3

Overview

SITRANS FC Coriolis mass flowmeters are designed for measurement of a variety of liquids and gases. The meter offers accurate measurement of mass flow, volume flow, density, temperature and fraction.

Compatibility between transmitters and sensors

Transmitter	Page	Compact	Remote	Ex-Approval	Sensor	Page
FCT030	3/155	Yes	Yes	Yes	FCS300, DN 15 ... DN 150	3/167
		Yes	Yes	Yes	FCS400, DN 15 ... DN 50	3/187
		No	Yes	Yes	MASS 2100, DI 1.5	3/203; 3/218
		Yes	Yes	Yes	MASS 2100, DI 3 ... DI 15	3/203; 3/218
		No	Yes	Yes	FC300, DN 4	3/203; 3/218
FCT010	3/161	Yes	No	Yes	FCS300, DN 15 ... DN 150	3/167
		Yes	No	Yes	FCS400, DN 15 ... DN 50	3/187
		No	Yes	Yes	MASS 2100, DI 1.5	3/203; 3/223
		Yes	Yes	Yes	MASS 2100, DI 3 ... DI 15	3/203; 3/223
		No	Yes	Yes	FC300, DN 4	3/203; 3/223
FCT070	3/164	No	Yes	Yes	FCS300, DN 15 ... DN 150	3/167
		No	Yes	Yes	FCS400, DN 15 ... DN 50	3/187
		No	Yes	Yes	MASS 2100, DI 1.5	3/203; 3/227
		No	Yes	Yes	MASS 2100, DI 3 ... DI 15	3/203; 3/227
		No	Yes	Yes	FC300, DN 4	3/203; 3/227
SIFLOW FC070	3/240	No	Yes	Yes	FC300, DN 4	3/203
		No	Yes	Yes	MASS 2100, DI 1.5	3/203
		No	Yes	Yes	MASS 2100, DI 3 ... DI 15	3/203

Benefits

Greater flexibility

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

Easier commissioning

All SITRANS FC Coriolis flowmeters feature a sensor related memory unit SensorFlash which stores calibration data and transmitter settings for the lifetime of the product as well as all product documentation and certificates.

At commissioning the flowmeter commences measurement without any initial programming.

Easier service

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

Room for growth

- FC330/FC310:
  Digital platform allows for any sensor in the range DN 15 to DN 150 to be matched in compact or remote installation.
- FC430/FC410:
  Robust and compact sensor dedicated for OEM and skid manufacturer in sizes DN 15 to DN 50. Also available in a true sanitary version.
- MASS 2100/FC300 DN 4 sensors with FCT digital platform transmitters allows all sensors from DI 1.5 to DI 15 to be matched with the FCT010, FCT030 and FCT070 transmitters.
- FCT070 transmitter solution as a fully integrated technology module in SIMATIC ET 200SP. Seamless communicating with all SIMATIC solutions by very fast PROFINET communication. Advanced batch function blocks are available.

Application

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

Due to this versatility the meter is easy to install and use. The Coriolis flowmeter is recognized for its high accuracy over a wide turn-down ratio and its ability to be a true multi parameter devise.

The main applications of the Coriolis flowmeter can be found in all industries, such as:	
Chemical	Detergents, bulk chemicals, pharmaceuticals, acids, alkalis, filling and dosing
Food and beverage	Dairy products, beer, wine, softdrinks, °Plato/°Brix, fruit juices and pulps, bottling, CO2 dosing, CIP liquids
Automotive	Fuel injection nozzle and pump testing, filling of AC units, engine consumption measurement, paint robots
Oil and gas	Filling of gas bottles, furnace control, test separators, LPG, well-head water-cut monitoring. All hydrocarbon fluids in refineries
Marine	Fuel consumption management, boiler control, bunkering management
Water & waste water	Dosing of chemicals for water treatment

Application (continued)

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on the Internet, since some constrains might be related to some of the features

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	FC310	FC330	FCS300 with FCT070	FC410	FC430	FCS400 with FCT070	MASS 2100 DI 1.5 FC300 DN 4 with FCT010	MASS 2100 DI 1.5 FC300 DN 4 with FCT030	MASS 2100 DI 1.5 FC300 DN 4 with FCT070	MASS 2100 with FCT010	MASS 2100 with FCT030	MASS 2100 with FCT070
	7ME4631	7ME4633	7ME4637	7ME4611	7ME4613	7ME4617	7ME4811	7ME4813	7ME4817	7ME4811	7ME4813	7ME4817
Design												
Compact	●	●		●	●					●	●	
Remote		●	●		●	●	●	●	●	●	●	●
Transmitter enclosure												
Aluminium IP67 Field mounting enclosure	●	●		●	●		●	●		●	●	
Aluminum IP67 Wall mounting enclosure		●			●			●			●	
Noryl (FCT070), IP20/NEMA 2			●			●			●			●
Communication												
HART		●			●			●			●	
PROFIBUS PA		●			●			●			●	
PROFIBUS DP		●			●			●			●	
MODBUS RTU/RS 485	●	●		●	●		●	●		●	●	
SIMATIC integration ET200SP ST & HF (Profinet)			●			●			●			●
Supply voltage												
24 V DC	●	●	●	●	●	●	●	●	●	●	●	●
115/230 V AC		●			●			●			●	
Pipe size												
DI 1,5 (1/16")							●	●	●			
DI 3 (1/8")										●	●	●
DN 4 (1/6")							●	●	●			
DI 6 (¼")										●	●	●
DI 15 (½")										●	●	●
DN 15 (½")	●	●	●	●	●	●						
DN 25 (1")	●	●	●	●	●	●						
DN 50 (2")	●	●	●	●	●	●						
DN 80 (3")	●	●	●									
DN 100 (4")	●	●	●									
DN 150 (6")	●	●	●									

Application (continued)

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The tool for Engineering, Ordering, Installation and Operation

	FC310	FC330	FCS300 with FCT070	FC410	FC430	FCS400 with FCT070	MASS 2100 DI 1.5 FC300 DN 4 with FCT010	MASS 2100 DI 1.5 FC300 DN 4 with FCT030	MASS 2100 DI 1.5 FC300 DN 4 with FCT070	MASS 2100 with FCT010	MASS 2100 with FCT030	MASS 2100 with FCT070
	7ME4631	7ME4633	7ME4637	7ME4611	7ME4613	7ME4617	7ME4811	7ME4813	7ME4817	7ME4811	7ME4813	7ME4817
Process connection norms and pressure												
Pipe thread												
NPT ANSI/ASME B.20.1; PN 100	●	●	●	●	●	●	●	●	●	●	●	●
ISO 228/1; PN 100	●	●	●	●	●	●	●	●	●	●	●	●
Flange												
EN 1092-1 PN 16	●	●	●	●	●	●						
EN 1092-1 PN 40	●	●	●	●	●	●				●	●	●
EN 1092-1 PN 63	●	●	●	●	●	●						
EN 1092-1 PN 100	●	●	●	●	●	●				●	●	●
ANSI B 16.5 Class 150	●	●	●	●	●	●				●	●	●
ANSI B 16.5 Class 300	●	●	●	●	●	●						
ANSI B 16.5 Class 600	●	●	●	●	●	●				●	●	●
ANSI B 16.5 Class 900[1)]	●	●	●	●	●	●						
ANSI B 16.5 Class 1500[1)]	●	●	●									
JIS B2220 10K	●	●	●	●	●	●						
JIS B2220 20K	●	●	●	●	●	●						
JIS B2220 40K	●	●	●									
JIS B2220 63K	●	●	●									
Hygenic												
DIN 11851	●	●	●	●	●	●				●	●	●
DIN32676 Clamp Form C Triclamp				●	●	●						
DIN 32676 Clamp (ISO) Row A	●	●	●									
DIN11864-1 GS Form A Row A				●	●	●						
DIN11864-2 BF Form A Row A				●	●	●						
DIN11864-3 BKS Form A Row A				●	●	●						
ISO 2852 Clamp				●	●	●				●	●	●
ISO 2853 Threat				●	●	●				●	●	●
SMS 1145	●	●	●	●	●	●						
Others on request	●	●	●	●	●	●				●	●	●

Application (continued)

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The tool for Engineering, Ordering, Installation and Operation

	FC310	FC330	FCS300 with FCT070	FC410	FC430	FCS400 with FCT070	MASS 2100 DI 1.5 FC300 DN 4 with FCT010	MASS 2100 DI 1.5 FC300 DN 4 with FCT030	MASS 2100 DI 1.5 FC300 DN 4 with FCT070	MASS 2100 with FCT010	MASS 2100 with FCT030	MASS 2100 with FCT070
	7ME4631	7ME4633	7ME4637	7ME4611	7ME4613	7ME4617	7ME4811	7ME4813	7ME4817	7ME4811	7ME4813	7ME4817
Pipe material												
Stainless steel AISI 316L/1.4435/1.4404	●	●	●	●	●	●	●	●	●	●	●	●
Nickel-Alloy C4	●	●	●									
Hastelloy C22/2.4602							●	●	●	●	●	●
With heating jacket												
Internal U-Tube										●	●	●
Heating jacket electrical (optional)				●	●	●						
Pressure rating												
PN 16	●	●										
PN 40	●	●		●						●	●	●
PN 63	●	●		●								
PN 100	●	●	●	●	●	●	●	●	●	●	●	●
PN 130							●	●	●	●	●	●
PN 160					●[5]	●[5]	●[5]					
PN 230						●	●	●	●	●	●	●
PN 265										●	●	●
PN 350						●				●	●	●
PN 365							●	●	●	●	●	●
PN 410										●	●	●
High-pressure version[2]							●	●	●	●	●	●
Accuracy (liquids)												
Flow error ≤ 0.1 % of rate[3]	●	●	●	●	●	●	●	●	●	●	●	●
Flow error ≤ 0.2 % of rate[3]	●	●	●									
Density error ≤ 0.0005 g/cm³				●	●	●				●	●	●
Density error ≤ 0.005 g/cm³				●	●	●				●	●	●
Density error ≤ 0.001 g/cm³							●	●	●			
Density error ≤ 0.002 g/cm³	●	●	●									
Density error ≤ 0.010 g/cm³	●	●	●									
Cable glands												
½" NPT	●	●	●	●	●	●	●	●	●	●	●	●
M20	●	●	●	●	●	●	●	●	●	●	●	●

Application (continued)

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The tool for Engineering, Ordering, Installation and Operation

	FC310	FC330	FCS300 with FCT070	FC410	FC430	FCS400 with FCT070	MASS 2100 DI 1.5 FC300 DN 4 with FCT010	MASS 2100 DI 1.5 FC300 DN 4 with FCT030	MASS 2100 DI 1.5 FC300 DN 4 with FCT070	MASS 2100 with FCT010	MASS 2100 with FCT030	MASS 2100 with FCT070
	7ME4631	7ME4633	7ME4637	7ME4611	7ME4613	7ME4617	7ME4811	7ME4813	7ME4817	7ME4811	7ME4813	7ME4817
Approvals												
Hazardous locations												
ATEX zone 1	●	●	●	●[6]	●[6]	●[6]	●	●	●	●	●	●
IECEx zone 1	●	●	●	●[6]	●[6]	●[6]	●	●	●	●	●	●
EAC Ex zone 1	●	●	●	●	●	●	●	●	●	●	●	●
US /CSA) Div 1	●	●	●	●	●	●	●	●	●	●	●	●
Canada (CSA) zone 1	●	●	●	●	●	●	●	●	●	●	●	●
NEPSI	●	●	●	●	●	●						
INMETRO	●	●	●	●	●	●						
PED												
Fluid group 1 Category III, gas PED Directive 2014/68/EU	●	●	●	●	●	●	●	●	●	●	●	●
CRN												
Category F, OF10769.5C CRN	●	●	●	●	●	●	●	●	●	●[4]	●[4]	●[4]
F&B/Pharma												
EHEDG (in preparation)				●	●	●						
3A (in preparation)				●	●	●						
Marine												
Germanischer Lloyd/det Norske Veritas, Bureau Veritas, Lloyds of London, American Bureau of Shipping, Rina, CCS	●	●		●	●							

● = Available

1) Sensor pressure and temperature limited to ANSI class 600 rating.
2) See technical specifications.
3) Increased error for gas mass flow measurement.
4) Only DI 6 is CRN.
5) Max. 100 bar.
6) Also for dust zone 21.

3

Function

The SITRANS FC flow measuring principle is based on the Coriolis effect. The flowmeter consists of a sensor and a transmitter. The sensor can be digital with an integrated frontend DSL or for low flow sensors also analogue sensors directly connected to the transmitter.

There are following sensors available:

- SITRANS FC MASS 2100 DI 1.5 to DI 15 mm in a single loop design
- SITRANS FC300 DN 4 in a single loop design
- SITRANS FCS300 DN 15 to DN 150 mm in bended dual tube design
- SITRANS FCS400 DN 15 to DN 50 mm in a compact bended dual tube design for OEM and other specific applications.

All sensors can be freely combined with three different transmitters in various configurations and protection style.

- SITRANS FCT010 transmitter: single channel Modbus
- SITRANS FCT030 transmitter: multi channel transmitter with full graphical display and full feature loaded.
- FCT070 transmitter: for full integration in the Siemens SIMATIC TIA and PCS7 world by the ET 200SP ST & HF. Full functionality including advanced functions blocks for easy integration. Functions block in TIA and APL library.

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

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

The amplitude of the driver is automatically regulated to ensure a stable output from the 2 pick-ups. The temperature of the tubes is measured by a Pt1000. The flow-proportional signal from the 2 pick-ups, the temperature measurement and the driver frequency are fed into the SITRANS FC transmitter for calculations of mass, volume, fraction, temperature and density.The signal transfer function is based on a DFT technology (Discrete Fourier Transformation).

The transmitter has built-in noise filters, which can be used to improve the meter's performance if the installation and application conditions are not ideal. Typically influence from process noise such as pump pulsations, mechanical vibrations, oscillating valves and aerated flowconditions can be reduced considerably.

SensorFlash flow memory units

FCT010 flow transmitters communicate via Modbus RTU and FCT030 via HART/Modbus/PROFIBUS DP / PROFIBUS PA beside up to 4 individual I/O free programmable as analogue , frequency, pulse or relay outputs. As well as static inputs can be set up.

The FCT070 transmitter is a technology module for the SIMATIC ET 200SP ST & HF system with directly connection from the digital sensor. Full transmitter functionality available to be set up directly in the SIMATIC system. The ET 200SP is very often connected to other SIMATIC systems like PCS7; S7 1200 and S7 1500 via the direct connection by PROFINET. Fast and simple signal transfer and controlling.

Integration

General installation requirements / System design information

The SITRANS FC mass flowmeter is suitable for in- and outdoor installations. The standard instrument meets the requirements of Protection Class IP67/NEMA 4x or IP65. The flowmeter is bidirectional and can be installed in almost any orientation, however, the sensor is not self-emptying in all positions.

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

The corrosion and erosion resistance of the fluid-wetted materials must be evaluated to secure long lifetime of the sensor. 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://www.siemens.com) can be used to calculate the pressure drop and the accuracy over the full flowrange in use for the application.

Sizing

Liquids: The correct sensor size is determent by the allowable pressure drop at the maximum flowrate the meter is used with. After selecting the sensor size the accuracy throughout the flowrate range for the application can be checked by using the Sizing Program.

Gases: The correct size is very often determent by the calculation of the Mach number at maximum flowrate for the application. After that the accuracy throughout the flowrange should be checked.

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

Note: For some sensor types, specific installation requirement has be taken into account. Please also see under the specific sensor type chapter.

Generel installation orientation

- FCS300 and FCS400 – sensors.
  The optimal installation orientation is vertical with flow upwards (liquids). This ensures that suspended solids or bubbles are completely pushed through the sensor. A drain valve below the sensor will allow the pipe and sensor to drain . To secure selfdraining a up to 10° off vertical installation could be required.
- MASS 2100/FC300 DN4 – sensors.
  The optimal installation orientation is horizontal.

Supports

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

Shut-off devices

- To conduct a system zero adjustment, shut-off devices are ideally required in the pipeline before and after the sensor:
- A bypass valve is recommended where regular zero adjustment is planned to avoid disruption of the flowing system.

Installation: straight run requirements

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

System design information

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

Zero adjustment

- In order to adjust the zero under operating conditions it must be possible to reduce the flow rate to „ZERO“ while the meter tube is completely filled. It is important for accurate measurements that during the zero adjustment there are no gas bubbles in the flowmeter. It is also important that the pressure and temperature in the meter tube be the same as that which exists during operation.

3

Technical specifications

Flowmeter uncertainty/specifications

To ensure continuous accurate measurement, flowmeters must be calibrated.

The Siemens flowmeter calibration process is ISO 9001-certified, ensuring the entire calibration procedure is controlled to the highest quality standards. All primary measuring instrumentation used by the Flow Laboratory during the performance of its calibrations, has been calibrated with international standards traceability referring directly to the physical unit of measurement according to the International System of Units (SI). Therefore the calibration certificate ensures recognition of the test results worldwide, including the US (NIST traceability).

A calibration certificate is shipped with every sensor and calibration data are stored in the SD Memory card . The sensors has the calibration data written to the frontend section DSL.
A backup of all calibrations and PDF copies of all certificates are stored in the SensorFlash.

Sensor flow capacity

FCS300 sensors for liquids:

	Q_{min} at 1 % accuracy water		Q_{nom} [1]		100 % (Q_{max}) [2]	
	kg/h	(lb/min)	kg/h	(lb/min)	kg/h	(lb/min)
DN 15 (½")	70	(2.57)	4 500	(165)	8 000	(294)
DN 25 (1")	240	(8.92)	20 500	(753)	35 000	(1 286)
DN 50 (2")	800	(29.4)	49 000	(1 800)	90 000	(3 307)
DN 80 (3")	2 000	(73.5)	122 000	(4 483)	250 000	(9 186)
DN 100 (4")	4 000	(147)	273 000	(10 031)	520 000	(19 108)
DN 150 (6")	6 900	(253)	459 200	(16 873)	860 000	(31 600)

FCS400 sensors for liquids:

	Q_{min} at 1 % accuracy water [3]		Q_{nom} [1]		100 % (Q_{max}) [2]	
	kg/h	(lb/min)	kg/h	(lb/min)	kg/h	(lb/min)
DN 15 (½")	20	(0.73)	3 700	(135)	6 400	(234)
DN 25 (1")	200	(7.32)	11 500	(421)	17 700	(648)
DN 50 (2")	750	(27.4)	50 000	(1 831)	70 700	(2 590)

MASS 2100 and FC300 sensors for liquids:

	Q_{min} at 1 % accuracy water		Q_{nom} [1]		100 % (Q_{max}) [2]	
	kg/h	(lb/h)	kg/h	(lb/h)	kg/h	(lb/h)
DI 1.5 (1/16")	0.1	(0.22)	19	(42)	30	(66)
DI 3 (1/8")	1.0	(2.2)	90	(198)	250	(550)
DN 4 (1/6")	1	(2.2)	140	(308)	350	(770)
DI 6 (¼")	5	(11)	500	(1 102)	1 000	(2 200)
DI 15 (½")	20	(44)	3 800	(8 370)	5 600	(12 345)

[1] Q_{nom} = Δ 1 barg @ water 20 °C.
[2] Q_{max} = 10 m/sec @ water 20 °C at inlet (up to 25 m/s in the flowtubes).
[3] For 0.1% sensor.

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

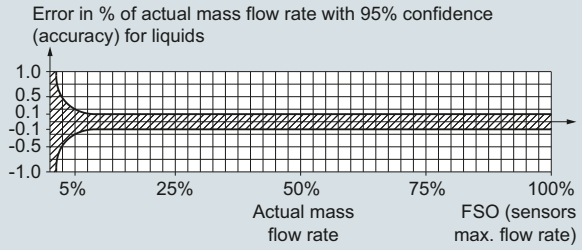
- For flow > 5% of the sensors max. flow rate, the error can be read directly from the curve below.
- For flow < 5 % of the sensors max. flow rate, use the formula to calculate the error.

The error curve is plotted from the formula:

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

E Error
Z Zero point error [kg/h] [1]
qm Mass flow [kg/h]
Cal. Calibrated flow accuracy: 0.10, 0.15 or 0.20

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



For gas applications: typical additional 0.4 % + zero point

Reference conditions for flow calibration	
Flow conditions	Fully developed flow profile
Temperature, medium	25 °C (77 °F) ± 5 K
Temperature, ambient	25 °C (77 °F) +10/-5 K
Liquid pressure	2 ± 1 bar
Density	0.997 g/cm^3
Brix	40 °Brix
Supply voltage	U_n ±1 %
Warming-up time	30 min.
Cable length	5 m between transmitter and sensor

Additions in the event of deviations from reference conditions	
Current output	As pulse output ± (0.1 % of actual flow +0.05 % FSO)
Effect of ambient temperature	• 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

Technical specifications (continued)

Sensor type		FC300	MASS 2100			
Sensor size		**DN 4 (1/6")**	**DI 1.5 (1/16")**	**DI 3 (1/8")**	**DI 6 (¼")**	**DI 15 (½")**
Number of measuring pipes		1	1	1	1	1
Mass flow (liquids)						
Linearity error[1)]	% of rate	0.10	0.10	0.10	0.10	0.10
Repeatability of flow-rate at rates > 5 % of Q_{max}	% of rate	0.05	0.05	0.05	0.05	0.05
Max. zero point error	[kg/h]	0.010	0.001	0.010	0.050	0.200
Density (liquids)						
Density error standard	[g/cm³]	n.a.	0.008	0.008	0.008	0.008
Density error extended	[g/cm³]	0.007[2)]	0.001	0.0015	0.0015	0.0005
Repeatability error	[g/cm³]	0.0002	0.0002	0.0002	0.0002	0.0001
Range	[g/cm³]	0.3 … 2.9	0.3 … 2.9	0.3 … 2.9	0.3 … 2.9	0.3 … 2.9
Temperature						
Error	[°K]	0.5	0.5	0.5	0.5	0.5

1) Increased error can be expected for gas mass flow measurement (for gas measurement typically additional +0.40 % error).

2) For Hastelloy tubes: 0.0025 g/cm³.

Sensor type		FCS300					
Sensor size		**DN 15 (½")**	**DN 25 (1")**	**DN 50 (2")**	**DN 80 (3")**	**DN 100 (4")**	**DN 150 (6")**
Number of measuring pipes		2	2	2	2	2	2
Mass flow (liquids)							
Linearity error[1)]	0.1% sensor % of rate	0.1	0.1	0.1	0.1	0.1	0.1
	0.2% sensor % of rate	0.2	0.2	0.2	0.2	0.2	0.2
Repeatability of flow-rate at rates > 5 % of Q_{max}	% of rate	0.05	0.05	0.05	0.05	0.1	0.1
Max. zero point error	[kg/h]	0.6	2.16	7.2	20.0	41.6	68.8
Density (liquids)							
Density error	0.1% massflow sensor [g/cm³]	0.002	0.002	0.002	0.002	0.002	0.002
	0.2% massflow sensor [g/cm³]	0.010	0.010	0.010	0.010	0.010	0.010
Range	[kg/dm³]	0.001 ... 5.0	0.001 ... 5.0	0.001 ... 5.0	0.001 ... 5.0	0.001 ... 5.0	0.001 ... 5.0
Repeatability error	[kg/m³]	± 0.25	± 0.25	± 0.25	± 0.25	± 0.25	± 0.25
Temperature							
Error	[°K]	0.5	0.5	0.5	0.5	0.5	0.5

1) Increased error can be expected for gas mass flow measurement (for gas measurement typically additional +0.4 % error).

Sensor type		FCS400		
Sensor size		**DN 15 (½")**	**DN 25 (1")**	**DN 50 (2")**
Number of measuring pipes		2	2	2
Mass flow (liquids)				
Linearity error[1)]	% of rate	0.1	0.1	0.1
Repeatability of flow-rate at rates > 5 % of Q_{max}	% of rate	0.05	0.05	0.05
Max. zero point error	[kg/h]	0.2	2.0	7.5
Density (liquids)				
Density error	(Standard) [g/cm³]	0.005	0.005	0.005
	(Extended) [g/cm³]	0.0005	0.0005	0.0005
Range	[kg/dm³]	0.001 ... 5.0	0.001 ... 5.0	0.001 ... 5.0
Repeatability error	[kg/m³]	± 0.25	± 0.25	± 0.25
Temperature				
Error	[°K]	0.5	0.5	0.5

1) Increased error can be expected for gas mass flow measurement (for gas measurement typically additional up to +0.4 % error).

Technical specifications (continued)

PROFIBUS PA/DP for FCT030

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

Electrical specification DP

Physical layer specifications	
Applicable standard	IEC 61158/EN 50170
Physical Layer (transmission technology)	RS 485
Transmission speed	≤ 12 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	100 m at 12 Mbit/s, up to 1.2 km at 93.75 kbit/s. Extendable by repeaters

Electrical specification PA

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

IS (Intrinsic Safety) data	
Required sensor electronics	Compact mounted SITRANS FCT030
FISCO	Yes
Max. U_I	17.5 V
Max. I_I	380 mA
Max. P_I	5.32 V
Max. L_I	10 µH
Max. C_I	5 nF
Max. U_O	1.3 V
Max. I_O	50 µA
FISCO cable requirements	
Loop resistance R_C	15 … 150 Ω/km
Loop inductance L_C	0.4 … 1 mH/km
Capacitance C_C	80 … 200 nF/km
Max. Spur length in IIC and IIB	30 m
Max. Trunk length in IIC	1 km
Max. Trunk length in IIB	5 km

PROFIBUS parameter support

The following parameters are accessible using a Class 1 Master.

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

[1)] Requires a flowmeter ordered with fraction option.

Overview

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

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

The FCT030 IP67 transmitter can be remote connected or compact mounted with all sensors of type FCS300 sizes DN 15 to DN 150, FCS400 sizes DN 15 to DN 50, MASS 2100 DI 1.5, DI 3, DI 6, DI 15 and FC300 DN 4.

Fraction

The transmitter FCT030 can be set up at works to measure and report various fraction concentrations of two-part mixtures or solutions. Where a discrete relationship exists between concentration and density at particular temperatures a calculation is performed and the percentage concentration by volume or mass of Part A or Part B (100 % minus Part A) is measured. For solutions and some mixtures the total mass, or dry weight, is also available.

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

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

- API number
- Balling
- °Baumé light
- °Baumé heavy
- °Brix
- °Oeschlé
- Plato
- Specific Gravity
- Twaddell
- %HFCS42
- %HFCS55
- %HFCS90
- Ethanol-Water (ABM)[1] 0 % to 20 %
- Ethanol-Water (ABM)[1] 15 % to 35 %
- Ethanol-Water (ABM)[1] 30 % to 55 %
- Ethanol-Water (ABM)[1] 50 % to 100 %

[1] ABM: Alcohol by Mass
ABV: Alohol by volume on request

Benefits

Flow calculation and measurement

- Dedicated mass flow calculation with DSP technology
- Fast dosing and flow step response with maximum 10 ms response time
- 100 Hz update rate to all outputs
- Maximum data age from pickup to output is 20 ms (two update cycles)
- Independent low flow cut-off settings for mass and volume flowrates
- Automatic zero-point adjustment on command from discrete input or host system
- Empty pipe monitoring

Operation and display

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

Alarms and safety

- Advanced diagnosis and service menu enhances trouble-shooting and meter validation
- Configurable upper and lower alarm and warning limits for all process values
- Alarm handling can be selected between Siemens and NAMUR standard configurations

Outputs and control

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

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

Channel 1

Channel 1 is 4 to 20 mA analog output with HART 7.5, PROFIBUS PA, PROFIBUS DP or Modbus RS 485 RTU. The current signal can be configured for massflow, volumeflow or density, standard volume flow, medium temperature, Fraction A and B and Fraction A% and B%.

Channel 2

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

Benefits (continued)

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

Channels 3 and 4

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

Signal

Signal output can be user configured to:

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

Relay

Relay output(s) can be user configured to:

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

Signal input

Signal input can be user configured for

- Dosing control
- Totalizer reset functions
- Force or freeze output(s)
- Inititate automatic zero point adjustment

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

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

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

Approvals and certificates

The FCT030 coriolis flowmeter program was designed from the ground up to comply with or exceed the requirements of international standards and regulations.

Application

SITRANS FCT030 transmitters are suitable for applications within the entire process industry where there is a demand for accurate flow measurement. The meter is capable of measuring both liquid and gas flow.

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

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

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

Design

The transmitter SITRANS FCT030 is designed in an IP67/NEMA 4X aluminum enclosure with corrosion resistant coating. It can be remote connected or compact mounted with the following sensors:

- FCS300 DN 15, DN 25, DN 50, DN 80, DN 100, DN 150
- FCS400 DN 15, DN 25 and DN 50
- MASS 2100 DI 1.5, DI 3, DI 6, DI 15
- FC300 DN 4

FCT030 is available with current output HART 7.5, Modbus RS 485 RTU, PROFIBUS DP or PROFIBUS PA as standard on Channel 1.

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

SensorFlash

SensorFlash is a standard, 4 GByte micro SD card with the ability to be updated by PC. It is supplied with each sensor with the complete set of certification documents including calibration report. Material, pressure test, factory conformance certificates are optional at ordering.

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

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

Dataloggin on SensorFlash

The following functions are available:

- Logging of process values and diagnostic values simultaneous
- Logging of parameter settings
- Selectable logging interval

Function

The following functions are available:

- Mass flowrate, volume flowrate, density, process temperature, frame temperature, fraction flow
- Up to four output/input channels selected at ordering
- Outputs can be individually configured with mass, volume, density etc.
- Three built-in totalizers which can count forward, backward or forward and backward
- Low flow cut-off, adjustable
- Density cut-off or empty pipe cut-off, adjustable
- Flow direction adjustable
- Alarm system consisting of alarm-log, alarm pending menu
- Internal data logger is updated each 10 minutes with operational data such as system health, totalizer values, all configurations and data needed for custody transfer requirements to OIML R 117 and NTEP
- Display of operating time with real-time clock. Daylight saving time is not implemented
- Uni/bidirectional flow measurement
- Flowrate outputs are freely configurable between maximum negative and maximum positive flows according to the sensor capacity
- Limit switches programmable for flow, density, temperature or fraction process values. Limit points can be graded as warning and alarm for values both above and below nominal process conditions
- Process noise filter for optimization of measurement performance under non-ideal application conditions. 5-stage pumping filter compensates for flow fluctuations caused by e.g. single acting piston pumps
- Full dosing controller with 5 user-configurable recipes
- Automatic zero adjustment menu, with zero point evaluation display
- Full service menu for effective and straight forward application and meter troubleshooting
- Precise temperature measurement ensures optimum accuracy on massflow, density and fraction flow.
- Fraction flow computation is based on a 5th-order algorithm matching known applications.
- Audit trail information, stores parameters changes with time stamp information
- Simulation of process values, status information and alarms
- Aerated flow filtering system, for advanced filtering of fluids with gas or air bubbles
- Datalogging of process values and parameter changes on SensorFlash

Technical specifications

Number of process variables	7
Measurement of	• Mass flow • Volume flow • Density • Process media temperature • Standard volume flow • Reference density • Fraction A flow • Fraction B flow • Fraction A % • Fraction B %
Current output	
Current	0 ... 20 mA or 4 ... 20 mA (Channel 1 only 4 ... 20 mA)
Load	Ex i: < 470 Ω (HART ≥ 230 Ω) Non-Ex: < 770 Ω (HART ≥ 230 Ω)
Time constant	0 ... 100 s adjustable
Digital output[1)]	
Pulse	41.6 µs ... 5 s pulse duration
Frequency	0 ... 12.5 kHz, 50 % duty cycle, 120 % overscale provision
Time constant	0 ... 100 s adjustable
Active	0 ... 24 V DC, 87 mA, short-circuit-protected
Passive	3 ... 30 V DC, max. 110 mA
Relay	Only for channel 3 and 4
Type	Change-over voltage-free relay contact
Load	30 V AC/100 mA
Functions	Alarm level, alarm number, limit, flow direction
Digital input[1)]	Only for channel 3 and 4
Voltage	15 ... 30 V DC (2 ... 15 mA)
Functionality	Start/stop/hold/continue dosing, reset totalizer 1 and 2, force output, freeze output
Galvanic isolation	All inputs and outputs are galvanically isolated, isolation voltage 500 V
Cut-off	
Low-flow	0 ... 9.9 % of maximum flow
Limit function	Mass flow, volume flow, fraction, density, sensor temperature
Totalizer	Three eight-digit counters for forward, net or reverse flow
Display	• Background illumination with alphanumerical text, 3 × 20 characters to indicate flow rate, totalized values, settings and faults. • Time constant as current output 1 • Reverse flow indicated by negative sign
Zero point adjustment	Via keypad or remote via digital input

Technical specifications (continued)

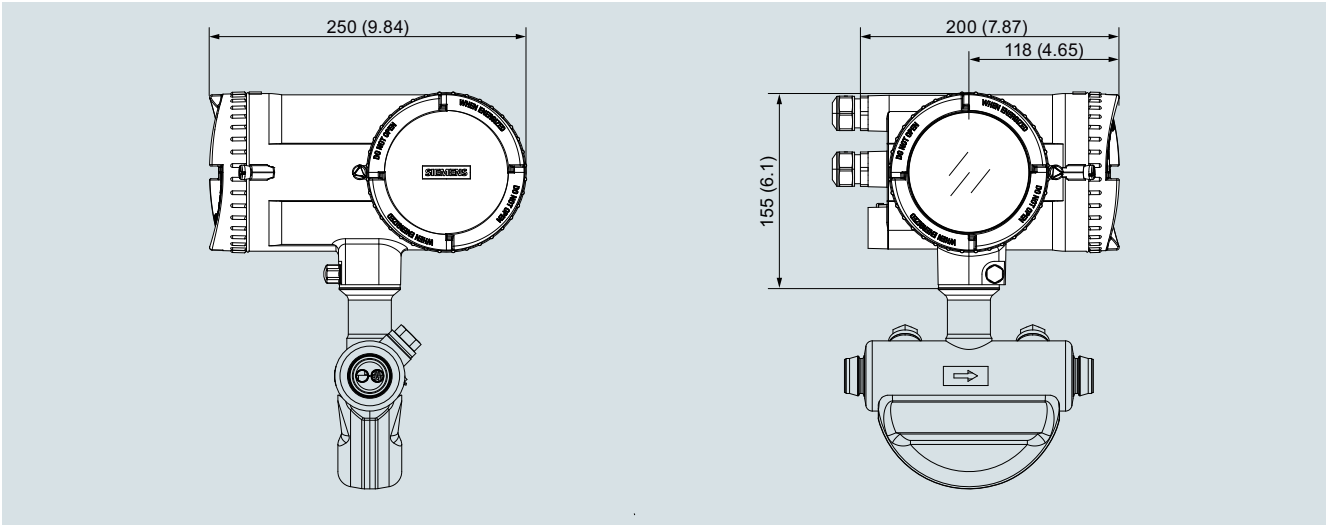
Ambient temperature	
Operation	
• Transmitter	-40 ... +60 °C (-40 ... +140 °F) (humidity max. 95 %)
• Display	-20 ... +60 °C (-4 ... +140 °F)
Storage	
• Transmitter	-40 ... +70 °C (-40 ... +158 °F) (humidity max. 95 %)
• Display	-20 ... +70 °C (-4 ... +158 °F)
Communication Ch1	HART 7.5 PROFIBUS PA PROFIBUS DP Modbus RS 485 RTU
Enclosure	
Material	Aluminum, corrosion Class C4
Rating	IP67/NEMA 4X to EN/IEC 60529 (1 mH_2O for 30 min.)
Mechanical load	18 ... 1000 Hz random, 3.17 g RMS, in all directions, to IEC 68-02-36
Supply voltage	
Supply	20 ... 90 V DC ± 10 % 100 ... 240 V AC ± 10 % 47 ... 63 Hz
Fluctuation	No limit
Power consumption	11 W/30 VA
EMC performance	
Emission	EN 55011/CISPR-11 (Class A)
Immunity	EN/IEC 61236-1 (Industry)
NAMUR	Within the value limits according to "General requirements" with error criteria A in accordance with NE 21
Environment	
Environmental conditions acc. to IEC/EN/UL 61010-1	• Altitude up to 2000 m • Pollution degree 2
Maintenance	The flowmeter has a built-in error log/pending menu which should be inspected on a regular basis
Cable glands	Cable glands are available in nylon, nickel plated brass or stainless steel (316L/W1.4404) in the following dimensions: • 1 × M25, 2 × M20 • 3 × ½" NPT
Digital cable connection (remote version)	Standard industrial signal cable up to 75 m long with 2 × screened pairs or 4-wire overall screen can be laid between the sensor and transmitter. Siemens offers cables in a selection of pre-cut lengths and prepared for either gland or plug connection.
Analog cable connection (MASS 2100/FC300)	Standard industrial cable up to 15 m distance between sensor and transmitter. PVC insulated 5 × 2 × Ø 0.34 mm, twisted and screened in pairs, temperature range -20 ... +105 °C Siemens offers cables in a selection of precut lengths.

Approvals FCT030	
Hazardous area (fieldmouint housing only) [2]	• ATEX zone 1, IECEx zone 1, cCSAus (Class 1 Div 1), EAC Ex zone 1, cCSAus Zone 1, NEPSI, INMETRO (depending on version and configuration) - ATEX/IECEx Zone 1: Ex db eb ia [ia Ga] IIC T6 Gb - ATEX/IECEx Zone 21 (depending on sensor type): Ex tb [ia Da] IIIC T85°C Db - Canada: Ex db eb ia [ia Ga] IIC T6 Gb Ex tb [ia Da] IIIC T85°C (depending on sensor type) - USA: Class I, II, III, Division 1, Groups A, B, C, D, E, F, Class I Zone 1: AEx db eb ia [ia Ga] IIC T6 Gb Zone 21: AEx tb [ia Da] IIIC T85°C
Certificates	
CE mark	• Pressure equipment • Low voltage directive • WEEE • RoHS
Regional certifications	• C-TICK (Australia and New Zealand EMC) • EAC (Belarus, Armenia, Kazakhstan, Russia) • KCC (South Korea) (in preparation)

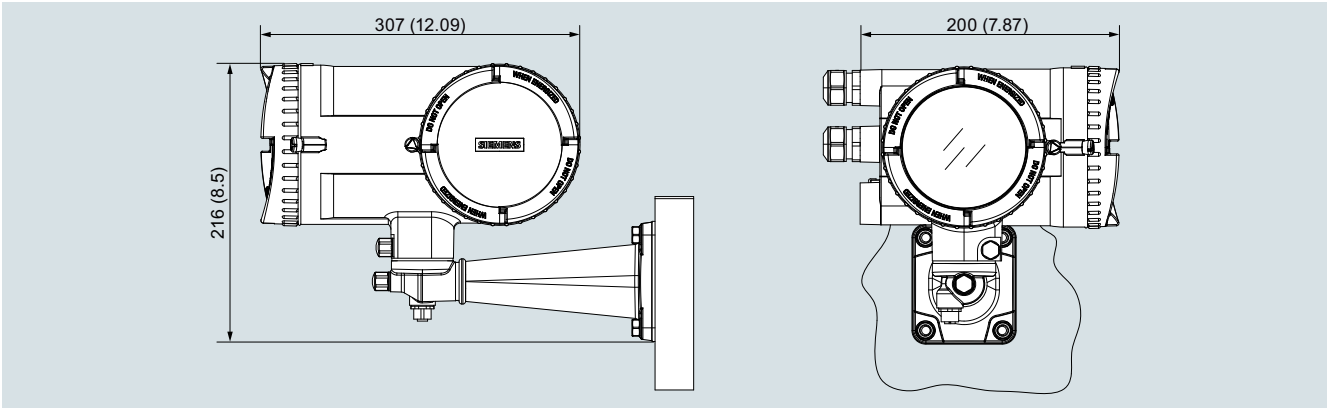
[1] With 300 Ω internal impedance. For coil switching use the passive output option.

[2] Dust certification depending on sensor type.

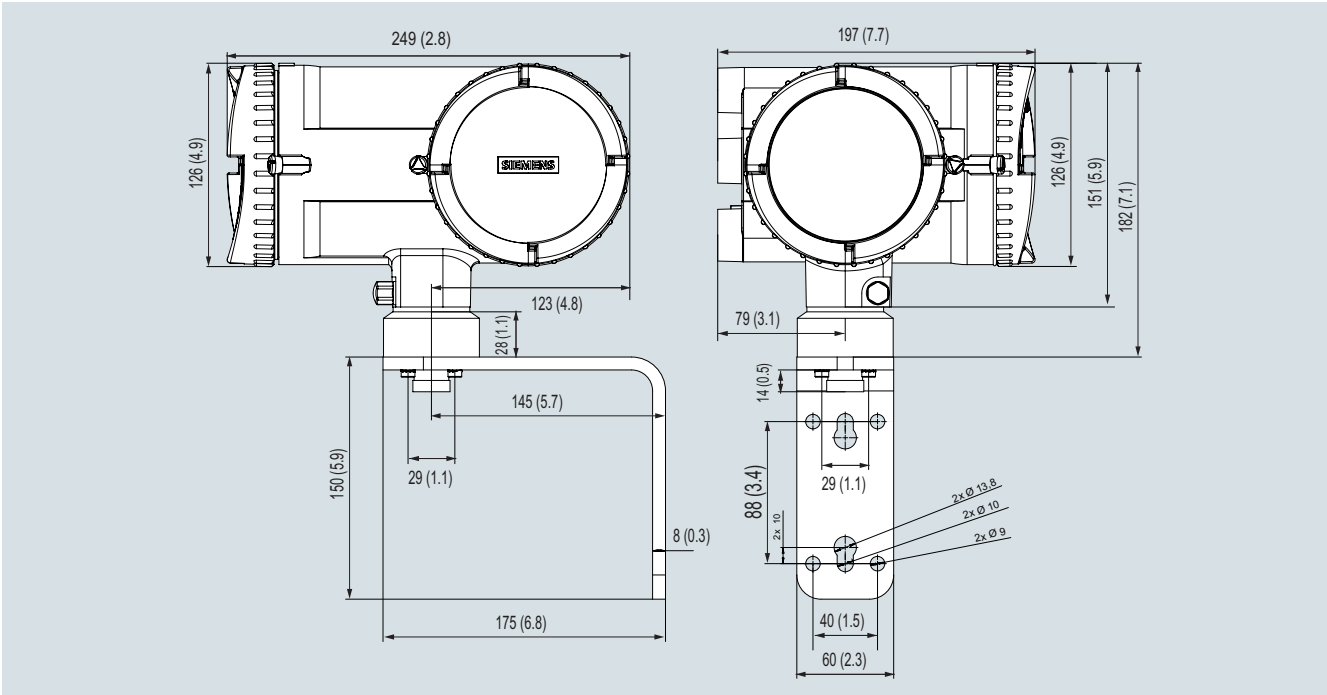
Dimensional drawings



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

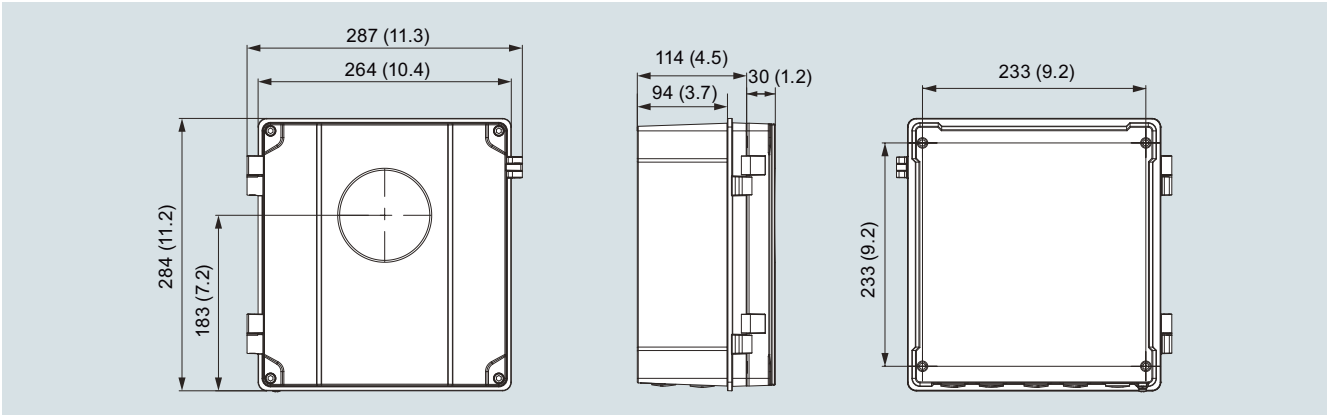


SITRANS FCT030, field mount version for sensors with digital cable and M12 plug connection, dimensions in mm (inch)



SITRANS FCT030, field mount version for low flow MASS 2100 / FC300 sensors with analog cable dimensions in mm (inch)

Dimensional drawings (continued)



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

Overview

FCT010 is based on the latest developments within digital signal processing technology – engineered for high measuring performance, fast response to step changes in flow, fast dosing applications, high immunity against process noise, easy to install commission and maintain.

The FCT010 transmitter delivers true multi-parameter measurements i.e. massflow, volumeflow, standard volumeflow, density, temperature . All with a single Modbus connection.

The FCT010 IP67 transmitter is compact mounted with all sensors of type FCS300, FCS400 , MASS 2100 DI 3, DI 6, DI 15.

For MASS 2100 DI 1.5 to DI 15 and FC300 DN 4 an analogue connection is available for a remote FCT010 solution.

Benefits

Flow calculation and measurement

Dedicated mass flow calculation with DSP technology

- Fast dosing and flow step response with maximum 10 ms response time
- 100 Hz update rate to all outputs
- Independent low flow cut-off settings for mass and volume flowrates
- Automatic zero-point adjustment on command from discrete input or host system

Operation

- User-configurable settings over SIMATIC PDM

Alarms and safety

- Advanced diagnosis and service menu enhances trouble-shooting and meter validation
- Configurable upper and lower alarm and warning limits for all process values
- Alarm handling can be selected between Siemens and NAMUR standard configurations

Outputs and control

- Single channel Modbus RTU output
- Individually configurable for massflow, volumeflow, standard volumeflow, density, temperature
- One Totalizer (data not secured by power failure)

Approvals and certificates

The FCT010 coriolis flowmeter program was designed from the ground up to comply with or exceed the requirements of international standards and regulations.

Application

SITRANS FCT010 transmitters are suitable for applications within the entire process industry where there is a demand for accurate flow measurement. The meter is capable of measuring both liquid and gas flow.

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

- Chemical & Pharma: detergents, bulk chemicals, acids, alkalis, paint mixing systems, solvents and resins, pharmaceuticals, blood products, vaccines, insulin production
- Food & Beverage: dairy products, beer, wine, soft drinks, CO2 dosing, CIP/SIP-liquids, mixture recipe control
- Automotive: fuel injection nozzle & pump testing, filling of AC units, engine consumption
- Oil & Gas applications e.g. test separators
- Hydrocarbon processing: oil refining, derivatives manufacturing, polymerisation
- Water & Waste Water: dosing of chemicals for water treatment

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

Design

The transmitter SITRANS FCT010 is designed in an IP67/NEMA 4X aluminum enclosure with corrosion resistant coating.

It is compact mounted with the following sensors:

- FCS300 DN 15, DN 25, DN 50, DN 80, DN 100, DN 150
- FCS400 DN 15, DN 25 and DN 50
- MASS 2100 DI 3, DI 6, DI 15

It can be remote mounted with the following sensors:

- MASS 2100 DI 1.5, DI 3, DI 6, DI 15
- FC300 DN 4

FCT010 is available with Modbus RS 485 RTU as standard.

SensorFlash

SensorFlash is a standard, 4 GByte micro SD card with the ability to be updated by PC. It is supplied with each sensor with the complete set of certification documents including calibration report. Material, pressure test, factory conformance certificates are optional at ordering.

The Siemens SensorFlash memory unit for the FCT010 only has the function of documentation including a parameter backup and a FW bundle. The Sensor Flash is not mounted into the FCT010 and will not have the extra features as the FCT030 transmitter has.

- Storing of alarm history log
- Storing of parameter change log

SITRANS FCT010

Function

The following functions are available:

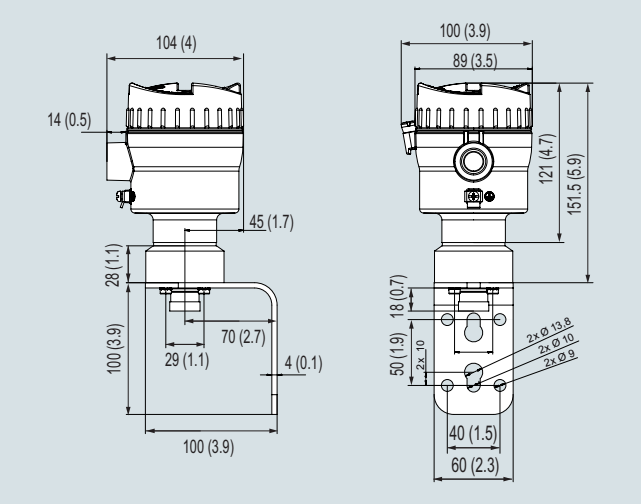
- Mass flowrate, volume flowrate, density, process temperature
- Single Modbus RTU I/O
- Low flow cut-off, adjustable
- Density cut-off or empty pipe cut-off, adjustable
- Flow direction adjustable
- Alarm system consisting of alarm-log, alarm pending menu
- Uni/bidirectional flow measurement
- Flowrate outputs are freely configurable between maximum negative and maximum positive flows according to the sensor capacity
- Process noise filter for optimization of measurement performance under non-ideal application conditions. 5-stage pumping filter compensates for flow fluctuations caused by e.g. single acting piston pumps
- Full service menu for effective and straight forward application and meter troubleshooting
- Aerated flow filtering system, for advanced filtering of fluids with gas or air bubbles

Technical specifications

Number of process variables	5
Measurement of	• Mass flow • Volume flow • Density • Process media temperature • Standard volume flow
I/O	Modbus RTU
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, density, sensor temperature
Totalizer	One eight-digit counters for forward, or reverse flow - data recovery not protected at power loss.
Zero point adjustment	Via Simatic PDM
Ambient temperature	
Operation	
• Transmitter	-40 ... +60 °C (-40 ... +140 °F) (humidity max. 95 %)
Storage	
• Transmitter	-40 ... +70 °C (-40 ... +158 °F) (humidity max. 95 %)
Communication Ch1	Modbus RS 485 RTU
Enclosure	
Material	Aluminum corrosion Class C4
Rating	IP67/NEMA 4X to EN/IEC 60529 (1 mH2O for 30 min.)
Mechanical load	18 ... 1000 Hz random, 3.17 g RMS, in all directions, to IEC 68-02-36
Supply voltage	
Supply	12 ... 27 V DC Ex d: 12-24 V DC Intrisic safe: Ui: 20 V, Ii: 484 mA, Pi: 2.3 W, Li: 0.6 uH, Ci: 1.9 nF
Fluctuation	No limit
Power consumption	1.1 W
EMC performance	
Emission	EN 55011/CISPR-11 (Class A)
Immunity	EN/IEC 61236-1 (Industry)
NAMUR	Within the value limits according to "General requirements" with error criteria A in accordance with NE 21
Environment	
Environmental conditions acc. to IEC/EN/UL 61010-1	• Altitude up to 2000 m • Pollution degree 2
Maintenance	The flowmeter has a built-in error log/pending menu which should be inspected on a regular basis.
Cable glands	M12 connector Cable glands are available in nylon, nickel plated brass or stainless steel (316L/W1.4404) in the following dimensions: • 1 × M20 • 1 × ½" NPT
Digital cable connection	Standard industrial signal cable up to 75 m long with 2 × screened pairs or 4-wire overall screen can be laid between the sensor and transmitter. Siemens offers cables in a selection of pre-cut lengths and prepared for either gland or plug connection.
Analog cable connection (MASS 2100/FC300)	Standard industrial cable up to 15 m distance between sensor and transmitter. PVC insulated 5 × 2 × Ø 0.34 mm, twisted and screened in pairs, temperature range -20 ... +105 °C
Approvals	
Hazardous area	FCT010 can be installed in zone 1 for gas and zone 21 for dust (dust: depending on sensor type) and Class 1 Div 1/ Zone 1 • ATEX, IECEx, cCSAus (Class 1 Div 1), EAC Ex, cCSAus Zone 1, NEPSI Zone 1
Certificates	
CE mark	• Pressure equipment • Low voltage directive • WEEE • RoHS
Regional certifications	• C-TICK (Australia and New Zealand EMC) • EAC (Belarus, Armenia, Kazakhstan, Russia) • KCC (South Korea) (in preparation)

Dimensional drawings

Dimension for the FCT010 remote mounted (for analogue cable connections for MASS 2100 / FC300 DN4)

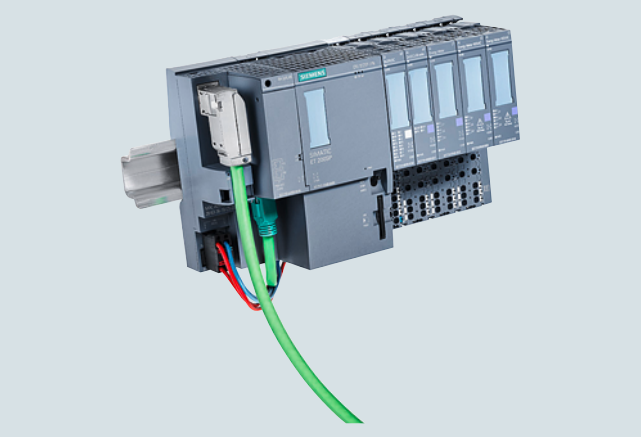


SITRANS FCT010, dimensions in mm (inch)

SITRANS FCT070

Overview

SITRANS FCT070 transmitter



Mounting on the SIMATIC ET 200SP ST & HF

The technology module SITRANS FCT070 is a Coriolis flow meter transmitter for the SIMATIC ET 200SP ST & HF.

The TM SITRANS FCT070 flow transmitter can be operated directly in the SIMATIC PCS7 or in TIA Portal with the FCT070 Faceplates.

TM FCT070 offers real-time data processing and the display of all measuring and status data of the Coriolis flowmeter.

The TM FCT070 can work with all Siemens Coriolis flow meters. It can be directly connected to the SITRANS FCS300, SITRANS FCS400 and SITRANS FC MASS 2100 FC300 DN 4.

Benefits

- Easy integration into automation process control as TIA portal and PCS7
- Easy selection and integration of flow meters via TIA-Selector
- No transmitter between automation and flow meter required
- Cost effective integration of Coriolis flow meters for PLC controlled machines
- SITRANS FCT070 is a ET 200SP technology module and can combined with all other SIMATIC ET 200S SP ST & HF modules
- Fast and trouble-free communication between the flow meter and the PLC through digital data communication with up to 10 ms update rate
- SITRANS FCT070 and ET 200SP have the ATEX Zone 2 Class 1 Div 2 approvals. With the barrier SITRANS I300 the flowmeters sensor can be used in Ex Zone 1 & Class 1 Div 1 approval.
- Included advanced batch functionality without additional modules. I/Os are onboard
- Included the 17 standard fraction tables.

Application

SITRANS FCT070 can be used for machine builders and in the process industry plants. The meters are suitable for measuring on liquid and gas. With ET 200SP ST & HF the SITRANS FCT070 can be installed decentralized in small stations, with fast communication to the control room.

The faceplates for TIA-Portal and PCS 7 offer the direct full remote access to the flow meter.

The main industries for the SITRANS FCT070 transmitter:

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

Design

The SITRANS FCT070 is designed as ET 200SP ST & HF module and can directly installed with other ET 200SP modules.

The sensor DSL cable is directly mounted to the ET 200SP ST & HF base unit is providing the supply voltage and the data communication. The SITRANS FC sensors with DSL can be connected directly to the SITRANS FCT070.

For sensors in ATEX Zone 1, the SITRANS I300 barrier must be installed between FCT070 and the FC DSL.

Function

The following key functionalities are available:

- Mass flow rate, volume flow rate, density, temperature and fraction flow
- Three built-in totalizers which can freely be set for counting mass flow, volume flow, standard volume flow and fraction
- Two-stage batch controller
- Two digital inputs
- Two digital outputs
- Low flow cut-off
- Zero point adjustment
- Configurable upper and lower alarm and warning limits for all process values
- Comprehensive status and error reporting

Technical specifications

Measurement of	Mass flow, volume flow, density, temperature, fraction A flow, fraction A %, fraction B flow, fraction B %
Measurement functions	
• Totalizer 1	**Mass flow**, volume flow, standard volume flow, fraction A, fraction B
• Totalizer 2	Mass flow, **volume flow**, standard volume flow, fraction A, fraction B
• Totalizer 3	Mass flow, volume flow, **standard volume flow**, fraction A, fraction B
• Single and 2-stage batch function	Batching function with the use of one or two outputs for dosing at high and low speed
General information	
Product type designation	Technology module TM FCT070
FW update possible	Yes
Usable BaseUnits	BU 20 type B1
ET 200SP	Yes; from FW V4.2 or higher.
ET 200SP ST & HF	Compatible and tested ST: Standard HF: High Feature
Engineering with	• STEP 7 TIA Portal configurable/integrated as of version V16 or higher • STEP 7 configurable/integrated as of version V5.5 SP4 and higher • PCS 7 V9.0 or higher • PROFINET as of GSD version/GSD revision GSDML V2.34
Cable	
Maximum cable length to FC DSL	75 m (150 m)
Supply voltage	
Load voltage L+	24 V DC
Rated value (DC)	24 V NEC-Class II
Permissible range, lower limit (DC)	19.2 V
Permissible range, upper limit (DC)	28.8 V
Short-circuit protection	Yes
Reverse polarity protection	Yes; against destruction
Input current	
Current consumption, max.	500 mA
Power loss	
Typical power loss, max.	1.7 W
Protection class	
IP protection	IP20
EMV	• Electrostatic discharge according to IEC 61000-4-2: 2008 • Field-related interference according to IEC 61000-4-3: 2006 • Bursted interference due to Burst according to IEC 61000-4-4: 2012 • Conducted interference by surge according to IEC 61000-4-5: 2014 • Conducted interference by high-frequency radiation according to IEC 61000-4-6: 2013

Decentralized operation	
• to SIMATIC S7-300	Yes
• to SIMATIC S7-400	Yes
• to SIMATIC S7-1200	Yes
• to SIMATIC S7-1500	Yes
• to standard PROFINET controller	Yes
Usable with the following flowmeters	• SITRANS FCS400 • SITRANS FCS300 • SITRANS FC MASS2100 • SITRANS FC300 For hazardous area application the SITRANS I300 can be used as barrier/power supply between sensor and FCT070
Digital inputs 1 and 2	
Free usable inputs 1 and 2	• Start dosing • Stop dosing • Pause/resume dosing • Start/stop totalizer 1, 2 or 3 • Reset totalizer 1, 2 or 3 • Zero adjust • Force outputs • Freeze process values
High signal	• Nominal voltage: 24 V DC • Upper limit: +30 V DC • Lower limit: +11 V DC • Current: max 35 mA
Low signal	• Nominal voltage: 0 V DC • Lower limit: -30 V DC • Upper limit: +5 V DC • Current: max 35 mA
Potential separation	• Module and backplane bus • Short circuit protection
Isolation test	707 V DC
Cable length	• Max. 50 m shielded • Max. 25 m unshielded
Digital outputs 1 and 2	
Free useable outputs 1 and 2	• Alarm acknowledgment • Out of specification • Failure sensor measuring • Function check • Status force value • Flow direction
Low signal	Max. 1 V
High signal	Min 23.2 V
Switching capacity	300 mA signal high
On lamp load	8 W
Load resistance	80 … 10 kΩ
Between diffrenet circuits	Electronic/thermal
Potential seperation	Module and backplane bus
Isolation test	707 V DC
Cable length	• Max. 50 m shielded • Max. 25 m unshielded

Technical specifications (continued)

Environment	
Ambient temperature during operation	
Minimum installation	-25 °C
horizontal installation, max.	60 °C; observe derating
vertical installation, max.	50 °C; observe derating
Ambient temperature during storage/transport	
Storage, min.	-40 °C
Storage, max.	70 °C
Transport, min.	-40 °C
Transport, max.	70 °C
Relative humidity	
Operation, min.	5 %
Operation, max.	95 %; no condensation
Height in operation	
Ambient air pressure altitude (relative to sea level)	T_{min} ... T_{max} at 1 080 hPa ... 795 hPa (-1 000 m ... +2 000 m)
EMC performance	
Emission	• EN 61000-6-4
Electromagnetic compatibilty	• IEC 61000-6-2:2016 • IEC 61000-6-4:2018
Emission of radio interference	Class A industrial environment: • IEC 61000-6-4: 2018 • IEC/CISPR 16-2-3: 2008 • EN 55016-2-3: 2006
Emission on power supply cables	Class A Industrial environment: • IEC 61000-6-4: 2018 • IEC/CISPR 16-2-1: 2010 • EN 55016-2-1: 2009
Certification	
CE mark	Low voltage directive RoHS
UL	ANSI / ISA 12.12.01
CAN/CSA	CSA C22.2 No. 213-M1987 Class I, Div. 2 Group A.B.C.D T4
ATEX	II 3 G Ex ec IIC T4 Gc
IECEx	Ex ec IIC T4 Gc
EAC	Yes
Tick	Yes
KCC	Yes
RoHS	Yes
FM	Class I, Div. 2, Group A.B.C.D T4
Communication	
Digital Sensor Link	460.8 kBits/s
Cable length FCT070 to FC DSL Sensor	75 m (150 m)
Power supply FCS sensor	The operating voltage of the sensors is supplied via the sensor cable directly from the FCT070

Selection and ordering data

Description	Article No.	
SITRANS FCT070 Transmitter for ET 200SP	**7ME4138-6AA00-0BB1**	
BU20-P12+A0+4B, PU1 BaseUnit plate for ET 200SP	**6ES7193-6BP20-0BB0** **6ES7193-6BP20-0BB1**	
SITRANS I300 – Isolating power supply – Ex barrier	**A5E39832532**	
Compatible Coriolis sensors		
SITRANS FCS300	**7ME4637-…**	
SITRANS FCS400	**7ME4617-…**	
SITRANS MASS 2100	**7ME4817-…**	
SITRANS FC300 DN4	**7ME4817-…**	

Operating instructions for SITRANS FCT070

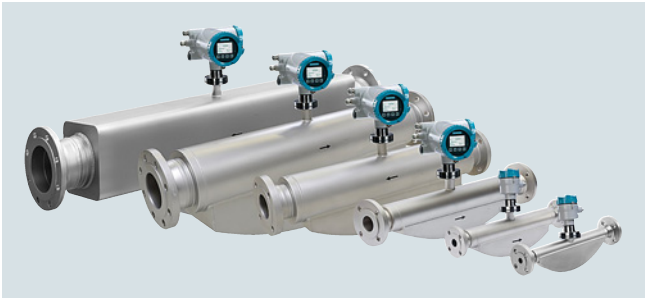
Description	Article No.
SITRANS FCT070 system manual • English • German	**A5E47701533-AA**

Circuit diagrams

Naming	Con.	PIN	BU20 type B1	PIN	Con.	Naming
Digital input	DI0	1		2	DQ0	Digital output
Digital input	DI1	3		4	DQ1	Digital output
+24 V DC supply voltage for digital inputs	DI_L+	5		6	nc	
Ground for digital outputs	M	7		8	M	Ground for digital outputs
RS 485 data line A for SEN communication	SEN_A	9		10	SEN_L+	+24 V DC supply voltage for SEN
RS 485 data line B for SEN communication	SEN_B	11		12	SEN_M	GND for SEN supply
+24 V DC supply voltage	L+	13		14	M	Ground for supply voltage
	L+	15		16	M	

Pin assignment of the BaseUnit BU20-P12+A0+4B

Overview



The SITRANS FCS300 sensor is available in DN 15 to DN 150 mm sizes in stainless steel AISI 316 L or nickel allow wetted material. The sensor design consists of process connections, inlet and outlet manifolds mounted in a stiff frame and two parallel tubes equally sharing the process medium flow.

The sensing tubes are curved in the CompactCurve shape which gives high sensitivity and low pressure loss. The CompactCurve shape was selected to ensure that the smallest flows are measured with optimal signal to noise ratio.

The compact sensor design with a split flow dual tube design with high driver frequency is suitable for high end applications in all industry segments e.g. Chemical, Oil & Gas , Refineries, F&B and Power.

A variety of process connections available to cover all common process connections and pressure ratings.

The sensor has a solid stainless steel fully welded enclosure to protect the measuring tubes from any harsh environments. For hazardous area applications the FCS300 comes in a number of common harzardous area approved like Atex, IECEx, cCSAus, EAC, and NEPSI.

Integration

The SITRANS FCS300 sensor is suitable for both indoor and outdoor installation and meets the requirements of Protection Class IP67/NEMA 4X. Optionally the sensor can be ordered with hazardous certification to Zone 1 and Div 1 (ATEX, IECEx, cCSAus, EAC Ex, NEPSI).

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

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

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

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

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

Installation orientation

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

Supports

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

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

Shut-off devices

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

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

Configuration

Installation guidelines

- The mass flowmeter does not require any flow conditioning or straight inlet pipe sections. Care should be exercised however to ensure that any upstream valves, gates, sight glasses etc. do not cavitate and are not set into vibration by the flow.
- It is always preferred to place the flowmeter upstream of any control valve or other pipeline component which may cause flashing, cavitation or vibrations.
- The presence of gas bubbles in the fluid may result in erroneous measurements, particularly in the density measurement. Therefore the flowmeter should not be installed at the lowest pressure point in the liquid piping system or where vapour can collect. Install the meter in pipeline sections with high pressure to maintain system pressure and compress any bubbles.
- Drop lines downstream from the flow sensor should be avoided to prevent the meter tube from draining during flowing conditions. A back-pressure device or orifice is recommended to ensure that flow does not separate within the flow sensor but the metering section remains at positive pressure at all times while there is flow.
- The flowmeter should not come into contact with any other objects. Avoid making attachments to the housing except for the pressure guard components (if required).
- When the connecting pipeline is larger than the sensor size, suitable standard reducers may be installed. A selection of oversize and undersize connections can be ordered - refer to the sizes tables below.
- The flow sensor may be supported at the junction between process connection and the manifold, but should not be used to support adjacent piping. Ensure that the piping is also supported on both sides so that connection stresses are neutral.
- If strong vibrations exist in the pipeline, they should be damped using elastic pipeline elements. The damping devices must be installed outside the supported flowmeter section. Direct connection of flexible elements to the sensor should be avoided.
- Make sure that any dissolved gases, which are present in many liquids, do not outgas. The back pressure at the outlet should be at least 0.2 bar (3 psi) above the vapour pressure of the process fluid.
- Assure that operation below the vapour pressure cannot occur particularly for fluids with low latent heat of vaporisation.
- The sensor should not be installed in the vicinity of strong electromagnetic fields, e.g. near motors, pumps, variable frequency drives, transformers etc.
- When operating meters on a common mounting base the sensors should be mounted and spaced separate from each other to avoid cross-talk and other vibration interferences.
- When operating meters in interconnected pipelines the pipes should be decoupled to prevent cross talk.

Remote system cabling

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

Be aware of maximum sensor length cable depending on product selection, currently 75 m. Data transmission speed and process variable update rates may be affected by the cable characteristics. For best results, choose a cable with the following electrical characteristics:

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

The flowmeter system applies maximum 15 V DC in operation and is certified intrinsically safe. The complete system is insulation tested to 1 500 V in production.

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

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

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

Insulation and heating

For applications where pipeline insulation is required for personnel protection or process temperature maintenance, the SITRANS FCS300 flow sensor may also be insulated. The form and material of insulation is not prescribed and entirely depends on the practices at the application location or plant.

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

Technical specifications

Flow sensor FCS300		
Parameter	**Unit**	**Value**
Process media		• Fluid Group 1 (suitable for dangerous fluids) • Aggregate state: Paste/light slurry, liquid and gas
Process pressure range	[barg (psi)]	The maximum permissible operating pressure is determined by the respective process connection and the temperature of the medium 316L: 0 ... 100 (0 ... 1 450) Nickel-alloy C4 (2.4610)[3]: 0 ... 100 (0 ... 1 450)
Process temperature range	[°C (°F)]	The maximum permissible process temperature is determined by the respective process connection -50 ... +205 (-58 ... +400)
Ambient temperature range	[°C (°F)]	-40 ... +70 (-40 ... +158)
Transport temperature range	[°C (°F)]	-40 … +70 (-40 … +158)
Density range	[kg/m^3 (lb/ft^3)]	1 … 5 000 (0.062 … 312.2)
No. of process values		
• Primary process values		• Mass flow • Density • Process medium temperature
• Derieved process values		• Volume flow • Standard volume flow (with reference density) • Fraction A:B • Fraction % A:B

Performance specifications		**Sensor**					
Parameter	**Unit**	**DN 15**	**DN 25**	**DN 50**	**DN 80**	**DN 100**	**DN 150**
Max. zero point error		0.6 (0.0235)	2.16 (0.0792)	7.2 (0.264)	20 (0.735)	41.6 (1.628)	68.8 (2.528)
Q_{min} (1 % error)[4]	[kg/h (lb/min)]	70 (2.57)	240 (8.92)	800 (29.4)	2 000 (73.5)	4 000 (146.9)	6 900 (253.5)
Q_{nom} (1 bar pressure)	[kg/h (lb/min)]	4 500 (163.3)	20 500 (753.2)	49 000 (1 800)	122 000 (4 483)	273 000 (10 031)	459 200 (16 873)
Qmax[2]	[kg/h (lb/min)]	8 000 (293.9)	35 000 (1 286)	90 000 (3 307)	250 000 (9 186)	520 000 (19 107)	860 000 (31 600)
Linearity error mass flow							
• for liquids[1]	0.1% massflow sensor [%]	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1
	0.2% massflow sensor [%]	± 0.2	± 0.2	± 0.2	± 0.2	± 0.2	± 0.2
• for gases (additional)	[%]	± 0.40	± 0.40	± 0.40	± 0.40	± 0.40	± 0.40
Repeatability mass flow	[%]	± 0.05	± 0.05	± 0.05	± 0.05	± 0.05	± 0.05
Density accuracy with 0.1%	[kg/m^3 (lb/ft^3)]	± 2 (± 0.124)	± 2 (± 0.124)	± 2 (± 0.124)	± 2 (± 0.124)	± 2 (± 0.124)	± 2 (± 0.124)
Density accuracy with 0.2 %	[kg/m^3 (lb/ft^3)]	± 10 (± 0.62)	± 10 (± 0.62)	± 10 (± 0.62)	± 10 (± 0.62)	± 10 (± 0.62)	± 10 (± 0.62)
Temperature error	[°K]	± 0.5	± 0.5	± 0.5	± 0.5	± 0.5	± 0.5

1) Increased error can be expected for gas mass flow measurement (for gas measurement typically + 0.40 % error).

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

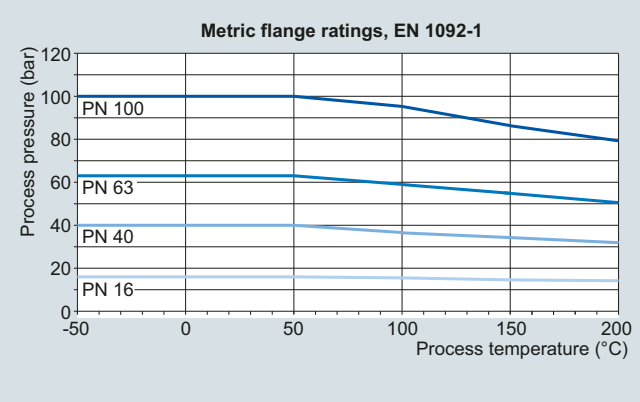
3) Hastelloy C is a registered trademark of Haynes International. C4 nickel alloys are equivalent to Hastelloy C4.

4) Valid for the 0.1% sensor.

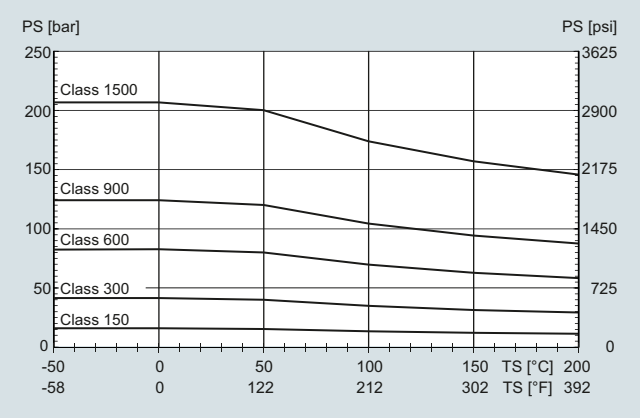
Technical specifications (continued)

Pressure/temperature curves

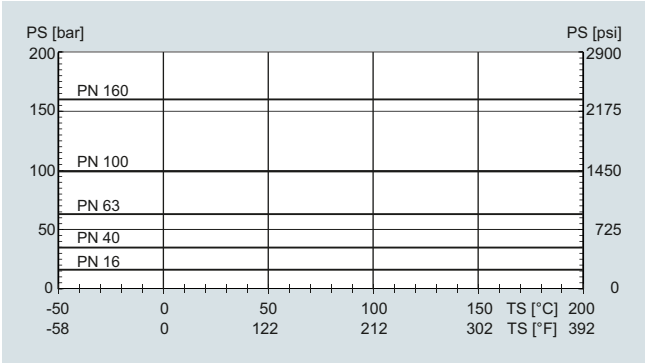
With two major exceptions, the pressure rating of the flow sensors is independent of the process medium temperature. Design rules for flange connections in both the EN 1092-1 and ASME B16.5 standards dictate pressure derating with increasing temperature. The charts below show the effect of process medium temperature on the pressure ratings for the flanges within the FCS300 product program.



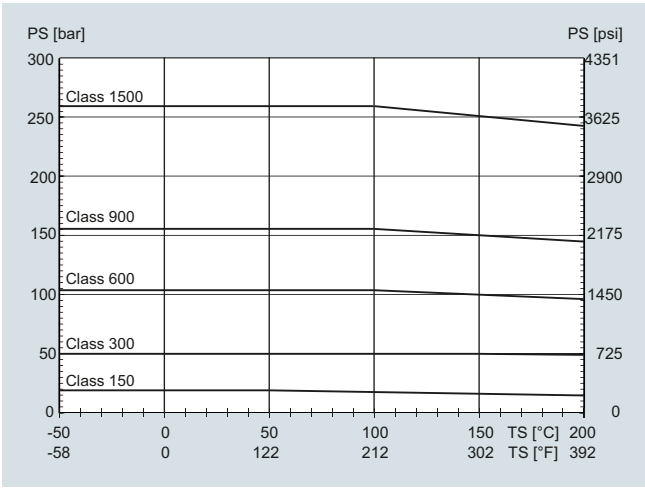
EN1092-1 flanged sensors in AISI 316L



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



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



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

Sanitary connections

Design	Nominal size	PS_{max}		TS_{max}		TS_{min}	
		[bar]	[psi]	[°C]	[°F]	[°C]	[°F]
Pipe fitting DIN 11851	DN 15 ... 40 (½ ... 1½")	40	580	140	284	-40	-40
	DN 50 ... 100 (2 ... 4")	25	363	140	284	-40	-40
Pipe fitting SMS 1145	DN 25 ... 80 (1 ... 3")	6	87	140	284	-40	-40
Clamp DIN 32676	DN 15 ... 50 (½ ... 2")	16	232	120	248	-40	-40
	DN 65 ... 100 (2½ ... 4")	10	145	120	248	-40	-40

Technical specifications (continued)

Sensor variants

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

Standard variants

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

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

Hygienic sensor variants

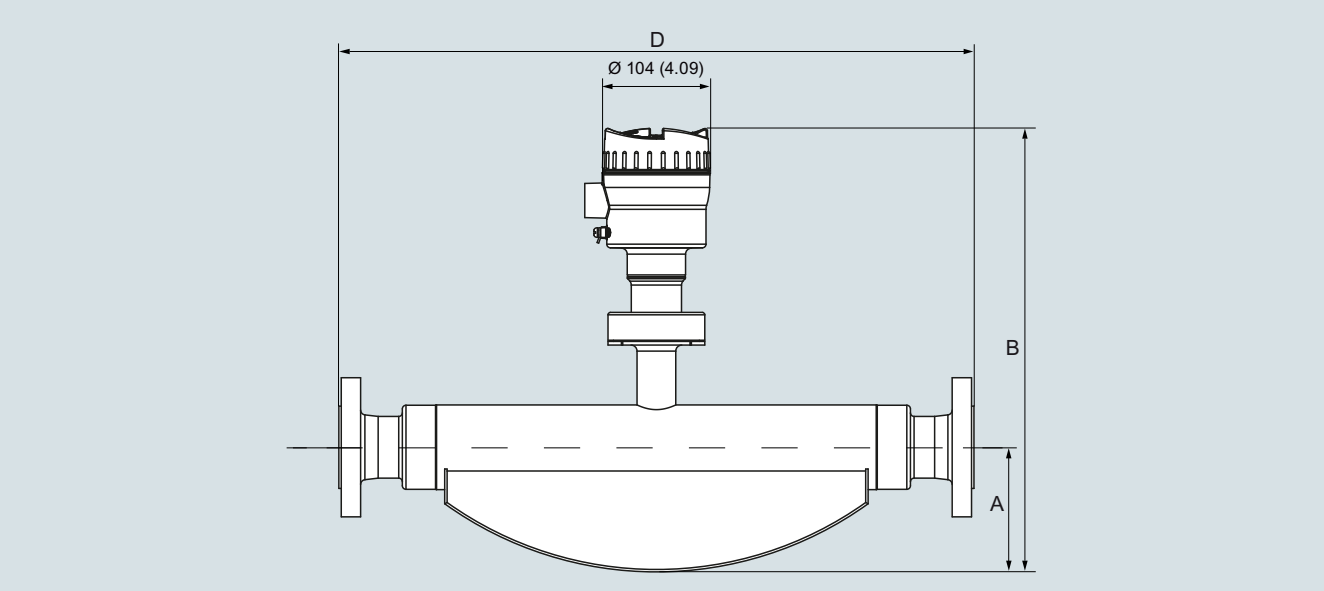
The hygienic sensors will have to be ordered with stainless steel tubes 316L/1.4435/1.4404 (polished). Hygienic sensors are offered with process connection conforming to various international quick-connect clamps or threaded connectors. Pressure ratings are according to the relevant standard and the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

NAMUR sensor variants

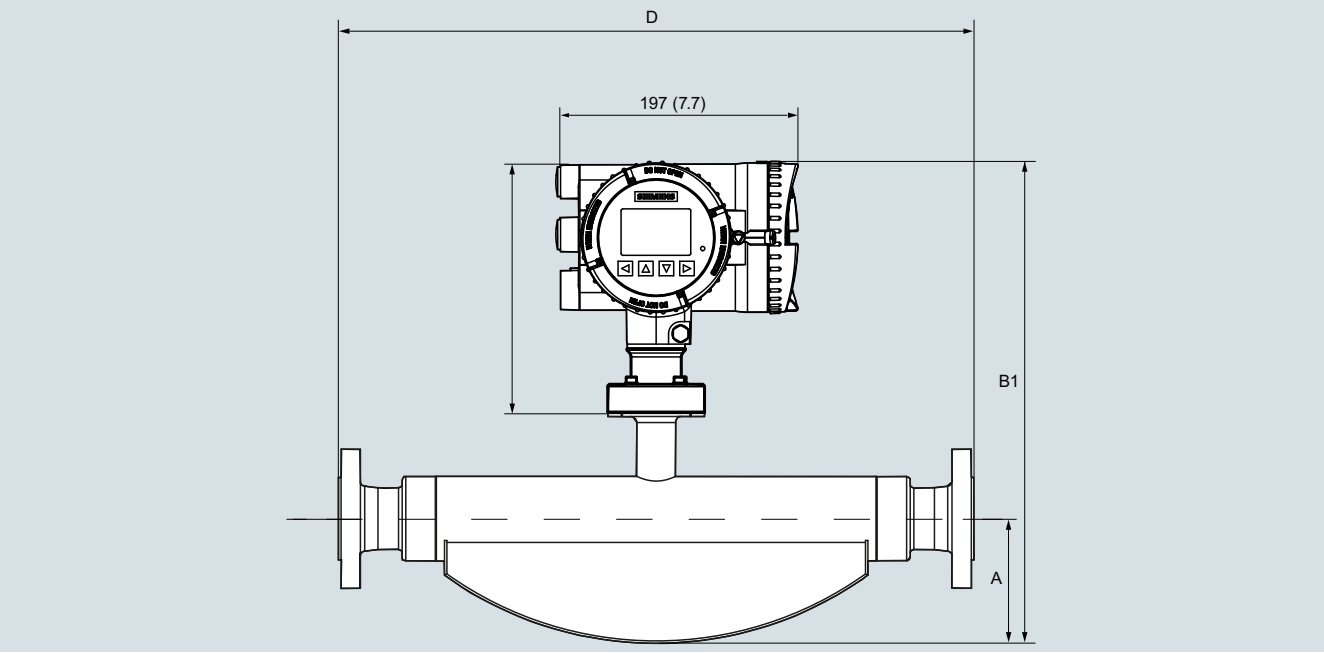
The NAMUR variants have built-in lengths according to NAMUR recommendation NE 132. The recommendations of NE 132 are stated for sensors with flanges the same size as the sensor nominal size, and for flanges to EN 1092-1 PN 40 with B1 flange facing. For DN 100 and DN 150 flanges to PN 16.

Dimensional drawings

Sensor dimensions



SITRANS FCS300 remote sensor



SITRANS FCS300 compact

Sensor		A		B		B1		Weight[1)]	
[DN]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[kg]	[lb]
15	½	80	3.15	358	14.09	387	15.19	4.6	10.1
25	1	103	4.06	398	15.67	427	16.77	7.9	17.4
50	2	126	4.96	435	17.13	464	18.23	25.7	56.7
80	3	181	7.13	525	20.67	554	21.77	66.5	147
100	4	262	10.31	622	24.49	651	25.59	128	282
150	6	317	12.48	714	28.11	743	29.21	207	456

1) For FCT030 compact add 4 kg (8.8 lb)

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

The built-in length D depends on the flange.

Dimensional drawings (continued)

Overall length

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

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

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

Sensor	**DN 80 (3")**			**DN 100 (4")**			**DN 150 (6")**		
Connection	**DN 65 (2½")**	**DN 80 (3")**	**DN 100 (4")**	**DN 80 (3")**	**DN 100 (4")**	**DN 150 (6")**	**DN 100 (4")**	**DN 150 (6")**	**DN 200 (8")**
EN 1092-1 B1, PN 16			875	1222	1122	1260	1569	1421	1587
EN 1092-1 B1, PN 40	910	870	875	1222	1144	1260	1599	1461	1650
EN 1092-1 B2, PN 63	910	910	1060	1234	1304				
EN 1092-1 B2, PN 100	910	910	1080	1234	1334				
EN 1092-1 D, PN 40		870							
ASME B16.5, class 150		880	880	1244	1144	1330	1630	1485	1650
ASME B16.5, class 300	920	895	1075	1244	1324	1350		1505	1670
ASME B16.5, class 600	920	920	1100	1244	1354	1400	1675	1555	
ASME B16.5, class 900	965	1100	1130	1470	1380	1450	1705	1605	
ASME B16.5, class 1500	965	1300	1150	1500	1400	1510	1725	1665	
ISO 228-1 G female pipe thread									
ASME B1.20.1 NPT female pipe thread									
DIN 11851 hygienic screwed	990	940	940						
DIN 32676 (ISO) Row A hygienic clamp	950	910	910						
SMS 1145 hygienic screwed	990	940							
JIS B2220/10K	910	870		1275	1150	1300			
JIS B2220/20K	910	870		1275	1150	1308			
EN 1092-1 PN 16, NAMUR length					1400			1700	
EN 1092-1 PN 40, NAMUR length		915							

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

Dimensional drawings (continued)

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

Sensor	DN 80 (3")			DN 100 (4")			DN 150 (6")		
Connection	**DN 65 (2½")**	**DN 80 (3")**	**DN 100 (4")**	**DN 80 (3")**	**DN 100 (4")**	**DN 150 (6")**	**DN 100 (4")**	**DN 150 (6")**	**DN 200 (8")**
EN 1092-1 B1, PN 16			34.45	48.11	44.17	49.61	61.77	55.94	62.48
EN 1092-1 B1, PN 40	35.83	34.25	34.45	48.11	45.04	49.61	62.95	57.52	64.96
EN 1092-1 B2, PN 63	35.83	35.83	41.73	48.58	51.34				
EN 1092-1 B2, PN 100	35.83	35.83	42.52	48.58	52.52				
EN1092-1 D, PN 40		34.25							
ASME B16.5, class 150		34.65	34.65	48.98	45.04	52.36	64.17	58.46	64.96
ASME B16.5, class 300	36.22	35.24	42.32	48.98	52.13	55.12		59.25	65.75
ASME B16.5, class 600	36.22	36.22	43.31	48.98	53.31	57.14	65.94	61.22	
ASME B16.5, class 900	37.99	43.31	44.49	57.87	54.33	57.09	67.13	63.19	
ASME B16.5, class 1500	37.99	51.18	45.28	59.06	55.12	59.45	67.91	65.55	
ISO 228-1 G female pipe thread									
ASME B1.20.1 NPT female pipe thread									
DIN 11851 hygienic screwed	38.98	37.01	37.01						
DIN 32676 (ISO) Row A hygienic clamp	37.40	35.83	35.83						
SMS 1145 hygienic screwed	38.98	37.01							
JIS B2220/10K	35.83	34.25		50.20	45.28	50.20			
JIS B2220/20K	35.83	34.25		50.20	45.28	51.50			
EN 1092-1 PN 16, NAMUR length					55.12			66.93	
EN 1092-1 PN 40, NAMUR length		36.02							

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

Dimensional drawings (continued)

Sensor in nickel-alloy C4: 7ME463.-...

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

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

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

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

Sensor	DN 80 (3")			DN 100 (4")			DN 150 (6")		
Connection	**DN 65 (2½")**	**DN 80 (3")**	**DN 100 (4")**	**DN 80 (3")**	**DN 100 (4")**	**DN 150 (6")**	**DN 100 (4")**	**DN 150 (6")**	**DN 200 (8")**
EN 1092-1 B1, PN 16			38.2	53.4	50.4	49.6	62.7	59.1	
EN 1092-1 B1, PN 40	40.2	38.2	38.2	53.4	50.4	49.6	62.7	59.1	
EN 1092-1 B2, PN 63	40.2		38.2	53.4	50.4	49.6	64.3	60.7	
EN 1092-1 B2, PN 100	40.2	38.2	38.2	53.4	50.4	49.6	64.3	60.7	
ANSI B16.5, class 150	40.2	38.2	38.2	53.4	50.4	49.6	62.7	59.1	
ANSI B16.5, class 300	40.2	38.2	38.2	53.4	50.4	49.6	64.3	60.7	
ANSI B16.5, class 600	40.2	38.2	38.2	53.4	50.4	49.6	64.3	60.7	
JIS B2220/10K	35.83	34.25	41.73	53.4	50.4	49.6	62.7	59.1	

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

SITRANS FC330 flowmeter system

Overview

The complete flowmeter system SITRANS FC330 can be ordered for standard, hygienic or NAMUR service. The flowmeter is based on the latest developments within digital signal processing technology – engineered for high measuring performance:

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

With all global marine approvals the FC330 is ideal for integration in ship fuel efficiency and environmental measurement systems as well as bunkering solutions.
FC330 is available with current output HART 7.5, Modbus RS 485 RTU, PROFIBUS DP or PROFIBUS PA as standard on Channel 1. Additional functions can be freely configured for analog, pulse, frequency, relay or status output or binary input.

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

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

Benefits

- It is compact and light, fitting neatly into dense piping arrangements
- Easy maintenance because modules can be exchanged rapidly
- Effective separation of measurement from plant vibration
- Highly secure operation in safety critical applications
- Non-volatile memory of all setup and operation data
- Reliable measurements due to high signal to noise ratio
- Secure, digital transfer of measurement data from the sensor
- Short overall length; easy drop-in replacement into most existing installations

Technical specifications

Sizes	DN 15 (½") DN 25 (1") DN 50 (2") DN 80 (3") DN 100 (4") DN 150 (6")
Accuracy	± 0.10 % or 0.20 % for liquids additional ±0.40 for gases
Repeatability	± 0.05 %
Flow range (liquids)	
(water @ 1 bar pressure loss) (Q_{nom})	
• DN 15	4 500 kg/h (163.3 lb/min)
• DN 25	20 500 kg/h (753.2 lb/min)
• DN 50	49 000 kg/h (1 800 lb/min)
• DN 80	122 000 kg/h (4 483 lb/min)
• DN 100	273 000 kg (10 031 lb/min)
• DN 150	459 200 kg/h (16 873 lb/min)
Architecture	Compact or remote configuration
Display	Full graphical display, 240 × 160 pixels with selection of 6 languages
Power supply	20 ... 90 V DC ± 10 %; 100 ... 240 V AC ± 10 %, 47 ... 63 Hz ± 10 %
Material	
• Sensor	
- Wetted parts	316L stainless steel or nickel alloy C4
- Enclosure	304 stainless steel
• Transmitter	Aluminum with corrosion-resistant coating class C4
Enclosure rating	IP67[1)]
Pressure ratings	
• Measuring tubes	
- 316L	100 bar (1 450 psi)
- Nickel alloy C4	100 bar (1 450 psi)
• Sensor enclosure	No pressure containment
Temperature ratings	
• Process medium	-50 ... +205 °C (-58 ... +400 °F)
• Ambient	-40 ... +60 °C (-40 ... +140 °F)[1)]
• Display	-20 ... +60 °C (-4 ... +140 °F)

Process connections	
• Flanges	EN 1092-1 B1, EN 1092-1 B2, EN 1092-1 D, ANSI/ASME B16.5, JIS B 2220
• Pipe threads	ASME B1.20 (NPT) female pipe thread, ISO 228-1 G female pipe thread (BSPP)
• Hygienic threads	DIN 11851, SMS 1145
• Hygienic clamps	DIN 32676 (ISO) Row A
Approvals	
• Hazardous area (zone 1)	ATEX, IECEx, EAC Ex, CSA, cCSAus, NEPSI, EAC No dust approval
• Pressure equipment	PED, CRN
• Hygienic	EHEDG (DN 25 ... DN 80) (in preparation)
• Marine (in preparation for FC330 compact)	Germanischer Lloyd/det Norske Veritas, Bureau Veritas, Lloyds of London, American Bureau of Shipping, RINA (Italy)
NAMUR	NAMUR-compliant (e.g. NE 21, NE 41, NE 107 and NE 132)
I/O	Up to 4 channels combining analog, relay or digital outputs and binary input
Communication	HART PROFIBUS PA PROFIBUS DP Modbus RTU (RS 485)
EMC performance	
Emission	EN 55011/CISPR-11 (Class A)
Immunity	EN/IEC 61326-1 (Industry)
Mechanical load	18 ... 400 Hz random The flow meter will mechanically tolerate 3.17 g RMS in all directions. Flow accuracy cannot be guaranteed under all conditions.

[1)] If operating outdoors, avoid direct sunlight, paritcularly in warm climatic regions.

SITRANS FC330 flowmeter system

Selection and ordering data

Article No.

SITRANS FC330 digital coriolis flowmeter with SITRANS FCS300 standard flow sensor compact or remote mounting with FCT030 transmitter ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ME4633-					-					Ord. code		
Sensor size, connector size													
DN 15, DN 10 (½", 3/8")	3	F											
DN 15, DN 15 (½", ½")	3	G											
DN 15, DN 20 (½", ¾")	3	H											
DN 25, DN 20 (1", ¾")	3	K											
DN 25, DN 25 (1", 1")	3	L											
DN 25, DN 40 (1", 1½")	3	N											
DN 50, DN 40 (2", 1½")	4	B											
DN 50, DN 50 (2", 2")	4	C											
DN 50, DN 65 (2", 2½")	4	D											
DN 80, DN 65 (3", 2½")	4	J											
DN 80, DN 80 (3", 3")	4	K											
DN 80, DN 100 (3", 4")	4	L											
DN 100, DN 80 (4", 3")	5	M											
DN 100, DN 100 (4", 4")	5	N											
DN 100, DN 150 (4", 6")	5	Q											
DN 150, DN 100 (6", 4")	6	D											
DN 150, DN 150 (6", 6")	6	F											
DN 150, DN 200 (6", 8")	6	H											
Process connection													
EN 1092-1 B1, PN 16			A	0									
EN 1092-1 B1, PN 40			A	1									
EN 1092-1 B2, PN 63			A	2									
EN 1092-1 B2, PN 100			A	3									
EN 1092-1 D, PN 40			A	5									
ASME B16.5 RF, lass 150			D	1									
ASME B16.5 RF, Class 300			D	2									
ASME B16.5 RF, Class 600			D	3									
ASME B16.5 RF, Class 900 (p- and t-rating as Class 600)			D	4									
ASME B16.5 RF, Class 1500 (p- and t-rating as Class 600)			D	5									
ISO 228-1G female pipe thread			E	1									
ASME B1.20.1 NPT female pipe thread			E	3									
DIN 11851 hygienic screwed			F	1									
DIN 32676 hygenic clamp (ISO) Row A			G	2									
SMS 1145 hygienic screwed			K	1									
JIS B2220/10K			L	2									
JIS B2220/20K			L	4									
EN 1092-1, PN 16, NAMUR length			N	1									
EN 1092-1, PN 40, NAMUR length			N	2									
Wetted parts material													
AISI 316L/1.4435/1.4404					1								
AISI 316L/1.4435/1.4404 (polished)					2								
Nickel alloy C4					3								

Article No.

SITRANS FC330 digital coriolis flowmeter with SITRANS FCS300 standard flow sensor compact or remote mounting with FCT030 transmitter	7ME4633-					-					Ord. code		
Calibration/Accuracy class													
0.2 % flow, 10 kg/m³ density							0						
0.1 % flow, 2 kg/m³ density							1						
0.1 % Standard fraction (with density 2 kg/m³)							8						
0.1 % Customer selected fraction							9				N	0	Y
Mounting style, transmitter housing and material													
None (replacement sensor)								A					
Compact, IP67 fieldmount, aluminum								D					
Remote, IP67 fieldmount, aluminum, M12								G					
Remote, IP67 fieldmount, aluminum, T/Box								K					
Remote, IP67, wall mount, aluminium (in preparation)								U					
Ex approval (depending on variant)													
Non-Ex									A				
ATEX (zone 1)									C				
IECEx (zone 1)									F				
US (cCSAus), Div 1									L				
Canada (cCSAus), zone 1									M				
NEPSI									N				
INMETRO (in preparation)									P				
KCC (in preparation)									Q				
EAC									U				
Local User Interface													
None (replacement sensor, DSL only)										0			
Blind										1			
Graphical, 240 × 160 pxl										3			

Selection and ordering data

Order code

Further designs Please add "**-Z**" to Article No. and specify Order code(s).	
Cable glands	
None (replacement sensor)	**A00**
Metric, no glands	**A01**
Metric, nylon, limited to -20 °C/-4 °F	**A02**
Metric, brass/Ni plated	**A05**
Metric, stainless steel	**A06**
NPT, no glands	**A11**
NPT, nylon, limited to -20 °C/-4 °F	**A12**
NPT, brass/Ni plated	**A15**
NPT, stainless steel	**A16**
Metric thread with M12 socket fitted	**A20**
Sofware functions and CT approvals	
None (replacement sensor)	**B10**
Standard	**B11**

Selection and ordering data

	Order code
Further designs	
Please add "**-Z**" to Article No. and specify Order code(s).	
I/O configuration Ch1	
No output channel	**E00**
4 ... 20 mA HART Active/Passive (non-Ex)	**E02**
Ca 4 ... 20 mA HART active (Ex)	**E06**
Ca 4 ... 20 mA HART passive (Ex)	**E07**
PROFIBUS PA	**E10**
PROFIBUS DP (non-Ex)	**E11**
Modbus RTU RS 485	**E14**
I/O configuration Ch2, Ch3 and Ch4	
None	**F00**
• Non Ex: Sig O, None, None	**F01**
• Non Ex: Sig O, Sig I/O, None	**F02**
• Non Ex: Sig O, Sig I/O, Sig I/O	**F03**
• Non Ex: Sig O, Sig I/O, R	**F04**
• Non Ex: Sig O, R, R	**F05**
• Non Ex: Sig O, R, None	**F06**
• Ex: pSig O, None, None	**F11**
• Ex: pSig O, pSig I/O, None	**F12**
• Ex: pSig O, pSig I/O, pSig I/O	**F13**
• Ex: pSig O, pSig I/O, R	**F14**
• Ex: pSig O, R, R	**F15**
• Ex: pSig O, R, None	**F16**
• Ex: aSig O, None, None	**F21**
• Ex: aSig O, aSig I/O, None	**F22**
• Ex: aSig O, aSig I/O, aSig I/O	**F23**
• Ex: aSig O, aSig I/O, R	**F24**
• Ex: aSig O, R, R	**F25**
• Ex: aSig O, R, None	**F26**

Notes on I/O configurations:

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

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

I: Discrete status input to the flowmeter. Functions are selected in the menu including 'Freeze output', 'Reset totalizer' (only CH3&4).

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

The MLFB structure for FC330 systems must be filled to **this level**, including "**-Z**" options A.., B.., E.. and F.

	Order code
Add-on options and accessories	
Please add "**-Z**" to Article No. and specify Order code(s).	
Certificates	
Certificate EN 10204-2.2 confirmation of pressure containing material	**C01**
Certificate EN 10204-3.1 material (wetted parts)	**C02**
Material certificate EN 10204-3.2 with inspection	**C03**
Certificate NACE MR0175-2009 + MR0103-2012	**C04**
Certificate EN 10204-2.1 Declaration of compliance with the order	**C05**
Insp. Certificate EN 10204-3.1 for visual, dimensional and functional test	**C06**
Certificate EN 10204-3.1 PMI Positive material ident. of pressure-cont./wetted parts (confirmation only)	**C07**
Certificate EN 10204-3.1 P-test Pressure-test acc. AD2000	**C08**
Test pack (pressure test, non-destructive welding test, welder & welding procedure certificate)	**C09**
Certificate EN10204-3.1welding X-ray / Dye-penetration test of weldings (pressure cont.)	**C10**
Certificate EN10204-2.1 Declaration of accuracy	**C11**
Certificate EN10204-3.1 PMI Positive material ident. of pressure-cont./wetted parts (including heat analysis)	**C12**

	Order code
Add-on options and accessories	
Please add "**-Z**" to Article No. and specify Order code(s).	
Customer selected calibration	
DN 15 ... 50: Multi-point (5 flows × 1 pass) Flow 10 ... 100 % of Q_{norm}	**D60**
DN 15 ... 50: Multi-point (10 flows × 1 pass) Flow 10 ... 100 % of Q_{norm}	**D61**
DN 80: Multi-point (5 flows × 1 pass) Flow 10 ... 100 % of Q_{norm}	**D62**
DN 80: Multi-point (10 flows × 1 pass) Flow 10 ... 100 % of Q_{norm}	**D63**
DN 100: Multi-point (5 flows × 1 pass) Flow 10 ... 100 % of Q_{norm}	**D64**
DN 100: Multi-point (10 flows × 1 pass) Flow 10 ... 100 % of Q_{norm}	**D65**
DN 150: Multi-point (5 flows × 1 pass) Flow 10 ... 100 % of Q_{norm}	**D66**
DN 150: Multi-point (8 flows × 1 pass) Flow 10 ... 100 % of Q_{norm}	**D67**
Cable	
None	**L50**
5 m (16.4 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L51**
5 m (16.4 ft), sensor cable, 4 wire, without plugs for terminal connection	**L52**
10 m (32.8 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L55**
10 m (32.8 ft), sensor cable, 4 wire, without plugs for terminal connection	**L56**
25 m (82 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L59**
25 m (82 ft), sensor cable, 4 wire, without plugs for terminal connection	**L60**
50 m (164 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L63**
50 m (164 ft), sensor cable, 4 wire, without plugs for terminal connection	**L64**
75 m (246 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L67**
75 m (246 ft), sensor cable, 4 wire, without plugs for terminal connection	**L68**
Sensor options	
FCS300 marine approval (in preparation)	**S22**
SD-Card accessibility via USB	
(not allowed in USA by Patent)	
Mass storage enabled	**S30**
Additional data	
Please add "**-Z**" to Article No. and specify Order code(s) and plain text.	
Tag name	
Tag name plate, stainless steel	**Y17**

Operating instructions for SITRANS FC330

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

All literature is available to download for free, in a range of languages, at

www.siemens.com/processinstrumentation/documentation

SITRANS FC310 flowmeter system

Overview

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

Intended for integration into OEM skids, machines or pre-assembled plant systems, the flowmeter is based on the latest developments within digital signal processing technology - engineered for high measuring performance:

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

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

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

FC310 is available with Modbus RTU (RS 485) multi-drop serial communication.

The flowmeter is supplied with SensorFlash, a micro SD card containing all relevant certificates. The SITRANS FC310 flowmeter system consists of a SITRANS FCS300 sensor and a SITRANS FCT010 transmitter always compact mounted.

Benefits

- It is compact and light, fitting neatly into dense piping arrangements
- Effective separation of measurement from plant vibration
- Reliable measurements due to high signal to noise ratio
- Short overall length; easy drop-in replacement into most existing installations
- Direct connection to host with high-speed Modbus simplifies machine or skid construction and set-up
- Modbus RS 485 RTU allows simple and easy integration with all Modbus masters with fast update rate of process values.

Technical specifications

Sizes	DN 15 (½") DN 25 (1") DN 50 (2") DN 80 (3") DN 100 (4") DN 150 (6")
Accuracy	± 0.10 % or ± 0.20 % Addional ± 0.40 % for gases
Repeatability	± 0.05 %
Flow range	
(water @ 1 bar pressure loss)	
• DN 15	4 500 kg/h (163.3 lb/min)
• DN 25	20 500 kg/h (753.2 lb/min)
• DN 50	49 000 kg/h (1 800 lb/min)
• DN 80	122 000 kg/h (4 483 lb/min)
• DN 100	273 000 kg/h (10 031 lb/min)
• DN 150	459 200 kg/h (16 873 lb/min)
Power supply	12-27 V DC; 1.1 W
Weight	4.6 ... 207 kg
Material	
• Sensor	
- Measuring tubes	316L stainless steel or nickel alloy C4
- Enclosure	304 stainless steel
• Transmitter	Aluminum with corrosion-resistant coating class C4
Enclosure rating	IP67
Pressure ratings	
• Measuring tubes	
- 316L	100 bar (1 450 psi)
- Nickel alloy C4	100 bar (1 450 psi)
• Sensor enclosure	No pressure containment
Temperature ratings	
• Process medium	-50 ... +205 °C (-58 ... +400 °F)
• Ambient	-40 ... +60 °C (-40 ... +140 °F)
Process connections	
• Flanges	EN 1092-1 B1, EN 1092-1 B2, EN 1092-1 D, ANSI/ASME B16.5, JIS B 2220
• Pipe threads	ASME B1.20 (NPT) female pipe thread, ISO 228-1 G female pipe thread (BSPP)
• Hygienic threads	DIN 11851, SMS 1145
• Hygienic clamps	DIN 32676 Hygenic Clamp Row A
Approvals	
• Hazardous area (zone 1)	ATEX, IECEx, EAC Ex, cCSAus, NEPSI, EAC No dust approval
• Pressure equipment	PED, CRN (in preparation)
• Hygienic	EHEDG (DN 25 ... 80) (in preparation)
• Marine	Germanischer Lloyd/det Norske Veritas, Bureau Veritas, Lloyds of London, American Bureau of Shipping, RINA (Italy)
NAMUR	NAMUR-compliant (e.g. NE 21, NE 41 and NE 132)
Communication	Modbus RS 485 RTU
EMC performance	
Emission	EN 55011/CISPR-11 (Class B)
Immunity	EN/IEC 61326-1 (Industry)
Mechanical load	18 ... 400 Hz random The flow meter will mechanically tolerate 3.17 g RMS in all directions. Flow accuracy cannot be guaranteed under all conditions.

Selection and ordering data

Article No. **7ME4631-** _ _ _ _ - _ _ _ _ Ord. code

SITRANS FC310 digital coriolis flowmeter with SITRANS FCS300 standard flow sensor with hygienic and flange/pipe thread connections and compact mounting with FCT010 transmitter

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

Sensor size, connector size	
DN 15, DN 10 (½", 3/8")	**3 F**
DN 15, DN 15 (½", ½")	**3 G**
DN 15, DN 20 (½", ¾")	**3 H**
DN 25, DN 20 (1", ¾")	**3 K**
DN 25, DN 25 (1", 1")	**3 L**
DN 25, DN 40 (1", 1½")	**3 N**
DN 50, DN 40 (2", 1½")	**4 B**
DN 50, DN 50 (2", 2")	**4 C**
DN 50, DN 65 (2", 2½")	**4 D**
DN 80, DN 65 (3", 2½")	**4 J**
DN 80, DN 80 (3", 3")	**4 K**
DN 80, DN 100 (3", 4")	**4 L**
DN 100, DN 80 (4", 3")	**5 M**
DN 100, DN 100 (4", 4")	**5 N**
DN 100, DN 150 (4", 6")	**5 Q**
DN 150, DN 100 (6", 4")	**6 D**
DN 150, DN 150 (6", 6")	**6 F**
DN 150, DN 200 (6", 8")	**6 H**
Process connection	
EN 1092-1 B1, PN 16	**A 0**
EN 1092-1 B1, PN 40	**A 1**
EN 1092-1 B2, PN 63	**A 2**
EN 1092-1 B2, PN 100	**A 3**
EN 1092-1 D, PN 40	**A 5**
ASME B16.5 RF, class 150	**D 1**
ASME B16.5 RF, class 300	**D 2**
ASME B16.5 RF, class 600	**D 3**
ASME B16.5 RF, class 900 (p- and t-rating as class 600)	**D 4**
ANSI B16.5-2009, class 1500 (p- and t-rating as class 600)	**D 5**
ISO 228-1G female pipe thread	**E 1**
ASME B1.20.1 NPT female pipe thread	**E 3**
DIN 11851 hygienic screwed	**F 1**
DIN 32676 hygienic clamp Row A	**G 1**
SMS 1145 hygienic screwed	**K 1**
JIS B2220/10K	**L 2**
JIS B2220/20K	**L 4**
EN 1092-1, PN 16, NAMUR length	**N 1**
EN 1092-1, PN 40, NAMUR length	**N 2**
Wetted parts material	
AISI 316L/1.4435/1.4404	**1**
AISI 316L/1.4435/1.4404 (polished)	**2**
Nickel alloy C4	**3**

Article No. **7ME4631-** _ _ _ _ - _ _ _ _ Ord. code

SITRANS FC310 digital coriolis flowmeter with SITRANS FCS300 standard flow sensor with hygienic and flange/pipe thread connections and compact mounting with FCT010 transmitter

Calibration/Accuracy class	
0.2 % flow, 10 kg/m³ density	**0**
0.1 % flow, 2 kg/m³ density	**1**
Mounting style, transmitter housing and material	
Compact, IP67, aluminum	**D**
Ex approval	
Non-Ex	**A**
ATEX II 2G zone 1	**C**
IECEx Gb (zone 1)	**F**
US (cCSAus), Div 1	**L**
Canada (cCSAus), class I, zone 1	**M**
NEPSI	**N**
INMETRO (in preparation)	**P**
KCC (in preparation)	**Q**
EAC	**U**
Local User Interface	
Blind	**1**

Selection and ordering data

	Order code
Further designs	
Please add "**-Z**" to Article No. and specify Order code(s).	
Cable glands	
None (replacement sensor)	**A00**
Metric, no glands	**A01**
Metric, plastic	**A02**
Metric, brass/Ni plated	**A05**
Metric, stainless steel	**A06**
NPT, no glands	**A11**
NPT, plastic	**A12**
NPT, brass/Ni plated	**A15**
NPT, stainless steel	**A16**
Metric thread with M12 socket fitted	**A20**
Sofware functions and CT approvals	
Standard	**B11**
I/O configuration Ch1	
Modbus RTU RS 485	**E14**
I/O configuration Ch2, Ch3 and Ch4	
None	**F00**
Add-on options and accessories	
Please add "**-Z**" to Article No. and specify Order code(s).	
Certificates	
Certificate EN 10204-2.2 confirmation of pressure containing material	**C01**
Certificate EN 10204-3.1 material (wetted parts)	**C02**
Material certificate EN 10204-3.2 with inspection	**C03**
Certificate NACE MR0175-2009 + MR0103-2012	**C04**
Certificate EN 10204-2.1 Declaration of compliance with the order	**C05**

3

Selection and ordering data

	Order code
Add-on options and accessories	
Please add "**-Z**" to Article No. and specify Order code(s).	
Insp. Certificate EN 10204-3.1 for visual, dimensional and functional test	**C06**
Certificate EN 10204-3.1 PMI Positive material ident. of pressure-cont./wetted parts (confirmation only)	**C07**
Certificate EN 10204-3.1 P-test Pressure-test acc. AD2000	**C08**
Test pack (pressure test, non-destructive welding test, welder & welding procedure certificate)	**C09**
Certificate EN 10204-3.1 welding X-ray / Dye-penetration test of weldings (pressure cont.)	**C10**
Certificate EN 10204-2.1 Declaration of accuracy	**C11**
Certificate EN 10204-3.1 PMI Positive material ident. of pressure-cont./wetted parts (including heat analysis)	**C12**
Customer selected calibration	
DN 15 ... 50, multi-point, 5 flows × 1 pass Flow 10 ... 100 % of Q_{norm}	**D60**
DN 15 ... 50, multi-point, 10 flows × 1 pass Flow 10 ... 100 % of Q_{norm}	**D61**
DN 80, multi-point, 5 flows × 1 pass Flow 10 ... 100 % of Q_{norm}	**D62**
DN 80, multi-point, 10 flows × 1 pass Flow 10 ... 100 % of Q_{norm}	**D63**
DN 100, multi-point, 5 flows × 1 pass Flow 10 ... 100 % of Q_{norm}	**D64**
DN 100, multi-point, 10 flows × 1 pass Flow 10 ... 100 % of Q_{norm}	**D65**
DN 150, multi-point, 5 flows × 1 pass Flow 10 ... 100 % of Q_{norm}	**D66**
DN 150, multi-point, 8 flows × 1 pass Flow 10 ... 100 % of Q_{norm}	**D67**
Cable	
None	**L50**
5 m (16.4 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L51**
5 m (16.4 ft), sensor cable, 4 wire, without plugs for terminal connection	**L52**
5 m (16.4 ft), sensor cable, 4 wire, with 1 pc M12 plug mounted	**L53**
10 m (32.8 ft) sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L55**
10 m (32.8 ft), sensor cable, 4 wire, without plugs for terminal connection	**L56**
10 m (32.8 ft), sensor cable, 4 wire, with 1 pc M12 plug mounted	**L57**
25 m (82 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L59**
25 m (82 ft), sensor cable, 4 wire, without plugs for terminal connection	**L60**

	Order code
Add-on options and accessories	
Please add "**-Z**" to Article No. and specify Order code(s).	
25 m (82 ft), sensor cable, 4 wire, with 1 pc M12 plug mounted	**L61**
50 m (164 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L63**
50 m (164 ft), sensor cable, 4 wire, without plugs for terminal connection	**L64**
50 m (164 ft), sensor cable, 4 wire, with 1 pc M12 plug mounted	**L65**
75 m (246 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L67**
75 m (246 ft), sensor cable, 4 wire, without plugs for terminal connection	**L68**
75 m (246 ft), sensor cable, 4 wire, with 1 pc M12 plug mounted	**L69**
Sensor options	
FCS300 marine approval	**S22**
Additional data	
Please add "**-Z**" to Article No. and specify Order code(s) and plain text.	
Tag name	
Tag name plate, stainless steel	**Y17**

Operating instructions for SITRANS FC310

Description	Article No.
English	
• for firmware V 4.0 and onwards	**A5E44036384**
German	
• for firmware V 4.0 and onwards	**TBD**

All literature is available to download for free, in a range of languages, at

www.siemens.com/processinstrumentation/documentation

Accessories

Description	Article No.	
SITRANS I300 **Isolating power supply – Ex barrier**	**A5E39832532**	

Overview

Full integration in the Siemens SIMATIC systems PCS7 or in TIA portal with FCT070 faceplates with the ET 200SP ST & HF powerful IO system for compact control cabinets. The complete flowmeter system consists of a SITRANS FCS300 sensor and a SIMATIC ET 200SP Coriolis module FCT070 transmitter.

The transmitter FCT070 offers real-time data processing and the display of all measuring and status data of the Coriolis flowmeter.

For hazardous area the FSC300 sensor can be placed in Ex Zone 1 or Class 1 Div 1 locations. Together with the SITRANS I300 power/barrier module the FCT070 transmitter can be place in Zone 2 or Div 2 areas.

Benefits

- FCS300 sensor in sizes from DN 15 to 150 mm in a large verity of process connections and wetted materials
- Short overall length; easy drop-in replacement into most existing installations
- Full hazardous area solutions
- Easy integration into automation process control as TIA portal and PCS7
- Easy selection and integration of flowmeters via TIA selector
- Cost effective integration of Coriolis flowmeters for PLC controlled machines
- SITRANS FCT070 ET 200SP technology module and can combined with all other SIMATIC ET200 ST & HF modules
- The FCT070 has all high-end transmitter functionality integrated including the advanged fraction tables on bord
- Fast and trouble-free communication between the flow meter and the PLC through digital data communication with up to 10 ms update rate
- Integrated advanced two-stage batch controller functionality without additional modules. I/Os are onboard

SITRANS FCS300 with FCT070 transmitter

Technical specifications

Sizes	DN 15 (½") DN 25 (1") DN 50 (2") DN 80 (3") DN 100 (4") DN 150 (6")
Accuracy	± 0.10 % or 0.20 % for liquids additional ± 0.40 for gases
Repeatability	± 0.05 %
Flow range (liquids)	
(water @ 1 bar pressure loss) (Q_{nom})	
• DN 15	4 500 kg/h (163.3 lb/min)
• DN 25	20 500 kg/h (753.2 lb/min)
• DN 50	49 000 kg/h (1 800 lb/min)
• DN 80	122 000 kg/h (4 483 lb/min)
• DN 100	273 000 kg/h (10 031 lb/min)
• DN 150	459 200 kg/h (16 873 lb/min)
Measurement of	Mass flow, volume flow, density, temperature, fraction A flow, fraction A %, fraction B flow, fraction B %
Architecture	Remote configuration
System integration	PCS7 and TIA portal with faceplates
Power supply	24 V DC, 19.2 ... 28.8 V
Material	
• Sensor	
• Wetted parts	316L stainless steel or nickel alloy C4
• Enclosure	304 stainless steel
• Transmitter	Aluminum with corrosion-resistant coating class C4
Enclosure rating	Sensor: IP67 FCT070 Transmitter: IP20
Pressure ratings	
• Measuring tubes	
• 316L	100 bar (1 450 psi)
• Nickel alloy C4	100 bar (1 450 psi)
• Sensor enclosure	No pressure containment
Temperature ratings	
• Process medium	-50 ... +205 °C (-58 ... +400 °F)
• Ambient	-40 ... +60 °C (-40 ... +140 °F)[1]
• Display	-20 ... +60 °C (-4 ... +140 °F)
Process connections	
• Flanges	EN 1092-1 B1, EN 1092-1 B2, EN 1092-1 D, ANSI/ASME B16.5, JIS B 2220
• Pipe threads	ASME B1.20 (NPT) female pipe thread, ISO 228-1 G female pipe thread (BSPP)
• Hygienic threads	DIN 11851, SMS 1145
• Hygienic clamps	DIN 32676 hygenic clamp Row A

Approvals	
• Hazardous area	Sensor FCS300: Zone 1 & Class 1 Div 1 ATEX, IECEx, EAC Ex, CSA, cCSAus, NEPSI, EAC No dust approval FCT070 transmitter: Zone 2 & Class 1 Div 2 ATEX, IECEx, EAC Ex, CSA, cCSAus, FM, NEPSI, EAC
• Pressure equipment	PED, CRN
• Hygienic	EHEDG (DN 25 ... DN 80) (in preparation)
NAMUR	NAMUR-compliant (e.g. NE 21, NE 41, NE 107 and NE 132)
I/O	2 digital Input and 2 digital output Single and 2 stage batch function
Totalizer	3 totalizer
Communication	Integrated PROFINET for SIMATIC integration and other PROFINET Controllers
EMC performance	
Emission	EN 55011/CISPR-11 (Class A)
Immunity	EN/IEC 61326-1 (Industry)
Mechanical load	18 ... 1000 Hz random The flow meter will mechanically tolerate 3.17 g RMS in all directions. Flow accuracy cannot be guaranteed under all conditions.

Selection and ordering data

Coriolis sensor SITRANS FCS300 with DSL ready for FCT070 trasmitter ↗	Article No. 7ME4637-					-					Ord. code		
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.													
Sensor size, connector size													
DN 15, DN 10 (½", 3/8")	**3**	**F**											
DN 15, DN 15 (½", ½")	**3**	**G**											
DN 15, DN 20 (½", ¾")	**3**	**H**											
DN 25, DN 20 (1", ¾")	**3**	**K**											
DN 25, DN 25 (1", 1")	**3**	**L**											
DN 25, DN 40 (1", 1½")	**3**	**N**											
DN 50, DN 40 (2", 1½")	**4**	**B**											
DN 50, DN 50 (2", 2")	**4**	**C**											
DN 50, DN 65 (2", 2½")	**4**	**D**											
DN 80, DN 65 (3", 2½")	**4**	**J**											
DN 80, DN 80 (3", 3")	**4**	**K**											
DN 80, DN 100 (3", 4")	**4**	**L**											
DN 100, DN 80 (4", 3")	**5**	**M**											
DN 100, DN 100 (4", 4")	**5**	**N**											
DN 100, DN 150 (4", 6")	**5**	**Q**											
DN 150, DN 100 (6", 4")	**6**	**D**											
DN 150, DN 150 (6", 6")	**6**	**F**											
DN 150, DN 200 (6", 8")	**6**	**H**											
Process connection													
EN 1092-1 B1, PN 16			**A**	**0**									
EN 1092-1 B1, PN 40			**A**	**1**									
EN 1092-1 B2, PN 63			**A**	**2**									
EN 1092-1 B2, PN 100			**A**	**3**									
EN 1092-1 D, PN 40			**A**	**5**									
ASME B16.5 RF, Class 150			**D**	**1**									
ASME B16.5 RF, Class 300			**D**	**2**									
ASME B16.5 RF, Class 600			**D**	**3**									
ASME B16.5 RF, Class 900 (p- and t-rating as Class 600)			**D**	**4**									
ANSI B16.5-2009, Class 1500 (p- and t-rating as Class 600)			**D**	**5**									
ISO 228-1G female pipe thread			**E**	**1**									
ASME B1.20.1 NPT female pipe thread			**E**	**3**									
DIN 11851 hygienic screwed			**F**	**1**									
DIN 32676 hygienic clamp Row A			**G**	**1**									
SMS 1145 hygienic screwed			**K**	**1**									
JIS B2220/10K			**L**	**2**									
JIS B2220/20K			**L**	**4**									
EN 1092-1, PN 16, NAMUR length			**N**	**1**									
EN 1092-1, PN 40, NAMUR length			**N**	**2**									
Wetted parts material													
AISI 316L/1.4435/1.4404					**1**								
AISI 316L/1.4435/1.4404 (polished)					**2**								
Nickel alloy C4					**3**								

Coriolis sensor SITRANS FCS300 with DSL ready for FCT070 trasmitter	Article No. 7ME4637-					-					Ord. code		
Calibration/Accuracy class													
0.2 % flow, 10 kg/m³ density							**0**						
0.1 % flow, 2 kg/m³ density							**1**						
Mounting style, transmitter housing and material													
Compac, IP67, aluminum								**D**					
Ex approval (sensor)													
Non-Ex									**A**				
ATEX II 2G zone 1									**C**				
IECEx Gb (zone 1)									**F**				
US (cCSAus), Div 1									**L**				
Canada (cCSAus), class I, zone 1									**M**				
NEPSI									**N**				
INMETRO									**P**				
KCC (in preparation)									**Q**				
EAC									**U**				
Local User Interface													
Blind										**1**			

Selection and ordering data

	Order code
Further designs Please add "**-Z**" to Article No. and specify Order code(s).	
Cable glands	
Metric, no glands	**A01**
Metric, plastic	**A02**
Metric, brass/Ni plated	**A05**
Metric, stainless steel	**A06**
NPT, no glands	**A11**
NPT, plastic	**A12**
NPT, brass/Ni plated	**A15**
NPT, stainless steel	**A16**
Metric thread with M12 socket fitted	**A20**
Sofware functions and CT approvals	
Standard software DSL	**B10**
I/O configuration Ch1	
No output channel (integration of FCT070)	**E00**
I/O configuration Ch2, Ch3 and Ch4	
None	**F00**

SITRANS FCS300 with FCT070 transmitter

Selection and ordering data

	Order code
Add-on options and accessories	
Please add "**-Z**" to Article No. and specify Order code(s).	
Certificates	
Certificate EN 10204-2.2 confirmation of pressure containing material	**C01**
Certificate EN 10204-3.1 material (wetted parts)	**C02**
Material certificate EN 10204-3.2 with inspection	**C03**
Certificate NACE MR0175-2009 + MR0103-2012	**C04**
Certificate EN 10204-2.1 Declaration of compliance with the order	**C05**
Insp. Certificate EN 10204-3.1 for visual, dimensional and functional test	**C06**
Certificate EN 10204-3.1 PMI Positive material ident. of pressure-cont./wetted parts (confirmation only)	**C07**
Certificate EN 10204-3.1 P-test Pressure-test acc. AD2000	**C08**
Test pack (pressure test, non-destructive welding test, welder & welding procedure certificate)	**C09**
Certificate EN 10204-3.1 welding X-ray / Dye-penetration test of weldings (pressure cont.)	**C10**
Certificate EN 10204-2.1 Declaration of accuracy	**C11**
Certificate EN 10204-3.1 PMI Positive material ident. of pressure-cont./wetted parts (including heat analysis)	**C12**
Customer selected calibration	
DN 15 ... 50, multi-point, 5 flows × 1 pass Flow 10 ... 100% of Q_{norm}	**D60**
DN 15 ... 50, multi-point, 10 flows × 1 pass Flow 10 ... 100% of Q_{norm}	**D61**
DN 80, multi-point, 5 flows × 1 pass Flow 10 ... 100% of Q_{norm}	**D62**
DN 80, multi-point, 10 flows × 1 pass Flow 10 ... 100% of Q_{norm}	**D63**
DN 100, multi-point, 5 flows × 1 pass Flow 10 ... 100% of Q_{norm}	**D64**
DN 100, multi-point, 10 flows × 1 pass Flow 10 ... 100% of Q_{norm}	**D65**
DN 150, multi-point, 5 flows × 1 pass Flow 10 ... 100% of Q_{norm}	**D66**
DN 150, multi-point, 8 flows × 1 pass Flow 10 ... 100% of Q_{norm}	**D67**

	Order code
Add-on options and accessories	
Please add "**-Z**" to Article No. and specify Order code(s).	
Cable	
No sensor cable	**L50**
5 m (16.4 ft), sensor cable, 4 wire, without plugs for terminal connection	**L52**
5 m (16.4 ft), sensor cable, 4 wire, with 1 pcs M12 plugs mounted	**L53**
10 m (32.8 ft), standard, without plugs	**L56**
10 m (32.8 ft), sensor cable, 4 wire, with 1 pcs M12 plugs mounted	**L57**
25 m (82 ft), standard, without plugs	**L60**
25 m (82 ft), sensor cable, 4 wire, with 1 pcs M12 plugs mounted	**L61**
50 m (164 ft), standard, without plugs	**L64**
50 m (164 ft), sensor cable, 4 wire, with 1 pcs M12 plugs mounted	**L65**
75 m (246 ft), standard, without plugs	**L68**
75 m (246 ft), sensor cable, 4 wire, with 1 pcs M12 plugs mounted	**L69**
Additional data	
Please add "**-Z**" to Article No. and specify Order code(s) and plain text.	
Tag name	
Tag name plate, stainless steel	**Y17**

Description	Article No.	
SITRANS FCT070 Transmitter for ET 200SP	**7ME4138-6AA00-0BB1**	
BU20-P12+A0+4B, PU1 Baseunit plate for ET 200SP	**6ES7193-6BP20-0BB0** **6ES7193-6BP20-0BB1**	
SITRANS I300 Isolating power supply – Ex barrier	**A5E39832532**	

Overview

The SITRANS FCS400 sensor is available in DN 15; DN 25 and DN 50 mm sizes in stainless steel AISI 316 L. The sensor design consists of process connections, inlet and outlet manifolds mounted in a stiff frame and two parallel tubes equally sharing the process medium flow.

The sensing tubes are curved in the CompactCurve shape which gives high sensitivity and low pressure loss. The CompactCurve shape was selected to ensure that the smallest flows are measured with optimal signal to noise ratio.

The super compact sensor design with a split flow dual tube design with very high driver frequency is suitable for high end applications in all industry segments e.g. Chemical, F&B , O&G and Power.

A variety of process connections available to cover all common process connections and pressure ratings.

The sensor has a solid stainless steel fully welded enclosure to protect the measuring tubes from any harsh environments. For hazardous area applications the FCS400 comes in a number of common harzardous area approved like ATEX, IECEx, cCSAus, EAC, and NEPSI.

For sanitary applications the sensor is available with polished inside wetted parts and carry the EHEDG and 3A sanitary certifications (in preparation).

For the chemical industry the FCS400 sensors are available with standardized NAMUR inbuilding length (in preparation).

Integration

The SITRANS FCS400 Massflow sensor is suitable for both indoor and outdoor installation and meets the requirements of Protection Class IP67/NEMA 4X. Optionally the sensor can be ordered with hazardous certification to Zone 1 + 21 (ATEX, IECEx, cCSAus, EAC Ex, NEPSI) or Class I + II + III Div. 1 (cCSAus).

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

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

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

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

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

Installation orientation

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

Supports

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

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

Shut-off devices

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

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

Configuration

Installation guidelines

- The mass flowmeter does not require any flow conditioning or straight inlet pipe sections. Care should be exercised however to ensure that any upstream valves, gates, sight glasses etc. do not cavitate and are not set into vibration by the flow.
- It is always preferred to place the flowmeter upstream of any control valve or other pipeline component which may cause flashing, cavitation or vibrations.
- The presence of gas bubbles in the fluid may result in erroneous measurements, particularly in the density measurement. Therefore the flowmeter should not be installed at the lowest pressure point in the liquid piping system or where vapour can collect. Install the meter in pipeline sections with high pressure to maintain system pressure and compress any bubbles.
- Drop lines downstream from the flow sensor should be avoided to prevent the meter tube from draining during flowing conditions. A back-pressure device or orifice is recommended to ensure that flow does not separate within the flow sensor but the metering section remains at positive pressure at all times while there is flow.
- The flowmeter should not come into contact with any other objects. Avoid making attachments to the housing except for the pressure guard components (if required).
- When the connecting pipeline is larger than the sensor size, suitable standard reducers may be installed. A selection of oversize and undersize connections can be ordered - refer to the sizes tables below.
- The flow sensor may be supported at the junction between process connection and the manifold, but should not be used to support adjacent piping. Ensure that the piping is also supported on both sides so that connection stresses are neutral.
- If strong vibrations exist in the pipeline, they should be damped using elastic pipeline elements. The damping devices must be installed outside the supported flowmeter section. Direct connection of flexible elements to the sensor should be avoided.
- Make sure that any dissolved gases, which are present in many liquids, do not outgas. The back pressure at the outlet should be at least 0.2 bar (3 psi) above the vapour pressure of the process fluid.
- Assure that operation below the vapour pressure cannot occur particularly for fluids with low latent heat of vaporisation.
- The sensor should not be installed in the vicinity of strong electromagnetic fields, e.g. near motors, pumps, variable frequency drives, transformers etc.
- When operating meters on a common mounting base the sensors should be mounted and spaced separate from each other to avoid cross-talk and other vibration interferences.
- When operating meters in interconnected pipelines the pipes should be decoupled to prevent cross talk.

Remote system cabling

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

Be aware of maximum sensor length cable depending on product selection, currently 75 m. Data transmission speed and process variable update rates may be affected by the cable characteristics. For best results, choose a cable with the following electrical characteristics:

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

The flowmeter system applies maximum 15 V DC in operation and is certified intrinsically safe. The complete system is insulation tested to 1 500 V in production.

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

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

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

Insulation and heating

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

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

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

The jacket can heat the sensor enclosure up to 200 °C (392 °F). However the maximum temperature increase is limited to 70 °C. Further insulation is also recommended for personnel protection or low loss temperature maintenance.

Technical specifications

Flow sensor FCS400		
Parameter	**Unit**	**Value**
Process media		• Fluid Group 1 (suitable for dangerous fluids) • Aggregate state: Paste/light slurry, liquid and gas
Process pressure range	[barg (psi)]	316L: 0 ... 100 (0 ... 1 450)
Process temperature range • DN 15 ... DN 50	[°C (°F)]	-50 ... +200 (-58 ... +392)
Ambient temperature range	[°C (°F)]	-40 ... +60 (-40 ... +140)
Transport temperature range	[°C (°F)]	-40 … +70 (-40 … +158)
Density range	[kg/m^3 (lb/ft^3)]	1 … 5 000 (0.062 … 312.2)
No. of process values • Primary process values		• Mass flow • Density • Process medium temperature
• Derieved process values		• Volume flow • Standard volume flow (with reference density) • Fraction A:B • Fraction % A:B

Performance specifications		**Sensor**		
Parameter	**Unit**	**DN 15**	**DN 25**	**DN 50**
Max. zero point error	[kg/h (lb/min)]	0.2 (0.007)	2 (0.8)	7.5 (0.27)
Q_{min} (1 % error)[1)]	[kg/h (lb/min)]	20 (0.735)	240 (8.92)	800 (29.4)
Q_{nom} (1 bar pressure)[1)]	[kg/h (lb/min)]	3 700 (136)	20 500 (753.2)	49 000 (1 800)
Q_{max}[1)]	[kg/h (lb/min)]	6 400 (235.2)	35 000 (1 286)	90 000 (3 307)
Linearity error mass flow • for liquids[2)]	[%]	± 0.1	± 0.1	± 0.1
• for gases	[%]	± 0.35	± 0.35	± 0.35
Repeatability mass flow	[%]	± 0.05	± 0.05	± 0.05
Density accuracy standard calibration[3)]	[kg/m^3 (lb/ft^3)]	± 5 (± 0.31)	± 5 (± 0.31)	± 5 (± 0.31)
Density accuracy extended calibration[3)]	[kg/m^3 (lb/ft^3)]	± 0.5 (± 0.031)	± 0.5 (± 0.031)	± 0.5 (± 0.031)
Temperature error	[°C (°F)]	± 0.5 (± 0.9)	± 0.5 (± 0.9)	± 0.5 (± 0.9)

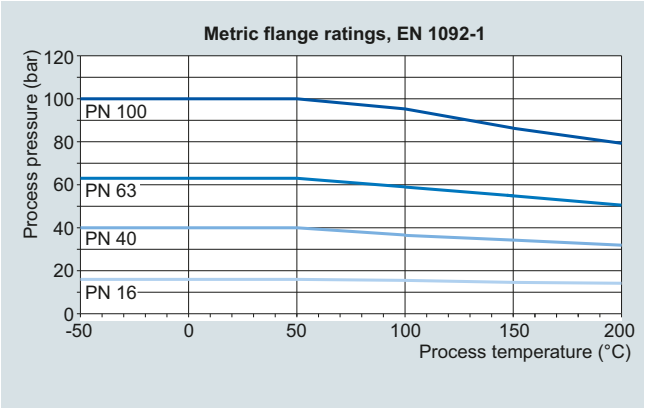
1) For gas applications the max. flowrate is calculated at Mach-Number = 03.

2) Increased error can be expected for gas mass flow measurement.

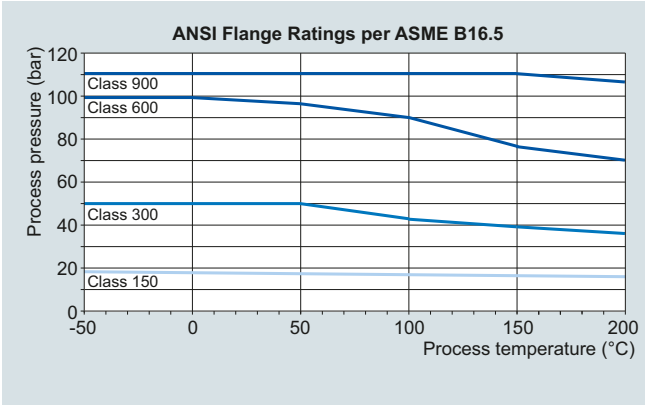
3) Liquid only.

Pressure/temperature curves

With two major exceptions, the pressure rating of the flow sensors is independent of the process medium temperature. Design rules for flange connections in both the EN 1092-1 and ASME B16.5 standards dictate pressure derating with increasing temperature. The charts below show the effect of process medium temperature on the pressure ratings for the flanges within the FCS400.



EN 1092-1 flanged sensors



ASME B16.5 flanged sensors

3

Technical specifications (continued)

Sensor variants

SITRANS FCS400 sensors are available in a wide range of process connections. The available combinations of type, sensor size and connection size are shown in the tables below.

Standard sensors

Sensor	Connection	EN 1092-1 B1, PN 16	EN 1092-1 B1, PN 40	EN 1092-1 B1, PN 63	EN 1092-1 B1, PN 100	EN 1092-1 B1, PN 160[2]	EN 1092-1 D Nut, PN 40	EN 1092-1 D Nut, PN 63	EN 1092-1 D Nut, PN 100	EN 1092-1 D Nut, PN 160[2]	ANSI B16.5-2009, class 150	ANSI B16.5-2009, class 300	ANSI B16.5-2009, class 600	ANSI B16.5-2009, class 900[1]	ISO 228-1 G pipe thread	ASME B1.20.1 NPT pipe thread	DIN 11851 hygienic screwed	DIN 32676 hygienic tri-clamp	DIN 11864-1A aseptic screwed	DIN 11864-2A aseptic flanged	DIN 11864-3A aseptic clamp	ISO 2852 hygienic clamped	ISO 2853 hygienic screwed	SMS 1145 hygienic screwed	12-VCO-4 quick connect	JIS B2220:2004/10K	JIS B2220:2004/20K	JIS B2220:2004/40K	JIS B2220:2004/63K
Standard: 7ME461.-...																													
DN 15 (½")	DN 6 (¼")														●	●													
	DN 10 (3/8")																●												
	DN 15 (½")	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				●	●	●	●	●
	DN 20 (¾")		●								●	●	●					●											
	DN 25 (1")	●	●		●												●					●	●	●					
DN 25 (1")	DN 15 (½")																												
	DN 25 (1")	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●
	DN 32 (1¼")		●														●												
	DN 40 (1½")	●	●		●						●	●	●					●					●	●						
DN 50 (2")	DN 25 (1")																												
	DN 40 (1½")	●	●	●	●	●	●	●									●		●	●	●	●	●	●					
	DN 50 (2")	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●

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

[2] P and T rating as PN 100.

Hygienic sensor variants (in preparation)

The hygienic sensors all have polished internal wetted material and a maximum internal surface roughness Ra < 0.8 µm and are EHEDG and 3A approved.

Aseptic flanged process connections

The aseptic flanges offered for FCS400 conform with the standard DIN 11864-2A BF-A. The flange fitted to the sensor is therefore the back flange and the seal is an O-ring.

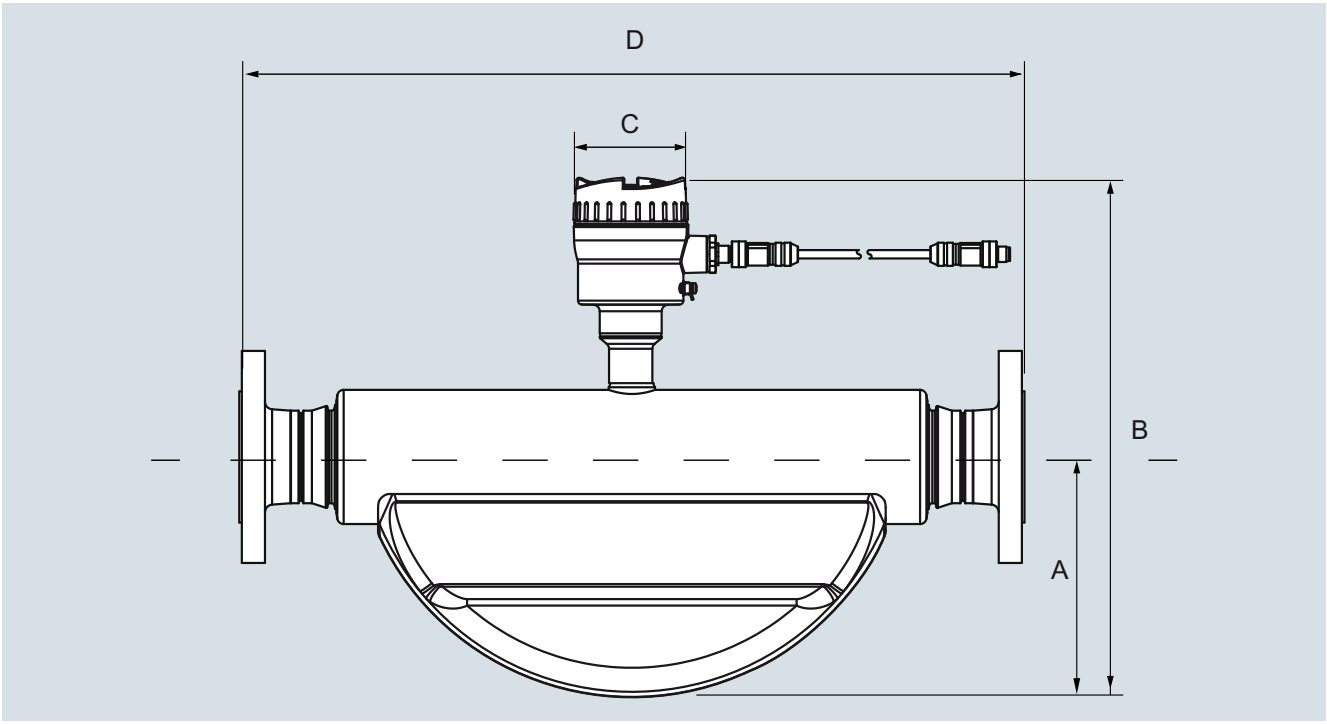
The flange dimensions in the FCS400 program are as follows:

Size DN	Pipe	Bore d_1	Ring OD d_{11}	Bolt circle d_5	Bolt holes	Flange diameter d_{10}
10	13 × 1.5	10	22.4	37	4 × Ø9	54
15	19 × 1.5	16	28.4	42	4 × Ø9	59
20	23 × 1.5	20	32.4	47	4 × Ø9	64
25	29 × 1.5	26	38.4	53	4 × Ø9	70
32	35 × 1.5	32	47.7	59	4 × Ø9	76
40	41 × 1.5	38	53.7	65	4 × Ø9	82
50	53 × 1.5	50	65.7	77	4 × Ø9	94
65	70 × 2.0	66	81.7	95	8 × Ø9	107
80	85 × 2.0	81	97.7	112	8 × Ø11	113

DIN 11864-2A BF-A flange dimensions

Dimensional drawings

Sensor dimensions



Sensor		A		B		B1		Weight[1]	
[DN]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[kg]	[lb]
15	½	90	3.54	280	11.0	314	12.4	4.6	10.1
25	1	123	4.84	315	12.4	349	13.8	7.9	17.4
50	2	187	7.36	390	15.4	424	16.8	25.7	56.7

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

The built-in length D depends on the flange.

1) For FCT030 compact add 4 kg (8.8 lb)

Overall length

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

Dimensional drawings (continued)

Standard: 7ME461.-...

Sensor	DN 15 (½")					DN 25 (1")			DN 50 (2")	
Connection	**DN 6 (¼")**	**DN 10 (3/8")**	**DN 15 (½")**	**DN 20 (¾")**	**DN 25 (1")**	**DN 25 (1")**	**DN 32 (1¼")**	**DN 40 (1½")**	**DN 40 (1½")**	**DN 50 (2")**
EN 1092-1 B1, PN 16			265		265	360			610	610
EN 1092-1 B1, PN 40			265		265	360		365	610	610
EN 1092-1 B1, PN 63			265			360			610	610
EN 1092-1 B1, PN 100			270		275	360			610	610
EN 1092-1 B1, PN 160			270			360				620
ANSI B16.5, class 150			270	270		360		365		620
ANSI B16.5, class 300			270	270		360		380		620
ANSI B16.5, class 600			270	285		360		380		620
ANSI B16.5, class 900			290			385				620
ISO 228-1 GH pipe thread	265		265			365				620
ANSI B1.20.1 NPT pipe thread	265		270			365				620
DIN 11851 hygienic screwed[1)]		265	265		193	360	360		610	610
DIN 32676-C hygienic tri-clamp			265	265		360		360		610
DIN 11864-1 aseptic screwed[1)]			265			360			610	610
DIN 11864-2 aseptic flange[1)]			265			360			620	610
DIN 11864-3 aseptic clamp[1)]			265			360			610	610
ISO 2852 hygienic clamp[1)]					265	360			610	610
ISO 2853 hygienic screwed[1)]			265			360		274		610
SMS 1145 hygienic screwed			285			360			610	610
12-VCO-4 quick connect			285							
JIS B2220/10K			265			360			620	610
JIS B2220/20K			265			360			620	610
JIS B2220/40K			270			360			620	610
JIS B2220/63K			275			370				620

[1)] Available with 3A and EHEDG certification.

Sensor	DN 15 (½")					DN 25 (1")			DN 50 (2")	
Connection	**DN 6 (¼")**	**DN 10 (3/8")**	**DN 15 (½")**	**DN 20 (¾")**	**DN 25 (1")**	**DN 25 (1")**	**DN 32 (1¼")**	**DN 40 (1½")**	**DN 40 (1½")**	**DN 50 (2")**
EN 1092-1 B1, PN 16			10.43		10.43	14.17			24.02	24.02
EN 1092-1 B1, PN 40			10.43		10.43	14.17		14.37	24.02	24.02
EN 1092-1 B1, PN 63			10.43			14.17			24.02	24.02
EN 1092-1 B1, PN 100			10.63		10.83	14.17			24.02	24.02
EN 1092-1 B1, PN 160			10.63			14.17				24.41
ANSI B16.5, class 150			10.63	10.63		14.17		14.37		24.41
ANSI B16.5, class 300			10.63	10.63		14.17		14.96		24.41
ANSI B16.5, class 600			10.63	11.22		14.17		14.96		24.41
ANSI B16.5, class 900			11.4			15.2				24.41
ISO 228-1 GH pipe thread	10.43		10.43			14.37				24.41
ANSI B1.20.1 NPT pipe thread	10.43		10.63			14.37				24.41
DIN 11851 hygienic screwed[1)]		10.43	10.43		7.60	14.17	14.17		24.02	24.02
DIN 32676-C hygienic tri-clamp			10.43	10.43		14.17		14.17		24.02
DIN 11864-1 aseptic screwed[1)]			10.43	10.43		14.17				24.02
DIN 11864-2 aseptic flange[1)]			10.43	10.43		14.17		10.78	24.41	24.02
DIN 11864-3 aseptic clamp[1)]			10.43			14.17			24.02	24.02
ISO 2852 hygienic clamp[1)]					10.43	14.17			24.02	24.02
ISO 2853 hygienic screwed[1)]			10.43			14.17		10.78		24.02
SMS 1145 hygienic screwed			10.43			14.17			24.02	24.02
12-VCO-4 quick connect			11.2							
JIS B2220/10K			10.4			14.2			24.4	24.0
JIS B2220/20K			10.4			14.2			24.4	24.0
JIS B2220/40K			10.6			14.2			24.4	24.0
JIS B2220/63K			10.8			14.6				24.4

[1)] Available with 3A and EHEDG certification.

SITRANS FCS400, overall length (D), dimensions in mm.

Overview

The complete flowmeter system SITRANS FC consist of a new FCS400 sensor in sizes DN 15 to DN 50 mm and a FCT030 multichannel/multifunctional in compact or remote versions. The flowmeter is based on the latest developments within digital signal processing technology – engineered for high measuring performance:

- Fast response to rapid changes in flow
- Fast dosing applications
- High immunity against process noise
- High turndown ratio of flowrates
- Suitable for liquid and gas service
- Easy to install, commission and maintain
- Aerated flow filtering system, for advanced filtering of fluids with gas or air bubbles
- Build in Data logger for all process variables and status messages (FCT030)
- Build in Batch functionality (FCT030)

The SITRANS FC430 is available with current output HART 7.5, Modbus RS 485 RTU, PROFIBUS DP or PROFIBUS PA as standard on Channel 1. Additional I/O functions can be freely configured for analog, pulse, frequency, relay or status output, or binary input.

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

Benefits

- It is truely compact and light, fitting neatly into dense piping arrangements
- Easy maintenance because modules can be exchanged rapidly
- Effective separation of measurement from plant vibration
- Highly secure operation in safety critical applications
- Non-volatile memory of all setup and operation data
- Reliable measurements due to high signal to noise ratio
- Secure, digital transfer of measurement data from the sensor
- Shortest overall length; easy drop-in replacement into most existing installations
- Marine Application: fuel management & consumption; bunkering solutions; boiler control

Technical specifications

SITRANS FC430	
Sizes	DN 15 (½") DN 25 (1") DN 50 (2")
Accuracy	± 0.10 %
Repeatability	± 0.05 %
Flow range (liquids)	
Q_{nom} (water @ 1 bar pressure loss)	
• DN 15 (½")	3 700 kg/h (8 157 lb/h)
• DN 25 (1")	11 500 kg/h (25 353 lb/h)
• DN 50 (2")	52 000 kg/h (114 640 lb/h)
Architecture	Compact or remote configuration
Display	Full graphical display, 240 × 160 pixels with selection of 6 languages
Power supply	20 ... 90 V DC ± 10 %; 100 ... 240 V AC ± 10 %, 47 ... 63 Hz ± 10 %
Materials	
• Sensor	
- Wetted parts	316L stainless steel
- Enclosure	304 stainless steel
• Transmitter	Aluminum with corrosion-resistant coating class C4
Enclosure rating	IP67[1)]
Pressure ratings	
• Measuring tubes	
- 316L	100 bar (1 450 psi)
- Sensore enclosure	20 bar (DN 15, DN 25) 17 bar (DN 50)
• Sensor enclosure burst pressure	>160 bar (depending on size)
Temperature ratings	
• Process medium	
- DN 15 ... DN 50	-50 ... +200 °C (-58 ... +392 °F)
• Ambient	-40 ... +60 °C (-40 ... +140 °F)[1)]
• Display	-20 ... +60 °C (-4 ... +140 °F)
Process connections	
• Flanges	EN 1092-1 B1, EN 1092-1 D, ANSI/ASME B16.5, JIS B 2220, DIN 11864-2
• Pipe threads	ASME B1.20 (NPT), ISO 228-1 G (BSPP), VCO Quick-connect
• Hygienic threads	DIN 11851, DIN 11864-1A, ISO 2853, SMS 1145
• Hygienic clamps	DIN 11864-3A, DIN 32676-C Triclamp, ISO 2852
Approvals	
• Hazardous area	ATEX, IECEx, EAC Ex, NEPSI, CSA, cCSA us
• Pressure equipment	PED, CRN
• Hygienic (in preparation)	3A, EHEDG
NAMUR	NAMUR-compliant (e.g. NE 21, NE 41, NE 107 and NE 132)
I/O	Up to 4 channels combining ana- log, relay or digital outputs and binary input
Communication	HART PROFIBUS PA PROFIBUS DP Modbus RTU (RS 485)
EMC performance	
• Emission	EN 55011/CISPR-11 (Class A)
• Immunity	EN/IEC 61326-1 (Industry)
Mechanical load	18 ... 400 Hz random The flow meter will mechanically tolerate 3.17 g RMS in all directions. Flow accuracy cannot be guaranteed under all conditions.

[1)] If operating outdoors, avoid direct sunlight, paritcularly in warm climatic regions.

SITRANS FC430 flowmeter for OEM customers

Selection and ordering data

Article No. **7ME4613-** - Ord. code

SITRANS FC430 digital coriolis flowmeter with SITRANS FCS400 standard flow sensor compact or remote mounting with FCT030 transmitter

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

Sensor size, connector size	
DN 15, DN 6 (½", ¼")	3 E
DN 15, DN 10 (½", 3/8")	3 F
DN 15, DN 15 (½", ½")	3 G
DN 15, DN 20 (½", ¾")	3 H
DN 15, DN 25 (½", 1")	3 J
DN 25, DN 25 (1", 1")	3 L
DN 25, DN 32 (1", 1¼")	3 M
DN 25, DN 40 (1", 1½")	3 N
DN 50, DN 40 (2", 1½")	4 B
DN 50, DN 50 (2", 2")	4 C
DN 50, DN 65 (2", 2½")	4 D
Process connection	
EN 1092-1 B1, PN 16	A 0
EN 1092-1 B1, PN 40	A 1
EN 1092-1 B1, PN 63	A 2
EN 1092-1 B1, PN 100	A 3
EN 1092-1 D, PN 40	A 5
EN 1092-1 D, PN 63	A 6
EN 1092-1 D, PN 100	A 7
EN 1092-1 D, PN 160 (max operation pressure 100 bar)	A 8
ASME B16.5 RF, Class 150	D 1
ASME B16.5 RF, lass 300	D 2
ASME B16.5 RF, lass 600	D 3
ASME B16.5 RF, Class 900 (p- and t-rating as Class 600)	D 4
ISO 228-1G female pipe thread	E 1
ASME B1.20.1 NPT female pipe thread	E 3
DIN 11851 hygienic screwed	F 1
DIN 32676, ASME, Form C (inch) (tri-clamp)	G 1
DIN 11864-1 GS Form A Row A, Form A = O-ring type hygienic, aseptic thread connector, hygienic class H3	H 1
DIN 11864-2 BF Form A Row A, Form A = O-ring type hygienic, aseptic flange connector, hygienic class H3	H 2
DIN 11864-3 BKS Form A Row A, Form A = O-ring type hygienic, aseptic clamp connector, hygienic class H3	H 3
ISO 2852 hygienic clamp	J 1
ISO 2853 hygienic thread	J 2
SMS 1145 hygienic screwed	K 1
Quick connect	K 5
JIS B2220/10K	L 2
JIS B2220/20K	L 4
JIS B2220/40K	L 6
JIS B2220/63K	L 7

Article No. **7ME4613-** - Ord. code

SITRANS FC430 digital coriolis flowmeter with SITRANS FCS400 standard flow sensor compact or remote mounting with FCT030 transmitter

Wetted parts material	
AISI 316L/1.4435/1.4404	1
AISI 316L/1.4435/1.4404 (polished; EHEDG; 3A) (in preparation)	2
Calibration/Accuracy class	
0.1 % flow, 5 kg/m³ density	1
0.1 % flow, 0.5 kg/m³ density	4
Standard fraction (with density 0.5 kg/m³)	8
Mounting style, transmitter housing and material	
None (replacement sensor)	A
Compact, IP67 fieldmount, aluminum	D
Remote, IP67 fieldmount, aluminum, M12	G
Remote, IP67 fieldmount, aluminum, T/Box	K
Remote, IP67, wall mount, aluminium	U
Ex approval (depending on variant)	
Non-Ex	A
ATEX (zone 1 / zone 21)	C
IECEx (zone 1 / zone 21)	F
US (cCSAus), Div 1	L
Canada (cCSAus), zone 1	M
NEPSI	N
INMETRO (in preparation)	P
KCC (in preparation)	Q
EAC	U
Local User Interface	
None (replacement sensor, DSL only)	0
Blind	1
Graphical, 240 × 160 pxl	3

Selection and ordering data — Order code

Further designs	
Please add "**-Z**" to Article No. and specify Order code(s).	
Cable glands	
None (replacement sensor)	**A00**
Metric, no glands	**A01**
Metric, nylon, limited to -20 °C/-4 °F	**A02**
Metric, brass/Ni plated	**A05**
Metric, stainless steel	**A06**
NPT, no glands	**A11**
NPT, nylon, limited to -20 °C/-4 °F	**A12**
NPT, brass/Ni plated	**A15**
NPT, stainless steel	**A16**
Metric thread with M12 socket fitted	**A20**
Sofware functions and CT approvals	
None (replacement sensor)	**B10**
Standard	**B11**
I/O configuration Ch1	
No output channel	**E00**
4 ... 20 mA HART Active/Passive (non-Ex)	**E02**
Ca 4 ... 20 mA HART active (Ex)	**E06**
Ca 4 ... 20 mA HART passive (Ex)	**E07**
PROFIBUS PA	**E10**
PROFIBUS DP (non-Ex)	**E11**
Modbus RTU RS 485	**E14**
I/O configuration Ch2, Ch3 and Ch4	
None	**F00**
• Non Ex: Sig O, None, None	**F01**
• Non Ex: Sig O, Sig I/O, None	**F02**
• Non Ex: Sig O, Sig I/O, Sig I/O	**F03**
• Non Ex: Sig O, Sig I/O, R	**F04**
• Non Ex: Sig O, R, R	**F05**
• Non Ex: Sig O, R, None	**F06**
• Ex: pSig O, None, None	**F11**
• Ex: pSig O, pSig I/O, None	**F12**
• Ex: pSig O, pSig I/O, pSig I/O	**F13**
• Ex: pSig O, pSig I/O, R	**F14**
• Ex: pSig O, R, R	**F15**
• Ex: pSig O, R, None	**F16**
• Ex: aSig O, None, None	**F21**
• Ex: aSig O, aSig I/O, None	**F22**
• Ex: aSig O, aSig I/O, aSig I/O	**F23**
• Ex: aSig O, aSig I/O, R	**F24**
• Ex: aSig O, R, R	**F25**
• Ex: aSig O, R, None	**F26**

Notes on I/O configurations:

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

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

I: Discrete status input to the flowmeter. Functions are selected in the menu including 'Freeze output', 'Reset totalizer' (only CH3&4).

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

The MLFB structure for FC330 systems must be filled to **this level**, including "**-Z**" options A.., B.., E.. and F.

	Order code
Add-on options and accessories	
Please add "**-Z**" to Article No. and specify Order code(s).	
Certificates	
Pressure testing certificate CRN	**C01**
Pressure testing certificate PED	**C02**
Material certificate EN 10204-3.1 (wetted parts)	**C05**
Welding inspection certificate	**C07**
Factory certificate EN 10204 2.1	**C10**
Factory certificate EN 10204 2.2	**C11**
Cleaned for oil and grease	**C50**
Customer selected calibration	
Multi-point (5 flows × 2 pass) Flow 10 ... 100 % of Q_{norm}	**Y60**
Multi-point (10 flows × 1 pass) Flow 10 ... 100 % of Q_{norm}	**Y61**
Multi-point calibration (5 flows × 2 pass) Flow 2 ... 20 % of Q_{norm}	**Y69**
Multi-point calibration (5 flows × 2 pass) Flow 5 ... 50 % of Q_{norm}	**Y71**
Multi-point calibration (10 flows × 1 pass) Flow 2 ... 20 % of Q_{norm}	**Y72**
Multi-point calibration (10 flows × 1 pass) Flow 5 ... 50 % of Q_{norm}	**Y73**
Cable	
None	**L50**
5 m (16.4 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L51**
5 m (16.4 ft), sensor cable, 4 wire, without plugs for terminal connection	**L52**
10 m (32.8 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L55**
10 m (32.8 ft), sensor cable, 4 wire, without plugs for terminal connection	**L56**
25 m (82 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L59**
25 m (82 ft), sensor cable, 4 wire, without plugs for terminal connection	**L60**
50 m (164 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L63**
50 m (164 ft), sensor cable, 4 wire, without plugs for terminal connection	**L64**
75 m (246 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L67**
75 m (246 ft), sensor cable, 4 wire, without plugs for terminal connection	**L68**
Sensor options	
FCS400 marine approval	**S22**
SD-Card accessibility via USB	
(not allowed in USA by Patent)	
Mass storage enabled	**S30**
Region-specific approvals and certificates	
South Korea (KCC)	**W28**
Additional data	
Please add "**-Z**" to Article No. and specify Order code(s) and plain text.	
Tag name	
Tag name plate, stainless steel	**Y17**

Selection and ordering data (continued)

Operating instructions for SITRANS FC430

Description	Article No.
English	
• for firmware V 4.0 and onwards	**A5E39789392**
German	
• for firmware V 4.0 and onwards	**TBD**

All literature is available to download for free, in a range of languages, at

www.siemens.com/processinstrumentation/documentation

Heating jacket for FCS400

Description	Article No.	
Heating jacket, indoor use, 0 ... 200 °C (32 ...392 °F) max. temperature. Complete with 5 m (16.4 ft) high temperature cable fitted.		
Dedicated plug connection to included controller		
• 230 V AC		
- DN 15 electric	**A5E33035287**	
- DN 25 electric	**A5E33035324**	
- DN 50 electric	**A5E33035325**	
• 115 V AC		
- DN 15 electric	**A5E32877520**	
- DN 25 electric	**A5E32877556**	
- DN 50 electric	**A5E32877557**	
Heating jacket controller, IP65. Digital display for 0 ... 200 °C (32 ...392 °F) control setpoint		
• 230 V AC	**A5E03839193**	
• 115 V AC	**A5E03839194**	

Overview

The compact flowmeter SITRANS FC410 is available in sizes DN 15, DN 25 and DN 50 for standard and hygienic applications.

Intended for integration into OEM skids, machines or pre-assembled plant systems. The sensor design is the marked leader in compact design which makes it easy to integrate in the compact skids. The flowmeter is based on the latest developments within digital signal processing technology - engineered for high measuring performance:

- Fast response to rapid changes in flow
- Markeds most compact sensor design
- Sensor with sanitary EHEDG and 3 A certification (in preparation)
- Fast dosing applications with control in host system
- High immunity against process noise
- High turndown ratio of flowrates
- Suitable for liquid and gas service
- Easy to install, commission and maintain

With all global marine approvals the FC410 is ideal for integration in ship fuel efficiency and environmental measurement systems. The FCT010 transmitter delivers true multi-parameter measurements i.e. massflow, density, temperature.

FC410 is available with Modbus RTU (RS 485) multi-drop serial communication.The flowmeter is supplied with SensorFlash, a micro SD card containing all relevant certificates. The SITRANS FC410 flowmeter system consists of a SITRANS FCS400 sensor and a SITRANS FCT010 transmitter always compact mounted.

Benefits

- It is truely compact and light, fitting neatly into dense piping arrangements
- Easy maintenance because modules can be exchanged rapidly
- Effective separation of measurement from plant vibration
- Reliable measurements due to high signal to noise ratio
- Shortest overall length; easy drop-in replacement into most existing installations
- Direct connection to host with high-speed Modbus simplifies machine or skid construction and set-up
- Modbus RS 485 RTU allows simple and easy integration with all Modbus masters with fast update rate of process values

Technical specifications

SITRANS FC410	
Sizes	DN 15 (½") DN 25 (1") DN 50 (2")
Accuracy	± 0.10 %
Repeatability	± 0.05 %
Flow range (liquids)	
Q_{nom} (water @ 1 bar pressure loss)	
• DN 15 (½")	3 700 kg/h (8 157 lb/h)
• DN 25 (1")	11 500 kg/h (25 353 lb/h)
• DN 50 (2")	52 000 kg/h (114 640 lb/h)
Architecture	Compact configuration
Display	Full graphical display, 240 × 160 pixels with selection of 6 languages
Power supply	12 ... 27 V DC; 1.1 W
Materials	
• Sensor	
- Wetted parts	316L stainless steel
- Enclosure	304 stainless steel
• Transmitter	Aluminum with corrosion-resistant coating class C4
Enclosure rating	IP67
Pressure ratings	
• Measuring tubes	
- 316L	100 bar (1 450 psi)
- Sensore enclosure	20 bar (DN 15, DN 25) 17 bar (DN 50)
• Sensor enclosure burst pressure	>160 bar (depending on size)
Temperature ratings	
• Process medium	
- DN 15 ... DN 50	-50 ... +200 °C (-58 ... +392 °F)
• Ambient	-40 ... +60 °C (-40 ... +140 °F)[1]
Process connections	
• Flanges	EN 1092-1 B1, EN 1092-1 D, ANSI/ASME B16.5, JIS B 2220, DIN 11864-2
• Pipe threads	ASME B1.20 (NPT), ISO 228-1 G (BSPP), VCO Quick-connect
• Hygienic threads	DIN 11851, DIN 11864-1A, ISO 2853, SMS 1145
• Hygienic clamps	DIN 11864-3A, DIN 32676-C Triclamp, ISO 2852
Approvals	
• Hazardous area	ATEX, IECEx, EAC Ex, NEPSI, CSA, cCSA us
• Pressure equipment	PED, CRN
• Hygienic	3A, EHEDG (in preparation)
NAMUR	NAMUR-compliant (e.g. NE 21, NE 41, NE 107 and NE 132)
I/O	Up to 4 channels combining ana- log, relay or digital outputs and binary input
Communication	Modbus RTU (RS 485)
EMC performance	
• Emission	EN 55011/CISPR-11 (Class A)
• Immunity	EN/IEC 61326-1 (Industry)
Mechanical load	18 ... 400 Hz random The flow meter will mechanically tolerate 3.17 g RMS in all directions. Flow accuracy cannot be guaranteed under all conditions.

[1] If operating outdoors, avoid direct sunlight, paritcularly in warm climatic regions.

SITRANS FC410 flowmeter for OEM customers

Selection and ordering data

Article No.

SITRANS FC410 digital coriolis flowmeter with SITRANS FCS400 standard flow sensor compact or remote mounting with FCT010 transmitter ↗	**7ME4611-**					-					Ord. code	
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.												
Sensor size, connector size												
DN 15, DN 6 (½", ¼")	**3**	**E**										
DN 15, DN 10 (½", 3/8")	**3**	**F**										
DN 15, DN 15 (½", ½")	**3**	**G**										
DN 15, DN 20 (½", ¾")	**3**	**H**										
DN 15, DN 25 (½", 1")	**3**	**J**										
DN 25, DN 25 (1", 1")	**3**	**L**										
DN 25, DN 32 (1", 1¼")	**3**	**M**										
DN 25, DN 40 (1", 1½")	**3**	**N**										
DN 50, DN 40 (2", 1½")	**4**	**B**										
DN 50, DN 50 (2", 2")	**4**	**C**										
DN 50, DN 65 (2", 2½")	**4**	**D**										
Process connection												
EN 1092-1 B1, PN 16			**A**	**0**								
EN 1092-1 B1, PN 40			**A**	**1**								
EN 1092-1 B1, PN 63			**A**	**2**								
EN 1092-1 B1, PN 100			**A**	**3**								
EN 1092-1 D, PN 40			**A**	**5**								
EN 1092-1 D, PN 63			**A**	**6**								
EN 1092-1 D, PN 100			**A**	**7**								
EN 1092-1 D, PN 160 (max operation pressure 100 bar)			**A**	**8**								
ASME B16.5 RF, Class 150			**D**	**1**								
ASME B16.5 RF, Class 300			**D**	**2**								
ASME B16.5 RF, lass 600			**D**	**3**								
ASME B16.5 RF, Class 900 (p- and t-rating as Class 600)			**D**	**4**								
ISO 228-1G female pipe thread			**E**	**1**								
ASME B1.20.1 NPT female pipe thread			**E**	**3**								
DIN 11851 hygienic screwed			**F**	**1**								
DIN 32676, ASME, Form C (inch) (tri-clamp)			**G**	**1**								
DIN 11864-1 GS Form A Row A, Form A = O-ring type hygienic, aseptic thread connector, hygienic class H3			**H**	**1**								
DIN 11864-2 BF Form A Row A, Form A = O-ring type hygienic, aseptic flange connector, hygienic class H3			**H**	**2**								
DIN 11864-3 BKS Form A Row A, Form A = O-ring type hygienic, aseptic clamp connector, hygienic class H3			**H**	**3**								
ISO 2852 hygienic clamp			**J**	**1**								
ISO 2853 hygienic thread			**J**	**2**								
SMS 1145 hygienic screwed			**K**	**1**								
Quick connect			**K**	**5**								
JIS B2220/10K			**L**	**2**								
JIS B2220/20K			**L**	**4**								
JIS B2220/40K			**L**	**6**								
JIS B2220/63K			**L**	**7**								

Article No.

SITRANS FC410 digital coriolis flowmeter with SITRANS FCS400 standard flow sensor compact or remote mounting with FCT010 transmitter	**7ME4611-**					-					Ord. code	
Wetted parts material												
AISI 316L/1.4435/1.4404					**1**							
AISI 316L/1.4435/1.4404 (polished; EHEDG; 3A) (in preparation)					**2**							
Calibration/Accuracy class												
0.1 % flow, 5 kg/m³ density							**1**					
0.1 % flow, 0.5 kg/m³ density							**4**					
Mounting style, transmitter housing and material												
None (replacement sensor)								**A**				
Compact, IP67 fieldmount, aluminum								**D**				
Ex approval (depending on variant)												
Non-Ex									**A**			
ATEX (zone 1 / zone 21)									**C**			
IECEx (zone 1 / zone 21)									**F**			
US (cCSAus), Div 1									**L**			
Canada (cCSAus), zone 1									**M**			
NEPSI									**N**			
INMETRO (in preparation)									**P**			
KCC (in preparation)									**Q**			
EAC									**U**			
Local User Interface												
Blind										**1**		

Selection and ordering data

	Orde code
Further designs	
Please add "**-Z**" to Article No. and specify Order code(s).	
Cable glands	
None (replacement sensor)	**A00**
Metric, no glands	**A01**
Metric, plastic	**A02**
Metric, brass/Ni plated	**A05**
Metric, stainless steel	**A06**
NPT, no glands	**A11**
NPT, plastic	**A12**
NPT, brass/Ni plated	**A15**
NPT, stainless steel	**A16**
Metric thread with M12 socket fitted	**A20**
Sofware functions and CT approvals	
Standard	**B11**
I/O configuration Ch1	
Modbus RTU RS 485	**E14**
I/O configuration Ch2, Ch3 and Ch4	
None	**F00**
Add-on options and accessories	
Please add "**-Z**" to Article No. and specify Order code(s).	
Certificates	
Pressure testing certificate CRN	**C01**
Pressure testing certificate PED	**C02**
Material certificate EN 10204-3.1 (wetted parts)	**C05**
Welding inspection certificate	**C07**
Factory certificate EN 10204 2.1	**C10**
Factory certificate EN 10204 2.2	**C11**
Cleaned for oil and grease	**C50**
Customer selected calibration	
Multi-point (5 flows × 2 pass) Flow 10 ... 100 % of Q_{norm}	**Y60**
Multi-point (10 flows × 1 pass) Flow 10 ... 100 % of Q_{norm}	**Y61**
Multi-point calibration (5 flows × 2 pass) Flow 2 ... 20 % of Q_{norm}	**Y69**
Multi-point calibration (5 flows × 2 pass) Flow 5 ... 50 % of Q_{norm}	**Y71**
Multi-point calibration (10 flows × 1 pass) Flow 2 ... 20 % of Q_{norm}	**Y72**
Multi-point calibration (10 flows × 1 pass) Flow 5 ... 50 % of Q_{norm}	**Y73**
Cable	
None	**L50**
5 m (16.4 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L51**
5 m (16.4 ft), sensor cable, 4 wire, without plugs for terminal connection	**L52**
5 m (16.4 ft), sensor cable, 4 wire, with 1 pc M12 plugs mounted	**L53**
10 m (32.8 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L55**
10 m (32.8 ft), sensor cable, 4 wire, without plugs for terminal connection	**L56**
10 m (32.8 ft), sensor cable, 4 wire, with 1 pc M12 plugs mounted	**L57**
25 m (82 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L59**

	Order code
Further designs	
Please add "**-Z**" to Article No. and specify Order code(s).	
25 m (82 ft), sensor cable, 4 wire, without plugs for terminal connection	**L60**
25 m (82 ft), sensor cable, 4 wire, with 1 pc M12 plugs mounted	**L61**
50 m (164 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L63**
50 m (164 ft), sensor cable, 4 wire, without plugs for terminal connection	**L64**
50 m (164 ft), sensor cable, 4 wire, with 1 pc M12 plugs mounted	**L65**
75 m (246 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L67**
75 m (246 ft), sensor cable, 4 wire, without plugs for terminal connection	**L68**
75 m (246 ft), sensor cable, 4 wire, with 1 pc M12 plugs mounted	**L69**
Sensor options	
FCS400 marine approval	**S22**
Region-specific approvals and certificates	
South Korea (KCC)	**W28**
Additional data	
Please add "**-Z**" to Article No. and specify Order code(s) and plain text.	
Tag name	
Tag name plate, stainless steel	**Y17**

Operating instructions for SITRANS FC410

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

All literature is available to download for free, in a range of languages, at

www.siemens.com/processinstrumentation/documentation

SITRANS FCS400 with FCT070 transmitter

Overview

Full integration in the Siemens SIMATIC systems PCS7 or in TIA portal with FCT070 Faceplates with the ET 200SP ST & HF powerful IO system for compact control cabinets. The complete flowmeter system consists of a SITRANS FCS400 sensor and a SIMATIC ET200 SP Coriolis module FCT070 transmitter.

TM FCT070 offers real-time data processing and the display of all measuring and status data of the Coriolis flowmeter.

For hazardous area the FSC400 sensor can be placed in Ex Zone 1/21 or Class1 Div 1 locations . Together with the Sitrans I300 power/barrier module the FCT070 transmitter can be place in Zone 2 or Div 2 areas.

Benefits

- FCS400 sensor in sizes from DN 15 to DN 50 mm in a large verity of process connections and wetted materials
- Markeds most compact sensor design
- Sensor with sanitary EHEDG and 3A certification
- Full hazardous area solutions
- Easy integration into automation process control as TIA portal and PCS7
- Easy selection and integration of flow meters via TIA-Selector
- Cost effective integration of Coriolis flow meters for PLC controlled machines
- SITRANS FCT070 ET 200SP technology module and can combined with all other SIMATIC ET200 ST & HF modules.
- The FCT070 has all high-end transmitter functionality integrated including the advanged fraction tables on bord
- Fast and trouble-free communication between the flow meter and the PLC through digital data communication with up to 10 ms update rate
- Integrated advanced Two-stage batch controller functionality without additional modules. I/Os are onboard.

Technical specifications

SITRANS FCS400 with FCT070 transmitter	
Sizes	DN 15 (½") DN 25 (1") DN 50 (2")
Accuracy	± 0.10 %
Repeatability	± 0.05 %
Flow range (liquids)	
Q_{nom} (water @ 1 bar pressure loss)	
• DN 15 (½")	3 700 kg/h (8 157 lb/h)
• DN 25 (1")	11 500 kg/h (25 353 lb/h)
• DN 50 (2")	52 000 kg/h (114 640 lb/h)
Measurement of	Mass flow, volume flow, density, temperature Fraction A flow, fraction A % Fraction B flow, fraction B %
Architecture	Remote configuration
System integration	ET200 SP; PCS7 and TIA portal with faceplates ET 200SP ST & HF
Power supply	24 V DC, 19.2 ... 28.8 V
Materials	
• Sensor	
- Wetted parts	316L stainless steel
- Enclosure	304 stainless steel
• Transmitter	Aluminum with corrosion-resistant coating class C4
Enclosure rating	IP67
Pressure ratings	
• Measuring tubes	
- 316L	100 bar (1 450 psi)
- Sensore enclosure	20 bar (DN 15, DN 25) 17 bar (DN 50)
• Sensor enclosure burst pressure	>160 bar (depending on size)
Temperature ratings	
• Process medium	
- DN 15 ... DN 50	-50 ... +200 °C (-58 ... +392 °F)
• Ambient	-40 ... +60 °C (-40 ... +140 °F)[1]
Process connections	
• Flanges	EN 1092-1 B1, EN 1092-1 D, ANSI/ASME B16.5, JIS B 2220, DIN 11864-2
• Pipe threads	ASME B1.20 (NPT), ISO 228-1 G (BSPP), VCO Quick-connect
• Hygienic threads	DIN 11851, DIN 11864-1A, ISO 2853, SMS 1145
• Hygienic clamps	DIN 11864-3A, DIN 32676-C Triclamp, ISO 2852
Approvals	
• Hazardous area	FCS400 sensor: ATEX, IECEx, EAC Ex, NEPSI, CSA, cCSA us FCT070: Zone 2 & Class1 Div 2
• Pressure equipment (in preparation)	PED, CRN
• Hygienic	3A, EHEDG
NAMUR	NAMUR-compliant (e.g. NE 21, NE 41, NE 107 and NE 132)
I/O (FCT070)	2 digital Input and 2 digital output
Totalizer (FCT070)	3 totalizer
Communication (FCT070)	Integrated PROFINET for SIMATIC integration and other PROFINET Controllers
EMC performance	
• Emission	EN 55011/CISPR-11 (Class A)
• Immunity	EN/IEC 61326-1 (Industry)
Mechanical load	18 ... 400 Hz random The flow meter will mechanically tolerate 3.17 g RMS in all directions. Flow accuracy cannot be guaranteed under all conditions.

[1] operating outdoors, avoid direct sunlight, paritcularly in warm climatic regions.

Selection and ordering data

Article No.

SITRANS FC430 digital coriolis flowmeter with SITRANS FCS400 standard flow sensor for integration with FCT070 transmitter ↗	**7ME4617-**					-					Ord. code		
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.													
Sensor size, connector size													
DN 15, DN 6 (½", ¼")	3	E											
DN 15, DN 10 (½", 3/8")	3	F											
DN 15, DN 15 (½", ½")	3	G											
DN 15, DN 20 (½", ¾")	3	H											
DN 15, DN 25 (½", 1")	3	J											
DN 25, DN 25 (1", 1")	3	L											
DN 25, DN 32 (1", 1¼")	3	M											
DN 25, DN 40 (1", 1½")	3	N											
DN 50, DN 40 (2", 1½")	4	B											
DN 50, DN 50 (2", 2")	4	C											
DN 50, DN 65 (2", 2½")	4	D											
Process connection													
EN 1092-1 B1, PN 16			A	0									
EN 1092-1 B1, PN 40			A	1									
EN 1092-1 B1, PN 63			A	2									
EN 1092-1 B1, PN 100			A	3									
EN 1092-1 D, PN 40			A	5									
EN 1092-1 D, PN 63			A	6									
EN 1092-1 D, PN 100			A	7									
EN 1092-1 D, PN 160 (max operation pressure 100 bar)			A	8									
ASME B16.5 RF, class 150			D	1									
ASME B16.5 RF, class 300			D	2									
ASME B16.5 RF, class 600			D	3									
ASME B16.5 RF, class 900 (p- and t-rating as class 600)			D	4									
ISO 228-1G female pipe thread			E	1									
ASME B1.20.1 NPT female pipe thread			E	3									
DIN 11851 hygienic screwed			F	1									
DIN 32676, ASME, Form C (inch) (tri-clamp)			G	1									
DIN 11864-1 GS Form A Row A, Form A = O-ring type hygienic, aseptic thread connector, hygienic class H3			H	1									
DIN 11864-2 BF Form A Row A, Form A = O-ring type hygienic, aseptic flange connector, hygienic class H3			H	2									
DIN 11864-3 BKS Form A Row A, Form A = O-ring type hygienic, aseptic clamp connector, hygienic class H3			H	3									
ISO 2852 hygienic clamp			J	1									
ISO 2853 hygienic thread			J	2									
SMS 1145 hygienic screwed			K	1									
Quick connect			K	5									
JIS B2220/10K			L	2									
JIS B2220/20K			L	4									
JIS B2220/40K			L	6									
JIS B2220/63K			L	7									

Article No.

SITRANS FC430 digital coriolis flowmeter with SITRANS FCS400 standard flow sensor for integration with FCT070 transmitter	**7ME4617-**					-					Ord. code		
Wetted parts material													
AISI 316L/1.4435/1.4404					1								
AISI 316L/1.4435/1.4404 (polished; EHEDG; 3A) (in preparation)					2								
Calibration/Accuracy class													
0.1 % flow, 5 kg/m³ density							1						
0.1 % flow, 0.5 kg/m³ density							4						
Mounting style, transmitter housing and material													
Compact, IP67 fieldmount, aluminum								D					
Ex approval (depending on variant)													
Non-Ex									A				
ATEX (zone 1 / zone 21)									C				
IECEx (zone 1 / zone 21)									F				
US (cCSAus), Div 1									L				
Canada (cCSAus), zone 1									M				
NEPSI									N				
INMETRO (in preparation)									P				
KCC (in preparation)									Q				
EAC									U				
Local User Interface													
Blind										1			

Selection and ordering data

Order code

Further designs	
Please add "**-Z**" to Article No. and specify Order code(s).	
Cable glands	
Metric, no glands	**A01**
Metric, plastic	**A02**
Metric, brass/Ni plated	**A05**
Metric, stainless steel	**A06**
NPT, no glands	**A11**
NPT, plastic	**A12**
NPT, brass/Ni plated	**A15**
NPT, stainless steel	**A16**
Metric thread with M12 socket fitted	**A20**
Sofware functions and CT approvals	
Standard software DSL	**B10**
I/O configuration Ch1	
No output channel (integration of FCT070)	**E00**
I/O configuration Ch2, Ch3 and Ch4	
None	**F00**

SITRANS FCS400 with FCT070 transmitter

Selection and ordering data

	Order code
Add-on options and accessories	
Please add "**-Z**" to Article No. and specify Order code(s).	
Certificates	
Pressure testing certificate CRN	**C01**
Pressure testing certificate PED	**C02**
Material certificate EN 10204-3.1 (wetted parts)	**C05**
Welding inspection certificate	**C07**
Factory certificate EN 10204 2.1	**C10**
Factory certificate EN 10204 2.2	**C11**
Cleaned for oil and grease	**C50**
Customer selected calibration	
Multi-point (5 flows × 2 pass) Flow 10 ... 100 % of Q_{norm}	**Y60**
Multi-point (10 flows × 1 pass) Flow 10 ... 100 % of Q_{norm}	**Y61**
Multi-point calibration (5 flows × 2 pass) Flow 2 ... 20 % of Q_{norm}	**Y69**
Multi-point calibration (5 flows × 2 pass) Flow 5 ... 50 % of Q_{norm}	**Y71**
Multi-point calibration (10 flows × 1 pass) Flow 2 ... 20 % of Q_{norm}	**Y72**
Multi-point calibration (10 flows × 1 pass) Flow 5 – 50 % of Q_{norm}	**Y73**
Cable	
None	**L50**
5 m (16.4 ft), sensor cable, 4 wire, without plugs for terminal connection	**L52**
5 m (16.4 ft), sensor cable, 4 wire, with 1 pc M12 plugs mounted	**L53**
10 m (32.8 ft), sensor cable, 4 wire, without plugs for terminal connection	**L56**
10 m (32.8 ft), sensor cable, 4 wire, with 1 pc M12 plugs mounted	**L57**
25 m (82 ft), sensor cable, 4 wire, without plugs for terminal connection	**L60**
25 m (82 ft), sensor cable, 4 wire, with 1 pc M12 plugs mounted	**L61**
50 m (164 ft), sensor cable, 4 wire, without plugs for terminal connection	**L64**
50 m (164 ft), sensor cable, 4 wire, with 1 pc M12 plugs mounted	**L65**
75 m (246 ft), sensor cable, 4 wire, without plugs for terminal connection	**L68**
75 m (246 ft), sensor cable, 4 wire, with 1 pc M12 plugs mounted	**L69**
Region-specific approvals and certificates	
South Korea (KCC)	**W28**
Additional data	
Please add "**-Z**" to Article No. and specify Order code(s) and plain text.	
Tag name	
Tag name plate, stainless steel	**Y17**

Description	Article No.	
SITRANS FCT070 **Transmitter for ET 200SP**	**7ME4138-6AA00-0BB1**	
BU20-P12+A0+4B, PU1 **BaseUnit plate for ET 200SP**	**6ES7193-6BP20-0BB0** **6ES7193-6BP20-0BB1**	
SITRANS I300 **Isolating power supply – Ex barrier**	**A5E39832532**	

All literature is available to download for free, in a range of languages, at

www.siemens.com/processinstrumentation/documentation

Overview

MASS 2100 DI 1.5 to DI 15 and the FC300 DN4 is suitable for low flow measurement applications of a variety of liquids and gases.

The sensor is designed with a single bended tube in corrosion resistant stainless steel AISI316L or Hastelloy C22 and a solid stainless steel fully welded enclosure to protect the measuring tubes from any harsh environments. For hazardous area applications the MASS 2100 / FC300 DN4 sensor comes in a number of common hazardous area approved variants like ATEX, IECEx, cCSAus, EAC, and NEPSI.

The sensor offers superior performance in terms of flow accuracy, turn-down ratio and density accuracy and delivers true multi-parameter measurements i.e.: mass flow, volume flow, density, temperature and fraction.

With the large variety of process connections and the ability for high pressure solutions up to 1 000 bar, the compact single tube design is especially suitable for high end applications in all industry segments e.g. Automotive, Painting, Chemical, Oil & Gas and F&B. Accurate dosing and mixing down to drops are widely used applications.

The main applications for the MASS 2100 / FC300 DN 4 sensor can be found in:	
Chemical industry	Liquid and gas measurement within Miniplant and R&D, dosing of additives and catalysts
Cosmetic industry	Dosing of essence and fragrances
Pharmaceutical industry	High-speed dosing and coating of pills, filling of ampuls/injectors
Food and beverage industry	Dosing of flavourings, colours and additives, density measurement, inline
	Measurement of liquid or gaseous CO2
Automotive industry	Fuel injection nozzle and pump testing, filling of AC units, engine consumption, paint robots, ABS testbeds

Integration

The SITRANS MASS 2100/FC300 DN4 sensor are suitable for both indoor and outdoor installation and meets the requirements of Protection Class IP67/NEMA 4X. Optionally the sensor can be ordered with hazardous certification to Zone 1 (ATEX, IECEx, cCSAus, EAC Ex, NEPSI).

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

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

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

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

Shut-off devices

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

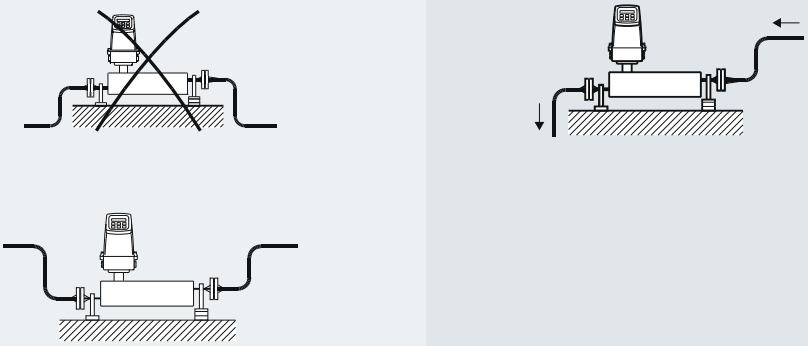
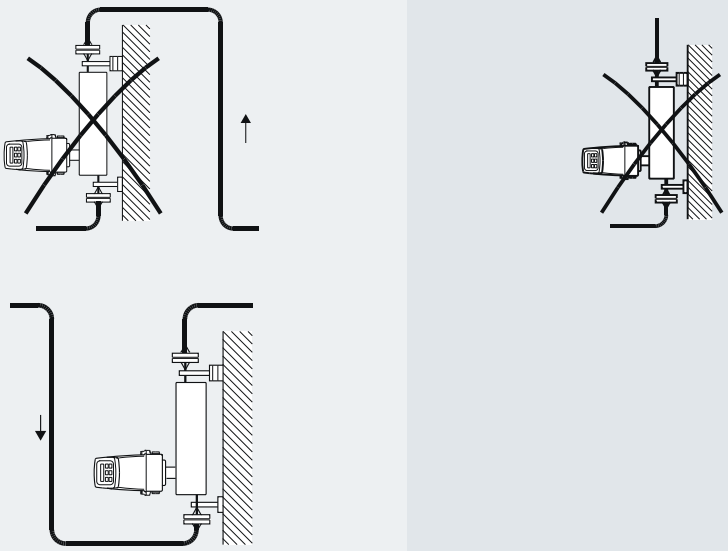
Where possible, shut-off devices should be installed both upstream and downstream of the flowmeter.

Integration (continued)

Installation guidelines MASS 2100 DI 3 … DI 15 (1/8" … ½")

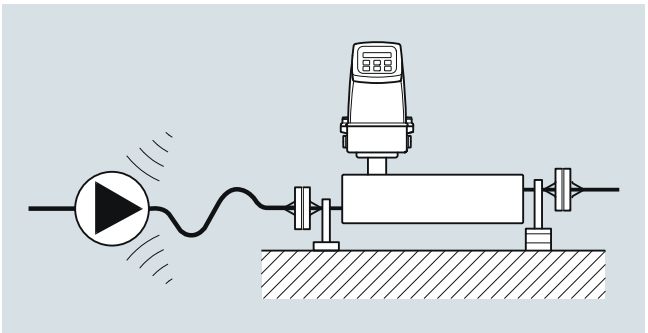
In order to perform according to given specifications for flow and density accuracy, the sensor must be installed using rigid mounting brackets as shown in the installation examples.

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

	Liquid	Gas
Horizontal		
Vertical		

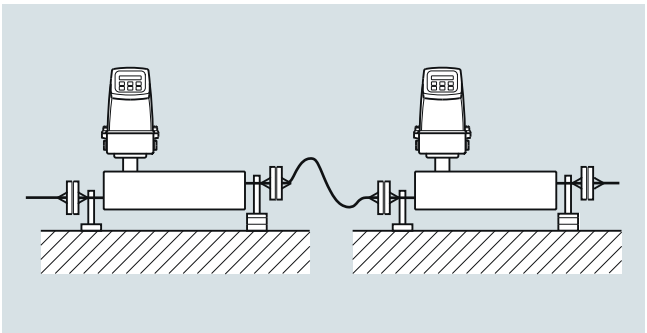
Vibration

Always locate the flowmeter as far away as possible from components that generate mechanical vibration in the piping. Avoid vibration. If necessary use flexible pipes.



Cross talk

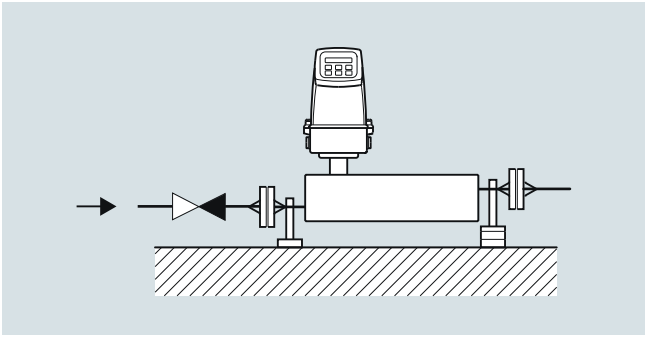
Cross talk between sensors mounted close to each other may disturb the measurement. To avoid cross talk never mount more than one meter on each frame and mount flexible hose connections between the sensors as shown.



Integration (continued)

Zero point adjustment

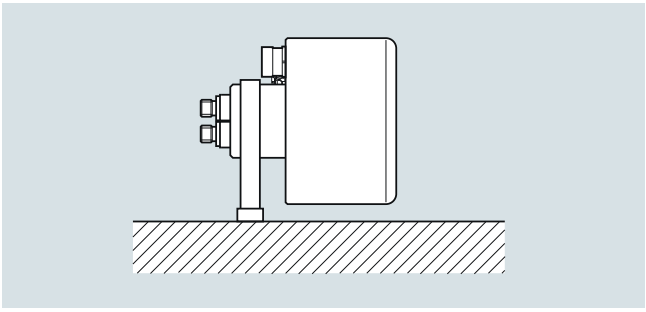
To facilitate zero point adjustment a shut-off valve should always be mounted in connection with the sensor as a proper zero point setting is essential for a good accuracy.



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

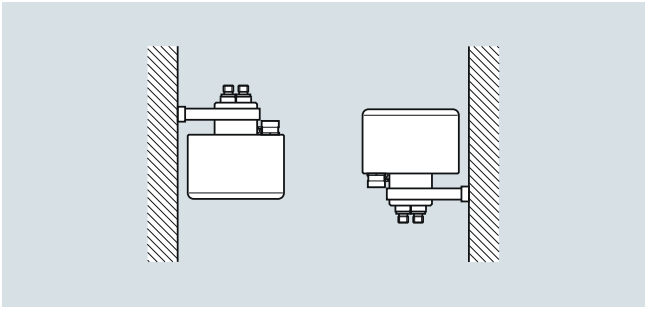
- The optimal installation is horizontal.
  If vertical mounting is necessary, upward flow is recommended to facilitate the removal of air bubbles. To remove the air from the sensor the flow speed in the sensor must be at least 1 m/s.
  If there are solid particles in the liquid, especially in connection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

Horizontal



Liquid and gas application

Vertical



Liquid application (left), gas application (right)

Installation guidelines for SITRANS FC300 sensor

Horizontal installation as shown in figure A is recommended with gas or liquid applications.

This installation is also recommended when the flow velocity is low (< 1 m/s) or the liquid contains solid particles or air bubbles.

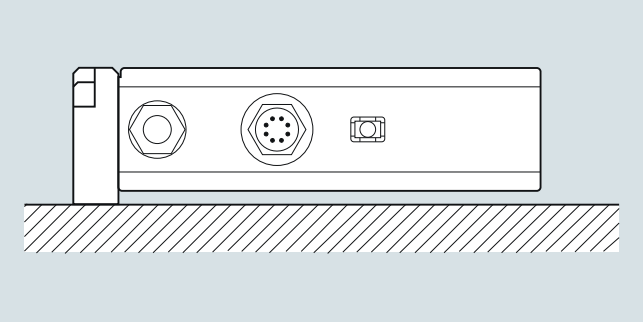
Vertical installation as shown in figure B can be used for liquid or gas applications.

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

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

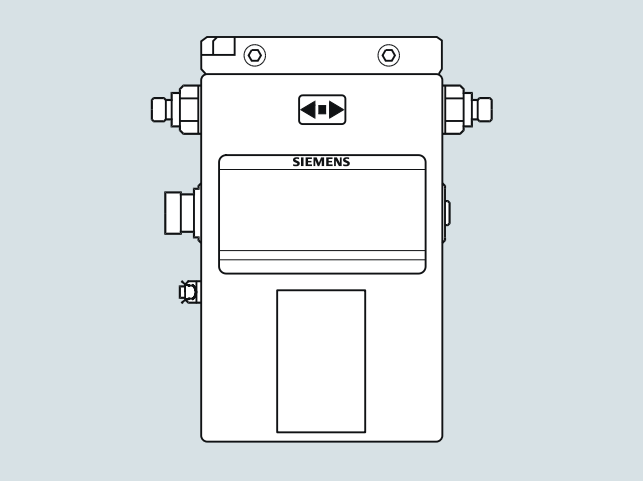
- To ensure that the sensor does not become partly empty, there must be a sufficient counter-pressure on the unit min. 0.2 bar (2.9 psi)
- Mount the sensor on a vibration-free and plane wall or steel frame
- Locate the sensor low in the system in order to avoid underpressure in the sensor separating air/gas in the liquid
- Ensure that the sensor is not emptied of liquid (during normal operation) otherwise incorrect measurement will occur

Horizontal mounting (recommended)



Liquid or gas (low to high flow)

Vertical mounting



Liquid or gas (medium to high flow)

SITRANS FC MASS 2100 and FC300 DN 4 sensors

Technical specifications

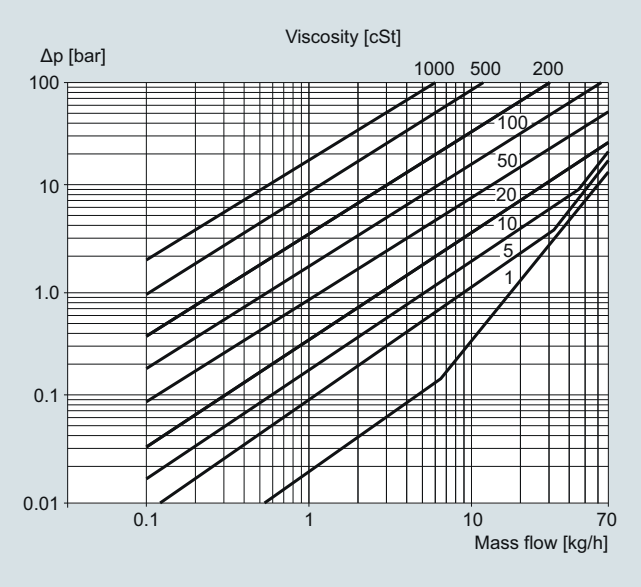
Versions dimensions		DI 1.5 (1/16)	DI 3 (1/8)	DI 6 (¼)	DI 15 (5/8)	FC300 DN 4
Inside pipe diameter (sensor consists of one continuous pipe)	mm (inch)	1.5 (0.06)	3.0 (0.12)	6.0 (0.24)	14.0 (0.55)	SS: 3.5 (0.14) Hast. 3.0 (0.12)
Pipe wall thickness	mm (inch)	0.25 (0.01)	0.5 (0.02)	1.0 (0.04)	1.0 (0.04)	SS: 0.25 (0.0098) Hast. 0.5 (0.0196)
Mass flow measuring range (liquids)	kg/h (lb/h)	0 ... 30 (0 ... 66)	0 … 250 (0 … 550)	0 … 1 000 (0 … 2 200)	0 … 5 600 (0 … 12 345)	0 ... 350 (0 ... 772)
Density (for liquids)	g/cm³ (lb/inch³)	0 … 2.9 (0 … 0.10)	0 … 2.9 (0 … 0.10)	0 … 2.9 (0 … 0.10)	0 … 2.9 (0 … 0.10)	0 … 2.9 (0 … 0.10)
Fraction e.g.	°Brix	0 … 100	0 ... 70 (applicable temperature range: 10 ... 99 °C (50 ... 210.2 °F))	0 ... 70 (applicable temperature range: 10 ... 99 °C (50 ... 210.2 °F))	0 ... 70 (applicable temperature range: 10 ... 99 °C (50 ... 210.2 °F))	0 … 100
Temperature						
Media temperature	°C (°F)	-50 … +180 °C (-58 … +356 °F)	-50 … +180 °C (-58 … +356 °F)	-50 … +180 °C (-58 … +356 °F)	-50 … +180 °C (-58 … +356 °F)	-40 ... 115 (40 ... 239) -40 ... 180 (40 ... 356)
Ambient temperature	°C (°F)	-20 … +50 °C (-4 … +122 °F)	-20 … +50 °C (-4 … +122 °F)	-20 … +50 °C (-4 … +122 °F)	-20 … +50 °C (-4 … +122 °F)	-20 … +50 °C (-4 … +122 °F)
Liquid pressure measuring pipe[1]						
Stainless steel	bar (psi)	230 (3 336)	230 (3 336)	265 (3 844)	130 (1 885)	130 (1 885)
Hastelloy C22/2.4602	bar (psi)	365 (5 294)	350 (5 076)	410 (5 946)	200 (2 900)	410 (5 945)
Materials						
Measuring pipe, flange and thread connection		Stainless steel AISI 316L/1.4435 Hastelloy C22/2.4602				
Enclosure and enclosure material		IP67 (NEMA 4) and stainless steel AISI 326L/1.4404 **The housing is not rated for pressure containment**				
Process connections[2]						
Flange						
• DIN 1092-1, PN 40				DN 10	DN 15	
• ANSI B16.5, Class 150				½"	½"	
• ANSI B16.5, Class 600 (Class 300)				½"	½"	
Dairy (screwed connection, PN 16/25/40)[3]						
• DIN 11851				DN 10	DN 15	
• ISO 2853/BS 4825 part 4 (SS3351)				25 mm	25 mm	
Dairy clamp connection (PN 16)[3]						
• ISO 2853/BS 4825 part 3 (SS3016)				25 mm	25 mm	
Thread						
• ISO 228/1, PN 100		G¼" male	G¼" female	G¼" male	G½" male	G¼" male
• ANSI/ASME B1.20.1, PN 100		¼" NPT male	¼" NPT female	¼" NPT male	½" NPT male	¼" NPT male
Ex-version (sensor)						
• ATEX, IECEX, EAC Ex		Zone 0: Ex ia IIC T3...T6 Ga				
• UL (c-UL-us)		Class I, Div. 1: Grp. A, B, C, D				
• cCSAus		Class 1 Div 1 or Class 1 Zone1				

1) Max. at 20 °C (68 °F), DIN 2413, DIN 17457
2) Other connections to order, see "Selection and Ordering data"
3) Material, AISI 316/1.4401 or corresponding

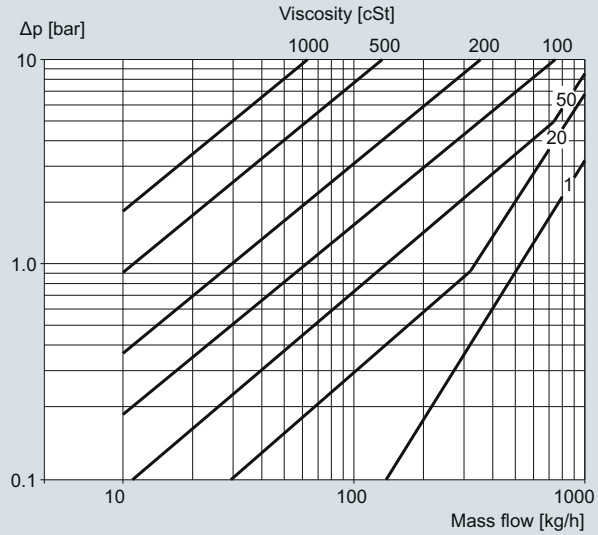
For accuracy specification see "System information SITRANS FC".

Technical specifications (continued)

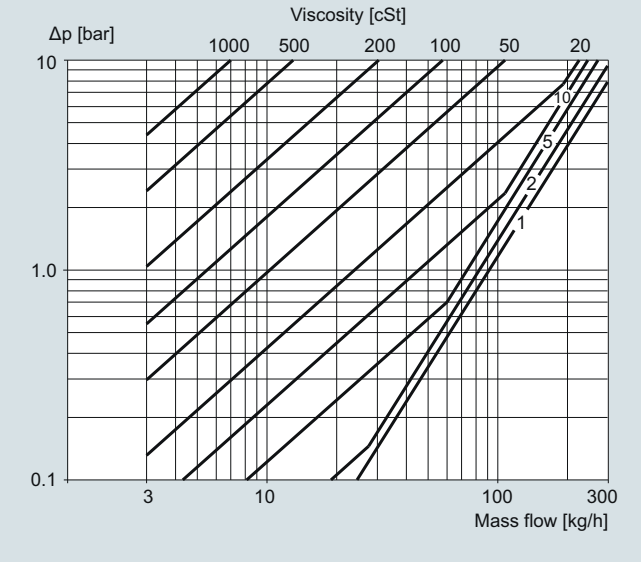
Pressure drop MASS 2100



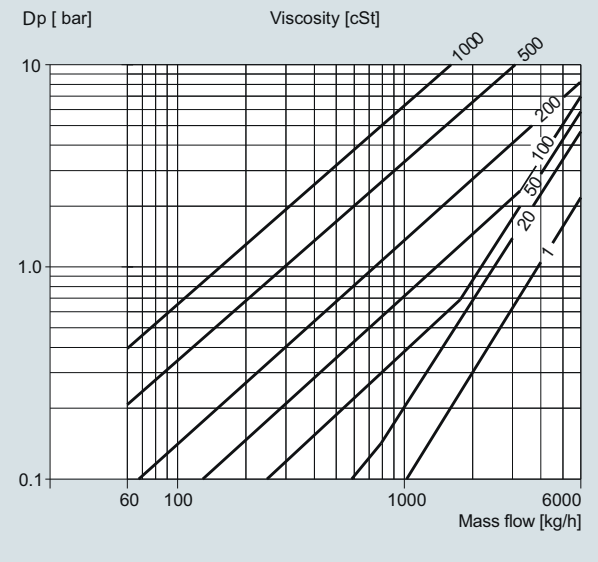
MASS 2100 DI 1.5 (1/16"), pressure drop for density = 1 000 kg/m^3



MASS 2100 DI 6 (¼"), pressure drop for density = 1 000 kg/m^3



MASS 2100 DI 3 (1/8"), pressure drop for density = 1 000 kg/m^3

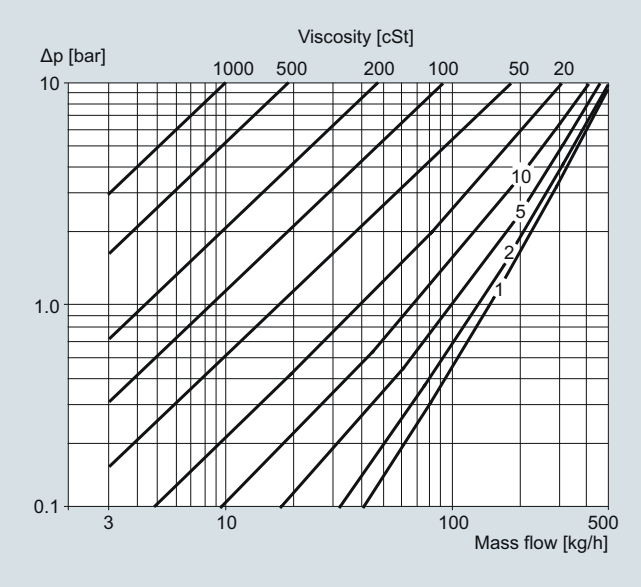


MASS 2100 DI 15 (½"), pressure drop for density = 101 500 kg/m^3

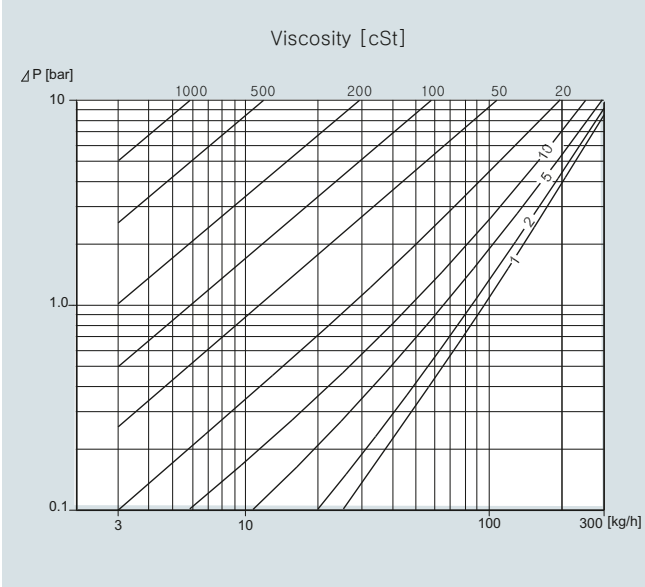
3

Technical specifications (continued)

Pressure drop FC300 DN4

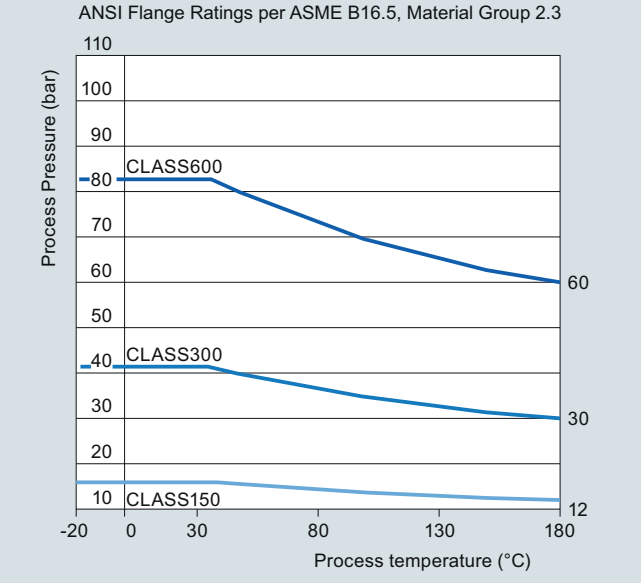


Stainless steel 316L/1.4404

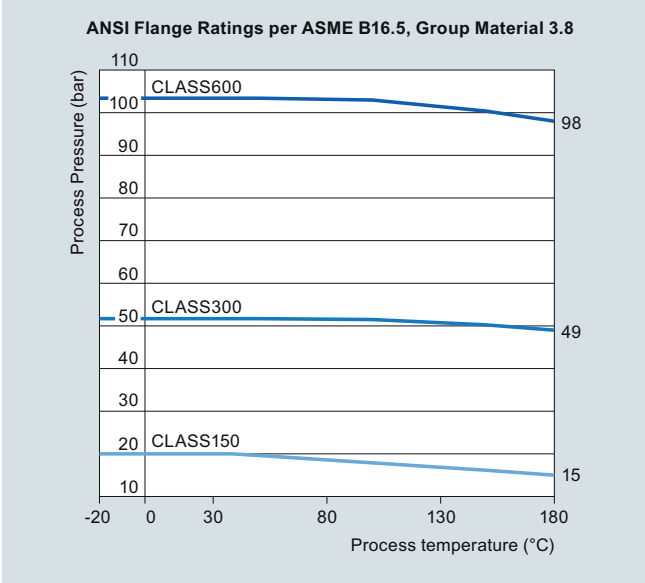


SITRANS FC300 DN 4, pressure loss, viscosity and flow rate for Hastelloy C22 / 2.4602

Pressure/temperature curves MASS 2100 DI 3 ... 15

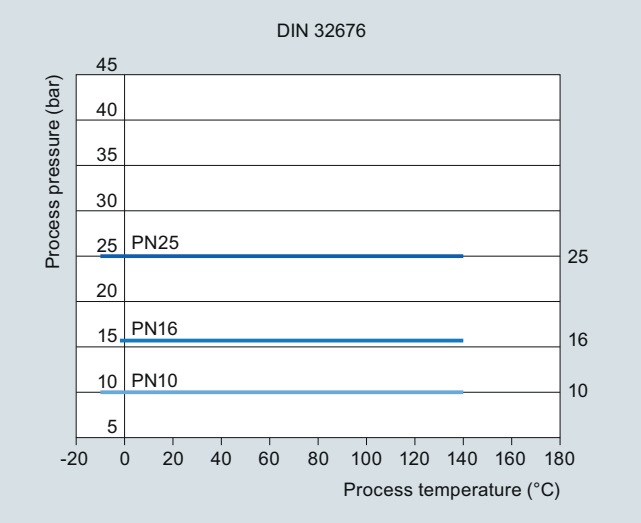


ASME flanges B16.5 stainless steel

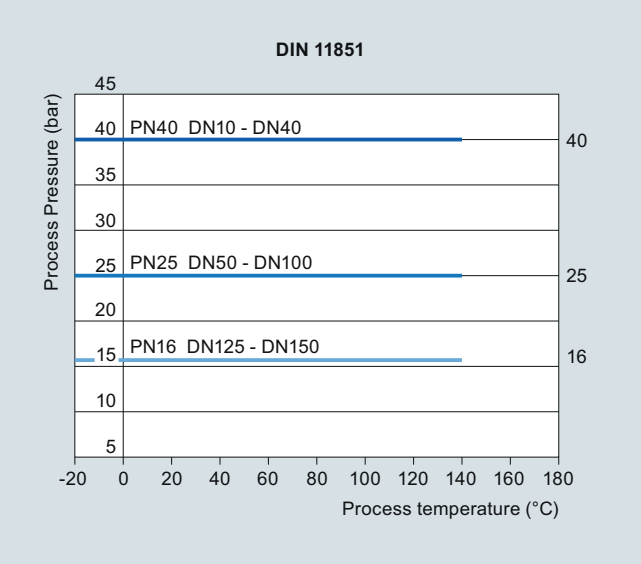


ASME flanges B16.5 Hastelloy C22/2.4602

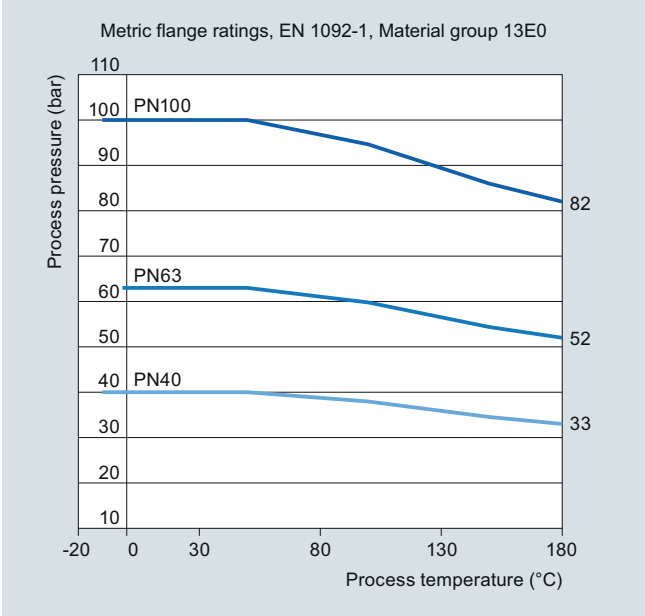
Technical specifications (continued)



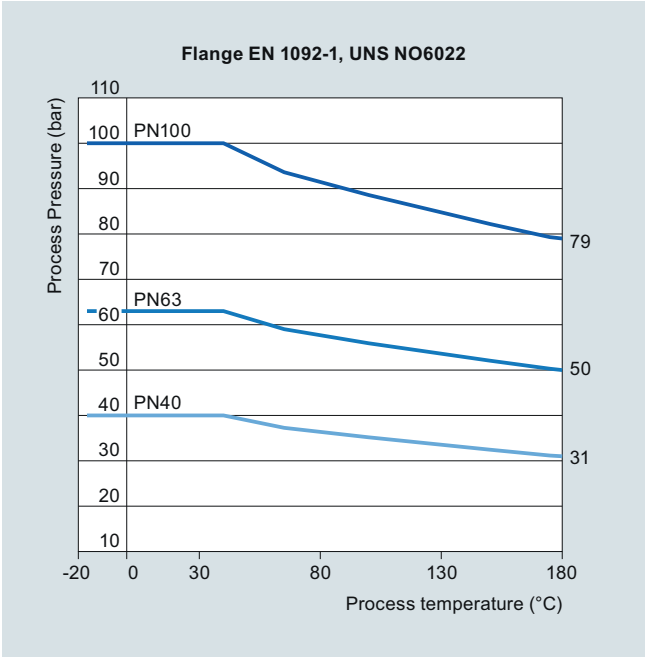
DIN 32676 flanges stainless steel (PN 10 ... PN 25)



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



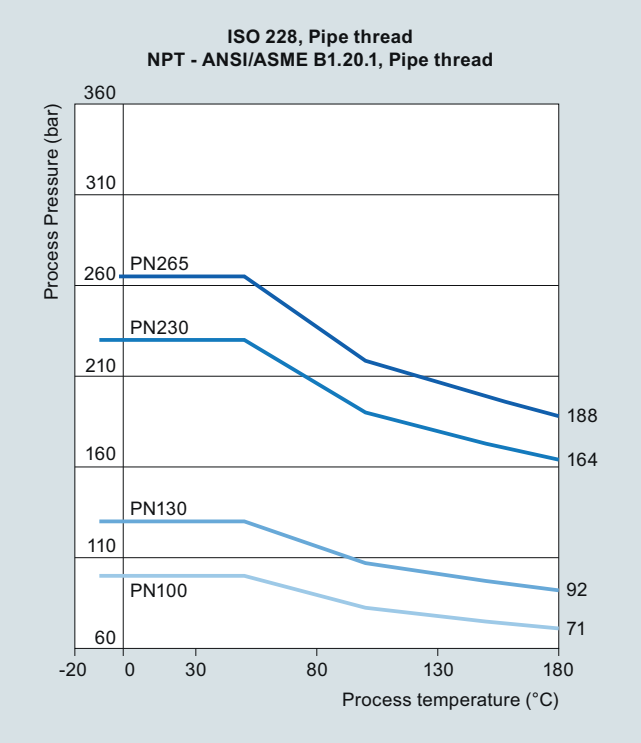
EN 1092 flanges stainless steel (PN 40 ... PN 100)



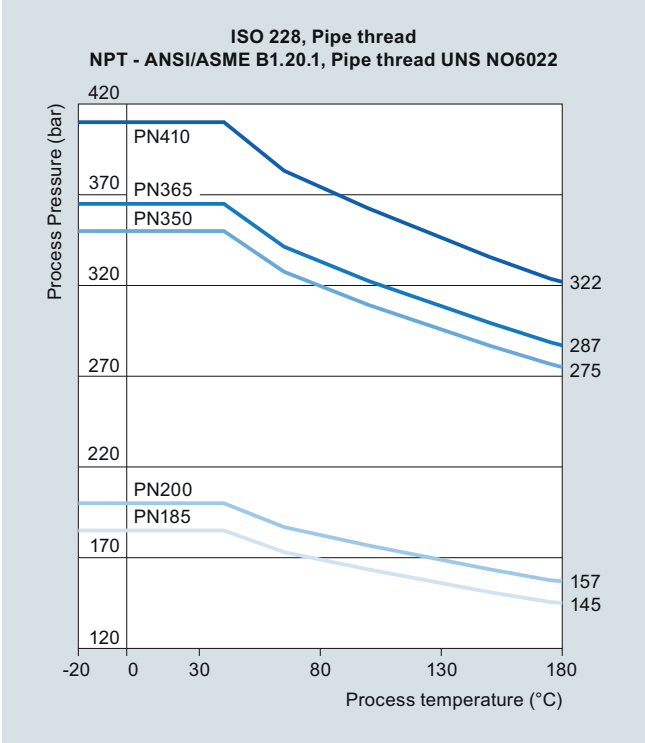
EN 1092 flanges Hastelloy C22/2.4602 (PN 40 ... PN 100)

3

Technical specifications (continued)



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

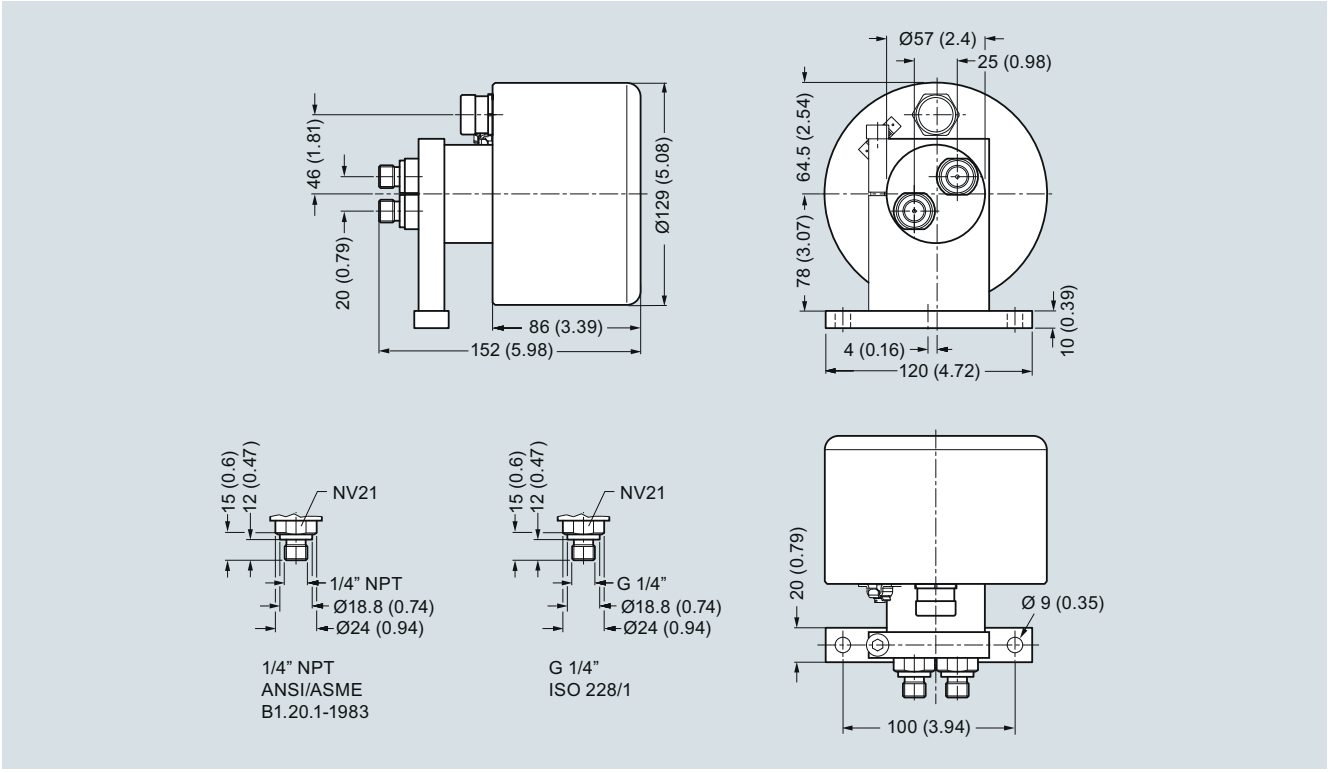


ISO 218 and NPT pipe thread stainless steel (PN 185 ... PN 410)

For further information on the PED standard and requirements, see the pressure equipment directives 2014/68/EU.

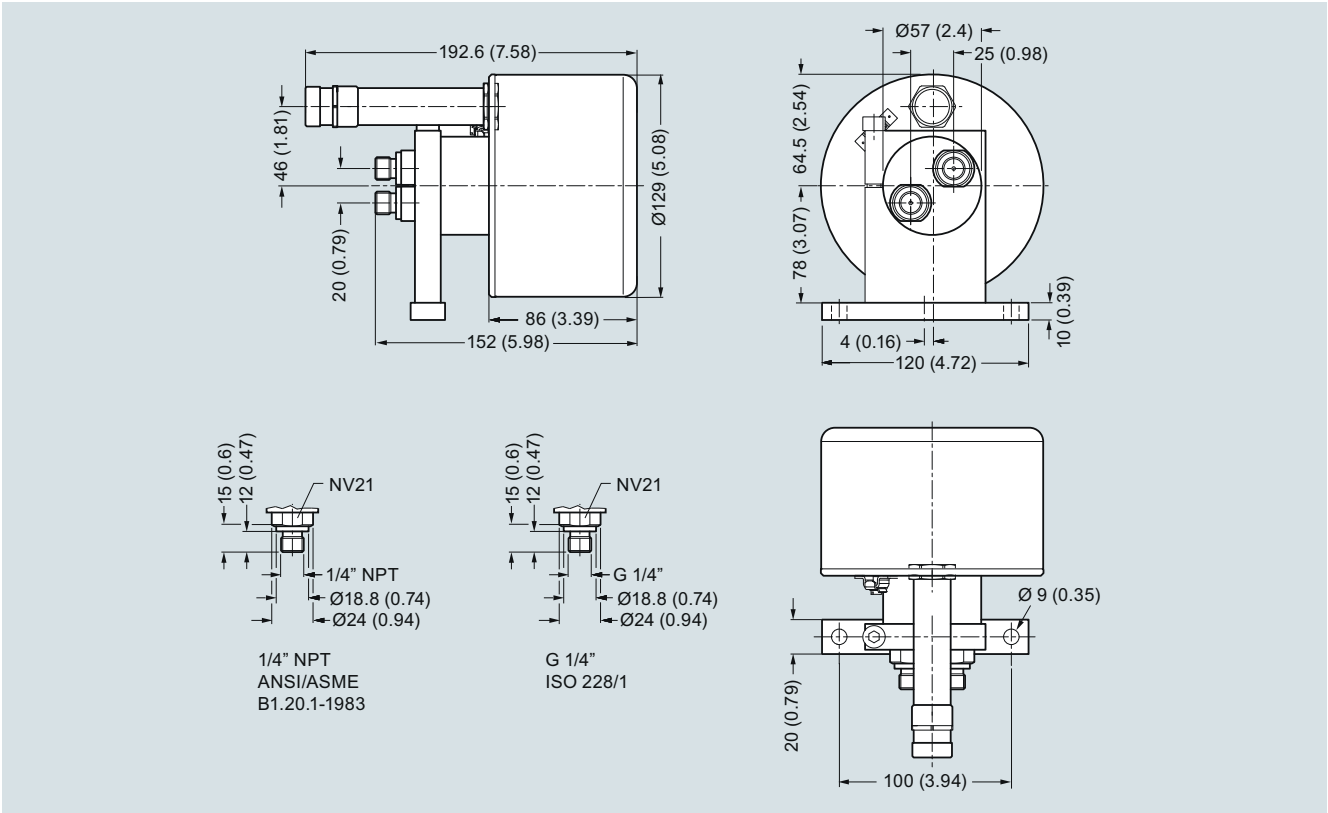
Dimensional drawings

MASS 2100 DI 1.5 (1/16")



Dimensions in mm (inch)

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

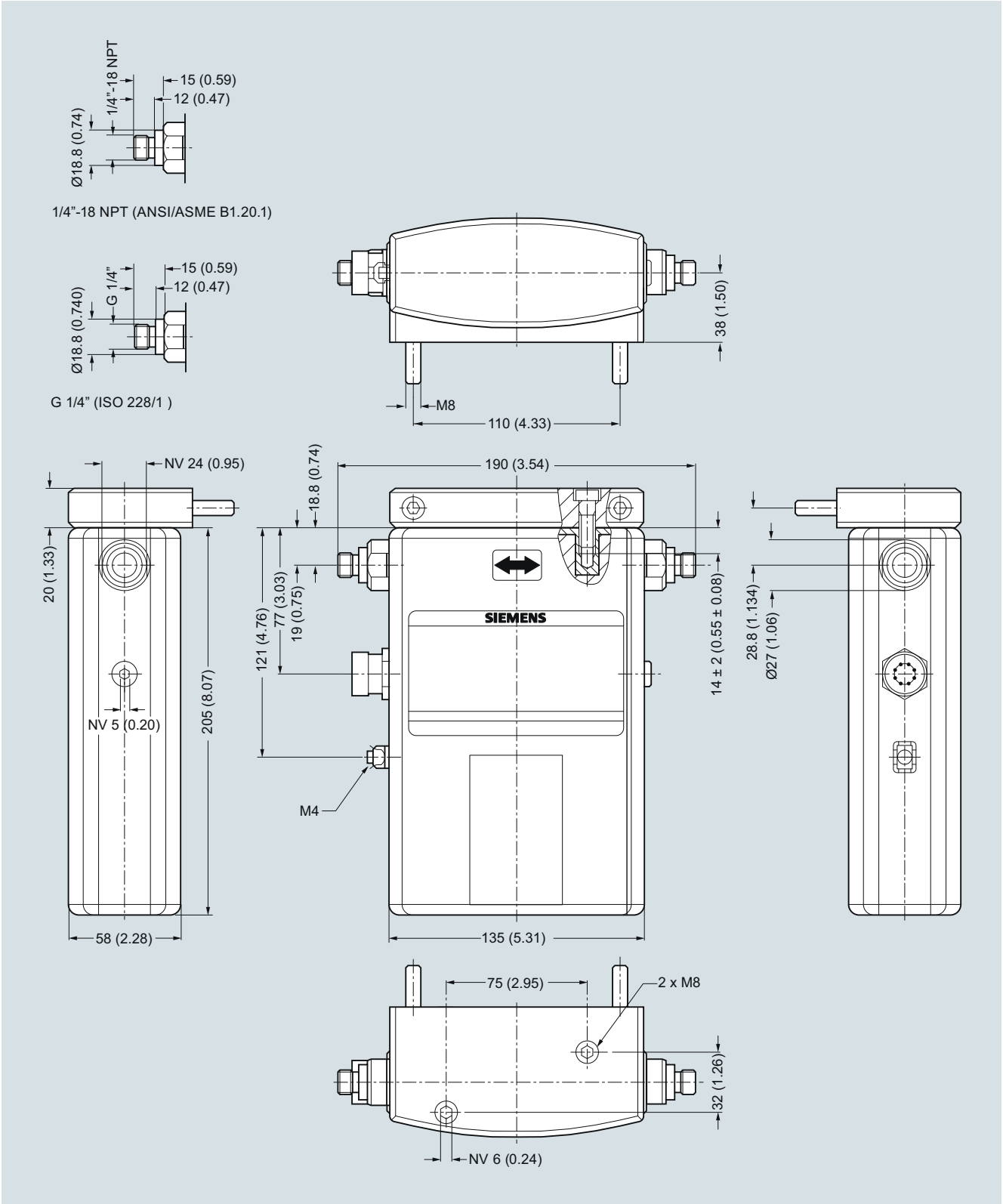


Dimensions in mm (inch)

3

Dimensional drawings (continued)

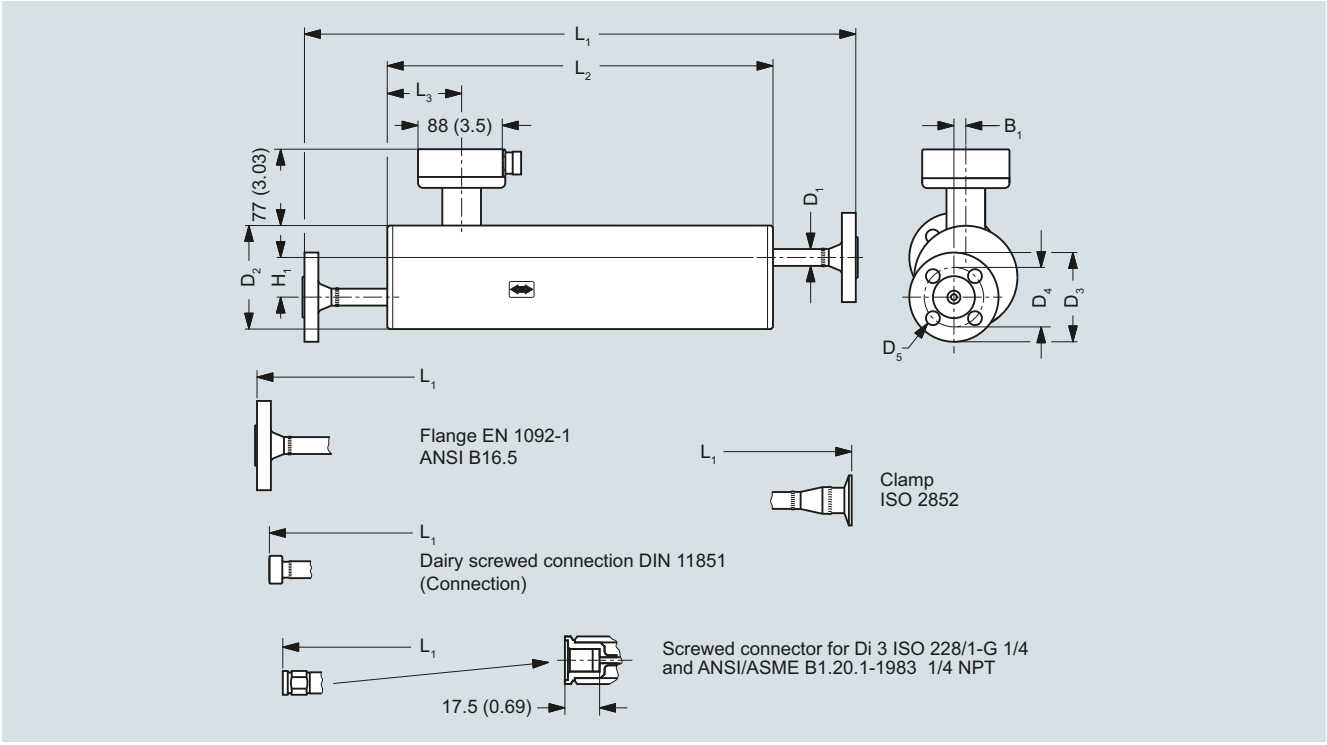
SITRANS FC300 DN 4



SITRANS FC300, weight 3.5 kg (7.7 lb), dimensions in mm (inch)

Dimensional drawings (continued)

MASS 2100 sensor for analog cable connection



Dimensions in mm (inch)

Sensor size	Connections			L1	L2	L3	H1	B1	D1	D2	D3	D4	D5
DI (inch)	Type	Pressure rating	Size	mm (inch)									
DI 3 (1/8)	Pipe thread ISO 228/1 - G¼ (female)	PN 100	¼"	470 (18.50)	280 (11.02)	75.5 (2.97)	60 (2.36)	0	21.3 (0.84)	104 (4.09)	-	-	-
		PN 230	¼"	470 (18.50)	280 (11.02)	75.5 (2.97)	60 (2.36)	0	21.3 (0.84)	104 (4.09)	-	-	-
		PN 350	¼"	470 (18.50)	280 (11.02)	75.5 (2.97)	60 (2.36)	0	21.3 (0.84)	104 (4.09)	-	-	-
	Pipe thread ANSI/ASME B 1.20.1 - ¼" NPT (female)	PN 100	¼"	470 (18.50)	280 (11.02)	75.5 (2.97)	60 (2.36)	0	21.3 (0.84)	104 (4.09)	-	-	-
		PN 230	¼"	470 (18.50)	280 (11.02)	75.5 (2.97)	60 (2.36)	0	21.3 (0.84)	104 (4.09)	-	-	-
		PN 350	¼"	470 (18.50)	280 (11.02)	75.5 (2.97)	60 (2.36)	0	21.3 (0.84)	104 (4.09)	-	-	-

Dimensional drawings (continued)

Sensor size	Connections			L1	L2	L3	H1	B1	D1	D2	D3	D4	D5
DI (inch)	Type	Pressure rating	Size	mm (inch)									
DI 6 (¼)	Pipe thread ISO 228/1 - G¼ (male)	PN 100	¼"	564 (22.20)	390 (15.35)	62 (2.44)	40 (1.57)	12 (0.47)	17 (0.67)	104 (4.09)	-	-	-
		PN 265	¼"	564 (22.20)	390 (15.35)	62 (2.44)	40 (1.57)	12 (0.47)	17 (0.67)	104 (4.09)	-	-	-
		PN 410	¼"	564 (22.20)	390 (15.35)	62 (2.44)	40 (1.57)	12 (0.47)	17 (0.67)	104 (4.09)	-	-	-
	Pipe thread ANSI/ASME B 1.20.1 - ¼" NPT (male)	PN 100	¼"	564 (22.20)	390 (15.35)	62 (2.44)	40 (1.57)	12 (0.47)	17 (0.67)	104 (4.09)	-	-	-
		PN 265	¼"	564 (22.20)	390 (15.35)	62 (2.44)	40 (1.57)	12 (0.47)	17 (0.67)	104 (4.09)	-	-	-
		PN 410	¼"	564 (22.20)	390 (15.35)	62 (2.44)	40 (1.57)	12 (0.47)	17 (0.67)	104 (4.09)	-	-	-
	Flange EN 1092-1	PN 40	DN 10	562 (22.13)	390 (15.35)	62 (2.44)	40 (1.57)	12 (0.47)	17 (0.67)	104 (4.09)	90	60	14
			DN 15	640 (25.20)	390 (15.35)	62 (2.44)	40 (1.57)	12 (0.47)	17 (0.67)	104 (4.09)	90	60	14
		PN 100	DN 10	582 (22.91)	390 (15.35)	62 (2.44)	40 (1.57)	12 (0.47)	17 (0.67)	104 (4.09)	100	70	14
			DN 15	653 (25.71)	390 (15.35)	62 (2.44)	40 (1.57)	12 (0.47)	17 (0.67)	104 (4.09)	100	70	14
	Flange ANSI B16.5	Class 150	½"	627 (24.69)	390 (15.35)	62 (2.44)	40 (1.57)	12 (0.47)	17 (0.67)	104 (4.09)	88.9	60.5	15.7
			¾"	672 (26,46)	390 (15.35)	62 (2.44)	40 (1.57)	12 (0.47)	17 (0.67)	104 (4.09)	88.9	60.5	15.7
		Class 600	½"	610 (24.02)	390 (15.35)	62 (2.44)	40 (1.57)	12 (0.47)	17 (0.67)	104 (4.09)	95.3	66.5	15.7
			¾"	695 (27.36)	390 (15.35)	62 (2.44)	40 (1.57)	12 (0.47)	17 (0.67)	104 (4.09)	95.3	66.5	15.7
	Screwed connection DIN 11851	PN 40	DN 10	534 (21.02)	390 (15.35)	62 (2.44)	40 (1.57)	12 (0.47)	17 (0.67)	104 (4.09)	-	-	-
			DN 15	574 (22.60)	390 (15.35)	62 (2.44)	40 (1.57)	12 (0.47)	17 (0.67)	104 (4.09)	-	-	-
	Clamp ISO 2852	PN 16	25 mm	572 (22.52)	390 (15.35)	62 (2.44)	40 (1.57)	12 (0.47)	17 (0.67)	104 (4.09)	-	-	-
	Hygienic screwed ISO 2853		DN 25	575 (22.64)	390 (15.35)	62 (2.44)	40 (1.57)	12 (0.47)	17 (0.67)	104 (4.09)	-	-	-

Dimensional drawings (continued)

Sensor size	Connections			L1	L2	L3	H1	B1	D1	D2	D3	D4	D5
DI (inch)	Type	Pressure rating	Size	mm (inch)									
DN 15 (½)	Pipe thread ISO 228/1 – G½ (male)	PN 100	½"	618 (24.33)	444 (17.48)	75 (2.97)	44 (1.73)	20 (0.79)	21.3 (0.84)	129 (5.08)	-	-	-
		PN 130	½"	618 (24.33)	444 (17.48)	75 (2.97)	44 (1.73)	20 (0.79)	21.3 (0.84)	129 (5.08)	-	-	-
		PN 200	½"	618 (24.33)	444 (17.48)	75 (2.97)	44 (1.73)	20 (0.79)	21.3 (0.84)	129 (5.08)	-	-	-
	Pipe thread ANSI/ASME B 1.20.1 - ½" NPT (male)	PN 100	½"	618 (24.33)	444 (17.48)	75 (2.97)	44 (1.73)	20 (0.79)	21.3 (0.84)	129 (5.08)	-	-	-
		PN 130	½"	618 (24.33)	444 (17.48)	75 (2.97)	44 (1.73)	20 (0.79)	21.3 (0.84)	129 (5.08)	-	-	-
		PN 200	½"	618 (24.33)	444 (17.48)	75 (2.97)	44 (1.73)	20 (0.79)	21.3 (0.84)	129 (5.08)	-	-	-
	Flange EN 1092-1	PN 40	DN 15	622 (24.49)	444 (17.48)	75 (2.97)	44 (1.73)	20 (0.79)	21.3 (0.84)	129 (5.08)	95	65	14
			DN 25	724 (28.50)	444 (17.48)	75 (2.97)	44 (1.73)	20 (0.79)	21.3 (0.84)	129 (5.08)	95	65	14
		PN 100	DN 15	635 (25.00)	444 (17.48)	75 (2.97)	44 (1.73)	20 (0.79)	21.3 (0.84)	129 (5.08)	105	75	14
			DN 25	760 (29.92)	444 (17.48)	75 (2.97)	44 (1.73)	20 (0.79)	21.3 (0.84)	129 (5.08)	105	75	14
	Flange ANSI B16.5	Class 150	½"	641 (25.24)	444 (17.48)	75 (2.97)	44 (1.73)	20 (0.79)	21.3 (0.84)	129 (5.08)	88.9	60.5	15.7
			¾"	719 (25.24)	444 (17.48)	75 (2.97)	44 (1.73)	20 (0.79)	21.3 (0.84)	129 (5.08)	88.9	60.5	15.7
		Class 600	½"	661 (26.02)	444 (17.48)	75 (2.97)	44 (1.73)	20 (0.79)	21.3 (0.84)	129 (5.08)	95.3	66.5	15.7
			¾"	742 (29.21)	444 (17.48)	75 (2.97)	44 (1.73)	20 (0.79)	21.3 (0.84)	129 (5.08)	95.3	66.5	15.7
	Screwed connection DIN 11851	PN 40	DN 15	588 (23.15)	444 (17.48)	75 (2.97)	44 (1.73)	20 (0.79)	21.3 (0.84)	129 (5.08)	-	-	-
			DN 25	674 (26.54)	444 (17.48)	75 (2.97)	44 (1.73)	20 (0.79)	21.3 (0.84)	129 (5.08)	-	-	-
	Clamp ISO 2852	PN 16	DN 25	626 (24.65)	444 (17.48)	75 (2.97)	44 (1.73)	20 (0.79)	21.3 (0.84)	129 (5.08)	-	-	-
	Hygienic screwed ISO 2853		DN 25	629 (24.76)	444 (17.48)	75 (2.97)	44 (1.73)	20 (0.79)	21.3 (0.84)	129 (5.08)	-	-	-

[1] For Hastelloy L1 is 628 mm (24.72 inch)

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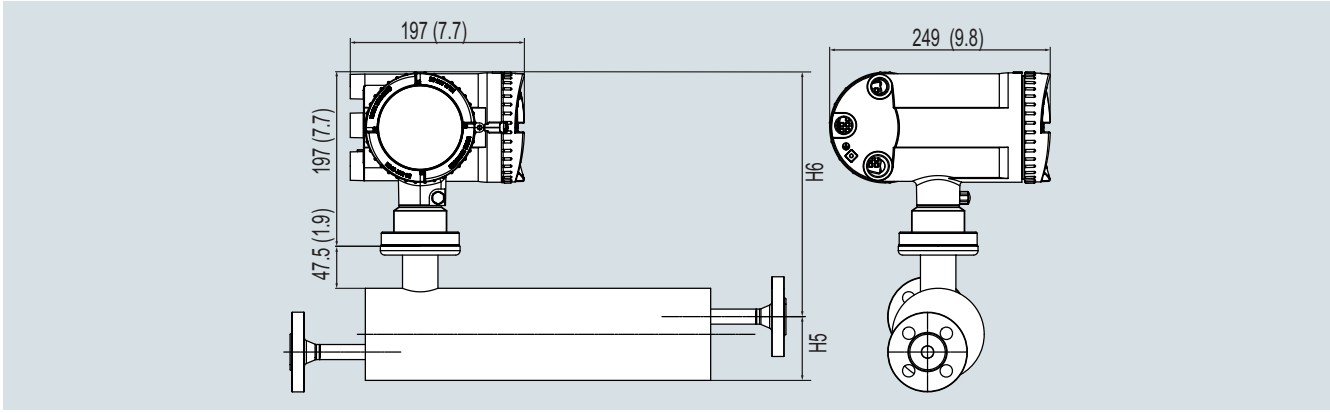
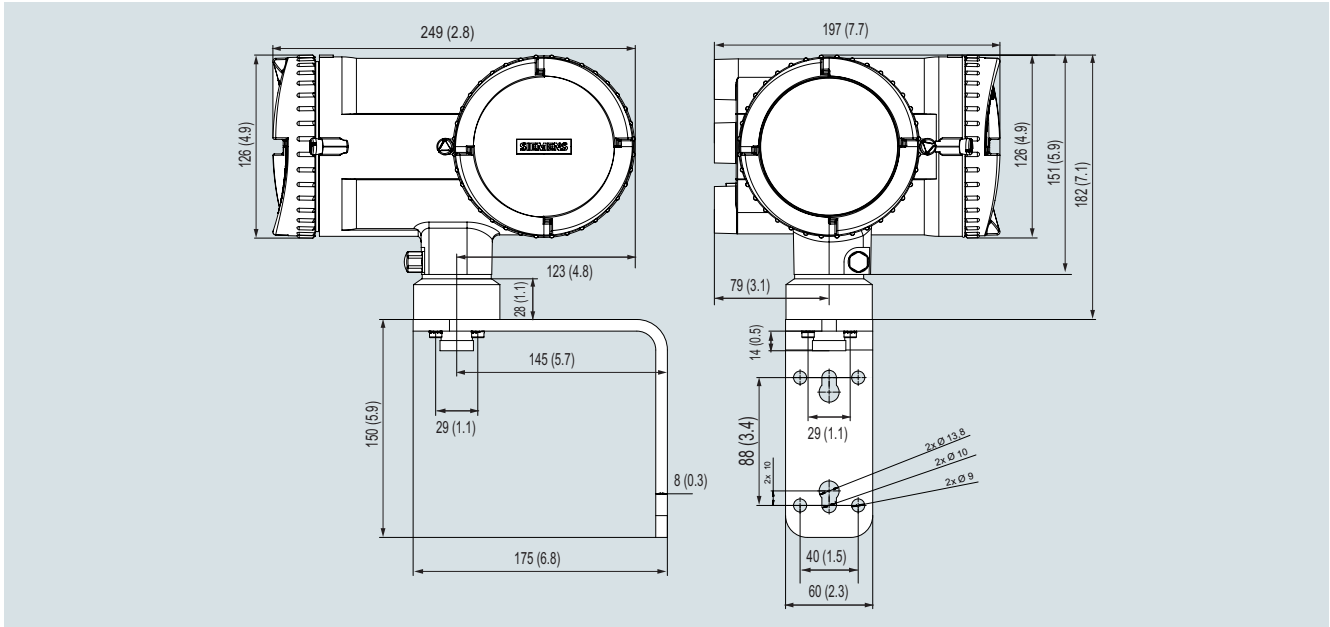
Dimensional drawings (continued)

Compact with FCT030



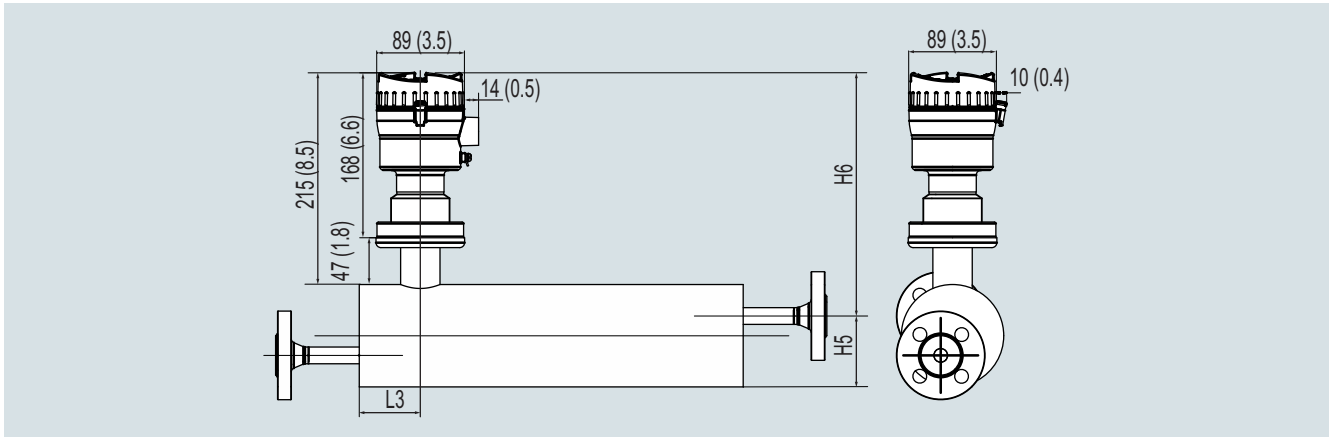
Dimensions in mm (inch)

Transmitter FCT030 remote field mount for M20 analog cable connection



Dimensions in mm (inch)

Compact with FCT010



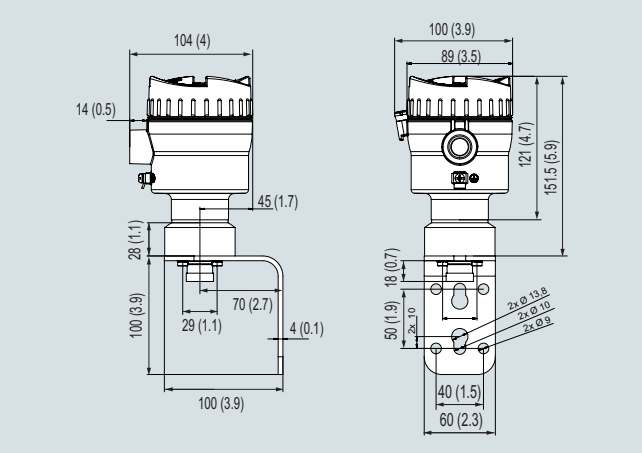
Dimensions in mm (inch)

Dimensional drawings (continued)

MASS 2100 with FCT010 transmitter compact

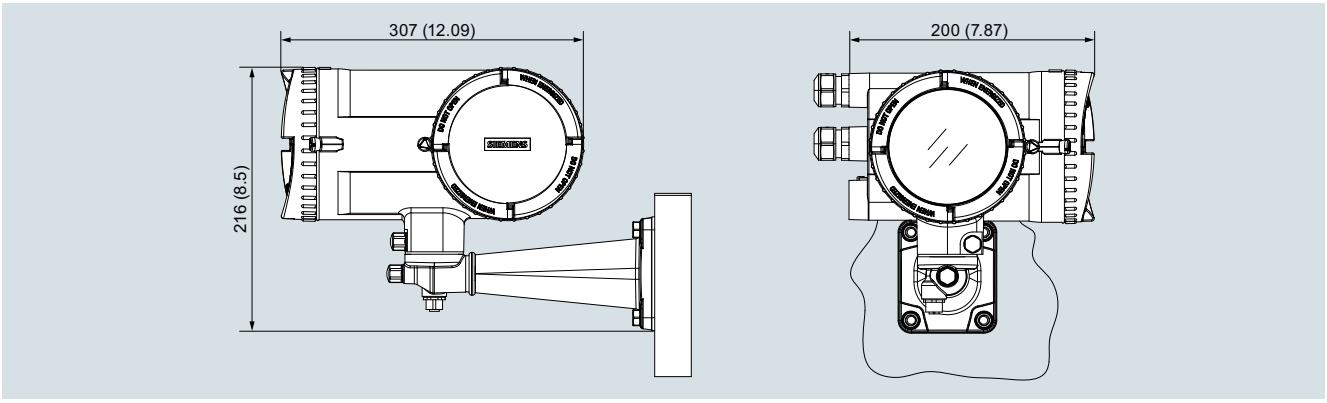
Sensor size DI (inch)	L_3 mm (inch)	H_5	H_6	$H_5 + H_6$
DI 3 (1/8)	75.5 (2.97)	82 (3.23)	237 (9.33)	319 (12.56)
DI 6 (¼)	62 (2.44)	72 (2.83)	247 (9.72)	319 (12.56)
DN 15 (½)	75 (2.97)	86.5 (3.41)	257 (10.11)	343.5 (13.52)

Dimensions for the FCT010 remote mounted (for analogue cable connections for MASS 2100 / FC300 DN4)



Dimensions in mm (inch)

Transmitter FCT030 remote field mount for M12 digital cable connection



Dimensions in mm (inch)

MASS 2100 sensor with "heating jacket"

Sensor size	Connections heated			L_5	H_3	B_2	D_6	D_7	D_8
DI (inch)	Type	Pressure rating	Size	mm (inch)					
DI 3 (1/8)	EN 1092-1	PN 40	DN 15	234 (9.21)	122 (4.8)	22 (0.87)	95 (3.74)	65 (2.56)	14 (0.55)
	ANSI B16.5	Class 150	½"	234 (9.21)	131.6 (5.18)	22 (0.87)	88.9 (3.5)	60.5 (2.38)	15.7 (0.62)
DI 6 (¼)	EN 1092-1	PN 40	DN 15	234 (9.21)	112 (4.41)	22.7 (0.89)	95 (3.74)	65 (2.56)	65 (2.56)
	ANSI B16.5	Class 150	½"	234 (9.21)	121.6 (4.79)	22.7 (0.89)	88.9 (3.5)	60.5 (2.38)	60.5 (2.38)
DN 15 (½)	EN 1092-1	PN 40	DN 15	234 (9.21)	126.5 (4.98)	31.5 (1.24)	95 (3.74)	65 (2.56)	65 (2.56)
	ANSI B16.5	Class 150	½"	234 (9.21)	136.1 (5.36)	31.5 (1.24)	88.9 (3.5)	60.5 (2.38)	60.5 (2.38)

MASS 2100 / FC300 DN 4 with FCT030 transmitter

Overview

Sensors MASS 2100 and FC300 DN 4 with FCT010 / FCT030 transmitters

The SITRANS MASS 2100 and FC300 DN 4 system consists of a SITRANS sensor and a SITRANS FCT030 transmitter.

The flowmeter comes in a compact and remote design depending for all MASS 2100 DI 3 to DI 15.

MASS 2100 DI 1.5 and FC300 DN4 are only available with analogue connection of the FCT030 transmitter.

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

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

FCT030 is available with current output HART 7.5, Modbus RS 485 RTU, PROFIBUS DP or PROFIBUS PA as standard on Channel 1. Additional functions can be freely configured for analog, pulse, frequency, relay or status output or binary input.

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

Benefits

- High accuracy better than 0.1 % of mass flow rate
- Large dynamic turn-down ratio better than 500:1
- Densitometer performance available through density accuracy (depending upon sensor size) ranging from 0.0005 to 0.0015 g/cm^3 with a typical repeatability better than 0.0001 to 0.0002 g/cm^3
- Single continuous tube design, with no internal welds, reductions or flow splitters offers optimal hygiene, safety and CIP cleanability for food and beverage and pharmaceutical applications
- Markets 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.)
- Full bore design provides lower pressure loss due to same internal diameter throughout the entire sensor
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Multi-plug electrical connector enables true “plug & play”
- Sensor pipe available in high-quality stainless steel AISI 316L/1.4435 or Hastelloy C22/2.4602 offering optimum corrosion resistance
- Centre-block design decouples process noise from the environment such as vibrations, pulsations, pressure shocks etc. making installation flexible and versatile
- Rugged and space-saving sensor design in stainless steel matching all environments
- High-pressure program as standard

Technical specifications

Sensors MASS 2100 / FC300 DN 4 with FCT030 transmitter	
Sizes mm (inch)	MASS 2100 DI 1.5 (1/16) MASS 2100 DI 3 (1/8") MASS 2100 DI 6 (1/4") MASS 2100 DI 15 (1/2") FC300 DN 4 (1/6")
Accuracy	± 0.10 % for liquids additional ±0.40 for gases
Repeatability	± 0.05 %
Flow range Q norm (liquids)	
(water @ 1 bar pressure loss) (Q_{nom})	
• DI 1.5	19 kg/h (42 lb/h)
• DI 3	90 kg/h (198 lb/h)
• DI 6	500 kg/h (1 102 lb/h)
• DI 15	3 800 kg/h (8 370 lb/h)
• DN 4	140 kg/h (308 lb/h)
Architecture	Compact: DI 3, DI 6, DI 15 Remote digital: DI 3, DI 6, DI 15 Remote analoge: DI 1.5, DI 3, DI 6, DI 15, DN 4
Display	Full graphical display, 240 × 160 pixels with selection of 6 languages
Power supply	20 ... 90 V DC ± 10 %; 100 ... 240 V AC ± 10 %, 47 ... 63 Hz ± 10 %
Material	
• Sensor	
- Wetted parts	316L stainless steel or Hastelly C 22
- Enclosure	316L stainless steel
• Transmitter	Aluminum with corrosion-resistant coating Class C4
Enclosure rating	IP67[1)]
Pressure ratings	
• Measuring tubes	
- 316L	Up to 265 bar (3 844 psi), depending on size and process connection
- Nickel Alloy C4	Up to 410 bar (5 945 psi), depending on size and process connection
• Sensor enclosure	No pressure containment
Temperature ratings	
• Process medium	-50 ... +180 °C (-58 ... +356 °F)
• Ambient	-20 ... +50 °C (-4 ... +122 °F)[1)]

Sensors MASS 2100 / FC300 DN 4 with FCT030 transmitter	
Process connections (depending on size and pressure rating)	
• Flanges	EN 1092-1 B1, ANSI/ASME B16.5
• Pipe threads	ASME B1.20 (NPT), ISO 228
• Hygienic threads	DIN 11851, ISO 2853/BS 4825 part 4 (SS3016)
• Hygienic clamps	ISO Clamp 2852
Approvals	
• Hazardous area	ATEX, IECEx, EAC Ex, CSA, cCSAus, EAC
• Pressure equipment	PED
NAMUR	NAMUR-compliant (e.g. NE 21, NE 41, NE 107 and NE 132)
I/O	Up to 4 channels combining analog, relay or digital outputs and binary input
Communication	HART PROFIBUS PA PROFIBUS DP Modbus RTU (RS 485)
EMC performance	
• Emission	EN 55011/CISPR-11 (Class A)
• Immunity	EN/IEC 61326-1 (Industry)
Mechanical load	18 ... 1 000 Hz random The flow meter will mechanically tolerate 3.17 g RMS in all directions. Flow accuracy cannot be guaranteed under all conditions.

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

MASS 2100 / FC300 DN 4 with FCT030 transmitter

Selection and ordering data

Article No.

SITRANS FC sensors MASS 2100/FC300 with FCT030 transmitter ↗	7ME4813-											Ord. code		
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.						-								
Sensor type and connector size														
MASS 2100 DI 1.5, 1/4"	1	G												
MASS 2100 DI 3, 1/4"	3	A												
MASS 2100 DI 3, 1/4" Heated w. DIN	3	B												
MASS 2100 DI 3,1/4" Heated w. ANSI	3	C												
FC300 DN 4, 1/4"	4	A												
MASS 2100 DI 6, 1/4"	6	A												
MASS 2100 DI 6,1/4" Heated w. EN	6	B												
MASS 2100 DI 6, 1/4" Heated w. ANSI	6	C												
MASS 2100 DI 6, DN 10	6	D												
MASS 2100 DI 6, DN 10 Heated w. EN	6	E												
MASS 2100 DI 6, DN 10 Heated w. ANSI	6	F												
MASS 2100 DI 6, DN 15 (½")	6	G												
MASS 2100 DI 6, DN 15 (½") Heated w. EN	6	H												
MASS 2100 DI 6, DN 15 (½") Heated w. ANSI	6	J												
MASS 2100 DI 6, DN 20 (¾")	6	K												
MASS 2100 DI 6, DN 20 (¾") Heated w. EN	6	L												
MASS 2100 DI 6, DN 20 (¾") Heated w. ANSI	6	M												
MASS 2100 DI 6, DN 25 (1")	6	N												
MASS 2100 DI 6, DN 25 (1") Heated w. EN	6	P												
MASS 2100 DI 6, DN 25 (1") Heated w. ANSI	6	Q												
MASS 2100 DI 15, DN 15 (½")	7	A												
MASS 2100 DI 15, DN 15 (½") Heated w. EN	7	B												
MASS 2100 DI 15, DN 15 (½") Heated w. ANSI	7	C												
MASS 2100 DI 15, DN 20 (¾")	7	D												
MASS 2100 DI 15, DN 20 (¾") Heated w. EN	7	E												
MASS 2100 DI 15, DN 20 (¾") Heated w. ANSI	7	F												
MASS 2100 DI 15, DN 25 (1")	7	G												
MASS 2100 DI 15, DN 25 (1") Heated w. EN	7	H												
MASS 2100 DI 15, DN 25 (1") Heated w. ANSI	7	J												

Article No.

SITRANS FC sensors MASS 2100/FC300 with FCT030 transmitter	7ME4813-											Ord. code		
						-								
Process connection/Pressure														
No connections (spare part transmitter)			A	0										
EN 1092-1 B1, PN 40			A	1										
EN 1092-1 B1, PN 100			A	3										
ASME B16.5, RF, Class 150			D	1										
ASME B16.5, RF, Class 600			D	3										
DIN 11851 crewed connection			F	1										
ISO 2852 hygienic clamped			J	1										
ISO 2853 hygienic screwed			J	5										
ISO 228-1 pipe thread, PN 100			C	1										
ISO 228-1 ipe thread, PN 130			C	2										
ISO 228-1 pipe thread, PN 200			C	3										
ISO 228-1 ipe thread, PN 230			C	4										
ISO 228-1 ipe thread, PN 265			C	5										
ISO 228-1 pipe thread, PN 350			C	6										
ISO 228-1 pipe thread, PN 365			C	7										
ISO 228-1 pipe thread, PN 410			C	8										
NPT ASME B 1.20.1 pipe thread, PN 100			N	1										
NPT ASME B 1.20.1 pipe thread, PN 130			N	2										
NPT ASME B 1.20.1 pipe thread, PN 200			N	3										
NPT ASME B 1.20.1 pipe thread, PN 230			N	4										
NPT ASME B 1.20.1 pipe thread, PN 265			N	5										
NPT ASME B 1.20.1 pipe thread, PN 350			N	6										
NPT ASME B 1.20.1 pipe thread, PN 365			N	7										
NPT ASME B 1.20.1 pipe thread, PN 410			N	8										
Tube material (wetted) and max. operational temperature														
AISI 316L/EN 1.4435, max. 115 °C					1									
AISI 316L/EN 1.4435, max. 125 °C					2									
AISI 316L/EN 1.4435, max.180 °C					3									
Hastelloy C22/UNS N06022/EN 2.4602, max. 115 °C					5									
Hastelloy C22/UNS N06022/EN 2.4602, max. 125 °C					6									
Hastelloy C22/UNS N06022/EN 2.4602, max. 180 °C					7									
Calibration														
Mass flow calibration 2 flow x 2 points							1							
Mass flow calibration 2 flow x 2 points + density calibration							4							
Standard fraction (selectable by menu) incl density calibration							8							
Individual fraction (on demand)							9					N	0	Y

Selection and ordering data

	Article No.											Order code
SITRANS FC sensors MASS 2100/FC300 with FCT030 transmitter	**7ME4813-**					-					Ord. code	
Mounting style, transmitter housing and material												
Compact mounted, IP67, Aluminium transmitter housing (DI 3, DI 6 and DI 15)							**D**					
Remote field mounted, IP67, Aluminium housing, M12 socket for digital cable connection (DI 3, DI6 and DI 15 only)							**G**					
Remote field mount, IP67, Aluminium housing, terminal box for digital cable connection (DI 3, DI6 and DI 15)							**K**					
Wall mount aluminum transmitter housing, M12 socket for digital cable connection (DI 3, DI 6 and DI 15)							**U**					
Remote field mount, IP67, Aluminium transmitter housing, analog cable connection with M20 connectors							**Z**			**P**	**0**	**D**
Remote wall mount, IP67, aluminum transmitter housing, analog cable connection with M20 connectors							**Z**			**P**	**0**	**E**
Ex approvals												
Non-Ex								**A**				
ATEX Zone 1 / 21								**C**				
IECEx Zone 1 / 21 (in preparation)								**F**				
USA (FM, CSA, UL), Zone 1/Div 1								**H**				
Canada (CSA, UL), Zone 1/Div 1								**M**				
EAC Zone 1 / 21								**U**				
Local User Interface												
Blind									**1**			
Graphical, 240 × 160 pixels, glass lid									**3**			

	Order code
Further designs Please add "**-Z**" to Article No. and specify Order code(s).	
Cable glands	
None (mechanical sensor)	**A00**
Metric, no glands	**A01**
Metric, plastic	**A02**
Metric, brass/Ni plated	**A05**
Metric, stainless steel	**A06**
NPT, no glands	**A11**
NPT, plastic	**A12**
NPT, brass/Ni plated	**A15**
NPT, stainless steel	**A16**
Integral M12 socket	**A20**
SW functions & CT approvals	
Standard	**B11**
I/O configuration Ch1	
None (replacement sensor)	**E00**
4 ... 20 mA, HART, active/passive output (non-Ex)	**E02**
4 ... 20 mA, HART, active Ex	**E06**
4 ... 20 mA, HART, passive Ex	**E07**
PROFIBUS PA	**E10**
PROFIBUS DP	**E11**
Modbus RTU RS 485 (none-Ex)	**E14**
I/O configuration Ch2, Ch3 and Ch4	
None	**F00**
Non Ex: Sig O, None, None	**F01**
Non Ex: Sig O, Sig I/O, None	**F02**
Non Ex: Sig O, Sig I/O, Sig I/O	**F03**
Non Ex: Sig O, Sig I/O, R	**F04**
Non Ex: Sig O, R, R	**F05**
Non Ex: Sig O, R, None	**F06**
Ex: pSig O, None, None	**F11**
Ex: pSig O, pSig I/O, None	**F12**
Ex: pSig O, pSig I/O, pSig I/O	**F13**
Ex: pSig O, pSig I/O, R	**F14**
Ex: pSig O, R, R	**F15**
Ex: pSig O, R, None	**F16**
Ex: aSig O, None, None	**F21**
Ex: aSig O, aSig I/O, None	**F22**
Ex: aSig O, aSig I/O, aSig I/O	**F23**
Ex: aSig O, aSig I/O, R	**F24**
Ex: aSig O, R, R	**F25**
Ex: aSig O, R, None	**F26**

MASS 2100 / FC300 DN 4 with FCT030 transmitter

Selection and ordering data	Order code
Further designs Please add "**-Z**" to Article No. and specify Order code(s).	
Certificates	
Press test certificate CRN	**C01**
Press test certificate PED	**C02**
Material certificate EN 10204-3.1	**C12**
Welding inspection report	**C13**
Factory certificate according to EN 10204 2.2	**C14**
Factory certificate according to EN 10204 2.1	**C15**
Cleaning for oil and grease/ASTM-A380	**C50**
Sensor data storage	
Sensor with SensorFlash for FCT	**S20**
Sensor with SensorProm for MASS 6000 (in preparation)	**S21**
SD-Card accessibility via USB	
(not allowed in USA by Patent)	
Mass storage enabled	**S30**
Digital cable sensor-transmitter	
None	**L50**
5 m (16.4 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L51**
5 m (16.4 ft), sensor cable, 4 wire, without plugs for terminal connection	**L52**
10 m (32.8 ft) sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L55**
10 m (32.8 ft), sensor cable, 4 wire, without plugs for terminal connection	**L56**
25 m (82 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L59**
25 m (82 ft), sensor cable, 4 wire, without plugs for terminal connection	**L60**
50 m (164 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L63**
50 m (164 ft), sensor cable, 4 wire, without plugs for terminal connection	**L64**
75 m (246 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L67**
75 m (246 ft), sensor cable, 4 wire, without plugs for terminal connection	**L68**
Analog cable sensor-transmitter	
1 m cable, analog, with 2 × M20 connectors	**L85**
2 m cable, analog with 2 × M20 connectors	**L86**
5 m cable, analog with 2 × M20 connectors	**L87**
10 m cable, analog with 2 × M20 connectors	**L88**
15 m cable, analog with 2 × M20 connectors	**L89**
Additional data Please add "**-Z**" to Article No. and specify Order code(s) and plain text.	
Tag name	
Tag name plate, stainless steel	**Y17**
Extended calibration	
Multi-point high, (5 flows × 2 passes), 10 ... 100 % of Q_{nom}	**Y61**
Multi-point high, (10 flows × 1 pass), 10 ... 100 % of Q_{nom}	**Y63**

Accessories for MASS 2100 and FC300 DN 4 with FCT030 transmitter

Description	Article No.	
Mounting bracket for flow sensor MASS 2100 DI 1.5	**A5E02590427**	
Mounting bracket for FC300 DN 4 in AISI 304	**A5E02590439**	

Overview

Sensors MASS 2100 and FC300 DN 4 with FCT010 / FCT030 transmitters

The SITRANS MASS 2100 and FC300 DN 4 system consists of a SITRANS sensor and a SITRANS FCT010 transmitter. The flowmeter comes in a compact design for all MASS 2100 DI 3 to DI 15.

MASS 2100 DI 1.5 to DI 15 and FC300 DN4 are available as remote FCT010 transmitter with analogue connection. Intended for integration into OEM skids, machines or pre-assembled plant systems, the flowmeter is based on the latest developments within digital signal processing technology - engineered for high measuring performance:

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

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

FCT010 is available with Modbus RTU (RS 485) multi-drop serial communication.The flowmeter is supplied with SensorFlash, a microSD card containing all relevant certificates.

Benefits

- High accuracy better than 0.1 % of mass flow rate
- Large dynamic turn-down ratio better than 500:1
- Densitometer performance available through density accuracy (depending upon sensor size) ranging from 0.0005 to 0.0015 g/cm^3 with a typical repeatability better than 0.0001 to 0.0002 g/cm^3
- Single continuous tube design, with no internal welds, reductions or flow splitters offers optimal hygiene, safety and CIP cleanability for food and beverage and pharmaceutical applications
- Markets 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.)
- Full bore design provides lower pressure loss due to same internal diameter throughout the entire sensor
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Multi-plug electrical connector enables true “plug & play”
- Sensor pipe available in high-quality stainless steel AISI 316L/1.4435 or Hastelloy C22/2.4602 offering optimum corrosion resistance
- Centre-block design decouples process noise from the environment such as vibrations, pulsations, pressure shocks etc. making installation flexible and versatile
- Rugged and space-saving sensor design in stainless steel matching all environments
- High-pressure program as standard

MASS 2100 / FC300 DN 4 with FCT010 transmitter

Technical specifications

Sensors MASS 2100 / FC300 DN 4 with FCT010 transmitter	
Sizes mm (inch)	MASS 2100 DI 1.5 (1/16) MASS 2100 DI 3 (1/8") MASS 2100 DI 6 (1/4") MASS 2100 DI 15 (1/2") FC300 DN 4 (1/6")
Accuracy	± 0.10 % for liquids additional ±0.40 for gases
Repeatability	± 0.05 %
Flow range Q norm (liquids)	
(water @ 1 bar pressure loss) (Q_{nom})	
• DI 1,5	19 kg/h (42 lb/h)
• DI 3	90 kg/h (198 lb/h)
• DI 6	500 kg/h (1 102 lb/h)
• DI 15	3 800 kg/h (8 370 lb/h)
• DN 4	140 kg/h (308 lb/h)
Architecture	Compact: DI 3, DI 6, DI 15 Remote analoge: DI 1.5, DI 3, DI 6, DI 15, DN 4
Power supply	12-27 V DC; 1.1 W for Ex d: 12 – 24 V DC; Intrinsic safety power supply: Ui: 20 V, Ii: 484 mA, Pi: 2.3 W, Li: 0.6 uH, Ci: 1.9 nF.
Material	
• Sensor	
- Wetted parts	316L stainless steel or Hastelly C 22
- Enclosure	316L stainless steel
• Transmitter	Aluminum with corrosion-resistant coating Class C4
Enclosure rating	IP67[1)]
Pressure ratings	
• Measuring tubes	
- 316L	Up to 265 bar (3 844 psi), depending on size and process connection
- Nickel Alloy C4	Up to 410 bar (5 945 psi), depending on size and process connection
• Sensor enclosure	No pressure containment
Temperature ratings	
• Process medium	-50 ... +180 °C (-58 ... +356 °F)
• Ambient	-20 ... +50 °C (-4 ... +122 °F)[1)]

Sensors MASS 2100 / FC300 DN 4 with FCT010 transmitter	
Process connections (depending on size and pressure rating)	
• Flanges	EN 1092-1 B1, ANSI/ASME B16.5
• Pipe threads	ASME B1.20 (NPT), ISO 228
• Hygienic threads	DIN 11851, ISO 2853/BS 4825 part 4 (SS3016)
• Hygienic clamps	ISO Clamp 2852
Approvals	
• Hazardous area	ATEX, IECEx, EAC Ex, CSA, cCSAus, EAC
• Pressure equipment	PED
NAMUR	NAMUR-compliant (e.g. NE 21, NE 41, NE 107 and NE 132)
I/O	Up to 4 channels combining analog, relay or digital outputs and binary input
Communication	Modbus RTU (RS 485)
EMC performance	
• Emission	EN 55011/CISPR-11 (Class B)
• Immunity	EN/IEC 61326-1 (Industry)
Mechanical load	18 ... 1 000 Hz random The flow meter will mechanically tolerate 3.17 g RMS in all directions. Flow accuracy cannot be guaranteed under all conditions.

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

Selection and ordering data

Article No.

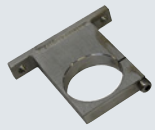
SITRANS FC sensors MASS 2100/FC300 with FCT010 transmitter ↗	**7ME4811-**											Ord. code
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.						-						
Sensor type and connector size												
MASS 2100 DI 1.5, 1/4"	1	G										
MASS 2100 DI 3, 1/4"	3	A										
MASS 2100 DI 3, 1/4" Heated w. DIN	3	B										
MASS 2100 DI 3,1/4" Heated w. ANSI	3	C										
FC300 DN 4, 1/4"	4	A										
MASS 2100 DI 6, 1/4"	6	A										
MASS 2100 DI 6,1/4" Heated w. EN	6	B										
MASS 2100 DI 6, 1/4" Heated w. ANSI	6	C										
MASS 2100 DI 6, DN 10	6	D										
MASS 2100 DI 6, DN 10 Heated w. EN	6	E										
MASS 2100 DI 6, DN 10 Heated w. ANSI	6	F										
MASS 2100 DI 6, DN 15 (½")	6	G										
MASS 2100 DI 6, DN 15 (½") Heated w. EN	6	H										
MASS 2100 DI 6, DN 15 (½") Heated w. ANSI	6	J										
MASS 2100 DI 6, DN 20 (¾")	6	K										
MASS 2100 DI 6, DN 20 (¾") Heated w. EN	6	L										
MASS 2100 DI 6, DN 20 (¾") Heated w. ANSI	6	M										
MASS 2100 DI 6, DN 25 (1")	6	N										
MASS 2100 DI 6, DN 25 (1") Heated w. EN	6	P										
MASS 2100 DI 6, DN 25 (1") Heated w. ANSI	6	Q										
MASS 2100 DI 15, DN 15 (½")	7	A										
MASS 2100 DI 15, DN 15 (½") Heated w. EN	7	B										
MASS 2100 DI 15, DN 15 (½") Heated w. ANSI	7	C										
MASS 2100 DI 15, DN 20 (¾")	7	D										
MASS 2100 DI 15, DN 20 (¾") Heated w. EN	7	E										
MASS 2100 DI 15, DN 20 (¾") Heated w. ANSI	7	F										
MASS 2100 DI 15, DN 25 (1")	7	G										
MASS 2100 DI 15, DN 25 (1") Heated w. EN	7	H										
MASS 2100 DI 15, DN 25 (1") Heated w. ANSI	7	J										
Process connection/Pressure												
No connections (spare part transmitter)			A	0								
EN 1092-1 B1, PN 40			A	1								
EN 1092-1 B1, PN 100			A	3								
ASME B16.5, RF, Class 150			D	1								
ASME B16.5, RF, Class 600			D	3								
DIN 11851 screwed connection			F	1								
ISO 2852 hygienic clamped			J	1								
ISO 2853 hygienic screwed			J	5								
ISO 228-1 pipe thread, PN 100			C	1								
ISO 228-1 pipe thread, PN 130			C	2								
ISO 228-1 pipe thread, PN 200			C	3								
ISO 228-1 pipe thread, PN 230			C	4								
ISO 228-1 pipe thread, PN 265			C	5								
ISO 228-1 pipe thread, PN 350			C	6								
ISO 228-1 pipe thread, PN 365			C	7								
ISO 228-1 pipe thread, PN 410			C	8								
NPT ASME B 1.20.1 pipe thread, PN 100			N	1								
NPT ASME B 1.20.1 pipe thread, PN 130			N	2								
NPT ASME B 1.20.1 pipe thread, PN 200			N	3								
NPT ASME B 1.20.1 pipe thread, PN 230			N	4								
NPT ASME B 1.20.1 pipe thread, PN 265			N	5								
NPT ASME B 1.20.1 pipe thread, PN 350			N	6								
NPT ASME B 1.20.1 pipe thread, PN 365			N	7								
NPT ASME B 1.20.1 pipe thread, PN 410			N	8								
Tube material (wetted) and max. operational temperature												
AISI 316L/EN 1.4435, max 115 °C					1							
AISI 316L/EN 1.4435, max 125 °C					2							
AISI 316L/EN 1.4435, max 180 °C					3							
Hastelloy C22/UNS N06022/EN 2.4602, max. 115 °C					5							
Hastelloy C22/UNS N06022/EN 2.4602, max. 125 °C					6							
Hastelloy C22/UNS N06022/EN 2.4602, max. 180 °C					7							
Calibration												
Mass flow calibration 2 flow × 2 points						1						
Mass flow calibration 2 flow × 2 points + density calibration						4						
Mounting style, transmitter housing and material												
Compact mounted, IP67, Aluminium transmitter housing (DI 3, DI 6 and DI 15 only)							D					
Remote mounted, IP67, Aluminium transmitter housing, analog cable connection with M20 connectors							Z			P	0	D
Ex approvals												
Non-Ex								A				
ATEX Zone 1 / 21								C				
IECEx Zone 1 / 21 (in preparation)								F				
USA (FM, CSA, UL), Zone 1/Div 1								H				
Canada (CSA, UL), Zone 1/Div 1								M				
EAC Zone 1 / 21								U				
Local User Interface												
Blind									1			

MASS 2100 / FC300 DN 4 with FCT010 transmitter

Selection and ordering data	Order code
Futher designs	
Please add "**-Z**" to Article No. and specify Order code(s).	
Cable glands	
None (mechanical sensor)	**A00**
Metric, no glands	**A01**
Metric, plastic	**A02**
Metric, brass/Ni plated	**A05**
Metric, stainless steel	**A06**
NPT, no glands	**A11**
NPT, plastic	**A12**
NPT, brass/Ni plated	**A15**
NPT, stainless steel	**A16**
Integral M12 socket	**A20**
SW functions & CT approvals	
Standard	**B11**
I/O configuration Ch1	
Modbus RTU RS 485	**E14**
I/O configuration Ch2, Ch3 and Ch4	
None	**F00**
Certificates	
Press test certificate CRN	**C01**
Press test certificate PED	**C02**
Material certificate EN 10204-3.1	**C12**
Welding inspection report	**C13**
Factory certificate according to EN 10204 2.2	**C14**
Factory certificate according to EN 10204 2.1	**C15**
Cleaning for oil and grease/ASTM-A380	**C50**
Cleaned according to PWIS	**C51**
Digital cable sensor-transmitter	
None	**L50**
5 m (16.4 ft), sensor cable, 4 wire, with 2 pcs M12 plugs mounted	**L51**
5 m (16.4 ft), sensor cable, 4 wire, without plugs for terminal connection	**L52**
5 m (16.4 ft), sensor cable, 4 wire, with 1 pcs M12 plugs mounted	**L53**
10 m (32.8 ft) standard with M12 connectors fitted	**L55**
10 m (32.8 ft), standard, without plugs	**L56**
10 m (32.8 ft), sensor cable, 4 wire, with 1 pcs M12 plugs mounted	**L57**
25 m (82 ft), standard with M12 connectors fitted	**L59**
25 m (82 ft), standard, without plugs	**L60**
25 m (82 ft), sensor cable, 4 wire, with 1 pcs M12 plugs mounted	**L61**
50 m (164 ft), standard with M12 connectors fitted	**L63**
50 m (164 ft), standard, without plugs	**L64**
50 m (164 ft), sensor cable, 4 wire, with 1 pcs M12 plugs mounted	**L65**
75 m (246 ft), standard with M12 connectors fitted	**L67**
75 m (246 ft), standard, without plugs	**L68**
75 m (246 ft), sensor cable, 4 wire, with 1 pcs M12 plugs mounted	**L69**

	Order code
Futher designs	
Please add "**-Z**" to Article No. and specify Order code(s).	
Analog cable sensor-transmitter	
1 m cable, analog, with 2 × M20 connectors	**L85**
2 m cable, analog, with 2 × M20 connectors	**L86**
5 m cable, analog, with 2 × M20 connectors	**L87**
10 m cable, analog, with 2 × M20 connectors	**L88**
15 m cable, analog, with 2 × M20 connectors	**L89**
Additional data	
Please add "**-Z**" to Article No. and specify Order code(s) and plain text.	
Tag name	
Tag name plate, stainless steel	**Y17**
Extended calibration	
Multi-point high, (5 flows × 2 passes), 10 ... 100 % of Q_{nom}	**Y61**
Multi-point high, (10 flows × 1 pass), 10 ... 100 % of Q_{nom}	**Y63**

Accessories for MASS 2100 and FC300 DN 4 with FCT010 transmitter

Description	Article No.	
SITRANS I300 – Isolating power supply – Ex barrier	**A5E39832532**	
Mounting bracket for flow sensor MASS 2100 DI 1.5	**A5E02590427**	
Mounting bracket for FC300 DN 4 in AISI 304	**A5E02590439**	

Overview

Sensors MASS 2100 and FC300 DN 4 (left) with FCT070 transmitter (right)

Full integration in the Siemens SIMATIC systems PCS7 or in TIA portal with FCT070 Faceplates with the ET 200SP ST & HF powerful IO system for compact control cabinets.

The SITRANS MASS 2100 and FC300 DN 4 system consists of a SITRANS sensor and a SITRANS FCT070 transmitter.

The flowmeter comes in a compact design for all MASS 2100 DI 3 to DI 15.

MASS 2100 DI and FC300 DN 4 the DSL is remote mounted with a analogue connection.

The complete flowmeter system consists of a sensor and a SIMATIC ET 200SP ST & HF Coriolis module FCT070 transmitter.

TM FCT070 offers real-time data processing and the display of all measuring and status data of the Coriolis flowmeter.

For hazardous area the MASS 2100 and the FSC300 sensor can be placed in Ex Zone 1 or Class 1 Div 1 locations . Together with the SITRANS I300 power/barrier module the FCT070 transmitter can be place in Zone 2 or Div 2 areas.

Benefits

- High accuracy better than 0.1 % of mass flow rate
- Large dynamic turn-down ratio better than 500:1
- Densitometer performance available through density accuracy (depending upon sensor size) ranging from 0.0005 to 0.0015 g/cm^3 with a typical repeatability better than 0.0001 to 0.0002 g/cm^3
- Single continuous tube design, with no internal welds, reductions or flow splitters offers optimal hygiene, safety and CIP cleanability for food and beverage and pharmaceutical applications
- Markets 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.)
- Full bore design provides lower pressure loss due to same internal diameter throughout the entire sensor
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Multi-plug electrical connector enables true “plug & play”
- Sensor pipe available in high-quality stainless steel AISI 316L/1.4435 or Hastelloy C22/2.4602 offering optimum corrosion resistance
- Centre-block design decouples process noise from the environment such as vibrations, pulsations, pressure shocks etc. making installation flexible and versatile
- Rugged and space-saving sensor design in stainless steel matching all environments
- High-pressure program as standard
- Full hazardous area solutions
- Easy integration into automation process control as TIA portal and PCS7
- Easy selection and integration of flow meters via TIA-Selector
- Cost effective integration of Coriolis flow meters for PLC controlled machines
- SITRANS FCT070 ET 200SP technology module and can combined with all other SIMATIC ET200 ST & HF modules
- The FCT070 has all high -end transmitter functionality integrated including the advanged fraction tables on bord
- Fast and trouble-free communication between the flow meter and the PLC through digital data communication with up to 10 ms update rate
- Integrated advanced Two-stage batch controller functionality without additional modules. I/Os are onboard

MASS 2100 / FC300 DN 4 with FCT070 transmitter

Technical specifications

Sensors MASS 2100 / FC300 DN 4 with FCT070 transmitter	
Sizes mm (inch)	MASS 2100 DI 1.5 (1/16) MASS 2100 DI 3 (1/8") MASS 2100 DI 6 (1/4") MASS 2100 DI 15 (1/2") FC300 DN 4 (1/6")
Accuracy	± 0.10 % for liquids additional ±0.40 for gases
Repeatability	± 0.05 %
Flow range Q norm (liquids)	
(water @ 1 bar pressure loss) (Q_{nom})	
• DI 1.5	19 kg/h (42 lb/h)
• DI 3	90 kg/h (198 lb/h)
• DI 6	500 kg/h (1 102 lb/h)
• DI 15	3 800 kg/h (8 370 lb/h)
• DN 4	140 kg/h (308 lb/h)
Architecture	Remote configuration
System integration	PCS7 and TIA portal with faceplates
Power supply	24 V DC; 19.2 ... 28.8 V
Material	
• Sensor	
- Wetted parts	316L stainless steel or Hastelly C 22
- Enclosure	316L stainless steel
• Transmitter	Aluminum with corrosion-resistant coating Class C4
Enclosure rating	Sensor: IP67 FCT070 transmitter: IP20
Pressure ratings	
• Measuring tubes	
- 316L	Up to 265 bar (3 844 psi), depending on size and process connection
- Nickel Alloy C4	Up to 410 bar (5 945 psi), depending on size and process connection
• Sensor enclosure	No pressure containment
Temperature ratings	
• Process medium	-50 ... +180 °C (-58 ... +356 °F)
• Ambient	-40 ... +60 °C (-4 ... +122 °F)[1]

Sensors MASS 2100 / FC300 DN 4 with FCT070 transmitter	
Process connections (depending on size and pressure rating)	
• Flanges	EN 1092-1 B1, ANSI/ASME B16.5
• Pipe threads	ASME B1.20 (NPT), ISO 228
• Hygienic threads	DIN 11851, ISO 2853/BS 4825 part 4 (SS3016)
• Hygienic clamps	ISO Clamp 2852
Approvals	
• Hazardous area	Sensor : ATEX, IECEx, EAC Ex, CSA, cCSAus, EAC FCT070 transmitter: Zone 2 & Class 1 Div 2 ATEX, IECEx, EAC Ex, CSA, cCSAus, FM; NEPSI, EAC
• Pressure equipment	PED
NAMUR	NAMUR-compliant (e.g. NE 21, NE 41, NE 107 and NE 132)
I/O	2 digital Input and 2 digital output Single and 2 stage batch function
Communication	Integrated PROFINET for SIMATIC integration and other PROFINET Controllers
Totalizer	3 totalizer
EMC performance	
• Emission	EN 55011/CISPR-11 (Class A)
• Immunity	EN/IEC 61326-1 (Industry)
Mechanical load	18 ... 1 000 Hz random The flow meter will mechanically tolerate 3.17 g RMS in all directions. Flow accuracy cannot be guaranteed under all conditions.

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

Selection and ordering data

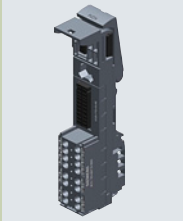
SITRANS FC sensors MASS 2100/FC300 DN 4 with DSL ready for FCT070 ↗	Article No. 7ME4817-	Ord. code
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Sensor type and connector size		
MASS 2100 DI 1.5, 1/4"	1 G	
MASS 2100 DI 3, 1/4"	3 A	
MASS 2100 DI 3, 1/4" Heated w. DIN	3 B	
MASS 2100 DI 3,1/4" Heated w. ANSI	3 C	
FC300 DN 4, 1/4"	4 A	
MASS 2100 DI 6, 1/4"	6 A	
MASS 2100 DI 6,1/4" Heated w. EN	6 B	
MASS 2100 DI 6, 1/4" Heated w. ANSI	6 C	
MASS 2100 DI 6, DN 10	6 D	
MASS 2100 DI 6, DN 10 Heated w. EN	6 E	
MASS 2100 DI 6, DN 10 Heated w. ANSI	6 F	
MASS 2100 DI 6, DN 15 (½")	6 G	
MASS 2100 DI 6, DN 15 (½") Heated w. EN	6 H	
MASS 2100 DI 6, DN 15 (½") Heated w. ANSI	6 J	
MASS 2100 DI 6, DN 20 (¾")	6 K	
MASS 2100 DI 6, DN 20 (¾") Heated w. EN	6 L	
MASS 2100 DI 6, DN 20 (¾") Heated w. ANSI	6 M	
MASS 2100 DI 6, DN 25 (1")	6 N	
MASS 2100 DI 6, DN 25 (1") Heated w. EN	6 P	
MASS 2100 DI 6, DN 25 (1") Heated w. ANSI	6 Q	
MASS 2100 DI 15, DN 15 (½")	7 A	
MASS 2100 DI 15, DN 15 (½") Heated w. EN	7 B	
MASS 2100 DI 15, DN 15 (½") Heated w. ANSI	7 C	
MASS 2100 DI 15, DN 20 (¾")	7 D	
MASS 2100 DI 15, DN 20 (¾") Heated w. EN	7 E	
MASS 2100 DI 15, DN 20 (¾") Heated w. ANSI	7 F	
MASS 2100 DI 15, DN 25 (1")	7 G	
MASS 2100 DI 15, DN 25 (1") Heated w. EN	7 H	
MASS 2100 DI 15, DN 25 (1") Heated w. ANSI	7 J	
Process connection/Pressure		
No connections (spare part transmitter)	A 0	
EN 1092-1 B1, PN 40	A 1	
EN 1092-1 B1, PN 100	A 3	
ASME B16.5, RF, Class 150	D 1	
ASME B16.5, RF, Class 600	D 3	
DIN 11851 crewed connection	F 1	
ISO 2852 hygienic clamped	J 1	
ISO 2853 hygienic screwed	J 5	
ISO 228-1 pipe thread, PN 100	C 1	
ISO 228-1 ipe thread, PN 130	C 2	
ISO 228-1 pipe thread, PN 200	C 3	
ISO 228-1 ipe thread, PN 230	C 4	
ISO 228-1 ipe thread, PN 265	C 5	
ISO 228-1 pipe thread, PN 350	C 6	
ISO 228-1 pipe thread, PN 365	C 7	
ISO 228-1 pipe thread, PN 410	C 8	
NPT ASME B 1.20.1 pipe thread, PN 100	N 1	
NPT ASME B 1.20.1 pipe thread, PN 130	N 2	
NPT ASME B 1.20.1 pipe thread, PN 200	N 3	
NPT ASME B 1.20.1 pipe thread, PN 230	N 4	
NPT ASME B 1.20.1 pipe thread, PN 265	N 5	
NPT ASME B 1.20.1 pipe thread, PN 350	N 6	
NPT ASME B 1.20.1 pipe thread, PN 365	N 7	
NPT ASME B 1.20.1 pipe thread, PN 410	N 8	
Tube material (wetted) and max. operational temperature		
AISI 316L/EN 1.4435, max. 115 °C	1	
AISI 316L/EN 1.4435, max. 125 °C	2	
AISI 316L/EN 1.4435, max. 180 °C	3	
Hastelloy C22/UNS N06022/EN 2.4602, max. 115 °C	5	
Hastelloy C22/UNS N06022/EN 2.4602, max. 125 °C	6	
Hastelloy C22/UNS N06022/EN 2.4602, max. 180 °C	7	
Calibration		
Mass flow calibration 2 flow × 2 points	1	
Mass flow calibration 2 flow × 2 points + density calibration	4	
Mounting style, transmitter housing and material		
Compact mounted, IP67, Aluminium transmitter housing (DI 3, DI 6 and DI 15)	D	
Remote field mount, IP67, Aluminium transmitter housing, analog cable connection with M20 connectors	Z	P 0 D
Ex approvals		
Non-Ex	A	
ATEX Zone 1 / 21	C	
IECEx Zone 1 / 21 (in preparation)	F	
USA (FM, CSA, UL), Zone 1/Div 1	H	
Canada (CSA, UL), Zone 1/Div 1	M	
EAC Zone 1 / 21	U	
Local User Interface		
Blind	1	

MASS 2100 / FC300 DN 4 with FCT070 transmitter

Selection and ordering data

	Order code
Further designs Please add "**-Z**" to Article No. and specify Order code(s).	
Cable glands	
None (mechanical sensor)	**A00**
Metric, no glands	**A01**
Metric, plastic	**A02**
Metric, brass/Ni plated	**A05**
Metric, stainless steel	**A06**
NPT, no glands	**A11**
NPT, plastic	**A12**
NPT, brass/Ni plated	**A15**
NPT, stainless steel	**A16**
Integral M12 socket	**A20**
SW functions & CT approvals	
Standard	**B10**
I/O configuration Ch1	
None (replacement sensor)	**E00**
I/O configuration Ch2, Ch3 and Ch4	
None	**F00**
Certificates	
Press test certificate CRN	**C01**
Press test certificate PED	**C02**
Material certificate EN 10204-3.1	**C12**
Welding inspection report	**C13**
Factory certificate according to EN 10204 2.2	**C14**
Factory certificate according to EN 10204 2.1	**C15**
Cleaning for oil and grease/ASTM-A380	**C50**
Digital cable sensor-transmitter	
None	**L50**
5 m (16.4 ft), sensor cable, 4 wire, without plugs for terminal connection	**L52**
5 m (16.4 ft), sensor cable, 4 wire, with 1 pcs M12 plugs mounted	**L53**
10 m (32.8 ft), sensor cable, 4 wire, without plugs for terminal connection	**L56**
10 m (32.8 ft), sensor cable, 4 wire, with 1 pcs M12 plugs mounted	**L57**
25 m (82 ft), sensor cable, 4 wire, without plugs for terminal connection	**L60**
25 m (82 ft), sensor cable, 4 wire, with 1 pcs M12 plugs mounted	**L61**
50 m (164 ft), sensor cable, 4 wire, without plugs for terminal connection	**L64**
50 m (164 ft), sensor cable, 4 wire, with 1 pcs M12 plugs mounted	**L65**
75 m (246 ft), sensor cable, 4 wire, without plugs for terminal connection	**L68**
75 m (246 ft), sensor cable, 4 wire, with 1 pcs M12 plugs mounted	**L69**

	Order code
Further designs Please add "**-Z**" to Article No. and specify Order code(s).	
Analog cable sensor-transmitter	
1 m cable, analog, with 2 × M20 connectors	**L85**
2 m cable, analog with 2 × M20 connectors	**L86**
5 m cable, analog with 2 × M20 connectors	**L87**
10 m cable, analog with 2 × M20 connectors	**L88**
15 m cable, analog with 2 × M20 connectors	**L89**
Additional data Please add "**-Z**" to Article No. and specify Order code(s) and plain text.	
Tag name	
Tag name plate, stainless steel	**Y17**
Extended calibration	
Multi-point high, (5 flows × 2 passes), 10 ... 100 % of Q_{nom}	**Y61**
Multi-point high, (10 flows × 1 pass), 10 ... 100 % of Q_{nom}	**Y63**

Description	Article No.	
SITRANS FCT070 **Transmitter for ET 200SP**	**7ME4138-6AA00-0BB1**	
BU20-P12+A0+4B, PU1 **Baseunit plate for ET 200SP**	**6ES7193-6BP20-0BB0** **6ES7193-6BP20-0BB1**	
SITRANS I300 **Isolating power supply – Ex barrier**	**A5E39832532**	

Accessories for MASS 2100 and FC300 DN 4 with FCT070 transmitter

Description	Article No.	
Mounting bracket for flow sensor MASS 2100 DI 1.5	**A5E02590427**	
Mounting bracket for FC300 DN 4 in AISI 304	**A5E02590439**	

Selection and ordering data

Accessories and spare parts for flowmeters

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

Description	Article No.	
Standard cable (non-Ex) f with M12 connector on one side, PO insulation and PUR sleeve, gray, -40 ... +80 °C (-40 ... +176 °F)		
• 5 m (16.4 ft)		
• 10 m (32.8 ft)		
• 25 m (82 ft)		
• 50 m (164 ft)		
• 75 m (246 ft)		
• 150 m (492 ft)		
Standard cable (Ex) with 2 x M12 connectors, PO insulation and PUR sleeve, blue, -40 ... +80 °C (-40 ... +176 °F)		
• 5 m (16.4 ft)	**A5E03914929**	
• 10 m (32.8 ft)	**A5E03914962**	
• 25 m (82 ft)	**A5E03914995**	
• 50 m (164 ft)	**A5E03915004**	
• 75 m (246 ft)	**A5E03915074**	
• 150 m (492 ft)	**A5E03915088**	
Standard cable (Ex) for termination, PO insulation and PUR sleeve, blue, -40 ... +80 °C (-40 ... +176 °F)		
• 5 m (16.4 ft)	**A5E03914945**	
• 10 m (32.8 ft)	**A5E03914973**	
• 25 m (82 ft)	**A5E03914984**	
• 50 m (164 ft)	**A5E03915015**	
• 75 m (246 ft)	**A5E03915057**	
• 150 m (492 ft)	**A5E03915100**	
Standard cable (Ex) with M12 connector on one side, PO insulation and PUR sleeve, blue, -40 ... +80 °C (-40 ... +176 °F)		
• 5 m (16.4 ft)		
• 10 m (32.8 ft)		
• 25 m (82 ft)		
• 50 m (164 ft)		
• 75 m (246 ft)		
• 150 m (492 ft)		
Analog signal cable For analog cable connection between MASS 2100/ FC300 sensor and FCT010/FCT030/FCT070 transmitters. 5 × 2 × Ø 0.34 mm screened and twisted in pairs. Blue PVC insulation and sleeve. With two M20 connectors, female/female. -20 ... 105 °C (-4 ... +221 °F), Ex		
• 1 m (3.28 ft)	**A5E42815465**	
• 2 m (6.56 ft)	**A5E42521862**	
• 5 m (16.4 ft)	**A5E42522447**	
• 10 m (32.8 ft)	**A5E42523233**	
• 15 m (49.21 ft)	**A5E42523347**	

[1] 2 pcs M20; 1 pce M25 with single and dual cable inserts.

[2] 2 pcs ½" NPT; 1 pce ½" NPT with single and dual cable inserts.

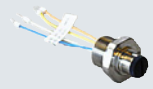
3

Selection and ordering data (continued)

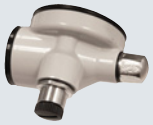
Heating jacket for FCS400

Description	Article No.	
Heating jacket, indoor use, 0 ... 200 °C (32 ...392 °F) max. temperature. Complete with 5 m (16.4 ft) high temperature cable fitted. Dedicated plug connection to included controller		
• 230 V AC		
- DN 15 electric	**A5E33035287**	
- DN 25 electric	**A5E33035324**	
- DN 50 electric	**A5E33035325**	
• 115 V AC		
- DN 15 electric	**A5E32877520**	
- DN 25 electric	**A5E32877556**	
- DN 50 electric	**A5E32877557**	
Heating jacket controller, IP65. Digital display for 0 ... 200 °C (32 ...392 °F) control setpoint		
• 230 V AC	**A5E03839193**	
• 115 V AC	**A5E03839194**	

Spare parts - sensor FCS400/FCS300 and MASS 2100/FC300

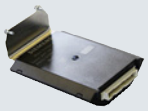
Description	Article No.	
Blind lid in painted aluminum with silicone o-ring seal	**A5E03549295**	
Sensor housing		
• Metric	**A5E03549313**	
• NPT	**A5E03906080**	
Bag of loose parts for sensor; including cable strain relief components, washer, seals, silicone o-rings, and assorted screws	**A5E03549324**	
M12 option for sensor housing in stainless steel. Pre-wired and potted to replace M12 socket in DSL housing	**A5E03906095**	

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

Description	Article No.	
Display lid in painted aluminum with Ex glass plate and silicone o-ring seal Ex and Non-Ex	**A5E03549344**	
Blind lid in painted aluminum with silicone o-ring seal	**A5E03549429**	
Bag of loose spare parts; including cable strain relief components, mounting tool, seals and gasket, assorted screws and washers, hex cap nut, blind connectors, and silicone o-rings	**A5E03549396**	
Mounting bracket - FCT030 field mount; in painted aluminum for pipe or wall mounting of transmitter FCT030 remote version. Including lock ring, pressure pads and seal cap	**A5E03906091**	
M12 option - remote - in painted aluminum. Pre-wired and potted replacement M12 connection for FCT030 field mount transmitter remote version	**A5E03906104**	
Remote terminal house painted aluminum for sensor cable termination at FCT030 transmitter remote version. Pre-wired and potted		
• M20	**A5E03906112**	
• NPT	**A5E03906130**	

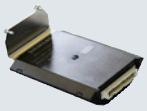
Selection and ordering data (continued)

Spare parts - Transmitter FCT030 (FW 3.1)

Description	Article No.	
Display and keypad assembly for field mount enclosure, with Siemens logo. For HW 2 and FW 3.1 version	**A5E03548971**	
Sensor cassette (compact) (HW version 2, FW 3.1.x)	**A5E03549142**	
Sensor cassette (remote) (HW version 2, FW 3.1.x)	**A5E03549098**	
Frontend cassette Spare part frontend cassette for remote version of FC430 and cassette for FC410 For firmware V 3.x	**A5E03549191**	
Power supply for field mount enclosure 100 ... 240 V AC, 47 ... 63 Hz, 24 ... 90 V DC (HW version 2 and FW 3.1.x)	**A5E03549413**	
Transmitter cassette (active) 4 ... 20 mA output and HART 7.2 (HW version 2 and FW 3.1.x)	**A5E03549357**	
Transmitter cassette (passive) 4 ... 20 mA output and HART 7.2 (HW version 2 and FW 3.1.x)	**A5E03549383**	
I/O assembly Advise Order code F40 to F97, Selection and Ordering data[1)]	**A5E03939114**	
SensorFlash (micro SD card 1G)	**A5E03915258**	

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

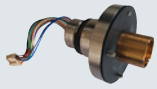
Spare parts FCT030 - Fieldmount enclosure (FW 4.0)

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

3

Selection and ordering data (continued)

Description	Article No.	
I/O Cassette for firmware 4.0		
• Ch2: Current/Frequ./Pulse, Ch3: None, Ch4: None, F01, Non-Ex	**A5E38006256**	
• Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: None, F02, Non-Ex	**A5E38006558**	
• Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: Current/Frequ./Pulse, F03, Non-Ex	**A5E38006598**	
• Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: Relay, F04, Non-Ex	**A5E38006896**	
• Ch2: Current/Frequ./Pulse, Ch3: Relay, Ch4: Relay, F05, Non-Ex	**A5E38006900**	
• Ch2: Current/Frequ./Pulse, Ch3: Relay, Ch4: None, F06, Non-Ex	**A5E38011432**	
• Ch2: Current/Frequ./Pulse, Ch3: None, Ch4: None, F11, Ex-passive	**A5E38011478**	
• Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: None, F12, Ex-passive	**A5E38011509**	
• Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: Current/Frequ./Pulse, F13, Ex-passive	**A5E38011541**	
• Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: Relay, F14, Ex-passive	**A5E38011600**	
• Ch2: Current/Frequ./Pulse, Ch3: Relay, Ch4: Relay, F15, Ex-active	**A5E38011618**	
• Ch2: Current/Frequ./Pulse, Ch3: Relay, Ch4: None, F16, Ex-active	**A5E38011908**	
• Ch2: Current/Frequ./Pulse, Ch3: None, Ch4: None, F21, Ex-active	**A5E38012039**	
• Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: None, F22, Ex-active	**A5E38012056**	
• Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: Current/Frequ./Pulse, F23, Ex-active	**A5E38012121**	
• Ch2: Current/Frequ./Pulse, Ch3: Relay, Ch4: Relay, F24, Ex-active	**A5E38019235**	
• Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: Relay, F25, Ex-passive	**A5E38019263**	
• Ch2: Current/Frequ./Pulse, Ch3: Relay, Ch4: None, F26, Ex-passive	**A5E38019378**	

Description	Article No.	
Adapter cable for FCS400 sensor with new transmitter DSL/FCT010/FCT030 Version 4.0	**A5E50371933**	
Remote adapter for wall bracket M20 cable connection		
• Ex	**A5E42404417**	
• Non-Ex	**A5E42846478**	
Wall bracket for FCT030 for M20 analog cable connector	**A5E42404426**	
Wall bracket for FCT010 for M20 analog cable connector	**A5E42404447**	
Compact adapter for DSL/FCT030 For upgrade from MASS 2100 DI 3, DI 6, DI 15 with MASS 6000 compact to DSL/FCT030		
• Ex	**A5E42846758**	
• Non-Ex	**A5E42846760**	
Compact adapter for DSL/FCT030 FCS300 and FCS400 (DN 100 and DN 150 sensor) adapter for compact mount DSL, FCT010 or FCT030 Ex and Non-Ex	**TBD**	

Selection and ordering data (continued)

Spare parts - FCT030 wall mount enclosure

Description	Article No.	
Display and keypad -assembly • For wall mount enclosure, Siemens logo	**A5E37697615**	
• For wall mount enclosure, neutral version	**A5E39844261**	
Power supply for wall mount 100 ... 240 V AC, 47 ... 63 Hz 19.2 ... 28.8 V DC	**A5E38263021**	
Sensor cassette for FCT030 wall mounting enclosure	**TBD**	
Foam insert set for wall mount with connectors	**A5E38287828**	
Wall mount enclosure front Versions: • blind, Siemens version • blind, neutral version - no company logo • with glass	**A5E**	

Description	Article No.	
Wall mount enclosure bracket for pipe mounting	**A5E38288020**	
Wall bracket panel mounting	**A5E38288032**	
Bag of loose spare parts for wall mount including cable strain relief components, mounting tool, seals and gasket, assorted screws and washers, hex cap nut, blind connectors and O-rings	**A5E38288072**	
Metall kit PSU cover back pane for wall mount enclosure	**A5E38415145**	
Power input cover plate for wall mount enclosure	**A5E38415205**	

3

MASS 6000 Generation - Spare parts

Overview

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

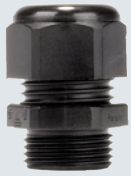
This product is not longer available. Repair and spare parts for MASS 6000 (all models and variants) can still be ordered. See spare part list.

Selection and ordering data

Accessories and spare parts for MASS 6000 generation

Description	Article No.	
Cable with multiple plug Standard blue cable between MASS 6000 and MASS 2100, 5 × 2 × 0.34 mm^2 twisted and screened in pairs. Temperature range -20 ... +110 °C (-4 ... +230 °F)		
• 5 m (16.4 ft)	**FDK:083H3015**	
• 10 m (32.8 ft)	**FDK:083H3016**	
• 25 m (82 ft)	**FDK:083H3017**	
• 50 m (164 ft)	**FDK:083H3018**	
• 75 m (246 ft)	**FDK:085U0229**	
• 150 m (492 ft)	**FDK:083H3055**	

Description	Article No.	
Adapter for MASS 2100 M23 electrical adapter for MASS 2100 DI 3, DI 6, DI 15, DI 25 and DI 40	**FDK:083L8889**	
M20 connector for cable mounting	**FDK:083H5056**	
2 kB SENSORPROM unit, including programming (Sensor Serial No. and Article No. must be specified by ordering)	**FDK:083H4410**	

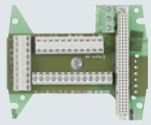
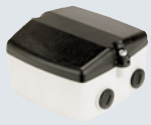
Description	Article No.	
Cable glands, screwed entries type in polyamide **100 °C (212 °F), black, 2 pcs.**		
• M20	**A5E00822490**	
• ½" NPT	**A5E00822501**	
Sun lid for MASS 6000 transmitter (frame and lid)	**A5E02328485**	

Add-on module

Description	Article No.	
HART[1]	**FDK:085U0226**	
PROFIBUS PA Profile 3[1]	**FDK:085U0236**	
PROFIBUS DP Profile 3	**FDK:085U0237**	
MODBUS RTU RS 485	**FDK:085U0234**	
FOUNDATION Fieldbus H1[1]	**A5E02054250**	
DeviceNet	**FDK:085U0229**	

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

Spare parts for compact or remote IP67 version

Description	Article No.	
MASS 6000 transmitter IP67/NEMA 6 Note: No CE decleration Fibre glass reinforced polyamide and without connection board 1 current output 1 frq./pulse output 1 relay output • 115/230 V AC, 50/60 Hz • 24 V AC/DC	**7ME4110-1AA10-1AA0** **7ME4110-1AA20-1AA0**	
Wall mounting unit for IP67/NEMA 6 version with wall bracket, without connection board but with • 4 × M20 cable glands • 4 × ½" NPT cable glands	**FDK:085U1018** **A5E01164211**	
Connection board/PCB Supply voltage: 115/230 V/24 V AC/DC	**FDK:083H4260**	
Terminal box kit • M20 cable glands • ½" NPT cable glands Change from remote to safe area compact mounting of MASS 6000 IP67/NEMA 6 with MASS 2100. The kit consists of a terminal box in polyamide incl. connection board, cable and connector between PCB and sensor pedestal, PCB, seal and screws (4 pcs.) for mounting on sensor. Not approved for hazardous locations	**A5E00832338** **A5E00832342**	
Terminal box, in polyamide, inclusive lid • M20 cable glands • ½" NPT cable glands Not approved for hazardous locations	**FDK:085U1050** **FDK:085U1052**	
Terminal box - lid in polyamide	**FDK:085U1003**	
Display and keypad • Siemens Front	**FDK:085U1039**	

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

Description	Article No.
MASS 6000 IP67	
Spare part PCB main	
• 230 V	**A5E41718138**
• 24 V	**A5E41718346**
MASS 6000 19"/IP20	
Spare part PCB main	
• 1 current, 230 V	**A5E43226138**
• 3 current, 230 V	**A5E43226145**
• 1 current, 24 V	**A5E43226154**
• 3 current, 24 V	**A5E43226168**
MASS 6000 19"/IP20 Ex	
Spare part PCB main	
• 1 current, 230 V	**A5E43226277**
• 3 current, 230 V	**A5E43226342**
• 1 current, 24 V	**A5E43226441**
• 3 current, 24 V	**A5E43226455**
MASS 6000 Ex d, spare part PCB Stainless steel, without module	**FDK:083H3061**
MASS 6000 Ex d, spare part barriere Stainless steel	**A5E41718720**
MASS 6000 19"/IP20, barriere PCB, Ex	**A5E41718669**
MASS 6000 Ex d, connection board Stainless steel	**A5E41718522**

3

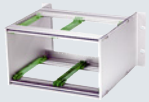
Selection and ordering data (continued)

Accessories

Enclosure (without PCB, connection board)

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

Enclosure

Description	Article No.	
Panel mounting enclosure for 19" insert (21 TE); IP65/NEMA 2 enclosure in ABS plastic for front panel mounting	**FDK:083F5030**	
Panel mounting enclosure for 19" insert (42 TE); IP65/NEMA 2 enclosure in ABS plastic for front panel mounting	**FDK:083F5031**	
Back of panel mounting enclosure for 19" insert (21 TE); IP20/NEMA 1 enclosure in aluminum	**FDK:083F5032**	
Back of panel mounting enclosure for 19" insert (42 TE); IP20/NEMA 1 enclosure in aluminum	**FDK:083F5033**	
Front cover (7 TE) for panel mounting enclosure	**FDK:083F4525**	

Connection boards/PCB for MASS 6000 and MASS 2100 sensors

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

Connection boards/PCB for MASS 6000 and MC2 sensors

Description	Article No.	
Connection board MASS 6000 for 19" IP20 rack mounting version • 24 V, 115/230 V	**FDK:083H4272**	
Connection board MASS 6000 for Ex application[1] and 19" IP20 rack mounting version (connection board MASS 6000 to MC2 sensors Ex-approved) • 24 V, 115/230 V	**FDK:083H4294**	
Connection board MASS 6000 for 19" wall mounting version, for enclosure FDK:083F5037/FDK:083F5038 • 24 V, 115/230 V	**FDK:083H4274**	
Connection board MASS 6000 for Ex application1) and 19" wall mounting version (connection board MASS 6000 to MC2 sensors Ex-approved), for enclosure FDK:083F5037/FDK:083F5038 • 24 V, 115/230 V	**FDK:083H4295**	

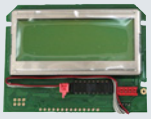
[1] Attention (Ex application): MC2 Ex version sensors must only be connected to connection board FDK:083H4294 or FDK:083H4295.

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

Selection and ordering data (continued)

Spare parts 19" versions

Enclosure (without PCB, connection board)

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

Accessories

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

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

Operating instructions for SITRANS F add-on modules

Description	Article No.
HART	
• English	**A5E03089708**
Profibus PA/DP	
• English	**A5E00726137**
• German	**A5E01026429**
MODBUS	
• English	**A5E00753974**
• German	**A5E03089262**
FOUNDATION Fieldbus	
• English	**A5E02318728**
• German	**A5E02488856**
DeviceNet	
• English	**A5E03089720**

This device is shipped with Safety Notes and a DVD containing further SITRANS F C literature.

All literature is available to download for free, in a range of languages, at

www.siemens.com/processinstrumentation/documentation

3

SIFLOW FC070

Overview

SIFLOW FC070 is based on the SIMATIC S7-300 and the MASS 6000 technology.

The SIFLOW FC070 transmitter can be analogue connected with the Sitrans FC MASS 2100 DI 1.5, DI 3, DI 6, DI 15 and the FC300 DN4.

SIFLOW FC070 is available in two versions:

- SIFLOW FC070 Standard
- SIFLOW FC070 Ex & CT

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

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

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

Benefits

- Easy integration in SIMATIC S7 and PCS 7
- Support of SIMATIC PDM configuration tool via Modbus
- Dedicated mass flow chip with high-performance ASIC technology
- True 30 Hz update rate securing fast batching and step response
- Superior noise immunity due to a DFT (Discrete Fourier Transformation) algorithm
- Front end resolution better than 0.35 ns improves zero point stability and enhances dynamic turn-down ratio on flow and density accuracy
- 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
- 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 3rd-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: FCS200, FC300 and MASS 2100 are remotely mounted.

Function

The following key functionalities are available:

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

Technical specifications

Measurement of	Mass flow, volume flow, density, sensor temperature, fraction A flow, fraction B flow, fraction A in %
Measurement functions	
• Totalizer 1	Totalization of mass flow, volume flow, fraction A, fraction B
• Totalizer 2	Totalization of mass flow, volume flow, fraction A, fraction B
• Single and 2-stage batch function	Batching function with the use of one or two outputs for dosing in high and low speed
• 4 programmable limits	4 programmable high/low limits for mass flow, volume flow, density, sensor temperature, fraction A flow, fraction B flow, fraction A in %. Limits will generate an alarm if reached
Digital input	
Functions	Start batch, stop batch, start/stop batch, hold/continue batch, reset totalizer 1, reset totalizer 2, reset totalizer 1 and 2, zero adjust, force frequency output, freeze frequency output
High signal	• Nominal voltage: 24 V DC • Lower limit: 15 V DC • Upper limit: 30 V DC • Current: 2 … 15 mA
Low signal	• Nominal voltage: 0 V DC • Lower limit: -3 V DC • Upper limit: 5 V DC • Current: -15 … +15 mA
Input	Approx. 10 kΩ
Switching	Max. 100 Hz
Digital output 1 and 2	
Functions	• Output 1: Pulse, frequency, redundancy pulse, redundancy frequency 2-stage batch, batch • Output 2: Redundancy pulse, redundancy frequency, 2-stage batch
Voltage supply	3 … 30 V DC (passive output)
Switching current	Max. 30 mA at 30 V DC
Voltage drop	≤ 3 V DC at max. current
Leakage current	≤ 0.4 mA at max. voltage 30 V DC
Load resistance	1 … 10 kΩ
Switching frequency	0 … 12 kHz 50 % duty cycle
Functions	Pulse, frequency, redundancy pulse, redundancy frequency 2-stage batch, batch
Communication	
Modbus RS 232C	• Max. baud rate: 115 200 baud • Max. line length: 15 m at 115 200 baud • Signal level: according to EIA-RS 232C
Modbus RS 485	• Max. baud rate: 115 200 baud • Max. line length: 1 200 m at 115 200 baud • Signal level: according to EIA-RS 485 • Bus termination: Integrated. Can be enabled by inserting wire jumpers.

Galvanic isolation	All inputs, outputs and communication interfaces are galvanically isolated. Isolation voltage: 500 V
Power	
Supply	24 V DC nominal
Tolerance	20.4 V DC … 28.8 V DC
Consumption	Max. 7.2 W
Fuse	T1 A/125 V, not replaceable by operator
Environment	
Ambient temperature	Storage: -40 °C … +70 °C (-40 °F … +158 °F)
Operation conditions	Horizontally mounted rail: • SIFLOW FC070 Standard: 0 … +60 °C (32 … +140 °F) • SIFLOW FC070 Ex CT: -40 … +60 °C (-40 … +140 °F) Vertically mounted rail: • SIFLOW FC070 Standard: 0 … 45 °C (32 … 113 °F) • SIFLOW FC070 Ex CT: -40 … +45 °C (-40 … +113 °F)
Altitude	Operation: -1 000 … 2 000 m (pressure 795 … 1 080 hPa)
Enclosure	
Material	Noryl, color: anthracite
Rating	IP20/NEMA 2 according to IEC 60529
Mechanical load	According to SIMATIC standards (S7-300 devices)
Ex approvals	
• SIFLOW FC070 Standard	ATEX: II 3G Ex nA II T4
• SIFLOW FC070 Ex CT	ATEX, IECEx, EAC Ex, FM, CSA, INMETRO - Zone 2: Ex nA [ia] IIC T4 FM - Class I, Div. 2: Grp. A, B, C, D (interface to Class I+II+III, Div. 1)
Custody transfer approvals	
SIFLOW FC070 Ex CT	Compressed gaseous fuel measuring systems for vehicles NTEP for USA and Canada, approval no: 97-111A3
EMC performance	
Emission	EN 55011/CISPR-11
Immunity	EN/IEC 61326-1
Certification	
CE mark	Low voltage directive RoHS
NAMUR	Within the limits according to "General recommendations" with error criteria A in accordance with NE 21
Programming tools	
SIMATIC S7	Configuration through backplane P-BUS, PLC program and WinCC flexible
SIMATIC PCS7	Configuration trough backplane P-BUS and PLC/WinCC faceplates, certified driver
SIMATIC PDM	Through Modbus port RS 232C and RS 485, certified driver

3

Selection and ordering data

Description	Article No.
SIFLOW FC070 flow transmitter Remember to order 40 pin front plug connector.	**7ME4120-2DH20-0EA0**
40 pin front plug with screw contacts	**6ES7392-1AM00-0AA0**
40 pin plug with spring contacts	**6ES7392-1BM01-0AA0**
SIFLOW FC070 Ex flow transmitter Remember to order 20 pin front plug connector.	**7ME4120-2DH21-0EA0**
20 pin front plug with screw contacts	**6ES7392-1AJ00-0AA0**
20 pin plug with spring contacts	**6ES7392-1BJ00-0AA0**

Operating instructions for SITRANS F C SIFLOW FC070

Description	Article No.
SIFLOW FC070 system manual	
• English	**A5E00924779**
• German	**A5E00924776**
SIFLOW FC070 with S7	
• English	**A5E02254228**
• German	**A5E02665536**
SIFLOW FC070 with PCS 7	
• English	**A5E03694109**

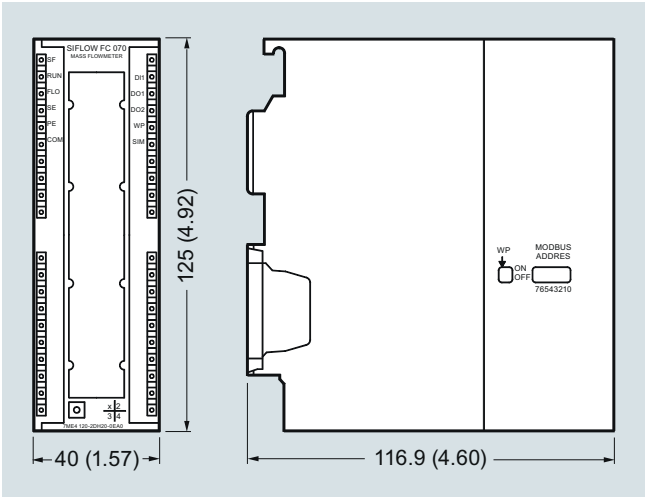
All literature is available to download for free, in a range of languages, at

www.siemens.com/processinstrumentation/documentation

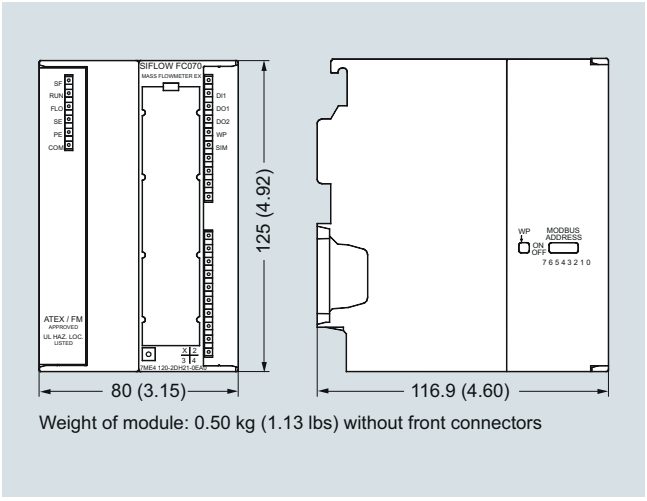
Accessories

Description	Article No.	
Cable with multiplug for connecting MASS 2100, FCS200 and FC300 sensors, 5 × 2 × 0.34 mm^2 twisted and screened in pairs. Temperature range -20 °C ... +110 °C (-4 °F ... +230 °F)		
• 5 m (16.4 ft)	**FDK:083H3015**	
• 10 m (32.8 ft)	**FDK:083H3016**	
• 25 m (82 ft)	**FDK:083H3017**	
• 50 m (164 ft)	**FDK:083H3018**	
• 75 m (246 ft)	**FDK:083H3054**	
• 150 m (492 ft)	**FDK:083H3055**	
Cable without multiplug for connecting MC2 sensors, 5 × 2 × 0.34 mm^2 twisted and screened in pairs. Temperature range - 20 °C ... +110 °C (-4 °F ... +230 °F)		
• 10 m (32.8 ft)	**FDK:083H3001**	
• 25 m (82 ft)	**FDK:083H3002**	
• 75 m (246 ft)	**FDK:083H3003**	
• 150 m (492 ft)	**FDK:083H3004**	
SIMATIC S7-300 rail The mechanical mounting rack of the SIMATIC S7-300		
• 160 mm (6.3")	**6ES7390-1AB60-0AA0**	
• 482 mm (18.9")	**6ES7390-1AE80-0AA0**	
• 530 mm (20.8")	**6ES7390-1AF30-0AA0**	
• 830 mm (32.7")	**6ES7390-1AJ30-0AA0**	
• 2 000 mm (78.7")	**6ES7390-1BC00-0AA0**	
SIMATIC S7-300, stabilized power supply PS307 • Input: 120/230 V AC • Output: 24 V DC/2 A	**6ES7307-1BA01-0AA0**	

Dimensional drawings

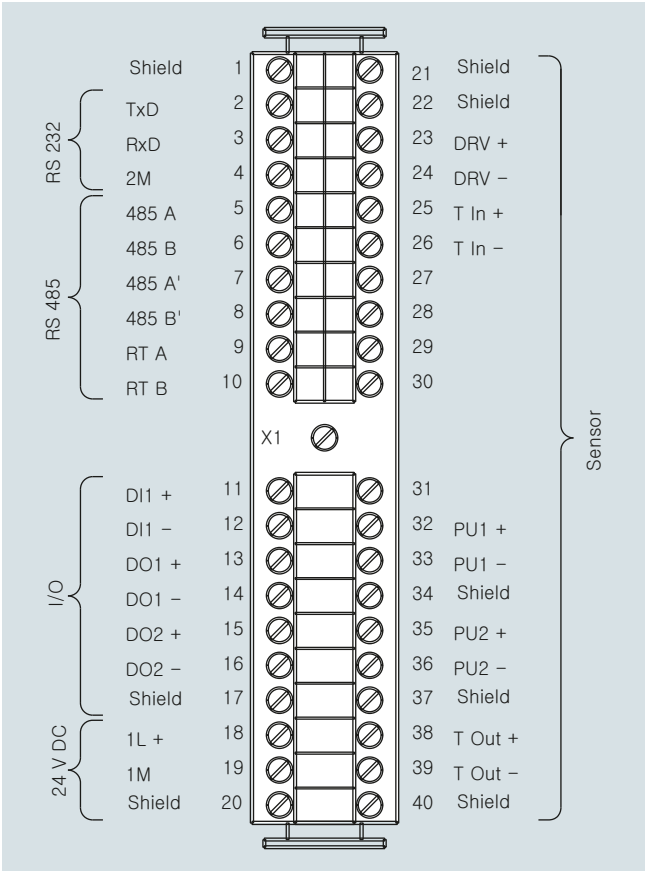


SIFLOW FC070, dimensions in mm (inch)

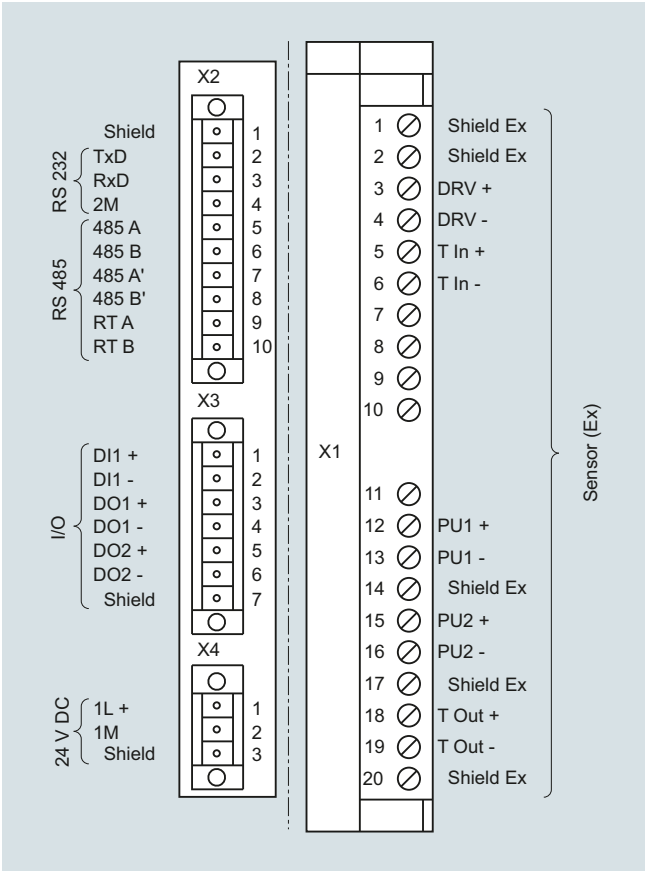


SIFLOW FC070 Ex CT, dimensions in mm (inch)

Circuit diagrams



SIFLOW FC070, electrical connection



SIFLOW FC070 Ex CT, electrical connection

Introduction

Overview

Siemens offers two types of ultrasonic flowmeters, inline flowmeters and clamp-on flowmeters. This offers the end user the maximum flexibility to choose the technology that best fits his needs. This following chapter shows the inline versions.

SITRANS FS inline ultrasonic flowmeters measure flow of electrically conductive and non-conductive liquids.

Benefits

- Greater flexibility:
  - Sensor sizes from DN 50 to 1200 mm (2" to 48")
  - Inline retrofit as 1-path and 2-path up to DN 1200 mm (2" to 48")
  - Compact and remote transmitter installation
  - HART and PROFIBUS PA communication
  - Mains or battery powered solutions
  - Dedicated transmitter portfolio for HVAC, power generation, utility and general industry as well as more demanding applications
- Easier service:
  - Exchange of the transducers without interrupting operation
  - Battery lifetime of up to 6 years
- Approvals/certificates:
  - Custody transfer approvals within district heating
  - ATEX
  - Standard with calibration certificate

Application

Inline ultrasonic flowmeters are suitable for measuring the flow of liquids with good acoustic permeability, independent of conductivity, viscosity, temperature, density and pressure.

- max. 3 % solids
- max. 3 % air and gas
- max. 350 cSt

The main applications can be found in the following sectors:

- Raw water intake for water treatment plants
- Treated waste water
- Power generation and utility
- Irrigation systems
- Cooling water plants within the industry and in power stations
- Plants transporting non-conductive liquids
- Custody transfer - district heating (MID-004)
- HART/4 to 20 mA output
- PROFIBUS PA
- ATEX