

## Flow Measurement

### SITRANS F C

#### Flow sensor MASS 2100 DI 1.5

##### Overview



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

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

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

##### Benefits

- High accuracy better than 0.1 % of mass flow rate
- Large dynamic turn-down ratio better than 500:1, from 30 kg/h to below 100 g/h
- Densitometer performance available through a density accuracy better than 0.001 g/cm<sup>3</sup> with a repeatability better than 0.0002 g/cm<sup>3</sup>.
- 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:

<b>Chemical industry</b>	Liquid and gas measurement within Miniplant and R & D, dosing of additives and catalysts
<b>Cosmetic industry</b>	Dosing of essence and fragrances
<b>Pharmaceutical industry</b>	High-speed dosing and coating of pills, filling of ampuls/injectors
<b>Food and beverage industry</b>	Dosing of flavourings, colours and additives, density measurement, inline measurement of liquid or gaseous CO <sub>2</sub>
<b>Automotive industry</b>	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 1/4" NPT or 1/4" 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.



**Function**

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

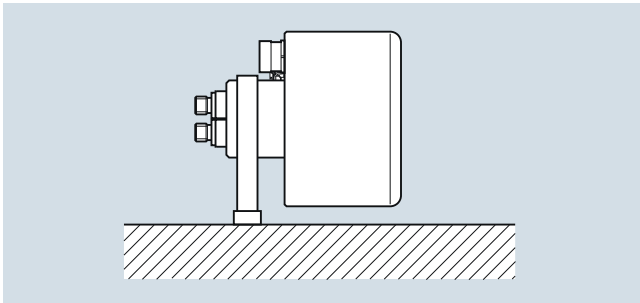
**Integration**

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

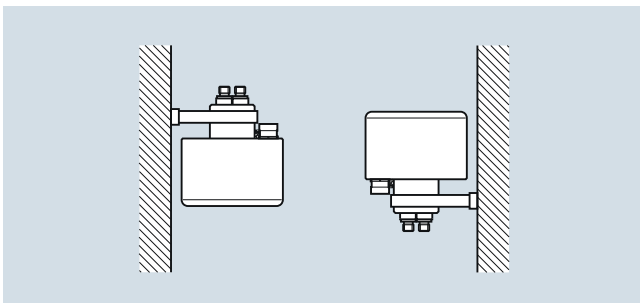
All sensors are delivered with a SENSORPROM containing all information about calibration data, identity and factory pre-programming of transmitter settings

**Installation guidelines 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)

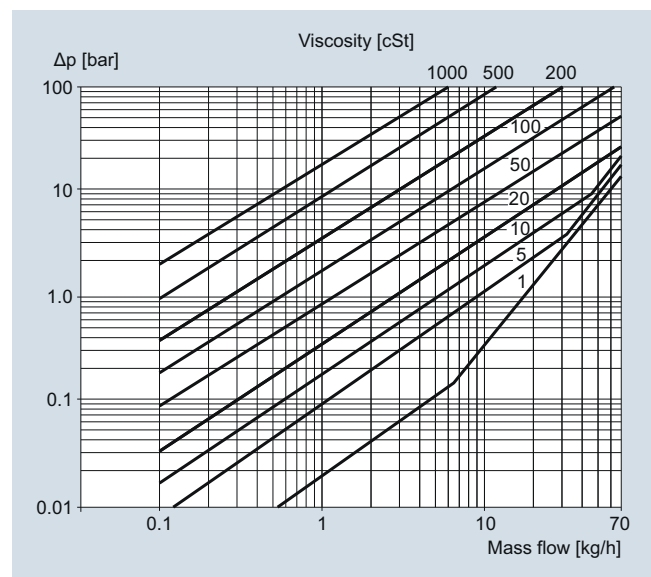
**Technical specifications**

<b>Inside pipe diameter</b> (sensor consists of one continuous pipe)	1.5 mm (0.06")
<b>Pipe wall thickness</b>	0.25 mm (0.010")
<b>Mass flow measuring range</b>	0 ... 30 kg/h (0 ... 66 lb/h)
<b>Density</b>	0 ... 2.9 g/cm <sup>3</sup> (0 ... 0.10 lb/inch <sup>3</sup> )
<b>Fraction e.g.</b>	0 ... 100 °Brix
<b>Temperature</b>	
Standard	-50 ... +125 °C (-58 ... +257 °F)
High-temperature version	-50 ... +180 °C (-58 ... +356 °F)
<b>Liquid pressure measuring pipe<sup>1)</sup></b>	
Stainless steel	230 bar (3336 psi) at 20 °C (68 °F)
Hastelloy C22/2.4602	365 bar (5294 psi) at 20 °C (68 °F)
<b>Materials</b>	
Measuring pipe and connection	Stainless steel AISI 316L/1.4435 Hastelloy C22/2.4602
<b>Enclosure and enclosure material<sup>2)</sup></b>	IP65 and stainless steel AISI316L/1.4404
<b>Connection thread</b>	
ISO 228/1	G1/4" male
ANSI/ASME B1.20.1	1/4" NPT male
<b>Cable connection</b>	Multiple plug connection to sensor 5 x 2 x 0.35 mm <sup>2</sup> twisted and screened in pairs, ext. Ø 12 mm
<b>Ex-version</b>	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
<b>Weight approx.</b>	2.6 kg (5.73 lb)

<sup>1)</sup> According to DIN 2413, DIN 17457

<sup>2)</sup> 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/m<sup>3</sup>

# Flow Measurement

## SITRANS F C

### Flow sensor MASS 2100 DI 1.5

Selection and Ordering data	Article No.	Ord. code
<b>SITRANS F C Flow sensors</b>	7ME4100-	
<b>MASS 2100 DI 1.5 (1/16") sensor</b>		
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
<b>Diameter</b>		
Stainless steel AISI 316L/1.4435	1 A	
DI 1.5, max. 125 °C (257 °F)	1 B	
DI 1.5, max. 180 °C (356 °F)		
Hastelloy C22/2.4602	2 A	
DI 1.5, max. 125 °C (257 °F)	2 B	
DI 1.5, max. 180 °C (356 °F)		
<b>Pressure</b>		
PN 100	D	
PN 230 (AISI 316L/1.4404)	L	
PN 365 (C22/2.4602)	P	
<b>Process connection/flange</b>		
Pipe thread		
G 1/4" male	1 0	
1/4" NPT male	1 1	
<b>Configuration</b>		
Standard	1	
Density	2	
Brix/Plato	3	
Fraction (specification required)	9	N O Y
<b>Transmitter</b>		
No transmitter, sensor and adapter only	A	
MASS 6000, Ex d, stainless steel enclosure, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC with Ex d e ib [ia Ga] IIC T4 Gb Ex-approval.	B	
MASS 6000, IP67, Polyamide enclosure, cable glands M20, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC.	C	
MASS 6000, IP67, Polyamide enclosure, cable glands M20, 1 current, 1 freq./pulse and 1 relay output, 115/230 V AC 50/60 Hz	D	
MASS 6000, IP67, Polyamide enclosure, cable glands 1/2" NPT, 1 current, 1 freq./pulse and 1 relay output, 24 V AC/DC	E	
MASS 6000, IP67, Polyamide enclosure, cable glands 1/2" NPT, 1 current, 1 freq./pulse and 1 relay output, 115/230 V AC 50/60 Hz, 1/2" NPT	F	
<b>Cable</b>		
No cable	A	
5 m (16.4 ft) cable	B	
10 m (32.8 ft) cable	C	
25 m (82 ft) cable	D	
50 m (164 ft) cable	E	
75 m (246 ft) cable	F	
150 m (492 ft) cable	G	
<b>Calibration</b>		
Standard calibration 3 flow x 2 points	1	
Standard calibration matched pair 3 flow x 2 points	2	
Accredited calibration matched pair 5 flow x 2 points (DANAK)	3	
Extended calibration customer-specified select Y60, Y61, Y62 or Y63 (see additional information)	8	

Selection and Ordering data	Order code
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#### Additional information

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

Pressure testing certificate PED: 2014/68/EU	<b>C11</b>
Material certificate EN 10204-3.1	<b>C12</b>
Welding certificate NDT-Penetrant: ISO 3452	<b>C13</b>
Factory certificate according to EN 10204 2.2	<b>C14</b>
Factory certificate according to EN 10204 2.1	<b>C15</b>
Tag name plate, stainless steel	<b>Y17</b>
Tag name plate, plastic	<b>Y18</b>
Customer-specific transmitter setup	<b>Y20</b>
Customer-specified, matched pair (5 x 2)	<b>Y60</b>
Customer-specified calibration (5 x 2)	<b>Y61</b>
Customer-specified, matched pair (10 x 1)	<b>Y62</b>
Customer-specified calibration (10 x 1)	<b>Y63</b>
Cleaned for oil and grease	<b>Y80</b>
Special version	<b>Y99</b>

#### Operating instructions for SITRANS F C MASS 2100 DI 1.5

Description	Article No.
• English	<b>A5E03089952</b>

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

All literature is available to download for free, in a range of languages, at [www.siemens.com/processinstrumentation/documentation](http://www.siemens.com/processinstrumentation/documentation)

#### Accessories

Description	Article No.
<b>Cable with multiple plug</b> Standard blue cable between MASS 6000 and MASS 2100, 5 x 2 x 0.34 mm <sup>2</sup> twisted and screened in pairs. Temperature range -20 °C ... +110 °C (-4 °F ... +230 °F)	
• 5 m (16.4 ft)	<b>FDK:083H3015</b>
• 10 m (32.8 ft)	<b>FDK:083H3016</b>
• 25 m (82 ft)	<b>FDK:083H3017</b>
• 50 m (164 ft)	<b>FDK:083H3018</b>
• 75 m (246 ft)	<b>FDK:083H3054</b>
• 150 m (492 ft)	<b>FDK:083H3055</b>



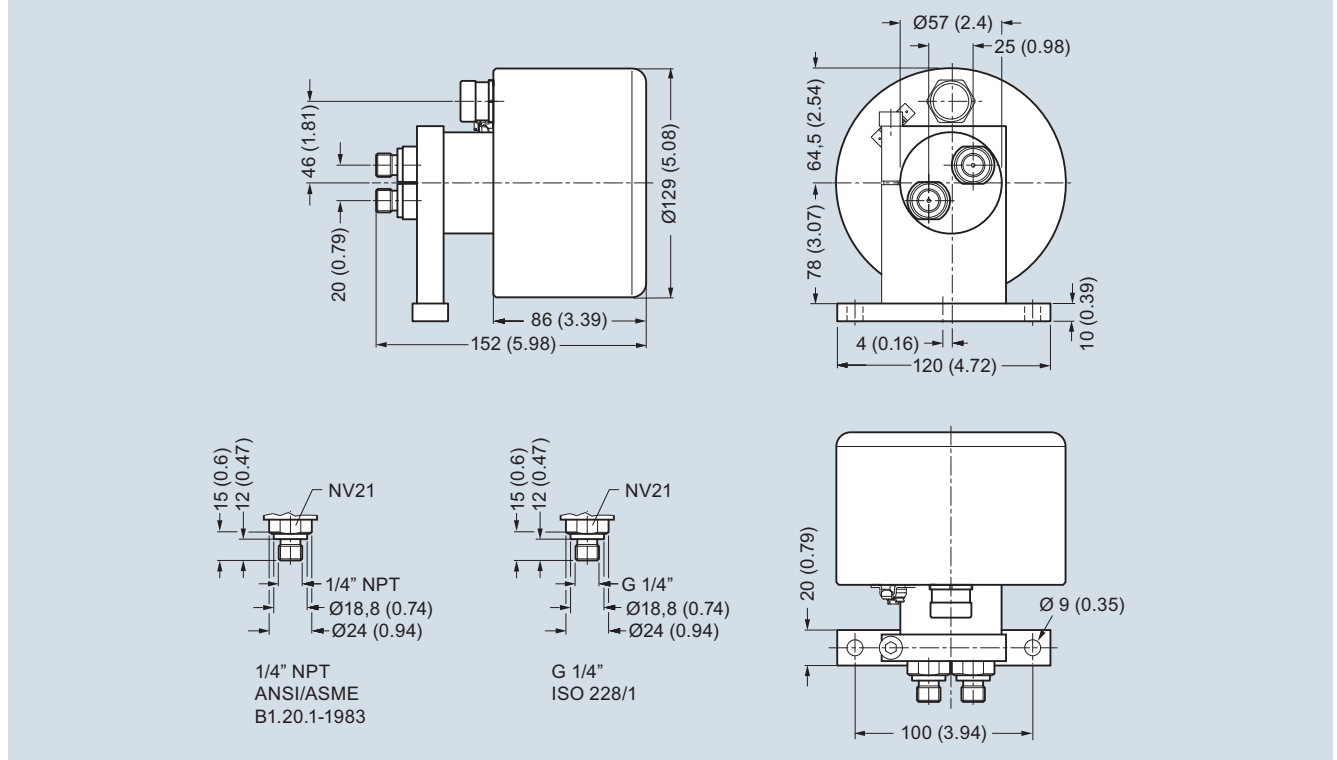
#### Spare parts

Description	Article No.
<b>Multiple plug for cable mounting</b>	<b>FDK:083H5056</b>
<b>2 kB SENSORPROM unit</b> (Sensor Serial No. and Article No. must be specified by ordering)	<b>FDK:083H4410</b>
<b>Bracket</b>	<b>A5E02590427</b>



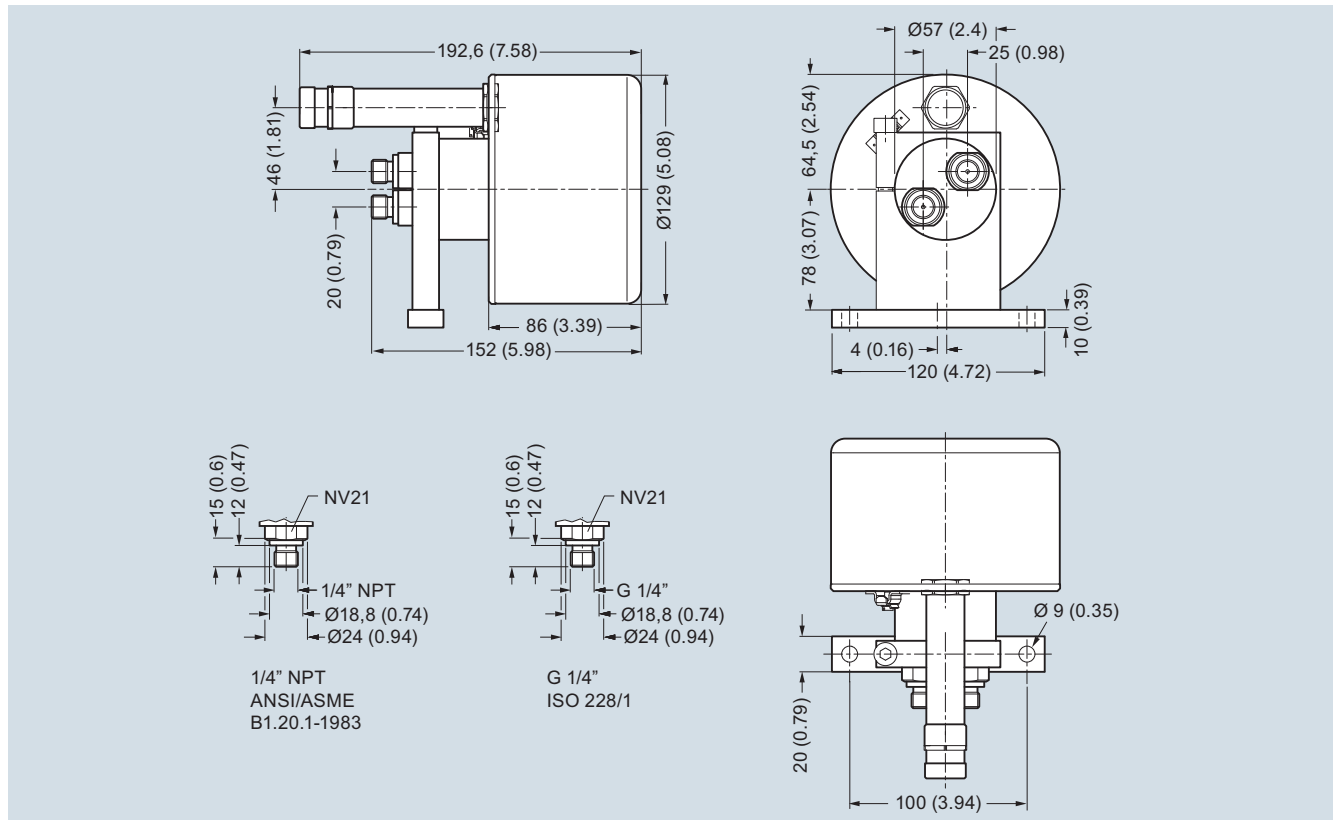
**Dimensional drawings**

MASS 2100 DI 1.5 (1/16")



Dimensions in mm (inch)

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



Dimensions in mm (inch)