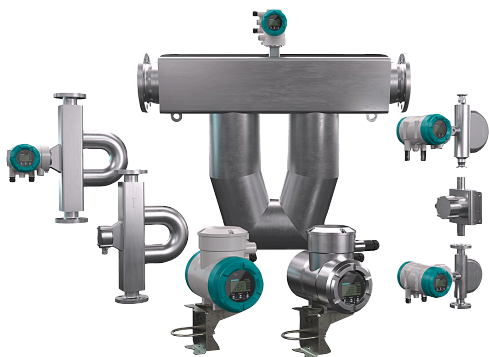


SITRANS FC (Coriolis)

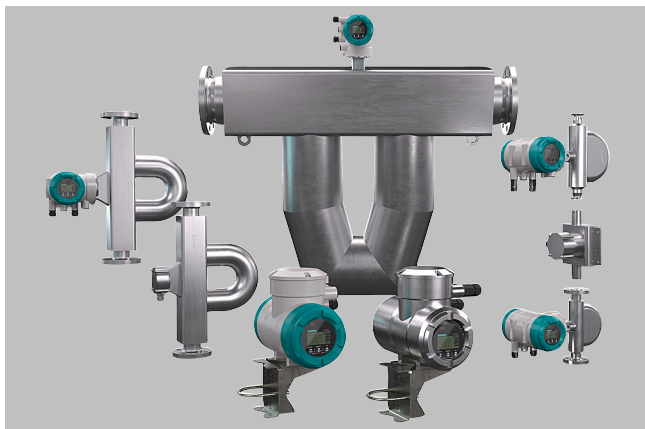


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SITRANS FC (Coriolis)

System information

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 <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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 (¾ ... 5") • Nominal flow: 1 600 ... 170 000 kg/h (3 527 ... 374 786 lb/h) Hygienic sensors with 3A and EHEDG approvals <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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 (¾ ... 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: $\pm 0.2\%$ (of rate)
- Density accuracy: $\pm 4 \text{ kg/m}^3$ ($\pm 0.25 \text{ lb/ft}^3$)
- Easy setup wizard, microSD card, self-verification
- Digital communication: HART, Modbus

SITRANS FCT040



Advanced transmitter with extended functionality

- Mass flow accuracy: $\pm 0.1\%$ (of rate)
- Density accuracy: $\pm 0.5 \text{ kg/m}^3$ ($\pm 0.03 \text{ lb/ft}^3$)
- 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

SITRANS FC (Coriolis)

System information

Benefits

	User value targets	SITRANS FC features and solutions
Engineering and project management	<ul style="list-style-type: none"> • Reduce engineering investment • Cut specification effort • Minimize project expenditure • Decrease the spending on each measurement point • Eliminate function duplication • Reduce number of suppliers 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Reduce footprint and transport outlay of OEM machinery • Lower installation complexity • Avoid costly modifications of existing plant 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Shorter commissioning schedules with lower costs • Faster start-up with reduced outgoings 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Optimize technician training • Reduce cost of spare parts • Increase predictive maintenance • Reduce production downtime and associated costs • Decrease unplanned maintenance • Maximize asset value 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Cut effort required to comply with Industry-specific demands • Reduce resource needed to maintain regulatory compliance 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 • CO₂ 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	<ul style="list-style-type: none"> • 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

SITRANS FC (Coriolis)

System information

Application (continued)

Industry sector	Application
Life sciences Pharmaceutical Bio	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Boiler fuel flow and burner control • Turbine fuel flow • Glycol flow and concentration • Bioethanol
Marine OEM Shipbuilders	<ul style="list-style-type: none"> • Fuel consumption management • Boiler control • Bunkering management • Density used to indicate fuel quality
Pulp, paper and textiles	<ul style="list-style-type: none"> • Accurate dosing of dyes and chemicals
Water and environmental	<ul style="list-style-type: none"> • 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.

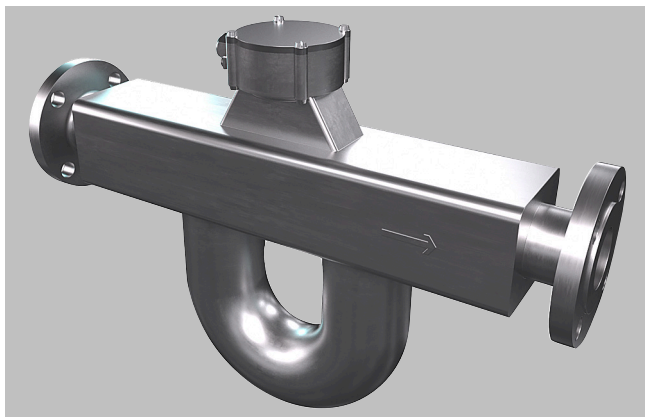


FC620 Coriolis flowmeter

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.



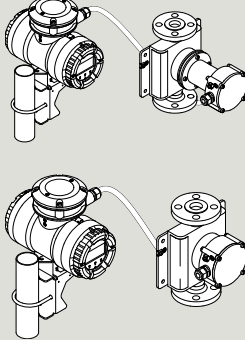
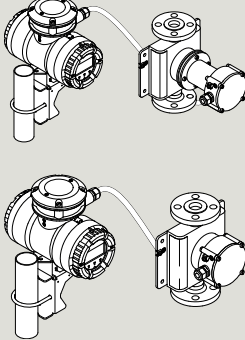
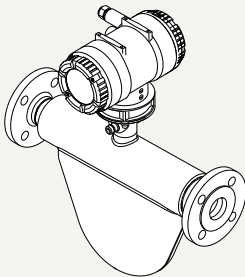
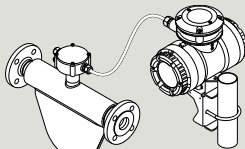
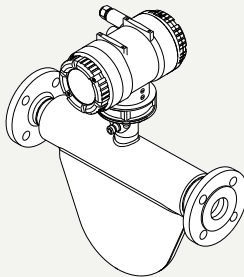
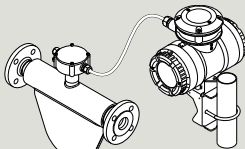
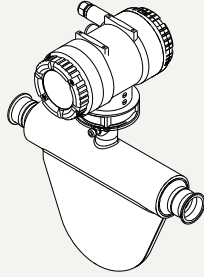
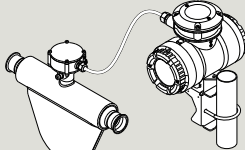
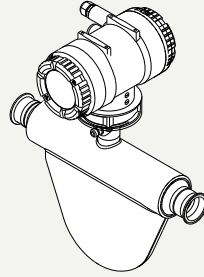
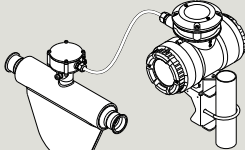
The following table shows a more complete interpretation of available combinations and the compatibility between sensors and transmitters.

SITRANS FC (Coriolis)

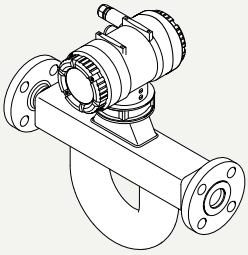
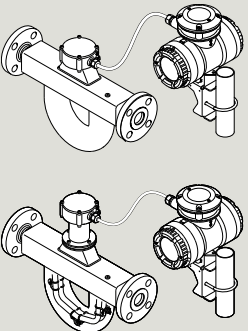
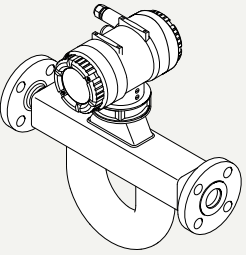
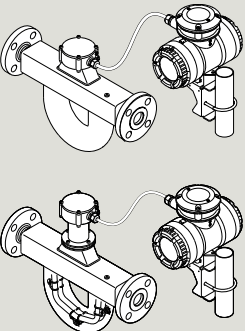
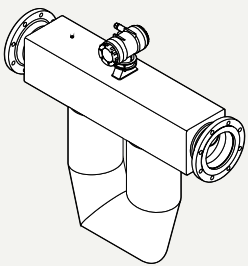
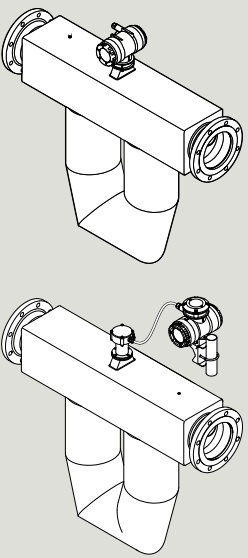
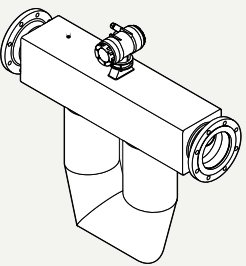
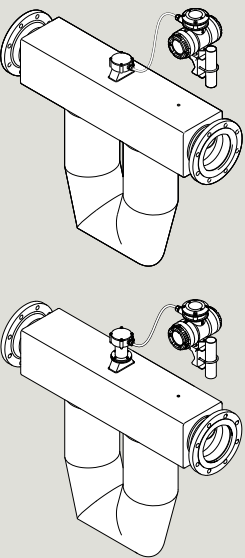
System information

Design (continued)





Overview of the available combinations and compatibility between sensors and transmitters

	Transmitter FCT020 Standard		Transmitter FCT040 Advanced	
	<ul style="list-style-type: none"> Accuracy 0.2% Easy setup wizard, microSD card, tube health check, up to 4 × I/O HART, Modbus Mass, density, temperature, volume 		<ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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	FC140	FC520	FC540	FC620	FC640	FC720	FC740
	7ME4412	7ME4414	7ME4452	7ME4454	7ME4462	7ME4464	7ME4472	7ME4474
Design								
Compact			•	•	•	•	•	•
Remote	•	•	•	•	•	•	•	•
Flow accuracy (liquids)								
Mass flow 0.1%		• ¹⁾		•		•		•
Mass flow 0.2%	•		•		•		•	
Density accuracy (liquids)								
Density 0.5 kg/m ³		• ²⁾		• ²⁾		• ²⁾		
Density 2 kg/m ³								•

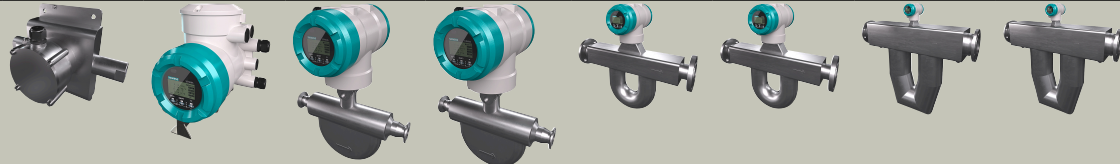
SITRANS FC (Coriolis)

System information

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/m ³	● 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	●	●	●	●	●	●	●	●



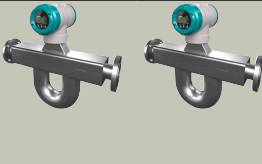

Design (continued)

								
	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	•	•	•	•	•	•	•	•

SITRANS FC (Coriolis)

System information

Design (continued)

								
	FCS100 sensors		FCS500 sensors		FCS600 sensors		FCS700 sensors	
	FC120	FC140	FC520	FC540	FC620	FC640	FC720	FC740
	7ME4412	7ME4414	7ME4452	7ME4454	7ME4462	7ME4464	7ME4472	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.

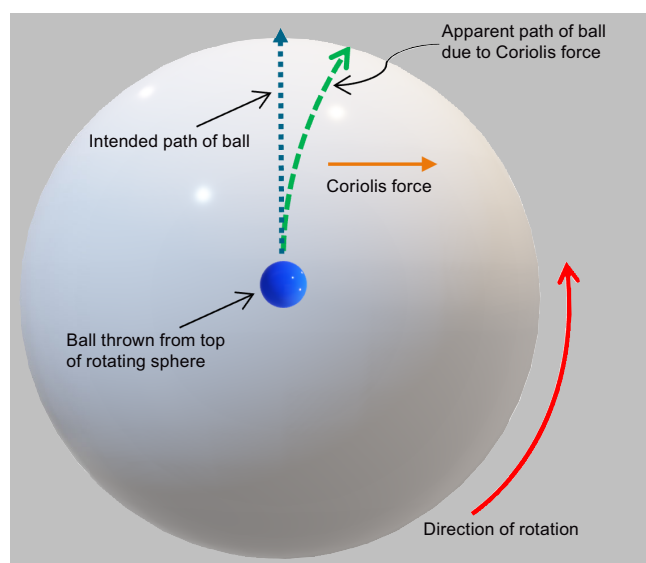
9) Hygienic fittings cannot be selected with low (cryogenic), medium and high temperature ranges.

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.

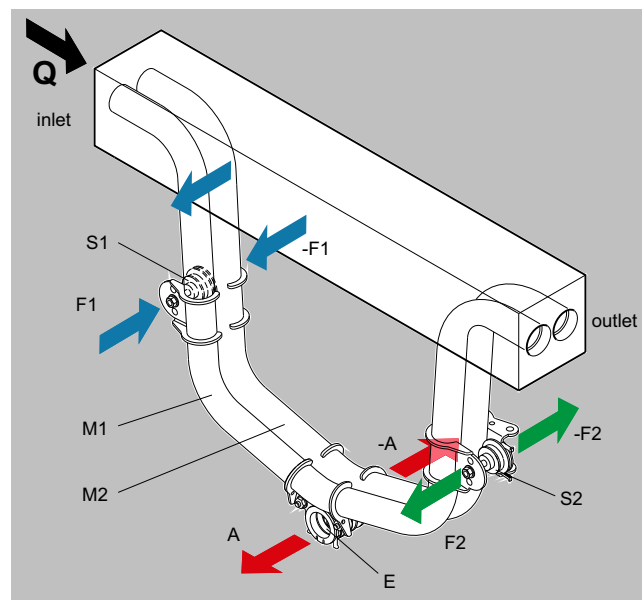


Coriolis force: effect on the direction of rotation

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.

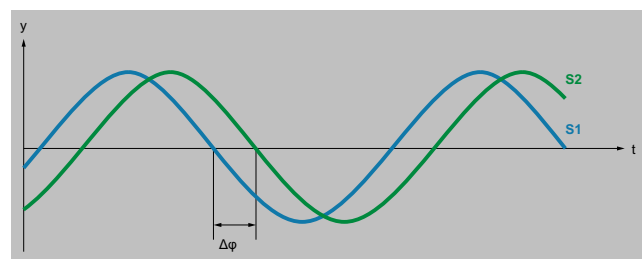
Mode of operation (continued)



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 (F_1 and F_2), 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

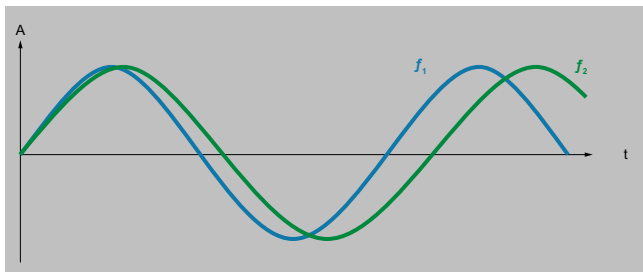
$\Delta\phi$	Phase shift
t	Time
S1, S2	Pick-offs

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.

SITRANS FC (Coriolis)

System information

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 ₄ NO ₃ / water (ammonium nitrate solution)	Mass fraction	1 ... 50	%	0 ... 80 °C (32 ... 176 °F)
G05	NH ₄ NO 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 ₂ O 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.

SITRANS FC (Coriolis)

System information

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

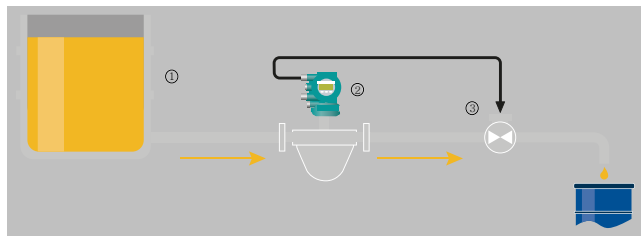
Batching and filling processes are found in many industries: food and beverage, cosmetic, pharmaceutical, oil and gas, and chemical.

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:

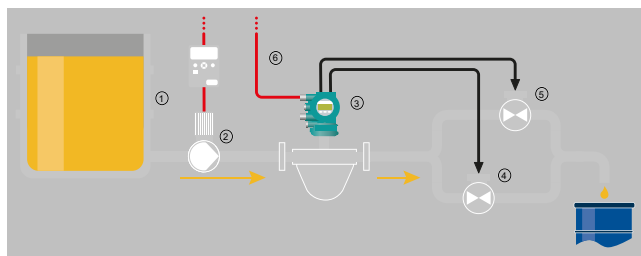
- Single-stage batch control with single valve
- Two-stage batching to control two valves for more accurate filling

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 kg/h	lb/h	Q_{flat} kg/h	lb/min	Q_{nom} kg/h	lb/min	Q_{max} 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 kg/h	lb/h	Q_{flat} kg/h	lb/min	Q_{nom} kg/h	lb/min	Q_{max} 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 kg/h	lb/h	Q_{flat} kg/h	lb/min	Q_{nom} kg/h	lb/min	Q_{max} 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 kg/h	lb/h	Q_{flat} kg/h	lb/min	Q_{nom} kg/h	lb/min	Q_{max} 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/m ³ (56 ... 69 lb/ft ³)
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.

SITRANS FC (Coriolis)

System information

Technical specifications (continued)

Density calibration reference conditions	
Flow condition	Fully developed flow profile
Fluid densities used to obtain density calibration constants	700 kg/m ³ (44 lb/ft ³) 1 000 kg/m ³ (62 lb/ft ³) 1 650 kg/m ³ (103 lb/ft ³)
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/m ³ (lb/ft ³)	FCT020	±20 (1.25)	±8 (0.5)	±4 (0.25)	±4 (0.25)	±4 (0.25)
	kg/m ³ (lb/ft ³)	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/m ³ (lb/ft ³)	FCT020	±4 (0.25)	±4 (0.25)	±4 (0.25)	±4 (0.25)	±4 (0.25)
	kg/m ³ (lb/ft ³)	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/m ³ (lb/ft ³)	FCT020	±8 (0.5)	±4 (0.25)	±4 (0.25)	±4 (0.25)	±4 (0.25)	±4 (0.25)
	kg/m ³ (lb/ft ³)	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

FCT020 is the standard transmitter, suitable for general purpose applications. It delivers accurate and precise measurements of mass flow rate, density, temperature and volume flow rate.

The FCT020 transmitter is available in compact or remote design and can be combined with all SITRANS FC sensors. The selection is made within the complete SITRANS FC ordering code.

Spare transmitters are selected using the SITRANS FC ordering code, but with no sensor selected.



Example of SITRANS FCT transmitter mounted on SITRANS FCS600



FCT transmitter and SITRANS FCS100

Following features are available in the FCT020 transmitter:

- Tube health check

Tube health check

(software functions option code: S12)

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.

Overview (continued)

Specification overview of SITRANS FCT020

Typical measurement performance	<ul style="list-style-type: none"> • Mass flow accuracy: $\pm 0.2\%$ (of rate) • Density accuracy: $\pm 4 \text{ kg/m}^3$ (0.25 lb/ft^3)
Features and functions	<ul style="list-style-type: none"> • Easy setup wizard • microSD card • Tube health check • Self-verification
Available measurements	<ul style="list-style-type: none"> • Mass flow • Density • Temperature • Volume flow
Digital communication options	<ul style="list-style-type: none"> • HART • MODBUS

Function

Tube health check

- Order code: S12

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.

Overview of functions and features

Overview of the main functions and features of FCT020 transmitter

Primary measurements	<ul style="list-style-type: none"> • Mass flow rate liquids (0.2% accuracy) • Mass flow rate gases (0.75% accuracy) • Density (accuracy 4 kg/m^3 (0.25 lb/ft^3)) • Temperature
Secondary measurements	<ul style="list-style-type: none"> • Volume flow rate liquids • Actual volume flow rate gases • Normal (standard) volume flow rate gases
Configuration and diagnostics	<ul style="list-style-type: none"> • microSD card (transmitter with display) • Easy setup wizard • Tube health check (self-verification) • Event management to NAMUR NE107
Inputs and outputs	<ul style="list-style-type: none"> • Up to 4 combined inputs and outputs
Inputs	<ul style="list-style-type: none"> • Status input
Outputs	<ul style="list-style-type: none"> • Analog output • Pulse (frequency) or status output • Status output • Option for internal pull-up resistor
Digital communications	<ul style="list-style-type: none"> • HART • MODBUS (in preparation)
Enclosure options	<ul style="list-style-type: none"> • Aluminum alloy with standard powder coating • Aluminum alloy with corrosion resistant coating • Stainless steel CF-8M (remote only)
Power supply	<ul style="list-style-type: none"> • Universal (AC and DC)

SITRANS FC (Coriolis)

Transmitters

SITRANS FCT020

Configuration

Overview of available inputs, outputs and digital communications

The table below provides a matrix of all available combinations for FCT020 transmitters.

Each combination is defined by a blend of two order code options:

- Ch 1 codes in the form "E.." define the required type of digital communication.

- Ch 2-4 codes in the form "F.." define the required combination of conventional inputs and outputs.

Abbreviations used in the table:

- Pulse or status output is abbreviated to "P/S output".
- Status only output is abbreviated to "S output".
- Status input is abbreviated to "S input".

Ch 1 code	Ch 2-4 code	I/O 1 (Channel 1)	I/O 2 (Channel 2)	I/O 3 (Channel 3)	I/O 4 (Channel 4)
E00	F00	none	none	none	none
E07 ¹⁾	F01	passive mA HART output	passive P/S output	passive mA output	none
E07 ¹⁾	F02	passive mA HART output	passive P/S output	passive mA output	passive P/S output
E07 ¹⁾	F03	passive mA HART output	passive P/S output NAMUR	passive mA output	none
E07 ¹⁾	F04	passive mA HART output	passive P/S output NAMUR	passive mA output	passive P/S output NAMUR
E06	F11	active mA HART output	passive P/S output	none	none
E06	F12	active mA HART output	passive P/S output	passive S output	passive P/S output
E06	F13	active mA HART output	passive P/S output	volt free S input	passive P/S output
E06	F20	active mA HART output	passive P/S output	volt free S input	active P/S output
E06	F21	active mA HART output	passive P/S output	volt free S input	active P/S output and pull-up
E06	F22	active mA HART output	passive P/S output	passive P/S output	active mA output
E06	F23	active mA HART output	passive P/S output	volt free S input	active mA output
E14	F31	none	passive P/S output	MODBUS C	MODBUS A & B
E14	F32	passive P/S output	passive P/S output	MODBUS C	MODBUS A & B
E14	F35	active P/S output	passive P/S output	MODBUS C	MODBUS A & B
E14	F36	active P/S output and pull-up	passive P/S output	MODBUS C	MODBUS A & B
E14	F37	active mA output	passive P/S output	MODBUS C	MODBUS A & B

¹⁾ Any combinations with passive mA HART output on Channel are only possible with Ex approval. All outputs in these combinations are intrinsically safe.

Technical specifications

Mechanical specifications

Material specifications			
Housing material options	Coating	Design	Order code position 14
Cast aluminum alloy Al-Si10Mg(Fe)	Standard coating ¹⁾	Remote transmitter	C or D
Cast aluminum alloy Al-Si10Mg(Fe)	Corrosion resistant coating ²⁾	Remote transmitter	E or F
ASTM CF8M stainless steel	None	Remote transmitter	G or H
Display			
Material of the lid window	Glass		
Mounting bracket ³⁾			
Material	AISI 316L stainless steel	Mat. no. 1.4404	
Nameplates ⁴⁾	Process temperature range	Nameplate material	
Transmitter with cast aluminum housing	Not applicable	Foil	
Transmitter with ASTM CF8M stainless steel housing	Not applicable	AISI 316L ss	

¹⁾ Standard coating is urethane cured polyester powder coating.

²⁾ Corrosion protection coating is a three-layer coating with high chemical resistance (polyurethane coating on two layers of epoxy).

³⁾ Only the remote transmitters are supplied with a mounting bracket.

⁴⁾ Nameplate material depends on the materials selected for SITRANS FC sensors.

Electrical specifications

Power supply	
Alternating current voltage (rms)	nominal 24 V AC (-15% ... +10%), or 100 ... 240 V AC (-20% ... +10%)
Frequency	47 ... 63 Hz
Direct current voltage	nominal 24 V DC (-15% ... +20%) or 100 ... 120 V DC (-10% ... +8.3%)
Power consumption	P ≤ 10 W (including sensor)

Notes:

- For DNV approval option supply voltage is limited to 24 V.
- NAMUR NE21 testing specifies the range 24 V DC ±20% under NE21 test conditions.

Power supply failure

In the event of a power failure, the flowmeter data are backed up on a non-volatile internal memory. In case of devices with display, the characteristic sensor values, such as nominal diameter, serial number, calibration constants, zero point and the error history are also stored on a microSD card.

Galvanic isolation

All circuits for inputs, outputs and power supply are galvanically isolated from each other.

Analog inputs and outputs

Analog input

FCT020 transmitters cannot be specified with analog current input.

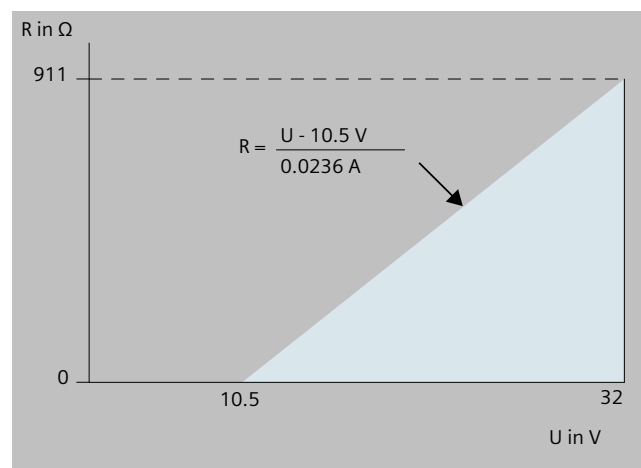
Analog output

Up to 2 analog outputs can be selected at time of ordering. The analog outputs can be configured to represent the following measured values:

- Flow rate (mass, volume, net partial component flow of a mixture)
- Density
- Temperature
- Pressure
- Concentration

HART communication, when selected, is supplied on channel 1 (I/O 1). The current output may be operated in compliance with the NAMUR NE43 standard.

Analog outputs	
Active output	
Nominal output current range	4 ... 20 mA
Maximum output current range	2.4 ... 21.6 mA
Load resistance	≤ 750 Ω
Load resistance for secure HART communication	230 ... 600 Ω
Passive output	
Nominal output current range	4 ... 20 mA
Maximum output current range	2.4 ... 21.6 mA
External power supply	10.5 ... 32 VDC
Load resistance for secure HART communication	230 ... 600 Ω
Load resistance at current output	≤ 911 Ω



Maximum load resistance as a function of an external power supply voltage

SITRANS FC (Coriolis)

Transmitters

SITRANS FCT020

Technical specifications (continued)

Digital inputs and outputs

Digital inputs (status)

Do not connect a signal source with electric voltage.

The status input is provided for use of voltage-free contacts with the following specification:

Resistance when closed	< 200 Ω
Resistance when open	> 100 kΩ

Digital outputs

Digital outputs	
Active pulse output available on Pulse/Status output, connection of an electronic counter¹⁾	
Load resistance	> 1 kΩ
Internal power supply	24 V DC ±20%
Maximum pulse rate	10 000 pulses/s
Frequency range	0 ... 12.5 kHz
Active pulse output available on Pulse/Status output, connection of an electromechanical counter	
Maximum current	150 mA
Average current	≤ 30 mA
Internal power supply	24 V DC ±20%
Maximum pulse rate	2 pulses/s
Pulse width	20, 33, 50, or 100 ms
Active pulse output available on Pulse/Status output, with internal pull-up resistor	
Internal power supply	24 V DC ±20%
Internal pull-up resistor	2.2 kΩ
Maximum pulse rate	10 000 pulses/s
Frequency range	0 ... 12.5 kHz
Passive pulse output available on Pulse/Status output¹⁾	
Maximum load current	≤ 200 mA
External power supply	≤ 30 V DC
Maximum pulse rate	10 000 pulses/s
Frequency range	0 to 12.5 kHz
Active status output available on Pulse/Status output²⁾	
Load resistance	> 1 kΩ
Internal power supply	24 V DC ±20%
Active status output available on Pulse/Status output, with internal pull-up resistor³⁾	
Internal pull-up resistor	2.2 kΩ
Internal power supply	24 V DC ±20%
Passive status output available on Pulse/Status output, or Status output	
Output current	≤ 200 mA
External power supply	≤ 30 V DC
Passive pulse or status output available on Pulse/Status output (NAMUR)	
Output signals according to EN 60947-5-6 (previously NAMUR, worksheet NA001)	

¹⁾ Maximum voltage and correct polarity must be observed for wiring.

²⁾ Since this is a transistor contact, maximum allowed current as well as polarity and level of output voltage must be observed during wiring.

³⁾ A relay must be connected in series to switch alternating voltage.

Digital communications

Each transmitter is configured with one default digital communication interface, selectable in the SITRANS FC order code.

HART

- When selected, HART communication is supplied on the output terminal pair I/O 1.
- Up to 3 further input/output options can be configured for output terminal pairs I/O 2, I/O 3, and I/O 4.
- HART is available with either non-intrinsically safe or intrinsically safe outputs.

PROFIBUS PA

- When selected, PROFIBUS PA communication is supplied on the output terminal pair I/O 1.
- PROFIBUS PA interface is available with and without intrinsic safety.
- PROFIBUS PA digital communication signal is in accordance with IEC 61158/61784.
- Maximum voltage and correct polarity must be observed for wiring.
- Power supply: 9 ... 32 V DC
- Current draw: 15 mA (maximum)
- Compliance with PA profile revision 3.02 supporting: Condensed Status (NE107)
- Device identification number (IDENT_NUMBER) adaption

Summary of available function blocks – PROFIBUS PA

Function block	Code	Description
Transducer block	FTB	Flow
	CTB	Concentration
	LTB	LCD Indicator
	MTB	Maintenance
	SDBT	Advanced diagnostics
Analog input block ¹⁾	AI1	Mass flow
	AI2	Density
	AI3	Temperature
	AI4	Volume flow
	AI5	Reference density
	AI6	Corrected (normal/standard) volume flow
Totalizer block ¹⁾	TOT1	Mass
	TOT2	Volume
	TOT3	Corrected (normal/standard) volume
Analog output block ¹⁾	AO	Pressure

¹⁾ Factory default setting. Assignment can be changed by parameter "channel".

Available function blocks are also influenced by the type of device description file (GSD) being used. For further details, please contact your regional Siemens Measurement Intelligence team.

MODBUS

(in preparation for later release)

- The MODBUS interface is available with up to two additional input/output options.
- When selected, MODBUS communication is supplied on the terminal pairs I/O 3 and I/O 4.
- The digital MODBUS communication signal is in accordance with EIA-485 standard (RS 485).

Technical specifications (continued)

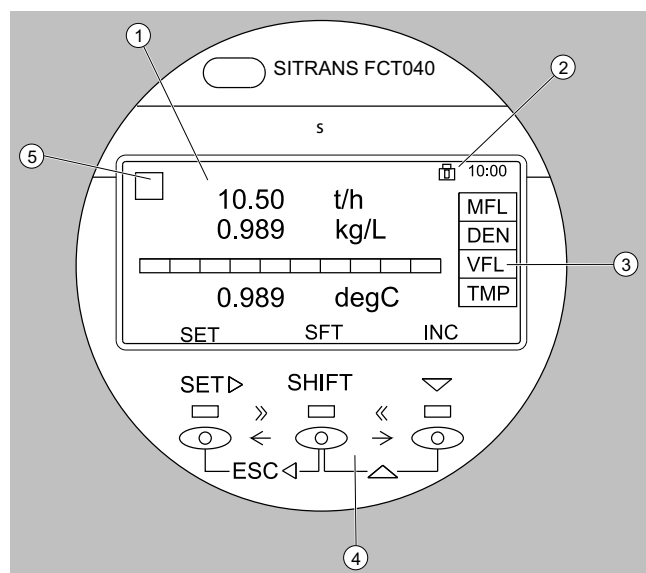
PROFINET over Ethernet-APL

(in preparation for later release)

Display attributes

Type	4-line dot-matrix display
Resolution	128 × 64 (W × H) dots
Size	64.6 × 31.2 mm (2.54" × 1.23")
Control	via IR switches

Numerical values entered via the display are limited to six digits for process variables and eight digits for totalizer.



Display layout

1	Measured quantities and units
2	Status icon and time
3	Measured quantity abbreviation
4	IR switches
5	Alarm symbol

The controls on the display are IR switches. They respond as soon as an object, such as a finger, is in proximity. It is not necessary to apply pressure to the display surface.

The display unit includes a slot for the microSD card.

microSD card specifications

Type	Industrial Grade microSD card, compliant with SD specification version 2.0
Physical dimension	15 × 11 × 1.0 mm (± 0.1 mm) (0.6 × 0.4 × 0.04 inch (± 0.004 inch))
Capacity	1 GB
Sequential throughput (read)	24.01 MB/s
Sequential throughput (write)	17.96 MB/s

It is recommended to use the microSD card included with the SITRANS FCT transmitter. Functionality of the device cannot be guaranteed if other cards are used.

Cable specifications

For remote type devices, an interconnecting cable must be used to connect the sensor to the transmitter. The device specifications, stated in this document, are valid only if one of the original SITRANS FC interconnecting cables is used.

Standard cable length options are specified up to 30 m are specified in the order code to maintain the stated specifications. Cables longer than 30 m (98 ft) are available but must be ordered as separate items. For further details, please contact your regional Siemens Measurement Intelligence team.

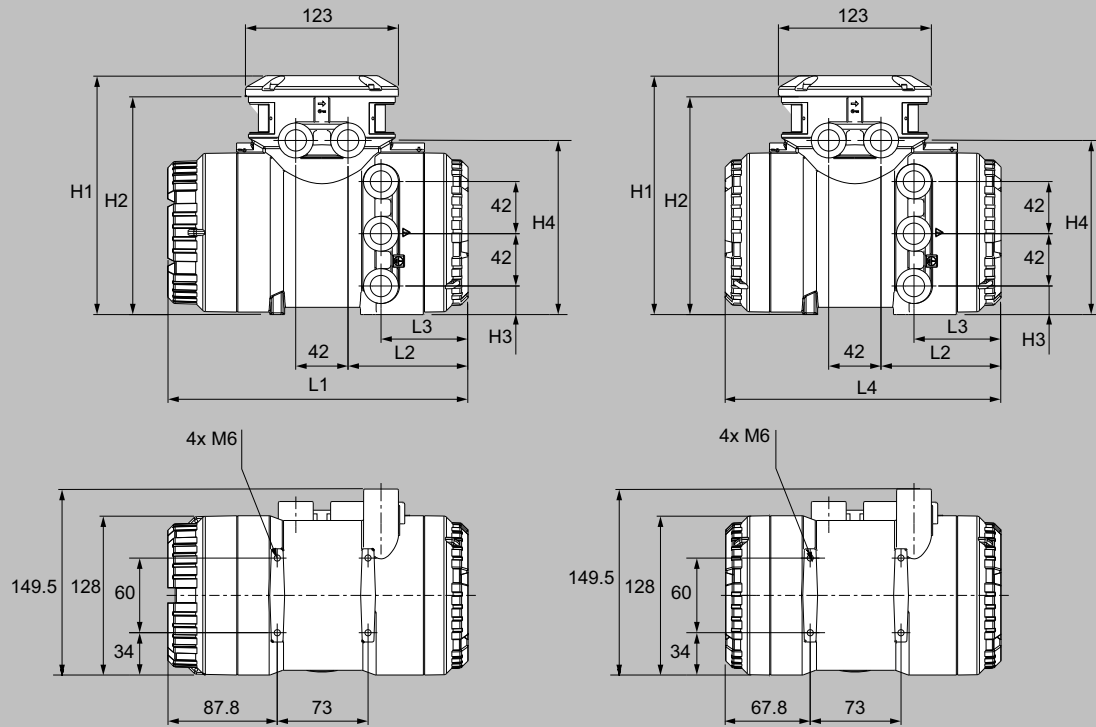
SITRANS FC (Coriolis)

Transmitters

SITRANS FCT020

Dimensional drawings

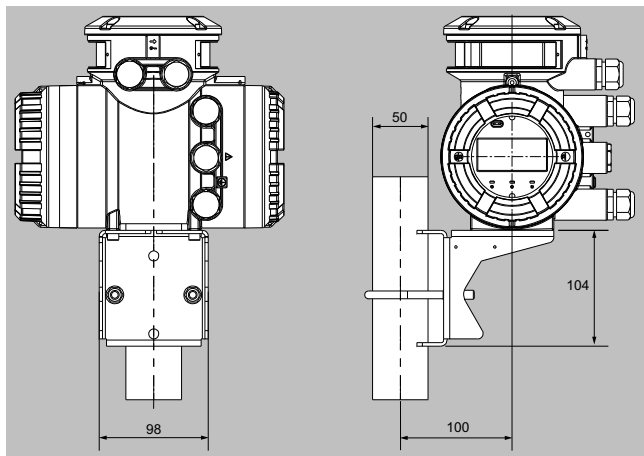
SITRANS FCT020 transmitter dimensions



Dimensions of FCT020 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)

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	

SITRANS FC (Coriolis)

Spare parts




SITRANS FC1x0, FC5x0, FC6x0, FC7x0 and FCT020, FCT040

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.



SITRANS FC (Coriolis)

Spare parts




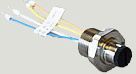
SITRANS FC4x0, FC3x0, MASS2100 and FCT010, FCT030

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 • NPT	A5E03549313 A5E03906080	
Bag of loose parts for sensor including cable strain relief components, washer, seals, silicone o- rings, and assorted screws	A5E03549324	
M12 option for sensor housing in stainless steel pre-wired and potted to replace M12 socket in DSL housing	A5E03906095	


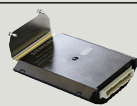





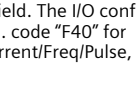

Spare parts - Transmitter FCT030 field mount enclosure (all FW versions)

Description	Article No.	
Display lid in painted aluminum with Ex glass plate and silicone o-ring seal, Ex and Non-Ex	A5E03549344	
Blind lid in painted aluminum with silicone o-ring seal	A5E03549429	
Bag of loose spare parts including cable strain relief components, mounting tool, seals and gasket, assorted screws and washers, hex cap nut, blind connectors, and silicone o-rings	A5E03549396	

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	




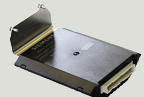



Spare parts - Transmitter FCT030 (FW 3.1)

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	

SITRANS FC (Coriolis)



Spare parts

SITRANS FC4x0, FC3x0, MASS2100 and FCT010, FCT030


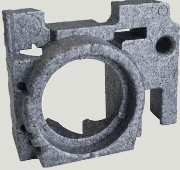
Selection and ordering data (continued)

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	

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	
Metal kit PSU cover back pane for wall mount enclosure	A5E38415145	
Power input cover plate for wall mount enclosure	A5E38415205	

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	

Overview



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

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

Selection and ordering data

Accessories and spare parts for MASS 6000 generation

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

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

SITRANS FC (Coriolis)

Spare parts

MASS 6000 Generation

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


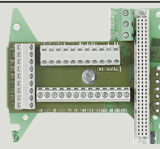


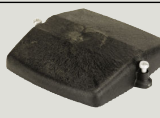

Description	Article No.	
HART ¹⁾	FDK:085U0226	
PROFIBUS PA Profile 3 ¹⁾	FDK:085U0236	
PROFIBUS DP Profile 3	FDK:085U0237	
MODBUS RTU RS 485	FDK:085U0234	
FOUNDATION Fieldbus H1 ¹⁾	A5E02054250	
DeviceNet	FDK:085U0229	

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 declaration Fibre glass reinforced polyamide and without connection board 1 current output 1 frq./pulse output 1 relay output • 115/230 V AC, 50/60 Hz • 24 V AC/DC	A5E44054472 A5E44054482	
Wall mounting unit for IP67/NEMA 6 version with wall bracket, without connection board but with • 4 x M20 cable glands	FDK:085U1018	

Selection and ordering data (continued)

Description	Article No.	
• 4 x 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 • ½" NPT cable glands Change from remote to safe area compact mounting of MASS 6000 IP67/NEMA 6 with MASS 2100. The kit consists of a terminal box in polyamide incl. connection board, cable and connector between PCB and sensor pedestal, PCB, seal and screws (4 pcs.) for mounting on sensor. Not approved for hazardous locations	A5E00832338 A5E00832342	
Terminal box, in polyamide, inclusive lid • M20 cable glands • ½" NPT cable glands Not approved for hazardous locations	FDK:085U1050 FDK:085U1052	
Terminal box - lid in polyamide	FDK:085U1003	
Display and keypad • Siemens Front	FDK:085U1039	

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

Description	Article No.	
MASS 6000 IP67 Spare part PCB main • 230 V • 24 V	A5E41718138 A5E41718346	
MASS 6000 19"/IP20 Spare part PCB main • 1 current, 230 V • 3 current, 230 V	A5E43226138 A5E43226145	

Selection and ordering data (continued)

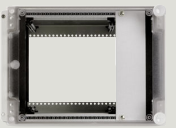


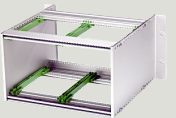
Description	Article No.	
• 1 current, 24 V	A5E43226154	
• 3 current, 24 V	A5E43226168	
MASS 6000 19" IP20 Ex Spare part PCB main		
• 1 current, 230 V	A5E43226277	
• 3 current, 230 V	A5E43226342	
• 1 current, 24 V	A5E43226441	
• 3 current, 24 V	A5E43226455	
MASS 6000 Ex d, spare part PCB Stainless steel, 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	

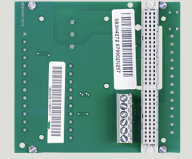

Selection and ordering data (continued)

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 application ¹⁾ 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.

SITRANS FC (Coriolis)

Spare parts



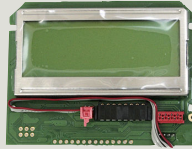
MASS 6000 Generation

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 <i>Remember to order 40 pin front plug connector.</i>	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 <i>Remember to order 20 pin front plug connector.</i>	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 mm ² twisted and screened in pairs. Temperature range -20 °C ... +110 °C (-4 °F ... +230 °F)		
• 5 m (16.4 ft)	FDK:083H3015	
• 10 m (32.8 ft)	FDK:083H3016	
• 25 m (82 ft)	FDK:083H3017	
• 50 m (164 ft)	FDK:083H3018	
• 75 m (246 ft)	FDK:083H3054	
• 150 m (492 ft)	FDK:083H3055	
Cable without multiplug for connecting MC2 sensors, 5 × 2 × 0.34 mm ² twisted and screened in pairs. Temperature range -20 °C ... +110 °C (-4 °F ... +230 °F)		
• 10 m (32.8 ft)	FDK:083H3001	
• 25 m (82 ft)	FDK:083H3002	
• 75 m (246 ft)	FDK:083H3003	
• 150 m (492 ft)	FDK:083H3004	

SITRANS FC (Coriolis)

Spare parts

SIFLOW FC070

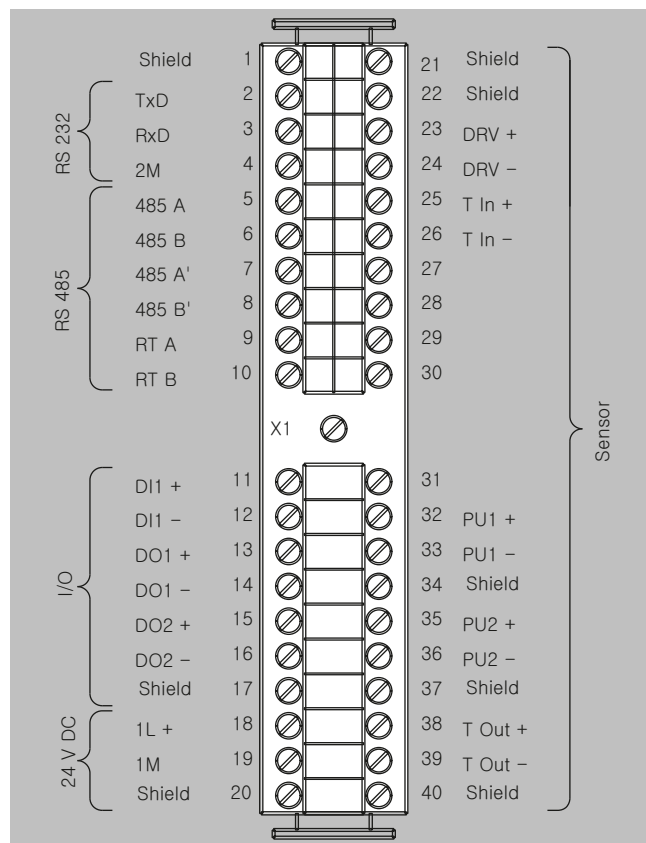
Technical specifications

Measurement of	Mass flow, volume flow, density, sensor temperature, fraction A flow, fraction B flow, fraction A in %
Measurement functions	
• Totalizer 1	Totalization of mass flow, volume flow, fraction A, fraction B
• Totalizer 2	Totalization of mass flow, volume flow, fraction A, fraction B
• Single and 2-stage batch function	Batching function with the use of one or two outputs for dosing in high and low speed
• 4 programmable limits	4 programmable high/low limits for mass flow, volume flow, density, sensor temperature, fraction A flow, fraction B flow, fraction A in %. Limits will generate an alarm if reached
Digital input	
Functions	Start batch, stop batch, start/stop batch, hold/continue batch, reset totalizer 1, reset totalizer 2, reset totalizer 1 and 2, zero adjust, force frequency output, freeze frequency output
High signal	<ul style="list-style-type: none"> Nominal voltage: 24 V DC Lower limit: 15 V DC Upper limit: 30 V DC Current: 2 ... 15 mA
Low signal	<ul style="list-style-type: none"> Nominal voltage: 0 V DC Lower limit: -3 V DC Upper limit: 5 V DC Current: -15 ... +15 mA
Input	Approx. 10 kΩ
Switching	Max. 100 Hz
Digital output 1 and 2	
Functions	<ul style="list-style-type: none"> Output 1: Pulse, frequency, redundancy pulse, redundancy frequency 2-stage batch, batch Output 2: Redundancy pulse, redundancy frequency, 2-stage batch
Voltage supply	3 ... 30 V DC (passive output)
Switching current	Max. 30 mA at 30 V DC
Voltage drop	≤ 3 V DC at max. current
Leakage current	≤ 0.4 mA at max. voltage 30 V DC
Load resistance	1 ... 10 kΩ
Switching frequency	0 ... 12 kHz 50 % duty cycle
Functions	Pulse, frequency, redundancy pulse, redundancy frequency 2-stage batch, batch
Communication	
Modbus RS 232C	<ul style="list-style-type: none"> Max. baud rate: 115 200 baud Max. line length: 15 m at 115 200 baud Signal level: according to EIA-RS 232C
Modbus RS 485	<ul style="list-style-type: none"> Max. baud rate: 115 200 baud Max. line length: 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)

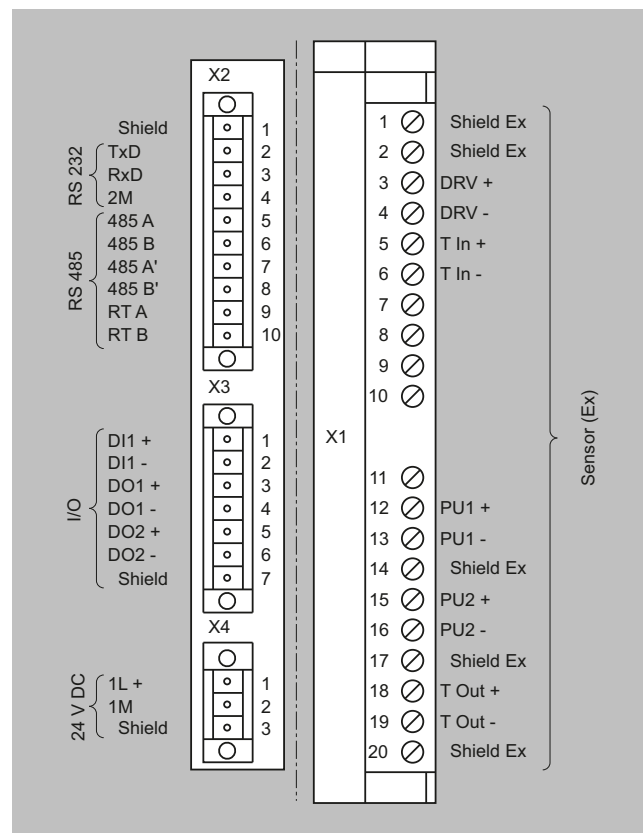
Measurement of	Mass flow, volume flow, density, sensor temperature, fraction A flow, fraction B flow, fraction A in %
Environment	
Ambient temperature	Storage: -40 °C ... +70 °C (-40 °F ... +158 °F)
Operation conditions	Horizontally mounted rail: <ul style="list-style-type: none"> SIFLOW FC070 Standard: 0 ... +60 °C (32 ... +140 °F) SIFLOW FC070 Ex CT: -40 ... +60 °C (-40 ... +140 °F) Vertically mounted rail: <ul style="list-style-type: none"> 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 through 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