System information SITRANS F C Coriolis mass flowmeters

Please see Product selector www.pia-portal.automation.siemens.com on the Internet, since some constrains 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 (¼)				●							
DN 10 (3/8)							●				
DI 15 (½)				●							
DN 15 (½)	●	●					●				
DN 25 (1)	●	●									
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 Coriolis mass flowmeters

Please see Product selector www.pia-portal.automation.siemens.com on the Internet, since some constrains 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[6]	●	●									
ANSI B16.5 Class 150	●	●		●		●					
ANSI B16.5 Class 300	●					●					
ANSI B16.5 Class 600	●	●		●		●[1]					
ANSI B16.5 Class 900[7]	●	●									
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	●	●				●					
Others on request	●	●	●	●	●	●					
Pipe material											
Stainless steel AISI 316L/1.4435	●	●	●	●	●						
Stainless steel AISI 316Ti/1.4571						●					
Hastelloy C22/2.4602	●	●	●	●	●		●[5]				
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[8]	●	●	●	●	●						
Flow error ≤ 0.15 % of rate[8]						●					
Flow error ≤ 0.5 % of rate[8]							●				
Density error ≤ 0.0005 g/cm³	●	●		●							
Density error ≤ 0.001 g/cm³			●			●					
Density error ≤ 0.0015 g/cm³				●[3]	●						
Cable glands											
PG 13.5									●[4]		
½ NPT	●	●						●			
M20	●	●				●		●		●	

● = available

1) Not available for DN 150 sensor.
2) See technical specifications.
3) DI 3 and DI 6
4) Only when mounted in enclosure.
5) Process connectors in AISI 316Ti/1.4571
6) Sensor pressure limited to 100 bar (AISI 316L) and 160 bar (Hastelloy C22)
7) Sensor pressure limited to 100 bar (AISI 316L) and 150 bar (Hastelloy C22)
8) For reference conditions: ISO 9104 and DIN/EN 29104. Increased error can be expected for gas mass flow measurement.

Please see Product selector www.pia-portal.automation.siemens.com on the Internet, since some constrains 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
Approvals											
Custody transfer											
Compressed gaseous fuel measuring systems for vehicles - OIML R 139							●				●[9]
NTEP	●	●					●				
Other media than water pattern approval - OIML R 117	●										
Harzardous locations											
ATEX	●	●	●	●	●	●	●	●	●	●	●[3)4]
IECEx	●	●					●				●[4]
EAC Ex	●	●	●	●	●	●	●		●	●	●[3)4]
FM	●	●					●				●[8]
UL			●[1]	●[1]	●						
CSA	●	●									●[4]
NEPSI	●	●					●				
INMETRO	●	●									
Ordinary locations											
UL listed (us, ca) Flowmeter c-UL-us								●[2]	●[7]		
UL recognized (us, ca) Flowmeter c-UL-us								●[2)5]	●[5)6]		
PED											
Fluid group 1 Category II, Module H PED Directive 2014/68/EU	●	●									
Module B1 + D 0/25 ... 100 bar, -80/200°C, DN 20 ...150 PED Directive 2014/68/EU						●					
CRN											
Category F OF10769.5C CRN	●	●	●	●[10]	●						
F&B/Pharma											
EHEDG TUM	●	●									
3A	●	●									
Marine											
Germanischer Lloyd/ det Norske Veritas, Bureau Veritas, Lloyds of London, American Bureau of Shipping		●									

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) For sizes ≥ DN 100 only
9) Install in Div. 2, sensor interface into Div. 1, only Ex CT version
10) Only DI 6 is CRN

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) and NTEP.

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 compact and light, fitting neatly into dense piping arrangements
- Easy maintenance because modules can be exchanged rapidly
- Effective separation of measurement from plant vibration
- Highly secure operation in safety critical applications
- Non-volatile memory of all setup and operation data
- Reliable measurements due to high signal to noise ratio
- Secure, digital transfer of measurement data from the sensor
- Short overall length; easy drop-in replacement into most existing installations
- 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
Display	Full graphical display, 240 x 160 pixels with selection of twelve languages including Chinese and Russian
Power supply	20 ... 27 V DC – 10%; 100 ... 240 V AC – 10 %, 47 ... 63 Hz – 10%
Weight	4.6 ... 50 kg
Material	
Sensor	
- Wetted parts	316L stainless steel or Hastelloy C22
- Enclosure	304 stainless steel
Transmitter	Aluminum with corrosion-resistant coating
Enclosure rating	IP67
Pressure ratings	
Measuring tubes	
- 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	
Process medium	-50 ... +200 °C (-58 ... +392 °F)
Ambient	-40 ... +60 °C (-40 ... +140 °F)[1)]
Display	-20 ... +60 °C (-4 ... +140 °F)
Process connections	
Flanges	EN 1092-1 B1, EN 1092-1 D, ANSI/ASME B16.5, JIS B 2220, DIN 11864-2
Pipe threads	ASME B1.20 (NPT), 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	
Hazardous area	ATEX, IECEx, EAC Ex, FM, NEPSI, CSA, INMETRO
Pressure equipment	PED, CRN
Hygienic	3A, EHEDG
Custody transfer	OIML R 117, NTEP
Operational safety (compact system only)	SIL 2 Single SIL 3 Redundant system
NAMUR	NAMUR-compliant (e.g. NE 21, NE 41, NE 107 and NE 132)
I/O	Up to 4 channels combining analog, relay or digital outputs and binary input
Communication	HART 7.2
EMC performance	
Emission	EN 55011/CISPR-11 (Class A)
Immunity	EN/IEC 61326-1 (Industry)
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.

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

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

With all global marine approvals the FC410 is ideal for integration in ship fuel efficiency and environmental measurement systems as well as bunkerings solutions.

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

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

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

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

Benefits

- It is compact and light, fitting neatly into dense piping arrangements
- Effective separation of measurement from plant vibration
- Reliable measurements due to high signal to noise ratio
- Short overall length; easy drop-in replacement into most existing installations
- Direct connection to host with high-speed Modbus simplifies machine or skid construction and set-up.
- Modbus RS485 RTU allows simple and easy integration with all Modbus masters with fast update rate of process values

Technical specifications

Sizes	DN 15 (½"), DN 25 (1"), DN 50 (2"), DN 80 (3")
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	
Sensor	
- Measuring tubes	316L stainless steel or Hastelloy C22
- Enclosure	304 stainless steel
Transmitter	Aluminum with corrosion-resistant coating
Enclosure rating	IP67
Pressure ratings	
Measuring tubes	
- 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	
Process medium	-50 ... +200 °C (-58 ... +392 °F)
Ambient	-40 ... +60 °C (-40 ... +140 °F)
Process connections	
Flanges	EN 1092-1 B1, EN 1092-1 D, ANSI/ASME B16.5, JIS B 2220, DIN 11864-2
Pipe threads	ASME B1.20 (NPT), 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	
Hazardous area	ATEX, IECEx, EAC Ex, FM, NEPSI, CSA, INMETRO (installed with flameproof 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 RS 485 RTU
EMC performance	
Emission	EN 55011/CISPR-11 (Class B)
Immunity	EN/IEC 61326-1 (Industry)
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.

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
°BaumØ light	%HFCS55
°BaumØ heavy	%HFCS90
°Brix	Ethanol-Water 0 % to 20 %
°OeschlØ	Ethanol-Water 15 % to 35 %
Plato	Ethanol-Water 30 % to 55 %
Specific Gravity	Ethanol-Water 50 % to 100 %

Application

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

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

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

Food & Beverage: dairy products, beer, wine, soft drinks, °Brix/°Plato, fruit juices and pulps, bottling, CO_2 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 trouble-shooting and meter validation

Configurable upper and lower alarm and warning limits for all process values

Alarm handling can be selected between Siemens and NAMUR standard configurations

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

Overview

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

The MASS 6000 transmitter delivers true multiparameter measurements i.e. mass flow, volume flow, density, temperature and fraction.

The MASS 6000 IP67 transmitter can be compact mounted on all sensors of type MASS 2100 DI 3 to DI 15, and can be used in remote version for all types of MASS 2100/MC2 and FC300 sensors.

Benefits

Dedicated mass flow chip with the latest ASIC technology

Fast batching and flow step response with an update rate of true 30 Hz

Superior noise immunity due to a DFT (Discrete Fourier Transformation) algorithm.

Front end resolution better than 0.35 ns improves zero point stability and enhances dynamic turn-down ratio on flow and density accuracy.

Advanced diagnosis and service menu enhances trouble-shooting and meter verification.

Built-in batch controller with compensation and monitoring comprising 2 built-in totalizers

Multi-parameter outputs, individual configurable for mass flow, volume flow, density, temperature or fraction flow such as Brix or Plato

Digital input for batch control, remote zero adjust or forced output mode

All outputs can be forced to preset value for simulation, verification or calibration purposes.

User-configurable operation menu with password protection
- 3 lines, 20 characters display in 11 languages
- Self-explaining error handling/log in text format
- Keypad can be used for controlling batch as start/stop/hold/reset

SENSORPROM technology automatically configures transmitter at start-up providing:
- Factory pre-programming with calibration data, pipe size, sensor type, output settings
- Any values or settings changed by users are stored automatically
- Automatically re-programming any new transmitter without loss of accuracy
- Transmitter replacement in less than 5 minutes.
- True "plug & play"

4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow.

Fraction flow computation based on a 3rd-order algorithm matching all applications.

USM II platform enables fitting of add-on bus modules without loss of functionality.
- All modules can be fitted through true "plug & play"
- Module and transmitter are automatically configured through the SENSORPROM.

Installation of the transmitter to the sensor is simple "plug & play" via the sensor pedestal.

Application

SITRANS F C mass flowmeters are suitable for all 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.

The main applications for the MASS 6000 IP67 transmitter can be found in:

Food and beverage industries

Pharmaceutical industries

Automotive industry

Oil and gas industry

Power generation and utility industry

Water and waste water industry

Design

The transmitter is designed in an IP67/NEMA 6 compact polyamide enclosure which can be compact mounted on the MASS 2100 sensor range DI 3 to DI 15 (1/8" to ½") and remote mounted for the entire sensor series.

The MASS 6000 IP67 is available as standard with 1 current, 1 frequency/pulse and 1 relay output and can be fitted with add-on modules for bus communication.

Function

The following functions are available:

Mass flow rate, volume flow rate, density, temperature, fraction flow

1 current output, 1 frequency/pulse output, 1 relay output, 1 digital input

All outputs can be individually configured with mass, volume, density etc.

2 built-in totalizers which can count positive, negative or net

Low flow cut-off

Density cut-off or empty pipe cut-off, adjustable

Flow direction adjustable

Error system consisting of error-log, error pending menu

Display of operating time

Uni/bidirectional flow measurement

Limit switches with 1 or 2 limits, programmable for flow, density or temperature

Noise filter setting for optimization of measurement performance under non-ideal application conditions

Full batch controller

Automatic zero adjustment menu, with zero point evaluation feed back

Full service menu for effective and straight forward application and meter troubleshooting

Flow Measurement
SITRANS F C

Transmitter MASS 6000 for 19" insert/19" wall mounting

Overview

MASS 6000 is based on digital signal processing technology engineered for high performance, fast flow step response, fast batching applications, high immunity against process noise, easy to install, commission and maintain.
The MASS 6000 transmitter delivers true multi parameter measurements i.e.: Mass flow, volume flow, density, temperature and fraction.

The MASS 6000 19"transmitter can be connected to all sensors of types MASS 2100/MC2/FC300/FCS200 and are available in different versions depending of number of output facilities, Ex protection and grade of enclosure.

Benefits

Dedicated mass flow chip with the latest ASIC technology

Fast batching and flow step response with an update rate of true 30 Hz

Superior noise immunity due to a DFT (Discrete Fourier Transformation) algorithm.

Front end resolution better than 0.35 ns improves zero point stability and enhances dynamic turn-down ratio on flow and density accuracy.

Advanced diagnosis and service menu enhances trouble-shooting and meter verification.

Built-in batch controller with compensation and monitoring comprising 2 built-in totalizers

Multi-parameter outputs, individual configurable for mass flow, volume flow, density, temperature or fraction flow such as Brix or Plato

Many output capacities, up to 3 current, 2 frequency/pulse and 2 relay outputs (excludes the possibility of an add-on module)

Digital input for batch-control, remote zero adjust or forced output mode

All outputs can be forced to preset value for simulation, verification or calibration purposes.

User-configurable operation menu with password protection
- 3 lines, 20 characters display in 11 languages
- Self-explaining error handling/log in text format
- Keypad can be used for controlling batch as start/stop/hold/reset

SENSORPROM technology automatically configures transmitter at start-up providing:
- Factory pre-programming with calibration data, pipe size, sensor type, output settings
- Any values or settings changed by users are stored automatically
- Automatically re-programming any new transmitter without loss of accuracy
- Transmitter replacement in less than 5 minutes. True 'plug & play"

4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow

Fraction flow computation based on a 3rd-order algorithm matching all applications

USM II platform enables fitting of add-on bus modules without loss of functionality.
- All modules can be fitted as true 'plug & play"
- Module and transmitter automatically configured through the SENSORPROM.

Transmitter available with Ex approvals

All electrical connections are easily accessible on the large back plane PCB

Application

SITRANS F C Coriolis mass flowmeters are suitable for all applications within the entire process industry, where there is a demand for accurate flow measurement. The meter can measure both liquids and gases.

The main applications for the MASS 6000 19 transmitter can be found in:

Chemical and pharmaceutical industries

Food and beverage industries

Automotive industry

Oil and gas industry

Power generation and utility industry

Water and waste water industry

Design

The transmitter is designed as a 19"insert as base to be used in:

19"rack system

Panel mounting IP65

Back of panel mounting IP20

Wall mounting IP66

The MASS 6000 19" is available as standard or as Ex-approved transmitter which is to be mounted in the safe area.

Overview

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

The MASS 6000 transmitter delivers true multiparameter measurements i.e.: Mass flow, volume flow, density, temperature and fraction flow.

The MASS 6000 Ex d transmitter is manufactured in stainless steel (AISI 316L/1.4404) and able to withstand harsh installation conditions in hazardous applications within the process and chemical industry. The conservative choice of material guarantees the user a low cost of ownership and a long trouble-free lifetime.
The Ex d can be compact mounted on all sensors of type MASS 2100 DI 3 to DI 15, and can be used in remote version for all types of MASS 2100. MASS 6000 Ex d cannot be combined with MC2 sensors.

Benefits

Fully stainless steel flameproof Ex d enclosure, ensuring optimum cost of ownership

Intrinsically safe keypad and display directly programmable in hazardous area

Ex-approved transmitter which can be mounted in hazardous area Zone 1 or Zone 2.

Sensor and transmitter interface intrinsically safe Ex ia IIC

Exchange of transmitter directly in hazardous area without shut-down of process pipe line due to ia IIC sensor/transmitter interface.

Dedicated mass flow chip with the latest ASIC technology

Fast batching and flow step response with an update rate of true 30 Hz

Superior noise immunity due to a DFT (Discrete Fourier Transformation) algorithm

Front end resolution better than 0.35 ns improves zero point stability and enhances dynamic turn-down ratio on flow and density accuracy.

Advanced diagnosis and service menu enhances trouble-shooting and meter verification.

Built-in batch controller with compensation and monitoring comprising 2 built-in totalizers

Multi-parameter outputs, individual configurable for mass flow, volume flow, density, temperature or fraction flow such as Brix or Plato

1 current output, 1 frequency/pulse and 1 relay as standard output

Current output can be selected as passive or active output

Digital input for batch-control, remote zero adjust or forced output mode

All outputs can be forced to preset value for simulation, verification or calibration purposes.

User-configurable operation menu with password protection
- 3 lines, 20 characters display in 11 languages
- Self-explaining error handling/log in text format
- Keypad can be used for controlling batch as start/stop/hold/reset

SENSORPROM technology automatically configures transmitter at start-up providing:
- Factory pre-programming with calibration data, pipe size, sensor type, output settings
- Any values or settings changed by users are stored automatically
- Automatically re-programming any new transmitter without loss of accuracy
- Transmitter replacement in less than 5 minutes. True "plug & play"

Fraction flow computation based on a 3rd-order algorithm matching all applications

USM II platform enables fitting of add-on bus modules without loss of functionality:
- All modules can be fitted as true "plug & play"
- Module and transmitter automatically configured through the SENSORPROM

Installation of the transmitter to the sensor is simple "plug & play" via the sensor pedestal.

Application

SITRANS F C mass flowmeters are suitable for all applications within the entire process industry where there is a demand for accurate flow measurement in hazardous area. The meter can measure both liquids and gases.

The main applications for the MASS 6000 Ex d transmitter can be found in:

Chemical process industry

Pharmaceutical industries

Automotive industry

Oil and gas industry

Power generation and utility industry

Design

The transmitter is designed in an Ex d compact stainless steel enclosure which can be compact mounted on the MASS 2100 sensor range DI 3 to DI 15, and remote mounted for the entire sensor series except MC2.

The MASS 6000 Ex d is available as standard with 1 current, 1 frequency/pulse and 1 relay output and can be fitted with add-on modules for bus communication.

Flameproof d enclosure

Enclosure stainless steel, IP67/NEMA 6 as compact and IP65 as remote

Supply voltage 24 V AC/DC

MASS 6000 Ex d is Ex-approved together with all MASS 2100 sensors, but can not be used together with MC2 Ex versions

Flow sensor SITRANS FCS200

Overview

SITRANS FCS200 (DN10, DN 15 and DN 25) is a Coriolis sensor specialized for accurate mass flow measurement of gases.

The sensor offers superior performance in terms of flow accuracy and turn down ratio. The ultra compact sensor design makes installation, replacement and commissioning very straight forward and easy.

Benefits

- High accuracy gas measurement
- Approved for use in hazardous area
- DN 10 and DN 15 is custody transfer approved, according to OIML R 139 (Compressed gaseous fuel measuring systems for vehicles). For custody transfer applications SIFLOW FC070 Ex CT must be used.
- Self-draining in vertical orientation
- Pt1000 temperature measurement for optimum accuracy
- SENSORPROM enabling true "plug & play"
- Rigid enclosure design reducing influence from pipeline vibration and thermal stress
- High-pressure measurement up to 350 bar (5076 psi)
- Ultra compact sensor design with space-saving split flow

Application

SITRANS FCS200 is designed for measurement of gases and is suitable for use in the oil and gas industry:

- Filling of gas bottles
- CNG dispensers
- Metering of general gas applications

Design

SITRANS FCS200 is available in DN 10, DN 15 and DN 25.

The sensor consists of 2 parallel measuring pipes, welded directly onto a flow splitter at each end of the sensor to eliminate a direct coupling to the process connectors and significantly reduce effects from external vibrations. The flow-splitters are welded directly onto a rigid sensor housing which acts as a mechanical low pass filter.

The SITRANS FCS200 DN 10 and DN 15 wetted parts material is Hastelloy C22, and the DN 25 wetted parts material is AISI 316Ti/1.4571. The enclosure is made of stainless steel AISI 316L/1.4404 with a grade of encapsulation of IP67.

The two black rupture discs are designed to protect the enclosure from overpressure.

Function

The flow measuring principle is based on the Coriolis effect. See "System information SITRANS F C".

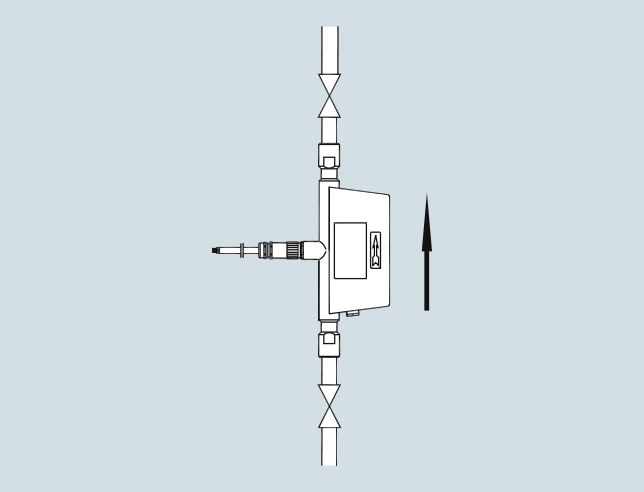
Integration

The complete flowmeter consists of the sensor (SITRANS FCS200) and a transmitter SITRANS F C MASS 6000 or SIFLOW FC070. All communication options are available for MASS 6000.

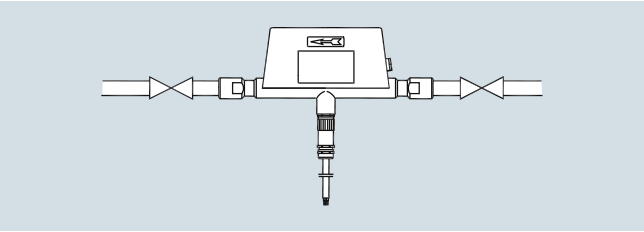
The sensor is shipped with a SENSORPROM memory unit containing all information about calibration data, device identity and factory pre-programming of transmitter settings.

Installation guidelines

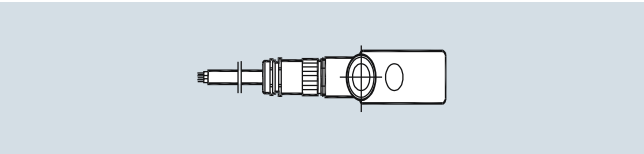
Siemens Flow Instruments recommends installing the sensor in one of the following ways:



Vertical orientation with an upwards flow



Horizontal installation, tubes up



Horizontal installation, tubes sideways

Overview

MASS 2100 DI 1.5 is suitable for low flow measurement applications of a variety of liquids and gases.

The sensor offers superior performance in terms of flow accuracy, turn-down ratio and density accuracy. The ease of installation through a "plug & play" mechanical and electrical interface ensures optimum performance and operation.

The sensor delivers true multi-parameter measurements i.e.: Mass flow, volume flow, density, temperature and fraction.

Benefits

- High accuracy better than 0.1 % of mass flow rate
- Large dynamic turn-down ratio better than 500:1, from 30 kg/h to below 100 g/h
- Densitometer performance available through a density accuracy better than 0.001 g/cm^3 with a repeatability better than 0.0002 g/cm^3.
- Single continuous tube design, with no internal welds, reductions or flow splitters offers optimal hygiene, safety and CIP cleanability for food and beverage and pharmaceutical applications.
- Markets biggest wall thickness, ensuring optimal life-time and corrosion resistance and high-pressure durability
- Balanced pipe design with little mechanical energy-loss, ensures optimal performance and stability under non-ideal and unstable process conditions (pressure, temperature, density-changes etc.).
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Multi-plug electrical connector and SENSORPROM enables true "plug & play". Installation and commissioning in less than 10 minutes
- Intrinsically safe Ex ia design as standard
- Sensor pipe available in high-quality stainless steel AISI 316L/ 1.4435 or Hastelloy C22/2.4602 offering optimum corrosion resistance
- Dual-drive pick-up and driver construction facilitate ultra low-weight pipe construction giving the markets smallest and most stable zero point.
- Rugged and space-saving sensor design in stainless steel matching all environments
- High-pressure program as standard
- The sensor calibration factor is also valid for gas measurement.

Application

In many industries such as the food and beverage or pharamceutical industry, accurate recipe control means everything. The MASS 2100 DI 1.5 has demonstrated superiour performance in numerous applications and field trails relating to accuracy and turn-down ratio. It is today the preferred meter for research and development and mini-plant applications for liquid or gas measurement, where measuring small quantities is important.

The main applications for the MASS 2100 DI 1.5 sensor can be found in:	
Chemical industry	Liquid and gas measurement within Miniplant and R & D, dosing of additives and catalysts
Cosmetic industry	Dosing of essence and fragrances
Pharmaceutical industry	High-speed dosing and coating of pills, filling of ampuls/injectors
Food and beverage industry	Dosing of flavourings, colours and additives, density measurement, inline measurement of liquid or gaseous CO_2
Automotive industry	Fuel injection nozzle and pump testing, filling of AC units, engine consumption, paint robots, ABS test-beds

Design

The MASS 2100 sensor consists of a single bent tube in a double omega pipe configuration, welded directly to the process connectors at each end.

The sensor is available in 2 material configurations, AISI 316L/ 1.4404 or Hastelloy C22/2.4602 with ¼ NPT or ¼ ISO process connections.

The enclosure is made in stainless steel AISI 316L/1.4404 with a grade of encapsulation of IP65/NEMA 4.

The sensor is available in either a standard version with a maximum liquid temperature of 125 °C (257 °F) or a high-temperature version, with raised electrical connector for 180 °C (356 °F).

The sensor can be installed in horizontal or vertical position. The enclosed single quick release clamp fitting which, along with its compact design and single multi-plug electrical connector, will keep installation costs and time to a minimum as shown below.

Overview

SITRANS FC300 is a compact Coriolis mass sensor suitable for flow measurement of a variety of liquids and gases.

The sensor offers superior performance in terms of flow accuracy, turn-down ratio and density accuracy. The ease of installation through a plug & play interface ensures optimum performance and operation.

A new designed encapsulation in stainless steel with a surprisingly low weight of only 3.5 kg (7.7 lb), ensures a rigid and robust sensor performance for a wide range of applications.

Benefits

High accuracy better than 0.1 % of mass flow rate

Large dynamic turn-down ratio better than 500:1

Densitometer performance available through a density accuracy as follows:
- For 316L/1.4404 version better than 0.007 g/cm^3 (0.00025 lb/inch^3) with repeatability better than 0.0002 g/cm^3 (0.0000072 lb/inch^3)
- For C22/2.4602 version better than 0.0025 g/cm^3 (0.000090 lb/inch^3) with repeatability better than 0.0002 g/cm^3 (0.0000072 lb/inch^3)

One tube without internal welds, reductions or flow splitters offers optimal hygiene, safety and CIP cleanability for food and beverage and pharmaceutical applications

Larger wall thickness, ensures optimal life-time and corrosion resistance and high-pressure durability

Balanced pipe design with little mechanical energy loss, ensures optimal performance and stability under non-ideal and unstable process conditions (pressure, temperature, density-changes etc.).

4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow

Multi-plug electrical connector and SENSORPROM enable true plug & play . Installation and commissioning in less than 10 minutes.

Intrinsically safe Ex design ia IIC as standard

Sensor pipe available in high-quality stainless steel AISI 316L/1.4435 or Hastelloy C22/2.4602 offering optimum corrosion resistance.

Rugged and space-saving sensor design in stainless steel matching all applications.

High-pressure program as standard

The sensor calibration factor is also valid for gas measurement.

Application

The industry today has an increasing demand for mass flowmeters with a reduced physical size without loss of performance. The meters must be suitable for installation in traditional process industry environment as well as OEM equipment for instance within automotive or appliance industry. Independent of industry application the meter must deliver accurate and reliable measurements. The new and versatile design of the FC300 offers this flexibility.

The main applications for the SITRANS FC300 DN 4 can be found in:	
Chemical industry	Liquid and gas measurement in normal as well as corrosive environments
Cosmetic industry	Dosing of essence and fragrances
Pharmaceutical industry	High-speed dosing and coating of pills, filling of ampuls/injectors
Food and beverage industry	Filling, dosing of flavorings, colors and additives, inline density measurement Measurement and dosing of liquid or gaseous CO_2
Automotive industry	Fuel injection nozzle and pump testing, filling of AC units, engine consumption, paint robots, ABS test-beds

Design

The FC300 sensor consists of a single tube bent in double omega pipe geometry, welded directly to the process connectors at each end. The sensor is available in 2 material configurations, AISI 316L/1.4404 or Hastelloy C22/2.4602 with ¼ -NPT or G¼ -ISO process connections.

The enclosure is made of stainless steel AISI 316L/1.4409 with a grade of encapsulation of IP67/NEMA 4. The enclosure has a very robust design and with an overall size of 130 x 200 x 60 mm (5.12 x 7.87 x 2.36) the sensor is very compact and requires only little installation space.

The sensor can be delivered in a standard version with a maximum liquid temperature of 115 °C (239 °F) or a high-temperature version, with raised electrical connector for 180 °C (356 °F).

The sensor can be installed in horizontal or vertical position. The sensor can be mounted directly on any given plane surface or if desired with the enclosed quick release clamp fitting which, along with its compact design and multi-plug electrical connector, will keep installation costs and time to a minimum.

Function

The measuring principle is based on the Coriolis effect. See System information SITRANS F C Coriolis mass flowmeters .

Integration

The sensor can be connected to all MASS 6000 and SIFLOW FC070 (standard and Ex types) transmitters for remote installation only.

All sensors are delivered with a SENSORPROM containing all information about calibration data, identity and factory pre-programming of transmitter settings

Flow Measurement
SITRANS F C

Flow sensor MASS 2100 DI 3 to DI 15

Overview

MASS 2100 DI 3 to DI 15 is suitable for accurate mass flow measurement of a variety of liquids and gases.

The sensor offers superior performance in terms of flow accuracy, turn-down ratio and density accuracy. The ease of installation through a "plug & play" mechanical and electrical interface ensures optimum performance and operation.

The sensor delivers true multi-parameter measurements i.e.: Mass flow, volume flow, density, temperature and fraction.

Benefits

- High accuracy better than 0.1 % of mass flow rate
- Large dynamic turn-down ratio better than 500:1
- Densitometer performance available through density accuracy (depending upon sensor size) ranging from 0.0005 to 0.0015 g/cm^3 with a typical repeatability better than 0.0001 to 0.0002 g/cm^3
- Single continuous tube design, with no internal welds, reductions or flow splitters offers optimal hygiene, safety and CIP cleanability for food and beverage and pharmaceutical applications
- Markets thickest sensor walls ensure optimal life-time and corrosion resistance and high-pressure durability
- Full bore design provides lower pressure loss due to same internal diameter throughout the entire sensor
- Balanced pipe design with little mechanical energy loss, ensures optimal performance and stability under non-ideal and unstable process conditions (pressure, temperature, density changes etc.)
- 4-wire Pt1000 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- Multi-plug electrical connector and SENSORPROM enables true "plug & play". Installation and commissioning in less than 10 minutes
- Intrinsically safe Ex design ia IIC as standard, making service in hazardous area possible without having to demount the sensor if a compact Ex d transmitter needs service
- Sensor pipe available in high-quality stainless steel AISI 316L/1.4435 or Hastelloy C22/2.4602 offering optimum corrosion resistance
- Centre-block design decouples process noise from the environment such as vibrations, pulsations, pressure shocks etc. making installation flexible and versatile
- Rugged and space-saving sensor design in stainless steel matching all environments
- High-pressure program as standard
- The sensor calibration factor is also valid for gas measurement
- Uniform sensor interface matching all transmitter versions at the same time whether it is compact IP67/NEMA 6, compact Ex d or remote installation, one sensor fits all

Application

Coriolis mass flowmeters are suitable for measuring all liquids and gases. The 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 the Coriolis flowmeter is recognized for its high accuracy in a wide turn-down ratio which is a paramount in many applications.

The main applications of the Coriolis flowmeter can be found in all industries, such as:	
Chemical and pharma	Detergents, bulk chemicals, pharmaceuticals, acids, alkalis
Food and beverage	Dairy products, beer, wine, soft-drinks, Brix/Plato, fruit juices and pulps, bottling, CO_2 dosing, CIP-liquids
Automotive	Fuel injection nozzle and pump testing, filling of AC units, engine consumption, paint robots
Oil and gas	Filling of gas bottles, furnace control, test separators, LPG
Water and waste water	Dosing of chemicals for water treatment

The wide varity of combinations and versions from the modular system means that ideal adaptation is possible to each measuring task.

Design

The MASS 2100 sensor consists of a single bent tube in a double bent pipe configuration, welded directly to the process connectors at each end.
The centre-block is brazed onto the sensor pipes from the outside acting as a mechanical low pass filter.

The sensor is available in 2 material configurations, AISI 316L/1.4404 or Hastelloy C22/2.4602 with a wide variety of process connections.

The enclosure is made in stainless steel AISI 316L/1.4404 with a grade of encapsulation of IP67.

The sensor is as standard Ex ia approved, intrinsically safe.

The sensor can be installed in horizontal or vertical position. In horizontal position the sensor is self draining.

Heating: All the sensors MASS 2100, DI 3 to DI 15, can optionally be equipped with a heating coil to avoid solidification of sensitive fluids during down-time or period between discontinuing processes. This feature gives the user an alternative to the costly electrical heating normally used, as it gives the freedom to choose either hot water, superheated steam or hot oil, to maintain a constant temperature inside the sensor.

Overview

SITRANS F C MC2 is available in sizes DN 100 and DN 150 (4" and 6").

The MC2 sensor is suitable for accurate mass flow measurement of a variety of liquids.

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

The very compact sensor construction makes installation and commissioning of even the largest sizes very straight forward and easy.

Benefits

- High accuracy better than 0.15 % of mass flow rate
- Large dynamic turn-down ratio
- Densitometer performance available through density accuracy better than 0.001 g/cm^3
- Space-saving split-flow sensor design facilitating low pressure loss
- Parallel S-tube design and optimal oriented inductive sensors enhances accuracy and turn-down ratio.
- Self-draining in both horizontal and vertical position
- Rigid enclosure design reduces the influence from pipeline vibration and thermal stress
- 4-wire Pt100 temperature measurement ensures optimum accuracy on mass flow, density and fraction flow
- SENSORPROM enables true "plug & play"- installed and commissioned in less than 10 minutes.
- Safe Ex design
- Sensor pipe available in high-quality stainless steel AISI 316Ti/1.4571 or Hastelloy C4/2.4610 offering optimum corrosion resistance.
- CIP cleanability for food and beverage and pharmaceutical applications

Application

Coriolis mass flowmeters are suitable for measuring all liquids. The 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 the Coriolis flowmeter is recognized for its high accuracy in a wide turndown ratio which is paramount in many applications.

MC2 sensors are not designed or approved for flow measurement of gaseous process media.

The product is manufactured by ABB Automation Products GmbH and distributed by Siemens.

The main applications of the Coriolis flowmeter can be found in all industries, such as:	
Chemical and pharma	Detergents, bulk chemicals, pharmaceuticals, acids, alkalis
Food and beverage	Dairy products, beer, wine, soft-drinks, Plato/Brix, fruit juices and pulps, bottling, CO_2 dosing, CIP-liquids
Oil and gas	Liquid measurement, furnace control, test separators, LPG, oil bunkering
Water and waste water	Dosing of chemicals for water treatment

The wide variety of combinations and versions from the modular system means that ideal adaptation is possible to each measuring task. MC2 ist not recommended for gas applications.

Design

The MC2 sensor consists of 2 parallel measuring pipes, welded directly onto a flow-splitter at each end to eliminate a direct coupling to the process connectors and significantly reduce effects from external vibrations.

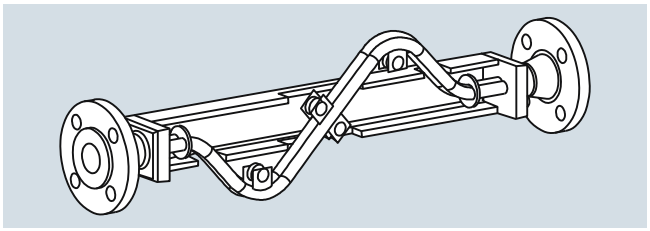
The flow-splitters are welded onto a rigid sensor housing which acts as a mechanical low-pass filter.

The sensor is available in 2 material configurations, AISI 316L/ 1.4436 or Hastelloy C4/2.4610 with a wide variety of process connections.

The enclosure is made of stainless steel AISI 304/1.4301 with an encapsulation grade of IP67/NEMA 4.

The sensor is Ex-approved.

It can be installed in horizontal or vertical position, and is self-draining in both positions.



The MC2 Ex version sensor is based on a different Ex concept than MASS 6000. Therefore the MC2 Ex version sensor can only be connected to MASS 6000 IP67, MASS 6000 19" or SIFLOW FC070 standard versions, which have to be remote mounted in the safe area. MASS 6000 Ex d, MASS 6000 19" Ex and SIFLOW FC070 Ex can not be used with MC2 Ex sensors.

Hazardous area
Zone 1 + 2

Safe area