

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC430

Overview



The complete flowmeter system SITRANS FC430 can be ordered for standard, hygienic or NAMUR service. All versions can be ordered for CT service, according to OIML R 117 (Liquids other than water).

SIL specified compact variants can be validated and configured for SIL 2 or SIL 3 operation. SIL 3 operation requires two flowmeters in series and monitored by a SIL-rated control system. Series mounting must not introduce cross-talk between the sensors. Refer to installation guidelines.

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

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

FC430 is available as standard with 4 to 20 mA analog output with HART 7.2. Additional functions can be freely configured for analog, pulse, frequency, relay or status output or binary input.

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

The SITRANS FC430 flowmeter system consists of a SITRANS FCS400 sensor and a SITRANS FCT030 transmitter.

Benefits

- It is narrow and light, fitting neatly into dense piping arrangements
- Easy maintenance because modules can be exchanged rapidly
- Effective separation of measurement from plant vibration
- Highly secure operation in safety critical applications
- Non-volatile memory of all setup and operation data
- Reliable measurements due to high signal to noise ratio
- Secure, digital transfer of measurement data from the sensor
- Short overall length; easy drop-in replacement into most existing installations
- Functional Safety (SIL X). Device suitable for use in accordance with IEC 61508 and IEC 61511.

Technical specifications

Sizes	DN 15 (½"), DN 25 (1"), DN 50 (2"), DN 80 (3")
Accuracy	± 0.10 %
Repeatability	± 0.05 %
Flow range (water @ 1 bar pressure loss)	DN 15: 3 700 kg/h (8 157 lb/h) DN 25: 11 500 kg/h (25 353 lb/h) DN 50: 52 000 kg/h (114 640 lb/h) DN 80: 136 000 kg/h (300 000 lb/h)
Architecture	Compact or remote configuration with selection of twelve languages including Chinese and Russian
Display	Full graphical display, 240 x 160 pixels
Power supply	24 ... 90 V DC ± 10 %; 100 ... 240 V AC ± 10 %, 50 ... 60 Hz ± 10 %
Weight	4.6 ... 50 kg
Material	<ul style="list-style-type: none"> • Sensor <ul style="list-style-type: none"> - Wetted parts: 316L stainless steel or Hastelloy C22 - Enclosure: 304 stainless steel • Transmitter: Aluminum with corrosion-resistant coating
Enclosure rating	IP67
Pressure ratings	<ul style="list-style-type: none"> • Measuring tubes <ul style="list-style-type: none"> - 316L: 100 bar (1450 psi) - Hastelloy C22: 160 bar (2321 psi) • Sensor enclosure: 20 bar (DN15, DN 25) 17 bar (DN 50, DN 80) • Sensor enclosure burst pressure: >160 bar (all sizes)
Temperature ratings	<ul style="list-style-type: none"> • Process medium: -50 ... +200 °C (-58 ... +392 °F) • Ambient: -40 ... +60 °C (-40 ... +140 °F) • Display: -20 ... +60 °C (-4 ... +140 °F)
Process connections	<ul style="list-style-type: none"> • Flanges: EN 1092-1 B1, EN 1092-1 D, ANSI/ASME B16.5, JIS B 2220, DIN 11864-2 • Pipe threads: ASME B1.20 (NPT), ISO228-1 G (BSPP), VCO Quick-connect • Hygienic threads: DIN 11851, DIN 11864-1A, ISO 2853, SMS 1145 • Hygienic clamps: DIN 11864-3A, DIN 32676, ISO 2852
Approvals	<ul style="list-style-type: none"> • Hazardous area: ATEX, IECEx, FM, NEPSI, CSA, INMETRO • Pressure equipment: PED, CRN • Hygienic: 3A, EHEDG • Custody transfer: OIML R 117 • Operational safety (compact system only): SIL 2 Single SIL 3 Redundant system
NAMUR	NAMUR-compliant (e.g. NE 21, NE 41 and NE 132)
I/O	Up to 4 channels combining analog, relay or digital outputs and binary input
Communication	HART 7.2
EMC performance	EN 61326-3-2
Mechanical load	18 to 400 Hz random The flow meter will mechanically tolerate 3.17 g RMS in all directions. Flow accuracy cannot be guaranteed under all conditions.

Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Article No.	Ord. code
SITRANS FC430 Digital Coriolis flowmeter with SITRANS FCS400 Standard flow sensor with hygienic and flange/pipe thread connections and compact or remote mounting with FCT030 transmitter	7ME 4 6 1 3 -		SITRANS FC430 Digital Coriolis flowmeter with SITRANS FCS400 Standard flow sensor with hygienic and flange/pipe thread connections and compact or remote mounting with FCT030 transmitter	7ME 4 6 1 3 -	
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			Ex approval		
Sensor size, connection size			Non-Ex		A
DN 15, DN 10 (½", 3/8")	3 F		ATEX II 2GD		C
DN 15, DN 15 (½", ½")	3 G		IECEX GDb		F
DN 15, DN 20 (½", ¾")	3 H		FM, Class 1, Div 1		H
DN 15, DN 25 (½", 1")	3 J		CSA, Class 1, Zone 1		M
DN 25, DN 15 (1", ½")	3 K		Local User Interface		
DN 25, DN 25 (1", 1")	3 L		Blind		1
DN 25, DN 40 (1", 1½")	3 N		Graphical, 240 x 160 pxl		3
DN 50, DN 40 (2", 1½")	4 B				
DN 50, DN 50 (2", 2")	4 C				
DN 80, DN 65 (3", 2½")	4 J				
DN 80, DN 80 (3", 3")	4 K				
DN 80, DN 100 (3", 4")	4 L				
Process connection			Selection and Ordering data		Order code
EN 1092-1 B1, PN 16	A 0		Further designs		
EN 1092-1 B1, PN 40	A 1		Please add "-Z" to Article No. and specify Order code(s).		
EN 1092-1 B1, PN 63	A 2		Cable glands		
EN 1092-1 B1, PN 100	A 3		Metric, no glands	A 01	
EN 1092-1 B1, PN 160	B 1		Metric, plastic	A 02	
EN 1092-1 D NUT, PN 40	A 5		Metric, brass/Ni plated	A 05	
EN 1092-1 D NUT, PN 63	A 6		Metric, stainless steel	A 06	
EN 1092-1 D NUT, PN 100	A 7		NPT, no glands	A 11	
EN 1092-1 D NUT, PN 160	A 8		NPT, Plastic	A 12	
ANSI B16.5-2009, class 150	D 1		NPT, brass/Ni plated	A 15	
ANSI B16.5-2009, class 300	D 2		NPT, stainless steel	A 16	
ANSI B16.5-2009, class 600	D 3		Software functions and CT approvals		
ANSI B16.5-2009, class 900	D 4		Standard	B 11	
ISO228-1 G pipe thread	E 1		CT standard	B 31	
ASME B1.20.1 NPT pipe thread	E 3		I/O configuration Ch1		
DIN 11851 hygienic screwed	F 1		Ca 4 ... 20 mA HART active SIL certified	E 04	
DIN 32676 hygienic Tri-Clamp	G 1		Cp 4 ... 20 mA HART passive SIL certified	E 05	
DIN 11864-1A aseptic screwed	H 1		Ca 4 ... 20 mA HART active	E 06	
DIN 11864-2A aseptic flanged	H 2		Cp 4 ... 20 mA HART passive	E 07	
DIN 11864-3A clamped	H 3		Only compact versions can be used in SIL applications.		
ISO 2852 hygienic clamped	J 1				
ISO 2853 hygienic screwed	J 5				
SMS 1145 hygienic screwed	K 1				
12-VCO-4 quick connect	K 5				
JIS B2200:2004/10K	L 2				
JIS B2220:2004/20K	L 4				
JIS B2220:2004/40K	L 6				
JIS B2220:2004/63K	L 7				
Wetted parts material					
AISI 316L/W1.4435/W1.4404 (100 barg max.)	1				
Hastelloy C22 (only for 7ME461)	3				
Calibration/Accuracy class					
0.1 % flow, 5 kg/m³ density	1				
0.1 % flow, 1 kg/m³ density	4				
Standard fraction calibration	8				
Transmitter/DSL material & mounting style					
Compact, IP67, aluminum	D				
Remote, IP67, aluminum, M12	G				
Remote, IP67, aluminum, T/Box	K				

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC430

Selection and Ordering data

Order code

I/O configuration Ch2, Ch3 and Ch4

None	F00
aSignal, None, None	F40
aSignal, aSignal, None	F41
aSignal, aSignal, aSignal	F42
aSignal, aSignal, Ia	F43
aSignal, aSignal, R	F44
aSignal, Ia, None	F45
aSignal, Ia, Ia	F46
aSignal, Ia, R	F47
aSignal, R, None	F50
aSignal, R, R	F51
pSignal, None, None	F60
pSignal, pSignal, None	F61
pSignal, pSignal, pSignal	F62
pSignal, pSignal, Ip	F63
pSignal, pSignal, R	F64
pSignal, Ip, None	F65
pSignal, Ip, Ip	F66
pSignal, Ip, R	F67
pSignal, R, None	F70
pSignal, R, R	F71
aSignal, aSignal, pSignal	F80
aSignal, aSignal, Ip	F81
aSignal, pSignal, None	F82
aSignal, pSignal, pSignal	F83
aSignal, pSignal, Ia	F84
aSignal, pSignal, Ip	F85
aSignal, pSignal, R	F86
aSignal, Ia, Ip	F87
aSignal, Ip, None	F90
aSignal, Ip, Ip	F91
aSignal, Ip, R	F92
pSignal, pSignal, Ia	F93
pSignal, Ia, None	F94
pSignal, Ia, Ia	F95
pSignal, Ia, Ip	F96
pSignal, Ia, R	F97

Notes on I/O configurations:

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

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

I: Discrete status input to the flowmeter. Functions are selected in the menu including 'Freeze output', 'Reset totalizer'.

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

The MLFB structure for FC430 systems must be filled to **this level**, including **"-Z"** options A., B., E. and F.

Selection and Ordering data

Order code

Add-on options and accessories

Please add **"-Z"** to Article No. and specify Order code(s).

Certificates

Pressure test certificate CRN	C01
Pressure test certificate PED	C02
Material certificate EN 10204-3.1	C05
Welding inspection report	C07
Factory certificate to EN 10204 2.1	C10
Factory certificate to EN 10204 2.2	C11

Cable

None	L50
5 m (16.4 ft), standard with M12 plugs fitted	L51
5 m (16.4 ft), standard	L52
10 m (32.8 ft) standard with M12 plugs fitted	L55
10 m (32.8 ft), standard	L56
25 m (82 ft), standard with M12 plugs fitted	L59
25 m (82 ft), standard	L60
50 m (164 ft), standard with M12 plugs fitted	L63
50 m (164 ft), standard	L64
75 m (246 ft), standard with M12 plugs fitted	L67
75 m (246 ft), standard	L68
150 m (492 ft), standard with M12 plugs fitted	L71
150 m (492 ft), standard	L72

Additional data

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

Tag name

Tag name plate, stainless steel	Y17
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Operating instructions for SITRANS FC430

Description	Article No.
• English	A5E03361511
• German	A5E03651143
• Spanish	A5E03651152
• French	A5E03651188
• Italian	A5E03651190
• Chinese	A5E03922773

This device is shipped with a Quick Start guide and a CD containing further SITRANS F C literature.

All literature is also available for free at:

<http://www.siemens.com/flowdocumentation>

Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Order code
SITRANS FC430 Digital Coriolis flowmeter	7ME 4 6 2 3 -		Further designs	
with SITRANS FCS400 Flow sensor			Please add "-Z" to Article No. and specify Order code(s).	
Hygienic version with Ra < 0.8 µm, 3A approved, and compact or remote mounting with FCT030 transmitter			Cable glands	
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			Metric, no glands	A01
			Metric, plastic	A02
			Metric, brass/Ni plated	A05
			Metric, stainless steel	A06
			NPT, no glands	A11
			NPT, plastic	A12
			NPT, brass/Ni plated	A15
			NPT, stainless steel	A16
Sensor size, connection size			Software functions and CT approvals	
DN 15, DN 10 (½", 3/8")	3 F		Standard	B11
DN 15, DN 15 (½", ½")	3 G		CT standard	B31
DN 15, DN 20 (½", ¾")	3 H			
DN 15, DN 25 (½", 1")	3 J		I/O configuration Ch1	
DN 25, DN 25 (1", 1")	3 L		Ca 4 ... 20 mA HART active SIL certified	E04
DN 25, DN 32 (1", 1¼")	3 M		Cp 4 ... 20 mA HART passive SIL certified	E05
DN 25, DN 40 (1", 1½")	3 N		Ca 4 ... 20 mA HART active	E06
DN 50, DN 40 (2", 1½")	4 B		Cp 4 ... 20 mA HART passive	E07
DN 50, DN 50 (2", 2")	4 C			
DN 80, DN 65 (3", 2½")	4 J			
DN 80, DN 80 (3", 3")	4 K			
Process connection				
DIN 11851 0.8 µm hygienic screwed	F 1			
DIN 32676 0.8 µm hygienic Tri-Clamp	G 1			
DIN 11864-1 0.8 µm hygienic screwed	H 1			
DIN 11864-2A BF-A 0.8 µm hygienic screwed (metric)	H 2			
DIN 11864-3A BF-A 0.8 µm hygienic clamped	H 3			
DIN 11864-2B BF-A 0.8 µm hygienic flanged (NPS)	H 4			
ISO 2852 0.8 µm hygienic clamped	J 1			
ISO 2853 0.8 µm hygienic screwed	J 5			
Wetted parts material				
AISI 316L/1.4435 (40 bar max.)	1			
Calibration/Accuracy class				
0.1 % flow, 5 kg/m³ density	1			
0.1 % flow, 1 kg/m³ density	4			
Standard fraction calibration	8			
Transmitter/DSL material and mounting style				
Compact, IP67, aluminum	D			
Remote, IP67, aluminum, M12	G			
Remote, IP67, aluminum, T/Box	K			
Ex approval				
Non-Ex	A			
ATEX II 2GD	C			
IECEX GDb	F			
FM, Class 1, Div 1	H			
CSA, Class 1, Zone 1	M			
Local User Interface				
Blind	1			
Graphical, 240 x 160 pxl	3			

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC430

Selection and Ordering data

Order code

I/O configuration Ch2, Ch3 and Ch4

None
aSignal, None, None
aSignal, aSignal, None
aSignal, aSignal, aSignal
aSignal, aSignal, Ia
aSignal, aSignal, R
aSignal, Ia, None
aSignal, Ia, Ia
aSignal, Ia, R
aSignal, R, None
aSignal, R, R
pSignal, None, None
pSignal, pSignal, None
pSignal, pSignal, pSignal
pSignal, pSignal, Ip
pSignal, pSignal, R
pSignal, Ip, None
pSignal, Ip, Ip
pSignal, Ip, R
pSignal, R, None
pSignal, R, R
aSignal, aSignal, pSignal
aSignal, aSignal, Ip
aSignal, pSignal, None
aSignal, pSignal, pSignal
aSignal, pSignal, Ia
aSignal, pSignal, Ip
aSignal, pSignal, R
aSignal, Ia, Ip
aSignal, Ip, None
aSignal, Ip, Ip
aSignal, Ip, R
pSignal, pSignal, Ia
pSignal, Ia, None
pSignal, Ia, Ia
pSignal, Ia, Ip
pSignal, Ia, R

F00
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F97

Notes on I/O configurations:

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

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

I: Discrete status input to the flowmeter. Functions are selected in the menu including 'Freeze output', 'Reset totalizer'.

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

The MLFB structure for FC430 systems must be filled to **this level**, including **"-Z"** options A., B., E. and F.

Selection and Ordering data

Order code

Add-on options and accessories

Please add **"-Z"** to Article No. and specify Order code(s).

Certificates

Pressure test certificate CRN	C01
Pressure test certificate PED	C02
Material certificate EN 10204-3.1	C05
Welding inspection report	C07
Factory certificate to EN 10204 2.1	C10
Factory certificate to EN 10204 2.2	C11

Cable

None	L50
5 m (16.4 ft), standard with M12 plugs fitted	L51
5 m (16.4 ft), standard	L52
10 m (32.8 ft) standard with M12 plugs fitted	L55
10 m (32.8 ft), standard	L56
25 m (82 ft), standard with M12 plugs fitted	L59
25 m (82 ft), standard	L60
50 m (164 ft), standard with M12 plugs fitted	L63
50 m (164 ft), standard	L64
75 m (246 ft), standard with M12 plugs fitted	L67
75 m (246 ft), standard	L68
150 m (492 ft), standard with M12 plugs fitted	L71
150 m (492 ft), standard	L72

Additional data

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

Tag name

Tag name plate, stainless steel	Y17
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Operating instructions for SITRANS FC430

Description	Article No.
• English	A5E03361511
• German	A5E03651143
• Spanish	A5E03651152
• French	A5E03651188
• Italian	A5E03651190
• Chinese	A5E03922773

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Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Article No.	Ord. code
SITRANS FC430 Digital Coriolis flowmeter	7ME 4 7 1 3 -		SITRANS FC430 Digital Coriolis flowmeter	7ME 4 7 1 3 -	
with SITRANS FCS400 NAMUR compliant flow sensor with flange/pipe thread connections and compact or remote mounting with FCT030 transmitter			with SITRANS FCS400 NAMUR compliant flow sensor with flange/pipe thread connections and compact or remote mounting with FCT030 transmitter		
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.					
Sensor size, Connection size			Ex approval		
DN 15, DN 6 (½", ¼")	3 E		Non-Ex	A	
DN 15, DN 10 (½", 3/8")	3 F		ATEX II 2GD	C	
DN 15, DN 15 (½", ½")	3 G		IECEx GDb	F	
DN 15, DN 20 (½", ¾")	3 H		FM, Class 1, Div 1	H	
DN 15, DN 25 (½", 1")	3 J		CSA, Class 1, Zone 1	M	
DN 25, DN 25 (1", 1")	3 L		Local User Interface		
DN 25, DN 32 (1", 1¼")	3 M		Blind		1
DN 25, DN 40 (1", 1½")	3 N		Graphical, 240 x 160 pxl		3
DN 50, DN 40 (2", 1½")	4 B				
DN 50, DN 50 (2", 2")	4 C				
DN 80, DN 65 (3", 2½")	4 J				
DN 80, DN 80 (3", 3")	4 K				
DN 80, DN 100 (3", 4")	4 L				
Process connection			Selection and Ordering data		Order code
EN 1092-1 B1, PN 16	A 0		Further designs		
EN 1092-1 B1, PN 40	A 1		Please add "-Z" to Article No. and specify Order code(s).		
EN 1092-1 B1, PN 63	A 2		Cable glands		
EN 1092-1 B1, PN 100	A 3		Metric, no glands	A01	
EN 1092-1 B1, PN 160	B 1		Metric, plastic	A02	
EN 1092-1 D, PN 40	A 5		Metric, brass/Ni plated	A05	
EN 1092-1 D, PN 63	A 6		Metric, stainless steel	A06	
EN 1092-1 D, PN 100	A 7		NPT, no glands	A11	
EN 1092-1 D, PN 160	A 8		NPT, plastic	A12	
ANSI B16.5, RF, class 150	D 1		NPT, brass/Ni plated	A15	
ANSI B16.5, RF, class 300	D 2		NPT, stainless steel	A16	
ANSI B16.5, RF, class 600	D 3		Software functions and CT approvals		
ANSI B16.5, RF, class 900	D 4		Standard	B11	
ISO228-1 G pipe thread	E 1		CT standard	B31	
ASME B1.20.1 NPT pipe thread	E 3		I/O configuration Ch1		
DIN 11851 Hygienic screwed	F 1		Ca 4 ... 20 mA HART active, SIL certified	E04	
DIN 32676-C (inch) Hygienic clamped	G 1		Cp 4 ... 20 mA HART passive, SIL certified	E05	
DIN 11864-1 Hygienic screwed	H 1		Ca 4 ... 20 mA HART active	E06	
DIN 11864-2A BF-A Hygienic flanged metric	H 2		Cp 4 ... 20 mA HART passive	E07	
DIN 11864-3A Hygienic clamped	H 3				
DIN 11864-2B BF-A Hygienic flanged NPS	H 4				
ISO 2852 Hygienic clamped	J 1				
ISO 2853 Hygienic screwed	J 5				
SMS 1145 Hygienic screwed	K 1				
Swagelok Quick Connect	K 5				
JIS B2200/10K	L 2				
JIS B2200/20K	L 4				
JIS B2200/40K	L 6				
JIS B2200/63K	L 7				
Wetted parts material					
AISI 316L/W1.4435/W1.4404 (100 barg max.)		1			
Calibration/Accuracy class					
0.1 % flow, 5 kg/m³ density		1			
0.1 % flow, 1 kg/m³ density		4			
Standard fraction calibration		8			
Transmitter/DSL material & mounting style					
Compact, IP67, aluminum		D			
Remote, IP67, aluminum, M12		G			
Remote, IP67, aluminum, T/Box		K			

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC430

Selection and Ordering data

Order code

I/O configuration Ch2, Ch3 and Ch4

None	F00
aSignal, None, None	F40
aSignal, aSignal, None	F41
aSignal, aSignal, aSignal	F42
aSignal, aSignal, Ia	F43
aSignal, aSignal, R	F44
aSignal, Ia, None	F45
aSignal, Ia, Ia	F46
aSignal, Ia, R	F47
aSignal, R, None	F50
aSignal, R, R	F51
pSignal, None, None	F60
pSignal, pSignal, None	F61
pSignal, pSignal, pSignal	F62
pSignal, pSignal, Ip	F63
pSignal, pSignal, R	F64
pSignal, Ip, None	F65
pSignal, Ip, Ip	F66
pSignal, Ip, R	F67
pSignal, R, None	F70
pSignal, R, R	F71
aSignal, aSignal, pSignal	F80
aSignal, aSignal, Ip	F81
aSignal, pSignal, None	F82
aSignal, pSignal, pSignal	F83
aSignal, pSignal, Ia	F84
aSignal, pSignal, Ip	F85
aSignal, pSignal, R	F86
aSignal, Ia, Ip	F87
aSignal, Ip, None	F90
aSignal, Ip, Ip	F91
aSignal, Ip, R	F92
pSignal, pSignal, Ia	F93
pSignal, Ia, None	F94
pSignal, Ia, Ia	F95
pSignal, Ia, Ip	F96
pSignal, Ia, R	F97

Notes on I/O configurations:

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

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

I: Discrete status input to the flowmeter. Functions are selected in the menu including 'Freeze output', 'Reset totalizer'.

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

The MLFB structure for FC430 systems must be filled to **this level**, including **"-Z"** options A..., B..., E... and F...

Selection and Ordering data

Order code

Add-on options and accessories

Please add **"-Z"** to Article No. and specify Order code(s).

Certificates

Pressure test certificate CRN	C01
Pressure test certificate PED	C02
Material certificate EN 10204-3.1	C05
Welding inspection report	C07
Factory certificate to EN 10204 2.1	C10
Factory certificate to EN 10204 2.2	C11

Cable

None	L50
5 m (16.4 ft), standard with M12 plugs fitted	L51
5 m (16.4 ft), standard	L52
10 m (32.8 ft) standard with M12 plugs fitted	L55
10 m (32.8 ft), standard	L56
25 m (82 ft), standard with M12 plugs fitted	L59
25 m (82 ft), standard	L60
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50 m (164 ft), standard	L64
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150 m (492 ft), standard with M12 plugs fitted	L71
150 m (492 ft), standard	L72

Additional data

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

Tag name

Tag name plate, stainless steel	Y17
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Operating instructions for SITRANS FC430

Description	Article No.
• English	A5E03361511
• German	A5E03651143
• Spanish	A5E03651152
• French	A5E03651188
• Italian	A5E03651190
• Chinese	A5E03922773

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Overview



The compact flowmeter SITRANS FC410 can be ordered for industrial, hygienic or NAMUR service.

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

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

FC410 is available with Modbus RTU (RS 485) multi-drop serial communication.

The flowmeter is supplied with SensorFlash, a micro SD card containing all relevant certificates.

The SITRANS FC410 flowmeter system consists of a SITRANS FCS400 sensor and a SITRANS FCT010 transmitter always compact mounted.

Benefits

- It is narrow and light, fitting neatly into dense piping arrangements
- Effective separation of measurement from plant vibration
- Reliable measurements due to high signal to noise ratio
- Short overall length; easy drop-in replacement into most existing installations
- Direct connection to host with high-speed Modbus simplifies machine or skid construction and set-up.

Technical specifications

Sizes	DN 15 (½"), DN 25 (1"), DN 50 (2"), DN 80 (3")
Accuracy	± 0.10 %
Repeatability	± 0.05 %
Flow range (water @ 1 bar pressure loss)	DN 15: 3 700 kg/h (8 157 lb/h) DN 25: 11 500 kg/h (25 353 lb/h) DN 50: 52 000 kg/h (114 640 lb/h) DN 80: 136 000 kg/h (300 000 lb/h)
Power supply	24 V DC ± 20 %; 110 mA
Weight	4.6 ... 50 kg
Material	<ul style="list-style-type: none"> • Sensor <ul style="list-style-type: none"> - Wetted parts: 316L stainless steel or Hastelloy C22 - Enclosure: 304 stainless steel • Transmitter: Aluminum with corrosion-resistant coating
Enclosure rating	IP67
Pressure ratings	<ul style="list-style-type: none"> • Measuring tubes <ul style="list-style-type: none"> - 316L: 100 bar (1450 psi) - Hastelloy C22: 160 bar (2321 psi) • Sensor enclosure <ul style="list-style-type: none"> 20 bar (DN15, DN 25) 17 bar (DN 50, DN 80) • Sensor enclosure burst pressure: >160 bar (all sizes)
Temperature ratings	<ul style="list-style-type: none"> • Process medium: -50 ... +200 °C (-58 ... +392 °F) • Ambient: -40 ... +60 °C (-40 ... +140 °F)
Process connections	<ul style="list-style-type: none"> • Flanges: EN 1092-1 B1, EN 1092-1 D, ANSI/ASME B16.5, JIS B 2220, DIN 11864-2 • Pipe threads: ASME B1.20 (NPT), ISO228-1 G (BSPP), VCO Quick-connect • Hygienic threads: DIN 11851, DIN 11864-1A, ISO 2853, SMS 1145 • Hygienic clamps: DIN 11864-3A, DIN 32676, ISO 2852
Approvals	<ul style="list-style-type: none"> • Hazardous area: ATEX, IECEx, FM, NEPSI, CSA, INMETRO (installed with flame-proof conduit) • Pressure equipment: PED, CRN • Hygienic: 3A, EHEDG • Marine: Germanischer Lloyd/det Norske Veritas, Bureau Veritas, Lloyds of London, American Bureau of Shipping
NAMUR	NAMUR-compliant (e.g. NE 21, NE 41 and NE 132)
Communication	Modbus RTU
EMC performance	EN 61326-3-2
Mechanical load	18 to 400 Hz random The flow meter will mechanically tolerate 3.17 g RMS in all directions. Flow accuracy cannot be guaranteed under all conditions.

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC410

Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Order code
SITRANS FC410 Digital Coriolis flowmeter with SITRANS FCS400 Standard flow sensor with hygienic and flange/pipe thread connections and compact mounting with FCT010 transmitter	7ME4611-		Further designs Please add "-Z" to Article No. and specify Order code(s).	
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			Cable glands Metric, no glands Metric, plastic Metric, brass/Ni plated Metric, stainless steel NPT, no glands NPT, Plastic NPT, brass/Ni plated NPT, stainless steel Integral M12 socket	A01 A02 A05 A06 A11 A12 A15 A16 A20
Sensor size, connection size DN 15, DN 10 (½", 3/8") DN 15, DN 15 (½", ½") DN 15, DN 20 (½", ¾") DN 15, DN 25 (½", 1") DN 25, DN 15 (1", ½") DN 25, DN 25 (1", 1") DN 25, DN 40 (1", 1½") DN 50, DN 40 (2", 1½") DN 50, DN 50 (2", 2") DN 80, DN 65 (3", 2½") DN 80, DN 80 (3", 3") DN 80, DN 100 (3", 4")	3 F 3 G 3 H 3 J 3 K 3 L 3 N 4 B 4 C 4 J 4 K 4 L		Software functions and CT approvals Standard I/O configuration Ch1 Modbus RTU RS 485 I/O configuration Ch2, Ch3 and Ch4 None The MLFB structure for FC410 systems must be filled to this level , including "-Z" options A., B., E. and F.	B11 E14 F00
Process connection EN 1092-1 B1, PN 16 EN 1092-1 B1, PN 40 EN 1092-1 B1, PN 63 EN 1092-1 B1, PN 100 EN 1092-1 B1, PN 160 EN 1092-1 D NUT, PN 40 EN 1092-1 D NUT, PN 63 EN 1092-1 D NUT, PN 100 EN 1092-1 D NUT, PN 160 ANSI B16.5-2009, class 150 ANSI B16.5-2009, class 300 ANSI B16.5-2009, class 600 ANSI B16.5-2009, class 900 ISO228-1 G pipe thread ASME B1.20.1 NPT pipe thread DIN 11851 hygienic screwed DIN 32676 hygienic Tri-Clamp DIN 11864-1A aseptic screwed DIN 11864-2A aseptic flanged DIN 11864-3A clamped ISO 2852 hygienic clamped ISO 2853 hygienic screwed SMS 1145 hygienic screwed 12-VCO-4 quick connect JIS B2200:2004/10K JIS B2220:2004/20K JIS B2220:2004/40K JIS B2220:2004/63K	A 0 A 1 A 2 A 3 B 1 A 5 A 6 A 7 A 8 D 1 D 2 D 3 D 4 E 1 E 3 F 1 G 1 H 1 H 2 H 3 J 1 J 5 K 1 K 5 L 2 L 4 L 6 L 7			
Wetted parts material AISI 316L/W1.4435/W1.4404 (100 barg max.) Hastelloy C22 (only for 7ME461)	1 3			
Calibration/Accuracy class 0.1 % flow, 5 kg/m³ density 0.1 % flow, 1 kg/m³ density Standard fraction calibration		1 4 8		
Ex approval Non-Ex ATEX II 2GD IECEx GDb FM, Class 1, Div 1 CSA, Class 1, Zone 1				A C F H M

Selection and Ordering data	Order code
Add-on options and accessories	
Please add "-Z" to Article No. and specify Order code(s).	
Certificates	
Pressure test certificate CRN	C01
Pressure test certificate PED	C02
Material certificate EN 10204-3.1	C05
Welding inspection report	C07
Factory certificate to EN 10204 2.1	C10
Factory certificate to EN 10204 2.2	C11
Cable¹⁾	
None	L50
5 m (16.4 ft), standard with M12 plugs fitted	L51
5 m (16.4 ft), standard	L52
10 m (32.8 ft) standard with M12 plugs fitted	L55
10 m (32.8 ft), standard	L56
25 m (82 ft), standard with M12 plugs fitted	L59
25 m (82 ft), standard	L60
50 m (164 ft), standard with M12 plugs fitted	L63
50 m (164 ft), standard	L64
75 m (246 ft), standard with M12 plugs fitted	L67
75 m (246 ft), standard	L68
150 m (492 ft), standard with M12 plugs fitted	L71
150 m (492 ft), standard	L72
Additional data	
Please add "-Z" to Article No. and specify Order code(s) and plain text.	
Tag name	
Tag name plate, stainless steel	Y17

¹⁾ M12 versions of cable have a plug at both ends.

Operating instructions for SITRANS FC410

Description	Article No.
• English	A5E33120874
• German	A5E33124885
• Spanish	A5E33209358
• French	A5E33209377
• Italian	A5E33209408
• Chinese	A5E33209431

This device is shipped with a Quick Start guide and a CD containing further SITRANS F C literature.

All literature is also available for free at:
<http://www.siemens.com/flowdocumentation>

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC410

Selection and Ordering data	Article No.	Ord. code	Selection and Ordering data	Order code
SITRANS FC410 Digital Coriolis flowmeter with SITRANS FCS400 Flow sensor Hygienic version with Ra < 0.8 µm, 3A approved, and compact mounting with FCT010 transmitter Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ME 4 6 2 1 -		Further designs Please add "-Z" to Article No. and specify Order code(s).	
Sensor size, connection size DN 15, DN 10 (½", 3/8") DN 15, DN 15 (½", ½") DN 15, DN 20 (½", ¾") DN 15, DN 25 (½", 1") DN 25, DN 25 (1", 1") DN 25, DN 32 (1", 1¼") DN 25, DN 40 (1", 1½") DN 50, DN 40 (2", 1½") DN 50, DN 50 (2", 2") DN 80, DN 65 (3", 2½") DN 80, DN 80 (3", 3")	3 F 3 G 3 H 3 J 3 L 3 M 3 N 4 B 4 C 4 J 4 K		Cable glands Metric, no glands Metric, plastic Metric, brass/Ni plated Metric, stainless steel NPT, no glands NPT, plastic NPT, brass/Ni plated NPT, stainless steel Integral M12 socket	A01 A02 A05 A06 A11 A12 A15 A16 A20
Process connection DIN 11851 0.8 µm hygienic screwed DIN 32676 0.8 µm hygienic Tri-Clamp DIN 11864-1 0.8 µm hygienic screwed DIN 11864-2A BF-A 0.8 µm hygienic flanged (metric) DIN 11864-3A BF-A0.8 µm hygienic clamped DIN 11864-2B BF-A0.8 µm hygienic flanged (NPS) ISO 2852 0.8 µm hygienic clamped ISO 2853 0.8 µm hygienic screwed	F 1 G 1 H 1 H 2 H 3 H 4 J 1 J 5		Software functions and CT approvals Standard	B11
Wetted parts material AISI 316L/1.4435 (40 bar max.)	1		I/O configuration Ch1 Modbus RTU RS 485	E14
Calibration/Accuracy class 0.1 % flow, 5 kg/m³ density 0.1 % flow, 1 kg/m³ density Standard fraction calibration	1 4 8		I/O configuration Ch2, Ch3 and Ch4 None The MLFB structure for FC410 systems must be filled to this level , including "-Z" options A., B., E. and F..	F00
Ex approval Non-Ex ATEX II 2GD IECEx GDb FM, Class 1, Div 1 CSA, Class 1, Zone 1		A C F H M		

Selection and Ordering data	Order code
Add-on options and accessories	
Please add "-Z" to Article No. and specify Order code(s).	
Certificates	
Pressure test certificate CRN	C01
Pressure test certificate PED	C02
Material certificate EN 10204-3.1	C05
Welding inspection report	C07
Factory certificate to EN 10204 2.1	C10
Factory certificate to EN 10204 2.2	C11
Cable¹⁾	
None	L50
5 m (16.4 ft), standard with M12 plugs fitted	L51
5 m (16.4 ft), standard	L52
10 m (32.8 ft) standard with M12 plugs fitted	L55
10 m (32.8 ft), standard	L56
25 m (82 ft), standard with M12 plugs fitted	L59
25 m (82 ft), standard	L60
50 m (164 ft), standard with M12 plugs fitted	L63
50 m (164 ft), standard	L64
75 m (246 ft), standard with M12 plugs fitted	L67
75 m (246 ft), standard	L68
150 m (492 ft), standard with M12 plugs fitted	L71
150 m (492 ft), standard	L72
Additional data	
Please add "-Z" to Article No. and specify Order code(s) and plain text.	
Tag name	
Tag name plate, stainless steel	Y17

¹⁾ M12 versions of cable have a plug at both ends.

Operating instructions for SITRANS FC410

Description	Article No.
• English	A5E33120874
• German	A5E33124885
• Spanish	A5E33209358
• French	A5E33209377
• Italian	A5E33209408
• Chinese	A5E33209431

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Flow Measurement

SITRANS F C

Flowmeter SITRANS FC410

Selection and Ordering data

SITRANS FC410 Digital Coriolis flowmeter with SITRANS FCS400 NAMUR compliant flow sensor with flange/pipe thread connections and compact mounting with FCT010 transmitter

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

Sensor size, Connection size

Article No.	Ord. code
7ME 4 7 1 1 -	
■ ■ ■ ■ ■ - ■ D ■ 1 ■ ■ ■ ■ ■	
DN 15, DN 6 (1/2", 1/4")	3 E
DN 15, DN 10 (1/2", 3/8")	3 F
DN 15, DN 15 (1/2", 1/2")	3 G
DN 15, DN 20 (1/2", 3/4")	3 H
DN 15, DN 25 (1/2", 1")	3 J
DN 25, DN 25 (1", 1")	3 L
DN 25, DN 32 (1", 1 1/4")	3 M
DN 25, DN 40 (1", 1 1/2")	3 N
DN 50, DN 40 (2", 1 1/2")	4 B
DN 50, DN 50 (2", 2")	4 C
DN 80, DN 65 (3", 2 1/2")	4 J
DN 80, DN 80 (3", 3")	4 K
DN 80, DN 100 (3", 4")	4 L

Process connection

EN1092-1 B1, PN 16	A 0
EN1092-1 B1, PN 40	A 1
EN1092-1 B1, PN 63	A 2
EN1092-1 B1, PN 100	A 3
EN1092-1 B1, PN 160	B 1
EN1092-1 D, PN 40	A 5
EN1092-1 D, PN 63	A 6
EN1092-1 D, PN 100	A 7
EN1092-1 D, PN 160	A 8
ANSI B16.5, RF, class 150	D 1
ANSI B16.5, RF, class 300	D 2
ANSI B16.5, RF, class 600	D 3
ANSI B16.5, RF, class 900	D 4
ISO228-1 G pipe thread	E 1
ASME B1.20.1 NPT pipe thread	E 3
DIN 11851 Hygienic screwed	F 1
DIN 32676-C (inch) Hygienic clamped	G 1
DIN 11864-1 Hygienic screwed	H 1
DIN 11864-2A BF-A Hygienic flanged metric	H 2
DIN 11864-3A Hygienic clamped	H 3
DIN 11864-2B BF-A Hygienic flanged NPS	H 4
ISO 2852 Hygienic clamped	J 1
ISO 2853 Hygienic screwed	J 5
SMS 1145 Hygienic screwed	K 1
Swagelok Quick Connect	K 5
JIS B2200/10K	L 2
JIS B2200/20K	L 4
JIS B2200/40K	L 6
JIS B2200/63K	L 7

Wetted parts material

AISI 316L/W1.4435/W1.4404 (100 barg max.) 1

Calibration/Accuracy class

0.1 % flow, 5 kg/m ³ density	1
0.1 % flow, 1 kg/m ³ density	4
Standard fraction calibration	8

Ex approval

Non-Ex	A
ATEX II 2GD	C
IECEx GDb	F
FM, Class 1, Div 1	H
CSA, Class 1, Zone 1	M

Selection and Ordering data

Order code

Further designs

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

Cable glands

Metric, no glands	A01
Metric, plastic	A02
Metric, brass/Ni plated	A05
Metric, stainless steel	A06
NPT, no glands	A11
NPT, plastic	A12
NPT, brass/Ni plated	A15
NPT, stainless steel	A16

Software functions and CT approvals

Standard B11

I/O configuration Ch1

Modbus RTU RS 485 E14

I/O configuration Ch2, Ch3 and Ch4

None F00

The MLFB structure for FC410 systems must be filled to **this level**, including "-Z" options A..., B..., E... and F...

Selection and Ordering data	Order code
Add-on options and accessories	
Please add "-Z" to Article No. and specify Order code(s).	
Certificates	
Pressure test certificate CRN	C01
Pressure test certificate PED	C02
Material certificate EN 10204-3.1	C05
Welding inspection report	C07
Factory certificate to EN 10204 2.1	C10
Factory certificate to EN 10204 2.2	C11
Cable¹⁾	
None	L50
5 m (16.4 ft), standard with M12 plugs fitted	L51
5 m (16.4 ft), standard	L52
10 m (32.8 ft) standard with M12 plugs fitted	L55
10 m (32.8 ft), standard	L56
25 m (82 ft), standard with M12 plugs fitted	L59
25 m (82 ft), standard	L60
50 m (164 ft), standard with M12 plugs fitted	L63
50 m (164 ft), standard	L64
75 m (246 ft), standard with M12 plugs fitted	L67
75 m (246 ft), standard	L68
150 m (492 ft), standard with M12 plugs fitted	L71
150 m (492 ft), standard	L72
Additional data	
Please add "-Z" to Article No. and specify Order code(s) and plain text.	
Tag name	
Tag name plate, stainless steel	Y17

¹⁾ M12 versions of cable have a plug at both ends.

Operating instructions for SITRANS FC410

Description	Article No.
• English	A5E33120874
• German	A5E33124885
• Spanish	A5E33209358
• French	A5E33209377
• Italian	A5E33209408
• Chinese	A5E33209431

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Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS400

Overview



The flow measuring principle is based on the Coriolis Effect. The FCS400 sensor's measuring tubes are energized by an electro-mechanical driver circuit which oscillates them at their resonance frequency.

Two pick-ups are placed symmetrically upstream and downstream of the central driver. When a process fluid passes through the sensor, the Coriolis Effect will act on the vibrating tubes and cause deflection which can be measured as a phase shift between pick-ups 1 and 2. The phase shift is proportional to the mass flow rate.

The amplitude of the driver is automatically regulated to ensure a stable output from both of the pickups.

The temperatures of the sensor tubes and frame are measured with high precision to provide compensation for changes with temperature in the measuring properties.

The sensor signals are analyzed for flow, density and fluid temperature in the sensor front end. The digital signal is controlled to conform to high Safety Integrated Level (SIL) and sent digitally to the transmitter via standard cable. The FCT030 further calculates total mass and volume, fraction, dosing control and many other functions.

The front-end module has a process noise filter, which can be used to improve the meter's performance when installation and application conditions are not ideal. Typical interferences from process conditions such as pump pulsations, mechanical vibrations, oscillating valves can be reduced considerably.

Integration

The SITRANS FCS400 Massflow sensor is suitable for both indoor and outdoor installation and meets the requirements of Protection Class IP67/NEMA 4X. Optionally the sensor can be supplied with hazardous certification to Class 1 Zone 1 (ATEX, IECEx) or Class 1 Div. 1 (FM).

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

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

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

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

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

Installation orientation

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

Supports

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

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

Shut-off devices

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

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

System design

- The sensor design consists of process connections, inlet and outlet manifolds mounted in a stiff frame and two parallel tubes equally sharing the process medium flow. The meter is protected in a pressure-rated stainless steel enclosure with two purge ports to support a pressure guard in non-Ex applications.
- The sensing tubes are curved in the CompactCurve shape which gives high sensitivity and low pressure loss. The CompactCurve shape was selected to ensure that the smallest flows are measured with optimal signal to noise ratio.
- Vibration mode separation creates a controlled measuring environment only within the CompactCurve part of the tubes. As a result the sensor has high immunity to plant vibration while avoiding large mass balancing of the meter components.
- The 15° slope of the CompactCurve shape ensures secure self-draining when the sensor axis is mounted vertically or up to 10° off vertical.
- The sensor frame is designed to conduct plant vibrations directly through the sensor body to adjacent pipeline while providing isolation of the metering section from the vibration. Careful mounting of the pipeline with regard to minimizing vibration at the meter will ensure a secure measurement environment.

Installation guidelines

- The mass flowmeter does not require any flow conditioning or straight inlet pipe sections. Care should be exercised however to ensure that any upstream valves, gates, sight glasses etc. do not cavitate and are not set into vibration by the flow.
- It is always preferred to place the flowmeter upstream of any control valve (what goes in, comes out) or other pipeline component which may cause flashing, cavitation or vibrations.
- The presence of gas bubbles in the fluid may result in erroneous measurements, particularly in the density measurement. Therefore the flowmeter should not be installed at the lowest pressure point in the liquid piping system or where vapour can collect. Install the meter in pipeline sections with high pressure to maintain system pressure and compress any bubbles.
- Drop lines downstream from the flow sensor should be avoided to prevent the meter tube from draining during flowing conditions. A back-pressure device or orifice is recommended to ensure that flow does not separate within the flow sensor but the metering section remains at positive pressure at all times while there is flow.

- The flowmeter should not come into contact with any other objects. Avoid making attachments to the housing except for the pressure guard components (if required).
- When the connecting pipeline is larger than the sensor size, suitable standard reducers may be installed. A selection of oversize and undersize connections can be ordered - refer to the sizes tables below.
- The flow sensor may be supported at the junction between process connection and the manifold, but should not be used to support adjacent piping. Ensure that the piping is also supported on both sides so that connection stresses are neutral.
- If strong vibrations exist in the pipeline, they should be damped using elastic pipeline elements. The damping devices must be installed outside the supported flowmeter section. Direct connection of flexible elements to the sensor should be avoided.
- Make sure that any dissolved gases, which are present in many liquids, do not outgas. The back pressure at the outlet should be at least 0.2 bar (3 psi) above the vapour pressure of the process fluid.
- Assure that operation below the vapour pressure cannot occur particularly for fluids with low latent heat of vaporisation.
- The sensor should not be installed in the vicinity of strong electromagnetic fields, e.g. near motors, pumps, variable frequency drives, transformers etc.
- When operating meters on a common mounting base the sensors should be mounted and spaced separate from each other to avoid cross-talk and other vibration interferences.
- When operating meters in interconnected pipelines the pipes should be decoupled to prevent cross talk.

Remote system cabling

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

The maximum design length for the sensor cable is 200 m (656.17 ft), limited to 150 m (492 ft) for Ex applications with Class IIC gases. Data transmission speed and process variable update rates may be affected by the cable characteristics. For best results, choose a cable with the following electrical characteristics:

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

The flowmeter system applies maximum 15 V DC in operation and is certified intrinsically safe. The complete system is insulation tested to 1500 V in production.

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

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

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

Insulation and heating

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

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

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

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

Calibration

To ensure accurate measurement all flowmeters must be initially calibrated. The calibration of each SITRANS FCS400 Coriolis sensor is conducted at SIEMENS flow facilities accredited according to ISO/IEC 17025 by DANAK. A calibration certificate is shipped with every sensor and calibration data are stored in the SensorFlash memory unit. The accreditation body DANAK has signed the ILAC MRA agreement (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement). Therefore the accreditation ensures international traceability and recognition of the test results in 39 countries worldwide, including the US (NIST traceability).

Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS400

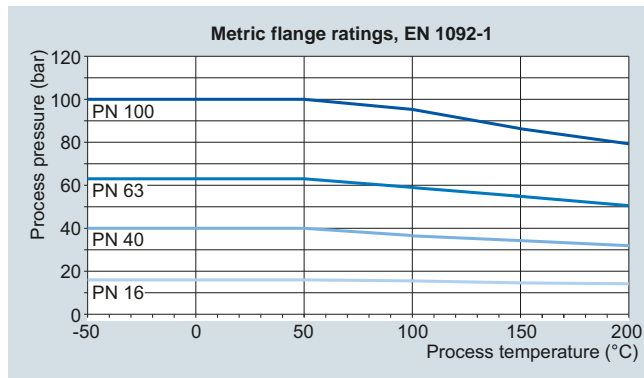
Technical specifications

Flow sensor FCS400		
Parameter	Unit	Value
Process pressure range	[barg (psi)]	316L: 0 ... 100 (0 ... 1450) Hastelloy C22: 0 ... 160 (0 ... 2321)
Process temperature range	[°C (°F)]	-50 ... +200 (-58 ... +392)
Ambient temperature range	[°C (°F)]	-40 ... +60 (-40 ... +140)
Transport temperature range	[°C (°F)]	-40 ... +70 (-40 ... +158)
Density range	[kg/m ³ (lb/ft ³)]	1 ... 5000 (0.062 ... 312.2)
Process media	Fluid group	1 (suitable for dangerous fluids)
	Form	Light slurry, liquid and non-condensing gas
No. of process values		
• Primary process values		<ul style="list-style-type: none"> • Mass flow • Density • Process medium temperature
• Derived process values		<ul style="list-style-type: none"> • Volume flow • Corrected volume flow (with reference density) • Fraction A:B • Fraction % A:B

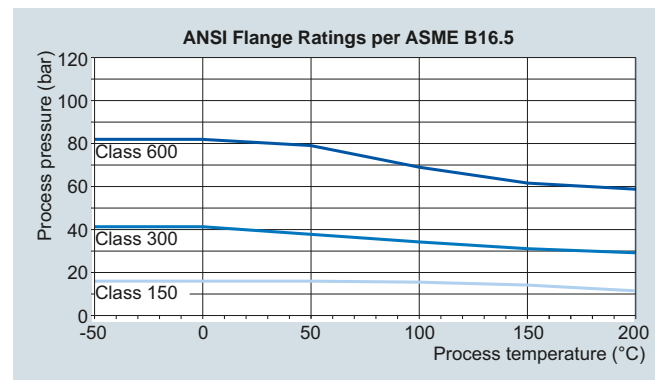
Performance specifications		Sensor			
Parameter	Unit	DN 15	DN 25	DN 50	DN 80
Max. zero point error	[kg/h (lb/min)]	0.2 (0.007)	2.0 (0.072)	7.5 (0.276)	18 (0.66)
Qmin	[kg/h (lb/min)]	20 (0.735)	200 (7.35)	750 (27.6)	900 (33.1)
Qnom	[kg/h (lb/min)]	3 700 (136.0)	11 500 (422.6)	52 000 (1 911)	136 000 (4 997)
Qmax	[kg/h (lb/min)]	31 900 (1 172)	88 400 (3 248)	353 500 (12 990)	904 800 (33 246)
Linearity error	[%]	± 0.1	± 0.1	± 0.1	± 0.1
Repeatability	[%]	± 0.05	± 0.05	± 0.05	± 0.05
Density error	[kg/m ³ (lb/ft ³)]	± 5 (± 0.31)	± 5 (± 0.31)	± 5 (± 0.31)	± 5 (± 0.31)
Extended density calibration	[kg/m ³ (lb/ft ³)]	± 1 (± 0.062)	± 1 (± 0.062)	± 1 (± 0.062)	± 1 (± 0.062)
Temperature error	[°C (°F)]	± 0.5 (± 0.9)	± 0.5 (± 0.9)	± 0.5 (± 0.9)	± 0.5 (± 0.9)

Pressure/temperature curves

With two major exceptions, the pressure rating of the flow sensors is independent of the process medium temperature. Design rules for flange connections in both the EN1092-1 and ASME B16.5 standards dictate pressure derating with increasing temperature. The charts below show the effect of process medium temperature on the pressure ratings for the flanges within the FCS400 product program.



EN1092-1 flanged sensors



ASME B16.5 flanged sensors

Sensor variants

SITRANS FCS400 sensors are available in three main variants: Standard, hygienic and NAMUR. A wide range of process connections is available for the FCS400 sensors. The available combinations of type, sensor size and connection size are shown in the tables below.

Standard sensors

Sensor	Connection	EN 1092-1 B1, PN 16	EN 1092-1 B1, PN 40	EN 1092-1 B1, PN 63	EN 1092-1 B1, PN 100	EN 1092-1 D Nut, PN 40	EN 1092-1 D Nut, PN 63	EN 1092-1 D Nut, PN 100	ANSI B16.5-2009, class 150	ANSI B16.5-2009, class 300	ANSI B16.5-2009, class 600	ISO 228-1 G pipe thread	ASME B1.20.1 NPT pipe thread	DIN 11851 Hygienic screwed	DIN 32676 Hygienic Tri-clamp	DIN 11864-1A Aseptic screwed	DIN 11864-2A Aseptic flanged	ISO 2852 Hygienic clamped	ISO 2853 Hygienic screwed	SMS 1145 Hygienic screwed	12-VCO-4 Quick connect	JIS B2200:2004/10K	JIS B2200:2004/20K	JIS B2200:2004/40K
316 Stainless - Standard: 7ME461.-...																								
DN 15 (½")	DN 6 (¼")											o	o											
	DN 10 (¾")													o										
	DN 15 (½")	o	●	o	●	o	o	o	●	o	●	●	●	●	●	●	●				o	o	o	o
	DN 20 (¾")								●	o	●				●									
	DN 25 (1")	o	●		●										o				●	●	o			
DN 25 (1")	DN 15 (½")																							
	DN 25 (1")	o	●	o	●	o	o	o	●	o	●	●	●	●	●	●	●	●	●	o		o	o	o
	DN 32 (1¼")													o										
DN 40 (1½")	o	●		o				o	o	o				●			o	o						
DN 50 (2")	DN 25 (1")																							
	DN 40 (1½")	o	●	o	●	o	o	o						o		o	●	o	o	o				
	DN 50 (2")	o	●	o	●	o	o	o	●	o	●	●	●	●	●	●	●	●	●	o		o	o	o
	DN 65 (2½")																							
DN 80 (3")	DN 50 (2")																							
	DN 65 (2½")	o	●	o	o				●	o	●			●										
	DN 80 (3")	o	●	o	●	o	o	o	●	o	●			●	●	●	●	●	●	o		o	o	o
	DN 100 (4")	o	o	o	o																			

- Combinations shown ● are Mainstream products with delivery time of up to 15 days depending on the combination and production stock levels.
- Combinations shown o are Sidestream products with delivery from 45 to 90 days. Not all components are held in production stock for Sidestream products.

Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS400

Hygienic sensor variants

The hygienic sensors all have maximum internal surface roughness < 0.8 µm and are EHEDG and 3A approved. Hygienic sensors are offered with process connection conforming to various international quick-connect clamps or threaded connectors. Pressure ratings are according to the relevant standard and the sensor size. Maximum pressure in the hygienic program is PN 40.

Sensor	Connection	316 SS - Hygienic: 7ME462-....					
		DIN 11851 0.8 µm screwed	DIN 32676 0.8 µm Tri-clamp	DIN 11864-1 0.8 µm screwed	DIN 11864-2 0.8 µm flanged	ISO 2852 0.8 µm clamped	ISO 2853 0.8 µm screwed
DN 15 (½")	DN 6 (¼")						
	DN 10 (¾")	○					
	DN 15 (½")	●	●	●	●		
	DN 20 (¾")		●				
	DN 25 (1")	○				●	●
DN 25 (1")	DN 15 (½")						
	DN 25 (1")	●	●	●	●	●	●
	DN 32 (1¼")	○					
	DN 40 (1½")		●			○	○
DN 50 (2")	DN 25 (1")						
	DN 40 (1½")	○		○	●	○	○
	DN 50 (2")	●	●	●	●	●	●
	DN 65 (2½")						
DN 80 (3")	DN 50 (2")						
	DN 65 (2½")	●					
	DN 80 (3")	●	●	●	●	●	●
	DN 100 (4")						

- Combinations shown ● are Mainstream products with delivery time of up to 15 days depending on the combination and production stock levels.
- Combinations shown ○ are Sidestream products with delivery from 45 to 90 days. Not all components are held in production stock for Sidestream products.

Aseptic flanged process connections

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

The flange dimensions in the FCS400 program are as follows:

Size DN	Pipe	Bore d ₁	Ring OD d ₁₁	Bolt Circle d ₅	Bolt holes	Flange diameter d ₁₀
10	13 x 1.5	10	22.4	37	4 x Ø9	54
15	19 x 1.5	16	28.4	42	4 x Ø9	59
20	23 x 1.5	20	32.4	47	4 x Ø9	64
25	29 x 1.5	26	38.4	53	4 x Ø9	70
32	35 x 1.5	32	47.7	59	4 x Ø9	76
40	41 x 1.5	38	53.7	65	4 x Ø9	82
50	53 x 1.5	50	65.7	77	4 x Ø9	94
65	70 x 2.0	66	81.7	95	8 x Ø9	107
80	85 x 2.0	81	97.7	112	8 x Ø11	113

DIN 11864-2A BF-A flange dimensions

NAMUR sensor variants

The NAMUR variants have build-in lengths according to NAMUR recommendation NE 132. The recommendations of NE 132 are stated for sensors with flanges the same size as the sensor nominal size, and for flanges to EN1092-1 PN 40 with B1 flange facing. For couplings of other standards such as ASME B16.5 Class 150, the overall length incorporates the difference in length between standard EN and ASME flanges. NAMUR variants are offered with flange and pipe thread connections according to EN, ISO and ASME standards, as shown in the table below.

Sensor	Connection	316 Stainless - NAMUR: 7ME471-...																	
		EN 1092-1 B1, PN 16	EN 1092-1 B1, PN 40	EN 1092-1 B1, PN 63	EN 1092-1 B1, PN 100	EN 1092-1 D Nut, PN 40	EN 1092-1 D Nut, PN 63	EN 1092-1 D Nut, PN 100	ANSI B16.5-2009, class 150	ANSI B16.5-2009, class 300	ANSI B16.5-2009, class 600	ISO 228-1 G pipe thread	ASME B1.20.1 NPT pipe thread	DIN 11851 Hygienic screwed	DIN 32676 Hygienic Tri-clamp	DIN 11864-1A Aseptic screwed	DIN 11864-2A Aseptic flanged	ISO 2852 Hygienic clamped	ISO 2853 Hygienic screwed
DN 15 (1/2")	DN 6 (1/4")											○	○						
	DN 10 (3/8")													○					
	DN 15 (1/2")	○	●	○	●	○	○	○	●	○	●	●	●	●	●	●	●		
	DN 20 (3/4")								●	○	●				●				
	DN 25 (1")	○	●		●									○				●	●
DN 25 (1")	DN 15 (1/2")																		
	DN 25 (1")	○	●	○	●	○	○	○	●	○	●	●	●	●	●	●	●	●	●
	DN 32 (1 1/4")													○					
	DN 40 (1 1/2")	○	●		○				○	○	○				●			○	○
DN 50 (2")	DN 25 (1")																		
	DN 40 (1 1/2")	○	●	○	●	○	○	○						○		○	●	○	○
	DN 50 (2")	○	●	○	●	○	○	○	●	○	●	●	●	●	●	●	●	●	●
	DN 65 (2 1/2")	○																	
DN 80 (3")	DN 50 (2")																		
	DN 65 (2 1/2")	○	●	○	○				●	○	●			●					
	DN 80 (3")	○	●	○	●	○	○	○	●	○	●			●	●	●	●	●	●
	DN 100 (4")	○	○	○	○														

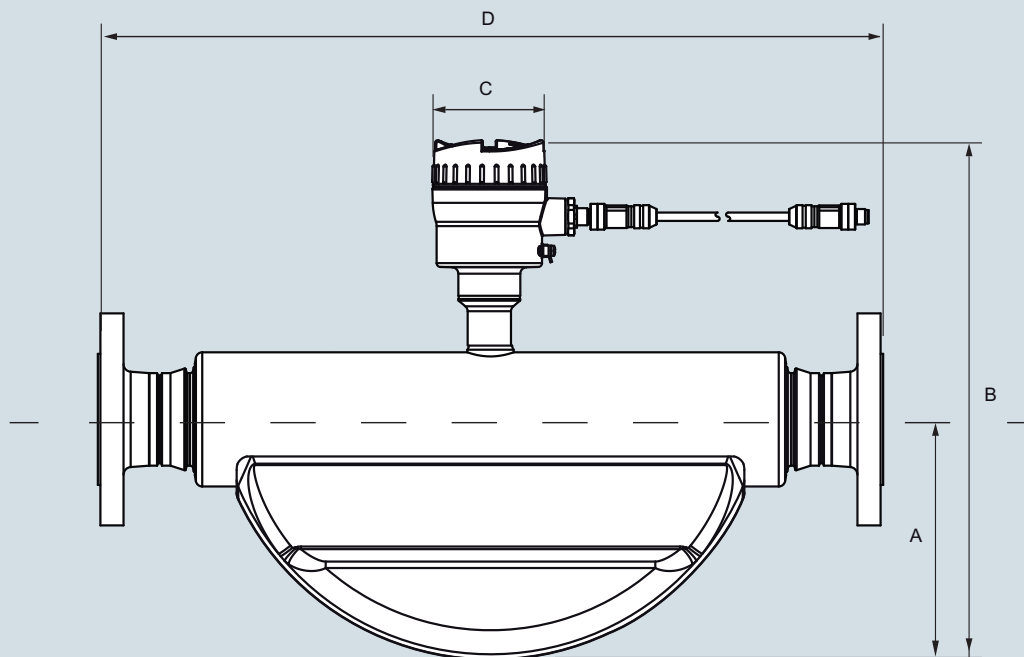
- Combinations shown ● are Mainstream products with delivery time of up to 15 days depending on the combination and production stock levels.
- Combinations shown ○ are Sidestream products with delivery from 45 to 90 days. Not all components are held in production stock for Sidestream products.

Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS400

Dimensional drawings



Sensor [DN]	[inch]	A		B		C		Weight	
		[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[kg]	[lb]
15	½	90	3.54	280	11.02	90	3.54	4.6	10.14
25	1	115	4.53	315	12.40	90	3.54	7.9	17.42
50	2	180	7.09	390	15.35	90	3.54	15	33.07
80	3	294	11.57	424	16.69	90	3.54	53	116.84

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

The build-in length D depends on the flange.

Overall length

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

316L stainless - Standard: 7ME461.-...

Sensor	DN 15 (½")					DN 25 (1")			DN 50 (2")		DN 80 (3")		
	DN 6 (¼")	DN 10 (3/8")	DN 15 (½")	DN 20 (¾")	DN 25 (1")	DN 25 (1")	DN 32 (1¼")	DN 40 (1½")	DN 40 (1½")	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")
EN 1092-1 B1, PN 16			265		265	360			610	610	915	840	840
EN 1092-1 B1, PN 40			265		265	360		365	610	610	915	840	840
EN 1092-1 B1, PN 63			265			360			610	610	915	915	915
EN 1092-1 B1, PN 100			270		275	360			610	610	915	915	915
ANSI B16.5, class 150			270	270		360		365		620	915	875	
ANSI B16.5, class 300			270	270		360		380		620	915	875	
ANSI B16.5, class 600			270	285		360		380		620	915	875	
ISO 228-1 GH pipe thread	265		265			365				620			
ANSI B1.20.1 NPT pipe thread	265		270			365				620			
DIN 11851 Hygienic screwed		265	265		193	360	360		610	610	840	840	
DIN 32676-C Hygienic clamp			265	265		360		360		610		875	
DIN 11864-1 Aseptic screwed			265	265		360				610		875	
DIN 11864-2 Aseptic flange			265	265		360		274	620	610		875	
ISO 2852 Hygienic clamp					265	360			610	610		840	
ISO 2853 Hygienic screwed			265			360		274		610		860	

SITRANS FCS400, overall length, dimensions in mm

Sensor	DN 15 (½")					DN 25 (1")			DN 50 (2")		DN 80 (3")		
	DN 6 (¼")	DN 10 (3/8")	DN 15 (½")	DN 20 (¾")	DN 25 (1")	DN 25 (1")	DN 32 (1¼")	DN 40 (1½")	DN 40 (1½")	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")
EN 1092-1 B1, PN 16			10.43		10.43	14.17			24.02	24.02	36.02	33.07	33.07
EN 1092-1 B1, PN 40			10.43		10.43	14.17		14.37	24.02	24.02	36.02	33.07	33.07
EN 1092-1 B1, PN 63			10.43			14.17			24.02	24.02	36.02	36.02	36.02
EN 1092-1 B1, PN 100			10.63		10.83	14.17			24.02	24.02	36.02	36.02	36.02
ANSI B16.5, class 150			10.63	10.63		14.17		14.37		24.41	36.02	34.45	
ANSI B16.5, class 300			10.63	10.63		14.17		14.96		24.41	36.02	34.45	
ANSI B16.5, class 600			10.63	11.22		14.17		14.96		24.41	36.02	34.45	
ISO 228-1 GH pipe thread	10.43		10.43			14.37				24.41			
ANSI B1.20.1 NPT pipe thread	10.43		10.63			14.37				24.41			
DIN 11851 Hygienic screwed		10.43	10.43		7.60	14.17	14.17		24.02	24.02	33.07	33.07	
DIN 32676-C Hygienic clamp			10.43	10.43		14.17		14.17		24.02		34.45	
DIN 11864-1 Aseptic screwed			10.43	10.43		14.17				24.02		34.45	
DIN 11864-2 Aseptic flange			10.43	10.43		14.17		10.78	24.41	24.02		34.45	
ISO 2852 Hygienic clamp					10.43	14.17			24.02	24.02		33.07	
ISO 2853 Hygienic screwed			10.43			14.17		10.78		24.02		33.86	

SITRANS FCS400, overall length, dimensions in inch

Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS400

316L stainless - Hygienic 0.8 µm: 7ME462-...

Sensor	DN 15 (½")				DN 25 (1")			DN 50 (2")		DN 80 (3")	
	DN 10 (3/8")	DN 15 (½")	DN 20 (¾")	DN 25 (1")	DN 25 (1")	DN 32 (1¼")	DN 40 (1½")	DN 40 (1½")	DN 50 (2")	DN 65 (2½")	DN 80 (3")
DIN 11851 Hygienic screwed	265	265			360	360		610	610	840	840
DIN 32676-C Hygienic clamp		265	265		360		360		610		875
DIN 11864-1 Aseptic screwed		265			360				610		875
DIN 11864-2 Aseptic flange		265			360			620	610		875
ISO 2852 Hygienic clamp				265	360			610	610		840
ISO 2853 Hygienic screwed				265	360				610		860

SITRANS FCS400, overall length, dimensions in mm

Sensor	DN 15 (½")				DN 25 (1")			DN 50 (2")		DN 80 (3")	
	DN 10 (3/8")	DN 15 (½")	DN 20 (¾")	DN 25 (1")	DN 25 (1")	DN 32 (1¼")	DN 40 (1½")	DN 40 (1½")	DN 50 (2")	DN 65 (2½")	DN 80 (3")
DIN 11851 Hygienic screwed	10.43	10.43		7.60	14.17	14.17		24.20	24.20	33.07	33.07
DIN 32676-C Hygienic clamp		10.43	10.43		14.17		14.17		24.20		34.45
DIN 11864-1 Aseptic screwed		10.43			14.17				24.20		34.45
DIN 11864-2 Aseptic flange		10.43			14.17			24.41	24.20		34.45
ISO 2852 Hygienic clamp				10.43	14.17			24.20	24.20		33.07
ISO 2853 Hygienic screwed				10.43	14.17				24.20		33.86

SITRANS FCS400, overall length, dimensions in inch

316L stainless - NAMUR: 7ME471.-...

Sensor	DN 15 (½")					DN 25 (1")			DN 50 (2")		DN 80 (3")		
	DN 6 (¼")	DN 10 (3/8")	DN 15 (½")	DN 20 (¾")	DN 25 (1")	DN 25 (1")	DN 32 (1¼")	DN 40 (1½")	DN 40 (1½")	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")
EN 1092-1 B1, PN 16			510		510	600			715	715	915	915	915
EN 1092-1 B1, PN 40			510		510	600			715	715	915	915	915
EN 1092-1 B1, PN 63			510			600			715	715	915	915	915
EN 1092-1 B1, PN 100						600			715	715	915	915	915
EN 1092-1 D, PN 16			510			600			715	715		915	
EN 1092-1 D, PN 40			510			600			715	715		915	
EN 1092-1 D, PN 63						600			715	715		915	
ANSI B16.5, class 150						600					915		
ANSI B16.5, class 300						600					915		
ANSI B16.5, class 600						600					915		
ISO 228-1 GH pipe thread	510		510										
ANSI B1.20.1 NPT pipe thread	510												
DIN 11851 Hygienic screwed		510	510			600	600		715	715	915	915	
DIN 32676-C Hygienic clamp			510	510		600		600		715			
DIN 11864-1 Aseptic screwed			510			600				715			
DIN 11864-2 Aseptic flange													
ISO 2852 Hygienic clamp					510	600			715	715		915	
ISO 2853 Hygienic screwed					510	600				715			

SITRANS FCS400, overall length, dimensions in mm

Sensor	DN 15 (½")					DN 25 (1")			DN 50 (2")		DN 80 (3")		
	DN 6 (¼")	DN 10 (3/8")	DN 15 (½")	DN 20 (¾")	DN 25 (1")	DN 25 (1")	DN 32 (1¼")	DN 40 (1½")	DN 40 (1½")	DN 50 (2")	DN 65 (2½")	DN 80 (3")	DN 100 (4")
EN 1091-1 B1, PN 16			20.08		20.08	23.62			28.15	28.15	36.02	36.02	36.02
EN 1091-1 B1, PN 40			20.08		20.08	23.62			28.15	28.15	36.02	36.02	36.02
EN 1091-1 B1, PN 63			20.08			23.62			28.15	28.15	36.02	36.02	36.02
EN 1091-1 B1, PN 100						23.62			28.15	28.15	36.02	36.02	36.02
EN 1092-1 D, PN 16			20.08			23.62			28.15	28.15		36.02	
EN 1092-1 D, PN 40			20.08			23.62			28.15	28.15		36.02	
EN 1092-1 D, PN 63						23.62			28.15	28.15		36.02	
ANSI B16.5, class 150						23.62					36.02		
ANSI B16.5, class 300						23.62					36.02		
ANSI B16.5, class 600						23.62					36.02		
ISO 228-1 GH pipe thread	20.08		20.08										
ANSI B1.20.1 NPT pipe thread	20.08												
DIN 11851 Hygienic screwed		20.08	20.08			23.62	23.62		28.15	28.15	36.02	36.02	
DIN 32676-C Hygienic clamp			20.08	20.08		23.62		23.62		28.15			
DIN 11864-1 Aseptic screwed			20.08			23.62				28.15			
DIN 11864-2 Aseptic flange													
ISO 2852 Hygienic clamp					20.08	23.62			28.15	28.15		36.02	
ISO 2853 Hygienic screwed					20.08	23.62				28.15			

SITRANS FCS400, overall length, dimensions in inch

Flow Measurement

SITRANS F C

Transmitter SITRANS FCT030

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, 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

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
- 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.

Flow Measurement

SITRANS F C

Transmitter SITRANS FCT030

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
Number of process variables	7
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 %
Current output	
Current	0 ... 20 mA or 4 ... 20 mA (Channel 1 only 4 ... 20 mA)
Load	< 500 Ω per channel
Time constant	0 ... 100 s adjustable
Digital output¹⁾	
Pulse	41.6 μs ... 5 s pulse duration
Frequency	0 ... 10 kHz, 50 % duty cycle, 120 % overscale provision
Time constant	0 ... 100 s adjustable
Active	0 ... 24 V DC, 110 mA, short-circuit-protected
Passive	3 ... 30 V DC, max. 110 mA
Relay	
Type	Change-over voltage-free relay contact
Load	30 V AC/100 mA
Functions	Alarm level, alarm number, limit, flow direction
Digital input	
Voltage	15 ... 30 V DC (2 ... 15 mA)
Functionality	Start/stop/hold/continue dosing, reset totalizer 1 and 2, force output, freeze output
Galvanic isolation	All inputs and outputs are galvanically isolated, isolation voltage 500 V.
Cut-off	
Low-flow	0 ... 9.9 % of maximum flow
Limit function	Mass flow, volume flow, fraction, density, sensor temperature
Totalizer	Three eight-digit counters for forward, net or reverse flow
Display	<ul style="list-style-type: none"> Background illumination with alphanumerical text, 3 × 20 characters to indicate flow rate, totalized values, settings and faults. Time constant as current output 1 Reverse flow indicated by negative sign
Zero point adjustment	Via keypad or remote via digital input

Ambient temperature	
Operation	
• Transmitter	-40 ... +60 °C (-40 ... +140 °F), (humidity max. 95 %)
• Display	-20 ... +60 °C (-4 ... +140 °F)
Storage	
• Transmitter	-40 ... +70 °C (-40 ... +158 °F) (Humidity max. 95 %)
• Display	-20 ... +70 °C (-4 ... +158 °F)
Communication	HART 7.2
Enclosure	
Material	Aluminum
Rating	IP67/NEMA 4X to IEC 529 and DIN 40050 (1 mH ₂ O for 30 min.)
Mechanical load	18 ... 400 Hz random, 3.17 g RMS, in all directions
Supply voltage	
Supply	20 ... 27 V DC ± 10%; 100 ... 240 V AC ± 10 %, 47 ... 63 Hz
Fluctuation	No limit
Power consumption	7.5 W/15 VA
EMC performance	
Emission	EN/IEC 61326-1-4 (Industry)
Immunity	EN/IEC 61326-1-2 (Industry)
NAMUR	Within the value limits according to "General requirements" with error criteria A in accordance with NE 21
Environment	
Environmental conditions acc. to IEC/EN/UL 61010-1	<ul style="list-style-type: none"> Altitude up to 2000 m Pollution degree 2
Maintenance	The flowmeter has a built-in error log/pending menu which should be inspected on a regular basis.
Cable glands	Cable 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
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.

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

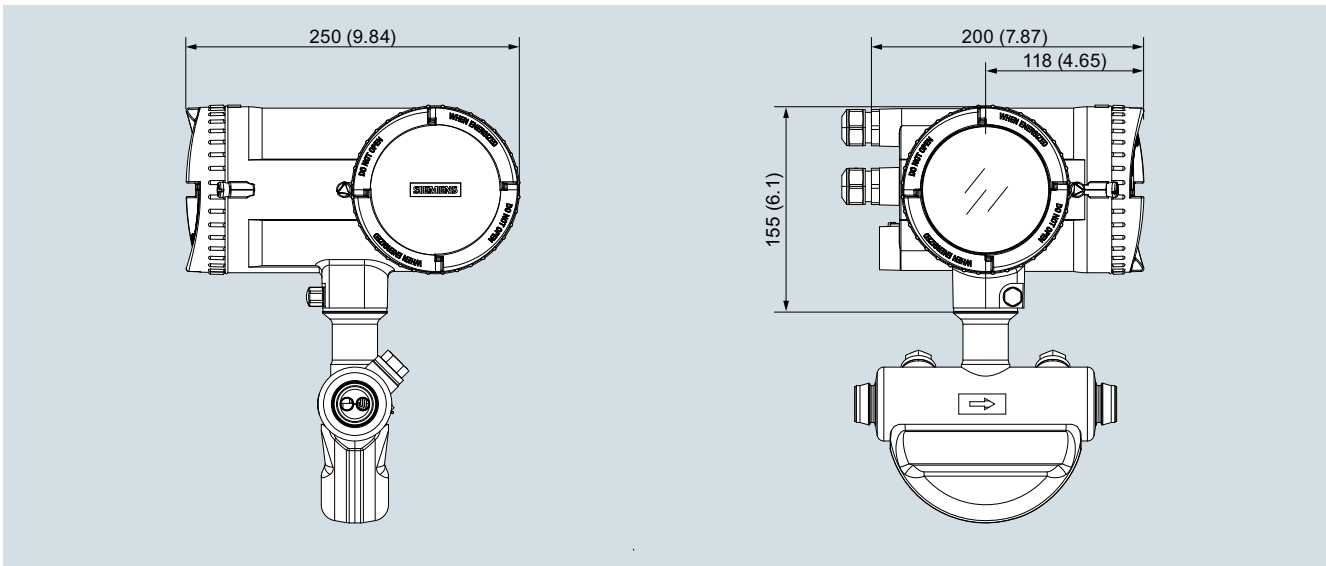
Approvals

Hazardous area	<ul style="list-style-type: none"> • ATEX Ex II 2(1) GD Ex d e [ia] ia IIC T6 Gb • FM/CSA Class1 Div. 1 • IECEx II 2(1) GD Ex d e [ia] ia IIC T6 Gb
Custody transfer	<ul style="list-style-type: none"> • OIML R 117 type approval to a wide variety of liquids other than water
Pressure equipment	<ul style="list-style-type: none"> • PED • CRN
Hygienic applications	<ul style="list-style-type: none"> • EHEDG for hygienic variant sensors • 3A for hygienic variant sensors • External cleanability satisfies EHEDG and 3A rules

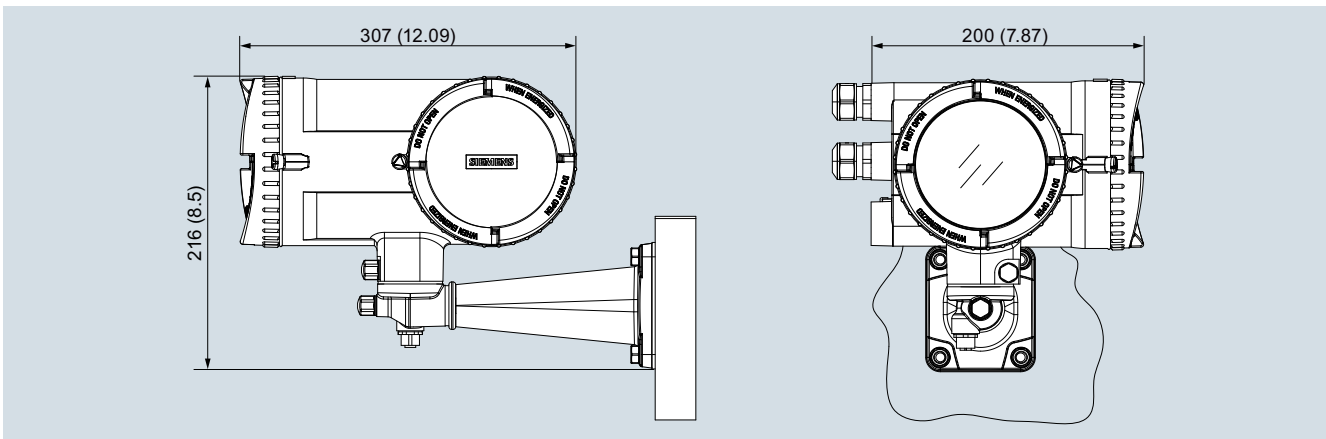
Certificates

Safety Integration Level (applies only to compact versions)	<ul style="list-style-type: none"> • SIL 3 for software • SIL 2 for hardware • SIL 3 for redundant hardware systems
CE mark	<ul style="list-style-type: none"> • Pressure equipment • Low voltage directive • WEEE • RoHS
Regional certifications	<ul style="list-style-type: none"> • C-TICK (Australia and New Zealand EMC) • NEPSI (China Ex)

Dimensional drawings



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














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






Flow Measurement

SITRANS F C

Flowmeter - Accessories/Spare parts

Accessories

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	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 NiPlatedBrass 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 NiPlatedBrass Ex e/i ²⁾	A5E03907473	
Standard cable (non-Ex) with M12 plugs, PO insulation and PUR sleeve, gray, -40 ... +80 °C (-40 ... +176 °F)		
• 5 m (16.4 ft)	A5E03914805	
• 10 m (32.8 ft)	A5E03914850	
• 25 m (82 ft)	A5E03914853	
• 50 m (164 ft)	A5E03914859	
• 75 m (246 ft)	A5E03914861	
• 150 m (492 ft)	A5E03914874	
Standard cable (non-Ex) for termination, PO insulation and PUR sleeve, gray, -40 ... +80 °C (-40 ... +176 °F)		
• 5 m (16.4 ft)	A5E03914833	
• 10 m (32.8 ft)	A5E03914849	
• 25 m (82 ft)	A5E03914854	
• 50 m (164 ft)	A5E03914856	
• 75 m (246 ft)	A5E03914864	
• 150 m (492 ft)	A5E03914873	

Description	Article No.	
Standard cable (Ex) with M12 plugs, PO insulation and PUR sleeve, blue, -40 ... +80 °C (-40 ... +176 °F)		
• 5 m	A5E03914929	
• 10 m	A5E03914962	
• 25 m	A5E03914995	
• 50 m	A5E03915004	
• 75 m	A5E03915074	
• 150 m	A5E03915088	
Standard cable (Ex) for termination, PO insulation and PUR sleeve, blue, -40 ... +80 °C (-40 ... +176 °F)		
• 5 m	A5E03914945	
• 10 m	A5E03914973	
• 25 m	A5E03914984	
• 50 m	A5E03915015	
• 75 m	A5E03915057	
• 150 m	A5E03915100	
Suitcase for comprehensive sales and training for FC430	A5E31467598	
It comes in a special suitcase with a fan implemented that allows the flowmeter to demonstrate airflow.		
Suitcase for comprehensive sales support and training for FC410.	A5E33219071	
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.		
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	

Description	Article No.	
<p>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 controller</p> <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 		
<p>Heating jacket controller, IP65. Digital display for 0 ... 200 °C (32 ... 392 °F) control setpoint</p> <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 ½" NPT; 1 pce ½" NPT with single and dual cable inserts


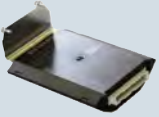
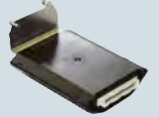








Description	Dimension	Article No.
<p>Mating parts for hygienic fittings DIN 11851</p> <p>Includes:</p> <ul style="list-style-type: none"> • 2 unions • 2 mating parts (for welding in) • 2 EPDM gaskets 	DN 10	FDK:085U1016
	DN 15	FDK:085U1017
	DN 25	FDK:085U1019
	DN 32	FDK:085U1020
	DN 40	FDK:085U1021
	DN 50	FDK:085U1022
<p>Mating parts for hygienic clamp ISO 2852</p> <p>Includes:</p> <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
<p>2 EPDM gaskets with collar for mounting set DIN 11851</p>	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





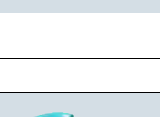
Flow Measurement

SITRANS F C





Flowmeter - Accessories/Spare parts

Spare parts - transmitter FCT030

Description	Article No.	
Display and keypad assembly with firewire connection to the transmitter module	A5E03548971	
Sensor interface (Compact). Front end flow calculator and process detection. SIL 3 approved	A5E03549142	
Sensor interface (Remote); barrier unit for high speed digital communication and Ex ib power supply to remote front end DSL module	A5E03549098	
Display lid in painted aluminum with Ex glass plate and o-ring seal	A5E03549344	
Transmitter cassette (active) with SIL approved 4 ... 20 mA output and HART 7.2	A5E03549357	
Transmitter cassette (passive) with SIL approved 4 ... 20 mA output and HART 7.2	A5E03549383	
Bag of loose spare parts; including cable strain relief components, mounting tool, seals and gasket, assorted screws and washers, hex cap nut, blind plugs, and o-rings	A5E03549396	
Power supply 240 V AC, 47 ... 63 Hz 24 ... 90 V DC	A5E03549413	
Blind lid in painted aluminum with o-ring seal	A5E03549429	
I/O assembly Advise Order code F00 to F97 from Selection and Ordering data	A5E03939114	
SensorFlash (1 GB micro SD card)	A5E03915258	

Description	Article No.	
Mounting bracket - FCT030; in painted aluminum for pipe or wall mounting of transmitter FCT030 remote version. Including lock ring, pressure pads and seal cap	A5E03906091	
M12 option for sensor housing in stainless steel. Pre-wired and potted to replace M12 socket in DSL housing	A5E03906095	
M12 option - remote - in painted aluminum. Pre-wired and potted replacement M12 connection for FCT030 transmitter remote version	A5E03906104	
Remote terminal house - M20	A5E03906112	
Remote terminal house - NPT - in painted aluminum for sensor cable termination at FCT030 transmitter remote version. Pre-wired and potted	A5E03906130	

Spare parts - sensor FCS400

Description	Article No.	
Blind lid in painted aluminum with o-ring seal	A5E03549295	
Sensor link insert. Front end flow calculator and process detection. SIL 3 approved	A5E03549191	
Sensor housing metric	A5E03549313	
Sensor housing NPT in painted aluminum	A5E03906080	
Bag of loose parts for sensor; including cable strain relief components, washer, seals, o-rings, and assorted screws	A5E03549324	

Overview



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

Compatibility between transmitters and sensors

Transmitter	Page	Compact	Remote	Ex-Approval	Sensor	Page
FCT030	3/170	Yes	Yes	Yes	FCS400 Standard, DN 15 ... DN 80	3/160
		Yes	Yes	Yes	FCS400 Hygienic, DN 15 ... DN 80	3/160
		Yes	Yes	Yes	FCS400 NAMUR, DN 15 ... DN 80	3/160
FCT010 (only compact - FC410)	3/153	Yes	No	Yes	FCS400 Standard, DN 15 ... DN 80	3/160
		Yes	No	Yes	FCS400 Hygienic, DN 15 ... DN 80	3/160
		Yes	No	Yes	FCS400 NAMUR, DN 15 ... DN 80	3/160
MASS 6000 IP67 Polyamide enclosure	3/177	No	Yes	No	FCS200, DN 10 ... DN 25	3/200
		No	Yes	No	FC300, DN 4	3/209
		No	Yes	No	MASS 2100, DI 1.5	3/205
		Yes	Yes	No	MASS 2100, DI 3 ... DI 40	3/214
		No	Yes	No	MASS MC2, DN 100...DN 150	3/225
		No	Yes	Yes	MASS MC2 Ex, DN 100...DN 150	3/225
MASS 6000 19"	3/182	No	Yes	No	FCS200, DN 10 ... DN 25	3/200
		No	Yes	No	FC300, DN 4	3/209
		No	Yes	No	MASS 2100, DI 1.5	3/205
		No	Yes	No	MASS 2100, DI 3 ... DI 40	3/214
		No	Yes	No	MASS MC2, DN 100...DN 150	3/225
		No	Yes	Yes	MASS MC2 Ex, DN 100...DN 150	3/225
MASS 6000 Ex 19"	3/182	No	Yes	Yes	FCS200, DN 10 ... DN 25	3/200
		No	Yes	Yes	FC300, DN 4	3/209
		No	Yes	Yes	MASS 2100 Ex, DI 1.5	3/205
		No	Yes	Yes	MASS 2100 Ex, DI 3 ... DI 40	3/214
MASS 6000 Ex d Stainless steel enclosure	3/191	No	Yes	Yes	FCS200, DN 10 ... DN 25	3/200
		No	Yes	Yes	FC300, DN 4	3/209
		No	Yes	Yes	MASS 2100 Ex, DI 1.5	3/205
		Yes	Yes	Yes	MASS 2100 Ex, DI 3 ... DI 40	3/214
SIFLOW FC070 Standard	3/196	No	Yes	No	all	
SIFLOW FC070 Ex CT	3/196	No	Yes	Yes	all except MC2	

Flow Measurement

SITRANS F C

System information SITRANS F C

Benefits

Greater flexibility

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

Easier commissioning

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

At commissioning the flowmeter commences measurement without any initial programming.

Easier service

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

Room for growth

- FC430: Digital platform allows for any sensor in the range to be matched in compact or remote. The wide range of sensors are all certified to SIL2 or SIL3 (redundant) with the FCT030 transmitter in compact mode.
- MASS 6000: USM II the Universal Signal Module with "plug & play" simplicity makes it easy to access and integrate the flowmeter with almost any system and bus-protocol and it ensures the flowmeter will be easy to upgrade to future communication/bus platforms.
- SIFLOW: Direct integration into SIMATIC S7-300 systems as a flowmeter specific I/O module ensures fast and smooth startup, seamless integration, fast operation.

Application

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

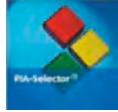
Due to this versatility the meter is easy to install and use. The Coriolis flowmeter is recognized for its high accuracy over a wide turn-down ratio.

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

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

Please see Product selector

www.pia-selector.automation.siemens.com on the Internet, since some constraints might be related to some of the features



FC430	FC410	MASS 2100 DI 1.5	MASS 2100 DI 3 to DI 15	FC300 DN 4	MC2 DN 100 to DN 150	FCS200 DN 10 to DN 25	MASS 6000 IP67	MASS 6000 19"	MASS 6000 Ex d	SIFLOW FC070 Std/Ex CT
7ME4613 7ME4623 7ME4713	7ME4611 7ME4621 7ME4711	7ME4100	7ME4100, 7ME4200, 7ME4210	7ME4400	7ME4300	7ME4500	7ME4110	7ME4110	7ME4110	7ME4120

Design

Compact	●	●	●				●		●	
Remote	●		●	●	●	●	●	●	●	●

Transmitter enclosure

Polyamide, IP67/NEMA 6							●			
Noryl (SIMATIC S7-300), IP20/NEMA 2										●
Stainless steel IP67/NEMA 6									●	
19" rack IP20/NEMA 2 aluminum								●		
Back of panel IP20 aluminum								●		
Wall mounting IP65 ABS plastic								●		
Front of panel IP65 ABS plastic								●		
Aluminium IP67	●	●								

Communication

HART	●						●	●	●	
PROFIBUS PA							●	●	●	
PROFIBUS DP							●	●		
Modbus RTU/RS 485		●					●	●		●
Modbus RTU/RS 232										●
FOUNDATION Fieldbus H1							●	●	●	
DeviceNet							●	●		

Supply voltage

24 V DC	●	●								●
24 V AC/DC							●	●	●	
115/230 V AC	●						●	●		

Pipe size

DI 1.5 (1/16")			●							
DI 3 (1/8")				●						
DN 4 (1/6")					●					
DI 6 (1/4")				●						
DN 10 (3/8")						●				
DI 15 (1/2")				●						
DN 15 (1/2")	●	●				●				
DI 25 (1")	●	●		●						
DI 40 (1 1/2")				●						
DN 50 (2")	●	●								
DN 80 (3")	●	●								
DN 100 (4")									●	
DN 150 (6")									●	

Process connection norms and pressure**Pipe thread**

NPT ANSI/ASME B.20.1; PN 100	●	●	●	●	●					
NPT ANSI/ASME B.20.1; PN 350							●			
VCO	●	●				●				
ISO 228/1; PN 100	●	●	●	●	●					

● = available

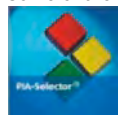
Flow Measurement

SITRANS F C

System information SITRANS F C

Please see Product selector

www.pia-selector.automation.siemens.com on the Internet, since some constraints might be related to some of the features



FC430	FC410	MASS 2100 DI 1.5	MASS 2100 DI 3 to DI 15	FC300 DN 4	MC2 DN 100 to DN 150	FCS200 DN 10 to DN 25	MASS 6000 IP67	MASS 6000 19"	MASS 6000 Ex d	SIFLOW FC070 Std/Ex CT
7ME4613 7ME4623 7ME4713	7ME4611 7ME4621 7ME4711	7ME4100	7ME4100, 7ME4200, 7ME4210	7ME4400	7ME4300	7ME4500	7ME4110	7ME4110	7ME4110	7ME4120

Flange

EN 1092-1 PN 40	●	●	●	●	●					
EN 1092-1 PN 100	●	●		●	● ¹⁾					
EN 1092-1 PN 160 ⁷⁾	●	●								
ANSI B16.5 Class 150	●	●		●	●					
ANSI B16.5 Class 300	●				●					
ANSI B16.5 Class 600	●	●		●	● ¹⁾					
ANSI B16.5 Class 900 ⁸⁾	●	●								

Dairy

DIN 11851 PN 25	●	●		●	● ¹⁾					
DIN 11851 PN 40	●	●		●						
DIN 11864-1A	●	●								
DIN 11864-2A	●	●								
DIN 11864-3A	●	●								
Clamp ISO 2852 PN 16	●	●		●						
ISO 2853 PN 16	●	●		●						
DIN 32676 Tri-Clamp PN 10/PN 16	●				●					
Others on request	●	●	●	●	●	●				

Pipe material

Stainless steel AISI 316L/1.4435	●	●	●	●	●					
Stainless steel AISI 316Ti/1.4571						●				
Hastelloy C22/2.4602	●	●	●	● ⁴⁾	●	● ⁶⁾				
Hastelloy C4/2.4610						●				

With heating jacket

Internal U - tube				●						
External electric jacket	●	●								

Pressure rating

PN 40	●	●		●	●					
PN 100	●	●	●	●	●	● ¹⁾				
PN 160	●	●								
PN 214							●			
PN 350							●			
High-pressure version ²⁾			●	●	●					

Accuracy

Flow error ≤ 0.1 % of rate	●	●	●	●	●					
Flow error ≤ 0.15 % of rate						●				
Flow error ≤ 0.5 % of rate							●			
Density error ≤ 0.0005 g/cm ³					●					
Density error ≤ 0.001 g/cm ³	●	●	●			●				
Density error ≤ 0.0015 g/cm ³				● ³⁾	●					

Cable glands

PG 13.5								● ⁵⁾		
½" NPT	●	●					●			
M20	●	●				●	●		●	

● = available

¹⁾ Not available for DN 150 sensor.

²⁾ See technical specifications.

³⁾ DI 3 and DI 6

⁴⁾ DI 15, DI 25 and DI 40 are not available for Hastelloy C22/2.4602.

⁵⁾ Only when mounted in enclosure.

⁶⁾ Process connectors in AISI 316Ti/1.4571

⁷⁾ Sensor pressure limited to 100 bar (AISI 316L) and 160 bar (Hastelloy C22)

⁸⁾ Sensor pressure limited to 100 bar (AISI 316L) and 150 bar (Hastelloy C22)

Please see Product selector

www.pia-selector.automation.siemens.com on the Internet, since some constraints might be related to some of the features



FC430	FC410	MASS 2100 DI 1.5	MASS 2100 DI 3 to DI 15	FC300 DN 4	MC2 DN 100 to DN 150	FCS200 DN 10 to DN 25	MASS 6000 IP67	MASS 6000 19"	MASS 6000 Ex d	SIFLOW FC070 Std/Ex CT
7ME4613 7ME4623 7ME4713	7ME4611 7ME4621 7ME4711	7ME4100	7ME4100, 7ME4200, 7ME4210	7ME4400	7ME4300	7ME4500	7ME4110	7ME4110	7ME4110	7ME4120

ApprovalsCustody Transfer

Compressed gaseous fuel measuring systems for vehicles - OIML R 139

Other media than water pattern approval - OIML R 117

Hazardous locations

ATEX

IECEX

FM

UL

CSA

NEPSI

INMETRO

Ordinary locations

USL, CNL-Flowmeter c-UL-us

USR, CNR-Flowmeter c-UL-us

PED

Fluid group 1 Category II, Module H PED Directive 97/23/EC

Module B1 + D 0/25 ... 100 bar, -80/200°C, DN 20 ... 150 PED Directive 97/23/EC

CRN

Category F OF10769.5C CRN

Pharma

EHEDG TUM

3A

Note: Special conditions for safe use might be specified in certificates or operating instructions.

● = available

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

2) Only remote version

3) Can be placed in zone 2 if mounted in minimum IP54 cabinet.

4) Only Ex version

5) 24 V; IP20

6) 115 ... 230 V; IP20

7) 115 ... 230 V; IP65

8) Only DI 25 and DI 40

9) For sizes ≥ DN 100 only

10) Install in Div. 2, sensor interface into Div. 1, only Ex CT version

11) Only DI 6 is CRN

Flow Measurement

SITRANS F C

System information SITRANS F C

Function

The flow measuring principle is based on the Coriolis effect. The flowmeter consists of a system FC410 or FC430 or a combination of a sensor type MASS 2100/FC300/FCS200/MC2 and a transmitter type MASS 6000/SIFLOW FC070.

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

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

The amplitude of the driver is automatically regulated to ensure a stable output from the 2 pick-ups.

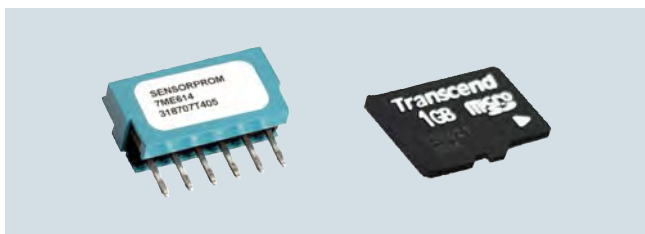
The temperature of the sensor is measured by a Pt1000. For MC2 the temperature is measured with a Pt100.

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

The signal transfer function is based on a DFT technology (Discrete Fourier Transformation).

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

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



SENSORPROM and SensorFlash flow memory units

FC410 flow transmitters communicate via Modbus RTU and FC430 via HART. Currently the USM platform handles all present and future communication protocols, e.g., PROFIBUS DP, PROFIBUS PA, HART, Modbus, FOUNDATION Fieldbus H1 and DeviceNet.

Integration

Installation of MASS 2100/FC300 and MC2 sensors

Installation requirements/System design information

The SITRANS F C mass flowmeter is suitable for in- and outdoor installations. The standard instrument meets the requirements of Protection Class IP67/NEMA 6 or IP65. The flowmeter is bidirectional and can be installed in any orientation, however, the sensor is not self-emptying in all positions.

It is important to ensure that the meter tubes are always completely filled with homogeneous fluid. Otherwise measuring errors may occur.

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

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

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

Installation orientation

- FCS400 – sensors
The optimal installation orientation is vertical with flow upwards (liquids) and up to 10° off vertical for self-draining.
- MASS 2100/FC300 – sensors
The optimal installation orientation is horizontal.
- MC2 – sensors
The optimal installation orientation is vertical with the flow upwards.

Supports

- In order to support the weight of the flowmeter and to ensure reliable measurements when external effects exist (e.g. vibrations), the sensor should be installed in well-supported pipelines. Supports or hangers should be installed symmetrically and stress-free in close proximity to the process connections. FCS400 sensors can be supported at the junction between the process connection and the main body of the sensor.

Shut-off devices

- To conduct a system zero adjustment, shut-off devices are required in the pipeline.
 - In horizontal installations at the outlet for FC300 and MC2 and the inlet for MASS 2100.
 - In vertical installations at the inlet.
- When possible, shut-off devices should be installed both up- and downstream of the flowmeter. A bypass valve is recommended where regular zero adjustment is planned to avoid disruption of the flowing system.

Installation: straight run requirements

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

System design information

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

- When operating more than one meter in one or multiple interconnected pipelines, the sensors should be spaced distant from each other or the pipelines should be decoupled to prevent cross talk.

Zero adjustment

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

Technical specifications

Flowmeter uncertainty/specifications

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

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

A calibration certificate is shipped with every sensor and calibration data are stored in the SENSORPROM memory unit. FC410 and FC430 meters have the calibration data written to the front end section. A backup of all calibrations and PDF copies of all certificates are stored in the SensorFlash.

FCS400 sensors and FCT030/FCT010 transmitters

	5 %		50 %		100 %	
	kg/h	(lb/h)	kg/h	(lb/h)	kg/h	(lb/h)
DN 15 (½")	185	(408)	1 850	(4 079)	3 700	(8 157)
DN 25 (1")	575	(1 268)	5 750	(12 677)	11 500	(25 353)
DN 50 (2")	2 600	(5 732)	26 000	(57 320)	52 000	(114 640)
DN 80 (3")	6 800	(15 000)	68 000	(150 000)	136 000	(300 000)

MASS 2100 sensors and MASS 6000 transmitters

	5 %		50 %		100 %	
	kg/h	(lb/h)	kg/h	(lb/h)	kg/h	(lb/h)
DI 1.5 (1/16")	1.5	(3.3)	15	(33)	30	(66)
DI 3 (1/8")	12	(26)	125	(275)	250	(550)
DI 4 (1/6")	17.5	(38)	175	(386)	350	(770)
DI 6 (¼")	50	(110)	500	(1 102)	1 000	(2 200)
DI 15 (½")	280	(617)	2 800	(6 173)	5 600	(12 345)
DI 25 (1")	1 250	(2 756)	12 500	(27 558)	25 000	(55 100)
DI 40 (1½")	2 600	(5 732)	26 000	(57 320)	52 000	(114 600)

MC2 sensors and MASS 6000 transmitters

	5 %		50 %		100 %	
	kg/h	(lb/h)	kg/h	(lb/h)	kg/h	(lb/h)
DN 100 (4")	7 100	(15 653)	71 000	(156 528)	142 000	(313 056)
DN 150 (6")	21 050	(46 407)	210 500	(464 073)	421 000	(928 145)

- Q_{max} (100%) is calibrated with water at:
 - FCS400 sensors: a pressure drop of 1 bar (14.5 psi)
 - MASS 2100 sensors (all except Di 1.5): a flow speed of 10 m/s (Di 1.5: a flow speed of 4.7 m/s)
 - MC2 sensors: a pressure drop of 2 bar (29 psi).
- For flow > 5 % of the sensors max. flow rate, the error can be read directly from the curve below.
- For flow < 5 % of the sensors max. flow rate, use the formula to calculate the error.
- The error curve is plotted from the formula:

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

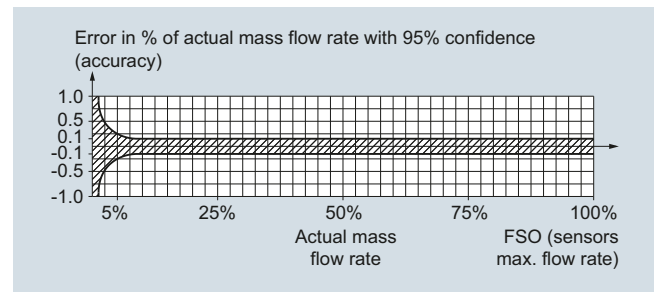
E = Error [%]

Z = Zero point error [kg/h]¹⁾

qm = Mass flow [kg/h]

Cal. = Calibrated flow accuracy: 0.10 or 0.15

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



Reference conditions for flow calibrations (ISO 9104 and DIN/EN 29104)

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

Additions in the event of deviations from reference conditions

Current output	As pulse output ± (0.1% of actual flow + 0.05 % FSO)
Effect of ambient temperature	<ul style="list-style-type: none"> Display/frequency/pulse output: < ± 0.003%/K act. Current output: < ± 0.005 %/K act.
Effect of supply voltage	< 0.005 % of measuring value on 1 % alteration

Flow Measurement

SITRANS F C

System information SITRANS F C

Sensor type		FC300	MASS 2100					
Sensor size		DN 4 (1/6")	DI 1.5 (1/16")	DI 3 (1/8")	DI 6 (1/4")	DI 15 (1/2")	DI 25 (1")	DI 40 (1 1/2")
Number of measuring pipes		1	1	1	1	1	1	1
Mass flow								
Linearity error	% of rate	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Repeatability error	% of rate	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Max. zero point error	[kg/h]	0.010	0.001	0.010	0.050	0.200	1.500	6.000
Density								
Density error ¹⁾	[g/cm ³]	0.0025 ²⁾	0.001	0.0015	0.0015	0.0005	0.0005	0.0005
Repeatability error	[g/cm ³]	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001
Range	[g/cm ³]	0 ... 2.9	0 ... 2.9	0 ... 2.9	0 ... 2.9	0 ... 2.9	0 ... 2.9	0 ... 2.9
Temperature								
Error	[°C (°F)]	0.5 (0.9)	0.5 (0.9)	0.5 (0.9)	0.5 (0.9)	0.5 (0.9)	0.5 (0.9)	0.5 (0.9)
Brix								
Error	[°Brix]	0.3	0.2	0.3	0.3	0.1	0.1	0.1

¹⁾ Accuracy is only valid when sensor is density-calibrated.

²⁾ Hastelloy C22 version.

Sensor type		FCS400				MC2	
Sensor size		DN 15 (1/2")	DN 25 (1")	DN 50 (2")	DN 80 (3")	DN 100 (4")	DN 150 (6")
Number of measuring pipes		2	2	2	2	2	2
Mass flow:							
Linearity error	% of rate	0.1	0.1	0.1	0.1	0.15	0.15
Reproducibility of flowrate at rates > 5 % of Q _{max}	% of rate	0.05	0.05	0.05	0.05	0.1	0.1
Max. zero point error	[kg/h (lb/h)]	0.2 (0.44)	2 (4.41)	7.5 (16.5)	18.0 (39.7)	24.96 (55.03)	330 (727.53)
Density							
Density error	(Standard) [g/cm ³]	0.005	0.005	0.005	0.005	0.005	0.005
	(Extended) [g/cm ³]	0.001	0.001	0.001	0.001	0.001	Not available
Range	[kg/dm ³]	0.001 ... 5.0	0.001 ... 5.0	0.001 ... 5.0	0.001 ... 5.0	0.5 ... 3.5	0.5 ... 3.5
Repeatability error	[g/l]	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1
Temperature							
Error	[°C (°F)]	0.5 (0.9)	0.5 (0.9)	0.5 (0.9)	0.5 (0.9)	1.0 (1.8)	1.0 (1.8)
Brix¹⁾							
Error	[°Brix]	0.1	0.1	0.1	0.1	On request ¹⁾	Not available

¹⁾ Flow and density calibration (1 kg/m³) required. Brix/Plato and Fraction available as PVR.

Technical specifications PROFIBUS PA/DP**General specifications**

PROFIBUS device profile	3.00 Class B
Certified	Yes, according to Profile for process control devices V3.00.
MS0 connections	1
MS1 connections	1
MS2 connections	2

Electrical specification DP**Physical layer specifications**

Applicable standard	IEC 61158/EN 50170
Physical Layer (Transmission technology)	RS 485
Transmission speed	≤ 1.5 Mbit/s
Number of stations	Up to 32 per line segment, (maximum total of 126)

Cable specification (Type A)

Cable design	Two wire twisted pair
Shielding	CU shielding braid or shielding braid and shielding foil
Impedance	35 up to 165 Ω at frequencies from 3 ... 20 MHz
Cable capacity	< 30 pF per meter
Core diameter	> 0.34 mm ² , corresponds to AWG 22
Resistance	< 110 Ω per km
Signal attenuation	Max. 9 dB over total length of line section
Max. bus length	200 m at 1500 kbit/s, up to 1.2 km at 93.75 kbit/s. Extendable by repeaters

Electrical specification PA**Physical layer specifications**

Applicable standard	IEC 61158/EN 50170
Physical Layer (Transmission technology)	IEC-61158-2
Transmission speed	31.25 kbit/s
Number of stations	Up to 32 per line segment, maximum total of 126)
Max. basic current [I _B]	14 mA
Fault current [I _{FDE}]	0 mA
Bus voltage	9 ... 32 V (non Ex)

Preferred cable specification (Type A)

Cable design	Two wire twisted pair
Conductor area (nominal)	0.8 mm ² (AWG 18)
Loop resistance	44 Ω/km
Impedance	100 Ω ± 20 %
Wave attenuation at 39 kHz	3 dB/km
Capacitive asymmetry	2 nF/km
Bus termination	Passive line terminated at both ends
Max. bus length	Up to 1.9 km. Extendable by repeaters

IS (Intrinsic Safety) data

Required sensor electronics	Compact mounted SITRANS F C MASS 6000 Ex d
FISCO	Yes
Max. U _I	17.5 V
Max. I _I	380 mA
Max. P _I	5.32 V
Max. L _I	10 μH
Max. C _I	5 nF
Max. U _o	1.3 V
Max. I _o	50 μA

FISCO cable requirements

Loop resistance R _C	15 ... 150 Ω/km
Loop inductance L _C	0.4 ... 1 mH/km
Capacitance C _C	80 ... 200 nF/km
Max. Spur length in IIC and IIB	30 m
Max. Trunk length in IIC	1 km
Max. Trunk length in IIB	5 km

PROFIBUS parameter support

The following parameters are accessible using a MS0 relationship from a Class 1 Master. MS0 specifies cyclic Data Exchange between a Master and a Slave.

Cyclic services:

Input (Master view)	Parameter	MASS 6000
	Mass flow	✓
	Volume flow	✓
	Temperature	✓
	Density	✓
	Fraction A ¹⁾	✓
	Fraction B ¹⁾	✓
	Pct Fraction A ¹⁾	✓
	Totalizer 1	✓
	Totalizer 2 ²⁾	✓
	Batch progress ²⁾	✓
	Batch setpoint	✓
	Batch compensation	✓
	Batch status (running ...)	✓
Output (Master view)	Set Totalizer 1+2	✓
	Set Mode Totalizer 1+2	✓
	Batch control (start, stop ...)	✓
	Batch setpoint	✓
	Batch compensation	✓

¹⁾ Requires a SENSORPROM containing valid fraction data.

²⁾ Value returned is dependent on the BATCH function.

When **ON**, Batch progress is returned.

When **OFF**, TOTALIZER 2 is returned.