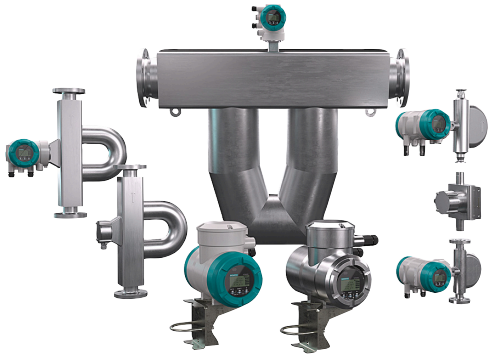
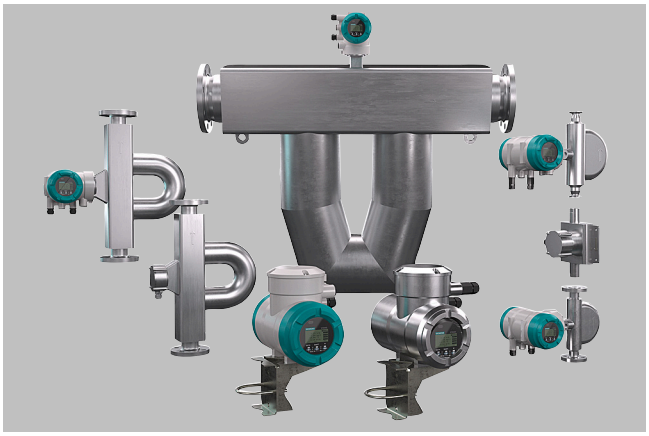


Overview



SITRANS FC is the range of Siemens Coriolis mass flowmeters that provides high performance process measurements. The extensive portfolio provides multi-parameter measurement solutions for all fluid types, including liquids, gases and multi-phase fluids.

Primary measurements of mass flow, density and temperature are available immediately on device start-up.

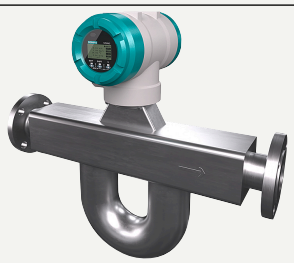
SITRANS FC also calculates multiple secondary measurements including:

- Fraction (or concentration)
- Liquid volume flow
- Normal (standard) volume flow of gases
- Viscosity (requires external input)
- Thermal energy

Siemens measurement experts are available globally. They provide application guidance to optimize the whole life value of SITRANS FC multi-parameter instruments, across all process industry sectors.

Diligence in the design, carried through manufacturing and calibration, is evident in the solution-specific range of sensors and transmitters, described on the following pages.

Product overview

SITRANS FC sensors		
SITRANS FCS100		**Precision sensors for low flow applications** • Alloy 22 measuring tubes • Process connection: flange, thread or hygienic clamp • Nominal sizes: DN 1, DN 2, DN 4, DN 6, DN 8 • Connection sizes: DN 6 ... 40 (¼ ... 1½") • Nominal flow: 21 ... 950 kg/h (46 ... 2 094 lb/h)
SITRANS FCS500		**Universal sensors for standard applications** • Wetted parts: stainless steel 316L • Process connections: flange or thread • Nominal sizes: DN 10, DN 15, DN 25, DN 50, DN 80 • Connection sizes: DN 8 ... 125 (⅜ ... 5") • Nominal flow: 1 600 ... 170 000 kg/h (3 527... 374 786 lb/h) **Hygienic sensors with 3A and EHEDG approvals** • Wetted parts: stainless steel 316L • Process connection: hygienic, thread or clamp • Nominal sizes: DN 10, DN 15, DN 25, DN 50 • Connection sizes: DN 25 ... 80 (1 ... 3") • Nominal flow: 1 600 ... 51 000 kg/h (3 527 ... 112 436 lb/h)
SITRANS FCS600		**Resistant sensors for extreme conditions** • Resistant to high temperature, up to 350 °C (662 °F) • Resistant to high pressure, up to 700 bar (10 153 psi) (gauge) • Resistant to corrosive fluids • Wetted parts: stainless steel 316L or alloy 22 • Process connection: flange or thread • Nominal sizes: DN 2, DN 4, DN 15, DN 25, DN 40, DN 65 • Connection sizes: DN 8 ... 125 (⅜ ... 5") • Nominal flow: 45 ... 100 000 kg/h (99 ... 220 462 lb/h)

Overview (continued)

SITRANS FC sensors		
SITRANS FCS700		**Grand sensors for high flow applications** • Wetted parts: stainless steel 316L or alloy 22 • Process connection: flange • Nominal sizes: DN 100, DN 150, DN 200 • Connection sizes: DN 100 ... 250 (4 ... 10") • Nominal flow: 250 000 kg/h ... 900 000 kg/h (551 156 ... 1 984 160 lb/h)

SITRANS FC transmitters		
SITRANS FCT020		**Standard transmitter for routine applications** • Mass flow accuracy: ±0.2% (of rate) • Density accuracy: ±4 kg/m³ (±0.25 lb/ft³) • Easy setup wizard, microSD card, self-verification • Digital communication: HART, Modbus
SITRANS FCT040		**Advanced transmitter with extended functionality** • Mass flow accuracy: ±0.1% (of rate) • Density accuracy: ±0.5 kg/m³ (±0.03 lb/ft³) • Easy setup wizard, microSD card, self-verification • Batch control, viscosity measurement • Fraction (percent concentration), e.g. API, Brix, ABV • Thermal energy calculation • Digital communication: HART, Modbus, PROFIBUS PA, PROFINET

Each SITRANS FC Coriolis mass flowmeter system comprises one sensor and one transmitter. The FCS100 precision sensors for low flow are compatible with remote mounted transmitters only. The user can select either compact or remote mounted transmitters in the specification of all other sensor types.

Transmitter	Compact	Remote	Ex	Sensor
FCT020 (standard)	Yes	Yes	Yes	FCS500
	Yes	Yes	Yes	FCS500 hygienic
	No	Yes	Yes	FCS100
	Yes	Yes	Yes	FCS600
	Yes	Yes	Yes	FCS700
FCT040 (advanced)	Yes	Yes	Yes	FCS500
	Yes	Yes	Yes	FCS500 hygienic
	No	Yes	Yes	FCS100
	Yes	Yes	Yes	FCS600
	Yes	Yes	Yes	FCS700

Benefits

	User value targets	SITRANS FC features and solutions
Engineering and project management	• Reduce engineering investment • Cut specification effort • Minimize project expenditure • Decrease the spending on each measurement point • Eliminate function duplication • Reduce number of suppliers	• Siemens project teams offer complimentary evaluation of customer specifications, provided by regional and HQ experts • Simple product selection using intuitive sizing software • One SITRANS FC device can typically provide 3 to 6 individual measurements, all transmitted via digital communication, when planned during pre-project design • Added value functions: batch control, viscosity, thermal energy, concentration measurement (Fraction) of two-component solutions, and pressure compensation
Installation	• Reduce footprint and transport outlay of OEM machinery • Lower installation complexity • Avoid costly modifications of existing plant	• Can be installed in horizontal or vertical (self-draining) pipes • Twin tube bend design delivers strong signal to noise characteristic resistant to external influence, so install in tight spaces with no inlet and outlet restrictions • Adaptable to existing pipes: typically, 3 or 4 connection sizes for each sensor size • Flexible selection of traditional inputs, outputs, and digital communications
Configuration and commissioning	• Shorter commissioning schedules with lower costs • Faster start-up with reduced outgoings	• Easy setup wizard delivers working meters straight after start-up • microSD card stores sensor calibration data and default setup • Simple configuration using Process Device Manager (PDM) • Siemens device-specific faceplates simplify operation in plantwide control systems
Efficient plant operation	• Improve finished product consistency to reduce waste • Keep process performance when scaling production up or down • Optimize process control • Improve finished product quality enabling higher levels of profit • Reduce downtime with fast resolution of process upsets • Improve asset performance	• SITRANS FC meters are calibrated in rigs accredited to EN/ISO 17025 to ensure consistently high performance of flow, density, and concentration measurements • First-class zero-point quality maintains high accuracy into the low flow region • High sensitivity and intelligent dynamic range keeps the measurement active in demanding high fluid damping cases • Designed-in resilience to process extremes • Self-verification alerts to potential performance issues due to unplanned process events, for example gas or vapor breakout or solid deposits building up in the tubes • Diagnostic data via local menu or PDM is backed by Siemens applications experts • Intelligent Siemens SITRANS IQ apps for continuing asset evaluation
Maintenance and asset management	• Optimize technician training • Reduce cost of spare parts • Increase predictive maintenance • Reduce production downtime and associated costs • Decrease unplanned maintenance • Maximize asset value	• Simple product design with interchangeable modular parts • microSD card loads sensor-specific data to deliver fast service exchange • Self-verification: tube health check monitors key diagnostics, including tube stiffness, driver and pickups; the user defines verification frequency and alarm behavior • Verification results indicate whether preventive maintenance action is required • Siemens SIMATIC Maintenance Station uses cyclical acquisition to provide life cycle reports and intelligent preventive maintenance strategies
Industry compliance	• Cut effort required to comply with Industry-specific demands • Reduce resource needed to maintain regulatory compliance	• Food and beverage sector covered with EHEDG and 3-A approvals, polished tubes • Global hazardous area approvals for international plant duplications • Common and emerging digital networks covered: HART, PROFIBUS PA, PROFINET • Class-leading safety: SIL2/SIL3, secondary containment, PED, NAMUR NE95

Application

The SITRANS FC Coriolis family provides flexibility to the user including

- Choice of sizes from DN 1 to DN 250
- Choice of performance levels
- Optionally selectable functions, approvals and certification
- Selection of sensor types, process connections and materials to suit specific application demands
- Resistance to extreme process conditions where necessary

This flexibility and extensive range of options means an excellent value solution is available for routine and challenging applications alike, with no industry sector excluded.

Generic measurement and application examples found in all industry sectors

- Mass flow rate, density and temperature of liquids, gases, and mixed phase fluids
- Bulk volume flow rate of all fluid types
- Concentration measurement (fraction) of two-component slurries, solutions and mixtures
- Fractional mass flow rate of each component in a two-component fluid (net flow)
- Fractional volume flow rate of each component in a two-component fluid (net flow)
- Single or two stage batch control
- Viscosity measurement (requires differential pressure via analog input or digital communication)
- Thermal energy measurement
- Accumulated (totalized) mass and volume values of the bulk fluid and each fractional component
- Finished product filling and dosing into appropriate containers

During the selection of any SITRANS FC Coriolis flow meter it is important to obtain sufficient application data. The application checklist below provides guidance on what to look out for.

Application checklist

- Name of fluid?
- What type of fluid are you measuring – gas, liquid, slurry, other?
- Fluid properties and operating conditions – density, viscosity, temperature, pressure?
- Measurement(s) required: mass flow, volume flow, density, concentration, temperature?
- Expected flow rates – minimum, normal, maximum?
- Any hazardous area or corrosive properties?
- Adjacent pipe layout, disturbances (e.g. valves, bends)?
- What are the priorities – accuracy, installation and running costs, approvals?
- Power supply and outputs – analog, digital network?
- Will periodic verification or re-calibration be required – consider isolation valves, and bypass?

Application (continued)

Application examples for SITRANS FC multi-parameter meters across diverse industry sectors

Industry sector	Application
Chemical and petrochemical Bulk chemicals Industrial gases Polymers Agrochemicals Fine chemicals Aroma chemicals	• Transfer, loading and unloading of bulk chemicals • Concentration control of acids and alkalis (process optimization) • Accurate mass or volume flow of feed chemicals to in-line blending systems • Accurate mass flow and density (quality) of reactor fluid feeds catalyst • Chemical recovery • Mass balance optimization • Compressed and cryogenic gases • Lubricating oil blending and dosing • High-accuracy measurement of critical fluid components • Low flow control in pilot plants and R&D facilities
Food and beverage Food processing Dairies Breweries Distilleries Confectionary Soft drinks Animal feed plants OEM	• Accurate bulk transfer (mass or volume) of all dairy products: milk, cream, whey and yoghurt • Fat concentration in cream • Flow, density, temperature, and concentration (Plato) during all fermentation processes • Flow, density, temperature, and sugar concentration (Brix) in soft drink processing • Distilled spirits – % alcohol by volume (ABV), liters of pure alcohol, volume transfer, blending, batch and column still optimization and energy management, cask filling, tanker loading • Flow and density of fruit juices and pulps • Mixing and inventory control of confectionary ingredients, e.g. chocolate, syrup, oils, flavors • Metering pump control • Oils, fat enzymes dosing in animal feed plants • CO_2 dosing • CIP liquids • Bottling of beer, spirits, wine, soft drinks, etc. • Bulk sugar processing – molasses, sugar slurries, density, Brix of finished product
Oil and gas Offshore, onshore Upstream, downstream Pipelines Distribution networks Refineries Skid manufacturers	• Loading/unloading of hydrocarbons (e.g. crude oil, bitumen) from/to ship, road tanker, rail car • High-pressure chemical injection • High-pressure low flow gas • Net oil computing • Gas void fraction • Filling of gas bottles • Furnace control • Test separators • LPG, natural gas hydration • Well-head water-cut monitoring • All hydrocarbon fluids in refineries • Metrology, custody transfer • Drilling mud • Oil well cementing and hydrofracturing

Application (continued)

Industry sector	Application
Life sciences Pharmaceutical Bio	• High-accuracy flow and batching of bioreactor feeds • Solvent flow rate, density and batching • Flow of demineralized and deionized water • Solvents and fish oils used in high grade omega 3 oils • Precision coatings • Vacuum thin film coating
Household and personal care Detergents Cosmetics	• Blending and batching of detergent ingredients • Tanker loading and unloading • Salt concentration • Reliable measurement of aerated liquids
Automotive and aeronautical Vehicle manufacturing Paint Engine testing OEM	• Fuel injection nozzle and pump testing • Filling of under bonnet fluid reservoirs, air conditioning, coolant • Fuel flow and density measurement in engine test beds • Checking for air in oil using high-accuracy density measurement • Paint spray robots – requires accurate and fast measurements • Aircraft fuel loading (kerosene) • High pressure flow used in turbine blade manufacture
Power and energy Renewable Hydrogen	• Boiler fuel flow and burner control • Turbine fuel flow • Glycol flow and concentration • Bioethanol
Marine OEM Shipbuilders	• Fuel consumption management • Boiler control • Bunkering management • Density used to indicate fuel quality
Pulp, paper and textiles	• Accurate dosing of dyes and chemicals
Water and environmental	• Dosing of chemicals for water treatment • Chemical concentration for water quality control

Design

Each SITRANS FC Coriolis mass flowmeter is built from one SITRANS FCS sensor and one SITRANS FCT transmitter. FCS sensors have a common twin tube U-shaped design.

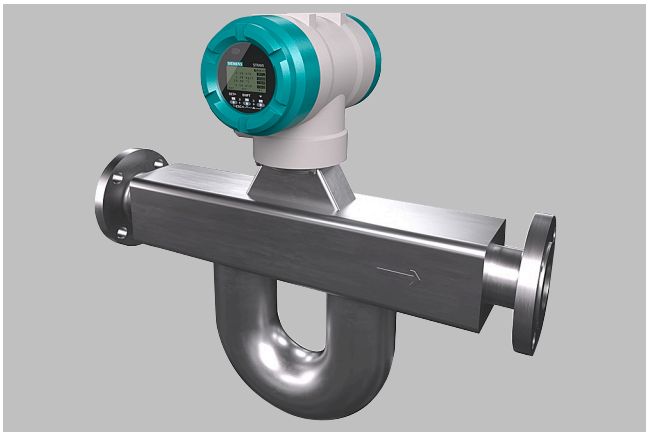
The four available sensor types are defined by size, wetted part materials, pressure and temperature rating, and process connection type. Generally, sensors can be combined with compact or remote mounted transmitters.

Two transmitter versions, FCT020 standard and FCT040 advanced, provide a choice of performance, measurement functions, housing material and output types.

Examples

Compact mount

FCS600 resistant sensor with FCT020 standard transmitter becomes a complete FC620 Coriolis flowmeter. Specification of sensor size, transmitter and process connections is required.

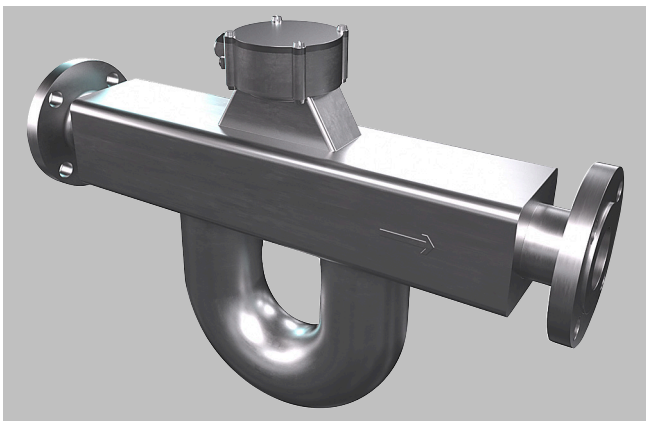


FC620 Coriolis flowmeter

Remote mount

FCS600 resistant sensor with FCT040 advanced transmitter becomes a complete FC640 Coriolis flowmeter.

Specification of sensor size, terminal housing design, transmitter, process connections and cable are required.



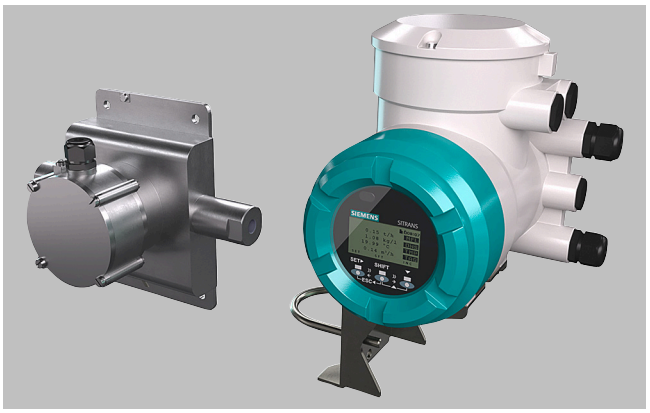
FCS600 sensor

FCT040 transmitter

FCS100 precision sensors (sizes DN 1 to DN 8) are compatible with remote mounted transmitters only.

Other example

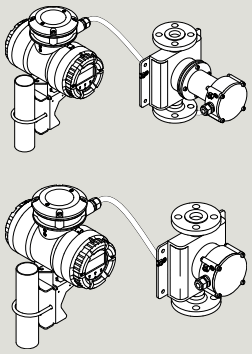
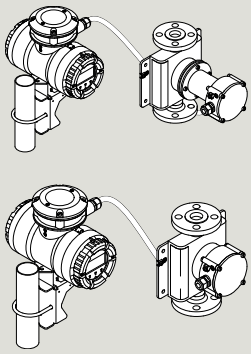
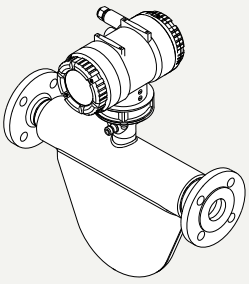
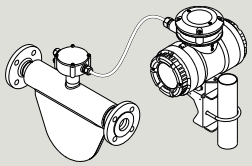
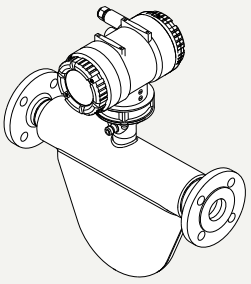
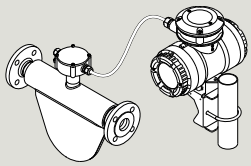
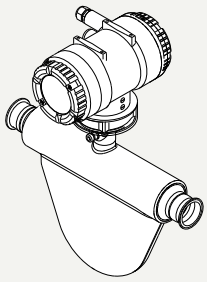
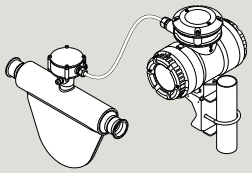
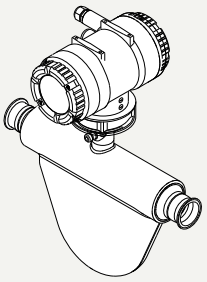
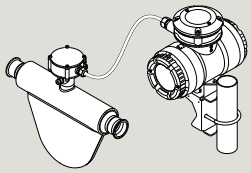
FCS100 precision sensor with remote FCT020 standard transmitter becomes a complete FC120 Coriolis flowmeter.



The following table shows a more complete interpretation of available combinations and the compatibility between sensors and transmitters.

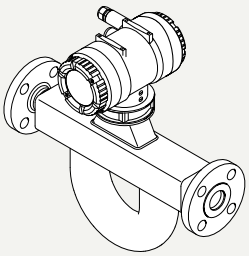
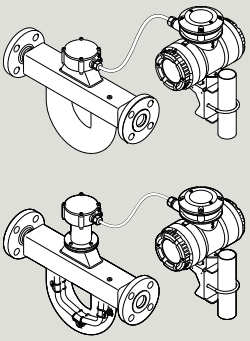
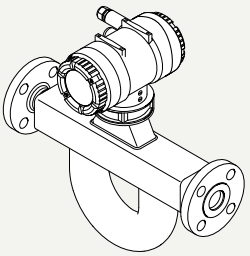
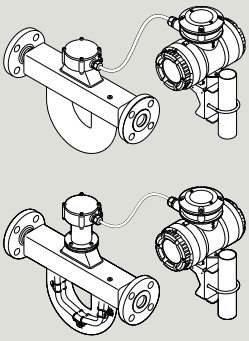
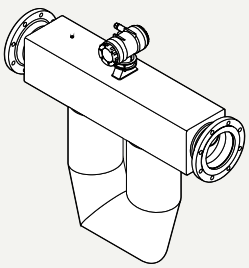
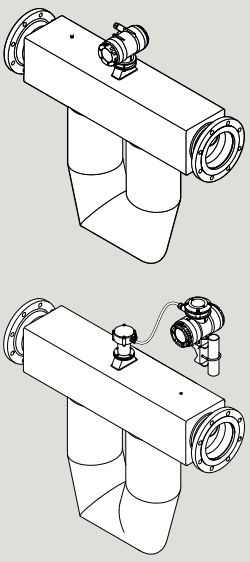
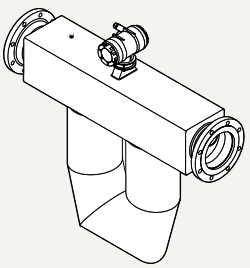
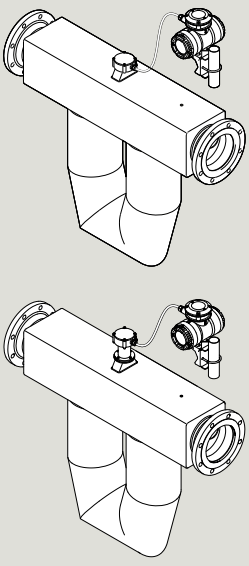
Design (continued)

Overview of the available combinations and compatibility between sensors and transmitters

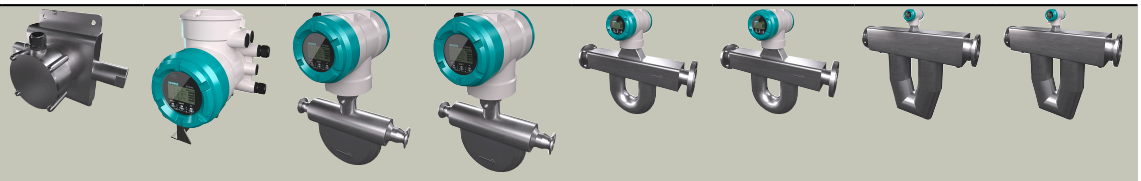
	Transmitter FCT020 Standard • Accuracy 0.2% • Easy setup wizard, microSD card, tube health check, up to 4 × I/O • HART, Modbus • Mass, density, temperature, volume		**Transmitter FCT040 Advanced** • Accuracy 0.1% • Easy setup wizard, microSD card, tube health check, up to 4 × I/O • HART, Modbus, PROFIBUS PA, PROFINET • Mass, density, temperature, volume • Fraction, batch, viscosity, net oil	
Sensors	**Compact** Aluminum alloy	**Remote** Aluminum alloy or CF 8M	**Compact** Aluminum alloy	**Remote** Aluminum alloy or CF 8M
FCS100 • DN 1 to DN 8 • Alloy 22 or 316L ss • max. 260 °C (500 °F) (long neck) • max. 285 bar (4 134 psi) • Ex, PED, SIL2/3 • NACE, Marine, CT	Not available	FC120 	Not available	FC140 
FCS500 non hygienic • DN 10 to DN 80 • 316L ss • max. 200 °C (392 °F) (remote) • max. 100 bar (1450 psi) • Ex. PED. SIL2/3 • NACE, Marine, CT	FC520 	FC520 	FC540 	FC540 
FCS500 hygienic • DN 10 to DN 50 • 316L ss, polished • max. 140 °C (284 °F) • max. 40 bar (580 psi) • Ex. PED. SIL2/3 • EHEDG, 3A	FC520 	FC520 	FC540 	FC540 

Design (continued)

Overview of the available combinations and compatibility between sensors and transmitters

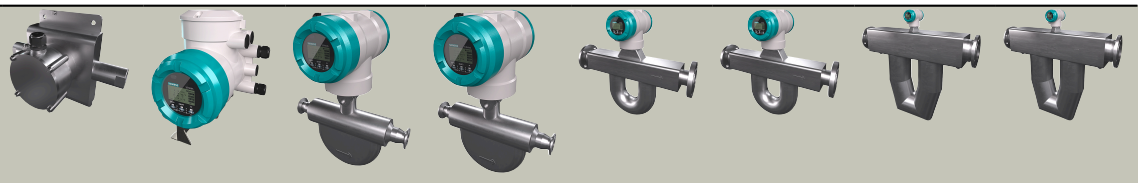
FCS600 • DN 15 to DN 80 • Alloy 22 or 316L ss • -196 °C ... +350 °C (-321 ... +662 °F) • Max. 700 bar (10 153 psi) • Ex, PED, SIL2/3 • NACE, Marine, CT • EHEDG, 3A	FC620 	FC620 	FC640 	FC640 
FCS700 • DN 100 to DN 200 • Alloy 22 or 316L ss • Max. 350 °C (662 °F) • Max. 100 bar (1 450 psi) • Ex, PED, SIL2/3 • NACE, Marine, CT	FC720 	FC720 	FC740 	FC740 

Selection Guide



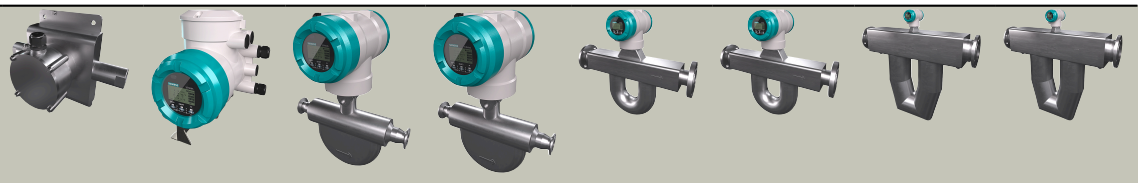
	FCS100 sensors		FCS500 sensors		FCS600 sensors		FCS700 sensors	
	FC120 7ME4412	FC140 7ME4414	FC520 7ME4452	FC540 7ME4454	FC620 7ME4462	FC640 7ME4464	FC720 7ME4472	FC740 7ME4474
Design								
Compact			●	●	●	●	●	●
Remote	●	●	●	●	●	●	●	●
Flow accuracy (liquids)								
Mass flow 0.1%		●[1]		●		●		●
Mass flow 0.2%	●		●		●		●	
Density accuracy (liquids)								
Density 0.5 kg/m³		●[2]		●[2]		●[2]		
Density 2 kg/m³								●

Design (continued)



	FCS100 sensors		FCS500 sensors		FCS600 sensors		FCS700 sensors	
	FC120 7ME4412	FC140 7ME4414	FC520 7ME4452	FC540 7ME4454	FC620 7ME4462	FC640 7ME4464	FC720 7ME4472	FC740 7ME4474
Density 4 kg/m³	●[3]		●		●[3]		●	
Flow accuracy (gases)								
Mass flow: 0.35%				●		●[4]		●[4]
Mass flow: 0.5%		●						
Mass flow: 0.75%	●		●		●		●	
Transmitter enclosure								
IP66/IP67	●	●	●	●	●	●	●	●
Cast aluminum Standard coating	●	●	●	●	●	●	●	●
Cast aluminum Corrosion protection coating	●	●	●	●	●	●	●	●
Stainless steel (remote only)	●	●	●	●	●	●	●	●
Inputs and outputs								
Up to 4 input and output channels (passive or active)	●	●	●	●	●	●	●	●
Analog output	●	●	●	●	●	●	●	●
Pulse or status output	●	●	●	●	●	●	●	●
Pulse or status input	●	●	●	●	●	●	●	●
Analog input		●		●		●		●
Communication								
HART	●	●	●	●	●	●	●	●
PROFIBUS PA		●		●		●		●
MODBUS	●	●	●	●	●	●	●	●
PROFINET		●		●		●		●
Supply voltage								
24 V DC	●	●	●	●	●	●	●	●
115/230 V AC	●	●	●	●	●	●	●	●
Sensor size								
DN 1	●	●						
DN 2	●	●			●	●		
DN 4	●	●			●	●		
DN 6	●	●						
DN 8	●	●						
DN 10			●	●				
DN 15			●	●	●	●		
DN 25			●	●	●	●		
DN 40					●	●		
DN 50			●	●				
DN 65					●	●		
DN 80			●	●				
DN 100							●	●
DN 150							●	●
DN 200							●	●
Pipe thread connections								
Internal G (BSPP)	●	●	● DN 10/15 only	● DN 10/15 only	● DN 15 only	● DN 15 only		
Internal NPT	●	●	● DN 10/15 only	● DN 10/15 only	● DN 15 only	● DN 15 only		
Flange connections								
ASME B15.5	●	●	●	●	●	●	●	●
EN 1092-1	●	●	●	●	●	●	●	●

Design (continued)



	FCS100 sensors		FCS500 sensors		FCS600 sensors		FCS700 sensors	
	FC120 7ME4412	FC140 7ME4414	FC520 7ME4452	FC540 7ME4454	FC620 7ME4462	FC640 7ME4464	FC720 7ME4472	FC740 7ME4474
JIS B 2220	●	●	●	●	●	●	● DN 100 only	● DN 100 only
Hygienic connections								
DIN 32676 clamp	●	●	●	●	●	●		
ISO 2852 clamp			●	●	● not DN 65	● not DN 65		
DIN 11851 thread			●	●				
SMS 1145 thread			●	●				
Wetted part materials								
Alloy 22/2.4602 and 316L/1.4404	●	●						
316L ss/1.4404			●	●	●	●	●	●
Alloy 22/2.4602					●	●	● DN 100 only	● DN 100 only
Maximum pressure								
100 bar g [5]			●	●			●	●
260 bar g [5]					●	●		
285 bar g [5]	●	●						
700 bar g [5]					●			
Temperature range compact								
Standard -50 ... +150 °C (-58 ... +302 °F)			● [6], [7]	● [6], [7]	● [6], [7]	● [6], [7]	●	●
Temperature range remote								
Standard -50 ... +150 °C (-58 ... +302 °F)	● [7]	● [7]						
Standard -70 ... +200 °C (-94 ... +392 °F)			● [6], [7]	● [6], [7]				
Standard -70 ... +150 °C (-94 ... +302 °F)					● [6], [7]	● [8], [9]	●	●
Medium -50 ... +260 °C (-58 ...+500 °F)	● [8], [9]	● [8], [9]						
Medium -70 ... +230 °C (-94 ... +446 °F)					● [8], [9]	● [8], [9]	● [8]	● [8]
High 0 ... 350 °C (32 ... 662 °F)					● [8], [9]	● [8], [9]	● [8]	● [8]
Low -196 ... +150 °C (-321 ... +302 °F)					● [8], [9]	● [8], [9]		
Sensor features								
Cleaning for oxygen service	●	●	●	●	●	●	●	●
Insulation and heat tracing	●	●			●	●	●	●
Polished surface Ra ≤ 0.8 µm			●	●	●	●		
Rupture disk					●	●	●	●
Customer defined built-in length	●	●	●	●	●	●	●	●
Namur NE132 built-in length	●	●	●	●	●	●	●	●

Design (continued)








	FCS100 sensors		FCS500 sensors		FCS600 sensors		FCS700 sensors	
	FC120 7ME4412	FC140 7ME4414	FC520 7ME4452	FC540 7ME4454	FC620 7ME4462	FC640 7ME4464	FC720 7ME4472	FC740 7ME4474
Software functions								
Thermal energy		●		●		●		●
Fraction		●		●		●		●
Viscosity		●		●		●		●
Batching		●		●		●		●
Net oil computing		●		●		●		●
Tube health check	●	●	●	●	●	●	●	●
Hazardous area (Ex) approvals								
ATEX	●	●	●	●	●	●	●	●
IECEx	●	●	●	●	●	●	●	●
FM	●	●	●	●	●	●	●	●
EAC Ex	●	●	●	●	●	●	●	●
NEPSI	●	●	●	●	●	●	●	●
Korea Ex	●	●	●	●	●	●	●	●
Hygienic approvals								
3-A certificate Ra ≤ 0.8 µm			●	●	●	●		
EHEDG certificate Ra ≤ 0.8 µm			●	●	●	●		
Marine approvals (Classes 2 and 3)								
Det Norske Veritas	●	●	●	●	●	●	●	●
Lloyds Register	●	●	●	●	●	●	●	●
Bureaux Veritas	●	●	●	●	●	●	●	●
American Bureaux of Shipping	●	●	●	●	●	●	●	●
Korean Register	●	●	●	●	●	●	●	●
Additional approvals								
NACE MR0175, MR0103	●	●	●	●	●	●	●	●
Pressure Equipment Directive	●	●	●	●	●	●	●	●
Functional Safety SIL 2/3	●	●	●	●	●	●	●	●
Custody Transfer (NTEP accuracy class 0.3)	●	●	●	●	●	●	●	●
NAMUR NE 21, NE 95	●	●	●	●	●	●	●	●
EMC	●	●	●	●	●	●	●	●
Low voltage	●	●	●	●	●	●	●	●
RoHS	●	●	●	●	●	●	●	●

● = Available

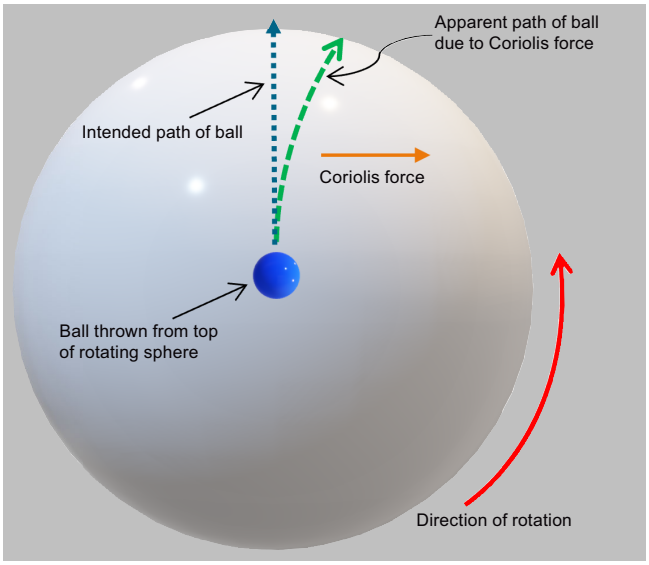
1) FC140 meters in sizes DN 1 and DN 2 have 0.2% liquid mass flow accuracy.
2) Some sensor sizes do not have 0.5 kg/m³ (0,03 lb/ft³) density accuracy with FCT040 transmitters. Refer to technical specifications for more details.
3) Some sensor sizes do not have 4 kg/m³ (0,25 lb/ft³) density accuracy with FCT020 transmitters. Refer to technical specifications for more details.
4) Some sensor sizes do not have 0.35% gas mass flow accuracy with FCT040 transmitters. Refer to technical specifications for more details.
5) Maximum pressure ratings may be lower than shown, depending on the type of process connection (fitting) selected. Refer to the technical specifications for more details.
6) With hygienic thread fittings temperature range is -50 ... +140 °C (-58 ... +284 °F).
7) With hygienic clamp fittings temperature range is -10 ... +140 °C (14 ... 284 °F).
8) Long neck sensor option is mandatory for low (cryogenic), medium and high temperature ranges.
9) Hygienic fittings cannot be selected with low (cryogenic), medium and high temperature ranges.

Mode of operation

The Coriolis Effect

Gaspar-Gustave de Coriolis (1792–1843) was a French mathematician, mechanical engineer and scientist. His work explained the supplementary forces detected in a rotating frame of reference, one of which would eventually bear his name.

Imagine that the rotating sphere in the sketch below is the earth, with the viewer looking down from above. When a ball is thrown from the top of the sphere (north pole) several forces act upon it including centrifugal force and gravity. Our focus is on the Coriolis force which acts perpendicular to the flight of the ball and opposite to the direction of rotation. The path of the ball is shifted to the right, away from its intended path due to the Coriolis effect.

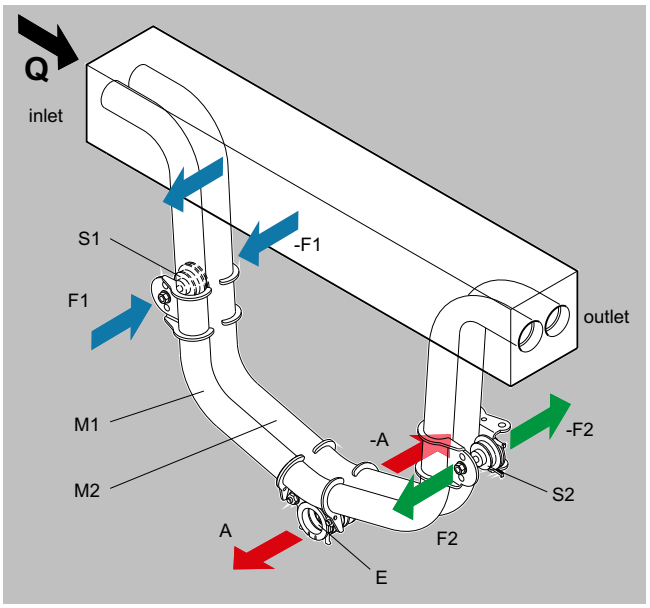


Coriolis force: effect on the direction of rotation

Inside the Coriolis flowmeter an oscillating system is used in place of continuous rotation.

SITRANS FC sensors are energized by an electromagnetic driver which causes the twin measuring tubes to oscillate at their resonant frequency. The oscillation generates back and forth rotation at the tube ends, close to the electromagnetic pickups S1 and S2.

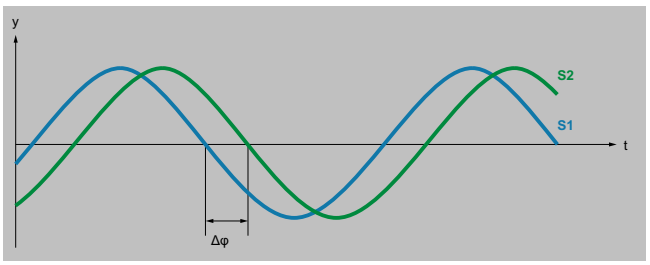
Mode of operation (continued)



M1, M2	Measuring tubes
S1, S2	Pick-offs
F1, F2	Coriolis forces
E	Driver system
A	Direction of measuring tube vibration
Q	Direction of fluid flow

When the fluid in the rotating system is not flowing, there is no Coriolis force. As fluid starts to flow, Coriolis forces are generated (*F1* and *F2*), together with a phase shift (time difference) between the output of pickups.

The phase shift is directly proportional to the **mass flow rate** of the flowing fluid, and it can be measured with high accuracy.

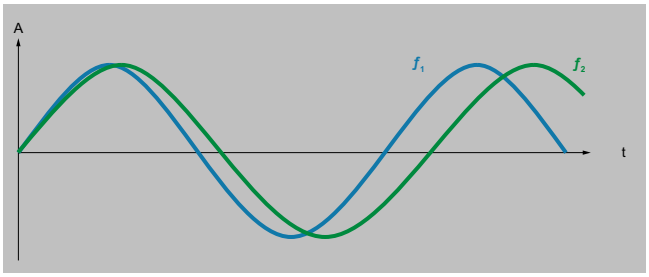


Mass flow rate proportional to phase shift

Δφ	Phase shift
t	Time
S1, S2	Pick-offs

Fluid density becomes the second primary measurement, achieved using the inverse relationship between fluid density and tube resonant frequency. Fluid 2 frequency f_2 is lower than fluid 1 frequency f_1, therefore fluid 2 has a greater density than fluid 1.

Mode of operation (continued)



Density inversely proportional to frequency

A	Measuring tube displacement
t	Time
f_1	Resonance frequency with fluid 1
f_2	Resonance frequency with fluid 2

The third primary measurement, **temperature**, is made using a PT1000 temperature sensor.

Function

Before making out your order for Coriolis flowmeters, why not let Siemens measurement experts help with the planning and specification of your new plant or existing process upgrade. Coriolis meters can be expensive, but not when you use the proven multi-measurement power to get real value from your investment by loading all the potential functionality into a single device.

Primary measurements

Make use of the three independent primary process variables, measured simultaneously and continuously.

Mass flow rate with liquid accuracy up to 0.1% of actual flow

Directly proportional to the phase shift measured between the two pickups mounted at either end of the oscillating tubes – the shift is created by the naturally occurring Coriolis forces acting on the tubes whenever fluid flows through.

In-line fluid density with choice of accuracies to suit your application

Inversely proportional to the oscillating system's resonant frequency. The tubes are driven to resonance with an electromagnetic driver circuit flexible enough to allow the tubes to find their natural resonant frequency, defined by the density of the fluid passing through.

Process temperature

Provided by the process industries' go to high resolution device, a PT1000 resistance temperature detector (RTD).

Secondary measurement possibilities

No need to stop at three measurements, but instead take advantage of the computing ability of the SITRANS FCT020 or FCT040 transmitters to make secondary measurements.

Volume flow rate

Both transmitters, FCT020 standard and FCT040 advanced, calculate volume flow from mass flow and density using the simple school physics formula: density = mass / volume.

FCT040 secondary measurements

Measurements below are available only with the SITRANS FCT040 advanced transmitter.

Standard concentration

Used for concentration measurements of emulsions or suspensions when fluid density depends largely on temperature.

The standard concentration measurement can be used for many low-concentration solutions if there is only minor interaction between the liquids or if the miscibility is negligible.

Fraction (advanced concentration)

Up to four pre-configured fraction ranges can be selected using the SITRANS FC option order codes from the table below.

Order code	Fraction description	Type	Range	Unit	Temperature range
G01	Sugar / water (sucrose solution)	Mass fraction	0 ... 85	°Bx	0 ... 80 °C (32 ... 176 °F)
G02	NaOH / water (sodium hydroxide solution)	Mass fraction	2 ... 50	%	0 ... 100 °C (32 ... 212 °F)
G03	KOH / water (potassium hydroxide solution)	Mass fraction	0 ... 60	%	54 ... 100 °C (129 ... 212 °F)
G04	NH_4NO_3 / water (ammonium nitrate solution)	Mass fraction	1 ... 50	%	0 ... 80 °C (32 ... 176 °F)
G05	NH_4NO_3 / water (ammonium nitrate solution)	Mass fraction	20 ... 70	%	20 ... 100 °C (68 ... 212 °F)
G06	HCl / water (hydrochloric acid)	Mass fraction	22 ... 34	%	20 ... 40 °C (68 ... 104 °F)
G07	HNO_3 / water (nitric acid)	Mass fraction	50 ... 67	%	10 ... 60 °C (50 ... 140 °F)
G09	H_2O_2 / water (hydrogen peroxide)	Mass fraction	30 ... 75	%	4 ... 44 °C (39 ... 111 °F)
G10	Ethylene glycol / water (homogenous mixture)	Mass fraction	10 ... 50	%	-20 ... +40 °C (-4 ... +104 °F)
G11	Amylum (starch) / water (paste-like suspension)	Mass fraction	33 ... 43	%	35 ... 45 °C (95 ... 113 °F)
G12	Methanol / water (homogenous mixture)	Mass fraction	35 ... 60	%	0 ... 40 °C (32 ... 104 °F)
G20	Alcohol / water (homogenous mixture)	Volume fraction	55 ... 100	%	10 ... 40 °C (50 ... 104 °F)
G21	Sugar / water (sucrose solution)	Mass fraction	40 ... 80	°Bx	75 ... 100 °C (167 ... 212 °F)
G30	Alcohol / water (homogenous mixture)	Mass fraction	66 ... 100	%	15 ... 40 °C (59 ... 104 °F)
G37	Alcohol / water (homogenous mixture)	Mass fraction	66 ... 100	%	10 ... 40 °C (50 ... 104 °F)

Fraction A & B volume flow rate (net flow computing)

Example: In an alcohol application the net volume flow rate of each component of the mixture can be displayed and transmitted. So, volume flow of ethanol (fraction A) and volume flow of water (fraction B) are both available.

Fraction A & B mass flow rate (net flow computing)

Like the volume example but with mass flow units for each fraction.

Petroleum measurement function / Net oil computing (NOC)

The NOC function provides real-time measurements of water cut and includes American Petroleum Institute (API) correction according to API MPMS Chapter 11.1.

Oil sometimes contains entrained gas. SITRANS FC meters measure the density of the combined emulsion oil and gas, which is lower than the oil density. The NOC function includes a Gas Void Fraction (GVF) parameter to be set.

Viscosity measurement

Viscosity is sometimes used as reference value to activate other processes like fluid heating systems.

Function (continued)

The viscosity estimation is calculated based on a comparison between measured pressure loss and a calculated value between two points of the pipe. A differential pressure transmitter is required to use this function. Its output is connected to the analog input of the FCT040. Based on an iteration process, a viscosity value is determined.

Thermal energy calculation (heat quantity measurement)

Either a constant value of the calorific value of the fluid can be used, or an additional device like a gas chromatograph can provide the instantaneous calorific value via the analog input of the FCT040 transmitter.

Based on the fluid flow, the total calorific energy of the fluid is calculated.

Additional functions available with SITRANS FC Coriolis flowmeters

Tube health check

This feature is available in both transmitters, FCT020 and FCT040.

Tube health check monitors key diagnostics, including tube stiffness, driver and pickups. Self-verification alerts to potential performance issues due to unplanned process events, for example gas or vapor breakout, or solid deposits building up in the tubes. The user defines verification frequency and alarm behavior. Verification results indicate whether preventive maintenance action is required.

Six totalizers

A maximum of six totalizers can be used on the device to provide accumulation of process flow variables, including:

- Mass flow
- Volume flow
- Corrected volume flow
- Energy

When a concentration option has been selected in the order code, additional variables can be assigned to the totalizers:

- Net mass flow, component A or B
- Net volume flow, component A or B
- Net corrected volume flow

Universal power supply

Single power supply compatible with DC and AC supply voltage

Easy Setup Wizard

For the most important functions, there is a wizard menu to help set up common parameters used in many applications, such as date, installation, display, outputs and totalizers.

Event Management

According to NAMUR NE107

Batch control

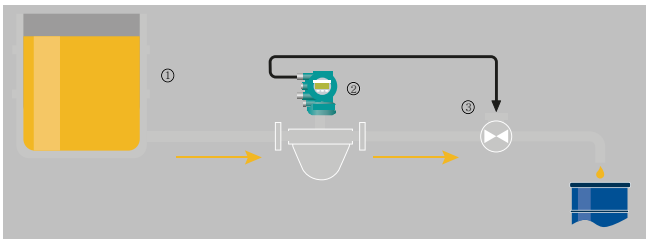
Batching and filling processes are found in many industries: food and beverage, cosmetic, pharmaceutical, oil and gas, and chemical.

SITRANS FCT040 transmitters offer an integrated batching function to carry out the task. A self-learning algorithm optimizes the process to provide accurate and reliable results.

The function supports two filling modes:

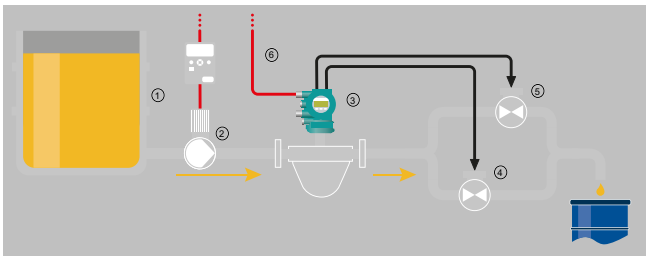
- Single-stage batch control with single valve
- Two-stage batching to control two valves for more accurate filling

The error management function allows the user to set alarms and warnings according to the application.



Example diagram for 1-stage batching

1	Storage tank
2	SITRANS FC
3	Valve



Example diagram for 2-stage batching

1	Storage tank
2	Pump
3	SITRANS FC
4	Valve A
5	Valve B
6	HART

For questions regarding a specific application, contact your regional Siemens Measurement Intelligence team.

Technical specifications

Mass flow rate of liquids

The mass flow rate characteristics of SITRANS FC meters are defined by the values of zero stability, Q_{flat}, Q_{nom} and Q_{max}.

Zero stability is the maximum allowable flow rate value that can be displayed at zero flow under reference conditions. It is a good indicator of the meter performance as flow rates reduce, and approach zero.

Q_{flat} is the mass flow rate above which the base accuracy is maintained (0.1% when using FCT040 transmitters).

Q_{nom} is the nominal mass flow rate of water at reference conditions that would result in a pressure drop of 1 bar (15 psi).

Q_{max} is the recommended maximum mass flow rate for each sensor size.

FCS100: the precision sensor for low flow rates

Nominal size	Zero stability		Q_{flat}		Q_{nom}		Q_{max}	
	kg/h	lb/h	kg/h	lb/min	kg/h	lb/min	kg/h	lb/min
DN 1	0.003	0.007	2.52	0.092	21.0	0.0771	40.0	1.47
DN 2	0.005	0.011	4.50	0.165	45.0	1.65	94.0	3.45
DN 4	0.009	0.020	14.0	0.514	170	6.24	300	11.0
DN 6	0.019	0.042	30.0	1.10	370	13.6	600	22.0
DN 8	0.048	0.106	79.0	2.90	950	34.9	1 500	55.1

FCS500: the universal sensor for standard and hygienic applications

Nominal size	Zero stability		Q_{flat}		Q_{nom}		Q_{max}	
	kg/h	lb/h	kg/h	lb/min	kg/h	lb/min	kg/h	lb/min
DN 10	0.032	0.070	80.0	2.94	1 600	58.7	2 300	84.4
DN 15	0.090	0.198	235	8.62	4 700	172	7 000	257
DN 25	0.400	0.880	1 000	36.7	20 000	734	29 000	1 064
DN 50	2.55	5.61	2 550	93.6	51 000	1872	76 000	2 789
DN 80	8.50	18.7	8 500	312	170 000	6239	255 000	9 359

FCS600: the resistant sensor for high pressure, high temperature, cryogenic and corrosive liquids

Nominal size	Zero stability		Q_{flat}		Q_{nom}		Q_{max}	
	kg/h	lb/h	kg/h	lb/min	kg/h	lb/min	kg/h	lb/min
DN 2	0.005	0.011	4.00	0.147	45.0	1.65	94.0	3.45
DN 4	0.018	0.040	14.0	0.514	170	6.24	300	11.0
DN 15	0.150	0.330	250	9.18	3 000	110	5 000	184
DN 25	0.500	1.10	830	30.5	10 000	367	17 000	624
DN 40	1.60	3.52	2 670	98.0	32 000	1 174	50 000	1 835
DN 65	5.00	11.0	8 330	306	100 000	3 670	170 000	6 239

FCS700: the grande sensor for high flow rates

Nominal size	Zero stability		Q_{flat}		Q_{nom}		Q_{max}	
	kg/h	lb/h	kg/h	lb/min	kg/h	lb/min	kg/h	lb/min
DN 100	13.0	28.6	20 000	734	250 000	9 175	300 000	11 010
DN 150	25.0	55.0	38 000	1 395	500 000	18 350	600 000	22 020
DN 200	27.0	59.4	45 000	1 652	900 000	33 030	1 100 000	40 370

Volumetric liquid flow characteristics and gas flow capability

When measuring volume flow rate and gas flow rates, fluid properties will influence the selection of sensor type and size. Please contact your regional Siemens Measurement Intelligence team for further assistance. Based on your application details, they will be able to provide suitable sizing and selection advice.

Mass flow calibration and density adjustment for liquids

Siemens SITRANS FC Coriolis meters are calibrated in rigs accredited according to the international standard DIN EN ISO/IEC 17025:2018. Each flowmeter comes with a standard calibration certificate.

Mass flow calibration takes place at reference conditions. Specific values are listed in the standard calibration certificate.

Mass flow calibration reference conditions	
Fluid	Water
Density	900 ... 1 100 kg/m³ (56 ... 69 lb/ft³)
Fluid temperature	10 ... 35 °C (50 ... 95 °F), average temperature: 22.5 °C (72.5 °F)
Ambient temperature	10 ... 35 °C (50 ... 95 °F)
Process pressure	1 ... 5 bar (15 ... 73 psi)

Liquid density calibration is performed when density accuracy of 0.5 kg/m³ (0.03 lb/ft³) is selected in the model code.

Technical specifications (continued)

Density calibration reference conditions	
Flow condition	Fully developed flow profile
Fluid densities used to obtain density calibration constants	700 kg/m³ (44 lb/ft³) 1 000 kg/m³ (62 lb/ft³) 1 650 kg/m³ (103 lb/ft³)
Fluid temperature	20 °C (68 °F)
Determination of temperature compensation coefficients	20 ... 80 °C (68 ... 176 °F)

Performance specifications

SITRANS FCS100: the precision sensor for low flow applications

Sensor size			DN 1	DN 2	DN 4	DN 6	DN 8
Mass flow (liquids)							
Accuracy	% (of rate)	FCT020	±0.2	±0.2	±0.2	±0.2	±0.2
	% (of rate)	FCT040	±0.2	±0.2	±0.1	±0.1	±0.1
Zero stability	kg/h (lb/h)		±0.003 (0.007)	±0.005 (0.011)	±0.009 (0.02)	±0.019 (0.042)	±0.048 (0.106)
Density (liquids)							
Accuracy	kg/m³ (lb/ft³)	FCT020	±20 (1.25)	±8 (0.5)	±4 (0.25)	±4 (0.25)	±4 (0.25)
	kg/m3 (lb/ft³)	FCT040	±20 (1.25)	±8 (0.5)	±1 (0.06)	±0.5 (0.03)	±0.5 (0.03)
Mass flow (gases)							
Accuracy	% (of rate)	FCT020	±0.75	±0.75	±0.75	±0.75	±0.75
	% (of rate)	FCT040	±0.5	±0.5	±0.5	±0.5	±0.5
Temperature							
Accuracy	°C (°F)		±0.5 (0.9)	±0.5 (0.9)	±0.5 (0.9)	±0.5 (0.9)	±0.5 (0.9)

SITRANS FCS500: the universal sensor for routine and hygienic applications

Sensor size			DN 10	DN 15	DN 25	DN 50	DN 80
Mass flow (liquids)							
Accuracy	% (of rate)	FCT020	±0.2	±0.2	±0.2	±0.2	±0.2
	% (of rate)	FCT040	±0.1	±0.1	±0.1	±0.1	±0.1
Zero stability	kg/h (lb/h)		±0.032 (0.07)	±0.09 (0.198)	±0.4 (0.88)	±2.55 (5.61)	±8.5 (18.7)
Density (liquids)							
Accuracy	kg/m³ (lb/ft³)	FCT020	±4 (0.25)	±4 (0.25)	±4 (0.25)	±4 (0.25)	±4 (0.25)
	kg/m³ (lb/ft³)	FCT040	±0.5 (0.03)	±0.5 (0.03)	±0.5 (0.03)	±0.5 (0.03)	±1 (0.06)
Mass flow (gases)							
Accuracy	% (of rate)	FCT020	±0.75	±0.75	±0.75	±0.75	±0.75
	% (of rate)	FCT040	±0.35	±0.35	±0.35	±0.35	±0.35
Temperature							
Accuracy	°C (°F)		±1 (1.8)	±1 (1.8)	±1 (1.8)	±1 (1.8)	±1 (1.8)

SITRANS FCS600: the resistant sensor for high pressure, high temperature, cryogenic and corrosive liquids

Sensor size			DN2	DN4	DN15	DN25	DN40	DN65
Mass flow (liquids)								
Accuracy	% (of rate)	FCT020	±0.2	±0.2	±0.2	±0.2	±0.2	±0.2
	% (of rate)	FCT040	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1
Zero stability	kg/h (lb/h)		±0.005 (0.011)	±0.018 (0.44)	±0.15 (0.33)	±0.5 (1.1)	±1.6 (3.52)	±5 (11)
Density (liquids)								
Accuracy	kg/m³ (lb/ft³)	FCT020	±8 (0.5)	±4 (0.25)	±4 (0.25)	±4 (0.25)	±4 (0.25)	±4 (0.25)
	kg/m3 (lb/ft³)	FCT040	±8 (0.5)	±1 (0.06)	±0.5 (0.03)	±0.5 (0.03)	±0.5 (0.03)	±0.5 (0.03)
Mass flow (gases)								
Accuracy	% (of rate)	FCT020	±0.75	±0.75	±0.75	±0.75	±0.75	±0.75
	% (of rate)	FCT040	±0.5	±0.5	±0.35	±0.35	±0.35	±0.35
Temperature								
Accuracy	°C (°F)		±0.5 (0.9)	±0.5 (0.9)	±0.5 (0.9)	±0.5 (0.9)	±0.5 (0.9)	±0.5 (0.9)

Technical specifications (continued)

FCS700: the grande sensor for high flow rates

Sensor size			DN100	DN150	DN200
Mass flow (liquids)					
Accuracy	% (of rate)	FCT020	±0.2	±0.2	±0.2
	% (of rate)	FCT040	±0.1	±0.1	±0.1
Zero stability	kg/h (lb/h)		±13 (28.6)	±25 (55)	±27 (59.4)
Density (liquids)					
Accuracy	kg/m³ (lb/ft³)	FCT020	±4 (0.25)	±4 (0.25)	±4 (0.25)
	kg/m³ (lb/ft³)	FCT040	±2 (0.12)	±2 (0.12)	±2 (0.12)
Mass flow (gases)					
Accuracy	% (of rate)	FCT020	±0.75	±0.75	±0.75
	% (of rate)	FCT040	±0.35	±0.35	±0.5
Temperature					
Accuracy	°C (°F)		±1 (1.8)	±1 (1.8)	±1 (1.8)

Overview

The flowmeter systems of the SITRANS FC500 series are the universal Coriolis multi-parameter flowmeter for routine and hygienic applications.

They are formed by one FCS500 sensor and one FCT transmitter:

- SITRANS FC520 is the combination of the FCS500 sensor and the FCT020 transmitter
- SITRANS FC540 is the combination of the FCS500 sensor and the FCT040 transmitter

Features:

- Dual curved AISI 316L stainless steel measuring tubes
- Process connection: flange, thread, or a selection of hygienic fittings
- Nominal sizes: DN 10 to DN 80
- Connection sizes: DN 8 to DN 125 (⅜" to 5")
- Nominal flow rates: 1 600 to 170 000 kg/h (3 527 to 374 786 lb/h)
- FCS500 sensors can be combined with compact or remote transmitters
- Versatility with superior turndown and low pressure loss
- Hygienic specification for food and beverage, biotechnological and pharmaceutical applications

FC520/540 Coriolis flowmeter

Benefits

Product features aligned to user value targets

	User value targets	SITRANS FC features and solutions
Engineering and project management	• Reduce engineering investment • Cut specification effort • Minimize project expenditure • Decrease the spending on each measurement point • Eliminate function duplication • Reduce number of suppliers	• Siemens project teams offer complimentary evaluation of customer specifications, provided by regional and HQ experts • Simple product selection using intuitive sizing software • One SITRANS FC device can typically provide 3 to 6 individual measurements, all transmitted via digital communication, when planned during pre-project design • Added value functions: batch control, viscosity, thermal energy, concentration measurement (Fraction) of two-component solutions, and pressure compensation
Installation	• Reduce footprint and transport outlay of OEM machinery • Lower installation complexity • Avoid costly modifications of existing plant	• Can be installed in horizontal or vertical (self-draining) pipes • Twin tube bend design delivers strong signal to noise characteristic resistant to external influence, so install in tight spaces with no inlet and outlet restrictions • Adaptable to existing pipes:typically, 3 or 4 connection sizes for each sensor size • Flexible selection of traditional inputs, outputs, and digital communications
Configuration and commissioning	• Shorter commissioning schedules with lower costs • Faster start-up with reduced outgoings	• Easy setup wizard delivers working meters straight after start-up • microSD card stores sensor calibration data and default setup • Simple configuration using Process Device Manager (PDM) • Siemens device-specific faceplates simplify operation in plantwide control systems
Efficient plant operation	• Improve finished product consistency to reduce waste • Keep process performance when scaling production up or down • Optimize process control • Improve finished product quality enabling higher levels of profit • Reduce downtime with fast resolution of process upsets • Improve asset performance	• SITRANS FC meters are calibrated in rigs accredited to EN/ISO 17025 to ensure consistently high performance of flow, density, and concentration measurements • First-class zero-point quality maintains high accuracy into the low flow region • High sensitivity and intelligent dynamic range keeps the measurement active in demanding high fluid damping cases • Designed-in resilience to process extremes • Self-verification alerts to potential performance issues due to unplanned process events, for example gas or vapor breakout or solid deposits building up in the tubes • Diagnostic data via local menu or PDM is backed by Siemens application experts • Intelligent Siemens SITRANS IQ apps for continuing asset evaluation
Maintenance and asset management	• Optimize technician training • Reduce cost of spare parts • Increase predictive maintenance • Reduce production downtime and associated costs • Decrease unplanned maintenance • Maximize asset value	• Simple product design with interchangeable modular parts • microSD card loads sensor-specific data to deliver fast service exchange • Self-verification: tube health check monitors key diagnostics, including tube stiffness, driver and pickups; the user defines verification frequency and alarm behavior • Verification results indicate whether preventive maintenance action is required • Siemens SIMATIC Maintenance Station uses cyclical acquisition to provide life cycle reports and intelligent preventive maintenance strategies
Industry compliance	• Cut effort required to comply with Industry-specific demands • Reduce resources needed to maintain regulatory compliance	• Food and beverage sector covered with EHEDG and 3-A approvals, polished tubes • Global hazardous area approvals for international plant duplications • Common and emerging digital networks covered: HART, PROFIBUS PA, PROFINET • Class-leading safety: SIL2/SIL3, secondary containment, PED, NAMUR NE95

Application

Application examples for SITRANS FC multi-parameter meters across diverse industry sectors	
Chemical and petrochemical Bulk chemicals Industrial gases Polymers Agrochemicals Fine chemicals Aroma chemicals	• Transfer, loading and unloading of bulk chemicals • Concentration control of acids and alkalis (process optimization) • Accurate mass or volume flow of feed chemicals to in-line blending systems • Accurate mass flow and density (quality) of reactor fluid feeds catalyst • Chemical recovery • Mass balance optimization • Compressed and cryogenic gases • Lubricating oil blending and dosing • High accuracy measurement of critical fluid components • Low flow control in pilot plants and R&D facilities
Food and beverage Food processing Dairies Breweries Distilleries Confectionary Soft drinks Animal feed plants OEM	• Accurate bulk transfer (mass or volume) of all dairy products: milk, cream, whey and yoghurt • Fat concentration in cream • Flow, density, temperature and concentration (Plato) during all fermentation processes • Flow, density, temperature and sugar concentration (Brix) in soft drink processing • Distilled spirits – % alcohol by volume (ABV), liters of pure alcohol, volume transfer, blending, batch and column still optimization and energy management, cask filling, tanker loading • Flow and density of fruit juices and pulps • Mixing and inventory control of confectionary ingredients, e.g. chocolate, syrup, oils, flavors • Metering pump control • Oils, fats enzymes dosing in animal feed plants • CO_2 dosing • CIP liquids • Bottling of beer, spirits, wine, soft drinks, etc. • Bulk sugar processing – molasses, sugar slurries, density, Brix of finished product
Oil and gas Offshore/onshore Upstream/downstream Pipelines Distribution networks Refineries Skid manufacturers	• Loading/unloading of hydrocarbons (e.g. crude oil, bitumen) from/to ship, road tanker, rail car • High pressure chemical injection • High pressure low flow gas • Net oil computing • Gas void fraction • Filling of gas bottles • Furnace control • Test separators • LPG, natural gas hydration • Well-head water-cut monitoring • All hydrocarbon fluids in refineries • Metrology, custody transfer • Drilling mud • Oil well cementing and hydrofracturing

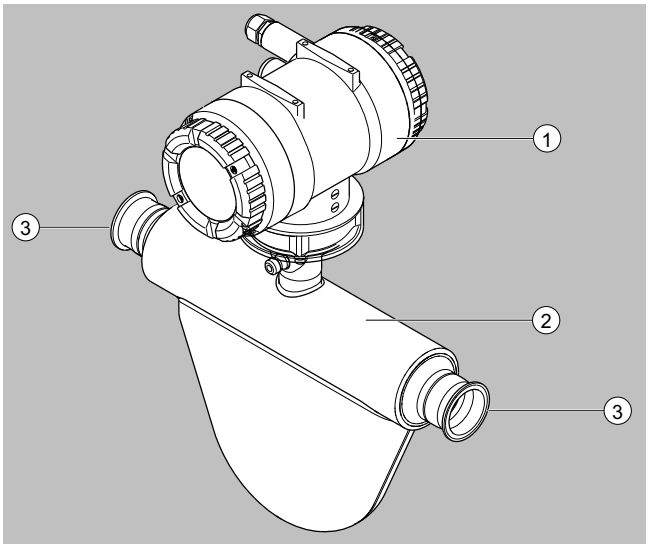
Application (continued)

Application examples for SITRANS FC multi-parameter meters across diverse industry sectors	
Life sciences Pharmaceutical Bio	• High accuracy flow and batching of bioreactor feeds • Solvent flow rate, density and batching • Flow of demineralized and deionized water • Solvents and fish oils used in high grade omega 3 oils • Precision coatings • Vacuum thin film coating
Household and personal care Detergents Cosmetics	• Blending and batching of detergent ingredients • Tanker loading and unloading • Salt concentration • Reliable measurement of aerated liquids
Automotive and aeronautical Vehicle manufacturing Paint Engine testing OEM	• Fuel injection nozzle and pump testing • Filling of under bonnet fluid reservoirs, air conditioning, coolant • Fuel flow and density measurement in engine test beds • Checking for air in oil using high accuracy density measurement • Paint spray robots – requires accurate and fast measurements • Aircraft fuel loading (kerosene) • High pressure flow used in turbine blade manufacture
Power and energy Renewable Hydrogen	• Boiler fuel flow and burner control • Turbine fuel flow • Glycol flow and concentration • Bioethanol
Marine OEM Shipbuilders	• Fuel consumption management • Boiler control • Bunkering management • Density used to indicate fuel quality
Pulp, paper and textiles	• Accurate dosing of dyes and chemicals
Water and environmental	• Dosing of chemicals for water treatment • Chemical concentration for water quality control

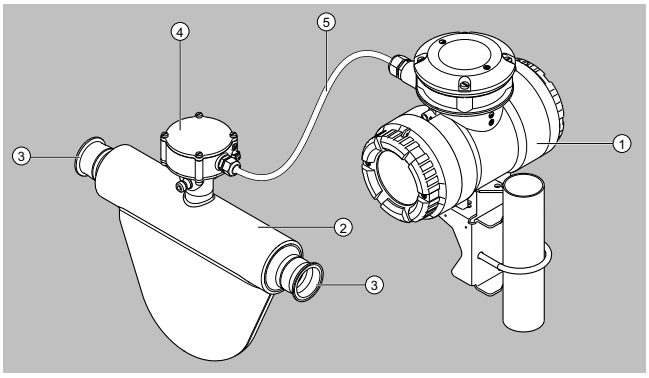
Design

Design options and related temperature range for FC500 series

Design version	Transmitter style	Process fluid temperature range
Non-hygienic, flange or thread, standard neck	Compact	Standard [-50 ... +150 °C (-58 ... +302 °F)]
	Remote	Standard [-70 ... +200 °C (-94 ... +392 °F)]
Hygienic, thread, polished wetted parts, standard neck	Compact	Standard [-40 ... +140 °C (-58 ... +284 °F)]
	Remote	Standard [-70 ... +140 °C (-94 ... +284 °F)]
Hygienic, clamp, polished wetted parts, standard neck	Compact	Standard [-10 ... +140 °C (14 ... 284 °F)]
	Remote	Standard [-10 ... +140 °C (14 ... 284 °F)]



FCS500 sensor with compact transmitter (hygienic version)



FCS500 sensor with remote transmitter (hygienic version)

1	Transmitter
2	FCS500 sensor
3	Process connection
4	Sensor terminal box
5	Connecting cable

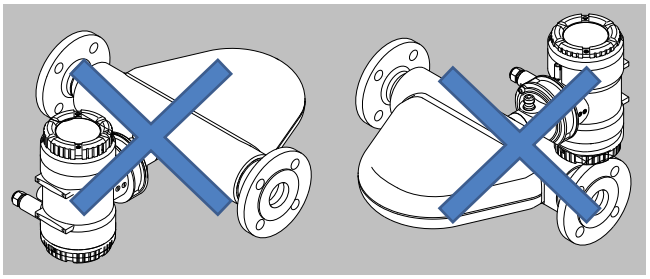
Design (continued)

Installation guidelines

FC500 series flowmeters can be mounted horizontally, vertically and at an incline. The measuring tubes should be filled with the fluid during flow measurement as entrained gas may result in errors in measurement. Straight pipe runs at inlet or outlet are usually not required.

Avoid the following installation locations and positions:

- Measuring tubes as highest point in piping when measuring liquids
- Measuring tubes as lowest point in piping when measuring gases
- Immediately in front of a free pipe outlet in a downpipe
- Lateral positions



Avoid measuring tubes in sideways position resulting in possible non-homogeneous fluid separation

Function

Compatible fluids

- Liquids
- Gases
- Mixtures, solutions, emulsions, suspensions, and slurries

Primary measured variables

- Mass flow
- Density
- Temperature

Based on the primary measured quantities, the transmitter also calculates

- Volume flow
- Percent concentration (fraction) of a two-component mixture (FCT040 only)
- Partial component flow rate (net flow) of a mixture consisting of two components (FCT040 only)

Bi-directional operation

The mass flow, volume flow, and net flow measurements can be bi-directional.

Measurement variables for NTEP approval

- Mass flow uni-directional
- Volume flow uni-directional

Feature overview

- Energy-efficient low pressure loss design with short tube paths and large tube diameter
- Cost-effective short face-to-face length or customized installation length options
- Batching function with batch leakage detection and batch control by transmitter for precise dosing
- Accurate density measurement and up to four advanced Concentration Measurement data sets
- Benefit from Viscosity function and capability to handle high viscous process fluids
- Hygienic design, self-draining in vertical installation, with hygienic approval options

Selection and ordering data

SITRANS FC520/540 (Standard and Hygienic)	Article No. 7ME445	● -	● ●	● ● ● -	● ● ● ● -	Order code ● ● ●
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.						
Transmitter variant						
None (spare sensor)		0				
Coriolis sensor FCS500 with transmitter FCT020		2				
Coriolis sensor FCS500 with transmitter FCT040		4				
SITRANS FC spare part transmitter, no sensor included		9				G 3 Y
Sensor size / Connector size						
No sensor (SITRANS FCT transmitter as spare part)			0 A			
Sensor size DN 10 with connection size 3/8"			1 B			
Sensor size DN 10 with connection size 1/2" DN 15			1 C			
Sensor size DN 10 with connection size 3/4"			1 D			
Sensor size DN 10 with connection size 1" DN 25			1 E			
Sensor sizeDN 10 with connection size 1 1/2" DN 40			1 F			
Sensor size DN 15 with connection size 1/2" DN 15			2 C			
Sensor size DN 15 with connection size 3/4"			2 D			
Sensor size DN 15 with connection size 1" DN 25			2 E			
Sensor size DN 15 with connection size 1 1/2" DN 40			2 F			
Sensor size DN 25 with connection size 1" DN 25			3 E			
Sensor size DN 25 with connection size 1 1/2" DN 40			3 F			
Sensor size DN 25 with connection size 2" DN 50			3 G			
Sensor size DN 50 with connection size 1 1/2" DN 40			4 F			
Sensor size DN 50 with connection size 2" DN 50			4 G			
Sensor size DN 50 with connection size 2 1/2" DN 65			4 H			
Sensor size DN 50 with connection size 3" DN 80			4 J			
Sensor size DN 80 with connection size 3" DN 80			5 J			
Sensor size DN 80 with connection size 4" DN 100			5 K			
Sensor size DN 80 with connection size 5" DN 125			5 L			
Process connection						
No connection (SITRANS FCT transmitter as spare part)				A 0		
EN flange PN 40, suitable for EN 1092-1 type B1, raised face (RF)				A 1		
EN flange PN 100, suitable for EN 1092-1 type B1, raised face (RF)				A 3		
EN flange PN 40, suitable for EN 1092-1 type D, groove				A 5		
EN flange PN 100, suitable for EN 1092-1 type D, groove				A 7		
EN flange PN 40, suitable for EN 1092-1 type E, spigot				B 1		
EN flange PN 100, suitable for EN 1092-1 type E, spigot				B 3		
EN flange PN 40, suitable for EN 1092-1 type F, recess				B 5		
EN flange PN 100, suitable for EN 1092-1 type F, recess				B 7		
ASME flange class 150, suitable for ASME B16.5, raised face (RF)				D 1		
ASME flange class 300, suitable for ASME B16.5, raised face (RF)				D 2		
ASME flange class 600, suitable for ASME B16.5, raised face (RF)				D 3		
ASME flange class 600, suitable for ASME B16.5, ring joint (RJ)				C 3		
JIS flange 10K, JIS B 2220				L 2		
JIS flange 20K, JIS B 2220				L 4		
DIN 11851 threaded connection				F 1		
DIN 11864-2 Form A				H 2		
JIS G3447 and ISO 2852 clamp				J 1		
Clamp process connection according to DIN 32676 series A				G 2		
Clamp process connection according to DIN 32676 series C (Tri-clamp)				G 6		
Process connection with internal thread G				E 1		
Process connection with internal thread NPT				E 3		
Special design				Z 1		K 1 Y
Tube material (wetted) and max operational temperature						
None (SITRANS FCT transmitter as spare part)					0	
316L, 1.4404 media temperature -50 ... 150 °C (-58 ... 302 °F)					1	
316L, 1.4404 media temperature -50 ... 140 °C (-58 ... 284 °F), polished Ra ≤ 0.8 µm					2	
316L, 1.4404 media temperature -70 ... 200 °C (-94 ... 392 °F)					3	
316L, 1.4404 media temperature -70 ... 140 °C (-94 ... 284 °F), polished Ra ≤ 0.8 µm					4	

Selection and ordering data (continued)

SITRANS FC520/540 (Standard and Hygienic)	Article No. 7ME445 ● - ● ● ● ● ● - ● ● ● ● -	Order code ● ● ●
Calibration		
No calibration	0	
Massflow 0.1%, density 0.5 g/l	1	
Massflow 0.1%, density 1 g/l	2	
Massflow 0.1%, density 4 g/l	5	
Massflow 0.2%, density 4 g/l	6	
Accuracy for gas please select below	9	
Massflow gas 0.75%		N 1 A
Massflow gas 0.5%		N 2 A
Mounting style, transmitter housing and material		
Compact type with "urethane-cured polyester powder coating" coated aluminum transmitter housing	A	
Compact type with "corrosion protection coating" coated aluminum transmitter housing	B	
Remote type with "urethane-cured polyester powder coating" coated aluminum transmitter housing and standard neck sensor	C	
Remote type with "corrosion protection coating" coated aluminum transmitter housing and standard neck sensor	E	
Remote type stainless steel transmitter and standard neck sensor	G	
Ex approvals		
None	A	
ATEX, explosion group IIC and IIIC	B	
ATEX, explosion group IIB and IIIC	C	
IECEx, explosion group IIC and IIIC	D	
IECEx, explosion group IIB and IIIC	E	
FM, groups A B C D E F G	H	
FM, groups C D E F G	J	
NEPSI, explosion group IIC and IIIC	M	
NEPSI, explosion group IIB and IIIC	N	
Local User Interface		
Spare sensor without transmitter, no display applied	0	
No display	1	
With display	3	

	Order code
Further designs Please add "**-Z**" to Article No. and specify order code(s).	
Cable glands	
Metric, no glands (M20)	**A10**
NPT, no glands (1/2")	**A11**
Armored cable setup (NPT threads supplied)	**A20**
NPT, no glands (1/2") steel armored cable	**A21**
Sensor housing material	
None (SITRANS FCT transmitter as spare part)	**B00**
Stainless steel 1.4301/304, 1.4404/316L	**B01**
I/O Configuration Ch1	
None	**E00**
4-20 mA HART active	**E06**
4-20 mA HART passive	**E07**
PROFIBUS PA	**E10**
I/O Configuration Ch2, Ch3 and Ch4	
Spare sensor without transmitter, all communication types and I/Os apply	**F00**
1 passive current output, 1 passive pulse or status output	**F01**
1 passive current output, 2 passive pulse or status outputs	**F02**
1 passive current output, 1 passive pulse or status outputs, 1 passive NAMUR pulse or status output	**F03**
1 passive current output, 2 passive NAMUR pulse or status outputs	**F04**
1 passive pulse or status output	**F11**
2 passive pulse or status outputs, 1 passive status output	**F12**
2 passive pulse or status outputs, 1 voltage-free status input	**F13**
2 passive pulse or status outputs, 1 active current input	**F14**
2 passive pulse or status outputs, 1 passive current input	**F15**
1 passive pulse or status output, 1 passive current output, 1 active current input	**F16**
1 passive pulse or status output, 1 passive current output, 1 passive current input	**F17**
1 passive pulse or status output, 1 voltage-free status input, 1 active current input	**F18**
1 passive pulse or status output, 1 voltage-free status input, 1 passive current input	**F19**

Selection and ordering data (continued)

	Order code
1 passive pulse or status output, 1 active pulse or status output, 1 voltage-free status input	**F20**
1 passive pulse or status output, 1 active pulse or status output with pull-up resistor, 1 voltage-free status input	**F21**
1 active current output, 2 passive pulse or status outputs	**F22**
1 active current output, 1 passive pulse or status output,1 voltage-free status input	**F23**
1 passive pulse or status output	**F31**
2 passive pulse or status outputs	**F32**
1 passive pulse or status output,1 active current input	**F33**
1 passive pulse or status output,1 passive current input	**F34**
1 passive pulse or status output,1 active pulse or status output	**F35**
1 passive pulse or status output,1 active pulse or status output with pull-up resistor	**F36**
1 passive pulse or status output,1 active current output	**F37**
1 passive pulse output	**F41**
Output CH1 intrinsically safe, 1 passive pulse output	**F42**
Certificates	
Declaration of compliance with the order 2.1 according to EN 10204	**C11**
Quality Inspection Certificate (Inspection Certificate 3.1 according to EN 10204)	**C40**
Certificate of Marking Transfer and Raw Material Certificates (Inspection Certificate 3.1 according to EN 10204), including IGC and conform to NACE MR0175 and MR0103	**C13**
Hydrostatic Pressure Test Certificate (Inspection Certificate 3.1 according to EN 10204)	**C18**
Degreasing of wetted surfaces according to ASTM G93-03 (Level C), including test report	**C54**
WPS according to EN ISO 15809-1; WPQR according to EN ISO 15814-1; WQC according to DIN EN 287-1 or EN ISO 8908-4	**C36**
Welding procedures and certificate ASME IX	**C37**
X-ray inspection of flange weld seam according to EN ISO 17636-1/B, evaluation according to AD 2000 HP 5/3 and EN ISO 5817/C, including certificate	**C33**
X-ray test according to ASME V	**C34**
Dye penetrant test of process connection weld seams according to EN ISO 3452-1, including certificate	**C38**
Dye penetrant test of flange welding according to ASME V, including certificate	**C39**
Positive Material Identification of wetted parts, including certificate (Inspection Certificate 3.1 according to EN 10204)	**C15**
3-A product conformity with 3-A certificate and marking, including Surface Roughness wetted parts Ra ≤ 0.8 µm and Surface Roughness Inspection Certificate	**C62**
EHEDG product conformity with EHEDG Certificate and marking, including Surface Roughness wetted parts Ra ≤ 0.8 µm and Surface Roughness Inspection Certificate	**C63**
Surface Roughness wetted parts Ra ≤ 0.8 µm and Surface Roughness Inspection Certificate	**C61**
NTEP approval accuracy class 0.3 acc. NIST	**C16**
Connecting cable type and length	
without standard connecting cable	**L50**
5 meter (16.4 ft) remote connecting cable terminated standard gray / Ex blue	**L51**
10 meter (32.8 ft) remote connecting cable terminated standard gray / Ex blue	**L54**
15 meter (49.2 ft) remote connecting cable terminated standard gray / Ex blue	**L57**
20 meter (65.6 ft) remote connecting cable terminated standard gray / Ex blue	**L60**
30 meter (98.4 ft) remote connecting cable terminated standard gray / Ex blue	**L63**
without fire retardant connecting cable	**L70**
5 meter (16.4 ft) remote fire retardant connecting cable not terminated	**L71**
10 meter (32.8 ft) remote fire retardant connecting cable not terminated	**L74**
15 meter (49.2 ft) remote fire retardant connecting cable not terminated	**L77**
20 meter (65.6 ft) remote fire retardant connecting cable not terminated	**L80**
30 meter (98.4 ft) remote fire retardant connecting cable not terminated	**L83**
SW functions	
Heat measurement	**S11**
Tube health check	**S12**
Batching and filling function	**S13**
Netoil computing	**S14**
Viscosity computing function for liquids	**S15**
Standard concentration measurement	**S16**
Marine approval	
Marine approved DNV, ABS, KR piping class 2	**S22**
Marine approved DNV, ABS, KR piping class 3	**S23**
Marine approved LR, MR, TAC piping class 2	**S24**
Marine approved LR, MR, TAC piping class 3	**S25**
Marine approved BV piping class 2	**S26**
Marine approved BV piping class 3	**S27**
Mounting	
Namur built-in length according to NE132	**S31**
Country-specific delivery	
Delivery to China including China RoHS mark	**W21**
Delivery to Korea including KC mark	**W22**
Fraction setup PIA: Please select four options	
Sugar / Water 0 ... 85 °Bx, 0 ... 80 °C (32 ... 176 °F)	**G01**
NaOH / Water 2 ... 50 WT%, 0 ... 100 °C (32 ... 212 °F)	**G02**
KOH / Water 0 ... 60 WT%, 54 ... 100 °C (129 ... 212 °F)	**G03**
NH_4NO_3 / Water 1 ... 50 WT%, 0 ... 80 °C (32 ... 176 °F)	**G04**
NH_4NO_3 / Water 20 ... 70 WT%, 20 ... 100 °C (68 ... 212 °F)	**G05**
HCl / Water 22 ... 34 WT%, 20 ... 40 °C (68 ... 104 °F)	**G06**
HNO_3 / Water 50 ... 67 WT%, 10 ... 60 °C (50 ... 140 °F)	**G07**
H_2O_2 / Water 30 ... 75 WT%, 4 ... 44 °C (39 ... 111 °F)	**G09**
Ethylene Glycol / Water 10 ... 50 WT%, -20 ... 40 °C (-4 ... 104 °F)	**G10**
Amylum = Starch / Water 33 ... 43 WT%, 35 ... 45 °C (95 ... 113 °F)	**G11**
Methanol / Water 35 ... 60 WT%, 0 ... 40 °C (32 ... 104 °F)	**G12**

Selection and ordering data (continued)

	Order code
Alcohol / Water 55 ... 100 VOL%, 10 ... 40 °C (50 ... 104 °F)	**G20**
Sugar / Water 40 ... 80 °Bx, 75 ... 100 °C (167 ... 212 °F)	**G21**
Alcohol / Water 66 ... 100 WT%, 15 ... 40 °C (59 ... 104 °F)	**G30**
Alcohol / Water 66 ... 100 WT%, 10 ... 40 °C (50 ... 104 °F)	**G37**

	Order code
Tag name	
Tag name plate, SS (max. 16 characters)	**Y11**
HART Tag No. (max. 8 characters)	**Y25**
HART Tag No. (max. 32 characters)	**Y26**
PROFIBUS PA NODE ADDRESS (4 characters HEX)	**Y28**
PROFIBUS PA SOFTWARE TAG (max. 32 characters)	**Y29**
Customer installation length	
Customer installation length (mm)	**Y30**
Special versions	
ID-Number of special design	**Y99**

Technical specifications

Mass flow rate of liquids

The mass flow rate characteristics of SITRANS FC meters are defined by the values of zero stability, Q_{flat}, Q_{nom} and Q_{max}.

Zero stability is the maximum allowable flow rate value that can be displayed at zero flow under reference conditions. It is a good indicator of the meter performance as flow rates reduce, and approach zero.

- Q_{flat} is the mass flow rate above which the base accuracy is maintained (0.1% when using FCT040 transmitters).
- Q_{nom} is the nominal mass flow rate of water at reference conditions that would result in a pressure drop of 1 bar (15 psi).
- Q_{max} is the recommended maximum mass flow rate for each sensor size.

For questions regarding expected performance in specific applications, please contact your regional Siemens Measurement Intelligence team.

Flow rate summary by FCS500 sensor size

Nominal size	Zero stability		Q_{flat}		Q_{nom}		Q_{max}	
	kg/h	lb/h	kg/h	lb/min	kg/h	lb/min	kg/h	lb/min
DN 10	0.032	0.070	80.0	2.94	1 600	58.7	2 300	84.4
DN 15	0.090	0.198	235	8.62	4 700	172	7 000	257
DN 25	0.400	0.880	1 000	36.7	20 000	734	29 000	1 064
DN 50	2.55	5.61	2 550	93.6	51 000	1 872	76 000	2 789
DN 80	8.50	18.7	8 500	312	170 000	6 239	255 000	9 359

Performance summary by FCS500 sensor size and transmitter type

Sensor size			DN 10	DN 15	DN 25	DN 50	DN 80
Mass flow (liquids)							
Accuracy	% (of rate)	FCT020	± 0.2	± 0.2	± 0.2	± 0.2	± 0.2
	% (of rate)	FCT040	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1
Zero stability	kg/h (lb/h)		± 0.032 (0.07)	± 0.09 (0.198)	± 0.4 (0.88)	± 2.55 (5.61)	± 8.5 (18.7)
Density (liquids)							
Accuracy	kg/m³ (lb/ft³)	FCT020	± 4 (0.25)	± 4 (0.25)	± 4 (0.25)	± 4 (0.25)	± 4 (0.25)
	kg/m3 (lb/ft³)	FCT040	± 0.5 (0.03)	± 0.5 (0.03)	± 0.5 (0.03)	± 0.5 (0.03)	± 1 (0.06)
Mass flow (gases)							
Accuracy	% (of rate)	FCT020	± 0.75	± 0.75	± 0.75	± 0.75	± 0.75
	% (of rate)	FCT040	± 0.35	± 0.35	± 0.35	± 0.35	± 0.35
Temperature							
Accuracy	°C (°F)		± 1 (1.8)	± 1 (1.8)	± 1 (1.8)	± 1 (1.8)	± 1 (1.8)

Note:

The accuracy values in the table above are based on reference conditions at the time of calibration and represent the combined measurement uncertainties including sensor, electronic and pulse output interface.

Liquid density calibration is performed when density accuracy of 0.5 kg/m³ (0.03 lb/ft³) is selected in the model code.

Mass flow calibration and density adjustment for liquids

Siemens SITRANS FC Coriolis meters are calibrated in rigs accredited according to the international standard DIN EN ISO/IEC 17025:2018. Each flowmeter comes with a standard calibration certificate.

Mass flow calibration takes place at reference conditions. Specific values are listed in the standard calibration certificate.

Mass flow calibration reference conditions

Fluid	Water
Density	900 ... 1 100 kg/m³ (56 ... 69 lb/ft³)
Fluid temperature	10 ... 35 °C (50 ... 95 °F), average temperature: 22.5 °C (72.5 °F)
Ambient temperature	10 ... 35 °C (50 ... 95 °F)
Process pressure	1 ... 5 bar (15 ... 73 psi)

Density calibration reference conditions

Flow condition	Fully developed flow profile
Fluid densities used to obtain density calibration constants	700 kg/m³ (44 lb/ft³) 1 000 kg/m³ (62 lb/ft³) 1 650 kg/m³ (103 lb/ft³)
Fluid temperature	20 °C (68 °F)
Determination of temperature compensation coefficients	20 ... 80 °C (68 ... 176 °F)

Analog output performance specification

Typical additional uncertainty when using the analog current output:

± 0.04% at a nominal mid-range current output of 12 mA, which includes the effects of: Output adjustment, linearity, power supply variation, load resistance variation, short-term and long-term drift for one year, and ambient temperature effect on the transmitter in the range 20 °C ± 30 °C (14 ... 122 °F).

Process pressure effect on flow measurement performance

Changes in operating pressure have a small effect on the mass flow measurement performance. When the pressure changes are very large this effect can be corrected by a dynamic pressure input or a fixed process pressure.

Technical specifications (continued)

Sensor size	Additional flow measurement errors due to change in operating pressure from reference pressure	
	in % of rate per 1 bar variation	in % of rate per 1 psi variation
DN 10	-0.0020	-0.00014
DN 15	-0.0084	-0.00058
DN 25	-0.0109	-0.00075
DN 50	-0.0130	-0.0009
DN 80	-0.0233	-0.0016

Process temperature effect

For mass flow measurement, process fluid temperature effect is defined as the change in sensor flow accuracy due to process fluid temperature change, away from the 20 °C (68 °F) reference condition. Variation in process temperature influences the measuring tube characteristics and this is compensated for using the built-in PT 1000 temperature sensor.

A small flow uncertainty remains in the compensation circuit, defined below.

Uncertainty due to process temperature change: ± 0.0009% of mass flow rate per °C (± 0.0005% of mass flow rate per °F)

Temperature effect on zero

Temperature effect on the mass flow zero-point quality can be corrected by zeroing at the process fluid temperature.

Process conditions

Process fluid temperature range

Design version	Transmitter	Process fluid temperature range
Non-hygienic, flange or thread, standard neck	Compact	Standard [-50 ... +150 °C (-58 ... +302 °F)]
	Remote	Standard [-70 ... +200 °C (-94 ... +392 °F)]
Hygienic, thread, polished wetted parts, standard neck	Compact	Standard [-40 ... +140 °C (-58 ... +284 °F)]
	Remote	Standard [-70 ... +140 °C (-94 ... +284 °F)]
Hygienic, clamp, polished wetted parts, standard neck	Compact	Standard [-10 ... +140 °C (14 ... 284 °F)]
	Remote	Standard [-10 ... +140 °C (14 ... 284 °F)]

Operating pressure

The maximum allowed process pressure depends on the selected process connection and process temperature.

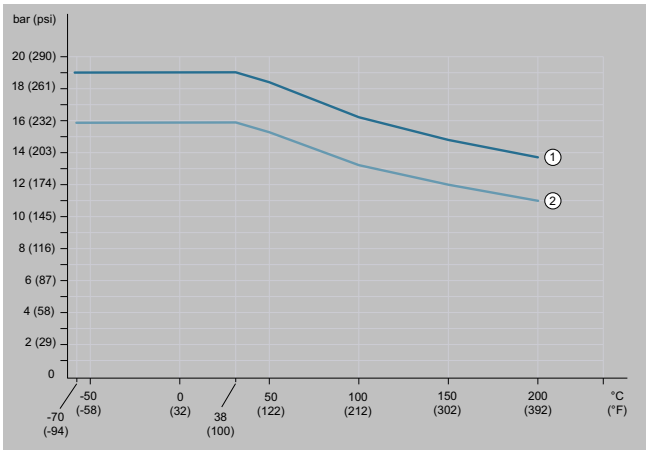
The given process temperature and process pressure ranges are calculated and approved without corrosion or erosion effects.

Pressure versus temperature relationship depending on selected process connection

The following diagrams show the process pressure as a function of process temperature as well as the process connection used (type and size of process connection).

Calculations for ASME flanges are based on ASME B16.5 Material group 2.2 (316/316L dual certified).

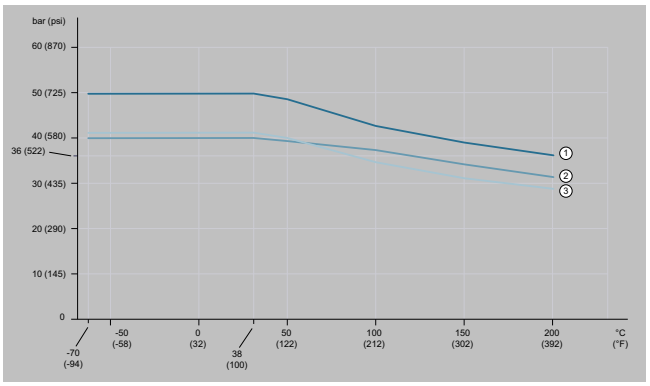
ASME class 150



Allowed process pressure as a function of process fluid temperature

1	Process connection compatible to ASME B16.5 class 150
2	Not used for this product

ASME class 300, EN PN 40

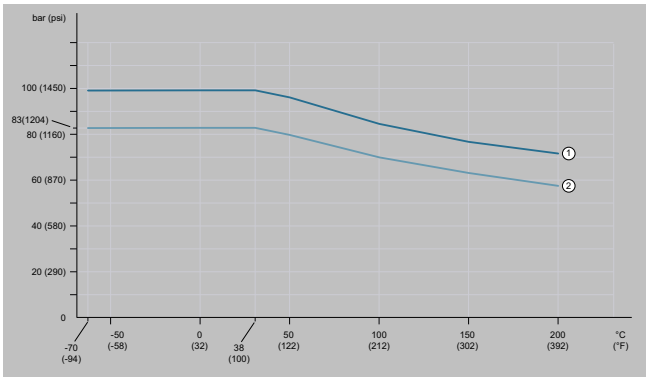


Allowed process pressure as a function of process fluid temperature

1	Process connection compatible to ASME B16.5 class 300
2	Process and heat tracing connection compatible to EN 1092-1 PN 40
3	Not used for this product

Technical specifications (continued)

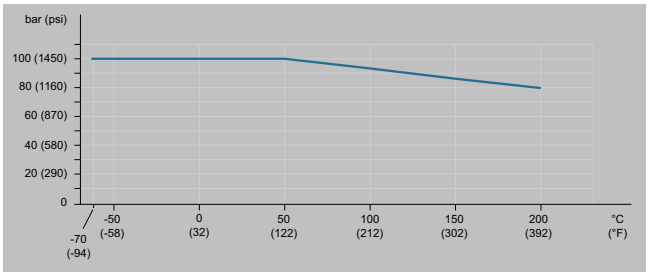
ASME class 600



Allowed process pressure as a function of process fluid temperature

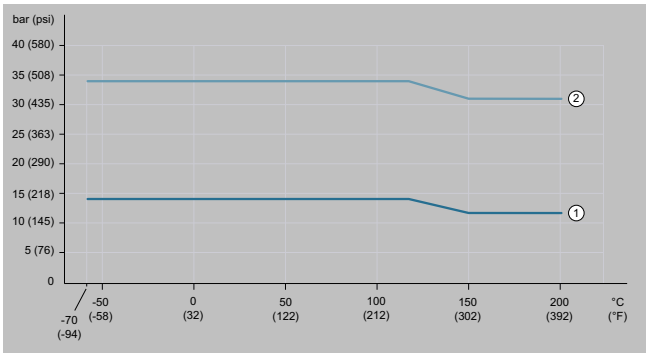
1	Process connection compatible to ASME B16.5 class 600
2	Not used for this product

EN PN100



Allowed process pressure as a function of process fluid temperature, compatible to EN 1092-1 PN 100

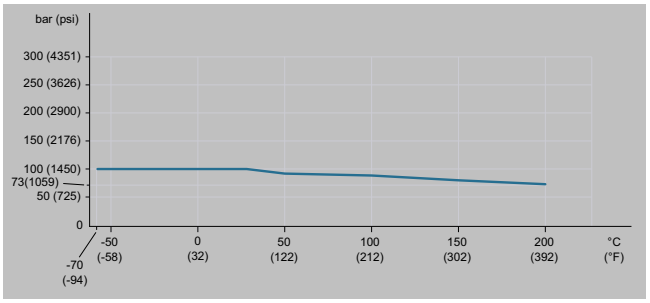
JIS 10K, JIS 20K



Allowed process pressure as a function of process connection temperature

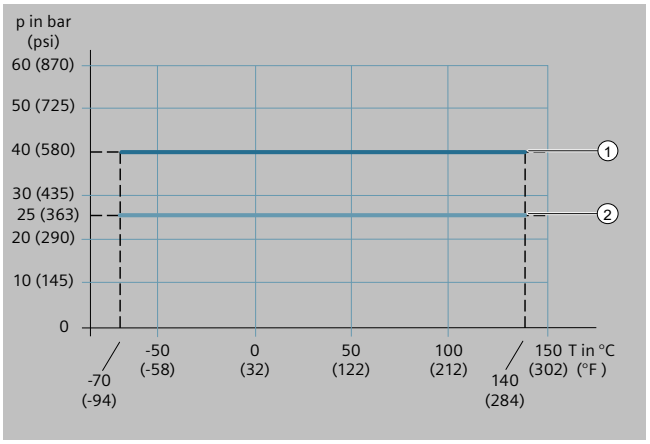
1	Process connection compatible to JIS B 2220 10K
2	Process connection compatible to JIS B 2220 20K

Process connection with internal thread G and NPT



Allowed process pressure as a function of process fluid temperature

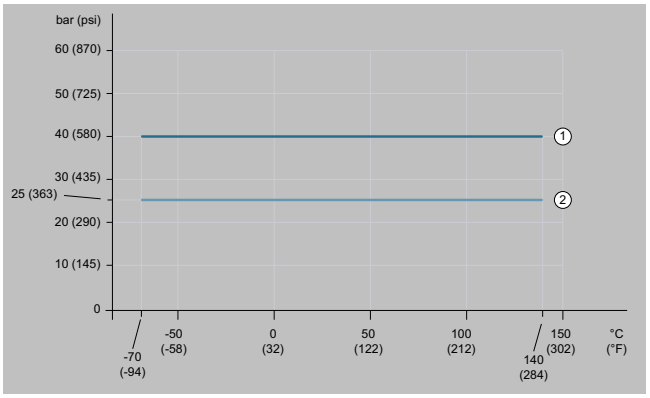
Threaded connection according to DIN 11851



Allowed process pressure as a function of process connection temperature

1	Threaded connection compatible to DIN 11851 up to DN 40
2	Threaded connection compatible to DIN 11851 from DN 50 to DN 100

Threaded connection according to SMS 1145

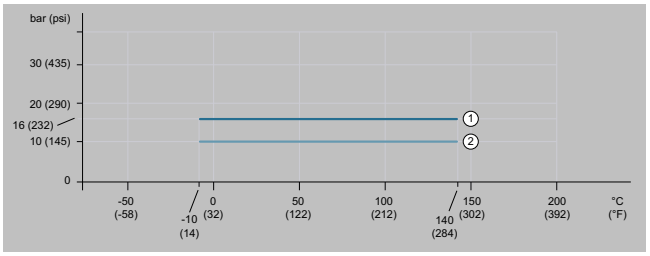


Allowed process pressure as a function of process connection temperature

Technical specifications (continued)

1	Threaded sanitary connection for SMS 1145 up to DN 40
2	Threaded sanitary connection for SMS 1145 from DN 50 up to DN 80

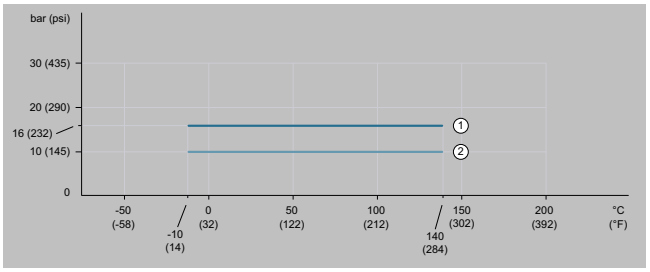
Clamp process connection according to DIN 32676 series A



Allowed process pressure as a function of process fluid temperature

1	Clamp connection compatible to DIN 32676 series A up to DN 50
2	Clamp connection compatible to DIN 32676 series A above DN 50

Clamp process connection according to DIN 32676 series C (Tri-Clamp)



Allowed process pressure as a function of process fluid temperature

1	Clamp connection compatible to DIN 32676 series C up to 2"
2	Clamp connection compatible to DIN 32676 series C above 2"

Ambient conditions

Allowed ambient and storage temperature of SITRANS FC500 series is influenced by the temperature specification of FCS500 sensor, FCT0X0 transmitter and the interconnecting cable.

Ambient temperature

Device surrounding air temperature is considered as ambient temperature. If the device is operating outdoors make sure that the solar irradiation does not increase the surface temperature of the device higher than the allowed maximum ambient temperature. Transmitter display has limited legibility below -20 °C (-4 °F).

The sensor ambient temperature limits may also be influenced by the process fluid temperature, details shown in the chapter “Sensors” (Technical specifications).

Maximum ambient temperature ranges for FC500 series

Cable type	Transmitter style	Device	Ambient temperature range
None	Compact	Sensor and transmitter	-40 ... +60 °C (-40 ... +140 °F)
Standard cable	Remote	Sensor	-50 ... +80 °C (-58 ... +176 °F)
		Transmitter	-40 ... +60 °C (-40 ... +140 °F)
Fire retardant cable	Remote	Sensor	-35 ... +80 °C (-31 ... +176 °F)
		Transmitter	-35 ... +60 °C (-31 ... +140 °F)

Ambient temperature range for NTEP custody transfer approval

Cable type	Transmitter style	Device	Ambient temperature range
None	Compact	Sensor and transmitter	-40 ... +50 °C (-40 ... +122 °F)
Standard cable	Remote	Sensor	-50 ... +80 °C (-58 ... +176 °F)
		Transmitter	-40 ... +50 °C (-40 ... +122 °F)
Fire retardant cable	Remote	Sensor	-35 ... +80 °C (-31 ... +176 °F)
		Transmitter	-35 ... +50 °C (-31 ... +122 °F)

Technical specifications (continued)

Maximum storage temperature ranges for FC500 series

Cable type	Transmitter style	Device	Storage temperature range
None	Compact	Sensor and transmitter	-40 ... +60 °C (-40 ... +140 °F)
Standard cable	Remote	Sensor	-50 ... +80 °C (-58 ... +176 °F)
		Transmitter	-40 ... +60 °C (-40 ... +140 °F)
Fire retardant cable	Remote	Sensor	-35 ... +80 °C (-31 ... +176 °F)
		Transmitter	-35 ... +60 °C (-31 ... +140 °F)

Temperature specification of FC500 series Ex versions located in hazardous areas

Please select appropriate equipment in accordance with the laws and regulations of the relevant country/region, when it is used in a location where explosive atmospheres may be present.

The maximum ambient and process fluid temperatures depending on explosion groups and temperature classes can be determined via the SITRANS FC order code together with the Ex code (see the corresponding explosion proof type manual).

Note:

The maximum process fluid temperature could be further restricted due to process connection type. Refer to curves above under the heading, “Allowed ambient temperature for FCS500 sensors”.

FCS500 nominal sizes DN 10 and DN 15, compact transmitter

Ex approvals:

All gas groups: ATEX, IEC Ex, FM, EAC Ex, NEPSI, Korea Ex, UK Ex

Temperature class	Maximum process temperature	Maximum ambient temperature
T6	47 °C (116 °F)	43 °C (109 °F)
T5	62 °C (143 °F)	58 °C (136 °F)
T4	99 °C (210 °F)	60 °C (140 °F)
T3	150 °C (302 °F)	60 °C (140 °F)
T2	150 °C (302 °F)	60 °C (140 °F)
T1	150 °C (302 °F)	60 °C (140 °F)

FCS500 nominal size DN 25, compact transmitter

Ex approvals:

All gas groups: ATEX, IEC Ex, FM, EAC Ex, NEPSI, Korea Ex, UK Ex

Temperature class	Maximum process temperature	Maximum ambient temperature
T6	54 °C (129 °F)	54 °C (129 °F)
T5	68 °C (154 °F)	60 °C (140 °F)
T4	107 °C (224 °F)	60 °C (140 °F)
T3	150 °C (302 °F)	60 °C (140 °F)
T2	150 °C (302 °F)	60 °C (140 °F)
T1	150 °C (302 °F)	60 °C (140 °F)

FCS500 nominal size DN 50, compact transmitter

Ex approvals:

- Gas groups IIC and IIIC: ATEX, IEC Ex, EAC Ex, NEPSI, Korea Ex, UK Ex
- Gas groups A, B, C, D, E, F & G: FM

Temperature class	Maximum process temperature	Maximum ambient temperature
T6	64 °C (147 °F)	40 °C (104 °F)
T5	80 °C (176 °F)	55 °C (131 °F)
T4	117 °C (224 °F)	60 °C (140 °F)
T3	150 °C (302 °F)	60 °C (140 °F)
T2	150 °C (302 °F)	60 °C (140 °F)
T1	150 °C (302 °F)	60 °C (140 °F)

Ex approvals:

- Gas groups IIB and IIIC: ATEX, IEC Ex, EAC Ex, NEPSI, Korea Ex, UK Ex
- Gas groups C, D, E, F & G: FM

Technical specifications (continued)

Temperature class	Maximum process temperature	Maximum ambient temperature
T6	64 °C (147 °F)	44 °C (111 °F)
T5	80 °C (176 °F)	59 °C (138 °F)
T4	117 °C (242 °F)	60 °C (140 °F)
T3	150 °C (302 °F)	60 °C (140 °F)
T2	150 °C (302 °F)	60 °C (140 °F)
T1	150 °C (302 °F)	60 °C (140 °F)

FCS500 nominal size DN 80, compact transmitter

Ex approvals:

All gas groups: ATEX, IEC Ex, FM, EAC Ex, NEPSI, Korea Ex, UK Ex

Temperature class	Maximum process temperature	Maximum ambient temperature
T6	68 °C (154 °F)	39 °C (102 °F)
T5	83 °C (181 °F)	54 °C (129 °F)
T4	119 °C (246 °F)	60 °C (140 °F)
T3	150 °C (302 °F)	60 °C (140 °F)
T2	150 °C (302 °F)	60 °C (140 °F)
T1	150 °C (302 °F)	60 °C (140 °F)

FCS500 nominal sizes DN 10 and DN 15, remote transmitter

Ex approvals:

All gas groups: ATEX, IEC Ex, EAC Ex, NEPSI, Korea Ex, UK Ex

Temperature class	Maximum process temperature	Maximum ambient temperature	
		Standard cable	Fire retardant cable
T6	47 °C (116 °F)	46 °C (114 °F)	46 °C (114 °F)
T5	62 °C (143 °F)	61 °C (141 °F)	61 °C (141 °F)
T4	99 °C (210 °F)	80 °C (176 °F)	74 °C (165 °F)
T3	162 °C (323 °F)	74 °C (165 °F)	56 °C (132 °F)
T2	200 °C (392 °F)	60 °C (140 °F)	46 °C (114 °F)
T1	200 °C (392 °F)	60 °C (140 °F)	46 °C (114 °F)

Ex approvals:

All gas groups: FM

Temperature class	Maximum process temperature	Maximum ambient temperature	
		Standard cable	Fire retardant cable
T6	47 °C (116 °F)	46 °C (114 °F)	46 °C (114 °F)
T5	62 °C (143 °F)	61 °C (141 °F)	61 °C (141 °F)
T4	99 °C (210 °F)	80 °C (176 °F)	70 °C (158 °F)
T3	162 °C (323 °F)	74 °C (165 °F)	56 °C (132 °F)
T2	200 °C (392 °F)	60 °C (140 °F)	46 °C (114 °F)
T1	200 °C (392 °F)	60 °C (140 °F)	46 °C (114 °F)

FCS500 nominal size DN 25, remote transmitter

Ex approvals:

All gas groups: ATEX, IEC Ex, FM, EAC Ex, NEPSI, Korea Ex, UK Ex

Temperature class	Maximum process temperature	Maximum ambient temperature	
		Standard cable	Fire retardant cable
T6	54 °C (129 °F)	54 °C (129 °F)	54 °C (129 °F)
T5	68 °C (154 °F)	68 °C (154 °F)	68 °C (154 °F)
T4	107 °C (224 °F)	80 °C (176 °F)	66 °C (150 °F)
T3	176 °C (348 °F)	68 °C (154 °F)	51 °C (123 °F)
T2	200 °C (392 °F)	60 °C (140 °F)	46 °C (114 °F)
T1	200 °C (392 °F)	60 °C (140 °F)	46 °C (114 °F)

Technical specifications (continued)

FCS500 nominal size DN 50, remote transmitter

Ex approvals:

- Gas groups IIC and IIIC: ATEX, IEC Ex, EAC Ex, NEPSI, Korea Ex, UK Ex
- Gas groups A, B, C, D, E, F & G: FM

Temperature class	Maximum process temperature	Maximum ambient temperature	
		Standard cable	Fire retardant cable
T6	64 °C (147 °F)	42 °C (107 °F)	42 °C (107 °F)
T5	80 °C (176 °F)	57 °C (134 °F)	57 °C (134 °F)
T4	117 °C (242 °F)	80 °C (176 °F)	66 °C (150 °F)
T3	185 °C (365 °F)	68 °C (154 °F)	50 °C (122 °F)
T2	200 °C (392 °F)	60 °C (140 °F)	46 °C (114 °F)
T1	200 °C (392 °F)	60 °C (140 °F)	46 °C (114 °F)

Ex approvals:

- Gas groups IIB and IIIC: ATEX, IEC Ex, EAC Ex, NEPSI, Korea Ex, UK Ex
- Gas groups C, D, E, F & G: F

Temperature class	Maximum process temperature	Maximum ambient temperature	
		Standard cable	Fire retardant cable
T6	64 °C (147 °F)	46 °C (114 °F)	46 °C (114 °F)
T5	80 °C (176 °F)	61 °C (141 °F)	61 °C (141 °F)
T4	117 °C (242 °F)	80 °C (176 °F)	66 °C (150 °F)
T3	185 °C (365 °F)	66 °C (150 °F)	50 °C (122 °F)
T2	200 °C (392 °F)	60 °C (140 °F)	46 °C (114 °F)
T1	200 °C (392 °F)	60 °C (140 °F)	46 °C (114 °F)

FCS500 nominal size DN 80, remote transmitter

Ex approvals:

- All gas groups: ATEX, IEC Ex, EAC Ex, NEPSI, Korea Ex, UK Ex

Temperature class	Maximum process temperature	Maximum ambient temperature	
		Standard cable	Fire retardant cable
T6	68 °C (154 °F)	40 °C (104 °F)	40 °C (104 °F)
T5	83 °C (181 °F)	55 °C (131 °F)	55 °C (131 °F)
T4	119 °C (246 °F)	80 °C (176 °F)	66 °C (150 °F)
T3	185 °C (365 °F)	66 °C (150 °F)	50 °C (122 °F)
T2	200 °C (392 °F)	60 °C (140 °F)	46 °C (114 °F)
T1	200 °C (392 °F)	60 °C (140 °F)	46 °C (114 °F)

Additional ambient and environmental specifications

Specification	Rating/level of compliance
Relative humidity	0 ... 95%
Ingress protection	IP66 or IP67 with suitable cable glands
Environmental pollution	Pollution degree 4 in accordance with EN 61010-1 whilst in operation
Maximum altitude	2 000 m (6 600 ft) above mean sea level (MSL)
Mechanical load	• Transmitter: 10 ... 500 Hz, 1g • Sensor: 10 ... 500 Hz, 1g according to IEC 60068-2-6
Electromagnetic (EMC) Immunity	• EN IEC 61326-1, Table 2 • EN IEC61326-2-3 • EN IEC 61326-2-5 • NAMUR NE 21 recommendation • DNV-CG-0339 section 3, chapter 14

Specification	Rating/level of compliance
Surge Immunity Emission	• EN 61000-4-5 for lightning protection • EN IEC 61000-3-2, Class A (harmonic current emissions) • EN IEC 61000-3-3, Class A (voltage fluctuations) • Immunity assessment criterion: output signal fluctuation is within ± 1% of the output span
Overvoltage	Category II according to EN IEC 61010-1

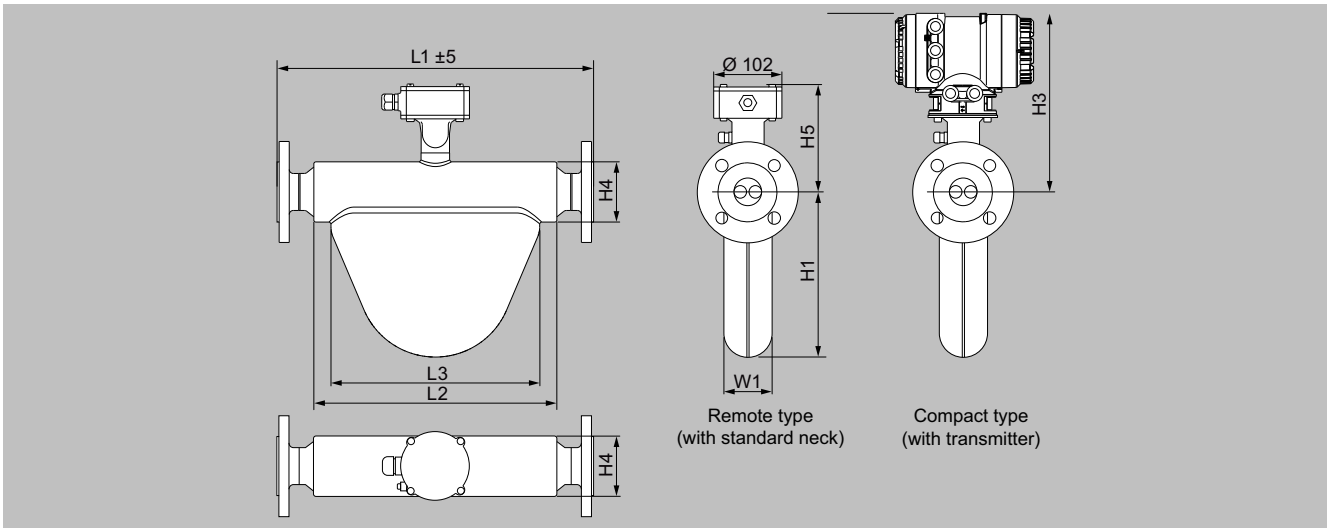
Technical specifications (continued)

Approvals and certificates – summary

Position in code, type	Order code	Description
15, Ex approval	B	ATEX, explosion group IIC and IIIC
15, Ex approval	C	ATEX, explosion group IIB and IIIC
15, Ex approval	D	IECEx, explosion group IIC and IIIC
15, Ex approval	E	IECEx, explosion group IIB and IIIC
15, Ex approval	H	FM, groups A, B, C, D, E, F, G
15, Ex approval	J	FM, groups C, D, E, F, G
15, Ex approval	M	NEPSI, explosion group IIC and dust proof
15, Ex approval	N	NEPSI, explosion group IIB and dust proof
15, Ex approval	F	EAC Ex, explosion group IIC and IIIC
15, Ex approval	G	EAC Ex, explosion group IIB and IIIC
15, Ex approval	P	Korea Ex, explosion group IIC and IIIC
15, Ex approval	Q	Korea Ex, explosion group IIB and IIIC
15, Ex approval	U	UKEx, explosion group IIC and IIIC
15, Ex approval	V	UKEx, explosion group IIB and IIIC
ZS2, Marine approval	S22	Marine approval according DNV, ABS and KR piping class 2
ZS2, Marine approval	S23	Marine approval according DNV, ABS and KR piping class 3
ZS2, Marine approval	S24	Marine approval according LR MR TAC piping class 2
ZS2, Marine approval	S25	Marine approval according LR MR TAC piping class 3
ZS2, Marine approval	S26	Marine approved BV piping class 2
ZS2, Marine approval	S27	Marine approved BV piping class 3
ZC1, Certificate	C16	NTEP approval, accuracy class 0.3 acc. NIST Handbook 44
ZC1, Certificate	C11	Compliance with the order 2.1 EN 10204
ZC1, Certificate	C40	Quality Inspection Certificate 3.1 EN 10204
ZC1, Certificate	C13	3.1 EN 10204 + IGC + NACE MR0175, MR0103
ZC1, Certificate	C18	Pressure Test Certificate 3.1 EN 10204
ZC1, Certificate	C54	Degreasing ASTM G93-03, including report
ZC1, Certificate	C36	WPS; WPQR; WQC
ZC1, Certificate	C37	Welding procedures and Certificate ASME IX
ZC1, Certificate	C33	X-ray DIN EN ISO 17636-1/B
ZC1, Certificate	C34	X-ray test according to ASME V
ZC1, Certificate	C38	Dye penetration DIN EN ISO 3452-1
ZC1, Certificate	C39	Dye penetration ASME V
ZC1, Certificate	C20	Functional Safety (IEC 61508) - SIL2/3
ZC1, Certificate	C61	Surface wetted parts Ra ≤ 0.8 µm
ZC1, Certificate	C62	3A approval, surface wetted parts Ra ≤ 0.8 µm
ZC1, Certificate	C63	EHEDG approval, surface wetted parts Ra ≤ 0.8 µm
ZC1, Certificate	C15	PMI 3.1 according to EN 10204

Dimensional drawings

Drawings, dimensions and weight for FCS500 sensors (non-hygienic versions)



FCS500 sensor non hygienic, dimensions in mm

FCS500 sensor dimensions (non-hygienic versions)

Nominal size	L2	L3	H1	H3	H4	H5	W1
	Dimensions in mm (inch)						
DN 10	190 (7.5)	165 (6.5)	117 (4.6)	268 (10.6)	56 (2.2)	138 (5.4)	42 (1.7)
DN 15	227 (8.9)	195 (7.7)	145 (5.7)	277 (10.9)	71 (2.8)	148 (5.8)	50 (2)
DN 25	361 (14.2)	310 (12.2)	245 (9.6)	289 (11.4)	90 (3.5)	159 (6.3)	72 (2.8)
DN 50	455 (17.9)	400 (15.7)	333 (13.1)	296 (11.7)	102 (4)	167 (6.6)	96 (3.8)
DN 80	682 (26.9)	620 (24.4)	482 (19)	330 (13)	168 (6.6)	201 (7.9)	150 (5.9)

Overall length L1 and weight

The overall length of the sensor depends on the selected process connection (type and size). The following tables list the overall length and weight as functions of the individual process connection.

The weights in the tables are for the remote type. Additional weight for the compact type: up to 3.2 kg (7.1 lb)

L1 dimension and weight with process connections according to ASME B16.5 (AISI 316/AISI 316L)

Process connection size and type	FCS500 sensor nominal size									
	DN 10		DN 15		DN 25		DN 50		DN 80	
	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
ASME ½" class 150, raised face (RF)	280 (11)	6 (13)	320 (12.6)	8 (18)	n/a	n/a	n/a	n/a	n/a	n/a
ASME ½" class 300, raised face (RF)	280 (11)	6.4 (14)	320 (12.6)	8.4 (18)	n/a	n/a	n/a	n/a	n/a	n/a
ASME ½" class 600, raised face (RF)	290 (11.4)	6.7 (15)	330 (13)	8.7 (19)	n/a	n/a	n/a	n/a	n/a	n/a
ASME ½" class 600, ring joint (RJ)	290 (11.4)	6.6 (15)	330 (13)	8.6 (19)	n/a	n/a	n/a	n/a	n/a	n/a
ASME 1" class 150, raised face (RF)	280 (11)	6.9 (15)	320 (12.6)	8.9 (20)	490 (19.3)	15.7 (35)	n/a	n/a	n/a	n/a
ASME 1" class 300, raised face (RF)	280 (11)	7.9 (17)	320 (12.6)	9.9 (22)	490 (19.3)	16.7 (37)	n/a	n/a	n/a	n/a
ASME 1" class 600, raised face (RF)	300 (11.8)	8.3 (18)	340 (13.4)	10.3 (23)	500 (19.7)	17 (38)	n/a	n/a	n/a	n/a
ASME 1" class 600, ring joint (RJ)	300 (11.8)	8.4 (19)	340 (13.4)	10.4 (23)	500 (19.7)	17.2 (38)	n/a	n/a	n/a	n/a
ASME 1½" class 150, raised face (RF)	290 (11.4)	7.8 (17)	330 (13)	9.8 (22)	470 (18.5)	16.5 (36)	620 (24.4)	25.7 (57)	n/a	n/a

Dimensional drawings (continued)

Process connection size and type	FCS500 sensor nominal size DN 10		DN 15		DN 25		DN 50		DN 80	
	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
ASME 1½" class 300, raised face (RF)	290 (11.4)	10.1 (22)	330 (13)	12.1 (27)	480 (18.9)	19 (42)	620 (24.4)	28.1 (62)	n/a	n/a
ASME 1½" class 600, raised face (RF)	310 (12.2)	11.5 (25)	350 (13.8)	13.5 (30)	500 (19.7)	20 (44)	630 (24.8)	28.9 (64)	n/a	n/a
ASME 1½" class 600, ring joint (RJ)	310 (12.2)	11.4 (25)	350 (13.8)	13.4 (30)	500 (19.7)	20 (44)	630 (24.8)	29.1 (64)	n/a	n/a
ASME 2" class 150, raised face (RF)	n/a	n/a	n/a	n/a	480 (18,9)	18.1 (40)	580 (22.8)	26.8 (59)	n/a	n/a
ASME 2" class 300, raised face (RF)	n/a	n/a	n/a	n/a	480 (18,9)	19.7 (43)	580 (22.8)	28.3 (62)	n/a	n/a
ASME 2" class 600, raised face (RF)	n/a	n/a	n/a	n/a	510 (20.1)	21.3 (47)	610 (24)	30.5 (67)	n/a	n/a
ASME 2" class 600, ring joint (RJ)	n/a	n/a	n/a	n/a	510 (20.1)	21.8 (48)	610 (24)	30.3 (67)	n/a	n/a
ASME 2½" class 150, raised face (RF)	n/a	n/a	n/a	n/a	n/a	n/a	580 (22.8)	29.8 (66)	n/a	n/a
ASME 2½" class 300, raised face (RF)	n/a	n/a	n/a	n/a	n/a	n/a	580 (22.8)	31.3 (69)	n/a	n/a
ASME 2½" class 600, raised face (RF)	n/a	n/a	n/a	n/a	n/a	n/a	610 (24)	33.4 (74)	n/a	n/a
ASME 2½" class 600, ring joint (RJ)	n/a	n/a	n/a	n/a	n/a	n/a	610 (24)	33.8 (74)	n/a	n/a
ASME 3" class 150, raised face (RF)	n/a	n/a	n/a	n/a	n/a	n/a	580 (23.3)	30.9 (68)	870 (34.3)	71.2 (157)
ASME 3" class 300, raised face (RF)	n/a	n/a	n/a	n/a	n/a	n/a	590 (22.8)	34.5 (76)	880 (34.6)	75 (165)
ASME 3" class 600, raised face (RF)	n/a	n/a	n/a	n/a	n/a	n/a	630 (24.8)	37.8 (83)	900 (35.4)	77.7 (171)
ASME 3" class 600, ring joint (RJ)	n/a	n/a	n/a	n/a	n/a	n/a	610 (24)	38.4 (85)	900 (35.4)	78.3 (173)
ASME 4" class 150, raised face (RF)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	850 (33.5)	74.4 (164)
ASME 4" class 300, raised face (RF)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	850 (33.5)	81.8 (180)
ASME 4" class 600, raised face (RF)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	920 (36.2)	94 (207)
ASME 4" class 600, ring joint (RJ)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	920 (36.2)	94.6 (209)
ASME 5" class 150, raised face (RF)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	870 (34.3)	77 (170)
ASME 5" class 300, raised face (RF)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	890 (35)	89.4 (197)
ASME 5" class 600, raised face (RF)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	920 (36.2)	114.2 (252)
ASME 5" class 600, ring joint (RJ)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	920 (36.2)	114.9 (253)

L1 dimension and weight with process connections according to EN 1092-1 (AISI 316L)

Process connection size and type	FCS500 sensor nominal size DN 10		DN 15		DN 25		DN 50		DN 80	
	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
EN DN 15 PN 40 type B1, raised face (RF)	280 (11)	6.6 (14)	320 (12.6)	8.6 (19)	n/a	n/a	n/a	n/a	n/a	n/a
EN DN 15 PN 40 type D, with groove	280 (11)	6.4 (14)	320 (12.6)	8.4 (18)	n/a	n/a	n/a	n/a	n/a	n/a
EN DN 15 PN 40 type E, with spigot	280 (11)	6.3 (14)	320 (12.6)	8.3 (18)	n/a	n/a	n/a	n/a	n/a	n/a
EN DN 15 PN 40 type F, with recess	280 (11)	6.5 (14)	320 (12.6)	8.5 (19)	n/a	n/a	n/a	n/a	n/a	n/a
EN DN 15 PN 100 type B1, raised face (RF)	290 (11.4)	7.4 (16)	330 (13)	9.4 (21)	n/a	n/a	n/a	n/a	n/a	n/a
EN DN15 PN100 type D, with groove	290 (11.4)	7.4 (16)	330 (13)	9.4 (21)	n/a	n/a	n/a	n/a	n/a	n/a

Dimensional drawings (continued)

Process connection size and type	FCS500 sensor nominal size DN 10		DN 15		DN 25		DN 50		DN 80	
	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
EN DN 15 PN 100 type E, with spigot	290 (11.4)	7.1 (16)	330 (13)	9.1 (20)	n/a	n/a	n/a	n/a	n/a	n/a
EN DN 15 PN 100 type F, with recess	290 (11.4)	7.3 (16)	330 (13)	9.3 (21)	n/a	n/a	n/a	n/a	n/a	n/a
EN DN 25 PN 40 type B1, raised face (RF)	280 (11)	7.5 (17)	320 (12.6)	9.5 (21)	490 (19.3)	16.4 (36)	n/a	n/a	n/a	n/a
EN DN 25 PN 40 type D, with groove	280 (11)	7.5 (17)	320 (12.6)	9.5 (21)	490 (19.3)	16.3 (36)	n/a	n/a	n/a	n/a
EN DN 25 PN 40 type E, with spigot	280 (11)	7.2 (16)	320 (12.6)	9.2 (20)	490 (19.3)	16.1 (35)	n/a	n/a	n/a	n/a
EN DN 25 PN 40 type F, with recess	280 (11)	7.4 (67)	320 (12.6)	9.4 (21)	490 (19.3)	16.3 (36)	n/a	n/a	n/a	n/a
EN DN 25 PN 100 type B1, raised face (RF)	300 (10.1)	10.1 (22)	340 (13.4)	12.1 (27)	490 (19.3)	18.8 (41)	n/a	n/a	n/a	n/a
EN DN 25 PN 100 type D, with groove	300 (10.1)	10 (22)	340 (13.4)	12 (26)	490 (19.3)	18.7 (41)	n/a	n/a	n/a	n/a
EN DN 25 PN 100 type E, with spigot	300 (10.1)	9.5 (21)	340 (13.4)	11.5 (25)	490 (19.3)	18.3 (40)	n/a	n/a	n/a	n/a
EN DN 25 PN100 type F, with recess	300 (10.1)	9.9 (22)	340 (13.4)	11.9 (26)	490 (19.3)	18.7 (41)	n/a	n/a	n/a	n/a
EN DN 40 PN40 type B1, raised face (RF)	280 (11)	9.1 (20)	320 (12.6)	11.1 (24)	470 (18.5)	17.7 (39)	610 (24)	26.9 (59)	n/a	n/a
EN DN 40 PN 40 type D, with groove	280 (11)	8.9 (20)	320 (12.6)	10.9 (24)	470 (18.5)	17.6 (39)	610 (24)	26.8 (59)	n/a	n/a
EN DN 40 PN 40 type E, with spigot	280 (11)	8.6 (19)	320 (12.6)	10.6 (23)	470 (18.5)	17.4 (38)	610 (24)	26.5 (58)	n/a	n/a
EN DN 40 PN 40 type F, with recess	280 (11)	8.8 (19)	320 (12.6)	10.8 (24)	470 (18.5)	17.5 (39)	610 (24)	26.7 (59)	n/a	n/a
EN DN 40 PN 100 type B1, raised face (RF)	360 (14.2)	13.5 (30)	400 (15.7)	15.5 (34)	500 (19.7)	21.5 (47)	610 (24)	30.5 (67)	n/a	n/a
EN DN 40 PN 100 type D, with groove	360 (14.2)	13.4 (30)	400 (15.7)	15.4 (34)	500 (19.7)	21.4 (47)	610 (24)	30.4 (67)	n/a	n/a
EN DN 40 PN 100 type E, with spigot	360 (14.2)	13 (29)	400 (15.7)	15 (33)	500 (19.7)	21.1 (46)	610 (24)	30 (66)	n/a	n/a
EN DN 40 PN 100 type F, with recess	360 (14.2)	13.3 (29)	400 (15.7)	15.3 (34)	500 (19.7)	21.3 (47)	610 (24)	30.3 (67)	n/a	n/a
EN DN 50 PN 40 type B1, raised face (RF)	n/a	n/a	n/a	n/a	470 (18.5)	19.1 (42)	580 (22.8)	27.8 (61)	n/a	n/a
EN DN 50 PN 40 type D, with groove	n/a	n/a	n/a	n/a	470 (18.5)	18.9 (42)	580 (22.8)	27.7 (61)	n/a	n/a
EN DN 50 PN 40 type E, with spigot	n/a	n/a	n/a	n/a	470 (18.5)	18.6 (41)	580 (22.8)	27.4 (60)	n/a	n/a
EN DN 50 PN 40 type F, with recess	n/a	n/a	n/a	n/a	470 (18.5)	18.8 (41)	580 (22.8)	27.6 (61)	n/a	n/a
EN DN 50 PN 100 type B1, raised face (RF)	n/a	n/a	n/a	n/a	540 (21.3)	25.4 (56)	610 (24)	33.5 (74)	n/a	n/a
EN DN 50 PN 100 type D, with groove	n/a	n/a	n/a	n/a	540 (21.3)	25.3 (56)	610 (24)	33.4 (74)	n/a	n/a
EN DN 50 PN 100 type E, with spigot	n/a	n/a	n/a	n/a	540 (21.3)	24.8 (55)	610 (24)	32.9 (72)	n/a	n/a
EN DN 50 PN 100 type F, with recess	n/a	n/a	n/a	n/a	540 (21.3)	25.2 (56)	610 (24)	33.2 (73)	n/a	n/a
EN DN 80 PN 40 type B1, raised face (RF)	n/a	n/a	n/a	n/a	n/a	n/a	590 (23.2)	31.5 (69)	870 (34.2)	71.6 (158)
EN DN 80 PN 40 type D, with groove	n/a	n/a	n/a	n/a	n/a	n/a	590 (23.2)	31.3 (69)	870 (34.2)	71.1 (157)
EN DN 80 PN 40 type E, with spigot	n/a	n/a	n/a	n/a	n/a	n/a	590 (23.2)	30.9 (68)	870 (34.2)	70.7 (156)
EN DN 80 PN 40 type F, with recess	n/a	n/a	n/a	n/a	n/a	n/a	590 (23.2)	31.1 (69)	870 (34.2)	70.9 (156)
EN DN 80 PN 100 type B1, raised face (RF)	n/a	n/a	n/a	n/a	n/a	n/a	650 (25.6)	40 (88)	890 (35)	79.1 (174)
EN DN 80 PN 100 type D, with groove	n/a	n/a	n/a	n/a	n/a	n/a	650 (25.6)	39.8 (88)	890 (35)	78.9 (174)
EN DN 80 PN 100 type E, with spigot	n/a	n/a	n/a	n/a	n/a	n/a	650 (25.6)	39.2 (86)	890 (35)	78.3 (173)

Dimensional drawings (continued)

Process connection size and type	FCS500 sensor nominal size									
	DN 10		DN 15		DN 25		DN 50		DN 80	
	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
EN DN 80 PN 100 type F, with recess	n/a	n/a	n/a	n/a	n/a	n/a	650 (25.6)	39.6 (87)	890 (35)	78.7 (173)
EN DN 100 PN 40 type B1, raised face (RF)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	850 (33.5)	73.8 (163)
EN DN 100 PN 40 type D, with groove	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	850 (33.5)	73.6 (162)
EN DN 100 PN 40 type E, with spigot	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	850 (33.5)	73 (161)
EN DN 100 PN 40 type F, with recess	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	850 (33.5)	73.3 (162)
EN DN 100 PN 100 type B1, raised face (RF)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	870 (34.3)	85.2 (188)
EN DN 100 PN 100 type D, with groove	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	870 (34.3)	84.8 (187)
EN DN 100 PN 100 type E, with spigot	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	870 (34.3)	84 (185)
EN DN 100 PN 100 type F, with recess	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	870 (34.3)	84.5 (186)
EN DN125 PN40 type B1, raised face (RF)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	860 (33.9)	78.5 (173)
EN DN 135 PN 40 type D, with groove	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	860 (33.9)	78.1 (172)
EN DN 125 PN 40 type E, with spigot	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	860 (33.9)	77.4 (171)
EN DN 125 PN 40 type F, with recess	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	860 (33.9)	77.7 (171)
EN DN 125 PN 100 type B1, raised face (RF)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	880 (34.6)	98 (216)
EN DN 125 PN 100 type D, with groove	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	880 (34.6)	97.6 (215)
EN DN 125 PN 100 type E, with spigot	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	880 (34.6)	96.3 (212)
EN DN 125 PN 100 type F, with recess	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	880 (34.6)	97.1 (214)

L1 dimension and weight with process connections according to JIS B 2220 (AISI 316/AISI 316L)

Process connection size and type	FCS500 sensor nominal size									
	DN 10		DN 15		DN 25		DN 50		DN 80	
	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
JIS DN 15 10 K	280 (11)	6.3 (14)	320 (12.6)	8.3 (18)	n/a	n/a	n/a	n/a	n/a	n/a
JIS DN 15 20 K	280 (11)	6.5 (14)	320 (12.6)	8.5 (19)	n/a	n/a	n/a	n/a	n/a	n/a
JIS DN 25 10 K	280 (11)	7.4 (16)	320 (12.6)	9.4 (21)	490 (19.3)	16.3 (36)	n/a	n/a	n/a	n/a
JIS DN 25 20 K	280 (11)	7.8 (17)	320 (12.6)	9.8 (22)	490 (19.3)	16.6 (37)	n/a	n/a	n/a	n/a
JIS DN 40 10 K	280 (11)	8.2 (18)	320 (12.6)	10.2 (23)	470 (18.5)	16.9 (37)	620 (24.4)	26.1 (58)	n/a	n/a
JIS DN 40 20 K	280 (11)	8.6 (19)	320 (12.6)	10.6 (23)	470 (18.5)	17.3 (38)	620 (24.4)	26.5 (58)	n/a	n/a
JIS DN 50 10 K	n/a	n/a	n/a	n/a	470 (18.5)	17.5 (39)	600 (23.6)	26.6 (59)	n/a	n/a
JIS DN 50 20 K	n/a	n/a	n/a	n/a	470 (18.5)	17.7 (39)	600 (23.6)	26.7 (59)	n/a	n/a
JIS DN 80 10 K	n/a	n/a	n/a	n/a	n/a	n/a	570 (22.4)	27.9 (62)	880 (34.6)	68.7 (151)
JIS DN 80 20 K	n/a	n/a	n/a	n/a	n/a	n/a	580 (22.8)	30.4 (67)	880 (34.6)	71 (156)
JIS DN 100 10 K	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	850 (33.5)	69.8 (154)
JIS DN 100 20 K	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	850 (33.5)	73.4 (162)
JIS DN 125 10 K	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	850 (33.5)	73.5 (162)
JIS DN 125 20 K	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	850 (33.5)	79.7 (176)

L1 dimension and weight with process connections according to NPT internal thread

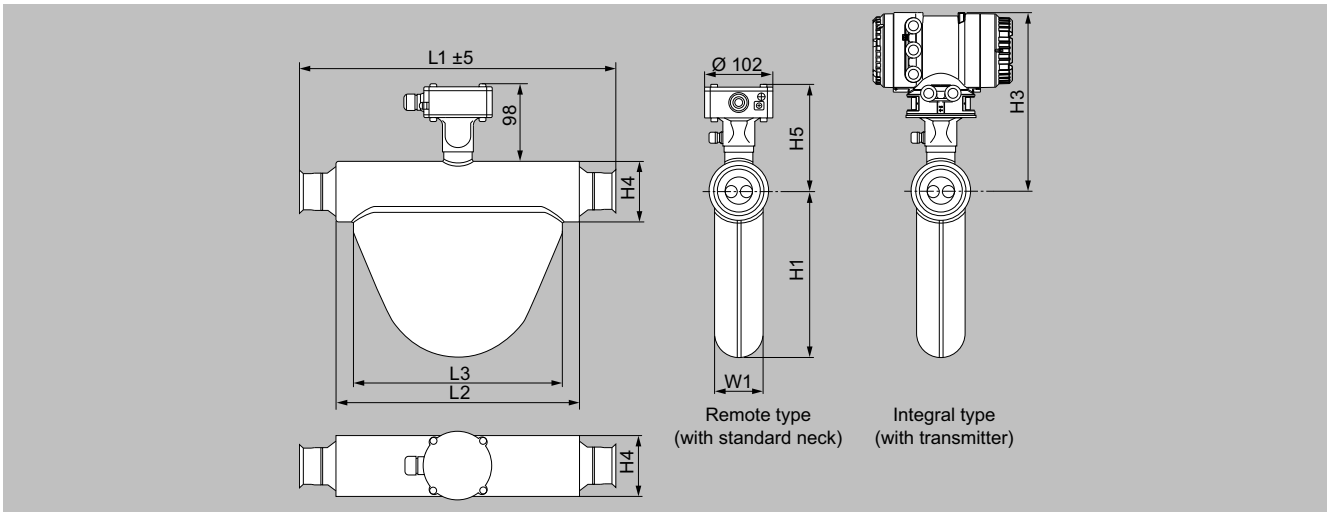
Process connection size and type	FCS500 sensor nominal size									
	DN 10		DN 15		DN 25		DN 50		DN 80	
	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
⅜" NPT	300 (11.8)	5.4 (12)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
½" NPT	300 (11.8)	5.4 (12)	340 (13.4)	7.4 (16)	n/a	n/a	n/a	n/a	n/a	n/a
¾" NPT	300 (11.8)	5.3 (12)	340 (13.4)	7.3 (16)	n/a	n/a	n/a	n/a	n/a	n/a

Dimensional drawings (continued)

L1 dimension and weight with process connections according to G internal thread

Process connection size and type	FCS500 sensor nominal size									
	DN 10		DN 15		DN 25		DN 50		DN 80	
	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
G ⅜"	300 (11.8)	5.4 (12)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
G ½"	300 (11.8)	5.4 (12)	340 (13.4)	7.4 (16)	n/a	n/a	n/a	n/a	n/a	n/a
G ¾"	300 (11.8)	5.3 (12)	340 (13.4)	7.3 (16)	n/a	n/a	n/a	n/a	n/a	n/a

Drawings, dimensions and weight for FCS500 sensors (hygienic versions)



Dimensions in mm

FCS500 sensor dimensions (hygienic versions)

Nominal size	L2	L3	H1	H3	H4	H5	W1
	Dimensions in mm (inch)						
DN 10	190 (7.5)	165 (6.5)	117 (4.6)	268 (10.6)	56 (2.2)	138 (5.4)	42 (1.7)
DN 15	227 (8.9)	195 (7.7)	145 (5.7)	277 (10.9)	71 (2.8)	148 (5.8)	50 (2)
DN 25	361 (14.2)	310 (12.2)	245 (9.6)	289 (11.4)	90 (3.5)	159 (6.3)	72 (2.8)
DN 50	455 (17.9)	400 (15.7)	333 (13.1)	296 (11.7)	102 (4)	167 (6.6)	96 (3.8)

Overall length L1 and weight

The overall length of the sensor depends on the selected process connection (type and size). The following tables list the overall length and weight as functions of the individual process connection.

The weights in the tables are for the remote type. Additional weight for the compact type: up to 3.2 kg (7.1 lb)

L1 dimension and weight with threaded hygienic process connections according to DIN 11851

Process connection size and type	FCS500 sensor nominal size							
	DN 10		DN 15		DN 25		DN 50	
	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
DIN 11851, DN 25	280 (11)	5.4 (12)	320 (12.6)	7.4 (16)	n/a	n/a	n/a	n/a
DIN 11851, DN 40	290 (11.4)	5.5 (12)	330 (13)	7.5 (17)	490 (19.3)	14.3 (32)	n/a	n/a
DIN 11851, DN 50	n/a	n/a	n/a	n/a	480 (18.9)	14.4 (32)	610 (24)	23.4 (52)
DIN 11851, DN 65	n/a	n/a	n/a	n/a	n/a	n/a	590 (23.2)	23.4 (52)
DIN 11851, DN 80	n/a	n/a	n/a	n/a	n/a	n/a	590 (23.2)	23.8 (52)

Dimensional drawings (continued)

L1 dimension and weight with hygienic clamp process connections according to DIN 32676 Series A

Process connection size and type	FCS500 sensor nominal size							
	DN 10		DN 15		DN 25		DN 50	
	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
DIN 32676 series A, DN 25	280 (11)	5.2 (11)	320 (12.6)	7.2 (16)	n/a	n/a	n/a	n/a
DIN 32676 series A, DN 40	280 (11)	5.2 (11)	320 (12.6)	7.2 (16)	470 (18.5)	14 (31)	n/a	n/a
DIN 32676 series A, DN 50	n/a	n/a	n/a	n/a	470 (18.5)	14 (31)	600 (23.6)	22.9 (50)
DIN 32676 series A, DN 65	n/a	n/a	n/a	n/a	n/a	n/a	590 (23.2)	23 (51)
DIN 32676 series A, DN 80	n/a	n/a	n/a	n/a	n/a	n/a	590 (23.2)	23.1 (51)

L1 dimension and weight with hygienic clamp process connections according to DIN 32676 Series C (Tri-clamp)

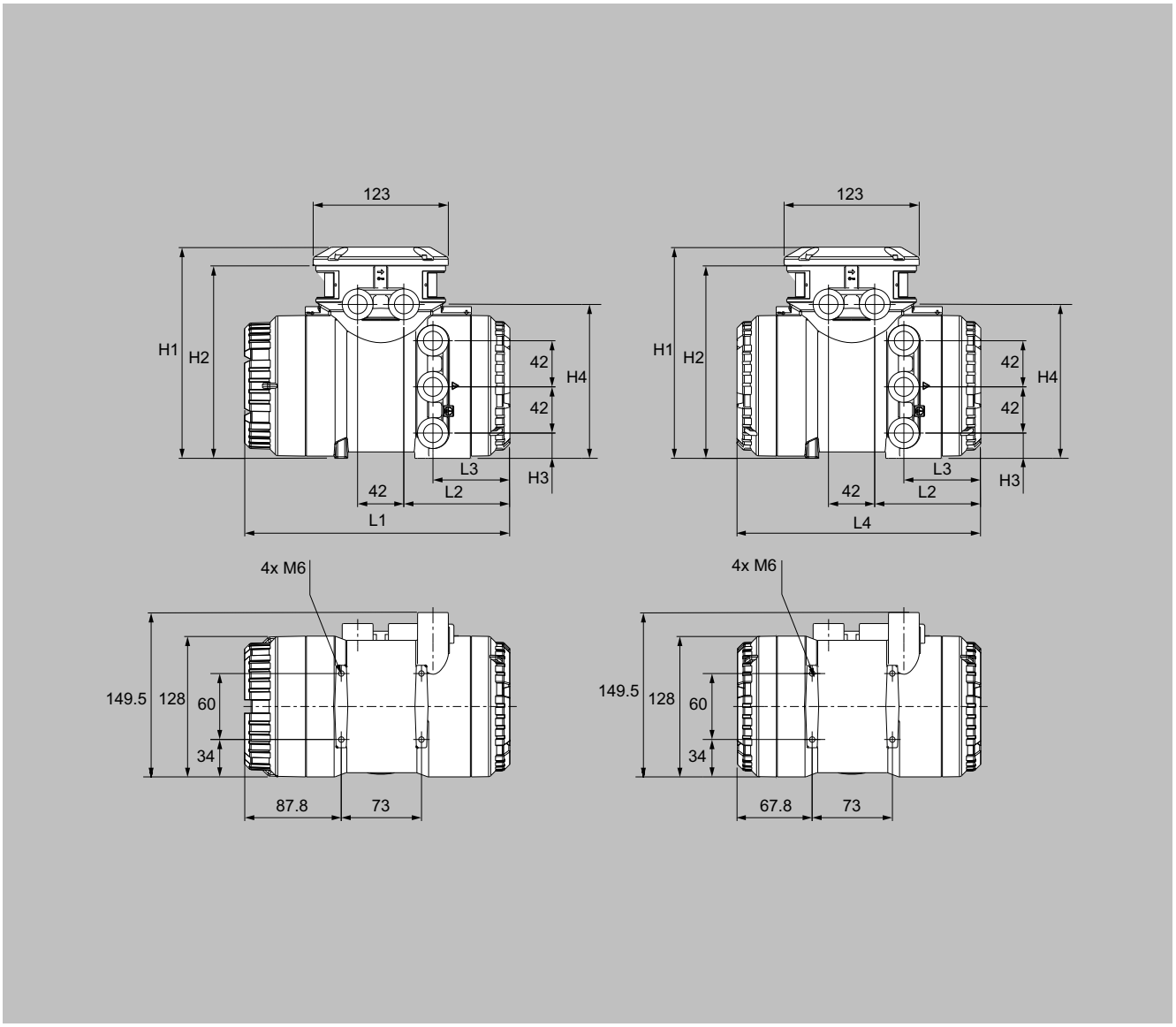
Process connection size and type	FCS500 sensor nominal size							
	DN 10		DN 15		DN 25		DN 50	
	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
DIN 32676 series C, 1"	280 (11)	5.2 (11)	320 (12.6)	7.2 (16)	n/a	n/a	n/a	n/a
DIN 32676 series C, 1½"	280 (11)	5.2 (11)	320 (12.6)	7.2 (16)	480 (18.9)	14 (31)	n/a	n/a
DIN 32676 series C, 2"	n/a	n/a	n/a	n/a	470 (18.5)	14 (31)	600 (23.6)	22.9 (50)
DIN 32676 series C, 2½"	n/a	n/a	n/a	n/a	n/a	n/a	580 (22.8)	22.8 (50)
DIN 32676 series C, 3"	n/a	n/a	n/a	n/a	n/a	n/a	580 (22.8)	22.9 (50)

L1 dimension and weight with hygienic clamp process connections according to JIS/ISO 2852

Process connection size and type	FCS500 sensor nominal size							
	DN 10		DN 15		DN 25		DN 50	
	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
JIS/ISO 2852, 1"	280 (11)	5.2 (11)	320 (12.6)	7.2 (16)	n/a	n/a	n/a	n/a
JIS/ISO 2852, 1½"	280 (11)	5.2 (11)	320 (12.6)	7.2 (16)	480 (18.9)	14 (31)	n/a	n/a
JIS/ISO 2852, 2"	n/a	n/a	n/a	n/a	470 (18.5)	14 (31)	600 (23.6)	22.9 (50)
JIS/ISO 2852, 2½"	n/a	n/a	n/a	n/a	n/a	n/a	580 (22.8)	22.8 (50)
JIS/ISO 2852, 3"	n/a	n/a	n/a	n/a	n/a	n/a	580 (22.8)	22.9 (50)

Dimensional drawings (continued)

Drawings, dimensions and weight for FCT020 and FCT040 transmitters

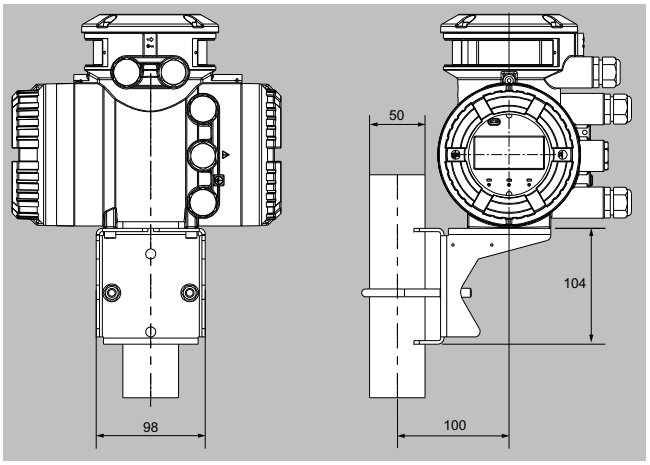


Dimensions of FCT020 or FCT040 transmitter in mm. Transmitter with display shown on the left. Transmitter without display shown on the right.

Dimensions L1 to L4 and H1 to H4 (material options: stainless steel, aluminum)

Material	L1 in mm (inch)	L2 in mm (inch)	L3 in mm (inch)	L4 in mm (inch)	H1 in mm (inch)	H2 in mm (inch)	H3 in mm (inch)	H4 in mm (inch)
Stainless steel	255.5 (10.06)	110.5 (4.35)	69 (2.72)	235 (9.25)	201 (7.91)	184 (7.24)	24 (0.94)	150.5 (5.93)
Aluminum	241.5 (9.51)	96.5 (3.8)	70 (2.76)	221 (8.7)	192 (7.56)	175 (6.89)	23 (0.91)	140 (5.51)

Dimensional drawings (continued)



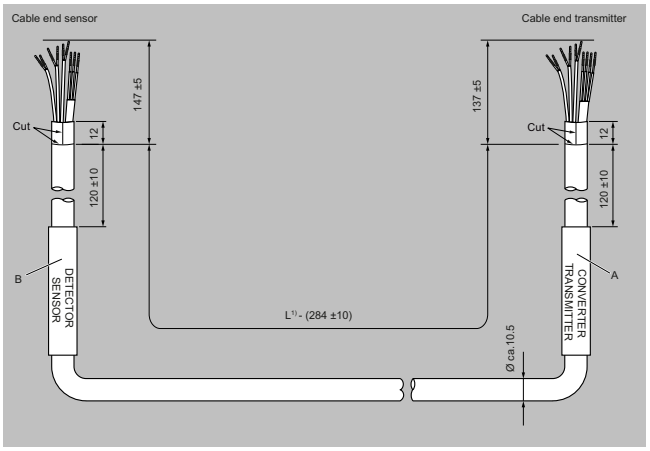
Dimensions of transmitter in mm, attached to mounting bracket.

Transmitter weights

Design type	Transmitter enclosure material	Weight in kg (lb)
Remote	Cast aluminum	4.2 (9.3)
	CF-8M stainless steel	12.5 (27.6)

Connecting cable dimensions and weights

Standard cable

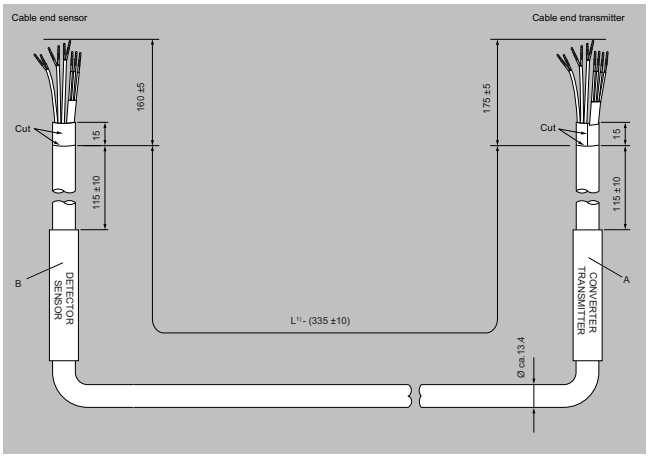


Dimensions in mm. Standard terminated cable. A and B are factory-fitted labels.

Option code	Cable length, L	Cable color
L51	5 m (16.4 ft)	Non-Ex: gray / Ex: blue
L54	10 m (32.8 ft)	
L57	15 m (49.2 ft)	
L60	20 m (65.6 ft)	
L63	30 m (98.4 ft)	

Weight of cable ≤ 0.200 kg/m (0.134 lb/ft)

Standard cable with steel armored option

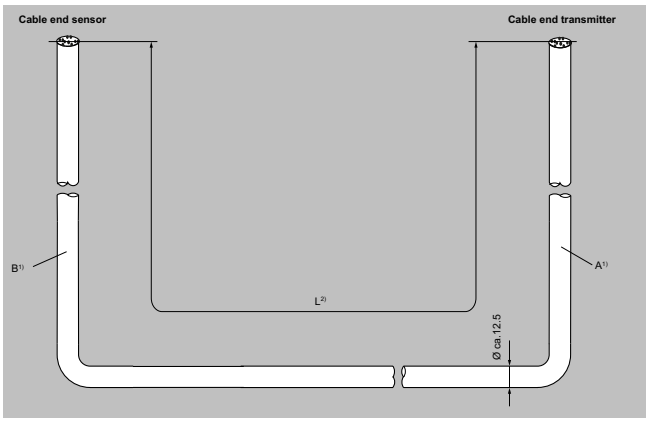


Dimensions in mm. Steel armored terminated cable. A and B are factory-fitted labels.

Option code	Cable length, L	Cable colour
L51 + A20/A21	5 m (16.4 ft)	Blue
L54 + A20/A21	10 m (32.8 ft)	
L57 + A20/A21	15 m (49.2 ft)	
L60 + A20/A21	20 m (65.6 ft)	
L63 + A20/A21	30 m (98.4 ft)	

Weight of cable ≤ 0.300 kg/m (0.202 lb/ft)

Fire retardant cable

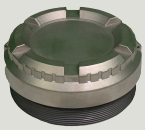
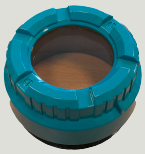
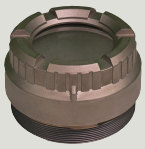
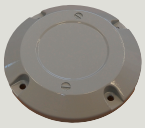
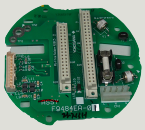
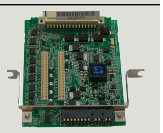


Dimensions in mm. Fire retardant unterminated cable. Labels A and B are supplied loose with termination kit.

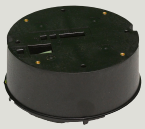
Option code	Cable length, L	Cable colour
L71	5 m (16.4 ft)	Gray
L74	10 m (32.8 ft)	
L77	15 m (49.2 ft)	
L80	20 m (65.6 ft)	
L83	30 m (98.4 ft)	

Weight of cable ≤ 0.270 kg/m (0.181 lb/ft)

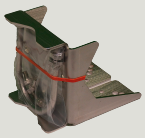
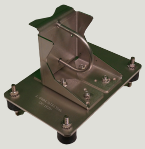
Selection and ordering data

Description	Article No.	
Cover		
Back cover, aluminum PU coating	SAG:M3889JB-01	
Back cover, aluminum high corrosion protection coating	SAG:M3889JC-01	
Back cover, stainless steel	SAG:M3830YB-01	
Front cover, aluminum PU coating, with glass	SAG:M3889JD-01	
Front cover, aluminum high corrosion protection coating, with glass	SAG:M3889JE-01	
Front cover, stainless steel, with glass	SAG:M3829RC-01	
Neck cover, aluminum PU coating	SAG:M3889JF-01	
Neck cover, aluminum high corrosion protection coating	SAG:M3889JG-01	
Neck cover, stainless steel	SAG:M3830YC-01	
Base board		
Base board HART	SAG:M3829ND-01	
Base board for PROFIBUS Fieldbus	SAG:M3829JQ-01	
Base board Modbus	SAG:M3829ZR-01	
Amplifier for sensor incl. specific SN setting and customer set-up		
Transmitter cassette, FCT040, HART, Non-Ex, including serial number setting, without option board (please provide serial number)	SAG:M3889JH-01	
Transmitter cassette, FCT020, HART, Non-Ex, including serial number setting, without option board	SAG:M3889JJ-01	
Transmitter cassette, FCT040, Modbus, Non-Ex, including serial number setting, without option board	SAG:M3889JK-01	
Transmitter cassette, FCT020, Modbus, Non-Ex, including serial number setting, without option board	SAG:M3889JL-01	
Transmitter cassette, FCT040, PROFIBUS PA, Non-Ex, including SN setting	SAG:M3889JL-01	
Display (serial number mandatory)		
Display, HART FCT020 aluminum housing	SAG:M3889JN-01	

Selection and ordering data (continued)

Description	Article No.	
Display, HART FCT040 aluminum housing	SAG:M3889JP-01	
Display, Modbus FCT020 aluminum housing	SAG:M3889JY-01	
Display, Modbus FCT040 aluminum housing	SAG:M3889JZ-01	
Display, PROFIBUS FCT040 aluminum housing	SAG:M3889KA-01	
Display, HART FCT020 SST housing	SAG:M3889JN-01	
Display, HART FCT040 SST housing	SAG:M3889JP-01	
Display, Modbus FCT020 SST housing	SAG:M3889JY-01	
Display, Modbus FCT040 SST housing	SAG:M3889JZ-01	
Display, PROFIBUS FCT040 SST housing	SAG:M3889KA-01	
Accessories		
Cable cover	SAG:M3829NE-01	
Safety cover	SAG:M3829QC-01	
MicroSD card with mini case	SAG:M3829QR-01	
Complete O-Ring set transmitter/sensor	SAG:M3829QW-01	
O-Ring set 114,4x3,1 NBR/HNBR -40 ... 100 °C (-40 ... 212 °F)	SAG:M3827XJ-01	
O-Ring set 83x4 NBR [-50 ... +100 °C (-58 ... 212 °F)]	SAG:M3827XK-01	
O-Ring set 84x3 NBR [-50 ... +100 °C (-58 ... 212 °F)]	SAG:M3827XL-01	
Adapter NPT 1/2" ==> G1/2"	SAG:M3810EM-01	
Terminal box housing part	SAG:M3889KB-01	

Selection and ordering data (continued)

Description	Article No.	
Terminal box cover and O-ring part	SAG:M3889KC-01	
Mounting bracket and bracket mounting set	SAG:M3810DR-01	
2" pipe mounting set	SAG:M3806JA-01	
Remote sensor cable standard		
5 meter sensor cable std terminated	SAG:M3889KJ-01	
10 meter sensor cable std terminated	SAG:M3889KK-01	
15 meter sensor cable std terminated	SAG:M3889KL-01	
20 meter sensor cable std terminated	SAG:M3889KM-01	
30 meter sensor cable std terminated	SAG:M3889KN-01	
50 meter sensor cable std not terminated	SAG:M3889KP-01	
100 meter sensor cable std not terminated	SAG:M3889KQ-01	
150 meter sensor cable std not terminated	SAG:M3889KR-01	
200 meter sensor cable std not terminated	SAG:M3889KS-01	
250 meter sensor cable std not terminated	SAG:M3889KT-01	
300 meter sensor cable std not terminated	SAG:M3889KW-01	
Cable termination set standard and Ex	SAG:M3889KX-01	
Remote sensor cable Ex		
5 meter sensor cable Ex terminated	SAG:M3889KY-01	
10 meter sensor cable Ex terminated	SAG:M3889KZ-01	
15 meter sensor cable Ex terminated	SAG:M3889LA-01	
20 meter sensor cable Ex terminated	SAG:M3889LB-01	
30 meter sensor cable Ex terminated	SAG:M3889LC-01	
50 meter sensor cable Ex not terminated	SAG:M3889LD-01	
100 meter sensor cable Ex not terminated	SAG:M3889LE-01	
150 meter sensor cable Ex not terminated	SAG:M3889LF-01	
200 meter sensor cable Ex not terminated	SAG:M3889LG-01	
250 meter sensor cable Ex not terminated	SAG:M3889LH-01	
300 meter sensor cable Ex not terminated	SAG:M3889LJ-01	
Cable termination set standard and Ex	SAG:M3889KX-01	
Marine and fire retardant remote sensor cable		
5 meter marine sensor cable terminated	SAG:M3889LK-01	
10 meter marine sensor cable terminated	SAG:M3889LL-01	
15 meter marine sensor cable terminated	SAG:M3889LM-01	
20 meter marine sensor cable terminated	SAG:M3889LN-01	
30 meter marine sensor cable terminated	SAG:M3889LP-01	
50 meter marine sensor cable	SAG:M3889LQ-01	
100 meter marine sensor cable	SAG:M3889LR-01	
150 meter marine sensor cable	SAG:M3889LS-01	
300 meter marine sensor cable	SAG:M3889LT-01	
1000 meter marine sensor cable roll	SAG:M3889LW-01	
Cable termination set > 50+ meter marine	SAG:M3889LX-01	

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 × 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), max. +30 °C (86 °F)	**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), max. +30 °C (86 °F)	**A5E03914873**	

Selection and ordering data (continued)

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), max. +30 °C (86 °F)		
Standard cable (Ex) with 2 × 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), max. +30 °C (86 °F)	**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), max. +30 °C (86 °F)	**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), max. +30 °C (86 °F)		
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**	

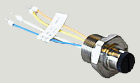
[1] 2 pcs M20; 1 pce M25 with single and dual cable inserts.
[2] 2 pcs ½" NPT; 1 pce ½" NPT with single and dual cable inserts.

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**	
• 230 V AC, DN 25 electric	**A5E33035324**	
• 230 V AC, DN 50 electric	**A5E33035325**	
• 115 V AC, DN 15 electric	**A5E32877520**	
• 115 V AC, DN 25 electric	**A5E32877556**	
• 115 V AC, 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**	

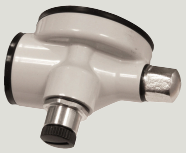
Spare parts - sensor FCS400/FCS300 and MASS 2100/FC300

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**	

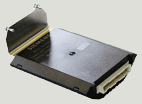
Spare parts - Transmitter FCT030 field mount enclosure (all FW versions)

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**	

Selection and ordering data (continued)

Description	Article No.	
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 junction box painted aluminum for sensor cable termination at FCT030 transmitter remote version. Pre-wired and potted		
• M20	**A5E03906112**	
• NPT	**A5E03906130**	

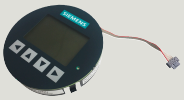
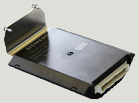
Spare parts - Transmitter FCT030 (FW 3.1)

Description	Article No.	
Display and keypad assembly for field mount enclosure with Siemens logo for HW 2 and FW 3.1 version	**A5E03548971**	
Sensor cassette (compact) (HW version 2, FW 3.1.x)	**A5E03549142**	
Sensor cassette (remote) (HW version 2, FW 3.1.x)	**A5E03549098**	
Frontend cassette Spare part frontend cassette for remote version of FC430 and cassette for FC410. For firmware 2.02.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 (microSD card 1G)	**A5E03915258**	

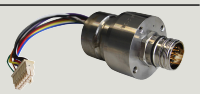
1) The I/O configuration must be stated in the "Remark" field. The I/O configuration is found in the F option of the ordering code. e.g. code “F40” for ordering Ch2 Active Current/Freq/Pulse, Ch3 Active Current/Freq/Pulse, Ch4 Active Input.

Selection and ordering data (continued)

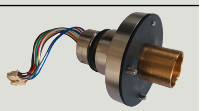
Spare parts FCT030 - Fieldmount enclosure (FW 4.0)

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 (microSD 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	
I/O Cassette for firmware 4.0		
• F01, Non-Ex Ch2: Current/Frequ./Pulse Ch3: None Ch4: None	A5E38006256	

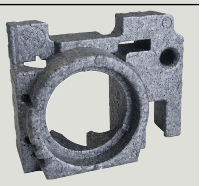
Selection and ordering data (continued)

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

Selection and ordering data (continued)

Description	Article No.	
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**	

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**	

Selection and ordering data (continued)

Description	Article No.	
Wall mount enclosure front Versions: • blind, Siemens version • blind, neutral version - no company logo • with glass	**A5E**	
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**	

Overview

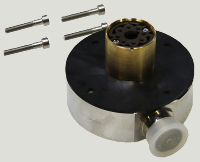
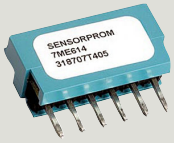
MASS 6000 is based on digital signal processing technology – engineered for high performance, fast flow step response, fast batching applications, high immunity against process noise, easy to install, commission and maintain.

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.

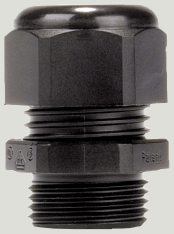
Selection and ordering data

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 mm² 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**	

Selection and ordering data (continued)

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

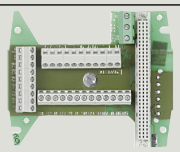
Description	Article No.	
HART[1]	**FDK:085U0226**	
PROFIBUS PA Profile 3[1]	**FDK:085U0236**	
PROFIBUS DP Profile 3	**FDK:085U0237**	
MODBUS RTU RS 485	**FDK:085U0234**	
FOUNDATION Fieldbus H1[1]	**A5E02054250**	
DeviceNet	**FDK:085U0229**	

[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	**A5E44054472**	
• 24 V AC/DC	**A5E44054482**	
Wall mounting unit for IP67/NEMA 6 version with wall bracket, without connection board but with		
• 4 × M20 cable glands	**FDK:085U1018**	

Selection and ordering data (continued)

Description	Article No.	
• 4 × ½" NPT cable glands	**A5E01164211**	
Connection board/PCB Supply voltage: 115/230 V/24 V AC/DC	**FDK:083H4260**	
Terminal box kit		
• M20 cable glands	**A5E00832338**	
• ½" NPT cable glands	**A5E00832342**	
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		
Terminal box, in polyamide, inclusive lid		
• M20 cable glands	**FDK:085U1050**	
• ½" NPT cable glands	**FDK:085U1052**	
Not approved for hazardous locations		
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**

Selection and ordering data (continued)

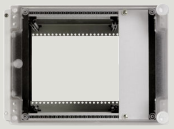
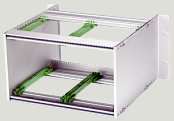
Description	Article No.
• 1 current, 24 V	A5E43226154
• 3 current, 24 V	A5E43226168
MASS 6000 19"/IP20 Ex Spare part PCB main	
• 1 current, 230 V	A5E43226277
• 3 current, 230 V	A5E43226342
• 1 current, 24 V	A5E43226441
• 3 current, 24 V	A5E43226455
MASS 6000 Ex d, spare part PCB Stainless steel, without 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

Accessories

Enclosure (without PCB, connection board)

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

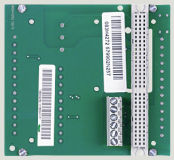
Enclosure

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	

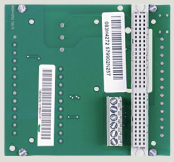
Selection and ordering data (continued)

Description	Article No.	
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:083F50-38 • 24 V, 115/230 V	FDK:083H4274	
Connection board MASS 6000 Ex [ia] IIC for 19" wall mounting version, for enclosure FDK:083F5037/FDK:083F50-38 • 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:083F50-38 • 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:083F50-38 • 24 V, 115/230 V	FDK:083H4295	

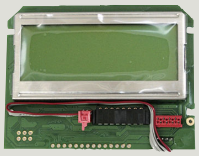
[1] Attention (Ex application): MC2 Ex version sensors must only be connected to connection board FDK:083H4294 or FDK:083H4295.

Selection and ordering data (continued)

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

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

Selection and ordering data (continued)

Description	Article No.
FOUNDATION Fieldbus	
• English	A5E02318728
• German	A5E02488856
DeviceNet	
• English	A5E03089720

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

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

Overview

SIFLOW FC070 is only available as spare part.

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

The SIFLOW FC070 transmitter can be connected analogically 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

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

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**

Accessories

Description	Article No.	
Cable with multiplug for connecting MASS 2100, FCS200 and FC300 sensors, 5 × 2 × 0.34 mm² 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 mm² 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**	

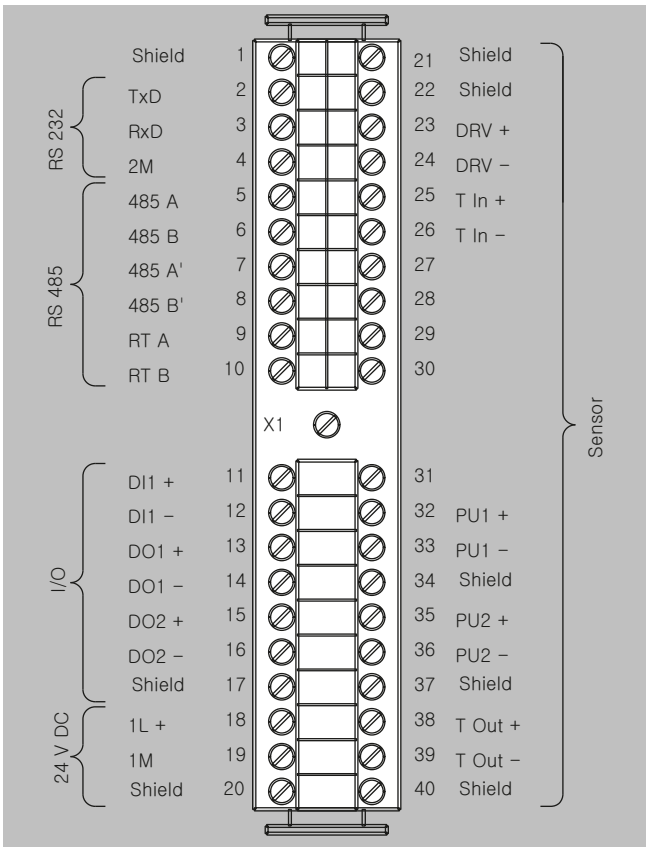
Technical specifications

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

Technical specifications (continued)

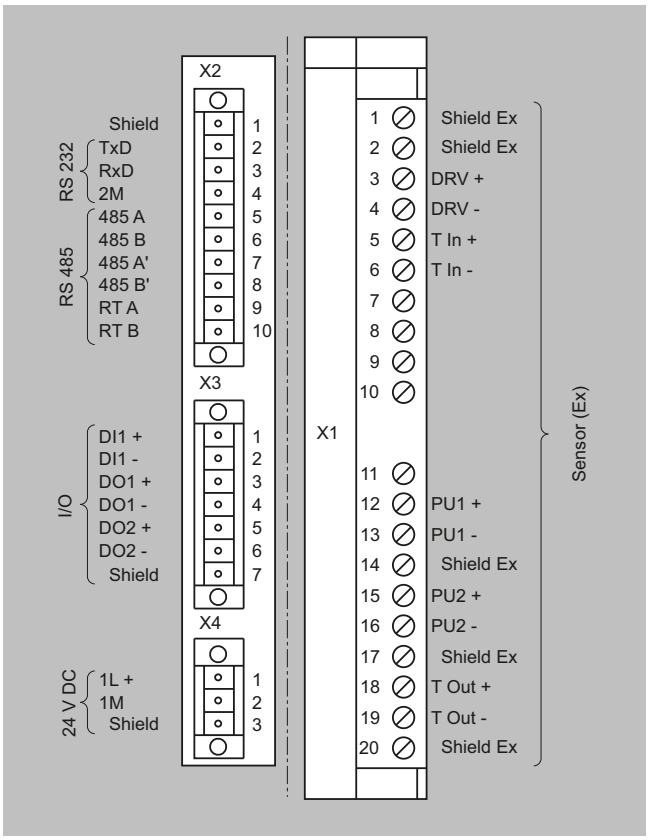
Measurement of	Mass flow, volume flow, density, sensor temperature, fraction A flow, fraction B flow, fraction A in %
Environment	
Ambient temperature	Storage: -40 °C ... +70 °C (-40 °F ... +158 °F)
Operation conditions	Horizontally mounted rail: • SIFLOW FC070 Standard: 0 ... +60 °C (32 ... +140 °F) • 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)
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

Circuit diagrams



SIFLOW FC070, electrical connection

Circuit diagrams (continued)



SIFLOW FC070 Ex CT, electrical connection