

VersaFlow Coriolis 6000 Sensor for Mass Flow Specifications 34-VF-03-27, February 2022



The Solution for extended temperature applications

A high level of performance, together with a wide operating temperature range up to 400°C / 752°F, makes the VersaFlow Coriolis 6000 the ideal choice for mass flow measurement in a wide variety of applications.

High performance meter designed to meet the requirements of general purpose liquid and gas applications, the extended low temperature range of -200°C/-328°F also makes VersaFlow Coriolis 6000 suitable for Liquid Natural Gas (LNG) and cryogenic applications.

Combined with the power of the TWC 9400, the VersaFlow Coriolis 6000 will provide accurate measurement of volume, mass, density and concentration

Features

- Innovative twin V-tube design
- Temperature range -200°C to +400°C
- Optional insulation / heating jacket
- Compact envelope
- Optimized flow divider for minimum pressure loss
- Modular electronics concept: electronics and sensor are easy to replace
- Self-draining when mounted vertically
- Stability with entrained gas, even with gas concentrations 0...100%

Industries

- Water and Wastewater
- Chemical & Petrochemical
- Oil and gas
- Power Plants
- Fertilizer



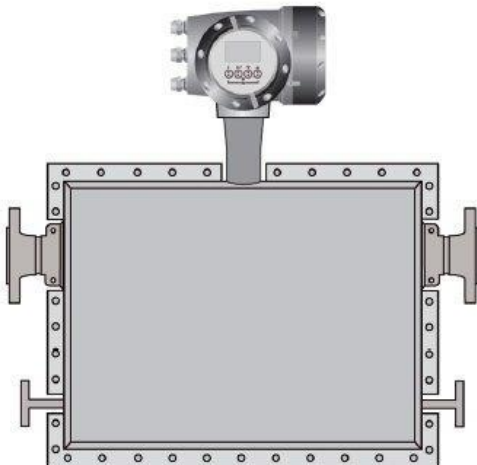
Figure 1 – VersaFlow Coriolis 6000 sensor for mass flow

1. Standard flange process connections available.
2. Modular electronics with a range of output options.
3. Comprehensive diagnostic capabilities.

Applications

- Crystalizing, solidifying and cryogenic products
- Tanker loading
- General purpose applications
- CIP and SIP >130°C
- Liquid Natural Gas (LNG)
- Supercritical gases

Features and Options



Features

- Available as compact or remote.
- Nominal flow rates up to 550000 kg/h / 20209 lb/min.
- Self-draining, when mounted vertically.
- With advanced Entrained Gas Management (EGM) the meter maintains operation over a wide range of gas fractions and complex flow conditions.

Connection Options

- Standard flanges with ratings up to 1500 lb / PN160.
- Supports a wide range of industry standard hygienic connections as specials.
- Optional sealing faces.
- NAMUR NE132 flange lengths

Heating Jacket

- For use with temperature dependent products.
- Prevents solidification of process product.
- The heating case can also be used as a cryogenic insulation case.

Purge Port

- Allows hazardous chemicals to be drained away safely.

Meter / converter combinations

Table 1

Converter		
Configuration	Compact	Remote field
VersaFlow Coriolis 6000	TWC 9400C	TWC 9400F

Measuring principle (twin tube)

Meter from side, showing tube layout

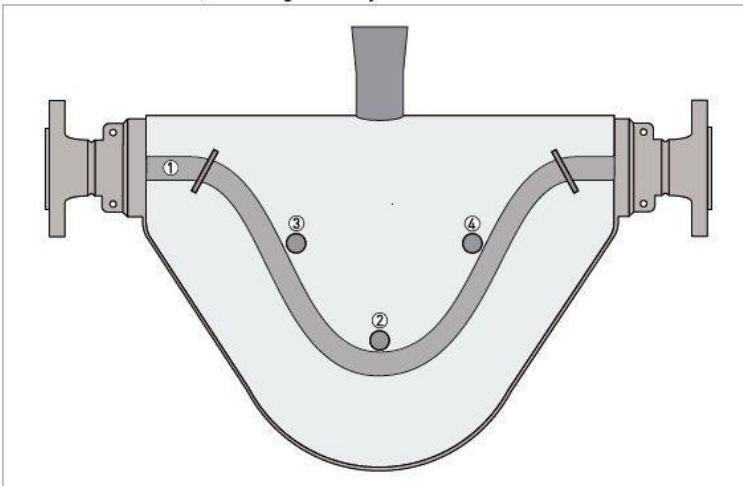


Figure 2 – Meter from side, showing tube layout

- (1) Measuring tubes
- (2) Drive coil
- (3) Sensor 1
- (4) Sensor 2

Static meter not energized and with no flow

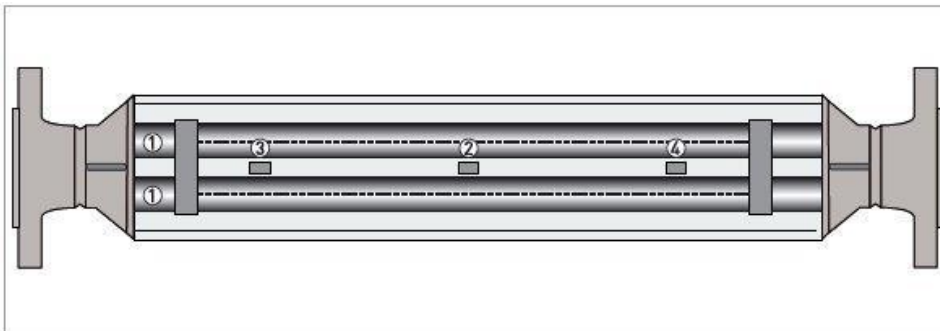
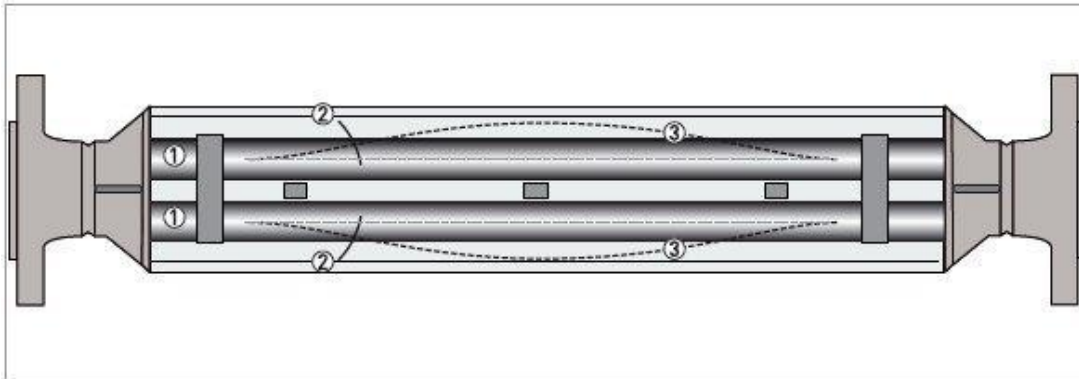


Figure 3 – Static meter not energized and with no flow

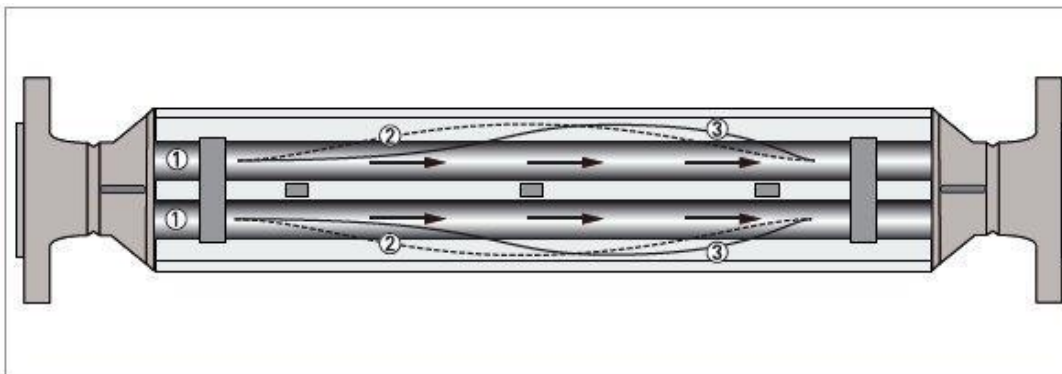
- (1) Measuring tubes
- (2) Drive coil
- (3) Sensor 1
- (4) Sensor 2

A Coriolis twin tube mass flowmeter consists of two measuring tubes 1 a drive coil 2 and two sensors (3 and 4) that are positioned either side of the drive coil.

Energized meter**Figure 4 – Energized meter**

- (1) Measuring tubes
- (2) Direction of oscillation
- (3) Sine wave

When the meter is energized, the drive coil vibrates the measuring tubes causing them to oscillate and produce a sine wave 3. The sine wave is monitored by the two sensors.

Energized meter with process flow**Figure 5 – Energized meter with process flow**

- (1) Process flow
- (2) Sine wave
- (3) Phase shift

When a fluid or gas passes through the tubes, the Coriolis effect causes a phase shift in the sine wave that is detected by the two sensors. This phase shift is directly proportional to the mass flow.

Density measurement is made by evaluation of the frequency of vibration and temperature measurement is made using a Pt500 sensor.

Technical data

The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local sales office.

Table 2

Measuring System	
Measuring principle	Coriolis mass flow
Application range	Mass flow and density measurement of fluids, gases and solids
Measured values	Mass, density, temperature
Calculated values	Volume, referred density, concentration, velocity
Sensor model range	
Stainless Steel 316L 08...200	Compact / remote 100 barg @ 20°C / 1450 psig @ 68°F, temp. range-70°C...+230°C / -94°F...+446°F
	Remote only 100 barg @ 20°C / 1450 psig @ 68°F, temp. range-50°C...+400°C / -58°F...+752°F
	Remote only 100 barg @ 20°C / 1450 psig @ 68°F, temp. range -200°C...+40°C / -364°F...+104°F
Hastelloy® 08...80	Compact / remote 200 barg @ 20°C / 2900 psig @ 68°F, temp. range-70°C...+ 400°C / - 94°F...+ 752°F
	Compact / remote 200 barg @ 20°C / 2900 psig @ 68°F, temp. range -50°C...+400°C / -58°F...+752°F
	Remote only 200 barg @ 20°C / 2900 psig @ 68°F, temp. range -196°C...+40°C / -321°F...+104°F
Duplex Stainless Steel 100...200	Compact / remote 200 barg @ 20°C / 2900 psig @ 68°F, temp. range-50°C...+230°C / -58°F...+446°F
Design	
Basic	System consists of a measuring sensor and a converter to process the output signal
Features	Fully welded maintenance free sensor with dual-straight measuring tube
Variants	
Compact version	Integral converter
Remote version	Available with field, wall or 19" rack mount versions of the converter

Measuring Accuracy

Table 3

Mass (standard)	
Liquid	±0.1% of actual measured flow rate
Liquid	±zero stability (see zero stability below)
Gas	±0.35% of actual measured flow rate + zero stability
Mass (optional)1	
Liquid (≥ 10:1 of nominal flow rate)	±0.05% of actual measured flow rate
Liquid (< 10:1 of nominal flow rate)	± zero stability (see zero stability below)

Table 3 cont'd..

Repeatability	
Liquid	Better than 0.05% plus zero stability (includes the combined effects of repeatability, linearity and hysteresis)
Gas	Better than 0.2% plus zero stability (includes the combined effects of repeatability, linearity and hysteresis)

Table 4

Zero stability		
Meter size	Standard temperature	High temperature
08 (CM71)	< 0.03 kg/h	< 0.05 kg/h
10 (CM72)	< 0.06 kg/h	< 0.10 kg/h
15 (CM73)	< 0.19 kg/h	< 0.30 kg/h
25 (CM74)	< 0.95 kg/h	< 1.52 kg/h
50 (CM75)	< 1.8 kg/h	< 2.8 kg/h
80 (CM76)	< 3.9 kg/h	< 6.24 kg/h
100 (CM77)	< 8.8 kg/h	< 14.0 kg/h
150 (CM78)	< 16.0 kg/h	< 25.6 kg/h
200 (CM79)	< 30.0 kg/h	< 44.0 kg/h
Reference conditions		
Product	Water	
Temperature	+20°C / +68°F	
Operating pressure	1.....6 barg / 14.5.....87 psig	
Effect on sensor zero point caused by a shift in process temperature		
Standard temperature range		
All materials sizes 08...10	0.0010% of nominal flow per 1°C / 0.00056% of nominal flow per 1°F	
All materials sizes 15...200	0.00075% of nominal flow per 1°C / 0.00042% of nominal flow per 1°F	
High temperature range		
All materials sizes 08...200	0.008% of nominal flow per 1°C / 0.0044% of nominal flow per 1°F	
Pressure effect on mass flow rate		
All materials sizes 08...50	0.005% per 1 barg / 0.00034 % per 1 psig	
All materials sizes 80...100	0.0055% per 1 barg / 0.00038 % per 1 psig	
All materials sizes 150...200	0.008% per 1 barg / 0.00055 % per 1 psig	
Density		
Measuring range	100...3000 kg/m ³ / 6...187 lb/ft ³	
Accuracy	±1 kg/m ³ / ±0.06 lb/ft ³	
On site calibration	±0.2 kg/m ³ / ±0.012 lb/ft ³	
Process temperature effect	0.015 g/l per 1°C / 0.0083 g/l per 1°F	
Temperature		
Accuracy	± 0.5°C / ±0.9°F (± 0.5% of reading)	

Operating Conditions

Table 5

Nominal flow rates (1 barg / 14.5 psig pressure drop)	
08 (CM71)	600 kg/h / 22 lb/min
10 (CM72)	1200 kg/h / 44 lb/min
15 (CM73)	3800 kg/h / 139 lb/min
25 (CM74)	19000 kg/h / 698 lb/min
50 (CM75)	35000 kg/h / 1286 lb/min
80 (CM76)	78000 kg/h / 2866 lb/min
100 (CM77)	175000 kg/h / 6430 lb/min
150 (CM78)	320000 kg/h / 11758 lb/min
200 (CM79)	550000 kg/h / 20209 lb/min
	Assumes operating density 1000 kg/m ³ / 62.4 lb/ft ³ . For Hastelloy® meters, assume a pressure drop of 1.15 barg
Maximum flow rates	
All meters	150% of nominal flow rate

Environmental

Table 6

Ambient temperature		
Compact meter	Standard converter	SIL capable converter (Pending)
Aluminium converter	-40...+65°C / -40...+149°F	-40...+55°C / -40...+131°F
Stainless Steel converter	-40...+55°C / -40...+131°F	-40...+55°C / -40...+131°F
Remote versions	Standard converter	SIL capable converter
Standard temperature range	-40...+65°C / -40...+149°F	-40...+55°C / -40...+131°F
Cryogenic temperature range	-20...+65°C / -4...+149°F	-40...+55°C / -40...+131°F
Hazardous Area versions	Refer to temperature limits	
Protection category (Acc. to EN 60529)	IP 67, NEMA 4X	
Vibration (acc IEC 60068-2-6)	10-150-10 Hz with 0.15 mm for 10...60 Hz, 20 m/s ² for 60...150 Hz	
Process temperature		
Standard temperature range (flange connections)	Extended stem	Short stem
Safe area	-70...+230°C / -94...+446°F	-70...+150°C / -94...+302°F
Hazardous area	-50...+230°C / -58...+446°F	-50...+150°C / -58...+302°F
High temperature range	-50...+400°C / -58...+752°F	N/A
Cryogenic temperature range	200...+40°C / -328...+104°F	-200...+40°C / -328...+104°F
Standard temperature range (hygienic connections as specials)	Extended stem	Short stem
Safe area	-70...+150°C / -94...+302°F	-70...+150°C / -94...+302°F
Hazardous area	-50...+150°C / -58...+302°F	-50...+150°C / -58...+302°F

Table 7

Nominal pressure at 20°C / 68°F		
Measuring tube	SS 316 / 316L	Hastelloy® C22 / S31803
FM / PED	-1...100 barg / -14.5...1450 psig	-1...200 barg / -14.5...2900 psig
CRN / ASME B31.3	-1...100 barg / -14.5...1450 psig	Pending
Outer casing burst pressure		
08 (CM71)	≈ 100 barg	
10 (CM72)		
15 (CM73)		
25 (CM74)		
50 (CM75)	≈ 70 barg	
80 (CM76)		
100 (CM77)	≈ 10 barg	
150 (CM78)		
200 (CM79)		
If the process temperature is higher than 20°C / 68°F, the burst pressure will be lower. For more information, please contact the manufacturer.		
Fluid properties		
Permissible physical condition	Liquids, gases, slurries	
Permissible gas content (volume)	Contact manufacturer for information.	
Permissible solid content (volume)	Contact manufacturer for information.	
Installation conditions		
Inlet runs / Outlet runs	None required	

Materials

Table 8

Stainless Steel (316 / 316L) meter	
Measuring tubes / Flanges	Stainless Steel AISI 316 / 316L (1.4401 / 1.4404) dual certified
Spigot	Stainless Steel CF3M (1.4409)
Bridge	Stainless Steel AISI 304 / 304L (1.4301 / 1.4307) dual certified or AISI 316 / 316L (1.4401 / 1.4404) dual certified
Outer casing	Stainless Steel AISI 316 / 316L (1.4401 / 1.4404) dual certified
Stainless Steel (S31803) meter	
Measuring tubes / Flanges	Stainless Steel UNS 31803 (1.4462)
Spigot	Stainless Steel J92205 (1.4470)
Bridge	Stainless Steel AISI 304 / 304L (1.4301 / 1.4307) dual certified or AISI 316 / 316L (1.4401 / 1.4404) dual certified
Outer casing	Stainless Steel AISI 316 / 316L (1.4401 / 1.4404) dual certified
Hastelloy® C22 meter	
Measuring tubes / raised face	Hastelloy® C22
Backing flanges	Stainless Steel AISI 316 / 316L (1.4401 / 1.4404) dual certified

Table 8 cont'd.

Bridge	Stainless Steel AISI 316 / 316L (1.4401 / 1.4404) dual certified
Outer casing	Stainless Steel AISI 316 /316L (1.4401) dual certified
Heating jacket version	
Heating loop and insulation jacket	Stainless Steel AISI 316 (1.4401)
All versions	
Junction box (remote version)	Die cast Aluminium (polyurethane coating)
	Optional Stainless Steel 316 (1.4401)

Process Connections

Table 9

Flange	
DIN (EN 1092-1 2007)	DN10...200 / PN16...160
ASME (B616.5)	1/2"...8" / ASME 150...1500
JIS	10A...100A / 10...20K (10K maximum allowable temperature 300°C / 572°F)

Electrical Connections

Table 10

Electrical connections	For full details, including power supply, power consumption etc., see technical data for the relevant converter.
I/O	For full details of I/O options, including data streams and protocols, see technical data for the relevant converter.

Approvals

Table 11

Mechanical	
CE	The device fulfils the statutory requirements of the CE directive. The manufacturer certifies that these requirements have been met by applying the CE mark.
CRN	acc to: ASME B31.3 (most recent and up to date version)
NACE	MR0175 / ISO 15156 ("Sulphide Stress Corrosion Cracking Resistant Metallic Materials for Oil Field Equipment") and MR0103 ("Materials Resistant to Sulfide Stress Cracking in Corrosive Petroleum Refining Environments") (most recent and up to date versions)
IECEX	Available
Custody Transfer	OIML R117-1

Table 12

ATEX (most recent and up to date version)	
Coriolis 6000 with TWC 9400C non-Ex i signal outputs	
Ex d connection compartment	II 1/2 G Ex d ia IIC T6....T1 Ga/Gb
	II 2 D Ex t IIIC T270°C Db
Ex e connection compartment	II 1/2 G Ex de ia IIC T6....T1 Ga/Gb
	II 2 D Ex t IIIC T270°C Db
Coriolis 6000 with TWC 9400C Ex i signal outputs	
Ex d connection compartment	II 1/2(1) G Ex d ia [ia Ga] IIC T6....T1 Ga/Gb
	II 2(1) D Ex t [ia Da] IIIC T270°C Db
Ex e connection compartment	II 1/2(1) G Ex de ia [ia Ga] IIC T6....T1 Ga/Gb
	II 2(1) D Ex t [ia Da] IIIC T270°C Db
Coriolis 6000 with TWC 9400F	II 1 G Ex ia IIC T6...T1 Ga
	II 1 D Ex ia IIIC T270°C Da
	II 1 D Ex ia IIIC T440°C Da

(1) For information only. Secondary pressure containment is NOT supplied on this meter

Table 13

ATEX temperature limits					
	Ambient temp. Tamb °C	Max. medium temp. Tm °C	Temp. class	Max. surface temp. °C	
Coriolis 6000 with or without heating jacket / insulation	-40...40	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
	-40...50	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
	-40...65	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
Cryogenic version	-25...65	-140...40	T6-T1	T80	
		-160...40			
	-20...65	-180...40			
		-200...40			
Coriolis 6000 with TWC 9400C, Aluminium converter housing - with or without heating jacket / insulation	-40...40	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
	-40...50	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
	-40...65	65	T4-T1	T105	
	Cryogenic version	-35...65	-140...40	T6-T1	T80
			-160...40		
-30...65		-180...40			
-25...65	-200...40				
Coriolis 6000 with TWC 9400C Stainless Steel converter housing - with or without heating jacket / insulation	-40...40	40	T6-T1	T80	
		55	T5-T1	T95	

	Ambient temp. Tamb °C	Max. medium temp. Tm °C	Temp. class	Max. surface temp. °C	
Coriolis 6000 with TWC 9400C Stainless Steel converter housing - with or without heating jacket / insulation	-40...40	90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
	-40...50	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
	-40...60	60	T4-T1	T100	
	Cryogenic version	-35...60	-140...40	T6 - T1	T80
-30...60		-160...40			
-25...+60		-180...40			
High temperature version					
Coriolis 6000 with TWC 9400F- HT with aluminum junction box, heating jacket and insulation	-40...40	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
		400	T1	T440	
	-40...55	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
		400	T1	T440	
	-40...60	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
		400	T1	T440	
	-40...65	350	T1	T390	
	Coriolis 6000 with TWC 9400F - HT with SS junction box, heating jacket and insulation	-40...40	40	T6 - T1	T80
			55	T5 - T1	T95
			90	T4 - T1	T130
			150	T3 - T1	T190
			230	T2 - T1	T270
400			T1	T440	
-40...50		40	T6 - T1	T80	

	Ambient temp. T _{amb} °C	Max. medium temp. T _m °C	Temp. class	Max. surface temp. °C	
Coriolis 6000 with TWC 9400F - HT with SS junction box, heating jacket and insulation	-40...50	55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
		400	T1	T440	
	-40...55	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
		400	T1	T440	
	-40...60	350	T1	T390	
	Coriolis 6000 with TWC 9400F - HT with aluminum junction box, heating jacket and insulation	-40...40	40	T6 - T1	T80
			55	T5 - T1	T95
			90	T4 - T1	T130
150			T3 - T1	T190	
230			T2 - T1	T270	
400			T1	T440	
-40...55		40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
		400	T1	T440	
40...65		40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
		400	T1	T440	

Maximum End Loadings

Table 14

		S08/ S10 (CM71/ CM72)	S15 (CM73)	S25 (CM74)	S50 (CM75)	S80 (CM76)	S100 (CM77)	S150 (CM78)	S200 (CM79)
Flanges									
20°C	40 barg	15 kN	25 kN	38 kN	48 kN	99 kN	130 kN	250 kN	300 kN
	100 barg	12 kN	17 kN	19 kN	15 kN	20 kN	100 kN	120 kN	150 kN
230°C	32 barg	7 kN	12 kN	18 kN	25 kN	45 kN	60 kN	50 kN	100 kN
	60 barg	5 kN					20kN		
400°C	27.4 barg	5 kN	6 kN	10 kN	12 kN	20 kN	50 kN	80 kN	100 kN
	40 barg	4 kN	5 kN				20kN		
Hygienic (all connections) *									
150°C	10 barg	5kN	9 kN	12 kN	12 kN	18 kN	21 kN	N/A	N/A
140°C	40 barg	3 kN	5 kN	5 kN	N/A	N/A	N/A	N/A	N/A
	25 barg	N/A	N/A	N/A	9 kN	N/A	N/A	N/A	N/A
	16 barg	N/A	N/A	N/A	N/A	12 kN	12 kN	N/A	N/A
Heating jacket connections									
(1)		0 kN	0 kN	0 kN	0 kN	0 kN	0 kN	0 kN	0 kN

(1) All temperature and pressure ranges

* Available as specials

Maximum End Loadings (Hastelloy® and Stainless Steel UNS S31803)

Table 15

		H08/ H 10 (CM71/C M72)	H 15 (CM73)	H 25 (CM74)	H 50 (CM75)	H 80 (CM76)	H 100 (CM77)	H 150 (CM78)	H 200 (CM79)
Flanges (not including CRN)									
20°C	200 barg	12 kN	17 kN	19 kN	15 kN	20 kN	100 kN	120 kN	
230°C	145 barg	5 kN				20 kN			
Flanges (CRN regions)									
20°C	200 barg (1)	12 kN	17 kN	19 kN	15 kN	20 kN	60 kN	30 kN	10 kN
230°C	145 barg (2)	5 kN				20 kN			
Heating jacket connections									
(3)		0 kN	0 kN	0 kN	0 kN	0 kN	0 kN	0 kN	0 kN

(1) D200 limited to 180 barg at 20°C

(2) D100 and D150 limited to 120 barg at 230°C. D200 limited to 110 barg at 230°C

(3) All temperature and pressure ranges

- DN08...50 (axial) loads have been calculated, based on 316L schedule 40 process pipework, where un-radiographed butt welds have been used in pipe joints.
- DN80...200 (axial) loads have been calculated, based on 316L schedule 80 process pipework, where un-radiographed butt welds have been used in pipe joints.
- The loads shown are the maximum permitted static load. If loads are cycling (between tension and compression) these loads should be reduced. For advice, consult the manufacturer.

Measuring Accuracy

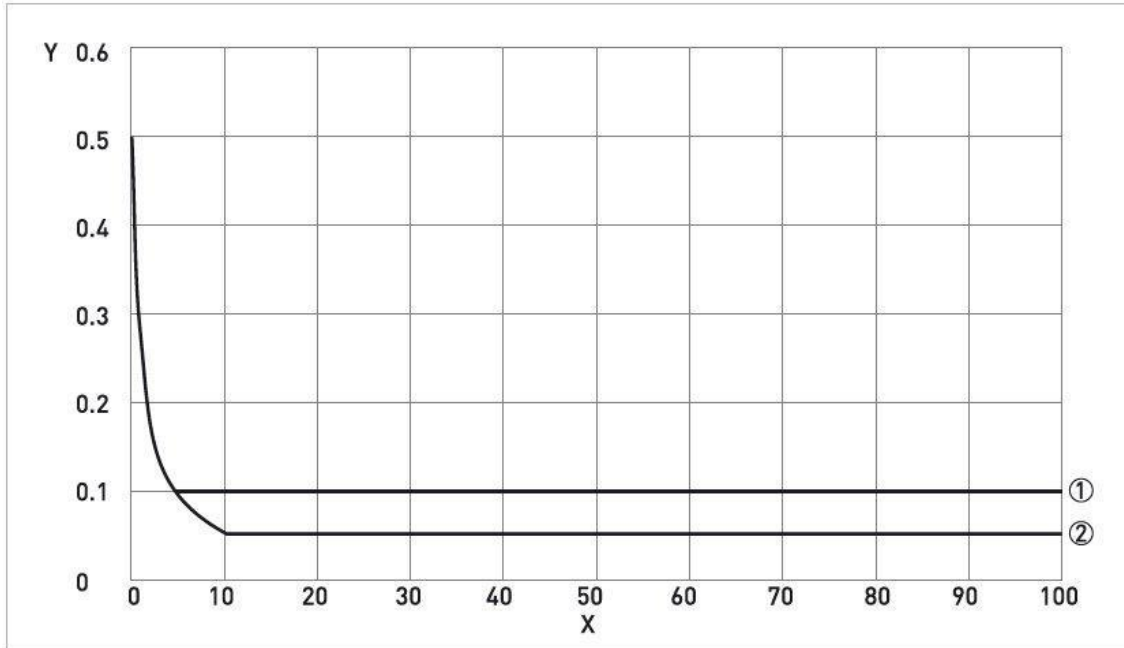


Figure 6 – Measuring Accuracy

X nominal flow rate [%]

Y measuring error [%]

(1) Standard measuring accuracy

(2) Optional measuring accuracy (not available in SIL mode)

Measuring Error

The measuring error is obtained from the combined effects of accuracy and zero stability.

Reference Conditions

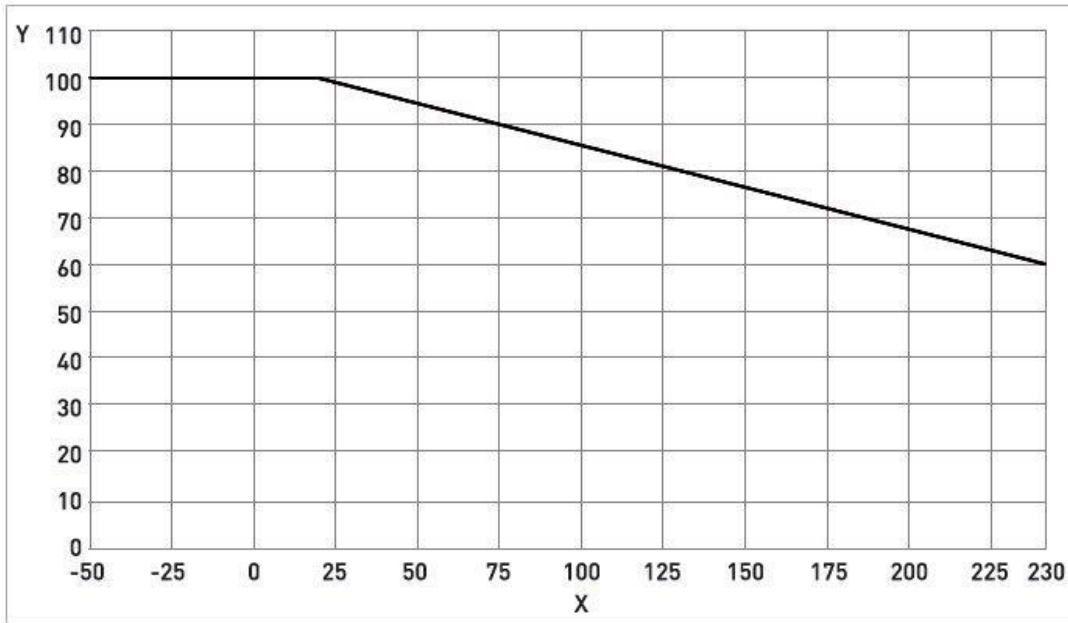
Table 16

Product	Water
Temperature	+20°C / +68°F
Operating pressure	1 barg / 14.5 psig

Guidelines for maximum operating pressure

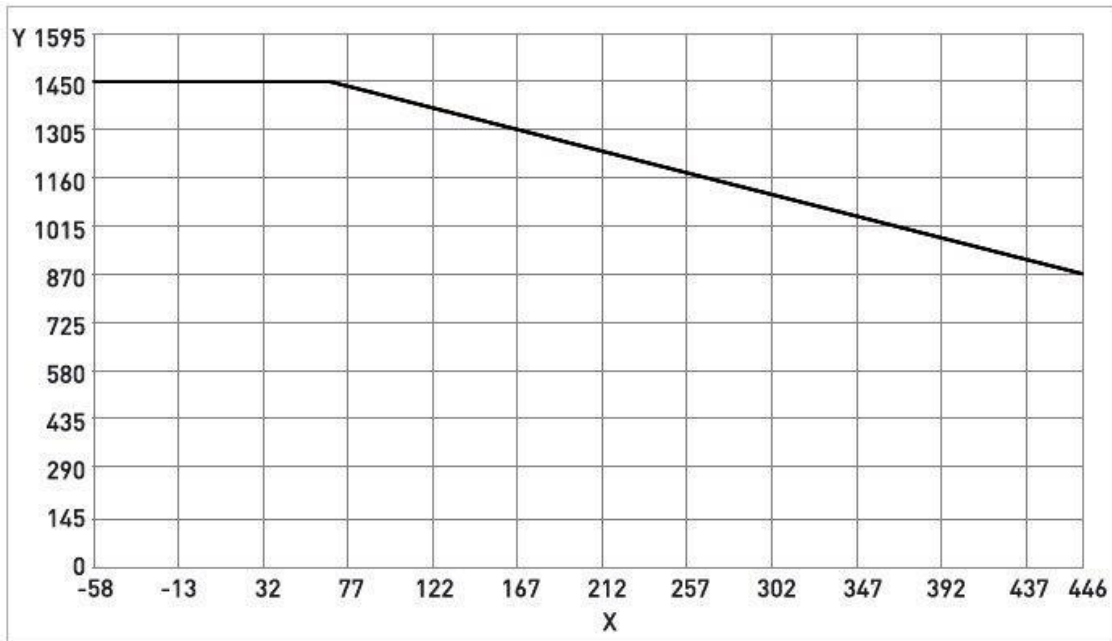
Always make sure that the meter is used within its operating limits.

Pressure / temperature de-rating (metric) for meters with SS 316 measuring tubes. Standard temperature range.



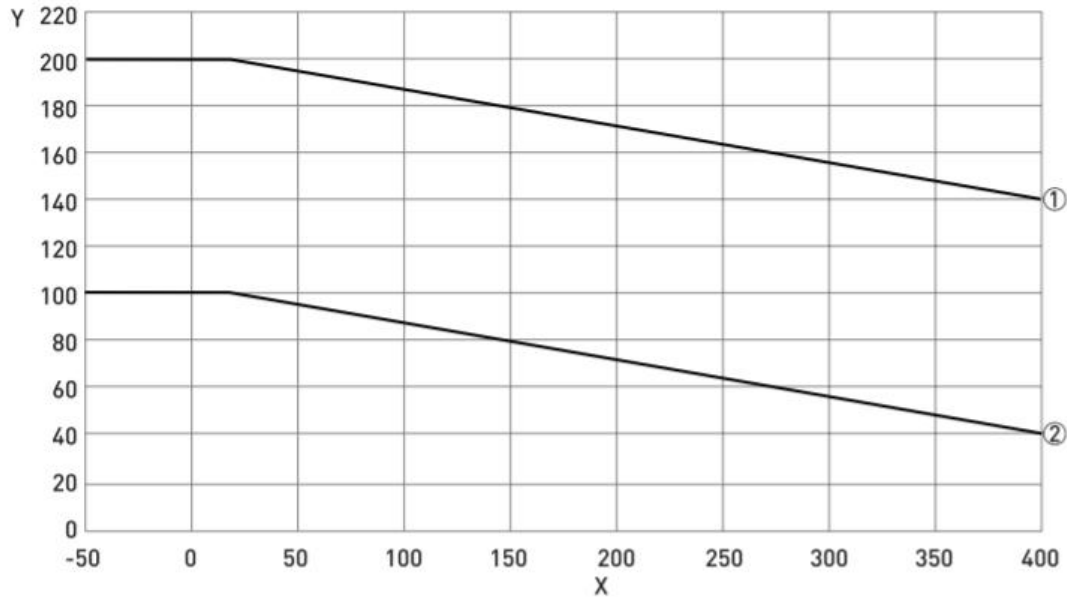
X temperature [°C]
Y pressure [barg]

Pressure / temperature de-rating (imperial) for meters with SS 316 measuring tubes. Standard temperature range.



X temperature [°F]
Y pressure [psig]

Pressure / temperature de-rating (metric) for meters with SS 316 and Hastelloy C22, PED certified measuring tubes. High temperature range.



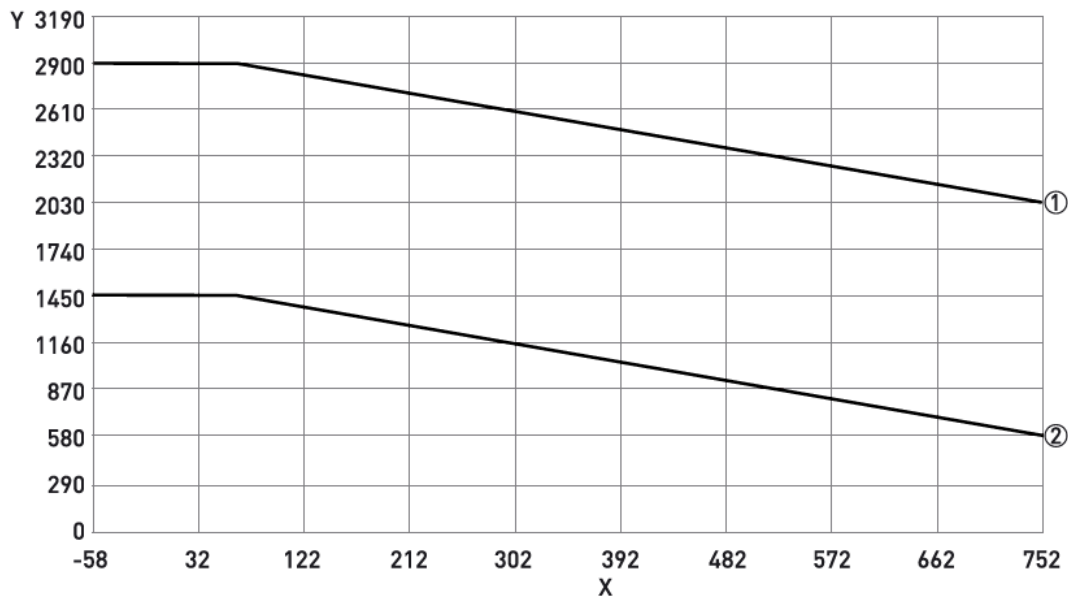
X temperature [°C]

Y pressure [barg]

(1) Hastelloy® C22 08...80

(2) Stainless Steel 316 08...200

Pressure / temperature de-rating (imperial) for meters with SS 316 and Hastelloy C22, PED certified measuring tubes. High temperature range.



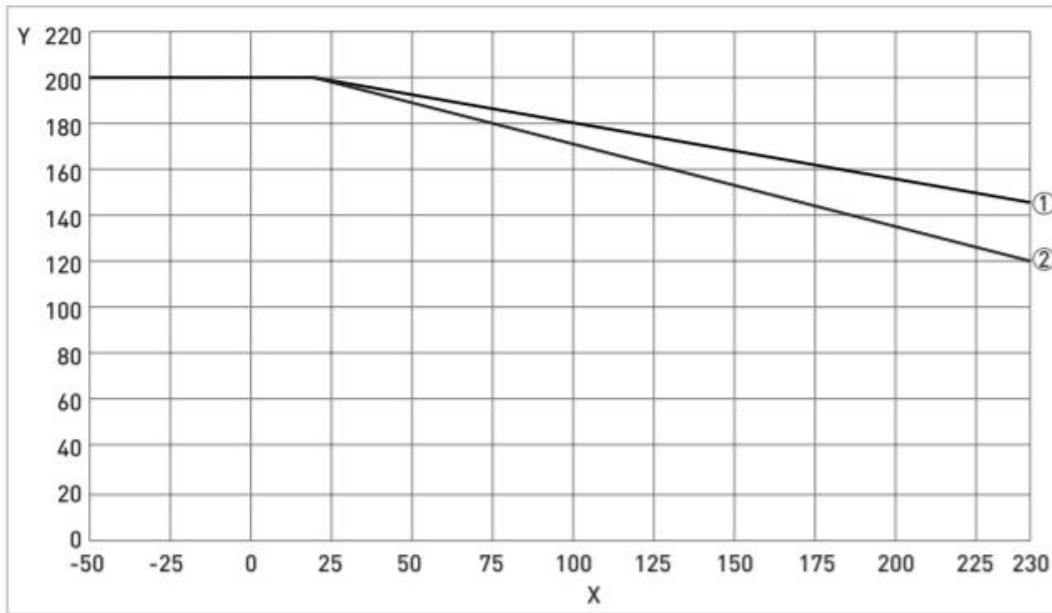
X temperature [°F]

Y pressure [psig]

(1) Hastelloy® C22 08...80

(2) Stainless Steel 316 08...200

Pressure / temperature de-rating (metric) for meters with SS 31803 and Hastelloy C22, PED certified measuring tubes. Standard temperature range.

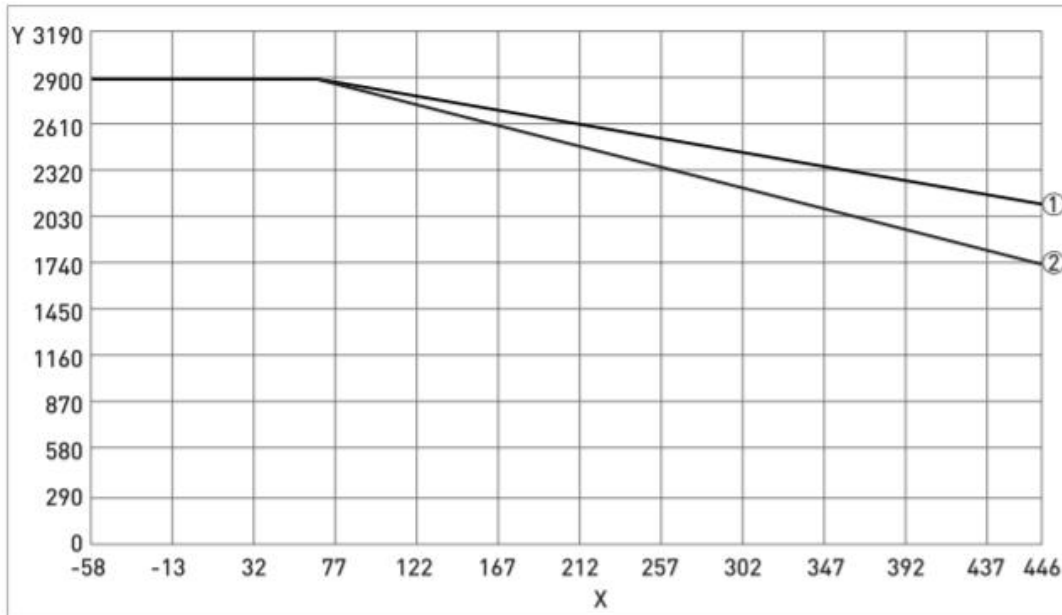


X temperature [°C]

Y pressure [barg]

- (1) PED / CRN H08...80, D100
- (2) CRN D150...200

Pressure / temperature de-rating (imperial) for meters with SS 31803 and Hastelloy C22, PED certified measuring tubes. Standard temperature range.

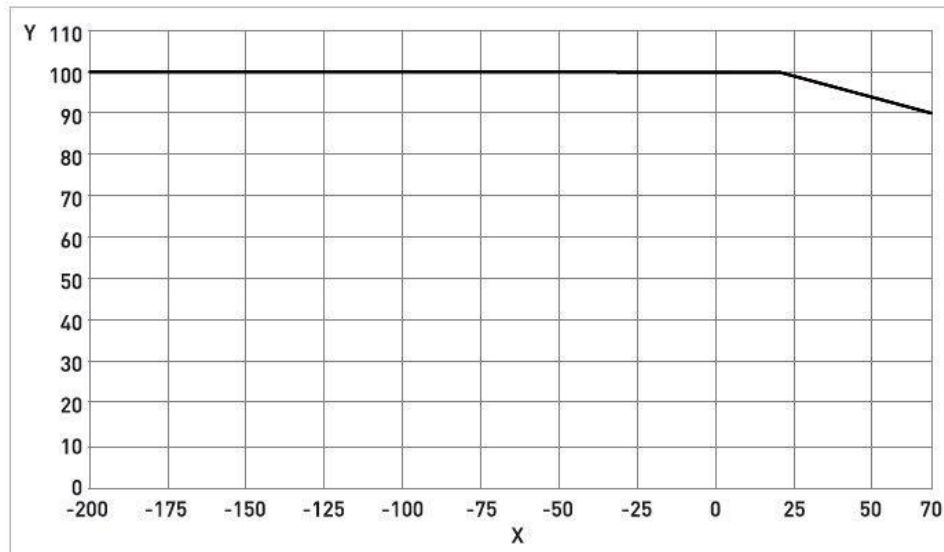


X temperature [°F]

Y pressure [psig]

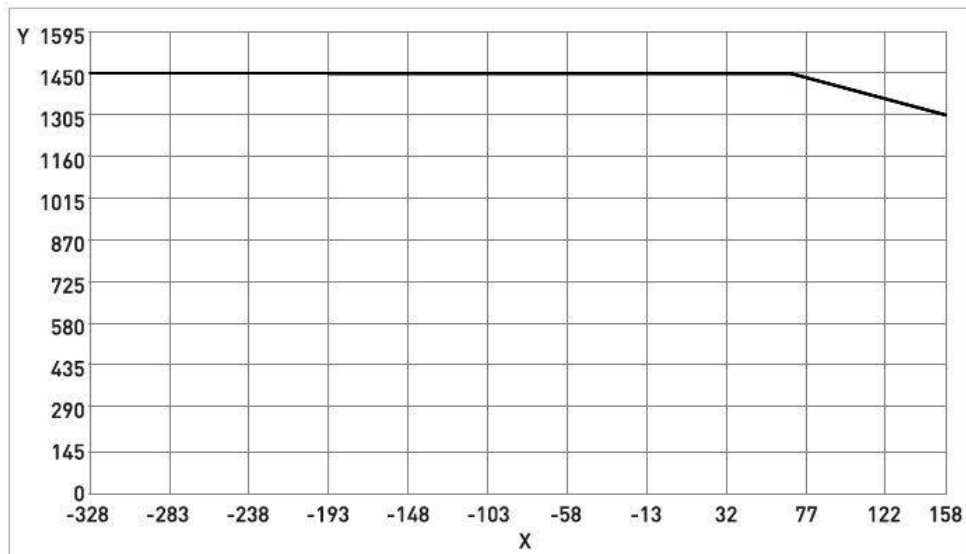
- (1) PED / CRN H08...80, D100
- (2) CRN D150...200

Pressure / temperature de-rating (metric) for meters with SS 316, PED certified measuring tubes. Cryogenic temperature range.



X temperature [°C]
Y pressure [barg]

Pressure / temperature de-rating (imperial) for meters with SS 316 measuring tubes PED certified. Cryogenic temperature range.



X temperature [°F]
Y pressure [psig]

Flanges

- DIN flange ratings are based on EN 1092-1 2007 table G.4.1 material group 14EO
- ASME flange ratings are based on ASME B16.5 2003 table 2 material group 2.2
- JIS flange ratings are based on JIS 2220: 2001 table 1 division 1 material group 022a
- JIS 10K flanges are limited to a maximum temperature of 300°C / 572°F

Notes

- The maximum operating pressure will be either the flange / hygienic connection rating or the measuring tube rating, **WHICHEVER IS THE LOWER!**
- The maximum pressure for steam cleaning is 10 bar / 145 psi.
- For other applications above 10 bar / 145 psi, please contact the manufacturer.

Dimensions and Weights

Flanged versions

Meter Weights

Table 17

	S08 (CM71)	S10 (CM72)	S15 (CM73)	S25 (CM74)	S50 (CM75)	S80 (CM76)	S100 (CM77)	S150 (CM78)	S200 (CM79)
Aluminum (compact)	9.3	10.1	12.9	23.5	29.4	58.9	94.3	193.6	443.6
Stainless Steel (compact)	15.2	16	18.8	29.4	36.3	64.8	100.2	199.5	449.5
Aluminum (remote)	5.8	6.6	9.4	19.9	25.9	55.4	90.8	190.1	440
Stainless Steel (remote)	6.6	7.3	10.2	20.7	26.6	56.1	91.5	191.5	440.8
Heating jacket add	3.1		4.5	7	7.9	12.7	15.7	27.6	N/A
	S08 (CM71)	S10 (CM72)	S15 (CM73)	S25 (CM74)	S50 (CM75)	S80 (CM76)	S100 (CM77)	S150 (CM78)	S200 (CM79)
Aluminum (compact)	20.5	22.3	28.4	51.8	64.8	129.8	207.9	426.8	978
Stainless Steel (compact)	33.5	35.3	41.4	64.8	77.8	142.9	220.9	440.7	991
Aluminum (remote)	12.8	14.5	20.7	43.9	57.1	122.1	200.2	419.1	970
Stainless Steel (remote)	14.55	16.1	22.5	45.6	58.6	123.7	201.7	422.2	971.8
Heating jacket add	6.8		9.9	15.4	17.4	28	34.6	60.8	N/A

The weights shown are for meters fitted with PN40 flanges. Smaller or larger flange sizes will affect the overall weight. For further information, please contact the manufacturer.

Meter Dimensions

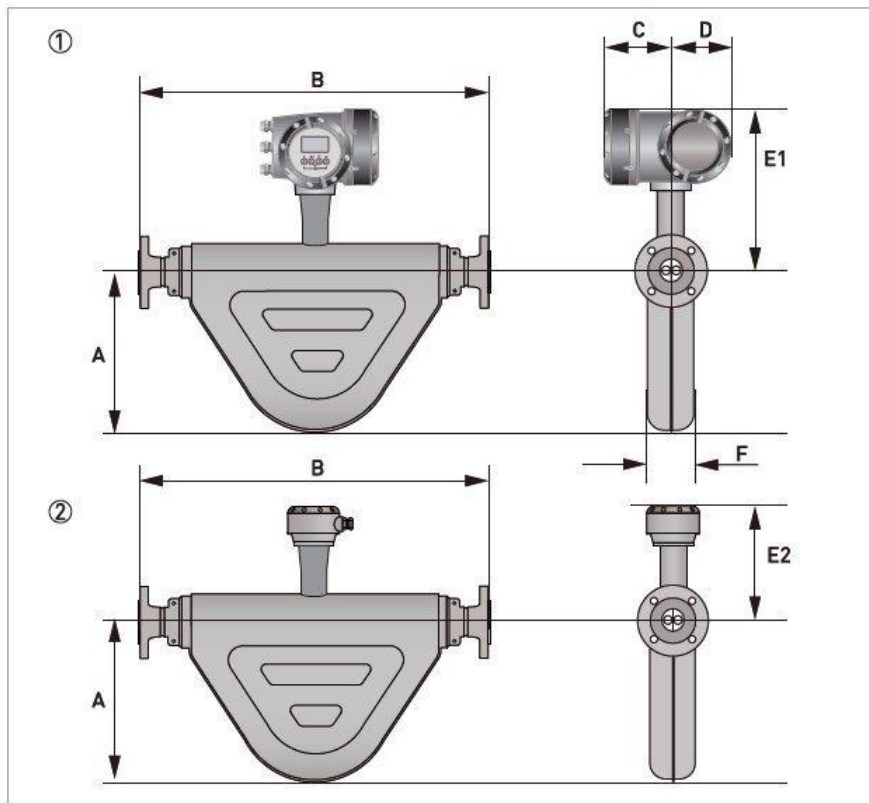


Figure 7 – Meter Dimensions

(1) Compact version

(2) Remote version

Dimensions – (mm)

Table 18

	S08 (CM71)	S10 (CM72)	S15 (CM73)	S25 (CM74)	S50 (CM75)	S80 (CM76)	S100 (CM77)	S150 (CM78)	S200 (CM79)
A ± 3	156		186	282	321	411	453	555	710
C	137								
D	122								
E1 ±3 (1)	279	280	297	333	359	384	426		
E1 ±3 (2)	365	366	383	419	445	470	512		
E2 ±3 (3)	222		240	246	302	327	369		
E2 ±3 (4)	308		326	361	388	413	455		
E2 ±3 (5)	348		366	401	428	453	495		
F ±2	81		118	130	196	251	273	356	

(1) compact 150°C (short stem)

(2) compact 230°C (extended stem)

(3) remote 150°C (short stem)

(4) remote 230°C (extended stem)

(5) remote 400°C (extended stem)

	S08 (CM71)	S10 (CM72)	S15 (CM73)	S25 (CM74)	S50 (CM75)	S80 (CM76)	S100 (CM77)	S150 (CM78)	S200 (CM79)
DN300	-	-	-	-	-	-	-	-	-
PN63									
DN50	-	-	-	-	743	923	-	-	-
DN80	-	-	-	-	-	943	1014	-	-
DN100	-	-	-	-	-	-	1026	1217	-
DN150	-	-	-	-	-	-	-	1231	1600
DN200	-	-	-	-	-	-	-	-	1630
DN250	-	-	-	-	-	-	-	-	-
DN300	-	-	-	-	-	-	-	-	-
PN100									
DN10	355	367	-	-	-	-	-	-	-
DN15	355	367	524	-	-	-	-	-	-
DN25	-	-	550	636	-	-	-	-	-
DN40	-	-	-	644	743	-	-	-	-
DN50	-	-	-	-	755	935	-	-	-
DN80	-	-	-	-	-	955	1026	-	-
DN100	-	-	-	-	-	-	1050	1221	-
DN150	-	-	-	-	-	-	-	1271	1640
DN200	-	-	-	-	-	-	-	-	1670
DN250	-	-	-	-	-	-	-	-	-
DN300	-	-	-	-	-	-	-	-	-
ASME 150									
½"	361	373	530	-	-	-	-	-	-
¾"	-	-	540	-	-	-	-	-	-
1"	-	-	546	632	-	-	-	-	-
1½"	-	-	-	644	743	-	-	-	-
2"	-	-	-	-	747	927	-	-	-
3"	-	-	-	-	-	939	1010	-	-
4"	-	-	-	-	-	-	1024	1195	-
6"	-	-	-	-	-	-	-	1219	1588
8"	-	-	-	-	-	-	-	-	1614
10"	-	-	-	-	-	-	-	-	-
12"	-	-	-	-	-	-	-	-	-
ASME 300									
½"	371	383	540	-	-	-	-	-	-
¾"	-	-	550	-	-	-	-	-	-
1"	-	-	558	644	-	-	-	-	-
1½"	-	-	-	658	757	-	-	-	-
2"	-	-	-	-	759	939	-	-	-
3"	-	-	-	-	-	959	1030	-	-
4"	-	-	-	-	-	-	1042	1213	-

Dimension B for meters with Hastelloy® and Stainless Steel (UNS S31803) measuring tubes

Dimension mm(±5)

Table 22

	H08 (CM71)	H10 (CM72)	H15 (CM73)	H25 (CM74)	H50 (CM75)	H80 (CM76)	D100 (CM77)	D150 (CM78)	D200 (CM79)
PN40									
DN15	329	354	-	-	-	-	-	-	-
DN25	-	-	511	-	-	-	-	-	-
DN40	-	-	-	601	-	-	-	-	-
DN50	-	-	-	-	714	-	-	-	-
DN80	--	-	-	-	-	914	-	-	-
PN63									
DN50	-	-	-	-	714	-	-	-	-
DN80	-	-	-	-	-	914	-	-	-
PN100									
DN15	329	354	-	-	-	-	-	-	-
DN25	-	-	511	-	-	-	-	-	-
DN40	-	-	-	601	-	-	-	-	-
DN50	-	-	-	-	714	-	-	-	-
DN80	-	-	-	-	-	914	-	-	-
PN160									
DN15	329	354	-	-	-	-	-	-	-
DN25	-	-	511	-	-	-	-	-	-
DN40	-	-	-	601	-	-	-	-	-
DN50	-	-	-	-	714	-	-	-	-
DN80	-	-	-	-	-	914	1042	-	-
DN100	-	-	-	-	-	-	1070	1241	-
DN150	-	-	-	-	-	-	-	1297	1666
DN200	-	-	-	-	-	-	-	-	1690
ASME 150									
½"	329	354	-	-	-	-	-	-	-
1"	-	-	511	-	-	-	-	-	-
1½"	-	-	-	601	-	-	-	-	-
2"	-	-	-	-	714	-	-	-	-
3"	-	-	-	-	-	914	-	-	-
ASME 300									
½"	329	354	-	-	-	-	-	-	-
1"	-	-	511	-	-	-	-	-	-
1½"	-	-	-	601	-	-	-	-	-
2"	-	-	-	-	714	-	-	-	-
3"	-	-	-	-	-	914	-	-	-
ASME 600									
½"	336	361	-	-	-	-	-	-	-
1"	-	-	518	-	-	-	-	-	-
1½"	-	-	-	608	-	-	-	-	-
2"	-	-	-	-	721	-	-	-	-
3"	-	-	-	-	-	921	-	-	-
ASME 900									
1½"	-	-	-	608	-	-	-	-	-
2"	-	-	-	-	721	-	-	-	-
3"	-	-	-	-	-	921	1088	-	-
4"	-	-	-	-	-	-	1112	1283	-
6"	-	-	-	-	-	-	-	1335	-

Dimension mm(± 5)

Table 22

	H08 (CM71)	H10 (CM72)	H15 (CM73)	H25 (CM74)	H50 (CM75)	H80 (CM76)	D100 (CM77)	D150 (CM78)	D200 (CM79)
8"	-	-	-	-	-	-	-	-	1748
ASME 1500									
½"	336	361	-	-	-	-	-	-	-
1"	-	-	518	-	-	-	-	-	-
1½"	-	-	-	608	-	-	-	-	-
2"	-	-	-	-	721	-	-	-	-
3"	-	-	-	-	-	921	1118	-	-
4"	-	-	-	-	-	-	1132	1303	-
6"	-	-	-	-	-	-	-	1397	1766
8"	-	-	-	-	-	-	-	-	1850
JIS 10K									
50A	-	-	-	-	714	-	-	-	-
80A	-	-	-	-	-	914	-	-	-
JIS20K									
15A	329	354	-	-	-	-	-	-	-
25A	-	-	511	-	-	-	-	-	-
40A	-	-	-	601	-	-	-	-	-
50A	-	-	-	-	714	-	-	-	-
80A	-	-	-	-	-	914	-	-	-

Dimensions inches(± 0.2)

Table 23

	H08 (CM71)	H10 (CM72)	H15 (CM73)	H25 (CM74)	H50 (CM75)	H80 (CM76)	D100 (CM77)	D150 (CM78)	D200 (CM79)
PN40									
DN15	13.0	13.9	-	-	-	-	-	-	-
DN25	-	-	20.1	-	-	-	-	-	-
DN40	-	-	-	23.7	-	-	-	-	-
DN50	-	-	-	-	28.1	-	-	-	-
DN80	-	-	-	-	-	36.0	-	-	-
PN63									
DN50	-	-	-	-	28.1	-	-	-	-
DN80	-	-	-	-	-	36.0	-	-	-
PN100									
DN15	13.0	13.9	-	-	-	-	-	-	-
DN25	-	-	20.1	-	-	-	-	-	-
DN40	-	-	-	23.7	-	-	-	-	-
DN50	-	-	-	-	28.1	-	-	-	-
DN80	-	-	-	-	-	36.0	-	-	-
PN160									
DN15	13.0	13.9	-	-	-	-	-	-	-
DN25	-	-	20.1	-	-	-	-	-	-
DN40	-	-	-	23.7	-	-	-	-	-
DN50	-	-	-	-	28.1	-	-	-	-
DN80	-	-	-	-	-	36.0	41.0	-	-
DN100	-	-	-	-	-	-	42.1	48.9	-
DN150	-	-	-	-	-	-	-	51.1	65.6
DN200	-	-	-	-	-	-	-	-	66.5
ASME 150									
½"	13.0	13.9	-	-	-	-	-	-	-
1"	-	-	20.1	-	-	-	-	-	-
1½"	-	-	-	23.7	-	-	-	-	-
2"	-	-	-	-	28.1	-	-	-	-
3"	-	-	-	-	-	36.0	-	-	-
ASME 300									
½"	13.0	13.9	-	-	-	-	-	-	-
1"	-	-	20.1	-	-	-	-	-	-
1½"	-	-	-	23.7	-	-	-	-	-

inches (± 0.2)

	H08 (CM71)	H10 (CM72)	H15 (CM73)	H25 (CM74)	H50 (CM75)	H80 (CM76)	D100 (CM77)	D150 (CM78)	D200 (CM79)
2"	-	-	-	-	28.1	-	-	-	-
3"	-	-	-	-	-	36.0	-	-	-
ASME 600									
1/2"	13.2	14.2	-	-	-	-	-	-	-
1"	-	-	20.1	-	-	-	-	-	-
1 1/2"	-	-	-	23.9	-	-	-	-	-
2"	-	-	-	-	28.4	-	-	-	-
3"	-	-	-	-	-	36.3	-	-	-
ASME 900									
1 1/2"	-	-	-	23.9	-	-	-	-	-
2"	-	-	-	-	28.4	-	-	-	-
3"	-	-	-	-	-	36.3	42.8	-	-
4"	-	-	-	-	-	-	43.8	50.5	-
6"	-	-	-	-	-	-	-	52.6	67.1
8"	-	-	-	-	-	-	-	-	68.8
ASME1500									
1/2"	13.2	14.2	-	-	-	-	-	-	-
1"	-	-	20.4	-	-	-	-	-	-
1 1/2"	-	-	-	23.9	-	-	-	-	-
2"	-	-	-	-	28.4	-	-	-	-
3"	-	-	-	-	-	36.3	44.0	-	-
4"	-	-	-	-	-	-	44.6	51.3	-
6"	-	-	-	-	-	-	-	55.0	69.5
8"	-	-	-	-	-	-	-	-	72.8
JIS 10K									
50A	-	-	-	-	28.1	-	-	-	-
80A	-	-	-	-	-	36.0	-	-	-
JIS20K									
15A	13.0	13.9	-	-	-	-	-	-	-
25A	-	-	20.1	-	-	-	-	-	-
40A	-	-	-	23.7	-	-	-	-	-
50A	-	-	-	-	28.1	-	-	-	-
80A	-	-	-	-	-	36.0	-	-	-

NAMUR dimensions

The following face to face dimensions comply with NAMUR NE132

Dimension mm (± 3)
Table 24

	S15 (CM 73)	S25 (CM 74)	S50 (CM 75)	S80 (CM 76)	S100 (CM 77)	S150 (CM 78)
PN10						
DN250	-	-	-	-	-	-
PN16						
DN100	-	-	-	-	1000	-
DN150	-	-	-	-	-	1200 (1)
DN200	-	-	-	-	-	-
PN40						
DN15	510	-	-	-	-	-
DN25	-	600	-	-	-	-
DN50	-	-	715	-	-	-
DN80	-	-	-	915	-	-
DN100	-	-	-	-	1000	-
DN150	-	-	-	-	-	1200 (1)

(1) Available on special orders

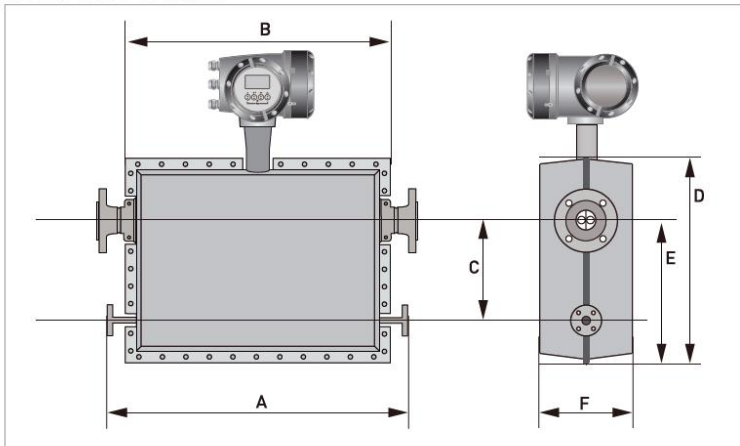
Dimension inches (± 0.12)
Table 25

	S15 (CM 73)	S25 (CM 74)	S50 (CM 75)	S80 (CM 76)	S100 (CM 77)	S150 (CM 78)
PN10						
DN 250	-	-	-	-	-	-
PN16						
DN 100	-	-	-	-	39.4	-
DN 150	-	-	-	-	-	47.2 (1)
DN 200	-	-	-	-	-	-
PN40						
DN 15	20.1	-	-	-	-	-
DN 25	-	23.6	-	-	-	-
DN 50	-	-	28.1	-	-	-
DN 80	-	-	-	36.0	-	-
DN 100	-	-	-	-	39.4	-
DN 150	-	-	-	-	-	47.2 (1)

(1) Available on special orders

Heating jacket version

Meter sizes 08...100



Meter sizes 150...200

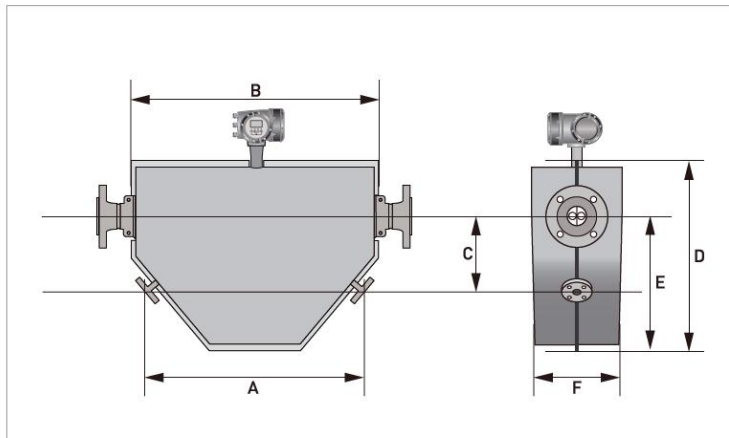


Figure 8 – Heating Jacket Version

Dimension mm

Table 26

	S08 (CM 71)	S10 (CM 72)	S15 (CM 73)	S25 (CM 74)	S50 (CM 75)	S80 (CM 76)	S100 (CM 77)	S150 (CM 78)	S200 (CM 79)
Heating connection size : PN40 DN15 or ASME 150 ^{1/2} "									
A±5.0	435		550	660	685	860	925	847	1135
B ±3.0	283		440	542	565	741	806	1036	1408
C ±3.0	100		130	210	230	320	340	493	506
D ±3.0	315		344	453	499	622	682	918	230
E ±3.0	198		221	316	356	451	486	688	857
F ±3.0	232		226	254	266	322	372	414	500

Dimension inches

Table 27

	S08 (CM 71)	S10 (CM 72)	S15 (CM 73)	S25 (CM 74)	S50 (CM 75)	S80 (CM 76)	S100 (CM 77)	S150 (CM 78)	S200 (CM 79)
Heating connection size : PN40 DN15 or ASME 150 ^{1/2} "									
A±0.2	17.1		21.7	26.0	27.0	33.9	36.4	33.3	44.7
B ±0.12	11.1		17.3	21.3	22.2	29.2	31.7	40.8	55.4
C ±0.12	3.9		5.1	8.3	9.1	12.6	13.4	19.4	19.9
D ±0.12	12.4		13.5	17.8	19.6	24.5	26.9	36.1	9.1
E ±0.12	7.8		8.7	12.4	14.0	17.8	19.1	27.1	33.7
F ±0.12	9.1		8.9	10.0	10.5	12.7	14.6	16.3	19.7

Purge port option

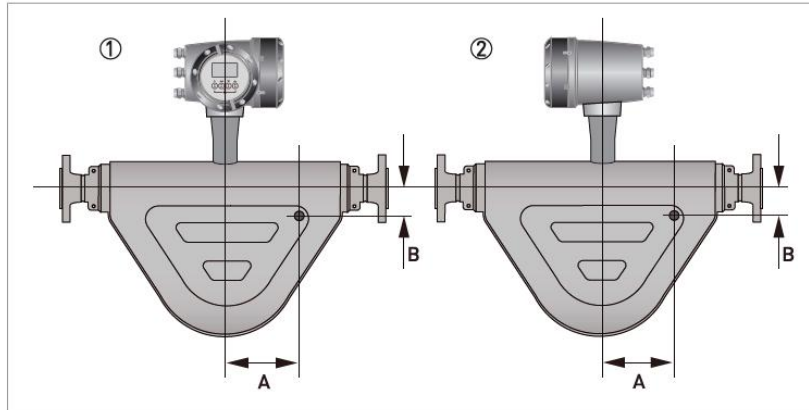


Figure 9 – Purge port option

- (1) Front view
- (2) Rear view

**Dimension mm
Table 28**

	S08 (CM 71)	S10 (CM 72)	S15 (CM 73)	S25 (CM 74)	S50 (CM 75)	S80 (CM 76)	S100 (CM 77)	S150 (CM 78)	S200 (CM 79)
A	70		110	145	150	205	220	345	600
B	32		45	57	60	85		100	160

**Dimension inches
Table 29**

	S08 (CM 71)	S10 (CM 72)	S15 (CM 73)	S25 (CM 74)	S50 (CM 75)	S80 (CM 76)	S100 (CM 77)	S150 (CM 78)	S200 (CM 79)
A	2.8		4.3	5.7	5.9	8.1	8.7	13.6	23.6
B	1.3		1.8	2.2	2.4	3.3		3.9	6.3

Burst disc option

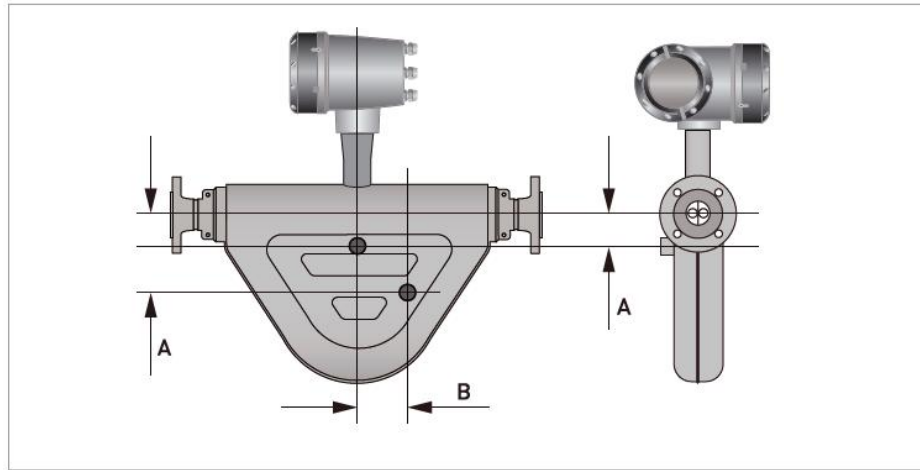


Figure 10 – Burst disc option

**Dimension mm
Table30**

	S08 (CM 71)	S10 (CM 72)	S15 (CM 73)	S25 (CM 74)	S50 (CM 75)	S80 (CM 76)	S100 (CM 77)	S150 (CM 78)	S200 (CM 79)
A	76		92	135	57	74		175	195
B	38.5		62	0	0	0		0	0

**Dimension mm
Table 31**

	S08 (CM 71)	S10 (CM 72)	S15 (CM 73)	S25 (CM 74)	S50 (CM 75)	S80 (CM 76)	S100 (CM 77)	S150 (CM 78)	S200 (CM 79)
A	3.0		3.6	5.3	2.2	2.9		6.9	7.7
B	1.52		2.4	0	0	0		0	0

INSTALLATION

Intended use

This mass flowmeter is designed for the direct measurement of mass flow rate, product density and product temperature. Indirectly, it also enables the measurement of parameters like total mass, concentration of dissolved substances and the volume flow. For use in hazardous areas, special codes and regulations are also applicable and these are specified in a separate documentation.

Responsibility for the use of the measuring devices with regard to suitability, intended use and corrosion resistance of the used materials against the measured fluid lies solely with the operator.

This device is a Group 1, Class A device as specified within CISPR11. It is intended for use in industrial environment. There may be potential difficulties in ensuring electromagnetic compatibility in other environments, due to conducted as well as radiated disturbances.

The manufacturer is not liable for any damage resulting from improper use or use for other than the intended purpose.

Mounting restrictions

General installation principles

There are no special installation requirements, but you should note the following points:

- Support the weight of the meter as close to the meter body as possible.
- Mount the meter in such a way to avoid the buildup of gas or liquid in the measuring tube
- Straight runs either side of the meter are not required.
- The use of reducers and other fittings at flanges, including flexible hoses, is allowed but you should take care to avoid cavitation.
- Avoid extreme pipe size reductions.
- Meters are not affected by crosstalk and can be mounted in series or in parallel.

Avoid mounting the meter at the highest point in the pipeline where air / gas can collect.

Mounting positions

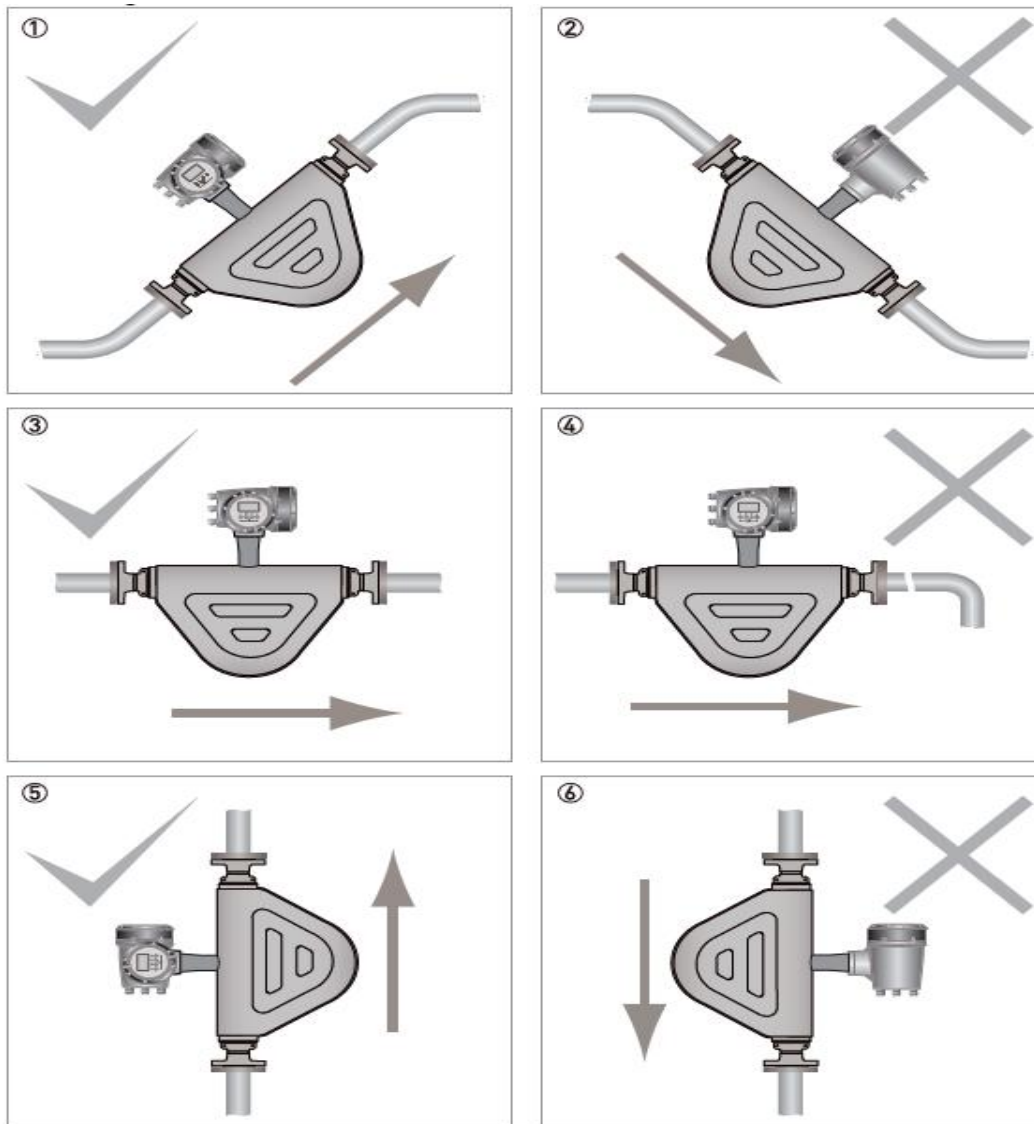


Figure 11 – Mounting positions

- (1) The meter can be mounted at an angle, but it is recommended that the flow is uphill.
- (2) Avoid mounting the meter with the flow running downhill because it can cause siphoning. If the meter has to be mounted with the flow running downhill, install an orifice plate or control valve downstream of the meter to maintain backpressure.
- (3) Horizontal mounting with flow running left to right.
- (4) Avoid mounting meter with long vertical runs after the meter as it can cause cavitation. Where the installation includes a vertical run after the meter, install an orifice plate or control valve downstream to maintain backpressure.
- (5) The meter can be mounted vertically but it is recommended that the flow is uphill.
- (6) Avoid mounting the meter vertically with the flow running downhill. This can cause siphoning. If the meter has to be installed this way, install an orifice plate or control valve downstream to maintain backpressure.

Sales and Service

For application assistance, current specifications, pricing, or name of the nearest Authorized Distributor, contact one of the offices below.

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Specifications are subject to change without notice.

For more information

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