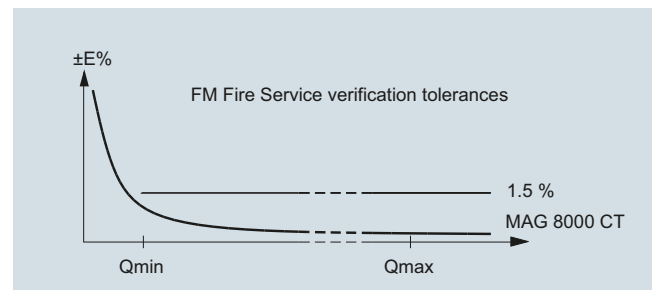
Battery operation time and calculation

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).

MAG 8000 CT (7ME6820) for Fire Service applications

MAG 8000 CT (7ME6820) is FM Fire Service approved for automatic fire protection systems according to the Fire Service Meters Standard, Class Number 1044. The approval is applicable for the sizes DN 50, DN 80, DN 100, DN 150, DN 200, DN 250, and DN 300 (2", 3", 4", 6", 8", 10", and 12") with ANSI B16.5 Class 150 flanges. The FM Fire Service approved product can be ordered via the Z-options P20, P21 and P22.



Flow Measurement SITRANS F M

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

3

Selection and Ordering data	Article No.
SITRANS F M	
MAG 8000 CT water meter with EPDM liner and Hastelloy electrodes	7 ME 6 8 2 0 -
	0 -
Diameter	
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") ¹⁾	5 Y
DN 500 (20") ¹⁾	6 F
DN 600 (24") ¹⁾	6 P
Flange norm and pressure rating	
EN 1092-1	
PN 16	C
ANSI B16.5	
Class 150	J
AS4087	
PN 16	N
Approval/Verification³⁾	
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	Article No.
SITRANS F M	
MAG 8000 CT water meter with EPDM liner and Hastelloy electrodes	7 ME 6 8 2 0 -
	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
Power cable (1.5 m (4.9 ft)) with IP68/NEMA 6P plugs for external battery (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 3/126 to 3/128.
- 4) Standard calibration or according to FM Fire Service requirements if P20, P21 or P22 is selected as Z option.

Operating instructions for SITRANS F M MAG 8000

Description	Article 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	Article No.
English	A5E03644134

Flow Measurement

SITRANS F M

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

Selection and Ordering data Order code

Additional information

Please add "-Z" to Article No. and specify Order code(s) and plain text.

FP2E marking (France only)

C17

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

FM Fire Service Approval

(with ANSI B16.5 Class 150 flanges)

DN 50, DN 80 and DN 100 (2", 3" and 4")

P20

DN 150 and DN 200 (6" and 8")

P21

DN 250 and DN 300 (10" and 12")

P22

Overview



Benefits

- IP68/NEMA 6P rating with tamper proof
- Flexible power supply - internal or external battery pack or mains power supply with battery back-up possibilities
- No moving parts in a robust construction means less wear and tear
- Up to 8 years maintenance-free operation in typical application
- Connectable to AMR systems

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 (factory-mounted cable option also provides IP68/NEMA 6P)
Approvals	
Drinking water approvals	<ul style="list-style-type: none"> • ANSI/NSF 61¹⁾ (cold water) USA • WRAS (BS 6920 cold water) UK
Custody transfer approval	NMI10 Australia (under preparation)
Conformity	IEC/EN 61326
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

¹⁾ Including Annex G

Flow Measurement

SITRANS F M

**MAG 8000 for irrigation applications
(7ME6880)**

Selection and Ordering data	Article No.
SITRANS F M MAG 8000 water meter including factory-mounted grounding rings	7 ME 6 8 8 0 -
	0 -
Diameter	
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
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	Article No.
SITRANS F M MAG 8000 water meter including factory-mounted grounding rings	7 ME 6 8 8 0 -
	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	D
Power supply	
Internal battery (no battery included)	0
Internal battery pack installed 2 D-cell ^{1) 2)}	1
Power cable (1.5 m (4.9 ft)) with IP68/NEMA 6P plugs for external battery (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) 2)}	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. ²⁾ Can be ordered by US region only.	
Operating instructions for SITRANS F M MAG 8000	
Description	Article 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	

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Article No. and specify Order code(s) and plain text.	
<u>Flow unit</u>	
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
MI/d	L12
m ³ /d	L13
GPD	L14
<u>Totalizer</u>	
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
<u>Volume unit</u>	
m ³	L40
MI	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
AI	L51
kl	L52
<u>Pulse set up</u>	
(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, 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 0.0001	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

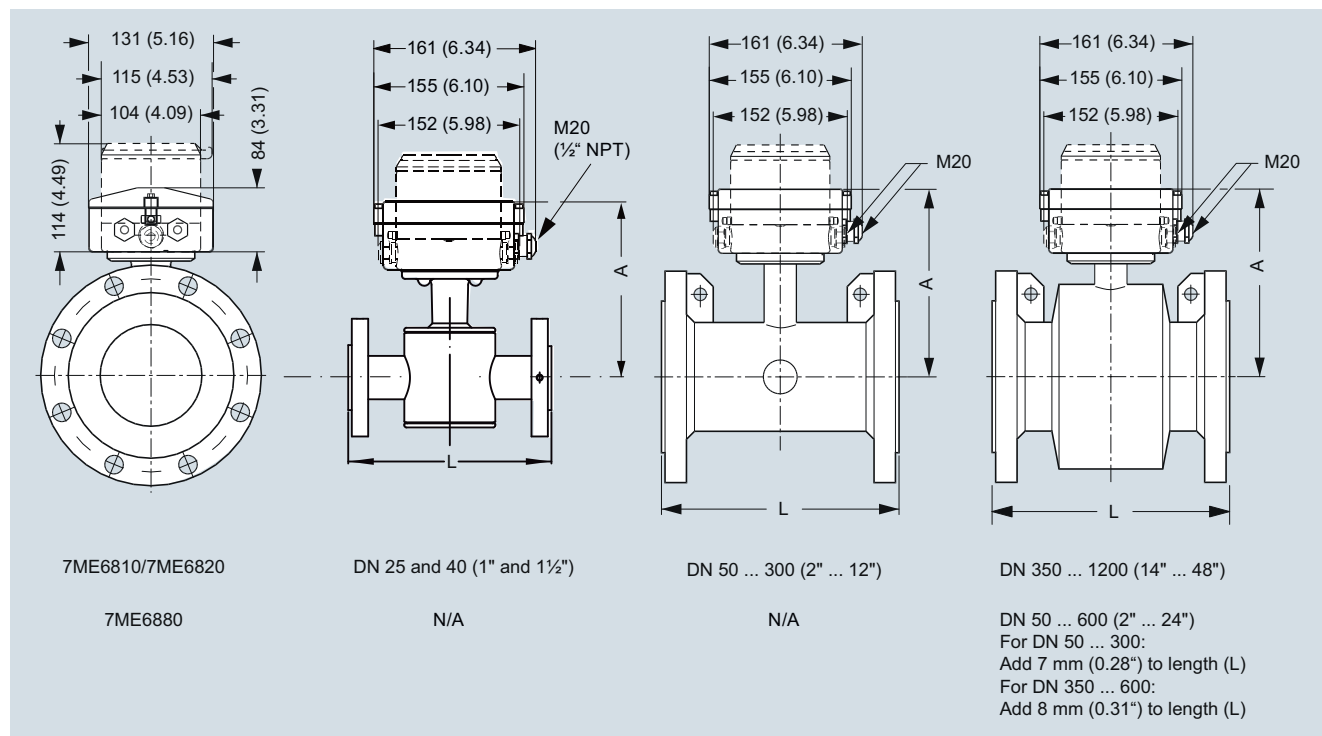
Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Article No. and specify Order code(s) and plain text.	
<u>Data logger set up</u> (default month logging)	
DataloggerInterval = Daily	M31
DataloggerInterval = Weekly	M32
<u>Factory mounted cables</u>	
5 m (16.4 ft) pulse 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

Flow Measurement

SITRANS F M

Battery-operated water meter MAG 8000

Dimensional drawings

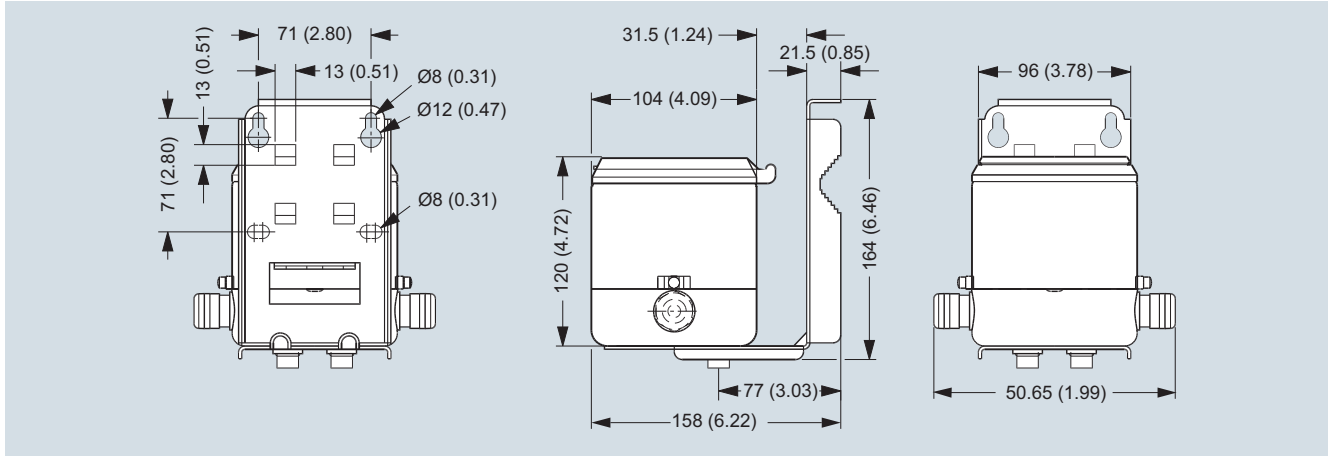


Dimensions in mm (inch)

Nominal DN size	A	L, lengths						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	kg
mm (inch)	mm (inch)	mm	mm	mm	inch	mm	mm		
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

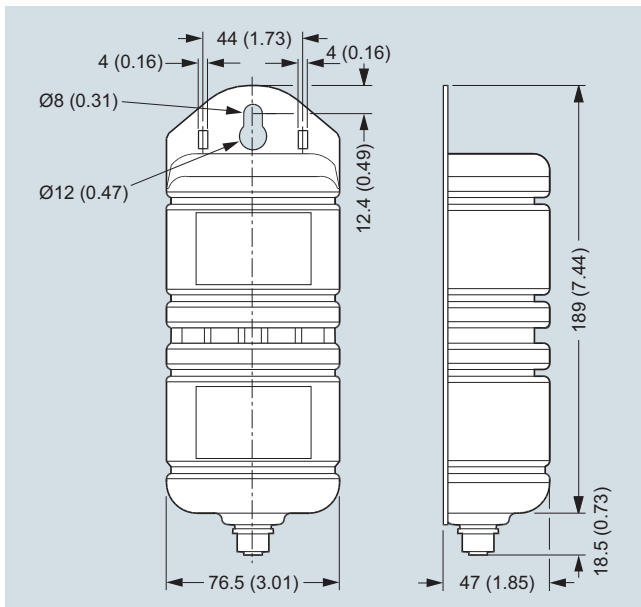
¹⁾ For remote version the sensor weight is reduced with 2 kg (4.5 lb)

Remote version



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

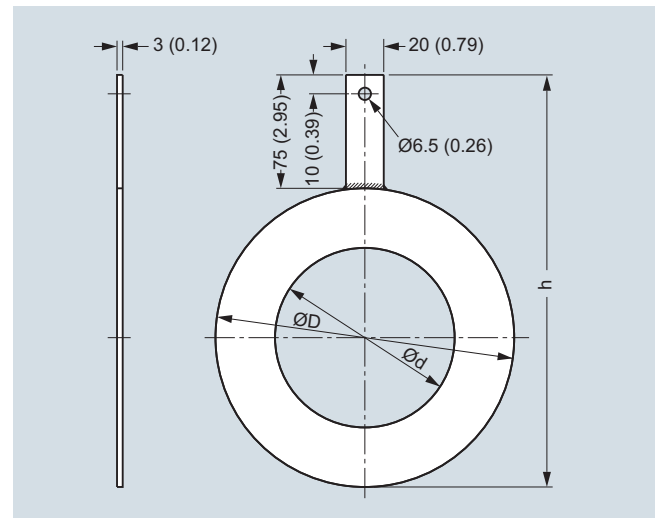
External battery pack



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

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

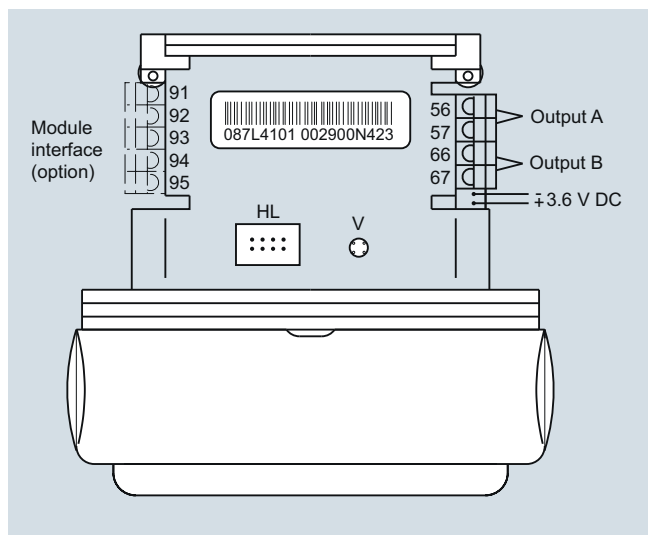
Dimension	Internal diameter (d)	Outside diameter (D)	h
DN 25	27	68	143
DN 40	38	88	163
DN 50	52	100	175
DN 65	64	120	195
DN 80	79	133	208
DN 100	95	158	233
DN 125	115	188	263
DN 150	145	216	336
DN 200	193	268	343
DN 250	246	324	399
DN 300	295	374	449

Flow Measurement SITRANS F M

Battery-operated water meter MAG 8000

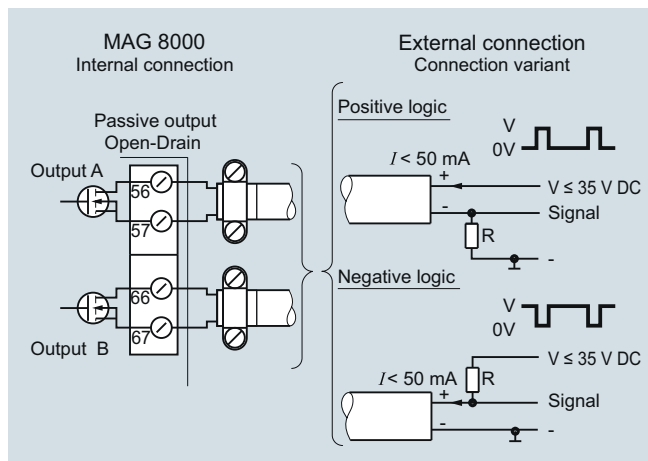
Schematics

Electrical installation and pulse output – Connection diagram



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

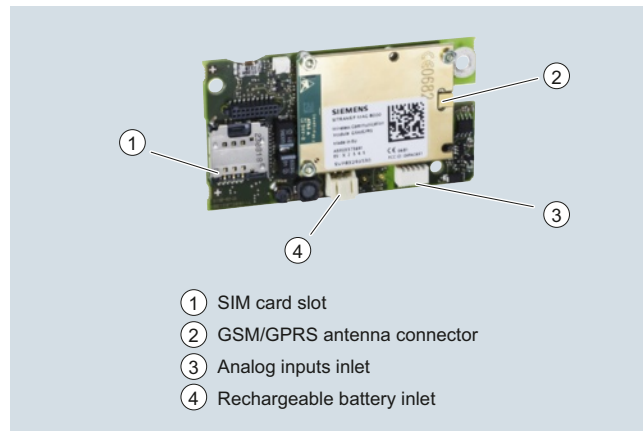
Pulse wire connection



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).









Electrical installation of GSM/GPRS module





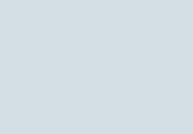
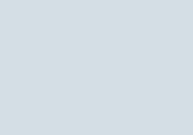





- ① SIM card slot
- ② GSM/GPRS antenna connector
- ③ Analog inputs inlet
- ④ Rechargeable battery inlet

Battery-operated water meter MAG 8000

Accessories


Description	Article 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⁾	◆ FDK:087L4150	
External battery pack IP68/NEMA 6P with connector, 4 D-cell (3.6 V 66 Ah) ¹⁾ . Order cable FDK:087L4152 separately.	◆ FDK:087L4151	
Mains power supply 12 ... 24 V AC/DC (average power consumption during line ≤ 0.1 VA) with battery backup and 3 m (9.8 ft) power cable for external connection (no battery included) Temperature range: Fixed laying: -40 ... +90 °C (-40 ... +194 °F) Flexible application: -30 ... +80 °C (-22 ... +176 °F)	FDK:087L4210	
Mains power supply 115 ... 230 V AC, 50/60 Hz, 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	
RS 485 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 and 7ME6880 routes	A5E02475650	

Description	Article No.	
MAG 8000 GSM/GPRS communication module. Rechargeable battery, antenna and analog cable input must be ordered separately	◆ A5E03412758	
One cable entry 6 ... 8 mm (0.24 ... 0.31 ") M20 brass glands package ²⁾ (1 pc)	◆ FDK:087L4196	
One cable entry 2 ... 5 mm (0.08 ... 0.20 ") M12 brass glands with M20 reduction ²⁾ . Package of 10 pcs	FDK:087L4154	
One cable entry 6 ... 8 mm (0.24 ... 0.31 ") M20 brass glands package ²⁾ (10 pcs)	FDK:087L4155	
One cable entry 8 ... 11 mm (0.31 ... 0.43 ") M20 brass glands package ²⁾ (10 pcs)	FDK:087L4156	
One cable entry 11 ... 15 mm (0.43 ... 0.59 ") M20 brass glands package ²⁾ (10 pcs)	FDK:087L4157	
Two cable entries 3.5 ... 5 mm (0.14 ... 0.20 ") M20 brass glands package ²⁾ (10 pcs)	FDK:087L4158	
Two cable entries 5.5 ... 7.5 mm (0.22 ... 0.30 ") M20 brass glands package ²⁾ (10 pcs)	FDK:087L4159	
High gain antenna for MAG 8000 GSM/GPRS (PVC, IP68, cable length 5 m (16.4 ft), with SMA male connector (type RG 58) and internal SMA to SMP female cable adapter, and single entry cable gland)	◆ A5E03436689	
Analog input cable for MAG 8000 GSM/GPRS (3 m (9.8 ft) cable with M12 connector A-Coding female 5 pins, and two-entry cable gland)	A5E03436698	
Potting kit for terminal box of flow sensors for IP68/NEMA 6P (not for Ex sensors)	◆ 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	

Flow Measurement

SITRANS F M

Battery-operated water meter MAG 8000

Description	Article No.	
Alkaline battery for MAG 8000 demo transmitter (3 V 13 Ah) (No dangerous goods limitations)	FDK:087L4142	


◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

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.

²⁾ For cable connection through MAG 8000 transmitter bottom part.




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






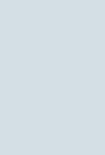
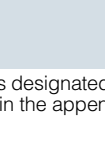
Grounding rings, type C must be used for the 7ME6810 and 7ME6820 routes (sizes > DN 300). Please see grounding rings in the section MAG 3100 Grounding rings and be aware that the mentioned MLFB codes include only 1 grounding ring. Grounding rings DN 25 to DN 300 in stainless steel are packed in pairs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

Dimension	Article No.	
DN 25	◆ A5E01002946	
DN 40	◆ A5E01002947	
DN 50	◆ A5E01002948	
DN 65	A5E01002950	
DN 80	◆ A5E01002952	
DN 100	◆ A5E01002953	
DN 125	A5E01002954	
DN 150	◆ A5E01002955	
DN 200	A5E01002957	
DN 250	◆ A5E01002958	
DN 300	◆ A5E01002962	

We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Spare parts

Description	Article No.	
MAG 8000 transmitter compact replacement kit ¹⁾ . No battery included. System number specified by ordering.	FDK:087L4166	
MAG 8000 transmitter remote replacement kit ¹⁾ . System number specified by ordering.	FDK:087L4202	
MAG 8000 (Advanced version) transmitter compact replacement kit ¹⁾ . No battery included. No system number required.	FDK:087L4203	

Description	Article No.	
MAG 8000 (Advanced version) transmitter remote replacement kit ¹⁾ . No battery included. No system number required.	FDK:087L4204	
MAG 8000 (Basic version) transmitter PCB replacement kit ¹⁾ . No system number required.	◆ A5E01171569	
MAG 8000 (Advanced version) transmitter PCB replacement kit ¹⁾ . No system number required.	FDK:087L4168	
Enclosure top including plastic lid, screws and blank product label	◆ FDK:087L4167	
Power cable (1.5 m (4.9 ft)) with IP68/NEMA 6P plugs for external battery (no battery included); PE jacket, ambient temperature: -20 ... +60 °C (-4 ... +140 °F)	◆ FDK:087L4152	
5 ft. Encoder interface cable with IP68/NEMA 6P plugs included, for ITRON 200WP and 100W radio; 22 AWG stranded TC conductors, polypropylene insulation, twisted pair, overall Beldfoil shield, 22 AWG stranded TC drain wire, PVC jacket	A5E02551263	
25 ft. Encoder interface cable with IP68/NEMA 6P plugs included, for ITRON 200WP radio; 22 AWG stranded TC conductors, polypropylene insulation, twisted pair, overall Beldfoil shield, 22 AWG stranded TC drain wire, PVC jacket	A5E02551182	

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Flow Measurement

SITRANS F M

Battery-operated water meter MAG 8000

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

Description	Article 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 ²⁾	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 ²⁾	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 ²⁾	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 ²⁾	FDK:087L4111	
Remote cable set 30 m (98.4 ft) with IP68/NEMA 6P plugs - M20	A5E00862497	

¹⁾ Not applicable to Custody Transfer (CT) verified systems without re-verification

²⁾ For sensors produced before October 2007.

Dimension		Article 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	

Flow Measurement

SITRANS F C

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 offers accurate measurement of mass flow, volume flow, density, temperature and fraction.

Transmitter	Page	Compact	Remote	Ex-Approval	Sensor	Page
FCT030	3/167	Yes	Yes	Yes	FCS400 Standard, DN 15 ... DN 80	3/157
		Yes	Yes	Yes	FCS400 Hygienic, DN 15 ... DN 80	3/157
		Yes	Yes	Yes	FCS400 NAMUR, DN 15 ... DN 80	3/157
MASS 6000 IP67 Polyamide enclosure	3/173	No	Yes	No	FCS200, DN 10 ... DN 25	3/192
		No	Yes	No	FC300, DN 4	3/201
		No	Yes	No	MASS 2100, DI 1.5	3/197
		Yes	Yes	No	MASS 2100, DI 3 ... DI 40	3/206
		No	Yes	No	MASS MC2, DN 100...DN 150	3/217
		No	Yes	Yes	MASS MC2 Ex, DN 100...DN 150	3/217
MASS 6000 19"	3/177	No	Yes	No	FCS200, DN 10 ... DN 25	3/192
		No	Yes	No	FC300, DN 4	3/201
		No	Yes	No	MASS 2100, DI 1.5	3/197
		No	Yes	No	MASS 2100, DI 3 ... DI 40	3/206
		No	Yes	No	MASS MC2, DN 100...DN 150	3/217
		No	Yes	Yes	MASS MC2 Ex, DN 100...DN 150	3/217
MASS 6000 Ex 19"	3/177	No	Yes	Yes	FCS200, DN 10 ... DN 25	3/192
		No	Yes	Yes	FC300, DN 4	3/201
		No	Yes	Yes	MASS 2100 Ex, DI 1.5	3/197
		No	Yes	Yes	MASS 2100 Ex, DI 3 ... DI 40	3/206
MASS 6000 Ex d Stainless steel enclosure	3/183	No	Yes	Yes	FCS200, DN 10 ... DN 25	3/192
		No	Yes	Yes	FC300, DN 4	3/201
		No	Yes	Yes	MASS 2100 Ex, DI 1.5	3/197
		Yes	Yes	Yes	MASS 2100 Ex, DI 3 ... DI 40	3/206
SIFLOW FC070 Standard	3/188	No	Yes	No	all	
SIFLOW FC070 Ex CT	3/188	No	Yes	Yes	all except MC2	

Benefits

Greater flexibility

- Wide product program
- High performance and top-end flowmeters
- Compact or remote installation using the same transmitters and sensors within their flowmeter series

Easier commissioning

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

At commissioning the flowmeter commences measurement without any initial programming.

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

- FC430:
Digital platform allows for any sensor in the range to be matched in compact or remote. The wide range of sensors are all certified to SIL2 or SIL3 (redundant) with the FCT030 transmitter in compact mode.
- MASS 6000:
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.
- SIFLOW:
Direct integration into SIMATIC S7-300 systems as a flowmeter specific I/O module ensures fast and smooth startup, seamless integration, fast operation.

Application

Coriolis flowmeters are generally suitable for measuring liquids and gases. The flow 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 use. The Coriolis flowmeter is recognized for its high accuracy over 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, filling and dosing
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 measurement, paint robots
Oil and gas	Filling of gas bottles, furnace control, CNG-dispensers, test separators, LPG, well-head water-cut monitoring
Water and waste water	Dosing of chemicals for water treatment

Flow Measurement

SITRANS F C

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



SITRANS FC430	MASS 2100 DI 1.5	MASS 2100 DI 3 to DI 40	FC300 DN 4	MC2 DN 100 to DN 150	FCS200 DN 10 to DN 25	MASS 6000 IP67	MASS 6000 19"	MASS 6000 Ex d	SIFLOW FC070 Std/Ex CT
7ME4613 7ME4623 7ME4713	7ME4100	7ME4100, 7ME4200, 7ME4210	7ME4400	7ME4300	7ME4500	7ME4110	7ME4110	7ME4110	7ME4120

Design

Compact	●		●			●		●	
Remote	●	●	●	●	●	●	●	●	●

Transmitter enclosure

Polyamide, IP67/NEMA 6						●			
Noryl (SIMATIC S7-300), IP20/NEMA 2									●
Stainless steel IP67/NEMA 6								●	
19" rack IP20/NEMA 2 aluminum							●		
Back of panel IP20 aluminum							●		
Wall mounting IP65 ABS plastic							●		
Front of panel IP65 ABS plastic							●		
Aluminium IP67	●								

Communication

HART	●					●	●	●	
PROFIBUS PA						●	●	●	
PROFIBUS DP						●	●		
MODBUS RTU/RS 485						●	●		●
MODBUS RTU/RS 232									●
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 (1/4")			●						
DN 10 (3/8")						●			
DI 15 (1/2")			●						
DN 15 (1/2")	●					●			
DN 20 (3/4")									
DI 25 (1")			●						
DN 25 (1")	●					●			
DI 40 (1 1/2")			●						
DN 40 (1 1/2")									
DN 50 (2")	●								●
DN 65 (2 1/2")									●
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

Flow Measurement

SITRANS F C

System information SITRANS F C
Coriolis mass flowmeters

Please see Product selector
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7ME4613 7ME4623 7ME4713	7ME4100	7ME4100, 7ME4200, 7ME4210	7ME4400	7ME4300	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 11864-1A	●								
DIN 11864-2A	●								
DIN 11864-3A	●								
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		●	● ⁴⁾	●		● ⁶⁾			
Hastelloy C4/2.4610					●				

With heating jacket

Internal U - tube		●							
External electric jacket	●								

Pressure rating

PN 40			●		●				
PN 100	●	●	●	●	● ¹⁾				
PN 160	●								
PN 214						●			
PN 350						●			
High-pressure version ²⁾		●	●	●					

Accuracy

Flow error ≤ 0.1 % of rate	●	●	●	●					
Flow error ≤ 0.15 % of rate					●				
Flow error ≤ 0.5 % of rate						●			
Density error ≤ 0.005 g/cm ³			●						
Density error ≤ 0.001 g/cm ³	●	●			●				
Density error ≤ 0.0015 g/cm ³			● ³⁾	●					

Cable glands

PG 13.5							● ⁵⁾		
½" NPT	●					●			
M20	●			●		●		●	

● = available

¹⁾ Not available for DN 150 sensor.

²⁾ See technical specifications.

³⁾ DI 3 and DI 6

⁴⁾ DI 15, DI 25 and DI 40 are not available for Hastelloy C22/2.4602.

⁵⁾ Only when mounted in enclosure.

⁶⁾ Process connectors in AISI 316Ti/1.4571

Flow Measurement

SITRANS F C

System information SITRANS F C Coriolis mass flowmeters

Please see Product selector
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SITRANS FC430	MASS 2100 DI 1.5	MASS 2100 DI 3 to DI 40	FC300 DN 4	MC2 DN 100 to DN 150	FCS200 DN 10 to DN 25	MASS 6000 IP67	MASS 6000 19"	MASS 6000 Ex d	SIFLOW FC070 Std/Ex CT
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Approvals

Custody Transfer

Compressed gaseous fuel
measuring systems for vehi-
cles - OIML R 139

Other media than water pat-
tern approval - OIML R 117

Harzardous locations

ATEX

IECEX

FM

UL

CSA

NEPSI

INMETRO

Ordinary locations

USL, CNL-Flowmeter

c-UL-us

USR, CNR-Flowmeter

c-UL-us

PED

Fluid group 1

Category II, Module H

PED
Directive
97/23/EC

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

3A

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 remote version

3) Can be placed in zone 2 if mounted in minimum IP54 cabinet.

4) Only Ex version

5) 24 V; IP20

6) 115 ... 230 V; IP20

7) 115 ... 230 V; IP65

8) Only DI 25 and DI 40

9) For sizes ≥ DN 100 only

10) Install in Div. 2, sensor interface into Div. 1, only Ex CT version

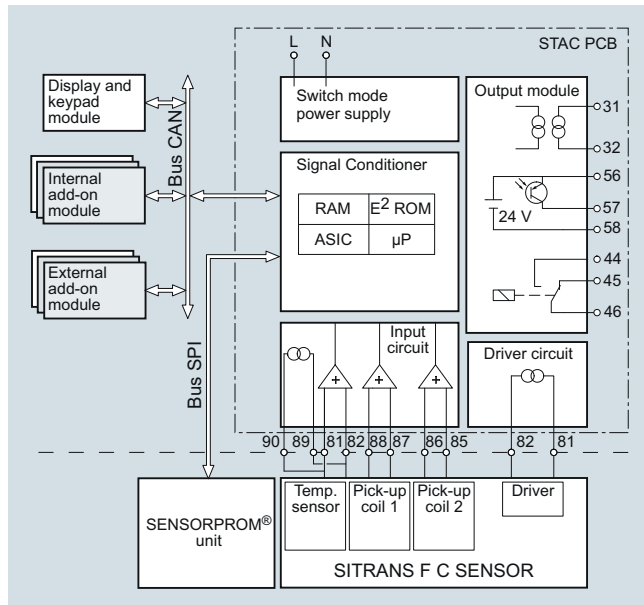
Flow Measurement

SITRANS F C

System information SITRANS F C
Coriolis mass flowmeters

Function

The flow measuring principle is based on the Coriolis effect. The flowmeter consists of a system FC430 or a combination of a sensor type MASS 2100/FC300/FCS200/MC2 and a transmitter type 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 6 or IP65. 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 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 well-supported pipelines. 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. A bypass valve is recommended where regular zero adjustment is planned to avoid disruption of the flowing system.

Flow Measurement

SITRANS F C

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 where bubbles are possibly largest.
- 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.

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 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")	1.5	(3.3)	15	(33)	30	(66)
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:

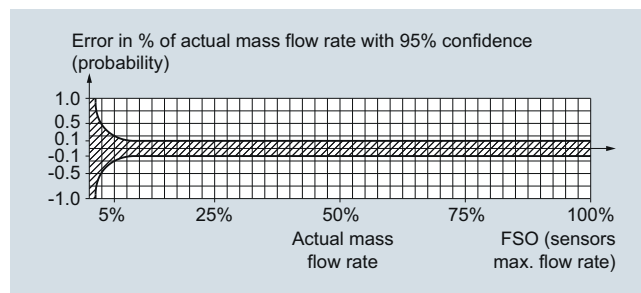
$$E = \pm \sqrt{(\text{Cal.})^2 + \left(\frac{z \times 100}{qm}\right)^2}$$

E = Error [%]

Z = Zero point error [kg/h]

qm = Mass flow [kg/h]

Cal. = Calibrated flow accuracy: 0.10 or 0.15



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	<ul style="list-style-type: none"> 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

Sensor type		FC300	MASS 2100					
Sensor size		DN 4 (1/6")	DI 1.5 (1/16")	DI 3 (1/8")	DI 6 (1/4")	DI 15 (1/2")	DI 25 (1")	DI 40 (1 1/2")
Number of measuring pipes		1	1	1	1	1	1	1
Mass flow								
Linearity error	± 0.5 %	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Repeatability error	± 0.25 %	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]	0.0025 ²⁾	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.

²⁾ Hastelloy C22 version.

Sensor type		FCS400				MC2	
Sensor size		DN 15 (1/2")	DN 25 (1")	DN 50 (2")	DN 80 (3")	DN 100 (4")	DN 150 (6")
Number of measuring pipes		2	2	2	2	2	2
Mass flow:							
Linearity error	% of rate	0.1	0.1	0.1	0.1	0.15	0.15
Reproducibility of flowrate at rates > 5 % of Q _{max}	% of rate	0.05	0.05	0.05	0.05	0.1	0.1
Max. zero point error	[kg/h (lb/h)]	0.2 (0.44)	2 (4.41)	7.5 (16.5)	18.0 (39.7)	24.96 (55.03)	330 (727.53)
Density							
Density error	(Standard) [g/cm ³]	0.005	0.005	0.005	0.005	0.005	0.005
	(Extended) [g/cm ³]	0.001	0.001	0.001	0.001	0.001	Not available
Range	[kg/dm ³]	0.001 ... 5.0	0.001 ... 5.0	0.001 ... 5.0	0.001 ... 5.0	0.5 ... 3.5	0.5 ... 3.5
Repeatability error	[g/l]	± 0.1	± 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)	1.0 (1.8)
Brix¹⁾							
Error	[°Brix]	0.1	0.1	0.1	0.1	On request ¹⁾	Not available

¹⁾ Flow and density calibration (1 kg/m³) required. Brix/Plato and Fraction available as PVR.

Flow Measurement

SITRANS F C

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 100 (4")	7 100	(15 653)	71 000	(156 528)	142 000	(313 056)
DN 150 (6")	21 050	(46 407)	210 500	(464 073)	421 000	(928 145)

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

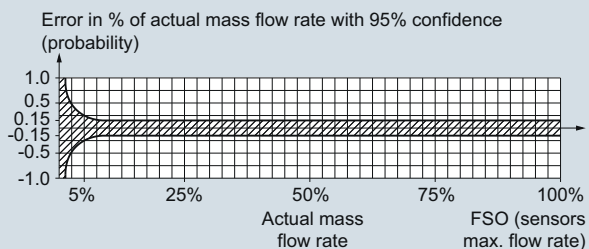
$$E = \pm \sqrt{(0,15)^2 + \left(\frac{z \times 100}{qm}\right)^2}$$

E = Error [%]

Z = Zero point error [kg/h]

qm = Mass flow [kg/h]

Q_{max.} at 2 bar pressure loss at 1 g/cm³



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	IEC 61158/EN 50170
Physical Layer (Transmission technology)	RS 485
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 mm ² , 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	IEC 61158/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 mm ² (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 terminated at both ends
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.

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC430

Overview



The complete flowmeter system SITRANS FC430 can be ordered for industrial, hygienic or NAMUR service. All versions can be ordered for CT service, according to OIML R 117 (Liquids other than water).

SIL specified compact variants can be validated and configured for SIL 2 or SIL 3 operation. SIL 3 operation requires two flowmeters in series and monitored by a SIL-rated control system. Series mounting must not introduce cross-talk between the sensors. Refer to installation guidelines.

The flowmeter is based on the latest developments within digital signal processing technology – engineered for high measuring performance:

- Fast response to rapid changes in flow
- Fast dosing applications
- High immunity against process noise
- High turndown ratio of flowrates
- Suitable for liquid and gas service
- Easy to install, commission and maintain

FC430 is available as standard with 4 to 20 mA analog output with HART 7.2. Additional functions can be freely configured for analog, pulse, frequency, relay or status output or binary input.

The transmitter comes with a user-configurable graphical display and new SensorFlash technology, a micro SD card for configuration backup, firmware update and data storage.

The SITRANS FC430 flowmeter system consists of a SITRANS FCS400 sensor and a SITRANS FCT030 transmitter.

Benefits

- It is narrow and light, fitting neatly into dense piping arrangements
- Easy maintenance because modules can be exchanged rapidly
- Effective separation of measurement from plant vibration
- Highly secure operation in safety critical applications
- Non-volatile memory of all setup and operation data
- Reliable measurements due to high signal to noise ratio
- Secure, digital transfer of measurement data from the sensor
- Short overall length; easy drop-in replacement into most existing installations
- Functional Safety (SIL X). Device suitable for use in accordance with IEC 61508 and IEC 61511.

Technical specifications

Sizes	DN 15 (1/2"), DN 25 (1"), DN 50 (2"), DN 80 (3")
Accuracy	± 0.10 %
Repeatability	± 0.05 %
Flow range (water @ 1 bar pressure loss)	DN 15: 3 700 kg/h (8 157 lb/h) DN 25: 11 500 kg/h (25 353 lb/h) DN 50: 52 000 kg/h (114 640 lb/h) DN 80: 136 000 kg/h (300 000 lb/h)
Architecture	Compact or remote configuration with selection of twelve languages including Chinese and Russian
Display	Full graphical display, 240 x 160 pixels
Power supply	24 ... 90 V DC ± 10%, 100 ... 240 V AC ± 10 %, 50 ... 60 Hz ± 10%
Weight	4.6 ... 50 kg
Material	<ul style="list-style-type: none"> • Sensor <ul style="list-style-type: none"> - Wetted parts 316L stainless steel - Enclosure 304 stainless steel • Transmitter Aluminum with corrosion-resistant coating
Enclosure rating	IP67
Pressure ratings	<ul style="list-style-type: none"> • Measuring tubes 100 bar (1450 psi) • Sensor enclosure 20 bar (DN15, DN 25) 17 bar (DN 50, DN 80) • Sensor enclosure burst pressure >160 bar (all sizes)
Temperature ratings	<ul style="list-style-type: none"> • Process medium -50 ... +200 °C (-58 ... +392 °F) • Ambient -40 ... +60 °C (-40 ... +140 °F)
Process connections	<ul style="list-style-type: none"> • Flanges EN 1092-1 B1, EN 1092-1 D, ANSI/ASME B16.5, JIS B 2220, DIN 11864-2 • Pipe threads ASME B1.20 (NPT), ISO228-1 G (BSPP), VCO Quick-connect • Hygienic threads DIN 11851, DIN 11864-1A, ISO 2853, SMS 1145 • Hygienic clamps DIN 11864-3A, DIN 32676, ISO 2852
Approvals	<ul style="list-style-type: none"> • Hazardous area ATEX, IECEx, FM, NEPSI, CSA, INMETRO • Pressure equipment PED, CRN • Hygienic 3A, EHEDG • Custody transfer OIML R 117 • Operational safety (compact system only) SIL 2 Single SIL 3 Redundant system
NAMUR	NAMUR-compliant (e.g. NE 21, NE 41 and NE 132)
I/O	Up to 4 channels combining analog, relay or digital outputs and binary input
Communication	HART 7.2
EMC performance	EN 61326-3-2
Mechanical load	18 to 400 Hz random The flow meter will mechanically tolerate 3.17 G rms in all directions. Flow accuracy cannot be guaranteed under all conditions.

Selection and Ordering data	Article No.	Ord. code
SITRANS FC430 Digital coriolis flowmeter with SITRANS FCS400 Standard flow sensor with hygienic and flange/pipe thread connections and compact or remote mounting with FCT030 transmitter	7ME4613-	
Sensor size, connection size		
DN 15, DN 10 (½", 3/8")	3 F	
DN 15, DN 15 (½", ½")	3 G	
DN 15, DN 20 (½", ¾")	3 H	
DN 15, DN 25 (½", 1")	3 J	
DN 25, DN 15 (1", ½")	3 K	
DN 25, DN 25 (1", 1")	3 L	
DN 25, DN 40 (1", 1½")	3 N	
DN 50, DN 40 (2", 1½")	4 B	
DN 50, DN 50 (2", 2")	4 C	
DN 80, DN 65 (3", 2½")	4 J	
DN 80, DN 80 (3", 3")	4 K	
DN 80, DN 100 (3", 4")	4 L	
Process connection		
EN1092-1 B1, PN 16	A 0	
EN1092-1 B1, PN 40	A 1	
EN1092-1 B1, PN 63	A 2	
EN1092-1 B1, PN 100	A 3	
EN1092-1 D nUT, PN 40	A 5	
EN1092-1 D nUT, PN 63	A 6	
EN1092-1 D nUT, PN 100	A 7	
ANSI B16.5-2009, class 150	D 1	
ANSI B16.5-2009, class 300	D 2	
ANSI B16.5-2009, class 600	D 3	
ISO228-1 G pipe thread	E 1	
ASME B1.20.1 NPT pipe thread	E 3	
DIN 11851 hygienic screwed	F 1	
DIN32676 hygienic Tri-Clamp	G 1	
DIN11864-1A aseptic screwed	H 1	
DIN11864-2A aseptic flanged	H 2	
ISO 2852 hygienic clamped	J 1	
ISO 2853 hygienic screwed	J 5	
SMS 1145 hygienic screwed	K 1	
12-VCO-4 quick connect	K 5	
JIS B2200:2004/10K	L 2	
JIS B2220:2004/20K	L 4	
JIS B2220:2004/40K	L 6	
Wetted parts material		
AISI 316L/W1.4435/W1.4404 (100 barg max.)	1	
Calibration/Accuracy class		
0,1 % flow, 5 kg/m³ density	1	
0,1 % flow, 1 kg/m³ density	4	
Standard fraction calibration		
• API number	9	N 0 A
• Balling	9	N 0 B
• °Baumé light	9	N 0 C
• °Baumé heavy	9	N 0 D
• °Brix	9	N 0 E
• °Oeschlé	9	N 0 F
• °Plato	9	N 0 G
• Specific Gravity	9	N 0 H
• °Twaddell	9	N 0 J
• %HFCS42	9	N 0 K
• %HFCS55	9	N 0 L
• %HFCS90	9	N 0 M

Selection and Ordering data	Article No.	Ord. code
SITRANS FC430 Digital coriolis flowmeter with SITRANS FCS400 Standard flow sensor with hygienic and flange/pipe thread connections and compact or remote mounting with FCT030 transmitter	7ME4613-	
Transmitter/DSL material & mounting style		
Compact, IP67, aluminum		D
Remote, IP67, aluminum, M12		G
Remote, IP67, aluminum, T/Box		K
Ex approval		
Non-Ex		A
ATEX II 2GD		C
IECEx GDb		F
FM, Class 1, Div 1		H
CSA, Class 1, Zone 1		M
Local User Interface		
Blind		1
Graphical, 240 x 160 pxl		3

• We can offer shorter delivery times for configurations designated with the Quick Ship Symbol •. For details see page 9/5 in the appendix.

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Cable glands	
Metric, no glands	A 01
Metric, plastic	A 02
Metric, brass/Ni plated	A 05
Metric, stainless steel	A 06
NPT, no glands	A 11
NPT, Plastic	A 12
NPT, brass/Ni plated	A 15
NPT, stainless steel	A 16
Software functions and CT approvals	
Standard	B 11
CT standard	B 31
I/O configuration Ch1	
Ca 4 ... 20 mA HART active SIL certified	E 04
Cp 4 ... 20 mA HART passive SIL certified	E 05
Ca 4 ... 20 mA HART active	E 06
Cp 4 ... 20 mA HART passive	E 07
Only compact versions can be used in SIL applications.	

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC430

3

Selection and Ordering data

I/O configuration Ch2, Ch3 and Ch4

Order code
None
◆ F00
F40
F41
F42
F43
F44
F45
F46
F47
F50
F51
F60
F61
F62
F63
F64
F65
F66
F67
F70
F71
F80
F81
F82
F83
F84
F85
F86
F87
F90
F91
F92
F93
F94
F95
F96
F97

Notes on I/O configurations:

a or p suffix: The I/O module is selected at ordering with either active or passive function.

Signal: The output can be selected for Current (0 or 4 to 20 mA), frequency or pulse function in the menu.

I: Discrete status input to the flowmeter. Functions are selected in the menu including 'Freeze output', 'Reset totalizer'.

R: Relay output for discrete status reporting. Function is selected in the menu, including 'Error', 'High flow warning'.

The MLFB structure for FC430 systems must be filled to **this level**, including "-Z" options A., B., E. and F.

Selection and Ordering data

Add-on options and accessories

Please add "-Z" to Article No. and specify Order code(s).

Certificates

Order code
Pressure test certificate CRN
Pressure test certificate PED
Material certificate EN 10204-3.1
Welding inspection report
Factory certificate to EN 10204 2.1
◆ C10
Factory certificate to EN 10204 2.2
C11

Cable

Order code
None
L50
5 m (16.4 ft), standard with M12 plugs fitted
L51
5 m (16.4 ft), standard
L52
10 m (32.8 ft) standard with M12 plugs fitted
L55
10 m (32.8 ft), standard
L56
25 m (82 ft), standard with M12 plugs fitted
L59
25 m (82 ft), standard
L60
50 m (164 ft), standard with M12 plugs fitted
L63
50 m (164 ft), standard
L64
75 m (246 ft), standard with M12 plugs fitted
L67
75 m (246 ft), standard
L68
150 m (492 ft), standard with M12 plugs fitted
L71
150 m (492 ft), standard
L72

Additional data

Please add "-Z" to Article No. and specify Order code(s) and plain text.

Tag name

Tag name plate, stainless steel	Y17
---------------------------------	-----

Customer specific calibration

Customer specific calibration (5 flow x 2 points)	Y61
Customer specific calibration (10 flow x 1 point)	Y62

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Operating instructions for SITRANS FC430

Description	Article No.
• English	A5E03361511
• German	A5E03651143
• Spanish	A5E03651152
• French	A5E03651188
• Italian	A5E03651190
• Chinese	A5E03922773

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>

Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Order code
SITRANS FC430 Digital coriolis flowmeter	7ME4623-		Further designs	
with SITRANS FCS400 Flow sensor			Please add "-Z" to Article No. and specify Order code(s).	
Hygienic version with Ra < 0.8 µm, 3A approved, and compact or remote mounting with FCT030 transmitter			Cable glands	
Sensor size, connection size			Metric, no glands	◆ A01
DN 15, DN 10 (½", 3/8")	◆ 3 F		Metric, plastic	◆ A02
DN 15, DN 15 (½", ½")	◆ 3 G		Metric, brass/Ni plated	◆ A05
DN 15, DN 20 (½", ¾")	◆ 3 H		Metric, stainless steel	◆ A06
DN 15, DN 25 (½", 1")	◆ 3 J		NPT, no glands	◆ A11
DN 25, DN 25 (1", 1")	◆ 3 L		NPT, plastic	◆ A12
DN 25, DN 25 (1", 1¼")	◆ 3 M		NPT, brass/Ni plated	◆ A15
DN 25, DN 40 (1", 1½")	◆ 3 N		NPT, stainless steel	◆ A16
DN 50, DN 40 (2", 1½")	◆ 4 B		Software functions and CT approvals	
DN 50, DN 50 (2", 2")	◆ 4 C		Standard	◆ B11
DN 80, DN 65 (3", 2½")	◆ 4 J		CT standard	◆ B31
DN 80, DN 80 (3", 3")	◆ 4 K		I/O configuration Ch1	
Process connection			Ca 4 ... 20 mA HART active SIL certified	◆ E04
DIN 11851 0.8 µm screwed	◆ F 1		Cp 4 ... 20 mA HART passive SIL certified	◆ E05
DIN 32676 0.8 µm Tri-Clamp	◆ G 1		Ca 4 ... 20 mA HART active	◆ E06
DIN 11864-1 0.8 µm screwed	◆ H 1		Cp 4 ... 20 mA HART passive	◆ E07
DIN 11864-2 0.8 µm flanged	◆ H 2			
ISO 2852 0.8 µm clamped	◆ J 1			
ISO 2853 0.8 µm screwed	◆ J 5			
Wetted parts material				
AISI 316L/1.4435 (40 bar max.)	◆ 1			
Calibration/Accuracy class				
0,1 % flow, 5 kg/m³ density	◆ 1			
0,1 % flow, 1 kg/m³ density	◆ 4			
Standard fraction calibration				
• API number	◆ 9		N 0 A	
• Balling	◆ 9		N 0 B	
• °Baumé light	◆ 9		N 0 C	
• °Baumé heavy	◆ 9		N 0 D	
• °Brix	◆ 9		N 0 E	
• °Oeschlé	◆ 9		N 0 F	
• °Plato	◆ 9		N 0 G	
• Specific Gravity	◆ 9		N 0 H	
• °Twaddell	◆ 9		N 0 J	
• %HFCS42	◆ 9		N 0 K	
• %HFCS55	◆ 9		N 0 L	
• %HFCS90	◆ 9		N 0 M	
Transmitter/DSL material and mounting style				
Compact, IP67, aluminum	◆ D			
Remote, IP67, aluminum, M12	◆ G			
Remote, IP67, aluminum, T/Box	◆ K			
Ex approval				
Non-Ex	◆ A			
ATEX II 2GD	◆ C			
IECEX GDb	◆ F			
FM, Class 1, Div 1	◆ H			
CSA, Class 1, Zone 1	◆ M			
Local User Interface				
Blind	◆ 1			
Graphical, 240 x 160 pxl	◆ 3			

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC430

3

Selection and Ordering data

Order code

I/O configuration Ch2, Ch3 and Ch4

None
 aSignal, None, None
 aSignal, aSignal, None
 aSignal, aSignal, aSignal
 aSignal, aSignal, Ia
 aSignal, aSignal, R
 aSignal, Ia, None
 aSignal, Ia, Ia
 aSignal, Ia, R
 aSignal, R, None
 aSignal, R, R
 pSignal, None, None
 pSignal, pSignal, None
 pSignal, pSignal, pSignal
 pSignal, pSignal, Ip
 pSignal, pSignal, R
 pSignal, Ip, None
 pSignal, Ip, Ip
 pSignal, Ip, R
 pSignal, R, None
 pSignal, R, R
 aSignal, aSignal, pSignal
 aSignal, aSignal, Ip
 aSignal, pSignal, None
 aSignal, pSignal, pSignal
 aSignal, pSignal, Ia
 aSignal, pSignal, Ip
 aSignal, pSignal, R
 aSignal, Ia, Ip
 aSignal, Ip, None
 aSignal, Ip, Ip
 aSignal, Ip, R
 pSignal, pSignal, Ia
 pSignal, Ia, None
 pSignal, Ia, Ia
 pSignal, Ia, Ip
 pSignal, Ia, R

◆ **F00**
F40
F41
F42
F43
F44
F45
F46
F47
F50
F51
F60
F61
F62
F63
F64
F65
F66
F67
F70
F71
F80
F81
F82
F83
F84
F85
F86
F87
F90
F91
F92
F93
F94
F95
F96
F97

Notes on I/O configurations:

a or p suffix: The I/O module is selected at ordering with either active or passive function.

Signal: The output can be selected for Current (0 or 4 to 20 mA), frequency or pulse function in the menu.

I: Discrete status input to the flowmeter. Functions are selected in the menu including 'Freeze output', 'Reset totalizer'.

R: Relay output for discrete status reporting. Function is selected in the menu, including 'Error', 'High flow warning'.

The MLFB structure for FC430 systems must be filled to **this level**, including "-Z" options A., B., E. and F.

Selection and Ordering data

Order code

Add-on options and accessories

Please add "-Z" to Article No. and specify Order code(s).

Certificates

Pressure test certificate CRN **C01**
 Pressure test certificate PED **C02**
 Material certificate EN 10204-3.1 **C05**
 Welding inspection report **C07**
 Factory certificate to EN 10204 2.1 ◆ **C10**
 Factory certificate to EN 10204 2.2 **C11**

Cable

None **L50**
 5 m (16.4 ft), standard with M12 plugs fitted **L51**
 5 m (16.4 ft), standard **L52**
 10 m (32.8 ft) standard with M12 plugs fitted **L55**
 10 m (32.8 ft), standard **L56**
 25 m (82 ft), standard with M12 plugs fitted **L59**
 25 m (82 ft), standard **L60**
 50 m (164 ft), standard with M12 plugs fitted **L63**
 50 m (164 ft), standard **L64**
 75 m (246 ft), standard with M12 plugs fitted **L67**
 75 m (246 ft), standard **L68**
 150 m (492 ft), standard with M12 plugs fitted **L71**
 150 m (492 ft), standard **L72**

Additional data

Please add "-Z" to Article No. and specify Order code(s) and plain text.

Tag name

Tag name plate, stainless steel **Y17**

Customer specific calibration

Customer specific calibration (5 flow x 2 points) **Y61**
 Customer specific calibration (10 flow x 1 point) **Y62**

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Operating instructions for SITRANS FC430

Description	Article No.
• English	A5E03361511
• German	A5E03651143
• Spanish	A5E03651152
• French	A5E03651188
• Italian	A5E03651190
• Chinese	A5E03922773

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>

Selection and Ordering data	Article No.	Ord. code
SITRANS FC430 Digital coriolis flowmeter	7ME4713-	
with SITRANS FCS400 NAMUR compliant flow sensor with flange/pipe thread connections and compact or remote mounting with FCT030 transmitter		
Sensor size, Connection size		
DN 15, DN 15 (½", ½")	3 G	
DN 25, DN 25 (1", 1")	3 L	
DN 50, DN 50 (2", 2")	4 C	
DN 80, DN 80 (3", 3")	4 K	
Process connection		
EN1092-1 B1, PN 40	A 1	
EN1092-1 B1, PN 100	A 3	
ANSI B16.5-2009, class 150	D 1	
ANSI B16.5-2009, class 600	D 3	
ISO228-1 G pipe thread	E 1	
ASME B1.20.1 NPT pipe thread	E 3	
Wetted parts material		
AISI 316L/W1.4435/W1.4404 (100 barg max.)	1	
Calibration/Accuracy class		
0,1 % flow, 5 kg/m³ density	1	
0,1 % flow, 1 kg/m³ density	4	
Standard fraction calibration		
• API number	9	N 0 A
• Balling	9	N 0 B
• °Baumé light	9	N 0 C
• °Baumé heavy	9	N 0 D
• °Brix	9	N 0 E
• °Oeschlé	9	N 0 F
• °Plato	9	N 0 G
• Specific Gravity	9	N 0 H
• °Twaddell	9	N 0 J
• %HFCS42	9	N 0 K
• %HFCS55	9	N 0 L
• %HFCS90	9	N 0 M
Transmitter/DSL material & mounting style		
Compact, IP67, aluminum	D	
Remote, IP67, aluminum, M12	G	
Remote, IP67, aluminum, T/Box	K	
Ex approval		
Non-Ex	A	
ATEX II 2GD	C	
IECEX GDb	F	
FM, Class 1, Div 1	H	
CSA, Class 1, Zone 1	M	
Local User Interface		
Blind	1	
Graphical, 240 x 160 pxl	3	

◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 9/5 in the appendix.

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Cable glands	
Metric, no glands	◆ A01
Metric, plastic	◆ A02
Metric, brass/Ni plated	A05
Metric, stainless steel	◆ A06
NPT, no glands	A11
NPT, plastic	A12
NPT, brass/Ni plated	A15
NPT, stainless steel	A16
Software functions and CT approvals	
Standard	◆ B11
CT standard	B31
I/O configuration Ch1	
Ca 4 ... 20 mA HART active, SIL certified	◆ E04
Cp 4 ... 20 mA HART passive, SIL certified	◆ E05
Ca 4 ... 20 mA HART active	E06
Cp 4 ... 20 mA HART passive	E07

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC430

3

Selection and Ordering data

I/O configuration Ch2, Ch3 and Ch4

Order code
None
• F00
aSignal, None, None
F40
aSignal, aSignal, None
F41
aSignal, aSignal, aSignal
F42
aSignal, aSignal, Ia
F43
aSignal, aSignal, R
F44
aSignal, Ia, None
F45
aSignal, Ia, Ia
F46
aSignal, Ia, R
F47
aSignal, R, None
F50
aSignal, R, R
F51
pSignal, None, None
F60
pSignal, pSignal, None
F61
pSignal, pSignal, pSignal
F62
pSignal, pSignal, Ip
F63
pSignal, pSignal, R
F64
pSignal, Ip, None
F65
pSignal, Ip, Ip
F66
pSignal, Ip, R
F67
pSignal, R, None
F70
pSignal, R, R
F71
aSignal, aSignal, pSignal
F80
aSignal, aSignal, Ip
F81
aSignal, pSignal, None
F82
aSignal, pSignal, pSignal
F83
aSignal, pSignal, Ia
F84
aSignal, pSignal, Ip
F85
aSignal, pSignal, R
F86
aSignal, Ia, Ip
F87
aSignal, Ip, None
F90
aSignal, Ip, Ip
F91
aSignal, Ip, R
F92
pSignal, pSignal, Ia
F93
pSignal, Ia, None
F94
pSignal, Ia, Ia
F95
pSignal, Ia, Ip
F96
pSignal, Ia, R
F97

Notes on I/O configurations:

a or p suffix: The I/O module is selected at ordering with either active or passive function.

Signal: The output can be selected for Current (0 or 4 to 20 mA), frequency or pulse function in the menu.

I: Discrete status input to the flowmeter. Functions are selected in the menu including 'Freeze output', 'Reset totalizer'.

R: Relay output for discrete status reporting. Function is selected in the menu, including 'Error', 'High flow warning'.

The MLFB structure for FC430 systems must be filled to **this level**, including "-Z" options A..., B..., E... and F...

Selection and Ordering data

Order code

Add-on options and accessories

Please add "-Z" to Article No. and specify Order code(s).

Certificates

Pressure test certificate CRN	C01
Pressure test certificate PED	C02
Material certificate EN 10204-3.1	C05
Welding inspection report	C07
Factory certificate to EN 10204 2.1	• C10
Factory certificate to EN 10204 2.2	C11

Cable

None	L50
5 m (16.4 ft), standard with M12 plugs fitted	L51
5 m (16.4 ft), standard	L52
10 m (32.8 ft) standard with M12 plugs fitted	L55
10 m (32.8 ft), standard	L56
25 m (82 ft), standard with M12 plugs fitted	L59
25 m (82 ft), standard	L60
50 m (164 ft), standard with M12 plugs fitted	L63
50 m (164 ft), standard	L64
75 m (246 ft), standard with M12 plugs fitted	L67
75 m (246 ft), standard	L68
150 m (492 ft), standard with M12 plugs fitted	L71
150 m (492 ft), standard	L72

Additional data

Please add "-Z" to Article No. and specify Order code(s) and plain text.

Tag name

Tag name plate, stainless steel	Y17
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Customer specific calibration

Customer specific calibration (5 flow x 2 points)	Y61
Customer specific calibration (10 flow x 1 point)	Y62

• We can offer shorter delivery times for configurations designated with the Quick Ship Symbol •. For details see page 9/5 in the appendix.

Operating instructions for SITRANS FC430

Description	Article No.
• English	A5E03361511
• German	A5E03651143
• Spanish	A5E03651152
• French	A5E03651188
• Italian	A5E03651190
• Chinese	A5E03922773

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<http://www.siemens.com/flowdocumentation>

Overview



The flow measuring principle is based on the Coriolis Effect. The SITRANS FC430 flowmeter consists of a sensor type FCS400 and a transmitter FCT030. The FCS400 sensor's measuring tubes are energized by an electro-mechanical driver circuit which oscillates them at their resonance frequency.

Two pick-ups are placed symmetrically upstream and downstream of the central driver. When a process fluid passes through the sensor, the Coriolis Effect will act on the vibrating tubes and cause deflection which can be measured as a phase shift between pick-ups 1 and 2. The phase shift is proportional to the mass flow rate.

The amplitude of the driver is automatically regulated to ensure a stable output from both of the pickups.

The temperatures of the sensor tubes and frame are measured with high precision to provide compensation for changes with temperature in the measuring properties.

The sensor signals are analyzed for flow, density and fluid temperature in the sensor front end. The digital signal is controlled to conform to high Safety Integrated Level (SIL) and sent digitally to the transmitter via standard cable. The transmitter further calculates total mass and volume, fraction, dosing control and many other functions.

The front-end module has a process noise filter, which can be used to improve the meter's performance when installation and application conditions are not ideal. Typical interferences from process conditions such as pump pulsations, mechanical vibrations, oscillating valves can be reduced considerably.

Fraction

The sensor FCS400 can be calibrated at works to measure and report various fraction concentrations of two-part mixtures or solutions. Where a discrete relationship exists between concentration and density at particular temperatures a calculation is performed and the percentage concentration by volume or mass of Part A or Part B (100% minus Part A) is measured. For solutions and some mixtures the total mass, or dry weight, is also available.

In some industries, a selection of standard density scales has been adopted to represent the density or relative density of the process fluid.

At ordering the following fraction or standard density scales can be specified:

- API number
- Balling
- °Baumé light
- °Baumé heavy
- °Brix
- °Oeschlé
- °Plato
- Specific Gravity
- °Twaddell
- %HFCS42
- %HFCS55
- %HFCS90

Integration

The SITRANS FCS400 Massflow sensor is suitable for both indoor and outdoor installation and meets the requirements of Protection Class IP67/NEMA 4X. Optionally the sensor can be supplied with hazardous certification to Class 1 Zone 1 (ATEX, IEC Ex) or Class 1 Div. 1 (FM).

The flowmeter is bidirectional and can be installed in any orientation. The sensor is self-draining in many positions, with vertical mounting preferred.

It is important to ensure that the sensor tubes are always completely filled with homogeneous fluid; otherwise measuring errors may occur. Suitable fluids are clean liquids, pastes, light slurries or gases. Condensing vapours, aerated liquids or slush are not recommended.

The materials in contact with the process medium must be evaluated for corrosion and erosion resistances for long sensor life.

The pressure drop through the sensor is a function of the properties of the fluid and the flow rate. A pressure loss and accuracy calculator can be found on the Siemens Internet site www.siemens.com/fc430/sizer

The preferred flow direction is indicated by an arrow on the sensor. Flow in the direction of the arrow will be measured as positive. The sense of the flow can be adjusted at the transmitter to compensate for reverse installation.

Installation orientation

The optimal installation orientation is vertical with the flow upwards. This ensures that suspended solids or bubbles are completely pushed through the sensor. A drain valve below the sensor will allow the pipe and sensor to drain completely.

Supports

In order to support the weight of the flowmeter and to ensure reliable measurements when external effects exist (e.g. plant vibrations), the sensor should be installed in rigidly supported pipelines.

Supports or hangers should be installed symmetrically and stress-free in close proximity to both of the process connections.

Shut-off devices

To conduct a system zero adjustment, secure shut-off devices are required in the pipeline.

Where possible, shut-off devices should be installed both upstream and downstream of the flowmeter.

System design

- The sensor design consists of process connections, inlet and outlet manifolds mounted in a stiff frame and two parallel tubes equally sharing the process medium flow. The meter is protected in a pressure-rated stainless steel enclosure with two purge ports to support a pressure guard in non-Ex applications.
- The sensing tubes are curved in the CompactCurve shape which gives high sensitivity and low pressure loss. The CompactCurve shape was selected to ensure that the smallest flows are measured with optimal signal to noise ratio.

Flow Measurement

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Flow sensor SITRANS FCS400

- Vibration mode separation creates a controlled measuring environment only within the CompactCurve part of the tubes. As a result the sensor has high immunity to plant vibration while avoiding large mass balancing of the meter components.
- The 15° slope of the CompactCurve shape ensures secure self-draining when the sensor axis is mounted vertically or up to 10° off vertical.
- The sensor frame is designed to conduct plant vibrations directly through the sensor body to adjacent pipeline while providing isolation of the metering section from the vibration. Careful mounting of the pipeline with regard to minimizing vibration at the meter will ensure a secure measurement environment.

Installation guidelines

- The mass flowmeter does not require any flow conditioning or straight inlet pipe sections. Care should be exercised however to ensure that any upstream valves, gates, sight glasses etc. do not cavitate and are not set into vibration by the flow.
- It is always preferred to place the flowmeter upstream of any control valve (what goes in, comes out) or other pipeline component which may cause flashing, cavitation or vibrations.
- 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 liquid piping system or where vapour can collect. Install the meter low in pipeline sections to maintain system pressure and compress any bubbles.
- Drop lines downstream from the flow sensor should be avoided to prevent the meter tube from draining during flowing conditions. A back-pressure device or orifice is recommended to ensure that flow does not separate within the flow sensor but the metering section remains at positive pressure at all times while there is flow.
- The flowmeter should not come into contact with any other objects. Avoid making attachments to the housing except for the pressure guard components (if required).
- When the connecting pipeline is larger than the sensor size, suitable standard reducers may be installed. A selection of oversize and undersize connections can be ordered - refer to the sizes tables below.
- The flow sensor may be supported at the junction between process connection and the manifold, but should not be used to support adjacent piping. Ensure that the piping is also supported on both sides so that connection stresses are neutral.
- 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. 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) above the vapour pressure of the process fluid.
- Assure that operation below the vapour pressure cannot occur particularly for fluids with low latent heat of vaporisation.
- The sensor should not be installed in the vicinity of strong electromagnetic fields, e.g. near motors, pumps, variable frequency drives, transformers etc.
- When operating meters on a common mounting base the sensors should be mounted and spaced separate from each other to avoid cross-talk and other vibration interferences.
- When operating meters in interconnected pipelines the pipes should be decoupled to prevent cross talk.

Remote system cabling

The system is designed so that standard instrumentation cable with four cores and overall screen or two screened pairs can be used, or cable sets can be ordered with the flowmeter. The cable can be ordered in various set lengths and terminated in the field.

The maximum design length for the sensor cable is 200 m (656.17 ft). Data transmission speed and process variable update rates may be affected by the cable characteristics. For best results, choose a cable with the following electrical characteristics:

Property	Unit	Value
Resistance	[Ω /km]	59
Characteristic impedance	[Ω]	100 @ 1 MHz
Insulation resistance	[M Ω /km]	200
Maximum voltage	[V]	300

The flowmeter system applies maximum 15 V DC in operation and is certified intrinsically safe. The complete system is insulation tested to 1500 V in production.

Cabling solutions which can be ordered with the flowmeter are as follows:

1. High performance plugged cable using M12 plugs into prepared sockets
2. Cable glands for either metric or NPT threaded terminal housings.
3. Plain cable in set lengths to be passed through flexible and rigid conduit (not supplied) for metric or NPT threaded terminal housings

Cable for items 1, 2 and 3 are available either gray for standard applications or light blue for Ex applications to identify the circuit as intrinsically safe.

Insulation and heating

For applications where pipeline insulation is required for personnel protection or process temperature maintenance, the SITRANS FCS400 flow sensor may also be insulated. The form and material of insulation is not prescribed and entirely depends on the practices at the application location or plant.

Insulation must not be crowded around the sensor pedestal but shaped at a 45° cone to allow the pedestal to radiate excess heat and maintain a suitable working temperature within the front-end housing.

Where trace heating is employed, an electric heating jacket can be ordered as an accessory. It is shaped to the sensor body and controlled from a weatherproof setpoint device.

The jacket can heat the sensor enclosure up to 200 °C (392 °F). However further insulation is also recommended for personnel protection or low loss temperature maintenance.

Calibration

To ensure accurate measurement all flowmeters must be initially calibrated. The calibration of each SITRANS FCS400 coriolis sensor is conducted at SIEMENS flow facilities accredited according to ISO/IEC 17025 by DANAK. A calibration certificate is shipped with every sensor and calibration data are stored in the SensorFlash memory unit. 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).

Technical specifications**Flow sensor FCS400**

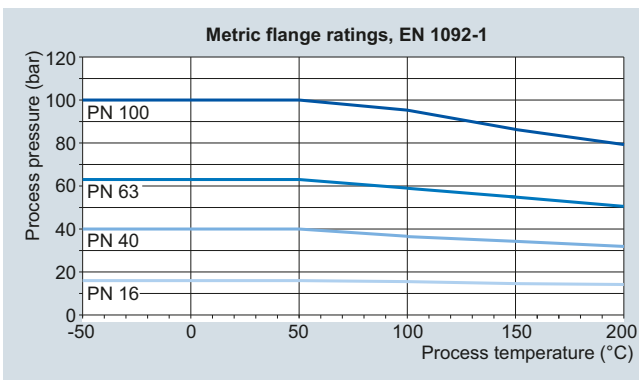
Parameter	Unit	Value
Process pressure range	[barg (psi)]	0 ... 100 (0 ... 1450)
Process temperature range	[°C (°F)]	-50 ... +200 (-58 ... +392)
Ambient temperature range	[°C (°F)]	-40 ... +60 (-40 ... +140)
Transport temperature range	[°C (°F)]	-40 ... +70 (-40 ... +158)
Density range	[kg/m ³ (lb/ft ³)]	1 ... 5000 (0.062 ... 312.2)
Process media	Fluid group	1 (suitable for dangerous fluids)
	Form	Light slurry, liquid and non-condensing gas
No. of process values		
• Primary process values		<ul style="list-style-type: none"> • Mass flow • Density • Process medium temperature
• Derived process values		<ul style="list-style-type: none"> • Volume flow • Corrected volume flow (with reference density) • Fraction A:B • Fraction % A:B

Performance specifications

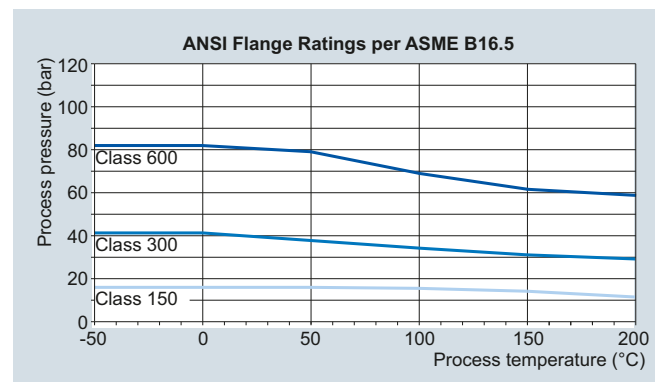
Parameter	Unit	Sensor			
		DN 15	DN 25	DN 50	DN 80
Max. zero point error	[kg/h (lb/min)]	0.2 (0.007)	2.0 (0.072)	7.5 (0.276)	18 (0.66)
Qmin	[kg/h (lb/min)]	20 (0.735)	200 (7.35)	750 (27.6)	900 (33.1)
Qnom	[kg/h (lb/min)]	3 700 (136.0)	11 500 (422.6)	52 000 (1 911)	136 000 (4 997)
Qmax	[kg/h (lb/min)]	31 900 (1 172)	88 400 (3 248)	353 500 (12 990)	904 800 (33 246)
Linearity error	[%]	± 0.1	± 0.1	± 0.1	± 0.1
Repeatability	[%]	± 0.05	± 0.05	± 0.05	± 0.05
Density error	[kg/m ³ (lb/ft ³)]	± 5 (± 0.31)	± 5 (± 0.31)	± 5 (± 0.31)	± 5 (± 0.31)
Extended density calibration	[kg/m ³ (lb/ft ³)]	± 1 (± 0.062)	± 1 (± 0.062)	± 1 (± 0.062)	± 1 (± 0.062)
Temperature error	[°C (°F)]	± 0.5 (± 0.9)	± 0.5 (± 0.9)	± 0.5 (± 0.9)	± 0.5 (± 0.9)

Pressure/temperature curves

With two major exceptions, the pressure rating of the flow sensors is independent of the process medium temperature. Design rules for flange connections in both the EN1092-1 and ASME B16.5 standards dictate pressure derating with increasing temperature. The charts below show the effect of process medium temperature on the pressure ratings for the flanges within the FCS400 product program.



EN1092-1 flanged sensors



ASME B16.5 flanged sensors

Flow Measurement

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Flow sensor SITRANS FCS400

Sensor variants

SITRANS FCS400 sensors are available in three main variants: Standard, hygienic and NAMUR. A wide range of process connections is available for the FCS400 sensors. The available combinations of type, sensor size and connection size are shown in the tables below.

Standard sensors

Sensor	Connection	EN 1092-1 B1, PN 16	EN 1092-1 B1, PN 40	EN 1092-1 B1, PN 63	EN 1092-1 B1, PN 100	EN 1092-1 D Nut, PN 40	EN 1092-1 D Nut, PN 63	EN 1092-1 D Nut, PN 100	ANSI B16.5-2009, class 150	ANSI B16.5-2009, class 300	ANSI B16.5-2009, class 600	ISO 228-1 G pipe thread	ASME B1.20.1 NPT pipe thread	DIN 11851 Hygienic screwed	DIN 32676 Hygienic Tri-clamp	DIN 11864-1A Aseptic screwed	DIN 11864-2A Aseptic flanged	ISO 2852 Hygienic clamped	ISO 2853 Hygienic screwed	SMS 1145 Hygienic screwed	12-VCO-4 Quick connect	JIS B2200:2004/10K	JIS B2200:2004/20K	JIS B2200:2004/40K	
316 Stainless - Standard: 7ME461-...																									
DN 15 (½")	DN 6 (¼")											o	o												
	DN 10 (⅜")													o											
	DN 15 (½")	o	●	o	●	o	o	o	●	o	●	●	●	●	●	●	●					o	o	o	o
	DN 20 (¾")								●	o	●				●										
	DN 25 (1")	o	●		●									o					●	●	o				
DN 25 (1")	DN 15 (½")																								
	DN 25 (1")	o	●	o	●	o	o	o	●	o	●	●	●	●	●	●	●	●	●	o		o	o	o	
	DN 32 (1¼")													o											
	DN 40 (1½")	o	●		o				o	o	o				●			o	o						
DN 50 (2")	DN 25 (1")																								
	DN 40 (1½")	o	●	o	●	o	o	o						o		o	●	o	o	o					
	DN 50 (2")	o	●	o	●	o	o	o	●	o	●	●	●	●	●	●	●	●	●	o		o	o	o	
	DN 65 (2½")																								
DN 80 (3")	DN 50 (2")																								
	DN 65 (2½")	o	●	o	o				●	o	●			●											
	DN 80 (3")	o	●	o	●	o	o	o	●	o	●			●	●	●	●	●	●	o		o	o	o	
	DN 100 (4")	o	o	o	o																				

- Combinations shown ● are Mainstream products with delivery time of up to 15 days depending on the combination and production stock levels.
- Combinations shown o are Sidestream products with delivery from 45 to 90 days. Not all components are held in production stock for Sidestream products.

Hygienic sensor variants

The hygienic sensors all have maximum internal surface roughness < 0.8 µm and are EHEDG and 3A approved. Hygienic sensors are offered with process connection conforming to various international quick-connect clamps or threaded connectors. Pressure ratings are according to the relevant standard and the sensor size. Maximum pressure in the hygienic program is PN 40.

Sensor	Connection	DIN 11851 0.8 µm screwed	DIN 32676 0.8 µm Tri-clamp	DIN 11864-1 0.8 µm screwed	DIN 11864-2 0.8 µm flanged	ISO 2852 0.8 µm clamped	ISO 2853 0.8 µm screwed
316 SS - Hygienic: 7ME462.-...							
DN 15 (½")	DN 6 (¼")	○					
	DN 10 (⅜")	○					
	DN 15 (½")	●	●	●	●		
	DN 20 (¾")		●				
	DN 25 (1")	○				●	●
DN 25 (1")	DN 15 (½")	●	●	●	●	●	●
	DN 25 (1")	●	●	●	●	●	●
	DN 32 (1¼")	○					
	DN 40 (1½")		●			○	○
DN 50 (2")	DN 25 (1")	○		○	●	○	○
	DN 40 (1½")	○		○	●	○	○
	DN 50 (2")	●	●	●	●	●	●
	DN 65 (2½")						
DN 80 (3")	DN 50 (2")						
	DN 65 (2½")	●					
	DN 80 (3")	●	●	●	●	●	●
	DN 100 (4")						

- Combinations shown ● are Mainstream products with delivery time of up to 15 days depending on the combination and production stock levels.
- Combinations shown ○ are Sidestream products with delivery from 45 to 90 days. Not all components are held in production stock for Sidestream products.

Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS400

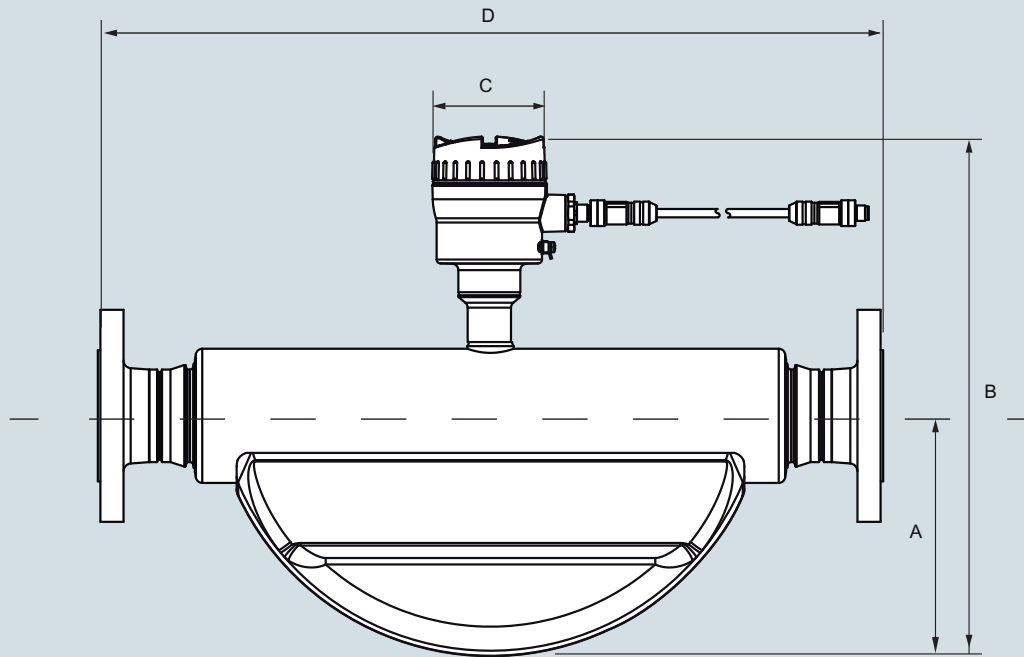
NAMUR sensor variants

The NAMUR variants have build-in lengths according to NAMUR recommendation NE 132. The recommendations of NE 132 are stated for sensors with flanges the same size as the sensor nominal size, and for flanges to EN1092-1 PN 40 with B1 flange facing. For couplings of other standards such as ASME B16.5 Class 150, the overall length incorporates the difference in length between standard EN and ASME flanges. NAMUR variants are offered with flange and pipe thread connections according to EN, ISO and ASME standards, as shown in the table below.

Sensor	Connection	EN 1092-1 B1, PN 16	EN 1092-1 B1, PN 40	EN 1092-1 B1, PN 63	EN 1092-1 B1, PN 100	EN 1092-1 D Nut, PN 40	EN 1092-1 D Nut, PN 63	EN 1092-1 D Nut, PN 100	ANSI B16.5-2009, class 150	ANSI B16.5-2009, class 300	ANSI B16.5-2009, class 600	ISO 228-1 G pipe thread	ASME B1.20.1 NPT pipe thread	DIN 11851 Hygienic screwed	DIN 32676 Hygienic Tri-clamp	DIN 11864-1A Aseptic screwed	DIN 11864-2A Aseptic flanged	ISO 2852 Hygienic clamped	ISO 2853 Hygienic screwed
316 Stainless - NAMUR: 7ME471-...																			
DN 15 (½")	DN 6 (¼")											○	○						
	DN 10 (⅜")													○					
	DN 15 (½")	○	●	○	●	○	○	○	●	○	●	●	●	●	●	●	●		
	DN 20 (¾")								●	○	●				●				
	DN 25 (1")	○	●		●									○				●	●
DN 25 (1")	DN 15 (½")																		
	DN 25 (1")	○	●	○	●	○	○	○	●	○	●	●	●	●	●	●	●	●	●
	DN 32 (1¼")													○					
	DN 40 (1½")	○	●		○				○	○	○				●			○	○
DN 50 (2")	DN 25 (1")																		
	DN 40 (1½")	○	●	○	●	○	○	○						○		○	●	○	○
	DN 50 (2")	○	●	○	●	○	○	○	●	○	●	●	●	●	●	●	●	●	●
	DN 65 (2½")	○																	
DN 80 (3")	DN 50 (2")																		
	DN 65 (2½")	○	●	○	○				●	○	●			●					
	DN 80 (3")	○	●	○	●	○	○	○	●	○	●			●	●	●	●	●	●
	DN 100 (4")	○	○	○	○														

- Combinations shown ● are Mainstream products with delivery time of up to 15 days depending on the combination and production stock levels.
- Combinations shown ○ are Sidestream products with delivery from 45 to 90 days. Not all components are held in production stock for Sidestream products.

Dimensional drawings



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Sensor [DN]	[inch]	A		B		C		Weight	
		[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[kg]	[lb]
15	½	90	3.54	280	11.02	90	3.54	4.6	10.14
25	1	115	4.53	315	12.40	90	3.54	7.9	17.42
50	2	180	7.09	390	15.35	90	3.54	15	33.07
80	3	294	11.57	424	16.69	90	3.54	53	116.84

SITRANS FCS400, dimensions in mm (inch), weights in kg (lb), for a EN 1092 PN 40 flanged version.

The build-in length D depends on the flange.

Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS400

Overall length

The overall length (build-in length) of each sensor depends on the connection standard and the pressure rating. The tables below summarize the dimensions available at the time of publishing. Please contact Siemens for further information about our desired process connection specification.

316L stainless - Standard: 7ME461.-...

Sensor	DN 15 (½")					DN 25 (1")			DN 50 (2")		DN 80 (3")		
	DN 6 (¼")	DN 10 (3/8")	DN 15 (½")	DN 20 (¾")	DN 25 (1")	DN 25 (1")	DN 32 (1¼")	DN 40 (1½")	DN 40 (1½")	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")
EN1092-1 B1, PN 16			265		265	360			610	610	915	840	840
EN1092-1 B1, PN 40			265		265	360		365	610	610	915	840	840
EN1092-1 B1, PN 63			265			360			610	610	915	915	915
EN1092-1 B1, PN 100			270		275	360			610	610	915	915	915
ANSI B16.5, class 150			270	270		360		365		620	915	875	
ANSI B16.5, class 300			270	270		360		380		620	915	875	
ANSI B16.5, class 600			270	285		360		380		620	915	875	
ISO 228-1 GH pipe thread	265		265			365				620			
ANSI B1.20.1 NPT pipe thread	265		270			365				620			
DIN 11851 Hygienic screwed		265	265		193	360	360		610	610	840	840	
DIN 32676-C Hygienic clamp			265	265		360		360		610		875	
DIN 11864-1 Aseptic screwed			265	265		360				610		875	
DIN 11864-2 Aseptic flange			265	265		360		274	620	610		875	
ISO 2852 Hygienic clamp					265	360			610	610		840	
ISO 2853 Hygienic screwed			265			360		274		610		860	

SITRANS FCS400, overall length, dimensions in mm

Sensor	DN 15 (½")					DN 25 (1")			DN 50 (2")		DN 80 (3")		
	DN 6 (¼")	DN 10 (3/8")	DN 15 (½")	DN 20 (¾")	DN 25 (1")	DN 25 (1")	DN 32 (1¼")	DN 40 (1½")	DN 40 (1½")	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")
EN1092-1 B1, PN 16			10.43		10.43	14.17			24.02	24.02	36.02	33.07	33.07
EN1092-1 B1, PN 40			10.43		10.43	14.17		14.37	24.02	24.02	36.02	33.07	33.07
EN1092-1 B1, PN 63			10.43			14.17			24.02	24.02	36.02	36.02	36.02
EN1092-1 B1, PN 100			10.63		10.83	14.17			24.02	24.02	36.02	36.02	36.02
ANSI B16.5, class 150			10.63	10.63		14.17		14.37		24.41	36.02	34.45	
ANSI B16.5, class 300			10.63	10.63		14.17		14.96		24.41	36.02	34.45	
ANSI B16.5, class 600			10.63	11.22		14.17		14.96		24.41	36.02	34.45	
ISO 228-1 GH pipe thread	10.43		10.43			14.37				24.41			
ANSI B1.20.1 NPT pipe thread	10.43		10.63			14.37				24.41			
DIN 11851 Hygienic screwed		10.43	10.43		7.60	14.17	14.17		24.02	24.02	33.07	33.07	
DIN 32676-C Hygienic clamp			10.43	10.43		14.17		14.17		24.02		34.45	
DIN 11864-1 Aseptic screwed			10.43	10.43		14.17				24.02		34.45	
DIN 11864-2 Aseptic flange			10.43	10.43		14.17		10.78	24.41	24.02		34.45	
ISO 2852 Hygienic clamp					10.43	14.17			24.02	24.02		33.07	
ISO 2853 Hygienic screwed			10.43			14.17		10.78		24.02		33.86	

SITRANS FCS400, overall length, dimensions in inch

316L stainless - Hygienic 0.8 µm: 7ME462-...

Sensor	DN 15 (½")				DN 25 (1")			DN 50 (2")		DN 80 (3")	
	DN 10 (3/8")	DN 15 (½")	DN 20 (¾")	DN 25 (1")	DN 25 (1")	DN 32 (1¼")	DN 40 (1½")	DN 40 (1½")	DN 50 (2")	DN 65 (2½")	DN 80 (3")
DIN 11851 Hygienic screwed	265	265			360	360		610	610	840	840
DIN 32676-C Hygienic clamp		265	265		360		360		610		875
DIN 11864-1 Aseptic screwed		265			360				610		875
DIN 11864-2 Aseptic flange		265			360			620	610		875
ISO 2852 Hygienic clamp				265	360			610	610		840
ISO 2853 Hygienic screwed				265	360				610		860

SITRANS FCS400, overall length, dimensions in mm

Sensor	DN 15 (½")				DN 25 (1")			DN 50 (2")		DN 80 (3")	
	DN 10 (3/8")	DN 15 (½")	DN 20 (¾")	DN 25 (1")	DN 25 (1")	DN 32 (1¼")	DN 40 (1½")	DN 40 (1½")	DN 50 (2")	DN 65 (2½")	DN 80 (3")
DIN 11851 Hygienic screwed	10.43	10.43		7.60	14.17	14.17		24.20	24.20	33.07	33.07
DIN 32676-C Hygienic clamp		10.43	10.43		14.17		14.17		24.20		34.45
DIN 11864-1 Aseptic screwed		10.43			14.17				24.20		34.45
DIN 11864-2 Aseptic flange		10.43			14.17			24.41	24.20		34.45
ISO 2852 Hygienic clamp				10.43	14.17			24.20	24.20		33.07
ISO 2853 Hygienic screwed				10.43	14.17				24.20		33.86

SITRANS FCS400, overall length, dimensions in inch

Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS400

316L stainless - NAMUR: 7ME471.-...

Sensor	DN 15 (½")					DN 25 (1")			DN 50 (2")		DN 80 (3")		
	DN 6 (¼")	DN 10 (3/8")	DN 15 (½")	DN 20 (¾")	DN 25 (1")	DN 25 (1")	DN 32 (1¼")	DN 40 (1½")	DN 40 (1½")	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")
EN1092-1 B1, PN 16			510		510	600			715	715	915	915	915
EN1092-1 B1, PN 40			510		510	600			715	715	915	915	915
EN1092-1 B1, PN 63			510			600			715	715	915	915	915
EN1092-1 B1, PN 100						600			715	715	915	915	915
EN1092-1 D, PN 16			510			600			715	715		915	
EN1092-1 D, PN 40			510			600			715	715		915	
EN1092-1 D, PN 63						600			715	715		915	
ANSI B16.5, class 150						600					915		
ANSI B16.5, class 300						600					915		
ANSI B16.5, class 600						600					915		
ISO 228-1 GH pipe thread	510		510										
ANSI B1.20.1 NPT pipe thread	510												
DIN 11851 Hygienic screwed		510	510			600	600		715	715	915	915	
DIN 32676-C Hygienic clamp			510	510		600		600		715			
DIN 11864-1 Aseptic screwed			510			600				715			
DIN 11864-2 Aseptic flange													
ISO 2852 Hygienic clamp					510	600			715	715		915	
ISO 2853 Hygienic screwed					510	600				715			

SITRANS FCS400, overall length, dimensions in mm

Sensor	DN 15 (½")					DN 25 (1")			DN 50 (2")		DN 80 (3")		
	DN 6 (¼")	DN 10 (3/8")	DN 15 (½")	DN 20 (¾")	DN 25 (1")	DN 25 (1")	DN 32 (1¼")	DN 40 (1½")	DN 40 (1½")	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")
EN1091-1 B1, PN 16			20.08		20.08	23.62			28.15	28.15	36.02	36.02	36.02
EN1091-1 B1, PN 40			20.08		20.08	23.62			28.15	28.15	36.02	36.02	36.02
EN1091-1 B1, PN 63			20.08			23.62			28.15	28.15	36.02	36.02	36.02
EN1091-1 B1, PN 100						23.62			28.15	28.15	36.02	36.02	36.02
EN1092-1 D, PN 16			20.08			23.62			28.15	28.15		36.02	
EN1092-1 D, PN 40			20.08			23.62			28.15	28.15		36.02	
EN1092-1 D, PN 63						23.62			28.15	28.15		36.02	
ANSI B16.5, class 150						23.62					36.02		
ANSI B16.5, class 300						23.62					36.02		
ANSI B16.5, class 600						23.62					36.02		
ISO 228-1 GH pipe thread	20.08		20.08										
ANSI B1.20.1 NPT pipe thread	20.08												
DIN 11851 Hygienic screwed		20.08	20.08			23.62	23.62		28.15	28.15	36.02	36.02	
DIN 32676-C Hygienic clamp			20.08	20.08		23.62		23.62		28.15			
DIN 11864-1 Aseptic screwed			20.08			23.62				28.15			
DIN 11864-2 Aseptic flange													
ISO 2852 Hygienic clamp					20.08	23.62			28.15	28.15		36.02	
ISO 2853 Hygienic screwed					20.08	23.62				28.15			

SITRANS FCS400, overall length, dimensions in inch

Overview



FCT030 is based on the latest developments within digital signal processing technology – engineered for high measuring performance, fast response to step changes in flow, fast dosing applications, high immunity against process noise, easy to install commission and maintain.

The FCT030 transmitter delivers true multi-parameter measurements i.e. massflow, volumeflow, corrected volumeflow, density, temperature and fraction.

The FCT030 IP67 transmitter can be remote connected or compact mounted with all sensors of type FCS400, sizes DN 15 to DN 80.

Application

SITRANS FC430 mass flowmeters are suitable for 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.

Coriolis flowmeters can be applied in all industries, such as:

- Chemical & Pharma: detergents, bulk chemicals, acids, alkalis, pharmaceuticals, blood products, vaccines, insulin production
- Food & Beverage: dairy products, beer, wine, soft drinks, °Brix/°Plato, fruit juices and pulps, bottling, CO₂ dosing, CIP/SIP-liquids, mixture recipe control
- Automotive: fuel injection nozzle & pump testing, filling of AC units, engine consumption
- Oil & Gas: filling of gas bottles, furnace control, test separators
- Hydrocarbon processing: oil refining, derivatives manufacturing, polymerisation
- Water & Waste Water: dosing of chemicals for water treatment

The multiple outputs and bus communication mean that all of the process information can be read either instantaneously (10 ms update) or periodically as plant operation requires.

Benefits

Flow calculation and measurement

- Dedicated mass flow calculation with patented DSP technology
- Fast dosing and flow step response with maximum 10 ms response time.
- 100 Hz update rate to all outputs
- Maximum data age from pickup to output is 20 ms (two update cycles)
- Independent low flow cut-off settings for mass and volume flowrates

- Automatic zero-point adjustment on command
- Empty pipe monitoring

Operation and display

- User-configurable operation display
 - Full graphical display 240 x 160 pixels with up to 6 programmable views
 - Self-explaining alarm handling/log in clear text
 - Help text for all parameters appears automatically in the configuration menu
 - Keypad can be used for controlling dosing as start/stop/hold/reset
- SensorFlash technology stores production specific system documentation and provides removable memory of all flowmeter setups and functions
 - Calibration certificates
 - Pressure and material test certificates (as ordered)
 - Non-volatile memory backup of operational data
 - Transfer of user configuration to other flowmeters

Alarms and safety

- Advanced diagnosis and service menu enhances troubleshooting and meter validation
- Configurable upper and lower alarm and warning limits for all process values
- Alarm handling can be selected between Siemens and NAMUR standard configurations
- Designed from the ground up and certified for integrated safety in accordance with IEC 61508 and IEC 61511.
 - SIL 2 (single-channel operation)
 - SIL 3 (dual-channel operation)
 Unlike many systems which are certified in practice, the SITRANS FC430 system is certified in design, which is a higher qualification and more robust for secure implementation of safety systems.

Outputs and control

- Built-in dosing controller with compensation and monitoring comprising 3 built-in totalizers
- Multi-parameter outputs, individually configurable for mass-flow, volumeflow, corrected volumeflow, density, temperature or fraction flow such as °Brix or °Plato

Up to four I/O channels are configured as follows:

Channel 1

Channel 1 is 4 to 20 mA analog output with HART 7.2 which can be validated and setup for safety critical applications (SIL 3). The current signal can be configured for massflow, volumeflow or density.

Channel 2

Channel 2 is a signal output which can be freely configured for any process variable.

- Analog current (0/4 to 20 mA)
- 3 stage analog valve dosing control
- Frequency or pulse
- Discrete one or two-valve dosing control in combination with channel 3 or 4
- Operational and alarm status

Channels 3 and 4

Channels 3 and 4 can be ordered with signal (freely configured for any process variable) or relay outputs, or signal input.

Flow Measurement

SITRANS F C

Transmitter SITRANS FCT030

Signal

Signal output can be user configured to:

- Analog current (0/4 to 20 mA)
- 3 stage analog valve dosing control
- Frequency or pulse
- Redundant frequency or pulse (linked to Channel 2)
- Discrete one or two-valve dosing control
- Operational and alarm status

Relay

Relay output(s) can be user configured to:

- Discrete one or two-valve dosing control
- Operation status including flow direction
- Alarm status

Signal input

Signal input can be user-configured for

- Dosing control
- Totalizer reset functions
- Force or freeze output(s)

Signal outputs and inputs are individually ordered as active or passive.

During service and maintenance all outputs can be forced to a preset value for simulation, verification or calibration purposes.

Approvals and certificates

The FC430 coriolis flowmeter program was designed from the ground up to comply with or exceed the requirements of international standards and regulations.

Design

The transmitter SITRANS FCT030 is designed in an IP67/NEMA 4X aluminum enclosure with corrosion resistant coating. It can be remote connected or compact mounted with an FCS400 sensor of size DN 15, DN 25, DN 50 or DN 80.

FCT030 is available as standard with one current, HART 7.2 output and can be fitted with add-on modules for additional input/output functions.

The transmitter has a modular design with discrete, replaceable electronic modules and connection boards to maintain separation between functions and facilitate field service. All modules are fully traceable and their provenance is included in the transmitter setup.

SensorFlash

SensorFlash is a standard, 1 GByte micro SD card with the ability to be updated by PC. It is supplied with each sensor with the complete set of certification documents including calibration report. Material, pressure test, factory conformance certificates are optional at ordering.

The Siemens SensorFlash memory unit offers the following features and benefits:

- Automatically program any similar transmitter in seconds to the operation standard
- Transmitter replacement in less than 5 minutes
- True "plug & play" provided by integrated cross-checking data consistency and HW/SW version verification
- Permanent database of operational and functional information from the moment that the flowmeter is switched on
- New firmware updates can be downloaded from the SIEMENS internet portal for Product Support and placed onto SensorFlash (unmounted from the transmitter and inserted into a PC's SD card slot). The firmware is then inserted into the existing flowmeter and the complete system upgraded.

Function

The following functions are available:

- Mass flowrate, volume flowrate, density, process temperature, fraction flow
- Up to four output/input channels selected at ordering
- Outputs can be individually configured with mass, volume, density etc.
- Three built-in totalizers which can count positive, negative or net flows
- Low flow cut-off, adjustable
- Density cut-off or empty pipe cut-off, adjustable
- Flow direction adjustable
- Alarm system consisting of alarm-log, alarm pending menu
- Internal data logger is updated each 10 minutes with operational data such as system health, totalizer values, all configurations and data needed for Custody Transfer requirements to OIML R 117
- Display of operating time with real-time clock. Daylight saving time is not implemented
- Uni/bidirectional flow measurement
- Flowrate outputs are freely configurable between maximum negative and maximum positive flows according to the sensor capacity
- Limit switches programmable for flow, density, temperature or fraction process values. Limit points can be graded as warning and alarm for values both above and below nominal process conditions
- Process noise filter for optimization of measurement performance under non-ideal application conditions. 5-stage pumping filter compensates for flow fluctuations caused by e.g. single acting piston pumps
- Full dosing controller with 5 user-configurable recipes
- Automatic zero adjustment menu, with zero point evaluation display
- Full service menu for effective and straight forward application and meter troubleshooting
- Precise temperature measurement ensures optimum accuracy on massflow, density and fraction flow.
- Fraction flow computation is based on a 5th-order algorithm matching known applications. Users can either select from a list of standard fractions such as °Brix or "Ethanol in water", or order a specific fraction calibration to exactly match the process conditions. All standard fraction calculations fit within 0.1% of the true value.

Technical specifications

Process media	<ul style="list-style-type: none"> Fluid Group 1 (suitable for dangerous fluids) Aggregate state: Paste/light slurry, liquid and gas
Number of process variables	7
Measurement of	<ul style="list-style-type: none"> Mass flow Volume flow Density Process media temperature Corrected volume flow Reference density Fraction A flow Fraction B flow Fraction A % Fraction B %
Current output	
Current	0 ... 20 mA or 4 ... 20 mA (Channel 1 only 4 ... 20 mA)
Load	< 500 Ω per channel
Time constant	0 ... 100 s adjustable
Digital output	
Pulse	41.6 μs ... 5 s pulse duration
Frequency	0 ... 10 kHz, 50 % duty cycle, 120 % overscale provision
Time constant	0 ... 100 s adjustable
Active	0 ... 24 V DC, 110 mA, short-circuit-protected
Passive	3 ... 30 V DC, max. 110 mA
Relay	
Type	Change-over voltage-free relay contact
Load	30 V AC/100 mA
Functions	Alarm level, alarm number, limit, flow direction
Digital input	
Voltage	15 ... 30 V DC (2 ... 15 mA)
Functionality	Start/stop/hold/continue dosing, reset totalizer 1 and 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	Three eight-digit counters for forward, net or reverse flow
Display	<ul style="list-style-type: none"> 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	
• Transmitter	-40 ... +60 °C (-40 ... +140 °F), (humidity max. 95 %)
• Display	-20 ... +60 °C (-4 ... +140 °F)
Storage	
• Transmitter	-40 ... +70 °C (-40 ... +158 °F) (Humidity max. 95 %)
• Display	-20 ... +70 °C (-4 ... +158 °F)
Communication	HART 7.2
Enclosure	
Material	Aluminum
Rating	IP67/NEMA 4X to IEC 529 and DIN 40050 (1 mH ₂ O for 30 min.)
Mechanical load	18 ... 400 Hz random, 3.17 g RMS, in all directions
Supply voltage	
Supply	20 ... 27 V DC ± 10% 100 ... 240 V AC ± 10 %, 47 ... 63 Hz
Fluctuation	No limit
Power consumption	7.5 W/15 VA
EMC performance	
Emission	EN/IEC 61326-1-4 (Industry)
Immunity	EN/IEC 61326-1-2 (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	<ul style="list-style-type: none"> 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	<p>Cable gland are available in Nylon, Nickel plated brass or stainless steel (316L/W1.4404) in the following dimensions:</p> <ul style="list-style-type: none"> M20 ½" NPT
Cable	Standard industrial signal cable up to 200 m long with 2 x screened pairs or 4-wire overall screen can be laid between the sensor and transmitter. Siemens offers cables in a selection of pre-cut lengths and prepared for either gland or plug connection.

Flow Measurement

SITRANS F C

Transmitter SITRANS FCT030

Approvals

Hazardous area

- ATEX Ex II 2(1) GD
Ex d e [ia] ia IIC T6 Gb

Custody transfer

- FM/CSA Class1 Div. 1
- IEC Ex II 2(1) GD
Ex d e [ia] ia IIC T6 Gb

Pressure equipment

- OIML R 117 type approval to a wide variety of liquids other than water

Hygienic applications

- PED
- CRN
- Unfired pressure vessels (UK)
- EHEDG for all sensors
- 3A for hygienic variant sensors
- External cleanability satisfies EHEDG and 3A rules

Certificates

Safety Integration Level (applies only to compact versions)

- SIL 3 for software
- SIL 2 for hardware
- SIL 3 for redundant hardware systems

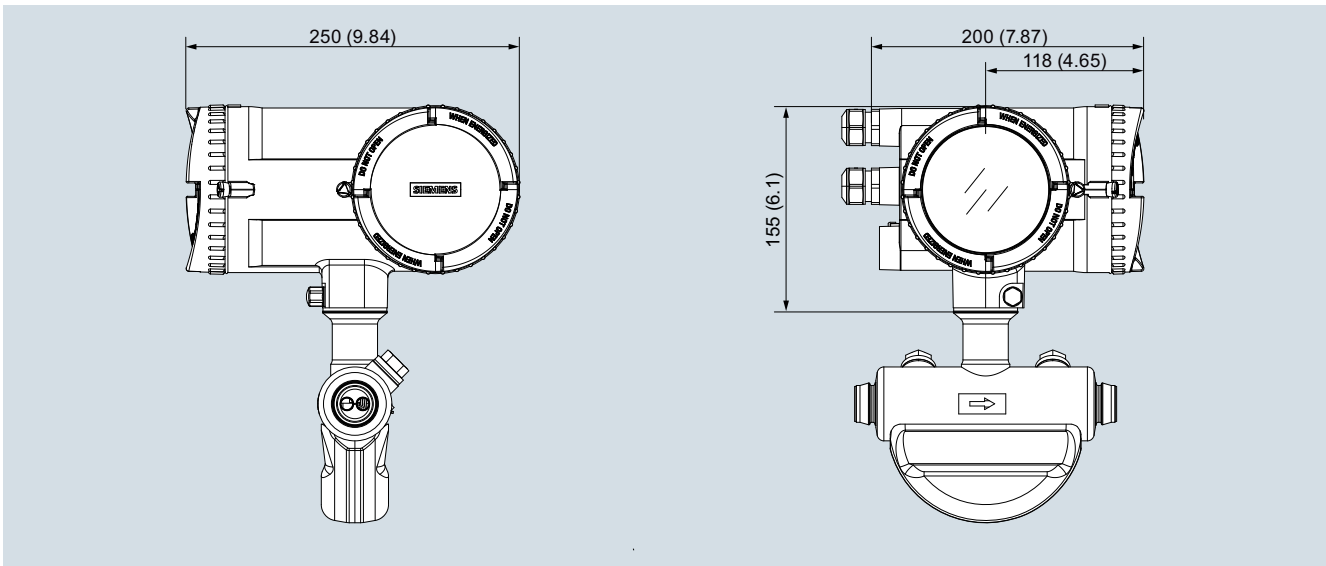
CE mark

- Pressure equipment
- Low voltage directive
- WEEE

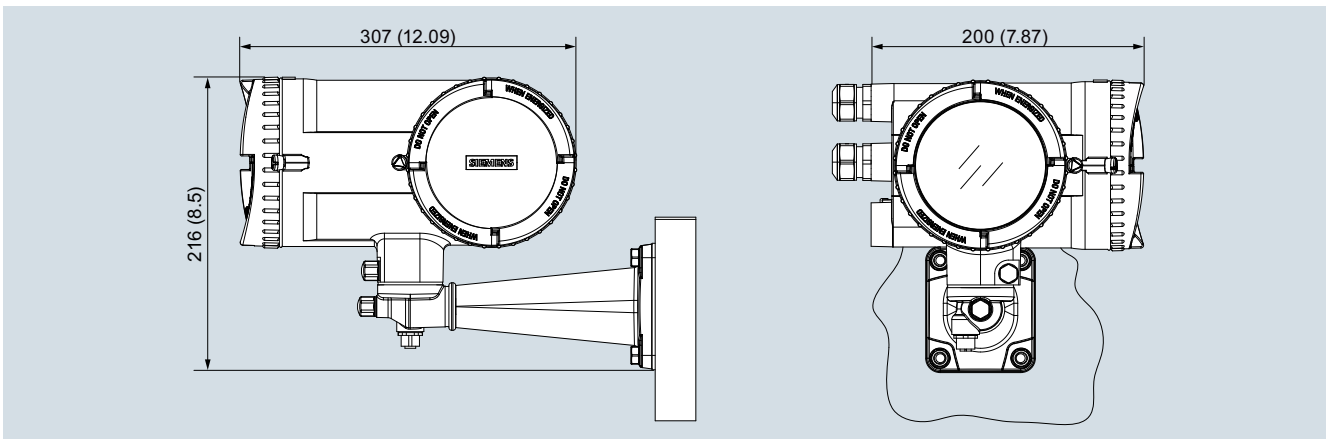
Regional certifications

- RoHS
- C-TICK (Australia and New Zealand EMC)
- NEPSI (China Ex)
- TISS (Japan)

Dimensional drawings









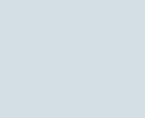









SITRANS FCT030, compact version, dimensions in mm (inch)



SITRANS FCT030, remote version, dimensions in mm (inch)

Accessories

Description	Article No.	
CT plug Tamper cover for CT locking. Fits over the M12 plug at both sensor and transmitter ends of the remote system cable	A5E31478498	
Bag of glands (metric) in black plastic ¹⁾	A5E03907414	
Bag of glands (metric) in gray plastic Ex e/i ¹⁾	A5E03907424	
Bag of glands (metric) in AISI 316 SS Ex e/i ¹⁾	A5E03907429	
Bag of glands (metric) in NiPlatedBrass Ex e/i ¹⁾	A5E03907430	
Bag of glands (NPT) in black plastic ²⁾	A5E03907435	
Bag of glands (NPT) in gray plastic Ex e/i ²⁾	A5E03907451	
Bag of glands (NPT) in AISI 316 SS Ex e/i ²⁾	A5E03907467	
Bag of glands (NPT) in NiPlatedBrass Ex e/i ²⁾	A5E03907473	
Standard cable (non-Ex) with M12 plugs, PO insulation and PUR sleeve, gray, -40 ... +80 °C (-40 ... +176 °F)		
• 5 m (16.4 ft)	A5E03914805	
• 10 m (32.8 ft)	A5E03914850	
• 25 m (82 ft)	A5E03914853	
• 50 m (164 ft)	A5E03914859	
• 75 m (246 ft)	A5E03914861	
• 150 m (492 ft)	A5E03914874	
Standard cable (non-Ex) for termination, PO insulation and PUR sleeve, gray, -40 ... +80 °C (-40 ... +176 °F)		
• 5 m (16.4 ft)	A5E03914833	
• 10 m (32.8 ft)	A5E03914849	
• 25 m (82 ft)	A5E03914854	
• 50 m (164 ft)	A5E03914856	
• 75 m (246 ft)	A5E03914864	
• 150 m (492 ft)	A5E03914873	

Description	Article No.	
Standard cable (Ex) with M12 plugs, PO insulation and PUR sleeve, blue, -40 ... +80 °C (-40 ... +176 °F)		
• 5 m	A5E03914929	
• 10 m	A5E03914962	
• 25 m	A5E03914995	
• 50 m	A5E03915004	
• 75 m	A5E03915074	
• 150 m	A5E03915088	
Standard cable (Ex) for termination, PO insulation and PUR sleeve, blue, -40 ... +80 °C (-40 ... +176 °F)		
• 5 m	A5E03914945	
• 10 m	A5E03914973	
• 25 m	A5E03914984	
• 50 m	A5E03915015	
• 75 m	A5E03915057	
• 150 m	A5E03915100	
Service toolkit for field maintenance of transmitter and sensor components. Contains all hand tools necessary for maintenance. Other tools may be required for installation.	A5E03722877	
Heating Jacket, indoor use, 200 °C (392 °F) max. temperature. Complete with 5 m (16.4 ft) high temperature cable fitted. Dedicated plug connection to controller		
• DN 15 electric	A5E03830623	
• DN 25 electric	A5E03830624	
• DN 50 electric	A5E03830625	
• DN 80 electric	A5E03830626	
Heating jacket controller, IP65. Digital display for 0 ... 200 °C (32 ... 392 °F) control setpoint		
• 230 V AC	A5E03839193	
• 115 V AC	A5E03839194	

¹⁾ 2 pcs M20; 1 pce M25 with single and dual cable inserts

²⁾ 2 pcs ½" NPT; 1 pce ½" NPT with single and dual cable inserts

Flow Measurement

SITRANS F C

SITRANS FC430 Accessories/Spare parts

Description	Dimension	Article 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

3

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 3rd-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 6 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

Flow Measurement

SITRANS F C

Transmitter MASS 6000 IP67 compact/remote

Technical specifications

Measurement of	Mass flow [kg/s (lb/min)], volume flow [l/s (gpm)], fraction [%], °Brix, density [kg/m ³ , (lb/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 ... 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 galva- nically isolated. Isolation voltage: • 500 V to supply • 50 V between outputs
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 for- ward, net or reverse flow
Display	<ul style="list-style-type: none"> 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 nega- tive 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 RS 485, DeviceNet, FOUNDATION Fieldbus H1

Enclosure	
Material	Fibre glass reinforced polyamide
Rating	IP67/NEMA 6
Mechanical load	18 ... 1000 Hz random, 3.17 Grms, in all directions, to IEC 68-2-36
Supply voltage	
24 V version	
• Supply	18 ... 30 V DC 20 ... 30 V AC
230 V version	
• Supply	87 ... 253 V AC, 50 ... 60 Hz
Power consumption	
24 V DC	6 W
24 V AC	10 VA
30 V DC	9 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 61326-1-4 (Industry)
Immunity	EN/IEC 61326-1-2 (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:	<ul style="list-style-type: none"> 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 fol- lowing dimensions: M20 or ½" NPT

Transmitter MASS 6000 IP67 compact/remote

Selection and Ordering data	Article 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)	7 ME 4 1 1 0 - AA00AA
Version Remote IP67/NEMA 6 enclosure	2
Supply voltage 115/230 V AC, 50 ... 60 Hz 24 V AC/DC	1 2
Display/Keypad with display	1
Serial communication No communication HART PROFIBUS PA Profile 3 PROFIBUS DP Profile 3 MODBUS RTU RS 485 DeviceNet FOUNDATION Fieldbus H1	A B F G E H J
Cable glands M20 ½" NPT	1 2

Operating instructions for SITRANS F C MASS 6000 IP67

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

Add-on module

Description	Article No.
HART (Ex-i)	• FDK:085U0226
PROFIBUS PA Profile 3 (Ex-i)	FDK:085U0236
PROFIBUS DP Profile 3	FDK:085U0237
MODBUS RTU RS 485	FDK:085U0234
FOUNDATION Fieldbus H1 (Ex-i)	A5E02054250
DeviceNet	FDK:085U0229



• We can offer shorter delivery times for configurations designated with the Quick Ship Symbol . For details see page 9/5 in the appendix.

Operating instructions for SITRANS F add-on modules

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

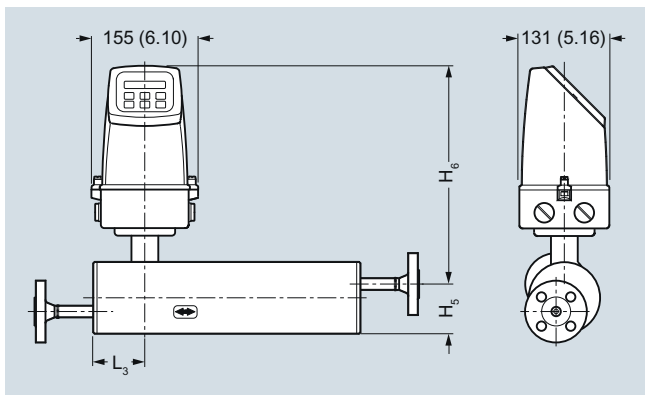
This device is shipped with a Quick Start guide and a CD containing further SITRANS F C literature.

Flow Measurement SITRANS F C

Transmitter MASS 6000 IP67 compact/remote

Dimensional drawings

Compact

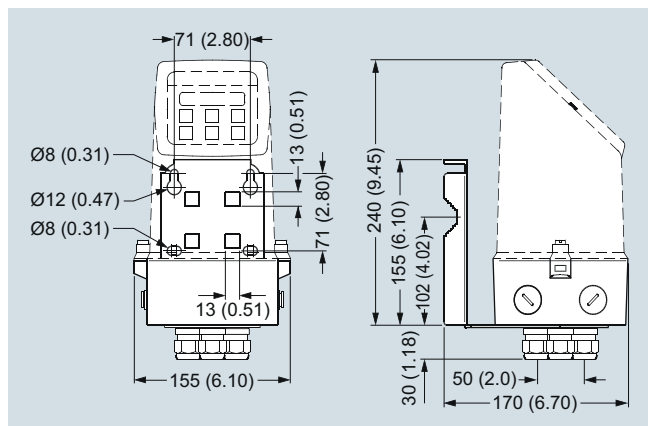


Dimensions in mm (inch)

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 (1/4)	62 (2.44)	72 (2.83)	316 (12.44)	388 (15.28)
15 (1/2)	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 (1 1/2)	75 (2.95)	227 (8.94)	330 (13.00)	557 (21.93)

Transmitter wall mounted



Dimensions in mm (inch)

Schematics

Electrical connection

Grounding

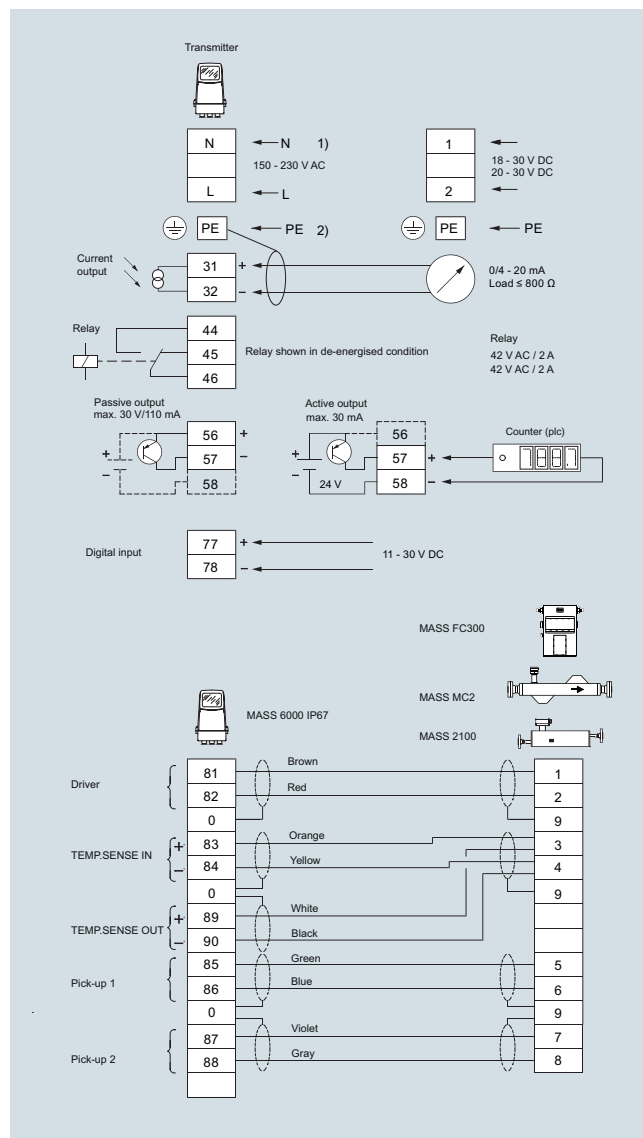
PE must be connected due to safety class 1 power supply.

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.



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 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
- 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 IP65
- Back of panel mounting IP20
- Wall mounting IP66

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

Flow Measurement

SITRANS F C

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 (lb/min)], volume flow [l/s (gpm)], fraction [%], °Brix, density [kg/m ³ (lb/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 to supply • 50 V between outputs
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	<ul style="list-style-type: none"> • Background illumination with alphanumeric 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 RS 485, DeviceNet, FOUNDATION Fieldbus H1
Enclosure 19"	
Material	Aluminum/steel (DIN 41494)
Rating	IP20
Mechanical load	18 ... 1000 Hz random, 3.17G rms, 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 I _N = 250 mA, I _{ST} = 2 A (30 ms)
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
Power consumption	
230 V AC	9 VA max.
24 V DC	6 W
EMC performance	
Emission	EN/IEC 61236-1-4 (Industry)
Immunity	EN/IEC 61236-1-2 (Industry)
Ex approval	[Ex 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.
Cable	<ul style="list-style-type: none"> • 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

Flow Measurement

SITRANS F C

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

Selection and Ordering data	Article No.
SITRANS F C MASS 6000 transmitter Transmitter for rack and wall mounting, incl. connection board	7 ME 4 1 1 0 - 2 ■ ■ ■ ■ ■ A 0
Enclosure 19 inch insert IP20 (rack) 19 inch insert in IP65 (wall mounting)	C E
Output configuration 1 current, 1 frequency, 1 relay 3 current, 2 frequency, 2 relay	A C
Supply voltage 115/230 V AC, 50/60 Hz 24 V AC/DC	1 2
Ex Approvals Standard (No Ex-approval) ATEX	0 1
Display/Keypad With display	1
Serial communication (Only possible to connect to MASS 6000 version with 1 current output) No communication HART PROFIBUS PA Profile 3 PROFIBUS DP Profile 3 MODBUS RTU RS 485 DeviceNet FOUNDATION Fieldbus H1	A B F G E H 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).

Operating instructions for SITRANS F C MASS 6000 19"

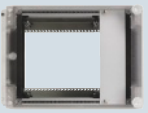


Description	Article No.
• English	A5E02944875

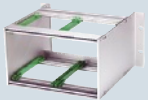

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

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



Accessories

Enclosure

Description	Article No.	
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	


Description	Article No.	
Back of panel mounting enclosure for 19" insert (42 TE); IP20/NEMA 1 enclosure in aluminum	FDK:083F5033	
Front cover (7TE) for panel mounting enclosure	FDK:083F4525	

Cable glands

Description	Article 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	Article No.	
HART (Ex-i)	FDK:085U0226	
PROFIBUS PA Profile 3 (Ex-i)	FDK:085U0236	
PROFIBUS DP Profile 3	FDK:085U0237	
MODBUS RTU RS 485	FDK:085U0234	
FOUNDATION Fieldbus H1 (Ex-i)	A5E02054250	
DeviceNet	FDK:085U0229	

Operating instructions for SITRANS F add-on modules

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

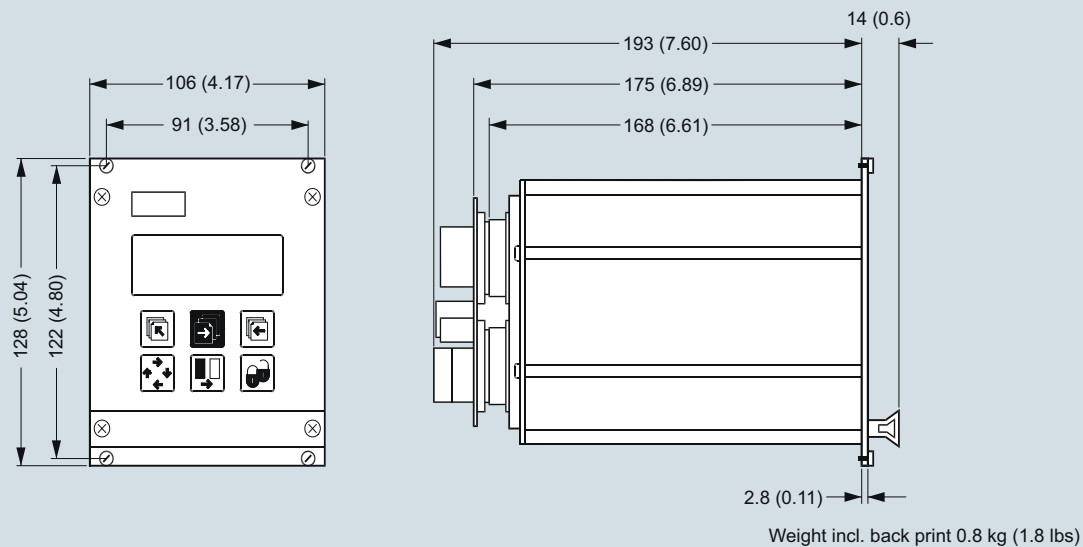
This device is shipped with a Quick Start guide and a CD containing further SITRANS F C literature.

Flow Measurement SITRANS F C

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

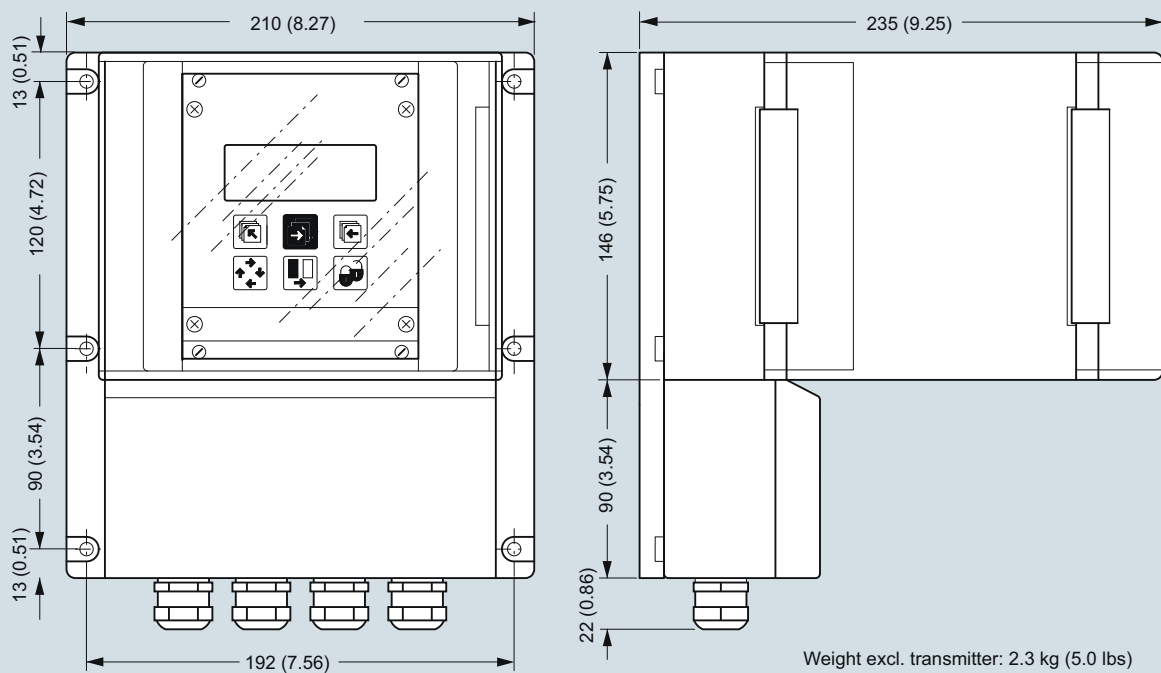
Dimensional drawings

Transmitter 19" insert



Dimensions in mm (inch)

Transmitter 19" wall mounting



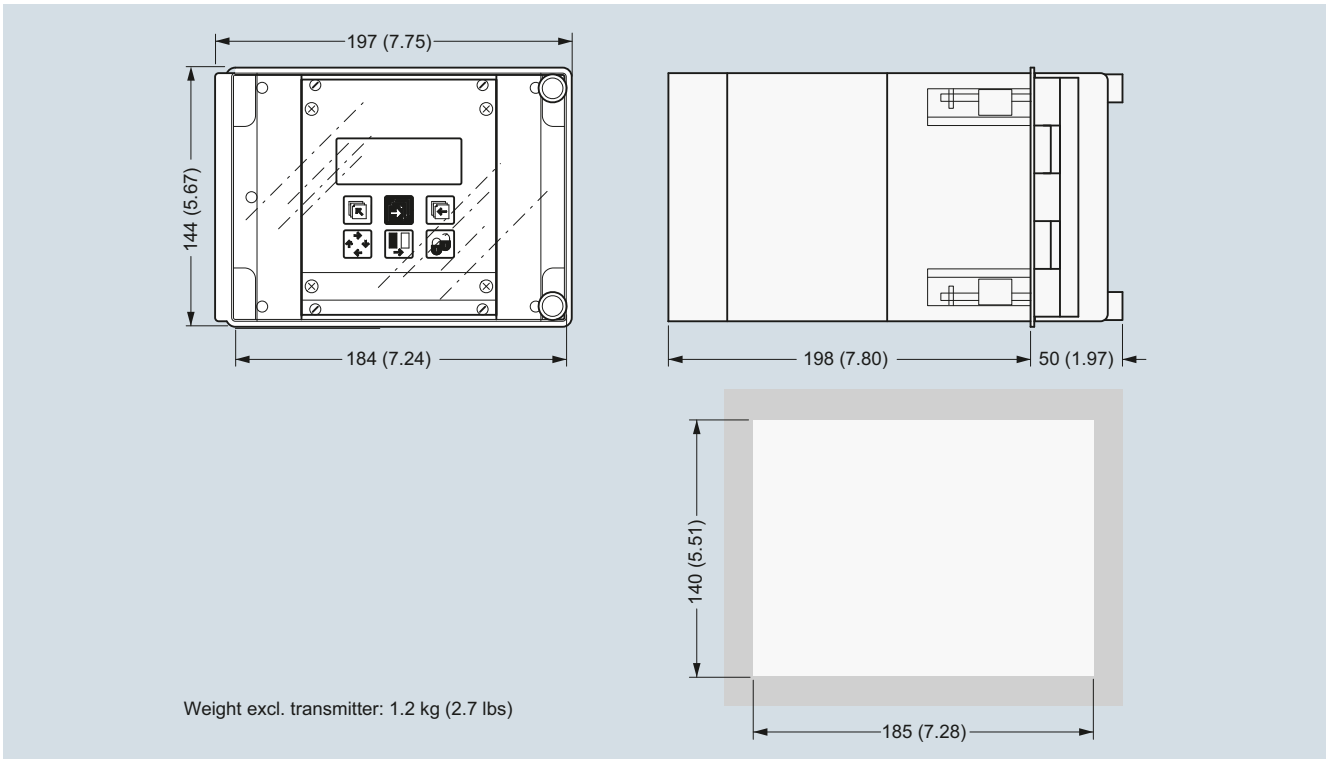
Dimensions in mm (inch)

Flow Measurement SITRANS F C

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

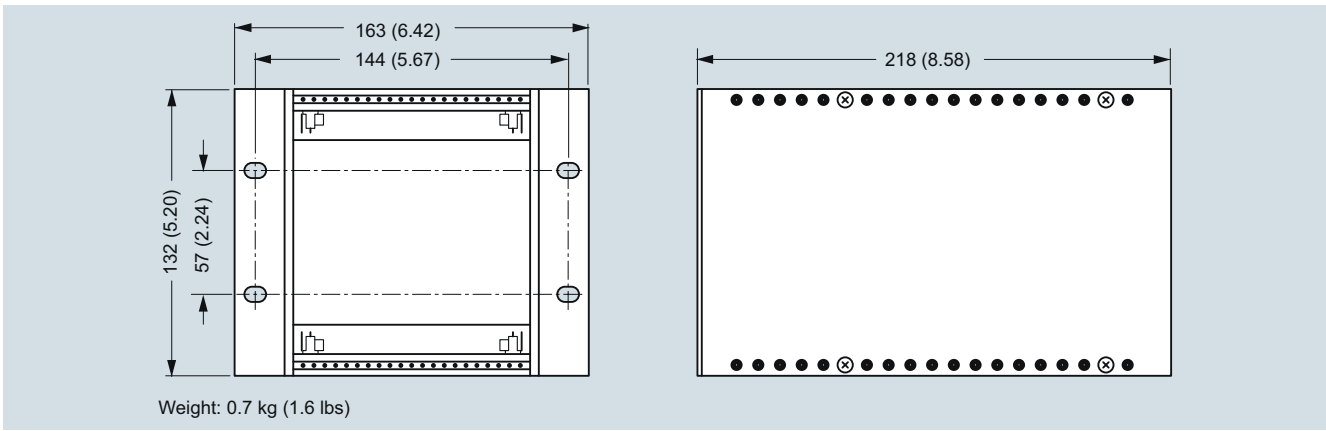
3

Transmitter 19" front of panel



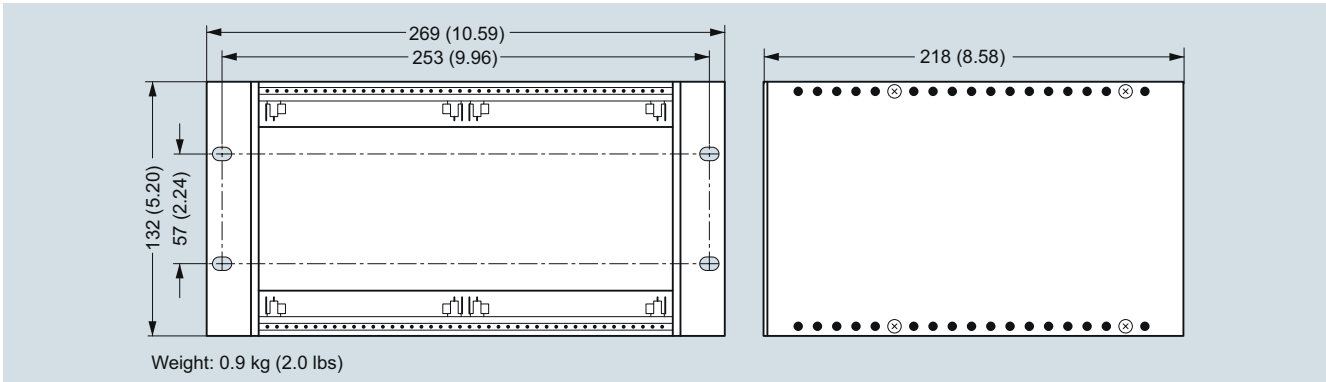
Dimensions in mm (inch)

Transmitter back of panel



Dimensions in mm (inch)

Transmitter back of panel, 42 TE



Dimensions in mm (inch)

Flow Measurement SITRANS F C

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

Schematics

Electrical connection

Grounding

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

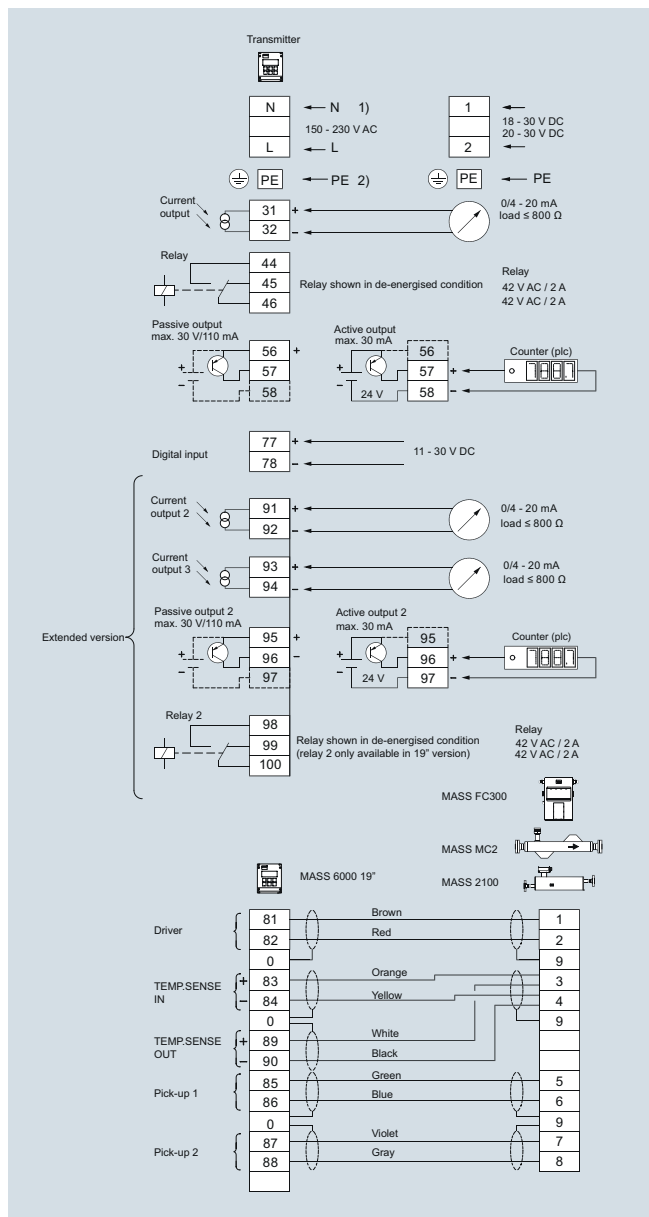
Mechanical counters

When mounting a mechanical counter to terminals 57 and 58 (active output), a 1000 μ F 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.

3



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 life-time.

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. MASS 6000 Ex d cannot be combined with MC2 sensors.

Benefits

- Fully stainless steel flameproof Ex 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 Ex 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 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
- 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"
- Fraction flow computation based on a 3rd-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 except MC2.

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 6 as compact and IP65 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

Flow Measurement

SITRANS F C

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 (lb/min)], volume flow [l/s (gpm)], fraction [%], °Brix, density [kg/m ³ (lb/ft ³)], temperature [°C (°F)]
Current output	Classified Ex 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 to supply • 50 V between outputs
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	<ul style="list-style-type: none"> • 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 AISI 316/1.4435
Rating	<ul style="list-style-type: none"> • Compact mounted on sensor: IP67/NEMA 4X • Remote mounted: IP65
Load	18 ... 1000 Hz random, 1.14 G rms, in all directions, to IEC 68-2-36, Curve E

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 W $I_N = 250$ 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 61326-1-4 (Industry)
Immunity	EN/IEC 61326-1-2 (Industry)
NAMUR	
	Within the value limits according to "Allgemeine Anforderung" with error criteria A in accordance with NE 21
Ex approval	
	Ex 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	Article No.
SITRANS F C MASS 6000 transmitter	7ME4110-
Transmitter Ex d for remote mounting inclusive of wall mounting kit	2 ■ ■ ■ ■ - ■ ■ ■ ■
Enclosure	G H J
Ex d SS with 5 m (16.5 ft) cable	
Ex d SS with 10 m (32.8 ft) cable	
Ex d SS with 25 m (82.0 ft) cable	
Output configuration	A
1 current, 1 frequency, 1 relay	
Supply voltage	2
24V AC/DC	
Ex approvals	1
ATEX	
Display/Keypad	1
With display	
Serial communication	A B F J
No communication	
HART	
PROFIBUS PA Profile 3	
FOUNDATION Fieldbus H1	
Cable gland	1
M20	

Operating instructions for SITRANS F C MASS 6000 Ex d

Description	Article 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.

Flow Measurement

SITRANS F C


Transmitter MASS 6000 Ex d compact/remote

Selection and Ordering data

Accessories

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

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



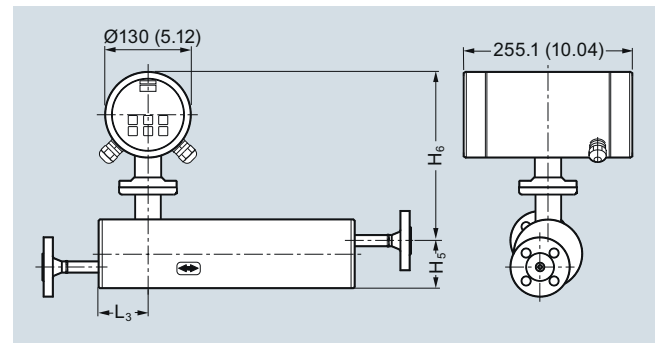
Operating instructions for SITRANS F add-on modules

Description	Article 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.

Dimensional drawings

MASS 6000 Ex d compact version



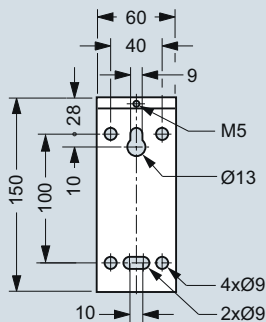
Dimensions in mm (inch)

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 (1/4)	62 (2.44)	72 (2.83)	257 (10.12)	329 (12.95)
15 (1/2)	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 (1 1/2)	75 (2.95)	227 (8.94)	271 (10.67)	498 (19.61)

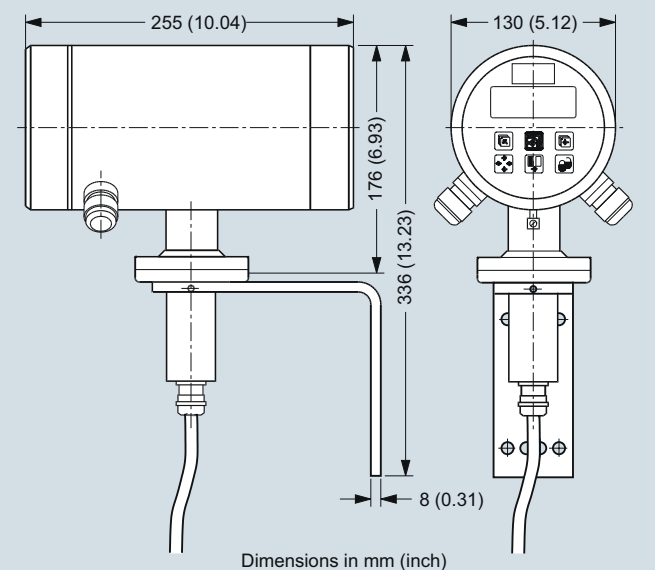
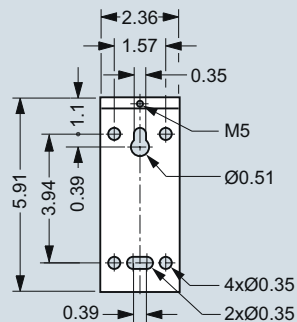
MASS 6000 Ex d remote version

Weight: 3 kg (6.6 lbs)

Dimensions in mm



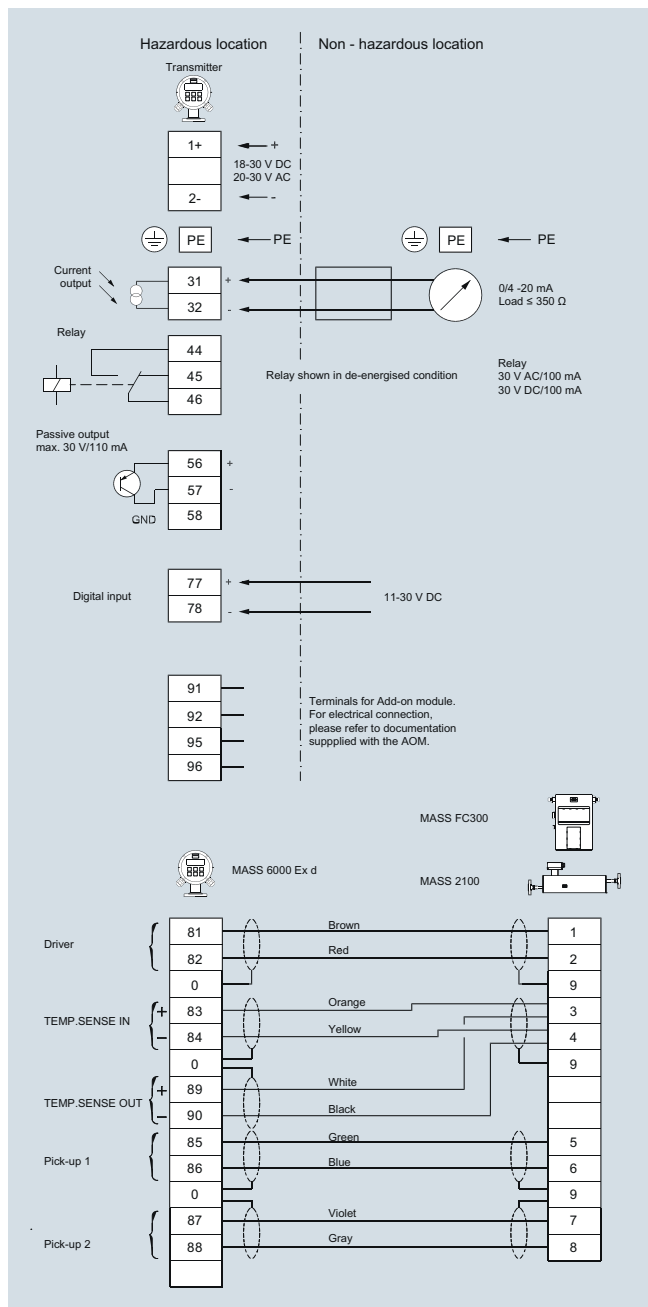
Dimensions in inch



Dimensions in mm (inch)

Schematics

Electrical connection compact or remote



3

Flow Measurement

SITRANS F C

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 RS 232/RS 485 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 3rd-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 output
- 1 phase shifted 90°/180° frequency/pulse output
- Two-stage batch controller
- 1 digital input
- Low flow cut-off
- Empty pipe detection
- Noise filter settings for different applications
- Simulation
- Automatic zero point adjustment with zero point evaluation feed back
- Configurable upper and lower alarm and warning limits for all process values
- Comprehensive status and error reporting

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	<ul style="list-style-type: none"> Nominal voltage: 24 V DC Lower limit: 15 V DC Upper limit: 30 V DC Current: 2 ... 15 mA
Low signal	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 RS 232C	<ul style="list-style-type: none"> Max. baud rate: 115 200 baud Max. line length: 15 m at 115 200 baud Signal level: according to EIA-RS 232C
MODBUS RS 485	<ul style="list-style-type: none"> Max. baud rate: 115 200 baud Max. line length: 1200 m at 115 200 baud Signal level: according to EIA-RS 485 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. 7.2 W
Fuse	T1 A/125 V, not replaceable by operator
Environment	
Ambient temperature	<ul style="list-style-type: none"> Storage -40 ... +70 °C (-40 ... +158 °F)
Operation conditions	<p>Horizontally mounted rail. For SIFLOW FC070 Std.: 0 ... 60 °C (32 ... 140 °F) For SIFLOW FC070 Ex CT: -40 ... +60 °C (-40 ... +140 °F)</p> <p>Vertically mounted rail For SIFLOW FC070 Std.: 0 ... 45 °C (32 ... 113 °F) For SIFLOW FC070 Ex CT: -40 ... +45 °C (-40 ... +113 °F)</p>
Altitude	<ul style="list-style-type: none"> 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 Ex nA IIC
SIFLOW FC070 Ex CT	CE, C-UL, UL Haz.Loc., FM Class I, Div. 2 Groups A, B, C, D 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 EN/IEC 61326-1 Emitted interference according to EN 55011/CISPR-11
NAMUR	Within the limits according to "General recommendations" with error criteria A in accordance with NE 21
Programming tools	
SIMATIC S7	Configuration through backplane P-BUS, PLC program and WinCC flexible
SIMATIC PCS7	Configuration through backplane P-BUS and PLC/WinCC faceplates, certified driver
SIMATIC PDM	Through MODBUS port RS 232C and RS 485, certified driver

Flow Measurement

SITRANS F C

Transmitter SIFLOW FC070

Selection and Ordering data

Description	Article 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






Operating instructions for SITRANS F C SIFLOW FC070

Description	Article No.
SIFLOW FC070 system manual	
• English	A5E00924779
• German	A5E00924776
SIFLOW FC070 with S7	
• English	A5E02254228
• German	A5E02665536
• French	A5E02591639
SIFLOW FC070 with PCS7	
• English	A5E03694109

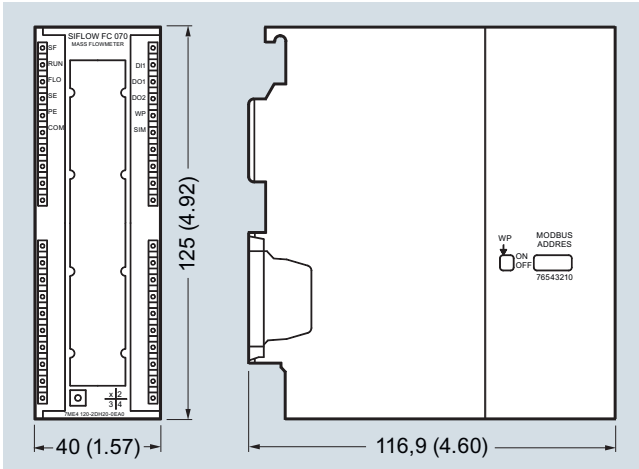
This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

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

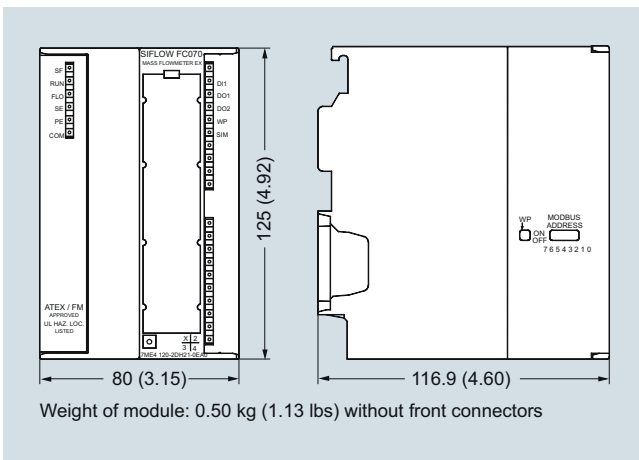
Accessories

Description	Article No.
Cable with multiplug for connecting MASS 2100, FCS200 and FC300 sensors, 5 x 2 x 0.34 mm ² twisted and screened in pairs. Temperature range -20 ... +110°C (-4 ... +230 °F) <ul style="list-style-type: none"> • 5 m (16.4 ft) • 10 m (32.8 ft) • 25 m (82 ft) • 50 m (164 ft) • 75 m (246 ft) • 150 m (492 ft) 	 FDK:083H3015 FDK:083H3016 FDK:083H3017 FDK:083H3018 FDK:083H3054 FDK:083H3055
Cable without multiplug for connecting MC2 sensors, 5 x 2 x 0.34 mm ² twisted and screened in pairs. Temperature range -20 ... +110°C (-4 ... +230 °F) <ul style="list-style-type: none"> • 10 m (32.8 ft) • 25 m (82 ft) • 75 m (246 ft) • 150 m (492 ft) 	 FDK:083H3001 FDK:083H3002 FDK:083H3003 FDK:083H3004
SIMATIC S7-300 rail The mechanical mounting rack of the SIMATIC S7-300 <ul style="list-style-type: none"> • 160 mm (6.3") • 482 mm (18.9") • 530 mm (20.8") • 830 mm (32.7") • 2000 mm (78.7") 	 6ES7 390-1AB60-0AA0 6ES7 390-1AE80-0AA0 6ES7 390-1AF30-0AA0 6ES7 390-1AJ30-0AA0 6ES7 390-1BC00-0AA0
SIFLOW FC070 Demo suitcase with MASS 2100 DI 1.5 sensor and SIMATIC HMI TP 177B touch panel	A5E01075465 
SIMATIC S7-300, stabilized power supply PS307 Input: 120/230 V AC Output: 24 V DC/2 A	6ES7307-1BA01-0AA0 

Dimensional drawings

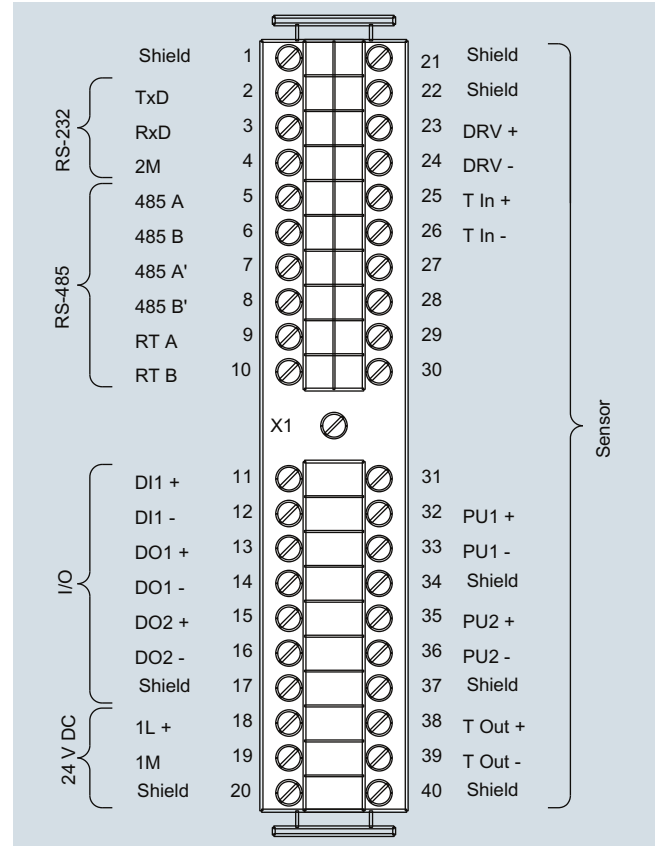


SIFLOW FC070, dimensions in mm (inch)

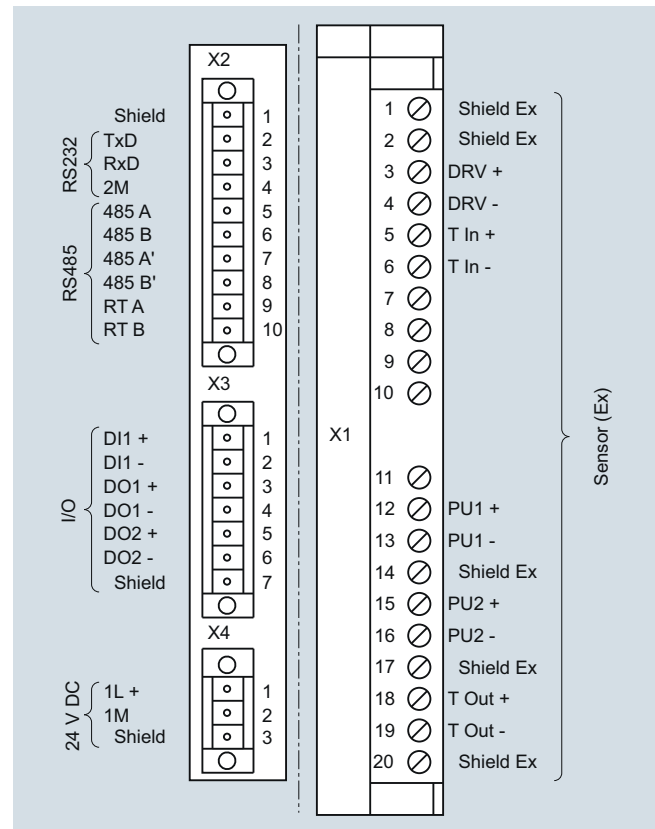


SIFLOW FC070 Ex CT, dimensions in mm (inch)

Schematics



SIFLOW FC070, electrical connection



SIFLOW FC070 Ex CT, electrical connection

Flow Measurement

SITRANS F C

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 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 SITRANS FCS200 DN 10 and DN 15 wetted parts material is Hastelloy C22, and the DN 25 wetted parts material is AISI 316Ti/1.4571. 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 protect the enclosure from overpressure.

Function

The flow measuring principle is based on the Coriolis effect. See "System information SITRANS F C".

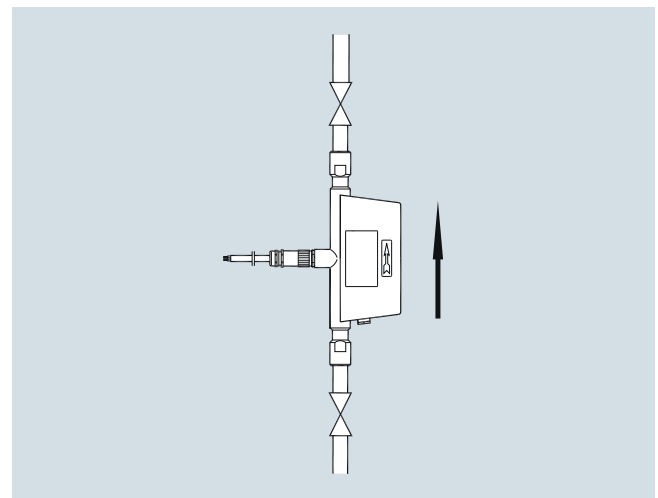
Integration

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.

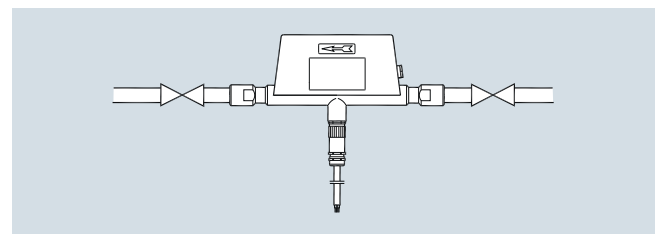
The sensor is shipped with a SENSORPROM memory unit containing all information about calibration data, device identity and factory pre-programming of transmitter settings.

Installation guidelines

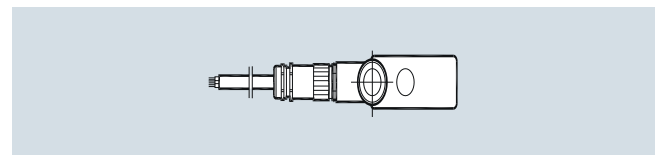
Siemens Flow Instruments recommends installing the sensor in one of the following ways:



Vertical orientation with an upwards flow



Horizontal installation, tubes up



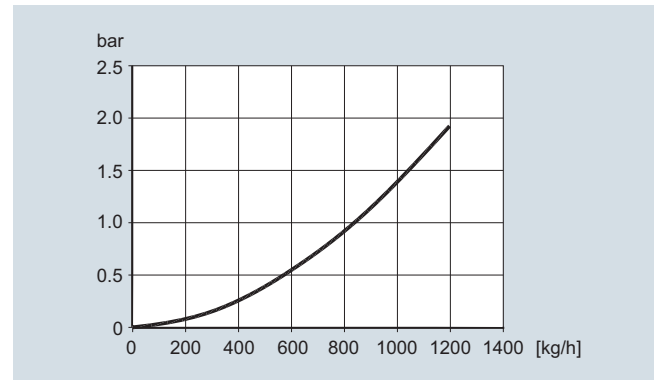
Horizontal installation, tubes sideways

Technical specifications

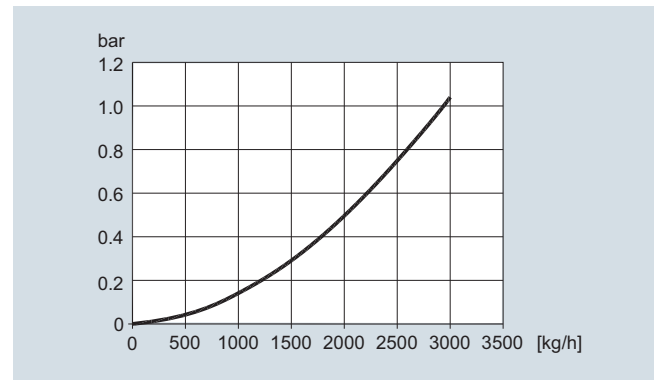
Sensor size	DN 10	DN 15	DN 25
Mass Flow			
Accuracy [% of rate]		± 0.5	
Repeatability [% of rate]		± 0.25	
Max. zero point error [kg/h (lb/h)]	0.25 (0.55)	1.2 (2.65)	3.0 (6.6)
Measuring range [kg/min (lb/min)]	0 ... 42 (0 ... 92.6)	0 ... 200 (0 ... 440.9)	0 ... 500 (0 ... 1102.3)
Process temperature	-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	Hastelloy C22/2.4602	Hastelloy C22/2.4602	Stainless steel AISI 316L/1.4571
Splitter	Hastelloy C22/2.4602	Stainless steel AISI 316L/1.4571	Stainless steel AISI 316L/1.4571
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	<ul style="list-style-type: none"> • ATEX II 1/2 G Ex ia IIC T5/T4 Ga/Gb • IECEx Ex ia IIC T5/T4 Ga/Gb • 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

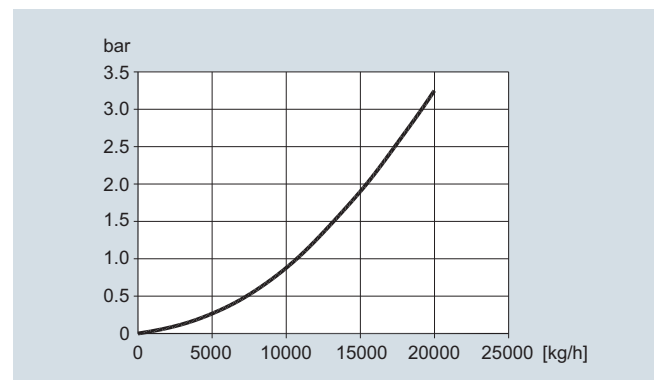
DN 10



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).

Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS200

Selection and Ordering data	Article No.
SITRANS F C Flow sensors	
SITRANS FCS200 sensor, without heating jacket	7 ME 4 5 0 0 -
Sensor size and material	
DN 10, Hastelloy C22/2.4602	2 D
DN 15, Hastelloy C22/2.4602	2 E
DN 25, Stainless steel AISI 316Ti/1.4571	1 F
Pressure	
PN 214 (DN 25)	K
PN 350 (DN 10 and DN 15)	N
Process connection/flange	
½" VCO	7 1
¾" VCO	7 2
1" VCO	7 3
¼"/NPT pipe thread	8 1
½"/NPT pipe thread	8 2
¾"/NPT pipe thread	8 3
1"/NPT pipe thread	8 4
1½"/NPT pipe thread	8 5
Configuration	
Standard	1
Transmitter	
None	A
Cable	
No cable	A
Calibration	
Standard calibration	1

Operating instructions for SITRANS FCS200

Description	Article No.
• English	A5E02508199
• German	A5E03082574
• Spanish	A5E03082587
• French	A5E03082581
• Italian	A5E03504933

Spare parts

Description	Article No.
Multiple plug for cable mounting	FDK:083H5056
2 kB SENSORPROM unit (Sensor Serial No. and Article No. must be specified by ordering)	FDK:083H4410

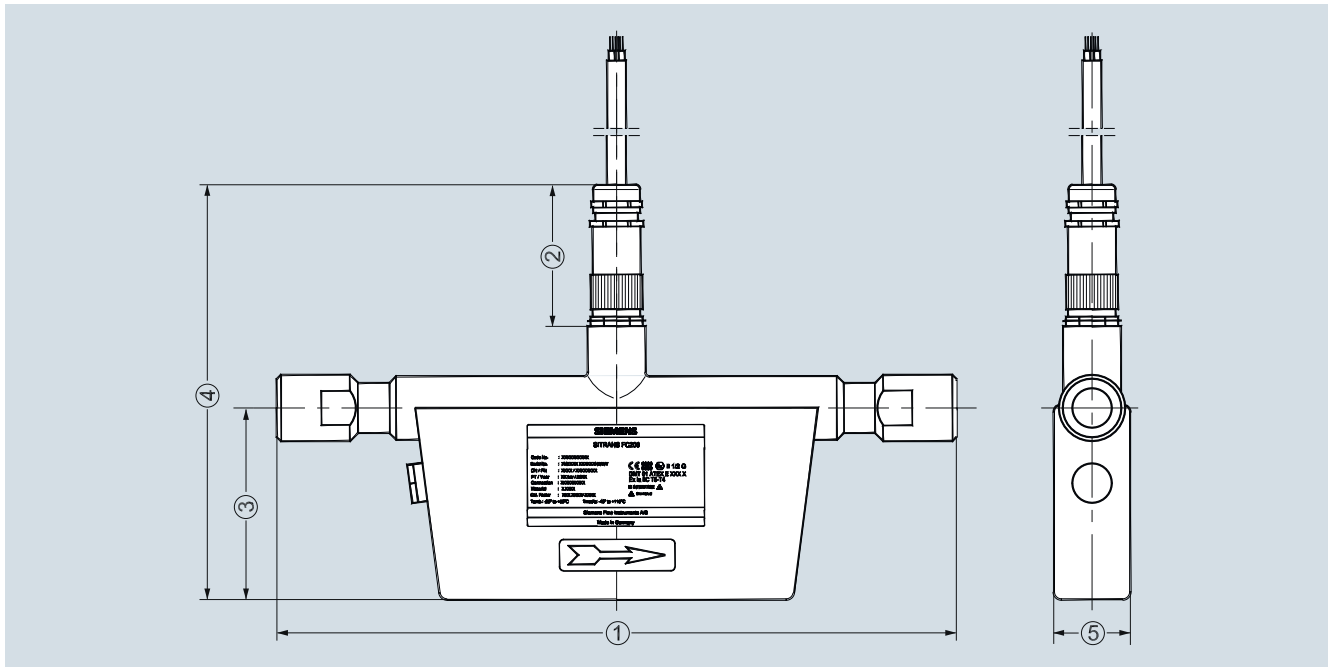
Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Article No. and specify Order code(s) and plain text.	
Pressure testing certificate PED: 97/23/EC	C11
Material certificate EN 10204-3.1	C12
NDT-Penetrant inspection report ISO 3452	C13
Factory certificate according to EN 10204 2.2	C14
Factory certificate according to EN 10204 2.1	C15
Tag name plate, stainless steel	Y17

Accessories

Description	Article No.
Cable with multiple plug	
5 m (16.4 ft)	FDK:083H3015
Standard blue cable between SIFLOW FC070/MASS 6000 and FCS200,	10 m (32.8 ft) FDK:083H3016
5 x 2 x 0.34 mm ² twisted and screened in pairs.	25 m (82 ft) FDK:083H3017
Temperature range -20 °C ... +110 °C (-4 °F ... +230 °F)	50 m (164 ft) FDK:083H3018
	75 m (246 ft) FDK:083H3054
	150 m (492 ft) FDK:083H3055

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)

Flow Measurement

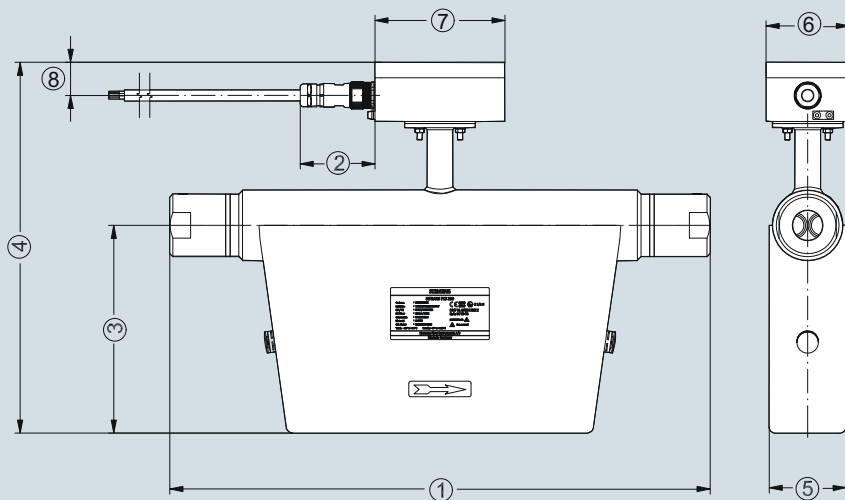
SITRANS F C

Flow sensor SITRANS FCS200

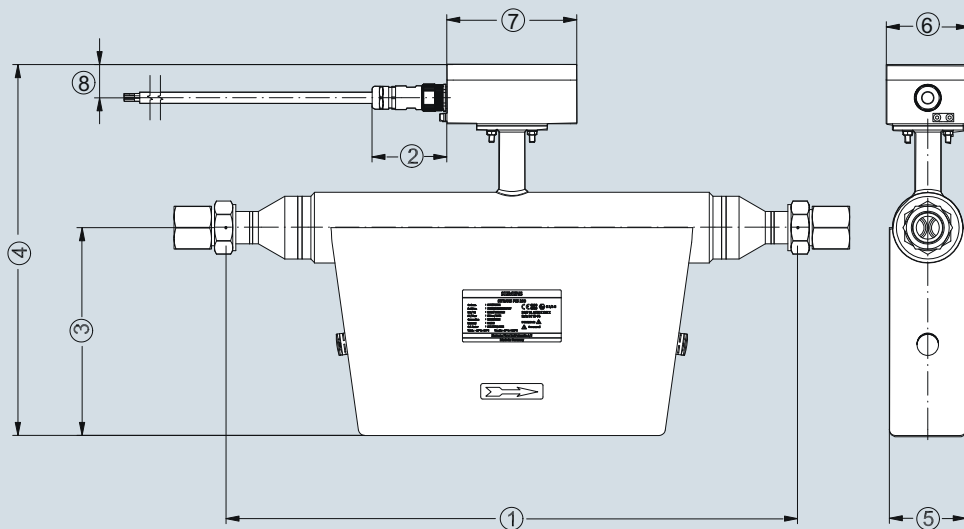
SITRANS FCS200, DN 25

3

DN 25 - NPT



DN 25 - VCO



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)

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 30 kg/h to a few g/h
- Densitometer performance available through a density accuracy better than 0.001 g/cm³ with a repeatability better than 0.0002 g/cm³.
- 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 Ex 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 pharmaceutical industry, accurate recipe control means everything. The MASS 2100 DI 1.5 has demonstrated superior performance in numerous applications and field trials 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.



Flow Measurement

SITRANS F C

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.

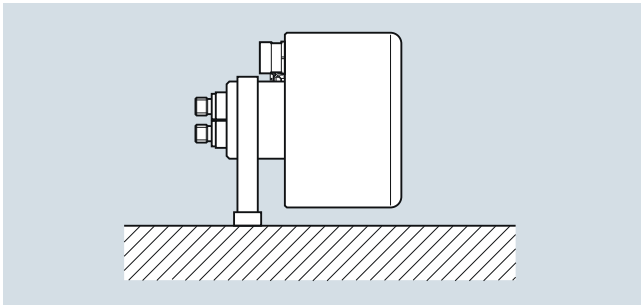
All sensors are delivered with a SENSORPROM containing all information about calibration data, identity and factory pre-programming of transmitter settings

Installation guidelines MASS 2100 DI 1.5 (1/16")

Installation of MASS 2100 sensor

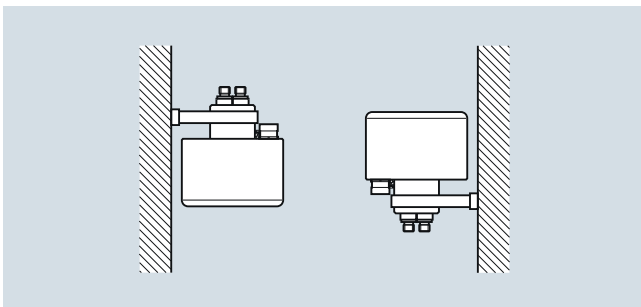
- The optimal installation is horizontal. If vertical mounting is necessary, upward flow is recommended to facilitate the removal of air bubbles. To remove the air from the sensor the flow speed in the sensor must be at least 1 m/s. If there are solid particles in the liquid, especially in connection 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. 0.2 bar (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 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



Liquid and gas application

Vertical



Liquid application (left), gas application (right)

Technical specifications

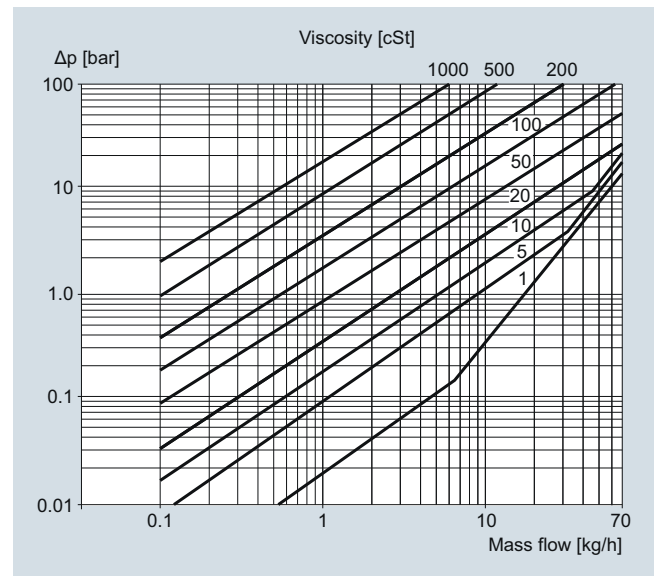
Inside pipe diameter (sensor consists of one continuous pipe)	1.5 mm (0.06")
Pipe wall thickness	0.25 mm (0.010")
Mass flow measuring range	0 ... 30 kg/h (0 ... 66 lb/h)
Density	0 ... 2.9 g/cm ³ (0 ... 0.10 lb/inch ³)
Fraction e.g.	0 ... 100 °Brix
Temperature	
Standard	-50 ... +125 °C (-58 ... +257 °F)
High-temperature version	-50 ... +180 °C (-58 ... +356 °F)
Liquid pressure measuring pipe¹⁾	
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 material²⁾	IP65 and stainless steel AISI316L/1.4404
Connection thread	
ISO 228/1	G1/4" male
ANSI/ASME B1.20.1	1/4" 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	II 1G Eex ia IIC T3-T6, DEMKO 03 ATEX 135252X c-UL-us AEx ia IIC T3-T6 UL WYMG.E232147
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/m³

Flow Measurement SITRANS F C

Flow sensor MASS 2100 DI 1.5

3

Selection and Ordering data	Article No.	Ord. code
SITRANS F C Flow sensors	7ME4100-	
MASS 2100 DI 1.5 (1/16") sensor		
Diameter		
Stainless steel AISI 316L/1.4435	1 A	
DI 1.5, max. 125 °C (257 °F)	1 B	
DI 1.5, max. 180 °C (356 °F)		
Hastelloy C22/2.4602	2 A	
DI 1.5, max. 125 °C (257 °F)	2 B	
DI 1.5, max. 180 °C (356 °F)		
Pressure		
PN 100	D	
PN 230 (AISI 316L/1.4404)	L	
PN 365 (C22/2.4602)	P	
Process connection/flange		
Pipe thread		
G 1/4" male	1 0	
1/4" NPT male	1 1	
Configuration		
Standard	1	
Density	2	
Brix/Plato	3	
Fraction (specification required)	9	N O Y
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 Ex 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 1/2" NPT, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC	E	
MASS 6000, IP67, Polyamide enclosure, cable glands 1/2" NPT, 1 current, 1 freq./pulse and 1 relay output, 115/230 V AC 50/60 Hz, 1/2" 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	

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Article 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	Article 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>

Description	Article 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



Description	Article No.
Spare parts	
Multiple plug for cable mounting	FDK:083H5056
2 kB SENSORPROM unit (Sensor Serial No. and Article No. must be specified by ordering)	FDK:083H4410
Bracket	A5E02590427



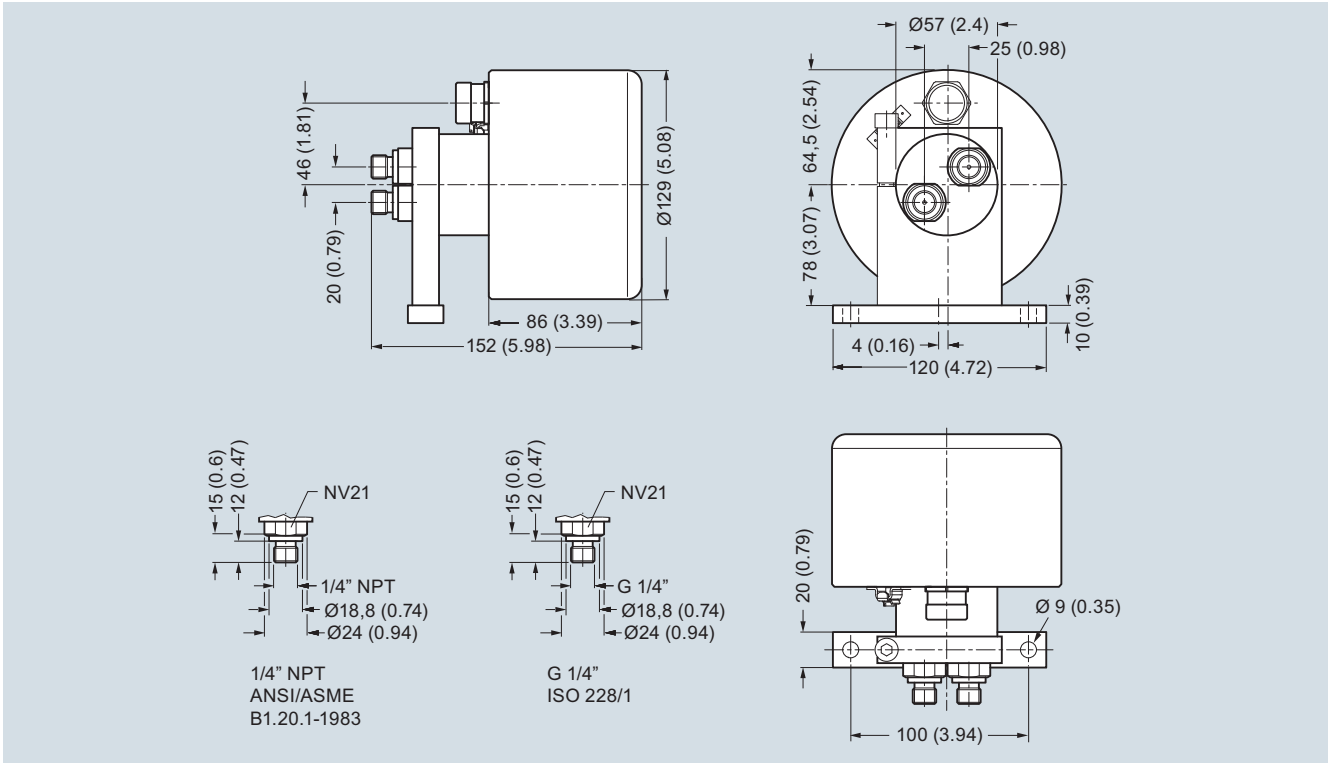
Flow Measurement SITRANS F C

Flow sensor MASS 2100 DI 1.5

Dimensional drawings

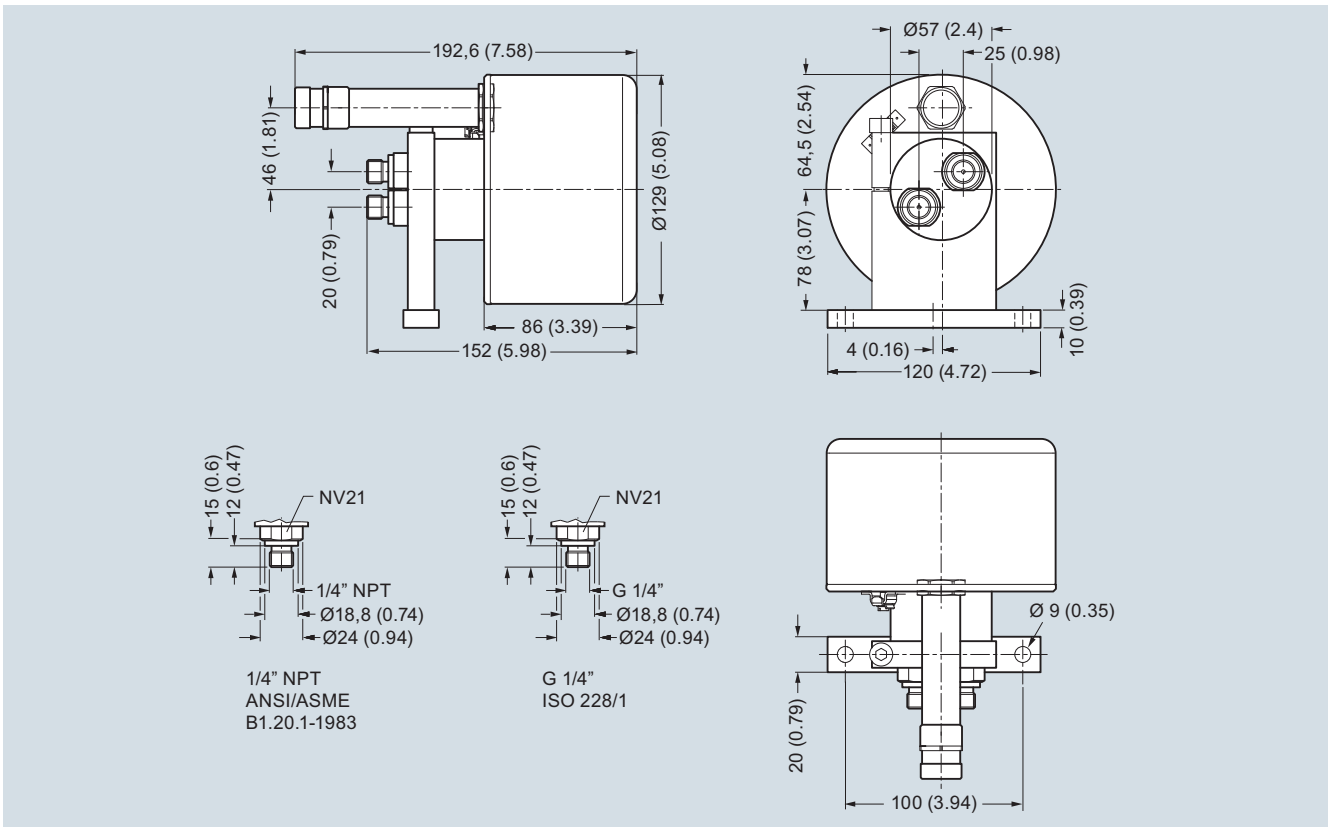
MASS 2100 DI 1.5 (1/16")

3



Dimensions in mm (inch)

MASS 2100 DI 1.5 High-temperature version to 180 °C (356 °F)



Dimensions in mm (inch)

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 as follows:
 - For 316L/1.4404 version better than 0.0015 g/cm³ (0.000036 lb/inch³) with repeatability better than 0.0002 g/cm³ (0.0000072 lb/inch³)
 - For C22/2.4602 version better than 0.0025 g/cm³ (0.000090 lb/inch³) with repeatability better than 0.001 g/cm³ (0.0000 lb/inch³)
- 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 IP67/NEMA 4. 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 and SIFLOW FC070 (standard and Ex types) 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

Flow Measurement

SITRANS F C

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.

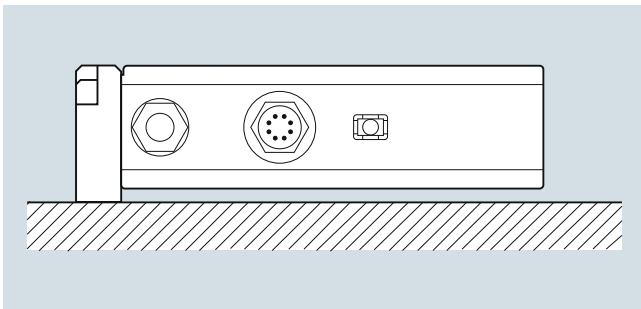
Vertical installation as shown in figure B can be used for liquid or gas applications.

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.

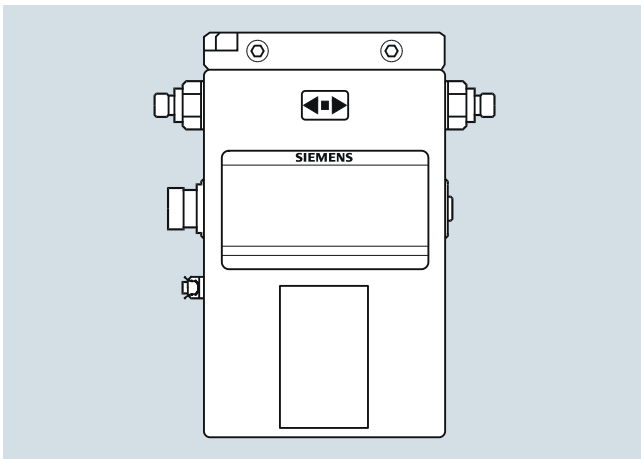
- To ensure that the sensor does not become partly empty, there must be a sufficient counter-pressure on the unit min. 0.2 bar (2.9 psi).
- Mount the sensor on a vibration-free and plane wall or steel frame.
- Locate the sensor low in the system in order to avoid under-pressure in the sensor separating 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	
• Stainless steel	0.007 g/cm ³ (0.00025 lb/inch ³)
• Hastelloy C22/2.4602	0.0025 g/cm ³ (0.00009 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 pipe¹⁾	
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	
Measuring pipe and connection	Stainless steel AISI 316L/1.4435 Hastelloy C22/2.4602
Enclosure²⁾	
Material	Stainless steel AISI 316L/1.4404
Enclosure grade	IP67/NEMA4
Connection thread	
ISO 228/1	G1/4" male
ANSI/ASME B1.20.1	1/4" NPT male
Ex approval	
	Ex ia IIC T3-T6 05ATEX138072X c-UL-us Class 1 Div. 1, Gr. A, B, C, D
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.

Selection and Ordering data	Article No.	Order code
SITRANS F C Flow sensors	7ME4400-	
SITRANS FC300 DN 4 (1/6") sensor		
Pipe material and temperature		
Stainless steel AISI 316L/1.4435		
115 °C (239 °F)	1 G	
180 °C (356 °F)	1 H	
Hastelloy C22/2.4602		
115 °C (239 °F)	2 G	
180 °C (356 °F)	2 H	
Pressure		
PN 100	D	
PN 130 (316L/C22)	G	
PN 410 (C22)	Q	
Process connection		
Pipe thread		
G 1/4" male	1 0	
1/4" NPT male	1 1	
Configuration		
Standard		1
Density ¹⁾		2
Brix/Plato		3
Fraction (specification required)		9
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 Ex 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 1/2" NPT, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC		E
MASS 6000, IP67, Polyamide enclosure, cable glands 1/2" NPT, 1 current, 1 freq./pulse and 1 relay output, 115/230 V AC 50/60 Hz, 1/2" 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⁾ Density calibration on request. Contact Siemens for details.

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Article 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	Article 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	Article 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	Article No.
Multiple plug for cable mounting	FDK:083H5056
2 kB SENSORPROM unit (Sensor Serial No. and Article No. must be specified by ordering)	FDK:083H4410
Mounting bracket in AISI 304	A5E02590439
Demo suitcase including MASS 6000, FC300 (DN 4), and HART module	A5E00789737



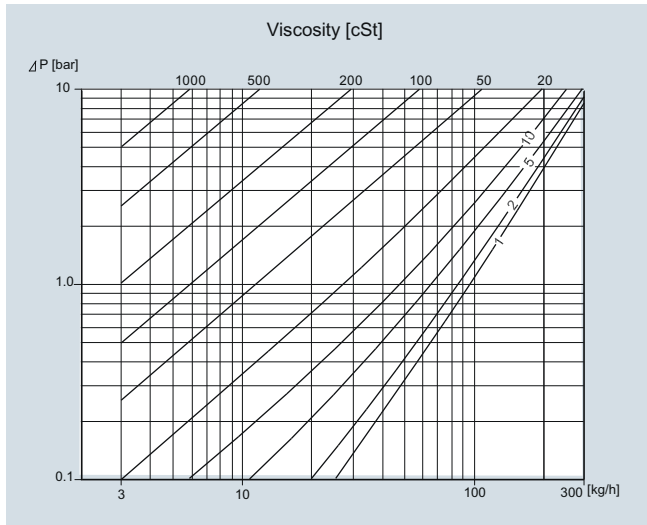
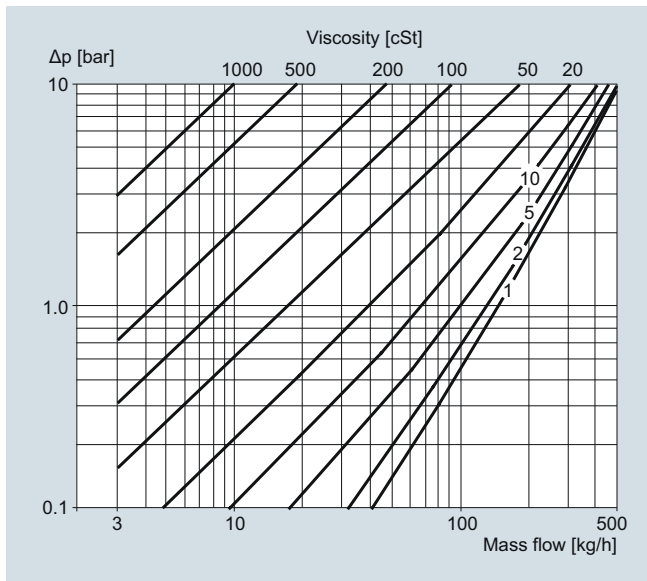
Flow Measurement SITRANS F C

Flow sensor SITRANS FC300

Characteristic curves

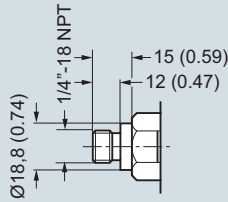
Pressure drop

3

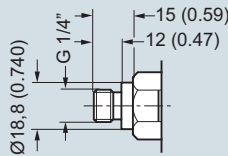


Dimensional drawings

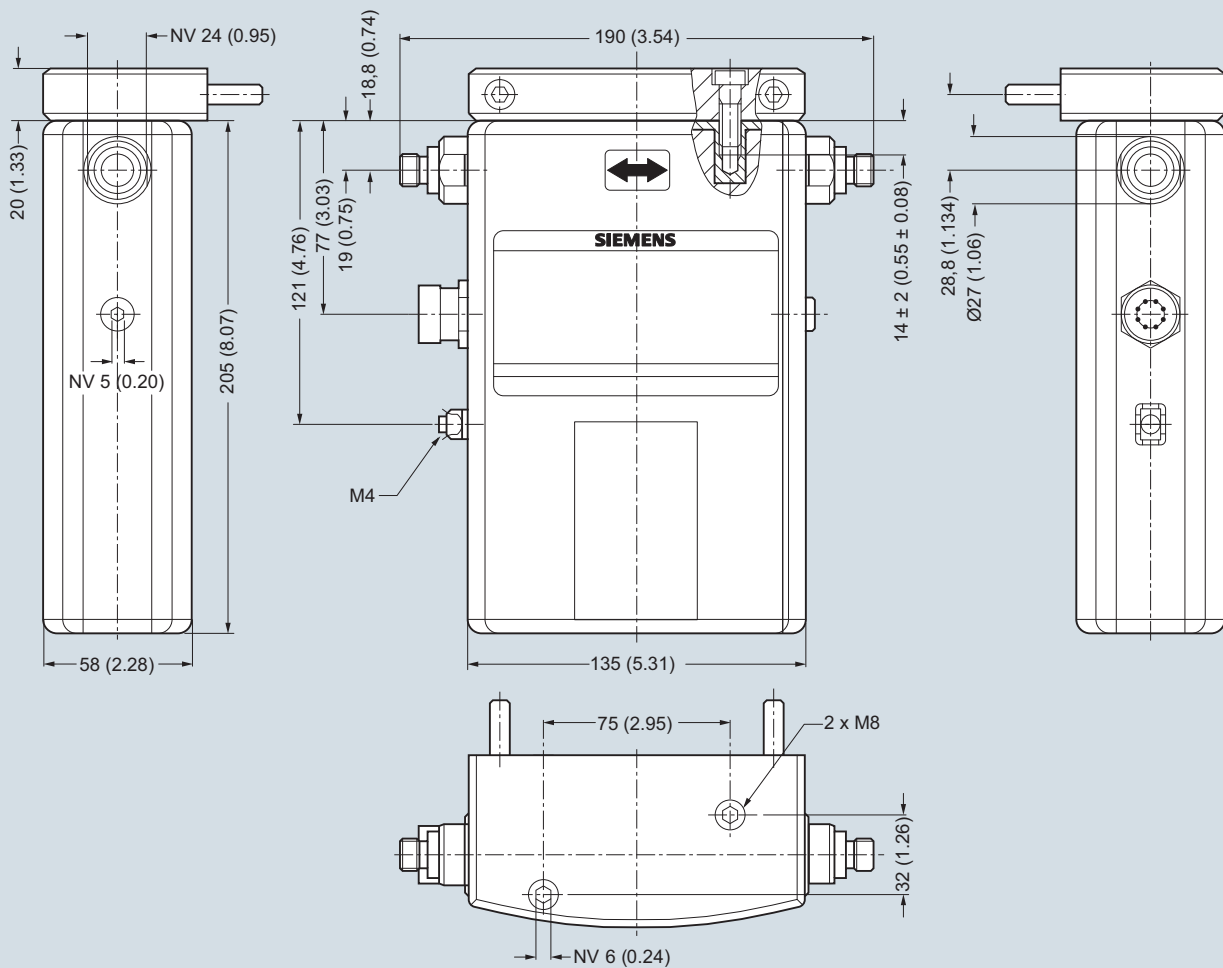
SITRANS FC300 DN 4



1/4"-18 NPT (ANSI/ASME B1.20.1)



G 1/4" (ISO 228/1)



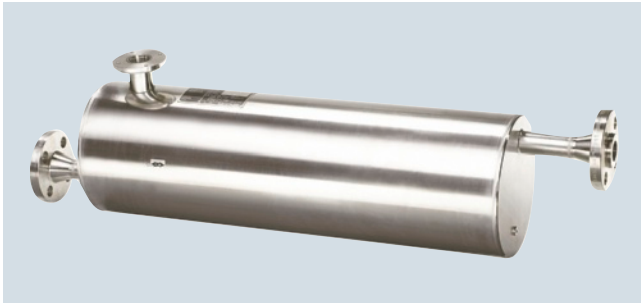
SITRANS FC300, dimensions in mm (inch)

Flow Measurement

SITRANS F C

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 density accuracy (depending upon sensor size) ranging from 0.0005 to 0.0015 g/cm³ with a typical repeatability better than 0.0001 g/cm³
- 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' thickest sensor walls ensure 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 6, 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, test separators, LPG
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.

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 316L/1.4404 with a grade of encapsulation of IP67.

The sensor is as standard Ex 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.

Flow sensor MASS 2100 DI 3 to DI 40

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 and remote installation as well as SIFLOW FC070 standard and Ex type transmitters.

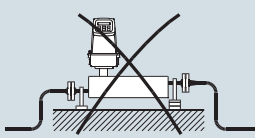
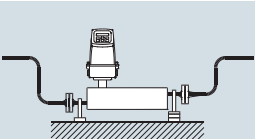

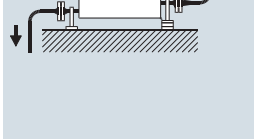
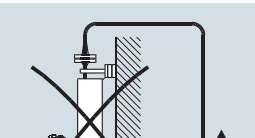

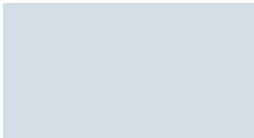
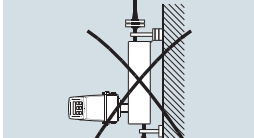
All sensors are delivered with a SENSORPROM containing all information about calibration data, identity and factory pre-programming of transmitter settings.

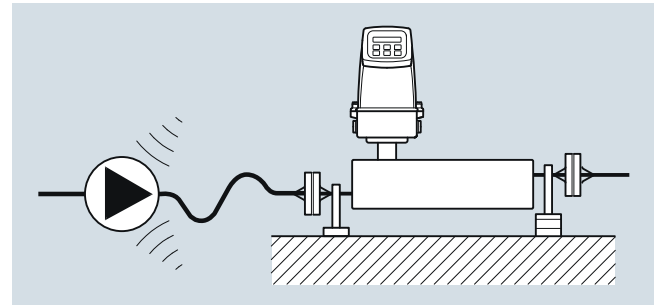
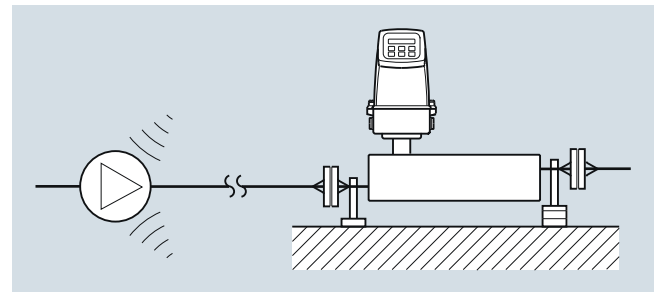
Installation guidelines MASS 2100 DI 3 ... DI 40 (1/8" ... 1½")

Installation of sensor

In order to perform according to given specifications for flow and density accuracy, the sensor must be installed using rigid mounting brackets as shown in the installation examples.

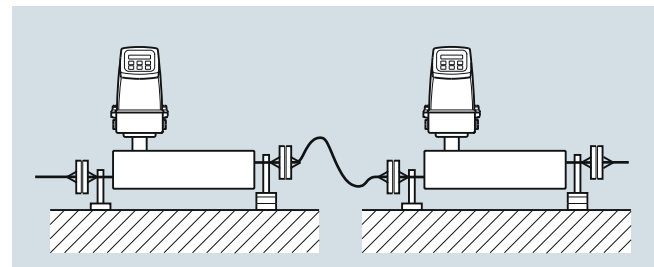
If the liquid is volatile or contains solid particles, vertical mounting is not recommended.

	Liquid	Gas
Horizontal	 	 
Vertical	 	 



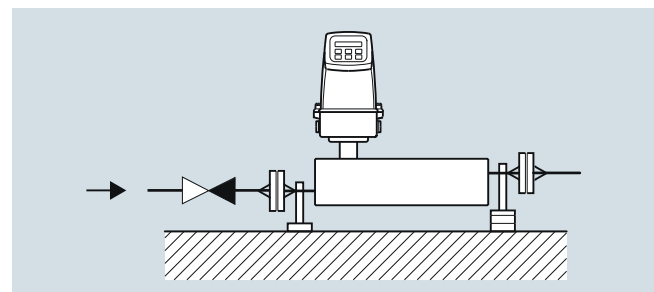
Vibration

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 facilitate 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 accuracy.

Flow Measurement

SITRANS F C

Flow sensor MASS 2100 DI 3 to DI 40

Technical specifications

Versions (mm (inch))		DI 3 (1/8)	DI 6 (1/4)	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/cm ³ (lb/inch ³)	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 pipe¹⁾						
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		IP67 (NEMA 4) and stainless steel AISI 316L/1.4404, The housing is not rated for pressure containment				
Process connections²⁾						
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 mm ² twisted and screened in pairs, ext. Ø 12 mm				
Ex-version		Ex 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

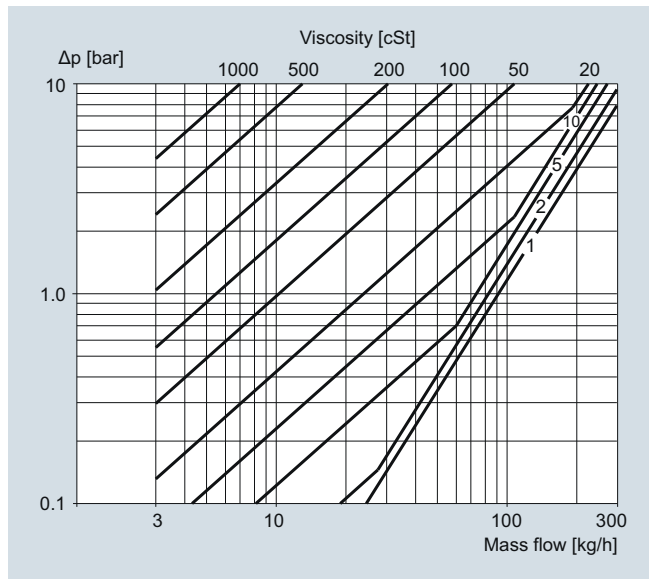
²⁾ Other connections to order, see "Selection and Ordering data"

³⁾ Material, AISI 316/1.4401 or corresponding

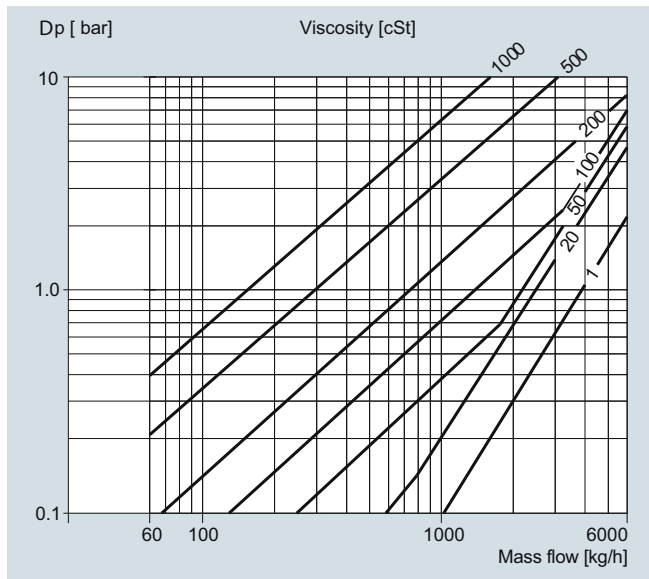
For accuracy specification see "System information SITRANS F C".

Flow sensor MASS 2100 DI 3 to DI 40

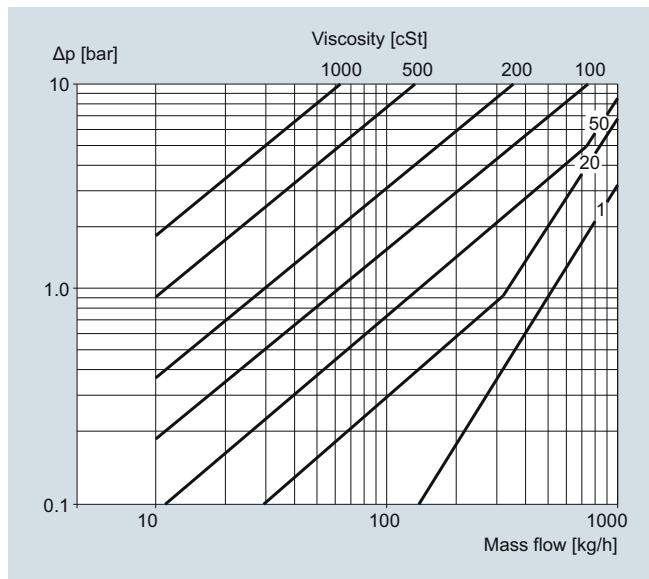
Pressure drop



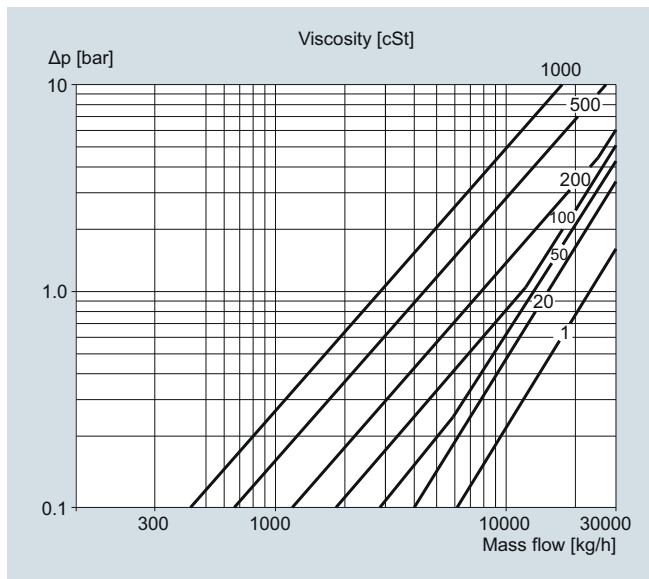
MASS 2100 DI 3 (1/8"), pressure drop for density = 1000 kg/m³



MASS 2100 DI 15 (1/2"), pressure drop for density = 1000 kg/m³



MASS 2100 DI 6 (1/4"), pressure drop for density = 1000 kg/m³



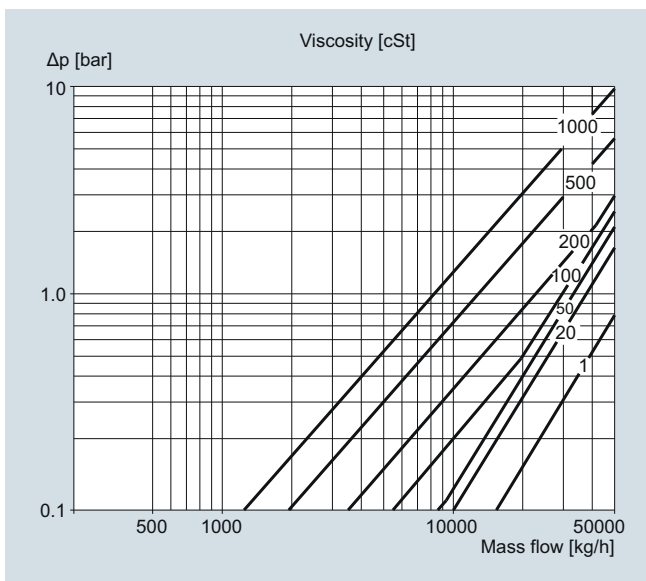
MASS 2100 DI 25 (1"), pressure drop for density = 1000 kg/m³

3

Flow Measurement SITRANS F C

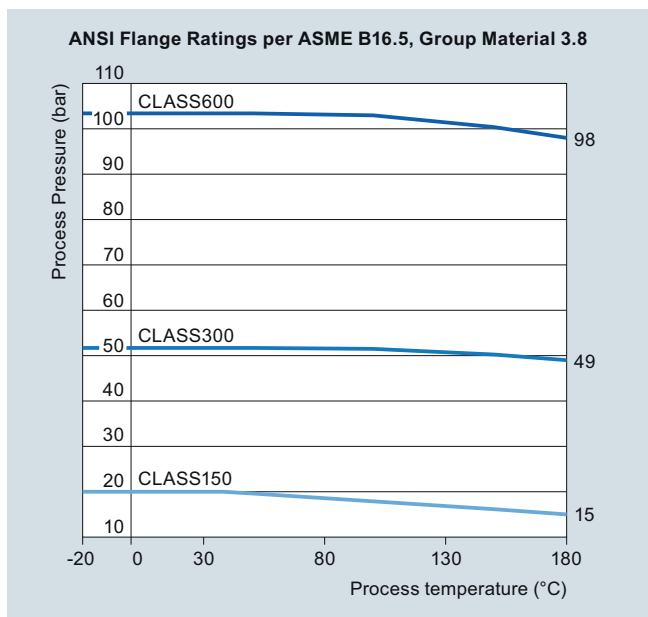
Flow sensor MASS 2100 DI 3 to DI 40

3

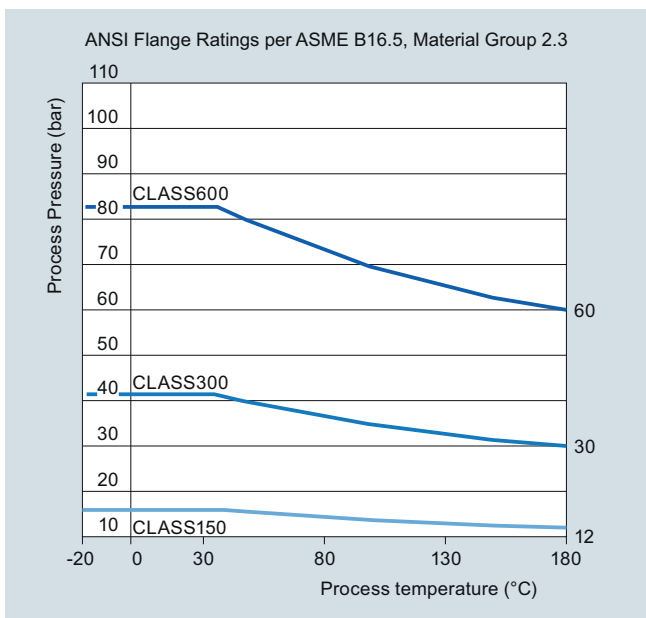


MASS 2100 DI 40 (1½"), pressure drop for density = 1000 kg/m³

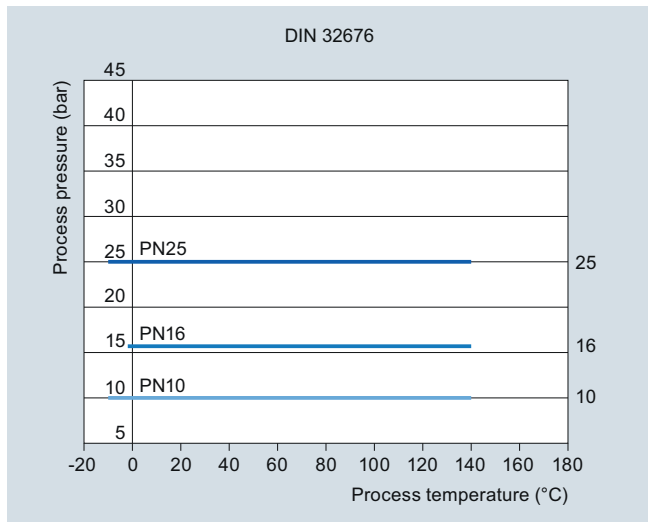
Pressure/temperature curves



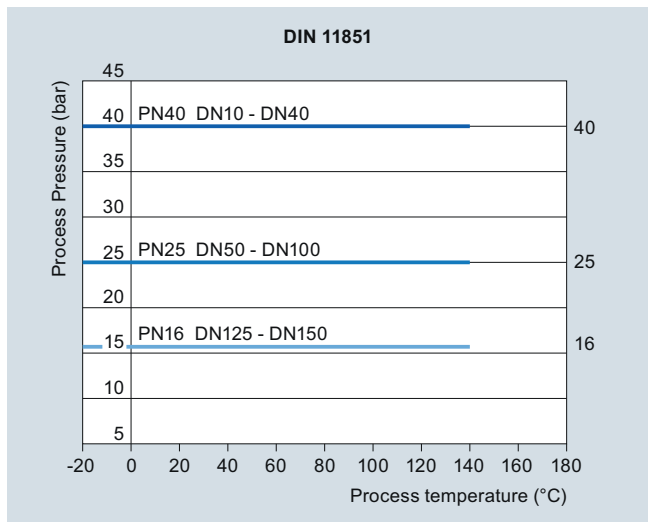
ASME flanges B16.5 Hastelloy C22/2.4602



ASME flanges B16.5 stainless steel



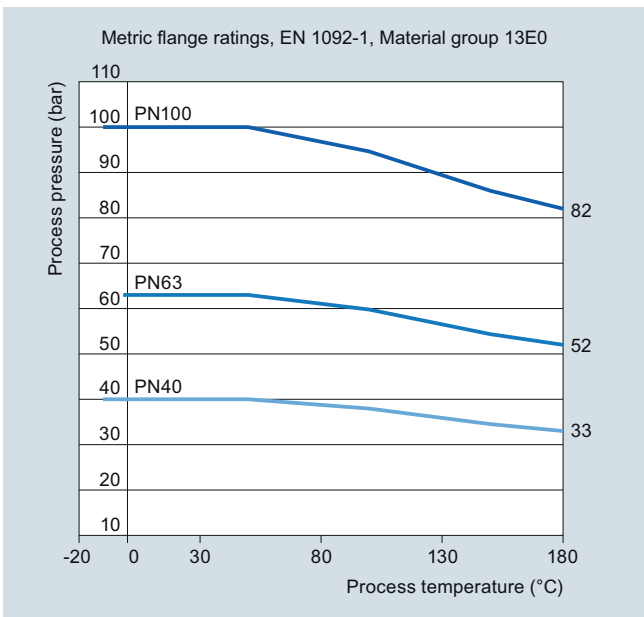
DIN 32676 flanges stainless steel (PN 10 ... PN 25)



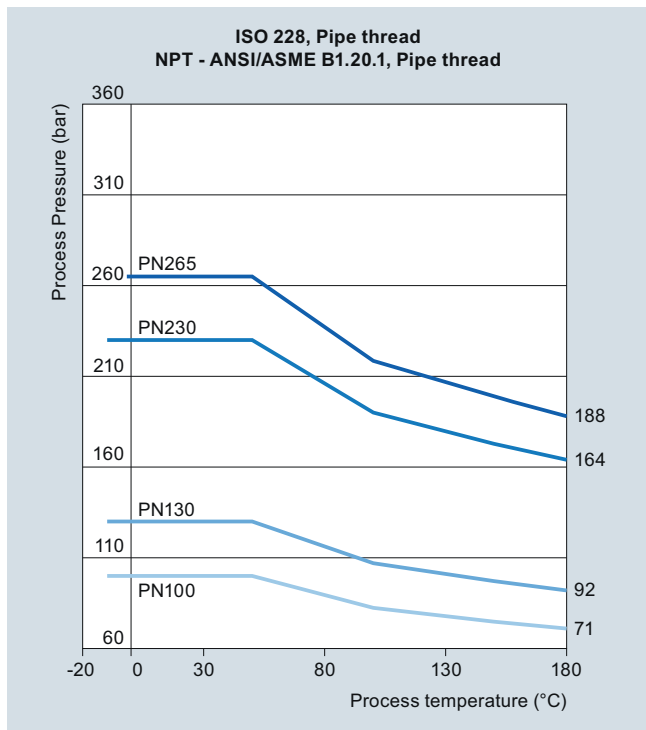
DIN 11581 flanges stainless steel (PN 25 ... PN 40)

Flow sensor MASS 2100 DI 3 to DI 40

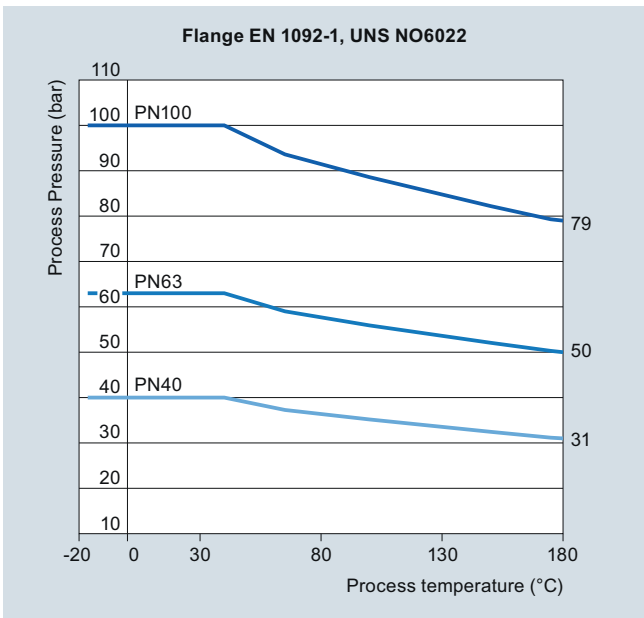
3



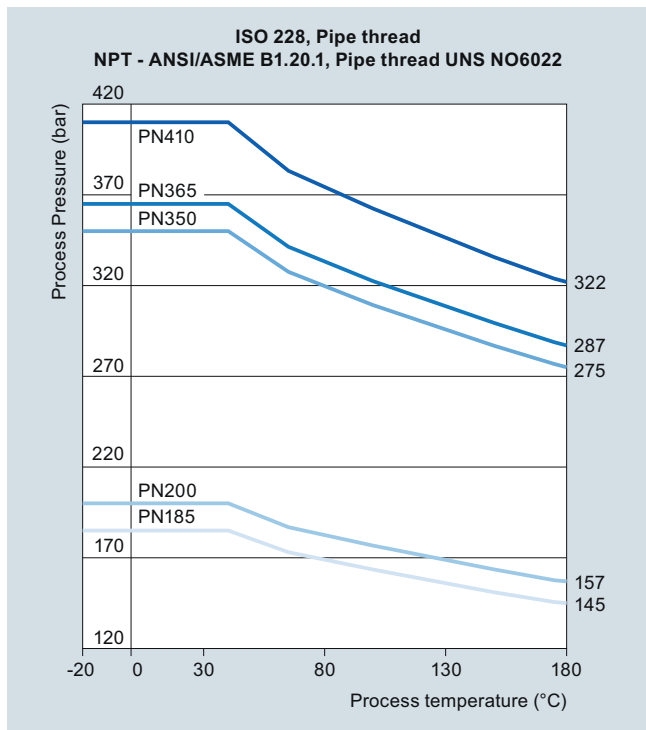
EN 1092 flanges stainless steel (PN 40 ... PN 100)



ISO 228 and NPT pipe thread stainless steel (PN 100 ... PN 265)



EN 1092 flanges Hastelloy C22/2.4602 (PN 40 ... PN 100)



ISO 218 and NPT pipe thread stainless steel (PN 185 ... PN 410)

For further information on the PED standard and requirements, see page 9/6.

Flow Measurement

SITRANS F C

Flow sensor MASS 2100 DI 3 to DI 40

Selection and Ordering data	Article No.	Ord. code
SITRANS F C sensors		
MASS 2100 without heating jacket	7ME 4 1 0 0 -	
MASS 2100 heated, DN 15 connection	7ME 4 2 0 0 -	
MASS 2100 heated, ½ inch, ANSI B16.5 connection	7ME 4 2 1 0 -	
Diameter		
Stainless steel AISI 316L/1.4435 DI 3 (PN 100/PN 230)	1 C	
DI 6	1 D	
DI 15	1 E	
DI 25	1 F	
DI 40	1 G	
Hastelloy C22/2.4602 DI 3 (PN 100/PN 350)	2 C	
DI 6	2 D	
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"	1 0	
¼" NPT	1 1	
G ½"	1 2	
½" NPT	1 3	
G 1	1 4	
1" NPT	1 5	
G 2"	1 6	
2" NPT	1 7	
Flange EN1092-1 Form B		
DN 10 (PN 40/PN 100)	2 0	
DN 15 (PN 40/PN 100)	2 1	
DN 25 (PN 40/PN 100)	2 2	
DN 40 (PN 40/PN 100)	2 3	
DN 50 (PN 40/PN 100)	2 4	
Flange ASME/ANSI B 16.5		
½" (class 150/class 600)	3 0	
¾" (class 150/class 600)	3 1	
1" (class 150/class 600)	3 2	
1 ½" (class 150/class 600)	3 3	
2" (class 150/class 600)	3 4	

Selection and Ordering data	Article No.	Ord. code
SITRANS F C sensors		
MASS 2100 without heating jacket	7ME 4 1 0 0 -	
MASS 2100 heated, DN 15 connection	7ME 4 2 0 0 -	
MASS 2100 heated, ½ inch, ANSI B16.5 connection	7ME 4 2 1 0 -	
Dairy screwed connection DIN 11851		
DN 10 (PN 40)	4 0	
DN 15 (PN 40)	4 1	
DN 25 (PN 40)	4 2	
DN 32 (PN 40)	4 3	
DN 40 (PN 25)	4 4	
DN 50 (PN 25)	4 5	
DN 65 (PN 25)	4 6	
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)	5 0	
38 mm (PN 16)	5 1	
51 mm (PN 16)	5 2	
Dairy screwed connection ISO 2853		
25 mm (PN 16)	6 0	
38 mm (PN 16)	6 1	
51 mm (PN 16)	6 2	
Configuration/calibration type		
Standard		1
Density		2
Brix/Plato		3
Fraction (specification required)		9
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 Ex 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

Dairy MLFB example**MASS 2100**

Sensor size DI 15,
AISI 316L/1.4435

PN 40

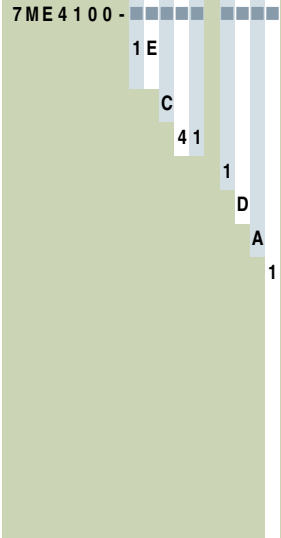
DN 15 connector

Standard configuration/calibration

MASS 6000 IP67 compact mounted

No cable

Standard calibration, 3 flow x 2 points

**Selection and Ordering data**

Order code

Additional information

Please add "-Z" to Article No. and specify Order code(s) and plain text.

Pressure testing certificate PED: 97/23/EC

Material certificate EN 10204-3.1

NDT- X-ray inspection report: EN 1435

DI3 sensor only: NDT-Penetrant inspection report ISO 3452.

Factory certificate according to EN 10204 2.2

Factory certificate according to EN 10204 2.1

Tag name plate, stainless steel

Tag name plate, plastic

Customer-specific transmitter setup

Customer-specified, matched pair (5 x 2)

Customer-specified calibration (5 x 2)

Customer-specified, matched pair (10 x 1)

Customer-specified calibration (10 x 1)

Cleaned for oil and grease

Special version

C11**C12****C13****C14****C15****Y17****Y18****Y20****Y60****Y61****Y62****Y63****Y80****Y99****Operating instructions for****SITRANS F C MASS 2100 DI 3 to DI 40**

Description	Article 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:

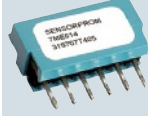
<http://www.siemens.com/flowdocumentation>

Selection and Ordering data**Accessories**

Description	Dimension	Article No.
Mating parts for hygienic fittings DIN 11851	DN 10 DN 15	FDK:085U1016 FDK:085U1017
Includes: • 2 unions • 2 mating parts (for welding in) • 2 EPDM gaskets	DN 25 DN 32 DN 40 DN 50 DN 65	FDK:085U1019 FDK:085U1020 FDK:085U1021 FDK:085U1022 FDK:085U1023
Mating parts for hygienic clamp ISO 2852	25 mm 40 mm 50 mm	FDK:085U1029 FDK:085U1031 FDK:085U1032
Includes: • 2 clamps • 2 mating parts • 2 EPDM gaskets		
2 EPDM gaskets with collar for mounting set DIN 11851	DN 10 DN 15 DN 25 DN 32 DN 40 DN 50 DN 65	FDK:085U1006 FDK:085U1007 FDK:085U1009 FDK:085U1010 FDK:085U1011 FDK:085U1012 FDK:085U1013

Description	Length	Article 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	Article No.
Adapter for MASS 2100	FDK:083L8889
Multiple plug for cable mounting	FDK:083H5056
2 kB SENSORPROM unit, including programming (Sensor Serial No. and Article No. must be specified by ordering)	 FDK:083H4410

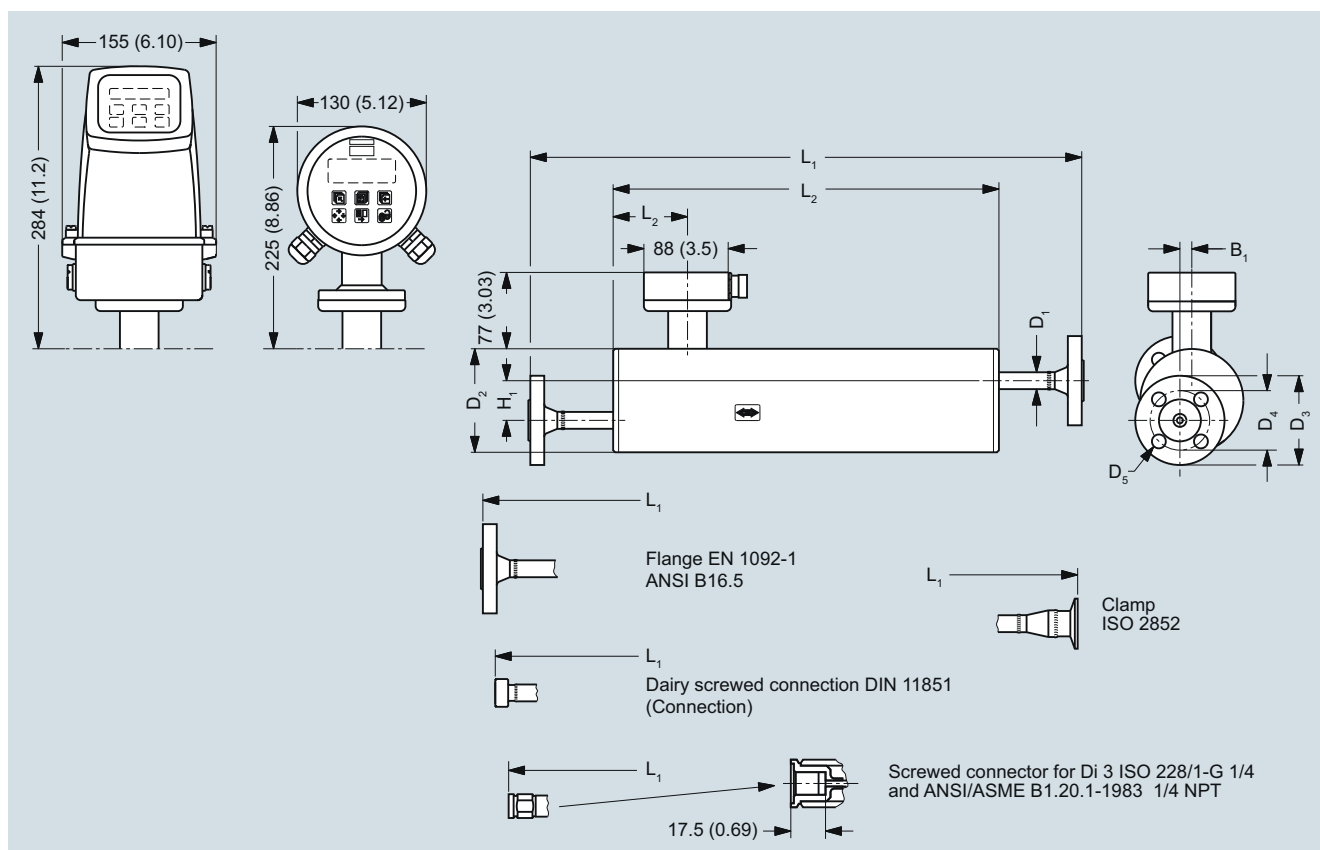
Flow Measurement

SITRANS F C

Flow sensor MASS 2100 DI 3 to DI 40

Dimensional drawings

MASS 2100 sensor



Dimension in mm (inch)

For not listed variants please contact product support

Sensor size	Connections			L1	L2	L3	H1	B1	D1	D2	D3	D4	D5
DI (inch)	Type	Pressure rating	Size	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
DI 3 (1/8)	Pipe thread ISO 228/1 - G1/4	PN 100	1/4"	400	280	75.5	60	0	21.3	104	-	-	-
	Pipe thread ANSI/ASME B 1.20.1 - 1/4" NPT	PN 100	1/4"	400	280	75.5	60	0	21.3	104	-	-	-
DI 6 (1/4)	Flange EN 1092-1	PN 100	DN 10	580	390	62.0	40	12	17.0	104	100	70.0	14.0
	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	1/2"	624	390	62.0	40	12	17.0	104	88.9	60.5	15.7
	Flange ANSI B16.5	Class 600	1/2"	608	390	62.0	40	12	17.0	104	95.3	66.5	15.7
	Screw 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 (1/2)	Flange EN 1092-1	PN 100	DN 15	634	444	75.5	44	20	21.3	129	105	75.0	14.0
	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	1/2"	639	444	75.5	44	20	21.3	129	88.9	60.5	15.7
	Flange ANSI B16.5	Class 600	1/2"	660	444	75.5	44	20	21.3	129	95.3	66.5	15.7
	Screw 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 (1)	Flange EN 1092-1	PN 100	DN 25	970	700	75.5	126	25	33.7	219	140.0	100.0	18.0
	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
	Screw 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 (1 1/2)	Flange EN 1092-1	PN 100	DN 40	1100	850	75.5	180	0	48.3	273	170.0	125.0	22.0
	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	1 1/2"	1100	850	75.5	180	0	48.3	273	127.0	98.6	15.7
	Flange ANSI B16.5	Class 600	1 1/2"	1128	850	75.5	180	0	48.3	273	155.4	114.3	22.4
	Screw 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	-	-	-

For not listed variants please contact product support.

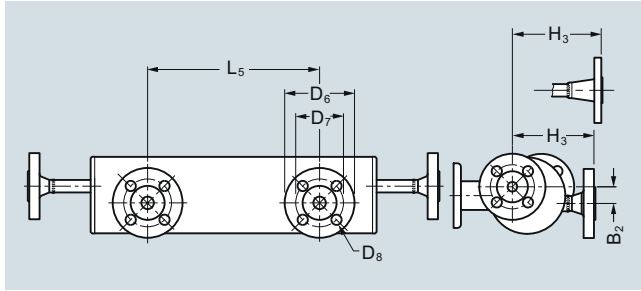
Sensor size	Connections			L1	L2	L3	H1	B1	D1	D2	D3	D4	D5
DI (inch)	Type	Pressure rating	Size	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch
DI 3 (1/8)	Pipe thread ISO 228/1 - G1/4	PN 100	1/4"	15.75	11.02	2.97	2.36	0	0.84	4.09	-	-	-
	Pipe thread ANSI/ASME B 1.20.1 - 1/4" NPT	PN 100	1/4"	15.75	11.02	2.97	2.36	0	0.84	4.09	-	-	-
DI 6 (1/4)	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
	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	1/2"	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	1/2"	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 (1/2)	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
	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	1/2"	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	1/2"	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 (1)	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
	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 (1 1/2)	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
	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	1 1/2"	43.31	33.46	2.97	7.09	0	1.9	10.75	5	3.88	0.62
	Flange ANSI B16.5	Class 600	1 1/2"	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	-	-	-

Flow Measurement

SITRANS F C

Flow sensor MASS 2100 DI 3 to DI 40

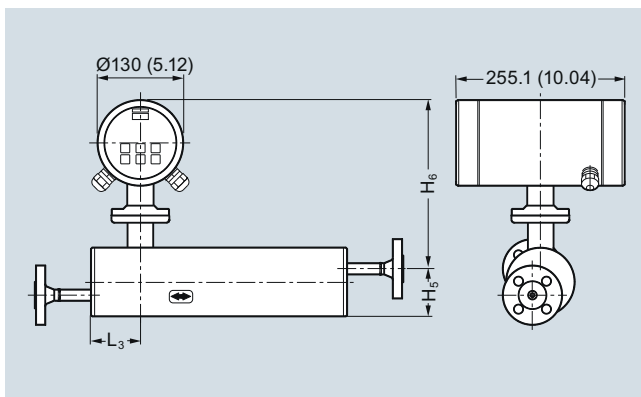
MASS 2100 sensor with "heating jacket"



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	Class 150	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)

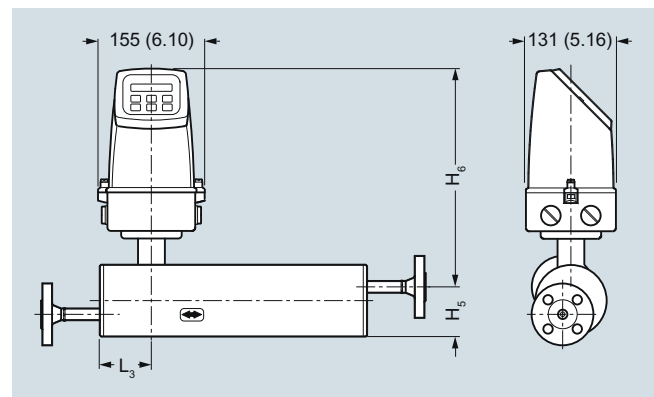
MASS 2100 and MASS 6000 Ex d compact version



Dimensions in mm (inch)

Sensor size	L ₃	H ₅	H ₆	H ₅ + H ₆
[DI (inch)]	[mm (inch)]	[mm (inch)]	[mm (inch)]	[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	L ₃	H ₅	H ₆	H ₅ + H ₆
[DI (inch)]	[mm (inch)]	[mm (inch)]	[mm (inch)]	[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)

Overview



SITRANS F C MC2 is available as standard version (DN 100 to DN 150 (4" to 6"))

The MC2 sensor is suitable for accurate mass flow measurement of a variety of liquids.

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/cm³
- 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 Ex em [ib] IIC
- Sensor pipe available in high-quality stainless steel AISI 316Ti/1.4571 or Hastelloy C4/2.4610 offering optimum corrosion resistance.
- CIP cleanability for food and beverage and pharmaceutical applications

Application

Coriolis mass flowmeters are suitable for measuring all liquids. 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	Liquid 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. MC2 is **not** recommended for gas applications.

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.

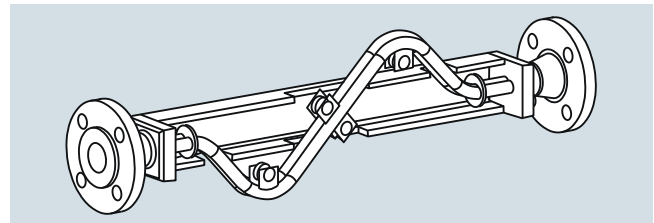
The flow-splitters are welded onto a rigid sensor housing which acts as a mechanical low-pass filter.

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 Ex em [ib] IIC.

It can be installed in horizontal or vertical position, and is self-draining in both positions.



The MC2 Ex version sensor is based on a different Ex concept than MASS 6000. Therefore the MC2 Ex version 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

Flow Measurement

SITRANS F C

Flow sensor MC2

Function

The measuring principle is based on the Coriolis effect. See "System information Coriolis mass flowmeters".

Integration

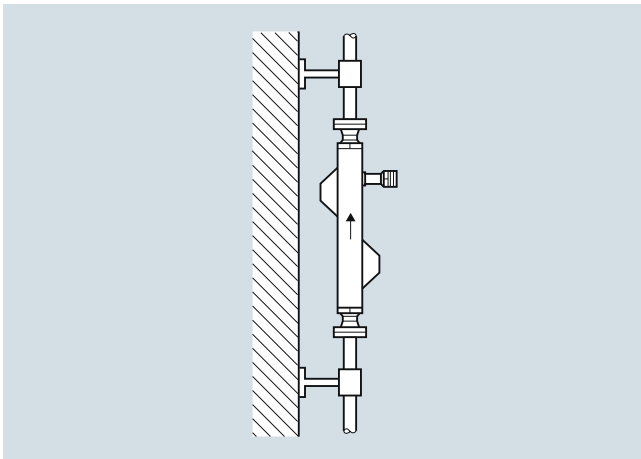
Installation guidelines MC2 DN 50 ... DN 150

Installation of sensor

Rigid mounting brackets must be used when installing the sensor. The brackets must be installed as close to the sensor as possible, attached to the piping outside the process connections.

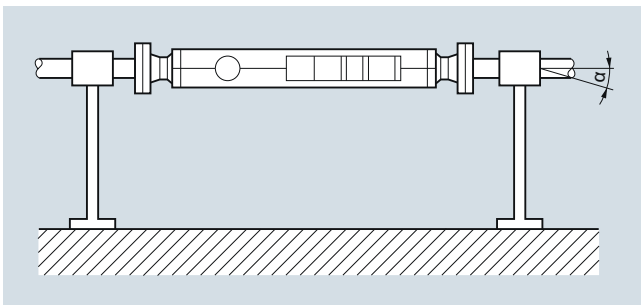
The optimal installation orientation is a vertical installation with an upward flow as shown in the following figure. This has the advantage that any solids contained in the fluid will settle downward and gas bubbles will move upward out of the meter tube when the flow rate is zero. Additionally, it is easy to drain the meter tube. Deposits can thereby be avoided.

Vertical orientation:

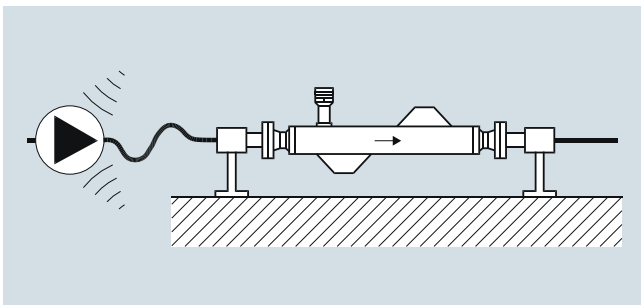


Vertical installation self-draining (upward flow)

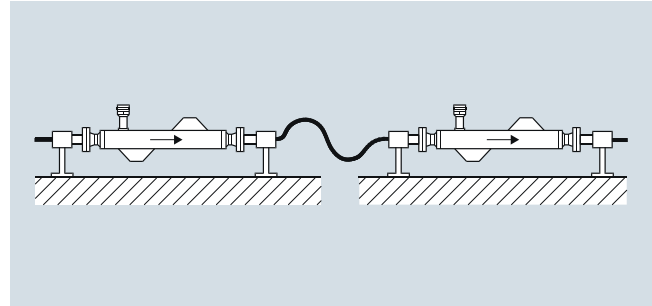
Horizontal orientation, self-draining



Avoid vibrations

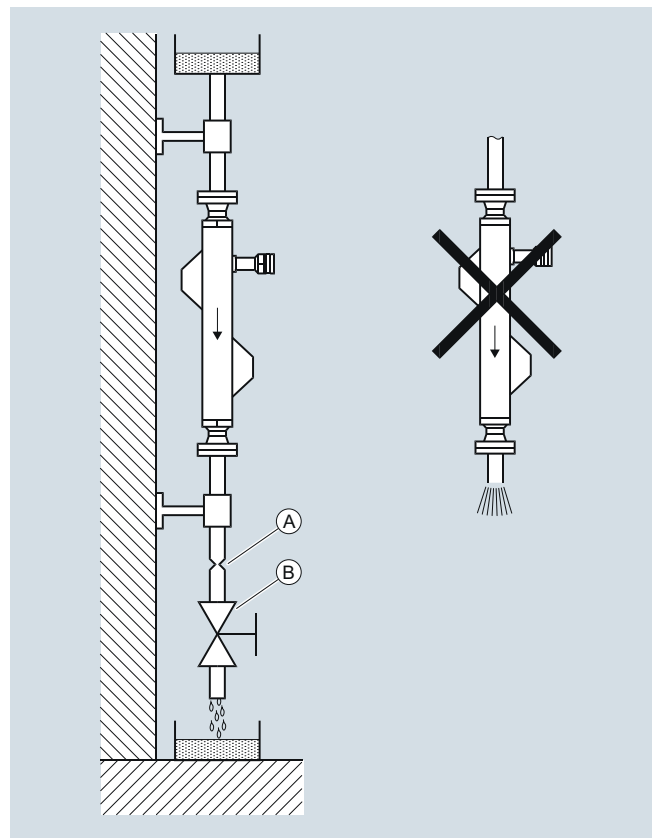


Avoid cross talk



Installation in a drop line

Mount with reduction (A) or orifice (B) to prevent partially draining (min. back pressure: 0.2 bar).



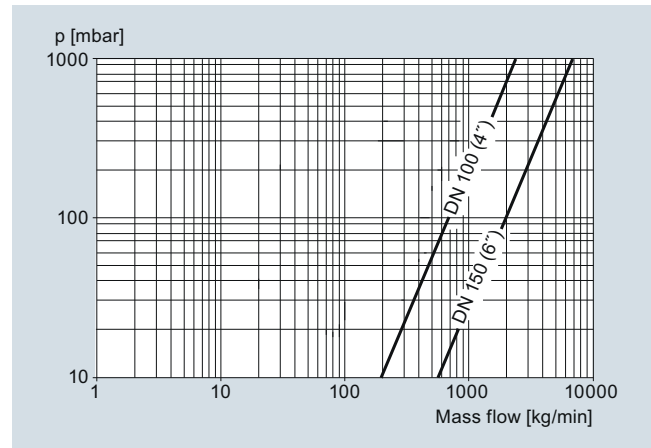
Installation in a drop line

Technical specifications

Versions (mm (inch))		100 (4)	150 (6)
Inside pipe diameter	mm (inch)	43.1 (1.69)	76.1 (2.99)
Pipe wall thickness	mm (inch)	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)	203 500 (448 640)	602 000 (1 327 181)
Density	g/cm ³ (lb/inch ³)	0.5 ... 3.5 (0.18 ... 0.126)	
Fraction e.g. Brix	°Brix	0 ... 100 (on request)	Not possible
Temperature			
Standard-version		-50 ... +200 °C (-58 ... +392 °F)	
Ex-version		-50 ... +200 °C (-58 ... +392 °F)	
Liquid pressure measuring pipe			
Stainless steel (DIN 2413, 20 °C (68 °F))	bar (psi)	40 (580)	40 (580)
Materials			
Measuring pipe		Stainless steel AISI 316Ti/1.4571 or Hastelloy C4/2.4610	
Enclosure			
Enclosure material/ connection box		IP67 AISI 304 (1.4301)/aluminum, max. pressure 40 bar (580 psi)	
Process connections			
Electrical connections		See dimensional drawings Screw terminals, M 20	
Cable		5 x 2 x 0.35 mm ² 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		II 2G Ex em [ib] IIC T2-T6	
Weight approx.	kg (lb)	91 (201)	261 (573)

For accuracy specifications see „System information Coriolis mass flowmeters“.

Pressure drop



Flow Measurement

SITRANS F C

Flow sensor MC2

Selection and Ordering data

SITRANS F C flow sensors MC2

Article No. Ord. code

7ME4300 -

Nominal diameter

Stainless steel AISI 316Ti/1.4571

DN 100

1 D

DN 150

1 E

Hastelloy C4/2.4610

DN 100

2 D

DN 150

2 E

Nominal pressure

PN 40

A

Class 150

C

Class 300

D

Clamps/screwed-connections

F

Process connections

Flange EN 1092-1

DN 80 (PN 40, PN 100)

2 2

DN 100 (PN 40)

2 3

DN 150 (PN 40)

2 4

Flange ASME/ANSI B16.5

3" (class 150/300/600)

3 2

4" (class 150/300)

3 3

6" (class 150/300)

3 4

Dairy screwed connection to DIN 11851

DN 80 (PN 25)

4 2

DN 100 (PN 25)

4 3

Dairy clamp connection DIN 32676

(ISO 2852) Tri-clamp

81 mm clamp (PN 10)

5 2

100 mm clamp (PN 10)

5 3

Aseptic nut flange DIN 11864-2 form A for pipes dimensioned by DIN 11866

DN 80 (3")

6 3

DN 100 (4")

6 4

Configuration

Flow (0.15% of rate) and density (5 kg/m³ [0.31 lb/ft³])

1

Flow (0.15% of rate) and density (1 kg/m³ [0.06 lb/ft³])

5

Selection and Ordering data

SITRANS F C flow sensors MC2

Article No. Ord. code

7ME4300 -

Ex-approval and cable gland

Non-Ex, M20 x 1.5

ATEX, M20 x 1.5

A

B

Cable

No cable

A

Calibration

Standard

1

Dairy MLFB example

Article No.

MC2 sensor

7ME4300 -

Sensor size DN 100, AISI 316Ti/1.4571

1 D

Nominal pressure: Clamps

F

DIN 11851, DN 100, PN 25

4 3



Configuration/calibration type: flow and density (5 kg/m³ [0.31 lb/ft³])

1

Without Ex approval

A

No cable

A

Standard calibration

1

Selection and Ordering data

Order code

Additional information

Please add "-Z" to Article No. and specify Order code(s) and plain text.

Pressure testing certificate PED: 97/23/EC

C11

Material certificate EN 10204-3.1

C12

Material certificate according to NACE

C16

Tag name plate, stainless steel

Y17

Tag name plate, plastic self-adhesive

Y18

Customer-specified, matched pair (5 x 2)

On request

Customer-specified calibration (5 x 2)

On request

Customer-specified, matched pair (10 x 1)

On request

Customer-specified calibration (10 x 1)

On request

Operating instructions for SITRANS F C MC2

Description	Article No.
• English	A5E02154544
• German	A5E02407329
• Spanish	A5E02384868
• French	A5E02384945

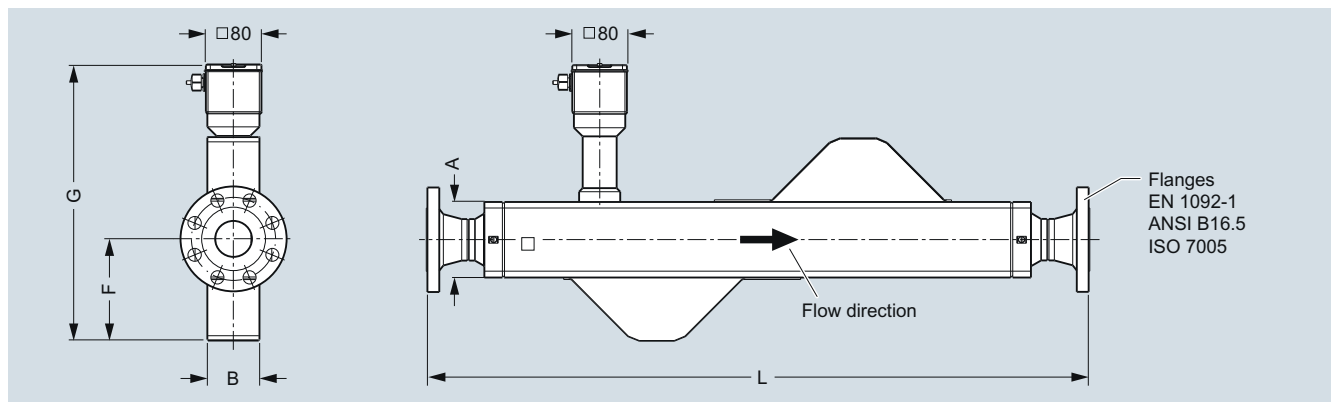
This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:

<http://www.siemens.com/flowdocumentation>

Dimensional drawings

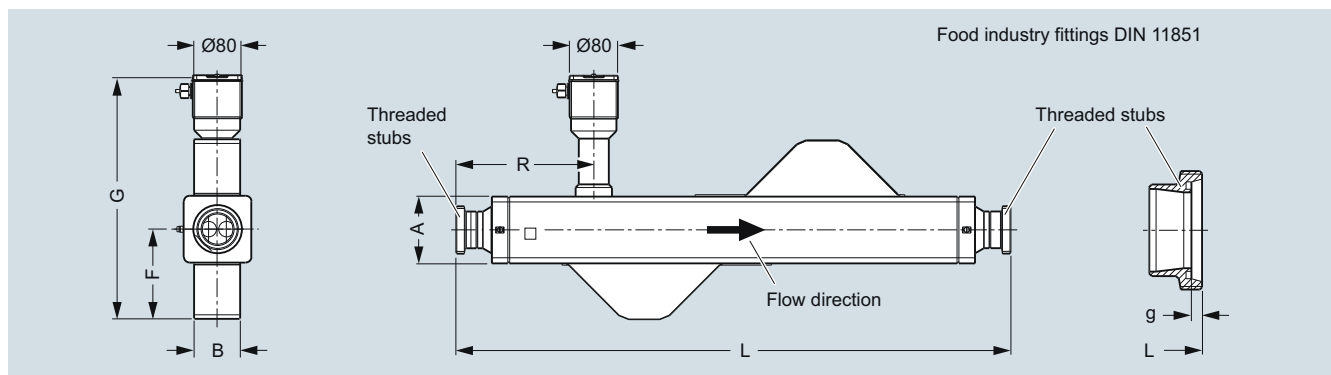
Remote design, flanged construction, DIN EN/ANSI



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	DIN 11864-2 form A	EN 1092-1 PN 40	EN 1092-1 PN 100	ANSI B16.5 CL 150	ANSI B16.5 CL 300						ANSI B16.5 CL 600		
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						
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 Ex 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								
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 1/4	1463 (57.60)	10 (0.39)					314 (12.36)	86 (190)

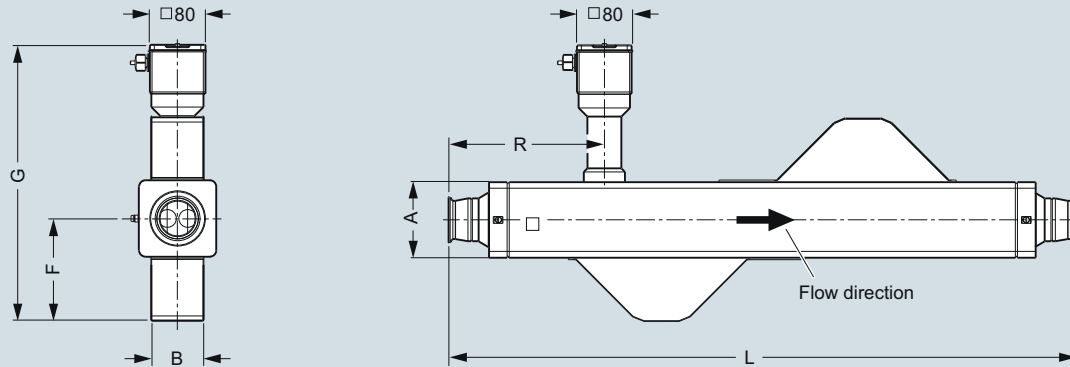
1) For Ex add 54 mm

Flow Measurement

SITRANS F C

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							
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 Ex add 54 mm

Process Connections

- Flanges EN 1092-1/ANSI B16.5
- Tri-Clamp DIN 32676 (ISO 2852)
- 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
Class 150, Class 300

Housing as secondary containment

- Max. 40 bar

Pressure Equipment Directive 97/23/EG

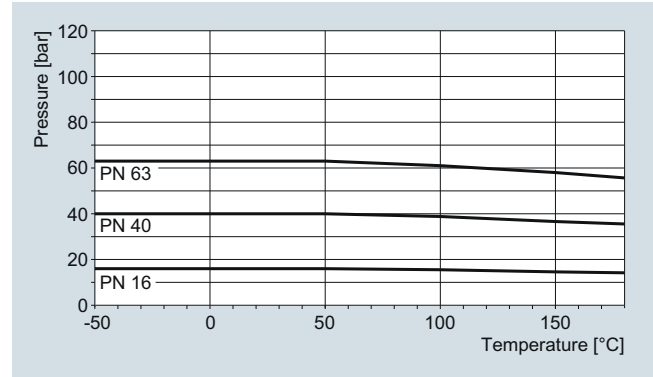
- Conformity evaluation category III, fluid group 1

Corrosion resistance of measuring pipe material to measuring medium has to be considered.

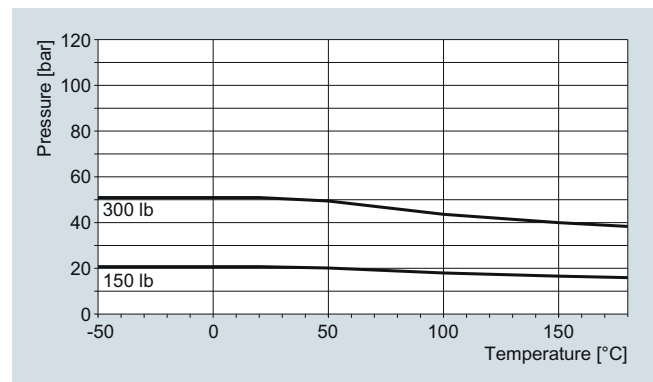
Material strength for process connections

Process connection	Size		PS _{max.} at 20 °C (68 °F)	TS _{max.}	TS _{min.}
	DN	inch			
Thread acc. DIN 11851	100	4	25 (363)	140 (284)	-40 (-40)
Tri-Clamp acc. DIN 32676	100	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 9/6.

Flow Measurement

SITRANS F US Inline

Inline 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-path and 2-path up to DN 4 000 (160")
 - Compact and remote transmitter installation
 - HART and PROFIBUS PA 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 6 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

Flow Measurement

SITRANS F US Inline

System information SITRANS F US
Inline ultrasonic flowmeters

Please see Product selector on the Internet, since some constraints 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
	7ME3300...	7ME3100...	7ME3210.../ 7ME3220...	7ME3410...	7ME3400...
Industry					
Water, treated waste water	XXX	XX	XXX		XXX
Irrigation	XX	XX	XXX		XXX
Utility, district heating water, cooling	XXX	XX	XXX	XXX	XXX
Utility, district heating, CT approvals required				XXX	
Oil	XX	XXX	XX		X
Cryogenic fluids (only on request)		XXX			
Onshore 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	●	●	●		
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-path system on request)		●			
0.50 %	●	●	●	●	●
Sensor design					
1-path ultrasonic measurement (special request)		● ¹⁾³⁾	● ²⁾		
2-path ultrasonic measurement	●	●	●	●	●
4-path ultrasonic measurement (special request)		●	●		
Dimension					
DN 25 ... 40 ³⁾	1" ... 1½" ³⁾	● ³⁾			
DN 50	2"	● ³⁾		●	●
DN 65	2½"	● ³⁾		●	●
DN 80	3"	● ³⁾		●	●
DN 100	4"	●	● ²⁾	●	●
DN 125	5"	●	● ²⁾	●	●
DN 150	6"	●	● ²⁾	●	●
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"	● ³⁾	●	●	●

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

1) Available as 1-path solution on request (down to DN 25 (1"))

2) SONOKIT 1-path DN 100 to DN 2400 and 2-path DN 200 to DN 4000

3) Only available as PVR (product variation request - special request)

Flow Measurement

SITRANS F US Inline

System information SITRANS F US Inline ultrasonic flowmeters

Please see Product selector on the Internet, since some constraints might be related to some of the features:
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SONO 3300/ FUS060	SONO 3100/ FUS060	SONOKIT/ FUS060 FUS080	FUE380	FUS380
7ME3300...	7ME3100...	7ME3210.../ 7ME3220...	7ME3410...	7ME3400...

Dimension (continued)

DN 800	32"	● ³⁾	●	●	●
DN 900	36"	● ³⁾	●	●	●
DN 1000	40"	● ³⁾	●	●	●
DN 1200	48"	● ³⁾	● ⁶⁾	●	●
DN 1400 ... 4000	54" ... 160"		● ^{2) 6)}		

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		● ³⁾			
Class 2500		● ³⁾			

Pipe, flange and transducer material

Carbon steel	●	●	●	●	●
Stainless steel		on request	●		
Die cast bronze				●	●
Other materials		on request	on request		

Media temperature

°C	°F				
-200	-328		● ^{1) 3)}		
-20	-4		●	●	
-10	+14	●	●	●	
+2	+35.6	●	●	●	● ⁷⁾
+60	+140	●	●	●	●
+120	+248	●	●	●	● ⁴⁾
+150	+302	●	●	●	● ⁵⁾
+160	+320	●	●	●	●
+190	+374		●	●	●
+200	+392		●	●	●
+250	+482		● ³⁾		

Measuring principle

Transit time principle	●	●	●	●	●
------------------------	---	---	---	---	---

● = available

- 1) Available as 1-path solution on request (down to DN 25 (1"))
- 2) SONOKIT 1-path DN 100 to DN 2400 and 2-path DN 200 to DN 4000
- 3) Only available as PVR (product variation request - special request).
- 4) Compact
- 5) Pipe material bronze brass
- 6) SONOKIT with FUS080 up to DN 1200
- 7) Min. 5 °C (41 °F)

Flow Measurement

SITRANS F US Inline

System information SITRANS F US
Inline ultrasonic flowmeters

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SONO 3300/ FUS060	SONO 3100/ FUS060	SONOKIT/ FUS060 FUS080	FUE380	FUS380
7ME3300...	7ME3100...	7ME3210.../ 7ME3220...	7ME3410...	7ME3400...

Approvals

Custody transfer approval

MID, MI-004, EN 1434
(European energy meter standard)

Other country-specific type approval available for:

- Russia
- China

Ex approval

Ex d ATEX

Ex i ATEX

● = available

			●	
			●	●
			●	
	●	●		
●	●	●		

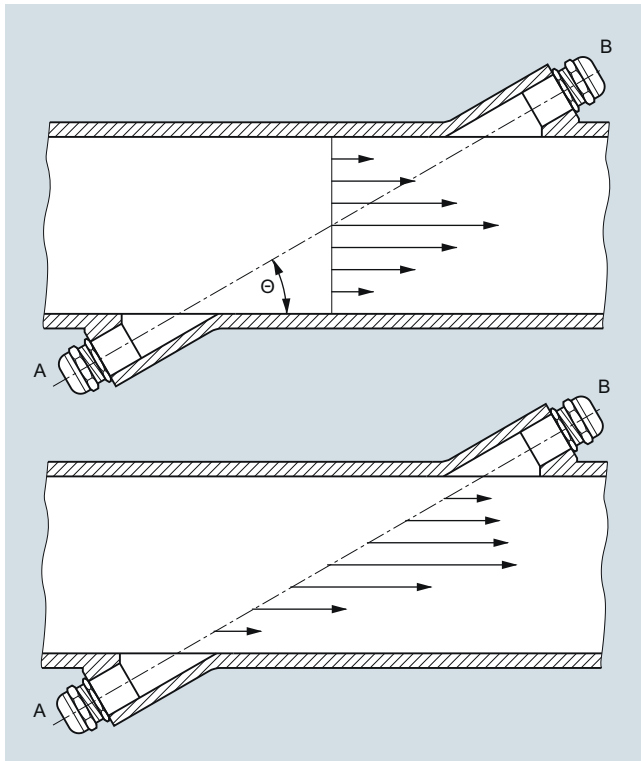
Flow Measurement

SITRANS F US Inline

System information SITRANS F US
Inline ultrasonic flowmeters

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

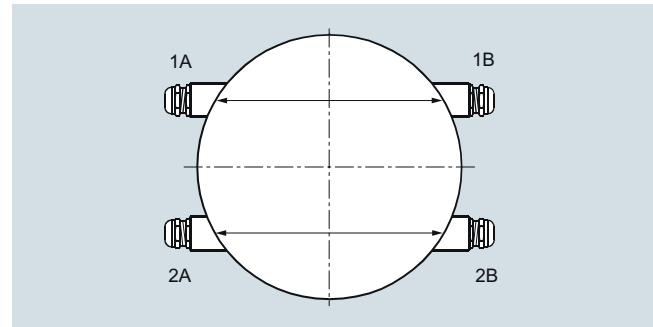
This measuring principle offers the advantage that it is independent of variations in the actual sound velocity of the liquid, i.e. independent of the temperature.

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-path solution



Ultrasonic 2-path flowmeter with 4 transducers. In the upper path transducers 1A / 1B and in the lower path 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 paths.

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-path 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 path stops working.

Typical straight inlet requirements are upstream $10 \times D_i$ (D_i = diameter of the flowmeter) and downstream $3 \times D_i$.

Typical accuracy that can be reached with 2-path ultrasonic flowmetering is $\pm 0.5\%$ with installations according to above demands.

4-path ultrasonic flowmeters

Some applications require accuracy under extreme short inlet conditions and swirl that cannot be obtained with 2-path solutions.

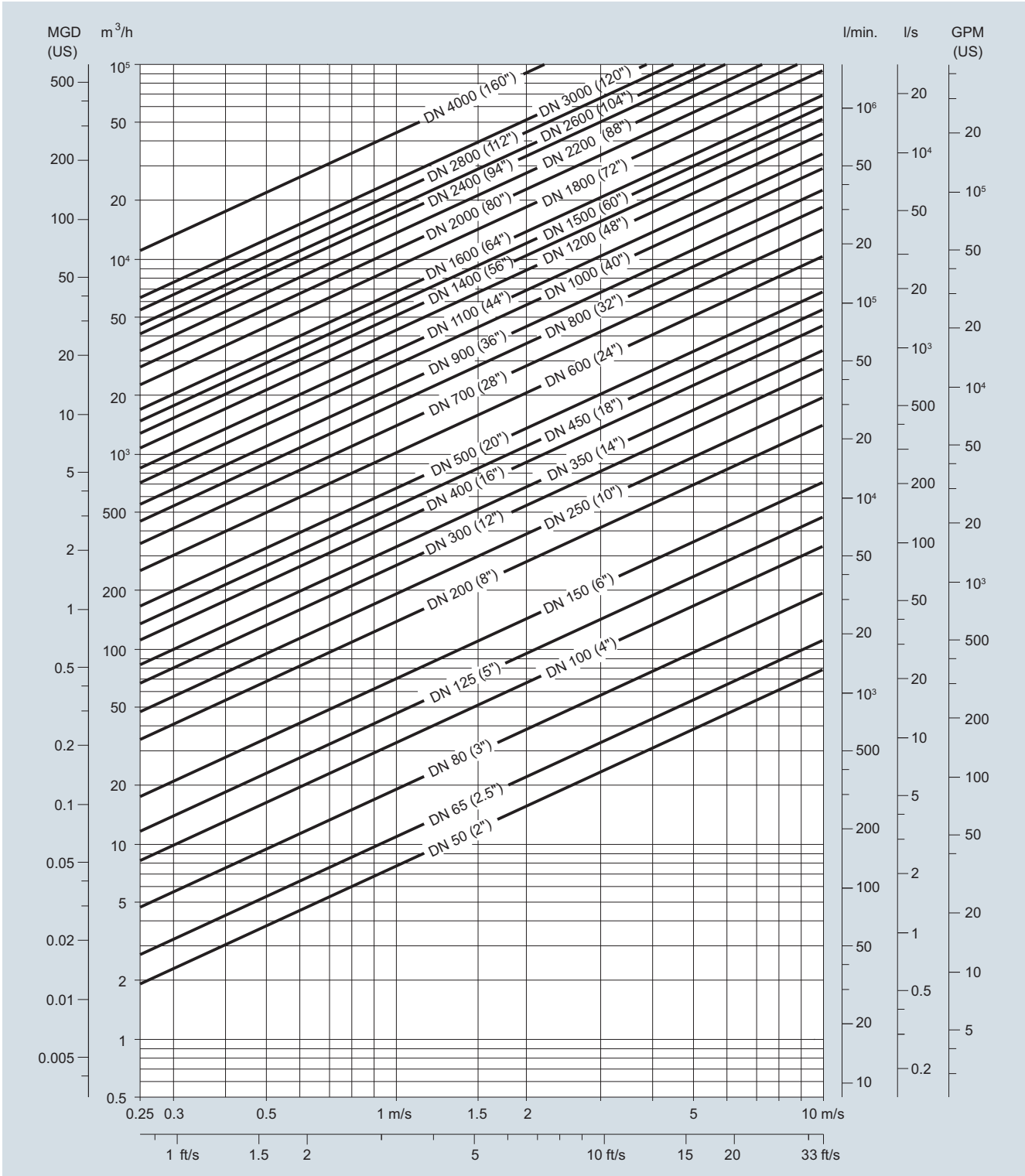
For these applications we can offer a 4-path solution – customer-specified – according to actual inlet conditions.

Please contact Siemens Flow Instruments for specific applications.

Flow Measurement SITRANS F US Inline

System information SITRANS F US
Inline ultrasonic flowmeters

Technical specifications



Nominal size and flow

Flow Measurement

SITRANS F US Inline

System information SITRANS F US Inline ultrasonic flowmeters

Guidelines for selection of sensor

- Min. measuring range: 0 ... 1 m/s
- Max. measuring range: 0 ... 10 m/s

Nominal flow velocity:

- Normal: 1 ... 3 m/s
- Minimum: not permanently below 0.5 m/s
- Maximum: up to 8 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 m³/h, D_i in m

Additional to the flow velocity check it is recommended to observe the Reynolds number (Re):

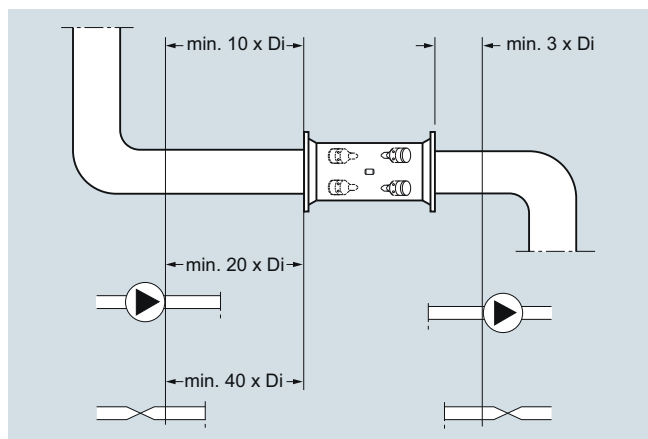
The optimal performance of the flowmeter is with a Re above 10 000, which is typical for flow velocities (water) above 0.5 m/s. Avoid an Re value between 2000 and 5000. In order to observe this and to be above the recommended 0.5 m/s flow velocity limit the sensor size must be reduced.

Re formula: $Re = V \times D_i / \text{Viscosity}$

V in m/s, D_i in m, Viscosity in cSt ($\times \times E-6 \text{ m}^2/\text{s}$)

Example: Viscosity for water at 20 °C = $1 \times E-6 \text{ m}^2/\text{s}$

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-path	FUS380/FUE380 ¹⁾	SONOKIT 1-path
90° bend	10 x Di	10 x Di	20 x Di
Fully opened valve	10 x Di	10 x Di	20 x Di
Partially opened valve	40 x Di	40 x Di	40 x Di
2 x 90° bends in same plane	15 x Di	15 x Di	25 x Di
2 x 90° bends in two planes	20 x Di	20 x Di	40 x Di
Reductions	10 x Di	10 x Di	20 x Di
(Outlet 0 x Di)			
Pumps	20 x Di	20 x Di	40 x Di
Outlet	3 x Di	3 x Di	3 x Di

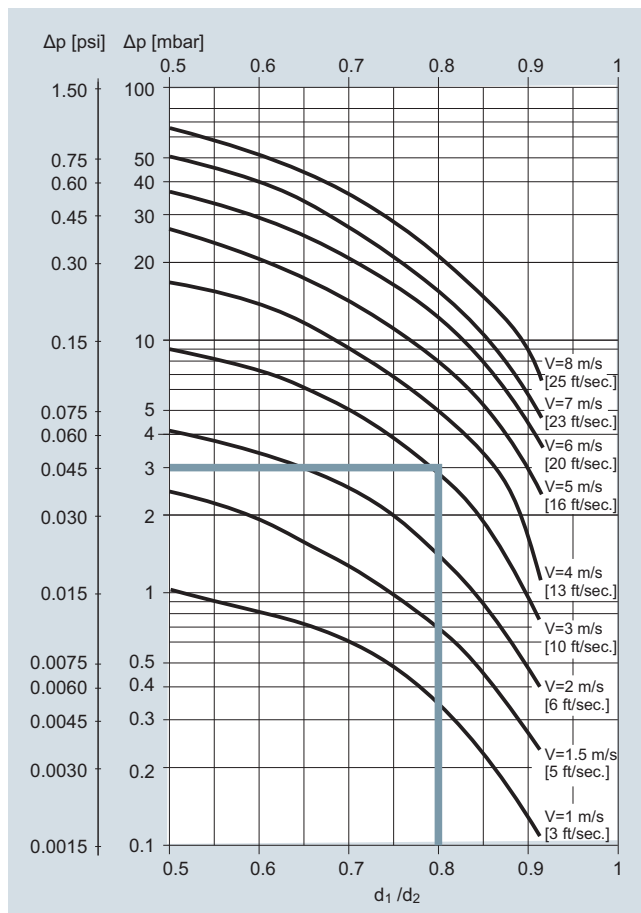
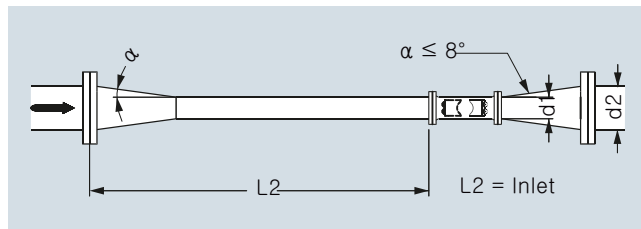
¹⁾ Inlet for FUE380 with MID approval should be for sizes \geq DN 80: 1.5 m

Reductions

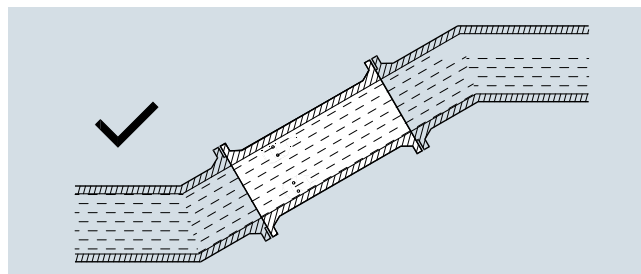
The flowmeter can be installed between two reducers (e.g. DIN 28545). At 8° the pressure drop curve below applies.

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:

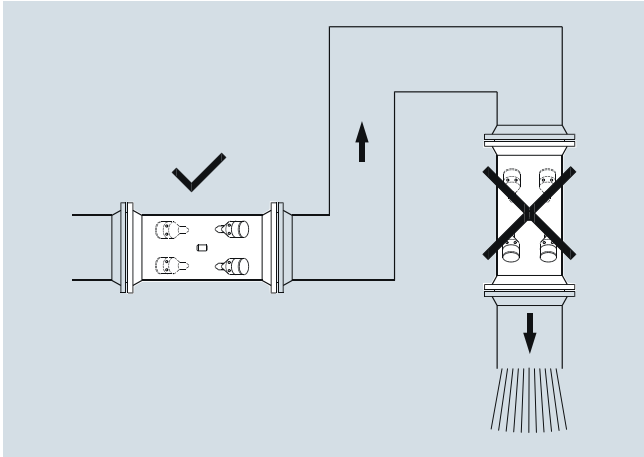
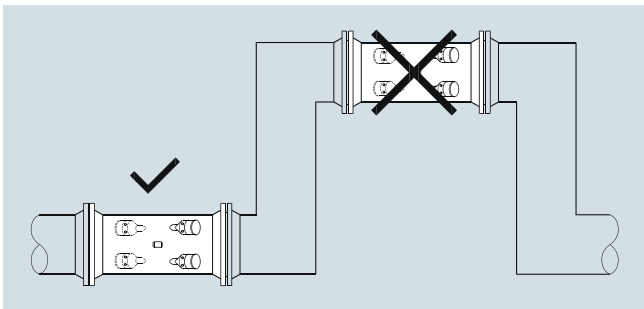


The following installations must be avoided:

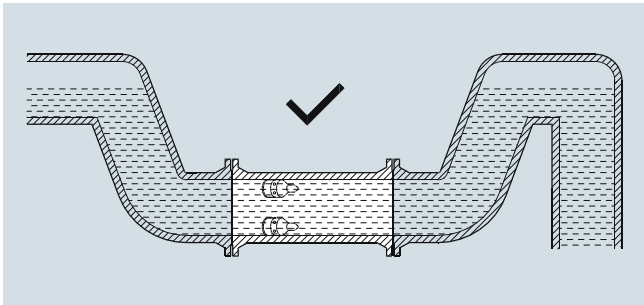
- Installation at the highest point of the pipe system
- Installation in vertical pipes with free outlet

Flow Measurement SITRANS F US Inline

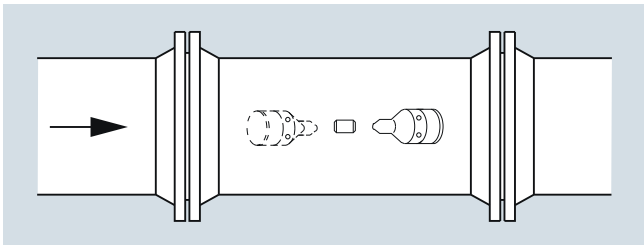
System information SITRANS F US Inline ultrasonic flowmeters



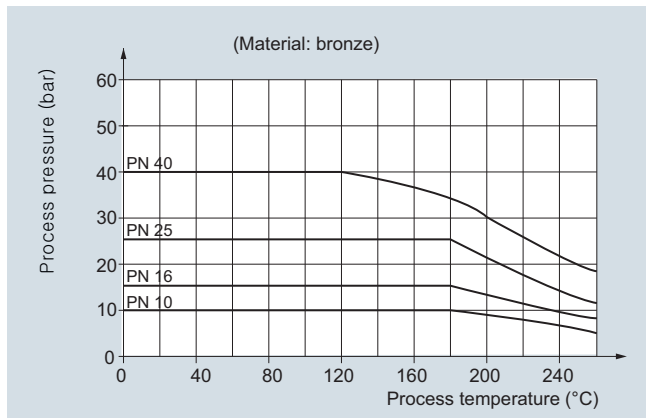
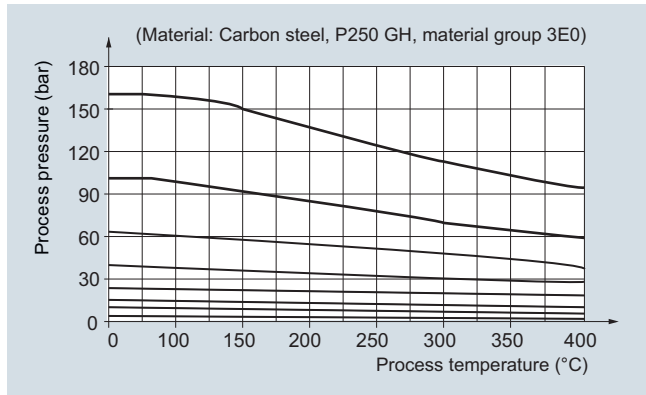
With partially full pipes or pipes with free outlet the flowmeter should be located in a U-shaped tube:



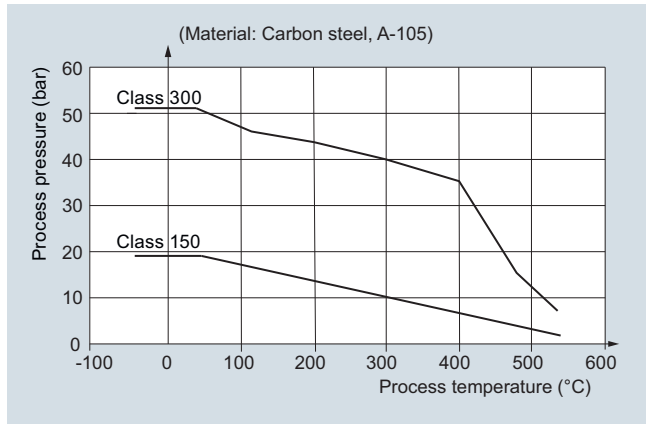
Installing the transducers in horizontal position is recommended:



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 9/6.

Flow Measurement

SITRANS F US Inline

System information SITRANS F US Inline 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).

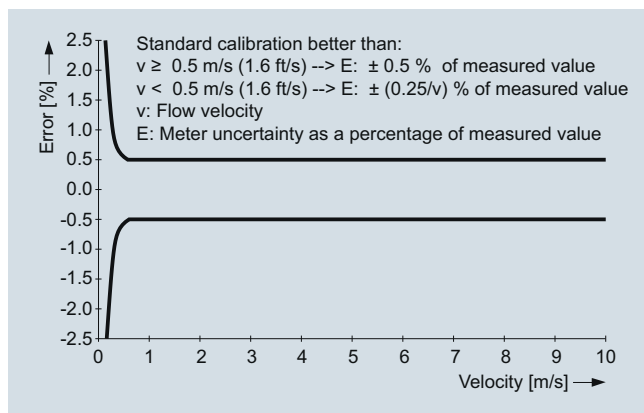
Therefore the calibration certificate ensures recognition of the test results worldwide, including the US (NIST traceability).

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/FUS060¹⁾ which are typically calibrated on the frequency output.



Typical calibration reference conditions:

Fluid	Water
Fluid temperature	$22 \pm 5 \text{ }^\circ\text{C}$
Ambient temperature	$22 \pm 5 \text{ }^\circ\text{C}$
Supply voltage	115/230 V AC +10 ... -15 % 24 V DC +25 ... -15 %, 24 V AC $\pm 15 \%$
Straight inlet length	$20 \times D_i$
Outlet	$3 \times D_i$
Rangeability	0 ... 1 m/s to 0 ... 10 m/s
Repeatability	Better than 0.25 % in the range 0.5 ... 10 m/s
Linearity (for water)	
• 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 ($\pm 0.1 \%$ of actual flow +0.05 % FSO)
- Effect of ambient temperature: Frequency/pulse output: $< 0.005 \% \text{ SPAN/K}$; Current output: $< \pm 0.0075 \% \text{ SPAN/K}$
- Effect of supply voltage: 0.005 % of measuring value at 1 % change

Overview



SITRANS FUS060 is a transit time based transmitter designed for ultrasonic flowmetering with dedicated sensors in the FUS in-line series up to DN 4000. SITRANS FUS060 is engineered for high performance and is suitable for 1-path, 2-path and 4-path 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 paths
- 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 of 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.

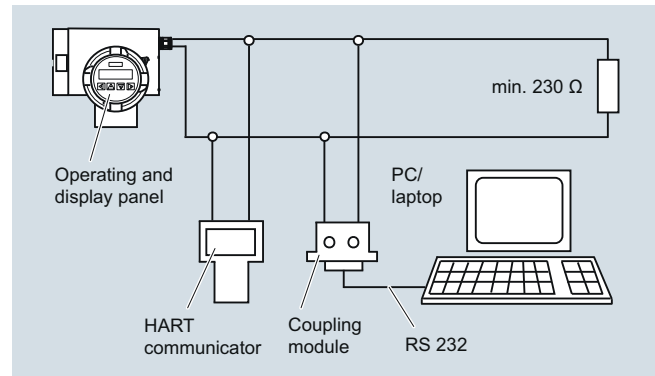
The settings of the transmitter output functions are individually programmed via keypad and display menu.

Function

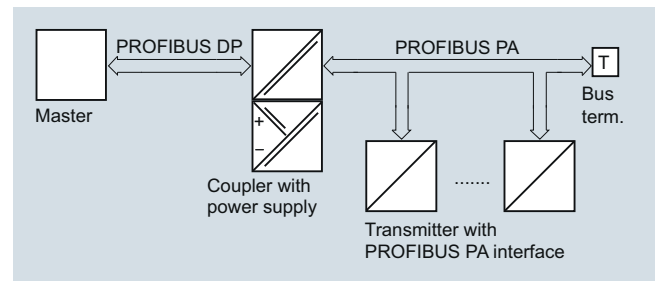
Displays and keypad

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

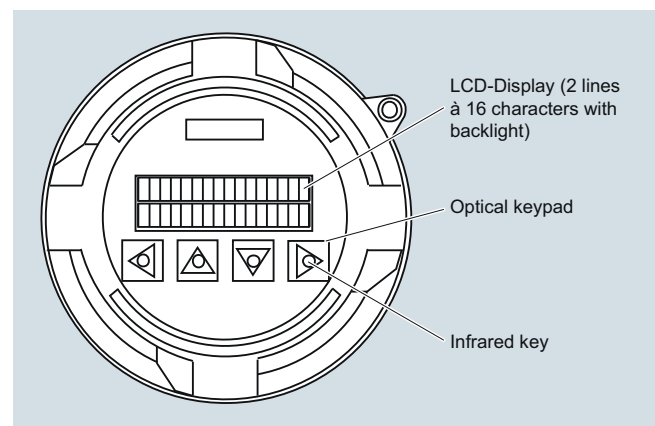


HART communication



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

Flow Measurement

SITRANS F US Inline

Transmitter SITRANS 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 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.

Technical specifications

Input

Measurement	Flow by measuring the transit time difference of ultrasonic signals through ultrasonic transducers in DN 100 ... 4000 2-path sensor pipes (optional, depending on selected size, 1-path or 4-path special solutions are possible).
Nominal diameters and number of paths	2-path DN 100 ... DN 4000 (optionally also 1-path and 4-path, depending on size (DN 25 ... DN 4000))
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-path and 4-path systems with sizes \geq DN 3000 cable length is restricted to 30 m (98.4 ft).

Output

Function	Current output programmable for flow, sound velocity or amplitude level.
Analog output	Active current output (13.2 V < open loop voltage < 15.8 V) 4 ... 20 mA
<ul style="list-style-type: none"> • Signal range • Upper limit • Signal on alarm • Load 	20 ... 22.5 mA, adjustable 3.6 mA, 22 mA, or 24 mA Max. 600 Ω ; for non Ex version \geq 230 Ω for HART communication \leq 330 Ω for Ex-version
<ul style="list-style-type: none"> • Only PROFIBUS PA version: 	Analog output omitted, is replaced by digital PROFIBUS PA interface

Digital output 1

Function	Pulse, frequency or status output - programmable for pulses, frequency, alarm, limit or status.
<ul style="list-style-type: none"> • Active or passive signal, can be configured with positive or negative logic • For explosion protection (ATEX version) and PROFIBUS PA version • Output function, configurable 	Active: 24 V DC, \leq 24 mA, $R_i = 300 \Omega$ Passive: open collector, 30 V DC, \leq 200 mA Only passive: open collector 30 V DC, \leq 100 mA Pulse output <ul style="list-style-type: none"> • Adjustable pulse significance \leq 5000 pulses/s • Adjustable pulse width \geq 0.1 ms Frequency response <ul style="list-style-type: none"> • f_{END} selectable up to 10 kHz Limit for flow, totalizers, ultrasonic velocity or ultrasonic amplitude device status, flow direction

Flow Measurement

SITRANS F US Inline

Transmitter SITRANS FUS060

Digital output 2	
Function	Relay output - programmable for alarm, limit or status indication.
• Relay, NC or NO contact	Switching capacity max. 5 W Max. 50 V DC, max. 200 mA DC Self-resetting fuse, $R_i = 9 \Omega$
• 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
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	
• Power supply	Layers 1 + 2 according to PROFIBUS PA Communication system according to IEC 61158/EN 50170 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	$\leq \pm 0.5$ % of measured value at 0.5 ... 10 m/s or $\leq \pm 0.25/V[m/s]$ % of measured value at flow < 0.5 m/s
• Analog output	As pulse output plus ± 0.1 % of measured value, $\pm 20 \mu A$
• Repeatability	$\leq \pm 0.25$ % of measured value at 0.5 ... 10 m/s
Reference conditions (water)	
• Process temperature in the connected sensor	25 °C \pm 5 °C (77 °F \pm 9 °F)
• Ambient temperature at the transmitter	25 °C \pm 5 °C (77 °F \pm 9 °F)
• Transmitter warming-up time	30 min.
Installation conditions of connected sensor	Upstream section $> 10 \times$ DN and downstream section $> 5 \times$ DN

Rated operation conditions

Ambient conditions

Ambient temperature

- Operation
- In potentially explosive atmospheres
- Storage

Enclosure rating

Electromagnetic compatibility

- Emitted interference
- Noise immunity

Medium conditions

- Process temperature

- Gases/solids

Design

Separate version

Enclosure material

Wall mounting bracket (standard and special)

Weight of transmitter

Electrical connection

Displays and controls

Display

- Multi-display:
2 freely-selectable values are displayed simultaneously in two lines

Operation

Power supply

Supply voltage

- Standard version

- Ex version

Power failure

Power consumption

Certificates and approvals

Explosion protection

-20 ... +50 °C (-4 ... +122 °F)

Observe temperature classes

-25 ... +80 °C (-13 ... +176 °F)

IP65 (NEMA 4)

For use in industrial environments

To EN 55011/CISPR-11

To EN/IEC 61326-1 (Industry)

The measuring media must be ultrasonic signal compatible. It must be homogeneous and not two-phased to transfer the acoustic ultrasonic signals.

-200 ... +250 °C (-328 ... +482 °F)
(not directly influenced by medium temperature)

Influence accuracy of measurement (approx. max. 3 % gases or solids)

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.

Die-cast aluminum, painted

Stainless steel (standard: always incl.)

4.4 kg (9.7 lb)

Cable glands (always incl.)

- Power supply and outputs
 - 2 x M20 (HART)/M25 (PROFIBUS) or
 - 2 x 1/2"-NPT (HART)

- Transducers/sensor
 - 2/4 x M16 or
 - 2/4 x 1/2" NPT

LCD, two lines with 16 characters each

Flow, volume, mass flow, mass, flow velocity, speed of sound, ultrasonic signal information, current, frequency, alarm information

4 infrared keys, hierarchical menu shown with codes

120 ... 230 V AC \pm 15 %
(50/60 Hz) or 19 ... 30 V DC/
21 ... 26 V AC

19 ... 30 V DC/21 ... 26 V AC

No effect for at least 1 period (> 20 ms)

Approx. 10 VA/10 W

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)

Flow Measurement SITRANS F US Inline

Transmitter SITRANS FUS060

Coaxial cable

Standard Coaxial cable (75 Ω) Coaxial cable with SMB straight plug on one end for connection to the FUS060



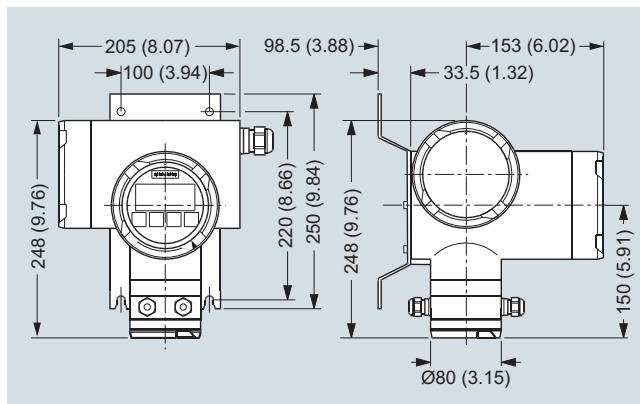
Outside diameter Ø 5.8 mm
 Length 3, 15, 30, 60, 90, 120 m (9.84, 49.21, 98.43, 196.85, 295.28, 393.70 ft) between sensor and transmitter
 Material (outside jacket) black PE
 Ambient temperature -10 ... +70 °C (14 ... 158 °F)

High temperature Coaxial cable (75 Ω) Coaxial cable with SMB straight plug on one end for the connection to FUS060

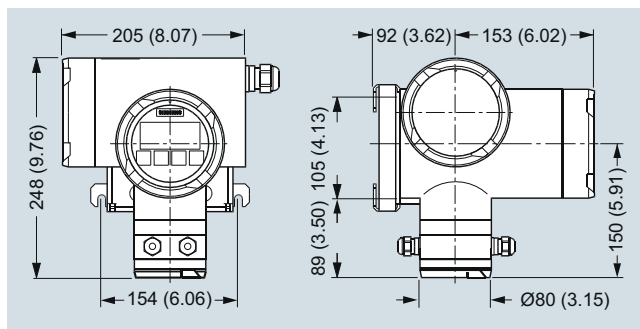
Outside diameter Ø 5.13 mm (first 0.3 m (0.98 ft) part to the transducer), Ø 5.8 mm (for remaining cable to the transmitter - with SMB plug at the end) and between these is a black hot melt junction Ø 16 mm (length 70 mm)
 Length 3, 15, 30, 60, 90, 120 m (9.84, 49.21, 98.43, 196.85, 295.28, 393.70 ft) 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)

Dimensional drawings

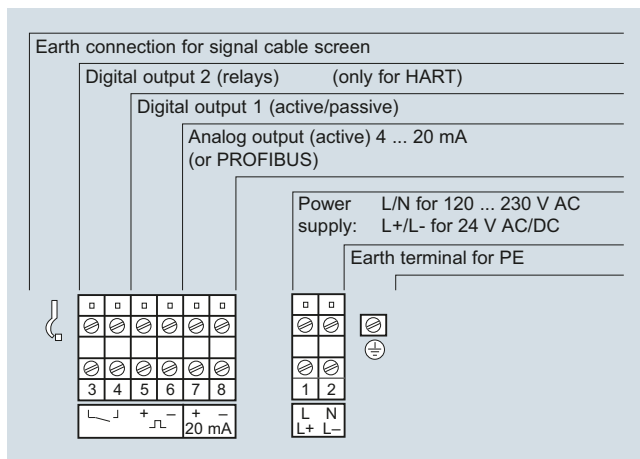


SITRANS FUS060 with standard mounting bracket, dimensions in mm (inch)



SITRANS FUS060 with optional special mounting bracket, dimensions in mm (inch)

Schematics



Electrical connection SITRANS FUS060

Transmitter FUS060 operating instructions, accessories and spare parts




Operating instructions

Description	Article 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	Article 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

Details about the SIMATIC PDM tool can be found on page 8/11, chapter "Communication and Software"

See page 8/18, chapter "Communication and Software"



HART modem for communication with FUS060 HART, PC and SIMATIC PDM

HART modem

With RS 232 connection

7MF4997-1DA

With USB connection


7MF4997-1DB

Spare parts

SITRANS FUS060 transmitter, available standard and Ex versions

The transmitter configuration is made in the flowmeter Order codes (together with the sensors).


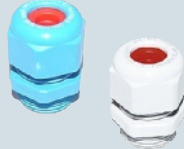






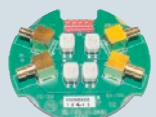




The information below is for spare part ordering only and with fixed standardized pre-settings for a DN 2000 2-path system.

Description	Version	Enclosure	Supply	Article 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	

Flow Measurement

SITRANS F US Inline

Transmitter SITRANS FUS060

Description	Article No.		Description	Article No.	
Operating/Display module	7ME5933-0AC00		M20 cable gland set for FUS060 ATEX version power and output connection, PA plastic, 1 x in blue (ATEX Ex i) and 1 x gray (ATEX Ex-e) • cables Ø 5 ... 9 mm (0.20" ... 0.35") • -20 ... +95 °C (-4 ... +203 °F)	A5E02246356	
Electronics cover with glass plate (non Ex) . Die cast aluminum, with corrosion-resistant Basic Polyester powder coating (min. 60 µm)	7ME5933-0AC01		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	
Cover for sensor cable and gasket. Die cast aluminum, with corrosion-resistant Basic Polyester powder coating (min. 60 µm)	7ME5933-0AC02		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	
Cover for mains supply/communication. Die cast aluminum, with corrosion-resistant Basic Polyester powder coating (min. 60 µm)	7ME5933-0AC03		M16x1.5 cable gland set for FUS060 (M16) sensor connection, gray PA plastic, 2 pcs. and 2 pcs. blind. • cables Ø 5 ... 9 mm (0.20" ... 0.35") • -40 ... +100 °C (-40 ... +212 °F)	A5E02593526	
FUS060 Sensor connection PCBA, Standard versions only, 1 pc.	A5E02551331		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	
FUS060 Sensor connection PCBA, ATEX version only, 1 pc.	A5E02551334		1/2" NPT cable gland set for FUS060 (NPT) sensor connection, 4 pcs. M16 bush to 1/2" NPT and 4 pcs. 1/2" NPT gray PA plastic glands • cables Ø 5 ... 9 mm (0.20 ... 0.35") • -20 ... +100 °C (-4 ... +212°F)	A5E02247877	
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				

Cables for FUS060

Description	Length m (ft)	Article 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
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)	120 (393.70)	A5E01278698
	3 (9.84)	A5E00875105
	15 (49.21)	A5E00861435
Special coaxial cable sets for low temperature cryogenic systems; with SMB plug for transmitter SITRANS FUS060, PTFE material, temp. -200 ... +200 °C (-328 ... +392 °F), impedance 75 Ω (2 pcs.)	30 (98.43)	A5E01196952
	10 (32.84)	A5E02085593
	15 (49.21)	A5E03262088
	30 (98.43)	A5E02085644
	40 (131.23)	A5E02085649



Flow Measurement

SITRANS F US Inline

Transmitter SITRANS 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 3/263. The standard flowmeter series SITRANS FUS380 is described from page 3/274. The type approved flowmeter series for flowmetering in energy meter custody transfer systems are named SITRANS FUE380 - see page 3/279.

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-path 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

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 fiber-glass 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-path or 2-path)
- FUS380 (2-path)
- FUE380 (2-path)

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.

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-path or 2-path sensors in sizes DN 50 ... 1200 measuring on water.
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
Output	
Max. pulse frequency	100 Hz at Q_s (Q_{max})
Pulse value and length	Selectable with the ordering of the flowmeter
Output A function	Pulse: forward, reverse, forward net, reverse net (preset: forward)
Output B function	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	Path 1 (F1), path 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)

Flow Measurement

SITRANS F US Inline

Transmitter SITRANS FUS080/FUE080

Rated operation conditions

Ambient conditions

Ambient temperature

- Operation -10 ... +60 °C (14 ... 140 °F) (MID version: max. +55 °C (131 °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 55011/CISPR-11
- Immunity To EN/IEC 61326-1 (Industry)
- 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: m³/h
Volume unit: Preset: m³

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 6 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

SONOKIT, FUS380, FUE380

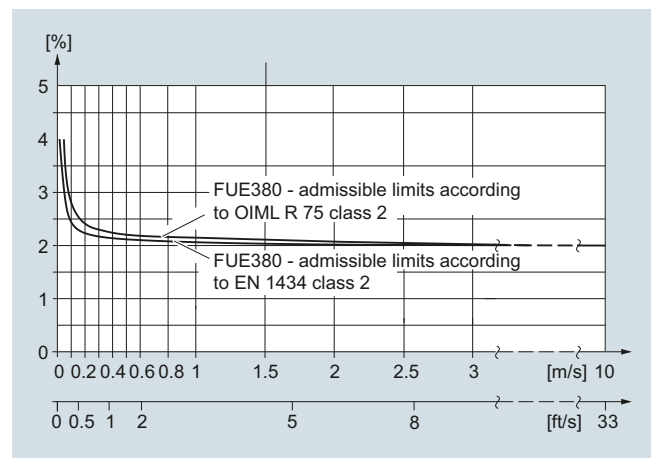
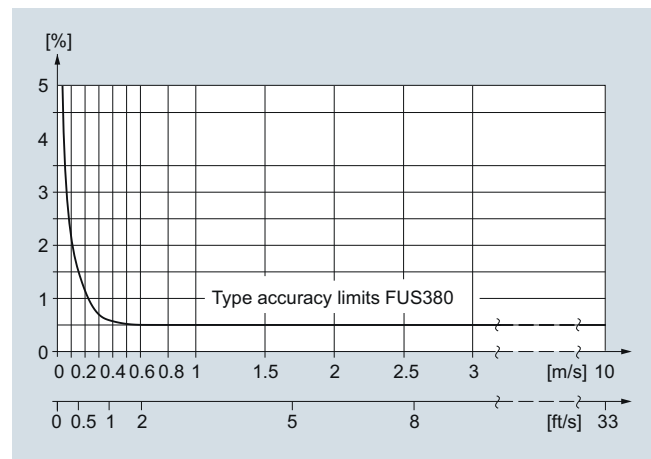
The flow values and settings are predefined according to dimension selection.

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 FUE380 series, SONOKIT series will differ in the accuracy)

- Pulse output
 - ± 0.5 % of measured value at 0.5 ... 10 m/s or
 - $\pm 0.25/V$ [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 \pm 5 °C (77 °F \pm 9 °F)
 - Transmitter warming-up time 30 min.
 - Installation conditions of the sensor: Upstream section > 10 x DN and downstream section > 5 DN

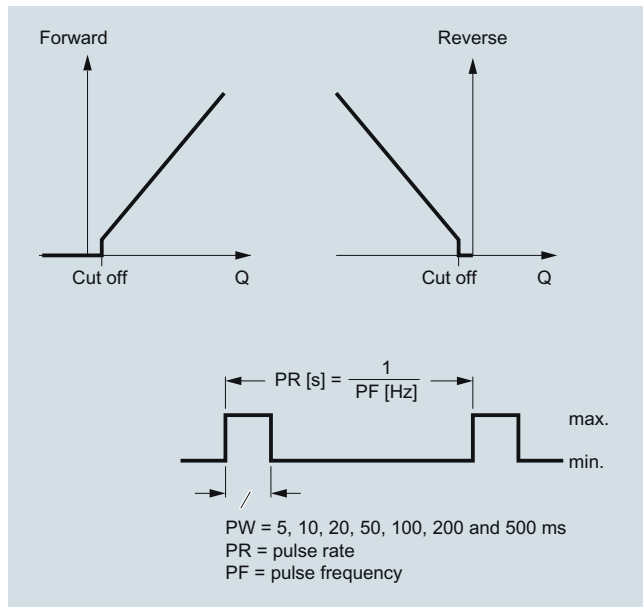


Flow Measurement

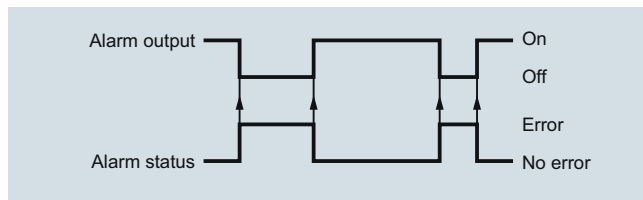
SITRANS F US Inline

Transmitter SITRANS FUS080/FUE080

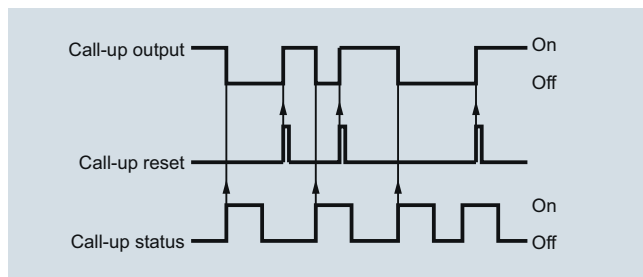
Output configuration



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)



Transmitter FUS080 operating instructions, accessories and spare parts

Operating instructions

Description	Article 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	Article 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

Process Device Manager SIMATIC PDM

SIMATIC PDM	See page 8/18, chapter "Communication and Software"
Details about the SIMATIC PDM tool can be found on page 8/11, chapter "Communication and Software"	

Spare parts

Spare part transmitter for FUS380 systems (7ME3400)

Description	Article No.
FUS080 transmitter 3.6 V battery (no battery included, to be ordered separate) as spare part transmitter for FUS380 flowmeter series	A5E02729700
FUS080 transmitter 3.6 V battery (battery included) as spare part transmitter for FUS380 flowmeter series ¹⁾	A5E02729035
FUS080 transmitter 230 V mains as spare part transmitter for FUS380 flowmeter series	A5E02699309
FUS080 transmitter 230 V mains with backup-battery as spare part transmitter for FUS380 flowmeter series	A5E02729610

When ordering: Inform on flowmeter Article No. and flowmeter serial no. (e.g. 7ME3400-xxxxx-xxxx-Z, XX.... and xxxxxxNxxx)

Spare part transmitter for FUE380 approved systems (7ME3410)

(only with MID approval marks, no MID verification – only a complete flowmeter can be MID-verified, i.e. sensor together with the transmitter)

Description	Article No.
FUE080 transmitter 3.6 V battery (no battery included, to be ordered separate) as spare part transmitter for FUE380 flowmeter series	A5E02734600
FUE080 transmitter 3.6 V battery (battery included) as spare part transmitter for FUE380 flowmeter series ¹⁾	A5E02734568
FUE080 transmitter 230 V mains as spare part transmitter for FUE380 flowmeter series	A5E02734539
FUE080 transmitter 230 V mains with backup-battery as spare part transmitter for FUE380 flowmeter series	A5E02734585

When ordering: Inform on flowmeter Article No. and flowmeter serial no. (e.g. 7ME3410-xxxxx-xxxx-Z, XX.... and xxxxxxNxxx)

Spare part transmitter for SONOKIT systems (7ME3210/7ME3220)

Description	Article 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 ¹⁾	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 Article No. and flowmeter serial no. (e.g. 7ME3220-xxxxx-xxxx-Z, XX.... and xxxxxxNxxx)



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.








Flow Measurement

SITRANS F US Inline

Transmitter SITRANS FUS080/FUE080

Spare part transmitter for FUS880 retrofitting systems (7ME3440)

Description	Article No.	
<p>Sparepart FUS080 transmitter 3.6 V, incl. 3.6V dual batterie pack, USA version</p> <p>Internal code: 7ME3450-0AA20-1CA0: Label, 0: Siemens FUS080 transmitter Version, 0: Without connection box Enclosure, A: IP67/NEMA 4X/6 A: Standard. Supply Voltage, 2: 3.6V DC battery. Ex. Approval, 0: no Ex approval. Display, 1: With display and unit label. Region version, C: USA: AcFt,CFS Application, 0: Standard FUS080 (for SITRANS Retrofit - 7ME344)</p>	A5E03412669	
<p>FUS080 transmitter for FUS880 retrofit systems, USA version,</p> <p>incl. wall-mounting kit, 2 transducers and 2 pcs. 60ft (20 m) of cables. Label, 0: Siemens Diameter, 0A: None Wall Thickness, A: None Pipe Material, 0: No Pipe Track configuration, 1: 1-Track Region version, 2: USA: AcFt,CFS Transmitter, D: FUS080,IP67, Battery, Remote,unit label Template, A: None Transducer coax cable, 4: 20 m with gland</p>	7ME3440-0AA01-2DA4	
<p>FUS080 transmitter for FUS880 retrofit systems, USA version,</p> <p>incl. wall-mounting kit, 4 transducers and 4 pcs. 60ft (20m) of cables: Label, 0: Siemens Diameter, 0A: None Wall Thickness, A: None Pipe Material, 0: No Pipe Track configuration, 3: 2-Track (X-Configuration) Region version, 2: USA: AcFt,CFS Transmitter, D: FUS080 ,IP67, Battery, Remote,unit label Template, A: None Transducer coax cable, 4: 20 m with gland</p>	7ME3440-0AA03-2DA4	

Description	Article No.	
<p>Internal battery pack, one set of 2 D-cell (3.6 V 33 Ah)¹⁾</p> <ul style="list-style-type: none"> • 1 pc. pack • 24 pcs. pack 	A5E02679676 A5E02896941	
<p>Single battery back-up to main supply (13.5 Ah)¹⁾</p>	A5E02679923	
<p>Battery cover for transmitter FUS080</p>	A5E00694468	
<p>PG 13.5 cable gland set for FUS080 power and output connection, black PA plastic, 2 pcs.</p> <ul style="list-style-type: none"> • cables Ø 6 ... 12 mm (0.24" ... 0.47") • -40 ... +100 °C (-40 ... +212 °F) 	FDK:083G0228	
<p>PG 13.5 cable gland set (two cable entries) for FUS080 sensor connection, black PA plastic, 2 pcs.</p> <ul style="list-style-type: none"> • cables Ø 6 ... 12 mm (0.24" ... 0.47") • -40 ... +100 °C (-40 ... +212 °F) 	A5E00694500	
<p>SITRANS FUS/FUE380 wall mounting kit for remote transmitter mounting, including connection plate (DN 50 ... DN 1200/2" ... 48")</p>	A5E00694509	
<p>SITRANS FUS/FUE380 terminal box for compact transmitter mounting, including connection plate, (bronze sensors only, DN 50 ... DN 80/2" ... 3")</p>	A5E01208138	
<p>SITRANS FUS/FUE380 terminal box for compact transmitter mounting, including connection plate, (steel sensors only, DN 100 ... DN 1200/4" ... 48")</p>	A5E00694660	
<p>FUS080 display and keypad</p>	A5E00873496	

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/WWW/view/en/23036121/133100>

Flow Measurement


SITRANS F US Inline

Transmitter SITRANS FUS080/FUE080


Sensor cables for FUS380/FUE380 flowmeters

Description	Article No.	
DN 50 to 80 flowmeters		
Coaxial cable for FUS080; with 0.3 m brown PTFE high temp. transducer part, max. 200 °C (392 °F) and black PVC for remaining transmitter part, max. 70 °C (158 °F); impedance 75 Ω		
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		
Coaxial cable for FUS080; with 0.3 m brown PTFE high temp. transducer part, max. 200 °C (392 °F) and black PVC for remaining transmitter part, max. 70 °C (158 °F); impedance 75 Ω		
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	Article No.	
15 m (49.2 ft) cable set (2 pcs.) remote mounting with SONOKIT flowmeters	A5E02478541	
30 m (98.4 ft) cable set (2 pcs.) remote mounting with SONOKIT flowmeters	A5E02478751	

Sensor cables for FUS880 retrofitting systems (7ME3440)

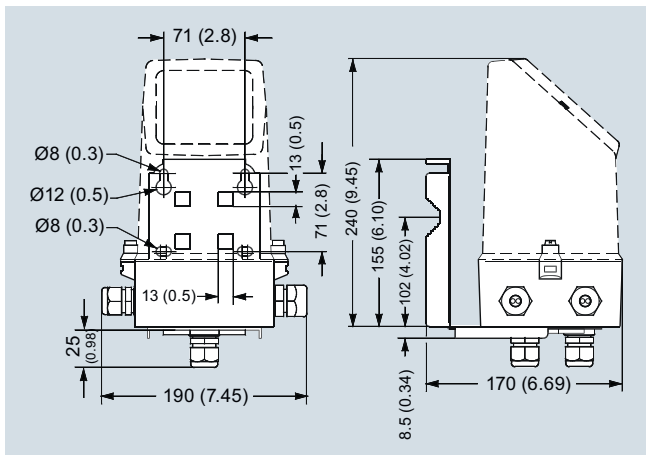
Description	Article No.	
Coaxial cable with transducer connection		
for use in FUS880 and SONO 3300 sensors; with 0.3 m brown PTFE high temperature transducer part, max. 200 °C (392 °F) and black PVC for the remaining transmitter part, max. 70 °C (158 °F); cable impedance 75 Ω		
• 1 x 10 m (32.8 ft)	FDK:087L2400	
• 1 x 20 m (65.6 ft)	FDK:087L2401	
• 1 x 30 m (98.4 ft)	FDK:087L2402	
Transducer spare part set of two transducers with gaskets for STRANS FUS880 retrofitting systems	FDK:087H3007	

Flow Measurement SITRANS F US Inline

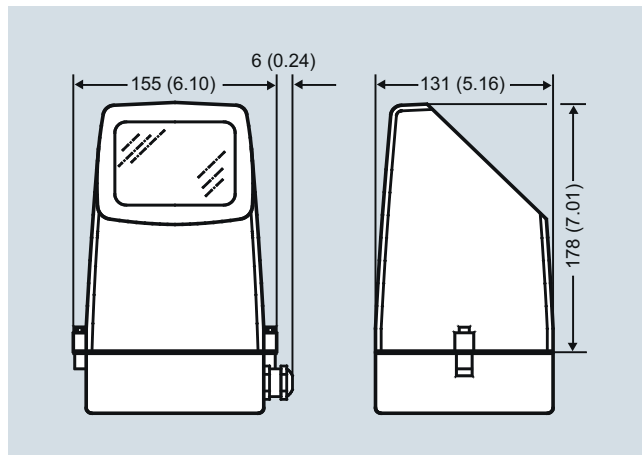
Transmitter SITRANS FUS080/FUE080

Dimensional drawings

FUS080 transmitter IP67/NEMA 4X/6, wall mounting and compact mounting

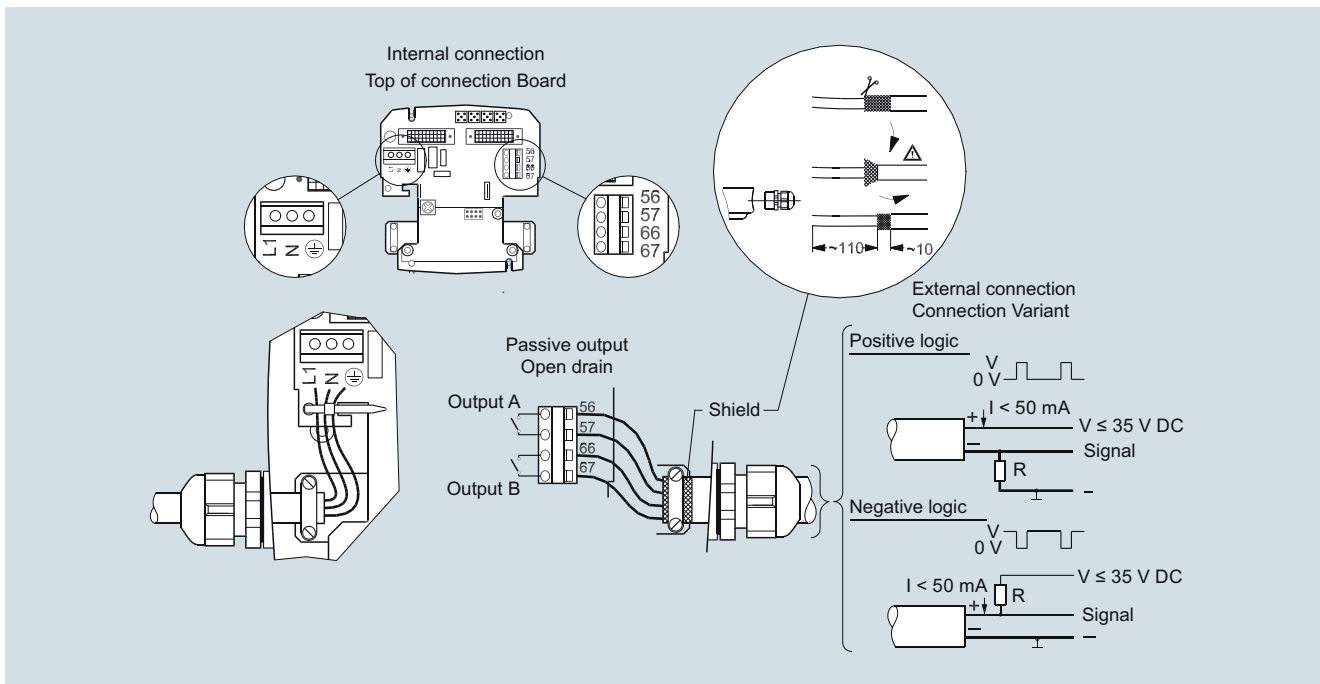


Transmitter wall mounted, dimensions in mm (inch)



Transmitter compact mounted, dimensions in mm (inch)

Schematics



Electrical connection of SITRANS FUS080

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, hot water/cooling systems.

Design

The SONO 3300/FUS060 consists of a casted sensor (DN 50 to 80 (2" to 3")), welded pipes (DN 100 to 300 (4" 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 3/234.

2-path sensor with flanges and inline transducers

Error in measurement

Error in measurement at reference conditions	$v > 0.5 \dots 10 \text{ m/s}$, $< \pm 0.5 \%$ of rate ($v = \text{flow speed}$)
Max. flow velocity	10 m/s (32 ft/s)

Nominal size

Media temperature	Separate version: $-10 \dots +160 \text{ }^\circ\text{C}$ ($14 \dots 320 \text{ }^\circ\text{F}$)
Ambient temperature (sensor)	Separate version: $-20 \dots +60 \text{ }^\circ\text{C}$ ($-4 \dots +140 \text{ }^\circ\text{F}$) Storage: $-40 \dots +85 \text{ }^\circ\text{C}$ ($-40 \dots +185 \text{ }^\circ\text{F}$)
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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • DN 50 ... 300 (2" ... 12"), class 150 • DN 50 ... 300 (2" ... 12"), class 300
Transducer	Inline version welded into pipe

Materials

Pipe	<ul style="list-style-type: none"> • DN 50 ... 80 (2" ... 3"): Cast steel EN 1.1131-GS-15Mn5 • DN 100 ... 300 (4" ... 12"): Carbon steel EN 1.0345-P235GH • DN 50 ... 300 (2" ... 12"): EN 1.0025-S235JRG2
Flange	
Class	ASTM A105
Transducer	Stainless steel AISI 316 or similar

Flow Measurement

SITRANS F US Inline

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)



Flow Measurement

SITRANS F US Inline

Flowmeter SONO 3300/FUS060

Selection and Ordering data		Article No.	Order code
Sensor SONO 3300 with transmitter FUS060		7ME3300-	
		0 -	
Diameter	Qn setting [m³/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 version of 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		Article 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
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

Selection and Ordering data	Order code
Additional information	
Please add „-Z“ to Article 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, 2 x 3 points in 10 %, 25 % and 100 % Qn)	Included
Accredited Siemens ISO/IEC 17025 calibration for DN 50 to DN 200 with Qn as selected in Diameter. Calibration certificate: 2 x 5 points in 5%, 10 %, 25 %, 50% and 100 % Qn (max. flow 630 m ³ /h).	D20
Accredited Siemens ISO/IEC 17025 calibration for DN 200 to DN 300 with Qn as selected in Diameter. Calibration certificate: 2 x 5 points in 5 %, 10 %, 25 %, 50 % and 100 % Qn (max. flow 2000 m ³ /h).	D21
Material certificate	
EN 10204-3.1	F10
EN 10204-3.1 with 100 % NDT on weldings	F11²⁾
Pressure certificate	
EN 10204-2.3	F21
Tag name plate	
Stainless steel TAG plate (1 x 24 x 80 mm), wire fixed. Font size depends on text length: 8 mm for 1 ... 10 characters, 4 mm for 11 ... 20 characters (specify in 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

Flow Measurement

SITRANS F US Inline

Flowmeter SONO 3300/FUS060

Flowmeter SONO 3300 with FUS060 operating instructions, accessories and spare parts

Operating instructions

Description	Article 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	Article No.
Potting kit for terminal box of flow sensors for IP68/NEMA 6P (not for Ex sensors)	FDK:085L2403



Cable connection boxes

(Optional for the connection of individually transducer cables with the FUS060 transducer cables)


Description	Article 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)	Article 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
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.)	120 (393.70)	A5E01278698
	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)]	Article No.
M20	Nickel-plated brass, 2x cables Ø 5 ... 6 mm (2 pcs.)	-25 ... +200 (-13 ... +392)	A5E02246329



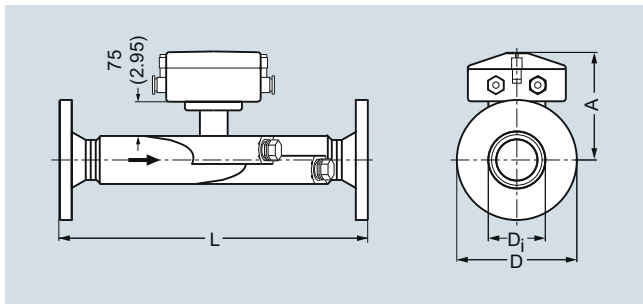
Description	Article No.	
SONO 3300 terminal box lid, in stainless steel painted black (1 pc.)	FDK:085U1505	
Gasket for SONO 3300 terminal lid in EPDM (1 pc.)	FDK-085U1820	
SONO 3300 stainless steel terminal box (1 pc.), M20 cable gland version, incl. lid in stainless steel (painted black) and gasket in EPDM	A5E00836867	
Coax cable connecting plate (1 pc.) for the SONO 3300 terminal box and use with transmitter type FUS060	On request	

Flow Measurement

SITRANS F US Inline

Flowmeter SONO 3300/FUS060

Dimensional drawings



Sensor SONO 3300, dimensions in mm (inch)

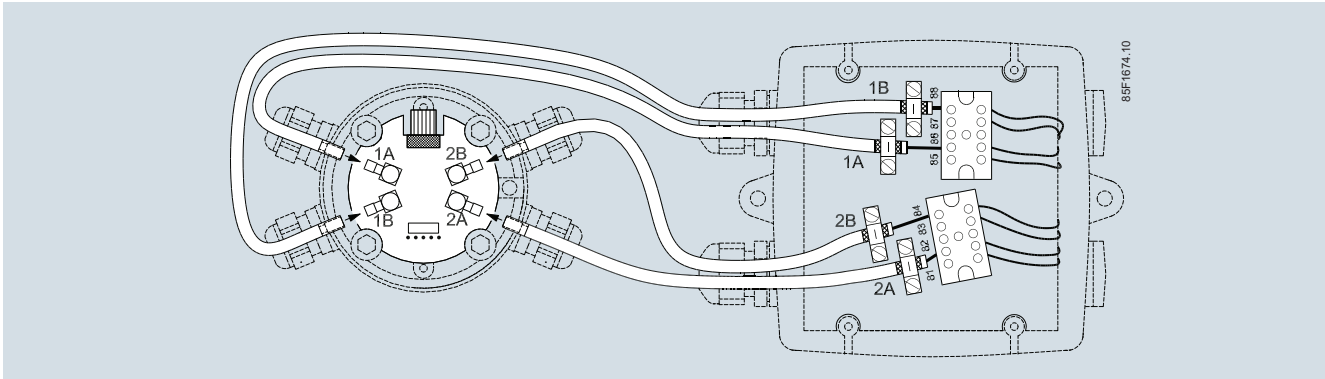
DN	EN 1092-1																	
	PN 10						PN 16						PN 40					
	L ¹⁾		D		D _i		L ¹⁾		D		D _i		L ¹⁾		D		D _i	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
50													475	18.70	165	6.50	52.60	2.07
65													475	18.70	185	7.28	62.70	2.47
80							380	14.96	200	7.87	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												EN and ANSI		Weight ²⁾			
	150 lb						300 lb						A		EN		ANSI	
	L ¹⁾		D		D _i		L ¹⁾		D		D _i		mm	inch	kg	lb	kg	lb
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch						
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): DN 50 ... 100 +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)

Schematics



Electrical connection of SITRANS FUS060 and SONO 3300

Flow Measurement

SITRANS F US Inline

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 be changed without interrupting operation. SONO 3100 can optionally be delivered as a 4-path 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 as special versions:
 - Special sensor material, e.g. Duplex, stainless steel
 - High/low temperature sensor version: +250 °C (+482 °F)/-200 °C (-328 °F) sensors
 - Pressure rating 430 bar (6235 psi)
 - Special sensor sizes down to DN 25
 - 1-path or 4-path sensor technology

Application

The main application for SONO 3100 in combination with transmitter type FUS060 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, SONO 3200 transducers with O-rings or flanges depending on selection - and a FUS060 transmitter. SONO 3100 is basically supplied in a 2-path solution with flanges in sizes from DN 100 to DN 600 and without flanges in sizes from DN 100 to DN 300.

1-path or 4-path special versions are available on request, depending on size (DN 25 to DN 4000).

SONO 3100 is as standard available in carbon steel from DN 100 to DN 600.

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 3/234.

2-path sensor fitted with four SONO 3200 transducers

Error in measurement

Error in measurement at reference conditions	$v > 0.5 \dots 10 \text{ m/s}$, $< \pm 0.5 \%$ of rate (v =flow velocity)
Max flow velocity	10 m/s (32 ft/s)
Nominal size	DN 100 ... 600 (4" ... 24")
Media temperature	<ul style="list-style-type: none"> • Standard -10 ... +200 °C (14 ... 392 °F) • ATEX Ex d version -20 ... +200 °C (-4 ... +392 °F) • ATEX Ex i version -10 ... +200 °C (14 ... +392 °F) • Specials -200 °C (-328 °F) or up to 250 °C (482 °F)
Ambient temperature	<ul style="list-style-type: none"> • Standard and Ex-i version -20 ... +60 °C (-4 ... +140 °F) • Ex d version -20 ... +180 °C (-4 ... +356 °F)
Enclosure	IP67 (NEMA 4X/6)/IP68 (NEMA 6P) and ATEX (see below)

Process connections

PN designated, EN 1092-1

Pipe material carbon steel

- DN 200 ... 600 (8" ... 24"), PN 10
- DN 100 ... 600 (4" ... 24"), PN 16
- DN 200 ... 600 (8" ... 24"), PN 25
- DN 100 ... 500 (4" ... 20"), 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

Without flanges, (weld-in version) only in carbon steel

- DN 350 ... 600 (14" ... 24"), PN 10
- DN 100 ... 600 (4" ... 24"), PN 16
- DN 200 ... 600 (8" ... 24"), PN 25
- DN 100 ... 500 (4" ... 20"), PN 40

Transducer SONO 3200

O-ring or flange versions

Materials

Pipe	Steel EN 1.0345-P235GH
Flange	
PN	EN 10025-S235JRG2, 1E1
Class	ASTM A105, 1, 1
Transducer body	Stainless steel AISI 316 or similar
Transducer terminal house	Stainless steel AISI 316 or plastic PA 6.6

Flow Measurement

SITRANS F US Inline

Flowmeter SONO 3100/FUS060

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 Ex d IIC T3-T6 Gb 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 to 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

Article No. Order code

SITRANS F US SONO 3100 sensor 2-path

7ME3100-

Diameter Qn setting [m³/h]

DN 100 (4")	28	1 N
DN 100 (4")	100	1 P
DN 100 (4")	220	1 R
DN 125 (5")	44	1 S
DN 125 (5")	150	1 T
DN 125 (5")	350	1 V
DN 150 (6")	64	2 A
DN 150 (6")	220	2 B
DN 150 (6")	500	2 D
DN 200 (8")	110	2 E
DN 200 (8")	380	2 F
DN 200 (8")	900	2 H
DN 250 (10")	180	2 J
DN 250 (10")	600	2 K
DN 250 (10")	1300	2 M
DN 300 (12")	250	2 N
DN 300 (12")	850	2 P
DN 300 (12")	2000	2 R
DN 350 (14")	350	2 S
DN 350 (14")	1000	2 T
DN 350 (14")	2800 ¹⁾	2 V
DN 400 (16")	450	3 A
DN 400 (16")	1300	3 B
DN 400 (16")	3600	3 D
DN 500 (20")	1300	3 J
DN 500 (20")	2200	3 K
DN 500 (20")	4200 ¹⁾	3 M
DN 600 (24")	1300	3 S
DN 600 (24")	3200	3 T
DN 600 (24")	4200 ¹⁾	3 V

Flange norm and pressure rating

(All sizes are not available in all pressure ratings)

EN 1092-1

PN 10 (DN 200 ... DN 600)

PN 16 (DN 100 ... DN 600)

PN 25 (DN 200 ... DN 600)

PN 40 (DN 100 ... DN 500)

ANSI B16.5

class 150 (DN 100 ... DN 600)

class 300 (DN 100 ... DN 300)

Pipe without flanges (weld-in version)

PN 10 (DN 200 ... DN 600)

PN 16 (DN 100 ... DN 600)

PN 25 (DN 200 ... DN 600)

PN 40 (DN 100 ... DN 500)

B
C
D
E

H
J

P
Q
R
S

Flow Measurement

SITRANS F US Inline

Flowmeter SONO 3100/FUS060

Selection and Ordering data

SITRANS F US SONO 3100 sensor 2-path Article No. **7ME3100-** Order code

Pipe and flange material

Carbon steel (DN 100 ... 1200) 1

Transducer type and approval

IP67 (NEMA 4X/6) PA housing, PN 40, O-ring, 50 mm, 100 °C (212 °F) (DN 100 ... 600) 1

IP68 SS housing, PN 40, O-ring, 50 mm, 200 °C (392 °F) (DN 100 ... 600) 2

IP68 SS housing, PN 40, O-ring, 50 mm, 180 °C (356 °F), Ex d ATEX approval (only with standard FUS060) (DN 100 ... 600) 3

IP67 (NEMA 4X/6) PA housing, PN 40, flange, 88 mm, 100 °C (212 °F) (DN 100 ... 300) 4

IP68 SS housing, PN 40, flange, 88 mm, 200 °C (392 °F) (DN 100 ... 300) 5

IP68 SS housing, PN 40, flange, 88 mm, 180 °C (356 °F), Ex d ATEX approval (only with standard FUS060) (DN 100 ... 300) 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 ... 600) 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) 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 version of 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

FUS060 output module

HART, 1 pulse output, 1 relay B

HART Ex, 1 pulse output, 1 relay C

PROFIBUS PA, 1 pulse/frequency D

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 Article No. and specify Order code(s) and plain text.

Calibration

Production calibration DN 100 ... DN 600 (with certificate) **Included**

Accredited Siemens ISO/IEC 17025 calibration for DN 100 to DN 200 with Qn as selected in diameter. Calibration certificate: 2 x 5 points in 5 %, 10 %, 25 %, 50 % and 100 % Qn (max. flow 6300 m³/h). **D20**

Accredited Siemens ISO/IEC 17025 calibration for DN 200 to DN 600 with Qn as selected in diameter. Calibration certificate: 2 x 5 points in 5 %, 10 %, 25 %, 50 % and 100 % Qn (max. flow 2800 m³/h). **D21**

Accredited Siemens ISO/IEC 17025 calibration for DN 400 to DN 600 with Qn as selected in diameter. Calibration certificate: 2 x 5 points in 5 %, 10 %, 25 %, 50 % and 100 % Qn (max. flow 8000 m³/h). **D22**

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 600 **F12**

Pressure certificate

EN 10204-2.3 **F21**

Tag name plate

Stainless steel TAG plate (1 x 24 x 80 mm), wire fixed. Font size depends on text length: 8 mm for 1 ... 10 characters, 4 mm for 11 ... 20 characters (specify in plain text). **Y17**



Please use online Product selector to get latest updates. Product selector link:

www.pia-selector.automation.siemens.com

Flowmeter SONO 3100 with FUS060 operating instructions, accessories and spare parts

Operating instructions


Description	Article 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	Article No.
Potting kit for terminal box of SONO 3200 transducer for IP68/NEMA 6P (not for Ex sensors)	FDK:085L2403




Description	Transducer length	Article No.
Extraction tool for replacement of SONO 3200 O-ring transducers under pressure and for hot-tapping (working conditions: typically water, max. 40 bar and max. 60 °C (max. 580 psi and max. 140 °F))	50 mm (1.97") transducers	FDK:085B5331



Cable connection boxes
 (For the connection of individually transducer cables with the FUS060 transducer cables)

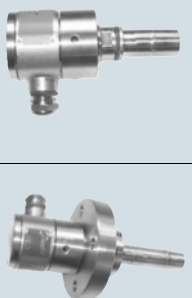
Description	Article No.
Junction box for coaxial cable	
• IP68 metal box for 4 coaxial cables	FDK:085B1361
• IP68 EEx e plastic box for 4 coaxial cables, no ATEX approval	FDK:085B1363



Spare parts

Transducer SONO 3200 spare parts, complete units

Type	Material	Gasket	Press. rating	Terminal housing	Approv.	Temp. range [°C (°F)]	Length mm (inch)	Article 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 ... +200 (-4 ... +392)	50 (1.97)	FDK:085B5451
O-ring	316 SS	O-ring	PN 40	316 SS M20	Ex i ²⁾	-10 ... +200 (14 ... 392)	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
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 ... +200 (-4 ... +392)	88 (3.47)	FDK:085B5463
Flange	316 SS	Graphite	PN 40	316 SS M20	Ex i ²⁾	-10 ... +200 (14 ... +392)	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
Flange	316 SS	Copper ring	PN 40	316 SS PG13.5 (cryogenic version)		-200 ... +100 (-328 ... +212)	88 (3.47)	FDK:085B5416
Flat flange	316 SS	Flat gasket	PN 40	316 SS M20 (cryogenic version)		-200 ... +100 (-328 ... +212)	88 (3.47)	A5E02593524
Flange	316 SS	Graphite	PN 160	316 SS M20		-20 ... +180 (-4 ... +356)	88 (3.47)	FDK:085B5464
Flange	316 SS	Graphite	PN 160	316 SS M20	Ex d ¹⁾	-20 ... +200 (-4 ... +392)	88 (3.47)	FDK:085B5465



¹⁾ ATEX (Ex) IIC 2G Ex d IIC T3-T6 Gb


²⁾ For systems with FUS060 ATEX IIC 2G Ex dem [ia/ib] T6/T4/T3

Flow Measurement

SITRANS F US Inline

Flowmeter SONO 3100/FUS060


Terminal housing for SONO 3200 sensor

Type	Pressure rating	Material	Temp. range [°C (°F)]	Article 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 ... +200 (-4 ... +392)	FDK:085B5505	
Ex i ²⁾ terminal housing (M20 cable gland)	N/A	ASTM 316	-10 ... +200 (14 ... 392)	A5E00835255	

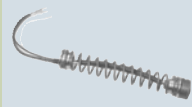
1) ATEX (Ex) IIC 2G EEx d IIC T3 ... T6

2) For systems with FUS060 ATEX IIC 2G Ex dem [ja/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)	Article 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	

SONO 3200 spare parts, transducer insert

Type	Temp. range [°C (°F)]	Length mm (inch)	Article 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)]	Article 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	

Flow Measurement


SITRANS F US Inline

Flowmeter SONO 3100/FUS060

SONO 3200 cable glands

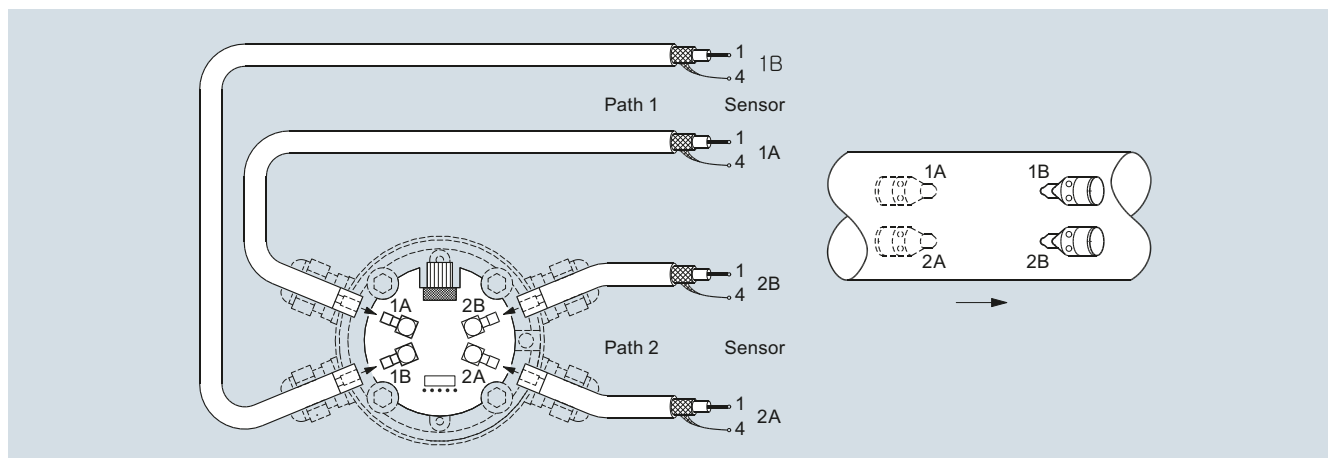
Type/description	Temperature range [°C (°F)]	Appr.	Article No.	
black PA plastic, cable Ø 5 ... 13 mm	-20 ... 100 (-4 ... +212)		A5E02246304	
½" NPT gray PA plastic, cable Ø 5 ... 9 mm	-20 ... 100 (-4 ... +212)		A5E02246309	
½" NPT chrome-plated brass, cable Ø 5 ... 9 mm	-40 ... 100 (-40 ... +212)		A5E02246258	
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)	Article 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	
SITRANS F US special coaxial cable sets for low temperature cryogenic systems, with SMB-plug for transmitter SITRANS FUS060, PTFE material, temp. -200 ... +200 °C (-328 ... +392 °F), impedance 75 Ω (2 pcs.)	10 (32.84)	A5E02085593	
	15 (49.21)	A5E03262088	
	30 (98.43)	A5E02085644	
	40 (131.23)	A5E02085649	

3

Schematics



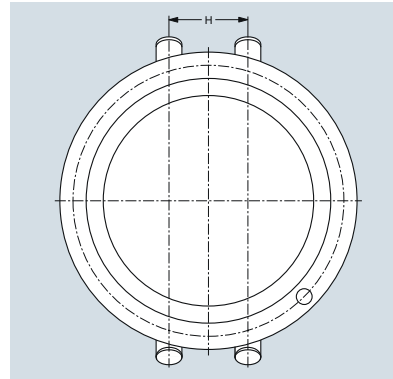
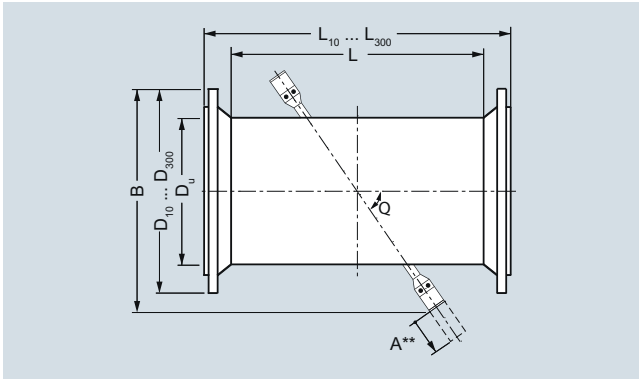
Electrical connection of SITRANS FUS060 and SONO 3100

Flow Measurement

SITRANS F US Inline

Flowmeter SONO 3100/FUS060

Dimensional drawings of sensor SONO 3100



Sensor SONO 3100 with EN norm

DN	Du [mm]	L ^{1) 4)} [mm]	B [mm]	θ [°]	H [mm]	PN 10			PN 16			PN 25			PN 40		
						W ₁₀ ²⁾ [mm]	D ₁₀ [mm]	L ₁₀ ¹⁾ [mm]	W ₁₆ ²⁾ [mm]	D ₁₆ [mm]	L ₁₆ ¹⁾ [mm]	W ₂₅ ²⁾ [mm]	D ₂₅ [mm]	L ₂₅ ¹⁾ [mm]	W ₄₀ ²⁾ [mm]	D ₄₀ [mm]	L ₄₀ ¹⁾ [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	505	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	-	-	-

¹⁾ Length tolerance (mm): DN 100 +2/-3, DN 125 ... 200 +3/-4, DN 250 ... 400 +4/-5, DN 500 ... 600 +5/-6

²⁾ Wall thickness for pressure rates PN 6 ... 40

³⁾ For all sensors with flange transducers path 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 3/257.

SONO 3100, 2-path

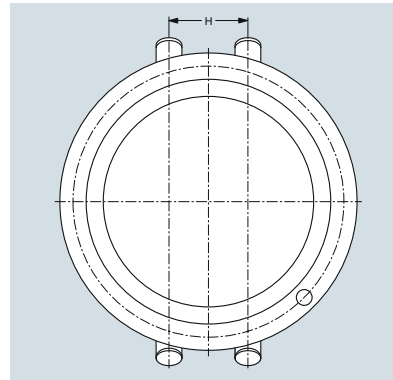
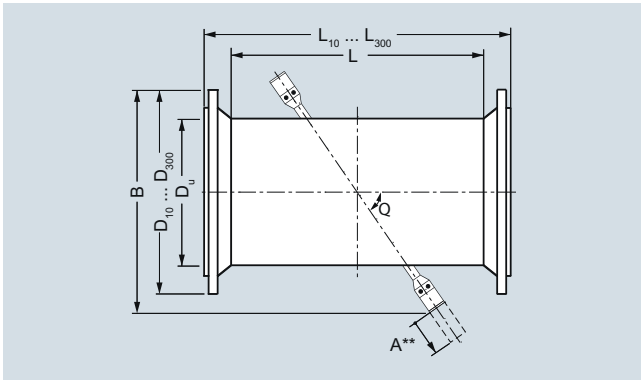
Nominal diam. DN	Flange type - Weight [kg (lb)]			
	PN 10	PN 16	PN 25	PN 40
100 (4")	-	32 (70.5)	-	35 (77.2)
125 (5")	-	38 (83.8)	-	44 (97.0)
150 (6")	-	45 (99.2)	-	52 (114.6)
200 (8")	59 (130.0)	58 (127.9)	70 (154.3)	79 (174.2)
250 (10")	73 (161.0)	75 (163.3)	96 (211.6)	117 (257.9)
300 (12")	83 (183.0)	92 (202.8)	114 (251.3)	151 (332.9)
350 (14")	98 (216.0)	113 (249.1)	145 (322.9)	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)	-

Weight of system incl. process flanges and standard O-ring transducers. For sensors with flange transducer please add approx. 10 kg (22.05 lb).
For SS terminal housings instead of the standard PA housing add approx. 5 kg (11.03 lb).

Flow Measurement

SITRANS F US Inline

Flowmeter SONO 3100/FUS060



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Sensor SONO 3100 with ANSI norm

Size (DN)	D _U	L ^{1) 4)}	B	θ	H	Class 150			Class 300		
						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 path 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 3/257.

Flow Measurement

SITRANS F US Inline

Flowmeter SONO 3100/FUS060

Approximate weights for SONO 3100 sensor with ANSI B16.5 flanges

Nominal diameter		Weight [kg (lb)] ¹⁾			
DN	DN	CL150		CL300	
[inch]	[mm]	[kg]	[lb]	[kg]	[lb]
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 lb). For SS terminal housings instead of the standard PA housing add approx. 5 kg (11.03 lb).

Overview



SONOKIT is a transit time based ultrasonic flowmeter for retrofitting on existing pipelines.

The kit offers all necessary parts and special tools to make the installation as 1-path or 2-path 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-path DN 100 to DN 2400 (4" to 96").
- 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-path 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 3/234 and to FUS080 see page 3/240.

Accuracy

Typical, depending on accuracy of measurements of installation

- 2-path: $\pm (0.5 \dots 1.5 \%)$
- 1-path: $\pm (1 \dots 3 \%)$

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")
max. 40 bar (580 psi)

Line pressure

Media temperature

- Standard -10 ... +200 °C (14 ... 392 °F)
- ATEX Ex d version -20 ... +200 °C (-4 ... +392 °F)
- ATEX Ex i version -10 ... +200 °C (+14 ... +392 °F)
- Specials -200 °C (-328 °F) or up to 250 °C (482 °F)

Ambient temperature sensor

- Standard and Ex-i version -20 ... +60 °C (-4 ... +140 °F)
- Ex d version -20 ... +180 °C (-4 ... +356 °F)

Transducer enclosure/ approvals/certificates

Standard version

IP67 (NEMA 6)/IP68 (NEMA 6P)

Ex approval

System ATEX approval for SONO 3200 Ex i transducers together with transmitter FUS060-Ex:
ATEX II 2G Ex dem [ia/lb] IIC T6/T4/T3 or
ATEX II 2G Ex d IIC T3-T6 Gb 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)

Flow Measurement

SITRANS F US Inline

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 \geq 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-path 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

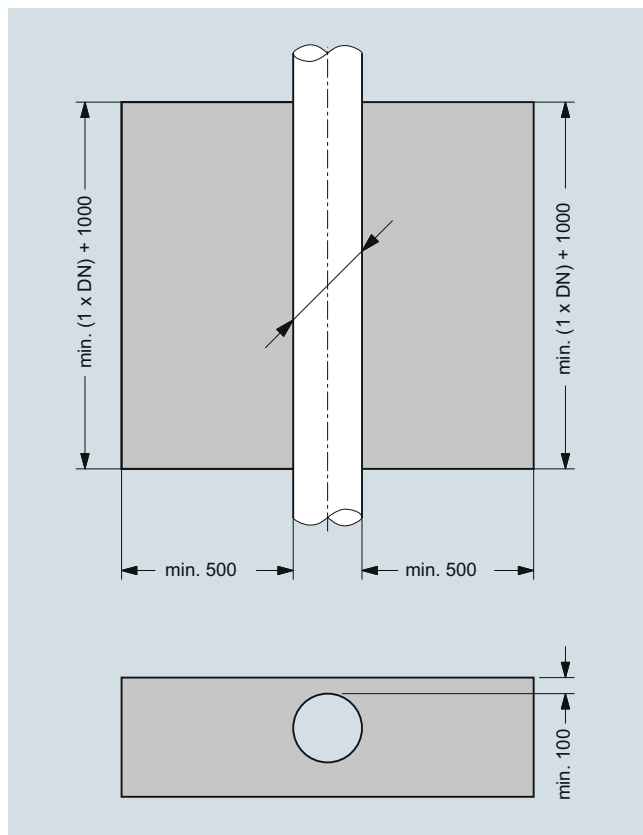
Information on PED approval:

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.

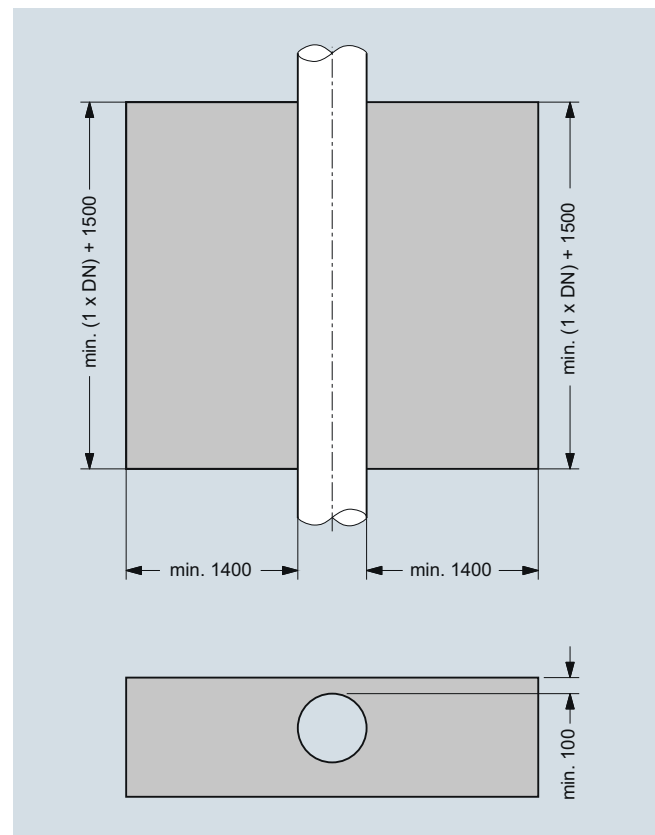
¹⁾ Mounting plates are only included for empty pipe installation types (refer to selection "A"). For tapping-band types holder and mounting plates are not included (refer to selection "C").

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

Flow Measurement

SITRANS F US Inline

Flowmeter SONOKIT (with FUS060 or FUS080)

Selection and Ordering data		Article No.	Ord. code	Selection and Ordering data		Article No.	Ord. code
SITRANS F US SONOKIT		7ME3210 -		SITRANS F US SONOKIT		7ME3210 -	
1-path sensor				1-path sensor			
Diameter	Qn setting [m³/h]						
DN 100 (4")	100	1 P		IP68 SS housing, Sylgard potting kit, PN 40, O-ring, 200 °C (392 °F), no approval	4		
DN 125 (5")	150	1 T		IP67 SS housing, PN 40, O-ring, 190 °C (374 °F), Ex i type, ATEX approval (only with FUS060 Ex)	5		
DN 150 (6")	220	2 B		Cable gland entries			
DN 200 (8")	380	2 F		Cable glands M20 in transducers and in transmitter M25/20/16 x 1.5 (FUS080 only M20)	1		
DN 250 (10")	600	2 K		Cable glands ½" NPT in transducers and in transmitter (only with FUS060)	2		
DN 300 (12")	850	2 P		Transmitter version of SITRANS FUS060			
DN 350 (14")	1000	2 T		(only DN 100 ... 2400 (4" ... 96"))			
DN 400 (16")	1300	3 B		IP65 (NEMA 4), 120/230 V AC	N		
DN 450 (18")	1700	3 F		IP65 (NEMA 4), 24 V AC/DC	P		
DN 500 (20")	2200	3 K		IP65 (NEMA 4), 24 V AC/DC Ex version	Q		
DN 550 (22")	2600	3 P		Transmitter version of SITRANS FUS080			
DN 600 (24")	3200	3 T		(only DN 100 ... 1200 (4" ... 48"))			
DN 650 (26")	3600	4 B		PDM software tool and IrDA-adaptor, which are needed for settings update, to be ordered separately, see FUS080 accessories			
DN 700 (28")	4200	4 F		IP67/NEMA 4X/6 115 ... 230 V AC	U		
DN 750 (30")	4800	4 K		IP67/NEMA 4X/6 3.6 V battery version, incl. dual battery pack	V		
DN 800 (32")	5500	4 P		IP67/NEMA 4X/6 115 ... 230 V AC, incl. 3.6 V single battery backup	W		
DN 900 (36")	7500	5 B		IP67/NEMA 4X/6 3.6 V battery version (no battery pack included) ²⁾	X		
DN 1000 (40")	9000	5 K		Transmitter output module			
DN 1100 (44")	10000	5 P		Transmitter SITRANS FUS080:			
DN 1200 (48")	13200	5 T		Pulse and/or alarm output (standard for FUS080).	A		
<u>Only for FUS060</u>				Transmitter SITRANS FUS060:			
DN 1300 (52")	14000	6 A		HART, 1 pulse output, 1 relay	B		
DN 1400 (56")	16800	6 C		HART Ex version, 1 pulse output, 1 relay	C		
DN 1500 (60")	19000	6 E		PROFIBUS PA, 1 pulse/frequency	D		
DN 1600 (64")	22800	6 G		Transducer coaxial cables			
DN 1700 (68")	25000	6 J		(with FUS080 only, 15 and 30 m, 70°C (158 °F) cable types)			
DN 1800 (72")	27600	6 L		2 x 3 m, max. 70 °C (158 °F), the only option for Ex i	0		
DN 1900 (76")	31000	6 N		2 x 15 m, max. 70 °C (158 °F)	1		
DN 2000 (80")	36000	6 Q		2 x 30 m, high temp. max. 200 °C (392 °F)	2		
DN 2100 (84")	37000	6 S		2 x 30 m, max. 70 °C (158 °F)	3		
DN 2200 (88")	42000	6 U		2 x 60 m, max. 70 °C (158 °F)	4		
DN 2300 (92")	45000	6 W		2 x 90 m, max. 70 °C (158 °F)	5		
DN 2400 (96")	51000	7 A		2 x 120 m, max. 70 °C (158 °F)	6		
Installation method³⁾				2 x 3 m, high temp. max. 200 °C (392 °F), the only option for Ex i	7		
Empty pipe (incl. transducer holder and mounting plates). Alignment rods and tools must be ordered as accessories.		A		2 x 15 m, high temp. max. 200 °C (392 °F)	8		
Hot tap, mounting under pressure (mounting plates not incl.). Special mounting tools to be ordered separately.		B		Special version (add Order code):			
SONOKIT for tapping band (DN 200 ... DN 1800) (transducer holder and mounting plates not incl., tapping band to be ordered separately) ¹⁾		C		No transducer cable, cable length 2 x 3 m, the only option for Ex i	9	R0A	
Transducer holder				No transducer cable, cable length 2 x 15 m	9	R0B	
None (for tapping band)		0		No transducer cable, cable length 2 x 30 m	9	R0C	
Carbon steel, length = 160 mm, mounting plates in carbon steel		1		No transducer cable, cable length 2 x 60 m	9	R0D	
Stainless steel, length = 160 mm, mounting plates in stainless steel		2		No transducer cable, cable length 2 x 90 m	9	R0E	
Stainless steel, length = 230 mm, for concrete pipe (DN 600 ... DN 2400)		3		No transducer cable, cable length 2 x 120 m	9	R0F	
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					

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.

Flow Measurement

SITRANS F US Inline

Flowmeter SONOKIT (with FUS060 or FUS080)

Selection and Ordering data

Additional information

Please add „-Z“ to Article 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 plate (1 x 24 x 80 mm), wire fixed. Font size depends on text length: 8 mm for 1 ... 10 characters, 4 mm for 11 ... 20 characters (specify in plain text). **Y17**

Accessories

Alignment rods-set for DN 100 ... 650 (4" ... 26")
 Ø = 25 mm, L = 500 mm, 3 pcs. **S10**

Alignment rods-set for DN 700 ... 1900 (28" ... 76")
 Ø = 25 mm, L = 500 mm, 6 pcs. **S11**

Alignment rods-set for DN 2000 ... 2400 (80" ... 96")
 Ø = 25 mm, L = 500 mm, 8 pcs. **S12**

Spanner key for transducer mounting type SONO 3200
 O-ring type **T11**

Tool set with various mounting/spare parts for SONOKIT installation **T12**

Operating instructions

Description	Article No.
SITRANS FUS060	
• English	A5E01204521
• German	A5E02123845
SITRANS FUS080	
• English	A5E03059912
• German	A5E31628428
• Spanish	A5E31628493
• French	A5E31628438
SITRANS F US SONOKIT 1-path	
• 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

Flow Measurement

SITRANS F US Inline

Flowmeter SONOKIT (with FUS060 or FUS080)

Selection and Ordering data		Article No.	Ord. code	Selection and Ordering data		Article No.	Ord. code
SITRANS F US SONOKIT		7ME3220 -		SITRANS F US SONOKIT		7ME3220 -	
2-path sensor				2-path sensor			
Diameter	Qn setting [m³/h]			Transducer holder			
DN 200 (8")	380	2 F		None (for tapping band)	0		
DN 250 (10")	600	2 K		Carbon steel, length = 160 mm, mounting plates in carbon steel	1		
DN 300 (12")	850	2 P		Stainless steel, length = 160 mm, mounting plates in stainless steel	2		
DN 350 (14")	1000	2 T		Stainless steel, length = 230 mm, for concrete pipe (DN 600 ... DN 4000)	3		
DN 400 (16")	1300	3 B		Transducer type and approval			
DN 450 (18")	1700	3 F		IP67 (NEMA 4X/6) PA housing, PN 40, O-ring, 100 °C (212 °F), no approval	1		
DN 500 (20")	2200	3 K		IP68 SS housing, PN 40, O-ring, 180 °C (356 °F), EEx d, ATEX approval (only with standard FUS060)	2		
DN 550 (22")	2600	3 P		IP68 PA housing, Sylgard potting kit, PN 40, SS, O-ring, 100 °C (212 °F), no approval	3		
DN 600 (24")	3200	3 T		IP68 SS housing, Sylgard potting kit, PN 40, SS, O-ring, 200 °C (392 °F), no approval	4		
DN 650 (26")	3600	4 B		IP67 SS housing, PN 40, O-ring, 190 °C (374 °F), Ex i, ATEX approval (only with FUS060 Ex)	5		
DN 700 (28")	4200	4 F		Cable gland entires			
DN 750 (30")	4800	4 K		Cable glands M20 in transducers and in transmitter M25/20/16 x 1.5 (FUS080 only M20)	1		
DN 800 (32")	5500	4 P		Cable glands ½" NPT in transducers and in transmitter (only with FUS060)	2		
DN 900 (36")	7500	5 B		Transmitter version of SITRANS FUS060			
DN 1000 (40")	9000	5 K		(only DN 200 ... 4000 (8" ... 160"))			
DN 1100 (44")	10 000	5 P		IP65 (NEMA 4), 120/230 V AC	N		
DN 1200 (48")	13 200	5 T		IP65 (NEMA 4), 24 V AC/DC	P		
<u>Only for FUS060</u>				IP65 (NEMA 4), 24 V AC/DC Ex version	Q		
DN 1300 (52")	14 000	6 A		Transmitter version of SITRANS FUS080			
DN 1400 (56")	16 800	6 C		(only DN 200 ... 1200 (8" ... 48"))			
DN 1500 (60")	19 000	6 E		PDM software tool and IrDA-adapter, which are needed for settings update, to be ordered separately, see FUS080 accessories			
DN 1600 (64")	22 800	6 G		IP67/NEMA 4X/6 115 ... 230 V AC	U		
DN 1700 (68")	25 000	6 J		IP67/NEMA 4X/6 3.6 V battery version, incl. dual battery pack	V		
DN 1800 (72")	27 600	6 L		IP67/NEMA 4X/6 115 ... 230 V AC, incl. 3.6 V single battery backup	W		
DN 1900 (76")	31 000	6 N		IP67/NEMA 4X/6 3.6 V battery version (no battery pack included) ⁴⁾	X		
DN 2000 (80")	36 000	6 Q		Transmitter output module			
DN 2100 (84")	37 000	6 S		<u>Transmitter SITRANS FUS080:</u>			
DN 2200 (88")	42 000	6 U		Pulse and/or alarm output (standard for FUS080).	A		
DN 2300 (92")	45 000	6 W		<u>Transmitter SITRANS FUS060:</u>			
DN 2400 (96")	51 000	7 A		HART, 1 pulse output, 1 relay	B		
DN 2500 (100")	53 000	7 C		HART Ex version, 1 pulse output, 1 relay	C		
DN 2600 (104")	60 000	7 E		PROFIBUS PA, 1 pulse/frequency	D		
DN 2700 (108")	62 000	7 G					
DN 2800 (112")	72 000	7 J					
DN 2900 (116")	71 000	7 L					
DN 3000 (120")	78 000	7 N					
DN 3100 (124")	82 000	7 Q					
DN 3200 (128")	85 000	7 S					
DN 3300 (132")	92 000	7 U					
DN 3400 (136")	100 000	7 W					
DN 3500 (140")	100 000	8 A					
DN 3600 (144")	110 000	8 C					
DN 3700 (148")	120 000	8 E					
DN 3800 (152")	130 000	8 G					
DN 3900 (156")	130 000	8 J					
DN 4000 (160")	144 000	8 L					
Installation method²⁾							
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) (transducer 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 ordered separately as "-Z" options

Flow Measurement

SITRANS F US Inline

Flowmeter SONOKIT (with FUS060 or FUS080)

Selection and Ordering data	Article No.	Ord. code
SITRANS F US SONOKIT 2-path 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 R 0 A
No transducer cable, cable length 4 x 15 m		9 R 0 B
No transducer cable, cable length 4 x 30 m		9 R 0 C
No transducer cable, cable length 4 x 60 m (up to DN 3000)		9 R 0 D
No transducer cable, cable length 4 x 90 m (up to DN 3000)		9 R 0 E
No transducer cable, cable length 4 x 120 m (up to DN 3000)		9 R 0 F

Selection and Ordering data

Additional information

Please add „-Z“ to Article 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 plate (1 x 24 x 80 mm), wire fixed. Font size depends on text length: 8 mm for 1 ... 10 characters, 4 mm for 11 ... 20 characters (specify in plain text).

Accessories

Alignment rods-set for DN 100 ... 750 (4" ... 30") Ø = 25 mm, L = 500 mm, 3 pcs.	S10
Alignment rods-set for DN 800 ... 2100 (32" ... 84") Ø = 25 mm, L = 500 mm, 6 pcs.	S11
Alignment rods-set for DN 2200 ... 4000 (88" ... 160") Ø = 25 mm, L = 500 mm, 8 or 10 pcs.	S12
Spanner key for transducer mounting type SONO 3200 O-ring type	T11
Tool set with various mounting/spare parts for SONOKIT installation	T12

Operating instructions

Description	Article No.
SITRANS FUS060	
• English	A5E01204521
• German	A5E02123845
SITRANS FUS080	
• English	A5E03059912
• German	A5E31628428
• Spanish	A5E31628493
• French	A5E31628438
SITRANS F US SONOKIT 2-path	
• 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


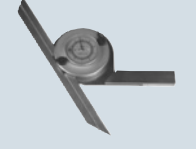
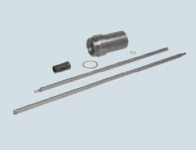
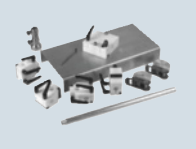
Flowmeter SONOKIT accessories and spare parts


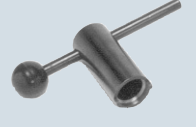
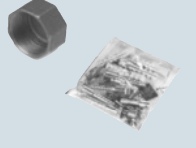
Accessories

Potting kit for SONO 3200 terminal housing

Description	Article No.	
Potting kit for terminal box of SONO 3200 transducers for IP68/NEMA 6P (not for Ex sensors)	FDK:085L2403	

Tools for SONO 3200 transducers and SONOKIT

Description	Article No.	
Extraction tool for replacement of SONO 3200 O-ring transducers under pressure and for hot-tapping (working conditions: typically water, max. 40 bar and max. 60 °C (max. 580 psi and max. 140 °F)) For transducer length:	FDK:085B5333	
<ul style="list-style-type: none"> • Up to 160 mm (6.3") • Up to 230 mm (9.1") 	FDK:085B5335	
Angle measurement tool for SONOKIT	FDK:085B5330	
Hot-tap drilling tool for SONOKIT, the extraction tool is required, max. pressure 40 bar (580 psi)	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	Article No.	
Alignment rods-set for DN 100 ... 650 (4" ... 26"), Ø = 25 mm, L = 500 mm, 3 pcs.	A5E02609214	
Alignment rods-set for DN 700 ... 1900 (28" ... 76"), Ø = 25 mm, L = 500 mm, 6 pcs.	A5E02609215	
Alignment rods-set for DN 2000 ... 4000 (80" ... 160"), Ø = 25 mm, L = 500 mm, 10 pcs.	A5E02609216	
Spanner key for transducer mounting type SONO 3200 O-ring type	A5E02609218	
Tool set with various mounting/spare parts for SONOKIT installation	A5E02609219	

Flow Measurement


SITRANS F US Inline

Flowmeter SONOKIT (with FUS060 or FUS080)

Cable connection boxes

(For the connection of individual transducer cables with the FUS060 transducer cables)


Description	Article 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)]	Article 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
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



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)]	Article 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 ... +200 (-4 ... +392)	160 (6.3)	FDK:085B5452
O-ring	316 SS	O-ring	PN 40	316 SS	Ex i ³⁾	-10 ... +200 (14 ... 392)	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 Ex d IIC T3-T6 Gb

³⁾ For systems with FUS060 ATEX IIC 2G Ex dem [ja/ib] T6/T4/T3

Transducer SONO 3200 spare parts, transducer terminal housing with M20 cable glands

Type	Article 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 ... +200 °C (-4 ... +392 °F)	FDK:085B5505
Material: AISI 316, Ex i ²⁾ , Temperature range: -10 ... +200 °C (14 ... 392 °F)	A5E00835255




¹⁾ ATEX (Ex) IIC 2G Ex d IIC T3-T6 Gb


²⁾ For systems with FUS060 ATEX IIC 2G Ex dem [ja/ib] T6/T4/T3

Flowmeter SONOKIT (with FUS060 or FUS080)

Transducer SONO 3200 spare parts, transducer terminal housing with ½"-NPT cable glands

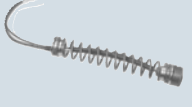
Type	Article No.	
Material: PA 6.6, Temperature range: -20 ... +100 °C (-4 ... +212 °F)	A5E00839460	
Material: AISI 316, Temperature range: -20 ... +200 °C (-4 ... +392 °F)	A5E00839427	

Transducer SONO 3200 spare parts transducer body with insert as well as insert only


Temperature range [°C (°F)]	Gasket	Length [mm (inch)]	Article No.	
-20 ... +200 (-4 ... +392)	O-ring (FFKM O-ring material) ¹⁾	160 (6.3)	FDK:085B1406	
-20 ... +200 (-4 ... +392)	O-ring (FKM 602 O-ring material) ²⁾	160 (6.3)	FDK:085B5510	
-20 ... +200 (-4 ... +392)	O-ring	230 (9.41)	FDK:085B5511	

¹⁾ Chemical resistant O-ring material. Body specially for Ex-approved transducers.


²⁾ Body specially for standard transducers.

Temperature range [°C (°F)]	Length [mm (inch)]	Article 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)]	Article 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)]	Article 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

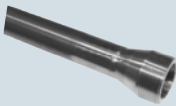
Description	Length [m (ft)]	Article No.	
Coaxial cable for FUS080, (75 Ω, max. 70 °C (158 °F), black PVC) (2 pcs.)	15 (49.21)	A5E02478541	
	30 (98.43)	A5E02478751	

Flow Measurement

SITRANS F US Inline

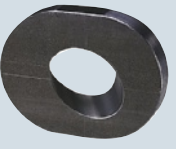
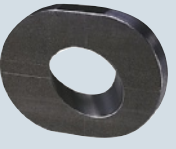
Flowmeter SONOKIT (with FUS060 or FUS080)

Transducer holder for SONOKIT SONO 3200 transducers

Description	Article No.	
1-path (each incl. 1 pc.)		
<ul style="list-style-type: none"> 160 mm (6.3") stainless steel 45°, DN 100 ... DN 150 (4" ... 6") 	FDK:085L1103	
<ul style="list-style-type: none"> 160 mm (6.3") carbon steel 45°, DN 100 ... DN 150 (4" ... 6") 	FDK:085L1102	
<ul style="list-style-type: none"> 230 mm (9.1") for concrete pipe 60°, DN 600 ... DN 2400 (24" ... 96") 	FDK:085L1107	
<ul style="list-style-type: none"> 160 mm (6.3") stainless steel 60°, DN 200 ... DN 2400 (8" ... 96") 	FDK:085L1105	
<ul style="list-style-type: none"> 160 mm (6.3") carbon steel 60°, DN 200 ... DN 2400 (8" ... 96") 	FDK:085L1104	
2-path (each incl. 1 pc.)		
<ul style="list-style-type: none"> 230 mm (9.1") for concrete pipe 60°, DN 600 ... DN 4000 (24" ... 160") 	FDK:085L1111	
<ul style="list-style-type: none"> 160 mm (6.3") stainless steel 60°, DN 200 ... DN 4000 (8" ... 160") 	FDK:085L1109	
<ul style="list-style-type: none"> 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

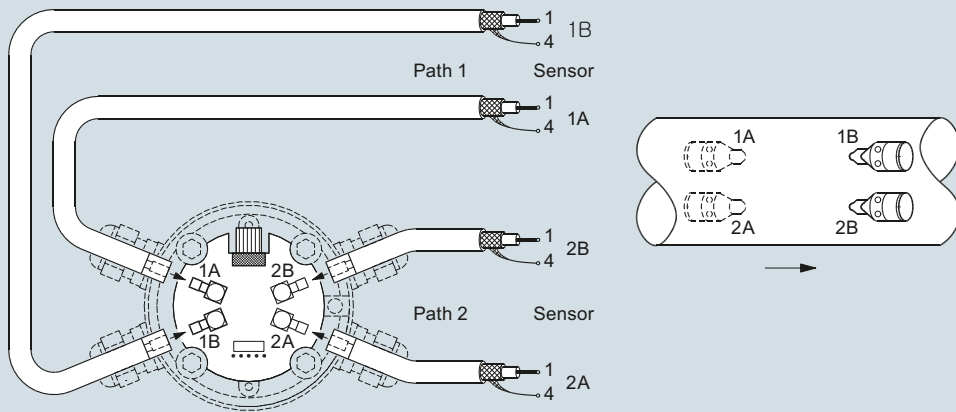
Description	Article No.	
1-path (each incl. 1 pc.)		
<ul style="list-style-type: none"> Stainless steel plate, 45°, DN 100 ... DN 150 (4" ... 6") 	FDK:085L1113	
<ul style="list-style-type: none"> Carbon steel plate, 45°, DN 100 ... DN 150 (4" ... 6") 	FDK:085L1112	
<ul style="list-style-type: none"> Stainless steel plate, 60°, DN 200 ... DN 2400 (8" ... 96") 	FDK:085L1115	
<ul style="list-style-type: none"> Carbon steel plate, 60°, DN 200 ... DN 2400 (8" ... 96") 	FDK:085L1114	
2-path (each incl. 1 pc.)		
<ul style="list-style-type: none"> Stainless steel plate, 60°, DN 200 ... DN 4000 (8" ... 160") 	FDK:085L1119	
<ul style="list-style-type: none"> 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).

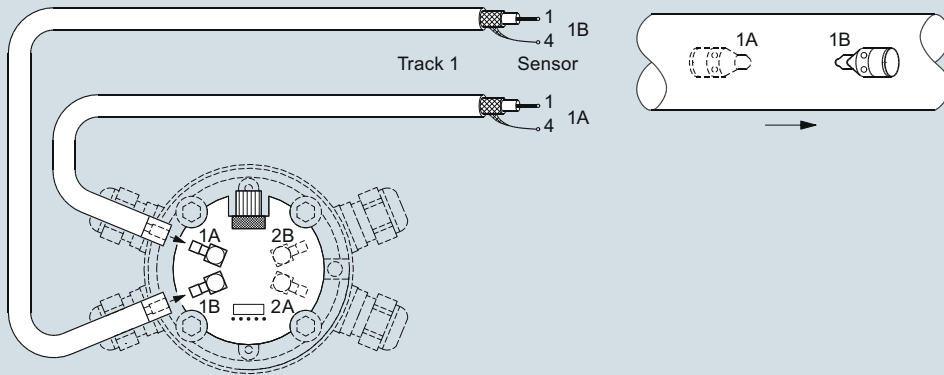
SONO 3200 cable glands

Type/description	Temperature range [°C (°F)]	Appr	Article 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 chrome-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	

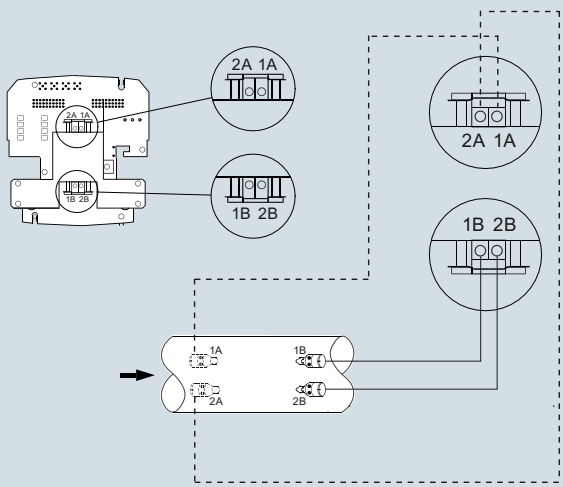
Schematics



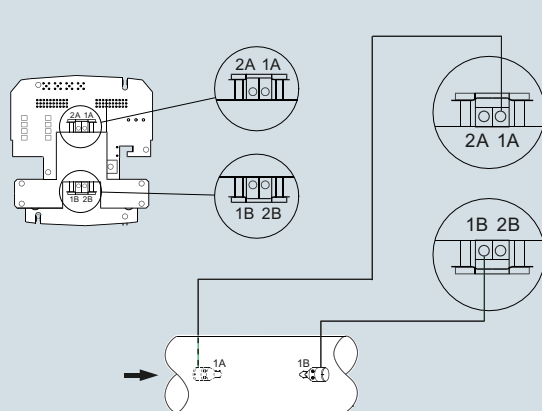
Electrical connection of SITRANS FUS060 and SONOKIT 2-path. Max. 30 m transducer cable length for sizes \geq DN 3000.



Electrical connection of SITRANS FUS060 and SONOKIT 1-path



Electrical connection of SITRANS FUS080 and SONOKIT 2-path



Electrical connection of SITRANS FUS080 and SONOKIT 1-path

Flow Measurement

SITRANS F US Inline

Flowmeter SITRANS FUS380 standard

Overview



The 2-path 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 3/279.

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 15 Hz/0.5 Hz (230 V AC/Battery)
- Easy one-button straight forward display
- 2-path measuring principle for optimum accuracy
- Compact or remote mounting
- Measures on most 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

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-path 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.

Pulse output rate is defined when ordering. To get optimal benefit the pulse value must be selected as low as possible.

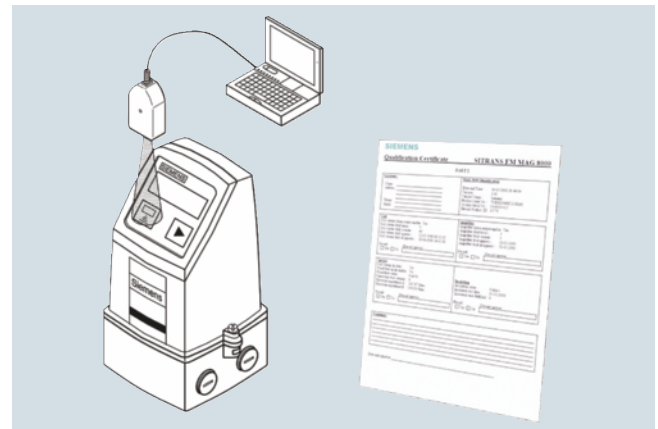
If the flowmeter forms part of an energy meter system for custody transfer, no further approvals are needed, except possible local approvals on the flowmeter.

Function

Together with the SIMATIC PDM tool the FUS380 offers the possibility of testing and verifying the flowmeter on site and creating a printed "Qualification Certificate" with specific data that defines the quality status of the measurement.

The Qualification Certificate shows information about the actual status of the flowmeter:

- General settings, flowmeter and battery information, totalizer values, and pulse output settings
- Detailed information about the transmitter and the sensor functionality, and a main parameter list for evaluating the functionality of the flowmeter



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 maximum 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.

To get optimal benefit of the pulses the pulse value and pulse length shall be selected as low as possible. The following calculation formula can be used for determining the shortest pulse value at a pulse length of 5 ms: L/pulse > Q_s (m³/h) /360.

For example Q_s = 300 m³/h; L/pulse > 300/360; L/pulse > 0.83; therefore the pulse value must be 1 l/pulse

¹⁾ Typical pulse values for SITRANS FUS380 with pulse length 5 ms. Other values are possible - please see the selections at the 7ME340 Order codes.

Flow Measurement

SITRANS F US Inline

Flowmeter SITRANS FUS380 standard

Technical specifications

Sensor design	2-path sensor with flanges and inline transducers wet-calibrated from factory
Nominal size (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	<ul style="list-style-type: none"> 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 (EN 1982)
Transducer design	<ul style="list-style-type: none"> 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 ₂ As)

Sensor operating conditions

Ambient temperature	
• Operation	-10 ... +60 °C (14 ... 140 °F) (MID version: -10 ... +55 °C (14 ... 131 °F))
• Storage	-40 ... +85 °C (-40 ... +185 °F)
Measured media	Heating water, according to VDI-2035 (pH 8.2 - 10.5), industrial VdTUV information sheet 1466 and AGFW information sheet FW 510.
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 55011/CSPRI-11
• Noise immunity	To EN/IEC 61236-1 (Industry)

Transmitter

The transmitter related to this system is the SITRANS FUS080. Technical specifications to the FUS080 see page 3/240 ff.

Sensor cable

Cable length	Max. 30 m (98.4 ft) between transmitter and sensor
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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

Flowmeter Calibration and traceability

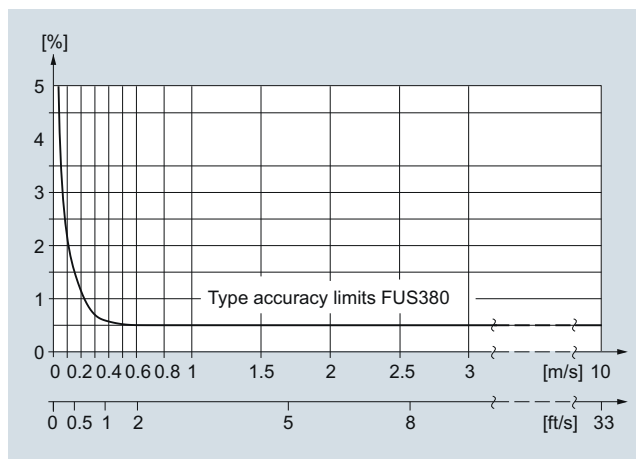
To ensure continuous accurate measurement, flowmeters must be calibrated. The calibration is conducted at Siemens flow facilities with traceable instruments referring directly to the physical unit of measurement according to the International System of Units (SI).

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 m³/h to 10 000 m³/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 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 m³/h).

Accuracy SITRANS FUS380:

$\pm 0.5\%$ for $0.5 \text{ m/s} < v < 10 \text{ m/s}$ and $\pm 0.25/V_{\text{act}}$ [%] below 0.5 m/s



Flow Measurement

SITRANS F US Inline

Flowmeter SITRANS FUS380 standard

Selection and Ordering data			Article-No.	Order code
Flowmeter SITRANS FUS380 (standard)			7ME3400-	
			0 - A	
Diameter	Flow setting [m ³ /h] Qp (Qn) ¹ Qs			
DN 50 (2") ²	15	15	1 A	
DN 50 (2") ²	15	45	1 C	
DN 50 (2") ²	30	45	1 D	
DN 65 (2½") ²	25	25	1 E	
DN 65 (2½") ²	25	72	1 G	
DN 65 (2½") ²	50	72	1 H	
DN 80 (3") ²	40	40	1 J	
DN 80 (3") ²	40	120	1 L	
DN 80 (3") ²	80	120	1 M	
DN 100 (4")	60	60	1 N	
DN 100 (4")	60	180	1 Q	
DN 100 (4")	120	240	1 R	
DN 125 (5")	100	100	1 S	
DN 125 (5")	100	280	1 U	
DN 125 (5")	200	400	1 V	
DN 150 (6")	150	150	2 A	
DN 150 (6")	150	420	2 C	
DN 150 (6")	300	560	2 D	
DN 200 (8")	250	250	2 E	
DN 200 (8")	250	700	2 G	
DN 200 (8")	500	900	2 H	
DN 250 (10")	400	400	2 J	
DN 250 (10")	400	1120	2 L	
DN 250 (10")	800	1400	2 M	
DN 300 (12")	560	560	2 N	
DN 300 (12")	560	1560	2 Q	
DN 300 (12")	1120	2100	2 R	
DN 350 (14")	750	750	2 S	
DN 350 (14")	750	2100	2 U	
DN 350 (14")	1500	2800	2 V	
DN 400 (16")	950	950	3 A	
DN 400 (16")	950	2660	3 C	
DN 400 (16")	1900	3600	3 D	
DN 500 (20")	1475	1475	3 J	
DN 500 (20")	1475	4130	3 L	
DN 500 (20")	2950	5500	3 M	
DN 600 (24")	2150	2150	3 S	
DN 600 (24")	2150	6020	3 U	
DN 600 (24")	4300	8000	3 V	
DN 700 (28")	2900	2900	4 E	
DN 700 (28")	2900	8120	4 G	
DN 700 (28")	5800	10 800	4 H	
DN 800 (32")	3800	3800	4 N	
DN 800 (32")	3800	10 640	4 Q	
DN 800 (32")	7600	14 200	4 R	
DN 900 (36")	5000	5000	5 A	
DN 900 (36")	5000	14 000	5 C	
DN 900 (36")	10000	20 000	5 D	
DN 1000 (40")	6000	6000	5 J	
DN 1000 (40")	6000	16 800	5 L	
DN 1000 (40")	12 000	24 000	5 M	
DN 1200 (48")	9000	9000	5 S	
DN 1200 (48")	9000	25 200	5 U	
DN 1200 (48")	18 000	36 000	5 V	

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			Article-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 Article 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 ⁵⁾				
0.1 l/p			1	
1 l/p			2	
2.5 l/p			3	
10 l/p			4	
50 l/p			5	
100 l/p			6	
250 l/pulse			7	
1 m ³ /pulse			8	
0.25 l/pulse			9	NOA
0.5 l/pulse			9	NOB
5 l/pulse			9	NOC
25 l/pulse			9	NO D
500 l/pulse			9	NO E
2.5 m ³ /pulse			9	NO F
5 m ³ /pulse			9	NO G
10 m ³ /pulse			9	NO H
25 m ³ /pulse			9	NO J
50 m ³ /pulse			9	NO K
100 m ³ /pulse			9	NO L
250 m ³ /pulse			9	NO M
500 m ³ /pulse			9	NO N
1000 m ³ /pulse			9	NO P
Transmitter version of SITRANS FUS080				
IP67/NEMA 4X/6 115 ... 230 V AC			B	
IP67/NEMA 4X/6 3.6 V battery version, incl. dual battery pack ⁴⁾			D	
IP67/NEMA 4X/6 115 ... 230 V AC, including 3.6 V single battery backup ⁴⁾			E	
IP67/NEMA 4X/6 3.6 V battery version (no battery pack included)			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.

5) To get optimal benefit of the pulses the pulse value and pulse length shall be selected as low as possible. The following calculation formula can be used for determining the shortest pulse value at a pulse length of 5 ms:

$$L/\text{pulse} > Q_s (\text{m}^3/\text{h}) / 360,$$

$$\text{For example } Q_s = 300 \text{ m}^3/\text{h}; L/\text{pulse} > 300/360;$$

$$L/\text{pulse} > 0.83; \text{ therefore the pulse value must be } 1 \text{ l/pulse}$$

Flow Measurement

SITRANS F US Inline

Flowmeter SITRANS FUS380 standard

Selection and Ordering data

Order code

Additional information

Please add „-Z“ to Article 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.
Incl. Calibration protocol: 2 x 3 points, Q_i , 10 %, Q_p and Q_p (max. 8000 m³/h).

Included

Accredited Siemens ISO/IEC 17025 calibration for DN 50 ... DN 200 with Q_n as selected in diameter. Certificate: 2 x 5 points, Q_i , 5 %, 10 %, 50 % and 100 % of Q_p (max. 630 m³/h).

D20

Accredited Siemens ISO/IEC 17025 calibration for DN 250 ... DN 600 with Q_n as selected in diameter. Certificate: 2 x 5 points, 5 %, 10 %, 50 % and 100 % of Q_p (max. 2800 m³/h).

D21

Accredited Siemens ISO/IEC 17025 calibration, DN 500 ... DN 1200 with Q_n as selected in diameter. Certificate: 2 x 5 points, Q_i , 5 %, 10 %, 50 % and 100 % of Q_p (max. 8000 m³/h).

D22

Output B as reverse flow pulses.
No calibration/verification of this function.

E21

Material certificate

EN 10204-3.1 (pipe material)

F10

Tag name plate

Stainless steel TAG plate (1 x 24 x 80 mm), wire fixed. Font size depends on text length: 8 mm for 1 ... 10 characters, 4 mm for 11 ... 20 characters (specify in plain text).

Y17

Flowmeter SITRANS FUS380 operating instructions, accessories and spare parts

Operating instructions

Description	Article 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 3/243.

3



Please use online Product selector to get latest updates. Product selector link:

www.pia-selector.automation.siemens.com

Flow Measurement

SITRANS F US Inline

Flowmeter SITRANS FUE380 with CT approval

Overview



The 2-path 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 15 Hz/0.5 Hz (230 V AC/Battery)
- Easy one-button straight forward display
- 2-path measuring principle for optimum accuracy
- Compact or remote mounting
- Measures on most 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 $Q_i:Q_s$ up to 1:400

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-path design of SITRANS FUE380 ensures maximum accuracy under short inlet conditions. The approved flowmeter con-

sists of a flow sensor pipe, 4 transducers/transducer cables and a 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 EN 1434. 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.

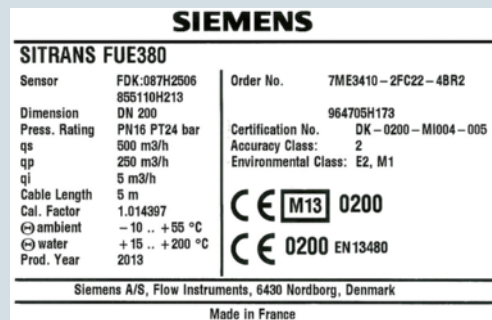
Module B: MI-004 Type MID approval according to EN 1434: 2007

Module D: Quality insurance MID 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 label (with MID first verification)



FUE380 sensor label (with MID first verification)

Flow Measurement

SITRANS F US Inline

Flowmeter SITRANS FUE380 with CT 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.

Pulse output rate is defined when ordering. To get optimal benefit the pulse value must be selected as low as possible.

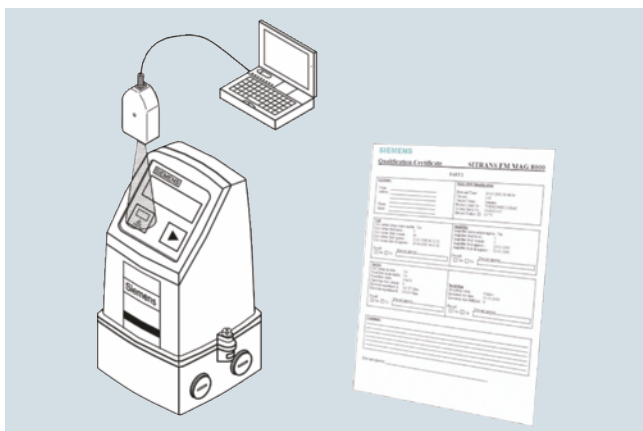
If the flowmeter forms part of an energy meter system for custody transfer, no further approvals are needed, except possible local approvals on the flowmeter.

Function

Together with the SIMATIC PDM tool the FUE380 offers the possibility of testing and verifying the flowmeter on site and creating a printed "Qualification Certificate" with specific data that defines the quality status of the measurement.

The Qualification Certificate shows information about the actual status of the flowmeter:

- general settings, flowmeter and battery information, totalizer values, and pulse output settings
- detailed information about the transmitter and the sensor functionality, and a main parameter list for evaluating the functionality of the flowmeter



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⁾	Cut-off (m ³ /h)	Cut-off (% of Q _{max})	Typical pulse value ⁵⁾ (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

Flow Measurement

SITRANS F US Inline

Flowmeter SITRANS FUE380 with CT 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 _n (m ³ /h) (1:100 of Q _p) ⁴⁾	Cut-off (m ³ /h)	Cut-off (% of Q _{max})	Typical pulse value ⁵⁾ (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 OIML R 75 class 2 and MID EN 1434 class 2.

Q_i (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) Typical pulse values with a pulse length of 5 ms in connection with SITRANS FUE950. Other values are possible, please see the selections at the 7ME341 Order code.
- 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)
- 5) To get optimal benefit of the pulses the pulse value and pulse length shall be selected as low as possible. The following calculation formula can be used for determining the shortest pulse value at a pulse length of 5 ms: $L/pulse > Q_s (m^3/h) / 360$.
For example Q_s = 300 m³/h; L/pulse > 300/360; L/pulse > 0.83; therefore the pulse value must be 1 l/pulse

Flow Measurement

SITRANS F US Inline

Flowmeter SITRANS FUE380 with CT approval

Technical specifications

Pipe design	2-path 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	<ul style="list-style-type: none"> 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 (EN 1982)
Transducer design	<ul style="list-style-type: none"> 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 ₂ As)
Sensor operating conditions	
Ambient temperature	
• Operation	-10 ... +60 °C (14 ... 140 °F) (MID version: -10 ... +55 °C (14 ... 131 °F))
• Storage	-40 ... +85 °C (-40 ... +185 °F)
Measured media	Heating water, according to VDI-2035 (pH 8.2 - 10.5), industrial VdTUV information sheet 1466 and AGFW information sheet FW 510.
Media/surface temperature	DN 100 ... DN 1200: <ul style="list-style-type: none"> Remote: 2 ... 200 °C (35.6 ... 392 °F) MID: min. +15 °C/+59 °F DN 50 ... DN 80: <ul style="list-style-type: none"> Remote: 2 ... 150 °C (35.6 ... 302 °F) MID: min. +15 °C/+59 °F DN 50 ... DN 1200: <ul style="list-style-type: none"> 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 55011/CISPR-11
• Noise immunity	To EN/IEC 61326-1 (Industry)
• 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 3/240 ff.

Sensor cable

Cable length	Max. 30 m (98.4 ft) between transmitter and sensor
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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

- Approval standards: EN 1434 and OIML R 75 Class 2
- Type approval: MID, MI-004, class 2 approval and certification (according to EN 1434)

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

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 m³/h to 10 000 m³/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 standard calibration certificate with Q_n as selected flow is shipped with each SITRANS FUE380. This production calibration protocol consists of 2 x 3 points at Q_i, 10 % Q_p and Q_p (max. 4 200 m³/h).

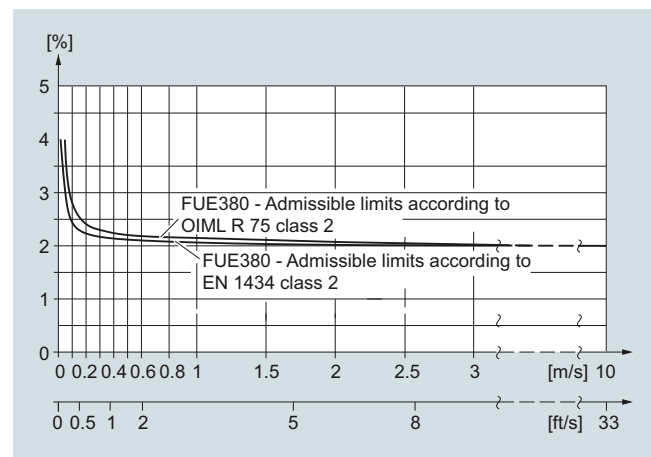
Typical accuracy SITRANS FUE380:

$$\pm(0.5 + 0.02 Q_p/Q_i) [\%]$$

Q_p according to EN 1434/OIML requirements.

Example: DN 100, Q_p = 60 m³/h at Q = 1.2 m³/h:

Accuracy at 1.2 m³/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.

Flow Measurement

SITRANS F US Inline

Flowmeter SITRANS FUE380 with CT approval

Selection and Ordering data

Flowmeter SITRANS FUE380 (type-approved)		Article No.	Order code
		7 ME 3 4 1 0 -	
Diameter	Flow setting [m³/h] Qp[m³/h]¹⁾ Qs [m³/h]		
DN 50 (2") ²⁾	15 ³⁾ 30	1 B	
DN 50 (2") ²⁾	15 ³⁾ 45	1 C	
DN 50 (2") ²⁾	30 ⁴⁾ 45	1 D	
DN 65 (2½") ²⁾	25 ³⁾ 50	1 F	
DN 65 (2½") ²⁾	25 ³⁾ 72	1 G	
DN 65 (2½") ²⁾	50 ⁴⁾ 72	1 H	
DN 80 (3") ²⁾	40 ³⁾ 80	1 K	
DN 80 (3") ²⁾	40 ³⁾ 120	1 L	
DN 80 (3") ²⁾	80 ⁴⁾ 120	1 M	
DN 100 (4")	60 ³⁾ 120	1 P	
DN 100 (4")	60 ³⁾ 180	1 Q	
DN 100 (4")	120 ⁴⁾ 180	1 R	
DN 125 (5")	100 ³⁾ 200	1 T	
DN 125 (5")	100 ³⁾ 280	1 U	
DN 125 (5")	200 ⁴⁾ 280	1 V	
DN 150 (6")	150 ³⁾ 300	2 B	
DN 150 (6")	150 ³⁾ 420	2 C	
DN 150 (6")	300 ⁴⁾ 420	2 D	
DN 200 (8")	250 ³⁾ 500	2 F	
DN 200 (8")	250 ³⁾ 700	2 G	
DN 200 (8")	500 ⁴⁾ 700	2 H	
DN 250 (10")	400 ³⁾ 800	2 K	
DN 250 (10")	400 ³⁾ 1120	2 L	
DN 250 (10")	800 ⁴⁾ 1120	2 M	
DN 300 (12")	560 ³⁾ 1120	2 P	
DN 300 (12")	560 ³⁾ 1560	2 Q	
DN 300 (12")	1120 ⁴⁾ 1560	2 R	
DN 350 (14")	750 ³⁾ 1500	2 T	
DN 350 (14")	750 ³⁾ 2100	2 U	
DN 350 (14")	1500 ⁴⁾ 2100	2 V	
DN 400 (16")	950 ³⁾ 1900	3 B	
DN 400 (16")	950 ³⁾ 2660	3 C	
DN 400 (16")	1900 ⁴⁾ 2660	3 D	
DN 500 (20")	1475 ³⁾ 2950	3 K	
DN 500 (20")	1475 ³⁾ 4130	3 L	
DN 500 (20")	2950 ⁴⁾ 4130	3 M	
DN 600 (24")	2150 ³⁾ 4300	3 T	
DN 600 (24")	2150 ³⁾ 6020	3 U	
DN 600 (24")	4300 ⁴⁾ 6020	3 V	
DN 700 (28")	2900 ³⁾ 5800	4 F	
DN 700 (28")	2900 ³⁾ 8120	4 G	
DN 700 (28")	5800 ⁴⁾ 8120	4 H	
DN 800 (32")	3800 ³⁾ 7600	4 P	
DN 800 (32")	3800 ³⁾ 10 640	4 Q	
DN 800 (32")	7600 ⁴⁾ 10 640	4 R	
DN 900 (36")	5000 ³⁾ 10 000	5 B	
DN 900 (36")	5000 ³⁾ 14 000	5 C	
DN 900 (36")	10 000 ⁴⁾ 14 000	5 D	
DN 1000 (40")	6000 ³⁾ 12 000	5 K	
DN 1000 (40")	6000 ³⁾ 16 800	5 L	
DN 1000 (40")	12 000 ⁴⁾ 16 800	5 M	
DN 1200 (48")	9000 ³⁾ 18 000	5 T	
DN 1200 (48")	9000 ³⁾ 25 200	5 U	
DN 1200 (48")	18 000 ⁴⁾ 25 200	5 V	

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.

For notes 1) to 8) see next page

Selection and Ordering data

Flowmeter SITRANS FUE380 (type-approved)		Article No.	Order code
		7 ME 3 4 1 0 -	
Flange norm and pressure rating			
System without sensor - only a transmitter			
EN 1092-1			
		C	
		D	
		E	
PN 16 (DN 100 ... DN 1200)			
PN 25 (DN 200 ... DN 1000)			
PN 40 (DN 50 ... DN 250) ⁵⁾			
Compact/remote connection			
Compact version, max. 120 °C (248 °F)			
		0	
Remote version, max. 150/200 °C (302/392 °F)			
		2	
		3	
		4	
		5	
5 m (16.4 ft)			
10 m (32.8 ft)			
20 m (65.6 ft)			
30 m (98.4 ft)			
Approvals/pulse output			
Without approval (neutral)			
		0	
Selectable pulse output			
		1	
With approval marks			
Selectable pulse output			
		2	
With approval marks and seal			
Selectable pulse output			
Pulse output value setup⁸⁾			
		1	
		2	
		3	
		4	
		5	
		6	
		7	
		8	
		9	NOA
		9	NOB
		9	NOC
		9	NOD
		9	NOE
		9	NOF
		9	NOG
		9	NOH
		9	NOJ
		9	NOK
		9	NOL
		9	NOM
		9	NON
		9	NOP

Flow Measurement

SITRANS F US Inline

Flowmeter SITRANS FUE380 with CT approval

Selection and Ordering data	Article 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 ⁶⁾		D
IP67/NEMA 4X/6 115 ... 230 V AC, including 3.6 V single battery backup ⁶⁾		E
IP67/NEMA 4X/6 3.6 V battery version (no battery pack included)		G
Country/approval type⁷⁾		
Neutral, no approval mark		A
China		C
Russia, EN 1434/OIML R 75		M
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/EN1434 flow values without PTB approval
- 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) To get optimal benefit of the pulses the pulse value and pulse length shall be selected as low as possible. The following calculation formula can be used for determining the shortest pulse value at a pulse length of 5 ms:
 $L/pulse > Q_s (m^3/h) / 360$
 For example $Q_s = 300 m^3/h$; $L/pulse > 300/360$; $L/pulse > 0.83$; therefore the pulse value must be 1 l/pulse

Selection and Ordering data	Order code
Additional information	
Please add „-Z“ to Article No. and following add-on code(s) with plain text.	
Calibration/certificate FUE380	
Approval, verification and approval sealing as defined with the article number. See Order code.	
Production calibration for DN 50 ... DN 1200 with Q_n as selected in diameter Incl. Calibration protocol: 2 x 3 points, Q_i , 10 % Q_p and Q_p (max. 8000 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 5 points, Q_i , 5 %, 10 %, 25 %, 50 % and 100 % of Q_p (max. 630 m ³ /h).	D20
Accredited Siemens ISO/IEC 17025 calibration for DN 250 ... DN 600 with Q_n as selected in diameter. Certificate: 2 x 5 points, Q_i , 5 %, 10 %, 25 %, 50 % and 100 % of Q_p (max. 2800 m ³ /h).	D21
Accredited Siemens ISO/IEC 17025 calibration, DN 500 ... DN 1200 with Q_n as selected in diameter. Certificate: 2 x 5 points, Q_i , 5 %, 10 %, 25 %, 50 % and 100 % of Q_p (max. 8000 m ³ /h).	D22
Output B as reverse flow pulses. No calibration/verification of this function.	E21
Material certificate	
EN 10204-3.1 (pipe material)	F10
Tag name plate	
Stainless steel TAG plate (1 x 24 x 80 mm), wire fixed. Font size depends on text length: 8 mm for 1 ... 10 characters, 4 mm for 11 ... 20 characters (specify in plain text).	Y17

Flowmeter SITRANS FUE380 operating instructions, accessories and spare parts

Operating instructions

Description	Article 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 3/243 see chapter of transmitter FUS080/FUE080.



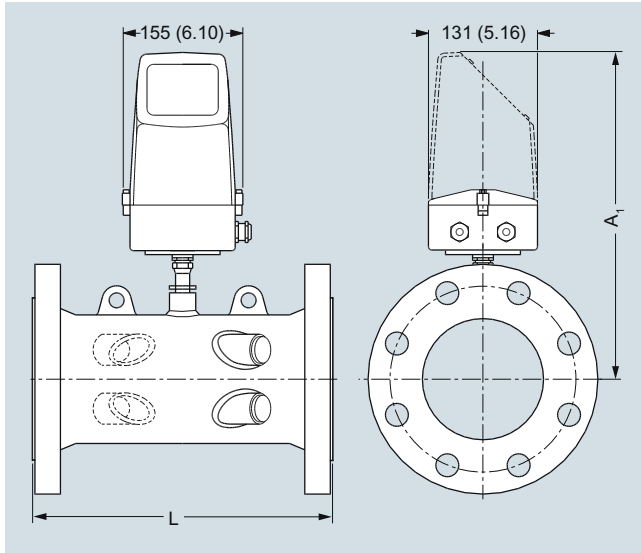
Please use online Product selector to get latest updates.
 Product selector link:
www.pia-selector.automation.siemens.com

Flow Measurement

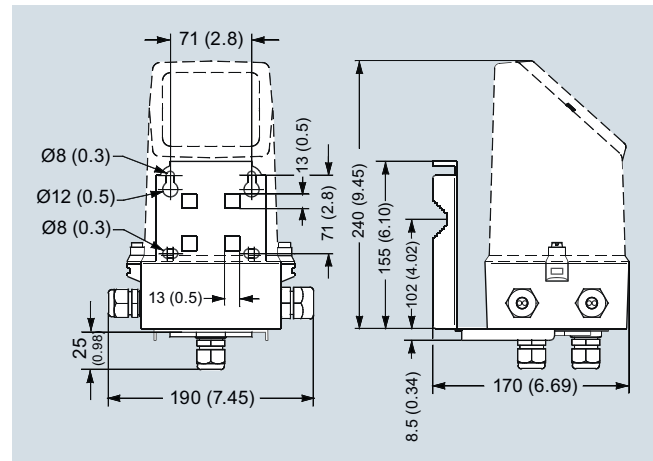
SITRANS F US Inline

Flowmeter SITRANS FUS380 and FUE380

Dimensional drawings



Transmitter IP67/NEMA 4X/6, wall mounting



Dimensions in mm (inch)

Sensor dimensions for FUS380 and FUE380

Size	PN 16		PN 25		PN 40		A1	Lift hug
	L	Weight	L	Weight	L	Weight		
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	194	625 +0/-3	231	-	-	558	Yes
600	750 +0/-3	303	750 +0/-3	365	-	-	609	Yes
700	875 +0/-3	361	875 +0/-3	553	-	-	660	Yes
800	1000 +0/-3	494	1000 +0/-3	770	-	-	710	Yes
900	1230 +6/-6	475	1300 +6/-6	835	-	-	810	Yes
1000	1300 +6/-6	594	1370 +6/-6	1000	-	-	910	Yes
1200	1360 +6/-6	732	-	-	-	-	1110	Yes

Notes:

- Weight for transmitter/electronics 1.5 kg (compact version) or approximately 5 kg (remote version including 10 m cable set)
- - Means not available
- All weights are **approximate**
- For flange values - see norm EN 1092-1

Flow Measurement

SITRANS F US Inline

Flowmeter SITRANS FUS380 and FUE380

Size inch	PN 16		PN 25		PN 40		A1 inch	Lift hug
	L inch	Weight lb	L inch	Weight lb	L inch	Weight lb		
2	-	-	-	-	11.81 +0/-0.08	22	13.78	No
2½	-	-	-	-	11.81 +0/-0.08	33	14.17	No
3	-	-	-	-	13.78 +0/-0.08	40	14.57	No
4	13.78 +0/-0.08	33	-	-	13.78 +0/-0.12	40	14.76	No
5	13.78 +0/-0.08	40	-	-	13.78 +0/-0.12	53	14.96	No
6	19.68 +0/-0.12	62	-	-	19.68 +0/-0.12	75	15.35	No
8	19.68 +0/-0.12	84	19.68 +0/-0.12	104	19.68 +0/-0.12	121	16.30	No
10	23.62 +0/-0.12	132	23.62 +0/-0.12	168	23.62 +0/-0.12	201	17.32	No
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	-	-	19.49	Yes
16	23.62 +0/-0.12	273	23.62 +0/-0.12	337	-	-	19.96	Yes
20	24.61 +0/-0.12	428	24.61 +0/-0.12	509	-	-	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	1246	-	-	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	-	-	31.89	Yes
40	51.18 +0/-0.24	1310	53.94 +0/-0.24	2205	-	-	35.83	Yes
48	53.54 +0/-0.24	1614	-	-	-	-	43.70	Yes

Notes:

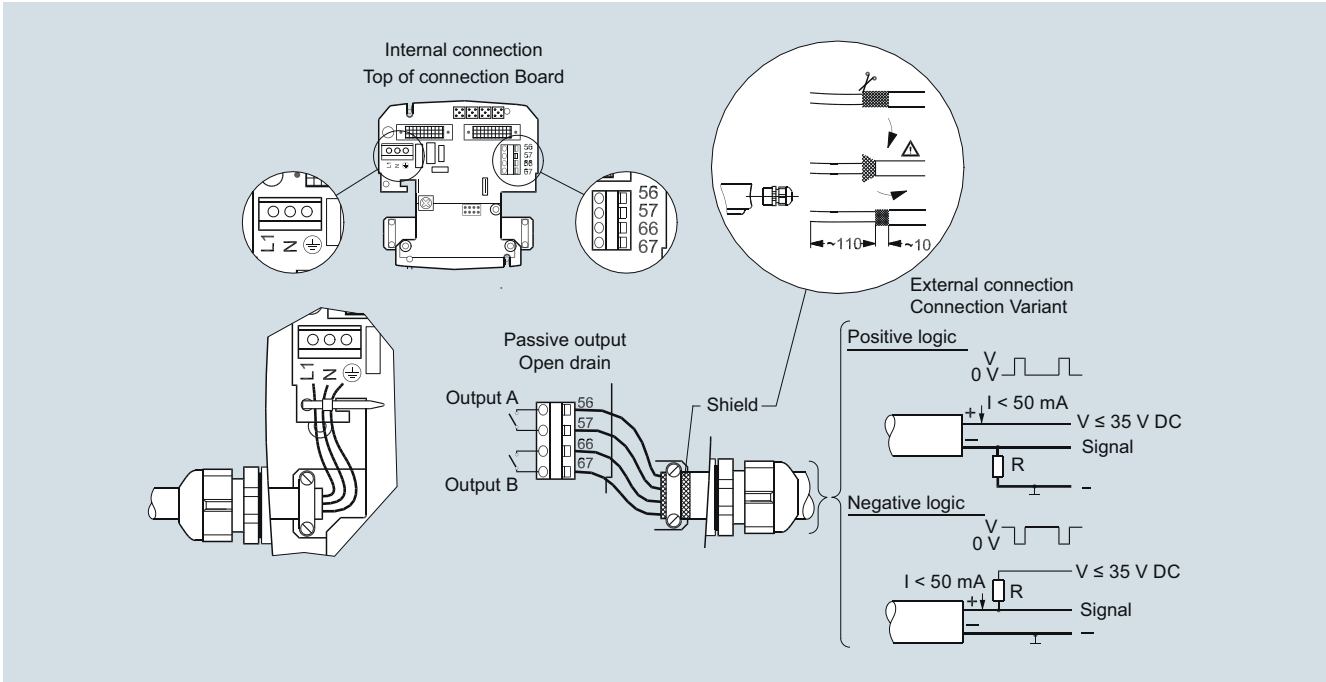
- Weight for transmitter/electronics 3.3 lb (compact version) or approximately 11 lb (remote version including 32.8 ft cable set)
- - Means not available
- All weights are **approximate**
- For flange values - see norm EN 1092-1

Flow Measurement SITRANS F US Inline

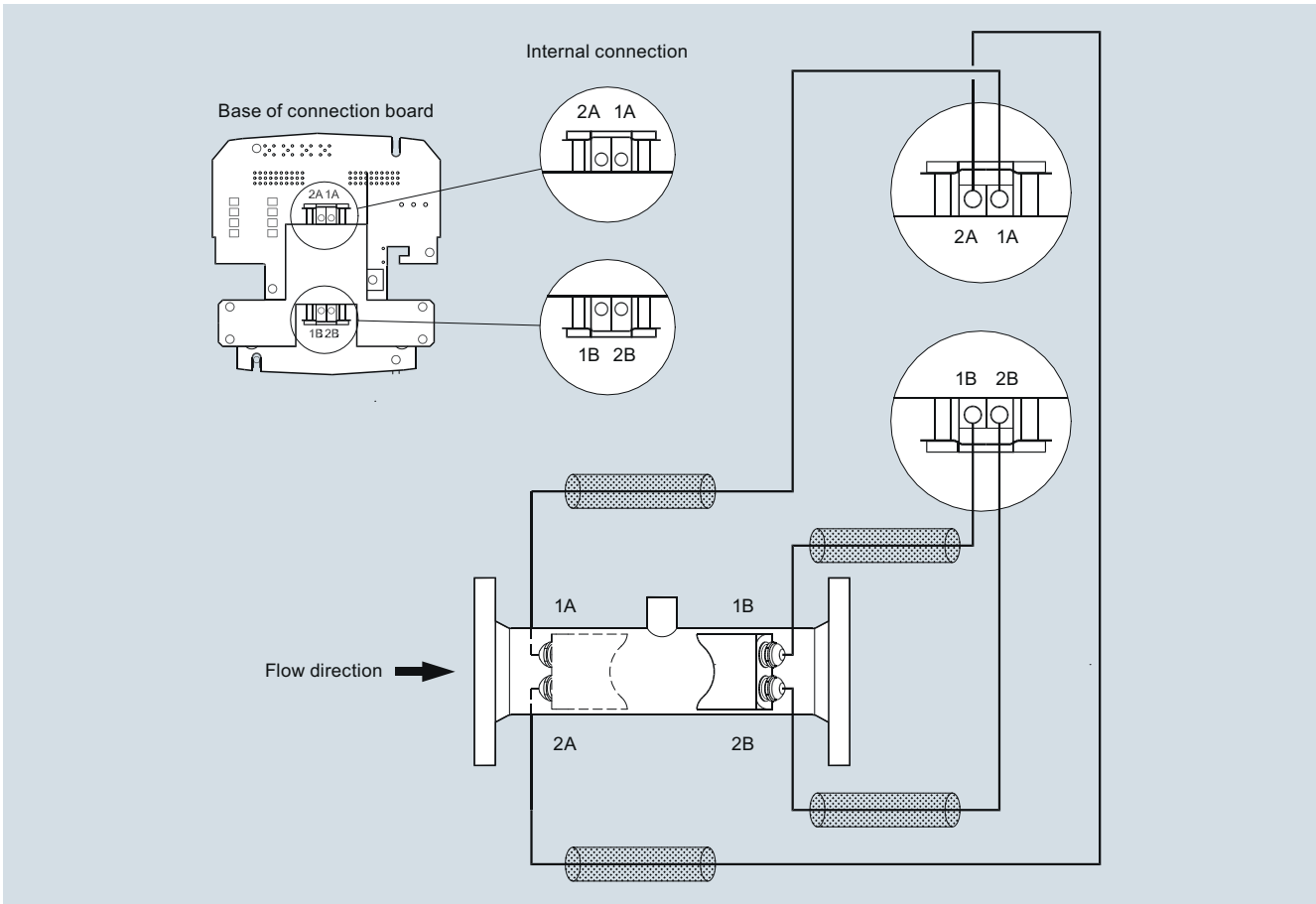
Flowmeter SITRANS FUS380 and FUE380

Schematics

3



Electrical connection of transmitter SITRANS FUS/FUE380



Electrical connection of sensor SITRANS FUS/FUE380

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 typically up to 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, RS 485 or RS 232

Add-on modules

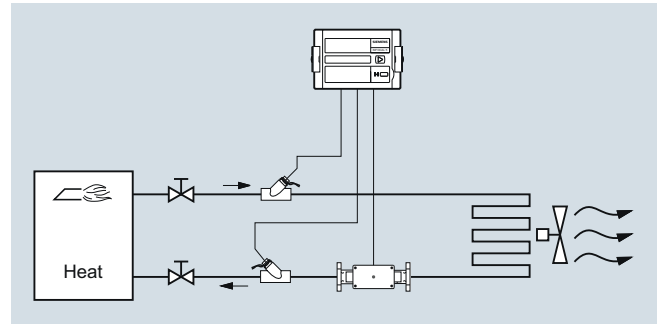
- Plug-in module with 2 extra pulse inputs
- Plug-in module with 2 pulse outputs
- Plug-in module with combination of input and output pulses
- Plug-in module for M-Bus communication
- Plug-in module for RS 232 or RS 485 communication
- Plug-in module with 2 passive current outputs (4 ... 20 mA)

Application

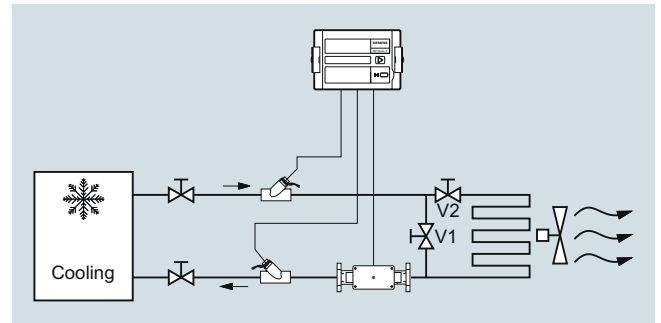
The SITRANS FUE950 is able to handle 3 kinds of applications, means energy calculation in:

- District heating applications
- Chilled water applications
- Combined cooling/heating applications

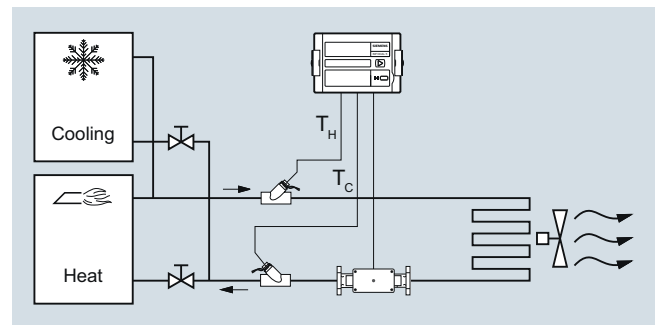
Energy metering in heating, hot water applications (code "A" and "B")



Energy metering in cooling, chilled water applications (code "C" and "D")



Energy metering in combined cooling/heating applications (code "E" and "F")



Flow Measurement

SITRANS F US Inline

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, some figures/symbols not used for normal district heating applications will be shown.

SITRANS FUE950 has a push button for simple operation and provides user-friendly control via the various 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 preprogrammed 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, m³, gal, m³/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:

$$\text{Energy} = \text{Volume} \times (T_{\text{Hot}} - T_{\text{Cold}}) \times K_{\text{factor}} (T_i)$$

Volume: Volume [m³] 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	• Volume
• Energy	• Error day counter
• Tariff energy 1	• Maximum monthly flow rate
• Tariff energy 2	• Maximum monthly power
• Tariff definition 1	• Date of maximum monthly flow rate
• Tariff definition 2	• Date of maximum monthly power
• Pulse counter input 1	• Pulse counter input 2
• Operation hours	

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	440	36.6 hours
15 minutes	• Overload time temperature	440	110 hours
1 hour	• Overload time flow rate	440	18.3 days
24 hours (default setting)	• 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	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.

The following tariff 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, EN 1434/EN 60870-3 (M-Bus protocol).

A specific optical 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: RS 232 module, RS 485 module and M-Bus module. The RS 232 and RS 485 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 which 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)
- RS 232 (M-Bus protocol according EN 1434-3)
- RS 485 (M-Bus protocol according EN 1434-3)

Flow Measurement

SITRANS F US Inline

SITRANS FUE950 energy calculator

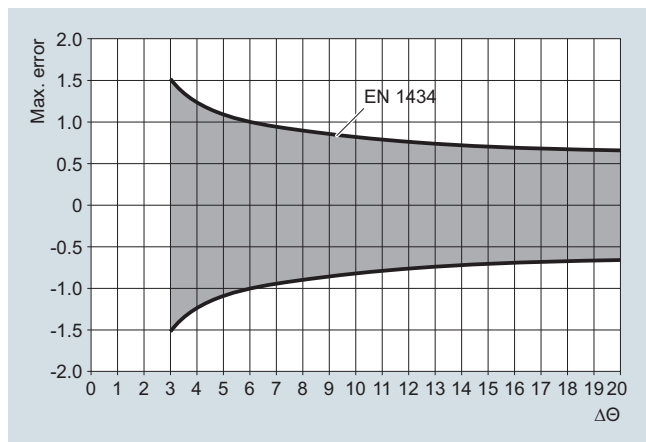
Integration

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 process 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 EN 1434 Typically max. $\pm (0.5 + 3K/\Delta\Theta)$ [%] of measured value	
Flow range	Depends on pulse input value (I/N0), see "Selection and Ordering data".	
Power range value	Depends on pulse input value as follows:	
	Pulse input value (I/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, MBtu/h (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 EN 1434, 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 Cicolac 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	-20 ... 190 °C (-4 ... 374 °F) for T _H and T _C
Absolute measuring range	Start 0.1 K, min. 3 K, max. 177 K
Temperature difference	0.125 K
Measurement cut-off	16-bit digital resolution AD converter
Display resolution	T _H and T _C : 0.1 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 (I/N0) (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 corresponding 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 corresponding Order code. The "installation place" will be shown at the device display and nameplate
Connected cable	Max. 10 m (shielded cables are highly recommended)
Ports for option modules	
Type	The calculator features 2 ports for optional plug-in modules.
Function modules (Port 1 or 2)	<ul style="list-style-type: none"> • 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 or 2)	M-Bus, RS 232 or RS 485 (M-Bus protocol, according EN 1434-3)
Pulse output	
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 corresponding Order code and setting can be read via display menu, settings changeable via software tool
Pulse output 1	
• Pulse frequency	≤ 4 Hz
• Pulse width	125 ms ± 10 %
• 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	<ul style="list-style-type: none"> • 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	
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	
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. The module will be connected on port 1 only, but both ports are occupied by the module.
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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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

Type	The optional M-Bus plug-in module is a serial interface for communication with external devices (M-Bus Repeater)
Protocol	M-Bus according EN 1434-3
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 (Prim1 = the last two digits of the serial number; Prim2 = 0). The secondary address is unique for each calculator and is factory-set to equal the serial number.

RS 232 output

Type	The optional module RS 232 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 EN 1434-3
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 (Article No. A5E02611774).

RS 485 output

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, RS 485, RS 232 or optical interface is maintained, affecting the backup battery lifetime.

Accessories/Software

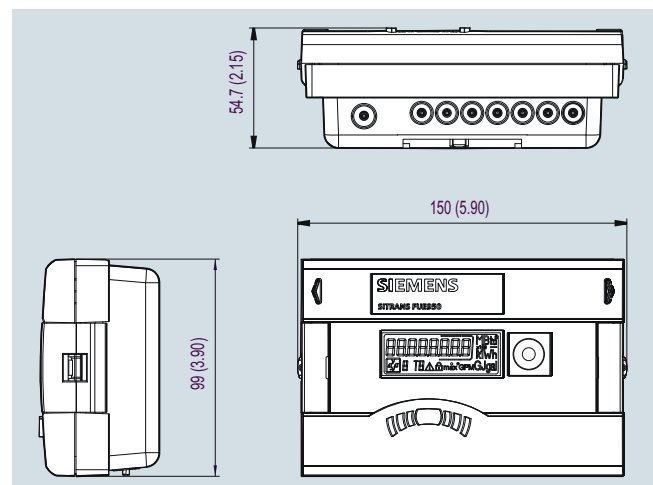
The parameterization software based on the M-Bus is a convenient tool for handling the calculator. It runs on Windows and is used for:

- Configuration of the calculator functionality, reading out different memories, printing out calculator logs (standard).
- Expert programming of the device (advanced setup).
- Test Lab programming of the device (full setup)

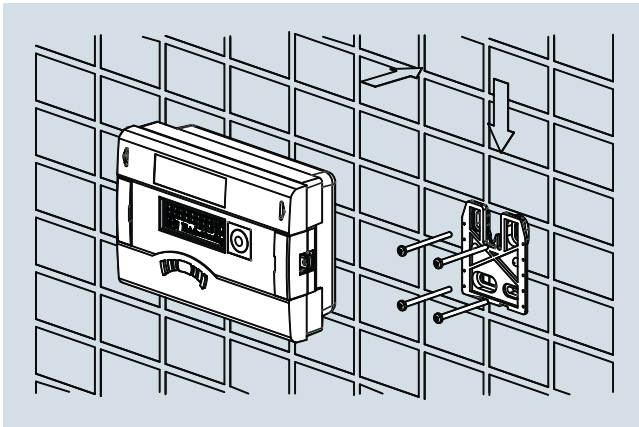
Configuration of the calculator functionality, reading out different memories, printing out calculator logs. For further details please contact your local Siemens representative.

A specific optical 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.

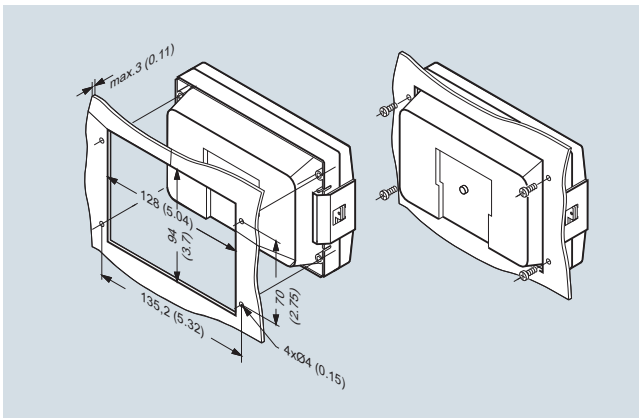
Dimensional drawings



SITRANS FUE950, dimensions in mm (inch)



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 corresponding 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 EN 1434 (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	Ø 6 mm
Sensor tube length	50 mm
Cable length	Up to 10 m (32.8 ft), fixed connected silicon cable, 2 connection wire terminals, terminal sleeves to DIN 46228

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	<ul style="list-style-type: none"> • Heating 3 ... 150 K • Cooling 3 ... 85 K
Medium	Approved for heating/cooling water
Protection	IP65
Environment	<ul style="list-style-type: none"> • Mechanic class M3 • Electromagnetic class E1 (MID)
Pressure rating	See sensor pocket specifications
Material	<ul style="list-style-type: none"> • Protective tube Stainless steel AISI 304Ti/1.4571 (or similar), diameter of protective tube: 6 mm • Connector cable Silicon cable, 4 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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Sensor pockets

Stainless steel sensor pocket (for 4-wire Pt500 types only - standard)

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	<ul style="list-style-type: none"> 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 - some only available as spare part)

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	<table border="1"> <tr> <td>L1 (mm)</td> <td>92</td> <td>127</td> <td>168</td> <td>223</td> </tr> <tr> <td>L (mm)</td> <td>82</td> <td>117</td> <td>155</td> <td>210</td> </tr> </table>	L1 (mm)	92	127	168	223	L (mm)	82	117	155	210
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										

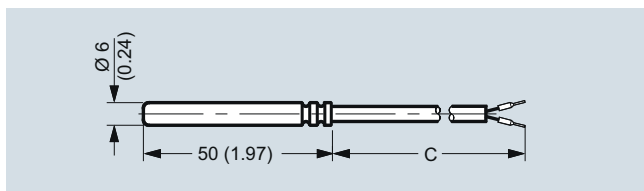
Brass sensor pocket (for 2-wire Pt500 types only - some only available as spare part)

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	<table border="1"> <tr> <td>L1 (mm)</td> <td>47</td> <td>92</td> <td>127</td> </tr> <tr> <td>L (mm)</td> <td>40</td> <td>82</td> <td>117</td> </tr> </table>	L1 (mm)	47	92	127	L (mm)	40	82	117
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

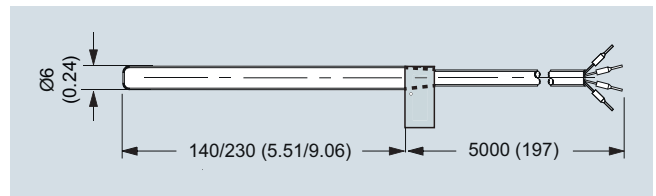
Pt500 2-wire temperature sensor pair (EN 1434)

Cable length 2, 3, 5 or 10 m ('C' at the dimensional drawing)



Pt500 2-wire temperature sensor, dimensions in mm (inch)

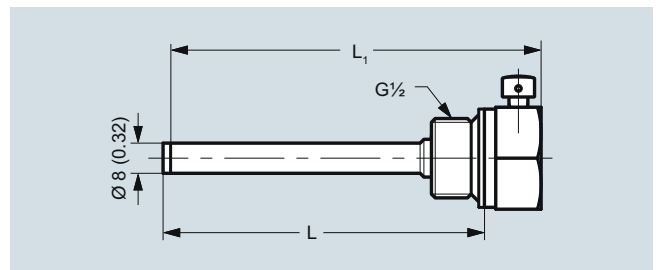
Pt500 4-wire temperature sensor pair (with MID and PTB K7.2 approval)



Pt500 4-wire temperature sensor, dimensions in mm (inch)

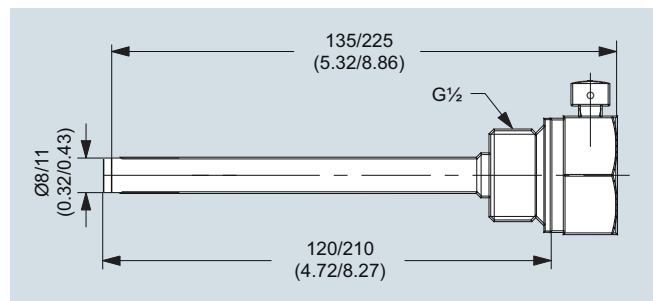
Stainless steel sensor pocket (for 2-wire Pt500 types only)

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)

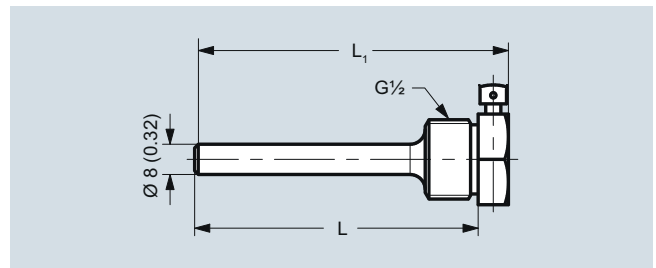
Stainless steel sensor pocket (for 4-wire Pt500 types only)



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)

Selection and Ordering data			Article No.	Order code
Energy calculator SITRANS FUE950, MID or PTB K7.2 custody transfer approved			7ME3480-	
Flow input setting (IN0) (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 m³/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, incl. factory test report (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, incl. factory test report (mentioned approvals are only valid if temp. sensors are used with the applicable temperature sensor pockets).				4
Pt100 setup, no sensor pair included				5
Pt 500 setup and PT500 sensor pair (6/50 mm), 2-wire type incl. 5 m cable, 6 mm sensor diameter and 50 mm length, with MID approval (only for use with the applicable temperature sensor pockets)				6
Pt 500 setup and PT500 sensor pair (6/50 mm), 2-wire type incl. 10 m cable, 6 mm sensor diameter and 50 mm length, with MID approval (only for use with the applicable temperature sensor pockets)				7
Temperature sensor pocket sets: (for 6 mm sensor diameter)				
No pockets (standard)				0
Brass pockets for 6 mm 2-wire sensors, length 92/92 mm, G½ inch, max. PN 16 (2 pcs.)				2
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 pockets for 6 mm 2-wire sensors, length 117/127 mm, G½ inch, max. PN 25 (2 pcs.)				6
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
Stainless steel pockets for 6 mm 2-wire sensors, length 155/168 mm, G½ inch, max. PN 25 (2 pcs.)				8
Voltage supply				
Battery 3.6 V DC (Lithium 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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Selection and Ordering data	Article No.	Order code
Energy calculator SITRANS FUE950, MID or PTB K7.2 custody transfer approved	7ME3480-	
Option modules		
No module (standard)		A
<u>1 module (communication module)</u>		
M-Bus module		B
RS 232 module (M-Bus protocol)		C
RS 485 module (M-Bus protocol)		D
<u>1 module (function module)</u>		
Pulse output, 2x output (Out1 "Energy" and Out2 "Volume")		E
Pulse input, 2x input (In1 and In2)		F
Pulse out-/input combination, 2x input and 1x output		G
<u>Combination of 2 modules (communication and function module)</u>		
M-Bus module and Pulse output, 2x output (Out1 "Energy" and Out2 "Volume")		H
M-Bus module and Pulse input, 2x input (In1 and In2)		J
M-Bus module and Pulse out-/input combination, 2x input and 1x output		K
RS 232 module (M-Bus) and Pulse output, 2x output (Out1 "Energy" and Out2 "Volume")		L
RS 232 module (M-Bus) and Pulse input, 2x input (In1 and In2)		M
RS 232 module (M-Bus) and Pulse out-/input combination, 2x input and 1x output		N
RS 485 module (M-Bus) and Pulse output, 2x output (Out1 "Energy" and Out2 "Volume")		P
RS 485 module (M-Bus) and Pulse input, 2x input (In1 and In2)		Q
RS 485 module (M-Bus) and Pulse out-/input combination, 2x input and 1x output		R
Combination current output module, 2x passive 4 ... 20 mA (Out 1 "Power", Out 2 "Flow") (occupies both module Ports 1 and 2)		S
Display units and resolutions		
MWh & kW, m ³ , m ³ /h in 2 digit resolution; Temperature: no decimal figures		C
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 2digit resolution; Temperature: no decimal figures		H
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 2 digit resolution; Temperature: no decimal figures		M
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 & MBTU/h, m ³ , m ³ /h in 2 digit resolution; Temperature: no decimal figures		Q
MBTU & MBTU/h, m ³ , m ³ /h in 1 digit resolution; Temperature: no decimal figures		R
MBTU & MBTU/h, 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 MID verification (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 Article 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)		C 0 2
Optional settings/programming		
Tariff function settings (specify in clear text, up to max. 20 characters)		D 0 2
Pulse output setting of option module (specify in clear text, up to max. 20 characters)		D 0 6
Pulse input setting of option module (specify in clear text, up to max. 20 characters)		D 0 8
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)		D 1 0
Special display units		
Flow in 'GPM' and Volume in 'gal' (x100) (digits/resolution as selected above, only with 0 digit resolution)		L 0 5
Temperature in deg. F (digit resolution as selected above)		L 3 1

Flow Measurement

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SITRANS FUE950 energy calculator

Flowmeter SITRANS FUE950 operating instructions, accessories and spare parts

Operating instructions

Description	Article 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	Article 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 RS 232 PC/D-sub 9F/3 wire	A5E02611774
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 (Note: Before using this Test-Lab version an online training must be completed)	A5E03461778

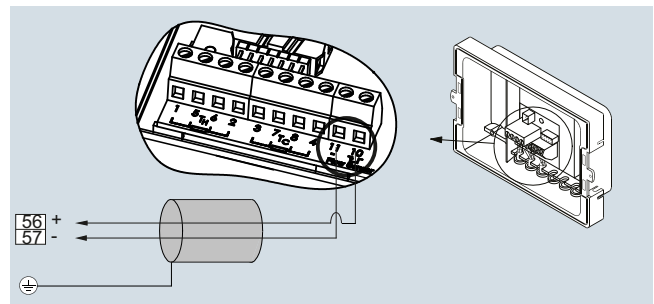
Spare parts

Description	Article No.
Add-on modules for FUE950 (only for 7ME348 versions)	
Pulse input module (2 inputs)	A5E03461432
Pulse output module (2 outputs)	A5E03461436
Combined pulse in-/output module (2 inputs and 1 output)	A5E03461437
RS 232 module (M-Bus protocol)	A5E03461459
RS 485 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, RS 232/RS 485, M-Bus, mA) (special connection cable with 2 plugs)	A5E03461585
Power supply for FUE950 (only for 7ME348 versions)	
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

Description	Article No.
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 (only for 7ME348 versions)	
Bottom part of FUE950 enclosure (1 pc.)	A5E03461508
Snap fit for FUE950 enclosure (1 pc.)	A5E30461731
Pocket for Pt500 temperature sensors (for corresponding 2-wire Pt500 types only, 1 pc.)	
Brass pocket 6 mm, G $\frac{1}{2}$ B x 40 mm (PN 16), 1 pc.	A5E02611778
Brass pocket 6 mm, G $\frac{1}{2}$ B x 85 mm (PN 16), 1 pc.	A5E02611779
Brass pocket 6 mm, G $\frac{1}{2}$ B x 120 mm (PN 16), 1 pc.	A5E02611780
Stainless steel 6 mm, G $\frac{1}{2}$ B x 85 mm (PN 25), 1 pc.	A5E02611781
Stainless steel 6 mm, G $\frac{1}{2}$ B x 120 mm (PN 25), 1 pc.	A5E02611783
Stainless steel 6 mm, G $\frac{1}{2}$ B x 155 mm (PN 25), 1 pc.	A5E02611792
Stainless steel 6 mm, G $\frac{1}{2}$ B x 210 mm (PN 25), 1 pc.	A5E02611793
Pt500 temperature sensor pair, 2-wire cable, 6 mm sensor diameter, with MID/EN-approval (for corresponding 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 (1) and 6 (2) (T_H) and 7 (3) and 8 (4) (T_C).

Note:

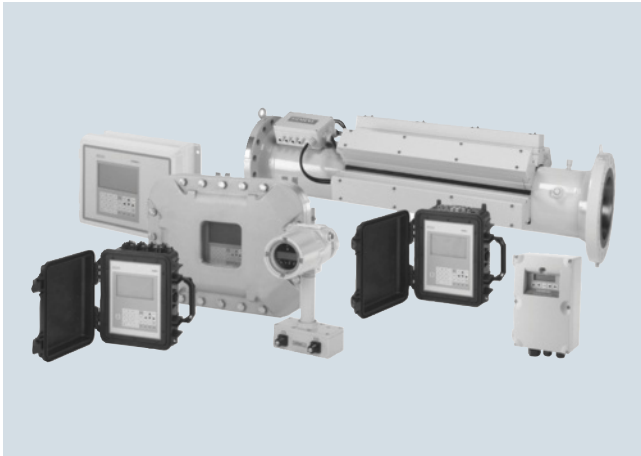
The right flowmeter pulse output value must be equal to the FUE950 pulse input value and must be checked via the user menu of the transmitter MAG 5000/6000 or nameplate of FUE380 or FUS380.

Flow Measurement

SITRANS F US Clamp-on

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

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

Flow Measurement

SITRANS F US Clamp-on

System information SITRANS F US Clamp-on ultrasonic flowmeters

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	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
Hydrocarbons (Single product with limited viscosity range) gross volume	X		X		X		X
Very low flow (< 0.1 m/s) in small pipes	X	X	X				
Natural gas						X	X
Process gas						X	X
Slurries or liquids with high percentage of undissolved gases	X ⁴⁾		X	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	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	4)		X	X	4)	4)	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

Flow Measurement

SITRANS F US Clamp-on

System information SITRANS F US
Clamp-on ultrasonic flowmeters

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	X	X
9 ... 36 V DC ⁴⁾	X	X		X	X	X	X
Size (For larger pipes, see spares list for appropriate sensors and mountings.)							
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⁾⁵⁾	X			X ³⁾	X	X	X
ATEX ⁵⁾	X				X	X	X
UL/ULC ⁵⁾		X	X	X			
INMETRO ⁵⁾	X			X	X	X	X
C-TICK ⁵⁾	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⁾ Not for portable enclosure

⁴⁾ -Neg and +pos ground available for compact NEMA 7

⁵⁾ Products are marked with CE as required by european directive.

Sensor type selection guide

Application condition. Note all that apply before making selection	Standard sensor supported in MLFB			Notes
	High precision	Universal	(Reflexor)	
Media				
General survey (clean liquids) on non-steel pipes		X	O	
General survey (clean liquids) on a limited range of steel pipes	X		O	
Moderately aerated liquid or slurry, up to 121 °C (250 °F)	X			
Highly aerated liquid or slurry	O	O	X	
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⁾		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 > 31.75 (1.25")	O	X		

O = not suitable X = preferred choice

¹⁾ Available for special order

Flow Measurement

SITRANS F US Clamp-on

System information SITRANS F US Clamp-on ultrasonic flowmeters

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

Sensor models	Availability																	
	Standard	Spare only	Gas	Ex-ATEX	Ex-FM	Corrosion resistant	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			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

Flow Measurement

SITRANS F US Clamp-on

System information SITRANS F US
Clamp-on ultrasonic flowmeters

Sensor models	Availability																
	Standard	Spare only	Gas	Ex-ATEX	Ex-FM	Corrosion resistant	Trackless	Tracks	Frames	Portable	Transportable	WeldSeal	T1 (best use -40 ... 65 °C)	T2 (best use 1 ... 104 °C)	T3 (best use 32 ... 120 °C)	Submersible	Cataloge
High Precision Sensor -40 ... +120 °C Alu T1 (T2, T3) CE IP68																	
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 Temperature 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 Temperature 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, for up to 121 °C (250 °F)	X			X ¹⁾	X ¹⁾		X		X							X ¹⁾	X
Corrosion Resistant Doppler, for up to 121 °C (250 °F)		X		X ¹⁾	X ¹⁾	X ¹⁾	X										

¹⁾ Excluding portable

²⁾ Spare Only

³⁾ Useable but not recommended

Flow Measurement

SITRANS F US Clamp-on

System information SITRANS F US Clamp-on ultrasonic flowmeters

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

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	Status allarm	4 ... 20 mA passive	0 ... 10 V	100 Ohm RTD	NoTot	ClrTot	ATEX	Unimass	Modbus	Doppler		
FUS1010	NEMA 4X and NEMA 7 wall mount	Single channel	X			2		2	2		4		4		1	1	X		X	X			
			X	X		2		2	2		4		4		1	1	1	X	X	X	X		
		Dual channel	X	X		2 ³⁾		2	2		4 ⁴⁾		4 ⁴⁾		4 ⁴⁾		2	2	X		X	X	
					X	2 ³⁾	4 ⁴⁾	2	2		4 ⁴⁾		4 ⁴⁾		4 ⁴⁾		2	2	X		X	X	
		Dual path	X			2		2	2		4		4		4		1	1	X		X	X	
			X	X		2		2	2		4		4		4		1	1	X	1	X	X	
	Four path	X			4 ³⁾	4 ³⁾¹⁾				4		4		4		4		X		X			
		X	X		4 ³⁾	4 ³⁾¹⁾				4 ³⁾		4 ³⁾		4	1	4		X	4	X			
	Four path	X			4	4 ¹⁾				4 ³⁾		4 ³⁾		4		4		X		X			
		X	X		4	4 ¹⁾				4		4		4	1	4		X	1	X			
	NEMA 7 compact	Single channel	X			2		2		1		1		1				X					
			X	X		2		2		2 ³⁾		2 ³⁾		2 ³⁾				X	X				
Dual channel		X		X	2 ³⁾		2 ³⁾		2 ³⁾		2 ³⁾		2 ³⁾	2 ³⁾	2		X	X					
Dual path	X			2		2		4 ⁴⁾		4 ⁴⁾		4 ⁴⁾				X							
	X	X		2		2		4 ⁴⁾		4 ⁴⁾		4 ⁴⁾		2	1		X	X					
FST020	FST020	Single channel	X			1		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		4	2	1	1	FM		X	X			
		Dual channel	X	X		2 ³⁾		2 ³⁾	2 ³⁾		4 ⁴⁾		2 ³⁾	4	2	2	FM		X	X			
			X	X	2 ³⁾		2 ³⁾	2 ³⁾		4 ⁴⁾		2 ³⁾	4	2	2	FM		X	X				
	Dual path	X	X		2		2	2		4		2	4	1	1	FM		X	X				
X		X	2	4	2	2		4		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		2	1	1	1	X		X				
		Dual path	X	X		2		2		2	4		2	1	1	1	X		X				
			X	X ²⁾	2	2	2		2	4		2	1	1	1	X		X					
	Four path ²⁾	X	X	2	2	2		2	4		2	1	1	1	X		X						
	NEMA 7 compact	Single channel	X	X		1			1	1		1		1	1	1	X						
Dual path		X	X		2				2		2		1	1	1	X							
	X	X	2			1	1		1		1		1	1	1	X							
FUG1010	NEMA 4X and NEMA 7 wall mount	Single channel	X	X		2		2	2		4		2	1	1	1	X		X				
		Dual path	X	X	2	2	2		2	4		2	1	1	1	X		X					
		Four path	X	X	2	2	2		2	4		2	1	1	1	X		X					
	NEMA 7 compact	Single channel	X	X		1			1	1		1		1	1	1	X						
		Dual channel	X	X		2				2		2		1	1	1	X						
X	X	2			1	1		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

Flow Measurement

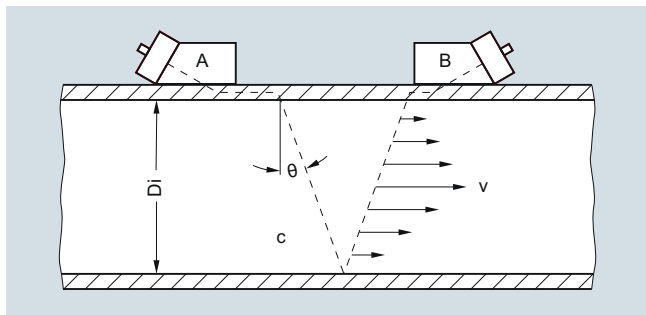
SITRANS F US Clamp-on

System information SITRANS F US Clamp-on ultrasonic flowmeters

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 through 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:

$$v = V_{\phi} / 2 \cdot \Delta t / T_{\text{Fluid}}$$

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.

$$Re = Di \cdot v / \text{visc} \cdot Q = K(Re) \cdot (\pi / 4 \cdot Di^2) \cdot v$$

v = Flow velocity

$\text{visc} = \mu / \rho$ = (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

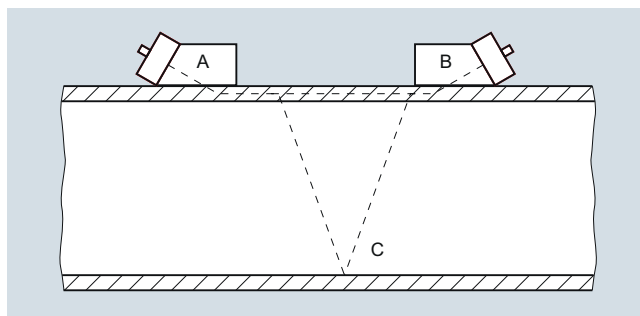
based on the pipe diameter range alone, so wall thickness is less important to the selection process.

The second sensor type is the 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.

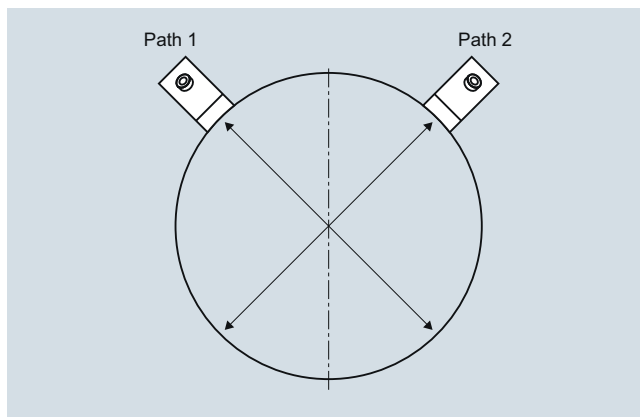


This latter path provides the meter with a reference signal that is completely independent of flow rate and can therefore be used as a measure of sensor "mis-match". By continually analyzing this pipe wall signal the SITRANS FUS1010 meter can dynamically correct for flow errors caused by zero drift.

Multi-Channel Flowmeters

For improved flow profile averaging, redundancy or better cost per measurement, Clamp-On meters can be supplied with 2, 3 or 4 path measurement systems.

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

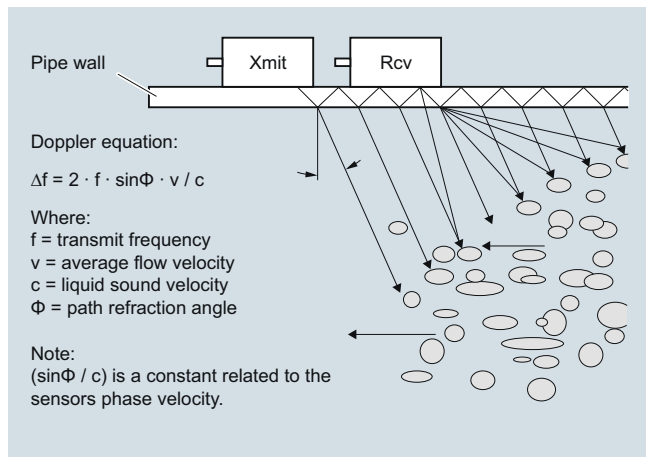
Flow Measurement

SITRANS F US Clamp-on

System information SITRANS F US
Clamp-on ultrasonic flowmeters

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, such as doppler and uni-mass. 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 k Ω 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:

$$\text{Std. Rate} = Q_{act} \cdot P_{act}/P_{base} \cdot T_{base}/T_{act} \cdot Z_{base}/Z_{act}$$

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.

Flow Measurement

SITRANS F US Clamp-on

System information SITRANS F US Clamp-on ultrasonic flowmeters

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 its 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 ρ_b is the liquid density at base conditions

Compute temperature correction factor (K_T):

$$K_T = \rho_b * \text{EXP}(-\alpha_b \Delta T (1 + 0.8 \alpha_b \Delta T))$$

where: $\Delta T = (T - \text{base temperature})$

Correction for Pressure:

Compute Compressibility Factor (F):

$$F = \text{EXP}(A + B T + (C + D T) / \rho_b^2)$$

where: A, B, C and D are constants, and "T" is liquid temperature

Compute pressure correction factor (K_p):

$$K_p = 1 / (1 - F (P_{\text{act}} - P_{\text{base}}) * 10^{-4})$$

Final Volume Correction: $Q_{\text{std}} = Q_{\text{act}} * K_t * K_p$

Available outputs from this meter include: API, Density, Mass Flowrate, Standard Volume Flowrate and Liquid Identification.

Interface Detection Option:

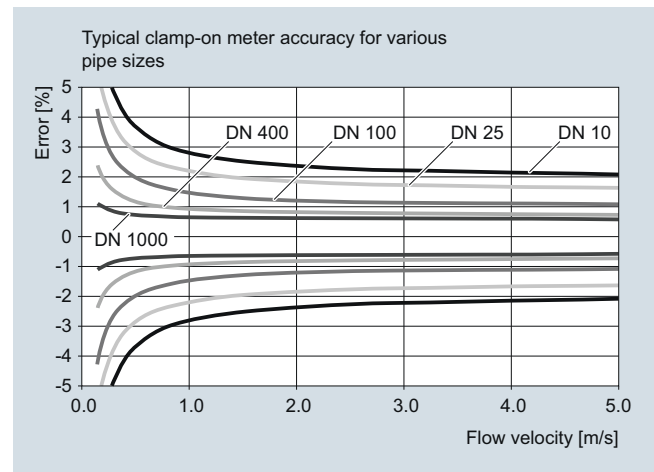
This meter option is designed to provide all the Non-Flow capabilities of a DV meter, making it an ideal non-intrusive alternative to a densitometer, interface detector or pig detector. Be aware that this meter does NOT measure flow rate.

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



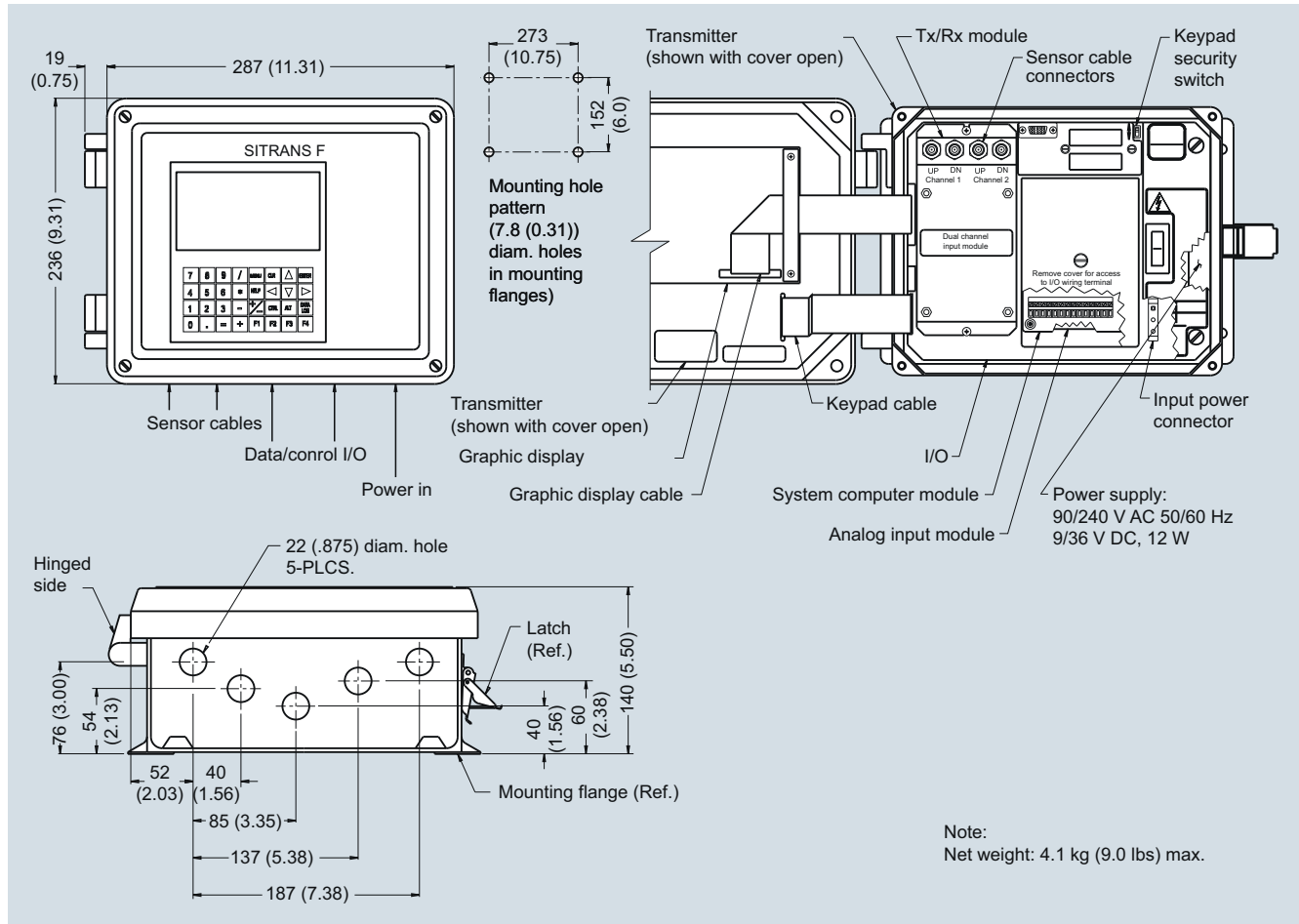
- Pipe must be completely full within the sensor installation volume for accurate flow measurement
- Typical MINIMUM straight pipe requirements are: 10 Diameters upstream/5 Diameters downstream. Additional straight run is required for double out-of-plane elbows and partially open valves. A minimum of 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

Flow Measurement SITRANS F US Clamp-on

System information SITRANS F US
Clamp-on ultrasonic flowmeters

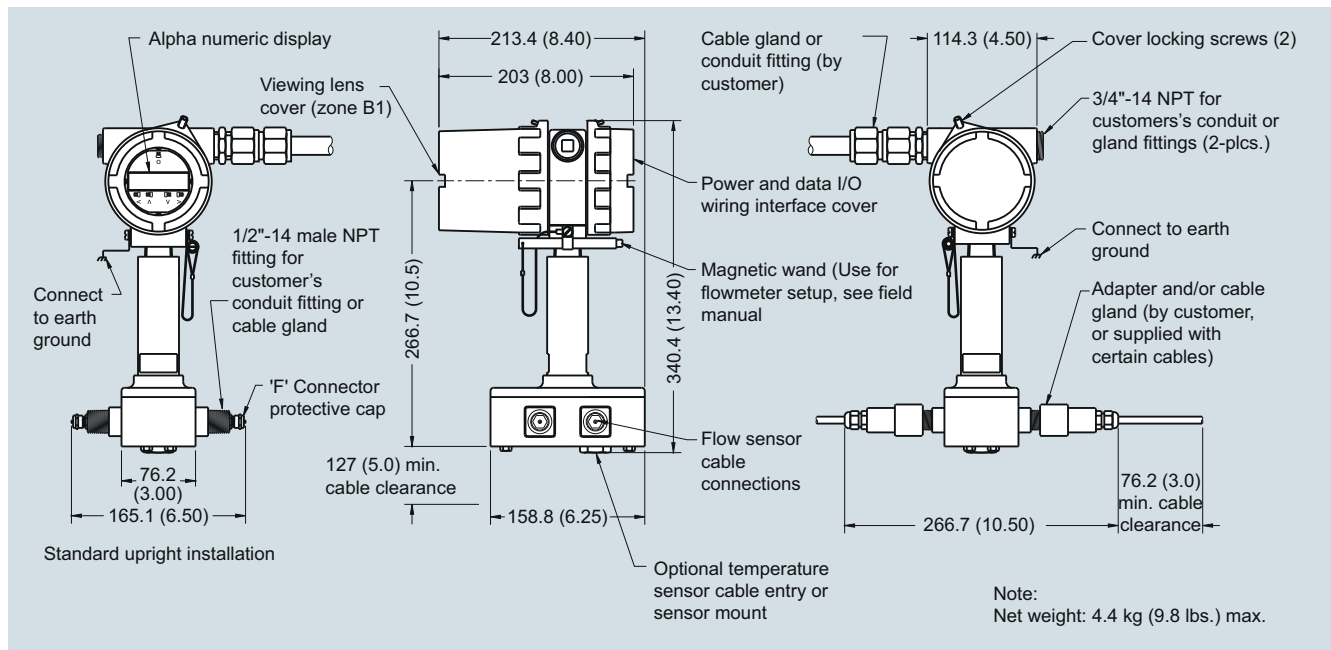
Dimensional drawings

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



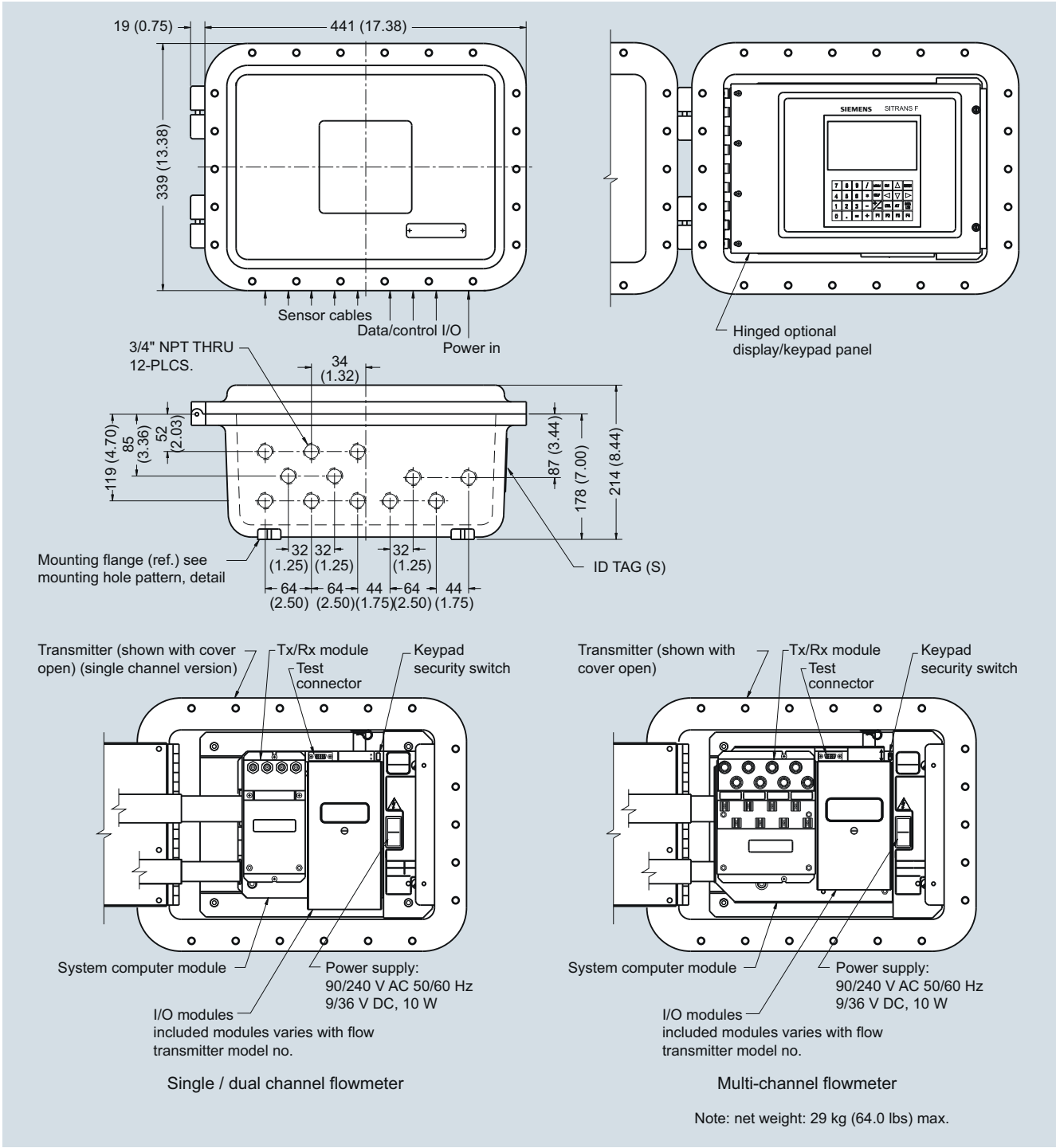
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Flow Measurement SITRANS F US Clamp-on

**System information SITRANS F US
Clamp-on ultrasonic flowmeters**

SITRANS FUS1010, FUH1010, FUT1010 and FUG1010 IP66 (NEMA 7) wall mount explosionproof enclosure

3

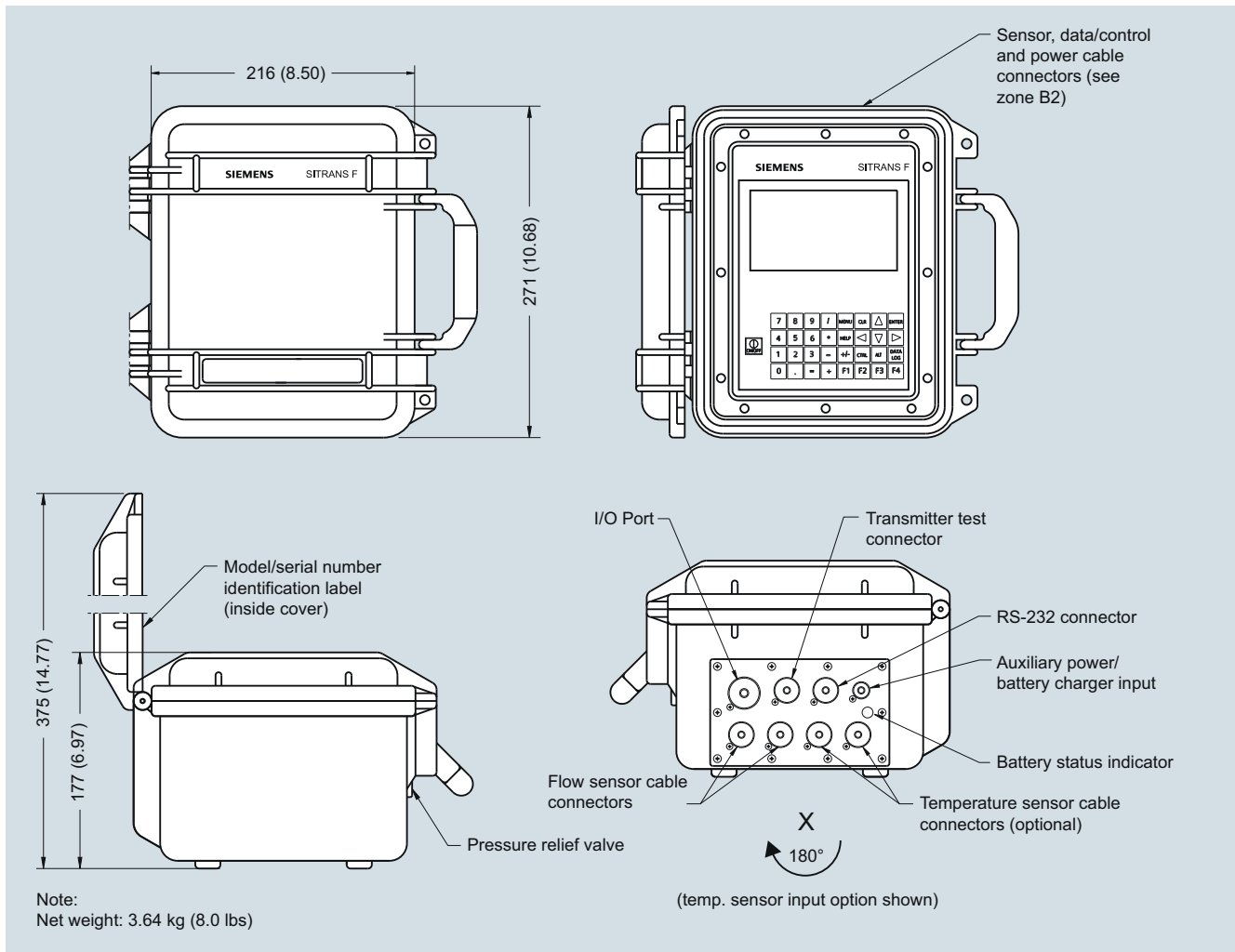


Dimensions in mm (inch)

Flow Measurement SITRANS F US Clamp-on

System information SITRANS F US
Clamp-on ultrasonic flowmeters

SITRANS FUP1010 IP67 Weatherproof impact resistant enclosure



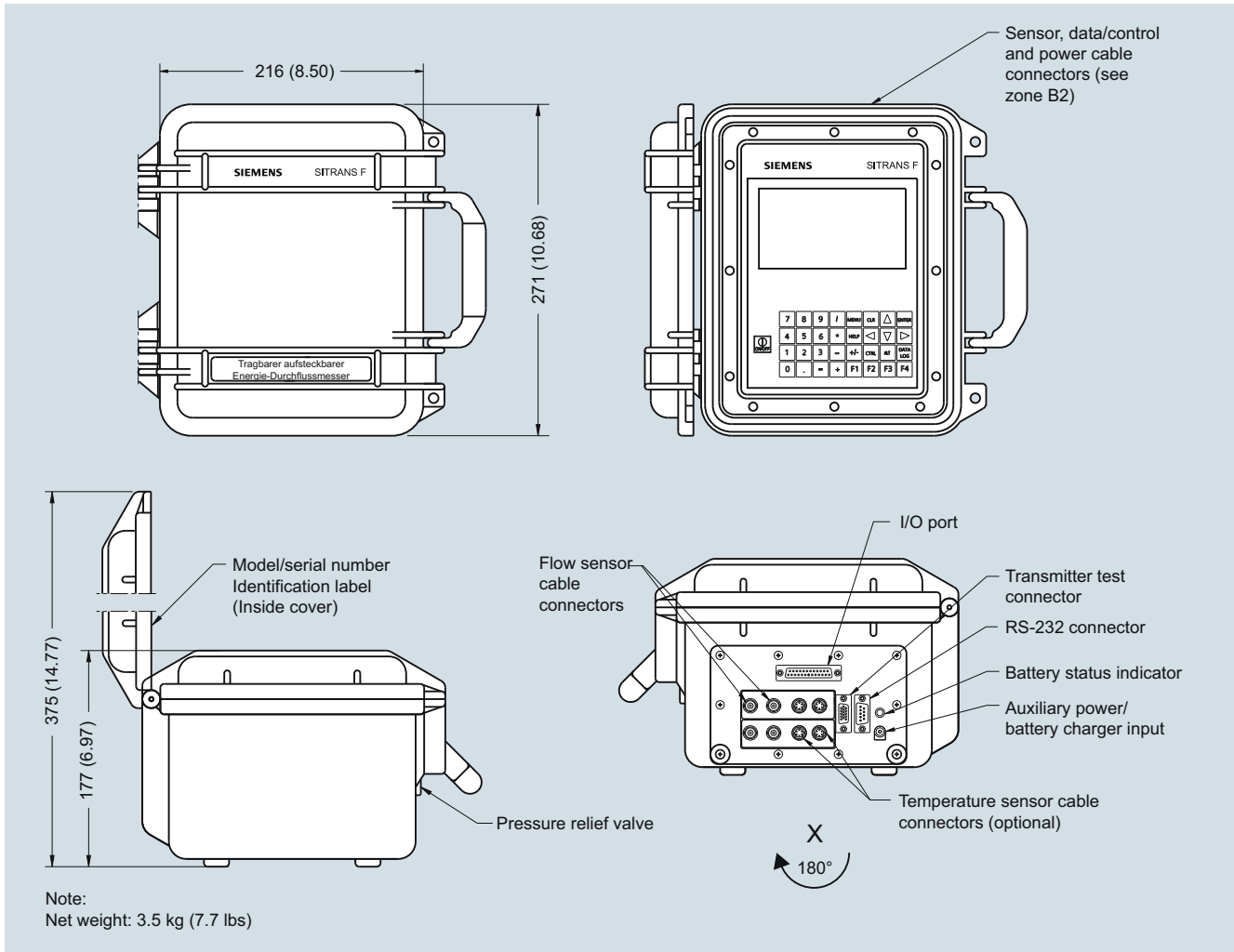
Dimensions in mm (inch)

Flow Measurement SITRANS F US Clamp-on

System information SITRANS F US Clamp-on ultrasonic flowmeters

SITRANS FUE1010 IP40 (NEMA 1) Portable impact resistant enclosure

3

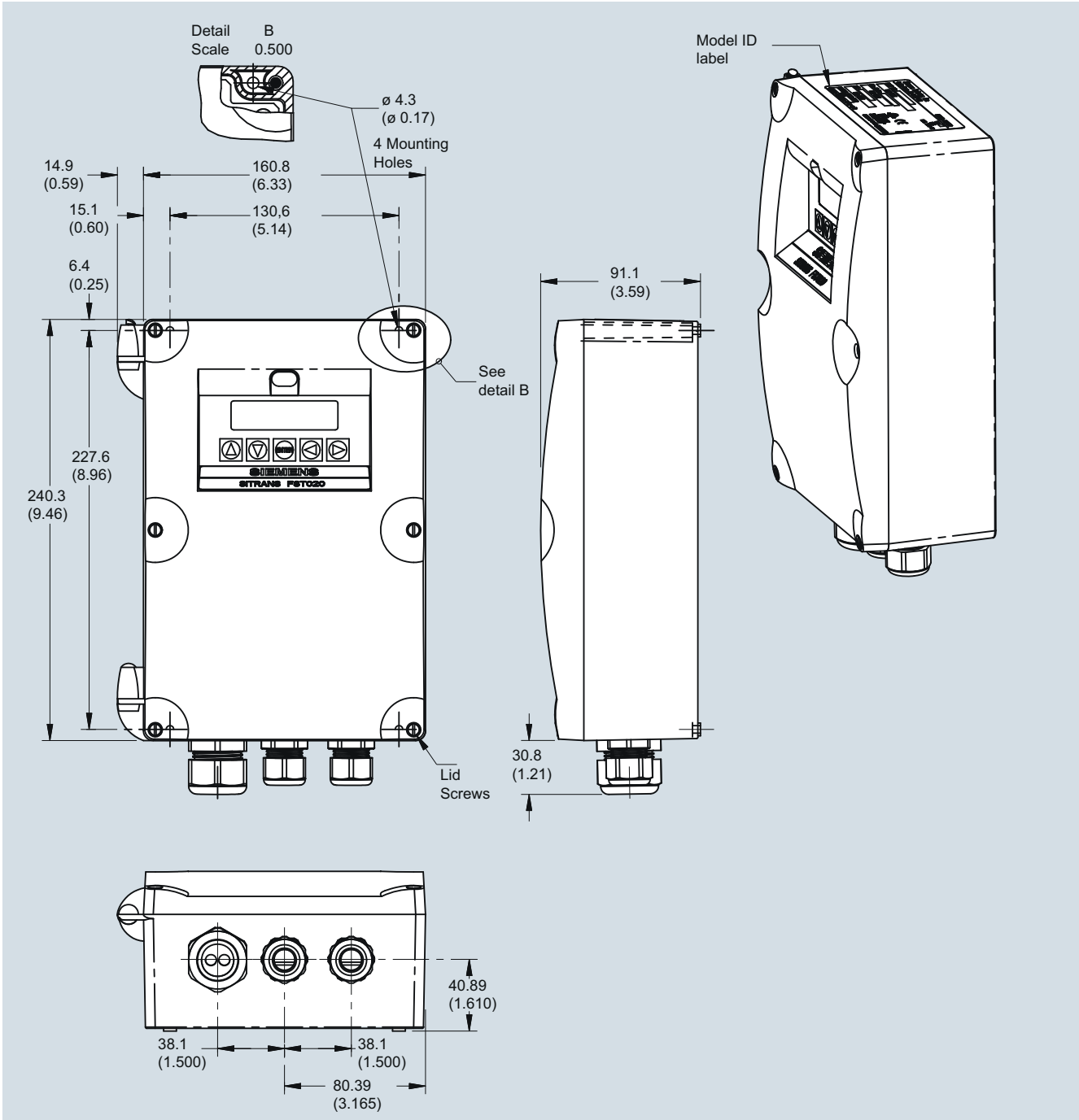


Dimensions in mm (inch)

Flow Measurement SITRANS F US Clamp-on

System information SITRANS F US
Clamp-on ultrasonic flowmeters

SITRANS FST020 IP65 (NEMA 4X) wall mount enclosure



Dimensions in mm (inch)

Flow Measurement

SITRANS F US Clamp-on

Thickness gauge

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.

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.

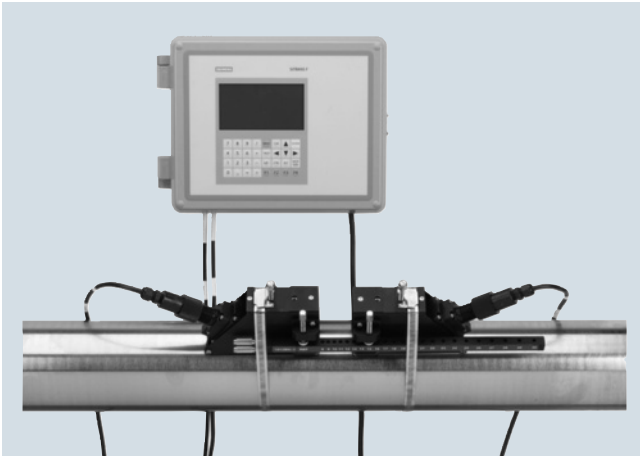
Technical specifications

Display type	4-digit LCD
Display resolution	0.1 mm (0.004")
Measurement units	Metric and imperial
Sound velocity range	1 000 ... 9 999 m/s (3 280 ... 32 805 ft/s)
Operating temperature	-10 ... +50 °C (14 ... 122 °F)
Probe/pipe temperature	70 °C (158 °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

Thickness gauge	Article No.
Thickness gauge	7ME3951-0TG20

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 fiber-glass 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 RS 232 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) enclosures¹⁾

¹⁾ Available on NEMA 7 compact as MLFB option, all others are software selectable.

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUS1010 (Standard)

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	<ul style="list-style-type: none"> • Current: 20 mA DC • Voltage: 10 V DC • Temperature: wire 1 kΩ RTD

Output

Standard outputs	<ul style="list-style-type: none"> • Current: 20 mA DC (1 kΩ at 30 V DC) • Voltage: 10 V DC (5 kΩ min.) • Status Alarm: 4 x SPDT relays • Form C relays • Frequency: 5 kHz • RS 232
Optional outputs	<ul style="list-style-type: none"> • Expanded I/Os (additional 4 ... 20 mA outputs) with form c relays • uniMass capability with 1 RTD input and 20 mA analog input • Modbus

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
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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 selectable by software

Certificates and approvals

FM and CSA ratings	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Transmitter: [BR-Ex ia] IIC BR-Ex nC [ia] IIC T5 • Sensors: BR-Ex ia IIC T5
IECEX	Pending

Flow Measurement

SITRANS F US Clamp-on

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 per channel	<ul style="list-style-type: none"> • Current: 1 x 4 ... 20 mA DC • Temperature: 2 x 4 wire 1 kΩ RTD

Output

Outputs	<ul style="list-style-type: none"> • 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 • RS 232
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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
 9 ... 36 V DC, 10 W - ground
 9 ... 36 V DC, 10 W + ground

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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • Transmitter: BR Ex d [ia] IIC T5 • Sensors: BR-Ex ia IIC T5
IECEX	Pending
CE	EMC Directive 2004/108/EC ATEX Directive 94/9/EC

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUS1010 (Standard)

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 per channel	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 • RS 232
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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Flow 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 ratings (Brazil)	<ul style="list-style-type: none"> • Flow transmitter: [BR-Ex ia] IIC BR-Ex d [ia IIC] IIB T5 • Sensors: BR-Ex ia IIC T5
IECEX	Pending

Standard MLFB for quick delivery on SITRANS FUS1010 (Dedicated standard)

Selection and Ordering data	Article No.	Order code
SITRANS FUS1010 (Standard)	7ME353 - - - - - 0	+ K02 + K02 + R02
Design IP65 (NEMA 4X) wall mount	0	
Number of channels/ultrasonic paths Single channel Dual channel/Dual path	1 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 9 ... 36 V DC (except NEMA 7 compact)	A B	
Communication options RS 232 (standard)	0	
RTD temperature sensor (include mounting hardware for pipes between 1.5" and 24" outer diameter) No RTDs 1x standard clamp-on 2x standard clamp-on 1x submersible 2x submersible	0 1 2 3 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)), for up to 121 °C (250 °F)		S
D1H High temperature range 104 °C/220 °F HP ²⁾		Z
		P 1 P

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUS1010 (Standard)

Selection and Ordering data	Article No.	Order code
SITRANS FUS1010 (Standard)	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)), for up to 121 °C (250 °F)		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 inch). For pipes larger than 1050 mm (42 inch) purchase also, spare part 7ME3960-0MS40 (1012BN-4)

²⁾ Supplied spacer bar supports pipes up to 750 mm (30 inch). For pipes larger than 750 mm (30 inch) purchase also, spare part 7ME3960-0MS40 (1012BN-4)

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.

Flow Measurement SITRANS F US Clamp-on

SITRANS FUS1010 (Standard)

Selection and Ordering data	Article No.	Ord. code
SITRANS FUS1010 (Standard)	7ME3530-	
<ul style="list-style-type: none"> • IP65 (NEMA 4X) wall mount • IP65 (NEMA 7) compact explosionproof • IP66 (NEMA 7) wall mount explosionproof 	7ME3531-	
	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		
<u>IP65 (NEMA 4X) wall mount and IP66 (NEMA 7 wall mount explosionproof) units</u>		
<ul style="list-style-type: none"> • Standard outputs <ul style="list-style-type: none"> - 2 x 0 ... 10 V - 2 x 4 ... 20 mA - 2 x pulse output - 4 x relay C type 	A	
For H1A multi channel option above:		
<ul style="list-style-type: none"> - 4 x 0 ... 10 V - 4 x 4 ... 20 mA - 4 x relay C type 		
<ul style="list-style-type: none"> • Standard outputs with optional input adder <ul style="list-style-type: none"> - UniMass capability with 2 x RTD input (1 x RTD only for H1A multi channel option) - 4 x 4 ... 20 mA analog input 	C	
<ul style="list-style-type: none"> • Extended outputs plus optional inputs (Dual channel only) <ul style="list-style-type: none"> Outputs: <ul style="list-style-type: none"> - 2 x 0 ... 10 V - 2 x 4 ... 20 mA active - 4 x 4 ... 20 mA passive - 2 x 0 ... 5K pulse - 4 x relay C type Inputs: <ul style="list-style-type: none"> - 4 x 4 ... 20 mA - 1 x RTD inputs per channel 	Z	J 1 B
<u>IP65 (NEMA 7) compact explosionproof units</u>		
<ul style="list-style-type: none"> • Standard outputs <ul style="list-style-type: none"> - 1 x 4 ... 20 mA (Loop) and 1 x status (open collector) per channel - 1 x pulse output for single channel units only 	D	
<ul style="list-style-type: none"> • Standard outputs with optional input adder <ul style="list-style-type: none"> - UniMass capability with 1 RTD input (1x RTD only, for H1A multi channel option) - 1 x analog input per channel 	F	
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	

Selection and Ordering data	Article No.	Ord. code
SITRANS FUS1010 (Standard)	7ME3530-	
<ul style="list-style-type: none"> • IP65 (NEMA 4X) wall mount • IP65 (NEMA 7) compact explosionproof • IP66 (NEMA 7) wall mount explosionproof 	7ME3531-	
	7ME3533-	
	0 -	
Communication options		
RS 232 (standard)	0	
Standard MODBUS configurations include Baudrate: 9600, Parity: None, Stop Bits: 1, Data bits: 8, MODBUS data: 16 bit, Data format: word normal, Mode: RTU, and MODBUS format: Gould.		
For other configurations please select option 9 and L1Y and state requirements in plain text.		
MODBUS (excludes compact) for Single channel systems	1	
MODBUS (excludes compact) for Dual channel systems	2	
MODBUS (excludes compact) for Dual path systems	3	
MODBUS (excludes compact) for Four channel systems	4	
MODBUS (excludes compact) for Four path systems	5	
Other Version,MODBUS, N2, Other Baud Rate, Other Parity, State in Plain Text	9	
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
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

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUS1010 (Standard)

3

Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Article No.	Ord. code
SITRANS FUS1010 (Standard)			SITRANS FUS1010 (Standard)		
<ul style="list-style-type: none"> • IP65 (NEMA 4X) wall mount • IP65 (NEMA 7) compact explosionproof • IP66 (NEMA 7) wall mount explosionproof 	7ME3530-		<ul style="list-style-type: none"> • IP65 (NEMA 4X) wall mount • IP65 (NEMA 7) compact explosionproof • IP66 (NEMA 7) wall mount explosionproof 	7ME3530-	
	7ME3531-			7ME3531-	
	7ME3533-			7ME3533-	
	0 -			0 -	
Sensor for channel 1 (continued)			Sensor for channel 2		
For the following A1H to D4H sensors, temperature range is -40 °C ... 65 °C			(includes pipe mounting kit for indicated max. OD listed) See "Sensor selection charts" for specifications.		
A2H (high precision) Trackmount and straps provided up to 75 mm (3")		H	no sensor		A
A3H (high precision) Trackmount and straps provided up to 75 mm (3")		J	A2 universal Trackmount and straps provided up to 75 mm (3")		B
B1H (high precision) Trackmount and straps provided up to 125 mm (5")		K	B3 universal Trackmount and straps provided up to 125 mm (5")		C
B2H (high precision) Trackmount and straps provided up to 125 mm (5")		L	C3 universal Mounting frame and straps provided up to 300 mm (13")		D
C1H (high precision) Mounting frame and straps provided up to 1200 mm (48")		M	D3 universal Mounting frame and straps provided up to 600 mm (24")		E
C2H (high precision) Mounting frame and straps provided up to 1200 mm (48")		N	E2 universal Mounting frame and straps provided up to 1200 mm (48") ¹⁾		F
D1H (high precision) Mounting frame and straps provided up to 1200 mm (48") ²⁾		P	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):		
D2H (high precision) Mounting frame and straps provided up to 1200 mm (48") ²⁾		Q	A2H (high precision) Trackmount and straps provided up to 75 mm (3")		H
D4H (high precision) Mounting frame and straps provided up to 1200 mm (48") ²⁾		R	A3H (high precision) Trackmount and straps provided up to 75 mm (3")		J
Doppler to 12" with strap kit (not for IP65 (NEMA 7)), for up to 121 °C (250 °F)		S	B1H (high precision) Trackmount and straps provided up to 125 mm (5")		K
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	B2H (high precision) Trackmount and straps provided up to 125 mm (5")		L
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	C1H (high precision) Mounting frame and straps provided up to 1200 mm (48")		M
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	C2H (high precision) Mounting frame and straps provided up to 1200 mm (48")		N
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):			D1H (high precision) Mounting frame and straps provided up to 1200 mm (48") ^{e2)}		P
B1H (high temperature range HP)	Z	P 1 K	D2H (high precision) Mounting frame and straps provided up to 1200 mm (48") ²⁾		Q
B2H (high temperature range HP)	Z	P 1 L	D4H (high precision) Mounting frame and straps provided up to 1200 mm (48") ²⁾		R
C1H (high temperature range HP)	Z	P 1 M	Doppler to 12" with strap kit (not for IP65 (NEMA 7)), for up to 121 °C (250 °F)		S
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			

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUS1010 (Standard)

Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Order code
SITRANS FUS1010 (Standard)			Further designs	
<ul style="list-style-type: none"> • IP65 (NEMA 4X) wall mount • IP65 (NEMA 7) compact explosionproof • IP66 (NEMA 7) wall mount explosionproof 	7ME3530- 7ME3531- 7ME3533- 		Please add "-Z" to Article No. and specify Order code(s).	
Sensor for channel 2 (continued)			Cable assembly for sensors (add for No. of channels) See "Sensor cable selection chart"	K..
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	Cable assembly for RTDs (add for No. of RTDs) See "RTD cable selection chart"	R..
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	Cable termination kit (for one cable pair)	
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	<ul style="list-style-type: none"> • Termination for standard, plenum and armored sensor cable • Termination for submersible sensor cable 	T01 T11
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):			<ul style="list-style-type: none"> • RTD cable termination kit for standard RTD • RTD cable termination kit for submersible RTD • Insert RTD cable termination kit 	T21 T31 T41
B1H (high temperature range HP)		Z Q 1 K	Languages (Meter and Documentation), English (default) for compact NEMA 7 only	
B2H (high temperature range HP)		Z Q 1 L	<ul style="list-style-type: none"> • German • French • Spanish • Italian 	B10 B12 B13 B14
C1H (high temperature range HP)		Z Q 1 M	Wet flow transfer calibration (priced on request)	
C2H (high temperature range HP)		Z Q 1 N	6 point calibration 2/water (Price per channel)	
D1H (high temperature range HP) ²⁾		Z Q 1 P	<ul style="list-style-type: none"> • 2SS40 pipe • 3CS40 pipe • 4CS40 pipe • 4SS40 pipe • 6CS40 pipe • 6SS40 pipe • 6CS120 pipe • 8CS40 pipe • 8SS40 pipe • 8CS120 pipe • 10CS Standard pipe • 10CS40 pipe • 10SS40 pipe • 12CS Standard pipe • 12CS40 pipe • 14CS30 pipe • 14CS40 pipe • 16CS Standard pipe • 16CS40 pipe • 18CS Standard pipe • 20CS20 pipe • 20CS30 pipe • 24CS Standard pipe • 24CS20 pipe • 24CS30 pipe • 30CS Standard pipe • 36CS Standard pipe • Other pipe, other liquid, additional points, witness 	D01 D02 D03 D04 D05 D06 D07 D08 D09 D10 D11 D12 D13 D14 D15 D16 D17 D18 D19 D20 D21 D22 D23 D24 D25 D26 D27 Y28
D2H (high temperature range HP) ²⁾		Z Q 1 Q	Tag name plate	
D4H (high temperature range HP) ²⁾		Z Q 1 R	<ul style="list-style-type: none"> • Stainless steel tag with 3.2 mm (0.13 inch) character size (68 characters max.) 	Y19
Approvals			Operating Instructions for SITRANS FUS1010	Article No.
FM/CSA, CE		1	English NEMA 4X wall mount & NEMA 7 wall mount explosionproof	A5E02951520
ATEX, CE, C-TICK		2	German NEMA 4X & wall mount NEMA 7 wall mount explosionproof	A5E02951532
INMETRO (Brazil)		3	NEMA 7 compact explosionproof	CQO: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	

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUS1010 (Standard)

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 Article No.: **7ME3530-2AB00-0QQ1-Z**
K03 + K03

Selection and Ordering data	Article No.	Ord. code
SITRANS FUS1010 meter family	7ME3530-2AB00-0QQ1-Z	
IP65 (NEMA 4X) enclosure	0	
Dual Path	2	
Standard I/O option	A	
9 ... 36 V DC power option	B	
RS 232 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		K03
30 m (100 ft) sensor cable for path 2		K03

Sensor cable (pair) selection chart

Cable length m (ft)	Sensor cable codes for length and type options			
	Standard (PVC jacket)	Submersible (polyethylene jacket)	Plenum Rated (teflon jacket)	Armored
	-40...+80 °C (-40...+176 °F)	-40...+80 °C (-40...+176 °F)	-40...+200 °C (-40...+392 °F)	-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 (single) selection chart

Cable length m (ft)	RTD cable codes for length and type	
	Standard (teflon wrapped)	Submersible (extruded jacket)
	-40 ... +200 °C (-40 ... +392 °F)	-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

Universal sensor selection chart IP68

Based on pipe size (pipes other than steel)					
Sensor	Order Code	Outer diameter range (mm)		Outer diameter range (inch)	
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 IP68

Based on pipe wall thickness (steel pipes only)					
Sensor	Order Code	Pipe wall (mm)		Pipe wall (inch)	
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

Overview



SITRANS FST020 offers reliable flow measurement at a much lower cost than other clamp-on ultrasonic flowmeters, with flow rate accuracy of $\pm 0.5\%$ 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

- 2 x 16 integral alphanumeric display and 5 key keypad for installation menu and data display
- Pulse rate output
- RS 232 digital communication port with a DB9 connector, Modbus and BACnet
- 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	<ul style="list-style-type: none"> • 4 ... 20 mA (Isolated) • externally powered 10 ... 30 V DC
Relay	<ul style="list-style-type: none"> • Programmable Form C 250 mA • 30 V DC • 3 V A max
Pulse rate ¹⁾	<ul style="list-style-type: none"> • Optically isolated transistor 10 mA • 30 V DC max
Accuracy	
• 4 ... 20 mA	For velocities ≥ 0.3 m/s (1 ft/s) $\pm 1.0\%$... 2.0% of flow
• Pulse, relay output	$\pm 0.5\%$... 1.0% of flow
Batch repeatability	$\pm 0.15\%$
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 lb)
Dimensions (W x H x D)	175 x 235 x 92 mm (6.89 x 9.25 x 3.62 inch)
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.

Flow Measurement

SITRANS F US Clamp-on

SITRANS FST020 (Basic)

Standard MLFB for quick delivery on SITRANS FST020 (Basic)

Selection and Ordering data

Article No.

SITRANS FST020 (Basic)

7ME357 - 30 - 0

Design

IP65 (NEMA 4X) wall mount

Number of channels/ultrasonic paths

Single channel

Flowmeter functions and I/O configurations

- With display and 1 additional analog output and SPST relay

Meter power options

100 ... 240 V AC

11.5 ... 28.5 V DC, 10 W max

Sensor

(includes pipe mounting kit for indicated max. OD listed)
See "Sensor selection charts" for specifications.

no sensor

A2 universal	Trackmount and straps provided up to 75 mm (3")	A
B3 universal	Trackmount and straps provided up to 125 mm (5")	B
C3 universal	Mounting frame and straps provided up to 300 mm (13")	C
D3 universal	Mounting frame and straps provided up to 600 mm (24")	D
E2 universal	Mounting frame and straps provided up to 1200 mm (48") ¹⁾	E
For the following A1H to C1H sensors, temperature range is -40 ... 65 °C (-41 ... 150 °F), nominal 21 °C (70 °F)		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

6 m (20 ft) PVC Jacket (1 pr)

15 m (50 ft) PVC Jacket (1 pr)

30 m (100 ft) PVC Jacket

46 m (150 ft) PVC Jacket

91 m (300 ft) PVC Jacket

Approvals

UL, UL_C, CE, C-TICK

Standard MLFB offering represents 2 to 3 weeks delivery time for quantities under 5.

¹⁾ Supplied spacer bar supports pipes up to 750 mm (30 inch). For pipes larger than 750 mm (30 inch) purchase also, spare part 7ME3960-0MS40 (1012BN-4).

Flow Measurement SITRANS F US Clamp-on

SITRANS FST020 (Basic)

Selection and Ordering data	Article No.	Ord. code
SITRANS FST020 (Basic) IP65 (NEMA 4x)	7ME3570-	
	3 0 - 0	
Number of channels/ultrasonic paths		
Single channel	1	
Flowmeter functions and I/O configurations		
<ul style="list-style-type: none"> 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 1¹⁾		
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 A2H 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	Article No.	Ord. code
SITRANS FST020 (Basic) IP65 (NEMA 4x)	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)

3

Flow Measurement SITRANS F US Clamp-on

SITRANS FST020 (Basic)

3

Selection and Ordering data	Order code
Further designs Please add "-Z" to Article 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 Article No.: **7ME3570-1HA300-ONE0**

Selection and Ordering data	Article No.	Ord. code
SITRANS FST020 meter family	7ME357	30-00
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	

Selection and Ordering data	Order code
Operating Instructions for SITRANS FST020	
English NEMA 4X	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	

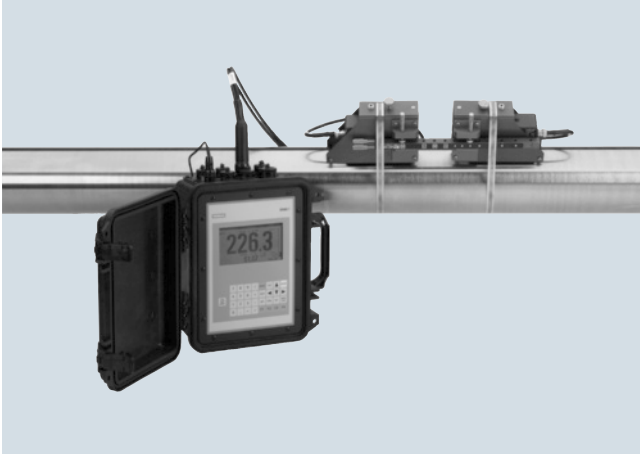
Universal sensor selection chart IP68

Based on pipe size (pipes other than steel)					
Pipe size	Order Code	Outer diameter range (mm)		Outer diameter range (inch)	
		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 IP68

Based on pipe wall thickness (steel pipes only)					
Pipe Wall	Order Code	Pipe Wall [mm]		Pipe Wall [inch]	
		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

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 RS 232 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

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUP1010 (Portable)

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	<ul style="list-style-type: none"> • Current: 2 x 4 ... 20 mA DC • Voltage: 2 x 0 ... 10 V DC • Temperature: 2 x 4 wire 1 kΩ RTD
Output	
Outputs	<ul style="list-style-type: none"> • 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 • RS 232
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	<ul style="list-style-type: none"> • Weatherproof/impact resistant • IP67
Liquid temperature	<ul style="list-style-type: none"> • 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

Flow Measurement SITRANS F US Clamp-on

SITRANS FUP1010 (Portable)

Standard MLFB for quick delivery on SITRANS FUP1010 Portable (excluding energy)

Selection and Ordering data	Article No.	Order Code
SITRANS FUP1010 (Portable)	7ME3510-	- 0 0
• IP67 weatherproof battery powered		
Number of channels/ultrasonic paths	1	
Single channel		
Dual channel/Dual path	2	
Standard flowmeter types and I/O configurations	C	
• Standard I/O		
- 2 x 4 ... 20 mA analog in		
- 2 x RTD input		
Sensor cables	A	
No sensor cable		
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	0	
No battery charger		
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	Article No.	Order Code
SITRANS FUP1010 (Portable)	7ME3510-	- 0 0
• IP67 weatherproof battery powered		
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		

3

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUP1010 (Portable)

Selection and Ordering data

SITRANS FUP1010 (Portable)

- IP67 weatherproof battery powered

Article No. Ord. code

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) cable¹⁾

5

2 x standard clamp-on RTD (NEMA 6) with
6 m (20 ft) cable¹⁾

6

1 x standard clamp-on RTD (NEMA 6) with
15 m (50 ft) cable¹⁾

7

2 x standard clamp-on RTD (NEMA 6) with
15 m (50 ft) cable¹⁾

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

SITRANS FUP1010 (Portable)

- IP67 weatherproof battery powered

Article No. Ord. code

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

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUP1010 (Portable)

Selection and Ordering data		Article No.	Ord. code
SITRANS FUP1010 (Portable)		7ME3510-	- 0 0
• IP67 weatherproof battery powered			
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 ... 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	
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		Article No.	Ord. code
SITRANS FUP1010 (Portable)		7ME3510-	- 0 0
• IP67 weatherproof battery powered			
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)			

Selection and Ordering data	Article No.
Operating Instructions for SITRANS FUP1010	
English IP67 Weatherproof	A5E02951522
German IP67 Weatherproof	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	

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUP1010 (Portable)

Selection and Ordering data

Order code

Further designs

Please add **"-Z"** to Article No. and specify Order code(s).

Languages (Meter and Documentation), English (default). All languages now come standard in all flowmeters

Wet flow transfer calibration (priced on request)

6 point calibration 2/water (Price per channel)

- 2SS40 pipe
- 3CS40 pipe
- 4CS40 pipe
- 4SS40 pipe
- 6CS40 pipe
- 6SS40 pipe
- 6CS120 pipe
- 8CS40 pipe
- 8SS40 pipe
- 8CS120 pipe
- 10CS Standard pipe
- 10CS40 pipe
- 10SS40 pipe
- 12CS Standard pipe
- 12CS40 pipe
- 14CS30 pipe
- 14CS40 pipe
- 16CS Standard pipe
- 16CS40 pipe
- 18CS Standard pipe
- 20CS20 pipe
- 20CS30 pipe
- 24CS Standard pipe
- 24CS20 pipe
- 24CS30 pipe
- 30CS Standard pipe
- 36CS Standard pipe
- Other pipe, other liquid, additional points, witness

1x Insertion RTD with thermowell and lagging

2x Insertion RTD with thermowell and lagging

Tag name plate

- Stainless steel tag with 3.2 mm (0.13 inch) character size (68 characters max.)

D01**D02****D03****D04****D05****D06****D07****D08****D09****D10****D11****D12****D13****D14****D15****D16****D17****D18****D19****D20****D21****D22****D23****D24****D25****D26****D27****Y28****M1A****M1B****Y19**

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 Article No.: **7ME3511-2AB01-0DE0-Z B10**

Selection and Ordering data

Article No.

Ord. code

SITRANS FUP1010 meter family

IP67 weatherproof

Dual channel

Portable I/O with Doppler capable, temperature

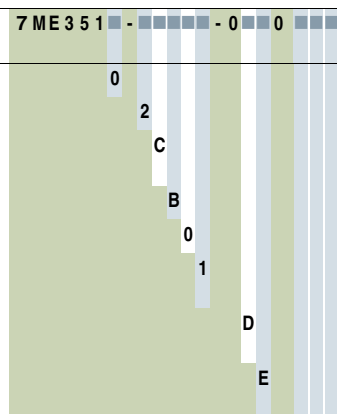
1 x PVC-Jacket, length 6 m (20 ft)

No RTDs required

Charger Type A for Europe (CEE7/7)

Sensor for DN 50 ... DN 300 (2" ... 12") pipes

Sensor for DN 200 ... DN 600 (8" ... 24") pipes



Universal sensor selection chart IP68

Based on pipe size (all pipe materials)

Pipe size	Order Code	Outer diameter range (mm)		Outer diameter range (inch)	
		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 IP68

Based on pipe wall thickness (steel pipes only)

Pipe Wall	Order Code	Pipe Wall [mm]		Pipe Wall [inch]	
		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

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 RS 232 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 RS 232 outputs (see Technical 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 3/332 for complete technical specifications

Certificates and approvals

Unclassified locations

UL
ULc

Classified locations

CE

EMV Directive 2004/108/EC
ATEX Directive 94/9/EC

Flow Measurement

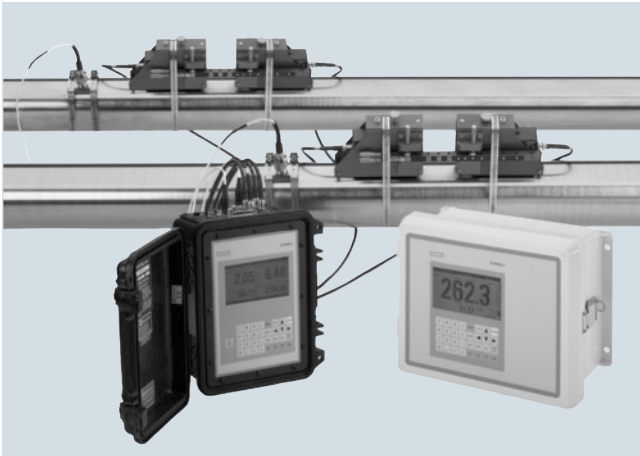
SITRANS F US Clamp-on

SITRANS FUP1010 Water and Liquid check metering kits

Selection and Ordering data	Article No.
SITRANS FUP1010 Water Check Metering Kit	CQO:FUPW-WWKIT
<i>Content of delivery</i>	
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	Article No.
SITRANS FUP1010 Liquid Check Metering Kit	CQO:FUS-LIQKIT
<i>Content of delivery</i>	
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 RS 232 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	

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 $^{\circ}\text{C}$ (0.02 $^{\circ}\text{F}$)
- 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)
 - RS 232 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

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUE1010 (Energy)

Technical specifications

Input		Indication and operation	
Flow range	0 ... 12 m/s (0 ... 40 ft/s), bi-directional	Data logger memory	1 Mbyte of storage
Flow sensitivity	0.0003 m/s (0.001 ft/s)	Display	128 x 240 pixel LCD with back-light
Pipe size	6.4 mm ... 9.14 m (0.25" ... 360")	Keypad	33 keypad buttons with tactile feedback
Inputs per channel	<ul style="list-style-type: none"> • 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) 	Language options	English, Spanish, German, Italian, French
Output		Certificates and approvals	
Standard outputs	<ul style="list-style-type: none"> • 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 • Form C relays • Frequency: 2 x 0 ... 5000 Hz • RS 232 	Dedicated enclosures	<ul style="list-style-type: none"> • Transmitter NI Class I, Div 2 S Class II, Div 2 • Sensor I.S. Class I, II, Div 1 EMC Directive 2004/108/EC ATEX Directive 94/9/EC
Optional outputs	<ul style="list-style-type: none"> • Expanded I/Os (4 additional 4 ... 20 mA outputs) with form c relays 	FM and CSA ratings	
		CE	
		C-TICK	
		ATEX ratings	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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
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	-40 ... +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 9 ... 36 V DC		
Portable enclosure	Rechargeable battery		

Standard MLFB for quick delivery on SITRANS FUE1010 (Energy system)

Selection and Ordering data	Article No.	Order code
SITRANS FUE1010 (Energy)	7ME350 - - 0	+ +
Design		
Dedicated		
IP65 (NEMA 4X) wall mount	0	K 0 2 + K 0 2 + R 0 2
Portable		
IP40 (NEMA 1) Battery powered	2	K 0 1 + K 0 1 + R 0 1
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		
RS 232 (standard)	0	
RTD temperature sensor pair		
No RTDs (Note: Temperature input is required for Energy systems)	0	
1 x Pair Std clamp-on RTD (NEMA 4X only) ³⁾	1	
2 x Pair Std clamp-on RTD (For Dual Channel NEMA 4X only) ³⁾	2	
1 x Pair Std clamp-on RTD (For NEMA 12 Portable) ³⁾	3	
2 x Pair Std clamp-on RTD (For Dual Channel NEMA 1 Portable) ³⁾	4	
1 x Insertion RTD with Thermowell and Lagging		M 1 A
2 x Insertion RTD with Thermowell and Lagging		M 1 B
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)), for up to 121 °C (250 °F)		S
D1H High temperature range 104 °C/220 °F HP ²⁾		Z
		P 1 P

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUE1010 (Energy)

Selection and Ordering data

Article No.

Order code

SITRANS FUE1010 (Energy)

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

A2 universal	Trackmount and straps provided up to 75 mm (3")	A
B3 universal	Trackmount and straps provided up to 125 mm (5")	B
C3 universal	Mounting frame and straps provided up to 300 mm (13")	C
D3 universal	Mounting frame and straps provided up to 600 mm (24")	D
E2 universal	Mounting frame and straps provided up to 1200 mm (48") ¹⁾⁴⁾	E
C1H (high precision)	Mounting frame and straps provided up to 1200 mm (48") ⁴⁾	F
C2H (high precision)	Mounting frame and straps provided up to 1200 mm (48") ⁴⁾	M
D1H (high precision)	Mounting frame and straps provided up to 1200 mm (48") ⁴⁾	N
D4H (high precision)	Mounting frame and straps provided up to 1200 mm (48") ⁴⁾	P
Doppler	to 12" with strap kit (not for IP65 (NEMA7)), for up to 121 °C (250 °F)	R
D1H	High temperature range 104 °C/220 °F HP ²⁾	S
		Z

Approvals

UL/Portable
FM, CSA, CE, Dedicated

- 1) Supplied spacer bar supports pipes up to 1050 mm (42 inch). For pipes larger than 1050 mm (42 inch) purchase also, spare part 7ME3960-OMS40 (1012BN-4)
- 2) Supplied spacer bar supports pipes up to 750 mm (30 inch). For pipes larger than 750 mm (30 inch) purchase also, spare part 7ME3960-OMS40 (1012BN-4)
- 3) Requires two R** cables per one RTD pair
- 4) 600 mm (24") for portable systems only

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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Flow Measurement

SITRANS F US Clamp-on

SITRANS FUE1010 (Energy)

Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Article No.	Ord. code
SITRANS FUE1010 (Energy)			SITRANS FUE1010 (Energy)		
<ul style="list-style-type: none"> Dedicated IP65 (NEMA 4X) wall mount 	7ME3500-		<ul style="list-style-type: none"> Dedicated IP65 (NEMA 4X) wall mount 	7ME3500-	
<ul style="list-style-type: none"> Portable IP40 (NEMA 1) Battery powered 	7ME3502-		<ul style="list-style-type: none"> Portable IP40 (NEMA 1) Battery powered 	7ME3502-	
	■ ■ ■ ■ ■ - 0 ■ ■ ■ ■ ■			■ ■ ■ ■ ■ - 0 ■ ■ ■ ■ ■	
Number of channels/ultrasonic paths			RTD temperature sensor		
Dedicated meter			(includes mounting hardware for pipes above 1.5" outer diameter)		
Dedicated meter			No RTDs (Note: temperature input is required for energy system)	0	
Single channel	1		1 x pair standard clamp-on RTD (NEMA 4X only) ²⁾	1	
Dual channel/Dual path	2		2 x pair standard clamp-on RTD (for dual channel NEMA 4X only) ²⁾	2	
Portables			1 x pair standard clamp-on RTD (NEMA 1 Portable) ²⁾	3	
Dual channel/Dual path	4		2 x pair standard clamp-on RTD (for dual channel NEMA 1 Portable) ²⁾	4	
Flowmeter functions and I/O configurations			1 x Insertion style RTD with thermowell and lagging ²⁾	9	M 1 A
<ul style="list-style-type: none"> Portable Standard I/O <ul style="list-style-type: none"> 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		2 x Insertion style RTD with thermowell and lagging ²⁾	9	M 1 B
<ul style="list-style-type: none"> Dedicated Standard I/O <ul style="list-style-type: none"> 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				
<ul style="list-style-type: none"> Extended output adder plus standard inputs (4 additional 4 ... 20 mA outputs) and form C relay 	Z	J 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.		
Meter power options			No sensor		A
90 ... 240 V AC (Dedicated only)	A		A2 universal Trackmount and straps provided up to 75 mm (3")		B
9 ... 36 V DC (Dedicated only)	B		B3 universal Trackmount and straps provided up to 125 mm (5")		C
Charger Type A for Europe (CEE7/7)	C		C3 universal Mounting frame and straps provided up to 300 mm (13")		D
Charger Type C for Australia (AS3112)	D		D3 universal Mounting frame and straps provided up to 600 mm (24")		E
Charger Type D for U.K. (BS1363)	E		E2 universal Mounting frame and straps provided up to 1200 mm (48") ¹⁾³⁾		F
Charger Type J for Japan (JIS8303)	F				
Charger Type K for U.S. (NEMA 5-15P)	G		For the following A1H to D4H sensors, temperature range is -40 °C ... 65 °C (-41 °F ... 150 °F), nominal 21 °C (70 °F):		
Charger Type L for Switzerland (SEV1011)	H		For other temperature ranges please see spare parts list.		
No Charger	J		A2H (high precision) Trackmount and straps provided up to 75 mm (3")		H
External 4 hours battery with US plug for Portable	Z	K 1 A	A3H (high precision) Trackmount and straps provided up to 75 mm (3")		J
External 4 hours battery with European plug for Portable	Z	K 1 B	B1H (high precision) Trackmount and straps provided up to 125 mm (5")		K
Communication options					
RS 232 (standard)	0				
Standard MODBUS configurations include Baudrate: 9600, Parity: None, Stop Bits: 1, Data bits: 8, MODBUS data: 16 bit, Data format: word normal, Mode: RTU, and MODBUS format: Gould. For other configurations please select option 9 and L1Y and state requirements in plain text					
MODBUS Single and Dual Channel	1				
MODBUS Dual Path	2				
Other Version, MODBUS, N2, Other Baud Rate, Other Parity, State in Plain Text	9				

¹⁾ Supplied spacer bar supports pipes up to 1050 mm (42 inch). For pipes larger than 1050 mm (42 inch) purchase also, spare part 7ME3960-0MS40 (1012BN-4).

²⁾ Requires two R** cables per one RTD pair

³⁾ 600 mm (24") for portable systems only

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUE1010 (Energy)

3

Selection and Ordering data		Article No.	Ord. code
SITRANS FUE1010 (Energy)			
• Dedicated IP65 (NEMA 4X) wall mount		7ME3500-	
• Portable IP40 (NEMA 1) Battery powered		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, for up to 121 °C (250 °F)	S	
High temperature sensor size 2 for up to 230 °C (446 °F) (30 ... 200 mm diam. (1.18 ... 7.67 inch diam.))		Z	P 1 A
High temperature sensor size 3 for up to 230 °C (446 °F) (150 ... 610 mm diam. (5.90 ... 24 inch diam.))		Z	P 1 B
High temperature sensor size 4 for up to 230 °C (446 °F) (400 ... 1200 mm diam. (15.75 ... 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		Article No.	Ord. code
SITRANS FUE1010 (Energy)			
• Dedicated IP65 (NEMA 4X) wall mount		7ME3500-	
• Portable IP40 (NEMA 1) Battery powered		7ME3502-	
		■ ■ ■ ■ - 0 ■ ■ ■ ■	
Sensor for channel 2 (continued)			
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	
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, for up to 121 °C (250 °F)	S	
High temperature sensor size 2 for up to 230 °C (446 °F) (30 ... 200 mm diam. (1.18 ... 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 ... 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 inch). For pipes larger than 1050 mm (42 inch) purchase also, spare part 7ME3960-OMS40 (1012BN-4). ²⁾ Supplied spacer bar supports pipes up to 750 mm (30 inch). For pipes larger than 750 mm (30 inch) purchase also, spare part 7ME3960-OMS40 (1012BN-4). ³⁾ 600 mm (24") for portable systems only			

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUE1010 (Energy)

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article 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 Article No.: **7ME3500-2DA10-2NE0-Z**
K03 + K05 + R03 + R05 + R02 + R03

Selection and Ordering data	Article No.	Ord. code
SITRANS FUE1010 meter family	7ME3500-2DA10-2NE0-Z	
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	1	
30 m (100 ft) sensor cable for channel 1		K 0 3
61 m (200 ft) sensor cable for channel 1		K 0 5
30 m (100 ft) cable for RTD 1		R 0 3
61 m (200 ft) cable for RTD 2		R 0 5
15 m (50 ft) cable for RTD 3		R 0 2
30 m (100 ft) cable for RTD 4		R 0 3

Selection and Ordering data	Order code
Operating Instructions for SITRANS FUE1010	
English NEMA 4X Wall mount	A5E03086491
German NEMA 4X Wall mount	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	

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUE1010 (Energy)

Universal sensor selection chart IP68

Based on pipe size (all pipe materials)					
Pipe size	Order Code	Outer diameter range (mm)		Outer diameter range (inch)	
		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 IP68

Based on pipe wall thickness (steel pipes only)					
Pipe Wall	Order Code	Pipe Wall [mm]		Pipe Wall [inch]	
		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 (single pair) selection chart

Sensor cable codes for length and type options				
Cable length m (ft)	Standard (PVC jacket)	Submersible ¹⁾ (polyethylene jacket)	Plenum Rated (teflon jacket)	Armored ¹⁾
	-40...+80 °C (-40...+176 °F)	-40...+80 °C (-40...+176 °F)	-40...+200 °C (-40...+392 °F)	-40...+80 °C (-40...+176 °F)
Order code				
6 (20)	K01²⁾	K11	K21	K31
15 (50)	K02	K12²⁾	K22	K32²⁾
30 (100)	K03²⁾	K13²⁾	K23	K33
46 (150)	K04²⁾	K14	K24	K34
61 (200)	K05	K15	K25	K35
91 (300)	K06²⁾	K16	K26	K36

¹⁾ Submersible and armored sensor cable is not available for portable versions.

²⁾ Standard MLFB for quick delivery

RTD cable (single) selection chart

RTD cable codes for length and type		
Cable length m (ft)	Standard (teflon wrapped)	Insert ¹⁾
	-40 ... +200 °C (-40 ... +392 °F)	-40 ... +200 °C (-40 ... +392 °F)
Order code		
6 (20)	R01²⁾	R21
15 (50)	R02²⁾	R22
30 (100)	R03²⁾	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

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUE1010 (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 RS 232 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 $^{\circ}\text{C}$ (0.02 $^{\circ}\text{F}$)
- 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 RS 232 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

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUE1010 (HVAC) Check metering kit

Technical specifications

Pipe sizes	25.4 mm ... 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 3/340 for complete technical specifications

Certificates 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

Article No.

Energy check metering kit

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	RS 232 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

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 RS 232 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

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUH1010 (Oil)

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	<ul style="list-style-type: none"> Current: 4 x 4 ... 20 mA (IP65 (NEMA 7) enclosure has (2))

Output

Standard outputs	<ul style="list-style-type: none"> 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) RS 232 Serial Port
Extended outputs	<ul style="list-style-type: none"> MODBUS (not for IP65 (NEMA 7) enclosure) Up to 4 x additional 4 ... 20 mA (not for IP65 (NEMA 7) enclosure) 4 x form C relays (not for IP65 (NEMA 7) enclosure) Up to 4 x digital pulse (not for IP65 (NEMA 7) enclosure)
Status/Alarm I/O	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Wall mount IP65 (NEMA 4X) Compact explosionproof IP65 (NEMA 7) Wall mount explosionproof IP66 (NEMA 7)
Liquid temperature	<ul style="list-style-type: none"> 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

<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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.

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 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] 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

IECEX

Pending

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUH1010 (Oil)

Standard MLFB for quick delivery on SITRANS FUH1010 (Oil)

Selection and Ordering data	Article No.	Order code
SITRANS FUH1010 (Oil)	7ME360 - 0 -	K12 + K12 + R12
Design	0	
IP65 (NEMA 4X) wall mount	4	
Number of ultrasonic paths/meter type	A	
Dual path Standard Volume	A	
Flowmeter functions and I/O configurations	0	
includes graphic or digital display, IP66 (BNB6665 (NEMA 4X)) and IP66 (NEMA 7) wall mount explosionproof units:	0	
Standard	1	
• Graphic display	2	
• 4 x 4 ... 20 mA analog input	3	
• 2 x 0 ... 10 V	4	
• 2 x 4 ... 20 mA		
• 2 x pulse outputs		
• 4 x form C relays		
• 2 x RTD input		
Meter power options		
90 ... 240 V AC		
Communication options		
RS 232 (standard)		
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
		P 1 P
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
		Q 1 P
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.		

Flow Measurement SITRANS F US Clamp-on

SITRANS FUH1010 (Oil)

3

Selection and Ordering data	Article No.	Ord. code
SITRANS FUH1010 (Oil)		
<ul style="list-style-type: none"> IP65 (NEMA 4X) wall mount IP65 (NEMA 7) compact explosionproof IP66 (NEMA 7) wall mount explosionproof 	7ME3600- 7ME3601- 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		
<u>IP65 (NEMA 4X) wall mount and IP66 (NEMA 7 wall mount explosionproof) units</u>		
<ul style="list-style-type: none"> Standard <ul style="list-style-type: none"> 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 form C relay 2 x RTD input Extended I/O option <ul style="list-style-type: none"> 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) 	A	
<u>IP65 (NEMA 7) compact explosionproof units</u>		
<ul style="list-style-type: none"> Standard <ul style="list-style-type: none"> Digital display 2 x 4 ... 20 mA (Loop) 2 x 4 ... 20 mA analog input 2 x status (open collector) 1 x RTD input Digital pulse option <ul style="list-style-type: none"> 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 	C	
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		
RS 232 (standard)		0
Standard MODBUS configurations include Baudrate: 9600, Parity: None, Stop Bits: 1, Data bits: 8, MODBUS data: 16 bit, Data format: word normal, Mode: RTU, and MODBUS format: Gould. For other configurations please select option 9 and L1Y and state requirements in plain text		
MODBUS (excludes NEMA 7 compact)		1
Other Version, MODBUS, N2, Other Baud Rate, Other Parity, State in Plain Text		9

Selection and Ordering data	Article No.	Ord. code
SITRANS FUH1010 (Oil)		
<ul style="list-style-type: none"> IP65 (NEMA 4X) wall mount IP65 (NEMA 7) compact explosionproof IP66 (NEMA 7) wall mount explosionproof 	7ME3600- 7ME3601- 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 inch). For pipes larger than 750 mm (30 inch) purchase also, spare part 7ME3960-0MS40 (1012BN-4).		
²⁾ Dual channel interface detector only		

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUH1010 (Oil)

Selection and Ordering data

SITRANS FUH1010 (Oil)

- IP65 (NEMA 4X) wall mount
- IP65 (NEMA 7) compact explosionproof
- IP66 (NEMA 7) wall mount explosionproof

Article No. Ord. code

7ME3600-

7ME3601-

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

SITRANS FUH1010 (Oil)

- IP65 (NEMA 4X) wall mount
- IP65 (NEMA 7) compact explosionproof
- IP66 (NEMA 7) wall mount explosionproof

Article No. Ord. code

7ME3600-

7ME3601-

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 inch).
For pipes larger than 750 mm (30 inch) purchase also, spare part 7ME3960-0MS40 (1012BN-4).

Selection and Ordering data

Order code

Further designs

Please add "-Z" to Article 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
- Termination for submersible cable

T01

T11

- RTD cable termination kit for standard RTD
- RTD cable termination kit for submersible RTD

T21

T31

Languages (Meter and Documentation), English (default)

- German
- French
- Spanish
- Italian

B10

B12

B13

B14

Tag name plate

- Stainless steel tags with 3.2 mm (0.13 inch) characters (68 characters max.)

Y19

Selection and Ordering data	Article 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	CQO:1010PVNFM-3
English NEMA 4X & NEMA 7 wall mount explosionproof Interface Detector	A5E02951504
English NEMA 7 compact explosionproof Standard Volume	CQO:1010DVXFM-3
English NEMA 7 compact explosionproof Precision Volume	CQO:1010PVXFM-3
English NEMA 7 compact explosionproof Interface Detector	CQO:1010BXXFM-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	

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 Article No.: **7ME3600-3CB00-3QQ1-Z**
K03 + K03 + R03

Selection and Ordering data	Article No.	Ord. code
SITRANS FUH1010 meter family	7 ME 3 6 0 - 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	
RS 232 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		K 0 3
30 m (100 ft) sensor cable for path 2		K 0 3
30 m (100 ft) cable for RTD		R 0 3

High precision sensor selection chart IP68

Based on pipe wall thickness (steel pipes only)					
Sensor Pipe wall	Order Code	Pipe wall (mm)		Pipe wall (inch)	
		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
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)	K01¹⁾	K11	K21	K31
15 (50)	K02	K12¹⁾	K22	K32¹⁾
30 (100)	K03¹⁾	K13¹⁾	K23	K33
46 (150)	K04¹⁾	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)	R01¹⁾	R11
15 (50)	R02¹⁾	R12
30 (100)	R03¹⁾	R13
46 (150)	R04	R14
61 (200)	R05	R15
91 (300)	R06	R16

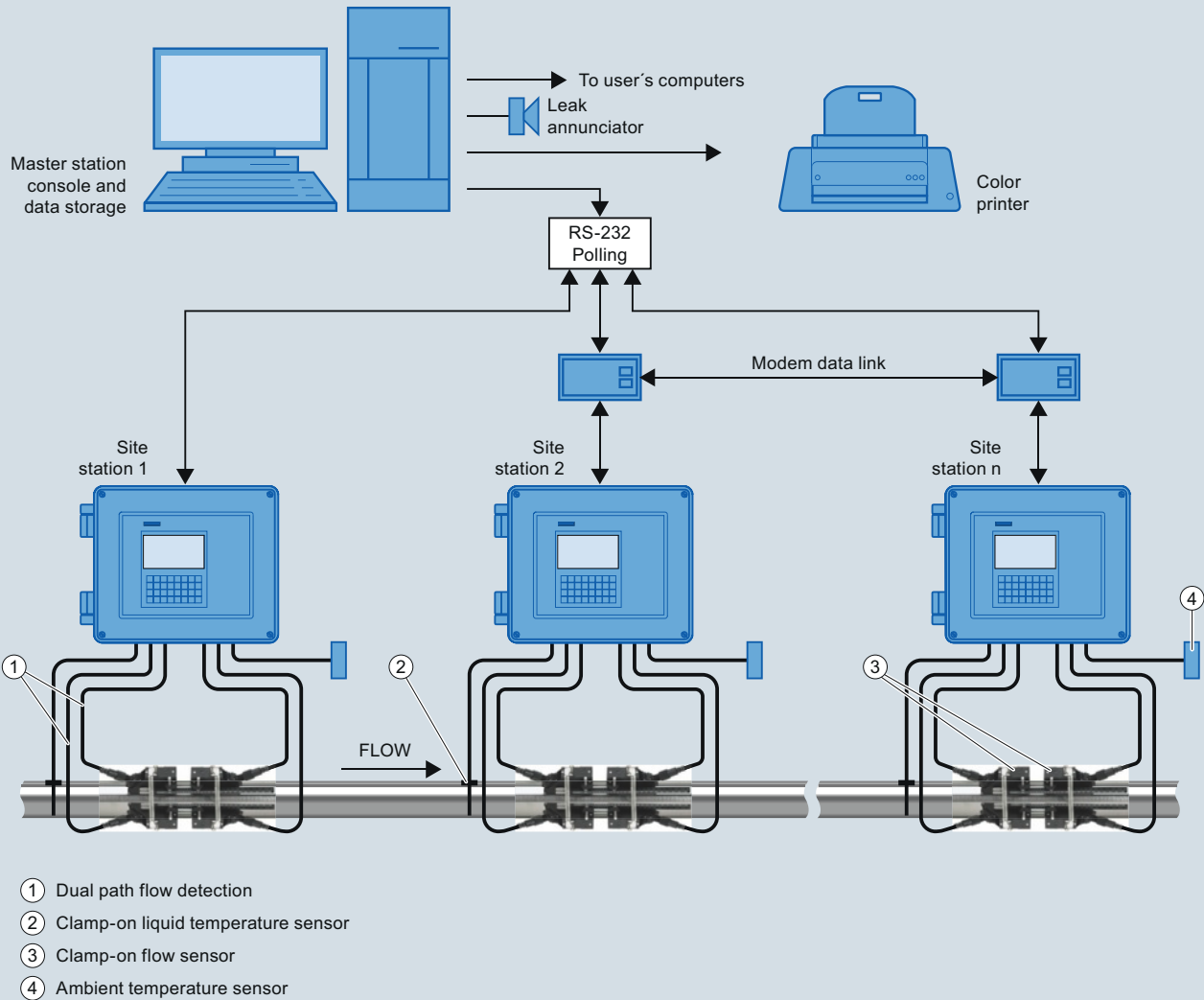
¹⁾ Standard MLFB for quick delivery

Flow Measurement

SITRANS F US Clamp-on

FUS-LDS Leak Detection System

Overview



The FUS-LDS Leak Detection System offers a complete software and hardware solution for liquid pipelines. The FUS-LDS uses clamp-on ultrasonic flow meters, identified as site stations, installed directly on the pipeline. The software monitors all site stations in order to assist the operator with a quick and reliable system that detects and localizes the leakages in the pipeline.

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
- Easy-to-understand Graphic User Interface (GUI) to allow for simple training for the operator and operational awareness without constant 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

Flow Measurement

SITRANS F US Clamp-on

FUS-LDS 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 fiber-glass 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	152.4 mm (5 ft) minimum length
Network	Internal RJ45
Modem	Internal 56K V.92 Modem
Audio	Capable

Special requests available on demand.

For additional 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.
- Advanced GUI Software creates new possibilities for the process visualization, as well as offering capabilities to link to SCADA systems.
- Operators can be trained on the FUS-LDS Leak Detection System in a very short period of time, which is vital for pipeline transportation companies in today's heavily regulated environment.
- Alarms – Automatic application condition (AppConn) technology provides adaptive alarm threshold parameters enabling maximum system resolution and sensitivity

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUG1010 (Gas)

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 fiber-glass 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 RS 232 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

Technical specifications

Input		Accuracy	
Flow range	± 30 m/s (± 100 ft/s), bidirectional	Typical accuracy	1 % ... 2 % of actual volume reading (higher accuracy is pipe condition and flow profile dependent)
Flow sensitivity	0.0003 m/s (0.001 ft/s), flow rate independent	Calibratable Accuracy	± 0.2 ... 0.5 % of flow
Minimum pressure	7 ... 10 bar (100 ... 145 psi), typical (gas composition and application dependent; plastic pipes support operation at atmospheric pressure)	Repeatability	0.05 % ... 0.1 %, of actual volume reading, for 1.5 ... 30 m/s (5 ... 100 ft/s) velocities (pipe condition dependent)
Pipe size	25 mm ... 1.52 m (1" ... 48") (for other sizes, consult factory)	Zero drift	0.0003 m/s (0.001 ft/s), with ZeroMatic Path active
Analog inputs	Current: 4 x 4 ... 20 mA, programmable (IP65 (NEMA 7) enclosure has 2 x 4 ... 20 mA, programmable)	Data refresh rate	5 Hz
Output		Rated operation conditions	
Standard outputs	<ul style="list-style-type: none"> 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 RS 232 Serial Port 	Degree of protection	<ul style="list-style-type: none"> IP65 (NEMA 4X) IP65 (NEMA 7) IP66 (NEMA 7)
Extended outputs	<ul style="list-style-type: none"> MODBUS (RS 485/422/232) (not for IP65 (NEMA 7)) 	Gas temperature	-40 ... +60 °C (-40 ... +140 °F) (for higher temperatures consult factory)
Status/Alarm I/O	<ul style="list-style-type: none"> 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) 	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	
		<ul style="list-style-type: none"> For IP65 (NEMA 4X) and IP66 (NEMA 7) For IP65 (NEMA 7): 	<ul style="list-style-type: none"> 90 ... 240 V AC, 50 ... 60 Hz (30 VA) or 9 ... 36 V DC (12 W) 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	<ul style="list-style-type: none"> IP65 (NEMA 4X) and IP66 (NEMA 7) enclosures IP65 (NEMA 7) enclosure
		Keypad	<ul style="list-style-type: none"> IP65 (NEMA 4X) and IP66 (NEMA 7) Enclosures IP65 (NEMA 7) Enclosure
		Language options	English, Spanish, German, Italian, French

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUG1010 (Gas)

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 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

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

SITRANS FUG1010 (Gas)

Standard MLFB for quick delivery on SITRANS FUG1010 (Gas)

Selection and Ordering data	Article No.	Order code
SITRANS FUG1010 (Gas)	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	B	
<ul style="list-style-type: none"> Extended I/O option <ul style="list-style-type: none"> additional 2 x 4 ... 20 mA form C 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)		
Communication options		
RS 232 (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

3

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.

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUG1010 (Gas)

Selection and Ordering data

SITRANS FUG1010 (Gas)

- IP65 (NEMA 4X) wall mount
- IP65 (NEMA 7) compact explosionproof
- IP66 (NEMA 7) wall mount explosionproof

Article No. Ord. code

7ME3610-

7ME3611-

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 Form C relays
 - 2 x RTD input

A

- Extended I/O option
 - additional 2 x 4 ... 20 mA
 - Form C 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
- Digital pulse option
 - 1 x digital pulse open collector output

D

E

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

RS 232 (standard)

0

Standard MODBUS configurations include Baudrate: 9600, Parity: None, Stop Bits: 1, Data bits: 8, MODBUS data: 16 bit, Data format: word normal, Mode: RTU, and MODBUS format: Gould. For other configurations please select option 9 and L1Y and state requirements in plain text MODBUS (excludes NEMA 7 compact) Other Version, MODBUS, N2, Other Baud Rate, Other Parity, State in Plain Text

1

9

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

SITRANS FUG1010 (Gas)

- IP65 (NEMA 4X) wall mount
- IP65 (NEMA 7) compact explosionproof
- IP66 (NEMA 7) wall mount explosionproof

Article No. Ord. code

7ME3610-

7ME3611-

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 B1H to D4H sensors, temperature range is -40 °C ... 65 °C (-41 °F ... 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 inch). For pipes larger than 750 mm (30 inch) purchase also, spare part 7ME3960-0MS40 (1012BN-4).

Flow Measurement SITRANS F US Clamp-on

SITRANS FUG1010 (Gas)

3

Selection and Ordering data	Article No.	Ord. code
SITRANS FUG1010 (Gas)		
<ul style="list-style-type: none"> • IP65 (NEMA 4X) wall mount • IP65 (NEMA 7) compact explosionproof • IP66 (NEMA 7) wall mount explosionproof 	7ME3610-	
	7ME3611-	
	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 B1H to D4H sensors, temperature range is -40 °C ... 65 °C (-41 °F ... 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

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article 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) for compact NEMA 7	
• 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 Article No.: **7ME3610-2BB00-0QQ1-Z
K03 + K03**

Selection and Ordering data	Article No.	Ord. code
SITRANS FUG1010 meter family	7 ME 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	
RS 232 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

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUG1010 (Gas)

Selection and Ordering data	Article 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	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>

High precision sensor selection chart IP68

Based on pipe wall thickness (steel pipes only)					
Sensor Pipe wall	Order Code	Pipe wall (mm)		Pipe wall (inch)	
		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 (pair) Selection Chart

Sensor cable codes for length and type options				
Cable length m (ft)	Standard (PVC jacket)	Submersible (polyethylene jacket)	Plenum Rated (teflon jacket)	Armored
	-40...+80 °C (-40...+176 °F)	-40...+80 °C (-40...+176 °F)	-40...+200 °C (-40...+392 °F)	-40...+80 °C (-40...+176 °F)
Order code				
6 (20)	K01¹⁾	K11	K21	K31
15 (50)	K02	K12¹⁾	K22	K32¹⁾
30 (100)	K03¹⁾	K13¹⁾	K23	K33
46 (150)	K04¹⁾	K14	K24	K34
61 (200)	K05	K15	K25	K35
91 (300)	K06¹⁾	K16	K26	K36

RTD Cable (single) Selection Chart

RTD cable codes for length and type		
Cable length m (ft)	Standard (teflon wrapped)	Submersible (extruded jacket)
	-40 ... +200 °C (-40 ... +392 °F)	-40 ... +200 °C (-40 ... +392 °F)
Order code		
6 (20)	R01¹⁾	R11
15 (50)	R02¹⁾	R12
30 (100)	R03¹⁾	R13
46 (150)	R04	R14
61 (200)	R05	R15
91 (300)	R06	R16

¹⁾ Standard MLFB for quick deliver

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 RS 232 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 3/359 for complete technical specifications

Certificates 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

CE

- Sensors:
Ex II 1 G Ex ia IIC T5
EMC Directive 2004/108/EC
ATEX Directive 94/9/EC

Selection and Ordering data

Article No.

SITRANS FUG1010 Gas Check Metering Kit

- FM/CSA approved
- ATEX approved

CQO:FUG-GASKIT
CQO:FUG-GASAKIT

Content of delivery

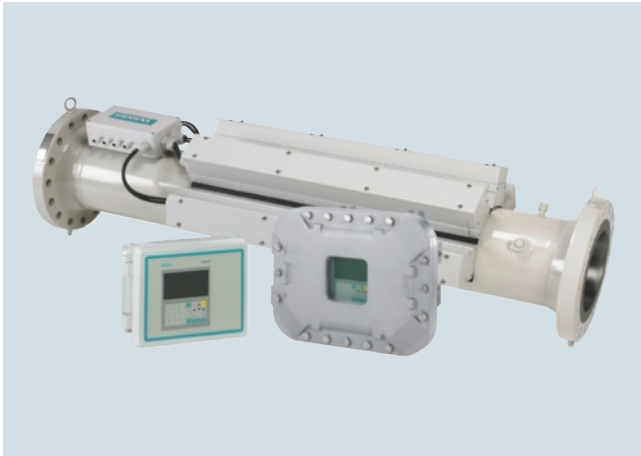
1	Dual channel dedicated transmitter (FM/CSA or ATEX approved)
1 pair	Transportable sensors C1 Pipe: od 3.500 inch, wt 0.216 inch, carbon steel
1 pair	Transportable sensors C2 Pipe: od 6.625 inch, wt 0.280 inch, carbon steel
1 pair	Transportable sensors D1 Pipe: od 10.750 inch, wt 0.365 inch, carbon steel
1 pair	Transportable sensors D2 Pipe: od 16.000 inch, 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 CC-128
1 kit	Couplant/Damping Film
1	Flow case
1	Flowmeter manual
1	Laminated card set

Flow Measurement

SITRANS F US Clamp-on

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 RS 232/485 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 inch (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 RS 232 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 (3/4" tap available for insert temperature sensor)
- Detection of aeration or contamination

Technical specifications

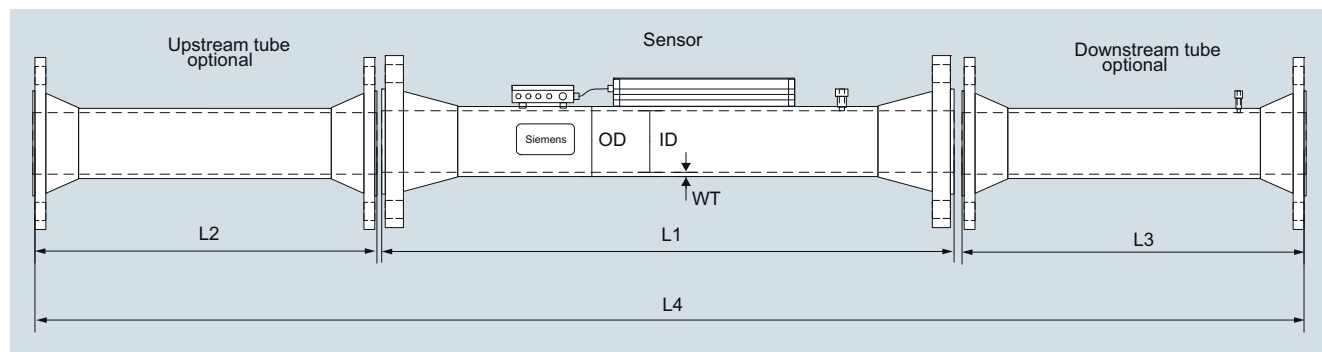
Input		Design Flow sensor	
Flow range (Gas)	± 36.5 m/s (± 120 f/s) for DN 100 ... DN 200 (4" ... 8") pipes bi-directional ± 30.5 m/s (± 100 ft/s) for DN 250 ... DN 600 (10" ... 24") pipes bi-directional	Nominal pipe sizes	4" ... 24" (DN 100 ... DN 600)
Flow range (Liquid)	± 12 m/s (± 40 f/s) including zero flow, bi-directional	Pipe material specification	API 5L ERW
Flow sensitivity	0.0003 m/s (0.001 f/s) flow rate independent	Temperature tap	¾"
Flow temperature range	-28 ... +93 °C (-20 ... +200 °F)	Pressure tap	¼"
Analog inputs	4 x 4 ... 20 mA, (Programmable to Density, Pressure, viscosity or Temperature)	Flange class	• Liquid 150, 300, 600 • Gas 300, 600
Output		Flange specification	• ASME B16.5 • Liquid 150, 300, 600 • Gas 300, 600
Standard outputs	<ul style="list-style-type: none"> • 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 RS 232 Serial Port or Optional RS 485/422 	Flange facing	Raised face weld neck
Status/Alarm I/O	<ul style="list-style-type: none"> • Programmable, 4x Form C Relays • Clear Switch Input Totalizer Hold Switch Input 	Flange material	A105
Calibrated accuracy		Flow sensor paths	Two, three, or four
<u>Gas</u>		Sensor length	See diagram
2-path	0.5 ... 1.0 % (4" ... 6" < 0.25 %)	Design temperature	-28 ... +93 °C (-20 ... +200 °F)
3-path	< 0.5 %	Exterior finish	Marine/offshore grade per ASTM B117
4-path	< 0.2 %	Optional pipe sections	<ul style="list-style-type: none"> • 10 D upstream (with optional flow conditioner) • 5 D downstream
<u>Liquid</u>		Certificates and approvals	
2-path	0.5 ... 1.0 % (4" ... 6" < 0.25 %)	Flow transmitter IP65 (NEMA 4X)	
3-path	< 0.5 %	FM and CSA	
4-path	< 0.15 %	<ul style="list-style-type: none"> • Transmitter N-I Class I, Div 2 S Class II, Div 2 • Sensor I.S. Class I, II, Div 1 	
Repeatability	± 0.05 ... 0.1 %	ATEX	
Data refresh rate		CE markings	
5 Hz		EMC 2004/108/EC ATEX 94/9/EC	
Design		INMETRO (Brazil)	
<u>Design Flow transmitter</u>		IECEX	
Dimensions	see SITRANS F US Clamp-on "System info and selection guide"	Flow Transmitter - IP66 (NEMA 7)	
Weight	see diagrams	FM and CSA	
Power supply		<ul style="list-style-type: none"> • 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 	
Power supply	90 ... 240 V AC, 50 ... 60 Hz, 30 VA or 9 ... 36 V DC, 12 W	ATEX	
Indication and operation		CE markings	
Data logger memory	1 MByte, programmable for all available data variables	EMC 2004/108/EC ATEX 94/9/EC	
Display	128 x 240 pixel LCD with backlight	INMETRO (Brazil)	
Keypad	33 keypad buttons with tactile feedback	[BR-Ex ia] IIC BR-Ex d [ia IIC] IIB T5	
Language options	English, Spanish, German, Italian, French	Pending	
		Sensor	
		FM and CSA	
		<ul style="list-style-type: none"> • Transmitter I.S. Class I, Div 1 N-I Class I, Div 2 S Class II, Div 2 	
		ATEX	
		CE markings	
		EMC 2004/108/EC PED 97/23/EEC ATEX 94/9/EC	

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUT1010 (Liquid and Gas)

Dimensional drawings



Length

Liquid Flange 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 Flange 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 Flange 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

Flow Measurement

SITRANS F US Clamp-on

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

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUT1010 (Liquid and Gas)

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

Pressure (psig)	SITRANS FUT1010 maximum flow rate (MMSCFD) [Millions of standard cubic feet per day]							
	Meter size and maximum velocity							
	4" 135 ft/s	6" 126 ft/s	8" 117 ft/s	10" 144 ft/s	12" 126 ft/s	16" 99 ft/s	20" 81 ft/s	24" 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

Pressure (psig)	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" 1.55 ft/s	6" 1.4 ft/s	8" 1.3 ft/s	10" 1.65 ft/s	12" 1.35 ft/s	16" 1.1 ft/s	20" 0.85 ft/s	24" 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

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUT1010 (Liquid and Gas)

Pressure (barg)	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
	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

Pressure (barg)	SITRANS FUT1010 Transition 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
	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

Flow Measurement SITRANS F US Clamp-on

SITRANS FUT1010 (Liquid and Gas)

3

Selection and Ordering data	Article No.	Order Code
SITRANS FUT1010 (Liquid)	7 ME362 - - - - - 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) lwith 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 <u>and</u> 5D downstream tubes	4	
10D up <u>and</u> 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	

Selection and Ordering data	Order code
Further designs Please add "-Z" to Article 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
Nace Certification	
• Nace, Spool only	C10
• Nace, W/10D upstream	C11
• Nace, W/10D upstream, cond	C12
• Nace, W/5D downstream	C13
• Nace, W/10D up, 5D dn	C14
• Nace, W/10D up, cond, 5D dn	C15
Standard Cal: Oil (2 cst), Forward flow direction, 6 points, 6 verification points, Range 2 ... 20 ft/sec, Lab pressure and temperature	
• Calibration, 100 DN (4 inch)	D10
• Calibration, 150 DN (6 inch)	D11
• Calibration, 200 DN (8 inch)	D12
• Calibration, 250 DN (10 inch)	D13
• Calibration, 300 DN (12 inch)	D14
• Calibration, 400 DN (16 inch)	D15
• Calibration, 450 DN (18 inch)	D16
• Calibration, 500 DN (20 inch)	D17
• Calibration, 600 DN (24 inch) D18	D18
• Calibration, Other contact factory for quote	Y28
Tag name plate	
• Stainless steel tags with 3.2 mm (0.13 inch) character size (68 characters max.)	Y19

Selection and Ordering data	Article 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>

Flow Measurement

SITRANS F US Clamp-on

SITRANS FUT1010 (Liquid and Gas)

Selection and Ordering data

Article No.

Order Code

SITRANS FUT1010 (Gas)

7 ME363 - - 0

Transmitter type

No meter
 IP65 NEMA 4X (2 path)
 IP65 NEMA 4X (2 path) with MODBUS
 IP65 NEMA 4X (3 or 4 path)
 IP65 NEMA 4X (3 or 4 path) with MODBUS
 IP66 NEMA 7 wall mount flame/explosion proof (2 Path)
 IP66 NEMA 7 wall mount flame/explosion proof (2 Path) with MODBUS
 IP66 NEMA 7 wall mount flame/explosion proof (3 or 4 Path)
 IP66 NEMA 7 wall mount flame/explosion proof (3 or 4 Path) with MODBUS

0
1
2
3
4
5
6
7
8

Input power

90 ... 240 V AC
 9 ... 36 V DC

1
2

Number of ultrasonic paths

2 path (standard enclosure material)
 3 path (standard material)
 4 path (standard material)

B
C
D

Pipe size

DN 100 (4") (Dual Path only)
 DN 150 (6") (Dual Path only)
 DN 200 (8")
 DN 250 (10")
 DN 300 (12")
 DN 400 (16")
 DN 450 (18")
 DN 500 (20")
 DN 600 (24")

A
B
C
D
E
F
G
H
J

Flange rating

Class 300 (Raised Face)
 Class 600 (Raised Face)

1
2

Upstream/downstream meter run

None
 10 pipe diameter upstream Tube only
 10 pipe diameter upstream Tube with flow conditioner
 5 pipe diameter downstream tube only
 10D up and 5D downstream tubes
 10D up and 5D downstream tubes with flow conditioner

0
1
2
3
4
5

Gas type range (select closest match)

Natural Gas (mostly CH₄)
 Process Gases (N₂, O₂, CO, Ar)
 Helium
 Hydrogen

A
B
C
D

Gas temperature range

-28 ... +65 °C (-20 ... +150 °F)
 1 ... 93 °C (30 ... 200 °F)

A
B

Transmitter and sensor approval

FM/CSA, CE
 ATEX and PED, CE, C-TICK
 INMETRO

1
2
3

3

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article 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
Nace Certification	
• Nace, Spool only	C10
• Nace, W/10D upstream	C11
• Nace, W/10D upstream, cond	C12
• Nace, W/5D downstream	C13
• Nace, W/10D up, 5D dn	C14
• Nace, W/10D up, cond, 5D dn	C15
Standard Cal: Nat Gas, Forward flow direction, 7 points, 2 verification points, Range 10 ... 100 ft/sec, Lab pressure and temperature	
• Calibration, 100 DN (4 inch)	D10
• Calibration, 150 DN (6 inch)	D11
• Calibration, 200 DN (8 inch)	D12
• Calibration, 250 DN (10 inch)	D13
• Calibration, 300 DN (12 inch)	D14
• Calibration, 400 DN (16 inch)	D15
• Calibration, 450 DN (18 inch)	D16
• Calibration, 500 DN (20 inch)	D17
• Calibration, 600 DN (24 inch)	D18
• Calibration, Other contact factory for quote	Y28
Tag name plate	
• Stainless steel tags with 3.2 mm (0.13 inch) character size (68 characters max.)	Y19

Selection and Ordering data	Article No.
Operating Instructions for SITRANS FUT1010 (Gas)	
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.

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<http://www.siemens.com/flowdocumentation>

Flow Measurement

SITRANS F US Clamp-on







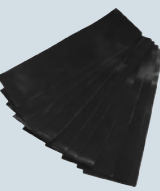

Accessories/Spare parts




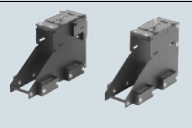
Accessories/Spare parts for clamp-on ultrasonic flowmeters

Description	Article No.		Description	Article 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.	7ME3951-...		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.	7ME3960-...	
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.	7ME3950-...		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.	7ME3960-...	
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.	7ME3950-...		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 "Liquid" and Standard Volume Correction.	7ME3950-...	
High Precision 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).	7ME3960-...		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".	7ME3950-...	
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.	7ME3960-...		Standard Cable (Flow Sensor or RTD) Selected for general purpose installations where no special application requirements exist.	7ME3960-...	
			Submersible Cable (Flow Sensor) Polyethylene jacketed, for locations that experience periodic or continual submersion of the flow sensors.	7ME3960-...	

Flow Measurement SITRANS F US Clamp-on

Accessories/Spare parts

Description	Article 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.	7ME3960-...	
Armored Cable (Flow Sensor) Double shielded cable, selected when cable will not be installed in conduit between meter and sensors.	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.	7ME3960-...	
Straps Used to fasten sensors or mounting frames to pipe for dedicated meter installations. Stainless steel construction for corrosion resistance.	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.	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).	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).	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.	7ME3960-...	

Description	Article 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.	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.	7ME3960-...	
Cable Gland Kit Cable gland kit for use with SITRANS FUS1010, FUH1010 and FUG1010 Ultrasonic Flowmeters housed in IP65 NEMA 4X wall mount enclosures. Kit contains a total of 5 glands to manage and seal the exit and entry of wires and cables to ancillary devices.	A5E32834162	
Magnetic mounting frames Magnetic mounting frames are designed to simplify clamp-on sensor installation on pipelines 8 inches (DN200) and larger by eliminating the need for straps to secure them. They feature powerful magnets to ensure quick and accurate setup. Compatible with all C, D and E universal and high-precision sensors belonging to the SITRANS F US clamp-on family, magnetic mounting frames can be installed on any carbon steel pipe and are constructed in aluminum for a high level of durability.	7ME3960-0MD02	

Flow Measurement

SITRANS F US Clamp-on

Accessories/Spare parts

Selection and Ordering data	Article No.
<i>Spare parts (System)</i>	
SITRANS F US clamp-on	7ME 3 9 4 0 -
Power supplies, batteries and chargers	
Power supply 90 ... 240 V AC	
• for IP65 (NEMA 4X) wall mount or IP66 (NEMA 7) wall mount explosionproof	0 PA 0 0
• for IP65 (NEMA 7) compact explosionproof	2 PA 0 0
Power supply 9 ... 36 V DC	
• for IP65 (NEMA 4X) wall mount or IP66 (NEMA7) wall mount explosionproof	0 PB 0 1
• negative ground for NEMA 7 compact explosionproof	2 PJ 0 0
• positive ground for NEMA 7 compact explosionproof	2 PK 0 0
Portable meter batteries and accessories	
• Internal battery (Portable meters only)	3 PP 0 0
IP67 Portable meter charger	
• Type A for Europe (CEE7/7)	3 PC 0 0
• Type C for Australia (AS3112)	3 PD 0 0
• Type D for UK (BS1363)	3 PE 0 0
• Type J for Japan (JIS8303)	3 PF 0 0
• Type K for US (NEMA 5-15P)	3 PG 0 0
• Type L for Switzerland (SEV1011)	3 PH 0 0
IP40 Portable meter charger	
• Type A for Europe (CEE7/7)	4 PC 0 0
• Type C for Australia (AS3112)	4 PD 0 0
• Type D for UK (BS1363)	4 PE 0 0
• Type J for Japan (JIS8303)	4 PF 0 0
• Type K for US (NEMA 5-15P)	4 PG 0 0
• Type L for Switzerland (SEV1011)	4 PH 0 0
MODBUS system computer modules	
MODBUS converter module	CQO:1015N-5M
Mounting kit (type 1) for MODBUS converter module	CQO:1015N-5M-MK1
Mounting kit (type 2) for MODBUS converter module	CQO:1015N-5M-MK2
Mounting kit (type 3) for MODBUS converter module	CQO:1015N-5M-MK3
Field configuration kit with manual, for MODBUS converter module	CQO:1015N-5M-FK1
Pipe mounting brackets	
2 inch pipe mounting bracket for IP65 (NEMA 7) compact explosionproof	CQO:1012XMB-1
2 inch pipe mounting bracket for IP65 (NEMA 4X) wall mount	CQO:1012NMB-1

Flow Measurement

SITRANS F US Clamp-on

Accessories/Spare parts

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
<i>Spare parts (Sensors)</i>		<i>Spare parts (Sensors)</i>	
SITRANS F US clamp-on		SITRANS F US clamp-on	
Meter type		Meter type	
Dedicated (SITRANS FUS1010, FUG1010, FUH1010, FUE1010)	7ME 3 9 5 0 -	Dedicated (SITRANS FUS1010, FUG1010, FUH1010, FUE1010)	7ME 3 9 5 0 -
Portable (SITRANS FUP1010 or FUE1010)	7ME 3 9 5 1 - 0	Portable (SITRANS FUP1010 or FUE1010)	7ME 3 9 5 1 - 0
Approvals		High temperature universal liquid sensors	
UL, ULc, CE (Portable only) ¹⁾	0	Note: not available with INMETRO approval	
FM/CSA hazardous (classified) locations ¹⁾	1	High temp. sensor size 1 for up to 230 °C (12.7 to 100 mm diam.)	LA 1 0
ATEX Ex II 1G Ex ia IIC T5 (not for RTDs) ¹⁾	2	High temp. sensor size 2 for up to 230 °C (30 to 200 mm diam.)	LA 2 0
INMETRO (not for (RTDs) ¹⁾	3	High temp. sensor size 3 for up to 230 °C (150 to 600 diam.)	LA 3 0
Spare sensor code		High temp. sensor size 4 for up to 230 °C (400 to 1200 diam.)	
For liquid flow sensors pipe ranges please refer to sensor selection chart in the SITRANS FUS1010 section		For gas flow sensors pipe ranges please refer to sensor selection chart in the SITRANS FUG1010 section	
Liquid flow sensors for use with mounting frames or tracks (including portable)		High precision gas flow sensors for use with mounting frames or tracks	
A2 universal	LB 0	B1H (high precision) ³⁾	GK 0
B3 universal	LC 0	B2H (high precision) ³⁾	GL 0
C3 universal	LD 0	B3H (high precision) ³⁾	GT 0
D3 universal	LE 0	C1H (high precision) ³⁾	GM 0
E2 universal	LF 0	C2H (high precision) ³⁾	GN 0
A1H (high precision)	LG 0	D1H (high precision) ³⁾	GP 0
A2H (high precision)	LH 0	D2H (high precision) ³⁾	GQ 0
A3H (high precision)	LJ 0	D3H (high precision) ³⁾	GU 0
B1H (high precision)	LK 0	D4H (high precision) ³⁾	GR 0
B2H (high precision)	LL 0	High precision gas sensor for weld seal enclosures	
B3H (high precision)	LT 0	C1H (high precision, weld seal) ³⁾	HM 0
C1H (high precision)	LM 0	C2H (high precision, weld seal) ³⁾	HN 0
C2H (high precision)	LN 0	D1H (high precision, weld seal) ³⁾	HP 0
D1H (high precision)	LP 0	D2H (high precision, weld seal) ³⁾	HQ 0
D2H (high precision)	LQ 0	D3H (high precision, weld seal) ³⁾	HU 0
D3H (high precision)	LU 0	D4H (high precision, weld seal) ³⁾	HR 0
D4H (high precision)	LR 0		
Doppler, for up to 121 °C (250 °F)	LS 0		
High precision liquid sensor for weld seal enclosures			
C1H (high precision, weld seal) ²⁾	SM 0		
C2H (high precision, weld seal) ²⁾	SN 0		
D1H (high precision, weld seal) ²⁾	SP 0		
D2H (high precision, weld seal) ²⁾	SQ 0		
D3H (high precision, weld seal) ²⁾	SU 0		
D4H (high precision, weld seal) ²⁾	SR 0		

Flow Measurement

SITRANS F US Clamp-on

Accessories/Spare parts

Selection and Ordering data	Article No.
<i>Spare parts (Sensors)</i>	
SITRANS F US clamp-on	
Meter type	
Dedicated (SITRANS FUS1010, FUG1010, FUH1010, FUE1010)	7ME3950 -
Portable (SITRANS FUP1010 or FUE1010)	7ME3951 - 0
<u>Standard RTD sensors (not for energy systems)</u>	
Standard clamp-on RTD	1TA00
Submersible clamp-on RTD (not for Portable)	1TB00
Insertion style RTD each (size 1), 140 mm (5.5 inch)	1TJ00
Insertion style RTD each (size 2), 216 mm (8.5 inch)	1TJ01
Insertion style RTD each (size 3), 292 mm (11.5 inch)	1TJ02
Insertion style RTD each (size 4), 368 mm (14.5 inch)	1TJ03
<u>Standard for energy system (matched pair)</u>	
Standard clamp-on RTD with mounting	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) Products are marked with CE as required by European directive.

2) Temperature Range:



T1: 0

T2: 1

T3: 3

3) T3 range not available.


Selection and Ordering data	Article No.
<i>Spare parts (Miscellaneous)</i>	
SITRANS F US clamp-on	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) Energy 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))	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))	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
High precision mounting enclosures for liquid and gas sensors	
• Stainless steel mounts for high precision size "C" sensors, single Enclosure	0WS50
• Stainless steel mounts for high precision size "D/E" sensors, single Enclosure	0WS60
• Stainless steel mounts for high precision size "C" sensors, dual Enclosure	0WD50
• Stainless steel mounts for high precision size "D/E" sensors, dual enclosure	0WD60


Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
<i>Spare parts (Miscellaneous)</i>		<i>Spare parts (Miscellaneous)</i>	
SITRANS F US clamp-on	7ME 3 9 6 0 - 	SITRANS F US clamp-on	7ME 3 9 6 0 - 
Stainless steel straps for weld seal enclosure mounting (2 x required for dual enclosures)		RTD mounting hardware for portable system	3 MR 0 0
<ul style="list-style-type: none"> Mounting strap for pipe diameter to 300 mm (13 inch) Mounting strap for pipe diameter to 600 mm (24 inch) Mounting strap for pipe diameter to 1200 mm (48 inch) Mounting strap for pipe diameter to 1500 mm (60 inch) Mounting strap for pipe diameter to 2130 mm (84 inch) Mounting strap for pipe diameter to 3050 mm (120 inch) 	0 SM 0 1 0 SM 1 1 0 SM 2 1 0 SM 3 1 0 SM 4 1 0 SM 5 1	Sensor connector adaptors	
Stainless mounting tracks for high temp 991 sensors, with straps		<ul style="list-style-type: none"> "F" connector to BNC adapter (order 2 per sensor set) 	CQO:1012NFPA
<ul style="list-style-type: none"> Size 1 high temp sensor pair Size 2 high temp sensor pair Size 3 high temp sensor pair Size 4 high temp sensor pair 	CQO:992MTNHMSH-1 CQO:992MTNHMSH-2 CQO:992MTNHMSH-3 CQO:992MTNHMSH-4		
Clamp-on RTD mounting hardware for dedicated systems			
<ul style="list-style-type: none"> RTD mounting hardware for dedicated system: 152 to 610 mm (6 to 24 inch) RTD mounting hardware for dedicated system: 12.7 to 50.8 mm (0.5 to 2 inch) RTD mounting hardware for dedicated system: 31.8 to 203.2 mm (1.25 to 8 inch) RTD mounting hardware for dedicated system: 508 to 1219 mm (20 to 48 inch) Junction box for clamp on RTD's 	0 MR 0 0 0 MR 0 1 0 MR 0 2 0 MR 0 4 CQO:992ECJ		
Portable sensor mounting hardware			
Sensor mounting tracks for portable sensors (aluminum with mounting chains) for pipes < 125 mm (5 inch) for			
<ul style="list-style-type: none"> Universal sensor size A or B High precision sensor size A or B 	3 MA 0 0 3 MB 0 0		
Sensor mounting frames			
<ul style="list-style-type: none"> Universal sensor size B (for pipes > 125 mm (5 inch) Universal sensor size C Universal sensor size D Universal sensor size E High precision sensor size B (for pipes > 125 mm (5 inch) High precision sensor size C High precision sensor size D 	CQO:1012FP-PB 3 MC 0 0 3 MC 0 1 3 MC 0 2 CQO:1012FPH-PB 3 MD 0 0 3 MD 0 1		
Spacer bar (for indexing portable sensors)			
Mounting chain and EZ clamp hardware			
<ul style="list-style-type: none"> 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. EZ clamp hardware set for DN 25 to DN 600 (1 to 24 inch) for "D" size HP and "E" size universal Mounting chain for portable sensors: 4 x 760 mm lengths Mounting chain for portable sensors: 2 x 760 mm and 2 x 1500 mm lengths 	3 MS 0 0 CQO:1012Z-1 CQO:1012Z-2 3 CM 1 0 3 CM 2 0		

Flow Measurement

SITRANS F US Clamp-on

Accessories/Spare parts

Selection and Ordering data	Article No.
<i>Spare parts (Miscellaneous)</i>	
SITRANS F US clamp-on	7ME3960 - 
Insert RTD Thermowells	
• Thermowell std. duty uninsulated pipe 140 mm (5.5 inch)	CQO:1012TW-1
• Thermowell std. duty uninsulated pipe 216 mm (8.5 inch)	CQO:1012TW-2
• Thermowell std. duty uninsulated pipe 292 mm (11.5 inch)	CQO:1012TW-3
• Thermowell std. duty with lagging 140 mm (5.5 inch)	CQO:1012TW-1L
• Thermowell std. duty with lagging 216 mm (8.5 inch)	CQO:1012TW-2L
• Thermowell std. duty with lagging 292 mm (11.5 inch)	CQO:1012TW-3L
Sensor cables for (Use "Sensor cable selection chart" to complete Article 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 Article 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	Article No.
<i>Spare parts (Miscellaneous)</i>	
SITRANS F US clamp-on	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: -40 ... +230 °C (-40 ... +450 °F)	0UC30
• Permanent vulcanizing silicone rubber couplant: 90 ml (3 oz): -40 ... +120 °C (-40 ... +250 °F)	CQO:CC112
• Permanent high temp silicone grease: 12 ml (0.4 oz): -40 ... +230 °C (-40 ... +450 °F)	CQO:CC117
• Permanent high temp silicone grease: 150 ml (5 oz): -40 ... +230 °C (-40 ... +450 °F)	CQO:CC117A
• Couplant for submersible sensor applications	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 (For one pair of sensors)	
• B1, B2, B3, C1 and C2 sensors	0DM10
• D1 and D3 sensors	0DM20
• D2 sensor	0DM30
• D4 sensor	0DM40
Serial RS 232 Cables and I/O Adapters	
• RS 232 Cable for all dedicated meters	0CS00
• RS 232 Cable for IP66 weatherproof portable meter	3CS00
• RS 232 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)	A5E02830664-03

Sensor cable selection chart (Dedicated, pair)

Sensor cable codes for length and type options				
Cable length m (ft)	Standard	Submersible	Plenum	Armored
	-40 ... +80 °C (-40 ... +176 °F)	-40 ... +80 °C (-40 ... +176 °F)	-40 ... +200 °C (-40 ... +392 °F)	-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	Plenum
	-40 ... +80 °C (-40 ... +176 °F)	-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	Submersible	for insert RTD	for submersible insert RTD
	-40 ... +200 °C (-40 ... +392 °F)	-40 ... +200 °C (-40 ... +392 °F)	-40 ... +200 °C (-40 ... +392 °F)	-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

RTD cable codes for length and type options		
Cable length m (ft)	IP67, FUP1010	IP40, FUE1010
	-40 ... +200 °C (-40 ... +392 °F)	-40 ... +200 °C (-40 ... +392 °F)
Order Code		
6 (20)	R11	R01
15 (50)	R12	R02
30 (100)	R13	R03

Flow Measurement

SITRANS F X

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 consumption 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).

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	Flange	Sandwich	Dual transmitter
Compact			
Remote			

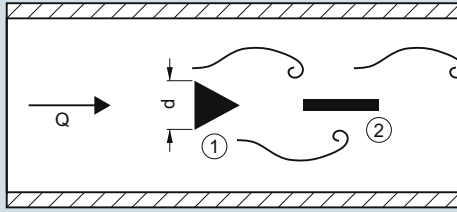
Design

The unit is available in a compact or a remote version with up to 15 meter distance from flowmeter to transmitter. When ordering a remote version the transducer cables are pre-mounted and ready for installation.

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.



① = Bluff Body, ② = Pick-up

The flowmeter calculates the flow velocity using the following equation:

$$Q = A \cdot V = A \cdot d / St \cdot f = 101.93 \cdot f / K \text{ [m}^3\text{/h]}$$

Where:

Q = flow rate [m³/h]

f = vortex shedding frequency [Hz]

K = calibration constant [pulses/m³]

d = width of the bluff body [m]

St = Strouhal Number

A = cross-section area [m²]

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 energy 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.
- **Vortex flowmeter - remote version**
Sensors and transmitters mounted separately. The device is equipped with temperature sensor (standard), pressure sensor (optional) and isolation valve (optional) providing all the features of the compact mounted version.

SITRANS FX300 Dual transmitter

This is a genuine redundant system with two independent sensors and two transmitters 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.	$R_{\max} = (U_{\text{Power Supply}} - 14 \text{ V}) / 22 \text{ mA}$
• 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, $U < 2 \text{ V}$
• Ex version	open < 1 mA, max. 30 V, closed 100 mA, $U < 2 \text{ V}$
Accuracy	
Standard version	
• For liquids	
- $Re \geq 20\,000$	± 0.75 %
• For steam and gases	
- $Re \geq 20\,000$	± 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 %
- $Re \geq 20\,000$	± 0.75 %
• For gases and steam	
- $10\,000 < Re < 20\,000$	± 2.5 %
- $Re \geq 20\,000$	± 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

Flow Measurement

SITRANS F X

SITRANS FX300

3

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 thermal energy of steam is to be measured	Order option 5
In options Y51 to Y56 add information regarding:	<ul style="list-style-type: none"> • 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).
Density compensated by temperature and pressure for gases, wet gases	Order option 7
Wet gases	Select Y49 and enter relative humidity in %
FAD - Free Air Delivery	
When the delivered air of a compressor is to be measured	Order option 8
In Y81 to Y87 add information regarding:	<ul style="list-style-type: none"> • 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 (Pick-up/Pressure sensor)	AISI 316L (1.4435) / FPM or FFKM FPM (Viton) for steam and non-aggressive gases. FFKM (Kalrez) for chlorine and other aggressive gases. (FPM/FFKM gaskets are only supplied if FX300 is configured with 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

Selection and Ordering data		Article No.	Ord. code	Selection and Ordering data		Article No.	Ord. code
SITRANS FX300 Flanged Single transmitter and T_{max} = 240 °C (464 °F)		7ME2600-		SITRANS FX300 Flanged Single transmitter and T_{max} = 240 °C (464 °F)		7ME2600-	
Connection size	Sensor size			Pressure sensor and isolation valve			
DN 15 (½")	DN 15	1 A		Without pressure sensor		A	
DN 25 (1")	DN 25	2 B		With pressure sensor, range:			
DN 40 (1½")	DN 40	2 K		4 bar (58 psi)		B	
DN 50 (2")	DN 50	2 R		6 bar (87 psi)		D	
DN 80 (3")	DN 80	3 L		10 bar (145 psi)		E	
DN 100 (4")	DN 100	3 S		16 bar (232 psi)		G	
DN 150 (6")	DN 150	4 M		25 bar (363 psi)		H	
DN 200 (8")	DN 200	4 T		40 bar (580 psi)		K	
DN 250 (10")	DN 250	4 W		60 bar (870 psi)		L	
DN 300 (12")	DN 300	5 E		100 bar (1450 psi)		N	
Flange norm and nominal pressure				With isolation valve and pressure sensor, range:			
Form B1/B2	EN 1092-1			4 bar (58 psi)		P	
PN 10	DN 200 ... 300	A		6 bar (87 psi)		Q	
PN 16	DN 50 ... 300	B		10 bar (145 psi)		R	
PN 25	DN 200 ... 300	C		16 bar (232 psi)		S	
PN 40	DN 15 ... 300	D		25 bar (363 psi)		U	
PN 63	DN 50 ... 150	E		40 bar (580 psi)		V	
PN 100	DN 15 ... 150	F		60 bar (870 psi)		W	
RF	ASME B16.5			100 bar (1450 psi)		Y	
150 lb	½ ... 12"	J					
300 lb	½ ... 12"	K		Software			
600 lb	½ ... 6"	L		Uncompensated for gases, wet gases, steam and liquids, respectively, temperature compensation for saturated steam		1	
Sensor material/Gasket				Density compensation for superheated steam		4	
St. steel AISI 316L (1.4404)/AISI 316L (1.4435)/FPM		1		Density compensation for superheated steam and setting of Gross heat Opt. Y51 ... Y56 for Energy measuring		5	
St. steel AISI 316L (1.4404)/AISI 316L (1.4435)/FFKM		5		Density compensation for gases and wet gases and setting of Relative humidity at opt. Y49		7	
Transmitter design				Density compensation for gases, wet gases and setting of FAD - free air delivery Opt. Y49 and Y81 ... Y87 for Compressor settings		8	
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					
Approval and cable gland							
Non-Ex, M20 x 1.5		1					
Non-Ex, ½" NPT		2					
FM approval Class 1 Div. 2, M20 x 1.5		3					
ATEX, M20 x 1.5		4					
ATEX, ½" NPT		5					
FM approval Class 1 Div. 1, M20 x 1.5		6					
FM approval Class 1 Div. 1, 1/2" NPT		7					
FM approval Class 1 Div. 2, 1/2" NPT		8					
Further approvals and cable glands							
IEC Ex with M20 x 1.5		9	N 0 A				
IEC Ex with ½" NPT		9	N 0 B				
Transmitter, display and communication							
With display, HART			A				

Flow Measurement

SITRANS F X

SITRANS FX300

Selection and Ordering data

Additional information

Please add "-Z" to Article No. and specify as minimum Order code Y40, Y41, Y42 and Y45 and plain text.

Input process data

	Order code
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 ¹⁾	Y81
Atmosphere pressure ¹⁾	Y82
Pressure drop filter ²⁾	Y83
Inlet relative humidity ¹⁾	Y84
Actual revolutions per minute (of compressor) ²⁾	Y85
Rated Rpm of compressor ²⁾	Y86
Outlet relative humidity ²⁾	Y87

¹⁾ Information to be provided by customer.

²⁾ Information is available on the data sheet from the compressor supplier.

Operating instructions

Description	Article 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

Further designs

Please add "-Z" to Article No. and specify Order code.

Converter housing material

Aluminum for increased requirement, color: petrol green	A10
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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
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Hardness test

Hardness test on pressure bearing parts + 3.1 Equotip LD procedure according to NACE MR 0175-01	H30
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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

Selection and Ordering data		Article No.	Ord. code
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	
10 m (32.8 ft)		3	
15 m (49.2 ft)		4	
Approval and cable gland			
Non-Ex, M20 x 1.5		1	
Non-Ex, ½" NPT		2	
FM approval Class 1 Div. 2, M20 x 1.5		3	
ATEX, M20 x 1.5		4	
ATEX, ½" NPT		5	
FM approval Class 1 Div. 1, M20 x 1.5		6	
FM approval Class 1 Div. 1, 1/2" NPT		7	
FM approval Class 1 Div. 2, 1/2" NPT		8	
Further approvals and cable glands			
IEC Ex with M20 x 1.5		9	N 0 A
IEC Ex with ½" NPT		9	N 0 B
Transmitter, display and communication			
With display, HART			A

Selection and Ordering data		Article No.	Ord. code
SITRANS FX300 Sandwich Single transmitter and T_{max} = 240 °C (464 °F)		7ME2700	
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
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

Flow Measurement

SITRANS F X

SITRANS FX300

Selection and Ordering data

Additional information

Please add "-Z" to Article 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 temperature¹⁾ **Y81**

Atmosphere pressure¹⁾ **Y82**

Pressure drop filter²⁾ **Y83**

Inlet relative humidity¹⁾ **Y84**

Actual revolutions per minute (of compressor)²⁾ **Y85**

Rated Rpm of compressor²⁾ **Y86**

Outlet relative humidity²⁾ **Y87**

¹⁾ Information to be provided by customer.

²⁾ Information is available on the data sheet from the compressor supplier.

Operating instructions

Description	Article No.
English	A5E2100423

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<http://www.siemens.com/flowdocumentation>

Selection and Ordering data

Further designs	Order code
Please add "-Z" to Article 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 **H30**

Equotip LD procedure according to NACE MR 0175-01

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**

Selection and Ordering data		Article No.	Ord. code
SITRANS FX300 Flanged Dual transmitter and T_{max} = 240 °C (464 °F)		7ME2800-	
Connection size	Sensor size		
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 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	
Approval and cable gland			
Non-Ex, M20 x 1.5		1	
Non-Ex, ½" NPT		2	
FM approval Class 1 Div. 2, M20 x 1.5		3	
ATEX, M20 x 1.5		4	
ATEX, ½" NPT		5	
FM approval Class 1 Div. 1, M20 x 1.5		6	
FM approval Class 1 Div. 1, 1/2" NPT		7	
FM approval Class 1 Div. 2, 1/2" NPT		8	
Further approvals and cable glands			
IEC Ex with M20 x 1.5		9	N 0 A
IEC Ex with ½" NPT		9	N 0 B
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
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Additional information

Please add "-Z" to Article 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	Article No.
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English	A5E2100423
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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
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Further designs

Please add "-Z" to Article 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**



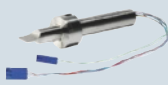

Stainless steel tag with 2.5 mm characters, max. 8 x 40 characters (120 x 46 mm, add plain text) **Y18**

Flow Measurement

SITRANS F X

SITRANS FX300

SITRANS FX300 spare parts

Description	Article 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. 1/2" socket)	A5E02181087	
• DN 25 (incl. 1" socket)	A5E02181116	
• DN 40 ... 100	A5E02181152	
• DN 150 ... 300	A5E02275105	
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

Service Toolbox for programming the software (basic, steam and gas) as well as for changing settings and parameters.

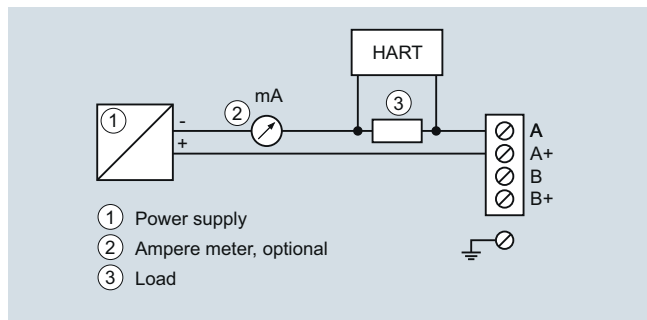
Note: Dedicated service training is required. Please contact Customer Support.

Article No.

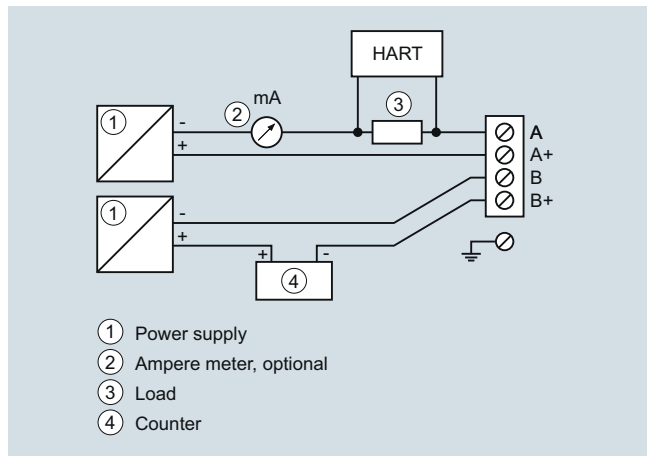
A5E02375819



Schematics



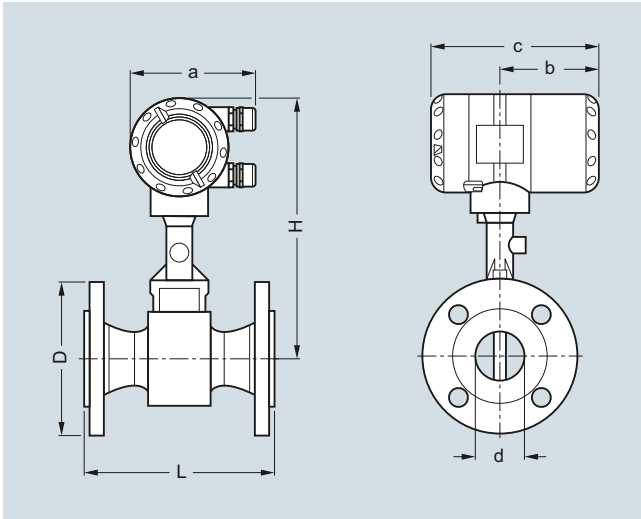
Load for HART communication



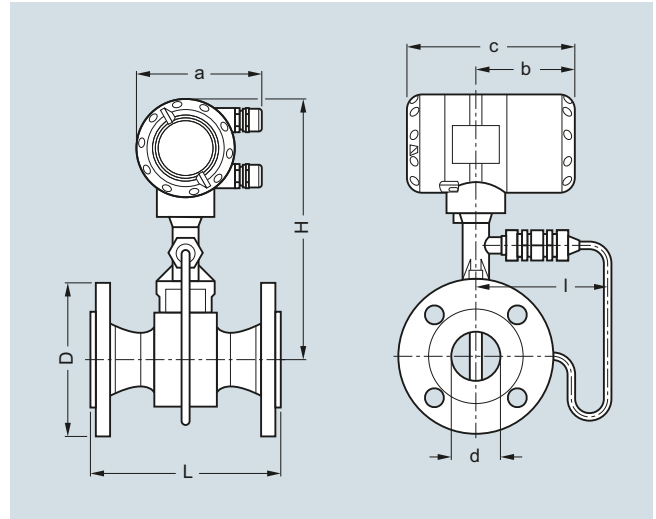
Connection pulse output

Dimensional drawings

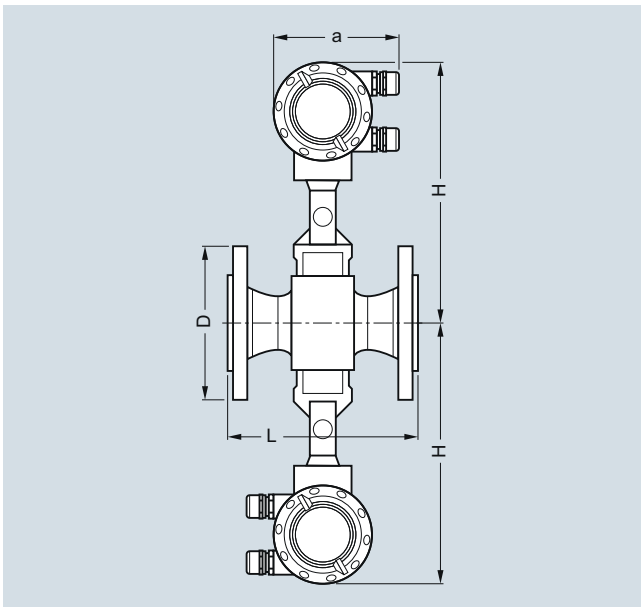
Compact version



Flange version



Flange version with pressure sensor



Flange version, dual converter

3

Flow Measurement

SITRANS F X

SITRANS FX300

Flange version EN1092-1

Size DN	Pres- sure rating PN	Dimensions [mm (inch)]								Weight [kg (lb)] ¹⁾	
		a	b	c	d	D	L	H	I	Flowmeter (without pres- sure sensor)	Flowmeter (with pres- sure sensor)
15	40	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	307.9 (12.12)	515 (20.28)	450 (17.72)	395 (15.55)	244 (9.61)	127.5 (281.09)	128.1 (282.41)

¹⁾ For dual converter: specified weight + 2.80 kg (6.17 lb).

Flange version ASME B16.5

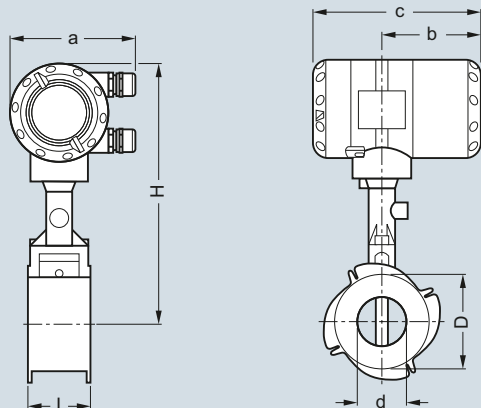
Size DN	Pres- sure rating Class	Dimensions [mm (inch)]								Weight [kg (lb)] ¹⁾	
		a	b	c	d	D	L	H	I	Flowmeter (without pressure sen- sor)	Flowmeter (with pres- sure sensor)
½	150	133 (5.24)	105 (4.13)	179 (7.05)	15.8 (0.62)	90 (3.54)	200 (7.87)	265 (10.43)	144 (5.67)	4.5 (9.92)	5.1 (11.24)
½	300	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	304.8 (12.00)	520 (20.47)	450 (17.72)	395 (15.55)	244 (9.61)	151.3 (333.56)	151.9 (334.88)

¹⁾ For dual converter: specified weight + 2.80 kg (6.17 lb).

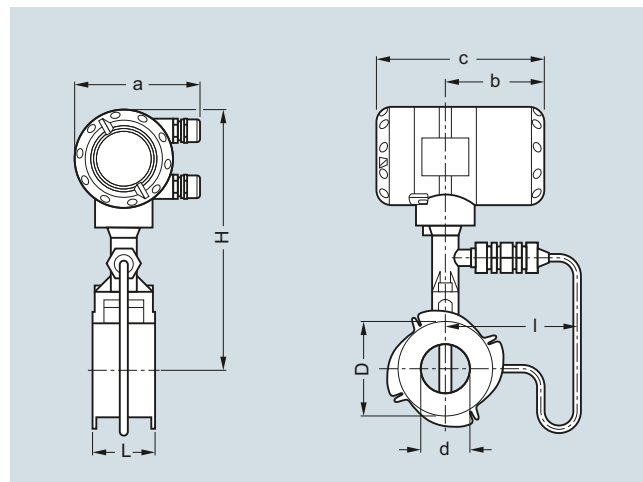
Flow Measurement

SITRANS F X

SITRANS FX300



Sandwich version



Sandwich version with pressure sensor

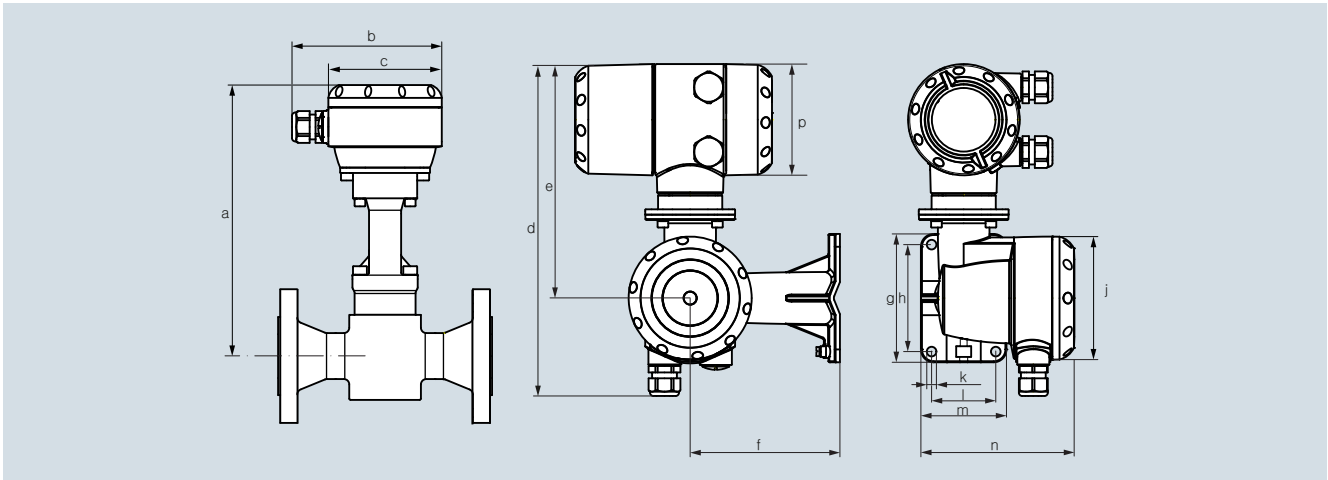
Sandwich version EN

Size DN	Pressure rating PN	Dimensions [mm (inch)]								Weight [kg (lb)]	
		a	b	c	d	D	L	H	I	Flowmeter (without pressure sensor)	Flowmeter (with pres- sure sensor)
15	16 ... 100	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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	133 (5.24)	105 (4.13)	179 (7.05)	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 DN	Pressure rating Class	Dimensions [inch]								Weight [lb]	
		a	b	c	d	D	L	H	I	Flowmeter (without pressure sensor)	Flowmeter (with pres- sure sensor)
½"	150, 300, 600	5.24	4.13	7.05	0.63	1.77	2.56	10.43	5.67	7.72	9.04
1"	150, 300, 600	5.24	4.13	7.05	0.94	2.56	2.56	10.43	5.67	9.48	10.80
1½"	150, 300, 600	5.24	4.13	7.05	1.50	3.23	2.56	10.63	5.67	10.80	12.13
2"	150, 300, 600	5.24	4.13	7.05	1.97	4.02	2.56	10.83	5.67	13.23	14.55
3"	150, 300, 600	5.24	4.13	7.05	2.91	5.31	2.56	11.42	6.10	18.08	19.40
4"	150, 300, 600	5.24	4.13	7.05	3.82	6.22	2.56	12.20	6.46	20.94	22.27

Remote version



Flanged version

DN	15	25	40	50	80	100	150	200	250	300			
	½"	1"	1½"	2"	3"	4"	6"	8"	10"	12"			
	a												
[mm]	248	248	253	258	273	293	308	333	353	378			
[inch]	9.77	9.77	9.97	10.2	10.8	11.5	12.1	13.1	13.9	14.9			
	b	c	d	e	f	g	h	j	k	l	m	n	p
[mm]	140	Ø106	310	219	140	120	100	Ø115	Ø9 (4x)	60	80	144	104
[inch]	5.52	Ø4.18	12.2	8.63	5.52	4.73	3.94	Ø4.53	Ø0.36 (4x)	2.36	3.15	5.67	4.09

Sandwich version

DN	15	25	40	50	80	100							
	½"	1"	1½"	2"	3"	4"							
	a												
[mm]	248	248	253	258	273	293							
[inch]	9.77	9.77	9.97	10.2	10.8	11.5							
	b	c	d	e	f	g	h	j	k	l	m	n	p
[mm]	140	Ø106	310	219	140	120	100	Ø115	Ø9 (4x)	60	80	144	104
[inch]	5.52	Ø4.18	12.2	8.63	5.52	4.73	3.94	Ø4.53	Ø0.36 (4x)	2.36	3.15	5.67	4.09

Flow Measurement

SITRANS F X

SITRANS FX300

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		Minimum flow rates [m/s]	Maximum flow rates [m/s]
	to EN	to ASME		
Liquids	DN 15 ... DN 300	DN ½" ... DN 12"	0.5 × (998/ρ) ^{0.5 1)}	7 × (998/ρ) ^{0.47 1)}
Gas, steam/vapor	DN 15 ... DN 300	DN ½" ... DN 12"	6 × (1.29/ρ) ^{0.5 2)}	7 × (998/ρ) ^{0.47 3)}

ρ = operating density [kg/m³]

- 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)

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

Flow Measurement

SITRANS F X

SITRANS FX300

Measuring range saturated steam: 15 to 100 psig

Overpressure [psig]		15		50		75		100	
Density [lb/ft ³]		0.0719		0.1497		0.2036		0.2569	
Temperature [°F]		249.98		297.86		320.36		338.184	
Flow [lb/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 [lb/ft ³]		0.3627		0.4681		0.5735		0.6792	
Temperature [°F]		366.08		388.04		406.22		422.06	
Flow [lb/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

Overview



SITRANS FVA250 variable area meter

Benefits

- 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

Application

The devices are particularly suitable for measuring:

- Water
- Liquids
- Anti-corrosives and lubricants
- Solvents
- Saturated and superheated steam
- Food and beverages
- Industrial gases

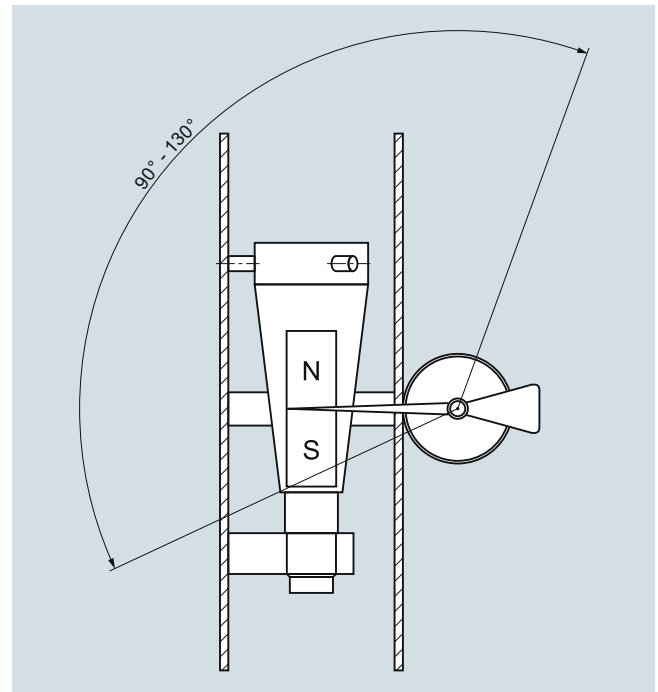
Design

Due to its full metal design, the SITRANS FVA250 variable area meter with a standard length of 250 mm (9.84 inch) can be used to measure many different types of liquids and gases passing through closed piping. The robust design means that it can also be used in harsh conditions. The various types of flange connections, linings and float materials satisfy the requirements of the pharmaceutical and chemical industries.

The measured value is displayed directly on the scale with the standard version. For process monitoring and control, the device can be equipped with a transmitter (MEM) as well as limit switches.

Function

Flow measurement with the SITRANS FVA250 is performed according to the float principle. The flowing medium lifts the conical float in the measuring ring. This increases the ring gap until an equilibrium is established between the buoyant force of the medium and the weight of the float. The height of the float is directly proportional to the flow rate. The movement of the float is transmitted from one magnet to another magnet in the display unit outside of the measuring tube.



Measuring cone/scale angle

Flow Measurement

SITRANS F VA

SITRANS FVA250 variable area meter

Technical specifications

Application	See page 3/401
Design and function	See page 3/401
Measuring principle	Variable area flowmeter
Input	
Measuring range	See table on page 3/403
Pressure rating	PN 16 ... PN 100 (232 ... 1450 psi) depending on version (see table on page 3/403)
Installation/flow direction	Vertical/from bottom to top
Rated operating conditions	
Ambient temperature	
• With local display	-40 ... +80 °C (-40 ... +176 °F)
• With limit switches	-40 ... +65 °C (-40 ... +149 °F)
• With electric remote encoder (MEM)	-40 ... +70 °C (-40 ... +156 °F)
Measuring accuracy	
• For liquids	± 1.6%
• For gases	± 2.0%
Reproducibility	0,5 % of the measuring range limit (URV)
Operating temperature	see page 3/403
Operating pressure	Min. operating pressure > 2x pressure drop (see table on page 3/403)
Design	
Flanges	EN 1092-1, ANSI B16.5
Material	
• Fitting	Stainless steel 1.4404/316L
• Float	Stainless steel 1.4404/316L, Hastelloy, PTFE
• Wetted parts materials	Stainless steel 1.4404/316L, PTFE, 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 sector
• EN 50081-1	Emitted interference residential sector
• EN 55011: 1998 + A1: 1999	Group 1, Class B
• NAMUR recommendation	NE 21

Classification according to pressure equipment directive (DGRL 97/23/EG)

	Article 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 switch	
Cable gland	M20x1,5
Auxiliary power supply	5 ... 25 V DC
Isolation (2 contacts)	Electrically isolated
Limit switch	SJ3.5-N-BU
• Switching function	NAMUR NC
Nominal voltage U_0	8,2 V DC (R_i approx. 1 k Ω)
Explosion protection	II 2G EEx ia IIC T6 - T4
EC-Type Examination Certificate for Directive 94/9/EG	PTB 99 ATEX 2219 X
Transmitter (MEM) with 4 ... 20 mA, pulse output and limit switch	
Cable gland	M20x1,5
Auxiliary power supply	14 ... 30 V DC
Analog output	4 ... 20 mA (2-wire technology)
Binary output	Pulses, limit switch
• Pulses	Max. pulse rate 10 Hz
• Limit switch	SJ3.5-N-BU (NAMUR, NC)
Temperature influence	$\leq \pm 0,5$ % of the measuring range limit (URV)/10 K
Explosion protection	ATEX II 2G EEx ia IIC T6
EC-Type Examination Certificate for Directive 94/9/EG	DMT 00 ATEX E 075
Transmitter (MEM) PROFIBUS PA	
Cable gland	M20x1,5
Auxiliary power supply	10 ... 25 V DC
Basic current	< 16,5 mA
Fault current	< 18 mA
Transfer rate	31,25 kBaud
Temperature influence	$\leq \pm 0,5$ % of the measuring range limit (URV)/10 K
Explosion protection	ATEX II 2G EEx ia IIC T6
EC-Type Examination Certificate for Directive 94/9/EG	DMT 00 ATEX E 075

Float damping

Float damping is recommended

- Generally for gas measurement
- When air bubbles in the medium cannot be avoided.
- When there are pressure surges in the lines caused by a delay in the flow, for example, due to rapid throttling or blocking
- When turbulence, pulsations or other instabilities cause the float to vibrate.
- When the flow pressure cannot be built up slowly
- When vibrations in the line cannot be avoided

Technical specifications (continued)

Permitted measuring ranges

Version	CF-S	EF-H	FF-P ¹⁾
Wetted parts materials	Mat. no. 1.4404/316L	Hastelloy C	PTFE
Fitting	Mat. no. 1.4404/316L	≤ DN 25 (1"): Hastelloy > DN 25 (1"): Hastelloy/stainless steel 1.4404/316L	Mat. no. 1.4404/316L with PTFE lining
Flange	Mat. no. 1.4404/316L	≤ DN 25 (1"): Hastelloy > DN 25 (1"): Hastelloy/Edelstahl 1.4404/316L	Mat. no. 1.4404/316L
Float/flow tube	Mat. no. 1.4404/316L	Hastelloy	PTFE
Max. media temperature	-20 ... +200 °C (-4 ... +392 °F) (optional -80 ... +300 °C (-112 ... +572 °F))		-20 ... +125 °C (-4 ... +257 °F)
Nominal pressure	DN15 ... 80 (½ ... 3"): PN 40 (580 psi) DN100 (4"): PN 16 (232 psi) optional to 400 bar (5800 psi)	DN15 ... 80 (½ ... 3"): PN 40 (580 psi) DN100 (4"): PN 16 (232 psi) optional to 400 bar (5800 psi)	PN 16 (232 psi)
Reference data for measuring range specifications	Fluid 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 0 °C (32 °F), viscosity: 0,0181 mPa·s, p _e = 0 bar (0 psi)		

Order code	Pressure loss [mbar]							Measuring ranges (dynamic 1:10)			
	Flow tube							Liquids		Gases	
	1	2	3	4	5	6	7	[l/h]	[USgpm]	[m ³ /h]	[scfm]
10	40 ¹⁾	40 ²⁾	-	-	-	-	-	0.5 ... 5	0.0022 ... 0.022	0.015 ... 0.15	0.0088 ... 0.088
11	44 ¹⁾	44 ²⁾	-	-	-	-	-	0 ... 10	0.0044 ... 0.044	0.03 ... 0.3	0.0177 ... 0.177
12	40 ¹⁾	40 ²⁾	-	-	-	-	-	1.6 ... 16	0.007 ... 0.07	0.045 ... 0.48	0.0265 ... 0.283
13	40 ¹⁾	40 ²⁾	-	-	-	-	-	2.5 ... 25	0.011 ... 0.11	0.075 ... 0.75	0.0441 ... 0.441
14	40 ¹⁾	40 ²⁾	-	-	-	-	-	4 ... 40	0.018 ... 0.18	0.13 ... 1.3	0.0765 ... 0.765
15	-	40 ²⁾	-	-	-	-	-	5 ... 50	0.022 ... 0.22	0.15 ... 1.5	0.0883 ... 0.883
16	-	40 ²⁾	-	-	-	-	-	7 ... 70	0.031 ... 0.31	0.2 ... 2.1	0.12 ... 1.24
17	-	60	60 ³⁾	-	-	-	-	10 ... 100	0.044 ... 0.44	0.3 ... 3	0.177 ... 1.77
20	-	60	60 ³⁾	-	-	-	-	16 ... 160	0.07 ... 0.7	0.5 ... 4.6	0.29 ... 2.71
21	-	60	60 ³⁾	-	-	-	-	25 ... 250	0.11 ... 1.1	0.7 ... 7	0.412 ... 4.12
22	-	70	70 ³⁾	-	-	-	-	40 ... 400	0.176 ... 1.76	1.0 ... 11	0.589 ... 6.47
23	-	80	80 ³⁾	-	-	-	-	60 ... 600	0.264 ... 2.64	1.7 ... 17	1 ... 10
24	-	-	60	-	-	-	-	100 ... 1 000	0.44 ... 4.4	2 ... 30	1.77 ... 17.66
25	-	-	70	-	-	-	-	160 ... 1 600	0.7 ... 7	3 ... 46	2.35 ... 27.07
26	-	-	100	50	-	-	-	250 ... 2 500	1.1 ... 11	6 ... 70	4.12 ... 41.2
27	-	-	240 ²⁾	120	80	-	-	400 ... 4 000	1.76 ... 17.6	10 ... 110	6.47 ... 64.74
30	-	-	-	180 ²⁾	90	-	-	600 ... 6 000	2.64 ... 26.4	16 ... 170	10 ... 100
31	-	-	-	-	110	-	-	1 000 ... 10 000	4.4 ... 44	28 ... 290	17.1 ... 170.7
32	-	-	-	-	230	70	-	1 600 ... 16 000	7 ... 70	45 ... 460	27.1 ... 270.7
33	-	-	-	-	230	70 ²⁾	-	2 000 ... 20 000	8.8 ... 88	55 ... 550	32.4 ... 323.7
34	-	-	-	-	500 ²⁾	100	-	2 500 ... 25 000	11 ... 110	69 ... 700	41.2 ... 412
35	-	-	-	-	-	350 ²⁾	120	4 000 ... 40 000	17.6 ... 176	109 ... 1 100	64.7 ... 647.4
36	-	-	-	-	-	350 ²⁾	120 ²⁾	5 000 ... 50 000	22 ... 220	134 ... 1 350	79.5 ... 794.6
37	-	-	-	-	-	-	360 ²⁾	6 000 ... 60 000	26.4 ... 264	169 ... 1 700	100 ... 1 000
40	-	-	-	-	-	-	600 ²⁾	8 000 ... 80 000	35.2 ... 352	239 ... 2 400	141.3 ... 1 413
41	-	-	-	-	-	-	600 ²⁾	10 000 ... 100 000	44 ... 440	299 ... 3 000	176.6 ... 1 766

- Not available

¹⁾ Not available for EF-H and FF-P.²⁾ Not available for FF-P.³⁾ Not available for CF-S and EF-H.

Note: Female thread connection (DIN ISO 228, NPT ANSI B 1.20.1) not available for FF-P.

Flow Measurement

SITRANS F VA

SITRANS FVA250 variable area meter

Permitted nominal diameters

Order Code	Flange		Measurement cone						
	EN 1092-1	ANSI B16.5	1	2	3	4	5	6	7
A	DN 15	½"	• ¹⁾	•	• ²⁾	–	–	–	–
B	DN 20	¾"	• ¹⁾	• ²⁾	• ²⁾	–	–	–	–
C	DN 25	1"	• ¹⁾	• ²⁾	•	• ²⁾	–	–	–
D	DN 32	1¼"	• ¹⁾	• ²⁾	• ²⁾	• ²⁾	–	–	–
E	DN 40	1½"	• ¹⁾	• ²⁾	• ²⁾	•	–	–	–
F	DN 50	2"	• ¹⁾	• ²⁾	• ²⁾	• ²⁾	•	–	–
G	DN 65	2½"	–	–	•	•	• ²⁾	–	–
H	DN 80	3"	–	–	–	•	• ²⁾	•	–
J	DN 100	4"	–	–	–	–	• ²⁾	• ²⁾	•

Order Code	Female thread		Measurement cone						
	DIN ISO 228	NPT ANSI B 1.20.1	1	2	3	4	5	6	7
Q	G ¼"	¼" NPT	•	•	–	–	–	–	–
R	G 3/8"	3/8" NPT	•	•	–	–	–	–	–
S	G ½"	½" NPT	•	•	•	•	–	–	–
T	G ¾"	¾" NPT	•	•	•	•	–	–	–
U	G 1"	1" NPT	•	•	•	•	•	–	–
V	G 1¼"	1¼" NPT	•	•	–	•	•	–	–
W	G 1½"	1½" NPT	–	–	–	•	•	–	–
X	G 2"	2" NPT	–	–	–	–	•	–	–

• Available

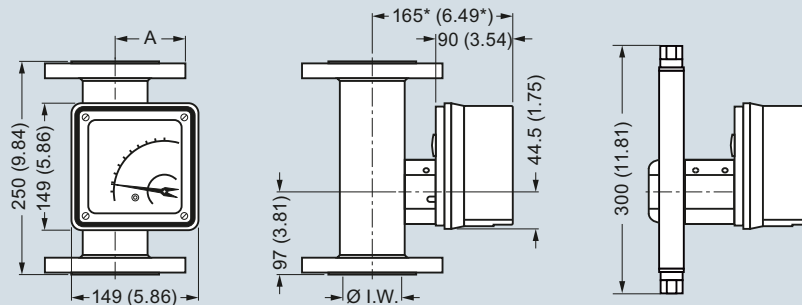
– Not available

¹⁾ Not available for EF-H and FF-P.

²⁾ Not available for FF-P.

Note: Female thread connection (DIN ISO 228, NPT ANSI B 1.20.1) not available for FF-P.

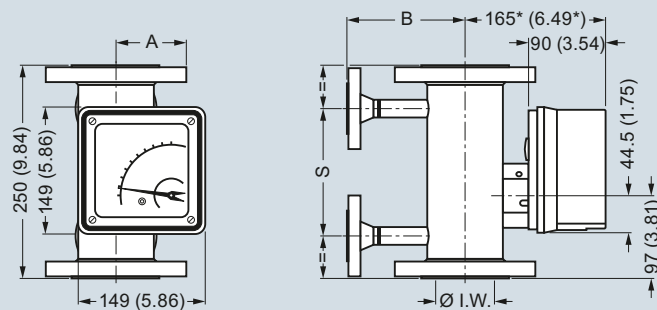
Dimensional drawings



EN 1092-1		ANSI B16.5		I. W.		A		Weight	
				mm	inch	mm	inch	kg	lb
DN 15	PN 40	½"	class 150	26	1.02	74	2.91	3.0	6.6
DN 20	PN 40	¾"	class 150	26	1.02	74	2.91	3.0	6.6
DN 25	PN 40	1"	class 150	32	1.26	77	3.03	4.2	9.3
DN 32	PN 40	1¼"	class 150	32	1.26	77	3.03	5.2	11.5
DN 40	PN 40	1½"	class 150	46	1.81	88	3.46	6.0	13.2
DN 50	PN 40	2"	class 150	70	2.76	97	3.82	7.5	16.5
DN 65	PN 16	2½"	class 150	70	2.76	97	3.82	8.5	18.7
DN 80	PN 16	3"	class 150	102	4.02	113	4.45	13	28.7
DN 100	PN 16	4"	class 150	125	4.92	126	4.96	18	39.7

* +100 mm (3.94 inch) with displaced display unit

SITRANS FVA250, enclosure of display unit made of aluminum, dimensions in mm (inch)



Nominal diameter	B (flange)		B (Ermeto)		S		Weight		
	mm	inch	mm	inch	mm	inch	kg	lb	
DN 15	½"	110	4.33	53	2.09	150	5.91	3.0	6.6
DN 20	¾"	110	4.33	53	2.09	150	5.91	3.0	6.6
DN 25	1"	110	4.33	58.5	2.3	150	5.91	4.2	9.3
DN 32	1¼"	110	4.33	58.5	2.3	150	5.91	5.2	11.5
DN 40	1½"	130	5.12	63	2.48	150	5.91	6.0	13.2
DN 50	2"	140	5.51	77.5	3.05	150	5.91	7.5	16.5
DN 65	2½"	140	5.51	77.5	3.05	150	5.91	8.5	18.7
DN 80	3"	160	6.3	93.5	3.68	150	5.91	13	28.7
DN 100	4"	175	6.89	110	4.33	120	4.72	18	39.7

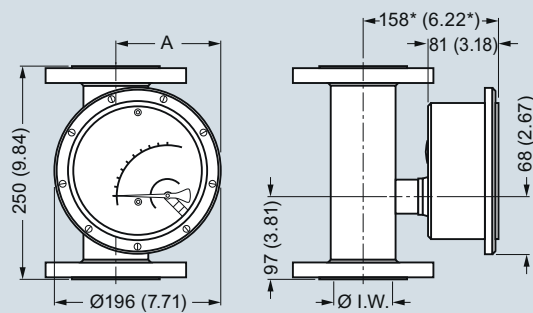
* +100 mm (3.94 inch) with displaced display unit

SITRANS FVA250, enclosure of display unit made of aluminum with heating connection, dimensions in mm (inch)

Flow Measurement

SITRANS F VA

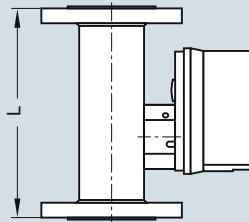
SITRANS FVA250 variable area meter



EN 1092-1		ANSI B16.5		I. W.		A		Gewicht	
				mm	inch	mm	inch	kg	lb
DN 15	PN 40	½"	class 150	26	1.02	103	4.06	3.0	6.6
DN 20	PN 40	¾"	class 150	26	1.02	103	4.06	3.0	6.6
DN 25	PN 40	1"	class 150	32	1.26	105	4.13	4.2	9.3
DN 32	PN 40	1¼"	class 150	32	1.26	105	4.13	5.2	11.5
DN 40	PN 40	1½"	class 150	46	1.81	115	4.53	6.0	13.2
DN 50	PN 40	2"	class 150	70	2.76	129	5.08	7.5	16.5
DN 65	PN 16	2½"	class 150	70	2.76	129	5.08	8.5	18.7
DN 80	PN 16	3"	class 150	102	4.02	145	5.71	13	28.7
DN 100	PN 16	4"	class 150	125	4.92	158	6.22	18	39.7

* +100 mm (3.94 inch) with displaced display unit

SITRANS FVA250, enclosure of display unit made of stainless steel, dimensions in mm (inch)



Nominal diameter	EN 1092-1				Nominal diameter	ANSI B16.5		
	PN 16	PN 40	PN63	PN100		class 150	class 300	class 600
DN 15	-	250 (9.84)	-	250 (9.84)	½"	250 (9.84)	250 (9.84)	250 (9.84)
DN 20	-	250 (9.84)	-	250 (9.84)	¾"	250 (9.84)	250 (9.84)	250 (9.84)
DN 25	-	250 (9.84)	-	250 (9.84)	1"	250 (9.84)	250 (9.84)	250 (9.84)
DN 32	-	250 (9.84)	-	250 (9.84)	1¼"	250 (9.84)	250 (9.84)	250 (9.84)
DN 40	-	250 (9.84)	-	250 (9.84)	1½"	250 (9.84)	250 (9.84)	250 (9.84)
DN 50	-	250 (9.84)	250 (9.84)	300 (11.81)	2"	250 (9.84)	250 (9.84)	300 (11.81)
DN 65	250 (9.84)	250 (9.84)	300 (11.81)	300 (11.81)	2½"	250 (9.84)	300 (11.81)	300 (11.81)
DN 80	250 (9.84)	250 (9.84)	300 (11.81)	300 (11.81)	3"	250 (9.84)	300 (11.81)	300 (11.81)
DN 100	250 (9.84)	250 (9.84)	300 (11.81)	300 (11.81)	4"	250 (9.84)	300 (11.81)	300 (11.81)

- not available

Build-in length of fitting in dependance of nominal diameter and pressure rating, dimensions mm (inch)

Selection and ordering data	Article No.	Order code
SITRANS FVA250 Full metal variable area meter	7ME586	- - - - -
Flow tube		
<u>Liquid</u>		
5 ... 40 l/h		1
50 ... 600 l/h		2
1 000 ... 4 000 l/h		3
2.5 ... 4 m ³ /h		4
4 ... 25 m ³ /h		5
16 ... 50 m ³ /h		6
63 ... 100 m ³ /h		7
<u>Gas</u>		
0.15 ... 1.3 m ³ /h		
1.5 ... 17 m ³ /h		
30 ... 110 m ³ /h		
70 ... 170 m ³ /h		
30 ... 700 m ³ /h		
460 ... 1 350 m ³ /h		
1 700 ... 3 000 m ³ /h		
Design		
<u>Type: CF-S (standard)</u>		2
Fitting: Stainless steel 1.4404/316L,		
Flange: Stainless steel 1.4404/316L		
Float: Stainless steel 1.4404/316L		
<u>Type: EF-H</u>		4
Fitting: Stainless steel 1.4404/316L,		
Flange: Stainless steel 1.4404/316L with Hastelloy lining		
Float: Hastelloy		
<u>Type: FF-P</u>		5
Fitting: Stainless steel 1.4404/316L,		
Flange: Stainless steel 1.4404/316L with PTFE lining		
Float: PTFE		
Nominal diameter		
DN 15/ANSI ½"		A
DN 20/ANSI ¾"		B
DN 25/ANSI 1"		C
DN 32/ANSI 1¼"		D
DN 40/ANSI 1½"		E
DN 50/ANSI 2"		F
DN 65/ANSI 2½"		G
DN 80/ANSI 3"		H
DN 100/ANSI 4"		J
Female thread ¼"		Q
Female thread 3/8"		R
Female thread ½"		S
Female thread ¾"		T
Female thread 1"		U
Female thread 1¼"		V
Female thread 1½"		W
Female thread 2"		X
Flange/thread standard - pressure rate		
EN 1092-1, PN 16, Form B1		B
EN 1092-1, PN 40, Form B1		D
EN 1092-1, PN 63, Form B2		E
EN 1092-1, PN 100, Form B2		F
ANSI B16.5, class 150 RF		J
ANSI B16.5, class 300 RF		K
ANSI B16.5, class 600 RF		L
Female thread G DIN ISO 228		T
Female thread NPT ANSI B1.20.1		N

Flow Measurement

SITRANS F VA

SITRANS FVA250 variable area meter

Selection and ordering data

Article No. Order code

SITRANS FVA250 Full metal variable area meter

7 ME 5 8 6 - - - - -

Measuring ranges

Liquids		Gases		Order code
l/h	(USgpm)	m ³ /h	(scfm)	
0.5 ... 5	(0.0022 ... 0.022)	0.015 ... 0.15	(0.0088 ... 0.088)	1 0
0 ... 10	(0.0044 ... 0.044)	0.03 ... 0.3	(0.0177 ... 0.177)	1 1
1.6 ... 16	(0.007 ... 0.07)	0.045 ... 0.45	(0.0265 ... 0.283)	1 2
2.5 ... 25	(0.011 ... 0.11)	0.075 ... 0.75	(0.0441 ... 0.441)	1 3
4 ... 40	(0.018 ... 0.18)	0.13 ... 1.3	(0.0765 ... 0.765)	1 4
5 ... 50	(0.022 ... 0.22)	0.15 ... 1.5	(0.0883 ... 0.883)	1 5
7 ... 70	(0.031 ... 0.31)	0.2 ... 2	(0.12 ... 1.24)	1 6
10 ... 100	(0.044 ... 0.44)	0.3 ... 3	(0.177 ... 1.77)	1 7
16 ... 160	(0.07 ... 0.7)	0.5 ... 5	(0.29 ... 2.71)	2 0
25 ... 250	(0.11 ... 1.1)	0.7 ... 7	(0.412 ... 4.12)	2 1
40 ... 400	(0.176 ... 1.76)	1.0 ... 11	(0.589 ... 6.47)	2 2
60 ... 600	(0.264 ... 2.64)	1.7 ... 17	(1 ... 10)	2 3
100 ... 1 000	(0.44 ... 4.4)	2 ... 30	(1.77 ... 17.66)	2 4
160 ... 1 600	(0.7 ... 7)	3 ... 46	(2.35 ... 27.07)	2 5
250 ... 2 500	(1.1 ... 11)	6 ... 70	(4.12 ... 41.2)	2 6
400 ... 4 000	(1.76 ... 17.6)	10 ... 110	(6.47 ... 64.74)	2 7
600 ... 6 000	(2.64 ... 26.4)	16 ... 170	(10 ... 100)	3 0
1 000 ... 10 000	(4.4 ... 44)	28 ... 290	(17.1 ... 170.7)	3 1
1 600 ... 16 000	(7 ... 70)	45 ... 460	(27.1 ... 270.7)	3 2
2 000 ... 20 000	(8.8 ... 88)	55 ... 550	(32.4 ... 323.7)	3 3
2 500 ... 25 000	(11 ... 110)	69 ... 700	(41.2 ... 412)	3 4
4 000 ... 40 000	(17.6 ... 176)	109 ... 1 100	(64.7 ... 647.4)	3 5
5 000 ... 50 000	(22 ... 220)	134 ... 1 350	(79.5 ... 794.6)	3 6
6 000 ... 60 000	(26.4 ... 264)	169 ... 1 700	(100 ... 1 000)	3 7
8 000 ... 80 000	(35.2 ... 352)	239 ... 2 400	(141.3 ... 1 413)	4 0
10 000 ... 100 000	(44 ... 440)	299 ... 3 000	(176.6 ... 1 766)	4 1

Display unit / process temperature

Standard (aluminum) - up to 200 °C with local display/150 °C with electrical output
 Standard (aluminum) - with displaced display
 Stainless steel IP66 - up to 150 °C with local display
 Stainless steel IP66 - with displaced display

0
1
2
3

Heating/cooling sheath

Without (standard)
 With flange connection EN1092-1 DN 15 PN 40
 With flange connection ½" ANSI B16.5 Class 150 RF

A
B
C

Display/outputs

With display
 With display, 1 inductive contact (limit switch) SJ 3.5N
 With display, 2 inductive contacts (limit switches) SJ 3.5N
 With display, HART and 4 to 20 mA
 With display, HART, 4 to 20 mA, 2 inductive contacts SJ 3.5N
 With display, HART, 4 to 20 mA, 1 inductive contact, 1 pulse output
 With display, PROFIBUS PA

A
B
C
D
E
F
G

Calibration

Standard calibration
 • Without calibration certificate
 • With calibration certificate

0
1

3




Selection and ordering data	Order code
Other types of liquid and gas measurement	
Please add "-Z" to Article No. and specify Order code.	
Marking of name plate	
Name plate in English	B11
Certificates	
Certificate of compliance EN 10204-2.1	C10
Factory inspection certificate EN 10204-2.2	C11
Acceptance test certificate 3.1 according to EN 10204	C12
Dye penetration test on pressure bearing weldings	C13
X-ray test of pressure bearing weldings	C14
Pressure test with acceptance test certificate 3.1 according to EN 10204	C15
PMI (positive material identification) test of pressure bearing metal parts	C16
Float damping	
With float damping	D01
Specification of medium process data (specify in plain text)	
Specification always required for each order:	
Medium	Y01
Operating pressure	
Operating temperature	
Density (when the medium unknown)	
Viscosity (when medium unknown)	
Measuring range	
TAG plate	
TAG plate in stainless steel (add plain text)	Y17
Cleaning to company standard	
Cleaning Class 2, with identification free of oil and grease	K46
Cleaning Class 1, with identification free of oil, grease and silicon	K48
Approvals	
With ATEX approval	M51
Special version (specify in plain text)	
	Y99
Note:	
For possible combinations of nominal diameters and flow tube, see table on page 3/404	

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

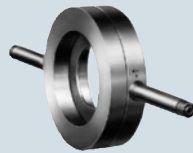
Technical description

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



+

For **compensation vessels** (for steam), see chapter 1

For **threaded flange pairs**, see chapter 1

+

For **initial shut-off valves**, see chapter 1

+

For **valve manifolds**, see chapter 1 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 1

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.

SITRANS F O delta p - Primary differential pressure devices

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 Article 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 Article 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 Article 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.

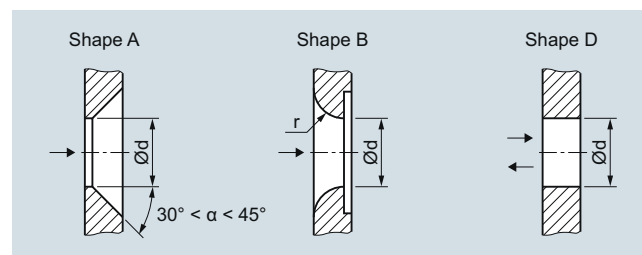
Orifice plate with single tappings

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 β 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.

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Technical description

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.

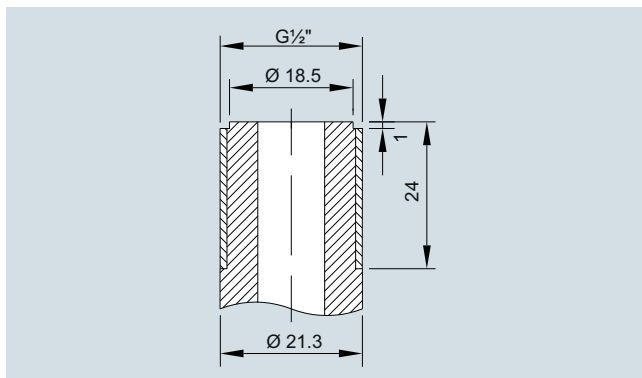
- With threaded connection G $\frac{1}{2}$ DIN ISO 228/1, connection dimensions to DIN 19207 Form V, for liquids and gases up to PN 160, for steam up to PN 100
- With threaded connection $\frac{1}{2}$ -14 NPT male, for version acc. to ASME up to class 600
- With \varnothing 12 mm pipe connection for pipe union with ferrule
- With \varnothing 21.3 mm welding connection for liquids and gases up to PN 400, and for steam up to PN 100, or \varnothing 24 mm for liquids and gases over PN 400, and for steam over PN 100

Other connections on request.

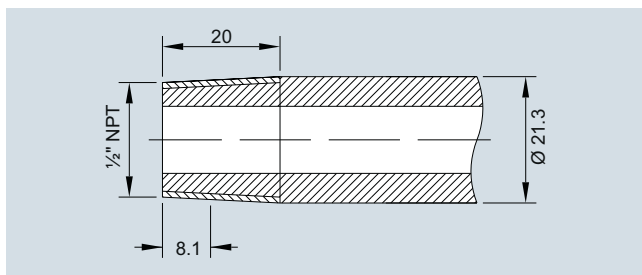
Length of tapping sockets

The length of the tapping sockets are specified in DIN 19205, Part 2.

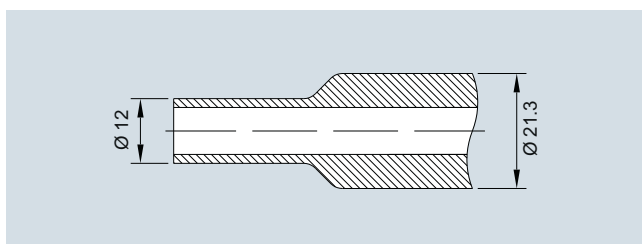
If using with high temperatures and stronger insulations, please quote the insulation thickness and the required length of the tapping sockets when placing an order.



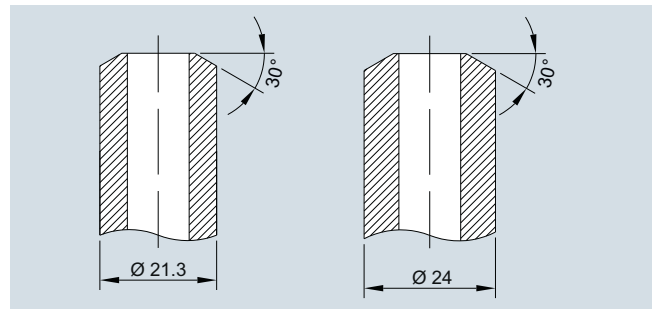
Threaded connections of tapping sockets for liquids and gases up to PN 160, for steam up to PN 100, dimensions in mm



Threaded connection $\frac{1}{2}$ -14 NPT male, dimensions in mm



With \varnothing 12 mm pipe for pipe union with ferrule, dimensions in mm

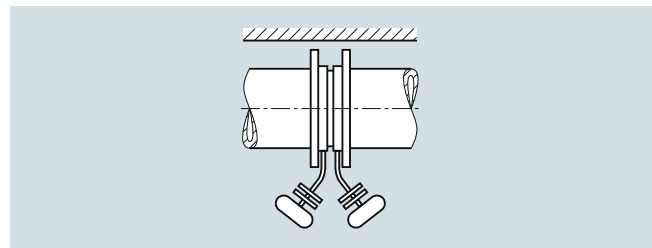


Welding connections of tapping sockets, dimensions in mm

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.

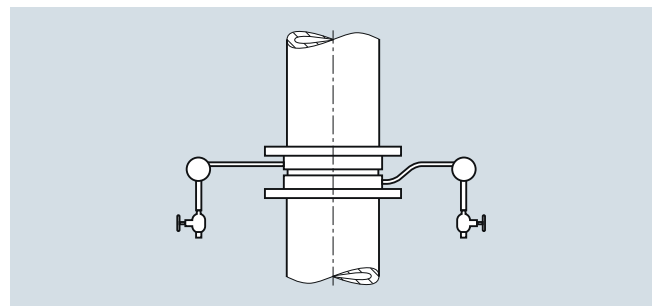
- Horizontal steam lines



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.

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Technical description

Extract from DIN 19205, Part 1, August 1988

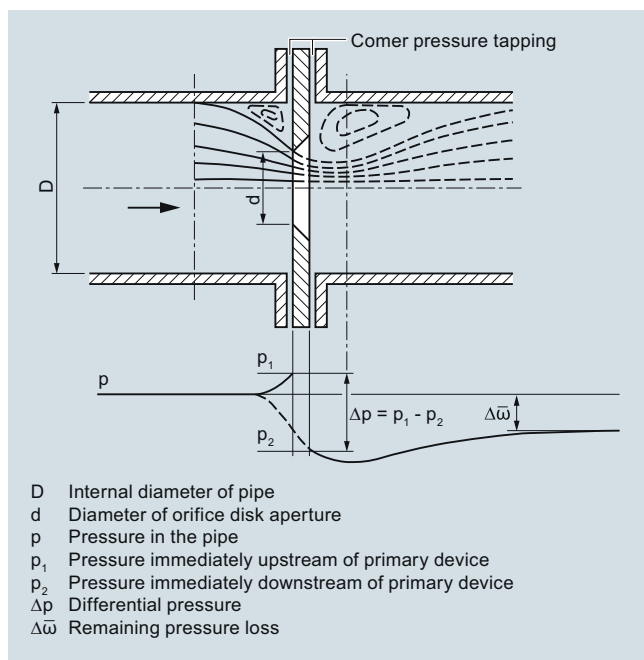
No.	Pipe position and flow direction	Position of the tapping sockets	Application
1	Horizontal →	180°	With compensation vessels
2 ¹⁾²⁾		0°	
3 ¹⁾²⁾			
4	Vertical Rising ↑	90°	Without compensation vessels
5	Falling ↓		
6	Rising ↑	180°	
7	Falling ↓		
10	Horizontal →	<γ ³⁾	Without compensation vessels
11	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



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.

Flow Measurement

SITRANS F O Δp - Primary differential pressure devices

Technical description

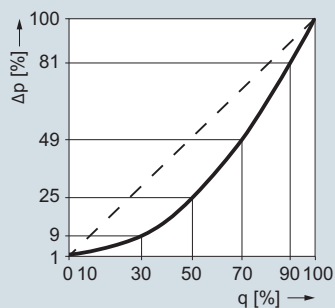
Options

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

Flow Measurement

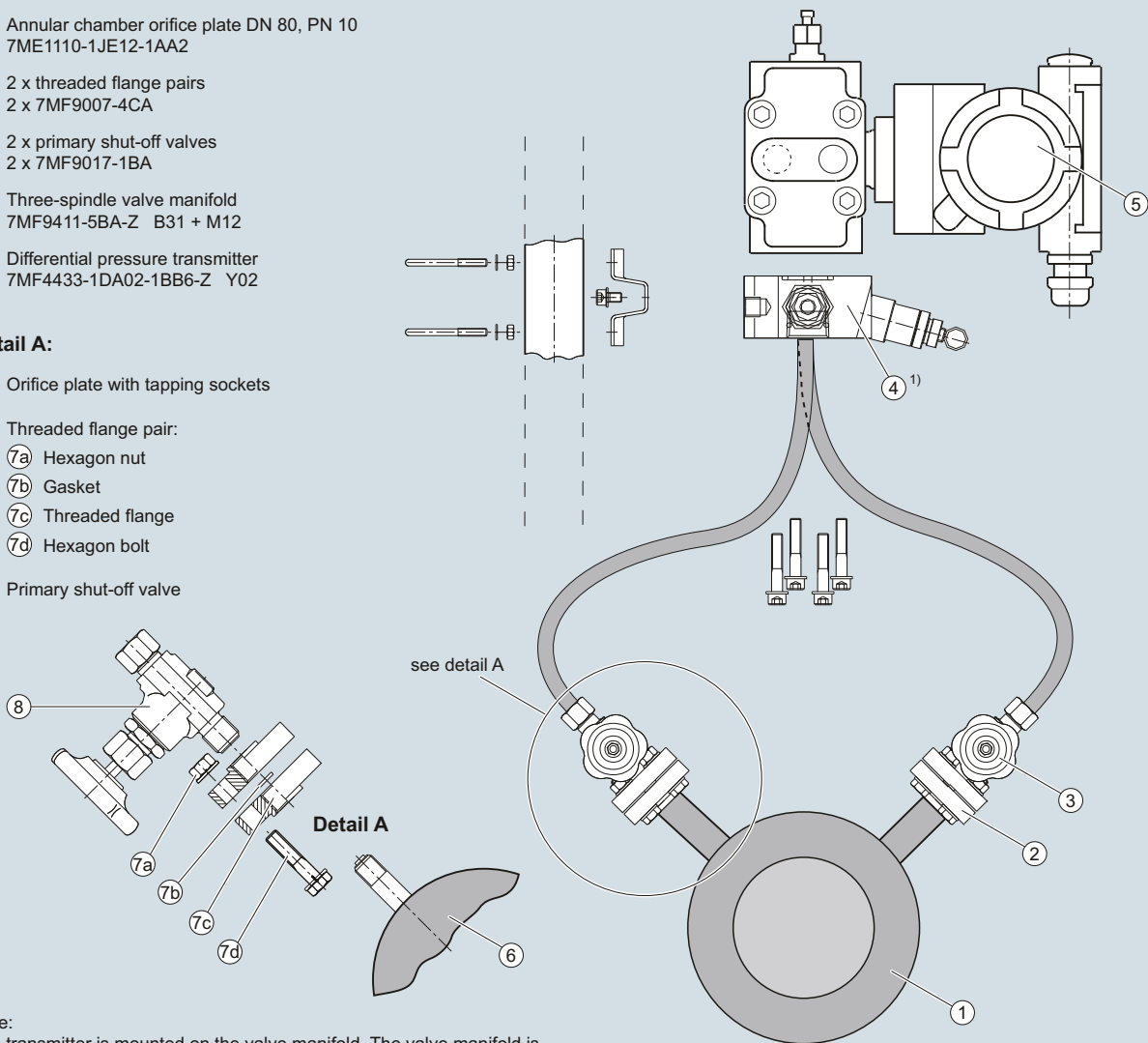
SITRANS F O delta p - Primary differential pressure devices

Technical description

- ① Annular chamber orifice plate DN 80, PN 10
7ME1110-1JE12-1AA2
- ② 2 x threaded flange pairs
2 x 7MF9007-4CA
- ③ 2 x primary shut-off valves
2 x 7MF9017-1BA
- ④ Three-spindle valve manifold
7MF9411-5BA-Z B31 + M12
- ⑤ Differential pressure transmitter
7MF4433-1DA02-1BB6-Z Y02

Detail A:

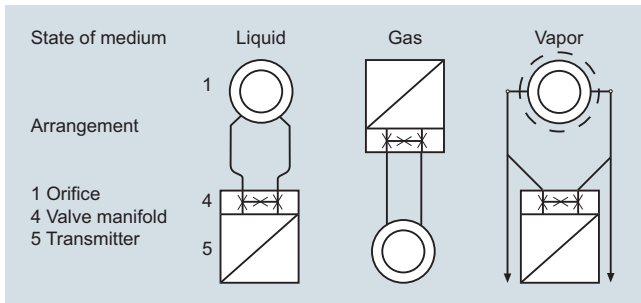
- ⑥ Orifice plate with tapping sockets
- ⑦ Threaded flange pair:
 - ⑦a Hexagon nut
 - ⑦b Gasket
 - ⑦c Threaded flange
 - ⑦d Hexagon bolt
- ⑧ Primary shut-off valve



Note:

The transmitter is mounted on the valve manifold. The valve manifold is mounted on the pipe (or wall).

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

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Pressure equipment directive 97/23/EC

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	
	<u>Explosive</u> R phrases: e. g.: 2, 3 (1, 4, 5, 6, 9, 16, 18, 19, 44)
	<u>Extremely flammable</u> R phrases: e. g.: 12 (17)
	<u>Highly flammable</u> R phrases: e. g.: 11, 15, 17 (10, 30)
	<u>Very toxic</u> R phrases: e. g.: 26, 27, 28, 39 (32)
	<u>Toxic</u> R phrases: e. g.: 23, 24, 25 (29, 31)
	<u>Oxidizing</u> R phrases: e. g.: 7, 8, 9 (14, 15, 19)

Flammable (where the maximum allowable temperature is above flash-point).

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.

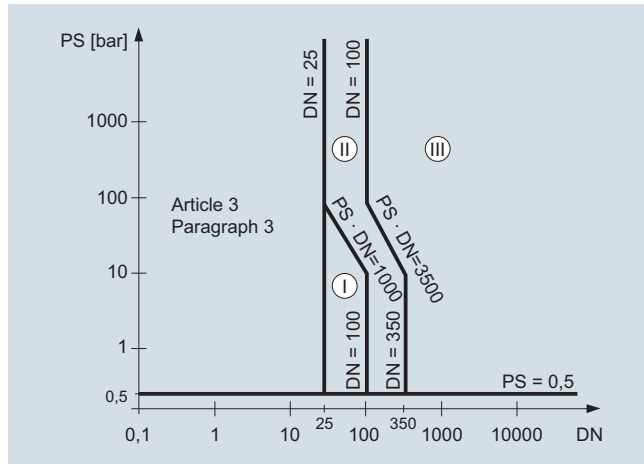
Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Pressure equipment directive 97/23/EC

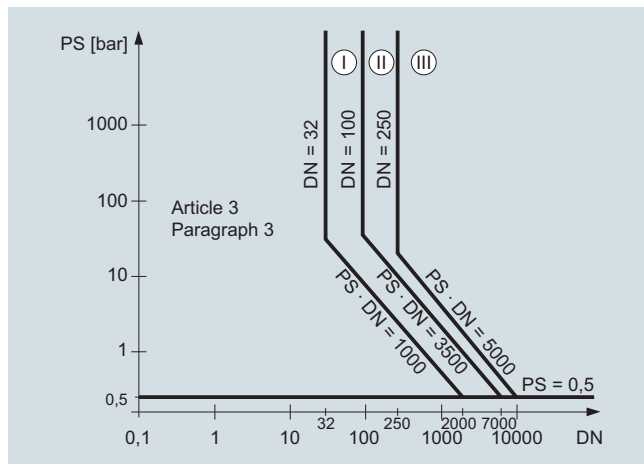
Characteristic curves

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

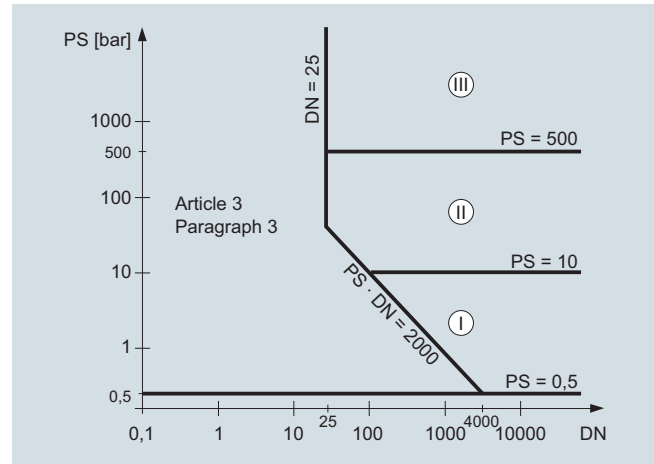
Gases of fluid group 2



Pipelines according to Article 3 Number 1.3 Letter a) Second dash

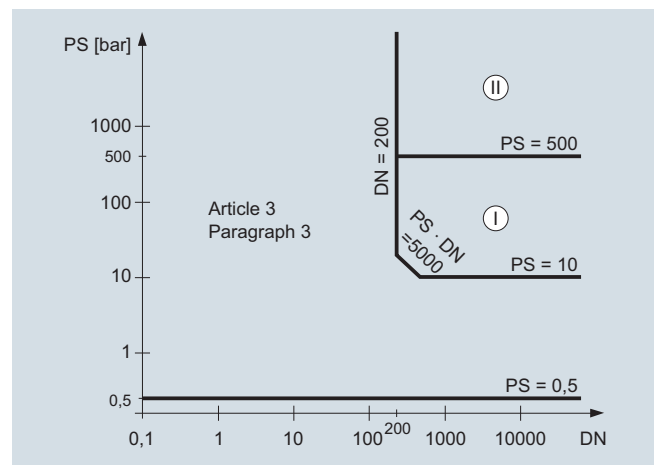
Exception: Liquids and steam, at temperatures > 350 °C belonging to Category II must be included in Category III.

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

3

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Pressure equipment directive 97/23/EC

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 article 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	<ul style="list-style-type: none"> • Medium/measured medium Name _____
Y32	<ul style="list-style-type: none"> • Aggregate state Liquid <input type="checkbox"/> Gaseous <input type="checkbox"/>
Y33	<ul style="list-style-type: none"> • Fluid group Group 1 <input type="checkbox"/> All others Group 2 <input type="checkbox"/> <ul style="list-style-type: none"> - Explosive - Highly, extremely flammable - Oxidizing - Toxic, highly toxic
Y34	<ul style="list-style-type: none"> • Maximum permissible pressure (<i>not PN</i>) PS¹⁾ _____ <input type="checkbox"/> bar <input type="checkbox"/> psi
Y35	<ul style="list-style-type: none"> - at the maximum permissible temperature TS²⁾ _____ <input type="checkbox"/> °C <input type="checkbox"/> °F <p>¹⁾ PS: Setting pressure of the safety mechanism (valve, bursting disk) ²⁾ TS: Range of the temperature limits</p>
The following are already defined by the article number:	
	<ul style="list-style-type: none"> • 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 3/417). <input type="checkbox"/> Article 3, Paragraph 3 <input type="checkbox"/> Category II <input type="checkbox"/> Category I <input type="checkbox"/> Category III

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

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Orifice plate with annular chamber

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

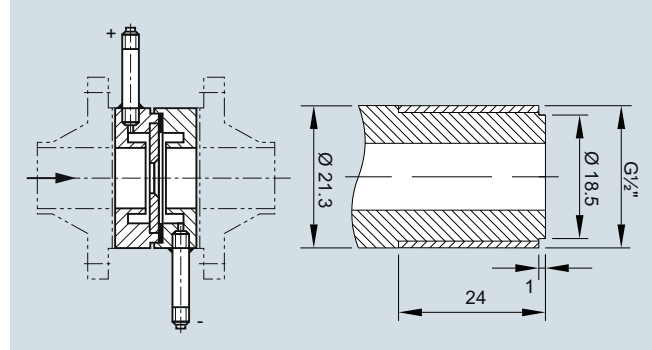
Tapping sockets

For the dimensions of the following tapping sockets, see "Function":

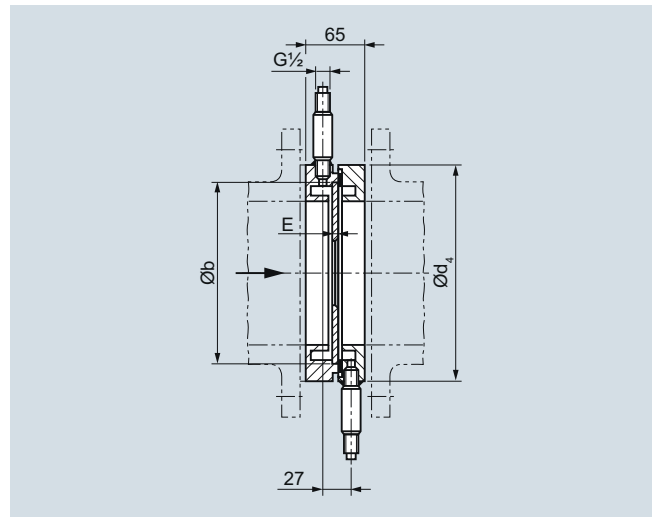
- With connection thread G $\frac{1}{2}$ DIN ISO 228/1, connection dimensions to DIN 19207 form V
- With threaded connection $\frac{1}{2}$ -14 NPT male, for version to ASME
- With \varnothing 12 mm pipe connection for pipe union with ferrule
- With welding connection \varnothing 21.3 mm

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.

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Orifice plate with annular chamber

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
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.)

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Orifice plate with annular chamber

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
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

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Orifice plate with annular chamber

Selection and ordering data	Article No.	Order code	Selection and ordering data	Article No.	Order code
Orifice plate with annular chambers	7 ME 1 1 1 0 -	- 1	Orifice plate with annular chambers	7 ME 1 1 1 0 -	- 1
for mounting between flanges					
Sealing faces to the mating flanges: plane.					
Nominal diameter acc. to EN					
DN 50			DN 350		
PN 6		1 GA	PN 6		2 HA
PN 10 ... PN 40		1 GE	PN 10		2 HB
PN 63		1 GF	PN 16		2 HC
PN 100		1 GG	PN 25		2 HD
DN 65			PN 40		2 HE
PN 6		1 HA	PN 63		2 HF
PN 10 ... PN 40		1 HE	PN 100		2 HG
PN 63		1 HF	DN 400		
PN 100		1 HG	PN 6		2 JA
DN 80			PN 10		2 JB
PN 6		1 JA	PN 16		2 JC
PN 10 ... PN 40		1 JE	PN 25		2 JD
PN 63		1 JF	PN 40		2 JE
PN 100		1 JG	PN 63		2 JF
DN 100			DN 500		
PN 6		2 AA	PN 6		2 KA
PN 10 and PN 16		2 AC	PN 10		2 KB
PN 25 and PN 40		2 AE	PN 16		2 KC
PN 63		2 AF	PN 25		2 KD
PN 100		2 AG	PN 40		2 KE
DN 125			DN 600		
PN 6		2 BA	PN 6		3 AA
PN 10 and PN 16		2 BC	PN 10		3 AB
PN 25 and PN 40		2 BE	PN 16		3 AC
PN 63		2 BF	PN 25		3 AD
PN 100		2 BG	DN 700		
DN 150			PN 6		3 BA
PN 6		2 CA	PN 10		3 BB
PN 10 and PN 16		2 CC	PN 16		3 BC
PN 25 and PN 40		2 CE	PN 25		3 BD
PN 63		2 CF	DN 800		
PN 100		2 CG	PN 6		3 CA
DN 200			PN 10		3 CB
PN 6		2 EA	PN 16		3 CC
PN 10 and PN 16		2 EC	PN 25		3 CD
PN 25		2 ED	DN 900		
PN 40		2 EE	PN 6		3 DA
PN 63		2 EF	PN 10		3 DB
PN 100		2 EG	PN 16		3 DC
DN 250			PN 25		3 DD
PN 6		2 FA	DN 1000		
PN 10		2 FB	PN 6		3 EA
PN 16		2 FC	PN 10		3 EB
PN 25		2 FD	PN 16		3 EC
PN 40		2 FE	PN 25		3 ED
PN 63		2 FF	Nomin. diameter acc. to ASME		
PN 100		2 FG	2 inch		
DN 300			Class 150		5 GA
PN 6		2 GA	Class 300		5 GB
PN 10		2 GB	Class 600		5 GC
PN 16		2 GC	2½ inch		
PN 25		2 GD	Class 150		5 HA
PN 40		2 GE	Class 300		5 HB
PN 63		2 GF	Class 600		5 HC
PN 100		2 GG	3 inch		
			Class 150		5 JA
			Class 300		5 JB
			Class 600		5 JC
			4 inch		
			Class 150		6 AA
			Class 300		6 AB
			Class 600		6 AC

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Orifice plate with annular chamber

Selection and ordering data	Article No.	Order code	Selection and ordering data	Article No.	Order code
Orifice plate with annular chambers	7 ME 1 1 1 0 -	- 1	Orifice plate with annular chambers	7 ME 1 1 1 0 -	- 1
5 inch			Tapping sockets		
Class 150	6 BA		with threaded connection G $\frac{1}{2}$; for liquids and gases PN 160, for steam PN 100		
Class 300	6 BB		• Opposite one another, straight	A	
Class 600	6 BC		• Opposite one another, bent- up, for vertical pipelines	B	
6 inch			• Arranged on one side, for horizontal pipelines	C	
Class 150	6 CA		With threaded connection $\frac{1}{2}$ -14 NPT male		
Class 300	6 CB		• Opposite one another, straight	Q	
Class 600	6 CC		• Opposite one another, bent- up, for vertical pipelines	R	
8 inch			• Arranged on one side, for horizontal pipelines	S	
Class 150	6 EA		With pipe \varnothing 12 mm for pipe union with ferrule, max. 200 °C permissible		
Class 300	6 EB		• Opposite one another, straight	J	
Class 600	6 EC		• Opposite one another, bent- up, for vertical pipelines	K	
10 inch			• Arranged on one side, for horizontal pipelines	L	
Class 150	6 FA		With welding connection \varnothing 21.3 mm for liquids and gases PN 100 ... PN 400, for steam PN 100		
Class 300	6 FB		• Opposite one another, straight	D	
Class 600	6 FC		• Opposite one another, bent- up, for vertical pipelines	E	
12 inch			• Arranged on one side, for horizontal pipelines	F	
Class 150	6 GA		Shape of orifice disk aper- ture		
Class 300	6 GB		For flow in one direction (see figure "Shapes of orifice disk aperture")		
Class 600	6 GC		• Orifice plate form A	A	
14 inch			• Quarter-circle nozzle form B	B	
Class 150	6 HA		For flow in both directions		
Class 300	6 HB		• Cylindrical orifice plate form D	D	
Class 600	6 HC		Manufactured according to pressure equipment directive		
16 inch			None ¹⁾		0
Class 150	6 JA		According to Article 3, Para- graph 3		1
Class 300	6 JB		Design data Y31 to Y35 neces- sary		
Class 600	6 JC		According to category 1, 2, 3 with CE marking and EC dec- laration of conformity		5
20 inch			Design data Y31 to Y35 neces- sary		
Class 150	6 KA				
Class 300	6 KB				
Class 600	6 KC				
24 inch					
Class 150	7 AA				
Class 300	7 AB				
Class 600	7 AC				
Special version					
Specify Order code and plain text	9 AA 0 0	H 1 Y			
Nominal diameter: ..., nominal pressure: ..., material no.: ... and material name: ...					
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 oper- ating temperature -10 to +400 °C	1 2				
Material for corrosive media					
Support rings, tapping sockets and orifice disk made of X 2 CrNiMo 17- 12-2, material No. 1.4404; per- missible operating temp. -10 to +400 °C	1 5				

SITRANS F O delta p - Primary differential pressure devices

Orifice plate with annular chamber

Selection and ordering data	Order code
Further designs Add "-Z" to Article 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

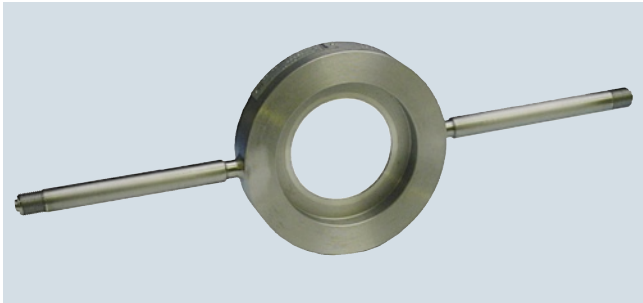
See "SITRANS P measuring instruments for pressure".

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Orifice plate with single tapping

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 G $\frac{1}{2}$ DIN ISO 228/1, with connection dimensions to DIN 19207 form V
- With threaded connection $\frac{1}{2}$ -14 NPT male, for version to ASME
- With \varnothing 12 mm pipe connection for pipe union with ferrule
- With welding connection, \varnothing 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 G $\frac{1}{2}$ or welding connection \varnothing 21.3 mm
 - from PN 6 and PN 400: Welding connection \varnothing 21.3 mm
 - > PN 400: Welding connection \varnothing 24 mm
- For steam
 - up to PN 100: Thread G $\frac{1}{2}$ or welding connection \varnothing 21.3 mm
 - > PN 100: Welding connection \varnothing 24 mm

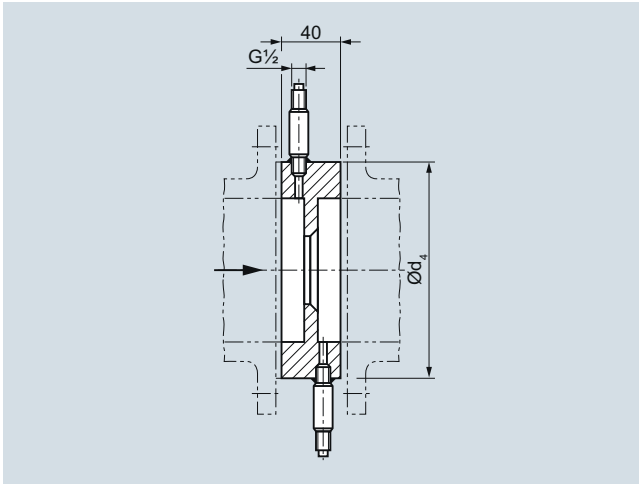
See "Technical description" and "Function" for position of the tapping sockets.

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Orifice plate with single tapping

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 tapplings for installation between EN flanges to EN 1092-1, dimensions in mm, weights

Nominal diameter acc. to ASME

ASME	External diameter d_4 / 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 tapplings for installation between ASME flanges to ASME B 16.5, dimensions in mm and weights

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Orifice plate with single tapping

Selection and ordering data	Article No.	Order code	Selection and ordering data	Article No.	Order code
Orifice plate with single tap-pings	7 ME 1 1 2 0 -	- 1	Orifice plate with single tap-pings	7 ME 1 1 2 0 -	- 1
for mounting between flanges					
Sealing faces to the mating flanges: plane.					
Nominal diameter acc. to EN					
DN 50			DN 250		
PN 6	1 GA		PN 6	2 FA	
PN 10 ... PN 40	1 GE		PN 10 and PN 16	2 FC	
PN 63	1 GF		PN 25	2 FD	
PN 100 and PN 160	1 GH		PN 40	2 FE	
PN 250	1 GJ		PN 63	2 FF	
PN 315	1 GK		PN 100 and PN 160	2 FH	
DN 65			PN 250	2 FJ	
PN 6	1 HA		PN 315	2 FK	
PN 10 ... PN 40	1 HE		DN 300		
PN 63	1 HF		PN 6	2 GA	
PN 100 and PN 160	1 HH		PN 10	2 GB	
PN 250	1 HJ		PN 16	2 GC	
PN 315	1 HK		PN 25	2 GD	
DN 80			PN 40	2 GE	
PN 6	1 JA		PN 63	2 GF	
PN 10 ... PN 40	1 JE		PN 100 and PN 160	2 GH	
PN 63	1 JF		DN 350		
PN 100 and PN 160	1 JH		PN 6	2 HA	
PN 250	1 JJ		PN 10	2 HB	
PN 315	1 JK		PN 16	2 HC	
DN 100			PN 25	2 HD	
PN 6	2 AA		PN 40	2 HE	
PN 10 and PN 16	2 AC		PN 63	2 HF	
PN 25 and PN 40	2 AE		PN 100	2 HG	
PN 63	2 AF		DN 400		
PN 100 and PN 160	2 AH		PN 6	2 JA	
PN 250	2 AJ		PN 10	2 JB	
PN 315	2 AK		PN 16	2 JC	
DN 125			PN 25	2 JD	
PN 6	2 BA		PN 40	2 JE	
PN 10 and PN 16	2 BC		PN 63	2 JF	
PN 25 and PN 40	2 BE		DN 500		
PN 63	2 BF		PN 6	2 KA	
PN 100 and PN 160	2 BH		PN 10	2 KB	
PN 250	2 BJ		PN 16	2 KC	
PN 315	2 BK		PN 25	2 KD	
DN 150			PN 40	2 KE	
PN 6	2 CA		Nominal diameter acc. to ASME		
PN 10 and PN 16	2 CC		2 inch		
PN 25 and PN 40	2 CE		Class 150	5 GA	
PN 63	2 CF		Class 300	5 GB	
PN 100 and PN 160	2 CH		Class 600	5 GC	
PN 250	2 CJ		2½ inch		
PN 315	2 CK		Class 150	5 HA	
DN 200			Class 300	5 HB	
PN 6	2 EA		Class 600	5 HC	
PN 10 and PN 16	2 EC		3 inch		
PN 25	2 ED		Class 150	5 JA	
PN 40	2 EE		Class 300	5 JB	
PN 63	2 EF		Class 600	5 JC	
PN 100 and PN 160	2 EH		4 inch		
PN 250	2 EJ		Class 150	6 AA	
PN 315	2 EK		Class 300	6 AB	
			Class 600	6 AC	
			5 inch		
			Class 150	6 BA	
			Class 300	6 BB	
			Class 600	6 BC	

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Orifice plate with single tapping

Selection and ordering data	Article No.	Order code	Selection and ordering data	Article No.	Order code
Orifice plate with single tapplings	7 ME 1 1 2 0 -	- 1	Orifice plate with single tapplings	7 ME 1 1 2 0 -	- 1
6 inch			Tapping sockets		
Class 150	6 CA		with threaded connection G $\frac{1}{2}$; for liquids and gases PN 160, for steam PN 100		
Class 300	6 CB		• Opposite one another, straight		A
Class 600	6 CC		• Opposite one another, bent- up, for vertical pipelines		B
8 inch			• Any arrangement of tapping sockets (specify angle in plain text -Z Y02)		G
Class 150	6 EA		With threaded connection $\frac{1}{2}$ -14 NPT male		
Class 300	6 EB		• Opposite one another, straight		Q
Class 600	6 EC		• Opposite one another, bent- up, for vertical pipelines		R
10 inch			• Any arrangement of tapping sockets (specify angle in plain text -Z Y02)		T
Class 150	6 FA		With pipe \varnothing 12 mm for pipe union with ferrule, max. 200 °C permissible		
Class 300	6 FB		• Opposite one another, straight		J
Class 600	6 FC		• Opposite one another, bent- up, for vertical pipelines		K
12 inch			• Any arrangement of tapping sockets (specify angle in plain text -Z Y02)		M
Class 150	6 GA		With welding connection \varnothing 21.3 mm; for liquids and gases PN 100 ... 400, for steam PN 100 or \varnothing 24 mm; for liquids and gases over PN 400, for steam over PN 100		
Class 300	6 GB		• Opposite one another, straight		D
Class 600	6 GC		• Opposite one another, bent- up, for vertical pipelines		E
14 inch			• Any arrangement of tapping sockets (specify angle in plain text -Z Y02)		H
Class 150	6 HA		Shape of orifice disk aper- ture		
Class 300	6 HB		(see figure "Shapes of orifice disk aperture")		
Class 600	6 HC		For flow in one direction		
16 inch			• Orifice plate form A		A
Class 150	6 JA		• Quarter-circle nozzle form B		B
Class 300	6 JB		For flow in both directions		
Class 600	6 JC		• Cylindrical orifice plate form D		D
20 inch			Manufactured according to pressure equipment directive		
Class 150	6 KA		None ¹⁾		0
Class 300	6 KB		According to Article 3, Para- graph 3 Design data Y31 to Y35 neces- sary		1
Class 600	6 KC		According to category 1, 2, 3 with CE marking and EC dec- laration of conformity Design data Y31 to Y35 neces- sary.		5
Special version					
Specify Order code and plain text	9 AA 0 0	H 1 Y			
Nominal diameter: ..., nominal pressure: ... material no.: ... and material name: ...					
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		2 3			
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		2 4			
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 temper- ature -10 to +400 °C		2 5			

¹⁾ Only possible outside Europe.

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Orifice plate with single tapping

Selection and ordering data

Further designs

Add "-Z" to Article 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 $d = \dots$ mm
Internal diameter of pipe $D = \dots$ mm
Radius of quarter-circle nozzle $r = \dots$ 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".

SITRANS F O delta p - Primary differential pressure devices

Metering pipe
with orifice plate and annular chamber

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 3/412)

- 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

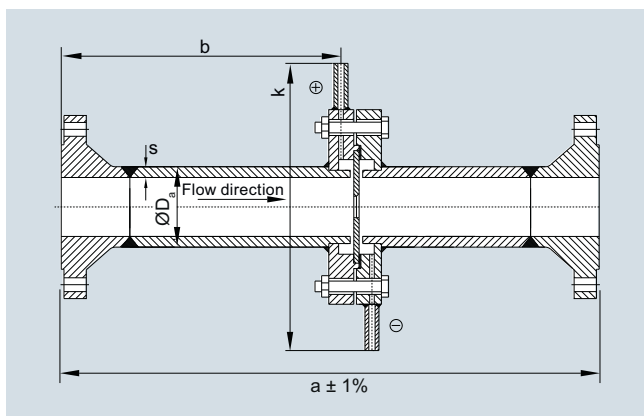
For length of tapping sockets for all metering pipe $L = 120$ mm and position of tapping socket, see "Technical Description" and "Function".

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Metering pipe
with orifice plate and annular chamber

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	400	218	320	16 x 3	4.5
	25 and 40			320		5
	63 and 100			295		6.5
15	10 and 16	550	368	325	20 x 2.5	5
	25 and 40			325		5.5
	63 and 100			300		7.5
20	10 and 16	700	488	335	25 x 2.5	6.5
	25 and 40					7
25	10 and 16	900	638	310	30 x 2.5	8
	25 and 40					9
	63 and 100					14
32	10 and 16	1100	788	320	38 x 3	11.5
	25 and 40					12.5
40	10 and 16	1300	988	330	48.3 x 3.6 oder 50 x 5	13
	25 and 40			330		15
	63 and 100			335		25
50	10 and 16	1500	1188	340	60 x 5	20
	25 and 40			340		22
	63			345		34
	100			345		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	550	368	297	20 x 2.5	5
	Class 300			307		5.5
	Class 600			307		7.5
¾ inch	Class 150	700	488	297	25 x 2.5	6.5
	Class 300			307		7
	Class 600			307		8
1 inch	Class 150	900	638	307	30 x 2.5	8
	Class 300			313		9
	Class 600			313		14
1¼ inch	Class 150	1100	788	316	38 x 3	11.5
	Class 300			322		12.5
	Class 600			322		14
1½ inch	Class 150	1300	988	326	48.3 x 3.6 or 50 x 5	13
	Class 300			335		15
	Class 600			335		25
2 inch	Class 150	1500	1188	345	60 x 5	20
	Class 300			371		22
	Class 600			351		34

Metering pipes with orifice plates and annular chambers for installation between 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.

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

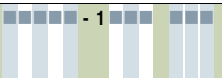
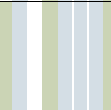
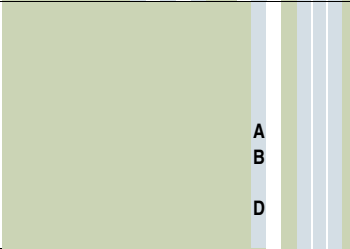
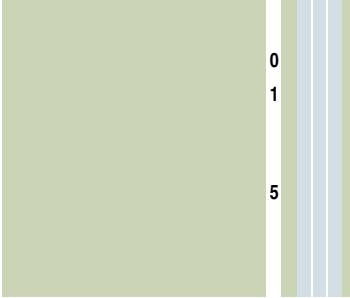
Metering pipe
with orifice plate and annular chamber

Selection and ordering data	Article No.	Selection and ordering data	Article No.
Metering pipe for mounting between flanges for non-corrosive media	7 ME 1 3 1 0 -	Metering pipe for mounting between flanges for non-corrosive media	7 ME 1 3 1 0 -
Orifice plate with annular chambers mounted between flanges		1½ inch	
Sealing faces to the mating flanges: plane		• Class 150	5 FA
		• Class 300	5 FB
		• Class 600	5 FC
		2 inch	
		• Class 150	5 GA
		• Class 300	5 GB
		• Class 600	5 GC
Nominal diameter acc. to EN		Special version	
DN 10		Specify Order code and plain text	9 AA 0 0
• PN 10 and PN 16	1 AC	Nominal diameter: ..., nominal pressure: ...	
• PN 25 and PN 40	1 AE	material no.: ... and	
• PN 63	1 AF	material name: ...	
• PN 100	1 AG		
DN 15		Material for non-corrosive media	
• PN 10 and PN 16	1 BC	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	3 2
• PN 25 and PN 40	1 BE		
• PN 63	1 BF		
• PN 100	1 BG		
DN 20		Material for corrosive media	
• PN 10 and PN 16	1 CC	Orifice disk, support rings, pipes and flange made of material no. 1.4404; permissible operating temperature -10 to +400 °C	3 4
• PN 25 and PN 40	1 CE		
DN 25		Tapping sockets	
• PN 10 and PN 16	1 DC	with threaded connection G½; for liquids and gases PN 160, for steam PN 100	
• PN 25 and PN 40	1 DE	• Opposite one another, straight	A
• PN 63	1 DF	• Opposite one another, bent-up, for vertical pipelines	B
• PN 100	1 DG	• Arranged on one side, for horizontal pipelines	C
DN 32		With threaded connection ½-14 NPT male; for liquids and gases PN 160, for steam PN 100	
• PN 10 and PN 16	1 EC	• Opposite one another, straight	Q
• PN 25 and PN 40	1 EE	• Opposite one another, bent-up, for vertical pipelines	R
DN 40		• Arranged on one side, for horizontal pipelines	S
• PN 10 and PN 16	1 FC	With pipe Ø 12 mm for pipe union with ferrule, max. 200 °C permissible	
• PN 25 and PN 40	1 FE	• Opposite one another, straight	J
• PN 63	1 FF	• Opposite one another, bent-up, for vertical pipelines	K
• PN 100	1 FG	• Arranged on one side, for horizontal pipelines	L
DN 50		With welding connection Ø 21.3 mm for liquids and gases PN 100 ... PN 400, for steam PN 100	
• PN 10 and PN 16	1 GC	• Opposite one another, straight	D
• PN 25 and PN 40	1 GE	• Opposite one another, bent-up, for vertical pipelines	E
• PN 63	1 GF	• Arranged on one side, for horizontal pipelines	F
• PN 100	1 GG		
Nominal diameter acc. to ASME			
½ inch			
• Class 150	5 BA		
• Class 300	5 BB		
• Class 600	5 BC		
¾ inch			
• Class 150	5 CA		
• Class 300	5 CB		
• Class 600	5 CC		
1 inch			
• Class 150	5 DA		
• Class 300	5 DB		
• Class 600	5 DC		
1¼ inch			
• Class 150	5 EA		
• Class 300	5 EB		
• Class 600	5 EC		

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Metering pipe with orifice plate and annular chamber

Selection and ordering data	Article No.	Selection and ordering data	Order code
Metering pipe for mounting between flanges for non-corrosive media	7 ME 1 3 1 0 -  - 1 	<i>Further designs</i> Add "-Z" to Article No. and specify Order code(s) and plain text.	
Shape of orifice disk aperture For flow in one direction (see figure "Shapes of orifice disk aperture") <ul style="list-style-type: none"> • Orifice plate form A • Quarter-circle nozzle form B For flow in both directions <ul style="list-style-type: none"> • Cylindrical orifice plate form D 		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
Manufactured according to pressure equipment directive None ¹⁾		Design data according to Pressure equipment directive 97/23/EC	
According to Article 3, Paragraph 3 Design data Y31 to Y35 necessary		Name of medium Specify in plain text: Medium: e. g. natural gas	Y31
According to category 1, 2 with CE marking and EC declaration of conformity Design data Y31 to Y35 necessary		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 <ul style="list-style-type: none"> • 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

¹⁾ Only possible outside Europe.

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".

Overview

Note on calculation order and product ordering:

Before an orifice plate is ordered, the calculation of the orifice plate 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	Article 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 Article 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

Flow Measurement

SITRANS F R

Rotary-piston meters and automatic batchmeters - Introduction

Overview

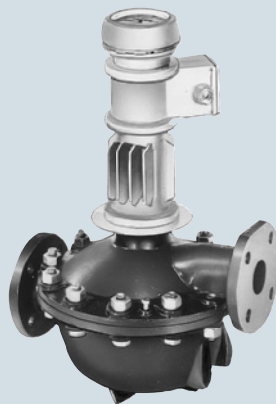
Mechanical registers, automatic batchmeters and digital registers with current and pulse output



Rotary-piston meter DN 25 (1") with single-pointer dial type 01



Rotary piston meter with electric flow register in compact form

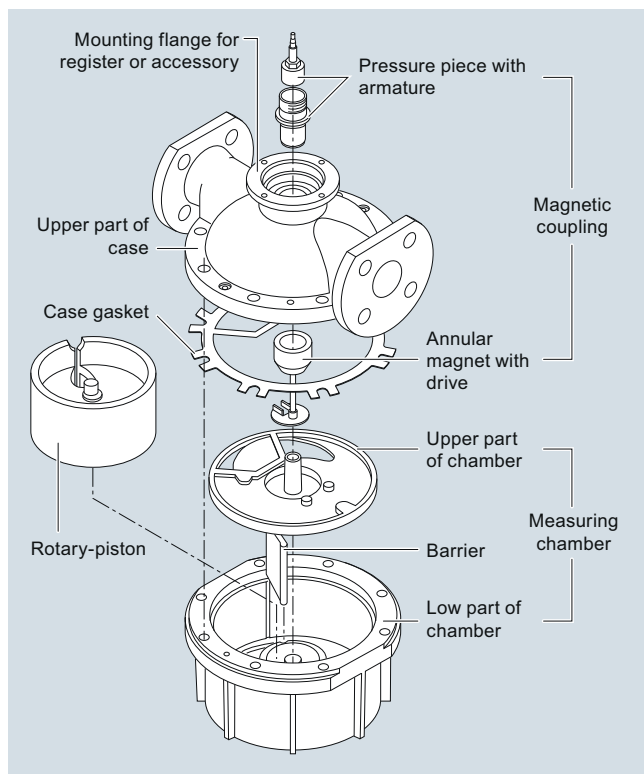


Rotary-piston meter DN 50 (2") with mech. single-pointer dial type 01, with accessories (here: cooling attachment and pulser)



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

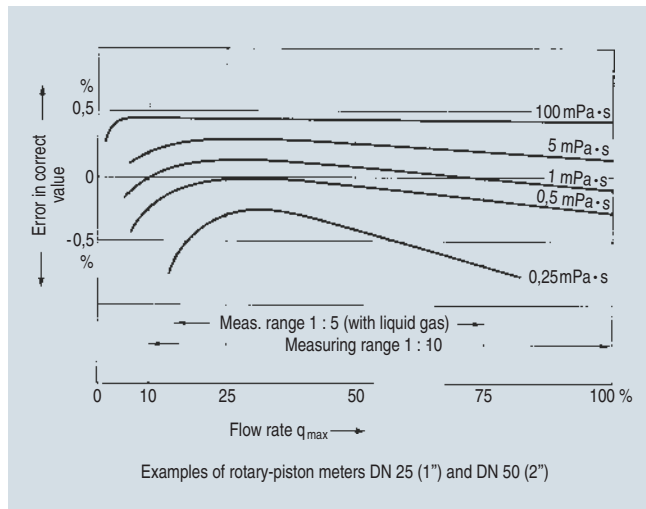
Configuration

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.



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)

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

Vertical

- Automatic batchmeter

- Special designs

Any

- Rotary-piston meter for oil fuels

- 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

Flow Measurement

SITRANS F R








Rotary-piston meters and automatic batchmeters - Introduction

Selection overview, rotary piston meters



Version	Rotary piston meters			
Nominal diameter	DN 15	DN 25	DN 50	DN 80
Article 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 single-pointer dial	•	•	•	•
Mechanical double-pointer dial	•	•	•	•
As automatic batchmeter (incl. shut-off valve)		•	•	
With electronic flow register	•	•	•	•
Remote or compact installation	•	•	•	•

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 Incl. protective cover	With pulse and current output 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 Article No. of the rotary piston meter)	•	•	•		
					
Pulser					
10 Impulse/measuring chamber volumes			•		
100 Impulse/measuring chamber volumes					
(Selection with data position 14 of Article No. of the rotary piston meter)					
					
Cooling attachment					
Up to 80 °C: none (Article No. 7MR1...-.....-.....)	•	•	•	•	•
Up to 180 °C: one (Article No. 7MR1...-.....-.....+7MV3001-1xx00)					
Up to 260 °C: two (Article 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.....-.....					
					
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)					

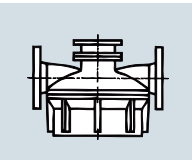
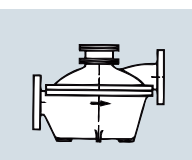
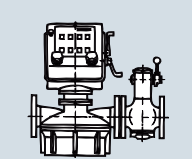
Flow Measurement

SITRANS F R

Rotary-piston meters and automatic batchmeters - Introduction

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						
	mm	(inch)	bar	(psi)	l/min	(USgpm)	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)
Rotary-piston meter for industrial use													
	15 ⁵⁾	(1/2) ⁵⁾	25	(363)	20	(5.3)	≤ 1	1.5	(0.26)	10 ⁶⁾	(5.3)	10	(2.6)
							< 5	1.0	(0.2)	20	(5.3)	10	(2.6)
							800	0.2	(0.05)	20	(5.3)	10	(2.6)
							2 000	0.2	(0.03)	10	(1.3)	5	(1.3)
up to PN 16 (MWP 232 psi)	25	(1)	10	(145)	100	(26.4)	0.3	12	(3.2)	100	(26)	80	(13)
			16	(232)			0.6	6	(1.6)	100	(26)	80	(13)
			25	(363)			1	5	(1.3)	100	(26)	80	(13)
			40	(580)			5	3	(0.8)	100	(26)	80	(13)
			63	(914)			800	1	(0.26)	100	(26)	80	(13)
	50	(2)	6	(87)	500	(132)	0.3	40	(11)	500	(106)	350	(44)
			16	(232)			0.6	20	(5.3)	500	(132)	350	(44)
			25	(363)			1	18	(4.8)	500	(132)	350	(44)
			40	(580)			5	10	(2.6)	500	(132)	350	(44)
			63	(914)			800	2	(0.53)	500	(106)	350	(44)
up to PN 63 (MWP 914 psi)	80	(3)	25	(363)	1 000	(264)	0.3	60	(16)	1 000	(211)	700	(93)
			40	(580)			0.6	35	(9.3)	1 000	(264)	700	(93)
							1	25	(6.6)	1 000	(264)	700	(93)
							5	10	(2.6)	1 000	(264)	700	(93)
							800	5	(1.3)	1 000	(211)	500	(93)
Automatic batchmeter (Rotary-piston meter with quantity preset register and mechanical shut-off valve)													
	25	(1)	10	(145)	100	(26.4)	0.3	12	(3.2)	100	(26)	-	-
							0.6	6	(1.6)	100	(26)	-	-
							1	5	(1.3)	100	(26)	-	-
							5	3	(0.8)	100	(26)	-	-
							800 ⁷⁾	1	(0.26)	100	(26)	-	-
	50	(2)	6	(87)	500	132	0.3	40	(11)	500	(106)	-	-
							0.6	20	(5.3)	500	(132)	-	-
							1	18	(4.8)	500	(132)	-	-
							5	10	(2.6)	500	(132)	-	-
							800 ⁷⁾	2	(0.53)	400	(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)	Article 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%

Rotary-piston meters – Ordering data
DN 15 (1/2"), rated flow rate 20 l/min (5.3 USgpm)

Selection and Ordering data							Article No.	Order code
Rotary-piston meter DN 15 (1/2")								
Nom. press.	Materials			Casing gasket	Can be heated using 2 thread connections	Weight appr. kg (lb)		
	Housing	Meas. chamber	Rotary piston					
PN 25 (363 psi)	Cast iron	Cast iron	• • • •	Flat gasket	R 3/4"	9.0 (19.8)	7MR1020 - E	-
	CrNiMo steel	CrNiMo steel	• • • •	AFM 34	no	9.0 (19.8)	7MR1020 - S	-
			↓ ↓ ↓ ↓					
Rotary piston material				Max. permissible liquid temperature				
	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								
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 registers¹⁾								
Single- pointer dial								
• Type 01								0 1
Double-pointer dial								
• Type 11, vertical mounting								1 1
• Type 12, horizontal mounting								1 2
Value per								
• 1 l (0.26 USg)								
Fastest pointer or fastest drum								1
Accessories (pulsers, cooling attachments)¹⁾								
• None								A
• Mounted								B
• Pulsar already mounted <u>above</u> the intermediate gear:								
- 10 pulses/value per revolution								C
- 100 pulses/value per revolution								D
• Pulsar already mounted <u>below</u> 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 3/445.
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.

Flow Measurement

SITRANS F R

Rotary-piston meters – Ordering data
DN 25 (1"), rated flow rate 100 l/min (26.5 USgpm)

Selection and Ordering data							Article No.	Order code	
Rotary-piston meter DN 25 (1")									
Nom. press.	Materials			Rotary piston	Casing gasket	Weight appr. kg (lb)			
	Housing	Meas. chamber							
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	• • • • •	• • • • •	AFM 34		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)		
Carbon					•	40 °C (104 °F)	0.15 (0.33)		K
Cast iron					•	40 °C (104 °F)	0.55 (1.21)		E
Cast iron, grooved					•	40 °C (104 °F)	0.5 (1.1)		B
Ni-resist					•	90 °C (194 °F)	0.55 (1.21)		N
Ni-resist, grooved					•	90 °C (194 °F)	0.5 (1.1)		C
Hard rubber					•	40 °C (104 °F)	0.1 (0.2)		G
Hard rubber, grooved					•	40 °C (104 °F)	0.1 (0.2)		D
PTFE with graphite filling					•	40 °C (104 °F)	0.3 (0.66)		F
PTFE with graphite filling, grooved					•	40 °C (104 °F)	0.3 (0.66)		L
PTFE with graphite filling					•	90 °C (194 °F)	0.3 (0.66)		R
PTFE with graphite filling, grooved					•	90 °C (194 °F)	0.3 (0.66)		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					•		0.16 (0.35)		J
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 approx. kg (lb)			
Single- pointer dial									
• Type 01						0.8 (1.76)		0 1	
Double-pointer dial									
• Type 11, vertical mounting						1.5 (3.3)		1 1	
• Type 12, horizontal mounting						2.5 (5.5)		1 2	
Quantity preset register (only for vertical mechanism shaft, flow direction according to codes 1 ... 4)									
• Type 30						11 (24.3)		3 0	
• Type 30, ex-protected switch						13.2 (29.1)		5 4	
Value per revolution									
• 1 l (0.26 USg)						11 (24.3)			1
• 10 l (2.65 USg)						13.2 (29.1)			2
Accessories (pulsers, cooling attachments) ¹⁾									
• None									A
• Mounted									B
• Pulsar already mounted <u>above</u> the intermediate gear:									
- 10 pulses/value per revolution									C
- 100 pulses/value per revolution									D
• Pulsar already mounted <u>below</u> 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 3/445.
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.

Selection and Ordering data						Article No.	Order code															
Rotary piston meter DN 50 (2")																						
Nom. press.	Materials		Rotary piston			Casing gasket	Weight appr. kg (lb)															
	Housing	Meas. chamber																				
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)															
Carbon							0.9 (2.0)															
Cast iron						•	3.5 (7.7)															
Cast iron, grooved						•	3.4 (7.5)															
Ni-resist						•	3.5 (7.7)															
Ni-resist, grooved						•	3.4 (7.5)															
Hard rubber						•	40 °C (104 °F)	0.7 (1.5)														
Hard rubber, grooved						•	40 °C (104 °F)															
PTFE with graphite filling						•	40 °C (104 °F)	0.5 (1.1)														
PTFE with graphite filling, grooved						•	40 °C (104 °F)															
PTFE with graphite filling						•	90 °C (194 °F)															
PTFE with graphite filling, grooved						•	90 °C (194 °F)															
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							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																						
• 10 l (2.65 USg)														2								
• 100 l (26.5 USg)														3								
Accessories (pulsers, cooling attachments) ¹⁾																						
• None																						
• Mounted																						
• Pulsar already mounted <u>above</u> the intermediate gear:																						
- 10 pulses/value per revolution																						
- 100 pulses/value per revolution																						
• Pulsar already mounted <u>below</u> the intermediate gear:																						
- 10 pulses/measuring chamber volume																						
- 100 pulses/measuring chamber volume																						

For Selection and Ordering data of „Digital register with current and pulse output“, „Tests“ und „Flanges“ see page 3/445.

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.

Flow Measurement

SITRANS F R

Rotary-piston meters – Ordering data
DN 80 (3"), rated flow rate 1000 l/min (264 USgpm)

Selection and Ordering data						Article 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 registers¹⁾					Weight appr. kg (lb)		
Single- pointer dial							
• Type 01					0.8 (1.76)		0 1
Double-pointer dial							
• Type 11, vertical mounting					1.5 (3.3)		1 1
• Type 12, horizontal mounting					2.5 (5.5)		1 2
Quantity preset register (only for vertical mechanism shaft, flow direction according to codes 1 ... 4)							
• Type 30					11 (24.3)		3 0
• Type 30, ex-protected switch					13.2 (29.1)		5 4
Value per revolution							
• 100 l (26.5 USg)							3
• 1000 l (265 USg)							4
Accessories (pulsers, cooling attachments)¹⁾							
• None							A
• Mounted							B
• Pulsar already mounted <u>above</u> the intermediate gear:							
- 10 pulses/value per revolution							C
- 100 pulses/value per revolution							D
• Pulsar already mounted <u>below</u> 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 3/445.
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.

Selection and Ordering data	Article No.	Order code
Rotary piston meter DN 15 (1/2") to DN 80 (3")	7MR 1 ■ ■ ■ 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)		D¹⁾
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)		E¹⁾
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
Article No. of the rotary-piston meter 7MR1 ■ ■ ■ ■ - ■ ■ ■ ■ ■ - ■ ■ ■ ■ ■ - Z	
Material acceptance test to EN 10 204-3.1	E01

Certificates and approvals

Classification according to pressure equipment directive (DGRL 97/23/EG):

- 7MR1020: for liquids of group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice SEP)
- 7MR1110, 7MR1020, 7MR1130 and 7MR1140: for liquids of group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice SEP)
- 7MR1410 and 7MR1420: for liquids of group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice SEP)
- 7MR1430 and 7MR1440: for liquids of group 2; complies with requirements of article 3, paragraph 3 (sound engineering practice SEP);
For liquids of fluid group 1 on request.
- 7MR1620 and 7MR1630: for liquids of fluid group 2; complies with requirements of article 3, para. 3 (SEP)

Flow Measurement

SITRANS FR

Rotary-piston meters - Ordering data

Automatic batchmeter DN 25 (1") and DN 50 (2")

Selection and Ordering data						Article No.	Order code
Automatic batchmeter DN 25 (1")							
With mechanical shut-off valve downstream of metering mechanism							
Nominal pressure	Materials				Weight appr. kg (lb)		
	Housing	Meas. chamber	Rotary piston				
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				Weight appr. kg (lb)		
	Housing	Meas. chamber	Rotary piston				
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)	
Carbon						0.15 (0.3)	
Cast iron						0.55 (1.2)	
Cast iron, grooved						0.5 (1.1)	
Ni-resist						0.55 (1.2)	
Ni-resist, grooved						0.5 (1.1)	
Hard rubber					40 °C (104 °F)	0.1 (0.2)	
Hard rubber, grooved					40 °C (104 °F)		
PTFE with graphite filling					40 °C (104 °F)	0.3 (0.7)	
PTFE with graphite filling, grooved					40 °C (104 °F)		
PTFE with graphite filling					90 °C (194 °F)		
PTFE with graphite filling, grooved					90 °C (194 °F)		
PCTFE (only DN 25)					40 °C (104 °F)	0.16 (0.4)	
PCTFE, grooved (only DN 25)					40 °C (104 °F)		
CrNiMo with carbon contact surface						0.4 (0.9)	
CrNiMo with PTFE contact surface							
Tapet bushing							
<ul style="list-style-type: none"> • With maintenance-free sealed bushing • With bellows²⁾³⁾ 							
Flow direction							
Mechanism shaft always vertical							
<ul style="list-style-type: none"> • From left to right, valve right • From right to left, valve left 							
Quantity preset register							
<ul style="list-style-type: none"> • Type 30 • Type 30, ex-protected switch 							
Value per revolution and adjustment step							
1 l/0,1 : 0,1 l (only DN 25)							
10 l/1 : 1 l							
100 l/10 : 1 l (only DN 50)							
Accessories							
Without							
Mounted							
Tests							
Works test							
Works test certificate							
Preliminary official test							
Flanges							
Plane, drilled to EN 1092-1							
Plane, drilled to specification							
With sealing ridge to specification							
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 Article No. required (see Selection and Ordering data table „Accessories“)

Certificates and approvals

Classification according to pressure equipment directive (DGRL 97/23/EG):

For liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice SEP)

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)	-	-	-	-	-	-	-	-
C₁	-	-	-	50 (1.97)	68 (2.68)	80 (3.15)	82 (3.23)	120 (4.72)	120 (4.72)	155 (6.10)	177 (6.97)
C₂	-	-	-	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)
a₃	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
L₁	210 (8.27)	325 (12.80)
L₂	135 (5.31)	175 (6.89)
C	90 (3.54)	147 (5.79)
a₃	153 (6.02)	205 (8.07)

In addition to dimension **a₃** 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)

Flow Measurement

SITRANS F R

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: $\pm 0.1\%$, 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 $\pm 10\%$ or 115/230 V AC $\pm 10\%$
Power consumption	Max. 9 W
Certificate and approvals	
Ex protection	EEx ia IIB/IIC T4
For official calibration inspections	In preparation

SITRANS F RA110 electric flow register

Selection and Ordering data

Electric flow register SITRANS F RA110

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

Signal input

NAMUR signal

Power supply

Incl. sensor supply 8.2 V DC

24 V AC/DC¹⁾

230 V AC¹⁾

16 ... 30 V DC²⁾

Function (output)

Display of flow and total value

Additional active pulse output¹⁾

Additional passive pulse output

Additional active pulse output and current output¹⁾

Additional passive pulse output and current output

Installation

For wall mounting

For additional mounting at compact version

Explosion protection

without

EEx ia IIB/IIC T4 up to max. 100 °C

LED background lighting

without

with background lighting

¹⁾ Not for ATEX version

²⁾ For ATEX version only

Note:

Cable glands for M20 are not included in delivery.

Article No.

7MV1070-

A 0

1

A

B

C

A 0

B 1

B 2

C 1

C 2

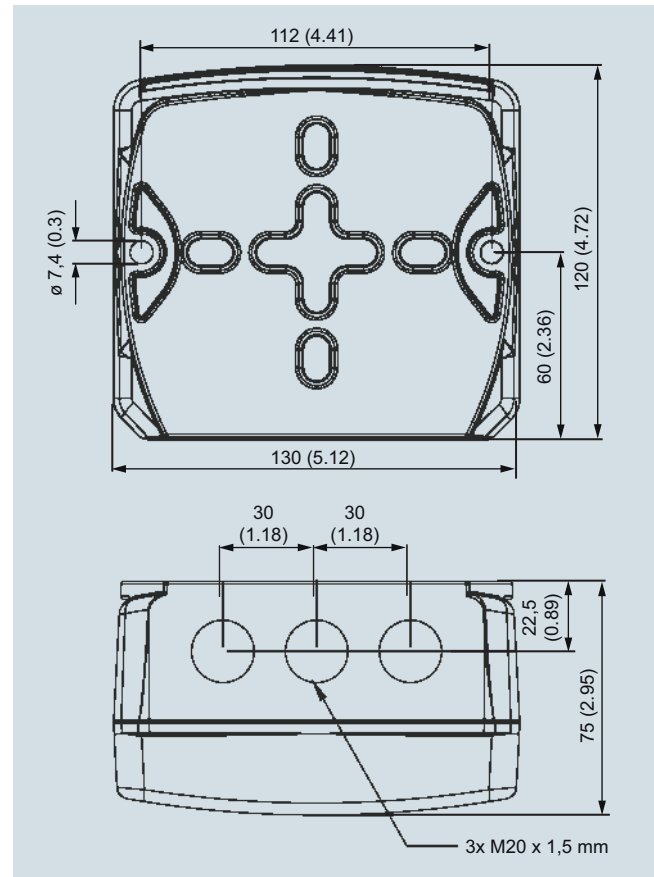
0

1

A

B

Dimensional drawings



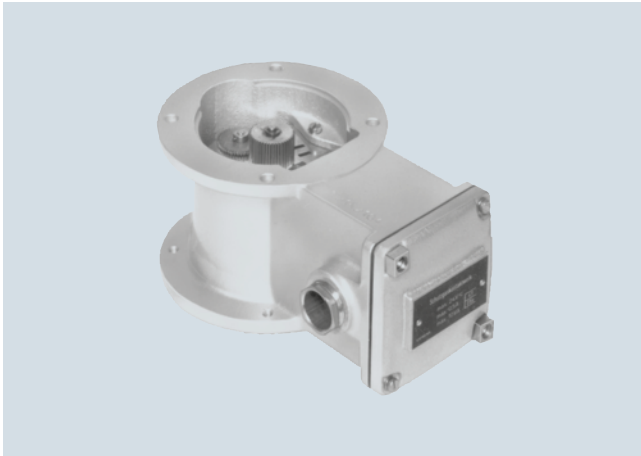
Electric flow register SITRANS F RA110, dimensions in mm (inch)

Flow Measurement

SITRANS F R

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.

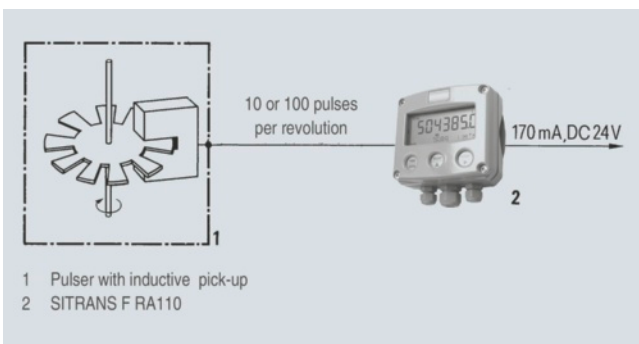
Design

- Electronic design
- High pulse frequency ($\leq 3\,000$ 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.

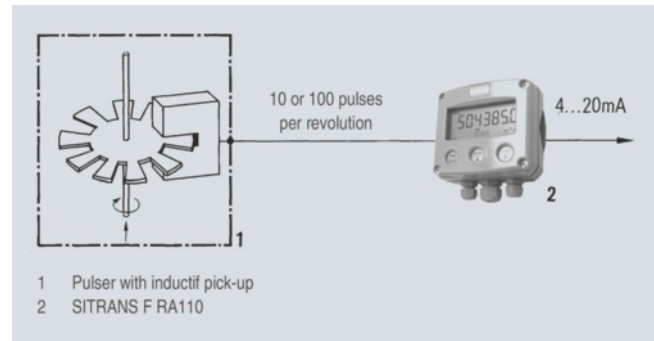
The quantitative value associated with one pulse depends on the value per revolution of the drive (pulses per liter or gallon) or on the respective volume of the measuring chamber of the drive.

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.

Technical specifications

Slot initiator	Sensor SJ 3,5 -N-K37
Power supply (from pulse amplifier)	8 V DC, R_i approx. 1 k Ω (DIN 19234) $C_i = 40$ nF; $L_i = 160$ μ H
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° \pm 30° Electrically offset 90° \pm 30°
Duty factor	1 : 1 \pm 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

Article No.

Pulser with inductive pick-up

Weight approx. 1.2 kg (2.65 lb)

Single pick-up

- 10 pulses/revolution
- 100 pulses/revolution

7MV1105-1AA00
7MV1105-2AA00

Double pick-up¹⁾

(for custody transfer installations)

- 10 pulses/revolution
- 100 pulses/revolution

7MV1105-3AA01
7MV1105-4AA01

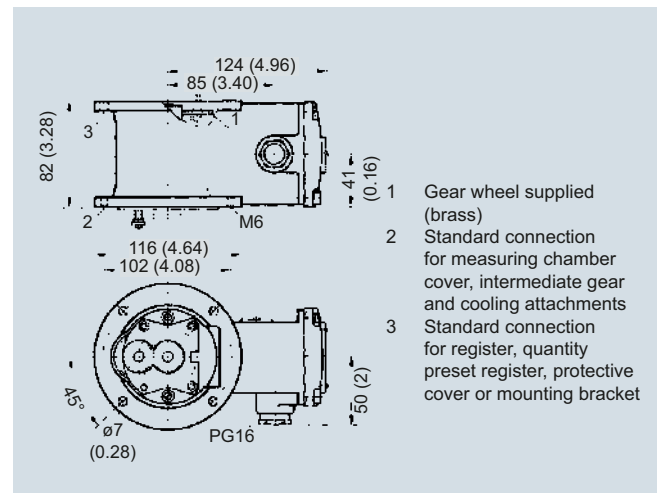
Instruction Manual

German/English

C73000-B5174-C25

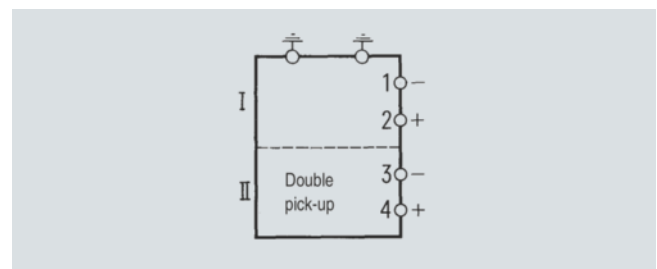
¹⁾ Pulse channels electrically offset by 90°

Dimensional drawings



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

Flow Measurement

Notes

3