

Overview

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

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

The FCT030 IP67 transmitter can be remote connected or compact mounted with all sensors of type FCS400, sizes DN 15 to DN 80.

Fraction

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

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

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

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

Application

SITRANS FC430 mass flowmeters are suitable for applications within the entire process industry where there is a demand for accurate flow measurement. The meter is capable of measuring both liquid and gas flow.

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

- Chemical & Pharma: detergents, bulk chemicals, acids, alkalis, paint mixing systems, solvents and resins, pharmaceuticals, blood products, vaccines, insulin production

- Food & Beverage: dairy products, beer, wine, soft drinks, °Brix/°Plato, fruit juices and pulps, bottling, CO₂ dosing, CIP/SIP-liquids, mixture recipe control
- Automotive: fuel injection nozzle & pump testing, filling of AC units, engine consumption
- Oil & Gas: filling of gas bottles, furnace control, test separators
- Hydrocarbon processing: oil refining, derivatives manufacturing, polymerisation
- Water & Waste Water: dosing of chemicals for water treatment

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

Benefits**Flow calculation and measurement**

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

Operation and display

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

Alarms and safety

- Advanced diagnosis and service menu enhances troubleshooting and meter validation
- Configurable upper and lower alarm and warning limits for all process values
- Alarm handling can be selected between Siemens and NAMUR standard configurations
- Designed from the ground up and certified for integrated safety in accordance with IEC 61508 and IEC 61511.
 - SIL 2 (single-channel operation)
 - SIL 3 (dual-channel operation)
 Unlike many systems which are certified in practice, the SITRANS FC430 system is certified in design, which is a higher qualification and more robust for secure implementation of safety systems.

Outputs and control

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

Flow Measurement

SITRANS F C

Transmitter SITRANS FCT030

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

Channel 1

Channel 1 is 4 to 20 mA analog output with HART 7.2 which can be validated and setup for safety critical applications (SIL 2). The current signal can be configured for massflow, volume flow or density.

Channel 2

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

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

Channels 3 and 4

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

Signal

Signal output can be user configured to:

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

Relay

Relay output(s) can be user configured to:

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

Signal input

Signal input can be user-configured for

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

Signal outputs and inputs are individually ordered as active or passive.

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

Approvals and certificates

The FC430 coriolis flowmeter program was designed from the ground up to comply with or exceed the requirements of international standards and regulations.

Design

The transmitter SITRANS FCT030 is designed in an IP67/NEMA 4X aluminum enclosure with corrosion resistant coating. It can be remote connected or compact mounted with an FCS400 sensor of size DN 15, DN 25, DN 50 or DN 80.

FCT030 is available as standard with one current, HART 7.2 output and can be ordered with additional input/output functions.

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

SensorFlash

SensorFlash is a standard, 1 GByte micro SD card with the ability to be updated by PC. It is supplied with each sensor with the complete set of certification documents including calibration report. Material, pressure test, factory conformance certificates are optional at ordering.

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

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

Function

The following functions are available:

- Mass flowrate, volume flowrate, density, process temperature, fraction flow
- Up to four output/input channels selected at ordering
- Outputs can be individually configured with mass, volume, density etc.
- Three built-in totalizers which can count positive, negative or net flows
- Low flow cut-off, adjustable
- Density cut-off or empty pipe cut-off, adjustable
- Flow direction adjustable
- Alarm system consisting of alarm-log, alarm pending menu
- Internal data logger is updated each 10 minutes with operational data such as system health, totalizer values, all configurations and data needed for custody transfer requirements to OIML R 117 and NTEP
- Display of operating time with real-time clock. Daylight saving time is not implemented
- Uni/bidirectional flow measurement
- Flowrate outputs are freely configurable between maximum negative and maximum positive flows according to the sensor capacity
- Limit switches programmable for flow, density, temperature or fraction process values. Limit points can be graded as warning and alarm for values both above and below nominal process conditions
- Process noise filter for optimization of measurement performance under non-ideal application conditions. 5-stage pumping filter compensates for flow fluctuations caused by e.g. single acting piston pumps
- Full dosing controller with 5 user-configurable recipes
- Automatic zero adjustment menu, with zero point evaluation display
- Full service menu for effective and straight forward application and meter troubleshooting
- Precise temperature measurement ensures optimum accuracy on massflow, density and fraction flow.
- Fraction flow computation is based on a 5th-order algorithm matching known applications. All standard fraction calculations fit within 0.1% of the true value.

Technical specifications

Process media	<ul style="list-style-type: none"> Fluid Group 1 (suitable for dangerous fluids) Aggregate state: Paste/light slurry, liquid and gas 	Ambient temperature	
Number of process variables	7	Operation	
Measurement of	<ul style="list-style-type: none"> Mass flow Volume flow Density Process media temperature Corrected volume flow Reference density Fraction A flow Fraction B flow Fraction A % Fraction B % 	<ul style="list-style-type: none"> Transmitter 	-40 ... +60 °C (-40 ... +140 °F), (humidity max. 95 %)
Current output		<ul style="list-style-type: none"> Display 	-20 ... +60 °C (-4 ... +140 °F)
Current	0 ... 20 mA or 4 ... 20 mA (Channel 1 only 4 ... 20 mA)	Storage	
Load	< 500 Ω per channel	<ul style="list-style-type: none"> Transmitter 	-40 ... +70 °C (-40 ... +158 °F) (Humidity max. 95 %)
Time constant	0 ... 100 s adjustable	<ul style="list-style-type: none"> Display 	-20 ... +70 °C (-4 ... +158 °F)
Digital output¹⁾		Communication	HART 7.2
Pulse	41.6 μs ... 5 s pulse duration	Enclosure	
Frequency	0 ... 10 kHz, 50 % duty cycle, 120 % overscale provision	Material	Aluminum
Time constant	0 ... 100 s adjustable	Rating	IP67/NEMA 4X to IEC 529 and DIN 40050 (1 mH ₂ O for 30 min.)
Active	0 ... 24 V DC, 110 mA, short-circuit-protected	Mechanical load	18 ... 400 Hz random, 3.17 g RMS, in all directions
Passive	3 ... 30 V DC, max. 110 mA	Supply voltage	
Relay		Supply	20 ... 27 V DC ± 10%; 100 ... 240 V AC ± 10 %, 47 ... 63 Hz
Type	Change-over voltage-free relay contact	Fluctuation	No limit
Load	30 V AC/100 mA	Power consumption	7.5 W/15 VA
Functions	Alarm level, alarm number, limit, flow direction	EMC performance	
Digital input		Emission	EN 55011/CISPR-11 (Class A)
Voltage	15 ... 30 V DC (2 ... 15 mA)	Immunity	EN/IEC 61236-1 (Industry)
Functionality	Start/stop/hold/continue dosing, reset totalizer 1 and 2, force out- put, freeze output	NAMUR	Within the value limits according to "General requirements" with error criteria A in accordance with NE 21
Galvanic isolation	All inputs and outputs are galva- nically isolated, isolation voltage 500 V.	Environment	
Cut-off		Environmental conditions acc. to IEC/EN/UL 61010-1	<ul style="list-style-type: none"> Altitude up to 2000 m Pollution degree 2
Low-flow	0 ... 9.9 % of maximum flow	Maintenance	The flowmeter has a built-in error log/pending menu which should be inspected on a regular basis.
Limit function	Mass flow, volume flow, fraction, density, sensor temperature	Cable glands	Cable gland are available in Nylon, Nickel plated brass or stainless steel (316L/W1.4404) in the following dimensions: <ul style="list-style-type: none"> M20 ½" NPT
Totalizer	Three eight-digit counters for for- ward, net or reverse flow	Cable	Standard industrial signal cable up to 200 m long with 2 x screened pairs or 4-wire overall screen can be laid between the sensor and transmitter. Siemens offers cables in a selection of pre- cut lengths and prepared for either gland or plug connection.
Display	<ul style="list-style-type: none"> Background illumination with alphanumeric text, 3 x 20 characters to indicate flow rate, totalized values, settings and faults. Time constant as current output 1 Reverse flow indicated by negative sign 		
Zero point adjustment	Via keypad or remote via digital input		

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

Flow Measurement

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Transmitter SITRANS FCT030

Approvals

Hazardous area

- ATEX, IECEx, EAC Ex, FM, CSA, NEPSI, INMETRO
- Zone 1:
Ex d e ia [ia Ga] IIC T6 Gb
- Zone 21:
Ex tb [ia Da] IIIC T85°C Db

Custody transfer

- FM
- Class I+II+III, Div. 1 (US only):
Grp. A, B, C, D, E, F, G, H

Pressure equipment

- OIML R 117 type approval to a wide variety of liquids other than water
- NTEP for US and Canada
- PED
- CRN
- EHEDG for hygienic variant sensors
- 3A for hygienic variant sensors
- External cleanability satisfies EHEDG and 3A rules

Hygienic applications

Certificates

Safety Integration Level (applies only to compact versions)

- SIL 3 for software
- SIL 2 for hardware
- SIL 3 for redundant hardware systems

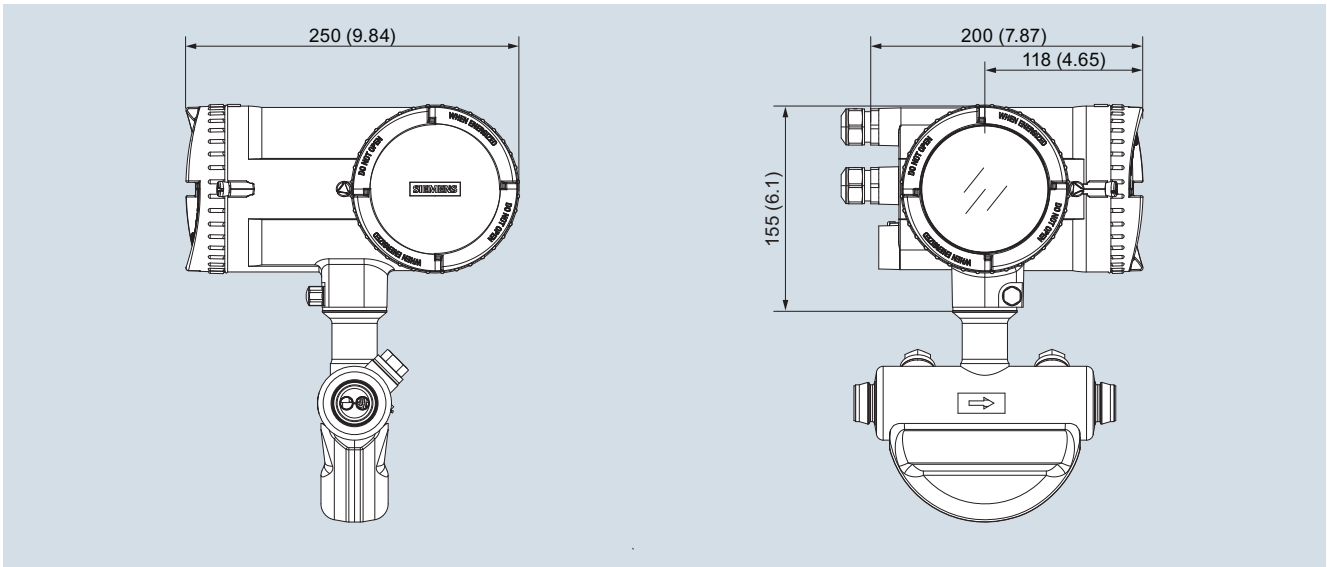
CE mark

- Pressure equipment
- Low voltage directive
- WEEE
- RoHS

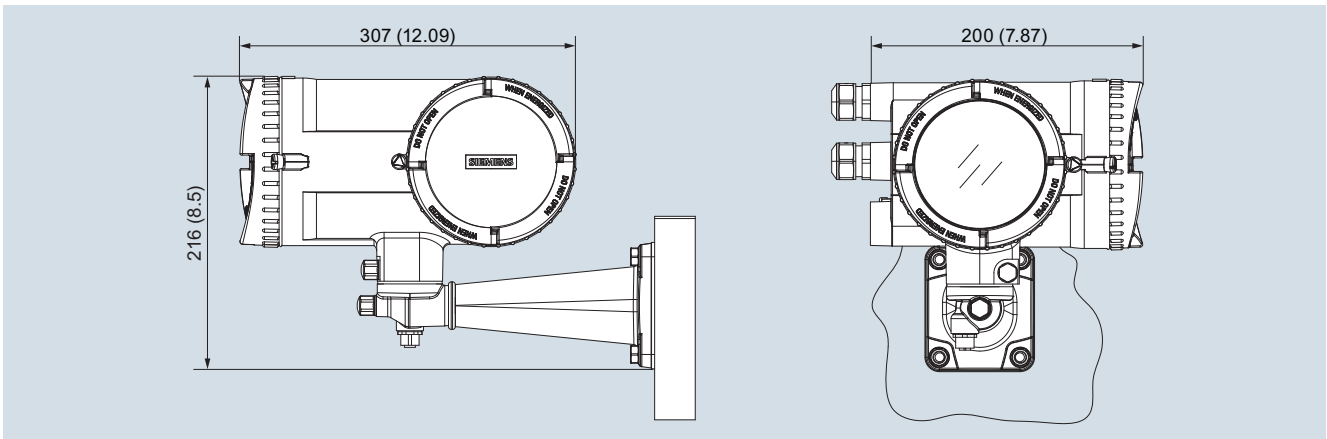
Regional certifications

- C-TICK (Australia and New Zealand EMC)
- EAC (Belarus, Armenia, Kazakhstan, Russia)
- KCC (South Korea)

Dimensional drawings



















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



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



Accessories

Description	Article No.		Description	Article No.	
CT plug Tamper cover for CT locking. Fits over the M12 plug at both sensor and transmitter ends of the remote system cable (2 pcs.)	A5E31478498		Standard cable (Ex) with M12 plugs, PO insulation and PUR sleeve, blue, -40 ... +80 °C (-40 ... +176 °F)		
Bag of glands (metric) in black plastic ¹⁾	A5E03907414		<ul style="list-style-type: none"> • 5 m • 10 m • 25 m • 50 m • 75 m • 150 m 	A5E03914929 A5E03914962 A5E03914995 A5E03915004 A5E03915074 A5E03915088	
Bag of glands, (metric) in gray plastic Ex e/i ¹⁾	A5E03907424		Standard cable (Ex) for termination, PO insulation and PUR sleeve, blue, -40 ... +80 °C (-40 ... +176 °F)		
Bag of glands (metric) in AISI 316 SS Ex e/i ¹⁾	A5E03907429		<ul style="list-style-type: none"> • 5 m • 10 m • 25 m • 50 m • 75 m • 150 m 	A5E03914945 A5E03914973 A5E03914984 A5E03915015 A5E03915057 A5E03915100	
Bag of glands (metric) in Ni-plated brass Ex e/i ¹⁾	A5E03907430				
Bag of glands (NPT) in black plastic ²⁾	A5E03907435		Suitcase for comprehensive sales support and training for FC430	A5E31467598	
Bag of glands (NPT) in gray plastic Ex e/i ²⁾	A5E03907451		It comes in a special suitcase with a fan implemented that allows the flowmeter to demonstrate airflow.		
Bag of glands (NPT) in AISI 316 SS Ex e/i ²⁾	A5E03907467		Suitcase for comprehensive sales support and training for FC410.	A5E33219071	
Bag of glands (NPT) in Ni-plated brass Ex e/i ²⁾	A5E03907473		It comes in a special suitcase with an S7-1200 PLC and HMI touch-screen display. The operating code is open-source and can be copied to customers to assist with system integration.		
Standard cable (non-Ex) with M12 plugs, PO insulation and PUR sleeve, gray, -40 ... +80 °C (-40 ... +176 °F)			Service toolkit for field maintenance of transmitter and sensor components. Contains all hand tools necessary for maintenance. Other tools may be required for installation.	A5E03722877	
<ul style="list-style-type: none"> • 5 m (16.4 ft) • 10 m (32.8 ft) • 25 m (82 ft) • 50 m (164 ft) • 75 m (246 ft) • 150 m (492 ft) 	A5E03914805 A5E03914850 A5E03914853 A5E03914859 A5E03914861 A5E03914874				
Standard cable (non-Ex) for termination, PO insulation and PUR sleeve, gray, -40 ... +80 °C (-40 ... +176 °F)					
<ul style="list-style-type: none"> • 5 m (16.4 ft) • 10 m (32.8 ft) • 25 m (82 ft) • 50 m (164 ft) • 75 m (246 ft) • 150 m (492 ft) 	A5E03914833 A5E03914849 A5E03914854 A5E03914856 A5E03914864 A5E03914873				

Flow Measurement

SITRANS F C

Flowmeter - Accessories/Spare parts

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 <ul style="list-style-type: none"> • 230 V AC <ul style="list-style-type: none"> - DN 15 electric A5E33035287 - DN 25 electric A5E33035324 - DN 50 electric A5E33035325 - DN 80 electric A5E33035336 • 115 V AC <ul style="list-style-type: none"> - DN 15 electric A5E32877520 - DN 25 electric A5E32877556 - DN 50 electric A5E32877557 - DN 80 electric A5E32877561 		
Heating jacket controller, IP65. Digital display for 0 ... 200 °C (32 ... 392 °F) control setpoint <ul style="list-style-type: none"> • 230 V AC A5E03839193 • 115 V AC A5E03839194 		

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

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

Description	Dimension	Article No.
Mating parts for hygienic fittings DIN 11851 Includes: <ul style="list-style-type: none"> • 2 unions • 2 mating parts (for welding in) • 2 EPDM gaskets 		
	DN 10	FDK:085U1016
	DN 15	FDK:085U1017
	DN 25	FDK:085U1019
	DN 32	FDK:085U1020
	DN 40	FDK:085U1021
	DN 50	FDK:085U1022
	DN 65	FDK:085U1023
Mating parts for hygienic clamp ISO 2852 Includes: <ul style="list-style-type: none"> • 2 clamps • 2 mating parts • 2 EPDM gaskets 		
	25 mm	FDK:085U1029
	40 mm	FDK:085U1031
	50 mm	FDK:085U1032
2 EPDM gaskets with collar for mounting set DIN 11851		
	DN 10	FDK:085U1006
	DN 15	FDK:085U1007
	DN 25	FDK:085U1009
	DN 32	FDK:085U1010
	DN 40	FDK:085U1011
	DN 50	FDK:085U1012
	DN 65	FDK:085U1013