

SITRANS F flowmeters

SITRANS F C

Flow sensor SITRANS FC300

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 range 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 range better than 100 : 1
- Densitometer performance available through a density accuracy better than 0.001 g/cm³ (0.000036 lb/inch³) with a 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 & 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 & SENSORPROM enable true „plug & play“. Installation and commissioning in less than 10 min.
- Intrinsically safe Ex-design ia IIC as standard
- Sensor pipe available in high-quality AISI 316L stainless steel W 1.4435 or Hastelloy C22 W 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 & fragrances
Pharmaceutical industry	High-speed dosing and coating of pills, filling of ampuls/injectors
Food & beverage industry	Filling, dosing of flavorings, colors and additives, in-line density measurement Measurement and dosing of liquid or gaseous CO ₂
Automotive industry	Fuel injection nozzle & 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 or Hastelloy C22 with 1/4"-NPT or G1/4"-ISO process connections.

The enclosure is made of stainless steel AISI 316L W 1.4409 with a grade of encapsulation of IP66/NEMA4. 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 coriolis force of movement, see "System information SITRANS F C coriolis mass flowmeters".

Integration

The sensor can be connected to all MASS 6000 transmitters for remote installation only.

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

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 is low or the liquid contains solid particles or air bubbles.

Horizontal installation as shown in figure B can be used for liquid applications especially where the flow velocity exceeds 1 m/s.

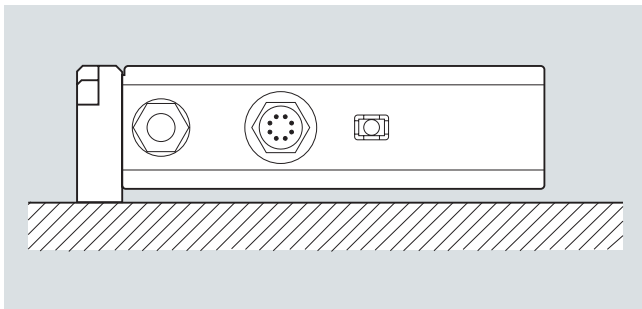
Vertical installation as shown in figure C can be used for liquid or gas applications.

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.

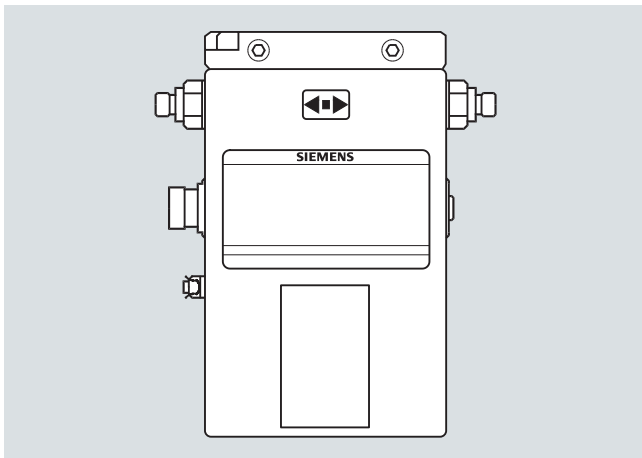
- To ensure that the sensor does not become partly empty, there must be a sufficient counter-pressure on the unit min. 0.1 to 0.2 bar.
- Mount the sensor on a vibration-free and plane wall or steel frame
- Locate the sensor low in the system in order to avoid under-pressure in the sensor separating air/gas 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)

Horizontal 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	0.0015 g/cm ³ (0.000036 lb/inch ³)
Repeatability error	0.0002 g/cm ³ (0.0000072 lb/inch ³)
Temperature	
Standard	-40 ... +115 °C (-40 ... +239 °F)
High-temperature version	-40 ... +180 °C (-40 ... +356 °F)
Temperature error	0.5 °C
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	410 bar (5945 psi) at 20 °C (68 °F)
Materials	W 1.4435 (AISI 316L) Stainless steel
Measuring pipe and connection	W 2.4602 (Hastelloy C22)
Enclosure²⁾	
Material	W 1.4404 (AISI 316L) Stainless steel
Enclosure grade	IP67/NEMA4
Connection thread	
ISO 228/1	G1/4" male
ANSI/ASME B1.20.1	1/4" NPT male
Ex approval	EEx ia IIC T3-T6 05ATEX138072X UL/CSA
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.

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Flow sensor SITRANS FC300

Selection and Ordering data

Order No. Order code

SITRANS F C Flow sensors

SITRANS FC300 DN 4 (1/6") sensor, without heating jacket¹⁾

7ME4400-

- A

Pipe material and temperature

Stainless steel W 1.4435/316L

115 °C (239 °F)

180 °C (356 °F)

1 G

1 H

W 2.4602/Hastelloy C22

115 °C (239 °F)

180 °C (356 °F)

2 G

2 H

Pressure

PN 100

PN 130 (316L)

PN 410 (C22)

D

G

Q

Process connection

Pipe thread

G 1/4" male

1/4" NPT male

1 0

1 1

Configuration

Standard

Density

Brix/Plato

Fraction (specification required)

1

2

3

9

N O Y

Cable

No cable

5 m (16 ft) cable

10 m (32 ft) cable

25 m (82 ft) cable

50 m (164 ft) cable

75 m (246 ft) cable

150 m (492 ft) cable

A

B

C

D

E

F

G

Calibration

Standard calibration 3 flow x 2 points

Standard calibration matched pair 3 flow x 2 points

Accredited calibration matched pair 5 flow x 2 points (DANAK)

Extended calibration customer-specified select Y60, Y61, Y62 or Y63 (see additional information)

1

2

3

8

This device is shipped with a Quick Start manual and the SITRANS F literature CD containing operating instructions, quick starts and certificates.

¹⁾ Not possible to order DN 4 sensor with heating jacket

Selection and Ordering data

Order code

Additional information

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

Pressure testing certificate PED: 97/23/EC

C11

Material certificate EN 10204-3.1

C12

Welding certificate NDT-Penetrant: ISO 3452

C13

Factory certificate according to EN 10204 2.2

C14

Factory certificate according to EN 10204 2.1

C15

Tag name plate, stainless steel

Y17

Tag name plate, plastic

Y18

Customer-specific transmitter setup

Y20

Customer-specified, matched pair (5x2)

Y60

Customer-specified calibration (5x2)

Y61

Customer-specified, matched pair (10x1)

Y62

Customer-specified calibration (10x1)

Y63

Cleaned for oil and grease

Y80

Special version

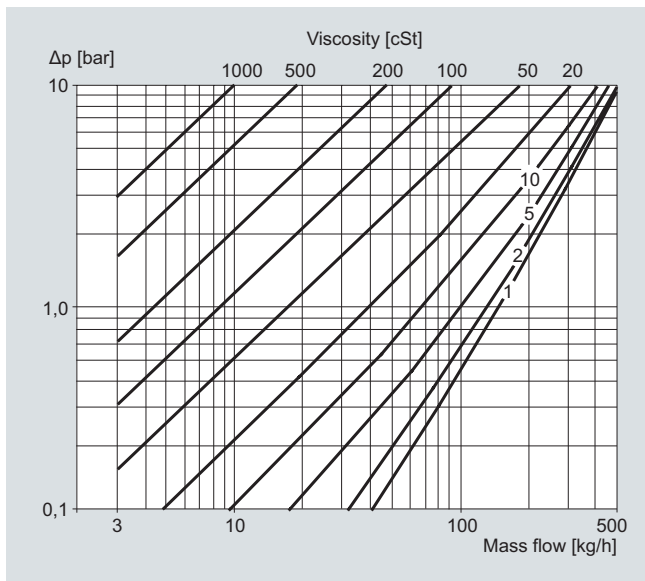
Y99

Spare parts

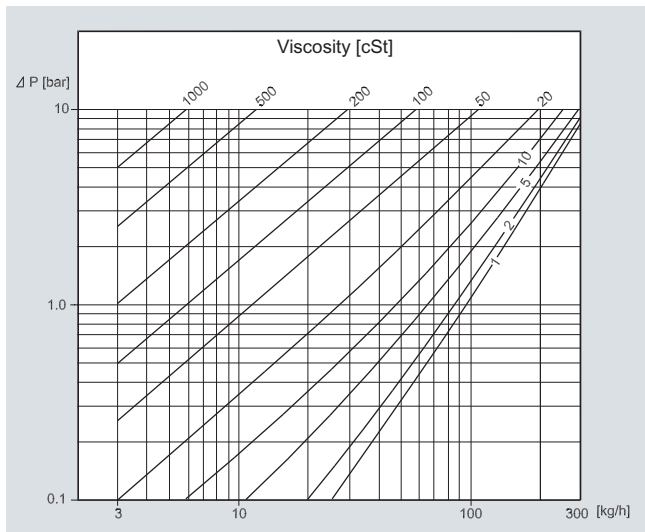
Description	Order No.
Multiple plug for cable mounting	FDK-083H5056
Cable with multiple plug	5 m (16.4 ft) FDK-083H3015
Standard blue cable between MASS 6000 and MASS 2100,	10 m (32.8 ft) FDK-083H3016
5 x 2 x 0.34 mm ² twisted and screened in pairs.	25 m (82 ft) FDK-083H3017
Temperature range -20 °C ... +110 °C (-4 °F ... +230 °F)	50 m (164 ft) FDK-083H3018
	75 m (246 ft) FDK-083H3054
	150 m (492 ft) FDK-083H3055
2 kB SENSORPROM unit (Sensor Serial No. and Order No. must be specified by ordering)	FDK-083H4410
Bracket	A5E02590427

Characteristic curves

Pressure drop



Stainless steel 316L



Hastelloy C22

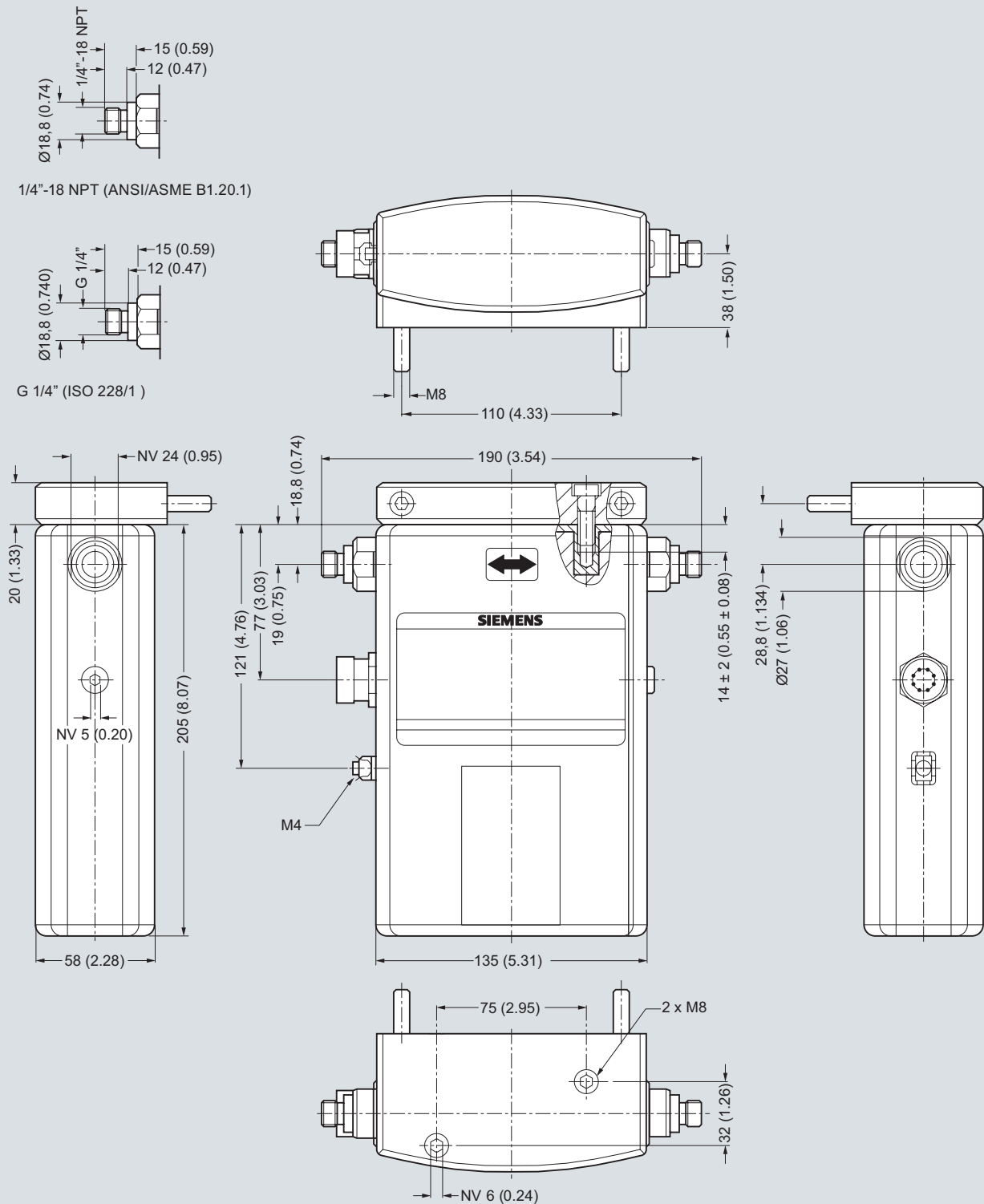
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Dimensional drawings

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SITRANS FC300, dimensions in mm (inch)