

SITRANS F flowmeters



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You can download all instructions, catalogs and certificates for SITRANS F free of charge at the following Internet address:

www.siemens.com/sitransf

SITRANS F flowmeters

SITRANS F

Product overview

Overview

	Application	Description	Catalog page	Software for parameterization
SITRANS F M electromagnetic flowmeters - Pulsed DC magnetic flowmeter				
	MAG 5000/6000 transmitter range in robust IP67 polyamid enclosures for compact or remote mounting. 19", back of panel and front of panel enclosure program.	Transmitter MAG 5000/6000 • Superior signal resolution for optimum turn down ratio • Comprehensively self-diagnostic, for error indication and logging • Multi-lingual display and keypad interface • Custody transfer approval: PTB, OIML R 75, OIML R 117, OIML R 49 and MI-001	4/28	SIMATIC PDM
	MAG 6000 I and MAG 6000 I Ex d in robust die-cast aluminium enclosure for demanding applications and where explosion proof protection is necessary.	Transmitter MAG 6000 I/6000 I Ex d • Remote and compact mounting with all sensors • Explosion proof design: ATEX II 2(1)(2) GD and FM Class 1, Div. 2 • Multi-lingual display and touchpad keypad • Comprehensively self-diagnostic	4/40	SIMATIC PDM
	Designed for the general industry environment. The obstructionless performance of the MAG 1100 is unaffected by the suspended solids, viscosity and temperature challenges.	Flow sensor MAG 1100 • Metering tube DN 2 ... DN100 (1/12" ... 4") flangeless design. • Corrosion-resistant AISI 316 stainless steel housing. • Highly resistant liner ceramic or PFA and electrodes fitting most extreme process media. • Temperature rating up to 200 °C (390 °F) • ATEX II 2(1) GD approval version • CSA/FM Class, 1 Div 2	4/44	
	Specially designed for the food & beverage and pharmaceutical industry.	Flow sensor MAG 1100 F • AISI 316 stainless steel enclosure • Hygienic seal, 3A and EHEDG-approved construction • Easy to clean • Supplied with connections according to your specification • ATEX II 2(1) GD approval version • CSA/FM class 1 Div 2	4/51	
	The MAG 5100 W designed for all water and waste applications in water plants and industrial applications.	Flow sensor MAG 5100 W • Metering tube DN 25 ... DN 1200 (1" ... 48") • NBR Hard Rubber or EPDM lining • Integral grounding electrodes as standard • Increased low flow accuracy for water leak detection • Drinking water approvals and custody transfer approvals, OIML R 49, MI-001 and PTB	4/58	

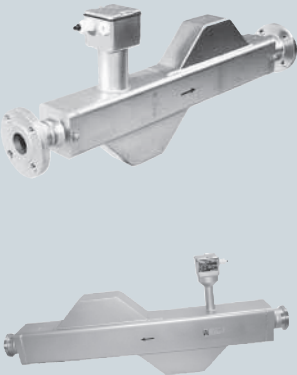
	Application	Description	Catalog page	Software for parameterization
	The MAG 3100 series with its flexibility in the choice of liner, electrode and flange material allows the measurement of even the most extreme process media.	Flow sensor MAG 3100 - For a wide range of pipe dimensions: DN 15 ... DN 2000 (½" ... 78") - Wide range of liner and electrode materials - High-temperature version for application with temperatures up to 180 °C (355 °F) - High-pressure solutions - Approved according to PTB, OIML R 75, OIML R 117, CSA/FM and ATEX	4/64	
SITRANS F M electromagnetic flowmeters - High-power AC magnetic flowmeter				
	Designed for heavy-duty applications like pulp & paper stock over 3%; heavy mining slurries and mining slurries with magnetic particles.	Transmitter Transmag 2 - Magnetic flowmeter with a very strong pulsed AC magnetic field - PROFIBUS PA or HART communication - Self-test function	4/79	SIMATIC PDM
	Application in conjunction with transmitter Transmag 2	Flow sensor 911/E - Metering tube: DN 15 ... DN 600 (½" ... 24") - Metering tube liner: rubber, PTFE, Novolak - Integral smartPLUG for storing of calibration values - Temperature of medium: -20 ... +150 °C (-4 ... +300 °F)	4/84	
SITRANS F M electromagnetic flowmeters - Battery-operated magnetic watermeter				
	Battery-operated electromagnetic water meter for water applications within abstraction, distribution network, revenue metering and irrigation.	Water meter MAG 8000 - Battery-operated water meter - Metering tube DN 25 ... DN 600 (1" ... 24") - Remote and compact installation IP68/ NEMA 6P enclosure - Custody transfer approval: OIML R 49 and MI-001 - Drinking water approvals	4/94	SIMATIC PDM and Flow Tool
SITRANS F C mass flowmeters				
	Measurement of liquids and gases. Measurement of mass flow, density, temperature and fraction e.g. °Brix or °Plato.	Flow sensors MASS 2100 (Single tube design) and FC300 - DI 1.5, DI 3, DI 6, DI 15, DI 25, DI 40 and DN 4 - Flow from 0.1 ... 52 000 kg/h - Pipe material: W 1.4435 (316L); W 2.4602 Hastelloy C22 - Accuracy, typically: - Flow: ≤ 0.1% of flow rate - Density: ≤ 0.0005 g/cm³ - Liquid temp./pressure: -50 ... +180 °C (-58 ... +356 °F) / Up to 410 bar (5946 psi) - Approved according to ATEX EEx ia IIC T3 ... T6	4/138, 4/142	

SITRANS F flowmeters

SITRANS F

Product overview

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	Application	Description	Catalog page	Software for parameterization
 	Measurement of liquids and gases. Measurement of mass flow, density, temperature and fraction e.g. °Brix or °Plato.	Flow sensor MC2 (Dual tube design) • Standard MC2 - DN 50, DN 65, DN 80, DN 100 and DN 150 - Flow from 0 ... 510 000 kg/h / 112 400 lb/h - Tube material: W 1.4571 (316Ti) and Hastelloy C4 • Hygienic MC2 - Approvals: EHEDG - DN 20, DN 25, DN 40, DN 50, DN 65 and DN 80 - Flow from 0 ... 113 600 kg/h / 250 000 lb/h - Tube material: W 1.4435 (316L) - Connectors: DIN 11851, DIN 32676 and DIN 11864-2A • Accuracy: $\leq 0.15\%$ of rate • Density: $\leq 0.001 \text{ g/cm}^3$ • Liquid temp.: $-50 \dots +180 \text{ }^\circ\text{C}$ ($-58 \dots +356 \text{ }^\circ\text{F}$) • Pressure: $< 100 \text{ bar}$ (1450 psi) • Approvals: ATEX EEx em [ib] IIC T2 ... T6	4/156	
	Measurement of liquids and gases Multiparameter transmitter for remote or compact mounting measuring mass flow, density, temperature and fraction e.g. °Brix and °Plato	Transmitters MASS 6000 and MASS 6000 Ex d • Digital signal processing measuring 30 times a second. • 3 current, 2 freq. and 2 relay outputs • Adaptive batch function • SENSORPROM memory unit making it easy to start up the flowmeter. • Easy retrofitting of communication modules (AOM) • Approved according to ATEX [EEx ia] IIC / EEx de [ia/ib] IIC T6	4/119, 4/130	SIMATIC PDM
SITRANS F US ultrasonic in-line flowmeters				
	SITRANS FUS060 is a time based transmitter designed for ultrasonic flowmetering for any pipe in the F US in-line series up to DN 4000	SITRANS FUS060 transmitter • EEx approved according to ATEX • HART communication + 1 analog output, 1 digital output for frequency or pulse and 1 relay output for alarms and flow direction • PROFIBUS PA communication with 1 digital output for frequency or pulse • Multi-functional output for process control • Easy menu based local operation with two-line display	4/176	SIMATIC PDM
	The main application for SONO 3300 ultrasonic flowmeters is to measure the volume flow of: • Water and treated waste water • Oil and liquefied gases • Hot water/cooling systems	SONO 3300/FUS060 • Ex approved according to ATEX • 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	4/181	SIMATIC PDM

SITRANS F flowmeters

SITRANS F

Product overview

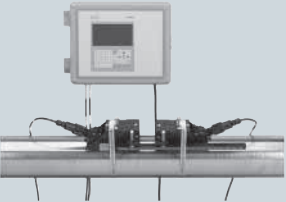
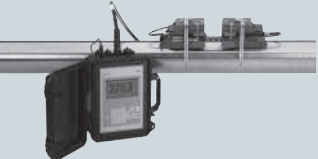
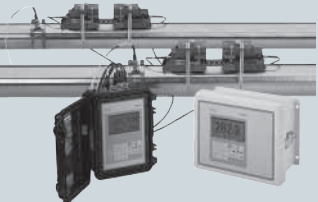
	Application	Description	Catalog page	Software for parameterization
	The main application for SONO 3100 ultrasonic flowmeters is to measure the volume flow of: • Water and treated waste water • Oil and liquefied gases • Liquid cryogenic application • District heating systems	SONO 3100/FUS060 • DN 100 ... DN 1200 (4" ... 48") • Pipe in carbon or stainless steel • Transducers can be replaced under pressure • ATEX-approved • Measure of all liquids less than 350 Cst, conductive or non-conductive • No pressure drop • 4-track on request • Special material on request	4/186	SIMATIC PDM
	Installation of one, two or four transducer sets in existing concrete or steel pipes.	SONOKIT • DN 100 ... DN 4000 (4" ... 160") • Control and display unit • Temperature of medium: -20 ... +200 °C (-4 ... +395 °F) • Installation on empty pipes or pipes under pressure (hot-tap installation)	4/194	SIMATIC PDM
	Battery or mains-powered ultrasonic flowmeter for use within water-based district heating, cooling systems and utility. The FUS380 can also be used for water irrigation systems. SITRANS FUS380/FUE380 are designed to work with the SITRANS FUE950 energy calculator	FUS380/FUE380 • <i>FUS380/FUE380</i>: DN 50 ... DN 1200 (2" ... 48") • <i>FUE380</i>: Approved for custody transfer according to EN 1434 Class 2, OIML R 75 and MID • FUS380/FUE380: Red brass or painted carbon steel flanges and metering tube. AISI transducers • Water temperatures 2 ... 200 °C (35.6 ... 392 °F) • Battery or mains-powered	4/202, 4/208	SIMATIC PDM
	Universal thermal energy calculator for district heating and cooling applications.	SITRANS FUE950 • Choice of battery, 230 V AC +15%/-30% or 24 V AC • 24 months memory • Plug-in modules for data output, extra input, M-Bus • Complete set with sensors and sensor pockets • Meets the requirements of OIML R 75 and EN 1434	4/218	
	Battery-operated ultrasonic retrofit flowmeter for water applications within irrigation. Installation of one or two transducer sets in existing PVC or concrete pipes.	SITRANS FUS880 • Irrigation flowmeter FUS880 • Battery or mains-powered • DN 200 ... DN 1200 (8" ... 48") • Wetted transducer technology • Remote installation IP67	4/224	SIMATIC PDM
	Accessories and spare parts for older flowmeter systems type SITRANS F US SONOFLO	Spare parts for sensors and transmitters of older flowmeter type SONOFLO: E.g. transducer type SONO 3200, coaxial cables, SONO 3000 transmitter spare parts, SENSORPROM	4/229	

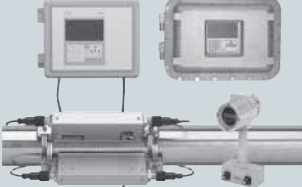
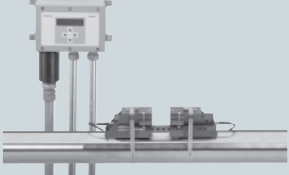
SITRANS F flowmeters

SITRANS F

Product overview

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	Application	Description	Catalog page	Software for parameterization
SITRANS F US ultrasonic clamp-on flowmeters				
	The thickness gauge can be used in any field application where there is a need for flow measurement. Including but not limited to: • Water and waste water • Energy measurement • Oil and gas industries	Thickness gauge The hand-held micro-processor controlled gauge is designed to measure the thickness of various metallic or non-metallic pipes. • Materials include steel, aluminium, titanium, plastics and ceramics • Measurements shown in millimeter or inches • Simple-to-read 4-digit LCD display • Weighs 150 g (5.3 oz) • Battery operation for 250 h	4/232	
	Dedicated flowmeters are suitable for a wide variety of liquid applications, including those in the: • Water Industry • Wastewater Industry • HVAC Industry • Power Industry • Processing Industry	SITRANS FUS1010 General purpose • Basic function dedicated meter • Full range of safety approvals, I/O's and enclosure types available • Has wide applicability but not the special functions found in FUH1010, FUG1010 and FUE1010 meters • Hazardous area approvals: FM, CSA, ATEX	4/244	
	Portable flowmeters are suitable for a wide variety of liquid applications, including those in the: • Water Industry • Wastewater Industry • HVAC Industry • Power Industry • Processing Industry	SITRANS FUP1010 Portable • Basic function portable meter • Has all the capabilities of the FUS1010 meter but in a battery-powered, portable configuration • Ideal for high-accuracy flow survey applications • Not available with hazardous area approvals • Unclassified, ordinary location approvals: UL, C-UL, CE	4/252	
	The SITRANS FUP1010 check meter measures practically all conductive or non-conductive clean or moderately aerated liquids or liquids with suspended solids. This basic feature enables the performance check and verification of existing meters used in various water and wastewater applications such as: • Water Industry - Raw water - Potable water - Chemicals • Wastewater industry - Raw sewage - Effluent - Sludges - Mixed liquor - Chemicals	SITRANS FUP1010 Portable Check metering kit • Pipe sizes 25.4 mm to 9.14 m (1" to 360") • Current, voltage, frequency and RS 232 outputs • Optional current, voltage and temperature inputs • Zeromatic Path automatically sets zero • Bi-directional flow operation • 1 MByte data logger with both site and data logger storage	4/257	
	Portable and dedicated energy meters are ideal for thermal energy / power applications: • Chilled & hot water submetering • Condenser water, potable water • Glycol and brine solution • Thermal storage	SITRANS FUE1010 Energy • Accurate absolute and differential temperature measurement with two matched 1000 Ω RTD elements installed on supply and return side of the heating or cooling system • Efficiency calculation (kW/ton, EER or COP) available in systems with optional analog input • Dedicated available with hazardous area approvals: FM, CSA • Portable available with unclassified/ordinary locations approval: UL, C-UL, FM	4/258	

	Application	Description	Catalog page	Software for parameterization
	The SITRANS FUE1010 check metering kit is a highly accurate clamp-on non-intrusive ultrasonic flow display computer for revenue grade thermal energy sub-metering and energy efficiency distribution monitoring, with a real-time coefficient of performance (COP) for HVAC systems. This kit is ideal for applications which include: • Chilled water sub-metering • Condenser water • Potable water • Ammonia and glycol • River and lake water • Lake source cooling	SITRANS FUE1010 HVAC Check metering kit • Pipe sizes 25.4 mm to 9.14 m (1" to 360") • Built-in energy/BTU mode • 4-wire 1000 Ω platinum RTDs for supply and return temperature measurements are precision matched to within 0.01 °C (0.02 °F) • Chiller efficiency analysis: accepts an independent analog input representing kW usage for calculation of the following functions which can be selected for data logging or output purposes: - Cooling load (kW/ton) - Coefficient of performance (COP) - Energy efficiency ratio (EER) • Current, voltage, frequency and RS 232 outputs • 1 MByte data logger with both site and data logger storage	4/265	
	Dedicated hydrocarbon flowmeters are ideal for crude oil, refined petroleum or liquefied gas. There are three application areas: • Viscosity compensated volumetric flowmeters • Standard volume (Net) mass flowmeters • Interface detectors/density meters	SITRANS FUH1010 Oil • Volumetric flowmeters output viscosity compensated gross volume to external RTU's or flow computers • Mass flowmeters output standard volume (net) mass flow, API, liquid identification, density, interface & pig detection • Interface Detectors are used for liquid identification and API density output, but do not output flow • Hazardous area approvals: FM, CSA, ATEX	4/266	
	Dedicated gas flowmeters are ideal for most natural and process gas industry applications, including: • Checkmetering • Allocation • Flow survey verification • Lost and unaccounted for (LAUF) gas analysis • Production	SITRANS FUG1010 Gas • Suitable for most gases (natural gas, oxygen, nitrogen, carbon monoxide, etc.) with typical minimum operating pressure of 10 barg (145 psig). • Standard volume or mass flow output for fixed gas compositions • Analog input for pressure and temperature compensation • Hazardous area approvals: FM, CSA, ATEX	4/273	
	Dedicated flowmeter is a basic option for many clean liquid applications in the: • Water Industry • Wastewater Industry • HVAC & Power Industries • Processing Industry	SITRANS FUS1020 Basic • Has FUS1010 system function but without the same I/O capability or safety approval ratings • This basic meter is intended for single liquid applications that do not require these features • Not available with hazardous area approvals • Unclassified, ordinary locations approvals: UL, C-UL, CE	4/280	

SITRANS F flowmeters

SITRANS F

Product overview

	Application	Description	Catalog page	Software for parameterization
Continuous measurement - Open channel flow				
	High accuracy ultrasonic flow monitor for open channels to complete system studies	OCM III	4/291	
		• High accuracy on unique or non-standard weirs and flumes • AC and DC operation. • Automatically switches to battery operation for uninterrupted power. • Low-power remote monitoring		
SITRANS F X Vortex Flowmeter				
	Measurement of steam, gases and liquids in: • Chemical • HVAC / Power plants • Oil & Gas • Food & Beverage • Pharma	SITRANS FX300	4/294	
		• 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		

Overview

Criteria for selection of flowmeter

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

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

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

Measuring principle		Electro-magnetic	Coriolis	Ultrasonic (In-line)	Vortex	Orifice plate	Rotary-piston meter	Variable area meter
Medium		Liquid (conductive)	Liquid or gas	Liquid	Steam/vapor, gases, liquid	Liquid, vapor, gas	Liquid	Liquid or gas
Nominal diameter		DN 2 ... 2000 (0.08" ... 78")	1.5 ... 150 mm (0.06" ... 6")	DN 50 ... 4000 (2" ... 160") optional down to DN 15 (½")	DN 15 ... 300 (½" ... 12")	DN 10 ... 1000 (0.4" ... 40")	DN 15 ... 80 (½" ... 3")	DN 10 ... 100 (0.4" ... 4") G½" ... G3"
Temperature range	°C (°F)	-40 ... +200 (-40 ... +392)	-50 ... +180 (-58 ... +356)	-200 ... +250 (-328 ... +482)	-40 ... +240 (-40 ... +464)	-200 ... +500 (-328 ... +932)	-30 ... +300 (-22 ... +572)	-20 ... +300 (-4 ... +572)
Max. pressure	bar (psi)	160 (2 320), optional higher	Up to 410 (Up to 5 950)	40 (580) optionally 430 (6 235)	100 (1 450)	315 (4 569)	63 (914)	40 (580)
Accuracy	%	± 0.25 or ± 0.5	± 0.1 or ± 0.15	± 0.5 ... ± 2	± 0.75 ... ± 1	± 0.5 ... ± 2	± 0.2 ... ± 0.5	± 2
Repeatability	%	0.1 ... 0.2	0.05	0.25	0.1	0.5	0.005	0.5
Dynamic response range		1:100	1:100	1:100	1:25	1:6	1:10	1:10
Start-of-scale value	m/s (ft/s)	0 (0)	0 (0)	0.1 (0.33)	0.4 (1.31) 2.0 (6.56)	Re > 500	0.3 (0.98)	0.2
Full-scale value						Re < 10 ⁸		
• For liquids	m/s (ft/s)	0.25 ... 10 (0.825 ... 33)	10 (32.8)	10 (32.8)	10 (32.8)	3	3	3.5 (11.4)
• For steam/vapor, gases	m/s (ft/s)		Approx. 300 (1000)		80 (262.5)	50/25 (164/82)		60 (197)
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 ... 10 (0 ... 10)	0 ... 10 (0 ... 10)	0.3 ... 350 000 (0.3 ... 350 000)	0.5 ... 100 (0.5 ... 100)
Power supply		Mains or battery	Mains	Mains or battery	2-wire	2-wire	non	non

SITRANS F flowmeters

SITRANS F

Introduction

Communication solutions

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

1) Supports SIMATIC PDM

2) Supports AMS

3) Supports Siemens Flow Tool

4) Supports HH275/375

5) Pluggable add-on modules

6) Profile 2

7) Profile 3

8) CT versions are not approved with communication modules.

9) All wall mount models

10) RS485

11) RS232

12) IrDA (Infrared)

SITRANS F flowmeters

SITRANS F M

System information SITRANS F M electromagnetic flowmeters

Overview



SITRANS F M products

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

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 Vericator is stored during the initial sensor calibration.

Easier service

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

Room for growth

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

Application

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

A prerequisite is that the medium must have a minimum conductivity of 5 $\mu\text{S}/\text{cm}$. The temperature, pressure, density and viscosity have no influence on the result.

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

- Water and waste water
- Chemical and 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.

SITRANS F flowmeters

SITRANS F M

System information SITRANS F M electromagnetic flowmeters

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

www.pia-selector.automation.siemens.com



								
MAG 3100	MAG 3100 HT	MAG 3100 P	MAG 5100 W	MAG 1100	MAG 1100 HT	MAG 1100 F	911/E	MAG 8000/ MAG 8000 CT
7ME6310	7ME6320	7ME6340	7ME6520	7ME6110	7ME6120	7ME6140	7ME51 7ME52 7ME53	7ME6810 7ME6820

Industry

Water / waste water	XX		X	XXX	XX				XXX
Chemical	XXX	XXX	XXX	X	XXX	XXX	XX		X
Pharma	XX	XX	XX	X	XX	XX	XXX		X
Food & beverage	X	X	X	X	XX		XXX		X
Mining, aggregates & cement	XXX			X	XX			XXX	X
HPI	XX	X	XX	X	XX	X			X
Other	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 20 (3/4")								●	
DN 25 (1")	●	●	●	●	●	●	●	●	●
DN 32 (1 1/4")							●	●	
DN 40 (1 1/2")	●	●	●	●	●	●	●	●	●
DN 50 (2")	●	●	●	●	●	●	●	●	●
DN 65 (2 1/2")	●	●	●	●	●	●	●	●	●
DN 80 (3")	●	●	●	●	●	●	●	●	●
DN 100 (4")	●	●	●	●	●	●	●	●	●
DN 125 (5")	●	●	●	●				●	●
DN 150 (6")	●	●	●	●				●	●
DN 200 (8")	●	●	●	●				●	●
DN 250 (10")	●	●	●	●				●	●
DN 300 (12")	●	●	●	●				●	●
DN 400 (16")	●			●				●	●
DN 450 (18")	●			●				●	●
DN 500 (20")	●			●				●	●
DN 600 (24")	●			●				●	●
DN 700 (28")	●			●					●
DN 750 (30")	●			●					●
DN 800 (32")	●			●					●
DN 900 (36")	●			●					●
DN 1000 (40")	●			●					●
DN 1050 (42")	●			●					●
DN 1100 (44")	●			●					●
DN 1200 (48")	●			●					●
DN 1400 (54")	●								
DN 1500 (60")	●								
DN 1600 (66")	●								
DN 1800 (72")	●								
DN 2000 (78")	●								

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

SITRANS F flowmeters

SITRANS F M

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MAG 3100	MAG 3100 HT	MAG 3100 P	MAG 5100 W	MAG 1100	MAG 1100 HT	MAG 1100 F	911/E	MAG 8000/CT
7ME6310	7ME6320	7ME6340	7ME6520	7ME6110	7ME6120	7ME6140	7ME51 7ME52 7ME53	7ME6810 7ME6820

Process connection									
Wafer design					•	•			
Sanitary process connections							•		
Flanges	•	•	•	•				•	•
Flange norms									
EN 1092-1	•	•	•	•				•	•
ANSI B 16.5 class 150	•	•	•	•				•	•
ANSI B 16.5 class 300	•	•						•	
AWWA class D	•			•					
AS 2129	•	•							
AS 4087, PN 16	•	•		•					•
AS 4087, PN 21	•	•							
AS 4087, PN 35	•	•							
JIS 10K	3)	3)						•	
Pressure rating ¹⁾									
PN 6	•								
PN 10	•	•	•	•				•	•
PN 16	•	•	•	•	•		•	•	•
PN 25	•	•						•	
PN 40	•	•	•	•	•	•	•	•	•
PN 63	•								
PN 100	•								
Accuracy									
0.2%									•
0.25%	•	•	•	•	•	•	•		
0.4%									•
0.5%	•	•	•	•	•	•	•	•	
Grounding electrodes, incl. ²⁾	•			•				(•)	•
Cable glands									
PG 13.5								•	
M20	•	•	•	•	•	•	•	•	•
½" NPT	•	•	•	•	•	•	•	•	
Materials / temperature:									
Liner material / max. temperatures									
NBR Hard Rubber: 70 °C (158 °F)				•					
EPDM: 70 °C (158 °F)	•			•				• ⁵⁾	•
Neoprene: 70 °C (158 °F)	•			•				•	
PTFE: 100 °C (212 °F)	•								
PTFE: 130 °C (266 °F)		•	•					•	
PTFE: 180 °C (356 °F)		•						(•) ⁴⁾	
Ebonite: 95 °C (203 °F)	•								
Linatex: 70 °C (158 °F)	•								
Ceramic: 150 °C (302 °F) ⁶⁾					•		•		
Ceramic: 200 °C (392 °F)						•			
PFA: 100 °C (212 °F)	•								
PFA: 150 °C (302 °F)		•	•		•		•		
Novolak: 130 °C (266 °F)								•	

• = available

¹⁾ Pressure may be limited by the liner material chosen

²⁾ Not for PTFE and PFA liner and tantalum/platinum electrodes.
For 911/E grounding electrodes are optional

³⁾ On request

⁴⁾ 150 °C (302 °F)

⁵⁾ 95 °C (203 °F)

⁶⁾ ATEX: 180 °C (356 °F)

SITRANS F flowmeters

SITRANS F M

System information SITRANS F M electromagnetic flowmeters

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MAG 3100	MAG 3100 HT	MAG 3100 P	MAG 5100 W	MAG 1100	MAG 1100 HT	MAG 1100 F	911/E	MAG 8000/ MAG 8000 CT
7ME6310	7ME6320	7ME6340	7ME6520	7ME6110	7ME6120	7ME6140	7ME51 7ME52 7ME53	7ME6810 7ME6820

Materials (continued):

Electrodes

S/S AISI 316 Ti	•	•						•	
Hastelloy C	•	•	•	•	•		•	•	•
Platinum	•	•			•	•	•	•	
Titanium	•	•						•	
Tantalum	•							•	
Monel								•	

Flange/housing material

Carbon steel	•	•	•	•				•	•
Stainless steel / carbon steel								•	
Polished stainless steel	•	•			•	•	•		

Approvals (Order as specials except for MAG 8000 CT version):

Custody transfer

Cold water - MI 001 (EU)				•					•
Cold water - DANAK TS 22.36.001	•								
Cold water pattern approval - OIML R 49 (Denmark)			•	•					
Cold water pattern approval PTB (Germany)	•	•			•	•	•		•
Heat meter pattern approval - OIML R 75 (Denmark)	•		•		•				
Hot water pattern approval - PTB (Germany)							•		
Other media than water pattern approval - OIML R 117	•				•		•		

Hazardous areas

ATEX - 2 GD zone 1	•	•	•		•	•	•		
FM - class 1, div 2	•	•	•	•	•	•	•		
CSA - class 1, div 2	•	•	•						

Hygienic

3A							•		
----	--	--	--	--	--	--	---	--	--

Drinking water

WRAS (WRc) - (UK) EPDM liner	•			•					•
NSF/ANSI - (US) NBR & EPDM liner				•					•
ACS (FR) EPDM liner	•			•					•
Belgaque (B) EPDM liner	•			•					•
DVGW-W270 (D) EPDM liner	•			•					•

Other

GOSS / GOST (Russia)	•	•	•	•	•	•	•		•
CRN (Canada)	•	•		• ³⁾	• ¹⁾		• ¹⁾		
Other national approvals, see internet	•	•	•	•	•	•	•	•	•

Vericator compatible²⁾

	•	•	•	•	•	•	•		
--	---	---	---	---	---	---	---	--	--

• = available

¹⁾ Only PFA liner.

²⁾ Only for MAG 5000 and MAG 6000 transmitters.

³⁾ Only DN 50 ... 300/2" ... 12".

SITRANS F flowmeters

SITRANS F M

System information SITRANS F M
electromagnetic flowmeters

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

www.pia-selector.automation.siemens.com



MAG 5000	MAG 6000	MAG 6000 I	MAG 6000 I Ex d	MAG 6000 + Ex barriere	MAG 6000 + Cleaning unit	Transmag 2	MAG 8000/8000 CT
7ME6910	7ME6920	7ME6930	7ME6930	7ME6920	7ME6920	7ME5034	7ME6810 7ME6820

Industry

Water / waste water	XXX	XXX	XX	X		XX		XXX
Chemical	X	XX	XX	XXX	X			X
Pharma	X	XXX	XX	XXX	X			X
Food & beverage	XX	XXX	XX					X
Mining, aggregates & cement	XX	X	XX	X			XXX	X
HPI	X	X	X	XX				X
Other	XX	XX	XX	XX			X	X

Design

Compact	•	•	•	•			•	•
Remote	•	•	•	•	•	•	•	•
Constant field (DC)	•	•	•	•	•	•		•
Alternating field (AC)							•	
Battery operated constant field (DC)								•

Enclosure transmitter

Polyamide, IP67	•	•						
Die-cast aluminium			•	•			•	
Stainless steel		•						• ¹⁾
19" rack	•	•			•	•		
Back of panel	•	•			•	•		
Panel mounting	•	•			•	•		
IP67 wall mounting	•	•	•	•	•	•		

Accuracy

0.2%								•
0.25%		•	•	•	•	•		
0.4%								•
0.5%	•						•	

Communication

HART	•	•	•	•	•	•	•	
PROFIBUS PA		•	•	•	•	•	•	
PROFIBUS DP		•	•		•	•		
FOUNDATION Fieldbus H1		•	•	•	•	•		
DeviceNet		•	•		•	•		
MODBUS RTU/RS 485		•	•		•	•		• ²⁾

Batching

		•	•	•	•	•		
--	--	---	---	---	---	---	--	--

Electrode cleaning

					•			
--	--	--	--	--	---	--	--	--

Cable glands

PG 13,5					•	•	•	
M20	•	•	• ³⁾	•			•	•
½" NPT	•	•	•	•			•	

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

³⁾ M25

¹⁾ IP68 enclosure

²⁾ Modbus RTU also as serial RS232

SITRANS F flowmeters

SITRANS F M

System information SITRANS F M electromagnetic flowmeters

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www.pia-selector.automation.siemens.com



MAG 5000	MAG 6000	MAG 6000 I	MAG 6000 I Ex d	MAG 6000 + Ex barriere	MAG 6000 + Cleaning unit	Transmag 2	MAG 8000/MAG 8000 CT
7ME6910	7ME6920	7ME6930	7ME6930	7ME6920	7ME6920	7ME5034	7ME6810 7ME6820

Power supply

24 V	● ¹⁾	● ¹⁾	●	●		● ¹⁾		● ^{1) 2)}
115 V - 230 V	●	●	●	●	●	●	●	● ²⁾
Battery								●

Approvals:

Custody transfer

Cold water - MI-001 (EU)	●	●						●
Cold water - DANAK TS 22.36.001	●	●						
Cold water pattern approval - OIML R 49 (Denmark)	●	●						●
Cold water pattern approval PTB (Germany)	●	●						●
Heat meter pattern approval - OIML R 75 (Denmark)		●						
Hot water pattern approval PTB (Germany)		●						
Other media than water pattern approval - OIML R 117		●						

Hazardous areas

ATEX - 2 GD zone 1				●	(●)			
FM - class 1 div 2	●	●	●					
CSA - class 1 div 2	●	●						
UL / C-UL- general safety	●	●			●	●		

Other

C - tick (Australia)	●	●	●	●	●	●		
GOSS / GOST (Russia)	●							●
Other national approvals, see internet	●	●	●	●	●	●	●	●

Verificator compatible

	●	●						
--	---	---	--	--	--	--	--	--

● = available

¹⁾ 12/24 V AC/DC

²⁾ Main power with battery backup

For more national approvals please check our internet page

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

SITRANS F flowmeters

SITRANS F M

System information SITRANS F M electromagnetic flowmeters

Practical examples of ordering

SITRANS F M compact installation



Example

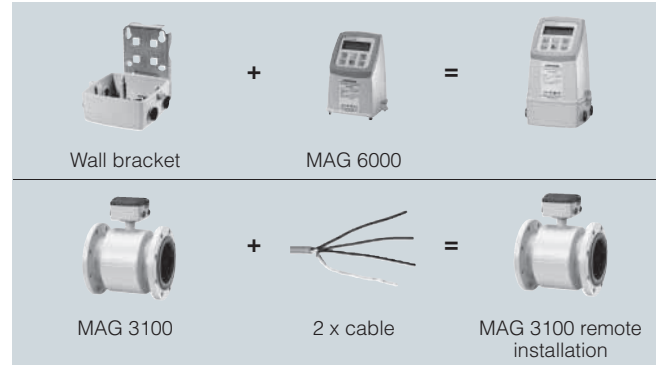
Sensor	7ME6310-3TC11-1JA1
Pipe size	DN 100
Liner	Neoprene
Electrodes	SS 316
Flanges	EN 1092-1, PN 16
Transmitter	MAG 6000, Polyamide, 115/230 V AC
Accuracy	0.25%
Supply	230 V AC

Note:

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

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

SITRANS F M remote installation



Example

Sensor	7ME6310-3TC11-1AA1
Pipe size	DN 100
Liner	Neoprene
Electrodes	SS 316
Flanges	EN 1092-1, PN 16
Transmitter	7ME6920-1AA10-0AA0
Accuracy	0.25%
Supply	230 V AC
Wall mounting kit	FDK-085U1018
Cable kit with sensor cable and electrode cable	A5E01181647

SITRANS F flowmeters

SITRANS F M

System information SITRANS F M electromagnetic flowmeters

Function

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

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

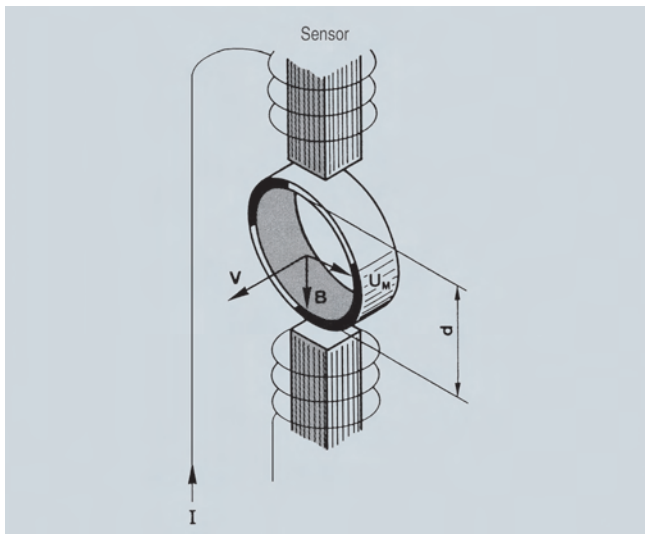
U_M = Measured voltage induced in the medium perpendicular to the magnetic field and the flow direction. The voltage is tapped at two point electrodes.

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

v = flow velocity of medium

d = internal diameter of metering tube

k = proportionality factor or sensor constant



Function and measuring principle of electromagnetic measurement

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

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

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

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

SITRANS F M diagnostics

The diagnostic functions are all internal tools in the meter:

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

SITRANS F M Vericator (MAG 5000 and 6000)

The SITRANS F M Vericator is an external tool designed for MAG 5000 and MAG 6000 with MAG 1100, MAG 1100 F, MAG 3100 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 Vericator 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 Vericator

- Stand alone Vericator 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 Vericator
- The Vericator can be connected via a serial cable to a PC enabling download of the data. A Windows OC program enables printing and management of vericator 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

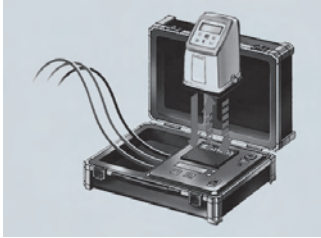
SITRANS F flowmeters

SITRANS F M

System information SITRANS F M electromagnetic flowmeters

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.

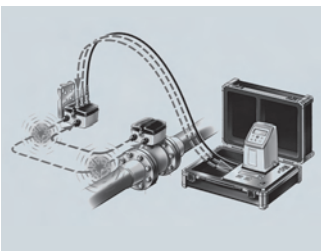


Transmitter test

Using the excitation power output, which is generated to drive the magnetic field of the sensor, the vericator simulates flow signal to the transmitter input. By measuring the transmitter outputs the vericator 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



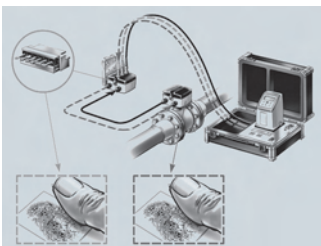
Flowmeter insulation test

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 vericator generates a high voltage disturbance within the coil circuit and then looks for any "crosstalk" 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 vericator 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
- Vericator specification with date of calibration ensuring traceability to international standards.

SIEMENS MAGFLO® Verification Certificate

Customer:		MAGFLO® Identification:	
Name		TAG No./Name	0
Address		Sensor Code No.	083C4054
		Sensor Serial No.	089904T361
		Transmitter Code No.	083F5003
Phone		Transmitter Serial No.	587022N520
Email		Location	

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

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

Current Output 4-20mA Frequency Output 0-10kHz

Transmitter Settings:		Sensor Details:	
Basic	Qmax. 50.0000 m³/h	Size	DN 80 3 IN
Flow Direction	Positiv	Cal. Factor	1.0
Low flow Cut-off	1.50%	Correction Factor	1.0
Empty Pipe	OFF	Excitation Freq	6.25Hz
Output	Current Output OFF		
Time Constant	N/A		
Relay Output	Error Level		
Digital Output	Pulse		
Frequency Range	N/A		
Time Constant	N/A		
Volume/pulse	1 m³/p		
Pulse width	N/A		
Pulse polarity	N/A		
Totalizer 1 value before test	0.00000 m³		
Totalizer 1 value after test	0.58892 m³		
Totalizer 2 value before test	0.00000 m³		
Totalizer 2 value after test	0.58892 m³		
Operating time in days	3		

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

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

Date and signature

2006.01.01

Description

SITRANS F M Vericator

- 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

Order No.

FDK-083F5060

FDK-083F5061

Note:

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

SITRANS F flowmeters

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System information SITRANS F M electromagnetic flowmeters

Technical specifications

Flowmeter Calibration and traceability

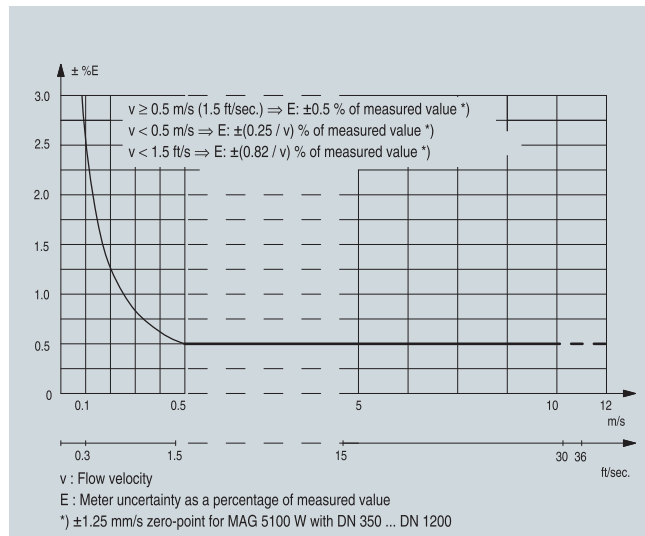
To ensure continuous accurate measurement, flowmeters must be calibrated. All measuring instrumentation, used in the calibration of the flowmeters, has either been calibrated by a UKAS or DANAK accredited laboratory or has been calibrated against certified master sensors. This provides an unbroken chain of measurement-traceability to national standards.

Siemens Flow Instruments can provide accredited calibration in the flow range from 0.0001 m³/h to 4350 m³/h.

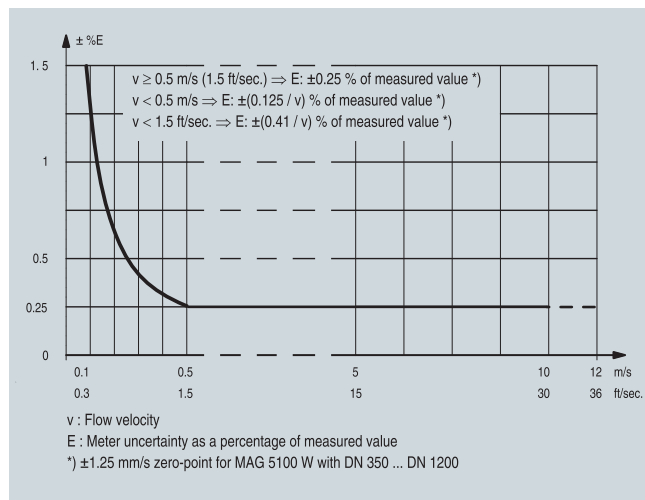
The accreditation bodies DANAK and UKAS have signed the ILAC MRA agreement (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement). Therefore the accreditation ensures international traceability and recognition of the test results in 39 countries world wide, including the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

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

Flowmeter uncertainty



MAG 5000 and MAG 6000/6000I with MAG 1100 (PFA)/
MAG 1100 F (PFA)



MAG 6000 or MAG 6000 I used with MAG 3100, MAG 1100 (Ceramic) or
MAG 5100 W

Reference conditions

Reference conditions (ISO 9104 and DIN EN 29104)

Temperature medium	20 °C ± 5 K (68 °F ± 9 °F)
Temperature ambient	20 °C ± 5 K (68 °F ± 9 °F)
Supply voltage	U _n ± 1 %
Warming-up time	30 minutes
Incorporation in conductive pipe section	
• Inlet section	10 x DN (DN ≤ 1200/48") 5 x DN (DN > 1200/48")
• Outlet section	5 x DN (DN ≤ 1200/48") 3 x DN (DN > 1200/48")
Flow conditions	Fully developed flow profile

Additions in the event of deviations from reference conditions

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

Certificates

• EN 10204 2.1	Certificate of conformity, stating that the delivered parts are made of the material quality that was ordered
• EN 10204 2.2	Test report certificate, a non batch specific material analysis of the ordered material
• EN 10204 3.1	Material analysis certificate, a batch specific analysis of the material issued by an independent inspector

Technical specifications PROFIBUS PA/DP

General specifications

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

Electrical specification DP

Physical layer specifications

Applicable standard	EN 50170 vol. 2
Physical Layer (Transmission technology)	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	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 $\Omega \pm 20\%$
Wave attenuation at 39 kHz	3 dB/km
Capacitive asymmetry	2 nF/km
Bus termination	Passive line termination at both
Max. bus length	Up to 1.9 km. Extendable by repeaters

IS (Intrinsic Safety) data

Required sensor electronics	Compact mounted SITRANS F C MASS 6000 Ex d
FISCO	Yes
Max. U_I	17.5 V
Max. I_I	380 mA
Max. P_I	5.32 V
Max. L_I	0 μ H
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
	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.

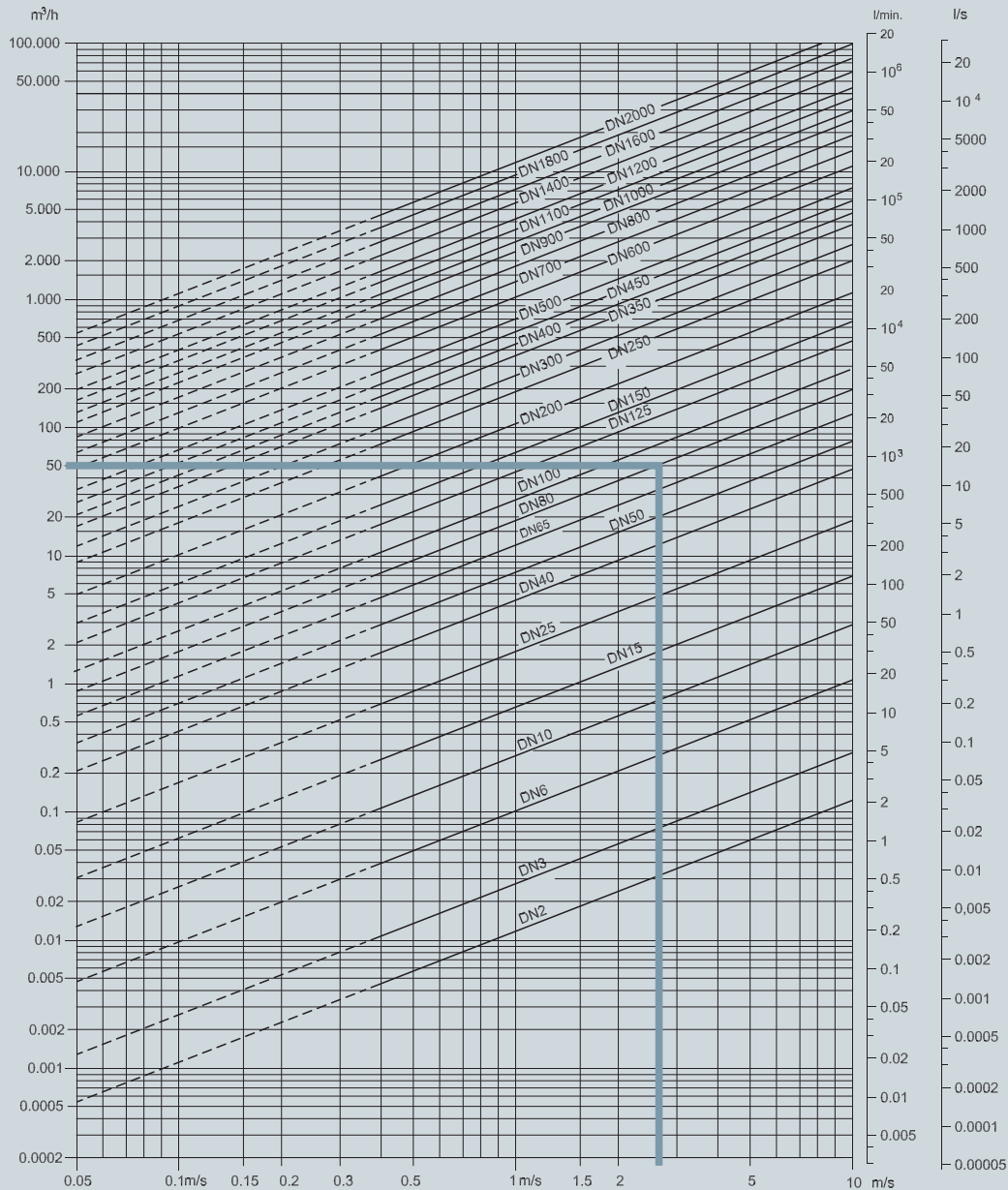
SITRANS F flowmeters

SITRANS F M

System information SITRANS F M electromagnetic flowmeters

Selection of sensor

Metric



Sizing table (DN 2 ... DN 2000)

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

Guidelines for selection of sensor

Min. measuring range: 0 to 0.25 m/s

Max. measuring range: 0 to 10 m/s

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

Example:

Flow quantity of 50 m³/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

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

$$v : [\text{m/s}], Q : [\text{l/s}], DN : [\text{mm}]$$

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

$$v : [\text{m/s}], Q : [\text{m}^3/\text{h}], DN : [\text{mm}]$$

Link to "Sizing program":

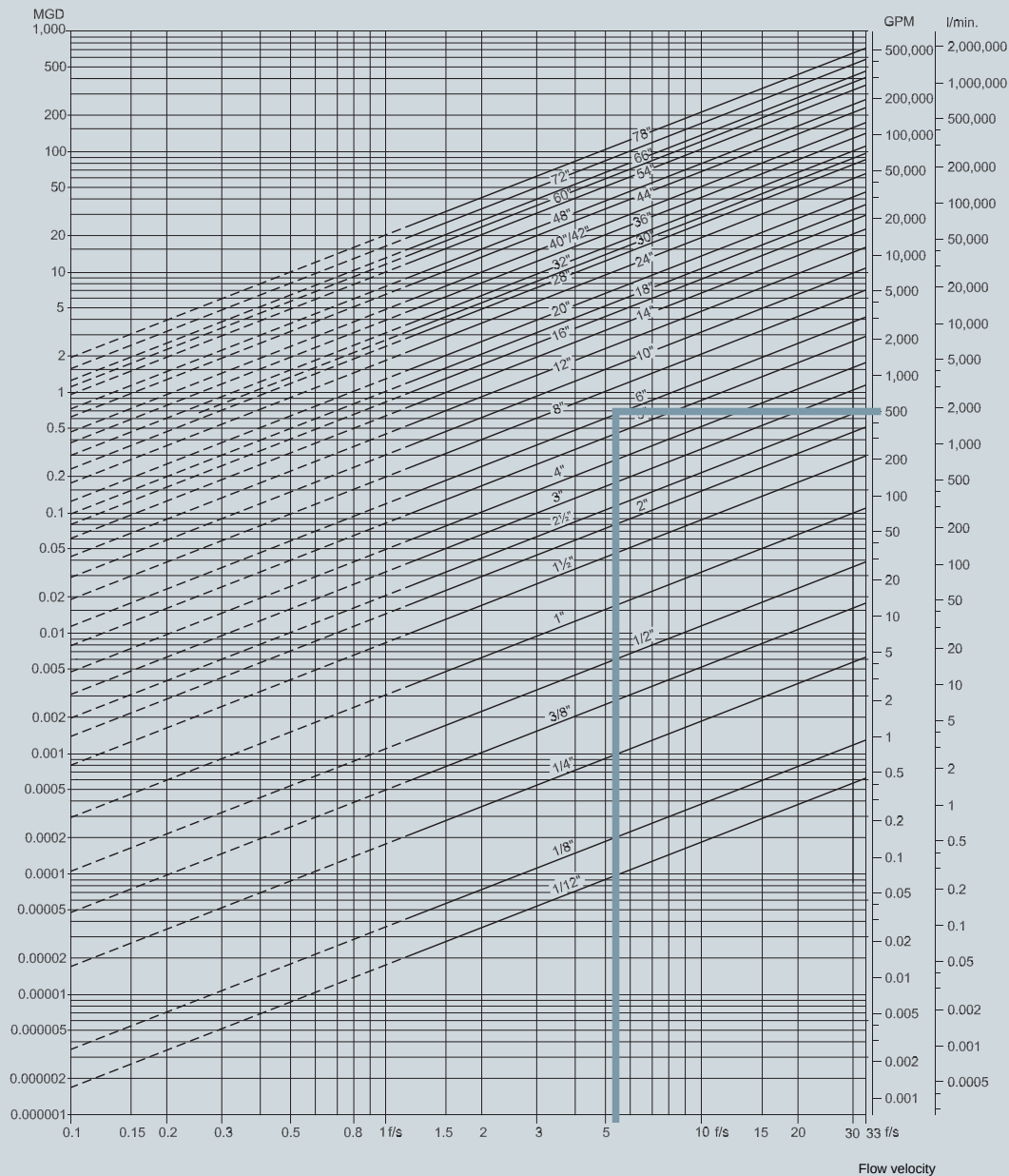
<https://pia.khe.siemens.com/index.aspx?nr=11501>

SITRANS F flowmeters

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

$$v = 0.408 \cdot Q / (\text{Pipe I.D.})^2 \text{ or}$$

v : [ft/s], Q : [GPM], Pipe I.D. : [inch]

$$v = 283.67 \cdot Q / (\text{Pipe I.D.})^2$$

v : [ft/s], Q : [MGD], Pipe I.D. : [inch]

Link to "Sizing program":

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

SITRANS F flowmeters

SITRANS F M

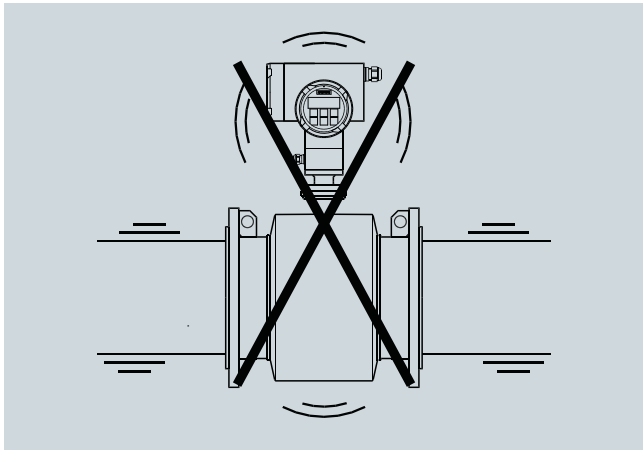
System information SITRANS F M electromagnetic flowmeters

Installation conditions

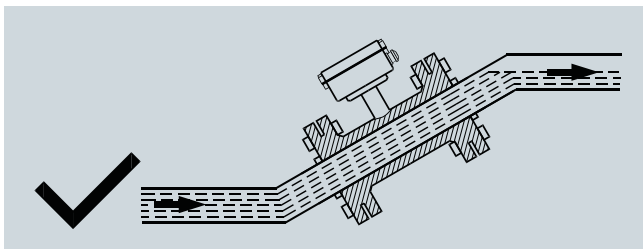
Vibrations

Strong vibrations should be avoided.

In applications with strong vibrations, we recommend remote mounting of the transmitter.



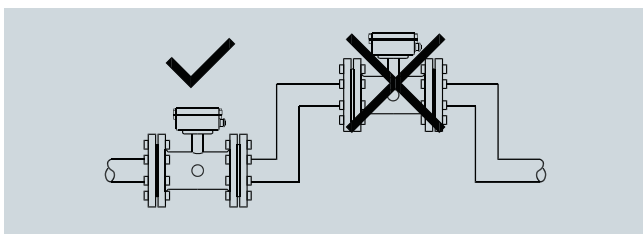
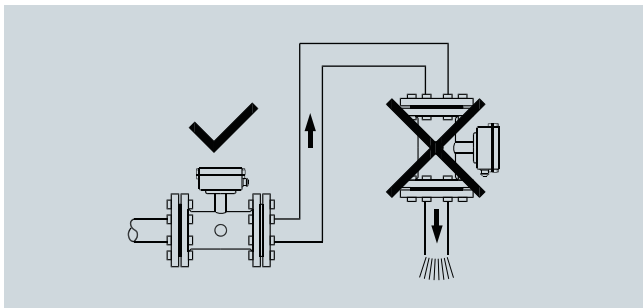
The sensor must always be completely filled with liquid.



Install in pipelines which are always full

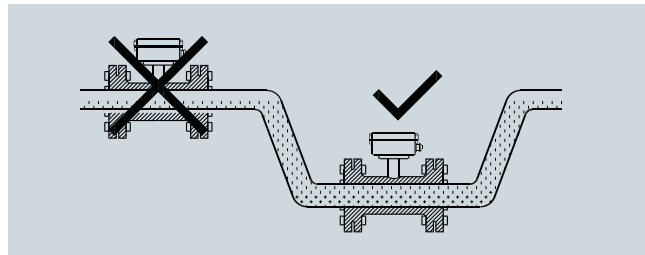
The sensor must always be completely filled with liquid. Therefore avoid:

- 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

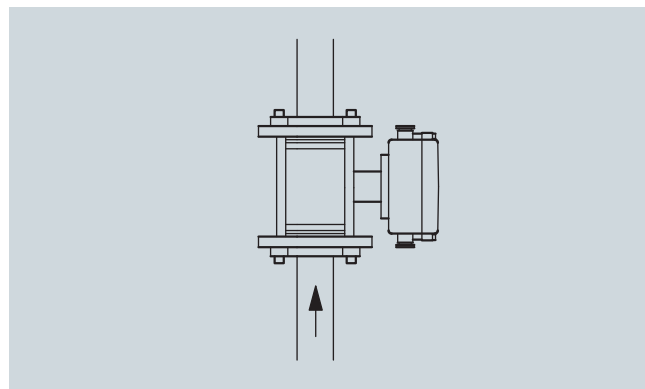
For partially filled pipes or pipes with downward flow and free outlet the flowmeter should be located in a U-Tube.



Install in U-tubes when pipe is partially filled

Installation in vertical pipes

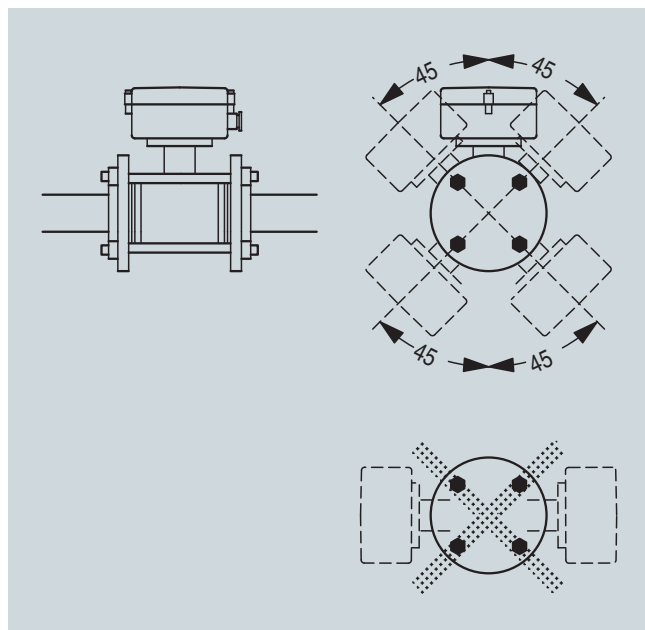
Recommended flow direction: upwards. This minimizes the effect on the measurement of any gas/air bubbles in the liquid.



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.



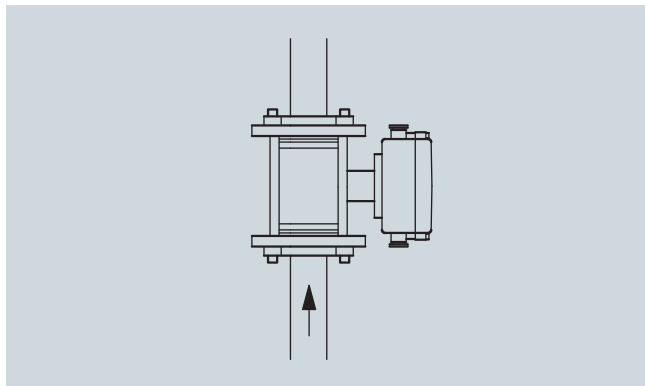
SITRANS F flowmeters

SITRANS F M

System information SITRANS F M electromagnetic flowmeters

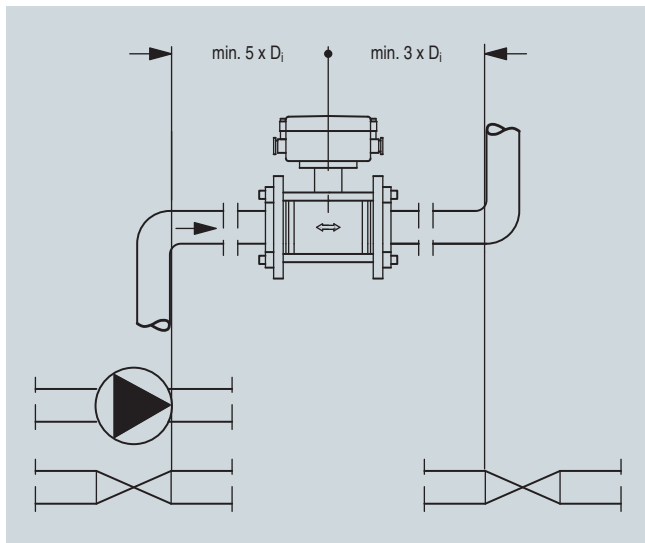
Measuring abrasive liquids and liquids containing particles

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



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

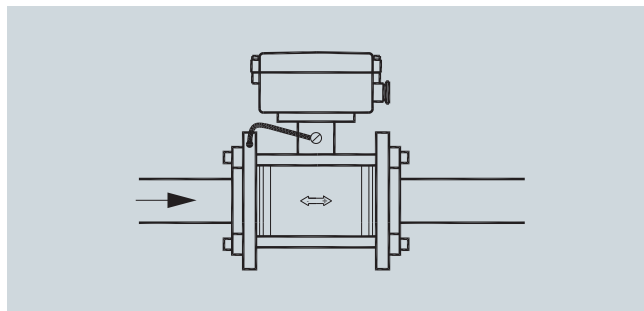
To achieve maximum accurate flow measurement it is essential to have straight length of inlet and outlet pipes and a certain distance between the flowmeter and pumps or valves.

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

Ambient temperature-Installation

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

Potential equalization

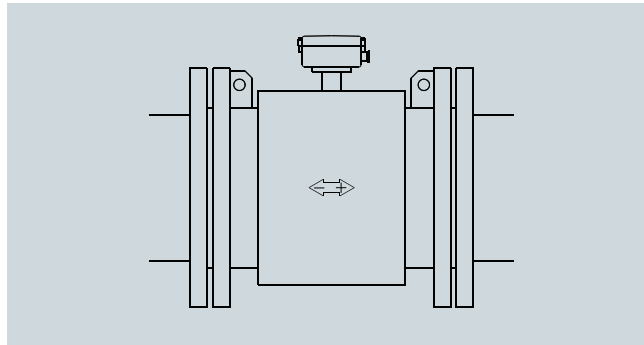


Potential equalization

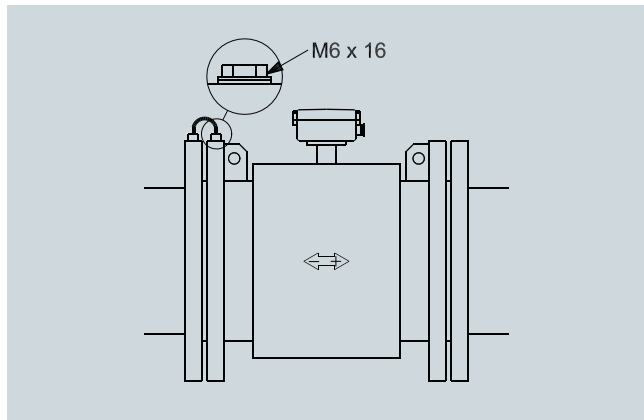
The electrical potential of the liquid must always be equal to the electrical potential of the sensor. This can be achieved in different ways depending on the application:

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

Bonding and grounding



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

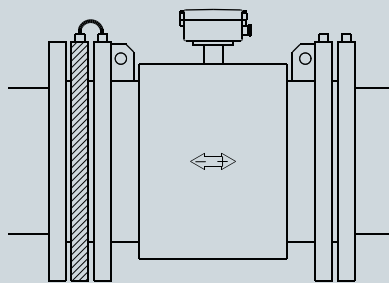


MAG 1100, MAG 3100 (PTFE and PFA): without earthing electrodes in conductive pipes (MAG 1100 use graphite gasket)

SITRANS F flowmeters

SITRANS F M

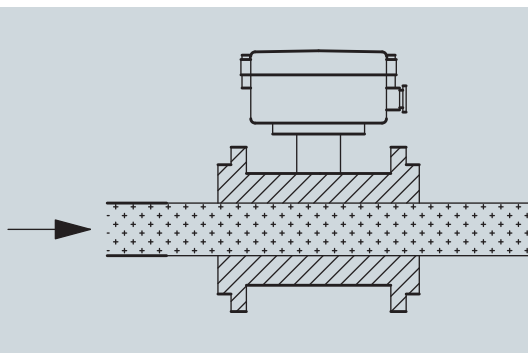
System information SITRANS F M electromagnetic flowmeters



With earthing electrodes in non-conductive pipes (MAG 1100 use graphite gasket)

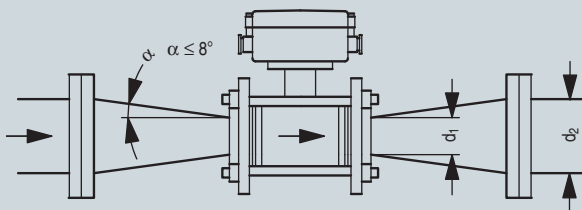
MAG 1100 F grounding via process connections. MAG 8000 grounding see MAG 8000 pages.

Vacuum



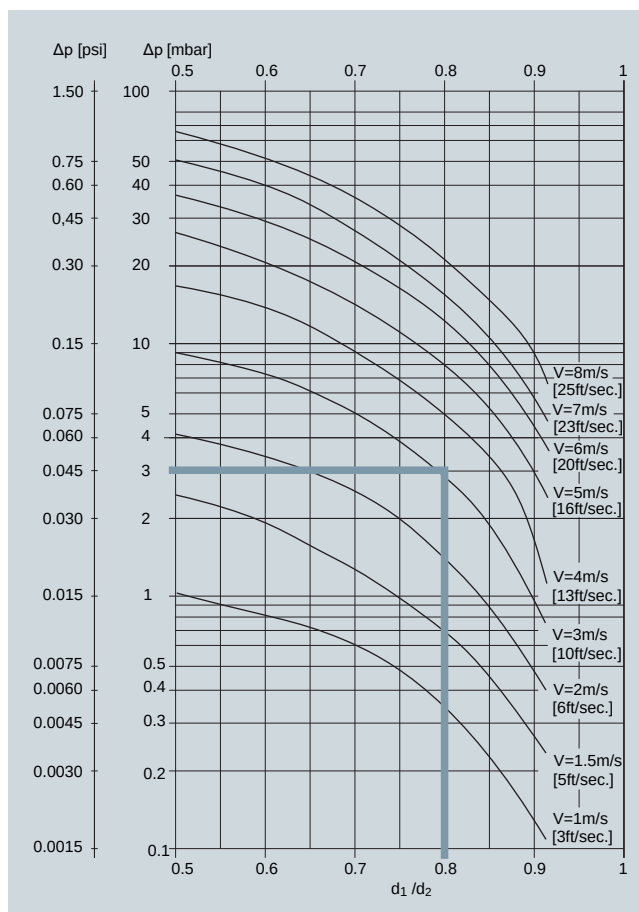
Avoid a vacuum in the measuring pipe, since this can damage certain liners.

Installation in large pipes



Reduction in nominal pipe diameter

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

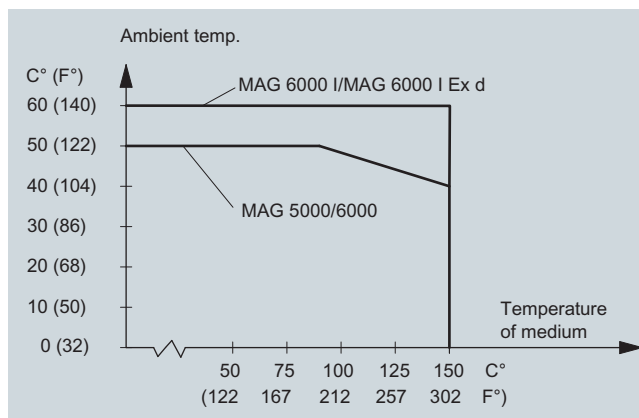


Pressure drop as function of diameter reduction between reducers

Example:

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

Ambient temperature



Max. ambient temperature as a function of temperature of medium

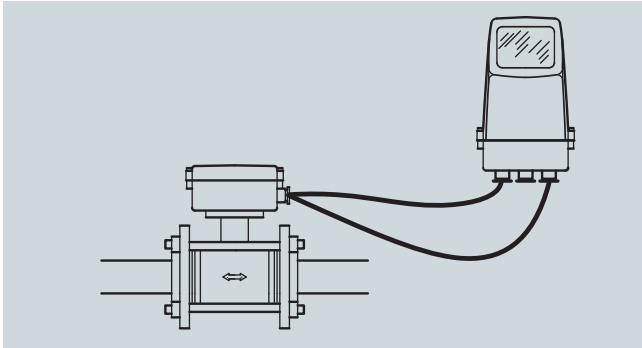
The transmitter can be installed either compact or remote.

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

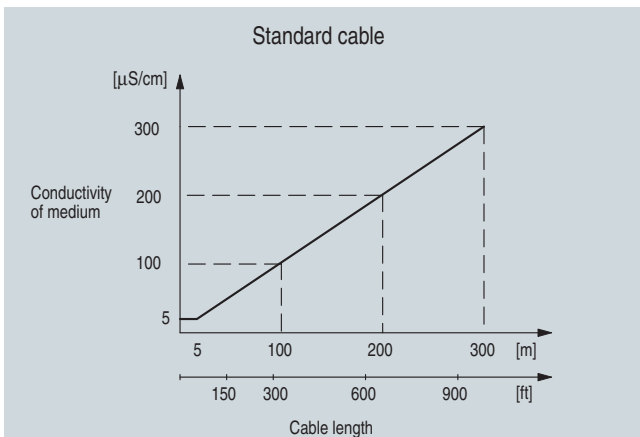
Sensor cables and conductivity of medium

Compact installation:

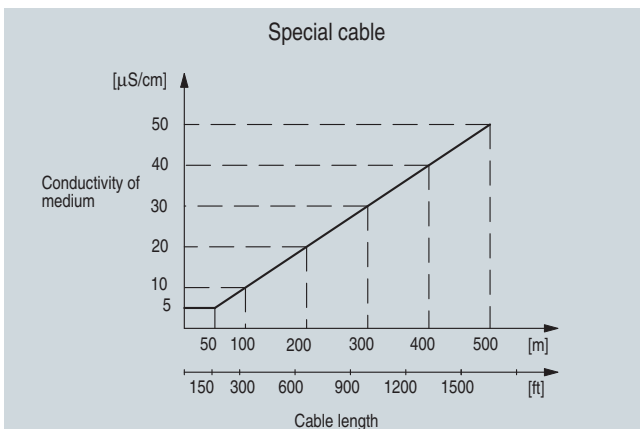
Liquids with an electrical conductivity $\geq 5 \mu\text{S/cm}$.



Remote installation



Minimum conductivity of medium (using standard electrode cable)



Minimum conductivity of medium (using special electrode cable)

Note

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

For **DN 2, DN 3** or for remote mounting in Ex applications special cable cannot be used, empty sensor cannot be detected and the conductivity must be $\geq 30 \mu\text{S/cm}$. For remote mounted CT installations the maximum cable length is 200 m (600 ft).

SITRANS F flowmeters

SITRANS F M

Transmitter MAG 5000/6000

Overview



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

The MAG 5000 and 6000 are microprocessor-based 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 and MAG 5100 W.

Transmitter types:

- MAG 5000: Max. measuring error 0.5% of rate (incl. sensor)
- MAG 6000: Max. measuring error 0.25% of rate (incl. sensor, see also sensor specifications) and with additional features such as: "plug & play" insert 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
- Custody transfer approval: PTB, OIML R 75, OIML R 117, OIML R 49 and MI-001,
- MAG 6000 with add-on bus modules for HART, FOUNDATION Fieldbus H1, DeviceNet, MODBUS RTU/RS485, PROFIBUS PA and DP

Application

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

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

Design

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

- 19" rack systems
- Panel mounting IP65/NEMA 4
- Back of panel mounting IP20/NEMA 2
- Wall mounting IP66/NEMA 4

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

Function

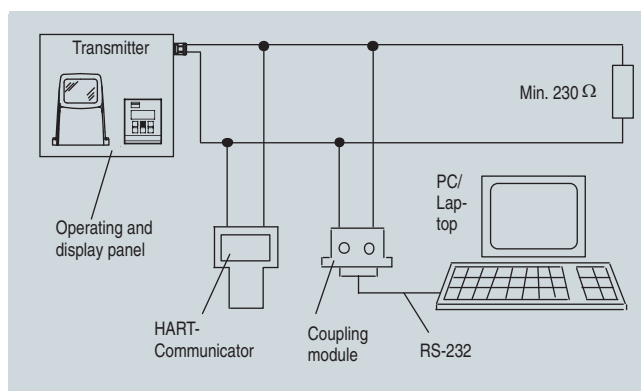
The MAG 5000/6000 are microprocessor-based transmitters with a built-in alphanumeric display in several languages. The transmitters evaluate the signals from the associated electro-magnetic sensors and also fulfil the task of a power supply unit which provides the magnet coils with a constant current.

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

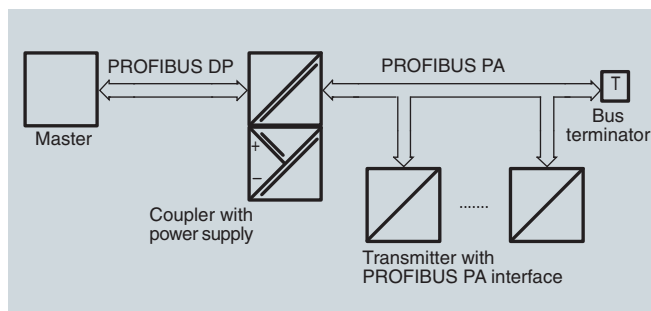
Displays and controls

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

SITRANS F flowmeters

SITRANS F M

Transmitter MAG 5000/6000

Technical specifications

Mode of operation and design

Measuring principle	Electromagnetic with pulsed constant field
Empty pipe	Detection of empty pipe (special cable required in remote mounted installation)
Excitation frequency	Depend on sensor size
Electrode input impedance	$> 1 \times 10^{14} \Omega$

Input

Digital input

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

Output

Current output

• Signal range	0 ... 20 mA or 4 ... 20 mA
• Load	$< 800 \Omega$
• Time constant	0.1 ... 30 s, adjustable

Digital output

Frequency	0 ... 10 kHz, 50% duty cycle (uni/bidirectional)
Pulse (active)	DC 24 V, 30 mA, $1 \text{ K}\Omega \leq R_i \leq 10 \text{ K}\Omega$, short-circuit-protected (power supplied from flowmeter)
Pulse (passive)	DC 3 ... 30 V, max. 110 mA, $200 \Omega \leq R_i \leq 10 \text{ K}\Omega$ (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 galvanically isolated

Max. measuring error (incl. sensor and zero point)

MAG 5000	0.5% of rate
MAG 6000	0.25% of rate

Rated operation conditions

Ambient temperature	
• Operation	• Display version: -20 ... +50 °C (-4 ... +122 °F) • Blind version: -20 ... +60 °C (-4 ... +140 °F)
• Storage	-40 ... +70 °C (-40 ... +158 °F)

Mechanical load

Compact version	18 ... 1000 Hz, 3,17 g rms, sinusoidal in all directions to IEC 68-2-36
19" insert	1 ... 800 Hz, 1 g, sinusoidal in all directions to IEC 68-2-36

Degree of protection

Compact version	IP67/NEMA 4X to IEC 529 and DIN 40050 (1 mH ₂ O 30 min.)
19" insert	IP20/NEMA 2 to IEC 529 and DIN 40050

EMC performance

EN 61326-1 (all environments)
EN 61326-2-5

Display and keypad

Totalizer	Two eight-digit counters for forward, net or reverse flow
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Display

Background illumination with alphanumeric text, 3 x 20 characters to indicate flow rate, totalized values, settings and faults;
Reverse flow indicated by negative sign

Time constant

Time constant as current output time constant

Design

Enclosure material

• Compact version	Fiber glass reinforced polyamide; optional (IP67 only): AISI 316 stainless steel
• 19" insert	Standard 19" insert of aluminium/steel (DIN 41494), width: 21 TE, height: 3 HE
• Back of panel	IP20/NEMA 2; Aluminium
• Panel mounting	IP65/NEMA 4; ABS plastic
• Wall mounting	IP66/NEMA 4; ABS plastic

Dimensional drawings

Compact version	See dimensional drawings
19" insert	See dimensional drawings

Weight

Compact version	0.75 kg (2 lb)
19" insert	See dimensional drawings

Power supply

- 115 ... 230 V AC +10% -15%, 50 ... 60 Hz
- 11 ... 30 V DC or 11 ... 24 V AC

Power consumption

- 230 V AC: 17 VA
- 24 V AC : 9 VA, $I_N = 380 \text{ mA}$, $I_{ST} = 8 \text{ A}$ (30 ms)
- 12 V DC : 11 W, $I_N = 920 \text{ mA}$, $I_{ST} = 4 \text{ A}$ (250 ms)

Certificates and approvals

Custody transfer approval (MAG 5000/6000 CT)

- CE, C-UL general purpose, C-tick; CSA/FM Class 1, div 2
- PTB OIML R 49 (cold water pattern approval); MI-001
- PTB and DANAK OIML R 75 (hot water pattern approval) (MAG 6000 CT)
- PTB and DANAK OIML R 117 Other media than water (milk, beer etc.) pattern approval (MAG 6000 CT)

Communication

Standard

• MAG 5000	Without serial communication or HART as option
• MAG 6000	Prepared for client mounted add-on modules
Optional (MAG 6000 only)	HART, MODBUS RTU/RS485, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS PA, PROFIBUS DP as add-on modules
• MAG 5000/6000 CT	No communication modules approved

SITRANS F flowmeters

SITRANS F M

Transmitter MAG 5000/6000

Safety barrier (e/ia)



Application	For use with MAG 5000/6000 19" and MAG 1100 Ex ATEX/MAG 3100 Ex ATEX		
Ex approval	MAG 1100 Ex [EEx e ia] IIB ATEX MAG 3100 Ex [EEx e ia] IIC ATEX		
Cable parameter	Group	Capacity in μF	Inductance in mH
• Electrode	IIC	≤ 4.1	≤ 80
	IIB	≤ 45	≤ 87
	IIA	≤ 45	≤ 87
Ambient temperature			
• During operation	-20 ... +50 °C (-4 ... +122 °F)		
• During storage	-20 ... +70 °C (-4 ... +158 °F)		
Enclosure			
• Material	Standard 19" insert in aluminium/steel (DIN 41494)		
• Width	21 TE (4.75")		
• Height	3 HE (5.25")		
• Rating	IP20 / NEMA 2 to EN 60529 and DIN 40050		
• Mechanical load	1 g, 1 ... 800 Hz sinusoidal in all directions to EN 60068-2-36		
EMC performance			
• Emission	EN 50081-1 (Light industry)		
• Immunity	EN 50082-2 (Industry)		

Electrode cleaning unit



Application	For use with transmitters MAG 5000 and 6000 19" to clean the electrodes on sensors MAG 1100 or MAG 3100		
	NB: Must not be used with intrinsically safe ATEX sensors NB: Not to be used with sensors with Hastelloy and Tantalum electrodes		
Cleaning voltage			
AC cleaning	60 V AC		
DC cleaning	30 V DC		
Cleaning period	60 s + 60 s pause period		
Relay			
• Load	42 V/2 A		
Operation	Switch relay activated when cleaning is in progress		
• Automatic	Yes		
• Manual	No		
Indicator lamps	LEDs: "ON" and "CLEANING"		
Supply voltage and power consumption	115 ... 230 V AC, +10% ... -15%, 50 ... 60 Hz, 7 VA cleaning, 5 VA stand by 11 ... 30 V DC / 11 ... 24 V AC, 50 ... 60 Hz, 7 VA cleaning, 5 VA stand by		
Ambient temperature			
• During operation	-20 ... +50 °C (-4 ... +122 °F)		
• During storage	-20 ... +70 °C (-4 ... +158 °F)		
Enclosure			
• Material	Standard 19" insert in aluminium/steel (DIN 41494)		
• Width	21 TE (4.75")		
• Height	3 HE (5.25")		
• Rating	IP20 / NEMA 2 to EN 60529 and DIN 40050		
• Mechanical load	1 g, 1 ... 800 Hz sinusoidal in all directions to EN 60068-2-36		

Cleaning unit

The Siemens cleaning unit can be used with MAG 5000 or 6000 in 19" insert version.

The cleaning unit can be used in applications where the liner and subsequently the electrodes may be coated with deposits. If the coating is electrically insulating, the electrode signal will be reduced. If the coating is electrically inductive, the electrode signal will be partly short-circuited and in both cases the accuracy of the meter will decrease (dependent on coating type and thickness).

Note:

The cleaning unit cannot be used for inflammable or explosive media!

Mode of operation

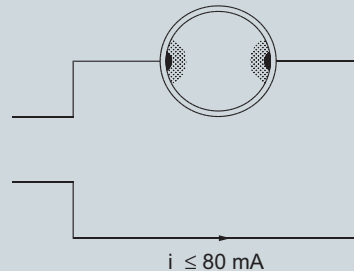
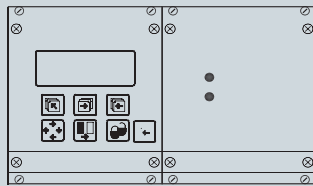
The cleaning unit cleans the electrodes electro-chemically by applying a voltage to the electrodes for approx. 60 seconds. While cleaning, the transmitter stores and holds the latest measured flow reading on the display and also the signal outputs. After an additional pausing period of 60 seconds the flowmeter resumes normal measurement and the cleaning is now completed.

The relay in the transmitter activates the cleaning cycle. In the relay output menu (under cleaning) the cleaning interval can be set between 1 hour and 24 hours.

Cleaning should only take place with liquid in the pipe. This can be detected via the empty pipe function. It is therefore recommended to select "empty pipe detection" ON when using the cleaning.

The cleaning sequence can also be controlled manually through the electrical input of the transmitter. Before this is done, ensure that the measuring pipe is full.

AC cleaning

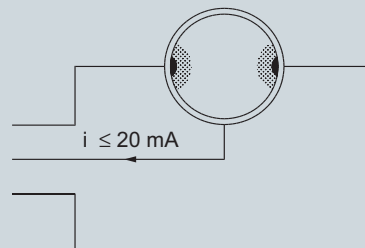
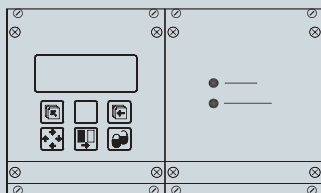


AC-cleaning is used to remove fatty deposits on the electrodes. These fatty deposits are seen in waste water applications, in abattoirs and water applications with oil residuals. During the cleaning process, the surface of the electrodes get warmer, which tends to soften grease particles and the gas bubbles generated mechanically lift deposits away from the surface of the electrodes.

Note:

Do not use AC-cleaning on sensors with Tantalum or Hastelloy electrodes.

DC cleaning



DC-cleaning is used to eliminate electrically conductive deposits in the measuring pipe influencing the measuring accuracy.

Particularly in district heating applications an electrically conductive deposit (magnetite) may occur and short-circuit the electrode signal. In this case the accuracy of the meter decreases and the signal/noise conditions of the meter become inferior. The problem only arises if the conductivity of the water is less than approx. $250 \mu\text{S}/\text{cm}$.

During DC-cleaning electrolysis takes place where the flow of electrons removes the particle deposits from the electrode area.

Note:

Do not use DC-cleaning on sensors with Tantalum or Hastelloy electrodes.

SITRANS F flowmeters

SITRANS F M

Transmitter MAG 5000/6000

Selection and Ordering Data

Transmitter MAG 5000

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

Transmitter MAG 6000

Description	Order No.	
Transmitter MAG 6000 Blind for compact and wall mounting; IP67/NEMA 4X, fibre glass reinforced polyamide		
• 11 ... 30 V DC / 11 ... 24 V AC	7ME6920-1AA30-0AA0	
• 115/230 V AC, 50/60 Hz	7ME6920-1AA10-0AA0	
Transmitter MAG 6000 for compact and wall mounting;		
• 11 ... 30 V DC / 11 ... 24 V AC	7ME6920-1AA30-1AA0	
• 115/230 V AC, 50/60 Hz	7ME6920-1AA10-1AA0	
IP67/NEMA 4X, AISI 316 stainless steel (only for sensor with SS terminal box)		
• 11 ... 30 V DC / 11 ... 24 V AC	7ME6920-1QA30-1AA0	
• 115/230 V AC, 50/60 Hz	7ME6920-1QA10-1AA0	

▶ Available ex stock

Description	Order No.	
Transmitter MAG 6000 CT for compact and wall mounting, approved for custody transfer (no communication moduls possible); IP67/NEMA 4X, fibre glass reinforced polyamide		
• 11 ... 30 V DC / 11 ... 24 V AC	7ME6920-1AA30-1AB0	
• 115/230 V AC, 50/60 Hz	7ME6920-1AA10-1AB0	
Transmitter MAG 6000 SV for compact and wall mounting; special excitation 44 Hz settings for Batch application DN ≤ 25/1" IP67/NEMA 4X, fibre glass reinforced polyamide		
11 ... 30 V DC / 11 ... 24 V AC	7ME6920-1AB30-1AA0	
115/230 V AC, 50/60 Hz	7ME6920-1AB10-1AA0	
Transmitter MAG 6000 for 19" rack and wall mounting		
• 11 ... 30 V DC / 11 ... 24 V AC	7ME6920-2CA30-1AA0	
• 115/230 V AC, 50/60 Hz	7ME6920-2CA10-1AA0	
Transmitter MAG 6000 SV for 19" rack and wall mounting; special excitation 44 Hz settings for Batch application DN ≤ 25/1"		
• 11 ... 30 V DC / 11 ... 24 V AC	7ME6920-2CB30-1AA0	
• 115/230 V AC, 50/60 Hz	7ME6920-2CB10-1AA0	
MAG 6000 with IP66/NEMA 4X enclosure; 115/230 V AC, 50/60 Hz		
	7ME6920-2EA10-1AA0	
MAG 6000 with electrode cleaning unit, complete mounted with IP66/NEMA 4X mounting enclosure		
• 11 ... 30 V DC / 11 ... 24 V AC	7ME6920-2PA30-1AA0	
• 115/230 V AC, 50/60 Hz	7ME6920-2PA10-1AA0	
MAG 6000 with safety barrier for ATEX 2G D approved sensors, complete mounted with IP66/NEMA 4X wall mounting enclosure, ATEX, 115/230 V AC, 50/60 Hz		
• For ATEX 2G D sensors	7ME6920-2MA11-1AA0	
MAG 6000 SV, 19" insert, in IP66/NEMA 4X, ABS plastic enclosure, excitation frequency 44 Hz for Batch application DN ≤ 25/1", 11 ... 30 V DC, 11 ... 24 V AC, 50/60 Hz		
	7ME6920-2EB30-1AA0	

SITRANS F flowmeters

SITRANS F M

Transmitter MAG 5000/6000

Communication modules for MAG 6000

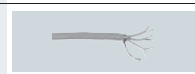
Description	Order No.
HART (not for MAG 6000 I)	► FDK-085U0226
MODBUS RTU/RS485	► FDK-085U0234
PROFIBUS PA Profile 3	► FDK-085U0236
PROFIBUS DP Profile 3	► FDK-085U0237
DeviceNet	► FDK-085U0229
FOUNDATION Fieldbus H1	► A5E02054250¹⁾



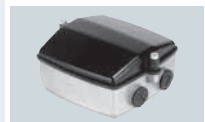
¹⁾ Pending for MAG 6000 I ATEX

Accessories for MAG 5000 and MAG 6000

Description	Order No.
Wall mounting unit for IP67/NEMA 4X version, wall bracket, terminal box in polyamide	
• 4 x M20 cable glands	► FDK-085U1018
• 4 x ½" NPT cable glands	► FDK-085U1053
Cable for standard electrode or coil, 3 x 1.5 mm ² / 18 gage with shield PVC	
• 10 m (33 ft)	► FDK-083F0121
• 20 m (65 ft)	► FDK-083F0210
• 40 m (130 ft)	► FDK-083F0211
• 60 m (200 ft)	► FDK-083F0212
• 100 m (330 ft)	FDK-083F0213
• 150 m (500 ft)	FDK-083F3052
• 200 m (650 ft)	FDK-083F3053
• 500 m (1650 ft)	FDK-083F3054
Electrode cable for empty pipe or low conductivity, double shielded, 3 x 0.25 mm ²	
• 10 m (33 ft)	FDK-083F3020
• 20 m (65 ft)	► FDK-083F3095
• 40 m (131 ft)	FDK-083F3094
• 60 m (200 ft)	FDK-083F3093
• 100 m (330 ft)	FDK-083F3092
• 150 m (500 ft)	FDK-083F3056
• 200 m (650 ft)	FDK-083F3057
• 500 m (1650 ft)	FDK-083F3058



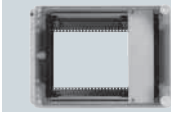
Description	Order No.
Cable kit with standard coil cable, 3 x 1.5 mm ² /18 gage with shield PVC and electrode cable double shielded, 3 x 0.25 mm ²	
• 5 m (16 ft)	A5E02296329
• 10 m (33 ft)	A5E01181647
• 15 m (49 ft)	A5E02296464
• 20 m (65 ft)	A5E01181656
• 25 m (82 ft)	A5E02296490
• 30 m (98 ft)	A5E02296494
• 40 m (130 ft)	A5E01181686
• 60 m (200 ft)	A5E01181689
• 100 m (330 ft)	A5E01181691
• 150 m (500 ft)	A5E01181699
• 200 m (650 ft)	A5E01181703
• 500 m (1640 ft)	A5E01181705
Cable glands, for above cable, 2 pcs.	
• M20	A5E00822490
• ½" NPT	A5E00822501
Sealing screws for sensor/transmitter, 2 pcs	FDK-085U0221
Terminal box, in polyamide, inclusive lid	
• M20	► FDK-085U1050
• ½" NPT	FDK-085U1052
Terminal box lid, in polyamid	FDK-085U1003
Terminal box for MAG 6000, in stainless steel, inclusive lid	
• M20	A5E00836867
• ½" NPT	A5E00836868
Terminal box (3A) for MAG 1100 F in polyamide, inclusive lid	
• M20	A5E00822478
• ½" NPT	A5E00822479
Potting kit for terminal box of MAG sensors for IP68/NEMA 6P (not ATEX)	► FDK-085U0220
19" cleaning unit for electrode cleaning (21TE) incl. back plate	
• 11 ... 30 V DC / 11 ... 24 V AC	FDK-083F5039
• 115 ... 230 V AC, 50/60 Hz	FDK-083F5036



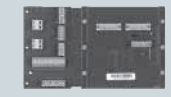
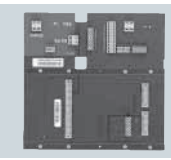
SITRANS F flowmeters

SITRANS F M

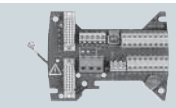
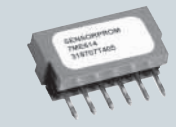
Transmitter MAG 5000/6000

Description	Order No.	
19" safety barrier (21 TE) [Ex e ia] IIC for MAG 1100 ATEX and MAG 3100 ATEX, incl. back plate	FDK-083F5034	
Panel mounting enclosure for 19" insert (21 TE); IP65/NEMA 4 enclosure in ABS plastic for front panel mounting	FDK-083F5030	
Panel mounting enclosure for 19" insert (42 TE); IP65/NEMA 4 enclosure in ABS plastic for front panel mounting	FDK-083F5031	
Back of panel mounting enclosure for 19" insert (21 TE); IP20/NEMA 2 enco- sure in aluminium	FDK-083F5032	
► Available ex stock		
Back of panel mounting enclosure for 19" insert (42 TE); IP20/NEMA 2 enco- sure in aluminium	FDK-083F5033	
IP66/NEMA 4, wall mounting enclosure for 19" inserts (without backplates)		
• 21 TE	FDK-083F5037	
• 42 TE	► FDK-083F5038	
Front cover (7TE)	FDK-083F4525	
► Available ex stock		

Back plates (if wall enclosure IP66 is used as part)

Description	Order No.	
Wall unit enclosure IP66, 12 ... 24 V, 115 ... 230 V		
• Transmitter	FDK-083F4121	
• Transmitter ia/e and safety barrier	FDK-083F4122	
• Transmitter ia/ib and safety barrier (only for sensors produced before October 2007)	FDK-083F4120	
• Transmitter and cleaning unit	FDK-083F4124	

Spare parts

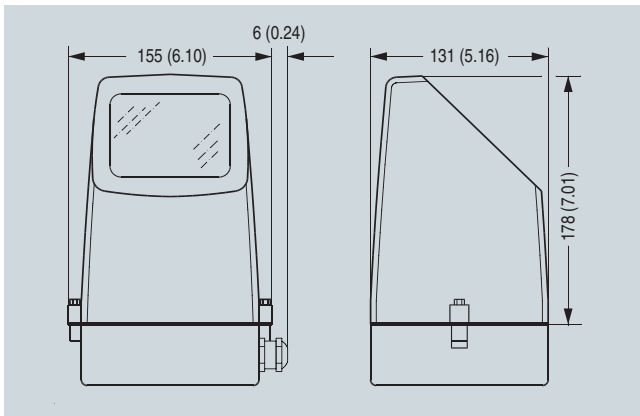
Description	Order No.	
Connection plate		
• 12 ... 24 V	FDK-083F4149	
• 115 ... 230 V	FDK-083F4148	
19" enclosure, 12 ... 24 V, 115 ... 230 V		
• Connection plate for stan- dard 19" transmitter	FDK-083F4117	
• Connection plate for trans- mitter ia and safety barrier	FDK-083F4118	
• Connection plate for trans- mitter ia/ib and safety bar- rier (only for sensors produced before October 2007)	FDK-083F4119	
• Connection plate for trans- mitter and cleaning unit	FDK-083F4123	
SENSORPROM memory unit (Sensor code and serial numbers must be specified on order)		
• 2 kB (for MAG 5000/6000/ MAG 6000 I)	FDK-085U1005	
• 250 B (for MAG 2500/3000)	FDK-085U1008	
Display unit for MAG 5000/6000		
• black neutral front	FDK-085U1038	
• Siemens front	FDK-085U1039	

Sun Shields for MAG 5000/6000 transmitters

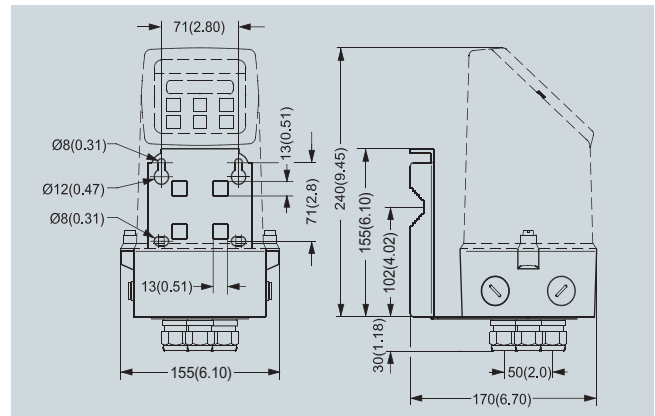
Description	Order No.	
Sun shield for remote MAG 5000/6000 transmit- ters	A5E01209496	
Sun Shield for compact MAG 5000/6000 transmit- ters on MAG 3100 (DN 15 ... 2000 (½" ... 78") or MAG 5100 (DN 150 ... 1200 (6" ... 48"))	A5E01209500	

Dimensional drawings

Transmitter IP67/NEMA 4X compact polyamide

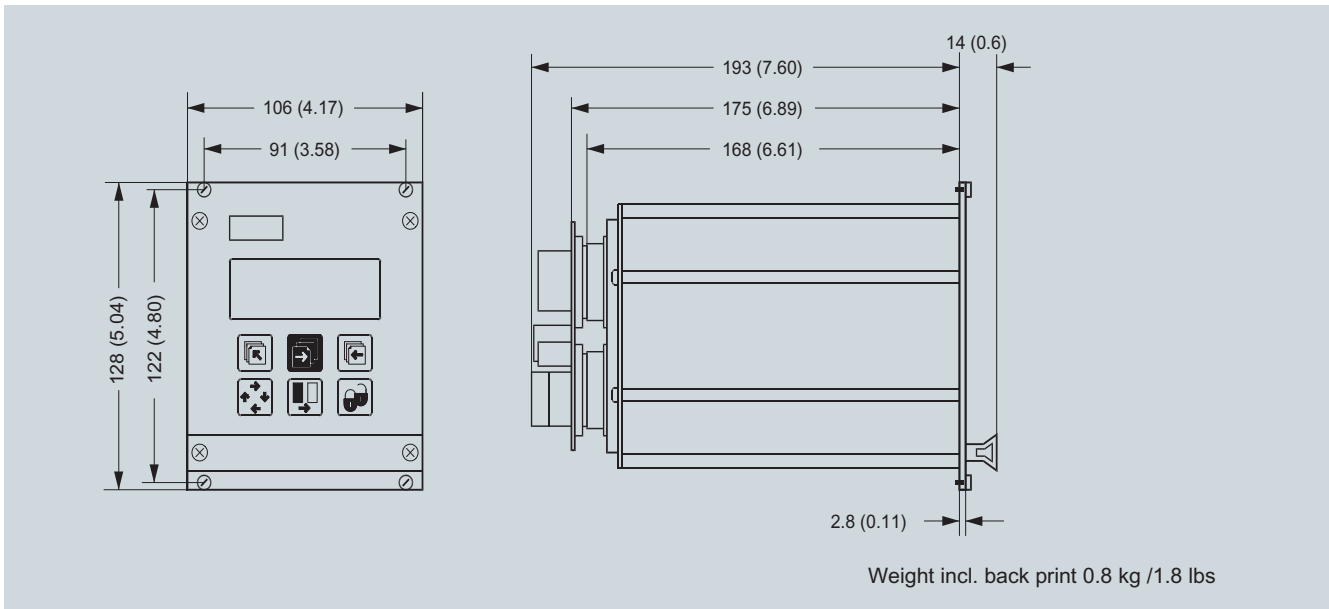


Transmitter compact mounted



Transmitter wall mounted

Transmitter, 19" IP20/ NEMA 2 standard unit

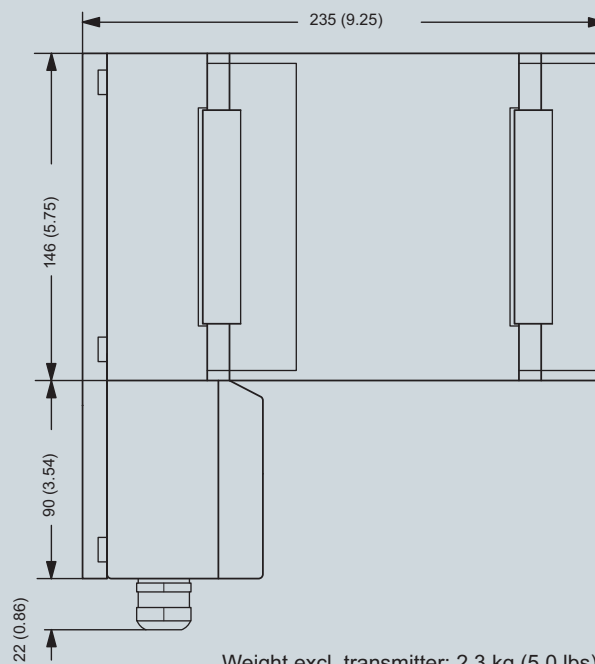
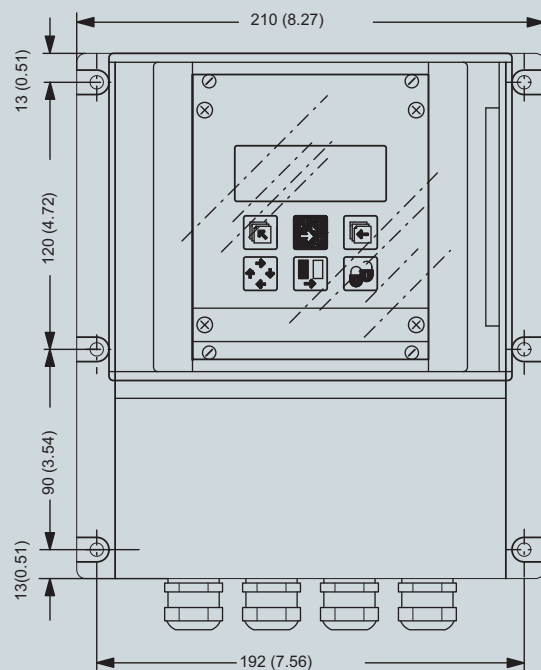


SITRANS F flowmeters

SITRANS F M

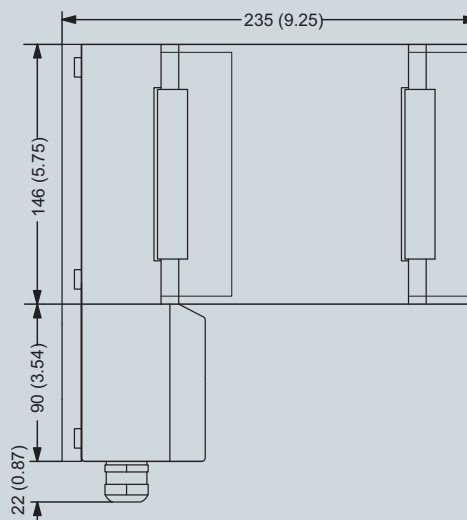
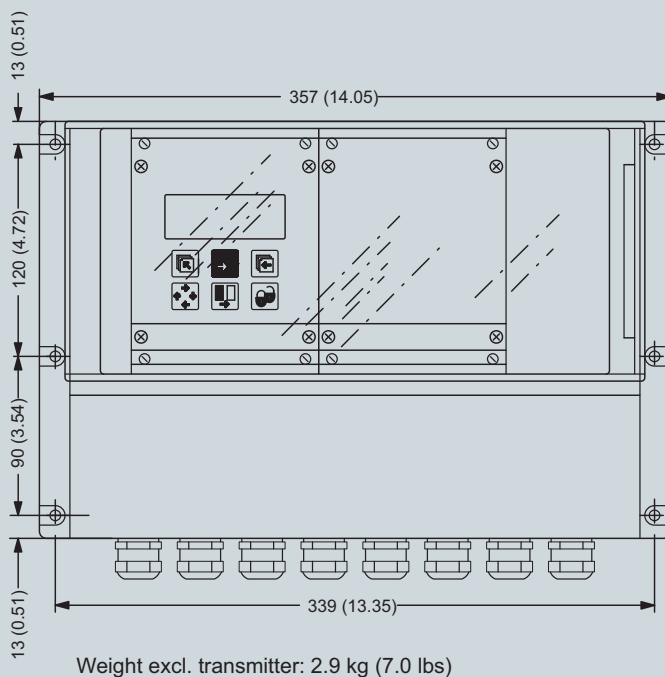
Transmitter MAG 5000/6000

Transmitter, wall mounting IP66/NEMA 4, 21 TE



Weight excl. transmitter: 2.3 kg (5.0 lbs)

Transmitter, wall mounting IP66/NEMA 4, 42 TE



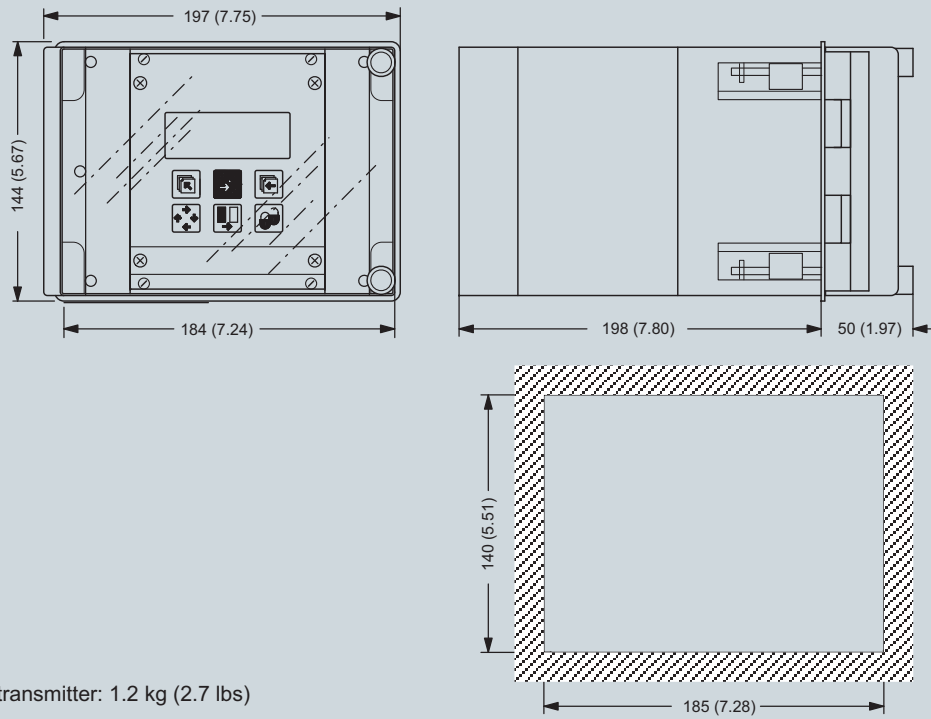
Weight excl. transmitter: 2.9 kg (7.0 lbs)

SITRANS F flowmeters

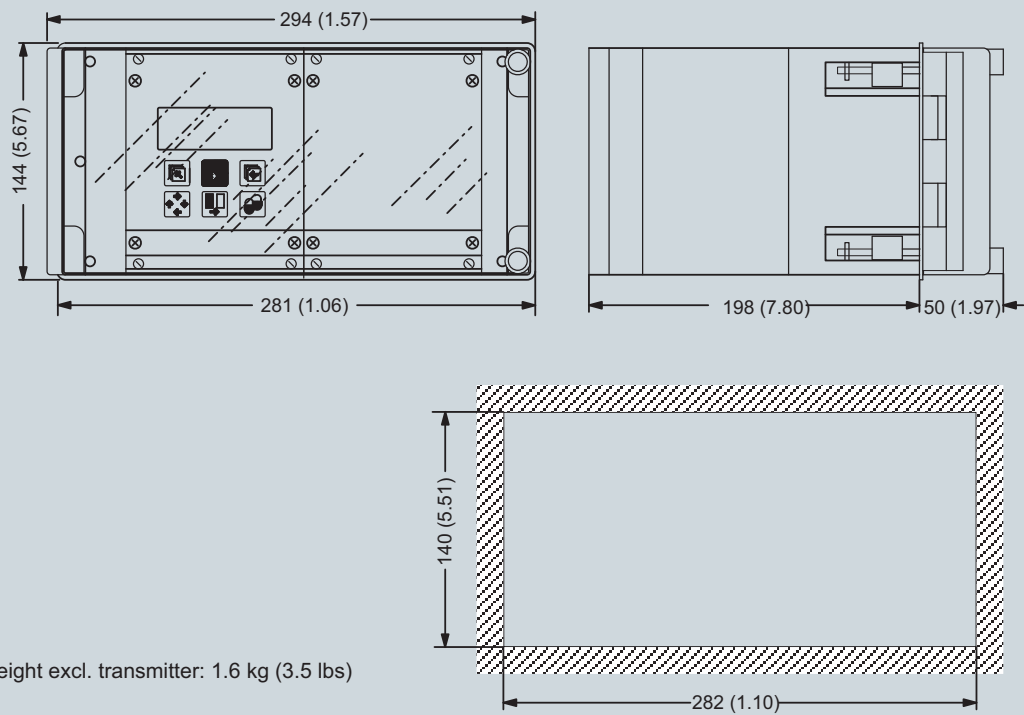
SITRANS F M

Transmitter MAG 5000/6000

Transmitter, panel front IP65/NEMA 4, 21 TE



Transmitter, panel front IP65/NEMA 4, 42 TE

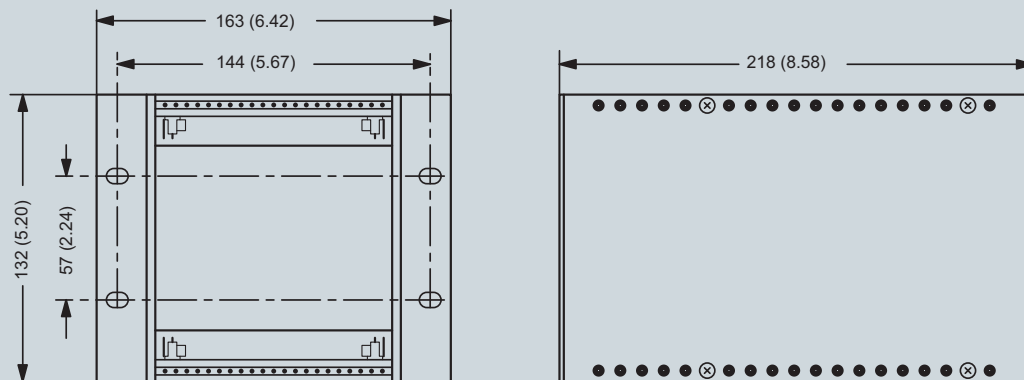


SITRANS F flowmeters

SITRANS F M

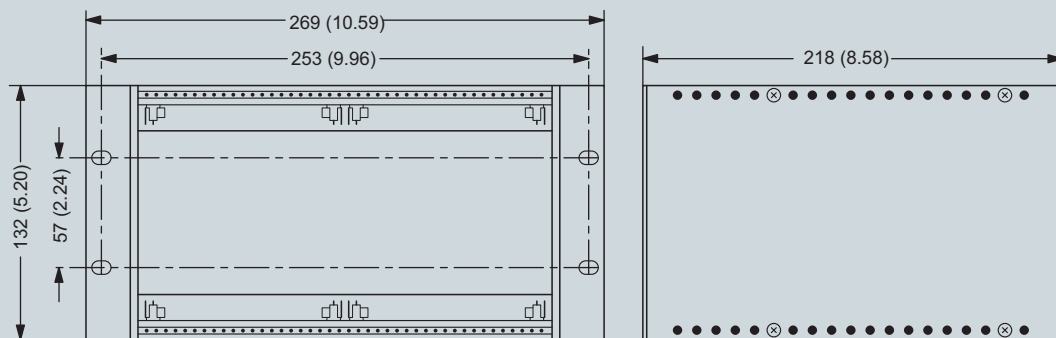
Transmitter MAG 5000/6000

Transmitter, back of panel IP20/NEMA 2, 21 TE



Weight: 0.7 kg (1.6 lbs)

Transmitter, back of panel IP20/NEMA 2, 42 TE



Weight: 0.9 kg (2.0 lbs)

Schematics

Electrical connection

Grounding

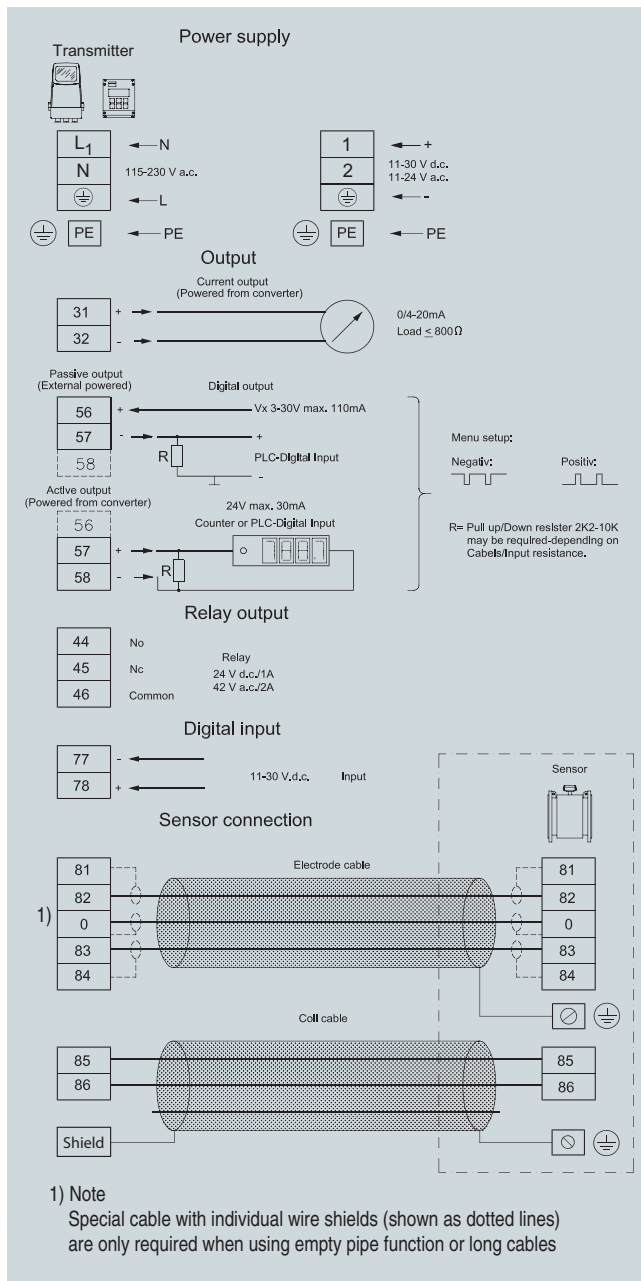
PE must be connected due to safety class 1 power supply.

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.



SITRANS F flowmeters

SITRANS F M

Transmitter MAG 6000 I/6000 I Ex d

Overview



The SITRANS F M MAG 6000 I/6000 I Ex d transmitter is designed for the demands in the process industry. The robust die cast aluminium 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 ATEX rated flowmeters with intrinsically safe rated input and outputs
- For compact or remote installation
- HART, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS PA and DP, MODBUS RTU/RS485 add-on communication modules available
- Superior signal resolution for optimum turn down ratio
- Digital signal processing with many possibilities
- Automatic reading of SENSORPROM data for easy commissioning
- User configurable operation menu with password protection
 - 3 lines, 20 characters display in 11 languages
 - Flow rate in various units
 - Totalizer for forward, reverse and net flow as well as much more information available.
- Multiple functional outputs for process control, minimum configuration with analogue, pulse/frequency and relay output (status, flow direction, limits)
- Comprehensive self-diagnostic for error indication and error logging
- Batch control

Design

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

Function

The following functions are available:

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

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

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

Displays and keypads

Operation of the transmitter can be carried out using:

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

Technical specifications

Mode of operation and design

Measuring principle	Electromagnetic with pulsed constant field
Empty pipe	Detection of empty pipe (special cable required in remote mounted installation)
Excitation frequency	Depend on sensor size
Electrode input impedance	$> 1 \times 10^{14} \Omega$

Input

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

Output

Current output	
• Signal range	0 ... 20 mA or 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
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Max. measuring error

MAG 6000 I/MAG 6000 I Ex d	0.25% of rate
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SITRANS F flowmeters

SITRANS F M

Transmitter MAG 6000 I/6000 I Ex d

Technical specifications (continued)

Rated operation conditions

Ambient temperature

- Operation

- MAG 6000 I -20 ... +60 °C (-4 ... +140 °F)
- MAG 6000 I Ex -10 ... +60 °C (+14 ... +140 °F)

- Storage

-40 ... +70 °C (-40 ... +158 °F)

Mechanical load

18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36

Transmitter: 1.14 grms

Degree of protection

IP67/NEMA 4X to IEC 529 and DIN 40050 (1 mH₂O 30 min.)

EMC performance

EN 61326

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, totaled 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 aluminium, painted

- Wall mounting

Wall mounting bracket enclosed for remote version

Dimensional drawings

See dimensional drawings

Weight

See dimensional drawings

Power supply

- Non Ex d: 18 ... 90 V DC; 115 ... 230 V AC; 50 ... 60 Hz
- Ex d: 18 ... 30 V DC
- Ex d: 115 ... 230 V AC; 50 ... 60 Hz

Power consumption

- 230 V AC: 21.5 VA
- 24 V DC: 12 W, I_N = 380 mA, I_{ST} = 1 A (3 ms)

Certificates and approvals

MAG 6000 I

- CE
- C-tick
- FM Class 1, div 2
- FM Class 1, Zone 2
- CSA Class 1, div 2
- CSA Class 1, Zone 2

MAG 6000 I Ex (to be used with ATEX 2G D sensors)

- SIRA 03 ATEX 2072X
- EX II 2 (1) (2) G D
- EEx d e [ia] ia [ib] ib IIC, T6

Cable entries

Remote installation

- MAG 6000 I: 2 x M25 (for supply/output) and 2 x M16 (for sensor connection) or 2 x 1/2" 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

Non ATEX versions

HART, MODBUS RTU/RS 485, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS PA, PROFIBUS DP add-on modules

ATEX 2G D

HART, PROFIBUS PA, FOUNDATION Fieldbus H1 available as integrated version

Selection and Ordering data

Order No.

SITRANS F M Transmitter MAG 6000 I / Ex d

7ME6930 -

Remote, local display, die cast aluminium

2BA - 1AA

Supply voltage

115 ... 230 V AC, 50 ... 60 Hz; 18 ... 90 V DC

ATEX 2G D, 18 ... 30 V DC

ATEX 2G D, 115 ... 230 V AC, 50 ... 60 Hz

Ex approval

None ATEX; FM/CSA class1 div 2

ATEX 2G D (For ATEX sensors: 7ME6110, 7ME6120, 7ME6140, 7ME6310, 7ME6320, 7ME6340)

Communication

None (add-on modules can be ordered separately, see below)

HART

PROFIBUS PA Profile 3

PROFIBUS DP Profile 3 (not Ex version)

MODBUS RTU/RS 485 (not Ex version)

FOUNDATION Fieldbus H1

Cable gland entries

Metric

1/2" NPT

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

Description

Order No.

HART
(only for MAG 6000 I/Ex)

► **FDK-085U0321**

MODBUS RTU/RS485

► **FDK-085U0234**

PROFIBUS PA Profile 3

► **FDK-085U0236**

PROFIBUS DP Profile 3

► **FDK-085U0237**

DeviceNet

► **FDK-085U0229**

FOUNDATION Fieldbus
H1¹⁾

► **A5E02054250**

► Available ex stock

¹⁾ Pending for MAG 6000 I ATEX



SITRANS F flowmeters

SITRANS F M

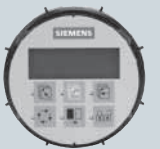
Transmitter MAG 6000 I/6000 I Ex d

Accessories MAG 6000 I

Description	Order No.	
Cable for standard electrode or coil, 3 x 1.5 mm ² /18 gage with shield PVC		
• 10 m (33 ft)	► FDK-083F0121	
• 20 m (65 ft)	► FDK-083F0210	
• 40 m (130 ft)	► FDK-083F0211	
• 60 m (200 ft)	► FDK-083F0212	
• 100 m (330 ft)	FDK-083F0213	
• 150 m (500 ft)	FDK-083F3052	
• 200 m (650 ft)	FDK-083F3053	
• 500 m (1650 ft)	FDK-083F3054	
Electrode cable for empty pipe or low conductivity, double shielded, 3 x 0.25 mm ² (cannot be used for Ex applications)		
• 10 m (33 ft)	FDK-083F3020	
• 20 m (65 ft)	► FDK-083F3095	
• 40 m (130 ft)	FDK-083F3094	
• 60 m (200 ft)	FDK-083F3093	
• 100 m (330 ft)	FDK-083F3092	
• 150 m (500 ft)	FDK-083F3056	
• 200 m (650 ft)	FDK-083F3057	
• 500 m (1650 ft)	FDK-083F3058	
Cable kit with standard coil cable, 3 x 1.5 mm ² /18 gage with shield PVC and electrode cable double shielded, 3 x 0.25 mm ²		 
• 5 m (16 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	
• 60 m (200 ft)	A5E01181689	
• 100 m (330 ft)	A5E01181691	
• 150 m (500 ft)	A5E01181699	
• 200 m (650 ft)	A5E01181703	
• 500 m (1640 ft)	A5E01181705	

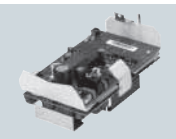
► Available ex stock

Spare parts

Description	Order No.	
Display	FDK-085U3122	

Description	Order No.	
Accessory bag including cable gland inserts coil & electrode connectors	FDK-085U3144	
Electronics cover with glass-plate Non Ex	7ME5933-0AC01	
Cover for connection board incl. gasket (for remote version)	7ME5933-0AC02	
Cover for connection board incl. gasket (for remote version)	7ME5933-0AC03	
Safety clamp	7ME5933-0AC06	

Complete spare part PCB unit

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

Please use online Product selector to get latest updates.

Product selector link:

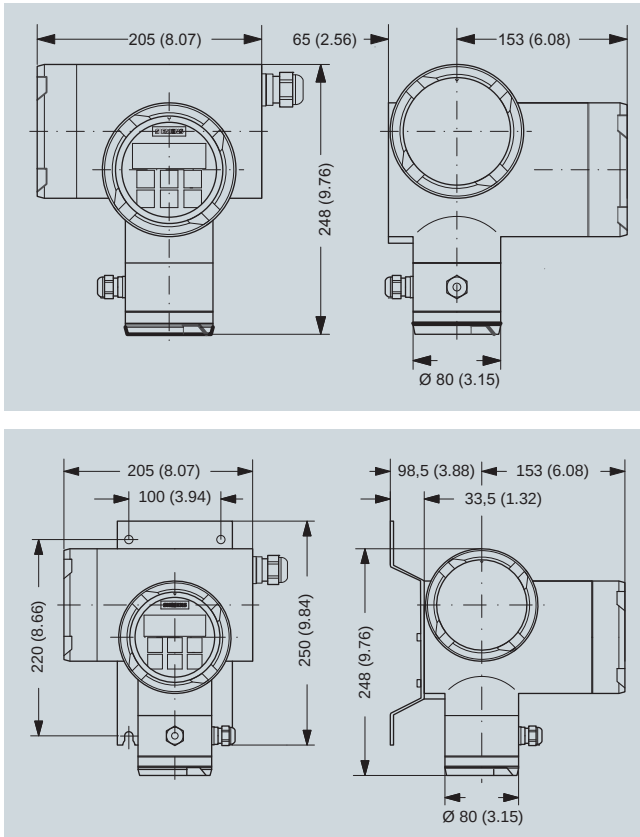
www.pia-selector.automation.siemens.comPlease also see www.siemens.com/SITRANSforordering for practical examples of ordering

SITRANS F flowmeters

SITRANS F M

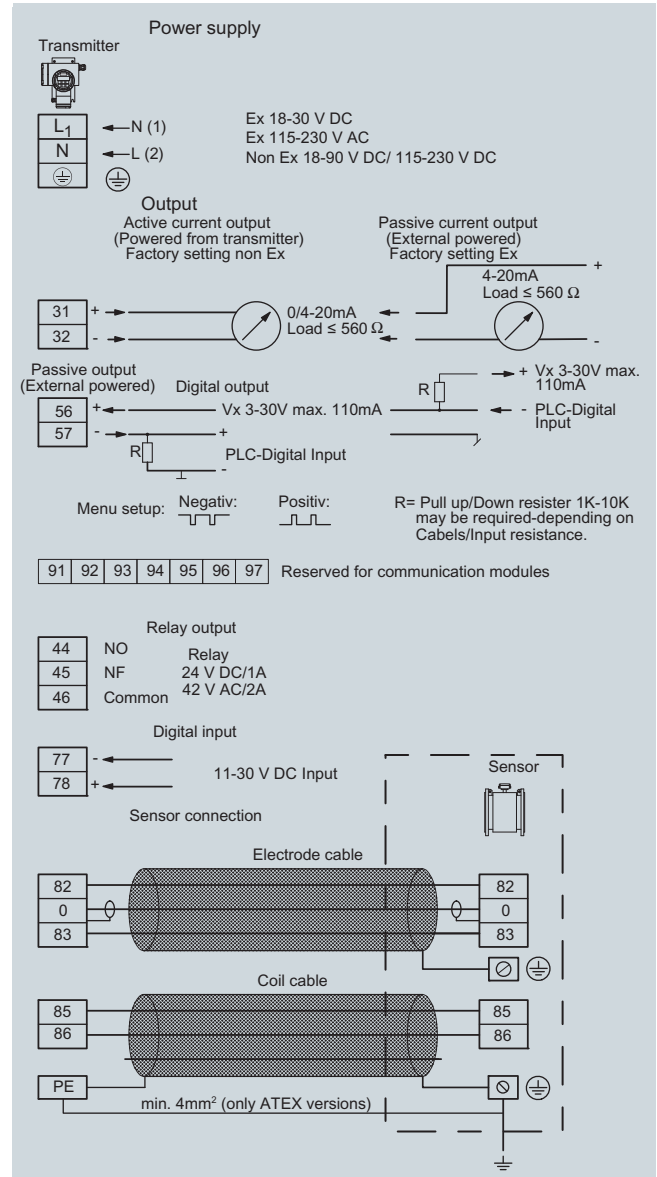
Transmitter MAG 6000 I/6000 I Ex d

Dimensional drawings



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

Schematics



SITRANS F flowmeters

SITRANS F M

MAG 1100

Overview



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

Benefits

- Sensor sizes: DN 2 to 100 (1/12" to 4")
- Compact wafer design meets EN 1092, DIN and ANSI flange standards
- Corrosion resistant AISI 316 stainless steel sensor housing
- Highly resistant liner and electrodes fitting most extreme process media
- Temperature rating up to 200 °C (390 °F)
- Hose proof IP67/NEMA 4X/6 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
- Ex ATEX 2G D version
- FM Class 1 Div 2

Mode of operation

The flow measuring principle is based on Faraday's law of electromagnetic induction where 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	DN 2 ... 65 (1/12" ... 2 1/2"): 12.5 Hz DN 80, 100 (3", 4"): 6.25 Hz	DN 15 ... 50 (1/2" ... 2"): 12.5 Hz DN 80, 100 (3", 4"): 6.25 Hz
Process connection Nominal size • MAG 1100 (Ceramic) • MAG 1100 (PFA) Mating flanges	DN 2 ... DN 100 (1/12" ... 4") DN 10 ... DN 100 (3/8" ... 4") 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	DN 15 ... DN 100 (1/2" ... 4") EN 1092-1 (DIN 2501), ANSI B 16.5 class 150 and 300 or equivalent
Rated operating conditions <u>Ambient conditions</u> Ambient temperature ¹⁾ • Sensor • Sensor ATEX • Compact transmitter MAG 5000/6000 • Compact transmitter MAG 6000 I • Compact transmitter MAG 6000 I Ex d	-40 ... +100 °C (-40 ... +212 °F) -20 ... +60 °C (-4 ... +140 °F) -20 ... +50 °C (-4 ... +122 °F) -20 ... +60 °C (-4 ... +140 °F) -10 ... +60 °C (+14 ... +140 °F)	-40 ... +100 °C (-40 ... +212 °F) -20 ... +50 °C (-4 ... +122 °F)
<u>Temperature of medium</u> • MAG 1100 (Ceramic) • MAG 1100 ATEX (Ceramic) • MAG 1100 (PFA)	-20 ... +150 °C (-4 ... +302 °F) -20 ... +150 °C (-4 ... +302 °F) -30 ... +130 °C (-20 ... +266 °F) Suitable for steam sterilization at 150 °C (302 °F)	-20 ... +200 °C (-4 ... +392 °F) -20 ... +180 °C (-4 ... +356 °F)
<u>Temperature shock</u> • MAG 1100 (Ceramic) - Duration ≤ 1 min, followed by 10 min rest • MAG 1100 (PFA)	• 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 ≤ 80 K/min) • DN 40, 50, 65: Max. ΔT ≤ 70 °C/min (1 1/2", 2", 2 1/2": Max. ΔT ≤ 70 K/min) • DN 80, 100: Max. ΔT ≤ 60 °C/min (3", 4": Max. ΔT ≤ 60 K/min) Max. ±100 °C (210 °F) momentarily	• DN 15, 25: Max. ΔT ≤ 80 °C/min (1/2", 1": Max. ΔT ≤ 80 K/min) • DN 40, 50: Max. ΔT ≤ 70 °C/min (1 1/2", 2": Max. ΔT ≤ 70 K/min) • DN 80, 100: Max. ΔT ≤ 60 °C/min (3", 4": Max. ΔT ≤ 60 K/min)
<u>Operating pressure</u> • MAG 1100 (Ceramic) • MAG 1100 (PFA)	• 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 x 10 ⁻⁶ bar _{abs} (1.5 x 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)	• 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 x 10 ⁻⁶ bar _{abs} (1.5 x 10 ⁻⁵ psi _{abs})
<u>Mechanical load</u>	• 18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 • Sensor: 3.17 grms • Sensor with compact MAG 5000/ 6000 mounted transmitter: 3.17 grms • Sensor with compact MAG 6000 I/ 6000 I Ex mounted transmitter: 1.14 grms • For compact installation with the MAG 6000 I, transmitter to be supported to avoid tension on sensor part.	• 18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 • Sensor: 3.17 grms
<u>Enclosure rating</u> • Standard • Option on sensor (no ATEX)	IP67 to EN 60529 (NEMA 4X/6), 1 mH ₂ O for 30 min 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 IP68 to EN 60529 (NEMA 6P), 10 mH ₂ O cont.
EMC	89/336 EEC	89/336 EEC

SITRANS F flowmeters

SITRANS F M

MAG 1100

Design		
Weight	See Dimensional drawings	See Dimensional drawings
Material		
• Enclosure - MAG 1100 • Terminal box - Standard - Option • Fixing studs • Gaskets - Standard - Option • Pipe connection adapters: DN 2, 3, 6 and 10 (1/12", 1/8", 1/4" and 3/8")	Stainless steel AISI 316L (1.4404) Fibre glass reinforced polyamide (no ATEX) Stainless steel AISI 316 (1.4436) Stainless steel AISI 304 (1.4301), Number and size to EN 1092-1:2001 EPDM (max. 150 °C, PN 40 (max. 300 °F, 600 psi) • Graphite (max. 200 °C, PN 40 (max. 390 °F, 600 psi) • PTFE (max. 130 °C, PN 25 (max. 270 °F, 300 psi) • Stainless steel, AISI 316 • Hastelloy • PVDF	Stainless steel AISI 316L (1.4404) Stainless steel AISI 316 (1.4436) Stainless steel AISI 304 (1.4301), Number and size to EN 1092-1:2001 Graphite (max. 200 °C, PN 40 (max. 390 °F, 600 psi)
Liner		
• MAG 1100 (Ceramic) • MAG 1100 (PFA)	• DN 2, 3 (1/12", 1/8"): Zirconium oxide (ZrO₂) (ceramic) • DN 6 ... 100 (1/4" ... 4"): Aluminium oxide Al₂O₃ - Reinforced PFA (no ATEX)	DN 15 ... 100 (1/2" ... 4"): Aluminium oxide Al ₂ O ₃
Electrodes		
• MAG 1100 (Ceramic) • MAG 1100 (PFA)	• DN10 ... 100 (3/8" ... 4") : Platinum with gold / Titanium brazing alloy • DN 2 ... 6 (1/12" ... 1/4"): Platinum • DN 10 ... 15 (3/8" ... 1/2"): Hastelloy C276 • DN 25 ... 100 (1" ... 4"): Hastelloy C22	Platinum with gold / Titanium brazing alloy
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 6000I: 2 x M25 (for supply/output) - MAG 6000I Ex d: 2 x M20 (for supply/output)	Remote installation 2 x M20 or 2 x 1/2" NPT
Certificates and approvals		
Conforms to	PED – 97/23 EC and CRN (PFA)	PED – 97/23 EC and CRN (PFA)
Ex approvals		
MAG 1100 (Ceramic) • ATEX sensor or Compact with MAG 6000 I Ex • Sensor with/without MAG 5000/6000 /6000 I MAG 1100 (PFA) • Sensor with/without MAG 5000/6000/6000 I	ATEX 2G D sensor Ex d e ia IIB T3 - T6 FM Class 1 div 2 FM Class 1 div 2	ATEX 2G D sensor Ex d e ia IIB T3 - T6 FM Class 1 div 2

¹⁾ Conditions are also dependent on liner characteristics

For technical specification for transmitter - please see transmitter pages.

SITRANS F flowmeters

SITRANS F M

MAG 1100

Selection and Ordering data	Order No.
Sensor SITRANS F M MAG 1100 EPDM gaskets included	7ME6110 - A 0 -
Diameter	
DN 2 (1/12")	1 D
DN 3 (1/8")	1 H
DN 6 (1/4")	1 M
DN 10 (3/8")	1 R
DN 15 (1/2")	1 V
DN 25 (1")	2 D
DN 40 (1 1/2")	2 R
DN 50 (2")	2 Y
DN 65 (2 1/2")	3 F
DN 80 (3")	3 M
DN 100 (4")	3 T
Liner material	
PFA - DN 10 ... 100 (3/8" ... 4") (no ATEX)	1
Ceramic	2
Electrode material	
Hastelloy C (only with PFA liner)	1
Platinum (only with ceramic liner)	2
Transmitter	
Sensor for remote transmitter (order transmitter separately)	A
Sensor ATEX 2G D for remote transmitter (order transmitter separately)	B
MAG 6000 I, Aluminium 18 ... 90 V DC, 115 ... 230 V AC	C
MAG 6000 I, Aluminium 18 ... 30 V DC, ATEX 2G D	D
MAG 6000 I, Aluminium 115 ... 230 V, ATEX 2G D	E
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
Communication	
No communication, add-on possible	A
HART	B
PROFIBUS PA Profile 3 (only MAG 6000/MAG 6000 I)	F
PROFIBUS DP Profile 3 (no ATEX) (only MAG 6000/MAG 6000 I)	G
MODBUS RTU/RS 485 (no ATEX) (only MAG 6000/MAG 6000 I)	E
FOUNDATION Fieldbus H1 (only MAG 6000/MAG 6000 I)	J
Cable glands/terminal box	
Metric: Polyamid terminal box or 6000I compact	1
1/2" NPT: Polyamid terminal box or 6000I compact	2
Metric: SS terminal box (mandatory for stainless steel MAG 6000 transmitter)	3
1/2" NPT: SS terminal box (mandatory for stainless steel MAG 6000 transmitter)	4
► Available ex stock	

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

Selection and Ordering data	Order No.
Sensor SITRANS F M	
MAG 1100 HT High Temperature	7ME6120 - A 2 0 - 2 A
Ceramic liner, Platinum electrode, Graphite gaskets included	
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 80 (3")	3 M
DN 100 (4")	3 T
Transmitter	
Sensor for remote transmitter (order transmitter separately)	A
Sensor ATEX 2G D for remote transmitter (order transmitter separately)	B
Cable glands/terminal box	
Metric: SS terminal box	3
1/2" NPT: SS terminal box	4

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

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

Please use online Product selector to get latest updates.

Product selector link:

www.pia-selector.automation.siemens.com

SITRANS F flowmeters

SITRANS F M

MAG 1100

Accessories

for MAG 1100 sensor

Pipe connection 1/2" external thread

For DN 2 ... 10 (1/12" ... 3/8") sensor
2 pipe connections, 2 EPDM gaskets,
12 pcs M4 x 12 screws

- 1/2" G, ISO 7-1 tapered thread, SS 316
- 1/2" G, ISO 7-1 tapered thread, Hastelloy C
- 1/2" NPT thread, SS 316
- 1/2" NPT thread, Hastelloy C

- ▶ **FDK-083G0080**
- ▶ **FDK-083G4332**
- ▶ **FDK-083G4330**
- ▶ **FDK-083G4331**

For DN 2 ... 10 (1/12" ... 3/8") sensor
2 PVDF pipe connections (Max. 70 °C,
PN 8 bar/max 158 °F, 116 PSI), 1 grounding
ring, 1 earthing wire, 3 PTFE gaskets, 6 pcs.
M4 x 12 and 6 pcs. M4 x 20 screws

- 1/2" G, ISO 7-1 tapered thread PVDF incl.
grounding ring Hastelloy C22
- 1/2" NPT thread PVDF incl. grounding ring
Hastelloy C22

A5E01018395

A5E01018400

EPDM gaskets

Material: EPDM; each set includes:
2 EPDM gaskets, 1 earthing wire, 1 M6 screw,
1 nut, 1 washer, 1 bolt earthing plate

- DN 2 ... 10, 1/12" ... 3/8"
- DN 15, 1/2"
- DN 25, 1"

FDK-083G3116
FDK-083G3117
FDK-083G3119

- DN 40, 1 1/2"
- DN 50, 2"
- DN 65, 2 1/2"

FDK-083G3121
FDK-083G3122
FDK-083G3123

- DN 80, 3"
- DN 100, 4"

FDK-083G3124
FDK-083G3125

PTFE gaskets

Material: PTFE; each set includes:
2 gaskets, 2 earthing wires, 3 M6 screws
(DN 2 ... DN 10: 12 pcs M4 x 14)

- DN 2 ... 10, 1/12" ... 3/8"
- DN 15, 1/2"
- DN 25, 1"

FDK-083G0156
FDK-083G0157
FDK-083G0159

- DN 40, 1 1/2"
- DN 50, 2"
- DN 65, 2 1/2"

FDK-083G0161
FDK-083G0162
FDK-083G0163

- DN 80, 3"
- DN 100, 4"

FDK-083G0164
FDK-083G0165

Graphite gaskets

Material: Graphite; conductive,
each set includes: 2 gaskets (conductive, can
also be used as grounding ring)

- DN 2 ... 10, 1/12" ... 3/8"
- DN 15, 1/2"
- DN 25, 1"

FDK-083G0116
FDK-083G0117
FDK-083G0119

- DN 40, 1 1/2"
- DN 50, 2"
- DN 65, 2 1/2"

FDK-083G0121
FDK-083G0122
FDK-083G0123

- DN 80, 3"
- DN 100, 4"

FDK-083G0124
FDK-083G0125

Grounding ring (S/S)

Material: AISI 316 (mat. no. 1.4436);
each set includes: 1 grounding ring, 3 PTFE
gaskets, 1 earth wire, 1 M6 screw

- DN 2 ... 10, 1/12" ... 3/8"
- DN 15, 1/2"
- DN 25, 1"

FDK-083G0686
FDK-083G0687
FDK-083G0689

- DN 40, 1 1/2"
- DN 50, 2"
- DN 65, 2 1/2"

FDK-083G0691
FDK-083G0692
FDK-083G0693

- DN 80, 3"
- DN 100, 4"

FDK-083G0694
FDK-083G0695

Accessories

for MAG 1100 sensor

Grounding ring (Hastelloy C)

Material: Hastelloy C22; each set includes:
1 grounding ring, 3 PTFE gaskets, 1 earth wire,
1 M6 screw

- DN 2 ... 10, 1/12" ... 3/8"
- DN 15, 1/2"
- DN 25, 1"
- DN 40, 1 1/2"
- DN 50, 2"
- DN 65, 2 1/2"

FDK-083G3256
FDK-083G3257
FDK-083G3259
FDK-083G3261
FDK-083G3262
FDK-083G3263

- DN 80, 3"
- DN 100, 4"

FDK-083G3264
FDK-083G3265

Grounding ring (Tantalum)

Material: Tantalum; each set includes:
1 grounding ring, 3 PTFE gaskets, 1 earth wire,
1 M6 screw

- DN 2 ... 10, 1/12" ... 3/8"
- DN 15, 1/2"
- DN 25, 1"
- DN 40, 1 1/2"
- DN 50, 2"
- DN 65, 2 1/2"

A5E01181599
A5E01181606
A5E01181610
A5E01181613
A5E01181615
A5E01181616

- DN 80, 3"
- DN 100, 4"

A5E01181619
A5E01181622

Studs and nuts

for DN 100 PN 25/40, 8 M20 studs,
16 M20 nuts

Material: AISI 304 (mat. no. 1.4305)

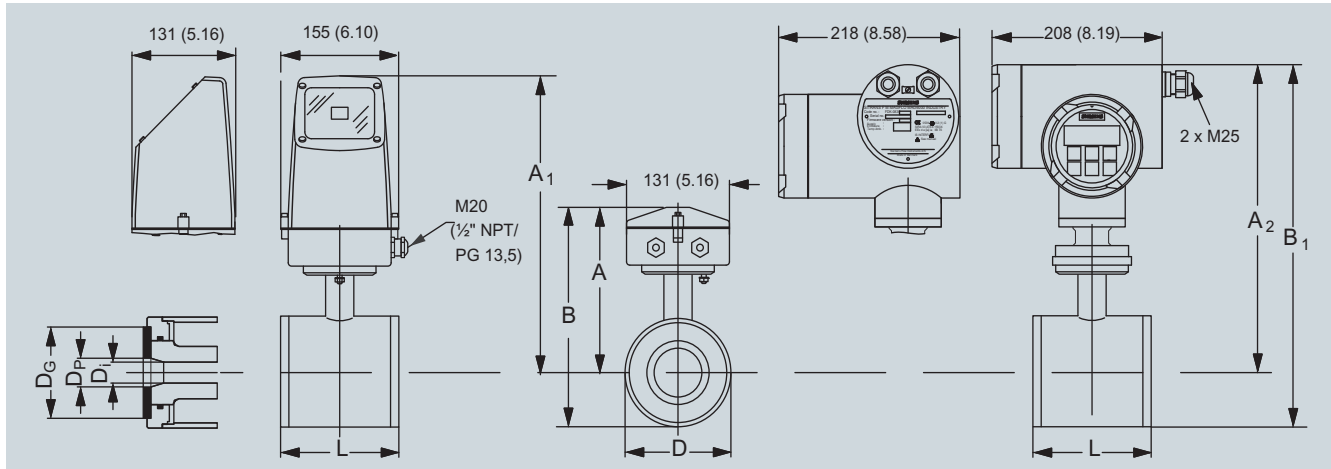
- DN 100, 4"

FDK-083G0226

▶ Available ex stock

Dimensional drawings

Sensor MAG 1100, compact/remote



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

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

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

¹⁾ 14.5 mm/0.571" shorter when the AISI terminal box is used (Ex or high temperature 200 °C (390 °F) version)

²⁾ With transmitter MAG 5000 or MAG 6000 installed, weight is increased by approximately 0.8 kg (1.8 lb).

With MAG 6000 I weight is increased with 5.5 kg (12.1 lbs).

³⁾ A₂ is 3 mm (0.12") shorter than A₁

SITRANS F flowmeters

SITRANS F M

MAG 1100

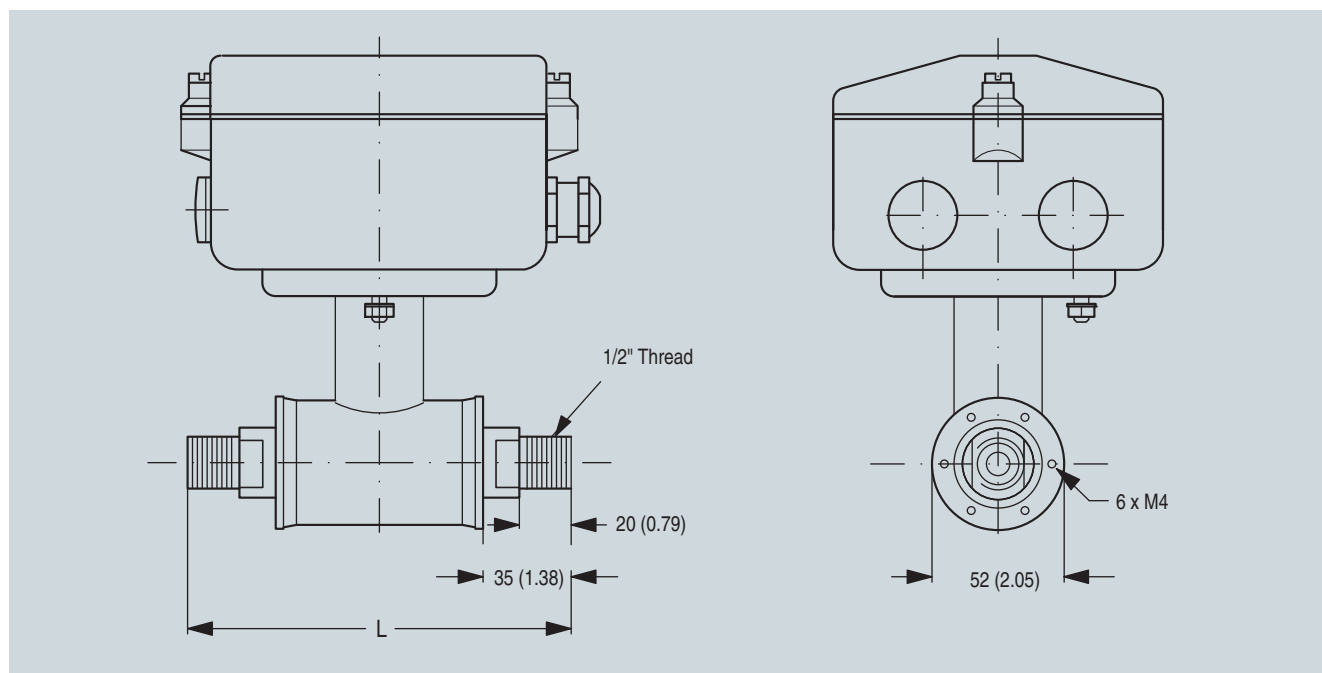
The total build-in length "L" [mm]/[inch] before assembling depends on the gasket selected

Size		EPDM		Graphite		PTFE (Teflon)		Without gasket		Earthing ring	
DN	Inch	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
2 ... 10 ¹⁾	1/12 ... 3/8	64	2.52	66	2.60	70	2.75	64	2.52	77	3.03
15	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

4

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



The MAG 1100 DN 2, 3, 6 and 10 (1/12", 1/8", 1/4" and 3/8") are prepared for assembly with the 1/2" pipe connections.

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

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

Important note:

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

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 design
- Sanitary design for CIP / SIP cleaning
- Conforms to FDA
- Internal product wetted surface finish R_a of $\leq 0.80 \mu\text{m}$ (32 μin)
- Easy commissioning, the SENSORPROM unit automatically updates settings
- Hose proof IP67/NEMA 4X/6 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
- Ex ATEX 2G D version for hazardous areas (ceramic liner)

Mode of operation

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

Integration

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

Technical specifications

Measuring principle	Electromagnetic induction
Excitation frequency	DN 10 ... 65 (1/4" ... 2 1/2"): 12.5 Hz DN 80 ... 100 (3", 4"): 6.25 Hz

Process connection	
Nominal size	DN 10 ... DN 100 (3/8" ... 4")
Process connection	Hygienic adapters available for: • Direct welding onto pipe • Clamp fitting • Threaded fitting

Rated operating conditions

Ambient conditions

Ambient temperature¹⁾

• Sensor	-40 ... +100 °C (-40 ... +212 °F)
• Sensor ATEX	-20 ... +60 °C (-4 ... +140 °F)
• Compact transmitter MAG 5000/6000	-20 ... +50 °C (-4 ... +122 °F)
• Transmitter MAG 6000 I	-20 ... +60 °C (-4 ... +140 °F)
• Compact transmitter MAG 6000 I Ex d	-10 ... +60 °C (+14 ... +140 °F)

Temperature of medium

MAG 1100 F (Ceramic)	-20 ... +150 °C (-4 ... +300 °F) Suitable for steam sterilization
MAG 1100 F (PFA)	-30 ... +130 °C (-20 ... +270 °F) Suitable for steam sterilization at 150 °C (300 °F)

Temperature shock

MAG 1100 F

• Duration ≤ 1 min, followed by 10 min rest	• DN 10, 15, 25: Max. $\Delta T \leq 80$ °C/min (3/8", 1/2", 1") Max. $\Delta T \leq 80$ K/min • DN 40, 50, 65: Max. $\Delta T \leq 70$ °C/min (1 1/2", 2", 2 1/2") Max. $\Delta T \leq 70$ K/min • DN 80, 100: Max. $\Delta T \leq 60$ °C/min (3", 4") Max. $\Delta T \leq 60$ K/min
MAG 1100 F (PFA)	Max. ± 100 °C (210 °F) momentarily

Operating pressure

MAG 1100 F (Ceramic)	DN 10 ... 65: 40 bar (3/8" ... 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})
MAG 1100 F (PFA)	20 bar (290 psi) Vacuum: 0.02 bar _{abs} (0.3 psi _{abs}) DN 80 ... DN 100: CO ₂ pressure max. 7 bar (101.5 psi)

¹⁾ Conditions are also dependent on liner characteristics

SITRANS F flowmeters

SITRANS F M

MAG 1100 F

Technical specifications (continued)

<u>Mechanical load</u>	18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 Sensor: 3.17 grms Sensor with compact MAG 5000/6000 mounted transmitter: 1.14 grms Sensor with compact MAG 6000 I/MAG 6000 I Ex mounted transmitter: 1.14 grms For compact installation with the MAG 6000 I/MAG 6000 I Ex, transmitter to be supported to avoid tension on sensor part.
<u>Enclosure rating</u>	
Standard	IP67 to EN 60529 (NEMA 4X), 1 mH ₂ O for 30 min
Option on sensor (not for ATEX)	IP68 to EN 60529 (NEMA 6), 10 mH ₂ O cont.
EMC	89/336 EEC
Design	
Weight	See Dimensional drawings
<u>Material</u>	
Enclosure	
• MAG 1100 F	Stainless steel AISI 316L (1.4404)
Terminal box (remote version only)	
• Standard	Fibre glass reinforced polyamide
• Option	Stainless steel AISI 316 (1.4436)
• Ex ATEX (remote version only)	Stainless steel AISI 316 (1.4436)
Liner	
MAG 1100 F (Ceramic)	Aluminium oxide Al ₂ O ₃ (ceramics)
MAG 1100 F (PFA)	Reinforced PFA (teflon) (no ATEX)
Electrodes	
MAG 1100 F (Ceramic)	Platinum with gold / Titanium brazing alloy
MAG 1100 F (PFA)	• DN 10 ... 15 (3/8" ... 1/2"): Hastelloy C276 • DN 25 ... 100 (1" ... 4"): Hastelloy C22
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 6000I: 2 x M25 (for supply/output) - MAG 6000I Ex. d: 2 x M20 (for supply/output)
Certificates and approvals	
MAG 1100 F (Ceramic)	3A (sensor with Polyamid terminal box), transmitter not part of the approval
• Ex ATEX approvals for sensor or compact with Mag 6000 I Ex	ATEX 2G D sensor EEx d e ia IIB T3 - T6
• Sensor with/without MAG 5000/6000/ 6000 I	FM Class 1 div 2
MAG 1100 F (PFA)	3A (sensor with Polyamid terminal box), transmitter not part of the approval
	FM Class 1 div 2
Conforms to	PED – 97/23/EC and CRN (PFA) FDA

Accessories

Weld-in adapter

Adapter for welding onto dairy pipe Tri-Clover, ISO 2037, DIN 11850, SMS 3008, BS 4825-1

• DN 10, 15, 25, 40, 50, 65 and 80 (3/8", 1/2", 1", 1 1/2", 2", 2 1/2" and 3") PN 40 (600 psi)

• DN 100 (4") PN 25 (350 psi)

Clamp adapter

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

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

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

Thread adapter

DIN 11851

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

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

ISO 2853, BS 4825-4

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

SMS 1145

• DN 25, 40, 50, 65 and 80 (1", 1 1/2", 2", 2 1/2" and 3") PN 6 (80 psi)

Design

Material

Adapter Stainless steel AISI 316/Stainless steel AISI 304 (ISO 2852)

Gasket

• MAG 1100 F (Ceramic) FKM/FPM with stainless steel insert (AISI 304) (-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.

SITRANS F flowmeters

SITRANS F M

MAG 1100 F

Selection and Ordering data	Order No.
Sensor SITRANS F M MAG 1100 F	7ME6140-
Diameter	
DN 10 (3/8")	▶ 1 R
DN 15 (1/2")	▶ 1 V
DN 25 (1")	▶ 2 D
DN 40 (1 1/2")	▶ 2 R
DN 50 (2")	▶ 2 Y
DN 65 (2 1/2")	▶ 3 F
DN 80 (3")	▶ 3 M
DN 100 (4")	▶ 3 T
Process connections	
No adaptors (specials see accessories)	▶ A
<u>Weld in</u>	
DIN 11850	▶ B
ISO 2037 (SMS3008)	▶ C
BS 4825-1	▶ D
Tri-Clamp®	E
<u>Clamp type</u>	
DIN 32676	G
ISO 2852 (SMS 3016)	H
BS 4825-3	J
Tri-Clamp®	K
<u>Threaded type</u>	
DIN 11851	M
SMS 1145	N
Liner material	
PFA (no ATEX)	▶ 1
Ceramic	▶ 2
Gasket material	
EPDM (FDA) (only with PFA liner)	▶ 0
NBR (only with PFA liner)	▶ 1
FPM/FKM (FDA) (only with ceramic liner)	▶ 2
Electrode material	
Hastelloy C (only with PFA liner)	▶ 1
Platinum (only with ceramic liner)	▶ 2
Transmitter	
Sensor for remote transmitter (order transmitter separately) 3A	▶ A
Sensor ATEX 2G D for remote transmitter (order transmitter separately) 3A	B
MAG 6000 I, Alu. 18 ... 90 V DC, 115 ... 230 V AC	C
MAG 6000 I, Aluminium 18 ... 30 V DC, ATEX 2G D	D
MAG 6000 I, Aluminium 115 ... 230 V, ATEX 2G D	E
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
Communication	
No communication, add-on possible	▶ A
HART	▶ B
PROFIBUS PA Profile 3 (only MAG 6000/MAG 6000 I)	▶ F
PROFIBUS DP Profile 3 (no ATEX) (only MAG 6000/MAG 6000 I)	▶ G
MODBUS RTU/RS 485 (no ATEX) (only MAG 6000/MAG 6000 I)	▶ E
FOUNDATION Fieldbus H1 (only MAG 6000/MAG 6000 I)	▶ J

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

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

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

Please use online Product selector to get latest updates.

Product selector link:

www.pia-selector.automation.siemens.com

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

SITRANS F flowmeters

SITRANS F M

MAG 1100 F

Accessories

Order No.

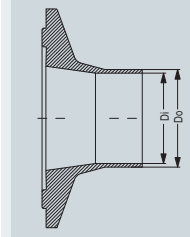
Weld in connection fittings for MAG 1100 F

Each of the following accessory order nos. comprises:

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

DIN 11850

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



10	13	10	10	► FDK-083G2116
15	19	16	15	► FDK-083G2117
20	23	20	15	FDK-083G2118
25	29	26	25	► FDK-083G2119
32	35	32	25	FDK-083G2120
40	41	38	40	► FDK-083G2121
50	53	50	50	► FDK-083G2122
65	70	66	65	► FDK-083G2123
80	85	81	80	► FDK-083G2124
100	104	100	100	► FDK-083G2125

ISO 2037 (SMS3008)

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

10	13	10	10	► FDK-083G2116
15	19	16	15	► FDK-083G2117
25	25.6	22.6	25	► FDK-083G2109
28	28.6	25.6	25	FDK-083G2100
38	38.6	35.6	40	► FDK-083G2111
40	40.6	37.6	40	► FDK-083G2101
51	51.6	48.6	50	► FDK-083G2112
63.5	64.1	60.3	65	► FDK-083G2113
76.1	76.7	72.9	80	► FDK-083G2114
101.6	102.5	97.6	100	FDK-083G2115
114.3	115.6	110.3	100	FDK-083G2105

Tri-Clamp® (BS 4825-1)

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

10	12.7	9.4	10	FDK-083G2276
15.9	19.05	15.75	15	FDK-083G2277
25	25.4	22.1	25	FDK-083G2279
38	38.1	34.8	40	FDK-083G2281
51	50.8	47.5	50	FDK-083G2282
63.5 ¹⁾	63.5	60.2	65	FDK-083G2283
76.1	76.2	72.9	80	FDK-083G2284
102 ¹⁾	101.6	97.38	100	FDK-083G2285

Tri-Clamp® is a registered trademark of Ladish Co.

► Available ex stock

D_o: outer diameter

D_i: inner diameter

¹⁾ For BS4825-1 see ISO 2037

Accessories

Order No.

Clamp-type connection fittings for MAG 1100 F

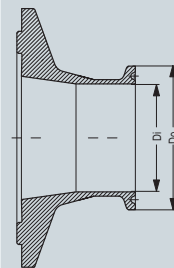
Sanitary pipe fittings for Clamp types

Each of the following accessory order nos. comprises:

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

DIN 32676

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



10	34	10	10	FDK-083G2186
15	34	16	15	FDK-083G2187
25	50.5	26	25	FDK-083G2179
40	50.5	38	40	FDK-083G2181
50	64	50	50	FDK-083G2182
65	91	66	65	FDK-083G2183
80	106	81	80	FDK-083G2184
100	119	100	100	FDK-083G2185

ISO 2852 (SMS 3016, BS 4825-3)

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

10	34	10	10	FDK-083G2186
15	34	16	15	FDK-083G2187
25	50.5	26	25	FDK-083G2179
33.7	50.5	31.3	25	FDK-083G2190
38	50.5	35.6	40	FDK-083G2191
51	64	48.6	50	FDK-083G2192
63.5	77.5	60.3	65	FDK-083G2193
76.1	91	72.9	80	FDK-083G2194
101.6	119	97.6	100	FDK-083G2195

Tri-Clamp®

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

10	34	10	10	FDK-083G2286
15	34	16	15	► FDK-083G2287
25	50.5	22.6	25	► FDK-083G2289
38	50.5	35.6	40	► FDK-083G2291
51	64	48.6	50	► FDK-083G2292
63.5	77.5	60.3	65	► FDK-083G2293
76.1	91	72.9	80	► FDK-083G2294
101.6	119	97.6	100	FDK-083G2295

Tri-Clamp® is a registered trademark of Ladish Co.

► Available ex stock

D_o: outer diameter

D_i: inner diameter

SITRANS F flowmeters

SITRANS F M

MAG 1100 F

Accessories

Order No.

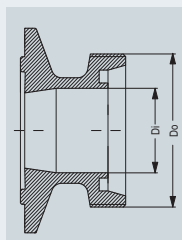
Threaded type connection fittings for MAG 1100 F**Sanitary pipe fittings for Threaded types**

Each of the following accessory order nos. comprises:

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

DIN 11851

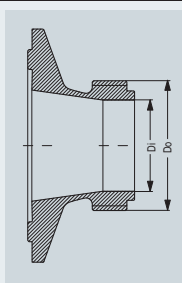
Adapter			Sensor
DN (mm)	D _o (mm)	D _i (mm)	DN (mm)



10	28	10	10	FDK-083G2156
15	34	16	15	► FDK-083G2157
20	44	20	15	FDK-083G2158
25	52	26	25	► FDK-083G2159
32	58	32	25	FDK-083G2160
40	65	38	40	► FDK-083G2161
50	78	50	50	► FDK-083G2162
65	95	66	65	► FDK-083G2163
80	110	81	80	FDK-083G2164
100	130	100	100	FDK-083G2165

ISO 2853

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



25	37	22.6	25	FDK-083G2149
38	51	35.6	40	FDK-083G2151
51	64	48.6	50	FDK-083G2152
63.5	78	60.3	65	FDK-083G2153
76.1	91	72.9	80	FDK-083G2154
101.6	118	97.6	100	FDK-083G2155

BS 4825-4

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
101.6	126	97.6	100	FDK-083G2145

Accessories

Order No.

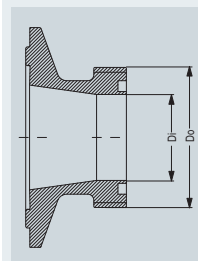
Threaded type connection fittings for MAG 1100 F**Sanitary pipe fittings for Threaded types**

Each of the following accessory order nos. comprises:

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

SMS 1145

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

Spare parts for MAG 1100 F

Order No.

Gaskets

(2 pcs., between flow sensor and adapter)

MAG 1100 F (ceramic)

Rubber: FKM/FPM (FDA)

• DN 10	► A5E00915707
• DN 15	► A5E00915764
• DN 25	► A5E00915771
• DN 40	► A5E00915773
• DN 50	► A5E00915775
• DN 65	► A5E00915780
• DN 80	► A5E00915782
• DN 100	► A5E00915784

MAG 1100 F (PFA)

Rubber: EPDM (FDA)

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

Rubber: NBR

• DN 10	► FDK-083G2216
• DN 15	► FDK-083G2217
• DN 25	► FDK-083G2219
• DN 40	► FDK-083G2221
• DN 50	► FDK-083G2222
• DN 65	► FDK-083G2223
• DN 80	► FDK-083G2224
• DN 100	► FDK-083G2225

► Available ex stock

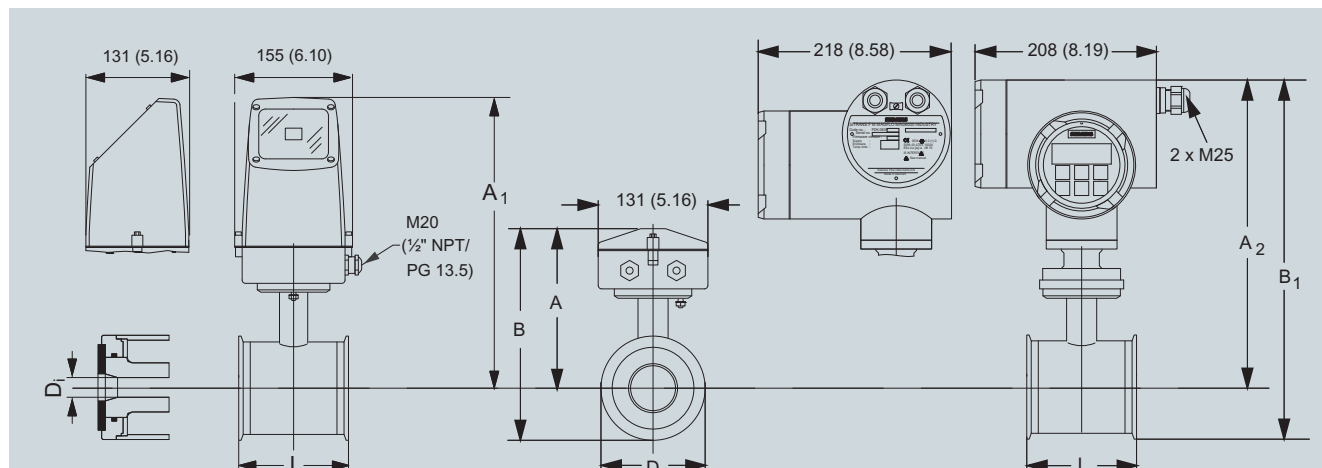
SITRANS F flowmeters

SITRANS F M

MAG 1100 F

Dimensional drawings

Sensor MAG 1100 F compact/remote



Important note:

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

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

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

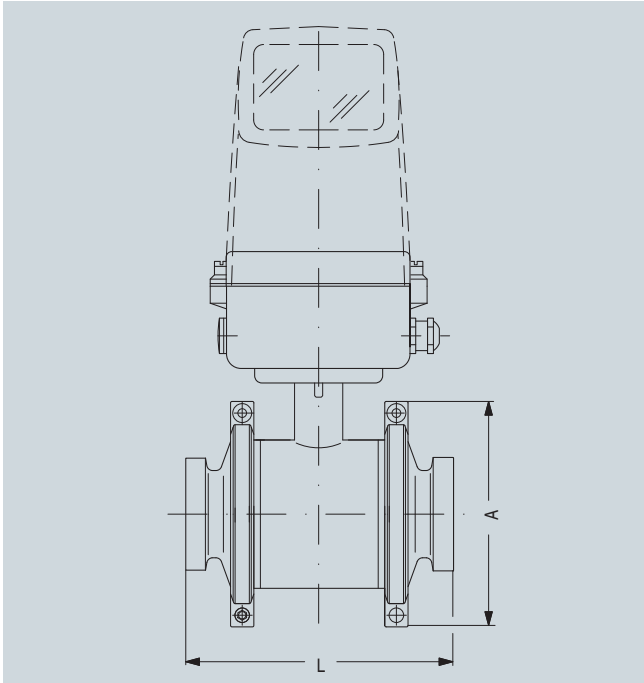
¹⁾ With transmitter MAG 5000 or MAG 6000 compact, weight is increased by approximately 0.8 kg (1.8 lb)

With MAG 6000 I weight is increased with 5.5 kg (12.1 lbs)

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

³⁾ A₂ is 3 mm (0.12") shorter than A₁

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



4

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

¹⁾ The total build-in length "L" is independent of the adapter type selected.

SITRANS F flowmeters

SITRANS F M

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 25 to DN 1200 (1" to 48")
- Connection flanges EN 1092-1 (DIN 2501), ANSI, AWWA and AS.
- NBR Hard Rubber liner for all water applications
- Drinking water EPDM liner with 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
- Build-in length according to ISO 13359
- Easy commissioning, SENSORPROM unit automatically uploads calibration values and settings.
- Designed that patented in-situ verification can be conducted. Using SENSORPROM fingerprint.

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 where the sensor converts the flow into an electrical voltage proportional to the velocity of the flow.

Function

- Highly resistant to a wide range of chemicals
 - Pattern approval OIML R 49 (Denmark, Germany)
 - conforms to ISO 4064 and EN 14154
 - MI-001 Custody Transfer approval for billing (EU)
- Meets EEC directives: PED, 97/23/EC pressure directive for EN1092-1 flanges
- Simple onsite or factory upgrade to IP68/NEMA 6P of a standard sensor.

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, FOUNDATION Fieldbus H1, DeviceNet, PROFIBUS DP and PA, MODBUS RTU/RS485.

Technical specifications

Design	Full bore sensor	Coned bore sensor	Full bore sensor
Nominal size	DN 25 ... 40 (1" ... 1½")	DN 50 ... 300 (2" ... 12")	DN 350 ... 1200 (14" ... 48")
Measuring principle	Electromagnetic induction		
Excitation frequency	12.5 Hz	• DN 50 ... 65 (2" ... 2½"): 12.5 Hz • DN 80 ... 150 (3" ... 6"): 6.25 Hz • DN 200 ... 300 (8" ... 12"): 3.125 Hz	1.56 Hz
Process connection			
Flanges	Raised face flanges	Flat face flanges	Raised face flanges
• EN 1092-1	PN 40 (580 psi)	• DN 50 ... 300: PN 16 (2" ... 12": 230 psi) • DN 200 ... 300: PN 10 (8" ... 12": 145 psi)	• PN 10 (145 psi) • PN 16 (230 psi)
• ANSI B16.5	Class 150 lb	Class 150 lb	Class 150 lb (≤ 24")
• AWWA C-207	--	--	28" ... 48": Class D
• AS4087	PN 16 (230 psi) DN 50 ... 1200 (2" ... 48"), 14 bar (232 psi)		
Rated Operation conditions			
Ambient temperature			
• Sensor	-40 ... +70 °C (-40 ... +158 °F)		
• With compact transmitter MAG 5000/6000	-20 ... +50 °C (-4 ... +122 °F)		
• With compact transmitter MAG 6000 I	-20 ... +60 °C (-4 ... +140 °F)		
Operating pressure (Abs)	0.01 ... 40 bar (0.15 ... 580 psi)	0.03 ... 20 bar (0.44 ... 290 psi)	0.01 ... 16 bar (0.15 ... 232 psi)
Enclosure rating			
• Standard	IP67 to EN 60529 / NEMA 4X/6 (1 mH ₂ O for 30 minutes)		
• Option	IP68 to EN 60529 / NEMA 6P (10 mH ₂ O continuously)		
Pressure drop at 3 m/s (10 ft/s)	As straight pipe	Max. 25 mbar (0.36 psi)	As straight pipe
Medium conditions			
Temperature of medium			
• NBR	-10 ... +70 °C (14 ... +158 °F)		
• EPDM	-10 ... +70 °C (14 ... +158 °F)		
EMC	89/336 EEC		
Design			
Weight	See dimensional drawings		
Material			
• Housing and flanges	Carbon steel, St 37.2		
• Terminal box	Fibre glass reinforced polyamide		
• Measuring pipe	AISI 304 (1.4301)		
• Liner	NBR Hard Rubber (hydro carbon resistant) EPDM		
• Electrodes	Hastelloy C276		
• Grounding electrodes standard	Hastelloy C276		
Certificates and approvals			
Custody Transfer (only together with MAG 5000/6000 CT), order as special	OIML R 49 pattern approval cold water (Denmark and Germany): DN 50 ... 300 (2" ... 12") MI 001 cold water (EU): DN 50 ... 300 (2" ... 12")		
Approvals	FM Class 1, Div 2		
Drinking water approvals			
• EPDM	NSF/ANSI Standard 61 (Cold water, US) WRAS (WRc, BS6920 cold water, GB) ACS listed (F), DVGW W270 (D) Belaqua (B)		
• NBR	NSF/ANSI Standard 61 (Cold water, US, only ANSI B16.5 flanges)		
Approvals	PED – 97/23 EC ¹⁾ , CRN		

¹⁾ 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.

SITRANS F flowmeters

SITRANS F M

MAG 5100 W

Selection and Ordering data	Order No.
SITRANS F M Flowsensor MAG 5100 W	7 ME 6 5 2 0 -
Hastelloy electrodes, carbon steel flanges	1 - 2
Diameter	
DN 25 (1")	2 D
DN 40 (1½")	2 R
DN 50 (2")	2 Y
DN 65 (2½")	3 F
DN 80 (3")	3 M
DN 100 (4")	3 T
DN 125 (5")	4 B
DN 150 (6")	4 H
DN 200 (8")	4 P
DN 250 (10")	4 V
DN 300 (12")	5 D
DN 350 (14")	5 K
DN 400 (16")	5 R
DN 450 (18")	5 Y
DN 500 (20")	6 F
DN 600 (24")	6 P
DN 700 (28")	6 Y
DN 750 (30")	7 D
DN 800 (32")	7 H
DN 900 (36")	7 M
DN 1000 (40")	7 R
42"	7 U
44"	7 V
DN 1200 (48")	8 B
Flange norm and pressure rating	
to EN 1092-1	
PN 10 (DN 200 ... 1200/8" ... 48")	B
PN 16 (DN 50 ... 1200/2" ... 48")	C
PN 16, non PED (DN 700 ... 1200/28" ... 48")	D
PN 40 (DN 25 ... 40/1" ... 1½")	F
to ANSI B16.5	
class 150 (1" ... 24")	J
to AWWA C-207	
Class D (28" ... 48")	L
to AS 408Z	
PN 16	N
Liner material	
EPDM	2
NBR Hard Rubber	3
Transmitter	
Sensor for remote transmitter (Order transmitter separately)	A
MAG 6000 I, Aluminum, 18 ... 90 V DC, 115 ... 230 V AC	C
MAG 6000, Polyamid, 11 ... 30 V DC/11 ... 24V AC	H
MAG 6000, Polyamid, 115/230 V AC	J
MAG 5000, Polyamid, 11 ... 30 V DC/11 ... 24V AC	K
MAG 5000, Polyamid, 115/230 V AC	L

Selection and Ordering data	Order No.
SITRANS F M Flowsensor MAG 5100 W	7 ME 6 5 2 0 -
Hastelloy electrodes, carbon steel flanges	1 - 2
Communication	
None	A
HART	B
PROFIBUS PA Profile 3 (only MAG 6000/MAG 6000 I)	F
PROFIBUS DP Profile 3 (only MAG 6000/MAG 6000 I)	G
MODBUS RTU/RS 485 (only MAG 6000/MAG 6000 I)	E
FOUNDATION Fieldbus H1 (only MAG 6000/MAG 6000 I)	J
Cable glands/terminal box	
Metric	1
½" NPT	2
► Available ex stock	

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

Description	Order No.
Potting kit for terminal box of SITRANS F M sensors for IP68/NEMA 6P (Not ATEX)	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.

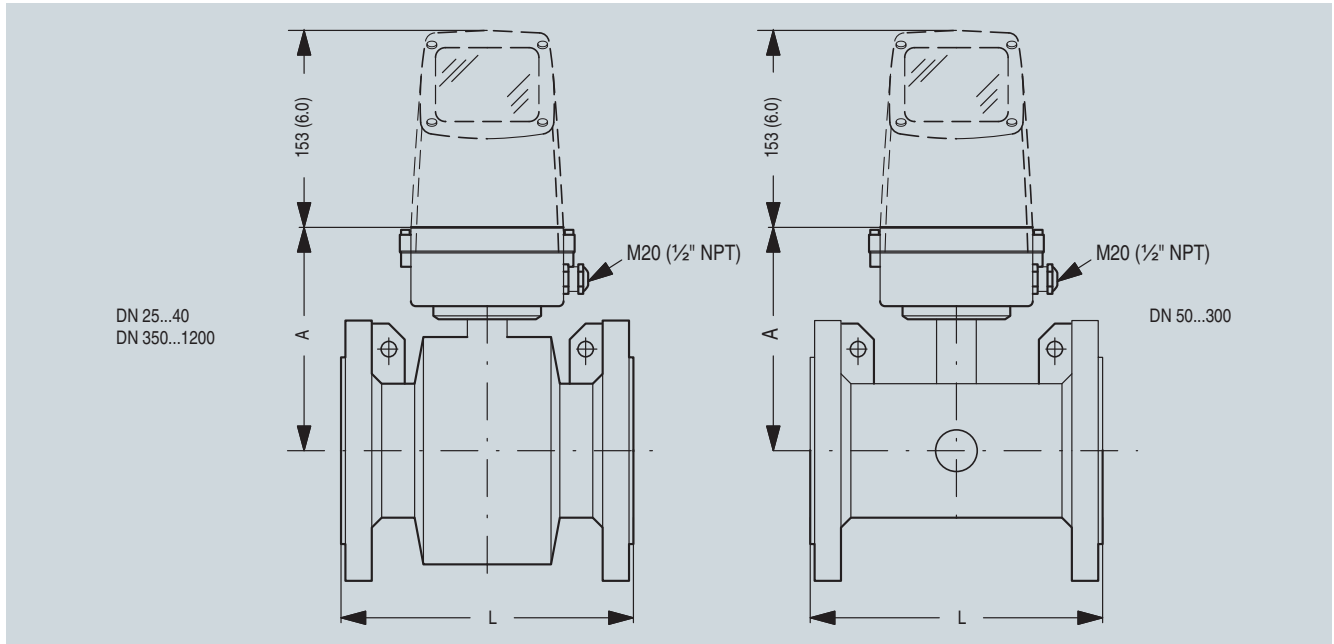
Please use online Product selector to get latest updates.

Product selector link:

www.pia-selector.automation.siemens.com

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

Dimensional drawings



Nominal size		A		L									
				PN 10		PN 16		PN 40		Class 150 / AWWA		AS	
[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
25	1	187	7.4	-	-	-	-	200	7.9	200	7.9	200	7.87
40	1½	197	7.8	-	-	-	-	200	7.9	200	7.9	200	7.87
50	2	188	7.4	-	-	200	7.9	-	-	200	7.9	200	7.87
65	2½	194	7.6	-	-	200	7.9	-	-	200	7.9	200	7.87
80	3	200	7.9	-	-	200	7.9	-	-	200	7.9	200	7.87
100	4	207	8.1	-	-	250	9.8	-	-	250	9.8	250	9.84
125	5	217	8.5	-	-	250	9.8	-	-	250	9.8	250	9.84
150	6	232	9.1	-	-	300	11.8	-	-	300	11.8	300	11.81
200	8	257	10.1	350	13.8	350	13.8	-	-	350	13.8	350	13.78
250	10	284	11.2	450	17.7	450	17.7	-	-	450	17.7	450	17.72
300	12	310	12.2	500	19.7	500	19.7	-	-	500	19.7	500	19.69
350	14	382	15.0	550	21.7	550	21.7	-	-	550	21.7	550	21.65
400	16	407	16.0	600	23.6	600	23.6	-	-	600	23.6	600	23.62
450	18	438	17.2	600	23.6	600	23.6	-	-	600	23.6	600	23.62
500	20	463	18.2	600	23.6	600	23.6	-	-	600	23.6	600	23.6
600	24	514	20.2	600	23.6	600	23.6	-	-	600	23.6	600	23.6
700	28	564	22.2	700	27.6	700	27.6	-	-	700	27.6	700	27.6
750	30	591	23.3	-	-	-	-	-	-	750	29.5	750	-
800	32	616	24.3	800	31.5	800	31.5	-	-	800	31.5	800	31.5
900	36	663	26.1	900	35.4	900	35.4	-	-	900	35.4	900	35.4
1000	40	714	28.1	1000	39.4	1000	39.4	-	-	1000	39.4	1000	39.4
	42	714	28.1	-	-	-	-	-	-	1000	39.4	-	-
	44	765	30.1	-	-	-	-	-	-	1100	43.3	-	-
1200	48	820	32.3	1200	47.2	1200	47.2	-	-	1200	47.2	1200	47.2

- not available

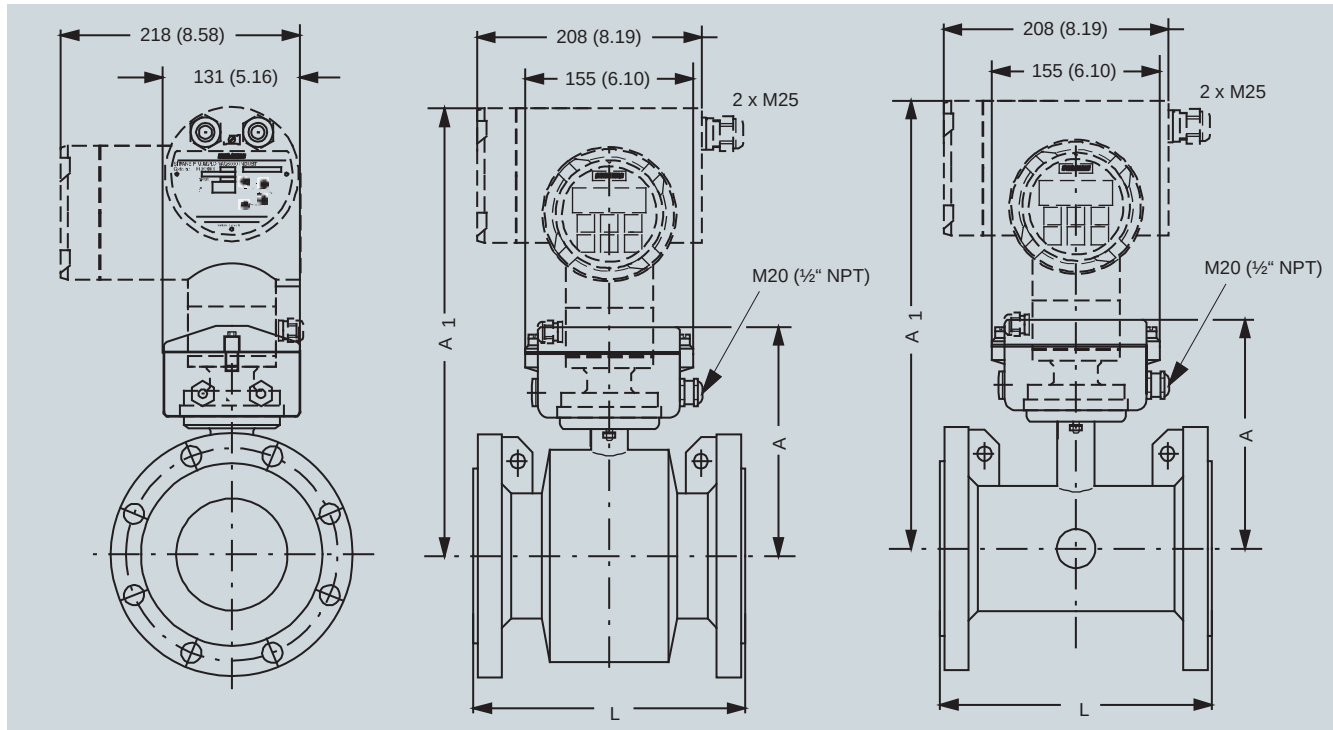
SITRANS F flowmeters

SITRANS F M

MAG 5100 W

MAG 5100 W / 6000 I Compact

4



Nominal size		A		A ₁		L		PN 10		PN 16		PN 40		Class 150/AWWA		AS	
[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
25	1	187	7.4	340	13.4	-	-	-	-	-	-	200	7.9	200	7.9	200	7.87
40	1½	197	7.8	350	13.8	-	-	-	-	-	-	200	7.9	200	7.9	200	7.87
50	2	188	7.4	341	13.4	-	-	200	7.9	-	-	-	-	200	7.9	200	7.87
65	2½	194	7.6	347	13.7	-	-	200	7.9	-	-	-	-	200	7.9	200	7.87
80	3	200	7.9	353	13.9	-	-	200	7.9	-	-	-	-	200	7.9	200	7.87
100	4	207	8.1	360	14.2	-	-	250	9.8	-	-	-	-	250	9.8	250	9.84
125	5	217	8.5	370	14.6	-	-	250	9.8	-	-	-	-	250	9.8	250	9.84
150	6	232	9.1	385	15.2	-	-	300	11.8	-	-	-	-	300	11.8	300	11.81
200	8	257	10.1	410	16.1	350	13.8	350	13.8	-	-	-	-	350	13.8	350	13.78
250	10	284	11.2	437	17.2	450	17.7	450	17.7	-	-	-	-	450	17.7	450	17.72
300	12	310	12.2	463	18.2	500	19.7	500	19.7	-	-	-	-	500	19.7	500	19.69
350	14	382	15.0	535	21.1	550	21.7	550	21.7	-	-	-	-	550	21.7	550	21.65
400	16	407	16.0	560	22.1	600	23.6	600	23.6	-	-	-	-	600	23.6	600	23.62
450	18	438	17.2	591	23.3	600	23.6	600	23.6	-	-	-	-	600	23.6	600	23.62
500	20	463	18.2	616	24.3	600	23.6	600	23.6	-	-	-	-	600	23.6	600	23.6
600	24	514	20.2	667	26.3	600	23.6	600	23.6	-	-	-	-	600	23.6	600	23.6
700	28	564	22.2	717	28.2	700	27.6	700	27.6	-	-	-	-	700	27.6	700	27.6
750	30	591	23.3	744	29.3	-	-	-	-	-	-	-	-	750	29.5	750	-
800	32	616	24.3	779	30.7	800	31.5	800	31.5	-	-	-	-	800	31.5	800	31.5
900	36	663	26.1	826	32.5	900	35.4	900	35.4	-	-	-	-	900	35.4	900	35.4
1000	40	714	28.1	877	34.5	1000	39.4	1000	39.4	-	-	-	-	1000	39.4	1000	39.4
	42	714	28.1	877	34.5	-	-	-	-	-	-	-	-	1000	39.4	-	-
	44	765	30.1	928	36.5	-	-	-	-	-	-	-	-	1100	43.3	-	-
1200	48	820	32.3	983	38.7	1200	47.2	1200	47.2	-	-	-	-	1200	47.2	1200	47.2

- not available

SITRANS F flowmeters

SITRANS F M

MAG 5100 W

Weight

Nominal size		PN 10		PN 16		PN 40		Class 150/AWWA		AS	
[mm]	[inch]	[kg]	[lbs]	[kg]	[lbs]	[kg]	[lbs]	[kg]	[lbs]	[kg]	[lbs]
25	1	-	-	-	-	4	9	4	9	4	9
40	1½	-	-	-	-	7	15	6	13	7	15
50	2	-	-	9	20	-	-	8	20	9	20
65	2½	-	-	10.7	24	-	-	11	24	10.7	24
80	3	-	-	11.6	26	-	-	13	28	11.6	26
100	4	-	-	15.2	33	-	-	19	41	15.2	33
125	5	-	-	20.4	45	-	-	24	52	20.4	45
150	6	-	-	26	57	-	-	29	64	26	57
200	8	48	106	48	106	-	-	56	124	48	106
250	10	64	141	69	152	-	-	79	174	69	152
300	12	76	167	86	189	-	-	110	243	86	189
350	14	104	229	125	274	-	-	139	307	115	254
400	16	119	263	143	314	-	-	159	351	125	277
450	18	136	299	173	381	-	-	182	400	141	311
500	20	163	359	223	491	-	-	225	495	189	418
600	24	236	519	338	744	-	-	320	704	301	664
700	28	270	595	314	692	-	-	273	602	320	704
750	30	-	-	-	-	-	-	329	725	-	-
800	32	346	763	396	873	-	-	365	804	428	944
900	36	432	951	474	1043	-	-	495	1089	619	1362
1000	40	513	1130	600	1321	-	-	583	1282	636	1399
	42	-	-	-	-	-	-	687	1512	-	-
	44	-	-	-	-	-	-	763	1680	-	-
1200	48	643	1415	885	1948	-	-	861	1896	813	1789

- not available

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

SITRANS F flowmeters

SITRANS F M

MAG 3100

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")
- Wide pressure range: PN 6 to PN 100 ANSI Class 150 / 300, AS 2129 / AS 4087. On request up to 690 bar (10000 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 & distribution
- Oil & gas / HPI
- Water & waste water

Design

- Compact or remote mounting possible
- Easy "plug & play" field changeability of transmitter
- Ex ATEX and CSA/FM versions
- High temperature sensor for applications with temperatures up to 180 °C (356 °F)
- Approvals for PTB, OIML R 75 and OIML R 117
- Meets EEC directives: PED, 97/23/EC pressure directive for EN1092-1 flanges
- Build-in length according to ISO 13359
- 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 where the sensor converts the flow into an electrical voltage proportional to the velocity of the flow.

Integration

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

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

Technical specifications

Version	MAG 3100	MAG 3100 HT (High Temperature)	MAG 3100 P
Nominal size	DN 15 ... DN 2000 (½" ... 78")	DN 15 ... DN 300 (½" ... 12")	DN 15 ... DN 300 (½" ... 12")
Measuring principle	electromagnetic induction		
Excitation frequency	• DN 15 ... 65 (½" ... 2½"): 12.5 Hz • DN 80 ... 150 (3" ... 6"): 6.25 Hz • DN 200 ... 1200 (8" ... 48"): 3.125 Hz • DN 1400 ... 2000 (54" ... 78"): 1.5625 Hz	• DN 15 ... 65 (½" ... 2½"): 12.5 Hz • DN 80 ... 150 (3" ... 6"): 6.25 Hz • DN 200 ... 300 (8" ... 12"): 3.125 Hz	• DN 15 ... 65 (½" ... 2½"): 12.5 Hz • DN 80 ... 150 (3" ... 6"): 6.25 Hz • DN 200 ... 300 (8" ... 12"): 3.125 Hz

Process connection

Flanges	EN 1092-1, raised face (EN 1092-1, DIN 2501 & BS 4504 have the same mating dimensions) • DN 65 ... 2000 (2½" ... 48"): PN 6 (87 psi) • DN 200 ... 2000 (8" ... 48"): PN 10 (145 psi) • DN 65 ... 2000 (2½" ... 78"): PN 16 (232 psi) • DN 200 ... 600 (8" ... 24"): PN 25 (362 psi) • DN 15 ... 600 (½" ... 24"): PN 40 (580 psi) • DN 50 ... 300 (2" ... 12"): PN 63 (913 psi) • DN 25 ... 300 (1" ... 12"): PN 100 (1450 psi) ANSI B16.5 (~BS 1560), raised face • ½" ... 24": Class 150 (20 bar (290 psi)) • ½" ... 24": Class 300 (50 bar (725 psi)) AWWA C-207, flat face 28" ... 78": Class D (10 bar) AS 2129, raised face ½" ... 48": Table E AS 4087, raised face: • PN 16 (DN 50 ... 1200, 16 bar (232 psi)) • PN 21 (DN 50 ... 600, 21 bar (304 psi)) • PN 35 (DN 50 ... 600, 35 bar (508 psi)) Other flanges and pressure ratings on request	EN 1092-1, raised face (EN 1092-1, DIN 2501 & BS 4504 have the same mating dimensions) • DN 15 ... 300 (½" ... 12"): PN 40 (580 psi) • DN 65 ... 300 (2½" ... 12"): PN 16 (232 psi) • DN 200 ... 300 (8" ... 12"): PN 10 (145 psi) • DN 200 ... 300 (8" ... 12"): PN 25 (362 psi) ANSI B16.5 (~BS 1560), raised face: • ½" ... 12": Class 150 (20 bar (290 psi)) • ½" ... 12": Class 300 (50 bar (725 psi)) AS 2129, raised face ½" ... 12": Table E Other flanges and pressure ratings on request	EN 1092-1, raised face (EN 1092-1, DIN 2501 & BS 4504 have the same mating dimensions) • DN 15 ... 50 (½" ... 2"): PN 40 (580 psi) • DN 65 ... 300 (2½" ... 12"): PN 16 (232 psi) • DN 200 ... 300 (8" ... 12"): PN 10 (145 psi) ANSI B16.5 (~BS 1560), raised face • ½" ... 12": Class 150 (20 bar (290 psi))
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Rated operation conditions

Ambient temperature (conditions also dependent on liner characteristics)			
• Sensor	-40 ... +100 °C (-40 ... +212 °F)	-40 ... +100 °C (-40 ... +212 °F)	-40 ... +100 °C (-40 ... +212 °F)
• Sensor ATEX	-20 ... +60 °C (-4 ... +140 °F)	for up to 150 °C (302 °F) temperature of medium: -20 ... +60 °C (-4 ... +140 °F) for 150 ... 180 °C (302 ... 356 °F) temperature of medium: -20 ... +50 °C (-4 ... +122 °F)	-20 ... +60 °C (-4 ... +140 °F)
• With compact transmitter MAG 5000/6000	-20 ... +50 °C (-4 ... +122 °F)	-20 ... +50 °C (-4 ... +122 °F)	-20 ... +50 °C (-4 ... +122 °F)
• With compact transmitter MAG 6000 I	-20 ... +60 °C (-4 ... +140 °F)	-20 ... +60 °C (-4 ... +140 °F)	-20 ... +60 °C (-4 ... +140 °F)
• With compact transmitter MAG 6000 I Ex d	-10 ... +60 °C (14 ... 140 °F)	-10 ... +60 °C (14 ... 140 °F)	-10 ... +60 °C (14 ... 140 °F)

SITRANS F flowmeters

SITRANS F M

MAG 3100

Version	MAG 3100	MAG 3100 HT (High Temperature)	MAG 3100 P
Operating pressure			
Operating pressure [abs. bar] (maximum operating pressure decreases with increasing operating temperature and with stainless steel flanges)	• Neoprene 0.01 ... 100 bar (0.15 ... 1450 psi) • EPDM 0.01 ... 40 bar (0.15 ... 580 psi) • Linatex® 0.01 ... 40 bar (0.15 ... 580 psi) • Ebonite 0.01 ... 100 bar (0.15 ... 1450 psi) • PTFE - DN ≤ 300 (≤ 12"): 0.3 ... 50 bar (4 ... 725 psi) - 350 ≤ DN ≤ 600 (14" ≤ DN ≤ 24"): 0.3 ... 40 bar (4 ... 580 psi) • PFA - DN 25 ... 100 (1" ... 4"): Vacuum ... 50 bar (0.15 ... 725 psi)	• PTFE Teflon - DN 15 ... 300 (½" ... 12") (130/180 °C (266 °F/356°F)): 0.3/0.6 ... 50 bar (4/8 ... 725 psi) (180 °C (356 °F) PTFE has factory mounted grounding SS rings type E & SS terminal box) • PFA - DN 25 ... 100 (1" ... 4"): Vacuum ... 50 bar (0.15 ... 725 psi)	• PTFE Teflon - DN 15 ... 300 (½" ... 12") : 0.3 ... 40 bar (4 ... 580 psi) • PFA - DN 15 ... 100 (1" ... 4"): Vacuum ... 50 bar (0.15 ... 725 psi)
Enclosure rating	IP67/NEMA 4X/6 to EN 60529, 1 mH ₂ O for 30 min Option: IP68/NEMA 6P to EN 60529, 10 mH ₂ O cont. (no ATEX)	IP67/NEMA 4X/6 to EN 60529, 1 mH ₂ O for 30 min Option: IP68/NEMA 6P to EN 60529, 10 mH ₂ O cont. (no ATEX)	IP67/NEMA 4X/6 to EN 60529, 1 mH ₂ O for 30 min Option: IP68/NEMA 6P to EN 60529, 10 mH ₂ O cont. (no ATEX)
Pressure drop at 3 m/s	As straight pipe		
Test pressure	1.5 x PN (where applicable)		
Mechanical load	• 18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 • Sensor: 3.17 grms • Sensor with compact MAG 5000/6000 mounted transmitter: 3.17 grms • Sensor with compact MAG 6000 I/6000 I Ex mounted transmitter: 1.14 grms	• 18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 • Sensor: 3.17 grms • Sensor with compact MAG 5000/6000 mounted transmitter: 3.17 grms • Sensor with compact MAG 6000 I/6000 I Ex mounted transmitter: 1.14 grms	• 18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 • Sensor: 3.17 grms • Sensor with compact MAG 5000/6000 mounted transmitter: 3.17 grms • Sensor with compact MAG 6000 I/6000 I Ex mounted transmitter: 1.14 grms
Temperature of medium	• Neoprene 0 ... +70 °C (32 ... 158 °F) • EPDM -10 ... +70 °C (14 ... 158 °F) • Linatex® (rubber) -40 ... +70 °C (-40 ... +158 °F) (for temperatures below -20 °C (-4 °F) AISI 304 or 316 flanges must be used) • Ebonite 0 ... 95 °C (32 ... 203 °F) • PTFE -20 ... +100 °C (-4 ... +212 °F) • PFA -20 ... +100 °C (-4 ... +212 °F)	• PTFE -20 ... +130 °C (-4 ... +266 °F) • PTFE -20 ... +180 °C (-4 ... +356 °F) Factory mounted grounding rings type E and SS terminal box. Can only be used with remote transmitter. • PFA -20 ... +150 °C (-4 ... +300 °F)	• PTFE -20 ... +130 °C (-4 ... +266 °F) • PFA -20 ... +150 °C (-4 ... +300 °F)
EMC	89/336 ECC	89/336 ECC	89/336 ECC
Design			
Weight	See dimensional drawings		
Flange and housing material	Carbon steel ASTM A 105, with corrosion resistant two component epoxy coating (min. 150 µm) or AISI 304 (1.4301) flanges and carbon steel housing, with corrosion resistant two component epoxy coating (min. 150 µm) or AISI 316 L (1.4404) flanges and housing, polished	Carbon steel ASTM A 105, with corrosion resistant two component epoxy coating (min. 150 µm) or AISI 304 (1.4301) flanges and carbon steel housing, with corrosion resistant two component epoxy coating (min. 150 µm) or AISI 316 L (1.4404) flanges and housing, polished	Carbon steel ASTM A 105, with corrosion resistant two component epoxy coating (min. 150 µm)
Measuring pipe material	AISI 304 (1.4301) (AISI 316L (1.4404) flanges and housing, polished has measuring pipe of AISI 316L (1.4435))	AISI 304 (1.4301) (AISI 316L (1.4404) flanges and housing, polished has measuring pipe of AISI 316L (1.4435))	AISI 304 (1.4301)
Electrode material	• AISI 316 Ti (1.4571) • Hastelloy C276 (PFA: Hastelloy C22) • Platinum/Iridium, • Titanium • Tantalum	• AISI 316 Ti (1.4571) • Hastelloy C276 (PFA: Hastelloy C22) • Platinum/Iridium, • Titanium • Tantalum	Hastelloy C276 (PFA: Hastelloy C22)
Grounding Electrode material	Material as measuring electrodes: Exceptions - see ordering data	No grounding electrodes	No grounding electrodes

Version	MAG 3100	MAG 3100 HT (High Temperature)	MAG 3100 P
Design (continued)			
Terminal box (remote version only)	- Standard fibre glass reinforced polyamide - Option Stainless steel AISI 316 (1.4436) - Ex ATEX (remote version only) Stainless steel AISI 316 (1.4436)	- Stainless steel AISI 316 (1.4436) - Ex ATEX (remote version only) Stainless steel AISI 316 (1.4436)	- Standard fibre glass reinforced polyamide - Option Stainless steel AISI 316 (1.4436) - Ex ATEX (remote version only) Stainless steel AISI 316 (1.4436)
Cable entries	- Remote installation 2 x M20 or 2 x ½ NPT - Compact installation - MAG 5000/MAG 6000: 4 x M20 or 4 x ½"NPT - MAG 6000 I: 2 x M25 (for supply/output) - MAG 6000 I Ex. d: 2 x M20 (for supply/output)	Remote installation 2 x M20 or 2 x ½ NPT	- Remote installation 2 x M20 or 2 x ½ NPT - Compact installation - MAG 5000/MAG 6000: 4 x M20 or 4 x ½"NPT - MAG 6000 I: 2 x M25 (for supply/output) - MAG 6000 I Ex. d: 2 x M20 (for supply/output)
Certificates and approvals			
Conforms to	PED – 97/23 EC, CRN	PED – 97/23 EC, CRN	PED – 97/23 EC, CRN
Material certificate EN 10204 3.1	On request	On request	Pipe and flange certificate available as option
Ex approvals	ATEX 2G D sensor - DN 15 ... 300: EEx d e ia IIC T4 - T6 - DN 350 ... 2000 EEx e ia IIC T4 - T6 Non ATEX sensors - FM Class 1 Div 2 - CSA Class 1, Div 2	ATEX 2G D sensor - DN 15 ... 300: EEx d e ia IIC T3 - T6 Non ATEX sensors - FM Class 1 Div 2 - CSA Class 1, Div 2	ATEX 2G D sensor - DN 15 ... 300: EEx d e ia IIC T3 - T6 Non ATEX sensors - FM Class 1 Div 2 - CSA Class 1, Div 2
Drinking water approvals	EPDM lining: - WRAS (WRc, BS6920 cold water, GB) - ACS listed (F) - DVGW W270 (D) - Belaqua (B)		
Custody transfer (CT) (≤ DN2000) (only together with MAG 5000/6000 CT), order as special	Cold water pattern approval - DANAK TS 22.36.001, PTB (Denmark and Germany) Heat meter pattern approval - OIML R 75 (Denmark) Hot water pattern approval - PTB (Germany) Other media than water - OIML R 117 (Denmark)	Cold water pattern approval - DANAK TS 22.36.001, PTB (Denmark and Germany) Heat meter pattern approval - OIML R 75 (Denmark) Hot water pattern approval - PTB (Germany) Other media than water - OIML R 117 (Denmark)	Cold water pattern approval - DANAK TS 22.36.001, PTB (Denmark and Germany) Heat meter pattern approval - OIML R 75 (Denmark) Hot water pattern approval - PTB (Germany) Other media than water - OIML R 117 (Denmark)

Technical specification for transmitter - please see transmitter pages.

SITRANS F flowmeters

SITRANS F M

MAG 3100

Selection and Ordering data	Order No.
Sensor SITRANS F M MAG 3100	7ME6310 -
Diameter	
DN 15 (½") (PTFE liner only)	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
DN 1050 (42")	7 U
DN 1100 (44")	7 V
DN 1200 (48")	8 B
DN 1400 (54")	8 F
DN 1500 (60")	8 K
DN 1600 (66")	8 P
DN 1800 (72")	8 T
DN 2000 (78")	8 Y
Flange norm and pressure rating	
to EN 1092-1	
PN 6 (DN 65 ... 2000 (2½" ... 78"))	A
PN 10 (DN 200 ... 2000 (8" ... 78"))	B
PN 16 (DN 65 ... 1200 (2½" ... 48"))	C
PN 16, non PED (DN 700 ... 2000 (28" ... 78"))	D
PN 25 (DN 200 ... 600 (8" ... 24"))	E
PN 40 (DN 15 ... 600 (½" ... 24"))	F
PN 63 (DN 50 ... 300 (2" ... 12")), not PTFE or PFA	G
PN 100 (DN 25 ... 300 (1" ... 12")), not PTFE or PFA	H
to ANSI B16.5	
Class 150 (½" ... 24")	J
Class 300 (½" ... 24")	K
to AWWA C207	
Class D (28" ... 78")	L
to AS	
2129, table E	M
4087, PN 16 (DN 50 ... 1200 (2" ... 48"))	N
4087, PN 21 (DN 50 ... 600 (2" ... 24"))	P
4087, PN 35 (DN 50 ... 600 (2" ... 24"))	Q
Flange material	
Carbon steel flanges ASTM A 105	1
Stainless steel flanges, AISI 304	2
Stainless steel flanges and sensor body, AISI 316L, polished	3

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

Selection and Ordering data	Order No.
Sensor SITRANS F M MAG 3100	7ME6310 -
Liner material	
Neoprene	1
EPDM	2
PTFE (DN ≤ 300, PN ≤ 50 bar / ≤ 12", PN ≤ 725 psi), PTFE (350 ≤ DN ≤ 600, PN ≤ 40 bar / 14" ≤ DN ≤ 24", PN ≤ 580 psi)	3
Ebonite	4
Linatex (PN ≤ 40 bar (580 psi) DN ≤ 600 (24"))	5
PFA (DN 25, 50, 80, 100 (1", 2", 3", 4")) (PN ≤ 40 bar (580 psi))	7
Electrode material (Grounding electrodes not for PTFE/PFA liner or Pressure PN 100)	
AISI 316 Ti	1
Hastelloy C276 (PFA liner: Hastelloy C22)	2
Platinum (DN ≤ 300/12") (no grounding electrodes)	3
Titanium (not PFA liner)	4
Tantalum (DN ≤ 600 (24")) (no grounding electrodes)	5
Transmitter with display	
Sensor for remote transmitter (Order transmitter sep.)	A
Sensor ATEX 2G D 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, ATEX 2G D	D
MAG 6000 I Alu. 115 ... 230 V, ATEX 2G D	E
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
Communication	
No communication, add-on possible	A
HART	B
PROFIBUS PA Profile 3 (only MAG 6000/MAG 6000 I)	F
PROFIBUS DP Profile 3 (no ATEX) (only MAG 6000/MAG 6000 I)	G
MODBUS RTU/RS 485 (no ATEX) (only MAG 6000/MAG 6000 I)	E
FOUNDATION Fieldbus H1 (only MAG 6000/MAG 6000 I)	J
Cable glands/terminal box	
Metric: Polyamid terminal box or 6000I compact	1
½" NPT: Polyamid terminal box or 6000I compact	2
Metric: SS terminal box (mandatory for Stainless steel MAG 6000 Transmitter)	3
½" NPT: SS terminal box (mandatory for Stainless steel MAG 6000 Transmitter)	4

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

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



Please use online Product selector to get latest updates.

Product selector link:

www.pia-selector.automation.siemens.com

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

Communication module will be pre-mounted in the transmitter.

SITRANS F flowmeters

SITRANS F M

MAG 3100

Selection and Ordering data

Order No.

Sensor SITRANS F M

MAG 3100 HT (High Temperature)

7 ME 6 3 2 0 -

Diameter

DN 15 (½")
 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")

1 V
 2 D
 2 R
 2 Y
 3 F
 3 M
 3 T
 4 B
 4 H
 4 P
 4 V
 5 D

Flange norm and pressure rating

to EN 1092-1

PN 10 (DN 200 ... 300 (8" ... 12"))
 PN 16 (DN 65 ... 300 (2½" ... 12"))
 PN 25 (DN 200 ... 300 (8" ... 12"))
 PN 40 (DN 15 ... 300 (½" ... 12"))

to ANSI B16.5

Class 150 (½" ... 12")
 Class 300 (½" ... 12")

to AS

2129, table E

Flange material

Carbon steel flanges ASTM A 105
 Stainless steel flanges, AISI 304
 Stainless steel flanges and sensor body,
 AISI 316L, polished

Liner material

PTFE (130 °C (266 °F))
 PTFE including type E protection rings AISI 316
 (180 °C (356 °F))
 PFA (150 °C (302 °F)) (DN 25, 50, 80, 100
 (1", 2", 3", 4"))

Electrode material (no grounding electrodes)

AISI 316 TI
 Hastelloy C276 (PFA liner: Hastelloy C22)
 Platinum
 Titanium (not for PFA)
 Tantalum

Transmitter with display

Sensor for remote transmitter (Order transmitter
 separately)
 Sensor ATEX 2G D for remote transmitter (Order
 transmitter separately)
 MAG 6000 I, Alu. 18 ... 90 V DC, 115 ... 230 V AC
 MAG 6000 I, Alu. 18 ... 30 V DC, ATEX 2G D
 MAG 6000 I, Alu. 115 ... 230 V, ATEX 2G D
 MAG 6000, Polyamid, 11 ... 30 V DC/11 ... 24 V AC
 MAG 6000, Polyamid, 115/230 V AC
 MAG 5000, Polyamid, 11 ... 30 V DC/11 ... 24 V AC
 MAG 5000, Polyamid, 115/230 V AC

Selection and Ordering data

Order No.

Sensor SITRANS F M

MAG 3100 HT (High Temperature)

7 ME 6 3 2 0 -

Communication

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

A
 B
 F
 G
 E
 J

Cable glands/terminal box

Metric: Polyamid terminal box or 6000I compact
 ½" NPT: Polyamid terminal box or 6000I compact

Metric: SS terminal box (mandatory for Stainless
 steel MAG 6000 Transmitter)
 ½" NPT: SS terminal box (mandatory for Stainless
 steel MAG 6000 Transmitter)

1
 2
 3
 4

Selection and Ordering data

Order code

Additional information

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

Customer specific converter setup

Y20

Tag name made, stainless steel fixed with SS wire
 (add plain text)

Y17

Tag name plate, plastic (self adhesive)

Y18

Factory certificate according to EN 10204-2.1

C15

Factory certificate according to EN 10204-2.2

C14

Sensor cables wired (specify cable order no.)

Y40

Other postproduction requirements (add desired text)

Y99

Please use online Product selector to get latest updates.

Product selector link:

www.pia-selector.automation.siemens.com

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

Communication module will be pre-mounted in the transmitter.

SITRANS F flowmeters

SITRANS F M

MAG 3100

Selection and Ordering data	Order No.
Sensor SITRANS F M MAG 3100 P	7 ME 6 3 4 0 -
Diameter	
DN 15 (½")	▶ 1 V
DN 25 (1")	▶ 2 D
DN 40 (1½")	▶ 2 R
DN 50 (2")	▶ 2 Y
DN 65 (2½")	▶ 3 F
DN 80 (3")	▶ 3 M
DN 100 (4")	▶ 3 T
DN 125 (5")	▶ 4 B
DN 150 (6")	▶ 4 H
DN 200 (8")	▶ 4 P
DN 250 (10")	▶ 4 V
DN 300 (12")	▶ 5 D
Flange norm and pressure rating	
to EN 1092-1	
PN 10 (DN 200 ... 300 (8" ... 12"))	▶ B
PN 16 (DN 65 ... 300 (2½" ... 12"))	▶ C
PN 40 (DN 15 ... 50 (½" ... 2"))	▶ F
to ANSI B16.5	
Class 150 (½" ... 12")	▶ J
Flange material	
Carbon steel flanges ASTM A 105	▶ 1
Liner material	
PTFE (130 °C (266 °F))	▶ 3
PFA (150 °C (302 °F)) (DN 25, 50, 80, 100 (1", 2", 3", 4"))	▶ 7
Electrode material	
Hastelloy C276 (PFA: Hastelloy C22)	▶ 2
Transmitter	
Sensor for remote transmitter (Order transmitter separately)	▶ A
Sensor ATEX 2G D for remote transmitter (Order transmitter separately)	▶ B
MAG 6000 I, Aluminium, 18 ... 90 V DC, 115 ... 230 V AC	▶ C
MAG 6000 I, Aluminium, 18 ... 30 V DC, ATEX 2G D	▶ D
MAG 6000 I, Aluminium, 115 ... 230 V AC, ATEX 2G D	▶ E
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
Communication	
No communication, add-on possible	▶ A
HART	▶ B
PROFIBUS PA Profile 3 (only MAG 6000/MAG 6000 I)	▶ F
PROFIBUS DP Profile 3 (no ATEX) (only MAG 6000/MAG 6000 I)	▶ G
MODBUS RTU/RS 485 (no ATEX) (only MAG 6000/MAG 6000 I)	▶ E
FOUNDATION Fieldbus H1 (only MAG 6000/MAG 6000 I)	▶ J
Cable glands/terminal box	
Metric: Polyamid terminal box or 6000I compact	▶ 1
½" NPT: Polyamid terminal box or 6000I compact	▶ 2
Metric SS terminal box (mandatory for stainless steel MAG 6000 transmitter)	▶ 3
½" NPT SS terminal box (mandatory for stainless steel MAG 6000 transmitter)	▶ 4

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Order No. and specify Order code(s) and plain text.	
Tag name plate, stainless steel fixed with SS wire (add plain text)	Y17
Tag name plate, plastic (self adhesive)	Y18
Factory certificate according to EN 10204-2.1	C15
Factory certificate according to EN 10204-2.2	C14
Power cable wired (specify cable order no.)	Y40
Sensor for remote transmitter's junction box IP68 with wired cable (specify cable order no.) (no ATEX)	Y41
Customer specific test	Y90
Other postproduction requirements (add desired text)	Y99

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

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

SITRANS F flowmeters

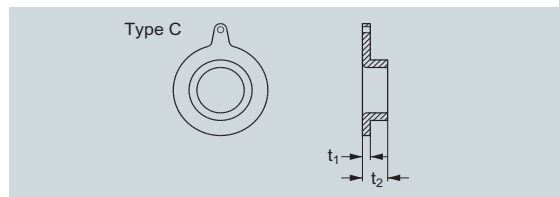
SITRANS F M

MAG 3100

Selection and Ordering data

MAG 3100 Type C Grounding and protection rings

AISI 304 grounding and protection rings **type C** for all liners except PTFE and PFA



DN	PN 6	PN 10	PN 16	PN 25	PN 40	AS2129, Table E
	Order No.	Order No.	Order No.	Order No.	Order No.	Order No.
DN 25					FDK-083N8361	FDK-083N8361
DN 40					FDK-083N8362	FDK-083N8362
DN 50					FDK-083N8344	FDK-083N8344
DN 65	FDK-083N8345		FDK-083N8345		FDK-083N8345	FDK-083N8346
DN 80	FDK-083N8347		FDK-083N8347		FDK-083N8347	FDK-083N8347
DN 100	FDK-083N8070		FDK-083N8025		FDK-083N8025	FDK-083N8025
DN 125	FDK-083N8071		FDK-083N8071		FDK-083N8071	FDK-083N8071
DN 150	FDK-083N8072		FDK-083N8008		FDK-083N8008	FDK-083N8008
DN 200	FDK-083N8074	FDK-083N8011	FDK-083N8011	FDK-083N8011	FDK-083N8075	FDK-083N8011
DN 250	FDK-083N8078	FDK-083N8013	FDK-083N8013	FDK-083N8013	FDK-083N8079	FDK-083N8013
DN 300	FDK-083N8080	FDK-083N8012	FDK-083N8012	FDK-083N8081	FDK-083N8082	FDK-083N8012
DN 350	FDK-083N8083	FDK-083N8039	FDK-083N8039	FDK-083N8084	FDK-083N8085	FDK-083N8039
DN 400	FDK-083N8099	FDK-083N8100	FDK-083N8100	FDK-083N8101	FDK-083N8102	FDK-083N8100
DN 450	FDK-083N8103	FDK-083N8103	FDK-083N8104	FDK-083N8104	FDK-083N8105	FDK-083N8104
DN 500	FDK-083N8107	FDK-083N8107	FDK-083N8108	FDK-083N8108	FDK-083N8109	FDK-083N8108
DN 600	FDK-083N8111	FDK-083N8111	FDK-083N8112	FDK-083N8112		FDK-083N8113
DN 700	FDK-083N8300	FDK-083N8294	FDK-083N8294			FDK-083N8372
DN 750						FDK-083N8366
DN 800	FDK-083N8303	FDK-083N8304	FDK-083N8304			FDK-083N8373
DN 900	FDK-083N8306	FDK-083N8307	FDK-083N8307			FDK-083N8396
DN 1000	FDK-083N8309	FDK-083N8310	FDK-083N8310			FDK-083N8397
DN 1100		FDK-083N8367	FDK-083N8367			FDK-083N8367
DN 1200	FDK-083N8312	FDK-083N8313	FDK-083N8313			FDK-083N8398
DN 1400	FDK-083N8467	FDK-083N8468	FDK-083N8469			
DN 1500	FDK-083N8471	FDK-083N8472	FDK-083N8473			
DN 1600	FDK-083N8475	FDK-083N8476	FDK-083N8477			
DN 1800	FDK-083N8479	FDK-083N8480	FDK-083N8481			
DN 2000	FDK-083N8483	FDK-083N8484	FDK-083N8485			

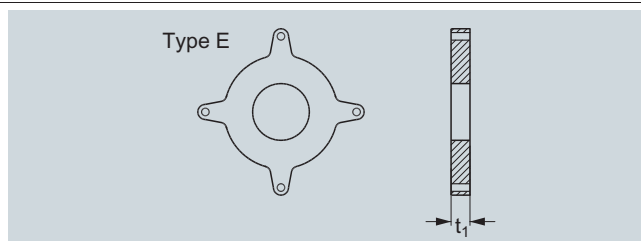
Size	ANSI Class 150 Order No.	Class 300 Order No.
1"	FDK-083N8361	FDK-083N8361
1½"	FDK-083N8362	FDK-083N8362
2"	FDK-083N8344	FDK-083N8344
2½"	FDK-083N8345	FDK-083N8345
3"	FDK-083N8347	FDK-083N8347
4"	FDK-083N8025	FDK-083N8025
5"	FDK-083N8071	FDK-083N8071
6"	FDK-083N8008	FDK-083N8073
8"	FDK-083N8011	FDK-083N8076
10"	FDK-083N8013	FDK-083N8079
12"	FDK-083N8012	FDK-083N8082
14"	FDK-083N8039	FDK-083N8085
16"	FDK-083N8100	FDK-083N8102
18"	FDK-083N8104	FDK-083N8106
20"	FDK-083N8107	FDK-083N8110
24"	FDK-083N8113	FDK-083N8114

Size	AWWA C207 Order No.
28"	FDK-083N8302
30"	FDK-083N8366
32"	FDK-083N8305
36"	FDK-083N8308
40"	FDK-083N8311
42"	FDK-083N8394
44"	FDK-083N8395
48"	FDK-083N8314
54"	FDK-083N8470
60"	FDK-083N8474
66"	FDK-083N8478
72"	FDK-083N8482
78"	FDK-083N8486

Selection and Ordering data

MAG 3100, 3100 HT, MAG 3100 P Type E grounding and protection ring1 pc. AISI 316 grounding and protection rings **type E** for PTFE liners**Note:**

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



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

Protection of PTFE liner use 2 pcs.

Earthing of PTFE lined flowmeter use 1 pc.

Size	ANSI Class 150 Order No.	Class 300 Order No.
½"	FDK-083N8365	FDK-083N8365
1"	FDK-083N8272	FDK-083N8272
1½"	FDK-083N8279	FDK-083N8279
2"	FDK-083N8283	FDK-083N8283
2½"	FDK-083N8287	FDK-083N8287
3"	FDK-083N8291	FDK-083N8292
4"	FDK-083N8118	FDK-083N8119
5"	FDK-083N8122	FDK-083N8123
6"	FDK-083N8126	FDK-083N8127
8"	FDK-083N8370	FDK-083N8133
10"	FDK-083N8140	FDK-083N8141
12"	FDK-083N8148	FDK-083N8149
14"	FDK-083N8157	FDK-083N8158
16"	FDK-083N8165	FDK-083N8166
18"	FDK-083N8173	FDK-083N8174
20"	FDK-083N8182	FDK-083N8183
24"	FDK-083N8190	FDK-083N8191

Protection of PTFE liner use 2 pcs.

Grounding of PTFE lined flowmeter use 1 pc.

AS2129, Table E

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

Protection of PTFE liner use 2 pcs.

Grounding of PTFE lined flowmeter use 1 pcs.

SITRANS F flowmeters

SITRANS F M

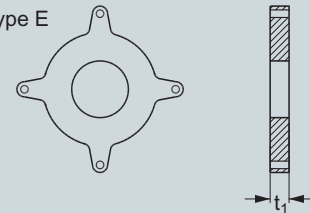
MAG 3100

Selection and Ordering data

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

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

Type E



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

Selection and Ordering data

MAG 3100, MAG 3100 HT, MAG 3100 P Grounding rings: Flat rings

1 pc. AISI 316 grounding **flat ring** for all liners (not PTFE 180 °C)



t = 2 mm (0.08 inch)

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

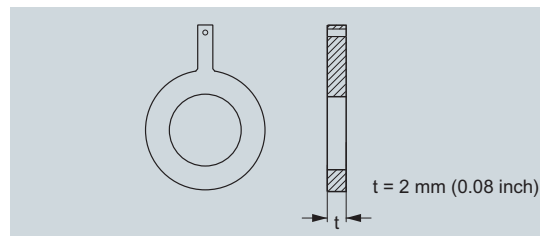
SITRANS F flowmeters

SITRANS F M

MAG 3100

Selection and Ordering data

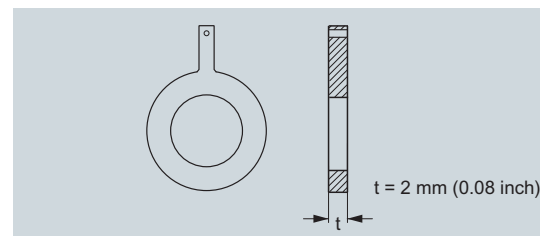
MAG 3100, MAG 3100 HT, MAG 3100 P Grounding rings : Flat rings

1 pc. Hastelloy C276 grounding **flat ring** for all liners (not PTFE 180 °C)

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

Selection and Ordering data

MAG 3100, MAG 3100 HT, MAG 3100 P Grounding rings : Flat rings

1 pc. Tantalum grounding **flat ring** for all liners (not PTFE 180 °C)

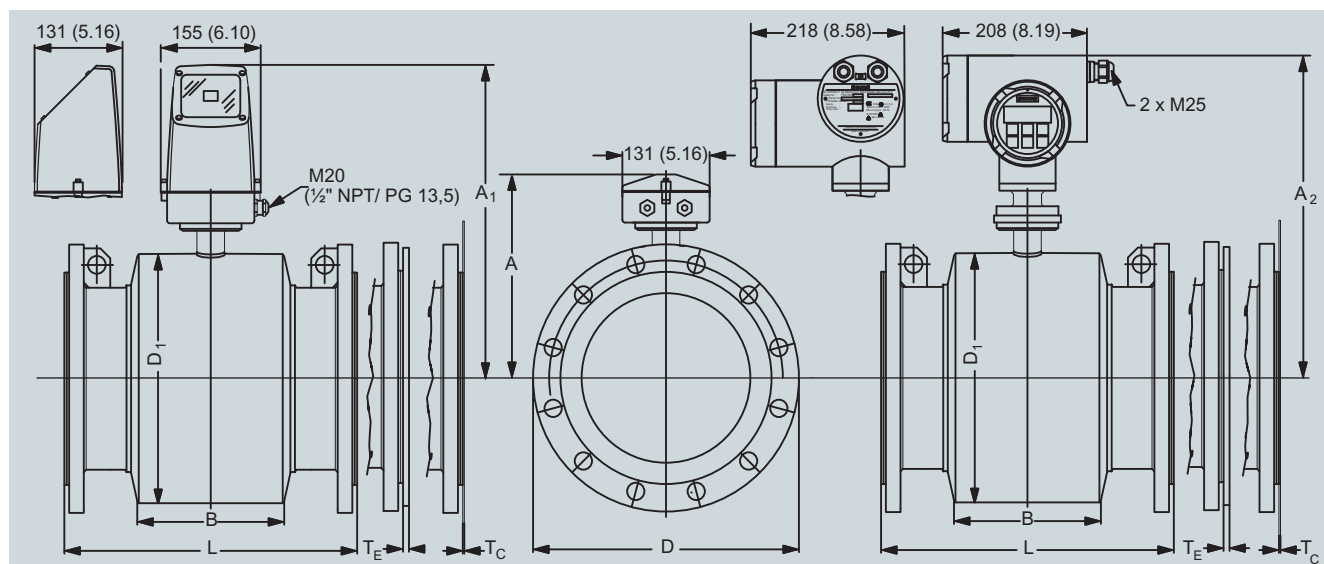
DN	PN 16 Order No.	PN 40 Order No.	Size	ANSI Class 150 Order No.	Class 300 Order No.
DN 15		A5E01192007	½"	A5E01192010	
DN 25		A5E01150883	1"	A5E01150030	A5E01150381
DN 40		A5E01192008	1½"	A5E01192011	
DN 50		A5E01150926	2"	A5E01151129	A5E01151199
DN 65	A5E01192005	A5E01192009	2½"	A5E01192012	
DN 80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

SITRANS F flowmeters

MAG 3100

Dimensional drawings

MAG 3100, MAG 3100 HT, MAG 3100 P sensor with compact or remote transmitter



Metric

DN	A ¹⁾	A ₁ /A ₂ ⁸⁾	B	D ₁	L ²⁾										T _C ³⁾	T _E ³⁾	T _F ³⁾	Wgt. ⁴⁾
					EN 1092-1-201						ANSI 16.5		AS 2129 E AS 4087 PN 16, 21, 35	AWWA C-207 Class D				
					PN 6, 10	PN 16/ PN 16 non PED	PN 25	PN 40	PN 63	PN 100	Class 150	Class 300						
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
15	187	338	59	104	-	-	-	200	-	-	200	200	200	-	-	6	2	4
25	187	338	59	104	-	-	-	200	-	260	200	200	200	-	1.2	6	2	5
40	197	348	82	124	-	-	-	200	-	280	200	200	200	-	1.2	6	2	8
50	205	356	72	139	-	-	-	200	276	300	200	200	200	-	1.2	6	2	9
65	212	363	72	154	200	200/-	-	200	320	350	200	272	200	-	1.2	6	2	11
80	222	373	72	174	200	200/-	-	272	323	340	272	272	200 ⁵⁾	-	1.2	6	2	12
100	242	393	85	214	250	250/-	-	250	380	400	250	310	250	-	1.2	6	2	16
125	255	406	85	239	250	250/-	-	250	420	450	250	335	250	-	1.2	6	2	19
150	276	427	85	282	300	300/-	-	300	415	450	300	300	300	-	1.2	6	2	27
200	304	455	137	338	350	350/-	350	350	480	530	350	350	350	-	1.2	8	2	40
250	332	483	157	393	450	450/-	450	450	550	620	450	450	450	-	1.2	8	2	60
300	357	508	157	444	500	500/-	500	500	600	680	500	500	500	-	1.6	8	2	80
350	362	513	270	451	550	550/-	550	550	-	-	550	550	550	-	1.6	8	-	110
400	387	538	270	502	600	600/-	600	600	-	-	600	600	600	-	1.6	10	-	125
450	418	569	310	563	600	600/-	600	600	-	-	600	600	600	-	1.6	10	-	175
500	443	594	350	614	600	600/-	625	680	-	-	600	730	600 ⁶⁾	-	1.6	10	-	200
600	494	645	430	715	600	600/-	750	800	-	-	600	860	600 ⁷⁾	-	1.6	10	-	287
700	544	695	500	816	700	875/700	-	-	-	-	-	-	700	700	2.0	-	-	330
750	571	722	556	869	-	-/-	-	-	-	-	-	-	750	750	2.0	-	-	360
800	606	757	560	927	800	1000/800	-	-	-	-	-	-	800	800	2.0	-	-	450
900	653	804	630	1032	900	1125/900	-	-	-	-	-	-	900	900	2.0	-	-	530
1000	704	906	670	1136	1000	1250/1000	-	-	-	-	-	-	1000	1000	2.0	-	-	660
1100	755	906	770	1238	-	-/-	-	-	-	-	-	-	1100	1100	2.0	-	-	1140
1200	810	961	792	1348	1200	1500/1200	-	-	-	-	-	-	1200	1200	2.0	-	-	1180
1400	925	1076	1000	1675	1400	-/1400	-	-	-	-	-	-	-	1400	2.0	-	-	1600
1500	972	1123	1020	1672	1500	-/1500	-	-	-	-	-	-	-	1500	3.0	-	-	2460
1600	1025	1176	1130	1915	1600	-/1600	-	-	-	-	-	-	-	1600	3.0	-	-	2140
1800	1123	1274	1250	1974	1800	-/1800	-	-	-	-	-	-	-	1800	3.0	-	-	2930
2000	1223	1374	1375	2174	2000	-/2000	-	-	-	-	-	-	-	2000	3.0	-	-	3665

¹⁾ 14.5 mm shorter with AISI terminal box (Ex and high temperature version)

2) When earthing flanges are used, the thickness of the earthing flange must be added to the built-in length

3) T_C = Type C grounding ring, T_E = Type E grounding ring (Included and factory mounted on high temperature 180 °C (356 °F) PTFE sensor),
 T_F = Flat type grounding rings

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

5) PN 35 DN 80 = 272 mm

6) PN 35 DN 500 = 680 mm

7) PN 35 DN 600 = 750 mm

8) A_2 is 3 mm/0.12" shorter than A_1

- not available

D = Outside diameter of flange, see flange tables

SITRANS F flowmeters

SITRANS F M

MAG 3100

MAG 3100, MAG 3100 HT, MAG 3100 P sensor with compact or remote transmitter

Imperial

Size	A ¹⁾	A ₁ /A ₂ ⁸⁾	B	D ₁	L ²⁾									AS 2129 E AS 4087 PN 16, 21, 35	T _C ³⁾	T _E ³⁾	T _F ³⁾	Wgt. ⁴⁾
					EN 1092-1-201						ANSI 16.5		AWWA C-207 Class D					
					PN 6, 10	PN 16/ PN 16 non PED	PN 25	PN 40	PN 63	PN 100	Class 150	Class 300						
[in.]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[in.]	[in.]	[in.]	[lb]
½	7.36	13.31	2.32	4.09	-	-	-	7.87	-	-	7.87	7.87	-	7.87	-	0.24	0.08	11
1	7.36	13.31	2.32	4.09	-	-	-	7.87	-	10.24	7.87	7.87	-	7.87	0.05	0.24	0.08	13
1½	7.76	13.70	3.23	4.88	-	-	-	7.87	-	11.02	7.87	7.87	-	7.87	0.05	0.24	0.08	17
2	8.07	14.01	2.83	5.47	-	-	-	7.87	10.87	11.81	7.87	7.87	-	7.87	0.05	0.24	0.08	28
2½	8.35	14.29	2.83	6.06	7.87	7.87/-	-	7.87	12.60	13.78	7.87	10.71	-	7.87	0.05	0.24	0.08	30
3	8.74	14.69	2.83	6.85	7.87	7.87/-	-	10.71	12.72	13.39	10.71	10.71	-	7.87 ⁵⁾	0.05	0.24	0.08	33
4	9.53	15.47	3.35	8.43	9.84	9.84/-	-	9.84	14.96	-	9.84	12.20	-	9.84	0.05	0.24	0.08	44
5	10.04	15.98	3.35	9.41	9.84	9.84/-	-	9.84	16.54	-	9.84	13.10	-	9.84	0.05	0.24	0.08	55
6	10.87	16.81	5.39	11.10	11.81	11.81/-	-	11.81	16.34	-	11.81	11.81	-	11.81	0.05	0.24	0.08	66
8	11.97	17.91	5.39	13.31	13.78	13.78/-	13.78	13.78	18.90	-	13.78	13.78	-	13.78	0.05	0.31	0.08	110
10	13.07	19.02	6.18	15.47	17.72	17.72/-	17.72	17.72	-	-	17.72	17.72	-	17.72	0.05	0.31	0.08	155
12	14.05	20.00	6.18	17.48	19.69	19.69/-	19.69	19.69	-	-	19.69	19.69	-	19.69	0.06	0.31	0.08	176
14	14.25	20.20	10.63	17.76	21.65	21.65/-	21.65	21.65	-	-	21.65	21.65	-	21.65	0.06	0.31	-	242
16	15.24	21.18	10.63	19.76	23.62	23.62/-	23.62	23.62	-	-	23.62	23.62	-	23.62	0.06	0.39	-	275
18	16.45	22.40	12.20	22.16	23.62	23.62/-	23.62	23.62	-	-	23.62	23.62	-	23.62	0.06	0.39	-	385
20	17.44	23.39	13.78	24.17	23.62	23.62/-	24.61	26.77	-	-	23.62	28.70	-	23.62 ⁶⁾	0.06	0.39	-	335
24	19.45	25.39	16.93	28.15	23.62	23.62/-	29.53	31.50	-	-	23.62	33.80	-	23.62 ⁷⁾	0.06	0.39	-	630
28	21.42	27.36	19.69	32.13	27.56	34.45/27.56	-	-	-	-	-	-	27.56	27.56	0.08	-	-	725
30	22.48	28.43	21.89	34.21	-	-/-	-	-	-	-	-	-	29.52	-	0.08	-	-	830
32	23.86	29.80	22.05	36.50	31.50	39.37/31.50	-	-	-	-	-	-	31.50	31.50	0.08	-	-	990
36	25.71	31.65	24.80	40.63	35.43	44.29/35.43	-	-	-	-	-	-	35.43	35.43	0.08	-	-	1160
40	27.72	35.67	26.38	44.72	39.37	49.21/39.37	-	-	-	-	-	-	39.37	39.37	0.08	-	-	1453
42	27.72	35.67	26.38	44.72	-	-/-	-	-	-	-	-	-	39.37	-	0.08	-	-	1453
44	29.72	35.67	30.31	48.74	-	-/-	-	-	-	-	-	-	43.31	43.31	0.08	-	-	-
48	31.89	37.83	31.18	53.07	47.24	59.06/47.24	-	-	-	-	-	-	47.24	47.24	0.08	-	-	2592
54	36.42	42.36	39.37	65.94	55.12	-/55.12	-	-	-	-	-	-	55.12	-	0.12	-	-	2940
60	38.27	44.21	40.15	65.83	59.06	59.06/59.06	-	-	-	-	-	-	59.06	-	0.12	-	-	3422
66	40.35	46.30	44.49	75.39	62.99	-/62.99	-	-	-	-	-	-	63.00	-	0.12	-	-	3904
72	44.21	50.16	49.21	77.72	70.87	-/70.87	-	-	-	-	-	-	70.87	-	0.12	-	-	4846
78	48.15	54.09	54.13	85.59	78.74	-/78.74	-	-	-	-	-	-	78.74	-	0.12	-	-	6806

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

2) When earthing flanges are used, the thickness of the earthing flange must be added to the built-in length

3) T_C = Type C grounding ring, T_E = Type E grounding ring (Included and factory mounted on high temperature 180 °C (356 °F) PTFE sensor),
T_F = Flat type grounding rings

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) A₂ is 0.06" shorter than A₁

- not available

D = Outside diameter of flange, see flange tables

SITRANS F flowmeters

SITRANS F M

Sensor calibration

Selection and Ordering data

Product designation Order No.

SITRANS F M - Electromagnetic flowmeters

Calibrations/recalibration for MAG 1100, 1100 F, 5100 W and 3100

Accessories for SITRANS F M

Calibration

Standard Production calibration
• Zero-point 2 x 25 %, 2 x 90 %³⁾

MAG 8000 calibration
• Zero-point 1 x 25 %, 1 x 100 %

Standard production calibration - Matched pair

Size < DN 350 (14")
Size DN 300 ... 1200 (12" ... 48")
Larger sizes

Customer specified calibration up to 10 point¹⁾

Size ≤ DN 150 (6")
Size DN 200 ... 300 (8" ... 12")
Size DN 350 ... 600 (14" ... 24")
Size DN 700 ... 1100 (28" ... 48")
Add-on: Matched pair of any above
Larger sizes

Accredited calibration ISO/IEC 17025 - Matched pair¹⁾

Accredited calibration report with up
to 21 points¹⁾
Size ≤ DN 150 (6")
Size DN 200 ... 300 (8" ... 12")
Size DN 350 ... 600 (14" ... 24")
Size DN 700 ... 1100 (28" ... 48")
Larger sizes

CT-calibration and authority seal

Up to DN 300 (12") for PTB and DANAK
Size ≤ DN 150 (6")
Size DN 200 ... 300 (8" ... 12")
Larger sizes

Customer witnessed calibration

Any of above calibration
Add-on price per sensor
Size DN 200 ... 300 (8" ... 12")
Daily rates available on request for larger
project.

FDK -
O.R.²⁾

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¹⁾ **Size** dependent restriction on maximum 42,682 flow rates may apply.

²⁾ **Ordering O.R.** As we need dedicated information from the customer on the individual sensor, we must have the calibration forms filed and sent together with the order.

³⁾ MAG 5100 DN > 300/12": 1x 25% , 1x 90%.

SITRANS F flowmeters

SITRANS F M

Transmitter Transmag 2 with sensor 911/E

Overview



SITRANS F M transmitter Transmag 2

SITRANS F M Transmag 2 is a pulsed alternating field magnetic flowmeter where the magnetic field strength is much higher than conventional DC pulsed magnetic flowmeters.

This makes it ideal for difficult applications like:

- High concentrated paper stock > 3%
- Heavy mining slurries
- Mining slurries with magnetic particles.

Transmag 2 is used with the SITRANS F M 911/E sensor, available with diameters of DN 15 to DN 600.

Benefits

- Fast signal processing with 16-bit technology
- Automatic recognition of sensor type and calibration data as result of SmartPLUG
- PROFIBUS PA (profile 2.0) / HART communication
- Simple menu operation with two-line display
- Self-monitoring functions
- Internal simulator (for all input and output functions)
- Monitoring of sensor using magnetizing current and reference voltage as well as wet electrode function
- Analog output and digital outputs for pulses, device status, limits, flow direction, frequency output
- Optional passive switch input for resetting the counter values or for switching off the measuring equipment (PZR)
- With pulsed alternating field for minimum conductivity of $\geq 1 \mu\text{S}/\text{cm}$, on request $0.1 \mu\text{S}/\text{cm}$ depending on medium
- Split mode

Application

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

- Pulp & Paper Industry
- Mining Industry

The measuring procedure with pulsed alternating field patented by Siemens AG is particularly suitable for media with a high solids content, or magnetically conducting media.

Design

The complete flowmeter consists of a flow sensor and an associated transmitter from the SITRANS F M Transmag 2 for pulsed alternating field. These are available as remote and compact versions (SITRANS F M 911/E compact version with Transmag 2 only possible with nominal diameters DN 65 to DN 600 (2½" to 24"). They operate according to Faradays law of induction where an electric voltage is induced in a conductor moving through a magnetic field.

Function

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 fulfil the task of a power supply unit which provides the magnet coils with a constant current.

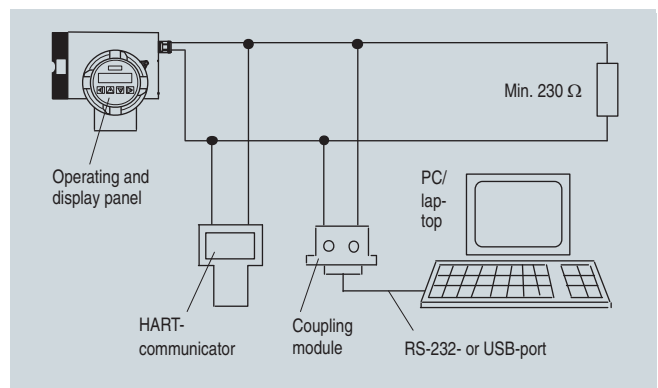
The magnetic flux density in the sensor is additionally monitored by reference coils.

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

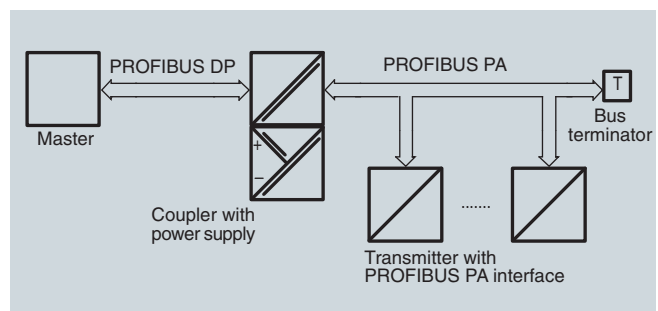
Displays and keypad

Operation of the Transmag 2 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

SITRANS F flowmeters

SITRANS F M

Transmitter Transmag 2 with sensor 911/E

Technical specifications

Mode of operation and design

Measuring principle	Electromagnetic with pulsed alternating field (PAC)
Magnetic field excitation	Automatic power supply synchronization
- 50 Hz AC power supply	Bipolar (16.7 Hz) Bipolar with prepulse (10 Hz) Unipolar (8.33 Hz)
- 60 Hz AC power supply	Bipolar (20 Hz) Bipolar with prepulse (12 Hz) Unipolar (10 Hz)

Outputs

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

	0/4 ... 20 mA
	Only for 20 mA / HART devices (7ME5034-0.... or 7ME5034-2....)

• Signal	
- Upper limit	0/4 ... 20 mA, selectable
- Failure	20 ... 22.5 mA
• Load	3.6; 20 or 24 mA
- Output	max. 600 Ω , max. load voltage 15 V DC
- For HART communication	$\geq 250 \Omega$

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

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

Output configuration

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

Digital output 2 (relay)

(only 7ME5034-0....)

Relay	NC or NO function
• Rating	Max. 5 W, max. 50 V AC/DC, max. 200 mA
• Output configuration	Limits for flow and quantity, flow direction, alarm

Digital input (optional to digital output 2)

(only 7ME5034-2....)

• Input function configurable as high-active or low-active	Set measured value or counter to zero
• Signal voltage	Max. 30 V DC, $R_i = 3$ k; 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

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 ± 0.0012 m/s (0.0039 ft/s)
• With $v < 0.25$ m/s (0.82 ft/s)	± 0.0025 m/s (0.0082 ft/s)

Measuring tolerance of analog output
As pulse output plus $\pm 0.1\%$ conversion error $\pm 20 \mu A$

Repeatability	0.2% of measured value
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Reference conditions

• Process temperature	25 °C ± 5 °C (77 °F ± 9 °F)
• Ambient temperature	25 °C ± 5 °C (77 °F ± 9 °F)
• Warm-up time	Min. 30 min
• Installation conditions	Inlet pipe section $\geq 10 \times DN$ Outlet pipe section $\geq 5 \times DN$ Installed centered in pipe
• Medium	Water without gaseous or solid components

Rated operating conditions

Installation conditions	See also sensors
Ambient temperature	
• Remote design	-20 ... +60 °C (-4 ... +140 °F)
• Compact design	-20 ... +60 °C (-4 ... +140 °F), process temperature up to 60 °C (up to 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 EN 61326 for use in industrial areas
• Noise immunity	To EN 61326 for use in industrial areas NAMUR NE21 for use in residential areas

Medium conditions

- Process temperature with compact design -20 ... +130 °C (-4 ... 266 °F)
depending on sensor and ambient temperature

Minimum conductivity of medium

- With SITRANS F M 911/E sensors $\geq 1 \mu\text{S/cm}$,
on request $0.1 \mu\text{S/cm}$ depending
on medium

Design

Weight of transmitter	4.4 kg (9.7 lb)
Compact versions	Transmitter fixed onto metering tube
Remote version	Transmitter must be connected to sensor using shielded cable
Maximum cable length	100 m (328 ft)
Housing	Die-cast aluminium, 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

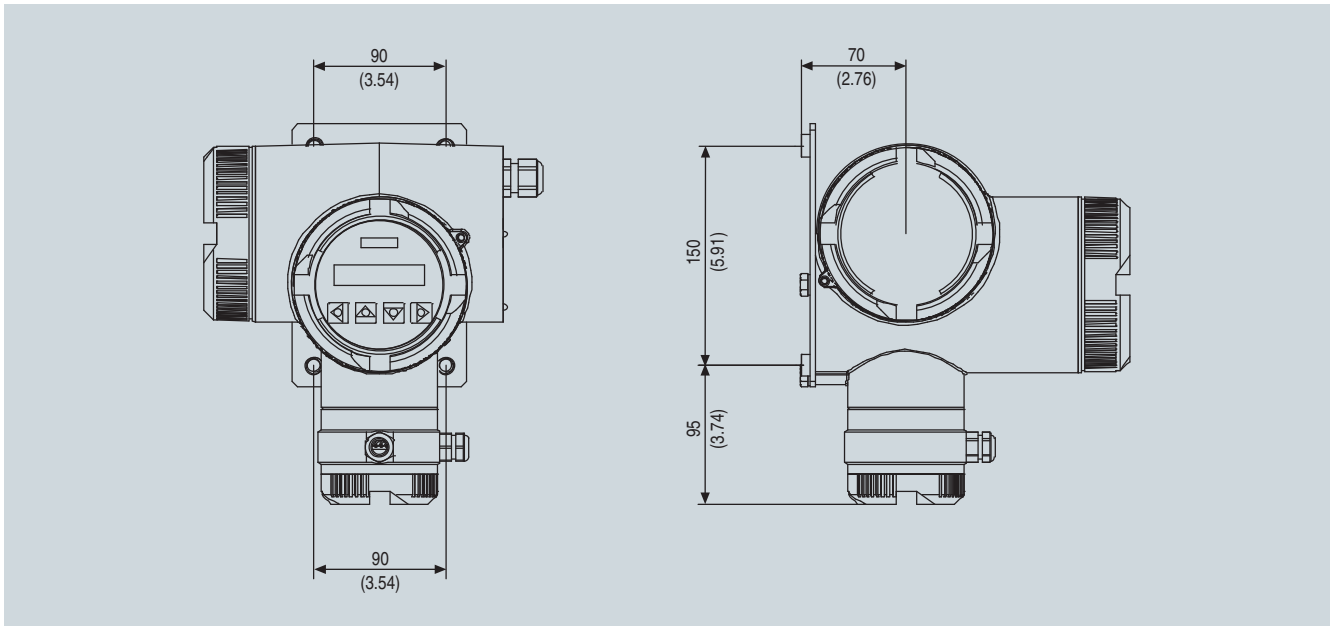
corresponding to rating plate

• AC supply	100 ... 250 V AC $\pm 15\%$, 47 ... 63 Hz
• Power consumption	Approx. 120 ... 630 VA, depending on sensor
Power failure	Bridging of min. 1 power supply cycle (> 20 ms)
Line fuse	100 ... 230 V AC: T1.6A
Magnet current fuse	F5A / 250 V

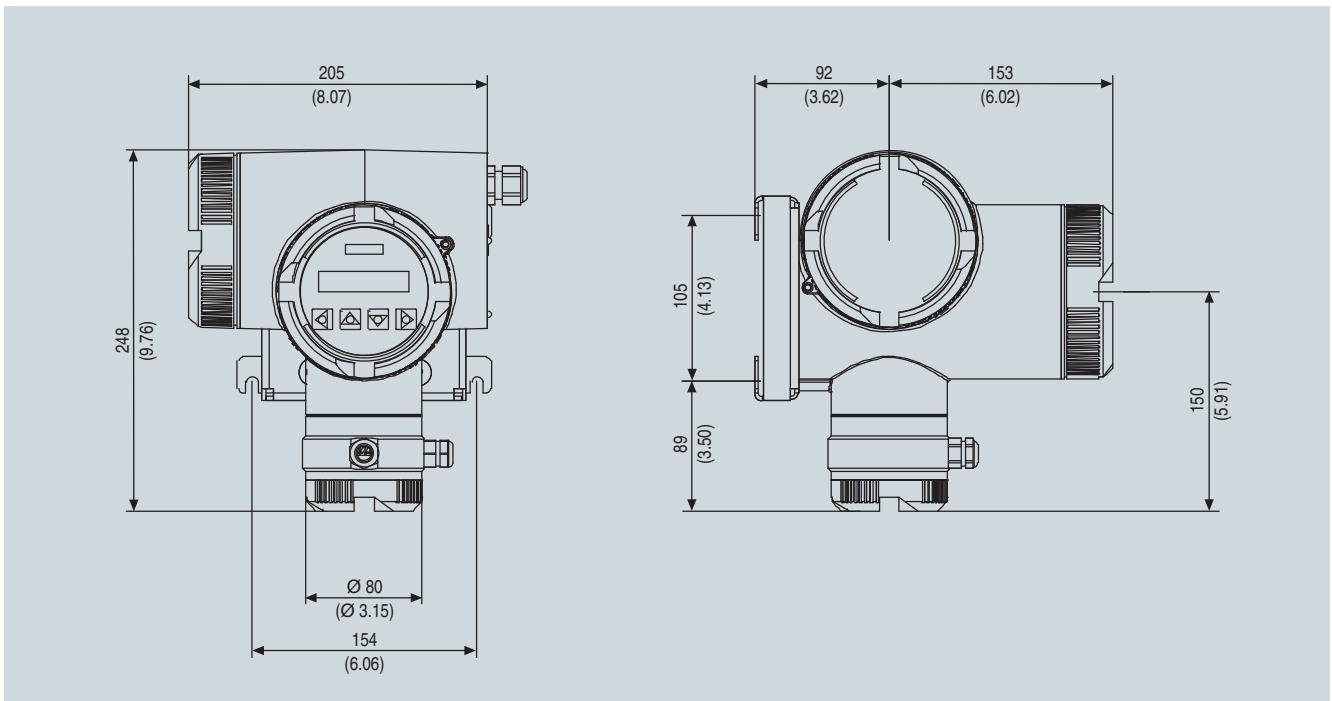
Certificates and approvals

Pressure equipment directive	Device is not subject to the pressure equipment directive
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Dimensional drawings



SITRANS F M transmitter Transmag 2 with standard mounting plate, dimensions in mm (inch)



SITRANS F M transmitter Transmag 2 with optional mounting plate also for pipeline mounting, dimensions in mm (inch)

SITRANS F flowmeters

SITRANS F M

Transmitter Transmag 2 with sensor 911/E

Overview



Benefits

- Fully-welded steel fitting
- Metering tube liners available made of hard/soft rubber, PTFE or Novolak
- Various flange connections available to EN 1092-1, ANSI B16.5
- Input amplifier with integral data component (smartPLUG) for all calibration values and customized settings if required.

Technical specifications

911/E sensor

Mode of operation and design

Measuring principle Pulsed alternating field

Process connection

Nominal diameters DN 15 ... 600 (½" ... 24")

Metering tube connections EN 1092-1, ANSI B16.5, others on request

Rated operating conditions

Installation conditions

- Minimum process temperature
- With hard rubber liner

See system information

-20 °C (-4 °F)

Max. 90 °C (194 °F)

Option: 100 °C (212 °F)

- With PTFE liner

• 150 °C (300 °F) at 25 bar (363 psi)

• 100 °C (194 °F) at 40 bar (580 psi)

- With Novolak liner

130 °C (266 °F) at 40 bar (580 psi)

Ambient temperature limits

- Remote versions

• -20 ... +65 °C (-4 ... +149 °F)

• -20 ... +40 °C (-4 ... +104 °F) with a process temperature > 130 °C (> 266 °F)

- Compact versions from DN 65 (2½")

• -20 ... +65 °C (-4 ... +149 °F) with a process temperature ≤ 60 °C (≤ 140 °F)

• -20 ... +40 °C (-4 ... +104 °F) with a process temperature 60 ... 130 °C (140 ... 266 °F), depends on used sensor and its liner

Degree of protection

IP67/NEMA 4X

Optional IP68/NEMA 6

Medium conditions

Minimum conductivity

> 1 µS/cm, on request 0.1 µS/cm depending on medium

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)

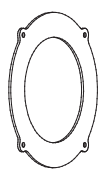
Transmitter Transmag 2 with sensor 911/E

Sensor cables between sensor and transmitter

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

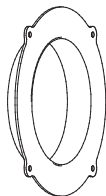
Attention must also be paid to the cable routing. Signal cables must be routed free of vibration, and protected against strong magnetic and stray fields. In case of doubt, the sensor cables must be routed in earthed steel conduit.

Protection washers for liners



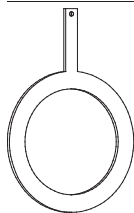
Function	Protection of liner during transport.
Contact with medium	Yes, but the protection washers can be removed prior to installation of the sensor in the pipeline if they are not resistant to the measured medium.
Material	Stainless steel mat. No. 1.4571/316Ti, optionally Hastelloy C4 mat. No. 2.4610
Material thickness	The overall length of the sensor is increased by • 6 mm for DN 15 to DN 150 (0.24" for 1/2" to 6") or • 10 mm for DN 200 to DN 600 (0.4" for 8" to 24")
Standard	Yes, can be used for PTFE liners up to PN 10 (MWP 145 psi) and for soft rubber; cannot be used for other liners.
Order No.	7ME592x-....

Protection rings for liners



Function	To protect the edges of liners from abrasion (e.g. gravel, sand etc.). Used mainly with soft rubber liners and for PTFE liners at high temperatures from 100 to 150 °C (212 to 300 °F).
Contact with medium	Yes, please always check resistance to measured medium.
Material	Stainless steel mat. No. 1.4571/316Ti, optionally Hastelloy C4 mat. No. 2.4610
Material thickness	The overall length of the sensor is increased by • 6 mm for DN 15 to DN 150 (0.24" for 1/2" to 6") or • 10 mm for DN 200 to DN 600 (0.4" for 8" to 24")
Standard	No, optional for PTFE and soft rubber liners. They are required for PTFE liners of PN 16 (MWP 232 psi) or more instead of protection washers, and must be ordered separately.
Order No.	7ME591x-....

Earthing washers



Function	Electrical reference and earthing of the medium. Required if the pipelines are not electrically conducting or are lined (plastic pipelines, concrete pipelines etc.). All earthing rings must be connected to the earthing screw present on the sensor.
Contact with medium	Yes, please always check resistance to measured medium.
Material	Stainless steel mat. No. 1.4571/316Ti, or Hastelloy C4 mat. No. 2.4610
Material thickness	The overall length of the sensor is increased by 2 mm (0.08") per earthing ring.
Standard	No, only optional. Required between the medium and sensor for equipotential bonding between non-conducting pipelines or lined pipelines.
Order No.	7ME590x-....

SITRANS F flowmeters

SITRANS F M

Transmitter Transmag 2 with sensor 911/E

Notes on pressure equipment directive

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

The minimum temperature is defined at -10 °C (14 °F) for the flange materials C22.8 (1.0460) and ST52-5 (1.0570).

The minimum temperature is defined at -20 °C (-4 °F) for the flange material 1.4571/316Ti.

Classification according to pressure equipment directive (PED 97/23/EC)

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

SITRANS F flowmeters

SITRANS F M

Transmitter Transmag 2 with sensor 911/E

Selection and Ordering data	Order No.	Order code
SITRANS F M 911/E flow sensor		
Rubber liner	7 ME 5 1 - - - - - 0	
Nominal pressure		
PN 10 (MWP 145 psi)	1	
PN 16 (MWP 232 psi)	2	
PN 25 (MWP 363 psi)	3	
PN 40 (MWP 580 psi)	4	
Design (transmitter to be ordered separately)		
Compact, alternating field from DN 65 (2½")	1	
Remote, alternating field	3	
Liner		
Hard rubber		
• VHE/H3b max. 90 °C (194 °F)	1	
• VHE/G31 up to 100 °C (212 °F)	2	
• VHE/181 (potable water - KTW)	3	
Soft rubber VWE/R61	4	
Neoprene BWE/DN 63	5	
Soft rubber VWE/1645 (potable water - KTW)	6	
Nominal diameter		
DN 15 (½")	A	
DN 20 (¾")	B	
DN 25 (1")	C	
DN 32 (1¼")	D	
DN 40 (1½")	E	
DN 50 (2")	F	
DN 65 (2½")	G	
DN 80 (3")	H	
DN 100 (4")	J	
DN 125 (5")	K	
DN 150 (6")	L	
DN 200 (8")	M	
DN 250 (10")	N	
DN 300 (12")	P	
DN 350 (14")	Q	
DN 400 (16")	R	
DN 500 (20")	S	
DN 600 (24")	T	
Other nominal diameters: specify in plain text	Z	J 1 Y
Connection flange		
DIN 2501/EN 1092-1, mat. No. 1.0460/1.0570 (mild steel)	A	
DIN 2501/EN 1092-1, mat. No. 1.4571/316Ti	B	
ANSI B 16.5 RF, mat. No. 1.0432/1.0570 (mild steel), to 10 bar (145 psi)	C	
ANSI 300 RF, steel, to 20 bar (290 psi)	D	
JIS 10 K, mat. No. 1.0570	E	
Other connection form	Z	K 1 Y
Electrode material		
Mat. No. 1.4571/316Ti	1	
Hastelloy C4 (mat. No. 2.4610)	2	
Titanium	3	
Tantalum	4	
Monel	5	
Platinum head with shaft, mat. No. 1.4571/316Ti	7	
Other materials: specify in plain text	9	L 1 Y

Selection and Ordering data	Order No.	Order code
SITRANS F M 911/E flow sensor		
Rubber liner	7 ME 5 1 - - - - - 0	
Sealing material		
Viton	1	
EPDM	2	
Kalrez	3	
Protection washers, protection rings		
Without	0	
With protection washers (only for soft rubber and Neoprene; order as accessory)	1	
With protection rings (only for soft rubber and Neoprene; order as accessory)	2	
Cable gland		
½" NPT	B	
M16 x 1.5	C	
Degree of protection		
IP67/NEMA4X	B	
IP68/NEMA6, cable length 5 m (16.4 ft)	C	
IP68/NEMA6, cable length 10 m (32.8 ft)	D	
IP68/NEMA6, other cable lengths (order as accessory 7ME5930...)	E	

Selection and Ordering data	Order Code
Additional information	
Please add "-Z" to Order No. and specify Order code(s) and plain text.	
One earthing (grounding) electrode made of mat No. 1.4571/316Ti up to DN 300 (12")	A01
Two earthing (grounding) electrodes made of mat. No. 1.4571/316Ti above DN 350 (14")	A02
One earthing (grounding) electrode made of Hastelloy C4/2.4610 up to DN 300 (12")	A03
Two earthing (grounding) electrodes made of Hastelloy C4/2.4610 above DN 350 (14")	A04
Replaceable electrodes above DN 100 (4")	A05
Replaceable electrodes above DN 100 (4"), replaceable under pressure	A06
With 3-point calibration certificate up to DN 600 (24") or Q _{max} > 2000 m³/h (8805 USgpm)	B06
With 6-point calibration certificate up to DN 600 (24") or Q _{max} > 2000 m³/h (8805 USgpm)	B07
Rating plate inscription in English	B11
Acceptance test B to DIN 50049, Section 3.1 and EN 10204	C12
Factory certificate to EN 10204-2.2	C14
Silicone-free materials	Y04
Measuring-point number (max. 16 char.), specify in plain text. Y15:....	Y15
Measuring-point description (max. 27 char.), specify in plain text. Y16:....	Y16
Stainless steel tag plate	Y17
Special design, specify quotation No./date in plain text	Y99

SITRANS F flowmeters

SITRANS F M

Transmitter Transmag 2 with sensor 911/E

Selection and Ordering data	Order No.	Order code
SITRANS F M 911/E flow sensor		
Novolak liner	7 ME 5 2 - 0 - 0	
Nominal pressure		
PN 10 (MWP 145 psi)	1	
PN 16 (MWP 232 psi)	2	
PN 25 (MWP 363 psi)	3	
PN 40 (MWP 580 psi)	4	
Design (transmitter to be ordered separately)		
Compact, alternating field from DN 65 (2½")	1	
Remote, alternating field	3	
Nominal diameter		
DN 50 (2")	F	
DN 65 (2½")	G	
DN 80 (3")	H	
DN 100 (4")	J	
DN 125 (5")	K	
DN 150 (6")	L	
DN 200 (8")	M	
DN 250 (10")	N	
DN 300 (12")	P	
DN 350 (14")	Q	
DN 400 (16")	R	
DN 500 (20")	S	
DN 600 (24")	T	
Other nominal diameters: specify in plain text	Z	J 1 Y
Connection flange		
DIN 2501/EN 1092-1, mat. No. 1.0460/1.0570 (mild steel)	A	
DIN 2501/EN 1092-1, mat. No. 1.4571/316Ti	B	
ANSI B 16.5 RF, mat. No. 1.0432/1.0570 (mild steel), to 10 bar (145 psi)	C	
ANSI 300 RF, steel, to 20 bar (290 psi)	D	
JIS 10 K, mat. No. 1.0570	E	
Other connection form	Z	K 1 Y
Electrode material		
Mat. No. 1.4571/316Ti	1	
Hastelloy C4 (mat. No. 2.4610)	2	
Titanium	3	
Tantalum	4	
Platinum head with shaft, mat. No. 1.4571/316Ti	7	
Other materials: specify in plain text	9	L 1 Y
Sealing material		
Viton	1	
EPDM	2	
Kalrez	3	
Protection washers, protection rings		
Without	0	
With protection rings (order as accessory)	2	
Cable gland		
½" NPT	B	
M16 x 1.5	C	

Selection and Ordering data	Order No.	Order code
SITRANS F M 911/E flow sensor		
Novolak liner	7 ME 5 2 - 0 - 0	
Degree of protection		
IP67/NEMA4X		B
IP68/NEMA6, cable length 5 m (16.4 ft)		C
IP68/NEMA6, cable length 10 m (32.8 ft)		D
IP68/NEMA6, other cable lengths (order as accessory 7ME5930...)		E

Selection and Ordering data	Order Code
Additional information	
Please add "-Z" to Order No. and specify Order code(s) and plain text.	
One earthing (grounding) electrode made of mat No. 1.4571/316Ti up to DN 300 (12")	A01
Two earthing (grounding) electrodes made of mat. No. 1.4571/316Ti above DN 350 (14")	A02
One earthing (grounding) electrode made of Hastelloy C4/2.4610 up to DN 300 (12")	A03
Two earthing (grounding) electrodes made of Hastelloy C4/2.4610 above DN 350 (14")	A04
Replaceable electrodes above DN 100 (4"), replaceable under pressure	A06
With 3-point calibration certificate up to DN 600 (24") or $Q_{\max} > 2000 \text{ m}^3/\text{h}$ (8805 USgpm)	B06
With 6-point calibration certificate up to DN 600 (24") or $Q_{\max} > 2000 \text{ m}^3/\text{h}$ (8805 USgpm)	B07
Rating plate inscription in English	B11
Acceptance test B to DIN 50049, Section 3.1 and EN 10204	C12
Factory certificate to EN 10204-2.2	C14
Silicone-free materials	Y04
Measuring-point number (max. 16 char.), specify in plain text. Y15:....	Y15
Measuring-point description (max. 27 char.), specify in plain text. Y16:....	Y16
Stainless steel tag plate	Y17
Special design, specify quotation No./date in plain text	Y99

SITRANS F flowmeters

SITRANS F M

Transmitter Transmag 2 with sensor 911/E

Selection and Ordering data	Order No.	Order code
SITRANS F M 911/E flow sensor		
PTFE liner	7 ME 5 3  - 0  0 -  0 	
Nominal pressure		
PN 10 (MWP 145 psi)	1	
PN 16 (MWP 232 psi)	2	
PN 25 (MWP 363 psi)	3	
PN 40 (MWP 580 psi)	4	
Design (transmitter to be ordered separately)		
Compact, alternating field from DN 65 (2½")	1	
Remote, alternating field	3	
Nominal diameter		
DN 25 (1")		C
DN 32 (1¼")		D
DN 40 (1½")		E
DN 50 (2")		F
DN 65 (2½")		G
DN 80 (3")		H
DN 100 (4")		J
DN 125 (5")		K
DN 150 (6")		L
DN 200 (8")		M
DN 250 (10")		N
DN 300 (12")		P
DN 350 (14")		Q
DN 400 (16")		R
DN 500 (20")		S
DN 600 (24")		T
Other nominal diameters: specify in plain text		Z
Connection flange		
DIN 2501/EN 1092-1, mat. No. 1.0460/1.0570 (mild steel)		A
DIN 2501/EN 1092-1, mat. No. 1.4571/316Ti		B
ANSI B 16.5 RF, mat. No. 1.0432/1.0570 (mild steel), to 10 bar (145 psi)		C
ANSI 300 RF, steel, to 20 bar (290 psi)		D
JIS 10 K, mat. No. 1.0570		E
Other connection form		Z
Electrode material		
Mat. No. 1.4571/316Ti		1
Hastelloy C4 (mat. No. 2.4610)		2
Titanium		3
Tantalum		4
Platinum head with shaft, mat. No. 1.4571/316Ti		7
Other materials: specify in plain text		9

J 1 Y

K 1 Y

L 1 Y

Selection and Ordering data	Order No.	Order code
SITRANS F M 911/E flow sensor		
PTFE liner	7 ME 5 3  - 0  0 -  0 	
Protection washers, protection rings		
With protection washers (included as standard with PTFE, mat. No. 1.4571/316Ti)		1
With protection rings required for PN 16 (MWP 232 psi) and above, order as accessory)		2
With protection washers of other material (order as accessory)		3
Cable gland		
½" NPT		B
M16 x 1.5		C
Degree of protection		
IP67/NEMA4X		B
IP68/NEMA6, cable length 5 m (16.4 ft)		C
IP68/NEMA6, cable length 10 m (32.8 ft)		D
IP68/NEMA6, other cable lengths (order as accessory 7ME5930...)		E

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Order No. and specify Order code(s) and plain text.	
One earthing (grounding) electrode made of mat No. 1.4571/316Ti up to DN 300 (12")	A01
Two earthing (grounding) electrodes made of mat. No. 1.4571/316Ti above DN 350 (14")	A02
One earthing (grounding) electrode made of Hastelloy C4/2.4610 up to DN 300 (12")	A03
Two earthing (grounding) electrodes made of Hastelloy C4/2.4610 above DN 350 (14")	A04
Replaceable electrodes above DN 100 (4"), replaceable under pressure	A06
With 3-point calibration certificate up to DN 600 (24") or Q _{max} > 2000 m³/h (8805 USgpm)	B06
With 6-point calibration certificate up to DN 600 (24") or Q _{max} > 2000 m³/h (8805 USgpm)	B07
Rating plate inscription in English	B11
Acceptance test B to DIN 50049, Section 3.1 and EN 10204	C12
Factory certificate to EN 10204-2.2	C14
Silicone-free materials	Y04
Measuring-point number (max. 16 char.), specify in plain text. Y15:....	Y15
Measuring-point description (max. 27 char.), specify in plain text. Y16:....	Y16
Stainless steel tag plate	Y17
Special design, specify quotation No./date in plain text	Y99

SITRANS F flowmeters

SITRANS F M

Transmitter Transmag 2 with sensor 911/E

Selection and Ordering data	Order No.	Order code
SITRANS F M electromagnetic flowmeter		
Protection washers for flow sensor 911E (per pair)	7 ME 5 9 2 2 -	
Liner		
Hard rubber/soft rubber		1
PTFE		0
Nominal diameter		
<u>Material 1.4571/316 Ti</u>		
DN 15 (½")		AA
DN 20 (¾")		BA
DN 25 (1")		CA
DN 32 (1¼")		DA
DN 40 (1½")		EA
DN 50 (2")		FA
DN 65 (2½")		GA
DN 80 (3")		HA
DN 100 (4")		JA
DN 125 (5")		KA
DN 150 (6")		LA
DN 200 (8")		MA
DN 250 (10")		NA
DN 300 (12")		PA
Other nominal diameters: specify in plain text		ZA J 1 Y
<u>Material Hastelloy C4/2.4610</u>		
DN 15 (½")		AB
DN 20 (¾")		BB
DN 25 (1")		CB
DN 32 (1¼")		DB
DN 40 (1½")		EB
DN 50 (2")		FB
DN 65 (2½")		GB
DN 80 (3")		HB
DN 100 (4")		JB
DN 125 (5")		KB
DN 150 (6")		LB
DN 200 (8")		MB
DN 250 (10")		NB
DN 300 (12")		PB
Other nominal diameters: specify in plain text		ZB J 1 Y
Flange design		
Flange to DIN		1
Flange to ANSI		2
Flange to JIS		3

Selection and Ordering data	Order Code
Additional information	
Please add "-Z" to Order No. and specify Order code(s) and plain text.	
Special design, specify quotation No./date in plain text	Y99

Selection and Ordering data	Order No.	Order code
SITRANS F M electromagnetic flowmeter		
Protection rings for flow sensor 911E (per pair)	7 ME 5 9 1 2 -	
Liner		
Hard rubber/soft rubber		1
Novolak		7
PTFE		0
Nominal diameter		
<u>for PTFE, material 1.4571/316 Ti</u>		
DN 15 (½")		AA
DN 20 (¾")		BA
DN 25 (1")		CA
DN 32 (1¼")		DA
DN 40 (1½")		EA
DN 50 (2")		FA
DN 65 (2½")		GA
DN 80 (3")		HA
DN 100 (4")		JA
DN 125 (5")		KA
DN 150 (6")		LA
DN 200 (8")		MA
DN 250 (10")		NA
DN 300 (12")		PA
Other nominal diameters: specify in plain text		ZA J 1 Y
<u>for Hard/Soft rubber, Novolak material 1.471/316 Ti</u>		
DN 15 (½")		AB
DN 20 (¾")		BB
DN 25 (1")		CB
DN 32 (1¼")		DB
DN 40 (1½")		EB
DN 50 (2")		FB
DN 65 (2½")		GB
DN 80 (3")		HB
DN 100 (4")		JB
DN 125 (5")		KB
DN 150 (6")		LB
DN 200 (8")		MB
DN 250 (10")		NB
DN 300 (12")		PB
Other nominal diameters: specify in plain text		ZB J 1 Y
Flange design		
Flange to DIN		1
Flange to ANSI		2
Flange to JIS		3

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Order No. and specify Order code(s) and plain text.	
Tag plate of stainless steel	
• Y30 - tag number (max. 16 digits, specify in plain text)	Y17
• Special design, specify quotation No./date in plain text	Y99

SITRANS F flowmeters

SITRANS F M

Transmitter Transmag 2 with sensor 911/E

Selection and Ordering data	Order No.	Order code
SITRANS F M electromagnetic flowmeter		
Earthing rings for flow sensor 911E (per unit)	7 ME 5 9 0 2 -	
Liner		
Hard rubber/soft rubber	1	
Novolak	7	
PTFE	0	
Nominal diameter		
<u>Material 1.4571/316 Ti</u>		
DN 15 (½")	AA	
DN 20 (¾")	BA	
DN 25 (1")	CA	
DN 32 (1¼")	DA	
DN 40 (1½")	EA	
DN 50 (2")	FA	
DN 65 (2½")	GA	
DN 80 (3")	HA	
DN 100 (4")	JA	
DN 125 (5")	KA	
DN 150 (6")	LA	
DN 200 (8")	MA	
DN 250 (10")	NA	
DN 300 (12")	PA	
DN 350 (14")	QA	
DN 400 (16")	RA	
DN 500 (20")	SA	
DN 600 (24")	TA	
DN 700 (28")	UA	
DN 800 (32")	VA	
DN 900 (36")	WA	
DN 1000 (40")	XA	
Other nominal diameters: specify in plain text	ZA	J 1 Y
<u>Material Hastelloy C4/2.4610</u>		
DN 15 (½")	AB	
DN 20 (¾")	BB	
DN 25 (1")	CB	
DN 32 (1¼")	DB	
DN 40 (1½")	EB	
DN 50 (2")	FB	
DN 65 (2½")	GB	
DN 80 (3")	HB	
DN 100 (4")	JB	
DN 125 (5")	KB	
DN 150 (6")	LB	
DN 200 (8")	MB	
DN 250 (10")	NB	
DN 300 (12")	PB	
DN 350 (14")	QB	
DN 400 (16")	RB	
DN 500 (20")	SB	
DN 600 (24")	TB	
Other nominal diameters: specify in plain text	ZB	J 1 Y
Flange design		
Flange to DIN	1	
Flange to ANSI	2	
Flange to JIS	3	

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Order No. and specify Order code(s) and plain text.	
Special design, specify quotation No./date in plain text	Y99

Selection and Ordering data	Order No.	Order code
SITRANS F M Transmag 2 and sensor 911/E	7 ME 5 9 3 0 -	
Cable for remote versions	A 0 0 - 0 A 0	
• Without cable	0 A	
• Suitable for sensor 911/E with alternating field, IP67 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)		
- Length: 5 m (16.4 ft)	5 B	
- Length: 10 m (32.8 ft)	5 C	
- Specify other length: in plain text	5 Z	J 1 Y
Later 3-point calibration certificate for SITRANS F M		
• Without	A	
• For SITRANS 911E up to DN 600, 24" (please specify Comm.-No. in plain text)	B	

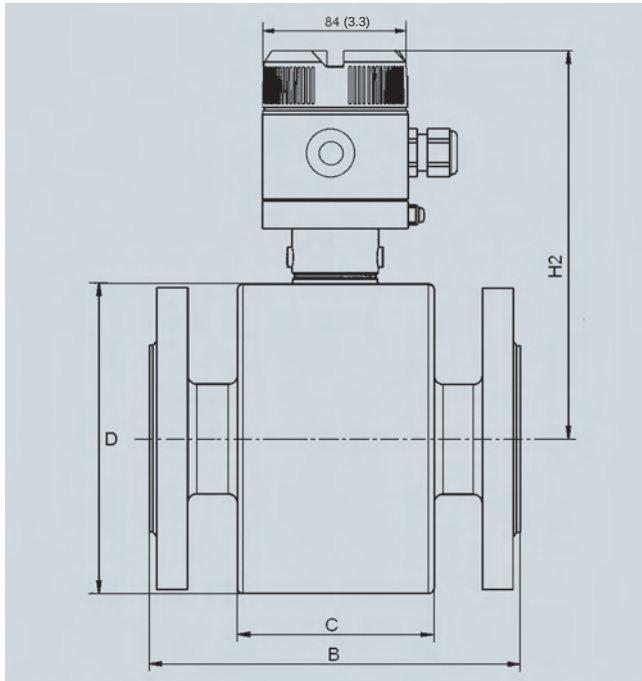
Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Order No. and specify Order code(s) and plain text.	
Tag plate of stainless steel	
• Y30 - tag number (max. 16 digits, specify in plain text)	Y17
• Special design, specify quotation No./date in plain text	Y99

SITRANS F flowmeters

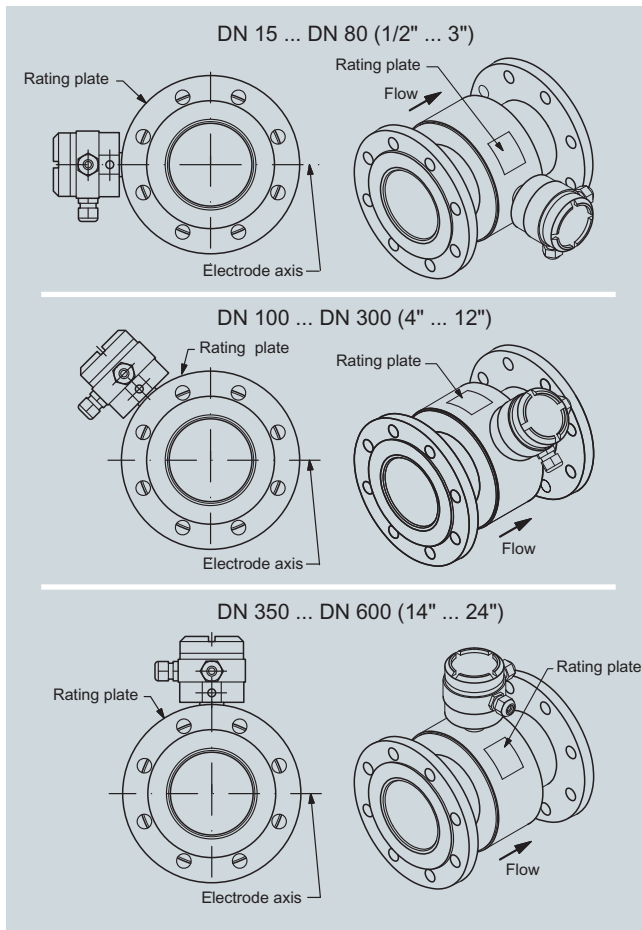
SITRANS F M

Transmitter Transmag 2 with sensor 911/E

Dimensional drawings



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

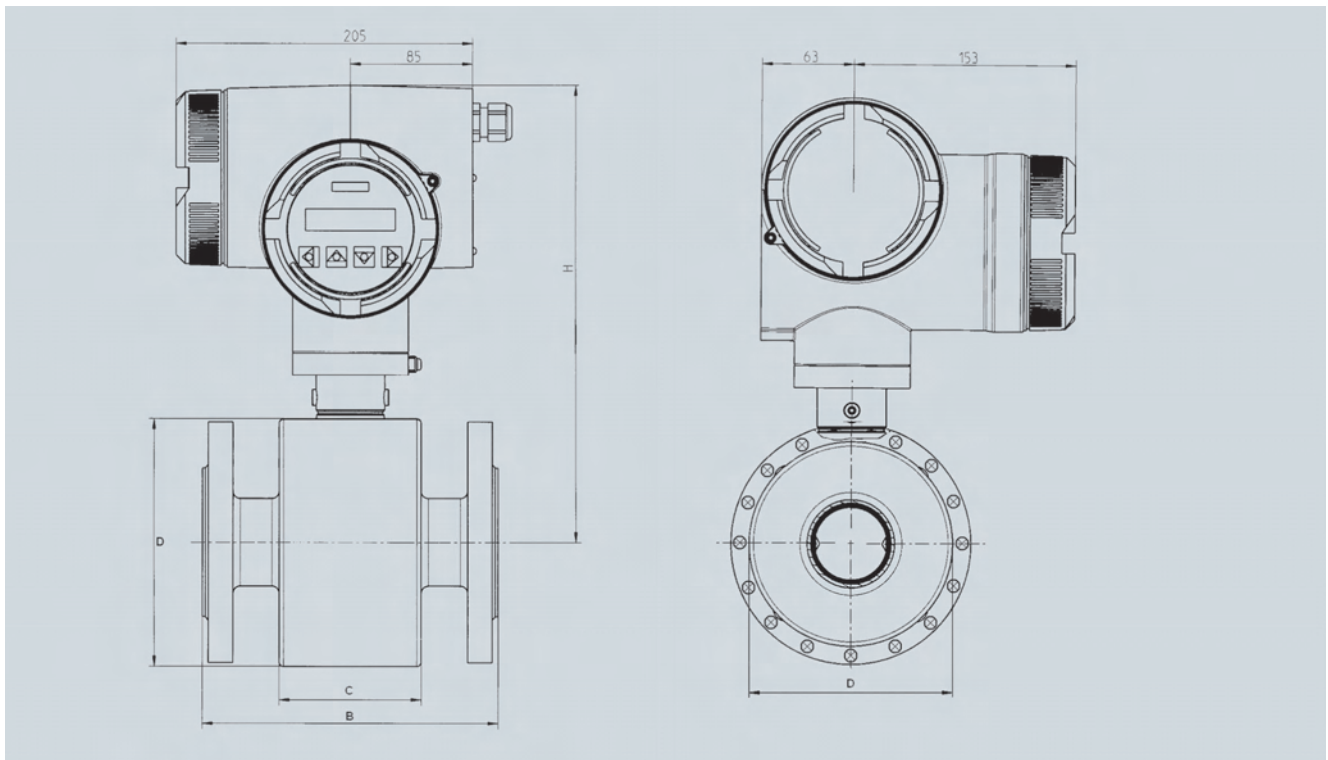


Electrode placement

SITRANS F flowmeters

SITRANS F M

Transmitter Transmag 2 with sensor 911/E



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

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

Nominal diameter	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150	DN 200	DN 250	DN 300	DN 350	DN 400	DN 500	DN 600	
	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	4"	5"	6"	8"	10"	12"	14"	16"	20"	24"	
	Build-in llength B ¹⁾																		
Hard rubber version	270 (10.63)			280 (11.02)			330 (12.99)		340 (13.39)		370 (14.57)		410 (16.14)	470 (18.50)	500 (19.68)	550 (21.65)	600 (23.62)	650 (25.59)	780 (30.71)
Soft rubber / neopren version																			
PTFE-liner without protection washers																			
PTFE-liner with protection washers	270 (10.83)			280 (11.02)			330 (12.99)		340 (13.39)		370 (14.57)		410 (16.14)	470 (18.50)	500 (19.68)	550 (21.65)	600 (23.62)	650 (25.59)	780 (30.71)
Novolak-version	-					275 (10.83)	325 (12.79)	335 (13.19)	333 (13.11)	362 (14.25)		401 (15.79)	460 (18.11)	489 (19.25)	538 (21.18)	588 (23.15)	638 (25.12)	772 (30.39)	
	Dimensions of sensor housing																		
Housing width C	170 (6.69)												240 (9.45)			306 (12.05)	360 (14.17)	412 (16.22)	552 (21.73)
Height H with compact version	281 (11.06)					285 (11.22)	291 (11.46)	298 (11.73)	314 (12.36)	326 (12.83)	345 (13.58)	371 (14.61)	408 (16.06)	441 (17.36)	553 (21.77)	578 (22.76)	633 (24.92)	688 (27.09)	
Height H2 with remote version	175 (6.89)					180 (7.08)	187.5 (7.38)	195 (7.68)	215 (8.46)	230 (9.06)	252.5 (9.94)	285 (11.22)	330 (12.99)	370 (14.57)	347 (13.66)	372 (14.65)	424 (16.69)	477 (18.78)	
Housing diameter D	135 (5.315)			169 (6.654)		184 (7.244)	249 (9.803)		274 (10.79)	298 (11.73)	324 (12.76)	394 (15.51)	442 (17.40)	492 (19.37)	469 (18.46)	536 (21.10)	631 (24.84)	746 (29.37)	
Weight of PN10 Version in kg (MWP 145 psi version in lb)	8.0 (17.6)		8.5 (18.7)	11.0 (24.3)	11.5 (25.4)	25.0 (55.1)	26 (57.3)		28 (61.7)	34 (75.0)	38 (83.8)	68 (149.9)	80 (176.4)	90 (198.4)	110 (242.5)	150 (330.7)	210 (463)	370 (860)	

¹⁾ Tolerance for build-in length: B + 0.0 mm (0.00 inches) / - 4.0 mm (-0.157 inches).

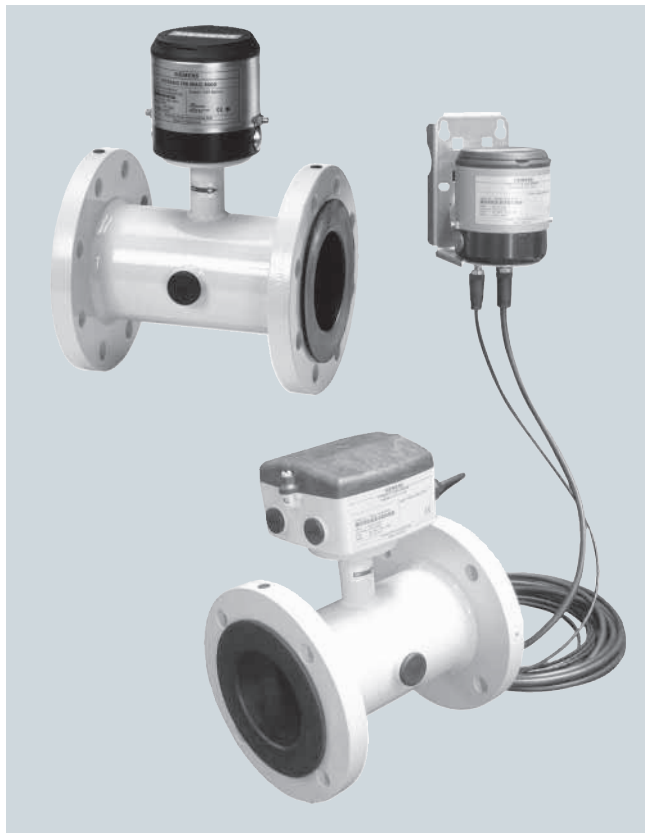
With protection rings or washers for > DN25 + 6.0 mm, > DN200 + 10.0 mm (> 1" + 0.236 inches, > 8" + 0.394 inches)

SITRANS F flowmeters

SITRANS F M

Battery operated water meter
MAG 8000/MAG 8000 CT

Overview



MAG 8000 is a battery powered electromagnetic water meter designed according to the global water meter standard OIML R 49 and the European CEN EN 14154. The meter fulfills the special customer demands to water applications within abstraction, distribution network, revenue metering as well as irrigation. All functionalities integrated in one meter to optimize water supply and use of highly scanty resources.

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.

Features like 6 years maintenance-free battery-powered operation and no moving parts provide long-term accuracy measurement.

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

Superior measurement

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

Long lasting performance/Cost of Ownership

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

Intelligent information, easy to access

- Advanced information on site
- Data logger for consumption profile
- Advanced statistics and diagnostics
- Add-on communication module

Application

MAG 8000 has been developed as a stand alone water meter for applications within:

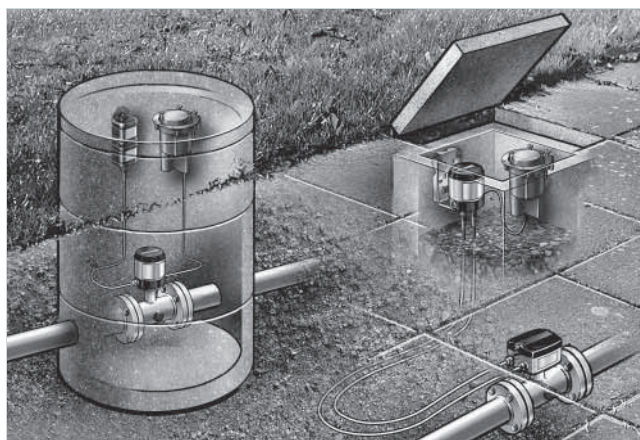
- Abstraction
- Distribution network (from treatment plant to customer)
- Revenue metering (measuring water delivered for billing purpose)
- Irrigation (measuring water delivered for billing purpose and water consumption)

Design

MAG 8000 is designed according to OIML R 49 and CEN EN 14154 water meter standards with focus on minimized power consumption.

The product program consists of

- Basic version: For general water applications
- Advanced version: With advanced information and functionality.
- A Custody Transfer version for water billing, with type approval after OIML R 49 and verified according to MI-001 for DN 50 to DN 300
- Sensor sizes from DN 25 to 1200 (1" to 48")
- Compact and remote installation in IP68/NEMA 6P enclosure and factory mounted cable
- Flexible power supply; internal or external battery pack or mains power supply with battery back-up possibilities
- Add-on communication modules
- PC configuration SIMATIC PDM and Flow Tool PC configuration software
- Customer setting from factory



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

SITRANS F flowmeters

SITRANS F M

Battery operated water meter
MAG 8000/MAG 8000 CT

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. The Basic version is selected for general water applications whereas the Advanced version is for more advanced functionality and information. Both versions are configured to achieve 6 years battery operation in typical revenue applications.

MAG 8000 CT is identical to the Basic and the Advanced versions. Only difference is that revenue parameters and data are protected against manipulation. The Custody Transfer version also includes additional labels, verification and user sealings to verify the CT meter according to MID.

Some information is accessible via the display whereas all information is accessible via the IrDA and communication interface with the PC Flow Tool or 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.

Features / Version	MAG 8000 Basic	MAG 8000 Advanced
Measuring frequency in battery power mode (Manually selected)	1/15, 1/30 or 1/60 Hz	from 6.25 to 1/60 Hz depending of sensor size
Output MAG 8000	2 FW/RV/AI/CA (max. 50 Hz pulse rate)	2 FW/RV/AI/CA (max. 100 Hz pulse rate)
Output MAG 8000 CT	2 FW/AI (max. 50 Hz pulse rate)	2 FW/AI (max. 100 Hz pulse rate)
Communication	Add-on	Add-on
Data logger	Yes	Yes
Insulation test	-	Yes
Leakage detection	-	Yes
Meter utilization	-	Yes
Statistics	-	Yes
Tariff	-	Yes
Settle date (Revenue)	-	Yes

Technical specifications

Meter

Accuracy MAG 8000

- Standard calibration $\pm 0.4\%$ of rate $\pm 2\text{ mm/s}$
 - Extended calibration $(2'' \dots 12'')$: $\pm 0.2\%$ of rate $\pm 2\text{ mm/s}$
- dimensions DN 50 ... DN 300

Accuracy MAG 8000 CT

- Custody transfer
- OIML R 49 for DN 50 ... DN 300, Class 1 and 2 with turn down up to $Q3/Q1 = 400$ at $Q2/Q1 = 1.6$
- MI-001 verification for DN 50 ... DN 300, Class 2 with turn down ratio $Q3/Q1 = 80$, $Q3/Q1 = 63$ or $Q3/Q1 = 25$ at $Q2/Q1 = 6.3$

Media conductivity

Clean water $> 20\text{ }\mu\text{S/cm}$

Temperature MAG 8000

- Ambient $-20 \dots +60\text{ }^{\circ}\text{C}$ ($-4 \dots +140\text{ }^{\circ}\text{F}$)
- Media $0 \dots 70\text{ }^{\circ}\text{C}$ ($32 \dots 158\text{ }^{\circ}\text{F}$)
- Storage $-40 \dots +70\text{ }^{\circ}\text{C}$ ($-22 \dots +158\text{ }^{\circ}\text{F}$)

Temperature MAG 8000 CT

- Ambient $-20 \dots +60\text{ }^{\circ}\text{C}$ ($-4 \dots +140\text{ }^{\circ}\text{F}$)
- Media $0.1 \dots 30\text{ }^{\circ}\text{C}$ ($32 \dots 70\text{ }^{\circ}\text{F}$)
- Storage $-40 \dots +70\text{ }^{\circ}\text{C}$ ($-22 \dots +158\text{ }^{\circ}\text{F}$)

Enclosure

- IP68/NEMA 6P rating; Cable glands mounted requires Sylgard potting kit to remain IP68/NEMA 6P, otherwise IP67/NEMA 4 rating is obtained; Factory mounted cable provides IP68/NEMA 6P rating

Approvals MAG 8000

Drinking water approval

- NSF/ANSI Standard 61 (cold water) USA,
- WRAS (BS 6920 cold water) UK,
- ACS Listed France,
- DVGW W270 Germany,
- Belaqua (B)
- OIML R 49 pattern approval

Approvals MAG 8000 CT

Drinking water approval

- NSF/ANSI Standard 61 (cold water) USA,
- WRAS (BS 6920 cold water) UK,
- ACS Listed France,
- DVGW W270 Germany,
- Belaqua (B)
- OIML R 49 pattern approval
- MI-001 approval (Number: DK-0200-MI-001-002)

Conformity

- CEN EN 14154, ISO 4064
- PED: 97/23EC
- EMC: EN 61000-6-3, EN 61000-6-2, EN 61326-1

Sensor

Size, flange and pressure range MAG 8000

- EN 1092-1 (DIN 2501)
 - DN 25 and DN 40: PN 40
 - DN 50 ... 150: PN 16
 - DN 200 ... 1200: PN 10 or PN 16
- ANSI 16.5 Class 150 lb
 - 1" ... 24": 20 bar (290 psi)
- AS 4087
 - DN 50 ... 1200: PN 16

Size, flange and pressure range MAG 8000 CT

- EN 1092-1 (DIN 2501)
 - DN 50 ... 300: PN 16
- ANSI 16.5 Class 150 lb
 - 2" ... 12": 230 psi

SITRANS F flowmeters

SITRANS F M

Battery operated water meter MAG 8000/MAG 8000 CT

Sensor (continued)

- AS 4087

Max. excitation frequency
(Transmitter decide the selected
excitation frequency)

DN 50 ... 300: PN 16

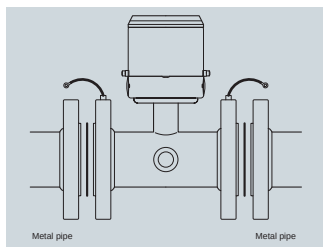
- 6.25 Hz for sensor size
DN 25 ... 150 (1" ... 6")
- 3.125 Hz for sensor size
DN 200 ... 600 (9" ... 24")
- 1.5625 Hz for sensor size
DN 700 ... DN 1200 (28" ... 48")

Liner

EPDM

Electrode and grounding electrodes

Hastelloy C276



Grounding straps are pre-mounted from the factory on each side of the sensor.

Transmitter

Installation MAG 8000

Integral (compact) or remote with factory mounted cable in 5, 10, 20 or 30 m lengths with IP68/NEMA 6P connectors. Connection is made at the transmitter bottom.

Installation MAG 8000 CT

Integral (compact) or remote with factory mounted cable in 5 or 10 m lengths with IP68/NEMA 6P connectors. Connection is made at the transmitter bottom

MI-001 verified meters only Integral (compact) mounted.

Enclosure

Stainless 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 and key

- Display with 8 digits for main information. Index, menu and status symbols for dedicated information
- Key for toggling through the information and reset customer totalizer and call-up function
- Selectable default information and accessible menus:
 - Operator
 - Meter
 - Service
 - Data Logger
 - Statistic and leakage (only Advanced version)
 - Revenue and Tariffs (only Advanced version)
- Totalized information can be displayed with 1, 2, 3 decimals or automatic adjustment for maximum resolution

Flow unit MAG 8000

- Europe std.

Volume in m³ and flow rate in m³/h

- US std.

Volume in Gallon and flow rate in GPM

- Australian std.

Volume in MI and flow rate as MI/d

Other units selectable:

- Volume: m³ x 100, l x 100, G x 100, G x 1000, MG, CF x 100, CF x 1000, AF, Al, kl
- Flow: m³/min, m³/d, l/s, l/min, GPS, GPH, GPD, MGD, CFS, CFM, CFH
- Other units are ordered from factory or manually configured on-site by sticking a label on the display and changing the scaling factors

Flow unit MAG 8000 CT

- Europe std.

Digital output MAG 8000

Volume in m³ and flow rate in m³/h

- 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 or call-up

Digital output MAG 8000 CT

- 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
- 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
- Output B function
- Alarm
- Output
Max. pulse rate of 50 Hz (only Basic version) and 100 Hz (only Advanced version), pulse width of 5, 10, 50, 100, 500 ms

Communication

IrDA: Standard integrated infrared communication interface with MODBUS RTU protocol

Add-on modules:

- RS 232 serial interface with MODBUS RTU (Rx/Tx/GND), point to point with max. 15 m cable
- RS 485 serial interface with MODBUS RTU (+/-/GND), multi-drop with up to 32 devices with max. 1000 m cable

MODBUS RTU protocol is an open protocol (further information available on request)
Serial speed 1200, 2400, 4800, 9600, 19200, 38400 Baud

SITRANS F flowmeters

SITRANS F M

Battery operated water meter MAG 8000/MAG 8000 CT

Power supply	Auto detection of power source with display symbol for operation power. Internal battery pack: 2 D-Cell 3.6 V/33 Ah External battery pack: 4 D-Cell 3.6 V/66 Ah Mains Power supply: • 12 ... 24 V AC/DC (10 ... 32 V) 2 VA • 115 ... 230 V AC (85 ... 264 V) 2 VA Both mains power supply systems are upgradable for battery backup via internal D-Cell (3.6 V 16.5 Ah) or external battery pack. The power supply has 3 m (9.8 ft) power cable for external connection to mains supply.
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Features

Application Identification

Tag number (visible on display if numbers are selected) and meter location, up to 15 characters per information.

Time and date

Real time clock and date (max. 15 min. change per year)

Totalizer MAG 8000

- 2 totalizer: Forward, Reverse, Bidirectional netflow calculation and free selectable start value.
- 1 customer totalizer, following totalizer 1 setting and resettable via display key or software with logging of date and time.

Totalizer MAG 8000 CT

- 2 totalizer: Forward
- 1 customer totalizer, following totalizer 1 setting and resettable via display key or software with logging of date and time.

Measurement MAG 8000

- Free selectable volume and flow unit, where m^3 and m^3/h is default in display. All other units are displayed with a display label.
- Excitation frequency in battery operation (manually selected):
 - Basic, max. selectable excitation frequency of 1/15 Hz
 - Advanced, max. selectable excitation frequency of 6.25 Hz and sensor related
 - Default excitation frequency is selected for typically 6 years operation in a revenue application;
 - 1/15 Hz for DN 25 ... 150 (1" ... 6")
 - 1/30 Hz for DN 200 ... 600 (8" ... 24")
 - 1/60 Hz for DN 700 ... 1200 (28" ... 48")
- Excitation frequency with mains power follow maximum sensor excitation frequency
- Filter constant is adjustable
- Low flow cut off, % of Q_n (Q3)
- Empty pipe detection (active symbol on display when active)
- Filter selection for mains power frequency (50/60 Hz)
- Correction factor for change flow direction or to adjust flow measurement

Measurement MAG 8000 CT

- Volume and flow unit, is m^3 and m^3/h as default in the display, if the meter has to obtain the MI-001 certification
- Excitation frequency in battery operation (manually selected):
 - Basic, max. selectable excitation frequency of 1/15 Hz
 - Advanced, max. selectable excitation frequency of 6.25 Hz and sensor related
 - Default excitation frequency is selected for typically 6 years operation in a revenue application;
 - 1/15 Hz for DN 25 ... 150 (1" ... 6")
 - 1/30 Hz for DN 200 ... 600 (8" ... 24")
- Low flow cut-off, % of Q_n (Q3)
- Empty pipe detection (active symbol on display when active)
- Filter selection for mains power frequency (50/60 Hz)

Data logger

- Logging of 26 records: selectable as daily, weekly or monthly logging
- Each logging includes:
 - Consumption on totalizer 1
 - Consumption on totalizer 2
 - Alarm in current period (13 alarms)
 - Meter status (8 values)
- Alarm on high or low consumption for selected logging period
- Totalizer 1 values for all 26 periods can be read on the display

Alarm

- Active alarm is indicated on the display
- Monitoring of all alarms with statistic recording on each alarm
 - Total hours an alarm has been active
 - Numbers of time the alarm has been activated
 - First time an alarm appears
 - Last time the alarm disappears
- Fatal faults is monitored before each measurement and interrupt the measurement, if active
 - Signal insulation – Flow signal immunity is influenced (only Advanced version)
 - Coil current – Fault in driving magnetic sensor field
 - Amplifier – Fault in signal circuit
 - Check sum – Fault in calculation or handling of data
- Warning faults
 - Low Power – customer selectable battery alarm level or power drop out
 - Flow overflow – Flow in sensor exceeds Q_{max} (Q_4) (125% Q_n (Q_3))
 - Pulse overflow on output A and B – Selected pulse volume is too small compared to actual flow rate and max. output pulse rate.
 - Consumption – saved data logger consumption exceeds customer selected limit on high or low consumption
 - Leakage – Leakage detected based on customer settings (only Advanced version)
 - Empty pipe – no water in the pipe / sensor
 - Low impedance - measured electrode impedance below customer low impedance level
 - Flow limit – actual flow exceeds selected high flow limited

Meter status (tamper monitoring of revenue data)

Monitoring of important revenue parameters and data

- Changing totalizers 1 and 2
- Changing Tariff totalizer
- Changing Tariff settings
- Changing date and time
- Alarm has been active (see alarm log for details)
- Fault log has been reset
- Hardware parameter protection has been broken
- Meter has been repowered

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.

SITRANS F flowmeters

SITRANS F M

Battery operated water meter MAG 8000/MAG 8000 CT

Diagnostic

- Continuous self test including
 - Coil current to drive the magnetic field
 - Signal input circuit
 - Data calculation, handling and storing
- Features
 - 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
- Advanced version includes
 - Insulation „Cross-Talk“ test
 - Meter utilization
 - Consumption profile
 - Statistic flow and consumption data

Insulation test (only Advanced version)

Test of signal immunity against disturbance and bad installation. Test interval is selectable and measurement is interrupted during the test period of 4 min.

Leakage detection (only Advanced version)

Monitoring the lowest flow or volume during selected time window within 24 hours. Leakage is detected over a selectable period where monitored value exceed the possible leakage level. Min and max values are stored with date registration. Last store value visible on the display.

Meter Utilization (only Advanced version)

6 registers for monitoring total time the meter has operated in different flow intervals. Registered intervals are free selectable as % of Q_n (Q3)

Tariff (only Advanced version)

6 tariff registers count the volume delivered within the selected tariff windows, based on time of day or flow rates or a combination.

Tariff can also be used for consumption profile where consumption is related to different time intervals or flow rates.

Tariff values visible on the display.

Settling date (only Advanced version)

On a predefined date the totalizer 1 index value is stored. Old values are stored to show the latest two totalized 1 index values.

Settling values visible on the display.

Statistic (only Advanced version)

- Min. flow rate with time and date registration
- Max. flow rate with time and date registration
- Min. daily consumption with date registration
- Max. daily consumption with date registration
- Latest 7 days total and daily consumption
- Actual month consumption
- Latest month consumption

PC Configuration Software

- Flow Tool for parameter configuration and data collection via IrDA interface (free download from internet).
 - Meter configuration – online and offline mode
 - Own parameter settings
 - Parameter documentation
 - Print and export of data and parameters
- Flow Tool meter device drivers version 1.0
 - Versions 1.0, 2.0 and 3.0
 - Latest version downloadable from the Internet
- PDM 6.0 Service Pack 2 – Basic and Online version

SITRANS F flowmeters

SITRANS F M

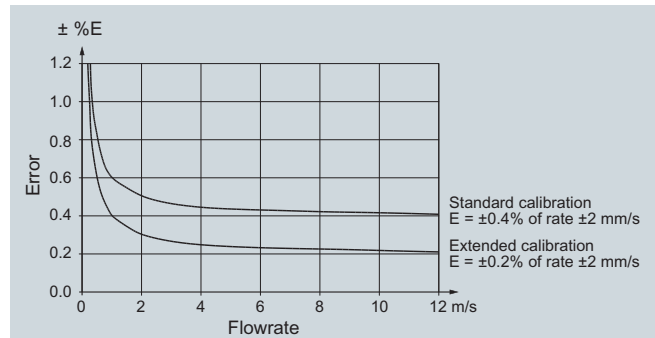
Battery operated water meter
MAG 8000/MAG 8000 CT

MAG 8000 water meter uncertainty

To ensure continuous accurate measurement, water meters must be calibrated. Calibration is conducted at SIEMENS flow facilities accredited according to ISO/IEC 17025 by DANAK and UKAS.

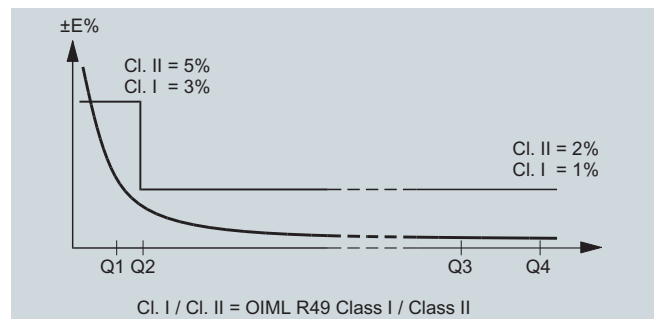
The accreditation bodies DANAK and UKAS have signed the ILAC MRA agreement (International Laboratory Accreditation Cooperation - Mutual Recognition Arrangement). Therefore the accreditation ensures international traceability and recognition of the test results in 39 countries world wide, including US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

The selected calibration determines the accuracy of the meter. A standard calibration results in max $\pm 0.4\%$ uncertainty and an extended calibration $\pm 0.2\%$. A calibration certificate follows every sensor and calibration data are stored in the meter unit.



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 standard OIML R 49 specification.



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

Size	50 (2")	65 (2½")	80 (3")	100 (4")	125 (5")	150 (6")	200 (8")	250 (10")	300 (12")
„R“ Q3/Q1	250	250	250	250	250	250	250	250	160
Q4 [m³/h]	78.75	125	200	312.5	500	787.5	1250	2000	2000
Q3 [m³/h]	63	100	160	250	400	630	1000	1600	1600
Q2 [m³/h]	0.40	0.64	1.00	1.60	2.50	4.00	6.40	10.0	16.0
Q1 [m³/h]	0.25	0.40	0.63	1.00	1.60	2.50	4.00	6.40	10.0

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

Size	50 (2")	65 (2½")	80 (3")	100 (4")	125 (5")	150 (6")	200 (8")	250 (10")	300 (12")
„R“ Q3/Q1	400	400	400	400	400	400	400	400	250
Q4 [m³/h]	78.75	125	200	312.5	500	787.5	1250	2000	2000
Q3 [m³/h]	63	100	160	250	400	630	1000	1600	1600
Q2 [m³/h]	0.25	0.40	0.63	1.00	1.60	2.50	4.00	6.40	10.0
Q1 [m³/h]	0.16	0.25	0.40	0.63	1.00	1.60	2.5	4.0	6.4

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

MAG 8000 CT (Revenue program) MI-001

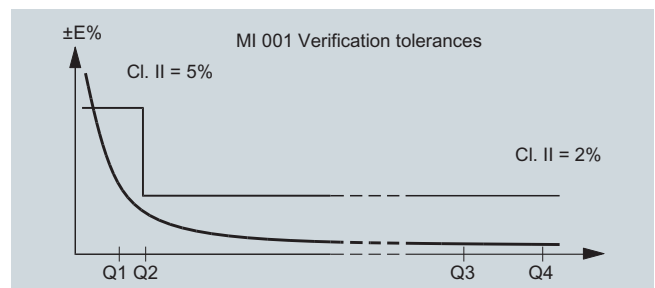
MAG 8000 CT program is type approved according to international water meter standard OIML R 49. Since the first November 2006 the MI-001 water meter directive is in force, which means that all water meters can be sold across the EU borders if the water meters contain a MI-001 label.

The MAG 8000 CT MI-001 verified and labeled products are a Class II approval according to Directive 2004/22/EC of the European Parliament and Council of March 31, 2004 on measuring instruments (MID), Annex MI-001 in the sizes from DN 50 to DN 300.

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



SITRANS F flowmeters

SITRANS F M

Battery operated water meter MAG 8000/MAG 8000 CT

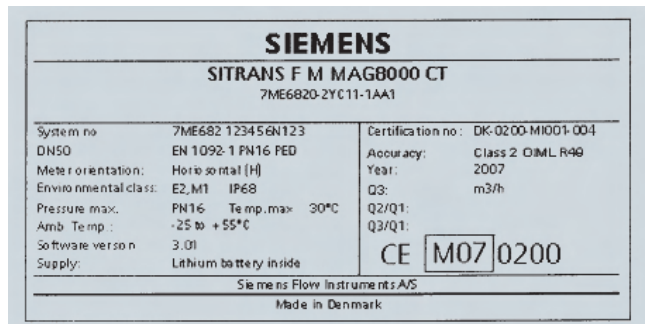
MAG 8000 CT MI-001 verified and labeled products at a given Q3 and Q3/Q4 = 1,25 and Q2/Q1 = 6,3 measuring ranges see below table:

DN	50 (2")	65 (2½")	80 (3")	100 (4")	125 (5")	150 (6")	200 (8")	250 (10")	300 (12")
„R“ Q3/Q1	25	25	25	25	25	25	25	25	25
Q4 [m³/h]	19	31	50	75	125	188	313	500	750
Q3 [m³/h]	15	25	40	60	100	150	250	400	600
Q2 [m³/h]	3.78	6.30	10.1	15.1	25.2	37.8	63.0	100.8	151.2
Q1 [m³/h]	0.60	1.00	1.60	2.40	4.0	6.0	10.0	16.0	24.0

DN	50 (2")	65 (2½")	80 (3")	100 (4")	125 (5")	150 (6")	200 (8")	250 (10")	300 (12")
„R“ Q3/Q1	63	63	63	63	63	63	63	63	63
Q4 [m³/h]	19	31	50	75	125	188	313	500	750
Q3 [m³/h]	15	25	40	60	100	150	250	400	600
Q2 [m³/h]	1.50	2.50	4.0	6.0	10.0	15.0	25.0	40.0	60.0
Q1 [m³/h]	0.24	0.40	0.63	0.95	1.59	2.38	3.97	6.35	9.52

DN	50 (2")	65 (2½")	80 (3")	100 (4")	125 (5")	150 (6")	200 (8")	250 (10")	300 (12")
„R“ Q3/Q1	80	80	80	80	80	80	80	80	80
Q4 [m³/h]	19	31	50	75	125	188	313	500	750
Q3 [m³/h]	15	25	40	60	100	150	250	400	600
Q2 [m³/h]	1.18	1.97	3.15	4.73	7.88	11.81	19.69	31.50	47.25
Q1 [m³/h]	0.19	0.31	0.50	0.75	1.25	1.88	3.13	5.00	7.50

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

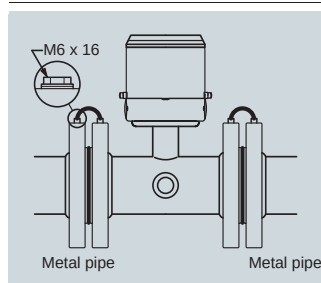


Installation conditions

Please refer to "System information SITRANS F M electromagnetic flowmeters".
MAG 8000 CT has to be mounted in Integral (compact) and horizontal position only, to obtain the MI-001 certification.
Battery packs must be installed with the top part in upwards direction to reach maximum capacity.

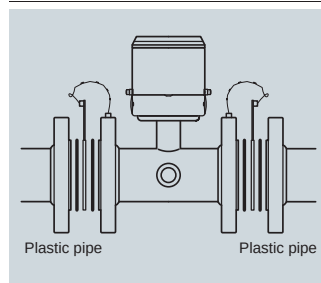
Bonding and grounding

The sensor body must be grounded using grounding/bonding straps and/or grounding rings to protect the flow signal against stray electrical noise and/or lightning. This ensures that the noise is carried through the sensor body and a noise-free measuring area within the sensor body.



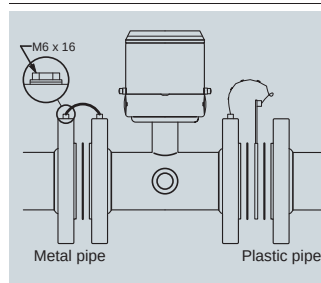
Metal pipelines

On metal pipelines, connect the straps to both flanges.



Plastic pipelines

On plastic pipelines 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 pipelines

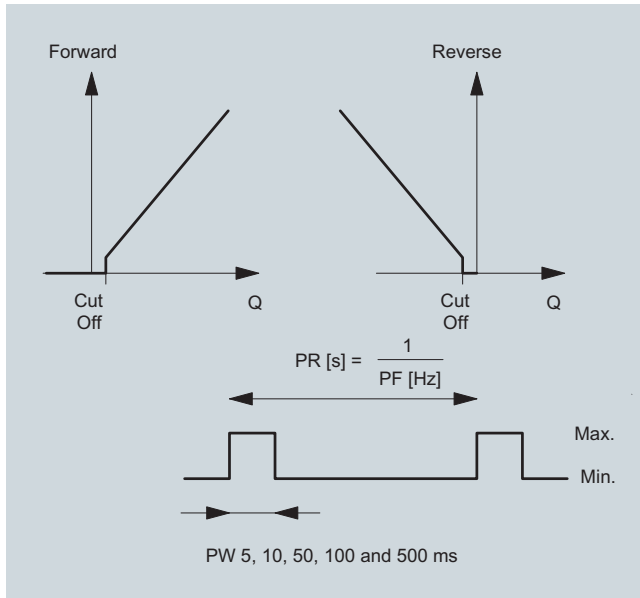
A combination of metal and plastic requires straps for metal pipeline and grounding rings for plastic pipeline.

SITRANS F flowmeters

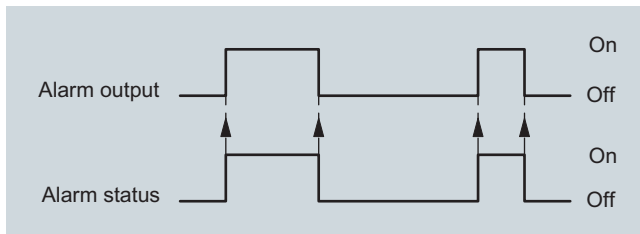
SITRANS F M

Battery operated water meter MAG 8000/MAG 8000 CT

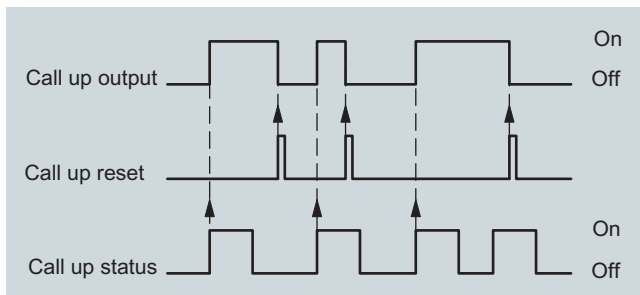
Output configuration MAG 8000



Pulse volume: Output A/B configured as volume per pulse, the output delivers a pulse when the preset volume has passed the selected direction, calculated on forward/reverse or Net forward/reverse flow. The volume per pulse is freely scalable, from 0.0001 to 10 000 meter-unit per pulse. PR = pulse rate and PF = pulse frequency.



Alarm: The alarm will follow the internal alarm status.



Call up: The "call-up" output is active until manually reset via key on display or via communication. The call-up function is activated when an alarm is activated.

MAG 8000 has a special net pulse output that includes bidirectional flow calculations. This is special for installations where the meter is connected to a system with only one input. The example shows that over time, the net pulse output indicates the bidirectional totalized meter calculations. Same principle for forward and reverse flow calculations.

Flow	Net totalizer in meter display (Bi-directional)	Pulse output forward Uni-directional mode		Pulse output net forward Bi-directional mode	
		Volume [m³]	Internal calculation	Delivered volume	Internal calculation
	0	-	0	0	0
	10	-	10	0	10
	-2	-	0	-12	0
	18	-	20	-12+20=	8
Total accounted volume [m³] Forward/reverse	18F	-	30F		18F

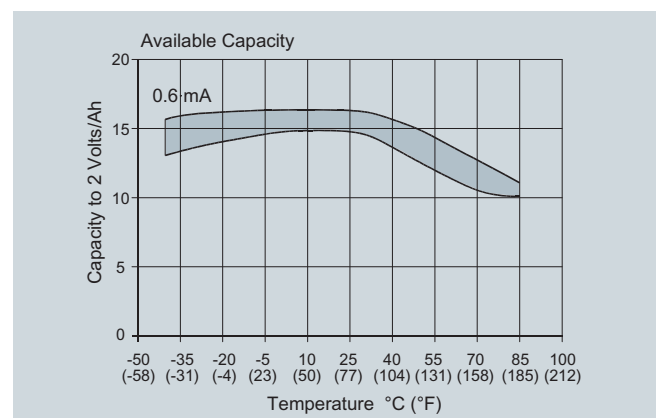
Output configuration MAG 8000 CT

MAG 8000 CT has same output functionality as MAG 8000, due to MI-001 is only forward flow (output A predefined) and output B as Alarm output available).

Battery operation time and calculation

The battery operation time depends on the connected battery pack as well as the operation condition of the meter. A program is available to calculate your expected operation time.

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



SITRANS F flowmeters

SITRANS F M

Battery operated water meter MAG 8000/MAG 8000 CT

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

At typical revenue scenario of expected battery operation time can be seen in the table. For other scenario use the battery operation calculation program (Download from the Internet).

The measurement 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 profile	• 5% at 0 °C (32 °F) • 80% at 15 °C (59 °F) • 15% at 50 °C (122 °F)

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
Two D-Cell battery 33 Ah Internal battery pack	DN 25 ... 200 (1" ... 8")	8 years	8 years	6 years	40 months	8 months	4 months	2 months
	DN 250 ... 600 (10" ... 24")	8 years	6 years	4 years	20 months	4 months	2 months	NA
	DN 700 ... 1 200 (28" ... 48")	6 years	4 years	2 years	1 year	2 months	NA	NA
Four D-Cell battery 66 Ah External battery pack	DN 25 ... 200 (1" ... 8")	N/A	10 years	10 years	80 months	16 months	8 months	4 months
	DN 250 ... 600 (10" ... 24")	N/A	10 years	10 years	40 months	8 months	4 months	NA
	DN 700 ... 1 200 (28" ... 48")	10 years	8 years	4 years	2 years	4 months	NA	NA

External battery pack can be used as battery backup for mains power supply.

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

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

SITRANS F flowmeters

SITRANS F M

Battery operated water meter
MAG 8000/MAG 8000 CT

Selection and Ordering data	Order No.
SITRANS F M	
MAG 8000 water meter	7ME6810 -
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") ⁴⁾	6 Y
DN 750 (30") ⁴⁾	7 D
DN 800 (32") ⁴⁾	7 H
DN 900 (36") ⁴⁾	7 M
DN 1000 (40") ⁴⁾	7 R
DN 1050 (42") ⁴⁾	7 T
DN 1100 (44") ⁴⁾	7 V
DN 1200 (48") ⁴⁾	8 B
Flange norm and pressure rating	
EN 1092-1	
PN 10 (DN 200 ... 1200 (8" ... 48"))	B
PN 16 (DN 50 ... 1200 (2" ... 48"))	C
PN 16 none PED (DN 700 ... DN 1200 (28" ... 48"))	D
PN 40 (DN 25 ... 40 (1" ... 1½"))	F
ANSI B16.5	
Class 150	J
AS4087	
PN 16	N
Sensor version	
EPDM liner and Hastelloy electrodes	3
Calibration	
Standard ± 0.4% of rate ± 2 mm/s	1
Extended ± 0.2% of rate ± 2 mm/s DN 50 ... 300 (2" ... 12")	2
Region version¹⁾	
Europe (m³, m³/h, 50 Hz)	1
USA (Gallon, GPM, 60 Hz)	2
Australia (ML, l/h, 50 Hz)	3
Transmitter type and installation	
Basic version integral on sensor	A
Basic version remote, 5 m (16.4 ft) mounted cable on sensor with IP68/NEMA 6P plugs	B
Do - 10 m (32.8 ft)	C
Do - 20 m (65.6 ft)	D
Do - 30 m (98.4 ft)	E
Advanced version integral on sensor	K
Advanced version remote, 5 m mounted cable on sensor with IP68/NEMA 6P plugs	L
Do - 10 m (32.8 ft)	M
Do - 20 m (65.6 ft)	N
Do - 30 m (98.4 ft)	P

Selection and Ordering data	Order No.
SITRANS F M	
MAG 8000 water meter	7ME6810 -
Communication interface	
No additional "add-on" communication module installed	A
Serial RS 485 with MODBUS RTU (Terminated as end device)	B
Serial RS 232 with MODBUS RTU	C
Power supply²⁾	
Internal battery (no battery included)	0
Internal battery pack installed ³⁾	1
External battery with 1.5 m (4.9 ft) power cable with IP68/NEMA 6P plugs, no battery included	2
12/24 V AC/DC power supply with battery backup and 3 m (9.8 ft) power cable for external connection. (Battery not included)	3
115/230 V AC power supply with battery backup and 3 m (9.8 ft) power cable for external connection. (Battery not included)	4
¹⁾ Integral (compact) transmitter is mandatory for MI-001 certified products ²⁾ MI-001 certified products only battery driven ³⁾ 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. ⁴⁾ The Diameter DN 700 (28") to DN 1200 (48") is only available as remote transmitter type installation.	

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Order No. and specify Order code(s) and plain text.	
Flow unit	
l/s	L00
MGD	L01
CFS	L02
l/min	L03
m³/min	L04
GPM	L05
CFM	L06
l/h	L07
m³/h	L08
GPH	L09
CFH	L10
GPS	L11
MI/d	L12
m³/d	L13
GPD	L14
Totalizer	
Volume calculation (default totalizer 1 = forward and totalizer 2 = reverse)	
Totalizer 1 = RV, reverse flow	L20
Totalizer 1 = NET, net flow	L22
Totalizer 2 = FW, forward flow	L30
Totalizer 2 = NET, net flow	L31

SITRANS F flowmeters

SITRANS F M

Battery operated water meter MAG 8000/MAG 8000 CT

Selection and Ordering data Order code

Additional information

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

Volume unit

m ³	L40
MI	L41
G	L42
AF	L43
l x 100	L44
m ³ x 100	L45
G x 100	L46
CF x 100	L47
MG	L48
G x 1000	L49
CF x 1000	L50
AI	L51
kl	L52

Pulse set up

(default pulse A = forward and pulse B = Alarm)

A function = RV, reverse flow	L62
A function = FWnet, forward net flow	L63
A function = RVnet, reverse net flow	L64
A function = Off	L65
Volume per pulse A = x 0.0001	L70
Volume per pulse A = x 0.001	L71
Volume per pulse A = x 0.01	L72
Volume per pulse A = x 0.1	L73
Volume per pulse A = x 1	L74
B function = FW, forward flow	L80
B function = RV, forward flow	L81
B function = FWnet, forward net flow	L82
B function = RVnet, reverse net flow	L83
B function = Alarm	L84
B function = Call up	L85
Volume per pulse B = x 0.0001	L90
Volume per pulse B = x 0.001	L91
Volume per pulse B = x 0.01	L92
Volume per pulse B = x 0.1	L93
Volume per pulse B = x 1	L94

Various

Protection of CT parameters **M02**

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
2 x 5 m (16.4 ft) pulse A+B and communication cable	M83
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
2 x 20 m (65.6 ft) pulse A+B and communication cable	M86
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

SITRANS F flowmeters

SITRANS F M

Battery operated water meter
MAG 8000/MAG 8000 CT

Selection and Ordering data	Order No.
SITRANS F M	
MAG 8000 CT water meter with EPDM liner and Hastelloy electrodes	7 ME 6 8 2 0 -
	0 -
Diameter	
DN 50 (2")/Q3 63 m ³ /h (m ³) without verification or DN 50 (2")/Q3 15 m ³ /h (m ³) with MI-001 verification	2 Y
DN 65 (2½")/Q3 100 m ³ /h (m ³) without verification or DN 65 (2½")/Q3 25 m ³ /h (m ³) with MI-001 verification	3 F
DN 80 (3")/Q3 150 m ³ /h (m ³) without verification or DN 80 (3")/Q3 40 m ³ /h (m ³) with MI-001 verification	3 M
DN 100 (4")/Q3 250 m ³ /h (m ³) without verification or DN 100 (4")/Q3 60 m ³ /h (m ³) with MI-001 verification	3 T
DN 125 (5")/Q3 400 m ³ /h (m ³) without verification or DN 125 (5")/Q3 100 m ³ /h (m ³) with MI-001 verification	4 B
DN 150 (6")/Q3 629 m ³ /h (m ³) without verification or DN 150 (6")/Q3 150 m ³ /h (m ³) with MI-001 verification	4 H
DN 200 (8")/Q3 997 m ³ /h (m ³) without verification or DN 200 (8")/Q3 250 m ³ /h (m ³) with MI-001 verification	4 P
DN 250 (10")/Q3 1600 m ³ /h (m ³) without verification or DN 250 (10")/Q3 400 m ³ /h (m ³) with MI-001 verification	4 V
DN 300 (12")/Q3 2500 m ³ /h (m ³) without verification or DN 300 (12")/Q3 600 m ³ /h (m ³) with MI-001 verification	5 D
Flange norm and pressure rating	
EN 1092-1	
PN 16	C
ANSI B16.5	
Class 150	J
AS4087	
PN 16	N
Approval/Verification	
Without verification according to OIML R 49	0
MI-001 Q3/Q1 = 25	1
MI-001 Q3/Q1 = 63	2
MI-001 Q3/Q1 = 80	3
Region version	
Europe (m ³ , m ³ /h, 50 Hz) ¹⁾	1
USA (m ³ , m ³ /h, 60 Hz)	2
Transmitter type and installation	
Basic version integral on sensor ¹⁾	A
Basic version remote, 5 m (16.4 ft) mounted cable on sensor with IP68/NEMA 6P plugs	B
Do - 10 m (32.8 ft)	C
Advanced version integral on sensor ¹⁾	K
Advanced version remote, 5 m mounted cable on sensor with IP68/NEMA 6P plugs	L
Do - 10 m (32.8 ft)	M
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

Selection and Ordering data	Order No.
SITRANS F M	
MAG 8000 CT water meter with EPDM liner and Hastelloy electrodes	7 ME 6 8 2 0 -
	0 -
Power supply³⁾	
Internal battery (no battery included)	0
Internal battery pack installed ²⁾	1
External battery with 1.5 m (4.9 ft) power cable with IP68/NEMA 6P plugs, no battery included	2
12/24 V AC/DC power supply with battery backup and 3 m (9.8 ft) power cable for external connection. (Battery not included)	3
115/230 V AC power supply with battery backup and 3 m (9.8 ft) power cable for external connection. (Battery not included)	4
¹⁾ Integral (compact) transmitter is mandatory for MI-001 certified products 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⁾ MI-001 certified products only battery driven.	

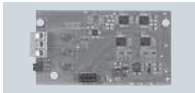
Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Order No. and specify Order code(s) and plain text.	
Pulse set up (default pulse A= forward and pulse B = Alarm)	
Volume per pulse A = x 0.001 m ³	L71
Volume per pulse A = x 0.01 m ³	L72
Volume per pulse A = x 0.1 m ³	L73
Volume per pulse A = x 1 m ³	L74
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
2 x 5 m (16.4 ft) pulse A+B and communication cable	M83
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

SITRANS F flowmeters

SITRANS F M

Battery operated water meter MAG 8000/MAG 8000 CT

Accessories

Description	Order No.	
PC Flow Tool on CD (Download for free from www.siemens.com/flow)	FDK-087L6001	
IrDA infrared interface adapter with USB for data acquisition with 1.2 m (3.9 ft) cable	FDK-087L4163	
Battery backup for mains power supply, one pc. D-cell (3.6 V, 16.5 Ah) Attention on note ¹⁾	FDK-087L4201	
Internal battery pack, one set D-cell (3.6 V 33 Ah) and accessories for replacement Attention on note ¹⁾	FDK-087L4150	
External battery pack IP68/NEMA 6P with connector, four D-cell (3.6 V 66 Ah) Attention on note ¹⁾	FDK-087L4151	
Mains power supply 12 ... 24 V AC/DC with battery backup and 3 m (9.8 ft) power cable for external connection (no battery included)	FDK-087L4210	
Mains power supply 115 ... 230 V AC with battery backup up and 3 m (9.8 ft) power cable for external connection (no battery included)	FDK-087L4211	
RS 232 add-on module, point to point communication interface with MODBUS RTU protocol	FDK-087L4212	
RS485 add-on module, multidrop communication interface with MODBUS RTU protocol	FDK-087L4213	
One cable entry 6 ... 8 mm (0.02 ... 0.026 ft) M20 brass glands package (1 pc)	FDK-087L4196	
One cable entry 3.5 ... 5 mm (0.011 ... 0.016 ft) M12 brass glands with M20 reduction. Package of 10 pcs	FDK-087L4154	

Description	Order No.	
One cable entry 6 ... 8 mm (0.02 ... 0.026 ft) M20 brass glands package (10 pcs)	FDK-087L4155	
One cable entry 8 ... 11 mm (0.026 ... 0.036 ft) M20 brass glands package (10 pcs)	FDK-087L4156	
One cable entry 11 ... 15 mm (0.036 ... 0.049 ft) M20 brass glands package (10 pcs)	FDK-087L4157	
Two cable entries 3.5 ... 5 mm (0.011 ... 0.016 ft) M20 brass glands package (10 pcs)	FDK-087L4158	
Two cable entries 5.5 ... 7.5 mm (0.018 ... 0.024 ft) M20 brass glands package (10 pcs)	FDK-087L4159	
IP68/NEMA 6P potting kit	FDK-085U0220	
MAG 8000 Hardware key to access protected parameters	FDK-087L4165	
MAG 8000 demo - training unit pack operating on Alkaline batteries. Transmitter with Flow tool CD, IrDA interface adapter and hardware key (No dangerous goods limitations)	FDK-087L4080	
Alkaline battery for MAG 8000 demo transmitter (3 V 13 Ah) (No dangerous goods limitations)	FDK-087L4142	

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.

SITRANS F flowmeters

SITRANS F M

Battery operated water meter MAG 8000/MAG 8000 CT

MAG 8000 has built in Hastelloy grounding electrodes, when installed in PVC or coated pipelines, grounding rings must be installed additionally.

Grounding rings, type C must be used for sizes > DN 300. Grounding rings DN 25 to DN 300 in stainless steel are packed in pairs and sold as a "grounding ring kit". The corresponding order number for each of the dimensions are described in the below table.

Dimension	Order 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	Order No.
MAG 8000 (Basic version) transmitter compact replacement kit. System number specified by ordering. No battery included	FDK-087L4166
MAG 8000 (Basic version) transmitter remote replacement kit. System number specified by ordering. No battery included	FDK-087L4202
MAG 8000 (Advanced version) transmitter compact replacement kit. No battery included	FDK-087L4203
MAG 8000 (Advanced version) transmitter remote replacement kit. No battery included.	FDK-087L4204
MAG 8000 (Basic version) transmitter PCB replacement kit	A5E01171569
MAG 8000 (Advanced version) transmitter PCB replacement kit	FDK-087L4168



Description	Order No.
Enclosure top including plastic lid, screws and blank product label	FDK-087L4167
Cable for external battery pack, 1.5 m (4.92 ft) with IP68/NEMA 6P connector	FDK-087L4152
Service tool kit package with various component for service and replacement.	FDK-087L4162
Remote cable set 5 m (16.4 ft) with IP68/NEMA 6P plugs - PG 13.5	FDK-087L4108
Remote cable set 5 m (16.4 ft) with IP68/NEMA 6P plugs - M20	On request
Remote cable set 10 m (32.8 ft) with IP68/NEMA 6P plugs - PG 13.5	FDK-087L4109
Remote cable set 10 m (32.8 ft) with IP68/NEMA 6P plugs - M20	On request
Remote cable set 20 m (65.6 ft) with IP68/NEMA 6P plugs - PG 13.5	FDK-087L4110
Remote cable set 20 m (65.6 ft) with IP68/NEMA 6P plugs - M20	On request
Remote cable set 30 m (98.4 ft) with IP68/NEMA 6P plugs - PG 13.5	FDK-087L4111
Remote cable set 30 m (98.4 ft) with IP68/NEMA 6P plugs - M20	On request

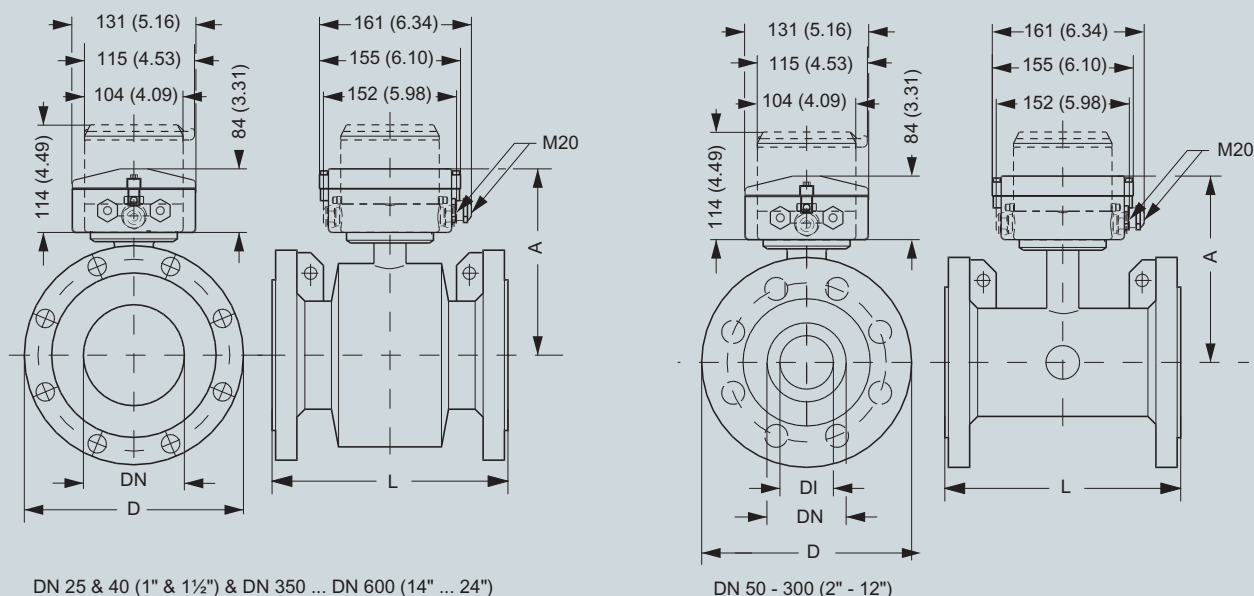


SITRANS F flowmeters

SITRANS F M

Battery operated water meter
MAG 8000/MAG 8000 CT

Dimensional drawings



Nominal DN size	A	L, lengths					D, diameter		Weight ¹⁾	
		EN 1092-1 PN 10	EN 1092-1 PN 16	EN 1092-1 PN 40	ANSI 16.5 Class 150	AS 4087 PN 16	DI	D		
mm (inch)	mm (inch)	mm	mm	mm	inch	mm	mm (inch)	mm (inch)	kg	lbs
25 (1)	194 (7.7)	-	-	200	7.9	200	25 (0.98)	See flange table	6	13
40 (1½)	204 (8.1)	-	-	200	7.9	200	40 (1.57)	See flange table	9	20
50 (2)	195 (7.7)	-	200	-	7.9	200	42 (1.65)	See flange table	11	25
65 (2½)	201 (8)	-	200	-	7.9	200	55 (2.17)	See flange table	13	29
80 (3)	207 (8.2)	-	200	-	7.9	200	67 (2.64)	See flange table	15	34
100 (4)	214 (8.5)	-	250	-	9.8	250	81 (3.19)	See flange table	17	38
125 (5)	224 (8.9)	-	250	-	9.8	250	101 (3.98)	See flange table	22	50
150 (6)	239 (9.5)	-	300	-	11.8	300	131 (5.16)	See flange table	28	63
200 (8)	264 (10.5)	350	350	-	13.8	350	169 (6.65)	See flange table	50	113
250 (10)	291 (11.5)	450	450	-	17.7	450	212 (8.35)	See flange table	71	160
300 (12)	317 (12.6)	500	500	-	19.7	500	265 (10.43)	See flange table	88	198
350 (14)	369 (14.6)	550	550	-	21.7	550	350 (13.78)	See flange table	127	279
400 (16)	394 (15.6)	600	600	-	23.6	600	400 (15.75)	See flange table	145	318
450 (18)	425 (16.8)	600	600	-	23.6	600	450 (17.72)	See flange table	175	384
500 (20)	450 (17.8)	600	600	-	26.8	600	500 (19.68)	See flange table	225	494
600 (24)	501 (19.8)	600	600	-	32.3	600	600 (23.62)	See flange table	340	747
700 (28)	544 (21.4)	700	875	-	N/A	N/A	700 (27.55)	See flange table	316	694
750 (30)	571 (22.5)	N/A	N/A	-	N/A	N/A	750 (29.52)	See flange table	N/A	N/A
800 (32)	606 (23.9)	800	1000	-	N/A	N/A	800 (31.49)	See flange table	398	1045
900 (36)	653 (25.7)	900	1125	-	N/A	N/A	900 (35.42)	See flange table	476	1045
1000 (40)	704 (27.7)	1000	1250	-	N/A	N/A	1000 (39.36)	See flange table	602	1322
1050 (42)	704 (27.7)	N/A	N/A	-	N/A	N/A	1050 (41.33)	See flange table	N/A	N/A
1100 (44)	755 (29.7)	N/A	N/A	-	N/A	N/A	1100 (43.30)	See flange table	N/A	N/A
1200 (48)	810 (31.9)	1200	1500	-	N/A	N/A	1200 (47.23)	See flange table	887	1996

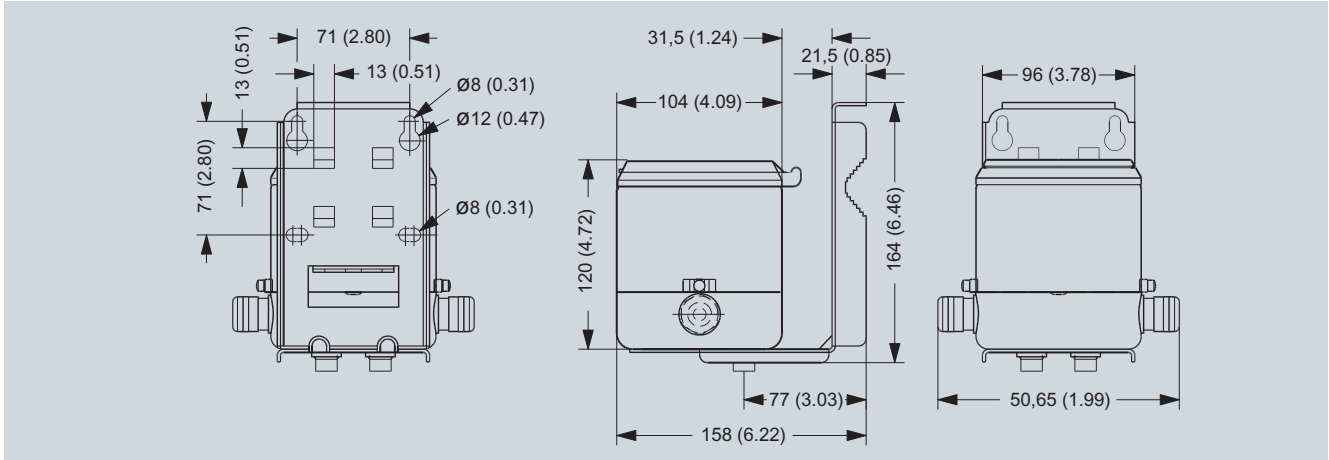
¹⁾ For remote version the sensor weight is reduced with 2 kg (4.5 lb)

SITRANS F flowmeters

SITRANS F M

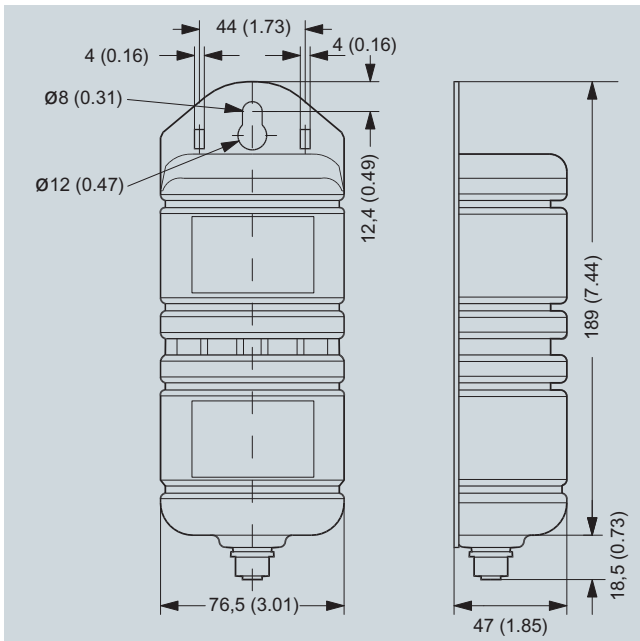
Battery operated water meter
MAG 8000/MAG 8000 CT

Remote version



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

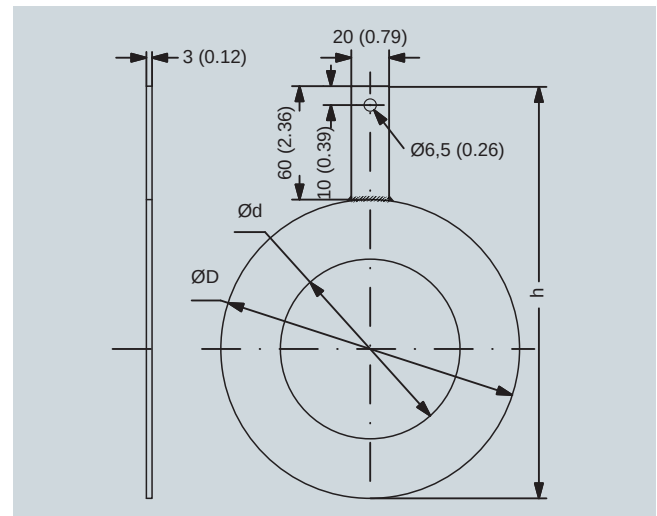
External battery pack



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

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

Grounding rings



Dimensions in mm for grounding rings MAG 8000 DN 25 to DN 300

Dimension	Internal diameter (d)	Outside diameter (D)	h
DN 25	27	68	88
DN 40	38	88	105
DN 50	52	100	113
DN 65	64	120	123
DN 80	79	133	130
DN 100	95	158	145
DN 125	115	188	155
DN 150	145	216	175
DN 200	193	268	200
DN 250	246	324	230
DN 300	295	374	253

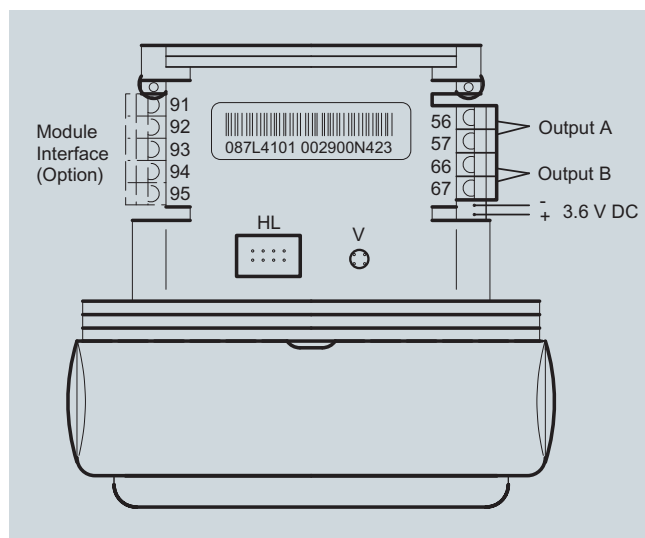
SITRANS F flowmeters

SITRANS F M

Battery operated water meter
MAG 8000/MAG 8000 CT

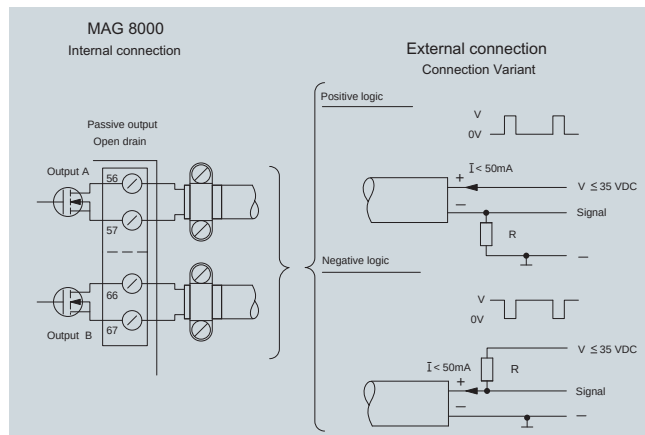
Schematics

Electrical installation and pulse output – Connection diagram



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

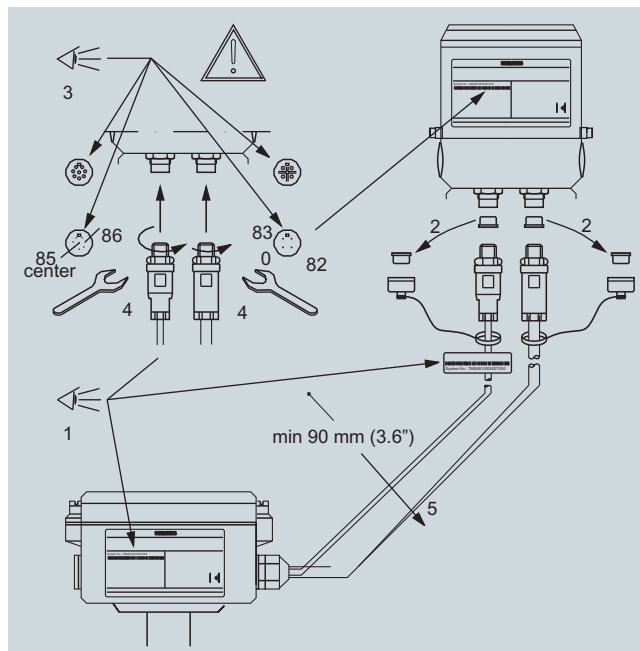
Pulse wire connection



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

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

Remote installation



Remote solutions have factory mounted sensor cable with IP68/
NEMA 6P plugs. Sensor cable has meter label (1) with system
number to ensure transmitter and sensor are correct matched.
The dust cover on the cable end and on the transmitter bottom
must be screwed together for future protection (2). The connec-
tors must be clean and duly fastened to secure a good signal
detection (3+4).

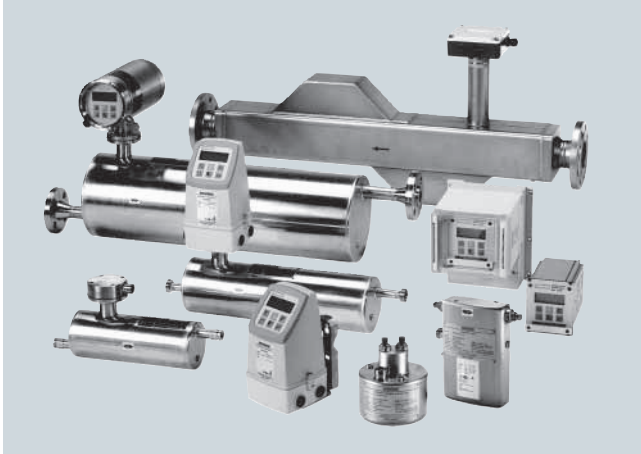
SITRANS F flowmeters

SITRANS F C

System information

Coriolis mass flowmeters

Overview



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

Transmitter	Page	Compact	Remote	Ex-Approval	Sensor	Page
MASS 6000 IP67 Polyamide enclosure	4/119	No	Yes	No	FC300 DN 4	4/142
		No	Yes	No	MASS 2100 DI 1.5	4/138
		Yes	Yes	No	MASS 2100 DI 3 ... DI 40	4/146
		No	Yes	No	MASS MC2 DN 50 ... DN 150	4/156
		No	Yes	Yes	MASS MC2-Ex DN 50 ... DN 150	4/156
		No	Yes	No	MASS MC2 Hygienic DN 20 ... DN 80	4/156
MASS 6000 19"	4/123	No	Yes	No	FC300 DN 4	4/142
		No	Yes	No	MASS 2100 DI 1.5	4/138
		No	Yes	No	MASS 2100 DI 3 ... 40	4/146
		No	Yes	No	MASS MC2 DN 50 ... DN 150	4/156
		No	Yes	Yes	MASS MC2-Ex DN 50 ... DN 150	4/156
		No	Yes	No	MASS MC2 Hygienic DN 20 ... DN 80	4/156
MASS 6000 Ex 19"	4/123	No	Yes	Yes	FC300 DN 4	4/142
		No	Yes	Yes	MASS 2100-Ex DI 1.5	4/138
		No	Yes	Yes	MASS 2100-Ex DI 3 ... DI 40	4/146
MASS 6000 Ex d Stainless steel enclosure	4/130	No	Yes	Yes	FC300 DN 4	4/142
		No	Yes	Yes	MASS 2100-Ex DI 1.5	4/138
		Yes	Yes	Yes	MASS 2100-Ex DI 3 ... DI 40	4/146
		No	Yes	No	MASS MC2 DN 50 ... DN 150	4/156
		No	Yes	No	MASS MC2 Hygienic	4/156
		No	Yes	Yes	all	4/138

Benefits

Greater flexibility

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

Easier commissioning

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

At commissioning the flowmeter commences measurement without any initial programming.

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

Easier service

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

Room for growth

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

Application

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

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

The main applications of the coriolis flowmeter can be found in all industries, such as:

Chemical & pharma	Detergents, bulk chemicals, pharmaceuticals, acids, alkalis
Food & beverage	Dairy products, beer, wine, soft-drinks, plato/brix, fruit juices and pulps, bottling, CO ₂ dosing, CIP-liquids
Automotive	Fuel injection nozzle & pump testing, filling of AC units, engine consumption, paint robots
Oil & gas	Filling of gas bottles, furnace control, CNG-dispensers, Test separators, LPG
Water & waste water	Dosing of chemicals for water treatment

SITRANS F flowmeters

SITRANS F C

System information

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



MASS 2100 DI 1.5	MASS 2100 DI 3 to DI 40	FC300 DN 4	MC2 DN 50 to DN 150	MC2 Hygienic DN 25 to DN 80	MASS 6000 IP67	MASS 6000 19"	MASS 6000 Ex d	SIFLOW FC070 Std/Ex
7ME4100	7ME4100, 7ME4200, 7ME4210	7ME4400	7ME4300	7ME4310	7ME4110	7ME4110	7ME4110	7ME4120

Design

Compact		•				•		•	
Remote	•	•	•	•		•	•	•	•

Transmitter enclosure

Polyamide, IP67/NEMA4X						•			
Noryl (SIMATIC S7-300), IP20/NEMA 2									•
Stainless steel IP67/NEMA4X								•	
19" rack IP20/NEMA2 aluminium							•		
Back of panel IP20/NEMA2 aluminium							•		
Wall mounting IP66/NEMA4 ABS plastic							•		
Front of panel IP66/NEMA4 ABS plastic							•		

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")		•							
DI 15 (1/2")		•							
DN 20 (3/4")				•	•				
DN 25 (1")		•		•	•				
DN 40 (1 1/2")		•			•				
DN 50 (2")				•	•				
DN 65 (2 1/2")				•	•				
DN 80 (3")				•	•				
DN 100 (4")				•					
DN 150 (6")				•					

Process connection norms and pressure

Pipe thread

NPT ANSI/ASME B.20.1; PN 100	•	•	•						
ISO 228/1; PN 100	•	•	•						

• = available

¹⁾ Not available for DN 100 and DN 150 sensors

SITRANS F flowmeters

SITRANS F C

System information

Coriolis mass flowmeters

Please see Product selector
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 some of the features



MASS 2100 DI 1.5	MASS 2100 DI 3 to DI 40	FC300 DN 4	MC2 DN 50 to DN 150	MC2 Hygienic DN 25 to DN 80	MASS 6000 IP67	MASS 6000 19"	MASS 6000 Ex d	SIFLOW FC070 Std/Ex
7ME4100	7ME4100, 7ME4200, 7ME4210	7ME4400	7ME4300	7ME4310	7ME4110	7ME4110	7ME4110	7ME4120

Flange								
EN 1092-1 PN 40		•		•				
EN 1092-1 PN 100		•		• ¹⁾				
ANSI B16.5 Class 150		•		•				
ANSI B16.5 Class 300				•				
ANSI B16.5 Class 600		•		• ¹⁾				
Dairy								
DIN 11851 PN 25		•		• ¹⁾	•			
DIN 11851 PN 40		•						
DIN 11864-2A					•			
Clamp ISO 2852 PN 16		•						
ISO 2853 PN 16		•						
DIN 32676 Tri-Clamp PN 10/PN 16				•	•			
Others on request	•	•	•	•	•			
Pipe material								
Stainless steel W1.4435 (316L)	•	•	•		•			
Stainless steel W1.4571 (316 Ti)				•				
Hastelloy C22	•	•	•					
Hastelloy C4				•				
With heating jacket								
Internal U - tube		•						
Pressure rating								
PN 10				•				
PN 16		•		•				
PN 25		•		•				
PN 40		•		•	•			
PN 100	•	•	•	• ²⁾				
High-pressure version ³⁾	•	•	•					
Accuracy								
Flow error ≤ 0.1% of rate	•	•	•					
Flow error ≤ 0.15% of rate				•	•			
Density error ≤ 0.001 g/cm ³	•			•	•			
Density error ≤ 0.0015 g/cm ³		• ⁴⁾	•					
Density error ≤ 0.0005 g/cm ³		•						
Cable glands								
PG 13.5						•		
1/2" NPT				•	•	•		
M20				•	•	•	•	

• = available

¹⁾ Not available for DN 150 sensor

²⁾ Not available for DN 100 and DN 150 sensors

³⁾ Please see technical specifications

⁴⁾ DI 3 and DI 6

SITRANS F flowmeters

SITRANS F C

System information

Coriolis mass flowmeters

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



MASS 2100 DI 1.5	MASS 2100 DI 3 to DI 40	FC300 DN 4	MC2 DN 50 to DN 150	MC2 Hygienic DN 25 to DN 80	MASS 6000 IP67	MASS 6000 19"	MASS 6000 Ex d	SIFLOW FC070 Std/Ex
7ME4100	7ME4100, 7ME4200, 7ME4210	7ME4400	7ME4300	7ME4310	7ME4110	7ME4110	7ME4110	7ME4120

Approvals

Harzardous areas

ATEX Zone 0	●	●	●					
ATEX Zone 1	●	●	●	●	●		●	
ATEX Zone 2	●	●	●	●		●	●	●
UL Class 1, Div. 1	● ¹⁾	● ¹⁾	● ¹⁾					
UL Class 1, Div. 2	● ¹⁾	● ¹⁾	● ¹⁾			●	● ²⁾	
CSA/FM Class 1, Div. 2	● ¹⁾	● ¹⁾	● ¹⁾			●	● ²⁾	

Type approvals

GOSS/Gost (Russia)	●	●		●		●	●	●
CRN		●	●					

● = available

¹⁾ Sensor pressure max. 100 bar (1450 psi)

²⁾ Only IP66 version approved

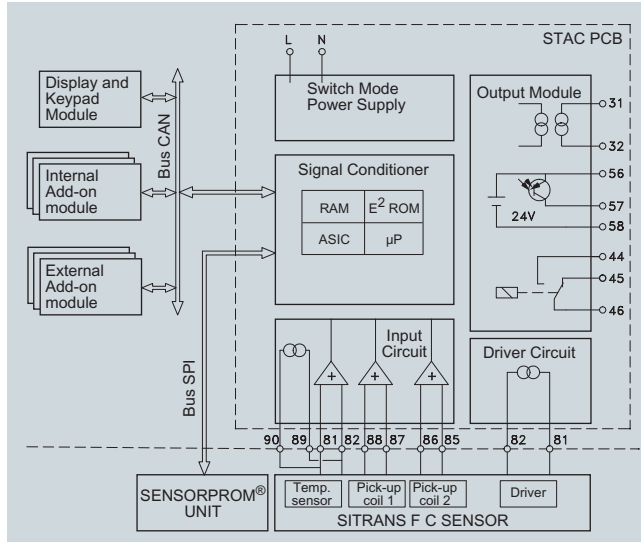
SITRANS F flowmeters

SITRANS F C

System information
Coriolis mass flowmeters

Function

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



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

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

The amplitude of the driver is automatically regulated via a „phase locked loop“, to ensure a stable output from the 2 pick-ups in the region of 80 to 110 mV.

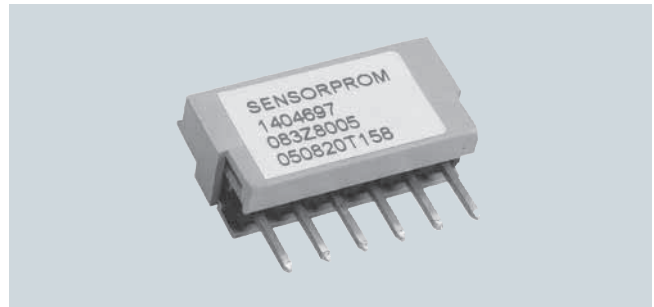
The temperature of the sensor is measured by a Pt1000, in a wheatstone configuration (4-wire).

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

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

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

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



SENSORPROM flow memory unit

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

Integration

Installation of MASS 2100/FC300 and MC2 sensors

Installation requirements/System design information

The SITRANS F C mass flowmeter is suitable for in- and outdoor installations. The standard instrument meets the requirements of Protection Class IP67/NEMA 4X and IP66/NEMA 4. The flowmeter is bidirectional and can be installed in any orientation. It is important to ensure that the meter tubes are always completely filled with homogeneous fluid. Otherwise measuring errors may occur.

The corrosion resistance of the fluid-wetted materials must be evaluated.

The pressure drop through the sensor is a function of the properties of the fluid and the flow rate. The **Sizing Program** (download from <https://pia.khe.siemens.com/index.aspx?nr=11501>) can be used to calculate the pressure drop.

The following points are to be considered during installation:

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

Installation orientation

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

Supports

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

Shut-off devices

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

SITRANS F flowmeters

SITRANS F C

System information

Coriolis mass flowmeters

Installation: straight run requirements

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

System design information

- The presence of gas bubbles in the fluid may result in erroneous measurements, particularly in the density measurement. Therefore the flowmeter should not be installed at the highest point in the system. Advantageous are installations in low pipeline sections, at the bottom of a U-section in the pipeline.
- Long drop lines downstream from the flowmeter should be avoided to prevent the meter tube from draining.
- The flowmeter should not come into contact with any other objects. Avoid attachments to the housing.
- When the cross-section of the connecting pipeline is larger than the sensor size, suitable standard reducers may be installed.
- If strong vibrations exist in the pipeline, they should be damped using elastic pipeline elements. The damping devices must be installed outside the supported flowmeter section and outside the section between the shut-off devices. The direct connection of flexible elements to the sensor should be avoided.
- Make sure that any dissolved gases, which are present in many liquids, do not outgas. The back pressure at the outlet should be at least 0.1 to 0.2 bar (0.5 to 3 psi).
- Assure that operation below the vapor pressure cannot occur when a vacuum exists in the meter tube or for fluids which boil readily.
- The sensor should not be installed in the vicinity of strong electromagnetic fields, e.g. near motors, pumps, transformers etc.
- When operating more than one meter in one or multiple interconnected pipelines, the sensors should be spaced distant from each other or the pipelines should be decoupled to prevent cross talk.

Zero adjustment

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

Technical specifications

Flowmeter uncertainty/specifications

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

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

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

MASS 2100 sensors and MASS 6000 transmitters

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

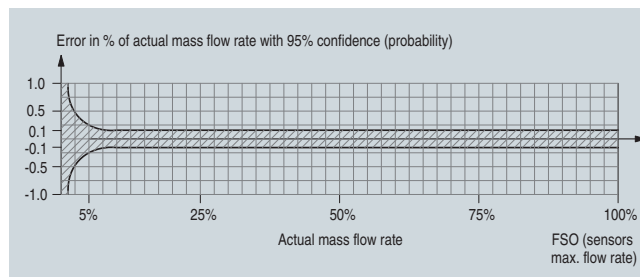
- $Q_{\max}$ is found at a pressure drop of 1 bar (29 psi). With increased counterpressure $Q_{\max}$ will increase.
- For flow > 5% of the sensors max. flow rate, the error can be read directly from the curve.
- For flow < 5% of the sensors max. flow rate, use the formula to calculate the error.
- The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

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

E = Error [%]

Z = Zero point error [kg/h]

qm = Mass flow [kg/h]



Reference conditions for MASS 2100 (ISO 9104 and DIN/EN 29104)

Flow conditions	Fully developed flow profile
Temperature, medium	20 °C ± 2 K (68 °F ± 3.6 °F)
Temperature, ambient	20 °C ± 2 K (68 °F ± 3.6 °F)
Liquid pressure	2 ± 1 bar
Density	0.997 g/cm ³
Brix	40 °Brix
Supply voltage	U _n ± 1%
Warming-up time	30 min.
Cable length	5 m between transmitter and sensor

Additions in the event of deviations from reference conditions

Current output	As pulse output ± (0.1% of actual flow + 0.05% FSO)
Effect of ambient temperature	- Display/frequency/pulse output: < ± 0.003% / K act. - Current output: < ± 0.005% / K act.
Effect of supply voltage	< 0.005% of measuring value on 1% alteration

SITRANS F flowmeters

SITRANS F C

System information
Coriolis mass flowmeters

4

Sensor type		FC300	MASS 2100					
Sensor size		DN 4 (1/6")	DI 1.5 (1/16")	DI 3 (1/8")	DI 6 (1/4")	DI 15 (1/2")	DI 25 (1")	DI 40 (1 1/2")
Number of measuring pipes		1	1	1	1	1	1	1
Mass flow								
Linearity error	% of rate	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Repeatability error	% of rate	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Max. zero point error	[kg/h]	0.010	0.001	0.010	0.050	0.200	1.500	6.000
Density								
Density error	[g/cm ³]	0.0015	0.001	0.0015	0.0015	0.0005	0.0005	0.0005
Repeatability error	[g/cm ³]	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001
Range	[g/cm ³]	0 ... 2.9	0 ... 2.9	0 ... 2.9	0 ... 2.9	0 ... 2.9	0 ... 2.9	0 ... 2.9
Temperature								
Error	[°C (°F)]	0.5 (1)	0.5 (1)	0.5 (1)	0.5 (1)	0.5 (1)	0.5 (1)	0.5 (1)
Brix								
Error	[°Brix]	0.3	0.2	0.3	0.3	0.1	0.1	0.1

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

¹⁾ Flow and density calibration (1 kg/m³) required.

Flowmeter uncertainty/specifications

MC2 sensors and MASS 6000 transmitters

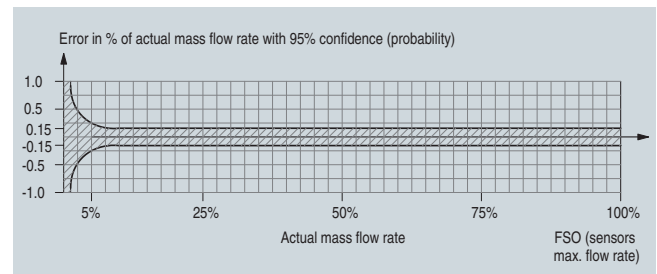
	5%		50%		100%	
	kg/h	(lb/h)	kg/h	(lb/h)	kg/h	(lb/h)
DN 20 (3/4")	150	(330)	3 000	(6 614)	6 000	(13 228)
DN 25 (1")	240	(529)	4 800	(10 582)	9 600	(21 164)
DN 40 (1 1/2")	712	(1 570)	14 250	(31 416)	28 500	(62 832)
DN 50 (2")	2 130	(4 695)	21 300	(46 958)	42 600	(93 900)
DN 65 (2 1/2")	4 350	(9 590)	43 500	(95 900)	87 000	(191 800)
DN 80 (3")	5 670	(12 500)	56 700	(125 002)	113 400	(250 000)
DN 100 (4")	9 600	(21 164)	96 000	(211 643)	192 000	(423 300)
DN 150 (6")	25 500	(56 217)	255 000	(562 178)	510 000	(1 124 356)

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

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

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

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



SITRANS F flowmeters

SITRANS F C

System information

Coriolis mass flowmeters

Technical specifications PROFIBUS PA/DP

General specifications

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

Electrical specification DP

Physical layer specifications

Applicable standard	EN 50170 vol. 2
Physical Layer (Transmission technology)	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	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 $\Omega \pm 20\%$
Wave attenuation at 39 kHz	3 dB/km
Capacitive asymmetry	2 nF/km
Bus termination	Passive line termination at both
Max. bus length	Up to 1.9 km. Extendable by repeaters

IS (Intrinsic Safety) data

Required sensor electronics	Compact mounted SITRANS F C MASS 6000 Ex d
FISCO	Yes
Max. U_I	17.5 V
Max. I_I	380 mA
Max. P_I	5.32 V
Max. L_I	10 μ H
Max. C_I	5 nF
Max. U_O	1.3 V
Max. I_O	50 μ A

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.

MASS 6000 IP67 compact/remote

Overview



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

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

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

Benefits

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

- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Fraction flow computation based on a 5th-order algorithm matching all applications
- USM II platform enables fitting of add-on bus modules without loss of functionality.
 - All modules can be fitted as true "plug & play"
 - Module and transmitter are automatically configured through the SENSORPROM
- Installation of the transmitter to the sensor is simple "plug & play" via the sensor pedestal

Application

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

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

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

Design

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

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

Function

The following functions are available:

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

SITRANS F flowmeters

SITRANS F C

MASS 6000 IP67 compact/remote

Technical specifications

Measurement of	Mass flow [kg/s (lbs/min)], volume flow [l/s (gpm)], fraction [%], °Brix, density [kg/m ³ , (lbs/ft ³)], temperature [°C (°F)]
Current output	
Current	0 ... 20 mA or 4 ... 20 mA
Load	< 800 Ω
Time constant	0 ... 99.9 s adjustable
Digital output	
Frequency	0 ... 10 kHz, 50% duty cycle
Time constant	0 ... 99.9 s adjustable
Active	24 V DC, 30 mA, 1 KΩ ≤ R _{load} ≤ 10 KΩ, short-circuit-protected
Passive	3 ... 30 V DC, max. 110 mA, 1 KΩ ≤ R _{load} ≤ 10 KΩ
Relay	
Type	Change-over relay
Load	42 V/2 A peak
Functions	Error level, error number, limit, flow direction
Digital input	11 ... 30 V DC (R _i = 13.6 KΩ)
Functionality	Start/hold/continue batch, zero point adjust, reset totalizer 1/2, force output, freeze output
Galvanic isolation	All inputs and outputs are galvanically isolated, isolation voltage 500 V
Cut-off	
Low-flow	0 ... 9.9% of maximum flow
Limit function	Mass flow, volume flow, fraction, density, sensor temperature
Totalizer	Two eight-digit counters for forward, net or reverse flow
Display	- Background illumination with alphanumeric 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	Manual via keypad or remote via digital input
Ambient temperature	
Operation	-20 ... +50 °C (-4 ... +122 °F), max. rel. humidity 80% at 31 °C (87.8 °F) decreasing to 50% at 40 °C (104 °F) according to IEC/EN/UL 61010-1
Storage	-40 ... +70 °C (-40 ... +158 °F) (Humidity max. 95%)
Communication	Add-on modules: HART, PROFIBUS PA & DP, MODBUS RTU RS 485, DeviceNet, FOUNDATION Fieldbus H1
Enclosure	
Material	Fibre glass reinforced polyamide
Rating	IP67/NEMA 4X to IEC 529 and DIN 40050 (1 m w.g. for 30 min.)
Mechanical load	18 ... 1000 Hz random, 3.17G rms, in all directions, to IEC 68-2-36

Supply voltage

24 V version	
• Supply	24 V DC/AC, 50 ... 60 Hz
• Fluctuation	18 ... 30 V DC 20 ... 30 V AC
• Power consumption	10 W
230 V version	
• Supply	87 ... 253 V AC, 50 ... 60 Hz
• Power consumption	26 VA
Fuse	
• 230 V version	T400 mA, T 250 V (IEC 127) - not replaceable by operator
• 24 V version	T1 A, T 250 V (IEC 127) - not replaceable by operator

EMC performance

Emission	EN/IEC 61000-6-4 (Industry)
Immunity	EN/IEC 61000-6-2 (Industry)

NAMUR

Within the value limits according to "Allgemeine Anforderung" with error criteria A in accordance with NE 21

Environment

Environmental conditions acc. to IEC/EN/UL 61010-1:	- Altitude up to 2000 m - POLLUTION DEGREE 2
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Maintenance

The flowmeter has a built-in error log/pending menu which should be inspected on a regular basis

Cable glands

Two types of cable gland are available in polyamide in the following dimensions: M20 or ½" NPT

SITRANS F flowmeters

SITRANS F C

MASS 6000 IP67 compact/remote

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)

Version

Remote IP67/NEMA 4X 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

Order No.

7ME4110-

AA0-AA

2

1

2

1

A

B

F

G

E

H

J

1

2

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

Accessories

Cable glands

Description

Order No.

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

• M20

• ½" NPT

A5E00822490

A5E01163775



Spare parts for compact or remote IP67 version

Description

Order No.

MASS 6000 transmitter IP67/NEMA 4X

Fibre glass reinforced polyamide and connection board
1 current output
1 frq./pulse output
1 relay output

• 115/230 V AC, 50/60 Hz

• 24 V AC/DC

7ME4110-1AA10-1AA0

7ME4110-1AA20-1AA0



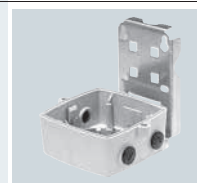
Wall mounting unit for IP67/NEMA 4X version with wall bracket, without connection board but with

• 4 x M20 cable glands

• 4 x ½" NPT cable glands

FDK-085U1018

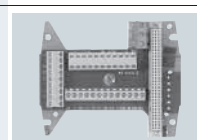
A5E01164211



Connection board/PCB

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

FDK-083H4260



Terminal box kit with

• M20 cable glands

• ½" NPT cable glands

A5E00832338^{F)}

A5E00832342^{F)}

Change from remote to compact mounting of MASS 6000 IP67/NEMA 4X with MASS 2100.

The kit consists of a terminal box in polyamide, cable and connector between PCB and sensor pedestal, PCB, seal and screws (4 pcs.) for mounting on sensor

Terminal box with

• M20 cable glands

• ½" NPT cable glands

FDK-085U1050

A5E01164206



Terminal box – in polyamide exclusive of lid

FDK-085U1002

Terminal box – lid in polyamide

FDK-085U1003



Add-on module

Description

Order No.

HART

PROFIBUS PA Profile 3

PROFIBUS DP Profile 3

MODBUS RTU RS 485

FOUNDATION Fieldbus H1

DeviceNet

FDK-085U0226

FDK-085U0236

FDK-085U0237

FDK-085U0234

A5E02054250

FDK-085U0229



F) Subject to export regulations AL: 91999, ECCN: N.

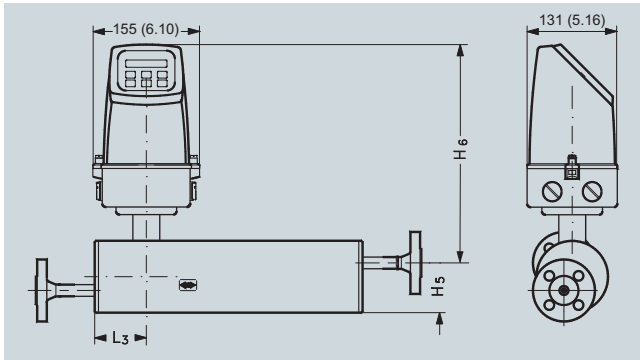
SITRANS F flowmeters

SITRANS F C

MASS 6000 IP67 compact/remote

Dimensional drawings

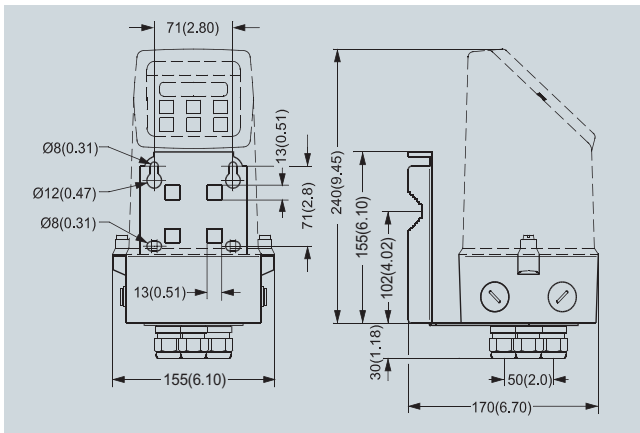
Compact



MASS 2100

Sensor size [Di (inch)]	L ₃ [mm (inch)]	H ₅ [mm (inch)]	H ₆ [mm (inch)]	H ₅ + H ₆ [mm (inch)]
3 (1/8)	75 (2.95)	82 (3.23)	306 (12.04)	388 (15.28)
6 (1/4)	62 (2.44)	72 (2.83)	316 (12.44)	388 (15.28)
15 (1/2)	75 (2.95)	87 (3.43)	326 (12.83)	413 (16.26)
25 (1)	75 (2.95)	173 (6.81)	330 (13.00)	503 (19.80)
40 (1 1/2)	75 (2.95)	227 (8.94)	330 (13.00)	557 (21.93)

Transmitter wall mounted



Schematics

Electrical connection

Grounding

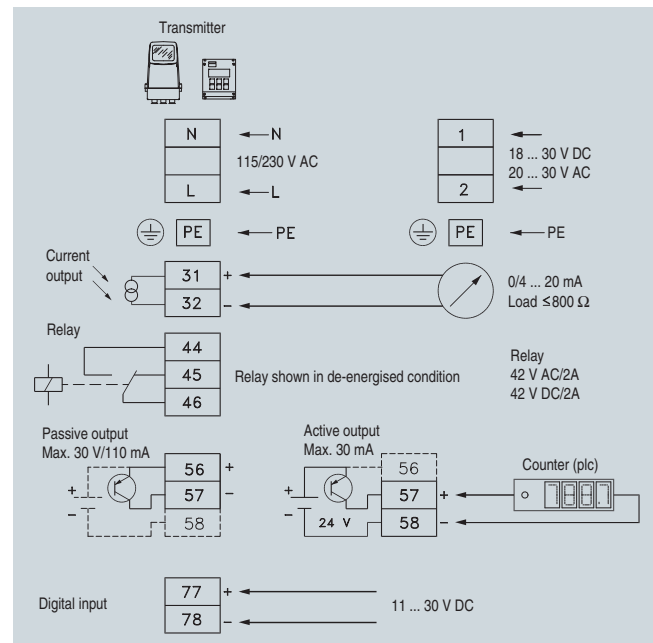
PE must be connected due to safety class 1 power supply.

Mechanical counters

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

Output cables

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



MASS 6000 for 19" insert/19" wall mounting

Overview



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

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

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

Benefits

- Dedicated mass flow chip with the latest ASIC technology
- Fast batching and flow step response with an update rate of true 30 Hz
- Superior noise immunity due to a patented DFT (Discrete Fourier Transformation) algorithm
- Front end resolution better than 0.35 ns improves zero point stability and enhances dynamic turn-down ratio on flow and density accuracy
- Advanced diagnosis and service menu enhances trouble-shooting and meter verification
- Built-in batch controller with compensation and monitoring comprising 2 built-in totalizers
- Multi-parameter outputs, individual configurable for mass flow, volume flow, density, temperature or fraction flow such as °BRIX or °PLATO
- Many output capacities, up to 3 current, 2 frequency/pulse and 2 relay outputs (excludes the possibility of an add-on module)
- Digital input for batch-control, remote zero adjust or forced output mode
- All outputs can be forced to preset value for simulation, verification or calibration purposes
- User-configurable operation menu with password protection
 - 3 lines, 20 characters display in 11 languages
 - Self-explaining error handling/log in text format
 - Keypad can be used for controlling batch as start/stop/hold/reset

- SENSORPROM technology automatically configures transmitter at start-up providing:
 - Factory pre-programming with calibration data, pipe size, sensor type, output settings
 - Any values or settings changed by users are stored automatically
 - Automatically re-programming any new transmitter without loss of accuracy
 - Transmitter replacement in less than 5 minutes. True "plug & play"
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Fraction flow computation based on a 5th-order algorithm matching all applications
- USM II platform enables fitting of add-on bus modules without loss of functionality.
 - All modules can be fitted as true "plug & play"
 - Module and transmitter automatically configured through the SENSORPROM
- Transmitter available with ATEX and UL approval
- All electrical connections are easily accessible on the large back plane PCB

Application

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

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

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

Design

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

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

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

SITRANS F flowmeters

SITRANS F C

MASS 6000 for 19" insert/19" wall mounting

Function

The following functions are available:

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

Technical specifications

Measurement of	Mass flow [kg/s (lbs/min)], volume flow [l/s (gpm)], fraction [%], °Brix, density [kg/m ³ (lbs/ft ³)], temperature [°C (°F)]
Current output	
Current	0 ... 20 mA or 4 ... 20 mA
Load	< 800 Ω
Time constant	0 ... 99.9 s adjustable
Digital output	
Frequency	0 ... 10 kHz, 50% duty cycle
Time constant	0 ... 30 s adjustable
Active	24 V DC, 30 mA, 1 KΩ ≤ R _{load} ≤ 10 KΩ, short-circuit-protected
Passive	3 ... 30 V DC, max. 110 mA, 1 KΩ ≤ R _{load} ≤ 10 KΩ
Relay	
Type	Change-over relay
Load	42 V/2 A peak
Functions	Error level, error number, limit, direction
Digital input	11 ... 30 V DC
Functionality	Start/hold/continue batch, zero point adjust, reset totalizer 1/2, force output, freeze output
Galvanic isolation	All inputs and outputs are galvanically isolated, isolation voltage 500 V
Cut-off	
Low-flow	0 ... 9.9% of maximum flow

Limit function	Mass flow, volume flow, fraction, density, sensor temperature
Totalizer	Two eight-digit counters for forward, net or reverse flow
Display	• Background illumination with alphanumeric text, 3 × 20 characters to indicate flow rate, totalized values, settings and faults • Reverse flow indicated by negative sign
Zero point adjustment	Manual 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 & DP, MODBUS RTU RS 485, DeviceNet, FOUNDATION Fieldbus H1
Enclosure 19"	
Material	Aluminium/steel (DIN 41494)
Rating	IP20/NEMA 1 to IEC 529 and DIN 40050 (1 m w.g. for 30 min.)
Mechanical load	18 ... 1000 Hz random, 3.17G rms, in all directions, to IEC 68-2-36
Supply voltage	• 87 ... 253 V AC +10% ... -10%, 50 ... 60 Hz • 18 ... 30 V DC or 20 ... 30 V AC
Power consumption	
230 V AC	9 VA max.
24 V DC	6 W I _N = 250 mA, I _{ST} = 2 A (30 ms)
EMC performance	
Emission	EN/IEC 61000-6-4 (Industry)
Immunity	EN/IEC 61000-6-2 (Industry)
Ex approval	[EEx ia] IIC, DEMKO 03 ATEX 135251X
Maintenance	The flowmeter has a built-in error log/pending menu which should be inspected on a regular basis
Fuse	T 400 mA, T 250 V (IEC 127), not replaceable by operator
Cable	• Max. 300 m • C: max. 300 [pF/m]; L_C/R_C: max. 100 [μH/Ω] • The total cable capacity must be max. 200 nF
Cable glands	The cable gland is available in polyamide, in dimension: PG 13.5

SITRANS F flowmeters

SITRANS F C

MASS 6000 for 19" insert/19" wall mounting

Selection and Ordering data	Order No.
SITRANS F C MASS 6000 transmitter Transmitter for rack and wall mounting	7 ME 4 1 1 0 - 2 ■ ■ ■ ■ - ■ A 0
Enclosure 19 inch insert IP20/NEMA 1 (rack) 19 inch insert in IP66/NEMA 4 (wall mounting)	C E
Output configuration 1 current, 1 frequency, 1 relay 3 current, 2 frequency, 2 relay	A C
Supply voltage 115/230 V AC, 50/60 Hz 24 V AC/DC	1 2
Ex Approvals Standard (No Ex-approval) ATEX UL Class 1, Div. 2 (only IP66/NEMA 4 version)	0 1 5
Display/Keypad With display	1
Serial communication (Only possible to connect to MASS 6000 version with 1 current output) No communication HART PROFIBUS PA Profile 3 PROFIBUS DP Profile 3 MODBUS RTU RS 485 DeviceNet FOUNDATION Fieldbus H1	A B F G E H J

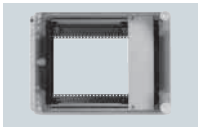
Attention (Ex applications)!

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

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

Accessories

Enclosure

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

Cable glands

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

Spare parts 19" versions

Enclosure (without PCB, connection board)

Description	Order No.
Enclosure in ABS plastic for wall mounting IP66/NEMA 4, for one 19" transmitter insert (21 TE)	FDK-083F5037 
Enclosure in ABS plastic for wall mounting IP66/NEMA 4, for two 19" transmitter inserts (42 TE)	FDK-083F5038 

Add-on module

Note:

Only possible to connect to MASS 6000 versions with 1 current output

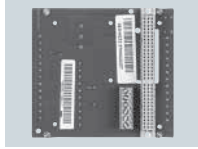
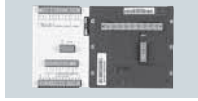
Description	Order No.
HART	FDK-085U0226
PROFIBUS PA Profile 3	FDK-085U0236
PROFIBUS DP Profile 3	FDK-085U0237
MODBUS RTU RS 485	FDK-085U0234
FOUNDATION Fieldbus H1	A5E02054250
DeviceNet	FDK-085U0229 

SITRANS F flowmeters

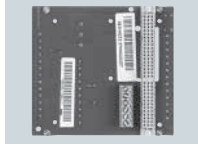
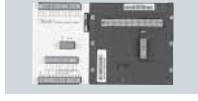
SITRANS F C

MASS 6000 for 19" insert/19" wall mounting

Connection boards/PCB for MASS 6000 and MASS 2100 sensors

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

Connection boards/PCB for MASS 6000 and MC2 sensors

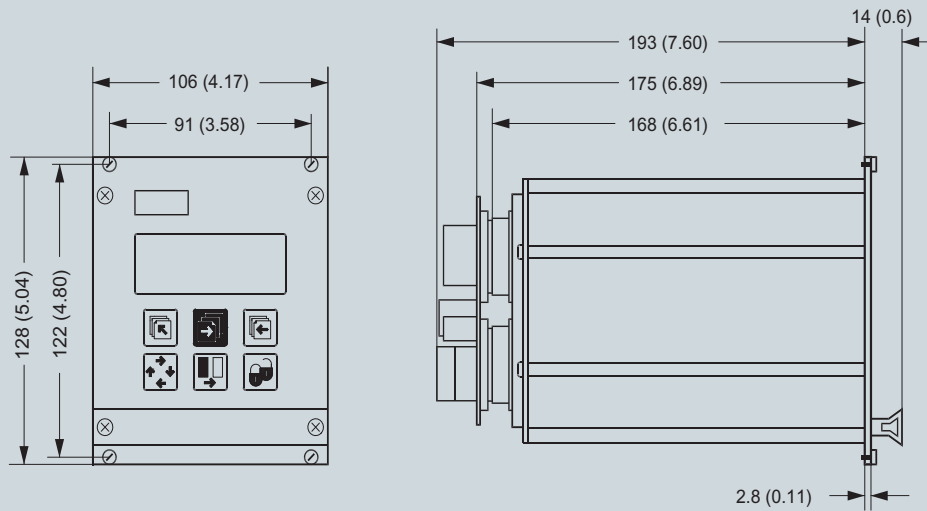
Description	Version	Order No.	
Connection board MASS 6000 for 19" rack mounting version	24 V 115/230 V	FDK-083H4272	
Connection board MASS 6000 for Ex application ¹⁾ and 19" rack mounting version (connection board MASS 6000 to MC2 sensors Ex-approved)	24 V 115/230 V	FDK-083H4294	
Connection board MASS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

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

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

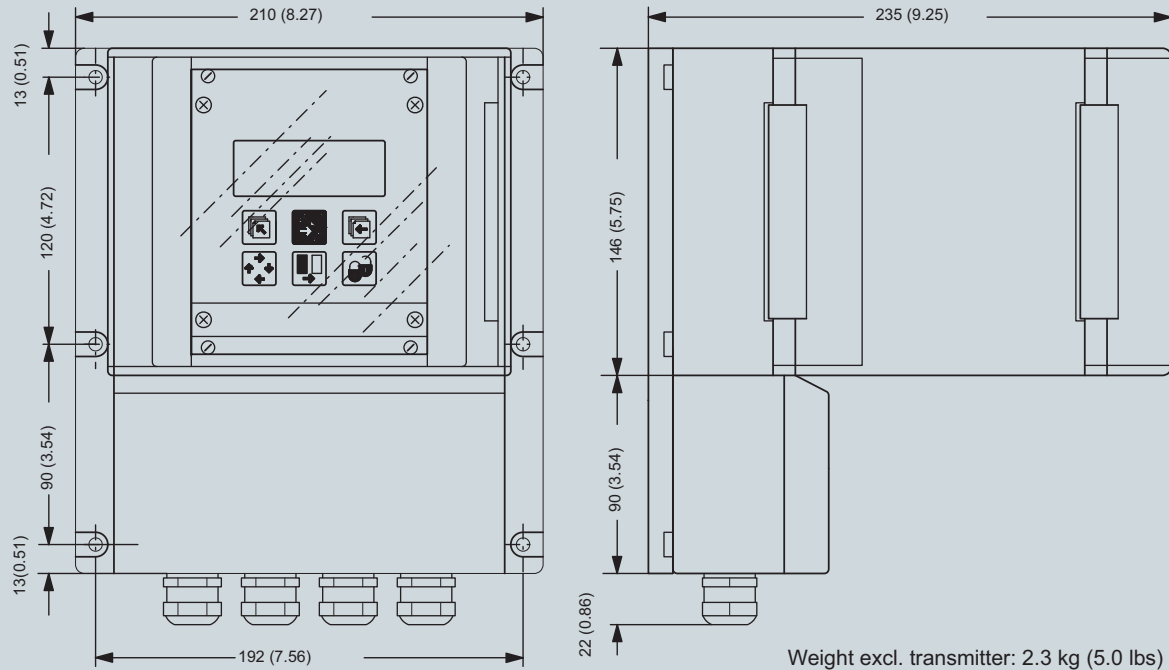
Dimensional drawings

Transmitter 19" insert



Weight incl. back print 0.8 kg /1.8 lbs

Transmitter 19" wall mounting



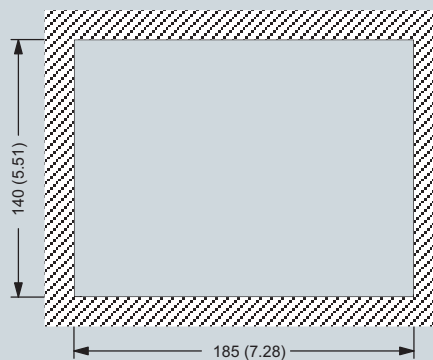
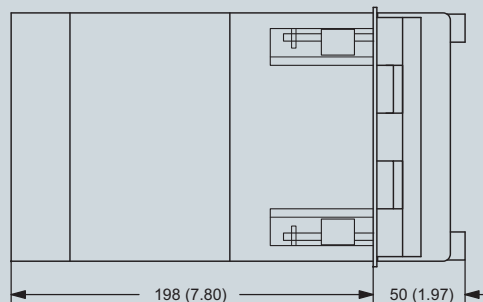
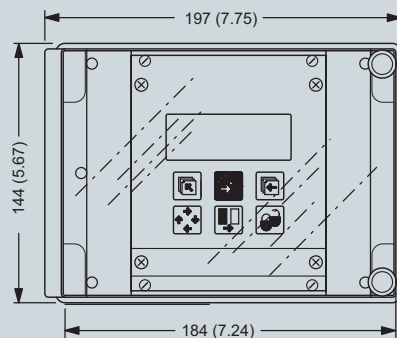
Weight excl. transmitter: 2.3 kg (5.0 lbs)

SITRANS F flowmeters

SITRANS F C

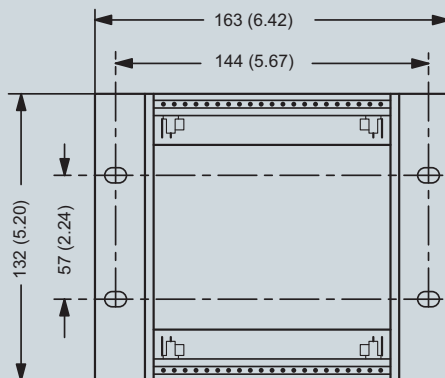
MASS 6000 for 19" insert/19" wall mounting

Transmitter 19" front of panel

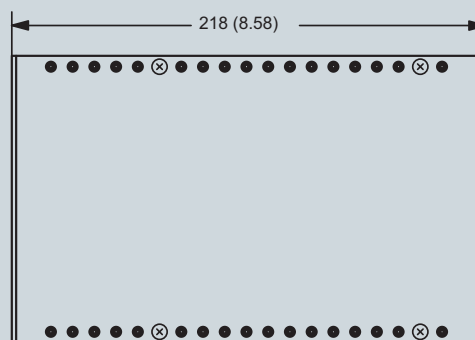


Weight excl. transmitter: 1.2 kg (2.7 lbs)

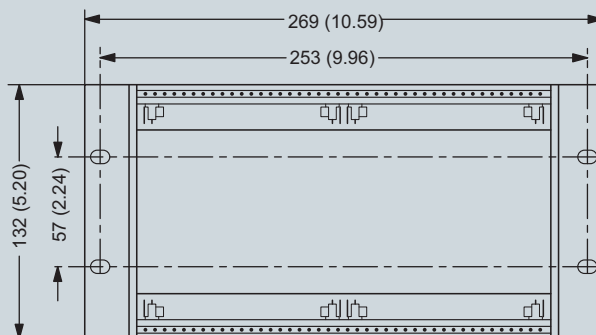
Transmitter back of panel



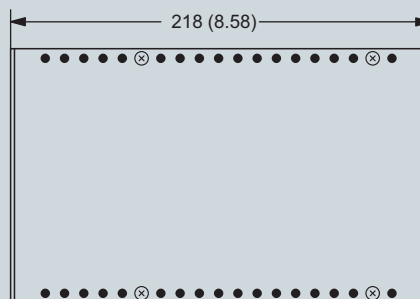
Weight: 0.7 kg (1.6 lbs)



Transmitter back of panel, 42 TE



Weight: 0.9 kg (2.0 lbs)



Schematics

Electrical connection

Grounding

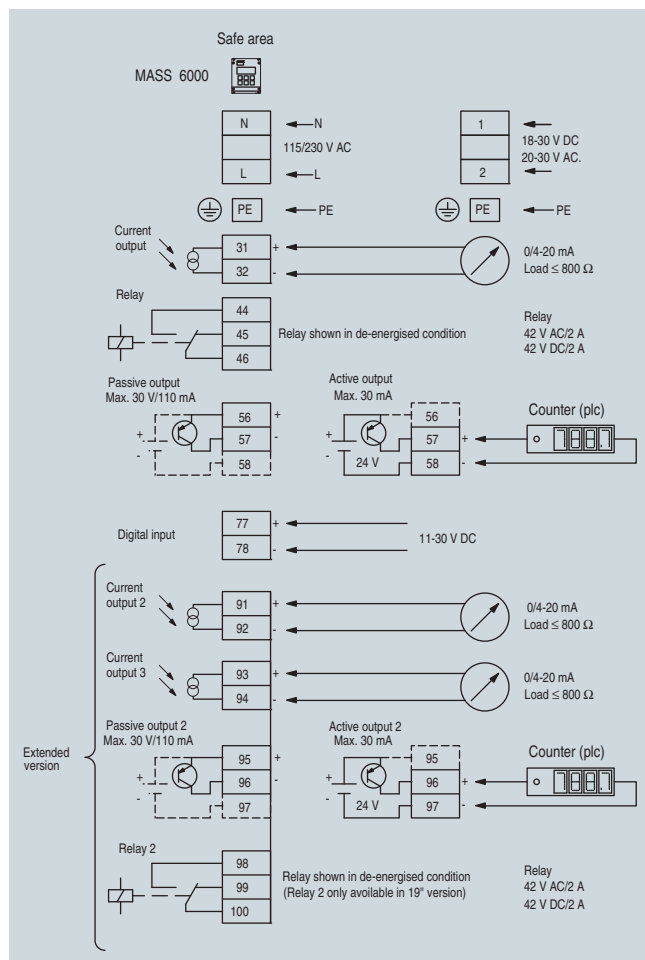
PE must be connected due to safety class 1 power supply.

Mechanical counters

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

Output cables

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



SITRANS F flowmeters

SITRANS F C

MASS 6000 Ex d compact/remote

Overview



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

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

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

Benefits

- Fully stainless steel flameproof EEx d enclosure, ensuring optimum cost of ownership
- Intrinsically safe keypad and display directly programmable in hazardous area
- ATEX-approved transmitter which can be mounted in hazardous area Zone 1 or Zone 2
- Sensor and transmitter interface intrinsically safe EEx ia IIC
- Exchange of transmitter directly in hazardous area without shut-down of process pipe line due to ia IIC sensor/transmitter interface
- Dedicated mass flow chip with the latest ASIC technology
- Fast batching and flow step response with an update rate of true 30 Hz
- Superior noise immunity due to a patented DFT (Discrete Fourier Transformation) algorithm
- Front end resolution better than 0.35 ns improves zero point stability and enhances dynamic turn-down ratio on flow and density accuracy
- Advanced diagnosis and service menu enhances 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"
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Fraction flow computation based on a 5th-order algorithm matching all applications
- USM II platform enables fitting of add-on bus modules without loss of functionality
 - All modules can be fitted as true "plug & play"
 - Module and transmitter automatically configured through the SENSORPROM
- Installation of the transmitter to the sensor is simple "plug & play" via the sensor pedestal

Application

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

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

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

Design

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

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

- Flameproof „d“ enclosure
- Enclosure stainless steel, IP67/NEMA 4X as compact and IP66/NEMA 4 as remote
- Supply voltage 24 V AC/DC.
- MASS 6000 Ex d is ATEX approved together with all MASS 2100 sensors

SITRANS F flowmeters

SITRANS F C

MASS 6000 Ex d compact/remote

Function

The following functions are available:

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

Technical specifications

Measurement of	Mass flow [kg/s (lbs/min)], volume flow [l/s (gpm)], fraction [%], °Brix, density [kg/m ³ (lbs/ft ³)], temperature [°C (°F)]
Current output	Classified EEx ia, selectable as active or passive outputs. Default setting is active mode.
Current	0 ... 20 mA or 4 ... 20 mA
Load	< 350 Ω
Time constant	0 ... 99.9 s adjustable
Current characteristics	
Active mode	U _o = 24 V, I _o = 82 mA, P _o = 0.5 W, C _o = 125 nF, L _o = 2.5 mH
Passive mode (max input from external barrier)	U _i = 30 V, I _i = 100 mA, P _i = 0.75 W, C _i = 52 nF, L _i = 100 μH
Digital output	
Frequency	0 ... 10 kHz, 50% duty cycle
Time constant	0.1 ... 30 s adjustable
Passive	6 ... 30 V DC, max. 110 mA, 1 KΩ ≤ R _{load} ≤ 10 KΩ
<u>Output characteristics</u>	
Active mode	Not available
Passive mode (max input from external barrier)	U _i = 30 V, I _i = 100 mA, P _i = 0.75 W, C _i = 52 nF, L _i = 100 μH
Relay	
Type	Change-over relay
Load	30 V/100 mA
Functionality	Error level, error number, limit, direction
Output characteristics	U _i = 30 V, I _i = 100 mA, P _i = 0.75 W, C _i = 0 nF, L _i = 0 mH

Digital input	11 ... 30 V DC (R _i = 13.6 KΩ)
Functionality	Start/hold/continue batch, zero point adjust, reset totalizer 1/2, force output, freeze output
Output characteristics	U _i = 30 V, I _i = 3.45 mA, P _i = 0.10 W, C _i = 0 nF, L _i = 0 mH
Galvanic isolation	All inputs and outputs are galvanically isolated, isolation voltage 500 V
Cut-off	
Low-flow	0 ... 9.9% of maximum flow
Empty pipe	Detection of empty sensor
Density	0 ... 2.9 g/cm ³
Totalizer	Two eight-digit counters for forward, net or reverse flow
Display	• Background illumination with alphanumerical text, 3 × 20 characters to indicate flow rate, totalized values, settings and faults. Time constant as current output • Reverse flow indicated by negative sign
Zero point adjustment	Manual via keypad or remote via digital input
Ambient temperature	
Operation	-20 ... +50 °C (-4 ... +122 °F)
Storage	-40 ... +70 °C (-40 ... +158 °F) (Humidity max. 95%)
Communication	Add-on modules: HART, PROFIBUS PA, FOUNDATION Fieldbus H1
HART	
Active mode	U _o = 6.88 V, I _o = 330 mA, P _o = 0.57 W, C _o = 20 nF, L _o = 100 μH
Passive mode (max input from external barrier)	U _i = 10 V, I _i = 200 mA, P _i = 0.5 W, C _i = 0 nF, L _i = 0 μH
PROFIBUS PA	
Active mode	Not available
Passive mode	U _i = 17.5 V, I _i = 380 mA, P _i = 5.32 W, C _i = 5 nF, L _i = 10 μH
FOUNDATION Fieldbus H1	
Active mode	Not available
Passive mode	U _i = 17.5 V, I _i = 380 mA
Enclosure	
Material	Stainless steel AISI 316 W 1.4435
Rating	• Compact mounted on sensor: IP67/NEMA 4X to IEC 529 and DIN 40050 • Remote mounted: IP66/NEMA 4 to IEC 529 and DIN 40050
Load	18 ... 1000 Hz random, 1.14 G rms, in all directions, to IEC 68-2-36, Curve E

SITRANS F flowmeters

SITRANS F C

MASS 6000 Ex d compact/remote

Technical specifications (continued)

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 mm²

24 V DC

- Range 18 ... 30 V DC
- Power consumption 6 VA $I_N = 250$ mA, $I_{ST} = 2$ A (30 ms)
- Power supply The power supply shall be from a safety isolating transformer. Maximal cable core is 1.5 mm²

EMC performance

Emission EN 50081-1 (Light industry)

Immunity EN 50082-2 (Industry)

NAMUR

Within the value limits according to "Allgemeine Anforderung" with error criteria A in accordance with NE 21

Ex approval

EEx-de [ia/ib] IIC T6, DEMKO 03 ATEX 135253X

Temperature class:

Process liquid temperature:

- T6 • T < 85 °C (185 °F)
- T5 • 85 °C < T < 100 °C (185 °F < T < 212 °F)
- T4 • 100 °C < T < 135 °C (212 °F < T < 275 °F)
- T3 • 135 °C < T < 180 °C (275 °F < T < 356 °F)

Selection and Ordering data

Order No.

SITRANS F C MASS 6000 transmitter

Transmitter Ex d for remote mounting inclusive of wall mounting kit

7ME4110-

2 ■ ■ ■ ■ - ■ ■ A ■

Enclosure

Ex d SS with 5 m (16.5 ft) cable
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

ATEX

1

Display/Keypad

With display

1

Serial communication

No communication
HART
PROFIBUS PA Profile 3
DeviceNet
FOUNDATION Fieldbus H1

A
B
F
H
J

Cable gland

M20

1

Note:

Only communication modules with Ex approvals are allowed.

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

Selection and ordering data

Spare parts for MASS 6000 Ex d

Description	Order No.
MASS 6000 Ex d transmitter 1 current output 1 frq./pulse output 1 relay output 24 V AC/DC	7ME4110-1FA21-1AA0



Description	Order No.
Wall mounting kit for remote Ex d inclusive of sensor cable of	
• 5 m	FDK-083H0231
• 10 m	FDK-083H0232
• 25 m	FDK-083H0233

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

Description	Order No.
HART	FDK-085U0226
PROFIBUS PA Profile 3	FDK-085U0236
FOUNDATION Fieldbus H1	A5E02054250
DeviceNet	FDK-085U0229



Description	Order No.
Ex d transmitter insert	FDK-083H3061
Front lid	FDK-085U2373
Screws and washers between pedestal and sensor (4 pcs.), seal (1 pc.)	FDK-085U2374
Package display unit	FDK-083H0235



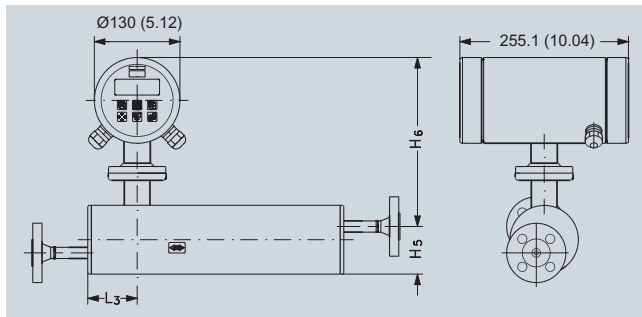
SITRANS F flowmeters

SITRANS F C

MASS 6000 Ex d compact/remote

Dimensional drawings

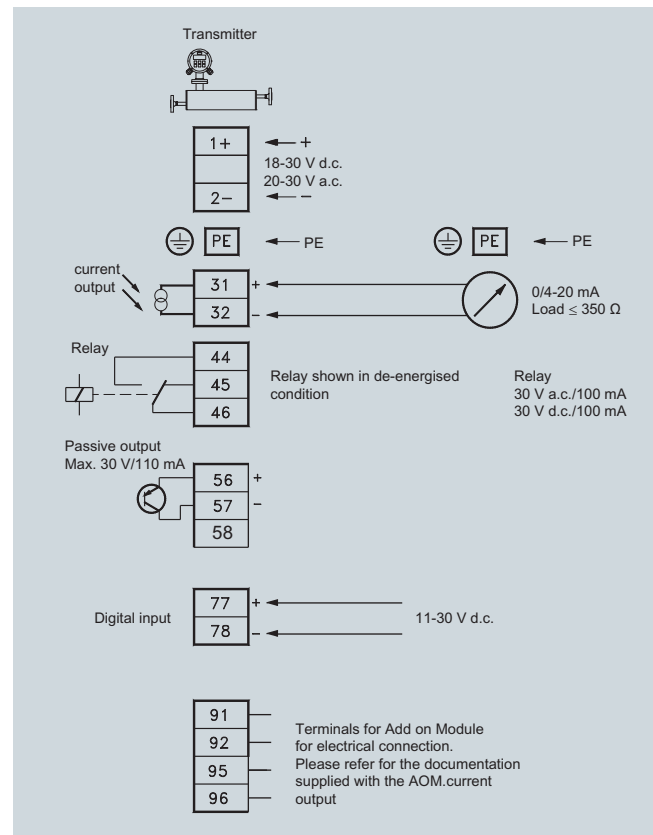
MASS 6000 Ex d compact version



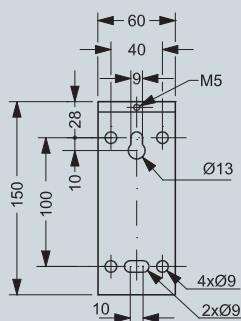
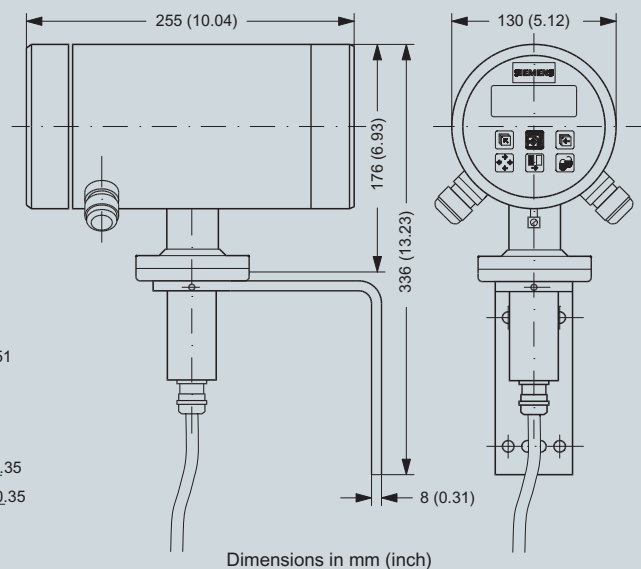
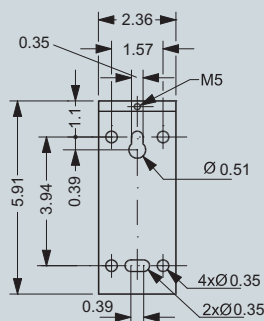
Sensor size [Di (inch)]	L ₃ [mm (inch)]	H ₅ [mm (inch)]	H ₆ [mm (inch)]	H ₅ + H ₆ [mm (inch)]
3 (1/8)	75 (2.95)	82 (3.23)	247 (9.72)	329 (12.95)
6 (1/4)	62 (2.44)	72 (2.83)	257 (10.12)	329 (12.95)
15 (1/2)	75 (2.95)	87 (3.43)	267 (10.51)	354 (13.94)
25 (1)	75 (2.95)	173 (6.81)	271 (10.67)	444 (17.48)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

Schematics

Electrical connection compact or remote



MASS 6000 Ex d remote version

Weight: 3 kg (6.6 lbs)
Dimensions in mm

Dimensions in inch


SITRANS F flowmeters

SITRANS F C

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

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 masters
- Decentralized in ET 200M for use with any automation system using standardized PROFIBUS DP masters
- Stand-alone via a MODBUS RTU master, i.e. SIMATIC PDM

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

Benefits

- Easy integration in SIMATIC S7 and PCS 7
- Support of SIMATIC PDM configuration tool via MODBUS
- Dedicated mass flow chip with high-performance ASIC technology
- True 30 Hz update rate securing fast batching and step response
- Superior noise immunity due to a patented DFT (Discrete Fourier Transformation) algorithm
- Front end resolution better than 0.35 ns improves zero point stability and enhances dynamic turn-down ratio on flow and density accuracy
- Advanced diagnostics enhancing troubleshooting and meter verification
- Built-in batch controller with two-stage control and compensation
- Digital outputs for direct batch control, frequency/pulse

- MODBUS RTU RS 232/485 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 5th-order algorithm matching all applications

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: FC300, MASS 2100 and MC2 are remotely mounted.

Function

The following key functionalities are available:

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

SITRANS F flowmeters

SITRANS F C

SIFLOW FC070

Technical specifications

Measurement of	Mass flow, volume flow, density, sensor temperature, fraction A flow, fraction B flow, fraction A in %
Measurement functions	
• Totalizer 1	Totalization of mass flow, volume-flow, fraction A, fraction B
• Totalizer 2	Totalization of mass flow, volume-flow, fraction A, fraction B
• Single and 2-stage batch function	Batching function with the use of one or two outputs for dosing in high and low speed
• 4 programmable limits	4 programmable high/low limits for mass flow, volume flow density, sensor temperature, fraction A flow, fraction B flow, fraction A in %. Limits will generate an alarm if reached.
Digital input	
Functions	Start batch, stop batch, start/stop batch, hold/continue batch, reset totalizer 1, reset totalizer 2, reset totalizer 1 and 2, zero adjust, force frequency output, freeze frequency output
High signal	- Nominal voltage: 24 V DC - Lower limit: 15 V DC - Upper limit: 30 V DC - Current: 2 ... 15 mA
Low signal	- Nominal voltage: 0 V DC - Lower limit: -3 V DC - Upper limit: 5 V DC - Current: -15 ... 15 mA
Input	Approx. 10 k Ω
Switching	Max. 100 Hz.
Digital output 1 and 2	
Functions	- Output 1: Pulse, frequency, quadrature pulse, quadrature frequency 2-stage batch, batch - Output 2: Quadrature pulse, quadrature frequency, 2-stage batch
Voltage supply	3 ... 30 V DC (passive output)
Switching current	Max. 30 mA at 30 V DC
Voltage drop	≤ 3 V DC at max. current
Leakage current	≤ 0.4 mA at max. voltage 30 V DC
Load resistance	1 ... 10 k Ω
Switching frequency	0 ... 12 kHz 50% duty cycle
Functions	Pulse, frequency, quadrature pulse, quadrature frequency 2-stage batch, batch
Communication	
MODBUS RS 232C	- Max. baudrate: 115 200 baud - Max. line length: 15 m at 115 200 baud - Signal level: according to EIA-RS 232C

MODBUS RS 485	- Max. baudrate: 115 200 baud - Max. line length: 1200 m at 115 200 baud - Signal level: according to EIA-RS 485 - Bus termination: Integrated. Can be enabled by inserting wire jumpers.
Galvanic isolation	All inputs, outputs and communication interfaces are galvanically isolated. Isolation voltage: 500 V
Power	
Supply	24 V DC nominal
Tolerance	20.4 V DC ... 28.8 V DC
Consumption	Max. 6 W
Fuse	T1 A/125 V, not replaceable by operator
Environment	
Ambient temperature	- Storage -40 ... +70 °C (-40 ... +158 °F) - Operation 0 ... 60 °C (32 ... 140 °F)
Operation conditions	Horizontally mounted rail. For vertically mounted rail, the maximum operating temperature is +45 °C (+113 °F).
Altitude	Operation: -1000 ... 2000 m (pressure 795 ... 1080 hPa)
Enclosure	
Material	Noryl, color: anthracite
Rating	IP20/NEMA 2 according to IEC 60529
Mechanical load	According to SIMATIC standards (S7-300 devices)
Approvals	
SIFLOW FC070 Standard	CE, C-UL, ATEX II 3G EEx nA IIC
SIFLOW FC070 Ex	CE, C-UL, UL Haz.Loc., FM, ATEX II 3 G EEx nA II T4 and II (1) G [EEx ia] IIC
Electromagnetic compatibility	Requirements of EMC law; Noise immunity according to IEC 61000-6-2, tested according to: IEC 61000-4-2, 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6 Emitted interference according to EN 50081-2, tested according to EN 55011, class A, group 1
NAMUR	Within the limits according to "Allgemeine Anforderung" with error criteria A in accordance with NE21
Programming tools	
SIMATIC S7	Configuration trough backplane P-BUS and PLC program
SIMATIC PCS7	Configuration trough backplane P-BUS and PLC/WinCC face-plates
SIMATIC PDM	Through MODBUS port RS 232C and RS 485

SITRANS F flowmeters

SITRANS F C

SIFLOW FC070

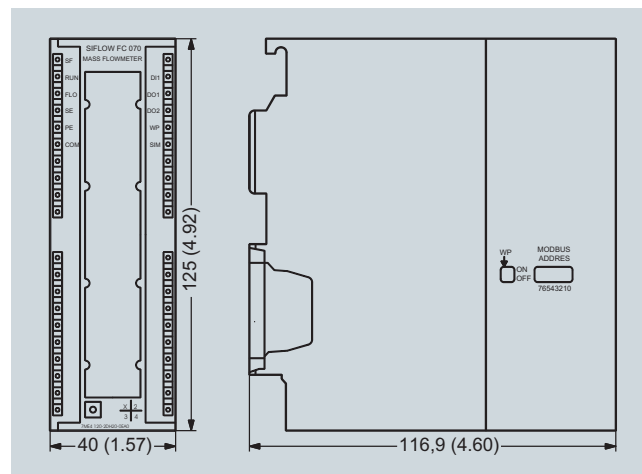
Selection and Ordering Data

Description	Order No.
SIFLOW FC070 flow transmitter Remember to order 40 pin front plug connector.	7ME4120-2DH20-0EA0
40 pin front plug with screw contacts	6ES7392-1AM00-0AA0
SIFLOW FC070 Ex flow transmitter Remember to order 20 pin front plug connector.	7ME4120-2DH21-0EA0
20 pin front plug with screw contacts	6ES7392-1AJ00-0AA0

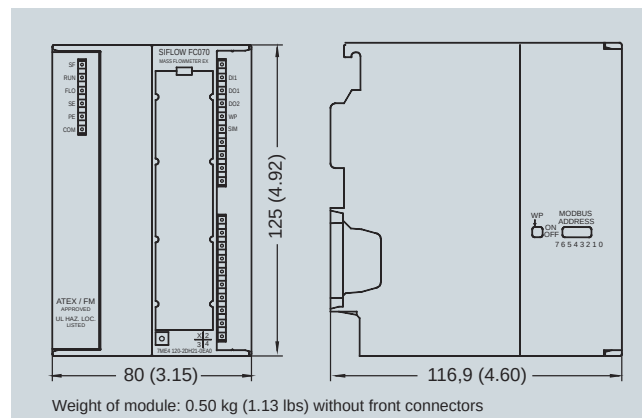
Accessories

Description	Order No.
Cable with multiplug for connecting MASS 2100 and FC300 sensors	
• 5 m (16.4 ft)	FDK-083H3015
• 10 m (32.8 ft)	FDK-083H3016
• 25 m (82 ft)	FDK-083H3017
• 50 m (164 ft)	FDK-083H3018
• 75 m (246 ft)	FDK-083H3054
• 150 m (492 ft)	FDK-083H3055
Cable without multiplug for connecting MC2 sensors	
• 10 m (32 ft)	FDK-083H3001
• 25 m (82 ft)	FDK-083H3002
• 75 m (246 ft)	FDK-083H3003
• 150 m (492 ft)	FDK-083H3004
SIMATIC S7-300 rail The mechanical mounting rack of the SIMATIC S7-300	
• 160 mm (6.3")	6ES7 390-1AB60-0AA0
• 482 mm (18.9")	6ES7 390-1AE80-0AA0
• 530 mm (20.8")	6ES7 390-1AF30-0AA0
• 830 mm (32.7")	6ES7 390-1AJ30-0AA0
• 2000 mm (78.7")	6ES7 390-1BC00-0AA0
Shield connecting element For mounting on S7-300 rail. 80 mm wide with 2 rows for 4 shield terminal elements each (no shield terminal elements included)	6ES7390-5AA00-0AA0
Shield terminal element for 1 cable with 3 to 8 mm in dia. 2 pieces	6ES7390-5BA00-0AA0
Shield terminal element for 1 cable with 4 to 13 mm in dia. 2 pieces	6ES7390-5CA00-0AA0
SIFLOW FC070 Demo suitcase	A5E01075465
Power supply	6ES7307-1BA00-0AA0

Dimensional drawings

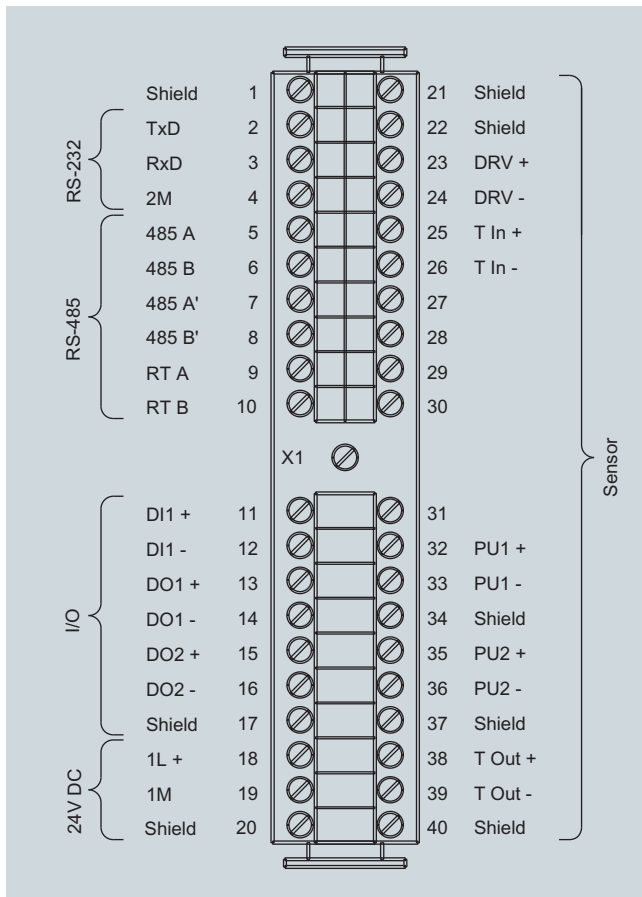


SIFLOW FC070, dimensions in mm (inch)

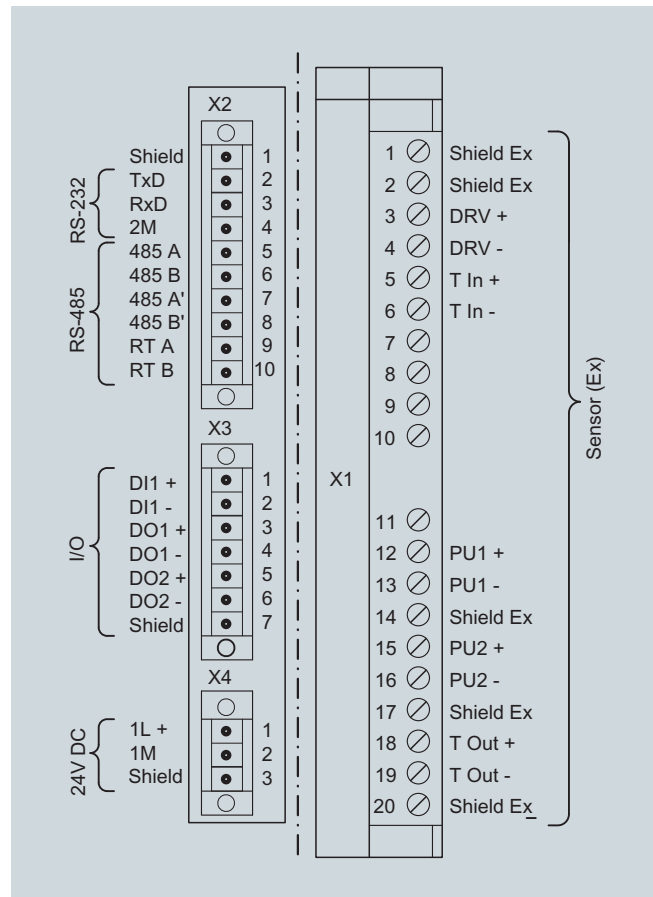


SIFLOW FC070 Ex, dimensions in mm (inch)

Schematics



SIFLOW FC070, electrical connection



SIFLOW FC070 Ex, electrical connection

SITRANS F flowmeters

SITRANS F C

MASS 2100 DI 1.5

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 range 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 range better than 500:1, from 65 kg/h to a few g/h
- Densitometer performance available through a density accuracy better than 0.001 g/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 & 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 & SENSORPROM enables true "plug & play". Installation and commissioning in less than 10 min.
- Intrinsically safe EEx ia design as standard
- Sensor pipe available in high-quality AISI 316L stainless steel W 1.4435 or Hastelloy C22 W 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 & 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 & fragrances
Pharmaceutical industry	High-speed dosing and coating of pills, filling of ampuls/injectors
Food & beverage industry	Dosing of flavourings, colours and additives, density measurement, in-line Measurement of liquid or gaseous CO ₂
Automotive industry	Fuel injection nozzle & 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 or Hastelloy C22 with 1/4" NPT or 1/4" ISO process connections.

The enclosure is made in stainless steel AISI 316L W 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.



Function

The measuring principle is based on coriolis force of movement, see "System information SITRANS F C coriolis mass flowmeters".

Integration

The sensor can be connected to all MASS 6000 transmitters for remote installation only.

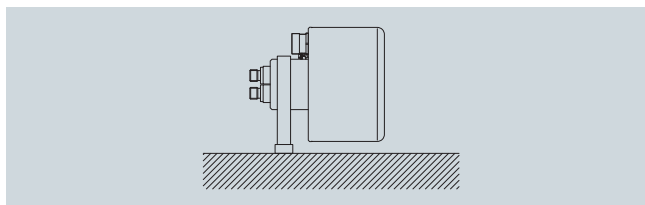
All sensors are delivered with a SENSORPROM containing all information about calibration data, identity and factory pre-programming of transmitter settings

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

Installation of MASS 2100 sensor

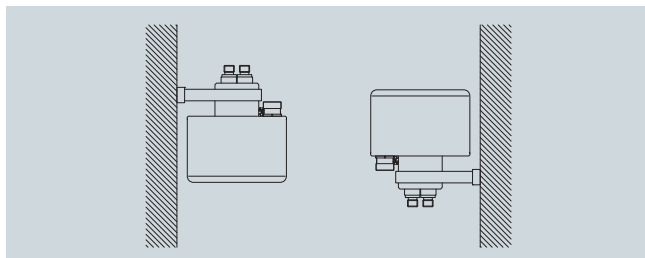
- The optimal installation is horizontal. If vertical mounting is necessary, upward flow is recommended to facilitate the removal of air bubbles. To remove the air from the sensor the flow speed in the sensor must be at least 1 m/s. If there are solid particles in the liquid, especially in connection with low flow, it is recommended that the sensor be mounted horizontally with inlet flange uppermost so that particles are more easily flushed out. To ensure that the sensor does not become partially empty, there must be sufficient counter-pressure on the unit min. 0.1 to 0.2 bar (1.45 to 2.9 psi).
- Mount the sensor on a vibration-free wall or steel frame.
- Locate the sensor low in the system in order to avoid an 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

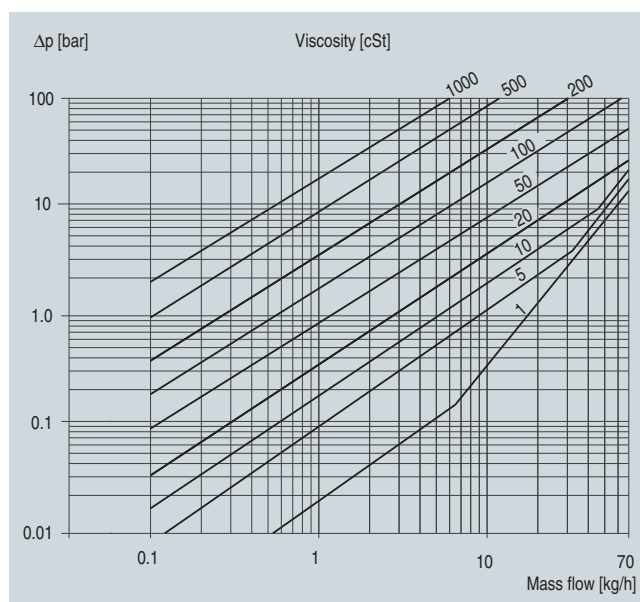
Versions	DI 1.5 (1/16")
Inside pipe diameter (sensor consists of one continuous pipe)	1.5 mm (0.06")
Pipe wall thickness	0.25 mm (0.010")
Mass flow measuring range	0 ... 65 kg/h (0 ... 143 lb/h)
Density	0 ... 2.9 g/cm ³ (0 ... 0.10 lb/inch ³)
Fraction e.g.	0 ... 100 °Brix
Temperature	
Standard	-50 ... +125 °C (-58 ... +257 °F)
High-temperature version	-50 ... +180 °C (-58 ... +356 °F)
Liquid pressure measuring pipe ¹⁾	
Stainless steel	230 bar (3336 psi) at 20 °C (68 °F)
Hastelloy C22	365 bar (5294 psi) at 20 °C (68 °F)
Materials	
Measuring pipe and connection	W 1.4435 (AISI 316L) (stainless steel) W 2.4602 (Hastelloy C22)
Enclosure and enclosure material ²⁾	IP66/NEMA 4 and W 1.4404 (AISI 316L) (stainless steel)
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	EEx ia IIC T3-T6, DEMKO 03 ATEX 135252X
Weight approx.	2.6 kg (5.73 lb)

¹⁾ According to DIN 2413, DIN 17457

²⁾ Housing is not rated for pressure containment.

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

Pressure drop



MASS 2100 DI 1.5 (1/16"), pressure drop for density = 1000 kg/m³

SITRANS F flowmeters

SITRANS F C

MASS 2100 DI 1.5

Selection and Ordering data

SITRANS F C Flow sensors
MASS 2100 DI 1.5 (1/16") sensor, without heating jacket ¹⁾

7ME4100-

■ ■ ■ ■ ■ - A ■ ■ ■ ■ ■

Diameter

Stainless steel W 1.4435/316L
 DI 1.5, max. 125 °C (257 °F)
 DI 1.5, max. 180 °C (356 °F)
 W 2.4602/Hastelloy C22
 DI 1.5, max. 125 °C (257 °F)
 DI 1.5, max. 180 °C (356 °F)

1 A

1 B

2 A

2 B

Pressure

PN 100
 PN 230 (316L)
 PN 365 (C22)

D

L

P

Process connection/flange

Pipe thread
 G 1/4" male
 1/4" NPT male

1 0

1 1

Configuration

Standard
 Density
 Brix/Plato
 Fraction (specification required)

1

2

3

9

N O Y

Cable

No cable
 5 m (16 ft) cable
 10 m (32 ft) cable
 25 m (82 ft) cable
 50 m (164 ft) cable
 75 m (246 ft) cable
 150 m (492 ft) cable

A

B

C

D

E

F

G

Calibration

Standard calibration 3 flow x 2 points
 Standard calibration matched pair 3 flow x 2 points
 Accredited calibration matched pair 5 flow x 2 points (DANAK)
 Extended calibration customer-specified select Y60, Y61, Y62 or Y63 (see additional information)

1

2

3

8

¹⁾ Not possible to order DI 1.5 sensor with heat jacket

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

Selection and Ordering data

Order code

Additional information

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

Pressure testing certificate PED: 97/23/EC

C11

Material certificate EN 10204-3.1B

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 (5x2)

Y60

Customer-specified calibration (5x2)

Y61

Customer-specified, matched pair (10x1)

Y62

Customer-specified calibration (10x1)

Y63

Special version

Y99

Spare parts

Description

Order No.

Multiple plug for cable mounting

FDK-083H5056

Description	Length	Order No.
Cable with multiple plug	5 m (16.4 ft)	FDK-083H3015
Standard blue cable between MASS 6000 and MASS 2100, 5 x 2 x 0.34 mm ² twisted and screened in pairs.	10 m (32.8 ft)	FDK-083H3016
Temperature range -20 °C ... +110 °C (-4 °F ... +230 °F)	25 m (82 ft)	FDK-083H3017
	50 m (164 ft)	FDK-083H3018
	75 m (246 ft)	FDK-083H3054
	150 m (492 ft)	FDK-083H3055

Description

Order No.

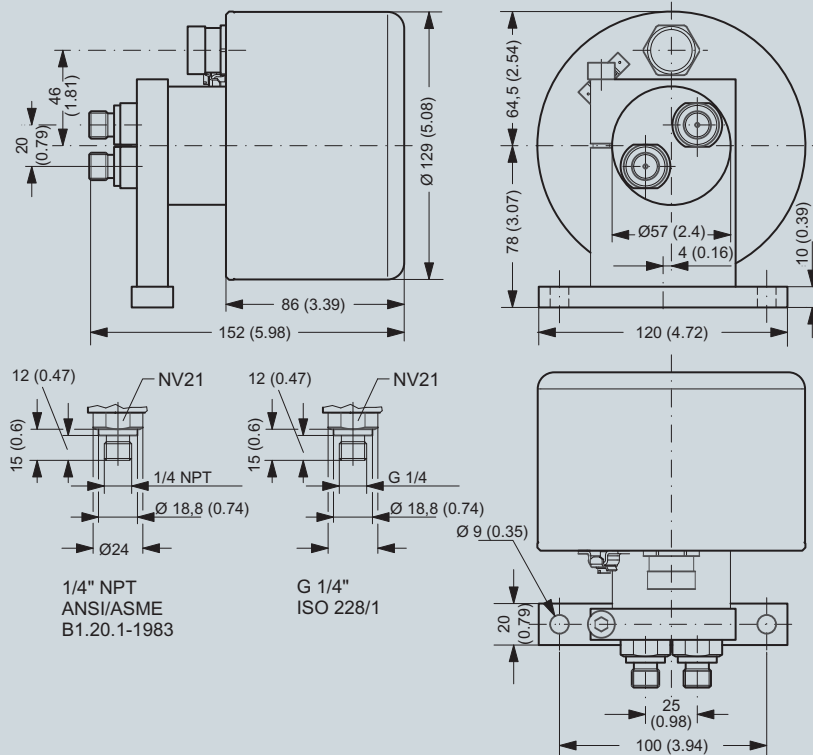
2 kB SENSORPROM unit

(Sensor Serial No. and Order No. must be specified by ordering)

FDK-083H4410

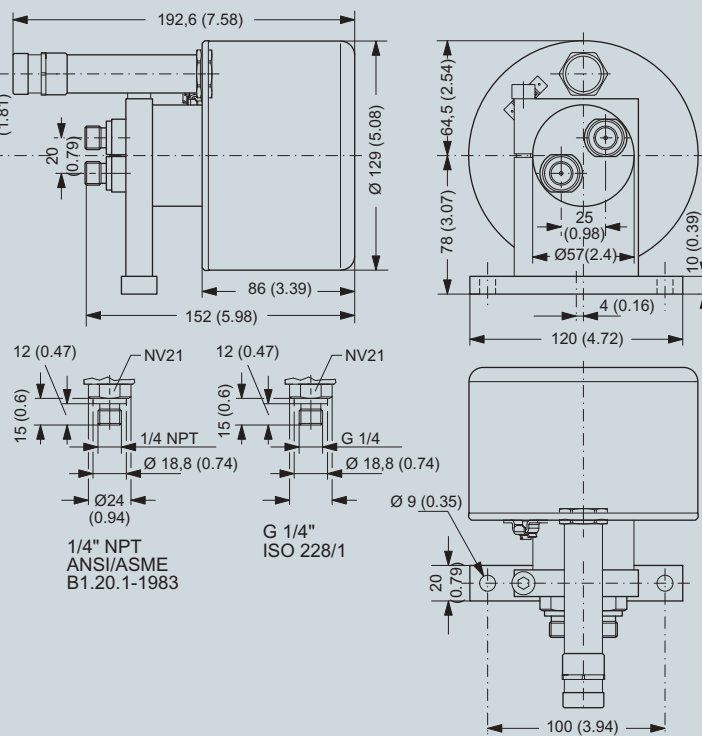
Dimensional drawings

MASS 2100 DI 1.5 (1/16")



Dimensions in mm (inch)

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



Dimensions in mm (inch)

SITRANS F flowmeters

SITRANS F C

SITRANS FC300

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 range 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 range better than 100:1
- Densitometer performance available through a density accuracy better than 0.001 g/cm³ (0.000036 lb/inch³) with a 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 & 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 & SENSORPROM enable true „plug & play“. Installation and commissioning in less than 10 min.
- Intrinsically safe Ex-design ia IIC as standard
- Sensor pipe available in high-quality AISI 316L stainless steel W 1.4435 or Hastelloy C22 W 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 and 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 & fragrances
Pharmaceutical industry	High-speed dosing and coating of pills, filling of ampuls/injectors
Food & beverage industry	Filling, dosing of flavorings, colors and additives, in-line density measurement Measurement and dosing of liquid or gaseous CO ₂
Automotive industry	Fuel injection nozzle & 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 or Hastelloy C22 with 1/4"-NPT or G1/4"-ISO process connections.

The enclosure is made of stainless steel AISI 316L W 1.4409 with a grade of encapsulation of IP66/NEMA4. The enclosure has a very robust design and with an overall size of 130 x 200 x 60 mm (5.12" x 7.87" x 2.36") the sensor is very compact and requires only little installation space.

The sensor can be delivered in a standard version with a maximum liquid temperature of 115 °C (239 °F) or a high-temperature version, with raised electrical connector for 180 °C (356 °F).

The sensor can be installed in horizontal or vertical position. The sensor can be mounted directly on any given plane surface or if desired with the enclosed quick release clamp fitting which, along with its compact design and multi-plug electrical connector, will keep installation costs and time to a minimum.

Function

The measuring principle is based on coriolis force of movement, see "System information SITRANS F C coriolis mass flowmeters".

Integration

The sensor can be connected to all MASS 6000 transmitters for remote installation only.

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

Installation guidelines 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 is low or the liquid contains solid particles or air bubbles.

Horizontal installation as shown in figure B can be used for liquid applications especially where the flow velocity exceeds 1 m/s.

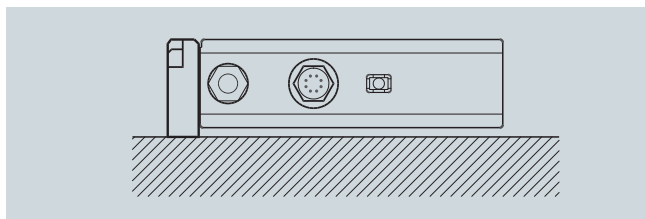
Vertical installation as shown in figure C can be used for liquid or gas applications.

For liquid applications upwards flow is recommended to facilitate the removal of air bubbles and to avoid partly emptying of the sensor.

For gas applications we recommend to place the flow inlet on the sensor high and the outlet low to remove impurities and oil films.

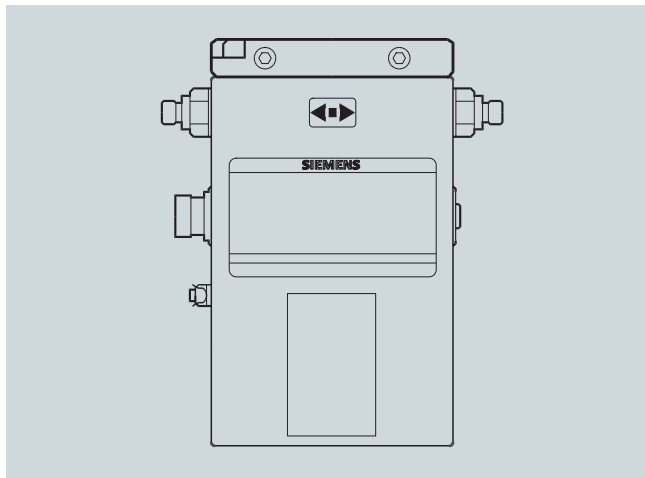
- To ensure that the sensor does not become partly empty, there must be a sufficient counter-pressure on the unit min. 0.1 to 0.2 bar.
- Mount the sensor on a vibration-free and plane wall or steel frame
- Locate the sensor low in the system in order to avoid under-pressure in the sensor separating air/gas 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)

Horizontal mounting (fig. B)



Liquid or gas (medium to high flow)

Technical specifications

Sensor size	DN 4 (1/6")
Mass flow	
Measuring range	0 ... 350 kg/h (0 ... 772 lb/h)
Accuracy, mass flow	0.1% of rate
Repeatability	0.05 of rate
Max. zero point error	0.010 kg/h (0.022 lb/h)
Density	
Density range	0 ... 2.9 g/cm ³ (0 ... 0.105 lb/inch ³)
Density error	0.0015 g/cm ³ (0.000036 lb/inch ³)
Repeatability error	0.0002 g/cm ³ (0.0000072 lb/inch ³)
Temperature	
Standard	-40 ... +115 °C (-40 ... +239 °F)
High-temperature version	-40 ... +180 °C (-40 ... +356 °F)
Temperature error	0.5 °C
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	410 bar (5945 psi) at 20 °C (68 °F)
Materials	
Measuring pipe and connection	W 1.4435 (AISI 316L) Stainless steel
Enclosure²⁾	
Material	W 1.4404 (AISI 316L) Stainless steel
Enclosure grade	IP67/NEMA4
Connection thread	
ISO 228/1	G1/4" male
ANSI/ASME B1.20.1	1/4" NPT male
Ex approval	
	EEx ia IIC T3-T6
	05ATEX138072X
	UL/CSA
Weight	3.5 kg (7.7 lb)
Dimensions	135 x 205 x 58 mm (5.31" x 8.07" x 2.28")

¹⁾ According to DIN 2413, DIN 17457

²⁾ Housing is not rated for pressure containment.

SITRANS F flowmeters

SITRANS F C

SITRANS FC300

Selection and Ordering data

Order No. Order code

SITRANS F C Flow sensors

SITRANS FC300 DN 4 (1/6") sensor, without heating jacket¹⁾

7ME4400-

-A

Pipe material and temperature

Stainless steel W 1.4435/316L

115 °C (239 °F)

180 °C (356 °F)

1G

1H

W 2.4602/Hastelloy C22

115 °C (239 °F)

180 °C (356 °F)

2G

2H

Pressure

PN 100

PN 130 (316L)

PN 410 (C22)

D

G

Q

Process connection

Pipe thread

G 1/4" male

1/4" NPT male

10

11

Configuration

Standard

Density

Brix/Plato

Fraction (specification required)

1

2

3

9

NOY

Cable

No cable

5 m (16 ft) cable

10 m (32 ft) cable

25 m (82 ft) cable

50 m (164 ft) cable

75 m (246 ft) cable

150 m (492 ft) cable

A

B

C

D

E

F

G

Calibration

Standard calibration 3 flow x 2 points

Standard calibration matched pair 3 flow x 2 points

Accredited calibration matched pair 5 flow x 2 points (DANAK)

Extended calibration customer-specified select Y60, Y61, Y62 or Y63 (see additional information)

1

2

3

8

¹⁾ Not possible to order DN 4 sensor with heating jacket

Selection and Ordering data

Order code

Additional information

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

Pressure testing certificate PED: 97/23/EC

C11

Material certificate EN 10204-3.1B

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 (5x2)

Y60

Customer-specified calibration (5x2)

Y61

Customer-specified, matched pair (10x1)

Y62

Customer-specified calibration (10x1)

Y63

Special version

Y99

Spare parts

Description

Order No.

Multiple plug for cable mounting

FDK-083H5056

Description

Length

Order No.

Cable with multiple plug

5 m (16.4 ft)

FDK-083H3015

Standard blue cable between

10 m (32.8 ft)

FDK-083H3016

MASS 6000 and MASS 2100,

25 m (82 ft)

FDK-083H3017

5 x 2 x 0.34 mm² twisted and

50 m (164 ft)

FDK-083H3018

screened in pairs.

75 m (246 ft)

FDK-083H3054

Temperature range -20 °C ... +110 °C

150 m (492 ft)

FDK-083H3055

(-4 °F ... +230 °F)

Description

Order No.

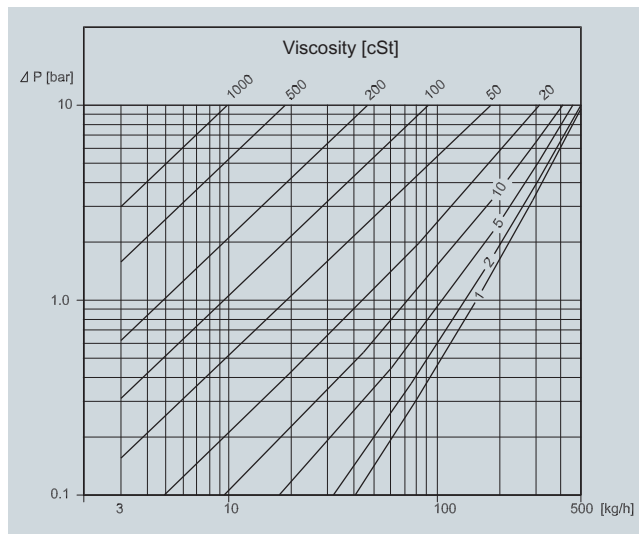
2 kB SENSORPROM unit

FDK-083H4410

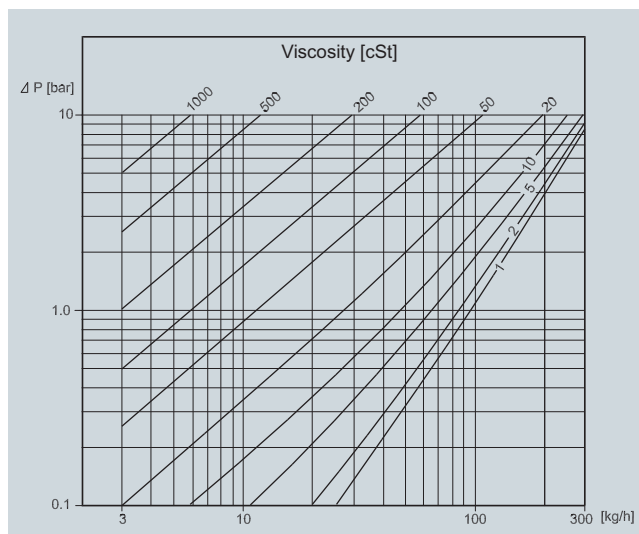
(Sensor Serial No. and Order No. must be specified by ordering)

Characteristic curves

Pressure drop

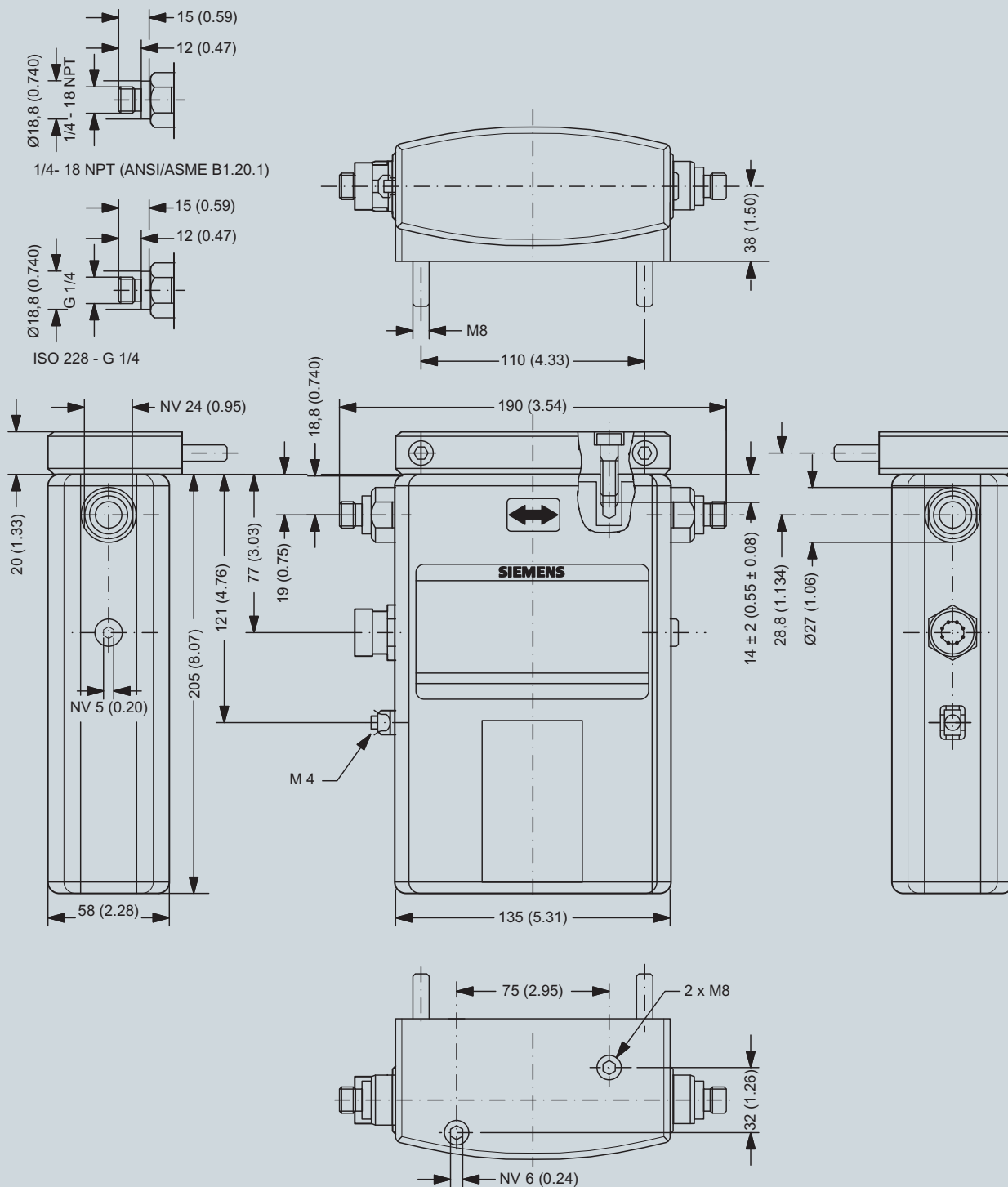


Stainless steel 316L



Hastelloy C22

Dimensional drawings



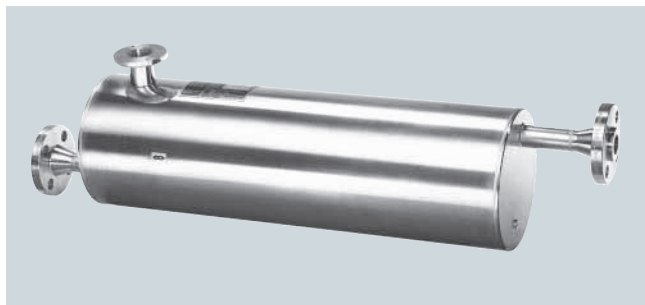
SITRANS FC300, dimensions in mm (inch)

SITRANS F flowmeters

SITRANS F C

MASS 2100 DI 3 to DI 40

Overview



MASS 2100 DI 3 to DI 40 is suitable for accurate mass flow measurement of a variety of liquids and gases.

The sensor offers superior performance in terms of flow accuracy, turn-down range 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 range better than 500:1
- Densitometer performance available through a density accuracy better than 0.0005 g/cm³ with a repeatability better than 0.0001 g/cm³
- Single continuous tube design, with no internal welds, reductions or flow splitters offers optimal hygiene, safety and CIP cleanability for food & beverage and pharmaceutical applications
- Markets' biggest wall thickness, ensuring optimal life-time and corrosion resistance and high-pressure durability
- Full bore design provides lower pressure loss due to same internal diameter throughout the entire sensor.
- Balanced pipe design with little mechanical energy loss, ensures optimal performance and stability under non-ideal and unstable process conditions (pressure, temperature, density changes etc.)
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Multi-plug electrical connector & SENSORPROM enables true "plug & play". Installation and commissioning in less than 10 min.
- 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 AISI 316L stainless steel W 1.4435 or Hastelloy C22 W 2.4602 offering optimum corrosion resistance
- Centre-block design decouples process noise from the environment such as vibrations, pulsations, pressure shocks etc. making installation flexible and versatile
- Rugged and space-saving sensor design in stainless steel matching all environments
- High-pressure program as standard
- The sensor calibration factor is also valid for gas measurement
- Uniform sensor interface matching all transmitter versions at the same time whether it is compact IP67/NEMA 4X, compact Ex d or remote installation, one sensor fits all

Application

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

Due to this versatility the meter is easy to install and the coriolis flowmeter is recognized for its high accuracy in a wide turn-down range which is a paramount in many applications.

The main applications of the coriolis flowmeter can be found in all industries, such as:

Chemical & pharma	Detergents, bulk chemicals, pharmaceuticals, acids, alkalis
Food & beverage	Dairy products, beer, wine, soft-drinks, plato/brix, fruit juices and pulps, bottling, CO ₂ dosing, CIP-liquids
Automotive	Fuel injection nozzle & pump testing, filling of AC units, engine consumption, paint robots
Oil & gas	Filling of gas bottles, furnace control, CNG-dispensers, test separators, LPG
Water & 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 or Hastelloy C22 with a wide variety of process connections.

The enclosure is made in stainless steel AISI 316L W 1.4404 with a grade of encapsulation of IP66/NEMA 4.

The sensor is as standard EEx ia approved, intrinsically safe

The sensor can be installed in horizontal or vertical position. In horizontal position the sensor is self draining.

Heating Jacket: All the sensors MASS 2100, DI 3 to DI 40, can optionally be equipped with a heating coil to avoid solidification of sensitive fluids during down-time or period between discontinuing processes. This feature gives the user an alternative to the costly electrical heating normally used, as it gives the freedom to choose either hot water, superheated steam or hot oil, to maintain a constant temperature inside the sensor.

SITRANS F flowmeters

SITRANS F C

MASS 2100 DI 3 to DI 40

Function

The measuring principle is based on coriolis law of movement, see "System information SITRANS F C coriolis mass flowmeters".

Integration

The sensor can be connected to all MASS 6000 transmitters for compact as well as remote installation.

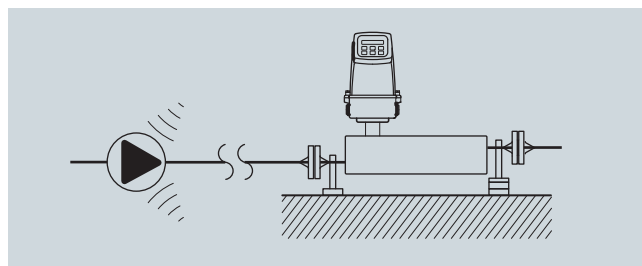
All sensors are delivered with a SENSORPROM containing all information about calibration data, identity and factory pre-programming of transmitter settings.

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

Installation of sensor

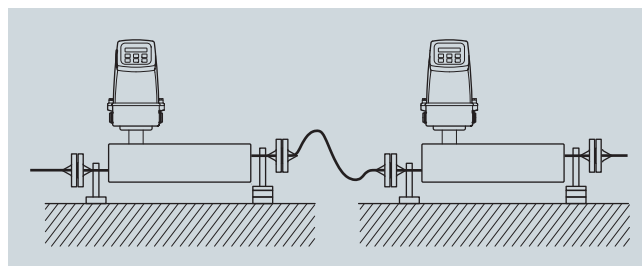
	Liquid	Gas
Horizontal		
Vertical		

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



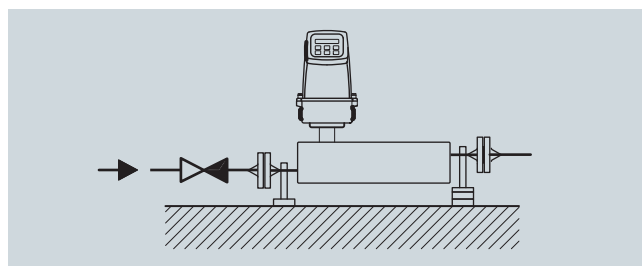
Vibration

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 flowmeters

SITRANS F C

MASS 2100 DI 3 to DI 40

Technical specifications

Versions	mm (inch)	DI 3 (1/8)	DI 6 (¼)	DI 15 (5/8)	DI 25 (1)	DI 40 (1½)
Inside pipe diameter (sensor consists of one continuous pipe)	mm (inch)	3.0 (0.12)	6.0 (0.24)	14.0 (0.55)	29.7 (1.17)	43.1 (1.70)
Pipe wall thickness	mm (inch)	0.5 (0.02)	1.0 (0.04)	1.0 (0.04)	2.0 (0.08)	2.6 (0.10)
Mass flow measuring range	kg/h (lb/h)	0 ... 250 (0 ... 550)	0 ... 1.000 (0 ... 2.200)	0 ... 5.600 (0 ... 12.345)	0 ... 25.000 (0 ... 55.100)	0 ... 52.000 (0 ... 114.600)
Density	g/cm ³ (lb/inch ³)	0 ... 2.9 (0 ... 0.10)				
Fraction e.g.	°Brix	0 ... 100				
Temperature						
Standard	°C (°F)	-50 ... +180 °C (-58 ... +356 °F)				
Liquid pressure measuring pipe¹⁾						
Stainless steel	bar (psi)	230 (3336)	265 (3844)	130 (1885)	110 (1595)	105 (1523)
Hastelloy C22	bar (psi)	350 (5076)	410 (5946)	200 (2900)	185 (2683)	not available
Materials						
Measuring pipe, flange and thread connection		W 1.4435 (AISI 316L) (Stainless steel)				
		W 2.4602 (Hastelloy C22)				
						not available
Enclosure and enclosure material		IP65 (NEMA 4) and W 1.4404 (AISI 316L) (Stainless steel), housing is not rated for pressure containment				
Process connections²⁾						
Flange						
EN 1092-1, PN 40			DN 10	DN 15	DN 25	DN 40
ANSI B16.5, Class 150			½"	½"	1"	1½"
ANSI B16.5, Class 600 (Class 300)			½"	½"	1"	1½"
Dairy screwed connection (PN 16/25/40)³⁾						
DIN 11851			DN 10	DN 15	DN 32	DN 40
ISO 2853/BS 4825 part 4 (SS3351)			25 mm	25 mm	38 mm	51 mm
Dairy clamp connection (PN 16)³⁾						
ISO 2852/BS 4825 part 3 (SMS3016)			25 mm	25 mm	38 mm	51 mm
Thread						
ISO 228/1, PN 100		G¼" female	G¼" male	G½" male	G1" male	G2" male
ANSI/ASME B1.20.1, PN 100		¼" NPT female	¼" NPT male	½" NPT male	1" NPT male	2" NPT male
Cable connection		Multiple plug connection to sensor 5 x 2 x 0.35 mm ² twisted and screened in pairs, ext. Ø 12 mm				
Ex-version		EEx ia IIC T3-T6, DEMKO 03 ATEX 135252X				
Weight approx.	kg (lb)	4 (8.8)	8 (17.6)	12 (26.5)	48 (105.8)	70 (154.5)

¹⁾ Max. at 20 °C (68 °F), DIN 2413, DIN 17457

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

³⁾ Material, W 1.4401 or corresponding

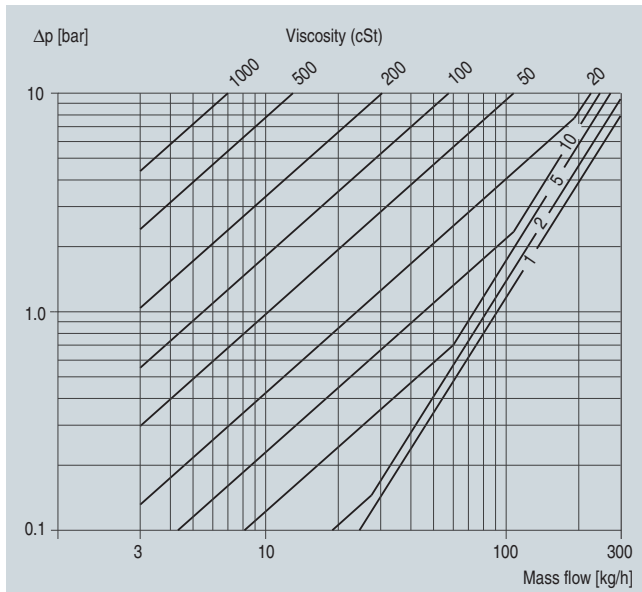
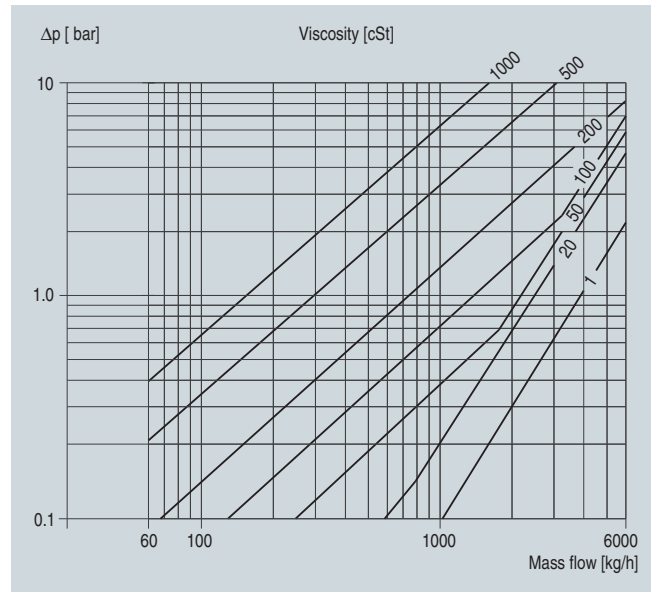
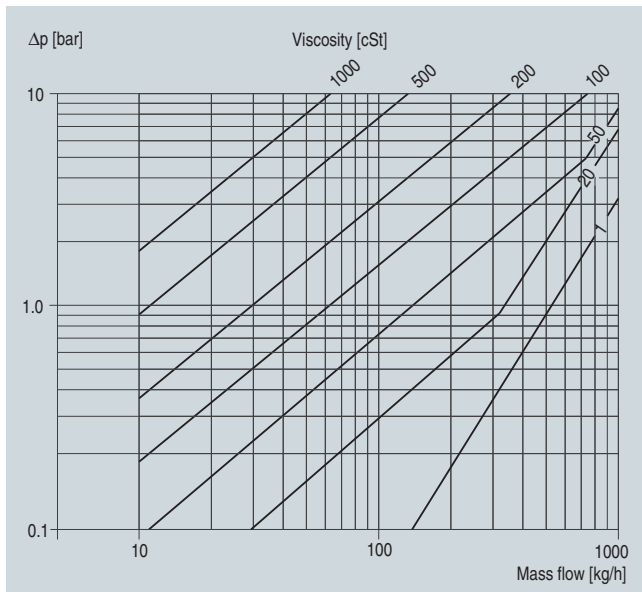
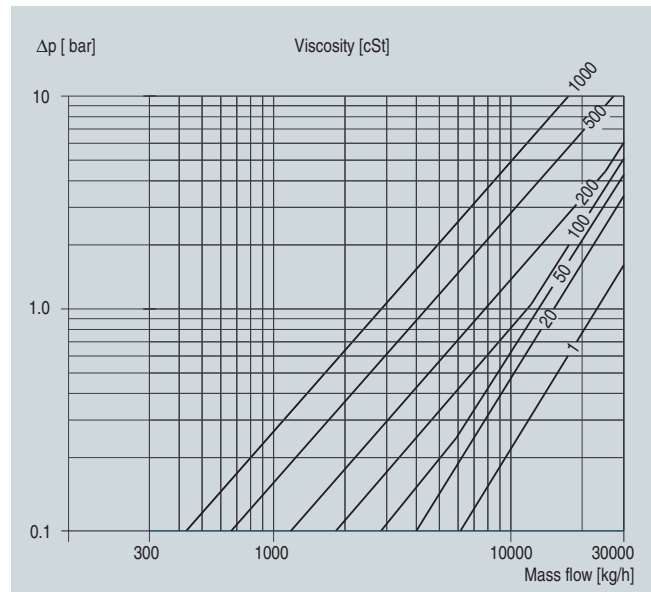
For accuracy specification see "System information SITRANS F C".

SITRANS F flowmeters

SITRANS F C

MASS 2100 DI 3 to DI 40

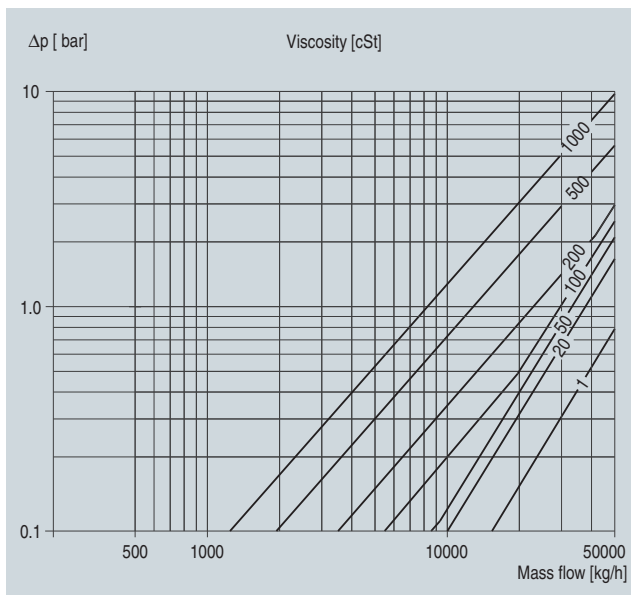
Pressure drop


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

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

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

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

SITRANS F flowmeters

SITRANS F C

MASS 2100 DI 3 to DI 40



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

SITRANS F flowmeters

SITRANS F C

MASS 2100 DI 3 to DI 40

Selection and Ordering data	Order No.	Order code
SITRANS F C sensors		
MASS 2100 without heating jacket	7ME4100 -	
MASS 2100 heated, DN 15 connection	7ME4200 -	
MASS 2100 heated, ½ inch, ANSI B16.5 connection	7ME4210 -	
Diameter		
Stainless steel W 1.4435/316L		
DI 3 (PN 100/PN 230)	1 C	
DI 6	1 D	
DI 15	1 E	
DI 25	1 F	
DI 40	1 G	
W 2.4602/Hastelloy C22		
DI 3 (PN 100/PN 350)	2 C	
DI 6	2 D	
DI 15	2 E	
DI 25	2 F	
Pressure		
PN 16 (DI 6, DI 15, DI 25 and DI 40)	A	
PN 25 (DI 6, DI 15, DI 25 and DI 40)	B	
PN 40 (DI 6, DI 15, DI 25 and DI 40)	C	
PN 100 (DI 3, DI 6, DI 15, DI 25 and DI 40)	D	
PN 105 (DI 40, 2", 316L)	E	
PN 110 (DI 25, 1", 316L)	F	
PN 130 (DI 15, ½", 316L)	G	
PN 185 (DI 25, 1", Hastelloy C22)	J	
PN 200 (DI 15, ½", Hastelloy C22)	K	
PN 230 (DI 3, ¼", 316L)	L	
PN 265 (DI 6, ¼", 316L)	M	
PN 350 (DI 3, ¼", Hastelloy C22)	N	
PN 410 (DI 6, ¼", Hastelloy C22)	Q	
Class 150 (DI 6, DI 15, DI 25 and DI 40)	R	
Class 600 (DI 6, DI 15, DI 25 and DI 40)	S	
Process connection/flange		
Pipe thread		
G ¼"	1 0	
¼" NPT	1 1	
G ½"	1 2	
½" NPT	1 3	
G 1	1 4	
1" NPT	1 5	
G 2"	1 6	
2" NPT	1 7	
Flange EN1092-1 Form B		
DN 10 (PN 40/PN 100)	2 0	
DN 15 (PN 40/PN 100)	2 1	
DN 25 (PN 40/PN 100)	2 2	
DN 40 (PN 40/PN 100)	2 3	
DN 50 (PN 40/PN 100)	2 4	
Flange ASME/ANSI B 16.5		
½" (class 150/class 600)	3 0	
¾" (class 150/class 600)	3 1	
1" (class 150/class 600)	3 2	
1 ½" (class 150/class 600)	3 3	
2" (class 150/class 600)	3 4	

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

Selection and Ordering data	Order No.	Order code
SITRANS F C sensors		
MASS 2100 without heating jacket	7ME4100 -	
MASS 2100 heated, DN 15 connection	7ME4200 -	
MASS 2100 heated, ½ inch, ANSI B16.5 connection	7ME4210 -	
Dairy screwed connection DIN 11851		
DN 10 (PN 40)	4 0	
DN 15 (PN 40)	4 1	
DN 25 (PN 40)	4 2	
DN 32 (PN 40)	4 3	
DN 40 (PN 25)	4 4	
DN 50 (PN 25)	4 5	
DN 65 (PN 25)	4 6	
Dairy clamp connection ISO 2852		
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 only	A	
MASS 6000, Ex d, stainless steel enclosure, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC with EEx-de [ia/ib] T3 -T6 Ex-approval.	B	
MASS 6000, IP67, Polyamide enclosure, cable glands M20, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC.	C	
MASS 6000, IP67, Polyamide enclosure, cable glands M20, 1 current, 1 freq./pulse and 1 relay output, 115/230 V AC 50/60 Hz	D	
MASS 6000, IP67, Polyamide enclosure, cable glands ½" NPT, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC	E	
MASS 6000, IP67, Polyamide enclosure, cable glands ½" NPT, 1 current, 1 freq./pulse and 1 relay output, 115/230 V AC 50/60 Hz, ½" NPT	F	
Cable		
No cable	A	
5 m (16 ft) cable	B	
10 m (32 ft) cable	C	
25 m (82 ft) cable	D	
50 m (164 ft) cable	E	
75 m (246 ft) cable	F	
150 m (492 ft) cable	G	
Calibration/verification		
Standard calibration 3 flow x 2 points	1	
Stand. calibration matched pair 3 flow x 2 points	2	
Accredited calibration matched pair 5 flow x 2 points (DANAK)	3	
Extended calibration customer-specified select Y60, Y61, Y62 or Y63 (see additional information)	8	

SITRANS F flowmeters

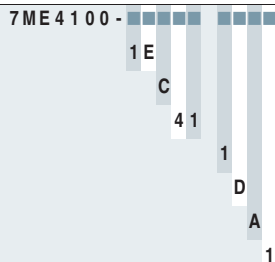
SITRANS F C

MASS 2100 DI 3 to DI 40

Dairy MLFB example

MASS 2100

Sensor size DI 15, W 1.4435/316L
 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

Accessories

Description	Dimension	Order No.
Mating parts for hygienic fittings DIN 11851	DN 10	FDK-085U1016
	DN 15	FDK-085U1017
Includes:	DN 25	FDK-085U1019
• 2 unions	DN 32	FDK-085U1020
• 2 mating parts (for welding in)	DN 40	FDK-085U1021
• 2 EPDM gaskets	DN 50	FDK-085U1022
	DN 65	FDK-085U1023
Mating parts for hygienic clamp ISO 2852	25 mm	FDK-085U1029
	40 mm	FDK-085U1031
Includes:	50 mm	FDK-085U1032
• 2 clamps		
• 2 mating parts		
• 2 EPDM gaskets		

Gaskets for MASS 2100

Description	Dimension	Order No.
2 EPDM gaskets with collar for mounting set DIN 11851	DN 10	FDK-085U1006
	DN 15	FDK-085U1007
	DN 25	FDK-085U1009
	DN 32	FDK-085U1010
	DN 40	FDK-085U1011
	DN 50	FDK-085U1012
	DN 65	FDK-085U1013

Spare parts

Description	Length	Order No.
Cable with multiple plug	5 m (16.4 ft)	FDK-083H3015
Standard blue cable between MASS 6000 and MASS 2100, 5 x 2 x 0.34 mm ² twisted and screened in pairs.	10 m (32.8 ft)	FDK-083H3016
Temperature range -20 °C ... +110 °C (-4 °F ... +230 °F)	25 m (82 ft)	FDK-083H3017
	50 m (164 ft)	FDK-083H3018
	75 m (246 ft)	FDK-083H3054
	150 m (492 ft)	FDK-083H3055
Adapter for MASS 2100		FDK-083L8889
Multiple plug for cable mounting		FDK-083H5056
2 kB SENSORPROM unit (Sensor Serial No. and Order No. must be specified by ordering)		FDK-083H4410

Selection and Ordering data

Order code

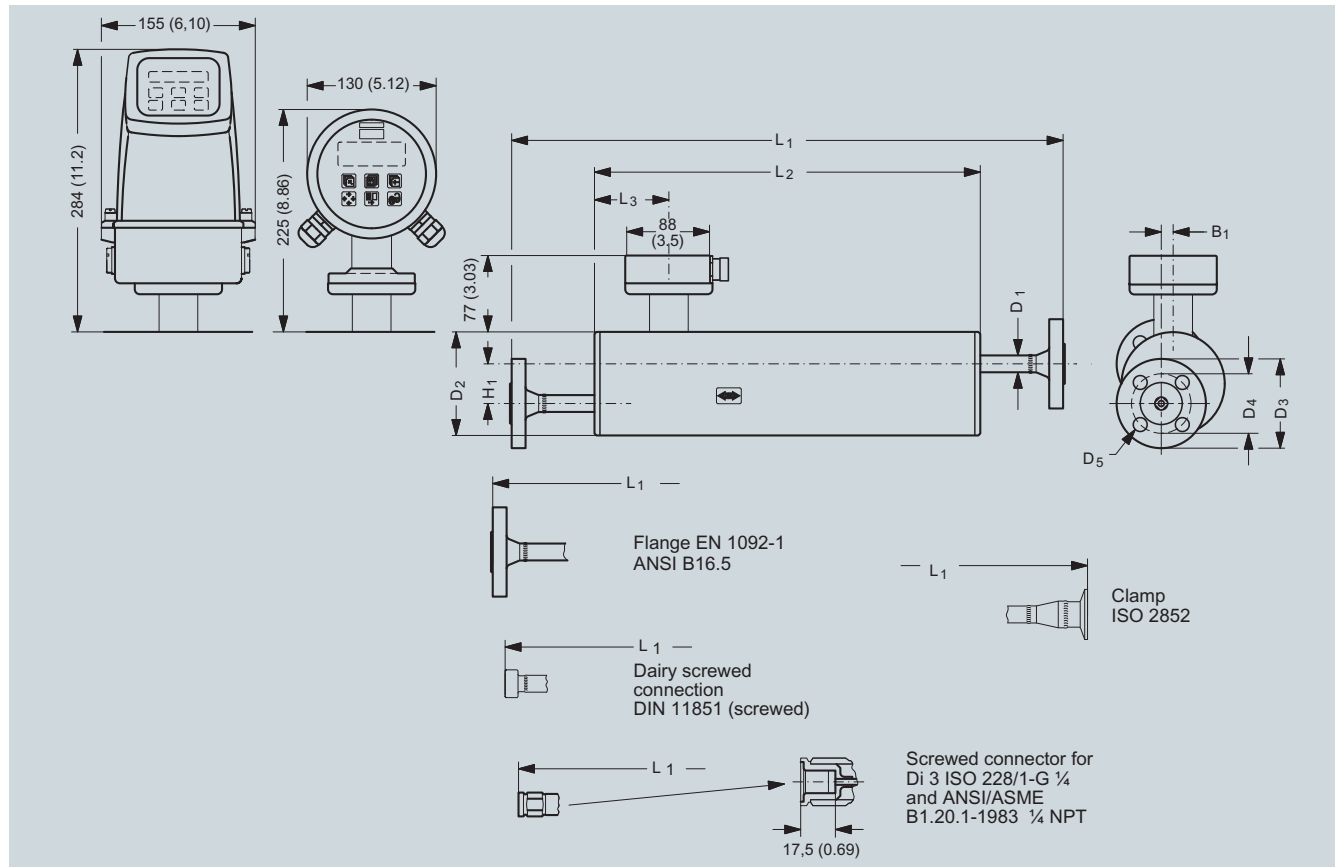
Additional information

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

Pressure testing certificate PED: 97/23/EC	C11
Material certificate EN 10204-3.1B	C12
Welding certificate NDT X-ray: EN 25817/B DI 3 sensor only: NDT-Penetrant: ISO 3452	C13
Factory certificate according to EN 10204 2.2	C14
Factory certificate according to EN 10204 2.1	C15
Tag name plate, stainless steel	Y17
Tag name plate, plastic	Y18
Customer-specific transmitter setup	Y20
Customer-specified, matched pair (5x2)	Y60
Customer-specified calibration (5x2)	Y61
Customer-specified, matched pair (10x1)	Y62
Customer-specified calibration (10x1)	Y63
Special version	Y99

Dimensional drawings

MASS 2100 sensor



Dimension in mm (inch)

Sensor size	Connections			L1 mm	L2 mm	L3 mm	H1 mm	B1 mm	D1 mm	D2 mm	D3 mm	D4 mm	D5 mm
DI (inch)	Type	Pressure rating	Size										
DI 3 (1/8")	Pipe thread ISO 228/1 - G 1/4	PN 100	1/4"	400	280	75.0	60	0	21.3	104	-	-	-
	Pipe thread ANSI/ASME B 1.20.1 - 1/4" NPT	PN 100	1/4"	400	280	75.0	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	75.0	44	20	21.3	129	105	75.0	14.0
	Flange EN 1092-1	PN 40	DN 15	620	444	75.0	44	20	21.3	129	95.0	65.0	14.0
	Flange ANSI B16.5	Class 150	1/2"	639	444	75.0	44	20	21.3	129	88.9	60.5	15.7
	Flange ANSI B16.5	Class 600	1/2"	660	444	75.0	44	20	21.3	129	95.3	66.5	15.7
	Screwed connection DIN 11851	PN 40	DN 15	586	444	75.0	44	20	21.3	129	-	-	-
	Clamp ISO 2852	PN 16	25 mm	624	444	75.0	44	20	21.3	129	-	-	-
DI 25 (1")	Flange EN 1092-1	PN 100	DN 25	970	700	74.5	126	25	33.7	219	140.0	100.0	18.0
	Flange EN 1092-1	PN 40	DN 25	934	700	74.5	126	25	33.7	219	115.0	85.0	14.0
	Flange ANSI B16.5	Class 150	1"	967	700	74.5	126	25	33.7	219	108.0	79.2	15.7
	Flange ANSI B16.5	Class 600	1"	992	700	74.5	126	25	33.7	219	124.0	88.9	19.1
	Screwed connection DIN 11851	PN 40	DN 32	922	700	74.5	126	25	33.7	219	-	-	-
	Clamp ISO 2852	PN 16	38 mm	940	700	74.5	126	25	33.7	219	-	-	-

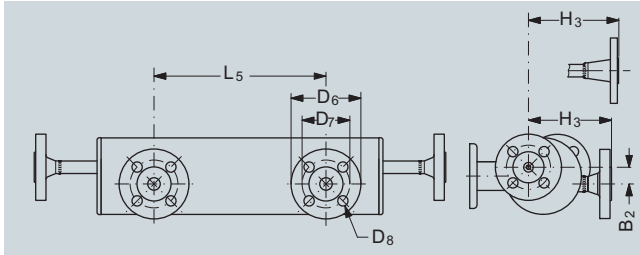
SITRANS F flowmeters

SITRANS F C

MASS 2100 DI 3 to DI 40

Sensor size	Connections			L1 mm	L2 mm	L3 mm	H1 mm	B1 mm	D1 mm	D2 mm	D3 mm	D4 mm	D5 mm
DI 40 (1½")	Flange EN 1092-1	PN 100	DN 40	1100	850	71.5	180	0	48.3	273	170.0	125.0	22.0
	Flange EN 1092-1	PN 40	DN 40	1064	850	71.5	180	0	48.3	273	150.0	110.0	18.0
	Flange ANSI B16.5	Class 150	1½"	1100	850	71.5	180	0	48.3	273	127.0	98.6	15.7
	Flange ANSI B16.5	Class 600	1½"	1128	850	71.5	180	0	48.3	273	155.4	114.3	22.4
	Screwed connection DIN 11851	PN 25	DN 50	1090	850	71.5	180	0	48.3	273	-	-	-
	Clamp ISO 2852	PN 25	51 mm	1062	850	71.5	180	0	48.3	273	-	-	-
Sensor size	Connections			L1 inch	L2 inch	L3 inch	H1 inch	B1 inch	D1 inch	D2 inch	D3 inch	D4 inch	D5 inch
DI (inch)	Type	Pressure rating	Size										
DI 3 (1/8")	Pipe thread ISO 228/1 - G¼	PN 100	¼"	15.75	11.02	2.95	2.36	0	0.84	4.09	-	-	-
	Pipe thread ANSI/ASME B 1.20.1 - ¼" NPT	PN 100	¼"	15.75	11.02	2.95	2.36	0	0.84	4.09	-	-	-
DI 6 (¼")	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	½"	24.57	15.35	2.44	1.57	0.47	0.67	4.09	3.5	2.38	0.62
	Flange ANSI B16.5	Class 600	½"	23.94	15.35	2.44	1.57	0.47	0.67	4.09	3.75	2.62	0.62
	Screwed connection DIN 11851	PN 40	DN 10	20.94	15.35	2.44	1.57	0.47	0.67	4.09	-	-	-
	Clamp ISO 2852	PN 16	25 mm	22.44	15.35	2.44	1.57	0.47	0.67	4.09	-	-	-
DI 15 (½")	Flange EN 1092-1	PN 100	DN 15	24.96	17.48	2.95	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	2.95	1.73	0.79	0.84	5.08	3.74	2.56	0.55
	Flange ANSI B16.5	Class 150	½"	25.16	17.48	2.95	1.73	0.79	0.84	5.08	3.5	2.38	0.62
	Flange ANSI B16.5	Class 600	½"	25.98	17.48	2.95	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	2.95	1.73	0.79	0.84	5.08	-	-	-
	Clamp ISO 2852	PN 16	25 mm	24.57	17.48	2.95	1.73	0.79	0.84	5.08	-	-	-
DI 25 (1")	Flange EN 1092-1	PN 100	DN 25	38.19	27.56	2.93	4.96	0.98	1.33	8.62	3.94	5.51	0.71
	Flange EN 1092-1	PN 40	DN 25	36.77	27.56	2.93	4.96	0.98	1.33	8.62	4.53	3.35	0.55
	Flange ANSI B16.5	Class 150	1"	38.07	27.56	2.93	4.96	0.98	1.33	8.62	4.25	3.12	0.62
	Flange ANSI B16.5	Class 600	1"	39.06	27.56	2.93	4.96	0.98	1.33	8.62	4.88	3.50	0.75
	Screwed connection DIN 11851	PN 40	DN 32	36.30	27.56	2.93	4.96	0.98	1.33	8.62	-	-	-
	Clamp ISO 2852	PN 16	38 mm	37.01	27.56	2.93	4.96	0.98	1.33	8.62	-	-	-
DI 40 (1½")	Flange EN 1092-1	PN 100	DN 40	43.31	33.46	2.81	7.09	0	1.9	10.75	4.92	6.69	0.87
	Flange EN 1092-1	PN 40	DN 40	41.89	33.46	2.81	7.09	0	1.9	10.75	5.91	4.33	0.71
	Flange ANSI B16.5	Class 150	1½"	43.31	33.46	2.81	7.09	0	1.9	10.75	5	3.88	0.62
	Flange ANSI B16.5	Class 600	1½"	44.41	33.46	2.81	7.09	0	1.9	10.75	6.12	4.50	0.88
	Screwed connection DIN 11851	PN 25	DN 50	42.91	33.46	2.81	7.09	0	1.9	10.75	-	-	-
	Clamp ISO 2852	PN 25	51 mm	41.81	33.46	2.81	7.09	0	1.9	10.75	-	-	-

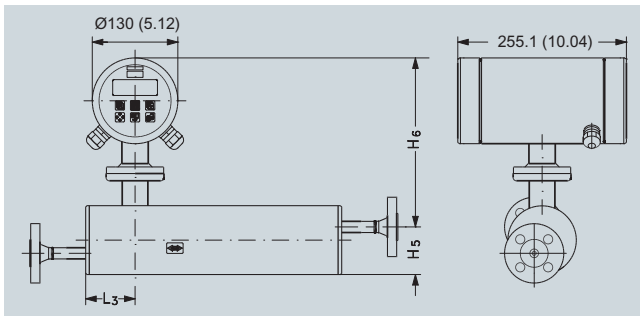
MASS 2100 sensor with "heating jacket"



Dimensions in mm (inch)

Sensor size	Connections heated			L5	L3	H3	B2	D6	D7	D8
DI (inch)	Type	Pressure rating	Size	mm (inch)	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)	75 (2.95)	122 (4.8)	22 (0.87)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class 150	1/2"	234 (9.21)	75 (2.95)	131.6 (5.18)	22 (0.87)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)
DI 6 (1/4")	EN 1092-1	PN 40	DN 15	234 (9.21)	62 (2.44)	112 (4.41)	22.7 (0.89)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class 150	1/2"	234 (9.21)	62 (2.44)	121.6 (4.79)	22.7 (0.89)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)
DI 15 (1/2")	EN 1092-1	PN 40	DN 15	234 (9.21)	75 (2.95)	126.5 (4.98)	31.5 (1.24)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class 150	1/2"	234 (9.21)	75 (2.95)	136.1 (5.36)	31.5 (1.24)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)
DI 25 (1")	EN 1092-1	PN 40	DN 15	420 (16.54)	75 (2.93)	213.6 (8.41)	60 (2.36)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class 150	1/2"	420 (16.54)	75 (2.93)	223.2 (8.79)	60 (2.36)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)
DI 40 (1 1/2")	EN 1092-1	PN 40	DN 15	500 (19.68)	71 (2.81)	267.5 (10.53)	43 (1.69)	95 (3.74)	65.0 (2.56)	14.0 (0.55)
	ANSI B16.5	Class 150	1/2"	500 (19.68)	71 (2.81)	277.1 (10.91)	43 (1.69)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)

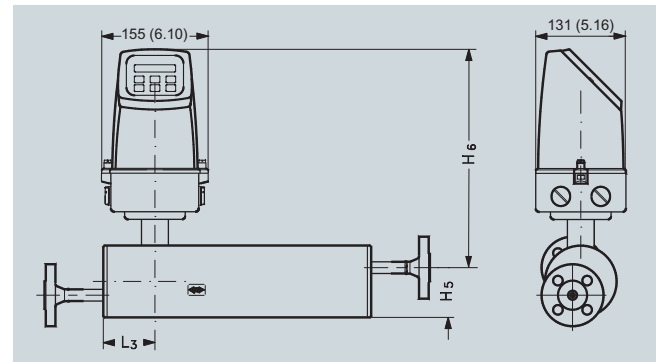
MASS 2100 and MASS 6000 Ex d compact version



Dimensions in mm (inch)

Sensor size [DI (inch)]	L3 [mm (inch)]	H5 [mm (inch)]	H6 [mm (inch)]	H5 + H6 [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 2100 and MASS 6000 IP67 compact version



Dimensions in mm (inch)

Sensor size [DI (inch)]	L3 [mm (inch)]	H5 [mm (inch)]	H6 [mm (inch)]	H5 + H6 [mm (inch)]
3 (1/8)	75 (2.95)	82 (3.23)	306 (12.04)	388 (15.28)
6 (1/4)	62 (2.44)	72 (2.83)	316 (12.44)	388 (15.28)
15 (1/2)	75 (2.95)	87 (3.43)	326 (12.83)	413 (16.26)
25 (1)	75 (2.95)	173 (6.81)	330 (13.00)	503 (19.80)
40 (1 1/2)	75 (2.95)	227 (8.94)	330 (13.00)	557 (21.93)

SITRANS F flowmeters

SITRANS F C

SITRANS F C MC2

Overview



SITRANS F C MC2 is available as a standard version (DN 50 to DN 150 (2" to 6")) and a hygienic, EHEDG-certified version (DN 20 to DN 80 (¾" to 3")). MC2 and MC2 hygienic are 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 range and density accuracy and delivers true multi-parameter measurements i.e.: mass flow, volume flow, density, temperature and fraction flow.

The very compact sensor construction makes installation and commissioning of even the largest sizes very straight forward and easy.

Benefits

- High accuracy better than 0.15% of mass flow rate
- Large dynamic turn-down range
- Densitometer performance available through a density accuracy better than 0.001 g/cm³
- Space-saving split-flow sensor design facilitating low pressure loss
- Parallel S-tube design and optimal oriented inductive sensors enhances accuracy and turn-down range
- Self-draining in both horizontal and vertical position
- Rigid enclosure design reduces the influence from pipeline vibration and thermal stress
- 4-wire Pt100 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- SENSORPROM enables true "plug & play". Installation and commissioning in less than 10 min.
- Safe Ex-design EEx em [ib] IIC
- Sensor pipe available in high-quality AISI 316L stainless steel W 1.4571 or Hastelloy C4 W 2.4610 offering optimum corrosion resistance
- The sensor calibration factor is also valid for gas measurement

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 range which is a paramount in many applications.

The main applications of the coriolis flowmeter can be found in all industries, such as:

Chemical & pharma	Detergents, bulk chemicals, pharmaceuticals, acids, alkalis
Food & beverage EHEDG-certified	Dairy products, beer, wine, soft-drinks, plato/brix, fruit juices and pulps, bottling, CO ₂ dosing, CIP-liquids
Oil & gas	Gas measurement, furnace control, test separators, LPG, oil bunkering
Water & 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 MC2 sensor consists of 2 parallel measuring pipes, welded directly onto a flow-splitter at each end to eliminate a direct coupling to the process connectors and significantly reduce effects from external vibrations.

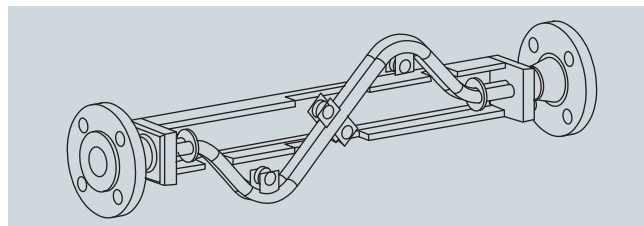
The flow-splitters are welded onto a rigid sensor housing which acts as a mechanical low-pass filter.

The sensor is available in 2 material configurations, AISI 316L or Hastelloy C4 with a wide variety of process connections.

The enclosure is made of stainless steel AISI W 304 1.4301 with a grade of encapsulation of IP67/NEMA 4.

The sensor is Ex-approved EEx em [ib] IIC

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



MC2 is based on increased safety and can therefore only be connected to: MASS 6000 19" or SIFLOW FC070 Ex standard versions which have to be remote mounted in the safe area. For all non-hazardous applications the complete MASS 6000 transmitter program can be used.



Hazardous area
Zone 1 + 2



Safe area

Function

The measuring principle is based on coriolis law of movement, see "System information coriolis mass flowmeters".

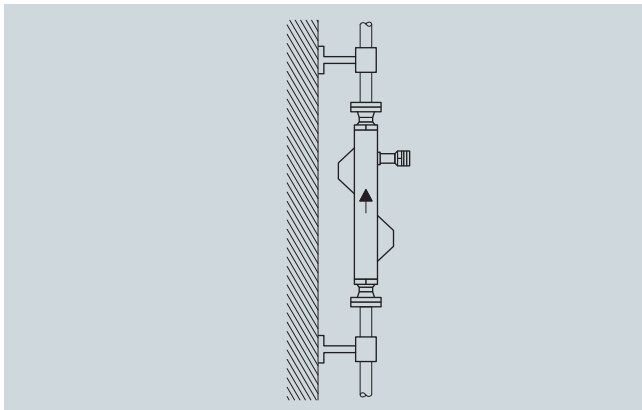
Integration

Installation guidelines MC2 DN 50 ... DN 150

Installation of sensor

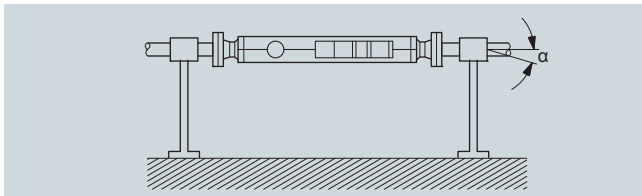
The optimal installation orientation is a vertical installation with an upward flow as shown in the following figure. This has the advantage that any solids contained in the fluid will settle downward and gas bubbles will move upward out of the meter tube when the flow rate is zero. Additionally, it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

Vertical orientation:

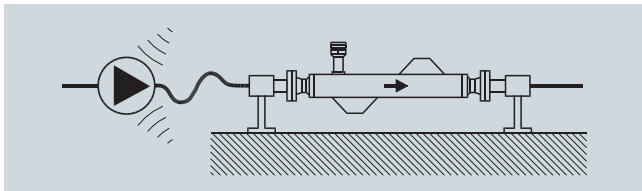


Vertical installation self-draining (upward flow)

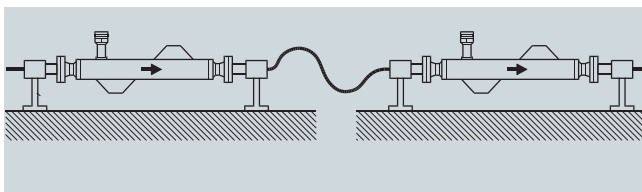
Horizontal orientation, self-draining



Avoid vibrations

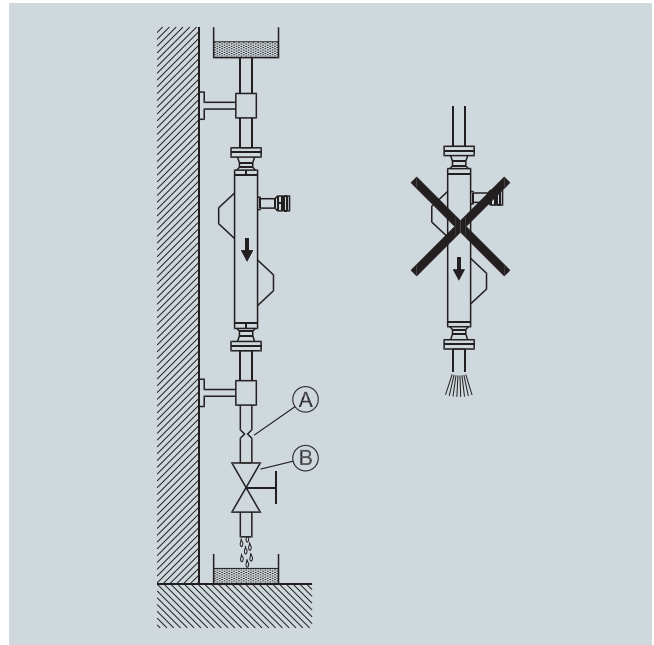


Avoid cross talk



Installation in a drop line

Mount with reduction or orifice to prevent partially draining (A) orifice, pipe constriction (B) valve.



Installation in a drop line

SITRANS F flowmeters

SITRANS F C

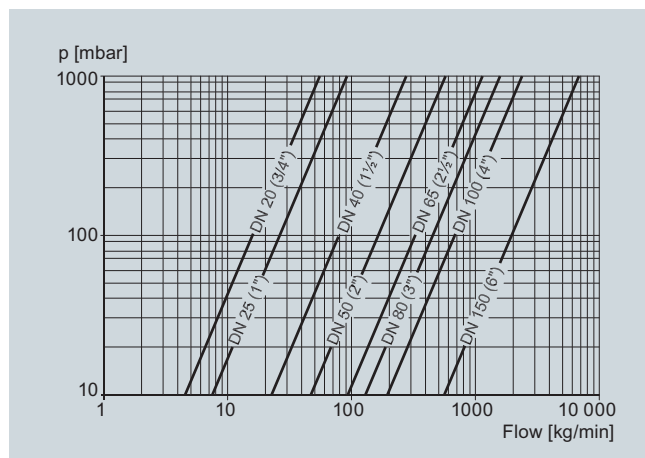
SITRANS F C MC2

Technical specifications

Versions	mm (inch)	20 (¾)	25 (1)	40 (1½)	50 (2)	65 (2½)	80 (3)	100 (4)	150 (6)
Inside pipe diameter	2 x mm (inch)	8.0 (0.31)	10.0 (0.39)	16.0 (0.63)	22.0 (0.87)	29.0 (1.14)	34.0 (1.34)	43.1 (1.69)	76.1 (2.99)
Pipe wall thickness	mm (inch)	1.0 (0.04)	1.0 (0.04)	1.0 (0.04)	1.5 (0.06)	1.5 (0.06)	2.0 (0.08)	2.6 (0.10)	3.2 (0.13)
Mass flow measuring range at pressure drop of 2 bar (29 psi) at 1 g/cm ³ (0.036 lb/inch ³)	kg/h (lb/h)	6 000 (13 227)	9 000 (19 841)	28 500 (62 831)	55 200 (121 695)	113 400 (250 000)	147 600 (325 401)	249 600 (550 273)	660 000 (1 455 049)
Density	g/cm ³ (lb/inch ³)	0.5 ... 3.5 (0.18 ... 0.126)							
Fraction e.g. Brix	°Brix	0 ... 100							
Temperature									
Standard-version		-50 ... +180 °C (-58 ... +356 °F)							
Ex-version		-20 ... +180 °C (-4 ... +356 °F)							
Liquid pressure measuring pipe		20	25	40					
Stainless steel (DIN 2413, 20 °C (68 °F))	bar (psi)	100 (1450)	100 (1450)	100 (1450)	100 (1450)	100 (1450)	100 (1450)	40 (580)	40 (580)
Materials									
Measuring pipe		SS 1.4571 or Hastelloy C4							
Flange		SS 1.4571 or Hastelloy C4							
Enclosure		IP67							
Enclosure material/connection box		W 1.4301/aluminium, max. pressure 40 bar (580 psi)							
Process connections		See dimensional drawings							
Electrical connections		Screw terminals, M 20							
Cable		5 x 2 x 0.35 mm ² twisted and screened in pairs, ext. Ø 12 mm							
Cable length		10, 25, 75 or 150 m (32, 80, 240 or 480 ft.)							
Ex-version									
ATEX 1443X		≤ DN 40: II 1/2 EEx em [ib] IIC T2-T6 ≥ DN 50: II 2G EEx em [ib] IIC T2-T6							
Weight approx.	kg (lb)	13 (28)	14 (31)	18 (40)	34 (75)	47 (104)	58 (128)	91 (201)	261 (573)

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

Pressure drop



SITRANS F flowmeters

SITRANS F C

SITRANS F C MC2

Selection and Ordering data	Order No.	Order code
SITRANS F C flow sensors MC2	7ME4300-	
Nominal diameter		
W 1.4571/316Ti		
DN 50	1 A	
DN 65	1 B	
DN 80	1 C	
DN 100	1 D	
DN 150	1 E	
Hastelloy C4		
DN 50	2 A	
DN 65	2 B	
DN 80	2 C	
DN 100	2 D	
DN 150	2 E	
Nominal pressure		
PN 40	A	
PN 100	B	
Class 150	C	
Class 300	D	
Class 600	E	
Clamps/screwed-connections	F	
Process connections		
Flange EN 1092-1		
DN 50 (PN 40/PN 100)	2 0	
DN 65 (PN 40/PN 100)	2 1	
DN 80 (PN 40/PN 100)	2 2	
DN 100 (PN 40)	2 3	
DN 150 (PN 40)	2 4	
Flange ASME/ANSI		
2" (class 150/300/600)	3 0	
2 ½" (class 150/300/600)	3 1	
3" (class 150/300/600)	3 2	
4" (class 150/300)	3 3	
6" (class 150/300)	3 4	
Dairy screwed connection to DIN 11851		
DN 50 (PN 25)	4 0	
DN 65 (PN 25)	4 1	
DN 80 (PN 25)	4 2	
DN 100 (PN 25)	4 3	
Dairy clamp connection DIN 32676 Tri-clamp		
50 mm clamp (PN 16)	5 0	
66 mm clamp (PN 10)	5 1	
81 mm clamp (PN 10)	5 2	
100 mm clamp (PN 10)	5 3	
Aseptic nut flange DIN 11864-2 form A for pipes dimensioned by DIN 11866		
DN 40 (1½")	6 0	
DN 50 (2")	6 1	
DN 65 (2½")	6 2	
DN 80 (3")	6 3	
DN 100 (4")	6 4	
Configuration		
Flow and density (5 kg/m³)	1	
Flow, Brix/Plato and density (1 kg/m³) ¹⁾	2	
Density (1 kg/m³) ¹⁾	5	
Fraction (specified by customer) and density (1 kg/m³) ¹⁾	9	N 0 Y

Selection and Ordering data	Order No.	Order code
SITRANS F C flow sensors MC2	7ME4300-	
Ex-approval		
Standard, without explosion protection	A	
With explosion protection: Ex, ATEX, FM Class I, Div 1	B	
Cable		
No cable (see accessories)	A	
Calibration		
Standard	1	
Matched pair	2	

¹⁾ Extended density and fraction not possible with DN 150.

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

Dairy MLFB example	
MC2 sensor	7ME4300-
Sensor size DN 80.	
material W 1.4571/316Ti	
Nominal pressure: Clamps	
DIN 11851, DN 80, PN 25	
	
Configuration/calibration type: flow and density (5 kg/m³)	
Without Ex approval	
No cable	
Standard calibration	

Selection and Ordering data	Order code
Additional information	
Please add "-Z" to Order No. and specify Order code(s) and plain text.	
Pressure testing certificate PED: 97/23/EC	C11
Material certificate EN 10204-31B	C12
Welding certificate NDT X-ray: EN 25817/B	C13
Factory certificate according to EN 10204 2.2	C14
Factory certificate according to EN 10204 2.1	C15
Tag name plate, stainless steel	Y17
Tag name plate, plastic	Y18
Customer-specific transmitter setup	Y20
Customer-specified, matched pair (5 x 2)	Y60
Customer-specified calibration (5 x 2)	Y61
Customer-specified, matched pair (10 x 1)	Y62
Customer-specified calibration (10 x 1)	Y63
Special version	Y99

Accessories

Description	Order No.
Cables from MC2 sensor to MASS 6000 transmitter	
10 m (32 ft)	FDK-083H3001
25 m (80 ft)	FDK-083H3002
75 m (240 ft)	FDK-083H3003
150 m (480 ft)	FDK-083H3004

Spare parts

Description	Order No.
2 kB SENSORPROM unit	FDK-083H4410
(Sensor Serial No. and Order No. must be specified by ordering)	

SITRANS F flowmeters

SITRANS F C

SITRANS F C MC2

Selection and Ordering data

Order No. Order code

SITRANS F C flow sensors MC2 for Hygienic applications only

7 ME 4 3 1 0 -

Nominal diameter

W 1.4435/316L

DN 20

1 A

DN 25

1 B

DN 40

1 C

DN 50

1 D

DN 65

1 E

DN 80

1 F

Nominal pressure 40 bar, PN 25

Clamps/screwed-connections

F

Pressure and Process connections

Dairy screwed connection to DIN 11851

DN 20 (¾"), PN 25

4 0

DN 25 (1"), PN 25

4 1

DN 40 (1½"), PN 25

4 2

DN 50 (2"), PN 25

4 3

DN 65 (2½"), PN 25

4 4

DN 80 (3"), PN 25

4 5

Dairy clamp connectors for DIN 32676

Tri-clamp

20 mm clamp

4 7

26 mm clamp

4 8

38 mm clamp

4 9

50 mm clamp

5 0

66 mm clamp

5 1

81 mm clamp

5 2

Aseptic connectors DIN 11864-2 Form A for
DIN tubes

DN 20

5 8

DN 25

5 9

DN 40

6 0

DN 50

6 1

DN 65

6 2

DN 80

6 3

Configuration

Flow and density (5 kg/m³)

1

Flow, Brix/Plato and density (5 kg/m³)¹⁾

2

Density (1 kg/m³)¹⁾

5

Flow, fraction (customer specified application
from the net)

9

N 0 Y

Ex-approval

Standard, without explosion protection

A

With explosion protection: Ex, ATEX,
FM Class I, Div 1

B

Cable

No cable (see accessories)

A

Calibration

Standard

1

Matched pair

2

Selection and Ordering data

Order code

Additional information

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

Pressure testing certificate PED: 97/23/EC

C11

Material certificate EN 10204-31B

C12

Welding certificate NDT X-ray: EN 25817/B

C13

Factory certificate according to EN 10204 2.2

C14

Factory certificate according to EN 10204 2.1

C15

Tag name plate, stainless steel

Y17

Tag name plate, plastic

Y18

Customer-specific transmitter setup

Y20

Customer specified, matched pair (5x2)

Y60

Customer-specified calibration (5x2)

Y61

Customer-specified, matched pair (10x1)

Y62

Customer-specified calibration (10x1)

Y63

Special version

Y99

Accessories

Description

Order No.

Cables from MC2 sensor to MASS 6000 transmitter

10 m (32 ft)

FDK-083H3001

25 m (80 ft)

FDK-083H3002

75 m (240 ft)

FDK-083H3003

150 m (480 ft)

FDK-083H3004

Spare parts

Description

Order No.

2 kB SENSORPROM unit

(Sensor Serial No. and Order No. must be specified
by ordering)

FDK-083H4410

Dairy MLFB example

MC2 sensor

Sensor size DN40
material 1.4435/316L

Nominal pressure: Clamp

DIN 11851, DN 40, PN 25

Configuration/calibration type: flow
and density (5 kg/m³)

Without Ex approval

No cable

Standard calibration

7 ME 4 3 1 0 -

1 C

F

4 2

1

A

A

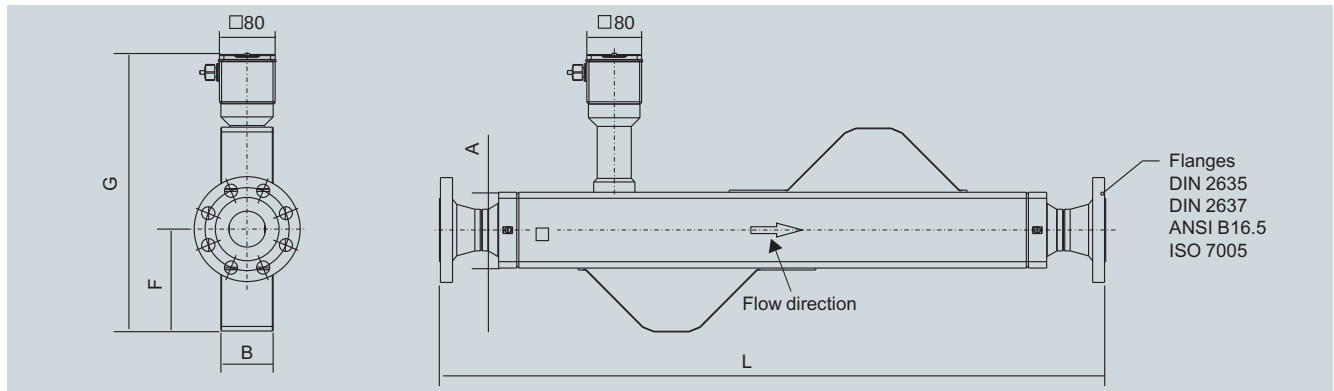
1

¹⁾ Extended density and fraction not possible with DN 150.

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

Dimensional drawings

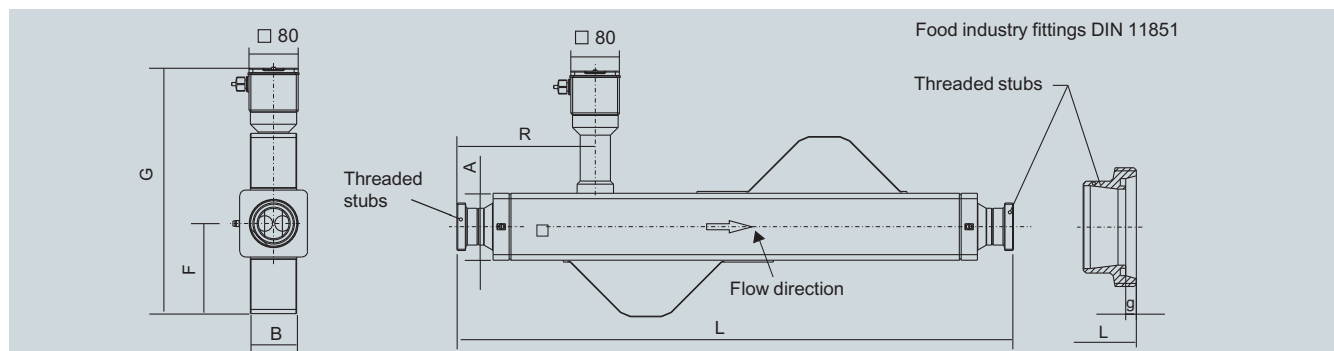
Remote design, flanged construction, DIN/ANSI



Meter size		Process connection size		L [mm (inch)]						G ¹⁾ [mm (inch)]	F [mm (inch)]	B [mm (inch)]	A [mm (inch)]	Weight kg
Inch	DN	Inch	DN	DIN 11864-2 form A	DIN 2635 PN 40	DIN 2637 PN 100	ANSI CL 150	ANSI CL 300	ANSI CL 600					
2	50	2	50	918 (36.14)	940 (37.01)	979 (38.54)	970 (38.19)	980 (38.58)	1001 (39.41)	403 (15.87)	148 (5.83)	80 (3.15)	110 (4.33)	34
		2½	65	1081 (42.56)	1100 (43.31)	1148 (45.20)	1218 (47.95)	1228 (48.35)	1248 (49.13)					38
2½	65	2	50	1197 (47.13)	1220 (48.03)	1259 (49.57)	1250 (49.21)	1260 (49.61)	1281 (50.43)					43
		2½	65	1081 (42.56)	1100 (43.31)	1148 (45.20)	1218 (47.95)	1228 (48.35)	1249 (49.17)	429 (16.89)	164 (6.64)	97 (3.82)	130 (5.12)	47
		3	80	1200 (47.24)	1220 (48.03)	1260 (49.61)	1240 (48.82)	1260 (49.61)	1282 (50.47)					50
3	80	2½	65	1310 (51.57)	1330 (52.36)	1378 (54.25)	1365 (53.74)	1375 (54.13)	1396 (54.96)					56
		3	80	1200 (47.24)	1220 (48.03)	1260 (49.61)	1240 (48.82)	1260 (49.61)	1282 (50.47)	456 (17.95)	186 (7.32)	108 (4.25)	140 (5.51)	58
		4	100	1463 (57.60)	1480 (58.27)	1530 (60.24)	1500 (59.06)	1520 (59.84)	1568 (61.73)					69
4	100	3	80	1618 (63.70)	1640 (64.57)	1680 (66.14)	1660 (65.35)	1680 (66.14)	1702 (67.01)					84
		4	100	1463 (57.60)	1480 (58.27)	1530 (60.24)	1500 (59.06)	1520 (59.84)	1568 (61.73)	500 (19.69)	215 (8.46)	131 (5.16)	170 (6.69)	91
		6	150	N/A	1778 (69.92)	N/A	1806 (71.10)	1826 (71.89)	N/A					120
6	150	6	150	N/A	2040 (80.31)	N/A	2070 (81.50)	2090 (82.28)	N/A	613 (24.13)	285 (11.22)	190 (7.84)	260 (9.84)	260

¹⁾ For EEx add 54 mm

Remote design, food industry fittings, DIN 11851



Meter size	Process connection size				L [mm (inch)]	g [mm (inch)]	G ¹⁾ [mm (inch)]	F [mm (inch)]	B [mm (inch)]	A [mm (inch)]	R [mm (inch)]	Weight kg
Inch	DN	Inch	DN									
2	50	2	50	Rd 78 x 1/6	918 (36.14)	7 (0.28)	403 (15.87)	148 (5.83)	80 (3.15)	110 (4.33)	177 (6.97)	30
		2½	65	Rd 95 x 1/6	1081 (42.56)	8 (0.31)					254 (10.00)	34
2½	65	2	50	Rd 78 x 1/6	1197 (47.13)	7 (0.28)					291 (11.46)	40
		2½	65	Rd 95 x 1/6	1081 (42.56)	8 (0.31)	429 (16.89)	164 (6.46)	97 (3.82)	130 (5.12)	227 (10.91)	44
		3	80	Rd 110 x 1/6	1200 (47.24)	8 (0.31)					281 (11.06)	47
3	80	2½	65	Rd 95 x 1/6	1310 (51.57)	8 (0.31)	456 (17.95)	186 (7.32)	108 (4.25)	140 (5.51)	319 (12.56)	54
		3	80	Rd 110 x 1/6	1200 (47.24)	8 (0.31)					258 (10.16)	56
		4	100	Rd 110 x 1/6	1463 (57.60)	10 (0.39)					381 (15.00)	60
4	100	3	80	Rd 110 x 1/6	1618 (63.70)	8 (0.31)	500 (19.69)	215 (8.46)	131 (5.16)	170 (6.69)	401 (15.79)	82
		4	100	Rd 130 x ¼	1463 (57.60)	10 (0.39)					314 (12.36)	86

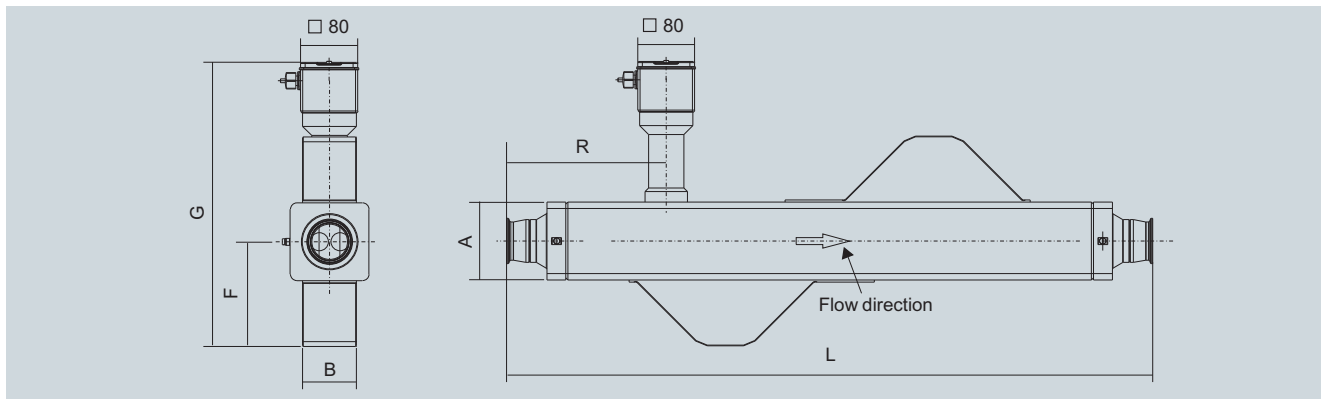
¹⁾ For EEx add 54 mm

SITRANS F flowmeters

SITRANS F C

SITRANS F C MC2

Remote design, Tri-clamp DIN 32676 (ISO 2852)



Dimensions in mm (inch)

Meter size		Process connection size		L [mm (inch)] ± 3	G ¹⁾ [mm (inch)]	F [mm (inch)]	B [mm (inch)]	A [mm (inch)]	R [mm (inch)]	Weight [kg]
Inch	DN	Inch	DN							
2	50	2	50	913 (35.94)	403 (15.87)	148 (5.83)	80 (3.15)	110 (4.33)	225 (8.86)	26
		2½	65	1073 (42.24)					305 (12.01)	27
2½	65	2	50	1192 (46.93)	429 (16.89)	164 (6.64)	97 (3.82)	130 (5.12)	335 (13.19)	36
		2½	65	1073 (42.24)					275 (10.83)	37
		3	80	1180 (46.46)					328 (12.91)	38
3	80	2½	65	1302 (51.26)	456 (17.95)	186 (7.32)	108 (4.25)	140 (5.51)	378 (14.88)	45
		3	80	1180 (46.46)					296 (11.65)	44
		4	100	1448 (57.01)					430 (16.93)	46
4	100	3	80	1598 (62.91)	500 (19.69)	215 (8.46)	131 (5.16)	170 (6.69)	440 (17.32)	71
		4	100	1448 (57.01)					365 (14.37)	69

¹⁾ For EEx add 54 mm

SITRANS F flowmeters

SITRANS F C

SITRANS F C MC2

Process Connections

- Flanges DIN/ASME
- Tri-Clamp DIN 32676
 - DN 15 to DN 50: Series 3
 - DN 65 to DN 100: Series 1
- Food Industry fittings DIN 11851

The max. allowable operating pressure is a function of the process connection type, the fluid temperature, the bolts and the gaskets.

Pressure Rating

- PN 16, PN 40, PN 100 (to DN 80 (3"))
Class 150, Class 300, Class 600 (to DN 80 (3"))

Housing as secondary containment

- Max. 40 bar

Pressure Equipment Directive 97/23/EG

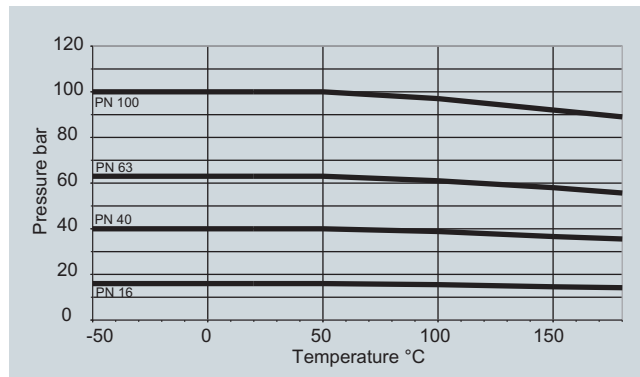
- Conformity evaluation category III, fluid group 1, gas, diagramme 6

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

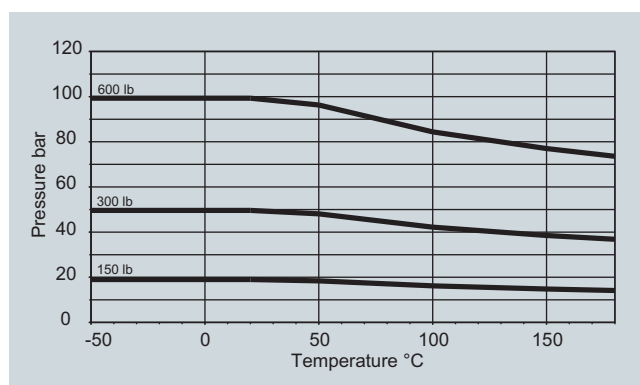
Material strength for process connections

Process connection	Size		PS _{max.} bar (psi g)	TS _{max.} °C (°F)	TS _{min.} °C (°F)
	DN	Inch			
Thread acc. DIN 11851	15 ... 40	½ ... 1½	40 (580)	140 (284)	-40 (-40)
	50 ... 100	2 ... 4	25 (363)	140 (284)	-40 (-40)
Tri-Clamp acc. DIN 32676	15 ... 50	½ ... 2	16 (232)	120 (248)	-40 (-40)
	65 ... 100	2½ ... 4	10 (145)	120 (248)	-40 (-40)

Material Loads Curves for Flanged Flowmeters



DIN-Flanges SS 1.4571/316Ti to DN 100 (4")



ASME-Flanges SS 1.4571/316Ti to DN 100 (4")

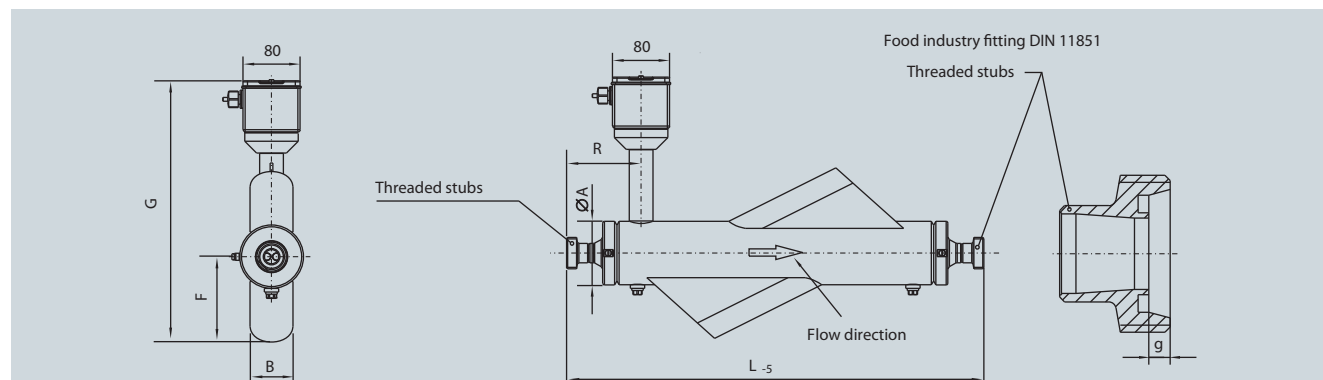
SITRANS F flowmeters

SITRANS F C

SITRANS F C MC2

Dimensional drawings

Remote Design, Food Industry Fitting, DIN 11851



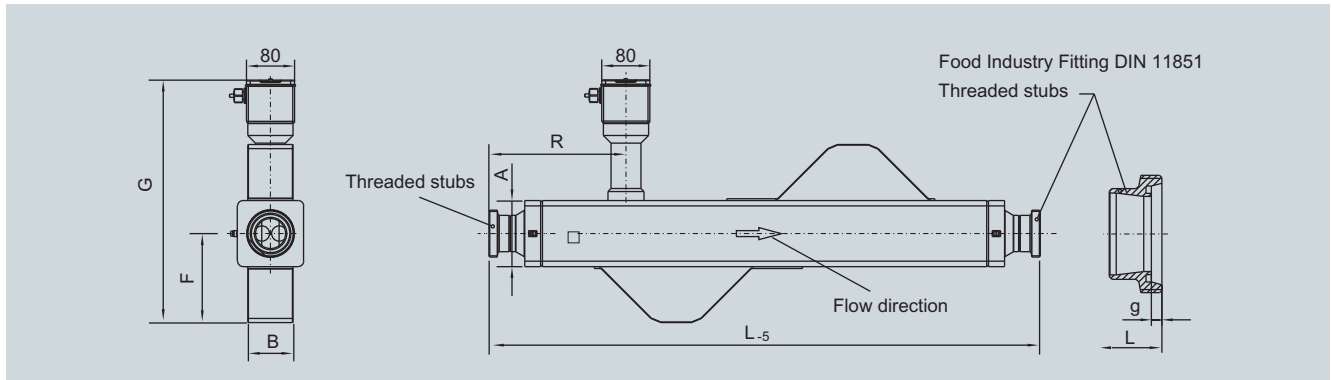
Dimensions in mm (inch)

DN (Size)		Process connections			L ₅	g	G	F	B	ØA	R	Weight
DN	inch	DN	inch		mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	kg
20	¾"	15	½"	Rd34 x 1/8	672 (26.46)	4 (0.16)	358 (14.94)	127 (5.00)	66 (2.60)	89 (3.50)	152 (5.98)	13
		20	¾"	Rd44 x 1/6	583 (22.95)	6 (0.24)					102 (4.02)	
		25	1"	Rd52 x 1/6	683 (26.89)	7 (0.28)					152 (5.98)	
25	1"	20	¾"	Rd44 x 1/6	743 (29.25)	6 (0.24)	358 (14.94)	127 (5.00)	66 (2.60)	89 (3.50)	162 (6.38)	14
		25	1"	Rd52 x 1/6	643 (25.31)	7 (0.28)					112 (4.11)	
		40	1½"	Rd65 x 1/6	786 (30.94)	7 (0.28)					185 (7.28)	



If this connection is supplied with an EHEDG-certified device, the device nominal sizes must correspond with the connection nominal sizes!

Remote Design, Food Industry Fitting, DIN 11851



Dimensions in mm (inch)

DN (Size)		Process connections			L ₅	g	G	F	B	ØA	R	Weight
DN	inch	DN	inch		mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	kg
40	1½"	25	1	Rd52 x 1/6	864 (34.02)	7 (0.28)	374 (14.72)	129 (5.08)	64 (2.52)	90 (3.54)	218 (8.58)	16
		40	1½	Rd65 x 1/6	761 (29.96)	7 (0.28)					164 (6.46)	18
		50	2"	Rd78 x 1/6	918 (36.14)	7 (0.28)					241 (9.49)	19
50	2"	40	1½	Rd65 x 1/6	1025 (40.35)	7 (0.28)	403 (15.87)	148 (5.83)	80 (3.15)	110 (4.33)	233 (9.17)	28
		50	2"	Rd78 x 1/6	918 (36.14)	7 (0.28)					177 (6.97)	30
		65	2½	Rd95 x 1/6	1081 (42.56)	8 (0.31)					254 (10.00)	34
65	2½"	50	2"	Rd78 x 1/6	1197 (47.13)	7 (0.28)	429 (16.89)	164 (6.46)	97 (3.82)	130 (5.12)	291 (11.46)	40
		65	2½	Rd95 x 1/6	1081 (42.56)	8 (0.31)					227 (8.94)	44
		80	3"	Rd110 x 1/4	1200 (47.24)	8 (0.31)					281 (11.06)	47
80	3"	65	2½	Rd95 x 1/6	1310 (51.57)	8 (0.31)	456 (17.95)	186 (7.32)	108 (4.25)	140 (5.51)	319 (12.56)	54
		80	3"	Rd110 x 1/4	1200 (47.24)	8 (0.31)					258 (10.16)	56
		100	4"	Rd130 x 1/4	1463 (57.60)	10 (0.39)					381 (15.00)	60
100	4"	80	3"	Rd110 x 1/4	1618 (63.70)	8 (0.31)	500 (19.68)	215 (8.46)	131 (5.16)	170 (6.69)	401 (15.79)	82
		100	4"	Rd130 x 1/4	1463 (57.60)	10 (0.39)					314 (12.36)	86



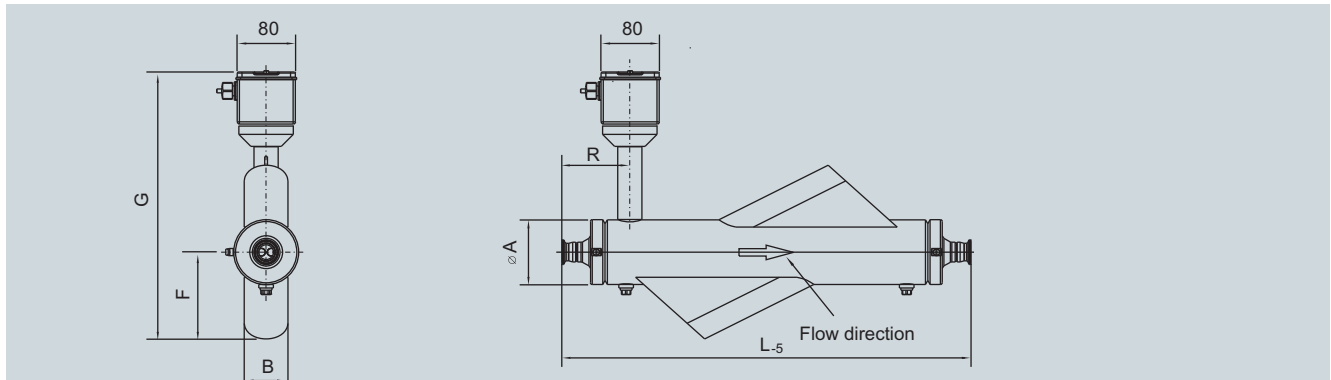
If this connection is supplied with an EHEDG-certified device, the device nominal sizes must correspond with the connection nominal sizes!

SITRANS F flowmeters

SITRANS F C

SITRANS F C MC2

Remote Design, Tri-Clamp DIN 32676



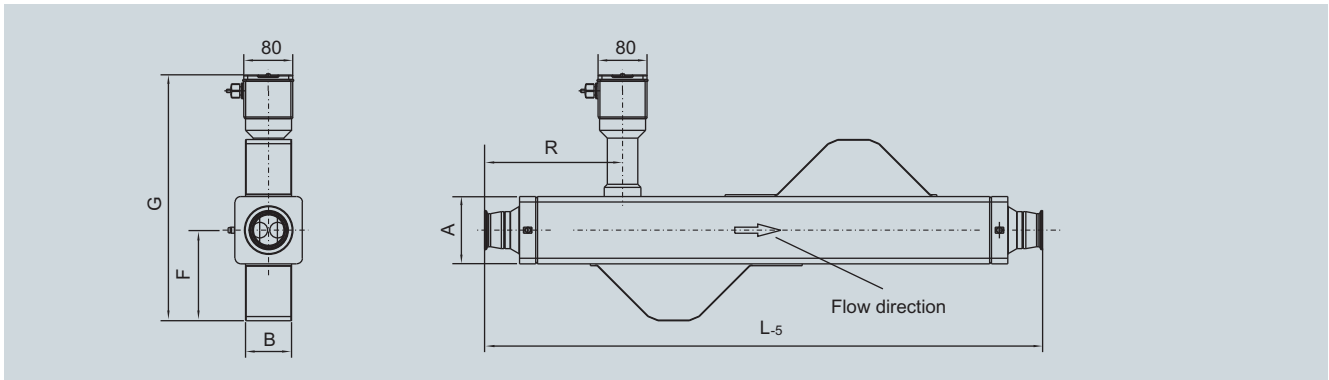
Dimensions in mm (inch)

DN (Size)		Process connections		L ₅	G	F	B	ØA	R	Weight
DN	inch	DN		mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	kg
20	¾"	15 (½")	DIN 32676	656 (25.83)	358 (14.09)	127 (5.00)	66 (2.60)	89 (3.50)	140 (5.51)	12
		20 (¾")		561 (22.09)					92 (3.62)	
		25 (1")		661 (26.02)					142 (5.59)	
25	1"	20 (¾")	DIN 32676	721 (28.39)	358 (14.09)	127 (5.00)	66 (2.60)	89 (3.50)	152 (5.98)	13
		25 (1")		621 (24.45)					102 (4.02)	
		40 (1½")		773 (30.43)					180 (7.09)	



If this connection is supplied with an EHEDG-certified device, the device nominal sizes must correspond with the connection nominal sizes!

Remote Design, Tri-Clamp DIN 32676



Dimensions in mm (inch)

DN (Size)		Process connections		L-5	G	F	B	ØA	R	Weight
DN	inch	DN	inch	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	kg
40	1½"	25	1	842 (33.15)	374 (14.72)	129 (5.08)	64 (2.52)	90 (3.54)	242 (9.53)	17
		40	1½	748 (29.45)					195 (7.68)	17
		50	2"	913 (35.94)					278 (10.94)	18
50	2"	40	1½	1012 (39.84)	403 (15.87)	148 (5.83)	80 (3.15)	110 (4.33)	275 (10.83)	27
		50	2"	913 (35.94)					225 (8.86)	26
		65	2½	1073 (42.24)					305 (12.01)	27
65	2½"	50	2"	1192 (46.93)	429 (16.89)	164 (6.46)	97 (3.82)	130 (5.12)	335 (13.19)	36
		65	2½	1073 (42.24)					275 (10.83)	37
		80	3"	1180 (46.46)					328 (12.91)	38
80	3"	65	2½	1302 (51.26)	456 (17.95)	186 (7.32)	108 (4.25)	140 (5.51)	378 (14.88)	45
		80	3"	1180 (46.46)					296 (11.65)	44
		100	4"	1448 (57.01)					430 (16.93)	46
100	4"	80	3"	1598 (62.91)	500 (19.68)	215 (8.46)	131 (5.16)	170 (6.69)	440 (17.32)	71
		100	4"	1448 (57.01)					365 (14.37)	69



If this connection is supplied with an EHEDG-certified device, the device nominal sizes must correspond with the connection nominal sizes!

SITRANS F flowmeters

SITRANS F US

System information and selection guide

Overview

Siemens offers two types of ultrasonic flowmeters, in-line flowmeters and clamp-on flowmeters. This offers the end user the maximum flexibility to choose the technology that best fits his needs. The following chapter shows the in-line versions.



SITRANS F US in-line ultrasonic flowmeters measure flow of electrically conductive and non-conductive liquids.

Application

In-line ultrasonic flowmeters are suitable for measuring the flow of liquids with good acoustic permeability, independent of conductivity, viscosity, temperature, density and pressure.

- max. 3% solids
- max. 3% air and gas
- max. 350 cSt

The main applications can be found in the following sectors:

- Raw water intake for water treatment plants
- Treated waste water
- Power generation and utility
- Oil and gas industry and petrochemical industry
- Irrigation systems
- Cooling water plants within the industry and in power stations
- Plants transporting non-conductive liquids
- HART/4 to 20 mA output
- PROFIBUS PA
- ATEX
- MODBUS

Benefits

SITRANS F US ultrasonic in-line flowmeters measure liquids with good acoustic permeability, independent of conductivity, viscosity, temperature, density and pressure.

- Sensor sizes from DN 50 to 1200 mm (2" to 48"), optional down to DN 25 (1")
- Standard with calibration certificate
- In-line retrofit as 1 and 2 track up to DN 4000 (160")
- Dedicated transmitter portfolio for HVAC, power generation, utility and general industry as well as more demanding applications
- Custody transfer approvals within district heating
- Compact and remote transmitter installation
- Comprehensively self-diagnostic for error indication and logging
- Exchange of the transducers without interrupting operation
- HART, PROFIBUS PA and MODBUS communication
- ATEX
- Mains or battery-powered solutions
- Battery lifetime of up to 8 year

SITRANS F flowmeters

SITRANS F US

System information and selection guide

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



SONO 3300/ FUS060	SONO 3100/ FUS060	SONOKIT/ FUS060	FUE380	FUS380	FUS880
7ME3300...	7ME3100...	7ME3210.../ 7ME3220...	7ME3410...	7ME3400	7ME...

Industry						
Water, treated waste water	XXX	XX	XXX		XXX	XX
Irrigation	XX	XX	XXX		XXX	XXX
Utility, district heating water, cooling	XXX	XX	XXX	XXX	XXX	
Utility, district heating, CT approvals required				XXX	XXX	
Oil	XX	XXX	XX		X	
Cryogenic fluids (only on request)		XXX				
On- and Offshore applications	XX	XXX	XX		X	
Chemical	XXX	XXX	X			
Design						
Electronic compact mounted				•	•	
Electronic remote mounted	•	•	•	•	•	•
Transducers can be replaced under pressure		•	•			
Retrofit on existing steel pipes/non-weldable			•			•
Transmitter enclosure						
Polyamid, IP67				•	•	•
Die-cast aluminium (painted), IP65	•	•	•			
Communication						
HART	•	•	•			
PROFIBUS PA	•	•	•			
MODBUS RTU / RS 232 and RS 485				•	•	•
Power supply						
3.6 V Battery				•	•	•
115 ... 230 V AC	•	•	•	•	•	•
115 ... 230 V AC and 3.6 V battery backup				•	•	•
24 V AC/DC	•	•	•			
Accuracy						
0.25% (with 4-track system on request)		•				
0.50%	•	•	•	•	•	•
Sensor design						
1 track ultrasonic measurement (special request)		• ¹⁾	• ³⁾			•
2 track ultrasonic measurement	•	•	•	•	•	•
4 track ultrasonic measurement		•	•			
Dimension						
DN 25 ... 40 ²⁾	1" ... 1½" ²⁾		• ¹⁾			
DN 50	2"	•	• ¹⁾		•	•
DN 65	2½"	•	• ¹⁾		•	•
DN 80	3"	•	• ¹⁾		•	•
DN 100	4"	•	•	• ³⁾	•	•
DN 125	5"	•	•	• ³⁾	•	•
DN 150	6"	•	•	• ³⁾	•	•
DN 200	8"	•	•	•	•	•
DN 225	9"	•	•	•	•	•
DN 250	10"	•	•	•	•	•
DN 300	12"	•	•	•	•	•
DN 350	14"		•	•	•	•
DN 400	16"		•	•	•	•
DN 500	20"		•	•	•	•
DN 600	24"		•	•	•	•
DN 700	28"		•	•	•	•

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

¹⁾ Also available as 1-track solution on request (down to DN 25 (1"))

³⁾ SONOKIT 1-Track DN100 to DN2400 and 2-track DN200 to DN4000

²⁾ Only SONO 3100 1-track (special request)

SITRANS F flowmeters

SITRANS F US

System information and selection guide

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



SONO 3300/ FUS060	SONO 3100/ FUS060	SONOKIT/ FUS060	FUE380	FUS380	FUS880
7ME3300...	7ME3100...	7ME3210.../ 7ME3220...	7ME3410...	7ME3400	7ME...

Dimension (continued)

DN 800	32"		•	•	•	•	•
DN 900	36"		•	•	•	•	•
DN 1000	40"		•	•	•	•	•
DN 1200	48"		•	•	•	•	•
DN 1400 ... 4000	54" ... 160"			• ³⁾			

Process connection

Flanges	•	•		•	•		
Flangeless (for weld-in)		•					

Flanges Norm

EN 1092-1	•	•		•	•		
EN 1759-1	•	•					
ANSI B16.5		•					

Pressure rating

PN 6			•				•
PN 10	•	•	•	•	•		
PN 16	•	•	•	•	•		
PN 25		•	•	•	•		
PN 40	•	•	•	•	•		
Class 150		•					
Class 300		•					
PN 160		• ⁴⁾					
Class 2500		• ⁴⁾					

Pipe, flange and transducer material

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

Media temperature

°C	°F						
-200	-328		• ^{1) 2) 4)}				
-20	-4		•	•			
-10	+14	•	•	•			
+2	+35.6	•	•	•		•	•
+60	+140	•	•	•	•	•	•
+120	+248	•	•	•	• ⁵⁾	• ⁵⁾	
+150	+302	•	•	•	• ⁶⁾	• ⁶⁾	
+160	+320	•	•	•	•	•	
+190	+374		•	•	•	•	
+200	+392		•	•	•	•	
+250	+482		• ⁴⁾				

Measuring principle

Transit time principle	•	•	•	•	•	•	•
------------------------	---	---	---	---	---	---	---

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

¹⁾ Also available as 1-track solution on request (down to DN 25 (1"))

²⁾ Only SONO 3100 1-track (special request)

³⁾ SONOKIT 1-Track DN100 to DN2400 and 2-track DN200 to DN4000

⁴⁾ Only on special request

⁵⁾ Compact

⁶⁾ Pipe material bronze brass

SITRANS F flowmeters

SITRANS F US

System information and selection guide

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



					
SONO 3300/ FUS060	SONO 3100/ FUS060	SONOKIT/ FUS060	FUE380	FUS380	FUS880
7ME3300...	7ME3100...	7ME3210.../ 7ME3220...	7ME3410...	7ME3400	7ME...

Approvals

Custody transfer approval for energy metering

MID class 2				●		
EN 1434 class 2 (Heat meter approval)				●		
OIML R 75 class 2 (Heat meter approval)				●		
PTB, Germany				●		
Other country specific type approval available for:						
- Russia (GOSS/GOST)	●	●	●	●	●	
- Rumania	●	●	●	●	●	
- China				●		

Ex approval

Ex d ATEX		●	●			
Ex i ATEX	●	●	●			

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

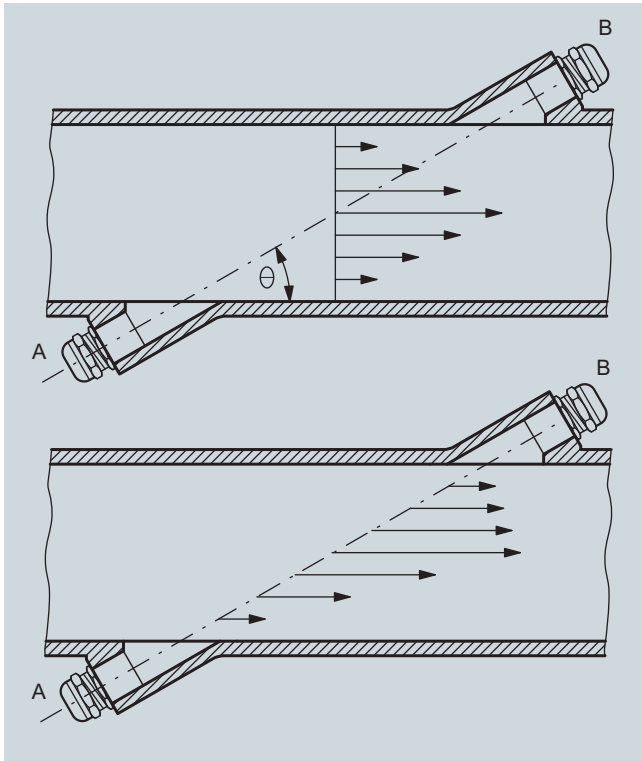
SITRANS F flowmeters

SITRANS F US

System information and selection guide

Function

Physical principle



Velocity distribution along sound path

A sound wave traveling in the same direction as the liquid flow arrives at point B from point A in a shorter time than the sound wave traveling against the direction of flow (from point B to A). The difference in sound transit time indicates the flow velocity in the pipe.

Since delay time is measured at short intervals both in and against flow direction, viscosity and temperature have no influence on measurement accuracy.

Measuring principle

In SITRANS F US flowmeters the two ultrasonic transducers are placed at an angle θ in relation to the pipe axis. The transducers function as transmitters and receivers of the ultrasonic signals. Measurement is performed by determining the time the ultrasonic signal takes to travel with and against the flow. The principle can be expressed as follows:

$$v = K \cdot (t_{B,A} - t_{A,B}) / (t_{A,B} \cdot t_{B,A}) = K \cdot \Delta t / t^2$$

v = Average flow velocity

t = Transit time

K = Proportional pipe geometry factor

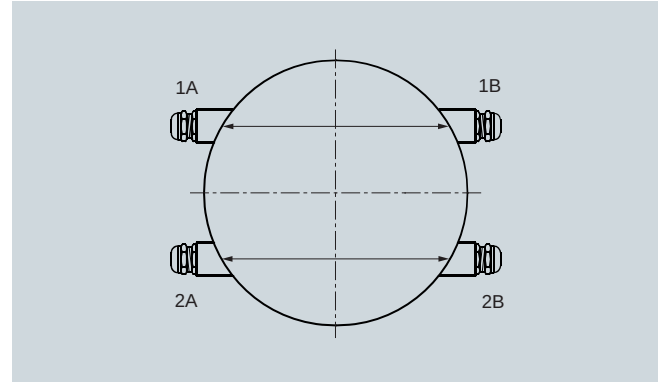
This measuring principle offers the advantage that it is independent of variations in the actual sound velocity of the liquid, i.e. independent of the temperature.

Proportional factor K is determined by wet calibration.

Direct signal processing

The ultrasonic signal is sent directly between the transducers. The advantage gained sending signals from point to point is an extremely good signal strength.

2-track solution



Ultrasonic 2-track flowmeter with 4 transducers. In the upper track transducers 1A / 1B and in the lower track 2A / 2B are displayed.

The accuracy of ultrasonic flowmeters depends on the pipe geometry before and after the flowmeter and the number of ultrasonic measuring tracks.

When water flows through a pipe, it has a tendency to swirl and/or flow with different velocities inside the pipe, depending on the pipe design.

A 2-track ultrasonic flowmeter offers:

- less sensitivity to upstream obstruction like bends, pumps or valves.
- high security in the measurements as the meter continues to measure even if, for some reason, one track stops working.

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

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

4-track ultrasonic flowmeters

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

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

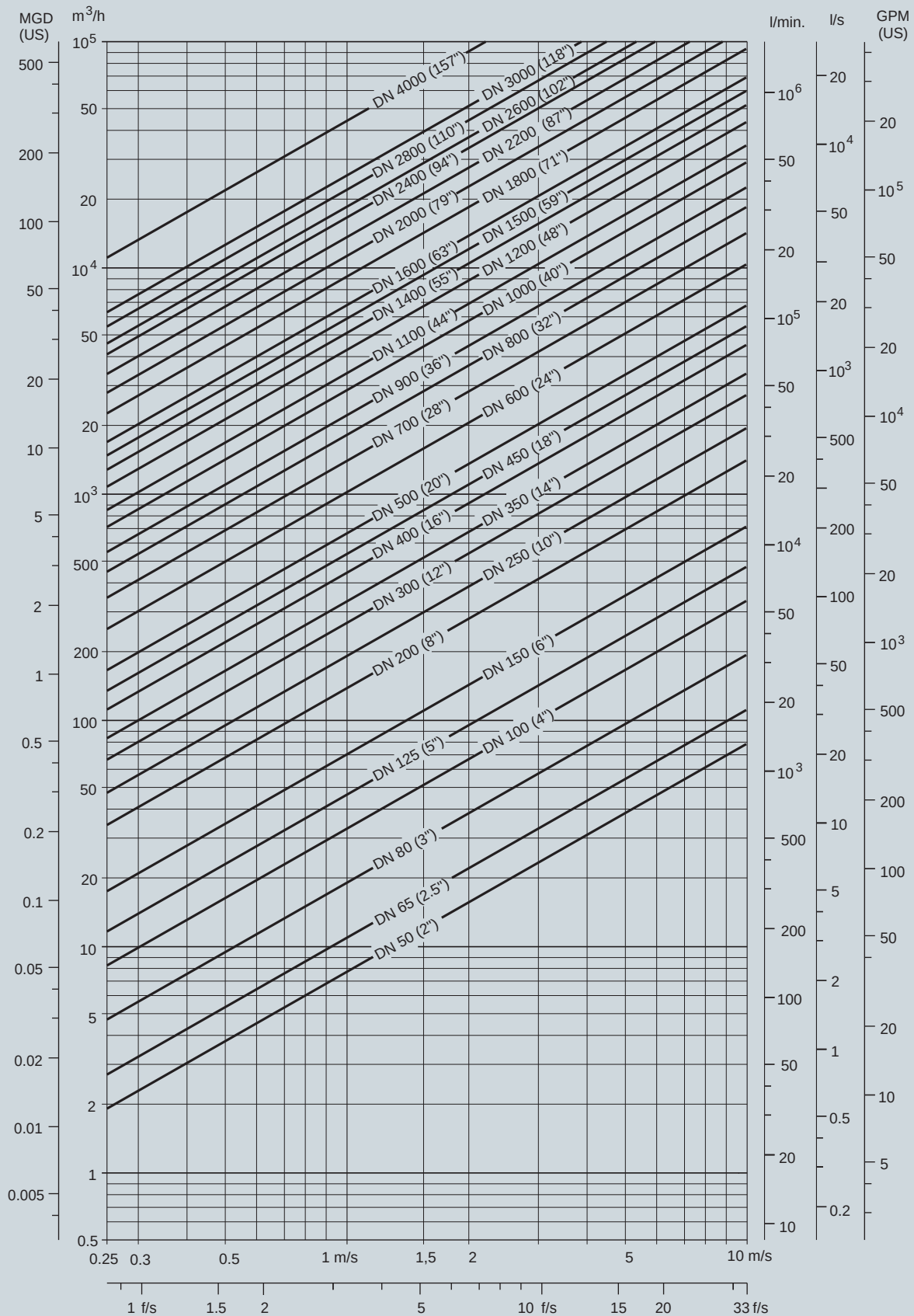
Please contact Siemens Flow Instruments for specific applications.

SITRANS F flowmeters

SITRANS F US

System information and selection guide

Technical specifications



Nominal size and flow

SITRANS F flowmeters

SITRANS F US

System information and selection guide

Guidelines for selection of sensor

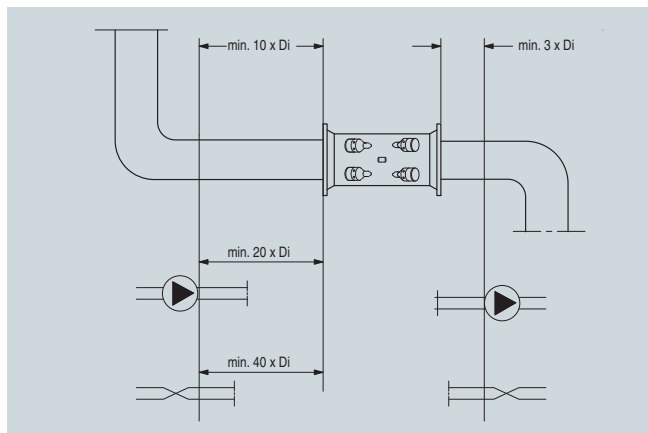
- Min. measuring range: 0 ... 0.25 m/s
- Max. measuring range: 0 ... 10 m/s

Normally nominal flow velocity is within the measuring range 1 ... 3 m/s.

Flow velocity calculation formula:

- $v = (4 \times Q_{\max}) / (\pi \times D_i^2 \times 3600)$
- v in m/s, $Q_{\max}$ in m³/h, D_i in m

Inlet and outlet conditions



Recommended inlets and outlets

To maximize performance inlet and outlet must be straight. There must be a certain distance between flowmeter and bends, pumps and valves. It is also important to centre the flowmeter in relation to pipe flanges and gaskets.

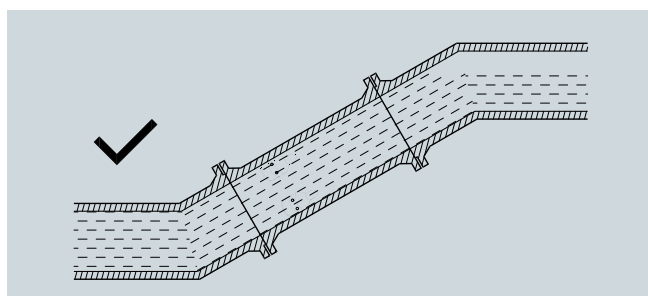
Valves must always be installed after the flowmeter. The only exception is installation of the sensor in a vertical pipe. In this case a valve below the sensor is necessary to allow zero point adjustment. It is important to select a valve which does not alter the flow when fully open.

Recommended inlet/outlet

	SONO 3300, SONO 3100, SONOKIT 2-track	FUS380/FUE380 ¹⁾	SONOKIT 1-track
90° bend	10 x D _i	10 x D _i	20 x D _i
Fully opened valve	10 x D _i	10 x D _i	20 x D _i
Partially opened valve	40 x D _i	40 x D _i	40 x D _i
2 x 90° bends in same plane	15 x D _i	15 x D _i	25 x D _i
2 x 90° bends in two planes	20 x D _i	20 x D _i	40 x D _i
Outlet	3 x D _i	3 x D _i	3 x D _i

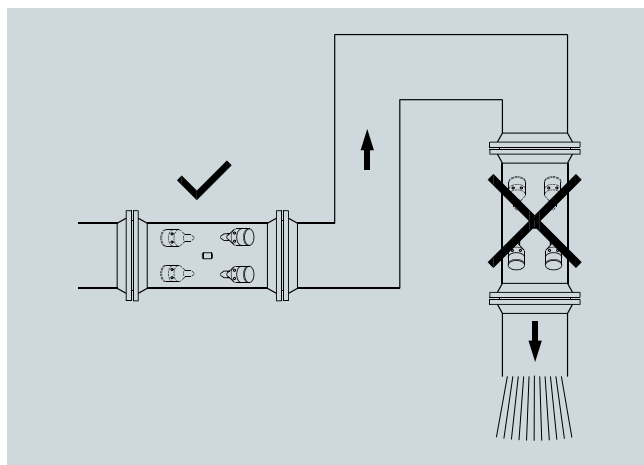
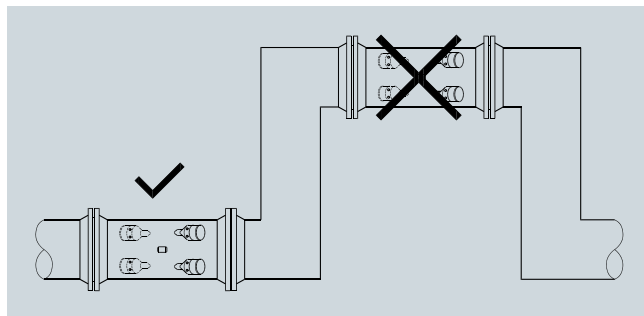
¹⁾ Inlet for FUE380 with MID approval should be for sizes ≥ DN 80: 1.5 m

The sensor must always be completely filled with liquid:

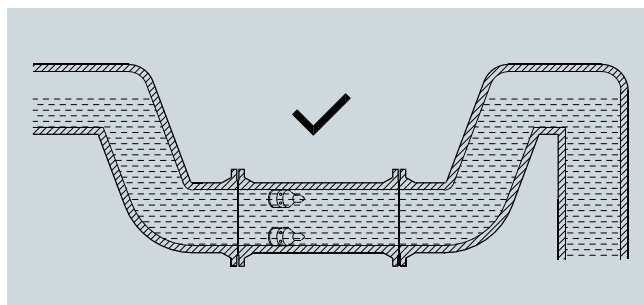


The following installations must be avoided:

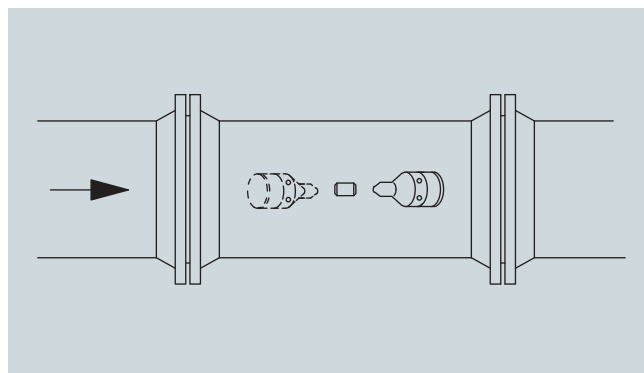
- Installation at the highest point of the pipe system
- Installation in vertical pipes with free outlet



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:

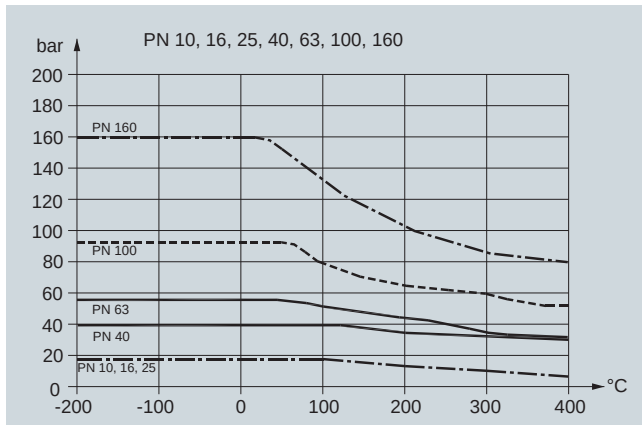


SITRANS F flowmeters

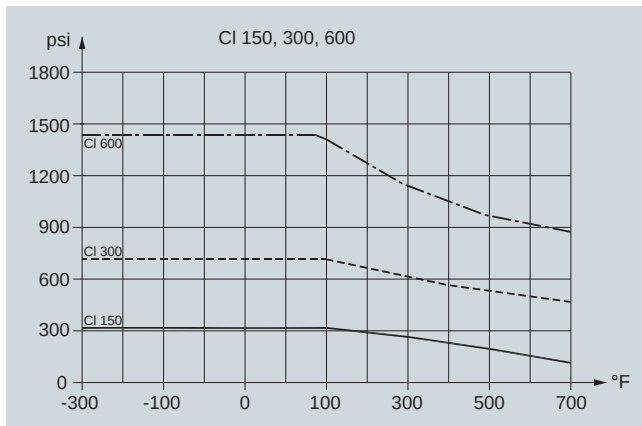
SITRANS F US

System information and selection guide

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 exact data please refer to the PED requirements.

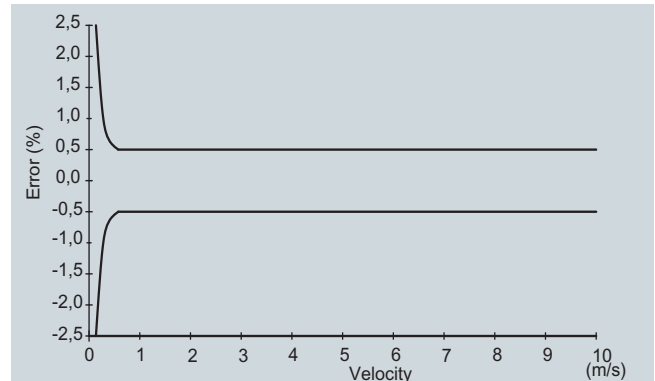
Reference conditions

To ensure maximum accuracy sensor and transmitter must be calibrated together.

Flowmeter calibration data are stored in the internal EPROM of the transmitters FUS060 or FUS080.

The system accuracy refers to the following systems:

SONO 3300/FUS060, SONO 3100/FUS060¹⁾.



Fluid	Water
Fluid temperature	22 ± 5 °C
Ambient temperature	22 ± 5 °C
Supply voltage	AC 115/230 V +10 ... -15% DC 24 V +25 ... -15%, AC 24 V ±15%
Straight inlet length	20 x 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	
• Reynolds number 1000 < Re < 5000	Better than 1%
• Reynolds number > 5000	Better than 0.5%

¹⁾ Only systems with transmitter FUS060. For systems with transmitter FUS080 see chapter on FUS380 and FUE380.

Additional effects of deviations from reference conditions

- Current output: As frequency output (± 0.1% of actual flow +0.05% FSO)
- Effect of ambient temperature: Frequency/pulse output: < 0.005% SPAN/K
- Current output: < ± 0.0075% SPAN/K
- Effect of supply voltage: 0.005% of measuring value at 1% change

SITRANS F flowmeters

SITRANS F US

Transmitter FUS060

Overview



SITRANS FUS060 transmitter

SITRANS FUS060 is a transit time based transmitter designed for ultrasonic flowmetering with any sensor in the FUS in-line series up to DN 4000. SITRANS FUS060 is engineered for high performance and is suitable for 1-, 2- and 4-tracks flowmeters.

Benefits

- Superior signal resolution for optimum turn down ratio
- Simple menu-based local operation with two-line display and four optical input elements, for unlimited use in potentially explosive atmospheres
- Self-monitoring and diagnostic
- Operate up to 4-tracks
- ATEX II 2G Ex dem [ia/ib] IIC T6/T4/T3
- Remote installation up to 120 m from sensor
- 1 analog output (4 to 20 mA) standard with HART-protocol, 1 digital frequency or pulse output, 1 relay output for limit, alarms, flow direction
- PROFIBUS PA Profile 2, 1 digital frequency or pulse output

Design

The transmitter type FUS060 is designed for remote installation in non-hazardous or hazardous areas.

The transmitter is designed for use in a flowmeter system together with sensors type SONOKIT, SONO 3300 and SONO 3100.

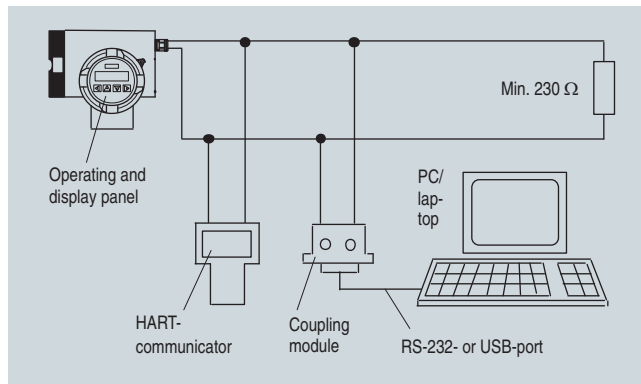
The FUS060 is ordered as part of a complete flowmeter system. It can be ordered separately as spare part and manually programmed with the sensor data.

Function

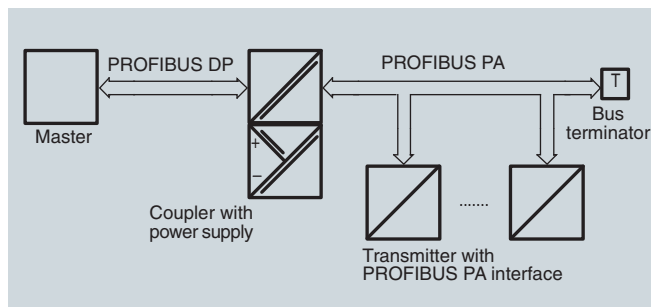
Displays and keypad

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

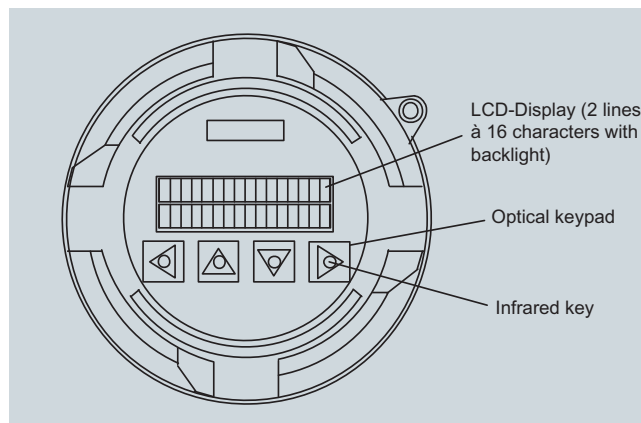


HART communication



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

SITRANS F flowmeters

SITRANS F US

Transmitter FUS060

The individual functions and parameters are selected using a hierarchical, multi-language input menu and four infrared keys. The parameters can be specifically selected and modified using codes, e.g.:

- Operating parameters such as measuring range, physical dimensions, device information
- Limits for flow, totalizer, ultrasonic velocity or ultrasonic amplitude
- Noise suppression using damping, error stages and hysteresis
- Display parameters (freely-configurable display)
- Display in volume or mass dimensions
- Density as constant input value for conversion of volume into mass dimensions
- Forward/backward measurement
- Flow direction
- Diagnostics functions and control values
- Functions of the PROFIBUS PA output: flow, net quantity (volume or mass), ultrasonic velocity, ultrasonic amplitude, forward quantity (volume or mass), backward quantity (volume or mass)
- Functions of the analog output: flow, ultrasonic velocity or ultrasonic amplitude
- Functions of digital output 1: pulse output, frequency output, limit, flow direction or device status
- Functions of digital output 2: limit, flow direction or device status
- Simulation of output signal via analog output, digital output 1 and digital output 2

The HART protocol is implemented via the analog output (current output). Using this communication facility, the device can be parameterized with a PC/laptop and SIMATIC PDM software in addition to local operation.

In the SITRANS F version with PROFIBUS PA, the analog output is replaced by the digital PROFIBUS PA output. The device can then be parameterized via PROFIBUS communication and with SIMATIC PDM in addition to local operation.

Technical specifications

Input

Nominal diameters and measuring ranges	2-track DN 50 ... DN 4000 (optionally also for 1 and 4-track)
Max. cable length	120 m (395 ft) (shielded coaxial cable) and for Ex-versions max. 3 m (9.84 ft)

Output

Analog output	
• Signal range	4 ... 20 mA
• Upper limit	20 ... 22.5 mA, adjustable
• Signal on alarm	3.6 mA, 22 mA, or 24 mA
• Load	Max. 600 Ω ; $\geq 230 \Omega$ for HART communication $\leq 330 \Omega$ for HART Ex-version
• Only PROFIBUS PA version:	Analog output omitted, is replaced by digital PROFIBUS PA interface
Digital output 1	
• Active or passive signal, can be configured with positive or negative logic	Active: 24 V DC, ≤ 24 mA, $R_i = 300 \Omega$ Passive: open collector, 30 V DC, ≤ 200 mA
• For explosion protection (ATEX version)	Passive: open collector 30 V DC, ≤ 100 mA
• Only PROFIBUS PA version:	Only passive signals for digital output 1

• Output function, configurable	Pulse output • Adjustable pulse significance ≤ 5000 pulses/s • Adjustable pulse width ≥ 0.1 ms Frequency response • f_{END} selectable up to 10 kHz Limit for flow, totalizers, ultrasonic velocity or ultrasonic amplitude device status, flow direction
Digital output 2	
• Relay, NC or NO contact	Switching capacity max. 5 W Max. 50 V DC, max. 200 mA DC Self-resetting fuse, $R_i = 9 \Omega$
• For explosion protection (ATEX version)	Max. 30 V DC, max 100 mA DC, 50 mA AC (cf. EC-Type Examination certificate)
• Output function, configurable	Limit for flow, ultrasonic velocity or ultrasonic amplitude flow direction device status
• Only PROFIBUS PA version:	Digital output 2 omitted
Communication via analog output 4 ... 20 mA	
• PC/laptop or HART communicator with SITRANS F flowmeter	
- Load with connection of coupling module	230 ... 500 Ω (max. 330 Ω for Ex-version)
- Load with connection of HART communicator	230 ... 600 Ω
- Cable	2-wire shielded ≤ 3 km (≤ 1.86 miles) Multi-core shielded ≤ 1.5 km (≤ 0.93 miles)
- Protocol	HART, version 5.1
Communication via PROFIBUS PA interface	Layers 1 + 2 according to PROFIBUS PA Communication system according to IEC 1158-2 Layer 7 (protocol layer) according to PROFIBUS DP, EN 50170 standard
• Power supply	Separate supply, four-wire device Permissible bus voltage 9 ... 32 V See certificates and approvals
• Current consumption from bus	10 mA; ≤ 15 mA in event of error with electronic current limiting
Electrical isolation	Outputs electrically isolated from power supply and from one another
Accuracy	
Error in measurement (at reference conditions)	
• Pulse output	$\leq \pm 0.5\%$ of measured value at 0.5 ... 10 m/s or $\leq \pm 0.25/V[m/s]\%$ of measured value at flow < 0.5 m/s
• Analog output	As pulse output plus $\pm 0.1\%$ of measured value, $\pm 20 \mu A$
• Repeatability	$\leq \pm 0.25\%$ of measured value at 0.5 ... 10 m/s
Reference conditions	
• Process temperature	25 °C ± 5 °C (77 °F ± 9 °F)
• Ambient temperature	25 °C ± 5 °C (77 °F ± 9 °F)
• Warming-up time	30 min.
Installation conditions	Upstream section $> 10 \times DN$ and downstream section $> 5 \times DN$

SITRANS F flowmeters

SITRANS F US

Transmitter FUS060

Rated operation conditions

Ambient conditions

Ambient temperature

• Operation -20 ... +50 °C (-4 ... +122 °F)

• In potentially explosive atmospheres Observe temperature classes

• Storage -25 ... +80 °C (-13 ... +176 °F)

Enclosure rating IP65 (NEMA 4)

Electromagnetic compatibility For use in industrial environments

• Emitted interference To EN 61000-6-3 (Light industry)

• Noise immunity To EN 61000-6-2 (Industry)

Medium conditions

• Process temperature -200 ... +250 °C (-328 ... +482 °F)

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

Design

Separate version Transmitter is connected to the transducers via 3 ... 120 m (9.8 ... 395 ft) long specially shielded cables (coaxial cable)
For ATEX versions mounted in the Ex area only with 3 m long cables.

Enclosure material Die-cast aluminum, painted

Wall mounting bracket (standard and special) Stainless steel (standard: always incl.)

Weight of transmitter 4.4 kg (9.7 lb)

Electrical connection Cable glands:
• 2 x M20 (HART) / M25 (Profibus) or
• 2 x 1/2"-NPT (HART) and transducers:
- 2/4 x M16 or
- 2/4 x 1/2" NPT (cable glands always incl.)

Displays and controls

Display LCD, two lines with 16 characters each

• Multi-display: 2 freely-selectable values are displayed simultaneously in two lines
Flow, volume, mass flow, mass, flow velocity, speed of sound, ultrasonic signal information, current, frequency, alarm information

Operation 4 infrared keys, hierarchical menu prompting with codes

Power supply

Supply voltage

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

• Ex version 19 ... 30 V DC / 21 ... 26 V AC

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

Power consumption Approx. 10 VA / 10 W

Certificates and approvals

Explosion protection ATEX II 2G Ex dem [ia/ib] IIC T6/T4/T3

Coaxial cable

Standard Coaxial cable (75 Ω)

Coaxial cable with SMB straight plug on one end for the FUS060 connector

Outside diameter $\varnothing$ 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 $\varnothing$ 5.13 mm (first 0.3 m (0.98 ft) part to the transducer), $\varnothing$ 5.8 mm (for remaining cable to the transmitter - with SMB plug at the end) and between these is a black hot melt junction $\varnothing$ 16 mm (length 70 mm)

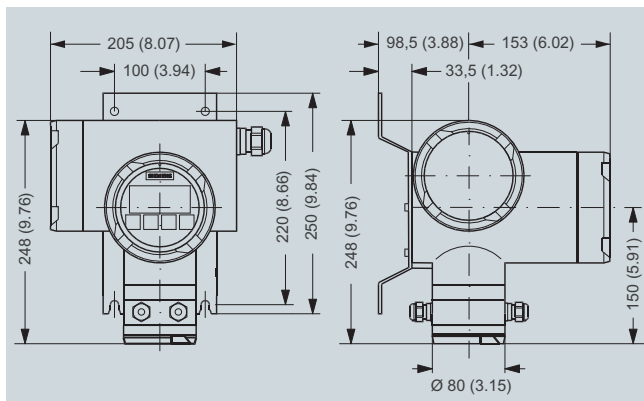
Length 3, 15, 30, 60, 90, 120 m (9.84, 49.21, 98.43, 196.85, 295.28, 393.70 ft) between sensor and transmitter (max 3 m 9.84 ft) transducer cable length for Ex area mounted transmitters)

Material (outside jacket) Brown PTFE (0.3 m (0.98 ft) part) and black PE (for remaining cable)

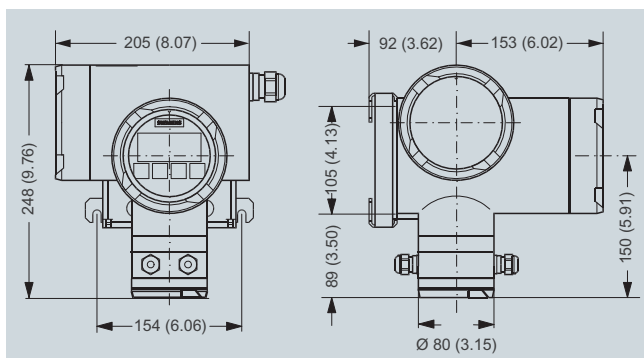
Ambient temperature -200 ... +200 °C (-328 ... +392 °F) (brown PTFE transducer part) and -10 ... +70 °C (14 ... 158 °F) (black PE for remaining transmitter cable part)



Dimensional drawings

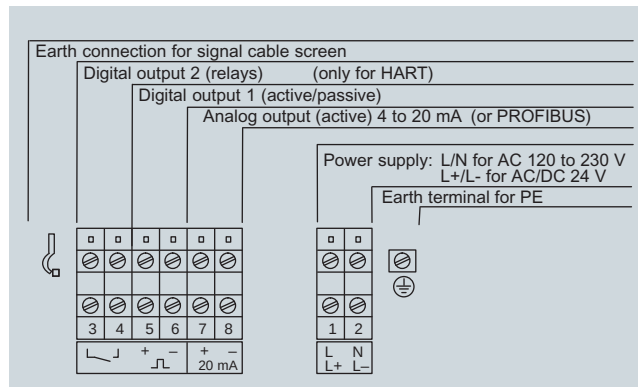


SITRANS FUS060 with standard mounting bracket, dimensions in mm (inch)



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

Schematics



Electrical connection SITRANS FUS060

4

Transmitter FUS060 accessories and spare parts

SITRANS FUS060 transmitter, available standard and Ex versions

The transmitter configuration is made in the flowmeter order codes (together with the sensors). Here only for spare part ordering.

Description	Version	Enclosure	Supply	Order No.
FUS060, 230 V, HART, Metric cable glands	Transmitter for remote connection	IP65 (NEMA 4)	115 ... 230 V AC 50/60 Hz	7ME3050-2BA10-1BA1
FUS060, 230 V, HART, Imperial cable glands	Transmitter for remote connection	IP65 (NEMA 4)	115 ... 230 V AC 50/60 Hz	7ME3050-2BA10-1BA2
FUS060, 230 V, PROFIBUS, Metric cable glands	Transmitter for remote connection	IP65 (NEMA 4)	115 ... 230 V AC 50/60 Hz	7ME3050-2BA10-1DA1
FUS060, 230 V, PROFIBUS, Imperial cable glands	Transmitter for remote connection	IP65 (NEMA 4)	115 ... 230 V AC 50/60 Hz	7ME3050-2BA10-1DA2
FUS060, 24 V, HART, Metric cable glands	Transmitter for remote connection	IP65 (NEMA 4)	19 ... 30 V DC / 21 ... 26 V AC	7ME3050-2BA20-1BA1
FUS060, 24 V, HART, Imperial cable glands	Transmitter for remote connection	IP65 (NEMA 4)	19 ... 30 V DC / 21 ... 26 V AC	7ME3050-2BA20-1BA2
FUS060, 24 V, PROFIBUS, Metric cable glands	Transmitter for remote connection	IP65 (NEMA 4)	19 ... 30 V DC / 21 ... 26 V AC	7ME3050-2BA20-1DA1
FUS060, 24 V, PROFIBUS, Imperial cable glands	Transmitter for remote connection	IP65 (NEMA 4)	19 ... 30 V DC / 21 ... 26 V AC	7ME3050-2BA20-1DA2
FUS060, ATEX, 24 V, HART, Metric cable glands	Transmitter for remote connection	IP65 (NEMA 4) ATEX approval	19 ... 30 V DC / 21 ... 26 V AC	7ME3050-2BA21-1CA1
FUS060, ATEX, 24 V, PROFIBUS, Metric cable glands	Transmitter for remote connection	IP65 (NEMA 4) ATEX approval	19 ... 30 V DC / 21 ... 26 V AC	7ME3050-2BA21-1EA1

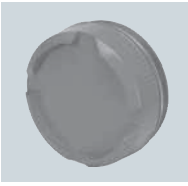
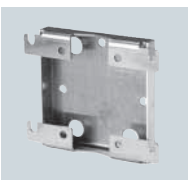


SITRANS F flowmeters

SITRANS F US

Transmitter FUS060

SITRANS FUS060 spare parts

Type/description	Order No.	
Operating/Display module for FUS060	7ME5933-0AC00	
Electronics cover with glass plate (non Ex)	7ME5933-0AC01^{F)}	
Cover for sensor cable and gasket	7ME5933-0AC02	
Cover for mains supply/communication	7ME5933-0AC03^{F)}	
Standard wall mounting bracket for SITRANS FUS060 transmitter	7ME5933-0AC04	
Special wall-/pipe mounting bracket kit for SITRANS FUS060 transmitter	7ME5933-0AC05	
Safety clamp for electronic cover with glass plate (7ME5933-0AC01)	7ME5933-0AC06	

Type/description	Order No.	
M20 cable gland set for FUS060 (M20) power and output connection, grey PA plastic, 2 pcs. • cables Ø 6 ... 12 mm (0.24" ... 0.47") • -40 ... 100 °C (-40 ... 212 °F)	A5E02246350	
M20 cable gland set for FUS060 ATEX version power and output connection, PA plastic, 1 x in blue (ATEX Ex-i) and 1 x grey (ATEX Ex-e) • cables Ø 5 ... 9 mm (0.20" ... 0.35") • -20 ... 95 °C (-4 ... 203 °F)	A5E02246356	
1/2" NPT cable gland set for FUS060 (NPT) power and output connection, grey PA plastic, 2 pcs. • cables Ø 6 ... 12 mm (0.24" ... 0.47") • -40 ... 100 °C (-40 ... 212 °F)	A5E02246396	
M25 cable gland set for the FUS060 PA (M25) power and output connection, grey PA plastic, 2 pcs. • cables Ø 9 ... 16 mm (0.35" ... 0.63") • -40 ... 100 °C (-40 ... 212 °F)	A5E02246378	
M16 x 1.5 cable gland set for FUS060 (M16) sensor connection, brass chrome, 2 pcs. and 2 pcs. blind • cables Ø 5 ... 9 mm (0.20" ... 0.35") • -20 ... 105 °C (-4 ... 221 °F)	A5E02246369	
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 grey PA plastic glands • cables Ø 5 ... 9 mm (0.20" ... 0.35") • -20 ... 100 °C (-4 ... 212 °F)	A5E02247877	

Cables for FUS060

Type/description	Length m (ft)	Order No.	
Coaxial cable for FUS060, (75 Ω, max. 70 °C (158 °F), black PVC) (2 pcs.)	3 (9.84)	A5E00875101	
	15 (49.21)	A5E00861432	
	30 (98.43)	A5E01278662	
	60 (196.85)	A5E01278682	
	90 (295.28)	A5E01278687	
	120 (393.70)	A5E01278698	
High temp. coaxial cable for FUS060; with 0.3 m brown PTFE high temp. transducer part, max. 200 °C (392 °F) and black PVC for remaining transmitter part with SMB plug, max. 70 °C (158 °F); (impedance 75 Ω) (2 pcs.)	3 (9.84)	A5E00875105^{F)}	
	15 (49.21)	A5E00861435	
	30 (98.43)	A5E01196952^{F)}	

F) Subject to export regulations AL: 91999, ECCN: N.

SITRANS F flowmeters

SITRANS F US

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 and liquefied gases, hot water / cooling systems.

Design

The SONO 3300/FUS060 consists of a casted sensor (DN 50 to 150 (2" to 6")), welded pipes (DN 200 to 300 (8" to 12")) and a transmitter FUS060.

The transmitter can only be mounted separately.

The internal signal cables from transducers to sensor connection box are protected from an aggressive environment by stainless steel pipes.

Sensor installation

See system information

Technical specifications

Transmitter specifications for the type SITRANS FUS060 see page 4/176 ff.

2-track sensor with flanges and integrated transducers

Error in measurement

Error in measurement at reference conditions; % of measured value $v > 0.5 \dots 10 \text{ m/s}$, $\pm 0.5\%$ of rate ($v = \text{flow speed}$)

SONO 3300 DN 50 and DN 65:
For Reynolds numbers
 $1000 < R_e < 5000$: $\pm 1.5\%$

Max. flow velocity

10 m/s (32 ft/s)

Nominal size

DN 50, DN 65, DN 80, DN 100, DN 125, DN 150, DN 200, DN 250, DN 300 (2" ... 12")

Media/surface temperature

Separate version: $-10 \dots +160 \text{ }^\circ\text{C}$
($14 \dots 320 \text{ }^\circ\text{F}$)

Ambient temperature (sensor)

Separate version: $-20 \dots +60 \text{ }^\circ\text{C}$
($-4 \dots +140 \text{ }^\circ\text{F}$)

Storage: $-40 \dots +85 \text{ }^\circ\text{C}$
($-40 \dots +185 \text{ }^\circ\text{F}$)

Enclosure

Standard version: IP67
(NEMA 4X/NEMA 6)
ATEX version: As standard, but with ATEX approval (see below)

Process connections

PN designated
EN 1092-1

• DN 50 ... 300 (2" ... 12"),
PN 40

• DN 100 ... 300 (4" ... 12"),
PN 16

• DN 200 ... 300 (8" ... 12"),
PN 10

Class designated
EN 1759-1

• DN 50 ... 300 (2" ... 12"),
class 150

• DN 50 ... 300 (2" ... 12"),
class 300

Transducer

Integrated version welded into pipe

Materials

Pipe

• DN 50 ... 150 (2" ... 6");
Steel EN 1.113145-16Mn5

• DN 200 ... 300 (8" ... 12"): Steel
EN 1.0345-P235GH

Flange

• DN 50 ... 300 (2" ... 12");
EN 1.0025-S235JRG2

Class

ASTM A105

Transducer

Stainless steel AISI 316 or similar

Certificates and approvals

Material certificate

The standard sensor is supplied with a Siemens Flow Instruments certificate of conformity. Extended material certificate is optionally available.

NDT examination report

Available on request

Ex approval

System ATEX approval for SONO 3300 with remote transmitter FUS060-Ex (ATEX II 2G Ex dem [ia/ib] IIC T6/T4/T3)

The sensors are approved according to EU directive 97/23/EC dated 29 May 1997 regarding fluid group 1, classified in category III. Design according to EN 13480 (PED Directive).

SITRANS F flowmeters

SITRANS F US

Flowmeter SONO 3300/FUS060

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)

SITRANS F flowmeters

SITRANS F US

Flowmeter SONO 3300/FUS060

Selection and Ordering data		Order No.	Order code
Sensor SONO 3300 with transmitter FUS060		7ME3300-	
Diameter	Qn setting [m³/h]		
DN 50 (2")	10	1A	
DN 50 (2")	26	1B	
DN 50 (2")	60	1D	
DN 65 (2½")	15	1E	
DN 65 (2½")	42	1F	
DN 65 (2½")	100	1H	
DN 80 (3")	20	1J	
DN 80 (3")	60	1K	
DN 80 (3")	150	1M	
DN 100 (4")	36	1N	
DN 100 (4")	100	1P	
DN 100 (4")	230	1R	
DN 125 (5")	50	1S	
DN 125 (5")	150	1T	
DN 125 (5")	360	1V	
DN 150 (6")	80	2A	
DN 150 (6")	220	2B	
DN 150 (6")	500	2D	
DN 200 (8")	120	2E	
DN 200 (8")	380	2F	
DN 200 (8")	900	2H	
DN 250 (10")	200	2J	
DN 250 (10")	600	2K	
DN 250 (10")	1400	2M	
DN 300 (12")	300	2N	
DN 300 (12")	850	2P	
DN 300 (12")	2200	2R	
Flange norm and pressure rating (All sizes are not available in all pressure ratings)			
System without sensor - only transmitter FUS060 as spare part - settings as defined by this Order No.		A ¹⁾	
EN 1092-1			
PN 10 (DN 200 ... 300 (8" ... 12"))		B	
PN 16 (DN 80 ... 300 (3" ... 12"))		C	
PN 40 (DN 50 ... 300 (2" ... 12"))		E	
ANSI B16.5			
class 150 (DN 50 ... 300 (2" ... 12"))		H	
class 300 (DN 50 ... 300 (2" ... 12"))		J	
Sensor type (approval) and transmitter mounting			
IP67 standard, remote transmitter		1	
IP67 Ex-version (ATEX), remote transmitter (Ex-version)		3	
Cable gland entries in FUS060 and SONO 3300			
Cable glands M20 in sensor and in transmitter M25/20/16 x 1.5		1	
Cable glands ½" NPT in sensor and in transmitter ½" NPT		2 ¹⁾	
Transmitter SITRANS FUS060			
Without transmitter (only sensor)		A ¹⁾	
IP65 (NEMA 4), 120/230 V AC		N	
IP65 (NEMA 4), 24 V AC/DC		P	
IP65 (NEMA 4), 24 V AC/DC, Ex-version (ATEX)		Q	

Selection and Ordering data		Order No.	Order code
Sensor SONO 3300 with transmitter FUS060		7ME3300-	
FUS060 output module			
Without transmitter (only sensor)			A ¹⁾
HART, 4 ... 20 mA, 1 pulse output, 1 relay			B
HART, Ex version, 4 ... 20 mA, 1 pulse output, 1 relay			C
PROFIBUS PA, 1 pulse/frequency			D
PROFIBUS PA, Ex version, 1 pulse/frequency			E
Transducer coax cable			
2 x 3 m, max. 70 °C (158 °F)			0
2 x 15 m, max. 70 °C (158 °F)			1
2 x 30 m, high temp. max. 200 °C (392 °F)			2
2 x 30 m, max. 70 °C (158 °F)			3
2 x 60 m, max. 70 °C (158 °F)			4
2 x 90 m, max. 70 °C (158 °F)			5
2 x 120 m, max. 70 °C (158 °F)			6
2 x 3 m, high temp. max. 200 °C (392 °F)			7
2 x 15 m, high temp. max. 200 °C (392 °F)			8

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

Selection and Ordering data	Order code
Additional information	
Please add „Z“ to Order No. and specify Order code(s) and plain text.	
Calibration	
Sensor prepared for older SONO 3000 transmitters	A30 ^{1) 2)}
Production calibration DN 50 ... DN 300 (with certificate)	Included
Accredited Siemens ISO/IEC 17025 calibration for DN50 to DN150 with Qn as selected in Diameter. Verification certificate: 2 x 3 points in 10%, 25% and 100% Qn (max. flow 325 m³/h).	D20
Accredited Siemens ISO/IEC 17025 calibration for DN125 to DN300 with Qn as selected in Diameter. Verification certificate: 2 x 3 points in 10%, 25% and 100% Qn (max. flow 1300 m³/h).	D21
Material certificate	
EN 10204-3.1	F10
EN 10204-3.1 with 100% NDT on weldings	F11 ²⁾
Tag name plate	
Stainless steel tag with 12 mm characters, max. 15 characters (add plain text)	Y17
Self-adhesive plastic tag with 8 mm characters, max. 15 characters (add plain text)	Y18
¹⁾ In preparation ²⁾ On request	



Please use online Product selector to get latest updates. Product selector link:

www.pia-selector.automation.siemens.com

SITRANS F flowmeters

SITRANS F US

Flowmeter SONO 3300/FUS060

Sensor SONO 3300 accessories and spare parts

Potting kit

Type/description	Order No.	
Potting kit, IP68, 10 m (32.81 ft) w.g. rating	FDK-085L2403	

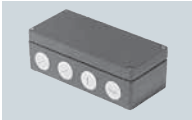
Cables for SONO 3300 with FUS060

(only as spare parts)

Type/description	Length m (ft)	Order No.	
Coaxial cable for FUS060, (75 Ω, max. 70 °C (158 °F), black PVC) (2 pcs.)	3 (9.84)	A5E00875101	
	15 (49.21)	A5E00861432	
	30 (98.43)	A5E01278662	
	60 (196.85)	A5E01278682	
	90 (295.28)	A5E01278687	
	120 (393.70)	A5E01278698	
High temp. coaxial cable for FUS060; with 0.3 m brown PTFE high temp. transducer part (max. 200 °C (392 °F)) and black PVC transmitter part with SMB plug (max. 70 °C (158 °F)); impedance 75 Ω (2 pcs.)	3 (9.84)	A5E00875105^{F)}	
	15 (49.21)	A5E00861435	
	30 (98.43)	A5E01196952^{F)}	

Cable connection boxes

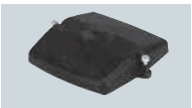
(For the connection of individually transducer cables with the FUS060 transducer cables)

Type/description	Order No.	
Junction box for coax cable	FDK-085B1361	
• IP68 metal box for 4 coax cables		

Cable glands (for the SONO 3300 terminal box)

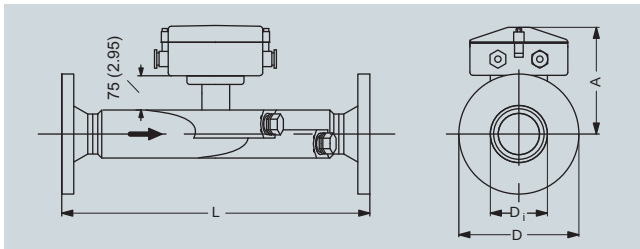
(only as spare parts)

Type	Material	Temperature range [°C (°F)]	Order No.	
M20	Nickel-plated brass, 2x cables Ø 5 ... 6 mm (2 pcs.)	-25 ... +200 (-13 ... +392)	A5E02246329	
M20	Steel Ex-d; Steel ATEX Ex-d; Ø 5 ... 8 mm	-60 ... +180 (-76 ... +356)	A5E02246311	

Description	Order No.	
SONO 3300 terminal box lid, in metal	on request	

F) Subject to export regulations AL: 91999, ECCN: N.

Dimensional drawings of sensor SONO 3300



Sensor SONO 3300

DN	EN 1092-1																	
	PN 10						PN 16						PN 40					
	L ¹⁾		D		Di		L ¹⁾		D		Di		L ¹⁾		D		Di	
	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							355	14.72	220	8.66	102.40	4.00	400	15.75	235	9.25	102.40	4.00
125							375	14.72	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 (PN 40)		ANSI CL 300	
	L ¹⁾		D		D _i		L ¹⁾		D		D _i		A					
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	kg	lbs	kg	lbs
50 mm / 2"	510	20.08	152	5.98	52.6	2.07	520	20.47	165	6.50	52.6	2.07	180	7.09	14	30.9	17	37.5
65 mm / 2½"	510	20.08	178	7.01	62.7	2.47	520	20.47	190	7.48	62.7	2.47	186	7.32	16	35.3	20	44
80 mm / 3"	420	16.54	191	7.52	78.0	3.07	440	17.32	210	8.27	78.0	3.07	193	7.60	19	42	23	51
100 mm / 4"	420	16.54	229	9.01	102.4	4.03	440	17.32	254	10	102.4	4.03	205	8.07	25	55	35	78
125 mm / 5"	440	17.32	254	10.00	128.3	5.05	460	18.11	279	10.98	128.3	5.05	218	8.58	29	64	40	89
150 mm / 6"	430	16.93	279	10.98	154.2	6.07	450	17.71	318	12.52	154.2	6.07	232	9.13	35	78	50	111
200 mm / 8"	480	18.90	343	13.50	202.7	7.98	500	19.69	381	15	202.7	7.98	256	10.08	54	119	72	160
250 mm / 10"	490	19.29	406	15.98	254.5	10.02	520	20.47	444	17.48	254.5	10.03	283	11.14	85	189	98	217
300 mm / 12"	550	21.65	483	19.02	306.3	12.06	580	22.83	521	20.51	306.3	12.06	309	12.17	115	256	142	322

¹⁾ Length tolerance (mm): DN50 ... DN100 +2/-3, DN 125 ... 200 +3/-4, DN 250 ... 300 +4/-5

²⁾ Approximate weights without transmitter FUS060 - weight of FUS060 is 4.4 kg (9.7 lb)

SITRANS F flowmeters

SITRANS F US

Flowmeter SONO 3100/FUS060

Overview



The combination of the SONO 3100 sensor and the FUS060 transmitter is ideal for applications where process shut-down is impossible during service and where there is a need for extreme high/low temperatures and pressures.

Transducers can easily be changed without interrupting operation. SONO 3100 can optionally be delivered as a 4-track solution for absolute best performance and accuracy.

Benefits

- Transducers can be replaced under pressure
- Measurement of all liquids less than 350 Cst, conductive or non-conductive
- No pressure drop
- Reliable and accurate flow measurements
- Long-time stability
- On request:
 - Special sensor material, e.g. Duplex
 - High/low temperature sensor version: +250 °C (+482 °F) / -200 °C (-328 °F) sensors
 - Pressure rating 430 bar (6235 psi)
 - 4-track sensor technology

Application

The main application for SONO 3100 in combination with FUS060 ultrasonic flowmeter is to measure volume flow within:

- Petrochemical industry
- Power engineering
- Water and waste water
- Oil and liquefied gases

SITRANS FUS060 holds ATEX for hazardous areas, HART and PROFIBUS PA. SONO 3100 holds ATEX Ex approval.

Design

The SONO 3100 in combination with FUS060 consists of a SONO 3100 sensor, transducers with O-rings or flanges depending on selection - and a FUS060 transmitter. SONO 3100 is basically supplied in a 2-track solution with and without flanges in sizes from DN 100 to DN 1200. 4-track version is available on request. SONO 3100 is as standard available in carbon/stainless steel from DN 100 to DN 1200. FUS060 is designed for wall mounting only.

Technical specifications

Transmitter specifications for the type SITRANS FUS060 see page 4/176 ff.

2-track sensor fitted with four SONO 3200 transducers

Error in measurement

Error in measurement at reference conditions; % of measured value	$v > 0.5 \dots 10 \text{ m/s}$, $< \pm 0.5\%$ of rate (v =flow velocity)
Max flow velocity	10 m/s (32 ft)
Nominal size	DN 100 ... 1200 (4" ... 48")
Media/surface temperature	• Standard: -10 °C ... +200 °C (14 ... 392 °F) • ATEX Ex-d version: -20 ... +180 °C (-4 ... +356 °F) • ATEX Ex-i version: -10 ... +190 °C (+14 ... +374 °F) • Specials: -200 °C (-328 °F) or up to 250 °C (482 °F)
Ambient temperature	-20 ... +60 °C (-4 ... +140 °F)
Enclosure	IP68 (NEMA 6)/IP68 (NEMA 6X) and ATEX (see below)

Process connections

PN designated, EN 1092-1

Pipe material carbon steel	• DN 200 ... 1200 (8" ... 48"), PN 10 • DN 100 ... 1200 (4" ... 48"), PN 16 • DN 200 ... 1000 (8" ... 40"), PN 25 • DN 100 ... 500 (4" ... 20"), PN 40
Pipe material stainless steel	• DN 200 ... 300 (8" ... 12"), PN 10 and PN 25 • DN 100 ... 300 (4" ... 12"), PN 16 and PN 40

Class designated, EN 1759-1

Pipe material carbon steel	• DN 100 ... 600 (4" ... 24") Class 150 • DN 100 ... 300 (4" ... 12") Class 300
Pipe material stainless steel	• DN 100 ... 300 (4" ... 12") Class 150 and Class 300
<u>Without flanges, (weld-in version) only in carbon steel</u>	• DN 100 ... 1200 (4" ... 48"), PN 16 • DN 200 ... 1000 (8" ... 40"), PN 25 • DN 100 ... 500 (4" ... 20"), PN 40
Transducer SONO 3200	O-ring or flange versions

Materials

Pipe	Steel EN 1.0345-P235GH or stainless steel EN 1.4404 - AISI 316L
Flange	
PN	EN 10025-S235JRG2, 1E1 or stainless steel EN 10222-5-1.4404, 13E0
Class	ASTM A105, 1, 1 or stainless steel ASTM F316L, 2, 3
Transducer body	Stainless steel AISI 316 or similar
Transducer terminal house	Stainless steel AISI 316 or plastic PA 6.6

Certificates and approvals

System ATEX approval for SONO 3100 together with transmitter FUS060-Ex	ATEX II 2G Ex dem [ia/ib] IIC T6/T4/T3 or ATEX II 2C EEx d T3-T6 with SONO 3200 Exd transducers (for standard FUS060 transmitter, installed outside of Ex zone)
Material certificates	The sensor is supplied as standard with a Siemens Certificate of Conformity. Material certificate on in-line parts on request.
NDT examination report	Available on request
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).	

SITRANS F flowmeters

SITRANS F US

Flowmeter SONO 3100/FUS060

Selection and Ordering data		Order No.	Order code
SITRANS F US SONO 3100 sensor 2-track		7ME3100-	
Diameter	Qn setting [m³/h]		
DN 100 (4")	28	1 N	
DN 100 (4")	100	1 P	
DN 100 (4")	220	1 R	
DN 125 (5")	44	1 S	
DN 125 (5")	150	1 T	
DN 125 (5")	350	1 V	
DN 150 (6")	64	2 A	
DN 150 (6")	220	2 B	
DN 150 (6")	500	2 D	
DN 200 (8")	110	2 E	
DN 200 (8")	380	2 F	
DN 200 (8")	900	2 H	
DN 250 (10")	180	2 J	
DN 250 (10")	600	2 K	
DN 250 (10")	1300 ¹⁾	2 M	
DN 300 (12")	250	2 N	
DN 300 (12")	850	2 P	
DN 300 (12")	2000 ¹⁾	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 ¹⁾	3 B	
DN 400 (16")	3600 ¹⁾	3 D	
DN 500 (20")	1300 ¹⁾	3 J	
DN 500 (20")	2200 ¹⁾	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	
DN 700 (28")	2000	4 E	
DN 700 (28")	4200	4 F	
DN 800 (32")	4200	4 N	
DN 800 (32")	5500 ¹⁾	4 P	
DN 900 (36")	4200	5 A	
DN 900 (36")	7500 ¹⁾	5 B	
DN 1000 (40")	4200	5 J	
DN 1000 (40")	9000 ¹⁾	5 K	
DN 1200 (48")	4200	5 S	
DN 1200 (48")	13200 ¹⁾	5 T	
Flange norm and pressure rating (All sizes are not available in all pressure ratings)			
System without sensor - only transmitter FUS060 as spare part - settings as defined with this Order No.		A ²⁾	
<u>EN 1092-1</u>			
PN 10 (DN 200 ... DN 1200)		B	
PN 16 (DN 100 ... DN 1200)		C	
PN 25 (DN 200 ... DN 1000)		D	
PN 40 (DN 100 ... DN 500)		E	
<u>ANSI B16.5</u>			
class 150 (DN 100 ... DN 600)		H	
class 300 (DN 100 ... DN 300)		J	
<u>Pipe without flanges (weld-in version)</u>			
PN 10 (DN 200 ... DN 1200)		P	
PN 16 (DN 100 ... DN 1200)		Q	
PN 25 (DN 200 ... DN 1200)		R	
PN 40 (DN 100 ... DN 500)		S	

Selection and Ordering data		Order No.	Order code
SITRANS F US SONO 3100 sensor 2-track		7ME3100-	
Pipe and flange material			
Carbon steel (DN 100 ... 1200)		1	
Stainless steel (DN 100 ... 300)		2	
Transducer type and approval			
IP67 (NEMA 4X/6) PA housing, PN 40, O-ring, 50 mm, 100 °C (212 °F) (DN 100 ... 1200; SS and CS sensors)		1	
IP68 SS housing, PN 40, O-ring, 50 mm, 200 °C (392 °F) (DN 100 ... 1200; SS and CS sensors)		2	
IP68 SS housing, PN 40, O-ring, 50 mm, 180 °C (356 °F), Ex d ATEX approval (only with standard FUS060) (DN 100 ... 1200; SS and CS sensors)		3	
IP67 (NEMA 4X/6) PA housing, PN 40, flange, 88 mm, 100 °C (212 °F) (DN 100 ... 300; SS sensors)		4	
IP68 SS housing, PN 40, flange, 88 mm, 200 °C (392 °F) (DN 100 ... 300; SS sensors)		5	
IP68 SS housing, PN 40, flange, 88 mm, 180 °C (356 °F), Ex d ATEX approval (only with standard FUS060) (DN 100 ... 300; SS sensors)		6	
IP68 SS housing, PN 40, O-ring, 50 mm, 190 °C (374 °F), Ex i ATEX approval (only with FUS060 Ex-version) (DN 100 ... 1200; SS and CS sensors)		7	
IP68 SS housing, PN 40, flange, 88 mm, 190 °C (374 °F), Ex i ATEX approval (only with FUS060 Ex-version) (DN 100 ... 300; SS sensors)		8	
Cable gland entries			
Cable glands M20 in transducers and in transmitter M25/20/16 x 1.5		1	
Cable glands ½" NPT in transducers and in transmitter		2	
Transmitter SITRANS FUS060			
Without transmitter (only sensor)		A ¹⁾	
IP65 (NEMA 4), 120/230 V AC		N	
IP65 (NEMA 4), 24 V AC/DC		P	
IP65 (NEMA 4), 24 V AC/DC ATEX Ex version		Q	
Module			
Without transmitter (only sensor)		A ¹⁾	
HART, 1 pulse output, 1 relay		B	
HART Ex, 1 pulse output, 1 relay		C	
PROFIBUS PA, 1 pulse/frequency		D	
PROFIBUS PA, Ex, 1 pulse/frequency		E	
Transducer coax cable			
4 x 3 m, max. 70 °C (158 °F)		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)		7	
4 x 15 m, high temp. max. 200 °C (392 °F)		8	

¹⁾ Reduced Q value during calibration (Qn setting unchanged)

²⁾ In preparation

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

SITRANS F flowmeters

SITRANS F US

Flowmeter SONO 3100/FUS060

Selection and Ordering data Order code

Additional information

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

Calibration

Production calibration DN 100 ... DN 1200 (with certificate)

Included

Theoretical calibration DN 500 ... DN 1200

D03

Accredited Siemens ISO/IEC 17025 calibration for DN100 to DN500/600 with Qn as selected in diameter. Verification certificate: 2 x 3 points in 10%, 25% and 100% Qn (max. flow 1235/1300 m³/h).

D21

Accredited Siemens ISO/IEC 17025 calibration for DN300 to DN700 with Qn as selected in diameter. Verification certificate: 2 x 3 points in 10%, 25% and 100% Qn (max. flow 4200 m³/h).

D22

Accredited Siemens ISO/IEC 17025 calibration for DN800 to DN1200 with Qn as selected in diameter. Verification certificate: 2 x 3 points in 10%, 25% and 100% Qn (max. flow 4200 m³/h).

D23

Accredited - Third Party ISO/IEC 17025 calibration for DN100 to DN600 with Qn as selected in diameter. Verification certificate: 2 x 3 points in 10%, 25% and 100% Qn (max. flow 1300 m³/h).

D31

Accredited - Third Party ISO/IEC 17025 calibration for DN300 to DN700 with Qn as selected in diameter. Verification certificate: 2 x 3 points in 10%, 25% and 100% Qn (max. flow 4200 m³/h).

D32

Accredited - Third Party ISO/IEC 17025 calibration for DN800 to DN1200 with Qn as selected in diameter. Verification certificate: 2 x 3 points in 10%, 25% and 100% Qn (max. flow 7000 m³/h).

D33

Material certificate

EN 10204-3.1

F10

EN 10204-3.1 and 100% NDT on weldings, DN 100 ... DN 400

F11

EN 10204-3.1 and 100% NDT on weldings, DN 500 ... DN 700

F12

EN 10204-3.1 and 100% NDT on weldings, DN 800 ... DN 1200

F13

Pressure certificate

EN 10204-2.3

F21

Tag name plate

Stainless steel tag with 12 mm characters, max. 15 characters (add plain text)

Y17

Self-adhesive plastic tag with 8 mm characters, max. 15 characters (add plain text)

Y18

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



Please use online Product selector to get latest updates. Product selector link:

www.pia-selector.automation.siemens.com

Sensor SONO 3100 accessories and spare parts

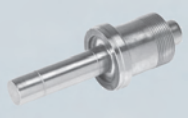
SONO 3200 spare parts, complete units

Type	Material	Gasket	Pressure rating	Terminal housing	Approv.	Temp. range [°C (°F)]	Length mm (inch)	Order No.	
O-ring	316 SS	O-ring	PN 40	Plastic, PA 6.6 M20		-20 ... +100 (-4 ... +212)	50 (1.97)	FDK-085B5453	
O-ring	316 SS	O-ring	PN 40	316 SS M20		-20 ... +200 (-4 ... +392)	50 (1.97)	FDK-085B5450	
O-ring	316 SS	O-ring	PN 40	316 SS M20	Ex-d ¹⁾	-20 ... +180 (-4 ... +356)	50 (1.97)	FDK-085B5451	
O-ring	316 SS	O-ring	PN 40	316 SS M20	Ex-i ²⁾	-10 ... +190 (-14 ... +374)	50 (1.97)	A5E00836448	
O-ring	316 SS	O-ring	PN 40	Plastic, PA 6.6 ½" NPT		-20 ... +100 (-4 ... +212)	50 (1.97)	A5E00839472	
O-ring	316 SS	O-ring	PN 40	316 SS ½" NPT		-20 ... +200 (-4 ... +392)	50 (1.97)	A5E00839431	
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)	on request	

Terminal housing

Type	Pressure rating	Material	Temp. range [°C (°F)]	Order No.	
Terminal housing (M20 cable gland)	N/A	PA 6.6	-20 ... +100 (-4 ... +212)	FDK-085B5501	
Terminal housing (M20 cable gland)	N/A	ASTM 316	-20 ... +200 (-4 ... +392)	FDK-085B5504	
Terminal housing (½" NPT cable gland)	N/A	PA 6.6	-20 ... +100 (-4 ... +212)	A5E00839460	
Terminal housing (½" NPT cable gland)	N/A	ASTM 316	-20 ... +200 (-4 ... +392)	A5E00839427	
Ex-d ¹⁾ terminal housing (M20 cable gland)	N/A	ASTM 316	-20 ... +180 (-4 ... +356)	FDK-085B5505	
Ex-i ²⁾ terminal housing (M20 cable gland)	N/A	ASTM 316	-10 ... +190 (-14 ... +374)	A5E00835255	
Gaskets for O-ring transducer	PN 40	70 FFKM	-20 ... +200 (-4 ... +392)	FDK-085B1098	
Gasket and 12 mm bolts and nuts for flange transducer	PN 40	Graphite 316 SS	-20 ... +200 (-4 ... +392)	FDK-085B1083	

SONO 3200 spare parts, transducer body without terminal housing, including insert

Type	Material	Gasket	Pressure rating	Temp. range [°C (°F)]	Length mm (inch)	Order No.	
O-ring	316 SS	O-ring	PN 40	-20 ... +200 (-4 ... +392)	50 (1.97)	FDK-085B1405	
Flange	316 SS	Graphite	PN 40	-20 ... +200 (-4 ... +392)	88 (3.47)	FDK-085B1464	

SONO 3200 spare parts, transducer insert

Type	Temp. range [°C (°F)]	Length mm (inch)	Order No.	
Insert	-20 ... +200 (-4 ... +392)	50 (1.97)	FDK-085B1411	
Insert	-20 ... +200 (-4 ... +392)	88 (3.47)	FDK-085B1459	

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

SITRANS F flowmeters

SITRANS F US

Flowmeter SONO 3100/FUS060

Transducer SONO 3200 gaskets

Type	Pressure rating	Material	Temperature range [°C (°F)]	Order No.	
Gasket O-ring (3 pcs. for o-ring transducers)	PN 40	FFKM ¹⁾ /FKM	-20 ... +200 (-4 ... +392)	FDK-085B1089	
Gasket flange	PN 40/160	Graphite	-20 ... +200 (-4 ... +392)	FDK-085B1080	
Gasket and 12 mm (0.47") bolts and nuts for flange transducers	PN 40	Flat ring type	-20 ... +200 (-4 ... +392)	FDK-085B1083	
Gasket and 16 mm (0.63") bolts and nuts for flange transducers	PN 160	Graphite, 316 SS	-20 ... +200 (-4 ... +392)	FDK-085B1084	
Gasket for cryogenics transducer with flat flange	PN 40	Graphite/metal	-200 ... +100 (-328 ... +212)	on request	
Gasket cryogenics	PN 40	Copper, O-ring	-200 ... +100 (-328 ... +212)	FDK-085B1099	

¹⁾ Chemical resistant O-ring

SONO 3200 cable glands

Type/description	Temperature range [°C (°F)]	Appr.	Order No.	
black PA plastic, cable Ø 5 ... 13 mm	-20 ... 100 (-4 ... +212)		A5E02246304	
½" NPT grey PA plastic, cable Ø 5 ... 9 mm	-20 ... 100 (-4 ... +212)		A5E02246309	
½" NPT chrome-plated brass, cable Ø 5 ... 9 mm	-40 ... 100 (-40 ... +212)		A5E02246258	
M20 stainless steel, cable Ø 4 ... 6 mm	-25 ... 200 (-13 ... +392)	Ex-i	A5E02246194	
M20 Stainless steel, cable Ø 5 ... 8 mm	-60 ... 180 (-76 ... +356)	Ex-d	A5E02246311	

Accessories and spare parts

Type/description	Order No.	
Submersible kit for transducers SONO 3200, IP68 10 m (32.81 ft) w.g. rating	FDK-085L2403	

Tools for transducer SONO 3200

Type/description	Transducer length	Order No.	
Extraction tool for replacement of SONO 3200 O-ring transducers under pressure (hot-tap)	50 mm (1.97") transducers	FDK-085B5331	

Cables for SONO 3100 with FUS060

Type/description	Length m (ft)	Order No.
Coaxial cable for FUS060, (75 Ω , max. 70 °C (158 °F), black PVC) (2 pcs.)	3 (9.84)	A5E00875101
	15 (49.21)	A5E00861432
	30 (98.43)	A5E01278662
	60 (196.85)	A5E01278682
	90 (295.28)	A5E01278687
	120 (393.7)	A5E01278698
High temp. coaxial cable for FUS060; with 0.3 m brown PTFE high temp. transducer part, max. 200 °C (392 °F) and black PVC for remaining transmitter part with SMB plug, max. 70 °C (158 °F); (impedance 75 Ω) (2 pcs.)	3 (9.84)	A5E00875105^{F)}
	15 (49.21)	A5E00861435
	30 (98.43)	A5E01196952^{F)}



F) Subject to export regulations AL: 91999, ECCN: N.

Cable connection boxes

(For the connection of individually transducer cables with the FUS060 transducer cables)

Type/description	Order No.
Junction box for coax cable	
• IP68 metal box for 4 coax cables	FDK-085B1361
• IP68 EEx e plastic box for 4 coax cables, no ATEX approval	FDK-085B1363

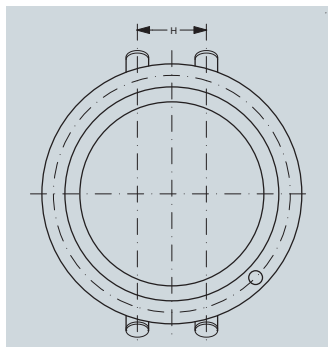
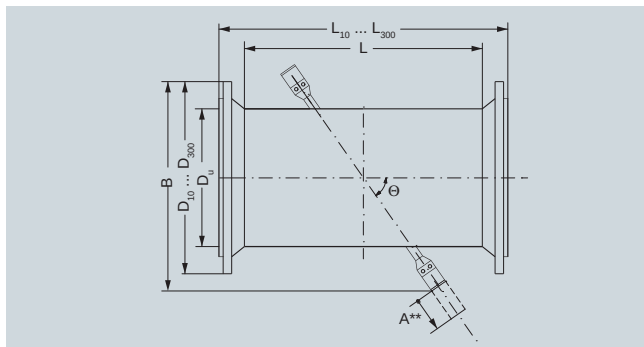


SITRANS F flowmeters

SITRANS F US

Flowmeter SONO 3100/FUS060

Dimensional drawings of sensor SONO 3100



Sensor SONO 3100 with EN norm

DN	D _U	L ^{1) 4)}	B	θ	H	PN 10			PN 16			PN 25			PN 40		
						W ₁₀ ²⁾	D ₁₀	L ₁₀ ¹⁾	W ₁₆ ²⁾	D ₁₆	L ₁₆ ¹⁾	W ₂₅ ²⁾	D ₂₅	L ₂₅ ¹⁾	W ₄₀ ²⁾	D ₄₀	L ₄₀ ¹⁾
	[mm]	[mm]	[mm]	[°]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
100	114.3	860	305	45 ³⁾	42.8	-	-	-	3.6	220	960	-	-	-	3.6	235	990
125	139.7	862	325	45 ³⁾	64.5	-	-	-	4.0	250	970	-	-	-	4.0	270	990
150	168.3	862	350	45 ³⁾	78.1	-	-	-	4.5	285	970	-	-	-	4.5	300	1010
200	219.1	668	430	45 ³⁾	102.1	6.3	340	790	6.3	340	790	6.3	360	820	6.3	375	840
250	273.0	714	480	45 ³⁾	127.6	6.3	395	850	6.3	405	850	7.1	425	890	7.1	450	920
300	323.9	607	525	45 ³⁾	151.8	7.1	445	740	7.1	460	760	8.0	485	790	8.0	515	830
350	355.6	639	550	45 ³⁾	166.4	8.0	405	770	8.0	520	800	8.0	555	840	8.8	580	880
400	406.4	703	600	45 ³⁾	191.3	8.0	565	850	8.0	580	875	8.8	620	925	11.1	660	975
500	508.0	797	690	45 ³⁾	241.1	7.1	670	950	8.0	715	980	10.0	730	1050	14.2	755	1080
600	610.0	912	705	60	294.8	7.1	780	1075	8.8	840	1105	11.0	845	1165	-	-	-
700	711.0	937	895	60	340.6	8.0	895	1100	8.8	910	1140	12.5	960	1190	-	-	-
800	813.0	967	985	60	390.4	8.0	1015	1150	10.0	1025	1180	14.2	1085	1240	-	-	-
900	914.0	1007	1070	60	445.9	10.0	1115	1200	10.0	1125	1230	16.0	1185	1300	-	-	-
1000	1016.0	1060	1160	60	490.0	10.0	1230	1250	10.0	1255	1300	17.5	1320	1370	-	-	-
1200	1220.0	1100	1350	60	588.0	8.0	1340	1280	11.0	1455	1360	-	-	-	-	-	-

¹⁾ Length tolerance (mm): DN100 +2/-3, DN 125 ... 200 +3/-4, DN 250 ... 400 +4/-5, DN 500 ... 1200 +5/-6

²⁾ Wall thickness for pressure rates PN 6 ... 40

A**) Space required for replacement of transducer min. 230 mm (9.1 inch). For replacement with special tool (extraction tool) see more information in „Sensor SONO 3100 accessories and spare parts“ on page 4/190.

³⁾ For all sensors with flange transducers track angle are 60°

⁴⁾ L is the length of sensor versions without flanges (weld-in version)

SONO 3100, 2-track

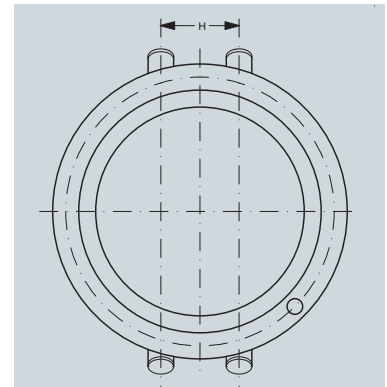
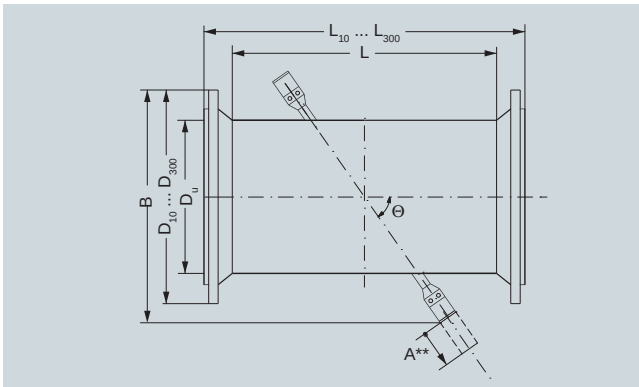
Nominal diam.	Flange type - Weight [kg] ([lbs])			
DN	PN 10	PN 16	PN 25	PN 40
100 (4")	-	32 (70.5)	-	35 (77.2)
125 (5")	-	38 (83.8)	-	44 (97.0)
150 (6")	-	45 (99.2)	-	52 (114.6)
200 (8")	59 (130.0)	58 (127.9)	70 (154.3)	79 (174.2)
250 (10")	73 (161.0)	75 (163.3)	96 (211.6)	117 (257.9)
300 (12")	83 (183.0)	92 (202.8)	114 (251.3)	151 (332.9)
350 (14")	98 (216.0)	113 (249.1)	145 (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)	-
700 (28")	262 (577.6)	303 (668.0)	480 (1058)	-
800 (32")	329 (725.3)	400 (881.8)	650 (1433)	-
900 (36")	428 (943.6)	475 (1047)	835 (1841)	-
1000 (40")	500 (1102)	594 (1010)	1078 (2377)	-
1200 (48")	680 (1496)	860 (1892)	-	-

Weight of system incl. process flanges and standard O-ring transducers. For sensors with flange transducer please add approx. 10 kg (22.05 lbs). For SS terminal housings instead of the standard PA housing add approx. 5 kg (11.03 lbs).

SITRANS F flowmeters

SITRANS F US

Flowmeter SONO 3100/FUS060



Sensor SONO 3100 with ANSI norm

Size (DN)	D _U	L ^{1) 4)}	B	θ	H	Class 150			Class 300		
						W ₁₅₀ ²⁾	D ₁₅₀	L ₁₅₀ ¹⁾	W ₃₀₀ ²⁾	D ₃₀₀	L ₃₀₀ ¹⁾
inch (mm)	[inch]	[inch]	[inch]	[°]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]
4" (100)	4.50	33.86	12.01	45 ³⁾	1.69	0.14	9.00	39.86	0.25	10.00	40.62
5" (125)	5.50	33.94	12.80	45 ³⁾	2.54	0.15	10.00	40.94	0.27	11.00	41.70
6" (150)	6.63	33.94	13.78	45 ³⁾	3.07	0.16	11.00	40.94	0.30	12.50	41.70
8" (200)	8.63	26.30	16.93	45 ³⁾	4.02	0.16	13.50	34.30	0.29	15.00	35.06
10" (250)	10.75	28.11	18.90	45 ³⁾	5.02	0.18	16.00	36.11	0.34	17.50	37.35
12" (300)	12.75	23.90	20.67	45 ³⁾	5.98	0.20	19.00	32.90	0.39	20.50	34.14
14" (350)	14.00	25.16	21.65	45 ³⁾	6.55	0.21	21.00	35.16	-	-	-
16" (400)	16.00	27.68	23.62	45 ³⁾	7.53	0.22	23.50	33.74	-	-	-
20" (500)	20.00	31.38	27.17	45 ³⁾	9.49	0.26	27.50	42.76	-	-	-
24" (600)	24.00	35.91	27.76	60	11.61	0.30	32.00	47.91	-	-	-

¹⁾ Length tolerance (mm): 4" +0.08"/-0.12" (+2/-3mm), 5" to 8" +0.12"/-0.16" (+3/-4mm), 10" to 16" +0.16"/-0.20" (+4/-5mm), 20" to 24" +0.20"/-0.24" (+5/-6mm)

²⁾ Minimum wall thickness for pressure rates CL150 or CL300

³⁾ For all sensors with flange transducers track angle are 60°

⁴⁾ L is the length of sensor versions without flanges (weld-in version)

A**) Space required for replacement of transducer min. 230 mm (9.1 inch). For replacement with special tool (extraction tool) see more information in „Sensor SONO 3100 accessories and spare parts“ on page 4/189.

Approximate weights for SONO 3100 sensor with ANSI B16.5 flanges

Nominal diam.		Weight [kg] ([lbs]) ¹⁾	
DN	DN	CL150	CL300
[inch]	[mm]	[kg]	[lbs]
4"	100	32	70.5
5"	125	38	83.8
6"	150	45	99.2
8"	200	58	127.9
10"	250	75	165.3
12"	300	92	202.8
14"	350	113	249.1
16"	400	141	310.9
20"	500	207	456.4
24"	600	276	608.5

¹⁾ Weight of system incl. process flanges and standard O-ring transducers.
For sensors with flange transducer please add approx. 10 kg (22.05 lbs).
For SS terminal housings instead of the standard PA housing add approx. 5 kg (11.03 lbs).

SITRANS F flowmeters

SITRANS F US

Flowmeter SONOKIT (with FUS060)

Overview



SONOKIT is a transit time based ultrasonic flowmeter for retrofitting on existing pipelines.

The kit includes all necessary parts and special tools to make the installation as 1- or 2-track flowmeter.

The set is made for installation on empty pipes or pipes under pressure without process shut-down (hot-tap).

Please contact Siemens for further information on hot-tap tools and instructions.

SONOKIT has in-line transducers (in contact with media) which assure superior accuracy and performance.

Benefits

- Cost-effective solution – contains all the necessary components for retrofitting
- SONOKIT is easy to install in pipeline sizes DN 200 to DN 4000 (8" to 160") 1-track DN 100 to DN 2400 (4" to 96") – without process shut-down or flow interruption
- No bypass installation necessary – withstands pressures up to 40 bar (580 psi) and media temperatures between -20 °C and +200 °C (-4 °F and +392 °F)
- High accuracy – the bigger the pipe, the more accurate the result
- Solid construction and no moving parts for a 100% maintenance and obstruction-free flowmeter
- The SONOKIT comes with transducers in IP68 enclosure
- Available in a robust version that can be buried and withstands constant flooding
- In-line transducers assure superior accuracy and performance
- Automatic calculation of the calibration factor when pipe geometry data are entered in the transmitter
- Transmitter versions with HART or PROFIBUS PA

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 transmitter for wall mounting
- 4-track version is available on request

Technical specifications

Transmitter specifications for the type SITRANS FUS060 see page 4/176 ff.

Accuracy

Typical, depending on accuracy of measurements of installation

- 2-Track: $\leq \pm (0.5 \dots 1.5 \%)$
- 1-Track: $\leq \pm (1 \dots 3 \%)$

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 transmitter.

Requirements for pipes

Requirements for pipes

Size	DN 100 ... DN 4000 (4" ... 160")
Line pressure	max. 40 bar (580 psi)
Media/surface temperature	• Standard version: -20 ... +100 °C (-4 ... +212 °F) • High temp. version: -20 ... +200 °C (-4 ... 392 °F) • ATEX Ex-d version: -20 ... +180 °C (-4 ... +356 °F) • ATEX Ex-i version: -10 ... +190 °C (14 ... 374 °F)
Ambient temperature	-20 ... +60 °C (-4 ... +140 °F)

Transducer enclosure/approvals/certificates

Standard version	IP67 (NEMA 6) / IP68 (NEMA 6X)
Ex approval	System ATEX approval for SONO 3200 Ex i transducers together with transmitter FUS060-Ex: ATEX II 2G Ex dem [ia/Ib] IIC T6/T4/T3 or ATEX II 2G EEx d T3-T6 with SONO 3200 Ex d transducers (for standard FUS060 transmitter, installed outside of Ex zone)
Material certificates	EN 10204-3.1 material certificate on transducer mounting parts

Transducer materials

Terminal housing	Standard version: PA 6.6, 100 °C (212 °F) or stainless steel AISI 316, 200 °C (392 °F)
Transducer body	Standard version: Stainless steel AISI 316, 200 °C (392 °F)

SITRANS F flowmeters

SITRANS F US

Flowmeter SONOKIT (with FUS060)

Materials of existing pipeline

Steel	Transducer holder: EN 10273 or EN 10216 (P235GH) Mounting plates: EN 10273 or EN 10216 (P235GH)
Concrete	Transducer holder: Stainless steel AISI 316 or similar Mounting plates: (not included)
Stainless steel	Transducer holder: Stainless steel AISI 316 or similar Mounting plates: Stainless steel AISI 316 or similar

Pipe wall thickness

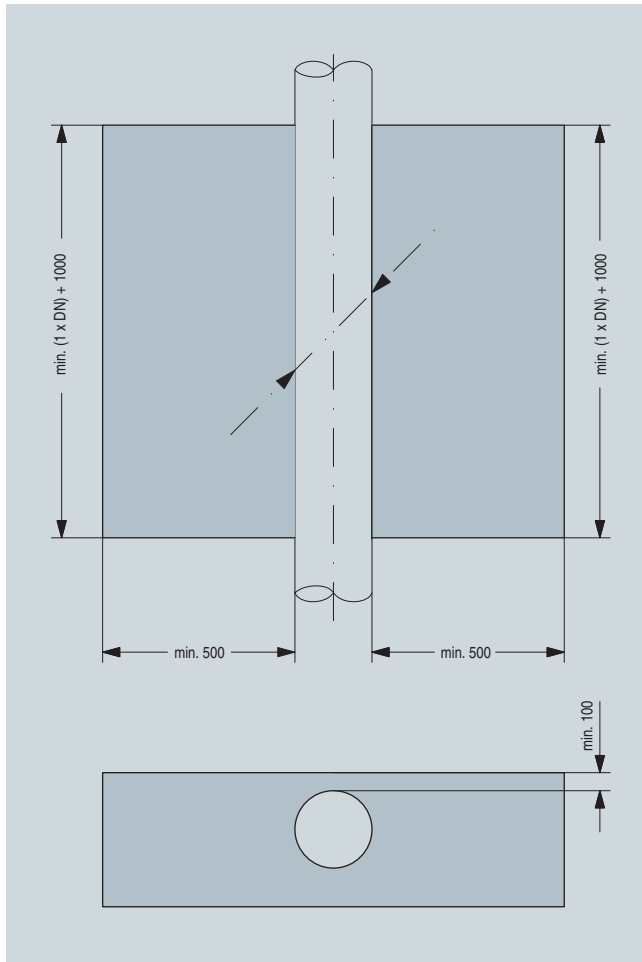
Steel pipe (AISI 316 and St. 37.2 or corresponding material)	Transducer and holder available in length $L = 160$, allowing a pipe wall thickness up to 20 mm (0.79")
Concrete pipe	Transducer and holder available in length $L = 230$, allowing a pipe wall thickness up to 200 mm (7.9") and pipe sizes $\geq \text{DN } 600$

Dimension of the package box

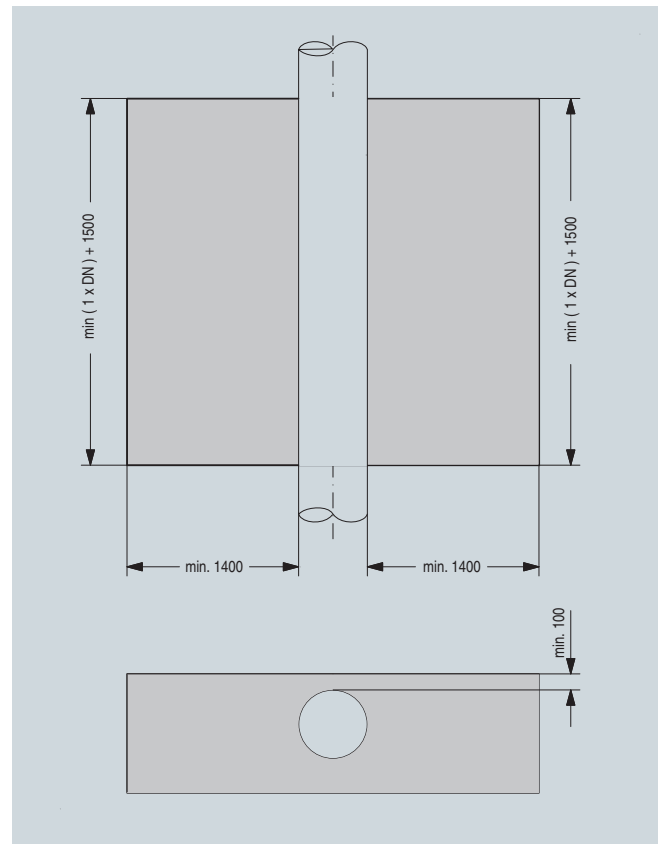
(L x W x H)	820 x 420 x 360 mm (32.3" x 16.6" x 14.2")
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Installation requirements

The space requirements (in mm) around the pipe for retrofitting a SITRANS F US ultrasonic flowmeter type SONOKIT are given below:



Empty pipe installation



Hot-tap installation

SITRANS F flowmeters

SITRANS F US

Flowmeter SONOKIT (with FUS060)

Selection and Ordering data		Order No.
SITRANS F US SONOKIT 1-track sensor		7ME3210 -
Diameter	Qn setting [m³/h]	
DN 100 (4")	100	1 P
DN 125 (5")	150	1 T
DN 150 (6")	220	2 B
DN 200 (8")	380	2 F
DN 250 (10")	600	2 K
DN 300 (12")	850	2 P
DN 350 (14")	1000	2 T
DN 400 (16")	1300	3 B
DN 450 (18")	1700	3 F
DN 500 (20")	2200	3 K
DN 550 (22")	2600	3 P
DN 600 (24")	3200	3 T
DN 650 (26")	3600	4 B
DN 700 (28")	4200	4 F
DN 750 (30")	4800	4 K
DN 800 (32")	5500	4 P
DN 900 (36")	7500	5 B
DN 1000 (40")	9000	5 K
DN 1100 (44")	10000	5 P
DN 1200 (48")	13200	5 T
DN 1300 (52")	14000	6 A
DN 1400 (56")	16800	6 C
DN 1500 (60")	19000	6 E
DN 1600 (64")	22800	6 G
DN 1700 (68")	25000	6 J
DN 1800 (72")	27600	6 L
DN 1900 (76")	31000	6 N
DN 2000 (80")	36000	6 Q
DN 2100 (84")	37000	6 S
DN 2200 (88")	42000	6 U
DN 2300 (92")	45000	6 W
DN 2400 (96")	51000	7 A
Installation method		
Empty pipe		A
Hot tap, mounting under pressure		B
SONOKIT for tapping band (DN 200 ... DN 1800) (Tapping band to be ordered separately) ¹⁾		C
Transducer holder		
None (for tapping band)		0
Carbon steel, length = 160 mm, mounting plates in carbon steel		1
Stainless steel, length = 160 mm, mounting plates in stainless steel		2
Stainless steel, length = 230 mm, for con- crete pipe (DN 600 ... DN 2400)		3
Transducer type and approval		
IP67 (NEMA 4X/6) PA housing, PN 40, O-ring, 100 °C (212 °F), no approval		1
IP68 SS housing, PN 40, O-ring, 180 °C (356 °F), Ex d, ATEX approval (only with standard FUS060)		2
IP68 PA housing, Sylgard potting kit, PN 40, O-ring, 100 °C (212 °F), no approval		3
IP68 SS housing, Sylgard potting kit, PN 40, O-ring, 200 °C (392 °F), no approval		4
IP68 SS housing, PN 40, SS, O-ring, 190 °C (374 °F), Ex i type, ATEX approval (only with FUS060 Ex)		5

Selection and Ordering data	Order No.
SITRANS F US SONOKIT 1-track sensor	7ME3210 -
Cable gland entries	
Cable glands M20 in transducers and in transmitter M25/20/16 x 1.5	1
Cable glands ½" NPT in transducers and in transmitter	2
Transmitter SITRANS FUS060	
IP65 (NEMA 4), 120/230 V AC	N
IP65 (NEMA 4), 24 V AC/DC	P
IP65 (NEMA 4), 24 V AC/DC Ex version	Q
Module	
HART, 1 pulse output, 1 relay	B
HART Ex version, 1 pulse output, 1 relay	C
PROFIBUS PA, 1 pulse/frequency	D
PROFIBUS PA, Ex version, 1 pulse/fre- quency	E
Transducer coax cable	
2 x 3 m, max. 70 °C (158 °F)	0
2 x 15 m, max. 70 °C (158 °F)	1
2 x 30 m, high temp. max. 200 °C (392 °F)	2
2 x 30 m, max. 70 °C (158 °F)	3
2 x 60 m, max. 70 °C (158 °F)	4
2 x 90 m, max. 70 °C (158 °F)	5
2 x 120 m, max. 70 °C (158 °F)	6
2 x 3 m, high temp. max. 200 °C (392 °F)	7
2 x 15 m, high temp. max. 200 °C (392 °F)	8
Special version (add order code):	
No transducer cable, cable length 2 x 3 m	9 R0A
No transducer cable, cable length 2 x 15 m	9 R0B
No transducer cable, cable length 2 x 30 m	9 R0C
No transducer cable, cable length 2 x 60 m	9 R0D
No transducer cable, cable length 2 x 90 m	9 R0E
No transducer cable, cable length 2 x 120 m	9 R0F

¹⁾ Tapping band via special request

Selection and Ordering data	Order code
Additional information	
Please add „-Z“ to Order No. and specify Order code(s) and plain text.	
Material certificate	
EN 10204-3.1, transducer body material	F30
EN 10204-3.1, transducer holder material	F31
EN 10204-3.1, mounting plate material	F32
Tag name plate	
Stainless steel tag with 12 mm characters (max. 15 characters) (add plain text)	Y17
Self-adhesive plastic tag with 8 mm characters (max. 15 characters) (add plain text)	Y18

Please also see www.siemens.com/SITRANSOrdering
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SITRANS F flowmeters

SITRANS F US

Flowmeter SONOKIT (with FUS060)

Selection and Ordering data		Order No.	Selection and Ordering data		Order No.
SITRANS F US SONOKIT 2-track sensor		7 ME 3 2 2 0 -	SITRANS F US SONOKIT 2-track sensor		7 ME 3 2 2 0 -
Diameter	Qn setting [m³/h]		Transducer type and approval		
DN 200 (8")	380	2 F	IP67 (NEMA 4X/6) PA housing, PN 40, O-ring, 100 °C (212 °F), no approval	1	
DN 250 (10")	600	2 K	IP68 SS housing, PN 40, O-ring, 180 °C (356 °F), EEx-d, ATEX approval (only with standard FUS060)	2	
DN 300 (12")	850	2 P	IP68 PA housing, Sylgard potting kit, PN 40, SS, O-ring, 100 °C (212 °F), no approval	3	
DN 350 (14")	1000	2 T	IP68 SS housing, Sylgard potting kit, PN 40, SS, O-ring, 200 °C (392 °F), no approval	4	
DN 400 (16")	1300	3 B	IP68 SS housing, PN 40, O-ring, 190 °C (374 °F), EEx-i, ATEX approval (only with FUS060 Ex)	5	
DN 450 (18")	1700	3 F			
DN 500 (20")	2200	3 K	Cable gland entires		
DN 550 (22")	2600	3 P	Cable glands M20 in transducers and in transmitter M25/20/16 x 1.5	1	
DN 600 (24")	3200	3 T	Cable glands ½" NPT in transducers and in transmitter	2	
DN 650 (26")	3600	4 B			
DN 700 (28")	4200	4 F	Transmitter SITRANS FUS060		
DN 750 (30")	4800	4 K	IP65 (NEMA 4), 120/230 V AC	N	
DN 800 (32")	5500	4 P	IP65 (NEMA 4), 24 V AC/DC	P	
DN 900 (36")	7500	5 B	IP65 (NEMA 4), 24 V AC/DC Ex version	Q	
DN 1000 (40")	9000	5 K			
DN 1100 (44")	10 000	5 P	Module		
DN 1200 (48")	13 200	5 T	HART, 1 pulse output, 1 relay	B	
DN 1300 (52")	14 000	6 A	HART Ex version, 1 pulse output, 1 relay	C	
DN 1400 (56")	16 800	6 C	PROFIBUS PA, 1 pulse/frequency	D	
DN 1500 (60")	19 000	6 E	PROFIBUS PA, Ex version, 1 pulse/frequency	E	
DN 1600 (64")	22 800	6 G			
DN 1700 (68")	25 000	6 J	Transducer coax cable		
DN 1800 (72")	27 600	6 L	4 x 3 m, max. 70 °C (158 °F)	0	
DN 1900 (76")	31 000	6 N	4 x 15 m, max. 70 °C (158 °F)	1	
DN 2000 (80")	36 000	6 Q	4 x 30 m, high temp. max. 200 °C (392 °F)	2	
DN 2100 (84")	37 000	6 S	4 x 30 m, max. 70 °C (158 °F)	3	
DN 2200 (88")	42 000	6 U	4 x 60 m, max. 70 °C (158 °F)	4	
DN 2300 (92")	45 000	6 W	4 x 90 m, max. 70 °C (158 °F)	5	
DN 2400 (96")	51 000	7 A	4 x 120 m, max. 70 °C (158 °F)	6	
DN 2500 (100")	53 000	7 C	4 x 3 m, high temp. max. 200 °C (392 °F)	7	
DN 2600 (104")	60 000	7 E	4 x 15 m, high temp. max. 200 °C (392 °F)	8	
DN 2700 (108")	62 000	7 G	Special version (add order code):		
DN 2800 (112")	72 000	7 J	No transducer cable, cable length 4 x 3 m	9 R 0 A	
DN 2900 (116")	71 000	7 L	No transducer cable, cable length 4 x 15 m	9 R 0 B	
DN 3000 (120")	78 000	7 N	No transducer cable, cable length 4 x 30 m	9 R 0 C	
DN 3100 (124")	82 000	7 Q	No transducer cable, cable length 4 x 60 m	9 R 0 D	
DN 3200 (128")	85 000	7 S	No transducer cable, cable length 4 x 90 m	9 R 0 E	
DN 3300 (132")	92 000	7 U	No transducer cable, cable length 4 x 120 m	9 R 0 F	
DN 3400 (136")	100 000	7 W			
DN 3500 (140")	100 000	8 A			
DN 3600 (144")	110 000	8 C			
DN 3700 (148")	120 000	8 E			
DN 3800 (152")	130 000	8 G			
DN 3900 (156")	130 000	8 J			
DN 4000 (160")	144 000	8 L			
Installation method					
Empty pipe		A			
Hot tap, mounting under pressure		B			
SONOKIT for tapping band (DN 200 ... DN 1800) (tapping band to be ordered separately) ¹⁾		C			
Transducer holder					
None (for tapping band)		0			
Carbon steel, length = 160 mm, mounting plates in carbon steel		1			
Stainless steel, length = 160 mm, mounting plates in stainless steel		2			
Stainless steel, length = 230 mm, for concrete pipe (DN 600 ... DN 4000)		3			

¹⁾ Tapping band via special request

SITRANS F flowmeters

SITRANS F US

Flowmeter SONOKIT (with FUS060)

Selection and Ordering data	Order code
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Additional information

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

Material certificate

EN 10204-3.1, transducer body material	F30
EN 10204-3.1, transducer holder material	F31
EN 10204-3.1, mounting plate material	F32

Tag name plate

Stainless steel tag with 12 mm characters (max. 15 characters) (add plain text)	Y17
Self-adhesive plastic tag with 8 mm characters (max. 15 characters) (add plain text)	Y18

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

4



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SONOKIT accessories and spare parts

SONO 3200 spare parts, complete transducer with ½"-NPT cable glands

Transducer type	Material	Gasket	Pressure rating	Terminal housing	Approval	Temperature range [°C (°F)]	Length [mm (inch)]	Order No.
O-ring	316 SS	O-ring	PN 40	Plastic PA 6.6		-20 ... +100 (-4 ... +212)	160 (6.3)	A5E00839476
O-ring	316 SS	O-ring	PN 40	316 SS		-20 ... +200 ¹⁾ (-4 ... +392)	160 (6.3)	A5E00839435
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.

SONO 3200 spare parts, complete transducer with M20 cable glands

Transducer type	Material	Gasket	Pressure rating	Terminal housing	Approval	Temperature range [°C (°F)]	Length [mm (inch)]	Order No.
O-ring	316 SS	O-ring	PN 40	Plastic PA 6.6		-20 ... +100 (-4 ... +212)	160 (6.3)	FDK-085B5454
O-ring	316 SS	O-ring ¹⁾	PN 40	316 SS		-20 ... +200 ²⁾ (-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 ¹⁾	PN 40	316 SS	Ex-d ³⁾	-20 ... +180 (-4 ... +356)	160 (6.3)	FDK-085B5452
O-ring	316 SS	O-ring	PN 40	316 SS	Ex-i ⁴⁾	-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⁾ Chemical resistant O-ring

²⁾ 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.

³⁾ ATEX (Ex) IIC 2G EEx d IIC T3 ... T6

⁴⁾ For systems with FUS060 ATEX IIC 2G Ex dem [ia/ib] T6/T4/T3

SONO 3200 spare parts, transducer terminal housing with M20 cable glands

Type	Order No.
Material: PA 6.6, Temperature range: -20 ... +100 °C (-4 ... +212 °F)	FDK-085B5501
Material: AISI 316, Temperature range: -20 ... +200 °C (-4 ... +392 °F)	FDK-085B5504
Material: AISI 316, Ex-d ¹⁾ , Temperature range: -20 ... +180 °C (-4 ... +356 °F)	FDK-085B5505
Material: AISI 316, Ex-i ²⁾ , Temperature range: -10 ... +190 °C (14 ... 374 °F)	A5E00835255



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 terminal housing with ½"-NPT cable glands

Type	Order No.
Material: PA 6.6, Temperature range: -20 ... +100 °C (-4 ... +212 °F)	A5E00839460
Material: AISI 316, Temperature range: -20 ... +200 °C (-4 ... +392 °F)	A5E00839427



SONO 3200 spare parts transducer body with insert

Temperature range [°C (°F)]	Gasket	Length [mm (inch)]	Order No.
-20 ... +200 (-4 ... +392)	O-ring ¹⁾	160 (6.3)	FDK-085B1406
-20 ... +200 (-4 ... +392)	O-ring	230 (9.41)	FDK-085B5511



¹⁾ Chemical resistant O-ring

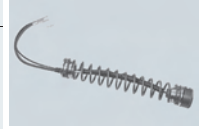
SITRANS F flowmeters

SITRANS F US

Flowmeter SONOKIT (with FUS060)

SONO 3200 spare parts, transducer insert

Temperature range [°C (°F)]	Length [mm (inch)]	Order No.
-20 ... +200 (-4 ... +392)	160 (6.3)	FDK-085B1419
-20 ... +200 (-4 ... +392)	230 (9.41)	FDK-085B1420



Transducer SONO 3200 gasket

Type	Pressure rating	Material	Temperature range [°C (°F)]	Order No.
Gasket O-ring (3 pcs. for O-ring transducers)	PN 40	FFKM ¹⁾ /FKM	-20 ... +200 (-4 ... +392)	FDK-085B1089



¹⁾ Chemical resistant O-ring

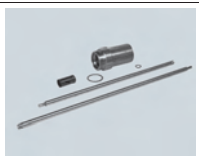
Potting kit for SONO 3200 terminal housing

Type/description	Order No.
Submersible kit for transducers SONO 3200, IP68 10 m (32.81 ft) w.g. rating	FDK-085L2403



Tools for SONO 3200 transducers and SONOKIT

Type/description	Order No.
Extraction tool for replacement of SONO 3200 O-ring transducers under pressure (hot-tap) Transducer length:	
• 160 mm (6.3")	FDK-085B5333
• 230 mm (9.1")	FDK-085B5335
Angle measurement tool for SONOKIT	FDK-085B5330
Hot-tap drilling tool for SONOKIT	FDK-085B5392
Alignment tool for SONOKIT (for pipe sizes DN 300 ... DN 1200)	FDK-085B5393



SITRANS F flowmeters

SITRANS F US

Flowmeter SONOKIT (with FUS060)

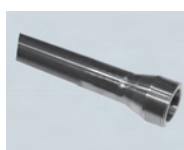
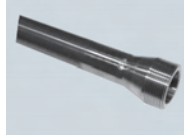
Cables for SONOKIT SONO 3200 transducers with FUS060

Type/description	Length m (ft)	Order No.
Coaxial cable for FUS060, (75 Ω , max. 70 °C (158 °F), black PVC) (2 pcs.)	3 (9.84)	A5E00875101
	15 (49.21)	A5E00861432
	30 (98.43)	A5E01278662
	60 (196.85)	A5E01278682
	90 (295.28)	A5E01278687
	120 (393.70)	A5E01278698
High temp. coaxial cable for FUS060; with 0.3 m brown PTFE high temp. transducer part, max. 200 °C (392 °F) and black PVC transmitter part with SMB plug, max. 70 °C (158 °F); (impedance 75 Ω) (2 pcs.)	3 (9.84)	A5E00875105^{F)}
	15 (49.21)	A5E00861435
	30 (98.43)	A5E01196952^{F)}



Transducer holder for SONOKIT SONO 3200 transducers

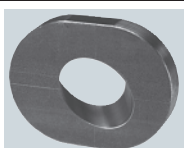
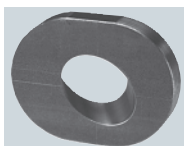
Type/description	Order No.
1-track	
• 160 mm (6.3") stainless steel 45°, DN 100 ... DN 150 (4" ... 6")	FDK-085L1103
• 160 mm (6.3") carbon steel 45°, DN 100 ... DN 150 (4" ... 6")	FDK-085L1102
• 230 mm (9.1") for concrete pipe 60°, DN 600 ... DN 2400 (24" ... 96")	FDK-085L1107
• 160 mm (6.3") stainless steel 60°, DN 200 ... DN 2400 (8" ... 96")	FDK-085L1105
• 160 mm (6.3") carbon steel 60°, DN 200 ... DN 2400 (8" ... 96")	FDK-085L1104
2-track	
• 230 mm (9.1") for concrete pipe 60°, DN 600 ... DN 4000 (24" ... 160")	FDK-085L1111
• 160 mm (6.3") stainless steel 60°, DN 200 ... DN 4000 (8" ... 160")	FDK-085L1109
• 160 mm (6.3") carbon steel 60°, DN 200 ... DN 4000 (8" ... 160")	FDK-085L1108



The part which is welded onto the pipe is either stainless steel or carbon steel.

Mounting plate for SONOKIT SONO 3200 transducers

Type/description	Order No.
1-track	
• Stainless steel plate, 45°, DN 100 ... DN 150 (4" ... 6")	FDK-085L1113
• Carbon steel plate, 45°, DN 100 ... DN 150 (4" ... 6")	FDK-085L1112
• Stainless steel plate, 60°, DN 200 ... DN 2400 (8" ... 96")	FDK-085L1115
• Carbon steel plate, 60°, DN 200 ... DN 2400 (8" ... 96")	FDK-085L1114
2-track	
• Stainless steel plate, 60°, DN 200 ... DN 4000 (8" ... 160")	FDK-085L1119
• Carbon steel plate, 60°, DN 200 ... DN 4000 (8" ... 160")	FDK-085L1118



The mounting plates are either completely in stainless steel or carbon steel.

Cable connection boxes

(For the connection of individual transducer cables with the FUS060 transducer cables)

Type/description	Order No.
Junction box for coax cable	
• IP68 metal box for 2 coaxial cables	FDK-085B1360
• IP68 metal box for 4 coaxial cables	FDK-085B1361
• IP68 EEx e plastic box for 2 coaxial cables, no ATEX approval	FDK-085B1362
• IP68 EEx e plastic box for 4 coaxial cables, no ATEX approval	FDK-085B1363



SONO 3200 cable glands

Type/description	Temperature range [°C (°F)]	Appr.	Order No.
black PA plastic, cable Ø 5 ... 13 mm	-20 ... 100 (-4 ... +212)		A5E02246304
1/2" NPT grey PA plastic, cable Ø 5 ... 9 mm	-20 ... 100 (-4 ... +212)		A5E02246309
1/2" NPT chrome-plated brass, cable Ø 5 ... 9 mm	-40 ... 100 (-40 ... +212)		A5E02246258
M20 stainless steel, cable Ø 4 ... 6 mm	-25 ... 200 (-13 ... +392)	Ex-i	A5E02246194
M20 stainless steel, cable Ø 5 ... 8 mm	-60 ... 180 (-76 ... +356)	Ex-d	A5E02246311



F) Subject to export regulations AL: 91999, ECCN: N.

SITRANS F flowmeters

SITRANS F US

Flowmeter SITRANS FUS380 standard

Overview



The 2-track flowmeter SITRANS FUS380 comes as battery or mains-powered and is designed to measure water flow in district heating plants, local networks, boiler stations, substations, chiller plants and other general water applications.

The type-approved flowmeter version is named SITRANS FUE380 - see page 4/208.

Technically, the meter types SITRANS FUS380 and SITRANS FUE380 are completely identical, only difference is the calibration limit and the type approval for custody transfer.

Benefits

- Battery-powered up to 6 years
- 115/230 V mains-powered with back-up battery option in case of mains power failure
- Fast measuring frequency 20 Hz/0.5 Hz (230 V AC/Battery)
- Easy one-button straight forward display
- 2-track measuring principle for optimum accuracy
- Compact or remote mounting
- Measures on all district water qualities and water conductivities
- No pressure drop
- Long-term stability
- 2 galvanically isolated digital outputs for easy connection to a calculator (potential-free)
- Bidirectional measurement, with 2 totalizers and outputs
- Dynamic range $Q_{\min}:Q_{\max}$ up to 1:400
- MODBUS RTU/RS 232, RS 485

Application

The main application for SITRANS FUS380 is measurement of water flow or water flow in heat meter systems in district heating networks or chilled water.

Design

The 2-track design of SITRANS FUS380 ensures maximum accuracy under short inlet conditions. The flowmeter consists of a flow sensor pipe, 4 transducers/transducer cables and a transmitter SITRANS FUS080.

The unit is available in a compact or a remote version with up to 30 meter distance from flowmeter to transmitter. When ordering a compact version the transducer cables are pre-mounted and ready for installation.

Compact mounting is only possible up to 120 °C (248 °F). The sensor must be isolated to protect transmitter from heat. The transmitter is available in an IP67/NEMA 4X/6 enclosure.

Integration

The flowmeter digital output is often used as input for an energy meter or as input for digital systems for remote reading.

SITRANS FUS380 has two digital output functions that can be individually selected, and optional MODBUS RTU communication modules.

Pulse output rate is defined when ordering.

If the flowmeter forms part of an energy meter system for custody transfer, no further approvals are needed, except possible local approvals on the flowmeter.

Configuration SITRANS FUS380*Selection guide SITRANS FUS380, standard version*

DN	Q_s (m³/h)	Q_{max} (m³/h) (105% of Q_s)	Q_p (m³/h)	Q_i (m³/h) (1:100 of Q_p)	Cut-off (m³/h) (50% of Q_i)	Cut-off (% of Q_{max})	Typical pulse value ¹⁾ (l/pulse)
50	15	15.75	15	0.15	0.075	0.48	1
50	45	47.25	15	0.15	0.075	0.16	1
50	45	47.25	30	0.3	0.150	0.32	1
65	25	26.25	25	0.25	0.125	0.48	1
65	72	75.6	25	0.25	0.125	0.17	1
65	72	75.6	50	0.5	0.250	0.33	1
80	40	42	40	0.4	0.200	0.48	2.5
80	120	126	40	0.4	0.200	0.16	2.5
80	120	126	80	0.8	0.400	0.32	2.5
100	60	63	60	0.6	0.300	0.48	2.5
100	180	189	60	0.6	0.300	0.16	2.5
100	240	252	120	1.2	0.600	0.24	2.5
125	10	10.5	100	1	0.500	4.76	2.5
125	280	294	100	1	0.500	0.17	2.5
125	400	420	200	2	1.000	0.24	2.5
150	150	157.5	150	1.5	0.750	0.48	10
150	420	441	150	1.5	0.750	0.17	10
150	560	588	300	3	1.500	0.26	10
200	250	262.5	250	2.5	1.250	0.48	10
200	700	735	250	2.5	1.250	0.17	10
200	900	945	500	5	2.500	0.26	10
250	400	420	400	4	2.000	0.48	10
250	1120	1176	400	4	2.000	0.17	10
250	1400	1470	800	8	4.000	0.27	10
300	560	588	560	5.6	2.800	0.48	50
300	1560	1638	560	5.6	2.800	0.17	50
300	2100	2205	1120	11.2	5.600	0.25	50
350	750	787.5	750	7.5	3.750	0.48	50
350	2100	2205	750	7.5	3.750	0.17	50
350	2800	2940	1500	15	7.500	0.26	50
400	950	997.5	950	9.5	4.750	0.48	50
400	2660	2793	950	9.5	4.750	0.17	50
400	3600	3780	1900	19	9.500	0.25	50
500	1475	1548.75	1475	14.75	7.375	0.48	100
500	4130	4336.5	1475	14.75	7.375	0.17	100
500	5500	5775	2950	29.5	14.750	0.26	100
600	2150	2257.5	2150	21.5	10.750	0.48	100
600	6020	6321	2150	21.5	10.750	0.17	100
600	8000	8400	4300	43	21.500	0.26	100
700	2900	3045	2900	29	14.500	0.48	100
700	8120	8526	2900	29	14.500	0.17	100
700	10 800	11 340	5800	58	29.000	0.26	100
800	3800	3990	3800	38	19.000	0.48	100
800	10 640	11 172	3800	38	19.000	0.17	100
800	14 200	14 910	7600	76	38.000	0.25	100
900	5000	5250	3800	50	25.000	0.48	100
900	14 000	14 700	5000	50	25.000	0.17	100
900	20 000	21 000	5000	100	50.000	0.24	100
1000	6000	6300	3800	60	30.000	0.48	100

SITRANS F flowmeters

SITRANS F US

Flowmeter SITRANS FUS380 standard

DN	Q _s (m³/h)	Q _{max} (m³/h) (105% of Q _s)	Q _p (m³/h)	Q _i (m³/h) (1:100 of Q _p)	Cut-off (m³/h) (50% of Q _i)	Cut-off (% of Q _{max})	Typical pulse value ¹⁾ (l/pulse)
1000	16 800	17 640	6000	60	30.000	0.17	100
1000	24 000	25 200	12 000	120	60.000	0.24	100
1200	9000	9450	3800	90	45.000	0.48	100
1200	25 200	26 460	9000	90	45.000	0.17	100
1200	36 000	37 800	18 000	180	90.000	0.24	100

The values Q_i, Q_p and Q_s are shown on the system label of the FUS380. Q_i (Q_{min}) means the minimal and Q_p (Q_{nom}) the nominal flow rate. Q_s is the highest operatable flow rate. The maximum flow rate (Q_{max}) is 105% of Q_s. The low flow cut-off is 50 % of Q_i.

In order to obtain best pulse output resolution in the range Q_{min} to Q_s of approx. 100 Hz at Q_s, two or three flow values for every dimension can be selected at ordering. Therefore the ordering data table also shows Q_p (Q_n). This flow rate is between Q_i (Q_{min}) and Q_s and indicates the normal or typical flow.

¹⁾ Typical pulse values for SITRANS FUS380. Other pulse values are possible - see Selection and Ordering data table.

4

Technical specifications for SITRANS FUS380

Pipe design	2-track sensor with flanges and integrated transducers wet-calibrated from factory
Nominal size welded version	DN 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 500, 600, 700, 800, 900, 1000, 1200
Pressure rate	PN 16, PN 25, PN 40 EN 1092-1
Pipe material	- DN 100 ... DN 1200: Carbon Steel EN 1.0345 / p235 GH, painted in light-gray. - DN 50 ... 80: Die-cast bronze G-CuSn10/W2.1050.01 (EN1982)
Transducer design	- DN 100 ... DN 1200: Integrated version and welded onto the pipe - DN 50 ... DN 80: Screwed into the pipe
Transducer material	Stainless steel (AISI 316/1.4404)/brass (CuZn36Pb2as)

Sensor operating conditions

Storage	-40 ... +85 °C (-40 ... +185 °F)
Media/surface temperature	DN 100 ... DN 1200: - Remote: 2 ... 200 °C (35.6 ... 392 °F) DN 50 ... DN 80: - Remote: 2 ... 150 °C (35.6 ... 302 °F) DN 50 ... DN 1200: - Compact: 2 ... 120 °C (35.6 ... 248 °F)
Degree of protection	Sensor connection IP67/NEMA 4X/6
Max. flow velocity	DN 50 ... DN 1200: 9 m/s (29.5 ft/s)

Transmitter

Display	LCD, 8 digits, additional 2 digits and symbols for status information
Push button	One push button for display information
Communication	IrDA – optical communication interface with MODBUS RTU protocol Add-on modules: - RS 232 serial interface with MODBUS RTU (Rx/Tx/GND), point to point with max. 15 m cable - RS 485 serial interface with MODBUS RTU (+/-/GND), multi-drop with up to 32 devices with max. 1000 m cable MODBUS RTU protocol is an open protocol (further information available on request) Serial speed 1200, 2400, 4800, 9600, 19200, 38400 Baud
Enclosure	IP67/NEMA 4X/6 to EN 60529 and DIN 40050
Temperature ambient	0 ... 60 °C (32 ... 140 °F)
Temperature storage	-40 ... +85 °C (-40 ... +185 °F) (battery included)
Installation	Compact on sensor: max. 120 °C (248 °F), Separate: max. 30 m (98.4 ft) from transmitter
Mechanical vibration	2 g, 1 ... 800 Hz sinusoidal in all directions to IEC 68-2-6
Design	Fibre-glass reinforced polyamide
Power supply	- Battery: replaceable 3.6 V LiSOCl (Lithium Thionyl Chloride) dual battery pack 32 Ah or single battery 16 Ah - Mains: 87 ... 265 V AC (50 ... 60 Hz)
Measuring rate	Battery mode: 0.5 Hz Mains supply: 20 Hz Back-up mode: 0.5 Hz (at mains supply drop)
Digital output	Two passive individual galvanically isolated MOS relay outputs, A and B, max. ± 35 V AC/DC, 50 mA
Max pulse frequency	100 Hz at Q _{max}

SITRANS F flowmeters

SITRANS F US

Flowmeter SITRANS FUS380 standard

Alarm indication	Track 1 (F1), track 2 (F2), internal failure (F3, F4), Low battery indication (F5), Qmax overflow (F6), pulse overflow (F7, F8), internal data logger warning (F9)
Cable length	Max. 30 m (98.4 ft) between transmitter and sensor
EMC	- Emission EN 61000-6-4 - Immunity EN 61000-6-2

	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

SITRANS FUS380 uncertainty

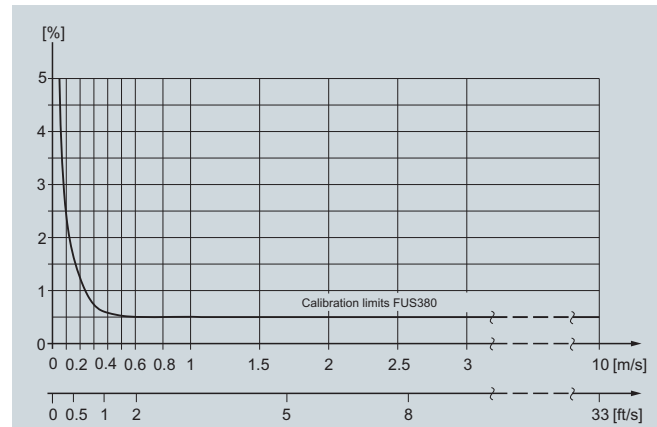
To ensure continuous accurate measurement, flowmeters must be calibrated. The calibration is conducted at SIEMENS flow facilities accredited according to ISO/IEC 17025 by DANAK or UKAS.

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

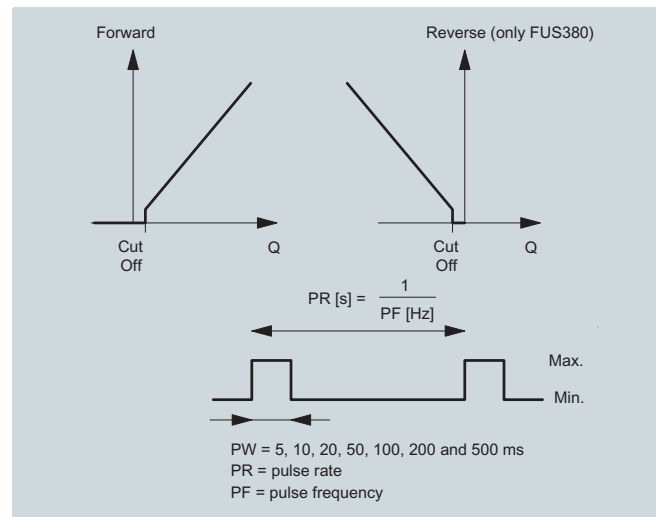
A standard calibration certificate is shipped with every SITRANS FUS380.

Accuracy SITRANS FUS380:

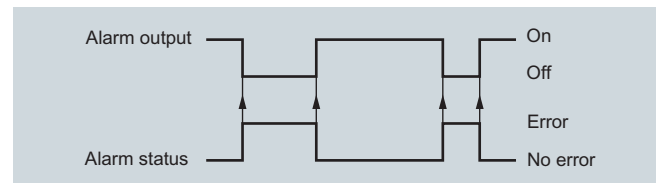
Standard calibration: Better than 0.5% of rate, $0.5 \text{ m/s} < v < 8 \text{ m/s}$
 $v < 0.5 \text{ m/s}$, $0.5 + 0.25/v$ [%]



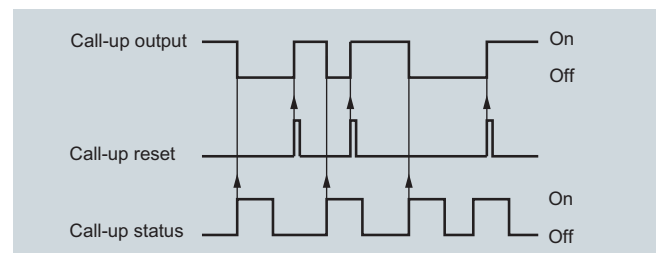
Output configuration SITRANS FUS380



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 program. The call-up function is activated when an alarm is activated.

SITRANS F flowmeters

SITRANS F US

Flowmeter SITRANS FUS380 standard

Selection and Ordering data			Order No.	Order code
Flowmeter SITRANS FUS380 (standard)			7 ME 3 4 0 0 -	
			0 - A	
Diameter	Flow setting [m ³ /h] Q _p (Q _n) ¹⁾ Q _s			
DN 50 (2") ²⁾	15	15	1 A	
DN 50 (2") ²⁾	15	45	1 C	
DN 50 (2") ²⁾	30	45	1 D	
DN 65 (2½") ²⁾	25	25	1 E	
DN 65 (2½") ²⁾	25	72	1 G	
DN 65 (2½") ²⁾	50	72	1 H	
DN 80 (3") ²⁾	40	40	1 J	
DN 80 (3") ²⁾	40	120	1 L	
DN 80 (3") ²⁾	80	120	1 M	
DN 100 (4")	60	60	1 N	
DN 100 (4")	60	180	1 Q	
DN 100 (4")	120	240	1 R	
DN 125 (5")	100	100	1 S	
DN 125 (5")	100	280	1 U	
DN 125 (5")	200	400	1 V	
DN 150 (6")	150	150	2 A	
DN 150 (6")	150	420	2 C	
DN 150 (6")	300	560	2 D	
DN 200 (8")	250	250	2 E	
DN 200 (8")	250	700	2 G	
DN 200 (8")	500	900	2 H	
DN 250 (10")	400	400	2 J	
DN 250 (10")	400	1120	2 L	
DN 250 (10")	800	1400	2 M	
DN 300 (12")	560	560	2 N	
DN 300 (12")	560	1560	2 Q	
DN 300 (12")	1120	2100	2 R	
DN 350 (14")	750	750	2 S	
DN 350 (14")	750	2100	2 U	
DN 350 (14")	1500	2800	2 V	
DN 400 (16")	950	950	3 A	
DN 400 (16")	950	2660	3 C	
DN 400 (16")	1900	3600	3 D	
DN 500 (20")	1475	1475	3 J	
DN 500 (20")	1475	4130	3 L	
DN 500 (20")	2950	5500	3 M	
DN 600 (24")	2150	2150	3 S	
DN 600 (24")	2150	6020	3 U	
DN 600 (24")	4300	8000	3 V	
DN 700 (28")	2900	2900	4 E	
DN 700 (28")	2900	8120	4 G	
DN 700 (28")	5800	10 800	4 H	
DN 800 (32")	3800	3800	4 N	
DN 800 (32")	3800	10 640	4 Q	
DN 800 (32")	7600	14 200	4 R	
DN 900 (36")	5000	5000	5 A	
DN 900 (36")	5000	14 000	5 C	
DN 900 (36")	10000	20 000	5 D	
DN 1000 (40")	6000	6000	5 J	
DN 1000 (40")	6000	16 800	5 L	
DN 1000 (40")	12 000	24 000	5 M	
DN 1200 (48")	9000	9000	5 S	
DN 1200 (48")	9000	25 200	5 U	
DN 1200 (48")	18 000	36 000	5 V	

Selection and Ordering data			Order No.	Order code
Flowmeter SITRANS FUS380 (standard)			7 ME 3 4 0 0 -	
			0 - A	
Flange norm and pressure rating				
System without sensor - only a transmitter FUS080 as spare part - settings as defined with this order no.			A	
EN 1092-1 Flanges				
PN 16 (DN 100 ... DN 1200)			C	
PN 25 (DN 200 ... DN 1000)			D	
PN 40 (DN 50 ... DN 250) ³⁾			E	
Compact / remote connection				
Compact version, max. 120 °C (248 °F) up to DN 800			0	
Remote version, max. 150/200 °C (302/392 °F)				
5 m (16.4 ft)			2	
10 m (32.8 ft)			3	
20 m (65.6 ft)			4	
30 m (98.4 ft)			5	
Pulse output value setup				
0.1 l/p (option for DN 50 ... DN 65) with 5 ms			1	
1 l/p (typical for DN 50 ... DN 65) with 5 ms			2	
2.5 l/p (typical for DN 80 ... DN 125) with 5 ms			3	
10 l/p (typical for DN 150 ... DN 250) with 5 ms			4	
50 l/p (typical for DN 300 ... DN 400) with 5 ms			5	
100 l/p (typical for DN 500 ... DN 1200) with 5 ms			6	
250 l/pulse			7	
1 m ³ /pulse			8	
0.25 l/pulse			9	N 0 A
0.5 l/pulse			9	N 0 B
5 l/pulse			9	N 0 C
25 l/pulse			9	N 0 D
500 l/pulse			9	N 0 E
2.5 m ³ /pulse			9	N 0 F
5 m ³ /pulse			9	N 0 G
10 m ³ /pulse			9	N 0 H
25 m ³ /pulse			9	N 0 J
50 m ³ /pulse			9	N 0 K
100 m ³ /pulse			9	N 0 L
250 m ³ /pulse			9	N 0 M
500 m ³ /pulse			9	N 0 N
1000 m ³ /pulse			9	N 0 P
Transmitter SITRANS FUS080				
IP67/NEMA 4X/6 115 ... 230 V AC			B	
IP67/NEMA 4X/6 3.6 V battery version D, incl. dual battery pack			D	
IP67/NEMA 4X/6 115 ... 230 V AC, including 3.6 V single battery backup			E	
IP67/NEMA 4X/6 3.6 V battery version (no battery pack included) ⁴⁾			G	
Pulse width setup				
5 ms (standard)			2	
10 ms			3	
20 ms			4	
50 ms			5	
100 ms			6	
200 ms			7	
500 ms			8	

¹⁾ Q_p (Q_n) is the normal or typical flow. Q_p and Q_s is shown on the system label.

²⁾ Pipe material bronze brass.

³⁾ PN 40 standard for DN 50 ... DN 80 die-cast bronze pipes.

⁴⁾ Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs.

Selection and Ordering data	Order code
Additional information	
Please add „-Z“ to Order No. and following add-on code(s) with plain text.	
Calibration / certificate FUS380	
Production calibration for DN 50 ... DN 1200 with Q_n as selected in diameter Calibration protocol: 2 x 3 points, Q_i , 10% Q_p and Q_p (max. 4200 m ³ /h).	Included
Accredited Siemens ISO/IEC 17025 calibration for DN 50 ... DN 200 with Q_n as selected in diameter. Certificate: 2 x 3 points, Q_i , 10% Q_p and Q_p (max. 250 m ³ /h).	D20
Accredited Siemens ISO/IEC 17025 calibration for DN 100 ... DN 500 with Q_n as selected in diameter. Certificate: 2 x 3 points, Q_i , 10% Q_p and Q_p (max. 1300 m ³ /h).	D21
Accredited Siemens ISO/IEC 17025 calibration, DN 300 ... DN 1200 with Q_n as selected in diameter. Certificate: 2 x 3 points, Q_i , 10% Q_p and Q_p (max. 4200 m ³ /h).	D22
Output B as reverse flow pulses. No calibration/verification.	E21
Material certificate	
EN 10204-3.1	F10
Tag name plate	
Stainless steel tag with 12 mm characters, max. 15 characters (add plain text)	Y17
Self-adhesive plastic tag with 8 mm characters, max. 15 characters (add plain text)	Y18
For accessories and spare parts see end of following chapter on FUE380.	

MLFB Ordering example

Customer requires a flowmeter:

- DN 250, PN 25, compact version (media temperature max. 120 °C (248 °F)), mains power version.
- Material certificate and metal tag name plate.
- Pulse output for for 10 l/pulse and min. 5 ms pulse width.

Ordering:

FUS380: **7ME3400-2LD00-4BA2-Z, F10, Y17**



Please use online Product selector to get latest updates. Product selector link:

www.pia-selector.automation.siemens.com

SITRANS F flowmeters

SITRANS F US

Flowmeter FUE380 with approval

Overview



The 2-track flowmeter SITRANS FUE380 comes as battery or mains-powered and is designed to measure water flow in district heating plants, local networks, boiler stations, substations, chiller plants and other general water applications.

The flowmeter FUE380 is approved according to heat meter standards EN 1434 class 2, OIML R 75 class 2 and MID class 2. Metrological parameters are protected against manipulation. The type-approved flowmeter version is named SITRANS FUE380. For a standard flowmeter type FUS380 without a type approval, see separate FUS380 chapter.

Technically, the meter types SITRANS FUS380 and SITRANS FUE380 are completely identical, only difference is the calibration limit and the type approval for custody transfer.

Benefits

- Battery-powered up to 6 years
- 115/230 V mains-powered with back-up battery option in case of mains power failure
- Fast measuring frequency 20 Hz/0.5 Hz (230 V AC/Battery)
- Easy one-button straight forward display
- 2-track measuring principle for optimum accuracy
- Compact or remote mounting
- Measures on all district water qualities and water conductivities
- No pressure drop
- Long-term stability
- 2 galvanically isolated digital outputs for easy connection to a calculator (potential-free)
- Bidirectional measurement, with 2 totalizers and outputs
- Dynamic range $Q_i:Q_p$ up to 1:50/100 or max. range $Q_i:Q_s$ up to 1:400
- MODBUS RTU/RS 232, RS 485

Application

The main application for SITRANS FUE380 is measurement of water flow or water flow in heat meter systems for custody transfer in district heating networks or chilled water.

Combined with an energy calculator and a pair of temperature sensors, SITRANS FUE380 can be used as part of an energy meter system. For this purpose Siemens offers energy calculator SITRANS FUE950.

Design

The 2-track design of SITRANS FUE380 ensures maximum accuracy under short inlet conditions. The flowmeter consists of a flow sensor pipe, 4 transducers/transducer cables and an approved transmitter SITRANS FUS080.

The unit is available in a compact or a remote version with up to 30 meter distance from flowmeter to transmitter. When ordering a compact version the transducer cables are pre-mounted and ready for installation.

Compact mounting is only possible up to 120 °C (248 °F). The sensor must be isolated to protect transmitter from heat. The transmitter is available in an IP67/NEMA 4X/6 enclosure.

Integration

The flowmeter digital output is often used as input for an energy meter or as input for digital systems for remote reading.

SITRANS FUE380 has two digital output functions that can be individually selected, and optional MODBUS RTU communication modules.

Pulse output rate is defined when ordering.

If the flowmeter forms part of an energy meter system for custody transfer, no further approvals are needed, except possible local approvals on the flowmeter.

Configuration SITRANS FUE380 type-approved

Selection guide SITRANS FUE380, type-approved flowmeter

DN	Q _s (m³/h)	Q _{max} (m³/h) (105% of Q _s)	Q _p (m³/h)	Q _i (m³/h) (1:50 of Q _p)	Q _i (m³/h) (1:100 of Q _p)	Cut-off (m³/h) (50% of Q _i)	Cut-off (% of Q _{max})	Typical pulse value ¹⁾ (l/pulse)
50	30	31.5	15 ²⁾	0.3	0.15	0.075	0.24	1
50	45	47.25	15 ²⁾	0.3	0.15	0.075	0.16	1
50	45	47.25	30 ³⁾	-	0.30	0.150	0.32	1
65	50	52.5	25 ²⁾	0.5	0.25	0.125	0.24	1
65	72	75.6	25 ²⁾	0.5	0.25	0.125	0.17	1
65	72	75.6	50 ³⁾	-	0.50	0.250	0.33	1
80	80	84	40 ²⁾	0.8	0.40	0.200	0.24	2.5
80	120	126	40 ²⁾	0.8	0.40	0.200	0.16	2.5
80	120	126	80 ³⁾	-	0.80	0.400	0.32	2.5
100	120	126	60 ²⁾	1.2	0.60	0.300	0.24	2.5
100	180	189	60 ²⁾	1.2	0.60	0.300	0.16	2.5
100	180	189	120 ³⁾	-	1.20	0.600	0.32	2.5
125	200	210	100 ²⁾	2.0	1.00	0.500	0.24	2.5
125	280	294	100 ²⁾	2.0	1.00	0.500	0.17	2.5
125	280	294	200 ³⁾	-	2.00	1.000	0.34	2.5
150	300	315	150 ²⁾	3.0	1.50	0.750	0.24	10
150	420	441	150 ²⁾	3.0	1.50	0.750	0.17	10
150	420	441	300 ³⁾	-	3.00	1.500	0.34	10
200	500	525	250 ²⁾	5.0	2.50	1.250	0.24	10
200	700	735	250 ²⁾	5.0	2.50	1.250	0.17	10
200	700	735	500 ³⁾	-	5.00	2.500	0.34	10
250	800	840	400 ²⁾	8.0	4.00	2.000	0.24	10
250	1120	1176	400 ²⁾	8.0	4.00	2.000	0.17	10
250	1120	1176	800 ³⁾	-	8.00	4.000	0.34	10
300	1120	1176	560 ²⁾	11.2	5.60	2.800	0.24	50
300	1560	1638	560 ²⁾	11.2	5.60	2.800	0.17	50
300	1560	1638	1120 ³⁾	-	11.20	5.600	0.34	50
350	1500	1575	750 ²⁾	15.0	7.50	3.750	0.24	50
350	2100	2205	750 ²⁾	15.0	7.50	3.750	0.17	50
350	2100	2205	1500 ³⁾	-	15.00	7.500	0.34	50
400	1900	1995	950 ²⁾	19.0	9.50	4.750	0.24	50
400	2660	2793	950 ²⁾	19.0	9.50	4.750	0.17	50
400	2660	2793	1900 ³⁾	-	19.00	9.500	0.34	50
500	2950	3097.5	1475 ²⁾	29.5	14.75	7.375	0.24	100
500	4130	4336.5	1475 ²⁾	29.5	14.75	7.375	0.17	100
500	4130	4336.5	2950 ³⁾	-	29.50	14.750	0.34	100
600	4300	4515	2150 ²⁾	43.0	21.50	10.750	0.24	100
600	6020	6321	2150 ²⁾	43.0	21.50	10.750	0.17	100
600	6020	6321	4300 ³⁾	-	43.00	21.500	0.34	100
700	5800	6090	2900 ²⁾	58.0	29.00	14.500	0.24	100
700	8120	8526	2900 ²⁾	58.0	29.00	14.500	0.17	100
700	8120	8526	5800 ³⁾	-	58.00	29.000	0.34	100
800	7600	7980	3800 ²⁾	76.0	38.00	19.000	0.24	100
800	10 640	11 172	3800 ²⁾	76.0	38.00	19.000	0.17	100
800	10 640	11 172	7600 ³⁾	-	76.00	38.000	0.34	100
900	10 000	10 500	5000 ²⁾	100.0	50.00	25.000	0.24	100
900	14 000	14 700	5000 ²⁾	100.0	50.00	25.000	0.17	100
900	14 000	14 700	10 000 ³⁾	-	100.00	50.000	0.34	100

SITRANS F flowmeters

SITRANS F US

Flowmeter FUE380 with approval

DN	Q _s (m ³ /h)	Q _{max} (m ³ /h) (105% of Q _s)	Q _p (m ³ /h)	Q _i (m ³ /h) (1:50 of Q _p)	Q _i (m ³ /h) (1:100 of Q _p)	Cut-off (m ³ /h) (50% of Q _i)	Cut-off (% of Q _{max})	Typical pulse value ¹⁾ (l/pulse)
1000	12 000	12 600	6000 ²⁾	120.0	60.00	30.000	0.24	100
1000	16 800	17 640	6000 ²⁾	120.0	60.00	30.000	0.17	100
1000	16 800	17 640	12 000 ³⁾	-	120.00	60.000	0.34	100
1200	18 000	18 900	9000 ²⁾	180.0	90.00	45.000	0.24	100
1200	25 200	26 460	9000 ²⁾	180.0	90.00	45.000	0.17	100
1200	25 200	26 460	18 000 ³⁾	-	180.00	90.000	0.34	100

Dynamic range Q_i:Q_p: better than 1:100 or 1:50 according to EN 1434, OIML R 75 class 2 and MID class 2.

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 label of the FUE380.

In order to obtain best pulse output resolution in the range Q_{min} to Q_s of approx. 100 Hz at Q_s, two or three flow values for every dimension can be selected at ordering. Therefore the ordering data table also shows Q_p (Q_n). This flow rate is between Q_i (Q_{min}) and Q_s and indicates the normal or typical flow according to the approval requirements.

¹⁾ In connection with SITRANS FUE950 - other pulse values - see Selection and Ordering data table.

²⁾ EN 1434 and MID flow values

³⁾ OIML R 75 and MID flow values

Technical specifications SITRANS FUE380

Pipe design	2-track sensor with flanges and integrated transducers wet-calibrated from factory		Add-on modules:
Nominal size welded version	DN 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 500, 600, 700, 800, 900, 1000, 1200		- 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), multi-drop with up to 32 devices with max. 1000 m cable
Pressure rate	PN 16, PN 25, PN 40 EN 1092-1		MODBUS RTU protocol is an open protocol (further information available on request)
Pipe material	- DN 100 ... DN 1200: Carbon Steel EN 1.0345/P235 GH, painted in light-gray. - DN 50 ... DN 80: Die-cast bronze G-CuSn10/W2.1050.01 (EN1982)		Serial speed 1200, 2400, 4800, 9600, 19200, 38400 Baud
Transducer design	- DN 100 ... DN 1200: Integrated version and welded onto the pipe - DN 50 ... DN 80: Screwed into the pipe	Enclosure	IP67/NEMA 4X/6 to EN 60529 and DIN 40050
Transducer material	Stainless steel (AISI 316/1.4404)/brass (CuZn ₃₆ Pb ₂ As)	Temperature ambient	0 ... 60 °C (32 ... 140 °F) MID: Climatic class -10 ... +55 °C (-14 ... +131 °F)
Sensor operating conditions		Temperature storage	-40 ... +85 °C (-40 ... +185 °F) (battery included)
Storage	-40 ... +85 °C (-40 ... +185 °F)	Installation	Compact on sensor: max. 120 °C (248 °F), Separate: max. 30 m (98.4 ft) from transmitter
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	Mechanical vibration	2 g, 1 ... 800 Hz sinusoidal in all directions to IEC 68-2-6
Degree of protection	Sensor connection IP67/NEMA 4X/6	Design	Fibre glass reinforced polyamide
Max. flow velocity at Q _s	DN 50 ... DN 1200: 7 m/s (22.9 ft/s)	Power supply	- Battery: replaceable 3.6 V LiSOCl (Lithium Thionyl Chloride) dual battery pack 32 Ah or single battery 16 Ah - Mains: 87 ... 265 V AC (50 ... 60 Hz)
Transmitter		Measuring rate	Battery mode: 0.5 Hz Mains supply: 20 Hz Back-up mode: 0.5 Hz (at mains supply drop)
Display	LCD, 8 digits, additional 2 digits and symbols for status information	Digital output	Two passive individual galvanically isolated MOS relay outputs, A and B, max. ± 35 V AC/DC, 50 mA
Push button	One push button for display information	Max pulse frequency	100 Hz at Q _{max}
Communication	IrDA – optical communication interface with MODBUS RTU protocol	Alarm indication	Track 1 (F1), track 2 (F2), internal failure (F3, F4), Low battery indication (F5), Q _{max} overflow (F6), pulse overflow (F7, F8), internal data logger warning (F9)

SITRANS F flowmeters

SITRANS F US

Flowmeter FUE380 with approval

Cable length	Max. 30 m (98.4 ft) between transmitter and sensor
EMC	- Emission EN 61000-6-4 - Immunity EN 61000-6-2 - MID: Environment class E2 and M1
Approvals	- EN 1434 and OIML R 75 Class 2 (PTB approval based on EN1434) - MID class 2 approval and certification

Type-dependent settings

	FUE380
Flow value	Predefined according to EN 1434 / OIML R 75 / MID
Approval	Country specific
Flow rate v_f	0.02 ... 7 m/s (0.065 ... 22.9 ft/s)
Output A	Preset: Forward pulses
Output B	Preset: Alarm
Pulse value A & B (depending on DN value)	Preset: See scheme - previous page Preset for SITRANS FUE950 or free selectable depending on flow rate (Q_s)
Pulse width	Preset: 5 ms
Flow unit setup	Preset: m ³ /h
Volume unit setup	Preset: m ³

SITRANS FUE380 uncertainty

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

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

A standard calibration certificate is shipped with every SITRANS FUE380.

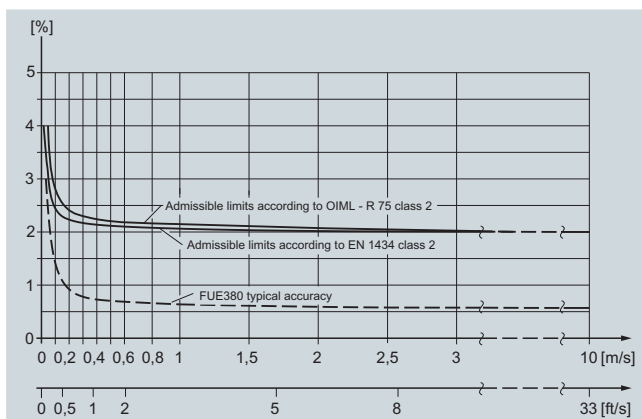
Typical accuracy SITRANS FUE380:

$$0.5 + 0.02 Q_p/Q [\%]$$

Q_p according to EN 1434/OIML requirements.

Example: DN 100, $Q_p = 60 \text{ m}^3/\text{h}$ at $Q = 1.2 \text{ m}^3/\text{h}$:

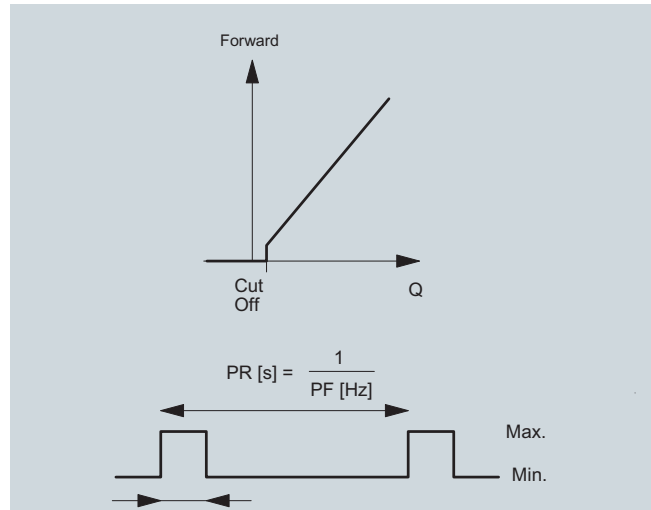
Accuracy = typical 1.5 %



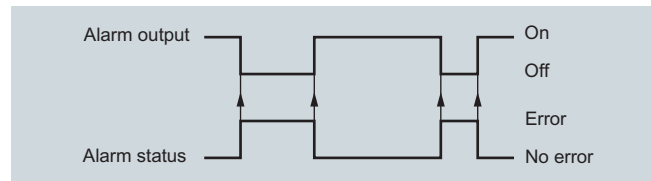
SITRANS FUE380 fulfils the requirements

$E_f = \pm (2 + 0.02 Q_p/Q_i)$ max. $\pm 5\%$, according to EN 1434 and OIML R 75, class 2 or MID class 2 requirements.

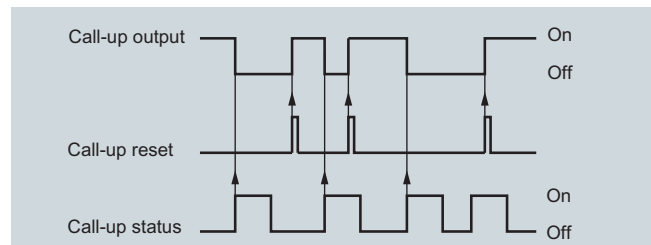
Output configuration SITRANS FUE380



Pulse volume: output A/B configured as volume per pulse, calculated on forward/reverse or net forward/reverse flow. The volume per pulse is freely scaleable (via PDM software) if the sealing is open.



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 program. The call-up function is activated when an alarm is activated.

SITRANS F flowmeters

SITRANS F US

Flowmeter FUE380 with approval

Selection and Ordering data			Order No.	Order code
Flowmeter SITRANS FUE380 (type-approved)			7 ME 3 4 1 0 -	
Diameter	Flow setting [m³/h] Qp[m³/h]¹⁾ Qs [m³/h]			
DN 50 (2") ²⁾	15 ³⁾ 30	1 B		
DN 50 (2") ²⁾	15 ³⁾ 45	1 C		
DN 50 (2") ²⁾	30 ⁴⁾ 45	1 D		
DN 65 (2½") ²⁾	25 ³⁾ 50	1 F		
DN 65 (2½") ²⁾	25 ³⁾ 72	1 G		
DN 65 (2½") ²⁾	50 ⁴⁾ 72	1 H		
DN 80 (3") ²⁾	40 ³⁾ 80	1 K		
DN 80 (3") ²⁾	40 ³⁾ 120	1 L		
DN 80 (3") ²⁾	80 ⁴⁾ 120	1 M		
DN 100 (4")	60 ³⁾ 120	1 P		
DN 100 (4")	60 ³⁾ 180	1 Q		
DN 100 (4")	120 ⁴⁾ 180	1 R		
DN 125 (5")	100 ³⁾ 200	1 T		
DN 125 (5")	100 ³⁾ 280	1 U		
DN 125 (5")	200 ⁴⁾ 280	1 V		
DN 150 (6")	150 ³⁾ 300	2 B		
DN 150 (6")	150 ³⁾ 420	2 C		
DN 150 (6")	300 ⁴⁾ 420	2 D		
DN 200 (8")	250 ³⁾ 500	2 F		
DN 200 (8")	250 ³⁾ 700	2 G		
DN 200 (8")	500 ⁴⁾ 700	2 H		
DN 250 (10")	400 ³⁾ 800	2 K		
DN 250 (10")	400 ³⁾ 1120	2 L		
DN 250 (10")	800 ⁴⁾ 1120	2 M		
DN 300 (12")	560 ³⁾ 1120	2 P		
DN 300 (12")	560 ³⁾ 1560	2 Q		
DN 300 (12")	1120 ⁴⁾ 1560	2 R		
DN 350 (14")	750 ³⁾ 1500	2 T		
DN 350 (14")	750 ³⁾ 2100	2 U		
DN 350 (14")	1500 ⁴⁾ 2100	2 V		
DN 400 (16")	950 ³⁾ 1900	3 B		
DN 400 (16")	950 ³⁾ 2660	3 C		
DN 400 (16")	1900 ⁴⁾ 2660	3 D		
DN 500 (20")	1475 ³⁾ 2950	3 K		
DN 500 (20")	1475 ³⁾ 4130	3 L		
DN 500 (20")	2950 ⁴⁾ 4130	3 M		
DN 600 (24")	2150 ³⁾ 4300	3 T		
DN 600 (24")	2150 ³⁾ 6020	3 U		
DN 600 (24")	4300 ⁴⁾ 6020	3 V		
DN 700 (28")	2900 ³⁾ 5800	4 F		
DN 700 (28")	2900 ³⁾ 8120	4 G		
DN 700 (28")	5800 ⁴⁾ 8120	4 H		
DN 800 (32")	3800 ³⁾ 7600	4 P		
DN 800 (32")	3800 ³⁾ 10 640	4 Q		
DN 800 (32")	7600 ⁴⁾ 10 640	4 R		
DN 900 (36")	5000 ³⁾ 10 000	5 B		
DN 900 (36")	5000 ³⁾ 14 000	5 C		
DN 900 (36")	10 000 ⁴⁾ 14 000	5 D		
DN 1000 (40")	6000 ³⁾ 12 000	5 K		
DN 1000 (40")	6000 ³⁾ 16 800	5 L		
DN 1000 (40")	12 000 ⁴⁾ 16 800	5 M		
DN 1200 (48")	9000 ³⁾ 18 000	5 T		
DN 1200 (48")	9000 ³⁾ 25 200	5 U		
DN 1200 (48")	18 000 ⁴⁾ 25 200	5 V		

Selection and Ordering data			Order No.	Order code
Flowmeter SITRANS FUE380 (type-approved)			7 ME 3 4 1 0 -	
Flange norm and pressure rating				
System without sensor - only a transmitter				
<u>EN 1092-1</u>				
PN 16 (DN 100 ... DN 1200)	C			
PN 25 (DN 200 ... DN 1000)	D			
PN 40 (DN 50 ... DN 250) ⁵⁾	E			
Compact / remote connection				
Compact version, max. 120 °C (248 °F)	0			
<u>Remote version, max. 200 °C (392 °F)</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			
Approvals / pulse output				
Without approval (neutral)	0			
Selectable pulse output (following code can be 1 ... 9)				
With approval marks	1			
Selectable pulse output (following code can be 1 ... 9)				
With approval marks and seal	2			
Selectable pulse output (following code can be 1 ... 9)				
Without approval (neutral) Preset pulse output for FUE950 energy meter (following code must be 2 ... 6)	3			
With approval marks	4			
Preset pulse output for FUE950 energy meter (following code must be 2 ... 6, dimension depending)				
With approval marks and seal	5			
Preset pulse output for FUE950 energy meter (following code must be 2 ... 6)				
Pulse output value setup				
0.1 l/p (option for DN 50 ... DN 65) with 5 ms	1			
1 l/p (typical for DN 50 ... DN 65) with 5 ms	2			
2.5 l/p (typical for DN 80 ... DN 125) with 5 ms	3			
10 l/p (typical for DN 150 ... DN 250) with 5 ms	4			
50 l/p (typical for DN 300 ... DN 400) with 5 ms	5			
100 l/p (typical for DN 500 ... DN 1200) with 5 ms	6			
Optional pulse values				
250 l/pulse	7			
1 m ³ /pulse	8			
0.25 l/pulse	9			N 0 A
0.5 l/pulse	9			N 0 B
5 l/pulse	9			N 0 C
25 l/pulse	9			N 0 D
500 l/pulse	9			N 0 E
2.5 m ³ /pulse	9			N 0 F
5 m ³ /pulse	9			N 0 G
10 m ³ /pulse	9			N 0 H
25 m ³ /pulse	9			N 0 J
50 m ³ /pulse	9			N 0 K
100 m ³ /pulse	9			N 0 L
250 m ³ /pulse	9			N 0 M
500 m ³ /pulse	9			N 0 N
1000 m ³ /pulse	9			N 0 P

For notes 1) to 8) see next page

SITRANS F flowmeters

SITRANS F US

Flowmeter FUE380 with approval

Selection and Ordering data	Order No.	Order code
Flowmeter SITRANS FUE380 (type-approved)	7ME3410-	
Transmitter SITRANS FUE080		
IP67/NEMA 4X/6 115 ... 230 V AC		B
IP67/NEMA 4X/6 3.6 V battery version D, incl. dual battery pack		D
IP67/NEMA 4X/6 115 ... 230 V AC, including 3.6 V single battery backup		E
IP67/NEMA 4X/6 3.6 V battery version (no battery pack included) ⁶⁾		G
Country / approval type ⁷⁾		
Neutral, no approval mark		A
Denmark ⁸⁾ , EN 1434/OIML R 75		E
Finland ⁸⁾ , EN 1434/OIML R 75		F
Germany ⁸⁾ , EN 1434 (PTB approval, DN 80 ... DN 1200)		G
Russia, EN 1434/OIML R 75		M
Ukraine, EN 1434/OIML R 75		P
China		Z
MID-Approval, (EN 1434/OIML R 75), English		R
MID-Approval, (EN 1434/OIML R 75), German		S
MID-Approval, (EN 1434/OIML R 75), Polish		T
MID-Approval, (EN 1434/OIML R 75), French		U
Pulse width setup		
5 ms (standard)		2
10 ms		3
20 ms		4
50 ms		5
100 ms		6
200 ms		7
500 ms		8

¹⁾ Q_p (Q_n) is the normal flow according to the approval requirements. Q_p and Q_s is shown on the system label.

²⁾ Pipe material bronze brass

³⁾ EN 1434 flow values

⁴⁾ OIML R 75 flow values

⁵⁾ PN 40 standard for DN 50 ... DN 80 die-cast bronze pipes

⁶⁾ Lithium batteries are subject to special transportation regulations according to United Nations "Regulation of Dangerous Goods, UN 3090 and UN 3091". Special transport documentation is required to observe these regulations. This may influence both transport time and costs.

⁷⁾ Other countries in progress

⁸⁾ In Europe the MID approval is the standard, please use following selections.

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

Selection and Ordering data	Order code
Additional information	
Please add „Z“ to Order No. and following add-on code(s) with plain text.	
Calibration / certificate FUE380	
Approval, verification and sealing as defined with the order number. See order code.	
Production calibration for DN 50 ... DN 1200 with Q_n as selected in diameter Calibration protocol: 2 x 3 points, Q_i , 10% Q_p and Q_p (max. 4200 m ³ /h).	Included
Accredited Siemens ISO/IEC 17025 calibration for DN 50 ... DN 200 with Q_n as selected in diameter. Certificate: 2 x 3 points, Q_i , 10% Q_p and Q_p (max. 250 m ³ /h).	D20
Accredited Siemens ISO/IEC 17025 calibration for DN 100 ... DN 500 with Q_n as selected in diameter. Certificate: 2 x 3 points, Q_i , 10% Q_p and Q_p (max. 1300 m ³ /h).	D21
Accredited Siemens ISO/IEC 17025 calibration, DN 300 ... DN 1200 with Q_n as selected in diameter. Certificate: 2 x 3 points, Q_i , 10% Q_p and Q_p (max. 4200 m ³ /h).	D22
Output B as reverse flow pulses. No calibration/verification.	E21
Material certificate	
EN 10204-3.1	F10
Tag name plate	
Stainless steel tag with 12 mm characters, max. 15 characters (add plain text)	Y17
Self-adhesive plastic tag with 8 mm characters, max. 15 characters (add plain text)	Y18

MLFB Ordering example

Customer requires a flowmeter for custody transfer:

- DN 250, PN 25, compact version (media temperature max. 120 °C), battery version.
- Type-approved according to EN 1434, verified and sealed for Germany.
- Material certificate and metal tag name plate.
- Pulse output for energymeter SITRANS FUE950.

Ordering:

FUE380: **7ME3410-2LD05-4DG2-Z, F10, Y17**

Example of appropriate energy meter:

Energy meter type: **FUE950-03110-0R1CB-10300-DK2-00012**



Please use online Product selector to get latest updates.

Product selector link:

www.pia-selector.automation.siemens.com

SITRANS F flowmeters

SITRANS F US

Flowmeter FUS380 and FUE380

Accessories and spare parts for Flowmeter FUS380 and FUE380

SITRANS FUS380/FUE380 - Spare parts

Type/description	Order No.	
Dual battery pack (6 year life-time) 33 Ah	FDK-087H2255	
Single battery back-up to main supply 13.5 Ah	FDK-087L4201	
Battery cover for transmitter FUS080	A5E00694468	
PG 13.5 set (2 pcs.) for main cable/pulse cable	FDK-083G0228	
PG 13.5 set (2 pcs.) for dual coax cable (6 mm)	A5E00694500	
SITRANS FUS/FUE380 wall mounting kit for remote transmitter mounting, including connection plate (DN 50 ... DN 1200/2" ... 48")	A5E00694509	
SITRANS FUS/FUE380 terminal box for compact transmitter mounting, including connection plate, (bronze sensors only, DN 50 ... DN 80/2" ... 3")	A5E01208138^{F)}	
SITRANS FUS/FUE380 terminal box for compact transmitter mounting, including connection plate, (steel sensors only, DN 100 ... DN 1200/4" ... 48")	A5E00694660^{F)}	
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	
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	

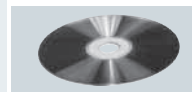
Type/description	Order No.	
5 m (16.4 ft) cable set (4 pcs.) for DN 50 ... DN 80 (2" ... 3") remote mounting	A5E01208092^{F)}	
10 m (32.8 ft) cable set (4 pcs.) for DN 50 ... DN 80 (2" ... 3") remote mounting	A5E01208114^{F)}	
20 m (65.6 ft) cable set (4 pcs.) for DN 50 ... DN 80 (2" ... 3") remote mounting	A5E01208117^{F)}	
30 m (98.4 ft) cable set (4 pcs.) for DN 50 ... DN 80 (2" ... 3") remote mounting	A5E01208121^{F)}	
1 m (3.28 ft) cable set (4 pcs.) for DN 50 ... DN 80 (2" ... 3") for compact version	A5E01208126^{F)}	
5 m (16.4 ft) cable set (4 pcs.) for DN 100 ... DN 1200 (4" ... 48") remote mounting	A5E00695476^{F)}	
10 m (32.8 ft) cable set (4 pcs.) for DN 100 ... DN 1200 (4" ... 48") remote mounting	A5E00695479^{F)}	
20 m (65.6 ft) cable set (4 pcs.) for DN 100 ... DN 1200 (4" ... 48") remote mounting	A5E00695480^{F)}	
30 m (98.4 ft) cable set (4 pcs.) for DN 100 ... DN 1200 (4" ... 48") remote mounting	A5E00695483^{F)}	
1 m (3.28 ft) cable set (4 pcs.) for DN 100 ... DN 1200 (4" ... 48") for compact version	A5E00695486^{F)}	

Process Device Manager SIMATIC PDM

SIMATIC PDM Single Point V6.0

For operation and parameterization of one field device, communication using PROFIBUS DP/PA or HART modem, incl. 1 TAG
Cannot be expanded by further functions or TAG
 option/power-pack 5 languages (German, English, French, Spanish, Italian) executes with Windows 2000 Professional or Windows XP Professional

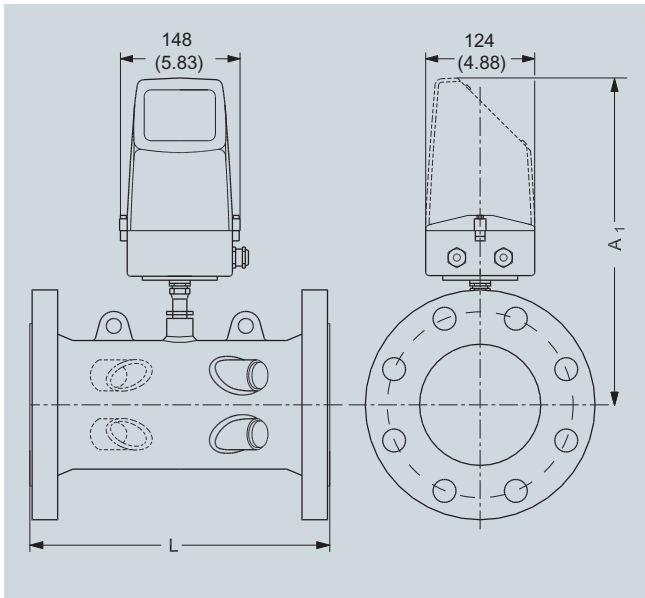
6ES7658-3HX06-0YA5



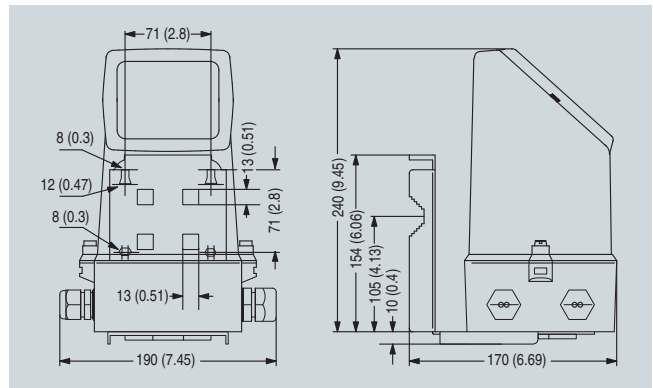
Downloads for DEVICE description FUE380
<http://support.automation.siemens.com/WW/view/en/17320235>

F) Subject to export regulations AL: 91999, ECCN: N.

Dimensional drawings



Transmitter IP67/NEMA 4X/6, wall mounting



4

Pipe Dimensions for FUS380 and FUE380

Size	PN 16		PN 25		PN 40			
	L	Weight	L	Weight	L	Weight	A1	Lift hug
DN	mm	kg	mm	kg	mm	kg	mm	
50	-	-	-	-	300 +0/-2	10	350	No
65	-	-	-	-	300 +0/-2	15	360	No
80	-	-	-	-	350 +0/-3	18	370	No
100	350 +0/-2	15	-	-	350 +0/-3	18	375	No
125	350 +0/-2	18	-	-	350 +0/-3	24	380	No
150	500 +0/-3	28	-	-	500 +0/-3	34	390	Yes
200	500 +0/-3	38	500 +0/-3	47	500 +0/-3	55	414	Yes
250	600 +0/-3	60	600 +0/-3	76	600 +0/-3	91	440	Yes
300	500 +0/-3	66	500 +0/-3	81	-	-	466	Yes
350	550 +0/-3	94	550 +0/-3	121	-	-	495	Yes
400	600 +0/-3	124	600 +0/-3	153	-	-	507	Yes
500	625 +0/-3	176	625 +0/-3	235	-	-	558	Yes
600	750 +0/-3	244	750 +0/-3	292	-	-	609	Yes
700	875 +0/-3	258	875 +0/-3	416	-	-	660	Yes
800	1000 +0/-3	338	1000 +0/-3	562	-	-	710	Yes
900	1230 +6/-6	475	1300 +6/-6	835	-	-	810	No
1000	1300 +6/-6	594	1370 +6/-6	1078	-	-	910	No
1200	1360 +6/-6	860	-	-	-	-	1110	No

Notes:

- Weight for transmitter/electronics 1.5 kg (3.3 lb)
- - Means not available
- All weights are **approximately**
- For flange values - see norm EN 1092-1

SITRANS F flowmeters

SITRANS F US

Flowmeter FUS380 and FUE380

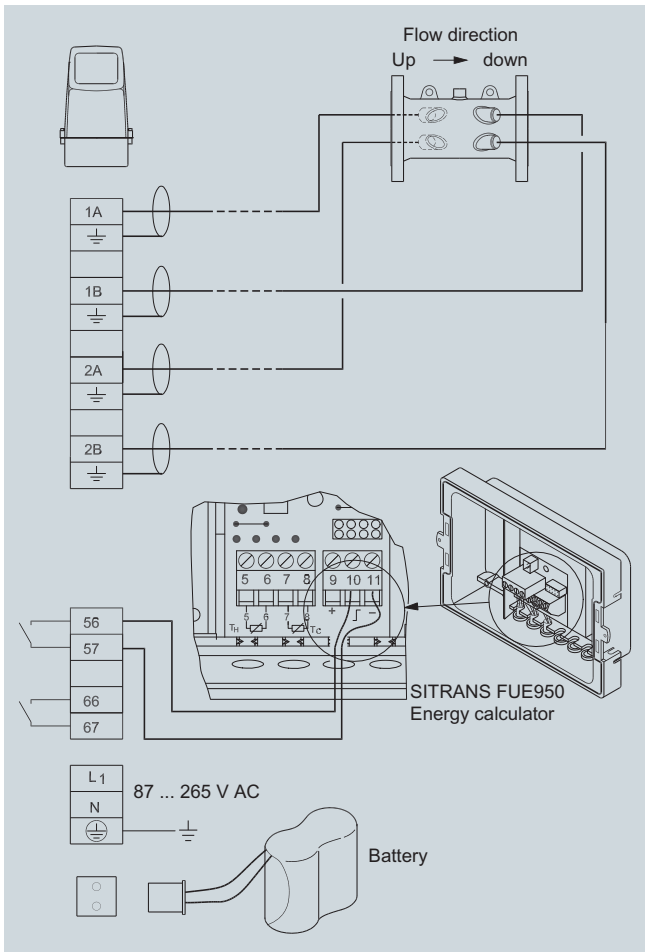
Size	PN 16		PN 25		PN 40		A1	Lift hug
	L	Weight	L	Weight	L	Weight		
inch	inch	lb	inch	lb	inch	lb	inch	
2	-	-	-	-	12 +0/-0.08	22	14	No
2½	-	-	-	-	12 +0/-0.08	33	14.4	No
3	-	-	-	-	14 +0/-0.08	40	14.8	No
4	13.77 +0/-0.08	33	-	-	13.77 +0/-0.12	40	15	No
5	13.77 +0/-0.08	40	-	-	13.77 +0/-0.12	53	15.2	No
6	19.68 +0/-0.12	62	-	-	19.68 +0/-0.12	75	15.6	Yes
8	19.68 +0/-0.12	84	19.68 +0/-0.12	104	19.68 +0/-0.12	121	16.30	Yes
10	23.62 +0/-0.12	132	23.62 +0/-0.12	168	23.62 +0/-0.12	201	17.32	Yes
12	19.68 +0/-0.12	146	19.68 +0/-0.12	179	-	-	18.35	Yes
14	21.65 +0/-0.12	207	21.65 +0/-0.12	267	-	-	19.8	Yes
16	23.62 +0/-0.12	273	23.62 +0/-0.12	337	-	-	19.96	Yes
20	24.61 +0/-3	419	24.61 +0/-0.12	538	-	-	21.97	Yes
24	29.53 +0/-0.12	668	29.53 +0/-0.12	805	-	-	23.98	Yes
28	34.45 +0/-0.12	796	34.45 +0/-0.12	1217	-	-	25.98	Yes
32	39.37 +0/-0.12	1089	39.37 +0/-0.12	1698	-	-	27.95	Yes
36	39.2 +0/-0.24	1047	52.00 +0/-0.24	1841	-	-	32.4	No
40	52 +0/-0.24	1310	54.80 +0/-0.12	2376	-	-	36.4	No
48	54.4 +0/-0.24	1892	-	-	-	-	44.4	No

Notes:

- Weight for transmitter/electronics 1.5 kg (3.3 lb)
- - Means not available
- All weights are **approximate**
- For flange values - see norm EN 1092-1

Schematics

Electrical connection FUS380 and FUE380



The scheme shows the transducer cable connections between transmitter terminals and respective transducer and the electrical connection of the energy calculator SITRANS FUE950.

SITRANS F flowmeters

SITRANS F US

SITRANS FUE950 energy calculator

Overview



SITRANS FUE950 is a universal thermal energy calculator, which meets the requirements of OIML R 75 class 4 and EN 1434. SITRANS FUE950 has been developed for the SITRANS FUS380/FUE380 and alternatively MAG 5000/6000.

SITRANS FUE950 is modular in construction and can by order be fitted with optional modules depending on the application.

SITRANS FUE950 can be used for up to 25 000 m³/h.

Benefits

Basic functions

- High-accuracy thermal energy metering
- Optical data reading in accordance with EN 1434
- Choice of battery, 230 V AC or 24 V AC
- Instantaneous values for energy/volume flow
- 24 months memory
- Error logging with date and time

Additional functions

- Battery backup of real-time clock in the event of power failure
- Tariff functions
- Read-out of account date

Add-on modules

- Plug-in module with data output, pulse output for accumulated energy and water or output signal for failure
- Plug-in module with data output and 2 extra pulse inputs
- Plug-in module for M-bus communication and 2 extra pulse inputs

Advanced functions for cooling/heating applications

- Separate totalizer registers for cooling/heating applications
- Zero point calibration of $\Delta\theta$ for cooling systems

Application

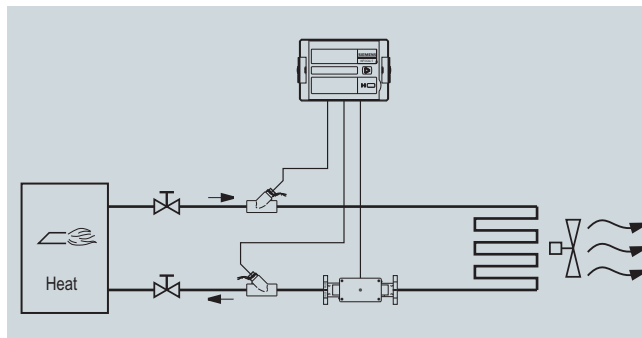
Energy calculation in:

- District heating applications
- Chilled water applications
- Combined cooling/heating applications

Application

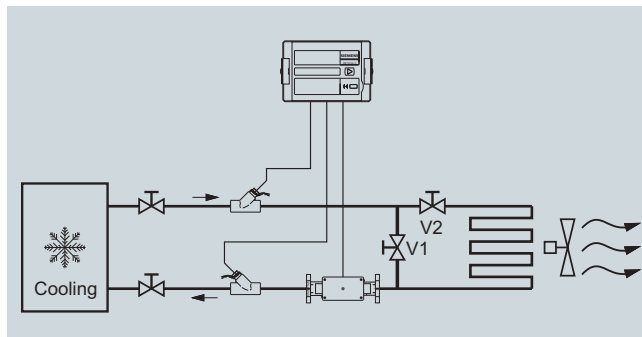
SITRANS FUE950 is able to handle 3 types of applications:

Type: OF/OR:



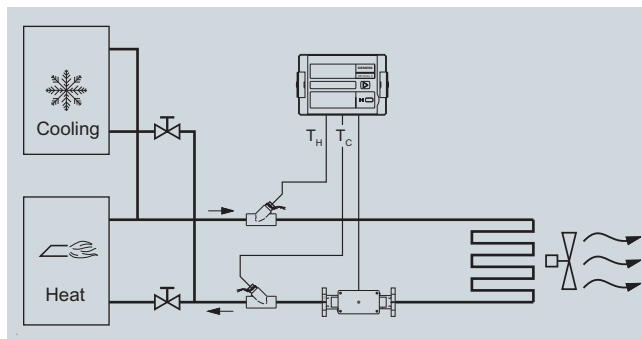
Hot water applications

Type: CF/CR:



Chilled water applications

Type: SF/SR:



Combined cooling/heating applications

SITRANS F flowmeters

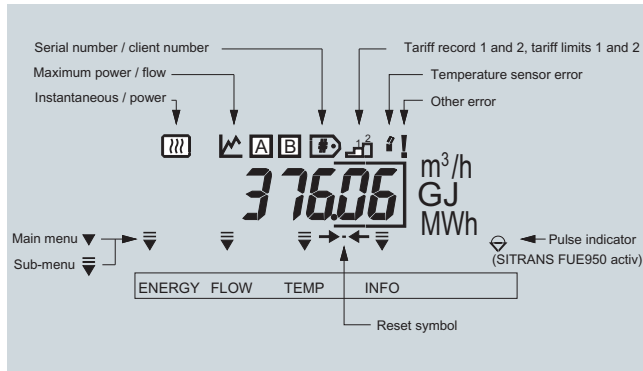
SITRANS F US

SITRANS FUE950 energy calculator

Design

SITRANS FUE950 has an easy-read 8-digit LCD display with associated pictograms for the various functions. As the display has been made for several applications, there will be figures/symbols which are not used for normal district heating applications.

SITRANS FUE950 has only one operating button. The display will always be configured for the application chosen, and for the selected display settings. In normal operation, the display will show cumulative energy values.



Displays and output pulses

Units: kWh (only DN50, $Q_p=15, 30$), MWh, GJ; all decimal points are statically.

The places after the decimal point of displayed values are indicated by the selected size and flow rate. The last decimal point are used as the pulse value and unit for the optional output modules.

Function

Technical

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 [m^3] of a given amount of water

T_{Hot} : Measured temperature in the flow

T_{Cold} : Measured temperature in the return

$K_{\text{factor}} (T_i)$: Thermal coefficient of enthalpy and heat content

The energy calculation is made by a counter and depends on flowmeter size, pulse frequency and legal requirements.

The calculator always carries out at least one energy calculation every 10 minutes if the flowmeter has not sent enough pulses to prompt an energy calculation.

Permanent memory/account date reading

The LOG of the calculator is read every 10 minutes with all cumulative values: Date, Σ energy, Σ water, Σ records 1 and 2, peak values of energy or flow, counter records A and B, date/time and info code.

Energy/volume

Maximum

Energy and volume can be output for the previous three months with associated dates when the maximum power occurred. Integration time can be set to 15, 30 or 60 minutes.

Standard factory setting: peak volume: 15 minutes.; peak energy: 60 minutes.

Error handling

If SITRANS FUE950 records an error, this will be indicated by a "!".

The following errors can be detected:

- F1 Forward temperature sensor is interrupted or short-circuited.
- F2 Return temperature sensor is interrupted or short-circuited.
- F3 Internal equipment error.
- F4 Differential temperature high and no flow for 48 hours.
- F5 Water flow exceeds preset Q_s .

Zero point calibration of differential temperature (only types CF/CR)

Cooling systems always operate with a small Δt and a relatively high flow rate. For technical reasons no sensor pair provides completely accurate temperature difference measurements when the sensor temperature difference between forward and return flow is close to zero.

SITRANS FUE950 type CF/CR contains a special zero point calibration routine that can be activated in order to minimize the temperature difference measuring failure.

Normally, the zero point calibration is not needed, but can be activated out in order to obtain maximum accuracy in the energy calculation.

The zero point calibration function requires a short circuit between forward and return sensor in the cooling system – e.g. by installing a valve V1 (See application drawing).

Optical output

SITRANS FUE950 is fitted with an optical infra-red send/receive port in accordance with IEC 61107.

Protocol standard, EN 60870-3 (M-bus protocol).

A reader head with a permanent magnet in 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.

Add-on modules

BUS communication

SITRANS FUE950 needs a special adapter cable to communicate with a PC. To access the terminals, it is necessary to use one of the supplementary modules – pulse output or input module, which, in addition to specific terminals - both have 3 terminals for connection to a PC.

Pulse output module

Module contains 3 terminals for DATA, REQUEST and GND. There are also 2 x 2 terminals for CE, CV/Alarm. Both outputs are galvanically separated.

Pulse sequence CE: 1 pulse per change in the least significant digit in the energy unit and resolution selected.

Pulse sequence CV: 1 pulse per change in the least significant digit in the volume unit and resolution selected.

Pulse input module/flow 2

If flowmeter 2 is used in a heating system, flowmeter 1 must always be placed in the flow and flowmeter 2 in the return.

The module contains 3 terminals for flowmeter 2 and 3 terminals for DATA, REQUEST and GND.

2 x 2 terminals for counters A and B, and 3 terminals for flow 2 input.

M-bus module

The M-bus protocol is in accordance with EN 1434-3 and EN 60870-5.

For communication with an M-bus, it is necessary to fit SITRANS FUE950 with an add-on module.

The M-bus module contains, in addition to terminals for BUS connection, terminals for counter inputs A and B.

Fitting/Installation

SITRANS FUE950 can only be wall mounted or panel mounted.

SITRANS F flowmeters

SITRANS F US

SITRANS FUE950 energy calculator

Integration

SITRANS FUE950 is a multi-purpose energy calculator which meets the requirements of EN 1434. Further, the energy calculator has been specially developed to receive volume pulses from SITRANS FUS380/FUE380 or alternatively MAG 5000/6000.

Technical specifications

Approved in accordance with	Heat meter EN 1434	Chilled water EN 1434 pr. A1
Temperature range	θ : 0 ... 170 °C	θ : 2 ... 30 °C
Differential temperature	$\Delta\theta$: 3 ... 150 K	$\Delta\theta$: 2 ... 20 K
Accuracy	Max. $\pm (0.5 + 3K/\Delta\theta)$ [%]	
Flow range	$Q_n (Q_p) \leq 25000 \text{ m}^3/\text{h}$	
Environment class	A	

Temperature input

Measuring range	0 ... 170 °C (32 ... 338 °F)
Differential temperature	1 ... 170 K (1.8 ... 306 °F)
Sensor type	Pt500
Sensor connection	2-wire
Measurement resolution	0.01 °C (0.018 °F)

Flow input 1

Pulse/frequency	$\leq 400 \text{ Hz}$ (The combined pulse frequency at flow 1, in pulse input A and B may not exceed 400 Hz, whether they are used one at a time or simultaneously.)
Pulse ON time	$\geq 0.5 \text{ ms}$
Pulse OFF time	$\geq 1.5 \text{ ms}$

Bus output

Protocol	EN 60870-5
Connection	Open collector, 2400/300 baud, 3.6 V

Optical connection

Protocol	EN 60870-5
Connection	Optical eye, 600 baud, EN 61107

Pulse output CE and CV/Alarm

ON time	$> 30 \text{ ms}$, max 10 Hz pulse frequency
ON Current	$\leq 10 \text{ mA}$
External supply	$\leq 24 \text{ V DC}$
OFF time with alarm	Approx. 1 hour

Supply data

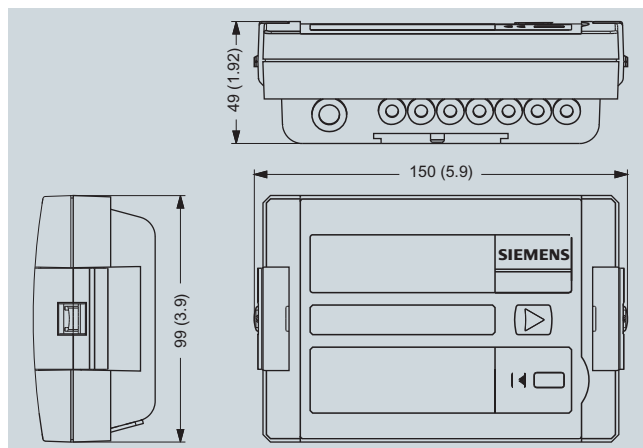
Internal voltage	3.6 ± 0.1 / -0.4 V DC
Current consumption	Typically 45 μA
Battery	3.6 V lithium D cell
Battery lifetime	Typically 8 years, 10 years with independently powered flowmeter
Power supply	230 V AC ± 15 / -30% 50/60 Hz 24 V AC
Battery backup	3.0 V CR 2032 cell (only in calculators with extra functions - MM = 0A,T0,TA)

Environment/safety

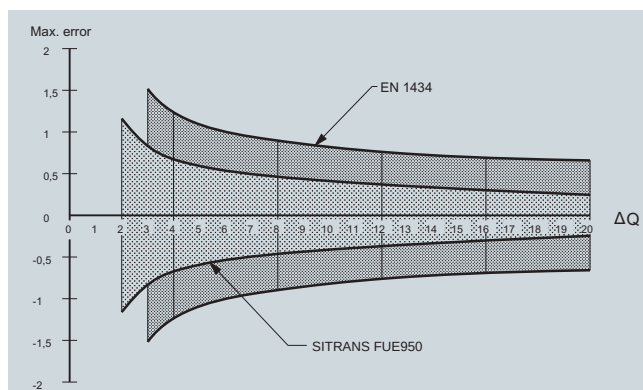
Generally	EN 1434
Ambient temperature	5 ... 55 °C (41 °F ... 131 °F)
Storage temperature	-25 ... +70 °C (-13 ... +158 °F)
Enclosure	IP54 in accordance with IEC 529
Vibrations	1g, 1 & 1000 Hz in accordance with IEC 68-2-34
Free fall	IEC 68-2-34
EMC	EN 1434 (EN 50081-1 / 50082-1)
Personal safety	EN 60730

Materials

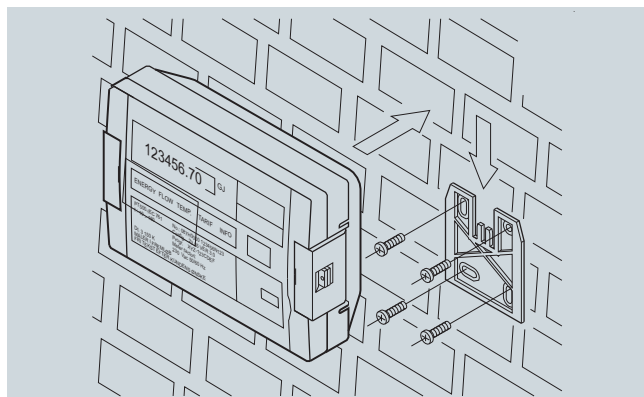
Top	PC Lexan 141R Transparent 111
Pipe/wall fitting	PA 6,6 GF25
Other plastic parts	ABS Cyclic GPM500
Gaskets	Neopren
Rubber bushing	EPDM 50



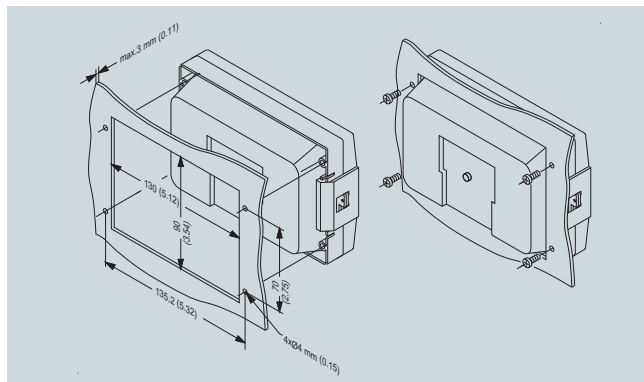
Dimensions



Accuracy curves



Wall mounting



Panel mounting

SITRANS F flowmeters

SITRANS F US

SITRANS FUE950 energy calculator

Selection and Ordering data

Note:

SITRANS FUE950 is not listed in the standard SIEMENS ordering set-up. Therefore, when placing an order for SITRANS FUE950, the **build-up code** mentioned below must be used and sent to order management at

Siemens Flow Instruments (SFI). SFI generates an FDK or No. that holds the required data for the order and for the logistics treatment via the order handling system.

Selection and Ordering data			Build-up code		
Calculator			SITRANS FUE950 -		
Calculator for SITRANS FUE380/FUS380 ¹⁾					
Size	Q _s : m ³ /h	l/pulse			
DN 50	15 ... 45	1	0	3	0 0 0
DN 65	25 ... 72	1	0	3	0 1 0
DN 80	40 ... 120	2.5	0	3	0 3 0
DN 100	60 ... 180	2.5	0	3	0 6 0
DN 125	100 ... 280	2.5	0	3	0 7 0
DN 150	150 ... 420	10	0	3	0 9 0
DN 200	250 ... 700	10	0	3	1 1 0
DN 250	400 ... 1120	10	0	3	1 2 0
DN 300	560 ... 1560	50	0	3	1 3 0
DN 350	750 ... 2100	50	0	3	1 4 0
DN 400	950 ... 2660	50	0	3	1 5 0
DN 500	1475 ... 4130	100	0	3	1 7 0
DN 600	2150 ... 6 020	100	0	3	1 8 0
DN 700					
to	2900 ... 16 800	100	0	3	2 0 0
DN 1000					
DN 1200	6000 ... 36 000	100	0	3	2 1 0
Calculator for SITRANS F M					
Size		l/pulse			
DN 6 ... DN 15		1	0	0	0 1 0
DN 25 ... DN 50		10	0	0	1 0 0
DN 65 ... DN 150		100	0	0	2 6 0
DN 200 ... DN 500 ²⁾		1000	0	0	3 1 0
Calculator setting					
For district heating, flowmeter in forward pipe			OF		
For district heating, flowmeter in return pipe			OR		
For chilled water, flowmeter in forward pipe (cold pipe) ³⁾			CF		
For chilled water, flowmeter in return pipe (hot pipe) ²⁾			CR		
For combined cooling/heating, flowmeter in forward pipe (hot pipe in winter) ²⁾			SF		
For combined cooling/heating, flowmeter in return pipe (cold pipe in winter) ²⁾			SR		
Temperature sensor type					
Pt500, no sensor included			1 0		
Pt100, no sensor included			3 0		
Pt500, 2-wire, pocket sensor, 6 mm:					
• 1.5 m cable			1 C		
• 3 m cable			1 D		
• 5 m cable			1 E		
• 10 m cable			1 F		
• 20 m cable			1 G		
Temperature sensor pocket sets					
No pockets			0		
Brass pocket 40 mm			A		
Brass pocket 85 mm			B		
Brass pocket 120 mm			C		
Steel pocket 85 mm			K		
Steel pocket 120 mm			L		
Steel pocket 155 mm			M		
Steel pocket 210 mm			N		

Selection and Ordering data		Build-up code	
Calculator		SITRANS FUE950 -	
Voltage supply			
No power supply included		0	
3.6 V battery supply		1	
230 V AC supply		2	
24 V AC supply		3	
Optional modules			
No modules		0	
Data input, input A & B		1	
Data output, 2 pulse output		2	
M-bus module and input A & B		3	
Display units			
GJ		1	
KWh (only DN 50)		2	
MWh		3	
Gcal		4	
Extra functions			
Standard (no extra functions)		0 0	
Accounting date		0 A	
Tariff function		T 0	
Country code			
Neutral (no approval marks)		0 0	
country code ¹⁾		X X	
Verification			
Without type approval mark		0	
With type approval mark (country specific)		1	
With approval mark and verification		2	

¹⁾ Available approvals for SITRANS FUE950 energy calculator:

DK (Denmark), DE (Germany), HR (Croatia)

²⁾ For larger dimensions the FUE950 can be used up to 36 000 m³/h. Please comply the maximal pulse output frequency (CV freq. max. 10 Hz).

³⁾ Only in neutral version - not available with approval marks

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

SITRANS F flowmeters

SITRANS F US

SITRANS FUE950 energy calculator

Ordering example



Example:

Calculator for a DN 1000 $Q_p = 6\,000\text{ m}^3/\text{h}$ FUE380 flowmeter.

- DN 1000, with 100 l/pulse output setting
- District heating, flowmeters in forward
- PT 500, 2-wire, pocket sensor with 1.5 m cable
- 210 mm stainless steel
- 230 V AC supply
- Data output and 2 pcs. pulse output
- MWh as unit in the display
- No extra functions
- DE (Germany) as country code
- With approval mark and verification

Please note that SITRANS FUE950 is not a part of the order number structure.

The **build-up code** has to be mailed to our customer service in Nordborg and you will get a FDK- number back which can be used to place the order.

Build up code: **SITRANS FUE950-03200-0F1CN-22300-DE2**

SITRANS FUE950 accessories and spare parts

Calculator SITRANS FUE950

Type/description	Order No.
<u>Accessories for calculator</u>	
Data/pulse input module	FDK-087H0111
Data/pulse output module	FDK-087H0110
M-bus slave module/input module	FDK-087H0109
Infrared optical head for data acquisition	FDK-087H0108
Bracket for SITRANS FUE950 wall mounting (12 pcs)	FDK-087H0117
Cable for data acquisition PC/D-sub 9F/3-wire	FDK-087H0121
Verification equipment for calculator	FDK-087H0122
3.6 V DC-cell for SITRANS FUE950	FDK-087H0113
230 V AC supply module for SITRANS FUE950	FDK-087H0114
24 V AC supply module for SITRANS FUE950	FDK-087H0115
3.0 V battery CR 2032 for SITRANS FUE950 (10 pcs.)	FDK-087H0116
Re-programming tool (complete set)	FDK-087H0134
<u>Pocket for temperature sensor Pt500 (2 pcs.)</u>	
Brass pocket G½B x 40 mm (PN 16)	FDK-087H0104
Brass pocket G½B x 85 mm (PN 16)	FDK-087H0105
Brass pocket G½B x 120 mm (PN 16)	FDK-087H0106
Stainless steel pocket G½B x 85 mm (PN 25)	FDK-087H0100
Stainless steel pocket G½B x 120 mm (PN 25)	FDK-087H0101
Stainless steel pocket G½B x 155 mm (PN 25)	FDK-087H0102
Stainless steel pocket G½B x 210 mm (PN 25)	FDK-087H0103

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

SITRANS F flowmeters

SITRANS F US

SITRANS FUE950 energy calculator

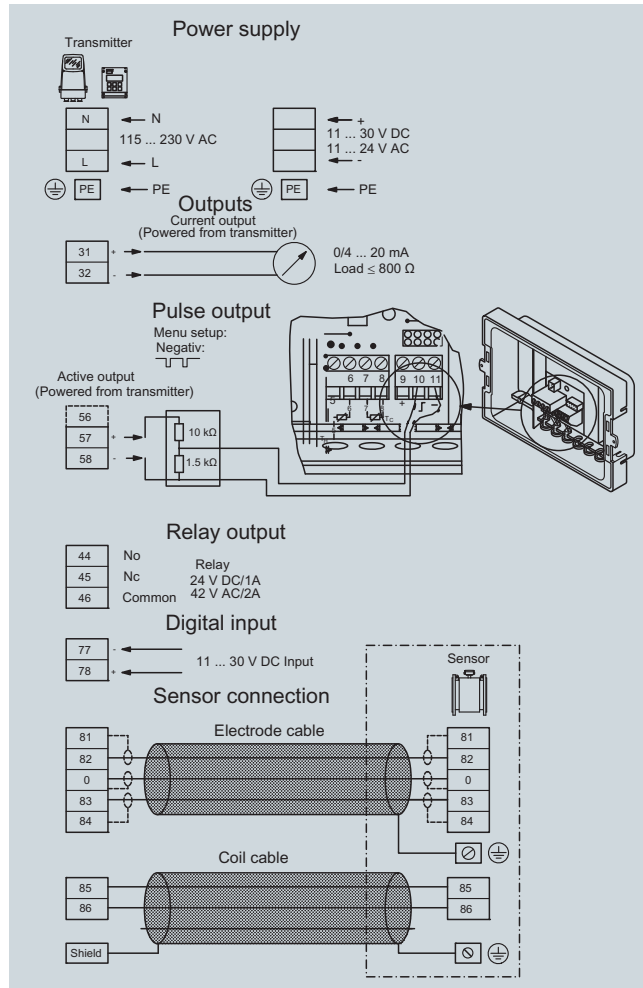
Schematics

Electrical connection for SITRANS FM electromagnetic flowmeters MAG 5000/6000 and SITRANS FUE950 in combination

2 resistors are required to obtain a correct transmission of pulses, when MAG 5000/6000 is connected together with a SITRANS FUE950 as a heat meter.

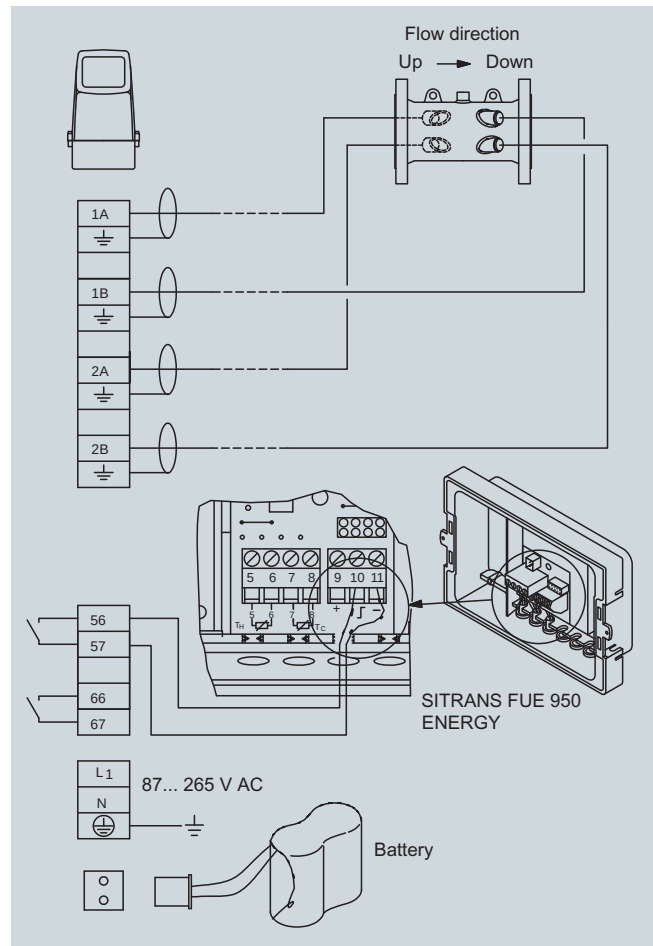
The 2 resistors are to be mounted between terminals 57 and 58 in the MAG terminal socket. Moreover, the resistors used are respectively 10 k Ω and 1.5 k Ω .

Resistors are not part of our accessories list.



The diagram shows the correct connection between SITRANS FUE950 and MAG 5000/6000.

Electrical connection for SITRANS FUS380/FUE950



SITRANS F flowmeters

SITRANS F US

SITRANS FUS880 (retrofit kit)

Overview



The SITRANS FUS880 is a battery-powered irrigation flowmeter, designed for pipes measuring from DN 200 up to DN 1200 (8" up to 48") in diameter. The SITRANS FUS880 gives you the ability to install the flowmeter underground retrofitting onto existing pipelines. This ultrasonic transient time irrigation flowmeter is used for full pipe flow measurements. Pipe material may be PVC or concrete and pipe construction may be single wall or double wall, smooth or corrugated.

The flowmeter produces a signal proportional to the velocity of the flow (flow rate) as the liquid flows past the ultrasonic sensors.

SITRANS FUS880 has transducers in the flow (in-line) which assures superior aides in accuracy and superior performance when compared to doppler or many other types of flow measurement systems.

Benefits

- Cost-effective solution - contains all the necessary components for retrofitting onto existing pipe
- Battery-operated - Maintenance-free up to 6 years
- SITRANS FUS880 is easy to install in pipeline sizes from DN 200 up to DN 1200 (8" up to 48") in diameter
- The transmitter display shows both accumulated volume and instantaneous flow rate
- The flowmeter provides a digital signal that can be sent directly to a PLC/RTU/DCS
- Solid construction with no moving parts for a 100% maintenance and obstruction-free flowmeter
- The SITRANS FUS880 transmitter comes within an IP67 enclosure
- Sensor can easily be buried and withstand constant flooding
- Automatic calculation of the calibration factor when pipe geometry data are entered in the signal transmitter
- Pipe material may be polyvinylchloride (PVC) or concrete
- Pipe construction may be single wall or double wall, smooth or corrugated

Application

- Irrigation systems
- Irrigation distribution systems
- Pumping stations
- Canal laterals
- On-farm outlets
- Water well production
- Drip and sprinkler irrigation
- Center pivot systems
- Potable water

Design

The SITRANS FUS880 set contains all necessary parts to build up an ultrasonic flowmeter on existing pipes depending on choices at ordering:

- Templates to wrap around pipes for alignment of sensors
- Transducer threading tool
- Thread adapters
- Transducer alignment tools
- Mounting plugs or saddles as well as FUS880 transmitter dependant upon the specifics at time of ordering and required mounting hardware
- Cables

Technical specifications

SITRANS FUS880

Accuracy

Typical $\leq \pm 2.0\%$, dependant upon the accuracy of measurements of tube diameter and during installation

Note:

Flow system measurement performance depends on the accuracy of the measurements taken at time of installation. This means that inaccurate measurements of angles, distance between transducers, wall thickness and pipe diameter have a direct effect on the accuracy as these values measured are entered into the memory of the FUS880 transmitter and used in part of the calculation of flow rate.

Requirements for pipes

Size	DN 200 ... DN 1200 (8" ... 48")
------	----------------------------------

Transmitter Enclosure

Rating	IP67 rated enclosure
Material	Fibre glass reinforced polyamide
Terminal box	PA 6.6, 100 °C (212 °F)
Transducer element	AISI 316 Stainless Steel 200 °C (392 °F)
<u>2000 Corrugated PVC</u>	Transducer holder: Polyvinyl chloride Mounting saddle: Polyvinyl chloride
• Line pressure max.	Pressure rating per spec. ASTM D-1784 (5.5 bar (80 psi))
• Liquid temperature max.	Temperature rating per spec. ASTM D-1784 (60 °C (140 °F))
<u>Pro21 Corrugated PVC</u>	Transducer holder: Polyvinyl chloride Mounting saddle: Polyvinyl chloride
• Line pressure max.	Pressure rating per spec. ASTM D-1784 (5.5 bar (80 psi))
• Liquid temperature max.	Temperature rating per spec. ASTM D-1784 (60 °C (140 °F))

PVC Solid PIP 80

- Line pressure max.
- Liquid temperature max.

Transducer holder: Polyvinyl chloride
Mounting saddle: Polyvinyl chloride

Pressure rating per spec. ASTM D-1784 (5.5 bar (80 psi))
Temperature rating per spec. ASTM D-1784 (60 °C (140 °F))

Concrete

- Line pressure max.
- Liquid temperature max.

Transducer holder: Polyvinyl chloride
Mounting saddle: Polyvinyl chloride

Pressure rating per spec. ASTM D-1784 (5.5 bar (80 psi))
Temperature rating per spec. ASTM D-1784 (60 °C (140 °F))
Structural Epoxy joint meets spec. ASTM D1002 (118 bar or 1710 psi)

Pipe wall thickness

A2000 Corrugated PVC	25 ... 50 mm (1" ... 2")
Pro21 Corrugated PVC	25 ... 50 mm (1" ... 2")
PVC Solid PIP 80	Less than 25 mm (1")
Concrete	• 51 ... 57 mm (2" ... 2.25") • 57 ... 64 mm (2.25" ... 2.5") • 70 ... 76 mm (2.75" ... 3") • 76 ... 83 mm (3" ... 3.25") • 89 ... 95 mm (3.5" ... 3.75") • 95 ... 100 mm (3.75" ... 4") • 108 ... 114 mm (4.25" ... 4.50")

More information**Installation requirement**

The space requirements around the pipe for retrofitting an ultrasonic flowmeter type SITRANS FUS880 are given below:

It is important to prepare excavation site for a safe and efficient installation. An underground pipe needs to be exposed so that there is a minimum of 1.52 m (5 ft) or more of working space on either side of the pipe. The length of the trench should exceed the template length by 1.83 m (6 ft) or more.

Pipe support:

Ensure that an unearthed pipe has sufficient support beneath it to prevent deformation or breakage.

Cave-in:

Always brace trench walls. Follow all applicable (e.g. municipal, company, customer, site, union) construction guidelines.

Epoxy:

Follow all safety recommendations listed by the epoxy manufacturer. Use proper protection equipment, such as gloves, safety glasses, clothing, etc. Read the labels on the epoxy cans before mixing. Note all safety related statements and temperature recommendations in particular. For additional information, see the epoxy manufacturer's internet site.

Pipe template:

Templates are printed on a durable material, such as Mylar, and are resistant to normal contaminants. Do not expose the template to excessive moisture or excessive periods of sunlight, heat and cold temperatures. Always roll and store the template in its' shipping tube. Do not stretch or fold as this could permanently damage the template.

Installation overview:Installation steps

Installation of the SITRANS FUS880 is accomplished with the following steps.

1. Expose and clean the pipe.
2. Mark a centerline on the pipe.
3. Place the template on the pipe and tape it securely to the pipe.
4. Mark the locations of the sensor mounting holes on the pipe.
5. Drill the sensor mounting holes in the pipe.
6. Clean and de-burr the sensor mounting area.
7. Measure up the pipe circumference C, the wall thickness WT and calculate OD and ID.
8. Epoxy and screw the saddle sensor holder to the pipe.
9. Assemble and install the sensors-holders.
10. Measure up the actual sensor-location to see if re-calibration is needed.
11. Assemble and install the sensors.
12. Install sensor wiring and conduit.
13. Install the transmitter and connect the sensor wiring.
14. Check the transmitter configuration.
15. Test the installation thoroughly and run a flow test.
16. Fill in the "Site Acceptance Form".
17. Cover the pipe.

For detailed instruction in installation please refer to User Manual Order no.: FDK:521HAP0553.

SITRANS F flowmeters

SITRANS F US

SITRANS FUS880 (retrofit kit)

Selection and Ordering data	Order No.
SITRANS F US	7ME3440 -
Ultrasonic flowmeters	
SITRANS FUS880 PVC (Solid) (PIP80)	
SONOKIT	
Battery-powered	
Pipe diameter	
DN 200 (8")	2 F
DN 250 (10")	2 K
DN 300 (12")	2 P
DN 380 (15")	2 M
DN 450 (18")	3 F
DN 530 (21")	3 M
DN 600 (24")	3 T
DN 680 (27")	4 D
Wall thickness	
Less than 25 mm (1")	B
Pipe material	
PVC (Solid) (PIP80)	1
Track configuration	
1-track	1
2-track X-configuration	3
Region version	
EU, US	2
Transmitters	
SITRANS FUS080, IP67, Battery-powered	D
Template	
Standard	A
Cable length	
20 m (65.6 ft) with gland	4

Selection and Ordering data	Order code
Further designs	
Please add „-Z“ to Order No. and specify Order code(s).	
Add on units of measure	
Flow unit GPM	L01
Flow unit CFS	L02
Flow unit m ³ /h	L03
Flow unit MGD	L05
Volume unit US Gal	L42
Volume unit m ³ /h	L44
Volume unit US Gal x 100	L46
Volume unit US Gal x 1000	L49
Volume unit US Mgal	L48
Volume unit AcF (Acre Feet)	L43
Volume unit Acl (Acre Inch)	L51

Selection and Ordering data	Order No.
SITRANS F US	7ME3440 -
Ultrasonic flowmeters	
SITRANS FUS880 A2000 Corrugated PVC	
SONOKIT 1-track	
Battery-powered	
Pipe diameter	
DN 380 (15")	2 V
DN 450 (18")	3 F
DN 530 (21")	3 M
DN 600 (24")	3 T
DN 750 (30")	4 K
DN 900 (36")	5 B
Wall thickness	
25 ... 50 mm (1" ... 2")	C
Pipe material	
PVC Corrugated A2000	3
Track configuration	
1-track	1
Region version	
EU, US	2
Transmitter	
SITRANS FUS080, IP67, Battery-powered	D
Template	
Standard	A
Cable length	
20 m (65.6 ft) with gland	4

Selection and Ordering data	Order code
Further designs	
Please add „-Z“ to Order No. and specify Order code(s).	
Add on units of measure	
Flow unit GPM	L01
Flow unit CFS	L02
Flow unit m ³ /h	L03
Flow unit MGD	L05
Volume unit US Gal	L42
Volume unit m ³ /h	L44
Volume unit US Gal x 100	L46
Volume unit US Gal x 1000	L49
Volume unit US Mgal	L48
Volume unit AcF (Acre Feet)	L43
Volume unit Acl (Acre Inch)	L51

Note: The FUS880 MLFB system is in preparation

SITRANS FUS880 (retrofit kit)

Selection and Ordering data	Order No.
SITRANS F US Ultrasonic flowmeters	7 ME 3 4 4 0 -
SITRANS FUS880 Pro21 Corrugated PVC	
SONOKIT 1-track	
Battery-powered	
Pipe diameter	
DN 750 (30")	4 K
DN 840 (33")	4 P
DN 900 (36")	5 B
DN 1050 (42")	5 M
DN 1200 (48")	5 T
Wall thickness	
25 ... 50 mm (1" ... 2")	C
Pipe material	
PVC Pro21 Corrugated	2
Track configuration	
1-track	1
Region version	
EU, US	2
Transmitter	
SITRANS FUS080, IP67, battery-powered	D
Template	
Standard	A
Cable length	
20 m (65.6 ft) with gland	4

Selection and Ordering data	Order code
<i>Further designs</i>	
Please add „Z“ to Order No. and specify Order code(s).	
Add on units of measure	
Flow unit GPM	L01
Flow unit CFS	L02
Flow unit m ³ /h	L03
Flow unit MGD	L05
Volume unit US Gal	L42
Volume unit m ³ /h	L44
Volume unit US Gal x 100	L46
Volume unit US Gal x 1000	L49
Volume unit US Mgal	L48
Volume unit AcF (Acre Feet)	L43
Volume unit AcI (Acre Inch)	L51

Selection and Ordering data		Order No.
SITRANS F US Ultrasonic flowmeters	7 ME 3 4 4 0 -	
SITRANS FUS880 Concrete SONOKIT 1-track Battery-powered	-	
Pipe diameter		
DN 300 (12")	2 P	
DN 380 (15")	2 V	
DN 450 (18")	3 F	
DN 530 (21")	3 M	
DN 600 (24")	3 T	
DN 680 (27")	4 D	
DN 750 (30")	4 K	
DN 900 (36")	5 B	
DN 1050 (42")	5 M	
Wall thickness		
51 ... 57 mm (2" ... 2.25")	D	
57 ... 64 mm (2.25" ... 2.5")	E	
70 ... 76 mm (2.75" ... 3")	F	
76 ... 83 mm (3" ... 3.25")	G	
89 ... 95 mm (3.5" ... 3.75")	H	
95 ... 100 mm (3.75" ... 4")	J	
108 ... 114 mm (4.25" ... 4.5")	K	
Pipe material		
Concrete	4	
Track configuration		
1-track	1	
Region version		
EU, US	2	
Transmitter		
SITRANS FUS080, IP67, battery-powered	D	
Template		
Standard	A	
Cable length		
20 m (65.6 ft) with gland	4	

Selection and Ordering data	Order code
<i>Further designs</i>	
Please add „-Z“ to Order No. and specify Order code(s).	
Add on units of measure	
Flow unit GPM	L01
Flow unit CFS	L02
Flow unit m ³ /h	L03
Flow unit MGD	L05
Volume unit US Gal	L42
Volume unit m ³ /h	L44
Volume unit US Gal x 100	L46
Volume unit US Gal x 1000	L49
Volume unit US Mgal	L48
Volume unit AcF (Acre Feet)	L43
Volume unit AcI (Acre Inch)	L51

Note: The FUS880 MLFB system is in preparation

SITRANS F flowmeters

SITRANS F US

SITRANS FUS880 (retrofit kit)

Selection and Ordering data

Order No.

Accessories and Spare parts

SITRANS F US Ultrasonic flowmeters

FUS880 transmitter

includes 2 transducers and 20 m (65.6 ft) of cable

7ME3440-0AA01-2DA4

FUS880 Installation pipe template

Template, PVC PIP 80

DN 250 (10")

TGX:16347-80

DN 300 (12")

TGX:16347-81

DN 380 (15")

TGX:16347-82

DN 450 (18")

TGX:16347-83

DN 530 (21")

TGX:16347-84

DN 600 (24")

TGX:16347-85

DN 680 (27")

TGX:16347-86

Template, Concrete

DN 300 (12")

TGX:16347-90

DN 380 (15")

TGX:16347-91

DN 400 (16")

TGX:16347-89

DN 450 (18")

TGX:16347-92

DN 530 (21")

TGX:16347-93

DN 600 (24")

TGX:16347-94

DN 680 (27")

TGX:16347-95

DN 750 (30")

TGX:16347-96

DN 900 (36")

TGX:16347-97

DN 1050 (42")

TGX:16347-98

Template, pipe DN 900 (36") PVC, A2000 corrugated

TGX:16347-100

Template, pipe DN 1050 (42") Pro21 corrugated

TGX:16347-101

FUS880 Installation spare kit

Concrete kit, Sensor mounting

51 ... 57 mm (2" ... 2.25")

TGX:16347-213K

57 ... 64 mm (2.25" ... 2.5")

TGX:16347-214K

70 ... 76 mm (2.75" ... 3")

TGX:16347-215K

76 ... 83 mm (3" ... 3.25")

TGX:16347-216K

89 ... 95 mm (3.5" ... 3.75")

TGX:16347-217K

95 ... 100 mm (3.75" ... 4")

TGX:16347-218K

108 ... 114 mm (4.25" ... 4.5")

TGX:16347-212K

PVC kit, Sensor Mounting

DN 300 (12")

TGX:16347-219K

DN 380 (15")

TGX:16347-220K

DN 450 (18")

TGX:16347-221K

DN 530 (21")

TGX:16347-222K

DN 600 (24")

TGX:16347-223K

DN 680 (27")

TGX:16347-224K

Corrugated PVC kit, DN 900 (36") A2000

TGX:16347-225K

Corrugated PVC kit, DN 1050 (42") Pro21

TGX:16347-226K

FUS880 spares

Holder - Saddle

DN 250 (10") PIP 80 PVC Saddle

TGX:16347-165

DN 300 (12") PIP 80 PVC Saddle

TGX:16347-166

DN 380 (15") PIP 80 PVC Saddle

TGX:16347-168

DN 450 (18") PIP 80 PVC Saddle

TGX:16347-170

DN 530 (21") PIP 80 PVC Saddle

TGX:16347-174

DN 600 (24") PIP 80 PVC Saddle

TGX:16347-175

DN 680 (27") PIP 80 PVC Saddle

TGX:16347-177

Selection and Ordering data

Order No.

Holder - Plug

51 ... 57 mm (2" ... 2.25") Cement sensor holder, PVC

TGX:16347-120

57 ... 64 mm (2.25" ... 2.5") Cement sensor holder, PVC

TGX:16347-121

70 ... 76 mm (2.75" ... 3") Cement sensor holder, PVC

TGX:16347-122

76 ... 83 mm (3" ... 3.25") Cement sensor holder, PVC

TGX:16347-123

89 ... 95 mm (3.5" ... 3.75") Cement sensor holder, PVC

TGX:16347-124

102 ... 108 (4" ... 4.25") Cement sensor holder, PVC

TGX:16347-125

108 ... 114 mm (4.25" ... 4.5") Cement sensor holder, PVC

TGX:16347-127

A2000 - DN 900 (36") ID

TGX:16347-134

PRO-21 - DN 1050 (42") ID

TGX:16347-135

Straps -Kits

Strap kit for -134 & -135 plugs

TGX:16347-235

Strap kit for -120, -121, -122, -123 plugs

TGX:16347-236

Strap kit for -124 & -125 plugs

TGX:16347-237

Strap kit for -127 plug

TGX:16347-238

Adhesive

1 lb epoxy

A6X30004048

Adapter

Conduit adapter

A6X30003981

Tools

Sensor Wrench

TGX:16347-111

Alignment Tool

TGX:16347-137

Documentation

Manual

FDK:521HAP0553

Converter

FUS880 converter kit for 2 track SYS

7ME3440-0AA03-2DA4

Note:

Installation spares kit include:

Concrete kit:

2 transducer mounting plugs, 2 straps, mounting hardware, epoxy, conduit adapter, installation guide

PVC kit:

2 transducer mounting saddles, mounting hardware, epoxy, conduit adapter, installation guide

SITRANS F flowmeters

SITRANS F US

Accessories and spare parts for older flowmeter systems type SITRANS F US

Accessories and spare parts for SITRANS F US SONOFLO

Accessories for transmitter SONO 3000

Description	Order No.	
Wall mounting kit for 7ME3150-1AA10-1AA0 and 7ME3150-1AA20-1AA0, using 4 x coaxial sensor cables, wall brackets, PG 13.5 cable glands.	FDK-085F5027	

SENSORPROM memory unit for sensors with SONO 3000 transmitters

Description	Order No.	
SENSORPROM memory unit for SITRANS F US systems with transmitter type SONO 3000 When ordering: Inform on sensor Order No. and Serial No.	FDK-085B5329	

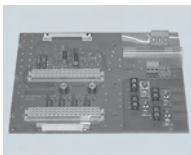
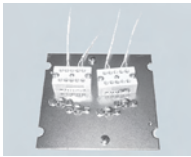
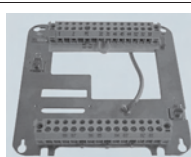
Terminal housing with PG 13.5 cable glands

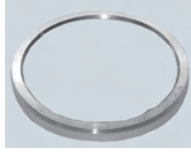
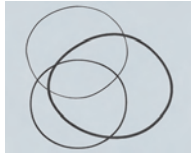
Type	Order No.	
Material: PA 6.6, Temperature range: -20 ... +100 °C (-4 ... +212 °F)	FDK-085B1403	
Material: AISI 316, Temperature range: -20 ... +200 °C (-4 ... +392 °F)	FDK-085B1402	

SONO 3200 spare parts, complete units

Type	Material	Gasket	Pressure rating	Terminal housing/ cable gland	Approv.	Temp. range [°C (°F)]	Length mm (inch)	Order No.	
Flange	316 SS	Graphite	PN40	316 SS/M20		-20 ... +200 (-4 ... +392)	158 (6.22)	On request	

Spare parts for transmitter SONO 3000

Description	Order No.	
SONO 3000 19" back print for IP65 (NEMA 4) wall mounting 230 V version	FDK-085F5327	
SONO 3000 assembly plate for coaxial connection in the SONO 3300 sensor and wall mounting connection box	FDK-085L1023	
SONO 3000 assembly base plate	FDK-085L1015	

Description	Order No.	
SONO 3000 EEx d, front glass incl. frame	FDK-085U2109	
SONO 3000 EEx d, gaskets for transmitter housing	FDK-085U2002	
SONO 3300 / FUS060 connection kit	On request	

Spare parts/accessories SONOCAL 3000 and SONO 3000/3300 CT spare parts, transducer cables

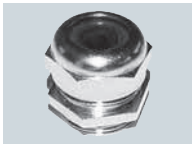
Description	Order No.
Coaxial cable with transducer connection for sensor type SONO 3300-CT (1 pc.)	
1 x 10 m (32.8 ft)	FDK-085L2400
1 x 20 m (65.6 ft)	FDK-085L2401
1 x 30 m (98.4 ft)	FDK-085L2402

SITRANS F flowmeters

SITRANS F US

Accessories or spare parts for older flowmeter systems type SITRANS F US SONOFLO

SONO 3200 / SONO 3000 PG 13.5 cable glands (each 1 pc.)

Type	Material	Temperature range [°C (°F)]	Approval	Order No.	
PG 13.5	Nickel-plated brass, cable Ø 6 ... 8 mm	-20 ... +100 (-4 ... +212)		A5E02247692	
PG 13.5	Stainless steel, cable Ø 5 ... 6 mm	-20 ... +200 (-4 ... +392)		A5E02247682	
PG 13.5	Stainless steel, cable Ø 6 ... 8 mm	-20 ... +200 (-4 ... +392)	Ex-d ¹⁾	A5E02247711	

¹⁾ No ATEX

SITRANS F flowmeters

SITRANS F US

Clamp-on ultrasonic flowmeters

Overview



SITRANS F US clamp-on ultrasonic flowmeters provide highly accurate measurement while minimizing installation time and maintenance expense.

Benefits

- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external transducers do not require periodic cleaning
- No moving parts to foul or wear
- No pressure drop or energy loss
- Wide turn-down ratio
- Choice of single, dual or multiple channel versions and a variety of enclosures - to suit your operating conditions and requirements

Application

SITRANS F US clamp-on ultrasonic flowmeters have six product families, each targeting specific applications:

FUS1010 and FUP1010 General purpose flowmeters are suitable for a wide variety of liquid applications, including the following:

- Water industry
 - Raw water
 - Potable water
 - Chemicals
- Wastewater industry
 - Raw sewage
 - Effluent
 - Sludges
 - Mixed liquor
 - Chemicals
- HVAC industry
 - Chillers
 - Condensers
 - Hot & cold water systems
- Power industry
 - Nuclear
 - Fossil
 - Hydroelectric
- Processing industry
 - Process control
 - Batching
 - Rate indication
 - Volumetric and mass measurement

FUE1010 Energy flowmeters are ideally suited to thermal energy/power industry applications, including:

- Chilled water sub-metering
- Hot water sub-metering
- Condenser water
- Glycol
- Thermal storage
- Lake source cooling

FUH1010 Oil flowmeters are ideal for applications carrying crude oil, refined petroleum or liquefied gas. There are three application areas: Interface detectors, volumetric flowmeters and mass or standard volume flowmeters

Interface detectors/density meters

- Precise identification of interfaces on multi-liquid pipelines
- Rapid and precise scraper "pig" indication
- Product identification
- Density indication

Viscosity compensated volumetric flowmeters

- Applications with multiple liquids having a wide viscosity range
- Automatic gross volume compensation due to viscosity changes

Standard volume (net) mass flowmeters

- Standard (net) volume flow measurement
- Suitable for use in leak detection systems
- Mass flow output measurement
- Interface detection
- Scraper ("pig") detection
- Chemical and petrochemical processing

FUG1010 Gas flowmeters are ideal for most natural and process gas industry applications, including:

- Checkmetering
- Allocation
- Flow survey verification
- Lost and unaccounted for (LAUF) analysis
- Production
- Storage

FUS1020 General purpose flowmeters are suitable for most clean liquid applications, including the following:

- Water & wastewater industry
 - Potable water
 - Wastewater, influent & effluent
 - Processed sewage, sludge
- Chemical feed industry
 - Sodium hypochlorite
 - Sodium hydroxide
- HVAC & power industries
 - Coolant flow
 - Fuel flow
- Process control
 - Chemicals
 - Pharmaceuticals

SITRANS F flowmeters

SITRANS F US

Clamp-on ultrasonic flowmeters

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 including but not limited to:

- Water and wastewater
- Energy measurement
- Oil and gas industries

Design

The hand-held micro-processor controlled gauge is designed to measure the thickness of various metallic or non-metallic pipe. Such materials include steel, aluminum, titanium, plastics and ceramics. Measurement results are shown in either inches or millimeter; only a simple pre-calibration to a known thickness or sound velocity is required. The simple-to-read 4-digit LCD display featuring a basic user friendly menu is easily navigable with only three conveniently located push buttons. The lightweight computing unit weighs a mere 150 g (5.3 oz) making it ideal for quick and easy on-site pipe wall thickness measurement and with two AAA alkaline batteries trouble-free operation is ensured for 250 hours.

Function

The thickness gauge measurement is based on the transit time ultrasonic wave propagation principle: a high frequency ultrasonic beam is shot 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

Thickness gauge

Display type	4-digit LCD
Display resolution	0.01 mm (0.001")
Measurement units	Metric and imperial
Sound velocity range	1 000 to 9 999 m/s (3 280 to 32 805 ft/s)
Operating temperature	-10 ... +50 °C (14 ... 122 °F)
Update range	4 Hz
Frequency	5 MHz
Power source	2 x 1.5 V AAA dry cells
Power consumption	Working current is less than 3 mA
Battery life	Approx. 250 h on a set of batteries
Dimensions (W x H x D)	61 x 108 x 28 mm (2.4 x 4.3 x 1.1")
Weight	150 g (5.3 oz)

Selection and Ordering data

Order No.

Thickness gauge

7ME3951-0TG20

SITRANS F flowmeters

SITRANS F US

System information and selection guide

System information and selection guide

SITRANS F US Clamp-on meters	FUS1010 (Standard)	FUS1020 (Basic)	FUP1010 (Portable)	FUE1010 (Energy)	FUH1010 (Oil)	FUG1010 (Gas)
Industry/Applications						
Water and aqueous solutions	X	X	X			
Utility district heating, cooling	X		X	X		
Chemical	X	X	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 (<10 lpm) in small pipes	X	X	X			
Natural gas						X
Process gas						X
Slurries or liquids with high percentage of undissolved gases	X		X			
High temperature liquids > 120 °C (248 °F)	X ¹⁾	X ¹⁾	X ¹⁾	X ¹⁾	X ¹⁾	
Aerospace or hydraulic test	X ²⁾		X ²⁾			
Refrigeration liquids	X	X	X	X		
Food products	X	X	X			
Design						
Field clamp-on (non-intrusive)	X	X	X	X	X	X
Doppler (Reflexor) hybrid capability	X		X	X		
Standard volume or mass flow; per API 2540					X	
Interface detection					X	
Density output					X	
Standard volume or mass flow; per AGA 8						X
Differential temperature with energy calculation				X		
Temperature measurement	X		X	X	X	X
Analog input	X		X	X	X	X
Large graphics display (optional)	X		X	X	X	X
Diagnostic PC software (DataView)	X	X	X	X	X	X
Number of acoustic beams and channels						
1-channel	X	X	X	X	X	X
2-path	X	X	X	X	X	X
2-channel w/ arithmetic function	X	X	X	X		
4-path / (special order)	X				X	X
4-channel w/ sum of active channels	X					
Transmitter enclosure						
IP65 (NEMA 4)		X				
IP65 (NEMA 4X)	X			X	X	X
IP67			X			
IP40 (NEMA 1)				X		
IP65 (NEMA 7) Compact	X				X	X
IP66 (NEMA 7) Wall mount	X				X	X

¹⁾ Special order high temperature clamp-on transducer

²⁾ Special order Aerospace clip-on transducer recommended

³⁾ Available with portable energy systems

SITRANS F flowmeters

SITRANS F US

System information and selection guide

SITRANS F US Clamp-on meters	FUS1010 (Standard)	FUS1020 (Basic)	FUP1010 (Portable)	FUE1010 (Energy)	FUH1010 (Oil)	FUG1010 (Gas)
Power Supply						
Internal battery operation			X	X ¹⁾		
Battery charger (100 ... 240 V AC 50 ... 60 Hz) with country specific line cord			X	X ¹⁾		
90 ... 240 V AC, 50 ... 60 Hz	X	X		X	X	X
9 ... 36 V DC	X	X		X	X	X
Size (larger sizes are available as special order)						
6.5 ... 1220 mm (0.25" ... 48")	X	X	X			
38 ... 1220 mm (1.5" ... 48")				X	X	X
Approvals						
FM / CSA CLASS I DIV 1 ²⁾	X			X	X	X
ATEX	X				X	X
UL / ULc / CE ³⁾		X	X	X		

¹⁾ Available with portable energy systems

²⁾ NEMA 4X associated equipment in DIV 2 connected to DIV 1 transducers, NEMA 7 explosionproof equipment in DIV 1 connected to DIV 1 transducers.

³⁾ Ordinary, unclassified locations only

Transducer type selection guide

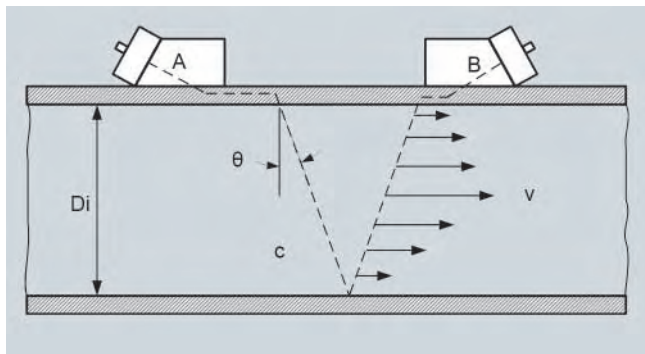
	Standard transducers supported in MLFB			
Application condition. Note all that apply before making selection	Standard clamp-on High precision	Standard clamp-on Universal	Standard Dop-pler (Reflexor)	Notes
Media				
General survey (clean liquids) on steel and non-steel pipes		X	O	
General survey (clean liquids) on a limited range of steel pipes	X		O	
Moderately aerated liquid or slurry	X			
Highly aerated liquid or slurry	O	O	X	High temperature Doppler transducers also available as special order
Permanent installation on steel pipe (clean liquids)	X		O	
Installation in offshore or corrosive environment	O	O	O	Transducers available with corrosion resistance as special order
Liquid temperature greater than 120 °C (248 °F)	O	O	O	High temp metal block transducers available as special order (to 230 °C (446 °F))
Operation on single pipeline flowing multiple products	X	O		
Natural gas or process gas	X	O	O	Consult sales specialist for all gas applications
Pipe material				
Steel pipe with liquid temperature > 60 °C (140 °F)	X	X		Special order high precision transducers can be request for temps > 60 °C but < 120 °C (248 °F)
Steel	X		O	
Steel pipe with diameter/wall thickness ratio <10	O	X		
Non-steel pipe material (copper, ductile iron, cast iron, etc.)	O	X		High precision transducers can also be used on plastic and aluminum pipes
Wall thickness > 25.4 mm (1")	O	X		

O = not suitable X = preferred choice

Function

Operating Principle

The SITRANS FUS1010 system is a transit-time ultrasonic meter that provides exceptional performance using a non-invasive clamp-on approach. Ultrasonic transducers 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 transducer 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 transducers A and B. By subtracting the computed fixed times (within the transducers and pipe wall) from the measured average transit-time, the meter can then infer the required transit-time in the fluid (T_{Fluid}).

The Sound waves traveling in the same direction as flow ($T_{A,B}$) arrive earlier than sound waves traveling against the direction of flow ($T_{B,A}$). This time difference (Δt) is used to compute the line integrated flow velocity (v) as shown in the equation below:

$$v = V_{\phi} / 2 \cdot \Delta t / T_{\text{Fluid}}$$

Once the raw flow velocity is determined, the fluid Reynolds number (Re) must be determined to properly correct for fully developed flow profile. This requires the entry of the fluid's kinematic viscosity (visc) as shown in the equations below, where Q represents the final flow profile compensated volumetric flow rate.

$$Re = Di \cdot v / \text{visc} \cdot Q = K(Re) \cdot (\pi / 4 \cdot Di^2) \cdot v$$

v = Flow velocity

$\text{visc} = \mu / \rho$ = (dynamic viscosity / density)

$K(Re)$ = Reynolds flow profile compensation

In all 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 meters 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 Transducer Types

Two basic types of Clamp-On transducers can be selected for use with the SITRANS FUS1010 flowmeter. The lower cost "universal" transducer is the most common type in the industry and is suitable for most single liquid application where the sound ve-

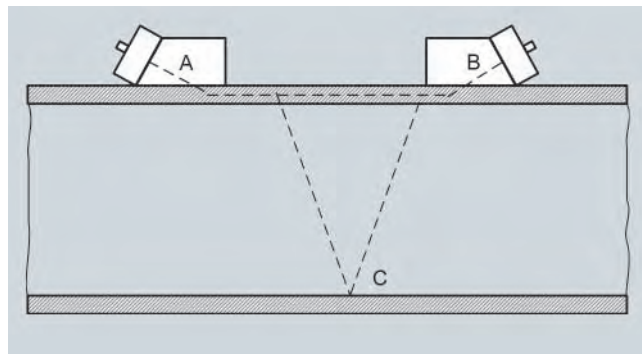
locity does not vary much. This transducer type can be used on any sonically conductive pipe material (including steel) making it well suited for portable survey applications. Universal transducers are selected based on the pipe diameter range alone, so wall thickness is not important to the selection process.

The second transducer type is the patented WideBeam transducer (called high precision), which utilizes the pipe wall as a kind of loudspeaker to optimize the signal to noise ratio and provide a wider area of vibration. This makes this kind of transducer less sensitive to any change in the fluid medium.

The WideBeam transducer is designed for steel pipes, but can also be used with aluminum, titanium and plastic pipe. It is the preferred transducer for HPI and gas applications. Note that unlike the universal type, this transducer selection is dependent only on the pipe's wall thickness.

Automatic Zero Drift Correction (ZeroMatic Path™)

When WideBeam transducers are installed in the "Reflect" mode configuration shown below, the acoustic signal travels in two different paths between transducers A and B. One path "ACB" travels through the pipe wall and fluid, while the other path "AB" never enters the fluid medium.



This later path provides the meter with a reference signal that is completely independent of flow rate and can therefore be used as a measure of transducer "mis-match". By continually analyzing this pipe wall signal the FUS1010 meter can dynamically correct for flow errors caused by zero drift.

Multi-Channel Flowmeters

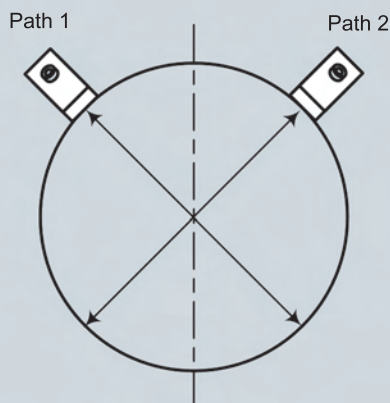
For improved flow profile averaging, redundancy, or better cost per measurement, Clamp-On meters can be supplied with 1 or 2 measurement channel, with 4 channel meters supplied as special order.

In the standard FUS, FUP, FUE systems, these channels can be installed on separate independent lines or in a multi-beam installation as shown below. This choice is made during meter setup, where either a multi-beam (two beams on same pipe) or multi-channel installation can be selected.

SITRANS F flowmeters

SITRANS F US

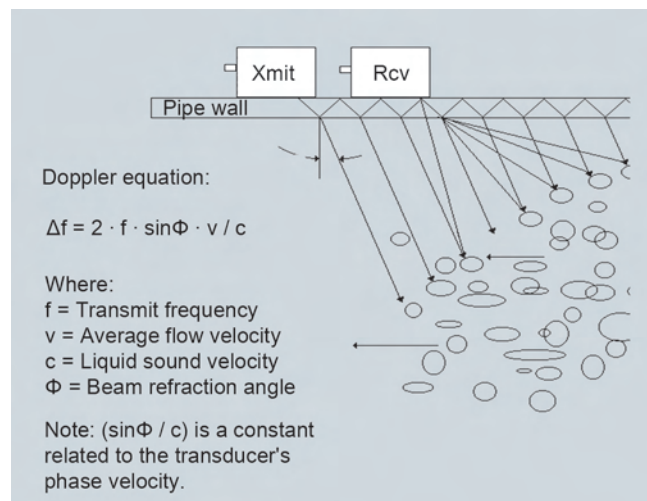
System information and selection guide



Dual Beam installation example

Doppler (Reflexor®) Operation

The Doppler measurement technique relies on the reflection of sound energy off tiny gas bubbles or suspended particles to create a doppler shift in the fixed frequency acoustic transmit signal, as shown below.



When de-demodulated using FFT signal processing, this doppler shifted frequency (Δf) can be used to measure the flow rate as described in the associated doppler equations below.

Although the standard transit-time measurement system is very tolerant of high levels of liquid aeration and high solids content, there will be cases where insufficient signal will be available for operation with transit-time mode. For these cases the FUS, FUP and FUE meters can be ordered with this optional doppler capability, which requires an additional doppler transducer.

SITRANS meter family description

SITRANS FUS1010 flowmeters

The FUS1010 system is a basic function permanent (or dedicated) clamp-on meter that is available with a full range of safety approvals, I/Os and enclosure types. This meter can be used in a wide range of applications but does not include the special functions found in the hydrocarbon FUH and energy FUE flowmeters.

The FUS1010 meter is typically programmed with a fixed viscosity and specific gravity entry, which can limit the mass flow and volumetric flow accuracy when highly variable (multi-product) liquid properties flow through the same pipeline.

If this meter is ordered with the Type 3 hardware and program configuration, it will have the ability to accommodate clamp-on

RTDs, or an analog input from a temperature transmitter. With an active measurement of liquid temperature the meter can then be programmed to compensate for changes in liquid density and viscosity by means of a "UniMass" table (for advanced users).

SITRANS FUS1020 flowmeters

The FUS1020 system has the same basic function of the FUS1010 system, but does not include the same I/O capability or safety approval rating of the FUS1010. This basic meter is intended for single liquid applications that do not require these additional features. Note that the FUS1020 is not available with hazardous area approvals.

SITRANS FUP1010 Portable meters

The FUP1010 meter has all the capabilities of the FUS1010 meter, but in a battery powered portable configuration. This meter is ideal for general flow survey work where high accuracy is required. Note that the FUP meter is not available with hazardous areas approvals.

SITRANS FUE1010 Energy meters

By combining clamp-on transit-time flow measurement with accurate temperature differential measurement, the FUE1010 system provides a solution to thermal energy metering with no interruption of service. Energy measurement can be provided for water, ethylene glycol and brine solutions or steam condensate.

Absolute and differential temperature measurement is accomplished with the use of 2 matched 1 k Ω RTD elements installed on the supply and return side of the heating or cooling system. Efficiency calculation (kW/ton, EER or COP) is also available in systems with the optional analog input capability, which allow the meter to accept a power meter output.

The FUE1010 system is available in both dedicated (IP65 (NEMA 4X)) and portable configurations (IP40).

SITRANS FUG1010 Gas meters

This unique Clamp-On gas meter uses the same WideBeam transit-time operating principle described above. However, due to the very low density and sound velocity characteristics of gases, this meter requires a high gain signal amplifier and the installation of a pipe damping material.

The pipe damping material consists of an adhesive backed viscoelastic film that is designed to attenuate any stray acoustic transmit energy that may otherwise interfere with the transit-time gas signal. Damping material installation requires a clean (grease free) pipe surface with well bonded paint.

The Clamp-On gas meter is capable of operation on most gases (natural gas, oxygen, nitrogen, carbon monoxide, etc) with a typical minimum operating pressure of 10 barg (145 psig). Low molecular weight gases such as helium or hydrogen can also be measured, but at a higher minimum pressure. **Be sure to contact a Siemens clamp-on specialist before placing a gas system order.**

Standard volume computation: The FUG1010 gas meter is not designed with the same capabilities of a volume compensating flow computer but it can provide a standard volume or mass flow output for fixed gas compositions. All FUG1010 Gas meters include analog input capability that can be used for pressure and temperature compensation. With the installation of an AGA8 lookup table this meter can dynamically adjust the compressibility factor (Z_{act}) in response to changes in gas pressure and temperature, as indicate below:

$$\text{Std. Rate} = Q_{act} \cdot P_{act}/P_{base} \cdot T_{base}/T_{act} \cdot Z_{base}/Z_{act}$$

SITRANS FUH1010 Hydrocarbon meters

There are two models of flowmeters included in the FUH1010 family, a viscosity compensated model, used for applications that will flow a wide range of viscosity, and a standard volume (Mass) model. Both models rely on a variable referred to as "liquid", which is used to infer the liquid's viscosity and optionally

System information and selection guide

the liquid's density. This variable represents the measured liquid sonic velocity compensated by the operating temperature and pressure, so for a given liquid product the measured liquid output will remain constant over a wide range of pressure or temperature.

PV (Viscosity Compensation) Option:

This is the lower cost FUH meter option that uses the liquid variable to infer only the actual liquid viscosity. This meter does NOT provide the standard volume, mass flow, liquid identification or density output available in the DV meter option described below. The PV meter is suitable for any petroleum application where actual volume required as the input to an external RTU or flow computer.

DV (Standard Volume) Option:

This Liquid variable can also be used to identify the liquid's name (gasoline, fuel oil, crude oil, etc) as well as its physical properties (specify gravity, API, viscosity and compressibility) at base conditions. With this information the meter can be configured to output a temperature and pressure compensated (Standard) volume flow rate using the API 2540 and API MPMS chapter 11.2.1 methods as shown below.

Correction for Temperature:

Compute Thermal Expansion Coefficient (α_b):

$$\alpha_b = KO / \rho_b^2 + K1 / \rho_b$$

where: KO and K1 are constants dependent on type of liquid and ρ_b is the liquid density at base conditions

Compute temperature correction factor (K_T):

$$K_T = \rho_b * \text{EXP}(-\alpha_b \Delta T (1 + 0.8 \alpha_b \Delta T))$$

where: $\Delta T = (T - \text{base temperature})$

Correction for Pressure:

Compute Compressibility Factor (F):

$$F = \text{EXP}(A + B T + (C + D T) / \rho_b^2)$$

where: A, B, C and D are constants, and "T" is liquid temperature

Compute pressure correction factor (K_p):

$$K_p = 1 / (1 - F (P_{\text{act}} - P_{\text{base}}) * 10^{-4})$$

Final Volume Correction: $Q_{\text{std}} = Q_{\text{act}} * K_t * K_p$

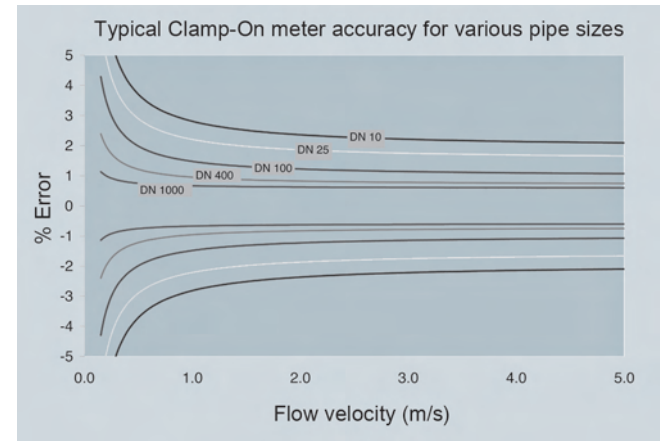
Available outputs from this meter include: API, Density, Mass Flowrate, Standard Volume Flowrate and Liquid Identification.

B (Interface Detection) Option:

This meter option is designed to provide all the Non-Flow capabilities of a DV meter, making it an ideal non-intrusive alternative to a densitometer, interface detector or pig detector. Be aware that this meter does NOT measure flow rate.

General Installation Guidelines for transit-time Clamp-On Transducers

- 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 transducers). Final flow range determination requires application review



- Pipe must be completely full within the transducer installation volume for accurate flow measurement!
- Typical MINIMUM straight pipe requirements are: 10 Diameters upstream / 5 Diameters downstream. Additional straight run is required for double out-of-plane elbows and partially open valves. A minimum of 20 upstream diameters is recommended for clamp-on gas systems
- Transducers 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 transducer orders. Insure that a permanent coupling compound is used for long term installations
- Refer to the "Transducer type selection guide" to insure proper application of the equipment

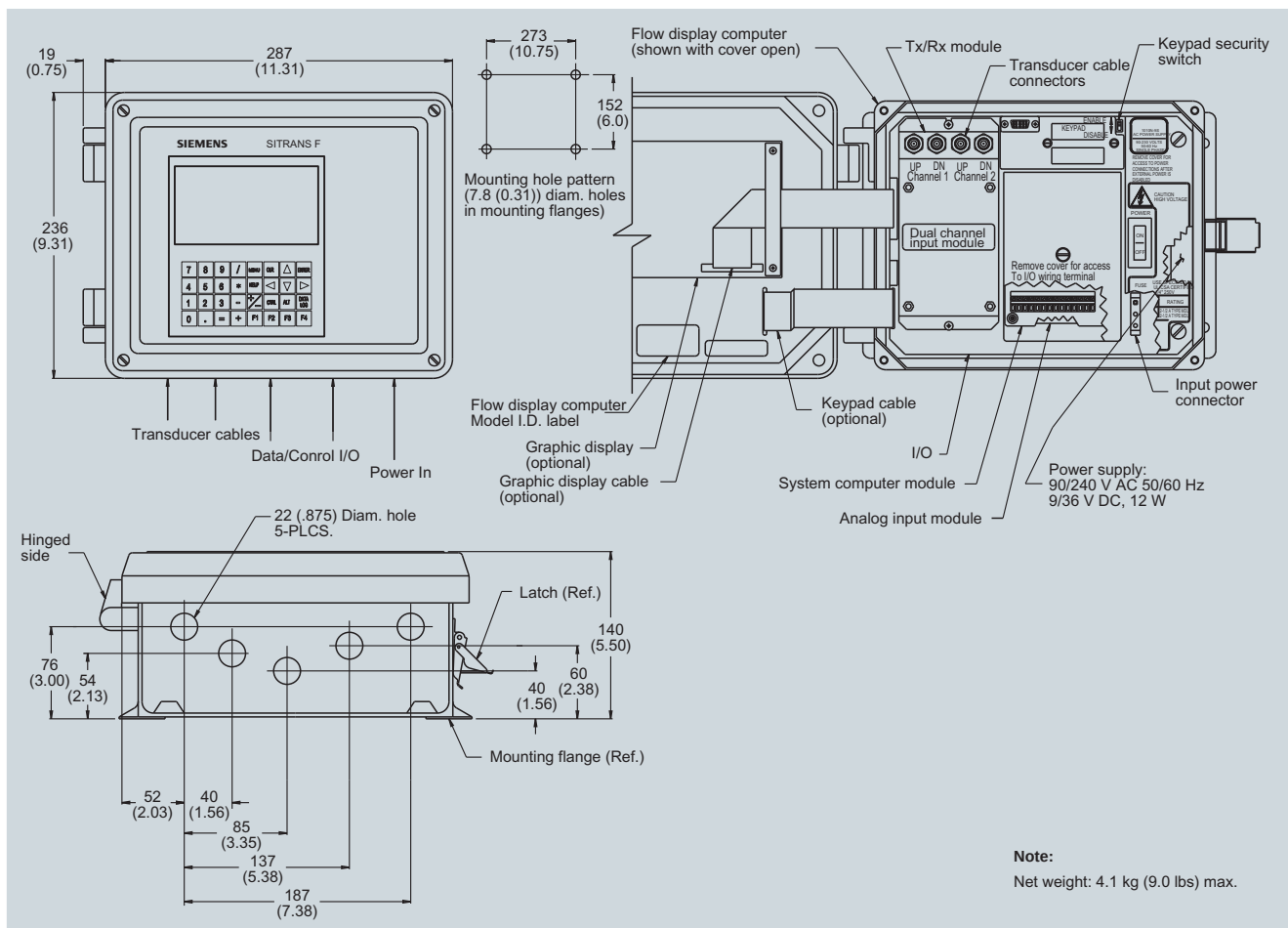
SITRANS F flowmeters

SITRANS F US

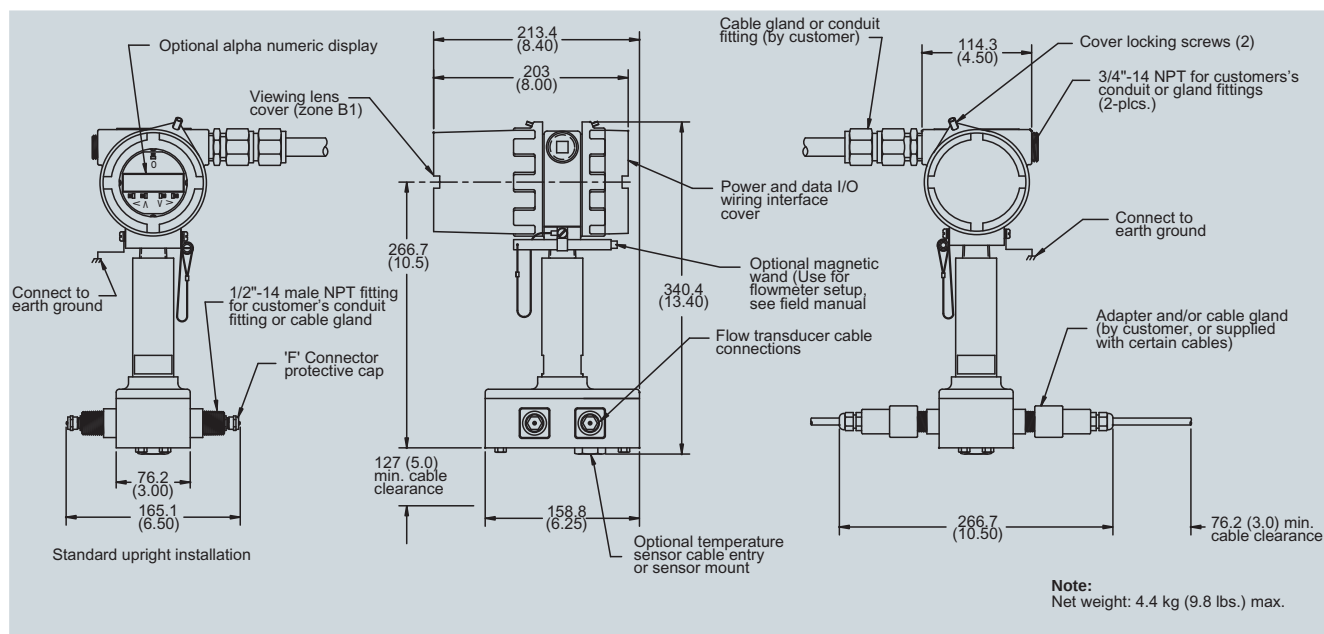
System information and selection guide

Dimensional drawings

FUS1010, FUE1010, FUH1010 and FUG1010 IP65 (NEMA 4X) Enclosure



FUS1010, FUH1010 and FUG1010 IP65 (NEMA 7) Compact explosionproof enclosure

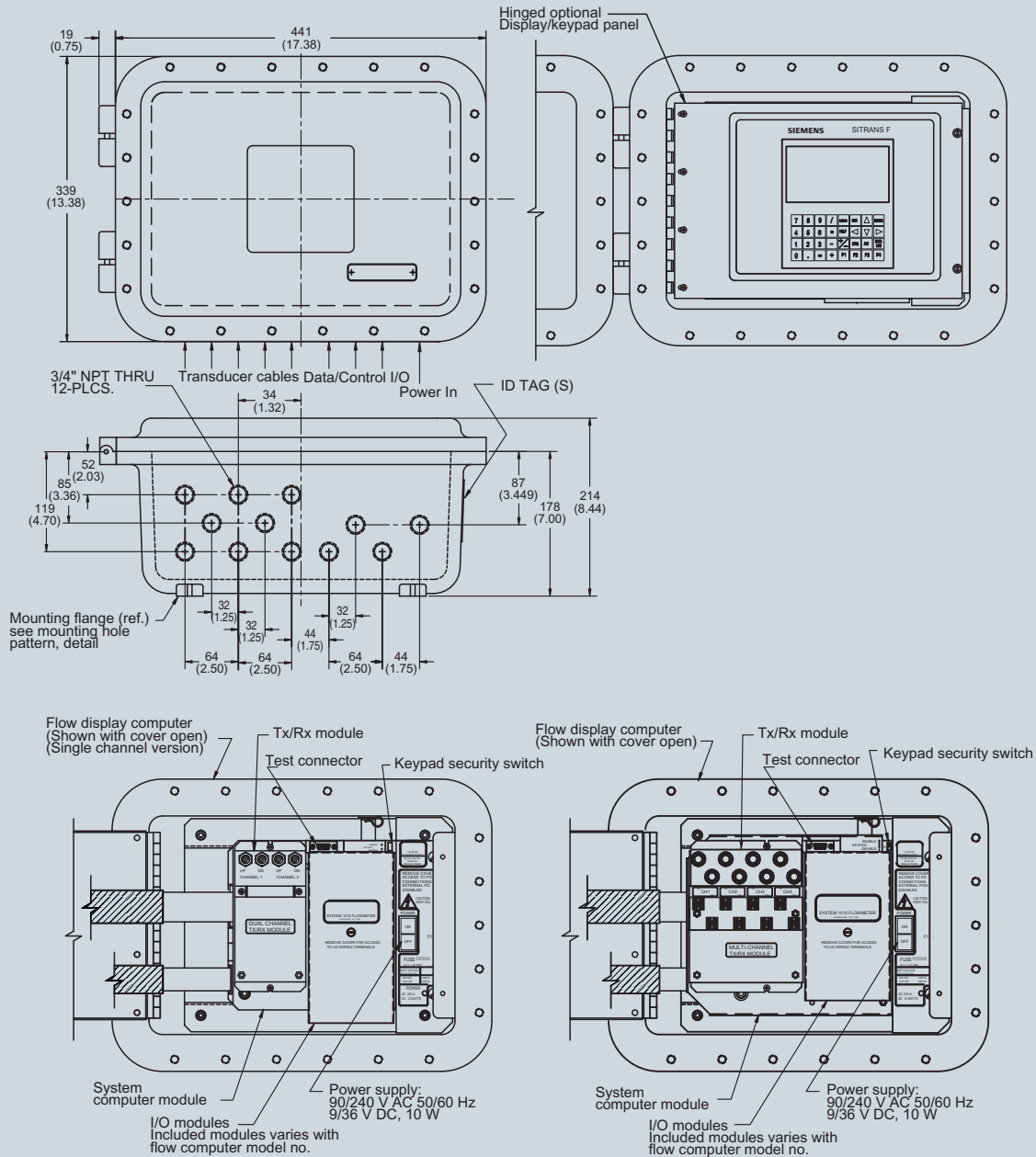


SITRANS F flowmeters

SITRANS F US

System information and selection guide

FUS1010 and FUH1010 IP66 (NEMA 7) Wall mount explosionproof enclosure



Single / Dual channel flowmeter

Multi-channel flowmeter

Note:

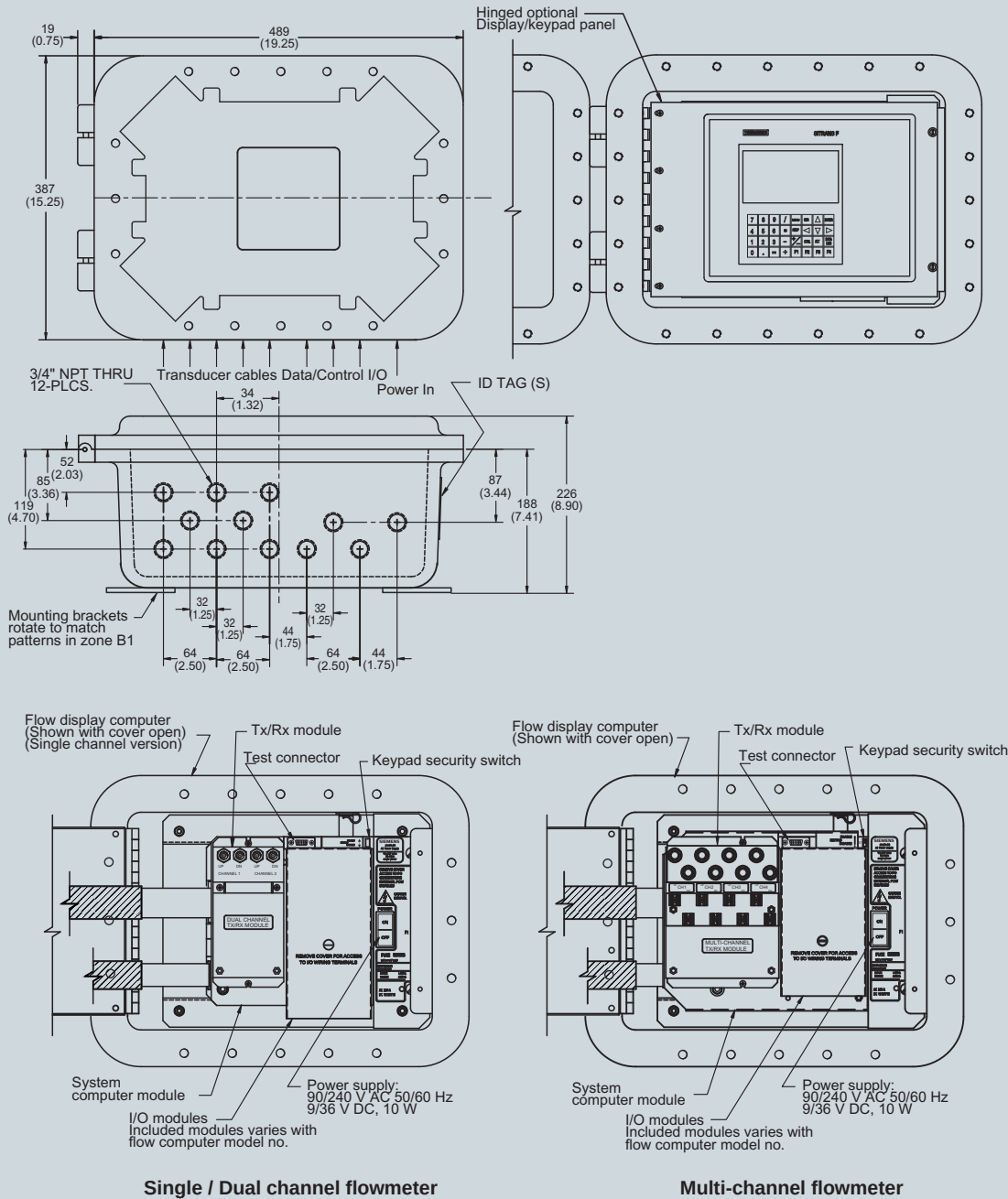
Net weight: 29 kg (64.0 lbs) max.

SITRANS F flowmeters

SITRANS F US

System information and selection guide

FUG1010 IP66 (NEMA 7) wall mount explosionproof enclosure

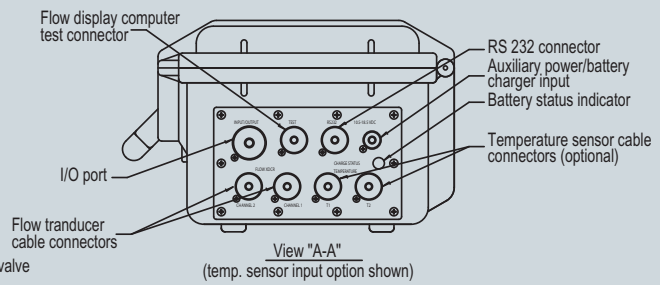
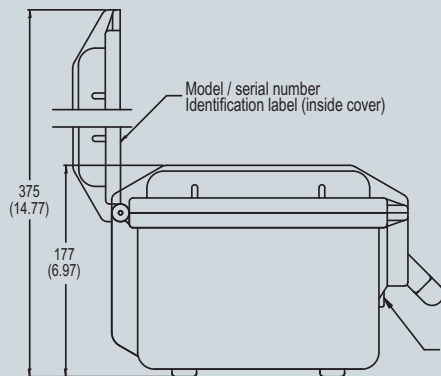
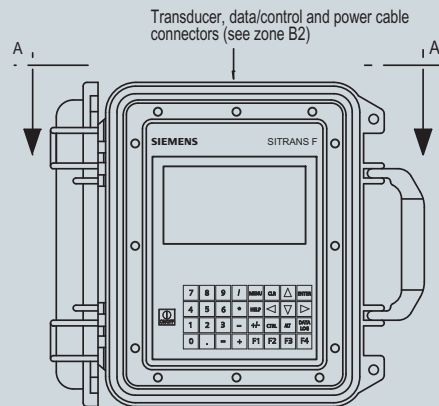
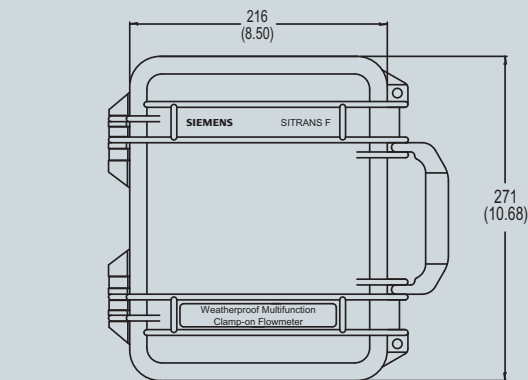


SITRANS F flowmeters

SITRANS F US

System information and selection guide

FUP1010 IP67 Weatherproof impact resistant enclosure



Note:
Net weight: 3.64 kg (8.0 lbs.)

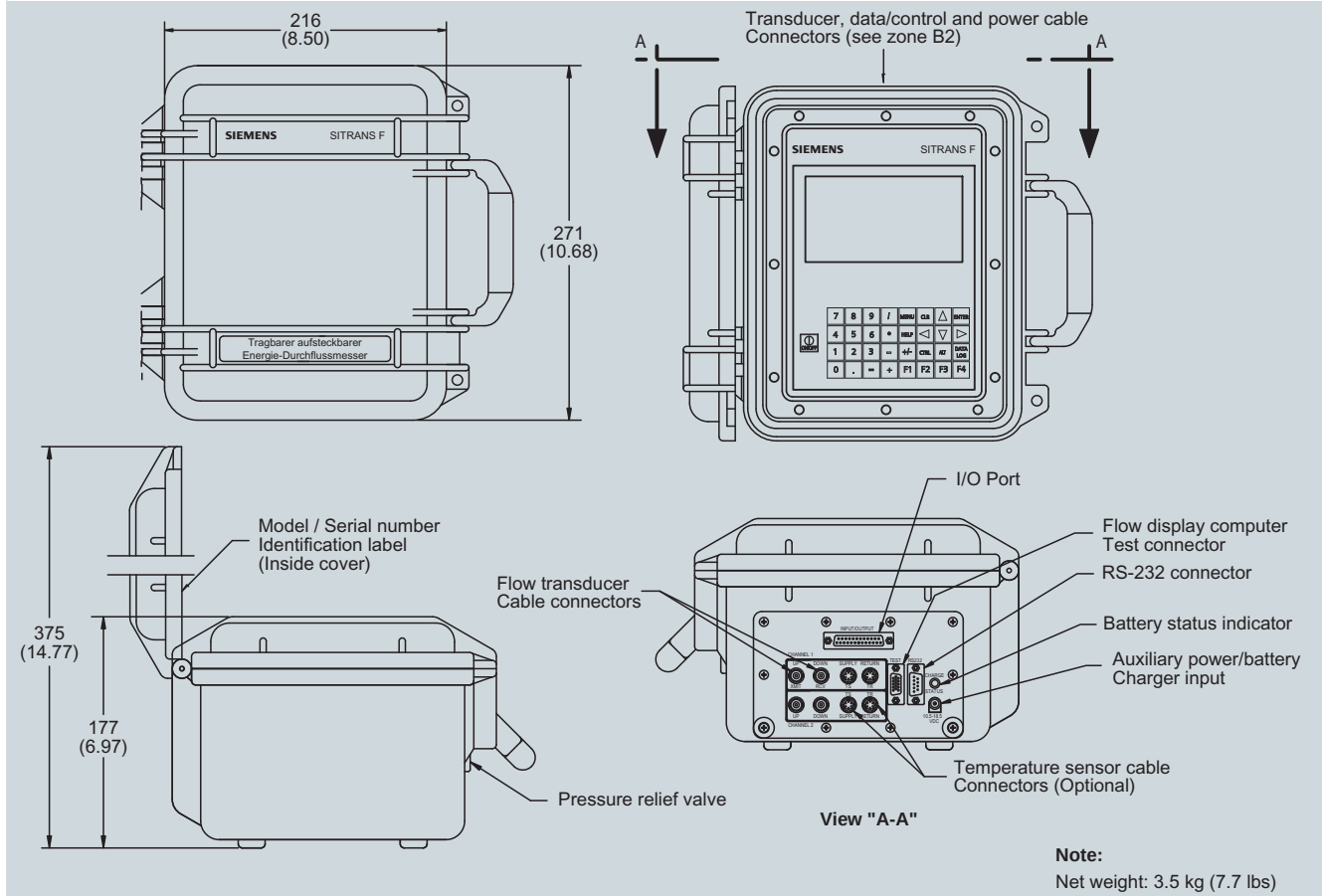
SITRANS F flowmeters

SITRANS F US

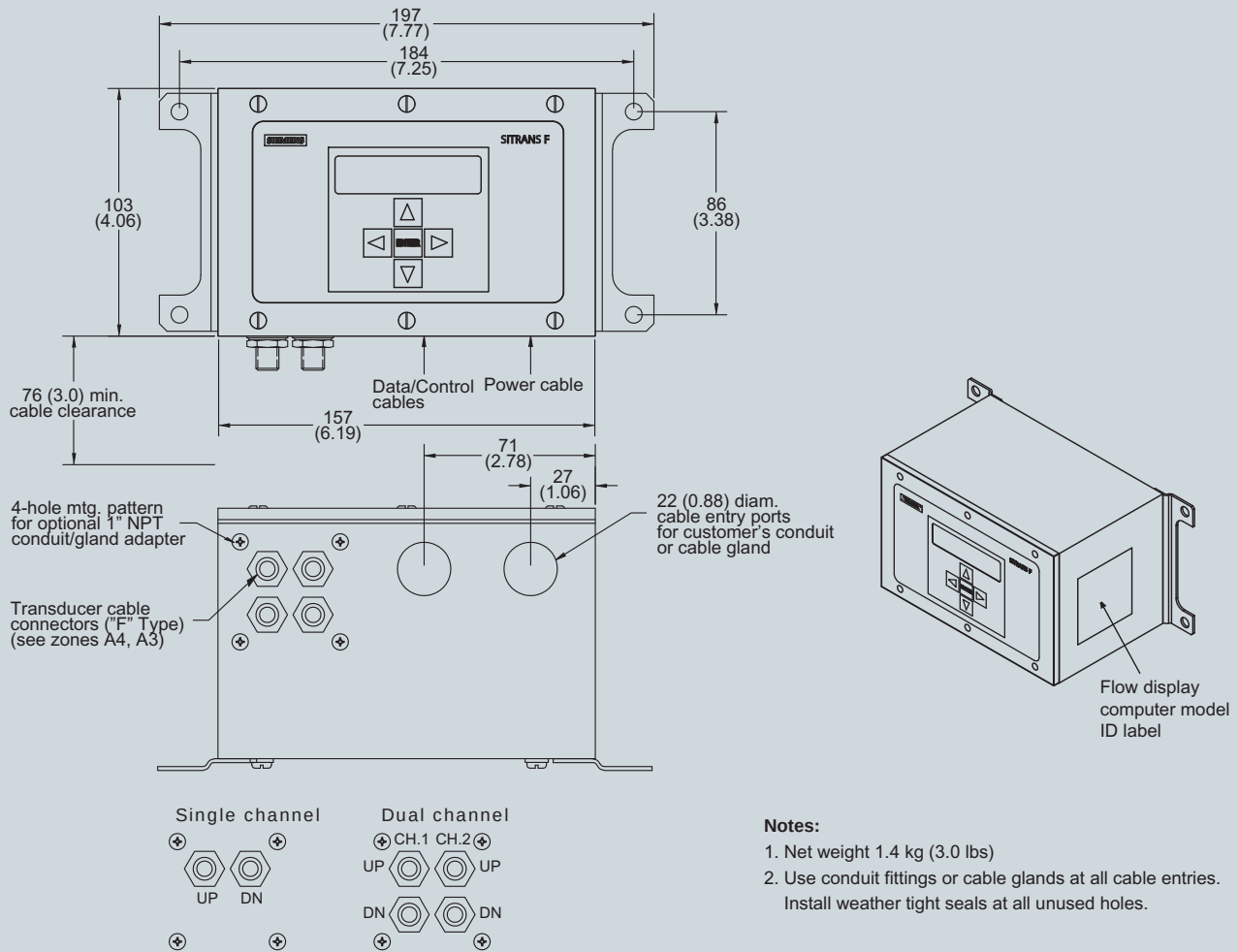
System information and selection guide

FUE1010 IP40 (NEMA 1) Portable impact resistant enclosure

4



FUS1020 IP65 (NEMA 4) Wall mount enclosure



Notes:

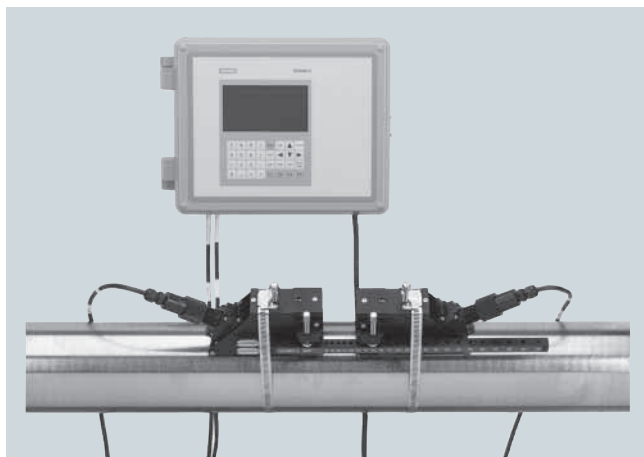
1. Net weight 1.4 kg (3.0 lbs)
2. Use conduit fittings or cable glands at all cable entries.
Install weather tight seals at all unused holes.

SITRANS F flowmeters

SITRANS F US

SITRANS FUS1010 Standard clamp-on

Overview



SITRANS FUS1010 is the most versatile clamp-on ultrasonic flow display computer available today. It can operate in either Wide-Beam Transit-Time or Reflexor (Doppler) mode, making it suitable for virtually any liquid, even those with high aeration or suspended solids.

SITRANS FUS1010 is available in single, dual and optional four beam configurations, with your choice of IP65 (NEMA 4X) or IP65 (NEMA 7) and IP66 (NEMA 7) explosionproof enclosures.

Benefits

- Versatility; there is no need to change meters when operating conditions change
- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external transducers do not require periodic cleaning
- No moving parts to foul or wear
- No pressure drop or energy loss
- Wide turn-down ratio
- Choice of single channel or dual channel/dual path, with doppler capability. Four channel/four beam optional.
 - Optional four channels allow measurement of four independent pipes at the same time, reducing overall ownership costs
 - Dual mode allows for transit time and reflexor operation at the same time on the same pipe
 - Dual path allows for two sets of transducers to be set up on one pipe and averaged for higher accuracy
- Zeromatic Path automatically sets zero without stopping flow and reduces zero drift, even at low flow

Application

FUS1010 is suitable for a wide variety of liquid applications, including the following:

- Water industry
 - Raw water
 - Potable water
 - Chemicals
- Wastewater industry
 - Raw sewage
 - Effluent
 - Sludges
 - Mixed liquor
 - Chemicals
- HVAC industry
 - Chillers
 - Condensers
 - Hot and cold water systems
- Power industry
 - Nuclear
 - Fossil
 - Hydroelectric
- Processing industry
 - Process control
 - Batching
 - Rate indication
 - Volumetric and mass measurement

Design

FUS1010 is available in three configurations:

- IP65 (NEMA 4X) enclosure constructed of fiberglass reinforced polyester with stainless steel hardware and polyester keypad
 - Single channel
 - Dual channel / dual path
 - Four channel (optional)
- IP65 (NEMA 7) Compact explosionproof enclosure constructed of cast aluminum with glass window, stainless steel hardware
 - Single channel
 - Dual channel / dual path
- IP66 (NEMA 7) Wall mount explosionproof enclosure constructed of cast aluminum, stainless steel hardware, optional glass window
 - Single channel
 - Dual channel / dual path
 - Four channel (optional)

Function

- IP65 (NEMA 4X) and IP66 (NEMA 7) flow display computers have integral 33 button keypads and large (128 x 240 pixel) graphic displays visible up to 12 m (40 ft) away
- IP65 (NEMA 7) compact flow display computer has a 2 x 16 Alphanumeric LCD display
- Current, voltage, status alarm, frequency and RS232 outputs (see specification section for details)
- Optional current, voltage and temperature inputs (see specification section for details)
- Zeromatic Path automatically sets zero
- Bidirectional flow operation
- 1 MByte data logger with both site and data logger storage
- English, spanish, german, italian and french language options

SITRANS F flowmeters

SITRANS F US

SITRANS FUS1010 Standard clamp-on

Technical specifications

SITRANS FUS1010, IP65 (NEMA 4X) Flow display computer



Enclosure IP65 (NEMA 4X)

Input

Flow range	± 12 m/s (± 40 ft/s), bidirectional
Pipe size	6.4 mm ... 9.14 m (0.25" ... 360")
Optional inputs Single channel	• Current: 2 x 4 ... 20 mA DC • Voltage: 2 x 0 ... 10 V DC • Temperature: 2 x 4 wire 1 kΩ RTD

Output

Type 3 outputs	• Current: 2 x 4 ... 20 mA DC (1 kΩ at 30 V DC) • Voltage: 2 x 0 ... 10 V DC (5 kΩ min.) • Status Alarm: 4 x SPDT relays • Mercury wetted relays • Frequency: 2 x 0 ... 5 kHz • RS232
Optional Type 3 outputs	• Mercury wetted relays • Expanded I/Os (4 additional 4 ... 20 mA outputs) with form c relays • Expanded I/Os with Mercury wetted relays • uniMass capability with 1 RTD input and 4 x 4 ... 20 mA analog input

Accuracy

Accuracy	$\pm 0.5\%$... 1.0% of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0015 ... 0.003 m/s (± 0.005 ... 0.01 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Batch repeatability	$\pm 0.15\%$ of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)

Data refresh rate

5 Hz

Rated operation conditions

Degree of protection	IP65 (NEMA 4X)
Liquid temperature	• Standard -40 ... +120 °C (-40 ... +250 °F) • Optional -40 ... +230 °C (-40 ... +450 °F)
Ambient temperature	-18 ... +60 °C (0 ... 140 °F)

Design

Dimensions	see SITRANS F US Clamp-on "System info and selection guide"
Weight	see diagrams

Power supply

90 ... 240 V AC, 50 ... 60 Hz, 30 VA or
9 ... 36 V DC, 12 W

Indication and operation

Data logger memory	1 MByte
Display	128 x 240 pixel LCD with back-light
Keypad	33 keypad buttons with tactile feedback
Language options	English, spanish, german, italian, french

Certificates and approvals

FM and CSA ratings	I.S. Class I, II, Div 1 N-I Class I, Div 2 S Class II, Div 2
ATEX ratings	
• Flow display computer	Ex II (1) G [EEx ia] IIC Ex II 3 (1) G EEx nC [ia] IIC T5
• Transducers	Ex II 1 G EEx ia IIC T5 Ex II 2 G EEx m II T5 (for use with flowmeter in safe area)

SITRANS F flowmeters

SITRANS F US

SITRANS FUS1010 Standard clamp-on

SITRANS FUS1010, IP65 (NEMA 7) Compact explosionproof



Enclosure IP65 (NEMA 7)

Input

Flow range	± 12 m/s (± 40 ft/s), bidirectional
Pipe size	6.4 mm ... 9.14 m (0.25" ... 360")
Optional inputs single channel	• Current: 1 x 4 ... 20 mA DC • Temperature: 2 x 4 wire 1 kΩ RTD

Output

Outputs	• Current (externally powered): 1 x 4 ... 20 mA DC (1 kΩ at 30 V DC) • Status Alarm: 1 x Isolated open collector • Frequency: 2 x 0 ... 5 kHz • RS232
---------	--

Accuracy

	$\pm 0.5\%$... 1.0% of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0015 ... 0.003 m/s $(\pm 0.005$... 0.01 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Batch repeatability	$\pm 0.15\%$ of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)

Data refresh rate	5 Hz
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Rated operation conditions

Degree of protection	IP65 (NEMA 7)
Liquid temperature	
• Standard	-40 ... +120 °C (-40 ... +250 °F)
• Optional	-40 ... +230 °C (-40 ... +450 °F)
Ambient temperature	-18 ... +60 °C (0 ... 140 °F)

Design

Dimensions	see SITRANS F US Clamp-on "System info and selection guide"
Weight	see diagrams

Power supply	90 ... 240 V AC, 50 ... 60 Hz, 15 VA or 9 ... 36 V DC, 10 W
---------------------	---

Indication and operation

Data logger memory	1 MByte
Display	2 x 16 alphanumeric LCD display
Keypad	5 Magnetic hall effect switches
Language options	English, spanish, german, italian, french

Certificates and approvals

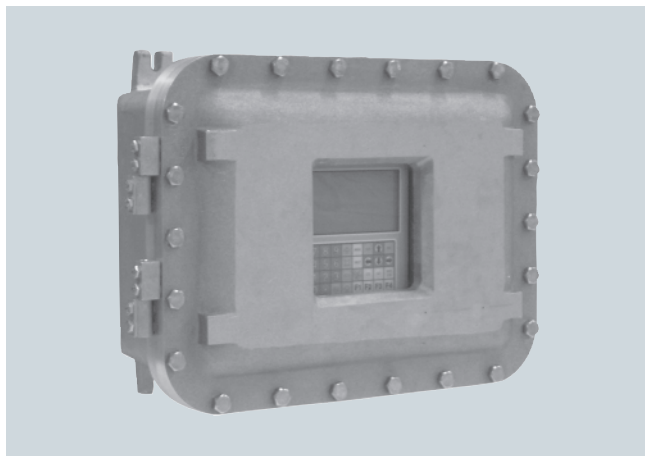
FM and CSA ratings	XP Class I, Div 1 D-I Class II, Div 1 I.S. Class I, Div 1 N-I Class I, Div 2 S Class II, Div 2
ATEX ratings	
• Flow display computer	Ex II 2 (1) G EEx d [ia] IIB + H2 T5
• Transducers	Ex II 1 G EEx ia IIC T5
INMETRO ratings (Brazil)	
• Flow display computer	BR Ex d [ia] IIC T5
• Transducers	BR-Ex ia IIC T5 -50 °C $\leq$ Ta $\leq$ +60 °C

SITRANS F flowmeters

SITRANS F US

SITRANS FUS1010 Standard clamp-on

SITRANS FUS1010, IP66 (NEMA 7) Wall mount explosionproof enclosure



Enclosure IP66 (NEMA 7)

Input

Flow range	± 12 m/s (± 40 ft/s), bidirectional
Pipe size	6.4 mm ... 9.14 m (0.25" ... 360")
Optional Inputs single channel	• Current: 2 x 4 ... 20 mA DC • Voltage: 2 x 0 ... 10 V DC • Temperature: 2 x 4 wire 1 kΩ RTD

Output

Outputs single channel	• Current: 2 x 4 ... 20 mA DC (1 kΩ at 30 V DC) • Voltage: 2 x 0 ... 10 V DC (5 kΩ min.) • Status Alarm: 4 x SPDT Relays • Frequency: 2 x 0 ... 5 kHz • RS232
---------------------------	---

Accuracy

Accuracy	$\pm 0.5\%$... 1.0% of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0015 ... 0.003 m/s (± 0.005 ... 0.01 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Batch repeatability	$\pm 0.15\%$ of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)

Data refresh rate	5 Hz
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Rated operation conditions

Degree of protection	IP66 (NEMA 7)
Liquid temperature	
• Standard	-40 ... +120 °C (-40 ... +250 °F)
• Optional	-40 ... +230 °C (-40 ... +450 °F)
Ambient temperature	-18 ... +60 °C (0 ... 140 °F)

Design

Dimensions	see SITRANS F US Clamp-on "System info and selection guide"
Weight	see diagrams

Power supply	90 ... 240 V AC, 50 ... 60 Hz, 30 VA or 9 ... 36 V DC, 12 W
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Indication and operation

Data logger memory	1 MByte
Display	128 x 240 pixel LCD with back-light
Keypad	33 keypad buttons with tactile feedback
Language options	English, spanish, german, italian, french

Certificates and approvals

FM and CSA ratings	XP Class I, Div 1 D-I Class II, Div 1 I.S. Class I, Div 1 N-I Class I, Div 2 S Class II, Div 2
ATEX ratings	
• Flow display computer	Ex II (1) G [EEx ia] IIC Ex II 3 (1) G EEx nC [ia] IIC T5 Ex II 2 (1) G EEx d [ia IIC] IIB + H2 T5
• Transducers	Ex II 1 G EEx ia IIC T5
INMETRO ratings (Brazil)	
• Flow display computer	[BR-Ex ia] IIC BR-Ex nC [ia] IIC T5 BR-Ex d [ia IIC] IIB + H2 T5
• Transducers	BR-Ex ia IIC T5 -50 °C $\leq$ Ta $\leq$ +60 °C

SITRANS F flowmeters

SITRANS F US

SITRANS FUS1010 Standard clamp-on

Selection and Ordering data	Order No.	Ord. code
SITRANS FUS1010 Standard clamp-on		
• IP65 (NEMA 4X)	K)	7ME3530-
• IP65 (NEMA 7) compact	K)	7ME3531-
• IP66 (NEMA 7) wall mounted	K)	7ME3532-
• IP66 (NEMA 7) with display window	K)	7ME3533-
	0 -	
Number of channels/ultrasonic beams		
Single channel	1	
Dual channel / Dual beam	2	
Special: Four channel / Four Beam (NEMA 4X and NEMA 7 wall mount only)	9	H 1 A
Flowmeter functions and I/O configurations		
includes graphic or digital display and Reflexor capability for all except IP65 (NEMA 7) compact units		
<u>IP65 (NEMA 4X) and IP66 (NEMA 7 wall mounted) units</u>		
• Type 3 option adder	C	
- 2 x 0 ... 10 V		
- 2 x 4 ... 20 mA		
- 2 x pulse output		
- 4 x relay C type		
- UniMass capability with 2 x RTD input and		
- 4 x 4 ... 20 mA analog input		
<u>IP65 (NEMA 7) compact units</u>		
• Type 3 option adder	F	
- 1 x 4 ... 20 mA (Loop) and 1 x status (open collector) per channel		
- 1 x pulse output for single channel units only		
- UniMass capability with 1 RTD input and		
- 1 x analog input per channel		
• Other version (Expanded I/O and/or Mercury wetted relays)	Z	J 1 Y
Add order code and plain text.		
• Type 3 with Mercury wetted relays	Z	J 1 A
• Type 3 with expanded I/Os (4 additional 4 ... 20 mA outputs) and form C relay	Z	J 1 B
• Type 3 with expanded I/Os and Mercury wetted relays	Z	J 1 C
Meter power options		
90 ... 240 V AC	A	
9 ... 36 V DC (except compact NEMA 7)	B	
9 ... 36 V DC negative GND (compact only)	J	
9 ... 36 V DC positive GND (compact only)	K	
Communication options		
RS232 (standard)	0	
MODBUS (dedicated only, excludes NEMA 7 compact)	1	
RTD temperature sensor		
(includes mounting hardware for pipes between 1.5" and 24" outer diameter)		
No RTDs	0	
1 x standard clamp-on RTD	1	
2 x standard clamp-on RTD	2	
1 x submersible clamp-on RTD	3	
2 x submersible clamp-on RTD	4	
Special (for insert style RTDs), describe RTD length, thermowell and lagging	9	N 1 Y
1 x Insertion style RTD with thermowell and lagging	9	N 1 A
2 x Insertion style RTD with thermowell and lagging	9	N 1 B

Selection and Ordering data	Order No.	Ord. code
SITRANS FUS1010 Standard clamp-on		
• IP65 (NEMA 4X)	K)	7ME3530-
• IP65 (NEMA 7) compact	K)	7ME3531-
• IP66 (NEMA 7) wall mounted	K)	7ME3532-
• IP66 (NEMA 7) with display window	K)	7ME3533-
	0 -	
Transducer for channel 1		
(includes pipe mounting kit and spacer bar for indicated max. OD listed) See „Transducer selection charts“ for specifications.		
no transducer		A
A2 universal to 2"/track mount		B
B3 universal to 5"/track mount		C
C3 universal to 13"/mounting frame		D
D3 universal to 24"/mounting frame		E
E2 universal to 48"/mounting frame ¹⁾		F
For the following A1H to D4H transducers, temperature range is -40 °C to 65 °C (-41 °F to 150 °F), nominal 21 °C (70 °F):		
A1H (high precision) to 3"/track mount		G
A2H (high precision) to 3"/track mount		H
A3H (high precision) to 3"/track mount		J
B1H (high precision) to 5"/track mount		K
B2H (high precision) to 5"/track mount		L
C1H (high precision) to 24"/mounting frame		M
C2H (high precision) to 24"/mounting frame		N
D1H (high precision) to 48"/mounting frame ²⁾		P
D2H (high precision) to 48"/mounting frame ²⁾		Q
D4H (high precision) to 48"/mounting frame ²⁾		R
Doppler to 12" with strap kit (not for IP65 (NEMA 7))		S
Other versions (different size, mount, type or pipe larger than DN 1200 (48"), or corrosion resistant), add Order code and plain text.	Z	P 1 Y
High temperature transducer size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))	Z	P 1 A
High temperature transducer size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))	Z	P 1 B
High temperature transducer size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))	Z	P 1 C
For the following B1H to D4H transducers, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):		
B1H (high temperature range HP)	Z	P 1 K
B2H (high temperature range HP)	Z	P 1 L
C1H (high temperature range HP)	Z	P 1 M
C2H (high temperature range HP)	Z	P 1 N
D1H (high temperature range HP) ²⁾	Z	P 1 P
D2H (high temperature range HP) ²⁾	Z	P 1 Q
D4H (high temperature range HP) ²⁾	Z	P 1 R

¹⁾ Supplied spacer bar supports pipes up to 1050 mm (42 inches). For pipes larger than 1050 mm (42 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4)

²⁾ Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4)

K) Subject to export regulations AL: N, ECCN: 5A991X.

SITRANS F flowmeters

SITRANS F US

SITRANS FUS1010 Standard clamp-on

Selection and Ordering data	Order No.	Ord. code
SITRANS FUS1010 Standard clamp-on		
• IP65 (NEMA 4X)	K)	7ME3530-
• IP65 (NEMA 7) compact	K)	7ME3531-
• IP66 (NEMA 7) wall mounted	K)	7ME3532-
• IP66 (NEMA 7) with display window	K)	7ME3533-
		0 -
Transducer for channel 2 (includes pipe mounting kit for indicated max. OD listed) See „Transducer selection charts“ for specifications.		
no transducer		A
A2 universal to 2"/track mount		B
B3 universal to 5"/track mount		C
C3 universal to 13"/mounting frame		D
D3 universal to 24"/mounting frame		E
E2 universal to 48"/mounting frame ¹⁾		F
For the following A1H to D4H transducers, temperature range is -40 °C to 65 °C (-41 °F to 150 °F), nominal 21 °C (70 °F):		
A1H (high precision) to 3"/track mount		G
A2H (high precision) to 3"/track mount		H
A3H (high precision) to 3"/track mount		J
B1H (high precision) to 5"/track mount		K
B2H (high precision) to 5"/track mount		L
C1H (high precision) to 24"/mounting frame		M
C2H (high precision) to 24"/mounting frame		N
D1H (high precision) to 48"/mounting frame ²⁾		P
D2H (high precision) to 48"/mounting frame ²⁾		Q
D4H (high precision) to 48"/mounting frame ²⁾		R
Doppler to 12" with chain or strap kit (not for IP65 (NEMA 7))		S
Other versions (different size, mount, type or pipe larger than DN 1200 (48"), or corrosion resistant), add Order code and plain text.	Z	Q 1 Y
High temperature transducer size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))	Z	Q 1 A
High temperature transducer size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))	Z	Q 1 B
High temperature transducer size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))	Z	Q 1 C
For the following B1H to D4H transducers, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):		
B1H (high temperature range HP)	Z	Q 1 K
B2H (high temperature range HP)	Z	Q 1 L
C1H (high temperature range HP)	Z	Q 1 M
C2H (high temperature range HP)	Z	Q 1 N
D1H (high temperature range HP) ²⁾	Z	Q 1 P
D2H (high temperature range HP) ²⁾	Z	Q 1 Q
D4H (high temperature range HP) ²⁾	Z	Q 1 R
Approvals		
FM/CSA		1
ATEX		2
INMETRO (Brazil)		3
Special ATEX EEx m add Order code and plain text: Length of integral cable:	9	R 1 Y

Selection and Ordering data	Order code
Further designs	
Please add „Z“ to Order No. and specify Order code(s).	
Cable assembly for transducers (add for No. of channels) See „Transducer cable selection chart“	K..
Cable assembly for RTDs (add for No. of RTDs) See „RTD cable selection chart“	R..
Cable termination kit (for one cable pair)	
• Termination for standard, plenum and armored transducer cable	T01
• Termination for submersible transducer cable	T11
• RTD cable termination kit for standard RTD	T21
• RTD cable termination kit for submersible RTD	T31
• Insert RTD cable termination kit	T41
Languages (Meter and Documentation), English (default)	
• German	B10
• French	B12
• Spanish	B13
• Italian	B14
Wet flow transfer calibration (priced on request)	
• 6 point up to 4 inch (DN 100)	D10
• 6 point up to 5 to 8 inch (DN 125 to DN 200)	D11
• 6 point up to 10 to 12 inch (DN 250 to DN 300)	D12
• 6 point up to 14 to 16 inch (DN 350 to DN 400)	D13
• 6 point up to 18 to 20 inch (DN 450 to DN 500)	D14
• 6 point up to 22 to 24 inch (DN 550 to DN 600)	D15
• 6 point up to 26 to 30 inch (DN 650 to DN 750)	D16
• 6 point up to 32 to 36 inch (DN 800 to DN 900)	D17
Tag name plate	
• Stainless steel tag with 3.2 mm (0.13 inch) character size (26 characters max.)	Y17
• Stainless steel tag with 3.2 mm (0.13 inch) character size (68 characters max.)	Y19
¹⁾ Supplied spacer bar supports pipes up to 1050 mm (42 inches). For pipes larger than 1050 mm (42 inches) purchase also, spare part 7ME3960-OMS40 (1012BN-4).	
²⁾ Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-OMS40 (1012BN-4).	
K) Subject to export regulations AL: N, ECCN: 5A991X.	

SITRANS F flowmeters

SITRANS F US

SITRANS FUS1010 Standard clamp-on

MLFB example

Application example

A clamp-on meter is required for a 12" carbon steel jet fuel line, with a wall thickness of 12.7 mm (0.5"). Meter electronics is to be located in a Class I Div 2 area only 18 m (60 ft) from the pipeline. 12 V DC power is available at the site.

Dual beam operation is desired for improved accuracy and redundant measurement.

MLFB Order No.: **7ME3530-2AB00-0QQ1-Z**
K03 + K03

Selection and Ordering data

Selection and Ordering data	Order No.	Ord. code
FUS1010 meter family	7 ME 3 5 3	-
IP65 (NEMA 4X) enclosure	0	-
Dual Beam	2	-
Standard I/O option	A	-
9 ... 36 V DC power option	B	-
RS232 Standard	0	-
No RTD required	0	-
Transducer code for path 1	Q	-
Transducer code for path 2	Q	-
FM approval required	1	-
30 m (100 ft) transducer cable for path 1	K 0 3	-
30 m (100 ft) transducer cable for path 2	K 0 3	-

Transducer cable selection chart

Transducer cable codes for length and type options

Cable length m (ft)	Standard (PVC jacket) -40...+80 °C (-40...+176 °F)	Submersible (polyethylene jacket) -40...+80 °C (-40...+176 °F)	Plenum Rated (teflon jacket) -40...+200 °C (-40...+392 °F)	Armored -40...+80 °C (-40...+176 °F)
Order code				
6 (20)	K01	K11	K21	K31
15 (50)	K02	K12	K22	K32
30 (100)	K03	K13	K23	K33
46 (150)	K04	K14	K24	K34
61 (200)	K05	K15	K25	K35
91 (300)	K06	K16	K26	K36

RTD cable selection chart

RTD cable codes for length and type

Cable length m (ft)	Standard (teflon wrapped) -40 ... +200 °C (-40 ... +392 °F)	Submersible (extruded jacket) -40 ... +200 °C (-40 ... +392 °F)
Order code		
6 (20)	R01	R11
15 (50)	R02	R12
30 (100)	R03	R13
46 (150)	R04	R14
61 (200)	R05	R15
91 (300)	R06	R16

Transducer selection charts

Universal transducers for any pipe material

Transducer	Order Code	Outer diameter range (mm)		Outer diameter range (inches)	
Size code		min.	max.	min.	max.
A2	B	12.7	50.8	0.5	2
B3	C	19	127	0.75	5
C3	D	51	305	2	12
D3	E	203	610	8	24
E2	F	254	6 096	10	240

High precision transducers for steel pipe with outer diameter/wall thickness ratio >10

Transducer	Order Code	Pipe wall (mm)		Pipe wall (inches)	
Size code		min.	max.	min.	max.
A1H	G	0.64	1.02	0.025	0.04
A2H	H	1.02	1.52	0.04	0.06
A3H	J	1.52	2.03	0.06	0.08
B1H	K	2.03	3.05	0.08	0.12
B2H	L	3.05	4.06	0.12	0.16
C1H	M	4.06	5.84	0.16	0.23
C2H	N	5.84	8.13	0.23	0.32
D1H	P	8.13	11.18	0.32	0.44
D2H	Q	11.18	15.75	0.44	0.62
D4H	R	15.75	31.75	0.62	1.25

Mainstream offering SITRANS FUS1010 (Dedicated standard)

Selection and Ordering data	Order No.	Order code
SITRANS FUS1010 Standard clamp-on	K) 7ME353 - 0 -	K02 + K02 + R02
Design (Includes cable glands)	0	
IP65 (NEMA 4X)		
Number of channels/ultrasonic beams	1 2	
Single channel Dual channel/Dual beam		
Flowmeter functions and I/O configurations includes graphic display and Reflexor capability	C	
Type 3 option adder • UniMass capability with 2 x RTD input • 4 x 4 ... 20 mA analog input		
Meter power options	A	
90 ... 240 V AC		
Communication options	0	
RS 232 (standard)		
RTD temperature sensor (includes mounting hardware for pipes between 1.5" and 24" outer diameter)	0 3 4	
No RTDs 1 x submersible clamp-on RTD 2 x submersible clamp-on RTD		
Transducer for channel 1 (includes pipe mounting kit and spacer bar for indicated max. OD listed) See „Transducer selection charts“ for specifications.	A C D E F M N P Q	
no transducer B3 universal to 5"/track mount C3 universal to 13"/mounting frame D3 universal to 24"/mounting frame E2 universal to 48"/mounting frame C1H (high precision) to 24"/mounting frame C2H (high precision) to 24"/mounting frame D1H (high precision) to 48"/mounting frame D2H (high precision) to 48"/mounting frame		
Transducer for channel 2 (includes pipe mounting kit for indicated max. OD listed) See „Transducer selection charts“ for specifications.	A C D E F M N P Q	
no transducer B3 universal to 5"/track mount C3 universal to 13"/mounting frame D3 universal to 24"/mounting frame E2 universal to 48"/mounting frame C1H (high precision) to 24"/mounting frame C2H (high precision) to 24"/mounting frame D1H (high precision) to 48"/mounting frame D2H (high precision) to 48"/mounting frame		
Approvals	1 2	
FM/CSA (default) ATEX EExia		

Mainstream product offering represents 4 to 6 weeks delivery time

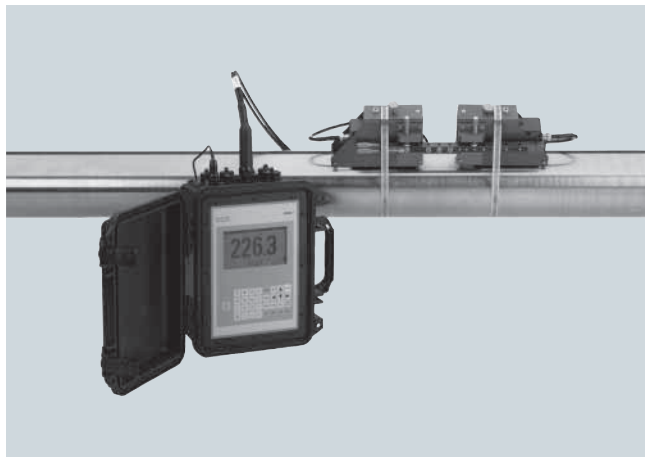
K) Subject to export regulations AL: N, ECCN: 5A991X.

SITRANS F flowmeters

SITRANS F US

SITRANS FUP1010 Portable clamp-on

Overview



SITRANS FUP1010 clamp-on non-intrusive ultrasonic flow display computer offers maximum versatility plus battery power for portable field use. It can operate in either WideBeam Transit-Time or reflexor (Doppler) mode, making it suitable for virtually any liquid, even those with high aeration or suspended solids.

SITRANS FUP1010 is available in single and dual channel or dual path configurations, with IP67 weatherproof enclosure.

Benefits

- Battery power facilitates field use; the meter is easily transported from one installation to another – saving time for surveys, monitoring and temporary installations
- Weatherproof model can be used outdoors and left in place without concern for rain damage
- Weatherproof model's rugged plastic case enables it to withstand rough treatment that would destroy most other meters
- Versatility - there is no need to change meters when operating conditions change
- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external transducers do not require periodic cleaning
- No moving parts to wear or foul
- No pressure drop or energy loss
- Wide turn-down ratio
- Choice of single or dual channel models minimizes total cost
- Zeromatic Path automatically sets zero without stopping flow and reduces zero drift, even at low flow
- Note that the FUP1010 flow display computer is not available with hazardous area approvals

Application

FUP1010 is suitable for a wide variety of liquid applications, including the following:

- Water industry
 - Raw water
 - Potable water
 - Chemicals
- Wastewater industry
 - Raw sewage
 - Effluent
 - Sludges
 - Mixed liquor
 - Chemicals
- HVAC industry
 - Chillers
 - Condensers
 - Hot and cold water systems
 - Thermal energy rate and total
- Power industry
 - Nuclear
 - Fossil
 - Hydroelectric
- Processing industry
 - Process control
 - Batching
 - Rate indication
 - Volumetric and mass measurement

Design

- IP67 Weatherproof / Impact resistant enclosure constructed of mineral reinforced copolymer polypropylene
 - Single channel
 - Dual channel / dual path

Function

- Integral 33 button keypad and large (128 x 240 pixel) graphic display visible up to 12 m (40 ft) away
- Current, voltage, frequency and RS232 outputs (see specification section for details)
- Optional current, voltage and temperature inputs (see specification section for details)
- Zeromatic Path automatically sets zero
- Bi-directional flow operation
- 1 MByte data logger with both site and data logger storage
- English, spanish, german, italian and french language options

Technical specifications

SITRANS FUP1010

Input

Flow range	± 12 m/s (± 40 ft/s), bidirectional
Pipe size	6.4 mm ... 9.14 m (0.25" ... 360")
Optional inputs, single channel	• Current: 2 x 4 ... 20 mA DC • Voltage: 2 x 0 ... 10 V DC • Temperature: 2 x 4 wire 1 kΩ RTD

Output

Outputs	• Current: 2 x 4 ... 20 mA DC (1 kΩ at 30 V DC) • Voltage: 2 x 0 ... 10 V DC (5 kΩ minimum) • Status Alarm: 4 x SPDT Relays • Frequency: 2 x 0 ... 5000 Hz • RS232
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Accuracy

Accuracy	$\pm 0.5\%$... 2% of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0015 ... 0.006 m/s $(\pm 0.005$... 0.02 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Batch repeatability	$\pm 0.15\%$ of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)

Rated operation conditions

Degree of protection	
• Weatherproof/impact resistant	• IP67
Liquid temperature	
• Standard	-40 ... +120 °C (-40 ... +250 °F)
• Optional	-40 ... +230 °C (-40 ... +450 °F)
Ambient temperature	-18 ... +60 °C (0 ... 140 °F)

Design

Dimensions	see SITRANS F US Clamp-on "System info and selection guide"
Weight	see diagrams

Power supply

Power	Internal NiCd battery
Battery operation	4 hours

Indication and operation

Data logger memory	1 MByte
Site storage memory	50 sites minimum
Display	128 x 240 pixel LCD with back-light
Keypad	33 keypad buttons with tactile feedback
Language options	English, spanish, german, italian, french

Certificates and approvals

Unclassified locations only	UL ULc CE: • LVD IEC 61010-1; CB Test Certificate • EMC EN61000-6-2, -4
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SITRANS F flowmeters

SITRANS F US

SITRANS FUP1010 Portable clamp-on

Selection and Ordering data	Order No.	Ord. code
SITRANS FUP1010 Portable clamp-on		
• IP67 weather proof battery powered	D)	7ME3510-
		■ ■ ■ ■ - 0 ■ 0 ■ ■ ■ ■
Number of channels/ultrasonic beams		
Single channel	1	
Dual channel / Dual beam	2	
Standard flowmeter types and I/O configurations		
• Type 3 option adder	C	
- Reflexor capable		
- Graphic display		
- 2 x 0 ... 10 V		
- 2 x 4 ... 20 mA		
- 2 x pulse outputs		
- 4 x status logic		
- 2 x 4 ... 20 mA analog in		
- 1 x RTD per channel		
Transducer cables (select proper quantity for active channels)		
No transducer cable	A	
<u>IP67 (weather proof) only</u>		
1 x PVC-jacket, length 6 m (20 ft) (for IP67 NEMA 6) ²⁾	B	
2 x PVC-jacket, length 6 m (20 ft) (for IP67 NEMA 6) ²⁾	C	
1 x PVC-jacket, length 15 m (50 ft) (for IP67 NEMA 6) ²⁾	D	
2 x PVC-jacket, length 15 m (50 ft) (for IP67 NEMA 6) ²⁾	E	
Other versions	Z	
add Order code and plain text.		
RTD temperature sensor (for type 3 meter only, mounting hardware and cable included)		
No RTDs	0	
<u>IP67 (weather proof) only</u>		
1 x standard clamp-on RTD (NEMA 6) with 6 m (20 ft) cable ¹⁾	5	
2 x standard clamp-on RTD (NEMA 6) with 6 m (20 ft) cable ¹⁾	6	
1 x standard clamp-on RTD (NEMA 6) with 15 m (50 ft) cable ¹⁾	7	
2 x standard clamp-on RTD (NEMA 6) with 15 m (50 ft) cable ¹⁾	8	
Other versions	9	L 1 Y
add Order code and plain text.		
Battery charger options		
no battery charger	0	
Charger Type A for Europe (CEE7/7)	1	
Charger Type C for Australia (AS3112)	2	
Charger Type D for U.K. (BS1363)	3	
Charger Type J for Japan (JIS8303)	4	
Charger Type K for U.S. (NEMA 5-15P)	5	
Charger Type L for Switzerland (SEV1011)	6	
Special: External battery for extended service, add Order code and plain text.	9	M 1 Y
External 4 hours battery with US plug for IP67 (NEMA 6) Portable	9	M 1 B
External 4 hours battery with European plug for IP67 Portable	9	M 1 D

Selection and Ordering data	Order No.	Ord. code
SITRANS FUP1010 Portable clamp-on		
• IP67 weather proof battery powered	D)	7ME3510-
		■ ■ ■ ■ - 0 ■ 0 ■ ■ ■ ■
Transducer for channel 1 (includes pipe mounting kit and spacer bar for indicated max. outer diameter listed) See „Transducer selection charts“ for specifications.		
no transducer		A
A2 universal to 2"/track mount		B
B3 universal to 5"/track mount		C
C3 universal to 13"/mounting frame		D
D3 universal to 24"/mounting frame		E
E2 universal to 48"/mounting frame ³⁾		F
For the following A1H to D4H transducers, temperature range is -40 °C to 65 °C (-41 °F to 150 °F), nominal 21 °C (70 °F):		
A1H (high precision) to 3"/track mount		G
A2H (high precision) to 3"/track mount		H
A3H (high precision) to 3"/track mount		J
B1H (high precision) to 5"/track mount		K
B2H (high precision) to 5"/track mount		L
C1H (high precision) to 24"/mounting frame		M
C2H (high precision) to 24"/mounting frame		N
D1H (high precision) to 48"/mounting frame ⁴⁾		P
D2H (high precision) to 48"/mounting frame ⁴⁾		Q
D4H (high precision) to 48"/mounting frame ⁴⁾		R
Doppler to 12" with chain kit		S
Other versions (different size, mount, type or pipe larger than DN 1200 (48"), or corrosion resistant), add Order code and plain text.		Z
High temperature transducer size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))		Z
High temperature transducer size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))		Z
High temperature transducer size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))		Z
For the following B1H to D4H transducers, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):		
B1H (high temperature range HP)		Z
B2H (high temperature range HP)		Z
C1H (high temperature range HP)		Z
C2H (high temperature range HP)		Z
D1H (high temperature range HP) ²⁾		Z
D2H (high temperature range HP) ²⁾		Z
D4H (high temperature range HP) ²⁾		Z

Approvals: No options (UL, ULc, CE by default)

¹⁾ -40 ... +200 °C (-40 ... +392 °F)

²⁾ -40 ... +80 °C (-40 ... +176 °F)

³⁾ Supplied spacer bar supports pipes up to 1050 mm (42 inches). For pipes larger than 1050 mm (42 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4)

⁴⁾ Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4)

SITRANS FUP1010 Portable clamp-on

Selection and Ordering data		Order No.	Ord. code
SITRANS FUP1010 Portable clamp-on			
• IP67 weather proof battery powered	D)	7ME3510-	
			
		- 0	0
Transducer for channel 2			
(includes pipe mounting kit and spacer bar for indicated max. outer diameter listed) See „Transducer selection charts“ for specifications.			
no transducer			A
A2 universal	to 2"/track mount		B
B3 universal	to 5"/track mount		C
C3 universal	to 13"/mounting frame		D
D3 universal	to 24"/mounting frame		E
E2 universal	to 48"/mounting frame ¹⁾		F
For the following A1H to D4H transducers, temperature range is -40 °C to 65 °C (-41 °F to 150 °F), nominal 21 °C (70 °F):			
A1H (high precision)	to 3"/track mount		G
A2H (high precision)	to 3"/track mount		H
A3H (high precision)	to 3"/track mount		J
B1H (high precision)	to 5"/track mount		K
B2H (high precision)	to 5"/track mount		L
C1H (high precision)	to 24"/mounting frame		M
C2H (high precision)	to 24"/mounting frame		N
D1H (high precision)	to 48"/mounting frame ²⁾		P
D2H (high precision)	to 48"/mounting frame ²⁾		Q
D4H (high precision)	to 48"/mounting frame ²⁾		R
Doppler	to 12" with chain kit		S
Other versions (different size, mount, type or pipe larger than DN 1200 (48"), or corrosion resistant), add Order code and plain text.			Z Q1 Y
High temperature transducer size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))			Z Q1 A
High temperature transducer size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))			Z Q1 B
High temperature transducer size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))			Z Q1 C
For the following B1H to D4H transducers, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):			
B1H (high temperature range HP)		Z	Q1 K
B2H (high temperature range HP)		Z	Q1 L
C1H (high temperature range HP)		Z	Q1 M
C2H (high temperature range HP)		Z	Q1 N
D1H (high temperature range HP) ²⁾		Z	Q1 P
D2H (high temperature range HP) ²⁾		Z	Q1 Q
D4H (high temperature range HP) ²⁾		Z	Q1 R

Selection and Ordering data	Order code
Further designs	
Please add „-Z“ to Order No. and specify Order code(s).	
Languages (Meter and Documentation), English (default). All languages now come standard in all flow-meters	
Wet flow transfer calibration (priced on request)	
• 6 point up to DN 100 (4 inch)	D10
• 6 point up to DN 125 to DN 200 (5 to 8 inch)	D11
• 6 point up to DN 250 to DN 300 (10 to 12 inch)	D12
• 6 point up to DN 350 to DN 400 (14 to 16 inch)	D13
• 6 point up to DN 450 to DN 500 (18 to 20 inch)	D14
• 6 point up to DN 550 to DN 600 (22 to 24 inch)	D15
• 6 point up to DN 650 to DN 750 (26 to 30 inch)	D16
• 6 point up to DN 800 to DN 900 (32 to 36 inch)	D17
Tag name plate	
• Stainless steel tag with 3.2 mm (0.13 inch) character size (26 characters max.)	Y17
• Stainless steel tag with 3.2 mm (0.13 inch) character size (68 characters max.)	Y19

¹⁾ Supplied spacer bar supports pipes up to 1050 mm (42 inches). For pipes larger than 1050 mm (42 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4)

2) Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-OMS40 (1012BN-4)

MLFB example

Application example

A general survey portable flowmeter is required for pipes sizes ranging from 76 ... 500 mm (3" ... 20") with both cast iron and steel material. Doppler may be required as liquid may be moderately aerated.

Requires language support for German.

MLFB Order No.: **7ME3510-2AB01-0DE0-Z
B10**

Selection and Ordering data	Order No.	Ord. code
FUP1010 meter family	7 ME 3 5 1	- 0 0
IP67 weather proof	0	
Dual channel	2	
Portable Type 3 I/O with Doppler capable, temperature	C	
2 Plenum rated transducer cables 20 ft	B	
No RTDs required	0	
Charger Type A for Europe (CEE7/7)	1	
Transducer for DN 50 ... DN 300 (2" ... 12") pipes	D	
Transducer for DN 200 ... DN 600 (8" ... 24") pipes	E	
German language support		B 1 0

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

SITRANS F flowmeters

SITRANS F US

SITRANS FUP1010 Portable clamp-on

Transducer Selection Charts

Universal transducers for any pipe material

Transducer	Order Code	Outer diameter range (mm)		Outer diameter range (inches)	
		min	max	min	max
A2	B	12.7	50.8	0.5	2
B3	C	19	127	0.75	5
C3	D	51	305	2	12
D3	E	203	610	8	24
E2	F	254	6096	10	240

High precision transducers for steel pipe with outer diameter/wall thickness ratio > 10

Transducer	Order Code	Pipe wall (mm)		Pipe wall (inches)	
		min	max	min	max
A1H	G	0.64	1.02	0.025	0.04
A2H	H	1.02	1.52	0.04	0.06
A3H	J	1.52	2.03	0.06	0.08
B1H	K	2.03	3.05	0.08	0.12
B2H	L	3.05	4.06	0.12	0.16
C1H	M	4.06	5.84	0.16	0.23
C2H	N	5.84	8.13	0.23	0.32
D1H	P	8.13	11.17	0.32	0.44
D2H	Q	11.18	15.75	0.44	0.62
D4H	R	15.75	31.75	0.62	1.25

Mainstream offering SITRANS FUP1010 Portables (excluding energy)

Selection and Ordering data		Order No.	
SITRANS FUP1010 Portable clamp-on			
IP67 Weather proof battery powered		D)	7ME3510-
			■ ■ ■ ■ ■ - 0 ■ ■ 0
Number of channels/ultrasonic beams		2	
Dual channel			
Standard flowmeter types and I/O configurations		C	
- Type 3 option adder 2 x 4 ... 20 mA analog in 2 x RTD input			
Transducer cables		A	
(select proper quantity of active channels)		B	
No transducer cable			
1 x PVC-jacket, length 6 m (20 ft) (for NEMA 6)			
RTD temperature sensor		0	
(for type 3 meter only, mounting hardware and cable included)		1	
No RTDs			
1 x standard clamp-on RTD (NEMA 12) with 6 m (20 ft) cable			
Battery charger options		0	
no battery charger		1	
Charger Type A for Europe (CEE7/7)		5	
Charger Type K for U.S. (NEMA 5-15P)			
Transducer for channel 1			
(includes pipe mounting kit and spacer bar for indicated max. outer diameter listed)			
See „Transducer selection charts“ for specifications.			
no transducer			A
B3 universal to 5"/track mount			C
C3 universal to 13"/mounting frame			D
D3 universal to 24"/mounting frame			E
E2 universal to 48"/mounting frame			F
C1H (high precision) to 24"/mounting frame			M
C2H (high precision) to 24"/mounting frame			N
D1H (high precision) to 48"/mounting frame			P
D2H (high precision) to 48"/mounting frame			Q
Transducer for channel 2			
(includes pipe mounting kit and spacer bar for indicated max. outer diameter listed)			
See „Transducer selection charts“ for specifications.			
no transducer			A
B3 universal to 5"/track mount			C
C3 universal to 13"/mounting frame			D
D3 universal to 24"/mounting frame			E
E2 universal to 48"/mounting frame)			F
C1H (high precision) to 24"/mounting frame			M
C2H (high precision) to 24"/mounting frame			N
D1H (high precision) to 48"/mounting frame			P
D2H (high precision) to 48"/mounting frame			Q

Mainstream product offering represents 4 to 6 weeks delivery time

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

SITRANS F flowmeters

SITRANS F US

SITRANS FUP1010 Portable clamp-on Check metering kit

Overview



The SITRANS FUP1010 clamp-on check metering kit is an all-inclusive water and wastewater kit developed especially for verifying the accuracy and performance of any brand or type of flowmeter. The meter's portability makes it capable of verifying the performance of meters based on any existing flow measurement principle: orifice, electromagnetic, ultrasonic, rotary piston, Coriolis, etc. It accurately computes flow over an extremely wide range and measures practically all conductive or non-conductive clean or moderately aerated liquids or liquids with suspended solids.

Benefits

- Performance check or verification of any type or brand of flowmeter
- Field use is facilitated by meter portability and 1 hour quick charge for 4 hours of normal operation
- Weatherproof model withstands even severe weather conditions
- 1 MByte datalogger capability downloadable to PC via included RS 232 cable
- Performs fast, easy and cost-efficient on-site measurement of any convoluted pipe from 25.4 mm to 9.14 m (1" to 360")
- Delivered as an all-inclusive kit with all the equipment needed to conduct performance and verification tests (cables, multiple transducers, flow computer etc.)
- Comes in a sturdy rolling case with a telescope handle that holds all the equipment needed to conduct performance and verification tests

Application

The SITRANS FUP1010 check meter measures practically all conductive or non-conductive clean or moderately aerated liquids or liquids with suspended solids. This basic feature enables the performance check and verification of existing meters used in various water and wastewater applications such as:

- Water industry
 - Raw water
 - Potable water
 - Chemicals
- Wastewater industry
 - Raw sewage
 - Effluent
 - Sludges
 - Mixed liquor
 - Chemicals

Design

- IP67 weatherproof/impact resistant enclosure, constructed of mineral reinforced copolymer polypropylene
- Single channel

Function

- Integral 33 button keypad and large (128 x 240 pixel) graphic display visible up to 12 m (40 ft) away
- Current, voltage, frequency and RS 232 outputs (see Technical specification section for details)
- Optional current, voltage and temperature inputs (see specification section for details)
- Zeromatic Path automatically sets zero
- Bi-directional flow operation
- 1 MByte data logger with both site and data logger storage
- English, Spanish, German, Italian and French language options

Technical specifications

Check metering kit

Pipe sizes	25.4 mm ... 9.14 m (1 ... 360")
Accuracy	±0.5 % ... ±2.0 % of flow rate
Flow range	12 m/s (40 ft/s) bidirectional
Media temperature	-40 ... +104 °C (-20 ... 220 °F)
Enclosure ratings	IP67 (waterproof)

See page 4/253 for complete technical specifications

Certificates and approvals

Unclassified locations	UL
Classified locations	ULc
	CE:
	• LVD IEC 61010-1
	• EMC EN 61000-6-2, -4

Selection and Ordering data

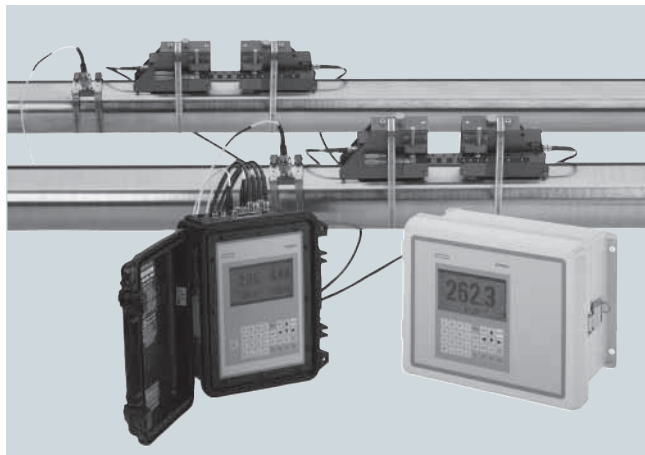
Order No.	
Portable clamp-on check metering kit	CQO:FUPW-WWKIT
<u>Content of delivery</u>	
1	Single channel portable submersible flow computer
1 pair	Universal transducer C3
1 pair	Universal transducer E2
1 pair	Doppler transducers
1 pair	Mounting Ezclamp (2 mounting Ezclamp chains)
1	Ladder chain
1	Battery charger
1 pair	20 ft transducer cable
1	Cable - 1010WP/WDP to PC
1	PinStop spacer bar (universal)
1	Flow case
1	Flow computer manual
1	Laminated card set
1	Certificate of intrinsic calibration

SITRANS F flowmeters

SITRANS F US

SITRANS FUE1010 Energy clamp-on

Overview



SITRANS FUE1010 is a highly accurate clamp-on non-intrusive ultrasonic flow display computer for revenue grade thermal energy sub-metering and energy efficiency distribution monitoring, with a real time coefficient of performance (COP) for HVAC systems.

SITRANS FUE1010 is available in single and dual channel or dual path configurations, with your choice of IP65 (NEMA 4X) dedicated wall mount or IP40 (NEMA 1) portable enclosures.

Benefits

- Measures energy rate and total consumption with highest accuracy available
- Accurately measures at both low flow rates and low differential temperatures
- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external transducers do not require periodic cleaning
- No moving parts to foul or wear
- No pressure drop or energy loss
- Wide turn-down ratio
- Choice of single or dual channel / dual path or dual mode operation:
 - Dual channel operation reduces the cost for the system on a per channel measurement basis and permits measuring hot and chilled water lines at the same time
 - Dual path capability insures high flow measurement accuracy on installations with less than desirable piping runs
- Ability to operate in either Wide-Beam Transit-time or reflexor (Doppler) mode for applications with high aeration
- Zeromatic Path automatically sets zero without stopping flow and reduces zero drift, even at low flow

Application

FUE1010 is ideally suited to thermal energy / power industry applications, including:

- Chilled water sub-metering
- Hot water sub-metering
- Condenser water
- Glycol
- Thermal storage
- Lake source cooling

Design

FUE1010 is available in three configurations:

- IP65 (NEMA 4X) Enclosure constructed of fiberglass reinforced polyester with stainless steel hardware and polyester keypad
 - Single channel
 - Dual channel / dual path
- IP40 (NEMA 1) Portable Impact Resistant Enclosure constructed of mineral reinforced copolymer polypropylene
 - Dual channel / dual path

Function

- Flow display computer has an integral 33 button keypad and large (128 x 240 pixel) graphic display visible up to 12 m (40 ft) away
- 4-wire 1000 Ω platinum RTD's for supply and return temperature measurements are precision matched to within 0.01 °C (0.02 °F)
- Temperature is factory calibrated with built-in field calibrator
- Built-in energy/BTU mode
- Detection of aeration and cavitation caused by worn or damaged impellers, misaligned shafts, etc.
- Reverse flow and empty pipe detection
- Chiller efficiency analysis: accepts an independent analog input representing kW usage for calculation of the following functions which can be selected for data logging or output purposes:
 - Cooling load (kW/ton)
 - Coefficient of performance (COP)
 - Energy efficiency ratio (EER)
- Optional current inputs
- Digital communication options:
 - MODBUS / Metasys N2 (IP65 (NEMA 4X) only)
 - RS232 Serial digital port (standard)
- Zeromatic Path automatically sets zero
- Bi-directional flow operation
- 1 MByte data logger with both site and data logger storage
- English, spanish, german, italian and french language options

SITRANS F flowmeters

SITRANS F US

SITRANS FUE1010 Energy clamp-on

Technical specifications

SITRANS FUE1010

Input

Flow range	0 ... 12 m/s (0 ... 40 ft/s), bi-directional
Flow sensitivity	0.0003 m/s (0.001 ft/s)
Pipe size	6.4 mm ... 9.14 m (0.25" ... 360")
Optional Inputs, single channel	• Current: 2 x 4 ... 20 mA • Voltage: 2 x 0 ... 10 V DC • Temperature: 2 x 4 wire 1 kΩ RTD • Totalizer commands (clear/hold)

Output

Type 3 outputs	• Current: 2 x 4 ... 20 mA DC (1 kΩ at 30 V DC) • Voltage: 2 x 0 ... 10 V DC (5 kΩ minimum) • Status Alarm: 4 x SPDT Relays • Mercury wetted relays • Frequency: 2 x 0 ... 5000 Hz • RS232
Optional Type 3 outputs	• Mercury wetted relays • Expanded I/Os (4 additional 4 ... 20 mA outputs) with form c relays • Expanded I/Os with Mercury wetted relays

Accuracy

Accuracy	$\pm 0.5\%$... 1.0% of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0015 ... 0.003 m/s $(\pm 0.005$... 0.01 ft/s), for velocities less than 0.3 m/s (1 ft/s)
Batch repeatability	$\pm 0.15\%$ of flow, for velocities greater than 0.3 m/s (1 ft/s) ± 0.0005 m/s (± 0.0015 ft/s), for velocities less than 0.3 m/s (1 ft/s)

Rated operation conditions

Degree of protection	Dedicated wall mount enclosure: IP65 (NEMA 4X) Portable enclosures: IP40 (NEMA 1)
Liquid Temperature	
• Standard	-40 ... +120 °C (-40 ... +250 °F)
• Optional	-40 ... +230 °C (-40 ... +450 °F)
Transducer temperature	
• Standard	-40 ... +120 °C (-40 ... +250 °F)
• Optional	-62 ... +232 °C (-80 ... +450 °F)
Ambient temperature	-18 ... +60 °C (0 ... 140 °F)

Design

Dimensions	see SITRANS F US Clamp-on "System info and selection guide"
Weight	see diagrams

Power supply

90 ... 240 V AC, 50 ... 60 Hz,
30 VA or
9 ... 36 V DC, 12 W

Indication and operation

Data logger memory	1 Mbyte of storage
Display	128 x 240 pixel LCD with back-light
Keypad	33 keypad buttons with tactile feedback
Language options	English, spanish, german, italian, french

Certificates and approvals

FM and CSA ratings	I.S. Class I, II, Div 1 NI Class I, Div 2 S Class II, Div 2
ATEX ratings	
• Flow display computer	Ex II (1) G [EEx ia] IIC Ex II 3 (1) G EEx nC [ia] IIC T5
• Transducers	Ex II 1 G EEx ia IIC T5 Ex II 2 G EEx m II T5 (for use with flowmeter in safe area)
Dedicated wall mount enclosure	CE • EMC EN61000-6-2, -4
Portable enclosures	UL ULc CE • LVD IEC 61010-1; CB Test Certificate • EMC EN61000-6-2, -4

SITRANS F flowmeters

SITRANS F US

SITRANS FUE1010 Energy clamp-on

Selection and Ordering data

SITRANS FUE1010 Energy clamp-on

- Dedicated IP65 (NEMA 4X) K) **7ME3500-**
- Portables IP40 (NEMA 1) battery powered K) **7ME3502-**

■ ■ ■ ■ ■ - 0 ■ ■ ■ ■ ■

Number of channels/ultrasonic beams

Dedicated meter

Dedicated meter

- Single channel 1
- Dual channel / Dual beam 2

Portables

- Dual channel / Dual beam 4

Flowmeter functions and I/O configurations

- Portable Type 3 option adder C
 - Reflexor capability
 - Graphic display
 - 2 x 0 ... 10 V
 - 2 x 4 ... 20 mA
 - 2 x pulse output
 - 4 x status logic
 - Energy efficiency COP/EER output
 - 2 x 4 ... 20 mA analog input
- Dedicated Type 3 option adder F
 - Reflexor capability
 - Graphic display
 - 2 x 0 ... 10 V
 - 2 x 4 ... 20 mA
 - 2 x pulse output
 - 4 x relay C type
 - Energy efficiency COP/EER output
 - 2 x 4 ... 20 mA analog input
- Specials (Expanded I/O and or Mercury wetted relays for dedicated only) Z J 1 Y

Add Order code and plain text.
- Type 3 with Mercury wetted relays Z J 1 A
- Type 3 with expanded I/Os (4 additional 4 ... 20 mA outputs) and form C relay Z J 1 B
- Type 3 with expanded I/Os and Mercury wetted relays Z J 1 C

Meter power options

- 90 ... 230 V AC (Dedicated only) A
- 9 ... 36 V DC (Dedicated only) B
- Charger Type A for Europe (CEE7/7) C
- Charger Type C for Australia (AS3112) D
- Charger Type D for U.K. (BS1363) E
- Charger Type J for Japan (JIS8303) F
- Charger Type K for U.S. (NEMA 5-15P) G
- Charger Type L for Switzerland (SEV1011) H
- No Charger J
- Other versions (External battery for extended service with portable meter) Z K 1 Y

Add Order code and plain text.
- External 4 hours battery with US plug for Portable Z K 1 A
- External 4 hours battery with European plug for Portable Z K 1 B

Communication options

- RS232 (standard) 0
- MODBUS (dedicated only) 1

Selection and Ordering data

SITRANS FUE1010 Energy clamp-on

- Dedicated IP65 (NEMA 4X) K) **7ME3500-**
- Portables IP40 (NEMA 1) battery powered K) **7ME3502-**

■ ■ ■ ■ ■ - 0 ■ ■ ■ ■ ■

RTD temperature sensor

(includes mounting hardware for pipes above 1.5" outer diameter)

- No RTDs (Note: temperature input is required for energy system) 0
- 1 x pair standard clamp-on RTD (NEMA 4X only) 1
- 2 x pair standard clamp-on RTD (for dual channel NEMA 4X only) 2
- 1 x pair standard clamp-on RTD (NEMA 1 portable) 3
- 2 x pair standard clamp-on RTD (for dual channel NEMA 1 portable) 4
- Special (for insert style RTDs), dedicated only 9 M 1 Y
- 1 x Insertion style RTD with thermowell and lagging 9 M 1 A
- 2 x Insertion style RTD with thermowell and lagging 9 M 1 B

Transducer for channel 1

(includes pipe mounting kit and spacer bar for indicated max. outer diameter listed)
See „Transducer selection charts“ for specifications.

- No transducer A
- A2 universal to 2"/track mount B
- B3 universal to 5"/track mount C
- C3 universal to 13"/mounting frame D
- D3 universal to 24"/mounting frame E
- E2 universal to 48"/mounting frame¹⁾ F
- For the following A1H to D4H transducers, temperature range is -40 °C to 65 °C (-41 °F to 150 °F), nominal 21 °C (70 °F):
- A1H (high precision) to 3"/track mount G
- A2H (high precision) to 3"/track mount H
- A3H (high precision) to 3"/track mount J
- B1H (high precision) to 5"/track mount K
- B2H (high precision) to 5"/track mount L
- C1H (high precision) to 24"/mounting frame M
- C2H (high precision) to 24"/mounting frame N
- D1H (high precision) to 48"/mounting frame²⁾ P
- D2H (high precision) to 48"/mounting frame²⁾ Q
- D4H (high precision) to 48"/mounting frame²⁾ R
- Doppler to 12" with chain or strap kit S

Other versions (different size, mount, type or pipe larger than DN 1200 (48"), or corrosion resistant), add Order code and plain text. Z P 1 Y

High temperature transducer size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.)) Z P 1 A

¹⁾ Supplied spacer bar supports pipes up to 1050 mm (42 inches). For pipes larger than 1050 mm (42 inches) purchase also, spare part 7ME3960-OMS40 (1012BN-4).

²⁾ Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-OMS40 (1012BN-4).

K) Subject to export regulations AL: N, ECCN: 5A991X.

SITRANS F flowmeters

SITRANS F US

SITRANS FUE1010 Energy clamp-on

Selection and Ordering data	Order No.	Ord. code
SITRANS FUE1010 Energy clamp-on		
• Dedicated IP65 (NEMA 4X)	K)	7ME3500-
• Portables IP40 (NEMA 1) battery powered	K)	7ME3502-
		- 0
Transducer for channel 1 (continued)		
High temperature transducer size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))	Z	P 1 B
High temperature transducer size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))	Z	P 1 C
For the following B1H to D4H transducers, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):		
B1H (high temperature range HP)	Z	P 1 K
B2H (high temperature range HP)	Z	P 1 L
C1H (high temperature range HP)	Z	P 1 M
C2H (high temperature range HP)	Z	P 1 N
D1H (high temperature range HP) ²⁾	Z	P 1 P
D2H (high temperature range HP) ²⁾	Z	P 1 Q
D4H (high temperature range HP) ²⁾	Z	P 1 R
Transducer for channel 2 (includes pipe mounting kit for indicated max. outer diameter listed) See „Transducer selection charts“ for specifications.		
no transducer	A	
A2 universal to 3"/track mount	B	
B3 universal to 5"/track mount	C	
C3 universal to 13"/mounting frame	D	
D3 universal to 24"/mounting frame	E	
E2 universal to 48"/mounting frame ¹⁾	F	
For the following A1H to D4H transducers, temperature range is -40 °C to 65 °C (-41 °F to 150 °F), nominal 21 °C (70 °F):		
A1H (high precision) to 3"/track mount	G	
A2H (high precision) to 3"/track mount	H	
A3H (high precision) to 3"/track mount	J	
B1H (high precision) to 5"/track mount	K	
B2H (high precision) to 5"/track mount	L	
C1H (high precision) to 24"/mounting frame	M	
C2H (high precision) to 24"/mounting frame	N	
D1H (high precision) to 48"/mounting frame ²⁾	P	
D2H (high precision) to 48"/mounting frame ²⁾	Q	
D4H (high precision) to 48"/mounting frame ²⁾	R	
Doppler to 12" with chain or strap kit	S	
Other versions (different size, mount, type or pipe larger than DN 1200 (48"), or corrosion resistant), add Order code and plain text.	Z	Q 1 Y
High temperature transducer size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))	Z	Q 1 A
High temperature transducer size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))	Z	Q 1 B
High temperature transducer size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))	Z	Q 1 C

Selection and Ordering data	Order No.	Ord. code
SITRANS FUE1010 Energy clamp-on		
• Dedicated IP65 (NEMA 4X)	K)	7ME3500-
• Portables IP40 (NEMA 1) battery powered	K)	7ME3502-
		- 0
Transducer for channel 2 (continued)		
For the following B1H to D4H transducers, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):		
B1H (high temperature range HP)	Z	Q 1 K
B2H (high temperature range HP)	Z	Q 1 L
C1H (high temperature range HP)	Z	Q 1 M
C2H (high temperature range HP)	Z	Q 1 N
D1H (high temperature range HP) ²⁾	Z	Q 1 P
D2H (high temperature range HP) ²⁾	Z	Q 1 Q
D4H (high temperature range HP) ²⁾	Z	Q 1 R
Approvals		
FM/CSA/CE Dedicated	1	
UL/ULc/CE Portable	2	
¹⁾ Supplied spacer bar supports pipes up to 1050 mm (42 inches). For pipes larger than 1050 mm (42 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4)		
²⁾ Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4)		
K) Subject to export regulations AL: N, ECCN: 5A991X.		

SITRANS F flowmeters

SITRANS F US

SITRANS FUE1010 Energy clamp-on

Selection and Ordering data

Order code

Further designs

Please add „Z“ to Order No. and specify Order code(s).

Cable assembly for transducers (add for # of channels)
See „Transducer cable selection chart“**K..**Cable assembly for RTDs (add for # of RTDs)
See „RTD cable selection chart“**R..**

Cable termination kit (for one cable pair) dedicated only

• Termination for standard, plenum and armored transducer cable

T01

• Termination for submersible transducer cable

T11

• RTD cable termination kit for standard RTD

T21

• RTD cable termination kit for submersible RTD

T31

• Insert RTD cable termination kit

T41

Wet flow transfer calibration (priced on request)

• 6 point up to 4 inch (DN 100)

D10

• 6 point up to 5 to 8 inch (DN 125 to DN 200)

D11

• 6 point up to 10 to 12 inch (DN 250 to DN 300)

D12

• 6 point up to 14 to 16 inch (DN 350 to DN 400)

D13

• 6 point up to 18 to 20 inch (DN 450 to DN 500)

D14

• 6 point up to 22 to 24 inch (DN 550 to DN 600)

D15

• 6 point up to 26 to 30 inch (DN 650 to DN 750)

D16

• 6 point up to 32 to 36 inch (DN 800 to DN 900)

D17

Tag name plate

• Stainless steel tag with 3.2 mm (0.13 inch) character size (26 characters max.)

Y17

• Stainless steel tag with 3.2 mm (0.13 inch) character size (68 characters max.)

Y19

MLFB example

Application example

A dedicated clamp-on energy meter is required for two separate return lines. Both will use clamp-on RTDs for the supply and return lines. AC power is available and data access will be via MODBUS communication.

Pipe 1 is a DN150 (6") schedule 40 carbon steel line

Pipe 2 is a DN 300 (12") ductile iron line

MLFB Order No.: **7ME3500-2DA10-2NE0-Z**
K03 + K05 + R03 + R05 + R02 + R03

Selection and Ordering data

Order No.

Ord. code

FUE1010 meter family

IP65 (NEMA 4X) enclosure

Dual channel

Dedicated Type 1 I/O option

90 ... 230 V AC power option

MODBUS option

2 pairs of clamp-on RTDs

Transducer code for 6" pipe

Transducer code for 12" pipe

No approval required

30 m (100 ft) transducer cable for channel 1

61 m (200 ft) transducer cable for channel 1

30 m (100 ft) cable for RTD 1

61 m (200 ft) cable for RTD 2

15 m (50 ft) cable for RTD 3

30 m (100 ft) cable for RTD 4

Order No.	Ord. code
7 ME 3 5 0 -	
0	
2	
D	
A	
1	
2	
N	
E	
0	
	K 0 3
	K 0 5
	R 0 3
	R 0 5
	R 0 2
	R 0 3

Transducer selection charts

Universal transducers for any pipe material

Transducer	Order code	Outer diameter range (mm)		Outer diameter range (inches)	
Size code		min	max	min	max
A2	B	12.7	50.8	0.5	2
B3	C	19	127	0.75	5
C3	D	51	305	2	12
D3	E	203	610	8	24
E2	F	254	6096	10	240

High precision transducers for steel pipe with outer diameter/wall thickness ratio > 10

Transducer	Order code	Pipe wall (mm)		Pipe wall (inches)	
Size code		min	max	min	max
A1H	G	0.64	1.02	0.025	0.04
A2H	H	1.02	1.52	0.04	0.06
A3H	J	1.52	2.03	0.06	0.08
B1H	K	2.03	3.05	0.08	0.12
B2H	L	3.05	4.06	0.12	0.16
C1H	M	4.06	5.84	0.16	0.23
C2H	N	5.84	8.13	0.23	0.32
D1H	P	8.13	11.18	0.32	0.44
D2H	Q	11.18	15.75	0.44	0.62
D4H	R	15.75	31.75	0.62	1.25

Transducer cable selection chart

Transducer cable codes for length and type options

Cable length m (ft)	Standard (PVC jacket) -40...+80 °C (-40...+176 °F)	Submersible ¹⁾ (polyethylene jacket) -40...+80 °C (-40...+176 °F)	Plenum Rated (teflon jacket) -40...+200 °C (-40...+392 °F)	Armored ¹⁾ -40...+80 °C (-40...+176 °F)
	Order code			
6 (20)	K01	K11	K21	K31
15 (50)	K02	K12	K22	K32
30 (100)	K03	K13	K23	K33
46 (150)	K04	K14	K24	K34
61 (200)	K05	K15	K25	K35
91 (300)	K06	K16	K26	K36

¹⁾ Submersible and armored transducer cable is not available for portable versions.

RTD cable selection chart

RTD cable codes for length and type

Cable length m (ft)	Standard (teflon wrapped) -40 ... +200 °C (-40 ... +392 °F)	Insert ¹⁾ -40 ... +200 °C (-40 ... +392 °F)
	Order code	
6 (20)	R01	R21
15 (50)	R02	R22
30 (100)	R03	R23
46 (150)	R04	R24
61 (200)	R05	R25
91 (300)	R06	R26

¹⁾ Submersible RTD cable is not available for portable versions.

SITRANS F flowmeters

SITRANS F US

SITRANS FUE1010 Energy clamp-on

Mainstream offering SITRANS FUE1010 (Energy system)

Selection and Ordering data	Order No.	Order code
SITRANS FUE1010 Energy Clamp-on	K) 7 ME 3 5 0 - - - - 0 - - - -	- - - + - - - + - - -
Design		
<u>Dedicated</u> IP65 (NEMA 4X)	0	K 0 2 + K 0 2 + R 1 2
<u>Portables</u> IP40 (NEMA 1) Battery powered	2	K 0 1 + K 0 1 + R 0 1
Number of channels/ultrasonic beams		
<u>Dedicated meters</u> Single channel	1	
Dual channel/Dual beam	2	
<u>Portable meters</u> Dual channel/Dual beam	4	
Flowmeter functions and I/O configurations		
- Portable Type 3 option adder - Energy efficiency COP/EER output 2x 4-20mA analog input - Type 3 option adder - Reflexor Caoability - Energy efficiency COP/EER output 2x 4-20mA analog input	C F	
Meter power options		
90 ... 240 V AC (Dedicated only)	A	
Charger Type A for Europe (CEE7/7)	C	
Charger Type K for U.S. (NEMA 5-15P)	G	
Communication options		
RS 232 (standard)	0	
RTD temperature sensor pair (includes mounting hardware for pipes above 1.5" outer diameter)		
No RTDs (Note: Temperature input is required for Energy systems)	0	
1x Pair Std clamp-on RTD (NEMA 4X only)	1	
2x Pair Std clamp-on RTD (For Dual Channel NEMA 4X only)	2	
1x Pair Std clamp-on RTD (For NEMA 12 portable)	3	
2x Pair Std clamp-on RTD (For Dual Channel NEMA 12 portable)	4	
Transducer for channel 1 (includes pipe mounting kit and spacer bar for indicated max. OD listed) See „Transducer selection charts“ for specifications.		
no transducer	A	
B3 universal to 5"/track mount	C	
C3 universal to 13"/mounting frame	D	
D3 universal to 24"/mounting frame	E	
E2 universal to 48"/mounting frame	F	
C1H (high precision) to 24"/mounting frame	M	
C2H (high precision) to 24"/mounting frame	N	
D1H (high precision) to 48"/mounting frame	P	
D2H (high precision) to 48"/mounting frame	Q	
Transducer for channel 2 (includes pipe mounting kit and spacer bar for indicated max. OD listed) See „Transducer selection charts“ for specifications.		
no transducer	A	
B3 universal to 5"/track mount	C	
C3 universal to 13"/mounting frame	D	
D3 universal to 24"/mounting frame	E	
E2 universal to 48"/mounting frame	F	
C1H (high precision) to 24"/mounting frame	M	
C2H (high precision) to 24"/mounting frame	N	
D1H (high precision) to 48"/mounting frame	P	
D2H (high precision) to 48"/mounting frame	Q	
Approvals		
FM/Dedicated	1	
UL/Portable	2	

Mainstream product offering represents 4 to 6 weeks delivery time

K) Subject to export regulations AL: N, ECCN: 5A991X.

SITRANS F flowmeters

SITRANS F US

SITRANS FUE1010 HVAC Check metering kit

Overview



The SITRANS FUE1010 dual channel clamp-on check metering kit is an all inclusive HVAC chilled water kit developed especially for verifying the accuracy and performance of any brand or type of flowmeter. The meter's portability makes it capable of verifying the performance of meters based on any existing flow measurement principle: electromagnetic, vortex, insertion turbine, or ultrasonic. Perfect for areas where no metering exists. Ideal for balancing building performance. It accurately computes flow over an extremely wide range and measures practically all conductive or non-conductive clean or moderately aerated liquids or liquids with suspended solids. Dual channel models can measure two separate applications at the same time.

Benefits

- Performance check or verification of any type or brand of flowmeter
- Measures energy rate and total consumption with highest accuracy available
- Accurately measures at both low flow rates and low differential temperatures
- Field use is facilitated by meter portability and 1 hour quick charge for 4 hours of normal operation
- 1 MByte datalogger capability downloadable to PC via included RS232 cable
- Performs fast, easy and cost-efficient on-site measurement of any convoluted pipe from 25.4 mm to 9.14 m (1.0" to 360")
- Delivered as an all inclusive kit with all the equipment needed to conduct performance and verification tests (cables, multiple transducers, flow computer etc.)
- Comes in a sturdy rolling case with a telescope handle that holds all the equipment needed to conduct performance and verification tests

Application

The SITRANS FUE1010 check meter kit is a highly accurate clamp-on non-intrusive ultrasonic flow display computer for revenue grade thermal energy sub-metering and energy efficiency distribution monitoring, with a real time coefficient of performance (COP) for HVAC systems. This kit is ideal for applications which include:

- Chilled water sub-metering
- Condenser water
- Potable water
- Ammonia and glycol
- River and lake water
- Lake source cooling

Design

- IP40 (NEMA 1) Impact resistant enclosure, constructed of flame retardant ABS with polycarbonate display and polyester keypad
- Dual channel

Function

- Integral 33 button keypad and large (128 x 240 pixel) graphic display visible up to 12 m (40 ft) away
- 4-wire 1000 Ω platinum RTD's for supply and return temperature measurements are precision matched to within 0.01 °C (0.02 °F)
- Chiller efficiency analysis: accepts an independent analog input representing kW usage for calculation of the following functions which can be selected for data logging or output purposes:
 - Cooling load (kW/ton)
 - Coefficient of performance (COP)
 - Energy efficiency ratio (EER)
- Temperature is factory calibrated with built-in field calibrator
- Built-in energy/BTU mode
- Detection of aeration and cavitation caused by worn or damaged impellers, misaligned shafts, etc.
- Current, voltage, frequency and RS232 outputs (see specification section for details)
- Optional current, voltage and temperature inputs (see specification section for details)
- Zeromatic Path automatically sets zero
- Bi-directional flow operation
- 1 MByte data logger with both site and data logger storage
- English, spanish, german, italian and french language options

Technical specifications

Check metering kit

Pipe sizes	25.4 mm to 9.14 m (1 ... 360")
Accuracy	$\pm 0.5\%$... $\pm 2.0\%$ of flow rate
Flow range	12 m/s (40 ft/s) bidirectional
Media temperature	-40 ... +104 °C (-40 ... 220 °F)
Enclosure ratings	IP40 (NEMA 1) impact resist

See page 4/259 for complete technical specifications

Certificates and approvals

Unclassified locations	UL
Classified locations	ULc
	CE:
	• LVD IEC 61010-1
	• EMC EN 61000-6-2, -4

Selection and Ordering data

HVAC chilled water and energy check metering kit

Content of delivery

1	Dual channel portable submersible flow computer
1 pair	Universal transducers C3
1 pair	Doppler transducers
1 pair	High precision transducers C2
1 pair	High precision transducers D1
2 pair	RTDs
2 pair	Mounting Ezclamp (4 mounting Ezclamp chains)
1	Battery charger
2 pair	6.09 m (20 ft) transducer cables
1	RS 232 cable
4	RTD cable
4	Mountings for RTDs
1	PinStop spacer bar (universal)
2	F connector to BHC
1	Flow case
1	Flow computer manual
1	Laminated card set
1	Certificate of intrinsic calibration

Order No.

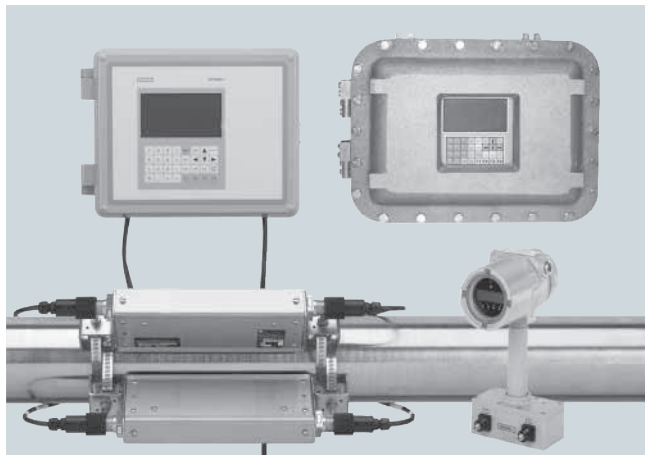
CQO:FUEHVACKIT

SITRANS F flowmeters

SITRANS F US

SITRANS FUH1010 Oil clamp-on

Overview



SITRANS FUH1010 clamp-on non-intrusive ultrasonic flowmeter is ideal for applications carrying crude oil, refined petroleum or liquefied gas.

SITRANS FUH1010 has three application areas: Interface detectors, volumetric flowmeters and mass or standard volume flowmeters.

Benefits

For all FUH1010 products

- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external transducers do not require periodic cleaning
- No moving parts to foul or wear
- No pressure drop or energy loss
- Wide turn-down ratio, 30:1
- Choice of single, dual, or optional, three or four beam versions.
 - Single beam version reduces initial investment
 - Two or optional three and four beam versions provide higher accuracy, especially where limited straight run or poor flow profile exists
- Wide-Beam technology
 - Helps provide improved accuracy over a wide range of liquid conditions and flow rates
 - Accommodates pipelines transporting multiple liquid products
- Zeromatic Path automatically corrects for zero drift without stopping flow

Interface detectors / Density meters ("interface detector")

- Outputs liquid density and API as a direct replacement for intrusive densitometers
- Exceptional repeatability is maintained, independent of changes in temperature, pressure or viscosity
- No need for straight run

Viscosity compensated volumetric flowmeters ("precision volume")

- Moderate cost
- Precise measurement is maintained with automatic „Reynolds Number“ compensation for temperature and viscosity changes

Standard volume (net) or mass flowmeters ("standard volume / mass")

- Exceptional repeatability is maintained, independent of changes in temperature, density or viscosity
- Batch interface and product quality diagnostics provided
- Density and API outputs provided
- Scraper („pig“) detection provided

Application

Interface detectors / Density meters

- Precise identification of interfaces on multi-liquid pipelines
- Rapid and precise scraper "pig" indication
- Product identification
- Density indication

Viscosity compensated volumetric flowmeters

- Applications with multiple liquids having a wide viscosity range
- Automatic gross volume compensation due to viscosity changes

Standard volume (net) mass flowmeters

- Standard (net) volume flow measurement
- Suitable for use in leak detection systems
- Mass flow output measurement
- Interface detection
- „Pig“ detection
- Chemical and petrochemical processing

Design

FUH1010 is available in three enclosures:

- IP65 (NEMA 4X) Enclosure constructed of fiberglass reinforced polyester with stainless steel hardware and polyester keypad
 - Single beam
 - Dual beam
 - Optional four beam
- IP65 (NEMA 7) Compact explosionproof enclosure constructed of cast aluminum with glass window, stainless steel hardware
 - Single beam
 - Dual beam (option)
- IP66 (NEMA 7) Wall mount explosionproof enclosure constructed of cast aluminum, stainless steel hardware, optional glass window
 - Single beam
 - Dual beam
 - Four beam (optional)

Function

- IP65 (NEMA 4X) and IP66 (NEMA 7) flow meters have integral 33 button keypads and large (128 x 240 pixel) graphic displays visible up to 12 m (40 ft) away
- IP65 (NEMA 7) compact flow meters has a 2 x 16 alphanumeric LCD display
- Current, voltage, status alarm, frequency and RS232 outputs (see specification section for details)
- Analog inputs (see specification section for details)
- Zeromatic Path automatically corrects for zero drift
- Bidirectional flow operation
- 1 MByte data logger with both site and data logger storage
- English, spanish, german, italian and french language options

SITRANS F flowmeters

SITRANS F US

SITRANS FUH1010 Oil clamp-on

Technical specifications

SITRANS FUH1010

Specifications for interface detectors

Accuracy

Accuracy	± 0.05 of API No.
Repeatability	± 0.01 of API No.

Specifications for volumetric and mass flowmeters

Input

Flow range	± 12 m/s (± 40 ft/s), bidirectional
Flow sensitivity	0.0003 m/s (0.001 ft/s), flow rate independent

Accuracy

Calibratable accuracy	± 0.15% ... 0.3% of flow, depending on version
Batch repeatability	± 0.05% of flow, maximum

Specifications for all FUH1010 products

Input

Pipe size	6.4 mm ... 9.14 m (0.25" ... 360")
Analog inputs	Current: 4 x 4 ... 20 mA (IP65 (NEMA 7) enclosure has (2))

Output

Standard outputs	- Current: 2 x 4 ... 20 mA (1 kΩ at 30 VDC) - Voltage: 2 x 0 ... 10 V DC (5 kΩ minimum) (None for IP65 (NEMA 7) enclosure) 1 x 0 ... 5 kHz Pulse Rate, Digital Quad. (None for IP65 (NEMA 7) enclosure) - RS232 Serial Port
Enhanced outputs	- MODBUS (not for IP65 (NEMA 7) enclosure) - RS232 standard - Up to 4 x additional 4 ... 20 mA (not for IP65 (NEMA 7) enclosure) 4 x Mercury wetted relays (not for IP65 (NEMA 7) enclosure) - Up to 4 x digital pulse (not for IP65 (NEMA 7) enclosure)

Status/Alarm I/O

- 4 x Programmable relays (not for IP65 (NEMA 7) enclosure)
- 2 x Optically coupled output logic gates (for IP65 (NEMA 7) enclosure, only)
- 1 x Totalizer clear switch input (not for IP65 (NEMA 4X) enclosure)¹⁾
- 1 x Totalizer hold switch input (not for IP65 (NEMA 7) enclosure)¹⁾
- 1 x Opto iso. totalizer clear switch input (for IP65 (NEMA 7) enclosure, only)¹⁾
- 1 x Opto iso. totalizer hold switch input (for IP65 (NEMA 7) enclosure, only)¹⁾

Accuracy

Zero Drift	0.0003 m/s (0.001 ft/s), with Zero-Matic Path active (not provided for interface detector)
Data refresh rate	5 Hz (80 Hz output for flow rate available on special order)

Rated operation conditions

Degree of protection	
• Wall mount enclosure	IP65 (NEMA 4X)
• Compact explosionproof	IP65 (NEMA 7)
• Wall mount explosionproof	IP66 (NEMA 7)
Liquid temperature	
• Standard	-40 ... +120 °C (-40 ... +250 °F)
• Optional	-40 ... +230 °C (-40 ... +450 °F)
Ambient temperature	-18 ... +60 °C (0 ... 140 °F)

Design

Dimensions	see SITRANS F US Clamp-on „System info and selection guide“
Weight	see diagrams

Power supply

• IP65 (NEMA 4X) and IP66 (NEMA 7) Wall Mount	90 ... 240 V AC, 50 ... 60 Hz, 30 VA or 9 ... 36 V DC, 12 W
• IP65 (NEMA 7) Compact	90 ... 240 V AC, 50 ... 60 Hz, 15 VA or 9 ... 36 V DC, 10 W

Indication and operation

Data logger memory	1 MByte
Display	
• IP65 (NEMA 4X) and IP66 (NEMA 7) Enclosures	128 x 240 pixel LCD with back-light
• IP65 (NEMA 7) Enclosure	2 x 16 Alphanumeric LCD Display
Keypad	
• IP65 (NEMA 4X) and IP66 (NEMA 7) Enclosures	33 keypad buttons with tactile feedback
• IP65 (NEMA 7) Enclosure	5 Magnetic hall effect switches
Language options	English, Spanish, German, Italian, French

¹⁾ Totalizer switch inputs are not provided for the interface detector

SITRANS F flowmeters

SITRANS F US

SITRANS FUH1010 Oil clamp-on

Certificates and approvals

IP65 (NEMA 4X) flow display computer ratings

FM and CSA	I.S. Class I, II, Div 1 N-I Class I, Div 2 S Class II, Div 2
ATEX	- Flowmeter: Ex II (1) G [EEx ia] IIC Ex II 3 (1) G EEx nC [ia] IIC T5 - Transducers: Ex II 1 G EEx ia IIC T5 Ex II 2 G EEx m II T5 for use with flowmeter in safe area only
INMETRO (Brazil)	- Flowmeter: [BR-Ex ia] IIC BR-Ex nC [ia] IIC T5 - Transducers: BR-Ex ia IIC T5 -50 °C ≤ Ta ≤ +60 °C

IP65 (NEMA 7) compact explosionproof enclosure ratings

FM and CSA	XP T5 Class I, Div 1 D-I Class II, Div 1 I.S. Class I, Div 1 N-I Class I, Div 2 S Class II, Div 2
ATEX	- Flowmeter: Ex II 2 (1) G EEx d [ia] IIB + H2 T5 - Transducers: Ex II 1 G EEx ia IIC T5
INMETRO (Brazil)	- Flowmeter: BR-Ex d [ia] IIC T5 - Transducers: BR-Ex ia IIC T6 -50 °C ≤ Ta ≤ +60 °C

IP66 (NEMA 7) wall mount explosionproof enclosure ratings

FM and CSA	XP Class I, Div 1 D-I Class II, Div 1 I.S. Class I, Div 1 N-I Class I, Div 2 S Class II, Div 2
ATEX	- Flowmeter: Ex II (1) G [EEx ia] IIC Ex II 3 (1) G EEx nC [ia] IIC T5 Ex II 2 (1) G EEx d [ia IIC] IIB + H2 T5 - Transducers: Ex II 1 G EEx ia IIC T5
INMETRO (Brazil)	- Flowmeter: [BR-Ex ia] IIC BR-Ex nC [ia] IIC T5 BR-Ex d [ia IIC] IIB + H2 T5 - Transducers: BR-Ex ia IIC T5 -50 °C ≤ Ta ≤ +60 °C

SITRANS F flowmeters

SITRANS F US

SITRANS FUH1010 Oil clamp-on

Selection and Ordering data	Order No.	Ord. code	Selection and Ordering data	Order No.	Ord. code
SITRANS FUH1010 Oil clamp-on			SITRANS FUH1010 Oil clamp-on		
• IP65 (NEMA 4X)	K)	7ME3600-	• IP65 (NEMA 4X)	K)	7ME3600-
• IP65 (NEMA 7) compact	K)	7ME3601-	• IP65 (NEMA 7) compact	K)	7ME3601-
• IP66 (NEMA 7) wall mounted (no display window)	K)	7ME3602-	• IP66 (NEMA 7) wall mounted (no display window)	K)	7ME3602-
• IP66 (NEMA 7) wall mounted (with display window)	K)	7ME3603-	• IP66 (NEMA 7) wall mounted (with display window)	K)	7ME3603-
0 -			0 -		
Number of ultrasonic beams / meter type			RTD temperature sensor (includes mounting hardware for pipes above 1.5" OD)		
Single beam (precision volume)	0		No RTDs (Note: temperature input is required for FUH systems)	0	
Single beam (interface detector)	1		1 x standard clamp-on RTD	1	
Dual channel/Dual beam (interface detector)	2		2 x standard clamp-on RTD	2	
Dual beam (precision volume)	3		1 x submersible clamp-on RTD	3	
Dual beam (standard volume / mass)	4		2 x submersible clamp-on RTD	4	
Special: Four beam (standard volume/mass) only	9	H 1 A	Special (for insert style RTDs)	9	N 1 Y
Flowmeter functions and I/O configurations			Transducer for channel/beam 1 (includes standard pipe mounting kit and spacer bar for indicated max. outer diameter listed) See „Transducer selection charts“ for specifications		
Includes graphic or digital display			no transducer	A	
<u>IP65 (NEMA 4X) and IP66 (NEMA 7 wall mounted) units</u>			For the following A1H to D4H transducers, temperature range is -40 °C to 65 °C (-41 °F to 150 °F), nominal 21 °C (70 °F):		
• Standard	A		A1H (high precision) to 3"/track mount	G	
- Graphic display			A2H (high precision) to 3"/track mount	H	
- 4 x 4 ... 20 mA analog input			A3H (high precision) to 3"/track mount	J	
- 2 x 0 ... 10 V			B1H (high precision) to 5"/track mount	K	
- 2 x 4 ... 20 mA analog output			B2H (high precision) to 5"/track mount	L	
- 2 x pulse output			B3H (high precision) to 5"/track mount	T	
- 4 x Mercury wetted relays (form C for interface detector)			C1H (high precision) to 24"/mounting frame	M	
- 2 x RTD input			C2H (high precision) to 24"/mounting frame	N	
• Enhanced I/O option	C		D1H (high precision) to 48"/mounting frame ¹⁾	P	
- additional 2 x 4 ... 20 mA outputs			D2H (high precision) to 48"/mounting frame ¹⁾	Q	
- Form C relays			D3H (high precision) to 48"/mounting frame ¹⁾	U	
- 4 x digital pulse outputs (2 x open collector and 2 x 0 ... 5 V TTL)			D4H (high precision) to 48"/mounting frame ¹⁾	R	
<u>IP65 (NEMA 7) compact units</u>			Other versions (different size, mount, type or pipe larger than DN 1200 (48") or corrosion resistant), add Order code and plain text.	Z	P 1 Y
• Standard	D		For the following B1H to D4H transducers, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):		
- Digital display			B1H (high temperature range HP)	Z	P 1 K
- 2 x 4 ... 20 mA (Loop)			B2H (high temperature range HP)	Z	P 1 L
- 2 x 4 ... 20 mA analog input			B3H (high temperature range HP)	Z	P 1 T
- 2 x status (open collector)			C1H (high temperature range HP)	Z	P 1 M
- 1 x RTD input			C2H (high temperature range HP)	Z	P 1 N
• Digital pulse option	F		D1H (high temperature range HP) ¹⁾	Z	P 1 P
- 1 x digital pulse open collector output			D2H (high temperature range HP) ¹⁾	Z	P 1 Q
- 2 x 4 ... 20 mA (Loop)			D3H (high temperature range HP) ¹⁾	Z	P 1 U
- 2 x 4 ... 20 mA analog input			D4H (high temperature range HP) ¹⁾	Z	P 1 R
- 1 x status (open collector)					
- 1 x RTD input					
• Other version (Expanded I/O for non-custody meters or dry contact relays for custody) Add order code and plain text.	Z	J 1 Y			
• Other version (Mercury wetted or dry contact relays) Add order code and plain text.					
- Dry contact form C relays for standard meter	Z	J 1 A			
- Mercury wetted relays for enhanced I/O meters	Z	J 1 D			
Meter power options					
90 ... 240 V AC	A				
9 ... 36 V DC (except compact NEMA 7)	B				
9 ... 36 V DC negative GND (compact only)	J				
9 ... 36 V DC positive GND (compact only)	K				
Communication options					
RS232 (standard)	0				
MODBUS (excludes NEMA 7 compact)	1				

¹⁾ Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4).

K) Subject to export regulations AL: N, ECCN: 5A991X.

SITRANS F flowmeters

SITRANS F US

SITRANS FUH1010 Oil clamp-on

Selection and Ordering data

Order No. Ord. code

SITRANS FUH1010 Oil clamp-on

- IP65 (NEMA 4X) K) **7ME3600-**
- IP65 (NEMA 7) compact K) **7ME3601-**
- IP66 (NEMA 7) wall mounted (no display window) K) **7ME3602-**
- IP66 (NEMA 7) wall mounted (with display window) K) **7ME3603-**

0 -

Transducer for channel/beam 2

(includes pipe mounting kit and spacer bar for indicated max. outer diameter listed)
See „Transducer selection charts“ for specifications

no transducer

For the following A1H to D4H transducers, temperature range is -40 °C to 65 °C (-41 °F to 150 °F), nominal 21 °C (70 °F):

- A1H (high precision) to 3"/track mount
- A2H (high precision) to 3"/track mount
- A3H (high precision) to 3"/track mount
- B1H (high precision) to 5"/track mount
- B2H (high precision) to 5"/track mount
- B3H (high precision) to 5"/track mount
- C1H (high precision) to 24"/mounting frame
- C2H (high precision) to 24"/mounting frame
- D1H (high precision) to 48"/mounting frame¹⁾
- D2H (high precision) to 48"/mounting frame¹⁾
- D3H (high precision) to 48"/mounting frame¹⁾
- D4H (high precision) to 48"/mounting frame¹⁾

Other versions (different size, mount, type or pipe larger than DN 1200 (48") or corrosion resistant), add Order code and plain text.

For the following B1H to D4H transducers, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):

- B1H (high temperature range HP)
- B2H (high temperature range HP)
- B3H (high temperature range HP)
- C1H (high temperature range HP)
- C2H (high temperature range HP)
- D1H (high temperature range HP)¹⁾
- D2H (high temperature range HP)¹⁾
- D3H (high temperature range HP)¹⁾
- D4H (high temperature range HP)¹⁾

Approvals

FM/CSA (default), also for non hazardous area

ATEX

INMETRO (Brazil)

Special ATEX EEx m
add Order code and plain text:
Length of integral cable:

¹⁾ Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4)

K) Subject to export regulations AL: N, ECCN: 5A991X.

Selection and Ordering data

Order code

Further designs

Please add „-Z“ to Order No. and specify Order code(s).

Cable assembly for transducers (add for # of beams)

See „Transducer cable selection chart“

K..

Cable assembly for RTDs (add for # of RTDs)

See „RTD cable selection chart“

R..

Cable termination kit (for one cable pair)

- Termination for standard, plenum and armored transducer cable

T01

- Termination for submersible cable

T11

- RTD cable termination kit for standard RTD

T21

- RTD cable termination kit for submersible RTD

T31

Languages (Meter and Documentation), English (default)

- German
- French
- Spanish
- Italian

B10
B12
B13
B14

Tag name plate

- Stainless steel tags with 3.2 mm (0.13 inch) characters (26 characters max.)

Y17

- Stainless steel tags with 3.2 mm (0.13 inch) characters (68 characters max.)

Y19

MLFB example

Application example

A clamp-on meter is required for a 12" carbon steel hydrocarbon line flowing multiple products, with a wall thickness of 12.7 mm (0.5"). Meter electronics is to be located in a Class I Div 2 area only 60 ft from the pipeline. 12 V DC power is available at the site.

Dual beam operation is desired for improved accuracy and redundant measurement. Pulse output will be primary flow data source.

MLFB Order No.: **7ME3600-3CB00-3QQ1-Z**
K03 + K03 + R03

Selection and Ordering data

Order No.

Ord. code

FUH1010 meter family

7 ME 3 6 0 -

IP65 (NEMA 4X) enclosure

0

Dual beam precision volume

3

Custody Transfer option with digital pulse

C

9 ... 36 V DC power option

B

RS232 Standard

0

RTD required for viscosity comp

3

Transducer code for path 1

Q

Transducer code for path 2

Q

FM approval required

1

30 m (100 ft) transducer cable for path 1

K 0 3

30 m (100 ft) transducer cable for path 2

K 0 3

30 m (100 ft) cable for RTD

R 0 3

Transducer Selection Chart

High precision transducers for steel pipe with outer diameter/wall thickness ratio >10

Transducer	Order Code	Pipe wall (mm)		Pipe wall (inches)	
		min.	max.	min.	max.
A1H	G	0.64	1.02	0.025	0.04
A2H	H	1.02	1.52	0.04	0.06
A3H	J	1.52	2.03	0.06	0.08
B1H	K	2.03	3.05	0.08	0.12
B2H	L	3.05	4.06	0.12	0.16
C1H	M	4.06	5.84	0.16	0.23
C2H	N	5.84	8.13	0.23	0.32
D1H	P	8.13	11.18	0.32	0.44
D2H	Q	11.18	15.75	0.44	0.62
D4H	R	15.75	31.75	0.62	1.25
B3H	T	2.7	3.3	0.106	0.128
D3H	U	7.4	9.0	0.293	0.354

Transducer Cable Selection Chart

Transducer cable codes for length and type options

Cable length m (ft)	Standard (PVC jacket) -40...+80 °C (-40...+176 °F)	Submersible (polyethylene jacket) -40...+80 °C (-40...+176 °F)	Plenum Rated (teflon jacket) -40...+200 °C (-40...+392 °F)	Armored -40...+80 °C (-40...+176 °F)
	Order code			
6 (20)	K01	K11	K21	K31
15 (50)	K02	K12	K22	K32
30 (100)	K03	K13	K23	K33
46 (150)	K04	K14	K24	K34
61 (200)	K05	K15	K25	K35
91 (300)	K06	K16	K26	K36

RTD Cable Selection Chart

RTD cable codes for length and type

Cable length m (ft)	Standard (teflon wrapped) -40 ... +200 °C (-40 ... +392 °F)	Submersible (extruded jacket) -40 ... +200 °C (-40 ... +392 °F)
	Order code	
6 (20)	R01	R11
15 (50)	R02	R12
30 (100)	R03	R13
46 (150)	R04	R14
61 (200)	R05	R15
91 (300)	R06	R16

SITRANS F flowmeters

SITRANS F US

SITRANS FUH1010 Oil clamp-on

Mainstream offering SITRANS FUH1010 (Hydrocarbon liquid meter)

Selection and Ordering data	Order No.	Order code
SITRANS FUS1010 Oil clamp-on	K) 7ME360 - - - - 0 - - - -	K12 + K12 + R12
Design (Includes cable glands)	0	
IP65 (NEMA 4X)		
Number of ultrasonic beams/meter type	4	
Dual beam (DV-Standard Volume/Mass)		
Flowmeter functions and I/O configurations	A	
includes graphic or digital display, IP66 (BNB6665 (NEMA 4X)) and IP66 (NEMA 7 wall mounted) units:		
Standard		
• Graphic display		
• 4x 4 ... 20 mA analog input		
• 2x 0 ... 10 V		
• 2x 4 ... 20 mA		
• 2x pulse outputs		
• 4 Mercury wetted relays		
• 2x RTD input		
Meter power options	A	
90 ... 240 V AC		
Communication options	0	
RS 232 (standard)		
RTD temperature sensor		
(includes mounting hardware for pipes above 1.5" outer diameter)		
No RTDs (Note: Temperature input is required for FUH1010 systems)		
1 x submersible clamp-on RTD	0 3	
Transducer for channel 1		
(includes pipe mounting kit and spacer bar for indicated max. outer diam. listed)		
no transducer		A
C1H (high precision) to 24"/mounting frame		M
C2H (high precision) to 24"/mounting frame		N
D1H (high precision) to 48"/mounting frame		P
D2H (high precision) to 48"/mounting frame		Q
Transducer for channel 2		
(includes pipe mounting kit and spacer bar for indicated max. OD listed)		
See „Transducer selection charts“ for specifications.		
no transducer		A
C1H (high precision) to 24"/mounting frame		M
C2H (high precision) to 24"/mounting frame		N
D1H (high precision) to 48"/mounting frame		P
D2H (high precision) to 48"/mounting frame		Q
Approvals		
FM/CSA (default)		1
ATEX EExia		2

Mainstream product offering represents 4 to 6 weeks delivery time

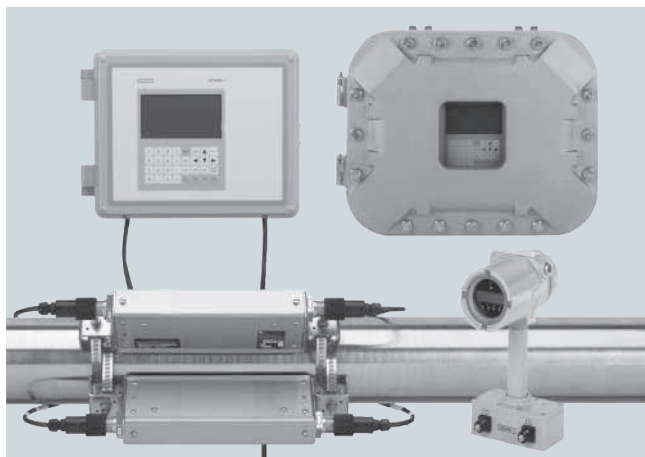
K) Subject to export regulations AL: N, ECCN: 5A991X.

SITRANS F flowmeters

SITRANS F US

SITRANS FUG1010 Gas clamp-on

Overview



SITRANS FUG1010 clamp-on non-intrusive ultrasonic flow display computer is ideal for natural and process gas applications, including checkmetering, allocation, production, storage and gas fired power station applications.

SITRANS FUG1010 is available in single, dual and optional four beam configurations, with your choice of IP65 (NEMA 4X) or IP65 (NEMA 7) and IP66 (NEMA 7) explosionproof enclosures.

Benefits

- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external transducers do not require periodic cleaning
- No moving parts to foul or wear as found in turbine and PD meters
- Eliminates the pressure drop or energy loss in orifice metering
- Wide turn-down ratio
- Choice of single, dual or optional four beam versions
 - Single beam version reduces initial investment
 - Multiple beam versions provide higher accuracy, especially with limited straight run and poor flow profile conditions
 - In diametric reflect mode configuration, the meter is less sensitive to crossflow and swirl
- Wide-Beam technology provides improved accuracy over a wide range of flow velocity and operating pressure
- Zeromatic Path automatically sets zero without stopping flow and reduces zero drift, even at low flow
- Tolerant of most wet gas conditions
- Immune to most pressure reducing valve noise
- Optional rugged stainless steel transducer enclosure permits permanent and direct burial installations
- Easy to use "DataView" diagnostic software

Application

SITRANS FUG1010 is ideal for most natural and process gas industry applications, including:

- Checkmetering
- Allocation
- Flow survey verification
- Lost and unaccounted for (LAUF) gas analysis
- Production
- Storage

Design

FUG1010 is available in three enclosures:

- IP65 (NEMA 4X) enclosure constructed of fiberglass reinforced polyester with stainless steel hardware and polyester keypad
 - Single beam
 - Dual beam
 - Four beam (optional)
- IP65 (NEMA 7) Compact explosionproof enclosure constructed of cast aluminum with glass window, stainless steel hardware
 - Single beam
 - Dual beam
- IP66 (NEMA 7) Wall mount explosionproof enclosure constructed of cast aluminum stainless steel hardware, optional glass window
 - Single beam
 - Dual beam
 - Four beam (optional)

Function

- IP65 (NEMA 4X) and IP66 (NEMA 7) flow display computers have integral 33 button keypads and large (128 x 240 pixel) graphic displays visible up to 12 m (40 ft) away
- IP65 (NEMA 7) compact flow display computer has a 2 x 16 alphanumeric LCD display
- Current, voltage, frequency and RS232 outputs (see specification section for details)
- Analog inputs for pressure and temperature
- Zeromatic Path automatically compensates for zero flow drift
- Bidirectional flow operation
- 1 Mbyte data logger with both site and data logger storage
- English, spanish, german, italian and french language options
- Internal AGA-8 table for fixed gas composition is available for standard volume computation
- Complete application and operation diagnostics, to assure calibration and operational integrity
- Upward compatibility and compliance with AGA-10 speed of sound measurement practice

SITRANS F flowmeters

SITRANS F US

SITRANS FUG1010 Gas clamp-on

Technical specifications

SITRANS FUG1010

Input

Flow range	± 30 m/s (± 100 ft/s), bidirectional
Flow sensitivity	0.0003 m/s (0.001 ft/s), flow rate independent
Minimum pressure	7 ... 10 bar (100 ... 145 psi), typical (gas composition and application dependent; plastic pipes support operation at atmospheric pressure)
Pipe size	25 mm ... 1.52 m (1" ... 60") (for other sizes, consult factory)
Analog inputs	Current: 4 x 4 ... 20 mA, programmable (IP65 (NEMA 7) enclosure has 2 x 4 ... 20 mA, programmable)

Output

Standard outputs	• Current: 2 x 4 ... 20 mA, a programmable, standard Additional 2 x optional, except IP65 (NEMA 7) • Voltage: 2 x 0 ... 10 V DC, menu programmable (None for IP65 (NEMA 7) enclosure) • 2 x Open collector digital pulses (quadrature) (None for IP65 (NEMA 7) enclosure) • 2 x 0 ... 5 kHz, TTL pulse square wave + (None for IP65 (NEMA 7) enclosure) • 1 x Optically isolated digital pulse & source, IP65 (NEMA 7) enclosure only • RS232 Serial Port
Enhanced outputs	• MODBUS (RS485/422/232) (not for IP65 (NEMA 7))
Status/Alarm I/O	• 4 x programmable form C relays (not for IP65 (NEMA 7) enclosure) • 4 x programmable N.O. Mer. Wet. Relays optional (not for IP65 (NEMA 7) enclosure) • 2 x Optically coupled output logic gates (for IP65 (NEMA 7) enclosure, only) • 1 Totalizer clear switch input (not for IP65 (NEMA 7)) • 1 Totalizer hold switch input (not for IP65 (NEMA 7) enclosure) • 1 x Opto iso. totalizer clear switch input (for IP65 (NEMA 7) enclosure, only) • 1 x Opto iso. totalizer hold switch input (for IP 65 (NEMA 7) enclosure, only)

Accuracy

Typical accuracy	1 % ... 2 % of actual volume reading (higher accuracy is pipe condition and flow profile dependent)
Repeatability	0.05 % ... 0.1 %, of actual volume reading, for 1.5 ... 30 m/s (5 ... 100 ft/s) velocities (pipe condition dependent)
Zero drift	0.0003 m/s (0.001 ft/s), with Zero-Matic Path active
Data refresh rate	5 Hz (80 Hz optional)

Rated operation conditions

Degree of protection	
• Wall mount enclosure	IP65 (NEMA 4X)
• Compact explosionproof	IP65 (NEMA 7)
• Wall mount explosionproof	IP66 (NEMA 7)
Gas temperature	-40 ... +60 °C (-40 ... +140 °F) (for higher temperatures consult factory)
Ambient temperature	-18 ... +60 °C (0 ... 140 °F)

Design

Dimensions	see SITRANS F US Clamp-on „System info and selection guide“
Weight	see diagrams

Power supply

• For IP65 (NEMA 4X) and IP66 (NEMA 7)	• 90 ... 240 V AC, 50 ... 60 Hz (30 VA) or 9 ... 36 V DC (12 W)
• For IP65 (NEMA 7):	• 90 ... 240 V AC, 50 ... 60 Hz (15 VA) or 9 ... 36 V DC (10 W)

Indication and operation

Data logger memory	1 Mbyte, programmable for 17 data functions
Display	
• IP65 (NEMA 4X) and IP66 (NEMA 7) enclosures	128 x 240 pixel LCD with backlight
• IP65 (NEMA 7) enclosure	2 x 16 alphanumeric LCD display
Keypad	
• IP65 (NEMA 4X) and IP66 (NEMA 7) Enclosures	33 keypad buttons with tactile feedback
• IP65 (NEMA 7) Enclosure	5 magnetic hall effect switches
Language options	English, spanish, german, italian, french

Certificates and approvals

IP65 (NEMA 4X) flow display computer ratings

FM and CSA	I.S. Class I, II, Div 1 N-I Class I, Div 2 S Class II, Div 2
ATEX	- Flowmeter: Ex II (1) G [EEx ia] IIC Ex II 3 (1) G EEx nC [ia] IIC T5 - Transducers: Ex II 1 G EEx ia IIC T5 Ex II 2 G EEx m II T5 (for use with flowmeter in safe area)
INMETRO (Brazil)	- Flowmeter: [BR-Ex ia] IIC BR-Ex nC [ia] T5 - Transducers: BR-Ex ia IIC T5 IP65 -50 °C ≤ Ta ≤ +60 °C

IP65 (NEMA 7) compact explosionproof enclosure ratings

FM and CSA	XP Class I, Div 1 D-I Class II, Div 1 I.S. Class I, Div 1 N-I Class I, Div 2 S Class II, Div 2
ATEX	- Flowmeter: Ex II 2 (1) G EEx d [ia] IIB + H2 T5 - Transducers: Ex II 1 G EEx ia IIC T5
INMETRO (Brazil)	- Flowmeter: BR-Ex d [ia] IIB + H2 T5 - Transducers: BR-Ex ia IIC T6 IP65 -50 °C ≤ Ta ≤ +60 °C

IP66 (NEMA 7) wall mount explosionproof enclosure ratings

FM and CSA	XP Class I, Div 1 D-I Class II, Div 1 I.S. Class I, Div 1 N-I Class I, Div 2 S Class II, Div 2
ATEX	- Flowmeter: Ex II (1) G [EEx ia] IIC Ex II 3 (1) G EEx nC [ia] IIC T5 Ex II 2 (1) G EEx d [ia IIC] IIB+H2 T5 - Transducers: Ex II 1 G EEx ia IIC T5
INMETRO (Brazil)	- Flowmeter: [BR-Ex ia] IIC BR-Ex nC [ia] IIC T5 BR-Ex d [ia IIC] IIB + H2 T5 - Transducers: BR-Ex ia IIC T5 -50 °C ≤ Ta ≤ +60 °C

SITRANS F flowmeters

SITRANS F US

SITRANS FUG1010 Gas clamp-on

Selection and Ordering data	Order No.	Ord. code
SITRANS FUG1010 Gas meter clamp-on		
• IP65 (NEMA 4X)	K)	7ME3610-
• IP65 (NEMA 7) compact	K)	7ME3611-
• IP66 (NEMA 7) wall mounted	K)	7ME3612-
• IP66 (NEMA 7) wall mounted with display window	K)	7ME3613-
	0 -	
Number of channels/ultrasonic beams		
Single beam	1	
Dual beam	2	
Special: Four beam (NEMA 4X and NEMA 7 wall mount only)	9	H 1 A
Flowmeter functions and I/O configurations (includes graphic or digital display)		
<u>IP65 (NEMA 4X) and IP66 (NEMA 7 wall mounted) units</u>		
• Standard (all but Compact NEMA 7)	A	
- Graphic display		
- 4 x 4 ... 20 mA analog input		
- 2 x 0 ... 10 V		
- 2 x 4 ... 20 mA analog output		
- 2 x pulse output		
- 4 x relay C type		
- 2 x RTD input		
• Enhanced I/O option	B	
- additional 2 x 4 ... 20 mA		
- Mercury wetted relays		
- 4 x digital pulse outputs (2 x open collector and 2 x 0 ... 5 V TTL)		
<u>IP65 (NEMA 7) compact units</u>		
• Standard	D	
- Digital display		
- 2 x 4 ... 20 mA (loop)		
- 2 x 4 ... 20 mA analog input		
- 2 x status (open collector)		
- 1 x RTD input		
• Digital pulse option	E	
1 x digital pulse open collector output		
• Mercury wetted relays for standard meter	Z	J 1 A
• Dry contact form C relays for enhanced I/O meter	Z	J 1 D
Meter power options		
90 ... 240 V AC	A	
9 ... 36 V DC (except compact NEMA 7)	B	
9 ... 36 V DC negative GND (Compact only)	J	
9 ... 36 V DC positive GND (Compact only)	K	
Communication options		
RS232 (standard)	0	
MODBUS (excludes NEMA 7 Compact)	1	
RTD temperature sensor (includes mounting hardware for pipes above 1.5" outer diameter)		
No RTDs	0	
1 x standard clamp-on RTD	1	
2 x standard clamp-on RTD	2	
1 x submersible clamp-on RTD	3	
2 x submersible clamp-on RTD	4	
Special (for insert style RTDs)	9	N 1 Y

Selection and Ordering data	Order No.	Ord. code
SITRANS FUG1010 Gas meter clamp-on		
• IP65 (NEMA 4X)	K)	7ME3610-
• IP65 (NEMA 7) compact	K)	7ME3611-
• IP66 (NEMA 7) wall mounted	K)	7ME3612-
• IP66 (NEMA 7) wall mounted with display window	K)	7ME3613-
	0 -	
Transducer for channel 1 (includes pipe mounting kit and spacer bar for indicated max. outer diameter listed) See „Transducer selection chart“ for specifications.		
no transducer		A
For the following A1H to D4H transducers, temperature range is -40 °C to 65 °C (-41 °F to 150 °F), nominal 21 °C (70 °F):		
B1H (high precision) to 5"/track mount	K	
B2H (high precision) to 5"/track mount	L	
B3H (high precision) to 5"/track mount	T	
C1H (high precision) to 24"/mounting frame	M	
C2H (high precision) to 24"/mounting frame	N	
D1H (high precision) to 48"/mounting frame ¹⁾	P	
D2H (high precision) to 48"/mounting frame ¹⁾	Q	
D3H (high precision) to 48"/mounting frame ¹⁾	U	
D4H (high precision) to 48"/mounting frame ¹⁾	R	
Other versions (different size, mount, type or pipe larger than DN 1200 (48") or corrosion resistant), add Order code and plain text.	Z	P 1 Y
For the following B1H to D4H transducers, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):		
B1H (high temperature range HP)	Z	P 1 K
B2H (high temperature range HP)	Z	P 1 L
B3H (high temperature range HP)	Z	P 1 T
C1H (high temperature range HP)	Z	P 1 M
C2H (high temperature range HP)	Z	P 1 N
D1H (high temperature range HP) ¹⁾	Z	P 1 P
D2H (high temperature range HP) ¹⁾	Z	P 1 Q
D3H (high temperature range HP) ¹⁾	Z	P 1 U
D4H (high temperature range HP) ¹⁾	Z	P 1 R
Transducer for channel 2 (includes pipe mounting kit and spacer bar for indicated max. outer diameter listed) See „Transducer selection chart“ for specifications.		
no transducer		A
For the following A1H to D4H transducers, temperature range is -40 °C to 65 °C (-41 °F to 150 °F), nominal 21 °C (70 °F):		
B1H (high precision) to 5"/track mount	K	
B2H (high precision) to 5"/track mount	L	
B3H (high precision) to 5"/track mount	T	
C1H (high precision) to 24"/mounting frame	M	
C2H (high precision) to 24"/mounting frame	N	
D1H (high precision) to 48"/mounting frame ¹⁾	P	
D2H (high precision) to 48"/mounting frame ¹⁾	Q	
D3H (high precision) to 48"/mounting frame ¹⁾	U	
D4H (high precision) to 48"/mounting frame ¹⁾	R	

¹⁾ Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-0MS40 (1012BN-4).

K) Subject to export regulations AL: N, ECCN: 5A991X.

SITRANS F flowmeters

SITRANS F US

SITRANS FUG1010 Gas clamp-on

Selection and Ordering data	Order No.	Ord. code
SITRANS FUG1010 Gas meter clamp-on		
• IP65 (NEMA 4X)	K) 7ME3610-	
• IP65 (NEMA 7) compact	K) 7ME3611-	
• IP66 (NEMA 7) wall mounted	K) 7ME3612-	
• IP66 (NEMA 7) wall mounted with display window	K) 7ME3613-	
	0 -	
Transducer for channel 2 (continued)		
Other versions (different size, mount, type or pipe larger than DN 1200 (48") or corrosion resistant), add Order code and plain text.	Z	Q1Y
For the following B1H to D4H transducers, temperature range is -1 °C up to 104 °C (30 °F up to 220 °F), nominal 65 °C (150 °F):		
B1H (high temperature range HP)	Z	Q1K
B2H (high temperature range HP)	Z	Q1L
B3H (high temperature range HP)	Z	Q1T
C1H (high temperature range HP)	Z	Q1M
C2H (high temperature range HP)	Z	Q1N
D1H (high temperature range HP)	Z	Q1P
D2H (high temperature range HP)	Z	Q1Q
D3H (high temperature range HP)	Z	Q1U
D4H (high temperature range HP)	Z	Q1R
Approvals		
FM/CSA (default)	1	
ATEX	2	
INMETRO (Brazil)	3	
Special ATEX EEx m	9	R1Y
Add Order code and plain text:		
Length of integral cable:		

K) Subject to export regulations AL: N, ECCN: 5A991X.

Selection and Ordering data	Order code
Further designs	
Please add „Z" to Order No. and specify Order code(s).	
Cable assembly for transducers (add for # of beams) See „Transducer cable selection chart"	K..
Cable assembly for RTDs (add for # of RTDs) See „RTD cable selection chart"	R..
Cable termination kit (for one cable pair)	
• Termination for standard, plenum and armored transducer cable	T01
• Termination for submersible transducer cable	T11
• RTD cable termination kit for standard RTD	T21
• RTD cable termination kit for submersible RTD	T31
• Insert RTD cable termination kit	T41
Languages (Meter and Documentation)	
• German	B10
• French	B12
• Spanish	B13
• Italian	B14
Tag name plate	
• Stainless steel tags with 3.2 mm (0.13 inch) characters (26 characters max.)	Y17
• Stainless steel tags with 3.2 mm (0.13 inch) characters (68 characters max.)	Y19

MLFB example

Application example

A clamp-on meter is required for a 300 mm (12") carbon steel gas line with a wall thickness of 12.7 mm (0.5"). Meter electronics is to be located in a Class I Div 2 area only 18 m (60 ft) from the pipeline. 12 V DC power is available at the site.

Dual beam operation is desired for improved accuracy and redundant measurement. Pulse output will be primary flow data source.

MLFB Order No.: **7ME3610-2BB00-0QQ1-Z**
K03 + K03

Selection and Ordering data	Order No.	Ord. code
FUG1010 meter family	7 ME 3 6 1	0 -
IP65 (NEMA 4X) enclosure	0	
Dual beam	2	
Custody Transfer option with digital pulse	B	
9 ... 36 V DC power option	B	
RS232 Standard	0	
No RTD required	0	
Transducer code for path 1	Q	
Transducer code for path 2	Q	
FM approval required	1	
30 m (100 ft) transducer cable for path 1		K 0 3
30 m (100 ft) transducer cable for path 2		K 0 3

SITRANS F flowmeters

SITRANS F US

SITRANS FUG1010 Gas clamp-on

Transducer Selection Chart

High precision transducers for steel pipe with outer diameter/wall thickness ratio >10

Transducer	Order Code	Pipe wall (mm)		Pipe wall (inches)	
		min.	max.	min.	max.
B1H	K	2.0	3.0	0.08	0.12
B2H	L	3.0	4.1	0.12	0.16
B3H	T	2.7	3.3	0.106	0.128
C1H	M	4.1	5.8	0.16	0.23
C2H	N	5.8	8.1	0.23	0.32
D1H	P	8.1	11.2	0.32	0.44
D2H	Q	11.2	15.7	0.44	0.62
D3H	U	7.4	9.0	0.293	0.354
D4H	R	15.7	31.8	0.62	1.25

Transducer Cable Selection Chart

Transducer cable codes for length and type options

Cable length m (ft)	Standard (PVC jacket) -40...+80 °C (-40...+176 °F)	Submersible (polyethylene jacket) -40...+80 °C (-40...+176 °F)	Plenum Rated (teflon jacket) -40...+200 °C (-40...+392 °F)	Armored -40...+80 °C (-40...+176 °F)
Order code				
6 (20)	K01	K11	K21	K31
15 (50)	K02	K12	K22	K32
30 (100)	K03	K13	K23	K33
46 (150)	K04	K14	K24	K34
61 (200)	K05	K15	K25	K35
91 (300)	K06	K16	K26	K36

RTD Cable Selection Chart

RTD cable codes for length and type

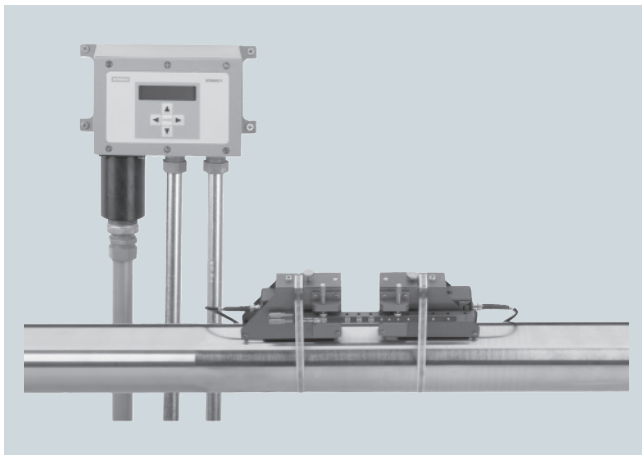
Cable length m (ft)	Standard (teflon wrapped) -40 ... +200 °C (-40 ... +392 °F)	Submersible (extruded jacket) -40 ... +200 °C (-40 ... +392 °F)
Order code		
6 (20)	R01	R11
15 (50)	R02	R12
30 (100)	R03	R13
46 (150)	R04	R14
61 (200)	R05	R15
91 (300)	R06	R16

SITRANS F flowmeters

SITRANS F US

SITRANS FUS1020 Basic clamp-on

Overview



SITRANS FUS1020 offers reliable flow measurement at a much lower cost than other clamp-on ultrasonic flowmeters, with flow rate accuracy of 1% or better for most applications.

Benefits

- Easy installation; no need to cut pipe or stop flow
- Minimal maintenance; external transducers do not require periodic cleaning
- No moving parts to wear or foul
- No pressure drop or energy loss
- Compact, integral design reduces installation cost
- Wide turn-down ratio
- Choice of single or dual channel operation
- Transducers are matched to the pipe material and have menu-driven location
- Wide-Beam technology ensures high performance
- Zeromatic Path automatically sets zero without stopping flow and eliminates zero drift

Application

FUS1020 is suitable for most clean liquid applications, including the following:

- Water & wastewater industry
 - Potable water
 - Wastewater, influent & effluent
 - Processed sewage, sludge
- Chemical feed industry
 - Sodium hypochlorite
 - Sodium hydroxide
- HVAC & power industries
 - Coolant flow
 - Fuel flow
- Process control
 - Chemicals
 - Pharmaceuticals

The FUS1020 flowmeter is not available with hazardous areas approval.

Design

- IP65 (NEMA 4) wall mount constructed of powder coated steel enclosure with powder coated aluminum cover, stainless steel hardware, optional stainless steel housing
- Single and dual channel versions are available

Function

- 2x16 integral alphanumeric display and 5 key keypad for installation menu and data display
- Assignable 4 ... 20 mA isolated loop-powered output
- TTL flow pulse rate output
- RS232 digital communication port
- DB9 connector for PC communication
- Assignable open collector alarm output (40 V DC max)
- Batch totalizer start-stop control line
- Internal calibration security switch
- Remote PC installation menu
- Zeromatic Path automatically sets zero
- Bidirectional flow operation
- 1 MByte data logger with both site & data logger storage

Technical specifications

SITRANS FUS1020

Input

Flow range	± 12 m/s (± 40 ft/s), bi-directional
Flow sensitivity	0.0003 m/s (0.001 ft/s) flow rate independent

Output

Outputs	• Current: 4 ... 20 mA 1 x for single channel 2 x for dual channel • 1 x 0 ... 5 kHz pulse rate, digital isolated, single channel only • RS232 serial port
Optional output	• Current: 1 x 4 ... 20 mA, programmable, single channel only
Status/Alarm I/O	• Programmable form a relays (optional) 1 x for single channel 2 x for dual channel • Optically coupled totalizer hold switch inputs 1 x for single channel 2 x for dual channel • Optically isolated totalizer reset switch, single channel only

Accuracy

Accuracy	± 0.5 % ... 1.0 % of flow
Batch repeatability	± 0.15%
Zero Drift	0.1% of rate; 0.0003 m/s (0.001 ft/s), with zeromatic path active
Data refresh rate	5 Hz

Rated operation conditions

Degree of protection	IP65 (NEMA 4)
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Design

Weight	1.4 kg (3.0 lbs)
Dimensions (W x H x D)	197 x 103 x 109 mm (7.77 x 4.06 x 4.3 inches)

Power supply

100 ... 240 V AC @ 15 VA or 9 ... 36 V DC @ 10 W

Certificates and approvals

Unclassified locations only	UL Listing ULc Listing CE: • LVD IEC 61010-1; CB report • EMC EN 61000-6-2, -4
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SITRANS F flowmeters

SITRANS F US

SITRANS FUS1020 Basic clamp-on

Selection and Ordering data	Order No.	Ord. code
SITRANS FUS1020 Basic clamp-on, IP65 (NEMA 4)	D) 7ME3570-	
Number of channels/ultrasonic beams		
Single channel	1	
Dual channel / Dual beam	2	
Flowmeter functions and I/O configurations		
• Blind system - 1 x 4 ... 20 mA per channel - 1 x pulse out (for single channel only)	A	
• With display	E	
• With display and 1 x additional analog output (single channel only)	F	
• With display and with SPST relay	G	
• With display and 1 x additional analog output and SPST relay (single channel only)	H	
Meter power options		
90 ... 240 V AC	A	
9 ... 36 V DC	B	
Transducer for channel 1 (includes pipe mounting kit for indicated max. outer diameter listed) See „Transducer selection charts“ for specifications.		
no transducer	A	
A2 universal to 2"/track mounting	B	
B3 universal to 5"/track mounting	C	
C3 universal to 13"/mounting frame	D	
D3 universal to 24"/mounting frame	E	
E2 universal to 48"/mounting frame ¹⁾	F	
A1H (high precision) to 3"/trackless mount.	G	
A2H (high precision) to 3"/trackless mount.	H	
A3H (high precision) to 3"/trackless mount.	J	
B1H (high precision) to 5"/trackless mount.	K	
B2H (high precision) to 5"/trackless mount.	L	
C1H (high precision) to 24"/trackless mount.	M	
C2H (high precision) to 24"/trackless mount.	N	
D1H (high precision) to 48"/trackless mount. ²⁾	P	
D2H (high precision) to 48"/trackless mount. ²⁾	Q	
Other versions (different size, mount, type or pipe larger than DN 1200 (48"), or corrosion resistant), add Order Code and plain text.	Z	P 1 Y
High temperature transducer size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))	Z	P 1 A
High temperature transducer size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))	Z	P 1 B
High temperature transducer size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))	Z	P 1 C
Transducer for channel 2 (includes pipe mounting kit for indicated max. outer diameter listed) See „Transducer selection charts“ for specifications.		
no transducer	A	
A2 universal to 2"/track mounting	B	
B3 universal to 5"/track mounting	C	
C3 universal to 13"/mounting frame	D	
D3 universal to 24"/mounting frame	E	
E2 universal to 48"/mounting frame ¹⁾	F	

Selection and Ordering data	Order No.	Ord. code
SITRANS FUS1020 Basic clamp-on, IP65 (NEMA 4)	D) 7ME3570-	
Transducer for channel 2 (continued)		
A1H (high precision) to 3"/trackless mount.	G	
A2H (high precision) to 3"/trackless mount.	H	
A3H (high precision) to 3"/trackless mount.	J	
B1H (high precision) to 5"/trackless mount.	K	
B2H (high precision) to 5"/trackless mount.	L	
C1H (high precision) to 24"/trackless mount.	M	
C2H (high precision) to 24"/trackless mount.	N	
D1H (high precision) to 48"/trackless mount. ²⁾	P	
D2H (high precision) to 48"/trackless mount. ²⁾	Q	
Other versions (different size, mount, type or pipe larger than DN 1200 (48"), or corrosion resistant), add Order Code and plain text.	Z	Q 1 Y
High temperature transducer size 2 for up to 230 °C (446 °F) (30 to 200 mm diam. (1.18 to 7.67 inch diam.))	Z	Q 1 A
High temperature transducer size 3 for up to 230 °C (446 °F) (150 to 610 mm diam. (5.90 to 24 inch diam.))	Z	Q 1 B
High temperature transducer size 4 for up to 230 °C (446 °F) (400 to 1200 mm diam. (15.75 to 47.25 inch diam.))	Z	Q 1 C
Approvals		
no approval options (UL, ULc, CE by default)	0	

Selection and Ordering data	Order code
Further designs Please add „Z“ to Order No. and specify Order code(s).	
Cable assembly for transducers (add for # of channels) See „Transducer cable selection chart“	K..
Cable termination kit (for one cable pair) • Transducer cable termination for standard and plenum cable	T01
Languages (Meter and Documentation), English (default) • German • French • Spanish • Italian	B10 B12 B13 B14
Wet flow transfer calibration (priced on request) • 6 point up to DN 100 (4 inch) • 6 point up to DN 125 to DN 200 (5 to 8 inch) • 6 point up to DN 250 to DN 300 (10 to 12 inch) • 6 point up to DN 350 to DN 400 (14 to 16 inch) • 6 point up to DN 450 to DN 500 (18 to 20 inch) • 6 point up to DN 550 to DN 600 (22 to 24 inch) • 6 point up to DN 650 to DN 750 (26 to 30 inch) • 6 point up to DN 800 to DN 900 (32 to 36 inch)	D10 D11 D12 D13 D14 D15 D16 D17
Tag name plate • Stainless steel tags with 3.2 mm (0.13 inch) character size (26 characters max.) • Stainless steel tags with 3.2 mm (0.13 inch) character size (68 characters max.)	Y17 Y19

¹⁾ Supplied spacer bar supports pipes up to 1050 mm (42 inches). For pipes larger than 1050 mm (42 inches) purchase also, spare part 7ME3960-OMS40 (1012BN-4)

²⁾ Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-OMS40 (1012BN-4)

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

SITRANS F flowmeters

SITRANS F US

SITRANS FUS1020 Basic clamp-on

Mainstream offering SITRANS FUS1020 (Dedicated basic standard)

Selection and Ordering data	Order No.	Order code
SITRANS FUS1020 Basic Clamp-on	D) 7ME357 - 00 - 0	K02 + K02 +
Design	0	
IP65 (NEMA 4)		
Number of channels/ultrasonic beams	1	
Single channel	2	
Dual channel/Dual beam		
Flowmeter functions and I/O configurations	E	
With display		
Meter power options	A	
90 ... 240 V AC		
Transducer for channel 1 (includes pipe mounting kit for indicated max. OD listed) See „Transducer selection charts“ for specifications.	A C D E F	
no transducer		
B3 universal to 5"/track mount		
C3 universal to 13"/mounting frame		
D3 universal to 24"/mounting frame		
E2 universal to 48"/mounting frame		
Transducer for channel 2 (includes pipe mounting kit for indicated max. OD listed) See „Transducer selection charts“ for specifications.	A C D E F	
no transducer		
B3 universal to 5"/track mount		
C3 universal to 13"/mounting frame		
D3 universal to 24"/mounting frame		
E2 universal to 48"/mounting frame		
Approvals	0	
No approval options		
Languages (Meter, Labels and Documentation)		B10
German		

Mainstream product offering represents 4 to 6 weeks delivery time

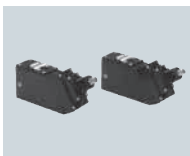
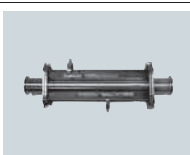
D) Subject to export regulations AL: N, ECCN: EAR99H.

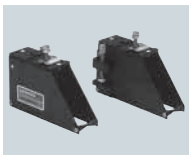
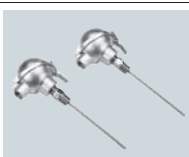
SITRANS F flowmeters

SITRANS F US

Accessories/Spare parts for clamp-on

Accessories/Spare parts for Clamp-on ultrasonic flowmeters

Description	Order No.	
Universal Portable Transducers Selected generally for portable systems where a wide variety of pipes are to be measured. Since they are selected based on diameter only, a wide range of pipe sizes and materials can be covered with a minimum number of transducers. These can also be selected as a cost savings on applications where accuracy standard accuracy is sufficient.	D) 7ME3951-...	
High Precision Transducers Selected generally for dedicated meters since the need to cover a range of pipes is not a requirement. They provide the highest accuracy achievable by the meters and therefore should be selected whenever higher accuracy/repeatability is required. They are only applicable to steel pipes but no other metals, and are selected solely by wall thickness.	D) 7ME3950-...	
High Temperature transducers Are selected whenever pipe temperature will exceed 250 °F (120 °C) up to a maximum of 450 °F (232 °C). They are universal type and can therefore be used on any pipe material and are selected by pipe diameter.	D) 7ME3950-...	
Weld Seal Mount These provide the most secure and strongest mounting of the flow transducers. They are generally selected for "High End" meter types where maximum performance criteria applies. They accommodate high precision transducers designed to mount inside these enclosures. May be welded to the pipe if so desired by the customer. They come in 2-piece or 1-piece configurations depending upon the application pipe size and type (Liquid/Gas).	D) 7ME3960-...	
Mounting tracks Typically used on smaller pipes for easier and more stable mounting for dedicated universal style transducer size A or B, also available for dedicated high precision transducer size A or B.	D) 7ME3960-...	

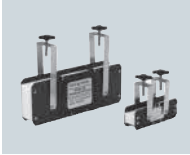
Description	Order No.	
Mounting Frames These items are useful in simplifying transducer installation. They are strapped to the pipe first then the transducers are installed, making the installation less cumbersome and more precise. They also enable easy repeated mounting of the transducers assuring conformation to the original transducer positioning. They may be left in place at each measurement location where periodic flow surveys are conducted to simplify subsequent installations and ensure repeatable results.	D) 7ME3960-...	
Spacer Bars Transducers are required to be mounted at a set distance from each other as determined by pipe size and medium being measured. The spacer bar simplifies this requirement by eliminating the need to undertake a precise dimensional measurement. The flowmeter will specify a specific spacing index which is easily accommodated with the marked indices on the bar.	D) 7ME3960-...	
Clamp-On RTD's 1000 Ω platinum RTD's for use where temperature is required. Used with Energy Meters to record supply/return temperature. For this purpose precision matched pairs (to 0.02 °C) are supplied. Single RTD's are also used with FUH and FUG meters to enable live calculations of "Liquident" and Standard Volume Correction.	D) 7ME3950-...	
Insert RTD's Are identical to clamp-on RTD's as described above except that they are inserted into the pipe (In a Thermowell). They provide more precise and quicker responding temperature measurement. They are selected when precise temperature measurement of the actual liquid or gas is required as opposed to pipe "skin temperature". Since they project into the pipe they cannot be used in pipeline that undergo periodic "piggings".	D) 7ME3950-...	
Standard Cable (Flow Transducer or RTD) Selected for general purpose installations where no special application requirements exist.	D) 7ME3960-...	
Submersible Cable (Flow Transducer) Polyethylene jacketed, for locations that experience periodic or continual submersion of the flow transducers.	D) 7ME3960-...	

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

SITRANS F flowmeters

SITRANS F US

Accessories/Spare parts for clamp-on

Description	Order No.	
Plenum Cable (Flow Transducer or RTD) For temperatures above 180 °F. Teflon jacketed to withstand high temperatures, is used when high temp transducers are specified.	D) 7ME3960-...	
Armored Cable (Flow Transducer) Double shielded cable, selected when cable will not be installed in conduit between meter and transducers.	D) 7ME3960-...	
Temperature sensor cable Cable to connect field installed RTD to flow meter, available in Teflon wrapped, plenum or submersible grade. Typically used for FUE, FUH and FUG series meters where a temperature sensor is employed.	D) 7ME3960-...	
Straps Used to fasten transducers or mounting frames to pipe for dedicated meter installations. Stainless steel construction for corrosion resistance.	D) 7ME3960-...	
Chains (EZ clamps) Used to fasten portable transducers or mounting frames to pipe. Thumbscrews eliminate need for hand tools when mounting transducers, and allow for easy on/off operations.	D) 7ME3960-...	
Ultrasonic Couplant Fills any voids between transducer emitting surface and pipe wall to allow maximum energy transfer between transducer and pipe. Several different types of couplants are employed as determined by the application conditions and type of installation (Temporary or permanent).	D) 7ME3960-...	
Damping Material Used with gas meters, and required as part of their transducer installation. This material absorbs excess ultrasonic energy from the pipe wall to enable the meter to detect and operate with low amplitude transducer signals normally associated with Clamp-on Gas applications.	D) 7ME3960-...	
Test Block Used for checking operation of a meter and transducers prior to a field installation, or as a troubleshooting tool. Selected by transducer size, each block accommodates 2 transducer sizes. Available only for universal transducers.	D) 7ME3960-...	

Description	Order No.	
Termination Kit (Flow Transducer or RTD) Provides the connectors, labels and shrink tubing or other associated hardware to complete the termination of a specific cable type. These can be provided in cases where users will be purchasing bulk cable directly and cutting to length at their site, or when existing cable length is to be altered. Selected by cable type.	D) 7ME3960-...	

SITRANS F flowmeters

SITRANS F US

Accessories/Spare parts for clamp-on

Selection and Ordering data	Order No.
Spare parts (System)	
SITRANS FUS clamp-on	7ME3940 -
Power supplies, batteries and chargers	
Power supply 110 ... 230 V AC	
• for IP65 (NEMA 4X) or IP66 (NEMA 7 Wall mount)	D) 0PA00
• for FUS1020	D) 1PA00
• for IP65 (NEMA 7) Compact	D) 2PA00
Power supply 9 ... 36 V DC	
• for IP65 (NEMA 4X) or IP66 (NEMA7 Wall mount)	K) 0PB00
• for FUS1020	D) 1PB00
• negative ground for NEMA 7 Compact	D) 2PJ00
• positive ground for NEMA 7 Compact	D) 2PK00
Portable meter batteries and accessories	
• Internal battery (Portable meters only)	D) 3PP00
• External 4-hour battery for portable meters	D) 3BB00
• Charger for external 4-hour battery (for US)	D) 3BC10
• Charger for external 4-hour battery (for Europe)	D) 3BC20
• 4-hour battery charger adapter for NEMA 6, weatherproof portable	D) 3BA00
IP67 Portable meter charger	
• Type A for Europe (CEE7/7)	D) 3PC00
• Type C for Australia (AS3112)	D) 3PD00
• Type D for UK (BS1363)	D) 3PE00
• Type J for Japan (JIS8303)	D) 3PF00
• Type K for US (NEMA 5-15P)	D) 3PG00
• Type L for Switzerland (SEV1011)	D) 3PH00
IP40 Portable meter charger	
• Type A for Europe (CEE7/7)	D) 4PC00
• Type C for Australia (AS3112)	D) 4PD00
• Type D for UK (BS1363)	D) 4PE00
• Type J for Japan (JIS8303)	D) 4PF00
• Type K for US (NEMA 5-15P)	D) 4PG00
• Type L for Switzerland (SEV1011)	D) 4PH00
System computer modules	
Modbus converter module	D) CQO-1015N-5M
Mounting kit (type 1) for Modbus converter module	D) CQO-1015N-5M-MK1
Mounting kit (type 2) for Modbus converter module	D) CQO-1015N-5M-MK2
Mounting kit (type 3) for Modbus converter module	D) CQO-1015N-5M-MK3
Field configuration kit with manual, for Modbus converter module	D) CQO-1015N-5M-FK1
Pipe mounting brackets	
2 inch pipe mounting bracket for IP65 (NEMA 7)	D) CQO-1012XMB-1
2 inch pipe mounting bracket for IP65 (NEMA 4X)	D) CQO-1012NMB-1

Selection and Ordering data	Order No.
Spare parts (Transducers)	
SITRANS FUS clamp-on	
Meter type	
Dedicated (FUS1010, FUG1010, FUH1010, FUE1010, FUS1020)	D) 7ME3950 -
Portable (FUP1010 or FUE1010)	D) 7ME3951 - 0
Approvals	
UL, ULc, CE (FUS1020 and Portable only)	0
FM/CSA hazardous (classified) locations	1
ATEX Ex II 1G EEx ia IIC T5 (not for RTDs)	2
INMETRO (not for RTDs)	3
Spare transducer code	
<u>For liquid flow transducers pipe ranges please refer to transducer selection chart in the FUS1010 section</u>	
<u>Liquid flow transducers for use with mounting frames or tracks (including portable)</u>	
A2 universal	LB00
B3 universal	LC00
C3 universal	LD00
D3 universal	LE00
E2 universal ¹⁾	LF00
A1H (high precision)	LG00
A2H (high precision)	LH00
A3H (high precision)	LJ00
B1H (high precision)	LK00
B2H (high precision)	LL00
B3H (high precision)	LT00
C1H (high precision)	LM00
C2H (high precision)	LN00
D1H (high precision) ²⁾	LP00
D2H (high precision) ²⁾	LQ00
D3H (high precision) ²⁾	LU00
D4H (high precision) ²⁾	LR00
Doppler	LS00
<u>High precision liquid transducer for weld seal enclosures</u>	
B1H (high precision, weld seal)	SK00
B2H (high precision, weld seal)	SL00
B3H (high precision, weld seal)	ST00
C1H (high precision, weld seal)	SM00
C2H (high precision, weld seal)	SN00
D1H (high precision, weld seal)	SP00
D2H (high precision, weld seal)	SQ00
D3H (high precision, weld seal)	SU00
D4H (high precision, weld seal)	SR00
<u>High temperature universal liquid transducers</u>	
Note: not available with INMETRO approval	
High temp. transducer size 1 for up to 230 °C (12.7 to 100 mm diam.)	LA10
High temp. transducer size 2 for up to 230 °C (30 to 200 mm diam.)	LA20
High temp. transducer size 3 for up to 230 °C (150 to 600 diam.)	LA30
High temp. transducer size 4 for up to 230 °C (400 to 1200 diam.)	LA40

¹⁾ Supplied spacer bar supports pipes up to 1050 mm (42 inches). For pipes larger than 1050 mm (42 inches) purchase also, spare part 7ME3960-OMS40 (1012BN-4)

²⁾ Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-OMS40 (1012BN-4)

D) Subject to export regulations AL: N, ECCN: EAR99H.
K) Subject to export regulations AL: N, ECCN: 5A991X.

SITRANS F flowmeters

SITRANS F US

Accessories/Spare parts for clamp-on

Selection and Ordering data	Order No.
Spare parts (Transducers)	
SITRANS FUS clamp-on	
Meter type	
Dedicated (FUS1010, FUG1010, FUH1010, FUE1010, FUS1020)	D) 7ME3950 -
Portable (FUP1010 or FUE1010)	D) 7ME3951 - 0
<u>FUS1020 High precision liquid flow transducer</u>	
A1H (high precision FUS 1020)	0LG10
A2H (high precision FUS 1020)	0LH10
A3H (high precision FUS 1020)	0LJ10
B1H (high precision FUS 1020)	0LK10
B2H (high precision FUS 1020)	0LL10
C1H (high precision FUS 1020)	0LM10
C2H (high precision FUS 1020)	0LN10
D1H (high precision FUS 1020) ¹⁾	0LP10
D2H (high precision FUS 1020) ¹⁾	0LQ10
<u>For gas flow transducers pipe ranges please refer to transducer selection chart in the FUG1010 section</u>	
<u>High precision gas flow transducers for use with mounting frames or tracks</u>	
B1H (high precision)	GK00
B2H (high precision)	GL00
B3H (high precision)	GT00
C1H (high precision)	GM00
C2H (high precision)	GN00
D1H (high precision)	GP00
D2H (high precision)	GQ00
D3H (high precision)	GU00
D4H (high precision)	GR00
<u>High precision gas transducer for weld seal enclosures</u>	
B1H (high precision, weld seal)	HK00
B2H (high precision, weld seal)	HL00
B3H (high precision, weld seal)	HT00
C1H (high precision, weld seal)	HM00
C2H (high precision, weld seal)	HN00
D1H (high precision, weld seal)	HP00
D2H (high precision, weld seal)	HQ00
D3H (high precision, weld seal)	HU00
D4H (high precision, weld seal)	HR00
<u>Standard RTD transducers (not for energy systems)</u>	
Standard clamp-on RTD	1TA00
Submersible clamp-on RTD (not for portable)	1TB00
Insertion style RTD pair (size 1), 140 mm (5.5 inch)	1TJ00
Insertion style RTD pair (size 2), 216 mm (8.5 inch)	1TJ01
Insertion style RTD pair (size 3), 292 mm (11.5 inch)	1TJ02
Insertion style RTD pair (size 4), 368 mm (14.5 inch)	1TJ03

Selection and Ordering data	Order No.
Spare parts (Transducers)	
SITRANS FUS clamp-on	
Meter type	
Dedicated (FUS1010, FUG1010, FUH1010, FUE1010, FUS1020)	D) 7ME3950 -
Portable (FUP1010 or FUE1010)	D) 7ME3951 - 0
<u>Standard for energy system (matched pair)</u>	
Standard clamp-on RTD	1TA10
Insertion style RTD pair (size 1) for Energy system FUE1010, 140 mm (5.5 inch)	1TJ10
Insertion style RTD pair (size 2) for Energy system FUE1010, 216 mm (8.5 inch)	1TJ11
Insertion style RTD pair (size 3) for Energy system FUE1010, 292 mm (11.5 inch)	1TJ12
Insertion style RTD pair (size 4) for Energy system FUE1010, 368 mm (14.5 inch)	1TJ13
¹⁾ Supplied spacer bar supports pipes up to 750 mm (30 inches). For pipes larger than 750 mm (30 inches) purchase also, spare part 7ME3960-0MS40 (1012-BN-4)	

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

SITRANS F flowmeters

SITRANS F US

Accessories/Spare parts for clamp-on

Selection and Ordering data	Order No.
<i>Spare parts (Miscellaneous)</i>	
SITRANS FUS clamp-on	D) 7ME 3 9 6 0 -
Meter design	
IP65 (NEMA 4X) or IP66 (NEMA 7 wall mount)	0
IP65 (NEMA 4) FUS1020	1
IP65 (NEMA 7) Compact	2
IP67 Weather proof portable	3
IP40 (NEMA 1) Portable	4
Dedicated transducer mounting hardware	
Transducer mounting frames for	
• Universal transducer size B (for pipes > 125 mm (5 inch))	D) CQO-1012FN-PB
• Universal transducer size C	0MC 0 0
• Universal transducer size D	0MC 0 1
• Universal transducer size E	0MC 0 2
• High precision transducer size B (for pipes > 125 mm (5 inch))	D) CQO-1012FNH-PB
• High precision transducer size C	0MD 0 0
• High precision transducer size D	0MD 0 1
Spacer bars (for indexing transducers on pipe)	
• Spacer bars for pipes to 200 mm/8 inch (liquid), 600 mm / 24 inch (gas)	0MS 1 0
• Spacer bars for pipes to 500 mm/20 inch (liquid), DN 1200 / 48 inch (gas)	0MS 2 0
• Spacer bars for pipes to 800 mm/32 inch (liquid)	0MS 3 0
• Spacer bars for pipes to 1200 mm/48 inch (liquid) Only use in conjunction with 7ME3960-0MS30	0MS 4 0
Mounting straps for mounting frames (slotted stainless steel)	
• For pipes from DN 50 to DN 150	0SM 0 0
• For pipes from DN 50 to DN 300	0SM 1 0
• For pipes from DN 300 to DN 600	0SM 2 0
• For pipes from DN 600 to DN 1200	0SM 3 0
• For pipes from DN 1200 to DN 1500	0SM 4 0
• For pipes from DN 1500 to DN 2100	0SM 5 0
• For pipes from DN 2100 to DN 3000	0SM 6 0
Weld seal mounting enclosures for liquid and gas transducers	
• Single enclosure for size B high precision	0WS 1 0
• Single enclosure for size C high precision	0WS 2 0
• Single enclosure for size D high precision	0WS 3 0
• Single enclosure for size E universal	0WS 4 0
• Dual enclosure for size C high precision	0WD 2 0
• Dual enclosure for size D high precision	0WD 3 0
• Dual enclosure for size E universal	0WD 4 0
Stainless steel bands for weld seal enclosure mounting	
• Mounting strap for pipe diameter to 300 mm (13 inch)	0SM 0 1
• Mounting strap for pipe diameter to 600 mm (24 inch)	0SM 1 1
• Mounting strap for pipe diameter to 1200 mm (48 inch)	0SM 2 1
• Mounting strap for pipe diameter to 1500 mm (60 inch)	0SM 3 1
• Mounting strap for pipe diameter to 2130 mm (84 inch)	0SM 4 1
• Mounting strap for pipe diameter to 3050 mm (120 inch)	0SM 5 1

Selection and Ordering data	Order No.
<i>Spare parts (Miscellaneous)</i>	
SITRANS FUS clamp-on	D) 7ME 3 9 6 0 -
Transducer mounting tracks (aluminium with mounting straps) for pipes < 125 mm (5 inch)	
• Universal transducer size A or B	0MA 0 0
• High precision transducer size A or B	0MB 0 0
Stainless mounting tracks for high temp 991 transducers	
• Size 1 high temp transducer pair	D) CQO-992MTNHMSH-1
• Size 2 high temp transducer pair	D) CQO-992MTNHMSH-2
• Size 3 high temp transducer pair	D) CQO-992MTNHMSH-3
• Size 4 high temp transducer pair	D) CQO-992MTNHMSH-4
Clamp-on RTD mounting hardware for dedicated systems	
• RTD mounting hardware for dedicated system: 152 to 610 mm (6 to 24 inch)	0MR 0 0
• RTD mounting hardware for dedicated system: 12.7 to 50.8 mm (0.5 to 2 inch)	0MR 0 1
• RTD mounting hardware for dedicated system: 31.8 to 203.2 mm (1.25 to 8 inch)	0MR 0 2
• RTD mounting hardware for dedicated system: 508 to 1219 mm (20 to 48 inch)	0MR 0 4
• Junction box for clamp on RTD's	D) CQO-992ECJ
Portable transducer mounting hardware	
Transducer mounting frames	
• Universal transducer size B (for pipes > 125 mm (5 inch))	D) CQO-1012FP-PB
• Universal transducer size C	3MC 0 0
• Universal transducer size D	3MC 0 1
• Universal transducer size E	3MC 0 2
• High precision transducer size B (for pipes > 125 mm (5 inch))	D) CQO-1012FPH-PB
• High precision transducer size C	3MD 0 0
• High precision transducer size D	3MD 0 1
Spacer bar (for indexing portable transducers)	3MS 0 0
Mounting chain and EZ clamp hardware	
• EZ clamp hardware set for DN 25 to DN 600 (1 to 24 inch); handles all transducers except "D" size HP and "E" size univ.	D) CQO-1012Z-1
• EZ clamp hardware set for DN 25 to DN 600 (1 to 24 inch) for "D" size HP and "E" size universal	D) CQO-1012Z-2
• Mounting chain for portable transducers: 4 x 760 mm lengths	3CM 1 0
• Mounting chain for portable transducers: 2 x 760 mm and 2 x 1500 mm lengths	3CM 2 0
Transducer mounting tracks for portable transducers (aluminum with mounting chains) for pipes < 125 mm (5 inch) for	
• Universal transducer size A or B	3MA 0 0
• High precision transducer size A or B	3MB 0 0
RTD mounting hardware for portable system	3MR 0 0
Transducer connector adaptors	
• "F" connector to BNC adapter (order 2 per transducer set)	D) CQO-1012NFPA

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

SITRANS F flowmeters

SITRANS F US

Accessories/Spare parts for clamp-on

Selection and Ordering data	Order No.
<i>Spare parts (Miscellaneous)</i>	
SITRANS FUS clamp-on	D) 7ME 3 9 6 0 -
Insert RTD Thermowells	
• Thermowell std. duty uninsulated pipe 140 mm (5.5 inch)	D) CQO-1012TW-1
• Thermowell std. duty uninsulated pipe 216 mm (8.5 inch)	D) CQO-1012TW-2
• Thermowell std. duty uninsulated pipe 292 mm (11.5 inch)	D) CQO-1012TW-3
• Thermowell std. duty with lagging 140 mm (5.5 inch)	D) CQO-1012TW-1L
• Thermowell std. duty with lagging 216 mm (8.5 inch)	D) CQO-1012TW-2L
• Thermowell std. duty with lagging 292 mm (11.5 inch)	D) CQO-1012TW-3L
Transducer cables for (Use „Transducer cable selection chart“ to complete Order No. with ##)	
• IP65 (NEMA 4X) or IP 66 (NEMA 7 wall mount)	0 C K ##
• IP65 (NEMA 4) FUS 1020	1 C K ##
• IP65 (NEMA 7) Compact	2 C K ##
• IP67 Weather proof portable	3 C K ##
• IP40 (NEMA 1) Energy portable	4 C K ##
RTD cables for (Use „Transducer cable selection chart“ to complete Order No. with ##)	
• All dedicated systems (except FUS 1020)	0 C R ##
• IP67 Weather proof portable	3 C R ##
• IP40 (NEMA 1) Energy portable	4 C R ##
Dedicated cable termination kits	
• Standard, plenum and armored transducer cable (NEMA 4X and NEMA 7 wall)	0 C T 0 1
• Submersible transducer cable (NEMA 4X and NEMA 7 wall)	0 C T 1 1
• Standard and plenum transducer cable (FUS1020)	1 C T 0 1
• Standard, plenum and armored transducer cable (compact NEMA 7)	2 C T 0 1
• Submersible transducer cable (compact NEMA 7)	2 C T 1 1
• Clamp-on RTD cable termination kit for standard RTD	0 C T 2 1
• Clamp-on RTD cable termination kit for submersible RTD	0 C T 3 1
• Insert RTD cable termination kit	0 C T 4 1

Selection and Ordering data	Order No.
<i>Spare parts (Miscellaneous)</i>	
SITRANS FUS clamp-on	D) 7ME 3 9 6 0 -
Ultrasonic couplants	
• Temporary water based for portable systems: 350 ml (12 oz): -34 ... +38 °C (-30 ... +100 °F)	0 U C 1 0
• Permanent synthetic polymer based: 90 ml (3 oz) -40 ... +190 °C (-40 ... +375 °F)	0 U C 2 0
• Permanent high temp fluoroether: 12 ml (0.4 oz): -40 ... +230 °C (-40 ... +450 °F)	0 U C 3 0
• Permanent high temp fluoroether: 163 ml (5.5 oz): -40 ... +230 °C (-40 ... +450 °F)	0 U C 3 1
• Permanent vulcanizing silicone rubber couplant: 90 ml (3 oz): -40 ... +120 °C (-40 ... +250 °F)	D) CQO-CC112
• Permanent high temp silicone grease: 12 ml (0.4 oz): -40 ... +230 °C (-40 ... +450 °F)	D) CQO-CC117
• Permanent high temp silicone grease: 150 ml (5 oz): -40 ... +230 °C (-40 ... +450 °F)	D) CQO-CC117A
• Couplant for submersible transducer applications	D) CQO-CC120
Pipe damping films for FUG gas systems	
• B1, B2, B3, C1 and C2 transducers	0 D M 1 0
• D1 and D3 transducers	0 D M 2 0
• D2 transducer	0 D M 3 0
• D4 transducer	0 D M 4 0
Serial RS232 Cables and I/O Adapters	
• RS232 Cable for all dedicated meters	0 C S 0 0
• RS232 Cable for IP66 Weather proof portable meter	3 C S 0 0
• RS232 Cable for IP40 Portable meter	4 C S 0 0
• I/O adapter for IP66 Weather proof portable meter	3 A D 0 0
Universal Transducer Test Blocks	
• Test block for size A and B universal transducers	0 T B 1 0
• Test block for size C and D universal transducers	0 T B 2 0
Field Manuals	
• CD with documentation for SITRANS F US Clamp-on ultrasonic flowmeters (English)	D) CQO-CDM0001

SITRANS F flowmeters

SITRANS F US

Accessories/Spare parts for clamp-on

Transducer cable selection chart (Dedicated, Pair)

Transducer cable codes for length and type options				
Cable length m (ft)	Standard -40...+80 °C (-40...+176 °F)	Submersible -40...+80 °C (-40...+176 °F)	Plenum -40...+200 °C (-40...+392 °F)	Armored -40...+80 °C (-40...+176 °F)
	Order code			
6 (20)	K01	K11	K21	K31
15 (50)	K02	K12	K22	K32
30 (100)	K03	K13	K23	K33
46 (150)	K04	K14	K24	K34
61 (200)	K05	K15	K25	K35
91 (300)	K06	K16	K26	K36

Transducer cable selection chart (FUP1010, Portable FUE1010, pair)

Transducer cable codes for length and type options		
Cable length m (ft)	Standard -40 ... + 80 °C (-40 ... +176 °F)	Plenum -40 ... + 200 °C (-40 ... +392 °F)
	Order Code	
6 (20)	K01	K21
15 (50)	K02	K22
30 (100)	K03	K23

RTD cable selection chart (Dedicated, each)

RTD cable codes for length and type				
Cable length m (ft)	Standard -40 ... +200 °C (-40 ... +392 °F)	Submersible -40 ... +200 °C (-40 ... +392 °F)	for insert RTD -40 ... +200 °C (-40 ... 392 °F)	for submersible insert RTD -40 ... +200 °C (-40 ... 392 °F)
	Order code			
6 (20)	R01	R11	R21	R31
15 (50)	R02	R12	R22	R32
30 (100)	R03	R13	R23	R33
46 (150)	R04	R14	R24	R34
61 (200)	R05	R15	R25	R35
91 (300)	R06	R16	R26	R36

RTD cable selection chart (FUP1010, Portable FUE1010, each)

RTD cable codes for length and type options	
Cable length m (ft)	IP67 -40 ... + 200 °C (-40 ... +392 °F)
	Order Code
6 (20)	R11
15 (50)	R12
30 (100)	R13

Accessories - Mainstream offering

Description	Recommended safety stock	Order No.
Insert RTD size 1	5	D) 7ME3950-1TJ10
Thermowell size 1 w/lagging	5	D) CQO:1012TW-1L
EZ Clamp 1 ... 24 inch	20	D) CQO:1012Z-1
Junction Box for Clamp RTD	10	D) CQO:992ECJ
Term kit standard, Plenum, Armored sensor cable	50	D) 7ME3960-0CT01
Term kit Submersible sensor cable	50	D) 7ME3960-0CT11
C1 Weld seal	12	D) 7ME3960-0WS20
D1 Weld Seal	12	D) 7ME3960-0WS30
C2 Weld Seal	12	D) 7ME3960-0WD20
D2 Weld Seal	12	D) 7ME3960-0WD30
Straps size 2	50	D) 7ME3960-0SM11
Straps size 3	20	D) 7ME3960-0SM21
Straps size 4	8	D) 7ME3960-0SM31
Weld seal transducers C2 FM	14	D) 7ME3950-1SN00
Weld seal transducers D1 FM	14	D) 7ME3950-1SP00
Weld seal transducers D2 FM	12	D) 7ME3950-1SQ00
Weld seal transducers D4 FM	8	D) 7ME3950-1SR00
Weld seal transducers C2 ATEX	14	D) 7ME3950-2SN00
Weld seal transducers D1 ATEX	14	D) 7ME3950-2SP00
Weld seal transducers D2 ATEX	12	D) 7ME3950-2SQ00
Weld seal transducers D4 ATEX	8	D) 7ME3950-2SR00
Weld seal transducers Gas C2 FM	14	D) 7ME3950-1HN00
Weld seal transducers Gas D1 FM	14	D) 7ME3950-1HP00
Weld seal transducers Gas D2 FM	12	D) 7ME3950-1HQ00
Weld seal transducers Gas D4 FM	6	D) 7ME3950-1HR00
Weld seal transducers Gas C2 ATEX	14	D) 7ME3950-2HN00
Weld seal transducers Gas D1 ATEX	14	D) 7ME3950-2HP00
Weld seal transducers Gas D2 ATEX	12	D) 7ME3950-2HQ00
Weld seal transducers Gas D4 ATEX	6	D) 7ME3950-2HR00

Mainstream product offering represents 4 to 6 weeks delivery time.

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

SITRANS F flowmeters

Continuous measurement - Open channel flow

OCM III

Overview



The OCM III is a high accuracy ultrasonic flow monitor for open channels.

Benefits

- Influent and effluent monitor
- BS 3680 calculations provide exceptional accuracy in measuring flow
- 1 to 24 months data log, subject to logging rate
- RS-232 serial communication
- High accuracy on unique or non-standard weirs and flumes
- AC and DC operation. Automatically switches to battery operation for uninterrupted power
- Dual power input
- Low power remote monitoring
- Flow Reporter software available for remote monitoring, configuration and data retrieval

Application

In addition to monitoring flowrate in sewage works, OCM III can monitor industrial discharge, rainfall/storm water studies, in-flow/infiltration studies and sewer system evaluations. As well as being compatible with many standard weirs and flumes, the programmable head versus flow curve (up to 16 points) accurately defines flow rate on unique or non-standard weirs and flumes.

The OCM III has data logging and is adjustable from once per minute to once a day. It records the average flow rate for that time period. Daily, it records minimum/maximum of temperature and flow rates, and the time they occurred, as well as the daily total. Advanced functions include variable rate logging. It can be pre-programmed to log at a higher rate when needed. Under steady conditions, the OCM III automatically logs less frequently to conserve data log space.

The OCM III has two-way communication via RS-232 with a modem or a bi-polar current loop with a current-to-voltage communication converter. Data logs can be downloaded to a file that can be manipulated into a spreadsheet or ASCII format.

Technical specifications

Mode of Operation

Measuring range¹⁾ 0.3 to 1.2 m (1 to 4 ft) or 0.6 to 3 m (2 to 10 ft)

Output

Transducer Echomax® XRS-5, 44 kHz

Relays 3 alarm/control relays, 1 SPDT Form C contact per relay, rated 5 A at 250 V AC non-inductive or 30 V DC

mA output	0/4 to 20 mA, isolated
• Max. load	1 K Ω max. load
• Resolution	5 μ A
• Isolation	300 V AC continuous
• DC output	+24 V DC, 20 mA average to 200 mA at 1/10 duty cycle max. 0 to 20

Accuracy

Error in measurement	± 1 mm/m, calculated error less than 0.02%
Resolution	0.2 mm (0.007")

Rated operating conditions

Installation conditions

Location	Indoor/outdoor
Installation category	II
Pollution degree	4

Ambient conditions

Ambient temperature (enclosure)	-20 to +50 °C (-5 to +122 °F)
---------------------------------	-------------------------------

Design

Weight	2.3 kg (5.1 lbs)
Material (enclosure)	Polycarbonate
Degree of protection (enclosure)	IP65/Type 4X/NEMA 4X

Cable

Transducer and mA output signal	• Transducer: co-axial to be RG62-A/U low capacity • mA output signal to be 2 copper conductors, twisted, with foil shield/drain wire, 300 V 0.5 to 0.75 mm² (22 to 18 AWG) • Relay/power to be copper conductors per local requirements to meet 250 V 5 A contact rating
Max. separation between transducer and transceiver	183 m (600 ft)

Displays and controls

Programming	LCD 5 x 7 dot matrix display with 2 lines of 40 characters each
Memory	Via removable programmer and communication link
	3 V battery (NEDA 5003LC or equivalent), operating life 1 year, SuperCap capacitor for back-up during battery replacement

Power supply

AC version	100/115/200/230 V AC $\pm 15\%$, 50/60 Hz, 20 VA max.
DC version	9 to 30 V DC, 8 W max.

Certificates and approvals

CE, FM, CSA_{NRTL}/C, MCERTS, C-TICK²⁾

Communication

RS-232 or ± 20 mA bipolar current loop, 300, 600, 1200, 2400, 4800, 9600, 19200 baud

Options

Temperature sensor	TS-2
Remote monitoring	Flow Reporter, a Windows®-based configuration software and data extractor
Velocity sensor	Consult with factory

¹⁾ Program range is defined as the empty distance to the face of the transducer plus any range extension

²⁾ EMC performance available upon request
Windows® is a registered trademark of Microsoft Corporation

SITRANS F flowmeters

Continuous measurement - Open channel flow

OCM III

Selection and Ordering data

Order No.

OCM III

High accuracy ultrasonic flow monitor for open channels.

C) **7ML1002-**

A 0

Input voltage

AC, voltage selector switch

0

Enclosure

Wall mount, standard enclosure
Wall mount, 6 entries, M20 holes¹⁾A
B

Approvals

CSANRTL/C, FM, CE (EN61326), C-TICK
CE²⁾5
6

Instruction manual

English

C) **7ML1998-5AB01**

French

C) **7ML1998-1AB11**

Spanish

C) **7ML1998-1AB21**

German

C) **7ML1998-1AB31**

Note: The instruction manual should be ordered as a separate line on the order.

This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and instruction manual library.

Required equipment

TS-2 Temperature Sensor

TS-2, 1 m cable

C) **7ML1812-1AA1**

TS-2, 5 m cable

C) **7ML1812-2AA1**

TS-2, 10 m cable

C) **7ML1812-3AA1**

TS-2, 30 m cable

C) **7ML1812-4AA1**

TS-2, 50 m cable

C) **7ML1812-5AA1**

TS-2, 70 m cable

C) **7ML1812-6AA1**

TS-2, 90 m cable

C) **7ML1812-7AA1**

TS-2 Instruction manual

C) **7ML1998-1EW01**

Note: The TS-2 instruction manual should be ordered as a separate line item on the order.

Accessories

Handheld programmer

7ML1830-2AA

Tag, stainless steel, 12 x 45 mm (0.47 x 1.77"), one text line, suitable for enclosure

7ML1930-1AC

M20 cable gland kit (6 M20 cable glands, 6 M20 nuts, 3 stop plugs)

7ML1830-1GM

Flow Reporter software license

B) **7ML1930-1AK**

Flow Reporter Kit (includes disk, authorization code and cable)

B) **7ML1930-1AL**

Spare parts

Card, Mother, main

C) **7ML1830-1MG**

Card, daughter/display

C) **7ML1830-1LT**

Card, LCD

7ML1830-1KY

Eprom

C) **7ML1830-1KW**

Battery

C) **7ML1830-1JV**

OCM III Lid overlay

7ML1830-1KV

¹⁾ Available with approval option 6 only

²⁾ Available with enclosure option B only

B) Subject to export regulations AL: N, ECCN: EAR99S

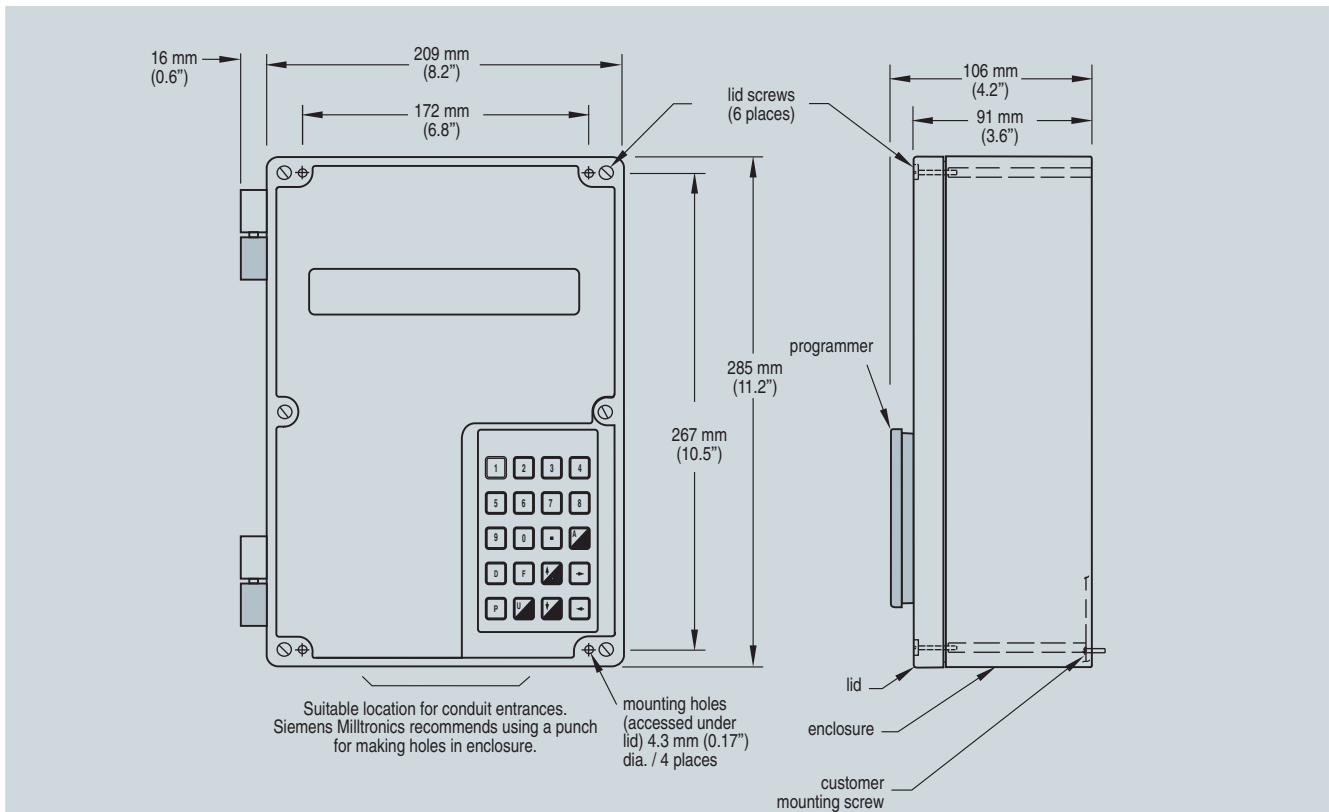
C) Subject to export regulations AL: N, ECCN: EAR99

SITRANS F flowmeters

Continuous measurement - Open channel flow

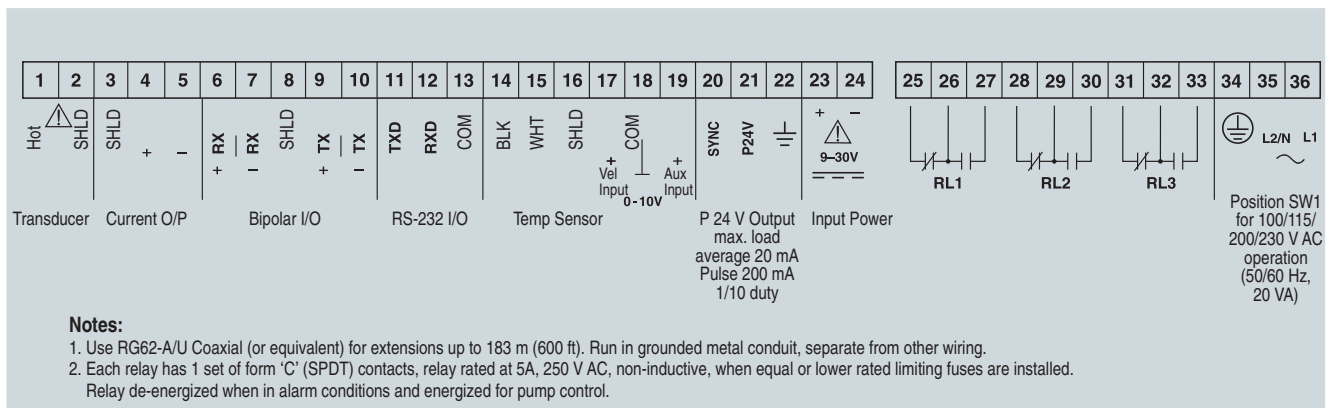
OCM III

Dimensional drawings



OCM III dimensions

Schematics



OCM III connections

SITRANS F flowmeters

SITRANS F X

SITRANS FX300

Overview



SITRANS F X vortex flowmeters provide accurate volumetric and mass flow measurement of steam, gases and liquids as an all-in-one solution with integrated temperature and pressure compensation.

Benefits

- All devices have 2-wire technology and HART communication
- Temperature compensation for saturated steam as standard feature
- Integrated temperature and pressure compensation enabling direct compensation of density
- Pressure, temperature and flow can be read at a single point. No additional installation of pressure and temperature sensors
- Direct measurement of energy
- Optimum process reliability thanks to Intelligent Signal Processing (ISP) - stable readings, free of external perturbations
- Fully welded stainless steel construction with high corrosion, pressure and temperature resistance
- Maintenance-free sensor design
- Ready to use due to plug & play feature. No additional cabling work
- Minimal pressure drop

Application

The SITRANS FX300 is a compact flowmeter in a single or dual transmitter version, suitable for measuring industrial steam, gases, as well as conductive and non-conductive liquids. E.g. steam (saturated steam, superheated steam), industrial gases (compressed air, nitrogen, liquefied gases, flue gases), and conductive and non-conductive liquids (demineralized water, boiler feed water, solvents, heat transfer oil).

The main applications of SITRANS FX300 can be found in the following sectors:

- Chemical
- Petrochemical
- Oil & Gas
- Power plants
 - Air
 - Heating
 - Cooling
 - Chilling
- Food & beverage
 - Pharmaceutical
 - Sugar refineries
 - Dairies
 - Breweries
 - Production of soft drinks
- Refining
- Water & waste water

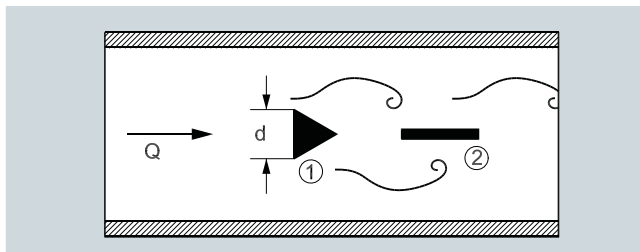
System Overview

Version	Single transmitter			Dual transmitter
Options	Standard	Pressure sensor	Pressure sensor and isolation valve	Standard
Flange				
Sandwich				

Function

Operating Principle

SITRANS F X vortex flowmeters measure flow rate by detecting the frequency at which alternating vortices are shed from a bluff body inserted into the flow stream. This principle of measurement is known as Von Karman's vortex street principle: alternating vortices form behind an object in a stream. The frequency of the alternating vortices is proportional to the flow rate. The passage of a vortex causes a slight stress on a pick-up placed downstream of the bluff body. The stress is picked up and counted as pressure surges by a dual Piezo crystal placed inside the wing.



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/ft³]
 d = diameter 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 rate must be 2 to 80 m/s (6.6 to 262 ft/s)
- For liquids the flow rate must be 0.4 to 10 m/s (1.3 to 32.8 ft/s)

Design

SITRANS FX300 volumetric and mass flowmeter is available in the following configurations:

SITRANS FX300 Single transmitter

The single transmitter is available as a flange or sandwich solution in the following versions:

- **Vortex standard flowmeter**
Measurement with integrated temperature sensor as standard feature
- **Vortex flowmeter with pressure sensor**
Measurement with integrated temperature and pressure sensors for compensation of gases, wet gases, gas mixtures or steam (for energy measurement).
- **Vortex flowmeter with pressure sensor and isolation valve**
Allowing the pressure sensor to be shut off for the purpose of pressure or leak testing of the pipeline or for being exchanged without interrupting the process. Using the built-in two-way valve, the pressure sensor can also be calibrated and tested at a later time.

SITRANS FX300 Dual transmitter

This is a genuine redundant system with two independent sensors and two converters providing twofold functional reliability and availability of the measurement. This variant is optimally suited for measurements in multi-product pipelines.

The dual converter is available as:

- **Vortex standard flowmeter**
Measurement with temperature sensor for saturated steam compensation as standard feature

Technical specifications

Input	
Measuring range limits	See „Dimensional Drawings“
Media pressure	1 ... 100 bar (Higher pressures on request)
Output	
Current output	
• Measuring range	4 ... 20 mA
• Over range	20.8 mA $\pm$ 1 % (105 % $\pm$ 1 %)
• Load	
- min.	100 Ω
- max.	$R_{\max} = (U_{\text{Power Supply}} - 14 \text{ V}) / 22 \text{ mA}$
• Error signal	NAMUR NE 43
• Maximum output	22 mA (112.5 %)
• Multidrop mode	4 mA
Digital output	
• Communication	HART
• Physical layer	FSK
• Device category	Transmitter
Pulse Output	
(Passive pulse output, needs separate power supply. Pulse output has to be defined in the Option menu Y47 totalizer or energy unit has to be entered. E.g.: 1 pulse/kg or 1 pulse/10 m ³)	
• Pulse frequency	Max. 0.5 Hz
• Power supply	Min. 24 V DC as NAMUR or
• Non-Ex version	open < 1 mA, max. 36 V, closed 100 mA, $U < 2 \text{ V}$
• Ex version	open < 1 mA, max. 30 V, closed 100 mA, $U < 2 \text{ V}$

Accuracy

Standard version

- For liquids
- $Re \geq 20\,000$ $\pm 0.75 \%$
- For steam and gases
- $Re \geq 20\,000$ $\pm 1 \%$
- For steam, gases and liquids
- $10\,000 < Re < 20\,000$ $\pm 2 \%$

Pressure and temperature-compensated version

- For liquids
- $10\,000 < Re < 20\,000$ $\pm 2 \%$
- $Re \geq 20\,000$ $\pm 0.75 \%$
- For gases and steam
- $10\,000 < Re < 20\,000$ $\pm 2.5 \%$
- $Re \geq 20\,000$ $\pm 1.5 \%$

Repeatability $\pm 0.1 \%$

Installation conditions

(At different conditions, e.g. installation after control valve, bends or reductions, please refer to the operating instructions.)

- Inlet run $\geq 20 \times DN$
- Outlet run $\geq 5 \times DN$

Software

Uncompensated for gases, steam and liquids, but temperature-compensated for saturated steam

Density-compensated by temperature and pressure for superheated steam, no energy calculation

Gross heat

When the device has to operate as a energy calculation device

- In options Y51 to Y56 add information regarding:
- Y51 Variable current output
 - Y52 Power unit
Select one of the following units from power units table in Y52: kJ/h, MJ/h, GJ/h, Btu/h, kcal/h, kW, MW or special (custom)
 - Y53 Fullscale power value
 - Y54 Variable pulse output
 - Y55 Totalizer on/off
 - Y56 Configures for totalizer select one of the following units from energy units table in Y56: kJ, MJ, GJ, Btu th, kcal, kWh, MWh or special (custom).

Gases and wet gases

Select 7

Wet gases

Select Y49 and enter relative humidity in %

FAD - Free Air Delivery

When the device has to operate close to a compressor

Select 8

In Y81 to Y87 add information regarding:

- Y81 Inlet suction temperature
- Y82 Atmosphere pressure
- Y83 Pressure drop filter
- Y84 Inlet relative humidity
- Y85 Actual revolutions per minute (of compressor)
- Y86 Rated rpm of compressor
- Y87 Outlet relative humidity. This information is available from compressor supplier.

Mixed gases

When the fluid is a gas mixture, make an SDR request (sheet available on intranet) and fill in gas names and amount in %

SITRANS F flowmeters

SITRANS F X

SITRANS FX300

Rated operation conditions

Ambient temperature

- Non-Ex version -40 ... +85 °C (-40 ... +185 °F)
- Ex version -40 ... +65 °C (-40 ... +149 °F)

Storage temperature -50 ... +85 °C (-58 ... +185 °F)

Media temperature -40 ... +240 °C (-40 ... +464 °F)

Density Taken into consideration when rating

Viscosity < 10 cP

Reynolds number 10 000 ... 2 300 000

Media pressure limit Max. 100 bar
(Higher pressure on request.
Make an SDR request, sheet available on intranet)

Design

Material

- Sensor: house/pick-up 1.4404(316L)/1.4435(316L)
Hastelloy C22 available
(make an SDR request, sheet available on intranet)
- Housing: transmitter Aluminium
Aluminium (paint petrol) for increased requirement
- Sensor gaskets: for pick-up and pressure sensor 1.4435(316L)/FPM or FFKM
FPM (Viton®) by steam and non-aggressive gases.
FFKM (Kalrez®) by chlorine and other aggressive gases (only available together with a pressure sensor).

Process connections Flange norm EN 1092-1 form B1/B2 or ASME B16.5 RF.
Other flanges on request.
Make an SDR request, sheet available on intranet

- Flange version DN 15 ... 300 (½ ... 12")

- Sandwich version DN 15 ... 100 (½ ... 4")

Degree of protection IP66/IP67

Dimensions and weights See „Dimensional Drawings“

Display and operating interface

Local display 2 lines, 10 characters per line

Languages German, English, French

Power supply

- Standard version 14 ... 36 V DC

- Ex version 14 ... 30 V DC

Certificates and approvals

Explosion protection

- ATEX II 2G EEx d ia [ia] IIC T6

- FM US/C Class I, II, III, Div 1 & 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

Choice Cleaning Class1 when fluid is oxygen or contains chloride.

Certificates

X-ray test on pressurized weldings and dye penetration test on pressure bearing weldings

Dye penetration test

SITRANS F flowmeters

SITRANS F X

SITRANS FX300

Selection and Ordering data		Order No.	
SITRANS FX300 Flanged Single transmitter and T_{max} = 240 °C (464 °F)		7 ME 2 6 0 0 -	
Connection size	Sensor size		
DN 15 (½")	DN 15	1 A	
DN 25 (1")	DN 25	2 B	
DN 40 (1½")	DN 40	2 K	
DN 50 (2")	DN 50	2 R	
DN 80 (3")	DN 80	3 L	
DN 100 (4")	DN 100	3 S	
DN 150 (6")	DN 150	4 M	
DN 200 (8")	DN 200	4 T	
DN 250 (10")	DN 250	4 W	
DN 300 (12")	DN 300	5 E	
Flange norm and nominal pressure			
Form B1/B2	EN 1092-1		
PN 10	DN 200 ... 300	A	
PN 16	DN 50 ... 300	B	
PN 25	DN 200 ... 300	C	
PN 40	DN 15 ... 300	D	
PN 63	DN 50 ... 150	E	
PN 100	DN 15 ... 150	F	
RF	ASME B16.5		
150 lb	½ ... 12"	J	
300 lb	½ ... 12"	K	
600 lb	½ ... 6"	L	
Sensor material/Gasket			
Stainless steel 1.4404 (316L)/1.4435 (316L)/FPM		1	
Stainless steel 1.4404 (316L)/1.4435 (316L)/FFKM		5	
Transmitter design			
Compact, none cable		1	
Approval and cable gland			
Non Ex, M20x1,5		1	
Non Ex, ½" NPT		2	
ATEX, M20x1,5		4	
ATEX, ½" NPT		5	
FM US/C, M20x1.5		6	
FM US/C, ½" NPT		7	
Transmitter, display and communication			
With display, HART		A	
Pressure sensor and isolation valve			
Without pressure sensor		A	
With pressure sensor, range:			
4 bar		B	
6 bar		D	
10 bar		E	
16 bar		G	
25 bar		H	
40 bar		K	
60 bar		L	
100 bar		N	
With isolation valve and pressure sensor, range:			
4 bar		P	
6 bar		Q	
10 bar		R	
16 bar		S	
25 bar		U	
40 bar		V	
60 bar		W	
100 bar		Y	

Selection and Ordering data		Order No.	
SITRANS FX300 Flanged Single transmitter and T_{max} = 240 °C (464 °F)		7 ME 2 6 0 0 -	
Software			
Uncompensated for gases, wet gases, steam and liquids, respectively, temperature compensation for saturated steam			1
Density compensation for superheated steam			4
Density compensation for superheated steam and setting of Gross heat Opt. Y51 ... Y56 for Energy measuring			5
Density compensation for gases and wet gases and setting of Relative humidity at opt. Y49			7
Density compensation for gases, wet gases and setting of FAD - free air delivery Opt. Y49 and Y81 ... Y87 for Compressor settings			8
Selection and Ordering data		Order code	
Further designs Please add "-Z" to Order No. and specify Order code.			
Converter housing material			
Aluminium for increased requirement, color: petrol green		A10	
Material certificate			
Certificate of compliance EN 10204-2.1		C10	
Pressure test + 3.1 accordance EN 10204		C11	
Material certificate pressure parts + certificate 3.1		C12	
Material in accordance with NACE MR 0175-01		C13	
PMI of pressure bearing metal parts + certificate 3.1		C14	
Material certificate pressure parts + PMI/certificate 3.1		C15	
Calibration certificate FX300 As standard the flow device has a 3-point calibration certificate.			
Calibration certificate (5 point)		D11	
Hardness test			
Hardness test on pressure bearing parts + 3.1 Equotip LD procedure according to NACE MR 0175-01		H30	
Cleaning for oil and fat			
Class 1 increased requirement (customer-specified)		K46	
Class 1 and 3.1 (EN 10204)		K48	
Certificates			
X-ray test on pressurized 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	

SITRANS F flowmeters

SITRANS F X

SITRANS FX300

Selection and Ordering data Order code

Additional data

Please add "-Z" to Order No. and specify Order code and plain text.

Input process data

Medium: Specify steam, gas, liquid or customised	Y40
Temperature: Specify max./operating temperature and units	Y41
Pressure: Specify max./operating pressure and units	Y42
Density; (only by customized medium): Specify medium density and units	Y43
Viscosity; (only by customized medium): Specify medium viscosity and units	Y44
Flow rate: Specify min./max. flow rate and units	Y45
Setting of pulse output: Specify totalizer or energy unit (1 pulse/unit)	Y47
Relative humidity (amount in %)	Y49

Settings of gross heat

Variable current output	Y51
Power unit (specify: kJ/h, MJ/h, GJ/h, Btu/h, kcal/h, kW, MW or special(custom))	Y52
Fullscale power value	Y53
Variable pulse output	Y54
Totalizer on/off	Y55
Configure totalizer (specify: kJ, MJ, GJ, Btu th, kcal, kWh, MWh or special(custom))	Y56

Settings of FAD

Inlet suction temperature	Y81
Atmosphere pressure	Y82
Pressure drop filter	Y83
Inlet relative humidity	Y84
Actual revolutions per minute (of compressor)	Y85
Rated Rpm of compressor	Y86
Outlet relative humidity This information is available from compressor supplier.	Y87

SITRANS F flowmeters

SITRANS F X

SITRANS FX300

Selection and Ordering data		Order No.
SITRANS FX300 Sandwich Single transmitter and T_{max} = 240 °C (464 °F)		7 ME 2 7 0 0 -
Connection size	Sensor size	
DN 15 (½")	DN 15	1 A
DN 25 (1")	DN 25	2 B
DN 40 (1½")	DN 40	2 K
DN 50 (2")	DN 50	2 R
DN 80 (3")	DN 80	3 L
DN 100 (4")	DN 100	3 S
Nominal pressure		
EN		
PN 16	DN 50 ... 100	B
PN 40	DN 15 ... 100	D
PN 63	DN 50 ... 100	E
PN 100	DN 15 ... 100	F
ASME		
150 lb	½ ... 4"	J
300 lb	½ ... 4"	K
600 lb	½ ... 4"	L
Sensor material/Gasket		
Stainless steel 1.4404 (316L)/1.4435 (316L)/FPM		1
Stainless steel 1.4404 (316L)/1.4435 (316L)/FFKM		5
Transducer design		
Compact, no cable		1
Approval and cable gland		
Non Ex, M20x1,5		1
Non Ex, ½" NPT		2
ATEX, M20x1,5		4
ATEX, ½" NPT		5
FM US/C, M20x1.5		6
FM US/C, ½" NPT		7
Transmitter, display and communication		
With display, HART		A
Pressure sensor and isolation valve		
Without pressure sensor		A
With pressure sensor, range:		
4 bar		B
6 bar		D
10 bar		E
16 bar		G
25 bar		H
40 bar		K
60 bar		L
100 bar		N
With isolation valve and pressure sensor, range:		
4 bar		P
6 bar		Q
10 bar		R
16 bar		S
25 bar		U
40 bar		V
60 bar		W
100 bar		Y
Software		
Uncompensated for gases, wet gases, steam and liquids respectively temperature compensation for saturated steam		1
Density compensation for superheated steam		4
Density compensation for superheated steam and setting of Gross heat Opt. Y51 ... Y56 for Energy measuring		5
Density compensation for gases and wet gases and setting of Relative humidity at opt. Y49		7
Density compensation for gases, wet gases and setting of FAD - free air delivery Opt. Y49 and Y81 ... Y87 for Compressor settings		8

Selection and Ordering data	Order code
Further designs Please add "-Z" to Order No. and specify Order code.	
Converter housing material Aluminium for increased requirement, color: petrol green	A10
Material certificate Certificate of compliance EN 10204-2.1	C10
Pressure test + 3.1 accordance EN 10204	C11
Material certificate pressure parts + certificate 3.1	C12
Material in accordance with NACE MR 0175-01	C13
PMI of pressure bearing metal parts + certificate 3.1	C14
Material certificate pressure parts + PMI/certificate 3.1	C15
Calibration certificate FX300 As standard the flow device has a 3-point calibration certificate.	
Calibration certificate (5-point)	D11
Hardness test Hardness test on pressure bearing parts + 3.1 Equotip LD procedure according to NACE MR 0175-01	H30
Cleaning for oil and fat Class 1 increased requirement (customer-specified)	K46
Class 1 and 3.1 (EN 10204)	K48
Certificates X-ray test on pressurized 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

SITRANS F flowmeters

SITRANS F X

SITRANS FX300

Selection and Ordering data Order code

Additional data

Please add "-Z" to Order No. and specify Order code and plain text.

Input process data

Medium: Specify steam, gas, liquid and customised	Y40
Temperature: Specify max./operating temperature and units	Y41
Pressure: Specify max./operating pressure and units	Y42
Density: (only by customized medium): Specify medium density and units	Y43
Viscosity: (only by customized medium): Specify medium viscosity and units	Y44
Flow rate: Specify min./max. flow rate and units	Y45
Setting of pulse output: Specify totalizer or energy unit (1 pulse/unit)	Y47
Relative humidity (amount in %)	Y49

Settings of gross heat

Variable current output	Y51
Power unit (specify: kJ/h, MJ/h, GJ/h, Btu/h, kcal/h, kW, MW or special(custom))	Y52
Fullscale power value	Y53
Variable pulse output	Y54
Totalizer on/off	Y55
Configure totalizer (specify: kJ, MJ, GJ, Btu th, kcal, kWh, MWh or special(custom))	Y56

Settings of FAD

Inlet suction temperature	Y81
Atmosphere pressure	Y82
Pressure drop filter	Y83
Inlet relative humidity	Y84
Actual revolutions per minute (of compressor)	Y85
Rated Rpm of compressor	Y86
Outlet relative humidity	Y87
This information is available from compressor supplier.	

SITRANS F flowmeters

SITRANS F X

SITRANS FX300

Selection and Ordering data		Order No.
SITRANS FX300 Flanged Dual transmitter and T_{max} = 240 °C (464 °F)		7 ME 2 8 0 0 -
Connection size	Sensor size	
DN 40 (1½")	DN 40	2 K
DN 50 (2")	DN 50	2 R
DN 80 (3")	DN 80	3 L
DN 100 (4")	DN 100	3 S
DN 150 (6")	DN 150	4 M
DN 200 (8")	DN 200	4 T
DN 250 (10")	DN 250	4 W
DN 300 (12")	DN 300	5 E
Flange norm and nominal pressure		
Form B1/B2	EN 1092-1	
PN 10	DN 200 ... 300	A
PN 16	DN 50 ... 300	B
PN 25	DN 200 ... 300	C
PN 40	DN 40 ... 300	D
PN 63	DN 50 ... 150	E
PN 100	DN 40 ... 150	F
RF	ASME B16.5	
150 lb	1½ ... 12"	J
300 lb	1½ ... 12"	K
600 lb	1½ ... 6"	L
Sensor material/Gasket		
Stainless steel 1.4404 (316L)/1.4435 (316L)/FPM		1
Stainless steel 1.4404 (316L)/1.4435 (316L)/FFKM		5
Transducer design		
Compact, no cable		1
Approval and cable gland		
Non Ex, M20x1,5		1
Non Ex, ½" NPT		2
ATEX, M20x1,5		4
ATEX, ½" NPT		5
FM US/C, M20x1.5		6
FM US/C, ½" NPT		7
Transmitter, display and communication		
With display, HART		A
Pressure sensor and isolation valve		
Without pressure sensor		A
Software		
Uncompensated for gases, wet gases, steam and liquids respectively temperature compensation for saturated steam		1

Selection and Ordering data	Order code
Further designs Please add "-Z" to Order No. and specify Order code.	
Converter housing material Aluminium for increased requirement, color: petrol green	A10
Material certificate Certificate of compliance EN 10204-2.1	C10
Pressure test + 3.1 accordance EN 10204	C11
Material certificate pressure parts + certificate 3.1	C12
Material in accordance with NACE MR 0175-01	C13
PMI of pressure bearing metal parts + certificate 3.1	C14
Material certificate pressure parts + PMI/certificate 3.1	C15
Calibration certificate FX300 As standard the flow device has a 3-point calibration certificate.	
Calibration certificate (5-point)	D11
Hardness test Hardness test on pressure bearing parts + 3.1 Equotip LD procedure according to NACE MR 0175-01	H30
Cleaning for oil and fat Class 1 increased requirement (customer-specified)	K46
Class 1 and 3.1 (EN 10204)	K48
Certificates X-ray test on pressurized 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
Additional data Please add "-Z" to Order No. and specify Order code and plain text.	
Input process data Medium: Specify steam, gas, liquid and customised	Y40
Temperature: Specify max./operating temperature and units	Y41
Pressure: Specify max./operating pressure and units	Y42
Density; (only by customized medium): Specify medium density and units	Y43
Viscosity; (only by customized medium): Specify medium viscosity and units	Y44
Flow rate: Specify min./max. flow rate and units	Y45
Setting of pulse output; Specify totalizer or energy unit (1 pulse/unit)	Y47
Relative humidity (amount in %)	Y49

SITRANS F flowmeters

SITRANS F X

SITRANS FX300

Accessories or spare parts for SITRANS FX300

Description	Order No.	
Seal disc 21,8-12-0,1	A5E02181439	
Socket only for DN 15/25 ; 1/2"	On request	
Socket only for DN 15/25 ; 1"	On request	
Pickup 1.4404	On request	
O-ring pickup	A5E02181464	
O-ring for pressure screw 17,13 x 2,62-FPM-70	A5E02181488	
Pressure sensor 4/6/10/16/25/40/60/100 bar	On request	
Cover gasket O-Ring 91.67 x 3.5	A5E02181492	
Converter housing gasket 59,35,5-2-N	A5E02181495	
O-ring DIN3771-20 x 1-FPM	A5E02181515	
O-ring 10x2-NBR	A5E02181525	
DUBOX plug, 5-pole-RM2	A5E02181527	
Electronic • Basic D-HART • Steam D-HART • Gas D-HART	A5E02181531 A5E02181541 A5E02181544	
Display	A5E02181558	
Cable feedthrough 10-pole (non Ex). O-ring for cable feedthrough 21,89 x 2,62 10-pole plug	A5E02181562	
Sensor replacement (incl. Seal disc, pickup, O-rings for pickup, and pressure screw • DN 15 (incl. 1/2" socket) • 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) • 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	

Description

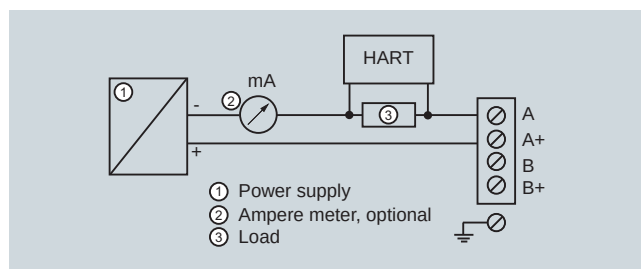
Service Toolbox for changing software (basic, steam and gas) and different settings in the electronic.

Order No.

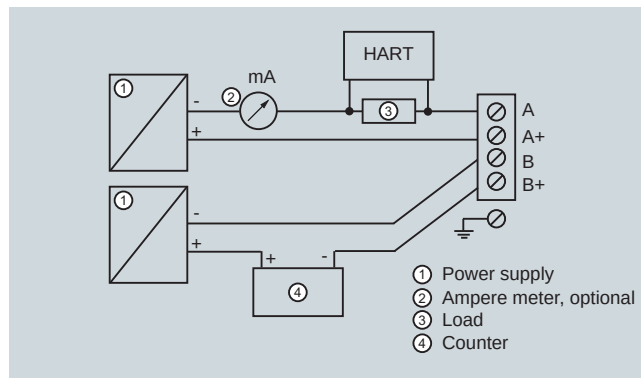
A5E02375819



Schematics

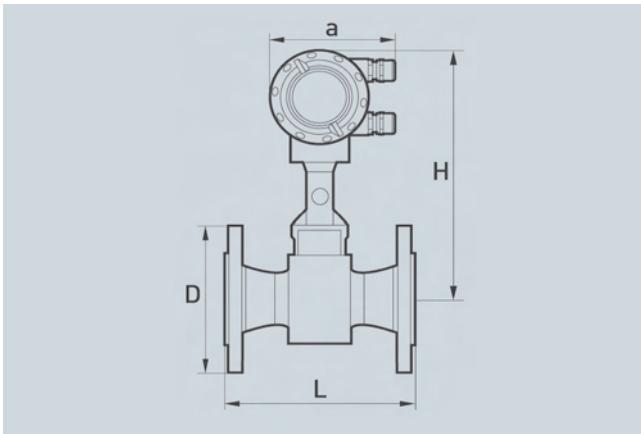


Load for HART communication

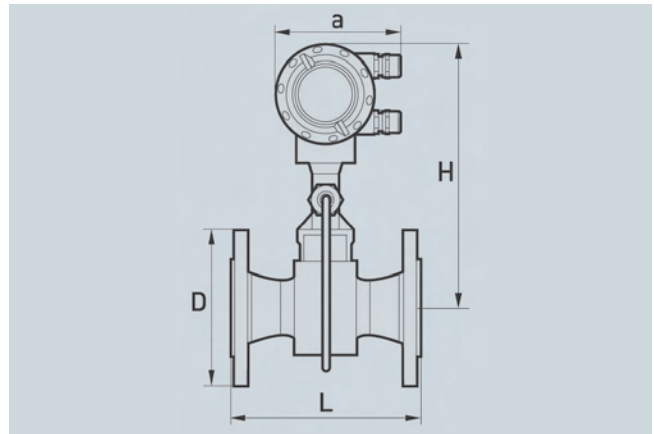


Connection pulse output

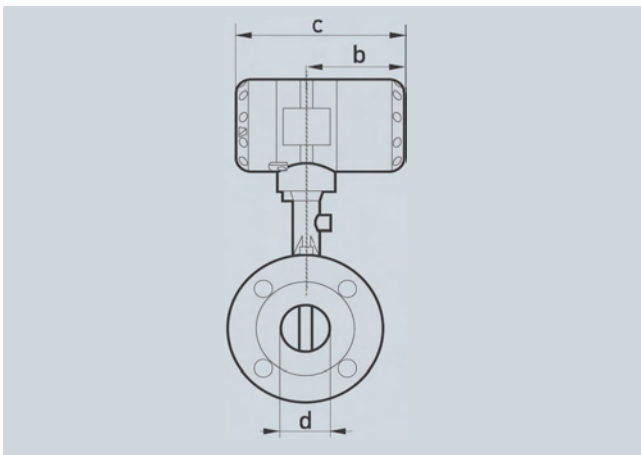
Dimensional drawings



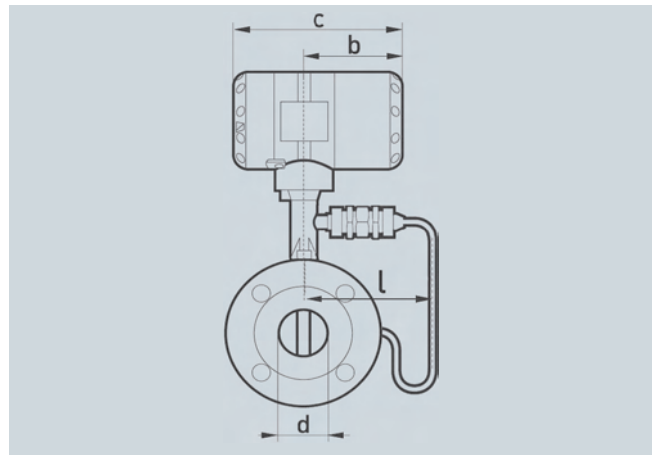
Flange version, frontal view, a = 133 mm (5.24 inches)



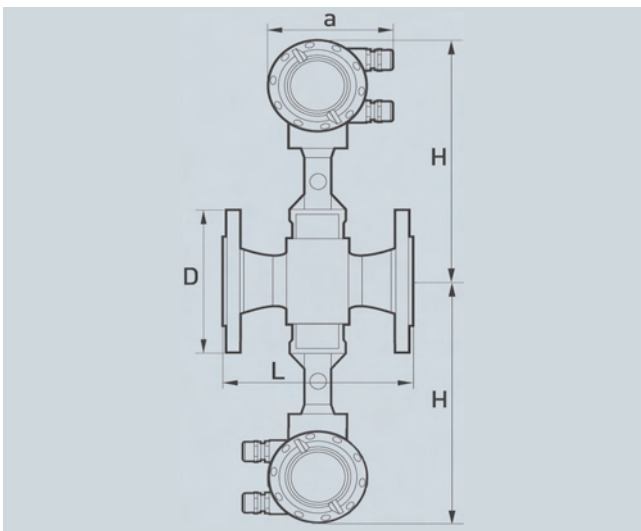
Flange version, frontal view, a = 133 mm (5.24 inches)



Flange version, side view, b = 105 mm (4.13 inches),
c = 179 mm (7.05 inches)



Flange version, side view, b = 105 mm (4.13 inches),
c = 179 mm (7.05 inches)



Flange version, dual converter, specified weight + 2.80 kg (6.17 lb)

SITRANS F flowmeters

SITRANS F X

SITRANS FX300

Flange version EN1092-1

Size	Pressure rating	Dimensions [mm (inches)]					Weight [kg (lb)]	
DN	PN	d	D	L	H	I	Flowmeter (with pressure sensor)	Flowmeter (without pres- sure sensor)
15	40	17.3 (0.68)	95 (3.74)	200 (7.87)	265 (10.43)	144 (5.67)	6.1 (13.45)	5.5 (12.13)
15	100	17.3 (0.68)	105 (4.13)	200 (7.87)	265 (10.43)	144 (5.67)	7.1 (15.65)	6.5 (14.33)
25	40	28.5 (1.12)	115 (4.53)	200 (7.87)	265 (10.43)	144 (5.67)	7.9 (17.42)	7.3 (16.09)
25	100	28.5 (1.12)	140 (5.51)	200 (7.87)	265 (10.43)	144 (5.67)	9.9 (21.83)	9.3 (20.50)
40	40	43.1 (1.70)	150 (5.91)	200 (7.87)	270 (10.63)	144 (5.67)	10.8 (23.81)	10.2 (22.49)
40	100	42.5 (1.67)	170 (6.69)	200 (7.87)	270 (10.63)	144 (5.67)	14.8 (32.63)	14.2 (31.31)
50	16	54.5 (2.15)	165 (6.50)	200 (7.87)	275 (10.83)	144 (5.67)	12.7 (28.00)	12.1 (26.68)
50	40	54.5 (2.15)	165 (6.50)	200 (7.87)	275 (10.83)	144 (5.67)	12.9 (28.44)	12.3 (27.12)
50	63	54.5 (2.15)	180 (7.09)	200 (7.87)	275 (10.83)	144 (5.67)	16.9 (37.26)	16.3 (35.94)
50	100	53.9 (2.12)	195 (7.68)	200 (7.87)	275 (10.83)	144 (5.67)	18.4 (40.57)	17.8 (39.24)
80	16	82.5 (3.25)	200 (7.87)	200 (7.87)	290 (11.42)	154 (6.06)	17.4 (38.36)	16.8 (37.04)
80	40	82.5 (3.25)	200 (7.87)	200 (7.87)	290 (11.42)	154 (6.06)	19.4 (42.77)	18.8 (41.45)
80	63	81.7 (3.22)	215 (8.46)	200 (7.87)	290 (11.42)	154 (6.06)	23.4 (51.59)	22.8 (50.27)
80	100	80.9 (3.19)	230 (9.06)	200 (7.87)	290 (11.42)	154 (6.06)	27.4 (60.41)	26.8 (59.08)
100	16	107.1 (4.22)	220 (8.66)	250 (9.84)	310 (12.20)	164 (6.46)	22 (48.50)	21.4 (47.18)
100	40	107.1 (4.22)	235 (9.25)	250 (9.84)	310 (12.20)	164 (6.46)	25 (55.12)	24.4 (53.79)
100	63	106.3 (4.19)	250 (9.84)	250 (9.84)	310 (12.20)	164 (6.46)	30 (66.14)	29.4 (64.82)
100	100	104.3 (4.11)	265 (10.43)	250 (9.84)	310 (12.20)	164 (6.46)	36 (79.37)	35.4 (78.04)
150	16	159.3 (6.27)	285 (11.22)	300 (11.81)	325 (12.80)	174 (6.85)	35.8 (78.93)	35.2 (77.60)
150	40	159.3 (6.27)	300 (11.81)	300 (11.81)	325 (12.80)	174 (6.85)	41.8 (92.15)	41.2 (90.83)
150	63	157.1 (6.19)	345 (13.58)	300 (11.81)	325 (12.80)	174 (6.85)	59.8 (131.84)	59.2 (130.51)
150	100	154.1 (6.07)	355 (13.98)	300 (11.81)	325 (12.80)	174 (6.85)	67.8 (149.47)	67.2 (148.15)
200	10	206.5 (8.13)	340 (13.39)	300 (11.81)	350 (13.78)	194 (7.64)	38.4 (84.66)	37.8 (83.33)
200	16	206.5 (8.13)	340 (13.39)	300 (11.81)	350 (13.78)	194 (7.64)	38.4 (84.66)	37.8 (83.33)
200	25	206.5 (8.13)	360 (14.17)	300 (11.81)	350 (13.78)	194 (7.64)	47.4 (104.50)	46.8 (103.18)
200	40	206.5 (8.13)	375 (14.76)	300 (11.81)	350 (13.78)	194 (7.64)	55.4 (122.14)	54.8 (120.81)
250	10	260.4 (10.25)	395 (15.55)	380 (14.96)	370 (14.57)	224 (8.82)	58.0 (127.87)	57.4 (126.55)
250	16	260.4 (10.25)	405 (15.94)	380 (14.96)	370 (14.57)	224 (8.82)	59.0 (130.07)	58.4 (128.75)
250	25	258.8 (10.19)	425 (16.73)	380 (14.96)	370 (14.57)	224 (8.82)	75.0 (165.35)	74.4 (164.02)
250	40	258.8 (10.19)	450 (17.72)	380 (14.96)	370 (14.57)	224 (8.82)	93.0 (205.03)	92.4 (203.71)
300	10	309.7 (12.19)	445 (17.52)	450 (17.72)	395 (15.55)	244 (9.61)	76.3 (168.21)	75.7 (166.89)
300	16	309.7 (12.19)	460 (18.11)	450 (17.72)	395 (15.55)	244 (9.61)	82.8 (182.54)	82.2 (181.22)
300	25	307.9 (12.12)	485 (19.09)	450 (17.72)	395 (15.55)	244 (9.61)	99.3 (218.92)	98.7 (217.60)
300	40	307.9 (12.12)	515 (20.28)	450 (17.72)	395 (15.55)	244 (9.61)	128.1 (282.41)	127.5 (281.09)

SITRANS F flowmeters

SITRANS F X

SITRANS FX300

Flange version ASME B16.5

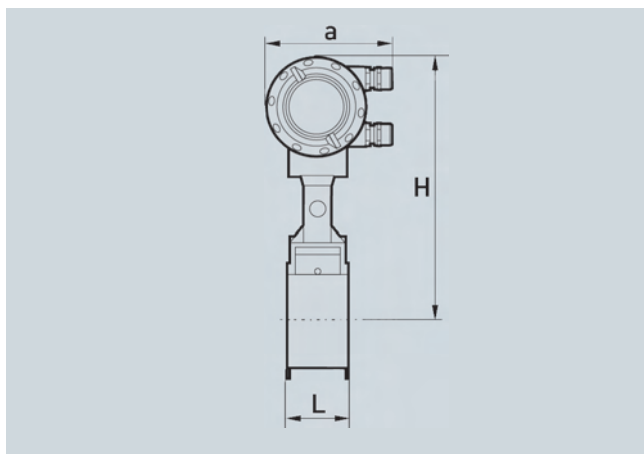
Size	Pressure rating	Dimensions [mm (inches)]					Weight [kg (lb)]	
DN	class	d	D	L	H	I	Flowmeter (with pressure sensor)	Flowmeter (without pres- sure sensor)
½	150	15.8 (0.62)	90 (3.54)	200 (7.87)	265 (10.43)	144 (5.67)	5.1 (11.24)	4.5 (9.92)
½	300	15.8 (0.62)	95 (3.74)	200 (7.87)	265 (10.43)	144 (5.67)	5.5 (12.13)	4.9 (10.80)
½	600	13.9 (0.55)	95 (3.74)	200 (7.87)	265 (10.43)	144 (5.67)	5.7 (12.57)	5.1 (11.24)
1	150	26.6 (1.05)	110 (4.33)	200 (7.87)	265 (10.43)	144 (5.67)	6.8 (14.99)	6.2 (13.67)
1	300	26.6 (1.05)	125 (4.92)	200 (7.87)	265 (10.43)	144 (5.67)	7.8 (17.20)	7.2 (15.87)
1	600	24.3 (0.96)	125 (4.92)	200 (7.87)	265 (10.43)	144 (5.67)	8.1 (17.86)	7.5 (16.53)
1½	150	40.9 (1.61)	125 (4.92)	200 (7.87)	270 (10.63)	144 (5.67)	8.9 (19.62)	8.3 (18.30)
1½	300	40.9 (1.61)	155 (6.10)	200 (7.87)	270 (10.63)	144 (5.67)	11 (24.25)	10.4 (22.93)
1½	600	38.1 (1.50)	155 (6.10)	200 (7.87)	270 (10.63)	144 (5.67)	12 (26.46)	11.4 (25.13)
2	150	52.6 (2.07)	150 (5.91)	200 (7.87)	275 (10.83)	144 (5.67)	11.6 (25.57)	11 (24.25)
2	300	52.6 (2.07)	165 (6.50)	200 (7.87)	275 (10.83)	144 (5.67)	13 (28.66)	12.4 (27.34)
2	600	49.3 (1.94)	165 (6.50)	200 (7.87)	275 (10.83)	144 (5.67)	14.5 (31.97)	13.9 (30.64)
3	150	78 (3.07)	190 (7.48)	200 (7.87)	290 (11.42)	154 (6.06)	20.4 (44.97)	19.8 (43.65)
3	300	78 (3.07)	210 (8.27)	200 (7.87)	290 (11.42)	154 (6.06)	23.4 (51.59)	22.8 (50.27)
3	600	73.7 (2.90)	210 (8.27)	200 (7.87)	290 (11.42)	154 (6.06)	24.4 (53.79)	23.8 (52.47)
4	150	102.4 (4.03)	230 (9.06)	250 (9.84)	310 (12.20)	164 (6.46)	24 (52.91)	23.4 (51.59)
4	300	102.4 (4.03)	255 (10.04)	250 (9.84)	310 (12.20)	164 (6.46)	32 (70.55)	31.4 (69.23)
4	600	97.2 (3.83)	275 (10.83)	250 (9.84)	310 (12.20)	164 (6.46)	41 (90.39)	40.4 (89.07)
6	150	154.2 (6.07)	280 (11.02)	300 (11.81)	325 (12.80)	174 (6.85)	36.8 (81.13)	36.2 (79.81)
6	300	154.2 (6.07)	320 (12.60)	300 (11.81)	325 (12.80)	174 (6.85)	51.8 (114.20)	51.2 (112.88)
6	600	146.3 (5.76)	355 (13.98)	300 (11.81)	325 (12.80)	174 (6.85)	76.8 (169.31)	46.2 (101.85)
8	150	202.7 (7.98)	345 (13.58)	300 (11.81)	350 (13.78)	194 (7.64)	50.6 (111.55)	50.0 (110.23)
8	300	202.7 (7.98)	380 (14.96)	300 (11.81)	350 (13.78)	194 (7.64)	75.4 (166.23)	74.8 (164.91)
10	150	254.5 (10.02)	405 (15.94)	380 (14.96)	370 (14.57)	224 (8.82)	75.0 (165.35)	74.4 (164.02)
10	300	254.5 (10.02)	455 (17.91)	380 (14.96)	370 (14.57)	224 (8.82)	107.0 (235.89)	106.4 (234.57)
12	150	304.8 (12.00)	485 (19.09)	450 (17.72)	395 (15.55)	244 (9.61)	106.9 (235.67)	106.3 (234.35)
12	300	304.8 (12.00)	520 (20.47)	450 (17.72)	395 (15.55)	244 (9.61)	151.9 (334.88)	151.3 (333.56)

SITRANS F flowmeters

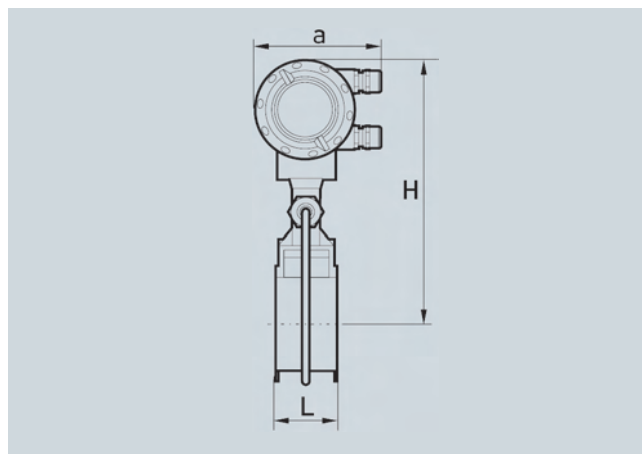
SITRANS F X

SITRANS FX300

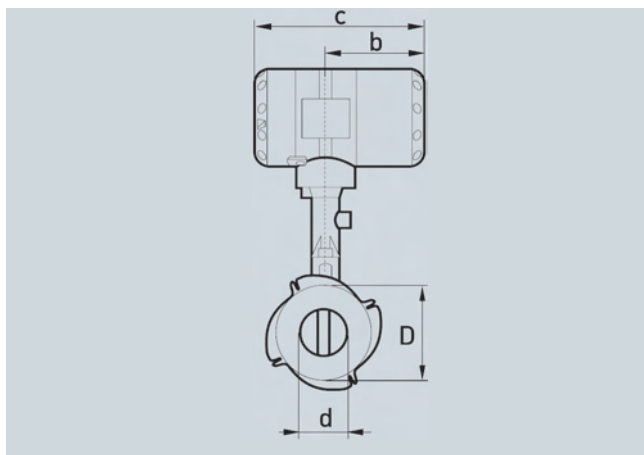
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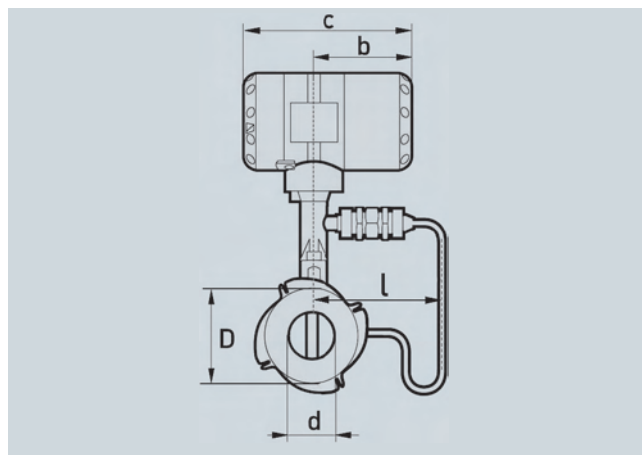
Sandwich version, front view, $a = 133 \text{ mm}$ (5.24 inches)



Sandwich version, front view, $a = 133 \text{ mm}$ (5.25 inches)



Sandwich version, side view, $b = 105 \text{ mm}$ (4.13 inches), $c = 179 \text{ mm}$ (7.05 inches)



Sandwich version, side view, $b = 105 \text{ mm}$ (4.13 inches), $c = 179 \text{ mm}$ (7.05 inches)

Sandwich version EN

Size	Pressure rating	Dimensions [mm (inches)]					Weight [kg (lb)]	
DN	PN	d	D	L	H	I	Flowmeter (with pressure sensor)	Flowmeter (without pressure sensor)
15	16 ... 100	16 (0.63)	45 (1.77)	65 (2.56)	265 (10.43)	144 (5.67)	4.1 (9.04)	3.5 (7.72)
25	16 ... 100	24 (0.94)	65 (2.56)	65 (2.56)	265 (10.43)	144 (5.67)	4.9 (10.80)	4.3 (9.48)
40	16 ... 100	38 (1.50)	82 (3.23)	65 (2.56)	270 (10.63)	144 (5.67)	5.5 (12.13)	4.9 (10.80)
50	16 ... 100	50 (1.97)	102 (4.02)	65 (2.56)	275 (10.83)	144 (5.67)	6.6 (14.55)	6 (13.23)
80	16 ... 100	74 (2.91)	135 (5.31)	65 (2.56)	290 (11.42)	155 (6.10)	8.8 (19.40)	8.2 (18.08)
100	16 ... 100	97 (3.82)	158 (6.22)	65 (2.56)	310 (12.20)	164 (6.46)	10.1 (22.27)	9.5 (20.94)

Sandwich version ASME

Size	Pressure rating	Dimensions [mm (inches)]					Weight [kg (lb)]	
DN	class	d	D	L	H	I	Flowmeter (with pressure sensor)	Flowmeter (without pressure sensor)
½"	150, 300	16 (0.63)	45 (1.77)	65 (2.56)	265 (10.43)	144 (5.67)	4.1 (9.04)	3.5 (7.72)
½"	600	16 (0.55)	45 (1.77)	65 (2.56)	265 (10.43)	144 (5.67)	4.1 (9.04)	3.5 (7.72)
1"	150, 300, 600	24 (0.94)	65 (2.56)	65 (2.56)	265 (10.43)	144 (5.67)	4.9 (10.80)	4.3 (9.48)
1½"	150, 300, 600	38 (1.50)	82 (3.23)	65 (2.56)	270 (10.63)	144 (5.67)	5.5 (12.13)	4.9 (10.80)
2"	150, 300, 600	50 (1.97)	102 (4.02)	65 (2.56)	275 (10.83)	144 (5.67)	6.6 (14.55)	6 (13.23)
3"	150, 300, 600	74 (2.91)	135 (5.31)	65 (2.56)	290 (11.42)	155 (6.10)	8.8 (19.40)	8.2 (18.08)
4"	150, 300, 600	97 (3.82)	158 (6.22)	65 (2.56)	310 (12.20)	164 (6.46)	10.1 (22.27)	9.5 (20.94)

SITRANS F flowmeters

SITRANS F X

SITRANS FX300

Flow tables

Measuring Range Limits

Size		Q _{min}	Q _{max}	Q _{min}	Q _{max}
DN to EN 1092-1	DN to ASME B16.5	EN 1092-1 [m ³ /h]	EN 1092-1 [m ³ /h]	ASME B16.5 [m ³ /h]	ASME B16.5 [m ³ /h]
Water					
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"	56.6	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) and 1.013 bar_{abs} (14.7 psi_{abs})

Air

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	Maximum flow rates
	to EN	to ASME	[m/s]	[m/s]
Liquids	DN 15 ... DN 300	DN ½"...DN 12"	$0.5 \times (998/\rho)^{0.5 \ 1)}$	$7 \times (998/\rho)^{0.47 \ 1)}$
Gas, steam/vapor	DN 15 ... DN 300	DN ½"...DN 12"	$6 \times (1.29/\rho)^{0.5 \ 2)}$	$7 \times (998/\rho)^{0.47 \ 3)}$

ρ = operating density [kg/m³]

¹⁾ Minimum flow rate 0.4 m/s (1.3 ft/s), maximum flow rate 10 m/s (32.8 ft/s)

²⁾ Minimum flow rate 2 m/s (6.6 ft/s), maximum flow rate 80 m/s (262 ft/s)

³⁾ Minimum flow rate 2 m/s (6.6 ft/s), maximum flow rate 80 m/s (262 ft/s); DN 15: 45 m/s (148 ft/s) and DN 25: 70 m/s (230 ft/s)

Measuring range saturated steam: 1 to 7 bar

Overpressure [bar]		1		3.5		5.2		7	
Density [kg/m³]		1.13498		2.4258		3.27653		4.16732	
Temperature [°C]		120.6		148.2		160.4		170.6	
Flow [kg/h]		min.	max.	min.	max.	min.	max.	min.	max.
DN to EN 1092-1	DN to ASME B16.5								
15	½"	5.87	28.75	7.68	61.46	8.93	83.01	10.06	105.57
25	1"	11.82	92.42	17.28	197.53	20.09	266.81	22.66	339.35
40	1½"	29.64	370.71	43.33	792.33	50.63	1 070.2	56.8	1 361.2
50	2"	51.31	641.82	75.02	1 371.8	87.19	1 852.8	98.33	2 356.6
80	3"	112.41	1 405.8	164.33	3 004.7	191	4 058.4	215.39	5 161.8
100	4"	193.14	2 415.5	282.36	5 162.7	328.16	6 973.3	370.09	8 869.2
150	6"	437.56	5 472.4	639.69	11 696	743.45	15 798	838.44	20 093
200	8"	821.9	10 279.0	1 201.6	21 970.0	1 396.5	29 675.0	1 574.9	37 743
250	10"	1 313.9	16 433.0	1 920.9	35 122.0	2 232.5	47 439.0	2 517.7	60 337
300	12"	1 908.3	23 866.0	2 789.8	51 010.0	3 242.4	68 899.0	3 656.6	87 630

Measuring range saturated steam: 10.5 to 20 bar

Overpressure [bar]		10.5		14		17.5		20	
Density [kg/m³]		5.88803		7.60297		9.31702		10.5442	
Temperature [°C]		186.2		198.5		208.7		215	
Flow [kg/h]		min.	max.	min.	max.	min.	max.	min.	max.
DN to EN 1092-1	DN to ASME B16.5								
15	½"	12.78	149.17	16.51	192.61	20.23	236.04	22.89	267.12
25	1"	26.93	479.46	30.6	619.11	33.87	758.69	36.04	858.62
40	1½"	67.51	1 878.2	76.72	2 150.7	84.93	2 395.3	90.35	2 557.7
50	2"	116.89	3 251.7	132.82	3 723.4	147.03	4 147	156.42	4 428.1
80	3"	256.03	7 122.4	290.93	8 155.8	322.06	9 083.7	342.62	9 699.3
100	4"	439.91	12 238	499.9	14 013	553.38	15 608	588.69	16 666
150	6"	996.62	27 725	1 132.5	31 747	1 253.7	35 359	1 333.7	37 756
200	8"	1 872.1	52 079	2 127.3	59 634	2 354.9	66 419	2 505.2	70 921
250	10"	2 992.7	83 254	3 400.7	95 333	3 764.6	106 180	4 004.9	113 380
300	12"	4 346.5	120 920	4 939.1	138 460	5 467.5	154 210	5 816.5	164 660

SITRANS F flowmeters

SITRANS F X

SITRANS FX300

Measuring range saturated steam: 15 to 100 psig

Overpressure [psig]		15		50		75		100	
Density [lbs/ft ³]		0.0719		0.1497		0.2036		0.2569	
Temperature [°F]		249.98		297.86		320.36		338.184	
Flow [lbs/h]		min.	max.	min.	max.	min.	max.	min.	max.
DN to EN 1092-1	DN to ASME B16.5								
15	½"	12.95	64.35	16.83	133.87	19.62	182.02	22.04	229.63
25	1"	26.25	206.83	37.86	430.3	44.15	585.06	49.59	738.09
40	1½"	65.81	829.61	94.92	1 726	110.68	2 346.7	124.32	2 960.5
50	2"	113.94	1 436.3	164.34	2 988	191.63	4 062.9	215.23	5 125.6
80	3"	249.57	3 146.1	360	6 545.3	419.74	8 899.4	471.45	11 227
100	4"	428.81	5 405.7	618.51	11 246	721.21	15 291	810.06	19 291
150	6"	971.47	12 246	1 401.2	25 478	1 633.9	34 642	1 835.2	43 703
200	8"	1 824.8	23 004	2 632.1	47 859	3 069.1	65 072	3 447.2	82 092
250	10"	2 917.2	36 774	4 207.7	76 508	4 906.4	104 030	5 510.8	131 230
300	12"	4 236.8	53 410	6 111.1	111 120	7 125.8	151 080	8 003.6	190 600

Measuring range saturated steam: 150 to 300 psig

Overpressure [psig]		150		200		250		300	
Density [lbs/ft ³]		0.3627		0.4681		0.5735		0.6792	
Temperature [°F]		366.08		388.04		406.22		422.06	
Flow [lbs/h]		min.	max.	min.	max.	min.	max.	min.	max.
DN to EN 1092-1	DN to ASME B16.5								
15	½"	27.79	324.21	35.86	418.47	43.94	512.66	52.04	607.12
25	1"	58.93	1 042.1	66.94	1 345.1	74.1	1 647.8	80.63	1 951.5
40	1½"	147.72	4 107.2	167.83	4 702.8	185.76	5 237	202.15	5 728
50	2"	255.75	7 111.9	290.56	8 141.9	321.6	9 066.8	350	9 917
80	3"	560.19	15 578	636.44	17 834	704.43	19 860	766.6	21 722
100	4"	962.54	26 766	1 093.5	30 643	1 210.4	34 124	1 317.2	37 324
150	6"	2 180.6	60 639	2 477.4	69 421	2 742.1	77 307	2 984	84 556
200	8"	4 096.1	113 900	4 653.6	130 400	5 150.7	145 210	5 605.2	158 830
250	10"	6 548.1	182 090	7 439.3	208 460	8 234.1	232 140	8 960.6	253 910
300	12"	9 510.2	264 460	10 805	302 760	11 959	337 150	13 014	368 770