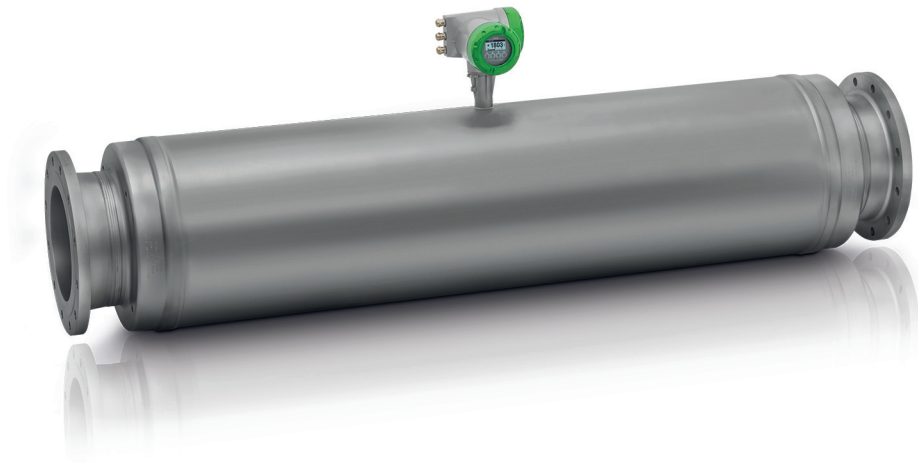


CFS400A Coriolis Flow Sensor



- ▶ Large diameter for bulk measurement and custody transfer of liquids and gases
- ▶ Stainless Steel measuring tubes (NACE compliant)
- ▶ Super Duplex option offering a maximum operating pressure of 180 barg

Equipment should be installed, operated, serviced, and maintained only by qualified personnel.

No responsibility is assumed by Schneider Electric for any consequences arising from the use of this material.

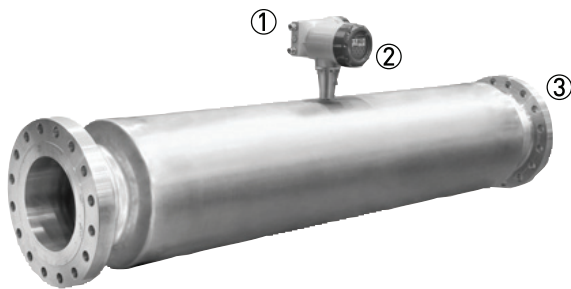
1	Product features	3
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1.1 The solution for bulk mass flow measurement

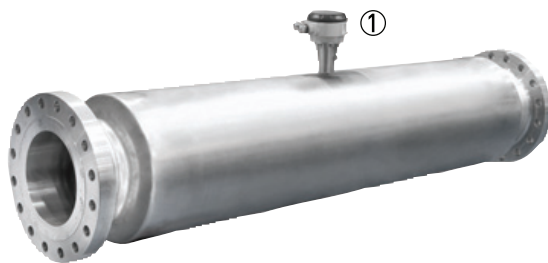
The CFS400A has been developed to meet the demanding custody transfer requirements of the oil and gas industry and is well suited to bulk measurement in many applications. The option of Super Duplex (UNS S32760) provides a maximum operating pressure of 180 barg.

A high level of performance makes the CFS400A suitable for the bulk measurement of petroleum and oil as well as products like syrup, molasses and raw chemicals.

Combined with the power of the CFT34A, the CFS400A will give accurate measurement of volume, mass, density, and concentration.



- ① Modular electronics with a range of output options (see separate documentation for details).
- ② Comprehensive diagnostic capabilities.
- ③ Standard flange process connections available.



- ① Remote terminal box

Highlights

- Innovative design with multiple large measuring tubes, gives a high flow rate capacity
- Easy to drain and easy to clean
- Optional heating jacket
- High levels of accuracy for custody transfer
- Optimised flow divider for minimum pressure loss
- Super Duplex option for operating pressures up to 180 barg
- Secondary containment up to 150 barg

Industries

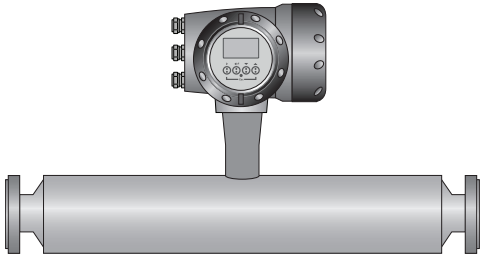
- Marine
- Oil and gas
- Waste water
- Chemical
- Paper and pulp
- Pharmaceutical
- Fresh water

Applications

- Bulk loading / unloading
- Custody transfer for volume and mass
- High volume
- Pipeline measurement applications
- Allocation metering

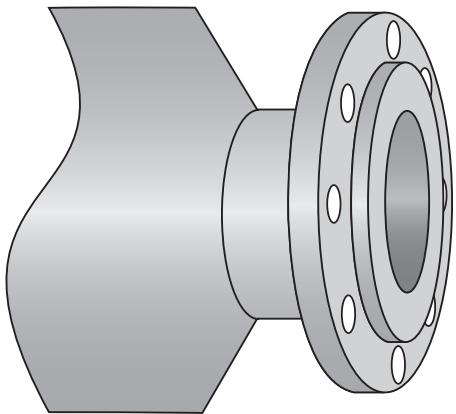
1.2 Features and options

Features



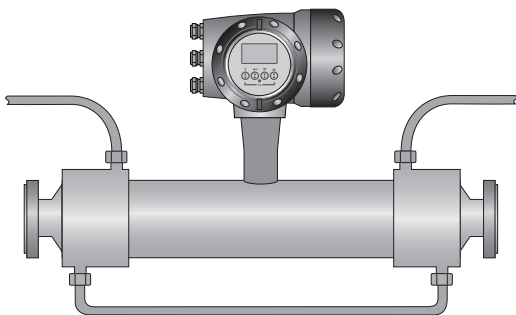
- Flow rates up to 4,600,000 kg/h / 169,021 lb/min.
- Integrated electronics.
- Self draining.
- Best in class for zero stability.
- With advanced Entrained Gas Control the meter maintains operation over a wide range of gas fractions and complex flow conditions.

Connection options



- Flange sizes from 4" / DN100 to 16" / DN400 1500 lbs / PN160.
- Flanges available in Stainless Steel, Duplex and Super Duplex.

Heating jacket and purge port



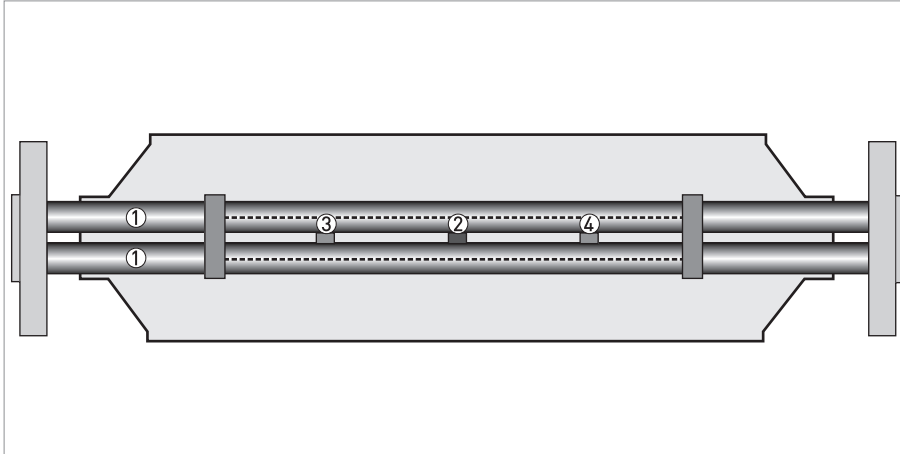
- Heating jacket option for use with temperature dependant products.
- Prevents solidification of process product.
- Purge port option for protection in the event of measuring tube failure.
- Allows hazardous chemicals to be drained away safely.
- Can also be used for the early detection of measuring tube failure where highly toxic chemicals are being measured.

1.3 Meter / transmitter combinations

Transmitter	CFT34A	
Configuration	Compact	Remote field
CFS400A	CFS400A(C)	CFS400A(F)

2.1 Measuring principle (multiple tube)

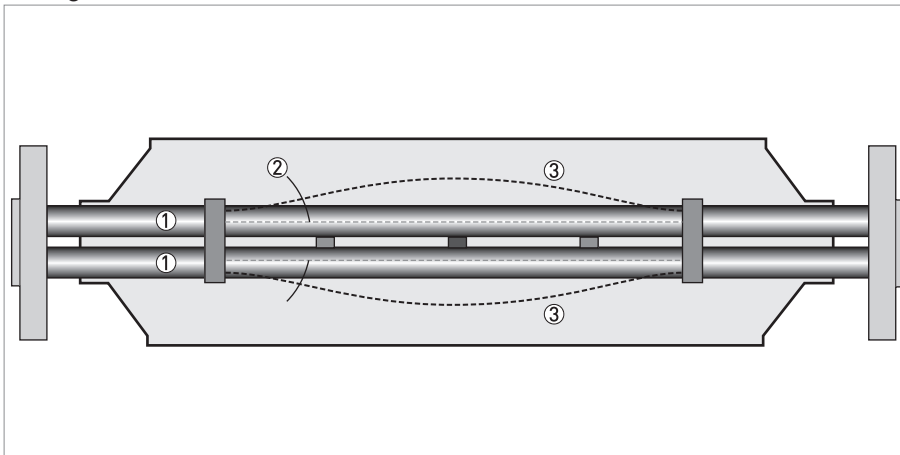
Static meter not energised and with no flow



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

A Coriolis multiple tube mass flowmeter consists of either two or four measuring tubes ① one or two drive coils ② and two or four sensors (③ and ④). The sensors are positioned either side of the drive coil / s.

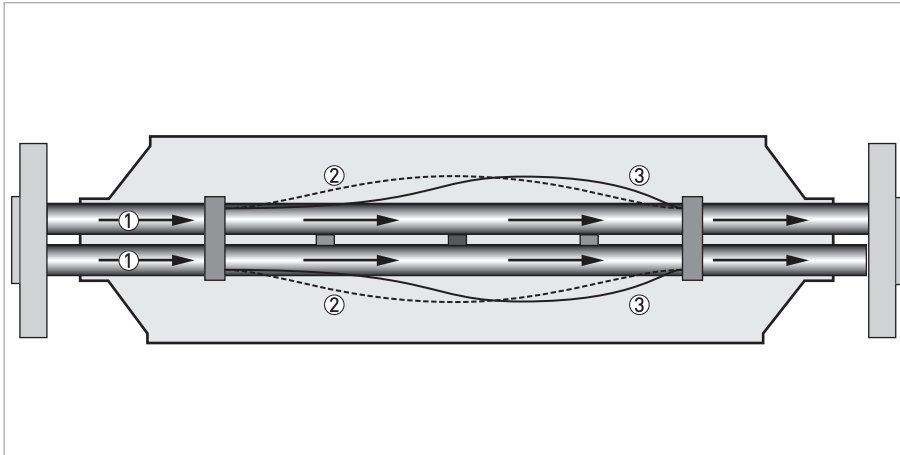
Energised meter



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

When the meter is energised, 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.

Energised 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.

2.2 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.*
- *Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website.*

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

Design

Basic	System consists of a measuring sensor and a transmitter to process the output signal
Features	Fully welded maintenance free sensor with multiple straight measuring tubes
Variants	
Compact version	Integral transmitter
Remote version	Available with field mount versions of the transmitter
Modbus version	Sensor with integral electronics providing Modbus output for connection to a PLC

Measuring accuracy

Mass standard	
Liquid ($\geq 20:1$ of nominal flow rate)	$\pm 0.1\%$ of actual measured flow rate
Liquid ($< 20:1$ of nominal flow rate)	\pm zero stability (see zero stability below)
Repeatability	
$\geq 20:1$ of nominal flow rate	Better than $\pm 0.05\%$
$< 20:1$ of nominal flow rate	Better than \pm zero stability x 0.5
Gas	$\pm 0.35\%$ of actual measured flow rate + zero stability
Repeatability	Better than 0.2% plus zero stability (includes the combined effects of repeatability, linearity and hysteresis)
Mass optional	
Liquid ($\geq 10:1$ of nominal flow rate)	$\pm 0.05\%$ of actual measured flow rate
Liquid ($< 10:1$ of nominal flow rate)	\pm zero stability (see zero stability below)
Repeatability	
$\geq 10:1$ of nominal flow rate	Better than $\pm 0.025\%$
$< 10:1$ of nominal flow rate	Better than \pm zero stability x 0.5

Zero stability	
S100	< 11 kg/h
S150	< 25 kg/h
S250	< 60 kg/h
S400	< 120 kg/h
Reference conditions	
Product	Water
Temperature	+20°C / +68°F
Operating pressure	1 barg / 14.5 psig
Effect on sensor zero point caused by a shift in process temperature	
Stainless Steel	0.0008% of nominal flow rate per 1°C / 0.00044% of nominal flow rate per 1°F
Effect on sensor zero point caused by a shift in process pressure	
Stainless Steel	0.0002% of the nominal flow rate per 1 barg / 0.000014% of the nominal flow rate per 1 psig
Density	
Measuring range	400...3000 kg/m ³ / 25...187 lb/ft ³
Accuracy	±1.0 kg/m ³ / ±0.06 lb/ft ³
On site calibration	±0.2 kg/m ³ / ±0.012 lb/ft ³
Temperature	
Accuracy	±1°C / ±1.8°F

Operating conditions

Nominal flow rates	
S100	220000 kg/h / 8084 lb/min
S150	500000 kg/h / 18372 lb/min
S250	1200000 kg/h / 44092 lb/min
S400	2400000 kg/h / 88185 lb/min
Maximum flow rates	
S100	420000 kg/h / 15432 lb/min
S150	900000 kg/h / 33069 lb/min
S250	2300000 kg/h / 84510 lb/min
S400	4600000 kg/h / 169021 lb/min
Ambient temperature	
Compact version with Aluminium transmitter	-40...+60°C / -40...+140°F
	Extended temperature range: 65°C / 149°F for some I/O options. For more information contact manufacturer.
Compact version with Stainless Steel transmitter	-40...+55°C / -40...+130°F
Remote versions	-40...+65°C / -40...+149°F
Process temperature	
Flanged connection	-45...+130°C / -49...+266°F

Nominal pressure at 20°C / 68°F	
Measuring tube (Duplex UNS S31803)	
PED	-1...150 barg / -14.5...2175 psig
cFMus (S100...250)	-1...140 barg / -14.5...2030 psig
cFMus (S400)	-1...110 barg / -14.5...1595 psig
CRN / ASME B31.3	-1...100 barg / -14.5...1450 psig
Measuring tube (Super Duplex UNS S32760)	
PED	-1...180 barg / -14.5...2610 psig
cFMus	-1...152 barg / -14.5...2205 psig
CRN / ASME B31.3	-1...120 barg / -14.5...1740 psig
Outer cylinder	
Non PED / CRN approved	Typical burst pressure > 100 barg / 1450 psig
PED approved secondary containment	-1...40 barg / -14.5...580 psig (S100...250 only)
	-1...150 barg / -14.5...2175 psig (Duplex option)
Fluid properties	
Permissible physical condition	Liquids, gases, slurries
Permissible gas content (volume)	Contact manufacturer for information.
Permissible solid content (volume)	Contact manufacturer for information.
Protection category	
EN 60529	IP66 / 67
NEMA 250	NEMA 4X
Installation conditions	
Inlet runs	None required
Outlet runs	None required

Materials

Measuring tube	Stainless Steel UNS S31803 (1.4462)
	Optional UNS S32760 (1.4501)
Spigot	Stainless Steel UNS J92205 (1.4470)
	Optional UNS J93404 (1.4469)
Flanges	Stainless Steel AISI 316 / 316L (1.4401 / 1.4404) dual certified
	Optional Stainless Steel UNS S31803 (1.4462) (NACE approved)
	Optional UNS S32760 (1.4501) (NACE approved)
Outer cylinder (S100...250)	Stainless Steel AISI 304 / 304L (1.4301 / 1.4307) dual certified
	Optional Stainless Steel AISI 316 / 316L (1.4401 / 1.4404) dual certified
	Optional Stainless Steel UNS S31803 (1.4462) ①
Outer cylinder (S400)	Standard 9mm wall: Stainless Steel AISI 316 / 316L (1.4401 / 1.4404) dual certified
	Optional 15mm wall: Stainless Steel UNS S31803 (1.4462) (NACE approved)

Heating jacket version	
Heating jacket	Stainless Steel 316L (1.4404)
	Note: the outer cylinder is in contact with the heating medium
Remote versions	
Junction box	Die cast Aluminium (polyurethane coating)

Process connections

Flange	
DIN	DN100...400 / PN16...160
ASME	4...16" / ASME 150...1500
JIS	100A / 10...20K

Electrical connections

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

Approvals

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.
cFMus	Class I, Div 1 groups A, B, C, D
	Class II, Div 1 groups E, F, G
	Class III, Div 1 hazardous areas
	Class I, Div 2 groups A, B, C, D
	Class II, Div 2 groups F, G
	Class III, Div 2 hazardous areas
ANSI / CSA (Dual Seal)	12.27.01-2003
Custody Transfer	Measuring Instruments Directive (MID) MI 002 and MI 005 (most recent and up to date version)
	OIML R117-1
	OIML R137 (pending)
	Compliant with API and AGA
Ingress protection	EN 60529 (most recent and up to date version)
	NEMA 250 (most recent and up to date version)
ATEX (most recent and up to date version)	
CFS400A(C) non Ex i Signal outputs	
Ex d connection compartment	II 1/2 G - Ex db ia IIC T6...T1 Ga/Gb
	II 2 D - Ex tb IIIC T160°C Db
Ex e connection compartment	II 1/2 G - Ex db eb ia IIC T6...T1 Ga/Gb
	II 2 D - Ex tb IIIC T160°C Db

CFS400A(C) Ex i signal outputs	
Ex d connection compartment	II 1/2 (1) G - Ex db ia (ia Ga) IIC T6...T1 Ga/Gb
	II 2 (1) D - Ex tb (ia Da) IIIC T160°C Db
Ex e connection compartment	II 1/2 (1) G - Ex db eb ia (ia Ga) IIC T6...T1 Ga/Gb
	II 2 (1) D - Ex tb (ia Da) IIIC T160°C Db
CFS400A(F)	II 1 G - Ex ia IIC T6...T1 Ga
	II 1 D - Ex ia IIIC T160°C Da

① Where this option is ordered, the electronics stem material is UNS J92205 (1.4470)

2.2.1 ATEX temperature limits

	Ambient temp. T_{amb} °C	Max medium temp. T_m °C	Temp. class	Max. Surface temp. °C	
CFS400A(F) - with or without heating jacket / insulation	-40...+40	40	T6 - T1	T70	
		55	T5 - T1	T85	
		90	T4 - T1	T120	
		130	T3 - T1	T160	
	-40...+50	55	T5 - T1	T85	
		90	T4 - T1	T120	
		130	T3 - T1	T160	
	-40...+65	65	T5 - T1	T95	
		90	T4 - T1	T120	
		130	T3 - T1	T160	
	Minimum medium temp: -50°C				
	CFS400A(C) – aluminium transmitter housing with or without heating jacket / insulation	-40...+40	40	T6 - T1	T70
55			T5 - T1	T85	
90			T4 - T1	T120	
130			T3 - T1	T160	
-40...+50		55	T5 - T1	T85	
		90	T4 - T1	T120	
		130	T3 - T1	T160	
-40...+60		65	T5 - T1	T95	
		100	T4 - T1	T130	
-40...+65 ①		65	T5 - T1	T95	
Minimum medium temp: -45°C					
CFS400A(C) – SS transmitter housing with or without heating jacket / insulation		-40...+40	40	T6 - T1	T70
	55		T5 - T1	T85	
	90		T4 - T1	T120	
	130		T3 - T1	T160	
	-40...+50	55	T5 - T1	T85	
		90	T4 - T1	T120	
	-40...+60	60	T5 - T1	T90	
	Minimum medium temp: -45°C				

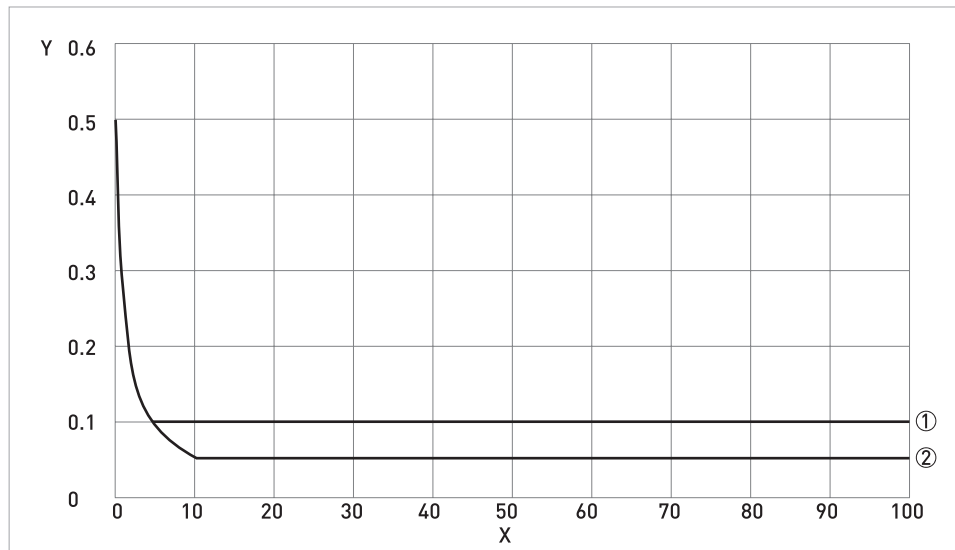
① Depending on I/O option. Please call for more information.

2.2.2 Maximum end loadings

		S100	S150	S250	S400
Flanges					
20°C	40 barg	150kN	350kN	550kN	750kN
	100 barg	100kN	120kN	60kN	
	150 barg				
	180 barg				
130°C	32 barg	150kN	280kN	400kN	
	80 barg	60kN	50kN	50kN	
	115 barg				
	130 barg				

- These (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.
- To prevent damage DO NOT apply loads to the heating jacket connections on the meter. The manufacturer recommends that you use flexible connection pipes.

2.3 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

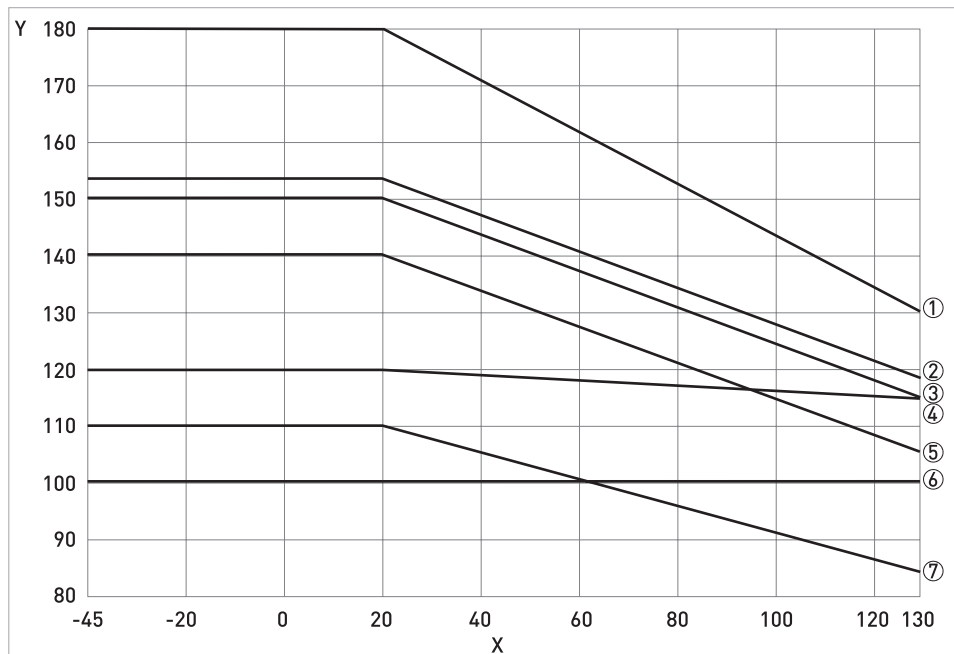
Product	Water
Temperature	+20°C / +68°F
Operating pressure	1 barg / 14.5 psig

2.4 Guidelines for maximum operating pressure

Notes:

- Ensure that the meter is used within its operating limits
- The maximum operating pressure will be either the flange rating or the measuring tube rating, **WHICHEVER IS THE LOWER!**

Pressure / temperature de-rating, all meter sizes in metric (flanged connections as per EN 1092-1:2007)



X temperature [°C]

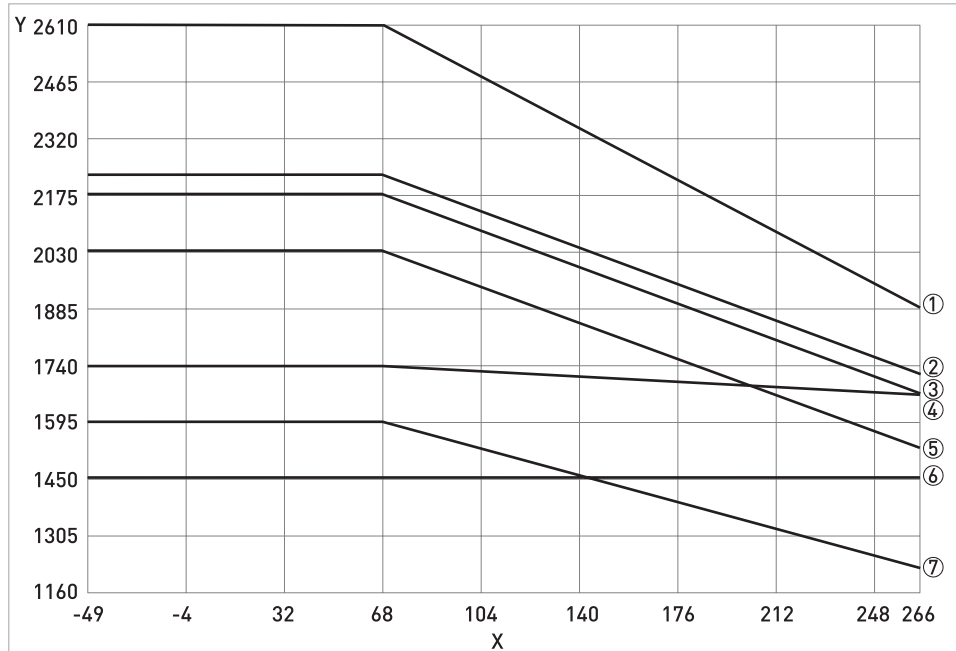
Y pressure [barg]

- ① Measuring tube (UNS S32760) PED certification
- ② Measuring tube (UNS S32760) FM certification
- ③ Measuring tube (UNS S31803) PED certification
- ④ Measuring tube (UNS S32760) CRN certification
- ⑤ Measuring tube (UNS S31803) FM certification (S100...250)
- ⑥ Measuring tube (UNS S31803) CRN certification
- ⑦ Measuring tube (UNS S31803) FM certification (S400)

Linear de-rating of PED certified secondary containment

Outer cylinder material	-45°C	20°C	130°C
304 / L or 316 / L (S100...250)	40 barg	40 barg	32 barg
UNS S31803 (S100...400)	150 barg	150 barg	100 barg

Pressure / temperature de-rating, all meter sizes, in imperial (flanged connections as per ASME B16.5)



X temperature [°F]
Y pressure [psig]

- ① Measuring tube (UNS S32760) PED certification
- ② Measuring tube (UNS S32760) FM certification
- ③ Measuring tube (UNS S31803) PED certification
- ④ Measuring tube (UNS S32760) CRN certification
- ⑤ Measuring tube (UNS S31803) FM certification (S100...250)
- ⑥ Measuring tube (UNS S31803) CRN certification
- ⑦ Measuring tube (UNS S31803) FM certification (S400)

Linear de-rating of PED certified secondary containment

Outer cylinder material	-49°F	68°F	266°F
304 / L or 316 / L (S100...250)	580 psig	580 psig	464 psig
UNS S31803 (S100...400)	2175 psig	2175 psig	1450 barg

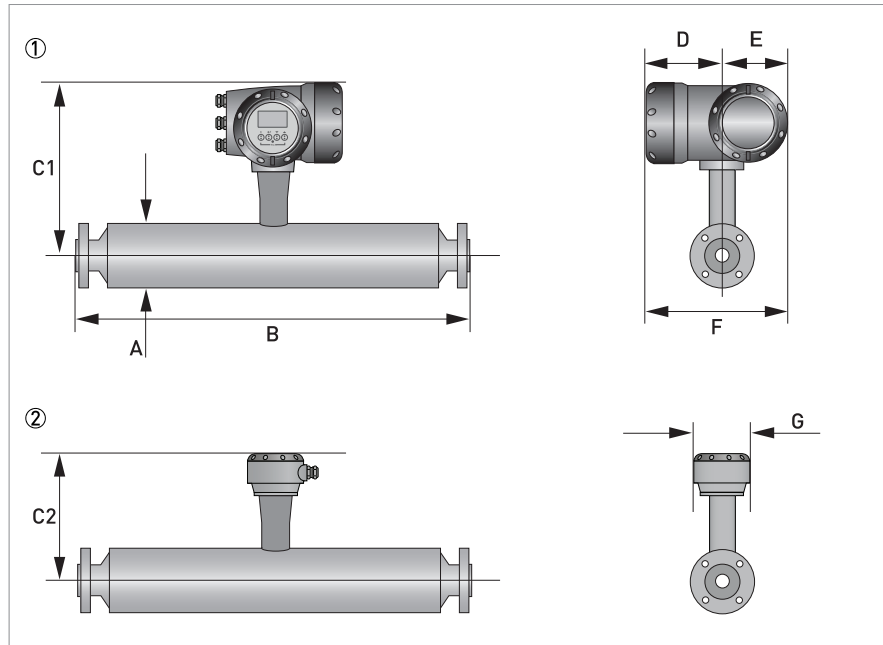
Flanges

- DIN flange ratings are based on EN 1092-1 2007 table G.4.1 material group 14E0
- 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

2.5 Dimensions and weights

2.5.1 Flanged versions

Meter dimensions



- ① Compact version
② Remote version

Meter weights (PN40 flanges).

	Weight	Compact		Remote	
		Aluminium	Stainless Steel	Aluminium	Stainless Steel
S100	kg	84.8	90.1	80.8	81.7
	lb	187.0	198.0	178.0	180.0
S150	kg	211.5	216.8	207.5	208.4
	lb	466.0	478.0	457.0	459.0
S250	kg	444.5	449.8	440.5	441.4
	lb	980.0	991.0	971.0	973.0
S400 ①	kg	940.0	945.3	936.0	936.9
	lb	2072.3	2083.4	2063.5	2065.5
S400 ②	kg	1045.0	1050.3	1041.0	1041.9
	lb	2303.8	2315.5	2295.0	2297.0

- ① 9mm outer cylinder wall thickness
② 15mm outer cylinder wall thickness

For meter weights with different flange ratings, please contact the manufacturer.

Measuring tube in Stainless Steel

	Dimensions [mm]			
	S100	S150	S250	S400
A	219 ±5	323 ±5	406 ±5	508 ±5
C1 (compact)	370 ±5	422 ±5	463 ±5	516 ±5
C2 (remote)	307 ±5	359 ±5	400 ±5	453 ±5
D	137			
E	123.5			
F	260.5			
G	118			

	Dimensions [inches]			
	S100	S150	S250	S400
A	8.6 ±0.2	12.7 ±0.2	16 ±0.2	20 ±0.2
C1 (compact)	14.6 ±0.2	16.6 ±0.2	18.2 ±0.2	20.3 ±0.2
C2 (remote)	12.1 ±0.2	14.1 ±0.2	15.7 ±0.2	17.8 ±0.2
D	5.4			
E	4.9			
F	10.2			
G	4.6			

Flange connections

	Dimension B [mm]			
	S100	S150	S250	S400
PN16				
DN100	1284	-	-	-
DN150	1290	1584	-	-
DN200	-	1598	-	-
DN250	-	-	1953	-
DN300	-	-	1969	-
DN350	-	-	-	2290
DN400	-	-	-	2296
PN40				
DN100	1310	-	-	-
DN150	1330	1624	-	-
DN200	-	1650	-	-
DN250	-	-	2023	-
DN300	-	-	2043	-

	Dimension B [mm]			
	S100	S150	S250	S400
DN350	-	-	-	2376
DN400	-	-	-	2396
PN63				
DN100	1336	-	-	-
DN150	1370	1664	-	-
DN200	-	1694	-	-
DN250	-	-	2063	-
DN300	-	-	2093	-
DN350	-	-	-	2426
DN400	-	-	-	2446
PN100				
DN100	1360	-	-	-
DN150	1410	1704	-	-
DN200	-	1734	-	-
DN250	-	-	1970	-
DN300	-	-	2153	-
DN350	-	-	-	2504
DN400	-	-	-	2496
PN160				
DN100	1380	-	-	-
DN150	1436	1730	-	-
DN200	-	1754	-	-
DN250	-	-	2123	-
DN300	-	-	2163	-
DN350	-	-	-	2566
DN400	-	-	-	2572
ASME 150				
4"	1334	-	-	-
6"	1358	1652	-	-
8"	-	1678	-	-
10"	-	-	2017	-
12"	-	-	2043	-
14"	-	-	-	2380
16"	-	-	-	2380
ASME 300				
4"	1352	-	-	-
6"	1378	1672	-	-
8"	-	1698	-	-

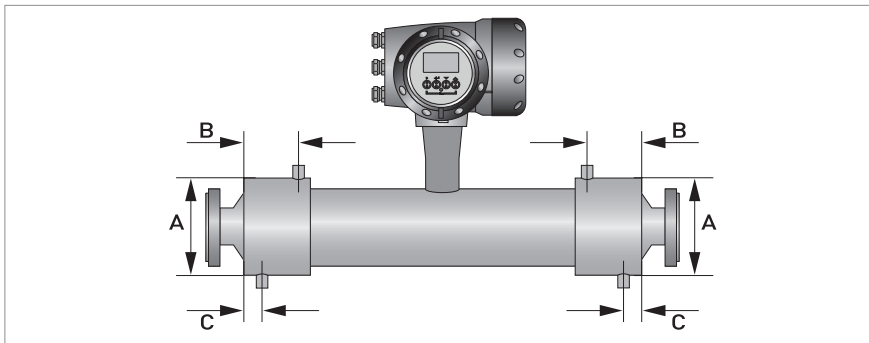
	Dimension B [mm]			
	S100	S150	S250	S400
10"	-	-	2049	-
12"	-	-	2075	-
14"	-	-	-	2412
16"	-	-	-	2414
ASME 600				
4"	1398	-	-	-
6"	1428	1722	-	-
8"	-	1754	-	-
10"	-	-	2131	-
12"	-	-	2139	-
14"	-	-	-	2470
16"	-	-	-	2496
ASME 900				
4"	1422	-	-	-
6"	1474	1768	-	-
8"	-	1812	-	-
10"	-	-	2195	-
12"	-	-	2227	-
14"	-	-	-	2566
16"	-	-	-	2572
ASME 1500				
4"	1442	-	-	-
6"	1554	-	-	-
8"	-	1914	-	-
10"	-	-	2335	-
12"	-	-	2393	-
14"	-	-	-	2736
16"	-	-	-	2762
JIS 10K				
100A	1270	-	-	-
350A	-	-	-	2284
JIS 20K				
100A	1296	-	-	-
350A	-	-	-	2346

	Dimension B [inches]			
	S100	S150	S250	S400
PN16				
DN100	50.5	-	-	-
DN150	50.8	62.4	-	-
DN200	-	62.9	-	-
DN250	-	-	77.0	-
DN300	-	-	77.5	-
DN350	-	-	-	90.2
DN400	-	-	-	90.4
PN40				
DN100	51.5	-	-	-
DN150	52.4	63.9	-	-
DN200	-	65.0	-	-
DN250	-	-	79.6	-
DN300	-	-	80.4	-
DN350	-	-	-	93.5
DN400	-	-	-	94.3
PN63				
DN100	52.6	-	-	-
DN150	53.9	65.5	-	-
DN200	-	66.7	-	-
DN250	-	-	81.2	-
DN300	-	-	82.4	-
DN350	-	-	-	95.5
DN400	-	-	-	96.3
PN100				
DN100	53.9	-	-	-
DN150	55.5	67.1	-	-
DN200	-	68.3	-	-
DN250	-	-	77.6	-
DN300	-	-	84.8	-
DN350	-	-	-	98.6
DN400	-	-	-	98.3
PN160				
DN100	54.3	-	-	-
DN150	56.5	68.1	-	-
DN200	-	69.0	-	-
DN250	-	-	83.6	-
DN300	-	-	85.1	-

	Dimension B [inches]			
	S100	S150	S250	S400
DN350	-	-	-	101.0
DN400	-	-	-	101.3
ASME 150				
4"	52.5	-	-	-
6"	53.4	65.0	-	-
8"	-	66.1	-	-
10"	-	-	79.4	-
12"	-	-	80.4	-
14"	-	-	-	93.7
16"	-	-	-	93.7
ASME 300				
4"	53.2	-	-	-
6"	54.2	65.8	-	-
8"	-	66.8	-	-
10"	-	-	80.7	-
12"	-	-	81.7	-
14"	-	-	-	95.0
16"	-	-	-	95.0
ASME 600				
4"	55.0	-	-	-
6"	56.2	67.8	-	-
8"	-	69.0	-	-
10"	-	-	83.9	-
12"	-	-	84.2	-
14"	-	-	-	97.2
16"	-	-	-	98.3
ASME 900				
4"	56.0	-	-	-
6"	58.0	69.6	-	-
8"	-	71.3	-	-
10"	-	-	86.4	-
12"	-	-	87.7	-
14"	-	-	-	101.0
16"	-	-	-	101.3
ASME 1500				
4"	56.8	-	-	-
6"	61.2	-	-	-
8"	-	75.3	-	-

	Dimension B [inches]			
	S100	S150	S250	S400
10"	-	-	91.9	-
12"	-	-	94.2	-
14"	-	-	-	107.7
16"	-	-	-	108.7
JIS 10K				
100A	50.0	-	-	-
350A	-	-	-	89.9
JIS 20K				
100A	51.0	-	-	-
350A	-	-	-	92.4

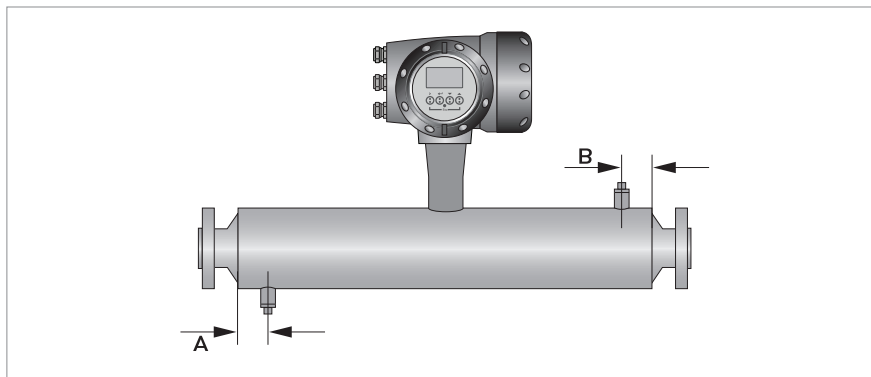
2.5.2 Heating jacket version



	Dimensions [mm]			
	S100	S150	S250	S400
Heating connection size	25 mm (ERMETO)			
A	254 ±2.5	355 ±2.5	444 ±2.5	545 ±2.5
B	178 ±2.0	228 ±2.0	234 ±2.0	268 ±2.0
C	28 ±2.0	28 ±2.0	32 ±2.0	28 ±2.0

	Dimensions [inches]			
	S100	S150	S250	S400
Heating connection size	1" (NPTF)			
A	10 ±0.1	14 ±0.1	17.5 ±0.1	21.5 ±0.1
B	7 ±0.08	9 ±0.08	9.2 ±0.08	10.5 ±0.08
C	1.1 ±0.08	1.1 ±0.08	1.26 ±0.08	1.1 ±0.08

2.5.3 Purge port option



	Dimensions [mm]			
	S100	S150	S250	S400
A	70 ±1.0	100 ±1.0		
B	70 ±1.0	100 ±1.0		

	Dimensions [inches]			
	S100	S150	S250	S400
A	2.75 ±0.04	4.0 ±0.04		
B	2.75 ±0.04	4.0 ±0.04		

3.1 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 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 CISPR11:2009. 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.

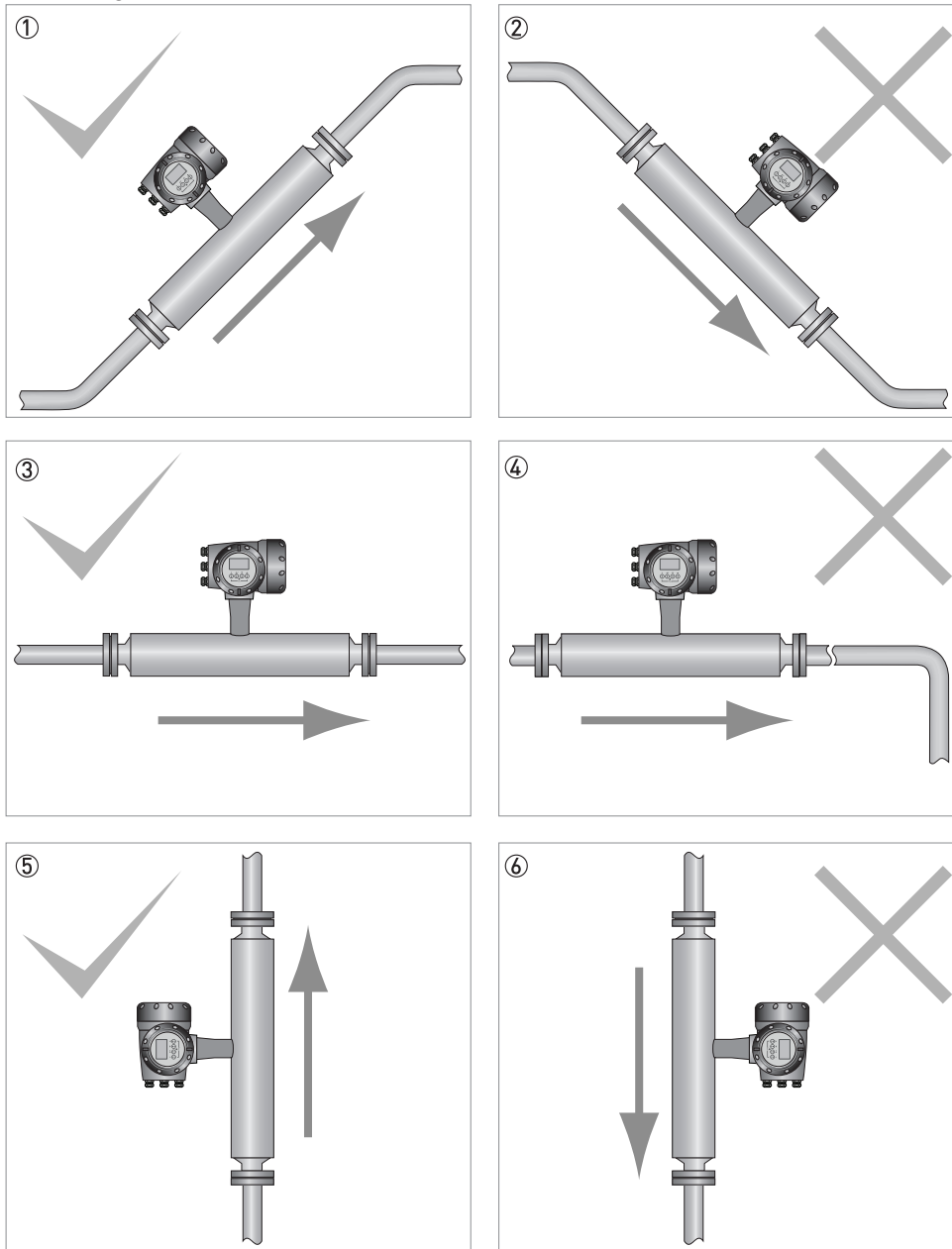
3.2 Mounting restrictions

3.2.1 General installation principles

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

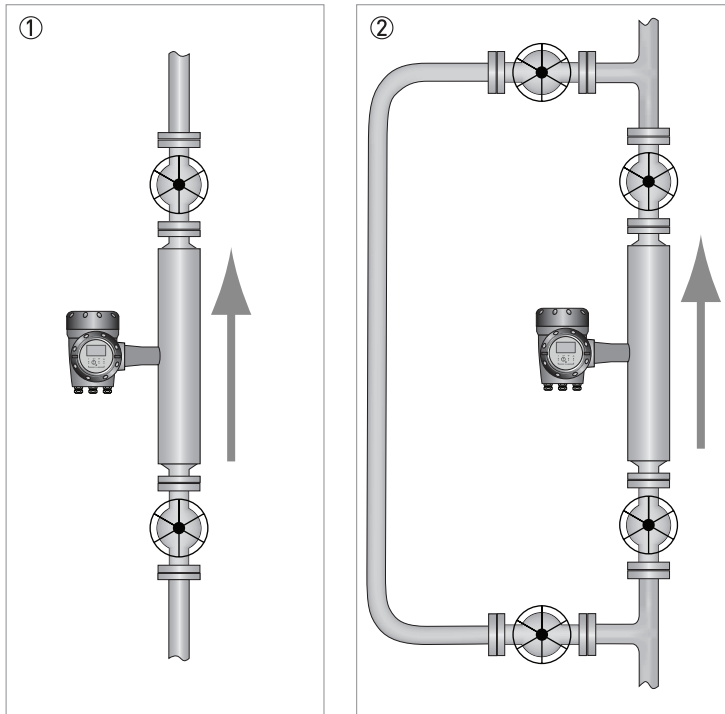
- Support the weight of the meter.
- The meter can be supported on the sensor body.
- On larger meter sizes and hygienic connections, it is strongly recommended that the meter is not supported solely by the process pipework.
- No straight runs are required.
- The use of reducers and other fittings at 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



- 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.

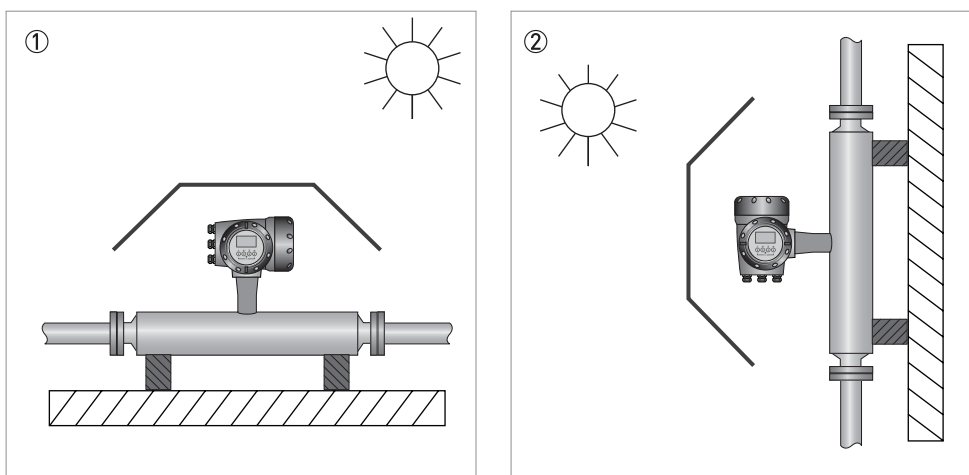
Zero calibration



- ① Where the meter has been installed vertically, install shut-off valves either side of the meter to assist with zero calibration.
- ② If the process flow cannot be stopped, install a bypass section for zero calibration.

3.2.2 Sunshades

The meter **MUST** be protected from strong sunlight.



- ① Horizontal installation
- ② Vertical installation

Size	Code	Description
404...410	Tube material	
	D	UNS S31803 Duplex (all wetted parts)
	U	EU Sourced UNS S32760 Super Duplex (all wetted parts)
All	S	UNS S31803 measuring tubes and spigots
	E	EU Sourced UNS S31803 Duplex (all wetted parts)
404	Flange connections	
	G7	DN100 PN16 to EN 1092-1
	GA	DN100 PN40 to EN 1092-1
	GB	DN100 PN63 to EN 1092-1
	GC	DN100 PN100 to EN 1092-1
	G4	DN100 PN160 to EN 1092-1
	17	DN150 PN16 to EN 1092-1
	1A	DN150 PN40 to EN 1092-1
	1B	DN150 PN63 to EN 1092-1
	1C	DN150 PN100 to EN 1092-1
	14	DN150 PN160 to EN 1092-1
	SD	4" ASME 150 lb
	SE	4" ASME 300 lb
	SF	4" ASME 600 lb
	S1	4" ASME 900 lb
	S2	4" ASME 1500 lb
	4D	6" ASME 150 lb
	4E	6" ASME 300 lb
	4F	6" ASME 600 lb
	41	6" ASME 900 lb
42	6" ASME 1500 lb	
ZG	100A JIS 10K	
ZH	100A JIS 20K	
406	Flange connections	
	17	DN150 PN16 EN 1092-1
	1A	DN150 PN40 to EN 1092-1
	1B	DN150 PN63 to EN 1092-1
	1C	DN150 PN100 to EN 1092-1
	14	DN150 PN160 to EN 1092-1
	27	DN200 PN16, EN 1092-1
	2A	DN200 PN40 to EN 1092-1
	2B	DN200 PN63 to EN 1092-1
	2C	DN200 PN100 to EN 1092-1
	24	DN200 PN160 to EN 1092-1
	4D	6" ASME 150 lb
	4E	6" ASME 350 lb
	4F	6" ASME 600 lb
	41	6" ASME 900 lb
	42	6" ASME 1500 lb
	5D	8" ASME 150 lb
	5E	8" ASME 300 lb
	5F	8" ASME 600 lb
	51	8" ASME 900 lb
52	8" ASME 1500 lb	

Size	Code	Description
410	Flange connections	
	37	DN250 PN16, EN 1092-1
	3A	DN250 PN40 to EN 1092-1
	3B	DN250 PN63 to EN 1092-1
	3C	DN250 PN100 to EN 1092-1
	34	DN250 PN160 to EN 1092-1
	87	DN300 PN16, EN 1092-1
	8A	DN300 PN40 to EN 1092-1
	8B	DN300 PN63 to EN 1092-1
	8C	DN300 PN100 to EN 1092-1
	84	DN300 PN160 to EN 1092-1
	6D	10" ASME 150 lb
	6E	10" ASME 300 lb
	6F	10" ASME 600 lb
	61	10" ASME 900 lb
	62	10" ASME 1500 lb
	7D	12" ASME 150 lb
	7E	12" ASME 300 lb
7F	12" ASME 600 lb	
71	12" ASME 900 lb	
72	12" ASME 1500 lb	
416	Flange connections	
	87	DN300 PN16, EN 1092-1
	8A	DN300 PN40 to EN 1092-1
	8B	DN300 PN63 to EN 1092-1
	8C	DN300 PN100 to EN 1092-1
	84	DN300 PN160 to EN 1092-1
	W7	DN350 PN16, EN 1092-1
	WA	DN350 PN40 EN 1092-1
	WB	DN350 PN63 to EN 1092-1
	WC	DN350 PN100 to EN 1092-1
	X7	DN400 PN16, EN 1092-1
	XA	DN400 PN40 to EN 1092-1
	XB	DN400 PN63 to EN 1092-1
	7D	12" ASME 150 lb
	7E	12" ASME 300 lb
	7F	12" ASME 600 lb
	71	12" ASME 900 lb
	72	12" ASME 1500 lb
	TD	14" ASME 150 lb
	TE	14" ASME 300 lb
	TF	14" ASME 600 lb
	T1	14" ASME 900 lb
T2	14" ASME 1500 lb	
UD	16" ASME 150 lb	
UE	16" ASME 300 lb	
UF	16" ASME 600 lb	
U1	16" ASME 900 lb	
U2	16" ASME 1500 lb	
All	Sealing face	
	O	Standard (Type B1 for PN40 & B2 for PN63 and PN100 acc. EN 1092-1)
	C	EN 1092-1 Type C with tongue
	D	EN 1092-1 Type D with groove
	E	RTJ Acc ASME B16.5
	H	EN 1092-1 Type F with recess

Size	Code	Description
404...410	Secondary containment	
	G	All externals SS 304 / 304L ①
	O A	All externals SS 304 / 304L ② All externals SS 316 / 316L ②
All	H 6	All externals SS 316 / 316 L ③ Duplex UNS S31803 ④
① Non-certified secondary pressure containment. Typical burst pressure > 100 bar ② Max secondary pressure containment 63 bar / 913 psi (PED approved) ③ Non-certified secondary pressure containment. Typical burst pressure > 100 bar ④ Max secondary containment 150 bar / 2175 psi (PED approved)		
404...410	Options	
	0	Without
	1	Liquid / steam heating jacket DN25 PN40
	2	Liquid / steam heating jacket ASME 150 lb Flange
	C	Liquid / steam heating jacket 1" NPT
D	Liquid / steam heating jacket 25mm ERMETO	
All	0	Without
	3	Purge fittings-1/2" NPTF
	B	Burst disk in outer cylinder 3/4" ①
① Recommended gas applications >40 bar. Burst disk must be fitted on all meters operating at 100 bar or greater. For 304 and 316 outers.		
All	Hazardous areas approvals	
	0	Without
	1	ATEX Ex ia (T1-T6)
	7	NEPSI Ex ia
	A	Non Ex (USA)
	B	Non Ex (Canada)
	E	INMETRO (Brazil only)
	R	IEC Ex ia (T1-T6)
	T	cFMus (Canadian Standards)
	U	cFMus (Canadian Standards) / Dual seal for liquids
V	cFMus (Canadian Standards) / Dual seal for gases	
Design approvals		
All	0	Without
	N	NACE acc to MR0175 / ISO 15156
All	Electronics configuration	
	0	Compact / integral mount
	1	Remote / field mount Aluminium junction box
	2	Remote / field mount SS junction box
All	Calibration	
	0	Standard 3 point mass flow calibration
	1	5 point calibration evenly spread across nominal flow rate
	A	0 + custom density calibration with water at 3 temps. (plus certificate)
	B	1 + custom density calibration with water at 3 temps. (plus certificate)
	D	1 + ISO / IEC 17025 calibration certificate
	E	5 point volume flow calibration + ISO/IEC 17025 certificate
	G	10 point mass flow calibration + ISO/IEC 17025 certificate
	H	10 point volume flow calibration + ISO/IEC 17025 certificate
	K	10 point mass flow calibration bi-directional + ISO/IEC 17025 certificate
	L	10 point volume flow calibration bi-directional + ISO/IEC 17025 certificate
	R	5 point mass flow 0.05% calibration + ISO/IEC 17025 certificate
S	5 point mass flow 0.05% calibration with volume acc. ISO10790 + ISO/IEC 17025 certificate	

Size	Code	Description
All	Custody Transfer approval	
	0	without
	U	MI 005 acc. MID 2014/32/EU for liquids other than water
	V	MI 002 acc. MID 2014/32/EU for fuel gases (inc. Burst Disk)
	Y	USA NTEP
	4	Brazil INMETRO
	F	Measurement Canada
	Z	Acc. OIML R117-1 for liquids other than water
P	Acc. OIML R137-1 for fuel gases (including Burst Disk)	
All	Transmitter type	
	6	Compact
	7	Field mount

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