



OPTIMASS 6000

Handbook

Sensor for mass flow

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

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1.1 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.

**CAUTION!**

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.

**INFORMATION!**

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.

**INFORMATION!**

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

1.2 CE certification

CE marking



This device conforms with the most recent and up to date versions of the following:

- EMC Directive
- ATEX Directive
- Low Voltage Directive
- Pressure Equipment Directive (PED)
- RoHS
- Measuring Instrument Directive
- Radio Equipment Directive (RED)

The manufacturer declares conformity and the device carries the CE mark.

1.3 Associated documents

This handbook should be read in conjunction with relevant documents in relation to:

- hazardous areas
- communications
- concentration
- corrosion

1.4 Insulation case

On meters fitted with an insulation case, the case will be filled with one of the following materials:

Cryogenic meters (-200°C...+40°C / -328°F...+104°F)

Block grade EPS 1112A (Polystyrene) containing flame retardant additive (FRA)

Standard meters (-70°C...+230°C / -94°F...+446°F)

Glass mineral wool

High temperature meters (-50°C...+400°C / -58°F...+752°F)

Silicon dioxide based mineral wool

Do not open the insulation case. Some, or all, of the above materials can cause:

- skin irritation
- throat and lung irritation
- eye irritation

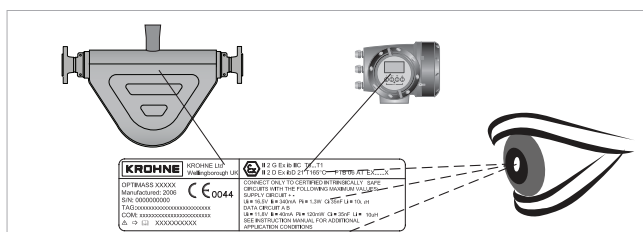
Water will damage the insulation material and reduce performance. Install the meter so that water cannot get into the insulation case. If the insulation case is fitted with rubber plugs **DO NOT REMOVE THEM!**

1.5 Pressure Equipment Directive (PED)



LEGAL NOTICE!

The Pressure Equipment Directive places legal requirements on both the manufacturer and the end user. Please read this section carefully!



To ensure the PED integrity of the meter, you **MUST** check that the serial numbers on the converter nameplate and the sensor nameplate are the same.

To comply with the requirements of the Pressure Equipment Directive (PED) the manufacturer provides all the relevant technical data in the technical data section of this handbook. Secondary pressure containment is **NOT** supplied on this meter.

Tube failure

Where the meter is being used to measure high pressure gases and / or gases kept as liquids by high pressure and / or where there is a risk of tube failure because of the use of corrosive or erosive fluids, frequent pressure and / or thermal cycling, seismic or other shock loading, the burst disc option MUST be purchased. For more information, please contact your nearest representative.



DANGER!

If it is suspected that the primary measuring tube has failed, de-pressurise the meter and remove it from service as soon as it is safe to do so.

1.6 Dirty gas

Dirty gas is gas that carries sand or other solid particles. Dirty gas causes excessive wear to the primary measuring tube that can eventually result in complete tube failure. In some situations tube failure where gas is being measured, can be very dangerous.



DANGER!

If the meter is being used to measure gas and there is a risk that the gas might be dirty, you must fit a filter upstream of the meter to catch solid particles.

1.7 Safety instructions from the manufacturer

1.7.1 Copyright and data protection

The contents of this document have been created with great care. Nevertheless, we provide no guarantee that the contents are correct, complete or up-to-date.

The contents and works in this document are subject to copyright. Contributions from third parties are identified as such. Reproduction, processing, dissemination and any type of use beyond what is permitted under copyright requires written authorisation from the respective author and/or the manufacturer.

The manufacturer tries always to observe the copyrights of others, and to draw on works created in-house or works in the public domain.

The collection of personal data (such as names, street addresses or e-mail addresses) in the manufacturer's documents is always on a voluntary basis whenever possible. Whenever feasible, it is always possible to make use of the offerings and services without providing any personal data.

We draw your attention to the fact that data transmission over the Internet (e.g. when communicating by e-mail) may involve gaps in security. It is not possible to protect such data completely against access by third parties.

We hereby expressly prohibit the use of the contact data published as part of our duty to publish an imprint for the purpose of sending us any advertising or informational materials that we have not expressly requested.

1.7.2 Disclaimer

The manufacturer will not be liable for any damage of any kind by using its product, including, but not limited to direct, indirect or incidental and consequential damages.

This disclaimer does not apply in case the manufacturer has acted on purpose or with gross negligence. In the event any applicable law does not allow such limitations on implied warranties or the exclusion of limitation of certain damages, you may, if such law applies to you, not be subject to some or all of the above disclaimer, exclusions or limitations.

Any product purchased from the manufacturer is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.

The manufacturer reserves the right to alter the content of its documents, including this disclaimer in any way, at any time, for any reason, without prior notification, and will not be liable in any way for possible consequences of such changes.

1.7.3 Product liability and warranty

The operator shall bear responsibility for the suitability of the device for the specific purpose. The manufacturer accepts no liability for the consequences of misuse by the operator. Improper installation or operation of the devices (systems) will cause the warranty to be void. The respective "Standard Terms and Conditions" which form the basis for the sales contract shall also apply.

1.7.4 Information concerning the documentation

To prevent any injury to the user or damage to the device it is essential that you read the information in this document and observe applicable national standards, safety requirements and accident prevention regulations.

If this document is not in your native language and if you have any problems understanding the text, we advise you to contact your local office for assistance. The manufacturer can not accept responsibility for any damage or injury caused by misunderstanding of the information in this document.

This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device. Special considerations and precautions are also described in the document, which appear in the form of icons as shown below.

1.7.5 Warnings and symbols used

Safety warnings are indicated by the following symbols.



DANGER!

This warning refers to the immediate danger when working with electricity.



DANGER!

This warning refers to the immediate danger of burns caused by heat or hot surfaces.



DANGER!

This warning refers to the immediate danger when using this device in a hazardous atmosphere.



DANGER!

These warnings must be observed without fail. Even partial disregard of this warning can lead to serious health problems and even death. There is also the risk of seriously damaging the device or parts of the operator's plant.



WARNING!

Disregarding this safety warning, even if only in part, poses the risk of serious health problems. There is also the risk of damaging the device or parts of the operator's plant.



CAUTION!

Disregarding these instructions can result in damage to the device or to parts of the operator's plant.



INFORMATION!

These instructions contain important information for the handling of the device.



LEGAL NOTICE!

This note contains information on statutory directives and standards.



• **HANDLING**

This symbol designates all instructions for actions to be carried out by the operator in the specified sequence.

➔ **RESULT**

This symbol refers to all important consequences of the previous actions.

1.8 Safety instructions for the operator

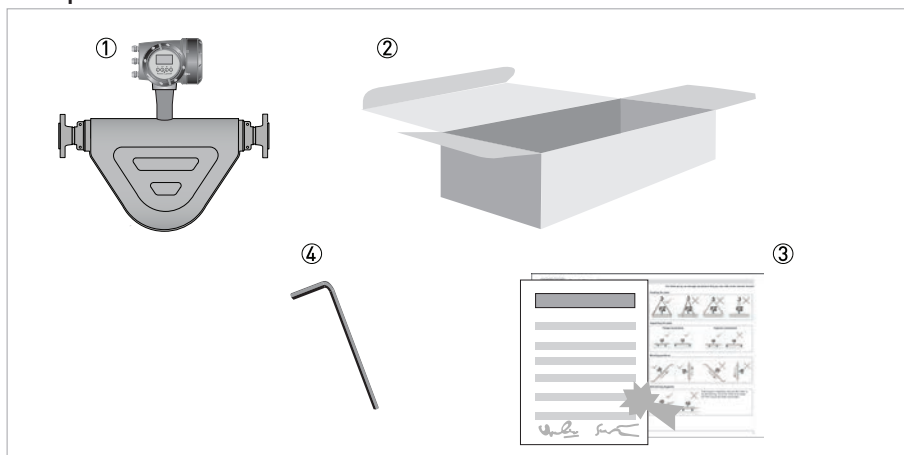


WARNING!

*In general, devices from the manufacturer may only be installed, commissioned, operated and maintained by properly trained and authorized personnel.
This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device.*

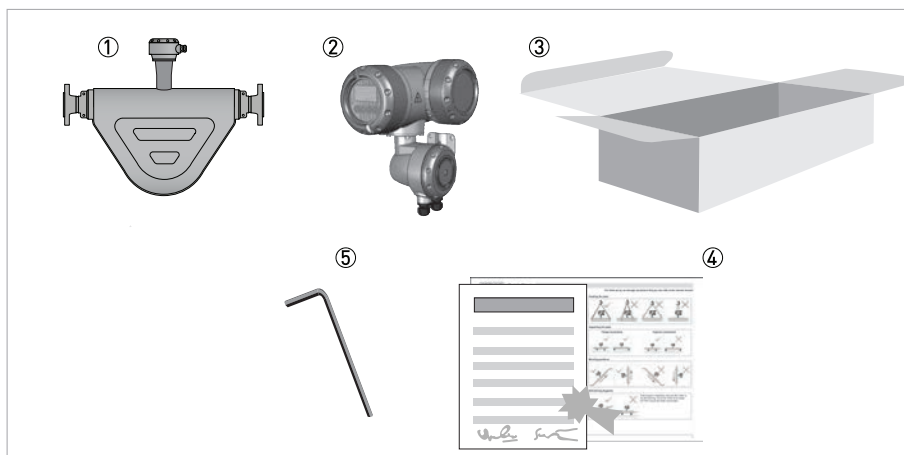
2.1 Scope of delivery

Compact version



- ① Mass flowmeter.
- ② Carton.
- ③ Documentation.
- ④ 2.5 mm hex head tool.

Remote version

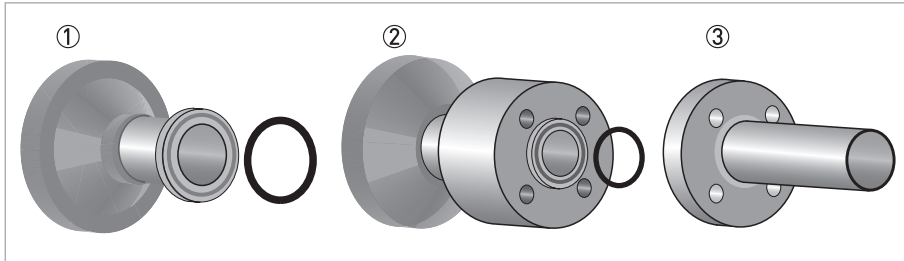


- ① Mass flowmeter.
- ② Converter. This will be either: field (as shown) or wall.
- ③ Carton.
- ④ Documentation.
- ⑤ 2.5 mm hex head tool.

If any items are missing, please contact the manufacturer.

If your meter has flange connections, the flange specification is stamped on the outer edge of the flange. Check that the specification on the flange is the same as your order.

2.1.1 Meters with hygienic connections



- ① Fully welded - the O-rings between the meter and the process pipework are not supplied as standard but can be ordered.
- ② DIN 11864-2 Form A - the O-rings between the Form A and Form B parts of the connection are not supplied as standard but can be ordered.
- ③ The 11864-2 Form B is not supplied as part of this connection but it can be ordered.

Inspect the condition of all seals between the meter and the process line (including seals supplied as part of the hygienic adapter) at regular intervals and replace them as necessary.

The time between inspections must be based on the seal material and the process conditions.

2.2 Nameplates



INFORMATION!

Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

2.3 CSA dual seal

To comply with the requirements of ANSI/ISA -12.27.01-2011 "Requirements for process Sealing Between electrical systems and Flammable or Combustible process Fluids" a secondary seal is incorporated into all OPTIMASS / GAS products. If the primary seal fails, the secondary seal will prevent escaping fluid reaching the electronic compartment.

Pressures and / or temperatures are limited by tube, temperature, connection and Ex limits. Check the meter nameplates and relevant documentation for full details. On all meters operating on gas measurement, the casing of the meter is fitted with a burst disc. If the primary seal (tube) fails leakage will occur from the burst disc. Install the meter so that the burst disc is pointing away from personnel.

Liquids (Example model code: OPTIMASS 6000F S50 - LIQUID)

Pressure and temperature data:

OPTIMASS 6000 / 6000F / 6400C -200°C...+230°C and 100...10000 kPa (Stainless Steel)
 OPTIMASS 6000 / 6000F / 6400C -50°C...+230°C and 100...20000 kPa (Hastelloy®/ duplex)
 OPTIMASS 6000 / 6000F- HT -50°C...+400°C and 100...10000 kPa (Stainless Steel)
 OPTIMASS 6000 / 6000F- HT -50°C...+400°C and 100...20000 kPa (Hastelloy®)

If the primary seal fails, the casing of the meter will fill with liquid and the meter will stop working. The meter will notify the operator by displaying the status message "Sensor: Sensor signal low" on the converter or PLC display. This is an indication that the primary seal (tube) has failed and the status of the meter should be checked.

As soon as it is safe to do so, de-pressurise the process line and remove the meter. Please contact customer service for servicing or replacement of the meter.



INFORMATION!

At high pressures, process fluid may also leak from the meter casing. This is also an indication that the primary seal has failed.

Meter status:

The meter will also display the message "Sensor: Sensor signal low" if the measuring tubes are not completely filled with fluid. For example, if the meter is drained or re/filled. To check the status of the meter, drain and re-fill with fluid and note the converter or PLC display. See the relevant section of the converter handbook for a list of status messages and diagnostics information.

If the meter continues to display the message: "Sensor: Sensor signal low" you MUST assume that the primary seal (tubes) has failed and the appropriate action MUST be taken.

Gases (Example model code: OPTIMASS 6000F S50 - GAS)

Pressure / temperature data:

OPTIMASS 6000 / 6000F / 6400C -200°C...+230°C and 500... 10000 kPa (Stainless Steel)
 OPTIMASS 6000 / 6000F / 6400C -50°C...+230°C and 500...20000 kPa (Hastelloy® / duplex)
 OPTIMASS 6000 / 6000F- HT -50°C...+400°C and 100...10000 kPa (Stainless Steel)
 OPTIMASS 6000 / 6000F- HT -50°C...+400°C and 100...20000 kPa (Hastelloy®)

Pressures and/or temperatures may be further limited by tube, temperature, connection and Ex limits. Consult the meter nameplate and relevant documentation for full details.

On all meters operating on gas measurement the casing of the meter is fitted with a burst disc. If the primary seal (tube/s) fails leakage will occur from the burst disc. Install the meter so that the burst disc is pointing away from personnel.

Regular maintenance of the burst disc:

Carry out regular maintenance checks on burst discs for leakage and/or blockages. On all OPTIMASS meters, the primary seal is considered to be the measuring tube of the meter. The materials of construction of the measuring tube/s are described within the relevant sections of this handbook and the customer's product and any other fluid flowing through the tube must be compatible with the material of construction. If failure of the primary seal is suspected then the process line should be de-pressurised and the meter removed as soon as it is safe to do so. Please contact customer service for servicing or replacement of the meter.

2.4 Temperature differential and thermal shock

Temperature differential

The maximum difference between ambient temperature and process (operating) temperatures are:

Meter temperature range	Maximum temperature differential
-200°C...+40°C / -328°F...+104°F	210°C / 410°F
-70°C...+230°C / -94°F...+446°F	
-50°C...+400°C / -58°F...+752°F	380°C / 716°F

Thermal shock

Thermal shock occurs when there is a sudden and extreme change (shift) in process temperature. Continual shocking (cycles) reduces the life span of the meter depending on the temperature shift. Please refer to the table below for the maximum temperature shift and the number of times (cycles) that the meter can be shocked at that temperature.

Meter size	Max temperature shift	Cycles
08...100	100°C / 212°F	3500
150...200	100°C / 212°F	2000

Thermal shocking below these temperature shifts will increase the life span of the meter. For more information, please contact your nearest representative.

Maximum temperature rate rise

If the change in temperature (rate rise) is greater than 100°C / 212°F, the temperature rise must be over a period of time. Calculate the time required for the whole temperature rise using the table below.

Meter size	Temperature rate rise	Example
08...50	6°C / 10.8°F per minute	20°C...230°C / 68°F...446°F = 35 minutes
		20°C...400°C / 68°F...752°F = 65 minutes
80...200	3°C / 5.4°F per minute	20°C...230°C / 68°F...446°F = 70 minutes
		20°C...400°C / 68°F...752°F = 140 minutes

These limits will provide a minimum calculated life span for the meter of 2000 cycles. Temperature rises below 100°C / 212°F, or temperature rises over a longer period of time, will increase the life span of the meter.

**CAUTION!**

Operation outside these limits may result in shifts in density and mass flow calibration. Repeated shocking and / or rapid heating, may also result in premature failure of the meter. However, higher thermal shocks and / or an increased number of cycles are possible at lower working pressures. For more information, please contact your nearest representative.

2.5 Functional safety (SIL capable Converter)

The meter can be used to measure mass, volume and density at SIL 2 (single channel architecture) and SIL 3 (multi-channel architecture with redundancy).

For more information please refer to the Safety manual.

3.1 General notes on installation

**INFORMATION!**

Inspect the packaging carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

**INFORMATION!**

Do a check of the packing list to make sure that you have all the elements given in the order.

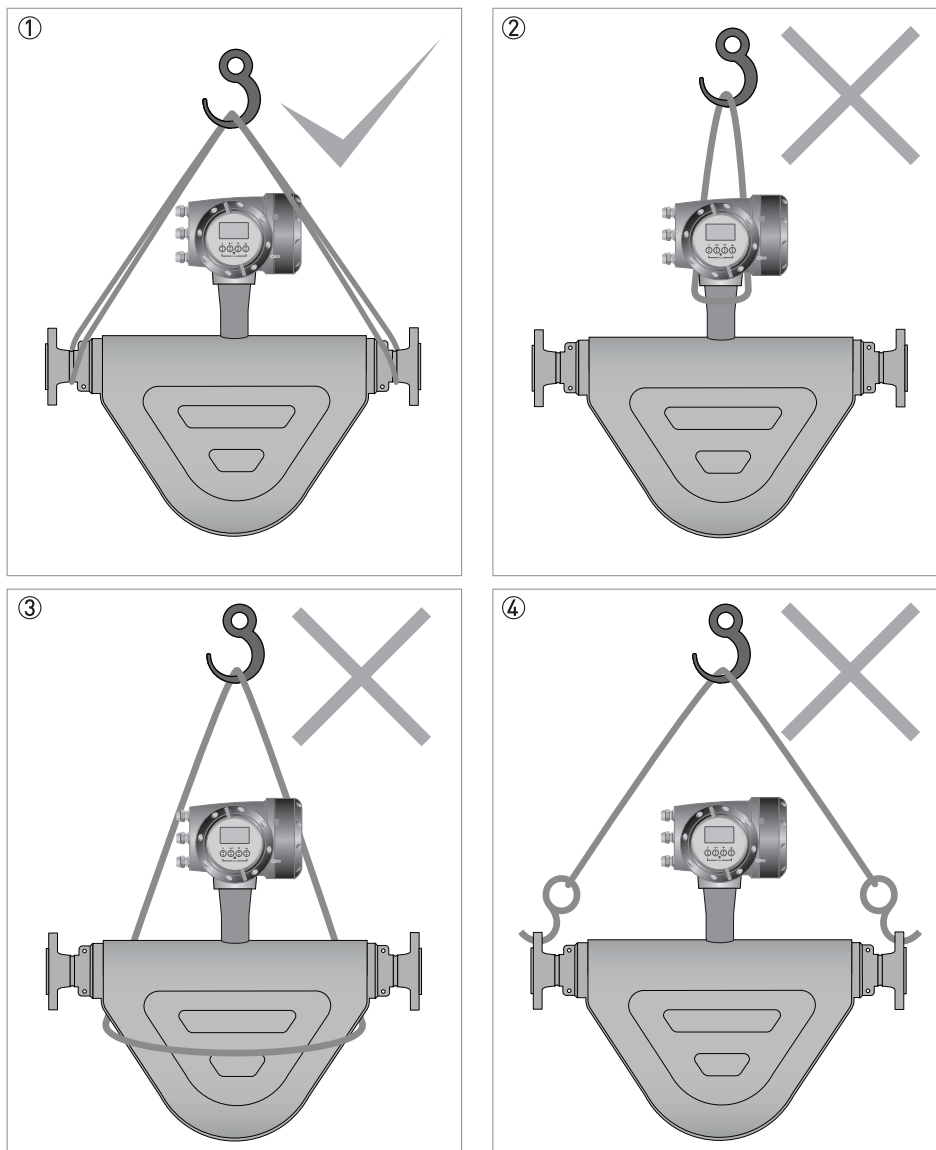
**INFORMATION!**

Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

3.2 Storage

- Store the device in a dry and dust-free location.
- Avoid direct exposure to the sun.
- Store the device in its original packing.
- Do not allow the ambient temperature to fall below -50°C / -58°F or rise above +85°C / +185°F. (-40°C / -40°F and +70°C / +158°F, where a SIL capable Converter has been supplied)

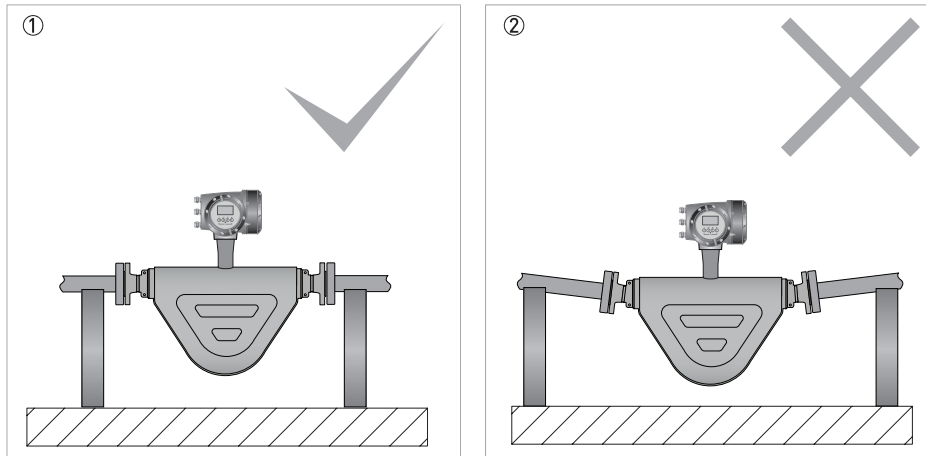
3.3 Handling



- ① Use a well maintained sling to lift the meter by the spigots.
- ② DO NOT lift the meter by the converter housing or the electronics stem.
- ③ DO NOT lift the meter by the meter body.
- ④ DO NOT lift the meter using the flange bolt holes.

3.4 Installation conditions

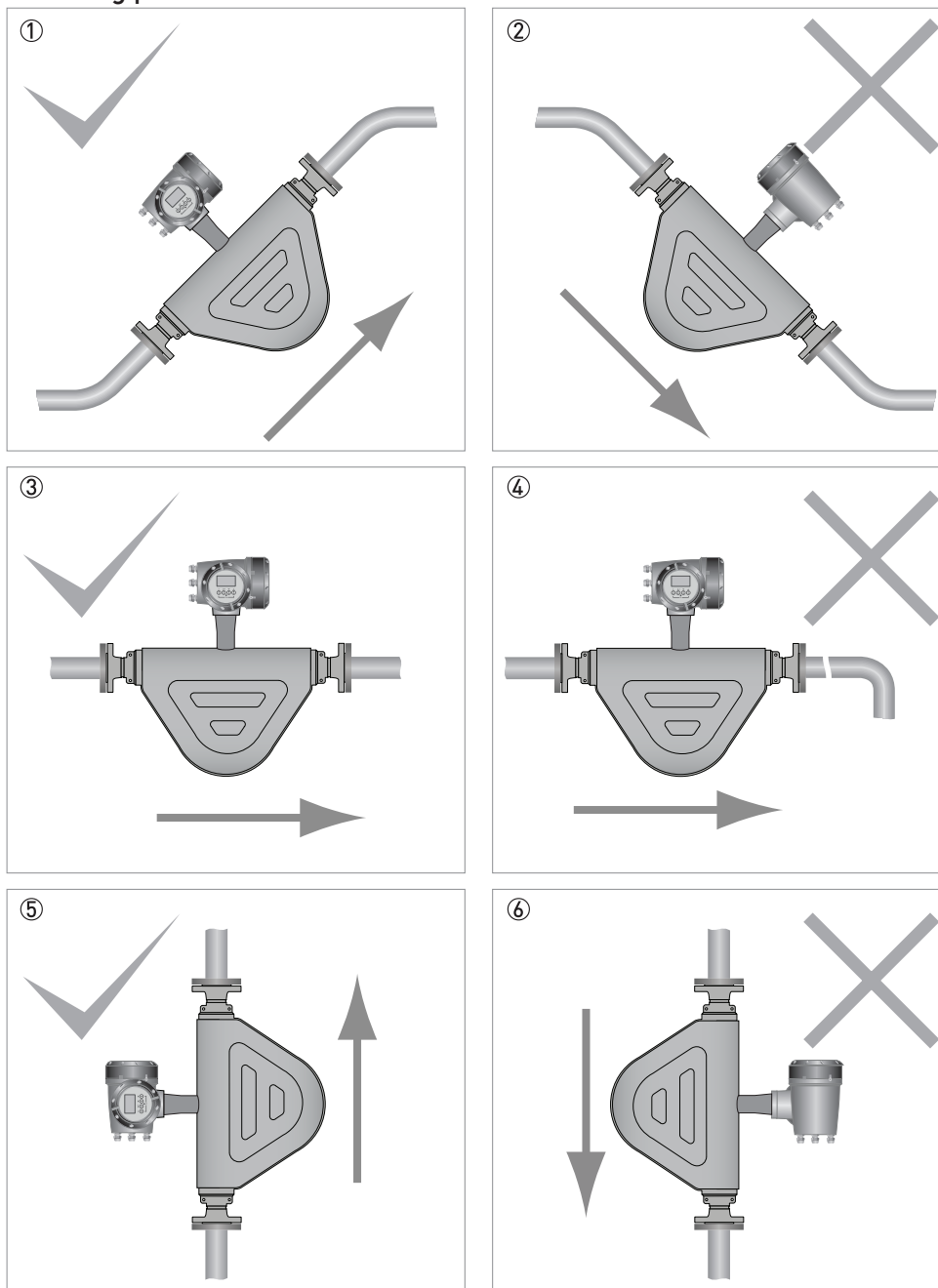
3.4.1 Supporting the meter



- ① Support the weight of the meter on the process pipework.
- ② DO NOT leave a long pipe run between the meter and the support. This can cause damage to the meter, especially on larger meter sizes.

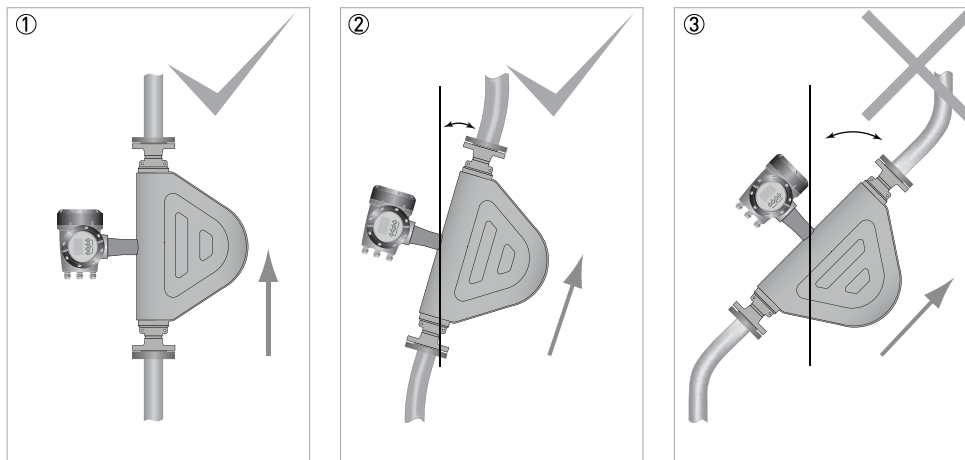
3.4.2 Mounting the meter

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.

3.4.3 Self draining



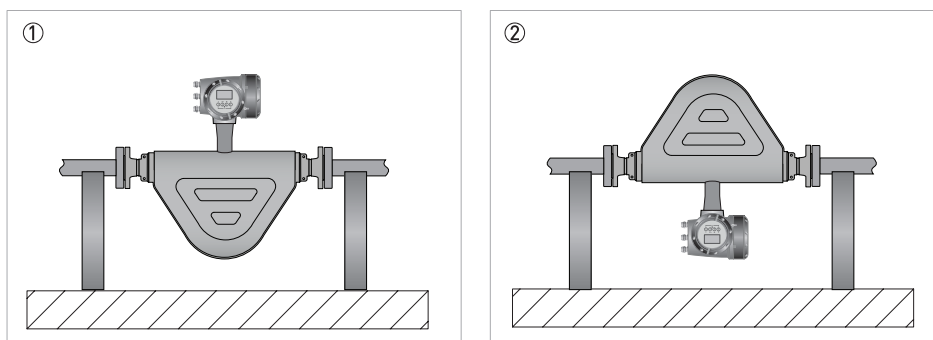
- ① If the meter needs to be self draining, install the meter vertically.
- ② If conditions prevent vertical installation, the meter can be installed at an angle, as shown. The table below gives the maximum angle according to meter size.
- ③ If the meter is installed at an angle greater than shown in the table, the meter will not be self draining.

Maximum angle (according to meter size)

Meter size	08	10	15	25	50	80	100	150	200
Maximum angle	15°				20°				

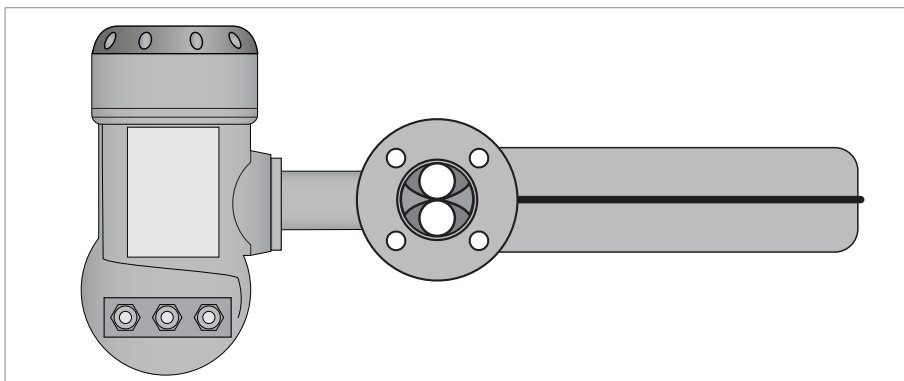
3.4.4 Gas / liquid build up

In certain applications, the design of the meter can cause either gas or liquid to build up in the measuring tube.



- ① Where liquids are being measured, mount the meter as shown. This will prevent gas building up in the measuring tube, when there is no flow.
- ② Where gases are being measured, mount the meter as shown. This will prevent liquids building up in the measuring tube, when there is no flow.

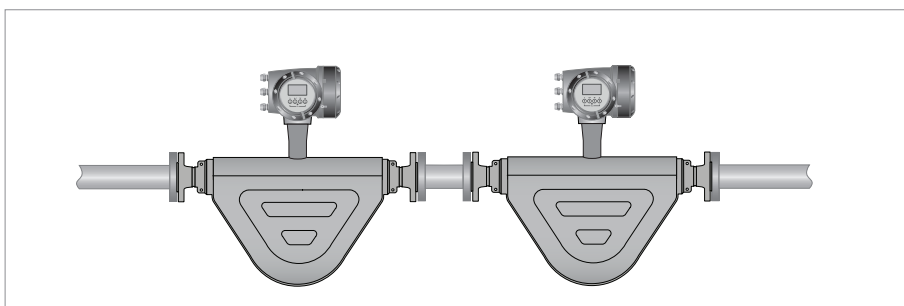
3.4.5 Side mounting



The meter can be installed with the converter (or remote junction box) on the side of the meter so that the measuring tubes are sitting one above the other. Avoid this method of installation where there is a two phase process flow, or where the process fluid contains gas. If this situation cannot be avoided, please contact the manufacturer for advice.

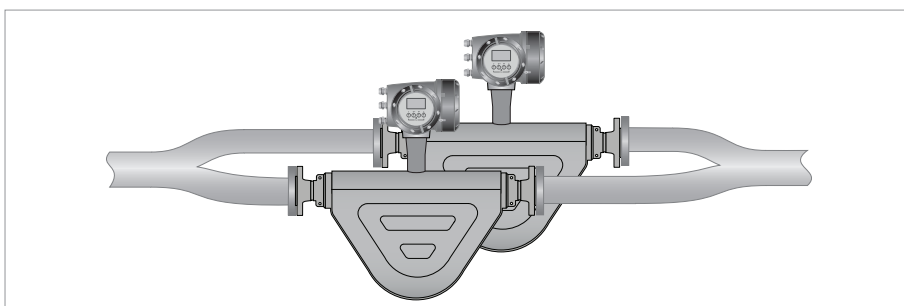
3.4.6 Cross talk

Where more than one meter is being installed, a very high level of immunity to cross talk means that the meters can be mounted within close proximity to each other. The meters can be mounted either in series or parallel, as shown.

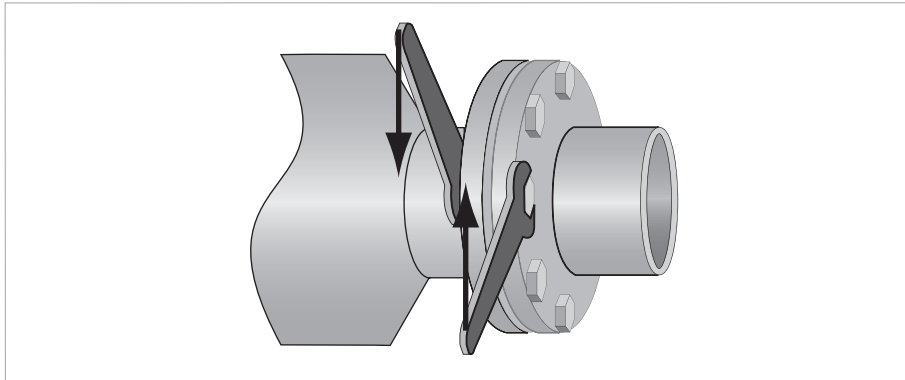


INFORMATION!

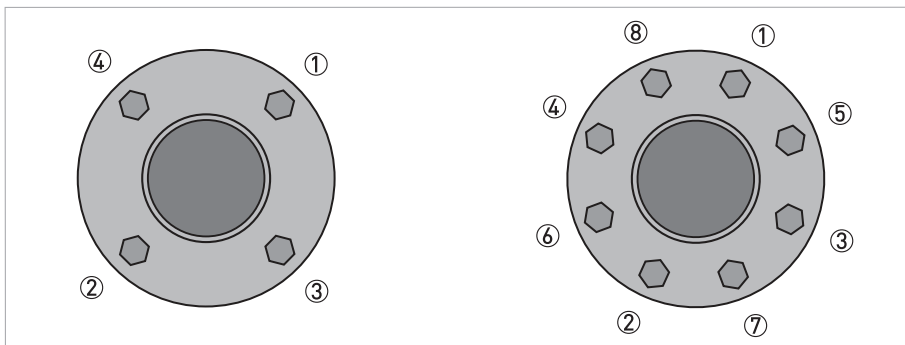
Where the meters are installed in series, it is strongly recommended that the process pipe diameter remains constant. For more information, please contact the manufacturer.



3.4.7 Flange connections

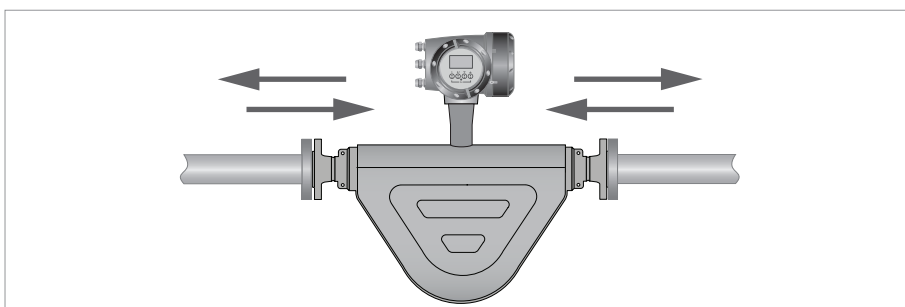


Tighten the flange bolts evenly and in turn.



Use a regular pattern to tighten the bolts evenly

3.4.8 Maximum pipework forces (end loadings)



Mass flowmeters have a maximum level of force (negative or positive) that can be applied to the ends of the meter. Refer to the table below for permitted forces.

Maximum end loadings (Stainless Steel 316 / 316L)

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

① All temperature and pressure ranges

Maximum end loadings (Hastelloy® and Stainless Steel UNS S31803)

		H08 / H10	H15	H25	H50	H80	D100	D150	D200
Flanges (not including CRN)									
20°C	200 barg	12 kN	17 kN	19 kN	15 kN	20 kN	100 kN	120 kN	
230°C	145 barg	5 kN				20 kN			
Flanges (CRN regions)									
20°C	200 barg ①	12 kN	17 kN	19 kN	15 kN	20 kN	60 kN	30 kN	10 kN
230°C	145 barg ②	5 kN				20 kN			
Heating jacket connections									
③		0 kN	0 kN	0 kN	0 kN	0 kN	0 kN	0 kN	0 kN

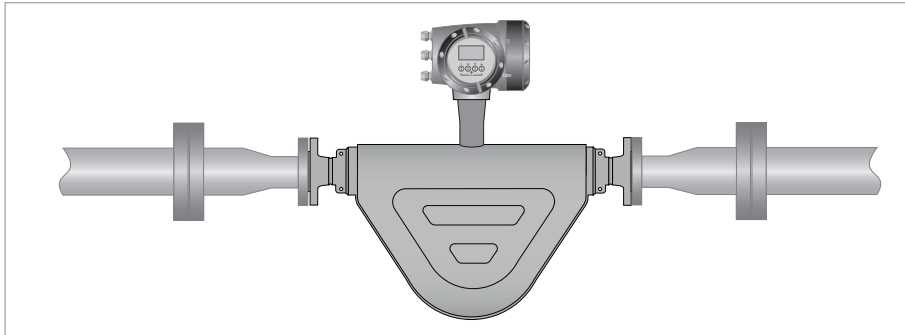
① D200 limited to 180 barg at 20°C

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

③ All temperature and pressure ranges

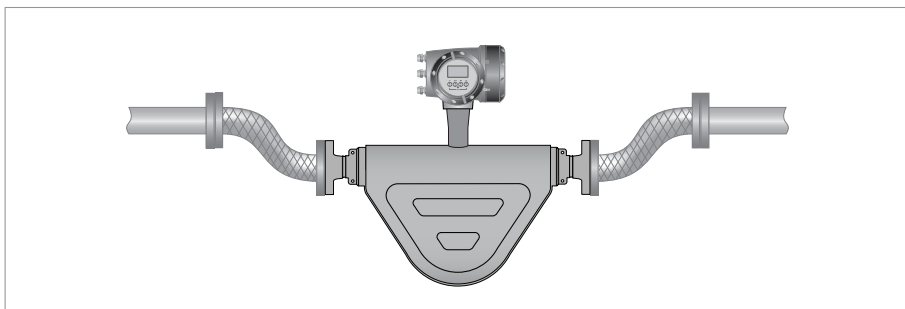
- DN08...50 (axial) loads have been calculated, based on 316L schedule 40 process pipework, where un-radiographed butt welds have been used in pipe joints.
- DN80...200 (axial) loads have been calculated, based on 316L schedule 80 process pipework, where un-radiographed butt welds have been used in pipe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

3.4.9 Pipework reducers



Always avoid extreme step changes in pipe size. Use pipework reducers, where there is a large difference between pipework size and meter flanges.

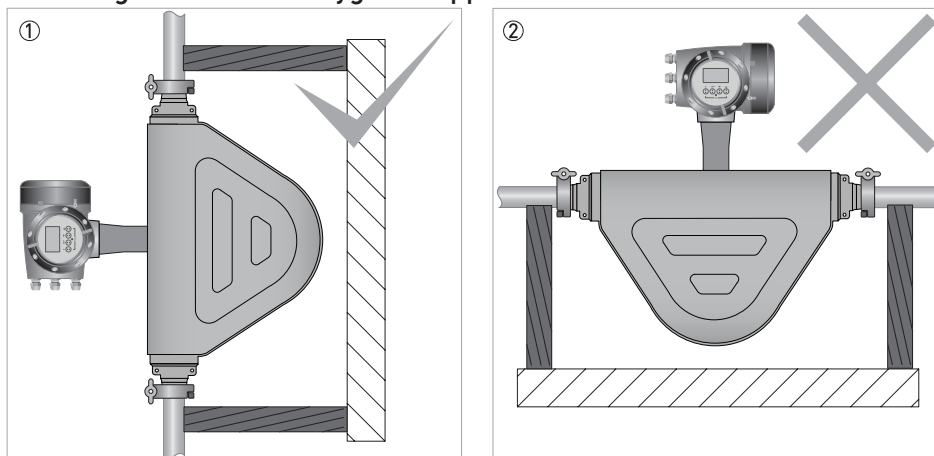
3.4.10 Flexible connections



Flexible connections can be used but because of the high flow rates associated with large diameter meters, it is recommended that flexible connections are not used on meters larger than size 80.

3.4.11 Hygienic installations

Mounting the meter for hygienic applications



- ① Install the meter vertically to allow self draining.
- ② DO NOT install the meter horizontally.

Where the meter has been approved by the sanitary requirements of the European Hygienic Engineering and Design Group, you **MUST** give consideration to:

- Installation - install the meter at an angle to allow self-draining (see illustration).
- Cleaning fluids - cleaning fluids should flow uphill with a velocity rate greater than 1.5 m/s / 5ft/s. If the process flow is downhill, install a flow restrictor downstream of the meter. This will make sure that the meter is completely filled with the cleaning fluid.
- Process connections and seals **MUST** be in accordance with EHEDG documentation.

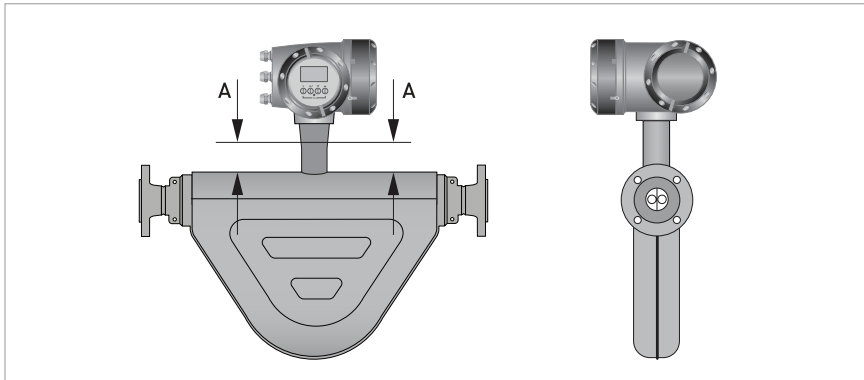
The manufacturer also recommends that you refer to EHEDG (www.ehedg.org) document number 8 "HYGIENIC EQUIPMENT DESIGN CRITERIA".

3.4.12 Heating and insulation

Insulation

The meter can be insulated to a maximum depth as shown (A). Do not insulate above this depth as this will cause the electronics to overheat.

Insulation



	S08	S10	S15	S25	S50	S80	S100	S150	S200
Dimension A [mm]	100	100	100	100	100	100	100	100	100
Dimension A [inches]	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9

Factory fitted heating jacket

If the meter has been ordered with a heating jacket, it will be supplied with DN15 PN40 to EN 1092-1 or 1/2" ASME150 flange connections.

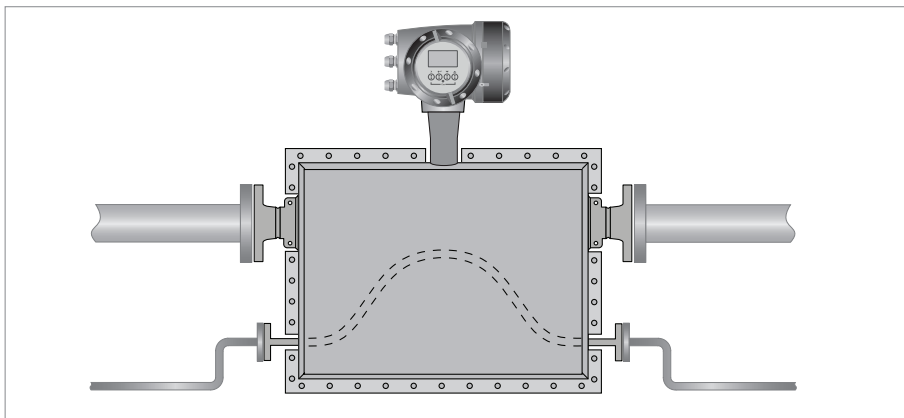


Figure 3-1: The loop inside the heating jacket, carries the heating medium.

Connecting / using the heating jacket

- Use rigid or reinforced flexible hoses to connect the heating jacket to the heat source.
- The heating jacket / loop material is SS316.
- Suitable heating mediums are steam or hot oil. Avoid the use of heating mediums that can cause crevice corrosion in Stainless Steel.

- Where liquid is being used, set up the pipe configuration so that air can be vented from the system.
- Where steam is being used, set up the pipe configuration so that condensation can be drained off.
- Gradually heat the jacket to working temperature before flowing the process fluid through the meter.

**CAUTION!**

The design of the heating jacket is such that NO end load pressure (negative or positive) can be applied. The manufacturer recommends that (where possible) flexible hoses are used to connect to the heat source.

**CAUTION!**

The maximum heating pressure and temperature for heating jackets is 10 barg at 230°C / 145 psig at 446°F or 5 barg at 400°C / 72.5 psig at 752°F

3.4.13 Purge ports

If the meter has been ordered with a purge port, it will be supplied with NPT female connections which are clearly marked. The connections are sealed with NPT plugs and PTFE tape.

**CAUTION!**

DO NOT remove these plugs.

The meter is factory sealed with a dry nitrogen gas fill and if moisture is allowed to enter the meter casing it will cause damage. The plugs should only be removed to purge the meter casing in the event that the primary measuring tube fails.

If it is suspected that the primary measuring tube has failed, de-pressurise the meter and remove it from service, as soon as it is safe to do so.

3.4.14 Burst discs

If the meter has been ordered with a burst disc, it will be supplied with the disc fitted. The failure pressure of the disc is 10 barg at +20°C / 145 psig at +68°F.

**CAUTION!**

The fitted burst disc will be suitable for the flow rates and process conditions specified on the original order. If the process conditions alter in any way, it is recommended that you contact the manufacturer for advice regarding suitability.

If the process product is hazardous (in any way) it is recommended that an exhaust tube is connected to the NPT male thread of the burst disc and the pipe routed so that the process product can be discharged to a safe area. Use a tube with a diameter large enough AND routed in such a way, so that pressure cannot build up in the meter case.

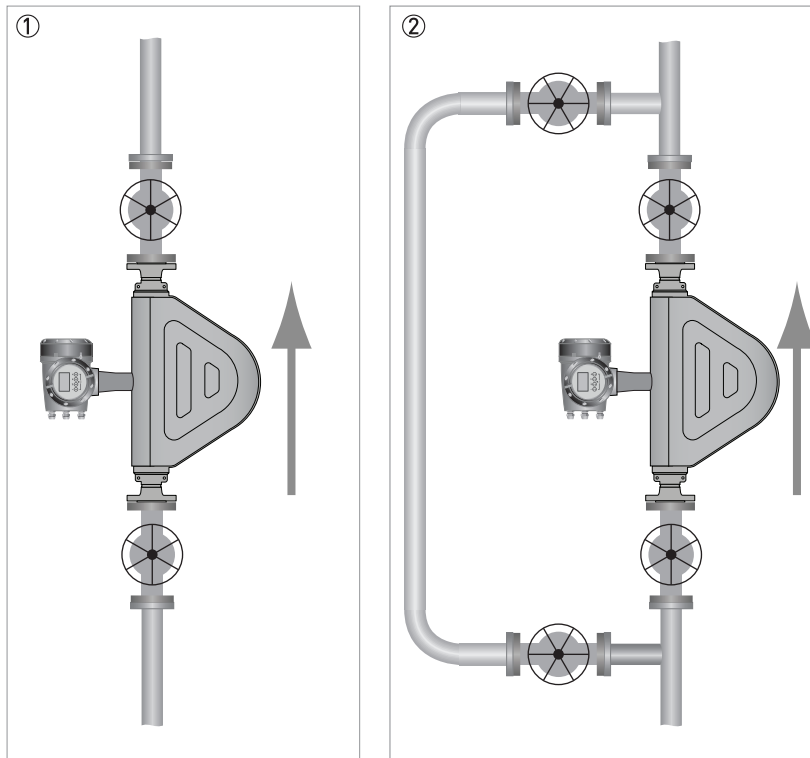
**INFORMATION!**

For gas applications, the burst disc must be specified at the time of ordering.

3.4.15 Zero calibration

The procedure for zero calibration is contained in the converter handbook. However, the following information should be considered when installing the meter.

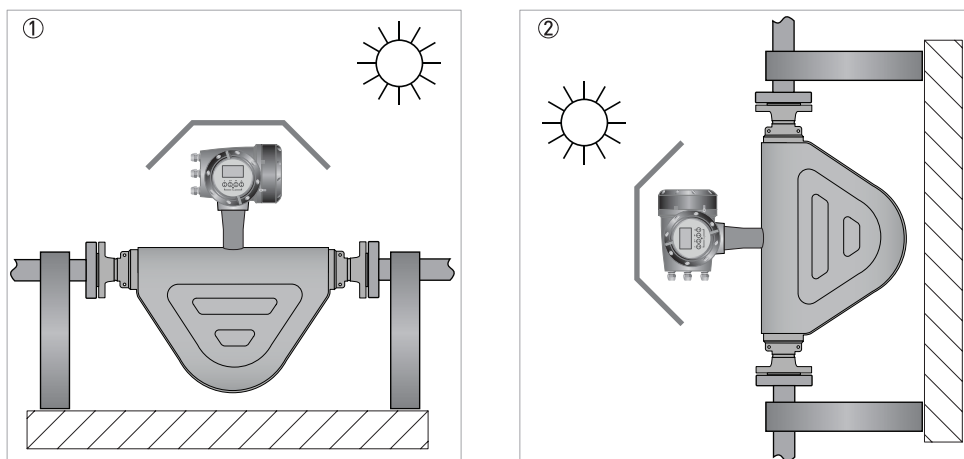
Zero calibration



- 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.

3.4.16 Sunshades

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



- ① Horizontal installation
- ② Vertical installation

4.1 Safety instructions

**DANGER!**

All work on the electrical connections may only be carried out with the power disconnected. Take note of the voltage data on the nameplate!

**DANGER!**

Observe the national regulations for electrical installations!

**DANGER!**

For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.

**WARNING!**

Observe without fail the local occupational health and safety regulations. Any work done on the electrical components of the measuring device may only be carried out by properly trained specialists.

**INFORMATION!**

Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

4.2 Electrical and I/O connections

For information regarding electrical and I/O connections, please refer to the handbook for the relevant signal converter/transmitter.

5.1 Spare parts availability

The manufacturer adheres to the basic principle that functionally adequate spare parts for each device or each important accessory part will be kept available for a period of 3 years after delivery of the last production run for the device.

This regulation only applies to spare parts which are subject to wear and tear under normal operating conditions.

5.2 Availability of services

The manufacturer offers a range of services to support the customer after expiration of the warranty. These include repair, maintenance, technical support and training.



INFORMATION!

For more precise information, please contact your local sales office.

5.3 Returning the device to the manufacturer

5.3.1 General information

This device has been carefully manufactured and tested. If installed and operated in accordance with these operating instructions, it will rarely present any problems.



WARNING!

Should you nevertheless need to return a device for inspection or repair, please pay strict attention to the following points:

- *Due to statutory regulations on environmental protection and safeguarding the health and safety of the personnel, the manufacturer may only handle, test and repair returned devices that have been in contact with products without risk to personnel and environment.*
- *This means that the manufacturer can only service this device if it is accompanied by the following certificate (see next section) confirming that the device is safe to handle.*



WARNING!

If the device has been operated with toxic, caustic, radioactive, flammable or water-endangering products, you are kindly requested:

- *to check and ensure, if necessary by rinsing or neutralising, that all cavities are free from such dangerous substances,*
- *to enclose a certificate with the device confirming that it is safe to handle and stating the product used.*

5.3.2 Form (for copying) to accompany a returned device



CAUTION!

To avoid any risk for our service personnel, this form has to be accessible from outside of the packaging with the returned device.

Company:		Address:	
Department:		Name:	
Telephone number:		Email address:	
Fax number:			
Manufacturer order number or serial number:			
The device has been operated with the following medium:			
This medium is:	<input type="checkbox"/>	radioactive	
	<input type="checkbox"/>	water-hazardous	
	<input type="checkbox"/>	toxic	
	<input type="checkbox"/>	caustic	
	<input type="checkbox"/>	flammable	
	<input type="checkbox"/>	We checked that all cavities in the device are free from such substances.	
	<input type="checkbox"/>	We have flushed out and neutralized all cavities in the device.	
We hereby confirm that there is no risk to persons or the environment caused by any residual media contained in this device when it is returned.			
Date:		Signature:	
Stamp:			

5.4 Disposal



LEGAL NOTICE!

Disposal must be carried out in accordance with legislation applicable in your country.

Separate collection of WEEE (Waste Electrical and Electronic Equipment) in the European Union:

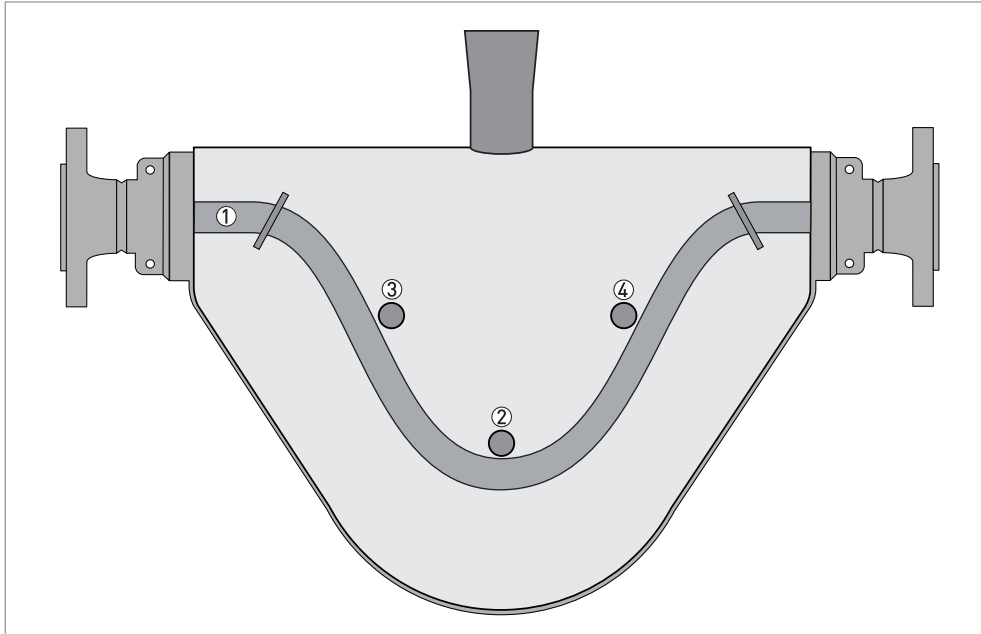


According to the directive 2012/19/EU, the monitoring and control instruments marked with the WEEE symbol and reaching their end-of-life **must not be disposed of with other waste.**

The user must dispose of the WEEE to a designated collection point for the recycling of WEEE or send them back to our local organisation or authorised representative.

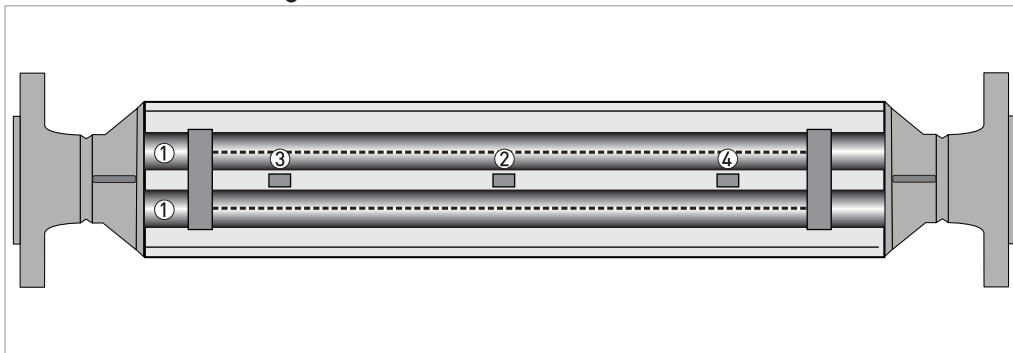
6.1 Measuring principle (twin tube)

Meter from the side, showing tube layout



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

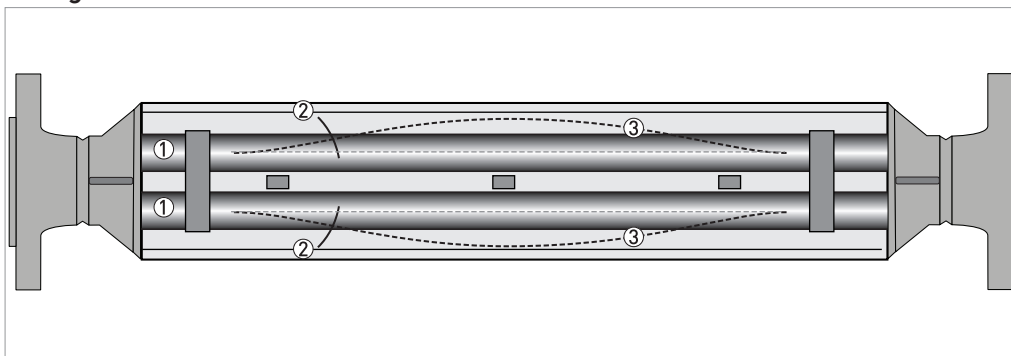
Static meter not energised and with no flow



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

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

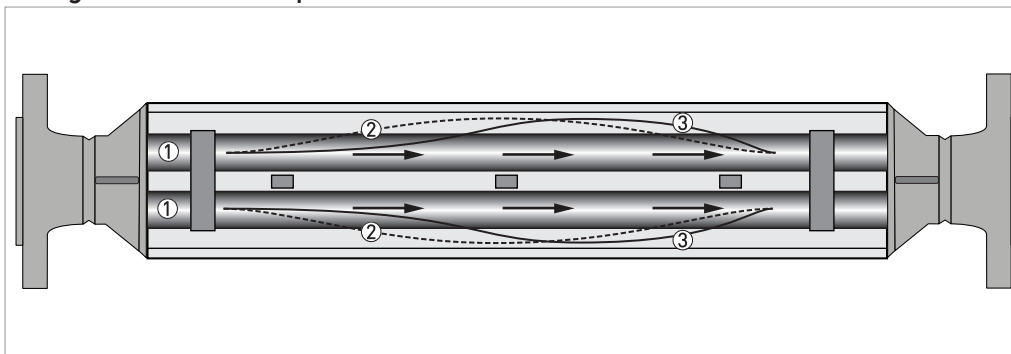
Energised meter



- 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.

6.2 Technical data



INFORMATION!

- 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
Sensor model range	
Stainless Steel 316L 08...200	Compact / remote 100 barg @ 20°C / 1450 psig @ 68°F, temp. range -70°C...+230°C / -94°F...+446°F
	Remote only 100 barg @ 20°C / 1450 psig @ 68°F, temp. range -50°C...+400°C / -58°F...+752°F
	Compact / remote 100 barg @ 20°C / 1450 psig @ 68°F, temp. range -200°C...+40°C / -328°F...+104°F
Hastelloy® 08...80	Compact / remote 200 barg @ 20°C / 2900 psig @ 68°F, temp. range -70°C...+400°C / -94°F...+752°F
	Compact / remote 200 barg @ 20°C / 2900 psig @ 68°F, temp. range -50°C...+400°C / -58°F...+752°F
	Remote only 200 barg @ 20°C / 2900 psig @ 68°F, temp. range -196°C...+40°C / -321°F...+104°F
Duplex Stainless Steel 100...200	Compact / remote 200 barg @ 20°C / 2900 psig @ 68°F, temp. range -50°C...+230°C / -58°F...+446°F

Design

Basic	System consists of a measuring sensor and a converter to process the output signal
Features	Fully welded maintenance free sensor with twin V-shaped measuring tube
Variants	
Compact version	Integral converter
Remote version	Available with a field version 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 flow rate ≥ zero stability × 1000	
Base accuracy	±0.1% of actual measured flow rate
Repeatability	Better than 0.05% of measured flow rate
Liquid flow rate < zero stability × 1000	

Base accuracy	±zero stability (see zero stability below)	
Repeatability	Better than zero stability × 0.5	
Gas	Better than 0.35% plus zero stability	
Repeatability	Better than 0.2% plus zero stability	
Mass flow (optional)		
Liquid flow rate ≥ zero stability × 2000		
Base accuracy	0.05% of measured flow rate	
Repeatability	Better than 0.025% of measured flow rate	
Liquid flow rate < zero stability × 2000		
Base accuracy	±zero stability	
Repeatability	Better than zero stability × 0.5	
Zero stability		
Meter size	Standard temperature	High temperature
08	< 0.03 kg/h	< 0.48 kg/h
10	< 0.06 kg/h	< 0.096 kg/h
15	< 0.19 kg/h	< 0.304 kg/h
25	< 0.95 kg/h	< 1.52 kg/h
50	< 1.75 kg/h	< 2.80 kg/h
80	< 3.90 kg/h	< 6.24 kg/h
100	< 8.75 kg/h	< 14.00 kg/h
150	< 16.00 kg/h	< 25.60 kg/h
200	< 27.50 kg/h	< 44.00 kg/h
Effect on sensor zero point caused by a deviation in process temperature from zero calibration temperature		
Standard temperature range		
All materials sizes 08...10	0.0010% of nominal flow per 1°C / 0.00056% of nominal flow per 1°F	
All materials sizes 15...200	0.00075% of nominal flow per 1°C / 0.00042% of nominal flow per 1°F	
High temperature range		
All materials sizes 08...200	0.008% of nominal flow per 1°C / 0.0044% of nominal flow per 1°F	
Pressure effect on mass flow rate		
All materials sizes 08...50	-0.005% of reading per 1 barg / -0.00034 % per 1 psig	
All materials sizes 80...100	-0.0055% of reading per 1 barg / -0.00038 % per 1 psig	
All materials sizes 150...200	-0.008% of reading per 1 barg / -0.00055 % per 1 psig	
Density		
Measuring range	100...3000 kg/m ³ / 6...187 lb/ft ³	
Base accuracy	±1 kg/m ³ / ±0.06 lb/ft ³	
Repeatability / on site calibration	±0.3 kg/m ³ / ±0.015 lb/ft ³	
Process temperature effect of deviation from calibration temperature		
All materials / meter sizes	Better than 0.015 g/l per 1°C / 0.0083 g/l per 1°F	
Pressure effect on density of deviation from calibration pressure (based on reference density = 1000 kg/m³)		
All materials size 08	+0.038 kg/m ³ per bar	
All materials sizes 10...15	+0.026 kg/m ³ per bar	
All materials sizes 25...80	+0.017 kg/m ³ per bar	
All materials sizes 100...150	+0.011 kg/m ³ per bar	

Volume flow	
Measurement error and repeatability calculations satisfy the requirements of BS ISO 10790 (most recent and up to date version)	
Temperature	
Measurement error	$\pm 0.5^{\circ}\text{C} \pm 0.5\%$ of reading / $\pm 0.9^{\circ}\text{F} \pm 0.5\%$ of reading

Operating conditions

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

Environmental

Ambient temperature		
Compact meter	Standard converter	SIL capable converter
Aluminium converter	-40...+65°C / -40...+149°F	-40...+55°C / -40...+131°F
Stainless Steel converter	-40...+60°C / -40...+140°F	-40...+55°C / -40...+131°F
Remote meter	Standard converter	SIL capable converter
Standard temperature range	-40...+65°C / -40...+149°F	-40...+55°C / -40...+131°F
Cryogenic temperature range	-20...+65°C / -4...+149°F	-40...+55°C / -40...+131°F
Hazardous Area versions	Refer to temperature limits	
Protection category (Acc. to EN 60529)	IP 66 / 67, NEMA 4X	
Vibration (acc IEC 60068-2-6)	10-150-10 Hz with 0.15 mm for 10...60 Hz, 20 m/s ² for 60...150 Hz	
Process temperatures		
Standard temperature range (flange connections)	Extended stem	Short stem
Safe area	-70...+230°C / -94...+446°F	-70...+150°C / -94...+302°F
Hazardous area	-50...+230°C / -58...+446°F	-50...+150°C / -58...+302°F
High temperature range	-50...+400°C / -58...+752°F	N/A
Cryogenic temperature range	-200...+40°C / -328...+104°F	-200...+40°C / -328...+104°F
Standard temperature range (hygienic connections)	Extended stem	Short stem
Safe area	-70...+150°C / -94...+302°F	-70...+150°C / -94...+302°F
Hazardous area	-50...+150°C / -58...+302°F	-50...+150°C / -58...+302°F

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

Materials

Stainless Steel (316 / 316L) meter	
Measuring tubes / Flanges	Stainless Steel AISI 316 / 316L (1.4401 / 1.4404) dual certified
Spigots	Stainless Steel CF3M (1.4409)
Bridge	AISI 316 / 316L (1.4401 / 1.4404) dual certified
Outer casing	Stainless Steel AISI 316 / 316L (1.4401 / 1.4404) dual certified
Stainless Steel (S31803) meter	
Measuring tubes / Flanges	Stainless Steel UNS 31803 (1.4462)
Spigots	Stainless Steel J92205 (1.4470)
Bridge	AISI 316 / 316L (1.4401 / 1.4404) dual certified
Outer casing	Stainless Steel AISI 316 / 316L (1.4401 / 1.4404) dual certified
Hastelloy® C22 meter	
Measuring tubes / raised face	Hastelloy® C22
(Backing) flanges	Stainless Steel AISI 316 / 316L (1.4401 / 1.4404) dual certified
Bridge	Stainless Steel AISI 316 / 316L (1.4401 / 1.4404) dual certified
Outer casing	Stainless Steel AISI 316 / 316L (1.4401 / 1.4404) dual certified
Heating jacket version	
Heating loop and insulation jacket	Stainless Steel AISI 316 (1.4401)
All versions	
Junction box (remote version)	Die-cast Aluminium (polyurethane coating)
	Optional Stainless Steel 316 (1.4401)

Process connections

Flange	
DIN	DN10...200 / PN16...160
ASME	½...8" / ASME 150...1500
JIS	10A...100A / 10...20K (10K maximum allowable temperature 300°C / 572°F)
Hygienic	
Tri-clover	½...4"
Tri-clamp DIN 32676	DN15..100
Tri-clamp ISO 2852	1...4"
DIN 11864-2 Form A	DN15...100
Male thread DIN 11851	DN15...100
Male thread SMS	25...100 mm / 1...4"

Electrical connections

Electrical connections	For full details, including: power supply, power consumption etc., see technical data for the relevant signal converter.
I/O	For full details of I/O options, including data streams and protocols, see technical data for the relevant signal 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.
cFMus	Compact and converter
	Class I, Div 1, Groups A,B,C and D (US)
	Class I, Div 1, Groups C and D.(Canada)
	Class II, Div 1, Groups E, F and G
	Class III Div 1 T6...T1
	Class I, Div 2 Groups A,B,C and D
	Class II Div 2 Groups F and G
	Class III Div 2 T6...T1
	Remote (sensor only)
	Class I Div 1 Groups A,B,C and D
	Class I Div 2 Groups A,B,C and D
	Class II Div 1 Groups E,F and G
	Class III Div 1 T6...T1
	Class II Div 2 Groups F and G
Class III Div 2 T6...T1	
CRN	acc to: ASME B31.3 (most recent and up to date version)
NACE	MR0175 / ISO 15156 ("Sulphide Stress Corrosion Cracking Resistant Metallic Materials for Oil Field Equipment") and MR0103 ("Materials Resistant to Sulfide Stress Cracking in Corrosive Petroleum Refining Environments") (most recent and up to date versions)

Custody transfer	Measuring Instruments Directive (MID) MI 002 and MI 005 (most recent and up to date version)
	OIML R117-1
	OIML R137
	Compliant with API and AGA
Functional safety	SIL2 / SIL3 (acc to: IEC 61508)
ATEX (most recent and up to date version)	
OPTIMASS 6400C 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 T270°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 T270°C Db
OPTIMASS 6400C 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 T270°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 T270°C Db
OPTIMASS 6000 / 6000F	II 1 G Ex ia IIC T6...T1 Ga
	II 1 D Ex ia IIIC T270°C Da
	II 1 D Ex ia IIIC T440°C Da

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

6.3 ATEX temperature limits

6.3.1 Standard temperature meters

	Ambient temp. T_{amb} °C	Max medium temp. T_m °C	Temp. class	Max. Surface temp. °C	
OPTIMASS 6000F with or without heating jacket / insulation	-40...+40	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
	-40...+50	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
	-40...+65	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
	Minimum medium temp: -50°C				
	Cryogenic version ("q" = C or D and "k" = 0, 2 or A)				
	-25...+65	-140...+40	T6 - T1	T80	
		-160...+40			
	-20...+65	-180...+40	T6 - T1	T80	
-200...+40					
Minimum medium temp: <-50°C					
OPTIMASS 6400C – aluminium converter housing with or without heating jacket / insulation	-40...+40	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
	-40...+50	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
	-40...+65	65	T4 - T1	T105	
	Minimum medium temp: -50°C				
	Cryogenic version ("q" = C or D and "k" = 0, 2 or A)				
	-35...+65	-140...+40	T6 - T1	T80	
		-160...+40			
	-30...+65	-180...+40	T6 - T1	T80	
	-25...+65	-200...+40			
	Minimum medium temp: <-50°C				

OPTIMASS 6400C – SS converter housing with or without heating jacket / insulation	-40...+40	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
	-40...+50	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
	-40...+60	60	T4 - T1	T100	
	Minimum medium temp: -50°C				
	Cryogenic version ("q" = C or D and "k" = 0, 2 or A)				
	-35...+60	-140...+40	T6 - T1	T80	
	-30...+60	-160...+40			
		-180...+40			
-25...+60	-200...+40				
Minimum medium temp: <-50°C					

6.3.2 Short stem meters

	Ambient temp. T_{amb} °C	Max medium temp. T_m °C	Temp. class	Max. Surface temp. °C	
OPTIMASS 6000F short stem without heating jacket / insulation	-40...+40	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
	-40...+50	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
	-40...+65	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		135	T3 - T1	T175	
	Minimum medium temp: -50°C				
	Cryogenic version ("q" = C or D and "k" = 0 or A)				
	+10...+65	-140...+40	T6 - T1	T80	
	+20...+65	-160...+40			
	+30...+65	-180...+40			
	+40...+65	-200...+40			
	Minimum medium temp: <-50°C				
	OPTIMASS 6400C short stem with aluminium converter housing without heating jacket / insulation	-40...+40	40	T6 - T1	T80
55			T5 - T1	T95	
90			T4 - T1	T130	
150			T3 - T1	T190	
-40...+50		40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		145	T3 - T1	T185	
-40...+65		65	T4 - T1	T105	
Minimum medium temp: -50°C					
Cryogenic version ("q" = C or D and "k" = 0 or A)					
-20...+65		-140...+40	T6 - T1	T80	
-15...+65		-160...+40			
		-180...+40			
-10...+65		-200...+40			
Minimum medium temp: <-50°C					

OPTIMASS 6400C short stem with SS converter housing without heating jacket / insulation	-40...+40	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
	-40...+50	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		145	T3 - T1	T185	
	-40...+60	60	T4 - T1	T100	
	Minimum medium temp: -50°C				
	Cryogenic version ("q" = C or D and "k" = 0 or A)				
	-10...+60	-140...+40	T6 - T1	T80	
	-5...+60	-160...+40			
	0...+60	-180...+40			
	+10...+60	-200...+40			
Minimum medium temp: <-50°C					

6.3.3 High temperature meters

	Ambient temp. T_{amb} °C	Max medium temp. T_m °C	Temp. class	Max. Surface temp. °C	
OPTIMASS 6000F high temperature with aluminium junction box and heating jacket	-40...+40	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
		400	T1	T440	
	-40...+55	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
		400	T1	T440	
	-40...+60	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
		400	T1	T440	
	-40...+65	350		T390	
	Minimum medium temp: -50°C				
	OPTIMASS 6000F high temperature with stainless steel junction box and heating jacket.	-40...+40	40	T6 - T1	T80
			55	T5 - T1	T95
			90	T4 - T1	T130
			150	T3 - T1	T190
230			T2 - T1	T270	
400			T1	T440	
-40...+50		40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
		400	T1	T440	
-40...+55		40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
		400	T1	T440	
-40...+60		350		T390	
Minimum medium temp: -50°C					

OPTIMASS 6000F high temperature with aluminium or stainless steel junction box and no heating jacket	-40...+40	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
		400	T1	T440	
	-40...+55	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
		400	T1	T440	
	-40...+65	40	T6 - T1	T80	
		55	T5 - T1	T95	
		90	T4 - T1	T130	
		150	T3 - T1	T190	
		230	T2 - T1	T270	
		400	T1	T440	
	Minimum medium temp: -50°C				

6.4 Guidelines for maximum operating pressure

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

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

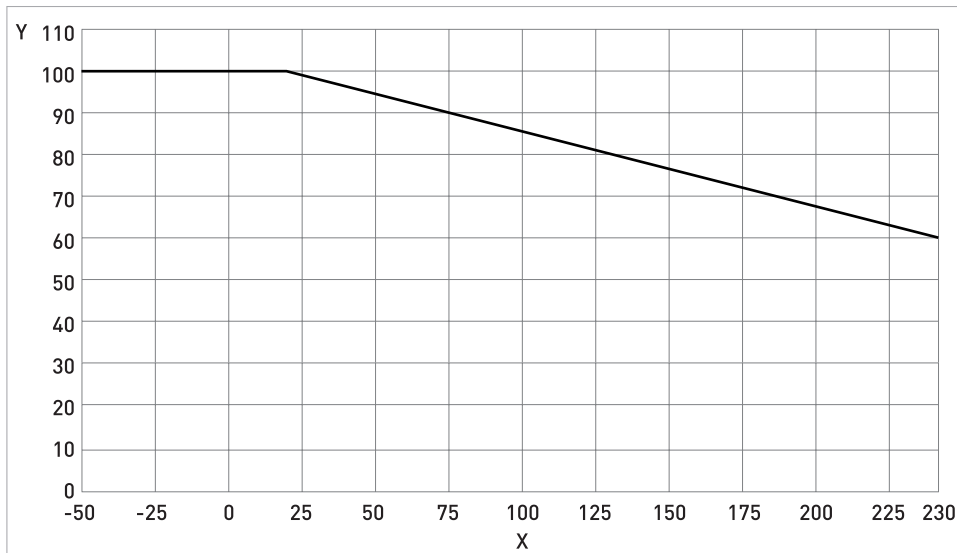


Figure 6-1: Measuring tube PED certification

X temperature [°C]

Y pressure [barg]

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

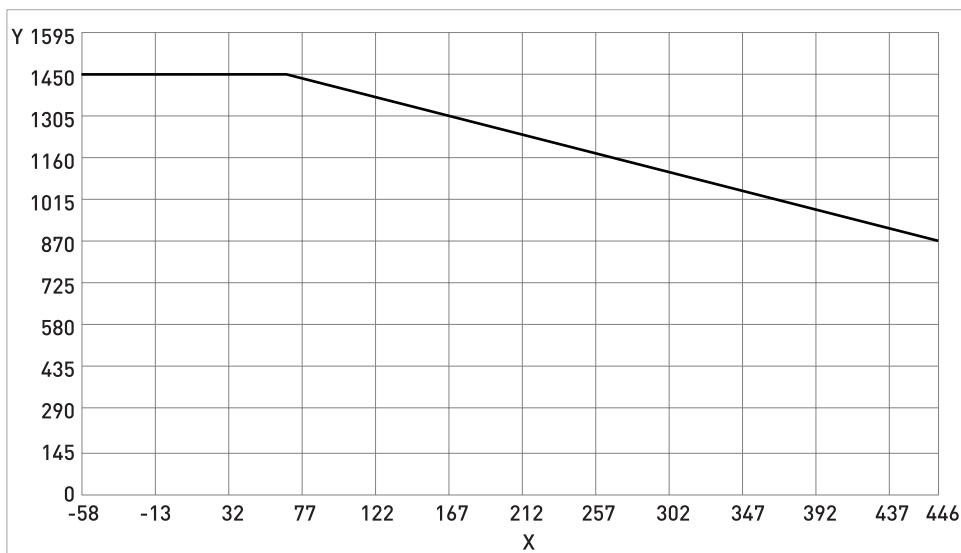
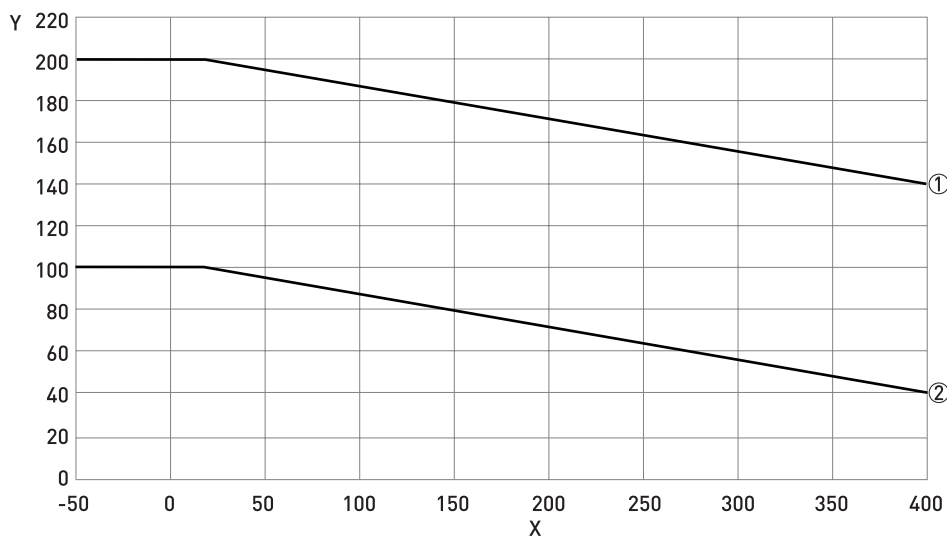


Figure 6-2: Measuring Tube PED certification

X temperature [°F]

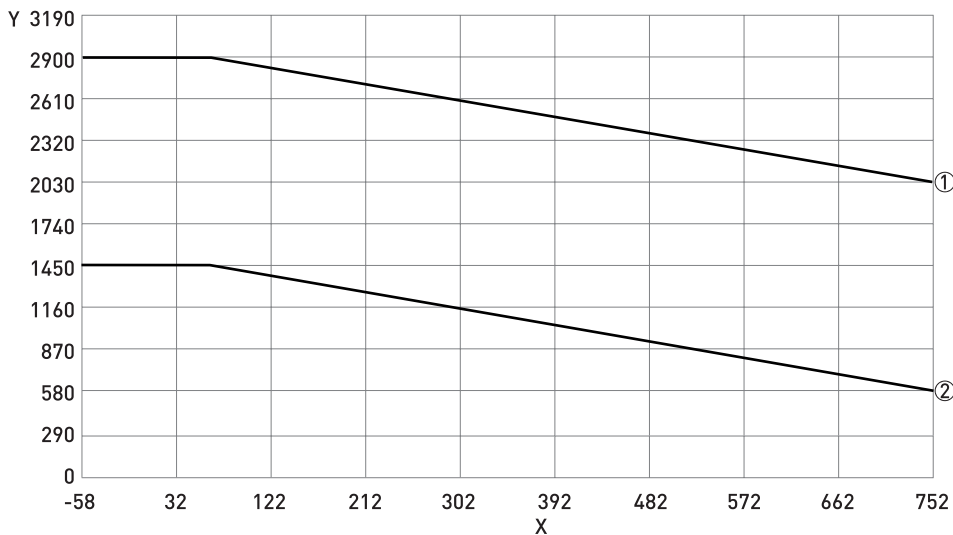
Y pressure [psig]

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



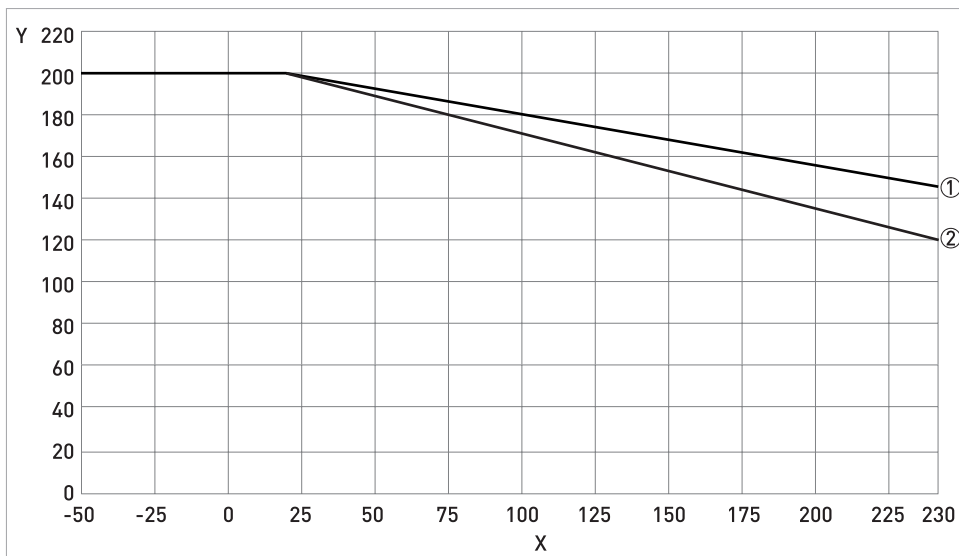
X temperature [°C]
 Y pressure [barg]
 ① Hastelloy® C22 08...80
 ② Stainless Steel 316 08...200

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



X temperature [°F]
 Y pressure [psig]
 ① Hastelloy® C22 08...80
 ② Stainless Steel 316 08...200

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



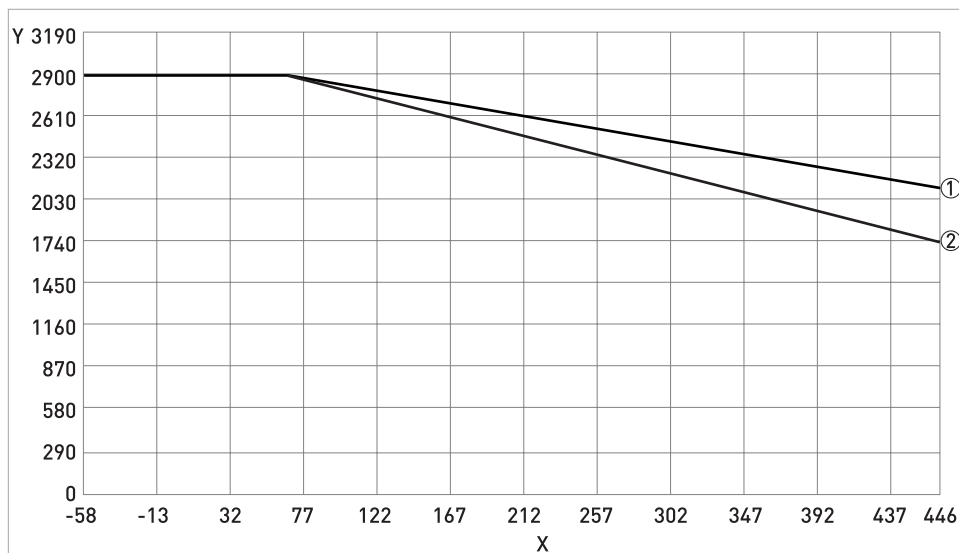
X temperature [°C]

Y pressure [barg]

① PED / CRN H08...80, D100

② CRN D150...200

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



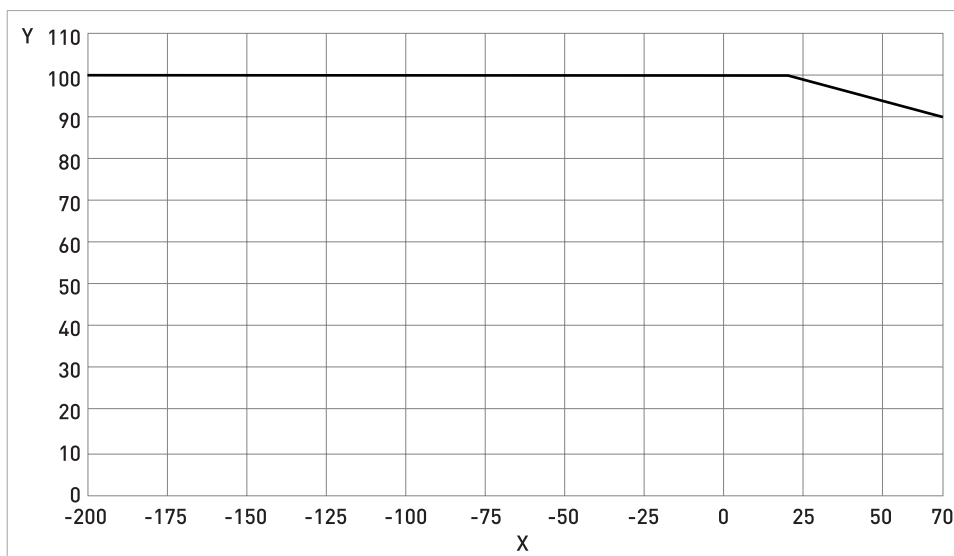
X temperature [°F]

Y pressure [psig]

① PED / CRN H08...80, D100

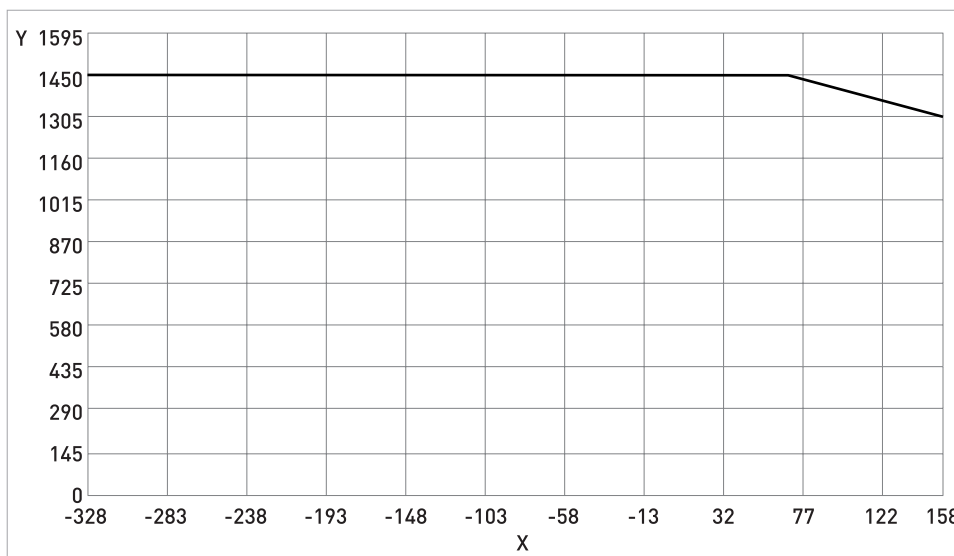
② CRN D150...200

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



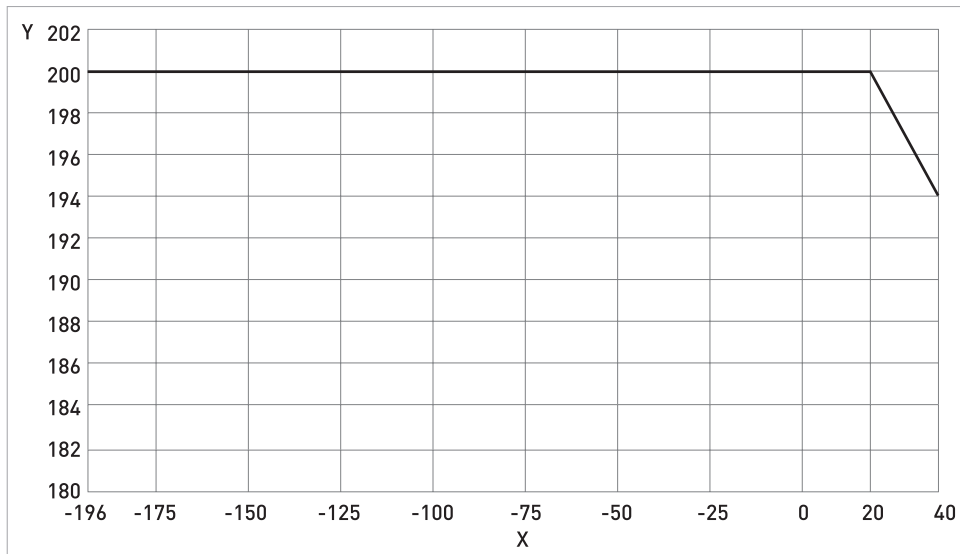
X temperature [°C]
Y pressure [barg]

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



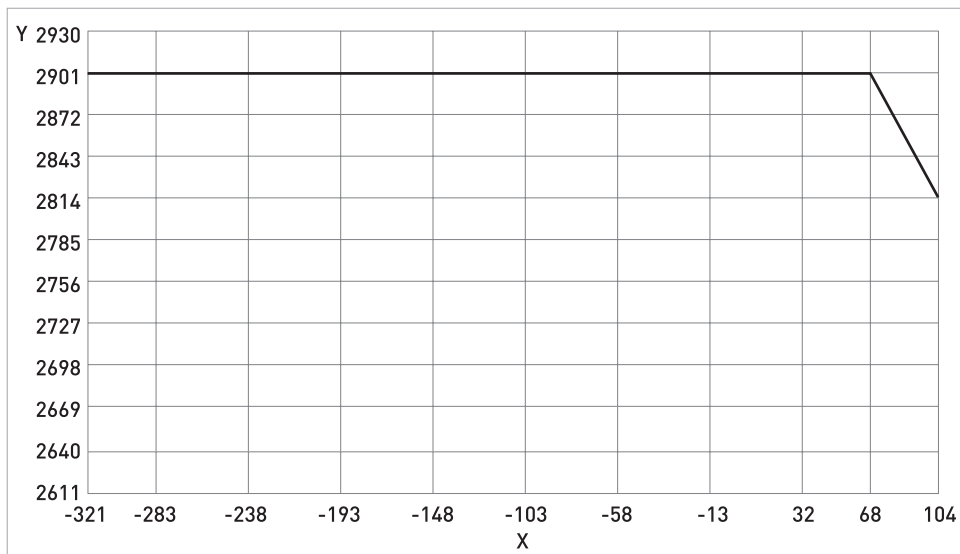
X temperature [°F]
Y pressure [psig]

Pressure / temperature de-rating (metric) for meters with Hastelloy®C22, PED certified measuring tubes. Cryogenic temperature range.



X temperature [°C]
Y pressure [barg]

Pressure / temperature de-rating (imperial) for meters with Hastelloy® C22, PED certified measuring tubes. Cryogenic temperature range.

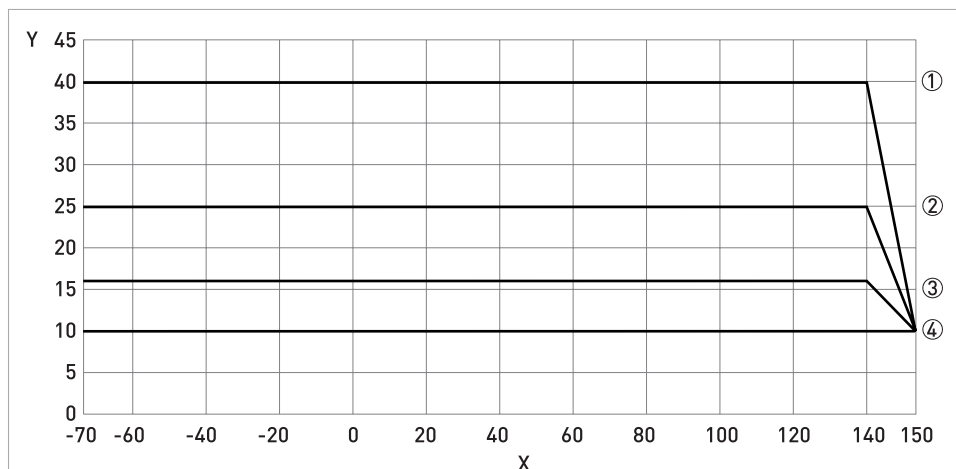


X temperature [°F]
Y pressure [psig]

Flanges

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

Pressure / temperature de-rating (metric) for meters with hygienic connections.

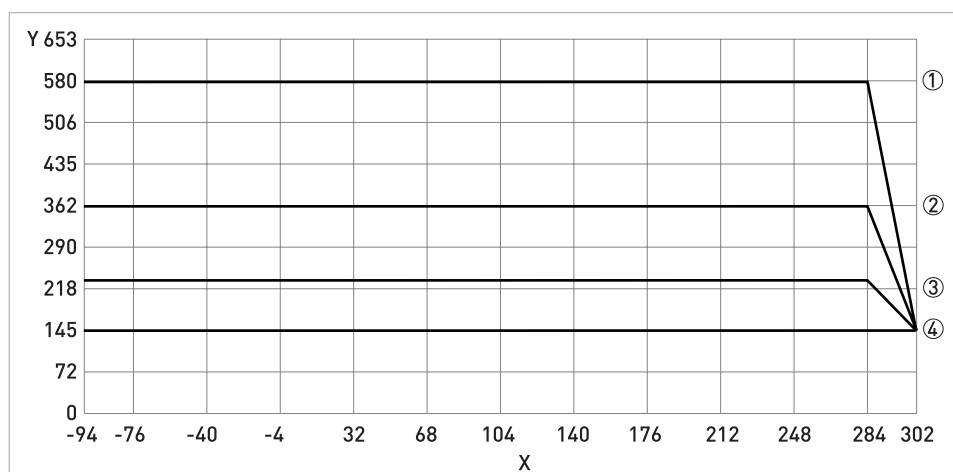


X temperature [°C]

Y pressure [barg]

- ① SMS 1...1½", DIN 11851 DN10...40
- ② SMS 2", Tri-clamp DN10...40, DIN 11864-2 DN10...40, DIN 11851 DN50...65
- ③ SMS 3", Tri-clamp DN50...65, DIN11864-2, DIN11864-2 DN50...100, DN11851 DN80...100
- ④ SMS 4", Tri-clamp DN80...100

Pressure / temperature de-rating (imperial) for meters with hygienic connections.



X temperature [°F]

Y pressure [psig]

- ① SMS 1...1½", DIN 11851 DN10...40
- ② SMS 2", Tri-clamp DN10...40, DIN 11864-2 DN10...40, DIN 11851 DN50...65
- ③ SMS 3", Tri-clamp DN50...65, DIN11864-2, DIN11864-2 DN50...100, DN11851 DN80...100
- ④ SMS 4", Tri-clamp DN80...100

Notes

- The maximum operating pressure will be either the flange / hygienic connection rating or the measuring tube rating, **WHICHEVER IS THE LOWER!**
- For hygienic applications above 10 bar, connection sizes DN25...100 / 1...4" are limited to the measurement of liquid at the pressures shown in the above table.
- The maximum pressure for steam cleaning is 10 bar / 145 psi.
- For other applications above 10 bar / 145 psi, please contact the manufacturer.
- The manufacturer recommends that the seals are replaced at regular intervals. This will maintain the hygienic integrity of the connection.

6.5 Dimensions and weights

6.5.1 Flanged versions

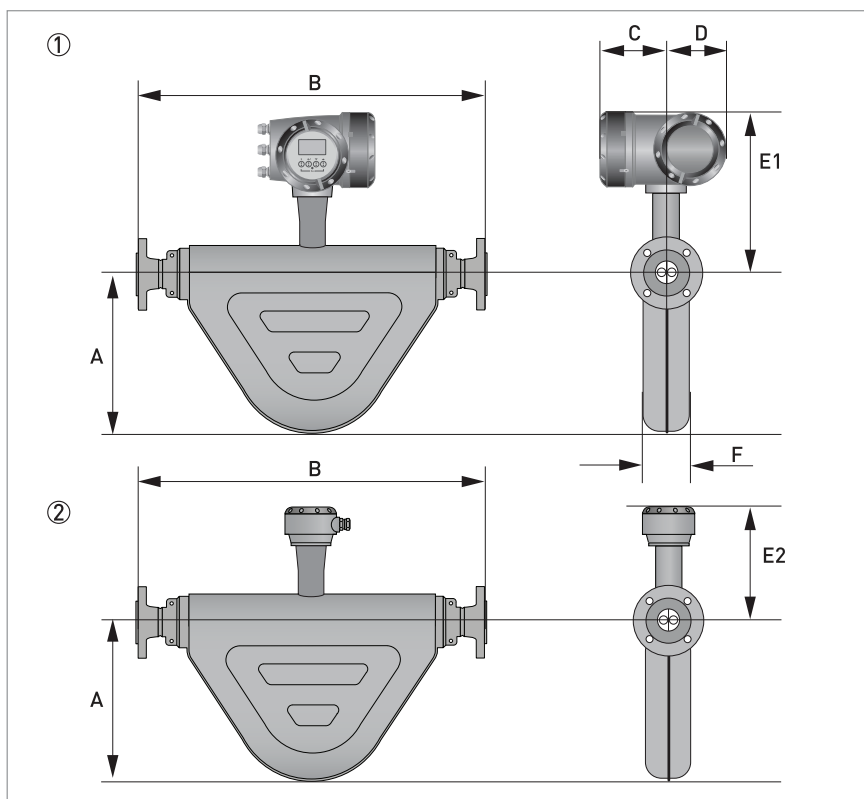
Meter weights

	kg								
	S08	S10	S15	S25	S50	S80	S100	S150	S200
Aluminium (compact)	9.3	10.1	12.9	23.5	29.4	58.9	94.3	193.6	443.6
Stainless Steel (compact)	15.2	16.0	18.8	29.4	35.3	64.8	100.2	199.5	449.5
Aluminium (remote)	5.8	6.6	9.4	19.9	25.9	55.4	90.8	190.1	440.0
Stainless Steel (remote)	6.6	7.3	10.2	20.7	26.6	56.1	91.5	191.5	440.8
Heating jacket add	3.1		4.5	7.0	7.9	12.7	15.7	27.6	N/A

	lbs								
	S08	S10	S15	S25	S50	S80	S100	S150	S200
Aluminium (compact)	20.5	22.3	28.4	51.8	64.8	129.8	207.9	426.8	978.0
Stainless Steel (compact)	33.5	35.3	41.4	64.8	77.8	142.9	220.9	439.8	991.0
Aluminium (remote)	12.8	14.5	20.7	43.9	57.1	122.1	200.2	419.1	970.0
Stainless Steel (remote)	14.6	16.1	22.5	45.6	58.6	123.7	201.7	422.2	971.8
Heating jacket add	6.8		9.9	15.4	17.4	28.0	34.6	60.8	N/A

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

Meter dimensions



- ① Compact version
- ② Remote version

General dimensions

	mm								
	S08	S10	S15	S25	S50	S80	S100	S150	S200
A ±3	156		186	282	321	411	453	555	710
C	137								
D	122								
E1 ±3 ①	279		280	297		333	359	384	426
E1 ±3 ②	365		366	383		419	445	470	512
E2 ±3 ③	222			240		246	302	327	369
E2 ±3 ④	308			326		361	388	413	455
E2 ±3 ⑤	348			366		401	428	453	495
F ±2	81		118		131	196	251	273	356

- ① compact 150°C (short stem)
- ② compact 230°C (extended stem)
- ③ remote 150°C (short stem)
- ④ remote 230°C (extended stem)
- ⑤ remote 400°C (extended stem)

	inches								
	S08	S10	S15	S25	S50	S80	S100	S150	S200
A ±0.11	6.1		7.3	11.1	12.6	16.2	17.8	21.9	28.0
C	5.4								
D	4.8								
E1 ±0.12 ①	11.0		11.0	11.7		13.1	14.1	15.1	16.8
E1 ±0.12 ②	14.4		14.4	15.1		16.5	17.5	18.5	20.2
E2 ±0.12 ③	8.7		8.7	9.4		9.7	11.9	12.9	14.5
E2 ±0.12 ④	12.1		12.1	12.8		14.2	15.3	16.3	17.9
E2 ±0.12 ⑤	13.7		13.7	14.4		15.8	16.9	17.8	19.5
F ±0.08	3.2			4.6	5.2	7.7	9.9	10.7	14.0

① compact 302°F (short stem)

② compact 446°F (extended stem)

③ remote 302°F (short stem)

④ remote 446°F (extended stem)

⑤ remote 752°F (extended stem)

Dimension B for meters with Stainless Steel measuring tubes

mm (±5)									
	S08	S10	S15	S25	S50	S80	S100	S150	S200
PN16									
DN80	-	-	-	-	-	-	970	-	-
DN100	-	-	-	-	-	-	1000	1195	-
DN150	-	-	-	-	-	-	-	1151	1570
DN200	-	-	-	-	-	-	-	-	1534
PN40									
DN10	335	347	-	-	-	-	-	-	-
DN15	341	353	510	-	-	-	-	-	-
DN25	-	-	514	600	-	-	-	-	-
DN40	-	-	-	610	709	-	-	-	-
DN50	-	-	-	-	715	895	-	-	-
DN80	-	-	-	-	-	915	986	-	-
DN100	-	-	-	-	-	-	1000	1205	-
DN150	-	-	-	-	-	-	-	1191	1580
DN200	-	-	-	-	-	-	-	-	1586
PN63									
DN50	-	-	-	-	743	923	-	-	-
DN80	-	-	-	-	-	943	1014	-	-
DN100	-	-	-	-	-	-	1026	1217	-
DN150	-	-	-	-	-	-	-	1231	1600
DN200	-	-	-	-	-	-	-	-	1630
PN100									
DN10	355	367	-	-	-	-	-	-	-

mm (±5)									
	S08	S10	S15	S25	S50	S80	S100	S150	S200
DN15	355	367	524	-	-	-	-	-	-
DN25	-	-	550	636	-	-	-	-	-
DN40	-	-	-	644	743	-	-	-	-
DN50	-	-	-	-	755	935	-	-	-
DN80	-	-	-	-	-	955	1026	-	-
DN100	-	-	-	-	-	-	1050	1221	-
DN150	-	-	-	-	-	-	-	1271	1640
DN200	-	-	-	-	-	-	-	-	1670
ASME 150									
½"	361	373	530	-	-	-	-	-	-
¾"	-	-	540	-	-	-	-	-	-
1"	-	-	546	632	-	-	-	-	-
1½"	-	-	-	644	743	-	-	-	-
2"	-	-	-	-	747	927	-	-	-
3"	-	-	-	-	-	939	1010	-	-
4"	-	-	-	-	-	-	1024	1195	-
6"	-	-	-	-	-	-	-	1219	1588
8"	-	-	-	-	-	-	-	-	1614
ASME 300									
½"	371	383	540	-	-	-	-	-	-
¾"	-	-	550	-	-	-	-	-	-
1"	-	-	558	644	-	-	-	-	-
1½"	-	-	-	658	757	-	-	-	-
2"	-	-	-	-	759	939	-	-	-
3"	-	-	-	-	-	959	1030	-	-
4"	-	-	-	-	-	-	1042	1213	-
6"	-	-	-	-	-	-	-	1239	1608
8"	-	-	-	-	-	-	-	-	1634
ASME 600									
½"	383	395	552	-	-	-	-	-	-
¾"	-	-	562	-	-	-	-	-	-
1"	-	-	572	658	-	-	-	-	-
1½"	-	-	-	674	773	-	-	-	-
2"	-	-	-	-	779	959	-	-	-
3"	-	-	-	-	-	979	1050	-	-
4"	-	-	-	-	-	-	1088	1259	-
6"	-	-	-	-	-	-	-	1289	1658
8"	-	-	-	-	-	-	-	-	1690
JIS 10K									
50A	-	-	-	-	699	879	-	-	-
80A	-	-	-	-	-	889	960	-	-

mm (± 5)									
	S08	S10	S15	S25	S50	S80	S100	S150	S200
100A	-	-	-	-	-	-	960	1195	-
150A	-	-	-	-	-	-	-	1147	1570
200A	-	-	-	-	-	-	-	-	1526
JIS 20K									
10A	331	343	-	-	-	-	-	-	-
15A	333	345	502	-	-	-	-	-	-
25A	-	-	510	596	-	-	-	-	-
40A	-	-	-	602	701	-	-	-	-
50A	-	-	-	-	703	883	-	-	-
80A	-	-	-	-	-	901	972	-	-
100A	-	-	-	-	-	-	986	1205	-
150A	-	-	-	-	-	-	-	1187	1580
200A	-	-	-	-	-	-	-	-	1564

inches (± 0.2)									
	S08	S10	S15	S25	S50	S80	S100	S150	S200
PN16									
DN80	-	-	-	-	-	-	38.2	-	-
DN100	-	-	-	-	-	-	39.4	47.0	-
DN150	-	-	-	-	-	-	-	45.3	61.8
DN200	-	-	-	-	-	-	-	-	60.4
PN40									
DN10	13.2	13.7	-	-	-	-	-	-	-
DN15	13.4	13.9	20.1	-	-	-	-	-	-
DN25	-	-	20.2	23.6	-	-	-	-	-
DN40	-	-	-	24.0	27.9	-	-	-	-
DN50	-	-	-	-	28.1	35.2	-	-	-
DN80	-	-	-	-	-	36.0	38.8	-	-
DN100	-	-	-	-	-	-	39.4	47.4	-
DN150	-	-	-	-	-	-	-	46.9	62.2
DN200	-	-	-	-	-	-	-	-	62.4
PN63									
DN50	-	-	-	-	29.3	36.3	-	-	-
DN80	-	-	-	-	-	37.1	39.9	-	-
DN100	-	-	-	-	-	-	40.4	47.9	-
DN150	-	-	-	-	-	-	-	48.5	63.0
DN200	-	-	-	-	-	-	-	-	64.2
PN100									
DN10	14.0	14.4	-	-	-	-	-	-	-
DN15	14.0	14.4	20.6	-	-	-	-	-	-

inches (± 0.2)									
	S08	S10	S15	S25	S50	S80	S100	S150	S200
DN25	-	-	21.7	25.0	-	-	-	-	-
DN40	-	-	-	25.4	29.3	-	-	-	-
DN50	-	-	-	-	29.7	36.8	-	-	-
DN80	-	-	-	-	-	37.6	40.4	-	-
DN100	-	-	-	-	-	-	41.3	48.1	-
DN150	-	-	-	-	-	-	-	50.0	64.6
DN200	-	-	-	-	-	-	-	-	65.7
ASME 150									
½"	14.2	14.7	20.9	-	-	-	-	-	-
¾"	-	-	21.3	-	-	-	-	-	-
1"	-	-	21.5	24.9	-	-	-	-	-
1½"	-	-	-	25.4	29.3	-	-	-	-
2"	-	-	-	-	29.4	36.5	-	-	-
3"	-	-	-	-	-	37.0	39.8	-	-
4"	-	-	-	-	-	-	40.3	47.0	-
6"	-	-	-	-	-	-	-	48.0	62.5
8"	-	-	-	-	-	-	-	-	63.5
ASME 300									
½"	14.6	15.1	21.3	-	-	-	-	-	-
¾"	-	-	21.7	-	-	-	-	-	-
1"	-	-	22.0	25.4	-	-	-	-	-
1½"	-	-	-	25.9	29.8	-	-	-	-
2"	-	-	-	-	29.9	37.0	-	-	-
3"	-	-	-	-	-	37.8	40.6	-	-
4"	-	-	-	-	-	-	41.0	47.8	-
6"	-	-	-	-	-	-	-	48.8	62.5
8"	-	-	-	-	-	-	-	-	63.5
ASME 600									
½"	15.1	15.6	21.7	-	-	-	-	-	-
¾"	-	-	22.1	-	-	-	-	-	-
1"	-	-	22.5	25.9	-	-	-	-	-
1½"	-	-	-	26.5	30.4	-	-	-	-
2"	-	-	-	-	30.7	37.8	-	-	-
3"	-	-	-	-	-	38.5	41.3	-	-
4"	-	-	-	-	-	-	42.8	49.6	-
6"	-	-	-	-	-	-	-	50.7	65.3
8"	-	-	-	-	-	-	-	-	66.5
JIS 10K									
50A	-	-	-	-	27.5	34.6	-	-	-
80A	-	-	-	-	-	35.0	37.8	-	-
100A	-	-	-	-	-	-	37.8	47.0	-

inches (± 0.2)									
	S08	S10	S15	S25	S50	S80	S100	S150	S200
150A	-	-	-	-	-	-	-	45.2	61.8
200A	-	-	-	-	-	-	-	-	60.1
JIS 20K									
10A	13.0	13.5	-	-	-	-	-	-	-
15A	13.1	13.6	19.8	-	-	-	-	-	-
25A	-	-	20.1	23.5	-	-	-	-	-
40A	-	-	-	23.7	27.6	-	-	-	-
50A	-	-	-	-	27.7	34.8	-	-	-
80A	-	-	-	-	-	35.5	38.3	-	-
100A	-	-	-	-	-	-	38.8	47.4	-
150A	-	-	-	-	-	-	-	46.7	62.2
200A	-	-	-	-	-	-	-	-	61.6

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

mm (± 5)									
	H08	H10	H15	H25	H50	H80	D100	D150	D200
PN40									
DN15	329	354	-	-	-	-	-	-	-
DN25	-	-	511	-	-	-	-	-	-
DN40	-	-	-	601	-	-	-	-	-
DN50	-	-	-	-	714	-	-	-	-
DN80	-	-	-	-	-	914	-	-	-
PN63									
DN50	-	-	-	-	714	-	-	-	-
DN80	-	-	-	-	-	914	-	-	-
PN100									
DN15	329	354	-	-	-	-	-	-	-
DN25	-	-	511	-	-	-	-	-	-
DN40	-	-	-	601	-	-	-	-	-
DN50	-	-	-	-	714	-	-	-	-
DN80	-	-	-	-	-	914	-	-	-
PN160									
DN15	329	354	-	-	-	-	-	-	-
DN25	-	-	511	-	-	-	-	-	-
DN40	-	-	-	601	-	-	-	-	-
DN50	-	-	-	-	714	-	-	-	-
DN80	-	-	-	-	-	914	1042	-	-
DN100	-	-	-	-	-	-	1070	1241	-
DN150	-	-	-	-	-	-	-	1297	1666
DN200	-	-	-	-	-	-	-	-	1690

mm (±5)									
	H08	H10	H15	H25	H50	H80	D100	D150	D200
ASME 150									
½"	329	354	-	-	-	-	-	-	-
1"	-	-	511	-	-	-	-	-	-
1½"	-	-	-	601	-	-	-	-	-
2"	-	-	-	-	714	-	-	-	-
3"	-	-	-	-	-	914	-	-	-
ASME 300									
½"	329	354	-	-	-	-	-	-	-
1"	-	-	511	-	-	-	-	-	-
1½"	-	-	-	601	-	-	-	-	-
2"	-	-	-	-	714	-	-	-	-
3"	-	-	-	-	-	914	-	-	-
ASME 600									
½"	336	361	-	-	-	-	-	-	-
1"	-	-	518	-	-	-	-	-	-
1½"	-	-	-	608	-	-	-	-	-
2"	-	-	-	-	721	-	-	-	-
3"	-	-	-	-	-	921	-	-	-
ASME 900									
1½"	-	-	-	608	-	-	-	-	-
2"	-	-	-	-	721	-	-	-	-
3"	-	-	-	-	-	921	1088	-	-
4"	-	-	-	-	-	-	1112	1283	-
6"	-	-	-	-	-	-	-	1335	1704
8"	-	-	-	-	-	-	-	-	1748
ASME 1500									
½"	336	361	-	-	-	-	-	-	-
1"	-	-	518	-	-	-	-	-	-
1½"	-	-	-	608	-	-	-	-	-
2"	-	-	-	-	721	-	-	-	-
3"	-	-	-	-	-	921	1118	-	-
4"	-	-	-	-	-	-	1132	1303	-
6"	-	-	-	-	-	-	-	1397	1766
8"	-	-	-	-	-	-	-	-	1850
JIS 10K									
50A	-	-	-	-	714	-	-	-	-
80A	-	-	-	-	-	914	-	-	-
JIS 20K									
15A	329	354	-	-	-	-	-	-	-
25A	-	-	511	-	-	-	-	-	-
40A	-	-	-	601	-	-	-	-	-

mm (± 5)									
	H08	H10	H15	H25	H50	H80	D100	D150	D200
50A	-	-	-	-	714	-	-	-	-
80A	-	-	-	-	-	914	-	-	-

inches (± 0.2)									
	H08	H10	H15	H25	H50	H80	D100	D150	D200
PN40									
DN15	13.0	13.9	-	-	-	-	-	-	-
DN25	-	-	20.1	-	-	-	-	-	-
DN40	-	-	-	23.7	-	-	-	-	-
DN50	-	-	-	-	28.1	-	-	-	-
DN80	-	-	-	-	-	36.0	-	-	-
PN63									
DN50	-	-	-	-	28.1	-	-	-	-
DN80	-	-	-	-	-	36.0	-	-	-
PN100									
DN15	13.0	13.9	-	-	-	-	-	-	-
DN25	-	-	20.1	-	-	-	-	-	-
DN40	-	-	-	23.7	-	-	-	-	-
DN50	-	-	-	-	28.1	-	-	-	-
DN80	-	-	-	-	-	36.0	-	-	-
PN160									
DN15	13.0	13.9	-	-	-	-	-	-	-
DN25	-	-	20.1	-	-	-	-	-	-
DN40	-	-	-	23.7	-	-	-	-	-
DN50	-	-	-	-	28.1	-	-	-	-
DN80	-	-	-	-	-	36.0	41.0	-	-
DN100	-	-	-	-	-	-	42.1	48.9	-
DN150	-	-	-	-	-	-	-	51.1	65.6
DN200	-	-	-	-	-	-	-	-	66.5
ASME 150									
½"	13.0	13.9	-	-	-	-	-	-	-
1"	-	-	20.1	-	-	-	-	-	-
1½"	-	-	-	23.7	-	-	-	-	-
2"	-	-	-	-	28.1	-	-	-	-
3"	-	-	-	-	-	36.0	-	-	-
ASME 300									
½"	13.0	13.9	-	-	-	-	-	-	-
1"	-	-	20.1	-	-	-	-	-	-
1½"	-	-	-	23.7	-	-	-	-	-
2"	-	-	-	-	28.1	-	-	-	-
3"	-	-	-	-	-	36.0	-	-	-

inches (±0.2)									
	H08	H10	H15	H25	H50	H80	D100	D150	D200
ASME 600									
½"	13.2	14.2	-	-	-	-	-	-	-
1"	-	-	20.1	-	-	-	-	-	-
1½"	-	-	-	23.9	-	-	-	-	-
2"	-	-	-	-	28.4	-	-	-	-
3"	-	-	-	-	-	36.3	-	-	-
ASME 900									
1½"	-	-	-	23.9	-	-	-	-	-
2"	-	-	-	-	28.4	-	-	-	-
3"	-	-	-	-	-	36.3	42.8	-	-
4"	-	-	-	-	-	-	43.8	50.5	-
6"	-	-	-	-	-	-	-	52.6	67.1
8"	-	-	-	-	-	-	-	-	68.8
ASME 1500									
½"	13.2	14.2	-	-	-	-	-	-	-
1"	-	-	20.4	-	-	-	-	-	-
1½"	-	-	-	23.9	-	-	-	-	-
2"	-	-	-	-	28.4	-	-	-	-
3"	-	-	-	-	-	36.3	44.0	-	-
4"	-	-	-	-	-	-	44.6	51.3	-
6"	-	-	-	-	-	-	-	55.0	69.5
8"	-	-	-	-	-	-	-	-	72.8
JIS 10K									
50A	-	-	-	-	28.1	-	-	-	-
80A	-	-	-	-	-	36.0	-	-	-
JIS 20K									
15A	13.0	13.9	-	-	-	-	-	-	-
25A	-	-	20.1	-	-	-	-	-	-
40A	-	-	-	23.7	-	-	-	-	-
50A	-	-	-	-	28.1	-	-	-	-
80A	-	-	-	-	-	36.0	-	-	-

6.5.2 NAMUR dimensions

The following face to face dimensions comply with NAMUR NE132

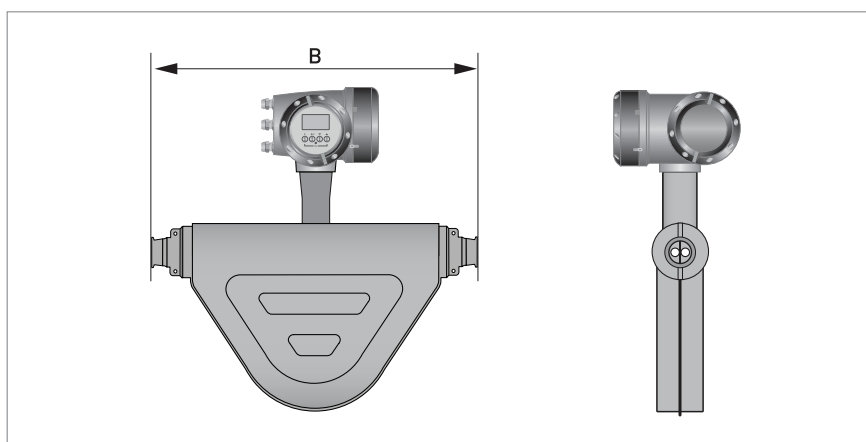
mm (± 3)						
	S15	S25	S50	S80	S100	S150
PN10						
DN250	-	-	-	-	-	-
PN16						
DN100	-	-	-	-	1000	-
DN150	-	-	-	-	-	1200 ①
DN200	-	-	-	-	-	-
PN40						
DN 15	510	-	-	-	-	-
DN 25	-	600	-	-	-	-
DN 50	-	-	715	-	-	-
DN 80	-	-	-	915	-	-
DN100					1000	-
DN150						1200 ①

① Available as special order

inches (± 0.12)						
	S15	S25	S50	S80	S100	S150
PN10						
DN250	-	-	-	-	-	-
PN16						
DN100	-	-	-	-	39.4	-
DN150	-	-	-	-	-	47.2 ①
DN200	-	-	-	-	-	-
PN40						
DN 15	20.1	-	-	-	-	-
DN 25	-	23.6	-	-	-	-
DN 50	-	-	28.1	-	-	-
DN 80	-	-	-	36.0	-	-
DN100					39.4	-
DN150						47.2 ①

① Available as special order

6.5.3 Hygienic versions



Dimension B for meters with Stainless Steel measuring tubes

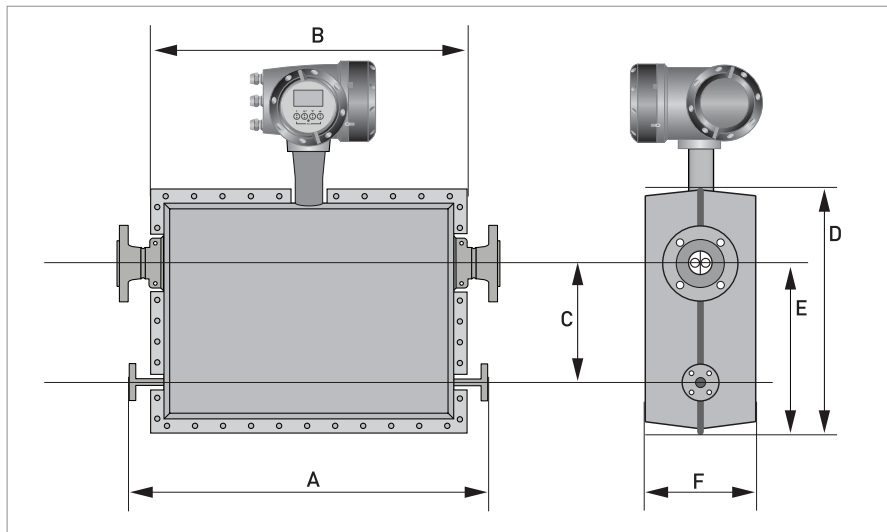
	mm (±5)						
	S08	S10	S15	S25	S50	S80	S100
Tri-clover							
½"	312	322	-	-	-	-	-
¾"	312	322	-	-	-	-	-
1"	-	-	499	-	-	-	-
1½"	-	-	-	603	-	-	-
2"	-	-	-	-	694	-	-
3"	-	-	-	-	-	866	-
4"	-	-	-	-	-	-	916
Tri-clamp DIN 32676							
DN15	305	315	-	-	-	-	-
DN25	-	-	479	-	-	-	-
DN40	-	-	-	584	-	-	-
DN50	-	-	-	-	680	-	-
DN80	-	-	-	-	-	870	-
DN100	-	-	-	-	-	-	929
Tri-clamp ISO 2852							
1"	-	-	485	-	-	-	-
1½"	-	-	-	571	-	-	-
2"	-	-	-	-	670	-	-
3"	-	-	-	-	-	851	-
4"	-	-	-	-	-	-	916
DIN 11864-2 Form A (female)							
DN15	352	362	-	-	-	-	-
DN25	-	-	519	-	-	-	-
DN40	-	-	-	631	-	-	-
DN50	-	-	-	-	727	-	-

	mm (±5)						
	S08	S10	S15	S25	S50	S80	S100
DN80	-	-	-	-	-	930	-
DN100	-	-	-	-	-	-	989
Male thread DIN 11851							
DN15	311	321	-	-	-	-	-
DN25	-	-	494	-	-	-	-
DN40	-	-	-	607	-	-	-
DN50	-	-	-	-	707	-	-
DN80	-	-	-	-	-	904	-
DN100	-	-	-	-	-	-	981
Male thread SMS							
1"	-	-	486	-	-	-	-
1½"	-	-	-	606	-	-	-
2"	-	-	-	-	697	-	-
3"	-	-	-	-	-	871	-
4"	-	-	-	-	-	-	929

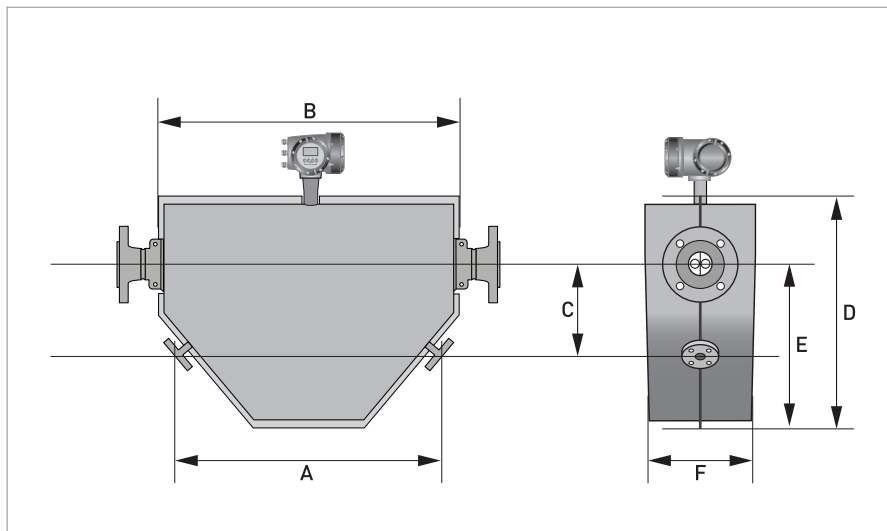
	inches (± 0.2)						
	S08	S10	S15	S25	S50	S80	S100
Tri-clover							
½"	12.3	12.7	-	-	-	-	-
¾"	12.3	12.7	-	-	-	-	-
1"	-	-	19.6	-	-	-	-
1½"	-	-	-	23.7	-	-	-
2"	-	-	-	-	27.3	-	-
3"	-	-	-	-	-	34.1	-
4"	-	-	-	-	-	-	36.1
Tri-clamp DIN 32676							
DN15	12.0	12.4	-	-	-	-	-
DN25	-	-	18.9	-	-	-	-
DN40	-	-	-	23.0	-	-	-
DN50	-	-	-	-	26.8	-	-
DN80	-	-	-	-	-	34.3	-
DN100	-	-	-	-	-	-	36.6
Tri-clamp ISO 2852							
1"	-	-	19.1	-	-	-	-
1½"	-	-	-	22.5	-	-	-
2"	-	-	-	-	26.4	-	-
3"	-	-	-	-	-	33.5	-
4"	-	-	-	-	-	-	36.1
DIN 11864-2 Form A (female)							
DN15	13.9	14.3	-	-	-	-	-
DN25	-	-	20.4	-	-	-	-
DN40	-	-	-	24.8	-	-	-
DN50	-	-	-	-	28.6	-	-
DN80	-	-	-	-	-	36.6	-
DN100	-	-	-	-	-	-	38.9
Male thread DIN 11851							
DN15	12.2	12.6	-	-	-	-	-
DN25	-	-	19.4	-	-	-	-
DN40	-	-	-	23.9	-	-	-
DN50	-	-	-	-	27.8	-	-
DN80	-	-	-	-	-	35.6	-
DN100	-	-	-	-	-	-	38.6
Male thread SMS							
1"	-	-	19.1	-	-	-	-
1½"	-	-	-	23.9	-	-	-
2"	-	-	-	-	27.4	-	-
3"	-	-	-	-	-	34.3	-
4"	-	-	-	-	-	-	36.6

6.5.4 Heating jacket version

Meter sizes 08...100



Meter sizes 150...200



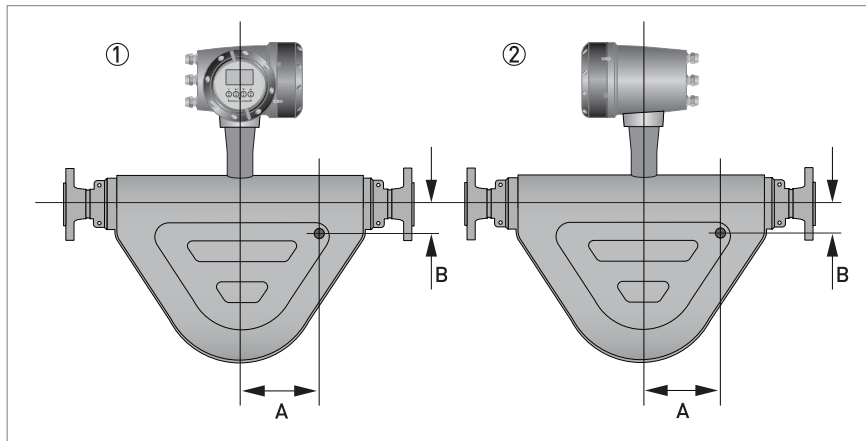
General dimensions

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

	inches								
	S08	S10	S15	S25	S50	S80	S100	S150	S200
Heating connection size: PN40 DN15 or ASME 150 ½"									
A ±0.2	17.1	21.7	26.0	27.0	33.9	36.4	33.3	44.7	
B ±0.12	11.1	17.3	21.3	22.2	29.2	31.7	40.8	55.4	
C ±0.12	3.9	5.1	8.3	9.1	12.6	13.4	19.4	19.9	
D ±0.12	12.4	13.5	17.8	19.6	24.5	26.9	36.1	9.1	
E ±0.12	7.8	8.7	12.4	14.0	17.8	19.1	27.1	33.7	
F ±0.12	9.1	8.9	10.0	10.5	12.7	14.6	16.3	19.7	

6.5.5 Purge port option

If the meter has been ordered with purge ports, it will be supplied with two ports: one on the front and one on the rear.



- ① Front view
② Rear view

Dimensions

	mm								
	S08	S10	S15	S25	S50	S80	S100	S150	S200
A	70		110	145	150	205	220	345	600
B	32		45	57	60	85		100	160

	inches								
	S08	S10	S15	S25	S50	S80	S100	S150	S200
A	2.8		4.3	5.7	5.9	8.1	8.7	13.6	23.6
B	1.3		1.8	2.2	2.4	3.3		3.9	6.3

6.5.6 Burst discs

If the meter has been ordered with a burst disc, it will be supplied with the disc fitted. The failure pressure of the disc is 10 barg at +20°C / 145 psig at +68°F.



CAUTION!

The fitted burst disc will be suitable for the flow rates and process conditions specified on the original order. If the process conditions alter in any way, it is recommended that you contact the manufacturer for advice regarding suitability.

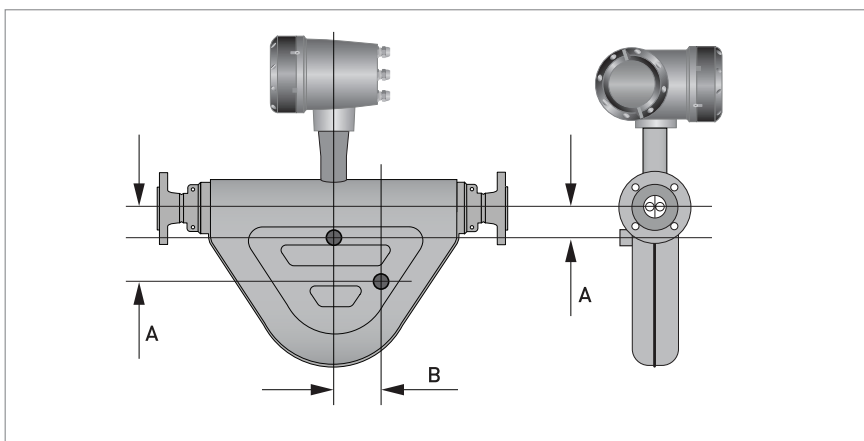
If the process product is hazardous (in any way) it is recommended that an exhaust tube is connected to the NPT male thread of the burst disc and the pipe routed so that the process product can be discharged to a safe area. Use a tube with a diameter large enough AND routed in such a way, so that pressure cannot build up in the meter case.



INFORMATION!

For gas applications, the burst disc must be specified at the time of ordering.

6.5.7 Burst disc option



Dimensions

	mm								
	S08	S10	S15	S25	S50	S80	S100	S150	S200
A	76	92	135	57	74	175	195		
B	38.5	62	0	0	0	0	0	0	0

	inches								
	S08	S10	S15	S25	S50	S80	S100	S150	S200
A	3.0	3.6	5.3	2.2	2.9	6.9	7.7		
B	1.52	2.4	0	0	0	0	0	0	0







KROHNE – Products, Solutions and Services

- Process instrumentation for flow, level, temperature, pressure measurement and process analytics
- Flow metering, monitoring, wireless and remote metering solutions
- Engineering, commissioning, calibration, maintenance and training services

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