

OPTIMASS 2400 **Technical Datasheet**

Sensor for bulk 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.

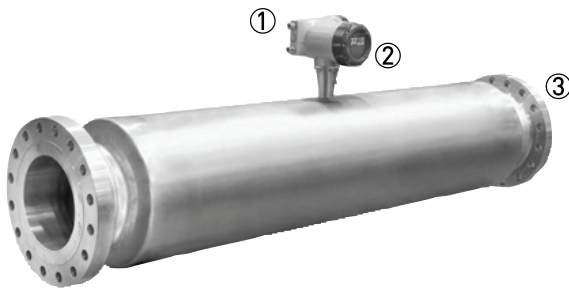
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1.1 The solution for bulk mass flow measurement

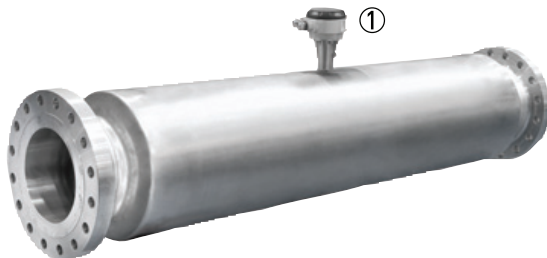
The OPTIMASS 2400 has been developed to meet the demanding custody transfer requirements of the oil and gas industry and is well suited to bulk measurement in many applications. The option of Super Duplex (UNS S32760) provides a maximum operating pressure of 180 barg.

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

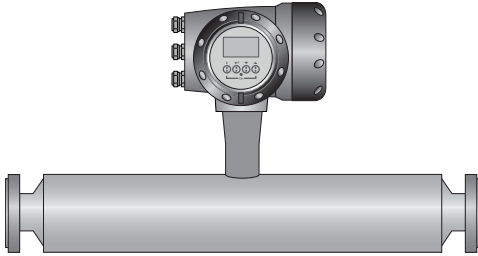
- Marine
- Oil and gas
- Waste water
- Chemical
- Paper and pulp
- Food and beverage
- Pharmaceutical
- Fresh water

Applications

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

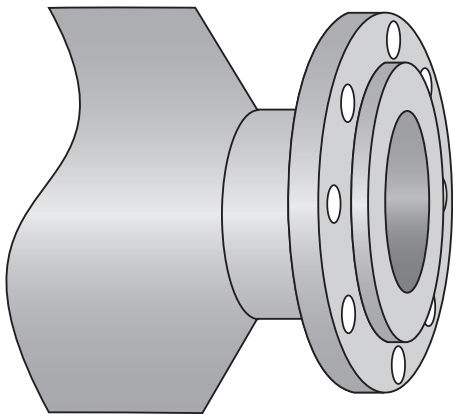
1.2 Features and options

Features



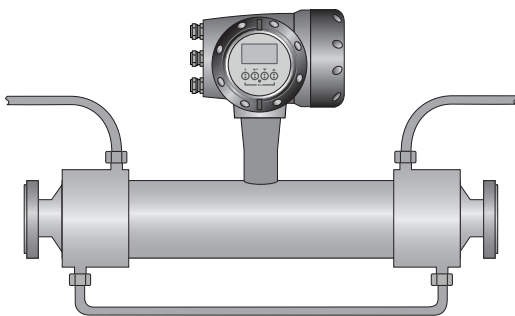
- Flow rates up to 4,600,000 kg/h / 169,021 lb/min.
- Integrated electronics.
- Self draining.
- Best in class for zero stability.
- With advanced Entrained Gas Management (EGM™) the meter maintains operation over a wide range of gas fractions and complex flow conditions.

Connection options



- Flange sizes from 4" / DN100 to 16" / DN400 1500 lbs / PN160.
- Supports a wide range of industry standard hygienic connections.
- Hygienic connections (DN100 only) for bulk measurement in the food and beverage industry.

Heating jacket and purge port



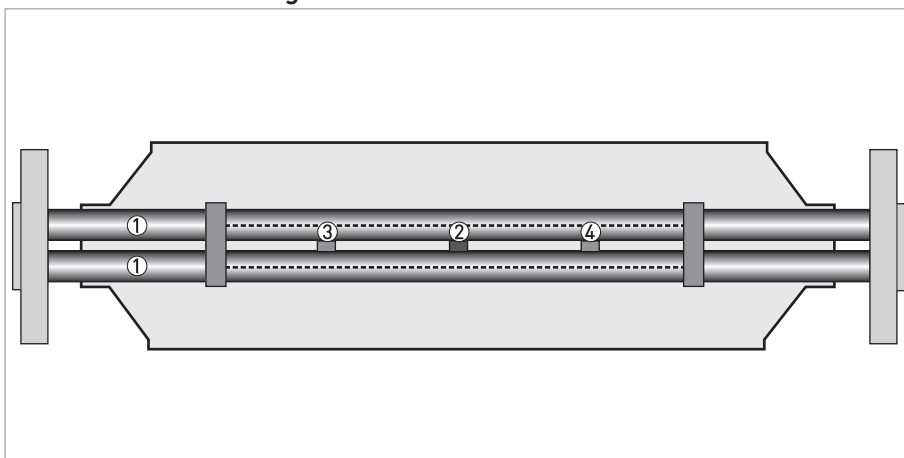
- Heating jacket option for use with temperature dependant products.
- Prevents solidification of process product.
- Purge port option for protection in the event of measuring tube failure.
- Allows hazardous chemicals to be drained away safely.
- Can also be used for the early detection of measuring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

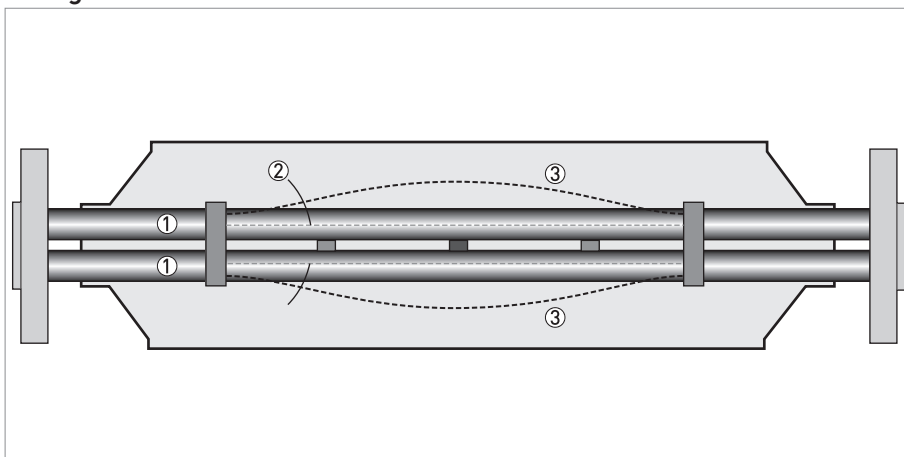
Static meter not energised and with no flow



- 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.

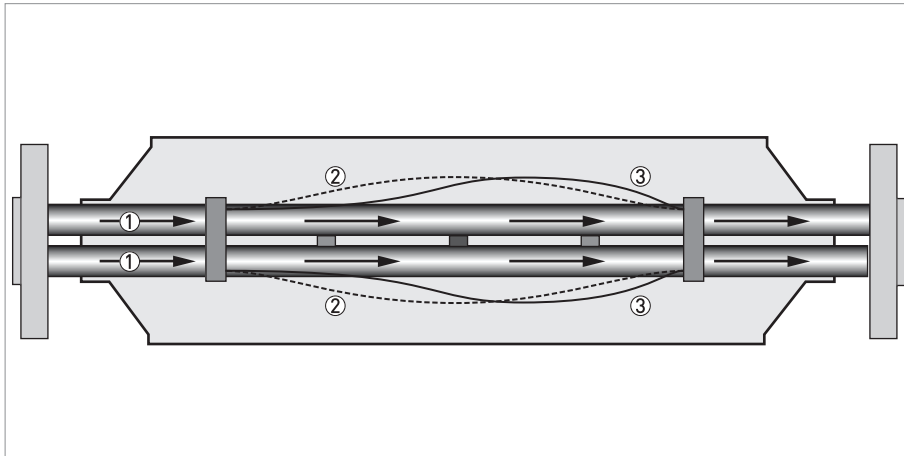
Energised meter



- 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 |
| 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 / 14698 lb/min |
| S150 | 900000 kg/h / 33804 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 |
| Hygienic connection (S100 only) | |
| Nominal pressure at 20°C / 68°F | |
| Measuring tube (Duplex UNS S31803) | |
| PED | -1...150 barg / -14.5...2175 psig |
| FM (S100...250) | -1...140 barg / -14.5...2030 psig |
| FM (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 |
| FM | -1...152 barg / -14.5...2205 psig |
| CRN / ASME B31.3 | -1...120 barg / -14.5...1885 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 |

| Hygienic | |
|-----------------------|-------|
| Tri-clover | 4" |
| Tri-clamp DIN 32676 | DN100 |
| Tri-clamp ISO 2852 | 4" |
| DIN 11864-2 Form A | DN100 |
| Male thread DIN 11851 | DN100 |
| Male thread SMS | 4" |
| Male thread IDF / ISS | 4" |
| Male thread RJT | 4" |

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 | The device fulfils the statutory requirements of the CE directive. The manufacturer certifies that these requirements have been met by applying the CE mark. |
| Factory Mutual / CSA | 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) | 12.27.901-2003 |
| Hygienic | 3A 28-03 |
| | ASME BPE |
| 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) | |
| OPTIMASS 2400C 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 T160°C Db |
| Ex e connection compartment | II 1/2 G - Ex de ia IIC T6...T1 Ga/Gb |
| | II 2 D - Ex t IIIC T160°C Db |

| OPTIMASS 2400C 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 T160°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 T160°C Db |
| OPTIMASS 2400F | 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 | |
|--|--|-------------------------------|-------------|--------------------------|------|
| OPTIMASS 2400C with or without heating jacket / insulation | 40 | 40 | T6 | T70 | |
| | | 55 | T5 | T85 | |
| | | 90 | T4 | T120 | |
| | | 130 | T3-T1 | T160 | |
| | 50 | 55 | T5 | T85 | |
| | | 90 | T4 | T120 | |
| | | 130 | T3-T1 | T160 | |
| | 65 | 65 | T5 | T95 | |
| | | 130 | T3-T1 | T160 | |
| | OPTIMASS 2400C Aluminium converter housing - with or without heating jacket / insulation | 40 | 40 | T6 | T70 |
| | | | 55 | T5 | T85 |
| | | | 90 | T41 | T120 |
| 130 | | | T3 - T1 | T160 | |
| 50 | | 55 | T5 | T85 | |
| | | 90 | T4 | T120 | |
| | | 130 | T3 - T1 | T160 | |
| 65 ① | | 65 | T4-T1 | T95 | |
| OPTIMASS 2400C Stainless Steel converter housing - with or without heating jacket / insulation | | 40 | 40 | T6 | T70 |
| | | | 55 | T5 | T85 |
| | | | 90 | T4 | T120 |
| | | | 130 | T3-T1 | T160 |
| | 50 | 55 | T5 | T85 | |
| | | 90 | T4-T1 | T120 | |
| | 60 | 60 | T5-T1 | T90 | |

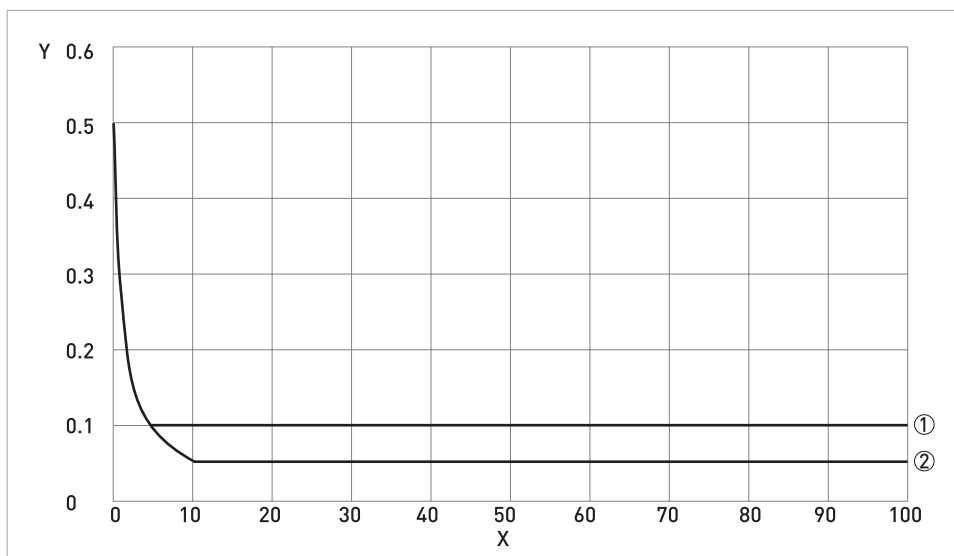
① depending on I/O option. Please call for more information.

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 | | | | |
| Hygienic (all connections) | | | | | |
| 130°C | 10 barg | 5kN | - | - | - |

- 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

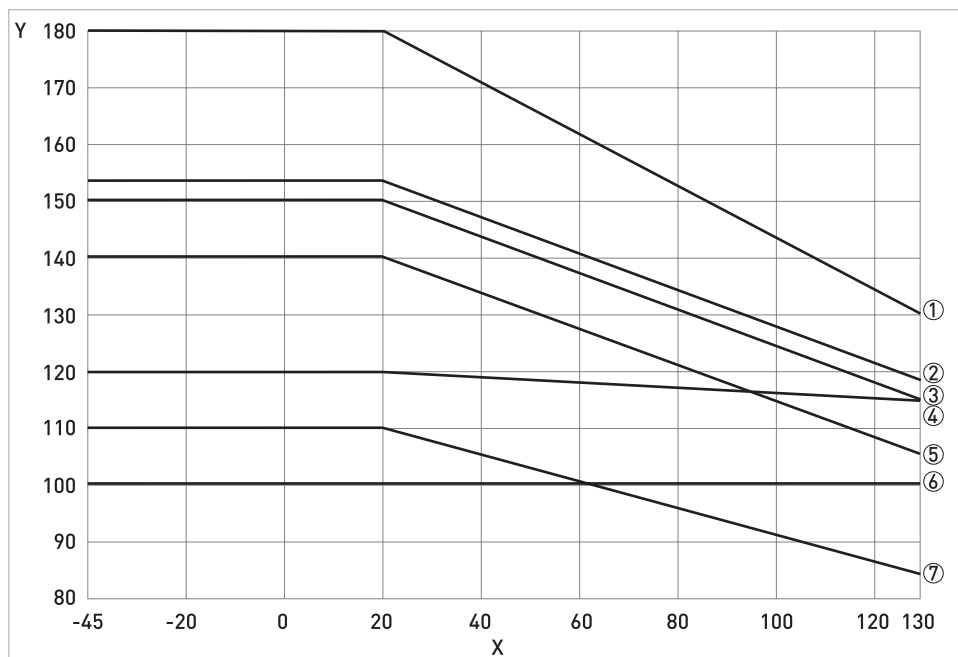
| | |
|--------------------|--------------------|
| Product | Water |
| Temperature | +20°C / +68°F |
| Operating pressure | 1 barg / 14.5 psig |

2.4 Guidelines for maximum operating pressure

Notes:

- Ensure that the meter is used within its operating limits
- All hygienic process connections have a maximum operating rating of 10 barg at 130°C / 145 psig at 266°F

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



X temperature [°C]

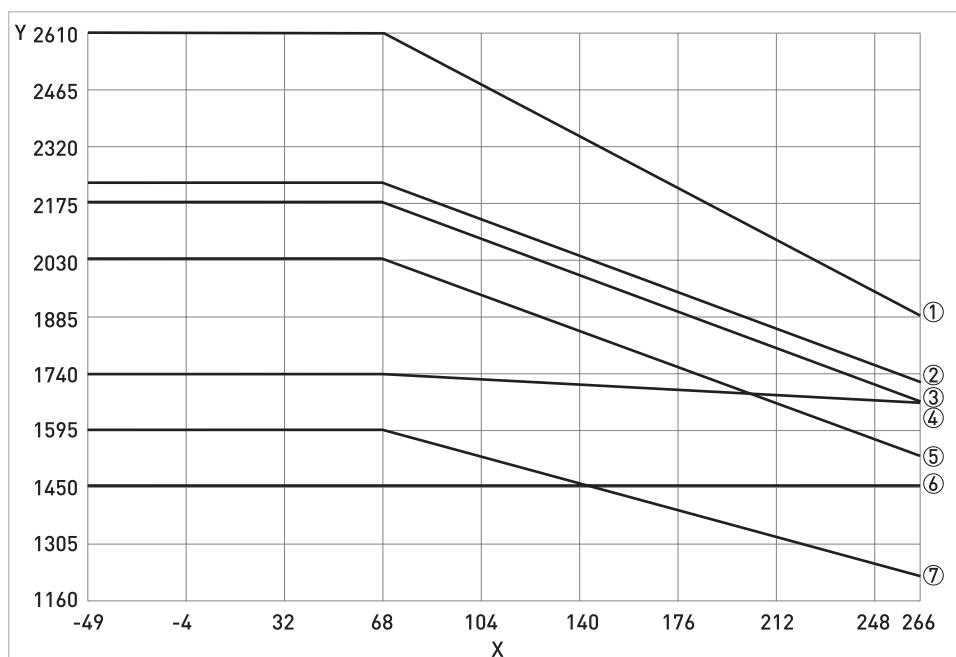
Y pressure [barg]

- 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

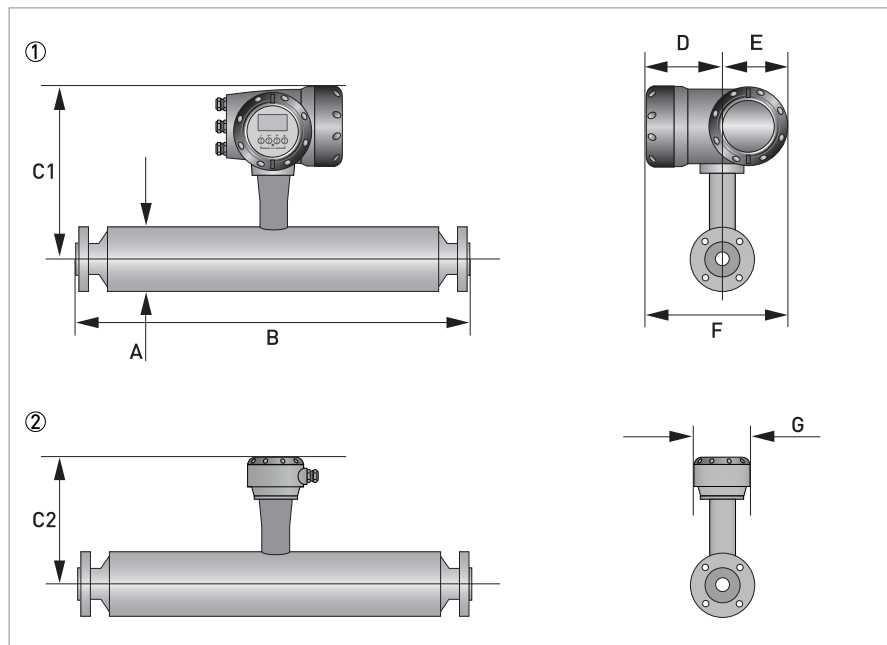
- DIN flange ratings are based on EN 1092-1 2007 table G.4.1 material group 14E0
- ASME flange ratings are based on ASME B16.5 2003 table 2 material group 2.2
- JIS flange ratings are based on JIS 2220: 2001 table 1 division 1 material group 022a

Notes

- The maximum operating pressure will be either the flange rating or the measuring tube rating, **WHICHEVER IS THE LOWER!**
- The manufacturer recommends that the seals are replaced at regular intervals. This will maintain the hygienic integrity of the connection.

2.5 Dimensions and weights

2.5.1 Flanged versions



- 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 | 44.5 | 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 | 400 |
| 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 | - |
| DN350 | - | - | - | 2376 |
| DN400 | - | - | - | 2396 |
| PN63 | | | | |
| DN100 | 1336 | - | - | - |

| | Dimension B [mm] | | | |
|-----------------|------------------|------|------|------|
| | S100 | S150 | S250 | 400 |
| 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 | - | - |
| 10" | - | - | 2049 | - |
| 12" | - | - | 2075 | - |
| 14" | - | - | - | 2412 |
| 16" | - | - | - | 2414 |
| ASME 600 | | | | |
| 4" | 1398 | - | - | - |
| 6" | 1428 | 1722 | - | - |

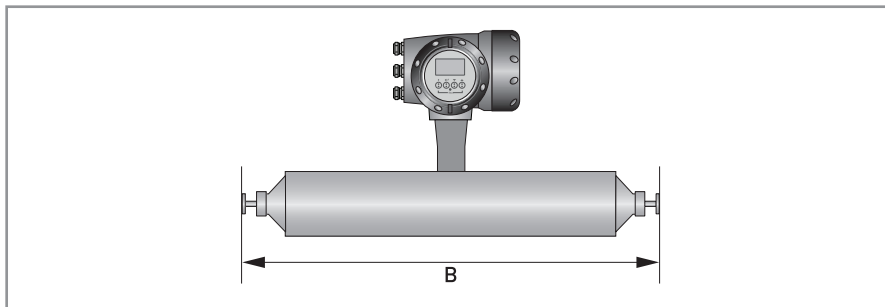
| | Dimension B [mm] | | | |
|------------------|------------------|------|------|------|
| | S100 | S150 | S250 | 400 |
| 8" | - | 1754 | - | - |
| 10" | - | - | 2131 | - |
| 12" | - | - | 2139 | - |
| 14" | - | - | - | 2470 |
| 16" | - | - | - | 2496 |
| ASME 900 | | | | |
| 4" | 1422 | - | - | - |
| 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 | 400 |
| 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 | - | - | - |

| | Dimension B [inches] | | | |
|-----------------|----------------------|------|------|-------|
| | S100 | S150 | S250 | 400 |
| DN150 | 52.6 | 63.9 | - | - |
| DN200 | - | 65.0 | - | - |
| DN250 | - | - | 79.6 | - |
| DN300 | - | - | 80.4 | - |
| DN350 | - | - | - | 93.5 |
| DN400 | - | - | - | 94.3 |
| PN63 | | | | |
| DN100 | 53.2 | - | - | - |
| DN150 | 52.3 | 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 | - |
| 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 | - | - |

| | Dimension B [inches] | | | |
|------------------|----------------------|------|------|-------|
| | S100 | S150 | S250 | 400 |
| 8" | - | 66.8 | - | - |
| 10" | - | - | 80.7 | - |
| 12" | - | - | 81.7 | - |
| 14" | - | - | - | 95.0 |
| 16" | - | - | - | 95.0 |
| ASME 600 | | | | |
| 4" | 54.9 | - | - | - |
| 6" | 56.1 | 67.8 | - | - |
| 8" | - | 69.0 | - | - |
| 10" | - | - | 83.9 | - |
| 12" | - | - | 84.2 | - |
| 14" | - | - | - | 97.2 |
| 16" | - | - | - | 98.3 |
| ASME 900 | | | | |
| 4" | 55.2 | - | - | - |
| 6" | 57.9 | 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 | - | - |
| 10" | - | - | 91.9 | - |
| 12" | - | - | 94.2 | - |
| 14" | - | - | - | 107.7 |
| 16" | - | - | - | 108.7 |
| JIS 10K | | | | |
| 100A | 52.5 | - | - | - |
| 350A | - | - | - | 89.9 |
| JIS 20K | | | | |
| 100A | 52.5 | - | - | - |
| 350A | - | - | - | 92.4 |

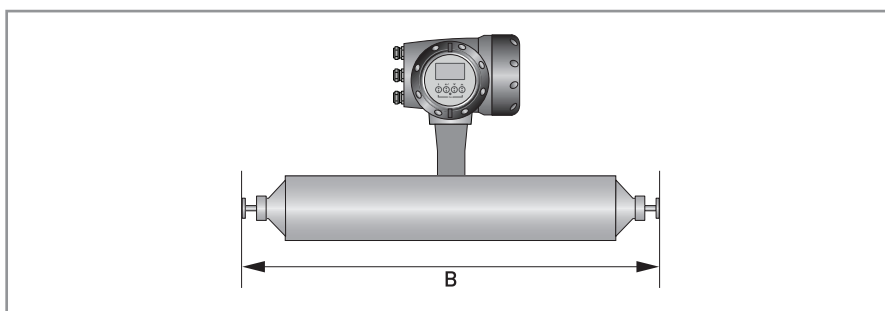
2.5.2 Hygienic versions



Hygienic connections: all welded versions

| | Dimension B [mm] | | | |
|----------------------------|------------------|------|------|------|
| | S100 | S150 | S250 | S400 |
| Tri-clover | | | | |
| 4" | 1223 | - | - | - |
| Tri-clamp DIN 32676 | | | | |
| DN100 | 1236 | - | - | - |
| Tri-clamp ISO 2852 | | | | |
| 4" | 1223 | - | - | - |
| DIN 11864-2 form A | | | | |
| DN100 | 1296 | - | - | - |

| | Dimension B [inches] | | | |
|----------------------------|----------------------|------|------|------|
| | S100 | S150 | S250 | S400 |
| Tri-clover | | | | |
| 4" | 48 | - | - | - |
| Tri-clamp DIN 32676 | | | | |
| DN100 | 48.7 | - | - | - |
| Tri-clamp ISO 2852 | | | | |
| 4" | 48 | - | - | - |
| DIN 11864-2 form A | | | | |
| DN100 | 51 | - | - | - |

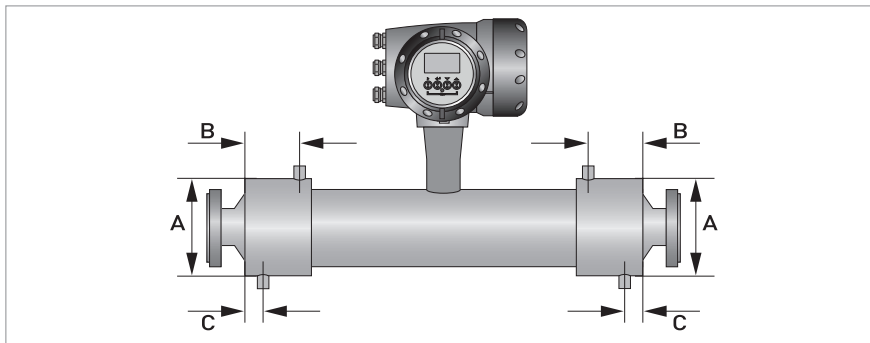


Hygienic connections: adapter versions (male thread)

| | Dimension B [mm] | | |
|------------------------------|------------------|------|------|
| | S100 | S150 | S250 |
| Male thread DIN 11851 | | | |
| DN100 | 1288 | - | - |
| Male thread SMS | | | |
| 4" | 1236 | - | - |
| Male thread IDF/ISS | | | |
| 4" | 1223 | - | - |
| Male thread RJT | | | |
| 4" | 1234 | - | - |

| | Dimension B [inches] | | |
|------------------------------|----------------------|------|------|
| | S100 | S150 | S250 |
| Male thread DIN 11851 | | | |
| DN100 | 50.1 | - | - |
| Male thread SMS | | | |
| 4" | 48.7 | - | - |
| Male thread IDF/ISS | | | |
| 4" | 48 | - | - |
| Male thread RJT | | | |
| 4" | 48.6 | - | - |

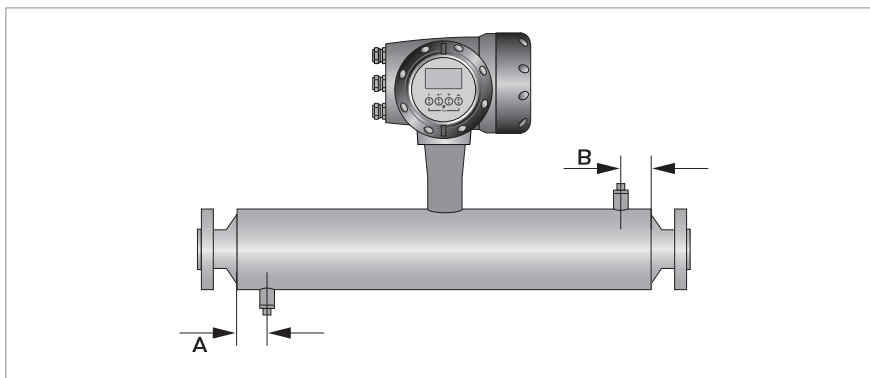
2.5.3 Heating jacket version



| | Dimensions [mm] | | | |
|-------------------------|-----------------|----------|----------|----------|
| | S100 | S150 | S250 | 400 |
| 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 | 400 |
| 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 | 106 ±0.08 |
| C | 1.1 ±0.08 | 1.1 ±0.08 | 1.26 ±0.08 | 1.1 ±0.08 |

2.5.4 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 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 CISPR11:2009. 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.

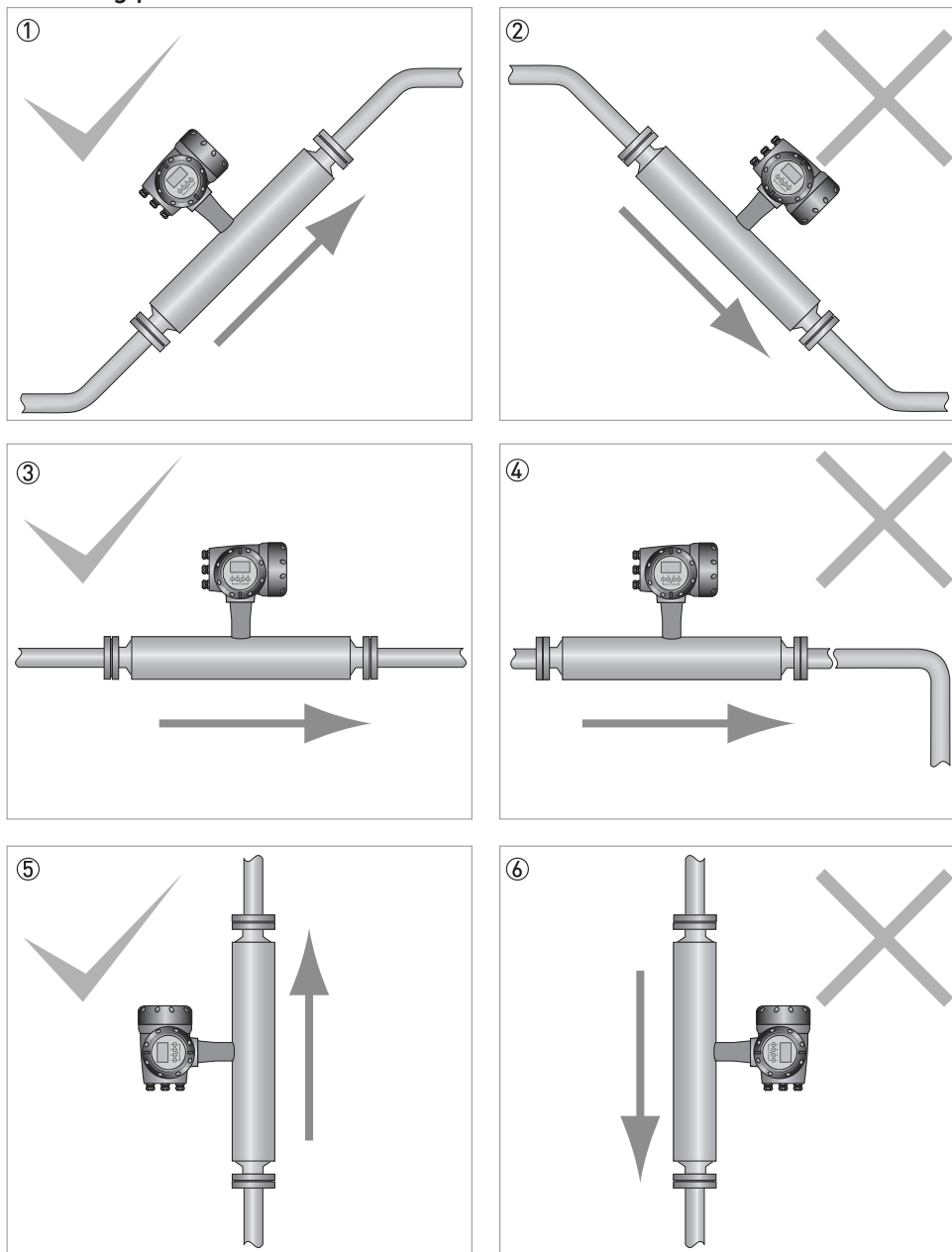
3.2 Mounting restrictions

3.2.1 General installation principles

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

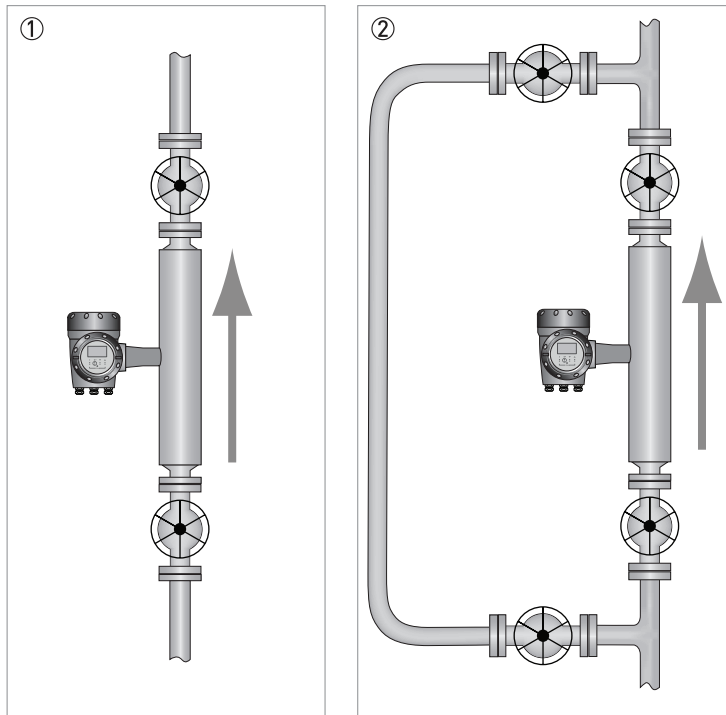
- Support the weight of the meter.
- The meter can be supported on the sensor body.
- On larger meter sizes and hygienic connections, it is strongly recommended that the meter is not supported solely by the process pipework.
- No straight runs are required.
- The use of reducers and other fittings at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

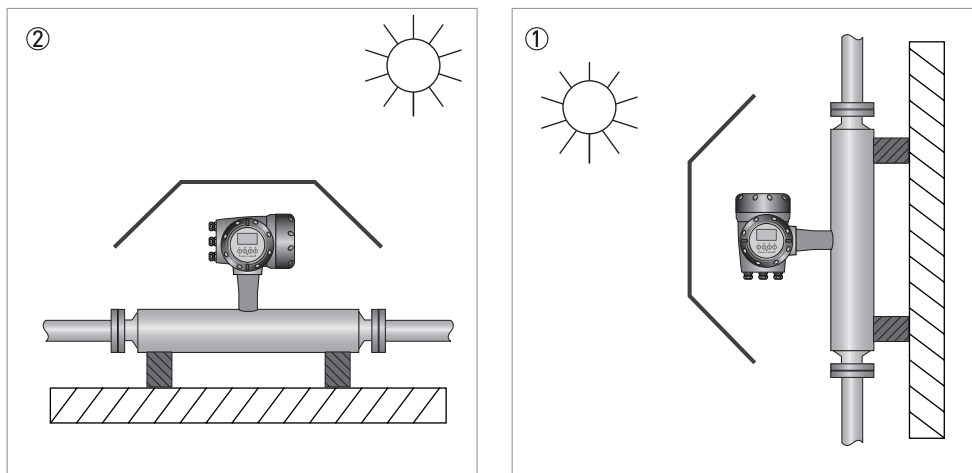
Zero calibration



- 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

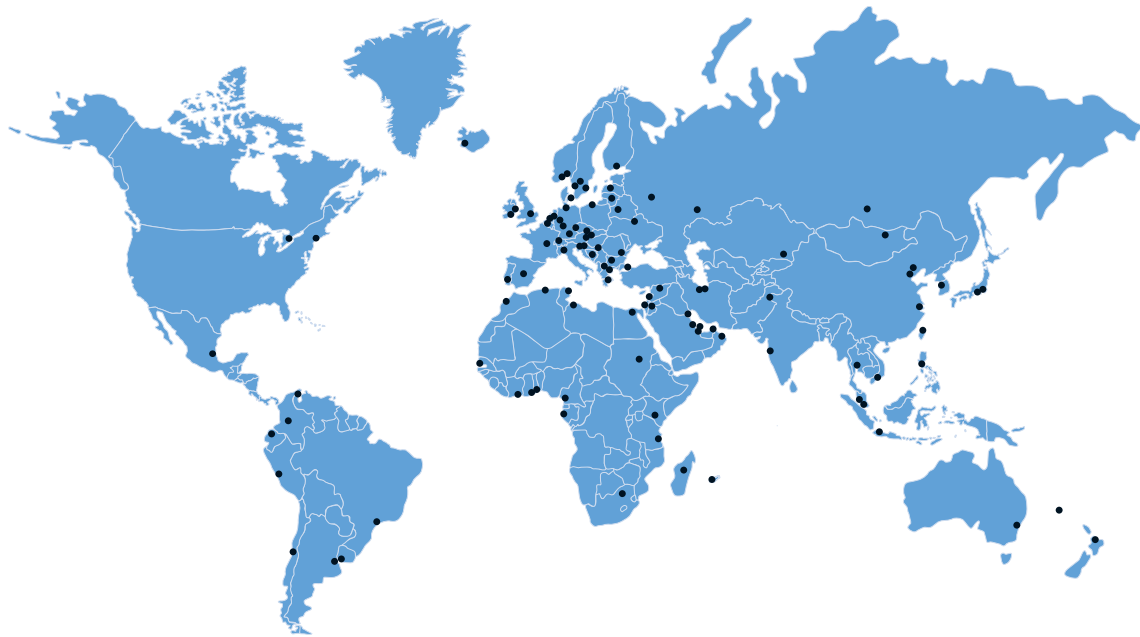
The meter **MUST** be protected from strong sunlight.



- ① Horizontal installation
- ② Vertical installation







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