

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 | 3/149 | Yes | Yes | Yes | FCS300 Standard, DN 15 ... DN 150 | 3/160 |
| | | No | Yes | Yes | MASS 2100, DI 1.5 | 3/180 |
| | | Yes | Yes | Yes | MASS 2100, DI 3, DI 6, DI 15 | 3/187 |
| | | No | Yes | Yes | FC300, DN 4 | 3/183 |
| FCT010 | 3/174 | Yes | No | Yes | FCS300 Standard, DN 15 ... DN 150 | 3/160 |
| | | No | Yes | Yes | MASS 2100, DI 1.5 | 3/180 |
| | | Yes | Yes | Yes | MASS 2100, DI 3, DI 6, DI 15 | 3/187 |
| | | No | Yes | Yes | FC300, DN 4 | 3/183 |
| MASS 6000 IP67 Polyamide enclosure | 3/205 | No | Yes | No | FCS200, DN 10 ... DN 25 | 3/228 |
| | | No | Yes | No | FC300, DN 4 | 3/183 |
| | | No | Yes | No | MASS 2100, DI 1.5 | 3/180 |
| | | Yes | Yes | No | MASS 2100, DI 3 ... DI 15 | 3/187 |
| MASS 6000 19" | 3/210 | No | Yes | No | FCS200, DN 10 ... DN 25 | 3/228 |
| | | No | Yes | No | FC300, DN 4 | 3/183 |
| | | No | Yes | No | MASS 2100, DI 1.5 | 3/180 |
| | | No | Yes | No | MASS 2100, DI 3 ... DI 15 | 3/187 |
| MASS 6000 Ex 19" | 3/210 | No | Yes | Yes | FCS200, DN 10 ... DN 25 | 3/228 |
| | | No | Yes | Yes | FC300, DN 4 | 3/183 |
| | | No | Yes | Yes | MASS 2100 Ex, DI 1.5 | 3/180 |
| | | No | Yes | Yes | MASS 2100 Ex, DI 3 ... DI 15 | 3/187 |
| MASS 6000 Ex d Stainless steel enclosure | 3/219 | No | Yes | Yes | FCS200, DN 10 ... DN 25 | 3/228 |
| | | No | Yes | Yes | FC300, DN 4 | 3/183 |
| | | No | Yes | Yes | MASS 2100 Ex, DI 1.5 | 3/180 |
| | | Yes | Yes | Yes | MASS 2100 Ex, DI 3 ... DI 15 | 3/187 |
| SIFLOW FC070 Standard | 3/224 | | | | FCS200, DN 10 ... DN 25 | 3/228 |
| | | No | Yes | No | FC300, DN 4 | 3/183 |
| | | | | | MASS 2100, DI 1.5 | 3/180 |
| | | | | | MASS 2100, DI 3 ... DI 15 | 3/187 |
| SIFLOW FC070 Ex CT | 3/224 | | | | FCS200, DN 10 ... DN 25 | 3/228 |
| | | No | Yes | Yes | FC300, DN 4 | 3/183 |
| | | | | | MASS 2100, DI 1.5 | 3/180 |
| | | | | | MASS 2100, DI 3 ... DI 15 | 3/187 |

Flow Measurement

SITRANS F C

System information SITRANS F C Coriolis mass flowmeters

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

- FC330/FC310:
Digital platform allows for any sensor in the range to be matched in compact or remote.
- MASS 2100/FC300 sensors with FCT digital platform allows all sensors from DI1,5 to DI 15 to be matched with the FCT010 and FCT030 transmitters.
Both analog and digital connections are available.
- MASS 6000:
Available for MASS 2100, FC200 and FC300. 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:
Available for MASS 2100, FC200 and FC300.
Direct integration into SIMATIC S7-300 systems or as stand-alone transmitter 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 |

System information SITRANS F C Coriolis mass flowmeters

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



| FC330 | FC310 | MASS 2100 DI 1.5 | MASS 2100 DI 3 to DI 15 | FC300 DN 4 | FCS200 DN 10 to DN 25 | MASS 6000 IP67 | MASS 6000 19" | MASS 6000 Ex d | SIFLOW FC070 Std/Ex CT | MASS 2100/FC300 with FCT010 | MASS 2100/FC300 with FCT030 |
|---------|---------|------------------|-------------------------|------------|-----------------------|----------------|---------------|----------------|------------------------|-----------------------------|-----------------------------|
| 7ME4633 | 7ME4631 | 7ME4100 | 7ME4100 | 7ME4400 | 7ME4500 | 7ME4110 | 7ME4110 | 7ME4110 | 7ME4120 | 7ME4811 | 7ME4813 |

Design

| | | | | | | | | | | | |
|---------|---|---|---|---|---|---|---|---|---|-----------------|-----------------|
| Compact | • | • | • | • | • | • | • | • | • | • ³⁾ | • ³⁾ |
|---------|---|---|---|---|---|---|---|---|---|-----------------|-----------------|

| | | | | | | | | | | | |
|--------|---|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | | • | | | | |
|-----------------------------|--|--|--|--|--|--|---|--|--|--|--|

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|--------------------------------|--|--|--|--|--|--|---|--|--|--|--|
| Wall mounting IP65 ABS plastic | | | | | | | • | | | | |
|--------------------------------|--|--|--|--|--|--|---|--|--|--|--|

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|---------------------------------|--|--|--|--|--|--|---|--|--|--|--|
| Front of panel IP65 ABS plastic | | | | | | | • | | | | |
|---------------------------------|--|--|--|--|--|--|---|--|--|--|--|

| | | | | | | | | | | | |
|--|---|---|--|--|--|--|--|--|--|---|---|
| Aluminum IP67 Field mounting enclosure | • | • | | | | | | | | • | • |
|--|---|---|--|--|--|--|--|--|--|---|---|

| | | | | | | | | | | | |
|---------------------------------------|---|--|--|--|--|--|--|--|--|--|---|
| Aluminum IP67 Wall mounting enclosure | • | | | | | | | | | | • |
|---------------------------------------|---|--|--|--|--|--|--|--|--|--|---|

Communication

| | | | | | | | | | | | |
|------|---|--|--|--|--|---|---|---|--|--|---|
| HART | • | | | | | • | • | • | | | • |
|------|---|--|--|--|--|---|---|---|--|--|---|

| | | | | | | | | | | | |
|-------------|---|--|--|--|--|---|---|---|--|--|---|
| PROFIBUS PA | • | | | | | • | • | • | | | • |
|-------------|---|--|--|--|--|---|---|---|--|--|---|

| | | | | | | | | | | | |
|-------------|---|--|--|--|--|---|---|--|--|--|---|
| PROFIBUS DP | • | | | | | • | • | | | | • |
|-------------|---|--|--|--|--|---|---|--|--|--|---|

| | | | | | | | | | | | |
|-------------------|---|---|--|--|--|---|---|--|---|---|---|
| Modbus RTU/RS 485 | • | • | | | | • | • | | • | • | • |
|-------------------|---|---|--|--|--|---|---|--|---|---|---|

| | | | | | | | | | | | |
|-------------------|--|--|--|--|--|--|--|--|---|--|--|
| Modbus RTU/RS 232 | | | | | | | | | • | | |
|-------------------|--|--|--|--|--|--|--|--|---|--|--|

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|------------------------|--|--|--|--|--|---|---|---|--|--|--|
| FOUNDATION Fieldbus H1 | | | | | | • | • | • | | | |
|------------------------|--|--|--|--|--|---|---|---|--|--|--|

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|-----------|--|--|--|--|--|---|---|--|--|--|--|
| DeviceNet | | | | | | • | • | | | | |
|-----------|--|--|--|--|--|---|---|--|--|--|--|

Supply voltage

| | | | | | | | | | | | |
|---------|---|---|--|--|--|--|--|--|---|---|---|
| 24 V DC | • | • | | | | | | | • | • | • |
|---------|---|---|--|--|--|--|--|--|---|---|---|

| | | | | | | | | | | | |
|------------|--|--|--|--|--|---|---|---|--|--|--|
| 24 V AC/DC | | | | | | • | • | • | | | |
|------------|--|--|--|--|--|---|---|---|--|--|--|

| | | | | | | | | | | | |
|--------------|---|--|--|--|--|---|---|--|--|--|---|
| 115/230 V AC | • | | | | | • | • | | | | • |
|--------------|---|--|--|--|--|---|---|--|--|--|---|

Pipe size

| | | | | | | | | | | | |
|----------------|--|--|---|--|--|--|--|--|--|---|---|
| DI 1.5 (1/16") | | | • | | | | | | | • | • |
|----------------|--|--|---|--|--|--|--|--|--|---|---|

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|-------------|--|--|--|---|--|--|--|--|--|---|---|
| DI 3 (1/8") | | | | • | | | | | | • | • |
|-------------|--|--|--|---|--|--|--|--|--|---|---|

| | | | | | | | | | | | |
|-------------|--|--|--|--|---|--|--|--|--|---|---|
| DN 4 (1/6") | | | | | • | | | | | • | • |
|-------------|--|--|--|--|---|--|--|--|--|---|---|

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|-------------|--|--|--|---|--|--|--|--|--|---|---|
| DI 6 (1/4") | | | | • | | | | | | • | • |
|-------------|--|--|--|---|--|--|--|--|--|---|---|

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|--------------|--|--|--|--|--|---|--|--|--|--|--|
| DN 10 (3/8") | | | | | | • | | | | | |
|--------------|--|--|--|--|--|---|--|--|--|--|--|

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|--------------|--|--|--|---|--|--|--|--|--|---|---|
| DI 15 (1/2") | | | | • | | | | | | • | • |
|--------------|--|--|--|---|--|--|--|--|--|---|---|

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|--------------|---|---|--|--|--|--|--|--|--|--|--|
| DN 15 (1/2") | • | • | | | | | | | | | |
|--------------|---|---|--|--|--|--|--|--|--|--|--|

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|------------|---|---|--|--|--|--|--|--|--|--|--|
| DN 25 (1") | • | • | | | | | | | | | |
|------------|---|---|--|--|--|--|--|--|--|--|--|

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|------------|---|---|--|--|--|--|--|--|--|--|--|
| DN 50 (2") | • | • | | | | | | | | | |
|------------|---|---|--|--|--|--|--|--|--|--|--|

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|------------|---|---|--|--|--|--|--|--|--|--|--|
| DN 80 (3") | • | • | | | | | | | | | |
|------------|---|---|--|--|--|--|--|--|--|--|--|

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|-------------|---|---|--|--|--|--|--|--|--|--|--|
| DN 100 (4") | • | • | | | | | | | | | |
|-------------|---|---|--|--|--|--|--|--|--|--|--|

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|-------------|---|---|--|--|--|--|--|--|--|--|--|
| 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 | | | | | | • | | | | | |
|------------------------------|--|--|--|--|--|---|--|--|--|--|--|

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



| FC330 | FC310 | MASS 2100 DI 1.5 | MASS 2100 DI 3 to DI 15 | FC300 DN 4 | FCS200 DN 10 to DN 25 | MASS 6000 IP67 | MASS 6000 19" | MASS 6000 Ex d | SIFLOW FC070 Std/Ex CT | MASS 2100/FC300 with FCT010 | MASS 2100/FC300 with FCT030 |
|---------|---------|------------------|-------------------------|------------|-----------------------|----------------|---------------|----------------|------------------------|-----------------------------|-----------------------------|
| 7ME4633 | 7ME4631 | 7ME4100 | 7ME4100 | 7ME4400 | 7ME4500 | 7ME4110 | 7ME4110 | 7ME4110 | 7ME4120 | 7ME4811 | 7ME4813 |

Flange

| | | | | | | | | | | | |
|-------------------------------------|---|---|--|---|--|--|--|--|--|---|---|
| EN 1092-1 PN 16 | • | • | | | | | | | | | |
| EN 1092-1 PN 40 | • | • | | • | | | | | | • | • |
| EN 1092-1 PN 63 | • | • | | | | | | | | | |
| EN 1092-1 PN 100 | • | • | | • | | | | | | • | • |
| ANSI B16.5 Class 150 | • | • | | • | | | | | | • | • |
| ANSI B16.5 Class 300 | • | • | | | | | | | | | |
| ANSI B16.5 Class 600 | • | • | | • | | | | | | • | • |
| ANSI B16.5 Class 900 ⁵⁾ | • | • | | | | | | | | | |
| ANSI B16.5 Class 1500 ⁵⁾ | • | • | | | | | | | | | |
| JIS B2220 10K | • | • | | | | | | | | | |
| JIS B2220 20K | • | • | | | | | | | | | |

Dairy

| | | | | | | | | | | | |
|-------------------------------|---|---|---|---|---|--|--|--|--|---|---|
| DIN 11851 | • | • | | • | | | | | | • | • |
| DIN 11851 PN 40 | | | | • | | | | | | • | • |
| Clamp ISO 2852 PN 16 | | | | • | | | | | | • | • |
| ISO 2853 PN 16 | | | | • | | | | | | • | • |
| DIN 32676 (ISO) clamp serie A | • | • | | | | | | | | | |
| SMS 1145 | • | • | | | | | | | | | |
| Others on request | • | • | • | • | • | | | | | • | • |

Pipe material

| | | | | | | | | | | | |
|--|---|---|---|---|---|---|----|--|--|---|---|
| Stainless steel AISI 316L/ 1.4435/1.4404 | • | • | • | • | • | | | | | • | • |
| Nickel-Alloy C4 | • | • | | | | | | | | | |
| Hastelloy C22/2.4602 | | | • | • | • | • | 4) | | | • | • |

With heating jacket

| | | | | | | | | | | | |
|-----------------|--|--|--|--|--|--|--|--|--|---|---|
| Internal U-tube | | | | | | | | | | • | • |
|-----------------|--|--|--|--|--|--|--|--|--|---|---|

Pressure rating

| | | | | | | | | | | | |
|-------------------------------------|---|---|---|---|---|--|---|--|--|---|---|
| PN 16 | • | • | | | | | | | | | |
| PN 40 | • | • | | • | | | | | | • | • |
| PN 63 | • | • | | | | | | | | | |
| PN 100 | • | • | • | • | • | | | | | • | • |
| PN 160 | | | | | | | | | | • | • |
| PN 214 | | | | | | | • | | | • | • |
| PN 350 | | | | | | | • | | | • | • |
| High-pressure version ¹⁾ | | | • | • | • | | | | | • | • |

Accuracy

| | | | | | | | | | | | |
|--|---|---|---|---|----|---|---|--|--|---|---|
| Flow error ≤ 0.1 % of rate ⁶⁾ | • | • | • | • | • | | | | | • | • |
| Flow error ≤ 0.2 % of rate ⁶⁾ | • | • | | | | | | | | | |
| Flow error ≤ 0.5 % of rate ⁶⁾ | | | | | | | • | | | | |
| Density error ≤ 0.0005 g/cm ³ | | | | | • | | | | | • | • |
| Density error ≤ 0.001 g/cm ³ | | | • | | | | | | | • | • |
| Density error ≤ 0.002 g/cm ³ | • | • | | | | | | | | | |
| Density error ≤ 0.010 g/cm ³ | • | • | | | | | | | | | |
| Density error ≤ 0.0015 g/cm ³ | | | | • | 2) | • | | | | | |

Cable glands

| | | | | | | | | | | | |
|---------|---|---|--|--|--|--|---|----|---|---|---|
| PG 13.5 | | | | | | | • | 3) | | | |
| ½" NPT | • | • | | | | | • | | | • | • |
| M20 | • | • | | | | | • | | • | • | • |

• = available

¹⁾ See technical specifications.

²⁾ DI 3, DI 6 and DI 15

³⁾ Only when mounted in enclosure.

⁴⁾ Process connectors in AISI 316TV1.4571

⁵⁾ Sensor pressure and temperature limited to ANSI class 600 rating

⁶⁾ For reference conditions: ISO 9104 and DIN/EN 29104. Increased error can be expected for gas mass flow measurement.

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|---------|---------|------------------|-------------------------|------------|-----------------------|----------------|---------------|----------------|------------------------|-----------------------------|-----------------------------|
| 7ME4633 | 7ME4631 | 7ME4100 | 7ME4100 | 7ME4400 | 7ME4500 | 7ME4110 | 7ME4110 | 7ME4110 | 7ME4120 | 7ME4811 | 7ME4813 |

Approvals custody transfer

| | | | | | | | | | | | |
|--|------|--|--|--|--|---|--|--|--|--|--|
| NTEP | • 9) | | | | | • | | | | | |
| Other media than water pattern approval - OIML R 117 (DN 25 to DN 150) | • 9) | | | | | | | | | | |

 Hazardous locations

| | | | | | | | | | | | | |
|---------------------|------|------|------|------|---|---|---|---|---|--------|---|---|
| ATEX zone 1 | • | • | • | • | • | • | • | • | • | • 3)4) | • | • |
| IECEX zone 1 | • | • | | | | • | | | | • 4) | • | • |
| EAC Ex zone 1 | • 9) | • 9) | • | • | • | • | | • | • | • 3)4) | | |
| US /CSA) Div 1 | • | • | | | | | | | | | • | • |
| Canada (CSA) zone 1 | • | • | | | | | | | | | • | • |
| FM | | | | | | • | | | | • | | |
| UL | | | • 1) | • 1) | • | | | | | | • | • |
| CSA | | | | | | | | | | • 4) | | |
| NEPSI | • 9) | • 9) | | | | • | | | | | | |
| INMETRO | • 9) | • 9) | | | | | | | | | | |

 Ordinary locations

| | | | | | | | | | | | | |
|--------------------------------------|--|--|--|--|--|--|--------|--------|--|--|--|--|
| UL listed (us, ca) c-UL-us Flowmeter | | | | | | | • 2) | • 7) | | | | |
| UL recognized (us, ca) Flowmeter | | | | | | | • 2)5) | • 5)6) | | | | |

 PED

| | | | | | | | | | | | | |
|---------------------------------|---------------------------|---|---|--|--|--|--|--|--|--|--|--|
| Fluid group 1 Category III, gas | PED Directive 2014/68/ EU | • | • | | | | | | | | | |
|---------------------------------|---------------------------|---|---|--|--|--|--|--|--|--|--|--|

 CRN

| | | | | | | | | | | | | |
|-----------------------|-----|------|------|---|------|---|--|--|--|------|------|--|
| Category F OF10769.5C | CRN | • 9) | • 9) | • | • 8) | • | | | | • 8) | • 8) | |
|-----------------------|-----|------|------|---|------|---|--|--|--|------|------|--|

 F&B/Pharma

| | | | | | | | | | | | | |
|-------|---------|---------|--|--|--|--|--|--|--|--|--|--|
| EHEDG | • 9)10) | • 9)10) | | | | | | | | | | |
|-------|---------|---------|--|--|--|--|--|--|--|--|--|--|

 Marine

| | | | | | | | | | | | | |
|---|------|------|--|--|--|--|--|--|--|--|--|--|
| SITRANS FC310: Germanischer Lloyd/ det Norske Veritas, Bureau Veritas, Lloyds of London, American Bureau of Shipping, Rina, CCS | • 9) | • 9) | | | | | | | | | | |
|---|------|------|--|--|--|--|--|--|--|--|--|--|

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 6 is CRN

9) In preparation

10) DN 25 to DN 80

Flow Measurement

SITRANS F C

System information SITRANS F C Coriolis mass flowmeters

Function

The flow measuring principle is based on the Coriolis effect. The flowmeter consists of a system FC310 or FC330 or a combination of a sensor type MASS 2100/FC300/FCS200 and a transmitter type MASS 6000/SIFLOW FC070/FCT010 and FCT030.

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.

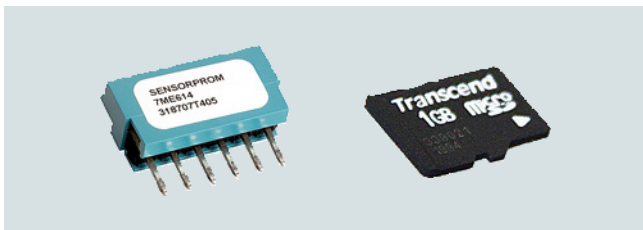
The amplitude of the driver is automatically regulated to ensure a stable output from the 2 pick-ups.

The temperature of the sensor is measured by a Pt1000.

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.



SENSORPROM and SensorFlash flow memory units

FC310 flow transmitters communicate via Modbus RTU and FC330 via HART/Modbus/PROFIBUS DP/ PROFIBUS PA.

Integration

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 4x 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 www.siemens.com) 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

- FCS300 – 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.

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.

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 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 flow facilities accredited according to ISO/IEC 17025 by an accreditation body.

The accreditation body 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. FC310 and FC330 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.

FCS300 sensors: for liquids

| | Q _{min} at 1% accuracy water | | Q _{nom} ¹⁾ | | 100 % (Q _{max}) ²⁾ | |
|---------------------|---------------------------------------|----------|--------------------------------|----------|---|----------|
| | kg/h | (lb/min) | kg/h | (lb/min) | kg/h | (lb/min) |
| DN 15 (1/2") | 70 | (2.57) | 4 500 | (165.3) | 8 000 | (293.9) |
| DN 25 (1") | 240 | (8.92) | 20 500 | (753.2) | 35 000 | (1 286) |
| DN 50 (2") | 800 | (29.4) | 49 000 | (1 800) | 90 000 | (3 307) |
| DN 80 (3") | 2 000 | (73.5) | 122 000 | (4 483) | 250 000 | (9 186) |
| DN 100 (4") | 4 000 | (147) | 273 000 | (10 031) | 520 000 | (19 108) |
| DN 150 (6") | 6 900 | (253) | 459 200 | (16 873) | 860 000 | (31 600) |

MASS 2100 and FC300 sensors: for liquids

| | Q _{min} at 1% accuracy water | | Q _{nom} ¹⁾ | | 100 % (Q _{max}) ²⁾ | |
|-----------------------|---------------------------------------|--------|--------------------------------|---------|---|----------|
| | kg/h | (lb/h) | kg/h | (lb/h) | kg/h | (lb/h) |
| DI 1.5 (1/16") | 0.1 | (0.22) | 15 | (33) | 30 | (66) |
| DI 3 (1/8") | 1.0 | (2.2) | 125 | (275) | 250 | (550) |
| DN 4 (1/6") | 1 | (2.2) | 175 | (386) | 350 | (770) |
| DI 6 (1/4") | 0 | (11) | 500 | (1 102) | 1 000 | (2 200) |
| DI 15 (1/2") | 5 | (44) | 2 800 | (6 173) | 5 600 | (12 345) |

¹⁾ Q_{nom} = ⊗ 1 barg @water 20 °C.

²⁾ Q_{max} = 10 m/sec @water 20 °C at inlet (up to 30 m/s in the flowtubes).

For gas applications the massflow rate is depending on the gas type. The max. flowrate is calculated with the Mach-Number to be Ma = 0.3.

- 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:

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

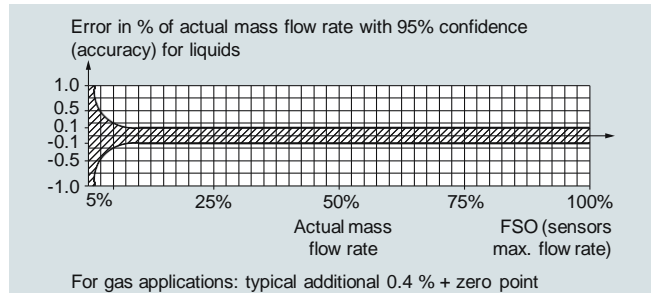
E = Error [%]

Z = Zero point error [kg/h]¹⁾

qm = Mass flow [kg/h]

Cal. = Calibrated flow accuracy: 0.10, 0.15 or 0.20

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 | 25 °C (77 °F) ± 5 K |
| Temperature, ambient | 25 °C (77 °F) +10/-5 K |
| 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 Coriolis mass flowmeters

| 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") |
| Number of measuring pipes | 1 | 1 | 1 | 1 | 1 |
| Mass flow | | | | | |
| Linearity error ¹⁾ % of rate | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Repeatability error % of rate | 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 |
| Density | | | | | |
| Density error ²⁾ [g/cm ³] | 0.0025 ³⁾ | 0.001 | 0.0015 | 0.0015 | 0.0005 |
| Repeatability error [g/cm ³] | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0001 |
| Range [g/cm ³] | 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) |
| Brix | | | | | |
| Error [°Brix] | 0.3 | 0.2 | 0.3 | 0.3 | 0.1 |

¹⁾ For reference conditions: ISO 9104 and DIN/EN 29104. Increased error can be expected for gas mass flow measurement (For gas measurement typically additional +0.40 % error).

²⁾ Accuracy is only valid when sensor is density-calibrated.

³⁾ Hastelloy C22 version.

| Sensor type | FCS300 | | | | | |
|--|---------------------------------|----------------------------|-----------------------------|---------------------------|---------------------|---------------------|
| 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 ¹⁾ % of rate | Standard | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | Medium | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| Repeatability of flowrate at rates > 5 % of Q _{max} | % of rate | 0.05 | 0.05 | 0.05 | 0.05 | 0.1 |
| Max. zero point error | 0.1 % [kg/h (lb/min)] | 0.4 (0.0147) ²⁾ | 1.35 (0.0495) ²⁾ | 4.5 (0.165) ²⁾ | 20.0(0.735) | 41.6(1.628) |
| | 0.2 % [kg/h (lb/min)] | 0.6 (0.0235) | 2.16 (0.0792) | 7.2 (0.264) | 20.0(0.735) | 41.6(1.628) |
| Density | | | | | | |
| Density error (Standard) [g/cm ³] | | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 |
| | (Extended) [g/cm ³] | 0.002 ³⁾ | 0.002 ³⁾ | 0.002 ³⁾ | 0.002 ³⁾ | 0.002 ³⁾ |
| Range [kg/dm ³] | | 0.001 ... 5.0 | 0.001 ... 5.0 | 0.001 ... 5.0 | 0.001 ... 5.0 | 0.001 ... 5.0 |
| Repeatability error [kg/m ³] | | ± 0.25 | ± 0.25 | ± 0.25 | ± 0.25 | ± 0.25 |
| Temperature | | | | | | |
| Error [°K] | | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |

¹⁾ For reference conditions: ISO 9104 and DIN/EN 29104. Increased error can be expected for gas mass flow measurement (For gas measurement typically additional +0.4 % error).

²⁾ In preparation: currently as for 0.2 % accuracy class.

³⁾ In preparation: 0.0005 g/cm³

Technical specifications PROFIBUS PA/DP for FCT030**General specifications**

PROFIBUS device profile Profile V 4.0 and compatible to V 3.x

Electrical specification DP**Physical layer specifications**

Applicable standard IEC 61158/EN 50170
Physical Layer (Transmission technology) RS 485
Transmission speed ≤ 12 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 mm², corresponds to AWG 22
Resistance < 110 Ω per km
Signal attenuation Max. 9 dB over total length of line section
Max. bus length 100 m at 12 Mbit/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 mm² (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 FCT030 |
| FISCO | Yes |
| Max. U_I | 17.5 V |
| Max. I_I | 380 mA |
| Max. P_I | 5.32 V |
| Max. L_I | 10 μ H |
| Max. C_I | 5 nF |
| Max. U_o | 1.3 V |
| Max. I_o | 50 μ A |

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 Class 1 Master.

Cyclic services:

| Input (Master view) | Parameter | FCT030 |
|-----------------------------|---|--------|
| | Mass flow | ✓ |
| | Volume flow | ✓ |
| | Media temperature | ✓ |
| | Frame temperature | ✓ |
| | Standard volume flow | ✓ |
| | Density | ✓ |
| | Fraction A ¹⁾ | ✓ |
| | Fraction B ¹⁾ | ✓ |
| | Pct Fraction A ¹⁾ | ✓ |
| | Pct Fraction B ¹⁾ | ✓ |
| | Totalizer 1 | ✓ |
| | Totalizer 2 | ✓ |
| | Totalizer 3 | ✓ |
| | Digital dosing control | ✓ |
| | Analog dosing control | ✓ |
| | Dosing status | ✓ |
| Output (Master view) | Control totalizer 1+2+3 | ✓ |
| | Control commands as Zero point adjustment | ✓ |

¹⁾ Requires a flowmeter ordered with fraction option.

Flow Measurement

SITRANS F C

System information SITRANS F C Coriolis mass flowmeters

Technical specifications PROFIBUS PA/DP for MASS 6000

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 μ H |
| Max. C_I | 5 nF |
| Max. U_o | 1.3 V |
| Max. I_o | 50 μ A |

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.

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, standard volumeflow, density, temperature and fraction.

The FCT030 IP67 transmitter can be remote connected or compact mounted with all sensors of type FCS300, sizes DN 15 to DN 150, MASS 2100 DI 1.5, DI 3, DI 6, DI 15 and FC300 DN 4.

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 FCT030 transmitters are suitable for applications within the entire process industry where there is a demand for accurate flow measurement. The meter is capable of measuring both liquid and gas flow.

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

- Chemical & Pharma: detergents, bulk chemicals, acids, alkalis, paint mixing systems, solvents and resins, pharmaceuticals, blood products, vaccines, insulin production
- Food & Beverage: dairy products, beer, wine, soft drinks, °Brix/°Plato, fruit juices and pulps, bottling, CO₂ dosing, CIP/SIP-liquids, mixture recipe control
- Automotive: fuel injection nozzle & pump testing, filling of AC units, engine consumption
- Oil & Gas: filling of gas bottles, furnace control, test separators
- Hydrocarbon processing: oil refining, derivatives manufacturing, polymerisation
- Water & WasteWater: 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
 - Alarm history log
 - Parameter change log
 - Logging of min and max process values
 - Data logging of process values and parameter (Version 4.0)

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
- FCT030 is in preparation to be certified for integrated safety in accordance with IEC 61508 and IEC 61511 as a compact FC330.
 - SIL 2 (single-channel operation) in preparation
 - SIL 3 (dual-channel operation) in preparation

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, standard volumeflow, density, temperature or fraction flow such as °Brix or °Plato

Flow Measurement

SITRANS F C

Transmitter SITRANS FCT030

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

Channel 1

Channel 1 is 4 to 20 mA analog output with HART 7.5, PROFIBUS PA, PROFIBUS DP and Modbus RS485 RTU. The current signal can be configured for massflow, volumeflow or density, standard volume flow, medium temperature, Fraction A and B and Fraction A% and B%.

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
- Digital 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)
- Digital one or two-valve dosing control
- Operational and alarm status

Relay

Relay output(s) can be user configured to:

- Digital 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 for non hazardous areas can be changed for active or passive operations by dip switch.

For hazardous areas Signal outputs and inputs can't be changed by dip switch, and has to be selected individually by ordering.

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

Approvals and certificates

The FCT030 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 sensor

- FCS300 DN 15, DN 25, DN 50, DN 80, DN 100 and DN 150,
- MASS 2100 DI1.5, DI 3, DI 6, DI 15 and
- FC300 DN 4.

FCT030 is available with current output HART 7.5, Modbus RS485 RTU, PROFIBUS DP or PROFIBUS PA as standard on Channel 1.

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, 4 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 memory 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.
- Storing of alarm history log
- Storing of parameter change log
- Storing of process peak values log

Datalogging on SensorFlash

The following functions are available:

- Logging of process values
- Logging of parameter settings
- Selectable logging interval

Function

The following functions are available:

- Mass flowrate, volume flowrate, density, process temperature, frame 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 forward, backward or forward and backward
- Low flow cut-off, adjustable
- Density cut-off or empty pipe cut-off, adjustable
- Flow direction adjustable
- Alarm system consisting of alarm-log, alarm pending menu
- Internal data logger is updated each 10 minutes with operational data such as system health, totalizer values, all configurations and data needed for custody transfer requirements to OIML R 117 and NTEP
- Display of operating time with real-time clock. Daylight saving time is not implemented
- Uni/bidirectional flow measurement
- Flowrate outputs are freely configurable between maximum negative and maximum positive flows according to the sensor capacity
- Limit switches programmable for flow, density, temperature or fraction process values. Limit points can be graded as warning and alarm for values both above and below nominal process conditions
- Process noise filter for optimization of measurement performance under non-ideal application conditions. 5-stage pumping filter compensates for flow fluctuations caused by e.g. single acting piston pumps
- Full dosing controller with 5 user-configurable recipes
- Automatic zero adjustment menu, with zero point evaluation display
- Full service menu for effective and straight forward application and meter troubleshooting
- Precise temperature measurement ensures optimum accuracy on massflow, density and fraction flow.
- Fraction flow computation is based on a 5th-order algorithm matching known applications.
- Audit trail information, stores parameters changes with time stamp information
- Simulation of process values, status information and alarms
- Aerated flow filtering system, for advanced filtering of fluids with gas or air bubbles
- Datalogging of process values and parameter changes on SensorFlash

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 Standard 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 μ s ... 5 s pulse duration |
| Frequency | 0 ... 12.5 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 input¹⁾ | |
| 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 x 20 characters to indicate flow rate, totalized values, settings and faults. Time constant as current output 1 Reverse flow indicated by negative sign |
| Zero point adjustment | Via keypad or remote via digital input |

| | |
|--|--|
| 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 Ch1 | HART 7.5 PROFIBUS PA PROFIBUS DP Modbus RS485 RTU |
| 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 \pm 10%; 100 ... 240 V AC \pm 10%, 47 ... 63 Hz |
| Fluctuation | No limit |
| Power consumption | 7.5 W/15 VA |
| EMC performance | |
| Emission | EN 55011/CISPR-11 (Class A) |
| Immunity | EN/IEC 61236-1 (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"> 1 x M25, 2 x M20 3 x 1/2" NPT |
| Digital cable connection | Standard industrial signal cable up to 75 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. |
| Analog cable connection (MASS 2100/FC300) | Standard industrial cable up to 15 m distance between sensor and transmitter. PVC insulated 5 x 2 x \varnothing 0.34 mm, twisted and screened in pairs, temperature range -20 ... +105 °C Siemens offers cables in a selection of pre-cut lengths and with two M20 connectors mounted. |

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

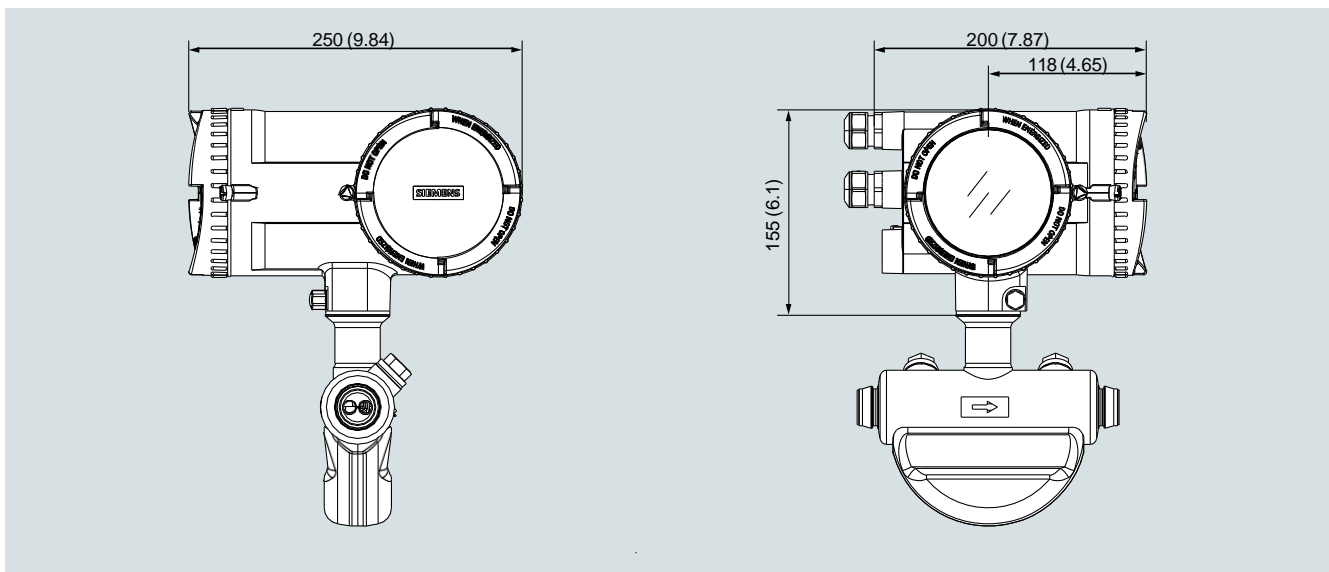
Approvals

| | |
|--|---|
| Hazardous area | <ul style="list-style-type: none"> • ATEX, IECEx, cCSAus (Class 1 Div 1), EAC Ex, cCSAus Zone 1, NEPSI, INMETRO (depending on version and configuration) - Zone 1: Ex d e ia [ia Ga] IIC T6Gb |
| Custody transfer (in preparation) | <ul style="list-style-type: none"> • OIML R 117 type approval to a wide variety of liquids other than water (in preparation) • NTEP for US and Canada (in preparation) |
| Pressure equipment | <ul style="list-style-type: none"> • PED • CRN (in preparation) |
| Hygienic applications (in preparation) | <ul style="list-style-type: none"> • EHEDG (in preparation) for hygienic variant sensors (DN 25 ... DN 80) • External cleanability satisfies EHEDG |

Certificates

| | |
|--|---|
| Safety Integration Level (in preparation) | <ul style="list-style-type: none"> • SIL 3 for software (in preparation) • SIL 2 for hardware (in preparation) • SIL 3 for redundant hardware systems (in preparation) |
| CE mark | <ul style="list-style-type: none"> • Pressure equipment • Low voltage directive • WEEE • RoHS |
| Regional certifications (depending on configuration) | <ul style="list-style-type: none"> • C-TICK (Australia and New Zealand EMC) • EAC (Belarus, Armenia, Kazakhstan, Russia) • KCC (South Korea) |

Dimensional drawings



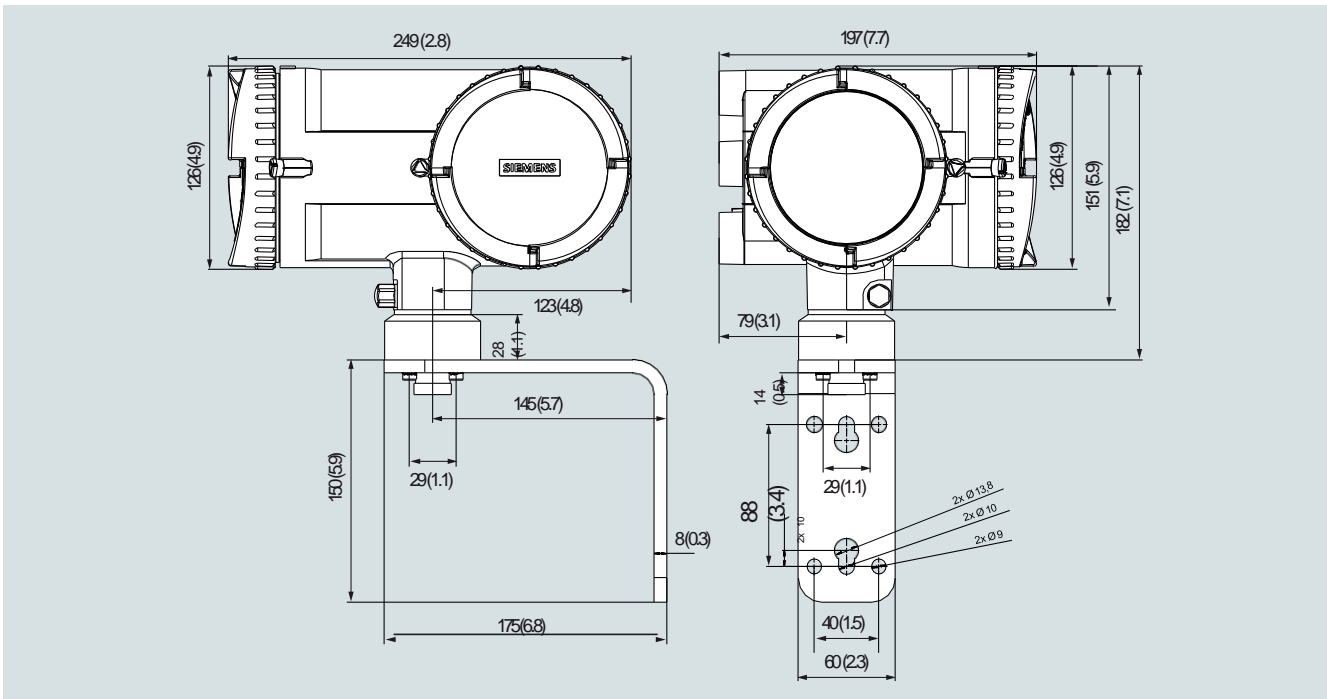
SITRANS FCT030, compact version, dimensions in mm (inch)

Flow Measurement

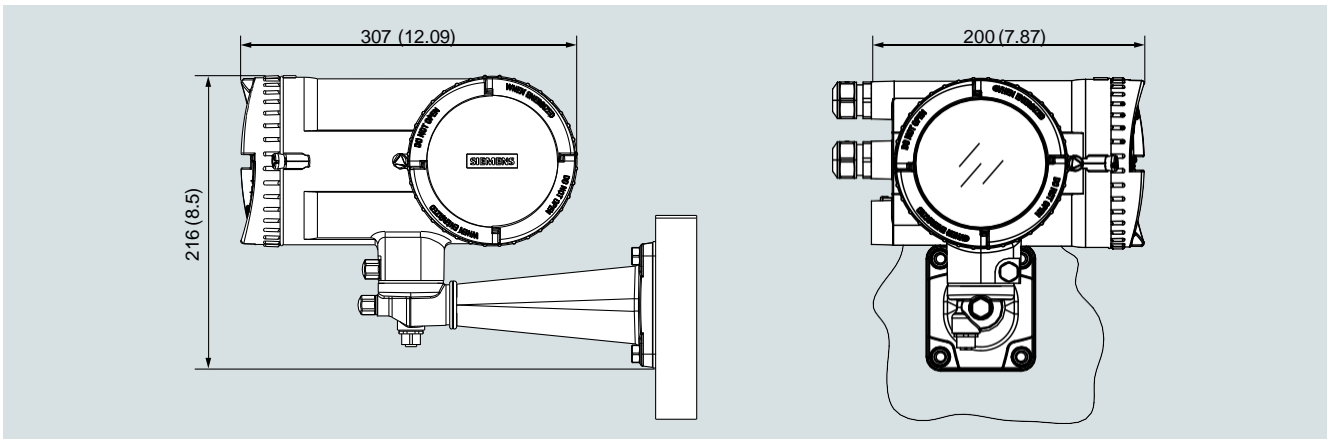
SITRANS F C

Transmitter SITRANS FCT030

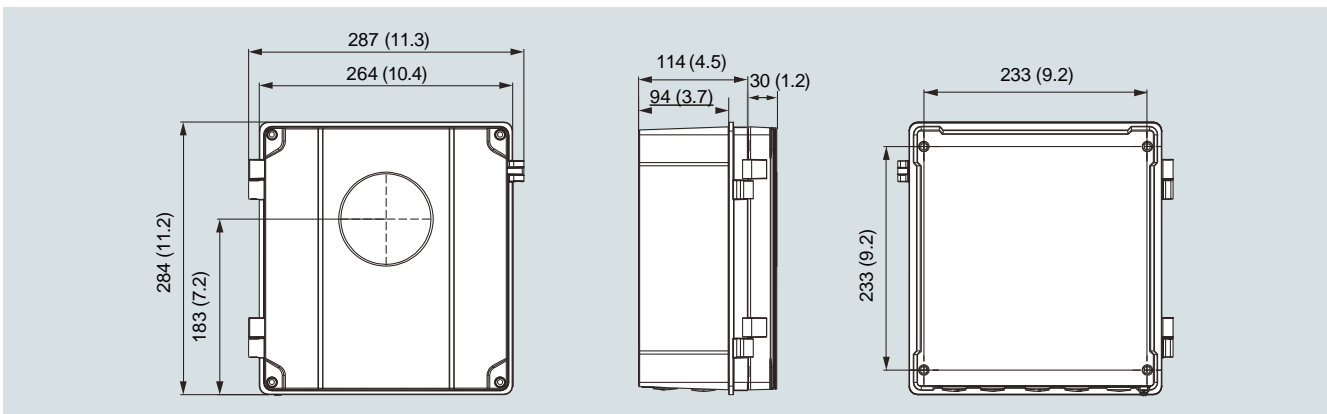
3



SITRANS FCT030, field mount version for low flow MASS2100/FC300 sensors with analog cable and M20 plug connection, dimensions in mm (inch)

















SITRANS FCT030, field mount version for sensors with digital cable and M12 plug connection, dimensions in mm (inch)



SITRANS FCT030, wall mount version, dimensions in mm (inch)

Accessories

| Description | Article No. | | Description | Article No. | |
|---|--|---|---|--|--|
| CT connector Tamper cover for CT locking. Fits over the M12 connector at both sensor and transmitter ends of the remote system cable (2 pcs.) | A5E31478498 |  | Standard cable (Ex) with M12 connectors, PO insulation and PUR sleeve, blue, -40 ... +80 °C (-40 ... +176 °F) | |  |
| Bag of glands (metric) in black plastic ¹⁾ | A5E03907414 |  | <ul style="list-style-type: none"> • 5 m • 10 m • 25 m • 50 m • 75 m • 150 m | A5E03914929 A5E03914962 A5E03914995 A5E03915004 A5E03915074 A5E03915088 | |
| Bag of glands, (metric) in gray plastic Ex e/i ¹⁾ | A5E03907424 |  | Standard cable (Ex) for termination, PO insulation and PUR sleeve, blue, -40 ... +80 °C (-40 ... +176 °F) | |  |
| Bag of glands (metric) in AISI 316 SS Ex e/i ¹⁾ | A5E03907429 |  | <ul style="list-style-type: none"> • 5 m • 10 m • 25 m • 50 m • 75 m • 150 m | A5E03914945 A5E03914973 A5E03914984 A5E03915015 A5E03915057 A5E03915100 | |
| Bag of glands (metric) in Ni-plated brass Ex e/i ¹⁾ | A5E03907430 |  | | | |
| Bag of glands (NPT) in black plastic ²⁾ | A5E03907435 |  | Analog signal cable For analog cable connection between MASS 2100/ FC300 sensor and FCT010/030 transmitters. 5 x 2 x Ø 0.34 mm screened and twisted in pairs. Blue PVC insulation and sleeve. With two M20 connectors, female/female. -20 ... 105 °C (-4 ... +221 °F), Ex | |  |
| Bag of glands (NPT) in gray plastic Ex e/i ²⁾ | A5E03907451 |  | <ul style="list-style-type: none"> • 1 m • 2 m • 5 m • 10 m • 15 m | A5E42815465 A5E42521862 A5E42522447 A5E42523233 A5E42523347 | |
| Bag of glands (NPT) in AISI 316 SS Ex e/i ²⁾ | A5E03907467 |  | | | |
| Bag of glands (NPT) in Ni-plated brass Ex e/i ²⁾ | A5E03907473 |  | | | |
| Standard cable (non-Ex) with M12 connectors, PO insulation and PUR sleeve, gray, -40 ... +80 °C (-40 ... +176 °F) | |  | | | |
| <ul style="list-style-type: none"> • 5 m (16.4 ft) • 10 m (32.8 ft) • 25 m (82 ft) • 50 m (164 ft) • 75 m (246 ft) • 150 m (492 ft) | A5E03914805 A5E03914850 A5E03914853 A5E03914859 A5E03914861 A5E03914874 | | | | |
| Standard cable (non-Ex) for termination, PO insulation and PUR sleeve, gray, -40 ... +80 °C (-40 ... +176 °F) | |  | | | |
| <ul style="list-style-type: none"> • 5 m (16.4 ft) • 10 m (32.8 ft) • 25 m (82 ft) • 50 m (164 ft) • 75 m (246 ft) • 150 m (492 ft) | A5E03914833 A5E03914849 A5E03914854 A5E03914856 A5E03914864 A5E03914873 | | | | |

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

Flow Measurement







SITRANS F C

Flowmeter - Accessories/Spare parts


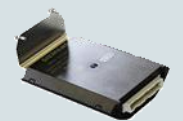





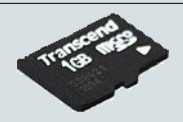
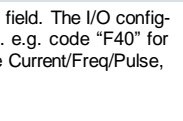
Spare parts - sensor FCS400/FCS300

| Description | Article No. | |
|---|--------------------|---|
| Blind lid in painted aluminum with silicone o-ring seal | A5E03549295 |  |
| Sensor housing | | |
| • metric | A5E03549313 |  |
| • NPT | A5E03906080 | |
| Bag of loose parts for sensor; including cable strain relief components, washer, seals, silicone o-rings, and assorted screws | A5E03549324 |  |
| M12 option for sensor housing in stainless steel. Pre-wired and potted to replace M12 socket in DSL housing | A5E03906095 |  |

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




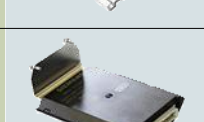

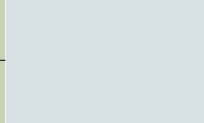


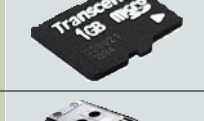
| Description | Article No. | |
|---|--------------------|---|
| Display lid in painted aluminum with Ex glass plate and silicone o-ring seal Ex and Non-Ex | A5E03549344 |  |
| Blind lid in painted aluminum with silicone o-ring seal | A5E03549429 |  |
| Bag of loose spare parts; including cable strain relief components, mounting tool, seals and gasket, assorted screws and washers, hex cap nut, blind connectors, and silicone o-rings | A5E03549396 |  |
| Mounting bracket - FCT030 field mount; in painted aluminum for pipe or wall mounting of transmitter FCT030 remote version. Including lock ring, pressure pads and seal cap | A5E03906091 |  |
| M12 option - remote - in painted aluminum. Pre-wired and potted replacement M12 connection for FCT030 field mount transmitter remote version | A5E03906104 |  |
| Remote terminal house painted aluminum for sensor cable termination at FCT030 transmitter remote version. Pre-wired and potted | |  |
| • M20 | A5E03906112 | |
| • NPT | A5E03906130 | |

Spare parts - Transmitter FCT030 (FW 3.1)

| Description | Article No. | |
|--|-------------|---|
| Display and keypad assembly for field mount enclosure, with Siemens logo. For HW 2 and FW 3.1 version | A5E03548971 |  |
| Sensor cassette (Compact) (HW version 2, FW 3.1.X) | A5E03549142 |  |
| Sensor cassette (Remote) (HW version 2, FW 3.1.X) | A5E03549098 |  |
| Frontend cassette Spare part frontend cassette for remote version of FC430 and cassette for FC410 For firmware V 2.x | A5E03549191 |  |
| Power supply for field mount enclosure 100 ... 240 V AC, 47 ... 63 Hz 24 ... 90 V DC (HW version 2 and FW 3.1.x) | A5E03549413 |  |
| Transmitter cassette (active) 4 ... 20 mA output and HART 7.2 (HW version 2 and FW 3.1.x) | A5E03549357 |  |
| Transmitter cassette (passive), 4 ... 20 mA output and HART 7.2 (HW version 2 and FW 3.1.x) | A5E03549383 |  |
| I/O assembly Advise Order code F40 to F97 Selection and Ordering data ¹⁾ | A5E03939114 |  |
| SensorFlash (micro SD card 1G) | A5E03915258 |  |

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






Spare parts FCT030 - Fieldmount enclosure (FW 4.0)

| Description | Article No. | |
|---|---|---|
| Display and keypad assembly • From firmware 4.0, with Siemens logo | A5E37705139 |  |
| • From firmware 4.0, neutral version - no company logo | A5E39844362 |  |
| Power supply for field mount enclosure FCT030 V 4.0 Fieldmount 100 ... 240 V AC, 47 ... 63 Hz 19.2 ... 28.8 V DC | A5E38264471 |  |
| Sensor cassette (compact) for systems without DSL and for systems with analog sensor connection, HW version 3, FW version 4.0 | A5E41526318 |  |
| Sensor cassette (remote) Ex barrier module digital sensor connection (HW version 3, FW version 4.0) | A5E03549098 |  |
| Sensor cassette (remote) for systems with DSL, HW version 3, FW version 4.0 | A5E03549098 |  |
| Frontend cassette Spare part frontend DSL for remote version. For firmware V 4.0 | A5E41526286 |  |
| SensorFlash (micro SD card 4G) | A5E38288507 |  |
| Transmitter cassette for firmware 4.0 • Ch1 E02: I/O and comm (active/passive) 4 ... 20 mA output and HART 7.5, Non-Ex • Ch1 E06: I/O and comm (active) 4 ... 20 mA output and HART 7.5, Ex • Ch1 E07: I/O and comm (passive) 4 ... 20 mA output and HART 7.5, Ex • Ch1 E10: Communication PROFIBUS PA, Non-Ex & Ex • Ch1 E11: Communication PROFIBUS DP, Non-Ex • Ch1: Communication Modbus RTU 485, Ex • Ch1: Communication Modbus RTU 485, Non-Ex | A5E38013040 A5E38012278 A5E38013025 A5E41216315 A5E41216042 A5E38013054 A5E38013069 |  |




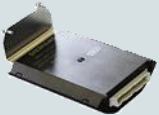




Flow Measurement


SITRANS F C

Flowmeter - Accessories/Spare parts

| Description | Article No. | | Description | Article No. | |
|---|--------------------|---|---|--------------------|---|
| IO Cassette for firmware4.0 | |  | Adapter cable for FCS400 sensor with new transmitter DSL/FCT010/FCT030 Version 4.0 | TBD | |
| • Ch2: Current/Frequ./Pulse, Ch3: None, Ch4: None F01, Non-Ex | A5E38006256 | | Remote adapter for wall bracket M20 cable connection | |  |
| • Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: None, F02, Non-Ex | A5E38006558 | | • Ex | A5E42404417 | |
| • Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: Current/Frequ./Pulse F03, Non-Ex | A5E38006598 | | • Non-Ex | A5E42846478 | |
| • Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: Relay, F04, Non-Ex | A5E38006896 | | Wall bracket for FCT030 for M20 analog cable connector | A5E42404426 |  |
| • Ch2: Current/Frequ./Pulse, Ch3: Relay, Ch4: Relay, F05, Non-Ex | A5E38000690 | | Wall bracket for FCT010 for M20 analog cable connector | A5E42404447 |  |
| • Ch2: Current/Frequ./Pulse, Ch3: Relay, Ch4: None, F06, Non-Ex | A5E38011432 | | Compact adapter for DSL/FCT030 For upgrade from MASS 2100 DI3, DI6, DI15 with MASS 6000 compact to DSL/FCT030 | |  |
| • Ch2: Current/Frequ./Pulse, Ch3: None, Ch4: None, F11, Ex-passive | A5E38011478 | | • Ex | A5E42846758 | |
| • Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: None, F12, Ex-passive | A5E38011509 | | • Non-Ex | A5E42846760 | |
| • Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: Current/Frequ./Pulse, F13, Ex-passive | A5E38011541 | | Compact adapter for DSL/FCT030 FCS300 and FCS400 (DN 100 and DN 150 sensor) adapter for compact mount DSL, FCT010 or FCT030 Ex and Non-Ex | TBD | |
| • Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: Relay, F14, Ex-passive | A5E38011600 | | | | |
| • Ch2: Current/Frequ./Pulse, Ch3: Relay, Ch4: Relay, F15, Ex-passive | A5E38011618 | | | | |
| • Ch2: Current/Frequ./Pulse, Ch3: Relay, Ch4: None, F16, Ex-passive | A5E38011908 | | | | |
| • Ch2: Current/Frequ./Pulse, Ch3: None, Ch4: None, F21, Ex-active | A5E38012039 | | | | |
| • Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: None, F22, Ex-active | A5E38012056 | | | | |
| • Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: Current/Frequ./Pulse, F23, Ex-active | A5E38012121 | | | | |
| • Ch2: Current/Frequ./Pulse, Ch3: Relay, Ch4: Relay, F24, Ex-active | A5E38019235 | | | | |
| • Ch2: Current/Frequ./Pulse, Ch3: Current/Frequ./Pulse, Ch4: Relay, F25, Ex-active | A5E38019263 | | | | |
| • Ch2: Current/Frequ./Pulse, Ch3: Relay, Ch4: None, F26, Ex-active | A5E38019378 | | | | |

Spare parts - FCT030 Wall mount enclosure

| Description | Article No. | |
|---|-------------|---|
| Display and keypad assembly | | |
| • For wall mount enclosure, Siemens logo | A5E37697615 |  |
| • For wall mount enclosure, neutral version | A5E39844261 |  |
| Power supply for wall mount 100 ... 240 V AC, 47 ... 63 Hz 19.2 ... 28.8 V DC | A5E38263021 |  |
| Sensor cassette for FCT030 wall mounting enclosure | TBD |  |
| Foam insert set for wall mount with connectors | A5E38287828 |  |
| Wall mount enclosure front blind, Siemens version | A5E38287882 |  |
| Wall mount enclosure front blind, Neutral version - no company logo | A5E38287965 |  |
| Wall mount enclosure front with glass | A5E38288007 |  |
| Wall mount enclosure bracket for pipe mounting | A5E38288020 | |
| Wall bracketpanel mounting | A5E38288032 | |
| Bag of loose spare parts for wall mount including cable strain relief components, mounting tool, seals and gasket, assorted screws and washers, hex cap nut, blind connectors and O-rings | A5E38288072 | |
| Metal kit PSU cover back pane for wall mount enclosure | A5E38415145 | |

| Description | Article No. | |
|--|-------------|---|
| Power input cover plate for wall mount enclosure | A5E38415205 |  |

Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS300

Overview



The flow measuring principle is based on the Coriolis Effect. The FCS300 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 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 FCS300 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 ordered with hazardous certification to Zone 1 (ATEX, IECEx, cCSAus, EAC Ex, NEPSI, INMETRO).

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

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 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.
- 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 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.

Be aware of maximum sensor length cable depending on product selection, currently 75 m. 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 connectors 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 FCS300 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.

Calibration

To ensure accurate measurement all flowmeters must be initially calibrated. The calibration of each SITRANS FCS300 Coriolis sensor is conducted at an accredited according to ISO/IEC 17025 flow calibration facility. A calibration certificate for every sensor is stored on the SensorFlash SD card. The accreditation body 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 FCS300

Technical specifications

| Flow sensor FCS300 | | |
|-----------------------------|---|---|
| Parameter | Unit | Value |
| Process pressure range | [barg (psi)] | The maximum permissible operating pressure is determined by the respective process connection and the temperature of the medium. 316L: 0 ... 100 (0 ... 1450) Nickel-alloy C4 (2.4610) ³⁾ : 0 ... 100 (0 ... 1450) |
| Process temperature range | [°C (°F)] | The maximum permissible process temperature is determined by the respective process connection -50 ... +205 (-58 ... +400) |
| Ambient temperature range | [°C (°F)] | -40 ... +70 (-40 ... +158) |
| 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 Form | 1 (suitable for dangerous fluids) 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 • Standard volume flow (with reference density) • Fraction A:B • Fraction % A:B |

| Performance specifications | | Sensor | | | | | |
|---|---|----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| Parameter | Unit | DN 15 | DN 25 | DN 50 | DN 80 | DN 100 | DN 150 |
| Max. zero point error | 0.2 % | 0.6 (0.0235) | 2.16 (0.0792) | 7.2 (0.264) | 20 (0.735) | 41.6 (1.628) | 68.8 (2.528) |
| | [kg/h (lb/min)] | | | | | | |
| | 0.1 % | 0.4 (0.0147) ⁴⁾ | 1.35 (0.0025) ⁴⁾ | 4.5 (0.165) ⁴⁾ | 20 (0.735) | 41.6 (1.628) | 68.8 (2.528) |
| | [kg/h (lb/min)] | | | | | | |
| Qmin (1 % error) | [kg/h (lb/min)] | 70 (2.57) | 240 (8.92) | 800 (29.4) | 2 000 (73.5) | 4 000 (146.9) | 6 900 (253.5) |
| Qnom (1 bar pressure) | [kg/h (lb/min)] | 4 500 (163.3) | 20 500 (753.2) | 49 000 (1 800) | 122 000 (4 483) | 273 000 (10 031) | 459 200 (16 873) |
| Qmax ²⁾ | [kg/h (lb/min)] | 8 000 (293.9.2) | 35 000 (1 286) | 90 000 (3 307) | 250 000 (9 186) | 520 000 (19 107) | 860 000 (31 600) |
| Linearity error mass flow | | | | | | | |
| • for liquids ¹⁾ | [%] standard | ± 0.1 | ± 0.1 | ± 0.1 | ± 0.1 | ± 0.1 | ± 0.1 |
| | [%] medium | ± 0.2 | ± 0.2 | ± 0.2 | ± 0.2 | ± 0.2 | ± 0.2 |
| • for gases (additional) | [%] | ± 0.40 | ± 0.40 | ± 0.40 | ± 0.40 | ± 0.40 | ± 0.40 |
| Repeatability mass flow | [%] | ± 0.05 | ± 0.05 | ± 0.05 | ± 0.05 | ± 0.05 | ± 0.05 |
| Density accuracy with standard 0.2% calibration | [kg/m ³ (lb/ft ³)] | ± 10 (±0.62) | ± 10 (±0.62) | ± 10 (±0.62) | ± 10 (±0.62) | ± 10 (±0.62) | ± 10 (±0.62) |
| Density accuracy with extended 0.1% calibration | [kg/m ³ (lb/ft ³)] | ± 2 (±0.124) ⁵⁾ | ± 2 (±0.124) ⁵⁾ | ± 2 (±0.124) ⁵⁾ | ± 2 (±0.124) ⁵⁾ | ± 2 (±0.124) ⁵⁾ | ± 2 (±0.124) ⁵⁾ |
| Temperature error | [°K] | ± 0.5 | ± 0.5 | ± 0.5 | ± 0.5 | ± 0.5 | ± 0.5 |

¹⁾ For reference conditions: ISO 9104 and DIN/EN 29104. Increased error can be expected for gas mass flow measurement (For gas measurement typically + 0.40 % error).

²⁾ For gas applications the max. flowrate is calculated at Mach-Number = 0.3.

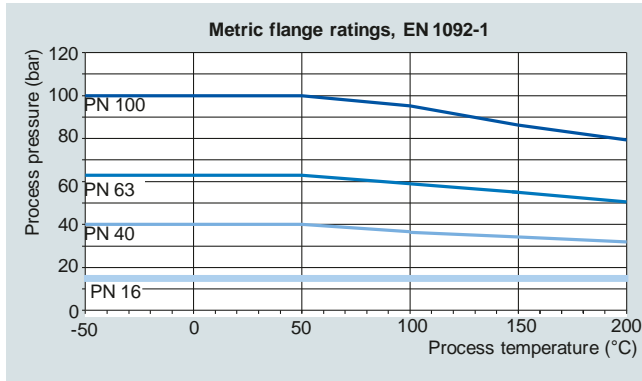
³⁾ Hastelloy C is a registered trademark of Haynes International. C4 nickel alloys are equivalent to Hastelloy C4 .

⁴⁾ In preparation: currently as for 0.2 % accuracy class.

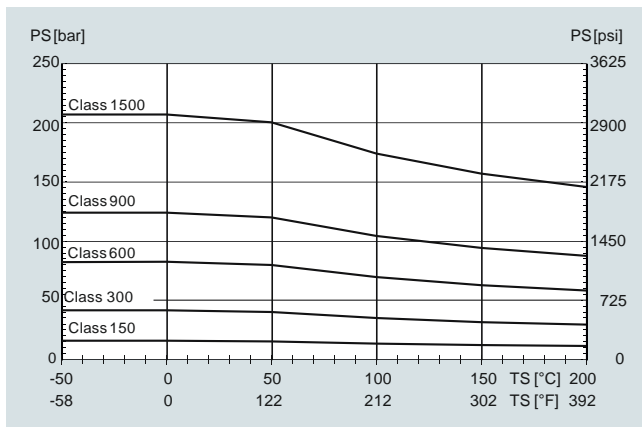
⁵⁾ In preparation: 0.5 kg/m³.

Pressure/temperature curves

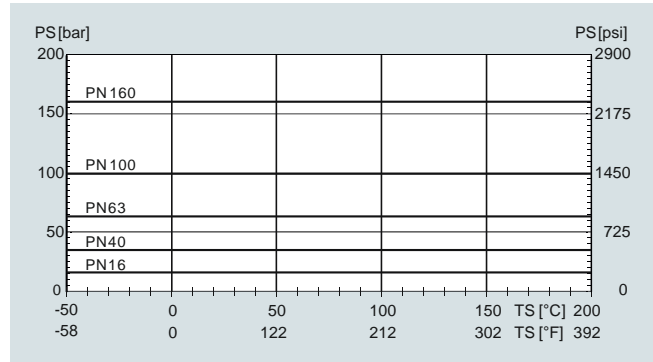
With two major exceptions, the pressure rating of the flow sensors is independent of the process medium temperature. Design rules for flange connections in both the EN1092-1 and ASME B16.5 standards dictate pressure derating with increasing temperature. The charts below show the effect of process medium temperature on the pressure ratings for the flanges within the FCS300 product program.



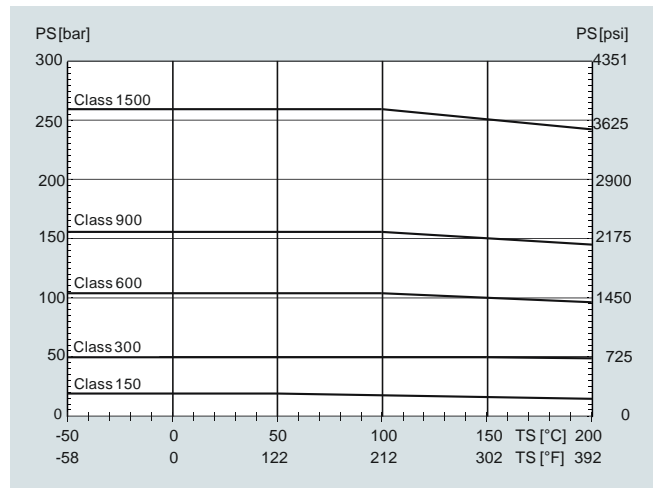
EN1092-1 flanged sensors in AISI 316L



Stainless steel ASME flange 1.4571/1.4404 (AISI 316Ti/316L) up to DN200 (8")



Nickel alloy DIN flange C4 (2.4610) or nickel alloy C22 (2.4602) up to DN200 (8")



Nickel alloy ASME flange C4 (2.4610) or nickel alloy C22 (2.4602) up to DN200 (8")

Sanitary connection

| Design | Nominal diameter | PS _{max} | | TS _{max} | | TS _{min} | |
|---------------------------|------------------------------|-------------------|-------|-------------------|------|-------------------|------|
| | | [bar] | [psi] | [°C] | [°F] | [°C] | [°F] |
| Pipe fitting DIN 11851 | DN 15 ... 40 (½ ... 1½") | 40 | 580 | 140 | 284 | -40 | -40 |
| | DN 50 ... 100 (2 ... 4") | 25 | 363 | 140 | 284 | -40 | -40 |
| Pipe fitting SMS 1145 | DN 25 ... 80 (1 ... 3") | 6 | 87 | 140 | 284 | -40 | -40 |
| Clamp DIN 32676 | DN 15 ... 50 (½ ... 2") | 16 | 232 | 120 | 248 | -40 | -40 |
| | DN 65 ... 100 (2½ ... 4") | 10 | 145 | 120 | 248 | -40 | -40 |

Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS300

Sensor variants

SITRANS FCS300 sensors are available in a wide range of process connections. The available combinations of type, sensor size and connection size are shown in the tables below.

Standard variants

| Sensor | Connection | EN 1092-1 B1, PN 16 | EN 1092-1 B1, PN 40 | EN 1092-1 B2, PN 63 | EN 1092-1 B2, PN 100 | EN 1092-1 D, PN 40 | ANSI B16.5-2009, class 150 | ANSI B16.5-2009, class 300 | ANSI B16.5-2009, class 600 | ANSI B16.5-2009, class 900 | ANSI B16.5-2009, class 1500 | ISO 228-1 G female pipe thread | ASME B1.20.1 NPT female pipe thread | DIN 11851 hygienic screwed | DIN 32676 (ISO) clamp serie A | SMS 1145 hygienic screwed | JIS B2220:2004/10K | JIS B2220:2004/20K | EN 1092-1 PN 16, NAMUR length | EN 1092-1 PN 40, NAMUR length |
|------------------------------|-------------|---------------------|---------------------|---------------------|----------------------|--------------------|----------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|--------------------------------|-------------------------------------|----------------------------|-------------------------------|---------------------------|--------------------|--------------------|-------------------------------|-------------------------------|
| Standard: 7ME463.-... | | | | | | | | | | | | | | | | | | | | |
| DN 15 (½") | DN 10 (¾") | | • | | | | | | | | | | • | | • | | | | | |
| | DN 15 (½") | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| | DN 20 (¾") | | • | | | | • | • | | | | | • | | • | • | | | | • |
| DN 25 (1") | DN 20 (¾") | | • | | | | • | | | | | | | • | • | | | | | |
| | DN 25 (1") | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| | DN 40 (1½") | | • | • | • | | • | • | • | • | • | | | • | • | • | • | • | • | • |
| DN 50 (2") | DN 40 (1½") | | • | • | • | | • | • | • | • | • | | | • | • | • | • | • | • | |
| | DN 50 (2") | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| | DN 65 (2½") | | • | • | | | • | • | • | • | • | | | • | • | • | • | • | • | • |
| DN 80 (3") | DN 65 (2½") | | • | • | • | | • | • | • | • | • | • | • | • | • | • | • | • | • | |
| | DN 80 (3") | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| | DN 100 (4") | • | • | • | • | | • | • | • | • | • | | | • | • | • | • | • | • | • |
| DN 100 (4") | DN 80 (3") | • | • | • | • | | • | • | • | • | • | • | • | | | | | | | |
| | DN 100 (4") | • | • | • | • | | • | • | • | • | • | • | • | | | | | | • | |
| | DN 150 (6") | • | • | • | • | | • | • | • | • | • | | | | | | | | | |
| DN 150 (6") | DN 100 (4") | • | • | • | • | | • | • | • | • | • | • | • | | | | | | • | |
| | DN 150 (6") | • | • | • | • | | • | • | • | • | • | • | • | | | | | | • | |
| | DN 200 (8") | • | • | • | • | | • | • | • | • | • | • | • | | | | | | • | |

¹⁾ Apply class 600 p and t ratings for class 900 and class 1500 flanges.

Hygienic sensor variants

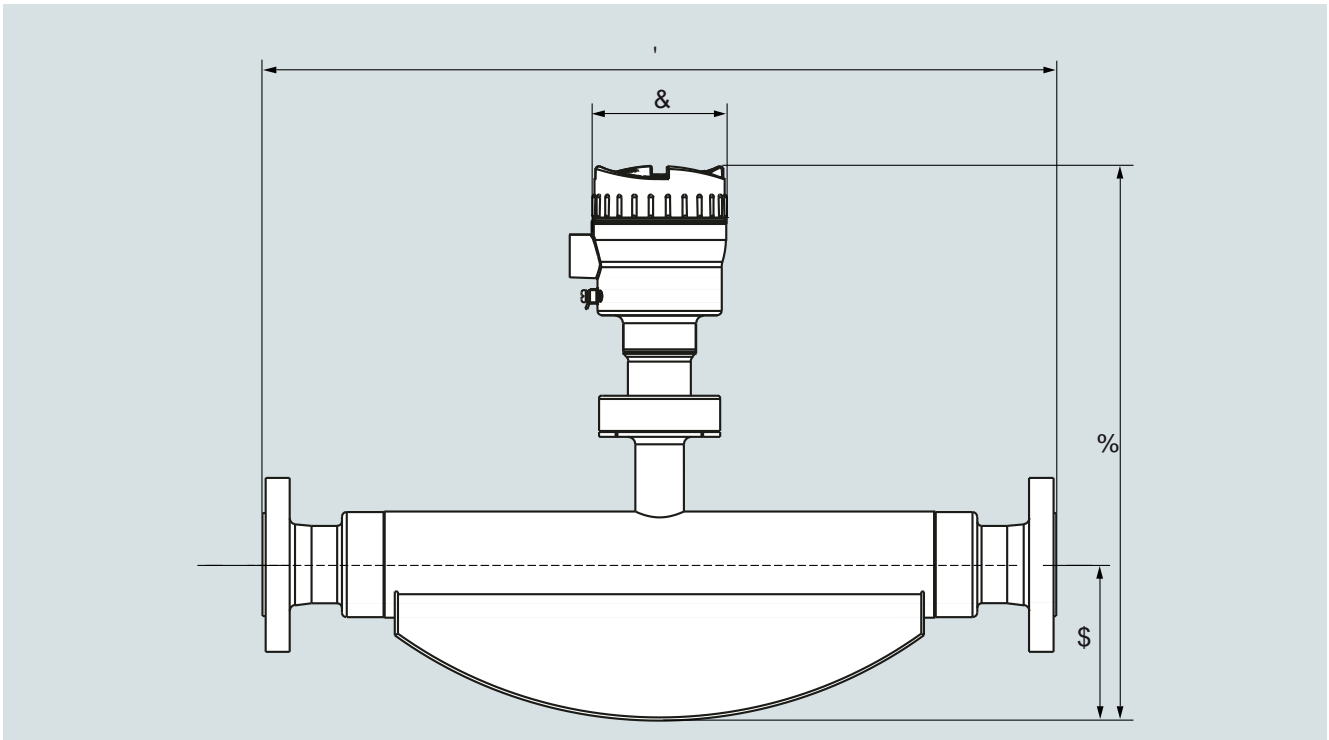
The hygienic sensors will have to be ordered with stainless steel tubes 316L/1.4435/1.4404 (polished). Hygienic sensors are offered with process connection conforming to various international quick-connect clamps or threaded connectors. Pressure ratings are according to the relevant standard and the sensor size.

NAMUR sensor variants

The NAMUR variants have built-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 DN 100 and DN 150 flanges to PN 16.

Dimensional drawings

Sensor dimensions



| Sensor [DN] | [inch] | A | | B | | C | | Weight | |
|----------------|--------|------|--------|------|--------|------|--------|--------|------|
| | | [mm] | [inch] | [mm] | [inch] | [mm] | [inch] | [kg] | [lb] |
| 15 | ½ | 80 | 3.15 | 358 | 14.09 | 90 | 3.54 | 4.6 | 10.1 |
| 25 | 1 | 103 | 4.06 | 398 | 15.67 | 90 | 3.54 | 7.9 | 17.4 |
| 50 | 2 | 126 | 4.96 | 435 | 17.13 | 90 | 3.54 | 25.7 | 56.7 |
| 80 | 3 | 181 | 7.13 | 525 | 20.67 | 90 | 3.54 | 66.5 | 147 |
| 100 | 4 | 262 | 10.31 | 622 | 24.49 | 90 | 3.54 | 128 | 282 |
| 150 | 6 | 317 | 12.48 | 714 | 28.11 | 90 | 3.54 | 207 | 456 |

SITRANS FCS300, dimensions in mm (inch), weights in kg (lb), for a EN 1092 PN 40 flanged version.

The built-in length D depends on the flange.

Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS300

Overall length

The overall length (built-in length (D)) 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.

Sensor in AISI 316L: 7ME463.-...

| Sensor AISI 316L Connection | DN 15 (½") | | | DN 25 (1") | | | DN 50 (2") | | |
|-------------------------------------|-----------------|---------------|---------------|---------------|---------------|----------------|----------------|---------------|----------------|
| | DN 10 (3/8") | DN 15 (½") | DN 20 (¾") | DN 20 (¾") | DN 25 (1") | DN 40 (1½") | DN 40 (1½") | DN 50 (2") | DN 65 (2½") |
| EN 1092-1 B1, PN 16 | | | | | | | | | |
| EN 1092-1 B1, PN 40 | 385 | 385 | 421 | 576 | 525 | 576 | 763 | 715 | 763 |
| EN 1092-1 B2, PN 63 | | 403 | | | 564 | 572 | 745 | 745 | |
| EN 1092-1 B2, PN 100 | | 403 | | | 564 | 576 | 745 | 745 | |
| EN 1092-1 D, PN 40 | | 385 | | | 525 | | | 715 | |
| ASME B16.5, class 150 | | 435 | 421 | 575 | 575 | 576 | 763 | 715 | 756 |
| ASME B16.5, class 300 | | 421 | | | 576 | 576 | 756 | 763 | |
| ASME B16.5, class 600 | | 421 | | | 576 | | 756 | 773 | |
| ASME B16.5, class 900 | | 421 | | | 576 | | 780 | 790 | 800 |
| ASME B16.5, class 1500 | | 421 | | | | | 780 | 790 | 800 |
| ISO 228-1 G female pipe thread | | 450 | | | | | | | |
| ASME B1.20.1 NPT female pipe thread | | 450 | | | | | | | |
| DIN 11851 Hygienic screwed | 413 | 413 | 413 | 590 | 590 | 590 | 763 | 740 | 740 |
| DIN 32676 (ISO) Hygienic clamp | 413 | 413 | 413 | 590 | 590 | 590 | 763 | 740 | 740 |
| SMS 1145 Hygienic screwed | | | | | 590 | 590 | 763 | 740 | 740 |
| JIS B2220/10K | 385 | 385 | 421 | 576 | 525 | 576 | 763 | 715 | 763 |
| JIS B2220/20K | 385 | 385 | 421 | 576 | 525 | 576 | 763 | 715 | 763 |
| EN 1092-1 PN 16, NAMUR length | | | | | | | | | |
| EN 1092-1 PN 40, NAMUR length | | 510 | | | 600 | | | 715 | |

| Sensor Connection | DN 80 (3") | | | DN 100 (4") | | | DN 150 (6") | | |
|-------------------------------------|----------------|---------------|----------------|---------------|----------------|----------------|----------------|----------------|----------------|
| | DN 65 (2½") | DN 80 (3") | DN 100 (4") | DN 80 (3") | DN 100 (4") | DN 150 (6") | DN 100 (4") | DN 150 (6") | DN 200 (8") |
| EN 1092-1 B1, PN 16 | | 870 | 875 | 1222 | 1122 | 1260 | 1569 | 1421 | |
| EN 1092-1 B1, PN 40 | 910 | 870 | 875 | 1222 | 1144 | 1260 | 1599 | 1461 | 1650 |
| EN 1092-1 B2, PN 63 | 910 | 910 | 1060 | 1234 | 1304 | | | | |
| EN 1092-1 B2, PN 100 | 910 | 910 | 1080 | 1234 | 1334 | | | | |
| EN 1092-1 D, PN 40 | | 870 | | | | | | | |
| ASME B16.5, class 150 | | 880 | 880 | 1244 | 1144 | 1330 | 1630 | 1485 | 1650 |
| ASME B16.5, class 300 | 920 | 895 | 1075 | | 1324 | | | 1505 | 1670 |
| ASME B16.5, class 600 | 920 | 920 | 1100 | 1244 | 1354 | | 1675 | 1555 | |
| ASME B16.5, class 900 | 965 | 1100 | 1130 | 1470 | 1380 | | 1705 | 1605 | |
| ASME B16.5, class 1500 | 965 | 1300 | 1150 | 1500 | 1400 | | 1725 | 1665 | |
| ISO 228-1 G female pipe thread | | | | | | | | | |
| ASME B1.20.1 NPT female pipe thread | | | | | | | | | |
| DIN 11851 Hygienic screwed | 990 | 940 | 940 | | | | | | |
| DIN 32676 (ISO) Hygienic clamp | 950 | 910 | 910 | | | | | | |
| SMS 1145 Hygienic screwed | 990 | 940 | | | | | | | |
| JIS B2220/10K | 910 | 870 | | 1275 | 1150 | 1300 | | | |
| JIS B2220/20K | 910 | 870 | | 1275 | 1150 | 1300 | | | |
| EN 1092-1 PN 16, NAMUR length | | | | | 1400 | | | 1700 | |
| EN 1092-1 PN 40, NAMUR length | | 915 | | | | | | | |

SITRANS FCS300, overall length (D), dimensions in mm

| Sensor Connection | DN 15 (½") | | | DN 25 (1") | | | DN 50 (2") | | |
|-------------------------------------|-----------------|---------------|---------------|---------------|---------------|----------------|----------------|---------------|----------------|
| | DN 10 (3/8") | DN 15 (½") | DN 20 (¾") | DN 20 (¾") | DN 25 (1") | DN 40 (1½") | DN 40 (1½") | DN 50 (2") | DN 65 (2½") |
| EN 1092-1 B1, PN 16 | | | | | | | | | |
| EN 1092-1 B1, PN 40 | 15.16 | 15.16 | 16.57 | 22.68 | 20.67 | 22.68 | 30.04 | 28.15 | 30.04 |
| EN 1092-1 B2, PN 63 | | 15.87 | | | 22.20 | 22.52 | 29.33 | 29.33 | |
| EN 1092-1 B2, PN 100 | | 15.87 | | | 22.20 | 22.68 | 29.33 | 29.33 | |
| EN1092-1 D, PN 40 | | 15.16 | | | 20.67 | | | 28.15 | |
| ASME B16.5, class 150 | | 17.13 | 16.57 | 22.64 | 22.64 | 22.68 | 30.04 | 28.15 | 29.76 |
| ASME B16.5, class 300 | | 16.57 | | | 22.68 | 22.68 | 29.76 | 30.04 | |
| ASME B16.5, class 600 | | 16.57 | | | 22.68 | 22.68 | 29.76 | 30.43 | |
| ASME B16.5, class 900 | | 16.57 | | | 22.68 | | 30.71 | 31.10 | 31.50 |
| ASME B16.5, class 1500 | | 16.57 | | | 22.68 | | 30.71 | 31.10 | 31.50 |
| ISO 228-1 G female pipe thread | | 17.72 | | | | | | | |
| ASME B1.20.1 NPT female pipe thread | | 17.72 | | | | | | | |
| DIN 11851 Hygienic screwed | 16.26 | 16.26 | 16.26 | 23.23 | 23.23 | 23.23 | 30.04 | 29.13 | 29.13 |
| DIN 32676 (ISO) Hygienic clamp | 16.26 | 16.26 | 16.26 | 23.23 | 23.23 | 23.23 | 30.04 | 29.13 | 29.13 |
| SMS 1145 Hygienic screwed | | | | | 23.23 | 23.23 | 30.04 | 29.13 | 29.13 |
| JIS B2220/10K | 15.16 | 15.16 | 16.57 | 22.68 | 20.67 | 22.68 | 30.04 | 28.15 | 30.04 |
| JIS B2220/20K | 15.16 | 15.16 | 16.57 | 22.68 | 20.67 | 22.68 | 30.04 | 28.15 | 30.04 |
| EN 1092-1 PN 16, NAMUR length | | | | | | | | | |
| EN 1092-1 PN 40, NAMUR length | | 20.08 | | | 23.62 | | | 28.15 | |

| Sensor Connection | DN 80 (3") | | | DN 100 (4") | | | DN 150 (6") | | |
|-------------------------------------|----------------|---------------|----------------|---------------|----------------|----------------|----------------|----------------|----------------|
| | DN 65 (2½") | DN 80 (3") | DN 100 (4") | DN 80 (3") | DN 100 (4") | DN 150 (6") | DN 100 (4") | DN 150 (6") | DN 200 (8") |
| EN 1092-1 B1, PN 16 | | 34.25 | 34.45 | 48.11 | 44.17 | 49.61 | 61.77 | 55.94 | |
| EN 1092-1 B1, PN 40 | 35.83 | 34.25 | 34.45 | 48.11 | 45.04 | 49.61 | 62.95 | 57.52 | 64.96 |
| EN 1092-1 B2, PN 63 | 35.83 | 35.83 | 41.73 | 48.58 | 51.34 | | | | |
| EN 1092-1 B2, PN 100 | 35.83 | 35.83 | 42.52 | 48.58 | 52.52 | | | | |
| EN1092-1 D, PN 40 | | 34.25 | | | | | | | |
| ASME B16.5, class 150 | | 34.65 | 34.65 | 48.98 | 45.04 | 52.36 | 64.17 | 58.46 | 64.96 |
| ASME B16.5, class 300 | 36.22 | 35.24 | 42.32 | | 52.13 | | | 59.25 | 65.75 |
| ASME B16.5, class 600 | 36.22 | 36.22 | 43.31 | 48.98 | 53.31 | | 65.94 | 61.22 | |
| ASME B16.5, class 900 | 37.99 | 43.31 | 44.49 | 57.87 | 54.33 | | 67.13 | 63.19 | |
| ASME B16.5, class 1500 | 37.99 | 51.18 | 45.28 | 59.06 | 55.12 | | 67.91 | 65.55 | |
| ISO 228-1 G female pipe thread | | | | | | | | | |
| ASME B1.20.1 NPT female pipe thread | | | | | | | | | |
| DIN 11851 Hygienic screwed | 38.98 | 37.01 | 37.01 | | | | | | |
| DIN 32676 (ISO) Hygienic clamp | 37.40 | 35.83 | 35.83 | | | | | | |
| SMS 1145 Hygienic screwed | 38.98 | 37.01 | | | | | | | |
| JIS B2220/10K | 35.83 | 34.25 | | 50.20 | 45.28 | 50.20 | | | |
| JIS B2220/20K | 35.83 | 34.25 | | 50.20 | 45.28 | 50.20 | | | |
| EN 1092-1 PN 16, NAMUR length | | | | | 55.12 | | | 66.93 | |
| EN 1092-1 PN 40, NAMUR length | | 36.02 | | | | | | | |

SITRANS FCS300, overall length (D), dimensions in inch

Flow Measurement

SITRANS F C

Flow sensor SITRANS FCS300

Sensor in Nickel-Alloy C4: 7ME463-...

| Sensor Nickel-Alloy C4 | DN 15 (½") | | | DN 25 (1") | | | DN 50 (2") | | |
|------------------------|--------------|------------|------------|------------|------------|-------------|-------------|------------|-------------|
| | DN 10 (3/8") | DN 15 (½") | DN 20 (¾") | DN 20 (¾") | DN 25 (1") | DN 40 (1½") | DN 40 (1½") | DN 50 (2") | DN 65 (2½") |
| EN 1092-1 B1, PN 40 | 449 | 442 | 428 | 646 | 614 | 576 | 814 | 764 | 819 |
| EN 1092-1 B2, PN 63 | 449 | 442 | 428 | 646 | 614 | 576 | 814 | 764 | 819 |
| EN 1092-1 B2, PN 100 | 449 | 442 | 428 | 646 | 614 | 576 | 814 | 764 | 819 |
| ANSI B16.5, class 150 | | 442 | 428 | 646 | 614 | 576 | 814 | 764 | 819 |
| ANSI B16.5, class 300 | | 442 | 428 | 646 | 614 | 576 | 814 | 764 | 819 |
| ANSI B16.5, class 600 | | 442 | 428 | 646 | 614 | 576 | 814 | 764 | 819 |
| JIS B2220/10K | | 442 | 428 | 646 | 614 | 576 | 814 | 764 | 819 |

| Sensor | DN 80 (3") | | | DN 100 (4") | | | DN 150 (6") | | |
|-----------------------|-------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | DN 65 (2½") | DN 80 (3") | DN 100 (4") | DN 80 (3") | DN 100 (4") | DN 150 (6") | DN 100 (4") | DN 150 (6") | DN 200 (8") |
| EN 1092-1 B1, PN 16 | | | 971 | 1357 | 1280 | 1261 | 1592 | 1502 | |
| EN 1092-1 B1, PN 40 | 1021 | 971 | 971 | 1357 | 1280 | 1261 | 1592 | 1502 | |
| EN 1092-1 B2, PN 63 | 1021 | | 971 | 1357 | 1280 | 1261 | 1632 | 1542 | |
| EN 1092-1 B2, PN 100 | 1021 | 971 | 971 | 1357 | 1280 | 1261 | 1632 | 1542 | |
| ANSI B16.5, class 150 | 1021 | 971 | 971 | 1357 | 1280 | 1261 | 1592 | 1502 | |
| ANSI B16.5, class 300 | 1021 | 971 | 971 | 1357 | 1280 | 1261 | 1632 | 1542 | |
| ANSI B16.5, class 600 | 1021 | 971 | 971 | 1357 | 1280 | 1261 | 1632 | 1542 | |
| JIS B2220/10K | 1021 | 971 | 971 | 1357 | 1280 | 1261 | 1592 | 1502 | |

SITRANS FCS300, overall length (D), dimensions in mm

| Sensor | DN 15 (½") | | | DN 25 (1") | | | DN 50 (2") | | |
|-----------------------|--------------|------------|------------|------------|------------|-------------|-------------|------------|-------------|
| | DN 10 (3/8") | DN 15 (½") | DN 20 (¾") | DN 20 (¾") | DN 25 (1") | DN 40 (1½") | DN 40 (1½") | DN 50 (2") | DN 65 (2½") |
| EN 1092-1 B1, PN 40 | 17.7 | 17.4 | 16.9 | 25.4 | 24.2 | 22.7 | 32.0 | 30.1 | 32.2 |
| EN 1092-1 B2, PN 63 | 17.7 | 17.4 | 16.9 | 25.4 | 24.2 | 22.7 | 32.0 | 30.1 | 32.2 |
| EN 1092-1 B2, PN 100 | 17.7 | 17.4 | 16.9 | 25.4 | 24.2 | 22.7 | 32.0 | 30.1 | 32.2 |
| ANSI B16.5, class 150 | | 17.4 | 16.9 | 22.6 | 22.6 | 22.7 | 32.0 | 30.1 | 31.2 |
| ANSI B16.5, class 300 | | 17.4 | 16.9 | 25.4 | 24.2 | 22.7 | 32.0 | 30.1 | 31.2 |
| ANSI B16.5, class 600 | | 17.4 | 16.9 | 25.4 | 24.2 | 22.7 | 32.0 | 30.1 | 31.2 |
| JIS B2220/10K | | 17.4 | 16.9 | 25.4 | 24.2 | 22.7 | 32.0 | 30.1 | 32.2 |

| Sensor | DN 80 (3") | | | DN 100 (4") | | | DN 150 (6") | | |
|-----------------------|-------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | DN 65 (2½") | DN 80 (3") | DN 100 (4") | DN 80 (3") | DN 100 (4") | DN 150 (6") | DN 100 (4") | DN 150 (6") | DN 200 (8") |
| EN 1092-1 B1, PN 16 | | | 38.2 | 53.4 | 50.4 | 49.6 | 62.7 | 59.1 | |
| EN 1092-1 B1, PN 40 | 40.2 | 38.2 | 38.2 | 53.4 | 50.4 | 49.6 | 62.7 | 59.1 | |
| EN 1092-1 B2, PN 63 | 40.2 | | 38.2 | 53.4 | 50.4 | 49.6 | 64.3 | 59.1 | |
| EN 1092-1 B2, PN 100 | 40.2 | 38.2 | 38.2 | 53.4 | 50.4 | 49.6 | 64.3 | 59.1 | |
| ANSI B16.5, class 150 | 40.2 | 38.2 | 38.2 | 53.4 | 50.4 | 49.6 | 62.7 | 59.1 | |
| ANSI B16.5, class 300 | 40.2 | 38.2 | 38.2 | 53.4 | 50.4 | 49.6 | 64.3 | 59.1 | |
| ANSI B16.5, class 600 | 40.2 | 38.2 | 38.2 | 53.4 | 50.4 | 49.6 | 64.3 | 59.1 | |
| JIS B2220/10K | 35.83 | 34.25 | 41.73 | 53.4 | 50.4 | 49.6 | 62.7 | 59.1 | |

SITRANS FCS300, overall length (D), dimensions in inch

Overview

The complete flowmeter system SITRANS FC330 can be ordered for standard, hygienic or NAMUR service.

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

FC330 is available with current output HART 7.5, Modbus RS485 RTU, PROFIBUS DP or PROFIBUS PA as standard on Channel 1. 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 FC330 flowmeter system consists of a SITRANS FCS300 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

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC330

Technical specifications

| | |
|--|--|
| Sizes | DN 15 (½") DN 25 (1") DN 50 (2") DN 80 (3") DN 100 (4") DN 150 (6") |
| Accuracy | ± 0.10 % or 0.20 % for liquids additional ±0.40 for gases |
| Repeatability | ± 0.05 % |
| Flow range (liquids) (water @1 bar pressure loss) (Q_{nom}) | |
| • DN 15 | 4 500 kg/h (163.3lb/min) |
| • DN 25 | 20 500 kg/h (753.2lb/min)) |
| • DN 50 | 49 000 kg/h (1 800lb/min) |
| • DN 80 | 122 000 kg/h (4 483 lb/min) |
| • DN 100 | 273 000 kg (10031 lb/min) |
| • DN 150 | 459 200 kg/h (16 873lb/min) |
| Architecture | Compact or remote configuration |
| Display | Full graphical display, 240 x 160 pixels with selection of 6 languages |
| Power supply | 20 ... 27 V DC ± 10%; 100 ... 240 V AC ± 10 %, 47 ... 63 Hz ± 10% |
| Weight | 4.6 ... 212 kg |
| Material | |
| • Sensor | |
| - Wetted parts | 316L stainless steel or Nickel Alloy C4 |
| - Enclosure | 304 stainless steel |
| • Transmitter | Aluminum with corrosion-resistant coating |
| Enclosure rating | IP67 |
| Pressure ratings | |
| • Measuring tubes | |
| - 316L | 100 bar (1450psi) |
| - Nickel Alloy C4 (DN 15 ... 50) | 100 bar (1450psi) |
| • Sensor enclosure | No pressure containment |
| Temperature ratings | |
| • Process medium | -50 ... +205 °C (-58 ... +400 °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 B2, EN 1092-1 D, ANSI/ASME B16.5, JIS B 2220 |
| • Pipe threads | ASME B1.20 (NPT) female pipe thread, ISO228-1 G female pipe thread (BSPP) |
| • Hygienic threads | DIN 11851, SMS 1145 |
| • Hygienic clamps | DIN 32676 serie A |
| Approvals | |
| • Hazardous area (zone 1) | ATEX, IECEx, EAC Ex, CSA, cCSAus (NEPSI, INMETRO, EAC (in preparation) |
| • Pressure equipment | PED, CRN (in preparation) |
| • Hygienic | EHEDG (DN 25 ... DN 80) (in preparation) |
| • Custody transfer | OIML R 117, NTEP (in preparation) |
| • Operational safety (compact system only NAMUR 7ME471) | SIL 2 Single (in preparation) SIL 3 Redundant system (in prepa- ration) |
| NAMUR | NAMUR-compliant (e.g. NE 21, NE 41, NE 107 and NE 132) |
| I/O | Up to 4 channels combining ana- log, relay or digital outputs and binary input |
| Communication | HART PROFIBUS PA PROFIBUS DP Modbus RTU (RS 485) |
| 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 tol- erate 3.17 g RMS in all directions. Flow accuracy cannot be guaran- teed under all conditions. |

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

| Selection and Ordering data | Article No. | Order code |
|---|-------------------------------|------------|
| SITRANS FC330 Digital Coriolis flowmeter with SITRANS FCS300 standard flow sensor compact or remote mounting with FCT030 transmitter | 7ME 46 3 3 - 77777 - 7777 777 | |
| ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal. | | |
| Sensor size, connector size | | |
| DN 15, DN 10 (½", 3/8") | | 3F |
| DN 15, DN 15 (½", ½") | | 3G |
| DN 15, DN 20 (½", ¾") | | 3H |
| DN 25, DN 20 (1", ¾") | | 3K |
| DN 25, DN 25 (1", 1") | | 3L |
| DN 25, DN 40 (1", 1½") | | 3N |
| DN 50, DN 40 (2", 1½") | | 4B |
| DN 50, DN 50 (2", 2") | | 4C |
| DN 50, DN 65 (2", 2½") | | 4D |
| DN 80, DN 65 (3", 2½") | | 4J |
| DN 80, DN 80 (3", 3") | | 4K |
| DN 80, DN 100 (3", 4") | | 4L |
| DN 100, DN 80 (4", 3") | | 5M |
| DN 100, DN 100 (4", 4") | | 5N |
| DN 100, DN 150 (4", 6") | | 5Q |
| DN 150, DN 100 (6", 4") | | 6D |
| DN 150, DN 150 (6", 6") | | 6F |
| DN 150, DN 200 (6", 8") | | 6H |
| Process connection | | |
| EN 1092-1 B1, PN 16 | | A0 |
| EN 1092-1 B1, PN 40 | | A1 |
| EN 1092-1 B2, PN 63 | | A2 |
| EN 1092-1 B2, PN 100 | | A3 |
| EN 1092-1 D, PN 40 | | A5 |
| ASME B16.5 RF, class 150 | | D1 |
| ASME B16.5 RF, class 300 | | D2 |
| ASME B16.5 RF, class 600 | | D3 |
| ASME B16.5 RF, class 900 (p- and t-rating as class 600) | | D4 |
| ASME B16.5 RF, class 1500 (p- and t-rating as class 600) | | D5 |
| ISO 228-1G female pipe thread | | E1 |
| ASME B1.20.1 NPT female pipe thread | | E3 |
| DIN 11851 hygienic screwed | | F1 |
| DIN 32676 (ISO) clamp serie A | | G2 |
| SMS 1145 hygienic screwed | | K1 |
| JIS B2220/10K | | L2 |
| JIS B2220/20K | | L4 |
| EN 1092-1, PN 16, NAMUR length | | N1 |
| EN 1092-1, PN 40, NAMUR length | | N2 |
| Wetted parts material | | |
| AISI 316L/1.4435/1.4404 | | 1 |
| AISI 316L/1.4435/1.4404 (polished) | | 2 |
| Nickel-alloy C4 | | 3 |
| Calibration/Accuracy class | | |
| 0.2 % flow, 10 kg/m ³ density | | 0 |
| 0.1 % flow, 2 kg/m ³ density | | 1 |
| Standard fraction (with density 2 kg/m ³) | | 8 |
| Customer selected fraction | | 9 |
| | | N 0Y |

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC330

| Selection and Ordering data | Article No. | Order code |
|---|-------------------------------|------------|
| SITRANS FC330 Digital Coriolis flowmeter with SITRANS FCS300 standard flow sensor compact or remote mounting with FCT030 transmitter | 7ME 46 3 3 - 77777 - 7777 777 | |
| Mounting style, transmitter housing and material | | |
| None (replacement sensor) | | A |
| Compact, IP67 fieldmount, aluminum | | D |
| Remote, IP67 fieldmount, aluminum, M12 | | G |
| Remote, IP67 fieldmount, aluminum, T/Box | | K |
| Remote, IP67, wall mount, aluminium | | U |
| Ex approval (depending on variant) | | |
| Non-Ex | | A |
| ATEX (zone 1) | | C |
| IECEX (zone 1) | | F |
| US (cCSAus), Div 1 | | L |
| Canada (cCSAus), zone 1 | | M |
| NEPSI (in preparation) | | N |
| INMETRO (in preparation) | | P |
| KCs (in preparation) | | Q |
| EAC (in preparation) | | U |
| Local User Interface | | |
| None (replacement sensor, DSL only) | | 0 |
| Blind | | 1 |
| Graphical, 240 x 160 pxl | | 3 |

3

| Selection and Ordering data | Order code | Selection and Ordering data | Order code |
|---|------------|---|------------|
| Further designs | | I/O configuration Ch2, Ch3 and Ch4 | |
| Please add "-Z" to Article No. and specify Order code(s). | | None | F00 |
| Cable glands | | Non Ex: Sig O, None, None | F01 |
| None (replacement sensor) | A00 | Non Ex: Sig O, Sig I/O, None | F02 |
| Metric, no glands | A01 | Non Ex: Sig O, Sig I/O, Sig I/O | F03 |
| Metric, Nylon, limited to -20 °C/-4 °F | A02 | Non Ex: Sig O, Sig I/O, R | F04 |
| Metric, brass/Ni plated | A05 | Non Ex: Sig O, R, R | F05 |
| Metric, stainless steel | A06 | Non Ex: Sig O, R, None | F06 |
| NPT, no glands | A11 | Ex: pSig O, None, None | F11 |
| NPT, Nylon, limited to -20 °C/-4 °F | A12 | Ex: pSig O, pSig I/O, None | F12 |
| NPT, brass/Ni plated | A15 | Ex: pSig O, pSig I/O, pSig I/O | F13 |
| NPT, stainless steel | A16 | Ex: pSig O, pSig I/O, R | F14 |
| Metric thread with M12 socket fitted | A20 | Ex: pSig O, R, R | F15 |
| Software functions and CT approvals | | Ex: pSig O, R, None | F16 |
| None (replacement sensor) | B10 | Ex: aSig O, None, None | F21 |
| Standard | B11 | Ex: aSig O, aSig I/O, None | F22 |
| CT OIML R 117 (in preparation) | B31 | Ex: aSig O, aSig I/O, aSig I/O | F23 |
| CT NTEP (in preparation) | B52 | Ex: aSig O, aSig I/O, R | F24 |
| I/O configuration Ch1 | | Ex: aSig O, R, R | F25 |
| No output channel | E00 | Ex: aSig O, R, None | F26 |
| 4 ... 20 mA HART Active/Passive (non-Ex) | E02 | | |
| Ca 4 ... 20 mA HART active (Ex) | E06 | Notes on I/O configurations: | |
| Ca 4 ... 20 mA HART passive (Ex) | E07 | a or p suffix: The I/O module is selected at ordering with either active or passive function. | |
| PROFIBUS PA | E10 | Signal: The output can be selected for Current (0 or 4 to 20 mA), frequency or pulse function in the menu. | |
| PROFIBUS DP (non-Ex) | E11 | I: Discrete status input to the flowmeter. Functions are selected in the menu including 'Freeze output', 'Reset totalizer' (only CH3&4). | |
| Modbus RTU RS 485 | E14 | 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 | |
| Factory certificate to EN 10204 -2.2 | C01 |
| Material certificate EN 10204-3.1 with inspection | C02 |
| Material certificate EN 10204-3.2 with inspection | C03 |
| NACE MR0175/EN 10204-3.1 | C04 |
| Declaration of conformity certificate EN 10204-2.1 | C05 |
| Inspection certificate EN 10204-3.1 incl. dimension and function test | C06 |
| Inspection certificate EN 10204-3.1 with PMI | C07 |
| Pressure test acc. AD2000 | C08 |
| Test package (Pressure, NDT, WPS, WPQS) | C09 |
| Inspection certificate to EN 10204 3.1/NDE-weld | C10 |
| Certificate of accuracy acc. EN 10204 2.1 | C11 |
| Inspection certificate to EN 10204 3.1 with PMI (including heat analysis) | C12 |
| Customer selected calibration | |
| DN 15 ... 50: Multi-point (5 flows x 1 pass) | D60 |
| DN 15 ... 50: Multi-point (10 flows x 1 pass) | D61 |
| DN 80: Multi-point (5 flows x 1 pass) | D62 |
| DN 80: Multi-point (10 flows x 1 pass) | D63 |
| DN 100: Multi-point (5 flows x 1 pass) | D64 |
| DN 100: Multi-point (10 flows x 1 pass) | D65 |
| DN 150: Multi-point (5 flows x 1 pass) | D66 |
| DN 150: Multi-point (8 flows x 1 pass) | D67 |
| Cable | |
| None | L50 |
| 5 m (16.4 ft), standard with M12 connectors fitted | L51 |
| 5 m (16.4 ft), standard | L52 |
| 10 m (32.8 ft) standard with M12 connectors fitted | L55 |
| 10 m (32.8 ft), standard, without plugs | L56 |
| 25 m (82 ft), standard with M12 connectors fitted | L59 |
| 25 m (82 ft), standard, without plugs | L60 |
| 50 m (164 ft), standard with M12 connectors fitted | L63 |
| 50 m (164 ft), standard, without plugs | L64 |
| 75 m (246 ft), standard with M12 connectors fitted | L67 |
| 75 m (246 ft), standard, without plugs | L68 |
| Sensor options | |
| FCS300 Marine approval (in preparation) | S22 |
| SD-Card accessibility via USB (not allowed in USA by Patent) | |
| Mass storage enabled | S30 |
| Region-specific approvals and certificates | |
| South Korea (KCC) (in preparation) | W28 |
| Additional data | |
| Please add "-Z" to Article No. and specify Order code(s) and plain text. | |
| Tag name | |
| Tag name plate, stainless steel | Y17 |

Operating instructions for SITRANS FC330

| Description | Article No. |
|----------------------------------|--------------------|
| English | A5E44030648 |
| • for firmware V 4.0 and onwards | |
| German | TBD |
| • for firmware V 4.0 and onwards | |

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

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC310

Overview



The compact flowmeter SITRANS FC310 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 FC310 is ideal for integration in ship fuel efficiency and environmental measurement systems as well as bunkering 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 FC310 flowmeter system consists of a SITRANS FCS300 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") DN 100 (4") DN 150 (6") | Process connections | |
| Accuracy | ± 0.10 % or ±0.20 % Additional ±0.40 % for gases | • Flanges | EN 1092-1 B1, EN 1092-1 B2, EN 1092-1 D, ANSI/ASME B16.5, JIS B 2220 |
| Repeatability | ± 0.05 % | • Pipe threads | ASME B1.20 (NPT) female pipe thread, ISO228-1 G female pipe thread (BSPP) |
| Flow range (water @1 bar pressure loss) | | • Hygienic threads | DIN 11851, SMS 1145 |
| • DN 15 | 4 500 kg/h (163.3lb/min) | • Hygienic clamps | DIN 32676 serie A |
| • DN25 | 20 500 kg/h (753.2lb/min) | Approvals | |
| • DN50 | 49 000 kg/h (1 800 lb/min) | • Hazardous area (zone 1) | ATEX, IECEx, EAC Ex, cCSAus (NEPSI, INMETRO, EAC in prepara- tion) |
| • DN 80 | 122 000 kg/h (4 483 lb/min) | • Pressure equipment | PED, CRN (in preparation) |
| • DN 100 | 273 000 kg (10 031 lb/min) | • Hygienic | EHEDG (DN 25 ... 80) (in preparation) |
| • DN 150 | 459 200 kg/h (16 873lb/min) | • Marine (in preparation) | Germanischer Lloyd/det Norske Veritas, Bureau Veritas, Lloyds of London, American Bureau of Shipping, RINA (Italy) |
| Power supply | 24 V DC ± 20 %; 110 mA | NAMUR | NAMUR-compliant (e.g. NE 21, NE 41 and NE 132) |
| Weight | 4.6 ... 207 kg | Communication | Modbus RS 485 RTU |
| Material | | EMC performance | |
| • Sensor | | Emission | EN 55011/CISPR-11 (Class B) |
| - Measuring tubes | 316L stainless steel or Nickel Alloy C4 | Immunity | EN/IEC 61326-1 (Industry) |
| - Enclosure | 304 stainless steel | Mechanical load | 18 to 400 Hz random The flow meter will mechanically tolerate 3.17 g RMS in all direc- tions. Flow accuracy cannot be guaranteed under all conditions. |
| • Transmitter | Aluminum with corrosion-resis- tant coating | | |
| Enclosure rating | IP67 | | |
| Pressure ratings | | | |
| • Measuring tubes | | | |
| - 316L | 100 bar (1450 psi) | | |
| - Nickel-Alloy C4 | 100 bar (1450 psi) | | |
| • Sensor enclosure | No pressure containment | | |
| Temperature ratings | | | |
| • Process medium | -50 ... +205 °C (-58 ... +400 °F) | | |
| • Ambient | -40 ... +60 °C (-40 ... +140 °F) | | |

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC310

| Selection and Ordering data | Article No. | Order code |
|--|-------------------------------|------------|
| SITRANS FC310 Digital Coriolis flowmeter with SITRANS FCS300 standard flow sensor with hygienic and flange/pipe thread connections and compact mounting with FCT010 transmitter | 7ME 46 3 1 - 77777 - 7777 777 | |
| Click on the Article No. for the online configuration in the PIA Life Cycle Portal. | | |
| Sensor size, connector size | | |
| DN 15, DN 10 (½", 3/8") | | 3F |
| DN 15, DN 15 (½", ½") | | 3G |
| DN 15, DN 20 (½", ¾") | | 3H |
| DN 25, DN 20 (1", ¾") | | 3K |
| DN 25, DN 25 (1", 1") | | 3L |
| DN 25, DN 40 (1", 1½") | | 3N |
| DN 50, DN 40 (2", 1½") | | 4B |
| DN 50, DN 50 (2", 2") | | 4C |
| DN 50, DN 65 (2", 2½") | | 4D |
| DN 80, DN 65 (3", 2½") | | 4J |
| DN 80, DN 80 (3", 3") | | 4K |
| DN 80, DN 100 (3", 4") | | 4L |
| DN 100, DN 80 (4", 3") | | 5M |
| DN 100, DN 100 (4", 4") | | 5N |
| DN 100, DN 150 (4", 6") | | 5Q |
| DN 150, DN 100 (6", 4") | | 6D |
| DN 150, DN 150 (6", 6") | | 6F |
| DN 150, DN 200 (6", 8") | | 6H |
| Process connection | | |
| EN 1092-1 B1, PN 16 | | A0 |
| EN 1092-1 B1, PN 40 | | A1 |
| EN 1092-1 B2, PN 63 | | A2 |
| EN 1092-1 B2, PN 100 | | A3 |
| EN 1092-1 D, PN 40 | | A5 |
| ASME B16.5 RF, class 150 | | D1 |
| ASME B16.5 RF, class 300 | | D2 |
| ASME B16.5 RF, class 600 | | D3 |
| ASME B16.5 RF, class 900 (p- and t-rating as class 600) | | D4 |
| ANSI B16.5-2009, class 1500 (p- and t-rating as class 600) | | D5 |
| ISO 228-1G female pipe thread | | E1 |
| ASME B1.20.1 NPT female pipe thread | | E3 |
| DIN 11851 hygienic screwed | | F1 |
| DIN 32676 (ISO) hygienic clamp serie A | | G1 |
| SMS 1145 hygienic screwed | | K1 |
| JIS B2220/10K | | L2 |
| JIS B2220/20K | | L4 |
| EN 1092-1, PN 16, NAMUR length | | N1 |
| EN 1092-1, PN 40, NAMUR length | | N2 |
| Wetted parts material | | |
| AISI 316L/1.4435/1.4404 | | 1 |
| AISI 316L/1.4435/1.4404 (polished) | | 2 |
| Nickel-Alloy C4 | | 3 |
| Calibration/Accuracy class | | |
| 0.2 % flow, 10 kg/m³ density | | 0 |
| 0.1 % flow, 2 kg/m³ density | | 1 |
| Mounting style, transmitter housing and material | | |
| Compact, IP67, aluminum | | D |
| Ex approval | | |
| Non-Ex | | A |
| ATEX II 2G zone 1 | | C |
| IECEx Gb (zone 1) | | F |
| US (cCSAus), Div 1 | | L |
| Canada (cCSAus), class I, zone 1 | | M |
| NEPSI (in preparation) | | N |
| INMETRO (in preparation) | | P |
| KCs (in preparation) | | Q |
| EAC (in preparation) | | U |
| Local User Interface | | |
| Blind | | 1 |

| Selection and Ordering data | Order code | Selection and Ordering data | Order code |
|---|------------|---|------------|
| Further designs | | Add-on options and accessories | |
| Please add "-Z" to Article No. and specify Order code(s). | | Please add "-Z" to Article No. and specify Order code(s). | |
| Cable glands | | Certificates | |
| None (replacement sensor) | A00 | Factory certificate to EN 10204-2.2 | C01 |
| Metric, no glands | A01 | Material certificate EN 10204-3.1 with inspection | C02 |
| Metric, plastic | A02 | Material certificate EN 10204-3.2 with inspection | C03 |
| Metric, brass/Ni plated | A05 | NACE MR0175/EN 10204-3.1 | C04 |
| Metric, stainless steel | A06 | Declaration of conformity certificate EN 10204-2.1 | C05 |
| NPT, no glands | A11 | Inspection certificate EN 10204-3.1 incl. dimension and function test | C06 |
| NPT, plastic | A12 | Inspection certificate EN 10204-3.1 with PMI | C07 |
| NPT, brass/Ni plated | A15 | Pressure test acc. AD2000 | C08 |
| NPT, stainless steel | A16 | Test package (Pressure, NDT, WPS, WPQS) | C09 |
| Metric thread with M12 socket fitted | A20 | Inspection certificate to EN 10204 3.1/NDE-weld | C10 |
| Software functions and CT approvals | | Certificate of accuracy acc. EN 10204 2.1 | |
| Standard | B11 | Inspection certificate to EN 10204 3.1 with PMI (including heat analysis) | C11 |
| I/O configuration Ch1 | | C12 | |
| Modbus RTU RS 485 | E14 | Customer selected calibration | |
| I/O configuration Ch2, Ch3 and Ch4 | | DN 15 ... 50, multi-point, 5 flows x 1 pass | |
| None | F00 | DN 15 ... 50, multi-point, 10 flows x 1 pass | |
| | | DN 80, multi-point, 5 flows x 1 pass | |
| | | DN 80, multi-point, 10 flows x 1 pass | |
| | | DN 100, multi-point, 5 flows x 1 pass | |
| | | DN 100, multi-point, 10 flows x 1 pass | |
| | | DN 150, multi-point, 5 flows x 1 pass | |
| | | DN 150, multi-point, 8 flows x 1 pass | |
| | | Cable | |
| | | (M12 versions of cable have a connector on both ends) | |
| | | None | |
| | | 5 m (16.4 ft), standard with M12 connectors fitted | |
| | | 5 m (16.4 ft), standard, without plugs | |
| | | 10 m (32.8 ft) standard with M12 connectors fitted | |
| | | 10 m (32.8 ft), standard, without plugs | |
| | | 25 m (82 ft), standard with M12 connectors fitted | |
| | | 25 m (82 ft), standard, without plugs | |
| | | 50 m (164 ft), standard with M12 connectors fitted | |
| | | 50 m (164 ft), standard, without plugs | |
| | | 75 m (246 ft), standard with M12 connectors fitted | |
| | | 75 m (246 ft), standard, without plugs | |
| | | Sensor options | |
| | | FCS300 Marine approval | |
| | | S22 | |
| | | Additional data | |
| | | Please add "-Z" to Article No. and specify Order code(s) and plain text. | |
| | | Tag name | |
| | | Tag name plate, stainless steel | |
| | | Y17 | |
| Operating instructions for SITRANS FC310 | | | |
| Description | | Article No. | |
| English | | | |
| •for firmware V 4.0 and onwards | | A5E39789214 | |
| German | | | |
| • for firmware V 4.0 and onwards | | TBD | |

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

Flow Measurement

SITRANS F C

Flowmeter SITRANS FC410 and FC430 for OEM customers

Overview



The complete flowmeter system SITRANS FC consist of a new FCS400 sensor in sizes DN 15 to DN50 mm and a FCT030 multichannel/multifunctional in compact or remote versions, or a single Modbus-channel FCT010 transmitter in compact version. 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
- Aerated flow filtering system, for advanced filtering of fluids with gas or air bubbles
- Build in Data logger for all process variables and status messages (FCT030)
- Build in Batch functionality (FCT030)

The SITRANS FC430 is available with current output HART 7.5, Modbus RS485 RTU, PROFIBUS DP or PROFIBUS PA as standard on Channel 1. Additional I/O 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 FC410 is available with a Modbus RTD output transferring all process values to a any PLC or DCS system like SIMATIC S7-1200; S7-1500 or PCS7. True multi-parameter measurements i.e. massflow, density, temperature.

The SITRANS FC410 is available with MODBUS RTU (RS 485) multi-drop serial communication.

Benefits

- It is truly 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
- Shortest overall length; easy drop-in replacement into most existing installations

Application


SITRANS FCS400 mass flowmeters are especially suitable for applications for machinebuilder, skid manufacturer and OEM's in general for the 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: detergents, bulk chemicals, acids, alkalis, paint mixing systems, solvents and resins, fertilizer, technical gases
- Oil & Gas Processing Up- Mid- Down stream: Well-head monitoring, oil separators, refineries control, furnace control
- Hydrocarbon processing: oil refining, derivatives manufacturing, polymerization
- Power industry processing
- Marine Application: Fuel management & consumption; bunkering solutions; Boiler control
- Food & Beverage: dairy products, beer, wine, Alcohol / spirit, soft drinks, °Brix/°Plato, fruit juices and pulps, bottling, CO₂ dosing, CIP/SIP-liquids, mixture recipe control

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.

Technical specifications

| Flowmeter | SITRANS FC430 | SITRANS FC410 | Flowmeter | SITRANS FC430 | SITRANS FC410 |
|--|---|---|--------------------------------|--|---|
| |  | | Materials | | |
| | | | • Sensor | | 316L stainless steel |
| | | | - Wetted parts | | 304 stainless steel |
| | | | - Enclosure | | |
| | | | • Transmitter | | Aluminum with corrosion-resistant coating |
| | | | Enclosure rating | IP67 | |
| Sizes | | DN 15 (½") DN 25 (1") DN 50 (2") | Pressure ratings | | |
| Accuracy | | | • Measuring tubes | | 100 bar (1450 psi) |
| • Massflow | | ± 0.10 % for liquids additional ± 0.25 for gases | - 316L | | 20 bar (DN 15, DN 25) |
| • Density | | ± 5 kg/m ³ or 0.5 kg/m ³ (in preparation) | • Sensor enclosure | | 17 bar (DN 50) |
| Repeatability | | | | | Burst pressure >100 bar |
| • Massflow | | ± 0.05 % | Temperature ratings | | |
| Flow range (liquids) | | | • Process medium | | |
| Q _{nom} (water @1 bar pressure loss) | | | - DN 15 ... DN50 | | -50 ... +200 °C (-58 ... +392 °F) |
| (Q _{max} approx. 2 x Q _{nom}) | | | • Ambient | | -40 ... +60 °C (-40 ... +140 °F) |
| • DN 15 (½") | | 3 700 kg/h (8 200 lb/h) | • Display | -20 ... +60 °C | - |
| • DN 25 (1") | | 11 500 kg/h (25 300 lb/h) | | -4 ... +140 °F) | |
| • DN 50 (2") | | 52 000 kg/h (115 000 lb/h) | Process connections | | |
| Installation | Compact or remote | Compact | • Flanges | | EN 1092-1 B1, EN 1092-1 D, ANSI/ASME B16.5, JIS B 2220, DIN 11864-2 |
| Display | Full graphical display, 240 x 160 pixels with selection of 6 languages | No display | • Pipe threads | | ASME B1.20 (NPT) male pipe thread, ISO228-1 G male pipe thread, VCO Quick-connect |
| Totalizer | Three eight-digit counters for forward, net or reverse flow | One Totalizer | • Hygienic threads | | DIN 11851, DIN 11864-1A, ISO 2853, SMS 1145 |
| Process values | Mass, volume, corrected volume, temperature, density, fraction e.g. Brix, Plato % Alc., concentration | Mass, volume, temperature, density | • Hygienic clamps | | DDIN 11864-3A, DIN 32676, ISO 2852 |
| Power supply | 20 ... 27 VDC ± 10%; 100 ... 240 V AC ± 10%, 47 ... 63 Hz ± 10% | 24 VDC ± 20%; 110 mA | Approvals | | |
| | | | • Hazardous area (zone 1 / 21) | | ATEX, IECEx, cCSA us |
| | | | • Pressure equipment | | PED, CRN |
| | | | 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 PROFIBUS PA PROFIBUS DP Modbus RTU (RS485) | Modbus RTU (RS 485) |

Selection and Ordering data (please contact Siemens sales office)

SITRANS FC430 Digital Coriolis flowmeter with SITRANS FCS400 sensor compact or remote mounting with FCT030 transmitter

Article No.

7ME 4 6 1 3 - 77777 - 7777

SITRANS FC410 Digital Coriolis flowmeter with SITRANS FCS400 sensor compact mounting FCT010 transmitter

7ME 4 6 1 1 - 77777 - 7777



Flow Measurement

SITRANS F C

SITRANS F C sensor MASS 2100 DI 1,5 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

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/cm³ with a repeatability better than 0.0002 g/cm³.
- 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.
- Market's 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 pharmaceutical industry, accurate recipe control means everything. The MASS 2100 DI 1.5 has demonstrated superior performance in numerous applications and field trials 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.



SITRANS F C sensor MASS 2100 DI 1,5 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

Function

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

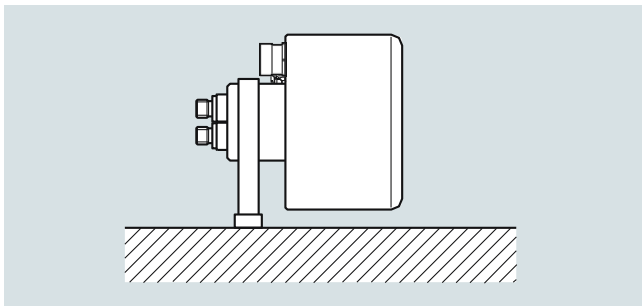
Integration

The sensor can be connected to FCT010, FCT030, SIFLOW and MASS 6000 (non CE) transmitters for remote installation only.

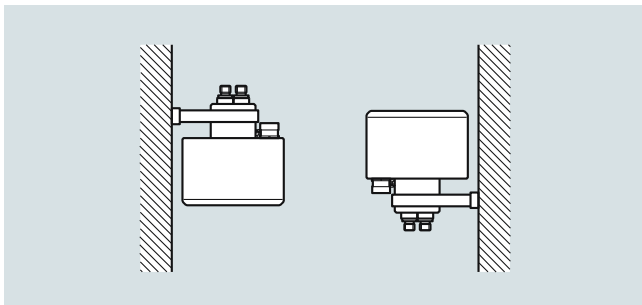
All sensors are delivered with a Sensor Flash or SENSORPROM containing all information about calibration data, identity and factory pre-programming of transmitter settings

Installation guidelines MASS 2100 DI 1.5 (1/16")**Installation of MASS 2100 sensor**

- The optimal installation is horizontal. If vertical mounting is necessary, upward flow is recommended to facilitate the removal of air bubbles. To remove the air from the sensor the flow speed in the sensor must be at least 1 m/s. If there are solid particles in the liquid, especially in connection with low flow, it is recommended that the sensor be mounted horizontally with inlet flange uppermost so that particles are more easily flushed out. To ensure that the sensor does not become partially empty, there must be sufficient counter-pressure on the unit min. 0.2 bar (2.9 psi).
- Mount the sensor on a vibration-free wall or steel frame.
- Locate the sensor low in the system in order to avoid an under-pressure in the sensor separating air/gas in the liquid.
- Ensure that the sensor is not emptied of liquid (during normal operation) otherwise incorrect measurement will occur.

Horizontal

Liquid and gas application

Vertical

Liquid application (left), gas application (right)

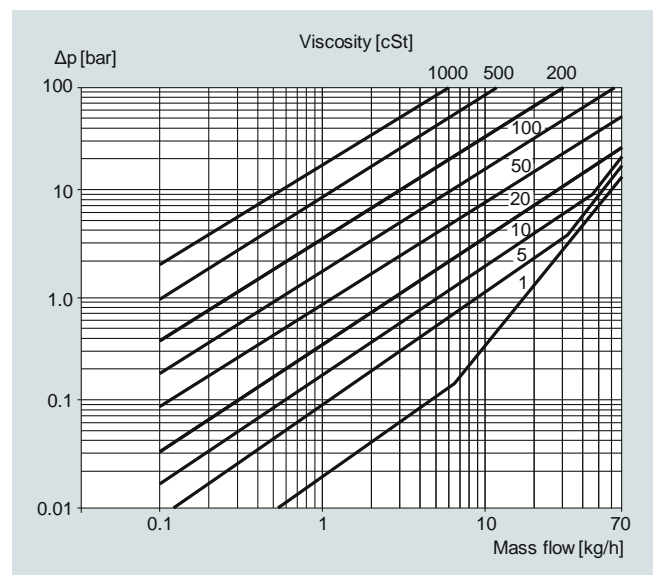
Technical specifications

| | |
|--|--|
| Inside pipe diameter (sensor consists of one continuous pipe) | 1.5 mm (0.06") |
| Pipe wall thickness | 0.25 mm (0.010") |
| Mass flow measuring range | 0 ... 30 kg/h (0 ... 66 lb/h) |
| Density | 0 ... 2.9 g/cm ³ (0 ... 0.10 lb/inch ³) |
| Fraction e.g. | 0 ... 100 °Brix |
| Media temperature | |
| Standard | -50 ... +125 °C (-58 ... +257 °F) |
| High-temperature version | -50 ... +180 °C (-58 ... +356 °F) |
| Ambient temperature | -20 ... +50 °C (-4 ... +122 °F) |
| Liquid pressure measuring pipe¹⁾ | |
| Stainless steel | 230 bar (3336 psi) at 20 °C (68 °F) |
| Hastelloy C22/2.4602 | 365 bar (5294 psi) at 20 °C (68 °F) |
| Materials | |
| Measuring pipe and connection | Stainless steel AISI 316L/1.4435 Hastelloy C22/2.4602 |
| Enclosure and enclosure material²⁾ | IP65 and stainless steel AISI316L/1.4404 |
| Connection thread | |
| ISO 228/1 | G 1/4" male |
| ANSI/ASME B1.20.1 | 1/4" NPT male |
| Cable connection | Multiple plug connection to sensor 5 x 2 x 0.35 mm ² twisted and screened in pairs, ext. Ø 12 mm |
| Ex-version | II 1G Eex ia IIC T3-T6, DEMKO 03 ATEX 135252X c-UL-us Ex ia IIC T3-T6 EAC Ex TC RU C- DE.MIO62.B.02013 0Ex ia IIC T3...T6 Gb UL WYMG.E232147 |
| Weight approx. | 2.6 kg (5.73lb) |

¹⁾ According to DIN 2413, DIN 17457

²⁾ Housing is not rated for pressure containment.

For accuracy specifications see "System information SITRANS F C".

Pressure drop

MASS 2100 DI 1.5 (1/16"), pressure drop for density = 1000 kg/m³

Flow Measurement

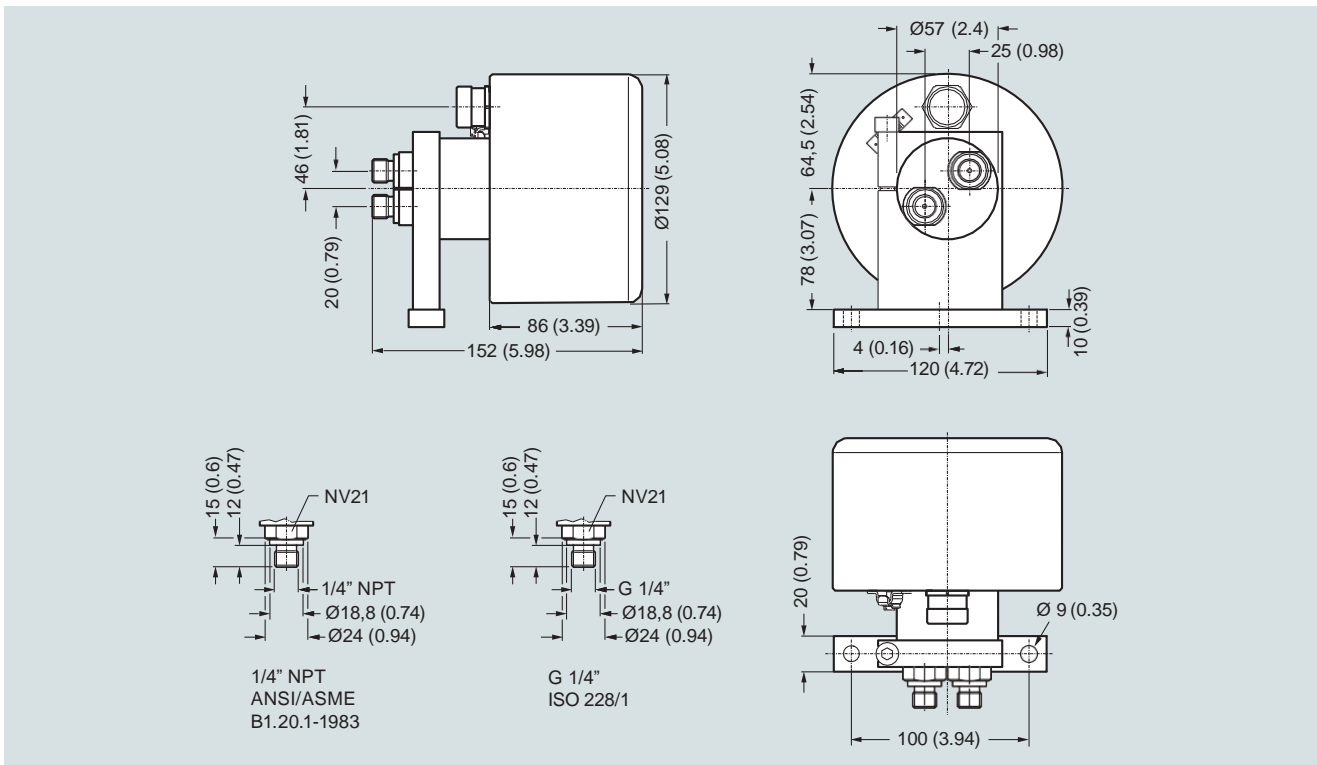
SITRANS F C

SITRANS F C sensor MASS 2100 DI 1,5 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

Dimensional drawings

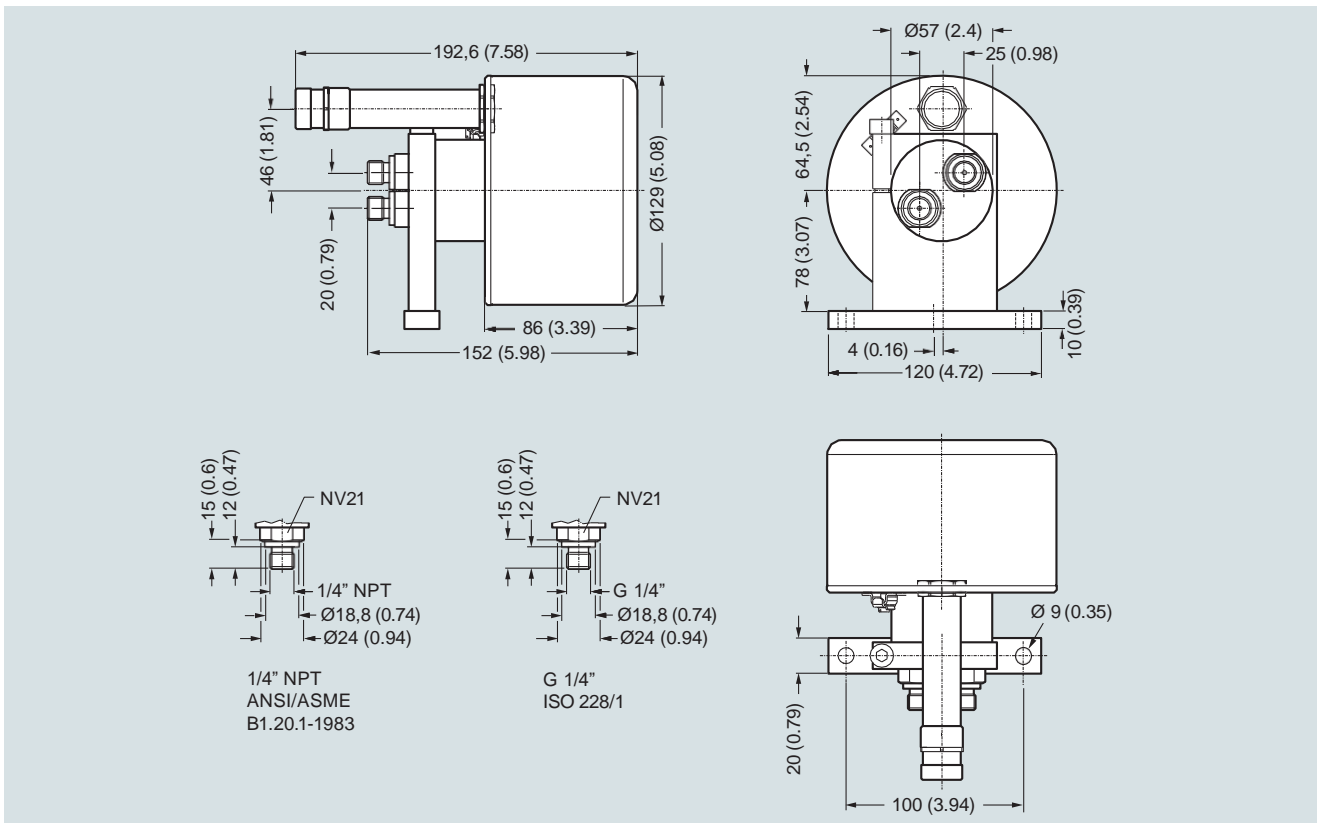
MASS 2100 DI 1.5 (1/16")

3



Dimensions in mm (inch)

MASS 2100 DI 1.5 High-temperature version to 180 °C (356 °F)



Dimensions in mm (inch)

SITRANS F C sensor FC300 DN 4 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

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/cm³ (0.00025 lb/inch³) with repeatability better than 0.0002 g/cm³ (0.000072 lb/inch³)
 - For C22/2.4602 version better than 0.0025 g/cm³ (0.00090 lb/inch³) with repeatability better than 0.0002 g/cm³ (0.000072 lb/inch³)
- 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 FCT010, FCT030, SIFLOW and MASS 6000 (non CE) transmitters for remote installation only.

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

Flow Measurement

SITRANS F C

SITRANS F C sensor FC300 DN 4 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

Installation guidelines for SITRANS FC300 sensor

Horizontal installation as shown in figure A is recommended with gas or liquid applications.

This installation is also recommended when the flow velocity is low (< 1 m/s) or the liquid contains solid particles or air bubbles.

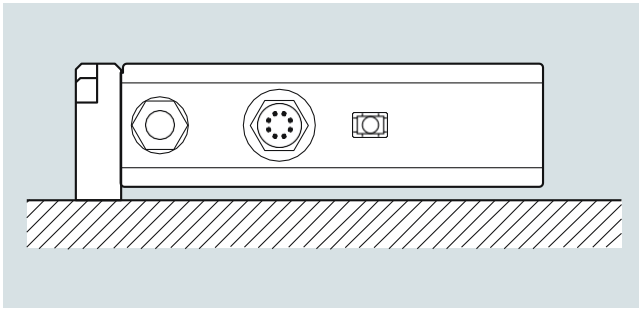
Vertical installation as shown in figure B can be used for liquid or gas applications.

For liquid applications upwards flow is recommended to facilitate the removal of air bubbles and to avoid partly emptying of the sensor.

For gas applications we recommend to place the flow inlet on the sensor high and the outlet low to remove impurities and oil films.

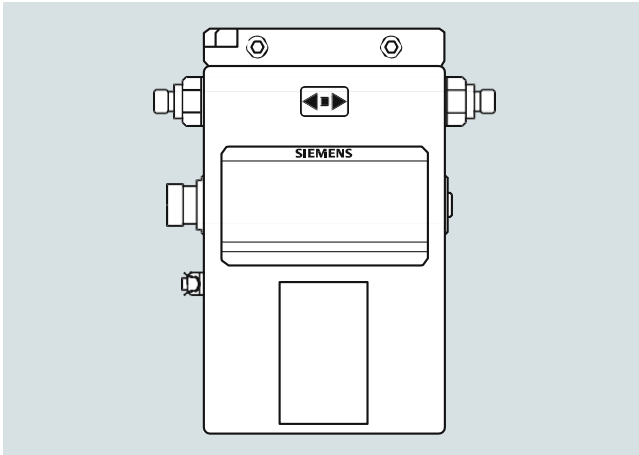
- To ensure that the sensor does not become partly empty, there must be a sufficient counter-pressure on the unit min. 0.2 bar (2.9 psi).
- Mount the sensor on a vibration-free and plane wall or steel frame.
- Locate the sensor low in the system in order to avoid under-pressure in the sensor separating air/gas in the liquid.
- Ensure that the sensor is not emptied of liquid (during normal operation) otherwise incorrect measurement will occur.

Horizontal mounting (recommended) (fig. A)



Liquid or gas (low to high flow)

Vertical mounting (fig. B)



Liquid or gas (medium to high flow)

Technical specifications

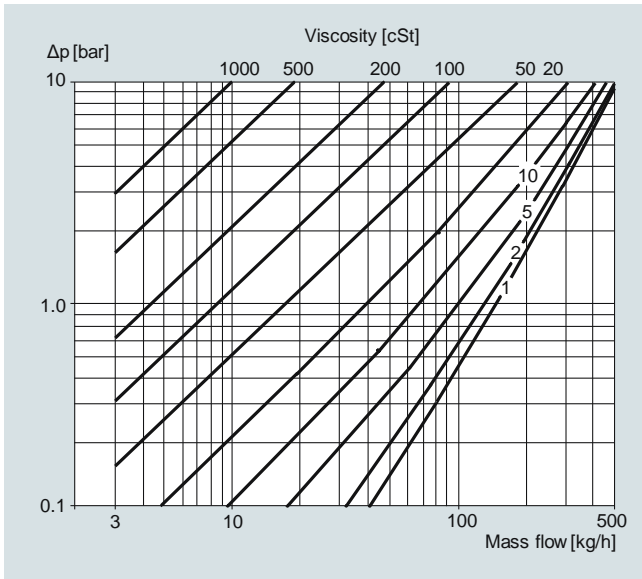
| | |
|--|---|
| Sensor size | DN 4 (1/6") |
| Mass flow | |
| Measuring range | 0 ... 350 kg/h (0 ... 772 lb/h) |
| Accuracy, mass flow | 0.1 % of rate |
| Repeatability | 0.05 % of rate |
| Max. zero point error | 0.010 kg/h (0.022 lb/h) |
| Density | |
| Density range | 0 ... 2.9 g/cm ³ (0 ... 0.105 lb/inch ³) |
| Density error | |
| • Stainless steel | 0.007 g/cm ³ (0.00025 lb/inch ³) |
| • Hastelloy C22/2.4602 | 0.0025 g/cm ³ (0.00009 lb/inch ³) |
| Repeatability error | 0.0002 g/cm ³ (0.0000072 lb/inch ³) |
| Media temperature | |
| Standard | -40 ... +115 °C (-40 ... +239 °F) |
| High-temperature version | -40 ... +180 °C (-40 ... +356 °F) |
| Temperature error | 0.5 °C (0.9 °F) |
| Ambient temperature | -20 ... +50 °C (-4 ... +122 °F) |
| Brix | |
| Measuring range | 0 ... 100 °Brix |
| Brix error | 0.3 °Brix |
| Inside pipe diameter | |
| Stainless steel version | 3.5 mm (0.14") |
| Hastelloy version | 3.0 mm (0.12") |
| Pipe wall thickness | |
| Stainless steel version | 0.25 mm (0.0098") |
| Hastelloy version | 0.5 mm (0.0196") |
| Liquid pressure measuring pipe¹⁾ | |
| Stainless steel | 130 bar (1885 psi) at 20 °C (68 °F) |
| Hastelloy C22/2.4602 | 410 bar (5945 psi) at 20 °C (68 °F) |
| Materials | Stainless steel AISI 316L/1.4435 |
| Measuring pipe and connection | Hastelloy C22/2.4602 |
| Enclosure²⁾ | |
| Material | Stainless steel AISI 316L/1.4404 |
| Enclosure grade | IP67/NEMA4 |
| Connection thread | |
| ISO 228/1 | G 1/4" male |
| ANSI/ASME B1.20.1 | 1/4" NPT male |
| Ex approval | Ex ia IIC T3-T6 05ATEX138072X EAC Ex TC RU C- DE.MIO62.B.02013 0Ex ia IIC T3...T6 Gb c-UL-us Class 1 Div. 1, Gr. A, B, C, D |
| Weight | 3.5 kg (7.7 lb) |
| Dimensions | 135 x 205 x 58 mm (5.31" x 8.07" x 2.28") |

¹⁾ According to DIN 2413, DIN 17457

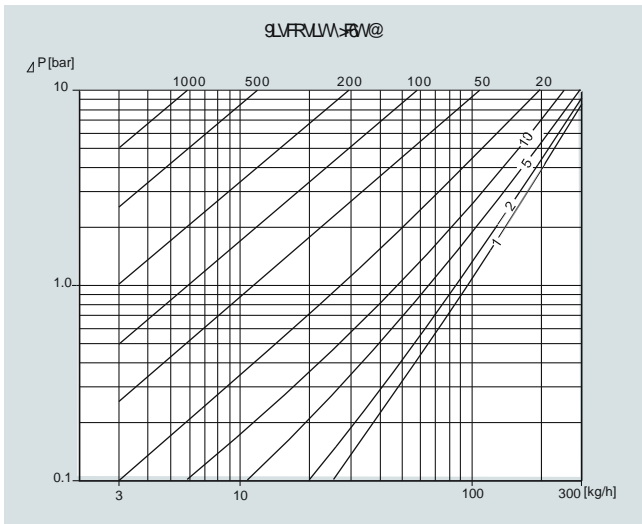
²⁾ Housing is not rated for pressure containment.

Characteristic curves

Pressure drop



Stainless steel 316L/1.4404



Hastelloy C22/2.4602

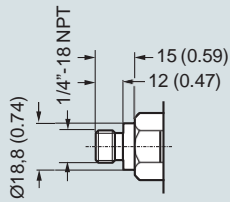
Flow Measurement

SITRANS F C

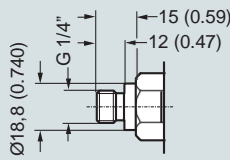
SITRANS F C sensor FC300 DN 4 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

Dimensional drawings

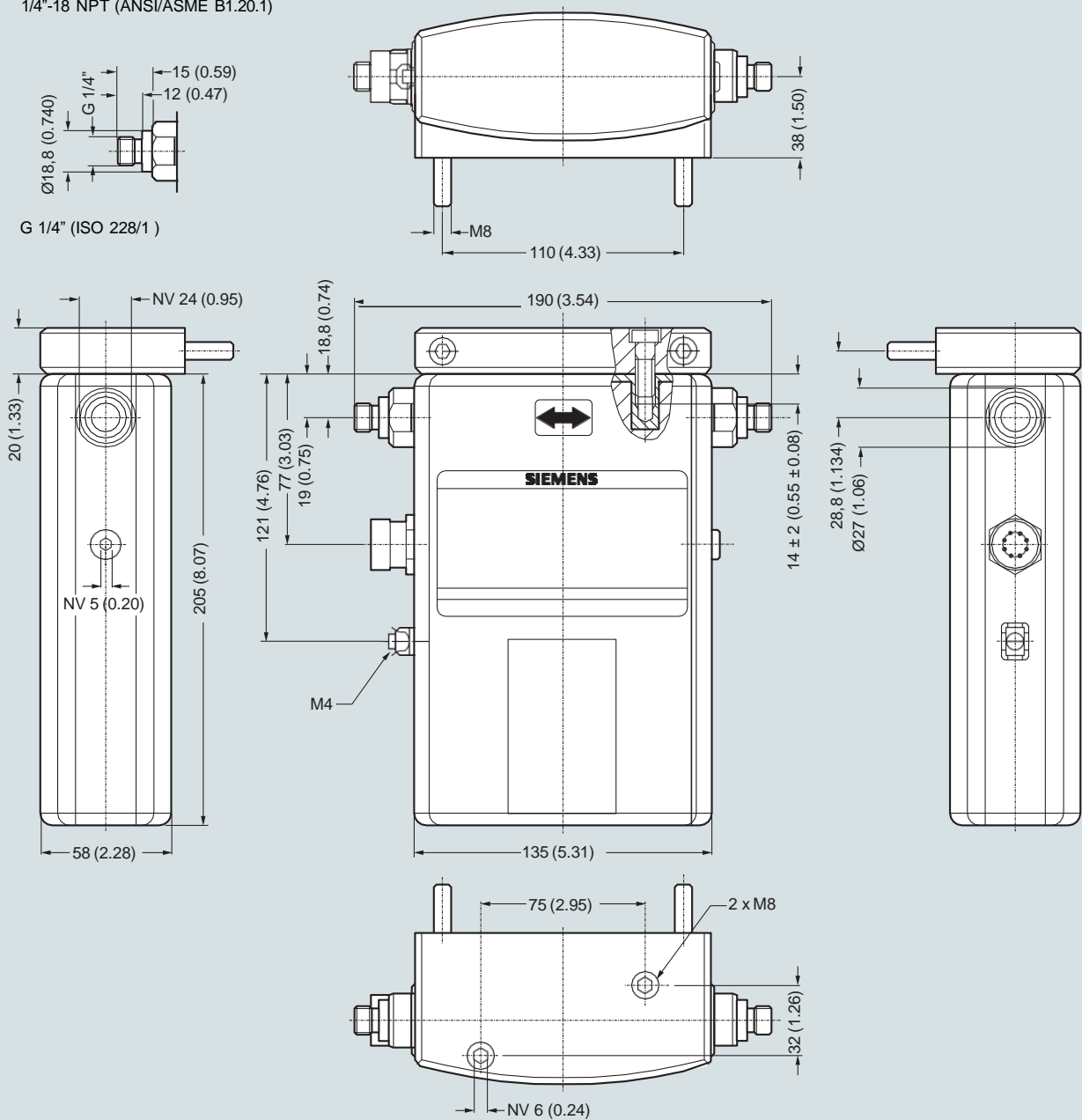
SITRANS FC300 DN 4



1/4"-18 NPT (ANSI/ASME B1.20.1)



G 1/4" (ISO 228/1)



SITRANS FC300, dimensions in mm (inch)

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/cm³ with a typical repeatability better than 0.0001 to 0.0002 g/cm³
- 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 Sensor Flash/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 variety 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.

Flow Measurement

SITRANS F C

SITRANS F C sensor MASS 2100 DI 3, DI 6 and DI 15 with SITRANS FCT010, FCT030 and SIFLOW FC070 transmitter

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 FCT010, FCT030 and MASS 6000 (none CE) transmitters for compact and remote installation as well as SIFLOW FC070 standard and Ex type transmitters.

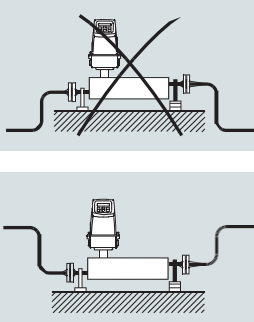
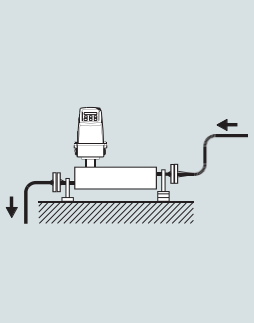
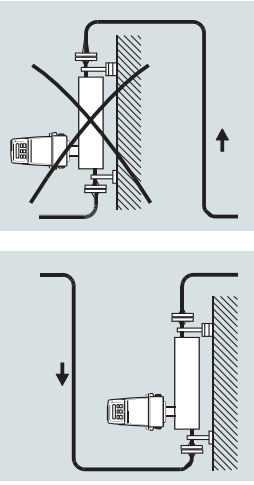
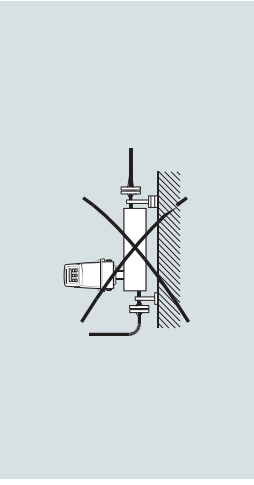
All sensors are delivered with a Sensor Flash or SENSORPROM containing all information about calibration data, identity and factory pre-programming of transmitter settings.

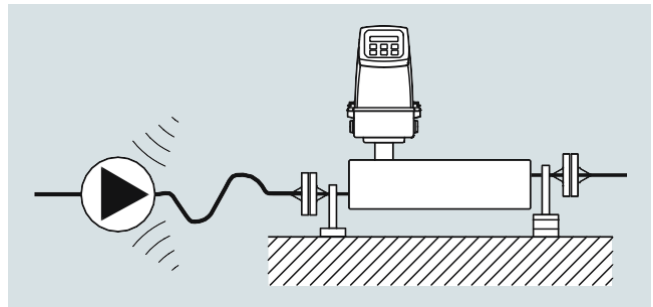
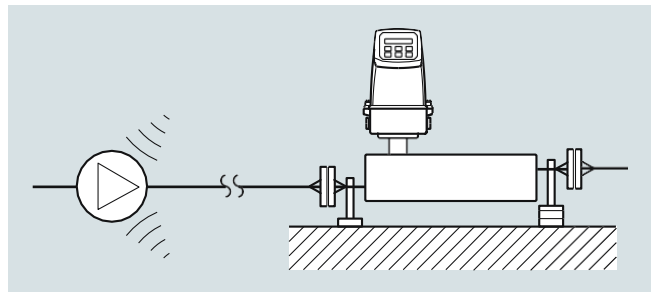
Installation guidelines MASS 2100 DI 3 ... DI 15 (1/8" ... 1/2")

Installation of sensor

In order to perform according to given specifications for flow and density accuracy, the sensor must be installed using rigid mounting brackets as shown in the installation examples.

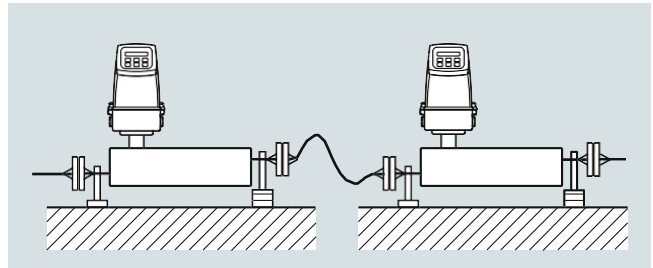
If the liquid is volatile or contains solid particles, vertical mounting is not recommended.

| | Liquid | Gas |
|-------------------|---|---|
| Horizontal |  |  |
| Vertical |  |  |



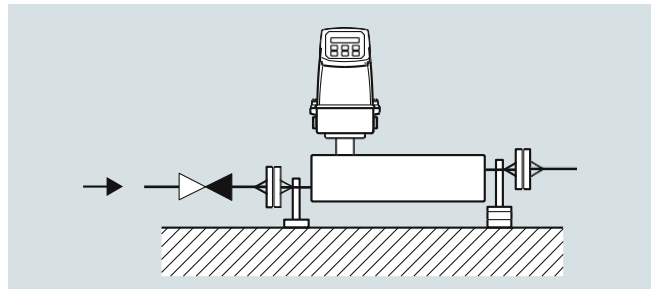
Vibration

Always locate the flowmeter as far away as possible from components that generate mechanical vibration in the piping.



Cross talk

Cross talk between sensors mounted close to each other may disturb the measurement. To avoid cross talk never mount more than one meter on each frame and mount flexible hose connections between the sensors as shown.



Zero point adjustment

To facilitate zero point adjustment a shut-off valve should always be mounted in connection with the sensor as a proper zero point setting is essential for a good accuracy.