OPTIMASS 2400 Technical Datasheet

Sensor for mass flow

- 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

The documentation is only complete when used in combination with the relevant documentation for the signal converter.

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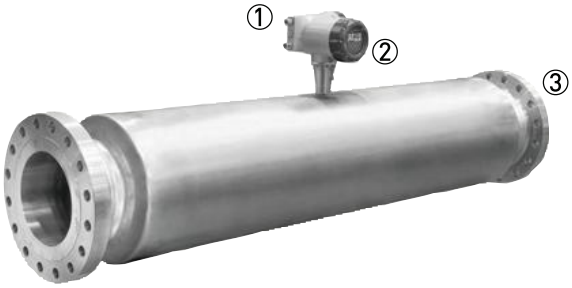
1.1 The solution for bulk mass flow measurement

The OPTIMASS 2400 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 OPTIMASS 2400 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 MFC 400, the OPTIMASS 2400 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

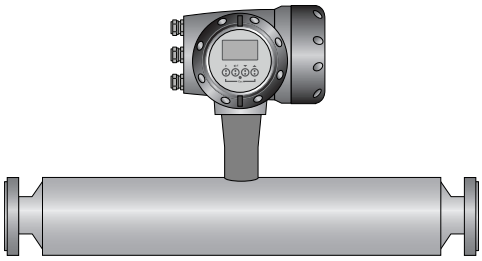
- Marine
- Oil and gas
- Waste water
- Chemical
- Paper and pulp
- Pharmaceutical
- Fresh water

Applications

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

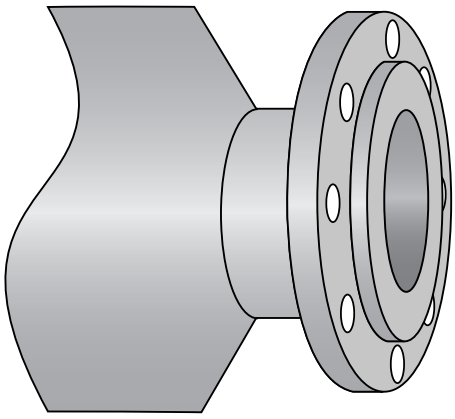
1.2 Features and options

Features



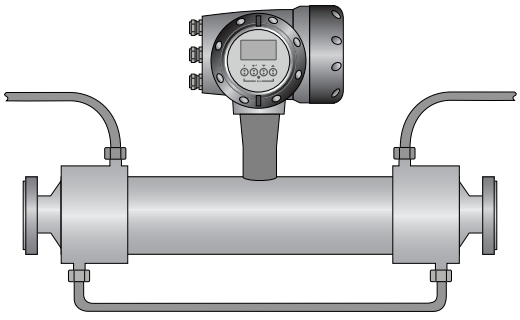
- Flow rates up to 4,600,000 kg/h / 169,021 lb/min.
- Integrated electronics.
- Self draining.
- Best in class for zero stability.
- With advanced Entrained Gas Management (EGM^{TM}) the meter maintains operation over a wide range of gas fractions and complex flow conditions.

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



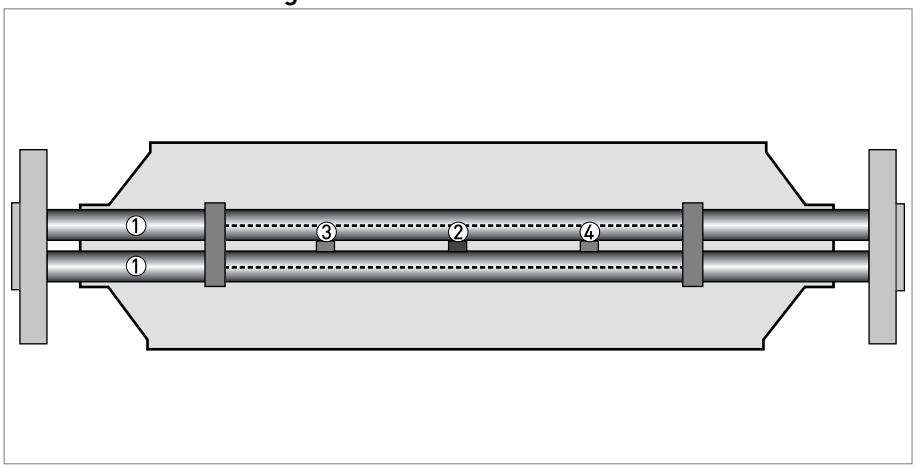
- Heating jacket option for use with temperature dependant products.
- Prevents solidification of process product.
- Purge port option for protection in the event of measuring tube failure.
- Allows hazardous chemicals to be drained away safely.
- Can also be used for the early detection of measuring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

1.3 Meter / converter combinations

Converter	MFC 400	
Configuration	Compact	Remote field
OPTIMASS 2400	2400C	2400F

2.1 Measuring principle (multiple tube)

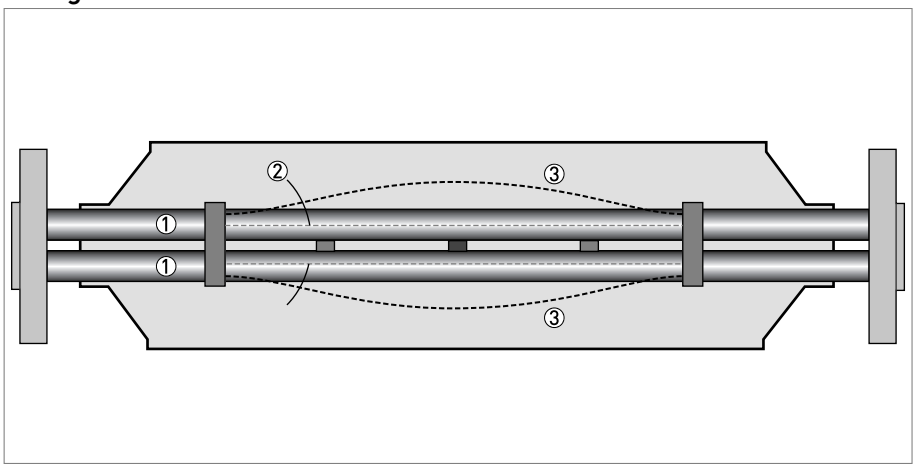
Static meter not energised and with no flow



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.

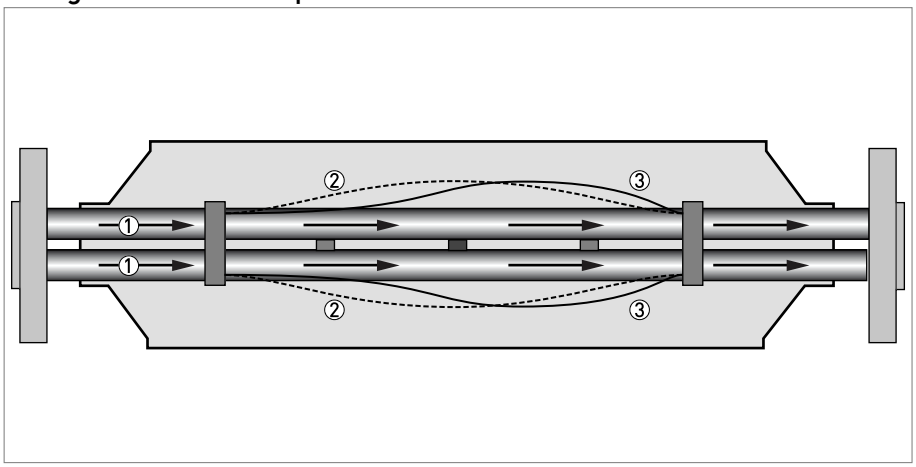
Energised meter



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 (Downloadcenter).*

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 converter to process the output signal
Features	Fully welded maintenance free sensor with multiple straight measuring tubes
Variants	
Compact version	Integral converter
Remote version	Available with field mount versions of the converter

Performance specification

Reference conditions	
Calibration fluid	Water
Calibration temperature	+20°C / +68°F (± 5°C)
Calibration pressure	1...6 barg / 14.5...87 psig
Calibration rig	Accreditation satisfies the requirements of BS EN ISO / IEC 17025
Mass flow (standard)	
Liquid	
Maximum permissible error (≥ 20:1 of nominal flow rate)	±0.1% of actual measured flow rate
Maximum permissible error (< 20:1 of nominal flow rate)	± zero stability (see zero stability below)
Repeatability	
≥ 20:1 of nominal flow rate	Better than ±0.05% of actual measured flow rate
< 20:1 of nominal flow rate	Better than ±zero stability x 0.5 of actual measured flow rate
Gas	
Maximum permissible error	±0.35% of actual measured flow rate + zero stability
Repeatability	Better than 0.2% of actual measured flow rate plus zero stability (includes the combined effects of repeatability, linearity and hysteresis)
Mass flow (optional)	
Liquid	
Maximum permissible error (≥ 10:1 of nominal flow rate)	±0.05% of actual measured flow rate
Maximum permissible error (< 10:1 of nominal flow rate)	± zero stability (see zero stability below)

Repeatability	
≥ 10:1 of nominal flow rate	Better than ±0.025% of actual measured flow rate
< 10:1 of nominal flow rate	Better than ±zero stability x 0.5 of actual measured flow rate
Zero stability	
S100	< 11 kg/h
S150	< 25 kg/h
S250	< 60 kg/h
S400	< 120 kg/h
Maximum permissible error on sensor zero point caused by deviation in process temperature from zero calibration temperature	
Stainless Steel	± 0.0008% of nominal flow rate per 1°C / 0.00044% of nominal flow rate per 1°F
Maximum permissible error on sensor zero point caused by deviation in process pressure from zero calibration pressure	
Stainless Steel	± 0.0002% of the nominal flow rate per 1 barg / 0.000014% of the nominal flow rate per 1 psig
Pressure effect on mass flow rate	
Size 100	+0.006% of reading per barg / +0.00041% of reading per psig
Size 150	+0.0042% of reading per barg / +0.00029% of reading per psig
Sizes 250...400	+0.0037% of reading per barg / +0.00026% of reading per psig
Density	
Measuring range	400...3000 kg/m^3 / 25...187 lb/ft^3
Maximum permissible error	±1.0 kg/m^3 / ±0.06 lb/ft^3
Repeatability / on site calibration	Better than ±0.2 kg/m^3 / ±0.012 lb/ft^3
Volume flow	
Measurement error and repeatability calculations satisfy the requirements of BS ISO 10790 (most recent and up to date version)	
Temperature	
Maximum permissible error	±1°C / ±1.8°F of reading

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 converter	-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 converter	-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)
	Optional UNS S32760 (1.4501) (NACE approved)
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 converter.
I/O	For full details of I/O options, including data streams and protocols, see technical data for the relevant converter.

Approvals

CE / UKCA	The device fulfils the statutory requirements of the relevant CE directives and UK designated standards. The manufacturer certifies that these requirements have been met by applying the CE and UKCA marks.
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)	12.27.01-2011
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)
Hazardous area markings	
OPTIMASS 2400C	
Gas, Ex e connection compartment	
II 1/2 G	Ex db eb ia IIc T6 - T1 Ga/Gb
Gas, Ex d connection compartment	
II 1/2 G	Ex db ia IIc T6 - T1 Ga/Gb
Dust	
II 2D/1G	Ex tb ia IIIC T160°C Db/Ga
OPTIMASS 2000F	
Gas	
II 1 G	Ex ia IIC T6-T1 Ga
Dust	
II 2D/1G	Ex ia IIIC T160°C Db/Ga

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

2.3 Hazardous areas temperature limits

OPTIMASS 2000F

Ambient temp. T_{amb} °C	Max. process temp. T_m °C	Temp. class	Max. surface temp. °C
-40...+65	65	T6 - T1	T80
	80	T5 - T1	T95
	115	T4 - T1	T130
	130	T3 - T1	T160
Minimum process temperature: $T_{amb} \geq$ -35°C T_m = -50°C, T_{amb} <-35°C T_m = -40°C			

OPTIMASS 2400C with aluminium converter housing

Ambient temp. T_{amb} °C	Max. process temp. T_m °C	Temp. class	Max. surface temp. °C
-40...+50	50	T6 - T1	T80
	130	T3 - T1	T160
-40...+55	100	T4 - T1	T130
	120	T3 - T1	T150
-40...+60	90	T4 - T1	T120
-40...+65	65	T5 - T1	T95
Minimum process temperature: $T_{amb} \geq$ -35°C T_m = -50°C, T_{amb} <-35°C T_m = -40°C			

OPTIMASS 2400C with Stainless Steel converter housing

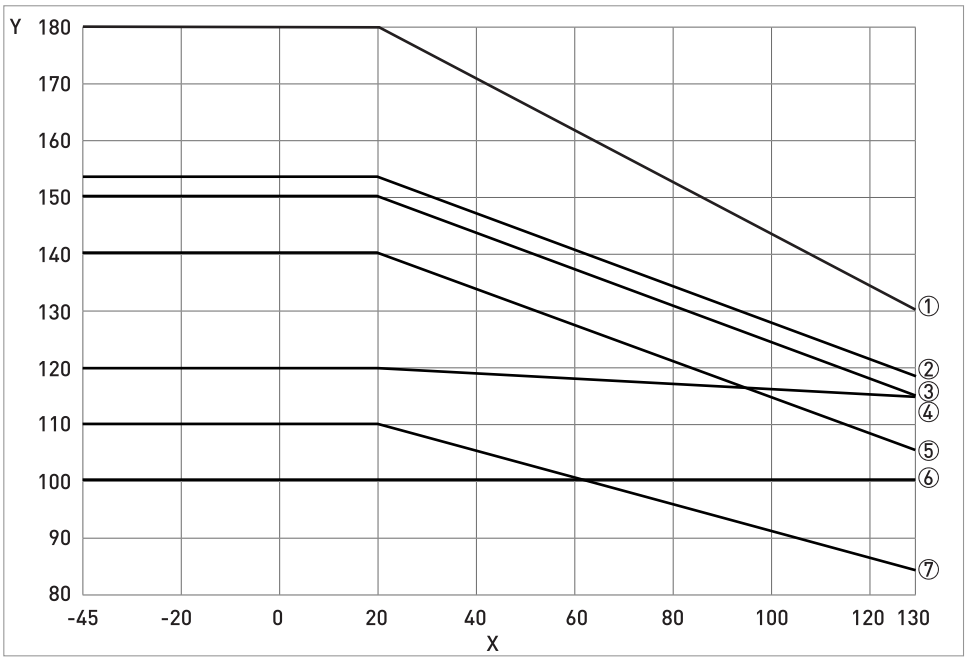
Ambient temp. T_{amb} °C	Max. process temp. T_m °C	Temp. class	Max. surface temp. °C
-40...+40	130	T3 - T1	T160
-40...+45	100	T4 - T1	T130
	110	T3 - T1	T140
-40...+50	50	T6 - T1	T80
	90	T4 - T1	T120
-40...+55	65	T5 - T1	T95
	75	T4 - T1	T105
-40...+60	60	T5 - T1	T90
Minimum process temperature: $T_{amb} \geq$ -35°C T_m = -50°C, T_{amb} <-35°C T_m = -40°C			

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)



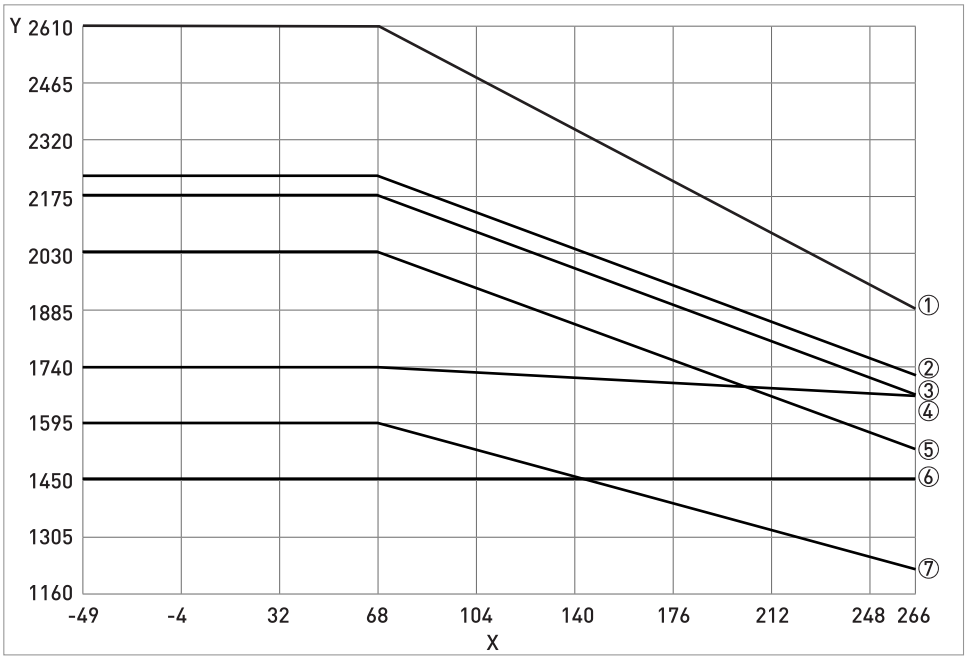
X temperature [°C]
Y pressure [barg]

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

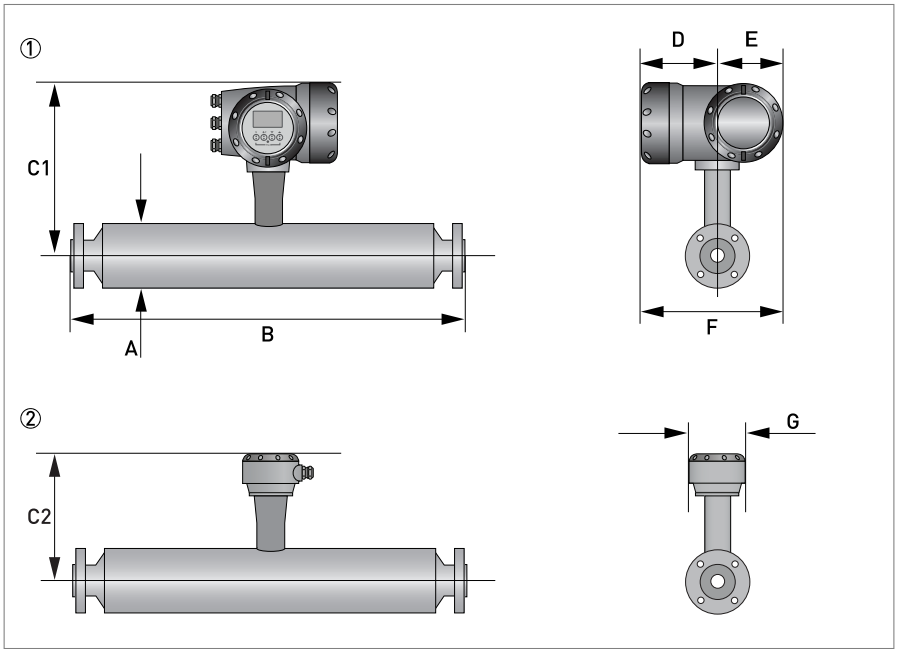
Flanges

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

2.5 Dimensions and weights

2.5.1 Flanged versions

Meter dimensions



① Compact version
② Remote version

Meter weights (PN40 flanges).

		Compact		Remote	
	Weight	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 cyclinder wall thickness
② 15mm outer cyclinder 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	324 ±5	406 ±5	508 ±5
C1 (compact)	370 ±5	422 ±5	463 ±5	515 ±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			

Dimension B

	mm (±5)			
	S100	S150	S250	S400
PN16				
DN100	1284	-	-	-
DN150	1290	1584	-	-
DN200	-	1598	-	-
DN250	-	-	1953	-
DN300	-	-	1969	2277
DN350	-	-	-	2285
DN400	-	-	-	2291
PN40				
DN100	1310	-	-	-
DN150	1330	1624	-	-
DN200	-	1650	-	-
DN250	-	-	2023	-
DN300	-	-	2043	2351
DN350	-	-	-	2371
DN400	-	-	-	2391
PN63				
DN100	1336	-	-	-

	mm (±5)			
	S100	S150	S250	S400
DN150	1370	1664	-	-
DN200	-	1694	-	-
DN250	-	-	2063	-
DN300	-	-	2093	2401
DN350	-	-	-	2421
DN400	-	-	-	2441
PN100				
DN100	1360	-	-	-
DN150	1410	1704	-	-
DN200	-	1734	-	-
DN250	-	-	1970	-
DN300	-	-	2153	2471
DN350	-	-	-	2499
DN400	-	-	-	-
PN160				
DN100	1380	-	-	-
DN150	1436	1730	-	-
DN200	-	1754	-	-
DN250	-	-	2123	-
DN300	-	-	2163	2471
DN350	-	-	-	-
DN400	-	-	-	-
ASME 150				
4"	1334	-	-	-
6"	1358	1652	-	-
8"	-	1678	2018	-
10"	-	-	2017	-
12"	-	-	2043	2351
14"	-	-	-	2375
16"	-	-	-	2375
ASME 300				
4"	1352	-	-	-
6"	1378	1672	-	-
8"	-	1698	2038	-
10"	-	-	2049	-
12"	-	-	2075	2383
14"	-	-	-	2407
16"	-	-	-	2413
ASME 600				
4"	1398	-	-	-
6"	1428	1722	-	-

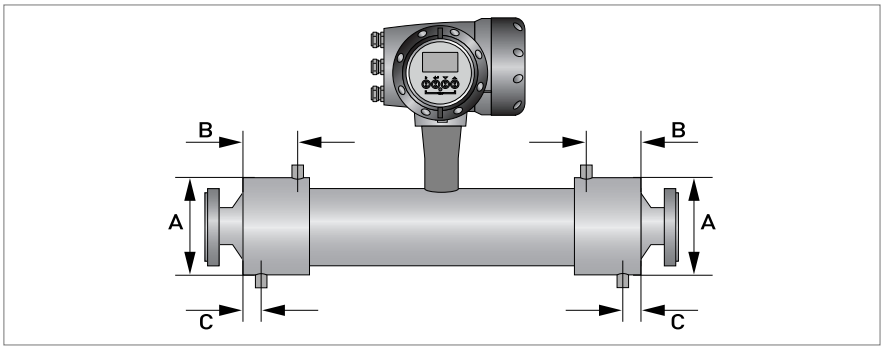
	mm (±5)			
	S100	S150	S250	S400
8"	-	1754	2094	-
10"	-	-	2131	-
12"	-	-	2139	2448
14"	-	-	-	2465
16"	-	-	-	2491
ASME 900				
4"	1422	-	-	-
6"	1474	1768	-	-
8"	-	1812	-	-
10"	-	-	2195	-
12"	-	-	2227	2535
14"	-	-	-	2561
16"	-	-	-	2567
ASME 1500				
4"	1442	-	-	-
6"	1554	-	-	-
8"	-	1914	-	-
10"	-	-	2335	-
12"	-	-	2393	2701
14"	-	-	-	2731
16"	-	-	-	2757
JIS 10K				
100A	1270	-	-	-
350A	-	-	-	-
JIS 20K				
100A	1296	-	-	-
350A	-	-	-	-

	Inches Dimension (±0.2)			
	S100	S150	S250	S400
PN16				
DN100	50.5	-	-	-
DN150	50.8	62.4	-	-
DN200	-	62.9	-	-
DN250	-	-	77.0	-
DN300	-	-	77.5	89.6
DN350	-	-	-	90.0
DN400	-	-	-	90.2
PN40				
DN100	51.5	-	-	-

	Inches Dimension (±0.2)			
	S100	S150	S250	S400
DN150	52.4	63.9	-	-
DN200	-	65.0	-	-
DN250	-	-	79.6	-
DN300	-	-	80.4	92.5
DN350	-	-	-	93.3
DN400	-	-	-	94.1
PN63				
DN100	52.6	-	-	-
DN150	53.9	65.5	-	-
DN200	-	66.7	-	-
DN250	-	-	81.2	-
DN300	-	-	82.4	94.5
DN350	-	-	-	95.3
DN400	-	-	-	96.1
PN100				
DN100	53.9	-	-	-
DN150	55.5	67.1	-	-
DN200	-	68.3	-	-
DN250	-	-	77.6	-
DN300	-	-	84.8	96.9
DN350	-	-	-	98.4
DN400	-	-	-	-
PN160				
DN100	54.3	-	-	-
DN150	56.5	68.1	-	-
DN200	-	69.0	-	-
DN250	-	-	83.6	-
DN300	-	-	85.1	97.3
DN350	-	-	-	-
DN400	-	-	-	-
ASME 150				
4"	52.5	-	-	-
6"	53.4	65.0	-	-
8"	-	66.1	79.7	-
10"	-	-	79.4	-
12"	-	-	80.4	92.6
14"	-	-	-	93.5
16"	-	-	-	93.5
ASME 300				
4"	53.2	-	-	-
6"	54.2	65.8	-	-

	Inches Dimension (±0.2)			
	S100	S150	S250	S400
8"	-	66.8	80.2	-
10"	-	-	80.7	-
12"	-	-	81.7	93.8
14"	-	-	-	94.8
16"	-	-	-	95.0
ASME 600				
4"	55.0	-	-	-
6"	56.2	67.8	-	-
8"	-	69.0	82.4	-
10"	-	-	83.9	-
12"	-	-	84.2	96.4
14"	-	-	-	97.0
16"	-	-	-	98.1
ASME 900				
4"	56.0	-	-	-
6"	58.0	69.6	-	-
8"	-	71.3	-	-
10"	-	-	86.4	-
12"	-	-	87.7	99.8
14"	-	-	-	100.8
16"	-	-	-	101.1
ASME 1500				
4"	56.8	-	-	-
6"	61.2	-	-	-
8"	-	75.3	-	-
10"	-	-	91.9	-
12"	-	-	94.2	106.3
14"	-	-	-	107.5
16"	-	-	-	108.5
JIS 10K				
100A	50.0	-	-	-
350A	-	-	-	-
JIS 20K				
100A	51.0	-	-	-
350A	-	-	-	-

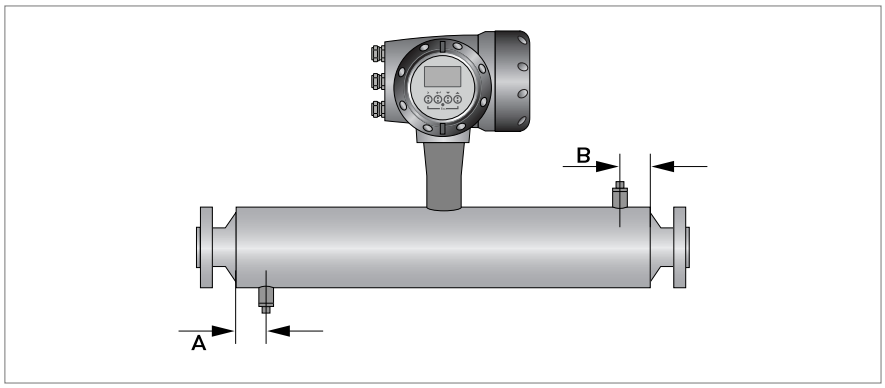
2.5.2 Heating jacket version



	Dimensions [mm]	
	S100	S150
Heating connection size	25 mm (ERMETO)	
A	254 ±2.5	355 ±2.5
B	178 ±2.0	228 ±2.0
C	28 ±2.0	28 ±2.0

	Dimensions [inches]	
	S100	S150
Heating connection size	1" (NPTF)	
A	10 ±0.1	14 ±0.1
B	7 ±0.08	9 ±0.08
C	1.1 ±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. 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.

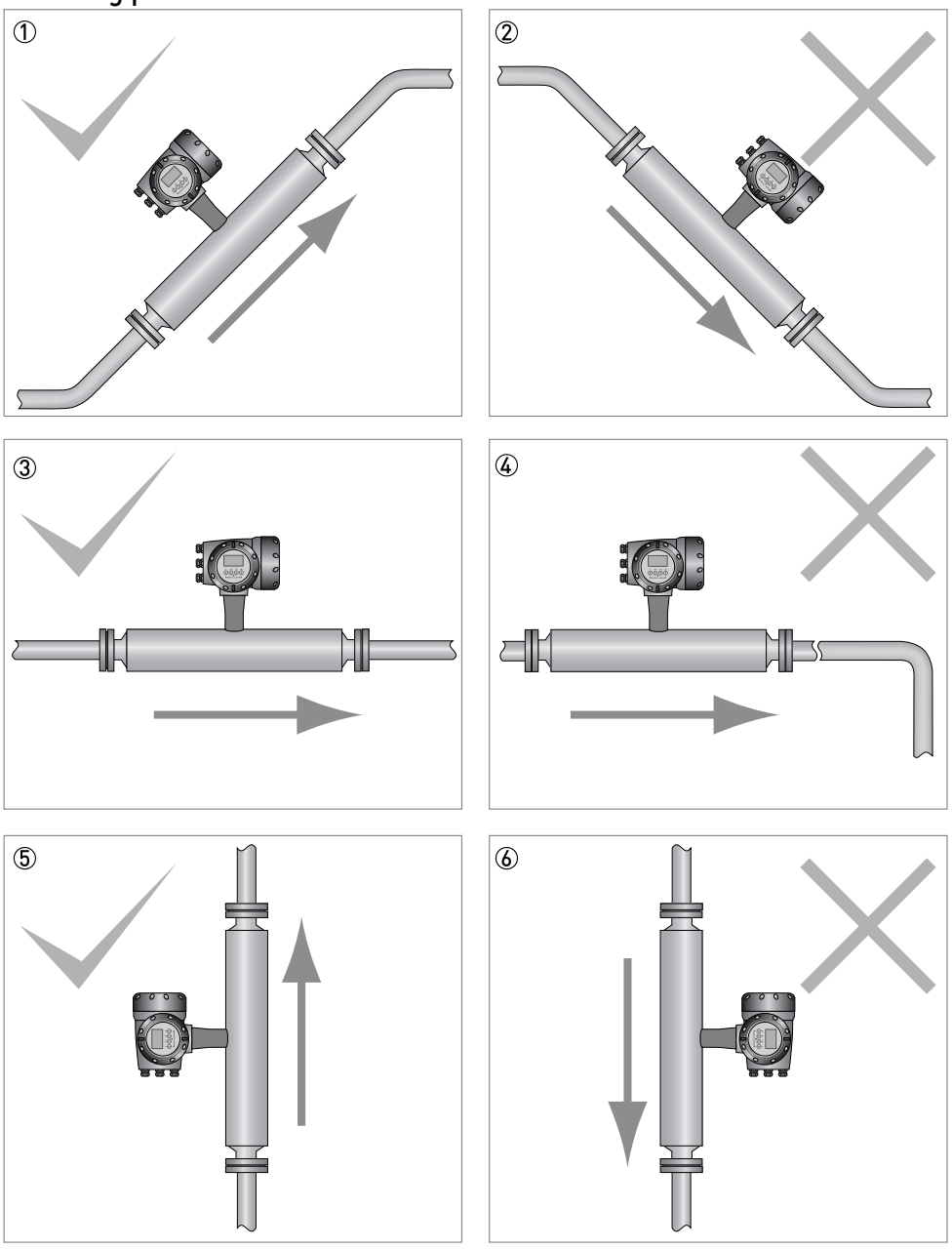
3.2 Mounting restrictions

3.2.1 General installation principles

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

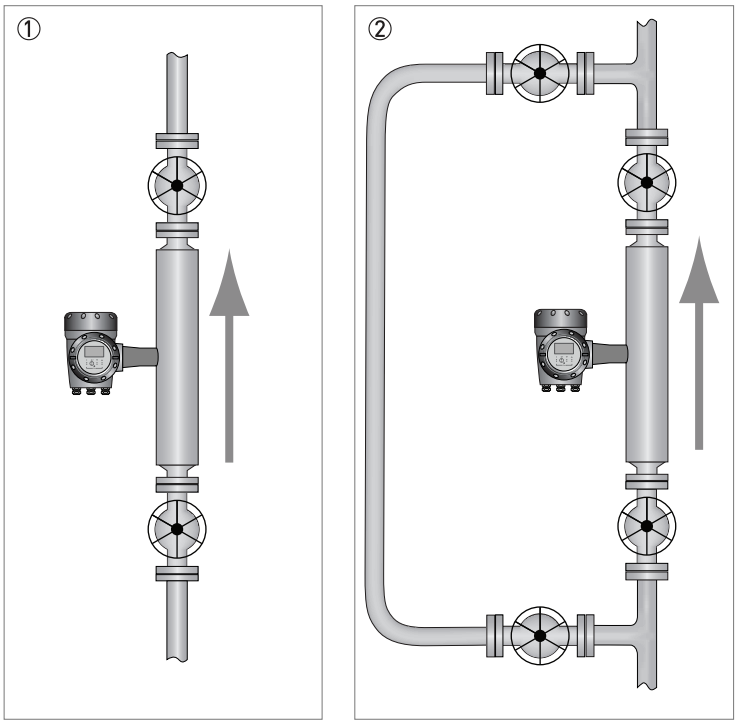
- Support the weight of the meter.
- The meter can be supported on the sensor body.
- On larger meter sizes and hygienic connections, it is strongly recommended that the meter is not supported solely by the process pipework.
- No straight runs are required.
- The use of reducers and other fittings at 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.
- Avoid mounting the meter in long horizontal pipe runs where a build up of air / gas could cause zero instability.

Mounting positions



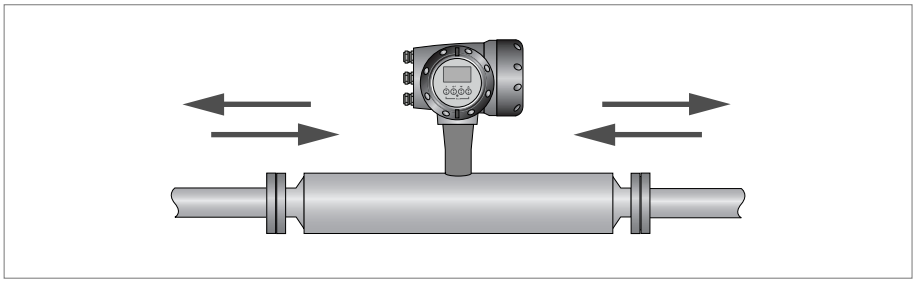
① The meter can be mounted at an angle but it is recommended that the flow is uphill.
② Avoid mounting the meter with the flow running downhill because it can cause siphoning. If the meter has to be mounted with the flow running downhill, install an orifice plate or control valve downstream of the meter 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.

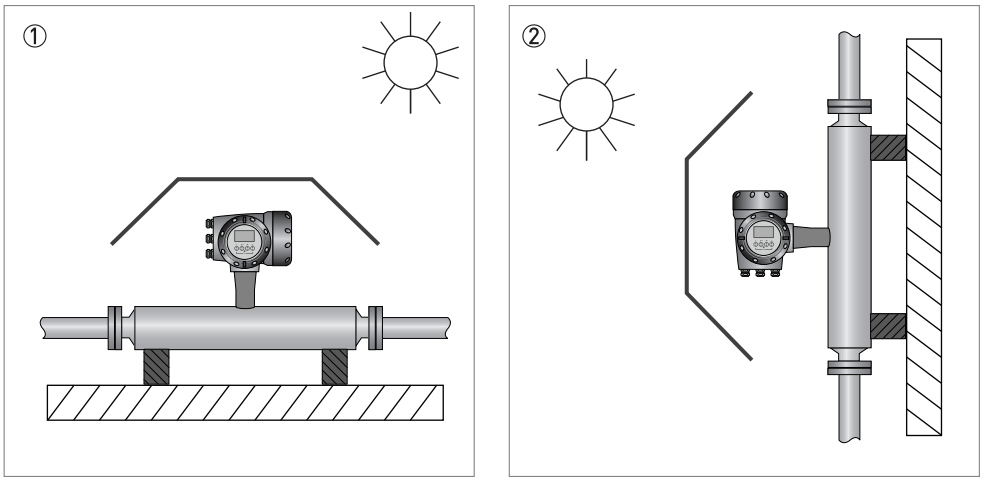
3.2.2 Maximum pipework forces



Avoid external forces that apply pressure (negative, positive or rotational) to the ends of the meter. If it is not possible to avoid such forces you MUST contact the manufacturer.

3.2.3 Sunshades

The meter MUST be protected from strong sunlight.



① Horizontal installation
② Vertical installation

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Head Office KROHNE Messtechnik GmbH
Ludwig-Krohne-Str. 5
47058 Duisburg (Germany)
Tel.: +49 203 301 0
Fax: +49 203 301 10389
info@krohne.de

The current list of all KROHNE contacts and addresses can be found at:
www.krohne.com

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