

Flow Measurement



3/2 Product overview

Introduction

- 3/9 Criteria for selection of flowmeter
- 3/10 Communication solutions

SITRANS F M (electromagnetic)

- 3/11 System information
- 3/29 SITRANS F M Verificator Transmitters
 - 3/31 - MAG 5000/6000
 - 3/43 - MAG 6000 I/6000 I Ex
- Flow sensors
 - 3/48 - MAG 1100 and MAG 1100 HT
 - 3/56 - MAG 1100 F
 - 3/67 - MAG 3100 and MAG 3100 HT
 - 3/83 - MAG 3100 P
 - 3/90 - MAG 5100 W
- 3/103 Transmitter TRANSMAG 2 with sensor 911/E
- 3/113 Battery-operated water meter MAG 8000
- 3/120 - MAG 8000 for abstraction and distribution network applications (7ME6810)
- 3/124 - MAG 8000 CT for revenue and bulk metering (7ME6820)
- 3/130 - MAG 8000 for irrigation appl. (7ME6880)

SITRANS F C (Coriolis)

- 3/139 System information
- Flowmeter
 - 3/149 - Transmitter SITRANS FCT030
 - 3/155 - Flowmeter - Accessories/Spare parts
 - 3/160 - Flow sensor SITRANS FCS300
 - 3/169 - Flowmeter SITRANS FC330
 - 3/174 - Flowmeter SITRANS FC310
 - 3/178 - Flowmeter SITRANS FC410 and FC430 for OEM customers
- 3/180 SITRANS F C sensors with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter
 - 3/180 - MASS 2100 DI 1.5
 - 3/183 - FC300 DN 4
 - 3/187 - MASS 2100 DI 3, DI 6 and DI 15
- 3/199 SITRANS F C sensors MASS 2100/FC300 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitters (Low flow program)
 - 3/205 - MASS 6000 IP67 compact/remote
 - 3/210 - MASS 6000 for 19" insert/19" wall mounting
 - 3/219 - MASS 6000 Ex d compact/remote
 - 3/224 - SIFLOW FC070
- 3/228 Flow sensor SITRANS FCS200
- 3/233 SITRANS F C sensors with SITRANS MASS 6000 and SIFLOW FC070 transmitter
 - 3/233 - MASS 2100 DI 1.5
 - 3/234 - FC300 DN 4
 - 3/235 - MASS 2100 DI 3, DI 6 and DI 15

SITRANS F US (ultrasonic)

- 3/238 In-line ultrasonic flowmeters
- 3/239 System information
 - Transmitters
 - 3/246 - SITRANS FUS060
 - 3/253 - SITRANS FUS080/FUE080
 - Flowmeters
 - 3/262 - SONO 3300/FUS060
 - 3/268 - SONO 3100/FUS060
 - 3/277 - SONOKIT (with FUS060 or FUS080)
 - 3/288 - SITRANS FUS380 standard
 - 3/294 - SITRANS FUE380 with CT approval
 - 3/303 - SITRANS FUS380 and FUE380 Dimensional drawings and Schematics
- Energy calculator
 - 3/306 - SITRANS FUE950

SITRANS F S (ultrasonic)

- 3/317 Clamp-on ultrasonic flowmeters FS230
- 3/318 System information
- 3/319 Ultrasonic flow sensor SITRANS FSS200
- 3/324 Transmitter SITRANS FST030, wall mount housing
 - Ultrasonic flowmeter SITRANS FS230
 - 3/328 - Ordering data
 - 3/332 - Accessories/Spare parts
- 3/338 Clamp-on ultrasonic flowmeters FS220
- 3/339 Ultrasonic flow sensor SITRANS FSS200
- 3/344 Ultrasonic flow transmitter SITRANS FST020, wall mount housing
 - Ultrasonic flowmeter SITRANS FS220
 - 3/346 - Ordering data
 - 3/348 - Accessories/Spare parts
 - 3/352 Thickness gauge

SITRANS F X (vortex)

- 3/353 SITRANS FX300
- 3/371 SITRANS FX330

SITRANS F VA

- 3/389 SITRANS FVA250 variable area meter

SITRANS F O delta p - Primary differential pressure devices

- 3/399 Technical description
- 3/405 Pressure equipment directive 2014/68/EU
- 3/408 SITRANS F O - questionnaire online
- 3/409 Orifice plate with annular chamber
- 3/415 Orifice plate with single tapping
- 3/420 Metering pipe with orifice plate and annular chamber
- 3/424 Calculation of primary devices



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 • Communication modules: HART, Modbus, PROFIBUS, FOUNDATION Fieldbus, DeviceNet • Custody transfer approval: PTB K7.2, OIML R 117, OIML R 49 and MI-001 	3/31	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 	3/43	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. • 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 	3/48	
	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 	3/56	
	The MAG 3100 series with its flexibility in the choice of liner, electrode and flange material allows the measurement of even the most extreme process media.	Flow sensor MAG 3100 <ul style="list-style-type: none"> • For a wide range of pipe dimensions: DN 15 ... DN 2000 (1/2" ... 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 	3/67	






	Application	Description	Catalog page	Software for parameterization
	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) (½" ... 48" (78")) • Hard Rubber or EPDM lining • Integral grounding electrodes as standard • Increased low flow accuracy for water leak detection • Drinking water approvals and custody transfer approvals , OIML R 49, MI-001 and PTB K7.2 	3/90	
SITRANS F M electromagnetic flowmeters - High-power AC magnetic flowmeter				
	Designed for heavy-duty applications like pulp & paper stock over 3 %; heavy mining slurries and mining slurries with magnetic particles	Transmitter TRANSMAG 2 <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 	3/103	SIMATIC PDM
	Designed for heavy-duty applications like pulp & paper stock over 3 %; heavy mining slurries and mining slurries with magnetic particles	Flow sensor 911/E <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 	3/103	
SITRANS F M electromagnetic flowmeters - Battery-operated magnetic water meter				
	Battery-operated electromagnetic water meter for water applications within abstraction, distribution network, revenue metering and irrigation	Water meter MAG 8000 <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 	3/113	SIMATIC PDM and Flow Tool
SITRANS F C mass flowmeters				
	<p>Designed for a variety of liquid and gas applications in the general Process Industry.</p> <p>Measurement of mass flow, density, temperature and fraction.</p>	Flowmeters FC330 NEW (Dual tube design) <ul style="list-style-type: none"> • DN 15, DN 25, DN 50, DN 80, DN 100 and DN 150 • Flow from 0.2 ... 860 000 kg/h (0.4 ... 1 895 976 lb/h) - water • Pipe material: AISI 316L or Nickel-Alloy C4 • Accuracy, typically: Flow: ± 0.1 % or 0.2 % version, Density: down to ± 0.002 g/cm³ • Liquid temperature/pressure: -50 ... +205 °C (-58 ... +400 °F)/up to 100 bar (1450 psi) • Approvals: ATEX, IECEx, cCSAus, CRN, PED (depending on configuration) 	3/169	

Flow Measurement

Product overview

3






	Application	Description	Catalog page	Software for parameterization
	<p>Designed for a variety of liquid and gas applications</p> <p>Measurement of mass flow, density, temperature</p> <p>Modbus RS 485 RTU communication for direct integration into skids, OEM and pre-assembled plant packages</p>	<p>Flowmeters FC310 NEW (Dual tube design)</p> <ul style="list-style-type: none"> • DN 15, DN 25, DN 50, DN 80, DN 100 and DN 150 • Flow from 0.2 ... 860 000 kg/h (0.4 ... 1 895 976 lb/h) • Pipe material: AISI 316L or Nickel-Alloy C4 • Accuracy, typically: Flow: $\pm 0.1\%$ or 0.2 % version, Density: down to $\pm 0.002\text{ g/cm}^3$ • Liquid temperature/pressure: -50 ... +205 °C (-58 ... +300 °F)/up to 100 bar (1450 psi) • Approvals: ATEX, IECEx, cCSAus, Germanischer Lloyd/det Norske Veritas, Bureau Veritas, Lloyds of London, American Bureau of Shipping (depending on configuration) 	3/174	
	<p>Designed for a variety of liquid and gas applications</p> <p>Measurement of mass flow, density, temperature and fraction</p> 	<p>Flowmeters FC430 (Dual tube design)</p> <ul style="list-style-type: none"> • DN 15, DN 25, DN 50, DN 80, DN 100 and DN 150 • Flow from 0.2 ... 860 000 kg/h (1 895 976 lb/h) - water • Pipe material: AISI 316L, Hastelloy • Accuracy, typically: Flow: $\pm 0.1\%$, Density: $\pm 0.005\text{ g/cm}^3$ (depending on size) • Liquid temp./pressure: -50 ... +200 °C (-58 ... +392 °F)/up to 100 bar (1450 psi) • Approvals: ATEX, IECEx, EAC Ex, FM, CSA, NEPSI, INMETRO, KCs, OIML R 117, NTEP, CPA, CT-KZ, SIL 2/3, EHEDG, 3A, CRN, PED (depending on configuration) 	3/178	
	<p>Designed for a variety of liquid and gas applications</p> <p>Measurement of mass flow, density, temperature</p> <p>Modbus RS 485 RTU communication for direct integration into skids, OEM and pre-assembled plant packages</p>	<p>Flowmeters FC410 (Dual tube design)</p> <ul style="list-style-type: none"> • DN 15, DN 25, DN 50, DN 80, DN 100 and DN 150 • Flow from 0.2 ... 860 000 kg/h (0.4 ... 1 895 976 lb/h) • Pipe material: AISI 316L or Hastelloy C22 • Accuracy, typically: Flow: $\pm 0.1\%$, Density: $\pm 0.005\text{ g/cm}^3$ (depending on size) • Liquid temperature/pressure: -50 ... +200 °C (-58 ... +392 °F)/up to 160 bar (2321 psi) • Approvals: ATEX, IECEx, EAC Ex, FM, CSA, NEPSI, INMETRO, EHEDG, 3A, Germanischer Lloyd/det Norske Veritas, Bureau Veritas, Lloyds of London, American Bureau of Shipping (depending on configuration) 	3/178	
	<p>Designed for accurate mass flow measurement of gases in high pressure applications</p>	<p>Flow sensor FCS200</p> <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 ... +125 °C (-40 ... 257 °F) • Pressure: Up to 350 bar • Approvals: ATEX, IECEx, EAC Ex, c-FM-us, NEPSI, NTEP 	3/228	




	Application	Description	Catalog page	Software for parameterization
	Designed for a variety of liquid and gas applications	Flow sensors MASS 2100 (Single tube design) and FC300 <ul style="list-style-type: none"> • MASS 2100: DI 1.5, DI 3, DI 6, DI 15 • FC300: 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 ... +180°C (-58 ... +356 °F) / Up to 410 bar (5946 psi) • Approvals: ed according to ATEX, EAC Ex, c-UL-us, CRN, PED 	3/180, 3/183	
	Measurement of liquids and gases Multiparameter transmitter for remote or compact mounting measuring mass flow, density, temperature and fraction e.g. °Brix and °Plato For sensor MASS 2100, FC300 and FC200 Note: Due to EU-RoHs directives active from July 22nd 2017, MASS 6000 transmitters of any model and variants are not for sale within EU, EU candidate countries, Norway, Switzerland, Iceland, Croatia, and Turkey.	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, EAC Ex • Communication modules: HART, Modbus, PROFIBUS, FOUNDATION Fieldbus, DeviceNet 	3/205, 3/210	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 For sensor MASS 2100, FC300 and FC200	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 • Approvals: ATEX, IECEx, EAC Ex, c-FM-us, NEPSI, c-CSA-us, NTEP 	3/224	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 3000	SITRANS FUS060 transmitter <ul style="list-style-type: none"> • Die cast aluminum enclosure • Ex 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 	3/246	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/FUE080 transmitter <ul style="list-style-type: none"> • Battery or mains-powered • Easy one-button operation • Bidirectional measuring • IrDA optical eye communication • Robust polyamide enclosure 	3/253	SIMATIC PDM

Flow Measurement

Product overview

3

	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 	3/262	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 steel • Transducers can be replaced under pressure • FUS060 transmitter for separate mounting • ATEX-approved • Measure of all liquids less than 350 Cst, conductive or non-conductive • No pressure drop • 1-path, 2-path; 4-path on request • Special material on request 	3/268	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 3000 (4" ... 120") • 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) 	3/277	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 for MID MI004 (according to EN 1434 Class 2, OIML R 75) • <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 	3/288, 3/294	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 	3/306	

	Application	Description	Catalog page	Software for parameterization
SITRANS F S ultrasonic clamp-on flowmeters				
	<p>SITRANS F S clamp-on ultrasonic flowmeters provide highly accurate measurement while minimizing installation time and maintenance expense. These 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 • Hydrocarbon Industry 	<p>SITRANS FS230</p> <ul style="list-style-type: none"> • Suitable for virtually any liquid, even those with high aeration or suspended solids • Hydrocarbon functions are ideal for applications carrying crude oil, refined petroleum or liquefied gas • Choice of single and dual path versions to suit your operating conditions and requirements. • Easy installation; no need to cut pipe or stop flow • Minimal maintenance; external sensors do not require periodic cleaning • Easy to read display with intuitive menu system • Designed for hazardous area approvals for ATEX Zone 2, IECEx Zone 2 FMc Class I Div. 2 	3/317	
	<p>SITRANS FS220 basic is a fast-to-install clamp-on ultrasonic flowmeter for accurate measurements with minimal maintenance. Based on latest technology, this flow meter is ideal suitable for applications like:</p> <ul style="list-style-type: none"> • Water Industry • Wastewater Industry • HVAC Industry • Power Industry • Process controls 	<p>SITRANS FS220 NEW</p> <ul style="list-style-type: none"> • Easy installation during process condition, no need to cut pipe or stop flow • Minimal maintenance; external sensors do not require periodic cleaning • No media-contacting parts, no wear, no pressure drop, no energy loss • Wide turn-down ratio, very sensitive in low flow condition • Optional WideBeam technology ensures high performance • Compatible with all previously fielded transit time sensors 	3/338	
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 	3/352	

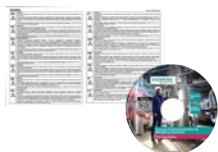
Flow Measurement

Product overview

3

	Application	Description	Catalog page	Software for parameterization
SITRANS F X vortex flowmeter				
	Measurement of steam, gases and liquids in: <ul style="list-style-type: none"> • Chemical • HVAC/Power plants • Oil & Gas • Food & Beverage • Pharma 	SITRANS FX300 <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 	3/353	
	Very versatile and flexible for use in many process applications. Flow meter combines flow, pressure and temperature measurement into one user-friendly, two-wire device. <ul style="list-style-type: none"> • Measurement of saturated steam and superheated steam • Heat metering of steam and hot water • Measurement of consumption in compressed air systems • Evaluation of Free Air Delivery (FAD) • SIP and CIP processes in the food, beverage and pharmaceutical industries • Measurement of conductive and non-conductive liquids • Safety-related measurement in SIL applications (SIL2) 	SITRANS FX330 <ul style="list-style-type: none"> • Integrated pressure and temperature compensation • Temperature compensation for saturated steam included as standard • SIL2 certified according to IEC 61508 Edition 2 • Use in hazardous areas • Integrated reduction of nominal diameter for space-saving and economic installation • Exchange of electronics without loss of calibration and configuration data • Gross and net heat calculation to support energy management • Remote version with cable length up to 50 m (164 ft) 	3/371	
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 	3/389	
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 	3/399	

Supplied product documentation on DVD and safety instructions



The scope of delivery of the Siemens products for process instrumentation includes a multilingual instruction sheet with **safety instructions** as well as a uniform **mini DVD – Process Instrumentation and Weighing Systems**.

This DVD contains the most important manuals and certificates for the Siemens process instrumentation and weighing technology portfolio. The delivery may also contain product-specific or order-specific printed materials.

For additional information, refer to the Annex on page 10/3.

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

Measuring principle		Electromagnetic	Coriolis	Ultrasonic (inline)	Ultrasonic (clamp-on)	Vortex	Variable area meter	Orifice plate
Medium		Liquid (conductive)	Liquid or gas	Liquid	Liquid or gas	Steam/vapor, gases, liquid	Liquid or gas	Liquid, vapor, gas
Nominal diameter		DN 2 ... 2000 (0.08" ... 78")	1.5 ... 150 mm (0.06" ... 6")	DN 50 ... 3000 (2" ... 120")	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")
Temperature range	°C (°F)	-40 ... +200 (-40 ... +392)	-50 ... +205 (-58 ... +400)	-20 ... +200 (-4 ... +392)	-40 ... +120 (-40 ... +248)	-40 ... +240 (-40 ... +464)	-20 ... +300 (-4 ... +572)	-200 ... +500 (-328 ... +932)
Max. pressure	bar (psi)	160 (2 320), optional higher	Up to 410 (Up to 5 950)	40 (580)	Unlimited	100 (1 450)	100 (1 450)	315 (4 569)
Accuracy	%	± 0.2 or ± 0.4	± 0.1, 0.15 or ± 0.2	± 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
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
Dynamic response range		1:100	1:100	1:100	1:100	1:25	1:10	1:6
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
Full-scale value					± 36/120			Re < 10 ⁸
• For liquids	m/s (ft/s)	0.25 ... 10 (0.825 ... 32.8)	10 (32.8)	10 (32.8)	± 12/40	10 (32.8)	3.5 (11.4)	3 (9.8)
• For steam/vapor, gases	m/s (ft/s)		Approx. 300 (1000) or Mach < 0.30		± 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)
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

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)		• 2) 4) 5)			
SITRANS F M TRANSMAG 2	• 1) 4)	• 1) 6)					
SITRANS F M MAG 8000						• 1) 3) 10) 11) 12)	• 14)
SITRANS F C FCT010						• 1) 10)	
SITRANS F C FCT030	• 1) 2) 4) 8)	• 1) 2) 4) 8)	• 1) 2) 4) 8)			• 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 FUS080	•	• 1) 8) 12)					
SITRANS FST030	•					• 1) 9) 10)	
SITRANS FST020	•					• 1) 10)	
SITRANS FX300	• 1)						
SITRANS FX330	• 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

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. 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.

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-portal.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 ¹⁾	XXX ¹⁾
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")			● ²⁾								
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 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")				●		●	●	●	●	●	●
DN 1050 (42")				●		●	●	●	●	●	●
DN 1100 (44")				●		●	●	●	●	●	●
DN 1200 (48")				●		●	●	●	●	●	●

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

¹⁾ Not suitable for wastewater applications

²⁾ Only in combination with DN 32 adapter A5E02054637, A5E02218297, FDK:083G2120 and FDK:083G2160

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-portal.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

Size (continued)

DN 1400 (54")				●				●		
DN 1500 (60")				●				●		
DN 1600 (66")				●				●		
DN 1800 (72")				●				●		
DN 2000 (78")				●				●		

Process connection

Wafer design	●	●								
Sanitary process connections			●							
Flanges				●	●	●	●	●	●	● ²⁾

Flange norms

EN 1092-1				●	●	●	●	●	●	● ²⁾
ANSI B 16.5 class 150				●	●	●	●	●	●	● ²⁾
ANSI B 16.5 class 300				●	●			●		
ASME B 16.47 class 150				●						
AWWA class D				●		●	●	●	●	
AS 2129				●	●					● ²⁾
AS 4087, PN 16				●	●		●	●	●	
AS 4087, PN 21				●	●					
AS 4087, PN 35				●	●					
JIS 10K				●				●	●	
JIS 20K				●						

Pressure rating¹⁾

PN 6				●				●		
PN 10				●	●	●	●	●	●	●
PN 16	●		●	●	●	●	●	●	●	●
PN 25				●	●			●		
PN 40	●	●	●	●	●	●	●	●	●	●
PN 63				●						
PN 100				●						

Accuracy

Flow error ± 0.2 % of rate	●	●	●	●	●	●	●	●	●	●
Flow error ± 0.4 % of rate	●	●	●	●	●	●	●	●	●	●
Flow error ± 0.5 % of rate								●		
Flow error ± 0.8 % of rate										●

Repeatability⁴⁾

0.1 %	●	●	●	●	●	●	●	●	●	●
0.2 %								●		

Grounding electrodes, incl.				● ³⁾		● ³⁾	●	●	(●)	●
-----------------------------	--	--	--	-----------------	--	-----------------	---	---	-----	---

Grounding rings premounted from factory										●
---	--	--	--	--	--	--	--	--	--	---

● = available

¹⁾ Pressure may be limited by the liner material chosen

²⁾ Drilled pattern flange max. 7 bar (107 psi).

³⁾ Optional on PFA

⁴⁾ Of actual flow for $v \geq 0.5$ m/s (1.5 ft/s) and conductivity $> 10 \mu\text{S/cm}$

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-portal.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

ApprovalsCustody transfer

Cold water - MI-001 (EU)

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

NMI 10 (Australia)

Chilled water pattern approval PTB K 7.2

OE12/C 040 (Austria)

Chilled water pattern approval

KIWA water approval

Marine

ABS

Bureau Veritas

DNV

GL

Lloyd's Register

● = available

¹⁾ 150 °C (302 °F)

²⁾ Ex sensor: 180 °C (356 °F)

³⁾ 70 °C (158 °F)

⁴⁾ For verification submit Product Variation Request (PVR)

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-portal.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 Zone 1/21				•	•	•				
FM Class I/II/III, Div 1				• ⁸⁾	• ⁸⁾	• ⁸⁾				
FM Class I, Zone 1/21				•	•	•				
FM Class I, Div 2	•	•	•	•	•	•	•	•		
FM Class I, Zone 2	•	•	•	•	•	•	•	•		
CSA Class I, Zone 1/21				•	•	•				
CSA Class I, Div 2				•	•	•	•	•		
NEPSI Zone 1				•	•	•				
EAC Ex	•	•	•	•	•	•				

Hygienic

EHEDG			•							
3A			•							
EC 1935:2004 European food contact material			•							

Drinking water

WRAS (WRc) - (GB)				•		• ⁴⁾	•		•	•
ANSI/NSF 61 (US) ⁷⁾				• ⁴⁾		•	•		•	•
ACS (FR) EPDM liner				•		•			•	
Belgaqua (B) EPDM liner				•		•			•	
DVGW-W270 (D) EPDM liner				•		•			•	
KIWA (NL) EPDM liner						•				

Other

CRN (Canada)	• ⁹⁾			•	•	•	•	•	•	
FM Fire Service (class number 1044)							• ⁶⁾		• ⁶⁾	
MCERTS (GB environmental)				• ⁵⁾			• ³⁾		•	
EAC (Russia, Belarus and Kazakhstan)	•	•	•	•	•	•	•	•	•	
CMC/CPA (China)				•			•			•
PED 2014/68/EU	•	•	•	•	•	•	•	•	•	
VdS							• ²⁾			

Verificator compatible

• = available

¹⁾ Only in combination with MAG 5000 and MAG 6000 transmitters.

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

³⁾ EPDM liner

⁴⁾ Only EPDM with Hastelloy electrodes

⁵⁾ EPDM or PTFE liner with AISI 316 or Hastelloy electrodes.

⁶⁾ 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

⁷⁾ Including Annex G

⁸⁾ Only DN 15 to DN 300 (½" to 12") with MAG 6000 I Ex, compact mounted

⁹⁾ Only PFA liner

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-portal.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	●	●			●			
Front panel mounting	●	●			●			
Panel mounting	●	●			●			
IP66 wall mounting	●	●	●	●	●			
Accuracy								
Flow error ± 0.2 % of rate		●	●	●	●		●	
Flow error ± 0.4 % of rate	●						●	
Flow error ± 0.5 % of rate						●		
Flow error ± 0.8 % of rate								●
Repeatability³⁾								
0.1 %	●	●	●	●	●		●	●
0.2 %						●		
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

³⁾ Of actual flow for $v \geq 0.5$ m/s (1.5 ft/s) and conductivity $> 10 \mu\text{S/cm}$

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-portal.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 approval - OIML R 49/OIML R 49 MAA							●	
Chilled water pattern approval PTB K 7.2	● ⁵⁾	● ⁵⁾					● ⁵⁾	
OE12/C 040 (Austria) Chilled water pattern approval	●	●						
KIWA water approval		●					●	
<u>Marine</u>								
ABS	●	●						
Bureau Veritas	●	●						
DNV	●	●						
GL	●	●						
Lloyd's Register	●	●						
<u>Hazardous areas</u>								
ATEX - 2 GD (Zone 1/21)				●	(●) ³⁾			
IECEX Gb Zone 1/21				●				
FM Class I/II/III, Div 1				● ⁴⁾				
FM Class I, Zone 1/21				●				
FM Class I, Div 2	●	●	●					
FM Class I, Zone 2	●	●	●					
CSA Class I, Zone 1/21				●				
CSA Class I, Div 2	●	●	●					
UL / C-UL- general safety	●	●			●			
NEPSI Zone 1				●				
EAC Ex				●	●			
<u>Other</u>								
FM Fire Service (1044)	●	●					●	
C - tick (Australia)	●	●	●	●	●			
EAC (Russia, Belarus and Kazakhstan)	●	●	●	●	●	●	●	
CMC/CPA (China)	●	●	●	●				●
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

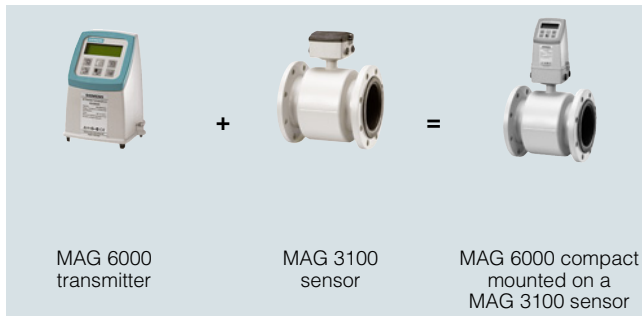
⁵⁾ For verification submit Product Variation Request (PVR)

For more national approvals please check our internet page

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

Practical examples of ordering

SITRANS F M compact installation



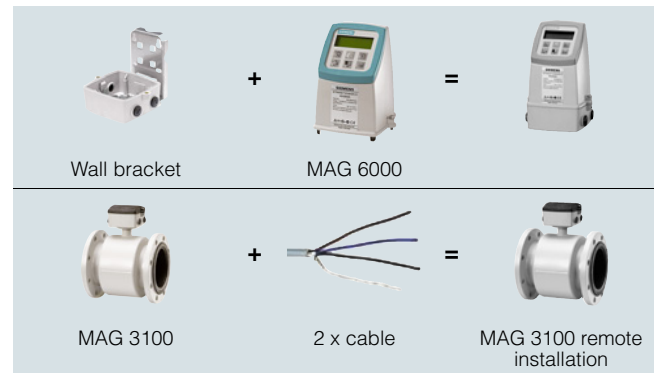
Example

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	$\pm 0.2\% \pm 1 \text{ mm/s}$
Supply	230 V AC

Note:

MAG 5000/6000 transmitters, sensors and communication modules 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	$\pm 0.2\% \pm 1 \text{ mm/s}$
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).

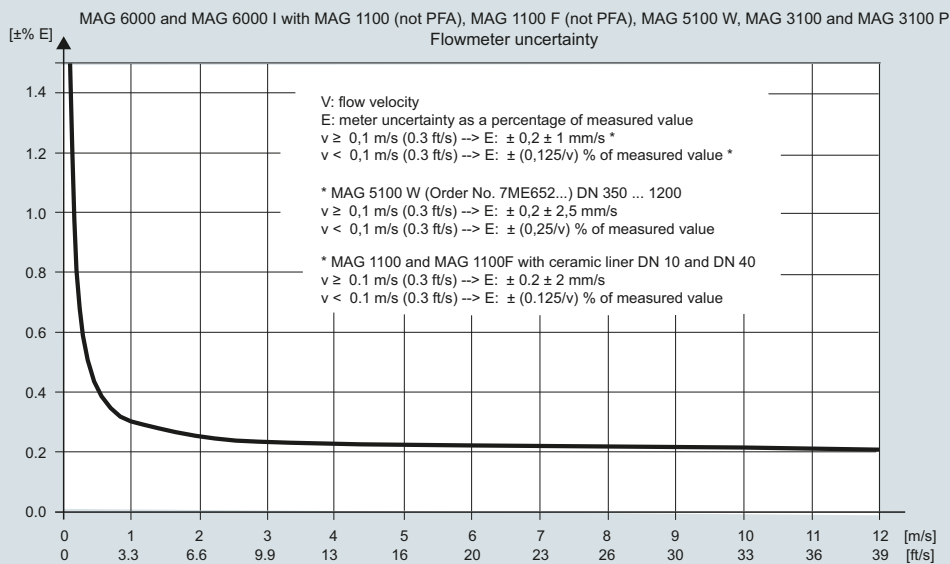
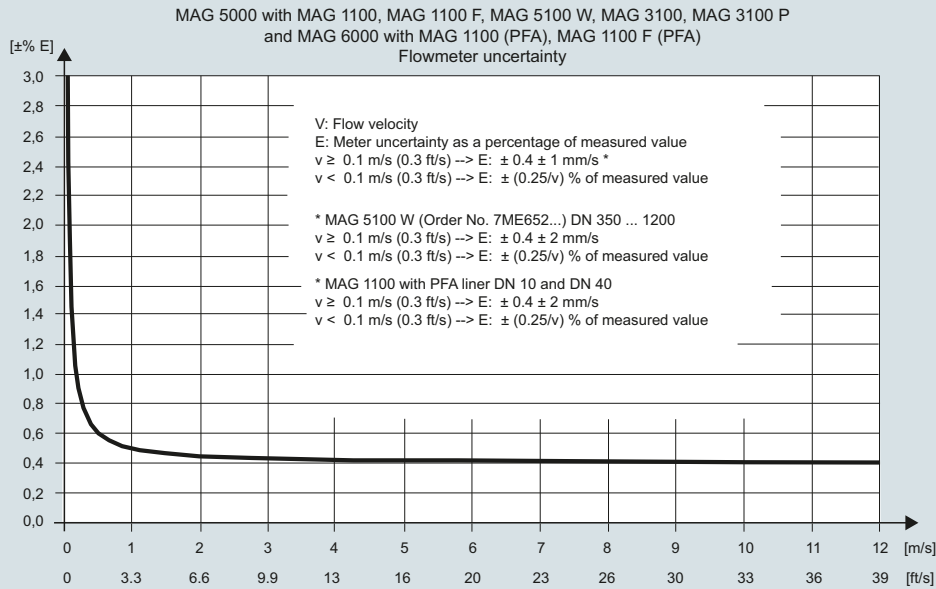
Siemens offers accredited calibrations assured to ISO 17025 in the flow range from 0.0001 m³/h to 10 000 m³/h.

The calibration follows the ISO 4185 performing calibrations under two methods: Static Weighing and Reference meter. Providing a measurement uncertainty of $\pm 0.1\%$.

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



Calibration 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 μS/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. Available as Z option C12.

Flow Measurement

SITRANS F M

System information SITRANS F M Electromagnetic flowmeters

Technical specifications

General specifications

PROFIBUS device profile	3.00 Class B
Certified	No
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	
	Fraction B	
	Pct Fraction A	
	Totalizer 1	✓
	Totalizer 2 ¹⁾	✓
	Batch progress ¹⁾	✓
	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	✓

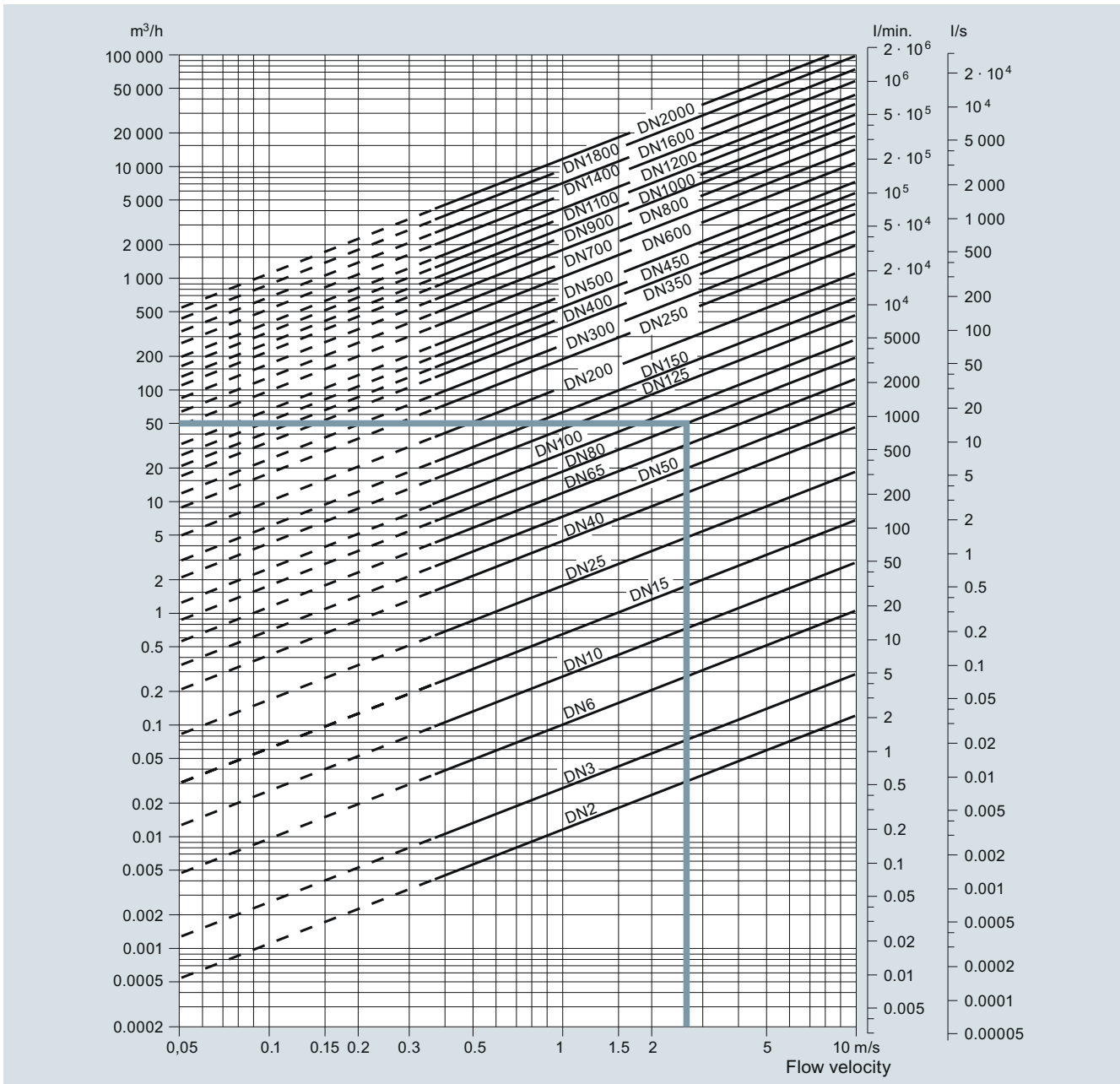
¹⁾ Value returned is dependent on the BATCH function.

When ON, Batch progress is returned.

When OFF, TOTALIZER 2 is returned.

Flow and speed chart

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":

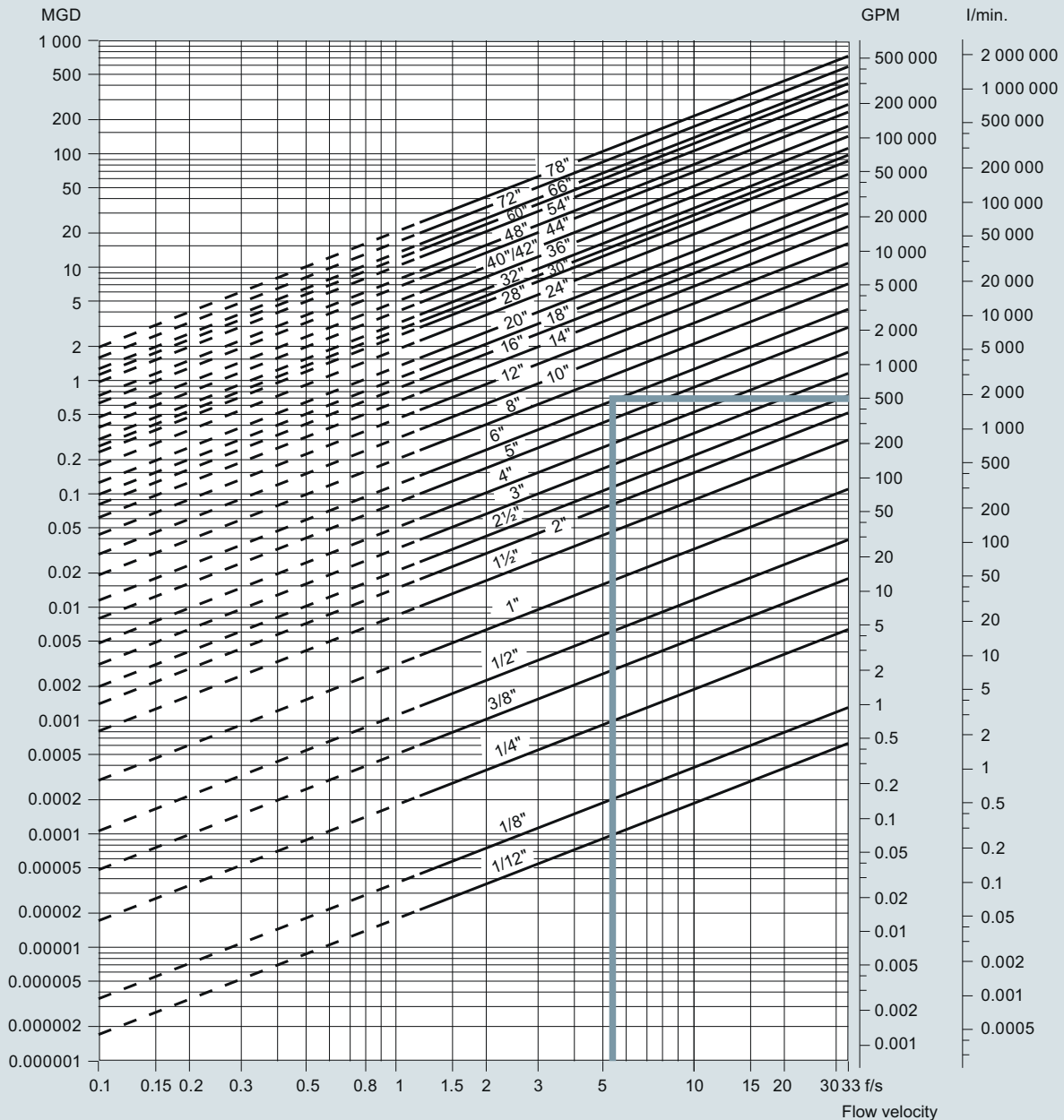
<https://pia.khe.siemens.com/index.aspx?nr=11501>

Flow Measurement

SITRANS F M

System information SITRANS F M Electromagnetic flowmeters

Imperial



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

$$v = 0.408 \cdot Q / (\text{Pipe I.D.})^2 \quad \text{or} \quad v : [\text{ft/s}], Q : [\text{GPM}], \text{Pipe I.D.} : [\text{inch}]$$

$$v = 283.67 \cdot Q / (\text{Pipe I.D.})^2 \quad \text{or} \quad v : [\text{ft/s}], Q : [\text{MGD}], \text{Pipe I.D.} : [\text{inch}]$$

Link to "Sizing program":

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

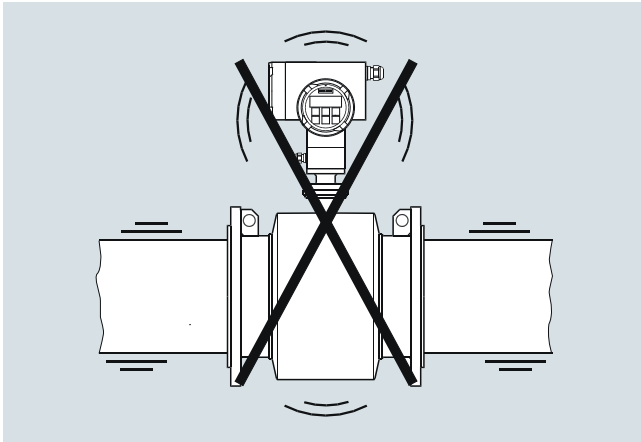
System information SITRANS F M Electromagnetic flowmeters

Installation conditions

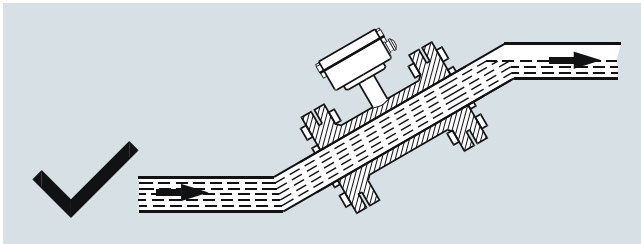
Vibrations

Strong vibrations should be avoided.

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



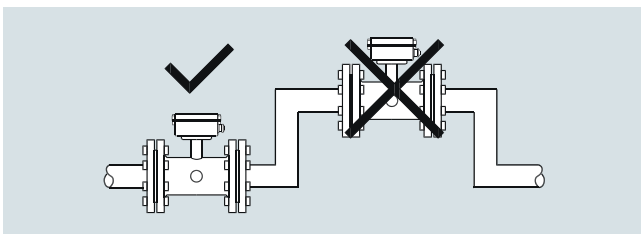
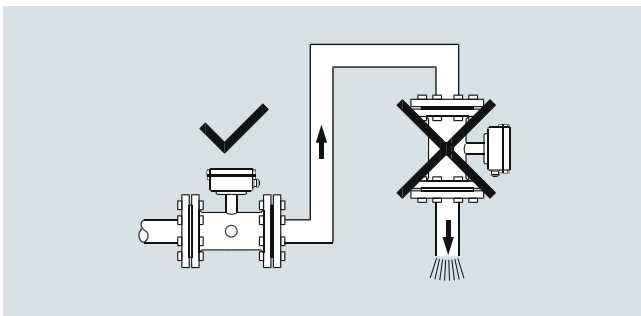
The sensor must always be completely filled with liquid.



Install in pipelines which are always full

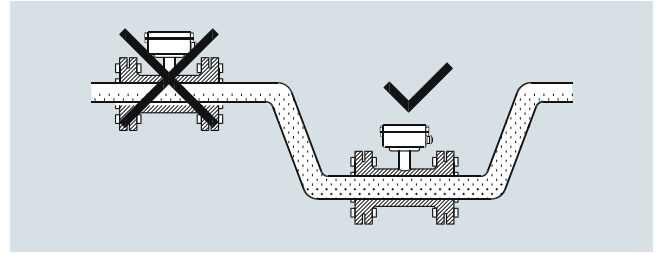
The sensor must always be completely filled with liquid. Therefore avoid:

- 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

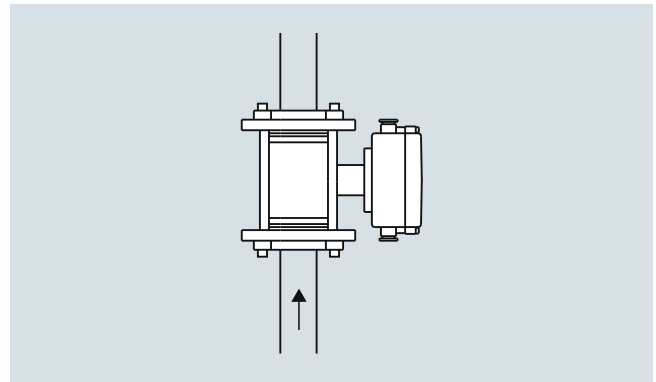
For partially filled pipes or pipes with downward flow and free outlet the flowmeter should be located in a U-Tube.



Install in U-tubes when pipe is partially filled

Installation in vertical pipes

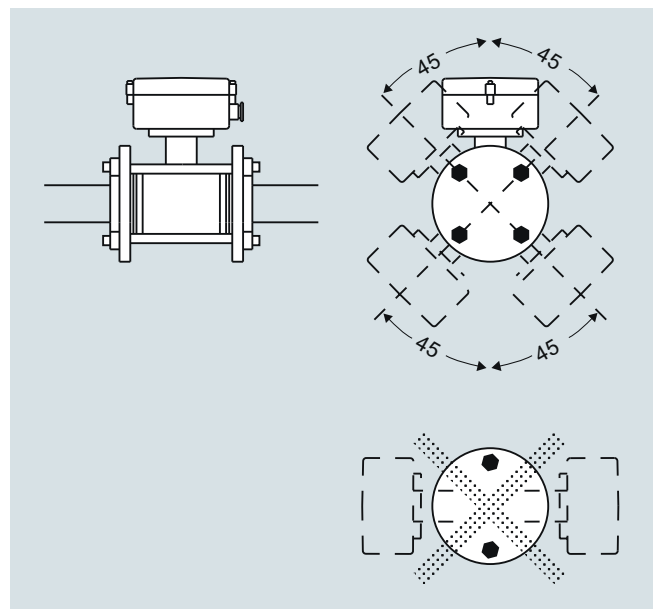
Recommended flow direction: upwards. This minimizes the effect on the measurement of any gas/air bubbles in the liquid.



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.



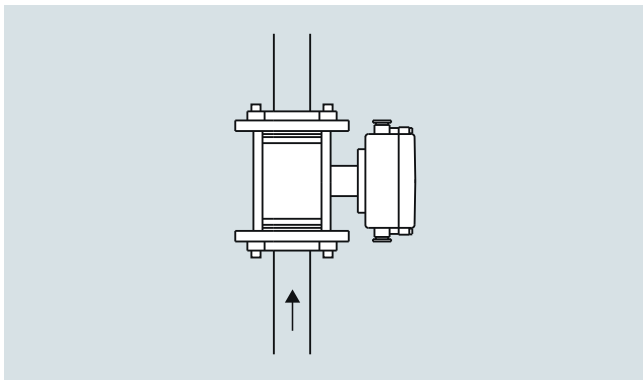
Flow Measurement

SITRANS F M

System information SITRANS F M Electromagnetic flowmeters

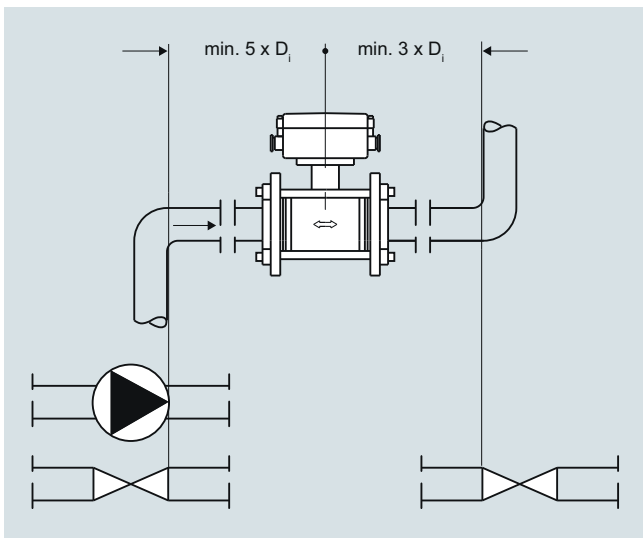
Measuring abrasive liquids and liquids containing particles

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



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

Inlet and outlet conditions



Recommended straight pipe lengths up and downstream for installations between elbows, pumps and valves.

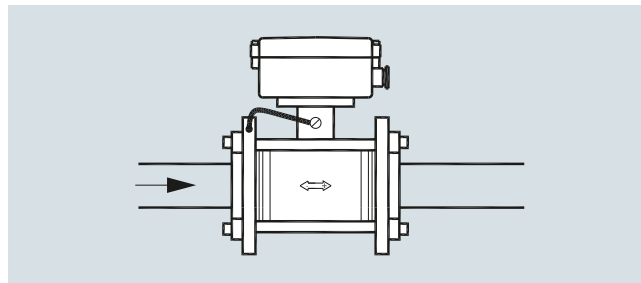
To achieve maximum accurate flow measurement it is essential to have straight pipe lengths up and downstream. Practical experience has proved that the MAG 5100 W and MAG 8000 are capable to operate in non-optimal piping arrangements and still provide acceptable accuracy even with zero diameters upstream and downstream of straight run pipe.

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

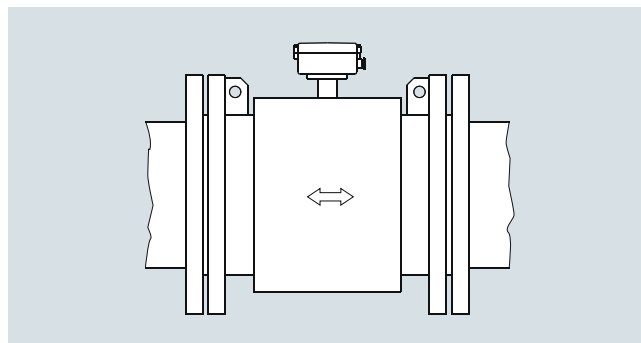


Potential equalization

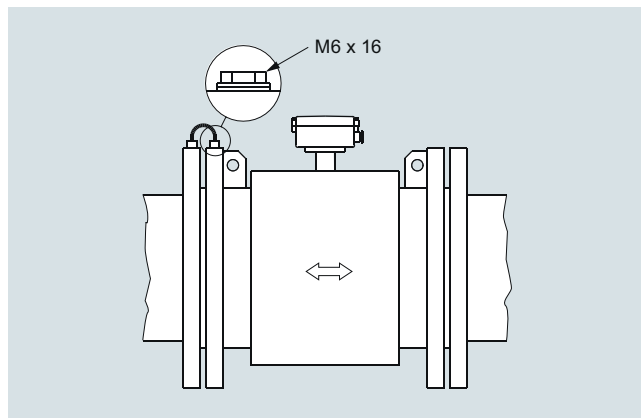
The electrical potential of the liquid must always be equal to the electrical potential of the sensor. This can be achieved in different ways depending on the application:

- Wire jumper between sensor and adjacent flange (MAG 1100, MAG 3100)
- Direct metallic contact between sensor and fittings (MAG 1100 F)
- Built-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.

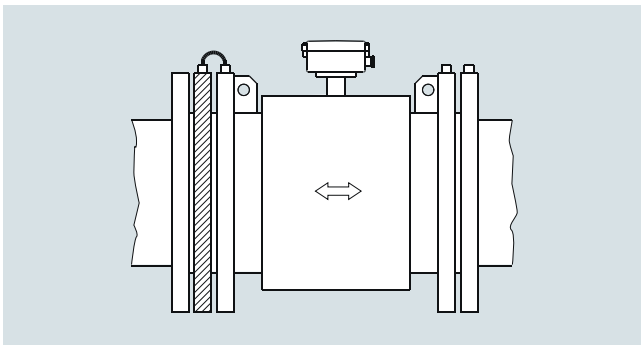
Grounding



MAG 3100 and MAG 5100 W: with grounding electrodes in conductive and non-conductive pipes (no further action necessary)



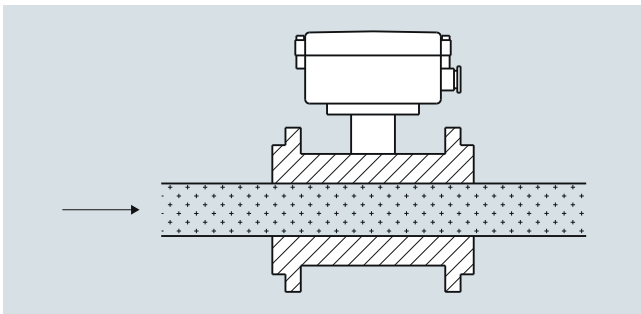
MAG 1100 and MAG 3100: without grounding electrodes in conductive pipes (MAG 1100 use graphite gasket)



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

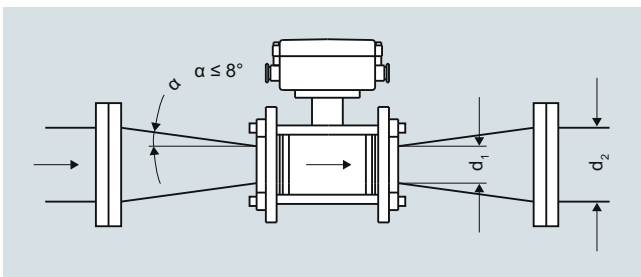
MAG 1100 F grounding via process connections. MAG 8000 grounding see MAG 8000 pages.

Vacuum



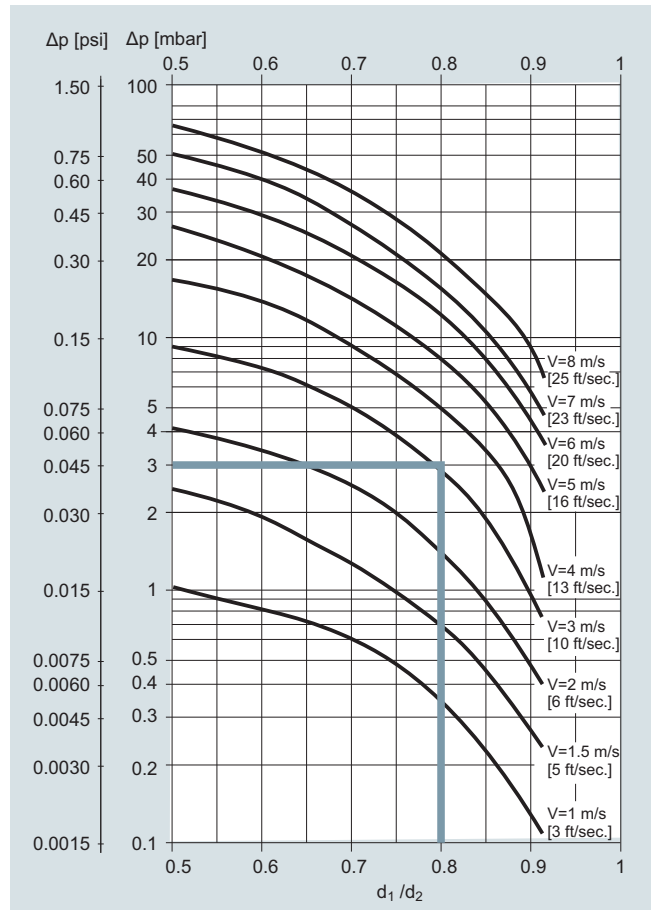
In order to prevent damages of liner when operating meters under vacuum please take note of the information "Operating pressure" given in section "Technical specification".

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.

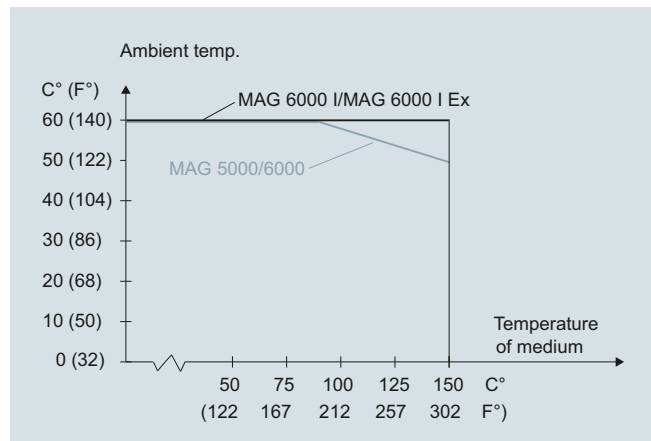


Pressure drop as function of diameter reduction between reducers

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

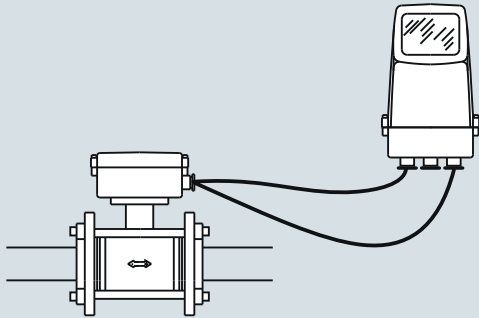
SITRANS F M

System information SITRANS F M Electromagnetic flowmeters

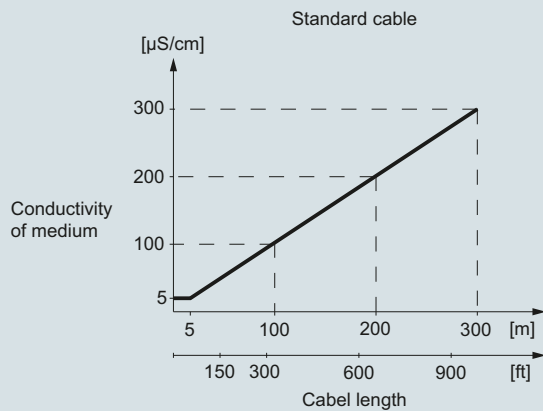
Sensor cables and conductivity of medium

Compact installation:

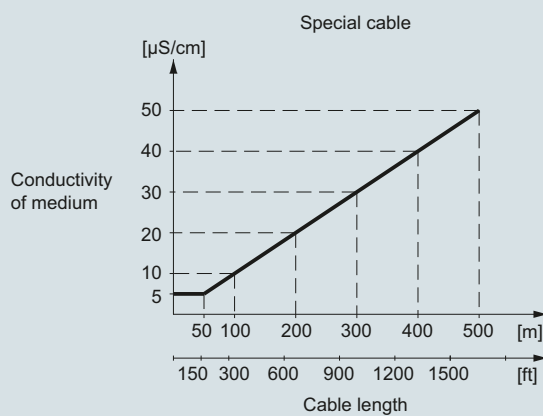
Liquids with an electrical conductivity $\geq 5 \mu\text{S/cm}$.



Remote installation



Minimum conductivity of medium (using standard electrode cable)



Minimum conductivity of medium (using special electrode cable)

Empty pipe detection

The installation has to fulfill the following limitations for usage of the empty pipe detection function:

- media conductivity $\geq 20 \mu\text{S/cm}$
- length of cable at remote installation $\leq 50 \text{ m}$ (150 ft)
- special shield cable must be used

Note for MAG 1100 sizes DN 2 and DN 3:

- empty pipe detection is not available
- the media conductivity must be $\geq 30 \mu\text{S/cm}$

Note for MAG 5000/6000 CT:

- empty pipe detection is not available

Function

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

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

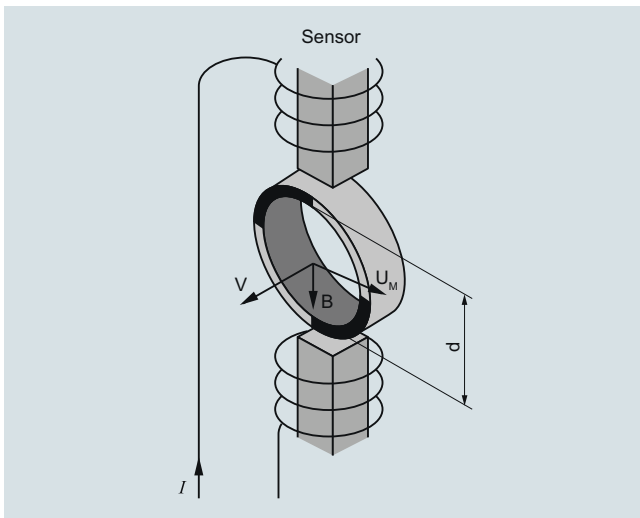
U_M = Measured voltage induced in the medium perpendicular to the magnetic field and the flow direction. The voltage is tapped at two point electrodes.

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

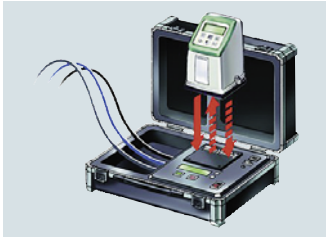
Flow Measurement

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.

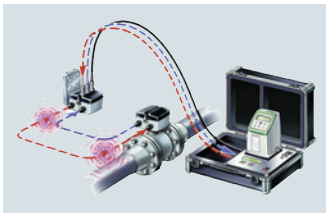


Transmitter test

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



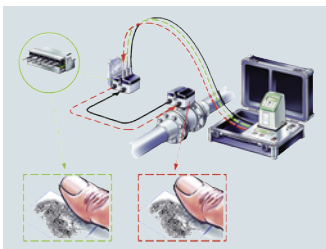
Flowmeter insulation test

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.

MAGFLO® Verification Certificate						
Customer:			MAGFLO® Identification:			
Name			TAG No./Name	0		
Address			Sensor Code No.	7ME634		
			Sensor Serial No.	057701H142		
			Transmitter Code No.	7ME692		
Phone			Transmitter Serial No.	109418N080		
Email			Location			
Results:						
Verification file name or No.			FT-103FT2801			
Transmitter			Passed			
Sensor Insulation			Passed			
Magnetic Circuit			Passed			
Velocity		Current Output		Frequency Output		
Theoretical	Theoretical	Actual	Deviation	Theoretical	Actual	Deviation
0.5m/s	4.800mA	4.802mA	0.25%	0.500kHz	0.501kHz	0.11%
1.0m/s	5.600mA	5.601mA	0.08%	1.000kHz	1.001kHz	0.07%
3.0m/s	8.800mA	8.804mA	0.08%	3.000kHz	3.004kHz	0.14%
Current Output 4-20mA			Frequency Output 0-10kHz			
Transmitter Settings:			Sensor Details:			
Basic	Qmax.	2.00000 m ³ /h				
	Flow Direction	Positive				
	Low flow Cut-off	1.50%				
	Empty Pipe	ON				
Output	Current Output	ON (4-20mA)				
	Time Constant	5.0 Sec.				
	Relay Output	Error Level				
	Digital Output	Pulse				
	Frequency Range	N/A				
	Time Constant	N/A				
	Volume/pulse	1.0 l/p				
	Pulse width	0.51999998 sec.				
	Pulse polarity	Positiv				
Totalizer 1 value before test	819442.93213 l					
Totalizer 1 value after test	819458.92334 l					
Totalizer 2 value before test	693.87579 l					
Totalizer 2 value after test	693.88145 l					
Operating time in days	1068					
			Size			
			DN 15 1/2 IN			
			Cal. Factor			
			0.16531426			
			Correction Factor			
			1.0			
			Excitation Freq.			
			12.5Hz			
			Verificator Details (083F5060)			
			Serial No.			
			107920N490			
			Device No.			
			94683			
			Software Version			
			1.40			
			PC-Software Version			
			5.01			
			Cal. date			
			2015.10.26			
			ReCal. date			
			2016.10.26			
Comments						
These tests verify that the flowmeter is functioning within 2% deviation of the original test parameters.						
Verification is traceable to National and International Standards.						
Date and signature						
2016.10.26						

Description

SITRANS F M Verificator

- 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

Article No.

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
- Front panel mounting IP65/NEMA 2
- 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

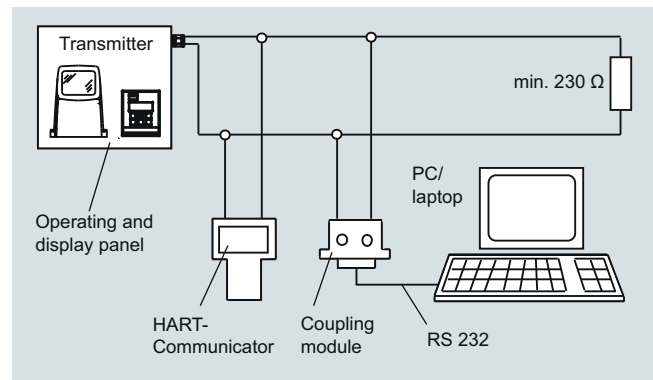
The MAG 5000/6000 are transmitters with a built-in alphanumeric display in several languages. The transmitters evaluate the signals from the associated electromagnetic sensors and also fulfil the task of a power supply unit which provides the magnet coils with a constant current.

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

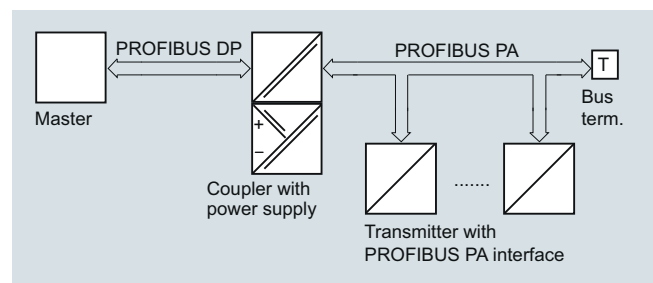
Displays and controls

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		Display and keypad	
Measuring principle	Electromagnetic with pulsed constant field	Totalizer	Two eight-digit counters for forward, net or reverse flow
Empty pipe	Detection of empty pipe (special cable required in remote mounted installation)	Display	Background illumination with alphanumeric text, 3 x 20 characters to indicate flow rate, totaled values, settings and faults; Reverse flow indicated by negative sign
Excitation frequency	Depend on sensor size	Time constant	Time constant as current output time constant
Electrode input impedance	$> 1 \times 10^{14} \Omega$	Design	
Input		Enclosure material	Fiber glass reinforced polyamide; stainless steel AISI 316/1.4436 (IP65)
Digital input	11 ... 30 V DC, $R_i = 4.4 \text{ K}\Omega$	• Compact version	Standard 19" insert of aluminum/steel (DIN 41494), width: 21 TE, height: 3 HE
• Activation time	50 ms	• 19" insert	IP20/NEMA 1; Aluminum
• Current	$I_{11 \text{ V DC}} = 2.5 \text{ mA}$, $I_{30 \text{ V DC}} = 7 \text{ mA}$	• Back of panel	IP20/NEMA 1 (prepared for IP65/NEMA 2 display side); ABS plastic
Output		• Panel mounting	IP66/NEMA 4X; ABS plastic
Current output		• Wall mounting	
• Signal range	0 ... 20 mA or 4 ... 20 mA	Dimensions	
• Load	$< 800 \Omega$	Compact version	See dimensional drawings
• Time constant	0.1 ... 30 s, adjustable	19" insert	See dimensional drawings
Digital output		Weight	
• Frequency	0 ... 10 kHz, 50 % duty cycle (uni/bidirectional)	Compact version	0.75 kg (2 lb)
• Pulse (active)	24 V DC, 30 mA, $1 \text{ K}\Omega \leq R_i \leq 10 \text{ K}\Omega$, short-circuit-protected (power supplied from flowmeter)	19" insert	See dimensional drawings
• Pulse (passive)	3 ... 30 V DC, max. 110 mA, $200 \Omega \leq R_i \leq 10 \text{ K}\Omega$ (powered from connected equipment)	Power supply	
• Time constant	0.1 ... 30 s, adjustable	• 115 ... 230 V AC +10 % -15 %, 50 ... 60 Hz	
Relay output		• 11 ... 30 V DC or 11 ... 24 V AC	
• Time constant	Changeover relay, same as current output	Power consumption	
• Load	42 V AC/2 A, 24 V DC/1 A	• 230 V AC: 17 VA	
Low flow cut off	0 ... 9.9 % of maximum flow	• 24 V AC: 9 VA, $I_N = 380 \text{ mA}$, $I_{ST} = 8 \text{ A}$ (30 ms)	
Galvanic isolation	All inputs and outputs are galvanically isolated.	• 12 V DC: 11 W, $I_N = 920 \text{ mA}$, $I_{ST} = 4 \text{ A}$ (250 ms)	
Max. measuring error (incl. sensor and zero point)¹⁾		• 24 V DC: 8.4 VA, $I_N = 350 \text{ mA}$, $I_{ST} = 4 \text{ A}$ (10 ms)	
• MAG 5000	0.4 % \pm 1 mm/s	$I_{ST} = 4 \text{ A}$ (250 ms): For solar panel please secure stable current supply	
• MAG 6000	0.2 % \pm 1 mm/s	Certificates and approvals	
Rated operation conditions		General purpose	• CE (LVD, EMC, PED, RoHS)
Ambient temperature		Hazardous areas	• UL (c-UL-us)
• 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) 	Custody transfer	• FM, CSA - NI Class I Div. 2 Groups A, B, C, D
• Storage	-40 ... +70 °C (-40 ... +158 °F)	Marine (only for remote version with MAG 5100 W, DN 50 ... DN 300)	• Cold water: MI-001
Mechanical load (vibration)		Others	• Chilled water - PTB K 7.2 (Germany) - OE12/C 040 (Austria) - TS 27.02 008 (Denmark)
Compact version	18 ... 1000 Hz, 3.17 g RMS, sinusoidal in all directions to IEC 60068-2-36		• ABS
19" insert	1 ... 800 Hz, 1 g, sinusoidal in all directions to IEC 60068-2-36		• Bureau Veritas
Degree of protection			• DNV
Compact version	IP67/NEMA 4X/6 to IEC 529 and DIN 40050 (1 mH ₂ O 30 min.)		• GL
19" insert	IP20/NEMA 1 to IEC 529 and DIN 40050		• Lloyd' s Register of Shipping
EMC performance	IEC/EN 61326-1 (all environments) IEC/EN 61326-2-5		• CMC/CPA (China)
			• C-TICK (Australia and New Zealand EMC)
			• EAC (Russia, Belarus, Kazakhstan)
			• KCC (South Korea)

Communication

Standard

- MAG 5000

- MAG 6000

Optional (MAG 6000 only)

- MAG 5000/6000 CT

Without serial communication or HART as option
Prepared for client-mounted add-on modules
HART, Modbus RTU/RS 485, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS PA, PROFIBUS DP as add-on modules
No communication modules approved

1) For detailed accuracy specifications, see page 3/20

Safety barrier (e/ia)

Application	For use with MAG 5000/6000 19" and MAG 1100 Ex/MAG 3100 Ex		
Ex approval	MAG 1100 Ex [EEx e ia] IIB ATEX, EAC Ex MAG 3100 Ex [EEx e ia] IIC ATEX, EAC Ex		
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 	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 	7ME6910-1AA30-1AA0 7ME6910-1AA10-1AA0 7ME6910-1AA10-1BA0	
Transmitter MAG 5000 CT for compact and wall mounting, approved for custody transfer, without verification (no approval marks - 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 	7ME6910-1AA30-1AD0 7ME6910-1AA10-1AD0	
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 	7ME6910-2CA30-1AA0 7ME6910-2CA10-1AA0	

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 	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 	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 stainless steel terminal box) (for remote version order stainless steel terminal box separately) <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz 	7ME6920-1QA30-1AA0 7ME6920-1QA10-1AA0	
Transmitter MAG 6000 CT for compact and wall mounting, approved for custody transfer, without verification (no approval marks - 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 	7ME6920-1AA30-1AD0 7ME6920-1AA10-1AD0	
Spare part transmitter for CT systems produced before 12/2016 or with firmware version 3.03 <ul style="list-style-type: none"> • 11 ... 30 V DC/ 11 ... 24 V AC • 115 ... 230 V AC, 50/60 Hz 	7ME6920-1AA30-1AB0 7ME6920-1AA10-1AB0	
Transmitter MAG 6000 SV for compact and wall mounting; special excitation frequency 44 Hz 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 	7ME6920-1AB30-1AA0 7ME6920-1AB10-1AA0	


Description	Article No.	
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 	7ME6920-2CA30-1AA0 7ME6920-2CA10-1AA0	
Transmitter MAG 6000 SV for 19" rack and wall mounting; special excitation frequency 44 Hz 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 19" insert, complete mounted with IP66/ NEMA 4X wall mounting enclosure in ABS plastic; 115 ... 230 V AC, 50/60 Hz; cable gland PG13.5	7ME6920-2EA10-1AA0	
MAG 6000 19" insert with safety barrier for Ex-approved sensors, complete mounted with IP66/NEMA 4X wall mounting enclosure in ABS plastic; 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, complete mounted with IP66/NEMA 4X wall mounting enclosure in ABS plastic, special 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 • 115 ... 230 V AC, 50/60 Hz 	7ME6920-2EB30-1AA0 7ME6920-2EB10-1AA0	

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 	A5E02338368 A5E02944982
For SITRANS F M MAG 5000/6000 19" <ul style="list-style-type: none"> • English 	A5E02082880

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Communication modules for MAG 6000



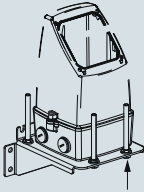


Description	Article No.	
HART (not for MAG 6000 I)	FDK:085U0226	
Modbus RTU/RS 485	FDK:085U0234	
PROFIBUS PA Profile 3	FDK:085U0236	
PROFIBUS DP Profile 3	FDK:085U0237	
DeviceNet	FDK:085U0229	
FOUNDATION Fieldbus H1	A5E02054250	

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 	A5E00753974 A5E03089262
FOUNDATION Fieldbus <ul style="list-style-type: none"> • English • German 	A5E02318728 A5E02488856
DeviceNet <ul style="list-style-type: none"> • English 	A5E03089720

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Accessories for MAG 5000 and MAG 6000



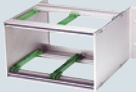



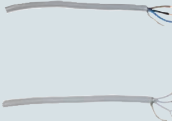





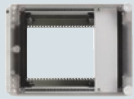

Description	Article No.	
Accessory kit for remote use of sensor with two 5-pin terminal blocks	A5E34827189	
Wall mounting unit for MAG 5000/6000 IP67/NEMA 4X/6, terminal box in polyamide ¹⁾ <ul style="list-style-type: none"> • 4 x M20 cable glands • 4 x 1/2" NPT cable glands 	FDK:085U1018 FDK:085U1053	
Special wall mounting unit for MAG 5000/6000 IP67/ NEMA 4X/6, mounting bracket in stainless steel AISI 316 (1.4401), terminal box in polyamide <ul style="list-style-type: none"> • 4 x M20 cable glands • 4 x 1/2" NPT cable glands 	A5E36699702 A5E36699938	
Sun lid for MAG 5000/6000 transmitter (Frame and lid)	A5E02328485	
Standard coil or electrode cable, 3 x 1.5 mm ² / 18 gage, single shielded with PVC jacket, Temp. range: -30 ... +70 °C (-22 ... +158 °F) <ul style="list-style-type: none"> • 5 m (16.5 ft) • 10 m (33 ft) • 20 m (65 ft) • 30 m (98 ft) • 40 m (131 ft) • 50 m (164 ft) • 60 m (197 ft) • 100 m (328 ft) • 150 m (492 ft) • 200 m (656 ft) • 500 m (1640 ft) 	A5E02296523 FDK:083F0121 FDK:083F0210 A5E02297309 FDK:083F0211 A5E02297317 FDK:083F0212 FDK:083F0213 FDK:083F3052 FDK:083F3053 FDK:083F3054	

¹⁾ For stainless steel wall mounting kit, order:
 - M20: FDK:085U1018 and A5E00836867
 - 1/2" NPT: FDK:085U1053 and A5E00836868

Flow Measurement

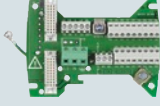










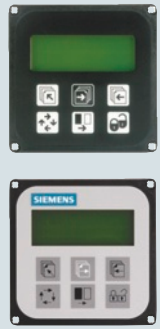





SITRANS F M

Transmitter MAG 5000/6000

Description	Article No.		Description	Article No.	
Special electrode cable ¹⁾ (empty pipe detection or low conductivity), 3 x 0.25 mm ² , double shielded with PVC jacket; Temperature range : -30 ... +70 °C (-22 ... +158 °F)			Panel mounting enclosure IP20/NEMA 1 in aluminium for 19" insert (21 TE)	FDK:083F5032	
<ul style="list-style-type: none"> • 10 m (33 ft) • 20 m (65 ft) • 40 m (131 ft) • 60 m (197 ft) • 100 m (328 ft) • 150 m (492 ft) • 200 m (656 ft) • 500 m (1640 ft) 	FDK:083F3020		Panel mounting enclosure IP20/NEMA 1 in aluminium for 19" insert (42 TE)	FDK:083F5033	
Low-noise electrode coax cable for low conductivity and high vibration levels, 3 x 0.13 mm ² ; Temp. range: -25 ... +85 °C (-13 ... +185 °F)			Wall mounting enclosure IP66/NEMA 4X in ABS plastic for 19" insert (cable glands and connection board not included)		
<ul style="list-style-type: none"> • 2 m (6.6 ft) • 5 m (16.5 ft) • 10 m (33 ft) 	A5E02272692		<ul style="list-style-type: none"> • 21 TE 	FDK:083F5037	
	A5E02272723		<ul style="list-style-type: none"> • 42 TE 	FDK:083F5038	
Cable kit including standard coil cable (3 x 1.5 mm ² / 18 gage, single shielded with PVC jacket) and special electrode cable ¹⁾ (3 x 0.25 mm ² , double shielded with PVC jacket); Temperature range: -30 ... +70 °C (-22 ... +158 °F)			Front cover (7TE) for panel mounting enclosure	FDK:083F4525	
<ul style="list-style-type: none"> • 5 m (16.5 ft) • 10 m (33 ft) • 15 m (49 ft) • 20 m (65 ft) • 25 m (82 ft) • 30 m (98 ft) • 40 m (131 ft) • 50 m (164 ft) • 60 m (197 ft) • 100 m (328 ft) • 150 m (492 ft) • 200 m (656 ft) • 500 m (1640 ft) 	A5E02296329		Sun shield for MAG 5000/6000 transmitters in remote design	A5E01209496	
	A5E01181647		Sun Shield for MAG 5000/6000 transmitter in compact design on MAG 3100 (DN 15 ... 2000/1/2" ... 78") or MAG 5100 W (DN 150 ... 1200/6" ... 48")	A5E01209500	
	A5E02296464				
	A5E01181656				
	A5E02296490				
	A5E02296494				
	A5E01181686				
	A5E02296498				
	A5E01181689				
	A5E01181691				
	A5E01181699				
	A5E01181703				
	A5E01181705				
Potting kit for IP68/NEMA 6P sealing of sensor junction box	FDK:085U0220				
19" safety barrier (21 TE) ¹⁾ [EEx e ia] IIC for MAG 1100 Ex sensors and MAG 3100 Ex sensors 12 ... 24 V, 115 ... 230 V, incl. back plate (A5E02559810)	FDK:083F5034				
Front panel mounting enclosure IP65/NEMA 2 in ABS plastic for 19" insert (21 TE)	FDK:083F5030				
Front panel mounting enclosure IP65/NEMA 2 in ABS plastic for 19" insert (42 TE)	FDK:083F5031				

¹⁾ Special cables cannot be used with 19" safety barrier

Spare parts

Description	Article No.		Description	Article No.	
Connection board (for polyamide terminalbox) • 12 ... 24 V • 115 ... 230 V	A5E02559817 A5E02559816		Sealing screws for sensor/ transmitter, 2 pcs	FDK:085U0221	
Connection board (for stainless steel terminalbox) • 12 ... 24 V • 115 ... 230 V	A5E02604280 A5E02604272		Terminal box, in polyamide, inclusive lid, terminal blocks, gasket and screws • M20 • ½" NPT	FDK:085U1050 FDK:085U1052	
Connection board MAG 5000/6000 19" insert for panel mounting enclosure, 12 ... 24 V/115 ... 230 V	A5E02559809		Terminal box lid, in polyamide	FDK:085U1003	
Connection board MAG 5000/6000 19" insert with safety barrier for panel mount- ing enclosure, 12 ... 24 V/115 ... 230 V	A5E02559810		Terminal box, in stainless steel, inclusive lid, terminal blocks, gasket and screws, for MAG 6000 in stainless steel and for all Ex sensors, • M20 • ½" NPT	A5E00836867 A5E00836868	
Connection board MAG 5000/6000 19" insert with safety barrier for panel mount- ing enclosure, 12 ... 24 V/115 ... 230 V (only for sensors produced before October 2007)	A5E02559811		Terminal box (3A) for MAG 1100 F in polyamide, inclusive lid, terminal blocks, gasket and screws • M20 • ½" NPT	A5E00822478 A5E00822479	
Connection board MAG 5000/6000 19" insert with cleaning unit for panel mount- ing enclosure, 12 ... 24 V/115 ... 230 V	FDK:083F4123		Gasket for terminal box lid in polyamide or for MAG 5000/ 6000 IP67/ NEMA 4X/6 enclo- sure in polyamide (5 pcs.)	A5E37086797	
SENSORPROM memory unit (Sensor code and serial num- bers must be specified on order) • 2 kB (for MAG 5000/6000/ MAG 6000 I) - 1 pc. - 10 pcs. • 250 B (for MAG 2500/3000)	FDK:085U1005 FDK:083F5052 FDK:085U1008		Spare part kit for remote use of sensor with 20 pcs. 5-pin ter- minal blocks	A5E34346873	
Display unit for MAG 5000/6000 • Black neutral front	FDK:085U1038		Display frame in polyamide for MAG 5000/6000 IP67/ NEMA 4X/6 (5 pcs.)	A5E43491675	
• Siemens front	FDK:085U1039		Connection board MAG 5000/6000 19" insert for wall mounting enclosure, 12 ... 24 V / 115 ... 230 V	A5E02559813	
HW key	On request		Connection board MAG 5000/ 6000 19" insert with safety bar- rier for wall mounting enclosure, 12 ... 24 V/115 ... 230 V	A5E02559814	
Cable glands (polyamide), 4 pcs. • M20 • ½" NPT • PG 13.5, 2 pcs.	A5E00822490 A5E00822501 FDK:083G0228		Connection board MAG 5000/ 6000 19" insert with safety bar- rier for wall mounting enclo- sure, 12 ... 24 V/115 ... 230 V (only for sensors produced before October 2007)	A5E02559812	
			Connection board MAG 5000/ 6000 19" insert with cleaning unit for wall mounting enclo- sure, 12 ... 24 V/115 ... 230 V	A5E02559815	
			SENSORPROM programmer with RS 232 interface	FDK:083H4246	

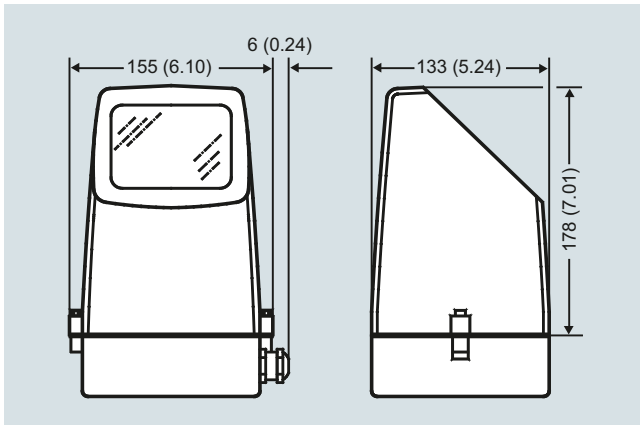
Flow Measurement

SITRANS F M

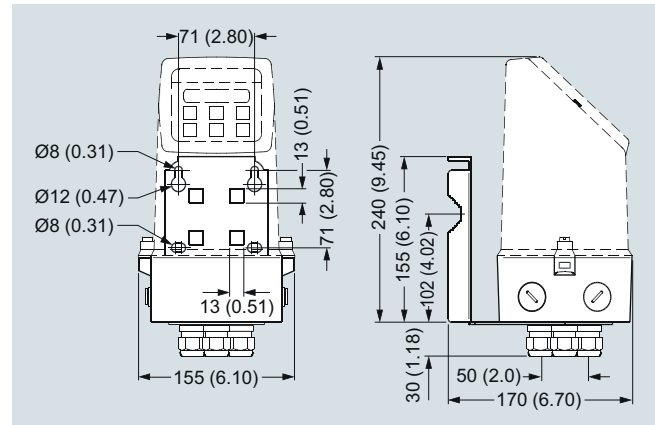
Transmitter MAG 5000/6000

Dimensional drawings

Transmitter IP67/NEMA 4X/6 compact polyamide

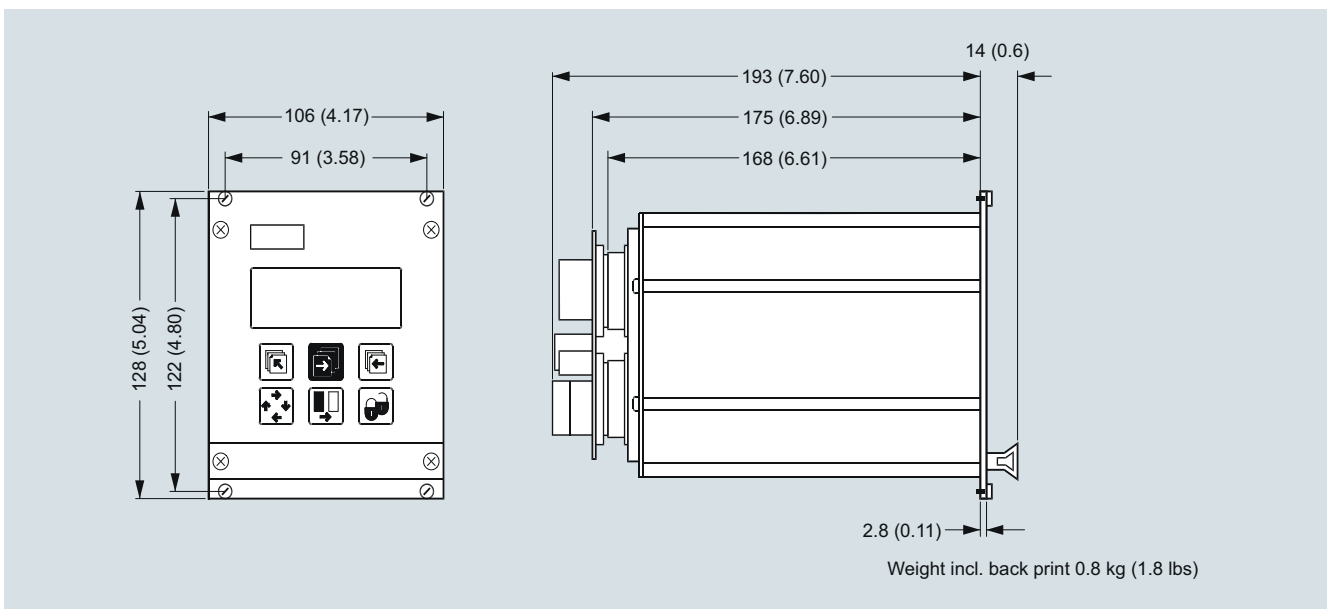


Transmitter compact mounted, dimensions in mm (inch)



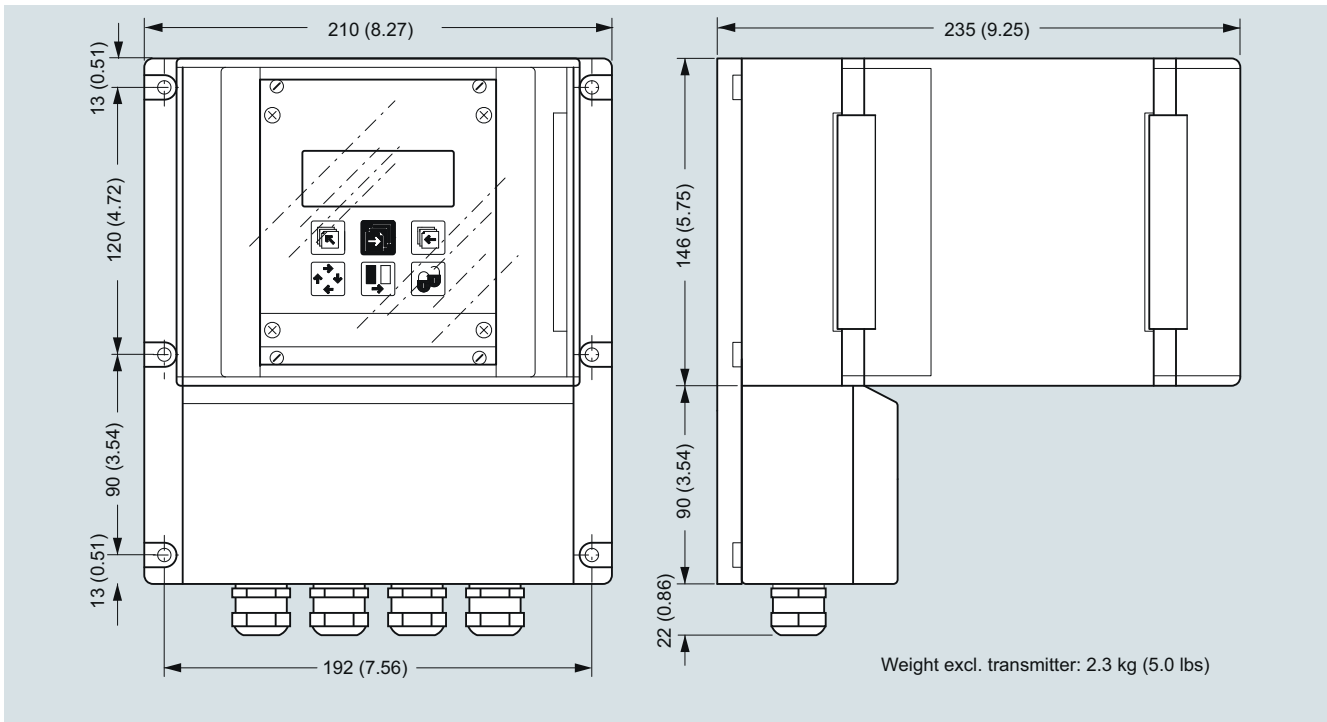
Transmitter wall mounted, dimensions in mm (inch)

Transmitter, 19" IP20/NEMA 1 standard unit



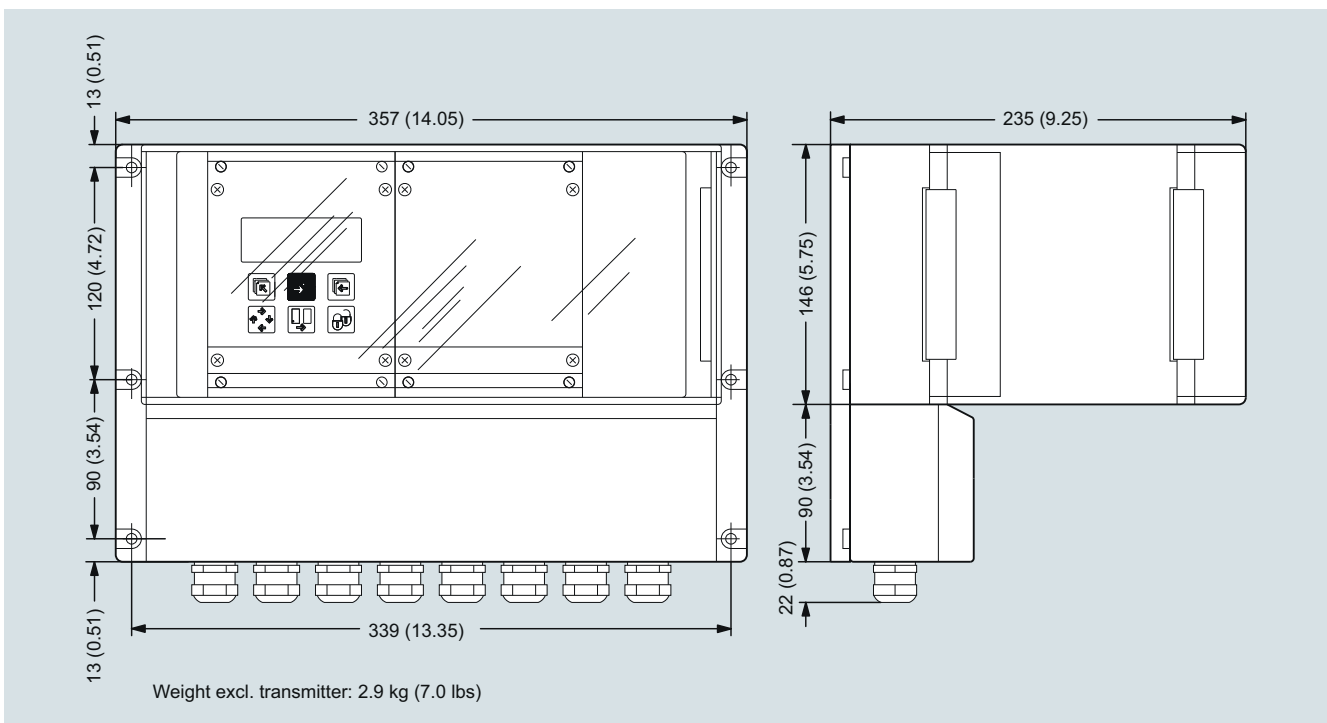
Dimensions in mm (inch)

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



Dimensions in mm (inch)

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



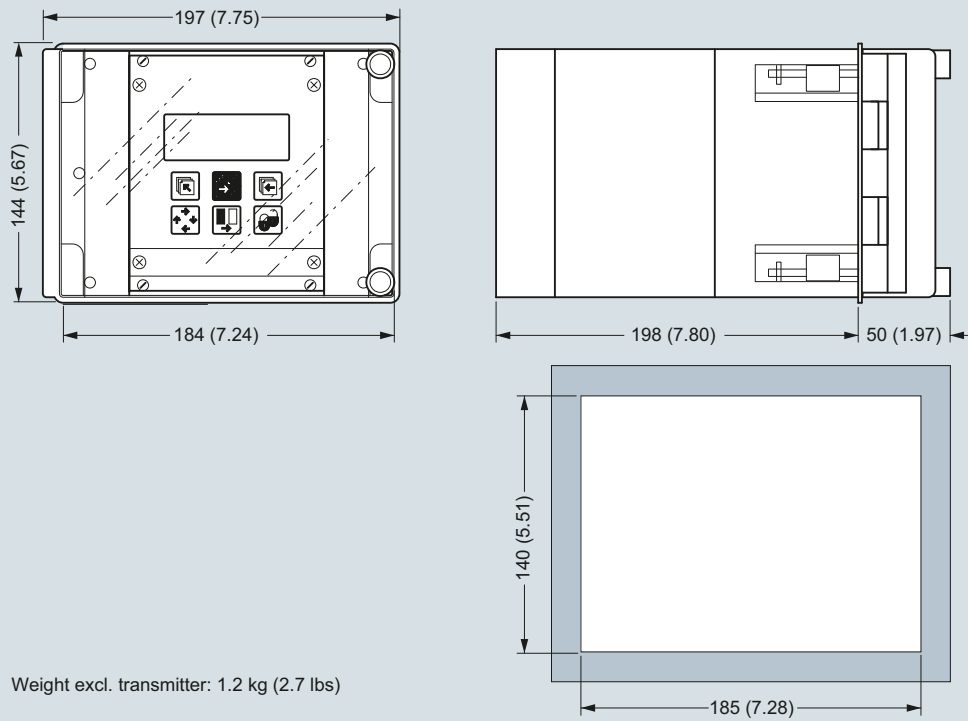
Dimensions in mm (inch)

Flow Measurement

SITRANS F M

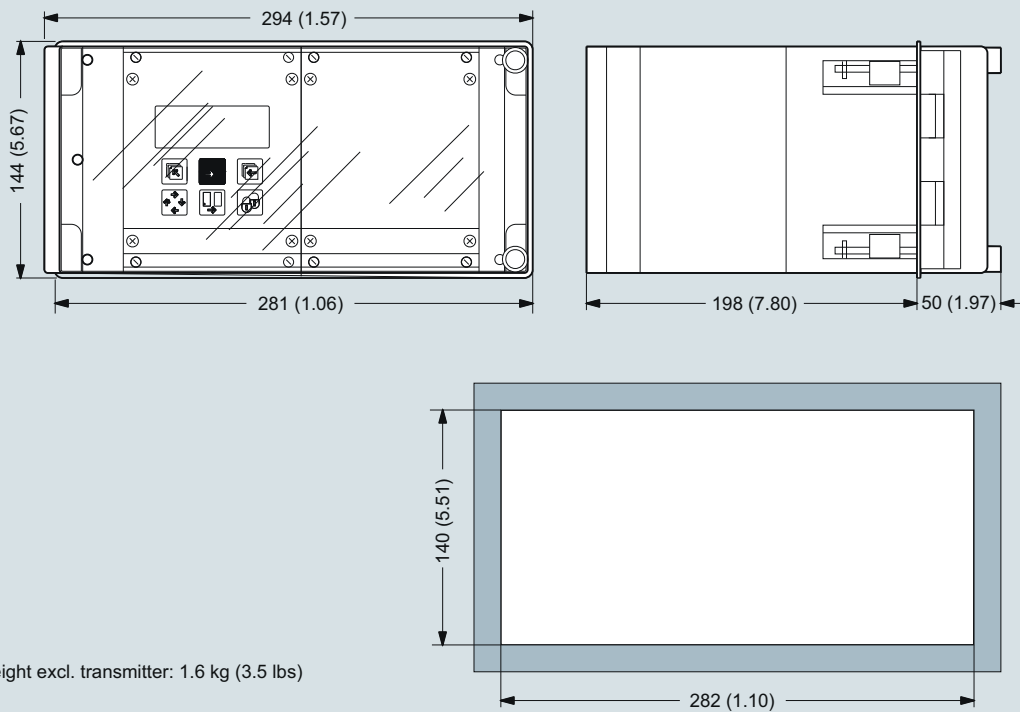
Transmitter MAG 5000/6000

Transmitter, panel front IP20/NEMA 1, 21 TE



Dimensions in mm (inch)

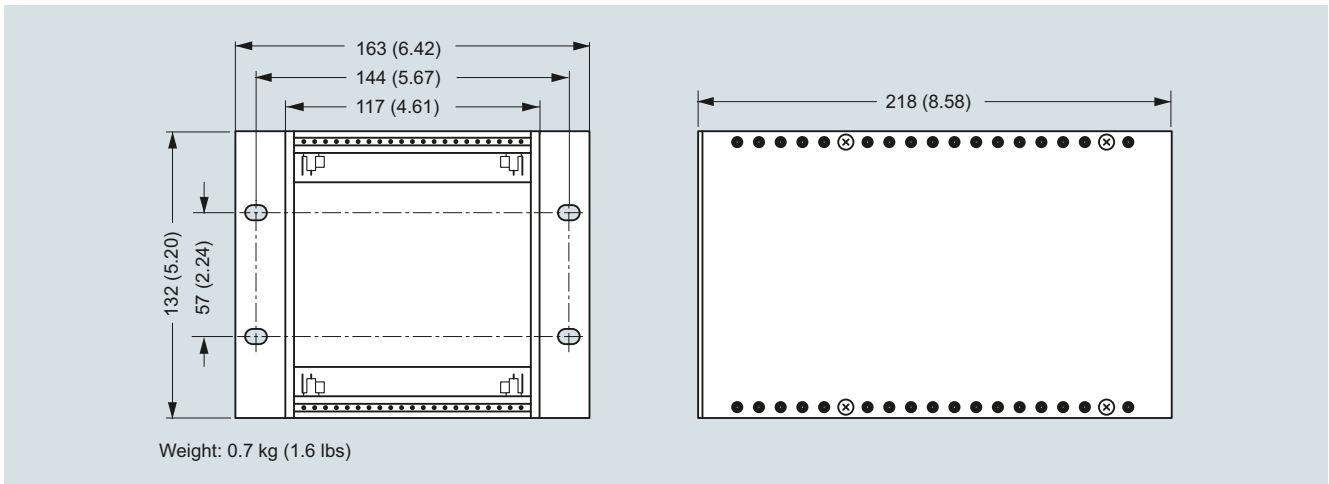
Transmitter, panel front IP20/NEMA 1, 42 TE



Dimensions in mm (inch)

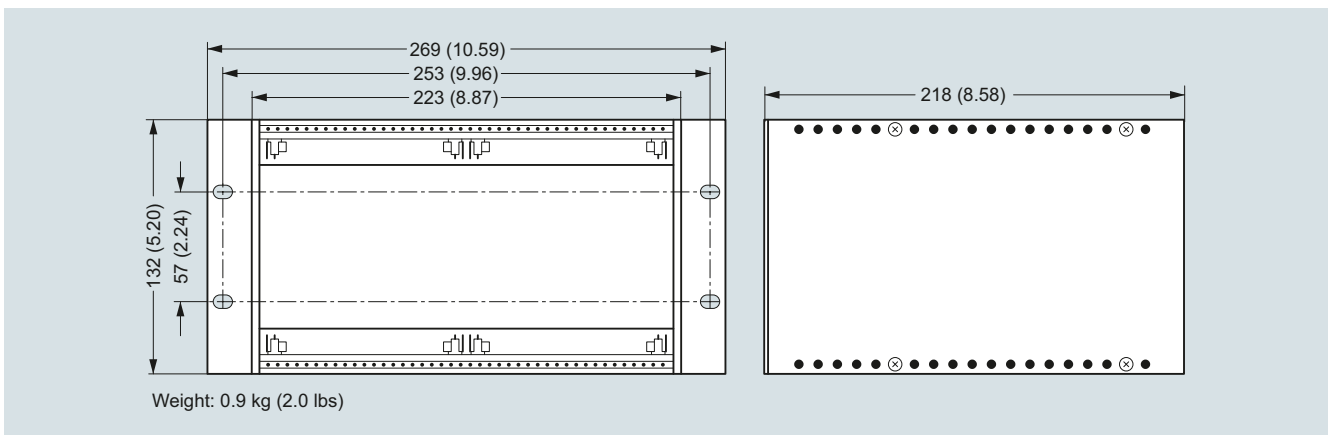
3

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

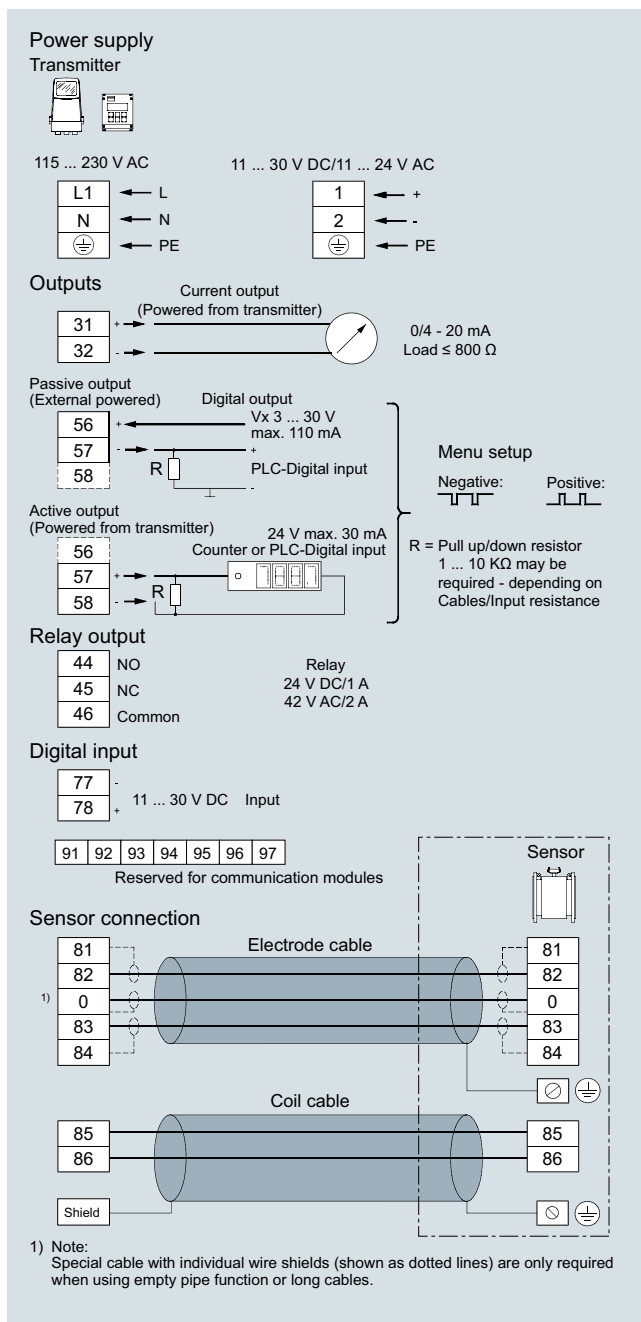
PE must be connected due to safety class 1 power supply.

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.



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 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 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 g RMS
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 powder 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 +10 %/-15 %; 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	
General purpose	• CE (LVD, EMC, PED, RoHS)
Hazardous areas	<ul style="list-style-type: none"> ATEX, IECEx, FM, CSA, EAC Ex, NEPSI <ul style="list-style-type: none"> - Zone 1 Ex d e [ia] ia IIC T6 Gb ATEX, IECEx, CSA <ul style="list-style-type: none"> - Zone 21 Ex tD A21 IP67 T85 °C FM <ul style="list-style-type: none"> - XP IS Class I Div. 1 Groups A, B, C, D - DIP Class II+III Div. 1 Groups E, F, G
Others	<ul style="list-style-type: none"> CMC/CPA (China) C-TICK (Australia and New Zealand EMC) EAC (Russia, Belarus, Kazakhstan) KCC (South Korea)

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	7ME6930-
Remote with standard wall mounting bracket, local display, die cast aluminum	2BA-1A
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Supply voltage	
Standard transmitter:	2
18 ... 90 V DC; 115 ... 230 V AC, 50 ... 60 Hz	
Standard transmitter (NAMUR):	3
18 ... 30 V DC; 115 ... 230 V AC, 50 ... 60 Hz	
Ex transmitter: 18 ... 30 V DC	4
Ex transmitter: 115 ... 230 V AC, 50 ... 60 Hz	5
Ex transmitter (NAMUR):	6
18 ... 30 V DC; 115 ... 230 V AC, 50 ... 60 Hz	
Ex approval	
Standard sensor: FM Class I, Div 2, CSA Class I, Div 2	0
Ex sensor: Hazardous area (ATEX 2G D; FM Class I, Zone 1; CSA Class I, Zone 1)	2
Communication	
None	
HART	
PROFIBUS PA Profile 3	
PROFIBUS DP Profile 3 (not for Ex version)	
Modbus RTU/RS 485 (not for Ex version)	
FOUNDATION Fieldbus H1	
Cable gland entries	
Metric	0
½" NPT	2

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 (specify in plain text)	Y17
Tag name plate, plastic (self adhesive)	Y18
Special version (specify in plain text)	Y99

Operating instructions for SITRANS F M MAG 6000 I

Description	Article No.
• English	A5E02083319
• German	A5E02210835

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

**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	A5E02054250



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
FOUNDATION Fieldbus	
• English	A5E02318728
• German	A5E02488856
DeviceNet, English	A5E03089720

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Accessories MAG 6000 I/MAG 6000 I Ex

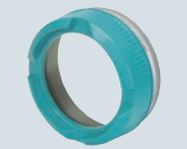
Description	Article No.
Standard coil or electrode cable, 3 x 1.5 mm ² / 18 gage, single shielded with PVC jacket, Temperature range: -30 ... +70 °C (-22 ... +158 °F)	
• 5 m (16.5 ft)	A5E02296523
• 10 m (33 ft)	FDK:083F0121
• 20 m (65 ft)	FDK:083F0210
• 30 m (98 ft)	A5E02297309
• 40 m (131 ft)	FDK:083F0211
• 50 m (164 ft)	A5E02297317
• 60 m (197 ft)	FDK:083F0212
• 100 m (328 ft)	FDK:083F0213
• 150 m (492 ft)	FDK:083F3052
• 200 m (656 ft)	FDK:083F3053
• 500 m (1640 ft)	FDK:083F3054
Special electrode cable (empty pipe detection or low conductivity), 3 x 0.25 mm ² , double shielded with PVC jacket, Temperature range: -30 ... +70 °C (-22 ... +158 °F)	
• 10 m (33 ft)	FDK:083F3020
• 20 m (65 ft)	FDK:083F3095
• 40 m (131 ft)	FDK:083F3094
• 60 m (197 ft)	FDK:083F3093
• 100 m (328 ft)	FDK:083F3092
• 150 m (492 ft)	FDK:083F3056
• 200 m (656 ft)	FDK:083F3057
• 500 m (1640 ft)	FDK:083F3058



Description	Article No.
Cable kit including standard coil cable (3 x 1.5 mm ² / 18 gage, single shielded with PVC jacket) and special electrode cable (3 x 0.25 mm ² , double shielded with PVC jacket); Temperature range: -30 ... +70 °C (-22 ... +158 °F)	
• 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 (131 ft)	A5E01181686
• 50 m (164 ft)	A5E02296498
• 60 m (197 ft)	A5E01181689
• 100 m (328 ft)	A5E01181691
• 150 m (492 ft)	A5E01181699
• 200 m (656 ft)	A5E01181703
• 500 m (1640 ft)	A5E01181705
Low noise electrode coax cable for low conductivity and high vibration levels, 3 x 0.13 mm ² ; Temperature range: -25 ... +85 °C (-13 ... +185 °F)	
• 2 m (6.6 ft)	A5E02272692
• 5 m (16.5 ft)	A5E02272723
• 10 m (33 ft)	A5E02272730

**Spare parts**




Description	Article No.
Display unit	FDK:085U3122
Accessory bag including cable gland inserts and connectors for sensor cables	FDK:085U3144
Display lid (Ex) in die-cast aluminum, with corrosion resistant coating (min. 60 µm).	7ME5933-0AC01
Blind lid for sensor cables connection compartment (only remote version) in die-cast aluminum, with corrosion resistant coating (min. 60 µm) incl. O-ring seal.	7ME5933-0AC02
Blind lid (mains supply, input/outputs) in die-cast aluminum, with corrosion resistant coating (min. 60 µm).	7ME5933-0AC03



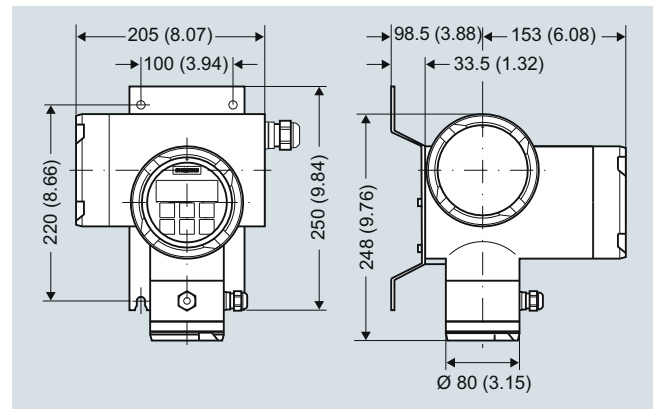
Flow Measurement

SITRANS F M

Transmitter MAG 6000 I/6000 I Ex


Description	Article No.	
Safety clamp	7ME5933-0AC06	
Standard wall-mounting bracket, stainless steel AISI 316L/1.4404	7ME5933-0AC04	
Special wall-mounting bracket, BI 2.5 DIN59382 X6Cr17	7ME5933-0AC05	

Dimensional drawings



SITRANS F M transmitter MAG 6000 I with wall-mounting bracket, dimensions in mm (inch)

Complete spare part PCB unit

Description	Article No.	
MAG 6000 I std. (not for Ex) 18 ... 30 V DC; 115 ... 230 V AC Spare PCBA	FDK:085U3123	
MAG 6000 I std. (NAMUR), 18 ... 30 V DC; 115 ... 230 V AC Spare PCBA	A5E31426892	
MAG 6000 I Ex (NAMUR), 18 ... 30 V DC; 115 ... 230 V AC Spare PCBA for use with Ex sensors with increased safety e (For Ex sensors: 7ME6110, 7ME6120, 7ME6140, 7ME6310, 7ME6320, 7ME6340) (For 7ME6330 > DN300)	A5E31426877¹⁾	
MAG 6000 I Ex d 115 ... 230 V AC Spare PCBA for use with ATEX sensors with increased safety e	A5E01013127	
MAG 6000 I Ex d 18 ... 30 V DC Spare PCBA for use with ATEX sensors with increased safety e	A5E01013340	

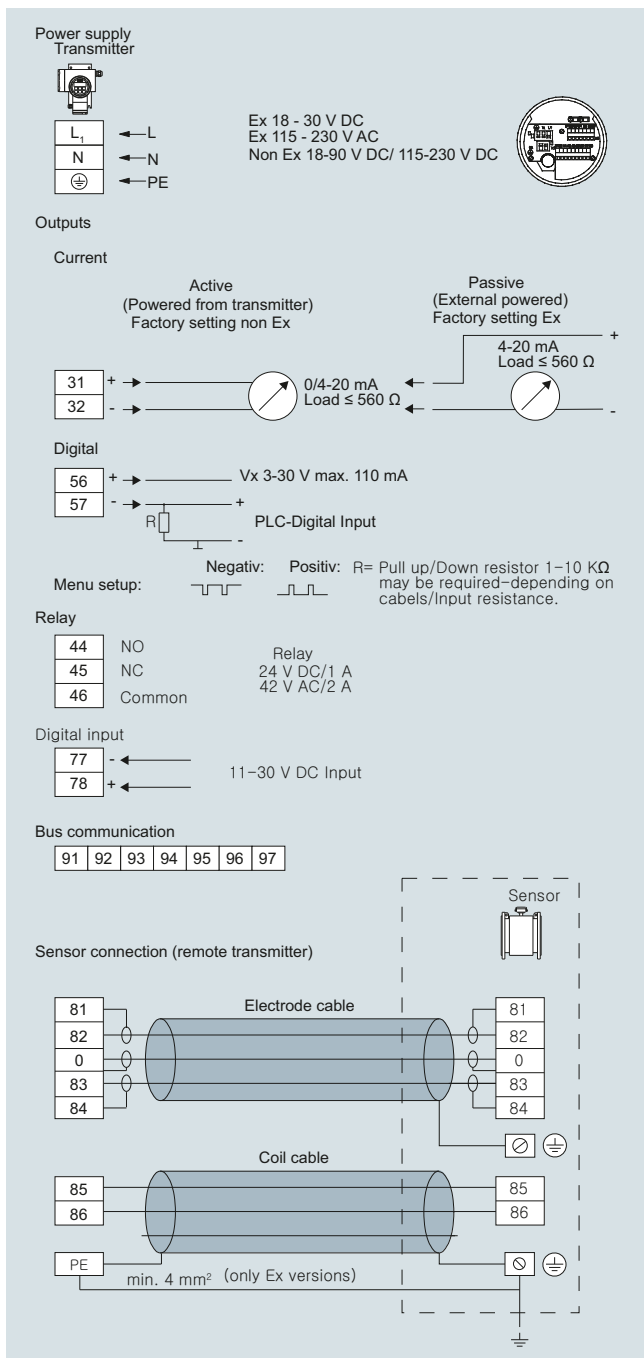
¹⁾ Ex spare parts may only be exchanged by authorized personnel from Siemens.

Please use online Product selector to get latest updates.

Product selector link:

www.pia-portal.automation.siemens.com

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
- 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" ... 2 1/2"): 12.5 Hz/15 Hz DN 80, 100 (3", 4"): 6.25 Hz/7.5 Hz	DN 15 ... 50 (1/2" ... 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 (1/2" ... 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"): G 1/2" / NPT 1/2" 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		
• 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 with transmitter MAG 5000/6000	-20 ... +60 °C (-4 ... +140 °F)	
• Compact with transmitter MAG 6000 I	-20 ... +60 °C (-4 ... +140 °F)	
• Compact with 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 (1/4", 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) 	<ul style="list-style-type: none"> • DN 15, 25: Max. ΔT ≤ 80 °C/min (1/2", 1": Max. ΔT ≤ 144 °F/min) • DN 40, 50: Max. ΔT ≤ 70 °C/min (1 1/2", 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" ... 2 1/2": 580 psi) • DN 80: 37.5 bar (3": 540 psi) • DN 100: 30 bar (4": 435 psi) Vacuum: 1×10^{-6} bar _{abs} (1.5×10^{-5} psi _{abs})	<ul style="list-style-type: none"> • DN 15 ... 50: 40 bar (1/2" ... 2": 580 psi) • DN 80: 37.5 bar (3": 540 psi) • DN 100: 30 bar (4": 435 psi) Vacuum: 1×10^{-6} bar _{abs} (1.5×10^{-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 g RMS • Sensor with compact MAG 5000/ 6000 mounted transmitter: 3.17 g RMS • Sensor with compact MAG 6000 I/ 6000 I Ex mounted transmitter: 1.14 g RMS • 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 g RMS
<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	2014/30/EU	2014/30/EU


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		
• Enclosure		
- MAG 1100	Stainless steel AISI 316L/1.4404	Stainless steel AISI 316L/1.4404
• Terminal box		
- Standard	Fibre glass reinforced polyamide (not for Ex)	Stainless steel AISI 316/1.4436
- Option	Stainless steel AISI 316/1.4436	
• Fixing studs		
	Stainless steel AISI 304/1.4301, Number and size to EN 1092-1:2001	Stainless steel AISI 304/1.4301, Number and size to EN 1092-1:2001
• Gaskets		
- Standard	EPDM (max. 150 °C, PN 40 (max. 302 °F, 600 psi))	Graphite (max. 200 °C, PN 40 (max. 392 °F, 600 psi))
- Option	• Graphite (max. 200 °C, PN 40 (max. 392 °F, 600 psi)) • PTFE (max. 130 °C, PN 25 (max. 266 °F, 300 psi))	
• Pipe connection adapters: DN 2, 3, 6 and 10 (1/12", 1/8", 1/4" and 3/8")	• Stainless steel, AISI 316/1.4436 • Hastelloy C22/2.4602 • PVDF	
Liner		
• MAG 1100 (Ceramic)	• DN 2, 3 (1/12", 1/8"): Zirconium oxide (ZrO ₂) (ceramic) • DN 6 ... 100 (1/4" ... 4"): Aluminum oxide Al ₂ O ₃	DN 15 ... 100 (1/2" ... 4"): Aluminum oxide Al ₂ O ₃
• MAG 1100 (PFA)	Reinforced PFA (not for Ex)	
Electrodes		
• MAG 1100 (Ceramic)	• DN10 ... 100 (3/8" ... 4") : Platinum with gold / Titanium brazing alloy • DN 2 ... 6 (1/12" ... 1/4"): Platinum	Platinum with gold / Titanium brazing alloy
• MAG 1100 (PFA)	• 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 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		
Calibration		
• Standard production calibration	Zero-point, 2 x 25 %, 2 x 90 %	Zero-point, 2 x 25 %, 2 x 90 %
• Special calibration	5-point calibration: 20 %, 40 %, 60 %, 80 %, 100 % of factory Q _{max} 10-point calibration: ascending and descending at 20 %, 40 %, 60 %, 80 %, 100 % of factory Q _{max} Matched-pair calibration: default, 5-point or 10-point	
Hazardous areas		
• MAG 1100 F (Ceramic)		
- Ex sensor in compact or remote version with MAG 6000 I Ex	ATEX, EAC Ex - Zone 1 Ex d e ia IIB T6 Gb	ATEX, EAC Ex - Zone 1 Ex d e ia IIB T6 Gb
- Standard sensor in compact or remote version with MAG 5000/6000/6000 I	ATEX - Zone 21 Ex tD A21 IP67	ATEX - Zone 21 Ex tD A21 IP67
• MAG 1100 F (PFA)		
- Standard sensor in compact or remote version with MAG 5000/6000/6000 I	FM - NI Class I Div. 2 Groups A, B, C, D	FM - NI Class I Div. 2 Groups A, B, C, D
Hygienic		
• MAG 1100 F (Ceramic)	3A (remote version with Polyamide terminal box)	
• MAG 1100 F (PFA)	3A (remote version with Polyamide terminal box) EHEDG (remote version with Polyamide terminal box, DN 25 ... 100/1 ... 4") Hygienic EC 1935:2004 European food contact material	
Pressure Equipment	PED - 2014/68/EU CRN (only PFA)	PED - 2014/68/EU
Others	EAC (Russia, Belarus, Kazakhstan) KCC (South Korea)	EAC (Russia, Belarus, Kazakhstan) KCC (South Korea)

For technical specification for transmitter - see transmitter pages.

Selection and Ordering data	Article No.	Selection and Ordering data	Order code
Sensor SITRANS F M MAG 1100 EPDM gaskets included	7ME6110 -	Additional information	
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	A 0 -	Please add "-Z" to Article No. and specify Order code(s) and plain text.	
Diameter		Certificates	
DN 2 (1/12")	1 D	• Material certificate according to EN 10204-3.1	C12
DN 3 (1/8")	1 H	• Factory certificate according to EN 10204-2.2	C14
DN 6 (1/4")	1 M	• Factory certificate according to EN 10204-2.1	C15
DN 10 (3/8")	1 R	Special calibration	
DN 15 (1/2")	1 V	• 5-point calibration ¹⁾	D01
DN 25 (1")	2 D	• 10-point calibration ²⁾	D06
DN 40 (1 1/2")	2 R	• Default (2 x 25 % and 2 x 90 %) matched-pair calibration	D11
DN 50 (2")	2 Y	• 5-point, matched-pair calibration ¹⁾	D15
DN 65 (2 1/2")	3 F	• 10-point, matched-pair calibration ²⁾	D18
DN 80 (3")	3 M	Terminal blocks	
DN 100 (4")	3 T	• Factory mounted terminal blocks	N02
Liner material		Region/customer specific labels	
PFA - DN 10 ... 100 (3/8" ... 4")	1	• KCC label (South Korea)	W28
Ceramic	2	Tag name plate, stainless steel (specify in plain text)	Y17
Electrode material		Tag name plate, plastic (self adhesive)	Y18
Hastelloy C (only with PFA liner)	1	Customer-specific transmitter setting	Y20
Platinum (only with ceramic liner)	2	Sensor cables wired (specify Article No. for sensor cables and order cables separately)	Y40
Transmitter		Sensor cables wired and IP68 sealing (specify Article No. for sensor cables and order cables separately)	Y41
Standard sensor for remote transmitter (order transmitter separately)	A	Special version (specify in plain text)	Y99
Ex sensor for remote transmitter (order transmitter separately)	B	Additional calibrations	
MAG 6000 I, Aluminum 18 ... 90 V DC, 115 ... 230 V AC	C	• Accredited Siemens Flow Instruments matched pair Calibration acc. to ISO/IEC 17025: 2005	On request³⁾
MAG 6000 I, Aluminum 18 ... 30 V DC, Ex	D	• Customer-specified calibration up to 10 points	On request³⁾
MAG 6000 I, Aluminum 115 ... 230 V AC, Ex	E	• Customer-witnessed calibration	On request³⁾
MAG 6000 Polyamide, 11 ... 30 V DC/ 11 ... 24 V AC	H	Any of above calibration	
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		Operating instructions for SITRANS F M MAG 1100	
No communication, add-on possible	A	Description	Article No.
HART	B	• English	A5E02435647
PROFIBUS PA Profile 3 (only MAG 6000/MAG 6000 I)	F	All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation	
PROFIBUS DP Profile 3 (not for Ex) (only MAG 6000/MAG 6000 I)	G	Accessories	
Modbus RTU/RS 485 (not for Ex) (only MAG 6000/MAG 6000 I)	E	Description	Article No.
FOUNDATION Fieldbus H1 (only MAG 6000/MAG 6000 I)	J	Potting kit for IP68/ NEMA 6P sealing of sensor junction box	FDK:085U0220
Cable glands/terminal box			
Metric: Polyamide terminal box or MAG 6000 I compact	1		
1/2" NPT: Polyamide terminal box or MAG 6000 I compact	2		
Metric: Stainless steel terminal box	3		
1/2" NPT: Stainless steel terminal box	4		

¹⁾ Quick ship only in combination with Ceramic liner

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	7ME6120-
Ceramic liner, Platinum electrode, Graphite gaskets included	A20-2A
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Diameter	
DN 15 (½")	1V
DN 25 (1")	2D
DN 40 (1½")	2R
DN 50 (2")	2Y
DN 80 (3")	3M
DN 100 (4")	3T
Transmitter	
Standard sensor for remote transmitter (order trans- mitter separately)	A
Ex sensor for remote transmitter (order transmitter separately)	B
Cable glands/terminal box	
Metric: Stainless steel terminal box	3
½" NPT: Stainless steel 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.	
Certificates	
• Material certificate according to EN 10204-3.1	C12
• Factory certificate according to EN 10204-2.2	C14
• Factory certificate according to EN 10204-2.1	C15
Special calibration	
• 5-point calibration ¹⁾	D01
• 10-point calibration ²⁾	D06
• Default (2 x 25 % and 2 x 90 %) matched-pair calibration	D11
• 5-point, matched-pair calibration ¹⁾	D15
• 10-point, matched-pair calibration ²⁾	D18
Terminal blocks	
• Factory mounted terminal blocks	N02
Region/customer specific labels	
• KCC label (South Korea)	W28
Tag name plate, stainless steel (specify in plain text)	Y17
Tag name plate, plastic (self adhesive)	Y18
Customer-specific transmitter setting	Y20
Sensor cables wired (specify Article No. for sensor cables and order cables separately)	Y40
Sensor cables wired and IP68 sealing (specify Article No. for sensor cables and order cables separately)	Y41
Special version (specify in plain text)	Y99
Additional calibrations	
• Accredited Siemens Flow Instruments matched pair Calibration acc. to ISO/IEC 17025: 2005	On request³⁾
• Customer-specified calibration up to 10 points	On request³⁾
• Customer-witnessed calibration Any of above calibration	On request³⁾

¹⁾ 20 %, 40 %, 60 %, 80 %, 100 % of factory Q_{max}


²⁾ Ascending and descending at 20 %, 40 %, 60 %, 80 %, 100 % of factory Q_{max}





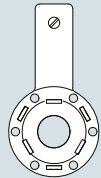



³⁾ Product Variation Request (PVR)

Operating instructions for SITRANS F M MAG 1100

Description	Article No.
• English	A5E02435647
All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation	
Please use online Product selector to get latest updates.	
Product selector link: www.pia-portal.automation.siemens.com	

Accessories

Description	Article No.
Potting kit for IP68/NEMA 6P sealing of sensor junction box	FDK:085U0220
	

Accessories for MAG 1100 sensor	Article No.	Accessories for MAG 1100 sensor	Article No.
Pipe connection ½" external thread For DN 2 ... 10 (1/12" ... 3/8") sensor, material: Stainless steel AISI 316L 2 pcs. pipe connections, 2 pcs. EPDM gaskets, 12 pcs. M4x12 screws 	FDK:083G0080 FDK:083G4330	Grounding ring (Stainless steel) Material: AISI 316/1.4436; each set includes: 1 pc. grounding ring ¹⁾ , 3 pcs. PTFE gaskets, 1 pc. grounding wire, 1 pc. M6 screw 	FDK:083G0686 FDK:083G0687 FDK:083G0689 FDK:083G0691 FDK:083G0692 FDK:083G0693 FDK:083G0694 FDK:083G0695
<ul style="list-style-type: none"> • ½" G, ISO 7-1 tapered thread, AISI 316L • ½" NPT thread, AISI 316L For DN 2 ... 10 (1/12" ... 3/8") sensor, material: Hastelloy C 2 pcs. pipe connections, 2 pcs. PTFE gaskets, 12 pcs. M4x14 screws <ul style="list-style-type: none"> • ½" G, ISO 7-1 tapered thread • ½" NPT thread For DN 2...10 (1/12"...3/8") sensor 2 pcs. PVDF pipe connections (Max. 70 °C, PN 8 bar/max 158 °F, 116 PSI), 1 pc. grounding ring ¹⁾ , 1 pc. grounding wire, 3 pcs. PTFE gas- kets, 2 pcs. space rings, 6 pcs. M4x12 and 6 pcs. M4x20 screws <ul style="list-style-type: none"> • ½"G, ISO 7-1 tapered thread PVDF incl. grounding ring Hastelloy C22/2.4602 • ½" NPT thread PVDF incl. grounding ring Hastelloy C22/2.4602 	FDK:083G4332 FDK:083G4331 A5E01018395 A5E01018400	<ul style="list-style-type: none"> • DN 2 ... 10 (1/12" ... 3/8") • DN 15 (½") • DN 25 (1") • DN 40 (1½") • DN 50 (2") • DN 65 (2½") • DN 80 (3") • DN 100 (4") Grounding ring (Hastelloy C) Material: Hastelloy C22/2.4602; each set includes: 1 pc. grounding ring ¹⁾ , 3 pcs. PTFE gaskets, 1 pc. grounding wire, 1 pc. M6 screw 	FDK:083G3256 FDK:083G3257 FDK:083G3259 FDK:083G3261 FDK:083G3262 FDK:083G3263 FDK:083G3264 FDK:083G3265
EPDM gaskets Material: EPDM; each set includes: 2 pcs. EPDM gaskets, 1 pc. grounding wire, 1 pc. M6 screw, 1 pc. nut, 1 pc. washer, 1 pc. bolt grounding plate 	FDK:083G3116 FDK:083G3117 FDK:083G3119 FDK:083G3121 FDK:083G3122 FDK:083G3123 FDK:083G3124 FDK:083G3125	<ul style="list-style-type: none"> • DN 2 ... 10 (1/12" ... 3/8") • DN 15 (½") • DN 25 (1") • DN 40 (1½") • DN 50 (2") • DN 65 (2½") • DN 80 (3") • DN 100 (4") Grounding ring (Tantalum) Material: Tantalum; each set includes: 1 pc. grounding ring ¹⁾ , 3 pcs. PTFE gaskets, 1 pc. grounding wire, 1 pc. M6 screw 	FDK:083G3256 FDK:083G3257 FDK:083G3259 FDK:083G3261 FDK:083G3262 FDK:083G3263 FDK:083G3264 FDK:083G3265
PTFE gaskets Material: PTFE; each set includes: 2 pcs. gaskets, 2 pcs. grounding wires, 3 pcs. M6 screws (DN 2 ... DN 10: 12 pcs. M4x14) 	FDK:083G0156 FDK:083G0157 FDK:083G0159 FDK:083G0161 FDK:083G0162 FDK:083G0163 FDK:083G0164 FDK:083G0165	<ul style="list-style-type: none"> • DN 2 ... 10 (1/12" ... 3/8") Studs and nuts for DN 100 PN 25/40, 8 pcs. M20 studs, 16 pcs. M20 nuts 	A5E01181599 A5E01181606 A5E01181610 A5E01181613 A5E01181615 A5E01181616 A5E01181619 A5E01181622
Graphite gaskets Material: Graphite; conductive, each set includes: 2 pcs. gaskets (can also be used as grounding ring) <ul style="list-style-type: none"> • DN 2 ... 10 (1/12" ... 3/8") • DN 15 (½") • DN 25 (1") • DN 40 (1½") • DN 50 (2") • DN 65 (2½") • DN 80 (3") • DN 100 (4") 	FDK:083G0116 FDK:083G0117 FDK:083G0119 FDK:083G0121 FDK:083G0122 FDK:083G0123 FDK:083G0124 FDK:083G0125	<ul style="list-style-type: none"> • DN 15 (½") • DN 25 (1") • DN 40 (1½") • DN 50 (2") • DN 65 (2½") • DN 80 (3") • DN 100 (4") Material: AISI 304/1.4305 <ul style="list-style-type: none"> • DN 100 (4") FDK:083G0226	

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

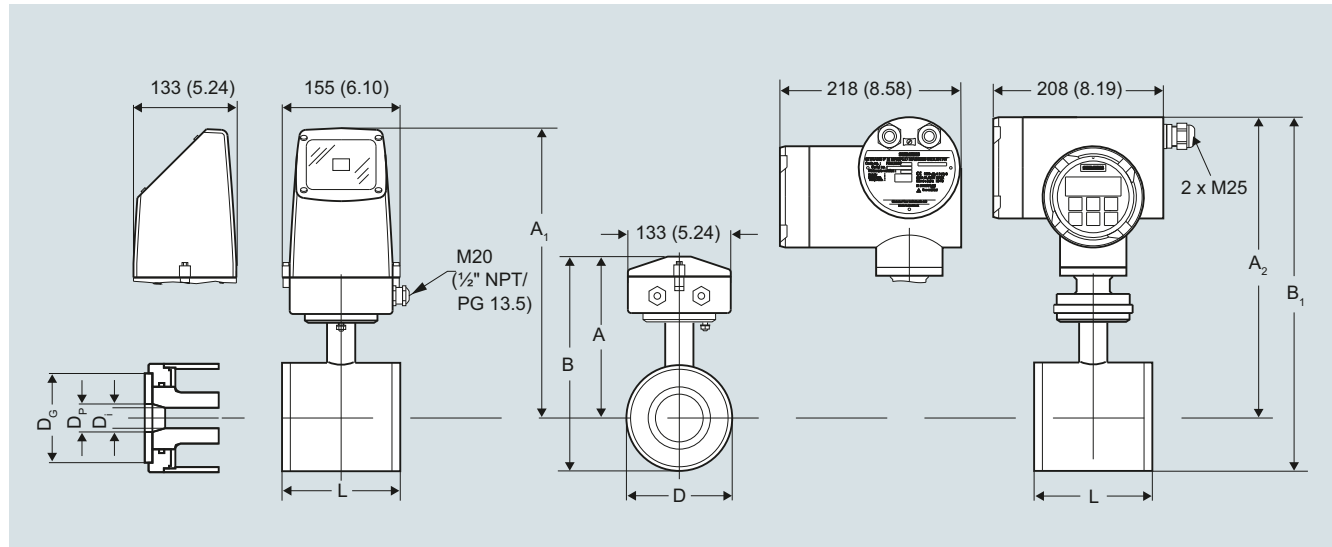
Flow Measurement

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 stainless steel 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).

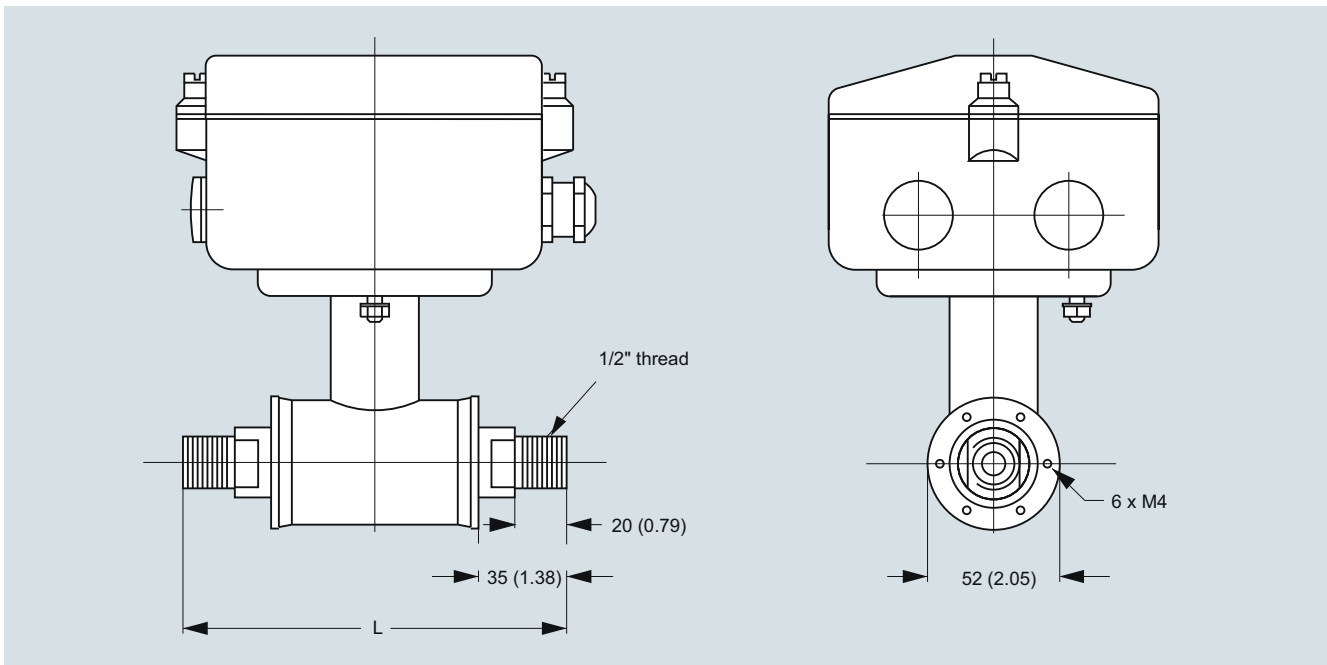
³⁾ A₂ is 3 mm (0.12") shorter than A₁

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

Size DN	inch	EPDM		Graphite		PTFE (Teflon)		Without gasket		Grounding 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
- 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
- ATEX 2G D version for hazardous areas (ceramic liner)

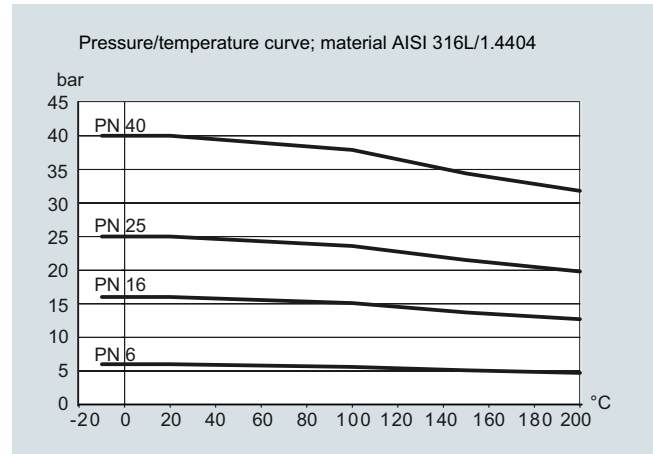
Mode of operation

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.

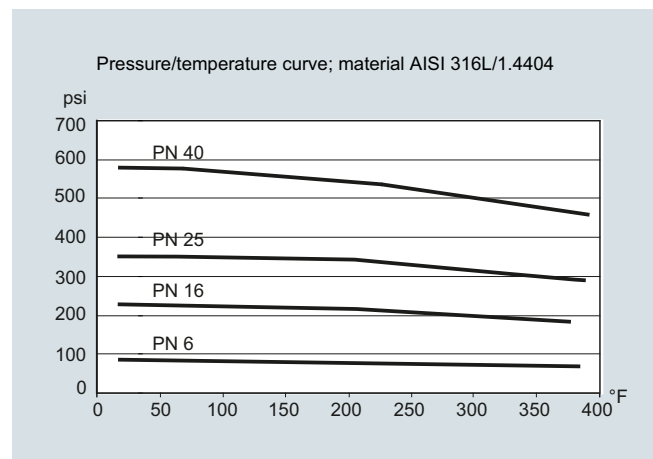
Integration

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 10/15.

Technical specifications

Measuring principle Excitation frequency (Mains supply: 50 Hz/60 Hz)	Electromagnetic induction DN 10 ... 65 (¼" ... 2½"): 12.5 Hz/15 Hz DN 80 ... 100 (3", 4"): 6.25 Hz/7.5 Hz	Design Weight Material Enclosure Terminal box (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
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	• MAG 1100 F • Standard • Option • Ex ATEX (remote version only)	
Rated operating conditions <u>Ambient conditions</u> Ambient temperature • Sensor • Ex sensor • Compact with transmitter MAG 5000/6000 • Compact with transmitter MAG 6000 I • Compact with 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> EMC	-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", 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) Max. ± 100 °C (212 °F) momentar- ily DN 10 ... 65: 40 bar (3/8" ... 2½"): 580 psi) DN 80: 25 bar (3": 363 psi) DN 100: 25 bar (4": 363 psi) Vacuum: 1 × 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 g RMS Sensor with compact MAG 5000/ 6000 mounted transmitter: 3.17 g RMS. Sensor with compact MAG 6000 I/MAG 6000 I Ex mounted transmitter: 1.14 g RMS 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 2014/30/EU	Liner MAG 1100 F (Ceramic) MAG 1100 F (PFA) Electrodes MAG 1100 F (Ceramic) MAG 1100 F (PFA) Cable entries Certificates and approvals Calibration • Standard production calibration Hazardous area • MAG 1100 F (Ceramic) - Ex-sensor in compact or remote version with MAG 6000 I Ex - Standard sensor in compact or remote version with MAG 5000/6000/6000 I MAG 1100 F (PFA) - Standard sensor in compact or remote version with MAG 5000/6000/6000 I Hygienic • MAG 1100 F (Ceramic) • MAG 1100 F (PFA) Pressure Equipment Others	Aluminum oxide Al ₂ O ₃ (ceramics) Reinforced PFA (teflon) (not for Ex) Platinum with gold /Titanium brazing alloy • DN 10 ... 15 (3/8" ... ½"): Hastelloy C276/2.4819 • DN 25 ... 100 (1" ... 4"): Hastelloy C22/2.4602 • Remote installation 2 x M20 or 2 x ½" NPT • Compact installation - MAG 5000/MAG 6000: 4 x M20 or 4 x ½" NPT - MAG 6000 I: 2 x M25 (for sup- ply/output) - MAG 6000 I Ex: 2 x M25 (for supply/output) Zero-point, 2 x 25 %, 2 x 90 % ATEX, EAC Ex - Zone 1 Ex d e ia IIB T6 Gb ATEX - Zone 21 Ex tD A21 IP67 FM - NI Class I Div. 2 Groups A, B, C, D FM - NI Class I Div. 2 Groups A, B, C, D 3A (remote version with Polyam- ide terminal box) 3A (remote version with Polyam- ide terminal box) EHEDG (remote version with Poly- amide terminal box, DN 25 ... 100/1 ... 4") Hygienic EC 1935:2004 European food contact material PED - 2014/68/EU EAC (Russia, Belarus, Kazakhstan) KCC (South Korea)

Flow Measurement

SITRANS F M

Flow sensor MAG 1100 F

Accessories

Weld-in adapter

Adapter for welding onto dairy pipe, stainless steel 1.4404

- DN 10, 15, 25, 40, 50 and 65 (3/8", 1/2", 1", 1 1/2", 2" and 2 1/2")
- DN 80 and DN 100 (3" and 4")

Tri-Weld, ISO 2037, DIN 11850, SMS 3008, BS 4825-1

PN 40 (600 psi)

PN 25 (350 psi)

Clamp adapter

DN 10, 15, 25, 40 and 50 (3/8", 1/2", 1", 1 1/2", and 2")

DN 65, 80 and 100 (2 1/2", 3" and 4")

Tri-Clamp, ISO 2852, DIN 32676, SMS 3016, BS 4825-3

PN 16 (200 psi)

PN 10 (150 psi)

Thread adapter

DIN 11851

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

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

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")

SMS 1145

- DN 25, 40, 50, 65 and 80 (1", 1 1/2", 2", 2 1/2" and 3")

PN 40 (600 psi)

PN 25 (350 psi)

PN 16 (200 psi)

PN 6 (80 psi)

Design

Material

Adapter

Gasket

- MAG 1100 F (Ceramic)

Stainless steel AISI 316/1.4436

FKM/FPM with stainless steel insert (AISI 304/1.4301) (-20 ... +150 °C (-4 ... +302 °F))

EPDM (-20 ... +150 °C (-4 ... +302 °F))

- MAG 1100 F (PFA)

EPDM (-20 ... +150 °C (-4 ... +302 °F))

NBR (-20 ... +100 °C (-4 ... +212 °F))

Note:

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

Selection and Ordering data

Sensor SITRANS F M MAG 1100 F

Article No.

7ME6140-

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Diameter

DN 10 (3/8")

DN 15 (1/2")

DN 25 (1")

DN 40 (1 1/2")

DN 50 (2")

DN 65 (2 1/2")

DN 80 (3")

DN 100 (4")

1 R

1 V

2 D

2 R

2 Y

3 F

3 M

3 T

Process connections

None (not suitable for 3A approval)

Weld in

DIN 11850

ISO 2037 (SMS 3008)

Tri-Weld/BS 4825-1

Clamp type

DIN 32676

ISO 2852 (SMS 3016)

Tri-Clamp/BS 4825-3

Threaded type

DIN 11851

SMS 1145¹⁾

A

B

C

D

G

H

J

M

N

Liner material

PFA

Ceramic

1

2

Gasket material¹⁾

EPDM flat gasket (3A)

FPM/FKM (3A) (only with ceramic liner)

EPDM-P gasket (only for PFA) (EHEDG, 3A)

0

2

3

Electrode material

Hastelloy C (only with PFA liner)

Platinum (only with ceramic liner)

1

2

Transmitter

Standard sensor for remote transmitter (order transmitter separately), 3A approved

Ex sensor for remote transmitter (order transmitter separately) 3A approved

MAG 6000 I, Alu.18 ... 90 V DC, 115 ... 230 V AC

MAG 6000 I, Aluminum 18 ... 30 V DC, Ex

MAG 6000 I, Aluminum 115 ... 230 V AC, Ex

MAG 6000, Polyamide, 11 ... 30 V DC/11 ... 24 V AC

MAG 6000, Polyamide, 115 ... 230 V AC

MAG 5000, Polyamide, 11 ... 30 V DC/

11 ... 24 V AC

MAG 5000, Polyamide, 115 ... 230 V AC

A

B

C

D

E

H

J

K

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)

A

B


F

G

E

J

¹⁾ SMS 1145 standard is not approved by 3A

Selection and Ordering data	Article No.
Sensor SITRANS F M MAG 1100 F	7ME6140-
	
Cable glands/terminal box	
Metric: Polyamide terminal box or MAG 6000 I compact	1
½" NPT: Polyamide terminal box or MAG 6000 I compact	2
Metric: Stainless steel terminal box	3
½" NPT: Stainless steel 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.	
Certificates	
Pressure test certificate according to EN 10204-3.1	C01
Material certificate according to EN 10204-3.1	C12
Factory certificate according to EN 10204-2.2	C14
Factory certificate according to EN 10204-2.1	C15
Terminal blocks	
• Factory mounted terminal blocks	N02
Region/customer specific labels	
• KCC label (South Korea)	W28
Tag name plate, stainless steel (specify in plain text)	Y17
Tag name plate, plastic (self adhesive)	Y18
Customer-specific transmitter setting	Y20
Sensor cables wired (specify Article No. for sensor cables and order cables separately)	Y40
Sensor cables wired and IP68 sealing (specify Article No. for sensor cables and order cables separately)	Y41
Special version (specify in plain 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⁾
• Customer-witnessed calibration Any of above calibration	On request¹⁾

¹⁾ Product Variation Request (PVR)

Operating instructions for SITRANS F M MAG 1100F

Description	Article No.
• English	A5E02435647

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

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

Accessories

Description	Article No.
Potting kit for IP68/ NEMA 6P sealing of sensor junction box	FDK:085U0220



Flow Measurement

SITRANS F M

Flow sensor MAG 1100 F

Accessories for MAG 1100 F sensor

Article No.

Weld-in connection fittings for use with P gaskets (Stainless steel)

Material: AISI 316L (1.4404)

Only for liner PFA

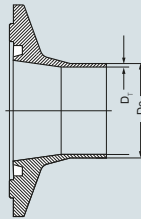
2 pcs. fittings

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

P gaskets not included

DIN 11850¹⁾

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 2037¹⁾

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)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	63.5	1.6	65	A5E02199118
76.2	76.2	1.6	80	A5E02199119
101.6	101.6	2.0	100	A5E02199120

Accessories for MAG 1100 F sensor

Article No.

Clamp-type connection fittings for use with P gaskets (Stainless steel)

Material: AISI 316L (1.4404)

Only for liner PFA

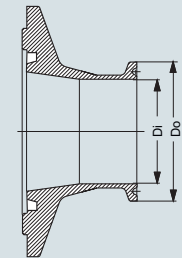
2 pcs. fittings

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

P gaskets not included

DIN 32676¹⁾

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 2852¹⁾

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)¹⁾

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 diameter¹⁾ Suitable for EHEDG²⁾ Not suitable for EHEDG

Accessories for MAG 1100 F sensor Article No.

Threaded type connection fittings for use with P gaskets (Stainless steel)

Material: AISI 316L (1.4404)

Only for liner PFA

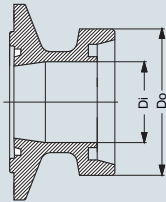
2 pcs. fittings

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

P gaskets not included

DIN 11851¹⁾

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



10	28	10	10	A5E02218293
15	34	16	15	A5E02218294
20	44	20	15	A5E02218295
25	52	26	25	A5E02218296
32	58	32	25	A5E02218297
40	65	38	40	A5E02218298
50	78	50	50	A5E02218299
65	95	66	65	A5E02218300
80	110	81	80	A5E02218301
100	130	100	100	A5E02218302

Accessories for MAG 1100 F sensor Article No.

Threaded type connection fittings for use with P gaskets (Stainless steel)

Material: AISI 316L (1.4404)

Only for liner PFA

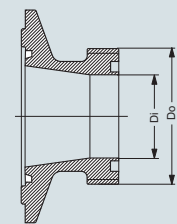
2 pcs. fittings

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

P gaskets not included

SMS 1145¹⁾

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



25	40	22.6	25	A5E02218310
38	60	35.6	40	A5E02218312
51	70	48.6	50	A5E02218313
63.5	85	60.3	65	A5E02218314
76	98	72	65	A5E02218315

D_o: Outer diameterD_i: Inner diameter¹⁾ Suitable for EHEDG

Flow Measurement

SITRANS F M

Flow sensor MAG 1100 F

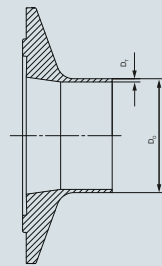
Accessories for MAG 1100 F sensor Article No.

Weld-in connection fittings for use with flat gaskets (Stainless steel)

Material: AISI 316L (1.4404)
For liner PFA and ceramic
2 pcs. fittings
2 pcs. clamps (to join flow sensor and fitting),
Flat gaskets not included

DIN 11850¹⁾

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 2037¹⁾

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)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	63.5	1.6	65	FDK:083G2283
76.2	76.2	1.6	80	FDK:083G2284
101.6	101.6	2.0	100	FDK:083G2285

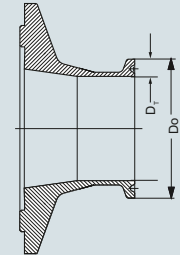
Accessories for MAG 1100 F sensor Article No.

Clamp-type connection fittings for use with flat gaskets (Stainless steel)

Material: AISI 316L (1.4404)
For liner PFA and ceramic
2 pcs. fittings
2 pcs. clamps (to join flow sensor and fitting),
Flat gaskets not included

DIN 32676¹⁾

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 2852¹⁾

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)¹⁾

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 diameter

D_i: Inner diameter

¹⁾ Suitable for 3A

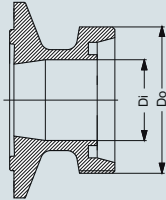
Accessories for MAG 1100 F sensor Article No.

Threaded type connection fittings for use with flat gaskets (Stainless steel)

Material: AISI 316L (1.4404)
 For liner PFA and ceramic
 2 pcs. fittings
 2 pcs. clamps (to join flow sensor and fitting),
 Flat gaskets not included

DIN 11851¹⁾

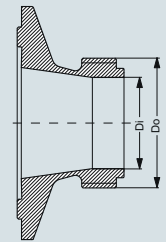
Adapter			Sensor
DN (mm)	D _o (mm)	D _i (mm)	DN (mm)



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 2853¹⁾

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 4825-4¹⁾

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

101.6	126	97.6	100	FDK:083G2145
-------	-----	------	-----	---------------------

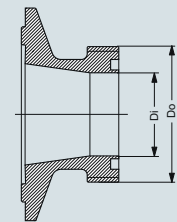
Accessories for MAG 1100 F sensor Article No.

Threaded type connection fittings for use with flat gaskets (Stainless steel)

Material: AISI 316L (1.4404)
 For liner PFA and ceramic
 2 pcs. fittings
 2 pcs. clamps (to join flow sensor and fitting),
 Flat gaskets not included

SMS 1145²⁾

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

D_o: Outer diameter

D_i: Inner diameter

¹⁾ Suitable for 3A

²⁾ Not suitable for 3A

Flow Measurement

SITRANS F M

Flow sensor MAG 1100 F

Spare parts for MAG 1100 F sensor

Article No.

Gaskets

(delivered in pairs, to be placed between flow sensor and adapter)

MAG 1100 F (PFA) - P gaskets

Rubber: EPDM

- | | |
|----------|--------------------|
| • 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

- | | |
|----------|--------------------|
| • 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, ceramic) - Flat gaskets

Rubber: EPDM

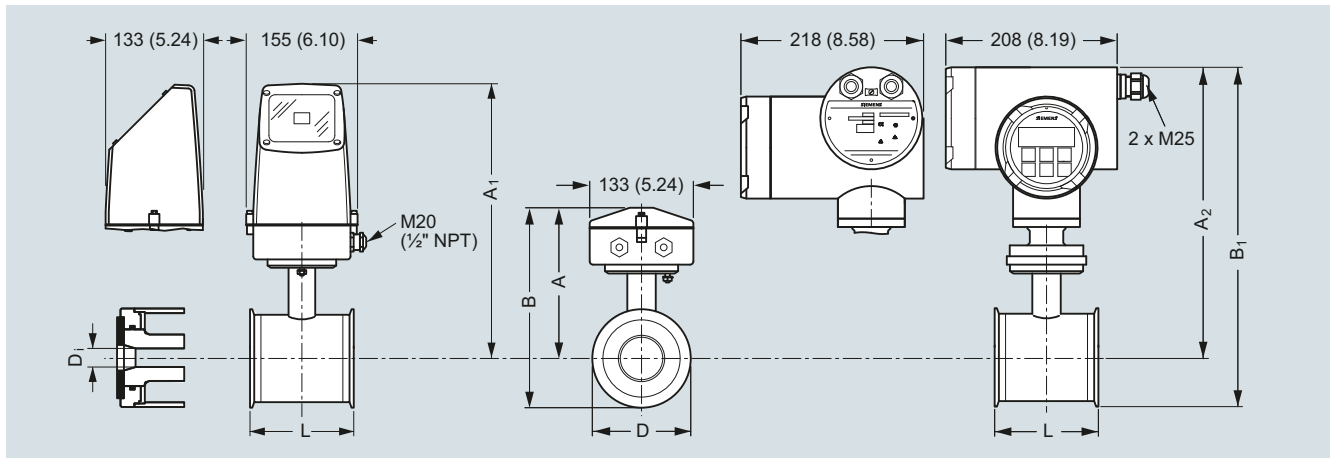
- | | |
|----------|---------------------|
| • DN 10 | FDK:083G2206 |
| • DN 15 | FDK:083G2207 |
| • DN 25 | FDK:083G2209 |
| • DN 40 | FDK:083G2211 |
| • DN 50 | FDK:083G2212 |
| • DN 65 | FDK:083G2213 |
| • DN 80 | FDK:083G2214 |
| • DN 100 | FDK:083G2215 |

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 |

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 _i (Al ₂ O ₃) [mm]	D _i PFA [mm]	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 _i (Al ₂ O ₃) [inch]	D _i PFA [inch]	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 stainless steel terminal box is used (always Ex version)

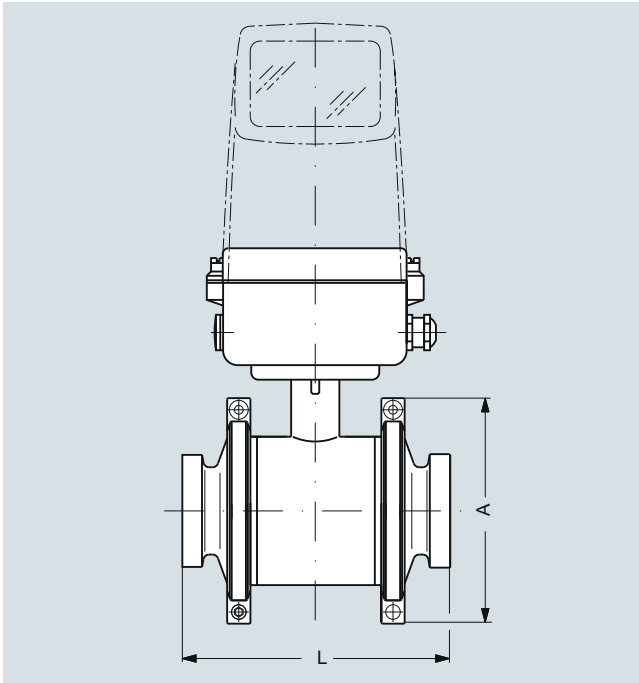
³⁾ A₂ is 3 mm (0.12") shorter than A₁

Flow Measurement

SITRANS F M

Flow sensor MAG 1100 F

Sensor MAG 1100 F compact/separate – built-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 built-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
- ATEX and FM/CSA versions
- High temperature sensor for applications with temperatures up to 180 °C (356 °F)
- Meets EEC directives: PED, 2014/68/EU pressure directive for EN1092-1 flanges
- Built-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.

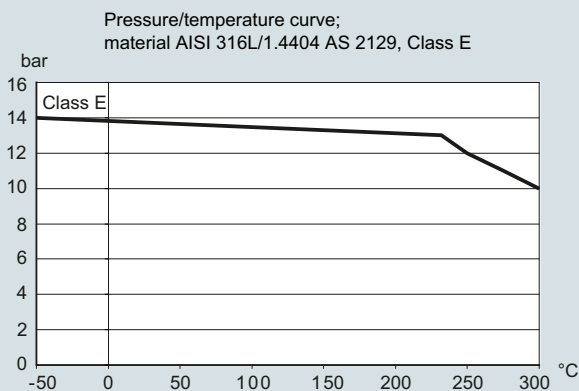
The flexible communication concept USM II simplifies integration and update to a variety of fieldbus systems such as HART, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS DP and PA, Modbus RTU/RS 485.

Flow Measurement

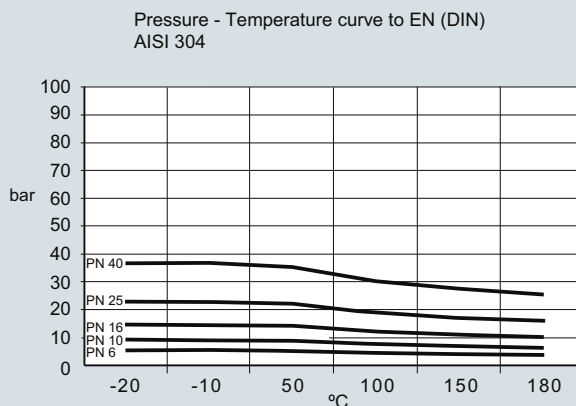
SITRANS F M

Flow sensor MAG 3100 and MAG 3100 HT

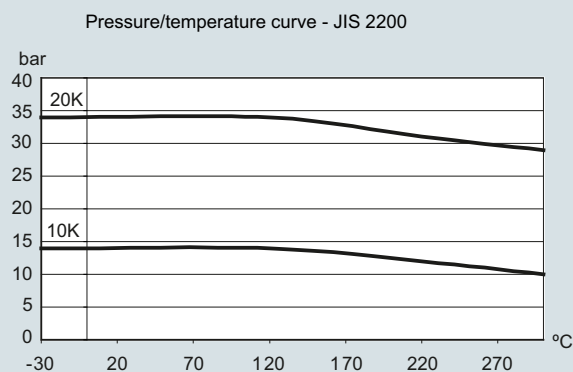
Pressure/temperature curve;
material AISI 316L/1.4404 AS 2129, Class E



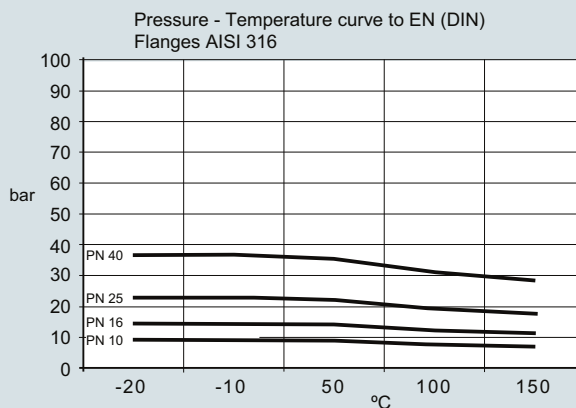
Pressure/temperature curve to EN (DIN) flanges AISI 304



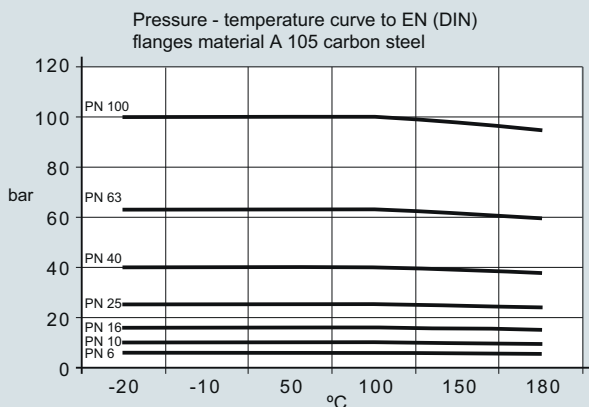
Pressure/temperature curve - JIS 2200



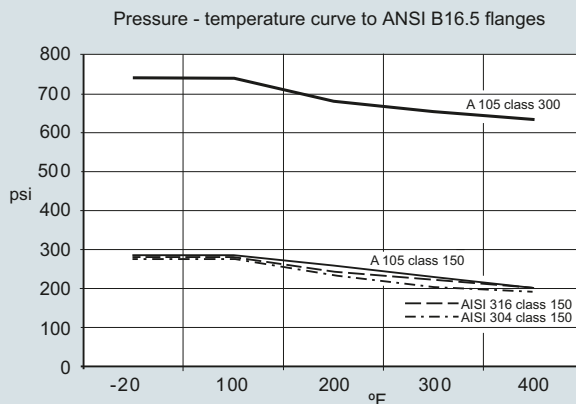
Pressure/temperature curve to EN (DIN) flanges AISI 316



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



Pressure/temperature curve to ANSI B16.5 flanges



Note: The pressure-temperature curves only assist in the selection of a system. No responsibility is taken for the correctness of the information. For further information on the PED standard and requirements, see page 10/15.

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	<p>EN 1092-1, raised face¹⁾ (EN 1092-1, DIN 2501 and BS 4504 have the same mating dimensions)</p> <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) <p>ANSI B16.5 (~BS 1560), raised face</p> <ul style="list-style-type: none"> • ½" ... 24": Class 150 (20 bar (290 psi)) • ½" ... 24": Class 300 (50 bar (725 psi)) <p>AWWA C-207, flat face 28" ... 78": Class D (10 bar)</p> <p>AS 2129, raised face ½" ... 48": Table E</p> <p>AS 4087, raised face:</p> <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)) <p>JIS B 2220:2004</p> <ul style="list-style-type: none"> • K10 (1" ... 24") • K20 (1" ... 24") <p>Other flanges and pressure ratings on request</p>	<p>EN 1092-1, raised face (EN 1092-1, DIN 2501 and BS 4504 have the same mating dimensions)</p> <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) <p>ANSI B16.5 (~BS 1560), raised face:</p> <ul style="list-style-type: none"> • ½" ... 12": Class 150 (20 bar (290 psi)) • ½" ... 12": Class 300 (50 bar (725 psi)) <p>AS 2129, raised face ½" ... 12": Table E</p> <p>Other flanges and pressure ratings on request</p>
Rated operation conditions		
Ambient temperature (conditions also dependent on liner characteristics)		
<ul style="list-style-type: none"> • Standard sensor • Ex sensor 	<p>-40 ... +100 °C (-40 ... +212 °F)</p> <p>-20 ... +60 °C (-4 ... +140 °F)</p>	<p>-40 ... +100 °C (-40 ... +212 °F)</p> <p>For medium temperature up to 150 °C (302 °F): -20 ... +60 °C (-4 ... +140 °F)</p> <p>For medium temperature 150 ... 180 °C (302 ... 356 °F): -20 ... +50 °C (-4 ... +122 °F)</p>
<ul style="list-style-type: none"> • Compact with transmitter <ul style="list-style-type: none"> - MAG 5000/6000 - MAG 6000 I - MAG 6000 I Ex 	<p>-20 ... +60 °C (-4 ... +140 °F)</p> <p>-20 ... +60 °C (-4 ... +140 °F)</p> <p>-20 ... +60 °C (-4 ... +140 °F)</p>	<p>-20 ... +60 °C (-4 ... +140 °F)</p> <p>-20 ... +60 °C (-4 ... +140 °F)</p> <p>-20 ... +60 °C (-4 ... +140 °F)</p>

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"): 0.3/0.6 ... 50 bar (4/8 ... 725 psi) (180 °C (356 °F)) Factory mounted grounding rings type E in stainless steel and stainless steel terminal box. Can only be used with remote transmitter. 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.	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.
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 g RMS Sensor with compact MAG 5000/ 6000 mounted transmitter: 3.17 g RMS Sensor with compact MAG 6000 I/ 6000 I Ex mounted transmitter: 1.14 g RMS 	<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 g RMS Sensor with compact MAG 5000/ 6000 mounted transmitter: 3.17 g RMS Sensor with compact MAG 6000 I/ 6000 I Ex mounted transmitter: 1.14 g RMS
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 ... +150 °C (-4 ... +302 °F) PTFE -20 ... +180 °C (-4 ... +356 °F) Factory mounted grounding rings type E in stainless steel and stainless steel terminal box. Can only be used with remote transmitter. PFA -20 ... +150 °C (-4 ... +300 °F)
EMC	2014/30/EU	2014/30/EU
Design		
Weight	See dimensional drawings	
Flange and housing material	Carbon steel ASTM A 105, with corrosion resistant coating Corrosivity category C4, according to ISO 12944-2 or Stainless steel AISI 304/1.4301 flanges and carbon steel housing, with corrosion resistant coating Corrosivity category C4, according to ISO 12944-2 or Stainless steel AISI 316L/1.4404 flanges and housing, polished	Carbon steel ASTM A 105, with corrosion resistant coating Corrosivity category C4, according to ISO 12944-2 or Stainless steel AISI 304/1.4301 flanges and carbon steel housing, with corrosion resistant coating Corrosivity category C4, according to ISO 12944-2 or Stainless steel AISI 316L/1.4404 flanges and housing, polished
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"> Stainless steel 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 grounding electrodes in stainless steel AISI 316Ti/1.4571 or Hastelloy PTFE: no grounding electrodes PFA: optional in Hastelloy, Tantalum or Platinum 	<ul style="list-style-type: none"> PTFE: no grounding electrodes 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		
<ul style="list-style-type: none"> Standard production calibration Special calibration 	Zero-point, 2 x 25 % and 2 x 90 % 5-point calibration: 20 %, 40 %, 60 %, 80 %, 100 % of factory Q _{max} 10-point calibration: ascending and descending at 20 %, 40 %, 60 %, 80 %, 100 % of factory Q _{max} Matched-pair calibration: default, 5-point or 10-point	Zero-point, 2 x 25 % and 2 x 90 %
Hazardous areas ²⁾		
<ul style="list-style-type: none"> Ex sensor in compact or remote version with MAG 6000 I Ex 	ATEX, FM, CSA, IECEx, EAC Ex, NEPSI - Zone 1 Ex d e ia IIC T6 Gb ⁴⁾ - Zone 1 Ex e ia IIC T6 Gb ⁵⁾ ATEX, FM, CSA, IECEx - Zone 21 Ex tD A21 IP67 FM - XP IS Class I Div. 1 Groups A, B, C, D ⁶⁾ - DIP Class II+III Div. 1 Groups E, F, G ⁶⁾	ATEX, FM, CSA, IECEx, EAC Ex - Zone 1 Ex d e ia IIC T6 Gb ⁴⁾ - Zone 1 Ex e ia IIC T6 Gb ⁵⁾ ATEX, FM, CSA, IECEx - Zone 21 Ex tD A21 IP67 FM - XP IS Class I Div. 1 Groups A, B, C, D ⁶⁾ - DIP Class II+III Div. 1 Groups E, F, G ⁶⁾
<ul style="list-style-type: none"> Standard sensor with/without MAG 5000/6000/6000 I 	FM - NI Class I Div. 2 Groups A, B, C, D - NI Class I Zone 2 Groups IIC	FM - NI Class I Div. 2 Groups A, B, C, D - NI Class I Zone 2 Groups IIC
Drinking water	EPDM liner: <ul style="list-style-type: none"> WRAS (WRc, BS690 cold water, GB) NSF/ANSI Standard 61⁷⁾ (Cold water, US) ACS listed (F) DVGW W270 (D) Belgaqua (B) MCERTS (GB) (EPDM or PTFE lining with AISI 316 or Hastelloy electrodes) 	
Pressure equipment	<ul style="list-style-type: none"> PED conforming: All EN 1092-1 flanges - 2014/68/EU³⁾ CRN 	<ul style="list-style-type: none"> PED conforming: All EN 1092-1 flanges - 2014/68/EU³⁾ CRN
Others	<ul style="list-style-type: none"> EAC (Russia, Belarus, Kazakhstan) KCC (South Korea) CMC/CPA (China) 	<ul style="list-style-type: none"> EAC (Russia, Belarus, Kazakhstan) KCC (South Korea)

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⁾ Not for sensor with 300 µm coating.

³⁾ For sizes larger than 600 mm (24") in PN 16 PED conformity is available as a cost-added option. The basic unit will carry the LVD (Low Voltage Directive) and EMC approval. All products sold outside of EU and EFTA are excluded from the Pressure Equipment directive, also products sold into certain market sectors are excluded. These include:

a) Meters used in networks for the supply, distribution and discharge of water.

b) Meters used in pipelines for the conveyance of any fluid from offshore to onshore.

c) Meters used in the extraction of petroleum or gas, including christmas tree and manifold equipment.

d) Any meter mounted on a ship or mobile offshore platform. For further information on the PED standard and requirements see page 10/15.

⁴⁾ In remote version with sensor size DN 15 ... DN 300 (½" ... 12")

⁵⁾ In remote version with sensor size DN 350 ... DN 2000 (14" ... 78")

⁶⁾ In compact version with sensors size DN 15 ... 300 (½" ... 12").

⁷⁾ Including Annex G

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	7 ME 6 3 1 0 -
<p>➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.</p> <p>Diameter</p> <p>DN 15 (½") (PTFE and PFA liner) 1 V</p> <p>DN 25 (1") 2 D</p> <p>DN 40 (1½") 2 R</p> <p>DN 50 (2") 2 Y</p> <p>DN 65 (2½") 3 F</p> <p>DN 80 (3") 3 M</p> <p>DN 100 (4") 3 T</p> <p>DN 125 (5") 4 B</p> <p>DN 150 (6") 4 H</p> <p>DN 200 (8") 4 P</p> <p>DN 250 (10") 4 V</p> <p>DN 300 (12") 5 D</p> <p>DN 350 (14") 5 K</p> <p>DN 400 (16") 5 R</p> <p>DN 450 (18") 5 Y</p> <p>DN 500 (20") 6 F</p> <p>DN 600 (24") 6 P</p> <p>DN 700 (28") 6 Y</p> <p>DN 750 (30") (AWWA and AS 2129 only) 7 D</p> <p>DN 800 (32") 7 H</p> <p>DN 900 (36") 7 M</p> <p>DN 1000 (40") 7 R</p> <p>DN 1050 (42") (AWWA only) 7 U</p> <p>DN 1100 (44") (AWWA only) 7 V</p> <p>DN 1200 (48") 8 B</p> <p>DN 1400 (54") 8 F</p> <p>DN 1500 (60") 8 K</p> <p>DN 1600 (66") 8 P</p> <p>DN 1800 (72") 8 T</p> <p>DN 2000 (78") 8 Y</p> <p>Flange norm and pressure rating</p> <p>EN 1092-1</p> <p>PN 6 (DN 65 ... 2000 (2½" ... 78")) A</p> <p>PN 10 (DN 200 ... 2000 (8" ... 78")) B</p> <p>PN 16 (DN 65 ... 1200 (2½" ... 48")) C</p> <p>PN 16, non-PED (DN 700 ... 2000 (28" ... 78")) D</p> <p>PN 25 (DN 200 ... 600 (8" ... 24")) E</p> <p>PN 40 (DN 15 ... 600 (½" ... 24")) F</p> <p>PN 63 (DN 50 ... 300 (2" ... 12")) G</p> <p>PN 100 (DN 25 ... 300 (1" ... 12")) H</p> <p>ANSI B16.5</p> <p>Class 150 (½" ... 24") J</p> <p>Class 300 (½" ... 24") K</p> <p>AWWA C-207</p> <p>Class D (28" ... 78") L</p> <p>AS</p> <p>2129, table E M</p> <p>4087, PN 16 (DN 50 ... 1200 (2" ... 48")) (Not PTFE and PFA) N</p> <p>4087, PN 21 (DN 50 ... 600 (2" ... 24")) (Not PTFE and PFA) P</p> <p>4087, PN 35 (DN 50 ... 600 (2" ... 24")) (Not PTFE and PFA) Q</p> <p>JIS B 2220:2004</p> <p>K10 (1" ... 24") R</p> <p>K20 (1" ... 24") S</p>	

Selection and Ordering data	Article No.
Sensor SITRANS F M MAG 3100	7 ME 6 3 1 0 -
<p>Flange material and coating</p> <p>Carbon steel flanges ASTM A 105, corrosion-resistant coating of category C4 1</p> <p>Stainless steel flanges, AISI 304/1.4301, corrosion-resistant coating of category C4 2</p> <p>Stainless steel flanges and sensor body, AISI 316L/1.4404, polished 3</p> <p>Carbon steel flanges ASTM A 105, 300 µm corrosion-resistant coating of category C4 4</p> <p>Stainless steel flanges, AISI 304/1.4301, 300 µm corrosion-resistant coating of category C4 5</p> <p>Liner material</p> <p>Soft rubber 1</p> <p>EPDM 2</p> <p>PTFE (DN ≤ 300, PN ≤ 50 bar / ≤ 12", PN ≤ 725 psi), PTFE (350 ≤ DN ≤ 600, PN ≤ 40 bar / 14" ≤ DN ≤ 24", PN ≤ 580 psi) 3</p> <p>Ebonite 4</p> <p>Linatex (PN ≤ 40 bar (580 psi) DN ≤ 600 (24")) 5</p> <p>PFA (DN 15 ... 150 (½" ... 6")) (PN ≤ 40 bar (580 psi)) 7</p> <p>Electrode material</p> <p>(Grounding electrodes not for PTFE liner or pressure rating PN 100)</p> <p>AISI 316Ti/1.4571 (not for PFA) 1</p> <p>Hastelloy C276/2.4819 (PFA liner: Hastelloy C22/2.4602) 2</p> <p>Platinum (DN ≤ 300 (12")) (not for Ebonite) 3</p> <p>Titanium (not for PFA) (DN ≤ 600/24") 4</p> <p>Tantalum (DN ≤ 600/24") (not for Ebonite) 5</p> <p>Hastelloy C incl. grounding electrodes (only PFA) 6</p> <p>Platinum incl. grounding electrodes (only PFA) 7</p> <p>Tantalum incl. grounding electrodes (only PFA) 8</p> <p>Transmitter with display</p> <p>Standard sensor for remote transmitter (order transmitter separately) A</p> <p>Ex sensor for remote transmitter (order transmitter separately) B</p> <p>MAG 6000 I, Alu.18 ... 90 V DC, 115 ... 230 V AC C</p> <p>MAG 6000 I Alu. 18 ... 30 V DC, Ex D</p> <p>MAG 6000 I Alu. 115 ... 230 V, Ex E</p> <p>MAG 6000 Polyamide, 11... 30 V DC / 11...24 V AC H</p> <p>MAG 6000, Polyamide, 115 ... 230 V AC J</p> <p>MAG 5000, Polyamide, 11... 30 V DC / 11...24 V AC K</p> <p>MAG 5000, Polyamide, 115 ... 230 V AC L</p> <p>Communication</p> <p>No communication, add-on possible A</p> <p>HART B</p> <p>PROFIBUS PA Profile 3 (only MAG 6000/MAG 6000 I) F</p> <p>PROFIBUS DP Profile 3 (not for Ex) (only MAG 6000/MAG 6000 I) G</p> <p>Modbus RTU/RS 485 (not for Ex) (only MAG 6000/MAG 6000 I) E</p> <p>FOUNDATION Fieldbus H1 (only MAG 6000/MAG 6000 I) J</p> <p>Cable glands/terminal box</p> <p>Metric: Polyamide terminal box or MAG 6000 I compact 1</p> <p>½" NPT: Polyamide terminal box or MAG 6000 I compact 2</p> <p>Metric: Stainless steel terminal box 3</p>	

Selection and Ordering data	Order code
Additional information	
Please add “-Z” to Article No. and specify Order code(s) and plain text.	
Certificates	
• Pressure test certificate according to EN 10204-3.1	C01
• Material certificate according to EN 10204-3.1	C12
• Factory certificate according to EN 10204-2.2	C14
• Factory certificate according to EN 10204-2.1	C15
Special calibration	
• 5-point calibration for DN 15 ... DN 200 ¹⁾	D01
• 5-point calibration for DN 250 ... DN 600 ¹⁾	D02
• 5-point calibration for DN 700 ... DN 1200 ¹⁾	D03
• 10-point calibration for DN 15 ... DN 200 ²⁾	D06
• 10-point calibration for DN 250 ... DN 600 ²⁾	D07
• 10-point calibration for DN 700 ... DN 1200 ²⁾	D08
• Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 15 ... DN 200	D11
• Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 250 ... DN 600	D12
• Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 700 ... DN 1200	D13
• 5-point, matched-pair calibration for DN 15 ... DN 200 ¹⁾	D15
• 5-point, matched-pair calibration for DN 250 ... DN 600 ¹⁾	D16
• 5-point, matched-pair calibration for DN 700 ... DN 1200 ¹⁾	D17
• 10-point, matched-pair calibration for DN 15 ... DN 200 ²⁾	D18
• 10-point, matched-pair calibration for DN 250 ... DN 600 ²⁾	D19
• 10-point, matched-pair calibration for DN 700 ... DN 1200 ²⁾	D20
Terminal blocks	
• Factory mounted terminal blocks	N02
Region/customer specific labels	
• Chinese label	W06
• KCC label (South Korea)	W28
Tag name plate, stainless steel (specify in plain text)	Y17
Tag name plate, plastic (self adhesive)	Y18
Customer-specific transmitter setting	Y20
Sensor cables wired (specify Article No. for sensor cables and order cables separately)	Y40
Sensor cables wired and IP68 sealing (specify Article No. for sensor cables and order cables separately)	Y41
Special version (specify in plain text)	Y99
Additional calibrations	
• Accredited Siemens Flow Instruments matched pair Calibration acc. to ISO/IEC 17025: 2005	On request³⁾
• Customer-specified calibration up to 10 points	On request³⁾
• Customer-witnessed calibration Any of above calibration	On request³⁾

¹⁾ 20 %, 40 %, 60 %, 80 %, 100 % of factory Q_{max}

²⁾ Ascending and descending at 20 %, 40 %, 60 %, 80 %, 100 % of factory Q_{max}

³⁾ Product Variation Request (PVR).


Operating instructions for SITRANS F M MAG 3100

Description	Article No.
• English	A5E03005599
• German	A5E03086288

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Accessories

Description	Article No.
Potting kit for IP68/ NEMA 6P sealing of sensor junction box	FDK:085U0220



Please use online Product selector to get latest updates.

Product selector link:

www.pia-portal.automation.siemens.com

Flow Measurement

SITRANS F M

Flow sensor MAG 3100 and MAG 3100 HT

3

Selection and Ordering data	Article No.
Sensor SITRANS F M MAG 3100 HT (High Temperature)	7 ME 6 3 2 0 -
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
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 (150 °C (302 °F))	2
PTFE including type E protection rings	3
AISI 316/1.4436 (180 °C (356 °F))	
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	2
(PFA liner: Hastelloy C22/2.4602)	
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

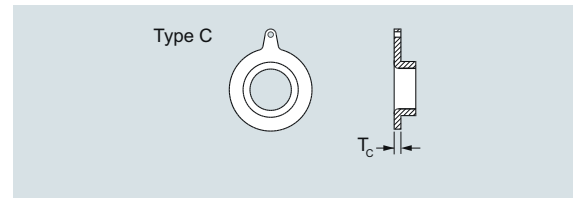
Selection and Ordering data	Article No.
Sensor SITRANS F M MAG 3100 HT (High Temperature)	7 ME 6 3 2 0 -
Communication	
No communication, add-on possible	A
HART	B
PROFIBUS PA Profile 3 (only MAG 6000/MAG 6000 I)	F
PROFIBUS DP Profile 3 (only MAG 6000/MAG 6000 I)	G
Modbus RTU/RS 485 (only MAG 6000/MAG 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 MAG 6000 I compact	1
½" NPT: Polyamide terminal box (PTFE 130 °C (266 °F)) or MAG 6000 I compact	2
Metric: Stainless steel terminal box	3
½" NPT: Stainless steel 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.	
Certificates	
• Pressure test certificate according to EN 10204-3.1	C01
• Material certificate according to EN 10204-3.1	C12
• Factory certificate according to EN 10204-2.2	C14
• Factory certificate according to EN 10204-2.1	C15
Terminal blocks	
• Factory mounted terminal blocks	N02
Region/customer specific labels	
• KCC label (South Korea)	W28
Tag name made, stainless steel (specify in plain text)	Y17
Tag name plate, plastic (self adhesive)	Y18
Customer-specific transmitter setting	Y20
Sensor cables wired (specify Article No. for sensor cables and order cables separately)	Y40
Sensor cables wired and IP68 sealing (specify Article No. for sensor cables and order cables separately)	Y41
Special version (specify in plain 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⁾
• Customer-witnessed calibration Any of above calibration	On request¹⁾

¹⁾ Product Variation Request (PVR).

Accessories for MAG 3100 and MAG 3100 HT sensor**Grounding and protection ring - Type C (Stainless steel)¹⁾**

Material AISI 304
For all liners except PTFE and PFA
1 pc.



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 DN 40 DN 50					FDK:083N8361 FDK:083N8362 FDK:083N8344	FDK:083N8361 FDK:083N8362 FDK:083N8344
DN 65 DN 80 DN 100	FDK:083N8345 FDK:083N8347 FDK:083N8070		FDK:083N8345 FDK:083N8347 FDK:083N8025		FDK:083N8345 FDK:083N8347 FDK:083N8025	FDK:083N8346 FDK:083N8347 FDK:083N8025
DN 125 DN 150 DN 200	FDK:083N8071 FDK:083N8072 FDK:083N8074	FDK:083N8011	FDK:083N8071 FDK:083N8008 FDK:083N8011	FDK:083N8011	FDK:083N8071 FDK:083N8073 FDK:083N8075	FDK:083N8071 FDK:083N8008 FDK:083N8011
DN 250 DN 300 DN 350	FDK:083N8078 FDK:083N8080 FDK:083N8083	FDK:083N8013 FDK:083N8012 FDK:083N8039	FDK:083N8013 FDK:083N8012 FDK:083N8039	FDK:083N8013 FDK:083N8081 FDK:083N8084	FDK:083N8079 FDK:083N8082 FDK:083N8085	FDK:083N8013 FDK:083N8012 FDK:083N8039
DN 400 DN 450 DN 500	FDK:083N8099 FDK:083N8103 FDK:083N8107	FDK:083N8100 FDK:083N8103 FDK:083N8107	FDK:083N8100 FDK:083N8104 FDK:083N8108	FDK:083N8101 FDK:083N8104 FDK:083N8108	FDK:083N8102 FDK:083N8105 FDK:083N8109	FDK:083N8100 FDK:083N8104 FDK:083N8108
DN 600 DN 700 DN 750	FDK:083N8111 FDK:083N8300	FDK:083N8111 FDK:083N8294	FDK:083N8112 FDK:083N8294	FDK:083N8112		FDK:083N8113 FDK:083N8372
DN 800 DN 900 DN 1000	FDK:083N8303 FDK:083N8306 FDK:083N8309	FDK:083N8304 FDK:083N8307 FDK:083N8310	FDK:083N8304 FDK:083N8307 FDK:083N8310			FDK:083N8373 FDK:083N8396 FDK:083N8397
DN 1100 DN 1200 DN 1400		FDK:083N8367 FDK:083N8313 FDK:083N8468	FDK:083N8367 FDK:083N8313 FDK:083N8469			FDK:083N8367 FDK:083N8398
DN 1500 DN 1600 DN 1800 DN 2000	FDK:083N8471 FDK:083N8475 FDK:083N8479 FDK:083N8483	FDK:083N8472 FDK:083N8476 FDK:083N8480 FDK:083N8484	FDK:083N8473 FDK:083N8477 FDK:083N8481 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		

¹⁾ Also for MAG 5100 W (7ME6520 > 12 inch and 7ME6580)

Flow Measurement

SITRANS F M

Flow sensor MAG 3100 and MAG 3100 HT

Accessories for MAG 3100 and MAG 3100 HT sensor

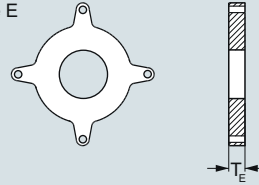
Grounding and protecting ring - Type E (Stainless steel)

Material: AISI 316
For all PTFE liners
1 pc. incl. straps and screws

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 DN 25 DN 40					FDK:083N8365 FDK:083N8271 FDK:083N8278
DN 50 DN 65 DN 80	FDK:083N8284 FDK:083N8288		FDK:083N8285 FDK:083N8289		FDK:083N8282 FDK:083N8286 FDK:083N8290
DN 100 DN 125 DN 150	FDK:083N8116 FDK:083N8120 FDK:083N8124		FDK:083N8117 FDK:083N8121 FDK:083N8125		FDK:083N8118 FDK:083N8122 FDK:083N8126
DN 200 DN 250 DN 300	FDK:083N8129 FDK:083N8135 FDK:083N8144	FDK:083N8130 FDK:083N8136 FDK:083N8144	FDK:083N8130 FDK:083N8137 FDK:083N8145	FDK:083N8131 FDK:083N8138 FDK:083N8146	FDK:083N8132 FDK:083N8139 FDK:083N8147
DN 350 DN 400 DN 450	FDK:083N8152 FDK:083N8160 FDK:083N8168	FDK:083N8153 FDK:083N8161 FDK:083N8169	FDK:083N8154 FDK:083N8162 FDK:083N8170	FDK:083N8155 FDK:083N8163 FDK:083N8171	FDK:083N8156 FDK:083N8164 FDK:083N8172
DN 500 DN 600	FDK:083N8177 FDK:083N8186	FDK:083N8178 FDK:083N8187	FDK:083N8179 FDK:083N8188	FDK:083N8180 FDK:083N8189	FDK:083N8181

For use as protection ring order 2 pcs.
For use as grounding ring order 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

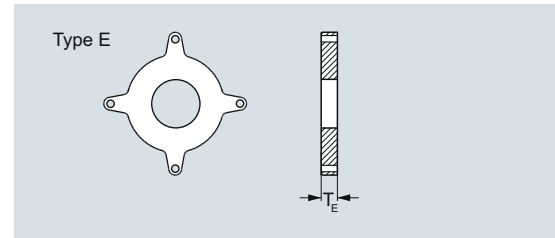
For use as protection ring order 2 pcs.
For use as grounding ring order 1 pc.

AS2129, Table E	
DN	Article No.
DN 15 DN 25 DN 40	FDK:083N8365 FDK:083N8272 FDK:083N8280
DN 50 DN 65 DN 80	FDK:083N8281 FDK:083N8284 FDK:083N8293
DN 100 DN 125 DN 150	FDK:083N8117 FDK:083N8121 FDK:083N8128
DN 200 DN 250 DN 300	FDK:083N8134 FDK:083N8143 FDK:083N8151
DN 350 DN 400 DN 450	FDK:083N8153 FDK:083N8161 FDK:083N8176
DN 500 DN 600	FDK:083N8185 A5E32710253

For use as protection ring order 2 pcs.
For use as grounding ring order 1 pc.

Accessories for MAG 3100 and MAG 3100 HT sensor**Grounding and protecting ring - Type E (Hastelloy)**

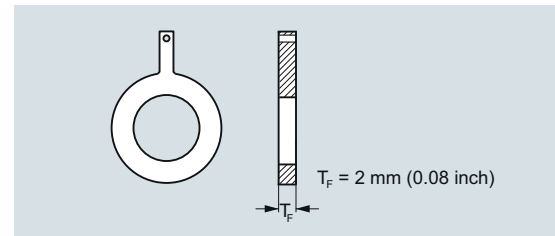
Material: Hastelloy C276
For all PTFE liners
1 pc. incl. straps and screws



DN	PN 6	PN 16	PN 40	Size	ANSI Class 150	Class 300
	Article No.	Article No.	Article No.		Article No.	Article No.
DN 15			FDK:083N8487	1/2"	FDK:083N8487	FDK:083N8487
DN 25			FDK:083N8488	1"	FDK:083N8489	FDK:083N8489
DN 40			FDK:083N8490	1 1/2"	FDK:083N8491	FDK:083N8491
DN 50			FDK:083N8492	2"	FDK:083N8493	FDK:083N8493
DN 65	FDK:083N8494	FDK:083N8495	FDK:083N8496	2 1/2"	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

Accessories for MAG 3100 and MAG 3100 HT sensor**Grounding ring - Type Flat ring (Stainless steel)¹⁾**

Material: AISI 316
For all liners (PTFE max. 130 °C (266 °F))
1 pc. incl. straps and screws



DN	PN 10	PN 16	PN 40	Size	ANSI Class 150	Class 300
	Article No.	Article No.	Article No.		Article No.	Article No.
DN 15			A5E01191969	1/2"	A5E01191968	
DN 25			A5E01150880	1"	A5E01150022	A5E01150378
DN 40			A5E01191952	1 1/2"	A5E01191961	
DN 50		A5E01192006	A5E01150918	2"	A5E01151121	A5E01151194
DN 65		A5E01191940	A5E01191954	2 1/2"	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 (7ME6580)

Flow Measurement

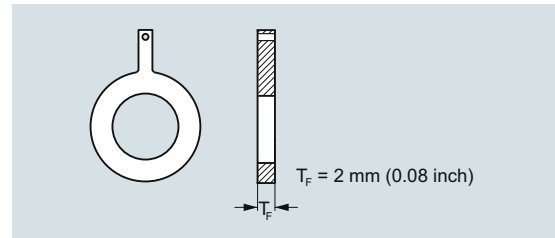
SITRANS F M

Flow sensor MAG 3100 and MAG 3100 HT

Accessories for MAG 3100 and MAG 3100 HT sensor

Grounding ring - Type Flat ring (Hastelloy)

Material: Hastelloy C276
 For all liners (PTFE max. 130 °C (266 °F))
 1 pc. incl. straps and screws

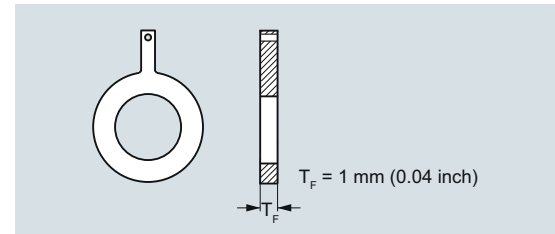


DN	PN 10 Article No.	PN 16 Article No.	PN 40 Article No.	Size	ANSI Class 150 Article No.	Class 300 Article No.
DN 15			A5E01191981	1/2"	A5E01191989	
DN 25			A5E01150882	1"	A5E01150028	A5E01150379
DN 40			A5E01191982	1 1/2"	A5E01191990	
DN 50			A5E01150922	2"	A5E01151124	A5E01151197
DN 65		A5E01191971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

Accessories for MAG 3100 and MAG 3100 HT sensor

Grounding ring - Type Flat ring (Tantalum)

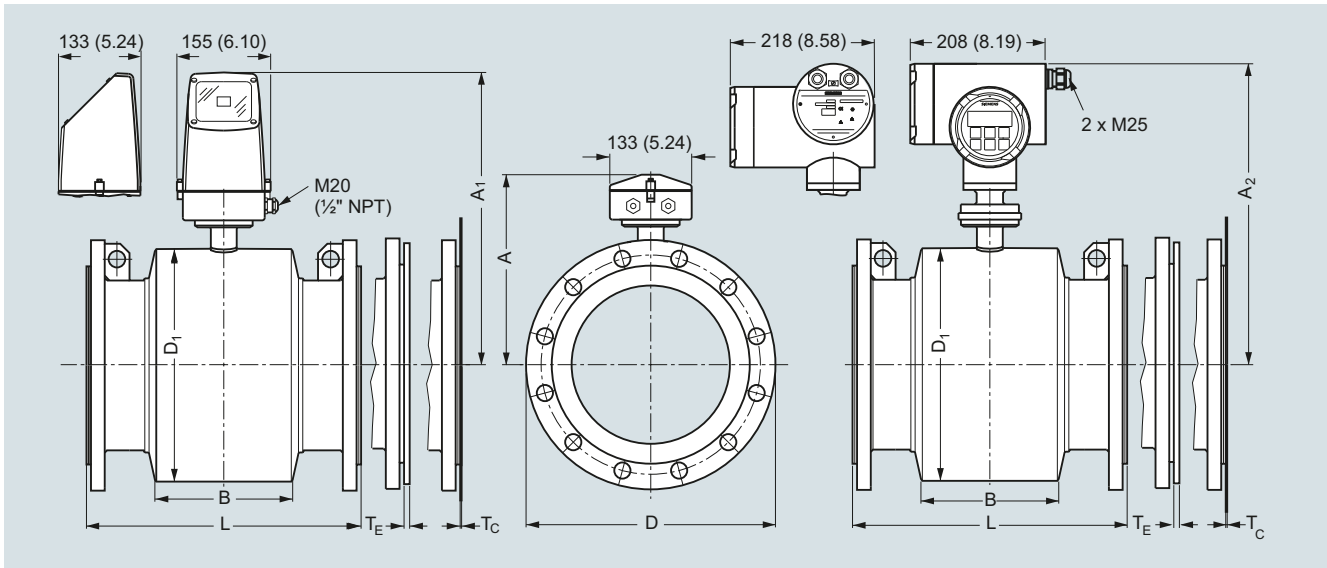
Material: Tantalum
 For all liners (PTFE max. 130 °C (266 °F))
 1 pc. incl. straps and screws



DN	PN 16 Article No.	PN 40 Article No.	Size	ANSI Class 150 Article No.	Class 300 Article No.
DN 15		A5E01192007	1/2"	A5E01192010	
DN 25		A5E01150883	1"	A5E01150030	A5E01150381
DN 40		A5E01192008	1 1/2"	A5E01192011	
DN 50		A5E01150926	2"	A5E01151129	A5E01151199
DN 65	A5E01192005	A5E01192009	2 1/2"	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) 3)}						ANSI 16.5	
						EN 1092-1-201		PN 25	PN 40	PN 63	PN 100	Class 150	Class 300
[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
40	197	351	348	82	124	-	-	-	200	-	280	200	200
50	205	359	356	72	139	-	-	-	200	276	300	200	200
65	212	366	363	72	154	200	200/-	-	200	320	350	200	272
80	222	376	373	72	174	200	200/-	-	272 ⁴⁾	323	340	272 ⁴⁾	272 ⁴⁾
100	242	396	393	85	214	250	250/-	-	250	380	400	250	310
125	255	409	406	85	239	250	250/-	-	250	420	450	250	335
150	276	430	427	85	282	300	300/-	-	300	415	450	300	300
200	304	458	455	137	338	350	350/-	350	350	480	530	350	350
250	332	486	483	157	393	450	450/-	450	450	550	620	450	450
300	357	511	508	157	444	500	500/-	500	500	600	680	500	500
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 stainless steel terminal box (Ex and high temperature version)

2) When grounding rings are used, the thickness of the grounding ring must be added to the built-in length

3) Tolerances on built-in length (PN 6, PN 10, PN 16, PN 25 and PN 40):

DN 15 to DN 200: +0/-3 mm, DN 250 to DN 400: +0/-5 mm, DN 450 to DN 600: +5/-5 mm, DN 700 to DN 2000: +10/-10 mm

Tolerances on built in length (PN 63 and PN 100): All sizes: +8/-8 mm

4) Not according to ISO 13359

Flow Measurement

SITRANS F M

Flow sensor MAG 3100 and MAG 3100 HT

DN	L ^{1) 2)}				T _C ³⁾	T _E ³⁾	T _F ³⁾	Weight ⁴⁾
	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]	[kg]
15	200	-	200	200	-	6	2	4
25	200	-	200	200	1.2	6	2	5
40	200	-	200	240	1.2	6	2	8
50	200	-	200	240	1.2	6	2	9
65	200	-	200	272	1.2	6	2	11
80	200 ⁵⁾	-	200 ⁹⁾	272 ⁹⁾	1.2	6	2	12
100	250	-	250	310	1.2	6	2	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 ⁶⁾	-	600	680	1.6	10	-	200
600	600 ⁷⁾	-	600	800	1.6	10	-	287
700	700 ⁸⁾	700	-	-	2.0	-	-	330
750	750 ⁸⁾	750	-	-	2.0	-	-	360
800	800 ⁸⁾	800	-	-	2.0	-	-	450
900	900 ⁸⁾	900	-	-	2.0	-	-	530
1000	1000 ⁸⁾	1000	-	-	2.0	-	-	660
1050	-	1050	-	-	2.0	-	-	660
1100	-	1100	-	-	2.0	-	-	1140
1200	1200 ⁶⁾	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 grounding rings are used, the thickness of the grounding ring must be added to the built-in length

2) Tolerances on built-in length (PN 6, PN 10, PN 16, PN 25 and PN 40):

DN 15 to DN 200: +0/-3 mm, DN 250 to DN 400 : +0/-5 mm, DN 450 to DN 600 : +5/-5 mm, DN 700 to DN 2000 : +10/-10 mm

Tolerances on built-in length (PN 63 and PN 100):

All sizes: +8/-8 mm

3) T_C = Protection ring Type C, T_E = Grounding ring Type E (included and factory mounted for 180 °C PTFE liner), T_F = Grounding ring Type Flat ring

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

5) PN 35 DN 80 = 272 mm (not according to ISO 13359)

6) PN 35 DN 500 = 680 mm

7) PN 35 DN 600 = 750 mm

8) Not AS 4087 PN 21 or PN 35

9) Not according to ISO 13359

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) 3)}								
						EN 1092-1-201						ANSI 16.5/ASME B16.47 ⁴⁾		
						PN 6, 10	PN 16/ PN 16 non PED	PN 25	PN 40	PN 63	PN 100	Class 150	Class 300	Class 600
[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[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 ⁵⁾	12.72	13.39	10.71 ⁵⁾	10.71 ⁵⁾	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	33.85	33.79	26.38	44.72	39.37	49.21/39.37	43.32	-	-	-	43.32	-	-
42	27.72	33.85	33.79	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 stainless steel terminal box (Ex and high temperature version)

2) When grounding rings are used, the thickness of the grounding ring must be added to the built-in length

3) Tolerances on built-in length (PN 6, PN 10, PN 16, PN 25 and PN 40):

½" to 8": +0/-0.12", 10" to DN 16": +0/-0.20", 18" to DN 24": +0.20/-0.20", 28" to DN 78": +0.39/-0.39"

Tolerances on built-in length (PN 63 and PN 100):

All sizes: +0.31/-0.31"

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

5) Not according to ISO 13359

Flow Measurement

SITRANS F M

Flow sensor MAG 3100 and MAG 3100 HT

Size	L ^{1) 2)}				T _C ³⁾	T _E ³⁾	T _F ³⁾	Weight ⁴⁾
	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]	[lb]
½	7.87	-	7.87	7.87	-	0.24	0.08	9
1	7.87	-	7.87	7.87	0.05	0.24	0.08	11
1½	7.87	-	7.87	9.44	0.05	0.24	0.08	17
2	7.87	-	7.87	9.44	0.05	0.24	0.08	20
2½	7.87	-	7.87	10.70	0.05	0.24	0.08	24
3	7.87 ⁵⁾	-	7.87 ⁸⁾	10.70 ⁹⁾	0.05	0.24	0.08	26
4	9.84	-	9.84	12.20	0.05	0.24	0.08	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 ⁶⁾	-	23.62	26.77	0.06	0.39	-	440
24	23.62 ⁷⁾	-	23.62	31.49	0.06	0.39	-	633
28	27.56 ⁸⁾	27.56	-	-	0.08	-	-	728
30	29.53 ⁸⁾	29.52	-	-	0.08	-	-	794
32	31.50 ⁸⁾	31.50	-	-	0.08	-	-	992
36	35.43 ⁸⁾	35.43	-	-	0.08	-	-	1168
40	39.37 ⁸⁾	39.37	-	-	0.08	-	-	1455
42	-	39.37	-	-	0.08	-	-	1455
44	-	43.31	-	-	0.08	-	-	2513
48	47.24 ⁸⁾	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 grounding rings are used, the thickness of the grounding ring must be added to the built-in length

2) Tolerances on built-in length (PN 6, PN 10, PN 16, PN 25 and PN 40):

½" to 8": +0/-0.12", 10" to DN 16": +0/-0.20", 18" to DN 24": +0.20/-0.20", 28" to DN 78": +0.39/-0.39"

Tolerances on built-in length (PN 63 and PN 100):

All sizes: +0.31/-0.31"

3) T_C = Protection ring Type C, T_E = Grounding ring Type E (included and factory mounted for 356 °F PTFE liner), T_F = Grounding ring Type Flat ring

4) Weights are for ANSI 150 without transmitter

5) PN 35 DN 80 = 10.70 inch

6) PN 35 DN 500 = 26.77 inch

7) PN 35 DN 600 = 29.53 inch

8) Not AS 4087 PN 21 or PN 35

9) Not according to ISO 13359

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, 2014/68/EU pressure directive for EN1092-1 flanges
- Built-in length according to ISO 13359
- Onsite or factory upgrade to IP68/NEMA 6P of a standard sensor.

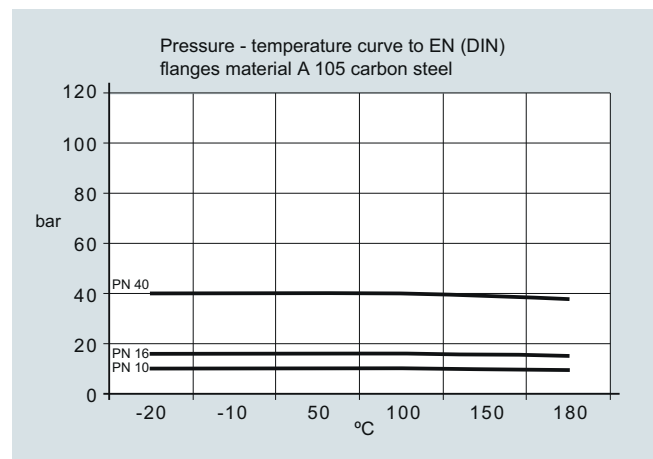
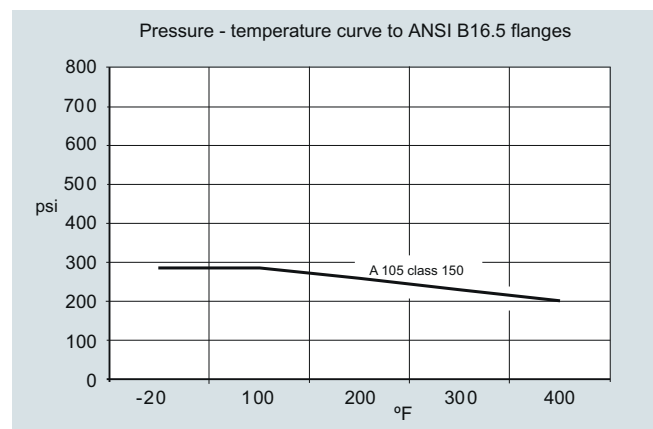
Mode of operation

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 10/15.

Flow Measurement

SITRANS F M

Flow sensor MAG 3100 P

Technical specifications

Product characteristic	Chemical and process industry-oriented (Included in Quick Ship Program)	Design	
Nominal size	<ul style="list-style-type: none"> • PTFE: DN 15 ... 300 (½" ... 12") • PFA: DN 15 ... 150 (½" ... 6") 	Weight	See dimensional drawings
Measuring principle	Electromagnetic induction	Flange and housing material	Carbon steel ASTM A 105, with corrosion resistant coating Corrosivity category C4, according to ISO 12944-2
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 	Electrode material	PTFE: Hastelloy C276/2.4819 PFA: Hastelloy C22/2.4602
Process connection		Grounding electrode material	PTFE: No grounding electrodes PFA: Hastelloy
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)) 	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
Rated operation conditions		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)
Ambient temperature (conditions also dependent on liner characteristics)		Certificates and approvals	
<ul style="list-style-type: none"> • Standard sensor • Ex sensor • Compact with transmitter <ul style="list-style-type: none"> - MAG 5000/6000 - MAG 6000 I - MAG 6000 I Ex 	-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)	Calibration	
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) 	Standard production calibration	Zero-point, 2 x 25 % and 2 x 90 %
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)	Hazardous area	
Pressure drop at 3 m/s	As straight pipe	Ex-sensor in compact or remote version with MAG 6000 I Ex	<ul style="list-style-type: none"> • ATEX, FM, CSA, IECEx, EAC Ex, NEPSI <ul style="list-style-type: none"> - Zone 1 Ex de ia IIC T6 Gb • ATEX, FM, CSA, IECEx, EAC Ex <ul style="list-style-type: none"> - Zone 21 Ex tD A21 IP67 • FM <ul style="list-style-type: none"> - XP IS Class I Div. 1 Groups A, B, C, D²⁾ - DIP Class II+III Div. 1 Groups E, F, G²⁾ • FM <ul style="list-style-type: none"> - NI Class I Div. 2 Groups A, B, C, D - NI Class I Div. 2 Groups IIC
Test pressure	1.5 x PN (where applicable)	Ex-sensor with/without MAG 5000/6000/6000 I	
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 g RMS • Sensor with compact MAG 5000/6000 mounted transmitter: 3.17 g RMS • Sensor with compact MAG 6000 I/6000 I Ex mounted transmitter: 1.14 g RMS 	Pressure equipment	PED, CRN
Temperature of medium	<ul style="list-style-type: none"> • PTFE -20 ... +150 °C (-4 ... +302 °F) • PFA -20 ... +150 °C (-4 ... +302 °F) 	Others	EAC (Russia, Belarus, Kazakhstan) KCC (South Korea)
EMC	2014/30/EU		

¹⁾ DN ≤ 600 type 01 (SORF); DN > 600 type 11 (WNRF)

²⁾ In compact version only

Selection and Ordering data	Article No.
Sensor SITRANS F M MAG 3100 P (Short delivery time)	7ME6340-
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
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
Flange norm and pressure rating	
EN 1092-1	
PN 10 (DN 200 ... 300 (8" ... 12"))	B
PN 16 (DN 65 ... 300 (2 1/2" ... 12"))	C
PN 40 (DN 15 ... 50 (1/2" ... 2"))	F
ANSI B16.5	
Class 150 (1/2" ... 12")	J
Flange material	
Carbon steel flanges ASTM A 105	1
Liner material	
PTFE (150 °C (302 °F))	3
PFA (150 °C (302 °F)) (DN 15 ... 150 (1/2" ... 6"))	7
Electrode material	
Hastelloy C	2
Hastelloy C incl. grounding electrodes (only PFA)	6
Transmitter	
Standard sensor for remote transmitter (Order transmitter separately)	A
Ex sensor for remote transmitter (Order transmitter separately)	B
MAG 6000 I, Aluminum, 18 ... 90 V DC, 115 ... 230 V AC	C
MAG 6000 I, Aluminum, 18 ... 30 V DC, Ex	D
MAG 6000 I, Aluminum, 115 ... 230 V AC, Ex	E
MAG 6000, Polyamide, 11 ... 30 V DC/11 ... 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 6000/6000 I)	J
Cable glands/terminal box	
Metric: Polyamide terminal box or MAG 6000 I compact	1
1/2" NPT: Polyamide terminal box or MAG 6000 I compact	2
Metric: Stainless steel terminal box	3
1/2" NPT: Stainless steel 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.	
Certificates	
• Factory certificate according to EN 10204-2.2	C14
• Factory certificate according to EN 10204-2.1	C15
Terminal blocks	
• Factory mounted terminal blocks	N02
Region/customer specific labels	
• KCC label (South Korea)	W28
Tag name plate, stainless steel (specify in plain text)	Y17
Tag name plate, plastic (self adhesive)	Y18
Customer-specific transmitter setting	Y20
Sensor cable wired (specify Article No. for sensor cables and order cables separately)	Y40
Sensor cables wired and IP68 sealing (Article No. for sensor cables and order cables separately)	Y41
Special version (specify in plain 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⁾
• Customer-witnessed calibration Any of above calibration	On request¹⁾

¹⁾ Product Variation Request (PVR).

Operating instructions for SITRANS F M MAG 3100 P

Description	Article No.
• English	A5E03005599
• German	A5E03086288

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Accessories

Description	Article No.
Potting kit for IP68/NEMA 6P sealing of sensor junction box	FDK:085U0220



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

Flow Measurement

SITRANS F M

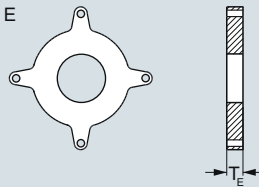
Flow sensor MAG 3100 P

Accessories for MAG 3100 P sensor

Grounding and protection ring - Type E (Stainless steel)

Material: AISI 316
For liner PTFE
1 pc. incl. straps and screws

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	½"	FDK:083N8365
DN 25			FDK:083N8271	1"	FDK:083N8272
DN 40			FDK:083N8278	1½"	FDK:083N8279
DN 50		FDK:083N8285 FDK:083N8289	FDK:083N8282	2"	FDK:083N8283
DN 65				2½"	FDK:083N8287
DN 80				3"	FDK:083N8291
DN 100		FDK:083N8117 FDK:083N8121 FDK:083N8125		4"	FDK:083N8118
DN 125				5"	FDK:083N8122
DN 150				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

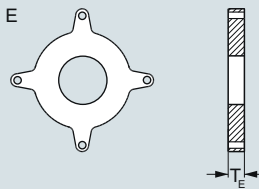
For use as protection ring order 2 pcs.
For use as grounding ring order 1 pc.

Accessories for MAG 3100 P sensor

Grounding and protection ring - Type E (Hastelloy)

Material: Hastelloy C276
For liner PTFE
1 pc. incl. straps and screws

Type E

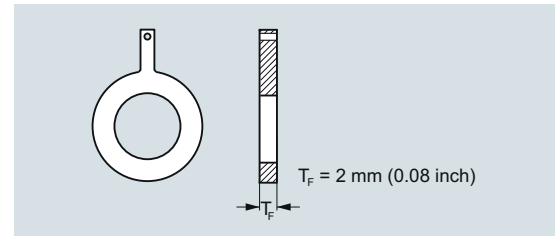


DN	PN 16 Article No.	PN 40 Article No.	Size	ANSI ¹⁾ Class 150 Article No.
DN 15		FDK:083N8487	½"	FDK:083N8487
DN 25		FDK:083N8488	1"	FDK:083N8489
DN 40		FDK:083N8490	1½"	FDK:083N8491
DN 50		FDK:083N8492	2"	FDK:083N8493
DN 65	FDK:083N8495		2½"	FDK:083N8497
DN 80	FDK:083N8499		3"	FDK:083N8501
DN 100	FDK:083N8504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

¹⁾ For dimensions of MAG 3100 P see table on page 3/88

Accessories for MAG 3100 P sensor**Grounding ring - Type Flat ring (Stainless steel)**

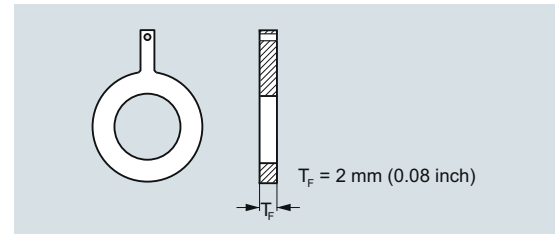
Material: AISI 316
For liner PTFE and PFA
1 pc. incl. straps and screws



DN	PN 10 Article No.	PN 16 Article No.	PN 40 Article No.	Size	ANSI ¹⁾ Class 150 Article No.
DN 15			A5E01191968	1/2"	A5E01191969
DN 25			A5E01150880	1"	A5E01150022
DN 40			A5E01191952	1 1/2"	A5E01191961
DN 50			A5E01150918	2"	A5E01151121
DN 65		A5E01191940		2 1/2"	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

Accessories for MAG 3100 P sensor**Grounding ring - Type Flat ring (Hastelloy)**

Material: Hastelloy C276
For liner PTFE and PFA
1 pc. incl. straps and screws



DN	PN 10 Article No.	PN 16 Article No.	PN 40 Article No.	Size	ANSI ¹⁾ Class 150 Article No.
DN 15			A5E01191981	1/2"	A5E01191989
DN 25			A5E01150882	1"	A5E01150028
DN 40			A5E01191982	1 1/2"	A5E01191990
DN 50			A5E01150922	2"	A5E01151124
DN 65		A5E01191971		2 1/2"	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 3/88

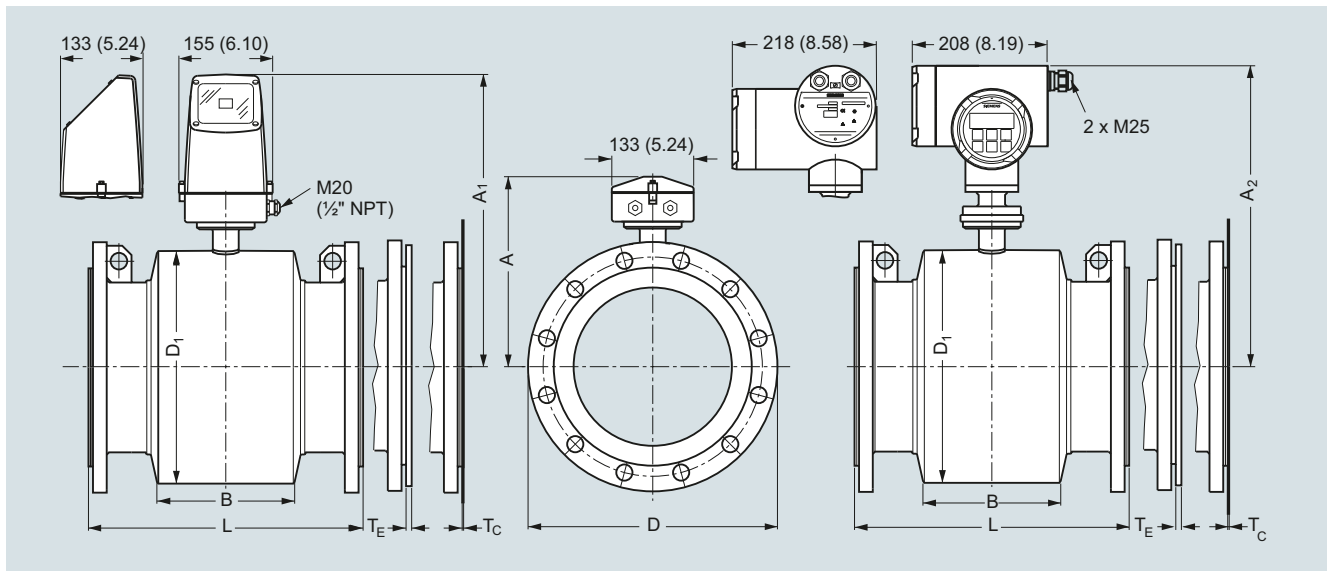
Flow Measurement

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⁾				T _E ³⁾	T _F ³⁾	Weight ⁴⁾
						EN 1092-1-201 PN 10	PN 16	PN 40	ANSI 16.5 Class 150			
[mm]	[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 stainless steel terminal box (Ex and high temperature version)

²⁾ When grounding rings are used, the thickness of the grounding ring must be added to the built-in length

³⁾ T_E = Grounding ring Type E, T_F = Grounding ring Type Flat ring

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

⁵⁾ Not according to ISO 13359

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 _E ³⁾	T _F ³⁾	Weight ⁴⁾
						EN 1092-1-201 PN 10	PN 16	PN 40	ANSI 16.5 Class 150			
[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[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	0.24	0.08	11
1½	7.76	13.8	13.74	3.23	4.88	-	-	7.87	7.87	0.24	0.08	17
2	8.07	14.1	14.04	2.83	5.47	-	-	7.87	7.87	0.24	0.08	20
2½	8.35	14.4	14.34	2.83	6.06	-	7.87/-	-	7.87	0.24	0.08	24
3	8.74	14.8	14.74	2.83	6.85	-	7.87/-	-	10.71 ⁵⁾	0.24	0.08	26
4	9.53	15.6	15.54	3.35	8.43	-	9.84/-	-	9.84	0.24	0.08	35
5	10.04	16.1	16.04	3.35	9.41	-	9.84/-	-	9.84	0.24	0.08	42
6	10.87	16.9	16.84	3.35	11.10	-	11.81/-	-	11.81	0.24	0.08	60
8	11.97	18.0	17.94	5.39	13.31	13.78	13.78/-	-	13.78	0.31	0.08	88
10	13.07	19.1	19.04	6.18	15.47	17.72	17.72/-	-	17.72	0.31	0.08	132
12	14.05	20.1	20.04	6.18	17.48	19.69	19.69/-	-	19.69	0.31	0.08	176

¹⁾ 0.571 inch shorter with stainless steel terminal box (Ex and high temperature version)

²⁾ When grounding rings are used, the thickness of the grounding ring must be added to the built-in length

³⁾ T_E = Grounding ring Type E, T_F = Grounding ring Type Flat ring

⁴⁾ Weights are for ANSI 150 without transmitter

⁵⁾ Not according to ISO 13359

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.
- Drinking water approvals
- Suitable for direct burial and constant flooding
- Custody transfer approvals
- Built-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 - OD inlet/OD outlet installation
 - Pattern approval OIML R 49
 - Conform to ISO 4064 and EN 14154 for mechanical flowmeters
 - PTB K7.2
 - Kiwa water approval
- FM Fire Service Meter (Class Number 1044) for automatic fire protection systems
- Meets EEC directives: PED 2014/68/EU pressure directive for EN1092-1 flanges
- Simple onsite or factory upgrade to IP68/NEMA 6P of a standard sensor
- Type approval of marine equipment (ABS, Bureau Veritas, DNV, GL, Lloyd's Register)

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 (octagon liner): DN 15 ... 40 (½" ... 1½") Coned sensor: DN 50 ... 300 (2" ... 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 ¹⁾		
• 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 ²⁾ PN 16 (232 psi): DN 50 ... 300 (2" ... 12") Flat face ³⁾ PN 16 (232 psi): DN 350 ... 1200 (14" ... 48") Raised face PN 40 (580 psi): DN 15 ... 40 (½" ... 1½") Flat face	Raised face ³⁾ (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 (232 psi): DN 15 ... DN 300 (2" ... 12") Flat Face; DN 350 ... DN 1200 (14" ... 48") Raised face	PN 16 (232 psi): DN 50 ... DN 1200 (2" ... 48") Raised face
• 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)
• Compact with transmitter MAG 5000/6000 ⁴⁾	-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 g RMS Sensor with compact MAG 5000/6000 mounted transmitter: 3.17 g RMS Sensor with compact MAG 6000 I mounted transmitter: 1.14 g RMS	18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 Sensor: 3.17 g RMS Sensor with compact MAG 5000/6000 mounted transmitter: 3.17 g RMS Sensor with compact MAG 6000 I mounted transmitter: 1.14 g RMS

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
Medium conditions		
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	2014/30/EU	2014/30/EU
Design		
Material		
• Housing and flanges	Carbon steel ASTM A 105, with corrosion-resistant coating Corrosivity category C4, according to ISO 12944-2	Carbon steel ASTM A 105, with corrosion-resistant coating Corrosivity category C4, according to ISO 12944-2
• Electrode	Hastelloy C276	Hastelloy C276
• Grounding electrode	Hastelloy C276	Hastelloy C276
• Terminal box	Fibre glass reinforced polyamide	Fibre glass reinforced polyamide
Certificates and approvals		
Calibration		
• Standard production calibration	Zero-point, 2 x 25 % and 2 x 90 %	Zero-point, 2 x 25 % and 2 x 90 %
• Special calibration	5-point calibration: 20 %, 40 %, 60 %, 80 %, 100 % of factory Q _{max} 10-point calibration: ascending and descending at 20 %, 40 %, 60 %, 80 %, 100 % of factory Q _{max} Matched-pair calibration: default, 5-point or 10-point	5-point calibration: 20 %, 40 %, 60 %, 80 %, 100 % of factory Q _{max} 10-point calibration: ascending and descending at 20 %, 40 %, 60 %, 80 %, 100 % of factory Q _{max} Matched-pair calibration: default, 5-point or 10-point
Custody transfer	<ul style="list-style-type: none"> • MI-001 cold water (EU): DN 50 ... DN 1200 (2" ... 48") • Kiwa water approval (NL): DN 50 ... DN 1200 (2" ... 48") • Chilled water pattern approval PTB K 7.2 DN 50 ... DN 300 (Germany)⁵⁾ 	-
Drinking water	EPDM liner: <ul style="list-style-type: none"> • WRAS (WRc, BS690 cold water, GB) • NSF/ANSI Standard 61⁶⁾ (Cold water, US) • ACS listed (F) • DVGW W270 (D) • Belgaqua (B) • MCERTS (GB environmental) 	<ul style="list-style-type: none"> • WRAS (WRc, BS690 cold water, GB) • NSF/ANSI Standard 61⁶⁾ (Cold water, US)
Marine ⁷⁾	<ul style="list-style-type: none"> • American Bureau of Shipping (ABS) • Bureau Veritas • Det Norske Veritas (DNV) • Germanischer Lloyd (GL) • Lloyd's Register of Shipping 	
Hazardous areas ⁸⁾		
• Standard sensor with/without MAG 5000/6000/6000 I	<ul style="list-style-type: none"> • FM - NI Class I Div. 2 Groups A, B, C, D - NI Class I Zone 2 Groups IIC 	<ul style="list-style-type: none"> • FM - NI Class I Div. 2 Groups A, B, C, D - NI Class I Zone 2 Groups IIC
Pressure equipment	<ul style="list-style-type: none"> • PED conforming: All EN1092-1 flanges and ANSI Class 150 (< DN 300 /<12") – 2014/68/EU⁹⁾ • CRN 	<ul style="list-style-type: none"> • PED conforming: All EN1092-1 flanges (< DN 600 /<24") – 2014/68/EU⁹⁾ • CRN
Others	<ul style="list-style-type: none"> • EAC (Russia, Belarus, Kazakhstan) • KCC (South Korea) • FM Fire Service Approval acc. to class 1044⁸⁾ • VdS: Extinguishing systems DN 50 ... 300 	<ul style="list-style-type: none"> • EAC (Russia, Belarus, Kazakhstan) • CMC/CPA (China)

¹⁾ 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

²⁾ Type 01 (SORF)

³⁾ DN ≤ 600 type 01 (SORF); DN > 600 type 11

⁴⁾ Compact with transmitter MAG 5000 CT/6000 CT -20 ... +50 °C (-4 ... +122 °F)

⁵⁾ For verification submit Product Variation Request

⁶⁾ Including Annex G

⁷⁾ In remote version with sensor size DN 50 ... DN 300 (2" ... 12")

⁸⁾ For sizes larger than 600 mm (24") in PN 16 PED conformity is available as a cost-added option. The basic unit will carry the LVD (Low Voltage Directive) and EMC approval. All products sold outside of EU and EFTA are excluded from the directive, also products sold into certain market sectors are excluded. These include:

a) Meters used in networks for the supply, distribution and discharge of water.

b) Meters used in pipelines for the conveyance of any fluid from offshore to onshore.

c) Meters used in the extraction of petroleum or gas, including Christmas tree and manifold equipment.

d) Any meter mounted on a ship or mobile offshore platform. For further information on the PED standard and requirements see page 10/15.

⁹⁾ Not for sensors with 300 µm coating.

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

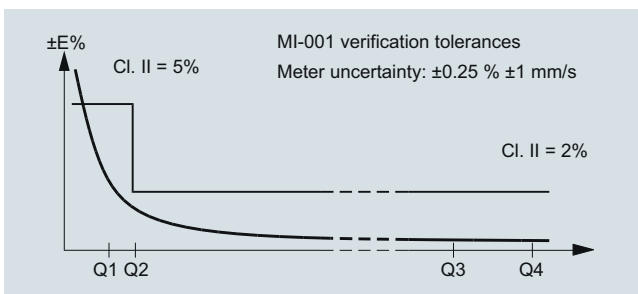
MAG 5100 W CT program is type approved according to international water meter standard OIML R 49. Since the first November 2006 the MI-001 water meter directive is in force, which means that all water meters can be sold across the EU borders if the water meters contain a MI-001 label.

The MAG 5100 W MI-001 verified and labeled products are a Class II approval according to Directive 2014/32/EU of the European Parliament and Council of 26 February, 2014 on measuring instruments, Annex VI Thermal Energy Meters (MI-004) in the sizes from DN 50 to DN 1200 (Article No. 7ME6520).

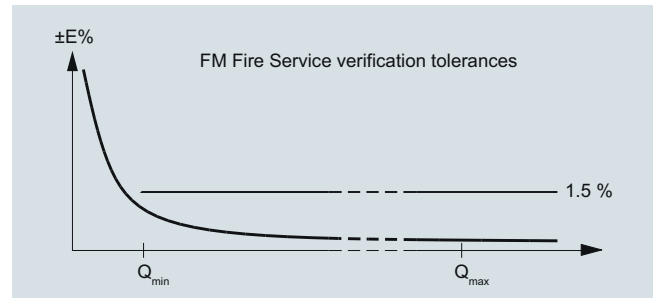
The MID certification is obtained as a modul B + D module approval according to the above mentioned directive.

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	40	40	40	40	40	40	40	40	40
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]	0.64	1.0	1.6	2.52	4.0	6.4	10.0	16.0	25.2
Q1 [m³/h]	0.4	0.63	1.0	1.58	2.5	4.0	6.25	10.0	15.75

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	0.5	0.8	1.26	2.0	3.2	5.0	8.0	12.6
Q1 [m³/h]	0.20	0.31	0.50	0.79	1.25	2.00	3.13	5.00	7.9

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]	0.4	0.63	1.0	1.6	2.5	4.0	6.3	10.0	16.0
Q1 [m³/h]	0.25	0.39	0.63	1.0	1.56	2.5	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	2.0	3.2	5.0	8.0	12.8
Q1 [m³/h]	0.2	0.32	0.5	0.8	1.25	2.0	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	0.4	0.64	1.02	1.6	2.56	4.0	6.4	10.24
Q1 [m³/h]	0.16	0.25	0.4	0.64	1.0	1.6	2.52	4.0	6.4

Order code: P24	DN 350 (14")	DN 400 (16")	DN 450 (18")	DN 500 (20")	DN 600 (24")
„R“ Q3/Q1	40	40	40	40	40
Q4 [m³/h]	1250	1250	2000	2000	3125
Q3 [m³/h]	1000	1000	1600	1600	2500
Q2 [m³/h]	40.0	40.0	64.0	64.0	100.0
Q1 [m³/h]	25.0	25.0	40.0	40.0	62.5

Order code: P25	DN 350 (14")	DN 400 (16")	DN 450 (18")	DN 500 (20")	DN 600 (24")
„R“ Q3/Q1	63	63	63	63	63
Q4 [m³/h]	1250	2000	3125	3125	5000
Q3 [m³/h]	1000	1600	2500	2500	4000
Q2 [m³/h]	25.4	40.63	63.49	63.49	101.6
Q1 [m³/h]	15.9	25.4	39.7	39.7	63.49

Order code: P26	DN 350 (14")	DN 400 (16")	DN 450 (18")	DN 500 (20")	DN 600 (24")
„R“ Q3/Q1	80	80	80	80	80
Q4 [m ³ /h]	2000	3125	5000	5000	7875
Q3 [m³/h]	1600	2500	4000	4000	6300
Q2 [m ³ /h]	32.0	50.0	80.0	80.0	126.0
Q1 [m ³ /h]	20.0	31.25	50.0	50.0	78.75


Order code: P27	DN 350 (14")	DN 400 (16")	DN 450 (18")	DN 500 (20")	DN 600 (24")
„R“ Q3/Q1	100	100	100	100	100
Q4 [m ³ /h]	3125	3125	5000	5000	7875
Q3 [m³/h]	2500	2500	4000	4000	6300
Q2 [m ³ /h]	40.0	40.0	64.0	64.0	100.8
Q1 [m ³ /h]	25.0	25.0	40.0	40.0	63.0

Order code: P29	DN 700 (28")	DN 750 (30")	DN 800 (32")	DN 900 (36")	DN 1000 (40")	DN 1200 (48")
„R“ Q3/Q1	40	40	40	40	40	40
Q4 [m ³ /h]	5000	5000	5000	7875	7875	7875
Q3 [m³/h]	4000	4000	4000	6300	6300	6300
Q2 [m ³ /h]	160.0	160.0	160.0	252.0	252.0	252.0
Q1 [m ³ /h]	100.0	100.0	100.0	157.5	157.5	157.5

Order code: P30	DN 700 (28")	DN 750 (30")	DN 800 (32")	DN 900 (36")	DN 1000 (40")	DN 1200 (48")
„R“ Q3/Q1	63	63	63	63	63	-
Q4 [m ³ /h]	5000	5000	5000	7875	7875	-
Q3 [m³/h]	4000	4000	4000	6300	6300	-
Q2 [m ³ /h]	101.6	101.6	101.6	160.0	160.0	-
Q1 [m ³ /h]	63.5	63.5	63.5	100.0	100.0	-

Order code: P31	DN 700 (28")	DN 750 (30")	DN 800 (32")	DN 900 (36")	DN 1000 (40")	DN 1200 (48")
„R“ Q3/Q1	80	80	80	80	80	-
Q4 [m ³ /h]	5000	5000	5000	7875	7875	-
Q3 [m³/h]	4000	4000	4000	6300	6300	-
Q2 [m ³ /h]	80.0	80.0	80.0	126.0	126.0	-
Q1 [m ³ /h]	50.0	50.0	50.0	78.75	78.75	-

The label is placed on the transmitter housing. An example of the product label is shown below:

SIEMENS	
SITRANS F M MAG 6000 / 5100W CT	
Order No.: 7ME65204PB132MA1-Z P11	Supply: 115-230V AC
Serial No.: 157802H502	Certification No.: DK-0200-MI001-001
200 (Bin.) EN 1092-1, PN 10	Accuracy: Class 2 OIML R49
Meter orientation: Horizontal (H)	Software version: 3.03
Environmental Class: E2, M1 IP 67	Year: 2013
Pressure max.: PN 10	Q3: 250 m ³ /h Q3/Q1: 25
Temp. max.: 30°C	CE M13 0200
Amb. Temp.: -25° to +55° C	
Siemens A/S, Flow Instruments 6400 Soenderborg, Denmark	
Made in France	

OIML R 49/MI-001 approvals valid for:

- DN 50 to DN 1200 (2" to 48")
- Horizontal and vertical installation
- Compact or remote with max. 500 m cable
- Power supply 115 to 230 V AC, 12 to 24 V AC/DC
- With or without communication module

Other restrictions may apply (see certificate).

Special OIML / MI-001 settings:

- Unit: m³
- Qmax: Q3
- Low flow cut-off: 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

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

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Diameter

DN 15 (½")	1 V
DN 25 (1")	2 D
DN 40 (1½")	2 R
DN 50 (2")	2 Y
DN 65 (2½")	3 F
DN 80 (3")	3 M
DN 100 (4")	3 T
DN 125 (5")	4 B
DN 150 (6")	4 H
DN 200 (8")	4 P
DN 250 (10")	4 V
DN 300 (12")	5 D
DN 350 (14")	5 K
DN 400 (16")	5 R
DN 450 (18")	5 Y
DN 500 (20")	6 F
DN 600 (24")	6 P
DN 700 (28")	6 Y
DN 750 (30")	7 D
DN 800 (32")	7 H
DN 900 (36")	7 M
DN 1000 (40")	7 R
(42")	7 U
(44")	7 V
DN 1200 (48")	8 B

Flange norm and pressure rating

<u>EN 1092-1</u>	
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
<u>ANSI B16.5</u>	
class 150 (½" ... 24")	J
<u>AWWA C-207</u>	
Class D (28" ... 48")	L
<u>AS 4087</u>	
PN 16 (DN 50 ... 1200/2" ... 48")	N

Flange material and coating

Carbon steel flanges ASTM A 105, corrosion-resistant coating of category C4	1
Carbon steel flanges ASTM A 105, 300 µm corrosion-resistant coating of category C4	4

Liner material

EPDM	2
NBR Hard Rubber	3

Selection and Ordering data

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

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**

MAG 6000 CT, Polyamid, 11 ... 30 V DC/11 ... 24 V AC **R**

Transmitter including wall-mounting kit for remote design

MAG 5000, Polyamid, 115 ... 230 V AC, incl. special wall-mounting unit (approved marine equipment)

• M20x1.5 cable glands **Z P 0 C**

• ½" NPT cable glands **Z P 0 D**

MAG 6000, Polyamid, 115 ... 230 V AC, incl. special wall-mounting unit (approved marine equipment)

• M20x1.5 cable glands **Z P 0 G**

• ½" NPT cable glands **Z P 0 H**

MAG 6000 CT, Polyamid, 11 ... 30 V DC/11 ... 24 V AC, incl. wall-mounting unit

• M20x1.5 cable glands **Z P 0 J**

• ½" NPT cable glands **Z P 0 K**

MAG 6000 CT, Polyamid, 115 ... 230 V AC, incl. wall-mounting unit

• M20x1.5 cable glands **Z P 0 L**

• ½" NPT cable glands **Z P 0 M**

Communication

None **A**

HART **B**

PROFIBUS PA Profile 3 (only MAG 6000/ MAG 6000 I) **F**

PROFIBUS DP Profile 3 (only MAG 6000/ MAG 6000 I) **G**

Modbus RTU/RS 485 (only MAG 6000/ MAG 6000 I) **E**

FOUNDATION Fieldbus H1 (only MAG 6000/ MAG 6000 I) **J**

Cable glands/terminal box

Metric: Polyamide terminal box or MAG 6000 I compact **1**

Selection and Ordering data	Order code	Selection and Ordering data	Order code
Additional information			
Please add “-Z” to Article No. and specify Order code(s) and plain text.			
Certificates			
• Pressure test certificate according to EN 10204-3.1	C01	• Without verification according to OIML R 49 (DN 350 ... DN 600)	P23
• Material certificate according to EN 10204-3.1	C12	• MI-001 Q3/Q1 = 40 (DN 350 ... DN 600)	P24
• Factory certificate according to EN 10204-2.2	C14	• MI-001 Q3/Q1 = 63 (DN 350 ... DN 600)	P25
• Factory certificate according to EN 10204-2.1	C15	• MI-001 Q3/Q1 = 80 (DN 350 ... DN 600)	P26
Special calibration		• MI-001 Q3/Q1 = 100 (DN 350 ... DN 600)	P27
• 5-point calibration for DN 15 ... DN 200 ¹⁾	D01	• Without verification according to OIML R 49 (DN 700 ... DN 1200)	P28
• 5-point calibration for DN 250 ... DN 600 ¹⁾	D02	• MI-001 Q3/Q1 = 40 (DN 700 ... DN 1200)	P29
• 5-point calibration for DN 700 ... DN 1200 ¹⁾	D03	• MI-001 Q3/Q1 = 63 (DN 700 ... DN 1200)	P30
• 10-point calibration for DN 15 ... DN 200 ²⁾	D06	• MI-001 Q3/Q1 = 80 (DN 700 ... DN 1200)	P31
• 10-point calibration for DN 250 ... DN 600 ²⁾	D07	FM Fire Service Approval (with ANSI B16.5 Class 150 flanges)	
• 10-point calibration for DN 700 ... DN 1200 ²⁾	D08	• DN 50, DN 80 and DN 100 (2", 3" and 4")	P20
• Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 15 ... DN 200	D11	• DN 150 and DN 200 (6" and 8")	P21
• Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 250 ... DN 600	D12	• DN 250 and DN 300 (10" and 12")	P22
• Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 700 ... DN 1200	D13	Region/customer specific labels	
• 5-point, matched-pair calibration for DN 15 ... DN 200 ¹⁾	D15	• Chinese label	W06
• 5-point, matched-pair calibr. for DN 250 ... DN 600 ¹⁾	D16	• KCC label (South Korea)	W28
• 5-point, matched-pair calibr. for DN 700 ... DN 1200 ¹⁾	D17	• FP2E label (France)	H20
• 10-point, matched-pair calibration for DN 15 ... DN 200 ²⁾	D18	Tag name plate, stainless steel (specify in plain text)	Y17
• 10-point, matched-pair calibr. for DN 250 ... DN 600 ²⁾	D19	Tag name plate, plastic (self-adhesive)	Y18
• 10-point, matched-pair calibr. for DN 700 ... DN 1200 ²⁾	D20	Customer-specific transmitter setting	Y20
Country of origin		Factory mounted sensor cables	
• France	F55	• Sensor cables wired (specify Article No. for sensor cables and order cables separately or specify K-option)	Y40
Sensor cables		• Sensor cables wired and IP68 sealing (specify Article No. for sensor cables and order cables separately or specify K-option)	Y41
• Standard coil and electrode cable, PVC jacket		Special version (specify in plain text)	Y99
- 5 m (16 ft)	K01	Additional calibrations	
- 10 m (33 ft)	K02	• Accredited Siemens Flow Instruments matched pair calibration acc. to ISO/IEC 17025:2005	On request⁴⁾
- 20 m (65 ft)	K04	• Customer-witnessed calibration	On request⁴⁾
- 30 m (98 ft)	K06	Any of above calibration	
- 40 m (131 ft)	K07		
- 50 m (164 ft)	K08		
- 60 m (197 ft)	K09		
- 100 m (328 ft)	K10		
- 150 m (492 ft)	K11		
- 200 m (656 ft)	K12		
- 500 m (1640 ft)	K13		
• Standard coil and special electrode cable, PVC jacket			
- 5 m (16 ft)	K51		
- 10 m (33 ft)	K52		
- 20 m (65 ft)	K54		
- 30 m (98 ft)	K56		
- 40 m (131 ft)	K57		
- 50 m (164 ft)	K58		
- 60 m (197 ft)	K59		
- 100 m (328 ft)	K60		
- 150 m (492 ft)	K61		
- 200 m (656 ft)	K62		
- 500 m (1640 ft)	K63		
Terminal blocks			
• Factory mounted terminal blocks	N02		
Approval/Verification ³⁾			
• Without verification acc. to OIML R 49 (DN 50 ... DN 300)	P10		
• MI-001 Q3/Q1 = 40 (DN 50 ... DN 300)	P11		
• MI-001 Q3/Q1 = 63 (DN 50 ... DN 300)	P12		
• MI-001 Q3/Q1 = 80 (DN 50 ... DN 300)	P13		
• MI-001 Q3/Q1 = 160 (DN 50 ... DN 300)	P16		
• MI-001 Q3/Q1 = 200 (DN 50 ... DN 300)	P17		
• MI-001 Q3/Q1 = 250 (DN 50 ... DN 300)	P18		


Operating instructions for SITRANS F M MAG 5100 W

Description	Article No.
• English	A5E03063678
• German	A5E03376527

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Accessories

Description	Article No.
Potting kit for IP68/NEMA 6P sealing of sensor junction box	FDK:085U0220



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-portal.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

➤ Click on the Article No. for the online configuration
in the PIA Life Cycle Portal.

Diameter

DN 25 (1")
DN 40 (1½")
DN 50 (2")
DN 65 (2½")
DN 80 (3")
DN 100 (4")
DN 125 (5")
DN 150 (6")
DN 200 (8")
DN 250 (10")
DN 300 (12")
DN 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")
(42")
(44")
DN 1200 (48")
DN 1400 (54")
DN 1500 (60")
DN 1600 (66")
DN 1800 (72")
DN 2000 (78")

2 D
2 R
2 Y
3 F
3 M
3 T
4 B
4 H
4 P
4 V
5 D
5 K
5 R
5 Y
6 F
6 P
6 Y
7 D
7 H
7 M
7 R
7 U
7 V
8 B
8 F
8 K
8 P
8 T
8 Y

Flange norm and pressure rating

EN 1092-1

PN 6 (DN 1400 ... 2000 (54" ... 78"))¹⁾
PN 10 (DN 200 ... 2000 (8" ... 78"))¹⁾
PN 16 (DN 65 ... 600 (2½" ... 24"))
PN 16, non-PED (DN 700 ... 2000 (28" ... 78"))
PN 40 (DN 25 ... 50 (1" ... 2"))

ANSI B16.5

class 150 (1" ... 24")

AWWA C-207

Class D (28" ... 78")¹⁾

AS 4087

PN 16 (DN 50 ... 1200 (2" ... 48"))

JIS

B 2220:2004 K10 (1" ... 24")

Flange material and coating

Carbon steel flanges ASTM A 105,
corrosion-resistant coating of category C4
Carbon steel flanges ASTM A 105, 300 µm
corrosion-resistant coating of category C4

Liner material

Ebonite Hard Rubber

Electrode material

Hastelloy

A
B
C
D
F
J
L
N
R
1
4
4
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 sepa-
rately)

MAG 6000, Polyamid, 11 ... 30 V DC/11 ... 24V AC
MAG 6000, Polyamid, 115 ... 230 V AC
MAG 5000, Polyamid, 11 ... 30 V DC/11 ... 24V AC
MAG 5000, Polyamid, 115 ... 230 V AC

A
H
J
K
L

Communication

No communication, add-on possible
HART
PROFIBUS PA Profile 3 (only MAG 6000)
PROFIBUS DP Profile 3 (only MAG 6000)
Modbus RTU/RS 485 (only MAG 6000)
FOUNDATION Fieldbus H1 (only MAG 6000)

A
B
F
G
E
J

Cable glands/terminal box

Metric: Polyamide terminal box or MAG 6000 I com-
pact
½" NPT: Polyamide terminal box or MAG 6000 I com-
pact

1
2

¹⁾ DN 1400 to DN 2000 (54" to 78") do not conform to PED or CRN.

Selection and Ordering data	Order code
Additional information	
Please add “-Z” to Article No. and specify Order code(s) and plain text.	
Certificates	
Pressure test certificate according to EN 10204-3.1	C01
Factory certificate according to EN 10204-2.2	C14
Factory certificate according to EN 10204-2.1	C15
Special calibration	
• 5-point calibration for DN 15 ... DN 200 ¹⁾	D01
• 5-point calibration for DN 250 ... DN 600 ¹⁾	D02
• 5-point calibration for DN 700 ... DN 1200 ¹⁾	D03
• 10-point calibration for DN 15 ... DN 200 ²⁾	D06
• 10-point calibration for DN 250 ... DN 600 ²⁾	D07
• 10-point calibration for DN 700 ... DN 1200 ²⁾	D08
• Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 15 ... DN 200	D11
• Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 250 ... DN 600	D12
• Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 700 ... DN 1200	D13
• 5-point, matched-pair calibration for DN 15 ... DN 200 ¹⁾	D15
• 5-point, matched-pair calibration for DN 250 ... DN 600 ¹⁾	D16
• 5-point, matched-pair calibration for DN 700 ... DN 1200 ¹⁾	D17
• 10-point, matched-pair calibration for DN 15 ... DN 200 ²⁾	D18
• 10-point, matched-pair calibration for DN 250 ... DN 600 ²⁾	D19
• 10-point, matched-pair calibration for DN 700 ... DN 1200 ²⁾	D20
Terminal blocks	
• Factory mounted terminal blocks	N02
Region/customer specific labels	
• Chinese label	W06
• KCC label (South Korea)	W28
Tag name plate, stainless (specify in plain text)	Y17
Tag name plate, plastic (self-adhesive)	Y18
Customer-specific transmitter setting	Y20
Sensor cables wired (specify Article No. for sensor cables and order cables separately)	Y40
Sensor cables wired and IP68 sealing (specify Article No. for sensor cables and cables cable separately)	Y41
Special version (specify in plain text)	Y99

¹⁾ 20 %, 40 %, 60 %, 80 %, 100 % of factory Q_{max}

²⁾ Ascending and descending at 20 %, 40 %, 60 %, 80 %, 100 % of factory Q_{max}

Operating instructions for SITRANS F M MAG 5100 W

Description	Article No.
• German	A5E03376527
• English	A5E03063678

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Accessories

Description	Article No.
Potting kit for IP68/ NEMA 6P sealing of sensor junction box	FDK:085U0220



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

Communication module will be pre-mounted in the transmitter.

Please use online Product selector to get latest updates.

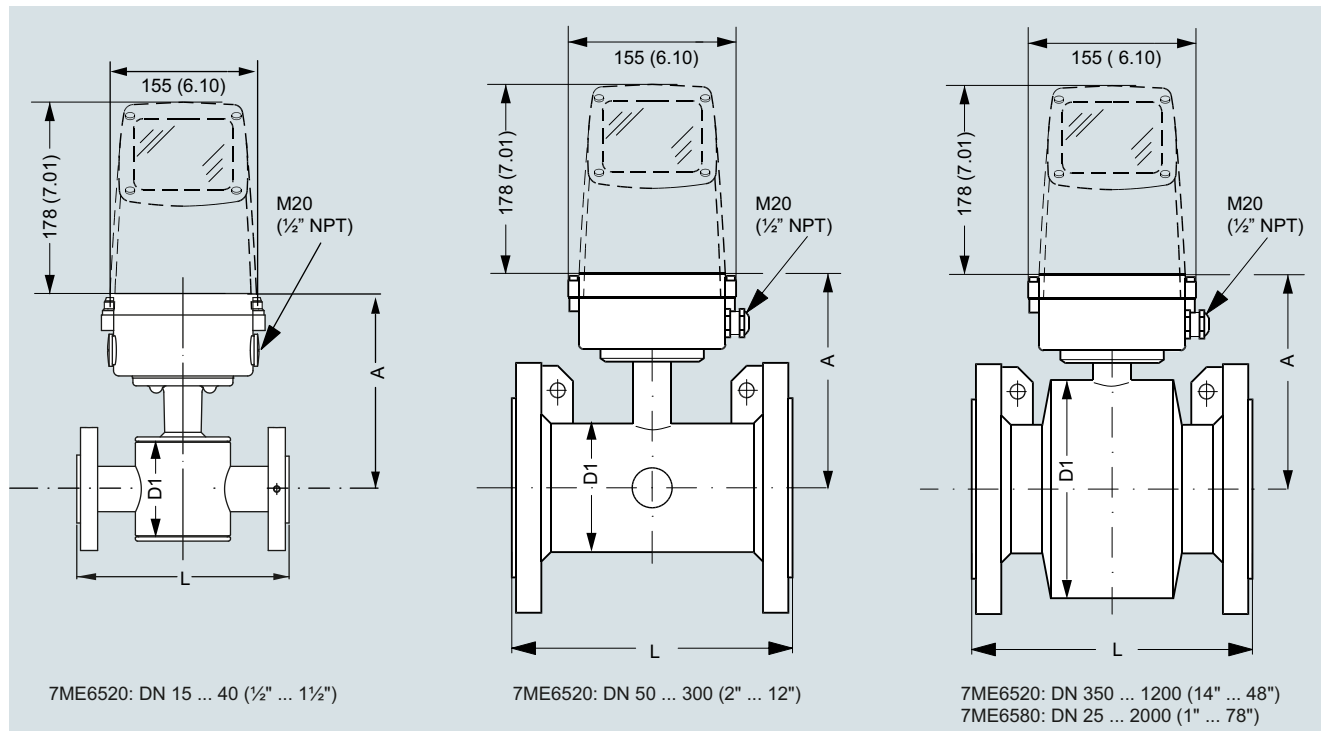
Product selector link: www.pia-portal.automation.siemens.com

Flow Measurement

SITRANS F M

Flow sensor MAG 5100 W

Dimensional drawings



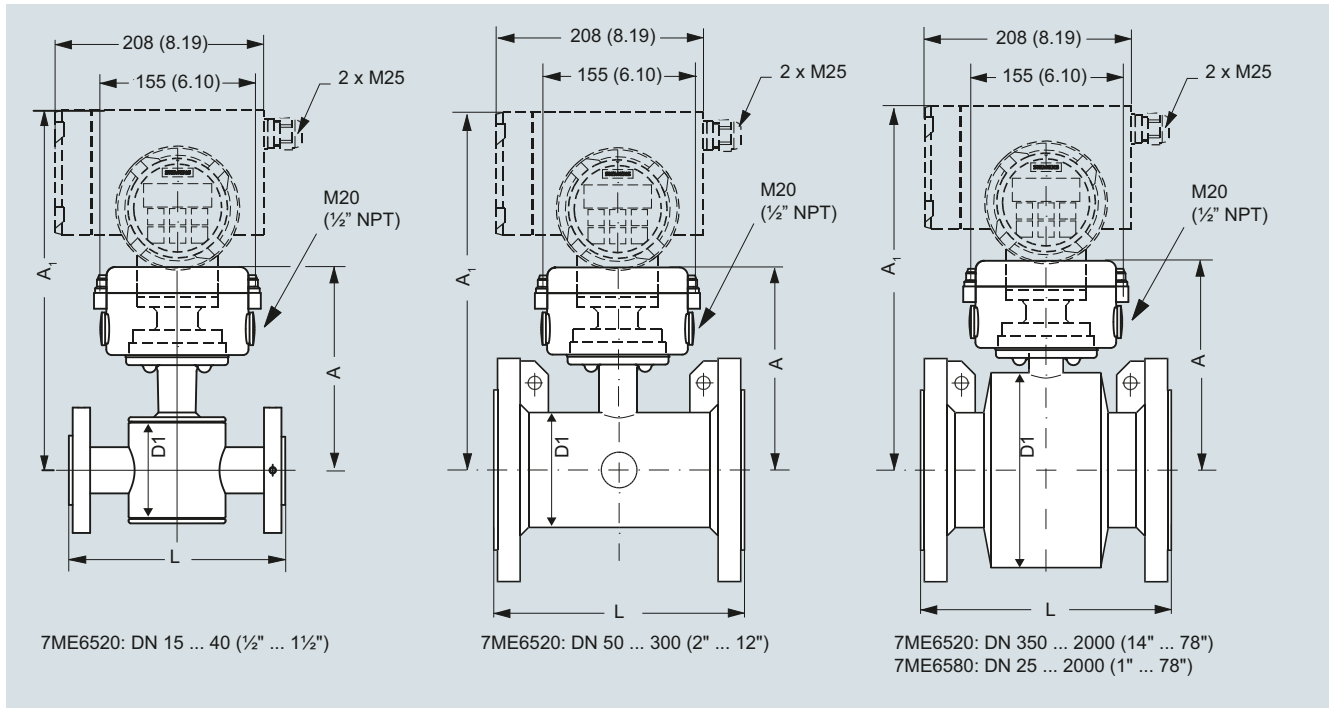
7ME6520 NBR or EPDM liner						7ME6580 Ebonite liner					
Nominal size A		A		D1		A		D1		L ¹⁾	
[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
15	½	177	7.0	77	3.0	-	-	-	-	200	7.9
25	1	187	7.4	96	3.8	187	7.4	104	4.09	200	7.9
40	1½	202	8.0	127	5.0	197	7.8	124	4.88	200	7.9
50	2	188	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

¹⁾ Tolerances on built-in length:

DN 15 to DN 200 (½" to 8"): +0/-3 mm (+0/-0.12"), DN 250 to DN 400 (10" to 16"): +0/-5 mm (+0/-0.20"),

DN 450 to DN 600 (18" to 24"): +5/-5 mm (+0.20/-0.20"), DN 700 to DN 2000 (28" to 78"): +10/-10 mm (+0.39/-0.39")

MAG 5100 W/6000 | Compact



3

7ME6520 NBR or EPDM liner								7ME6580 Ebonite liner						L ¹⁾	
Nominal size	A	A1		D1		A	A1		D1						
[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	1/2	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	1 1/2	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	2 1/2	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

1) Tolerances on built-in length:

DN 15 to DN 200 (1/2" to 8"): +0/-3 mm (+0/-0.12"), DN 250 to DN 400 (10" to 16"): +0/-5 mm (+0/-0.20"),

DN 450 to DN 600 (18" to 24"): +5/-5 mm (+0.20/-0.20"), DN 700 to DN 2000 (28" to 78"): +10/-10 mm (+0.39/-0.39")

Flow Measurement

SITRANS F M

Flow sensor MAG 5100 W

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

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).

Overview



SITRANS F M TRANSMAG 2 with the SITRANS F M 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 pulse alternating field technology is ideal for difficult applications like:

- High concentrated paper stock > 3 %
- Heavy mining slurries up to 70 % solid concentration
- Mining slurries with magnetic particles.
- Low conductive medias $\geq 1 \mu\text{S}/\text{cm}$ (0.1 $\mu\text{S}/\text{cm}$ 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 built-in alphanumeric display in several languages. The transmitters evaluate the signals from the associated electromagnetic sensors and also fulfill the task of a power supply unit which provides the magnet coils with a constant current.

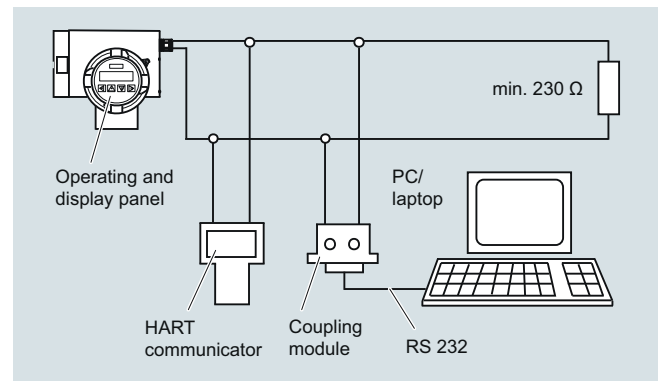
The magnetic flux density in the sensor is additionally monitored by reference coils.

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

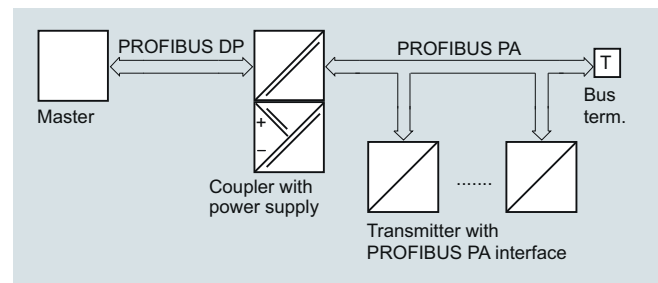
Displays and keypad

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

Flow Measurement

SITRANS F M

Transmitter TRANSMAG 2 with sensor 911/E

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	2 x 20 %, 2 x 50 % and 2 x 100 %
---	----------------------------------

Output

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

Current output

	0/4 ... 20 mA (7ME5034-0.... or 7ME5034-2....)
• Signal	
- Upper limit	0/4 ... 20 mA, selectable
- Failure	20 ... 22.5 mA, optional 3.6; 20 or 24 mA
• Load	
- Output	max. 600 Ω , max. load voltage 15 V DC
- For HART communication	≥ 250 Ω

Communication

	Via analog output with PC coupling module or HART communicator
• Protocol	HART, version 5.1

Digital output

Signal

• Output	Configurable as active or passive signals
- Active signal	24 V DC, ≤ 24 mA, $R_i = 170$ Ω
- Passive signal	Open collector, max. 30 V DC, 200 mA

Output configuration

• Pulse	
- Pulse significance	≤ 5000 pulses/s
- Pulse width	≥ 0.1 ms
• Limit frequency	≤ 10000 Hz
• Limits	Limits for flow and quantity, flow direction, alarm

Digital output 2 (relay)

(only 7ME5034-0....)

Relay

• 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 to zero or reset totalizer
• 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

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

Sufficient shielding must be provided, as well as fixed routing of the signal cables (electrode and coil cable).

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 grounded steel conduit. The cable length between the sensor and transmitter must not exceed 100 m (328 ft).

Selection and Ordering data	Article No.
SITRANS F M Transmitter TRANSMAG 2	7ME5034 - AA11 - AA0
Remote with standard wall mounting bracket, local display, die cast alumi- num	
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Output/communication	
4 ... 20 mA with HART	0
PROFIBUS PA	1
4 ... 20 mA with HART and digital input	2
Cable glands	
M20 x 1.5	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.	
Special mounting bracket for wall and pipeline instal- lation	A02
Transmitter setting for parameter "TAG number" (specify in plain text, max. 8 characters)	Y15
Transmitter setting for parameter "TAG descriptor" (specify in plain text, max. 16 characters)	Y16
Tag name plate, stainless steel (specify in plain text)	Y17
Special version (specify in plain text)	Y99

Operating instructions for SITRANS F M TRANSMAG 2

Description	Article No.
• English	A5E00102775
• German	A5E00102774




All literature is available to download for free, in a range of languages, at
www.siemens.com/processinstrumentation/documentation

Flow Measurement









SITRANS F M

Transmitter TRANSMAG 2 with sensor 911/E

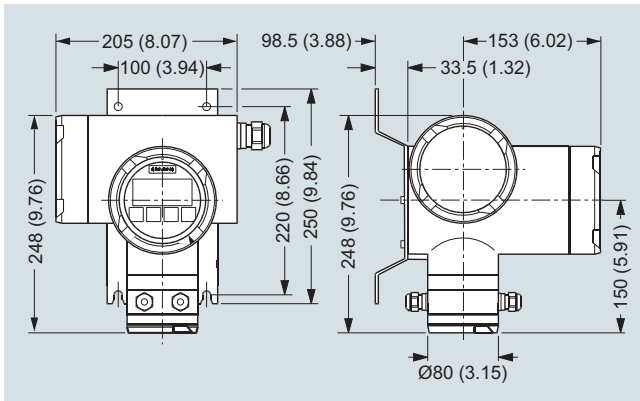
Accessories

Description	Article No.	
Standard wall-mounting bracket, stainless steel AISI 316L/1.4404	7ME5933-0AC04	
Special wall-mounting bracket, BI 2.5 DIN 59382 X6Cr17	7ME5933-0AC05	
Potting kit for IP68/ NEMA 6P sealing of sensor junction box	FDK:085U0220	

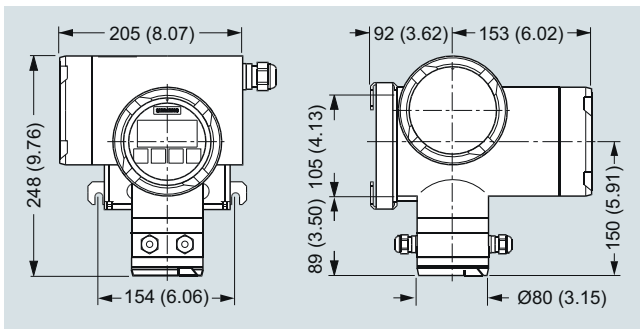
Spare parts

Description	Article No.	
Display unit	7ME5933-0AC00	
Display lid (Ex) in die-cast aluminum, with corrosion resistant coating (min. 60 µm)	7ME5933-0AC01	
Blind lid for sensor cables connection compartment (only remote version) in die-cast aluminum, with corrosion resistant coating (min. 60 µm) incl. O-ring seal	7ME5933-0AC02	
Blind lid (mains supply, input/outputs) in die-cast aluminum, with corrosion resistant 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	

Dimensional drawings

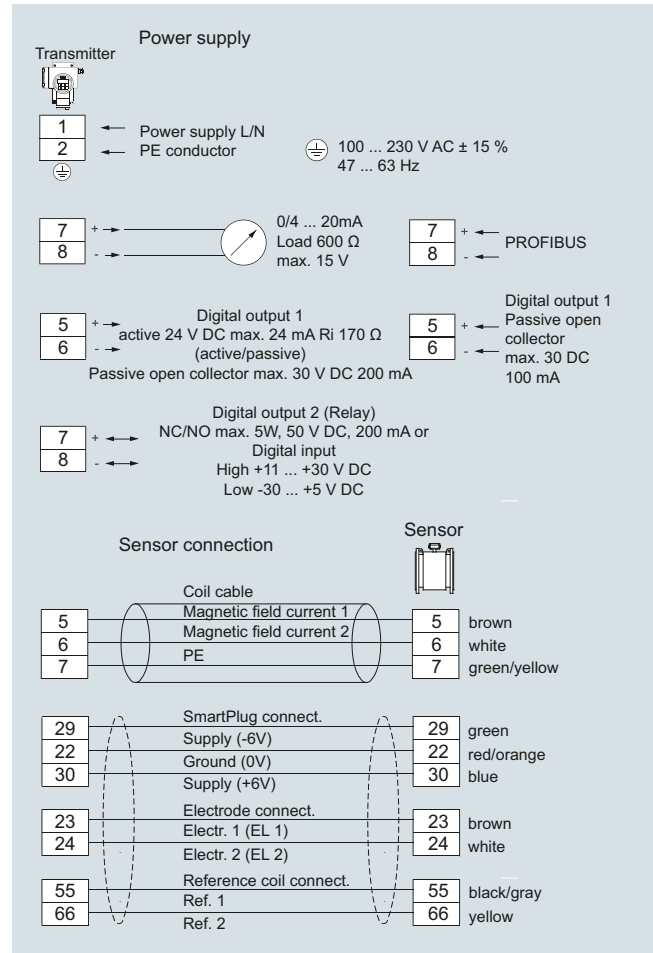


SITRANS F M transmitter TRANSMAG 2 with wall-mounting bracket, dimensions in mm (inch)



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

Schematics



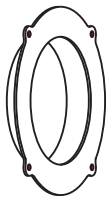
SITRANS F M transmitter TRANSMAG 2, connection diagram


Flow Measurement

SITRANS F M

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, AWWA C-207 and JIS 10 K
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
<u>Medium conditions</u>	
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	Carbon steel ASTM A 105, with corrosion resistant coating Corrosivity category C3 according to ISO 12944-2 or AISI 316L/1.4404 flanges and carbon steel housing ASTM A 105, with corrosion resistant coating Corrosivity category C3, according to ISO 12944-2
Measuring pipe material	Stainless steel AISI 304 or higher
Electrode material	<ul style="list-style-type: none"> • AISI 316/1.4571 • Hastelloy C276/2.4819 • Platinum • Titanium • Tantalum
Grounding electrode material	Defined via the Order code

Protection ring		
	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 316/1.4571, 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	Optional for all liners. Must be ordered separately.
	Article No.	7ME5942-...

Grounding ring		
	Function	Electrical reference and grounding of the medium. Required if the pipelines are not electrically conducting or are lined (plastic pipelines, concrete pipelines etc.). All grounding rings must be connected to the grounding screw present on the sensor.
	Contact with medium	Yes, please always check resistance to measured medium.
	Material	Stainless steel AISI 316/1.4571 or Hastelloy C4/2.4610
	Material thickness	The overall length of the sensor is increased by 2 mm (0.08") per grounding ring.
	Standard	Optional for all liners. Required between the medium and sensor for equipotential bonding between non-conducting pipelines or lined pipelines.
	Article No.	7ME5943-...

Important:

The rings must be ordered together with the sensor. Gaskets are not included. In case of replacement please include the sensor MLFB code on the order.

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.


For further information on the PED standard and requirements, see page 10/15.

Classification according to pressure equipment directive (PED 2014/68/EU)					
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 4.3
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

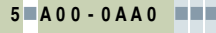
Flow Measurement

SITRANS F M

Transmitter TRANSMAG 2 with sensor 911/E

Selection and Ordering data	Article No.
Flowsensor SITRANS F M 911/E	7ME5610 -
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
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 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 ... 1000 (8" ... 40"))	E
EN 1092-1, PN 40 (DN 15 ... 1000 (1/2" ... 40"))	F
ANSI B16.5, Class 150 (1/2" ... 24") ¹⁾	J
ANSI B16.5, Class 300 (1/2" ... 24") ²⁾	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 (DN 25 to DN 1000)	1
PTFE (DN 15 to DN 600)	3
Hardrubber (DN 15 to DN 1000)	4
Linatex (DN 25 to DN 1000)	5
Novolak (sealing material FFKM) (DN 50 to DN 1000)	6
Electrode material	
AISI 316Ti/1.4571	1
Hastelloy C276/2.4819	2
Platinum	3
Titanium	4
Tantalum	5
Cable glands/terminal box	
Metric: Polyamide terminal box	1
1/2" NPT: Polyamide terminal box	2
Metric: Stainless steel terminal box	3
1/2" NPT: Stainless steel 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.	
Two grounding electrodes made of stainless steel AISI 316Ti/1.4571	A02
Two grounding electrodes made of Hastelloy C276/2.4819	A04
Two grounding electrodes made of Platinum	A05
Two grounding electrodes made of Titanium	A06
Two grounding electrodes made of Tantalum	A07
Factory certificate to EN 10204-2.2	C14
Material certificate according to EN 10204-3.1	C16
Power supply 110 V/60 Hz	P01
Flow range setting: Specify upper flow range value	Y01
Pulse output setting: Specify pulse value (1 pulse/unit)	Y02
Silicon-free version	Y04
Tag name plate, stainless steel (specify in plain text)	Y17
Special version (specify in plain text)	Y99
1) 20 °C (68 °F), max. 19.6 bar (285 psi) for steel flanges and max. 15.9 bar (231 psi) for stainless steel flanges	
2) 20 °C (68 °F), max. 51.1 bar (741 psi) for steel flanges and max. 41.4 bar (600 psi) for stainless steel flanges	

Selection and Ordering data	Article No.	Order code
SITRANS F M TRANSMAG 2 and sensor 911/E	7ME5930 -	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Cable		
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	
• Length: 40 m (131 ft)	F	
• Length: 50 m (164 ft)	G	
• Length: 60 m (197 ft)	H	
• Length: 80 m (260 ft)	J	
• Length: 100 m (328 ft)	K	
• Other length (specify in plain text)	Z	J1Y

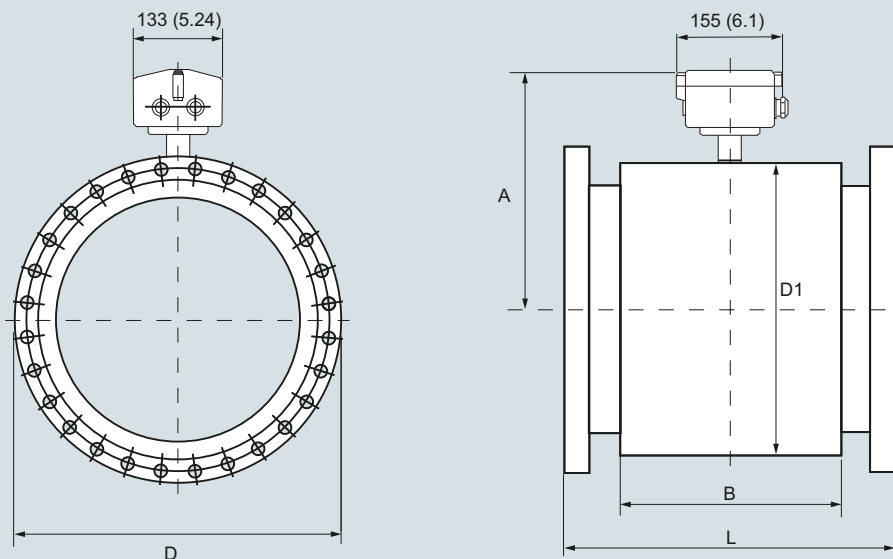
Selection and Ordering data	Article No.
SITRANS F M electromagnetic flowmeter	
Protection ring for 911/E sensor (2 pcs.)	7 ME 5 9 4 2 -
Grounding ring for 911/E sensor (1 pc.)	7 ME 5 9 4 3 -
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Nominal diameter	
DN 15 (½")	1 V
DN 25 (1")	2 D
DN 40 (1½")	2 R
DN 50 (2")	2 Y
DN 65 (2½")	3 F
DN 80 (3")	3 M
DN 100 (4")	3 T
DN 125 (5")	4 B
DN 150 (6")	4 H
DN 200 (8")	4 P
DN 250 (10")	4 V
DN 300 (12")	5 D
DN 350 (14")	5 K
DN 400 (16")	5 R
DN 450 (18")	5 Y
DN 500 (20")	6 F
DN 600 (24")	6 P
DN 700 (28")	6 Y
DN 800 (32")	7 H
DN 900 (36")	7 M
DN 1000 (40")	7 R
Flange design	
EN 1092-1, PN10	B
EN 1092-1, PN16	C
EN 1092-1, PN25	E
EN 1092-1, PN40	F
AISI B16.5, class 150	J
AISI B16.5, class 300	K
AWWA C-207, class D	L
JIS B2220, 10K	R
Material	
Stainless steel AISI 316/1.4571	1
Hastelloy C4/2.4610	2
Liner	
Soft rubber	1
PTFE	3
Hard rubber	4
Linatex	5
Novolak	6

Flow Measurement

SITRANS F M

Transmitter TRANSMAG 2 with sensor 911/E

Dimensional drawings



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

Built-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"
Built-in length L¹⁾											
Hard rubber version		270 (10.63)	280 (11.02)	330 (12.99)	340 (13.39)	370 (14.57)	410 (16.14)	470 (18.50)			
Linatex/soft rubber version		270 (10.63)	280 (11.02)	330 (12.99)	340 (13.39)	370 (14.57)	410 (16.14)	470 (18.50)			
PTFE-liner without protection rings		270 (10.63)	280 (11.02)	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"
Built-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	500 (19.68)	550 (21.65)	600 (23.62)	660 (25.98)	650 (25.59)	780 (30.71)					
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 built-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)

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

- No moving parts means less wear and tear
- Up to 6 to 10 years maintenance-free operation in typical revenue application
- Robust construction built for the application

Intelligent information, easy to access

- Embedded self-testing and alarm/fault detection feature
- Internal data logger
- Advanced statistics and diagnostics
- Various Add-on communication modules

Application

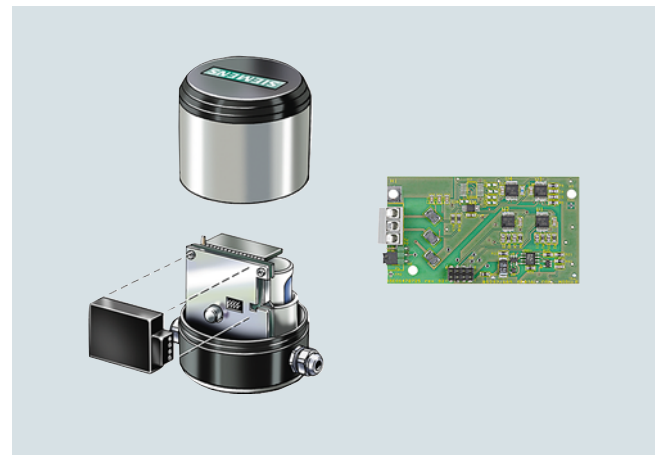
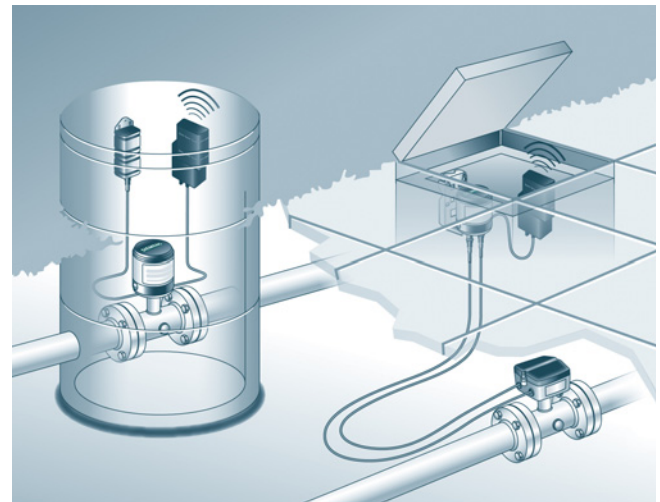
The following MAG 8000 versions are available as stand-alone water meters:

- 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

Flow Measurement

SITRANS F M

Battery-operated water meter MAG 8000



3G/UMTS module



PC-IrDA connection

MAG 8000 3G/UMTS Wireless Communication Module

The 3G/UMTS wireless communication module is a compact built-in solution which can be installed in the existing MAG 8000 with SW version 3.02 and higher, supporting HSDPA cat.8/HSUPA Cat.6 at 5 UMTS bands, with flexibility of backward compatible to GSM/GPRS network.

The 3G/UMTS module collects comprehensive measurement data from MAG 8000 at an interval down to 1 minute, allows for data transmission via numerous protocols including SMS, email via SMTP, email via SMTPS (TLS/SSL-based encryption), FTP, and FTPS (TLS/SSL-based encryption), with a customer configurable transmission interval (down to 1 hour). This provides customers with the flexibility to receive data via email, FTP or text message for the monitoring and control systems anywhere in the world.

TLS/SSL based data encryption provides a high level information security to protect customers data privacy.

The 3G/UMTS module offers

- Remote Qualification Certificate feature to enable the offsite diagnostic and audit on devices installed anywhere in the world
- 2-channel analog input measurement for external ratiometric pressure transmitter, transmission together with flow measurement (2-in-1 solution)
- 4-20 mA alarm signal detection and realtime SMS alarm for tamper protection and flooding situations
- Real-time clock synchronization with internet NTP server, ensuring that all measurement data is accurately time-stamped
- Data transmission at customer-specified points in time, allowing for synchronization of information from multiple MAG 8000 devices

The OPC server specifically designed for the MAG 8000 3G/UMTS 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.

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⁾	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	Yes	Yes
Leakage detection	No	Yes
Meter utilization	No	Yes
Statistics	No	Yes
Tariff	No	Yes
Settle date (Revenue)	No	Yes

¹⁾ Excitation frequency settings with mains power supply, see technical specifications for each version

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 8/5).

Flow Measurement

SITRANS F M

Battery-operated water meter MAG 8000

Technical specifications

Transmitter	
Installation	Compact (integral) Remote with factory-mounted cable 5, 10, 20 or 30 m (16.4, 32.8, 65.6 or 98.4 ft)
Enclosure	Stainl. steel top housing (AISI 316) and coated brass bottom. Remote wall mount bracket in stainless steel (AISI 304).
Cable entries	2 x M20 (one gland for one cable of size 6 ... 8 mm (0.02 ... 0.026 ft) is included in the standard delivery)
Display	Display with 8 digits for main information. Index, menu and status symbols for dedicated information
Resolution	Totalized information can be displayed with 1, 2 or 3 decimals or automatic adjustment (default)
Flow unit	
Europe	Volume in m ³ and flow rate in m ³ /h
US	Volume in Gallon and flow rate in GPM
Australia	Volume in Ml and flow rate as Ml/d
Optional display units	Volume: m ³ x 100, l x 100, G x 100, G x 1000, MG, CF x 100, CF x 1000, AF, Al, Kl, BBL42 Flow: m ³ /min, m ³ /d, l/s, l/min, GPS, GPH, GPD, MGD, CFS, CFM, CFH, BBL42/s, BBL42/min, BBL42/h, BBL42/d
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" • 3G/UMTS 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)

Battery-operated water meter MAG 8000

Features	
Application identification	Tag number up to 15 characters
Time and date	Device embedded Real Time Clock (Synchronization with NTP server if 3G/UMTS module connected)
Totalizer MAG 8000	Totalizer 1 and Totalizer 2: Configurable to Forward, Reverse and Bidirectional netflow Totalizer3 (following totalizer 1 setting) resetable via display key
Measurement Low flow cut-off	
• 7ME6810	Cut-off at 15 mm/s
• 7ME6820	Cut-off at 15 mm/s
• 7ME6880	1 % of Qmax (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	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 9.0 Service Pack 1

Flow Measurement

SITRANS F M

Battery-operated water meter MAG 8000

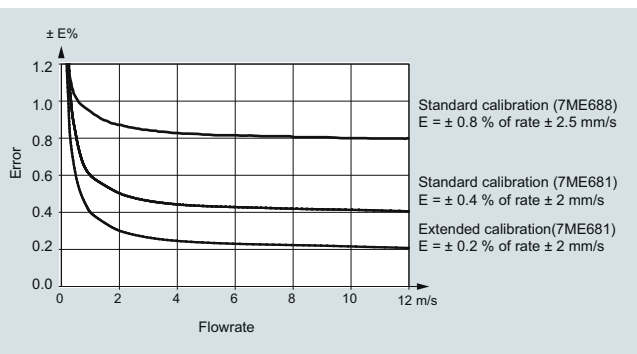
MAG 8000 water meter uncertainty

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).

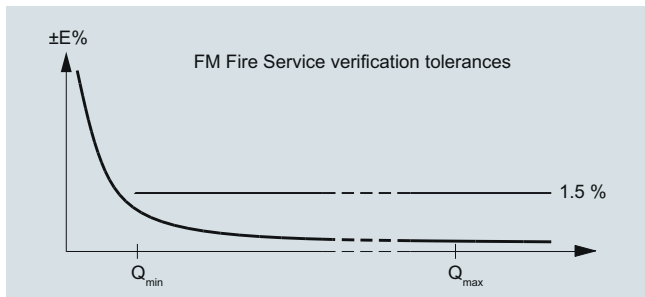
Siemens offers accredited calibrations assured to ISO 17025 in the flow range from 0.0001 m³/h to 10 000 m³/h. Siemens Flow Instruments accredited laboratories are recognized by ILAC MRA (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement) ensuring international traceability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



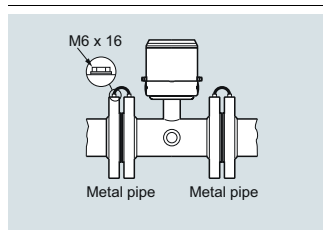
MAG 8000 (7ME6810) for Fire Service applications

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



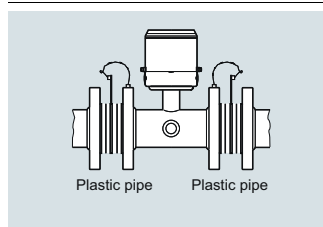
Grounding

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.



Metal pipes

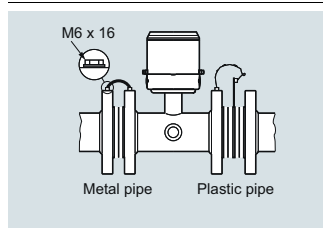
On metal pipes, connect the straps to both flanges.



Plastic pipes

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

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



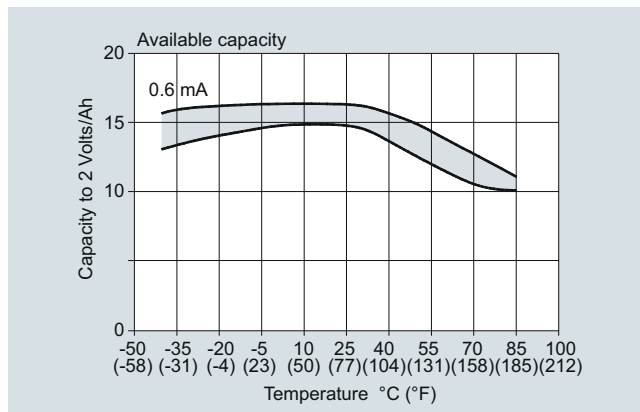
Combination of metal and plastic pipes

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

Battery operation time and calculation

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

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



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

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

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

Scenario - Revenue application

Output A	Pulse rate max. 10 Hz
Output B	Alarm or call-up
Meter dialog	1 hour per month
Add-com	None
Temperature	<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 ... 150 (1" ... 6")	9 years	9 years	7 years	43 months	8 months	3 months	2 months
	DN 200 ... 600 (8" ... 24")	9 years	6 years	4 years	22 months	3 months	1 month	N/A
	DN 700 ... 1 200 (28" ... 48")	7 years	4 years	2 years	12 months	1 month	N/A	N/A
4 D-Cell battery 66 Ah External battery pack	DN 25 ... 150 (1" ... 6")	15 years	15 years	14 years	86 months	16 months	7 months	4 months
	DN 200 ... 600 (8" ... 24")	15 years	13 years	8 years	44 months	7 months	3 months	N/A
	DN 700 ... 1 200 (28" ... 48")	14 years	9 years	5 years	24 months	3 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 Internal battery pack	DN 25 ... 600 (1" ... 24")	52 months	3 years	25 months	12 months	2 months	1 month	
	DN 700 ... 1 200 (28" ... 48")	3 years	2 years	1 years	6 months	1 month	N/A	
2 D-Cell battery 33 Ah Internal battery pack	DN 50 ... 600 (2" ... 24")	8 years	6 years	4 years	22 months	3 months	2 months	
	DN 700 ... 1 200 (28" ... 48")	6 years	4 years	2 years	12 months	1 month	N/A	
4 D-Cell battery 66 Ah External battery pack	DN 50 ... 600 (2" ... 24")	10 years	10 years	8 years	44 months	7 months	4 months	
	DN 700 ... 1 200 (28" ... 48")	10 years	8 years	5 years	24 months	3 months	N/A	

Typical battery lifetime scenario for MAG 8000 with 3G module

Transmission once a day and MAG 8000 factory settings

2 D-Cell battery 33 Ah Internal battery pack	3 ... 4 years
4 D-Cell battery 66 Ah External battery pack	7 ... 8 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 3/136).

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:
 - Switched on constantly:
 - 6.4 months for 2 D-cell internal battery pack / 12.8 months for 4 D-cell ext. battery pack
 - Switched on 2 s/day:
 - 39 months for 2 D-cell internal battery pack / 78 months for 4 D-cell ext. battery pack
- RS 485:
 - With the termination resistor on:
 - 2.3 months for 2 D-cell internal battery pack / 4.6 months for 4 D-cell ext. battery pack
 - With the termination resistor off:
 - 39 months for 2 D-cell internal battery pack / 78 months for 4 D-cell ext. battery pack, in case the entire communication time is less than 4 hours/day

Flow Measurement

SITRANS F M

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

Overview



Benefits

Easy to install

- Compact or remote solution with factory mounted cable
- 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 3G/UMTS module offers an efficient solution for remote measurement and monitor via wireless networks.

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
Low flow cut-off (default)	15 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	
Remote sensor	IP68 to EN 60529/NEMA 6P, 10 mH ₂ O cont.
Compact version	IP68 to EN 60529/NEMA 6P, 3 mH ₂ O for six months
Certificates and approvals	
Calibration	
• Standard calibration	2 x 25 % and 2 x 90 % (default)
• Special calibration	5-point calibration: 20 %, 40 %, 60 %, 80 %, 100 % of factory Q _{max} 10-point calibration: ascending and descending at 20 %, 40 %, 60 %, 80 %, 100 % of factory Q _{max} Matched-pair calibration: default, 5-point, 10-point
Material certificate EN 10204-3.1	Available when ordering together with meter ¹⁾
Drinking water approvals	<ul style="list-style-type: none"> • NSF/ANSI Standard 61²⁾ (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) ³⁾
Conformity	<ul style="list-style-type: none"> • PED: 97/23EC⁴⁾ For pressure/temperature curves see MAG 3100 on page 3/68. <ul style="list-style-type: none"> • EMC: IEC/EN 61326
Sensor version	DN 25 ... 1200 (1" ... 48")
Sensor material	Carbon steel ASTM A 105, with corrosion resistant two-component epoxy coating (150 µm/300 µm) Corrosivity category C4M, according to ISO 12944
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

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) Has to be ordered with the meter. It is not possible to order the certificate afterwards.

2) Including Annex G

3) Not for sensors with 300 µm coating.

4) For further information on the PED standard and requirements see page 10/15.

Flow Measurement

SITRANS F M

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

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.										
SITRANS F M MAG 8000 water meter	7 ME 6 8 1 0 -	SITRANS F M MAG 8000 water meter	7 ME 6 8 1 0 -										
<p>↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.</p> <p>Diameter</p> <p>DN 25 (1") 2 D</p> <p>DN 40 (1½") 2 R</p> <p>DN 50 (2") 2 Y</p> <p>DN 65 (2½") 3 F</p> <p>DN 80 (3") 3 M</p> <p>DN 100 (4") 3 T</p> <p>DN 125 (5") 4 B</p> <p>DN 150 (6") 4 H</p> <p>DN 200 (8") 4 P</p> <p>DN 250 (10") 4 V</p> <p>DN 300 (12") 5 D</p> <p>DN 350 (14") 5 K</p> <p>DN 400 (16") 5 R</p> <p>DN 450 (18") 5 Y</p> <p>DN 500 (20") 6 F</p> <p>DN 600 (24") 6 P</p> <p>DN 700 (28")¹⁾ 6 Y</p> <p>DN 750 (30")¹⁾ 7 D</p> <p>DN 800 (32")¹⁾ 7 H</p> <p>DN 900 (36")¹⁾ 7 M</p> <p>DN 1000 (40")¹⁾ 7 R</p> <p>DN 1050 (42")¹⁾ 7 U</p> <p>DN 1100 (44")¹⁾ 7 V</p> <p>DN 1200 (48")¹⁾ 8 B</p> <p>Flange norm and pressure rating</p> <p>EN 1092-1</p> <p>PN 10 (DN 200 ... 1200 (8" ... 48")) B</p> <p>PN 16 (DN 50 ... 1200 (2" ... 48")) C</p> <p>PN 16 non-PED (DN 700 ... 1200 (28" ... 48")) D</p> <p>PN 40 (DN 25 ... 40 (1" ... 1½")) F</p> <p>ANSI B16.5</p> <p>Class 150 J</p> <p>AWWA C-207</p> <p>Class D (28" ... 48") L</p> <p>AS4087</p> <p>PN 16 (DN 50 ... 1200 (2" ... 48")) N</p> <p>Sensor version</p> <p>EPDM liner and Hastelloy electrodes, 150 µm coating 3</p> <p>EPDM liner and Hastelloy electrodes, 300 µm coating 4</p> <p>Calibration</p> <p>Standard ± 0.4 % of rate ± 2 mm/s 1</p> <p>Extended ± 0.2 % of rate ± 2 mm/s DN 50... 300 (2" ... 12") 2</p> <p>Region version</p> <p>Europe (m³, m³/h, 50 Hz) 1</p> <p>USA (Gallon, GPM, 60 Hz) 2</p> <p>Australia (MI, MI/d, 50 Hz) 3</p> <p>Transmitter type and installation</p> <p>Basic version integral on sensor A</p> <p>Basic version, remote cables mounted on sensor with IP68/NEMA 6P plugs:</p> <ul style="list-style-type: none"> • 5 m (16.4 ft) B • 10 m (32.8 ft) C • 20 m (65.6 ft) D • 30 m (98.4 ft) E <p>Advanced version integral on sensor K</p>		<p>Advanced version, remote cables mounted on sensor with IP68/NEMA 6P plugs:</p> <ul style="list-style-type: none"> • 5 m (16.4 ft) • 10 m (32.8 ft) • 20 m (65.6 ft) • 30 m (98.4 ft) <p>Communication interface</p> <p>No additional "add-on" communication module installed</p> <p>Serial RS 485 with Modbus RTU (Terminated as end device) B</p> <p>Serial RS 232 with Modbus RTU C</p> <p>Encoder interface with Sensus protocol D</p> <p>3G/UMTS communication module with remote antenna; 5 m (16.4 ft) cable S</p> <p>3G/UMTS communication module with analog inputs and remote antenna; 5 m (16.4 ft) cable T</p> <p>Power supply</p> <p>Internal battery (no battery included) 0</p> <p>Internal battery pack installed²⁾ 1</p> <p>Power cable (1.5 m (4.9 ft)) with IP68/NEMA 6P plugs for external battery (no battery included) 2</p> <p>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</p> <p>115 ... 230 V AC power supply with battery backup and 3 m (9.8 ft) power cable for external connection (no battery included) 4</p> <p>1) The Diameter DN 700 (28") to DN 1200 (48") is only available as remote transmitter type installation.</p> <p>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.</p> <p>Operating instructions for SITRANS F M MAG 8000</p> <table border="1"> <thead> <tr> <th>Description</th> <th>Article No.</th> </tr> </thead> <tbody> <tr> <td>• English</td> <td>A5E03071515</td> </tr> <tr> <td>• German</td> <td>A5E00740986</td> </tr> </tbody> </table> <p>All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation</p> <p>Operating instructions for MAG 8000 3G/UMTS communication module</p> <table border="1"> <thead> <tr> <th>Description</th> <th>Article No.</th> </tr> </thead> <tbody> <tr> <td>• English</td> <td>A5E03644134</td> </tr> </tbody> </table>	Description	Article No.	• English	A5E03071515	• German	A5E00740986	Description	Article No.	• English	A5E03644134	<p>L</p> <p>M</p> <p>N</p> <p>P</p> <p>A</p> <p>B</p> <p>C</p> <p>D</p> <p>S</p> <p>T</p> <p>0</p> <p>1</p> <p>2</p> <p>3</p> <p>4</p>
Description	Article No.												
• English	A5E03071515												
• German	A5E00740986												
Description	Article No.												
• English	A5E03644134												

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

Selection and Ordering data	Order code	Selection and Ordering data	Order code
Additional information		Additional information	
Please add “-Z” to Article No. and specify Order code(s) and plain text.		Please add “-Z” to Article No. and specify Order code(s) and plain text.	
Certificate		G x 1000	L49
Material certificate according to EN 10204-3.1	C12¹⁾	CF x 1000	L50
Special calibration		Al	L51
5-point calibration for DN 15 ... DN 200 ²⁾	D01	kl	L52
5-point calibration for DN 250 ... DN 600 ²⁾	D02	BBL42 (US oil barrel, 1 barrel = 42 US gallons)	L54
5-point calibration for DN 700 ... DN 1200 ²⁾	D03		
10-point calibration for DN 15 ... DN 200 ³⁾	D06	Pulse set up	
10-point calibration for DN 250 ... DN 600 ³⁾	D07	(default pulse A = forward and pulse B = Alarm, pulse width = 50 ms)	
10-point calibration for DN 700 ... DN 1200 ³⁾	D08	A function = RV, reverse flow	L62
Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 15 ... DN 200	D11	A function = FWnet, forward net flow	L63
Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 250 ... DN 600	D12	A function = RVnet, reverse net flow	L64
Default (2 x 25 % and 2 x 90 %) match-pair calibration for DN 700 ... DN 1200	D13	A function = Off	L65
5-point, matched-pair calibration for DN 15 ... DN 200 ²⁾	D15	Volume per pulse A = x 0.0001 ⁴⁾	L70
5-point, matched-pair calibr. for DN 250 ... DN 600 ²⁾	D16	Volume per pulse A = x 0.001 ⁴⁾	L71
5-point, matched-pair calibr. for DN 700 ... DN 1200 ²⁾	D17	Volume per pulse A = x 0.01 ⁴⁾	L72
10-point, matched-pair calibr. for DN 15 ... DN 200 ³⁾	D18	Volume per pulse A = x 0.1 ⁴⁾	L73
10-point, matched-pair calibr. for DN 250 ... DN 600 ³⁾	D19	Volume per pulse A = x 1 ⁴⁾	L74
10-point, matched-pair calibr. for DN 700 ... DN 1200 ³⁾	D20	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
Flow unit		Volume per pulse B = x 0.0001 ⁴⁾	L90
l/s	L00	Volume per pulse B = x 0.001 ⁴⁾	L91
MGD	L01	Volume per pulse B = x 0.01 ⁴⁾	L92
CFS	L02	Volume per pulse B = x 0.1 ⁴⁾	L93
l/min	L03	Volume per pulse B = x 1 ⁴⁾	L94
m ³ /min	L04		
GPM	L05	Data logger set up (default month logging)	
CFM	L06	DataloggerInterval = Daily	M31
l/h	L07	DataloggerInterval = Weekly	M32
m ³ /h	L08		
GPH	L09	Factory mounted cables	
CFH	L10	5 m (16.4 ft) pulse cable A+B	M81
GPS	L11	5 m (16.4 ft) communication cable RS 232/RS 485 terminated as end device	M82
MI/d	L12	20 m (65.6 ft) pulse cable A+B	M84
m ³ /d	L13	20 m (65.6 ft) communication cable RS 232/RS 485 terminated as end device	M85
GPD	L14	Cello 2 channel, input cable 3 m (9.84 ft) with Brad Harrison micro-change 3 way connector	M87
BBL42/s	L15	Cello 2 channel, input cable 5 m (16.4 ft) with MIL-C-26482 spec. connectors	M89
BBL42/min	L16	Encoder interface cable with connector for ITRON 200WP radio, length 25 ft	M90
BBL42/h	L17	Encoder interface cable with connector for ITRON 200WP radio, length 5 ft	M91
BBL42/d	L18	SOFREL cable 2 m for LS42 data logger	M92
		SOFREL cable 2 m for LS-Flow data logger	M97
Totalizer		FM Fire Service Approval	
Volume calculation (default totalizer 1 = forward and totalizer 2 = reverse)		(with ANSI B16.5 Class 150 flanges)	
Totalizer 1 = RV, reverse flow	L20	DN 50, DN 80 and DN 100 (2", 3" and 4")	P20
Totalizer 1 = NET, net flow	L22	DN 150 and DN 200 (6" and 8")	P21
Totalizer 2 = FW, forward flow	L30	DN 250 and DN 300 (10" and 12")	P22
Totalizer 2 = NET, net flow	L31		
Volume unit		Region/customer specific labels	
m ³	L40	KCC label (South Korea)	W28
MI	L41	DIN 43863 label ¹⁾	H21
G	L42	DIN 43863 label with SWM mark ¹⁾	H22
AF	L43		
l x 100	L44		
m ³ x 100	L45		
G x 100	L46		
CF x 100	L47		
MG	L48		

1) Under preparation

2) 20 %, 40 %, 60 %, 80 %, 100 % of factory Q_{max}3) Ascending and descending at 20 %, 40 %, 60 %, 80 %, 100 % of factory Q_{max}

4) Pulse width = 10 ms

Flow Measurement

SITRANS F M

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

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 600 (2" ... 24"), 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})
Low flow cut-off (default)	15 mm/s
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	
Remote sensor	IP68 to EN 60529/NEMA 6P, 10 mH ₂ O cont.
Compact version	IP68 to EN 60529/NEMA 6P, 3 mH ₂ O for six months
Certificates and approvals	
Calibration (standard)	2 x 25 % and 2 x 90 %
Material certificate EN 10204 3.1	Available when ordering together with meter ¹⁾
Drinking water approvals	<ul style="list-style-type: none"> • NSF/ANSI Standard 61²⁾ (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) ³⁾
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 600 (2" ... 24")) (DK-0200-MI-001-011) • PTB K7.2
Conformity	<ul style="list-style-type: none"> • CEN EN 14154, ISO 4064 • PED: 2014/68/EU⁴⁾ • EMC: IEC/EN 61326
Sensor version	DN 50 ... 600 (2" ... 24")
Sensor material	Carbon steel ASTM A 105, with corrosion resistant two-component epoxy coating (150 µm/300 µm) Corrosivity category C4M, according to ISO 12944
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

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

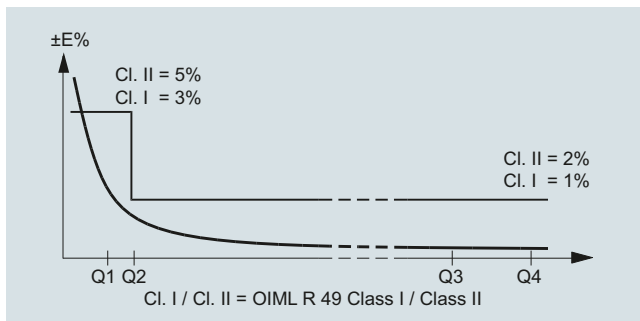
Advanced version	
• Battery-powered	DN 50 ... 150 (2" ... 6"): 1/15 Hz (adjustable up to 6.25 Hz; reduced battery lifetime) DN 200 ... 600 (8" ... 24"): 1/30 Hz (adjustable up to 3.125 Hz; reduced battery lifetime)
• Mains-powered	DN 50 ... 150 (2" ... 6"): 6.25 Hz DN 200 ... 600 (8" ... 24"): 3.125 Hz
Flanges	
EN 1092-1 (DIN 2501)	DN 50 ... 150 (2" ... 6"): PN 16 (232 psi) DN 200 ... 300 (8" ... 12"): PN 10 or PN 16 (145 psi or 232 psi) up to DN 600 (24") in preparation
ANSI 16.5 Class 150	2" ... 12": 20 bar (290 psi) up to DN 600 (24") in preparation
AWWA C-207	28" ... 48": PN 10 (145 psi)
AS 4087	DN 50 ... 300 (2" ... 12"): PN 16 (232 psi) up to DN 600 (24") in preparation
Liner	EPDM
Electrode and grounding electrodes	Hastelloy C276/2.4819
Grounding straps	Grounding straps are premounted from the factory on each side of the sensor

- 1) Has to be ordered with the meter. It is not possible to order the certificate afterwards.
- 2) Including Annex G
- 3) Not for sensors with 300 µm coating.
- 4) For further information on the PED standard and requirements see page 10/15.

3

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.

Flow Measurement

SITRANS F M

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

MAG 8000 CT (Revenue program) MI-001

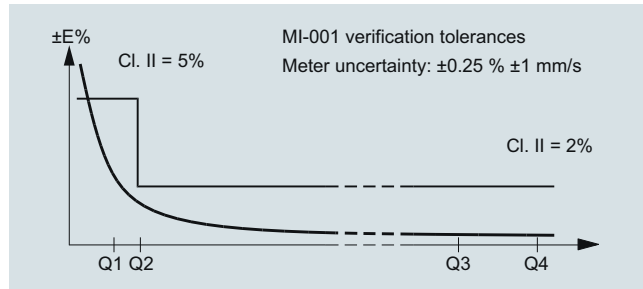
MAG 8000 CT program is type approved according to international water meter standard OIML R 49. Since the first November 2006 the MI-001 water meter directive is in force, which means that all water meters can be sold across the EU borders if the water meters contain a MI-001 label.

The MAG 8000 CT MI-001 verified and labeled products are a Class II approval according to Directive 2014/32/EU of the European Parliament and Council of 26 February, 2014 on measuring instruments, Annex VI Thermal Energy Meters (MI-004) 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	25	25	25
Q4 [m³/h]	20	31.25	50	78.75	125	200	312.5	500	787.5	1250	1250	1250	2000	3125
Q3 [m³/h]	16	25	40	63	100	160	250	400	630	630	1000	1000	1600	1600
Q2 [m³/h]	0.96	1.60	2.60	4.03	6.40	10.24	16	25.60	40.3	64	64	64	102.4	160
Q1 [m³/h]	0.60	1	1.60	2.52	4	6.40	10	16	25.2	40	40	40	64	100

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	63	63	63
Q4 [m³/h]	20	31.25	50	78.75	125	200	312.5	500	750	1250	1250	3125	3125	5000
Q3 [m³/h]	16	25	40	63	100	160	250	400	630	1000	1000	2500	2500	4000
Q2 [m³/h]	0.41	0.63	1.02	1.60	2.54	4.06	6.35	10.16	16	25.4	25.4	63.49	63.49	101.6
Q1 [m³/h]	0.25	0.40	0.63	1	1.59	2.54	3.97	6.35	10	15.9	15.9	39.68	39.68	63.49

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	80	80	80
Q4 [m³/h]	20	31.25	50	78.75	125	200	312.5	500	1250	2000	2000	5000	5000	7875
Q3 [m³/h]	16	25	40	63	100	160	250	400	1000	1600	1600	4000	4000	6300
Q2 [m³/h]	0.32	0.50	0.80	1.20	2	3.20	5	8	20	32	32	80	80	126
Q1 [m³/h]	0.20	0.31	0.50	0.75	1.25	2	3.13	5	12.50	20	20	50	50	78.75

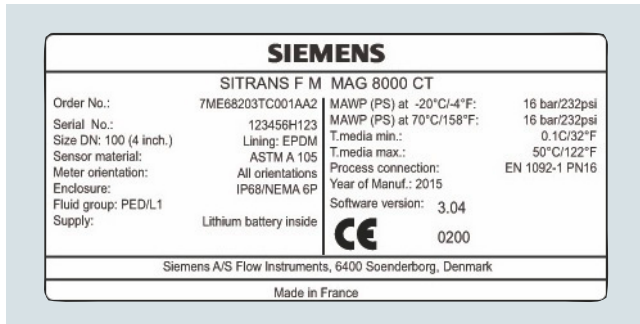
7ME6820-xxxx4	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")	DN 125 (5")	DN 150 (6")	DN 200 (8")	DN 250 (10")	DN 300 (12")	DN 350 (14")	DN 400 (16")	DN 450 (18")	DN 500 (20")	DN 600 (24")
„R“ Q3/Q1	160	160	160	160	160	160	160	160	160	160	160	160	160	-
Q4 [m³/h]	50	78.75	125	200	312.5	500	787.5	1250	2000	2000	2000	7875	7875	-
Q3 [m³/h]	40	63	100	160	250	400	630	1000	1600	1600	1600	6300	6300	-
Q2 [m³/h]	0.40	0.63	1	1.60	2.50	4	6.30	10	16	16	16	63	63	-
Q1 [m³/h]	0.25	0.39	0.63	1	1.56	2.50	3.94	6.25	10	10	10	39	39	-

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	-	-	-	-	-
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	3.20	5.04	8	12.8	-	-	-	-	-
Q1 [m³/h]	0.20	0.32	0.50	0.80	1.25	2	3.15	5	8	-	-	-	-	-

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	-	-	-	-	-	-
Q4 [m ³ /h]	50	78.75	125	200	312.5	500	787.5	1250	-	-	-	-	-	-
Q3 [m³/h]	40	63	100	160	250	400	630	1000	-	-	-	-	-	-
Q2 [m ³ /h]	0.26	0.40	0.64	1.02	1.60	2.56	4	6.40	-	-	-	-	-	-
Q1 [m ³ /h]	0.16	0.25	0.40	0.64	1	1.60	2.52	4	-	-	-	-	-	-

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".

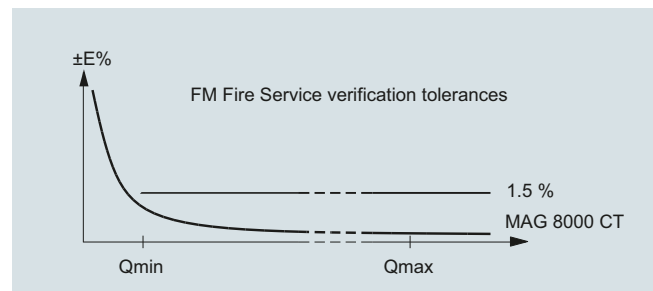
Battery operation time and calculation

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)

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 -
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
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") ¹⁾	5 K
DN 400 (16") ¹⁾	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	
<u>EN 1092-1</u>	
PN 16	C
<u>ANSI B16.5</u>	
Class 150	J
<u>AS4087</u>	
PN 16	N
Sensor version	
EPDM liner and Hastelloy electrodes, 150 µm coating	0
EPDM liner and Hastelloy electrodes, 300 µm coating	4
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 cables 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 cables 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 CT water meter with EPDM liner and Hastelloy electrodes	7 ME 6 8 2 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
3G/UMTS communication module with remote antenna; 5 m (16.4 ft) cable	S
3G/UMTS 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
<ol style="list-style-type: none"> 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 3/125 to 3/127. 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
All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation	
Operating instructions for MAG 8000 3G/UMTS communication module	
Description	Article No.
• English	A5E03644134

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

Selection and Ordering data	Order code	Selection and Ordering data	Order code
Additional information		Additional information	
Please add “-Z” to Article No. and specify Order code(s) and plain text.		Please add “-Z” to Article No. and specify Order code(s) and plain text.	
Material certificate according to EN 10204-3.1	C12¹⁾	Region/customer specific label	W28 H20 H21 H22
FP2E marking (France only)	C17		
Totalizer			
Volume calculation (default totalizer 1 = forward and totalizer 2 = reverse)		KCC label (South Korea)	
Totalizer 1 = RV, reverse flow	L20	FP2E label (France)	
Totalizer 1 = NET, net flow	L22	DIN 43863 label ¹⁾	
Totalizer 2 = FW, forward flow	L30	DIN 43863 label with SWM mark ¹⁾	
Totalizer 2 = NET, net flow	L31		
Pulse set up (default pulse A = forward and pulse B = Alarm, pulse width = 50 ms)			
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 ²⁾	L71		
Volume per pulse A = x 0.01 ²⁾	L72		
Volume per pulse A = x 0.1 ²⁾	L73		
Volume per pulse A = x 1 ²⁾	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 ²⁾	L91		
Volume per pulse B = x 0.01 ²⁾	L92		
Volume per pulse B = x 0.1 ²⁾	L93		
Volume per pulse B = x 1 ²⁾	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 cable 2 m for LS42 data logger	M92		
SOFREL cable 2 m for LS-Flow data logger	M97		
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		

1) Under preparation

2) Pulse width = 10 ms

Flow Measurement

SITRANS F M

MAG 8000 for irrigation applications (7ME6880)

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
- Adaptor for conduit installation to provide a clean, protected pathway for device cables

Technical specifications

Meter	
Accuracy	± 0.8 % ± 2.5 mm/s ± 0.4 % ± 2.5 mm/s NMI (class 2.5)
Low flow cut-off (default)	1.0 %
Media conductivity	Clean water > 20 µs/cm

NMI M 10 measuring range


7ME6880	DN 25 (1")	DN 40 (1½")	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")	DN 125 (5")	DN 150 (6")	DN 200 (8")	DN 250 (10")	DN 300 (12")	DN 350 (14")
„R“ Q3/Q1	10	10	10	10	10	10	10	10	10	10	10	10
Q4 [m³/h]	11.25	28.75	43.75	75	112.5	175	275	375	687.5	750	1625	2125
Q3 [m³/h]	9	23	35	60	90	140	220	300	550	600	1300	1700
Q1 [m³/h]	0.9	2.3	3.5	6	9	14	22	30	55	60	130	170


7ME6880	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")
„R“ Q3/Q1	10	10	10	10	10	10	10	10	10	10	10	10
Q4 [m³/h]	2125	2250	2250	2250	4375	4375	5000	5000	5000	5000	5000	5000
Q3 [m³/h]	1700	1800	1800	1800	3500	3500	4000	4000	4000	4000	4000	4000
Q1 [m³/h]	170	180	180	180	350	350	400	400	400	400	400	400

Temperature	
Ambient	-20 ... +60 °C (-4 ... +140 °F)
Media	0 ... 70 °C (32 ... 158 °F)
Storage	-40 ... +70 °C (-40 ... +158 °F)
Enclosure rating	
Remote sensor	IP68 to EN 60529/NEMA 6P, 10 mH ₂ O cont.
Compact version	IP68 to EN 60529/NEMA 6P, 3 mH ₂ O for six months
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	NMI M 10 Australia (DN 50 to DN 1200)
Sensor material	
Carbon steel ASTM A 105, with corrosion resistant two-component epoxy coating (150 µm/300 µm) Corrosivity category C4M, according to ISO 12944	
Conformity	
IEC/EN 61326	
Flanges	
EN 1092-1 (DIN 2501) PN 10 drilled pattern	DN 50 ... 600 (2" ... 24") (max. pressure 7 bar (101.5 psi))
ANSI 16.5 Class 150 drilled pattern	2" ... 24" (max. pressure 7 bar (101.5 psi))
AS 2091-1 Table D drilled pattern	DN 50 ... 600 (2" ... 24") (max. pressure 7 bar (101.5 psi))
AS 2129 Table E	DN 25, DN 40, DN 125 (1", 1½", 5")
AS 4087 PN 16	DN 50 ... DN 1200 (2" ... 48")
Excitation frequency	
Battery-powered	DN 50 ... 600 (2" ... 24"): 1/15 Hz DN 700 ... 1200 (28" ... 48"): 1/60 Hz
Mains-powered	DN 50 ... 600 (2" ... 24"): 3.125 Hz DN 700 ... 1200 (28" ... 48"): 1.5625 Hz
Liner	
Ebonite	
Electrodes	
Stainless steel AISI 316Ti/1.4571	

¹⁾ Including Annex G

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 -
	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
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
DN 1050 (42")	7 U
DN 1100 (44")	7 V
DN 1200 (48")	8 B
Flange norm and pressure rating	
EN 1092-1 drilled pattern PN 10/max. 7 bar (101 psi)	B
ANSI B16.5 drilled pattern CI 150/max. 7 bar (101 psi)	J
AS2129 drilled pattern table D/max. 7 bar (101 psi)	M
AS2129 table E (DN 25, DN 40, DN 125)	G
AS4087 PN 16 (DN 50 ... DN 1200)	N
Sensor version	
Ebonite liner and stainless steel electrodes	4
Calibration	
± 0.8 %, ± 2.5 mm/s	0
± 0.4 %, ± 2.5 mm/s	1
NMI (2.5 %)	3
Region version	
Europe (m ³ , m ³ /h, 50 Hz)	1
USA (Gallon, GPM, 60 Hz)	2
Australia (MI, MI/d, 50 Hz)	3
Transmitter type and installation	
Basic version integral on sensor	A
Basic version, remote cables mounted on sensor with IP68/NEMA 6P plugs	
2 m (6.56 ft)	T
5 m (16.4 ft)	B
10 m (32.8 ft)	C
20 m (65.6 ft)	D
30 m (98.4 ft)	E

Selection and Ordering data	Article No.
SITRANS F M MAG 8000 water meter including factory-mounted grounding rings	7 ME 6 8 8 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
3G/UMTS communication module with remote antenna and 5 m (16.4 ft) cable	S
3G/UMTS communication module with analog input, remote antenna and 5 m (16.4 ft) cable	T
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

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Flow Measurement

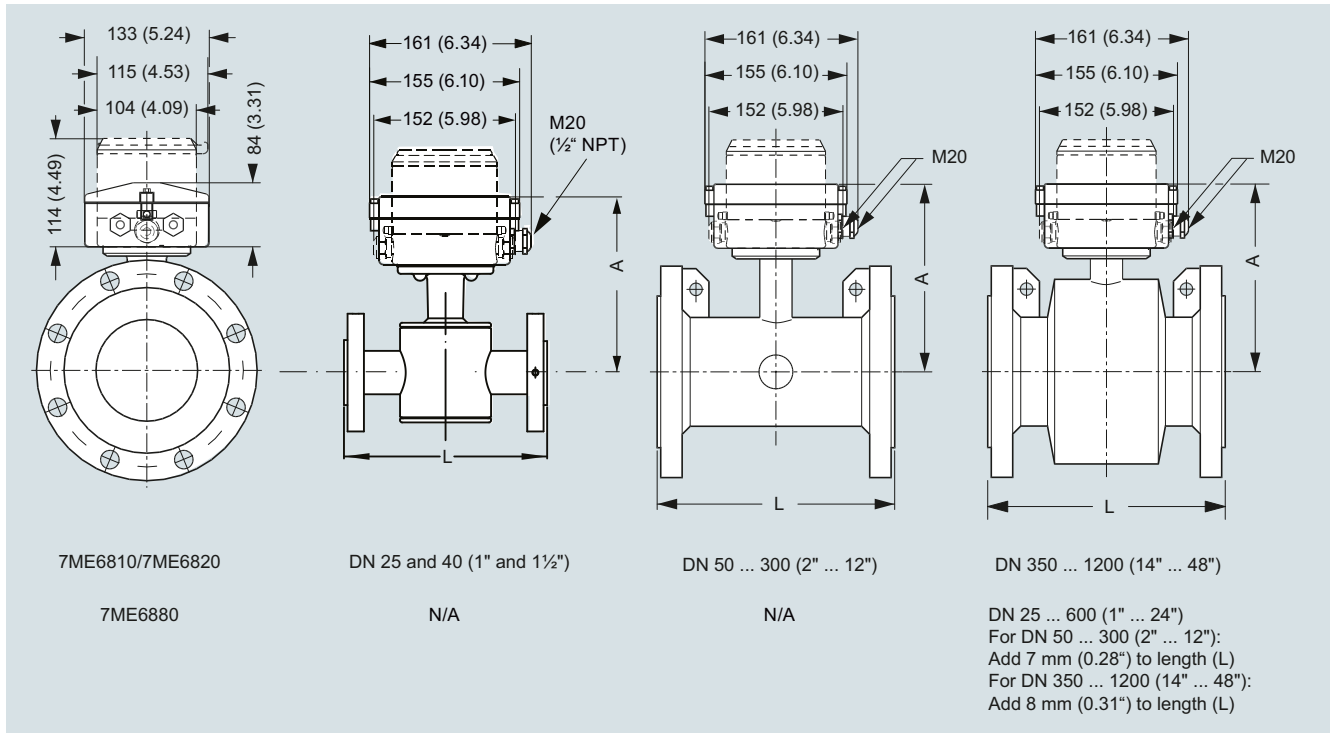
SITRANS F M

MAG 8000 for irrigation applications (7ME6880)

Selection and Ordering data	Order code	Selection and Ordering data	Order code
Additional information		Additional information	
Please add “-Z” to Article No. and specify Order code(s) and plain text.		Please add “-Z” to Article No. and specify Order code(s) and plain text.	
<u>Flow unit</u>		Volume per pulse B = x 0.0001 ¹⁾ L90	
l/s	L00	Volume per pulse B = x 0.001 ¹⁾ L91	
MGD	L01	Volume per pulse B = x 0.01 ¹⁾ L92	
CFS	L02	Volume per pulse B = x 0.1 ¹⁾ L93	
l/min	L03	Volume per pulse B = x 1 ¹⁾ L94	
m ³ /min	L04	<u>Device operation</u>	
GPM	L05	Only operator menu activated	M11
CFM	L06	<u>Data logger set up</u> (default month logging)	
l/h	L07	DataloggerInterval = Daily	M31
m ³ /h	L08	DataloggerInterval = Weekly	M32
GPH	L09	<u>Factory mounted cables</u>	
CFH	L10	5 m (16.4 ft) pulse cable A+B	M81
GPS	L11	5 m (16.4 ft) communication cable RS 232/RS 485 terminated as end device	M82
MI/d	L12	20 m (65.6 ft) pulse cable A+B	M84
m ³ /d	L13	20 m (65.6 ft) communication cable RS 232/RS 485 terminated as end device	M85
GPD	L14	Cello 2 channel, input cable 3 m (9.84 ft) with Brad Harrison micro-change 3 way connector	M87
<u>Totalizer</u>		Cello 2 channel, input cable 5 m (16.4 ft) with MIL-C-26482 spec. connectors	M89
Volume calculation (default totalizer 1 = forward and totalizer 2 = reverse)		5 ft Encoder interface cable with connector for ITRON 200WP radio	M91
Totalizer 1 = RV, reverse flow	L20	25 ft Encoder interface cable with connector for ITRON 200WP radio	M90
Totalizer 1 = NET, net flow	L22	SOFREL cable 2 m for LS42 data logger	M92
Totalizer 2 = FW, forward flow	L30	SOFREL cable 2 m for LS-Flow data logger	M97
Totalizer 2 = NET, net flow	L31	Adaptors for conduit installation	M94
<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, pulse width = 50 ms)			
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 ¹⁾	L70		
Volume per pulse A = x 0.001 ¹⁾	L71		
Volume per pulse A = x 0.01 ¹⁾	L72		
Volume per pulse A = x 0.1 ¹⁾	L73		
Volume per pulse A = x 1 ¹⁾	L74		
Pulse A pulse width 5 ms (volume per pulse x 1)	L75		
Pulse A pulse width 10 ms (volume per pulse x 1)	L76		
Pulse A pulse width 50 ms (volume per pulse x 1)	L77		
Pulse A pulse width 100 ms (volume per pulse x 1)	L78		
Pulse A pulse width 500 ms (volume per pulse x 1)	L79		
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		

¹⁾ Pulse width = 10 ms

Dimensional drawings



Dimensions in mm (inch)

Nominal DN size	A	L, lengths ¹⁾							Weight ²⁾	
		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	AS 2129 Table E	kg
mm (inch)	mm (inch)	mm	mm	mm	inch	mm	mm	mm		
25 (1)	188 (7.4)	-	-	200	7.9	200	-	200	6	13
40 (1½)	203 (8.0)	-	-	200	7.9	200	-	200	9	20
50 (2)	178 (7.0)	-	200	-	7.9	200	-	-	11	25
65 (2½)	181 (7.1)	-	200	-	7.9	200	-	-	13	29
80 (3)	191 (7.5)	-	200	-	7.9	200	-	-	15	34
100 (4)	197 (7.8)	-	250	-	9.8	250	-	-	17	38
125 (5)	210 (8.3)	-	250	-	9.8	250	-	250	22	50
150 (6)	224 (8.8)	-	300	-	11.8	300	-	-	28	63
200 (8)	249 (9.8)	350	350	-	13.8	350	-	-	50	113
250 (10)	276 (10.9)	450	450	-	17.7	450	-	-	71	160
300 (12)	303 (11.9)	500	500	-	19.7	500	-	-	88	198
350 (14)	365 (14.4)	550	550	-	21.7	550	-	-	127	279
400 (16)	391 (15.4)	600	600	-	23.6	600	-	-	145	318
450 (18)	421 (16.6)	600	600	-	23.6	600	-	-	175	384
500 (20)	447 (17.6)	600	600	-	26.8	600	-	-	225	494
600 (24)	497 (19.6)	600	600	-	32.3	600	-	-	340	747
700 (28)	548 (21.6)	700	875/700	-	N/A	700	700	-	316	694
750 (30)	573 (22.6)	N/A	N/A	-	N/A	N/A	750	-	N/A	N/A
800 (32)	603 (23.7)	800	1000/800	-	N/A	800	800	-	398	1045
900 (36)	656 (25.8)	900	1125/900	-	N/A	900	900	-	476	1045
1000 (40)	708 (27.9)	1000	1250/1000	-	N/A	1000	1000	-	602	1322
1050 (42)	708 (27.9)	N/A	N/A	-	N/A	N/A	1050	-	N/A	N/A
1100 (44)	759 (29.9)	N/A	N/A	-	N/A	N/A	1100	-	N/A	N/A
1200 (48)	814 (32.0)	1200	1500/1200	-	N/A	1200	1200	-	887	1996

¹⁾ Tolerances on built-in length:

DN 15 to DN 200 (½" to 8"): +0/-3 mm (+0/-0.12"), DN 250 to DN 400 (10" to 16"): +0/-5 mm (+0/-0.20"),

DN 450 to DN 600 (18" to 24"): +5/-5 mm (+0.20/-0.20"), DN 700 to DN 1200 (28" to 48"): +10/-10 mm (+0.39/-0.39")

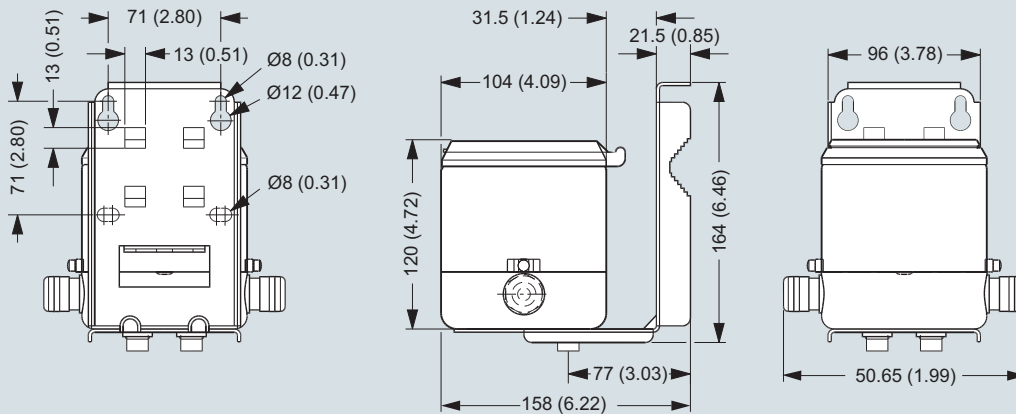
²⁾ For remote version the sensor weight is reduced with 2 kg (4.5 lb)

Flow Measurement

SITRANS F M

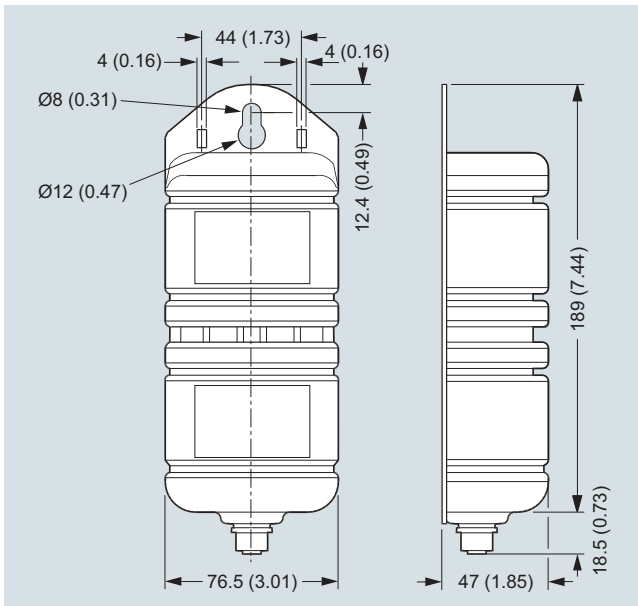
Battery-operated water meter MAG 8000

Remote version



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

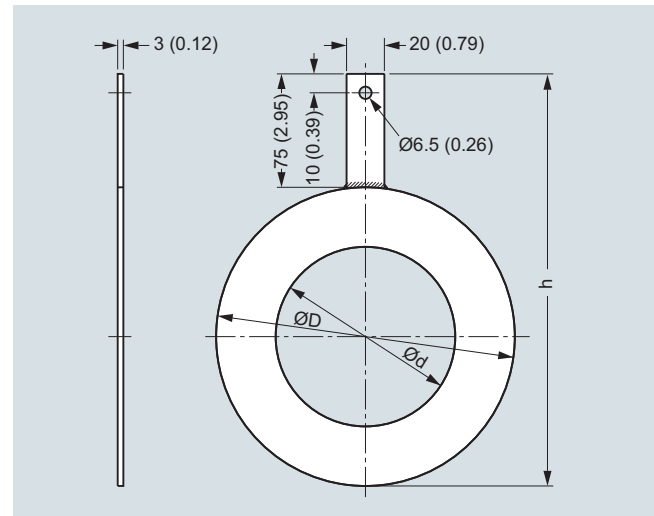
External battery pack



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

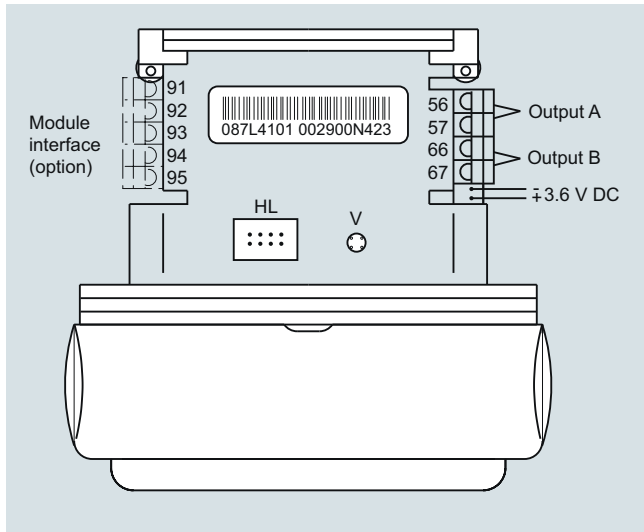


Dimensions in mm (inch) for grounding rings MAG 8000 with EPDM lining (7ME6810 and 7ME6820) DN 25 to DN 300

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	291
DN 200	193	268	343
DN 250	246	324	399
DN 300	295	374	449

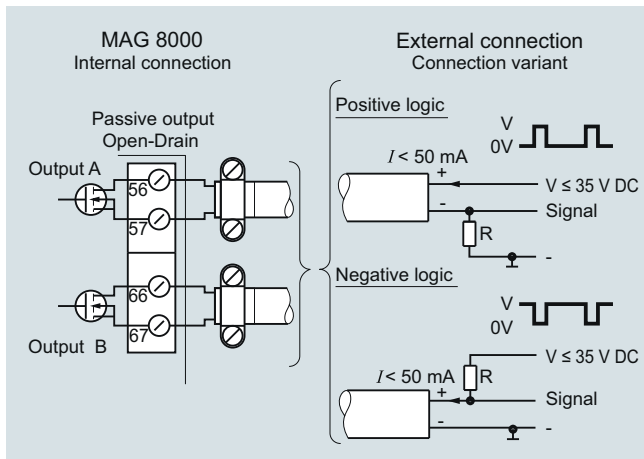
Schematics

Electrical installation and pulse output – Connection diagram



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

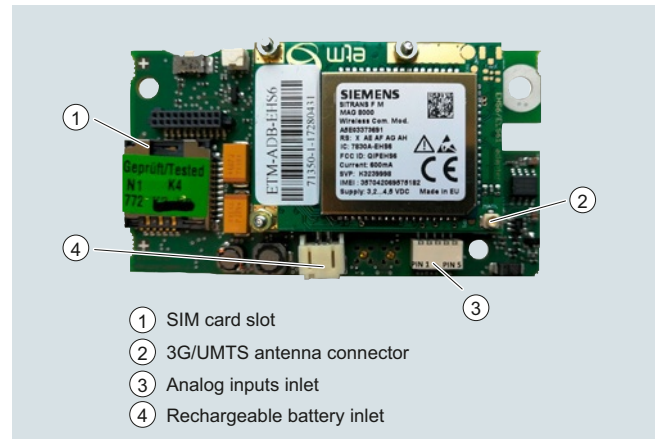
Pulse wire connection



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 V_x 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 3G/UMTS module












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


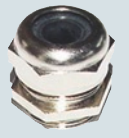






Flow Measurement

SITRANS F M



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 3G/UMTS communication module ¹⁾	A5E03436686	
Internal battery pack, one set of 2 D-cell (3.6 V, 33 Ah) and accessories for replacement ¹⁾ , incl. NBR O-ring	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, multi-drop communication interface with Modbus RTU protocol	FDK:087L4213	
Encoder interface module, with "Sensus" protocol for ITRON 200WP and 100W radio	A5E02475650	
MAG 8000 3G/UMTS module. Rechargeable battery, antenna and analog cable input must be ordered separately	A5E41011589	

Description	Article No.	
One cable entry 2 ... 5 mm (0.08 ... 0.20 ") M12 brass glands with M20 reduction ²⁾ , package of 10 pcs, for 3G/UMTS module antenna cable, power cable of external battery pack, encoder card cable	FDK:087L4154	
One cable entry 6 ... 8 mm (0.24 ... 0.31 ") M20 brass glands package ²⁾ (10 pcs), for pulse output cable or Modbus cable, Cello cable or mains power supply	FDK:087L4155	
One cable entry 8 ... 11 mm (0.31 ... 0.43 ") M20 brass glands package ²⁾ (10 pcs), for SOFREL cable	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 3G/UMTS (PVC, IP68, cable length 5 m (16.4 ft), with SMA male connector (type RG 58) and internal antenna adaptor cable, and single entry cable gland)	A5E40957990	
Analog input cable for MAG 8000 3G/UMTS (2.5 m (8.2 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	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	
Antenna adaptor cable for 3G/UMTS module (2 pieces)	A5E41896494	

Battery-operated water meter MAG 8000


Description	Article No.	
Service adaptor for 3G/UMTS module	A5E03436699	
Alkaline battery for MAG 8000 demo transmitter (3 V 13 Ah) (No dangerous goods limitations)	FDK:087L4142	

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.







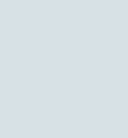

When MAG 8000 (7ME6810 and 7ME6820) is installed in PVC or coated pipelines, grounding rings must be installed additionally.

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	

Spare parts

Description	Article No.	
MAG 8000 transmitter compact replacement kit ¹⁾ . No battery included. With original product label. System number specified by ordering.	FDK:087L4166	
MAG 8000 transmitter remote replacement kit ¹⁾ . No battery included. With original product label. System number specified by ordering.	FDK:087L4202	

Description	Article No.	
MAG 8000 (Advanced version) transmitter compact replacement kit ¹⁾ . No battery included. With blank product label. No system number required.	FDK:087L4203	
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, O-ring 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	
152,4 cm (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	
762 cm (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	

Flow Measurement

SITRANS F M

Battery-operated water meter MAG 8000

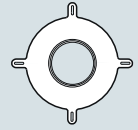
Description	Article No.	
Service tool kit package with various component for service and replacement. Content: 10 plastic top lids 20 screws 10 wire holders 10 battery cups 10 greased O-rings 20 clamp kits 10 IrDA adaptor holding rings	FDK:087L4162	
Remote cable set 5 m (16.4 ft) with IP68/NEMA 6P plugs - 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	
10 m cable set with pre-mounted conduit adaptor	A5E33400834	
20 m cable set with pre-mounted conduit adaptor	A5E33400836	

¹⁾ Not applicable to custody transfer (CT) verified systems without re-verification

²⁾ For sensors produced before October 2007.

MAG 8000 (7ME6880) grounding ring service kit, consisting of 2 pcs. grounding rings (AISI 304/1.4301), screws and gaskets

Dimension	Article No.	
Drilled pattern flanges (7 bar)		
DN 50	2"	A5E03082907
DN 65	2½"	A5E03082908
DN 80	3"	A5E03082909
DN 100	4"	A5E03082910
DN 125	5"	A5E03082911
DN 150	6"	A5E32877967
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
AS 2191 table E flanges		
DN 25	1"	A5E33474999
DN 40	1½"	A5E33475000
DN 125	5"	A5E33475006
AS 4087 PN 16 flanges		
DN 50	2"	A5E33475001
DN 65	2½"	A5E33475002
DN 80	3"	A5E33475003
DN 100	4"	A5E33475004
DN 150	6"	A5E33475007
DN 200	8"	A5E33475008
DN 250	10"	A5E33475009
DN 300	12"	A5E33475010
DN 350	14"	A5E33475011
DN 400	16"	A5E33475012
DN 450	18"	A5E34240921
DN 500	20"	A5E33475013
DN 600	24"	A5E33475014
DN 700	28"	A5E33414889
DN 800	32"	A5E33414890
DN 900	36"	A5E33414891
DN 1000	40"	A5E33414892
DN 1200	48"	A5E33414893



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.

Compatibility between transmitters and sensors

Transmitter	Page	Compact	Remote	Ex-Approval	Sensor	Page
FCT030	3/149	Yes	Yes	Yes	FCS300 Standard, DN 15 ... DN 150	3/160
		No	Yes	Yes	MASS 2100, DI 1.5	3/180
		Yes	Yes	Yes	MASS 2100, DI 3, DI 6, DI 15	3/187
		No	Yes	Yes	FC300, DN 4	3/183
FCT010	3/174	Yes	No	Yes	FCS300 Standard, DN 15 ... DN 150	3/160
		No	Yes	Yes	MASS 2100, DI 1.5	3/180
		Yes	Yes	Yes	MASS 2100, DI 3, DI 6, DI 15	3/187
		No	Yes	Yes	FC300, DN 4	3/183
MASS 6000 IP67 Polyamide enclosure	3/205	No	Yes	No	FCS200, DN 10 ... DN 25	3/228
		No	Yes	No	FC300, DN 4	3/183
		No	Yes	No	MASS 2100, DI 1.5	3/180
		Yes	Yes	No	MASS 2100, DI 3 ... DI 15	3/187
MASS 6000 19"	3/210	No	Yes	No	FCS200, DN 10 ... DN 25	3/228
		No	Yes	No	FC300, DN 4	3/183
		No	Yes	No	MASS 2100, DI 1.5	3/180
		No	Yes	No	MASS 2100, DI 3 ... DI 15	3/187
MASS 6000 Ex 19"	3/210	No	Yes	Yes	FCS200, DN 10 ... DN 25	3/228
		No	Yes	Yes	FC300, DN 4	3/183
		No	Yes	Yes	MASS 2100 Ex, DI 1.5	3/180
		No	Yes	Yes	MASS 2100 Ex, DI 3 ... DI 15	3/187
MASS 6000 Ex d Stainless steel enclosure	3/219	No	Yes	Yes	FCS200, DN 10 ... DN 25	3/228
		No	Yes	Yes	FC300, DN 4	3/183
		No	Yes	Yes	MASS 2100 Ex, DI 1.5	3/180
		Yes	Yes	Yes	MASS 2100 Ex, DI 3 ... DI 15	3/187
SIFLOW FC070 Standard	3/224				FCS200, DN 10 ... DN 25	3/228
		No	Yes	No	FC300, DN 4	3/183
					MASS 2100, DI 1.5	3/180
					MASS 2100, DI 3 ... DI 15	3/187
SIFLOW FC070 Ex CT	3/224				FCS200, DN 10 ... DN 25	3/228
		No	Yes	Yes	FC300, DN 4	3/183
					MASS 2100, DI 1.5	3/180
					MASS 2100, DI 3 ... DI 15	3/187

Flow Measurement

SITRANS F C

System information SITRANS F C Coriolis mass flowmeters

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

- FC330/FC310:
Digital platform allows for any sensor in the range to be matched in compact or remote.
- MASS 2100/FC300 sensors with FCT digital platform allows all sensors from DI1,5 to DI 15 to be matched with the FCT010 and FCT030 transmitters.
Both analog and digital connections are available.
- MASS 6000:
Available for MASS 2100, FC200 and FC300. 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:
Available for MASS 2100, FC200 and FC300.
Direct integration into SIMATIC S7-300 systems or as stand-alone transmitter 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

System information SITRANS F C Coriolis mass flowmeters

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



	FC330	FC310	MASS 2100 DI 1.5	MASS 2100 DI 3 to DI 15	FC300 DN 4	FCS200 DN 10 to DN 25	MASS 6000 IP67	MASS 6000 19"	MASS 6000 Ex d	SIFLOW FC070 Std/Ex CT	MASS 2100/FC300 with FCT010	MASS 2100/FC300 with FCT030
	7ME4633	7ME4631	7ME4100	7ME4100	7ME4400	7ME4500	7ME4110	7ME4110	7ME4110	7ME4120	7ME4811	7ME4813
Design												
Compact	●	●		●			●		●		● ³⁾	● ³⁾
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								●				
Aluminum IP67 Field mounting enclosure	●	●									●	●
Aluminum IP67 Wall mounting enclosure	●											●
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 25 (1")	●	●										
DN 50 (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 www.pia-selector.automation.siemens.com on the Internet, since some constraints might be related to some of the features



	FC330	FC310	MASS 2100 DI 1.5	MASS 2100 DI 3 to DI 15	FC300 DN 4	FCS200 DN 10 to DN 25	MASS 6000 IP67	MASS 6000 19"	MASS 6000 Ex d	SIFLOW FC070 Std/Ex CT	MASS 2100/FC300 with FCT010	MASS 2100/FC300 with FCT030
	7ME4633	7ME4631	7ME4100	7ME4100	7ME4400	7ME4500	7ME4110	7ME4110	7ME4110	7ME4120	7ME4811	7ME4813
Flange												
EN 1092-1 PN 16	●	●										
EN 1092-1 PN 40	●	●		●							●	●
EN 1092-1 PN 63	●	●										
EN 1092-1 PN 100	●	●		●							●	●
ANSI B16.5 Class 150	●	●		●							●	●
ANSI B16.5 Class 300	●	●										
ANSI B16.5 Class 600	●	●		●							●	●
ANSI B16.5 Class 900 ⁵⁾	●	●										
ANSI B16.5 Class 1500 ⁵⁾	●	●										
JIS B2220 10K	●	●										
JIS B2220 20K	●	●										
Dairy												
DIN 11851	●	●		●							●	●
DIN 11851 PN 40				●							●	●
Clamp ISO 2852 PN 16				●							●	●
ISO 2853 PN 16				●							●	●
DIN 32676 (ISO) clamp serie A	●	●										
SMS 1145	●	●										
Others on request	●	●	●	●	●						●	●
Pipe material												
Stainless steel AISI 316L/ 1.4435/1.4404	●	●	●	●	●						●	●
Nickel-Alloy C4	●	●										
Hastelloy C22/2.4602			●	●	●	● ⁴⁾					●	●
With heating jacket												
Internal U-tube											●	●
Pressure rating												
PN 16	●	●										
PN 40	●	●		●							●	●
PN 63	●	●										
PN 100	●	●	●	●	●						●	●
PN 160											●	●
PN 214						●					●	●
PN 350						●					●	●
High-pressure version ¹⁾			●	●	●						●	●
Accuracy												
Flow error ≤ 0.1 % of rate ⁶⁾	●	●	●	●	●						●	●
Flow error ≤ 0.2 % of rate ⁶⁾	●	●										
Flow error ≤ 0.5 % of rate ⁶⁾						●						
Density error ≤ 0.0005 g/cm ³				●							●	●
Density error ≤ 0.001 g/cm ³			●								●	●
Density error ≤ 0.002 g/cm ³	●	●										
Density error ≤ 0.010 g/cm ³	●	●										
Density error ≤ 0.0015 g/cm ³				● ²⁾	●							
Cable glands												
PG 13.5								● ³⁾				
½" NPT	●	●					●				●	●
M20	●	●					●		●		●	●

● = available

¹⁾ See technical specifications.

²⁾ DI 3, DI 6 and DI 15

³⁾ Only when mounted in enclosure.

⁴⁾ Process connectors in AISI 316Ti/1.4571

⁵⁾ Sensor pressure and temperature limited to ANSI class 600 rating

⁶⁾ For reference conditions: ISO 9104 and DIN/EN 29104. Increased error can be expected for gas mass flow measurement.

System information SITRANS F C Coriolis mass flowmeters

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



FC330	FC310	MASS 2100 DI 1.5	MASS 2100 DI 3 to DI 15	FC300 DN 4	FCS200 DN 10 to DN 25	MASS 6000 IP67	MASS 6000 19"	MASS 6000 Ex d	SIFLOW FC070 Std/Ex CT	MASS 2100/FC300 with FCT010	MASS 2100/FC300 with FCT030
7ME4633	7ME4631	7ME4100	7ME4100	7ME4400	7ME4500	7ME4110	7ME4110	7ME4110	7ME4120	7ME4811	7ME4813

ApprovalsCustody transfer

NTEP	● ⁹⁾					●					
Other media than water pattern approval - OIML R 117 (DN 25 to DN 150)	● ⁹⁾										

Harzardous locations

ATEX zone 1	●	●	●	●	●	●	●	●	●	● ³⁾⁴⁾	●	●
IECEX zone 1	●	●				●				● ⁴⁾	●	●
EAC Ex zone 1	● ⁹⁾	● ⁹⁾	●	●	●	●		●	●	● ³⁾⁴⁾		
US /CSA) Div 1	●	●									●	●
Canada (CSA) zone 1	●	●									●	●
FM						●				●		
UL			● ¹⁾	● ¹⁾	●						●	●
CSA										● ⁴⁾		
NEPSI	● ⁹⁾	● ⁹⁾				●						
INMETRO	● ⁹⁾	● ⁹⁾										

Ordinary locations

UL listed (us, ca) Flowmeter	c-UL-us					● ²⁾	● ⁷⁾					
UL recognized (us, ca) Flowmeter	c-UL-us					● ²⁾⁵⁾	● ⁵⁾⁶⁾					

PED

Fluid group 1 Category III, gas	PED Directive 2014/68/ EU	●	●									
---------------------------------	---------------------------	---	---	--	--	--	--	--	--	--	--	--

CRN

Category F OF10769.5C	CRN	● ⁹⁾	● ⁹⁾	●	● ⁸⁾	●					● ⁸⁾	● ⁸⁾
-----------------------	-----	-----------------	-----------------	---	-----------------	---	--	--	--	--	-----------------	-----------------

F&B/Pharma

EHDG		● ⁹⁾¹⁰⁾	● ⁹⁾¹⁰⁾									
------	--	--------------------	--------------------	--	--	--	--	--	--	--	--	--

Marine

SITRANS FC310: Germanischer Lloyd/ det Norske Veritas, Bureau Veritas, Lloyds of London, American Bureau of Shipping, Rina, CCS		● ⁹⁾	● ⁹⁾									
---	--	-----------------	-----------------	--	--	--	--	--	--	--	--	--

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 6 is CRN
- 9) In preparation
- 10) DN 25 to DN 80

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 FC310 or FC330 or a combination of a sensor type MASS 2100/FC300/FCS200 and a transmitter type MASS 6000/SIFLOW FC070/FC010 and FCT030.

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.

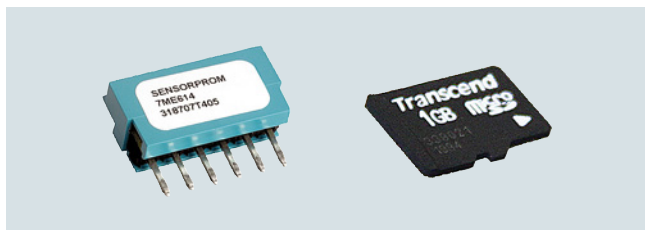
The amplitude of the driver is automatically regulated to ensure a stable output from the 2 pick-ups.

The temperature of the sensor is measured by a Pt1000.

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 signal transfer function is based on a DFT technology (Discrete Fourier Transformation).

The transmitter has a built-in noise filter, which can be used to improve the meter's 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.



SENSORPROM and SensorFlash flow memory units

FC310 flow transmitters communicate via Modbus RTU and FC330 via HART/Modbus/PROFIBUS DP/ PROFIBUS PA.

Integration

Installation requirements/System design information

The SITRANS F C mass flowmeter is suitable for in- and outdoor installations. The standard instrument meets the requirements of Protection Class IP67/NEMA 4x 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 www.siemens.com) 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

- FCS300 – sensors
The optimal installation orientation is vertical with flow upwards (liquids) and up to 10° off vertical for self-draining.
- MASS 2100/FC300 – sensors
The optimal installation orientation is horizontal.

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 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.

Installation: straight run requirements

- The mass flowmeter does not require any flow condition or 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 during operation.
- 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.
- 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. 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 flow facilities accredited according to ISO/IEC 17025 by an accreditation body.

The accreditation body 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. FC310 and FC330 meters have the calibration data written to the front end section. A backup of all calibrations and PDF copies of all certificates are stored in the SensorFlash.

FC330 sensors: for liquids

	Q _{min} at 1% accuracy water		Q _{nom} ¹⁾		100 % (Q _{max}) ²⁾	
	kg/h	(lb/min)	kg/h	(lb/min)	kg/h	(lb/min)
DN 15 (½")	70	(2.57)	4 500	(165.3)	8 000	(293.9)
DN 25 (1")	240	(8.92)	20 500	(753.2)	35 000	(1 286)
DN 50 (2")	800	(29.4)	49 000	(1 800)	90 000	(3 307)
DN 80 (3")	2 000	(73.5)	122 000	(4 483)	250 000	(9 186)
DN 100 (4")	4 000	(147)	273 000	(10 031)	520 000	(19 108)
DN 150 (6")	6 900	(253)	459 200	(16 873)	860 000	(31 600)

MASS 2100 and FC300 sensors: for liquids

	Q _{min} at 1% accuracy water		Q _{nom} ¹⁾		100 % (Q _{max}) ²⁾	
	kg/h	(lb/h)	kg/h	(lb/h)	kg/h	(lb/h)
DI 1.5 (1/16")	0.1	(0.22)	15	(33)	30	(66)
DI 3 (1/8")	1.0	(2.2)	125	(275)	250	(550)
DN 4 (1/6")	1	(2.2)	175	(386)	350	(770)
DI 6 (¼")	0	(11)	500	(1 102)	1 000	(2 200)
DI 15 (½")	5	(44)	2 800	(6 173)	5 600	(12 345)

¹⁾ Q_{nom} = Δ 1 barg @ water 20 °C.

²⁾ Q_{max} = 10 m/sec @ water 20 °C at inlet (up to 30 m/s in the flowtubes).

For gas applications the massflow rate is depending on the gas type. The max. flowrate is calculated with the Mach-Number to be Ma = 0.3.

- For flow > 5 % of the sensors max. flow rate, the error can be read directly from the curve below.
- For flow < 5 % of the sensors max. flow rate, use the formula to calculate the error.
- The error curve is plotted from the formula:

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

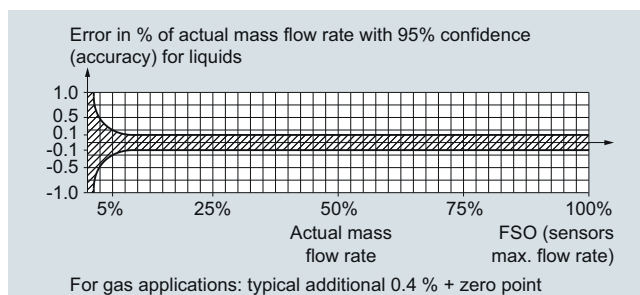
E = Error [%]

Z = Zero point error [kg/h]¹⁾

qm = Mass flow [kg/h]

Cal. = Calibrated flow accuracy: 0.10, 0.15 or 0.20

¹⁾ Zero point error for each sensor is shown in the tables below.



Reference conditions for flow calibrations (ISO 9104 and DIN/EN 29104)

Flow conditions	Fully developed flow profile
Temperature, medium	25 °C (77 °F) ± 5 K
Temperature, ambient	25 °C (77 °F) +10/-5 K
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

Flow Measurement

SITRANS F C

System information SITRANS F C Coriolis mass flowmeters

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")
Number of measuring pipes		1	1	1	1	1
Mass flow						
Linearity error ¹⁾	% of rate	0.10	0.10	0.10	0.10	0.10
Repeatability error	% of rate	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
Density						
Density error ²⁾	[g/cm ³]	0.0025 ³⁾	0.001	0.0015	0.0015	0.0005
Repeatability error	[g/cm ³]	0.0002	0.0002	0.0002	0.0002	0.0001
Range	[g/cm ³]	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)
Brix						
Error	[°Brix]	0.3	0.2	0.3	0.3	0.1

¹⁾ For reference conditions: ISO 9104 and DIN/EN 29104. Increased error can be expected for gas mass flow measurement (For gas measurement typically additional +0.40 % error).

²⁾ Accuracy is only valid when sensor is density-calibrated.

³⁾ Hastelloy C22 version.

Sensor type		FCS300					
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 ¹⁾	% of rate Standard	0.1	0.1	0.1	0.1	0.1	0.1
	% of rate Medium	0.2	0.2	0.2	0.2	0.2	0.2
Repeatability 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	0.1 % [kg/h (lb/min)]	0.4 (0.0147) ²⁾	1.35 (0.0495) ²⁾	4.5 (0.165) ²⁾	20.0 (0.735)	41.6 (1.628)	68.8 (2.528)
	0.2 % [kg/h (lb/min)]	0.6 (0.0235)	2.16 (0.0792)	7.2 (0.264)	20.0 (0.735)	41.6 (1.628)	68.8 (2.528)
Density							
Density error	(Standard) [g/cm ³]	0.010	0.010	0.010	0.010	0.010	0.010
	(Extended) [g/cm ³]	0.002 ³⁾	0.002 ³⁾	0.002 ³⁾	0.002 ³⁾	0.002 ³⁾	0.002 ³⁾
Range	[kg/dm ³]	0.001 ... 5.0	0.001 ... 5.0	0.001 ... 5.0	0.001 ... 5.0	0.001 ... 5.0	0.001 ... 5.0
Repeatability error	[kg/m ³]	± 0.25	± 0.25	± 0.25	± 0.25	± 0.25	± 0.25
Temperature							
Error	[°K]	0.5	0.5	0.5	0.5	0.5	0.5

¹⁾ For reference conditions: ISO 9104 and DIN/EN 29104. Increased error can be expected for gas mass flow measurement (For gas measurement typically additional +0.4 % error).

²⁾ In preparation: currently as for 0.2 % accuracy class.

³⁾ In preparation: 0.0005 g/cm³

Technical specifications PROFIBUS PA/DP for FCT030**General specifications**

PROFIBUS device profile	Profile V 4.0 and compatible to V 3.x
-------------------------	---------------------------------------

Electrical specification DP**Physical layer specifications**

Applicable standard	IEC 61158/EN 50170
Physical Layer (Transmission technology)	RS 485
Transmission speed	≤ 12 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	100 m at 12 Mbit/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 FCT030
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 Class 1 Master.

Cyclic services:

Input (Master view)	Parameter	FCT030
	Mass flow	✓
	Volume flow	✓
	Media temperature	✓
	Frame temperature	✓
	Standard volume flow	✓
	Density	✓
	Fraction A ¹⁾	✓
	Fraction B ¹⁾	✓
	Pct Fraction A ¹⁾	✓
	Pct Fraction B ¹⁾	✓
	Totalizer 1	✓
	Totalizer 2	✓
	Totalizer 3	✓
	Digital dosing control	✓
	Analog dosing control	✓
	Dosing status	✓
Output (Master view)	Control totalizer 1+2+3	✓
	Control commands as Zero point adjustment	✓

¹⁾ Requires a flowmeter ordered with fraction option.

Flow Measurement

SITRANS F C

System information SITRANS F C Coriolis mass flowmeters

Technical specifications PROFIBUS PA/DP for MASS 6000

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.

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, standard volumeflow, density, temperature and fraction.

The FCT030 IP67 transmitter can be remote connected or compact mounted with all sensors of type FCS300, sizes DN 15 to DN 150, MASS 2100 DI 1.5, DI 3, DI 6, DI 15 and FC300 DN 4.

Fraction

The transmitter FCT030 can be set up 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.

If "Standard fractions" option is chosen at ordering, the following fraction or standard density scales can be selected in the setup menu:

- | | |
|--------------------|-------------------------------|
| • API number | • Twaddell |
| • Balling | • %HFCS42 |
| • °Baumé light | • %HFCS55 |
| • °Baumé heavy | • %HFCS90 |
| • °Brix | • Ethanol-Water 0 % to 20 % |
| • °Oeschlé | • Ethanol-Water 15 % to 35 % |
| • Plato | • Ethanol-Water 30 % to 55 % |
| • Specific Gravity | • Ethanol-Water 50 % to 100 % |

Application

SITRANS FCT030 transmitters 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, paint mixing systems, solvents and resins, 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 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 from discrete input or host system
- 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
 - Alarm history log
 - Parameter change log
 - Logging of min and max process values
 - Data logging of process values and parameter (Version 4.0)

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
- FCT030 is in preparation to be certified for integrated safety in accordance with IEC 61508 and IEC 61511 as a compact FC330.
 - SIL 2 (single-channel operation) in preparation
 - SIL 3 (dual-channel operation) in preparation

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, standard volumeflow, density, temperature or fraction flow such as °Brix or °Plato

Flow Measurement

SITRANS F C

Transmitter SITRANS FCT030

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

Channel 1

Channel 1 is 4 to 20 mA analog output with HART 7.5, PROFIBUS PA, PROFIBUS DP and Modbus RS485 RTU. The current signal can be configured for massflow, volumeflow or density, standard volume flow, medium temperature, Fraction A and B and Fraction A% and B%.

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
- Digital 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.

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)
- Digital one or two-valve dosing control
- Operational and alarm status

Relay

Relay output(s) can be user configured to:

- Digital 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)
- Initiate automatic zero point adjustment

Signal outputs and inputs for non hazardous areas can be changed for active or passive operations by dip switch.

For hazardous areas Signal outputs and inputs can't be changed by dip switch, and has to be selected individually by ordering.

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

Approvals and certificates

The FCT030 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 sensor

- FCS300 DN 15, DN 25, DN 50, DN 80, DN 100 and DN 150,
- MASS 2100 DI1.5, DI 3, DI 6, DI 15 and
- FC300 DN 4.

FCT030 is available with current output HART 7.5, Modbus RS485 RTU, PROFIBUS DP or PROFIBUS PA as standard on Channel 1.

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, 4 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 memory 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.
- Storing of alarm history log
- Storing of parameter change log
- Storing of process peak values log

Datalogging on SensorFlash

The following functions are available:

- Logging of process values
- Logging of parameter settings
- Selectable logging interval

Function

The following functions are available:

- Mass flowrate, volume flowrate, density, process temperature, frame 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 forward, backward or forward and backward
- 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 and NTEP
- 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.
- Audit trail information, stores parameters changes with time stamp information
- Simulation of process values, status information and alarms
- Aerated flow filtering system, for advanced filtering of fluids with gas or air bubbles
- Datalogging of process values and parameter changes on SensorFlash

Flow Measurement

SITRANS F C

Transmitter SITRANS FCT030

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 Standard 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 output¹⁾	
Pulse	41.6 μs ... 5 s pulse duration
Frequency	0 ... 12.5 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 input¹⁾	
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 Ch1	HART 7.5 PROFIBUS PA PROFIBUS DP Modbus RS485 RTU
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 55011/CISPR-11 (Class A)
Immunity	EN/IEC 61236-1 (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	Cable gland are available in Nylon, Nickel plated brass or stainless steel (316L/W1.4404) in the following dimensions: <ul style="list-style-type: none"> 1 × M25, 2 × M20 3 × ½" NPT
Digital cable connection	Standard industrial signal cable up to 75 m long with 2 × 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.
Analog cable connection (MASS 2100/FC300)	Standard industrial cable up to 15 m distance between sensor and transmitter. PVC insulated 5 × 2 × Ø 0.34 mm, twisted and screened in pairs, temperature range -20 ... +105 °C Siemens offers cables in a selection of pre-cut lengths and with two M20 connectors mounted.

¹⁾ With 300 Ω internal impedance. For coil switching use the passive output option.

Approvals

Hazardous area

- ATEX, IECEX, cCSAus (Class 1 Div 1), EAC Ex, cCSAus Zone 1, NEPSI, INMETRO (depending on version and configuration)

Custody transfer (in preparation)

- Zone 1:
Ex d e ia [ia Ga] IIC T6 Gb
- OIML R 117 type approval to a wide variety of liquids other than water (in preparation)

Pressure equipment

- NTEP for US and Canada (in preparation)

Hygienic applications (in preparation)

- PED
- CRN (in preparation)
- EHEDG (in preparation) for hygienic variant sensors (DN 25 ... DN 80)
- External cleanability satisfies EHEDG

Certificates

Safety Integration Level (in preparation)

- SIL 3 for software (in preparation)

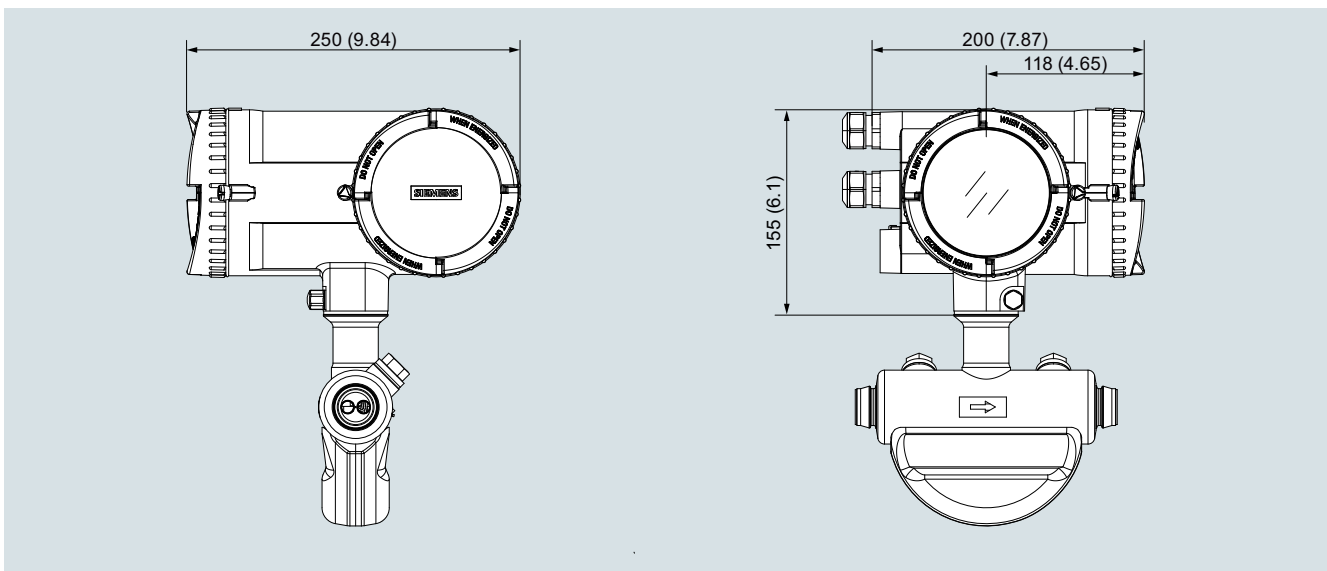
CE mark

- SIL 2 for hardware (in preparation)
- SIL 3 for redundant hardware systems (in preparation)

Regional certifications (depending on configuration)

- Pressure equipment
- Low voltage directive
- WEEE
- RoHS
- C-TICK (Australia and New Zealand EMC)
- EAC (Belarus, Armenia, Kazakhstan, Russia)
- KCC (South Korea)

Dimensional drawings



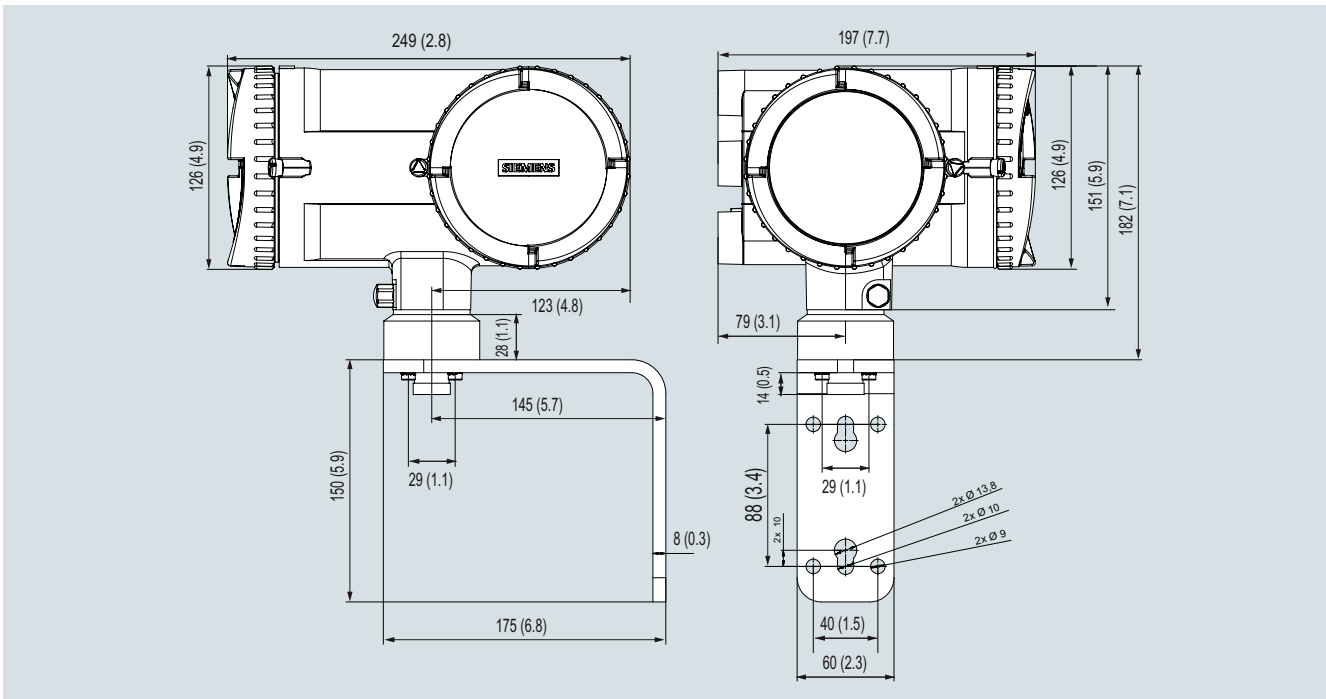
SITRANS FCT030, compact version, dimensions in mm (inch)

Flow Measurement

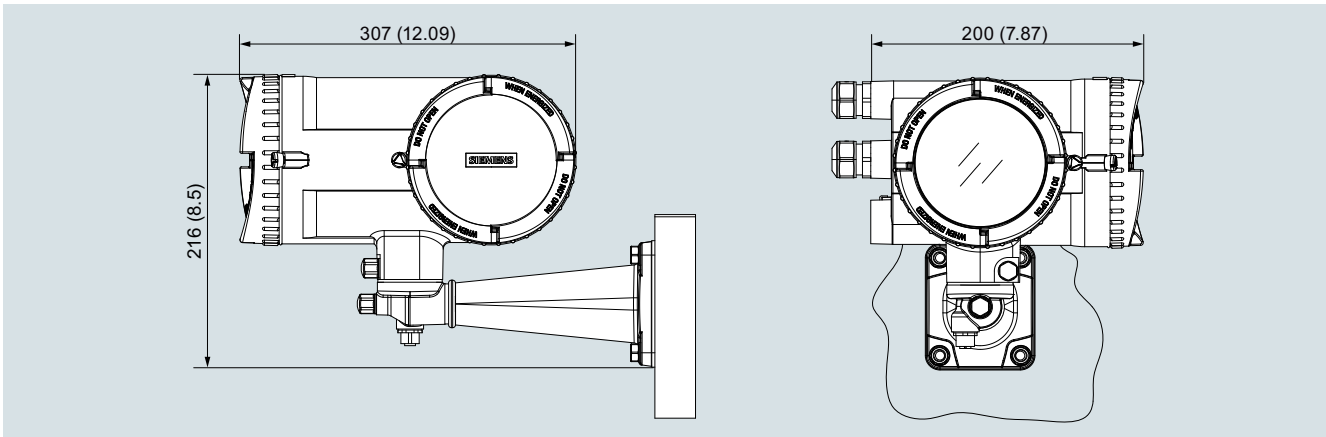
SITRANS F C

Transmitter SITRANS FCT030

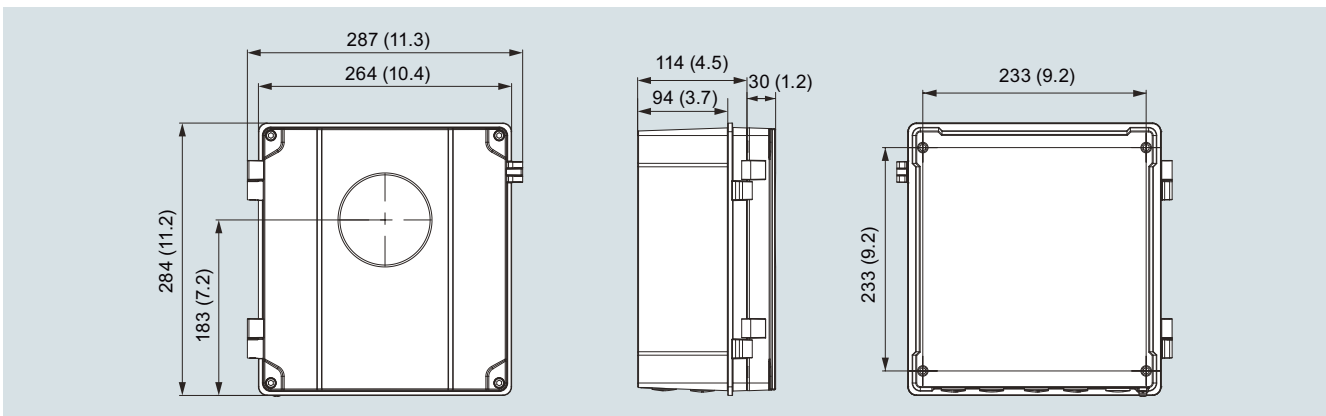
3



SITRANS FCT030, field mount version for low flow MASS2100/FC300 sensors with analog cable and M20 plug connection, dimensions in mm (inch)

















SITRANS FCT030, field mount version for sensors with digital cable and M12 plug connection, dimensions in mm (inch)



SITRANS FCT030, wall mount version, dimensions in mm (inch)

Accessories

Description	Article No.		Description	Article No.	
CT connector Tamper cover for CT locking. Fits over the M12 connector at both sensor and transmitter ends of the remote system cable (2 pcs.)	A5E31478498		Standard cable (Ex) with M12 connectors, PO insulation and PUR sleeve, blue, -40 ... +80 °C (-40 ... +176 °F)		
Bag of glands (metric) in black plastic ¹⁾	A5E03907414		<ul style="list-style-type: none"> • 5 m • 10 m • 25 m • 50 m • 75 m • 150 m 	A5E03914929 A5E03914962 A5E03914995 A5E03915004 A5E03915074 A5E03915088	
Bag of glands, (metric) in gray plastic Ex e/i ¹⁾	A5E03907424		Standard cable (Ex) for termination, PO insulation and PUR sleeve, blue, -40 ... +80 °C (-40 ... +176 °F)		
Bag of glands (metric) in AISI 316 SS Ex e/i ¹⁾	A5E03907429		<ul style="list-style-type: none"> • 5 m • 10 m • 25 m • 50 m • 75 m • 150 m 	A5E03914945 A5E03914973 A5E03914984 A5E03915015 A5E03915057 A5E03915100	
Bag of glands (metric) in Ni-plated brass Ex e/i ¹⁾	A5E03907430				
Bag of glands (NPT) in black plastic ²⁾	A5E03907435		Analog signal cable For analog cable connection between MASS 2100/ FC300 sensor and FCT010/030 transmitters. 5 x 2 x Ø 0.34 mm screened and twisted in pairs. Blue PVC insulation and sleeve. With two M20 connectors, female/female. -20 ... 105 °C (-4 ... +221 °F), Ex		
Bag of glands (NPT) in gray plastic Ex e/i ²⁾	A5E03907451		<ul style="list-style-type: none"> • 1 m • 2 m • 5 m • 10 m • 15 m 	A5E42815465 A5E42521862 A5E42522447 A5E42523233 A5E42523347	
Bag of glands (NPT) in AISI 316 SS Ex e/i ²⁾	A5E03907467				
Bag of glands (NPT) in Ni-plated brass Ex e/i ²⁾	A5E03907473				
Standard cable (non-Ex) with M12 connectors, PO insulation and PUR sleeve, gray, -40 ... +80 °C (-40 ... +176 °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) 	A5E03914805 A5E03914850 A5E03914853 A5E03914859 A5E03914861 A5E03914874				
Standard cable (non-Ex) for termination, PO insulation and PUR sleeve, gray, -40 ... +80 °C (-40 ... +176 °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) 	A5E03914833 A5E03914849 A5E03914854 A5E03914856 A5E03914864 A5E03914873				

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




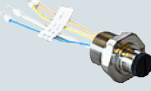
²⁾ 2 pcs ½" NPT; 1 pce ½" NPT with single and dual cable inserts

Flow Measurement







SITRANS F C

Flowmeter - Accessories/Spare parts






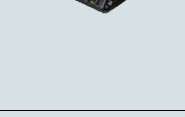


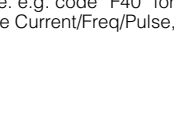
Spare parts - sensor FCS400/FCS300

Description	Article No.	
Blind lid in painted aluminum with silicone o-ring seal	A5E03549295	
Sensor housing <ul style="list-style-type: none"> • metric • NPT 	A5E03549313 A5E03906080	
Bag of loose parts for sensor; including cable strain relief components, washer, seals, silicone o-rings, and assorted screws	A5E03549324	
M12 option for sensor housing in stainless steel. Pre-wired and potted to replace M12 socket in DSL housing	A5E03906095	

Spare parts - Transmitter FCT030 Field mount enclosure (all FW versions)






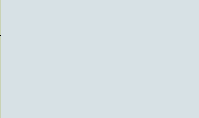



Description	Article No.	
Display lid in painted aluminum with Ex glass plate and silicone o-ring seal Ex and Non-Ex	A5E03549344	
Blind lid in painted aluminum with silicone o-ring seal	A5E03549429	
Bag of loose spare parts; including cable strain relief components, mounting tool, seals and gasket, assorted screws and washers, hex cap nut, blind connectors, and silicone o-rings	A5E03549396	
Mounting bracket - FCT030 field mount; in painted aluminum for pipe or wall mounting of transmitter FCT030 remote version. Including lock ring, pressure pads and seal cap	A5E03906091	
M12 option - remote - in painted aluminum. Pre-wired and potted replacement M12 connection for FCT030 field mount transmitter remote version	A5E03906104	
Remote terminal house painted aluminum for sensor cable termination at FCT030 transmitter remote version. Pre-wired and potted <ul style="list-style-type: none"> • M20 • NPT 	A5E03906112 A5E03906130	

Spare parts - Transmitter FCT030 (FW 3.1)

Description	Article No.	
Display and keypad assembly for field mount enclosure, with Siemens logo. For HW 2 and FW 3.1 version	A5E03548971	
Sensor cassette (Compact) (HW version 2, FW 3.1.X)	A5E03549142	
Sensor cassette (Remote) (HW version 2, FW 3.1.X)	A5E03549098	
Frontend cassette Spare part frontend cassette for remote version of FC430 and cassette for FC410 For firmware V 2.x	A5E03549191	
Power supply for field mount enclosure 100 ... 240 V AC, 47 ... 63 Hz 24 ... 90 V DC (HW version 2 and FW 3.1.x)	A5E03549413	
Transmitter cassette (active) 4 ... 20 mA output and HART 7.2 (HW version 2 and FW 3.1.x)	A5E03549357	
Transmitter cassette (passive), 4 ... 20 mA output and HART 7.2 (HW version 2 and FW 3.1.x)	A5E03549383	
I/O assembly Advise Order code F40 to F97 Selection and Ordering data ¹⁾	A5E03939114	
SensorFlash (micro SD card 1G)	A5E03915258	

¹⁾ The I/O configuration must be stated in the "Remark" field. The I/O configuration is found in the F option of the ordering code. e.g. code "F40" for ordering Ch2 Active Current/Freq/Pulse, Ch3 Active Current/Freq/Pulse, Ch4 Active Input





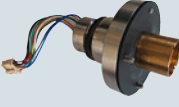
Spare parts FCT030 - Fieldmount enclosure (FW 4.0)

Description	Article No.	
Display and keypad assembly • From firmware 4.0, with Siemens logo	A5E37705139	
• From firmware 4.0, neutral version - no company logo	A5E39844362	
Power supply for field mount enclosure FCT030 V 4.0 Fieldmount 100 ... 240 V AC, 47 ... 63 Hz 19.2 ... 28.8 V DC	A5E38264471	
Sensor cassette (compact) for systems without DSL and for systems with analog sensor connection, HW version 3, FW version 4.0	A5E41526318	
Sensor cassette (remote) Ex barrier module digital sensor connection (HW version 3, FW version 4.0)	A5E03549098	
Sensor cassette (remote) for systems with DSL, HW version 3, FW version 4.0	A5E03549098	
Frontend cassette Spare part frontend DSL for remote version . For firmware V 4.0	A5E41526286	
SensorFlash (micro SD card 4G)	A5E38288507	
Transmitter cassette for firmware 4.0 • Ch1 E02: I/O and comm (active/passive) 4 ... 20 mA output and HART 7.5, Non-Ex • Ch1 E06: I/O and comm (active) 4 ... 20 mA output and HART 7.5, Ex • Ch1 E07: I/O and comm (passive) 4 ... 20 mA output and HART 7.5, Ex • Ch1 E10: Communication PROFIBUS PA, Non-Ex & Ex • Ch1 E11: Communication PROFIBUS DP, Non-Ex • Ch1: Communication Modbus RTU 485, Ex • Ch1: Communication Modbus RTU 485, Non-Ex	A5E38013040 A5E38012278 A5E38013025 A5E41216315 A5E41216042 A5E38013054 A5E38013069	








Flow Measurement


SITRANS F C

Flowmeter - Accessories/Spare parts

Description	Article No.		Description	Article No.	
IO Cassette for firmware 4.0			Adapter cable for FCS400 sensor with new transmitter DSL/FCT010/FCT030 Version 4.0	TBD	
• Ch2: Current/Frequ./Pulse, Ch3: None, Ch4: None F01, Non-Ex	A5E38006256		Remote adapter for wall bracket M20 cable connection		
• Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: None, F02, Non-Ex	A5E38006558		• Ex	A5E42404417	
• Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: Current/Frequ./Pulse F03, Non-Ex	A5E38006598		• Non-Ex	A5E42846478	
• Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: Relay, F04, Non-Ex	A5E38006896		Wall bracket for FCT030 for M20 analog cable connector	A5E42404426	
• Ch2: Current/Frequ./Pulse, Ch3: Relay, Ch4: Relay, F05, Non-Ex	A5E3800690		Wall bracket for FCT010 for M20 analog cable connector	A5E42404447	
• Ch2: Current/Frequ./Pulse, Ch3: Relay, Ch4: None, F06, Non-Ex	A5E38011432		Compact adapter for DSL/FCT030 For upgrade from MASS 2100 DI3, DI6, DI15 with MASS 6000 compact to DSL/FCT030		
• Ch2: Current/Frequ./Pulse, Ch3: None, Ch4: None, F11, Ex-passive	A5E38011478		• Ex	A5E42846758	
• Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: None, F12, Ex-passive	A5E38011509		• Non-Ex	A5E42846760	
• Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: Current/Frequ./Pulse, F13, Ex-passive	A5E38011541		Compact adapter for DSL/FCT030 FCS300 and FCS400 (DN 100 and DN 150 sensor) adapter for compact mount DSL, FCT010 or FCT030 Ex and Non-Ex	TBD	
• Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: Relay, F14, Ex-passive	A5E38011600				
• Ch2: Current/Frequ./Pulse, Ch3: Relay, Ch4: Relay, F15, Ex-passive	A5E38011618				
• Ch2: Current/Frequ./Pulse, Ch3: Relay, Ch4: None, F16, Ex-passive	A5E38011908				
• Ch2: Current/Frequ./Pulse, Ch3: None, Ch4: None, F21, Ex-active	A5E38012039				
• Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: None, F22, Ex-active	A5E38012056				
• Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: Current/Frequ./Pulse, F23, Ex-active	A5E38012121				
• Ch2: Current/Frequ./Pulse, Ch3: Relay, Ch4: Relay, F24, Ex-active	A5E38019235				
• Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: Relay, F25, Ex-active	A5E38019263				
• Ch2: Current/Frequ./Pulse, Ch3: Relay, Ch4: None, F26, Ex-active	A5E38019378				

Spare parts - FCT030 Wall mount enclosure

Description	Article No.	
Display and keypad assembly <ul style="list-style-type: none"> For wall mount enclosure, Siemens logo For wall mount enclosure, neutral version 	A5E37697615 A5E39844261	
Power supply for wall mount 100 ... 240 V AC, 47 ... 63 Hz 19.2 ... 28.8 V DC	A5E38263021	
Sensor cassette for FCT030 wall mounting enclosure	TBD	
Foam insert set for wall mount with connectors	A5E38287828	
Wall mount enclosure front blind, Siemens version	A5E38287882	
Wall mount enclosure front blind, Neutral version - no company logo	A5E38287965	
Wall mount enclosure front with glass	A5E38288007	
Wall mount enclosure bracket for pipe mounting	A5E38288020	
Wall bracket panel mounting	A5E38288032	
Bag of loose spare parts for wall mount including cable strain relief components, mounting tool, seals and gasket, assorted screws and washers, hex cap nut, blind connectors and O-rings	A5E38288072	
Metal kit PSU cover back pane for wall mount enclosure	A5E38415145	

Description	Article No.	
Power input cover plate for wall mount enclosure	A5E38415205	

Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS300

Overview



The flow measuring principle is based on the Coriolis Effect. The FCS300 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 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 FCT030 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.

Integration

The SITRANS FCS300 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 ordered with hazardous certification to Zone 1 (ATEX, IECEx, cCSAus, EAC Ex, NEPSI, INMETRO).

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

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 flow direction 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 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.
- 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 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 lowest pressure point in the liquid piping system or where vapour can collect. Install the meter in pipeline sections with high pressure 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.

Be aware of maximum sensor length cable depending on product selection, currently 75 m. 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 connectors 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 FCS300 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.

Calibration

To ensure accurate measurement all flowmeters must be initially calibrated. The calibration of each SITRANS FCS300 Coriolis sensor is conducted at an accredited according to ISO/IEC 17025 flow calibration facility. A calibration certificate for every sensor is stored on the SensorFlash SD card. The accreditation body 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).

Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS300

Technical specifications

Flow sensor FCS300		
Parameter	Unit	Value
Process pressure range	[barg (psi)]	The maximum permissible operating pressure is determined by the respective process connection and the temperature of the medium. 316L: 0 ... 100 (0 ... 1450) Nickel-alloy C4 (2.4610) ³⁾ : 0 ... 100 (0 ... 1450)
Process temperature range	[°C (°F)]	The maximum permissible process temperature is determined by the respective process connection -50 ... +205 (-58 ... +400)
Ambient temperature range	[°C (°F)]	-40 ... +70 (-40 ... +158)
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 Form	1 (suitable for dangerous fluids) 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 • Standard volume flow (with reference density) • Fraction A:B • Fraction % A:B

Performance specifications		Sensor					
Parameter	Unit	DN 15	DN 25	DN 50	DN 80	DN 100	DN 150
Max. zero point error	0.2 % [kg/h (lb/min)]	0.6 (0.0235)	2.16 (0.0792)	7.2 (0.264)	20 (0.735)	41.6 (1.628)	68.8 (2.528)
	0.1 % [kg/h (lb/min)]	0.4 (0.0147) ⁴⁾	1.35 (0.0025) ⁴⁾	4.5 (0.165) ⁴⁾	20 (0.735)	41.6 (1.628)	68.8 (2.528)
Qmin (1 % error)	[kg/h (lb/min)]	70 (2.57)	240 (8.92)	800 (29.4)	2 000 (73.5)	4 000 (146.9)	6 900 (253.5)
Qnom (1 bar pressure)	[kg/h (lb/min)]	4 500 (163.3)	20 500 (753.2)	49 000 (1 800)	122 000 (4 483)	273 000 (10 031)	459 200 (16 873)
Qmax ²⁾	[kg/h (lb/min)]	8 000 (293.9.2)	35 000 (1 286)	90 000 (3 307)	250 000 (9 186)	520 000 (19 107)	860 000 (31 600)
Linearity error mass flow	• for liquids ¹⁾	[%] standard	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1
		[%] medium	± 0.2	± 0.2	± 0.2	± 0.2	± 0.2
• for gases (additional)	[%]	± 0.40	± 0.40	± 0.40	± 0.40	± 0.40	± 0.40
Repeatability mass flow	[%]	± 0.05	± 0.05	± 0.05	± 0.05	± 0.05	± 0.05
Density accuracy with standard 0.2% calibration	[kg/m ³ (lb/ft ³)]	± 10 (± 0.62)	± 10 (± 0.62)	± 10 (± 0.62)	± 10 (± 0.62)	± 10 (± 0.62)	± 10 (± 0.62)
Density accuracy with extended 0.1% calibration	[kg/m ³ (lb/ft ³)]	± 2 (± 0.124) ⁵⁾	± 2 (± 0.124) ⁵⁾	± 2 (± 0.124) ⁵⁾	± 2 (± 0.124) ⁵⁾	± 2 (± 0.124) ⁵⁾	± 2 (± 0.124) ⁵⁾
Temperature error	[°K]	± 0.5	± 0.5	± 0.5	± 0.5	± 0.5	± 0.5

¹⁾ For reference conditions: ISO 9104 and DIN/EN 29104. Increased error can be expected for gas mass flow measurement (For gas measurement typically + 0.40 % error).

²⁾ For gas applications the max. flowrate is calculated at Mach-Number = 0.3.

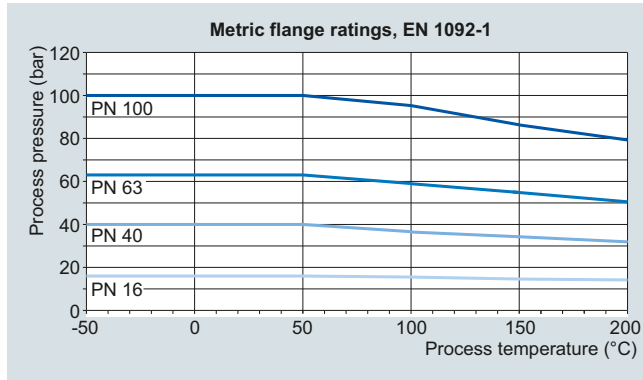
³⁾ Hastelloy C is a registered trademark of Haynes International. C4 nickel alloys are equivalent to Hastelloy C4 .

⁴⁾ In preparation: currently as for 0.2 % accuracy class.

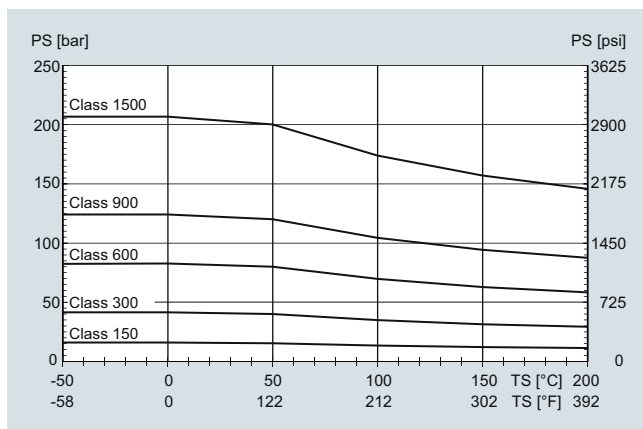
⁵⁾ In preparation: 0.5 kg/m³.

Pressure/temperature curves

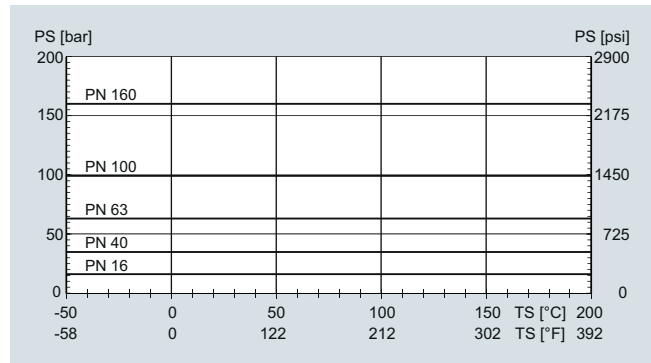
With two major exceptions, the pressure rating of the flow sensors is independent of the process medium temperature. Design rules for flange connections in both the EN1092-1 and ASME B16.5 standards dictate pressure derating with increasing temperature. The charts below show the effect of process medium temperature on the pressure ratings for the flanges within the FCS300 product program.



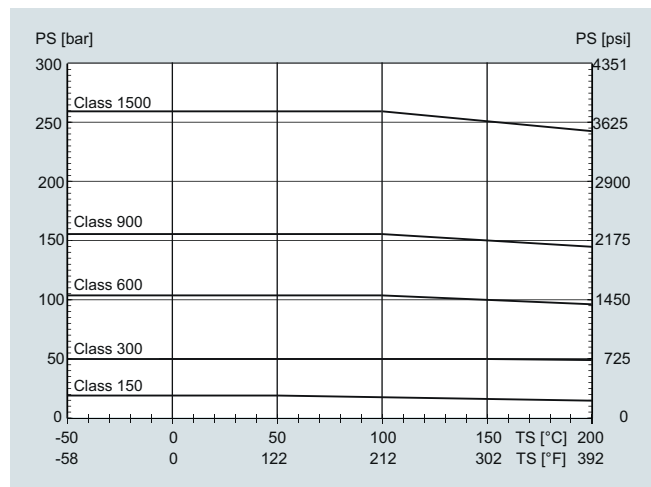
EN1092-1 flanged sensors in AISI 316L



Stainless steel ASME flange 1.4571/1.4404 (AISI 316Ti/316L) up to DN200 (8")



Nickel alloy DIN flange C4 (2.4610) or nickel alloy C22 (2.4602) up to DN200 (8")



Nickel alloy ASME flange C4 (2.4610) or nickel alloy C22 (2.4602) up to DN200 (8")

Sanitary connection

Design	Nominal diameter	PS _{max}		TS _{max}		TS _{min}	
		[bar]	[psi]	[°C]	[°F]	[°C]	[°F]
Pipe fitting DIN 11851	DN 15 ... 40 (1/2 ... 1 1/2")	40	580	140	284	-40	-40
	DN 50 ... 100 (2 ... 4")	25	363	140	284	-40	-40
Pipe fitting SMS 1145	DN 25 ... 80 (1 ... 3")	6	87	140	284	-40	-40
Clamp DIN 32676	DN 15 ... 50 (1/2 ... 2")	16	232	120	248	-40	-40
	DN 65 ... 100 (2 1/2 ... 4")	10	145	120	248	-40	-40

Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS300

Sensor variants

SITRANS FCS300 sensors are available in a wide range of process connections. The available combinations of type, sensor size and connection size are shown in the tables below.

Standard variants

Sensor	Connection	EN 1092-1 B1, PN 16	EN 1092-1 B1, PN 40	EN 1092-1 B2, PN 63	EN 1092-1 B2, PN 100	EN 1092-1 D, PN 40	ANSI B16.5-2009, class 150	ANSI B16.5-2009, class 300	ANSI B16.5-2009, class 600	ANSI B16.5-2009, class 900	ANSI B16.5-2009, class 1500	ISO 228-1 G female pipe thread	ASME B1.20.1 NPT female pipe thread	DIN 11851 hygienic screwed	DIN 32676 (ISO) clamp serie A	SMS 1145 hygienic screwed	JIS B2220:2004/10K	JIS B2220:2004/20K	EN 1092-1 PN 16, NAMUR length	EN 1092-1 PN 40, NAMUR length
Standard: 7ME463-...																				
DN 15 (½")	DN 10 (¾")	●					●	●	●	● ¹⁾	● ¹⁾	●		●	●		●	●		●
	DN 15 (½")	●	●	●	●	●	●	●	●	● ¹⁾	● ¹⁾	●	●	●	●		●	●		●
	DN 20 (¾")	●					●							●	●		●	●		●
DN 25 (1")	DN 20 (¾")	●					●							●	●		●	●		●
	DN 25 (1")	●	●	●	●	●	●	●	●	● ¹⁾	● ¹⁾			●	●		●	●		●
	DN 40 (1½")	●	●	●			●	●	●					●	●		●	●		●
DN 50 (2")	DN 40 (1½")	●	●	●			●	●	●	●	●			●	●		●	●		●
	DN 50 (2")	●	●	●	●	●	●	●	●	● ¹⁾	● ¹⁾			●	●		●	●		●
	DN 65 (2½")	●	●				●	●	●	● ¹⁾	● ¹⁾			●	●		●	●		●
DN 80 (3")	DN 65 (2½")	●	●	●			●	●	●	● ¹⁾	● ¹⁾			●	●		●	●		●
	DN 80 (3")	●	●	●	●	●	●	●	●	● ¹⁾	● ¹⁾			●	●		●	●		●
	DN 100 (4")	●	●	●	●		●	●	●	● ¹⁾	● ¹⁾			●	●		●	●		●
DN 100 (4")	DN 80 (3")	●	●	●	●		●	●	●	● ¹⁾	● ¹⁾						●	●		●
	DN 100 (4")	●	●	●	●		●	●	●	● ¹⁾	● ¹⁾						●	●	●	●
	DN 150 (6")	●	●	●	●		●	●	●	● ¹⁾	● ¹⁾						●	●		●
DN 150 (6")	DN 100 (4")	●	●	●	●		●	●	●	● ¹⁾	● ¹⁾						●	●		●
	DN 150 (6")	●	●	●	●		●	●	●	● ¹⁾	● ¹⁾						●	●	●	●
	DN 200 (8")	●	●	●	●		●	●	●	● ¹⁾	● ¹⁾						●	●		●

¹⁾ Apply class 600 p and t ratings for class 900 and class 1500 flanges.

Hygienic sensor variants

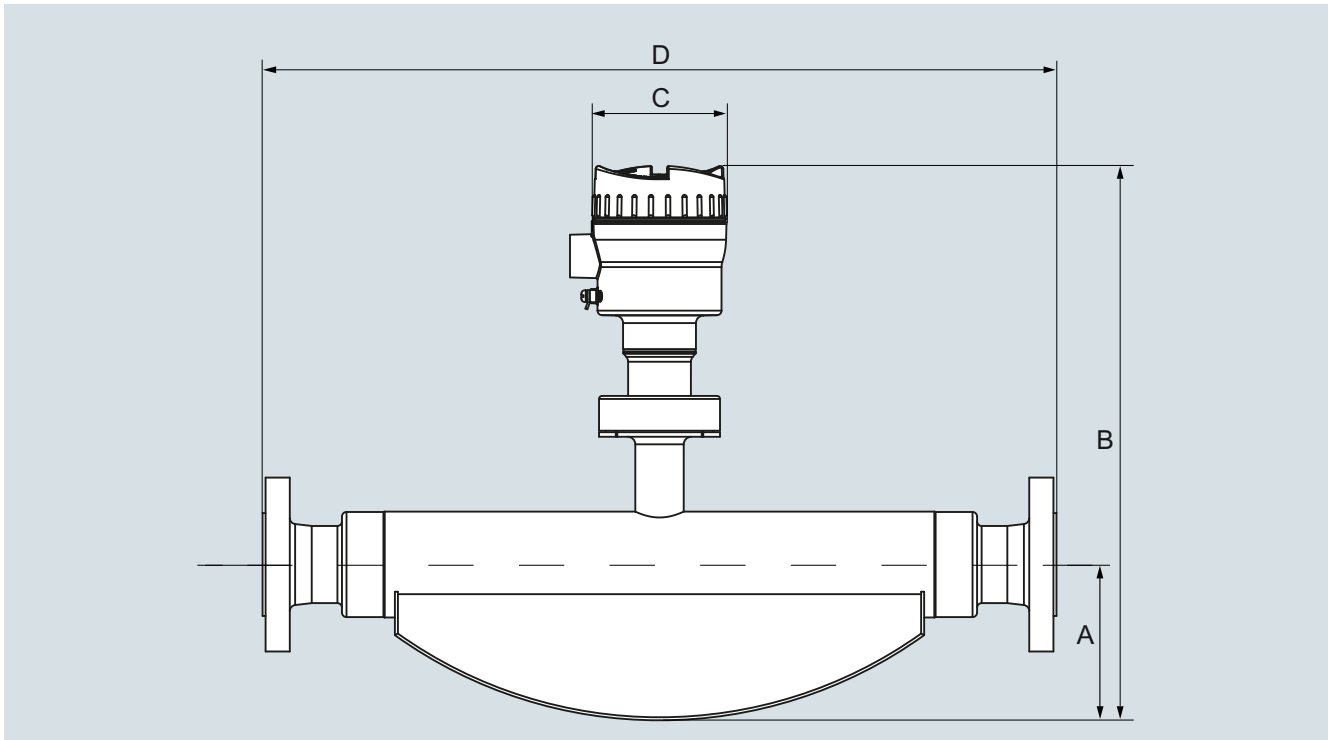
The hygienic sensors will have to be ordered with stainless steel tubes 316L/1.4435/1.4404 (polished). Hygienic sensors are offered with process connection conforming to various international quick-connect clamps or threaded connectors. Pressure ratings are according to the relevant standard and the sensor size.

NAMUR sensor variants

The NAMUR variants have built-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 DN 100 and DN 150 flanges to PN 16.

Dimensional drawings

Sensor dimensions



Sensor [DN]	[inch]	A		B		C		Weight	
		[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[kg]	[lb]
15	½	80	3.15	358	14.09	90	3.54	4.6	10.1
25	1	103	4.06	398	15.67	90	3.54	7.9	17.4
50	2	126	4.96	435	17.13	90	3.54	25.7	56.7
80	3	181	7.13	525	20.67	90	3.54	66.5	147
100	4	262	10.31	622	24.49	90	3.54	128	282
150	6	317	12.48	714	28.11	90	3.54	207	456

SITRANS FCS300, dimensions in mm (inch), weights in kg (lb), for a EN 1092 PN 40 flanged version.

The built-in length D depends on the flange.

Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS300

Overall length

The overall length (built-in length (D)) 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.

Sensor in AISI 316L: 7ME463.-...

Sensor AISI 316L Connection	DN 15 (½")			DN 25 (1")			DN 50 (2")		
	DN 10 (3/8")	DN 15 (½")	DN 20 (¾")	DN 20 (¾")	DN 25 (1")	DN 40 (1½")	DN 40 (1½")	DN 50 (2")	DN 65 (2½")
EN 1092-1 B1, PN 16									
EN 1092-1 B1, PN 40	385	385	421	576	525	576	763	715	763
EN 1092-1 B2, PN 63		403			564	572	745	745	
EN 1092-1 B2, PN 100		403			564	576	745	745	
EN 1092-1 D, PN 40		385			525			715	
ASME B16.5, class 150		435	421	575	575	576	763	715	756
ASME B16.5, class 300		421			576	576	756	763	
ASME B16.5, class 600		421			576		756	773	
ASME B16.5, class 900		421			576		780	790	800
ASME B16.5, class 1500		421					780	790	800
ISO 228-1 G female pipe thread		450							
ASME B1.20.1 NPT female pipe thread		450							
DIN 11851 Hygienic screwed	413	413	413	590	590	590	763	740	740
DIN 32676 (ISO) Hygienic clamp	413	413	413	590	590	590	763	740	740
SMS 1145 Hygienic screwed					590	590	763	740	740
JIS B2220/10K	385	385	421	576	525	576	763	715	763
JIS B2220/20K	385	385	421	576	525	576	763	715	763
EN 1092-1 PN 16, NAMUR length									
EN 1092-1 PN 40, NAMUR length		510			600			715	

Sensor Connection	DN 80 (3")			DN 100 (4")			DN 150 (6")		
	DN 65 (2½")	DN 80 (3")	DN 100 (4")	DN 80 (3")	DN 100 (4")	DN 150 (6")	DN 100 (4")	DN 150 (6")	DN 200 (8")
EN 1092-1 B1, PN 16		870	875	1222	1122	1260	1569	1421	
EN 1092-1 B1, PN 40	910	870	875	1222	1144	1260	1599	1461	1650
EN 1092-1 B2, PN 63	910	910	1060	1234	1304				
EN 1092-1 B2, PN 100	910	910	1080	1234	1334				
EN 1092-1 D, PN 40		870							
ASME B16.5, class 150		880	880	1244	1144	1330	1630	1485	1650
ASME B16.5, class 300	920	895	1075		1324			1505	1670
ASME B16.5, class 600	920	920	1100	1244	1354		1675	1555	
ASME B16.5, class 900	965	1100	1130	1470	1380		1705	1605	
ASME B16.5, class 1500	965	1300	1150	1500	1400		1725	1665	
ISO 228-1 G female pipe thread									
ASME B1.20.1 NPT female pipe thread									
DIN 11851 Hygienic screwed	990	940	940						
DIN 32676 (ISO) Hygienic clamp	950	910	910						
SMS 1145 Hygienic screwed	990	940							
JIS B2220/10K	910	870		1275	1150	1300			
JIS B2220/20K	910	870		1275	1150	1300			
EN 1092-1 PN 16, NAMUR length					1400			1700	
EN 1092-1 PN 40, NAMUR length		915							

SITRANS FCS300, overall length (D), dimensions in mm

Sensor	DN 15 (½")			DN 25 (1")			DN 50 (2")		
	DN 10 (3/8")	DN 15 (½")	DN 20 (¾")	DN 20 (¾")	DN 25 (1")	DN 40 (1½")	DN 40 (1½")	DN 50 (2")	DN 65 (2½")
EN 1092-1 B1, PN 16									
EN 1092-1 B1, PN 40	15.16	15.16	16.57	22.68	20.67	22.68	30.04	28.15	30.04
EN 1092-1 B2, PN 63		15.87			22.20	22.52	29.33	29.33	
EN 1092-1 B2, PN 100		15.87			22.20	22.68	29.33	29.33	
EN1092-1 D, PN 40		15.16			20.67			28.15	
ASME B16.5, class 150		17.13	16.57	22.64	22.64	22.68	30.04	28.15	29.76
ASME B16.5, class 300		16.57			22.68	22.68	29.76	30.04	
ASME B16.5, class 600		16.57			22.68	22.68	29.76	30.43	
ASME B16.5, class 900		16.57			22.68		30.71	31.10	31.50
ASME B16.5, class 1500		16.57			22.68		30.71	31.10	31.50
ISO 228-1 G female pipe thread		17.72							
ASME B1.20.1 NPT female pipe thread		17.72							
DIN 11851 Hygienic screwed	16.26	16.26	16.26	23.23	23.23	23.23	30.04	29.13	29.13
DIN 32676 (ISO) Hygienic clamp	16.26	16.26	16.26	23.23	23.23	23.23	30.04	29.13	29.13
SMS 1145 Hygienic screwed					23.23	23.23	30.04	29.13	29.13
JIS B2220/10K	15.16	15.16	16.57	22.68	20.67	22.68	30.04	28.15	30.04
JIS B2220/20K	15.16	15.16	16.57	22.68	20.67	22.68	30.04	28.15	30.04
EN 1092-1 PN 16, NAMUR length									
EN 1092-1 PN 40, NAMUR length		20.08			23.62			28.15	

Sensor	DN 80 (3")			DN 100 (4")			DN 150 (6")		
	DN 65 (2½")	DN 80 (3")	DN 100 (4")	DN 80 (3")	DN 100 (4")	DN 150 (6")	DN 100 (4")	DN 150 (6")	DN 200 (8")
EN 1092-1 B1, PN 16		34.25	34.45	48.11	44.17	49.61	61.77	55.94	
EN 1092-1 B1, PN 40	35.83	34.25	34.45	48.11	45.04	49.61	62.95	57.52	64.96
EN 1092-1 B2, PN 63	35.83	35.83	41.73	48.58	51.34				
EN 1092-1 B2, PN 100	35.83	35.83	42.52	48.58	52.52				
EN1092-1 D, PN 40		34.25							
ASME B16.5, class 150		34.65	34.65	48.98	45.04	52.36	64.17	58.46	64.96
ASME B16.5, class 300	36.22	35.24	42.32		52.13			59.25	65.75
ASME B16.5, class 600	36.22	36.22	43.31	48.98	53.31		65.94	61.22	
ASME B16.5, class 900	37.99	43.31	44.49	57.87	54.33		67.13	63.19	
ASME B16.5, class 1500	37.99	51.18	45.28	59.06	55.12		67.91	65.55	
ISO 228-1 G female pipe thread									
ASME B1.20.1 NPT female pipe thread									
DIN 11851 Hygienic screwed	38.98	37.01	37.01						
DIN 32676 (ISO) Hygienic clamp	37.40	35.83	35.83						
SMS 1145 Hygienic screwed	38.98	37.01							
JIS B2220/10K	35.83	34.25		50.20	45.28	50.20			
JIS B2220/20K	35.83	34.25		50.20	45.28	50.20			
EN 1092-1 PN 16, NAMUR length					55.12			66.93	
EN 1092-1 PN 40, NAMUR length		36.02							

SITRANS FCS300, overall length (D), dimensions in inch

Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS300

Sensor in Nickel-Alloy C4: 7ME463.-...

Sensor Nickel-Alloy C4	DN 15 (½")			DN 25 (1")			DN 50 (2")		
	DN 10 (3/8")	DN 15 (½")	DN 20 (¾")	DN 20 (¾")	DN 25 (1")	DN 40 (1½")	DN 40 (1½")	DN 50 (2")	DN 65 (2½")
EN 1092-1 B1, PN 40	449	442	428	646	614	576	814	764	819
EN 1092-1 B2, PN 63	449	442	428	646	614	576	814	764	819
EN 1092-1 B2, PN 100	449	442	428	646	614	576	814	764	819
ANSI B16.5, class 150		442	428	646	614	576	814	764	819
ANSI B16.5, class 300		442	428	646	614	576	814	764	819
ANSI B16.5, class 600		442	428	646	614	576	814	764	819
JIS B2220/10K		442	428	646	614	576	814	764	819

Sensor	DN 80 (3")			DN 100 (4")			DN 150 (6")		
	DN 65 (2½")	DN 80 (3")	DN 100 (4")	DN 80 (3")	DN 100 (4")	DN 150 (6")	DN 100 (4")	DN 150 (6")	DN 200 (8")
EN 1092-1 B1, PN 16			971	1357	1280	1261	1592	1502	
EN 1092-1 B1, PN 40	1021	971	971	1357	1280	1261	1592	1502	
EN 1092-1 B2, PN 63	1021		971	1357	1280	1261	1632	1542	
EN 1092-1 B2, PN 100	1021	971	971	1357	1280	1261	1632	1542	
ANSI B16.5, class 150	1021	971	971	1357	1280	1261	1592	1502	
ANSI B16.5, class 300	1021	971	971	1357	1280	1261	1632	1542	
ANSI B16.5, class 600	1021	971	971	1357	1280	1261	1632	1542	
JIS B2220/10K	1021	971	971	1357	1280	1261	1592	1502	

SITRANS FCS300, overall length (D), dimensions in mm

Sensor	DN 15 (½")			DN 25 (1")			DN 50 (2")		
	DN 10 (3/8")	DN 15 (½")	DN 20 (¾")	DN 20 (¾")	DN 25 (1")	DN 40 (1½")	DN 40 (1½")	DN 50 (2")	DN 65 (2½")
EN 1092-1 B1, PN 40	17.7	17.4	16.9	25.4	24.2	22.7	32.0	30.1	32.2
EN 1092-1 B2, PN 63	17.7	17.4	16.9	25.4	24.2	22.7	32.0	30.1	32.2
EN 1092-1 B2, PN 100	17.7	17.4	16.9	25.4	24.2	22.7	32.0	30.1	32.2
ANSI B16.5, class 150		17.4	16.9	22.6	22.6	22.7	32.0	30.1	31.2
ANSI B16.5, class 300		17.4	16.9	25.4	24.2	22.7	32.0	30.1	31.2
ANSI B16.5, class 600		17.4	16.9	25.4	24.2	22.7	32.0	30.1	31.2
JIS B2220/10K		17.4	16.9	25.4	24.2	22.7	32.0	30.1	32.2

Sensor	DN 80 (3")			DN 100 (4")			DN 150 (6")		
	DN 65 (2½")	DN 80 (3")	DN 100 (4")	DN 80 (3")	DN 100 (4")	DN 150 (6")	DN 100 (4")	DN 150 (6")	DN 200 (8")
EN 1092-1 B1, PN 16			38.2	53.4	50.4	49.6	62.7	59.1	
EN 1092-1 B1, PN 40	40.2	38.2	38.2	53.4	50.4	49.6	62.7	59.1	
EN 1092-1 B2, PN 63	40.2		38.2	53.4	50.4	49.6	64.3	59.1	
EN 1092-1 B2, PN 100	40.2	38.2	38.2	53.4	50.4	49.6	64.3	59.1	
ANSI B16.5, class 150	40.2	38.2	38.2	53.4	50.4	49.6	62.7	59.1	
ANSI B16.5, class 300	40.2	38.2	38.2	53.4	50.4	49.6	64.3	59.1	
ANSI B16.5, class 600	40.2	38.2	38.2	53.4	50.4	49.6	64.3	59.1	
JIS B2220/10K	35.83	34.25	41.73	53.4	50.4	49.6	62.7	59.1	

SITRANS FCS300, overall length (D), dimensions in inch

Overview



The complete flowmeter system SITRANS FC330 can be ordered for standard, hygienic or NAMUR service.

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

FC330 is available with current output HART 7.5, Modbus RS485 RTU, PROFIBUS DP or PROFIBUS PA as standard on Channel 1. 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 SensorFlash, a micro SD card for configuration backup, firmware update and data storage.

The SITRANS FC330 flowmeter system consists of a SITRANS FCS300 sensor and a SITRANS FCT030 transmitter.

Benefits

- It is compact 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

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC330

Technical specifications

Sizes	DN 15 (1/2") DN 25 (1") DN 50 (2") DN 80 (3") DN 100 (4") DN 150 (6")
Accuracy	± 0.10 % or 0.20 % for liquids additional ±0.40 for gases
Repeatability	± 0.05 %
Flow range (liquids) (water @ 1 bar pressure loss) (Q_{nom})	
• DN 15	4 500 kg/h (163.3 lb/min)
• DN 25	20 500 kg/h (753.2 lb/min)
• DN 50	49 000 kg/h (1 800 lb/min)
• DN 80	122 000 kg/h (4 483 lb/min)
• DN 100	273 000 kg (10 031 lb/min)
• DN 150	459 200 kg/h (16 873 lb/min)
Architecture	Compact or remote configuration
Display	Full graphical display, 240 x 160 pixels with selection of 6 languages
Power supply	20 ... 27 V DC ± 10%; 100 ... 240 V AC ± 10 %, 47 ... 63 Hz ± 10%
Weight	4.6 ... 212 kg
Material	
• Sensor	
- Wetted parts	316L stainless steel or Nickel Alloy C4
- Enclosure	304 stainless steel
• Transmitter	Aluminum with corrosion-resistant coating
Enclosure rating	IP67
Pressure ratings	
• Measuring tubes	
- 316L	100 bar (1450 psi)
- Nickel Alloy C4 (DN 15 ... 50)	100 bar (1450 psi)
• Sensor enclosure	No pressure containment
Temperature ratings	
• Process medium	-50 ... +205 °C (-58 ... +400 °F)
• Ambient	-40 ... +60 °C (-40 ... +140 °F) ¹⁾
• Display	-20 ... +60 °C (-4 ... +140 °F)

Process connections	
• Flanges	EN 1092-1 B1, EN 1092-1 B2, EN 1092-1 D, ANSI/ASME B16.5, JIS B 2220
• Pipe threads	ASME B1.20 (NPT) female pipe thread, ISO228-1 G female pipe thread (BSPP)
• Hygienic threads	DIN 11851, SMS 1145
• Hygienic clamps	DIN 32676 serie A
Approvals	
• Hazardous area (zone 1)	ATEX, IECEx, EAC Ex, CSA, cCSAus (NEPSI, INMETRO, EAC (in preparation)
• Pressure equipment	PED, CRN (in preparation)
• Hygienic	EHEDG (DN 25 ... DN 80) (in preparation)
• Custody transfer	OIML R 117, NTEP (in preparation)
• Operational safety (compact system only NAMUR 7ME471)	SIL 2 Single (in preparation) SIL 3 Redundant system (in prepa- ration)
NAMUR	NAMUR-compliant (e.g. NE 21, NE 41, NE 107 and NE 132)
I/O	Up to 4 channels combining ana- log, relay or digital outputs and binary input
Communication	HART PROFIBUS PA PROFIBUS DP Modbus RTU (RS 485)
EMC performance	
Emission	EN 55011/CISPR-11 (Class A)
Immunity	EN/IEC 61326-1 (Industry)
Mechanical load	18 to 400 Hz random The flow meter will mechanically tol- erate 3.17 g RMS in all directions. Flow accuracy cannot be guaran- teed under all conditions.

¹⁾ If operating outdoors, avoid direct sunlight, particularly in warm climatic regions.

Selection and Ordering data	Article No.	Order code
SITRANS FC330 Digital Coriolis flowmeter with SITRANS FCS300 standard flow sensor compact or remote mounting with FCT030 transmitter	7 ME 4 6 3 3 -	
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Sensor size, connector 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 25, DN 20 (1", ¾")		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 50, DN 65 (2", 2½")		4 D
DN 80, DN 65 (3", 2½")		4 J
DN 80, DN 80 (3", 3")		4 K
DN 80, DN 100 (3", 4")		4 L
DN 100, DN 80 (4", 3")		5 M
DN 100, DN 100 (4", 4")		5 N
DN 100, DN 150 (4", 6")		5 Q
DN 150, DN 100 (6", 4")		6 D
DN 150, DN 150 (6", 6")		6 F
DN 150, DN 200 (6", 8")		6 H
Process connection		
EN 1092-1 B1, PN 16		A 0
EN 1092-1 B1, PN 40		A 1
EN 1092-1 B2, PN 63		A 2
EN 1092-1 B2, PN 100		A 3
EN 1092-1 D, PN 40		A 5
ASME B16.5 RF, class 150		D 1
ASME B16.5 RF, class 300		D 2
ASME B16.5 RF, class 600		D 3
ASME B16.5 RF, class 900 (p- and t-rating as class 600)		D 4
ASME B16.5 RF, class 1500 (p- and t-rating as class 600)		D 5
ISO 228-1G female pipe thread		E 1
ASME B1.20.1 NPT female pipe thread		E 3
DIN 11851 hygienic screwed		F 1
DIN 32676 (ISO) clamp serie A		G 2
SMS 1145 hygienic screwed		K 1
JIS B2220/10K		L 2
JIS B2220/20K		L 4
EN 1092-1, PN 16, NAMUR length		N 1
EN 1092-1, PN 40, NAMUR length		N 2
Wetted parts material		
AISI 316L/1.4435/1.4404		1
AISI 316L/1.4435/1.4404 (polished)		2
Nickel-alloy C4		3
Calibration/Accuracy class		
0.2 % flow, 10 kg/m³ density		0
0.1 % flow, 2 kg/m³ density		1
Standard fraction (with density 2 kg/m³)		8
Customer selected fraction		9
		N O Y

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC330

Selection and Ordering data	Article No.	Order code
SITRANS FC330 Digital Coriolis flowmeter with SITRANS FCS300 standard flow sensor compact or remote mounting with FCT030 transmitter	7 ME 4 6 3 3 -	
Mounting style, transmitter housing and material		A D G K U
None (replacement sensor)		
Compact, IP67 fieldmount, aluminum		
Remote, IP67 fieldmount, aluminum, M12		
Remote, IP67 fieldmount, aluminum, T/Box		
Remote, IP67, wall mount, aluminium		
Ex approval (depending on variant)		A C F L M N P Q U
Non-Ex		
ATEX (zone 1)		
IECEX (zone 1)		
US (cCSAus), Div 1		
Canada (cCSAus), zone 1		
NEPSI (in preparation)		
INMETRO (in preparation)		
KCs (in preparation)		
EAC (in preparation)		
Local User Interface		0 1 3
None (replacement sensor, DSL only)		
Blind		
Graphical, 240 x 160 pxl		

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Cable glands	
None (replacement sensor)	A00
Metric, no glands	A01
Metric, Nylon, limited to -20 °C/-4 °F	A02
Metric, brass/Ni plated	A05
Metric, stainless steel	A06
NPT, no glands	A11
NPT, Nylon, limited to -20 °C/-4 °F	A12
NPT, brass/Ni plated	A15
NPT, stainless steel	A16
Metric thread with M12 socket fitted	A20
Software functions and CT approvals	
None (replacement sensor)	B10
Standard	B11
CT OIML R 117 (in preparation)	B31
CT NTEP (in preparation)	B52
I/O configuration Ch1	
No output channel	E00
4 ... 20 mA HART Active/Passive (non-Ex)	E02
Ca 4 ... 20 mA HART active (Ex)	E06
Ca 4 ... 20 mA HART passive (Ex)	E07
PROFIBUS PA	E10
PROFIBUS DP (non-Ex)	E11
Modbus RTU RS 485	E14

Selection and Ordering data	Order code
I/O configuration Ch2, Ch3 and Ch4	
None	F00
Non Ex: Sig O, None, None	F01
Non Ex: Sig O, Sig I/O, None	F02
Non Ex: Sig O, Sig I/O, Sig I/O	F03
Non Ex: Sig O, Sig I/O, R	F04
Non Ex: Sig O, R, R	F05
Non Ex: Sig O, R, None	F06
Ex: pSig O, None, None	F11
Ex: pSig O, pSig I/O, None	F12
Ex: pSig O, pSig I/O, pSig I/O	F13
Ex: pSig O, pSig I/O, R	F14
Ex: pSig O, R, R	F15
Ex: pSig O, R, None	F16
Ex: aSig O, None, None	F21
Ex: aSig O, aSig I/O, None	F22
Ex: aSig O, aSig I/O, aSig I/O	F23
Ex: aSig O, aSig I/O, R	F24
Ex: aSig O, R, R	F25
Ex: aSig O, R, None	F26
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' (only CH3&4).	
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	
Factory certificate to EN 10204 -2.2	C01
Material certificate EN 10204-3.1 with inspection	C02
Material certificate EN 10204-3.2 with inspection	C03
NACE MR0175/EN 10204-3.1	C04
Declaration of conformity certificate EN 10204-2.1	C05
Inspection certificate EN 10204-3.1 incl. dimension and function test	C06
Inspection certificate EN 10204-3.1 with PMI	C07
Pressure test acc. AD2000	C08
Test package (Pressure, NDT, WPS, WPQS)	C09
Inspection certificate to EN 10204 3.1/NDE-weld	C10
Certificate of accuracy acc. EN 10204 2.1	C11
Inspection certificate to EN 10204 3.1 with PMI (including heat analysis)	C12
Customer selected calibration	
DN 15 ... 50: Multi-point (5 flows x 1 pass)	D60
DN 15 ... 50: Multi-point (10 flows x 1 pass)	D61
DN 80: Multi-point (5 flows x 1 pass)	D62
DN 80: Multi-point (10 flows x 1 pass)	D63
DN 100: Multi-point (5 flows x 1 pass)	D64
DN 100: Multi-point (10 flows x 1 pass)	D65
DN 150: Multi-point (5 flows x 1 pass)	D66
DN 150: Multi-point (8 flows x 1 pass)	D67
Cable	
None	L50
5 m (16.4 ft), standard with M12 connectors fitted	L51
5 m (16.4 ft), standard	L52
10 m (32.8 ft) standard with M12 connectors fitted	L55
10 m (32.8 ft), standard, without plugs	L56
25 m (82 ft), standard with M12 connectors fitted	L59
25 m (82 ft), standard, without plugs	L60
50 m (164 ft), standard with M12 connectors fitted	L63
50 m (164 ft), standard, without plugs	L64
75 m (246 ft), standard with M12 connectors fitted	L67
75 m (246 ft), standard, without plugs	L68
Sensor options	
FCS300 Marine approval (in preparation)	S22
SD-Card accessibility via USB (not allowed in USA by Patent)	
Mass storage enabled	S30
Region-specific approvals and certificates	
South Korea (KCC) (in preparation)	W28
Additional data	
Please add "-Z" to Article No. and specify Order code(s) and plain text.	
Tag name	
Tag name plate, stainless steel	Y17

Operating instructions for SITRANS FC330

Description	Article No.
English	A5E44030648
• for firmware V 4.0 and onwards	
German	TBD
• for firmware V 4.0 and onwards	

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC310

Overview



The compact flowmeter SITRANS FC310 can be ordered for industrial, hygienic or NAMUR service.

Intended for integration into OEM skids, machines or pre-assembled plant systems, 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 with control in host system
- High immunity against process noise
- High turndown ratio of flowrates
- Suitable for liquid and gas service
- Easy to install, commission and maintain

With all global marine approvals the FC310 is ideal for integration in ship fuel efficiency and environmental measurement systems as well as bunkering solutions.

The FCT010 transmitter delivers true multi-parameter measurements i.e. massflow, density, temperature.

FC410 is available with Modbus RTU (RS 485) multi-drop serial communication.

The flowmeter is supplied with SensorFlash, a micro SD card containing all relevant certificates.

The SITRANS FC310 flowmeter system consists of a SITRANS FCS300 sensor and a SITRANS FCT010 transmitter always compact mounted.

Benefits

- It is compact and light, fitting neatly into dense piping arrangements
- Effective separation of measurement from plant vibration
- Reliable measurements due to high signal to noise ratio
- Short overall length; easy drop-in replacement into most existing installations
- Direct connection to host with high-speed Modbus simplifies machine or skid construction and set-up
- Modbus RS485 RTU allows simple and easy integration with all Modbus masters with fast update rate of process values

Technical specifications

Sizes	DN 15 (½") DN 25 (1") DN 50 (2") DN 80 (3") DN 100 (4") DN 150 (6")	Process connections	
Accuracy	± 0.10 % or ± 0.20 % Additional ± 0.40 % for gases	<ul style="list-style-type: none"> • Flanges • Pipe threads • Hygienic threads • Hygienic clamps 	EN 1092-1 B1, EN 1092-1 B2, EN 1092-1 D, ANSI/ASME B16.5, JIS B 2220 ASME B1.20 (NPT) female pipe thread, ISO228-1 G female pipe thread (BSPP) DIN 11851, SMS 1145 DIN 32676 serie A
Repeatability	± 0.05 %	Approvals	
Flow range (water @ 1 bar pressure loss)		<ul style="list-style-type: none"> • Hazardous area (zone 1) • Pressure equipment • Hygienic • Marine (in preparation) 	ATEX, IECEx, EAC Ex, cCSAus (NEPSI, INMETRO, EAC in prepara- tion) PED, CRN (in preparation) EHEDG (DN 25 ... 80) (in preparation) Germanischer Lloyd/det Norske Veritas, Bureau Veritas, Lloyds of London, American Bureau of Shipping, RINA (Italy)
<ul style="list-style-type: none"> • DN 15 • DN 25 • DN 50 • DN 80 • DN 100 • DN 150 	4 500 kg/h (163.3 lb/min) 20 500 kg/h (753.2 lb/min) 49 000 kg/h (1 800 lb/min) 122 000 kg/h (4 483 lb/min) 273 000 kg (10 031 lb/min) 459 200 kg/h (16 873 lb/min)	NAMUR	NAMUR-compliant (e.g. NE 21, NE 41 and NE 132)
Power supply	24 V DC ± 20 %; 110 mA	Communication	Modbus RS 485 RTU
Weight	4.6 ... 207 kg	EMC performance	
Material		Emission	EN 55011/CISPR-11 (Class B)
<ul style="list-style-type: none"> • Sensor - Measuring tubes - Enclosure • Transmitter 	316L stainless steel or Nickel Alloy C4 304 stainless steel Aluminum with corrosion-resis- tant coating	Immunity	EN/IEC 61326-1 (Industry)
Enclosure rating	IP67	Mechanical load	18 to 400 Hz random The flow meter will mechanically tolerate 3.17 g RMS in all direc- tions. Flow accuracy cannot be guaranteed under all conditions.
Pressure ratings			
<ul style="list-style-type: none"> • Measuring tubes - 316L - Nickel-Alloy C4 • Sensor enclosure 	100 bar (1450 psi) 100 bar (1450 psi) No pressure containment		
Temperature ratings			
<ul style="list-style-type: none"> • Process medium • Ambient 	-50 ... +205 °C (-58 ... +400 °F) -40 ... +60 °C (-40 ... +140 °F)		

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC310

Selection and Ordering data	Article No.	Order code
SITRANS FC310 Digital Coriolis flowmeter with SITRANS FCS300 standard flow sensor with hygienic and flange/pipe thread connections and compact mounting with FCT010 transmitter	7 ME 4 6 3 1 -	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Sensor size, connector 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 25, DN 20 (1", ¾")		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 50, DN 65 (2", 2½")		4 D
DN 80, DN 65 (3", 2½")		4 J
DN 80, DN 80 (3", 3")		4 K
DN 80, DN 100 (3", 4")		4 L
DN 100, DN 80 (4", 3")		5 M
DN 100, DN 100 (4", 4")		5 N
DN 100, DN 150 (4", 6")		5 Q
DN 150, DN 100 (6", 4")		6 D
DN 150, DN 150 (6", 6")		6 F
DN 150, DN 200 (6", 8")		6 H
Process connection		
EN 1092-1 B1, PN 16		A 0
EN 1092-1 B1, PN 40		A 1
EN 1092-1 B2, PN 63		A 2
EN 1092-1 B2, PN 100		A 3
EN 1092-1 D, PN 40		A 5
ASME B16.5 RF, class 150		D 1
ASME B16.5 RF, class 300		D 2
ASME B16.5 RF, class 600		D 3
ASME B16.5 RF, class 900 (p- and t-rating as class 600)		D 4
ANSI B16.5-2009, class 1500 (p- and t-rating as class 600)		D 5
ISO 228-1G female pipe thread		E 1
ASME B1.20.1 NPT female pipe thread		E 3
DIN 11851 hygienic screwed		F 1
DIN 32676 (ISO) hygienic clamp serie A		G 1
SMS 1145 hygienic screwed		K 1
JIS B2220/10K		L 2
JIS B2220/20K		L 4
EN 1092-1, PN 16, NAMUR length		N 1
EN 1092-1, PN 40, NAMUR length		N 2
Wetted parts material		
AISI 316L/1.4435/1.4404		1
AISI 316L/1.4435/1.4404 (polished)		2
Nickel-Alloy C4		3
Calibration/Accuracy class		
0.2 % flow, 10 kg/m³ density		0
0.1 % flow, 2 kg/m³ density		1
Mounting style, transmitter housing and material		
Compact, IP67, aluminum		D
Ex approval		
Non-Ex		A
ATEX II 2G zone 1		C
IECEx Gb (zone 1)		F
US (cCSAus), Div 1		L
Canada (cCSAus), class I, zone 1		M
NEPSI (in preparation)		N
INMETRO (in preparation)		P
KCs (in preparation)		Q
EAC (in preparation)		U
Local User Interface		
Blind		1

Selection and Ordering data	Order code	Selection and Ordering data	Order code
Further designs Please add "-Z" to Article No. and specify Order code(s).		Add-on options and accessories Please add "-Z" to Article No. and specify Order code(s).	
Cable glands None (replacement sensor) Metric, no glands Metric, plastic Metric, brass/Ni plated Metric, stainless steel NPT, no glands NPT, plastic NPT, brass/Ni plated NPT, stainless steel Metric thread with M12 socket fitted	A00 A01 A02 A05 A06 A11 A12 A15 A16 A20	Certificates Factory certificate to EN 10204 -2.2 Material certificate EN 10204-3.1 with inspection Material certificate EN 10204-3.2 with inspection NACE MR0175/EN 10204-3.1 Declaration of conformity certificate EN 10204-2.1 Inspection certificate EN 10204-3.1 incl. dimension and function test Inspection certificate EN 10204-3.1 with PMI Pressure test acc. AD2000 Test package (Pressure, NDT, WPS, WPQS) Inspection certificate to EN 10204 3.1/NDE-weld Certificate of accuracy acc. EN 10204 2.1 Inspection certificate to EN 10204 3.1 with PMI (including heat analysis)	C01 C02 C03 C04 C05 C06 C07 C08 C09 C10 C11 C12
Software functions and CT approvals Standard	B11	Customer selected calibration DN 15 ... 50, multi-point, 5 flows x 1 pass DN 15 ... 50, multi-point, 10 flows x 1 pass DN 80, multi-point, 5 flows x 1 pass DN 80, multi-point, 10 flows x 1 pass DN 100, multi-point, 5 flows x 1 pass DN 100, multi-point, 10 flows x 1 pass DN 150, multi-point, 5 flows x 1 pass DN 150, multi-point, 8 flows x 1 pass	D60 D61 D62 D63 D64 D65 D66 D67
I/O configuration Ch1 Modbus RTU RS 485	E14	Cable (M12 versions of cable have a connector on both ends) None 5 m (16.4 ft), standard with M12 connectors fitted 5 m (16.4 ft), standard, without plugs 10 m (32.8 ft) standard with M12 connectors fitted 10 m (32.8 ft), standard, without plugs 25 m (82 ft), standard with M12 connectors fitted 25 m (82 ft), standard, without plugs 50 m (164 ft), standard with M12 connectors fitted 50 m (164 ft), standard, without plugs 75 m (246 ft), standard with M12 connectors fitted 75 m (246 ft), standard, without plugs	L50 L51 L52 L55 L56 L59 L60 L63 L64 L67 L68
I/O configuration Ch2, Ch3 and Ch4 None	F00	Sensor options FCS300 Marine approval	S22
		Additional data Please add "-Z" to Article No. and specify Order code(s) and plain text.	
		Tag name Tag name plate, stainless steel	Y17

Operating instructions for SITRANS FC310

Description	Article No.
English • for firmware V 4.0 and onwards	A5E39789214
German • for firmware V 4.0 and onwards	TBD

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC410 and FC430 for OEM customers

Overview



The complete flowmeter system SITRANS FC consist of a new FCS400 sensor in sizes DN 15 to DN50 mm and a FCT030 multichannel/multifunctional in compact or remote versions, or a single Modbus-channel FCT010 transmitter in compact version. 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
- Aerated flow filtering system, for advanced filtering of fluids with gas or air bubbles
- Build in Data logger for all process variables and status messages (FCT030)
- Build in Batch functionality (FCT030)

The SITRANS FC430 is available with current output HART 7.5, Modbus RS485 RTU, PROFIBUS DP or PROFIBUS PA as standard on Channel 1. Additional I/O 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 SensorFlash, a micro SD card for configuration backup, firmware update and data storage.

The SITRANS FC410 is available with a Modbus RTD output transferring all process values to a any PLC or DCS system like SIMATIC S7-1200; S7-1500 or PCS7. True multi-parameter measurements i.e. massflow, density, temperature.

The SITRANS FC410 is available with MODBUS RTU (RS 485) multi-drop serial communication.

Benefits

- It is truly compact 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
- Shortest overall length; easy drop-in replacement into most existing installations

Application

SITRANS FCS400 mass flowmeters are especially suitable for applications for machinebuilder, skid manufacturer and OEM's in general for the 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: detergents, bulk chemicals, acids, alkalis, paint mixing systems, solvents and resins, fertilizer, technical gases
- Oil & Gas Processing Up- Mid- Down stream: Well-head monitoring, oil separators, refineries control, furnace control
- Hydrocarbon processing: oil refining, derivatives manufacturing, polymerization
- Power industry processing
- Marine Application: Fuel management & consumption; bunkering solutions; Boiler control
- Food & Beverage: dairy products, beer, wine, Alcohol / spirit, soft drinks, °Brix/°Plato, fruit juices and pulps, bottling, CO₂ dosing, CIP/SIP-liquids, mixture recipe control

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.

Flowmeter SITRANS FC410 and FC430 for OEM customers

Technical specifications

Flowmeter	SITRANS FC430	SITRANS FC410
		
Sizes	DN 15 (½") DN 25 (1") DN 50 (2")	
Accuracy	± 0.10 % for liquids additional ± 0.25 for gases	
• Massflow	± 5 kg/m ³ or 0.5 kg/m ³ (in preparation)	
Repeatability	± 0.05 %	
Flow range (liquids) Q _{nom} (water @ 1 bar pres- sure loss) (Q _{max} approx. 2 x Q _{nom})	• DN 15 (½") 3 700 kg/h (8 200 lb/h) • DN 25 (1") 11 500 kg/h (25 300 lb/h) • DN 50 (2") 52 000 kg/h (115 000 lb/h)	
Installation	Compact or remote	Compact
Display	Full graphical display, 240 x 160 pixels with selection of 6 languages	No display
Totalizer	Three eight-digit counters for forward, net or reverse flow	One Totalizer
Process values	Mass, volume, corrected volume, temperature, density, fraction e.g. Brix, Plato % Alc., concentration	Mass, volume, temperature, density
Power supply	20 ... 27 V DC ± 10%; 100 ... 240 V AC ± 10 %, 47 ... 63 Hz ± 10%	24 V DC ± 20%; 110 mA

Flowmeter	SITRANS FC430	SITRANS FC410
Materials	• Sensor - Wetted parts 316L stainless steel - Enclosure 304 stainless steel • Transmitter Aluminum with corrosion-resistant coating	
Enclosure rating	IP67	
Pressure ratings	• Measuring tubes - 316L 100 bar (1450 psi) • Sensor enclosure 20 bar (DN 15, DN 25) 17 bar (DN 50) Burst pressure >100 bar	
Temperature ratings	• Process medium - DN 15 ... DN 50 -50 ... +200 °C (-58 ... +392 °F) • Ambient -40 ... +60 °C (-40 ... +140 °F) • Display -20 ... +60 °C -4 ... +140 °F	
Process connections	• 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) male pipe thread, ISO228-1 G male pipe thread, VCO Quick-connect • Hygienic threads DIN 11851, DIN 11864-1A, ISO 2853, SMS 1145 • Hygienic clamps DDIN 11864-3A, DIN 32676, ISO 2852	
Approvals	• Hazardous area (zone 1 / 21) ATEX, IECEx, cCSA us • Pressure equipment PED, CRN	
NAMUR	NAMUR-compliant (e.g. NE 21, NE 41, NE 107 and NE 132)	
I/O	Up to 4 channels combining analog, relay or digital outputs and binary input	-
Communication	HART PROFIBUS PA PROFIBUS DP Modbus RTU (RS 485)	Modbus RTU (RS 485)

Selection and Ordering data (please contact Siemens sales office)

SITRANS FC430 Digital Coriolis flowmeter with SITRANS FCS400 sensor compact or remote mounting with FCT030 transmitter

Article No.

7 ME 4 6 1 3 -



SITRANS FC410 Digital Coriolis flowmeter with SITRANS FCS400 sensor compact mounting FCT010 transmitter

7 ME 4 6 1 1 -



Flow Measurement

SITRANS F C

SITRANS F C sensor MASS 2100 DI 1,5 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

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 below 100 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 1/4" NPT or 1/4" 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.



SITRANS F C sensor MASS 2100 DI 1,5 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

Function

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

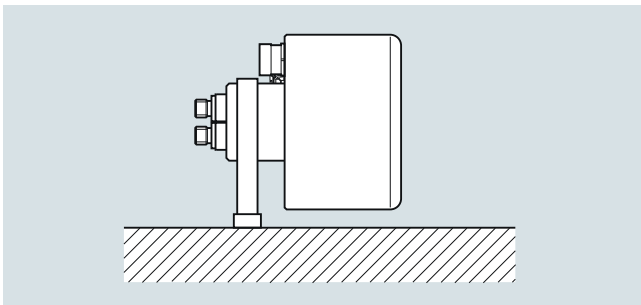
Integration

The sensor can be connected to FCT010, FCT030, SIFLOW and MASS 6000 (non CE) transmitters for remote installation only.

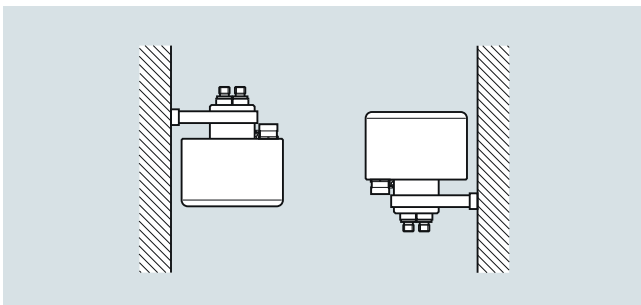
All sensors are delivered with a Sensor Flash or SENSORPROM containing all information about calibration data, identity and factory pre-programming of transmitter settings

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)

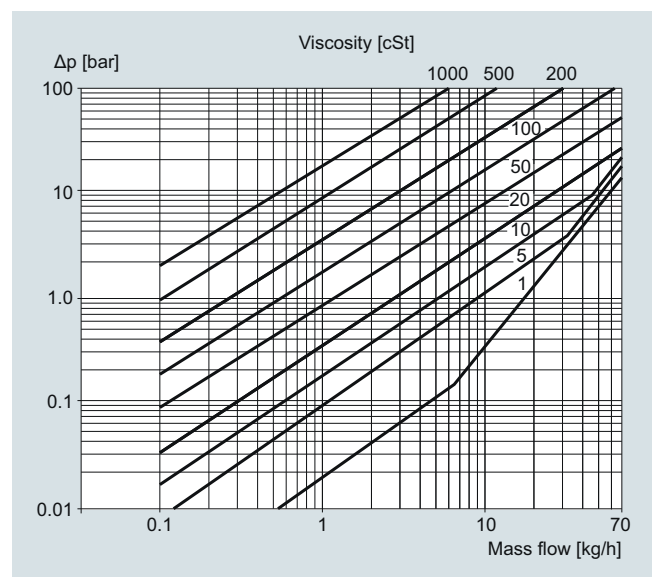
Technical specifications

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
Media temperature	
Standard	-50 ... +125 °C (-58 ... +257 °F)
High-temperature version	-50 ... +180 °C (-58 ... +356 °F)
Ambient temperature	-20 ... +50 °C (-4 ... +122 °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, Ex ia IIC T3-T6, EAC Ex TC RU C-DE, MIO62.B.02013, 0Ex ia IIC T3...T6 Gb, 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

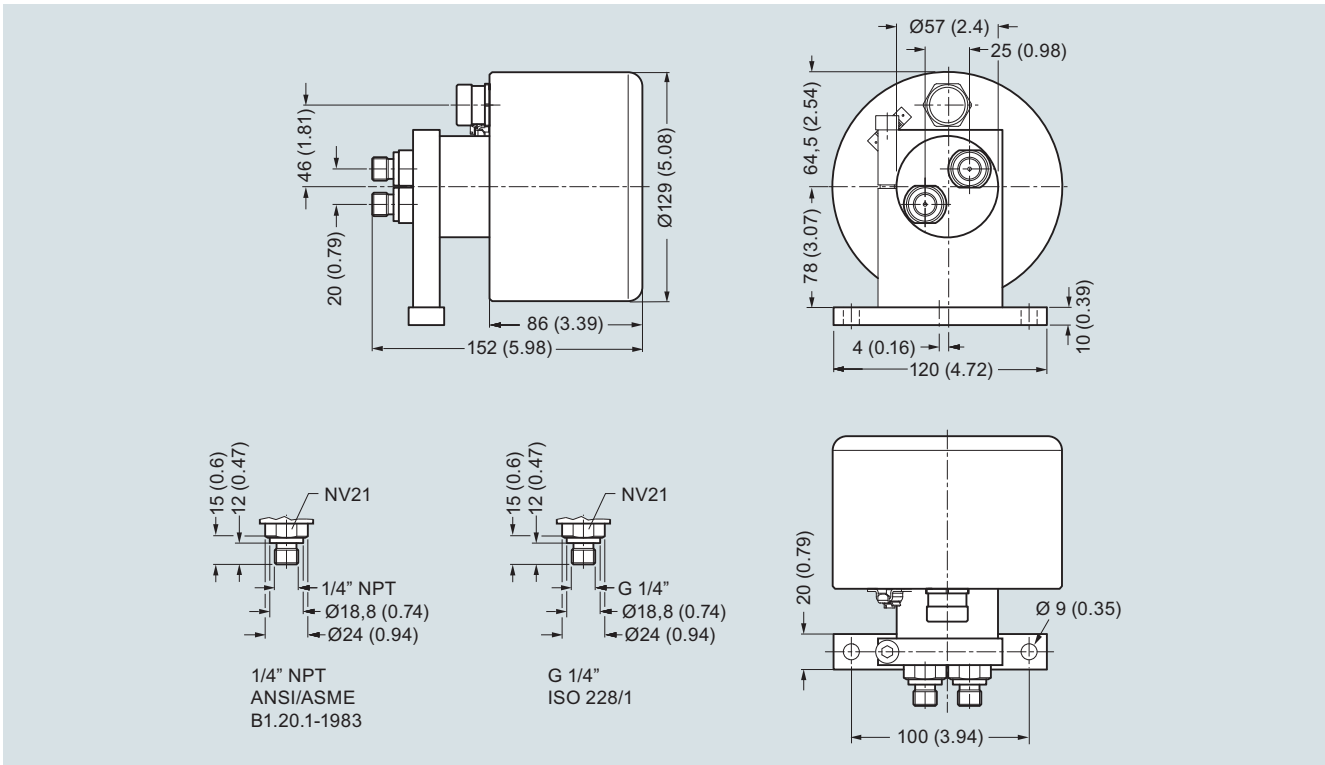
SITRANS F C

SITRANS F C sensor MASS 2100 DI 1,5 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

Dimensional drawings

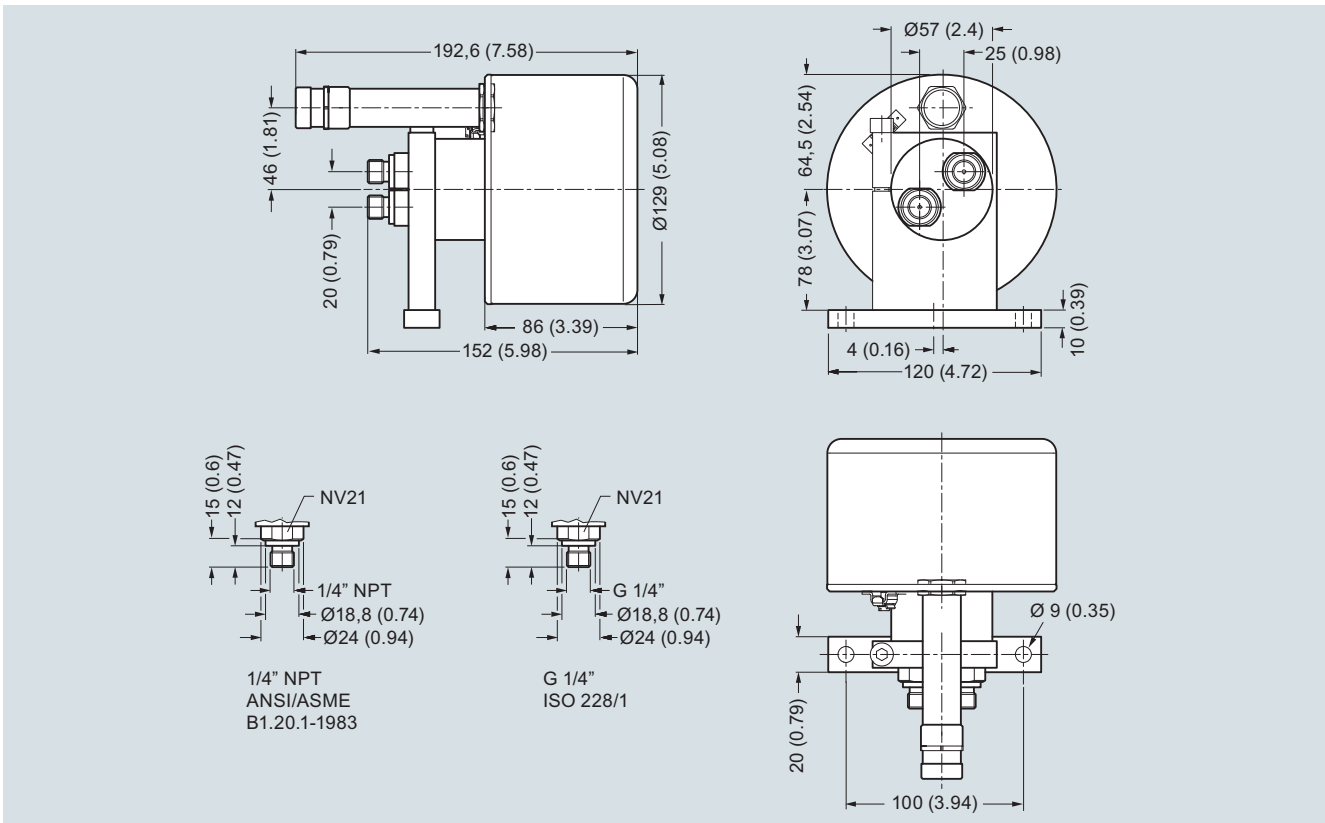
MASS 2100 DI 1.5 (1/16")

3



Dimensions in mm (inch)

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



Dimensions in mm (inch)

SITRANS F C sensor FC300 DN 4 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

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 0.007 g/cm³ (0.00025 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 0.0002 g/cm³ (0.0000072 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 FCT010, FCT030, SIFLOW and MASS 6000 (non CE) transmitters for remote installation only.

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

Flow Measurement

SITRANS F C

SITRANS F C sensor FC300 DN 4 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

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.

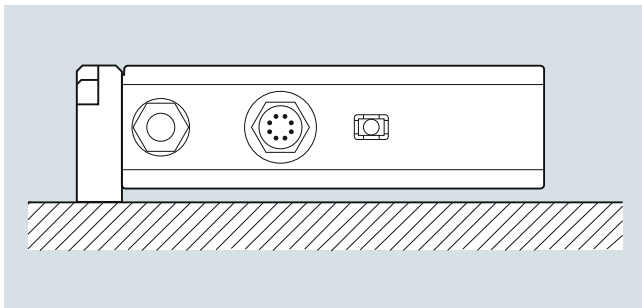
Vertical installation as shown in figure B can be used for liquid or gas applications.

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.

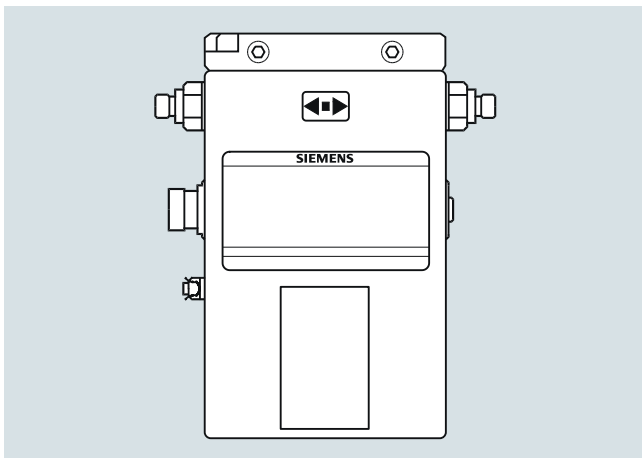
- To ensure that the sensor does not become partly empty, there must be a sufficient counter-pressure on the unit min. 0.2 bar (2.9 psi).
- Mount the sensor on a vibration-free and plane wall or steel frame.
- Locate the sensor low in the system in order to avoid under-pressure in the sensor separating 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

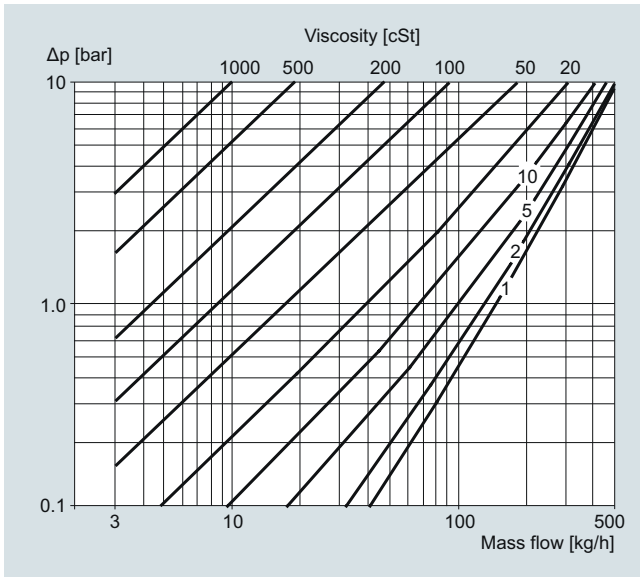
Sensor size	DN 4 (1/6")
Mass flow	
Measuring range	0 ... 350 kg/h (0 ... 772 lb/h)
Accuracy, mass flow	0.1 % of rate
Repeatability	0.05 % of rate
Max. zero point error	0.010 kg/h (0.022 lb/h)
Density	
Density range	0 ... 2.9 g/cm ³ (0 ... 0.105 lb/inch ³)
Density error	
• Stainless steel	0.007 g/cm ³ (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)
Media 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)
Ambient temperature	-20 ... +50 °C (-4 ... +122 °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	Stainless steel AISI 316L/1.4435
Measuring pipe and connection	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 EAC Ex TC RU C- DE.MIO62.B.02013 0Ex ia IIC T3...T6 Gb 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

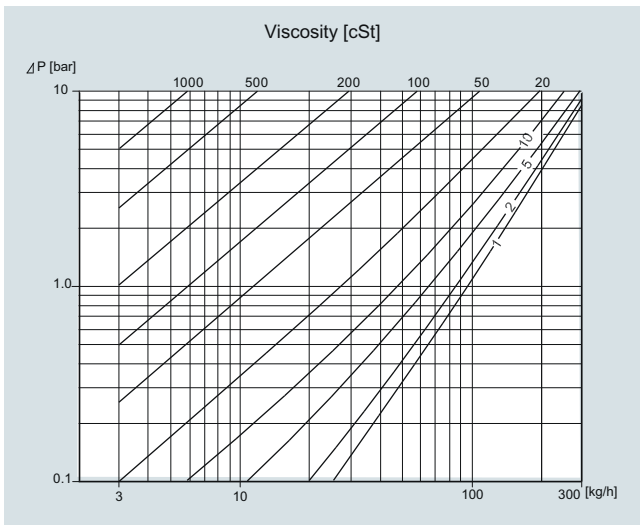
²⁾ Housing is not rated for pressure containment.

Characteristic curves

Pressure drop



Stainless steel 316L/1.4404



Hastelloy C22/2.4602

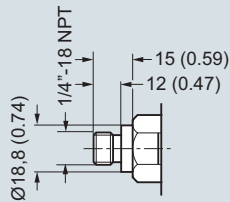
Flow Measurement

SITRANS F C

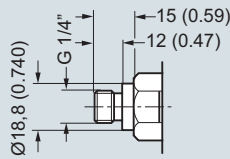
SITRANS F C sensor FC300 DN 4 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

Dimensional drawings

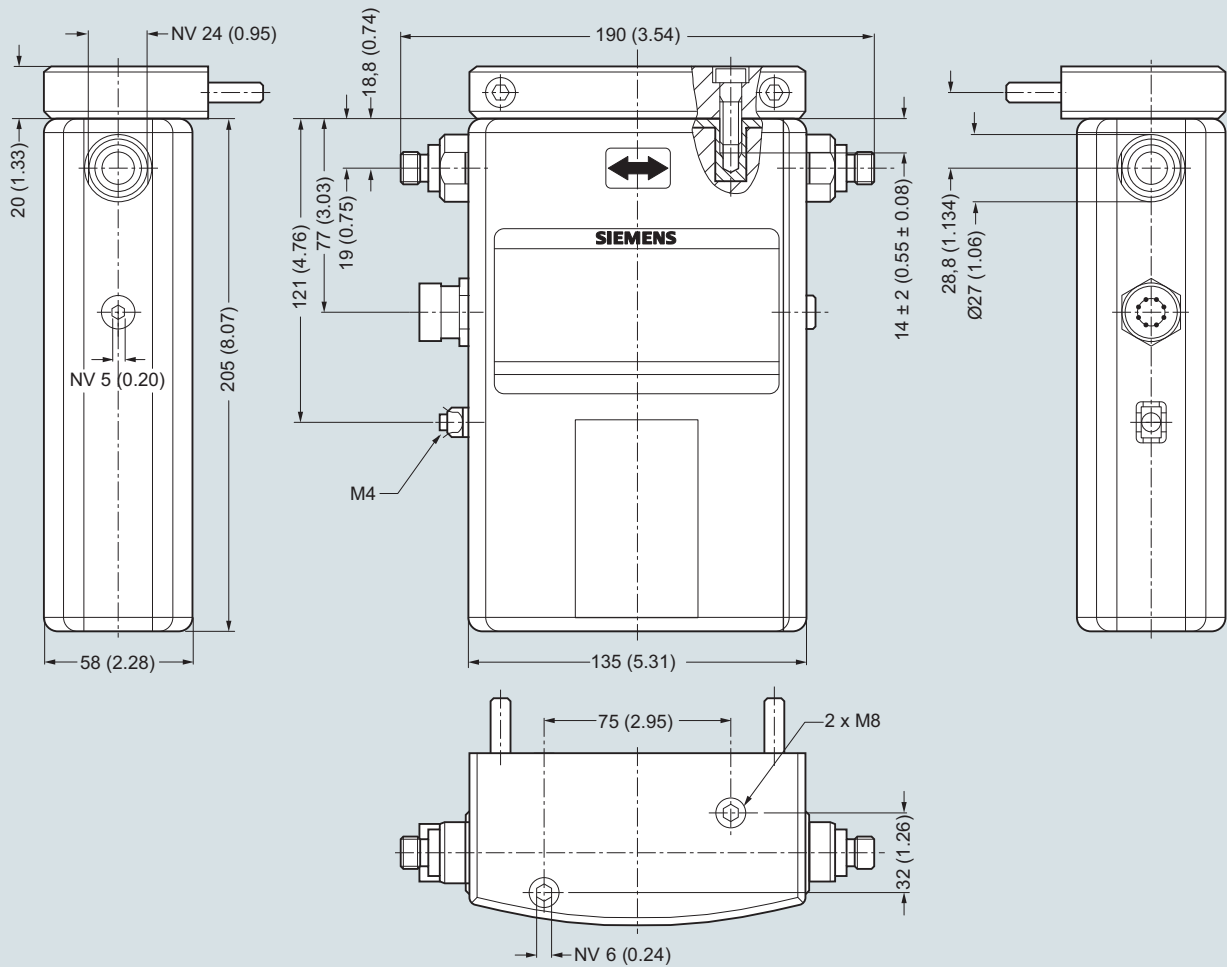
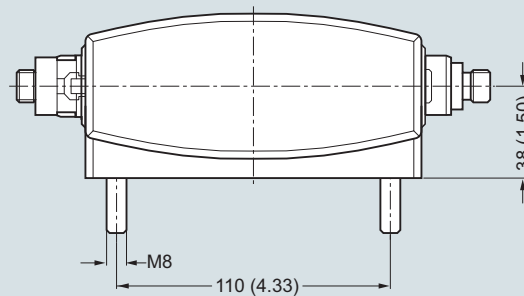
SITRANS FC300 DN 4



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



G 1/4" (ISO 228/1)



SITRANS FC300, dimensions in mm (inch)

SITRANS F C sensor MASS 2100 DI 3, DI 6 and DI 15 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

Overview



MASS 2100 DI 3 to DI 15 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 to 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
- 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 Sensor Flash/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: All the sensors MASS 2100, DI 3 to DI 15, 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 Measurement

SITRANS F C

SITRANS F C sensor MASS 2100 DI 3, DI 6 and DI 15 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

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 FCT010, FCT030 and MASS 6000 (none CE) transmitters for compact and remote installation as well as SIFLOW FC070 standard and Ex type transmitters.

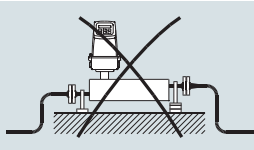
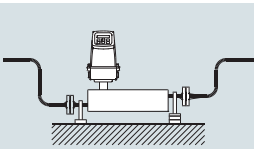
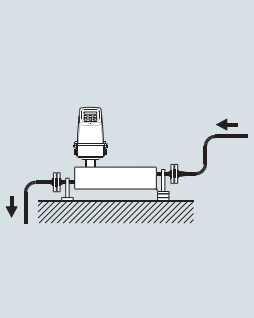
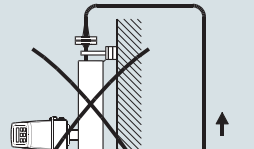
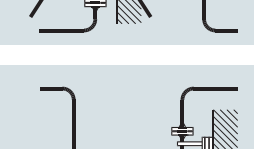
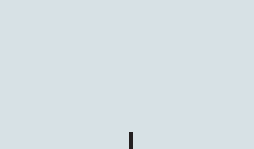
All sensors are delivered with a Sensor Flash or SENSORPROM containing all information about calibration data, identity and factory pre-programming of transmitter settings.

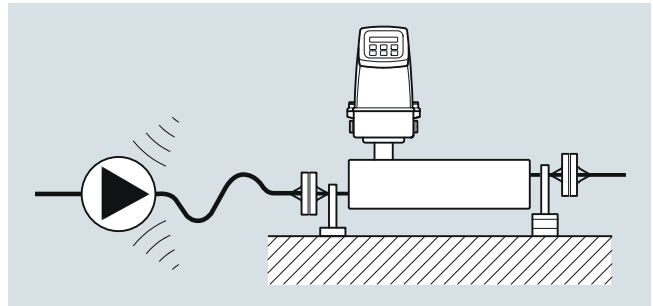
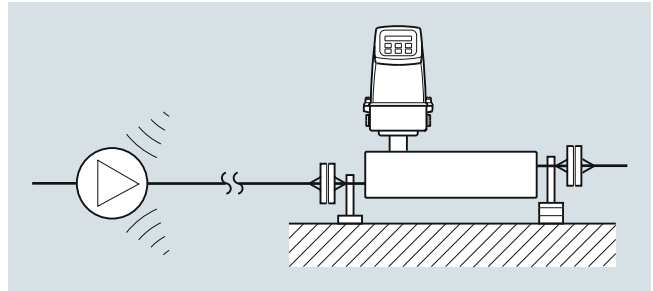
Installation guidelines MASS 2100 DI 3 ... DI 15 (1/8" ... 1/2")

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.

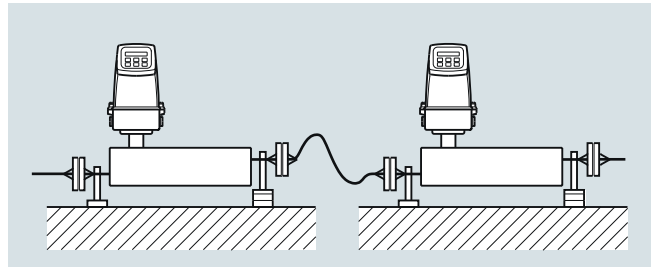
If the liquid is volatile or contains solid particles, vertical mounting is not recommended.

	Liquid	Gas
Horizontal	 	
Vertical	 	



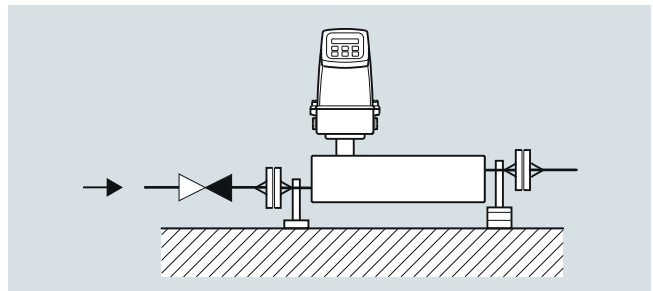
Vibration

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.

SITRANS F C sensor MASS 2100 DI 3, DI 6 and DI 15 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

Technical specifications

Versions (mm (inch))		DI 3 (1/8)	DI 6 (¼)	DI 15 (5/8)
Inside pipe diameter (sensor consists of one continuous pipe)	mm (inch)	3.0 (0.12)	6.0 (0.24)	14.0 (0.55)
Pipe wall thickness	mm (inch)	0.5 (0.02)	1.0 (0.04)	1.0 (0.04)
Mass flow measuring range (liquids)	kg/h (lb/h)	0 ... 250 (0 ... 550)	0 ... 1000 (0 ... 2200)	0 ... 5600 (0 ... 12345)
Density	g/cm ³ (lb/inch ³)	0 ... 2.9 (0 ... 0.10)		
Fraction e.g.	°Brix	0 ... 70 (applicable temperature range: 10 ... 99 °C (50 ... 210.2 °F))		
Temperature				
Media temperature	°C (°F)	-50 ... +180 °C (-58 ... +356 °F)		
Ambient temperature	°C (°F)	-20 ... +50 °C (-4 ... +122 °F)		
Liquid pressure measuring pipe¹⁾				
Stainless steel	bar (psi)	230 (3336)	265 (3844)	130 (1885)
Hastelloy C22/2.4602	bar (psi)	350 (5076)	410 (5946)	200 (2900)
Materials				
Measuring pipe, flange and thread connection		Stainless steel AISI 316L/1.4435 Hastelloy C22/2.4602		
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
ANSI B16.5, Class 150			½"	½"
ANSI B16.5, Class 600 (Class 300)			½"	½"
Dairy screwed connection (PN 16/25/40)³⁾				
DIN 11851			DN 10	DN 15
ISO 2853/BS 4825 part 4 (SS3351)			25 mm	25 mm
Dairy clamp connection (PN 16)³⁾				
ISO 2852/BS 4825 part 3 (SMS3016)			25 mm	25 mm
Thread				
ISO 228/1, PN 100		G¼" female	G¼" male	G½" male
ANSI/ASME B1.20.1, PN 100		¼" NPT female	¼" NPT male	½" 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				
ATEX, EAC Ex, c-UL-us		Zone 0: Ex ia IIC T3...T6 Ga		
UL (c-UL-us)		Class I, Div. 1: Grp. A, B, C, D		
Weight approx.	kg (lb)	4 (8.8)	8 (17.6)	12 (26.5)

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".

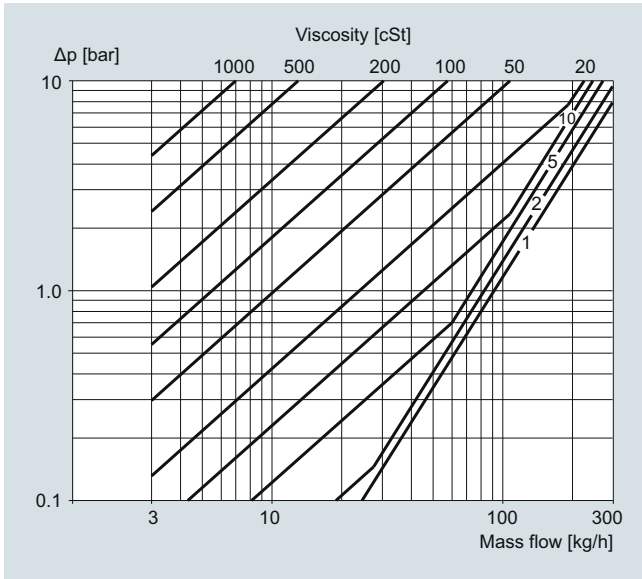
Flow Measurement

SITRANS F C

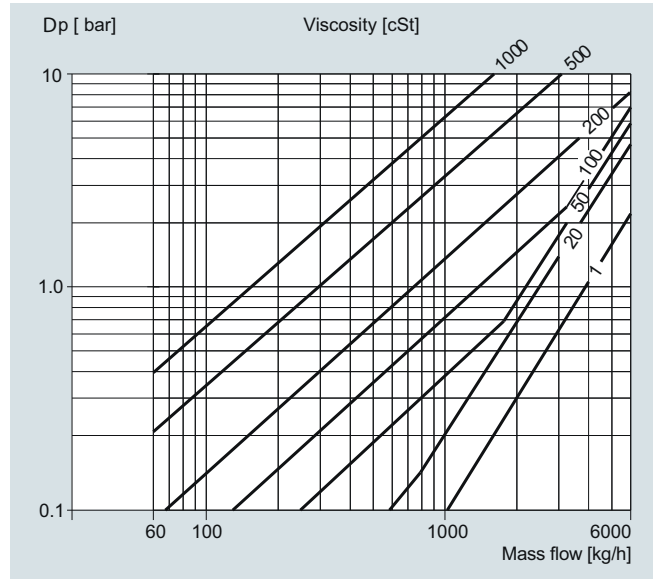
SITRANS F C sensor MASS 2100 DI 3, DI 6 and DI 15 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

Pressure drop

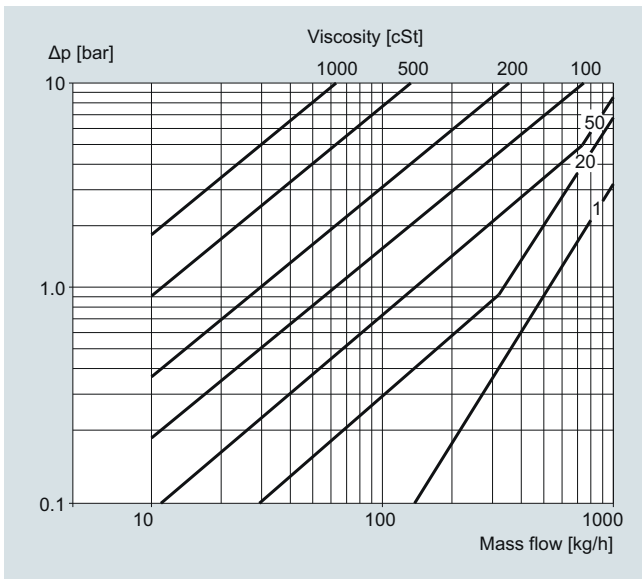
3



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

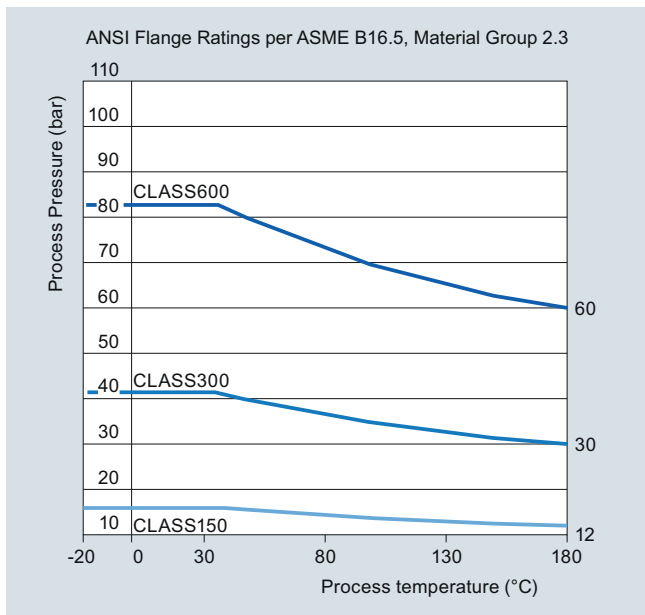


MASS 2100 DI 15 (1/2"), pressure drop for density = 1000 kg/m³

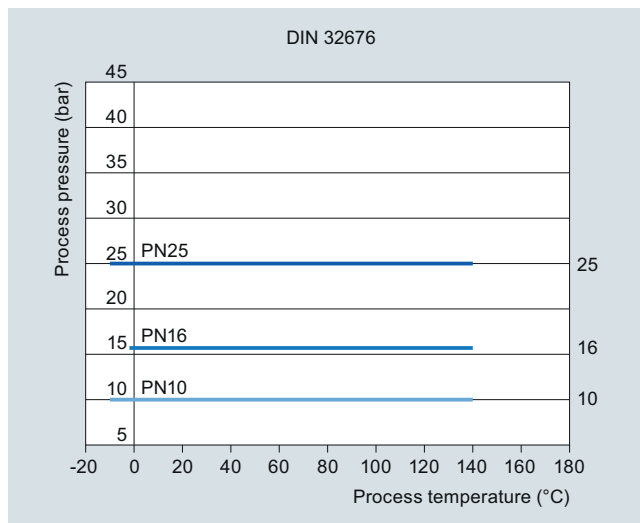


MASS 2100 DI 6 (1/4"), pressure drop for density = 1000 kg/m³

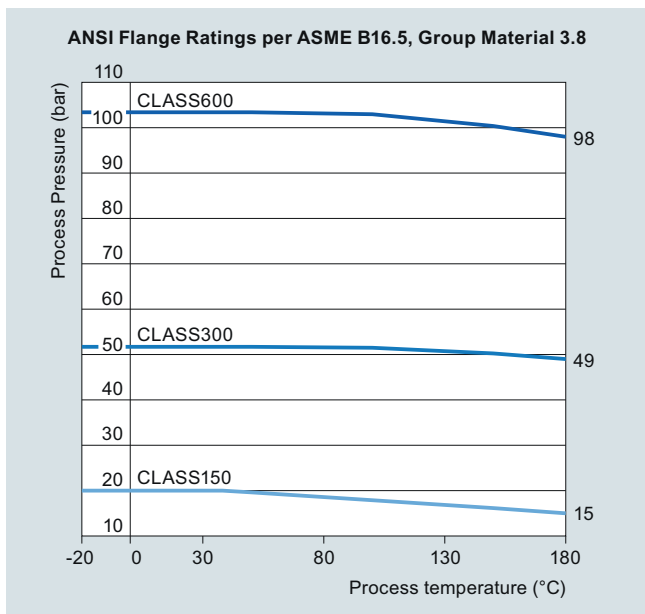
Pressure/temperature curves



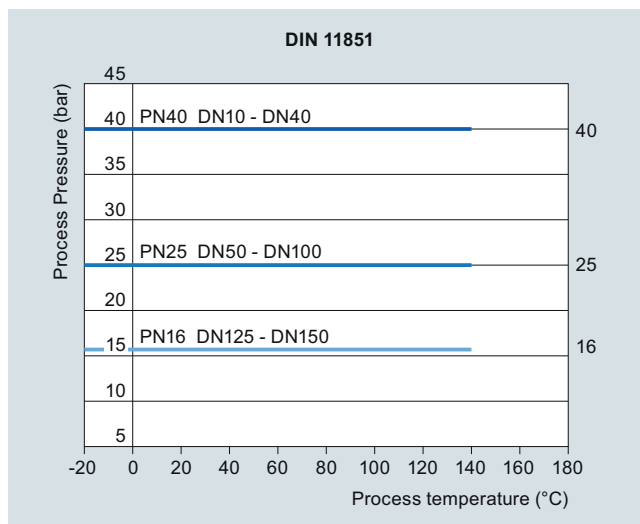
ASME flanges B16.5 stainless steel



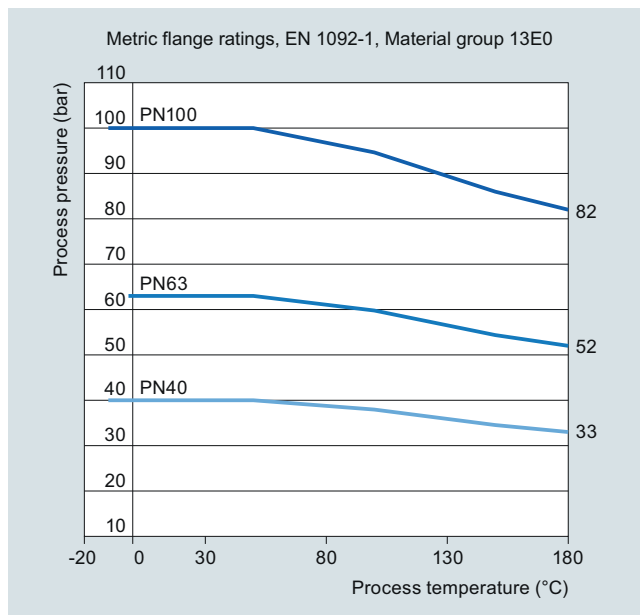
DIN 32676 flanges stainless steel (PN 10 ... PN 25)



ASME flanges B16.5 Hastelloy C22/2.4602



DIN 11851 flanges stainless steel (PN 25 ... PN 40)



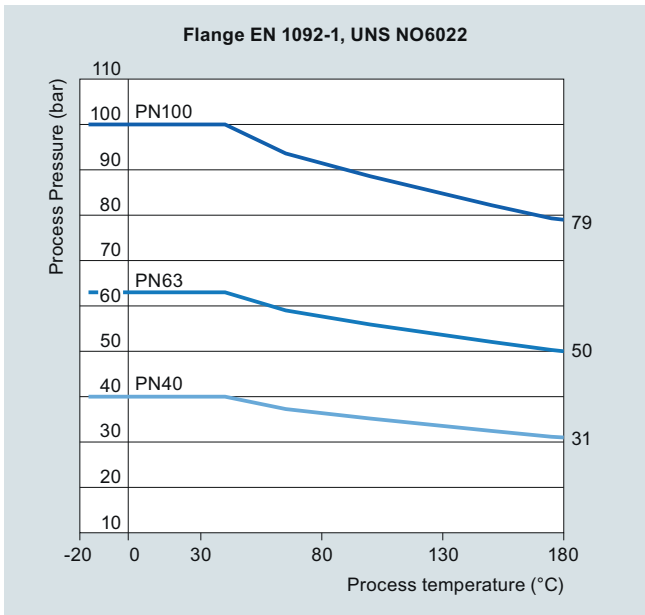
Flow Measurement

SITRANS F C

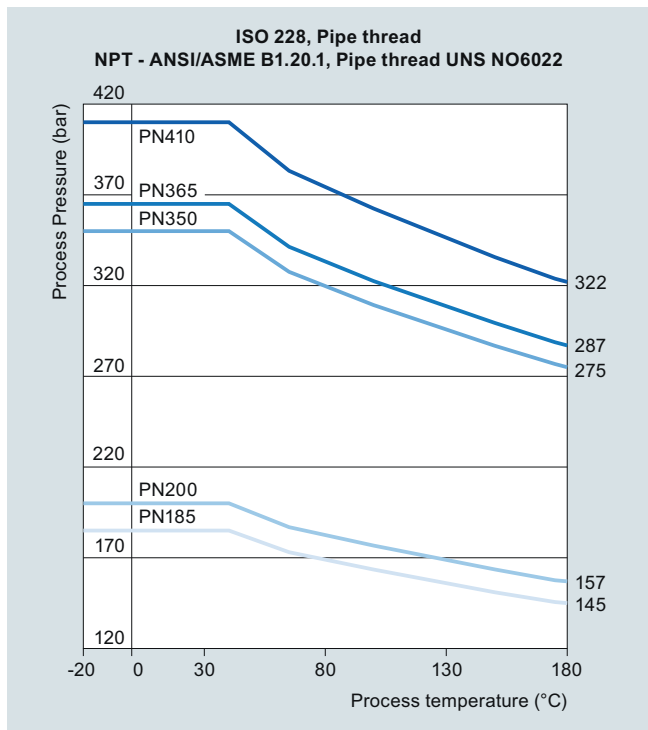
SITRANS F C sensor MASS 2100 DI 3, DI 6 and DI 15 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

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

3

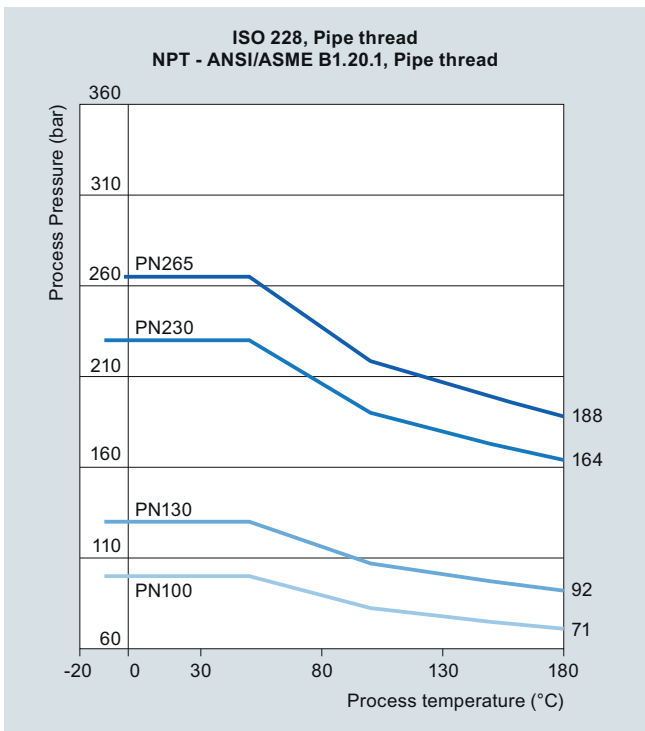


EN 1092 flanges Hastelloy C22/2.4602 (PN 40 ... PN 100)



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

For further information on the PED standard and requirements, see page 10/15.

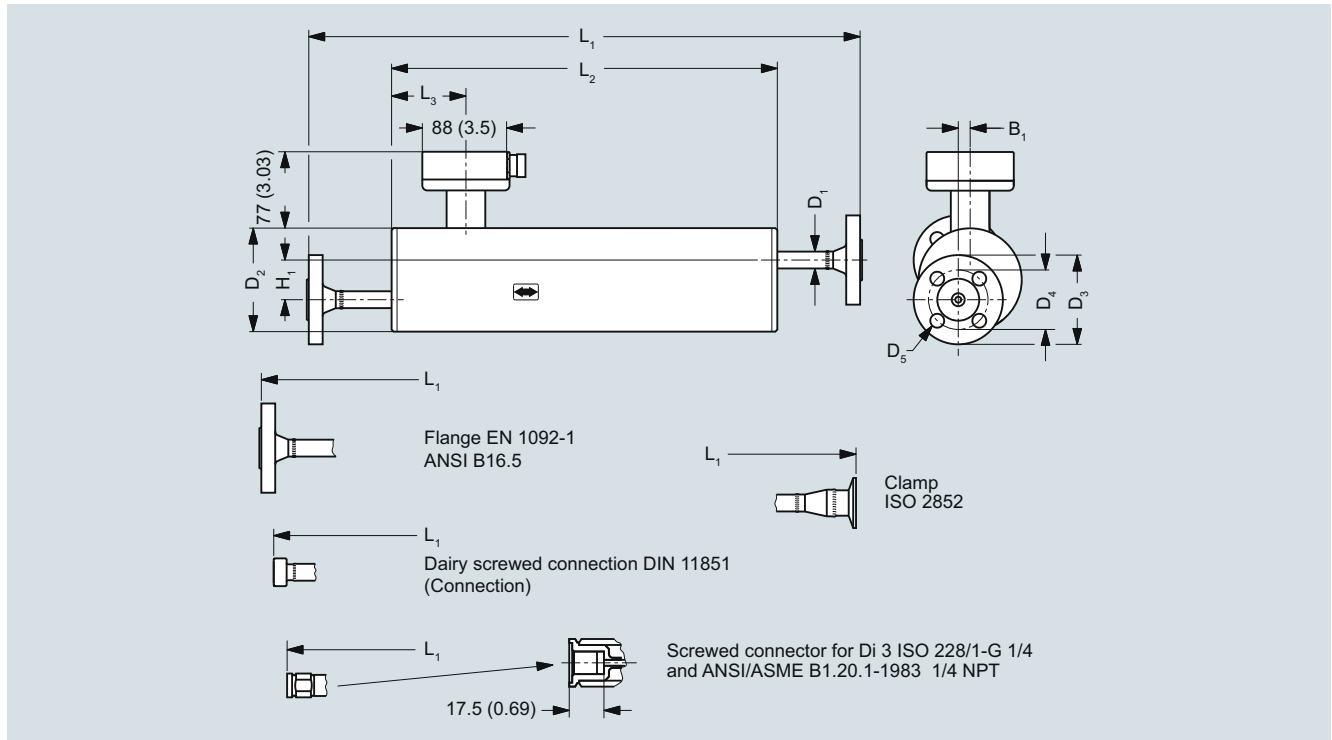


ISO 228 and NPT pipe thread stainless steel (PN 100 ... PN 265)

SITRANS F C sensor MASS 2100 DI 3, DI 6 and DI 15 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

Dimensional drawings

MASS 2100 sensor for analog cable connection



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 - G 1/4	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
	Screwed connection DIN 11851	PN 40	DN 10	532	390	62.0	40	12	17.0	104	-	-	-
	Clamp ISO 2852	PN 16	25 mm	570	390	62.0	40	12	17.0	104	-	-	-
DI 15 (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
	Screwed connection DIN 11851	PN 40	DN 15	586	444	75.5	44	20	21.3	129	-	-	-
	Clamp ISO 2852	PN 16	25 mm	624	444	75.5	44	20	21.3	129	-	-	-

Flow Measurement

SITRANS F C

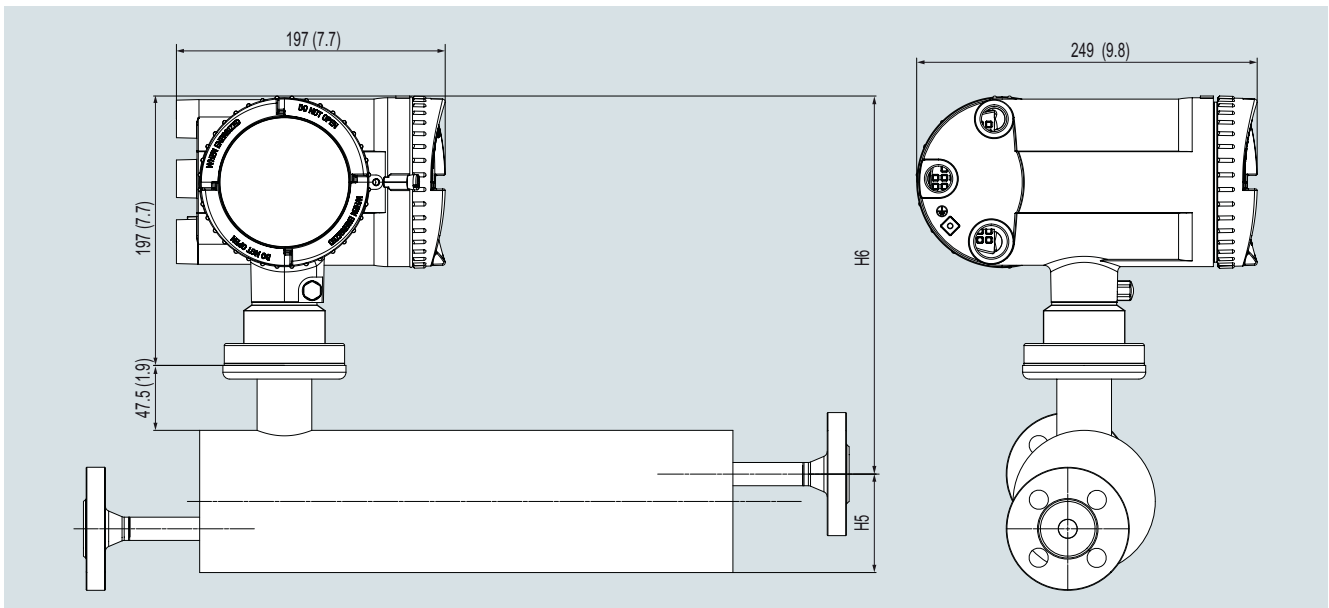
SITRANS F C sensor MASS 2100 DI 3, DI 6 and DI 15 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

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 - G $\frac{1}{4}$	PN 100	$\frac{1}{4}$ "	15.75	11.02	2.97	2.36	0	0.84	4.09	-	-	-
	Pipe thread ANSI/ASME B 1.20.1 - $\frac{1}{4}$ " NPT	PN 100	$\frac{1}{4}$ "	15.75	11.02	2.97	2.36	0	0.84	4.09	-	-	-
DI 6 ($\frac{1}{4}$)	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	$\frac{1}{2}$ "	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	$\frac{1}{2}$ "	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 ($\frac{1}{2}$)	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	$\frac{1}{2}$ "	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	$\frac{1}{2}$ "	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	-	-	-

SITRANS F C sensor MASS 2100 DI 3, DI 6 and DI 15 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

Compact with FCT030

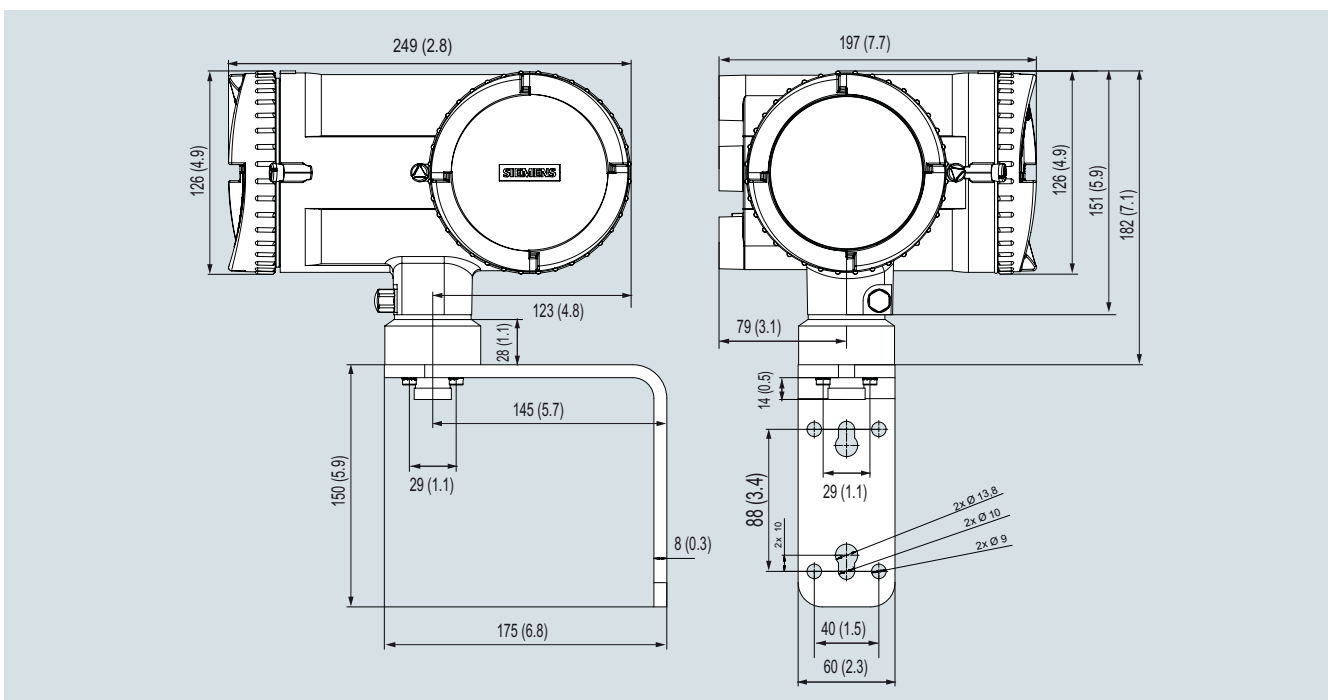


Dimensions in mm (inch)

MASS 2100 with FCT030 transmitter compact

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)	75.5 (2.97)	82 (3.23)	267 (10.51)	349 (13.74)
6 (1/4)	62 (2.44)	72 (2.83)	277 (10.91)	349 (13.74)
15 (1/2)	75.5 (2.97)	86.5 (3.41)	287 (11.3)	373.5 (14.71)

Transmitter FCT030 remote field mount for M20 analog cable connection



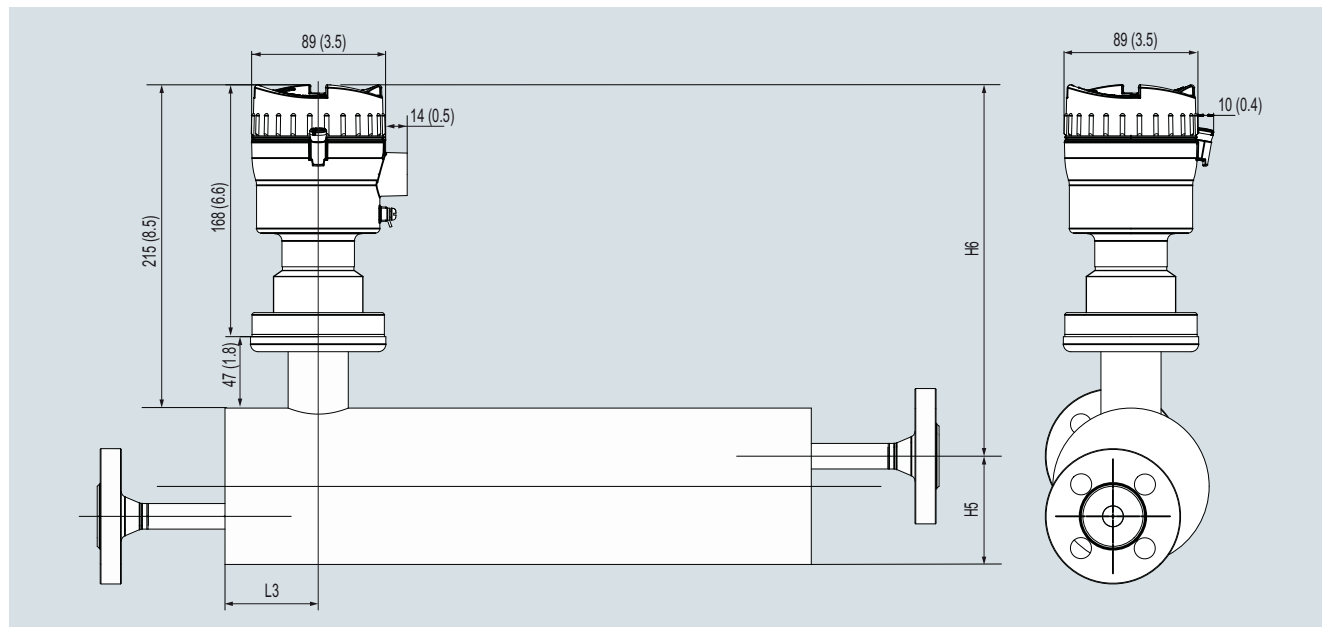
Dimensions in mm (inch)

Flow Measurement

SITRANS F C

SITRANS F C sensor MASS 2100 DI 3, DI 6 and DI 15 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

Compact with FCT010

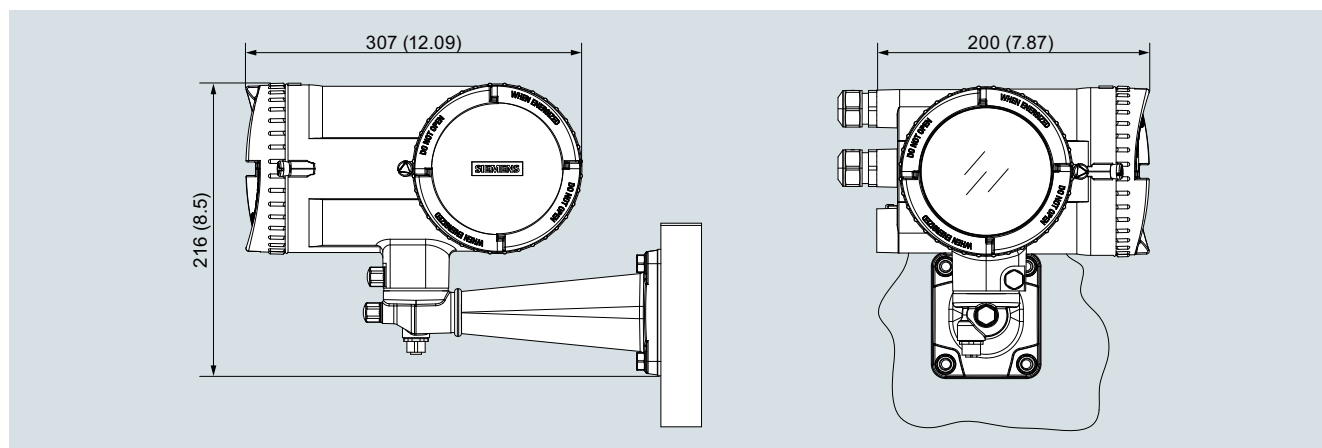


Dimensions in mm (inch)

MASS 2100 with FCT010 transmitter compact

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)	75.5 (2.97)	82 (3.23)	237 (9.33)	319 (12.56)
6 (1/4)	62 (2.44)	72 (2.83)	247 (9.72)	319 (12.56)
15 (1/2)	75.5 (2.97)	86.5 (3.41)	257 (10.11)	343.5 (13.52)

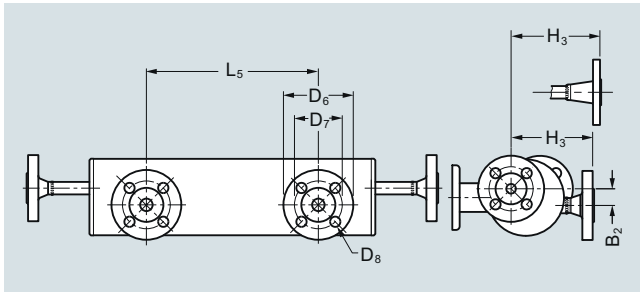
Transmitter FCT030 remote field mount for M12 digital cable connection



Dimensions in mm (inch)

SITRANS F C sensor MASS 2100 DI 3, DI 6 and DI 15 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

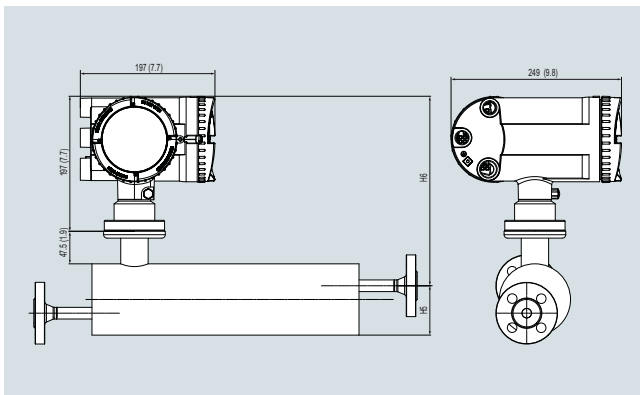
MASS 2100 sensor with "heating jacket"



Dimensions in mm (inch)

Sensor size	Connections heated			L5	H3	B2	D6	D7	D8
DI (inch)	Type	Pressure rating	Size	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)
DI 3 (1/8)	EN 1092-1	PN 40	DN 15	234 (9.21)	122 (4.8)	22 (0.87)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class 150	½"	234 (9.21)	131.6 (5.18)	22 (0.87)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)
DI 6 (¼)	EN 1092-1	PN 40	DN 15	234 (9.21)	112 (4.41)	22.7 (0.89)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class 150	½"	234 (9.21)	121.6 (4.79)	22.7 (0.89)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)
DI 15 (½)	EN 1092-1	PN 40	DN 15	234 (9.21)	126.5 (4.98)	31.5 (1.24)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class150	½"	234 (9.21)	136.1 (5.36)	31.5 (1.24)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)

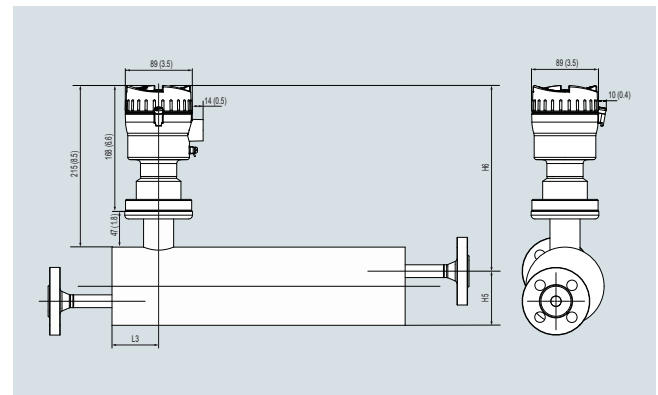
MASS 2100 and FCT030 compact version



MASS 2100 and FCT030 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)	75.5 (2.97)	82 (3.23)	267 (10.51)	349 (13.74)
6 (¼)	62 (2.44)	72 (2.83)	277 (10.91)	349 (13.74)
15 (½)	75.5 (2.97)	86.5 (3.41)	287 (11.30)	373.5 (14.70)

MASS 2100 and FCT010 compact version



MASS 2100 and FCT010 compact version, dimensions in mm (inch)

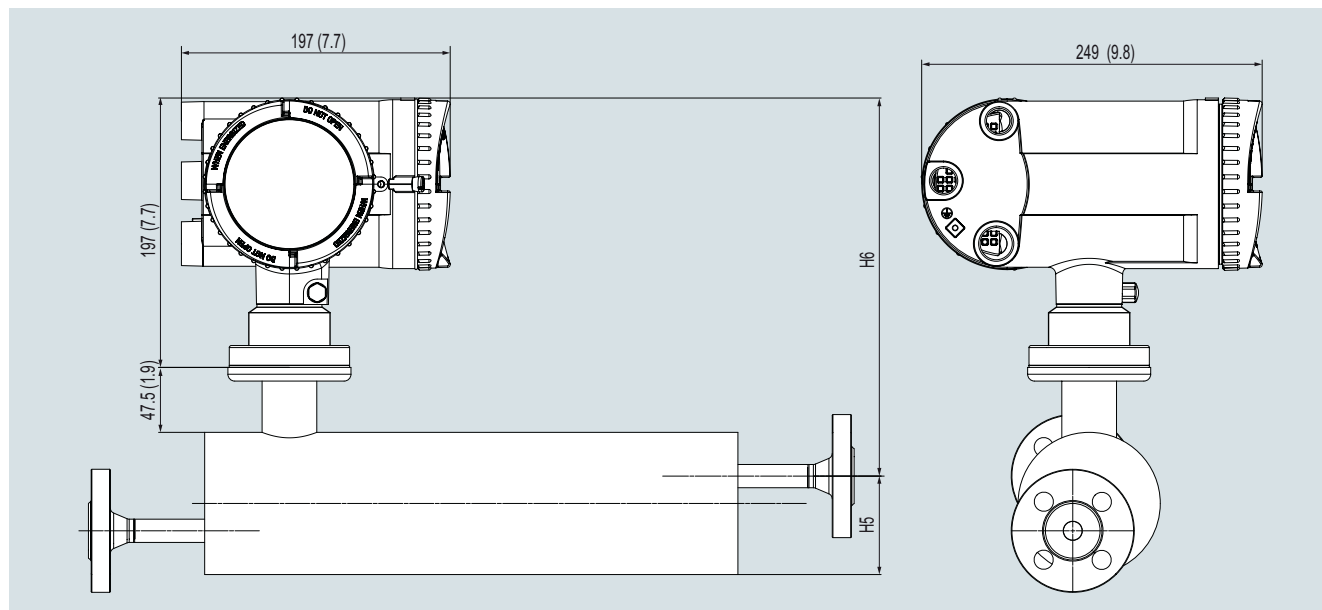
Sensor size [DI (inch)]	L ₃ [mm (inch)]	H ₅ [mm (inch)]	H ₆ [mm (inch)]	H ₅ + H ₆ [mm (inch)]
3 (1/8)	75 (2.95)	82 (3.23)	237 (9.33)	319 (12.56)
6 (¼)	62 (2.44)	72 (2.83)	247 (9.72)	319 (12.56)
15 (½)	75 (2.95)	87 (3.43)	257 (10.11)	343.5 (13.52)

Flow Measurement

SITRANS F C

SITRANS F C sensor MASS 2100 DI 3, DI 6 and DI 15 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

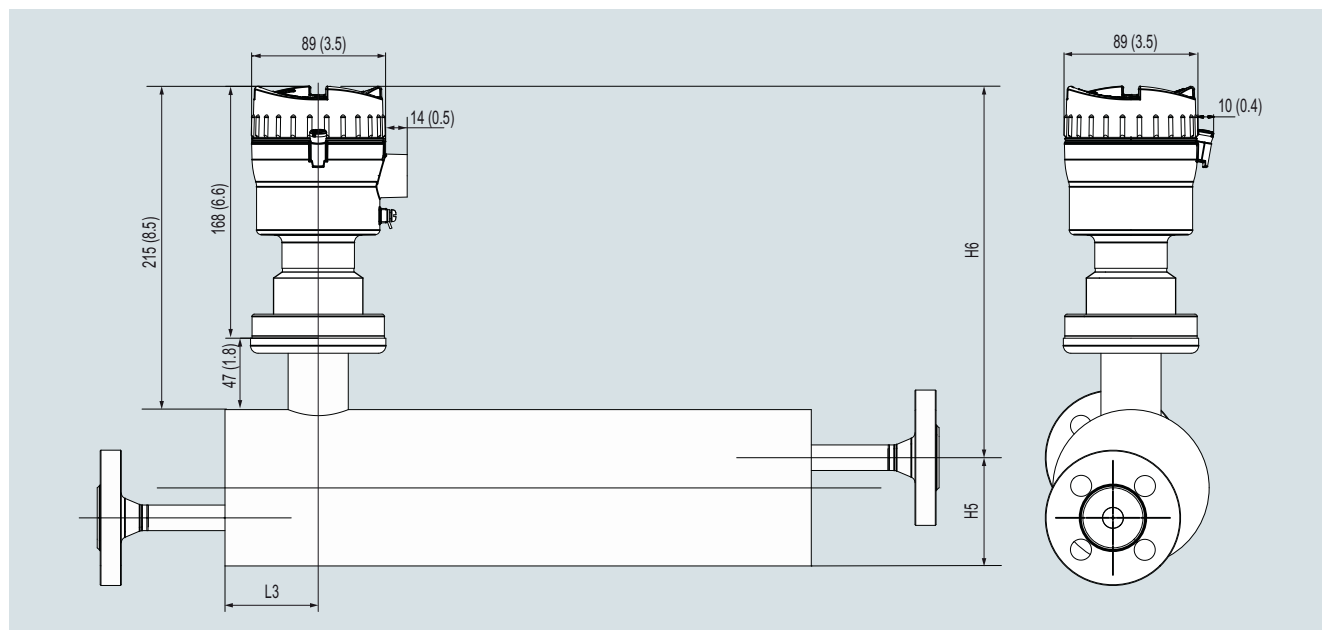
MASS 2100 and FCT030 compact version



MASS 2100 and FCT030 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)	75.5 (2.97)	82 (3.23)	267 (10.51)	349 (13.74)
6 (1/4)	62 (2.44)	72 (2.83)	277 (10.91)	349 (13.74)
15 (1/2)	75.5 (2.97)	86.5 (3.41)	287 (11.30)	373.5 (14.70)

MASS 2100 and FCT010 compact version



MASS 2100 and FCT010 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)	237 (9.33)	319 (12.56)
6 (1/4)	62 (2.44)	72 (2.83)	247 (9.72)	319 (12.56)
15 (1/2)	75 (2.95)	87 (3.43)	257 (10.11)	343.5 (13.52)

SITRANS F C sensors MASS 2100/FC300 with FCT010, FCT030 and SIFLOW FC070 transmitters (Low flow program)

Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Article No.	Ord. code
SITRANS F C sensors MASS 2100/FC300 with FCT010 transmitter	7ME4811-		SITRANS F C sensors MASS 2100/FC300 with FCT010 transmitter	7ME4811-	
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
Sensor type and connector size			Tube material (wetted) and max. operational temperature		
MASS 2100 DI 1.5, 1/4"	1G		AISI 316L/EN 1.4435, Max 115 °C	1	
MASS 2100 DI 3, 1/4"	3A		AISI 316L/EN 1.4435, Max 125 °C	2	
MASS 2100 DI 3, 1/4" Heated w. DIN	3B		AISI 316L/EN 1.4435, Max 180 °C	3	
MASS 2100 DI 3, 1/4" Heated w. ANSI	3C		Hastelloy C22/UNS N06022/EN 2.4602, Max. 115 °C	5	
FC300 DN 4, 1/4"	4A		Hastelloy C22/UNS N06022/EN 2.4602, Max. 125 °C	6	
MASS 2100 DI 6, 1/4"	6A		Hastelloy C22/UNS N06022/EN 2.4602, Max. 180 °C	7	
MASS 2100 DI 6, 1/4" Heated w. EN	6B				
MASS 2100 DI 6, 1/4" Heated w. ANSI	6C		Calibration		
MASS 2100 DI 6, DN 10	6D		Mass flow calibration	1	
MASS 2100 DI 6, DN 10 Heated w. EN	6E		Mass flow calibration and density calibration	4	
MASS 2100 DI 6, DN 10 Heated w. ANSI	6F				
MASS 2100 DI 6, DN 15 (1/2")	6G		Mounting style, Transmitter Housing and Material		
MASS 2100 DI 6, DN 15 (1/2") Heated w. EN	6H		Compact mounted, IP67, Aluminium transmitter housing (DI 3, DI 6 and DI 15 only)	D	
MASS 2100 DI 6, DN 15 (1/2") Heated w. ANSI	6J		Remote mounted, IP67, Aluminium transmitter housing, analog cable connection with M20 connectors	Z	P 0 D
MASS 2100 DI 6, DN 20 (3/4")	6K				
MASS 2100 DI 6, DN 20 (3/4") Heated w. EN	6L		Ex approvals		
MASS 2100 DI 6, DN 20 (3/4") Heated w. ANSI	6M		Non-Ex		A
MASS 2100 DI 6, DN 25 (1")	6N		ATEX Zone 1		C
MASS 2100 DI 6, DN 25 (1") Heated w. EN	6P		IECEx Zone 1		F
MASS 2100 DI 6, DN 25 (1") Heated w. ANSI	6Q		USA (FM, CSA, UL), Zone 1/Div1		H
MASS 2100 DI 15, DN 15 (1/2")	7A		Canada (CSA, UL), Zone 1/Div1		M
MASS 2100 DI 15, DN 15 (1/2") Heated w. EN	7B				
MASS 2100 DI 15, DN 15 (1/2") Heated w. ANSI	7C		Local User Interface		
MASS 2100 DI 15, DN 20 (3/4")	7D		Blind		1
MASS 2100 DI 15, DN 20 (3/4") Heated w. EN	7E				
MASS 2100 DI 15, DN 20 (3/4") Heated w. ANSI	7F				
MASS 2100 DI 15, DN 25 (1")	7G				
MASS 2100 DI 15, DN 25 (1") Heated w. EN	7H				
MASS 2100 DI 15, DN 25 (1") Heated w. ANSI	7J				
Process connection/Pressure					
No connections (spare part transmitter)	A0				
EN1092-1 B1, PN40	A1				
EN1092-1 B1, PN100	A3				
ASME B16.5, RF, Class 150	D1				
ASME B16.5, RF, Class 600	D3				
DIN 11851 Screwed connection	F1				
ISO2852 Hyg. Clamped	J1				
ISO2853 Hyg. Screwed	J5				
ISO 228-1 Pipe thread, PN 100	C1				
ISO 228-1 Pipe thread, PN 130	C2				
ISO 228-1 Pipe thread, PN 200	C3				
ISO 228-1 Pipe thread, PN 230	C4				
ISO 228-1 Pipe thread, PN 265	C5				
ISO 228-1 Pipe thread, PN 350	C6				
ISO 228-1 Pipe thread, PN 365	C7				
ISO 228-1 Pipe thread, PN 410	C8				
NPT ASME B 1.20.1 Pipe thread, PN 100	N1				
NPT ASME B 1.20.1 Pipe thread, PN 130	N2				
NPT ASME B 1.20.1 Pipe thread, PN 200	N3				
NPT ASME B 1.20.1 Pipe thread, PN 230	N4				
NPT ASME B 1.20.1 Pipe thread, PN 265	N5				
NPT ASME B 1.20.1 Pipe thread, PN 350	N6				
NPT ASME B 1.20.1 Pipe thread, PN 365	N7				
NPT ASME B 1.20.1 Pipe thread, PN 410	N8				

Flow Measurement

SITRANS F C

SITRANS F C sensors MASS 2100/FC300 with FCT010, FCT030 and SIFLOW FC070 transmitters (Low flow program)

Selection and Ordering data	Order code
Futher designs	
Please add "-Z" to Article No. and specify Order code(s).	
Cable glands	
None (mechanical sensor)	A00
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
Integral M12 socket	A20
SW functions & CT approvals	
Standard	B11
I/O configuration Ch1	
Modbus RTU RS 485	E14
I/O configuration Ch2, Ch3 and Ch4	
None	F00
Certificates	
Press test certificate CRN	C01
Press test certificate PED	C02
Material certificate EN 10204-3.1	C12
Welding inspection report	C13
Factory certificate according to EN 10204 2.2	C14
Factory certificate according to EN 10204 2.1	C15
Cleaning for oil and grease/ASTM-A380	C50
Cleaned according to PWIS	C51
Sensor data storage	
Sensor with SensorFlash for FCT	S20
Sensor with SensorProm for MASS 6000	S21
Cable sensor-transmitter	
None	L50
5 m, standard, M12 connectors	L51
5 m, standard, without connectors	L52
10 m, standard, M12 connectors	L55
10 m, standard, without connectors	L56
25 m, standard, M12 connectors	L59
25 m, standard, without connectors	L60
50 m, standard, M12 connectors	L63
50 m, standard, without connectors	L64
75 m, standard, M12 connectors	L67
75 m, standard, without connectors	L68
2 m cable, analog, with two M20 connectors	L85
5 m cable, analog, with two M20 connectors	L86
10 m cable, analog, with two M20 connectors	L87
15 m cable, analog, with two M20 connectors	L88

Selection and Ordering data	Order code
Additional data	
Please add "-Z" to Article No. and specify Order code(s) and plain text.	
Tag name	
Tag name plate, stainless steel	Y17
Extended calibration	
Multi-point high, (5 flows x 2 passes), 10 ... 100 % of Q_{nom}	Y61
Multi-point high, (10 flows x 1 pass), 10 ... 100 % of Q_{nom}	Y63

SITRANS F C sensors MASS 2100/FC300 with FCT010, FCT030 and SIFLOW FC070 transmitters (Low flow program)

Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Article No.	Ord. code
SITRANS F C sensors MASS 2100/FC300 with FCT030 transmitter	7ME4813-		SITRANS F C sensors MASS 2100/FC300 with FCT030 transmitter	7ME4813-	
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
Sensor type and connector size			Tube material (wetted) and max. operational temperature		
MASS 2100 DI 1.5, 1/4"	1G		AISI 316L/EN 1.4435, Max 115 °C	1	
MASS 2100 DI 3, 1/4"	3A		AISI 316L/EN 1.4435, Max 125 °C	2	
MASS 2100 DI 3, 1/4" Heated w. DIN	3B		AISI 316L/EN 1.4435, Max 180 °C	3	
MASS 2100 DI 3, 1/4" Heated w. ANSI	3C		Hastelloy C22/UNS N06022/EN 2.4602, Max. 115 °C	5	
FC300 DN 4, 1/4"	4A		Hastelloy C22/UNS N06022/EN 2.4602, Max. 125 °C	6	
MASS 2100 DI 6, 1/4"	6A		Hastelloy C22/UNS N06022/EN 2.4602, Max. 180 °C	7	
MASS 2100 DI 6, 1/4" Heated w. EN	6B				
MASS 2100 DI 6, 1/4" Heated w. ANSI	6C		Calibration		
MASS 2100 DI 6, DN 10	6D		Mass flow calibration	1	
MASS 2100 DI 6, DN 10 Heated w. EN	6E		Mass flow calibration and density calibration	4	
MASS 2100 DI 6, DN 10 Heated w. ANSI	6F		Standard fraction	8	
MASS 2100 DI 6, DN 15 (1/2")	6G				
MASS 2100 DI 6, DN 15 (1/2") Heated w. EN	6H		Mounting style, Transmitter Housing and Material		
MASS 2100 DI 6, DN 15 (1/2") Heated w. ANSI	6J		Compact mounted, IP67, Aluminium transmitter housing (DI 3, DI 6 and DI 15 only)	D	
MASS 2100 DI 6, DN 20 (3/4")	6K		Remote field mounted, IP67, Aluminium housing, M12 socket for digital cable connection (DI 3, DI 6 and DI 15 only)	G	
MASS 2100 DI 6, DN 20 (3/4") Heated w. EN	6L		Remote field mount, IP67, Aluminium housing, terminal box for digital cable connection (DI 3, DI 6 and DI 15 only)	K	
MASS 2100 DI 6, DN 20 (3/4") Heated w. ANSI	6M		Wall mount aluminum transmitter housing, M12 socket for digital cable connection (DI 3, DI 6 and DI 15 only)	U	
MASS 2100 DI 6, DN 25 (1")	6N		Remote field mount, IP67, Aluminium transmitter housing, analog cable connection with M20 connectors	Z	P 0 D
MASS 2100 DI 6, DN 25 (1") Heated w. EN	6P		Remote wall mount, IP67, aluminum transmitter housing, analog cable connection with M20 connectors	Z	P 0 E
MASS 2100 DI 6, DN 25 (1") Heated w. ANSI	6Q				
MASS 2100 DI 15, DN 15 (1/2")	7A		Ex approvals		
MASS 2100 DI 15, DN 15 (1/2") Heated w. EN	7B		Non-Ex	A	
MASS 2100 DI 15, DN 15 (1/2") Heated w. ANSI	7C		ATEX Zone 1	C	
MASS 2100 DI 15, DN 20 (3/4")	7D		IECEx Zone 1	F	
MASS 2100 DI 15, DN 20 (3/4") Heated w. EN	7E		USA (FM, CSA, UL), Zone 1/Div1	H	
MASS 2100 DI 15, DN 20 (3/4") Heated w. ANSI	7F		Canada (CSA, UL), Zone 1/Div1	M	
MASS 2100 DI 15, DN 25 (1")	7G				
MASS 2100 DI 15, DN 25 (1") Heated w. EN	7H		Local User Interface		
MASS 2100 DI 15, DN 25 (1") Heated w. ANSI	7J		Blind	1	
			Graphical, 240 x 160 pixels, glass lid	3	
Process connection/Pressure					
No connections (spare part transmitter)	A 0				
EN1092-1 B1, PN40	A 1				
EN1092-1 B1, PN100	A 3				
ASME B16.5, RF, Class 150	D 1				
ASME B16.5, RF, Class 600	D 3				
DIN 11851 Screwed connection	F 1				
ISO2852 Hyg. Clamped	J 1				
ISO2853 Hyg. Screwed	J 5				
ISO 228-1 Pipe thread, PN 100	C 1				
ISO 228-1 Pipe thread, PN 130	C 2				
ISO 228-1 Pipe thread, PN 200	C 3				
ISO 228-1 Pipe thread, PN 230	C 4				
ISO 228-1 Pipe thread, PN 265	C 5				
ISO 228-1 Pipe thread, PN 350	C 6				
ISO 228-1 Pipe thread, PN 365	C 7				
ISO 228-1 Pipe thread, PN 410	C 8				
NPT ASME B 1.20.1 Pipe thread, PN 100	N 1				
NPT ASME B 1.20.1 Pipe thread, PN 130	N 2				
NPT ASME B 1.20.1 Pipe thread, PN 200	N 3				
NPT ASME B 1.20.1 Pipe thread, PN 230	N 4				
NPT ASME B 1.20.1 Pipe thread, PN 265	N 5				
NPT ASME B 1.20.1 Pipe thread, PN 350	N 6				
NPT ASME B 1.20.1 Pipe thread, PN 365	N 7				
NPT ASME B 1.20.1 Pipe thread, PN 410	N 8				

Flow Measurement

SITRANS F C

SITRANS F C sensors MASS 2100/FC300 with FCT010, FCT030 and SIFLOW FC070 transmitters (Low flow program)

Selection and Ordering data	Order code	Selection and Ordering data	Order code
Further designs		Sensor data storage	
Please add "-Z" to Article No. and specify Order code(s).		Sensor with SensorFlash for FCT	S20
		Sensor with SensorProm for MASS 6000 (in preparation)	S21
Cable glands		SD-Card accessibility via USB (not allowed in USA by Patent)	
None (mechanical sensor)	A00	Mass storage enabled	S30
Metric, no glands	A01	Cable sensor-transmitter	
Metric, plastic	A02	None	L50
Metric, brass/Ni plated	A05	5 m, standard, M12 connectors	L51
Metric, stainless steel	A06	5 m, standard, without connectors	L52
NPT, no glands	A11	10 m, standard, M12 connectors	L55
NPT, plastic	A12	10 m, standard, without connectors	L56
NPT, brass/Ni plated	A15	25 m, standard, M12 connectors	L59
NPT, stainless steel	A16	25 m, standard, without connectors	L60
Integral M12 socket	A20	50 m, standard, M12 connectors	L63
		50 m, standard, without connectors	L64
SW functions & CT approvals		75 m, standard, M12 connectors	L67
Standard	B11	75 m, standard, without connectors	L68
I/O configuration Ch1		2 m cable, analog with two M20 connectors	L85
None (replacement sensor)	E00	5 m cable, analog with two M20 connectors	L86
4 ... 20 mA, HART, active/passive output (non-Ex)	E02	10 m cable, analog with two M20 connectors	L87
4 ... 20 mA, HART, active Ex	E06	15 m cable, analog with two M20 connectors	L88
4 ... 20 mA, HART, passive Ex	E07		
PROFIBUS PA (non-Ex)	E10	Additional data	
PROFIBUS DP	E11	Please add "-Z" to Article No. and specify Order code(s) and plain text.	
Modbus RTU RS 485	E14	Tag name	
I/O configuration Ch2, Ch3 and Ch4		Tag name plate, stainless steel	Y17
None	F00	Extended calibration	
Non Ex: Sig O, None, None	F01	Multi-point high, (5 flows x 2 passes), 10 ... 100 % of Q_{nom}	Y61
Non Ex: Sig O, Sig I/O, None	F02	Multi-point high, (10 flows x 1 pass), 10 ... 100 % of Q_{nom}	Y63
Non Ex: Sig O, Sig I/O, Sig I/O	F03		
Non Ex: Sig O, Sig I/O, R	F04		
Non Ex: Sig O, R, R	F05		
Non Ex: Sig O, R, None	F06		
Ex: pSig O, None, None	F11		
Ex: pSig O, pSig I/O, None	F12		
Ex: pSig O, pSig I/O, pSig I/O	F13		
Ex: pSig O, pSig I/O, R	F14		
Ex: pSig O, R, R	F15		
Ex: pSig O, R, None	F16		
Ex: aSig O, None, None	F21		
Ex: aSig O, aSig I/O, None	F22		
Ex: aSig O, aSig I/O, aSig I/O	F23		
Ex: aSig O, aSig I/O, R	F24		
Ex: aSig O, R, R	F25		
Ex: aSig O, R, None	F26		
Certificates			
Press test certificate CRN	C01		
Press test certificate PED	C02		
Material certificate EN 10204-3.1	C12		
Welding inspection report	C13		
Factory certificate according to EN 10204 2.2	C14		
Factory certificate according to EN 10204 2.1	C15		
Cleaning for oil and grease/ASTM-A380	C50		
Cleaned according to PWIS	C51		

SITRANS F C sensors MASS 2100/FC300 with FCT010, FCT030 and SIFLOW FC070 transmitters (Low flow program)

Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Article No.	Ord. code
SITRANS F C sensors MASS 2100/FC300 with SIFLOW FC070 transmitter¹⁾	7ME4818-		SITRANS F C sensors MASS 2100/FC300 with SIFLOW FC070 transmitter¹⁾	7ME4818-	
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
Sensor type and connector size			Tube material (wetted) and max. operational temperature		
MASS 2100 DI 1.5, 1/4"	1G		AISI 316L/EN 1.4435, Max 115 °C	1	
MASS 2100 DI 3, 1/4"	3A		AISI 316L/EN 1.4435, Max 125 °C	2	
MASS 2100 DI 3, 1/4" Heated w. DIN	3B		AISI 316L/EN 1.4435, Max 180 °C	3	
MASS 2100 DI 3, 1/4" Heated w. ANSI	3C		Hastelloy C22/UNS N06022/EN 2.4602, Max. 115 °C	5	
FC300 DN 4, 1/4"	4A		Hastelloy C22/UNS N06022/EN 2.4602, Max. 125 °C	6	
MASS 2100 DI 6, 1/4"	6A		Hastelloy C22/UNS N06022/EN 2.4602, Max. 180 °C	7	
MASS 2100 DI 6, 1/4" Heated w. EN	6B				
MASS 2100 DI 6, 1/4" Heated w. ANSI	6C		Calibration		
MASS 2100 DI 6, DN 10	6D		Mass flow calibration	1	
MASS 2100 DI 6, DN 10 Heated w. EN	6E		Mass flow calibration and density calibration	4	
MASS 2100 DI 6, DN 10 Heated w. ANSI	6F		Standard fraction calibration	8	
MASS 2100 DI 6, DN 15 (1/2")	6G		Mounting style, Transmitter Housing and Material		
MASS 2100 DI 6, DN 15 (1/2") Heated w. EN	6H		SIFLOW FC070 Standard DIN rail	W	
MASS 2100 DI 6, DN 15 (1/2") Heated w. ANSI	6J		Ex approvals		
MASS 2100 DI 6, DN 20 (3/4")	6K		Non-Ex	A	
MASS 2100 DI 6, DN 20 (3/4") Heated w. EN	6L		ATEX Zone 1	C	
MASS 2100 DI 6, DN 20 (3/4") Heated w. ANSI	6M		IECEx Zone 1	F	
MASS 2100 DI 6, DN 25 (1")	6N		USA (FM, CSA, UL), Zone 1/Div1	H	
MASS 2100 DI 6, DN 25 (1") Heated w. EN	6P		Canada (CSA, UL), Zone 1/Div1	M	
MASS 2100 DI 6, DN 25 (1") Heated w. ANSI	6Q		Local User Interface		
MASS 2100 DI 15, DN 15 (1/2")	7A		Blind	1	
MASS 2100 DI 15, DN 15 (1/2") Heated w. EN	7B				
MASS 2100 DI 15, DN 15 (1/2") Heated w. ANSI	7C				
MASS 2100 DI 15, DN 20 (3/4")	7D				
MASS 2100 DI 15, DN 20 (3/4") Heated w. EN	7E				
MASS 2100 DI 15, DN 20 (3/4") Heated w. ANSI	7F				
MASS 2100 DI 15, DN 25 (1")	7G				
MASS 2100 DI 15, DN 25 (1") Heated w. EN	7H				
MASS 2100 DI 15, DN 25 (1") Heated w. ANSI	7J				
Process connection/Pressure					
No connections (spare part transmitter)	A0				
EN1092-1 B1, PN40	A1				
EN1092-1 B1, PN100	A3				
ASME B16.5, RF, Class 150	D1				
ASME B16.5, RF, Class 600	D3				
DIN 11851 Screwed connection	F1				
ISO2852 Hyg. Clamped	J1				
ISO2853 Hyg. Screwed	J5				
ISO 228-1 Pipe thread, PN 100	C1				
ISO 228-1 Pipe thread, PN 130	C2				
ISO 228-1 Pipe thread, PN 200	C3				
ISO 228-1 Pipe thread, PN 230	C4				
ISO 228-1 Pipe thread, PN 265	C5				
ISO 228-1 Pipe thread, PN 350	C6				
ISO 228-1 Pipe thread, PN 365	C7				
ISO 228-1 Pipe thread, PN 410	C8				
NPT ASME B 1.20.1 Pipe thread, PN 100	N1				
NPT ASME B 1.20.1 Pipe thread, PN 130	N2				
NPT ASME B 1.20.1 Pipe thread, PN 200	N3				
NPT ASME B 1.20.1 Pipe thread, PN 230	N4				
NPT ASME B 1.20.1 Pipe thread, PN 265	N5				
NPT ASME B 1.20.1 Pipe thread, PN 350	N6				
NPT ASME B 1.20.1 Pipe thread, PN 365	N7				
NPT ASME B 1.20.1 Pipe thread, PN 410	N8				

¹⁾ SITRANS F C sensors MASS 2100/FC300 with SIFLOW FC070 transmitter (7ME4818-) are in preparation.

Flow Measurement

SITRANS F C

SITRANS F C sensors MASS 2100/FC300 with FCT010, FCT030 and SIFLOW FC070 transmitters (Low flow program)

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
SW functions & CT approvals	
Standard	B11
Certificates	
Press test certificate CRN	C01
Press test certificate PED	C02
Material certificate EN 10204-3.1	C12
Welding inspection report	C13
Factory certificate according to EN 10204 2.2	C14
Factory certificate according to EN 10204 2.1	C15
Cleaning for oil and grease/ASTM-A380	C50
Cleaned according to PWIS	C51
Sensor data storage	
Sensor with SensorFlash for FCT	S20
Sensor with SensorProm for MASS 6000 and SIFLOW FC070 (in preparation)	S21
Cable sensor-transmitter	
None	L50
5 m cable for SIFLOW FC070	L79
10 m cable for SIFLOW FC070	L80
25 m cable for SIFLOW FC070	L81
50 m cable for SIFLOW FC070	L82
75 m cable for SIFLOW FC070	L83
150 m cable for SIFLOW FC070	L84
Additional data	
Please add "-Z" to Article No. and specify Order code(s) and plain text.	
Tag name	
Tag name plate, stainless steel	Y17
Extended calibration	
Multi-point high, (5 flows x 2 passes), 10 ... 100 % of Q_{nom}	Y61
Multi-point high, (10 flows x 1 pass), 10 ... 100 % of Q_{nom}	Y63

Transmitter MASS 6000 IP67 compact/remote

Overview



MASS 6000 is based on 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 15, and can be used in remote version for all types of MASS 2100 and FC300 sensors.

Note

Due to RoHs directives active from July 22nd 2017, MASS 6000 transmitters of any model and variants are not for sale within EU, EU candidate countries, Norway, Switzerland, Iceland, Croatia, and Turkey.

Replacement products: 7ME461.-..., 7ME462.-..., 7ME471.-... and 7ME481.-...

Repair parts for MASS 6000 (all models and variants) are available. See spare part list.

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 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 15 (1/8" to 1/2") 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)]	Enclosure	
Current output		Material	Fibre glass reinforced polyamide
Current	0 ... 20 mA or 4 ... 20 mA	Rating	IP67/NEMA 6
Load	< 800 Ω	Mechanical load	18 ... 1000 Hz random, 3.17 g RMS, in all directions
Time constant	0 ... 99.9 s adjustable	Supply voltage	
Digital output		24 V version	
Frequency	0 ... 10 kHz, 50 % duty cycle	• Supply	18 ... 30 V DC 20 ... 30 V AC
Time constant	0 ... 99.9 s adjustable	230 V version	
Active	24 V DC, 30 mA, 1 kΩ ≤ R _{load} ≤ 10 kΩ, short-circuit-protected	• Supply	87 ... 253 V AC, 50 ... 60 Hz
Passive	3 ... 30 V DC, max. 110 mA, 250 Ω ≤ R _{load} ≤ 10 kΩ	Power consumption	
Relay		24 V DC	6 W
Type	Change-over relay	24 V AC	10 VA
Load	42 V/2 A peak	230 V AC	9 VA
Functions	Error level, error number, limit, flow direction	Fuse	
Digital input		230 V version	T 400 mA, T 250 V (IEC 127) - not replaceable by operator
Functionality	11 ... 30 V DC (R _i = 13.6 kΩ) Start/hold/continue batch, zero point adjust, reset totalizer 1/2, force output, freeze output	24 V version	T 1 A, T 250 V (IEC 127) - not replaceable by operator
Galvanic isolation		EMC performance	
	All inputs and outputs are galva- nically isolated. Isolation voltage: • 500 V to supply • 50 V between outputs	Emission	EN 55011/CISPR-11 (Class A)
Cut-off		Immunity	EN/IEC 61326-1 (Industry)
Low-flow	0 ... 9.9 % of maximum flow	NAMUR	Within the value limits according to "General requirements" with error criteria A in accordance with NE 21
Limit function		Environment	
	Mass flow, volume flow, fraction, density, sensor temperature	Environmental conditions acc. to IEC/EN/UL 61010-1:	• Altitude up to 2000 m • POLLUTION DEGREE 2
Totalizer		Maintenance	The flowmeter has a built-in error log/pending menu which should be inspected on a regular basis.
	Two eight-digit counters for for- ward, net or reverse flow	Cable glands	Two types of cable gland are available in polyamide in the fol- lowing dimensions: M20 or ½" NPT
Display		Note	
	• Background illumination with alphanumeric 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	Due to RoHs directives active from July 22 nd 2017, MASS 6000 transmitters of any model and variants are not for sale within EU, EU candidate countries, Norway, Switzerland, Iceland, Croatia, and Turkey.	
Zero point adjustment		Replacement products: 7ME461.-..., 7ME462.-..., 7ME471.-... and 7ME481.-...	
	Via keypad or remote via digital input	Repair parts for MASS 6000 (all models and variants) are avail- able. See spare part list.	
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		

Selection and Ordering data**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)

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Version

Remote IP67/NEMA 6 enclosure

Supply voltage

115/230 V AC, 50 ... 60 Hz
24 V AC/DC

Display/Keypad

with display

Serial communication

No communication

HART

PROFIBUS PA Profile 3

PROFIBUS DP Profile 3

Modbus RTU RS 485

DeviceNet

FOUNDATION Fieldbus H1

Cable glands

M20
½" NPT

Article No.

7ME4110-

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

AA0A

Add-on module**Description**

HART¹⁾
PROFIBUS PA Profile 3¹⁾
PROFIBUS DP Profile 3
Modbus RTU RS 485
FOUNDATION Fieldbus H1¹⁾
DeviceNet

Article No.

FDK:085U0226
FDK:085U0236
FDK:085U0237
FDK:085U0234
A5E02054250
FDK:085U0229



¹⁾ Modules are rated Ex i when used with MASS 6000 Ex d.

Operating instructions for SITRANS F add-on modules**Description**

HART
• English
PROFIBUS PA/DP
• English
• German
Modbus
• English
• German
FOUNDATION Fieldbus
• English
• German
DeviceNet
• English

Article No.

A5E03089708
A5E00726137
A5E01026429
A5E00753974
A5E03089262
A5E02318728
A5E02488856
A5E03089720

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Operating instructions for SITRANS F C MASS 6000 IP67**Description**

• English

Article No.

A5E03071936

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Accessories**Description**

Cable glands, screwed entries type in polyamide (100 °C (212 °F)) black, 2 pcs.

- M20
- ½" NPT

Article No.

A5E00822490
A5E00822501



Sun lid for MASS 6000 transmitter (Frame and lid)

Article No.

A5E02328485

**Spare parts for compact or remote IP67 version****Description**

MASS 6000 transmitter IP67/NEMA 6
Fibre glass reinforced polyamide and without connection board
1 current output
1 frq./pulse output
1 relay output
• 115/230 V AC, 50/60 Hz
• 24 V AC/DC

Article No.

7ME4110-1AA10-1AA0
7ME4110-1AA20-1AA0



Wall mounting unit for IP67/NEMA 6 version with wall bracket, without connection board but with

- 4 x M20 cable glands
- 4 x ½" NPT cable glands

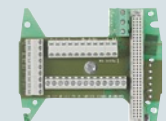
FDK:085U1018
A5E01164211

**Connection board/PCB**

Supply voltage:
115/230 V/24 V AC/DC

Article No.


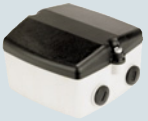


FDK:083H4260



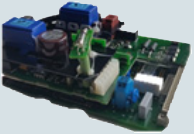








Flow Measurement

SITRANS F C

Transmitter MASS 6000 IP67 compact/remote

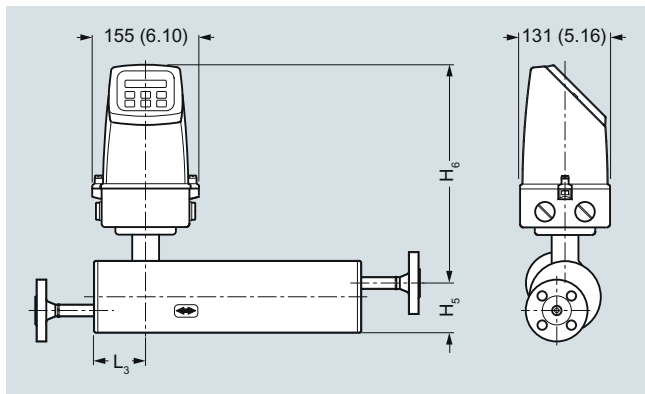
Description	Article No.	
Terminal box kit with <ul style="list-style-type: none"> • M20 cable glands • ½" NPT cable glands Change from remote to safe area compact mounting of MASS 6000 IP67/NEMA 6 with MASS 2100. The kit consists of a terminal box in polyamide incl. connection board, cable and connector between PCB and sensor pedestal, PCB, seal and screws (4 pcs.) for mounting on sensor. Not approved for hazardous locations	A5E00832338 A5E00832342	
Terminal box, in polyamide, inclusive lid <ul style="list-style-type: none"> • M20 cable glands • ½" NPT cable glands Not approved for hazardous locations	FDK:085U1050 FDK:085U1052	
Terminal box – lid in polyamide	FDK:085U1003	
Display and keypad <ul style="list-style-type: none"> • Siemens Front 	FDK:085U1039	

Add-on spare parts required due to RoHs directives and EoL for EU and EU related countries

Description	Article No.	
MASS 6000 IP67 Spare part PCB main <ul style="list-style-type: none"> • 230 V 	A5E41718138	
<ul style="list-style-type: none"> • 24 V 	A5E41718346	
MASS 6000 19"/IP20 Spare part PCB main <ul style="list-style-type: none"> • 1 current output 230 V • 3 current outputs 230 V • 1 current output 24V • 3 current outputs 24 V 	A5E43226138 A5E43226145 A5E43226154 A5E43226168	
MASS 6000 19"/IP20 Ex Spare part PCB main <ul style="list-style-type: none"> • 1 current output 230 V • 3 current outputs 230 V • 1 current output 24V • 3 current outputs 24 V 	A5E43226277 A5E43226342 A5E43226441 A5E43226455	
MASS 6000 Ex d, Spare part PCB Stainless steel, without module	FDK:083H3061	
MASS 6000 Ex d, Spare part barriere Stainless steel	A5E41718720	
MASS 6000 19"/IP20, Barriere PCB, Ex	A5E41718669	
MASS 6000 Ex d, Connection board Stainless steel	A5E41718522	
MASS 6000 IP20, Front plate Without display	A5E41718695	
MASS 6000 IP20, Front plate, Ex Without display	A5E41718706	

Dimensional drawings

Compact with MASS 6000 IP67

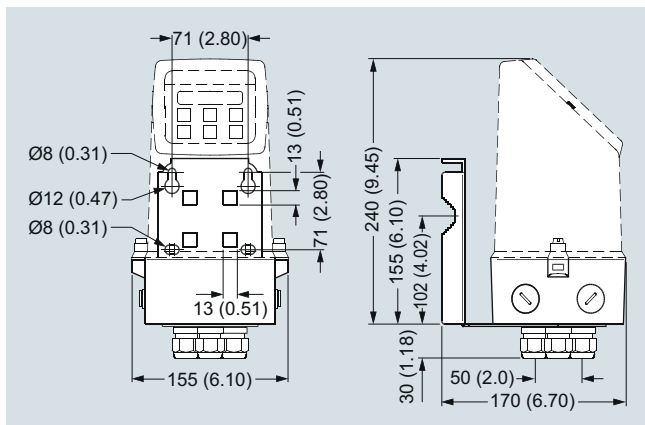


Dimensions in mm (inch)

MASS 2100 with MASS 6000 IP67 compact

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)

Transmitter MASS 6000 IP67 wall mounted



Dimensions in mm (inch)

Schematics

Electrical connection

Grounding

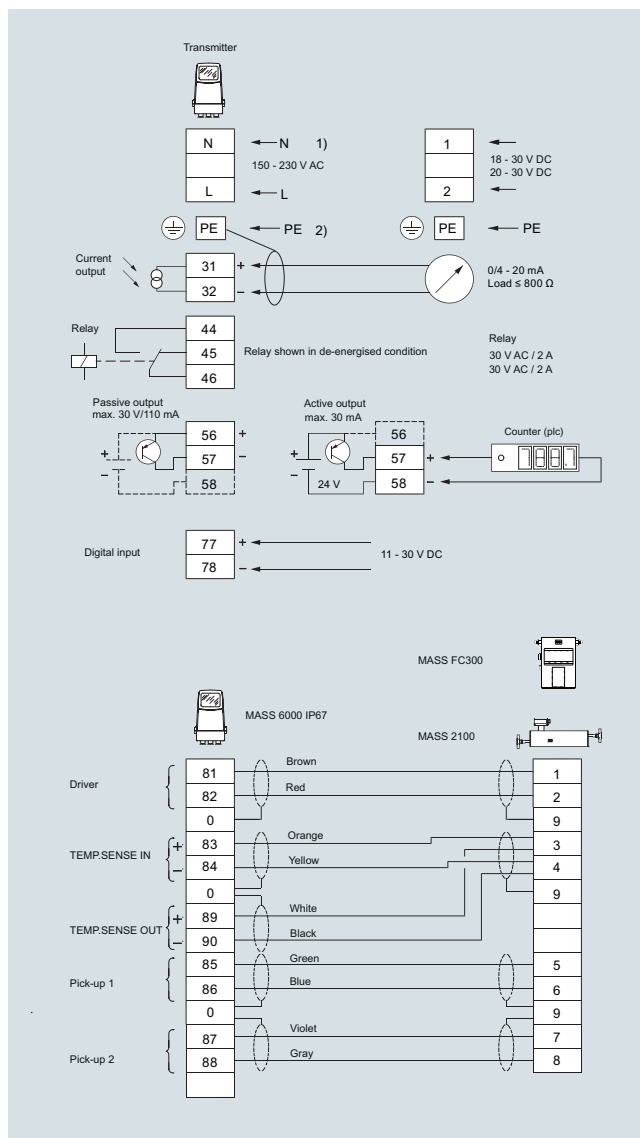
PE must be connected due to safety class 1 power supply.

Mechanical counters

When mounting a mechanical counter to terminals 57 and 58 (active output), a 1000 µF min. 35 V electrolytic 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.



3

Flow Measurement

SITRANS F C

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

Overview



MASS 6000 is based on 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/FC300/FCS200 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 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 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.
- Transmitter available with Ex approvals
- 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 Ex-approved transmitter which is to be mounted in the safe area.

Note

Due to RoHs directives active from July 22nd 2017, MASS 6000 transmitters of any model and variants are not for sale within EU, EU candidate countries, Norway, Switzerland, Iceland, Croatia, and Turkey.

Replacement products: 7ME461.-..., 7ME462.-..., 7ME471.-... and 7ME481.-...

Repair parts for MASS 6000 (all models and variants) are available. See spare part list.

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, 250 Ω ≤ 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, 3.17 g RMS, in all directions
Supply voltage	
24 V version	
• Supply	24 V DC/AC, 50 ... 60 Hz
• Fluctuation	18 ... 30 V DC 20 ... 30 V AC
• Power consumption	6 W I _N = 250 mA, I _{ST} = 2 A (30 ms)
230 V version	
• Supply	87 ... 253 V AC, 50 ... 60 Hz
• Power consumption	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 55011/CISPR-11 (Class A)
Immunity	EN/IEC 61236-1 (Industry)
Ex approval	ATEX, EAC Ex: [Ex ia] IIC
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

Note

Due to RoHS directives active from July 22nd 2017, MASS 6000 transmitters of any model and variants are not for sale within EU, EU candidate countries, Norway, Switzerland, Iceland, Croatia, and Turkey.

Replacement products: 7ME461.-..., 7ME462.-..., 7ME471.-... and 7ME481.-...

Repair parts for MASS 6000 (all models and variants) are available. See spare part list.

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	7ME4110 -
Transmitter for rack and wall mounting, incl. connection board	2 ■■■ - ■■ A 0
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Enclosure	
19 inch insert IP20 (rack mount, purchase rack separately)	C
19 inch insert in IP65 (wall mount, enclosure included)	E
Output configuration	
1 current, 1 frequency, 1 relay	A
3 current, 2 frequency, 2 relay	C
Supply voltage	
115/230 V AC, 50/60 Hz	1
24 V AC/DC	2
Ex Approvals	
Standard (No Ex-approval)	0
With Ex approval	1
Display/Keypad	
With display	1
Serial communication (Only possible to connect to MASS 6000 version with 1 current output)	
No communication	A
HART	B
PROFIBUS PA Profile 3	F
PROFIBUS DP Profile 3	G
Modbus RTU RS 485	E
DeviceNet	H
FOUNDATION Fieldbus H1	J


Operating instructions for SITRANS F C MASS 6000 19"

Description	Article No.
• English	A5E02944875

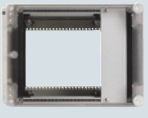

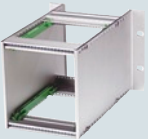


All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Accessories


Enclosure (without PCB, connection board)

Description	Article No.	
IP66/NEMA 4X, wall mounting enclosure for 19" inserts	FDK:083F5037	
• 21 TE		

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	
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 gland, screwed entry, type M20 , in polyamide (100 °C (212 °F)) black, 2 pcs.	A5E00822490	

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

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 • English	A5E03089708
PROFIBUS PA/DP • English • German	A5E00726137 A5E01026429
Modbus • English • German	A5E00753974 A5E03089262
FOUNDATION Fieldbus • English • German	A5E02318728 A5E02488856
DeviceNet • English	A5E03089720

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Connection boards/PCB for MASS 6000 and MASS 2100 sensors

Description	Version	Article No.
Connection board MASS 6000 for 19" IP20 rack mounting version	24 V 115/230 V	FDK:083H4272
Connection board MASS 6000 Ex [ia] IIC for 19" IP20 rack mounting version	24 V 115/230 V	FDK:083H4273
Connection board MASS 6000 for 19" wall mounting version, for enclosure FDK:083F5037/FDK:083F5038	24 V 115/230 V	FDK:083H4274
Connection board MASS 6000 Ex [ia] IIC for 19" wall mounting version, for enclosure FDK:083F5037/FDK:083F5038	24 V 115/230 V	FDK:083H4275

Connection boards/PCB for MASS 6000 and MC2 sensors

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



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

Description	Article No.
Wall mounting enclosure in ABS plastic IP65 with connection board/PCB for Ex application connected to MC2 Ex sensors	FDK:083H4296






Flow Measurement

SITRANS F C

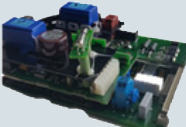









Transmitter MASS 6000 for 19" insert/19" wall mounting

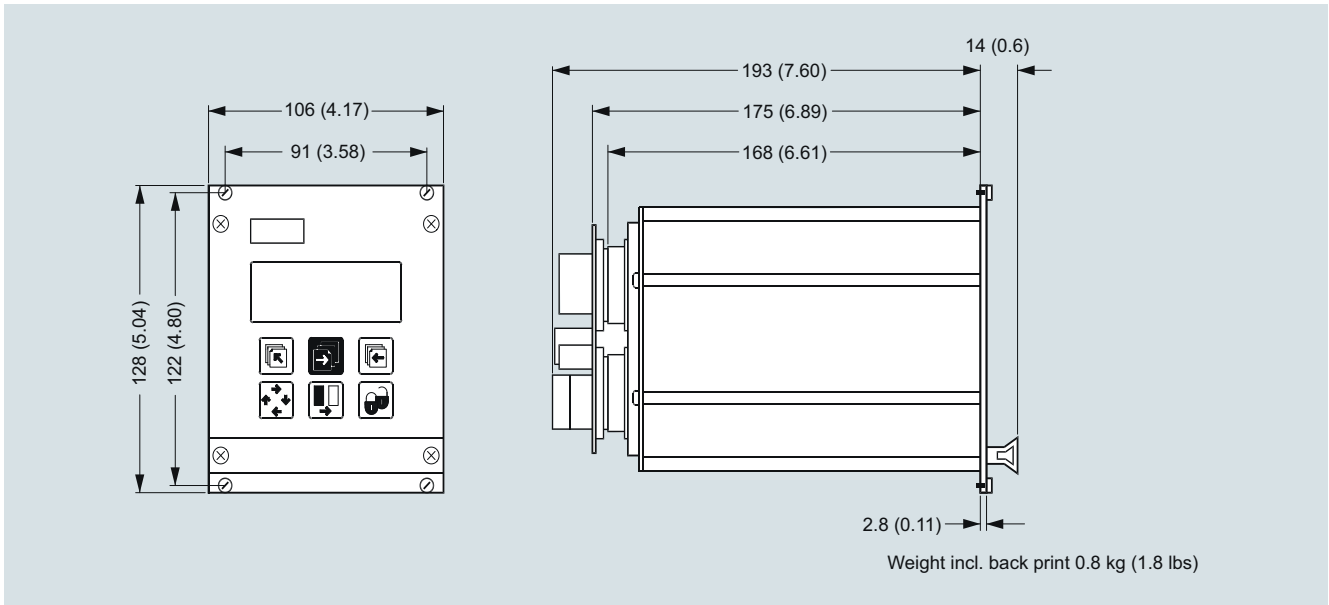
Spare parts 19" versions

Enclosure (without PCB, connection board)

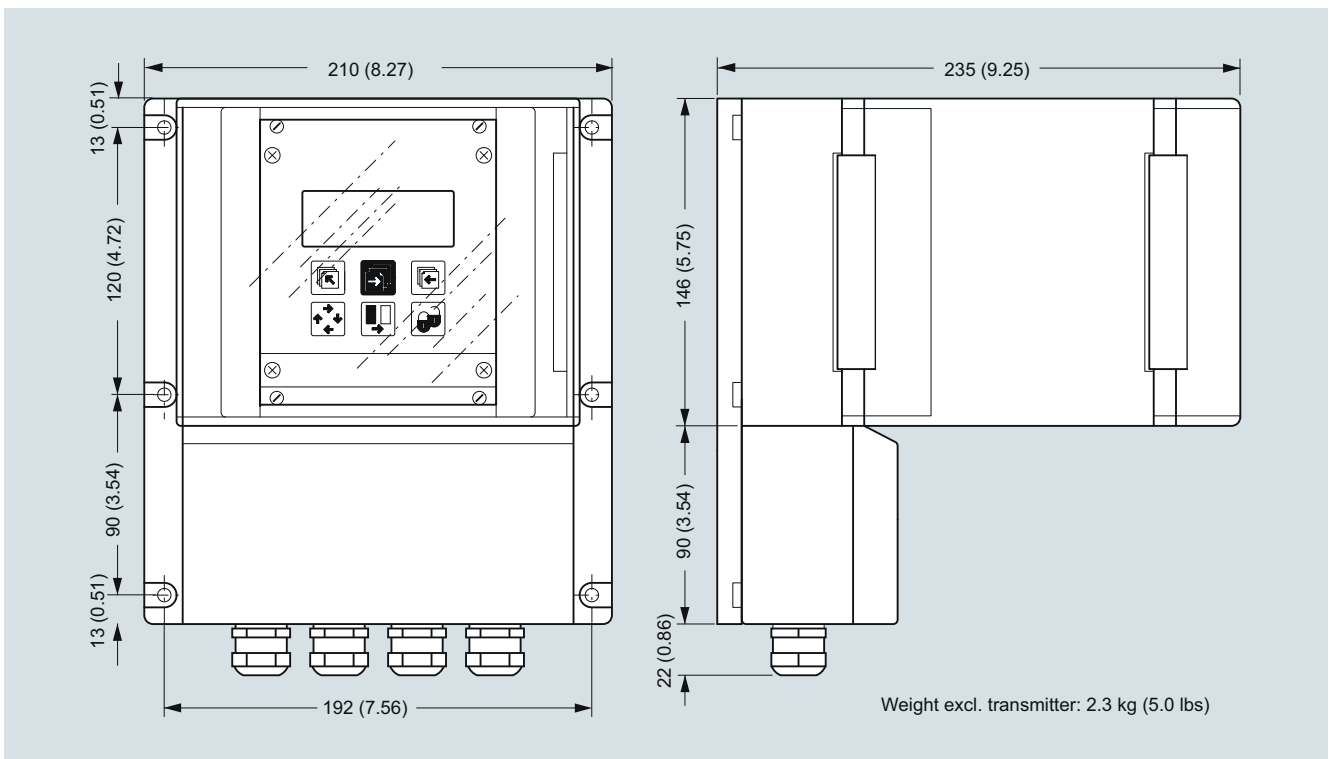
Description	Article No.	
IP66/NEMA 4X, wall mounting enclosure for 19" inserts (without back plates). Use with PCB A5E02559813 or A5E02559814		
• 21 TE	FDK:083F5037	
• 42 TE	FDK:083F5038	
Display unit for 19" versions Order the Display and Keypad accessory from MASS 6000 IP67 compact/remote (FDK:085U1039) and use the display part only for replacement	FDK:085U1039	

Add-on spare parts required due to RoHs directives and EoL for EU and EU related countries

Description	Article No.	
MASS 6000 IP67 Spare part PCB main		
• 230 V	A5E41718138	
• 24 V	A5E41718346	
MASS 6000 19"/IP20 Spare part PCB main		
• 1 current output 230 V	A5E43226138	
• 3 current outputs 230 V	A5E43226145	
• 1 current output 24V	A5E43226154	
• 3 current outputs 24 V	A5E43226168	
MASS 6000 19"/IP20 Ex Spare part PCB main		
• 1 current output 230 V	A5E43226277	
• 3 current outputs 230 V	A5E43226342	
• 1 current output 24V	A5E43226441	
• 3 current outputs 24 V	A5E43226455	
MASS 6000 Ex d, Spare part PCB	FDK:083H3061	
Stainless steel, without module		
MASS 6000 Ex d, Spare part barriere	A5E41718720	
Stainless steel		
MASS 6000 19"/IP20, Barriere PCB, Ex	A5E41718669	
MASS 6000 Ex d, Connection board	A5E41718522	
Stainless steel		
MASS 6000 IP20, Front plate	A5E41718695	
Without display		
MASS 6000 IP20, Front plate, Ex	A5E41718706	
Without display		

Dimensional drawingsTransmitter 19" insert

Dimensions in mm (inch)

Transmitter 19" wall mounting

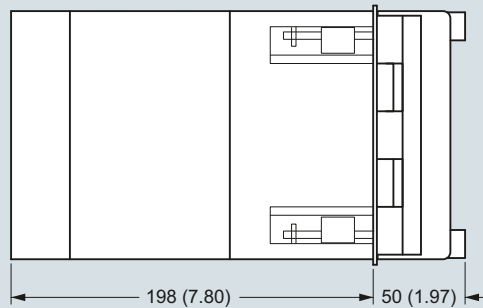
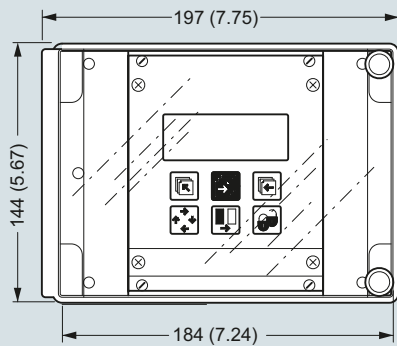
Dimensions in mm (inch)

Flow Measurement

SITRANS F C

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

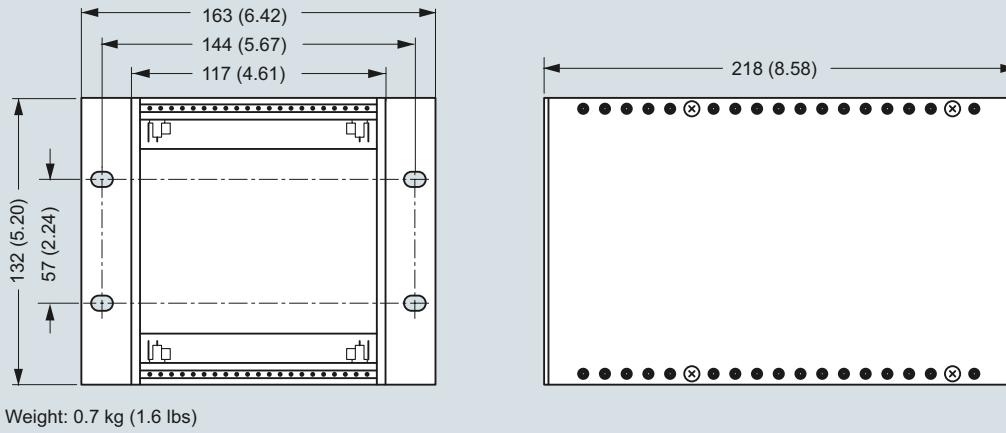
Transmitter 19" front of panel



Weight excl. transmitter: 1.2 kg (2.7 lbs)

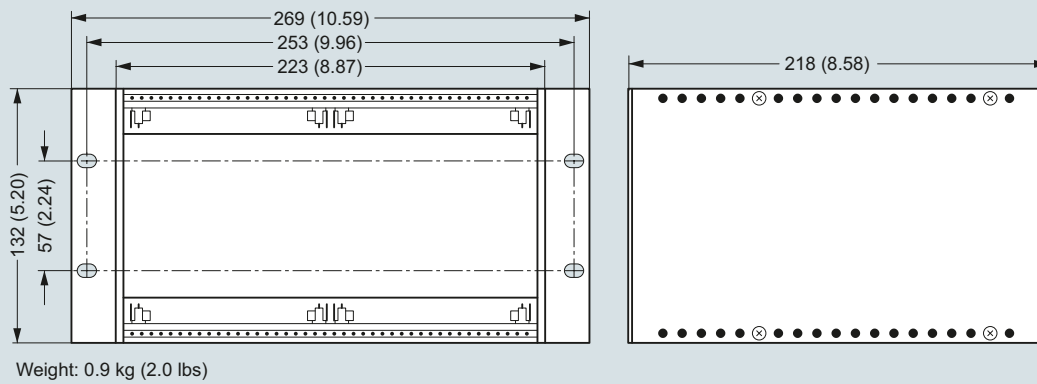
Dimensions in mm (inch)

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 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.

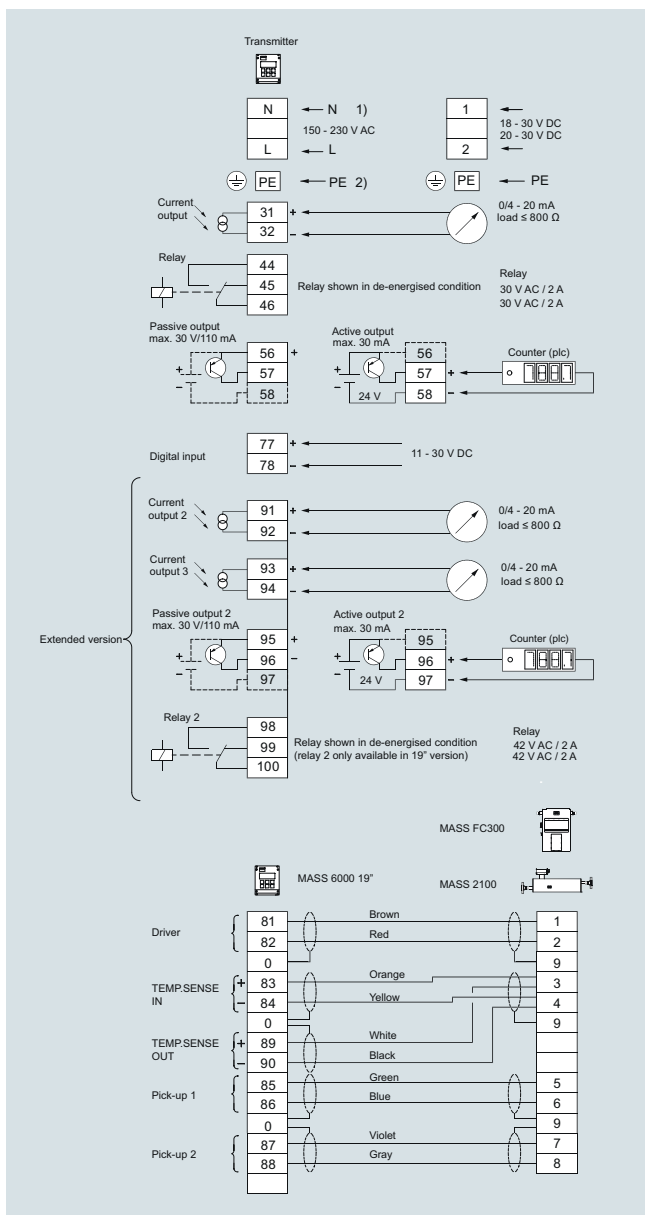
Mechanical counters

When mounting a mechanical counter to terminals 57 and 58 (active output), a 1000 μ F min. 35 V electrolytic 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



Overview



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

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

The MASS 6000 Ex d transmitter is manufactured in stainless steel (AISI 316L/1.4404) and able to withstand harsh installation conditions in hazardous applications within the process and chemical industry. The conservative choice of material guarantees the user a low cost of ownership and a long trouble-free lifetime.

The Ex d can be compact mounted on all sensors of type MASS 2100 DI 3 to DI 15, and can be used in remote version for all types of MASS 2100.

Benefits

- Fully stainless steel flameproof Ex d enclosure, ensuring optimum cost of ownership
- Intrinsically safe keypad and display directly programmable in hazardous area
- Ex-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 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 15, and remote mounted for the entire sensor series.

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

- Flameproof „d“ enclosure
- Enclosure stainless steel, IP67/NEMA 6 as compact and IP65 as remote
- Supply voltage 24 V AC/DC
- MASS 6000 Ex d is Ex-approved together with all MASS 2100 sensors, but can **not** be used together with MC2 Ex versions

Note

Due to RoHs directives active from July 22nd 2017, MASS 6000 transmitters of any model and variants are not for sale within EU, EU candidate countries, Norway, Switzerland, Iceland, Croatia, and Turkey.

Replacement products: 7ME461.-..., 7ME462.-..., 7ME471.-... and 7ME481.-...

Repair parts for MASS 6000 (all models and variants) are available. See spare part list.

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	$U_o = 24 \text{ V}$, $I_o = 82 \text{ mA}$, $P_o = 0.5 \text{ W}$, $C_o = 125 \text{ nF}$, $L_o = 2.5 \text{ mH}$
Passive mode (max input from external barrier)	$U_i = 30 \text{ V}$, $I_i = 100 \text{ mA}$, $P_i = 0.75 \text{ W}$, $C_i = 52 \text{ nF}$, $L_i = 100 \mu\text{H}$
Digital output	
Frequency	0 ... 10 kHz, 50 % duty cycle
Time constant	0.1 ... 30 s adjustable
Passive	6 ... 30 V DC, max. 110 mA, $1 \text{ k}\Omega \leq R_{load} \leq 10 \text{ k}\Omega$
<u>Output characteristics</u>	
Active mode	Not available
Passive mode (max input from external barrier)	$U_i = 30 \text{ V}$, $I_i = 100 \text{ mA}$, $P_i = 0.75 \text{ W}$, $C_i = 52 \text{ nF}$, $L_i = 100 \mu\text{H}$
Relay	
Type	Change-over relay
Load	30 V/100 mA
Functionality	Error level, error number, limit, direction
Output characteristics	$U_i = 30 \text{ V}$, $I_i = 100 \text{ mA}$, $P_i = 0.75 \text{ W}$, $C_i = 0 \text{ nF}$, $L_i = 0 \text{ mH}$

Digital input	11 ... 30 V DC ($R_i = 13.6 \text{ k}\Omega$)
Functionality	Start/hold/continue batch, zero point adjust, reset totalizer 1/2, force output, freeze output
Output characteristics	$U_i = 30 \text{ V}$, $I_i = 3.45 \text{ mA}$, $P_i = 0.10 \text{ W}$, $C_i = 0 \text{ nF}$, $L_i = 0 \text{ mH}$
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 alphanumeric 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	$U_o = 6.88 \text{ V}$, $I_o = 330 \text{ mA}$, $P_o = 0.57 \text{ W}$, $C_o = 20 \text{ nF}$, $L_o = 100 \mu\text{H}$
Passive mode (max input from external barrier)	$U_i = 10 \text{ V}$, $I_i = 200 \text{ mA}$, $P_i = 0.5 \text{ W}$, $C_i = 0 \text{ nF}$, $L_i = 0 \mu\text{H}$
PROFIBUS PA	
Active mode	Not available
Passive mode	$U_i = 17.5 \text{ V}$, $I_i = 380 \text{ mA}$, $P_i = 5.32 \text{ W}$, $C_i = 5 \text{ nF}$, $L_i = 10 \mu\text{H}$
FOUNDATION Fieldbus H1	
Active mode	Not available
Passive mode	$U_i = 17.5 \text{ V}$, $I_i = 380 \text{ mA}$
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

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 55011/CISPR-11 (Class A)
Immunity	EN/IEC 61326-1 (Industry)
NAMUR	
	Within the value limits according to "Allgemeine Anforderung" with error criteria A in accordance with NE 21
Ex approval	
	ATEX, EAC Ex: Ex d e ib [ia Ga] IIC T4 Gb

Note

Due to RoHS directives active from July 22nd 2017, MASS 6000 transmitters of any model and variants are not for sale within EU, EU candidate countries, Norway, Switzerland, Iceland, Croatia, and Turkey.

Replacement products: 7ME461.-..., 7ME462.-..., 7ME471.-... and 7ME481.-...

Repair parts for MASS 6000 (all models and variants) are available. See spare part list.

Selection and Ordering data		Article No.
SITRANS F C MASS 6000 transmitter Transmitter Ex d for remote mounting inclusive of wall mounting kit		7ME4110-
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		2 A
Enclosure 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		G H J
Output configuration 1 current, 1 frequency, 1 relay		A
Supply voltage 24V AC/DC		2
Ex approvals Ex		1
Display/Keypad With display		1
Serial communication No communication HART PROFIBUS PA Profile 3 FOUNDATION Fieldbus H1		A B F J
Cable gland M20		1

Operating instructions for SITRANS F C MASS 6000 Ex d

Description	Article No.
• English	A5E02944883

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

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



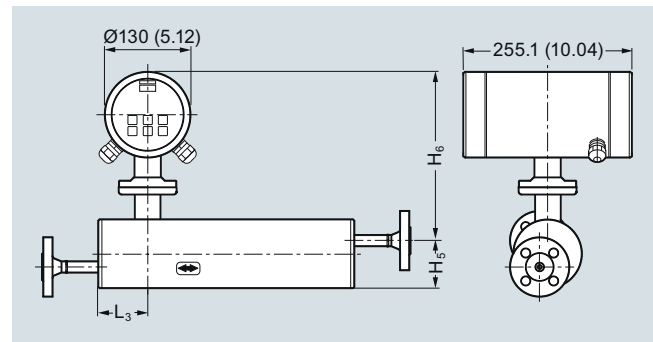
Operating instructions for SITRANS F add-on modules

Description	Article No.
HART	
• English	A5E03089708
PROFIBUS PA/DP	
• English	A5E00726137
• German	A5E01026429
FOUNDATION Fieldbus	
• English	A5E02318728
• German	A5E02488856

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Dimensional drawings

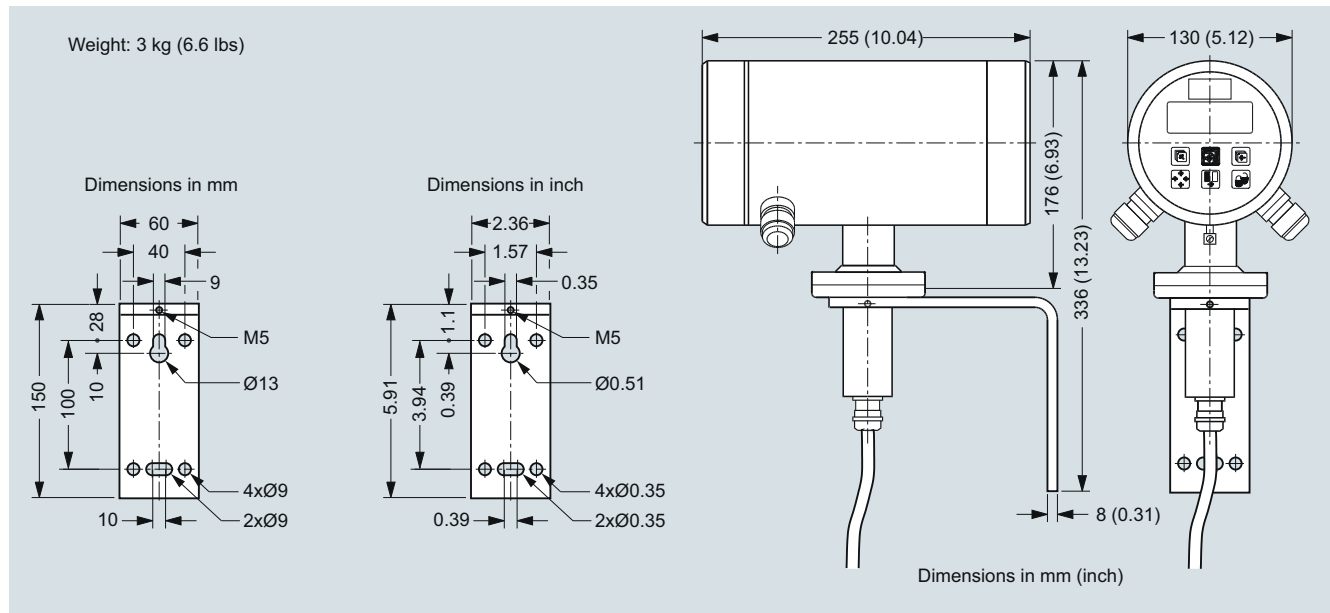
MASS 6000 Ex d compact version



Dimensions in mm (inch)

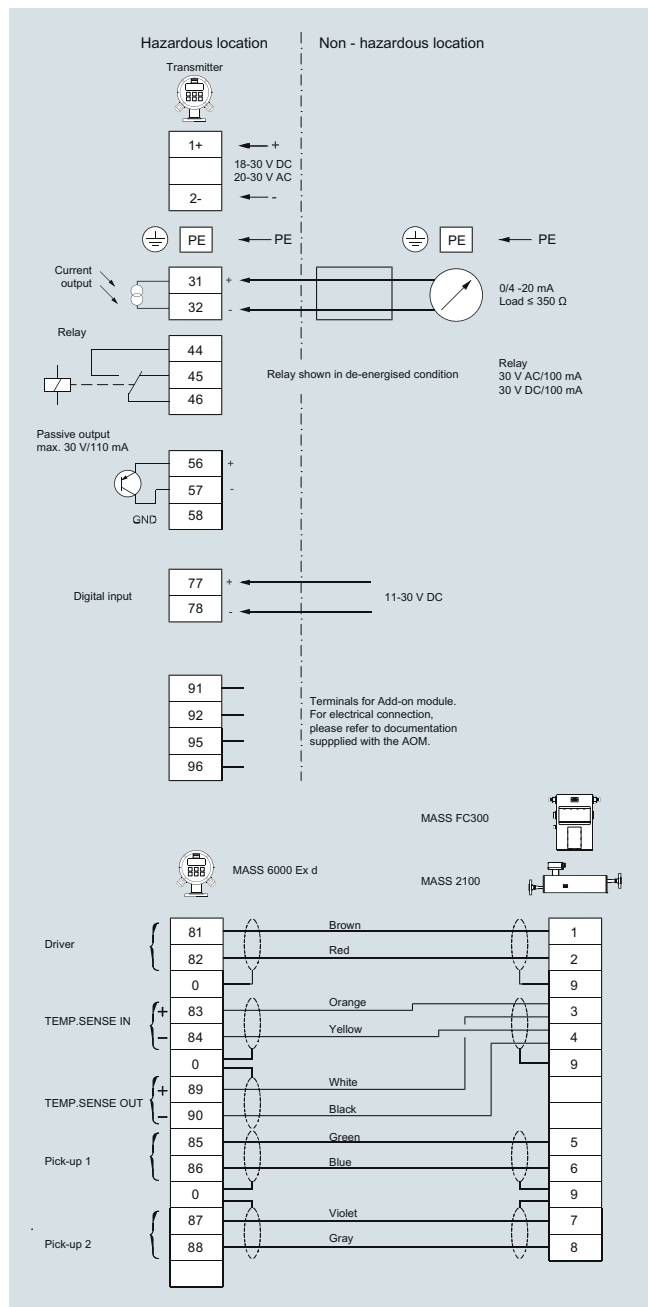
Sensor size [DI (inch)]	L ₃ [mm (inch)]	H ₅ [mm (inch)]	H ₆ [mm (inch)]	H ₅ + H ₆ [mm (inch)]
3 (1/8)	75 (2.95)	82 (3.23)	247 (9.72)	329 (12.95)
6 (1/4)	62 (2.44)	72 (2.83)	257 (10.12)	329 (12.95)
15 (1/2)	75 (2.95)	87 (3.43)	267 (10.51)	354 (13.94)
25 (1)	75 (2.95)	173 (6.81)	271 (10.67)	444 (17.48)
40 (1 1/2)	75 (2.95)	227 (8.94)	271 (10.67)	498 (19.61)

MASS 6000 Ex d remote version



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, 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 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 can be used for custody transfer approved application. (Compressed gaseous fuel measuring systems for vehicles), when using the redundant digital output or the encrypted ActiveX component for SIMATIC touch panels. The approval will have to be done locally at the customer.
- 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 and MASS 2100 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 %	Power	
Measurement functions		Supply	24 V DC nominal
• Totalizer 1	Totalization of mass flow, volume-flow, fraction A, fraction B	Tolerance	20.4 V DC ... 28.8 V DC
• Totalizer 2	Totalization of mass flow, volume-flow, fraction A, fraction B	Consumption	Max. 7.2 W
• Single and 2-stage batch function	Batching function with the use of one or two outputs for dosing in high and low speed	Fuse	T1 A/125 V, not replaceable by operator
• 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.	Environment	
Digital input		Ambient temperature	<ul style="list-style-type: none"> Storage -40 ... +70 °C (-40 ... +158 °F)
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	Operation conditions	Horizontally mounted rail. For SIFLOW FC070 Std.: 0 ... 60 °C (32 ... 140 °F) For SIFLOW FC070 Ex CT: -40 ... +60 °C (-40 ... +140 °F) Vertically mounted rail For SIFLOW FC070 Std.: 0 ... 45 °C (32 ... 113 °F) For SIFLOW FC070 Ex CT: -40 ... +45 °C (-40 ... +113 °F)
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 	Altitude	<ul style="list-style-type: none"> Operation: -1000 ... 2000 m (pressure 795 ... 1080 hPa)
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 	Enclosure	
Input	Approx. 10 kΩ	Material	Noryl, color: anthracite
Switching	Max. 100 Hz.	Rating	IP20/NEMA 2 according to IEC 60529
Digital output 1 and 2		Mechanical load	According to SIMATIC standards (S7-300 devices)
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 	Ex approvals	
Voltage supply	3 ... 30 V DC (passive output)	SIFLOW FC070 Standard	ATEX: II 3G Ex nA II T4
Switching current	Max. 30 mA at 30 V DC	SIFLOW FC070 Ex CT	<ul style="list-style-type: none"> ATEX, IECEx, EAC Ex, FM, CSA, INMETRO - Zone 2: Ex nA [ia] IIC T4 • FM - Class I, Div. 2: Grp. A, B, C, D (interface to Class I+II+III, Div. 1)
Voltage drop	≤ 3 V DC at max. current	Custody transfer approvals	
Leakage current	≤ 0.4 mA at max. voltage 30 V DC	SIFLOW FC070 Ex CT	Compressed gaseous fuel measuring systems for vehicles NTEP for USA and Canada, approval no: 97-111A3
Load resistance	1 ... 10 kΩ	EMC performance	
Switching frequency	0 ... 12 kHz 50 % duty cycle	Emission	EN 55011/CISPR-11
Functions	Pulse, frequency, redundancy pulse, redundancy frequency 2-stage batch, batch	Immunity	EN/IEC 61326-1
Communication		Certification	
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 	CE mark	Low voltage directive RoHS
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. 	NAMUR	Within the limits according to "General recommendations" with error criteria A in accordance with NE 21
Galvanic isolation	All inputs, outputs and communication interfaces are galvanically isolated. Isolation voltage: 500 V	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 connector with screw contacts	6ES7392-1AM00-0AA0
40 pin connector 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 connector with screw contacts	6ES7392-1AJ00-0AA0

Operating instructions for SITRANS F C SIFLOW FC070

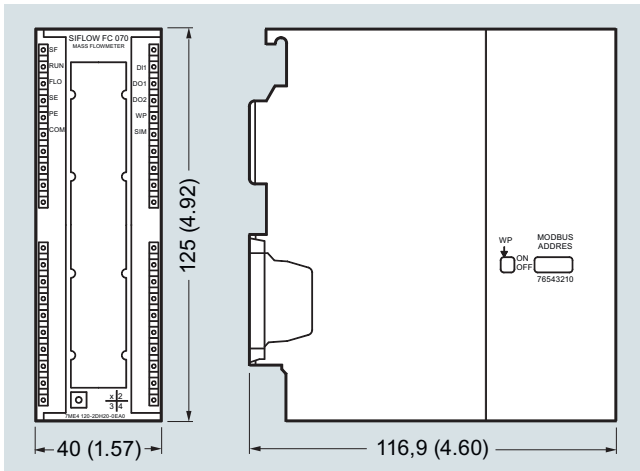
Description	Article No.
SIFLOW FC070 system manual	
• English	A5E00924779
• German	A5E00924776
SIFLOW FC070 with S7	
• English	A5E02254228
• German	A5E02665536
SIFLOW FC070 with PCS7	
• English	A5E03694109

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

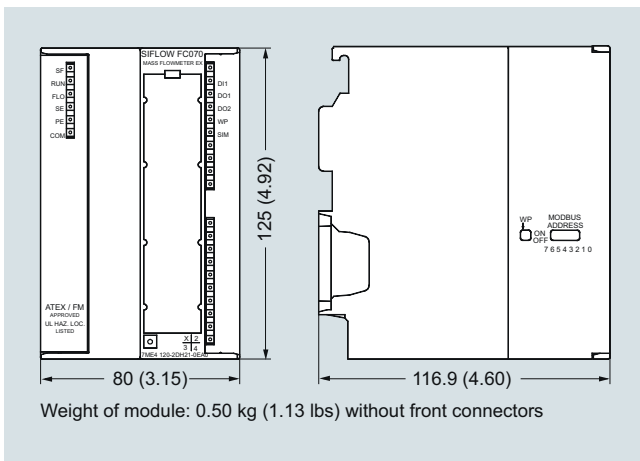
Accessories

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)		
• 5 m (16.4 ft)	FDK:083H3015	
• 10 m (32.8 ft)	FDK:083H3016	
• 25 m (82 ft)	FDK:083H3017	
• 50 m (164 ft)	FDK:083H3018	
• 75 m (246 ft)	FDK:083H3054	
• 150 m (492 ft)	FDK:083H3055	
Cable without multiplug for connecting MC2 sensors, 5 x 2 x 0.34 mm ² twisted and screened in pairs. Temperature range -20 ... +110°C (-4 ... +230 °F)		
• 10 m (32.8 ft)	FDK:083H3001	
• 25 m (82 ft)	FDK:083H3002	
• 75 m (246 ft)	FDK:083H3003	
• 150 m (492 ft)	FDK:083H3004	
SIMATIC S7-300 rail The mechanical mounting rack of the SIMATIC S7-300		
• 160 mm (6.3")	6ES7390-1AB60-0AA0	
• 482 mm (18.9")	6ES7390-1AE80-0AA0	
• 530 mm (20.8")	6ES7390-1AF30-0AA0	
• 830 mm (32.7")	6ES7390-1AJ30-0AA0	
• 2000 mm (78.7")	6ES7390-1BC00-0AA0	
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



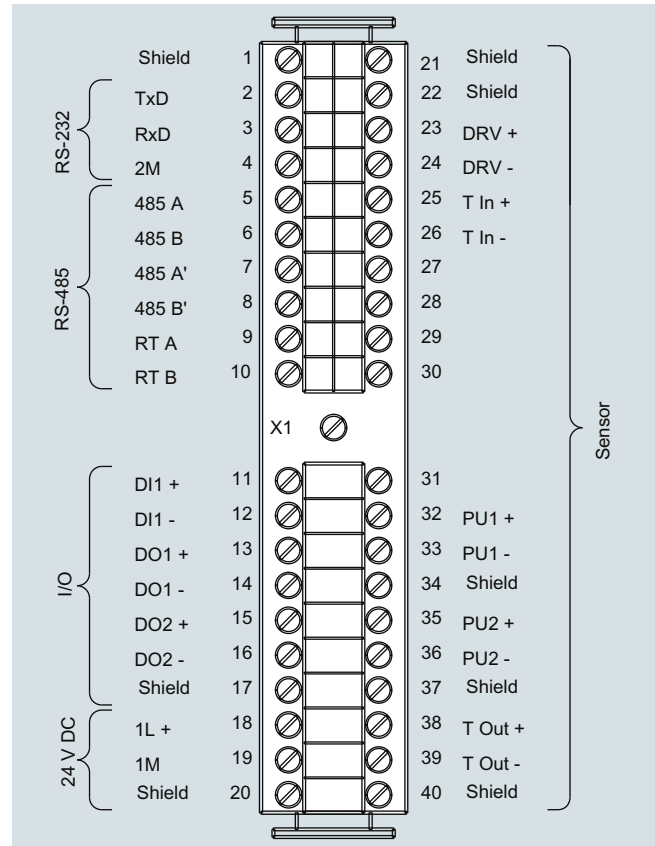
SIFLOW FC070, dimensions in mm (inch)



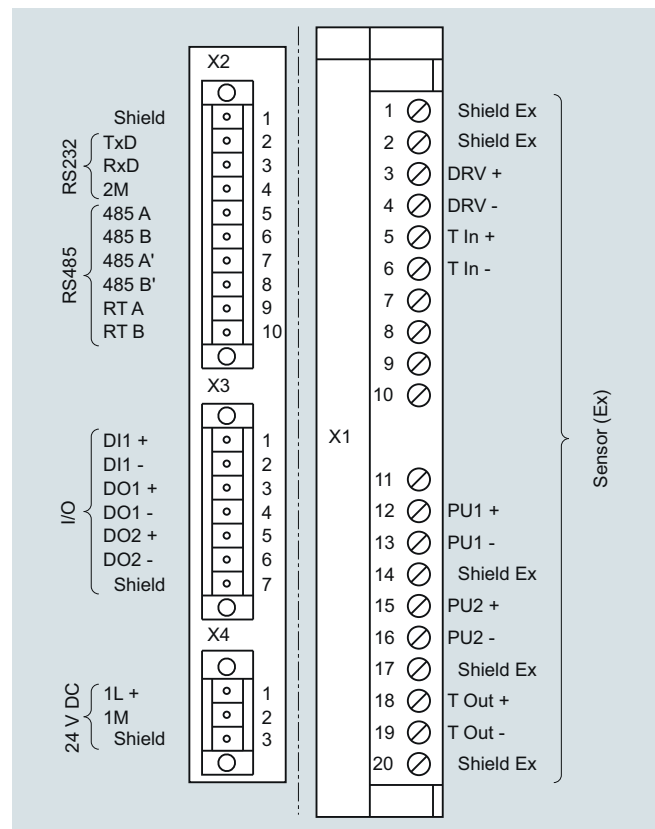
Weight of module: 0.50 kg (1.13 lbs) without front connectors

SIFLOW FC070 Ex CT, dimensions in mm (inch)

Schematics



SIFLOW FC070, electrical connection



SIFLOW FC070 Ex CT, electrical connection

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 NTEP (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 316L/1.4404 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".

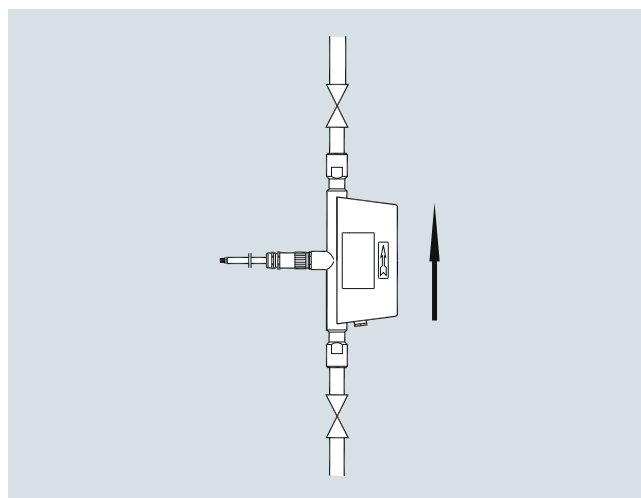
Integration

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.

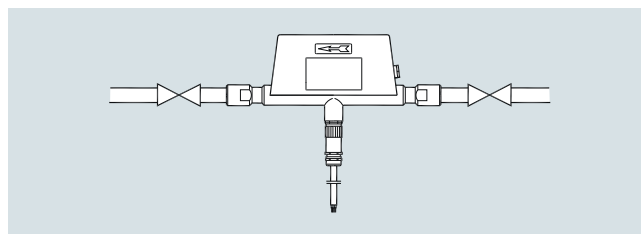
The sensor is shipped with a SENSORPROM memory unit containing all information about calibration data, device identity and factory pre-programming of transmitter settings.

Installation guidelines

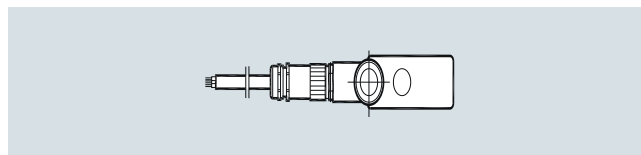
Siemens Flow Instruments recommends installing the sensor in one of the following ways:



Vertical orientation with an upwards flow



Horizontal installation, tubes up



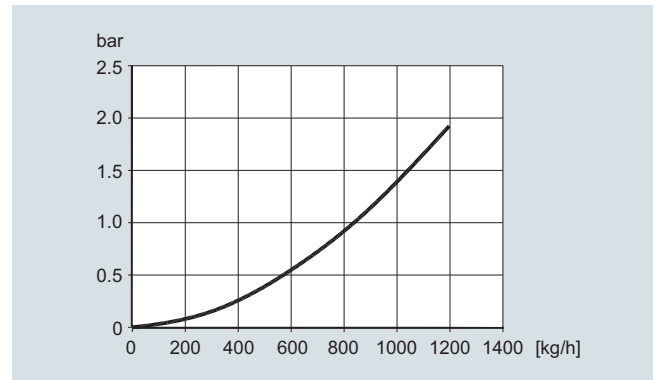
Horizontal installation, tubes sideways

Technical specifications

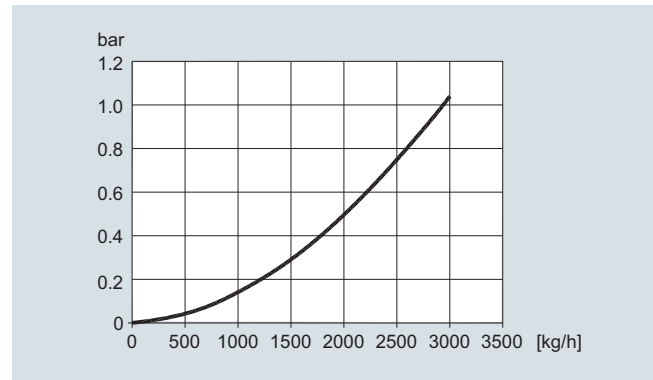
Sensor size	DN 10	DN 15	DN 25
Mass Flow			
Accuracy [% of rate]		± 0.5	
Repeatability [% of rate]		± 0.25	
Max. zero point error [kg/h (lb/h)]	0.25 (0.55)	1.2 (2.65)	3.0 (6.6)
Measuring range [kg/min (lb/min)]	0 ... 42 (0 ... 92.6)	0 ... 200 (0 ... 440.9)	0 ... 500 (0 ... 1102.3)
Process temperature	-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
Weight approx.			
	2.8 kg (6.2 lb)	6.0 kg (13.2 lb)	11 kg (24.2 lb)
Ex approvals			
ATEX	II 1/2 G Ex ia IIC T5/T4 Ga/Gb		
IECEX	Ex ia IIC T5/T4 Ga/Gb		
EAC Ex	0Ex ia IIC T4/T5 Gb		
FM	Class I, Div 1, Groups A, B, C and D		
Custody transfer approvals			
DN 10/DN 15	Compressed gaseous fuel measuring systems for vehicles NTEP for USA and Canada, approval no: 97-111A3		

Characteristic curves

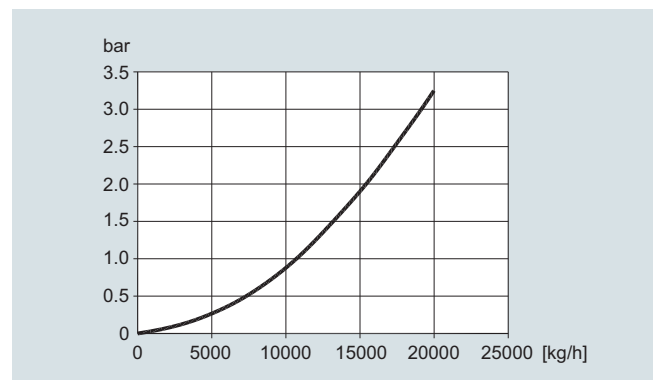
DN 10



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

Flowsensor SITRANS FCS200

Selection and Ordering data	Article No.
SITRANS F C Flow sensors	
SITRANS FCS200 sensor, without heating jacket	7ME4500-
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
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	
PTB custody transfer approval	1
NTEP custody transfer approval	2
Transmitter	
None	A
Cable	
No cable	A
Calibration	
Standard calibration	1
Extended calibration	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: 2014/68/EU	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 connector	
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

Operating instructions for SITRANS FCS200

Description	Article No.
• English	A5E02508199
• German	A5E03082574

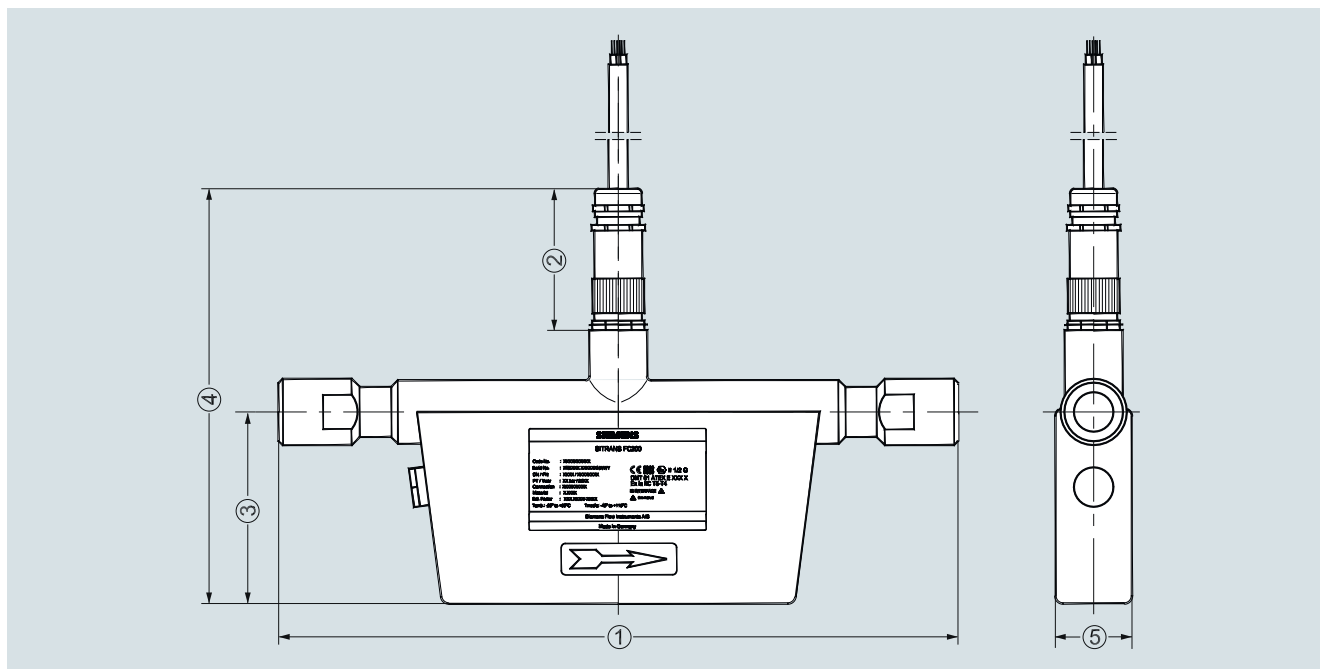
All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Spare parts

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

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)

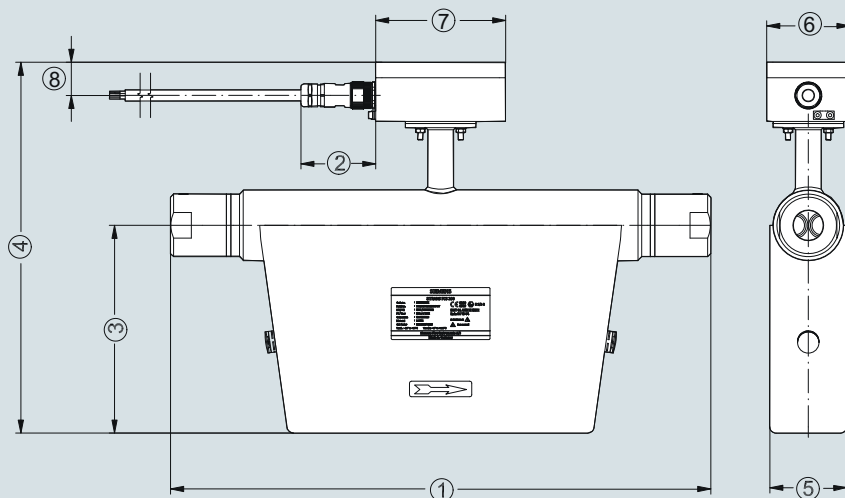
Flow Measurement

SITRANS F C

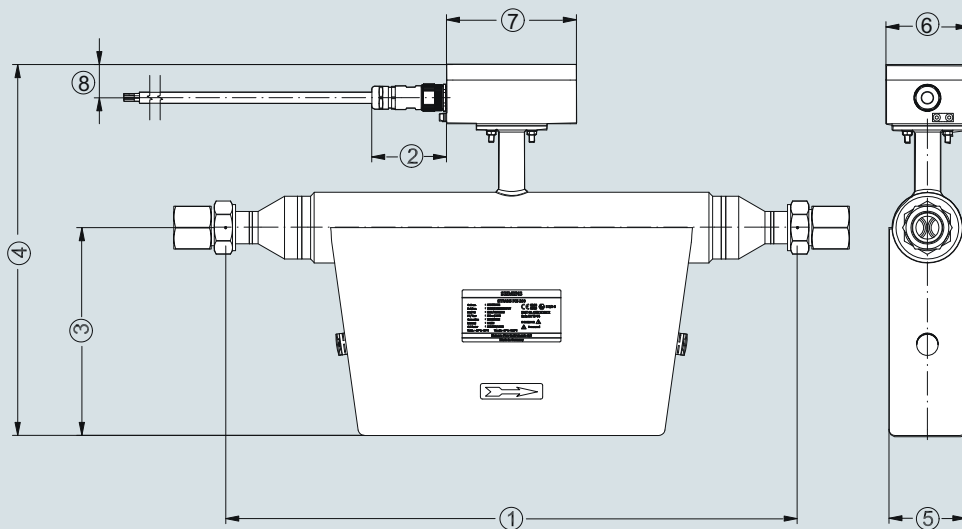
Flowsensor SITRANS FCS200

SITRANS FCS200, DN 25

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)

SITRANS F C sensor MASS 2100 DI 1.5 with SITRANS MASS 6000 and SIFLOW FC070 transmitter

Note: Technical specification see page 3/180 to 3/182.

Selection and Ordering data	Article No.	Ord. code
SITRANS F C Flow sensors	7ME4100-	
MASS 2100 DI 1.5 (1/16") sensor		
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Diameter		
Stainless steel AISI 316L/1.4435		
DI 1.5, max. 125 °C (257 °F)	1 A	
DI 1.5, max. 180 °C (356 °F)	1 B	
Hastelloy C22/2.4602		
DI 1.5, max. 125 °C (257 °F)	2 A	
DI 1.5, max. 180 °C (356 °F)	2 B	
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
Transmitter		
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 d e ib [ia Ga] IIC T4 Gb 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		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: 2014/68/EU

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

A5E03089952All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation**Accessories****Description**

Article No.

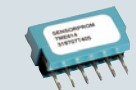
Cable with multiple connectorStandard blue cable between MASS 6000 and MASS 2100, 5 x 2 x 0.34 mm² twisted and screened in pairs. Temperature range -20 °C ... +110 °C (-4 °F ... +230 °F)

- 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

**Spare parts****Description**

Article No.

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

Mounting bracket for flow sensor MASS 2100 DI 1.5



Flow Measurement

SITRANS F C

SITRANS F C sensor FC300 DN 4 with SITRANS MASS 6000 and SIFLOW FC070 transmitter

Note: Technical specification see page 3/183 to 3/186.

Selection and Ordering data	Article No.	Order code
SITRANS F C Flow sensors	7ME4400-	
SITRANS FC300 DN 4 (1/6") sensor		
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Pipe material and temperature		
Stainless steel AISI 316L/1.4435	1 G	
115 °C (239 °F)	1 H	
180 °C (356 °F)		
Hastelloy C22/2.4602	2 G	
115 °C (239 °F)	2 H	
180 °C (356 °F)		
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	2	
Brix/Plato	3	
Fraction (specification required)	9	N 0 Y
Transmitter		
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 d e i b [ia Ga] IIC T4 Gb 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	
Cable with one M20 connector and one end for terminal connect		
• 5 m (16.4 ft)	B	
• 10 m (32.8 ft)	C	
• 25 m (82 ft)	D	
• 50 m (164 ft)	E	
• 75 m (246 ft)	F	
• 150 m (492 ft)	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	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: 2014/68/EU

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

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Accessories

Description

Article No.

Cable with M20 connector
Standard blue cable between MASS 6000 and MASS 2100, 5 x 2 x 0.34 mm² twisted and screened in pairs. Cable mounted with one M20 connector and one end for terminal connections. Temperature range: -20 ... +110 °C (-4 ... +230 °F)

- 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



Spare parts

Description

Article No.

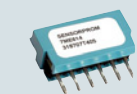
Multiple connector for cable mounting

FDK:083H5056



2 kB SENSORPROM unit
(Sensor Serial No. and Article No. must be specified by ordering)

FDK:083H4410



Mounting bracket
FC300, AISI 304

A5E02590439



SITRANS F C sensor MASS 2100 DI 3, DI 6 and DI 15 with SITRANS MASS 6000 and SIFLOW FC070 transmitter

Note: Technical specification see page 3/187 to 3/198.

Selection and Ordering data	Article No.	Ord. code
SITRANS F C sensors	7ME4100-	
MASS 2100 without heating jacket		
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Diameter		
Stainless steel AISI 316L/1.4435		
DI 3 (PN 100/PN 230)	1 C	
DI 6	1 D	
DI 15	1 E	
Hastelloy C22/2.4602		
DI 3 (PN 100/PN 350)	2 C	
DI 6	2 D	
DI 15	2 E	
Pressure		
PN 16 (DI 6, DI 15)	A	
PN 25 (DI 6, DI 15)	B	
PN 40 (DI 6, DI 15)	C	
PN 100 (DI 3, DI 6, DI 15)	D	
PN 130 (DI 15, 1/2", AISI 316L/1.4404)	G	
PN 200 (DI 15, 1/2", Hastelloy C22/2.4602)	K	
PN 230 (DI 3, 1/4", AISI 316L/1.4404)	L	
PN 265 (DI 6, 1/4", AISI 316L/1.4404)	M	
PN 350 (DI 3, 1/4", Hastelloy C22/2.4602)	N	
PN 410 (DI 6, 1/4", Hastelloy C22/2.4602)	Q	
Class 150 (DI 6, DI 15)	R	
Class 600 (DI 6, DI 15)	S	
Process connection/flange		
Pipe thread		
G 1/4"	1 0	
1/4" NPT	1 1	
G 1/2"	1 2	
1/2" 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	
Flange ASME/ANSI B 16.5		
1/2" (class 150/class 600)	3 0	

Selection and Ordering data	Article No.	Ord. code
SITRANS F C sensors	7ME4100-	
MASS 2100 without heating jacket		
Dairy screwed connection DIN 11851		
DN 10 (PN 40)	4 0	
DN 15 (PN 40)	4 1	
DN 25 (PN 40)	4 2	
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	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 d e ib [ia Ga] IIC T4 Gb 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	F	
Cable		
No cable	A	
Cable with one M20 connector and one end for terminal connect	B	
• 5 m (16.4 ft)	B	
• 10 m (32.8 ft)	C	
• 25 m (82 ft)	D	
• 50 m (164 ft)	E	
• 75 m (246 ft)	F	
• 150 m (492 ft)	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 (ISO 17025)	3	
Extended calibration customer-specified select Y60, Y61, Y62 or Y63 (see additional information)	8	

3

Flow Measurement

SITRANS F C

SITRANS F C sensor MASS 2100 DI 3, DI 6 and DI 15 with SITRANS MASS 6000 and SIFLOW FC070 transmitter

Dairy MLFB example

MASS 2100

Sensor size DI 15,
AISI 316L/1.4435

PN 40

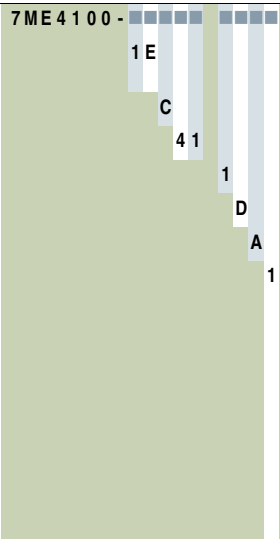
DN 15 connector

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: 2014/68/EU

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

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Selection and Ordering data

Accessories

Description	Dimension	Article No.
Mating parts for hygienic fittings DIN 11851 (AISI 316L)		
Includes:		
• 2 unions		
• 2 mating parts (for welding in)		
• 2 EPDM gaskets		
	DN 10	FDK:085U1016
	DN 15	FDK:085U1017
	DN 25	FDK:085U1019
Mating parts for hygienic clamp ISO 2852 (AISI 316L)		
Includes:		
• 2 clamps		
• 2 mating parts		
• 2 EPDM gaskets		
	25 mm	FDK:085U1029
2 EPDM gaskets with collar for mounting set DIN 11851		
	DN 10	FDK:085U1006
	DN 15	FDK:085U1007
	DN 25	FDK:085U1009

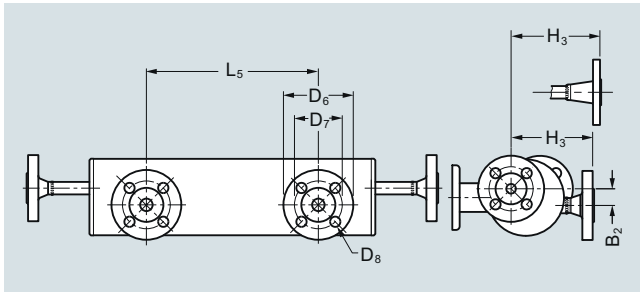
Description	Length	Article No.
Cable with M20 connector Standard blue cable between MASS 6000 and MASS 2100, 5 x 2 x 0.34 mm ² twisted and screened in pairs.		
	5 m (16.4 ft)	FDK:083H3015
	10 m (32.8 ft)	FDK:083H3016
	25 m (82 ft)	FDK:083H3017
	50 m (164 ft)	FDK:083H3018
	75 m (246 ft)	FDK:083H3054
	150 m (492 ft)	FDK:083H3055

Spare parts

Description	Article No.
Adapter for MASS 2100 M20 electrical adapter for MASS 2100 DI 3, 6, 15, 25 and 40	FDK:083L8889
M20 connector for cable mounting	FDK:083H5056
2 kB SENSORPROM unit, includ- ing programming (Sensor Serial No. and Article No. must be specified by ordering)	FDK:083H4410

SITRANS F C sensor MASS 2100 DI 3, DI 6 and DI 15 with SITRANS MASS 6000 and SIFLOW FC070 transmitter

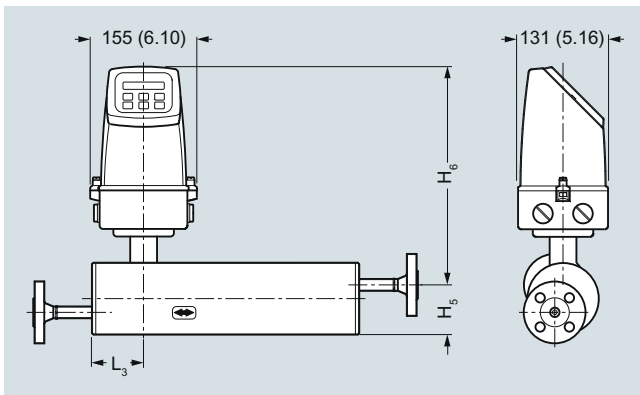
MASS 2100 sensor with "heating jacket"



Dimensions in mm (inch)

Sensor size	Connections heated			L5	H3	B2	D6	D7	D8
DI (inch)	Type	Pressure rating	Size	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)
DI 3 (1/8)	EN 1092-1	PN 40	DN 15	234 (9.21)	122 (4.8)	22 (0.87)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class 150	½"	234 (9.21)	131.6 (5.18)	22 (0.87)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)
DI 6 (¼)	EN 1092-1	PN 40	DN 15	234 (9.21)	112 (4.41)	22.7 (0.89)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class 150	½"	234 (9.21)	121.6 (4.79)	22.7 (0.89)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)
DI 15 (½)	EN 1092-1	PN 40	DN 15	234 (9.21)	126.5 (4.98)	31.5 (1.24)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class150	½"	234 (9.21)	136.1 (5.36)	31.5 (1.24)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)

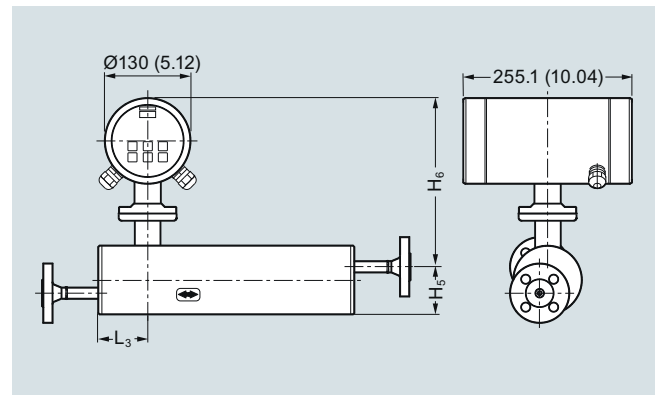
MASS 2100 and MASS 6000 IP67 compact version



MASS 2100 and MASS 6000 IP67 compact version, dimensions in mm (inch)

Sensor size [DI (inch)]	L ₃ [mm (inch)]	H ₅ [mm (inch)]	H ₆ [mm (inch)]	H ₅ + H ₆ [mm (inch)]
3 (1/8)	75 (2.95)	82 (3.23)	306 (12.04)	388 (15.28)
6 (¼)	62 (2.44)	72 (2.83)	316 (12.44)	388 (15.28)
15 (½)	75 (2.95)	87 (3.43)	326 (12.83)	413 (16.26)

MASS 2100 and MASS 6000 Ex d compact version



MASS 2100 and MASS 6000 Ex d compact version, dimensions in mm (inch)

Sensor size [DI (inch)]	L ₃ [mm (inch)]	H ₅ [mm (inch)]	H ₆ [mm (inch)]	H ₅ + H ₆ [mm (inch)]
3 (1/8)	75 (2.95)	82 (3.23)	247 (9.72)	329 (12.95)
6 (¼)	62 (2.44)	72 (2.83)	257 (10.12)	329 (12.95)
15 (½)	75 (2.95)	87 (3.43)	267 (10.51)	354 (13.94)

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 DN 3000 mm (2" to 120")
 - Inline retrofit as 1-path and 2-path up to DN 3000 (120")
 - 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 industry and petrochemical industry
- Irrigation systems
- Cooling water plants within the industry and in power stations
- Plants transporting non-conductive liquids
- Custody transfer - district heating (MID-004)
- Cryogenic fluids
- HART/4 to 20 mA output
- PROFIBUS PA
- ATEX

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-portal.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					
Compact transmitter mounted on pipe				●	●
Remote transmitter - Sensor up to 100 m	●	●	●	●	●
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		●	●		
2-path ultrasonic measurement	●	●	●	●	●
4-path ultrasonic measurement (special request)		● (DN 200 ... 1200)	● (DN 200 ... 1500)		
Dimension					
DN 50	2"	●	U-pipe, on request	Die cast bronze	Die cast bronze
DN 65	2½"	●	U-pipe, on request	Die cast bronze	Die cast bronze
DN 80	3"	●	U-pipe, on request	Die cast bronze	Die cast bronze
DN 100	4"	●	●	1-path only	●
DN 125	5"	●	●	1-path only	●
DN 150	6"	●	●	1-path only	●
DN 200	8"	●	●	●	●
DN 250	10"	●	●	●	●
DN 300	12"	●	●	●	●
DN 350	14"	●	●	●	●
DN 400	16"	●	●	●	●
DN 500	20"	●	●	●	●
DN 600	24"	●	●	●	●
DN 700	28"		On request	●	●
DN 800	32"		On request	●	●
DN 900	36"		On request	●	●
DN 1000	40"		On request	●	●
DN 1200	48"		On request	●	●
DN 1400 ... 2400	54" ... 96"		●		
DN 2500 ... 3000	100" ... 120"		2-path only		
> DN 1200	> 48"		FUS060 only		

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

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-portal.automation.siemens.com

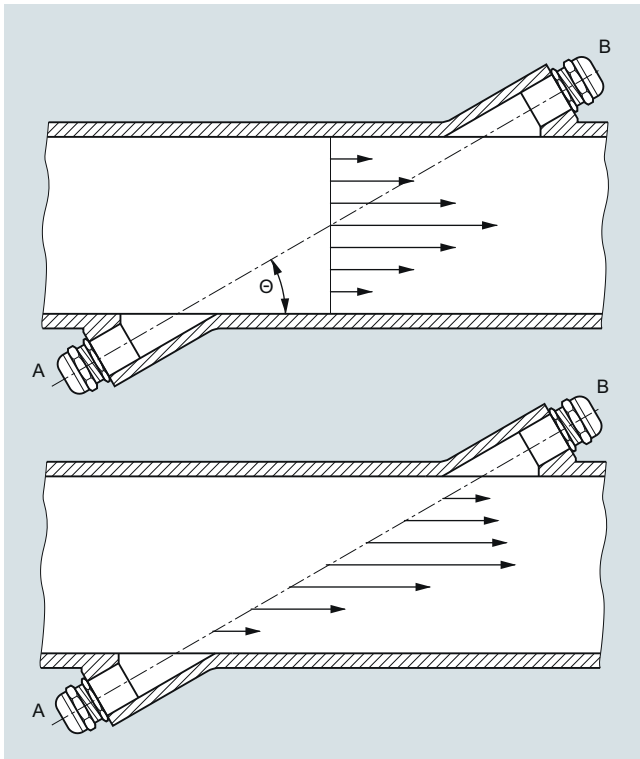


	SONO 3300/ FUS060	SONO 3100/ FUS060	SONOKIT/ FUS060 FUS080	FUE380	FUS380
	7ME3300...	7ME3100...	7ME3210.../ 7ME3220...	7ME3410...	7ME3400...
Process connection					
Flanges	●	●		●	●
Flangeless (for weld-in)		●			
Flanges Norm					
EN 1092-1	●	●		●	●
EN 1759-1	●	●			
ANSI B16.5		●			
Pressure rating					
PN 6			●		
PN 10	●	●	●		
PN 16	●	●	●	●	●
PN 25		●	●	●	●
PN 40	●	●	●	●	●
Class 150	●	●			
Class 300	●	●			
Pipe, flange					
Carbon steel	●	●	●	●	●
Die cast bronze (DN 50, 65, 80)				●	●
Media temperature					
°C	°F				
-20		-4	●		
-10	●	+14	●		
+2	●	+35.6	●	Min. 5 °C (41 °F)	●
+60	●	+140	●	●	●
+120	●	+248	●	Compact	Compact
+150	●	+302	●	Die cast bronze	Die cast bronze
+160	●	+320	●	●	●
+190		+374	●	●	●
+200		+392	●	●	●
-200 ... +100		-328 ... +212	Cryogenic		
Measuring principle					
Transit time principle	●	●	●	●	●
Approvals					
<u>Custody transfer approval</u>					
MID, MI-004, EN 1434 (European energy meter standard)				●	
Other country-specific type approval available for:					
● Russia	●	●	●	●	●
● China (CPA/CMC)				●	
● Korea KC	●	●	●	●	●
<u>Ex approval</u>					
Ex d ATEX		●	●		
Ex i ATEX	●	●	●		

● = available

Function

Physical principle (single path)



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

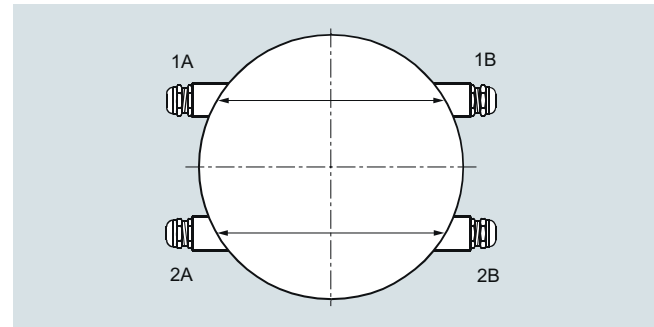
This measuring principle offers the advantage that it is independent of variations in the actual sound velocity of the liquid, i.e. independent of the temperature.

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.

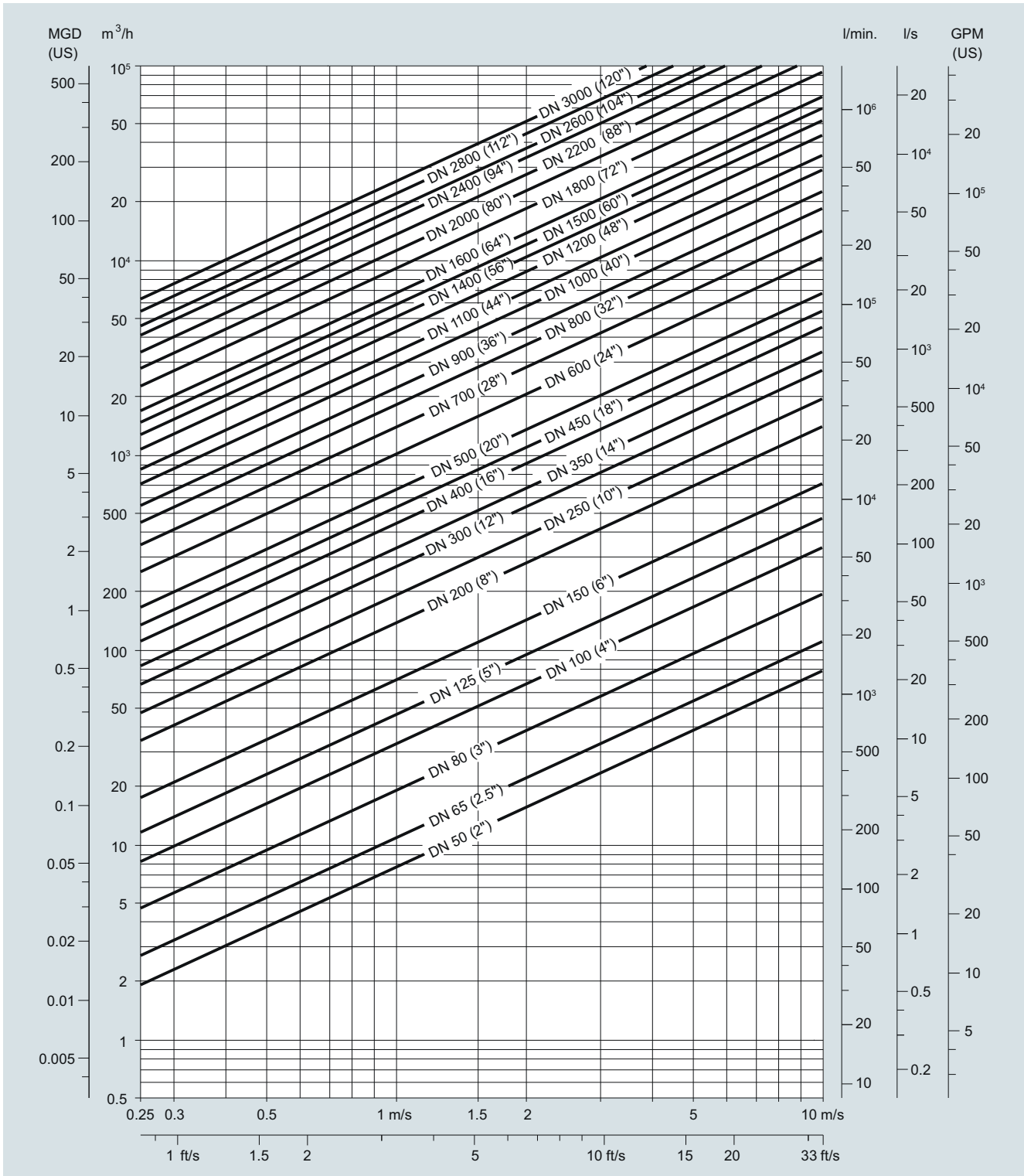
Flow Measurement

SITRANS F US Inline

System information SITRANS F US Inline ultrasonic flowmeters

Technical specifications

3



Nominal size and flow

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):

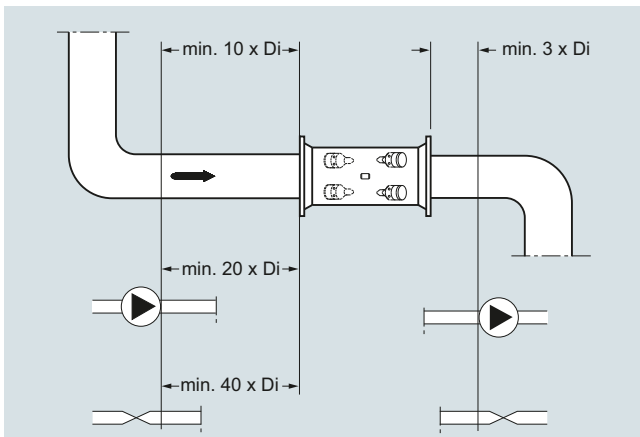
The optimal performance of the flowmeter is with a Re above 10 000, which is typical for flow velocities (water) above 0.5 m/s. Avoid an Re value between 2000 and 5000. In order to observe this and to be above the recommended 0.5 m/s flow velocity limit the sensor size must be reduced.

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

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

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		
	SONO 3300, SONO 3100, SONOKIT 2-path	FUS380/FUE380 ¹⁾	SONOKIT 1-path
90° bend	10 x D _i	10 x D _i	20 x D _i
Fully opened valve	10 x D _i	10 x D _i	20 x D _i
Partially opened valve	40 x D _i	40 x D _i	40 x D _i
2 x 90° bends in same plane	15 x D _i	15 x D _i	25 x D _i
2 x 90° bends in two planes	20 x D _i	20 x D _i	40 x D _i
Reductions (Outlet 0 x D _i)	10 x D _i	10 x D _i	20 x D _i
Pumps	20 x D _i	20 x D _i	40 x D _i
Outlet	3 x D _i	3 x D _i	3 x D _i

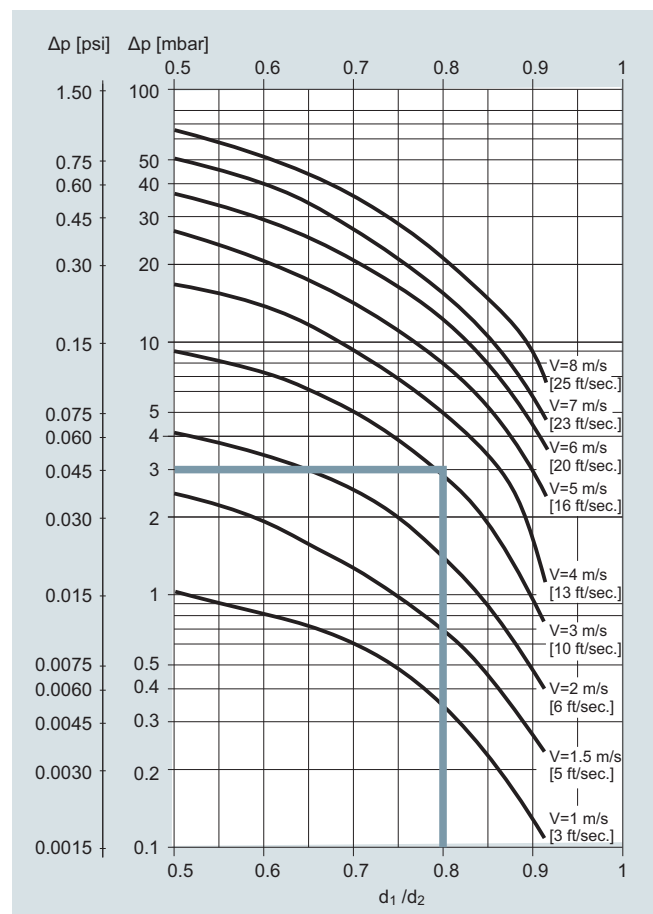
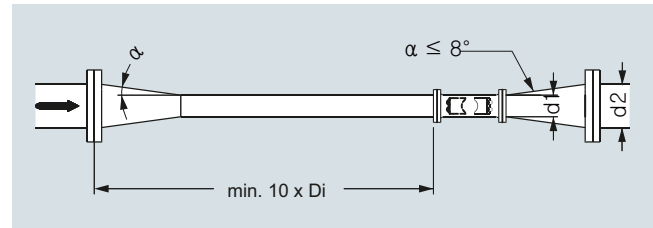
¹⁾ Inlet for FUE380 approved systems: Minimum straight inlet pipe: 1.5 m, but note further recommendations above.

Reductions

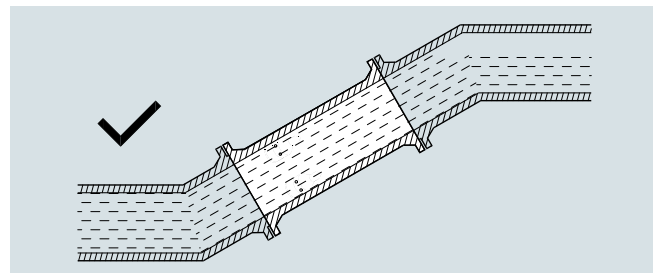
The flowmeter can be installed between two reducers (e.g. DIN 28545). At 8° the pressure drop curve below applies.

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:

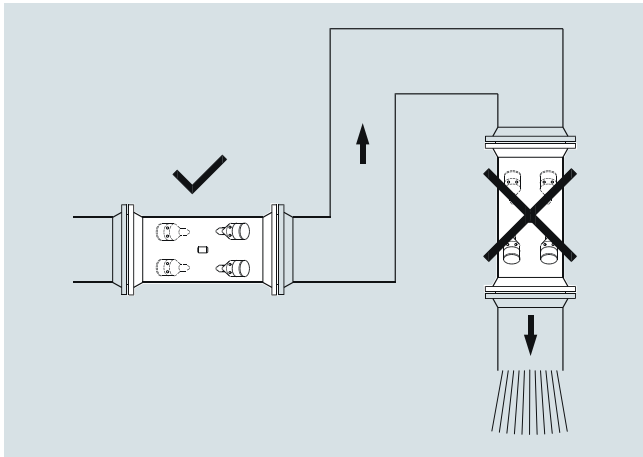
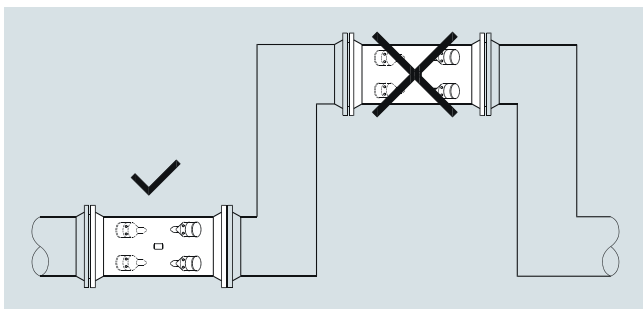
- Installation at the highest point of the pipe system
- Installation in vertical pipes with free outlet

Flow Measurement

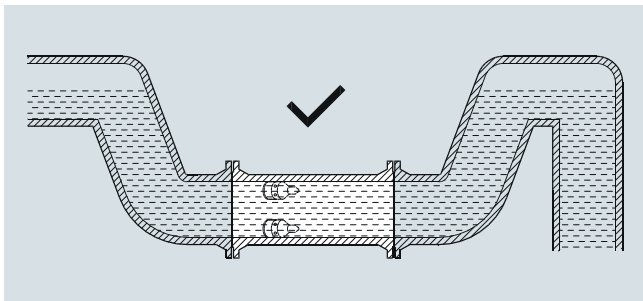
SITRANS F US Inline

System information SITRANS F US Inline ultrasonic flowmeters

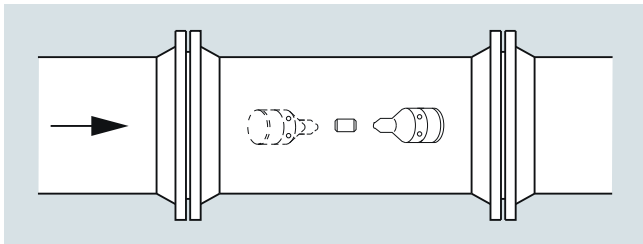
3



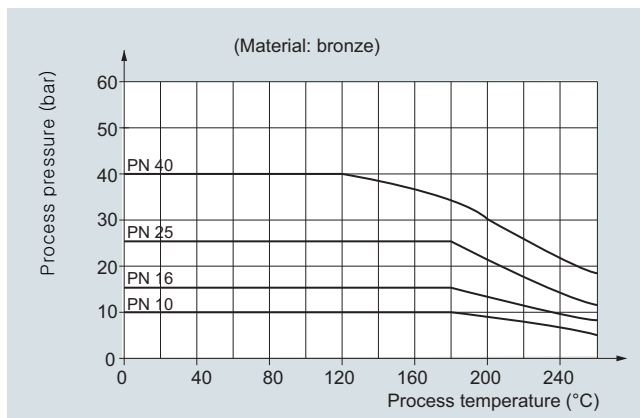
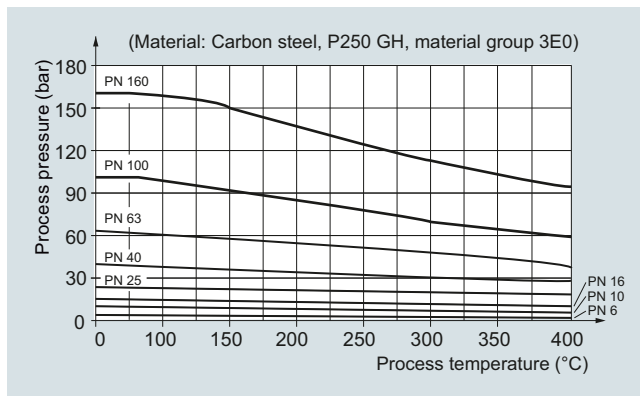
With partially full pipes or pipes with free outlet the flowmeter should be located in a U-shaped tube:



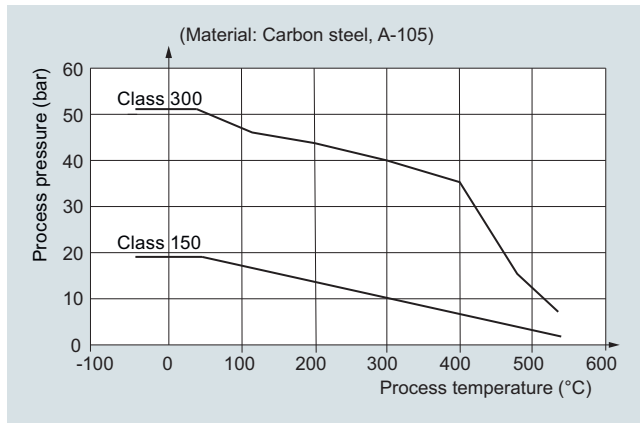
Installing the transducers in horizontal position is recommended:



Pressure/temperature curve to EN (DIN) flanges



Pressure/temperature curve to ANSI B16.5 flanges



Note: The pressure/temperature curves only assist in the selection of a system. No responsibility is taken for the correctness of the information. For further information on the PED standard and requirements, see page 10/15.

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).

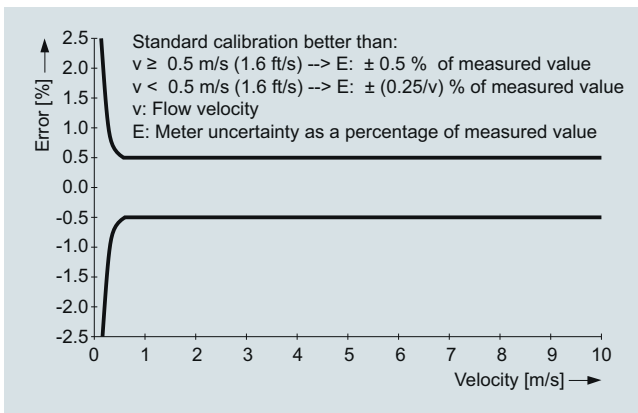
Therefore the calibration certificate ensures recognition of the test results worldwide, including the US (NIST traceability).

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

Flow Measurement

SITRANS F US InLine

Transmitter SITRANS FUS060

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 3000. 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 2 G Ex dem [ia/ib] IIC T6/T4/T3 Gb
- 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.

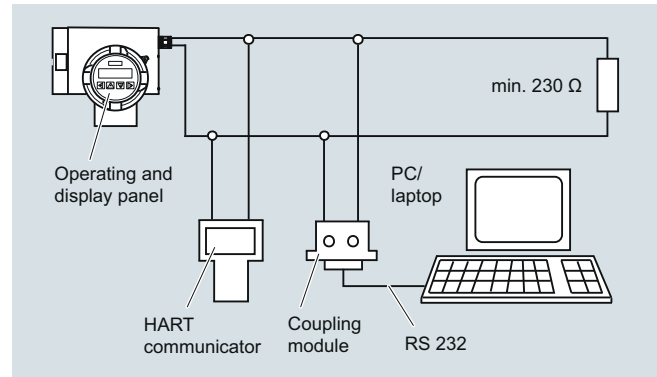
The settings of the transmitter output functions are individually programmed via keypad and display menu.

Function

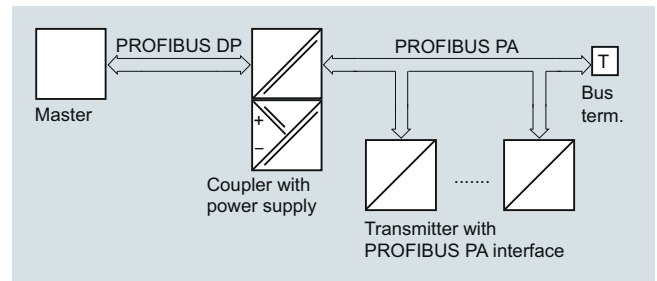
Displays and keypad

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

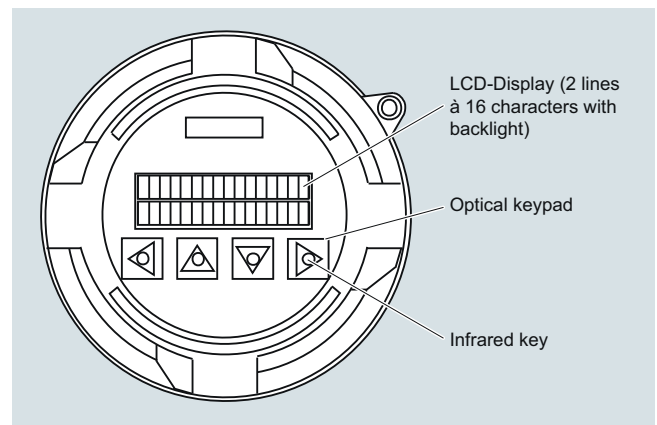


HART communication



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

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 (4") ... 3000 (120") 2-path sensor pipes (depending on selected size, 1-path or 4-path special solutions are possible).
Nominal diameters and number of paths	2-path DN 100 (4") ... DN 3000 (120") (depending on size, optionally also 1-path and 4-path)
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 systems with sizes \geq DN 1500 (60") cable length is recommended to be max. 30 m (98.4 ft).

Analog output

Function	Current output programmable for flow, sound velocity or amplitude level. Active current output (13.2 V < open loop voltage < 15.8 V) 4 ... 20 mA 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"> • Signal range • Upper limit • Signal on alarm • Load 	
<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 	Active: 24 V DC, \leq 24 mA, $R_i = 300 \Omega$ Passive: open collector, 30 V DC, \leq 200 mA
<ul style="list-style-type: none"> • For explosion protection (ATEX version) and PROFIBUS PA version 	Only passive: open collector 30 V DC, \leq 100 mA
<ul style="list-style-type: none"> • Output function, configurable 	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

<p>Digital output 2</p> <p>Function</p> <ul style="list-style-type: none"> Relay, NC or NO contact For explosion protection (ATEX version) Output function, configurable Only PROFIBUS PA version: 	<p>Relay output - programmable for alarm, limit or status indication. Switching capacity max. 5 W Max. 50 V DC, max. 200 mA DC Self-resetting fuse, $R_i = 9 \Omega$</p> <p>Max. 30 V DC, max. 100 mA DC, 50 mA AC (cf. EC-Type Examination certificate)</p> <p>Limit for flow, ultrasonic velocity or ultrasonic amplitude flow direction device status</p> <p>Digital output 2 omitted</p>	<p>Rated operation conditions</p> <p><u>Ambient conditions</u></p> <p>Ambient temperature</p> <ul style="list-style-type: none"> Operation In potentially explosive atmospheres Storage <p>Enclosure rating</p> <p>Electromagnetic compatibility</p> <ul style="list-style-type: none"> Emitted interference Noise immunity <p><u>Medium conditions</u></p> <ul style="list-style-type: none"> Process temperature Gases/solids 	<p>-20 ... +50 °C (-4 ... +122 °F)</p> <p>Observe temperature classes</p> <p>-25 ... +80 °C (-13 ... +176 °F)</p> <p>IP65 (NEMA 4)</p> <p>For use in industrial environments</p> <p>To EN 55011/CISPR-11</p> <p>To EN/IEC 61326-1 (Industry)</p> <p>The measuring media must be ultrasonic signal compatible. It must be homogeneous and not two-phased to transfer the acoustic ultrasonic signals.</p> <p>-200 ... +250 °C (-328 ... +482 °F) (not directly influenced by medium temperature)</p> <p>Influence accuracy of measurement (approx. max. 3 % gases or solids)</p>
<p>Communication via analog output 4 ... 20 mA</p> <ul style="list-style-type: none"> PC/laptop or HART communicator with SITRANS F flowmeter Load with connection of coupling module Load with connection of HART communicator Cable Protocol 	<p>min. 230 Ω (max. 330 Ω for Ex-version)</p> <p>min. 230 Ω</p> <p>2-wire shielded ≤ 3 km (≤ 1.86 miles)</p> <p>Multi-core shielded ≤ 1.5 km (≤ 0.93 miles)</p> <p>HART, version 5.1</p>	<p>Design</p> <p>Separate version</p> <p>Enclosure material</p> <p>Wall mounting bracket (standard and special)</p> <p>Weight of transmitter</p> <p>Electrical connection</p>	<p>For ATEX versions mounted in the Ex area only with 3 m (9.8 ft) long cables.</p> <p>Transmitter is connected to the transducers via 3 ... 120 m (9.8 ... 395 ft) long specially shielded cables (coaxial cable)</p> <p>Die-cast aluminum, painted</p> <p>Stainless steel (standard: always incl.)</p> <p>4.4 kg (9.7 lb)</p> <p>Cable glands (always incl.)</p> <ul style="list-style-type: none"> Power supply and outputs <ul style="list-style-type: none"> 2 x M20 (HART)/M25 (PROFIBUS) or 2 x 1/2" NPT (HART) Transducers/sensor <ul style="list-style-type: none"> 2/4 x M16 or 2/4 x 1/2" NPT
<p>Communication via PROFIBUS PA interface</p> <ul style="list-style-type: none"> Power supply Current consumption from bus 	<p>Layers 1 + 2 according to PROFIBUS PA Communication system according to IEC 61158/EN 50170</p> <p>Separate supply, four-wire device Permissible bus voltage 9 ... 32 V See certificates and approvals</p> <p>10 mA; ≤ 15 mA in event of error with electronic current limiting</p>	<p>Displays and controls</p> <p>Display</p> <ul style="list-style-type: none"> Multi-display: 2 freely-selectable values are displayed simultaneously in two lines <p>Operation</p>	<p>For ATEX versions mounted in the Ex area only with 3 m (9.8 ft) long cables.</p> <p>4.4 kg (9.7 lb)</p> <p>Cable glands (always incl.)</p> <p>LCD, two lines with 16 characters each</p> <p>Flow, volume, mass flow, mass, flow velocity, speed of sound, ultrasonic signal information, current, frequency, alarm information</p> <p>4 infrared keys, hierarchical menu shown with codes</p>
<p>Electrical isolation</p>	<p>Outputs electrically isolated from power supply and from one another</p>	<p>Power supply</p> <p>Supply voltage</p> <ul style="list-style-type: none"> Standard version Ex version <p>Power failure</p> <p>Power consumption</p>	<p>120 ... 230 V AC ± 15 % (50/60 Hz) or 19 ... 30 V DC/21 ... 26 V AC</p> <p>19 ... 30 V DC/21 ... 26 V AC</p> <p>No effect for at least 1 period (> 20 ms)</p> <p>Approx. 10 VA/10 W</p>
<p>Accuracy</p> <p>Error in measurement (at reference conditions)</p> <ul style="list-style-type: none"> Pulse output Analog output 4 ... 20 mA Repeatability <p>Reference conditions (water)</p> <ul style="list-style-type: none"> Process temperature in the connected sensor Ambient temperature at the transmitter Transmitter warming-up time <p>Installation conditions of connected sensor</p>	<p>Outputs electrically isolated from power supply and from one another</p> <p>$\leq \pm 0.5$ % of measured value at 0.5 ... 10 m/s or $\leq \pm 0.25\sqrt{V}$ [m/s] % of measured value at flow < 0.5 m/s</p> <p>As pulse output plus ± 0.1 % of measured value, $\pm 20 \mu\text{A}$</p> <p>$\leq \pm 0.25$ % of measured value at 0.5 ... 10 m/s</p> <p>25 °C ± 5 °C (77 °F ± 9 °F)</p> <p>25 °C ± 5 °C (77 °F ± 9 °F)</p> <p>30 min.</p> <p>Upstream section > 10 x DN and downstream section > 5 x DN</p>	<p>Certificates and approvals</p> <p>Explosion protection</p>	<p>Certificates and approvals</p> <p>ATEX II 2 G Ex dem [ia/ib] IIC T6/T4/T3 Gb</p> <p>T6 for media < 85 °C (185 °F)</p> <p>T5 for media < 100 °C (212 °F)</p> <p>T4 for media < 135 °C (275 °F)</p> <p>T3 for media < 200 °C (392 °F)</p>

Coaxial cable

Standard Coaxial cable (75 Ω)

Coaxial cable with SMB straight plug on one end for connection to the FUS060

Pre-terminated, can be shortened on sensor side



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)

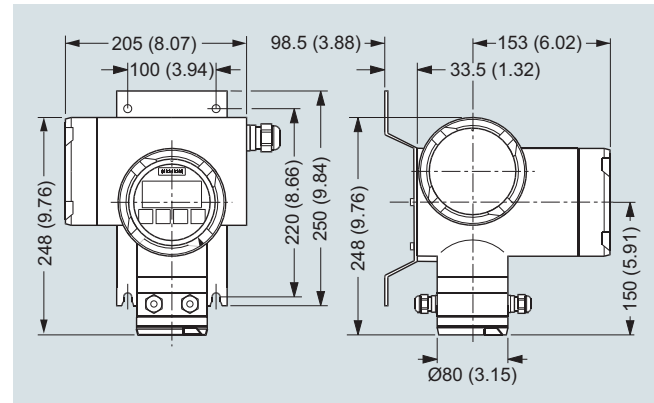
Coaxial cable with SMB straight plug on one end for the connection to FUS060

Fix terminated, can NOT be shortened

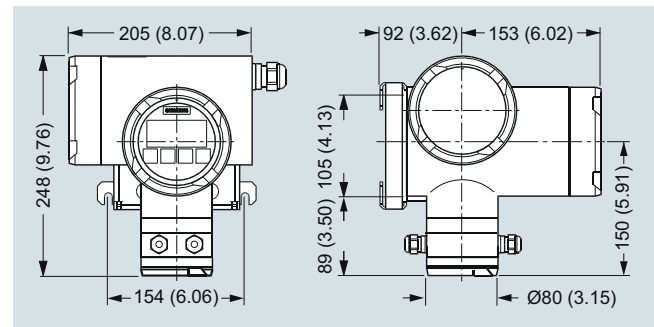
Outside diameter	Ø 5.13 mm (first 0.3 m (0.98 ft) part to the transducer), Ø 5.8 mm (for remaining cable to the transmitter - with SMB plug at the end) and between these is a black hot melt junction Ø 16 mm (length 70 mm)
Length	3, 15, 30 m (9.84, 49.21, 98.43 ft) between sensor and transmitter (max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

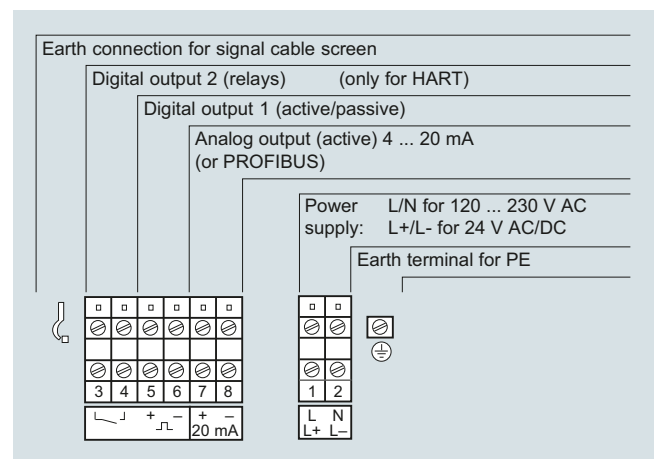


SITRANS FUS060 with standard mounting bracket, dimensions in mm (inch)



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

Schematics



Electrical connection SITRANS FUS060

Flow Measurement

SITRANS F US Inline

Transmitter SITRANS FUS060




Transmitter FUS060 operating instructions, accessories and spare parts

Operating instructions

Description	Article No.
• English	A5E01204521
• German	A5E02123845

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

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 8/5, chapter "Communication and Software"

See page 8/13, chapter "Communication and Software"



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


HART modem
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	

Ordering of pre-configured FUS060 spare transmitters only via PVR (product variation request - special request)

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				

Flow Measurement

SITRANS F US Inline

Transmitter SITRANS FUS060

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
	120 (393.70)	A5E01278698
High temp. coaxial cable for FUS060; with 0.3 m brown PTFE high temp. transducer part, max. 200 °C (392 °F) and black PVC for remaining transmitter part with SMB plug, max. 70 °C (158 °F), impedance 75 Ω (2 pcs.)	3 (9.84)	A5E00875105
	15 (49.21)	A5E00861435
	30 (98.43)	A5E01196952
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



Overview



SITRANS FUS080 is a transit time based transmitter designed for ultrasonic flow metering 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 3/277. The standard flowmeter series SITRANS FUS380 is described from page 3/288. The type approved flowmeter series for flow metering in energy meter custody transfer systems are named SITRANS FUE380 - see page 3/294.

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)
- 1 analog 4 to 20 mA output
- Bidirectional measurement, with 2 totalizers and outputs
- Dynamic range Q_i (min) : Q_s (max) up to 1:400
- Compact version with triax cables for highest EMC-protection

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 pre-programmed 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)
Analog output	Passive current output 4 ... 20 mA Data span pre-selectable depending on pipe size

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
Triax cables for integral version

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, 34 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, 17 Ah), replaceable, life time up to 8 years

Power consumption

Mains version

Approx. 2.5 VA

SONOKIT, FUS380, FUE380

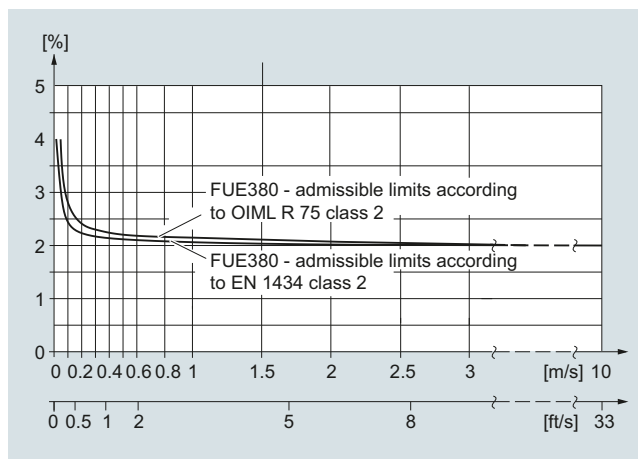
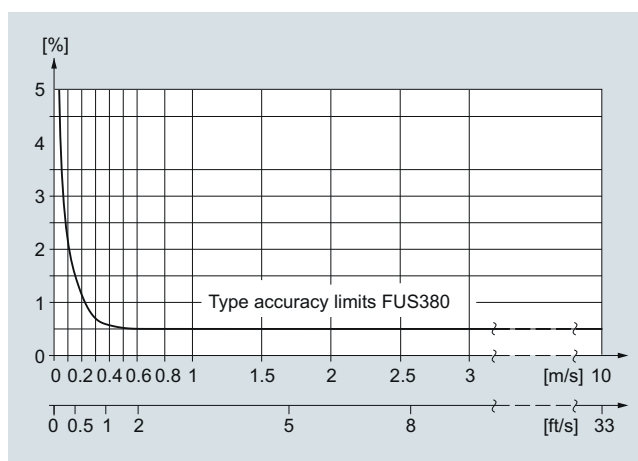
The flow values and settings are predefined according to dimension selection.

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).

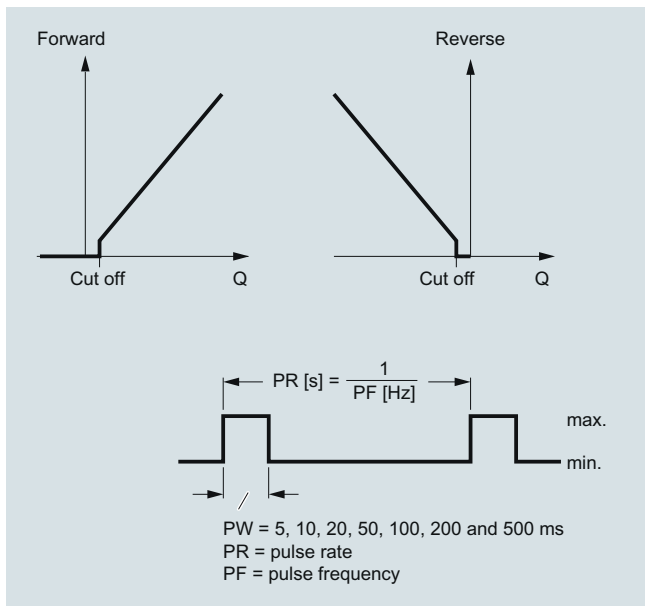
Accuracy/Error in measurement:

(at reference conditions for FUS380 and FUE380 series, SONOKIT series will differ in the accuracy)

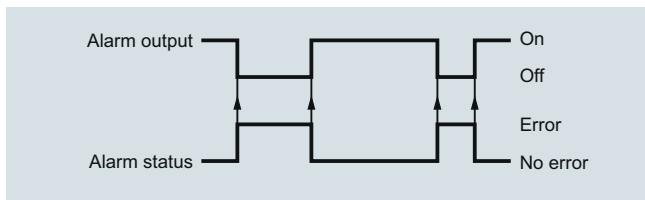
- Pulse output
 - $\leq \pm 0.5$ % of measured value at 0.5 ... 10 m/s or
 - $\leq \pm 0.25/V$ [m/s] % of measured value at flow < 0.5 m/s
- Repeatability ≤ 0.25 % of measured value at 0.5 ... 10 m/s
- Reference conditions
 - Process temperature and ambient temperature: 25 °C \pm 5 °C (77 °F \pm 9 °F)
 - Transmitter warming-up time 30 min.
 - Installation conditions of the sensor: Upstream section > 10 x DN and downstream section > 5 DN



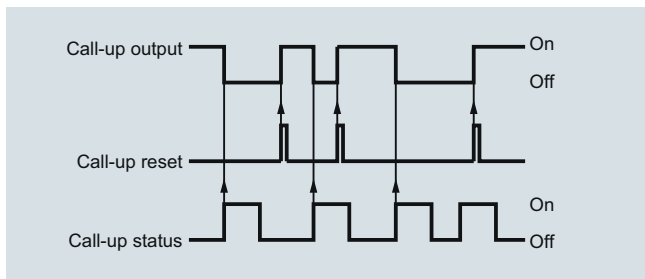
Output configuration



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).

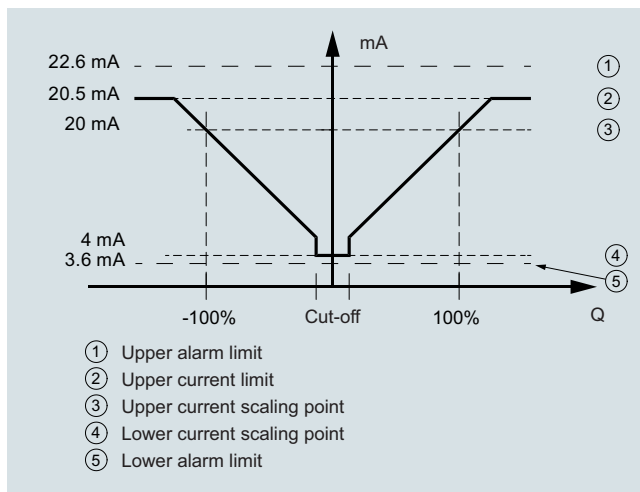


Pulse output B can be used as stated above or as alarm or call-up function.

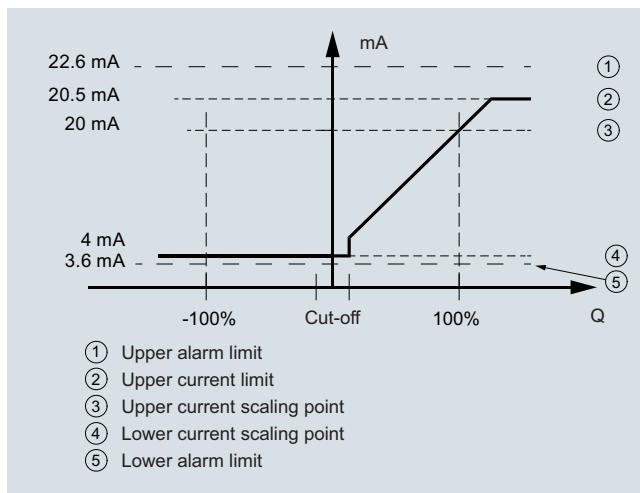


Call-up: the call-up output is active until manually reset by use of PDM tool. The call-up function is activated when an alarm is activated.

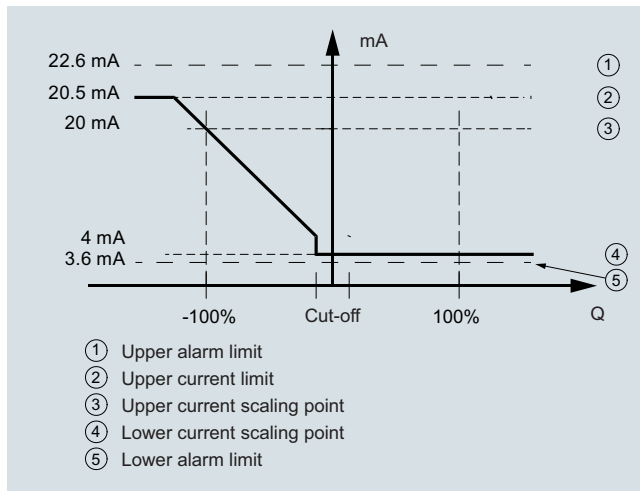
Current output



Bidirectional flow



Positive flow



Negative flow

Flow Measurement

SITRANS F US Inline

Transmitter SITRANS FUS080/FUE080

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/FUE380 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 • German	A5E00730100 A5E00740611

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

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 8/13, chapter "Communication and Software"
Details about the SIMATIC PDM tool can be found on page 8/5, chapter "Communication and Software"	

Spare parts

A spare part transmitter can be ordered for a specific system. In the description of the following spare part transmitters the related transmitter Article No. found on the device silver front label is noted.

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. Transmitter Article No. 7ME3450-0AA10-2AA0	A5E02729700
FUS080 transmitter 3.6 V battery (battery included) as spare part transmitter for FUS380 flowmeter series ¹⁾ . Transmitter Article No. 7ME3450-0AA20-2AA0	A5E02729035
FUS080 transmitter 230 V mains as spare part transmitter for FUS380 flowmeter series. Transmitter Article No. 7ME3450-0AA30-2AA0	A5E02699309
FUS080 transmitter 230 V mains with backup-battery as spare part transmitter for FUS380 flowmeter series. Transmitter Article No. 7ME3450-0AA40-2AA0	A5E02729610

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

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. Transmitter Article No. 7ME3450-0AA10-2AB0	A5E02734600
FUE080 transmitter 3.6 V battery (battery included) as spare part transmitter for FUE380 flowmeter series ¹⁾ . Transmitter Article No. 7ME3450-0AA20-2AB0	A5E02734568
FUE080 transmitter 230 V mains as spare part transmitter for FUE380 flowmeter series. Transmitter Article No. 7ME3450-0AA30-2AB0	A5E02734539
FUE080 transmitter 230 V mains with backup-battery as spare part transmitter for FUE380 flowmeter series. Transmitter Article No. 7ME3450-0AA40-2AB0	A5E02734585

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

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. Transmitter Article No. 7ME3450-0AA10-2AA0	A5E03048726
FUS080 transmitter 3.6V battery (battery included) as spare part transmitter for SONOKIT flowmeters ¹⁾ . Transmitter Article No. 7ME3450-0AA20-2AA0	A5E03048714
FUS080 transmitter 230V mains as spare part transmitter for SONOKIT flowmeters. Transmitter Article No. 7ME3450-0AA30-2AA0	A5E03048701
FUS080 transmitter 230V mains with backup-battery as spare part transmitter for SONOKIT flowmeters. Transmitter Article No. 7ME3450-0AA40-2AA0	A5E03048719

When ordering: Inform on flowmeter Article No. and flowmeter serial no. (e.g. 7ME3220-xxxx-xxxx-Z, XX.... and xxxxxxHxxx)











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.		Description	Article No.	
<p>Sparepart FUS080 transmitter 3.6 V, incl. 3.6V dual batterie pack, USA version</p> <p>Transmitter Article No.: 7ME3450-0AA20-1CA0; Label, 0: Siemens FUS080 transmitter; Version, 0: Without connection box; Enclosure, A: IP67/NEMA 4X/6; Code 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, A: Standard FUS080 (for SITRANS Retrofit - 7ME344); Code, 0: Standard</p>	A5E03412669		<p>Internal battery pack, one set of 2 D-cell (3.6 V 34 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 (17 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>FUS080 transmitter for FUS880 retrofit systems, USA version,</p> <p>incl. wall-mounting kit, 2 transducers and 2 pcs. 60 ft (20 m) of cables.</p> <p>Label, 0: Siemens FUS080 transmitter; 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>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 with Siemens logo</p>	A5E00873496	
			<p>FUS080 display and keypad neutral (without logo)</p>	A5E33147123	

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.

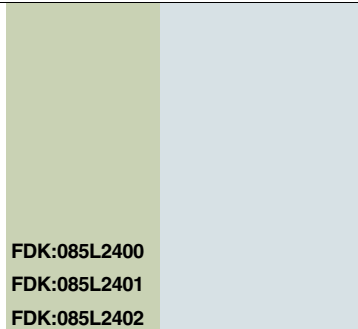

Sensor cables for FUS380/FUE380 flowmeters

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	
0.5 m (1.64 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:085L2400	
• 1 x 20 m (65.6 ft)	FDK:085L2401	
• 1 x 30 m (98.4 ft)	FDK:085L2402	
Transducer spare part set of two transducers with gaskets for STRANS FUS880 retrofitting systems	FDK:087H3007	

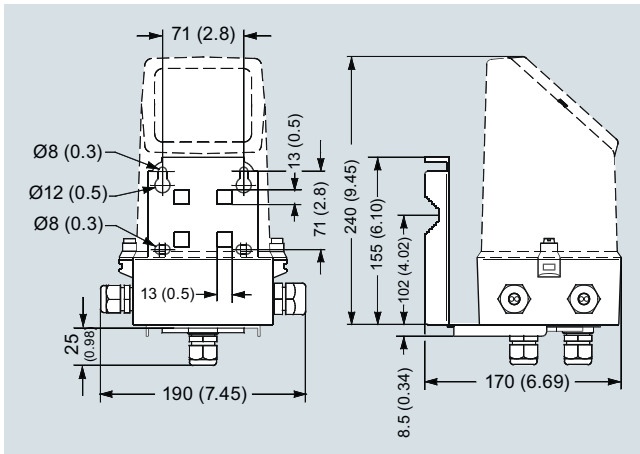
Flow Measurement

SITRANS F US InLine

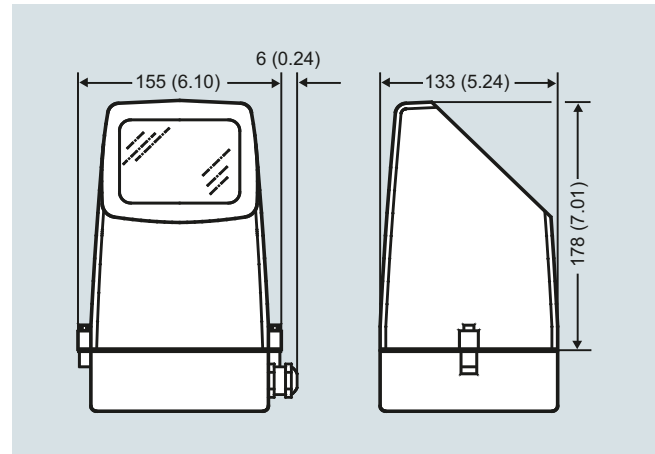
Transmitter SITRANS FUS080/FUE080

Dimensional drawings

FUS080 transmitter IP67/NEMA 4X/6, wall mounting and compact mounting

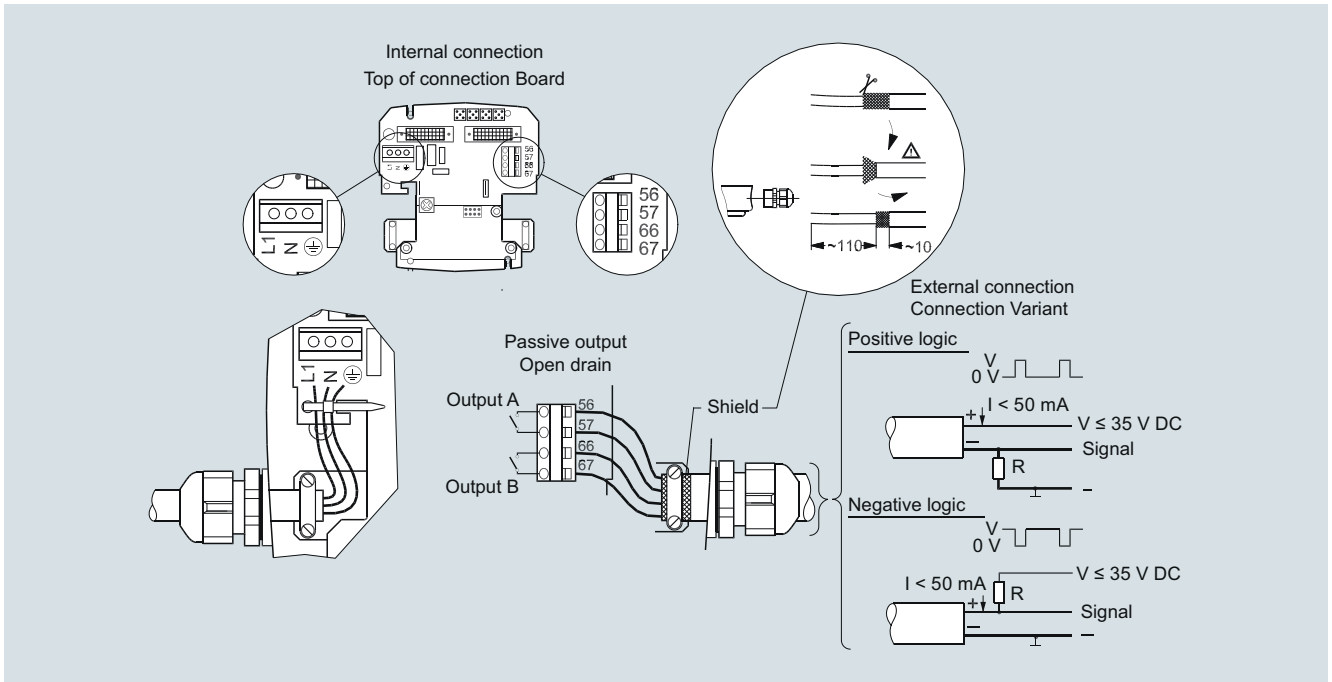


Transmitter wall mounted, dimensions in mm (inch)

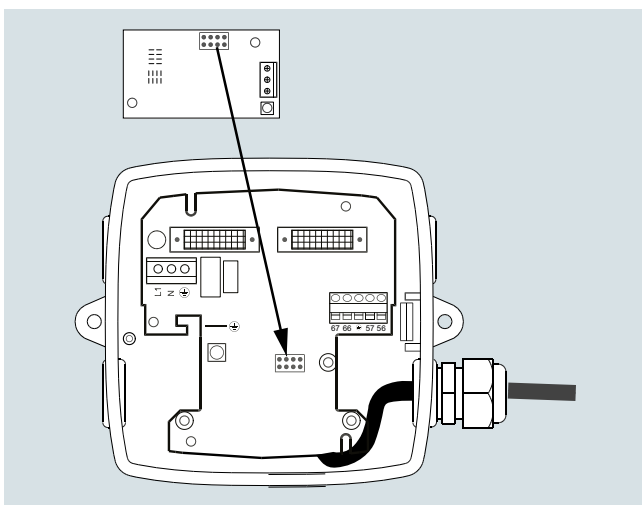


Transmitter compact mounted, dimensions in mm (inch)

Schematics



Electrical connection of SITRANS FUS080



Analog module SITRANS FUS080

Flow Measurement

SITRANS F US Inline

Flowmeter SONO 3300/FUS060

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 3/247.

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	
	DN 50, DN 65, DN 80, DN 100, DN 125, DN 150, DN 200, DN 250, DN 300 (2" ... 12")
Media temperature	Separate version: $-10 \dots +160 \text{ }^\circ\text{C}$ (14 ... 320 $^\circ\text{F}$)
Ambient temperature (sensor)	Separate version: $-20 \dots +60 \text{ }^\circ\text{C}$ (-4 ... +140 $^\circ\text{F}$) Storage: $-40 \dots +85 \text{ }^\circ\text{C}$ (-40 ... +185 $^\circ\text{F}$)
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, type 11 (B)	<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
Flange	<ul style="list-style-type: none"> • DN 50 ... 300 (2" ... 12"): EN 1.0025-S235JRG2
Class	ASTM A105
Transducer	Stainless steel AISI 316 or similar

Certificates and approvals

Conformity certificate	The devices are supplied as standard with a Siemens Certificate of Conformity on DVD
Material certificate	Material certificate according to EN 10204-3.1 is optionally available
NDT examination report	Extended material certificate is available on special request (PVR)
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 2 G Ex dem [ia/ib] IIC T6/T4/T3 Gb) 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 2014/68/EU dated 27 June 2014 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

Sensor SONO 3300 with transmitter FUS060 **7ME3300-**

↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Diameter	Qn setting [m ³ /h]	
DN 50 (2")	10	1 A
DN 50 (2")	26	1 B
DN 50 (2")	60	1 D
DN 65 (2½")	15	1 E
DN 65 (2½")	42	1 F
DN 65 (2½")	100	1 H
DN 80 (3")	20	1 J
DN 80 (3")	60	1 K
DN 80 (3")	150	1 M
DN 100 (4")	36	1 N
DN 100 (4")	100	1 P
DN 100 (4")	230	1 R
DN 125 (5")	50	1 S
DN 125 (5")	150	1 T
DN 125 (5")	360	1 V
DN 150 (6")	80	2 A
DN 150 (6")	220	2 B
DN 150 (6")	500	2 D
DN 200 (8")	120	2 E
DN 200 (8")	380	2 F
DN 200 (8")	900	2 H
DN 250 (10")	200	2 J
DN 250 (10")	600	2 K
DN 250 (10")	1400	2 M
DN 300 (12")	300	2 N
DN 300 (12")	850	2 P
DN 300 (12")	2200	2 R

Flange norm and pressure rating

(All sizes are not available in all pressure ratings)

EN 1092-1

PN 10 (DN 200 ... 300 (8" ... 12"))
 PN 16 (DN 80 ... 300 (3" ... 12"))
 PN 40 (DN 50 ... 300 (2" ... 12"))

ANSI B16.5

class 150 (DN 50 ... 300 (2" ... 12"))
 class 300 (DN 50 ... 300 (2" ... 12"))

Sensor type (approval) and transmitter mounting

IP67 standard, remote transmitter
 IP67 Ex-version (ATEX), remote transmitter (Ex-version)

Cable gland entries in FUS060 and SONO 3300

Cable glands M20 in sensor and in transmitter M25/20/16 x 1.5

Transmitter version of SITRANS FUS060

IP65 (NEMA 4), 120/230 V AC
 IP65 (NEMA 4), 24 V AC/DC
 IP65 (NEMA 4), 24 V AC/DC, Ex-version (ATEX)

Selection and Ordering data

Sensor SONO 3300 with transmitter FUS060 **7ME3300-**

FUS060 output module

HART, 4 ... 20 mA, 1 pulse output, 1 relay
 HART, Ex version, 4 ... 20 mA, 1 pulse output, 1 relay
 PROFIBUS PA, 1 pulse/frequency

Transducer coaxial cable

4 x 3 m, max. 70 °C (158 °F), the only option for Ex i
 4 x 15 m, max. 70 °C (158 °F)
 4 x 30 m, high temp. max.200 °C (392 °F)
 4 x 30 m, max. 70 °C (158 °F)
 4 x 60 m, max. 70 °C (158 °F)
 4 x 90 m, max. 70 °C (158 °F)
 4 x 120 m, max. 70 °C (158 °F)
 4 x 3 m, high temp. max. 200 °C (392 °F), the only option for Ex i
 4 x 15 m, high temp. max. 200 °C (392 °F)

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 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 m³/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 m³/h).

D21

Material certificate

EN 10204-3.1

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



Please use online Product selector to get latest updates. Product selector link:

www.pia-portal.automation.siemens.com

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

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Accessories

Potting kit


Description	Article No.
Potting kit for terminal box of SONO 3200 transducers 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	
• IP65 metal box for 4 coaxial cables (2 pair)	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
	120 (393.70)	A5E01278698
High temp. coaxial cable for FUS060; with 0.3 m brown PTFE high temp. transducer part (max. 200 °C (392 °F)) and black PVC transmitter part with SMB plug (max. 70 °C (158 °F)); impedance 75 Ω (2 pcs.)	3 (9.84)	A5E00875105
	15 (49.21)	A5E00861435
	30 (98.43)	A5E01196952



Cable glands (for the SONO 3300 terminal box) (only as spare parts)

Type	Material	Temperature range [°C (°F)]	Article No.
M20	Nickel-plated brass, 2x cables Ø 5 ... 6 mm (2 pcs.)	-25 ... +200 (-13 ... +392)	A5E02246329



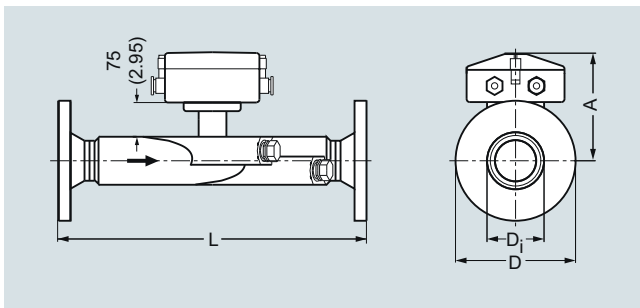
Flow Measurement

SITRANS F US Inline

Flowmeter SONO 3300/FUS060

Description	Article No.	Description	Article No.
SONO 3300 terminal box lid, in stainless steel painted black (1 pc.)	FDK:085U1505	SONO 3300 stainless steel terminal box (1 pc.), M20 cable gland version, incl. lid in stainless steel (painted black) and gasket in EPDM	A5E00836867
Gasket for SONO 3300 terminal lid in EPDM (1 pc.)	FDK-085U1820	Coax cable connecting plate (1 pc.) for SONO 3300 terminal box and use with transmitter type FUS060	A5E02593568

Dimensional drawings



Sensor SONO 3300, dimensions in mm (inch)

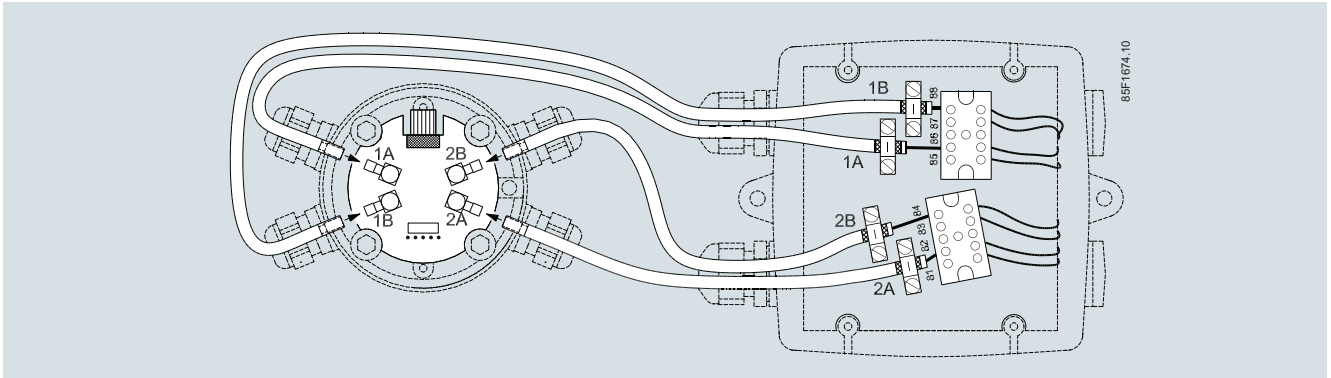
DN	EN 1092-1																	
	PN 10						PN 16						PN 40					
	L ¹⁾		D		D _i		L ¹⁾		D		D _i		L ¹⁾		D		D _i	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
50													475	18.70	165	6.50	52.60	2.07
65													475	18.70	185	7.28	62.70	2.47
80							380	14.96	200	7.87	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												Weight ²⁾					
	150 lb						300 lb						EN and ANSI		EN		ANSI	
	L ¹⁾		D		D _i		L ¹⁾		D		D _i		A					
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	kg	lb	kg	lb
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 2-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.

2 path standard, 1-path or 4-path special versions are available on request, depending on size (DN 25 to DN 1200).

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 3/247.

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

- Standard -10 ... +200 °C (14 ... 392 °F)

- ATEX Ex d version -20 ... +180 °C (-4 ... +356 °F)

- ATEX Ex i version -10 ... +190 °C (14 ... 374 °F)

- Specials -200 °C (-328 °F) or up to 250 °C (482 °F)

Ambient temperature

- 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, type 11 (B)

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 (EN 10217), (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

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 Gb 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 CE

The devices are supplied as standard with a Siemens Certificate of Conformity on DVD

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 10204-2.3 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 2014/68/EU dated 27 June 2014 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-

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

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)

B

PN 16 (DN 100 ... DN 600)

C

PN 25 (DN 200 ... DN 600)

D

PN 40 (DN 100 ... DN 500)

E

ANSI B16.5

class 150 (DN 100 ... DN 600)

H

class 300 (DN 100 ... DN 300)

J

Pipe without flanges (EN 10217) (weld-in version)²⁾

PN 10 (DN 200 ... DN 600)

P

PN 16 (DN 100 ... DN 600)

Q

PN 25 (DN 200 ... DN 600)

R

PN 40 (DN 100 ... DN 500)

S

Flow Measurement

SITRANS F US Inline

Flowmeter SONO 3100/FUS060

Selection and Ordering data	Article No.	Order code
SITRANS F US SONO 3100 sensor 2-path	7ME3100-	
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	

- 1) Reduced Q value during calibration (Qn setting unchanged).
 2) For weld-in sensor versions according to EN 10217 (flangeless sensors 7ME3100-xxYxx-xxxx, Y = P, Q, R, S) the tube roundness shall be agreed via the PVR process (only if the factor of Du / Wxx > 100).

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 630 m ³ /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 m ³ /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 m ³ /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-portal.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

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

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	
• IP65 metal box for 4 coaxial cables (2 pair)	FDK:085B1361
• IP65 EEx e plastic box for 4 coaxial cables (2 pair), 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 ... +180 (-4 ... +356)	50 (1.97)	FDK:085B5451
O-ring	316 SS	O-ring	PN 40	316 SS M20	Ex i ²⁾	-10 ... +190 (14 ... 374)	50 (1.97)	A5E00836448
O-ring	316 SS	O-ring	PN 40	Plastic, PA 6.6 ½" NPT		-20 ... +100 (-4 ... +212)	50 (1.97)	A5E00839472
O-ring	316 SS	O-ring	PN 40	316 SS ½" NPT		-20 ... +200 (-4 ... +392)	50 (1.97)	A5E00839431
Flange	316 SS	Graphite	PN 40	Plastic, PA 6.6 M20		-20 ... +100 (-4 ... +212)	88 (3.47)	FDK:085B5461
Flange	316 SS	Graphite	PN 40	316 SS M20		-20 ... +200 (-4 ... +392)	88 (3.47)	FDK:085B5462
Flange	316 SS	Graphite	PN 40	316 SS M20	Ex d ¹⁾	-20 ... +180 (-4 ... +356)	88 (3.47)	FDK:085B5463
Flange	316 SS	Graphite	PN 40	316 SS M20	Ex i ²⁾	-10 ... +190 (14 ... 374)	88 (3.47)	A5E00836465
Flange	316 SS	Graphite	PN 40	Plastic, PA 6.6 ½" NPT		-20 ... +100 (-4 ... +212)	88 (3.47)	A5E00839479
Flange	316 SS	Graphite	PN 40	316 SS ½" NPT		-20 ... +200 (-4 ... +392)	88 (3.47)	A5E00839440
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

¹⁾ ATEX (Ex) IIC 2G Ex d IIC T3-T6 Gb

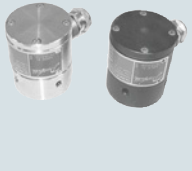
²⁾ For systems with FUS060 ATEX IIC 2G Ex dem [ia/ib] T6/T4/T3

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 (1/2" NPT cable gland)	N/A	PA 6.6	-20 ... +100 (-4 ... +212)	A5E00839460	
Terminal housing (1/2" NPT cable gland)	N/A	ASTM 316	-20 ... +200 (-4 ... +392)	A5E00839427	
Ex d ¹⁾ terminal housing (M20 cable gland)	N/A	ASTM 316	-20 ... +180 (-4 ... +356)	FDK:085B5505	
Ex i ²⁾ terminal housing (M20 cable gland)	N/A	ASTM 316	-10 ... +190 (14 ... 374)	A5E00835255	

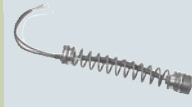
1) ATEX (Ex) IIC 2G EEx d IIC T3 ... T6

2) For systems with FUS060 ATEX IIC 2G Ex dem [ia/ib] T6/T4/T3






SONO 3200 spare parts, transducer body without terminal housing, including insert

Type	Material	Gasket	Pressure rating	Temp. range [°C (°F)]	Length mm (inch)	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 (4 pcs.)	PN 40	AISI 316 or equal	-20 ... +200 (-4 ... +392)	FDK:085B1083	
Gasket and 16 mm (0.63") bolts and nuts for flange transducers (4 pcs.)	PN 160	Graphite, 316 SS	-20 ... +200 (-4 ... +392)	FDK:085B1084	
Gasket for cryogenics transducer with flat flange (2 pcs.)	PN 40	Graphite/metal composite	-200 ... +100 (-328 ... +212)	A5E02593522	

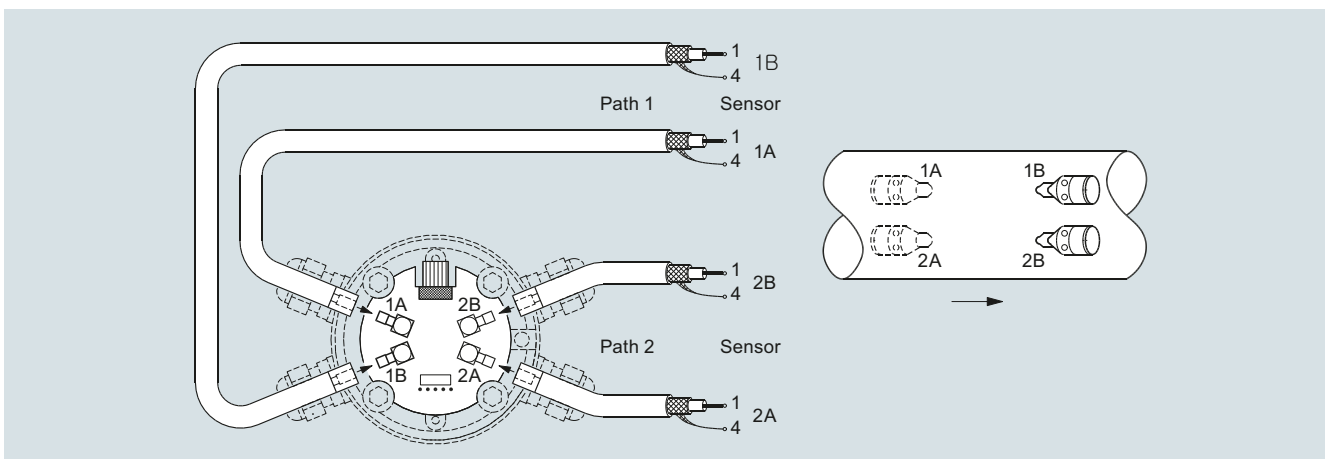
SONO 3200 cable glands

Type/description	Temperature range [°C (°F)]	Appr.	Article No.	
black PA plastic, cable Ø 5 ... 13 mm (1 pc.)	-20 ... 100 (-4 ... +212)		A5E02246304	
½" NPT gray PA plastic, cable Ø 5 ... 9 mm (1 pc.)	-20 ... 100 (-4 ... +212)		A5E02246309	
½" NPT chrome-plated brass, cable Ø 5 ... 9 mm (1 pc.)	-40 ... 100 (-40 ... +212)		A5E02246258	
M20 stainless steel, cable Ø 4 ... 6 mm (1 pc.)	-25 ... 200 (-13 ... +392)	Ex i	A5E02246194	
M20 Stainless steel, cable Ø 5 ... 8 mm (1 pc.)	-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	
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	

Schematics



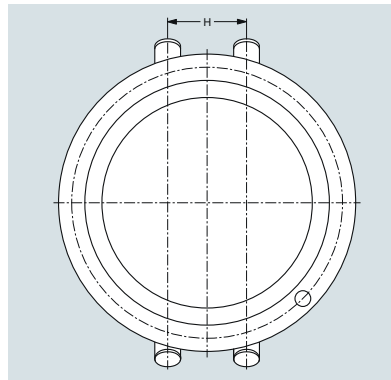
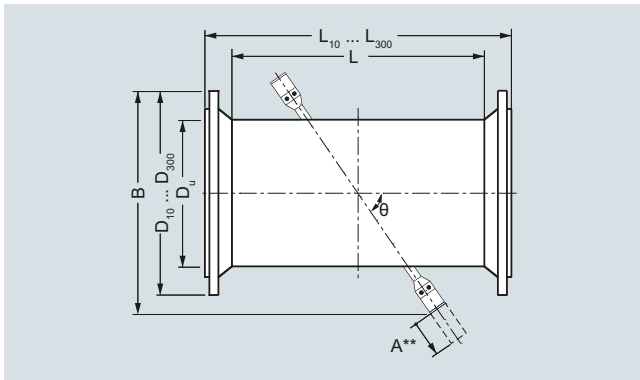
Electrical connection of SITRANS FUS060 and SONO 3100

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 ⁵⁾ [mm]	θ [°]	H [mm]	PN 10			PN 16			PN 25			PN 40		
						W _{min} ²⁾ [mm]	D ₁₀ [mm]	L ₁₀ ¹⁾ [mm]	W _{min} ²⁾ [mm]	D ₁₆ [mm]	L ₁₆ ¹⁾ [mm]	W _{min} ²⁾ [mm]	D ₂₅ [mm]	L ₂₅ ¹⁾ [mm]	W _{min} 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	830	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. For weld-in sensor versions according EN10217 (flangeless sensors 7ME3100-xxYxx-xxxx, Y=P, Q, R, S) the tube roundness shall be agreed via the PVR process (only if the factor of $D_u/W_{xx} > 100$).

W_{min} wall thickness are min. values. The delivered sensor can have larger wall thicknesses to meet the selected pressure rate. Any specific required wall thickness must be ordered as PVR.

³⁾ For all sensors with flange transducers path angle are 60°

⁴⁾ L is the length of sensor versions without flanges (weld-in version). For weld-in sensor versions according to EN 10217 (flangeless sensors 7ME3100-xxYxx-xxxx, Y = P, Q, R, S) the tube roundness shall be agreed via the PVR process (only if the factor of $D_u/W_{xx} > 100$).

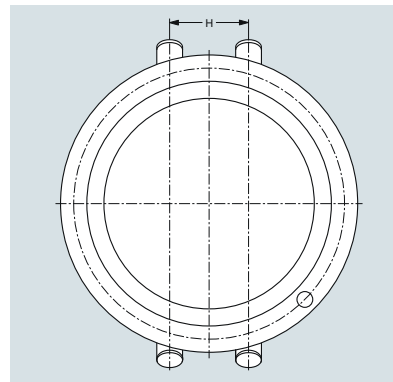
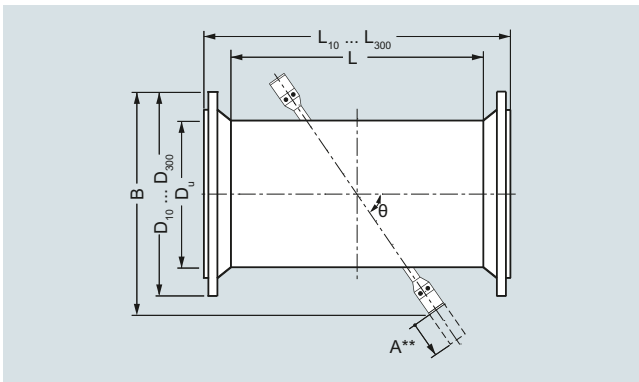
⁵⁾ B dimension value is an approximate information and may differ a little by flange pressure rate.

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 3/271.

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).



Sensor SONO 3100 with ANSI norm

Size (DN)	D _U	L ^{1) 4)}	B ⁵⁾	θ	H	Class 150			Class 300		
						W _{min} ²⁾	D ₁₅₀	L ₁₅₀ ¹⁾	W _{min} 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	32.68	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. For weld-in sensor versions according to EN 10217 (flangeless sensors 7ME3100-xxYxx-xxxx, Y = P, Q, R, S) the tube roundness shall be agreed via the PVR process (only if the factor of D_u/W_{xx} > 100). W_{min} wall thickness are min. values. The delivered sensor can have larger wall thicknesses to meet the selected pressure rate. Any specific required wall thickness must be ordered as PVR.

³⁾ For all sensors with flange transducers path angle are 60°

⁴⁾ L is the length of sensor versions without flanges (weld-in version)

For weld-in sensor versions according to EN 10217 (flangeless sensors 7ME3100-xxYxx-xxxx, Y = P, Q, R, S) the tube roundness shall be agreed via the PVR process (only if the factor of D_u/W_{xx} > 100).

⁵⁾ B dimension value is an approximate information and may differ a little by flange pressure rate.

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 3/271.

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 3000 (8" to 120") 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 (up to DN 1500 (60")) is available on special request (PVR)

Technical specifications

The transmitter related to this system is the SITRANS FUS080 or FUS060.

Technical specifications to the FUS060 see page 3/247 and to FUS080 see page 3/253.

Accuracy

Typical, depending on accuracy of measurements of installation

- 2-path: $\leq \pm (0.5 \dots 1.5 \%)$
- 1-path: $\leq \pm (1 \dots 3 \%)$

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 3000 (4" ... 120") FUS080: DN 100 ... DN 1200 (4" ... 48")
Line pressure	max. 40 bar (580 psi)
Media temperature	
• Standard	-10 ... +200 °C (14 ... 392 °F)
• ATEX Ex d version	-20 ... +180 °C (-4 ... +356 °F)
• ATEX Ex i version	-10 ... +190 °C (14 ... 374 °F)
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 2 G Ex dem [ia/ib] IIC T6/T4/T3 Gb or ATEX II 2 G 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 DVD

Material certificate

Material certificate for the transducer parts according to EN 10204-3.1 is optionally available

Approvals

No custody transfer approvals

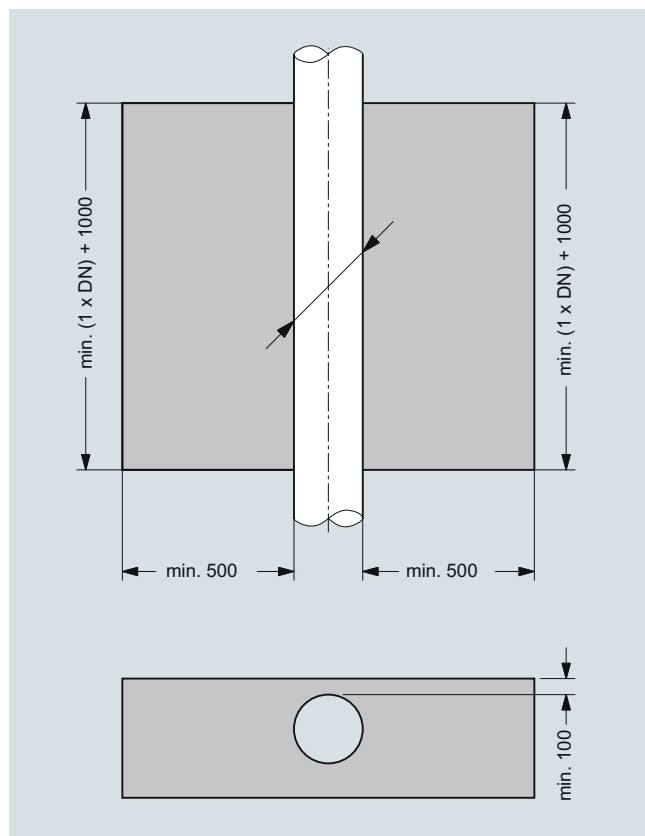
Information on PED approval:

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.

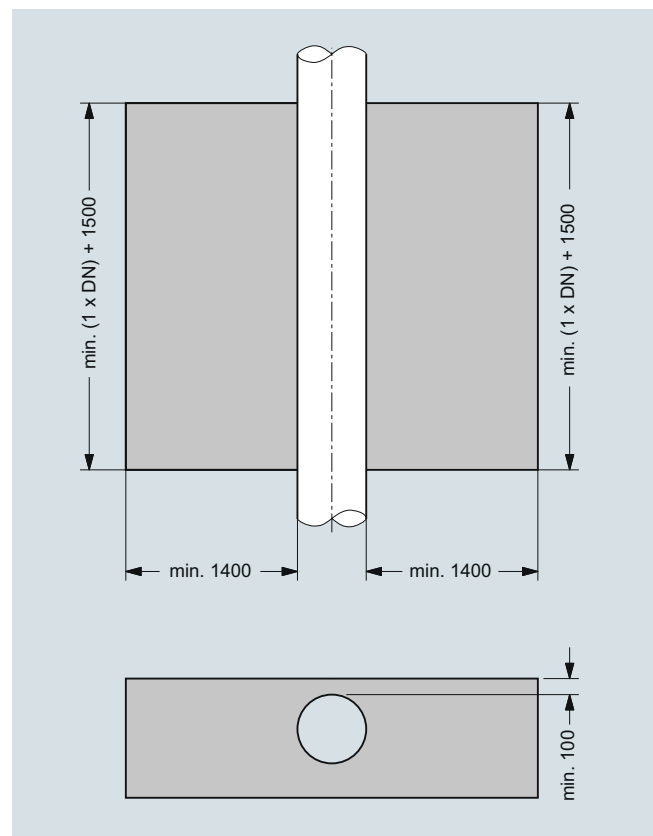
¹⁾ Mounting plates are only included for empty pipe installation types (refer to selection "A"). For hot tap mounting the mounting plates are not included (refer to selection "B").

Installation requirements

The space requirements (in mm) around the pipe for retrofitting a SITRANS F US ultrasonic flowmeter type SONOKIT are given below in mm:



Empty pipe installation



Hot-tap installation

Selection and Ordering data		Article No.	Ord. code	Selection and Ordering data		Article No.	Ord. code
SITRANS F US SONOKIT 1-path sensor		7ME3210 -		SITRANS F US SONOKIT 1-path sensor		7ME3210 -	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.				IP68 SS housing, Sylgard potting kit, PN 40, O-ring, 200 °C (392 °F), no approval		4	
Diameter	Qn setting [m³/h]			IP67 SS housing, PN 40, O-ring, 190 °C (374 °F), Ex i type, ATEX approval (only with FUS060 Ex)		5	
DN 100 (4")	100	1 P		Cable gland entries			
DN 125 (5")	150	1 T		Cable glands M20 in transducers and in transmitter M25/20/16 x 1.5 (FUS080 only M20)		1	
DN 150 (6")	220	2 B		Cable glands ½" NPT in transducers and in transmitter (only with FUS060)		2	
DN 200 (8")	380	2 F		Transmitter version of SITRANS FUS060 (only DN 100 ... 2400 (4" ... 96"))			
DN 250 (10")	600	2 K		IP65 (NEMA 4), 120/230 V AC		N	
DN 300 (12")	850	2 P		IP65 (NEMA 4), 24 V AC/DC		P	
DN 350 (14")	1000	2 T		IP65 (NEMA 4), 24 V AC/DC Ex version		Q	
DN 400 (16")	1300	3 B		Transmitter version of SITRANS FUS080 (only DN 100 ... 1200 (4" ... 48"))			
DN 450 (18")	1700	3 F		PDM software tool and IrDA-adaptor, which are needed for settings update, to be ordered separately, see FUS080 accessories			
DN 500 (20")	2200	3 K		IP67/NEMA 4X/6 115 ... 230 V AC		U	
DN 550 (22")	2600	3 P		IP67/NEMA 4X/6 3.6 V battery version, incl. dual battery pack		V	
DN 600 (24")	3200	3 T		IP67/NEMA 4X/6 115 ... 230 V AC, incl. 3.6 V single battery backup		W	
DN 650 (26")	3600	4 B		IP67/NEMA 4X/6 3.6 V battery version (no battery pack included) ²⁾		X	
DN 700 (28")	4200	4 F		Transmitter output module			
DN 750 (30")	4800	4 K		Transmitter SITRANS FUS080:			
DN 800 (32")	5500	4 P		Pulse and/or alarm output (standard for FUS080).		A	
DN 900 (36")	7500	5 B		Transmitter SITRANS FUS060:			
DN 1000 (40")	9000	5 K		HART, 1 pulse output, 1 relay		B	
DN 1100 (44")	10000	5 P		HART Ex version, 1 pulse output, 1 relay		C	
DN 1200 (48")	13200	5 T		PROFIBUS PA, 1 pulse/frequency		D	
Only for FUS060				Transducer coaxial cables (with FUS080 only, 15 and 30 m, 70 °C (158 °F) cable types)			
DN 1300 (52")	14000	6 A		2 x 3 m, max. 70 °C (158 °F), the only option for Ex i		0	
DN 1400 (56")	16800	6 C		2 x 15 m, max. 70 °C (158 °F)		1	
DN 1500 (60")	19000	6 E		2 x 30 m, high temp. max. 200 °C (392 °F)		2	
DN 1600 (64")	22800	6 G		2 x 30 m, max. 70 °C (158 °F)		3	
DN 1700 (68")	25000	6 J		2 x 60 m, max. 70 °C (158 °F)		4	
DN 1800 (72")	27600	6 L		2 x 90 m, max. 70 °C (158 °F)		5	
DN 1900 (76")	31000	6 N		2 x 120 m, max. 70 °C (158 °F)		6	
DN 2000 (80")	36000	6 Q		2 x 3 m, high temp. max. 200 °C (392 °F), the only option for Ex i		7	
DN 2100 (84")	37000	6 S		2 x 15 m, high temp. max. 200 °C (392 °F)		8	
DN 2200 (88")	42000	6 U		Special version (add Order code):			
DN 2300 (92")	45000	6 W		No transducer cable, cable length 2 x 3 m, the only option for Ex i		9	R O A
DN 2400 (96")	51000	7 A		No transducer cable, cable length 2 x 15 m		9	R O B
Installation method¹⁾				No transducer cable, cable length 2 x 30 m		9	R O C
Empty pipe (incl. transducer holder and mounting plates). Alignment rods and tools must be ordered as accessories.		A		No transducer cable, cable length 2 x 60 m		9	R O D
Hot tap, mounting under pressure (mounting plates not incl.). Special mounting tools to be ordered separately.		B		No transducer cable, cable length 2 x 90 m		9	R O E
Transducer holder				No transducer cable, cable length 2 x 120 m		9	R O F
Carbon steel, length = 160 mm, mounting plates in carbon steel		1					
Stainless steel, length = 160 mm, mounting plates in stainless steel		2					
Stainless steel, length = 230 mm, for concrete pipe (DN 600 ... DN 2400)		3					
Transducer type and approval							
IP67 (NEMA 4X/6) PA housing, PN 40, O-ring, 100 °C (212 °F), no approval		1					
IP68 SS housing, PN 40, O-ring, 180 °C (356 °F), Ex d, ATEX approval (only with standard FUS060)		2					
IP68 PA housing, Sylgard potting kit, PN 40, O-ring, 100 °C (212 °F), no approval		3					

¹⁾ Mounting tools must be ordered separately as "-Z"-options.

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.*

Flow Measurement

SITRANS F US Inline

Flowmeter SONOKIT (with FUS060 or FUS080)

Selection and Ordering data

Order code

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
 EN 10204-3.1, transducer holder material
 EN 10204-3.1, mounting plate material

F30
F31
F32

Regional specific approval

KCC marking for Korea

W28

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
- German

A5E01204521
A5E02123845

SITRANS FUS080

- English
- German

A5E03059912
A5E31628428

SITRANS F US SONOKIT 1-path

- English
- German

A5E00814557
A5E02610428

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation



Please use online Product selector to get latest updates. Product selector link:

www.pia-portal.automation.siemens.com

Selection and Ordering data		Article No.	Ord. code	Selection and Ordering data		Article No.	Ord. code
SITRANS F US SONOKIT 2-path sensor		7ME3220 -		SITRANS F US SONOKIT 2-path sensor		7ME3220 -	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.							
Diameter	Qn setting [m³/h]			Transducer holder			
DN 200 (8")	380	2 F		Carbon steel, length = 160 mm, mounting plates in carbon steel	1		
DN 250 (10")	600	2 K		Stainless steel, length = 160 mm, mounting plates in stainless steel	2		
DN 300 (12")	850	2 P		Stainless steel, length = 230 mm, for concrete pipe (DN 600 ... DN 3000)	3		
DN 350 (14")	1000	2 T		Transducer type and approval			
DN 400 (16")	1300	3 B		IP67 (NEMA 4X/6) PA housing, PN 40, O-ring, 100 °C (212 °F), no approval	1		
DN 450 (18")	1700	3 F		IP68 SS housing, PN 40, O-ring, 180 °C (356 °F), EEx d, ATEX approval (only with standard FUS060)	2		
DN 500 (20")	2200	3 K		IP68 PA housing, Sylgard potting kit, PN 40, SS, O-ring, 100 °C (212 °F), no approval	3		
DN 550 (22")	2600	3 P		IP68 SS housing, Sylgard potting kit, PN 40, SS, O-ring, 200 °C (392 °F), no approval	4		
DN 600 (24")	3200	3 T		IP67 SS housing, PN 40, O-ring, 190 °C (374 °F), Ex i, ATEX approval (only with FUS060 Ex)	5		
DN 650 (26")	3600	4 B		Cable gland entires			
DN 700 (28")	4200	4 F		Cable glands M20 in transducers and in transmitter M25/20/16 x 1.5 (FUS080 only M20)	1		
DN 750 (30")	4800	4 K		Cable glands ½" NPT in transducers and in transmitter (only with FUS060)	2		
DN 800 (32")	5500	4 P		Transmitter version of SITRANS FUS060			
DN 900 (36")	7500	5 B		(only DN 200 ... 4000 (8" ... 160"))			
DN 1000 (40")	9000	5 K		IP65 (NEMA 4), 120/230 V AC			N
DN 1100 (44")	10 000	5 P		IP65 (NEMA 4), 24 V AC/DC			P
DN 1200 (48")	13 200	5 T		IP65 (NEMA 4), 24 V AC/DC Ex version			Q
Only for FUS060				Transmitter version of SITRANS FUS080			
DN 1300 (52")	14 000	6 A		(only DN 200 ... 1200 (8" ... 48"))			
DN 1400 (56")	16 800	6 C		PDM software tool and IrDA-adaptor, which are needed for settings update, to be ordered separately, see FUS080 accessories			
DN 1500 (60")	19 000	6 E		IP67/NEMA 4X/6 115 ... 230 V AC			U
DN 1600 (64")	22 800	6 G		IP67/NEMA 4X/6 3.6 V battery version, incl. dual battery pack			V
DN 1700 (68")	25 000	6 J		IP67/NEMA 4X/6 115 ... 230 V AC, incl. 3.6 V single battery backup			W
DN 1800 (72")	27 600	6 L		IP67/NEMA 4X/6 3.6 V battery version (no battery pack included) ⁴⁾			X
DN 1900 (76")	31 000	6 N		Transmitter output module			
DN 2000 (80")	36 000	6 Q		Transmitter SITRANS FUS080:			
DN 2100 (84")	37 000	6 S		Pulse and/or alarm output (standard for FUS080).			A
DN 2200 (88")	42 000	6 U		Transmitter SITRANS FUS060:			
DN 2300 (92")	45 000	6 W		HART, 1 pulse output, 1 relay			B
DN 2400 (96")	51 000	7 A		HART Ex version, 1 pulse output, 1 relay			C
DN 2500 (100")	53 000	7 C		PROFIBUS PA, 1 pulse/frequency			D
DN 2600 (104")	60 000	7 E					
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					
Installation method¹⁾							
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					
¹⁾ Mounting tools must be orderd 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	Order code
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
Regional specific approval	
KCC marking for Korea	W28
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 ... 3000 (88" ... 120") 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
SITRANS F US SONOKIT 2-path	
• English	A5E02445496
• German	A5E02554972

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation




Please use online Product selector to get latest updates. Product selector link:

www.pia-portal.automation.siemens.com



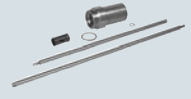
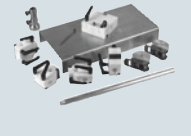
Flowmeter SONOKIT accessories and spare parts



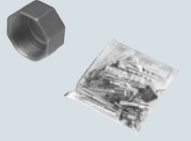
Accessories

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:		
• Up to 160 mm (6.3")	FDK:085B5333	
• Up to 230 mm (9.1")	FDK:085B5335	
Angle measurement tool for SONOKIT	FDK:085B5330	
Hot-tap drilling tool for SONOKIT, 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 ... 3000 (80" ... 120"), 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	
• IP65 metal box for 2 coaxial cables	FDK:085B1360
• IP65 metal box for 4 coaxial cables	FDK:085B1361
• IP65 EEx e plastic box for 2 coaxial cables, no ATEX approval	FDK:085B1362
• IP65 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 ... +180 (-4 ... +356)	160 (6.3)	FDK:085B5452
O-ring	316 SS	O-ring	PN 40	316 SS	Ex i ³⁾	-10 ... +190 (14 ... 374)	160 (6.3)	A5E00836462
O-ring	316 SS	O-ring	PN 40	316 SS		-20 ... +200 ²⁾ (-4 ... +392)	230 (9.41)	FDK:085B5459




¹⁾ 316 SS housing for -20 ... +200 °C (-4 ... +392 °F) media temp. but cable glands only for -20 ... +100 °C (-4 ... +212 °F) ambient temp.

²⁾ ATEX (Ex) IIC 2G Ex d IIC T3-T6 Gb

³⁾ For systems with FUS060 ATEX IIC 2G Ex dem [ia/ib] T6/T4/T3

Transducer SONO 3200 spare parts, transducer terminal housing with M20 cable glands

Type	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 ... +180 °C (-4 ... +356 °F)	FDK:085B5505
Material: AISI 316, Ex i ²⁾ , Temperature range: -10 ... +190 °C (14 ... 374 °F)	A5E00835255




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

Flowmeter SONOKIT (with FUS060 or FUS080)

Transducer SONO 3200 spare parts, transducer terminal housing with ½"-NPT cable glands

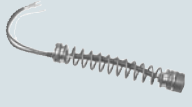
Type	Article No.	
Material: PA 6.6, Temperature range: -20 ... +100 °C (-4 ... +212 °F)	A5E00839460	
Material: AISI 316, Temperature range: -20 ... +200 °C (-4 ... +392 °F)	A5E00839427	

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

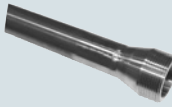
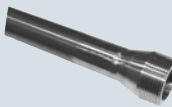
Description	Length [m (ft)]	Article No.	
Coaxial cable for FUS080, (75 Ω, max. 70 °C (158 °F), black PVC) (2 pcs.)	15 (49.21)	A5E02478541	
	30 (98.43)	A5E02478751	

Flow Measurement

SITRANS F US Inline

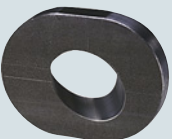
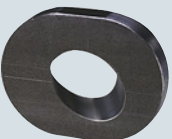
Flowmeter SONOKIT (with FUS060 or FUS080)

Transducer holder for SONOKIT SONO 3200 transducers

Description	Article No.	
1-path (each incl. 1 pc.)		
• 160 mm (6.3") stainless steel 45°, DN 100 ... DN 150 (4" ... 6")	FDK:085L1103	
• 160 mm (6.3") carbon steel 45°, DN 100 ... DN 150 (4" ... 6")	FDK:085L1102	
• 230 mm (9.1") for concrete pipe 60°, DN 600 ... DN 2400 (24" ... 96")	FDK:085L1107	
• 160 mm (6.3") stainless steel 60°, DN 200 ... DN 2400 (8" ... 96")	FDK:085L1105	
• 160 mm (6.3") carbon steel 60°, DN 200 ... DN 2400 (8" ... 96")	FDK:085L1104	
2-path (each incl. 1 pc.)		
• 230 mm (9.1") for concrete pipe 60°, DN 600 ... DN 3000 (24" ... 120")	FDK:085L1111	
• 160 mm (6.3") stainless steel 60°, DN 200 ... DN 3000 (8" ... 120")	FDK:085L1109	
• 160 mm (6.3") carbon steel 60°, DN 200 ... DN 3000 (8" ... 120")	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

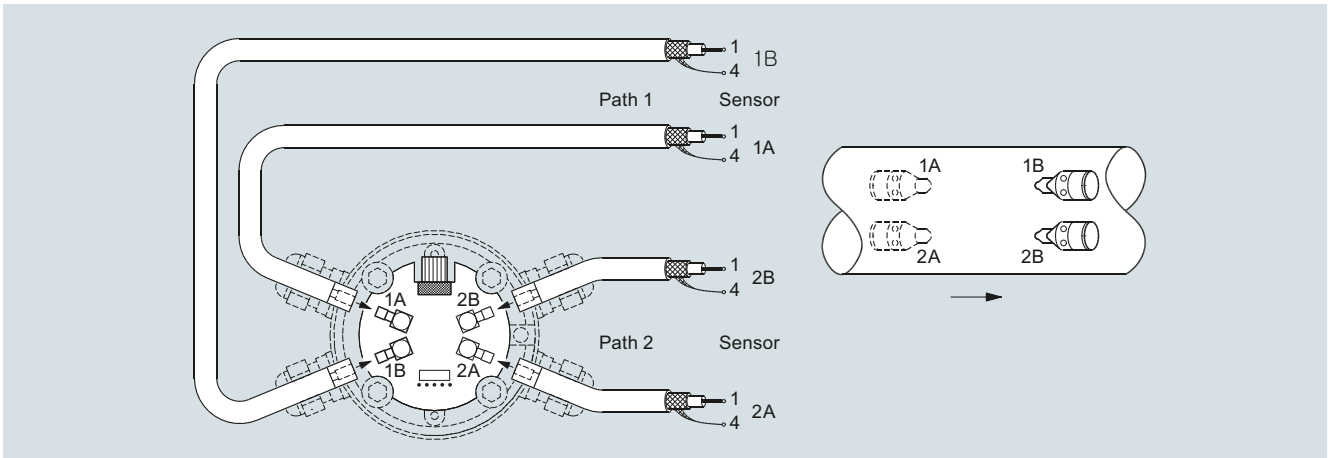
Description	Article No.	
1-path (each incl. 1 pc.)		
• Stainless steel plate, 45°, DN 100 ... DN 150 (4" ... 6")	FDK:085L1113	
• Carbon steel plate, 45°, DN 100 ... DN 150 (4" ... 6")	FDK:085L1112	
• Stainless steel plate, 60°, DN 200 ... DN 2400 (8" ... 96")	FDK:085L1115	
• Carbon steel plate, 60°, DN 200 ... DN 2400 (8" ... 96")	FDK:085L1114	
2-path (each incl. 1 pc.)		
• Stainless steel plate, 60°, DN 200 ... DN 3000 (8" ... 120")	FDK:085L1119	
• Carbon steel plate, 60°, DN 200 ... DN 3000 (8" ... 120")	FDK:085L1118	

The mounting plates are either in stainless steel (AISI 316L/1.4404 or similar) or carbon steel (St.37 or similar).

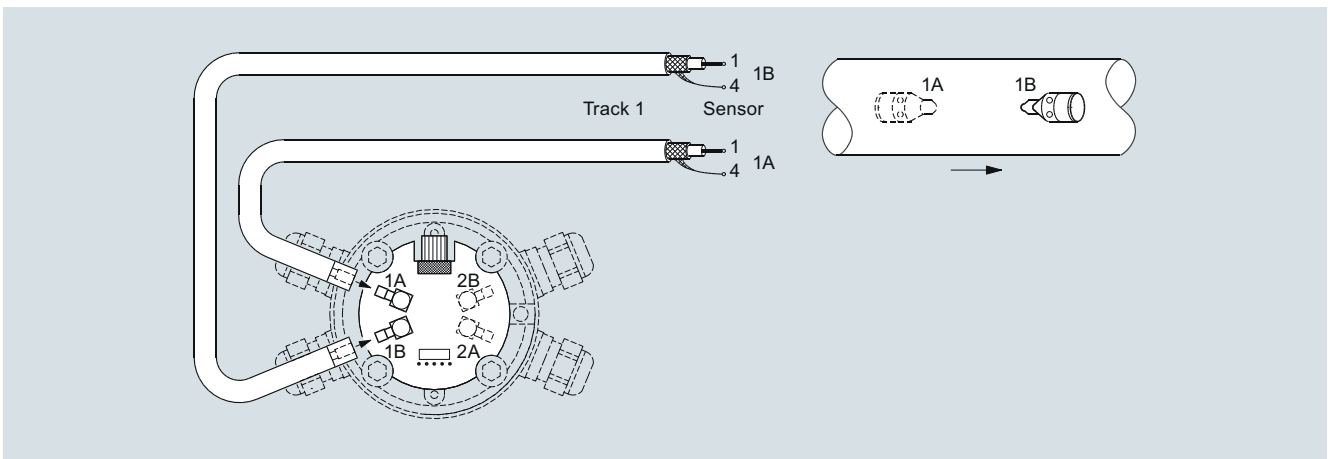
SONO 3200 cable glands

Type/ description	Tempera- ture range [°C (°F)]	Appr	Article No.	
black PA plastic, cable Ø 5 ... 13 mm (1 pc.)	-20 ... 100 (-4 ... +212)		A5E02246304	
½" NPT gray PA plastic, cable Ø 5 ... 9 mm (1 pc.)	-20 ... 100 (-4 ... +212)		A5E02246309	
½" NPT chrome-plated brass, cable Ø 5 ... 9 mm (1 pc.)	-40 ... 100 (-40 ... +212)		A5E02246258	
M20 stainless steel, cable Ø 4 ... 6 mm (1 pc.)	-25 ... 200 (-13 ... +392)	Ex i	A5E02246194	
M20 stainless steel, cable Ø 5 ... 8 mm (1 pc.)	-60 ... 180 (-76 ... +356)	Ex d	A5E02246311	

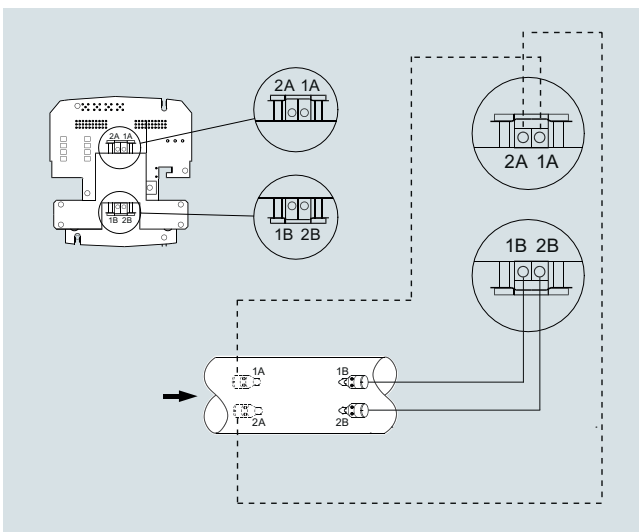
Schematics



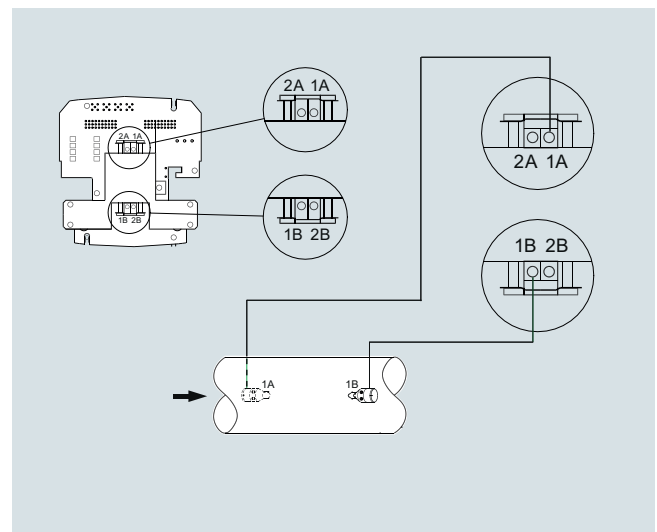
Electrical connection of SITRANS FUS060 and SONOKIT 2-path. Max. 30 m transducer cable length for sizes \geq DN 3000.



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 (including glycol mixes), and other general water applications.

The type-approved flowmeter version is named SITRANS FUE380 - see page 3/294.

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)
- Analog output 4 to 20 mA
- 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 (including glycol mixes).

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. Both versions are pre-mounted with short coax-cables. Remote transmitter up to a distance of 30 m by one Sensor link cable (SSL).

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.

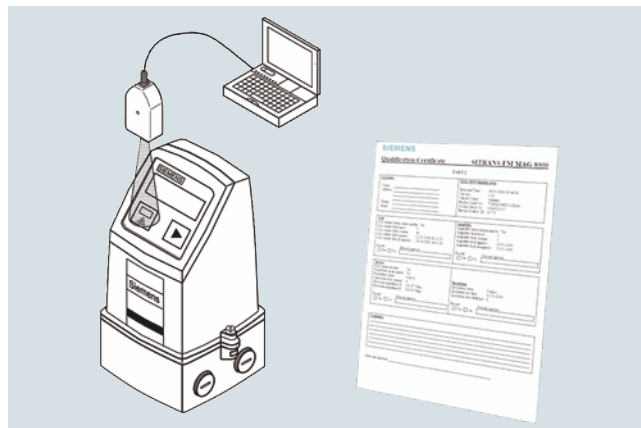
If the flowmeter forms part of an energy meter system for custody transfer, no further approvals are needed, except possible local approvals on the flowmeter.

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	1 120	1 176	400	4	2.000	0.17	10
250	1 400	1 470	800	8	4.000	0.27	10
300	560	588	560	5.6	2.800	0.48	50
300	1 560	1 638	560	5.6	2.800	0.17	50
300	2 100	2 205	1 120	11.2	5.600	0.25	50
350	750	787.5	750	7.5	3.750	0.48	50
350	2 100	2 205	750	7.5	3.750	0.17	50
350	2 800	2 940	1 500	15	7.500	0.26	50
400	950	9 97.5	950	9.5	4.750	0.48	50
400	2 660	2 793	950	9.5	4.750	0.17	50
400	3 600	3 780	1 900	19	9.500	0.25	50
500	1 475	1 548.75	1 475	14.75	7.375	0.48	100
500	4 130	4 336.5	1 475	14.75	7.375	0.17	100
500	5 500	5 775	2 950	29.5	14.750	0.26	100
600	2 150	2 257.5	2 150	21.5	10.750	0.48	100
600	6 020	6 321	2 150	21.5	10.750	0.17	100
600	8 000	8 400	4 300	43	21.500	0.26	100
700	2 900	3 045	2 900	29	14.500	0.48	100
700	8 120	8 526	2 900	29	14.500	0.17	100
700	10 800	11 340	5 800	58	29.000	0.26	100
800	3 800	3 990	3 800	38	19.000	0.48	100
800	10 640	11 172	3 800	38	19.000	0.17	100
800	14 200	14 910	7 600	76	38.000	0.25	100
900	5 000	5 250	3 800	38	19.000	0.36	100
900	14 000	14 700	5 000	50	25.000	0.17	100
900	20 000	21 000	5 000	50	25.000	0.12	100
1 000	6 000	6 300	3 800	38	19.000	0.30	100
1 000	16 800	17 640	6 000	60	30.000	0.17	100
1 000	24 000	25 200	12 000	120	60.000	0.24	100
1 200	9 000	9 450	3 800	38	19.000	0.20	100
1 200	25 200	26 460	9 000	90	45.000	0.17	100
1 200	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 flanges: • type 01 (B): DN 100 to DN 125 • type 11 (B): DN 150 to DN 1200 • type 11 (B) 'design': DN 50 to DN 80
Pipe material	• DN 100 ... DN 1200: Carbon Steel EN 1.0345/P235 GH, painted in light-gray. • DN 50 ... 80: Die-cast bronze G-CuSn10/W2.1050.01 (EN 1982)
Transducer design	• DN 100 ... DN 1200: Inline version and welded onto the pipe • DN 50 ... DN 80: Screwed into the pipe
Transducer material	Stainless steel (AISI 316/1.4404)/brass (CuZn ₃₆ Pb 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 3/253 ff.

Sensor cable

Transducer cable length	Pre-mounted with short coax-cables
Sensor link cable length (SSL)	5, 10, 20, 30 m (16.4, 32.8, 65.6, 98.4 ft)

Certificates and approvals

Conformity certificate (CE)	The devices are supplied as standard with a Siemens Certificate of Conformity on DVD
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 2014/68/EU dated 27 June 2014 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

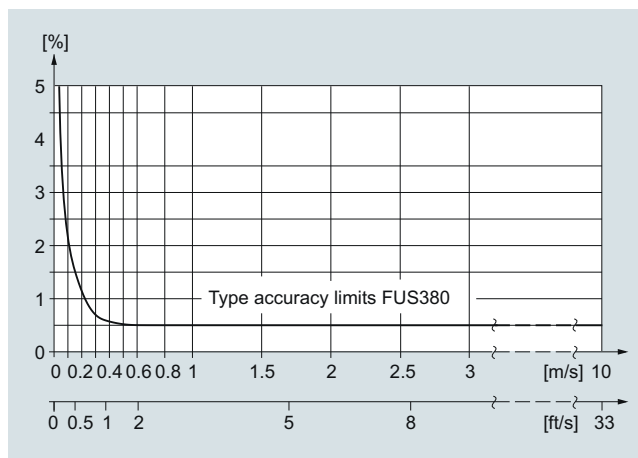
To ensure continuous accurate measurement, flowmeters must be calibrated. The calibration is conducted at Siemens flow facilities with traceable instruments referring directly to the physical unit of measurement according to the International System of Units (SI).

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:

± 0.5 % for 0.5 m/s < v < 10 m/s and ± 0.25/V_{act} [%] below 0.5 m/s



Selection and Ordering data					Article-No.	Order code
Flowmeter SITRANS FUS380 (standard)					7ME3400 -	0 - A
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.						
Diameter	Approval	Pressure rating	Flow setting [m ³ /h]			
			Q _p (Q _n) is the normal flow according to the approval requirements. Q _p and Q _s is shown on the system label.			
			Q _p (Q _n)	Q _s		
Pipe material: Die-cast bronze						
DN 50 (2")	EN 1434	PN 40	15	15		1 A
DN 50 (2")	EN 1434	PN 40	15	45		1 C
DN 50 (2")	OIML R75	PN 40	30	45		1 D
DN 65 (2½")	EN 1434	PN 40	25	25		1 E
DN 65 (2½")	EN 1434	PN 40	25	72		1 G
DN 65 (2½")	OIML R75	PN 40	50	72		1 H
DN 80 (3")	EN 1434	PN 40	40	40		1 J
DN 80 (3")	EN 1434	PN 40	40	120		1 L
DN 80 (3")	OIML R75	PN 40	80	120		1 M
Pipe material: Carbon steel						
DN 100 (4")	EN 1434	PN16, PN 40	60	60		1 N
DN 100 (4")	EN 1434	PN16, PN 40	60	180		1 Q
DN 100 (4")	OIML R75	PN16, PN 40	120	240		1 R
DN 125 (5")	EN 1434	PN16, PN 40	100	100		1 S
DN 125 (5")	EN 1434	PN16, PN 40	100	280		1 U
DN 125 (5")	OIML R75	PN16, PN 40	200	400		1 V
DN 150 (6")	EN 1434	PN16, PN 40	150	150		2 A
DN 150 (6")	EN 1434	PN16, PN 40	150	420		2 C
DN 150 (6")	OIML R75	PN16, PN 40	300	560		2 D
DN 200 (8")	EN 1434	PN16, PN 25, PN 40	250	250		2 E
DN 200 (8")	EN 1434	PN16, PN 25, PN 40	250	700		2 G
DN 200 (8")	OIML R75	PN16, PN 25, PN 40	500	900		2 H
DN 250 (10")	EN 1434	PN16, PN 25, PN 40	400	400		2 J
DN 250 (10")	EN 1434	PN16, PN 25, PN 40	400	1 120		2 L
DN 250 (10")	OIML R75	PN16, PN 25, PN 40	800	1 400		2 M
DN 300 (12")	EN 1434	PN16, PN 25	560	560		2 N
DN 300 (12")	EN 1434	PN16, PN 25	560	1 560		2 Q
DN 300 (12")	OIML R75	PN16, PN 25	1 120	2 100		2 R
DN 350 (14")	EN 1434	PN16, PN 25	750	750		2 S
DN 350 (14")	EN 1434	PN16, PN 25	750	2 100		2 U
DN 350 (14")	OIML R75	PN16, PN 25	1 500	2 800		2 V
DN 400 (16")	EN 1434	PN16, PN 25	950	950		3 A
DN 400 (16")	EN 1434	PN16, PN 25	950	2 660		3 C
DN 400 (16")	OIML R75	PN16, PN 25	1 900	3 600		3 D
DN 500 (20")	EN 1434	PN16, PN 25	1 475	1 475		3 J
DN 500 (20")	EN 1434	PN16, PN 25	1 475	4 130		3 L
DN 500 (20")	OIML R75	PN16, PN 25	2 950	5 500		3 M
DN 600 (24")	EN 1434	PN16, PN 25	2 150	2 150		3 S
DN 600 (24")	EN 1434	PN16, PN 25	2 150	6 020		3 U
DN 600 (24")	OIML R75	PN16, PN 25	4 300	8 000		3 V
DN 700 (28")	EN 1434	PN16, PN 25	2 900	2 900		4 E
DN 700 (28")	EN 1434	PN16, PN 25	2 900	8 120		4 G
DN 700 (28")	OIML R75	PN16, PN 25	5 800	10 800		4 H
DN 800 (32")	EN 1434	PN16, PN 25	3 800	3 800		4 N
DN 800 (32")	EN 1434	PN16, PN 25	3 800	10 640		4 Q
DN 800 (32")	OIML R75	PN16, PN 25	7 600	14 200		4 R

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	Approval	Pressure rating	Flow setting [m ³ /h] Qp (Qn)	Qs		
<u>Remote only</u>						
DN 900 (36")	EN 1434	PN16, PN 25	5 000	5 000	5 A	
DN 900 (36")	EN 1434	PN16, PN 25	5 000	14 000	5 C	
DN 900 (36")	OIML R75	PN16, PN 25	10 000	20 000	5 D	
DN 1 000 (40")	EN 1434	PN16, PN 25	6 000	6 000	5 J	
DN 1 000 (40")	EN 1434	PN16, PN 25	6 000	16 800	5 L	
DN 1 000 (40")	OIML R75	PN16, PN 25	12 000	24 000	5 M	
DN 1 200 (48")	EN 1434	PN16	9 000	9 000	5 S	
DN 1 200 (48")	EN 1434	PN16	9 000	25 200	5 U	
DN 1 200 (48")	OIML R75	PN16	18 000	36 000	5 V	
Flange norm and pressure rating						
System without sensor - only a transmitter FUS080 as spare part - settings as defined with this Article No.						A
<u>EN 1092-1 Flanges</u>						
PN 16 (DN 100 ... DN 1 200)						C
PN 25 (DN 200 ... DN 1 000)						D
PN 40 (DN 50 ... DN 250)						E
Compact/remote connection						
Note: Sensor cable always firmly connected to connection box.						
Compact version, Liquid max. 120 °C (248 °F)						0
<u>Remote version, Liquid max. 150/200 °C (302/392 °F)</u>						
<u>Sensor link cable (SSL)</u>						
• 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						
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: $L/\text{pulse} > Q_s \text{ (m}^3/\text{h)} / 360$. For example $Q_s = 300 \text{ m}^3/\text{h}$; $L/\text{pulse} > 300/360$; $L/\text{pulse} > 0.83$; therefore the pulse value must be 1 l/pulse						
<u>Pulse value</u>						
• 0.1 l/pulse						1
• 1 l/pulse						2
• 2.5 l/pulse						3
• 10 l/pulse						4
• 50 l/pulse						5
• 100 l/pulse						6
• 250 l/pulse						7
• 1 m ³ /pulse						8
• 0.25 l/pulse						9
• 0.5 l/pulse						9
• 5 l/pulse						9
• 25 l/pulse						9
• 50 l/pulse						9
• 2.5 m ³ /pulse						9
• 5 m ³ /pulse						9
• 10 m ³ /pulse						9
• 25 m ³ /pulse						9
• 50 m ³ /pulse						9
• 100 m ³ /pulse						9
• 250 m ³ /pulse						9
• 500 m ³ /pulse						9
• 1000 m ³ /pulse						9
						N 0 A
						N 0 B
						N 0 C
						N 0 D
						N 0 E
						N 0 F
						N 0 G
						N 0 H
						N 0 J
						N 0 K
						N 0 L
						N 0 M
						N 0 N
						N 0 P

Selection and Ordering data	Article-No.	Order code
Flowmeter SITRANS FUS380 (standard)	7ME3400 -	0 - A
Transmitter variant FUS080 power/anaaloo output 115 ... 230 V AC 3.6 V Lithium battery, dual pack is included 115 ... 230 V AC, backup 3.6 V DC Lithium battery, single pack is included 3.6 V battery version (no battery pack included) Option with 4 ... 20 mA analog output module • 115 ... 230 V AC • 115 ... 230 V AC, backup 3.6 V DC, Lithium battery, single pack is included Note: 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.		B D E G R U
Pulse width setup Pulse width • 5 ms (standard) • 10 ms • 20 ms • 50 ms • 100 ms • 200 ms • 500 ms		2 3 4 5 6 7 8

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 m ³ /h). 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 m ³ /h). 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 m ³ /h). 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 m ³ /h).	Included D20 D21 D22
Output B as reverse flow pulses. No calibration/verification of this function.	E21
Material certificate EN 10204-3.1 (pipe material)	C12
Regional specific approval KCC marking for Korea	W28
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

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

For accessories and spare parts see chapter of transmitter SITRANS FUS080/FUE080 on page 3/257.



Please use online Product selector to get latest updates. Product selector link:

www.pia-portal.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 (including glycol mixes without type approval) 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)
- Analog output 4 to 20 mA
- 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 (including glycol mixes without type approval).

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 consists 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. Both versions are pre-mounted with short coax-cables. Remote transmitter up to a distance of 30 m by one Sensor link cable (SSL).

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.

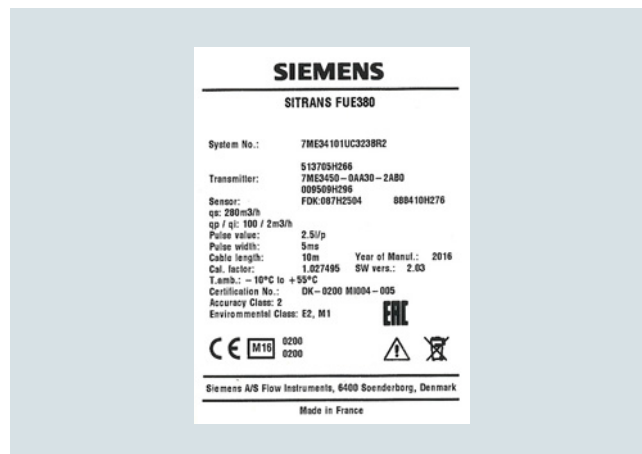
The FUE380 are MI-004 verified and labeled products according to Directive 2014/32/EU of the European Parliament and Council of 26 February, 2014 on measuring instruments, Annex VI Thermal Energy Meters (MI-004), in sizes from DN 50 to DN 1200.

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

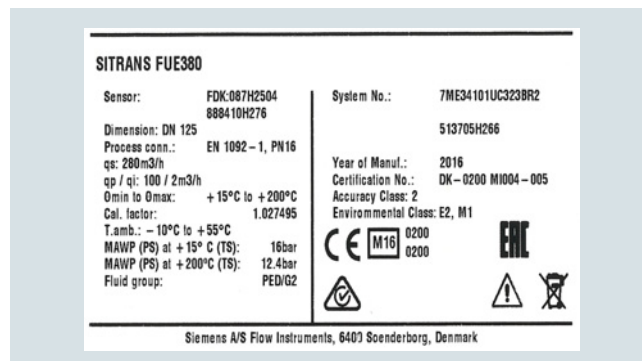
Module B: MI-004 Type MID approval according to EN 1434: 2007 (approved for media water)

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)

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.

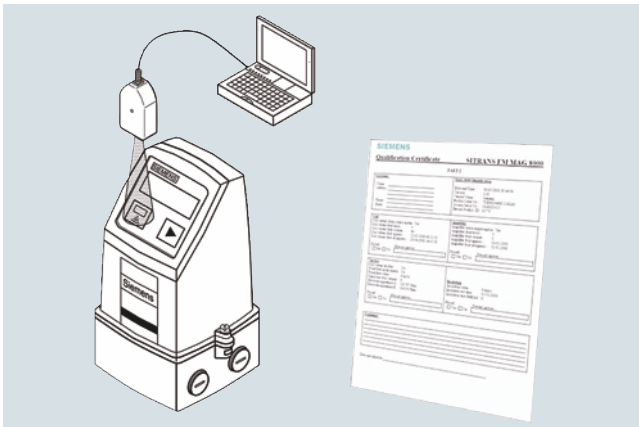
If the flowmeter forms part of an energy meter system for custody transfer, no further approvals are needed, except possible local approvals on the flowmeter.

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



Flow Measurement

SITRANS F US Inline

Flowmeter SITRANS FUE380 with CT approval

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)	Q _i (m ³ /h)	Cut-off (m ³ /h)	Cut-off (% of Q _{max})	Typical pulse value (l/pulse)
				(1:50 of Q _p) EN 1434/MID	(1:100 of Q _p) OIML R 75/MID			
50	30	31.5	15	0.3	-	0.075	0.24	1
50	45	47.25	15	0.3	-	0.075	0.16	1
50	45	47.25	30	-	0.30	0.150	0.32	1
65	50	52.5	25	0.5	-	0.125	0.24	1
65	72	75.6	25	0.5	-	0.125	0.17	1
65	72	75.6	50	-	0.50	0.250	0.33	1
80	80	84	40	0.8	-	0.200	0.24	2.5
80	120	126	40	0.8	-	0.200	0.16	2.5
80	120	126	80	-	0.80	0.400	0.32	2.5
100	120	126	60	1.2	-	0.300	0.24	2.5
100	180	189	60	1.2	-	0.300	0.16	2.5
100	180	189	120	-	1.20	0.600	0.32	2.5
125	200	210	100	2.0	-	0.500	0.24	2.5
125	280	294	100	2.0	-	0.500	0.17	2.5
125	280	294	200	-	2.00	1.000	0.34	2.5
150	300	315	150	3.0	-	0.750	0.24	10
150	420	441	150	3.0	-	0.750	0.17	10
150	420	441	300	-	3.00	1.500	0.34	10
200	500	525	250	5.0	-	1.250	0.24	10
200	700	735	250	5.0	-	1.250	0.17	10
200	700	735	500	-	5.00	2.500	0.34	10
250	800	840	400	8.0	-	2.000	0.24	10
250	1 120	1 176	400	8.0	-	2.000	0.17	10
250	1 120	1 176	800	-	8.00	4.000	0.34	10
300	1 120	1 176	560	11.2	-	2.800	0.24	50
300	1 560	1 638	560	11.2	-	2.800	0.17	50
300	1 560	1 638	1120	-	11.20	5.600	0.34	50
350	1 500	1 575	750	15.0	-	3.750	0.24	50
350	2 100	2 205	750	15.0	-	3.750	0.17	50
350	2 100	2 205	1 500	-	15.00	7.500	0.34	50
400	1 900	1 995	950	19.0	-	4.750	0.24	50
400	2 660	2 793	950	19.0	-	4.750	0.17	50
400	2 660	2 793	1 900	-	19.00	9.500	0.34	50
500	2 950	3 097.5	1 475	29.5	-	7.375	0.24	100
500	4 130	4 336.5	1 475	29.5	-	7.375	0.17	100
500	4 130	4 336.5	2 950	-	29.50	14.75	0.34	100
600	4 300	4 515	2 150	43.0	-	10.75	0.24	100
600	6 020	6 321	2 150	43.0	-	10.75	0.17	100
600	6 020	6 321	4 300	-	43.00	21.50	0.34	100
700	5 800	6 090	2 900	58.0	-	14.50	0.24	100
700	8 120	8 526	2 900	58.0	-	14.50	0.17	100
700	8 120	8 526	5 800	-	58.00	29.00	0.34	100
800	7 600	7 980	3 800	76.0	-	19.00	0.24	100
800	10 640	11 172	3 800	76.0	-	19.00	0.17	100
800	10 640	11 172	7 600	-	76.00	38.00	0.34	100
900	10 000	10 500	5 000	100.0	-	25.00	0.24	100
900	14 000	14 700	5 000	100.0	-	25.00	0.17	100
900	14 000	14 700	10 000	-	100.00	50.00	0.34	100

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)	Q_i (m ³ /h)	Cut-off (m ³ /h)	Cut-off (% of Q_{max})	Typical pulse value (l/pulse)
				(1:50 of Q_p) EN 1434/MID	(1:100 of Q_p) OIML R 75/MID			
1 000	12 000	12 600	6 000	120.0	-	30.00	0.24	100
1 000	16 800	17 640	6 000	120.0	-	30.00	0.17	100
1 000	16 800	17 640	12 000	-	120.00	60.00	0.34	100
1 200	18 000	18 900	9 000	180.0	-	45.00	0.24	100
1 200	25 200	26 460	9 000	180.0	-	45.00	0.17	100
1 200	25 200	26 460	18 000	-	180.00	90.00	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

Note:

The minimum flow (Q_i) should be checked in the PIA-portal or product master data base (PMD)

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

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 flanges: • type 01 (B): DN 100 to DN 125 • type 11 (B): DN 150 to DN 1200 • type 11 (B) 'design': DN 50 to DN 80
Pipe material	• DN 100 ... DN 1200: Carbon Steel EN 1.0345/P235 GH, painted in light-gray. • DN 50 ... DN 80: Die-cast bronze G-CuSn10/W2.1050.01 (EN 1982)
Transducer design	• DN 100 ... DN 1200: Inline version and welded onto the pipe • DN 50 ... DN 80: Screwed into the pipe
Transducer material	Stainless steel (AISI 316/1.4404)/brass (CuZn ₃₆ Pb 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 VdTÜV information sheet 1466 and AGFW information sheet FW 510.
Media/surface temperature	
• DN 100 ... DN 1200	Remote: 2 ... 200 °C (35.6 ... 392 °F) MID: min. +15 °C/+59 °F
• DN 50 ... DN 80	Remote: 2 ... 150 °C (35.6 ... 302 °F) MID: min. +15 °C/+59 °F
• DN 50 ... DN 1200	Compact: 2 ... 120 °C (35.6 ... 248 °F) MID: min. +15 °C/+59 °F
Degree of protection	Sensor connection IP67/NEMA 4X/6
Electromagnetic compatibility	
• Emitted interference	To EN 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 3/253 ff.

Sensor cable

Transducer cable length	Pre-mounted with short coax-cables
Sensor link cable length (SSL)	5, 10, 20, 30 m (16.4, 32.8, 65.6, 98.4 ft)

Certificates and approvals

Conformity certificate (CE)	The devices are supplied as standard with a Siemens Certificate of Conformity on DVD
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	<ul style="list-style-type: none"> Approval standards: EN 1434 and OIML R 75 Class 2 Type approval: MID, MI-004, class 2 approval and certification (according to EN 1434) CPA/CMC (China)

The sensors are approved according to EU directive 2014/68/EU dated 27 June 2014 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).

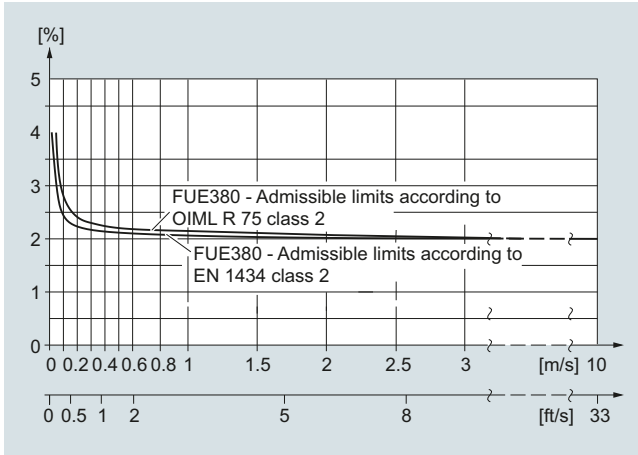
Typical accuracy SITRANS FUE380:

$$\pm(0.5 + 0.02 Q_p/Q) [\%]$$

Q_p according to EN 1434/OIML requirements.

Example: DN 100, $Q_p = 60 \text{ m}^3/\text{h}$ at $Q = 1.2 \text{ m}^3/\text{h}$:

Accuracy at $1.2 \text{ m}^3/\text{h} = \text{typical } 1.5 \%$



SITRANS FUE380 fulfils the requirements

$E_f = \pm(2 + 0.02 Q_p/Q_i) \text{ max. } \pm 5 \%$, 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

Article No. Order code

Flowmeter SITRANS FUE380 (type-approved)

7ME3410 - - - - -

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Diameter	Approval	Pressure rating	Flow setting [m ³ /h]		
			Q _p [m ³ /h]	Q _s [m ³ /h]	
Pipe material: Die-cast bronze					
DN 50 (2")	EN 1434	PN 40	15	30	1 B
DN 50 (2")	EN 1434	PN 40	15	45	1 C
DN 50 (2")	OIML R75	PN 40	30	45	1 D
DN 65 (2½")	EN 1434	PN 40	25	50	1 F
DN 65 (2½")	EN 1434	PN 40	25	72	1 G
DN 65 (2½")	OIML R75	PN 40	50	72	1 H
DN 80 (3")	EN 1434	PN 40	40	80	1 K
DN 80 (3")	EN 1434	PN 40	40	120	1 L
DN 80 (3")	OIML R75	PN 40	80	120	1 M
Pipe material: Carbon steel					
DN 100 (4")	EN 1434	PN16, PN 40	60	120	1 P
DN 100 (4")	EN 1434	PN16, PN 40	60	180	1 Q
DN 100 (4")	OIML R75	PN16, PN 40	120	180	1 R
DN 125 (5")	EN 1434	PN16, PN 40	100	200	1 T
DN 125 (5")	EN 1434	PN16, PN 40	100	280	1 U
DN 125 (5")	OIML R75	PN16, PN 40	200	280	1 V
DN 150 (6")	EN 1434	PN16, PN 40	150	300	2 B
DN 150 (6")	EN 1434	PN16, PN 40	150	420	2 C
DN 150 (6")	OIML R75	PN16, PN 40	300	420	2 D
DN 200 (8")	EN 1434	PN16, PN 25, PN 40	250	500	2 F
DN 200 (8")	EN 1434	PN16, PN 25, PN 40	250	700	2 G
DN 200 (8")	OIML R75	PN16, PN 25, PN 40	500	700	2 H
DN 250 (10")	EN 1434	PN16, PN 25, PN 40	400	800	2 K
DN 250 (10")	EN 1434	PN16, PN 25, PN 40	400	1 120	2 L
DN 250 (10")	OIML R75	PN16, PN 25, PN 40	800	1 120	2 M
DN 300 (12")	EN 1434	PN16, PN 25	560	1 120	2 P
DN 300 (12")	EN 1434	PN16, PN 25	560	1 560	2 Q
DN 300 (12")	OIML R75	PN16, PN 25	1 120	1 560	2 R
DN 350 (14")	EN 1434	PN16, PN 25	750	1 500	2 T
DN 350 (14")	EN 1434	PN16, PN 25	750	2 100	2 U
DN 350 (14")	OIML R75	PN16, PN 25	1 500	2 100	2 V
DN 400 (16")	EN 1434	PN16, PN 25	950	1 900	3 B
DN 400 (16")	EN 1434	PN16, PN 25	950	2 660	3 C
DN 400 (16")	OIML R75	PN16, PN 25	1 900	2 660	3 D
DN 500 (20")	EN 1434	PN16, PN 25	1 475	2 950	3 K
DN 500 (20")	EN 1434	PN16, PN 25	1 475	4 130	3 L
DN 500 (20")	OIML R75	PN16, PN 25	2 950	4 130	3 M
DN 600 (24")	EN 1434	PN16, PN 25	2 150	4 300	3 T
DN 600 (24")	EN 1434	PN16, PN 25	2 150	6 020	3 U
DN 600 (24")	OIML R75	PN16, PN 25	4 300	6 020	3 V
DN 700 (28")	EN 1434	PN16, PN 25	2 900	5 800	4 F
DN 700 (28")	EN 1434	PN16, PN 25	2 900	8 120	4 G
DN 700 (28")	OIML R75	PN16, PN 25	5 800	8 120	4 H
DN 800 (32")	EN 1434	PN16, PN 25	3 800	7 600	4 P
DN 800 (32")	EN 1434	PN16, PN 25	3 800	10 640	4 Q
DN 800 (32")	OIML R75	PN16, PN 25	7 600	10 640	4 R

Selection and Ordering data

Article No. Order code

Flowmeter SITRANS FUE380 (type-approved)

7ME3410 - - - - -

Diameter	Approval	Pressure rating	Flow setting [m ³ /h]							
			Qp[m ³ /h]	Qs [m ³ /h]						
<u>Remote only</u>										
DN 900 (36")	EN 1434	PN16, PN 25	5 000	10 000						5 B
DN 900 (36")	EN 1434	PN16, PN 25	5 000	14 000						5 C
DN 900 (36")	OIML R75	PN16, PN 25	10 000	14 000						5 D
DN 1000 (40")	EN 1434	PN16, PN 25	6 000	12 000						5 K
DN 1000 (40")	EN 1434	PN16, PN 25	6 000	16 800						5 L
DN 1000 (40")	OIML R75	PN16, PN 25	12 000	16 800						5 M
DN 1200 (48")	EN 1434	PN16	9 000	18 000						5 T
DN 1200 (48")	EN 1434	PN16	9 000	25 200						5 U
DN 1200 (48")	OIML R75	PN16	18 000	25 200						5 V
Flange norm and pressure rating										
System without sensor - only a transmitter										
<u>EN 1092-1</u>										
PN 16 (DN 100 ... DN 1 200)										
PN 25 (DN 200 ... DN 1 000)										
PN 40 (DN 50 ... DN 250)										
Compact/remote connection										
Note: Sensor cable always firmly connected to connection box.										
Compact version, Liquid max. 120 °C (248 °F)										
<u>Remote version, Liquid max. 150/200 °C (302/392 °F)</u>										
Sensor link cable (SSL)										
• 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)										
With CT approval										
With CT approval MID004, authority seal										
Pulse output value setup										
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										
Pulse value										
• 0.1 l/pulse										
• 1 l/pulse										
• 2.5 l/pulse										
• 10 l/pulse										
• 50 l/pulse										
• 100 l/pulse										
• 250 l/pulse										
• 1 m ³ /pulse										
• 0.25 l/pulse										
• 0.5 l/pulse										
• 5 l/pulse										
• 25 l/pulse										
• 500 l/pulse										
• 2.5 m ³ /pulse										
• 5 m ³ /pulse										
• 10 m ³ /pulse										
• 25 m ³ /pulse										
• 50 m ³ /pulse										
• 100 m ³ /pulse										
• 250 m ³ /pulse										
• 500 m ³ /pulse										
• 1 000 m ³ /pulse										

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 variant FUE080 power/analog output

- 115 ... 230 V AC
 3.6 V Lithium battery, dual pack is included
 115 ... 230 V AC, backup 3.6 V DC Lithium battery, single pack is included
 3.6 V battery version (no battery pack included)
- Option with 4 ... 20 mA analog output module
- 115 ... 230 V AC
 - 115 ... 230 V AC, backup 3.6 V DC, Lithium battery, single pack is included

Note:

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.

Country specific design

Neutral, no approval mark
 China, PA 2008-T222
 Russia, EN 1434/OIML R75
 MID-Approval (MI004), Language on name plate English
 MID-Approval (MI004), Language on name plate German
 MID-Approval (MI004), Language on name plate Polish
 MID-Approval (MI004), Language on name plate French

Pulse width setup

Pulse width

- 5 ms (standard)
- 10 ms
- 20 ms
- 50 ms
- 100 ms
- 200 ms
- 500 ms

B
D
E
G

R
U

A
C
M
R
S
T
U

2
2
3
4
5
6
7
8

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 m³/h).

3.1 Inspection certificate (EN 10204-3.1) - pipe material

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).

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 %, 50 % and 100 % of Q_p (max. 2800 m³/h).

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).

Output B as reverse flow pulses.
 No calibration/verification of this function.

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).

Included

C12

D20

D21

D22

E21

Y17

Flowmeter SITRANS FUE380 operating instructions, accessories and spare parts

Operating instructions

Description

Article No.

- English
- German

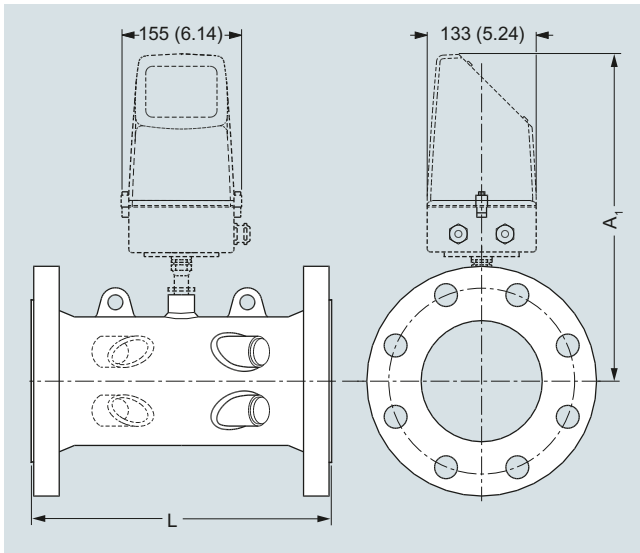
A5E00730100

A5E00740611

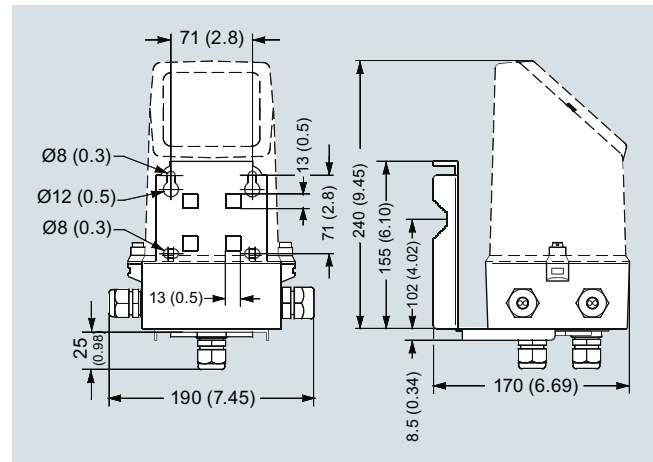
All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

For accessories and spare parts on page 3/257 see chapter of transmitter FUS080/FUE080.

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		A ₁ mm	Lift hug
DN	L mm	Weight kg	L mm	Weight kg	L mm	Weight kg		
50	-	-	-	-	300 +0/-2	10	350	No
65	-	-	-	-	300 +0/-2	15	363	No
80	-	-	-	-	350 +0/-2	18	370	No
100	350 +0/-2	15	-	-	350 +0/-2	18	372	No
125	350 +0/-2	18	-	-	350 +0/-2	24	385	No
150	500 +0/-3	28	-	-	500 +0/-3	34	399	No
200	500 +0/-3	38	500 +0/-3	47	500 +0/-3	55	425	Yes
250	600 +0/-3	60	600 +0/-3	76	600 +0/-3	91	452	Yes
300	500 +0/-3	66	500 +0/-3	81	-	-	478	Yes
350	550 +0/-3	94	550 +0/-3	121	-	-	495	Yes
400	600 +0/-3	124	600 +0/-3	153	-	-	520	Yes
500	625 +0/-3	194	625 +0/-3	231	-	-	570	Yes
600	750 +0/-3	303	750 +0/-3	365	-	-	622	Yes
700	875 +0/-3	361	875 +0/-3	553	-	-	673	Yes
800	1000 +0/-3	494	1000 +0/-3	770	-	-	724	Yes
900	1230 +0/-6	535	1300 +0/-6	835	-	-	775	Yes
1000	1300 +0/-6	594	1370 +0/-6	1000	-	-	826	Yes
1200	1360 +0/-6	732	-	-	-	-	928	Yes

Notes:

- Weight for transmitter/electronics 1.5 kg (compact version) or approximately 3 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

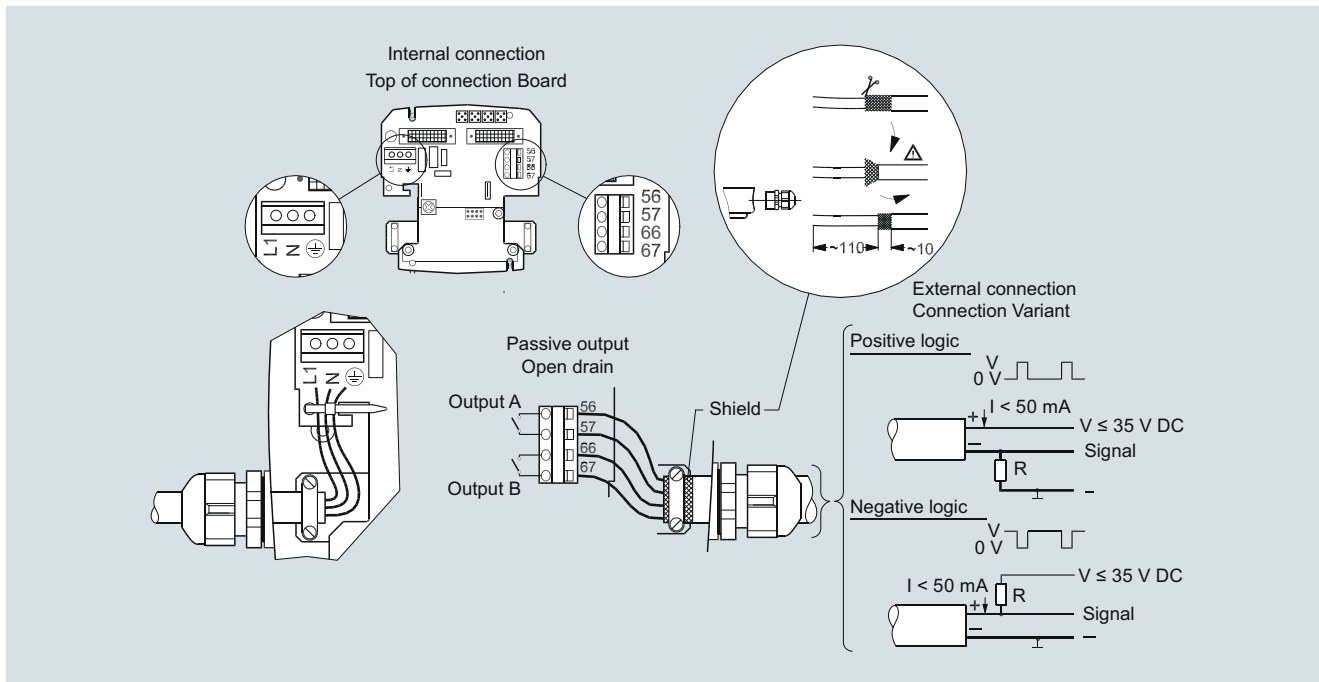
Flowmeter SITRANS FUS380 and FUE380

Size inch	PN 16		PN 25		PN 40		A ₁ 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	14.30	No
3	-	-	-	-	13.78 +0/-0.08	40	14.57	No
4	13.78 +0/-0.08	33	-	-	13.78 +0/-0.08	40	14.65	No
5	13.78 +0/-0.08	40	-	-	13.78 +0/-0.08	53	15.16	No
6	19.68 +0/-0.12	62	-	-	19.68 +0/-0.12	75	15.71	No
8	19.68 +0/-0.12	84	19.68 +0/-0.12	104	19.68 +0/-0.12	121	16.74	Yes
10	23.62 +0/-0.12	132	23.62 +0/-0.12	168	23.62 +0/-0.12	201	17.80	Yes
12	19.68 +0/-0.12	146	19.68 +0/-0.12	179	-	-	18.82	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	-	-	20.48	Yes
20	24.61 +0/-0.12	428	24.61 +0/-0.12	509	-	-	22.45	Yes
24	29.53 +0/-0.12	668	29.53 +0/-0.12	805	-	-	24.49	Yes
28	34.45 +0/-0.12	796	34.45 +0/-0.12	1246	-	-	26.50	Yes
32	39.37 +0/-0.12	1089	39.37 +0/-0.12	1698	-	-	28.51	Yes
36	48.43 +0/-0.24	1179	51.18 +0/-0.24	1841	-	-	30.52	Yes
40	51.18 +0/-0.24	1310	53.94 +0/-0.24	2205	-	-	32.52	Yes
48	53.54 +0/-0.24	1614	-	-	-	-	36.54	Yes

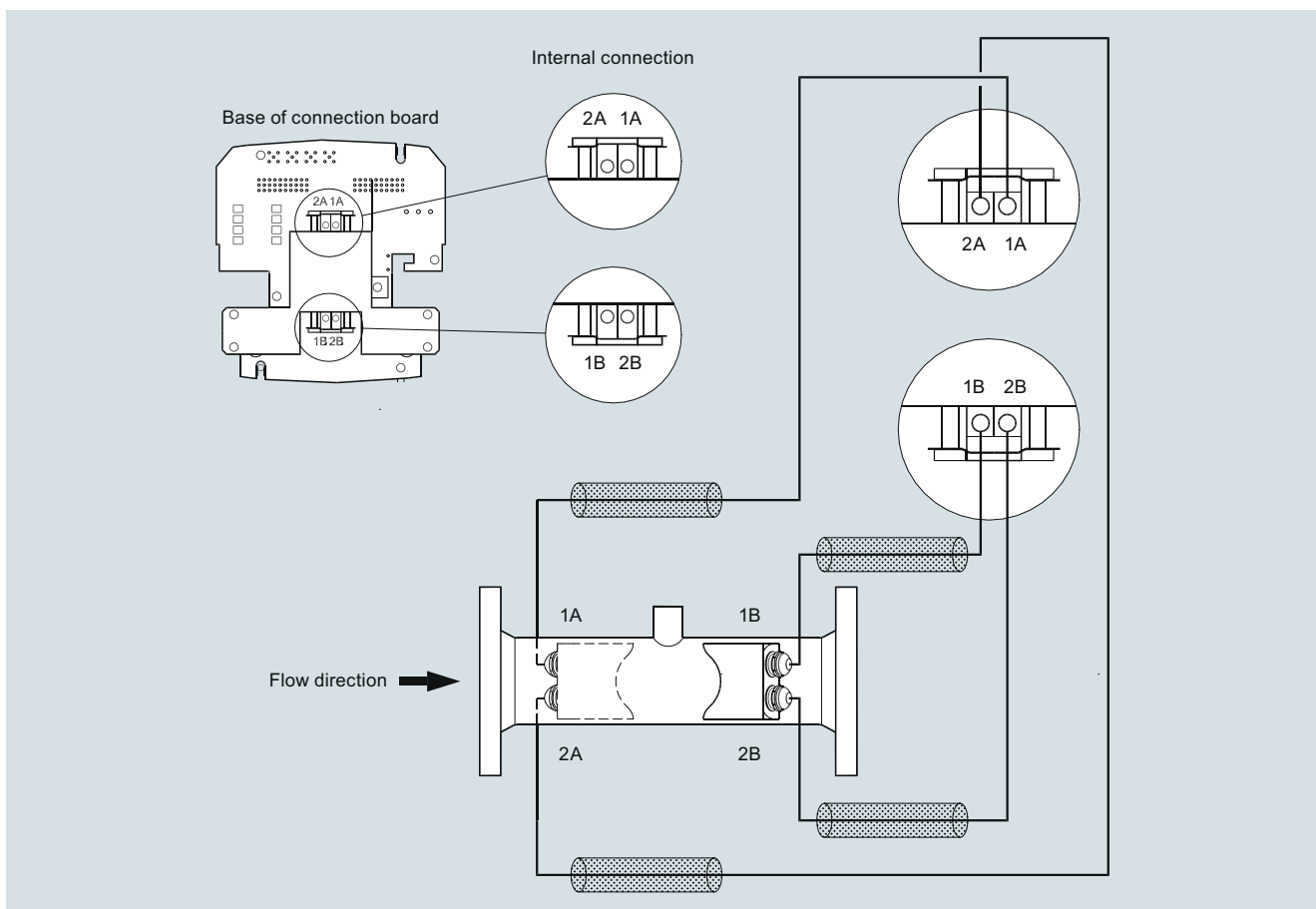
Notes:

- Weight for transmitter/electronics 3.3 lb (compact version) or approximately 6.6 lb (remote version including 32.8 ft cable set)
- - Means not available
- All weights are **approximate**
- For flange values - see norm EN 1092-1

Schematics



Electrical connection of transmitter SITRANS FUS/FUE380



Electrical connection of sensor SITRANS FUS/FUE380

Flow Measurement

SITRANS F US Inline

SITRANS FUE950 energy calculator

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 $-20 \dots +190 \text{ }^{\circ}\text{C}$ ($-4 \dots +374 \text{ }^{\circ}\text{F}$)
- 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

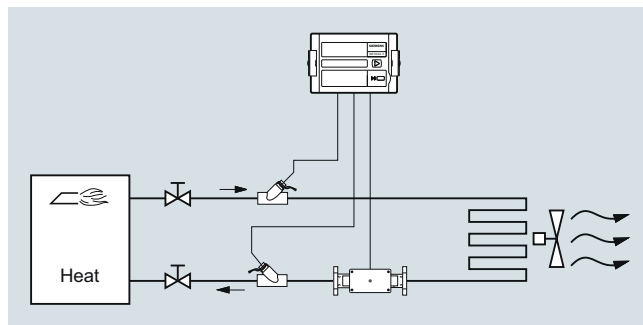
- Plug-in module with 2 extra pulse inputs
- Plug-in module with 2 pulse outputs
- Plug-in module with combination of input and output pulses
- Plug-in module for M-Bus communication
- Plug-in module for RS 232 or RS 485 communication
- Plug-in module with 2 passive current outputs ($4 \dots 20 \text{ mA}$)

Application

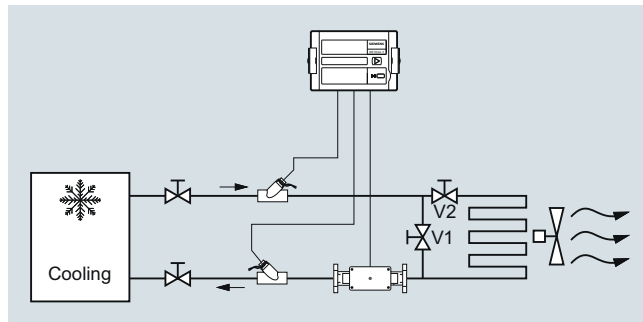
The SITRANS FUE950 is able to handle 3 kinds of applications, means energy calculation in:

- District heating applications
- Chilled water applications
- Combined cooling/heating applications

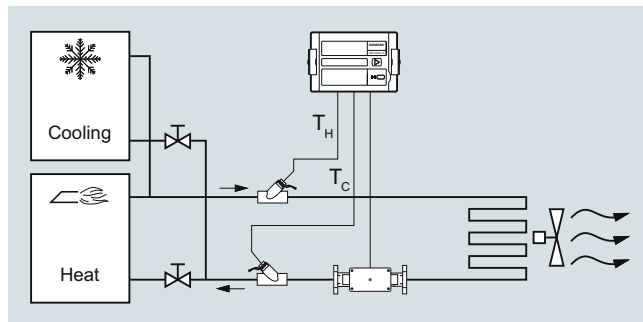
Energy metering in heating, hot water applications (code "A" and "B")



Energy metering in cooling, chilled water applications (code "C" and "D")



Energy metering in combined cooling/heating applications (code "E" and "F")



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.

Flow Measurement

SITRANS F US Inline

SITRANS FUE950 energy calculator

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)

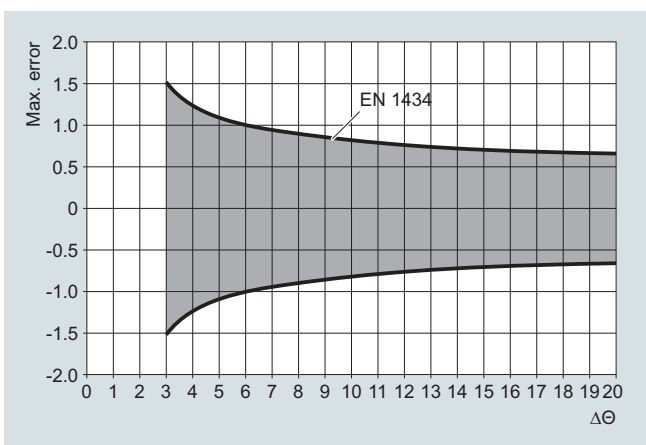
Integration

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	
Measuring rates		
• Battery type D-cell	Volume: 1 s, temperature: 4 s	
• Mains versions	Volume: 1/8 s, temperature: 2 s	
Flow range	Depends on pulse input value (IN0), 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-adaptor 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	5 ... 55 °C (41 ... 131 °F)
• Storage	-25 ... +70 °C (-13 ... +158 °F) Relative ambient humidity < 93 %
Environment class	
• Mechanic class	M1/M2
• Electromagnetic class	E1/E2 (MID) or C (DIN EN 1434)

Temperature input (always included)

Function	The temperature sensors must be connected to terminals 1-5 and 6-2 (TH) and 3-7 and 8-4 (TC) depending on cable type (2-wire or 4-wire).
Temperature range Absolute measuring range	-20 ... 190 °C (-4 ... 374 °F) for T _H and T _C
Temperature difference	Start 0.1 K, min. 3 K, max. 177 K
Measurement cut-off	0.125 K 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 (IN0) (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.
----------	--

Flow Measurement

SITRANS F US Inline

SITRANS FUE950 energy calculator

Pulse value	1 ... 1 000 l/pulse or 1 ... 100 gal/pulse, selection by corresponding Order code. Will be shown at the device label	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 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		
		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 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.).

SITRANS FUE950 energy calculator

Load	Max. 800 Ω
Upper limit	Up to 20.5 mA (exceed causes the error current value)
Signal on alarm	Errors are indicated with 3.5 mA or 22.6 mA (programmable, default: 3.5 mA)
Output values	Power, flow, temperature (configuring via software tool; default: for #1: Power and for #2: Flow)

M-Bus output	
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

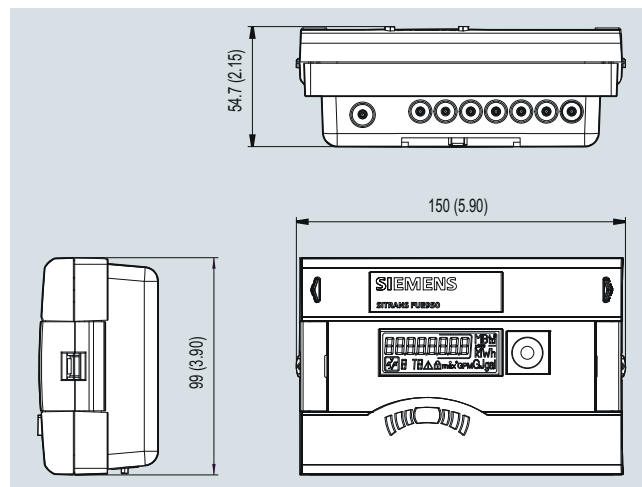
Power consumption	
230 V and 24 V versions	Typical current appr. 0.15 VA
3.6 V D-cell battery	Typical battery lifetime 10 years under normal conditions (no add-on modules, max. 40 °C ambient temperature)
Supply data	
Battery, 3.6 V type (option)	3.6 V lithium D-cell, battery lifetime typically 16 years 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. 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



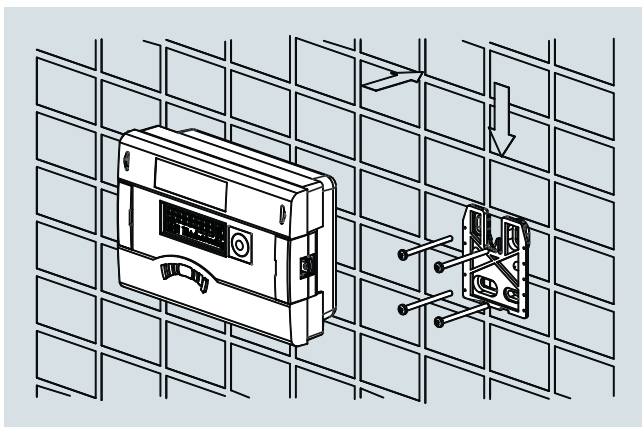
SITRANS FUE950, dimensions in mm (inch)

Flow Measurement

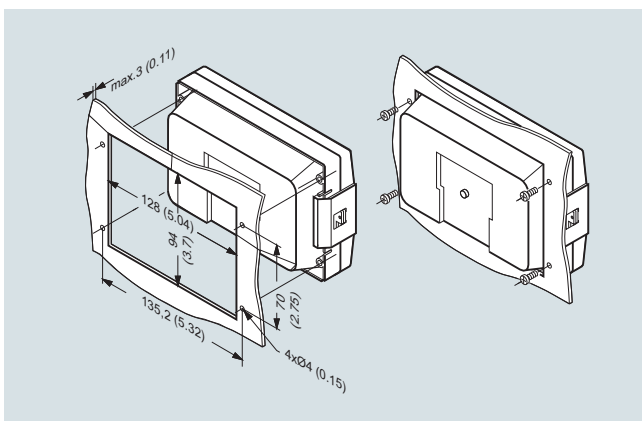
SITRANS F US Inline

SITRANS FUE950 energy calculator

3



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

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 without pasta Typically 5 s at 0.4 m/s with 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										

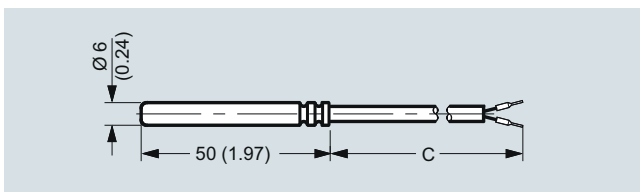
Brass sensor pocket (for 2-wire Pt500 types only - some only available as spare part)

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 without pasta Typically 5 s at 0.4 m/s with 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

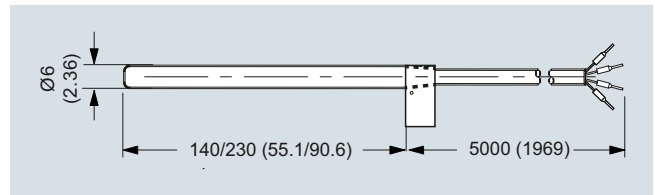
Pt500 2-wire temperature sensor pair (EN 1434)

Cable length 2, 3, 5 or 10 m ('C' at the dimensional drawing)



Pt500 2-wire temperature sensor, dimensions in mm (inch)

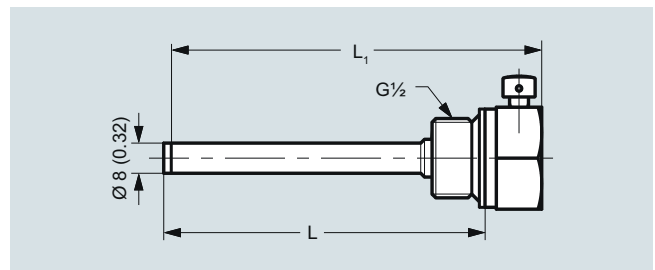
Pt500 4-wire temperature sensor pair (with MID and PTB K7.2 approval)



Pt500 4-wire temperature sensor, dimensions in mm (inch)

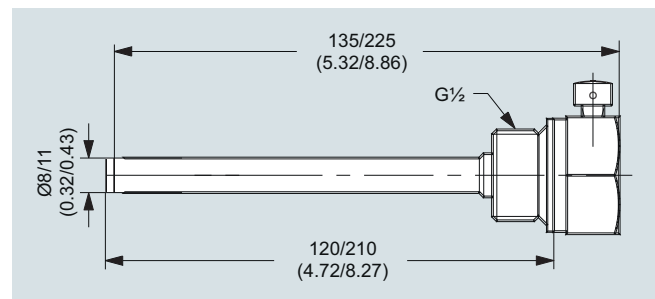
Stainless steel sensor pocket (for 2-wire Pt500 types only)

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)

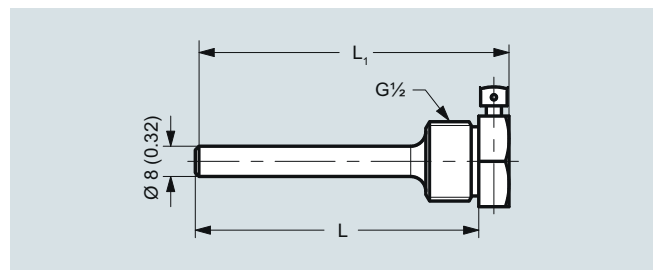
Stainless steel sensor pocket (for 4-wire Pt500 types only)



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)

Flow Measurement

SITRANS F US Inline

SITRANS FUE950 energy calculator

Selection and Ordering data			Article No.	Order code
Energy calculator SITRANS FUE950, MID or PTB K7.2 custody transfer approved			7ME3480 -	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.				
Flow input setting (IN0) The pulse input value selection must be the same as the pulse output setting of the selected flowmeter. To get optimal function and performance the pulse value must be selected as low as possible according to the maximum flow rate. The following calculation formula can be used for determining the lowest pulse value at a pulse length of 5 ms: $L/\text{pulse} > Q_{\text{max}} (\text{m}^3/\text{h})/360$. For example $Q_{\text{max}} = 300 \text{ m}^3/\text{h}$; $L/\text{pulse} > 300/360$; $L/\text{pulse} > 0.83$; therefore the pulse value must be 1 l/pulse.				
Pulse input in l/pulse or in gal/pulse (with option L05)	Flow limit Q_{max} in m^3/h	Flow limit Q_{max} in GPM *) (with option L05)		
1	360	6 000		2 A
2.5	900	15 000		2 B
5	1 800	30 000		2 C
10	3 600	60 000		3 A
25	9 000	150 000		3 B
50	18 000	300 000		3 C
100	36 000	600 000		4 A
250	90 000	-		4 B
500	180 000	-		4 C
1 000	360 000	-		5 A
*) GPM = Gallons per minute				
Calculator application/Flowmeter installation place For heating, flowmeter in return pipe (cold pipe), typical standard For heating, flowmeter in forward pipe (hot pipe) For cooling, media water, flowmeter in forward pipe (cold pipe) For cooling, media water, flowmeter in return pipe (hot pipe) For combined cooling/heating, flowmeter in forward pipe (hot pipe as heating) (MID conformity declaration for heating) For combined cooling/heating, flowmeter in return pipe (cold pipe as heating) (MID conformity declaration for heating)				A B C D E F
Temperature sensor type Pt500 setup, no sensor pair included (standard) 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). 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). Pt100 setup, no sensor pair included 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) 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)				0 3 4 5 6 7
Temperature sensor pocket sets: (for 6 mm sensor diameter) No pockets (standard) Brass pockets for 6 mm 2-wire sensors, length 82/92 mm, G½ inch, max. PN 16 (2 pcs.) 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) Stainless steel pockets for 6 mm 2-wire sensors, length 117/127 mm, G½ inch, max. PN 25 (2 pcs.) 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) Stainless steel pockets for 6 mm 2-wire sensors, length 155/168 mm, G½ inch, max. PN 25 (2 pcs.)				0 2 5 6 7 8
Voltage supply Battery 3.6 V DC (Lithium D-cell type) (standard) Mains power module for 230 V AC supply (incl. back-up battery) Mains power module for 24 V AC supply (incl. back-up battery) No power supply module (power supply ordering separate)				1 2 3 4

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

SITRANS F US Inline

SITRANS FUE950 energy calculator

Flowmeter SITRANS FUE950 operating instructions, accessories and spare parts

Operating instructions

Description	Article No.
• English	A5E03424739

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

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

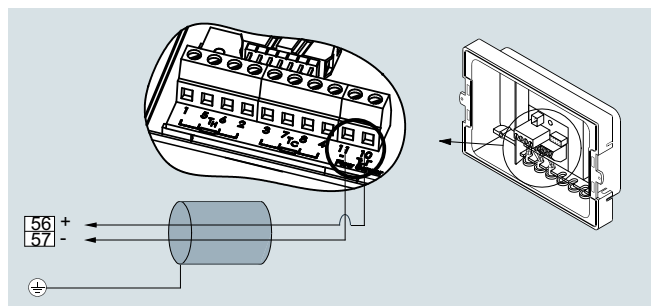
Spare parts

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, 1pc.)	
Brass pocket 6 mm, G½B x 40 mm (PN 16), 1 pc.	A5E02611778
Brass pocket 6 mm, G½B x 85 mm (PN 16), 1 pc.	A5E02611779
Brass pocket 6 mm, G½B x 120 mm (PN 16), 1 pc.	A5E02611780
Stainless steel 6 mm, G½B x 85 mm (PN 25), 1 pc.	A5E02611781
Stainless steel 6 mm, G½B x 120 mm (PN 25), 1 pc.	A5E02611783
Stainless steel 6 mm, G½B x 155 mm (PN 25), 1 pc.	A5E02611792
Stainless steel 6 mm, G½B x 210 mm (PN 25), 1 pc.	A5E02611793
Pt500 temperature sensor pair, 2-wire cable, 6 mm sensor diameter, with MID/EN-approval (for 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.

Overview



SITRANS F S 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 and dual path versions to suit your operating conditions and requirements.

System performance

Approvals	<ul style="list-style-type: none"> • ATEX Zone 2 • IECEx Zone 2 • FMc Class I Div. 2
Accuracy	± 0.5 ... 1 % for velocities above 0.3 m/s and >10 diameters straight run
Repeatability	± 0.25 % (based on ISO 11631)
Pipe size range	12.7 ... 10 m (0.5 ... 394")
Wall Thickness Range	0.64 ... 76.2 mm (0.025 ... 3.0")
Pipe material	Any sonically conductive material (steel, plastic, aluminum, glass, cement, ductile iron, copper)

Applications

SITRANS FS230 standard functions 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
 - Condensers
 - Hot and cold water systems
- Power industry
 - Nuclear
 - Fossil
 - Hydroelectric
- Processing industry
 - Process control
 - Batching
 - Rate indication
 - Volumetric and mass measurement

SITRANS FS230 hydrocarbon functions are ideal for applications carrying crude oil, refined petroleum or liquefied gas.

Standard volume (high end system)

- Standard (net) volume flow measurement
- Suitable for use in leak detection systems
- Mass flow output measurement
- Chemical and petrochemical processing
- Precise identification of interfaces on multi-liquid pipelines
- Product identification
- Standard density indication
- Applications with multiple liquids having a wide viscosity range
- Automatic gross volume compensation due to viscosity

Flow Measurement

SITRANS F S Clamp-on

System information SITRANS F S Clamp-on ultrasonic flowmeters

System information and selection guide

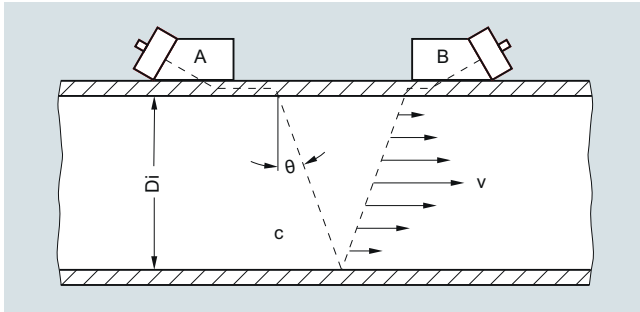
SITRANS F S clamp-on flowmeters	FS230 (Standard)	FS230 (Hydrocarbon)
Industry/Applications		
Water and aqueous solutions	X	
Utility district heating, cooling	X	
Chemical	X	
Hydrocarbons/petrochemical, multiple products or varying viscosity, liquefied gases, net and gross volume		X
Hydrocarbons (single product with limited viscosity range) gross volume	X	X
Very low flow (< 0.1 m/s) in small pipes	X	
High temperature applications < 232 °C (450 °F)	X	X
Refrigeration liquids	X	
Food products	X	
Design		
Field clamp-on (non-intrusive)	X	X
Standard volume or mass flow; per API MPMS chapter 11.1		X
Interface detection		X
Standard density output		X
Temperature measurement	X	X
Analog input	X	X
Large graphical display	X	X
Configuration and diagnostic software PDM compatible	X	X
Number of acoustic paths and channels		
1-path	X	X
2-path	X	X
Size		
12.7 ... 10000 mm (0.5" ... 394")	X	
38 ... 10000 mm (1.5" ... 394")		X
Approvals		
FM/FMc ¹⁾	X	X
ATEX	X	X
UL/ULc	X	X
IECEX	X	X

¹⁾ NEMA 4X associated equipment in DIV 2 connected to DIV 1 sensors.

Function

Operating Principle

The SITRANS F S 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 the 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}).

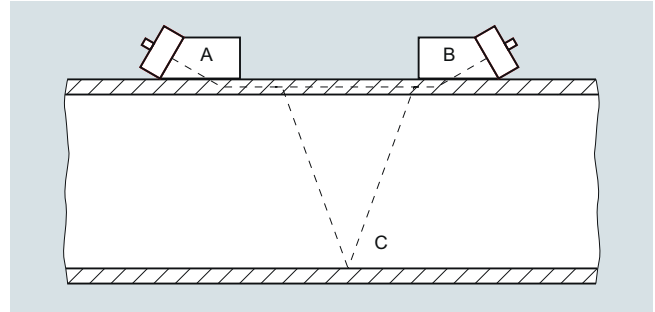
Ultrasonic sensor types

Two basic types of clamp-on sensors can be selected for use with the SITRANS F S 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.

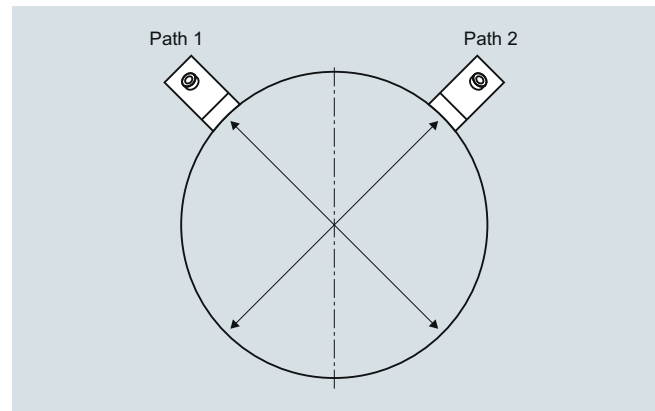
The WideBeam sensor is designed for steel pipes, but can also be used with aluminum and titanium. It is the preferred sensor for HPI applications. Note that unlike the universal type, this sensor selection is dependent only on the pipe's wall thickness.



Multi-path flowmeters

For improved flow profile averaging, redundancy or better cost per measurement, clamp-on meters can be supplied with 1 or 2 path measurement systems.

In the standard FS230 systems, these can be installed on a single pipe as shown below (two paths on same pipe).



Dual path installation example

Flow Measurement

SITRANS F S Clamp-on

Ultrasonic flow sensor SITRANS FSS200

SITRANS meter family description

SITRANS FS230 clamp-on flowmeters

The FS230 system is a basic function, permanent (or dedicated) Clamp-on meter that is available with a full range of safety approvals and I/Os. This meter can be used in a wide range of applications.

FST030 transmitter standard flow functions

When configured with standard flow functions, the FST030 transmitter 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.

It will have the ability to accommodate clamp-on RTDs, or analog input from a temperature transmitter.

FST030 hydrocarbon flow functions

When configured with hydrocarbon functions, the FST030 can be used for applications that will flow a wide range of viscosity with a standard volume (mass) and interface detection functions available. All functions rely on a variable referred to as "Liquident (TM)", which is used to infer the liquid's viscosity and 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 (TM) output will remain constant over a wide range of pressure or temperature.

Standard volume description:

This Liquident (TM) variable can also be used to identify the liquid flowing through the pipe as well as its physical properties (density, 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 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):

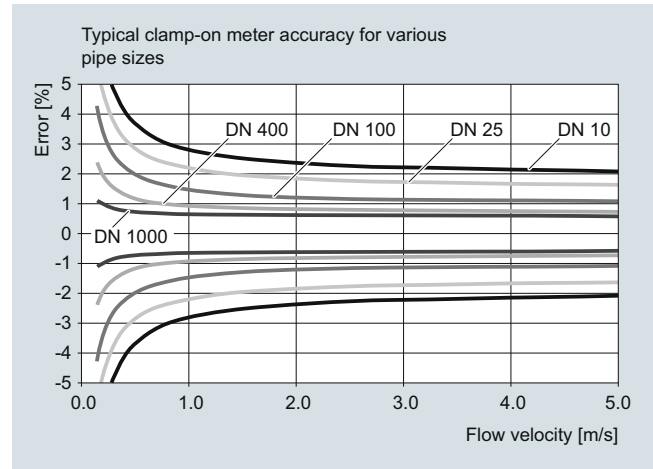
$$K_p = 1 / (1 - F (P_{\text{act}} - P_{\text{base}}) * 10^{-4})$$

Final volume correction: $Q_{\text{std}} = Q_{\text{act}} * K_t * K_p$

Available outputs from this meter include: API, standard density, mass flowrate, standard volume flowrate and liquid identification.

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.
- 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

Sensor type selection guide



Standard sensor supported in MLFB

Considerations for sensor selection	High precision	Universal	Notes
Media			
General survey (clean liquids) on non-steel pipes		X	
General survey (clean liquids) on a limited range of steel pipes	X		
Moderately aerated liquid or slurry, up to 121 °C (250 °F)	X		
Permanent installation on steel pipe (clean liquids)	X		
Installation in offshore or corrosive environment	X ¹⁾	X ²⁾	Sensor size C/D/E come standard as corrosion resistant. Size A and B optional stainless steel
Liquid temperature greater than 120 °C (248 °F)	O	X	FSS200 high temperature metal block sensors (up to 232 °C (450 °F))
Operation on single pipeline flowing multiple products	X	O	
Pipe material			
Steel	X		
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 in special cases
Wall thickness > 31.75 mm (1.25")	O	X	

O = not suitable X = preferred choice

¹⁾ For steel and stainless steel pipes only

²⁾ Not preferred for steel pipes

Definitions

Sensor chart	Description
FSS200	Formerly 1011 clamp-on sensors of the 1010 systems
Standard	Standard system sensor, selectable as part of a configured product
Special	Sensors available for non-standard applications and pipes. Contact tech support for application use
Corrosion resistant	Stainless steel metal parts on all Size C, D and E and all high temperature sensors
Aluminum	Aluminum metal parts on all HP and Universal size A and B (Corrosion resistant on request for size B)
Spare	Not available as part of a configured product, must be ordered separately
CE	Transmitter and sensors certified for sale in the EU
Trackless mount	Sensors fixed only by straps, no other mounting (spacer bar as an option) - not recommended
Tracks	Permanent installation for universal size A/B, high precision size A/B and all sizes of high temperature. Tracks always come as dual-part for either direct or reflect mounting, and always with straps.
Frames	Three sizes, for permanent installation for universal size C/ D/ E, and for high precision size C/D. For universal and high precision size B available for pipes > 125 OD (Spare)
T1	Usable from -40 ... +120 °C (-40 ... +248 °F), but best for Ø temperature below 80 °C (< 176 °F), standard
T2	Usable from -40 ... +120 °C (-40 ... +248 °F), but best for Ø temperature above 80 °C (> 176 °F)
Submersible	Sensors can be used submerged; adding Denso for supplemental protection is recommended

Flow Measurement

SITRANS F S Clamp-on

Ultrasonic flow sensor SITRANS FSS200

Sensor availability guide

Sensor models	Availability											
	Standard	Spare only	ATEX/FM/IECEX	Corrosion resistant	Trackless	Tracks	Frames	High precision mount	T1 best use < 80 °C (176 °F)	T2 best use > 80 °C (176 °F)	Submersible	Catalog
FSS200 Universal Sensor -40 ... 120 °C (-40 ... +248 °F) Polyetherimide - stainless steel housing CE IP68												
A1 Universal for pipe OD – 5.8 ... 50.8 mm (0.23" ... 2")		X	X	X	X ¹⁾	X					X	
A2 Universal for pipe OD – 12.7 ... 50.8 mm (0.5" ... 2")	X		X	X	X ¹⁾	X					X	X
B1 Universal for pipe OD – 12.7 ... 76 mm (0.5" ... 3")		X	X	X	X ¹⁾	X	X				X	
B2 Universal for pipe OD – 12.7 ... 76 mm (0.5" ... 3")		X	X	X	X ¹⁾	X	X				X	
B3 Universal for pipe OD – 19 ... 127 mm (0.75" ... 5")	X		X	X	X ¹⁾	X	X				X	X
C1 Universal for pipe OD – 51 ... 254 mm (2" ... 10")		X	X	X	X		X				X	
C2 Universal for pipe OD – 51 ... 254 mm (2" ... 10")		X	X	X	X		X				X	
C3 Universal for pipe OD – 51 ... 305 mm (2" ... 12")	X		X	X	X		X				X	X
D1 Universal for pipe OD – 102 ... 508 mm (4" ... 20")		X	X	X	X		X				X	
D2 Universal for pipe OD – 152 ... 610 mm (6" ... 24")		X	X	X	X		X				X	
D3 Universal for pipe OD – 203 ... 610 mm (8" ... 24")	X		X	X	X		X				X	X
*E1 Universal for pipe OD – 254 ... 3048 mm (10" ... 120")		X	X	X	X		X				X	
*E2 Universal for pipe OD – 254 ... 6096 mm (10" ... 240")	X		X	X	X		X				X	X
*E3 Universal for pipe OD – 304 ... 10007 mm (12" ... 394")		X	X	X	X		X	X			X	
FSS200 High Precision Sensor -40 ... +120 °C (-40 ... +248 °F) Polyetherimide - stainless steel housing T1/T2 CE IP68												
A1H (High Precision) for pipe WT - 0.64 ... 1.0 mm (0.025" ... 0.04")		X	X	X	X ¹⁾	X			X		X	X
A2H (High Precision) for pipe WT - 1.0 ... 1.5 mm (0.04" ... 0.06")	X		X	X	X ¹⁾	X			X		X	X
A3H (High Precision) for pipe WT - 1.5 ... 2.0 mm (0.06" ... 0.08")	X		X	X	X ¹⁾	X			X		X	X
B1H (High Precision) for pipe WT - 2.0 ... 3.0 mm (0.08" ... 0.12")	X		X	X	X ¹⁾	X	X		X	X	X	X
B2H (High Precision) for pipe WT - 3.0 ... 4.1 mm (0.12" ... 0.16")	X		X	X	X ¹⁾	X	X		X	X	X	X
B3H (High Precision) for pipe WT - 2.7 ... 3.3 mm (0.106" ... 0.128")		X	X	X	X ¹⁾	X	X		X	X	X	X
C1H (High Precision) for pipe WT - 4.1 ... 5.8 mm (0.16" ... 0.23")	X		X	X	X		X	X	X	X	X	X
C2H (High Precision) for pipe WT - 5.8 ... 8.1 mm (0.23" ... 0.32")	X		X	X	X		X	X	X	X	X	X
* D1H (High Precision) for pipe WT - 8.1 ... 11.2 mm (0.32" ... 0.44")	X		X	X	X		X	X	X	X	X	X
* D2H (High Precision) for pipe WT - 11.2 ... 15.7 mm (0.44" ... 0.62")	X		X	X	X		X	X	X	X	X	X
* D3H (High Precision) for pipe WT - 7.4 ... 9.0 mm (0.293" ... 0.354")		X	X	X	X		X	X	X	X	X	X
* D4H (High Precision) for pipe WT - 15.7 ... 31.8 mm (0.62" ... 1.25")	X		X	X	X		X	X	X	X	X	X
FSS200 High Temperature Universal Sensor -40 ... +230 °C (-40 ... +446 °F)												
High Temperature size 1 ... 230 °C (Ø 12.7 ... 100 mm)		X	X	X		X						
High Temperature size 2 ... 230 °C (Ø 30 ... 200 mm)	X		X	X		X						X
High Temperature size 3 ... 230 °C (Ø 150 ... 610 mm)	X		X	X		X						X
High Temperature size 4 ... 230 °C (Ø 400 ... 1200 mm)	X		X	X		X						X
High Temperature size 2A ... 230 °C (Ø 30 ... 200 mm)		X	X	X		X						
High Temperature size 3A ... 230 °C (Ø 150 ... 610 mm)		X	X	X		X						
High Temperature size 4A ... 230 °C (Ø 400 ... 1200 mm)		X	X	X		X						

¹⁾ Usable, but not recommended for selection.

Sensor mounting availability guide

	Sensor		
	FSS200 Dedicated Universal	FSS200 Dedicated High precision	FSS200 High temperature Universal
Mounting			
Trackless ¹⁾	X	X	
Tracks universal dedicated	X		
Tracks HP dedicated		X	
Frames universal dedicated	X		
Frames HP dedicated		X	
Tracks high temperature universal			X
High precision mounting single enclosure		X	
High precision mounting dual enclosure		X	
SpacerBar	X	X	
Straps	X	X	X
Chains EZ-Clamp 1	Size C, D	Size C	
Chains EZ-Clamp 2	Size E	Size D	
Denso	X	X	

¹⁾ Usable but not recommended

Flow Measurement

SITRANS F S Clamp-on

Transmitter SITRANS FST030, wall mount housing

Overview



FST030 is based on the latest developments within Digital Signal Processing (DSP) technology – engineered for high measuring performance, fast response to step changes in flow, high immunity against process noise, easy to install commission and maintain.

The FST030 transmitter delivers true multi-parameter measurements i.e. volume flow, standard volume flow, density, mass flow, fluid sound velocity and temperature.

The multiple outputs and bus communication mean that all primary process information can be read either instantaneously (10 ms update) or periodically as required by plant operations.

Process values

- Volume flow
- Mass flow
- Flow velocity
- Sound velocity
- Standard volume flow (hydrocarbon variant only)
- Density
- Kinematic viscosity
- Pressure
- Medium temperature
- Specific gravity (hydrocarbon variant only)
- Totalizer 1
- Totalizer 2
- Totalizer 3
- Standard density (hydrocarbon variant only)
- Standard specific gravity (hydrocarbon variant only)
- Standardizing factor (hydrocarbon variant only)
- Liquident (hydrocarbon variant only)
- API gravity (hydrocarbon variant only)
- Standard API gravity (hydrocarbon variant only)
- Standard kinematic viscosity (hydrocarbon variant only)
- Liquid identifier (hydrocarbon variant only)

Benefits

Flow calculation and measurement

- Dedicated volume flow calculation with DSP technology
- 100 Hz update rate for all output on all primary process values
- Maximum data age from sensor to output is 20 ms
- Independent low flow cut-off settings for volume and mass flow, standard volume flow and velocity
- Zero-point adjustment on command from discrete input or host system

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
- SensorFlash technology stores production specific system documentation and provides removable memory of all flowmeter setups and functions
 - Calibration certificates (with ordered calibration)
 - Non-volatile memory backup of operational data
 - Transfer of user configuration to other flowmeters
 - 4GB SD card for storage and data logging
 - Audit trail of all parameter changes
 - Alarm logging

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

Outputs and control

- Monitoring comprising of 3 individually configurable totalizers
- Multi-parameter outputs, configurable outputs assigned individually to any of the following parameters:
 - Volume flow
 - Standard volume flow
 - Mass flow
 - Flow velocity
 - Sound velocity
 - Density
 - Process viscosity
 - Process pressure
 - Process/medium temperature

Up to six I/O channels are configured as follows.

Channel 1

Channel 1 is 4 to 20 mA analog output with HART 7.5. The current signal can be configured for massflow, volumeflow and includes the availability of active or passive function selected by wiring on the non-Ex terminals. Alternative Modbus RTU RS 485 is available.

Channel 2

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

- Analog current (0/4 to 20 mA)
- Frequency or pulse
- 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.

Signal output

Signal output can be user configured to:

- Analog current (0/4 to 20 mA)
- Frequency or pulse
- Redundant frequency or pulse (linked to channel 2)
- Operational and alarm status

Signal input

Signal input can be user-configured for:

- Totalizer reset functions
- Force outputs or freeze process values
- Initiate automatic zero point adjustment

Relay

Relay output(s) can be user configured to:

- Alarm status

4-20 mA signal outputs and inputs are ordered as active or passive for Ex versions, active and passive for non-Ex versions - function selected by wiring on the terminals.

During initial commissioning of the flowmeter, all outputs can be forced to a preset value for simulation, verification or calibration purposes.

Channels 5 and 6

- RTD temperature inputs for 1000, 500 or 100 Ω RTD's - 2, 3 or 4 wire RTD's supported

Approvals and certificates

The SITRANS FST030 transmitter was designed to comply with or exceed the requirements of international standards and regulations.

Design

The SITRANS FST030 is designed in an IP67/NEMA 4X aluminum enclosure with corrosion resistant coating. It can be wall or pipe mounted and the enclosure can be locked with a padlock or wired with lead security seals. Includes all flow and DSL functions integrated into one unit.

The FST030 is available as standard with one current, HART 7.5 output and can be ordered with 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, 4 GB micro SD card with the ability to be updated by PC. It is supplied with each transmitter and comes with a complete set of certification documents including report if ordered. Factory conformance certificates are optional at ordering.

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

- Copy site setups to SD card for easy transfer to other similar transmitters
- 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 for system/firmware upgrade.

Function

The following functions are available:

- Up to four configurable outputs and 2 RTD input channels selected at ordering
- Outputs can be individually configured for mass flow, volume flow etc.
- Three built-in totalizers which can count positive, negative or net flows
- Independent low flow cut-offs, adjustable
- Uni/bidirectional flow measurement
- Flow direction adjustable
- Alarm system consisting of alarm-log, alarm pending menu
- Change log, logs all changes made to menu parameters or via communications
- Internal data logger
- Display of operating time with real-time clock
- Flowrate outputs are freely configurable between maximum negative and maximum positive flows according to the sensor capacity
- Limit switches programmable for flow, density and temperature. Limit points can be graded as warning and alarm for values both above and below nominal process conditions
- Zero adjustment menu, with zero point evaluation display
- Full service menu for effective and straight forward application and meter troubleshooting
- Precise temperature measurement ensures optimal accuracy on massflow and density
- Fully compatible with Siemens PDM version 8.2 service pack 1 or higher

Flow Measurement

SITRANS F S Clamp-on

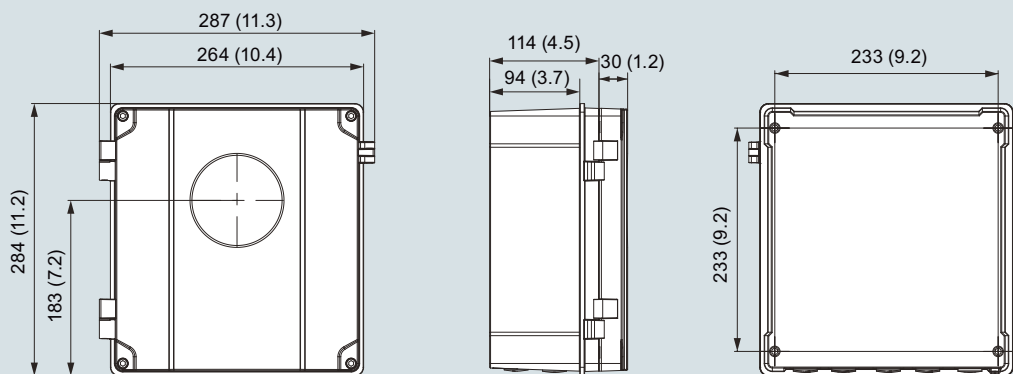
Transmitter SITRANS FST030, wall mount housing

Technical specifications

Process media	<ul style="list-style-type: none"> • Suitable for virtually any sonically conductive fluid, including hazardous liquids • Aggregate state: Light slurry and liquid 	Galvanic isolation	All inputs and outputs are galvanically isolated, isolation voltage 500 V
Process variables	<ul style="list-style-type: none"> • Volume flow • Mass flow • Flow velocity • Sound velocity • Standard volume flow (hydrocarbon variant only) • Density • Kinematic viscosity • Pressure • Medium temperature • Specific gravity (hydrocarbon variant only) • Totalizer 1 • Totalizer 2 • Totalizer 3 • Standard density (hydrocarbon variant only) • Standard specific gravity (hydrocarbon variant only) • Standardizing factor (hydrocarbon variant only) • Liquident (hydrocarbon variant only) • API gravity (hydrocarbon variant only) • Standard API gravity (hydrocarbon variant only) • Standard kinematic viscosity (hydrocarbon variant only) • Liquid identifier (hydrocarbon variant only) 	Alarm and warning limit	Available for all process values
Current output		Totalizer	Three counters for forward, net and reverse flow
Current	0 ... 20 mA or 4 ... 20 mA (channel 1 only 4 ... 20 mA)	Display	<ul style="list-style-type: none"> • Background illumination with alpha-numerical text to indicate flow rate, totalized values, settings and faults • Adjustable damping constant of 0 ... 100 s • Reverse flow indicated by negative sign
Load	< 500 Ω per channel	SD card functions	<ul style="list-style-type: none"> • Parameter change log • Configurable data logger • FW update log • Diagnostic log • Error and alarm log • Parameter backup
Time constant	0 ... 100 s adjustable	Ambient temperature	
Digital output¹⁾		Operation	
Pulse	41.6 μs ... 5 s pulse duration	• Transmitter	-40 ... +60 °C (-40 ... +140 °F), (humidity max. 95 %)
Frequency	0 ... 10 kHz, 50 % duty cycle, 120 % overscale provision	• Display	-20 ... +60 °C (-4 ... +140 °F)
Time constant	0 ... 100 s adjustable	Storage	
Active	0 ... 22 V DC, 30 mA, short-circuit-protected	• Transmitter	-40 ... +70 °C (-40 ... +158 °F) (humidity max. 95 %)
Passive	3 ... 30 V DC, max. 110 mA	Communication	HART 7.5 Modbus RTU RS 485
Relay		Enclosure	
Type	SPDT dry contact relay	Material	Aluminum
Load	30 V AC/100 mA	Rating	IP66/67, NEMA 4X to IEC 529 and DIN 40050 (1 mH ₂ O for 30 min.)
Functions	Alarm level, alarm number, limit, flow direction	Mechanical load	18 ... 400 Hz random, 3.17 g RMS, in all directions
Digital input		Power supply	
Voltage	15 ... 30 V DC (2 ... 15 mA)	Universal	20 ... 27 V DC 100 ... 240 V AC, 47 ... 63 Hz
Current	4 ... 20 mA	Fluctuation	No limit
Functionality	Reset totalizer 1, 2 and 3, force output, freeze process values, zero point adjustment	Power consumption	20 W/22 VA
		NAMUR	NAMUR requirements fulfilled when using Triax cable. Within the value limits according to "General requirements" with error criteria A in accordance with NE 21. Icons according to NE 107 status.
		Environment	
		Environmental conditions acc. to IEC/EN/UL 61010-1	<ul style="list-style-type: none"> • Altitude up to 2000 m • Pollution degree 2 • Overvoltage category II
		Maintenance	The flowmeter has a built-in error log/pending menu which should be inspected on a regular basis
		Cable glands	Cable glands are available in nylon, nickel plated brass or stainless steel (316L/W1.4404)

Approvals	
For non-hazardous area	No approval required
For hazardous area	
• ATEX	
- Sensor	Zone 0, 1, 2
- Transmitter with integrated DSL	Zone 2
• FM	
- Sensor	Class 1, Div 1, 2
- Transmitter	Class 1, Div 2
• FM Canada	
- Sensor	Class 1, Div 1, 2 (Zone 0, 1, 2)
- Transmitter with integrated DSL	Class 1, Div 2 (Zone 2)
• Combination Approval: ATEX, IECEx, FM, FM Canada	
- Sensor	Zone 0, 1, 2 (Div 1,2)
- Transmitter with integrated DSL	Zone 2 (Div 2)
Certificates	
CE conformity marking	<ul style="list-style-type: none"> • Low voltage directive • WEEE • RoHS
EMC performance	
Emission	CISPR 11:2009/A1:2010 and EN 55011:2009/A1:2010
Immunity	IEC/EN 61326-1:2013

Dimensional drawing



SITRANS FST030, wall mount version, dimensions in mm (inch)

Flow Measurement

SITRANS F S Clamp-on

Ultrasonic flowmeter SITRANS FS230 - Ordering data

Selection and Ordering data	Article No.	Ord. code
SITRANS FS230 clamp-on flowmeter	7ME372	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Transmitter model		
No transmitter, external DSL only	0	
Transmitter FST030	3	
Pipe material/temperature		
Transmitter only - no sensor	0	
Steel (stainless steel, carbon steel), temperature range: best use < 80 °C (176 °F)	1	
Steel (stainless steel, carbon steel), temperature range: best use > 80 °C (176 °F)	2	
Plastic (PVC) (for liquid applications), temperature: -40 ... +121 °C (-40 ... 250 °F)	6	
Any material, temperature: -40 ... +121 °C (-40 ... 250 °F)	7	
Any material, very high temperature: -40 ... +230 °C (-40 ... 446 °F)	8	
Pipe outer diameter range		
Transmitter only - no sensor		A
13 ... 19 mm (0.5 ... 0.75")		B
19.3 ... 30.5 mm (0.76 ... 1.20")		C
30.7 ... 50.8 mm (1.21 ... 2.00")		D
51 ... 76 mm (2.01 ... 3.00")		E
78 ... 127 mm (3.1 ... 5.0")		F
129 ... 203 mm (5.1 ... 8.0")		G
206 ... 305 mm (8.1 ... 12.0")		H
307 ... 508 mm (12.1 ... 20.0")		J
510 ... 813 mm (20.1 ... 32.0")		K
815 ... 9144 mm (32.1 ... 360")		L
Pipe wall thickness range		
Transmitter only - no sensor		A
0.635 ... 1.016 mm (0.025 ... 0.04")		B
1.016 ... 1.524 mm (0.04 ... 0.06")		C
1.524 ... 2.032 mm (0.06 ... 0.08")		D
2.032 ... 3.048 mm (0.08 ... 0.12")		E
3.048 ... 4.064 mm (0.12 ... 0.16")		F
4.064 ... 5.842 mm (0.16 ... 0.23")		G
5.842 ... 8.128 mm (0.23 ... 0.32")		H
8.128 ... 11.176 mm (0.32 ... 0.44")		J
11.176 ... 15.748 mm (0.44 ... 0.62")		K
15.748 ... 31.75 mm (0.62 ... 1.25")		L
31.75 ... 50.8 mm (1.25 ... 2.00")		M
Sensor mounting		
Transmitter only - no sensor		0
Mounting straps only		1
Standard frames and tracks		2
Magnetic - no straps		4
Magnetic - with straps		6
High precision mount (single enclosure)		7
High precision mount (dual enclosure)		8
Number of paths (sensor pairs)		
Transmitter only - no sensor		0
One path		1
Two path		2
Environment		
Standard		1

Ultrasonic flowmeter SITRANS FS230 - Ordering data

Selection and Ordering data	Article No.	Ord. code
SITRANS FS230 clamp-on flowmeter	7ME372 - - - - -	
Transmitter/DSL material and mounting style Wallmount transmitter, internal DSL, transmitter: aluminum wallbox, NEMA 4X, DSL: none, direct connected sensor cables, (max 2-path, max. 20 meter sensor cable)		U
Ex approvals Non-Ex ATEX, wallbox enclosure FM, wallbox enclosure FMc, wallbox enclosure ATEX, IECEx, FM, FMc, wallbox		A B G L P
Local User Interface Blind version transmitter Graphical local user interface, 240 x 160 pixels		1 3

3

Flow Measurement

SITRANS F S Clamp-on

Ultrasonic flowmeter SITRANS FS230 - Ordering data

Selection and Ordering data	Order code	Selection and Ordering data	Order code
Further designs		Ex Passive	
Please add "-Z" to Article No. and specify Order code(s).		• Ch2: current/freq./pulse, Ch3: none, Ch4: none	F21
Cable glands - transmitter, DSL (not for sensor cables)		• Ch2: current/freq./pulse, Ch3: current/freq./pulse Ch4: None	F22
No glands, metric threads on transmitter	A01	• Ch2:current/freq./pulse, Ch3: current/freq./pulse Ch4:current/freq./pulse	F23
No glands, metric thread with NPT thread adapters, stainless steel: quantity based on selection "U" in data place 14	A60	• Ch2: current/freq./pulse, Ch3: current/freq./pulse Ch4: relay	F24
No glands, metric thread with NPT thread adapters, nickel plated brass: quantity based on selection "U" in data place 14	A61	• Ch2: current/freq./pulse, Ch3: relay, Ch4: relay	F25
Nickel plated brass glands: quantity based on selection "U" in data place 14	A62	• Ch2: current/freq./pulse, Ch3: relay, Ch4: none	F26
Plastic glands: quantity based on selection "U" in data place 14	A64	Temperature sensors and pockets	
Stainless steel glands: quantity based on selection "U" in data place 14	A66	1000 Ω platinum standard clamp-on RTD	J61
Software functions and CT approvals		1000 Ω platinum submersible clamp-on RTD	J62
Software: for standard industry applications	B11	Sensor to transmitter cables	
Software including hydrocarbon process values	B39	10 m (32.8 ft) standard/submersible coax sensor cable pair with nylon glands	K24
I/O configuration Ch1		20 m (65.6 ft) standard/submersible coax sensor cable pair with nylon glands	K25
Non-Ex, 4 ... 20 mA HART, menu selected pas- sive/active	E02	10 m (32.8 ft) standard/submersible coax sensor cable pair with nickel plated brass glands	K29
Ex, 4 ... 20 mA HART, active	E06	20 m (65.6 ft) standard/submersible coax sensor cable pair with nickel plated brass glands	K30
Ex, 4 ... 20 mA HART, passive	E07	10 m (32.8 ft) standard/submersible coax sensor cable pair with stainless steel glands	K34
Modbus RTU 485	E14	20 m (65.6 ft) standard/submersible coax sensor cable pair with stainless steel glands	K35
I/O configuration Ch2, Ch3 and Ch4		20 m (65.6 ft) plenum rated coax sensor cable pair with nylon glands	K37
None	F00	20 m (65.6 ft) plenum rated coax sensor cable pair with nickel plated brass glands	K39
Non-Ex		20 m (65.6 ft) plenum rated coax sensor cable pair with stainless steel glands	K41
• Ch2: current/freq./pulse, Ch3: none Ch4: none. Active/passive menu selected	F01	10 m (32.8 ft) armored sensor cable pair with nickel plated brass glands	K53
• Ch2: current/freq./pulse, Ch3: current/freq./pulse Ch4: none. Active/passive menu selected	F02	20 m (65.6 ft) armored sensor cable pair with nickel plated brass glands	K54
• Ch2:current/freq./pulse, Ch3: current/freq./pulse Ch4:current/freq./pulse. Active/passive menu selected	F03		
• Ch2:current/freq./pulse, Ch3: current/freq./pulse Ch4: relay. Active/passive menu selected	F04		
• Ch2: current/freq./pulse, Ch3: relay Ch4: relay. Active/passive menu selected	F05		
• Ch2: current/freq./pulse, Ch3: relay Ch4: none. Active/passive menu selected	F06		
Ex Active			
• Ch2: current/freq./pulse, Ch3: none Ch4: none	F11		
• Ch2: current/freq./pulse, Ch3: current/freq./pulse Ch4: none	F12		
• Ch2: current/freq./pulse, Ch3: current/freq./pulse Ch4: current/freq./pulse	F13		
• Ch2: current/freq./pulse, Ch3: current/freq./pulse, Ch4: relay	F14		
• Ch2: current/freq./pulse, Ch3: relay, Ch4: relay	F15		
• Ch2: current/freq./pulse, Ch3: relay, Ch4: none	F16		

Selection and Ordering data	Order code
RTD cable (clamp temperature sensor to transmitter)	
6 m (20 ft) standard RTD cable	R50
15 m (50 ft) standard RTD cable	R51
30 m (100 ft) standard RTD cable	R52
46 m (150 ft) standard RTD cable	R53
61 m (200 ft) standard RTD cable	R54
91 m (300 ft) standard RTD cable	R55
6 m (20 ft) submersible RTD cable	R56
15 m (50 ft) submersible RTD cable	R57
30 m (100 ft) submersible RTD cable	R58
46 m (150 ft) submersible RTD cable	R59
61 m (200 ft) submersible RTD cable	R60
91 m (300 ft) submersible RTD cable	R61
RTD cable (insert temperature sensor to transmitter)	
15 m (50 ft) RTD cable with nickel plated gland	R74
15 m (50 ft) RTD cable with stainless steel gland	R75
30 m (100 ft) RTD cable with nickel plated gland	R76
30 m (100 ft) RTD cable with stainless steel gland	R77
91 m (300 ft) RTD cable with nickel plated gland	R78
91 m (300 ft) RTD cable with stainless steel gland	R79
15 m (50 ft) insert RTD cable with nickel plated gland	R80
15 m (50 ft) insert RTD cable with stainless steel gland	R81
30 m (100 ft) insert RTD cable with nickel plated gland	R82
30 m (100 ft) insert RTD cable with stainless steel gland	R83
91 m (300 ft) insert RTD cable with nickel plated gland	R84
91 m (300 ft) insert RTD cable with stainless steel gland	R85
Mass storage	
Enable mass storage function for SD card (not available for USA)	S30
Tag plate	
Tag plate for transmitter, stainless steel	Y15
Tag name plate, stainless steel	Y17

Flow Measurement

SITRANS F S Clamp-on

Ultrasonic flowmeter SITRANS FS230 - Accessories/Spare parts

Selection and Ordering data	Article No.
System spare parts	
Tool kits and loose parts "F" connector tool kit, 2 per Bag of loose spare parts; for wallmount, including cable strain relief components, mounting tool, seals and gasket, assorted screws and washers, hex cap nut, blind plugs, and O-rings	A5E38145699 A5E38288072
Electronics assemblies and modules	
Wall box <ul style="list-style-type: none"> • Display and keypad assembly • Digital Sensor Link (DSL), internal, for wall box • SensorFlash (4 GB micro SD card) -40 °C ... +85 °C • Power supply, for wall box, (240 V AC, 47 ... 63 Hz), (24 ... 90 V DC) • Foam insert for wall box with connectors 	A5E37697615 A5E38014726 A5E38288507 A5E38263021 A5E38287828
Cassettes, I/O configuration and communication	
Ex <ul style="list-style-type: none"> • Ch1: I/O and comm (active) 4 ... 20 mA output and HART 7.2 • Ch1: I/O and comm (passive) 4 ... 20 mA output and HART 7.2 • Ch1: communication Modbus RTU 485 	A5E38012278 A5E38013025 A5E38013054
Non Ex <ul style="list-style-type: none"> • Ch1: I/O and comm (active/passive) 4 ... 20 mA output and HART 7.2 • Ch1: communication Modbus RTU 485 • Ch2: current/freq./pulse, Ch3: None Ch4: none. Menu select active/passive • Ch2: current/freq./pulse, Ch3: current/freq./pulse Ch4: none. Menu select active/passive • Ch2: current/freq./pulse, Ch3: current/freq./pulse Ch4: current/Freq./Pulse. Menu select active/passive • Ch2: current/freq./pulse, Ch3: current/freq./pulse Ch4: relay. Menu select active/passive • Ch2: current/freq./pulse, Ch3: relay Ch4: relay. Menu select active/passive • Ch2: current/freq./pulse, Ch3: relay Ch4: none. Menu select active/passive 	A5E38013040 A5E38013069 A5E38006256 A5E38006558 A5E38006598 A5E38006896 A5E38006900 A5E38011432
Ex Passive <ul style="list-style-type: none"> • Ch2: current/freq./pulse, Ch3: None Ch4: none • Ch2: current/freq./pulse, Ch3: current/freq./pulse Ch4: none • Ch2: current/freq./pulse, Ch3: current/freq./pulse Ch4: current/freq./pulse • Ch2: current/freq./pulse, Ch3: current/freq./pulse Ch4: relay • Ch2: current/freq./pulse, Ch3: relay Ch4: relay • Ch2: current/freq./pulse, Ch3: relay Ch4: none 	A5E38012039 A5E38012056 A5E38012121 A5E38019235 A5E38019263 A5E38019378
Ex Active <ul style="list-style-type: none"> • Ch2: current/freq./pulse, Ch3: none Ch4: none • Ch2: current/freq./pulse, Ch3: current/freq./pulse Ch4: none • Ch2: current/freq./pulse, Ch3: current/freq./pulse Ch4: current/freq./pulse • Ch2: current/freq./pulse, Ch3: current/freq./pulse Ch4: relay • Ch2: current/freq./pulse, Ch3: relay Ch4: relay • Ch2: current/freq./pulse, Ch3: relay Ch4: none 	A5E38011478 A5E38011509 A5E38011541 A5E38011600 A5E38011618 A5E38011908
Miscellaneous parts	
Wall bracket "pipe mounting" Wall bracket "panel mounting" Metal kit: PSU cover, back plane Power input cover plate Blind plug brass-nickel 10 pcs (Ex version) Blind plug stainless steel 10 pcs (Ex version) F connectors, 4 pcs	A5E38288020 A5E38288032 A5E38415145 A5E38415205 A5E38145685 A5E38145689 A5E38268608

Ultrasonic flowmeter SITRANS FS230 - Accessories/Spare parts

Article No./Sensor Crossreference

Steel (T1)			Steel (T2)			Plastic (liquid)		
Data place 8,9,10 of 7ME372-... combination	Sensor part number	Sensor Size Code	Data place 8,9,10 of 7ME372-... combination	Sensor part number	Sensor Size Code	Data place 8,9,10 of 7ME372-... combination	Sensor part number	Sensor Size Code
1BB	7ME3950-5LG01	A1HT1	2BB	7ME3950-5LB11	A1	6BB	7ME3950-5LB01	A2
1BC	7ME3950-5LH01	A2HT1	2BC	7ME3950-5LB01	A2	6BC	7ME3950-5LB01	A2
1BD	7ME3950-5LB11	A1	2BD	7ME3950-5LB11	A1	6BD	7ME3950-5LB01	A2
1BE	7ME3950-5LB01	A2	2BE	7ME3950-5LB01	A2	6BE	7ME3950-5LB01	A2
1BF	7ME3950-5LB11	A1	2BF	7ME3950-5LB11	A1	6BF	7ME3950-5LB01	A2
1CB	7ME3950-5LG01	A1HT1	2CB	7ME3950-5LB11	A1	6CB	7ME3950-5LB01	A2
1CC	7ME3950-5LH01	A2HT1	2CC	7ME3950-5LB01	A2	6CC	7ME3950-5LB01	A2
1CD	7ME3950-5LJ01	A3HT1	2CD	7ME3950-5LB11	A1	6CD	7ME3950-5LB01	A2
1CE	7ME3950-5GK01	B1HT1	2CE	7ME3950-5GK21	B1HT2	6CE	7ME3950-5LB01	A2
1CF	7ME3950-5LB11	A1	2CF	7ME3950-5LB11	A1	6CF	7ME3950-5LB01	A2
1CG	7ME3950-5LB11	A1	2CG	7ME3950-5LB11	A1	6CG	7ME3950-5LB01	A2
1DB	7ME3950-5LG01	A1HT1	2DB	7ME3950-5LC11	B1	6DC	7ME3950-5LC01	B3
1DC	7ME3950-5LH01	A2HT1	2DC	7ME3950-5LC21	B2	6DD	7ME3950-5LC01	B3
1DD	7ME3950-5LJ01	A3HT1	2DD	7ME3950-5LC11	B1	6DE	7ME3950-5LC01	B3
1DE	7ME3950-5GK01	B1HT1	2DE	7ME3950-5GK21	B1HT2	6DF	7ME3950-5LC01	B3
1DF	7ME3950-5GL01	B2HT1	2DF	7ME3950-5GL21	B2HT2	6DG	7ME3950-5LC01	B3
1DG	7ME3950-5LC01	B3	2DG	7ME3950-5LC01	B3	6DH	7ME3950-5LC01	B3
1DH	7ME3950-5LC21	B2	2DH	7ME3950-5LC21	B2	6EC	7ME3950-5LC01	B3
1EB	7ME3950-5LG01	A1HT1	2EB	7ME3950-5LC11	B1	6ED	7ME3950-5LC01	B3
1EC	7ME3950-5LH01	A2HT1	2EC	7ME3950-5LC21	B2	6EE	7ME3950-5LC01	B3
1ED	7ME3950-5LJ01	A3HT1	2ED	7ME3950-5LC11	B1	6EF	7ME3950-5LC01	B3
1EE	7ME3950-5GK01	B1HT1	2EE	7ME3950-5GK21	B1HT2	6EG	7ME3950-5LC01	B3
1EF	7ME3950-5GL01	B2HT1	2EF	7ME3950-5GL21	B2HT2	6EH	7ME3950-5LC01	B3
1EG	7ME3950-5GM00	C1HT1	2EG	7ME3950-5GM20	C1HT2	6EJ	7ME3950-5LC01	B3
1EH	7ME3950-5GN00	C2HT1	2EH	7ME3950-5GN20	C2HT2	6EK	7ME3950-5LC01	B3
1EJ	7ME3950-5LC01	B3	2EJ	7ME3950-5LC01	B3	6FE	7ME3950-5LD00	C3
1EK	7ME3950-5LC01	B3	2EK	7ME3950-5LC01	B3	6FF	7ME3950-5LD00	C3
1FC	7ME3950-5LH01	A2HT1	2FC	7ME3950-5LD10	C1	6FG	7ME3950-5LD00	C3
1FD	7ME3950-5LJ01	A3HT1	2FD	7ME3950-5LD10	C1	6FH	7ME3950-5LD00	C3
1FE	7ME3950-5GK01	B1HT1	2FE	7ME3950-5GK21	B1HT2	6FJ	7ME3950-5LD00	C3
1FF	7ME3950-5GL01	B2HT1	2FF	7ME3950-5GL21	B2HT2	6FK	7ME3950-5LD00	C3
1FG	7ME3950-5GM00	C1HT1	2FG	7ME3950-5GM20	C1HT2	6GF	7ME3950-5LD00	C3
1FH	7ME3950-5GN00	C2HT1	2FH	7ME3950-5GN20	C2HT2	6GG	7ME3950-5LD00	C3
1FJ	7ME3950-5GP00	D1HT1	2FJ	7ME3950-5GP20	D1HT2	6GH	7ME3950-5LD00	C3
1FK	7ME3950-5LD10	C1	2FK	7ME3950-5LD10	C1	6GJ	7ME3950-5LD00	C3
1GD	7ME3950-5LJ01	A3HT1	2GD	7ME3950-5LD10	C1	6GK	7ME3950-5LD00	C3
1GE	7ME3950-5GK01	B1HT1	2GE	7ME3950-5GK21	B1HT2	6GL	7ME3950-5LD00	C3
1GF	7ME3950-5GL01	B2HT1	2GF	7ME3950-5GL21	B2HT2	6HG	7ME3950-5LE00	D3
1GG	7ME3950-5GM00	C1HT1	2GG	7ME3950-5GM20	C1HT2	6HH	7ME3950-5LE00	D3
1GH	7ME3950-5GN00	C2HT1	2GH	7ME3950-5GN20	C2HT2	6HJ	7ME3950-5LE00	D3
1GJ	7ME3950-5GP00	D1HT1	2GJ	7ME3950-5GP20	D1HT2	6HK	7ME3950-5LE00	D3
1GK	7ME3950-5GQ00	D2HT1	2GK	7ME3950-5GQ20	D2HT2	6HL	7ME3950-5LE00	D3
1GL	7ME3950-5LD00	C3	2GL	7ME3950-5LD00	C3	6HM	7ME3950-5LE00	D3
1HE	7ME3950-5GK01	B1HT1	2HE	7ME3950-5GK21	B1HT2	6JJ	7ME3950-5LE00	D3
1HF	7ME3950-5GL01	B2HT1	2HF	7ME3950-5GL21	B2HT2	6JK	7ME3950-5LE00	D3
1HG	7ME3950-5GM00	C1HT1	2HG	7ME3950-5GM20	C1HT2	6JL	7ME3950-5LE00	D3
1HH	7ME3950-5GN00	C2HT1	2HH	7ME3950-5GN20	C2HT2	6JM	7ME3950-5LE00	D3
1HJ	7ME3950-5GP00	D1HT1	2HJ	7ME3950-5GP20	D1HT2	6KK	7ME3950-5LF00	E2
1HK	7ME3950-5GQ00	D2HT1	2HK	7ME3950-5GQ20	D2HT2	6KL	7ME3950-5LF00	E2
1HL	7ME3950-5GR00	D4HT1	2HL	7ME3950-5GR20	D4HT2	6KM	7ME3950-5LF00	E2
1JG	7ME3950-5GM00	C1HT1	2JG	7ME3950-5GM20	C1HT2	6LM	7ME3950-5LF00	E2
1JH	7ME3950-5GN00	C2HT1	2JH	7ME3950-5GN20	C2HT2			
1JJ	7ME3950-5GP00	D1HT1	2JJ	7ME3950-5GP20	D1HT2			
1JK	7ME3950-5GQ00	D2HT1	2JK	7ME3950-5GQ20	D2HT2			
1JL	7ME3950-5GR00	D4HT1	2JL	7ME3950-5GR20	D4HT2			
1KH	7ME3950-5GN00	C2HT1	2KH	7ME3950-5GN20	C2HT2			
1KJ	7ME3950-5GP00	D1HT1	2KJ	7ME3950-5GP20	D1HT2			
1KK	7ME3950-5GQ00	D2HT1	2KK	7ME3950-5GQ20	D2HT2			
1KL	7ME3950-5GR00	D4HT1	2KL	7ME3950-5GR20	D4HT2			
1LJ	7ME3950-5GP00	D1HT1	2LJ	7ME3950-5GP20	D1HT2			
1LK	7ME3950-5GQ00	D2HT1	2LK	7ME3950-5GQ20	D2HT2			
1LL	7ME3950-5GR00	D4HT1	2LL	7ME3950-5GR20	D4HT2			



Flow Measurement

SITRANS F S Clamp-on

Ultrasonic flowmeter SITRANS FS230 - Accessories/Spare parts

Other (Univ)			Other (VH)			
Data place 8,9,10 of 7ME372-... combination	Sensor part number	Sensor Size Code	Data place 8,9,10 of 7ME372-... combination	Sensor part number	Sensor Size Code	
	7BB	7ME3950-5LB01	A2	8BB	7ME3950-5LA13	1
	7BC	7ME3950-5LB01	A2	8BC	7ME3950-5LA13	1
	7BD	7ME3950-5LB01	A2	8BD	7ME3950-5LA13	1
	7BE	7ME3950-5LB01	A2	8BE	7ME3950-5LA13	1
	7BF	7ME3950-5LB01	A2	8BF	7ME3950-5LA13	1
	7CB	7ME3950-5LB01	A2	8CB	7ME3950-5LA13	1
	7CC	7ME3950-5LB01	A2	8CC	7ME3950-5LA13	1
	7CD	7ME3950-5LB01	A2	8CD	7ME3950-5LA13	1
	7CE	7ME3950-5LB01	A2	8CE	7ME3950-5LA13	1
	7CF	7ME3950-5LB01	A2	8CF	7ME3950-5LA13	1
	7CG	7ME3950-5LB01	A2	8CG	7ME3950-5LA13	1
	7DB	7ME3950-5LC01	B3	8DB	7ME3950-5LA13	1
	7DC	7ME3950-5LC01	B3	8DC	7ME3950-5LA13	1
	7DD	7ME3950-5LC01	B3	8DD	7ME3950-5LA13	1
	7DE	7ME3950-5LC01	B3	8DE	7ME3950-5LA13	1
	7DF	7ME3950-5LC01	B3	8DF	7ME3950-5LA13	1
	7DG	7ME3950-5LC01	B3	8DG	7ME3950-5LA13	1
	7DH	7ME3950-5LC01	B3	8DH	7ME3950-5LA13	1
	7EB	7ME3950-5LC01	B3	8EB	7ME3950-5LA13	1
	7EC	7ME3950-5LC01	B3	8EC	7ME3950-5LA13	1
	7ED	7ME3950-5LC01	B3	8ED	7ME3950-5LA13	1
	7EE	7ME3950-5LC01	B3	8EE	7ME3950-5LA13	1
	7EF	7ME3950-5LC01	B3	8EF	7ME3950-5LA13	1
	7EG	7ME3950-5LC01	B3	8EG	7ME3950-5LA13	1
	7EH	7ME3950-5LC01	B3	8EH	7ME3950-5LA13	1
	7EJ	7ME3950-5LC01	B3	8EJ	7ME3950-5LA13	1
	7EK	7ME3950-5LC01	B3	8EK	7ME3950-5LA13	1
	7FC	7ME3950-5LD00	C3	8FC	7ME3950-5LA23	2
	7FD	7ME3950-5LD00	C3	8FD	7ME3950-5LA23	2
	7FE	7ME3950-5LD00	C3	8FE	7ME3950-5LA23	2
	7FF	7ME3950-5LD00	C3	8FF	7ME3950-5LA23	2
	7FG	7ME3950-5LD00	C3	8FG	7ME3950-5LA23	2
	7FH	7ME3950-5LD00	C3	8FH	7ME3950-5LA23	2
	7FJ	7ME3950-5LD00	C3	8FJ	7ME3950-5LA23	2
	7FK	7ME3950-5LD00	C3	8FK	7ME3950-5LA23	2
	7GD	7ME3950-5LD00	C3	8GD	7ME3950-5LA23	2
	7GE	7ME3950-5LD00	C3	8GE	7ME3950-5LA23	2
	7GF	7ME3950-5LD00	C3	8GF	7ME3950-5LA23	2
	7GG	7ME3950-5LD00	C3	8GG	7ME3950-5LA23	2
	7GH	7ME3950-5LD00	C3	8GH	7ME3950-5LA23	2
	7GJ	7ME3950-5LD00	C3	8GJ	7ME3950-5LA23	2
	7GK	7ME3950-5LD00	C3	8GK	7ME3950-5LA23	2
	7GL	7ME3950-5LD00	C3	8GL	7ME3950-5LA23	2
	7HE	7ME3950-5LE00	D3	8HE	7ME3950-5LA43	3
	7HF	7ME3950-5LE00	D3	8HF	7ME3950-5LA43	3
	7HG	7ME3950-5LE00	D3	8HG	7ME3950-5LA43	3
	7HH	7ME3950-5LE00	D3	8HH	7ME3950-5LA43	3
	7HJ	7ME3950-5LE00	D3	8HJ	7ME3950-5LA43	3
	7HK	7ME3950-5LE00	D3	8HK	7ME3950-5LA43	3
	7HL	7ME3950-5LE00	D3	8HL	7ME3950-5LA43	3
	7HM	7ME3950-5LE00	D3	8HM	7ME3950-5LA43	3
	7JG	7ME3950-5LE00	D3	8JG	7ME3950-5LA43	3
	7JH	7ME3950-5LE00	D3	8JH	7ME3950-5LA43	3
	7JJ	7ME3950-5LE00	D3	8JJ	7ME3950-5LA43	3
	7JK	7ME3950-5LE00	D3	8JK	7ME3950-5LA43	3
	7JL	7ME3950-5LE00	D3	8JL	7ME3950-5LA43	3
	7JM	7ME3950-5LE00	D3	8JM	7ME3950-5LA43	3
	7KH	7ME3950-5LF00	E2	8KH	7ME3950-5LA73	4
	7KJ	7ME3950-5LF00	E2	8KJ	7ME3950-5LA73	4
	7KK	7ME3950-5LF00	E2	8KK	7ME3950-5LA73	4
	7KL	7ME3950-5LF00	E2	8KL	7ME3950-5LA73	4
	7KM	7ME3950-5LF00	E2	8KM	7ME3950-5LA73	4
	7LJ	7ME3950-5LF00	E2	8LJ	7ME3950-5LA73	4
	7LK	7ME3950-5LF00	E2	8LK	7ME3950-5LA73	4
	7LL	7ME3950-5LF00	E2	8LL	7ME3950-5LA73	4
	7LM	7ME3950-5LF00	E2	8LM	7ME3950-5LA73	4



Ultrasonic flowmeter SITRANS FS230 - Accessories/Spare parts

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
<i>Spare parts (system)</i>		<i>Spare parts (system)</i>	
SITRANS FS230 IP65/IP66 (NEMA 4X)	7ME 3 9 5 0 - 	SITRANS FS230 IP65/IP66 (NEMA 4X)	7ME 3 9 5 0 - 
Approvals		High temperature universal liquid sensors	
All, FM/FMc, ATEX, IECEX - Flow sensors	5	Very high temperature up to 230 °C (446 °F)	
All, FM/FMc, ATEX, IECEX - Temperature sensors	1	• Size 1 (Ø 12.7 ... 100 mm (0.47 ... 3.94"))	5 LA 1 3
Spare sensor code		• Size 2 (Ø 30 ... 200 mm (1.18 ... 7.87"))	5 LA 2 3
For liquid flow sensors pipe ranges please refer to catalog sensor selection chart in the FSS200 section		• Size 2A (Ø 30 ... 200 mm (1.18 ... 7.87"))	5 LA 3 3
Flow sensors for use with mounting frames or tracks		• Size 3 (Ø 150 ... 610 mm (5.9 ... 24.0"))	5 LA 4 3
Suitable for pipes other than steel or stainless steel.		• Size 3A (Ø 150 ... 610 mm (5.9 ... 24.0"))	5 LA 6 3
Temperature -40 ... +121 °C (-40 ... +250 °F)		• Size 4 (Ø 400 ... 1200 mm (16.75 ... 47.24"))	5 LA 7 3
• A1 Universal	5 LB 1 1	• Size 4A (Ø 400 ... 1200 mm (16.75 ... 47.24"))	5 LA 8 3
• A2 Universal	5 LB 0 1	Standard RTD temperature sensors	
• B1 Universal	5 LC 1 1	Standard clamp-on RTD	1 TA 0 0
• B2 Universal	5 LC 2 1	Submersible clamp-on RTD	1 TB 0 0
• B3 Universal	5 LC 0 1	Insertion style RTD (size 1), 140 mm (5.5")	1 TJ 0 0
• C1 Universal	5 LD 1 0	Insertion style RTD (size 2), 216 mm (8.5")	1 TJ 0 1
• C2 Universal	5 LD 2 0	Insertion style RTD (size 3), 292 mm (11.5")	1 TJ 0 2
• C3 Universal	5 LD 0 0	Insertion style RTD (size 4), 368 mm (14.5")	1 TJ 0 3
• D1 Universal	5 LE 1 0		
• D2 Universal	5 LE 2 0		
• D3 Universal	5 LE 0 0		
• E1 Universal	5 LF 1 0		
• E2 Universal	5 LF 0 0		
• E3 Universal	5 LF 2 0		
Gas and liquid sensors for use with mounting frames or tracks			
Suitable for steel or stainless steel pipes			
Temperature T1			
• A1H high precision	5 LG 0 1		
• A2H high precision	5 LH 0 1		
• A3H high precision	5 LJ 0 1		
• B1H high precision	5 GK 0 1		
• B2H high precision	5 GL 0 1		
• B3H high precision	5 GT 0 1		
• C1H high precision	5 GM 0 0		
• C2H high precision	5 GN 0 0		
• D1H high precision	5 GP 0 0		
• D2H high precision	5 GQ 0 0		
• D3H high precision	5 GU 0 0		
• D4H high precision	5 GR 0 0		
Temperature T2			
• A1H high precision	5 LG 2 1		
• A2H high precision	5 LH 2 1		
• A3H high precision	5 LJ 2 1		
• B1H high precision	5 GK 2 1		
• B2H high precision	5 GL 2 1		
• B3H high precision	5 GT 2 1		
• C1H high precision	5 GM 2 0		
• C2H high precision	5 GN 2 0		
• D1H high precision	5 GP 2 0		
• D2H high precision	5 GQ 2 0		
• D3H high precision	5 GU 2 0		
• D4H high precision	5 GR 2 0		

Flow Measurement

SITRANS F S Clamp-on

Ultrasonic flowmeter SITRANS FS230 - Accessories/Spare parts

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
<i>Spare parts (Miscellaneous)</i>		<i>Spare parts (Miscellaneous)</i>	
SITRANS F S Clamp-on	7ME3960 - 	SITRANS F S Clamp-on	7ME3960 - 
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		Universal sensor size A or B	0MA00
		High precision sensor size A or B	0MB00
FS230 dedicated sensor mounting hardware		Stainless mounting tracks for high temperature 991 sensors	
Sensor mounting frames for		Size 1 high temperature sensor pair	CQO: 992MTNHMSH-1
• Universal sensor size B (for pipes > 125 mm (5 inch))	CQO:1012FN-PB	Size 2 high temperature sensor pair	CQO: 992MTNHMSH-2
• Universal sensor size C	0MC00	Size 3 high temperature sensor pair	CQO: 992MTNHMSH-3
• Universal sensor size D	0MC01	Size 4 high temperature sensor pair	CQO: 992MTNHMSH-4
• Universal sensor size E	0MC01		
• High precision sensor size B (For pipes > 125 mm (5 inch))	CQO:1012FNH-PB		
• High precision sensor size C	3MD00	Clamp-on RTD mounting hardware for dedicated systems	
• High precision sensor size D	3MD01	RTD mounting hardware for dedicated system	
• Magnetic mounting frames for size C, D, E, universal and high precision sensors	3MD02	• 1152 ... 610 mm (6 ... 24")	0MR00
Spacer bars (for indexing sensors on pipe)		• 12.7 ... 50.8 mm (0.5 ... 2")	0MR01
Spacer bar for pipes to 200 mm/8 inch (liquid), 600 mm/24 inch (gas)	3MS10	• 31.8 ... 203.2 mm (1.25 ... 8")	0MR02
Spacer bar for pipes to 500 mm/20 inch (liquid), DN 1200/48 inch (gas)	3MS20	• 508 ... 1219 mm (20 ... 48")	0MR04
Spacer bar for pipes to 800 mm/32 inch (liquid)	3MS30	Junction box for clamp on RTD's	CQO:992ECJ
Spacer bar for pipes to 1200 mm/48 inch (liquid). Must be used with 7ME39600SM30	3MS40	Insert RTD thermowells	
Mounting straps (slotted stainless steel)		Thermowell standard duty	
For pipes		• Uninsulated pipe 140 mm (5.5")	CQO:1012TW-1
DN 50 ... DN 150	0SM00	• Uninsulated pipe 216 mm (8.5")	CQO:1012TW-2
DN 50 ... DN 300	0SM10	• Uninsulated pipe: 292 mm (11.5")	CQO:1012TW-3
DN 300 ... DN 600	0SM20	• With lagging 140 mm (5.5")	CQO:1012TW-1L
DN 600 ... DN 1200	0SM30	• With lagging 216 mm (8.5")	CQO:1012TW-2L
DN 1200 ... DN 1500	0SM40	• With lagging 292 mm (11.5")	CQO:1012TW-3L
DN 1500 ... DN 2100	0SM50	Sensor cables	
DN 2100 ... DN 3000	0SM60	Coax (CE mark)	
High precision mounting enclosures for sensors		• 10 m (32.8 ft) armored sensor cable pair with nickel plated brass glands	A5E38028474004
Stainless steel mounts for high precision size "C" sensors, single enclosure	0WS50	• 20 m (65.6 ft) armored sensor cable pair with nickel plated brass glands	A5E38028474005
Stainless steel mounts for high precision size "D/E" sensors, single enclosure	0WS60	• 10 m (32.8 ft) standard/submersible Coax sensor cable pair with Nylon glands	A5E39669934004
Stainless steel mounts for high precision size "C" sensors, dual enclosure	0WD50	• 20 m (65.6 ft) standard/submersible Coax sensor cable pair with Nylon glands	A5E39669934005
Stainless steel mounts for high precision size "D/E" sensors, dual enclosure	0WD60	• 10 m (32.8 ft) standard/submersible Coax sensor cable pair with nickel plated brass glands	A5E39669934009
Stainless steel bands for high precision mounting enclosures		• 20 m (65.6 ft) standard/submersible Coax sensor cable pair with nickel plated brass glands	A5E39669934010
Mounting strap for pipe diameter to		• 10 m (32.8 ft) standard/submersible Coax sensor cable pair with stainless steel glands	A5E39669934014
• 300 mm (13")	0SM01	• 20 m (65.6 ft) standard/submersible Coax sensor cable pair with stainless steel glands	A5E39669934015
• 600 mm (24")	0SM11	• 20 m (65.6 ft) plenum rated Coax sensor cable pair with Nylon glands	A5E39669934020
• 1200 mm (48")	0SM21	• 20 m (65.6 ft) plenum rated Coax sensor cable pair with nickel plated brass glands	A5E39669934025
• 1500 mm (60")	0SM31	• 20 m (65.6 ft) plenum rated Coax sensor cable pair with stainless steel glands	A5E39669934030
• 2130 mm (84")	0SM41		
• 3050 mm (120")	0SM51		
• 5486 mm (216")	0SM61		
ADAPTER, MTG STRAP, TEMP COMP	CQO-1012WSM-A2		
Sensor mounting tracks (aluminum with mounting straps) for pipes < 125 mm (5 inch)			

Ultrasonic flowmeter SITRANS FS230 - Accessories/Spare parts

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
<i>Spare parts (Miscellaneous)</i>		<i>Spare parts (Miscellaneous)</i>	
SITRANS F S Clamp-on	7ME 3 9 6 0 -	SITRANS F S Clamp-on	7ME 3 9 6 0 -
Cable glands and adapters		Universal sensor test blocks	
Cable gland set M20, nylon	A5E38145321	Test block for size A and B universal sensors	0 TB 1 0
Cable gland set M20, nickel/brass	A5E38145323	Test block for size C and D universal sensors	0 TB 2 0
Cable gland set M20, stainless steel	A5E38145327	Thickness gauge	
Iris glands, set of 2, nickel plated brass	A5E38635890	Stand alone thickness gauge	7ME39510TG20
Iris glands, set of 2, stainless steel	A5E38635986		
M20xNPT adapters, set of 8, brass/nickel	A5E38145635		
M20xNPT adapters, set of 8, brass/nickel, Ex	A5E38309159		
M20xNPT adapters, set of 8, stainless steel	A5E38145643		
RTD temperature sensor cables			
6 m (20 ft) standard RTD cable	0 CR 5 0		
15 m (50 ft) standard RTD cable	0 CR 5 1		
30 m (100 ft) standard RTD cable	0 CR 5 2		
46 m (150 ft) standard RTD cable	0 CR 5 3		
61 m (200 ft) standard RTD cable	0 CR 5 4		
91 m (300 ft) standard RTD cable	0 CR 5 5		
6 m (20 ft) submersible RTD cable	0 CR 5 6		
15 m (50 ft) submersible RTD cable	0 CR 5 7		
30 m (100 ft) submersible RTD cable	0 CR 5 8		
46 m (150 ft) submersible RTD cable	0 CR 5 9		
61 m (200 ft) submersible RTD cable	0 CR 6 0		
91 m (300 ft) submersible RTD cable	0 CR 6 1		
Dedicated cable termination kits for:			
Standard, plenum sensor cable (NEMA 4X and NEMA 7 wall)	0 CT 0 1		
Submersible sensor cable (NEMA 4X and NEMA 7 wall)	0 CT 1 1		
Clamp-on RTD cable termination kit for standard RTD	0 CT 2 1		
Clamp-on RTD cable termination kit for submersible RTD	0 CT 3 1		
Insert RTD cable termination kit	0 CT 4 1		
Termination kit for armored cable	CQO:1012CNFX-TK		
Ultrasonic couplants			
Temporary water based for portable systems: 350 ml (12 oz): -34 ... +38 °C (-30 ... +100 °F)	0 UC 1 0		
Permanent synthetic polymer based: 90 ml (3 oz) -40 ... +190 °C (-40 ... +375 °F)	0 UC 1 0		
Dry coupling pad kit (10 pieces)	0 UC 1 0		
Permanent high temperature fluoroether: 163 ml (5.5 oz): -40 ... +230 °C (-40 ... +450 °F)	0 UC 1 0		
Permanent vulcanizing silicone rubber cou- plant: 90 ml (3 oz): -40...+120C (-40...+250F)	CQO:CC112		
Permanent high temperature silicone grease: 12 ml (0.4 oz): -40 ... +230 °C (-40 ... +450 °F)	CQO:CC117B		
Permanent high temperature silicone grease: 150 ml (5 oz): -40 ... +230 °C (-40 ... +450 °F)	CQO:CC117A		
Couplant for submersible sensor applications	CQO:CC120		
Pipe damping films			
B1, B2, B3, C1 and C2 sensors	0 DM 1 0		
D1 and D3 sensors	0 DM 2 0		
D2 sensor	0 DM 3 0		
D4 sensor	0 DM 4 0		

Flow Measurement

SITRANS F S Clamp-on

Ultrasonic flowmeter SITRANS FS220

Overview



The SITRANS FS220 is a clamp-on ultrasonic flow system consisting of an FST020 transmitter and FSS200 clamp-on sensors.

The transmitter classification FST020 describes a basic clamp-on ultrasonic flowmeter for basic application requirements. Based on the same digitalized platform as the FST030 this system provides the same accuracy and similar functions on a lower cost level. This system is ideal for water measurement and any application not requiring temperature or viscosity compensation.

Benefits

- Easy installation at any time; no production stop, 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 contact with media
- No pressure drop or energy loss
- Wide turn-down ratio, bidirectional and high stability at zero flow conditions
- Anomaly compensation tool for correction of non-ideal straight pipe runs. Automatic compensation during backflow
- Optional WideBeam technology ensures highest performance and accuracy
- Compatible with all previously installed transit time sensors

Applications

The SITRANS FS220 can be used for the following application conditions:

- Pipe sizes from 10 mm to 10 m
- Pipe materials: ideal for all metals, glass, FRP and most PVC variants; NOT for concrete pipes and special compound pipes
- Pipe wall thickness from 1 to 35 mm; specials on request up to 65 mm
- Media temperatures from -40 to 121 °C; universal high temperature sensors for up to 230 °C max.
- Underground/submerged locations, non-ideal environments, strong pipe vibrations

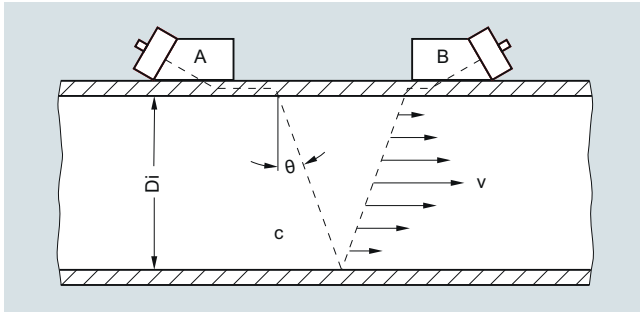
SITRANS FS220 flowmeters are suitable for most clean liquid applications, including the following:

- Water and wastewater industry
 - Potable water
 - Water and aqueous solutions
 - Wastewater, influent & effluent
 - Processed sewage, sludge
- Chemical feed industry
 - Sodium hypochlorite
 - Sodium hydroxide
- HVAC and power industries
 - Coolant flow
 - Fuel flow
 - Utility district heating, cooling
 - Refrigeration liquids
- Process control
 - Chemicals
 - Pharmaceuticals
 - Food products
 - Very low flow sensitivity (< 0.1 m/s)
 - High temperature liquids > 120 °C (248 °F).

Function

Operating Principle

The SITRANS F S 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 the 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.

$$Re = Di \cdot v / visc \cdot Q = K(Re) \cdot (\pi / 4 \cdot Di^2) \cdot v$$

v = Flow velocity

$visc = \mu / \rho$ = (dynamic viscosity / density)

$K(Re)$ = Reynolds flow profile compensation

In wetted type ultrasonic flowmeters the meter constants are configured prior to leaving the factory. As this is not possible with clamp-on meters, the settings must be made by the customer at the time of installation. These settings include pipe diameter, wall thickness, liquid viscosity, etc.

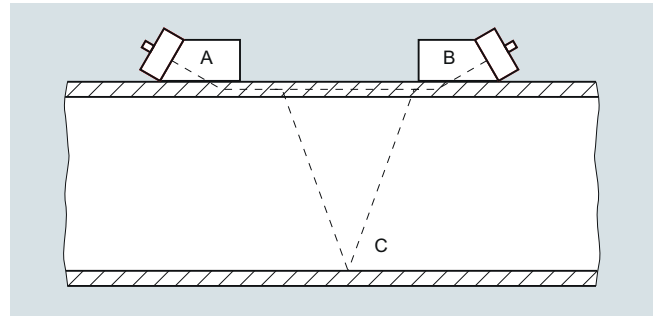
SITRANS clamp-on flowmeters that include temperature sensing can be configured to dynamically infer changes in fluid viscosity for the purpose of computing the most accurate flow profile compensation (K_{Re}).

Ultrasonic sensor types

Two basic types of clamp-on sensors can be selected for use with the SITRANS F S 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 temporary 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.



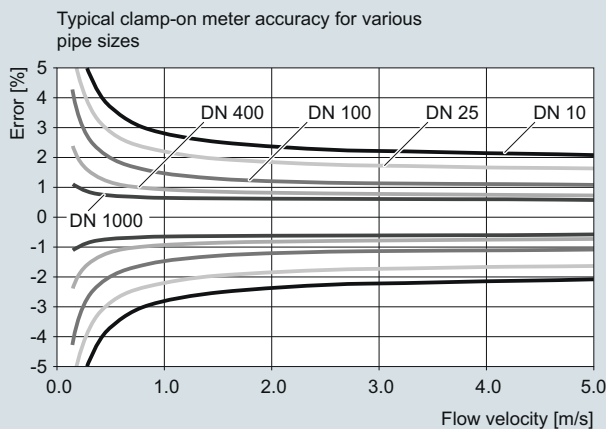
General installation guidelines for SITRANS FSS200 clamp-on sensors

- Minimum measuring range: 0 to ± 0.3 m/s velocity (see meter accuracy graph on next page 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

Flow Measurement

SITRANS F S Clamp-on

Ultrasonic flow sensor SITRANS FSS200



- 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.
- 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

Sensor type selection guide



Standard sensor supported in MLFB

Application condition	High precision	Universal	Notes
Note all that apply before making selection.			
Media			
General survey (clean liquids) on non-steel pipes		X	
General survey (clean liquids) on a limited range of steel pipes	X		
Moderately aerated liquid or slurry, up to 121 °C (250 °F)	X		
Permanent installation on steel pipe (clean liquids)	X		
Installation in offshore or corrosive environment	X		With optional stainless steel mounting
Liquid temperature greater than 120 °C (248 °F)	O	X	High temperature metal block sensors available to 230 °C (446 °F)
Operation on single pipeline flowing multiple products	X	O	
Pipe material			
Steel	X		
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 in special cases

O = not suitable X = preferred choice

Definitions

Sensor chart	Description
FSS200	Formerly 1011 clamp-on sensors of the 1010 systems
Standard	Standard system sensor, selectable as part of a configured product
Special	Sensors available for non-standard applications and pipes. Contact tech support for application use
Corrosion resistant	Stainless steel metal parts on all Size C, D and E and all high temperature sensors
Aluminum	Aluminum metal parts on all HP and Universal size A and B (Corrosion resistant on request for size B)
Spare	Not available as part of a configured product, must be ordered separately
CE	Transmitter and sensors certified for sale in the EU
Trackless mount	Sensors fixed only by straps, no other mounting (spacer bar as an option) - not recommended
Tracks	Permanent installation for universal size A/B, high precision size A/B and all sizes of high temperature. Tracks always come as dual-part for either direct or reflect mounting, and always with straps.
Frames	Three sizes, for permanent installation for universal size C/ D/ E, and for high precision size C/D. For universal and high precision size B available for pipes > 125 OD (Spare)
T1	Usable from -40 ... +120 °C (-40 ... +248 °F), but best for Ø temperature below 80 °C (< 176 °F), standard
T2	Usable from -40 ... +120 °C (-40 ... +248 °F), but best for Ø temperature above 80 °C (> 176 °F)
Submersible	Sensors can be used submerged; adding Denso for supplemental protection is recommended

Flow Measurement

SITRANS F S Clamp-on

Ultrasonic flow sensor SITRANS FSS200

Sensor availability guide

Sensor models	Availability									
	Standard	Spare only	Corrosion resistant	Trackless	Tracks	Frames	T1 best use below 80 °C (176 °F)	T2 best use 80 ... 120 °C (176 ... 248 °F)	Submersible	Catalog
Universal Sensor -40 ... 120 °C (-40 ... +248 °F) housing CE IP68										
A1 Universal for pipe OD – 5.8 ... 50.8 mm (0.23" ... 2")		X			X				X	
A2 Universal for pipe OD – 12.7 ... 50.8 mm (0.5" ... 2")	X				X				X	X
B1 Universal for pipe OD – 12.7 ... 76 mm (0.5" ... 3")		X			X	X			X	
B2 Universal for pipe OD – 12.7 ... 76 mm (0.5" ... 3")		X			X	X			X	
B3 Universal for pipe OD – 19 ... 127 mm (0.75" ... 5")	X				X	X			X	X
C1 Universal for pipe OD – 51 ... 254 mm (2" ... 10")		X	X	X		X			X	
C2 Universal for pipe OD – 51 ... 254 mm (2" ... 10")		X	X	X		X			X	
C3 Universal for pipe OD – 51 ... 305 mm (2" ... 12")	X		X	X		X			X	X
D1 Universal for pipe OD – 102 ... 508 mm (4" ... 20")		X	X	X		X			X	
D2 Universal for pipe OD – 152 ... 610 mm (6" ... 24")		X	X	X		X			X	
D3 Universal for pipe OD – 203 ... 610 mm (8" ... 24")	X		X	X		X			X	X
E1 Universal for pipe OD – 254 ... 3048 mm (10" ... 120")		X	X	X		X			X	
E2 Universal for pipe OD – 254 ... 6096 mm (10" ... 240")	X		X	X		X			X	X
E3 Universal for pipe OD – 304 ... 9144 mm (12" ... 360")		X	X	X		X			X	
High Precision Sensor -40 ... +120 °C (-40 ... +248 °F) T1 (T2) CE IP68										
A1H (High Precision) for pipe WT - 0.64 ... 1.0 mm (0.025" ... 0.04")		X			X		X		X	X
A2H (High Precision) for pipe WT - 1.0 ... 1.5 mm (0.04" ... 0.06")	X				X		X		X	X
A3H (High Precision) for pipe WT - 1.5 ... 2.0 mm (0.06" ... 0.08")	X				X		X		X	X
B1H (High Precision) for pipe WT - 2.0 ... 3.0 mm (0.08" ... 0.12")	X				X	X	X	X	X	X
B2H (High Precision) for pipe WT - 3.0 ... 4.1 mm (0.12" ... 0.16")	X				X	X	X	X	X	X
B3H (High Precision) for pipe WT - 2.7 ... 3.3 mm (0.106" ... 0.128")		X			X	X	X	X	X	X
C1H (High Precision) for pipe WT - 4.1 ... 5.8 mm (0.16" ... 0.23")	X		X	X		X	X	X	X	X
C2H (High Precision) for pipe WT - 5.8 ... 8.1 mm (0.23" ... 0.32")	X		X	X		X	X	X	X	X
D1H (High Precision) for pipe WT - 8.1 ... 11.2 mm (0.32" ... 0.44")	X		X	X		X	X	X	X	X
D2H (High Precision) for pipe WT - 11.2 ... 15.7 mm (0.44" ... 0.62")	X		X	X		X	X	X	X	X
D3H (High Precision) for pipe WT - 7.4 ... 9.0 mm (0.293" ... 0.354")		X	X	X		X	X	X	X	X
D4H (High Precision) for pipe WT - 15.7 ... 31.8 mm (0.62" ... 1.25")	X		X	X		X	X	X	X	X
High Temperature Universal Sensor -40 ... +230 °C (-40 ... +446 °F)										
High Temperature size 1 ... 230 °C (Ø 12.7 ... 100 mm)		X	X		X					X
High Temperature size 2 ... 230 °C (Ø 30 ... 200 mm)	X		X		X					X
High Temperature size 3 ... 230 °C (Ø 150 ... 610 mm)	X		X		X					X
High Temperature size 4 ... 230 °C (Ø 400 ... 1200 mm)	X		X		X					X
High Temperature size 2A ... 230 °C (Ø 30 ... 200 mm)		X	X		X					
High Temperature size 3A ... 230 °C (Ø 150 ... 610 mm)		X	X		X					
High Temperature size 4A ... 230 °C (Ø 400 ... 1200 mm)		X	X		X					

Sensor mounting availability guide

	Sensor (Dedicated)		
	Universal	High Precision	High Temperature universal
Mounting			
Trackless (straps only)	X	X	
Tracks universal dedicated	X		
Tracks HP dedicated		X	
Frames universal dedicated	X		
Frames HP dedicated		X	
Tracks high temperature universal			X
High precision mount single enclosure for one pair sensors		X	
High precision mount dual enclosure for one pair sensors		X	
Spacer Bar	X	X	
Straps	X	X	X
Denso	X	X	

Flow Measurement

SITRANS F S Clamp-on

Ultrasonic flow transmitter SITRANS FST020

Overview



The SITRANS FST020 is the basic device for simple and cost-effective clamp-on applications. As a single-path device, it is suitable for flow measurement on liquids that do not require temperature or viscosity consideration and where highest accuracies are not required.

Historically, the FST020 comes from the clamp-on family of analog FUS1010 transmitters. Since the revision in 2017, the updated transmitter is now part of a digital platform based on the latest developments within Digital Signal Processing (DSP) technology - engineered for high measuring performance, fast response to step changes in flow, high immunity against process noise and simplicity in installation, commissioning and maintenance.

The FST020 transmitter delivers standard parameter measurements i.e. volume flow, flow speed or sound velocity by analog outputs and Modbus communication.

Process values

- Volume flow
- Flow velocity
- Sound velocity
- Totalizer 1, 2 and 3

Benefits

Flow calculation and measurement

- Dedicated volume flow calculation with DSP technology
- 100 Hz update rate for all primary process values
- Maximum data age from sensor to output is 20 ms
- Independent low flow cut-off settings for volume flow and velocity
- Zero-point adjustment on command from discrete input or host system

Operation and display

- User-configurable operation display
 - Fully graphical display 240 x 160 pixel display 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
- SensorFlash technology stores production specific system documentation and provides removable memory of all flowmeter setups and functions
 - Calibration certificates (with ordered calibration)
 - Non-volatile memory backup of operational data
 - Transfer of user configuration to other flowmeters
 - 4GB SD card for storage and data logging
 - Audit trail of all parameter changes
 - Alarm logging

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

Outputs and control

- Monitoring comprised of 3 individually configurable totalizers
- Single parameter outputs that can be assigned individually to any of the following parameters:
 - Volume flow
 - Flow velocity
 - Sound velocity
 - Flow direction

Channel 1 is 4 to 20 mA analog output. The current signal can be configured for passive volume flow.

Relay output(s) can be user configured to Alarm status or warning.

Modbus RTU RS 485 comes as standard.

Signal input

The signal input can be user-configured for:

- Totalizer reset functions
- Forcing outputs or freezing process values
- Initiating automatic zero point adjustment

Approvals and certificates

The SITRANS FST020 transmitter was designed to comply with or exceed the requirements of international standards and regulations.

Design

- Field clamp-on (non-intrusive)
- Single path, for only one pair of sensors on one pipe
- IP65 (NEMA 4X) wall mount housing, constructed of polycarbonate
- Available AC or DC power, 100 to 240 V AC, 11.5 to 28.5 V DC

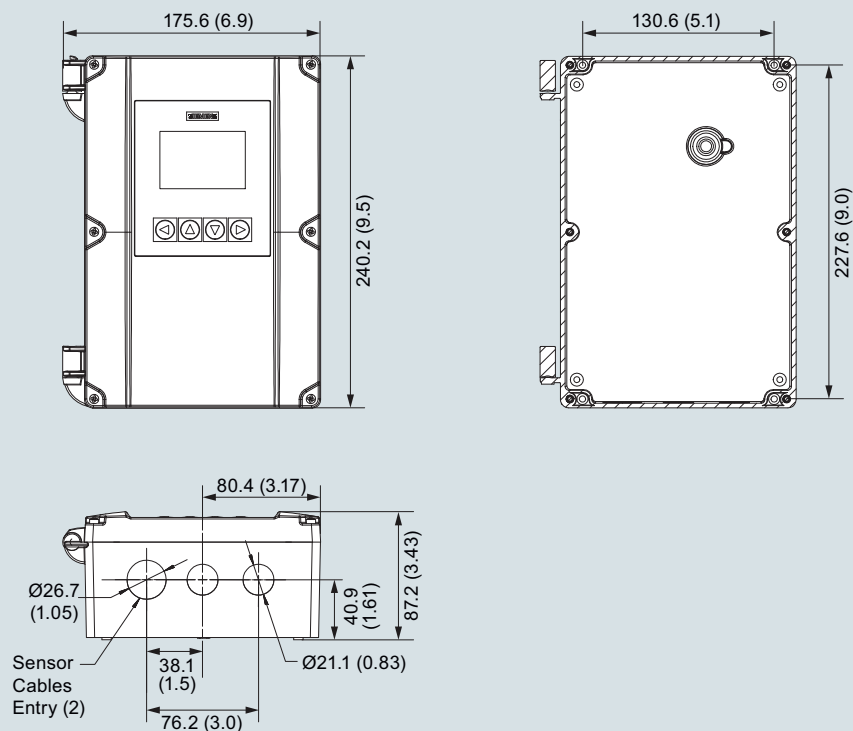
Function

- 240 x 160 pixel graphical display with 4 key navigation and backlight
- 6 user programmable views for individual process and diagnostic information
- Modbus RTU communication
- 100 Hz update rate for all primary process values
- Independent low flow cut-off settings for volume and flow velocity
- Fully compatible with Siemens PDM version 8.2 service pack 1 or higher
- Bidirectional flow operation
- Menus available in English and German

Technical specifications

Rangeability		Accuracy	
Flow range	±12 m/s (±40 ft/s), depending on pipe size higher or lower	For velocities above 0.3 m/s (1 ft/s), ±1.0 % of flow	
Flow direction	bi-directional	Repeatability	± 0.25 % (according to ISO 11631)
Flow sensitivity	0.001 m/s (0.003 ft/s) flow rate independent	Zero Drift	0.1 % of rate; < ±0.001 m/s (±0.003 ft/s)
Digital inputs		Data refresh rate	100 Hz
Totalizer Hold	Optically isolated diode Activated On: Input voltage: 2 ... 10 V DC	Transmitter conditions	
Totalizer Reset	Optically isolated diode Activated On: Input voltage: 2 ... 10 V DC	Operating temperature	-10 ... +50 °C (14 ... 122 °F)
Output Channel 1		Storage temperature	-20 ... +60 °C (-4 ... +140 °F)
Current	4 ... 20 mA (isolated) Externally powered 10 ... 30 V DC	Degree of protection	IP65, NEMA 4X
Relay	30 V DC, 3 V AC max.	Design	
Pulse rate	Optically isolated transistor 10 mA, 30 V DC max. Pulse: 41.6 ms ... 5 s pulse duration Frequency: 0 ... 12.5 kHz (50 % duty cycle)	Weight	1.4 kg (3.0 lb)
		Dimensions (W x H x D)	176 x 240 x 87 mm (6.9 x 9.5 x 3.4 inch)
		Enclosure material	Polycarbonate
		Power supply	
		100 ... 240 V AC @ 20 VA or 11.5 ... 28.5 V DC @ 10 W	
		Certificates and approvals	
		Unclassified locations	
		• General Safety	UL, ULc, CE

Dimensional drawings



SITRANS FST020 IP65 (NEMA 4X), wall mount enclosure, dimensions in mm (inch)

Flow Measurement

SITRANS F S Clamp-on

Ultrasonic flow transmitter SITRANS FST020, wall mount housing - Ordering data

Selection and Ordering data				Article No.	Ord. code
Transmitter SITRANS FST020 (Basic), IP65 (NEMA 4X)				7ME3570 -	40 - 0
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
Number of ultrasonic paths					
Single path				1	
Flowmeter functions and I/O configurations					
With display, keypad, 1x 4 ... 20 mA, 1x relay, 1x pulse/frequency, 2x digital input, Modbus RTU				J	
Power supply					
100 ... 240 V AC				A	
11.5 ... 28.5 V DC				B	
Sensor FSS200¹⁾					
When ordering a flow system, sensors always come automatically with suitable mounting equipment. Smaller sensor sizes A & B come with mounting tracks, while sensor sizes C, D & E are supplied with frames and spacer bars. 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" to find the most suitable sensors for specific pipe sizes and wall thicknesses.					
No sensor					A
For the following Universal sensors, temperature range is -40 ... +121 °C (-40 ... +250 °F), FSS200 Universal: select according to outer pipe diameter					
FSS 200 Universal	A2	12.7 ... 50 mm (0.5 ... 2")	Track mount and straps provided up to 75 mm (3")		B
FSS 200 Universal	B3	19 ... 127 mm (0.75 ... 5")	Track mount and straps provided up to 125 mm (5")		C
FSS 200 Universal	C3	51 ... 305 mm (2 ... 12")	Mounting frame, straps and spacer bar provided up to 330 mm (13")		D
FSS 200 Universal	D3	203 ... 610 mm (8 ... 24")	Mounting frame and straps and spacer bar provided up to 600 mm (24")		E
FSS 200 Universal	E2	304 ... 9144 mm (12 ... 360")	Mounting frame and straps and spacer bar provided up to 1200 mm (48")		F
For the following High Precision sensors T1, temperature range is -40 ... +120 °C (-40 ... +248 °F), FSS200 High Precision: select according to pipe wall thickness					
FSS200 HP	A1H	0.6 ... 1.0 mm (0.025 ... 0.4")	Track mount and straps provided up to 75 mm (3")		G
FSS200 HP	A2H	1.0 ... 1.5 mm (0.04 ... 0.06")	Track mount and straps provided up to 75 mm (3")		H
FSS200 HP	A3H	1.5 ... 2.0 mm (0.06 ... 0.08")	Track mount and straps provided up to 75 mm (3")		J
FSS200 HP	B1H	2.0 ... 3.0 mm (0.08 ... 0.12")	Track mount and straps provided up to 125 mm (5")		K
FSS200 HP	B2H	3.0 ... 4.1 mm (0.12 ... 0.16")	Track mount and straps provided up to 125 mm (5")		L
FSS200 HP	C1H	4.1 ... 5.8 mm (0.16 ... 0.23")	Mounting frame, straps and spacer bar provided up to 600 mm (24")		M
FSS200 HP	C2H	5.8 ... 8.1 mm (0.23 ... 0.32")	Mounting frame, straps and spacer bar provided up to 600 mm (24")		N
FSS200 HP	D1H	8.1 ... 11.2 mm (0.32 ... 0.44")	Mounting frame, straps and spacer bar provided up to 1200 mm (48") ¹⁾		P
FSS200 HP	D2H	11.2 ... 15.7 mm (0.44 ... 0.62")	Mounting frame, straps and spacer bar provided up to 1200 mm (48") ¹⁾		Q
FSS200 HP	D4H	15.7 ... 31.8 mm (0.62 ... 1.25")	Mounting frame, straps and spacer bar provided up to 1200 mm (48") ¹⁾		R
For the following High Temperature sensors, temperature range is -40 ... +230 °C (-40 ... +446 °F), FSS200 High Temperature: select according to outer diameter					
FSS200 HT	Size 2	30 ... 200 mm (1 ... 8")	Mounting track and straps provided up to 250 mm (10")	Z	P 1 A
FSS200 HT	Size 3	150 ... 610 mm (6 ... 24")	Mounting track and straps provided up to 650 mm (26")	Z	P 2 A
FSS200 HT	Size 4	400 ... 1200 mm (16 ... 48")	Mounting track and straps provided bar provided up to 1250 mm (50")	Z	P 3 A

Ultrasonic flow transmitter SITRANS FST020, wall mount housing - Ordering data

Selection and Ordering data	Article No.	Ord. code
Transmitter SITRANS FST020 (Basic), IP65 (NEMA 4X)	7ME3570 - 40 - 0	
Sensor cable (pair - terminated)		
No sensor cable		A
Sensor cable, HDPE jacket, submersible, length		P
• 5 m (16.4 ft)		Q
• 10 m (32.8 ft)		R
• 20 m (65.6 ft)		
Approvals		1
UL, ULc, CE		
1) Supplied spacer bar supports pipes up to 1050 mm (42"). For pipes larger than 1050 mm (42") purchase also, spare part 7ME3960-OMS40 (1012BN-4)		
2) Made of stainless steel construction.		

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Cable termination kit for customer supplied sensor cable pair	
Sensor cable termination for standard and plenum cable	T01
Mass storage	
Enable mass storage function or SD-card (not available for USA)	S30
Tag and name plates	
Tag plate, transmitter and sensor	Y19

MLFB example

Application example

A basic clamp-on meter is required for a DN 150 - 168.3 x 4.5 mm (6" schedule 40) carbon steel wastewater line. Meter electronics are to be located in an instrumentation shed with available AC power. 10 m (32 ft) of sensor cable is needed to reach pipe location.

MLFB Article No.: **7ME3570-1JA40-0MQ1**

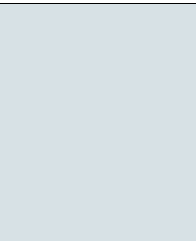









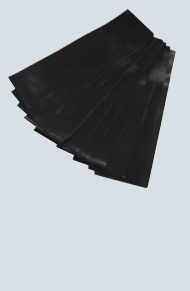
Selection and Ordering data	Article No.	Ord. code
SITRANS FST020 (Basic) IP65 (NEMA 4X)	7ME3570 - 40 - 0	
Single channel	1	
Standard I/O option	J	
100 ... 240 V AC power option	A	
Sensor FSS200 HP C1H		M
Sensor cable: HDPE jacket, submersible, length 10 m (32 ft)		Q
UL, ULc, CE		1

Flow Measurement





SITRANS F S Clamp-on


Ultrasonic flowmeter SITRANS FS220 - Accessories/Spare parts

Accessories/Spare parts for clamp-on ultrasonic flowmeters

Description	Article No.		Description	Article No.	
FSS200 Universal Sensors Selected for general purpose measurement. 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 for cost savings on applications where standard accuracy is sufficient.	7ME3950-...		Magnetic mounting frames Magnetic mounting frames are designed to simplify clamp-on sensor installation on pipelines 8 inches (DN 200) 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 FSS200 clamp-on family. Magnetic mounting frames are constructed in aluminum for a high level of durability. Ideal use on temporary installations.	7ME3960-0MD02	
FSS200 High Precision Sensors Selected for increased performance on steel pipes. They provide the highest accuracy achievable by the meters and therefore should be selected whenever higher accuracy / repeatability is required primarily based on pipe wall thickness.	7ME3950-...		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-...	
FSS200 High Temperature Sensors 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. Constructed in stainless steel. Connection junction box included.	7ME3950-...		Straps Used to fasten sensors or mounting frames to pipe for dedicated meter installations. Stainless steel construction for corrosion resistance.	7ME3960-...	
Mounting tracks Typically used on smaller pipes for easier and more stable mounting of dedicated universal style sensor size A or B; also available for dedicated high precision sensor size A or B.	7ME3960-...		Cable Gland Kit Cable gland kit for use with SITRANS FST020 transmitters housed in IP65 NEMA 4X wall mount enclosures. Kit contains two single port glands for power and one dual port gland for sensor cables.	A5E41693895	
Mounting Frames These items are useful in simplifying sensor installation. They are strapped to the pipe first and then the sensors are installed, making the installation less cumbersome and more precise. They also enable easy repeated mounting of the sensors assuring alignment 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-...		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-...	

Ultrasonic flowmeter SITRANS FS220 - Ordering data

Description	Article No.	
Termination Kit (Flow Sensors) Termination kit for one pair of sensor cables. These can be provided in cases where users will be purchasing bulk cable directly and cutting to length at site, or when existing cable length is to be altered. Selected by cable type.	7ME3960-...	
FST020 Transmitter module Main transmitter module for FST020 including SD-card and firmware load	A5E41693884	
FST020 Transmitter module cover AC Cover for FST020 Main transmitter module for AC powered units; includes label and screws	A5E41693888	
FST020 Transmitter module cover DC Cover for FST020 Main transmitter module for DC powered units; includes label and screws	A5E41693889	
FST020 Enclosure cover Enclosure lid for FST020; includes display module, connection label and screws	A5E38846901	
FST020 Power Supply AC Power supply module for FST020, AC power	7ML1830-1MD	
FST020 Power Supply DC Power supply module for FST020, DC power	7ML1830-1ME	
SensorFlash SD-card 4 GB micro SD card -40 °C ... +85 °C for FST020 or FST030 for data storage, firmware and back-up	A5E38288507	
Hardware kit Various nuts, screws, and grounding strap for FST020 transmitter	A5E41944763	
Sensor cable pair, 5 m Sensor cable for connection between FSS200 sensors and FST020 transmitter, 5 meters in length	A5E39669934 031	
Sensor cable pair, 10 m Sensor cable for connection between FSS200 sensors and FST020 transmitter, 10 meters in length	A5E39669934 032	

Description	Article No.	
Sensor cable pair, 20 m Sensor cable for connection between FSS200 sensors and FST020 transmitter, 20 meters in length	A5E39669934 033	
Enclosure mounting kit Mounting kit to fix enclosure on a 2" stanchion pipe	QCB: 1012NMB-1	

Flow Measurement

SITRANS F S Clamp-on

Ultrasonic flowmeter SITRANS FS220 - Ordering data

Selection and Ordering data	Article No.	Selection and Ordering data	Article No.
<i>Spare parts (FSS200 sensors)</i>		<i>Spare parts (Miscellaneous)</i>	
SITRANS F US clamp-on	7ME3950-5	SITRANS F US clamp-on	7ME3960-
Temperature range for all sensors is unless otherwise noted -40 °C ... +120 °C (-40 °F ... +248 °F)		↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Ideal operating temperatures as follows:		Dedicated sensor mounting hardware	
T1: -40 ... +80 °C (-40 ... +176 °F)	0	Sensor mounting tracks (dual part aluminum with mounting straps) for pipes < 125 mm (5 inch)	
T2: 80 ... 121 °C (176 ... 250 °F)	2	<ul style="list-style-type: none"> Tracks for Universal sensor pair size A or B 	0MA00
Spare sensor code (Stainless steel construction)		<ul style="list-style-type: none"> Tracks for High precision sensor pair size A or B 	0MB00
<u>Liquid flow sensors for use with mounting frames or tracks</u>		Sensor mounting frames pair with mounting straps	
FSS200 A2 universal	LB01	<ul style="list-style-type: none"> Frames for Universal sensor size B (for pipes > 125 mm (5 inch)) 	CQO:1012FN-PB
FSS200 B3 universal	LC01	<ul style="list-style-type: none"> Frames for Universal sensor size C 	0MC00
FSS200 C3 universal	LD00	<ul style="list-style-type: none"> Frames for Universal sensor size D 	0MC01
FSS200 D3 universal	LE00	<ul style="list-style-type: none"> Frames for Universal sensor size E 	0MC02
FSS200 E2 universal	LF00	<ul style="list-style-type: none"> Frames for High precision sensor size B (for pipes > 125 mm (5 inch)) 	CQO:1012FNH-PB
FSS200 A1H (high precision)	LG01	<ul style="list-style-type: none"> Frames for High precision sensor size C 	0MD00
FSS200 A2H (high precision)	LH01	<ul style="list-style-type: none"> Frames for High precision sensor size D 	0MD01
FSS200 A3H (high precision)	LJ01	Mounting straps for mounting frames (slotted stainless steel)	
FSS200 B1H (high precision)	GK1	<ul style="list-style-type: none"> Straps for pipes from DN 50 to DN 150 	0SM00
FSS200 B2H (high precision)	GL1	<ul style="list-style-type: none"> Straps for pipes from DN 50 to DN 300 	0SM10
FSS200 B3H (high precision)	GT1	<ul style="list-style-type: none"> Straps for pipes from DN 300 to DN 600 	0SM20
FSS200 C1H (high precision)	GM0	<ul style="list-style-type: none"> Straps for pipes from DN 600 to DN 1200 	0SM30
FSS200 C2H (high precision)	GN0	<ul style="list-style-type: none"> Straps for pipes from DN 1200 to DN 1500 	0SM40
FSS200 D1H (high precision)	GP0	<ul style="list-style-type: none"> Straps for pipes from DN 1500 to DN 2100 	0SM50
FSS200 D2H (high precision)	GQ0	<ul style="list-style-type: none"> Straps for pipes from DN 2100 to DN 3000 	0SM60
FSS200 D3H (high precision)	GU0	Spacer bars (for indexing sensors on pipe)	
FSS200 D4H (high precision)	GR0	<ul style="list-style-type: none"> Spacer bar for pipes to 200 mm/8 inch (liquid), 600 mm/24 inch (gas) 	0MS10
<u>High temperature universal liquid sensors up to 230 °C (446 °F)</u>		<ul style="list-style-type: none"> Spacer bar for pipes to 500 mm/20 inch (liquid), DN 1200/48 inch (gas) 	0MS20
FSS200 High temp. sensor size 1 for 12.7 to 100 mm diam.	LA13	<ul style="list-style-type: none"> Spacer bar for pipes to 800 mm/32 inch (liquid) 	0MS30
FSS200 High temp. sensor size 2 for 30 to 200 mm diam.	LA23	<ul style="list-style-type: none"> Spacer bar-extension for pipes to 1200 mm/ 48 inch (liquid) Only use in conjunction with 7ME3960-0MS30 	0MS40
FSS200 High temp. sensor size 3 for 150 to 600 mm diam.	LA43	High precision mounting enclosures. Spacer bar is included; straps should be ordered separately	
FSS200 High temp. sensor size 4 for 400 to 1200 mm diam.	LA73	<ul style="list-style-type: none"> Stainless steel mounts for high precision size "C" sensor pair, single enclosure (each) 	0WS50
		<ul style="list-style-type: none"> Stainless steel mounts for high precision size "D/E" sensor pair, single enclosure (each) 	0WS60
		<ul style="list-style-type: none"> Stainless steel mounts for high precision size "C" sensor pair, dual enclosure (pair) 	0WD50
		<ul style="list-style-type: none"> Stainless steel mounts for high precision size "D/E" sensor pair, dual enclosure (pair) 	0WD60

Selection and Ordering data	Article No.
<i>Spare parts (Miscellaneous)</i>	
SITRANS F US clamp-on	7ME3960 -
Stainless steel straps for weld seal enclosure mounting (2 x required for dual enclosures)	
Mounting strap for pipe diameter to 300 mm (13 inch)	0SM01
Mounting strap for pipe diameter to 600 mm (24 inch)	0SM11
Mounting strap for pipe diameter to 1200 mm (48 inch)	0SM21
Mounting strap for pipe diameter to 1500 mm (60 inch)	0SM31
Mounting strap for pipe diameter to 2130 mm (84 inch)	0SM41
Mounting strap for pipe diameter to 3050 mm (120 inch)	0SM51
Stainless mounting tracks for High temp. 991 sensors, with straps, dual part for direct and reflect mount, incl. straps	
Size 1 high temp sensor pair	CQO:992MTNHMSH-1
Size 2 high temp sensor pair	CQO:992MTNHMSH-2
Size 3 high temp sensor pair	CQO:992MTNHMSH-3
Size 4 high temp sensor pair	CQO:992MTNHMSH-4
Sensor cables FSS220 (IP65 NEMA 4X) wall mount	
Sensor cable pair, terminated, 5 m	A5E39669934031
Sensor cable pair, terminated, 10 m	A5E39669934032
Sensor cable pair, terminated, 20 m	A5E39669934033
Dedicated cable termination kits	
For externally supplied sensor cables, standard and plenum	0CT01
Cable gland kit (normally supplied with transmitter) for IP65 NEMA 4X enclosures	
	A5E41693895
Ultrasonic couplant	
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
Universal Sensor Test Blocks	
Test block for size A and B universal sensors	0TB10
Test block for size C and D universal sensors	0TB20

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

Article No.

Thickness gauge

7ME3951-0TG20

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

- 2-wire technology with HART communication
- Integrated temperature compensation for saturated steam as standard feature
- Integrated temperature and pressure compensation enabling direct measurement of mass, standard volume flow rate and energy
- One instrument for measuring pressure, temperature and flow. No additional installation of pressure and temperature sensors
- Maximum process reliability thanks to Intelligent Signal Processing (ISP) - stable readings, free of external disturbances
- Fully welded stainless steel construction with high corrosion, pressure and temperature resistance
- Maintenance-free design
- Ready to use due to plug & play feature
- Minimal pressure drop
- Compact or remote design
- Free Air Delivery (FAD) measurement of a compressor






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
- Pulp & paper
- Water & waste water

System Overview

Version	Flange	Sandwich	Dual transmitter
Compact			
Remote			

Design

SITRANS FX300 vortex flowmeters are available in the following variants:

SITRANS FX300 Single transmitter

The single transmitter variant exists in flange or sandwich design. In flange design the SITRANS FX300 offers a sensor with integrated nominal diameter reduction up to two nominal diameter sizes. That ensures best results in accuracy and optimal measuring ranges even in pipelines with large diameters, designed for low pressure loss. By forgoing complex pipeline reduction installations, space and cost saving installations can be realized. At the same time the number of potential leakages is reduced to a minimum.

The flowmeters in sandwich design will be supplied with additional optimised centring rings. With installation of the centring rings the SITRANS FX300 can be aligned centrally and eliminates any offset between the sensor and the pipeline.

The SITRANS FX300 is also available as a remote version. This feature allows separating the transmitter from the sensor up to a distance of 15m (49 ft). The remote mounted transmitter allows easy operation and optimal readability.

Flow Measurement

SITRANS F X

SITRANS FX300

The following configurations can be selected for the single transmitter variant:

- **Basic version**
Suitable for liquids and gases, integrated temperature compensation included as standard for saturated steam
- **With integrated pressure compensation**
Version with integrated temperature and pressure compensation for gases, wet gases, gas mixtures or steam (energy measurement optional)
- **With integrated pressure compensation and isolation valve**
Allowing the pressure sensor to be shut off for the purpose of pressure and leak testing of the pipeline or for being exchanged without interrupting the process.
- **Remote version**
With this version transmitter and sensor are locally separated. In addition, it offers the same the features as the compact version (integrated temperature and pressure compensation, isolation valve).

SITRANS FX300 Dual transmitter

This is a genuine redundant system with two independent sensors and transmitters providing twofold functional reliability and availability of the measurement. This variant is optimally suited for measurements in multi-product pipelines.

The dual transmitter version is available as:

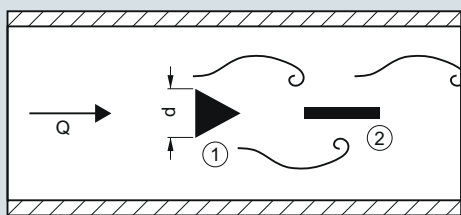
- **Basic version**
Suitable for liquids and gases, temperature compensation integrated as standard for saturated steam

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 derived from the Karman phenomenon of vortex shedding. 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 sensor placed downstream of the bluff body. The stress is detected by piezo-electric crystals placed inside the pick-up sensor.



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)

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, setting pulse value (meter factor) for totalized flow or heat quantity (energy) with option Y47 (e.g.: 1 pulse/kg or 1 pulse/kWh)	
• 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

Software		Design	
Uncompensated for liquids and gases, density-compensated by temperature for saturated steam	Order option 1	Material	AISI 316L (1.4404)/ AISI 316L (1.4435)
Density-compensated by temperature and pressure for superheated steam	Order option 4	• Sensor/Pick-up	Hastelloy C22/2.4602 available on request (contact your local Siemens representative)
Gross heat meter		• Transmitter housing	Aluminum
When the thermal energy of steam is to be measured	Order option 5	• Sensor gaskets (Pick-up/Pressure sensor)	AISI 316L (1.4435) / FPM or FFKM
Following information is required at option Y51 to Y56	<ul style="list-style-type: none"> • Y51 Variable current output: Flow rate, power • Y52 Power unit Select one of the following units: kJ/h, MJ/h, GJ/h, Btu/h, kcal/h, kW, MW or special (custom) • Y53 Fullscale value power • Y54 Variable pulse output: Totalized flow, energy • Y55 Totalizer on/off • Y56 Energy unit Select one of the following units: kJ, MJ, GJ, Btu th, kcal, kWh, MWh or special (custom). 	Process connections	FPM (Viton) for steam and non-aggressive gases. FFKM (Kalrez) for chlorine and other aggressive gases. (The meter is fitted with FPM/FFKM gasket only when configured with pressure sensor)
Density compensated by temperature and pressure for gases, wet gases	Order option 7	• Flange version	Flange norm EN 1092-1 form B1/B2 or ANSI B16.5 RF.
Wet gases	Select Y49 and enter relative humidity of process medium in %	• Sandwich version	Other flanges on request (contact your local Siemens representative)
FAD - Free Air Delivery		Degree of protection	DN 15 ... 300 (½ ... 12") DN 15 ... 100 (½ ... 4")
When the delivered air of a compressor is to be measured	Order option 8	Dimensions and weights	IP66/IP67 See "Dimensional Drawings"
In Y81 to Y87 add information regarding:	<ul style="list-style-type: none"> • Y81 Inlet suction temperature • Y82 Atmospheric pressure • Y83 Pressure drop at inlet suction filter • Y84 Inlet relative humidity • Y85 Actual compressor rotation (rpm) • Y86 Rated compressor rotation (rpm) • Y87 Relative humidity at compressor output 	Display and operating interface	
Mixed gases	When fluid is a gas mixture, specify the single gas components and their amount/concentration in %.	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 and dye penetration test on pressure bearing weldings
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 dimensioning		
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)		

Flow Measurement

SITRANS F X

SITRANS FX300

Valid combinations of sensor/connections size with flange norm/nominal pressure are shown in the following table.

Sensor size	Connection size	EN 1092-1, Form B1/B2, PN 10	EN 1092-1, Form B1/B2, PN 16	EN 1092-1, Form B1/B2, PN 25	EN 1092-1, Form B1/B2, PN 40	EN 1092-1, Form B1/B2, PN 63	EN 1092-1, Form B1/B2, PN 100	ANSI B16.5, class 150	ANSI B16.5, class 300	ANSI B16.5, class 600
SITRANS FX Flanged - Single transmitter (7ME2600-...)										
DN 15	DN 15	-	-	-	●	-	●	●	●	●
	DN 25	-	-	-	●	-	●	●	●	●
	DN 40	-	-	-	●	-	●	●	●	●
DN 25	DN 25	-	-	-	●	-	●	●	●	●
	DN 40	-	-	-	●	-	●	●	●	●
	DN 50	-	●	-	●	●	●	●	●	●
DN 40	DN 40	-	-	-	●	-	●	●	●	●
	DN 50	-	●	-	●	●	●	●	●	●
	DN 80	-	●	-	●	●	●	●	●	●
DN 50	DN 50	-	●	-	●	●	●	●	●	●
	DN 80	-	●	-	●	●	●	●	●	●
	DN 100	-	●	-	●	●	●	●	●	●
DN 80	DN 80	-	●	-	●	●	●	●	●	●
	DN 100	-	●	-	●	●	●	●	●	●
	DN 150	-	●	-	●	●	●	●	●	●
DN 100	DN 100	-	●	-	●	●	●	●	●	●
	DN 150	-	●	-	●	●	●	●	●	●
	DN 200	●	●	●	●	-	-	●	●	-
DN 150	DN 150	-	●	-	●	●	●	●	●	●
	DN 200	●	●	●	●	-	-	●	●	-
	DN 250	●	●	●	●	-	-	●	●	-
DN 200	DN 200	●	●	●	●	-	-	●	●	-
	DN 250	●	●	●	●	-	-	●	●	-
	DN 300	●	●	●	●	-	-	●	●	-
DN 250	DN 250	●	●	●	●	-	-	●	●	-
	DN 300	●	●	●	●	-	-	●	●	-
DN 300	DN 300	●	●	●	●	-	-	●	●	-

● available
- not available

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 -	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.				Approval and cable gland			
Sensor size	Connection size			Non-Ex, M20 x 1.5		1	
DN 15 (1/2")	DN 15 (1/2")	1 A		Non-Ex, 1/2" NPT		2	
	DN 25 (1")	1 B		FM approval Class 1 Div. 2, M20 x 1.5		3	
	DN 40 (1 1/2")	1 C		ATEX, M20 x 1.5		4	
DN 25 (1")	DN 25 (1")	2 B		ATEX, 1/2" NPT		5	
	DN 40 (1 1/2")	2 C		FM approval Class 1 Div. 1, M20 x 1.5		6	
	DN 50 (2")	2 D		FM approval Class 1 Div. 1, 1/2" NPT		7	
DN 40 (1 1/2")	DN 40 (1 1/2")	2 K		FM approval Class 1 Div. 2, 1/2" NPT		8	
	DN 50 (2")	2 L		<u>Further approvals and cable glands</u>			
	DN 80 (3")	2 M		IEC Ex with M20 x 1.5		9	N 0 A
DN 50 (2")	DN 50 (2")	2 R		IEC Ex with 1/2" NPT		9	N 0 B
	DN 80 (3")	2 S		Transmitter, display and communication			
	DN 100 (4")	2 T		With display, HART		A	
DN 80 (3")	DN 80 (3")	3 L		Pressure sensor and isolation valve			
	DN 100 (4")	3 M		Without pressure sensor		A	
	DN 150 (6")	3 R		With pressure sensor, range:			
DN 100 (4")	DN 100 (4")	3 S		4 bar (58 psi)		B	
	DN 150 (6")	3 T		6 bar (87 psi)		D	
	DN 200 (8")	3 Q		10 bar (145 psi)		E	
DN 150 (6")	DN 150 (6")	4 M		16 bar (232 psi)		G	
	DN 200 (8")	4 P		25 bar (363 psi)		H	
	DN 250 (10")	4 Q		40 bar (580 psi)		K	
DN 200 (8")	DN 200 (8")	4 T		60 bar (870 psi)		L	
	DN 250 (10")	4 U		100 bar (1450 psi)		N	
	DN 300 (12")	4 V		With isolation valve and pressure sensor, range:			
DN 250 (10")	DN 250 (10")	4 W		4 bar (58 psi)		P	
	DN 300 (12")	4 Y		6 bar (87 psi)		Q	
DN 300 (12")	DN 300 (12")	5 E		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	
Flange norm and nominal pressure				Software			
Form B1/B2	EN 1092-1			Uncompensated for liquids and gases, density compensated by temperature for saturated steam		1	
PN 10	DN 200 ... 300	A		Density compensation for superheated steam		4	
PN 16	DN 50 ... 300	B		Density compensated by temperature and pressure for superheated steam, gross heat meter - setting of energy metering at option Y51 ... Y56		5	
PN 25	DN 200 ... 300	C		Density compensation for gases, wet gases and mixed gases - setting of relative humidity at option Y49		7	
PN 40	DN 15 ... 300	D		Density compensation for gases, wet gases and mixed gases, Free air delivery (FAD) - setting of FAD at option Y81 ... Y87 and relative humidity at option Y49		8	
PN 63	DN 50 ... 150	E					
PN 100	DN 15 ... 150	F					
RF	ANSI B16.5						
class 150	1/2 ... 12"	J					
class 300	1/2 ... 12"	K					
class 600	1/2 ... 6"	L					
Sensor material/Gasket							
St. steel AISI 316L (1.4404)/AISI 316L (1.4435)/FPM			1				
St. steel AISI 316L (1.4404)/AISI 316L (1.4435)/FFKM			5				
Transmitter design							
Compact version - no cable			1				
Remote version:							
5 m (16.4 ft)			2				
10 m (32.8 ft)			3				
15 m (49.2 ft)			4				

Flow Measurement

SITRANS F X

SITRANS FX300

Selection and Ordering data

Selection and Ordering data	Order code
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 medium (Liquid, gas, steam or customer-specific)	Y40
Temperature: Specify operating temperature with unit	Y41
Pressure: Specify operating pressure with unit	Y42
Density (only for customer-specified medium): Specify density with unit	Y43
Viscosity (only for customer-specified medium): Specify viscosity with unit	Y44
Flow rate: Specify max. flow rate with units	Y45
Setting of pulse output: Specify pulse value (meter factor) for totalized flow or energy (1 pulse/unit)	Y47
Relative humidity of process medium in %	Y49
Settings of gross heat	
Variable current output: Flow rate, power	Y51
Power unit (specify: kJ/h, MJ/h, GJ/h, Btu/h, kcal/h, kW, MW or special (custom))	Y52
Fullscale value power	Y53
Variable pulse output: Totalized flow, energy	Y54
Totalizer on/off	Y55
Energy unit (specify: kJ, MJ, GJ, Btu th, kcal, kWh, MWh or special (custom))	Y56
Settings of FAD	
Inlet suction temperature ¹⁾	Y81
Atmospheric pressure ¹⁾	Y82
Pressure drop at inlet suction filter ²⁾	Y83
Inlet relative humidity ¹⁾	Y84
Actual compressor rotation (rpm) ²⁾	Y85
Rated compressor rotation (rpm) ²⁾	Y86
Relative humidity at compressor outlet ²⁾	Y87

¹⁾ Required information from customer.

²⁾ Required information from compressor manufacturer (data sheet).

Operating instructions

Description	Article No.
English	A5E2100423
German	A5E02171807

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Selection and Ordering data

Selection and Ordering data	Order code
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 of pressure bearing 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 of pressure bearing parts + PMI + certificate 3.1	C15
Calibration certificate FX300	
As standard the flow device has a 3-point calibration certificate.	
5-point calibration certificate	D11
Hardness test	
Hardness test on pressure bearing parts + certificate 3.1	H30
Cleaning	
Cleaning class 1	K46
Cleaning class 1 + certificate 3.1 acc. 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	Selection and Ordering data		Article No.	Ord. code
SITRANS FX300 Sandwich Single transmitter and T_{max} = 240 °C (464 °F)		7ME2700 -		SITRANS FX300 Sandwich Single transmitter and T_{max} = 240 °C (464 °F)		7ME2700 -	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.				Pressure sensor and isolation valve			
Sensor size	Connection size			Without pressure sensor		A	
DN 15 (½")	DN 15 (½")	1 A		With pressure sensor, range:		B	
DN 25 (1")	DN 25 (1")	2 B		4 bar (58 psi)		D	
DN 40 (1½")	DN 40 (1½")	2 K		6 bar (87 psi)		E	
DN 50 (2")	DN 50 (2")	2 R		10 bar (145 psi)		G	
DN 80 (3")	DN 80 (3")	3 L		16 bar (232 psi)		H	
DN 100 (4")	DN 100 (4")	3 S		25 bar (363 psi)		K	
				40 bar (580 psi)		L	
				60 bar (870 psi)		N	
				100 bar (1450 psi)			
Nominal pressure				With isolation valve and pressure sensor, range:		P	
Form B1/B2	EN 1092-1			4 bar (58 psi)		Q	
PN 16	DN 50 ... 100	B		6 bar (87 psi)		R	
PN 40	DN 15 ... 100	D		10 bar (145 psi)		S	
PN 63	DN 50 ... 100	E		16 bar (232 psi)		U	
PN 100	DN 15 ... 100	F		25 bar (363 psi)		V	
RF	ANSI B16.5			40 bar (580 psi)		W	
class 150	½ ... 4"	J		60 bar (870 psi)		Y	
class 300	½ ... 4"	K					
class 600	½ ... 4"	L					
Sensor material/Gasket				Software			
St. steel AISI 316L (1.4404)/AISI 316L (1.4435)/FPM		1		Uncompensated for liquids and gases, density compensated by temperature for saturated steam		1	
St. steel AISI 316L (1.4404)/AISI 316L (1.4435)/FFKM		5		Density compensation for superheated steam		4	
Transmitter design				Density compensated by temperature and pressure for superheated steam, gross heat meter - setting of energy metering at option Y51 ... Y56		5	
Compact version - no cable		1		Density compensation for gases, wet gases and mixed gases - setting of relative humidity at option Y49		7	
Remote version:				Density compensation for gases, wet gases and mixed gases, Free air delivery (FAD) - setting of FAD at option Y81 ... Y87 and relative humidity at option Y49		8	
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 O A				
IEC Ex with ½" NPT		9	N O B				
Transmitter, display and communication							
With display, HART			A				

Flow Measurement

SITRANS F X

SITRANS FX300

Selection and Ordering data	Order code
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 medium (Liquid, gas, steam or customer-specific)	Y40
Temperature: Specify operating temperature with unit	Y41
Pressure: Specify operating pressure with unit	Y42
Density (only for customer-specified medium): Specify density with unit	Y43
Viscosity (only for customer-specified medium): Specify viscosity with unit	Y44
Flow rate: Specify max. flow rate with units	Y45
Setting of pulse output: Specify pulse value (meter factor) for totalized flow or energy (1 pulse/unit)	Y47
Relative humidity of process medium in %	Y49
Settings of gross heat	
Variable current output: Flow rate, power	Y51
Power unit (specify: kJ/h, MJ/h, GJ/h, Btu/h, kcal/h, kW, MW or special (custom))	Y52
Fullscale value power	Y53
Variable pulse output: Totalized flow, energy	Y54
Totalizer on/off	Y55
Energy unit (specify: kJ, MJ, GJ, Btu th, kcal, kWh, MWh or special (custom))	Y56
Settings of FAD	
Inlet suction temperature ¹⁾	Y81
Atmospheric pressure ¹⁾	Y82
Pressure drop at inlet suction filter ²⁾	Y83
Inlet relative humidity ¹⁾	Y84
Actual compressor rotation (rpm) ²⁾	Y85
Rated compressor rotation (rpm) ²⁾	Y86
Relative humidity at compressor outlet ²⁾	Y87

¹⁾ Required information from customer.

²⁾ Required information from compressor manufacturer (data sheet).

Operating instructions

Description	Article No.
English	A5E2100423
German	A5E02171807

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Selection and Ordering data	Order code
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 of pressure bearing 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 of pressure bearing parts + PMI + certificate 3.1	C15
Calibration certificate FX300 As standard the flow device has a 3-point calibration certificate.	
5-point calibration certificate	D11
Hardness test	
Hardness test on pressure bearing parts + certificate 3.1	H30
Cleaning	
Cleaning class 1	K46
Cleaning class 1 + certificate 3.1 acc. 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-	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			
Sensor size	Connection size		
DN 40 (1½")	DN 40 (1½")	2 K	
DN 50 (2")	DN 50 (2")	2 R	
DN 80 (3")	DN 80 (3")	3 L	
DN 100 (4")	DN 100 (4")	3 S	
DN 150 (6")	DN 150 (6")	4 M	
DN 200 (8")	DN 200 (8")	4 T	
DN 250 (10")	DN 250 (10")	4 W	
DN 300 (12")	DN 300 (12")	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	ANSI B16.5		
class 150	1½ ... 12"	J	
class 300	1½ ... 12"	K	
class 600	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 liquids and gases, density-compensated by temperature for saturated steam			1

Selection and Ordering data	Order code
-----------------------------	------------

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

Specify medium (Liquid, gas, steam or customer-specific)	Y40
Temperature: Specify operating temperature with unit	Y41
Pressure: Specify operating pressure with unit	Y42
Density (only for customer-specified medium): Specify density with unit	Y43
Viscosity (only for customer-specified medium): Specify viscosity with unit	Y44
Flow rate: Specify max. flow rate with units	Y45
Setting of pulse output: Specify pulse value (meter factor) for totalized flow (1 pulse/unit)	Y47
Relative humidity of process medium in %	Y49

Operating instructions for SITRANS FX300

Description	Article No.
English	A5E2100423
German	A5E02171807

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Selection and Ordering data	Order code
-----------------------------	------------

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 of pressure bearing 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 of pressure bearing parts + PMI + certificate 3.1	C15

Calibration certificate FX300

As standard the flow device has a 3-point calibration certificate.

5-point calibration certificate	D11
---------------------------------	------------

Hardness test

Hardness test on pressure bearing parts + certificate 3.1	H30
---	------------

Cleaning

Cleaning class 1	K46
Cleaning class 1 + certificate 3.1 acc. 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

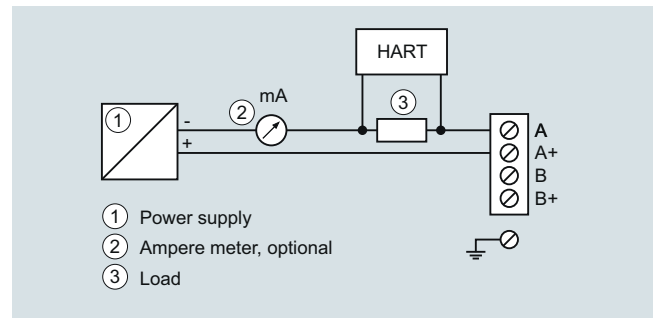
SITRANS F X

SITRANS FX300

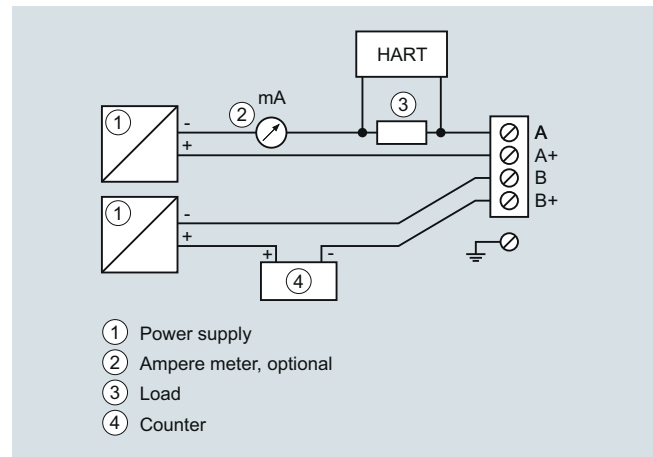
SITRANS FX300 spare parts

Description	Article No.	
Electronic <ul style="list-style-type: none"> • Basic D-HART • Steam D-HART • Gas D-HART Serial number of flow meter must be specified on order.	A5E02181531 A5E02181541 A5E02181544 A5E02181544	
Display	A5E02181558	
Sensor replacement (incl. seal disc, pickup, O-rings for pickup, and pressure screw) <ul style="list-style-type: none"> • DN 15 (incl. 1/2" socket) • DN 25 (incl. 1" socket) • DN 40 ... 100 • DN 150 ... 300 	A5E02181087 A5E02181116 A5E02181152 A5E02275105	
Pressure sensor replacement (Incl. pressure sensor, DUBOX plug, 2 O-rings and calibration certificate) <ul style="list-style-type: none"> • 4 bar (58 psi) • 6 bar (87 psi) • 10 bar (145 psi) • 16 bar (232 psi) • 25 bar (363 psi) • 40 bar (580 psi) • 60 bar (870 psi) • 100 bar (1450 psi) 	A5E02181157 A5E02181175 A5E02181180 A5E02181221 A5E02181307 A5E02181316 A5E02181322 A5E02181437	
Service Toolbox for programming software (basic, steam and gas); for changing settings and diagnostics Note: Dedicated service training is required. Please contact Customer Support.	A5E02375819	
Connection cable for remote mounting <ul style="list-style-type: none"> • 15 m (49 ft) 	A5E36832003	

Schematics



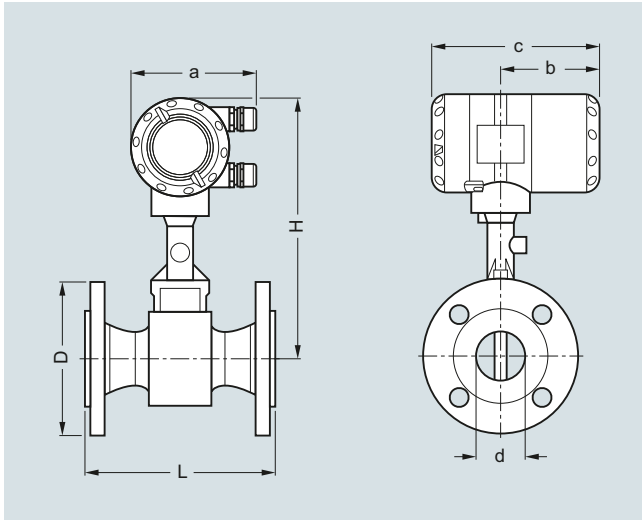
Connection power supply and HART communication



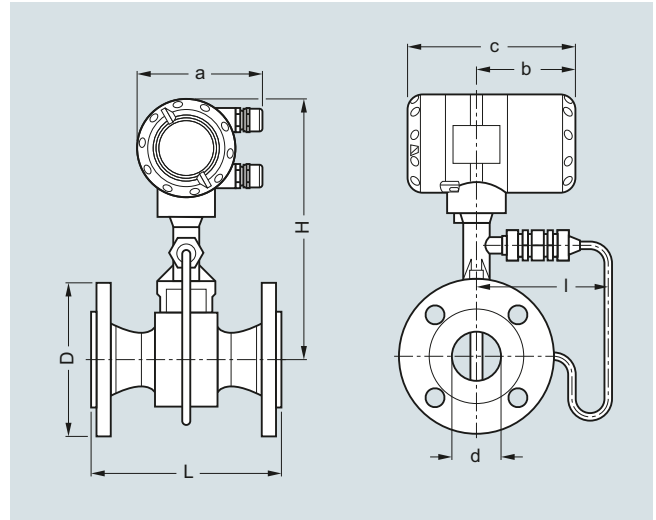
Connection pulse output

Dimensional drawings

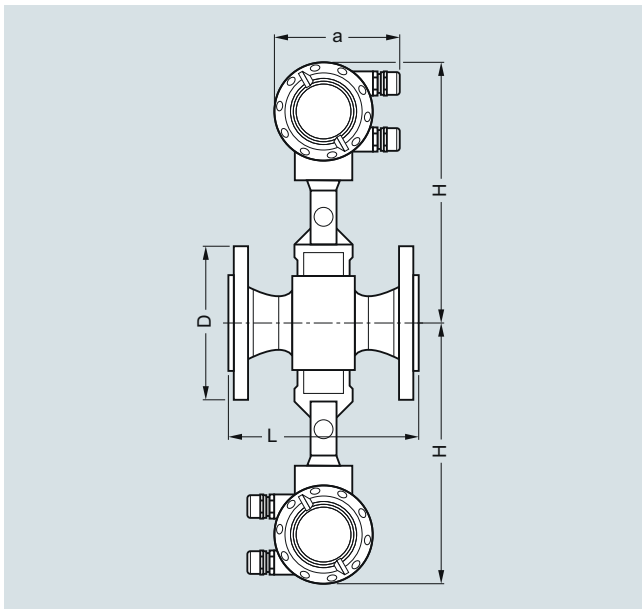
Compact version



Flange version



Flange version with pressure sensor



Flange version, dual converter

Flow Measurement

SITRANS F X

SITRANS FX300

Flange version EN1092-1

Size DN	Pres- sure rating PN	Dimensions [mm (inch)] a = 135 (5.32), b = 108 (4.26), c = 184 (7.25)							Weight [kg (lb)] ¹⁾	
		d	d FR ²⁾	d F2R ³⁾	D	L	H	I	Flowmeter (without pres- sure sensor)	Flowmeter (with pressure sensor)
15	40	17.3 (0.68)	-	-	95 (3.74)	200 (7.87)	315 (12.40)	144 (5.67)	5.5 (12.13)	6.1 (13.45)
15	100	17.3 (0.68)	-	-	105 (4.13)	200 (7.87)	315 (12.40)	144 (5.67)	6.5 (14.33)	7.1 (15.65)
25	40	28.5 (1.12)	17.3 (0.68)	-	115 (4.53)	200 (7.87)	315 (12.40)	144 (5.67)	7.3 (16.09)	7.9 (17.42)
25	100	28.5 (1.12)	17.3 (0.68)	-	140 (5.51)	200 (7.87)	315 (12.40)	144 (5.67)	9.3 (20.50)	9.9 (21.83)
40	40	43.1 (1.70)	28.5 (1.12)	17.3 (0.68)	150 (5.91)	200 (7.87)	320 (12.60)	144 (5.67)	10.2 (22.49)	10.8 (23.81)
40	100	42.5 (1.67)	28.5 (1.12)	17.3 (0.68)	170 (6.69)	200 (7.87)	320 (12.60)	144 (5.67)	14.2 (31.31)	14.8 (32.63)
50	16	54.5 (2.15)	42.5 (1.67)	28.5 (1.12)	165 (6.50)	200 (7.87)	325 (12.80)	144 (5.67)	12.1 (26.68)	12.7 (28.00)
50	40	54.5 (2.15)	42.5 (1.67)	28.5 (1.12)	165 (6.50)	200 (7.87)	325 (12.80)	144 (5.67)	12.3 (27.12)	12.9 (28.44)
50	63	54.5 (2.15)	42.5 (1.67)	28.5 (1.12)	180 (7.09)	200 (7.87)	325 (12.80)	144 (5.67)	16.3 (35.94)	16.9 (37.26)
50	100	53.9 (2.12)	42.5 (1.67)	28.5 (1.12)	195 (7.68)	200 (7.87)	325 (12.80)	144 (5.67)	17.8 (39.24)	18.4 (40.57)
80	16	82.5 (3.25)	54.5 (2.15)	42.5 (1.67)	200 (7.87)	200 (7.87)	340 (13.39)	154 (6.06)	16.8 (37.04)	17.4 (38.36)
80	40	82.5 (3.25)	54.5 (2.15)	42.5 (1.67)	200 (7.87)	200 (7.87)	340 (13.39)	154 (6.06)	18.8 (41.45)	19.4 (42.77)
80	63	81.7 (3.22)	54.5 (2.15)	42.5 (1.67)	215 (8.46)	200 (7.87)	340 (13.39)	154 (6.06)	22.8 (50.27)	23.4 (51.59)
80	100	80.9 (3.19)	54.5 (2.15)	42.5 (1.67)	230 (9.06)	200 (7.87)	340 (13.39)	154 (6.06)	26.8 (59.08)	27.4 (60.41)
100	16	107.1 (4.22)	80.9 (3.19)	54.5 (2.15)	220 (8.66)	250 (9.84)	360 (14.17)	164 (6.46)	21.4 (47.18)	22 (48.50)
100	40	107.1 (4.22)	80.9 (3.19)	54.5 (2.15)	235 (9.25)	250 (9.84)	360 (14.17)	164 (6.46)	24.4 (53.79)	25 (55.12)
100	63	106.3 (4.19)	80.9 (3.19)	54.5 (2.15)	250 (9.84)	250 (9.84)	360 (14.17)	164 (6.46)	29.4 (64.82)	30 (66.14)
100	100	104.3 (4.11)	80.9 (3.19)	54.5 (2.15)	265 (10.43)	250 (9.84)	360 (14.17)	164 (6.46)	35.4 (78.04)	36 (79.37)
150	16	159.3 (6.27)	107.1 (4.22)	80.9 (3.19)	285 (11.22)	300 (11.81)	375 (14.76)	174 (6.85)	35.2 (77.60)	35.8 (78.93)
150	40	159.3 (6.27)	107.1 (4.22)	80.9 (3.19)	300 (11.81)	300 (11.81)	375 (14.76)	174 (6.85)	41.2 (90.83)	41.8 (92.15)
150	63	157.1 (6.19)	107.1 (4.22)	80.9 (3.19)	345 (13.58)	300 (11.81)	375 (14.76)	174 (6.85)	59.2 (130.51)	59.8 (131.84)
150	100	154.1 (6.07)	107.1 (4.22)	80.9 (3.19)	355 (13.98)	300 (11.81)	375 (14.76)	174 (6.85)	67.2 (148.15)	67.8 (149.47)
200	10	206.5 (8.13)	159.3 (6.27)	107.1 (4.22)	340 (13.39)	300 (11.81)	400 (15.75)	194 (7.64)	37.8 (83.33)	38.4 (84.66)
200	16	206.5 (8.13)	159.3 (6.27)	107.1 (4.22)	340 (13.39)	300 (11.81)	400 (15.75)	194 (7.64)	37.8 (83.33)	38.4 (84.66)
200	25	206.5 (8.13)	159.3 (6.27)	107.1 (4.22)	360 (14.17)	300 (11.81)	400 (15.75)	194 (7.64)	46.8 (103.18)	47.4 (104.50)
200	40	206.5 (8.13)	159.3 (6.27)	107.1 (4.22)	375 (14.76)	300 (11.81)	400 (15.75)	194 (7.64)	54.8 (120.81)	55.4 (122.14)
250	10	260.4 (10.25)	206.5 (8.13)	159.3 (6.27)	395 (15.55)	380 (14.96)	420 (16.54)	224 (8.82)	57.4 (126.55)	58.0 (127.87)
250	16	260.4 (10.25)	206.5 (8.13)	159.3 (6.27)	405 (15.94)	380 (14.96)	420 (16.54)	224 (8.82)	58.4 (128.75)	59.0 (130.07)
250	25	258.8 (10.19)	206.5 (8.13)	159.3 (6.27)	425 (16.73)	380 (14.96)	420 (16.54)	224 (8.82)	74.4 (164.02)	75.0 (165.35)
250	40	258.8 (10.19)	206.5 (8.13)	159.3 (6.27)	450 (17.72)	380 (14.96)	420 (16.54)	224 (8.82)	92.4 (203.71)	93.0 (205.03)
300	10	309.7 (12.19)	260.4 (10.25)	206.5 (8.13)	445 (17.52)	450 (17.72)	445 (17.52)	244 (9.61)	75.7 (166.89)	76.3 (168.21)
300	16	309.7 (12.19)	260.4 (10.25)	206.5 (8.13)	460 (18.11)	450 (17.72)	445 (17.52)	244 (9.61)	82.2 (181.22)	82.8 (182.54)
300	25	307.9 (12.12)	260.4 (10.25)	206.5 (8.13)	485 (19.09)	450 (17.72)	445 (17.52)	244 (9.61)	98.7 (217.60)	99.3 (218.92)
300	40	307.9 (12.12)	260.4 (10.25)	206.5 (8.13)	515 (20.28)	450 (17.72)	445 (17.52)	244 (9.61)	127.5 (281.09)	128.1 (282.41)

¹⁾ For dual converter: specified weight + 2.80 kg (6.17 lb).

²⁾ FR - single reduction

³⁾ F2R - double reduction

Flange version ANSI B16.5

Size	Pressure rating	Dimensions [mm (inch)]							Weight [kg (lb)] ¹⁾	
		a = 135 (5.32), b = 108 (4.26), c = 184 (7.25)							Flowmeter (without pressure sensor)	Flowmeter (with pressure sensor)
DN	Class	d	d FR ²⁾	d F2R ³⁾	D	L	H	I		
½	150	15.8 (0.62)	-	-	90 (3.54)	200 (7.87)	315 (12.40)	144 (5.67)	4.5 (9.92)	5.1 (11.24)
½	300	15.8 (0.62)	-	-	95 (3.74)	200 (7.87)	315 (12.40)	144 (5.67)	4.9 (10.80)	5.5 (12.13)
½	600	13.9 (0.55)	-	-	95 (3.74)	200 (7.87)	315 (12.40)	144 (5.67)	5.1 (11.24)	5.7 (12.57)
1	150	26.6 (1.05)	15.8 (0.62)	-	110 (4.33)	200 (7.87)	315 (12.40)	144 (5.67)	6.2 (13.67)	6.8 (14.99)
1	300	26.6 (1.05)	15.8 (0.62)	-	125 (4.92)	200 (7.87)	315 (12.40)	144 (5.67)	7.2 (15.87)	7.8 (17.20)
1	600	24.3 (0.96)	15.8 (0.62)	-	125 (4.92)	200 (7.87)	315 (12.40)	144 (5.67)	7.5 (16.53)	8.1 (17.86)
1½	150	40.9 (1.61)	26.6 (1.05)	15.8 (0.62)	125 (4.92)	200 (7.87)	320 (12.60)	144 (5.67)	8.3 (18.30)	8.9 (19.62)
1½	300	40.9 (1.61)	26.6 (1.05)	15.8 (0.62)	155 (6.10)	200 (7.87)	320 (12.60)	144 (5.67)	10.4 (22.93)	11 (24.25)
1½	600	38.1 (1.50)	26.6 (1.05)	15.8 (0.62)	155 (6.10)	200 (7.87)	320 (12.60)	144 (5.67)	11.4 (25.13)	12 (26.46)
2	150	52.6 (2.07)	40.9 (1.61)	26.6 (1.05)	150 (5.91)	200 (7.87)	325 (12.80)	144 (5.67)	11 (24.25)	11.6 (25.57)
2	300	52.6 (2.07)	40.9 (1.61)	26.6 (1.05)	165 (6.50)	200 (7.87)	325 (12.80)	144 (5.67)	12.4 (27.34)	13 (28.66)
2	600	49.3 (1.94)	40.9 (1.61)	26.6 (1.05)	165 (6.50)	200 (7.87)	325 (12.80)	144 (5.67)	13.9 (30.64)	14.5 (31.97)
3	150	78 (3.07)	52.6 (2.07)	40.9 (1.61)	190 (7.48)	200 (7.87)	340 (13.39)	154 (6.06)	19.8 (43.65)	20.4 (44.97)
3	300	78 (3.07)	52.6 (2.07)	40.9 (1.61)	210 (8.27)	200 (7.87)	340 (13.39)	154 (6.06)	22.8 (50.27)	23.4 (51.59)
3	600	73.7 (2.90)	52.6 (2.07)	40.9 (1.61)	210 (8.27)	200 (7.87)	340 (13.39)	154 (6.06)	23.8 (52.47)	24.4 (53.79)
4	150	102.4 (4.03)	78 (3.07)	52.6 (2.07)	230 (9.06)	250 (9.84)	360 (14.17)	164 (6.46)	23.4 (51.59)	24 (52.91)
4	300	102.4 (4.03)	78 (3.07)	52.6 (2.07)	255 (10.04)	250 (9.84)	360 (14.17)	164 (6.46)	31.4 (69.23)	32 (70.55)
4	600	97.2 (3.83)	78 (3.07)	52.6 (2.07)	275 (10.83)	250 (9.84)	360 (14.17)	164 (6.46)	40.4 (89.07)	41 (90.39)
6	150	154.2 (6.07)	102.4 (4.03)	78 (3.07)	280 (11.02)	300 (11.81)	375 (14.76)	174 (6.85)	36.2 (79.81)	36.8 (81.13)
6	300	154.2 (6.07)	102.4 (4.03)	78 (3.07)	320 (12.60)	300 (11.81)	375 (14.76)	174 (6.85)	51.2 (112.88)	51.8 (114.20)
6	600	146.3 (5.76)	102.4 (4.03)	78 (3.07)	355 (13.98)	300 (11.81)	375 (14.76)	174 (6.85)	46.2 (101.85)	76.8 (169.31)
8	150	202.7 (7.98)	154.2 (6.07)	102.4 (4.03)	345 (13.58)	300 (11.81)	400 (15.75)	194 (7.64)	50.0 (110.23)	50.6 (111.55)
8	300	202.7 (7.98)	154.2 (6.07)	102.4 (4.03)	380 (14.96)	300 (11.81)	400 (15.75)	194 (7.64)	74.8 (164.91)	75.4 (166.23)
10	150	254.5 (10.02)	202.7 (7.98)	154.2 (6.07)	405 (15.94)	380 (14.96)	420 (16.54)	224 (8.82)	74.4 (164.02)	75.0 (165.35)
10	300	254.5 (10.02)	202.7 (7.98)	154.2 (6.07)	455 (17.91)	380 (14.96)	420 (16.54)	224 (8.82)	106.4 (234.57)	107.0 (235.89)
12	150	304.8 (12.00)	254.5 (10.02)	202.7 (7.98)	485 (19.09)	450 (17.72)	445 (17.52)	244 (9.61)	106.3 (234.35)	106.9 (235.67)
12	300	304.8 (12.00)	254.5 (10.02)	202.7 (7.98)	520 (20.47)	450 (17.72)	445 (17.52)	244 (9.61)	151.3 (333.56)	151.9 (334.88)

1) For dual converter: specified weight + 2.80 kg (6.17 lb).

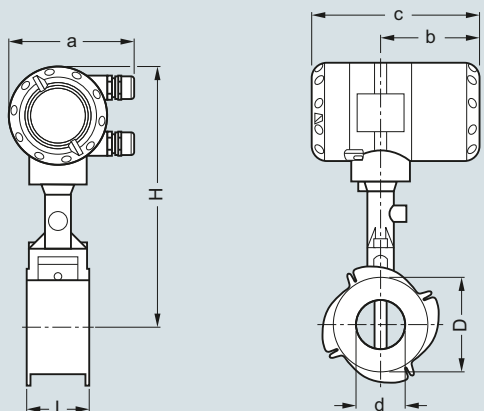
2) FR - single reduction

3) F2R - double reduction

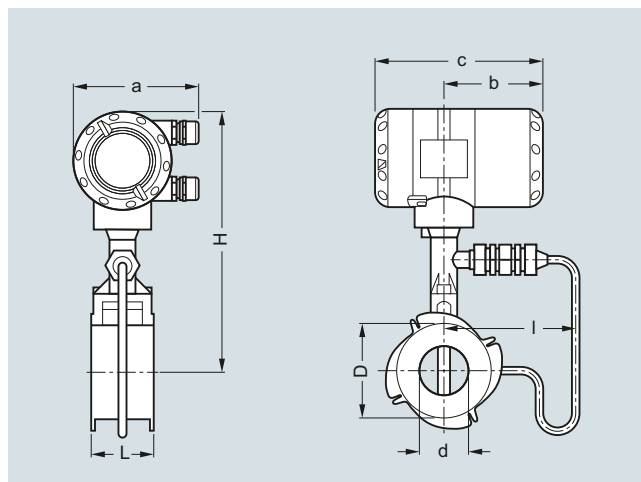
Flow Measurement

SITRANS F X

SITRANS FX300



Sandwich version



Sandwich version with pressure sensor

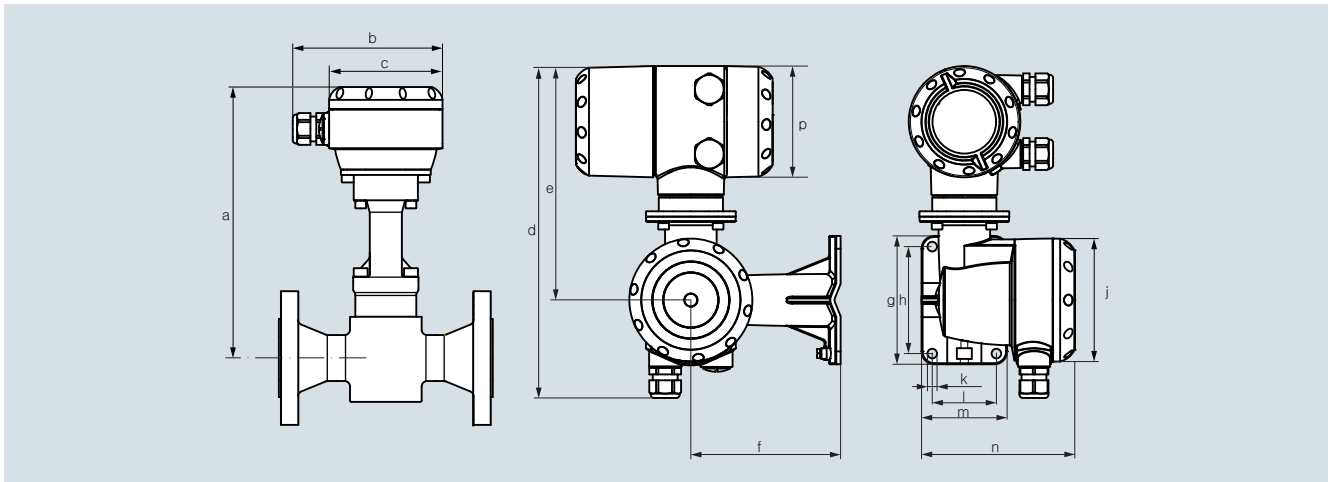
Sandwich version EN

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 ANSI

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 ANSI B16.5	Q _{min} EN 1092-1 [m ³ /h]	Q _{max} EN 1092-1 [m ³ /h]	Q _{min} ANSI B16.5 [m ³ /h]	Q _{max} ANSI 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 ANSI B16.5	Q _{min} EN 1092-1 [m ³ /h]	Q _{max} EN 1092-1 [m ³ /h]	Q _{min} ANSI B16.5 [m ³ /h]	Q _{max} ANSI 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 ANSI		
Liquids	DN 15 ... DN 300	DN ½"...DN 12"	$0.5 \times (998/\rho)^{0.5 \ 1)}$	$7 \times (998/\rho)^{0.47 \ 1)}$
Gas, steam/vapor	DN 15 ... DN 300	DN ½"...DN 12"	$6 \times (1.29/\rho)^{0.5 \ 2)}$	$7 \times (998/\rho)^{0.47 \ 3)}$

ρ = operating density [kg/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/m ³]		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 ANSI 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/m ³]		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 ANSI 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/ft³]		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 ANSI 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/ft³]		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 ANSI 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 FX vortex flowmeters are designed for use in industrial applications and optimally suited to the demands in auxiliary supply systems.

The proven principle of vortex flowmeters is suitable for measurement of liquids, gases and vapors unaffected by conductivity, viscosity, temperature and pressure.

Benefits

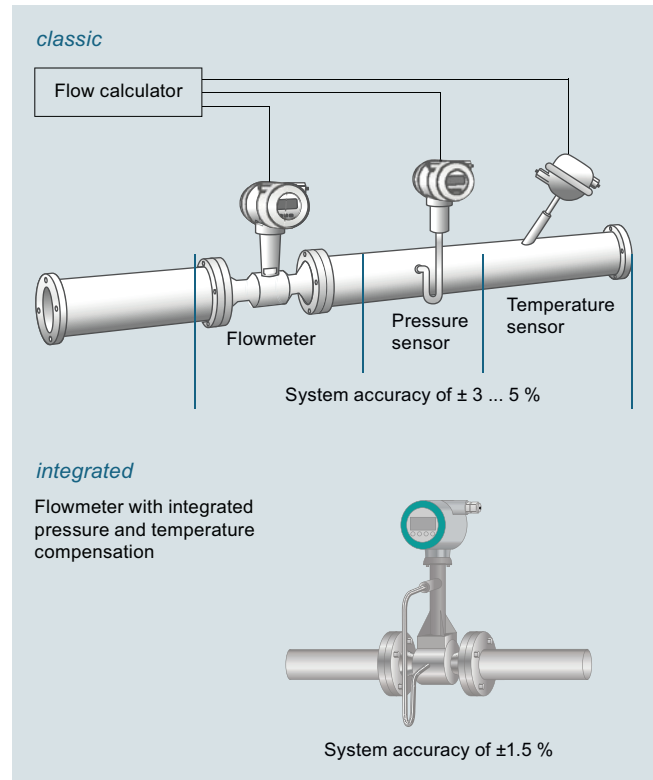
- Integrated pressure and temperature compensation
- Temperature compensation for saturated steam included as standard
- High measuring accuracy
- Maintenance-free sensor
- Non-wearing, fully welded stainless steel construction with high resistance to corrosion, pressure and temperature
- SIL2 certified according to IEC 61508 Edition 2
- Use in hazardous areas
- Integrated reduction of nominal diameter for space-saving and economic installation and large measuring ranges
- Redundant data management: Easy exchange of electronics without loss of calibration and configuration data
- FAD (Free Air Delivery) functionality
- Gross and net heat calculation to support advanced energy management
- Remote version with cable length up to 50 m (164 ft) (in preparation)

Even the basic version of the vortex flowmeter SITRANS FX330 is equipped with temperature compensation for saturated steam applications. With the optional pressure sensor the SITRANS FX330 has integrated density compensation for calculation of corrected volume and mass (online density compensation). The density compensation for calculation of corrected volume and mass is based on the standards of NIST for gases and IAPWS for steam.

Higher measuring accuracy with the use of compact measuring systems

With the classic installation of a vortex flowmeter and separate pressure and temperature sensor as well as flow calculator, all errors occurring in the measuring chain must be taken into account when determining system accuracy. This can result in a measuring error between ± 3 to 5 %.

Using a vortex flowmeter with integrated pressure and temperature compensation such as the SITRANS FX330 allows you not only to lower installation costs but also increase the measuring accuracy of the measuring point. In this case the accuracy is ± 1.5 % of the measured value.



The SITRANS FX330 in flanged design is available with integrated reduction of nominal diameter for space-saving installations and large measuring spans. About 90% of all vortex flowmeters are ordered one size smaller than the line diameter in order to increase the flow speed and to get a wider measuring range. Here, the line has to be reduced before and widened after the sensor, typically including 20x DN inlet and 5x DN outlet run. With the reduction and widening of nominal diameter included in the sensor, it is no longer necessary. To compensate the non-existent straight inlet run between reduction and the vortex bluff body, these devices are specially calibrated and linearized.

A new feature of the SITRANS FX330 is the advanced signal processing and filtering called AVFD (Advanced Vortex Frequency Detection): Interferences and disturbances in the measuring signal are suppressed, signals outside of the relevant frequency band are filtered out.

Redundant data management prevents loss of calibration and configuration data when changing electronics or display.

By default, all SITRANS FX330 meters are factory-calibrated (traceable to international standards) and pre-set according to customer specifications. The SITRANS FX330 also comes with an installation wizard to ease installation; e.g. in a steam application it will only show related settings.

Developed according to the standard IEC 61508 edition 2, the SITRANS FX330 can be used in safety-related application with classification SIL2 for continuous volume flow measurement.

Flow Measurement

SITRANS F X

SITRANS FX330

Application

- Measurement of saturated steam and superheated steam
- Steam boiler monitoring
- Heat metering of steam and hot water
- Measurement of consumption of industrial gases
- Measurement of consumption in compressed air systems
- Monitoring of compressor output
- Evaluation of Free Air Delivery (FAD)
- SIP and CIP processes in the food, beverage and pharmaceutical industries
- Measuring of conductive and non-conductive liquids
- Safety-related measurement in SIL applications (SIL2)

Gross and net heat quantity calculation

The SITRANS FX330 was designed for applications in auxiliary and supply service lines, such as internal monitoring of energy flows for saturated and superheated steam or hot water.

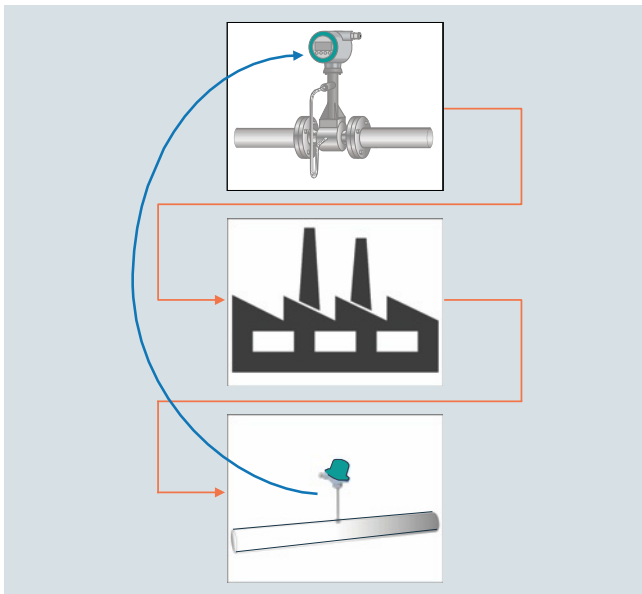
Equipped with temperature sensor as standard, the device can be installed as heat meter in the feed line directly connected with an external temperature sensor in the return line. The gross and net heat calculation can be fed into a DCS to support advanced energy management.

When it comes to energy, the most accurate measurement of consumption is essential. By combining flow, temperature and pressure measurements in one device, SITRANS FX330 provides the basis for a precise mass flow calculation.



In steam applications, the software even determines the enthalpy - the heat content - of the steam. Therefore, SITRANS FX330 is able to calculate the gross heat quantity.

In case net heat quantity consumption of process is asked for, a single temperature sensor can be added to the return line. SITRANS FX330 uses the readings to calculate the amount of heat consumed.

The SITRANS FX330 thereby proves itself to be a reliable partner.



Design

SITRANS FX330 Flange	SITRANS FX330 Sandwich
	
Flanged version with integrated temperature compensation as standard for saturated steam and optional pressure compensation for superheated steam, gases and wet gases.	All advantages of the flanged version in a space-saving sandwich design; centering rings guarantee an easy installation without any offset.
Integrated reduction of nominal diameter for space-saving and economic installations plus large measuring ranges.	Integrated reduction of nominal diameter not available
Also in remote design with field housing and connection cable up to 50 m/164 ft (in preparation)	
With shut-off valve allowing	
<ul style="list-style-type: none"> • exchange and calibration of pressure sensor • pressure and leak testing of pipeline without interrupting the process 	

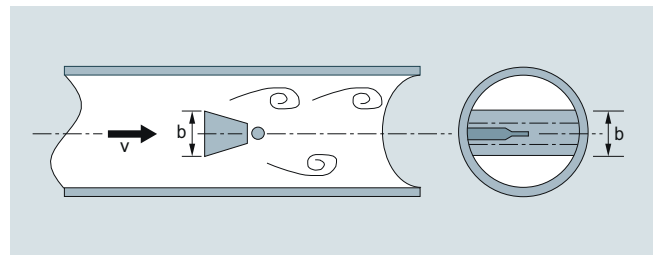
Function

Vortex flowmeters are used to measure the flow of gases, vapors and liquids in completely filled pipes. The measuring principle is based on the principle of the Karman vortex street. Inside the measuring sensor vortices are shed from a bluff body and are detected by a sensor located behind. The frequency f of the vortex shedding is proportional to the flow velocity v .

The nondimensional Strouhal number S describes the relationship between vortex frequency f , width b of the bluff body and the mean flow velocity v :

$$f = (S \cdot v) / b$$

The vortex frequency is recorded at the sensor and evaluated at the converter.



Functional principle

Technical data

Range of application	Flow measurement of liquids, gases and vapors	
Mode of operation	Measuring principle: Karman vortex street Primary measured value: <ul style="list-style-type: none"> • Volume flow • Mass flow • Corrected volume flow • Density • Temperature • Pressure • Heat energy 	
Design		
Transmitter	Cable length up to 50 m (164 ft) (in preparation)	
• Compact and remote version		
Sensor	Flanged version	Sandwich version
• Integrated temperature measurement	•	•
• Reduction of nominal diameter	•	
• Pressure and temperature compensation	•	•
• Isolation valve	•	•
• Dual measuring device	•	
Display	4-line graphical display (backlit) with control keys	
Operation	<ul style="list-style-type: none"> • Via local display (languages: German, English, French) • Via SIMATIC PDM 	
Accuracy		
Volume flow		
• Liquids		
- $Re \geq 20\,000$	$\pm 0.75\%$ of measured value	
- $10\,000 < Re < 20\,000$	$\pm 2.0\%$ of measured value	
• Gases and vapors		
- $Re \geq 20\,000$	$\pm 1.0\%$ of measured value	
- $10\,000 < Re < 20\,000$	$\pm 2.0\%$ of measured value	
Mass flow/Corrected volume flow		
• Gases and vapors		
- $Re \geq 20\,000$	$\pm 1.5\%$ of measured value	
- $10\,000 < Re < 20\,000$	$\pm 2.5\%$ of measured value	
Mass flow		
• Liquids/water		
- $Re \geq 20\,000$	$\pm 1.5\%$ of measured value	
- $10\,000 < Re < 20\,000$	$\pm 2.5\%$ of measured value	
Repeatability (Volume flow)	$\pm 0.1\%$ of measured value	

Operating conditions

Temperature ratings	
• Medium	-40 ... +240 °C (-40 ... +465 °F)
• Ambient	
- Non-Ex	-40 ... +85 °C (-40 ... +185 °F)
- Ex	-40 ... +65 °C (-40 ... +140 °F)
• Storage	-50 ... +85 °C (-58 ... +185 °F)
Pressure ratings	Max. 100 bar (1450 psi), higher pressure rates on request
Max. allowable test pressure	
• With integrated pressure sensor and isolation valve (closed)	1.5 x PN
• With integrated pressure sensor and without isolation valve	2 times the measuring range of pressure sensor
Process medium	
• Density	Taken into consideration when sizing
• Viscosity	< 10 cP
• Reynold's number	> 10000
Recommended flow velocities	
• Liquids	0.3 ... 7 m/s (0.98 ... 23 ft/s)
• Gases and vapors	2.0 ... 80 m/s (6.6 ... 262.5 ft/s)
DN 15:	3.0 ... 45 m/s (9.8 ... 148 ft/s)
DN 25:	2.0 ... 70 m/s (6.6 ... 230 ft/s)
	For detailed information see operating instructions "Intended use"

Installation conditions

Inlet run	
• For undisturbed flow profile, after pipe section with reducer, after 1 x 90° pipe bend	$\geq 15 \times DN$
• After 2 x 90° pipe bend	$\geq 30 \times DN$
• After 2 x 90° three-dimensional pipe bend	$\geq 40 \times DN$
• After control valves	$\geq 50 \times DN$
• Before flow conditioner	$\geq 2 \times DN$
• After flow conditioner	$\geq 8 \times DN$
Outlet run	$\geq 5 \times DN$

Material

Sensor and process connections	
• Standard	1.4404/316L
• Option	Hastelloy C22 (on request)
Transmitter housing	
• Standard	Aluminum die-cast, two-layer coating (epoxy/polyester)
• Option	Die-cast aluminum with finish for advanced requirements
Pressure sensor gasket	
• Standard	FPM
• Option	FFKM
Sensor gasket (Pick-up)	
• Standard	1.4435/316L
• Option	Hastelloy C276

Process connections

DIN EN 1092-1	DN 15 ... DN 300/PN 16 ... PN 100
ANSI B16.5	½" ... 12"/150 ... 600 lb
	For valid combinations of connection size and pressure rating see table "Sensor variants"

Flow Measurement

SITRANS F X

SITRANS FX330

Enclosure rating	
Standard	Compact and remote version: IP66/IP67
Option	Remote version: IP66/IP68 for sensor
Power supply	
Non-Ex version	12 ... 36 V DC
Ex version	12 ... 30 V DC
Inputs/Outputs	
Current output	4 ... 20 mA, HART
Binary output	Pulse/Frequency/Status/Limit switch
Current input	4 ... 20 mA, passive
Communication	
HART 7	
Calibration	
Standard calibration	3-point calibration: 3 x 15 %, 3 x 50 %, 3 x 80 %
Special calibration	5-point calibration: 3 x 15 %, 3 x 30 %, 3 x 50 %, 3 x 60 %, 3 x 80 %
Certificates and approvals	
Ex approvals	ATEX, QPS, IECEx
CE declaration of conformity	PED 2014/68/EU EMC 2014/30/EU
Safety integration level (SIL)	SIL2 according to IEC 61508

Available combinations of sensor and connection size for SITRANS FX330 in flanged design are shown in the table below.

Sensor size	Connection size	EN 1092-1, Form B1/B2, PN 10	EN 1092-1, Form B1/B2, PN 16	EN 1092-1, Form B1/B2, PN 25	EN 1092-1, Form B1/B2, PN 40	EN 1092-1, Form B1/B2, PN 63	EN 1092-1, Form B1/B2, PN 100	ANSI B16.5, Class 150	ANSI B16.5, Class 300	ANSI B16.5, Class 600
SITRANS FX330 Flanged (7ME2610-...)										
DN 15	DN 15	-	-	-	●	-	●	●	●	●
	DN 25	-	-	-	●	-	●	●	●	●
	DN 40	-	-	-	●	-	●	●	●	●
DN 25	DN 25	-	-	-	●	-	●	●	●	●
	DN 40	-	-	-	●	-	●	●	●	●
	DN 50	-	●	-	●	●	●	●	●	●
DN 40	DN 40	-	-	-	●	-	●	●	●	●
	DN 50	-	●	-	●	●	●	●	●	●
	DN 80	-	●	-	●	●	●	●	●	●
DN 50	DN 50	-	●	-	●	●	●	●	●	●
	DN 80	-	●	-	●	●	●	●	●	●
	DN 100	-	●	-	●	●	●	●	●	●
DN 80	DN 80	-	●	-	●	●	●	●	●	●
	DN 100	-	●	-	●	●	●	●	●	●
	DN 150	-	●	-	●	●	●	●	●	●
DN 100	DN 100	-	●	-	●	●	●	●	●	●
	DN 150	-	●	-	●	●	●	●	●	●
	DN 200	●	●	●	●	-	-	●	●	-
DN 150	DN 150	-	●	-	●	●	●	●	●	●
	DN 200	●	●	●	●	-	-	●	●	-
	DN 250	●	●	●	●	-	-	●	●	-
DN 200	DN 200	●	●	●	●	-	-	●	●	-
	DN 250	●	●	●	●	-	-	●	●	-
	DN 300	●	●	●	●	-	-	●	●	-
DN 250	DN 250	●	●	●	●	-	-	●	●	-
	DN 300	●	●	●	●	-	-	●	●	-
DN 300	DN 300	●	●	●	●	-	-	●	●	-

● available
- not available

Flow Measurement

SITRANS F X

SITRANS FX330

Selection and Ordering data

SITRANS FX330 Flanged

- Not approved for SIL2 safety applications
- Approved for SIL2 safety applications

Article No. Ord. code

7 ME 2 6 1 0 -

7 ME 2 6 1 1 -

↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Sensor size

Connection size

DN 15 (1/2")	DN 15 (1/2")	1 A
	DN 25 (1")	1 B
	DN 40 (1 1/2")	1 C
DN 25 (1")	DN 25 (1")	2 B
	DN 40 (1 1/2")	2 C
	DN 50 (2")	2 D
DN 40 (1 1/2")	DN 40 (1 1/2")	2 K
	DN 50 (2")	2 L
	DN 80 (3")	2 M
DN 50 (2")	DN 50 (2")	2 R
	DN 80 (3")	2 S
	DN 100 (4")	2 T
DN 80 (3")	DN 80 (3")	3 L
	DN 100 (4")	3 M
	DN 150 (6")	3 R
DN 100 (4")	DN 100 (4")	3 S
	DN 150 (6")	3 T
	DN 200 (8")	3 Q
DN 150 (6")	DN 150 (6")	4 M
	DN 200 (8")	4 P
	DN 250 (10")	4 Q
DN 200 (8")	DN 200 (8")	4 T
	DN 250 (10")	4 U
	DN 300 (12")	4 V
DN 250 (10")	DN 250 (10")	4 W
	DN 300 (12")	4 Y
DN 300 (12")	DN 300 (12")	5 E

Process connection and pressure rate

EN 1092-1 Form B1

PN 10	DN 200 ... 300	A
PN 16	DN 50 ... 300	B
PN 25	DN 200 ... 300	C
PN 40	DN 15 ... 300	D
PN 63	DN 50 ... 150	E
PN 100	DN 15 ... 150	F

ANSI B16.5 RF

Class 150	1/2 ... 12"	J
Class 300	1/2 ... 12"	K
Class 600	1/2 ... 6"	L

System design

Compact version	No cable	0
Remote version (in preparation)	Cable length with Order code L..	1

Transmitter housing

Aluminum		0
Aluminum, silicon free		1
Dual version, aluminum		6
Dual version, aluminum, silicon free		7

Selection and Ordering data

SITRANS FX330 Flanged

- Not approved for SIL2 safety applications
- Approved for SIL2 safety applications

Article No. Ord. code

7 ME 2 6 1 0 -

7 ME 2 6 1 1 -

Communication

HART	0
PROFIBUS PA (in preparation)	1
FOUNDATION Fieldbus (in preparation)	2

Ex approval

Without Ex approval	A
ATEX II2 G Ex ia	B
ATEX II2 G Ex d	C
ATEX II3 G Ex nA	D
ATEX II2 D Ex tb	E
QPS IS Class I Div.1	F
QPS XP Class I Div.1	G
QPS NI Class I Div. 2	H
QPS DIP Class I, III Div. 1	J
IECEX II2 G Ex ia	K
IECEX II2 G Ex d	L
IECEX II3 G Ex nA	M
IECEX II2 D Ex tb	N

Pressure sensor and gasket material

Without pressure sensor	A
With pressure sensor and gasket material FPM (Viton), Range:	
1 bar (14.5 psi)	B
2 bar (29 psi)	C
4 bar (58 psi)	D
6 bar (87 psi)	E
10 bar (145 psi)	F
16 bar (232 psi)	G
25 bar (363 psi)	H
40 bar (580 psi)	J
60 bar (870 psi)	K
100 bar (1450 psi)	L
With pressure sensor and gasket material FFKM (Kalrez), Range:	
1 bar (14.5 psi)	M
2 bar (29 psi)	N
4 bar (58 psi)	P
6 bar (87 psi)	Q
10 bar (145 psi)	R
16 bar (232 psi)	S
25 bar (363 psi)	T
40 bar (580 psi)	U
60 bar (870 psi)	V
100 bar (1450 psi)	W

Software version

Standard - Uncompensated for gases, steam and liquids including temperature compensation for saturated steam	0
Standard + Heat meter for saturated steam and water	1
Density compensation for steam + Heat meter for saturated and superheated steam	2
Density compensation for gases, wet gases and mixed gases + FAD	3

Selection and Ordering data	Order code	Selection and Ordering data	Order code
Additional information Please add “-Z” to Article No. and specify as minimum Order code Y40, Y41, Y42 and Y45 and plain text.		Isolation valve With isolation valve	B10
Application data		Certificates	
Medium: Specify medium (Liquid, gas, steam or customer-specific)	Y40	Certificate of compliance according to EN 10204-2.1	C10
Temperature: Specify operating temperature with unit	Y41	Pressure test + Inspection certificate according to EN 10204-3.1	C11
Pressure: Specify operating pressure with unit	Y42	Material certification of pressure bearing metal parts according to EN 10204-3.1	C12
Density (only for customer-specified medium): Specify density with unit	Y43	Material in accordance with NACE MR0175/ISO 15156	C13
Viscosity (only for customer-specified medium): Specify viscosity with unit	Y44	PMI of pressure bearing metal parts + Inspection certificate according to EN 10204-3.1	C14
Flow rate: Specify max. flow rate with units	Y45	Material certificate of pressure bearing metal parts according to EN 10204-3.1 + PMI	C15
Pulse output setting: Specify pulse value (1 pulse/unit)	Y47	Dye penetration test of wetted welds	C16
		X-ray test of wetted welds	C17
Operating instruction		Calibration 5-point calibration with certificate	D11
Description	Article No.	Cleaning	
English	A5E2100423	Free of oil and grease (wetted parts)	K46
All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation		Free of oil and grease (wetted parts) + Inspection certificate according to EN 10204-3.1	K48
		Cable length for remote version (in preparation)	
Selection and Ordering data	Order code	5 m (16 ft)	L01
Further designs Please add “-Z” to Article No. and specify Order code.		10 m (32 ft)	L02
Cable connection		15 m (49 ft)	L03
Without cable glands	A01	20 m (65 ft)	L04
M20x1.5 cable glands made of plastic, grey		25 m (82 ft)	L05
• 3 pcs.	A02	30 m (98 ft)	L06
• 2 pcs.	A12	35 m (114 ft)	L07
• 1 pc.	A22	40 m (131 ft)	L08
M20x1.5 cable glands made of plastic, blue		45 m (147 ft)	L09
• 3 pcs.	A03	50 m (164 ft)	L10
• 2 pcs.	A13		
• 1 pc.	A23	Tag name plate	
M20x1.5 cable glands made of brass, Ex-d/t approved		TAG name plate in stainless steel 40 x 20mm (Add plain text)	Y17
• 3 pcs.	A04	TAG name plate in stainless steel tag 120 x 46 mm (Add plain text)	Y18
• 2 pcs.	A14		
• 1 pc.	A24		
M20x1.5 cable glands made of brass, Ex-nA approved			
• 3 pcs.	A05		
• 2 pcs.	A15		
• 1 pc.	A25		
M20x1.5 cable glands in stainless steel, Ex-d/t approved			
• 3 pcs.	A06		
• 2 pcs.	A16		
• 1 pc.	A26		
1/2" NPT conduit connection in plastic (cable glands not included)			
• 3 pcs.	A07		
• 2 pcs.	A17		
• 1 pc.	A27		

Flow Measurement

SITRANS F X

SITRANS FX330

Selection and Ordering data	Article No.	Ord. code
SITRANS FX330 Sandwich		
• Not approved for SIL2 safety applications	7 ME 2 7 1 0 -	
• Approved for SIL2 safety applications	7 ME 2 7 1 1 -	
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Sensor size		
DN 15 (½")	1 A	
DN 25 (1")	2 B	
DN 40 (1½")	2 K	
DN 50 (2")	2 R	
DN 80 (3")	3 L	
DN 100 (4")	3 S	
Pressure rating		
EN 1092-1		
PN 16 DN 15 ... 100	B	
PN 25 DN 15 ... 100	C	
PN 40 DN 15 ... 100	D	
PN 63 DN 15 ... 100	E	
PN 100 DN 15 ... 100	F	
ANSI B16.5		
Class 150 ½ ... 4"	J	
Class 300 ½ ... 4"	K	
Class 600 ½ ... 4"	L	
System design		
Compact version No cable	0	
Remote version Cable length with (in preparation) Order code L...	1	
Transmitter housing		
Aluminum	0	
Aluminum, silicon free	1	

Selection and Ordering data	Article No.	Ord. code
SITRANS FX330 Sandwich		
• Not approved for SIL2 safety applications	7 ME 2 7 1 0 -	
• Approved for SIL2 safety applications	7 ME 2 7 1 1 -	
Communication		
HART	0	
PROFIBUS PA (in preparation)	1	
FOUNDATION Fieldbus (in preparation)	2	
Ex approval		
Without Ex approval		A
ATEX II2 G Ex ia		B
ATEX II2 G Ex d		C
ATEX II3 G Ex nA		D
ATEX II2 D Ex tb		E
QPS IS Class I Div.1		F
QPS XP Class I Div.1		G
QPS NI Class I Div. 2		H
QPS DIP Class I, III Div. 1		J
IECEX II2 G Ex ia		K
IECEX II2 G Ex d		L
IECEX II3 G Ex nA		M
IECEX II2 D Ex tb		N
Pressure sensor and gasket material		
Without pressure sensor		A
With pressure sensor and gasket material		
FPM (Viton), Range:		
1 bar (14.5 psi)		B
2 bar (29 psi)		C
4 bar (58 psi)		D
6 bar (87 psi)		E
10 bar (145 psi)		F
16 bar (232 psi)		G
25 bar (363 psi)		H
40 bar (580 psi)		J
60 bar (870 psi)		K
100 bar (1450 psi)		L
With pressure sensor and gasket material		
FFKM (Kalrez), Range:		
1 bar (14.5 psi)		M
2 bar (29 psi)		N
4 bar (58 psi)		P
6 bar (87 psi)		Q
10 bar (145 psi)		R
16 bar (232 psi)		S
25 bar (363 psi)		T
40 bar (580 psi)		U
60 bar (870 psi)		V
100 bar (1450 psi)		W
Software version		
Standard - Uncompensated for gases, steam and liquids including temperature compensation for saturated steam		0
Standard + Heat meter for saturated steam and water		1
Density compensation for steam + Heat meter for saturated and superheated steam		2
Density compensation for gases, wet gases and mixed gases + FAD		3

Selection and Ordering data		Order code	Selection and Ordering data		Order code
Additional information			Isolation valve		
Please add "-Z" to Article No. and specify as minimum Order code Y40, Y41, Y42 and Y45 and plain text.			With isolation valve		B10
Application data			Certificates		
Medium: Specify medium (Liquid, gas, steam or customer-specific)		Y40	Certificate of compliance according to EN 10204-2.1		C10
Temperature: Specify operating temperature with unit		Y41	Pressure test + Inspection certificate according to EN 10204-3.1		C11
Pressure: Specify operating pressure with unit		Y42	Material certification of pressure bearing metal parts according to EN 10204-3.1		C12
Density (only for customer-specified medium): Specify density with unit		Y43	Material in accordance with NACE MR0175/ISO 15156		C13
Viscosity (only for customer-specified medium): Specify viscosity with unit		Y44	PMI of pressure bearing metal parts + Inspection certificate according to EN 10204-3.1		C14
Flow rate: Specify max. flow rate with units		Y45	Material certificate of pressure bearing metal parts according to EN 10204-3.1 + PMI		C15
Pulse output setting: Specify pulse value (1 pulse/unit)		Y47	Dye penetration test of wetted welds		C16
			X-ray test of wetted welds		C17
Operating instruction			Calibration		
Description	Article No.		5-point calibration with certificate		D11
English	A5E2100423		Cleaning		
All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation			Free of oil and grease (wetted parts)		K46
			Free of oil and grease (wetted parts) + Inspection certificate according to EN 10204-3.1		K48
Selection and Ordering data		Order code	Cable length for remote version (in preparation)		
Further designs			5 m (16 ft)		L01
Please add "-Z" to Article No. and specify Order code.			10 m (32 ft)		L02
Cable connection			15 m (49 ft)		L03
Without cable glands		A01	20 m (65 ft)		L04
M20x1.5 cable glands made of plastic, grey			25 m (82 ft)		L05
• 3 pcs.		A02	30 m (98 ft)		L06
• 2 pcs.		A12	35 m (114 ft)		L07
• 1 pc.		A22	40 m (131 ft)		L08
M20x1.5 cable glands made of plastic, blue			45 m (147 ft)		L09
• 3 pcs.		A03	50 m (164 ft)		L10
• 2 pcs.		A13	Tag name plate		
• 1 pc.		A23	TAG name plate in stainless steel 40 x 20mm (Add plain text)		Y17
M20x1.5 cable glands made of brass, Ex-d/t approved			TAG name plate in stainless steel tag 120 x 46 mm (Add plain text)		Y18
• 3 pcs.		A04			
• 2 pcs.		A14			
• 1 pc.		A24			
M20x1.5 cable glands made of brass, Ex-nA approved					
• 3 pcs.		A05			
• 2 pcs.		A15			
• 1 pc.		A25			
M20x1.5 cable glands in stainless steel, Ex-d/t approved					
• 3 pcs.		A06			
• 2 pcs.		A16			
• 1 pc.		A26			
1/2" NPT conduit connection in plastic (cable glands not included)					
• 3 pcs.		A07			
• 2 pcs.		A17			
• 1 pc.		A27			

Flow Measurement

SITRANS F X

SITRANS FX330

SITRANS FX330 spare parts

Description	Article No.
Transmitter electronic for SITRANS FX330	
• FXT030 in compact design with HART (non-Ex/Ex-i)	A5E38663070
• FXT030 in compact design with HART (Ex-d)	A5E38663398
• FXT030 in remote design with HART (non-Ex/Ex-i)	A5E38663422
• FXT030 in remote design with HART (Ex-d)	A5E38663454
Sensor electronic for SITRANS FX330 in remote design (non-Ex/Ex-i/Ex-d)	A5E38663481
Display lid (non Ex) in painted aluminum with O-ring seal	A5E38663502
Display lid (Ex) in painted aluminum with O-ring seal	A5E38663517
Blind lid in painted aluminum with O-ring seal	A5E38663529
Display with HMI and data memory	A5E38663613
Sensor cable, grey (non-Ex)	
• 5 m (16 ft)	A5E38663641
• 10 m (32 ft)	A5E38663753
• 15 m (49 ft)	A5E38663838
• 20 m (65 ft)	A5E38663871
• 25 m (82 ft)	A5E38663887
• 30 m (98 ft)	A5E38663900
• 40 m (131 ft)	A5E38663912
• 50 m (164 ft)	A5E38663947
Sensor cable, blue (Ex)	
• 5 m (16 ft)	A5E38664060
• 10 m (32 ft)	A5E38664087
• 15 m (49 ft)	A5E38667790
• 20 m (65 ft)	A5E38667850
• 25 m (82 ft)	A5E38668087
• 30 m (98 ft)	A5E38668128
• 40 m (131 ft)	A5E38668158
• 50 m (164 ft)	A5E38668945
Sensor replacement kit including seal disc, socket, pickup and O-rings (for pickup and pressure screw)	
• DN 15	A5E38669012
• DN 25	A5E38669021
• DN 40 ... DN 100	A5E38669057
• DN 150 ... DN 300	A5E38669134
Pressure sensor replacement kit including pressure sensor with calibration certificate, DUBOX plug and O-rings	
• 1 bar	A5E38669157
• 2 bar	A5E38669183
• 4 bar	A5E38669194
• 6 bar	A5E02181175
• 10 bar	A5E02181180
• 16 bar	A5E02181221
• 25 bar	A5E02181307
• 40 bar	A5E02181316
• 60 bar	A5E02181322
• 100 bar	A5E02181437

Description	Article No.
SITRANS FX300 upgrade kit (transmitter housing included) ¹⁾	
• FXT030 in compact design with HART (non-Ex/Ex-i)	A5E38669219
• FXT030 in compact design with HART (Ex-d)	A5E38669227
• FXT030 in remote design with HART (non-Ex/Ex-i)	A5E38669236
• FXT030 in remote design with HART (Ex-d)	A5E38669287

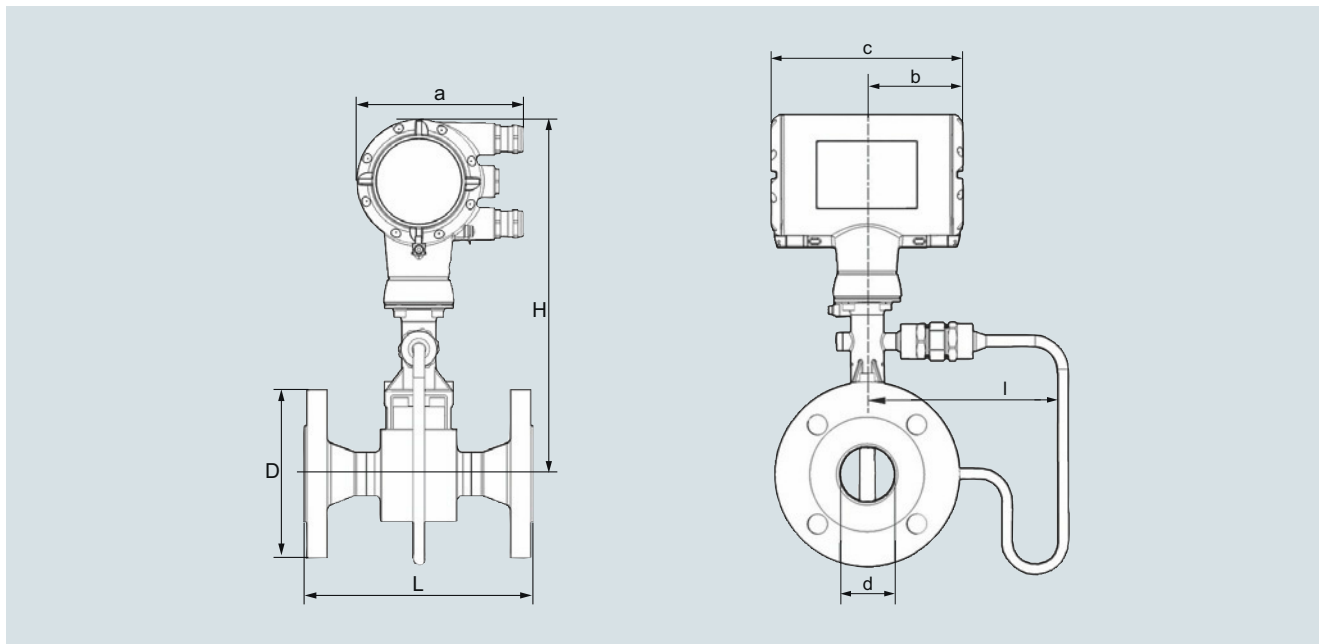
¹⁾ Please specify serial number of FX300 when placing order.

Selection and Ordering data	Article No.	Ord. code
SITRANS FX330 Flow Straightener	7ME2900-	0000
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Material		
Stainless steel 1.4404 (316L)		1
Nominal diameter		
DN 15 / ANSI ½"		A
DN 25 / ANSI 1"		B
DN 40 / ANSI 1½"		C
DN 50 / ANSI 2"		D
DN 80 / ANSI 3"		E
DN 100 / ANSI 4"		F
DN 150 / ANSI 6"		G
DN 200 / ANSI 8"		H
DN 250 / ANSI 10"		J
DN 300 / ANSI 12"		K
Pressure rating		
PN 10		A
PN 16		B
PN 25		C
PN 40		D
PN 63		E
PN 100		F
Class 150		J
Class 300		K
Class 600		L

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Article No. and specify Order code.	
Certificates	
Certificate of compliance to EN 10204-2.1	C10
Material certification of pressure bearing parts to EN 10204-3.1	C12
Material in accordance with NACE MR0175/ISO 15156	C13
PMI of pressure bearing parts + Inspection certificate according to EN 10204-3.1	C14
Material certificate of pressure bearing parts according to EN 10204-3.1 + PMI	C15
Cleaning	
Free of oil and grease (wetted parts)	K46
Free of oil and grease (wetted parts) + Inspection certificate according to EN 10204-3.1	K48

Dimensional drawings

Compact version



Flanged version with pressure sensor

3

Flow Measurement

SITRANS F X

SITRANS FX330

Flanged version EN 1092-1

Size ¹⁾ Pres- sure rating		Dimensions [mm (inch)] a = 148.5 (5.85), b = 85.8 (3.38), c = 171.5 (6.76)							Weight [kg (lb)]	
DN	PN	d	d FR ¹⁾	d F2R ²⁾	D	L	H	I	Flowmeter (without pres- sure sensor)	Flowmeter (with pres- sure sensor)
15	40	17.3 (0.68)	-	-	95 (3.74)	200 (7.87)	358.8 (14.2)	169.3 (6.67)	5.5 (12.13)	6.1 (13.45)
15	100	17.3 (0.68)	-	-	105 (4.13)	200 (7.87)	358.8 (14.2)	169.3 (6.67)	6.5 (14.33)	7.1 (15.65)
25	40	28.5 (1.12)	17.3 (0.68)	-	115 (4.53)	200 (7.87)	358.4 (14.1)	169.3 (6.67)	7.3 (16.09)	7.9 (17.42)
25	100	28.5 (1.12)	17.3 (0.68)	-	140 (5.51)	200 (7.87)	358.4 (14.1)	169.3 (6.67)	9.3 (20.50)	9.9 (21.83)
40	40	43.1 (1.70)	28.5 (1.12)	17.3 (0.68)	150 (5.91)	200 (7.87)	362.3 (14.3)	169.5 (6.67)	10.2 (22.49)	10.8 (23.81)
40	100	42.5 (1.67)	28.5 (1.12)	17.3 (0.68)	170 (6.69)	200 (7.87)	362.3 (14.3)	169.5 (6.67)	14.2 (31.31)	14.8 (32.63)
50	16	54.5 (2.15)	42.5 (1.67)	28.5 (1.12)	165 (6.50)	200 (7.87)	368.3 (14.5)	169.3 (6.67)	12.1 (26.68)	12.7 (28.00)
50	40	54.5 (2.15)	42.5 (1.67)	28.5 (1.12)	165 (6.50)	200 (7.87)	368.3 (14.5)	169.3 (6.67)	12.3 (27.12)	12.9 (28.44)
50	63	54.5 (2.15)	42.5 (1.67)	28.5 (1.12)	180 (7.09)	200 (7.87)	368.3 (14.5)	169.3 (6.67)	16.3 (35.94)	16.9 (37.26)
50	100	53.9 (2.12)	42.5 (1.67)	28.5 (1.12)	195 (7.68)	200 (7.87)	368.3 (14.5)	169.3 (6.67)	17.8 (39.24)	18.4 (40.57)
80	16	82.5 (3.25)	54.5 (2.15)	42.5 (1.67)	200 (7.87)	200 (7.87)	380.3 (15.0)	169.3 (6.67)	16.8 (37.04)	17.4 (38.36)
80	40	82.5 (3.25)	54.5 (2.15)	42.5 (1.67)	200 (7.87)	200 (7.87)	380.3 (15.0)	169.3 (6.67)	18.8 (41.45)	19.4 (42.77)
80	63	81.7 (3.22)	54.5 (2.15)	42.5 (1.67)	215 (8.46)	200 (7.87)	380.3 (15.0)	169.3 (6.67)	22.8 (50.27)	23.4 (51.59)
80	100	80.9 (3.19)	54.5 (2.15)	42.5 (1.67)	230 (9.06)	200 (7.87)	380.3 (15.0)	169.3 (6.67)	26.8 (59.08)	27.4 (60.41)
100	16	107 (4.21)	80.9 (3.19)	54.5 (2.15)	220 (8.66)	250 (9.84)	396.8 (15.7)	171.5 (6.75)	21.4 (47.18)	22 (48.50)
100	40	107 (4.21)	80.9 (3.19)	54.5 (2.15)	235 (9.25)	250 (9.84)	396.8 (15.7)	171.5 (6.75)	24.4 (53.79)	25 (55.12)
100	63	106 (4.17)	80.9 (3.19)	54.5 (2.15)	250 (9.84)	250 (9.84)	396.8 (15.7)	171.5 (6.75)	29.4 (64.82)	30 (66.14)
100	100	104 (4.09)	80.9 (3.19)	54.5 (2.15)	265 (10.43)	250 (9.84)	396.8 (15.7)	171.5 (6.75)	35.4 (78.04)	36 (79.37)
150	16	159 (6.26)	107 (4.21)	80.9 (3.19)	285 (11.22)	300 (11.81)	416.3 (16.4)	191.5 (7.54)	35.2 (77.60)	35.8 (78.93)
150	40	159 (6.26)	107 (4.21)	80.9 (3.19)	300 (11.81)	300 (11.81)	416.3 (16.4)	191.5 (7.54)	41.2 (90.83)	41.8 (92.15)
150	63	157 (6.18)	107 (4.21)	80.9 (3.19)	345 (13.58)	300 (11.81)	416.3 (16.4)	191.5 (7.54)	59.2 (130.51)	59.8 (131.84)
150	100	154 (6.06)	107 (4.21)	80.9 (3.19)	355 (13.98)	300 (11.81)	416.3 (16.4)	191.5 (7.54)	67.2 (148.15)	67.8 (149.47)
200	10	207 (8.15)	159 (6.26)	107 (4.21)	340 (13.39)	300 (11.81)	442.1 (17.4)	202.8 (7.98)	37.8 (83.33)	38.4 (84.66)
200	16	207 (8.15)	159 (6.26)	107 (4.21)	340 (13.39)	300 (11.81)	442.1 (17.4)	202.8 (7.98)	37.8 (83.33)	38.4 (84.66)
200	25	207 (8.15)	159 (6.26)	107 (4.21)	360 (14.17)	300 (11.81)	442.1 (17.4)	202.8 (7.98)	46.8 (103.18)	47.4 (104.50)
200	40	207 (8.15)	159 (6.26)	107 (4.21)	375 (14.76)	300 (11.81)	442.1 (17.4)	202.8 (7.98)	54.8 (120.81)	55.4 (122.14)
250	10	260 (10.24)	207 (8.15)	159 (6.26)	395 (15.55)	380 (14.96)	468.8 (18.5)	229.5 (9.04)	57.4 (126.55)	58.0 (127.87)
250	16	260 (10.24)	207 (8.15)	159 (6.26)	405 (15.94)	380 (14.96)	468.8 (18.5)	229.5 (9.04)	58.4 (128.75)	59.0 (130.07)
250	25	259 (10.20)	207 (8.15)	159 (6.26)	425 (16.73)	380 (14.96)	468.8 (18.5)	229.5 (9.04)	74.4 (164.02)	75.0 (165.35)
250	40	259 (10.20)	207 (8.15)	159 (6.26)	450 (17.72)	380 (14.96)	468.8 (18.5)	229.5 (9.04)	92.4 (203.71)	93.0 (205.03)
300	10	310 (12.20)	260 (10.24)	207 (8.15)	445 (17.52)	450 (17.72)	492.8 (19.4)	255 (10.04)	75.7 (166.89)	76.3 (168.21)
300	16	310 (12.20)	260 (10.24)	207 (8.15)	460 (18.11)	450 (17.72)	492.8 (19.4)	255 (10.04)	82.2 (181.22)	82.8 (182.54)
300	25	308 (12.13)	260 (10.24)	207 (8.15)	485 (19.09)	450 (17.72)	492.8 (19.4)	255 (10.04)	98.7 (217.60)	99.3 (218.92)
300	40	308 (12.13)	260 (10.24)	207 (8.15)	515 (20.28)	450 (17.72)	492.8 (19.4)	255 (10.04)	127.5 (281.09)	128.1 (282.41)

FR - single reduction

²⁾ F2R - double reduction

Flanged version ANSI B16.5

Size	Pres- sure rating	Dimensions [mm (inch)]							Weight [kg (lb)]	
		a = 148.5 (5.85), b = 85.8 (3.38), c = 171.5 (6.76)							Flowmeter (without pres- sure sensor)	Flowmeter (with pres- sure sensor)
DN	Class	d	d FR ¹⁾	d F2R ²⁾	D	L	H	I		
½	150	16 (0.63)	-	-	90 (3.5)	200 (7.9)	358.8 (14.2)	169.3 (6.67)	4.5 (9.92)	5.1 (11.24)
½	300	16 (0.63)	-	-	95 (3.7)	200 (7.9)	358.8 (14.2)	169.3 (6.67)	4.9 (10.80)	5.5 (12.13)
½	600	14 (0.55)	-	-	95 (3.7)	200 (7.9)	358.8 (14.2)	169.3 (6.67)	5.1 (11.24)	5.7 (12.57)
1	150	27 (1.1)	15.8 (0.62)	-	110 (4.3)	200 (7.9)	358.4 (14.1)	169.3 (6.67)	6.2 (13.67)	6.8 (14.99)
1	300	27 (1.1)	15.8 (0.62)	-	125 (4.9)	200 (7.9)	358.4 (14.1)	169.3 (6.67)	7.2 (15.87)	7.8 (17.20)
1	600	24 (1.0)	15.8 (0.62)	-	125 (4.9)	200 (7.9)	358.4 (14.1)	169.3 (6.67)	7.5 (16.53)	8.1 (17.86)
1½	150	41 (1.6)	26.6 (1.1)	15.8 (0.6)	125 (4.9)	200 (7.9)	362.3 (14.3)	169.5 (6.67)	8.3 (18.30)	8.9 (19.62)
1½	300	41 (1.6)	26.6 (1.1)	15.8 (0.6)	155 (6.1)	200 (7.9)	362.3 (14.3)	169.5 (6.67)	10.4 (22.93)	11 (24.25)
1½	600	38 (1.5)	26.6 (1.1)	15.8 (0.6)	155 (6.1)	200 (7.9)	362.3 (14.3)	169.5 (6.67)	11.4 (25.13)	12 (26.46)
2	150	53 (2.1)	40.9 (1.6)	26.6 (1.1)	150 (5.9)	200 (7.9)	368.3 (14.5)	169.5 (6.67)	11 (24.25)	11.6 (25.57)
2	300	53 (2.1)	40.9 (1.6)	26.6 (1.1)	165 (6.5)	200 (7.9)	368.3 (14.5)	169.5 (6.67)	12.4 (27.34)	13 (28.66)
2	600	49 (1.9)	40.9 (1.6)	26.6 (1.1)	165 (6.5)	200 (7.9)	368.3 (14.5)	169.5 (6.67)	13.9 (30.64)	14.5 (31.97)
3	150	78 (3.1)	52.6 (2.1)	40.9 (1.6)	190 (7.5)	200 (7.9)	380.3 (15.0)	169.3 (6.67)	19.8 (43.65)	20.4 (44.97)
3	300	78 (3.1)	52.6 (2.1)	40.9 (1.6)	210 (8.3)	200 (7.9)	380.3 (15.0)	169.3 (6.67)	22.8 (50.27)	23.4 (51.59)
3	600	74 (2.9)	52.6 (2.1)	40.9 (1.6)	210 (8.3)	200 (7.9)	380.3 (15.0)	169.3 (6.67)	23.8 (52.47)	24.4 (53.79)
4	150	102 (4.0)	78 (3.1)	52.6 (2.1)	230 (9.1)	250 (9.8)	396.8 (15.7)	171.5 (6.76)	23.4 (51.59)	24 (52.91)
4	300	102 (4.0)	78 (3.1)	52.6 (2.1)	255 (10)	250 (9.8)	396.8 (15.7)	171.5 (6.76)	31.4 (69.23)	32 (70.55)
4	600	97 (3.8)	78 (3.1)	52.6 (2.1)	275 (11)	250 (9.8)	396.8 (15.7)	171.5 (6.76)	40.4 (89.07)	41 (90.39)
6	150	154 (6.1)	102 (4.0)	78.0 (3.1)	280 (11)	300 (12)	416.3 (16.4)	191.5 (7.54)	36.2 (79.81)	36.8 (81.13)
6	300	154 (6.1)	102 (4.0)	78.0 (3.1)	320 (13)	300 (12)	416.3 (16.4)	191.5 (7.54)	51.2 (112.88)	51.8 (114.20)
6	600	146 (5.8)	102 (4.0)	78.0 (3.1)	355 (14)	300 (12)	416.3 (16.4)	191.5 (7.54)	76.2 (167.99)	76.8 (169.31)
8	150	203 (8.0)	154 (6.1)	102 (4.0)	345 (14)	300 (12)	442.1 (17.4)	202.8 (8.0)	50.0 (110.23)	50.6 (111.55)
8	300	203 (8.0)	154 (6.1)	102 (4.0)	380 (15)	300 (12)	442.1 (17.4)	202.8 (8.0)	74.8 (164.91)	75.4 (166.23)
10	150	255 (10.0)	203 (8.0)	154 (6.1)	405 (16)	380 (15)	468.8 (18.5)	229.5 (9.04)	74.4 (164.02)	75.0 (165.35)
10	300	255 (10.0)	203 (8.0)	154 (6.1)	455 (18)	380 (15)	468.8 (18.5)	229.5 (9.04)	106.4 (234.57)	107.0 (235.89)
12	150	305 (12.0)	255 (10.0)	203 (8.0)	485 (19)	450 (18)	492.8 (19.4)	255 (10.0)	106.4 (234.35)	107.0 (235.67)
12	300	305 (12.0)	255 (10.0)	203 (8.0)	520 (21)	450 (18)	492.8 (19.4)	255 (10.0)	151.4 (333.56)	152.0 (334.88)

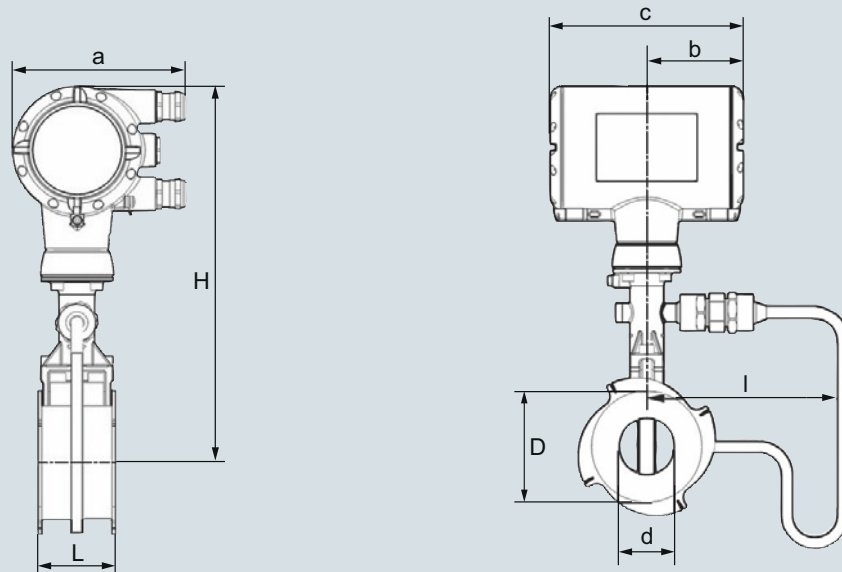
1) FR - single reduction

2) F2R - double reduction

Flow Measurement

SITRANS F X

SITRANS FX330



Sandwich version with pressure sensor

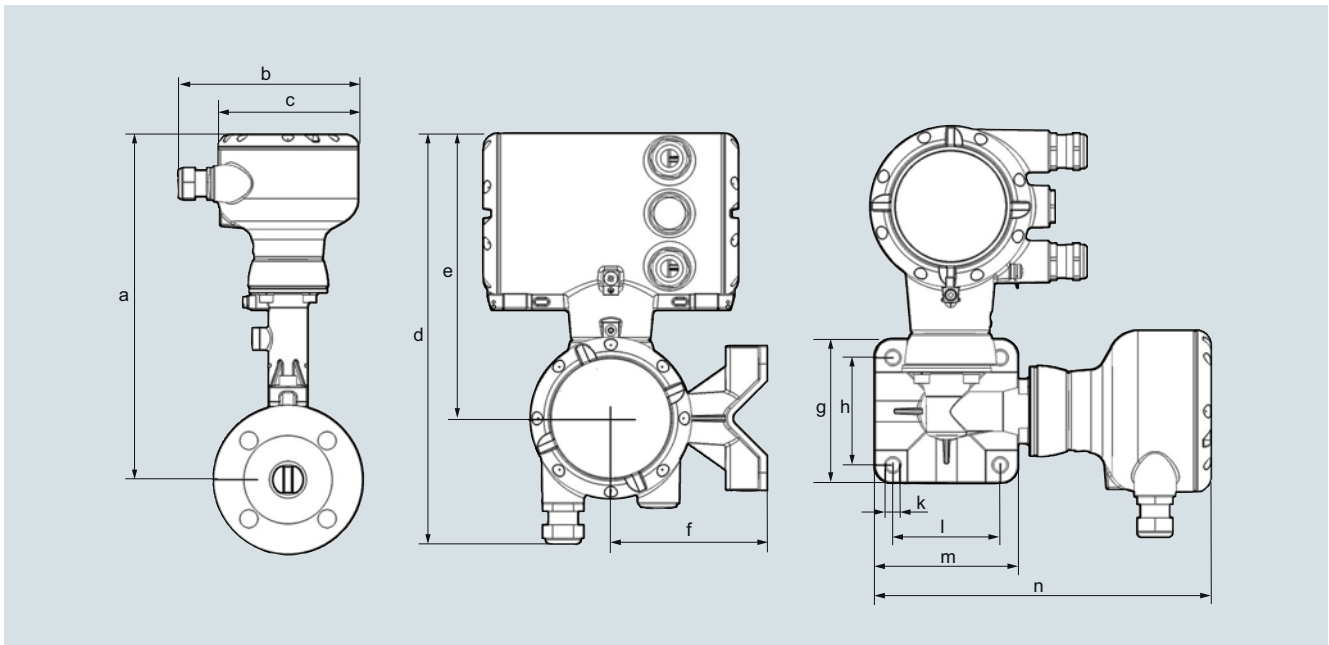
Sandwich version EN

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 sen- sor)
15	16 ... 100	133 (5.24)	105 (4.13)	179 (7.05)	16 (0.63)	45 (1.77)	65 (2.56)	265 (10.43)	174.25 (6.86)	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)	174.25 (6.86)	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)	174.5 (6.87)	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)	174.5 (6.87)	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)	174.25 (6.86)	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)	176.5 (6.95)	9.5 (20.94)	10.1 (22.27)

Sandwich version ANSI

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	5.32	4.26	7.25	0.63	1.77	2.56	10.43	6.82	7.72	9.04
½"	600	5.32	4.26	7.25	0.55	1.77	2.56	10.43	6.82	7.72	9.04
1"	150, 300, 600	5.32	4.26	7.25	0.94	2.56	2.56	10.43	6.82	9.48	10.80
1½"	150, 300, 600	5.32	4.26	7.25	1.50	3.23	2.56	10.63	6.87	10.80	12.13
2"	150, 300, 600	5.32	4.26	7.25	1.97	4.02	2.56	10.83	6.87	13.23	14.55
3"	150, 300, 600	5.32	4.26	7.25	2.91	5.31	2.56	11.42	6.82	18.08	19.40
4"	150, 300, 600	5.32	4.26	7.25	3.82	6.22	2.56	12.20	6.95	20.94	22.27

Remote version



Dimension a

	Flanged and Sandwich version						Flanged version			
DN	15	25	40	50	80	100	150	200	250	300
	½"	1"	1½"	2"	3"	4"	6"	8"	10"	12"
[mm]	265.7	265.2	269.2	275.2	287.2	303.7	323.2	348.9	375.7	399.7
[inch]	10.5	10.4	10.6	10.8	11.3	12.0	12.7	13.7	14.8	15.7

Dimension a F1/2R

	Flanged version									
DN	15	25	40	50	80	100	150	200	250	300
	½"	1"	1½"	2"	3"	4"	6"	8"	10"	12"
F1R ¹⁾ [mm]	-	315.7	315.2	319.2	325.2	337.2	353.7	373.2	398.9	425.7
F1R ¹⁾ [inch]	-	12.4	12.4	12.6	12.8	13.3	13.9	14.7	15.7	16.8
F2R ²⁾ [mm]	-	-	315.7	315.2	319.2	325.2	337.2	353.7	373.2	398.9
F2R ²⁾ [inch]	-	-	12.4	12.4	12.6	12.8	13.3	13.9	14.7	15.7

1) FR - single reduction

2) F2R - double reduction

Dimension b ... n

	b	c	d	e	f	g	h	j	k	l	m	n
[mm]	139	108	276	191	105	97	72	108	9	72	97	226
[inch]	5.46	4.25	10.9	7.53	4.14	3.82	2.84	4.25	0.35	2.84	3.82	8.90

Flow Measurement

SITRANS F X

SITRANS FX330

Flow tables

Measuring Range Limits

Water

Size		Q _{min}	Q _{max}	Q _{min}	Q _{max}
DN to EN 1092-1	DN to ANSI B16.5	EN 1092-1 [m ³ /h]	EN 1092-1 [m ³ /h]	ANSI B16.5 [m ³ /h]	ANSI 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		Q _{min}	Q _{max}	Q _{min}	Q _{max}
DN to EN 1092-1	DN to ANSI B16.5	EN 1092-1 [m ³ /h]	EN 1092-1 [m ³ /h]	ANSI B16.5 [m ³ /h]	ANSI 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	1 238.6
100	4"	165.19	2 128.27	165.19	2 128.27
150	6"	374.23	4 821.60	374.23	4 821.6
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})

Measuring range saturated steam: 1 to 7 bar

Overpressure [bar]		1		3.5		5.2		7	
Density [kg/m ³]		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 ANSI 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	56.80	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	191.00	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	11 696.0	743.45	15 798.0	838.44	20 093.0
200	8"	821.9	10 279.0	1 201.6	21 970.0	1 396.5	29 675.0	1 574.9	37 743.0
250	10"	1 313.9	16 433.0	1 920.9	35 122.0	2 232.5	47 439.0	2 517.7	60 337.0
300	12"	1 908.3	23 866.0	2 789.8	51 010.0	3 242.4	68 899.0	3 656.6	87 630.0

Measuring range saturated steam: 10.5 to 20 bar

Overpressure [bar]		10.5		14.0		17.5		20.0	
Density [kg/m ³]		5.88803		7.60297		9.31702		10.5442	
Temperature [°C]		186.2		198.5		208.7		215.0	
Flow [kg/h]		min.	max.	min.	max.	min.	max.	min.	max.
DN to EN 1092-1	DN to ANSI 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	30.60	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	499.90	14 013	553.38	15 608.0	588.69	16 666
150	6"	996.62	27 725.0	1 132.5	31 747	1 253.7	35 359.0	1 333.7	37 756
200	8"	1 872.1	52 079.0	2 127.3	59 634	2 354.9	66 419.0	2 505.2	70 921
250	10"	2 992.7	83 254.0	3 400.7	95 333	3 764.6	106 180.0	4 004.9	113 380
300	12"	4 346.5	120 920.0	4 939.1	138 460	5 467.5	154 210	5 816.5	164 660

Flow Measurement

SITRANS F X

SITRANS FX330

Measuring range saturated steam: 15 to 100 psig

Overpressure [psig]		15		50		75		100	
Density [lb/ft³]		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 ANSI 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	430.30	44.15	585.06	49.59	738.09
40	1½"	65.81	829.61	94.92	1 726.0	110.68	2 346.7	124.32	2 960.5
50	2"	113.94	1 436.3	164.34	2 988.0	191.63	4 062.9	215.23	5 125.6
80	3"	249.57	3 146.1	360.00	6 545.3	419.74	8 899.4	471.45	11 227.0
100	4"	428.81	5 405.7	618.51	11 246.0	721.21	15 291.0	810.06	19 291.0
150	6"	971.47	12 246.0	1 401.2	25 478.0	1 633.9	34 642.0	1 835.2	43 703.0
200	8"	1 824.8	23 004.0	2 632.1	47 859.0	3 069.1	65 072.0	3 447.2	82 092.0
250	10"	2 917.2	36 774.0	4 207.7	76 508.0	4 906.4	104 030.0	5 510.8	131 230.0
300	12"	4 236.8	53 410.0	6 111.1	111 120.0	7 125.8	151 080.0	8 003.6	190 600.0

Measuring range saturated steam: 150 to 300 psig

Overpressure [psig]		150		200		250		300	
Density [lb/ft³]		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 ANSI 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	74.10	1 647.8	80.63	1 951.5
40	1½"	147.72	4 107.2	167.83	4 702.8	185.76	5 237.0	202.15	5 728.0
50	2"	255.75	7 111.9	290.56	8 141.9	321.60	9 066.8	350.00	9 917.0
80	3"	560.19	15 578.0	636.44	17 834.0	704.43	19 860.0	766.60	21 722.0
100	4"	962.54	26 766.0	1 093.5	30 643.0	1 210.4	34 124.0	1 317.2	37 324.0
150	6"	2 180.6	60 639.0	2 477.4	69 421.0	2 742.1	77 307.0	2 984.0	84 556.0
200	8"	4 096.1	113 900.0	4 653.6	130 400.0	5 150.7	145 210.0	5 605.2	158 830.0
250	10"	6 548.1	182 090.0	7 439.3	208 460.0	8 234.1	232 140.0	8 960.6	253 910.0
300	12"	9 510.2	264 460.0	10 805.0	302 760.0	11 959.0	337 150.0	13 014.0	368 770.0

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

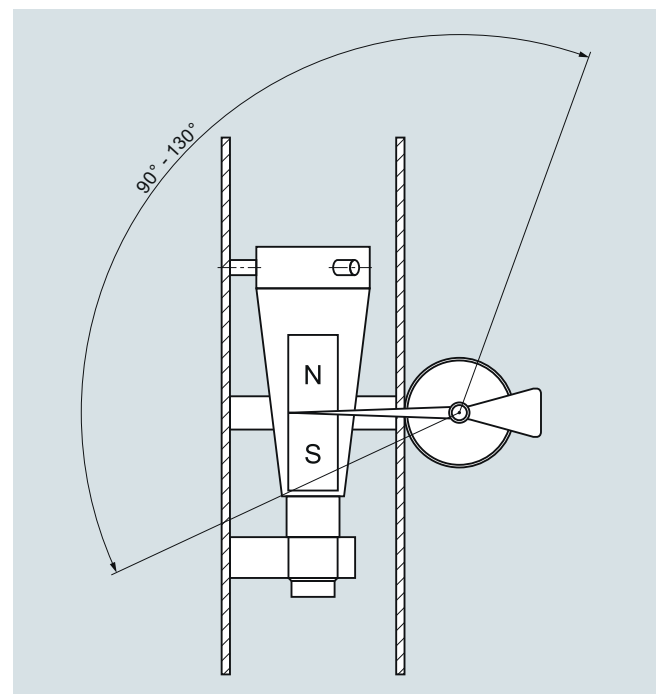
Design

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 3/389
Design and function	See page 3/389
Measuring principle	Variable area flowmeter
Input	
Measuring range	See table on page 3/391
Pressure rating	PN 16 ... PN 100 (232 ... 1450 psi) depending on version (see table on page 3/391)
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 acc. to VDI/VDE 3513-2	
• For liquids	± 1.6% (q _G = 50 %)
• For gases	± 2.0% (q _G = 50 %)
Reproducibility	0.5 % of the measuring range limit (URV)
Operating temperature	See page 3/391
Operating pressure	Min. operating pressure > 2x pressure drop (see table on page 3/391)
Design	
Flanges	EN 1092-1, ANSI B16.5
Material	
• Fitting	Stainless steel, Hastelloy
• Float	Stainless steel, Hastelloy, PTFE
• Wetted parts materials	Stainless steel, 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: 2011	Interference immunity industrial sector
• EN 61000-6-3	Emitted interference residential sector
• EN 55011: 2011	Group 1, Class B
• NAMUR recommendation	NE 21

Classification according to pressure equipment directive (PED 2014/68/EU)

Article No. 7ME586x-	Permissible media	Category
DN 15	Gases of fluid group 1 and liquids of fluid group 1	Article 4.3
DN 20		Article 4.3
DN 25		Article 4.3
DN 32		III
DN 40		III
DN 50		III
DN 65		III
DN 80		III
DN 100		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 kΩ)
Explosion protection	II 2G EEx ia IIC T6 - T4 Gb
EC-Type Examination Certificate for Directive 2014/34/EU	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, IEC 60947-5-6:1999)
Temperature influence	≤ ± 0.5 % of the measuring range limit (URV)/10 K
Explosion protection	II 2G Ex ia IIC T6 Gb
EC-Type Examination Certificate for Directive 2014/34/EU	BVS 07 ATEX E 033
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	≤ ± 0.5 % of the measuring range limit (URV)/10 K
Explosion protection	II 2G Ex ia IIC T6 Gb
EC-Type Examination Certificate for Directive 2014/34/EU	BVS 07 ATEX E 033

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)

Measuring range availability guide

Version	CF-S	EF-H	FF-P
Wetted parts materials	Mat. No. 1.4404/AISI 316L	Hastelloy	PTFE
Fitting	Mat. No. 1.4404/AISI 316L	≤ DN 25 (1"): Hastelloy > DN 25 (1"): Hastelloy/Mat. No. 1.4404/AISI 316L	Mat. No. 1.4404/AISI 316L with PTFE lining
Flange	Mat. No. 1.4404/AISI 316L	≤ DN 25 (1"): Hastelloy > DN 25 (1"): Hastelloy/Mat. No. 1.4404/AISI 316L	Mat. No. 1.4404/AISI 316L with PTFE lining
Float/flow tube	Mat. No. 1.4404/AISI 316L	Hastelloy	PTFE
Max. media temperature	-20 ... +200 °C (-4 ... +392 °F) (optional -80 ... +350 °C (-112 ... +662 °F))		-20 ... +125 °C (-4 ... +257 °F)
Nominal pressure	DN15 ... 50 (½" ... 2") PN 40 (580 psi) DN 65 ... 100 (2 ½" ... 4") PN 16 (232 psi)	DN15 ... 50 (½" ... 2") PN 40 (580 psi) DN 65 ... 100 (2 ½" ... 4") PN 16 (232 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 m³/h with density: 1.293 kg/m³, 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⁾	-	-	-	-	-	-	0.5 ... 5	0.0022 ... 0.022	0.015 ... 0.15	0.0088 ... 0.088
11	44 ¹⁾	-	-	-	-	-	-	0 ... 10	0.0044 ... 0.044	0.03 ... 0.3	0.0177 ... 0.177
12	40 ¹⁾	-	-	-	-	-	-	1.6 ... 16	0.007 ... 0.07	0.045 ... 0.48	0.0265 ... 0.283
13	40 ¹⁾	-	-	-	-	-	-	2.5 ... 25	0.011 ... 0.11	0.075 ... 0.75	0.0441 ... 0.441
14	40 ¹⁾	-	-	-	-	-	-	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	-	-	-	-	-	10 ... 100	0.044 ... 0.44	0.3 ... 3	0.177 ... 1.77
20	-	60	-	-	-	-	-	16 ... 160	0.07 ... 0.7	0.5 ... 4.6	0.29 ... 2.71
21	-	60	-	-	-	-	-	25 ... 250	0.11 ... 1.1	0.7 ... 7	0.412 ... 4.12
22	-	70	-	-	-	-	-	40 ... 400	0.176 ... 1.76	1.0 ... 11	0.589 ... 6.47
23	-	80	-	-	-	-	-	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 ²⁾	-	-	-	250 ... 2 500	1.1 ... 11	6 ... 70	4.12 ... 41.2
27	-	-	240 ²⁾	120 ²⁾	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.

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

Sensor size availability guide

Type CF-S and EF-H

Order Code	Diameter Flange		Flow tube						
			1	2	3	4	5	6	7
A	DN 15	½"	• ¹⁾	•	•	–	–	–	–
B	DN 20	¾"	• ¹⁾	•	•	–	–	–	–
C	DN 25	1"	• ¹⁾	•	•	• ²⁾	–	–	–
D	DN 32	1¼"	• ¹⁾	•	•	•	–	–	–
E	DN 40	1½"	• ¹⁾	•	•	•	• ²⁾	–	–
F	DN 50	2"	• ¹⁾	•	•	•	•	–	–
G	DN 65	2½"	–	–	•	•	•	• ²⁾	–
H	DN 80	3"	–	–	–	•	•	•	–
J	DN 100	4"	–	–	–	–	•	•	•

Type FF-P

Order Code	Diameter Flange		Flow tube						
			1	2	3	4	5	6	7
A	DN 15	½"	–	• ²⁾	–	–	–	–	–
B	DN 20	¾"	–	• ³⁾	–	–	–	–	–
C	DN 25	1"	–	•	•	–	–	–	–
D	DN 32	1¼"	–	–	–	–	–	–	–
E	DN 40	1½"	–	–	–	•	–	–	–
F	DN 50	2"	–	–	–	–	•	–	–
G	DN 65	2½"	–	–	–	–	–	–	–
H	DN 80	3"	–	–	–	–	–	•	–
J	DN 100	4"	–	–	–	–	–	–	•

Type CF-S and EF-H

Order Code	Diameter Female thread		Flow tube						
			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	–	–	–	–	•	–	–

Note: Female thread not available for type FF-P

• Available

– Not available

¹⁾ Not available for type EF-H.

²⁾ Only with EN 1092-1 flange.

³⁾ Only with ANSI B16.5 flange.

Flange sealing surface selection guide

Order Code	Diameter flange EN 1092-1	Flow tube						
		1	2	3	4	5	6	7
A	DN 15	N11	N11	N11	–	–	–	–
B	DN 20	N12	N12	N12	–	–	–	–
C	DN 25	–	–	N13	N13	–	–	–
D	DN 32	–	–	–	N14	–	–	–
E	DN 40	–	–	–	N15	N15	–	–
F	DN 50	–	–	–	–	N16	–	–
G	DN 65	–	–	–	–	–	N17	–
H	DN 80	–	–	–	–	–	N18	–
J	DN 100	–	–	–	–	–	–	N19

Order Code	Diameter flange ANSI B16.5	Flow tube						
		1	2	3	4	5	6	7
A	1/2"	N21	N21	N21	–	–	–	–
B	3/4"	N22	N22	N22	–	–	–	–
C	1"	–	–	N23	–	–	–	–
D	1 1/4"	–	–	–	N24	–	–	–
E	1 1/2"	–	–	–	N25	–	–	–
F	2"	–	–	–	–	N26	–	–
G	2 1/2"	–	–	–	–	N27	–	–
H	3"	–	–	–	–	–	N28	–
J	4"	–	–	–	–	–	–	N29

Flow Measurement

SITRANS F VA

SITRANS FVA250 variable area meter

Selection and ordering data

Article No.

SITRANS FVA250 Full metal variable area meter

7ME586 - - - - -

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Flow tube

Liquid	Gas
5 ... 40 l/h	0.15 ... 1.3 m ³ /h
50 ... 600 l/h	1.5 ... 17 m ³ /h
1 000 ... 4 000 l/h	30 ... 110 m ³ /h
2.5 ... 6 m ³ /h	70 ... 170 m ³ /h
4 ... 25 m ³ /h	30 ... 700 m ³ /h
16 ... 50 m ³ /h	460 ... 1 350 m ³ /h
60 ... 100 m ³ /h	1 700 ... 3 000 m ³ /h

1
2
3
4
5
6
7

Design

Type: CF-S (standard)

Fitting: Stainless steel

Flange: Stainless steel

Float: Stainless steel

Type: EF-H

Fitting: Stainless steel, Hastelloy

Flange: Stainless steel, Hastelloy

Float: Hastelloy

Type: FF-P

Fitting: Stainless steel with PTFE lining

Flange: Stainless steel with PTFE lining

Float: PTFE

2
4
5

Diameter

DN 15/ANSI ½"

DN 20/ANSI ¾"

DN 25/ANSI 1"

DN 32/ANSI 1¼"

DN 40/ANSI 1½"

DN 50/ANSI 2"

DN 65/ANSI 2½"

DN 80/ANSI 3"

DN 100/ANSI 4"

Female thread ¼"

Female thread 3/8"

Female thread ½"

Female thread ¾"

Female thread 1"

Female thread 1¼"

Female thread 1½"

Female thread 2"

A
B
C
D
E
F
G
H
J
K
Q
R
S
T
U
V
W
X

Process connection

EN 1092-1, PN 16, Form B1

EN 1092-1, PN 40, Form B1

EN 1092-1, PN 63, Form B2

EN 1092-1, PN 100, Form B2

ANSI B16.5, class 150 RF

ANSI B16.5, class 300 RF

ANSI B16.5, class 600 RF

ISO 228-1 G pipe thread PN 63

ISO 228-1 G pipe thread PN 100

ANSI B1.20.1 NPT pipe thread 900 lbs

ANSI B1.20.1 NPT pipe thread 1500 lbs

B
D
E
F
J
K
L
T
U
N
P

3

Selection and ordering data				Article No.
SITRANS FVA250 Full metal variable area meter				7ME586 - - - - -
Measuring ranges				
<u>Liquids</u>		<u>Gases</u>		
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				0
Standard (aluminum) with displaced display - up to 350 °C with local display and electrical outputs				1
Stainless steel IP66 - up to 200 °C with local display/150 °C with electrical outputs				2
Stainless steel IP66 with displaced display - up to 350 °C with local display and electrical outputs				3
Heating/cooling jacket				
Without (standard)				A
With flange connection EN1092-1 DN 15 PN 40				B
With flange connection ½ " ANSI B16.5 Class 150 RF				C
Display/outputs				
With display				A
With display, 1 limit switch				B
With display, 2 limit switches				C
With display, HART and 4 to 20 mA				D
With display, HART, 4 to 20 mA, 2 limit switches				E
With display, HART, 4 to 20 mA, 1 limit switch				F
With display, PROFIBUS PA				G
Calibration				
Standard calibration				0
• Without calibration certificate				1
• With calibration certificate				

Flow Measurement

SITRANS F VA

SITRANS FVA250 variable area meter

Selection and ordering data

Order code

Other types of liquid and gas measurement

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

Certificates

Certificate of compliance EN 10204-2.1	C10
Factory inspection certificate EN 10204-2.2	C11
Material certificate according to EN 10204-3.1	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
--------------------	------------

Flange sealing surface

Sealing surface according to EN 1092-1 welding neck flange

• DN 15	N11
• DN 20	N12
• DN 25	N13
• DN 32	N14
• DN 40	N15
• DN 50	N16
• DN 65	N17
• DN 80	N18
• DN 100	N19

Sealing surface according to ANSI B16.5 welding neck flange

• ½ inch	N21
• ¾ inch	N22
• 1 inch	N23
• 1¼ inch	N24
• 1½ inch	N25
• 2 inch	N26
• 2½ inch	N27
• 3 inch	N28
• 4 inch	N29

Specification of medium process data (specify in plain text)

Specification always required for each order:

Medium	Y01
Operating pressure	
Operating temperature	
Density (only for customer-specified medium)	
Viscosity (only for customer-specified medium)	
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:

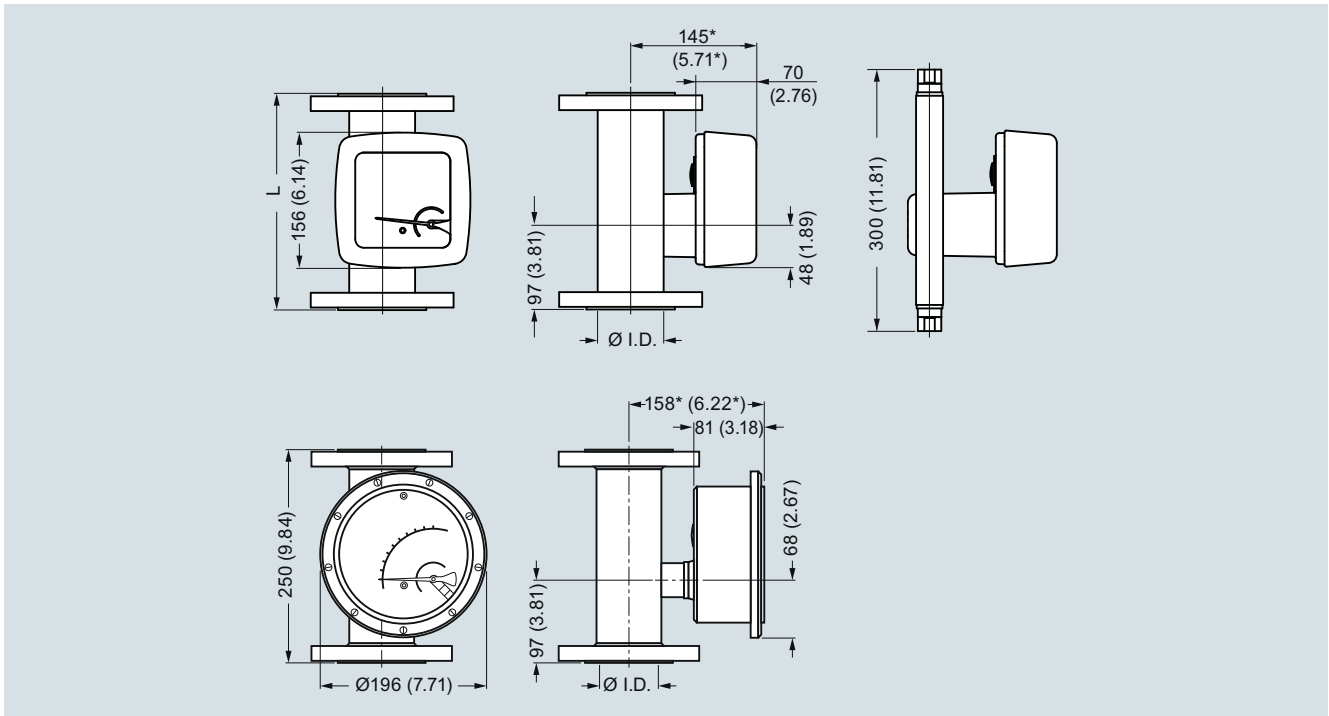
For possible combinations of nominal diameters and flow tube, see table on page 3/392

Operating instructions

Description	Article-No.
SITRANS FVA250	
• English	A5E03821131
• German	A5E32108136

All literature is available to download for free, in a range of languages, at www.siemens.com/processinstrumentation/documentation

Dimensional drawings



Order Code	Diameter flange EN 1092-1	Flow tube I.D. [mm]						
		1	2	3	4	5	6	7
A	DN 15	26 ¹⁾	26 ¹⁾	32 ¹⁾	-	-	-	-
B	DN 20	26 ¹⁾	26 ¹⁾	32 ¹⁾	-	-	-	-
C	DN 25	26	26	32 ¹⁾	46 ¹⁾	-	-	-
D	DN 32	26	26	32	46 ¹⁾	-	-	-
E	DN 40	26	26	32	46 ¹⁾	70 ¹⁾	-	-
F	DN 50	26	26	32	46	70 ¹⁾	-	-
G	DN 65	-	-	32	46	70	102 ¹⁾	-
H	DN 80	-	-	-	46	70	102 ¹⁾	-
J	DN 100	-	-	-	-	70	102	125 ¹⁾

*) +100 mm with displaced display unit.

¹⁾ Flange sealing surface not according to EN 1092-1 (Please select N-option for EN 1092-1 compliant flange sealing surface)

SITRANS FVA250, dimensions in mm

Order Code	Diameter flange ANSI B16.5	Flow tube I.D. [inch]						
		1	2	3	4	5	6	7
A	½"	1.02 ¹⁾	1.02 ¹⁾	1.26 ¹⁾²⁾	-	-	-	-
B	¾"	1.02 ¹⁾	1.02 ¹⁾	1.26 ¹⁾	-	-	-	-
C	1"	1.02	1.02	1.26 ¹⁾	-	-	-	-
D	1¼"	1.02	1.02	1.26	1.81 ¹⁾	-	-	-
E	1½"	1.02	1.02	1.26	1.81 ¹⁾	-	-	-
F	2"	1.02	1.02	1.26	1.81	2.76 ¹⁾	-	-
G	2½"	-	-	1.26	1.81	2.76	-	-
H	3"	-	-	-	1.81	2.76	4.02 ¹⁾	-
J	4"	-	-	-	-	2.76	4.02	4.92 ¹⁾

*) +3.94 inch with displaced display unit.

¹⁾ Flange sealing surface not according to ANSI B16.5 (Please select N-option for ANSI B16.5 compliant flange sealing surface)

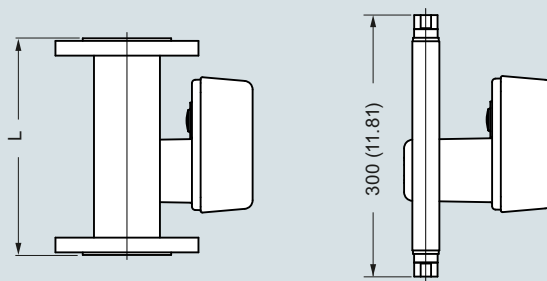
²⁾ Flange with threaded holes

SITRANS FVA250, dimensions in inch

Flow Measurement

SITRANS F VA

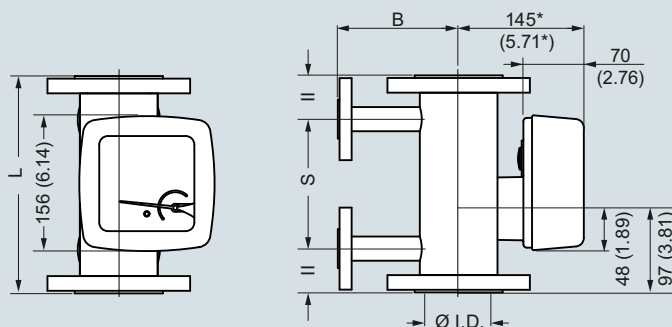
SITRANS FVA250 variable area meter



Diameter	EN 1092-1				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

SITRANS FVA250 build-in length, dimensions in mm (inch)






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

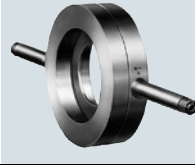
SITRANS FVA250 with heating/cooling jacket, dimensions in mm (inch)

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 1For **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 1Measuring 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 aSiemens FI 01 · 2018nd 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 2014/68/EU (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.

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Technical description

Classification in accordance with pressure equipment directive 2014/68/EU (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 4 paragraph 3 according to danger potential (medium/pressure/volume/nominal diameter).

Submission of this design data in accordance with pressure equipment directive 2014/68/EU 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 4 paragraph 3 in the Order code.

Detailed information is available under "Pressure equipment directive 2014/68/EU".

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 4 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 tapplings

In the version of the orifice plate with single tapplings the orifice plate is a single unit. The inside of the tube is connected to the tapping sockets by two single tapplings.

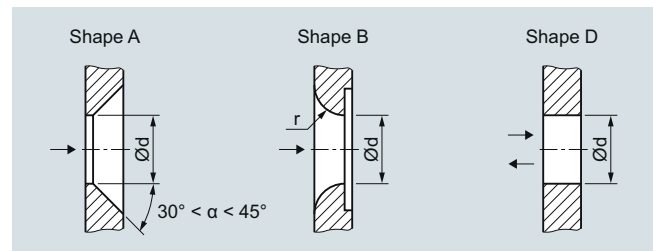
Both types of orifice plate are installed between two flanges in the pipeline.

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.

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.

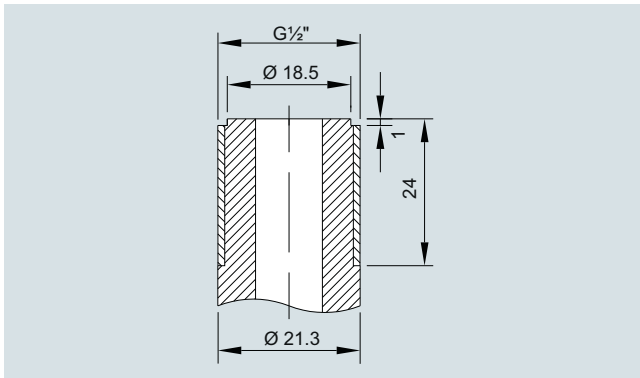
- With threaded connection G $\frac{1}{2}$ DIN ISO 228/1, connection dimensions to DIN 19207 Form V, for liquids and gases up to PN 160, for steam up to PN 100
- With threaded connection $\frac{1}{2}$ -14 NPT male, for version acc. to ASME up to class 600
- With \varnothing 12 mm pipe connection for 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.

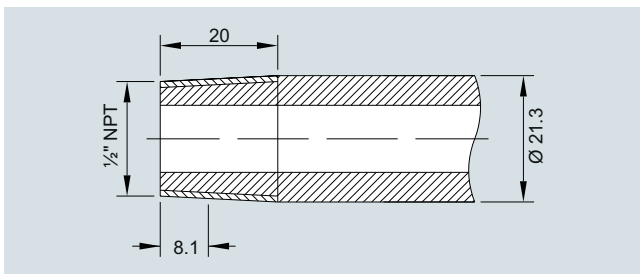
Length of tapping sockets

The length of the tapping sockets are specified in DIN 19205, Part 2.

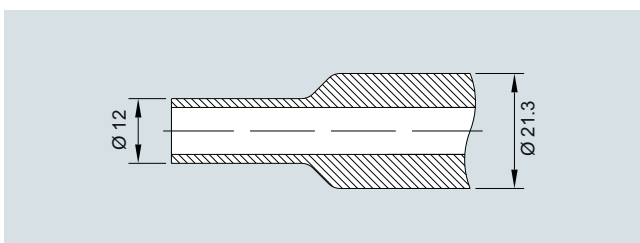
If using with high temperatures and stronger insulations, please quote the insulation thickness and the required length of the tapping sockets when placing an order.



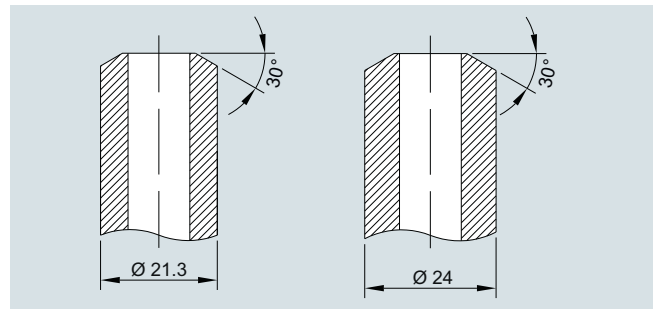
Threaded connections of tapping sockets for liquids and gases up to PN 160, for steam up to PN 100, dimensions in mm



Threaded connection $\frac{1}{2}$ -14 NPT male, dimensions in mm



With \varnothing 12 mm pipe for pipe union with ferrule, dimensions in mm

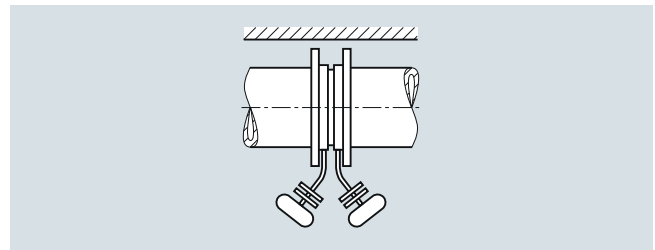


Welding connections of tapping sockets, dimensions in mm

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.

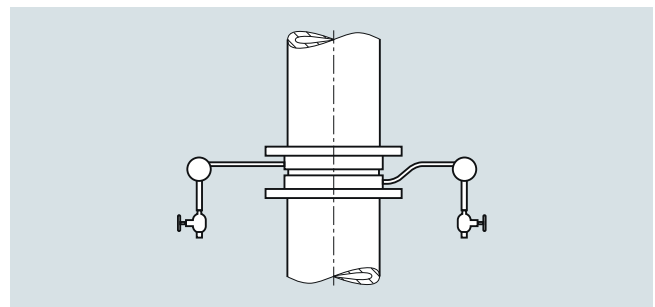
- Horizontal steam lines



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

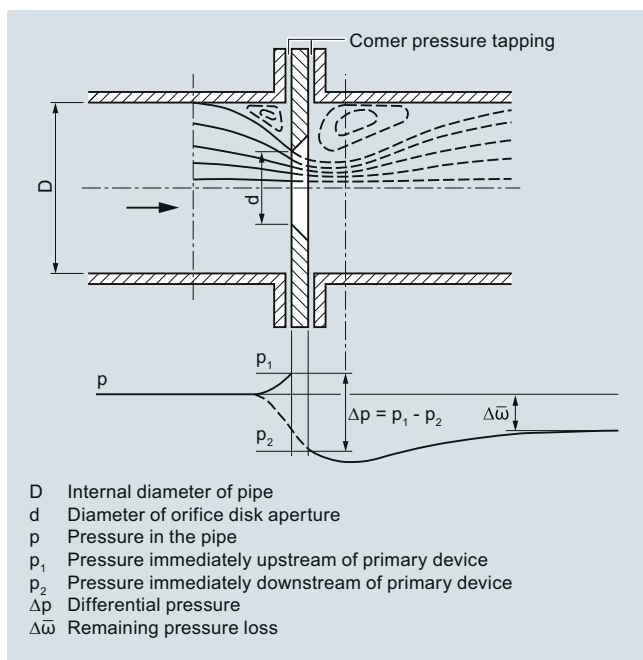
No.	Pipe position and flow direction	Position of the tapping sockets	Applica-tion
1	Horizontal →	180°	With compensation vessels
2 1)2)		0°	
3 1)2)			
4	Vertical Rising ↑	90°	Without compensation vessels
5	Falling ↓		
6	Rising ↑	180°	
7	Falling ↓		
10	Horizontal →	$<\gamma^3$	Without compensation vessels
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: $q = c v \Delta p$

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.

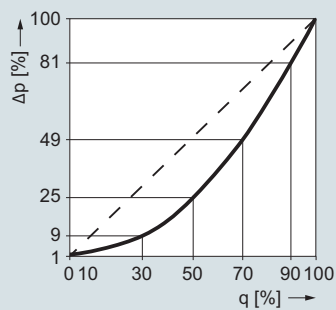
Options

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

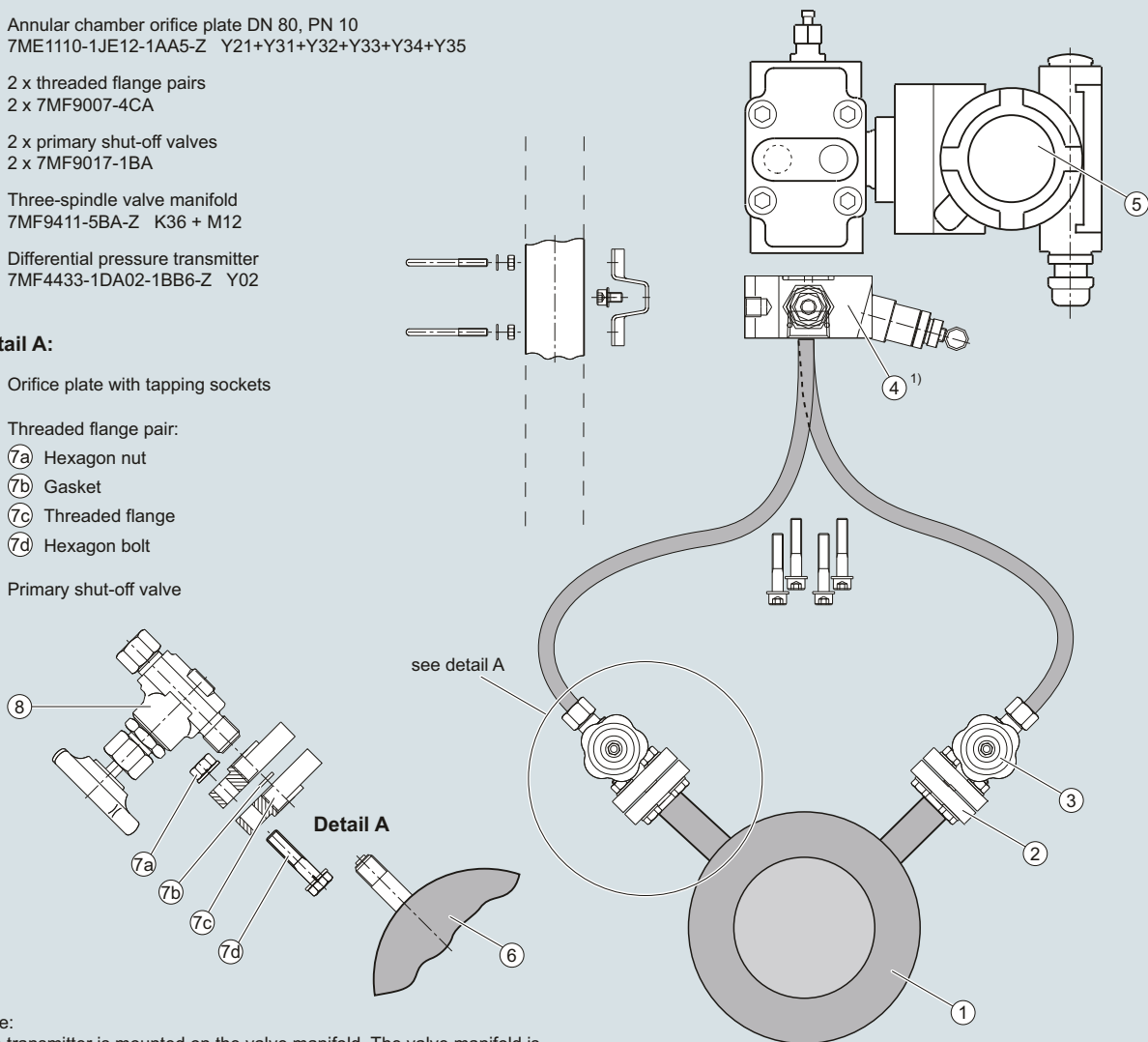
SITRANS F O delta p - Primary differential pressure devices

Technical description

- ① Annular chamber orifice plate DN 80, PN 10
7ME1110-1JE12-1AA5-Z Y21+Y31+Y32+Y33+Y34+Y35
- 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 K36 + M12
- ⑤ Differential pressure transmitter
7MF4433-1DA02-1BB6-Z Y02

Detail A:

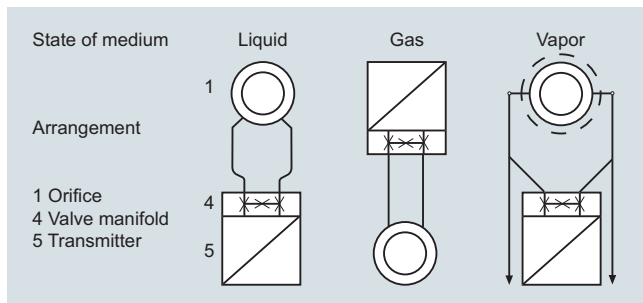
- ⑥ Orifice plate with tapping sockets
- ⑦ Threaded flange pair:
 - ⑦a Hexagon nut
 - ⑦b Gasket
 - ⑦c Threaded flange
 - ⑦d Hexagon bolt
- ⑧ Primary shut-off valve



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

Overview

The pressure equipment directive **2014/68/EU** involves the harmonization of the laws of European member states on pressure equipment. Pressure equipment in the sense of the Directive includes vessels, pipelines and components with a maximum allowable pressure greater than **0.5 bar** above atmospheric pressure.

Classification according to hazard potential

The classification of the devices according to the pressure equipment directive takes place according to the hazard potential (medium/pressure/volume/nominal width) in the categories I to IV or article 4 paragraph 3.

The following criteria are decisive for assessing the hazard potential; they are also listed in diagrams 1 to 4 and 6 to 9:

• Fluid group	Group 1 or 2
• Aggregate state	Liquid, gas
• Shape of the pressure equipment	
- Vessel	Product of pressure and volume (PS * V [barL])
- Pipeline	Nominal width, pressure or product of pressure and nominal width (PS * DN)

The fired or otherwise heated pressure equipment is listed separately in diagram 5.

Note:

Liquid fluids according to article 4 are those liquids whose vapor pressure at the maximum permitted temperature is **not** more than **0.5 bar** above the normal atmospheric pressure (1013 mbar).

The **maximum permitted temperature** for the utilized liquids is the maximum process temperature as specified by the user. It must be within the limits specified for the device.

Classification of the media (liquid/gas) into fluid groups*

"Fluids" are gases, liquids and vapors in pure phase as well as their mixtures; fluids can include a suspension of solid matter; fluids are classified into the following fluid groups according to article 13 of the pressure equipment directive 2014/68/EU.

Paragraph aGroup 1

Group 1 consisting of substances and mixtures, as defined in points 7 and 8 of article 2 of Regulation (EC) No. 1272/2008, that are classified as hazardous in accordance with the following physical or health hazard classes laid down in parts 2 and 3 of annex I to that Regulation:

- i) unstable explosive substances/mixtures or explosive substances/ mixtures of divisions 1.1, 1.2, 1.3, 1.4 and 1.5
- ii) flammable gases, categories 1 and 2
- iii) oxidizing gases, category 1
- iv) flammable liquids, category 1 and 2
- v) flammable liquids, category 3 where the maximum permissible temperature is above the flash point
- vi) flammable solids, category 1 and 2
- vii) self-reactive substances and mixtures, type A to F
- viii) pyrophoric liquids, category 1
- ix) pyrophoric solids, category 1

- x) substances and mixtures which in contact with water emit flammable gases, category 1, 2 and 3
- xi) oxidizing liquids, category 1, 2 and 3
- xii) oxidizing solids, category 1, 2 and 3
- xiii) organic peroxides, types A to F
- xiv) acute oral toxicity, category 1 and 2
- xv) acute dermal toxicity, category 1 and 2
- xvi) acute inhalation toxicity, category 1, 2 and 3
- xvii) specific target organ toxicity - single exposure, category 1

Group 1 comprises also substances and mixtures in pressure equipment with a maximum allowable temperature TS which exceeds the flash point of the fluid.

Paragraph bGroup 2

All fluids that are not included in Group 1.

* from: "Directive 2014/68/EU of the European Parliament and of the Council of 15 May 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment (recast)"

Conformity assessment

Pressure equipment of category I to IV must meet the safety requirements set out in annex II and carry a CE marking.

They must meet a conformity assessment procedure set out in annex III of the Directive.

Pressure equipment to article 4 paragraph 3 shall be designed and manufactured in accordance with the sound engineering practice of a Member State and must not have a CE marking (CE markings from other Directives are not affected).

Siemens has (as long as the device is not subject to article 4 paragraph 3) conducted a conformity assessment for its products, given a CE marking and provided a declaration of conformity.

Monitoring of the design, dimensioning, testing and production takes place according to module H (full quality assurance).

Notes:

- Equipment designed for media with a high level of hazard (e.g. gases fluid group 1) may also be used for media with a lower hazard potential (e.g. gas of fluid group 2 or liquids of fluid group 1 and 2).
- According to article 1 paragraph 2, this directive shall not apply to equipment such as moveable offshore installations, ships, aircraft, networks for water and wastewater supply, nuclear plants, rockets and pipelines outside of industrial plants.

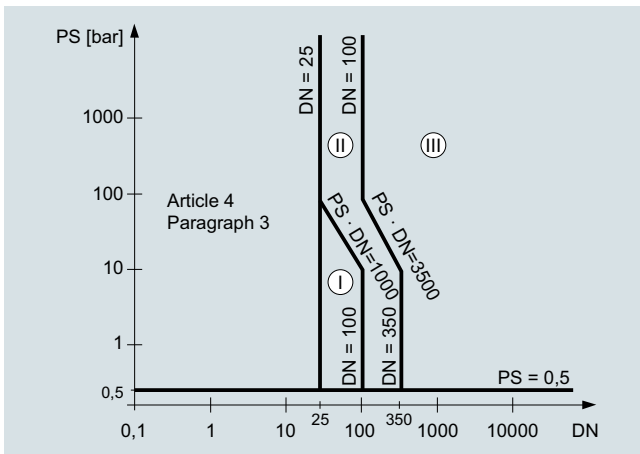
Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

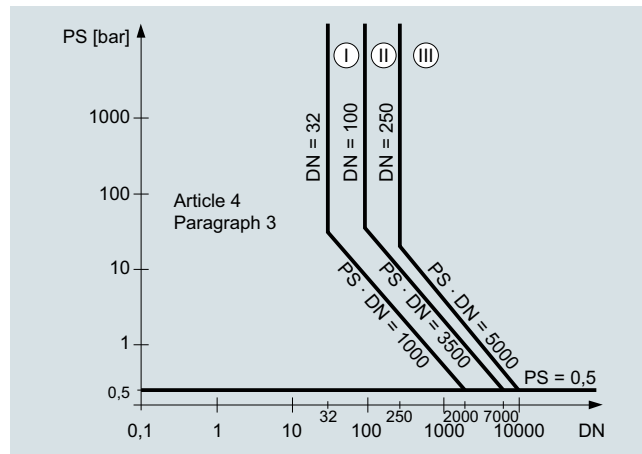
Pressure equipment directive 2014/68/EU

Characteristic curves

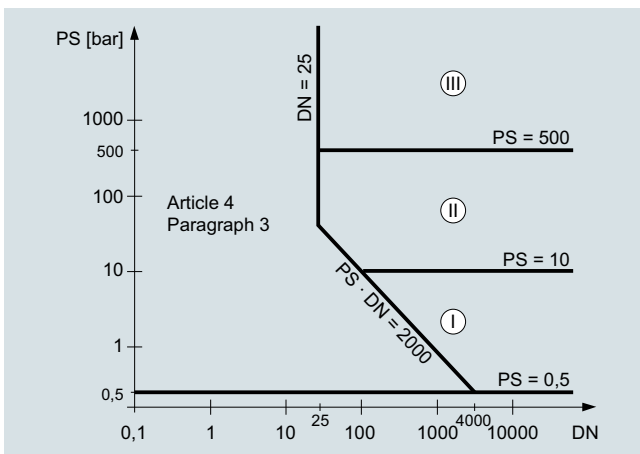
3



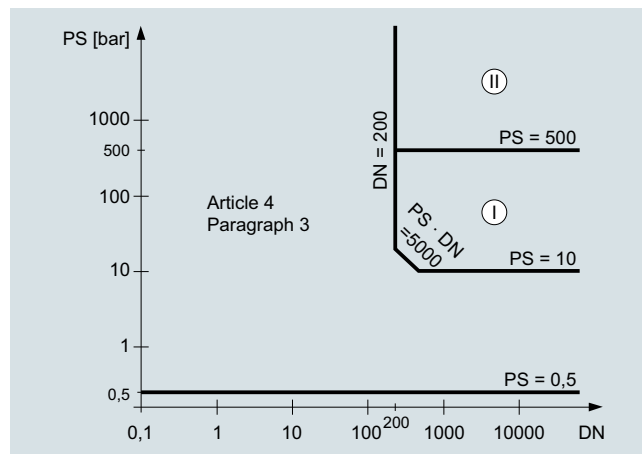
- Gases of fluid group 1
- Piping in accordance with article 4 paragraph 1 letter c number i first dash
- Exception: unstable gases belonging to Categories I and II must be included in Category III.



- Gases of fluid group 2
- Piping in accordance with article 4 paragraph 1 letter c number i second dash
- Exception: liquids at temperatures > 350 °C belonging to Category II must be included in Category III.



- Liquids of fluid group 1
- Piping in accordance with article 4 paragraph 1 letter c number ii first dash



- Liquids of fluid group 2
- Piping in accordance with article 4 paragraph 1 letter c number ii second dash

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 2014/68/EU.

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 2014/68/EU - 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 3/406). <ul style="list-style-type: none"> <input type="checkbox"/> Article 4, Paragraph 3 <input type="checkbox"/> Category II <input type="checkbox"/> Category I <input type="checkbox"/> Category III

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

SITRANS F O questionnaire online

Overview

SITRANS F O questionnaire online

For the calculation of a primary differential device in accordance with DIN EN ISO 5167 and for the production of primary differential devices in accordance with the Pressure Equipment Directive 2014/68/EU 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

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

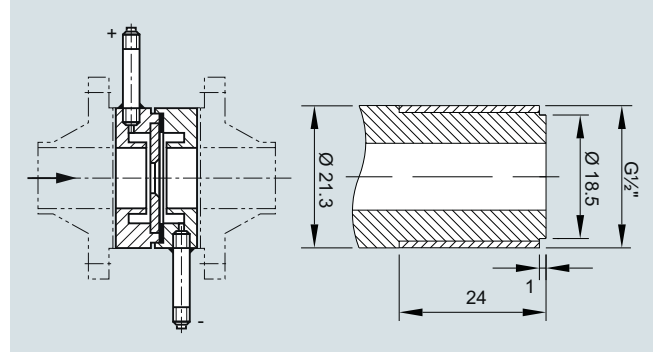
- Plane, sealing face turned, N10/N12 to DIN ISO 1302
- Plane, sealing face turned, N8 to DIN ISO 1302
- Plane, RF (raised faced) for version to ASME

Tapping sockets

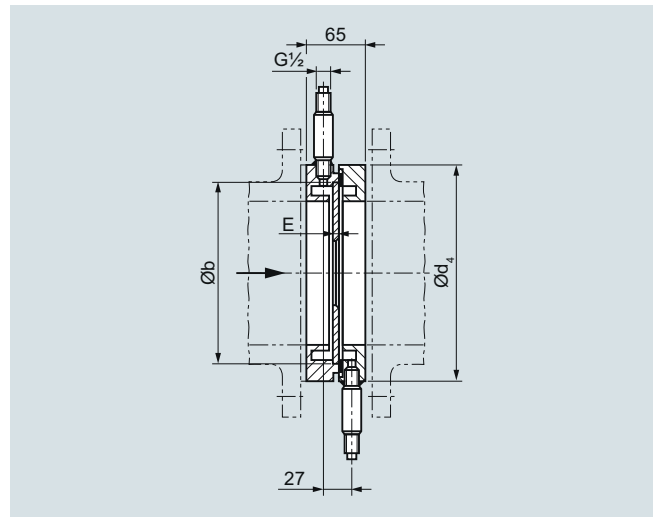
For the dimensions of the following tapping sockets, see "Function":

- 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 PN 6 ... 100	Weight (approx. in kg)	
	PN 6	PN 10 ... 25	PN 40	PN 63 ... 100		With smallest nominal pressure	With largest nominal pressure
50	79	79	79	79	2 ± 0.2	2.5	4.5
65	96	96	96	96	2 ± 0.2	3.4	6.4
80	115	115	115	115	4 ± 0.2	4.3	6.9
100	137	137	137	137	4 ± 0.25	4.7	8.6
125	164	164	164	164	4 ± 0.25	6.3	12.4
150	193	193	193	193	4 ± 0.29	7.0	17.0
200	247	247	247	247	4 ± 0.29	10.3	26.2
250	302	302	302	302	4 ± 0.32	13.1	36.6
300	354	354	354	354	4 ± 0.36	17.3	49.0
350	403	403	403	403	4 ± 0.4	25.0	63.0
400	452	452	452	452	4 ± 0.4	28.0	73.8
500	553	563	563	–	6 ± 0.4	36.2	65.9
600	659	659	–	–	6 ± 0.4	42.5	75.6
700	757	762	–	–	8 ± 0.4	51.8	89.5
800	869	875	–	–	8 ± 0.4	61.7	109
900	969	975	–	–	8 ± 0.4	68.3	123
1000	1071	1079	–	–	10 ± 0.4	74.0	148

Orifice plates with annular chambers for installation between EN flanges to EN 1092-1. dimensions in mm and weights (contd.)

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

Orifice plate with annular chambers

7 ME 1 1 1 0 - - 1

for mounting between flanges

Sealing faces to the mating flanges: plane.

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Nominal diameter acc. to EN

DN 50

PN 6 1 GA
PN 10 ... PN 40 1 GE
PN 63 1 GF
PN 100 1 GG

DN 65

PN 6 1 HA
PN 10 ... PN 40 1 HE
PN 63 1 HF
PN 100 1 HG

DN 80

PN 6 1 JA
PN 10 ... PN 40 1 JE
PN 63 1 JF
PN 100 1 JG

DN 100

PN 6 2 AA
PN 10 and PN 16 2 AC
PN 25 and PN 40 2 AE
PN 63 2 AF
PN 100 2 AG

DN 125

PN 6 2 BA
PN 10 and PN 16 2 BC
PN 25 and PN 40 2 BE
PN 63 2 BF
PN 100 2 BG

DN 150

PN 6 2 CA
PN 10 and PN 16 2 CC
PN 25 and PN 40 2 CE
PN 63 2 CF
PN 100 2 CG

DN 200

PN 6 2 EA
PN 10 and PN 16 2 EC
PN 25 2 ED
PN 40 2 EE
PN 63 2 EF
PN 100 2 EG

DN 250

PN 6 2 FA
PN 10 2 FB
PN 16 2 FC
PN 25 2 FD
PN 40 2 FE
PN 63 2 FF
PN 100 2 FG

DN 300

PN 6 2 GA
PN 10 2 GB
PN 16 2 GC
PN 25 2 GD
PN 40 2 GE
PN 63 2 GF
PN 100 2 GG

Selection and ordering data

Article No. Order code

Orifice plate with annular chambers

7 ME 1 1 1 0 - - 1

DN 350

PN 6 2 HA
PN 10 2 HB
PN 16 2 HC
PN 25 2 HD
PN 40 2 HE
PN 63 2 HF
PN 100 2 HG

DN 400

PN 6 2 JA
PN 10 2 JB
PN 16 2 JC
PN 25 2 JD
PN 40 2 JE
PN 63 2 JF

DN 500

PN 6 2 KA
PN 10 2 KB
PN 16 2 KC
PN 25 2 KD
PN 40 2 KE

DN 600

PN 6 3 AA
PN 10 3 AB
PN 16 3 AC
PN 25 3 AD

DN 700

PN 6 3 BA
PN 10 3 BB
PN 16 3 BC
PN 25 3 BD

DN 800

PN 6 3 CA
PN 10 3 CB
PN 16 3 CC
PN 25 3 CD

DN 900

PN 6 3 DA
PN 10 3 DB
PN 16 3 DC
PN 25 3 DD

DN 1000

PN 6 3 EA
PN 10 3 EB
PN 16 3 EC
PN 25 3 ED

Nomin. diameter acc. to ASME

2 inch

Class 150 5 GA
Class 300 5 GB
Class 600 5 GC

2½ inch

Class 150 5 HA
Class 300 5 HB
Class 600 5 HC

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

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 $\frac{1}{2}$;		
Class 300	6 BB		for liquids and gases PN 160,		
Class 600	6 BC		for steam PN 100		
6 inch			• Opposite one another, straight	A	
Class 150	6 CA		• Opposite one another, bent-up, for vertical pipelines	B	
Class 300	6 CB		• Arranged on one side, for horizontal pipelines	C	
Class 600	6 CC		With threaded connection $\frac{1}{2}$ -14 NPT male		
8 inch			• Opposite one another, straight	Q	
Class 150	6 EA		• Opposite one another, bent-up, for vertical pipelines	R	
Class 300	6 EB		• Arranged on one side, for horizontal pipelines	S	
Class 600	6 EC		With pipe \varnothing 12 mm for pipe union with ferrule, max. 200 °C permissible		
10 inch			• Opposite one another, straight	J	
Class 150	6 FA		• Opposite one another, bent-up, for vertical pipelines	K	
Class 300	6 FB		• Arranged on one side, for horizontal pipelines	L	
Class 600	6 FC		With welding connection \varnothing 21.3 mm for liquids and gases PN 100 ... PN 400, for steam PN 100		
12 inch			• Opposite one another, straight	D	
Class 150	6 GA		• Opposite one another, bent-up, for vertical pipelines	E	
Class 300	6 GB		• Arranged on one side, for horizontal pipelines	F	
Class 600	6 GC		Shape of orifice disk aperture		
14 inch			For flow in one direction (see figure "Shapes of orifice disk aperture")		
Class 150	6 HA		• Orifice plate form A	A	
Class 300	6 HB		• Quarter-circle nozzle form B	B	
Class 600	6 HC		For flow in both directions		
16 inch			• Cylindrical orifice plate form D	D	
Class 150	6 JA		Manufactured according to pressure equipment directive		
Class 300	6 JB		None ¹⁾	0	
Class 600	6 JC		According to Article 4, Paragraph 3	1	
20 inch			Design data Y31 to Y35 necessary		
Class 150	6 KA		According to category 1, 2, 3 with CE marking and EC declaration of conformity	5	
Class 300	6 KB		Design data Y31 to Y35 necessary		
Class 600	6 KC		¹⁾ Only possible outside Europe		
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 operating 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; permissible operating temp. -10 to +400 °C	1 5				

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Orifice plate with annular chamber

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

With third-party calculation

Specify in plain text: No.: ...
Attach calculation protocol to the order

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**

Design data according to Pressure equipment directive 2014/68/EU

Name of medium

Specify in plain text: Medium:
e. g. natural gas

Aggregate state

Specify in plain text: Aggregate state:
Liquid or gaseous

Fluid group

Specify in plain text: Fluid group:
Group 1: hazardous explosive fluid or
Group 2: All other fluids

Max. permissible pressure

Specify in plain text:
PS = ... in bar or PSI

Max. permissible temperature

Specify in plain text:
TS = ... in °C or °F

Orifice plate degreased

for oxygen measurements

• DN 50 (2") ... DN 150 (6")

• DN 200 (8") ... DN 400 (16")

• DN 500 (20") ... DN 1000 (40")

Material certificate

Acceptance test certificate to EN 10204-3.1

Cold water pressure test

1.5 x PN, with acceptance test certificate
EN 10204

Orifice disk including gasket

Sealing face of orifice plate with recess or
groove

Order code

Y21

Y22

Y01

Y31

Y32

Y33

Y34

Y35

A12

A13

A14

C01

D11

on request

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.

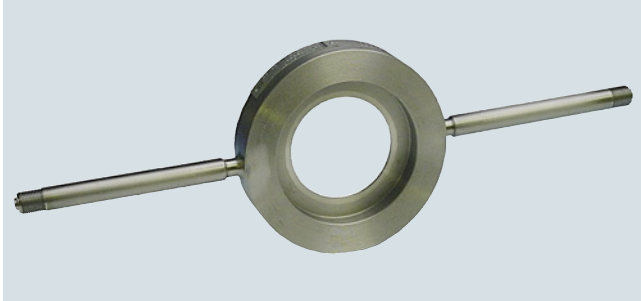
Scope of delivery

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".

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

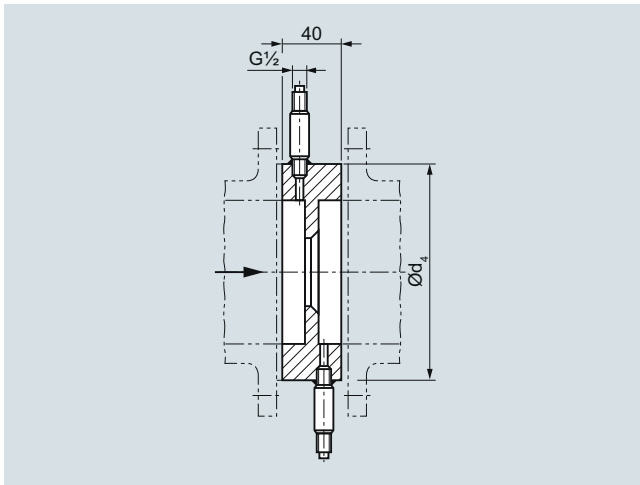
See "Technical description" and "Function" for position of the tapping sockets.

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

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.					
➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
<u>Nominal diameter acc. to EN</u>					
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
			PN 250		2 FJ
			PN 315		2 FK
DN 65			DN 300		
PN 6		1 HA	PN 6		2 GA
PN 10 ... PN 40		1 HE	PN 10		2 GB
PN 63		1 HF	PN 16		2 GC
PN 100 and PN 160		1 HH	PN 25		2 GD
PN 250		1 HJ	PN 40		2 GE
PN 315		1 HK	PN 63		2 GF
			PN 100 and PN 160		2 GH
DN 80			DN 350		
PN 6		1 JA	PN 6		2 HA
PN 10 ... PN 40		1 JE	PN 10		2 HB
PN 63		1 JF	PN 16		2 HC
PN 100 and PN 160		1 JH	PN 25		2 HD
PN 250		1 JJ	PN 40		2 HE
PN 315		1 JK	PN 63		2 HF
			PN 100		2 HG
DN 100			DN 400		
PN 6		2 AA	PN 6		2 JA
PN 10 and PN 16		2 AC	PN 10		2 JB
PN 25 and PN 40		2 AE	PN 16		2 JC
PN 63		2 AF	PN 25		2 JD
PN 100 and PN 160		2 AH	PN 40		2 JE
PN 250		2 AJ	PN 63		2 JF
PN 315		2 AK			
DN 125			DN 500		
PN 6		2 BA	PN 6		2 KA
PN 10 and PN 16		2 BC	PN 10		2 KB
PN 25 and PN 40		2 BE	PN 16		2 KC
PN 63		2 BF	PN 25		2 KD
PN 100 and PN 160		2 BH	PN 40		2 KE
PN 250		2 BJ			
PN 315		2 BK	<u>Nominal diameter acc. to ASME</u>		
DN 150			2 inch		
PN 6		2 CA	Class 150		5 GA
PN 10 and PN 16		2 CC	Class 300		5 GB
PN 25 and PN 40		2 CE	Class 600		5 GC
PN 63		2 CF			
PN 100 and PN 160		2 CH	2½ inch		
PN 250		2 CJ	Class 150		5 HA
PN 315		2 CK	Class 300		5 HB
			Class 600		5 HC
DN 200			3 inch		
PN 6		2 EA	Class 150		5 JA
PN 10 and PN 16		2 EC	Class 300		5 JB
PN 25		2 ED	Class 600		5 JC
PN 40		2 EE			
PN 63		2 EF	4 inch		
PN 100 and PN 160		2 EH	Class 150		6 AA
PN 250		2 EJ	Class 300		6 AB
PN 315		2 EK	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 tapings	7 ME 1 1 2 0 -	- 1	Orifice plate with single tapings	7 ME 1 1 2 0 -	- 1
6 inch			Tapping sockets		
Class 150	6 CA		with threaded connection G $\frac{1}{2}$;		
Class 300	6 CB		for liquids and gases PN 160,		
Class 600	6 CC		for steam PN 100		
8 inch			• Opposite one another,	A	
Class 150	6 EA		straight		
Class 300	6 EB		• Opposite one another, bent-	B	
Class 600	6 EC		up, for vertical pipelines		
10 inch			• Any arrangement of tapping	G	
Class 150	6 FA		sockets (specify angle in		
Class 300	6 FB		plain text -Z Y02)		
Class 600	6 FC		With threaded connection		
12 inch			$\frac{1}{2}$ -14 NPT male		
Class 150	6 GA		• Opposite one another,	Q	
Class 300	6 GB		straight		
Class 600	6 GC		• Opposite one another, bent-	R	
14 inch			up, for vertical pipelines		
Class 150	6 HA		• Any arrangement of tapping	T	
Class 300	6 HB		sockets (specify angle in		
Class 600	6 HC		plain text -Z Y02)		
16 inch			With pipe \varnothing 12 mm for pipe		
Class 150	6 JA		union with ferrule, max. 200 °C		
Class 300	6 JB		permissible		
Class 600	6 JC		• Opposite one another,	J	
20 inch			straight		
Class 150	6 KA		• Opposite one another, bent-	K	
Class 300	6 KB		up, for vertical pipelines		
Class 600	6 KC		• Any arrangement of tapping	M	
Special version			sockets (specify angle in		
Specify Order code and plain	9 AA 0 0	H 1 Y	plain text -Z Y02)		
text			With welding connection \varnothing		
Nominal diameter: ..., nominal			21.3 mm; for liquids and gases		
pressure: ...			PN 100 ... 400,		
material no.: ... and			for steam PN 100 or		
material name: ...			\varnothing 24 mm; for liquids and		
			gases over PN 400, for steam		
			over PN 100		
			• Opposite one another,	D	
			straight		
			• Opposite one another, bent-	E	
			up, for vertical pipelines		
			• Any arrangement of tapping	H	
			sockets (specify angle in		
			plain text -Z Y02)		
Material for corrosive media			Shape of orifice disk aper-		
Orifice plate and tapping	2 2		ture		
socket made of X 6 CrNiMoTi			(see figure "Shapes of orifice		
17-12-2, material no. 1.4571;			disk aperture")		
permissible operating temp.			For flow in one direction		
-10 to +400 °C			• Orifice plate form A	A	
Orifice plate and tapping	2 3		• Quarter-circle nozzle form B	B	
socket made of X 2 CrNiMo			For flow		
17-12-2, material no. 1.4404;			in both directions		
permissible operating temp.			• Cylindrical orifice plate form	D	
-10 to +400 °C			D		
Material for non-corrosive media			Manufactured according to		
Orifice plate and tapping	2 4		pressure equipment directive		
socket made of 13 CrMo 4-5,			None ¹⁾	0	
material no. 1.7335;			According to Article 4, Para-	1	
permissible operating temp.			graph 3		
-10 to +570, high temperature			Design data Y31 to Y35 neces-		
Orifice plate made of P265GH,	2 5		sary		
material no. 1.0425; tapping			According to category 1, 2, 3	5	
sockets made of P235GH2C2,			with CE marking and EC dec-		
material no. 1.0345; metering			laration of conformity		
edge with X 15 CrNiMn 18-8,			Design data Y31 to Y35 neces-		
material no. 1.4370,			sary.		
deposition welded;					
permissible operating tem-					
perature -10 to +400 °C					

¹⁾ Only possible outside Europe.

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 $d = \dots$ 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 2014/68/EU	
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".

Flow Measurement

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

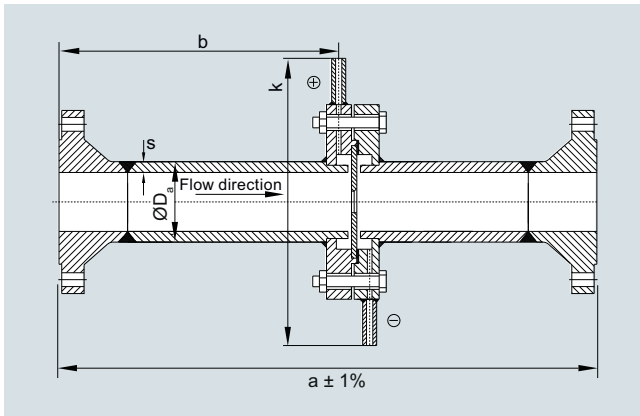
Tapping sockets

(For the dimensions of the following tapping sockets, see page 3/401)

- With connection thread G½ DIN ISO 228/1, connection dimensions to DIN 19207 form V
- With threaded connection ½-14 NPT male, for version to ASME
- With Ø 12 mm pipe connection for pipe union with ferrule
- With welding connection, Ø 21.3 mm

For length of tapping sockets for all metering pipe $L = 120$ mm and position of tapping socket, see "Technical Description" and "Function".

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 flanges to ASME B 16.5, dimensions in mm and weights

¹⁾ The stated pipe dimensions may vary, depending on availability. The pipe dimensions used can be found in the calculation for primary differential pressure devices and/or in the order confirmation.

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.	Order code	Selection and ordering data	Article No.	Order code
Metering pipe for mounting between flanges for non-corrosive media <u>Orifice plate with annular chambers mounted between flanges</u> Sealing faces to the mating flanges: plane ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7 ME 13 10 -	- 1	Metering pipe for mounting between flanges for non-corrosive media 1½ inch <ul style="list-style-type: none"> Class 150 Class 300 Class 600 2 inch <ul style="list-style-type: none"> Class 150 Class 300 Class 600 Special version Specify Order code and plain text Nominal diameter: ..., nominal pressure: ... material no.: ... and material name: ...	7 ME 13 10 -	- 1
Nominal diameter acc. to EN DN 10 <ul style="list-style-type: none"> PN 10 and PN 16 PN 25 and PN 40 PN 63 PN 100 DN 15 <ul style="list-style-type: none"> PN 10 and PN 16 PN 25 and PN 40 PN 63 PN 100 DN 20 <ul style="list-style-type: none"> PN 10 and PN 16 PN 25 and PN 40 DN 25 <ul style="list-style-type: none"> PN 10 and PN 16 PN 25 and PN 40 PN 63 PN 100 DN 32 <ul style="list-style-type: none"> PN 10 and PN 16 PN 25 and PN 40 DN 40 <ul style="list-style-type: none"> PN 10 and PN 16 PN 25 and PN 40 PN 63 PN 100 DN 50 <ul style="list-style-type: none"> PN 10 and PN 16 PN 25 and PN 40 PN 63 PN 100 		1 AC 1 AE 1 AF 1 AG 1 BC 1 BE 1 BF 1 BG 1 CC 1 CE 1 DC 1 DE 1 DF 1 DG 1 EC 1 EE 1 FC 1 FE 1 FF 1 FG 1 GC 1 GE 1 GF 1 GG	Material for non-corrosive media Orifice disk made of material no. 1.4404; support ring and flange made of material no. 1.0460, pipes and tapping sockets made of material number 1.0345; permissible operating temperature -10 to +400 °C		5 FA 5 FB 5 FC 5 GA 5 GB 5 GC 9 AA 00 3 2 3 4 A B C Q R S J K L D E F
Nominal diameter acc. to ASME ½ inch <ul style="list-style-type: none"> Class 150 Class 300 Class 600 ¾ inch <ul style="list-style-type: none"> Class 150 Class 300 Class 600 1 inch <ul style="list-style-type: none"> Class 150 Class 300 Class 600 1¼ inch <ul style="list-style-type: none"> Class 150 Class 300 Class 600 		5 BA 5 BB 5 BC 5 CA 5 CB 5 CC 5 DA 5 DB 5 DC 5 EA 5 EB 5 EC	Material for corrosive media Orifice disk, support rings, pipes and flange made of material no. 1.4404; permissible operating temperature -10 to +400 °C		With threaded connection G½; for liquids and gases PN 160, for steam PN 100 <ul style="list-style-type: none"> Opposite one another, straight Opposite one another, bent-up, for vertical pipelines Arranged on one side, for horizontal pipelines With threaded connection ½-14 NPT male; for liquids and gases PN 160, for steam PN 100 <ul style="list-style-type: none"> Opposite one another, straight Opposite one another, bent-up, for vertical pipelines Arranged on one side, for horizontal pipelines With pipe Ø 12 mm for pipe union with ferrule, max. 200 °C permissible <ul style="list-style-type: none"> Opposite one another, straight Opposite one another, bent-up, for vertical pipelines Arranged on one side, for horizontal pipelines With welding connection Ø 21.3 mm for liquids and gases PN 100 ... PN 400, for steam PN 100 <ul style="list-style-type: none"> Opposite one another, straight Opposite one another, bent-up, for vertical pipelines Arranged on one side, for horizontal pipelines

Metering pipe with orifice plate and annular chamber

Selection and ordering data	Article No.	Order code	Selection and ordering data	Order code
Metering pipe for mounting between flanges for non-corrosive media	7 ME 1 3 1 0 -	- 1	Further designs 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") • Orifice plate form A • Quarter-circle nozzle form B For flow in both directions • Cylindrical orifice plate form D		A B D	With Siemens calculation protocol Specify in plain text: No.: ... e. g. no.: 110025240101, Attach calculation protocol to the order	Y21
Manufactured according to pressure equipment directive None ¹⁾ According to Article 4, Paragraph 3 Design data Y31 to Y35 necessary According to category 1, 2 with CE marking and EC declaration of conformity Design data Y31 to Y35 necessary		0 1 5	With third-party calculation Specify in plain text: No.: ... Attach calculation protocol to the order	Y22
¹⁾ Only possible outside Europe.			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 2014/68/EU	
			Name of medium Specify in plain text: Medium: e. g. natural gas	Y31
			Aggregate state Specify in plain text: Aggregate state: Liquid or gaseous	Y32
			Fluid group Specify in plain text: Fluid group: Group 1: hazardous explosive fluid or Group 2: All other fluids	Y33
			Max. permissible pressure Specify in plain text: PS = ... in bar or PSI	Y34
			Max. permissible temperature Specify in plain text: TS = ... in °C or °F	Y35
			Orifice plate degreased for oxygen measurements • DN 10 (1/2") ... DN 50 (2")	A12
			Material certificate Acceptance test certificate to EN 10204-3.1	C02
			Cold water pressure test 1.5 x PN, with acceptance test certificate EN 10204	D11

Note on ordering

The "calculation protocol" released by the customer with Order code Y21 or Y22 must be attached to the order as an attachment or the statement "orifice plate without calculation" will be made with Order code Y01.

Scope of delivery:

Orifice plate, comprising two support rings with tapping sockets and one orifice disk, with gaskets between orifice disk and support ring, including screws and bolts.
Graphite (99.85%) flat gasket with foil insert (1.4401, 0.1 mm).
Application for liquids, steam, gases, liquid gases, acids, hydrocarbons, oils and oil products.

Accessories:

See "SITRANS P measuring instruments for pressure".

Flow Measurement

SITRANS F O delta p - Primary differential pressure devices

Calculation of primary devices

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
<i>Further designs</i> 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