

Brief Operating Instructions

Proline Promag W

Electromagnetic sensor

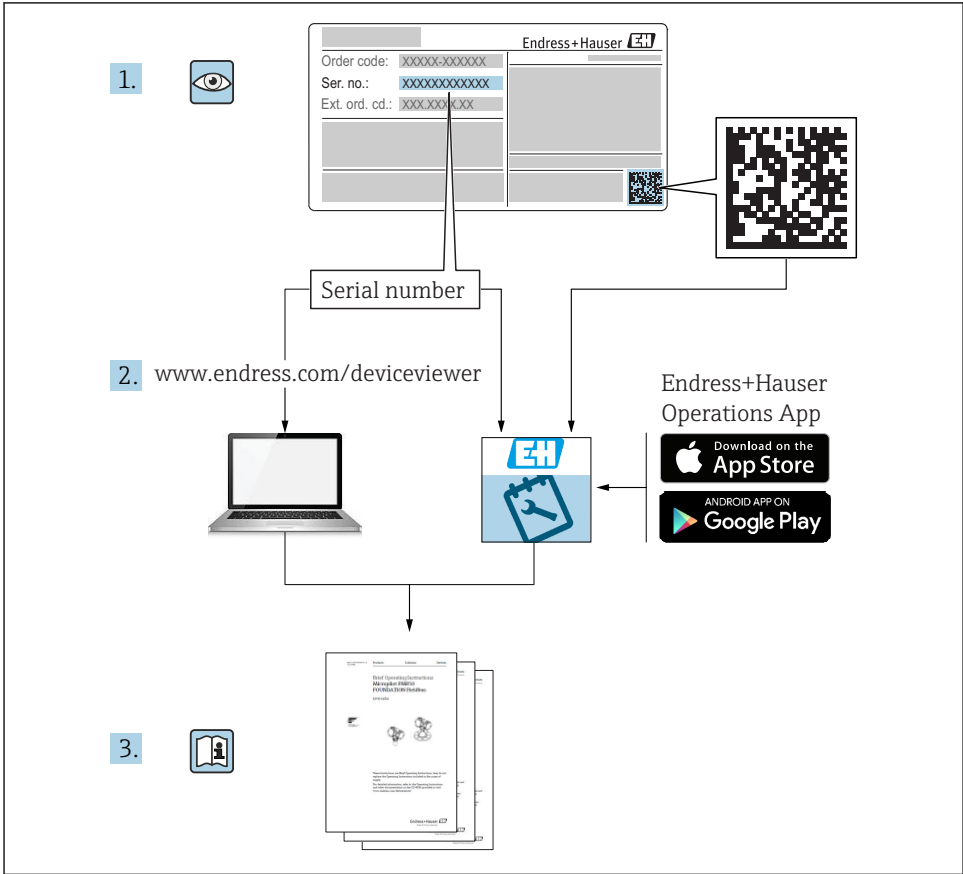


These instructions are Brief Operating Instructions; they are **not** a substitute for the Operating Instructions pertaining to the device.

Sensor Brief Operating Instructions

Contain information about the sensor.

Transmitter Brief Operating Instructions →  3.



A0023555

Brief Operating Instructions for the device

The device consists of a transmitter and a sensor.

The process of commissioning these two components is described in two separate manuals:

- Sensor Brief Operating Instructions
- Transmitter Brief Operating Instructions

Please refer to both Brief Operating Instructions when commissioning the device as the contents of the manuals complement one another:

Sensor Brief Operating Instructions

The Sensor Brief Operating Instructions are aimed at specialists with responsibility for installing the measuring device.

- Incoming acceptance and product identification
- Storage and transport
- Installation

Transmitter Brief Operating Instructions

The Transmitter Brief Operating Instructions are aimed at specialists with responsibility for commissioning, configuring and parameterizing the measuring device (until the first measured value).

- Product description
- Installation
- Electrical connection
- Operation options
- System integration
- Commissioning
- Diagnostic information

Additional device documentation



These Brief Operating Instructions are the **Sensor Brief Operating Instructions**.

The "Transmitter Brief Operating Instructions" are available via:

- Internet: www.endress.com/deviceviewer
- Smart phone/tablet: *Endress+Hauser Operations App*

Detailed information about the device can be found in the Operating Instructions and the other documentation:

- Internet: www.endress.com/deviceviewer
- Smart phone/tablet: *Endress+Hauser Operations App*





Table of contents

1	Document information	5
1.1	Symbols used	5
2	Basic safety instructions	8
2.1	Requirements for the personnel	8
2.2	Designated use	8
2.3	Workplace safety	9
2.4	Operational safety	9
2.5	Product safety	9
2.6	IT security	10
3	Incoming acceptance and product identification	11
3.1	Incoming acceptance	11
3.2	Product identification	12
4	Storage and transport	13
4.1	Storage conditions	13
4.2	Transporting the product	13
5	Installation	15
5.1	Installation conditions	15
5.2	Mounting the measuring device	22
5.3	Post-installation check	24
6	Disposal	25
6.1	Removing the measuring device	25
6.2	Disposing of the measuring device	25
7	Appendix	26
7.1	Screw tightening torques	26











1 Document information

1.1 Symbols used





1.1.1 Safety symbols


Symbol	Meaning
	DANGER! This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
	WARNING! This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
	CAUTION! This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
	NOTE! This symbol contains information on procedures and other facts which do not result in personal injury.

1.1.2 Symbols for certain types of information






Symbol	Meaning	Symbol	Meaning
	Permitted Procedures, processes or actions that are permitted.		Preferred Procedures, processes or actions that are preferred.
	Forbidden Procedures, processes or actions that are forbidden.		Tip Indicates additional information.
	Reference to documentation		Reference to page
	Reference to graphic		Series of steps
	Result of a step		Visual inspection





1.1.3 Electrical symbols

Symbol	Meaning	Symbol	Meaning
	Direct current		Alternating current
	Direct current and alternating current		Ground connection A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.






Symbol	Meaning
	<p>Protective Earth (PE) A terminal which must be connected to ground prior to establishing any other connections.</p> <p>The ground terminals are situated inside and outside the device:</p> <ul style="list-style-type: none"> ▪ Inner ground terminal: Connects the protective earth to the mains supply. ▪ Outer ground terminal: Connects the device to the plant grounding system.

1.1.4 Communication symbols


Symbol	Meaning	Symbol	Meaning
	<p>Wireless Local Area Network (WLAN) Communication via a wireless, local network.</p>		<p>Bluetooth Wireless data transmission between devices over a short distance.</p>
	<p>LED Light emitting diode is off.</p>		<p>LED Light emitting diode is on.</p>
	<p>LED Light emitting diode is flashing.</p>		




Symbol	Meaning	Symbol	Meaning
	<p>Wireless Local Area Network (WLAN) Communication via a wireless, local network.</p>		<p>LED Light emitting diode is off.</p>
	<p>LED Light emitting diode is on.</p>		<p>LED Light emitting diode is flashing.</p>

1.1.5 Tool symbols

Symbol	Meaning	Symbol	Meaning
	Torx screwdriver		Flat blade screwdriver
	Cross-head screwdriver		Allen key
	Open-ended wrench		

1.1.6 Symbols in graphics

Symbol	Meaning	Symbol	Meaning
1, 2, 3, ...	Item numbers		Series of steps
A, B, C, ...	Views	A-A, B-B, C-C, ...	Sections

Symbol	Meaning	Symbol	Meaning
	Hazardous area		Safe area (non-hazardous area)
	Flow direction		

2 Basic safety instructions

2.1 Requirements for the personnel

The personnel must fulfill the following requirements for its tasks:

- ▶ Trained, qualified specialists must have a relevant qualification for this specific function and task.
- ▶ Are authorized by the plant owner/operator.
- ▶ Are familiar with federal/national regulations.
- ▶ Before starting work, read and understand the instructions in the manual and supplementary documentation as well as the certificates (depending on the application).
- ▶ Follow instructions and comply with basic conditions.

2.2 Designated use

Application and media

The measuring device is only suitable for flow measurement of liquids with a minimum conductivity of 5 $\mu\text{S}/\text{cm}$.

Depending on the version ordered, the measuring device can also measure potentially explosive, flammable, poisonous and oxidizing media.

Measuring devices for use in hazardous areas, in hygienic applications or where there is an increased risk due to process pressure, are labeled accordingly on the nameplate.

To ensure that the measuring device remains in proper condition for the operation time:

- ▶ Keep within the specified pressure and temperature range.
- ▶ Only use the measuring device in full compliance with the data on the nameplate and the general conditions listed in the Operating Instructions and supplementary documentation.
- ▶ Based on the nameplate, check whether the ordered device is permitted for the intended use in the hazardous area (e.g. explosion protection, pressure vessel safety).
- ▶ Use the measuring device only for media to which the process-wetted materials are sufficiently resistant.
- ▶ If the measuring device is not operated at atmospheric temperature, compliance with the relevant basic conditions specified in the associated device documentation is absolutely essential: "Documentation" section.
- ▶ Protect the measuring device permanently against corrosion from environmental influences.



Promag 400

The measuring device is optionally tested in accordance with OIML R49: 2006 and has an EC type-examination certificate according to Measuring Instruments Directive 2004/22/EC (MID) for service subject to legal metrological control ("custody transfer") for cold water (Annex MI-001).

The permitted fluid temperature in these applications is 0 to 50 °C (32 to 122 °F).

Incorrect use

Non-designated use can compromise safety. The manufacturer is not liable for damage caused by improper or non-designated use.

⚠ WARNING**Danger of breakage due to corrosive or abrasive fluids!**

- ▶ Verify the compatibility of the process fluid with the sensor material.
- ▶ Ensure the resistance of all fluid-wetted materials in the process.
- ▶ Keep within the specified pressure and temperature range.

NOTICE**Verification for borderline cases:**

- ▶ For special fluids and fluids for cleaning, Endress+Hauser is glad to provide assistance in verifying the corrosion resistance of fluid-wetted materials, but does not accept any warranty or liability as minute changes in the temperature, concentration or level of contamination in the process can alter the corrosion resistance properties.

Residual risks**⚠ WARNING****The electronics and the medium may cause the surfaces to heat up. This presents a burn hazard!**

- ▶ For elevated fluid temperatures, ensure protection against contact to prevent burns.

2.3 Workplace safety

For work on and with the device:

- ▶ Wear the required personal protective equipment according to federal/national regulations.

For welding work on the piping:

- ▶ Do not ground the welding unit via the measuring device.

If working on and with the device with wet hands:

- ▶ Due to the increased risk of electric shock, gloves must be worn.

2.4 Operational safety

Risk of injury!

- ▶ Operate the device in proper technical condition and fail-safe condition only.
- ▶ The operator is responsible for interference-free operation of the device.

Environmental requirements Promag 400

If a plastic transmitter housing is permanently exposed to certain steam and air mixtures, this can damage the housing.

- ▶ If you are unsure, please contact your Endress+Hauser Sales Center for clarification.
- ▶ If used in an approval-related area, observe the information on the nameplate.

2.5 Product safety

This measuring device is designed in accordance with good engineering practice to meet state-of-the-art safety requirements, has been tested, and left the factory in a condition in which it is safe to operate.

It meets general safety standards and legal requirements. It also complies with the EU directives listed in the device-specific EU Declaration of Conformity. Endress+Hauser confirms this by affixing the CE mark to the device.

2.6 IT security

We only provide a warranty if the device is installed and used as described in the Operating Instructions. The device is equipped with security mechanisms to protect it against any inadvertent changes to the device settings.

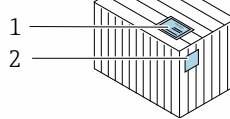
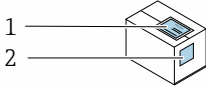
IT security measures in line with operators' security standards and designed to provide additional protection for the device and device data transfer must be implemented by the operators themselves.

3 Incoming acceptance and product identification

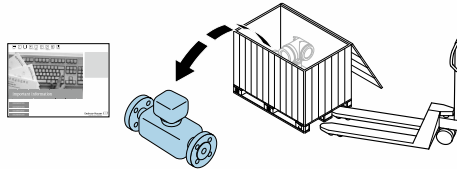
3.1 Incoming acceptance



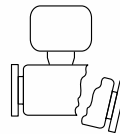
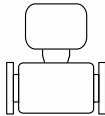
A0028673



Are the order codes on the delivery note (1) and the product sticker (2) identical?



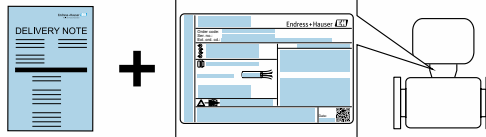
A0028673



Are the goods undamaged?



A0028673



Do the nameplate data match the ordering information on the delivery note?



A0028673



Is the CD-ROM with the Technical Documentation (depends on device version) and documents present?

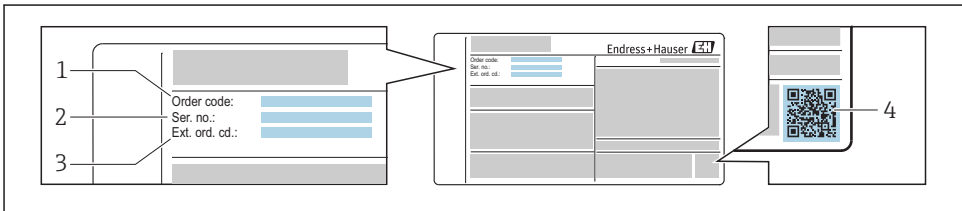


- If one of the conditions is not satisfied, contact your Endress+Hauser Sales Center.
- Depending on the device version, the CD-ROM might not be part of the delivery! The Technical Documentation is available via the Internet or via the *Endress+Hauser Operations App*.

3.2 Product identification

The following options are available for identification of the measuring device:

- Nameplate specifications
- Order code with breakdown of the device features on the delivery note
- Enter serial numbers from nameplates in *W@M Device Viewer* (www.endress.com/deviceviewer): All information about the measuring device is displayed.
- Enter the serial number from the nameplates into the *Endress+Hauser Operations App* or scan the 2-D matrix code (QR code) on the nameplate with the *Endress+Hauser Operations App*: all the information for the measuring device is displayed.



A0030196

1 Example of a nameplate

- 1 Order code
- 2 Serial number (Ser. no.)
- 3 Extended order code (Ext. ord. cd.)
- 4 2-D matrix code (QR code)



For detailed information on the breakdown of the specifications on the nameplate, see the Operating Instructions for the device .

4 Storage and transport

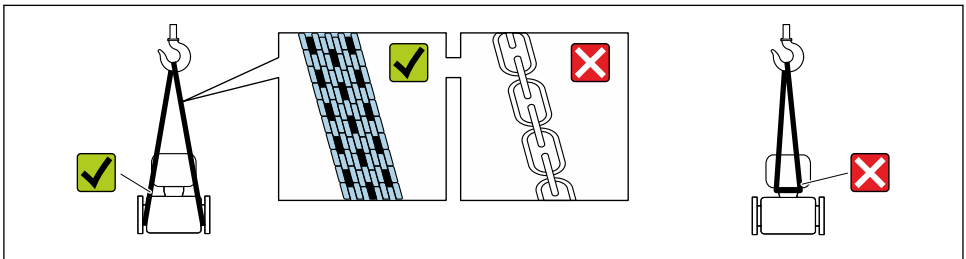
4.1 Storage conditions

Observe the following notes for storage:

- ▶ Store in the original packaging to ensure protection from shock.
- ▶ Do not remove protective covers or protective caps installed on process connections. They prevent mechanical damage to the sealing surfaces and contamination in the measuring tube.
- ▶ Protect from direct sunlight to avoid unacceptably high surface temperatures.
- ▶ Select a storage location where moisture cannot collect in the measuring device as fungus and bacteria infestation can damage the lining.
- ▶ Store in a dry and dust-free place.
- ▶ Store in a dry place.
- ▶ Do not store outdoors.

4.2 Transporting the product

Transport the measuring device to the measuring point in the original packaging.



A0029252

i Do not remove protective covers or caps installed on process connections. They prevent mechanical damage to the sealing surfaces and contamination in the measuring tube.

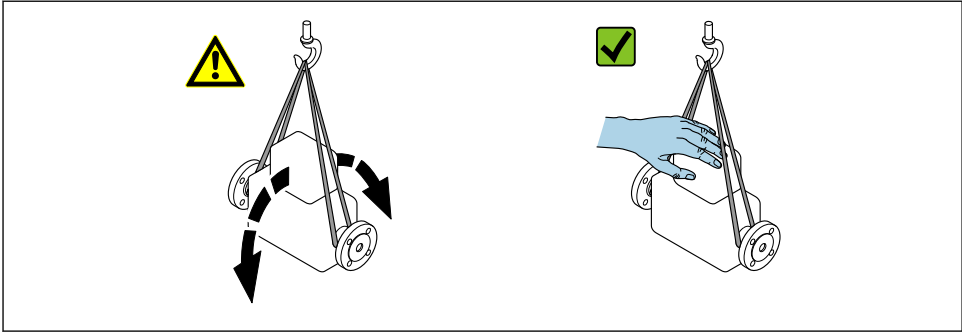
4.2.1 Measuring devices without lifting lugs

⚠ WARNING

Center of gravity of the measuring device is higher than the suspension points of the webbing slings.

Risk of injury if the measuring device slips.

- ▶ Secure the measuring device against slipping or turning.
- ▶ Observe the weight specified on the packaging (stick-on label).



A0029214

4.2.2 Measuring devices with lifting lugs

⚠ CAUTION

Special transportation instructions for devices with lifting lugs

- ▶ Only use the lifting lugs fitted on the device or flanges to transport the device.
- ▶ The device must always be secured at two lifting lugs at least.

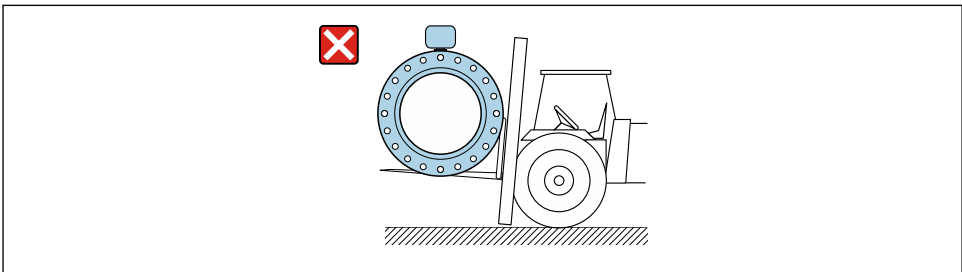
4.2.3 Transporting with a fork lift

If transporting in wood crates, the floor structure enables the crates to be lifted lengthwise or at both sides using a forklift.

⚠ CAUTION

Risk of damaging the magnetic coil

- ▶ If transporting by forklift, do not lift the sensor by the metal casing.
- ▶ This would buckle the casing and damage the internal magnetic coils.



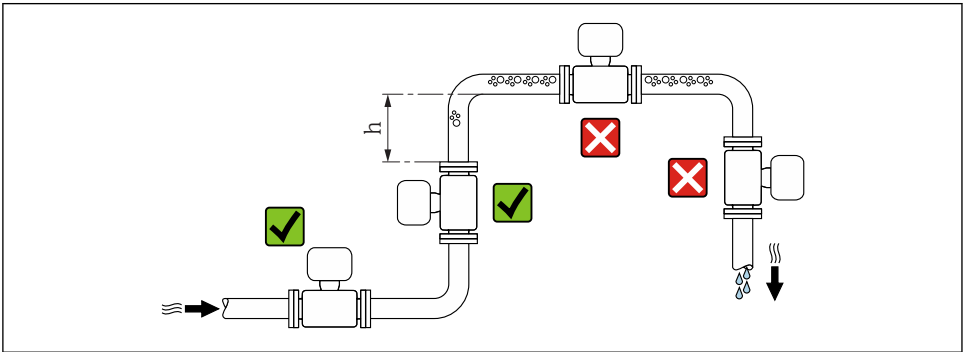
A0029219

5 Installation

5.1 Installation conditions

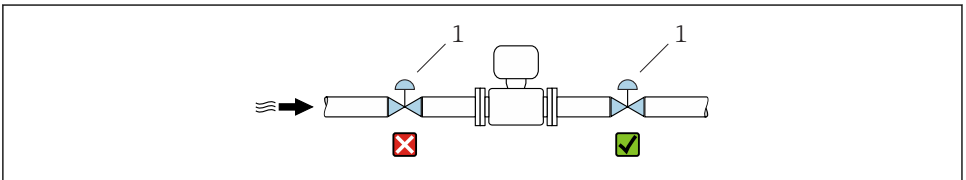
5.1.1 Mounting position

Mounting location



A0029343

$$h \geq 2 \times DN$$



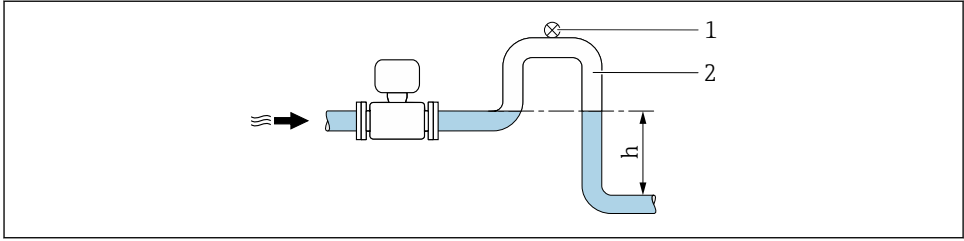
A0033017

❏ 2 Installation of the sensor after a control valve is not recommended

1 Control valve

Installation in down pipes

Install a siphon with a vent valve downstream of the sensor in down pipes whose length $h \geq 5 \text{ m}$ (16.4 ft). This precaution is to avoid low pressure and the consequent risk of damage to the measuring tube. This measure also prevents the system losing prime.



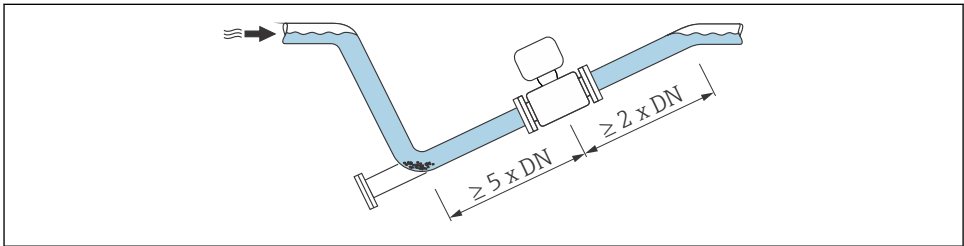
A0028981

3 Installation in a down pipe

- 1 Vent valve
- 2 Pipe siphon
- h Length of down pipe

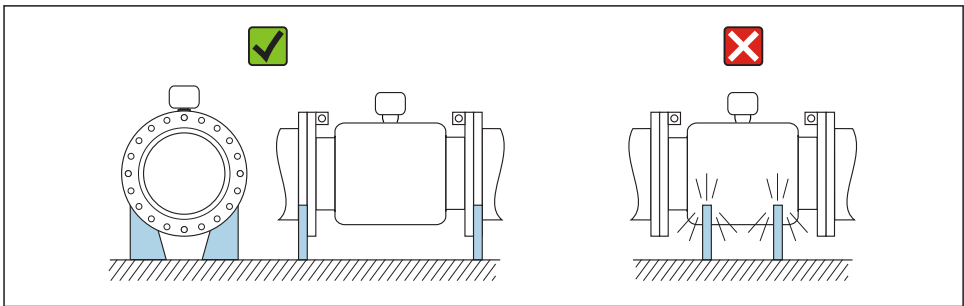
Installation in partially filled pipes

A partially filled pipe with a gradient necessitates a drain-type configuration.



A0029257

For heavy sensors $DN \geq 350$ (14")



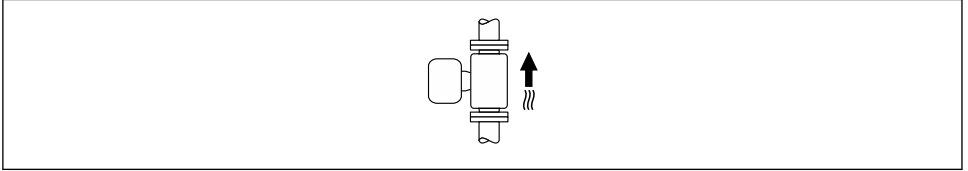
A0016276

Orientation

The direction of the arrow on the sensor nameplate helps you to install the sensor according to the flow direction.

An optimum orientation position helps avoid gas and air accumulations and deposits in the measuring tube.

Vertical

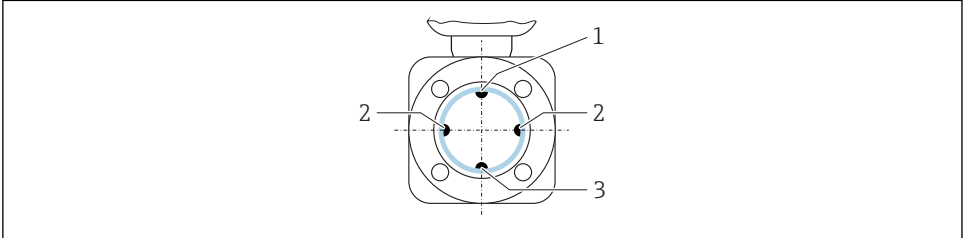


A0015991

Optimum for self-emptying pipe systems and for use in conjunction with empty pipe detection.

Horizontal

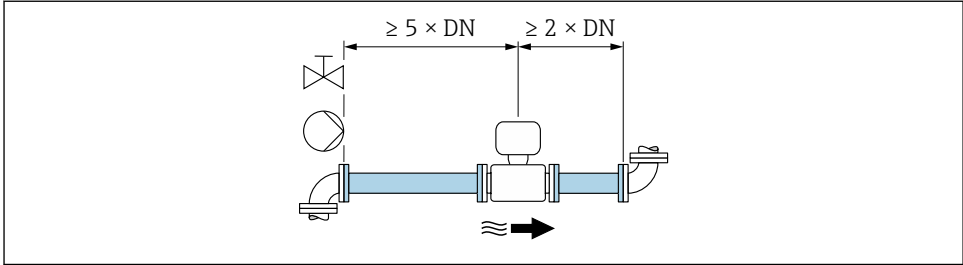
- Ideally, the measuring electrode plane should be horizontal. This prevents brief insulation of the two measuring electrodes by entrained air bubbles.
- Empty pipe detection only works if the transmitter housing is pointing upwards as otherwise there is no guarantee that the empty pipe detection function will actually respond to a partially filled or empty measuring tube.



A0029344

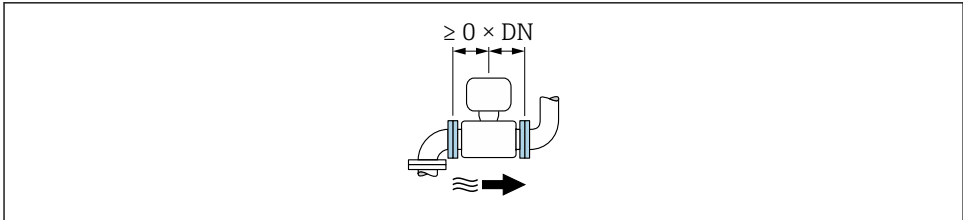
- 1 EPD electrode for empty pipe detection
- 2 Measuring electrodes for signal detection
- 3 Reference electrode for potential equalization

Inlet and outlet runs



A0028997

- 4 Order code for "Design", option A "Insertion length short, ISO/DVGW until DN400, DN450-2000 1:1" and order code for "Design", option B "Insertion length long, ISO/DVGW until DN400, DN450-2000 1:1.3"



A0032859

- 5 Order code for "Design", option C "Insertion length short ISO/DVGW until DN300, w/o inlet and outlet runs, constricted meas.tube"

i To keep within the in-service maximum permissible errors for custody transfer no additional requirements apply with regard to the graphic illustrated above.

b For the dimensions and installation lengths of the device, see the "Technical Information" document, "Mechanical construction" section.

5.1.2 Requirements from environment and process

Ambient temperature range

b For detailed information on the ambient temperature range, see the Operating Instructions for the device.

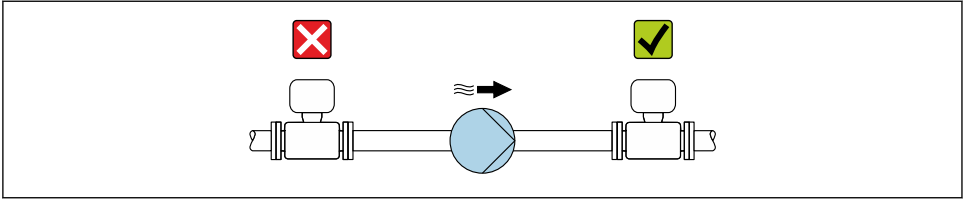
If operating outdoors:

- Install the measuring device in a shady location.
- Avoid direct sunlight, particularly in warm climatic regions.
- Avoid direct exposure to weather conditions.

Temperature tables

b For detailed information on the temperature tables, see the separate document entitled "Safety Instructions" (XA) for the device.

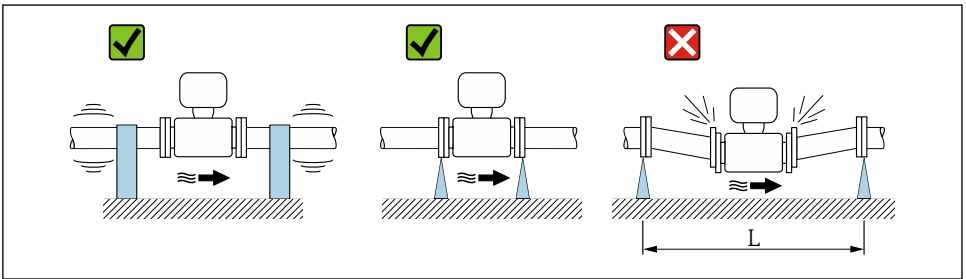
System pressure



A0028777

i Furthermore, install pulse dampers if reciprocating, diaphragm or peristaltic pumps are used.

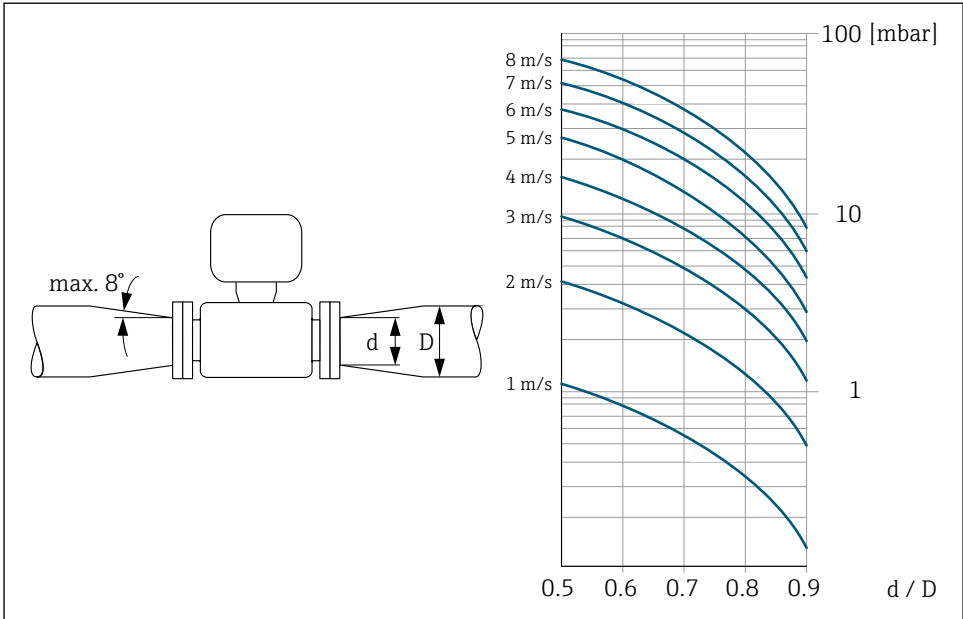
Vibrations



A0029004

6 Measures to avoid device vibrations ($L > 10\text{ m (33 ft)}$)

Adapters

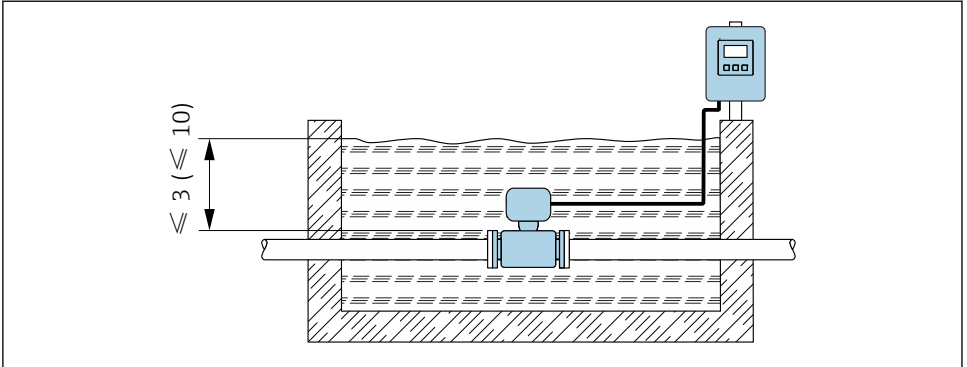


A0029002

5.1.3 Special mounting instructions

Permanent immersion in water

A fully welded remote version with IP68 protection is optionally available for permanent immersion in water ≤ 3 m (10 ft) or in exceptional cases for use for up to 48 hours at ≤ 10 m (30 ft). The measuring device meets the requirements of corrosion categories C5-M and Im1/Im2/Im3. The fully welded design along with the connection compartment sealing system ensure that moisture cannot enter the measuring device.



A0029320

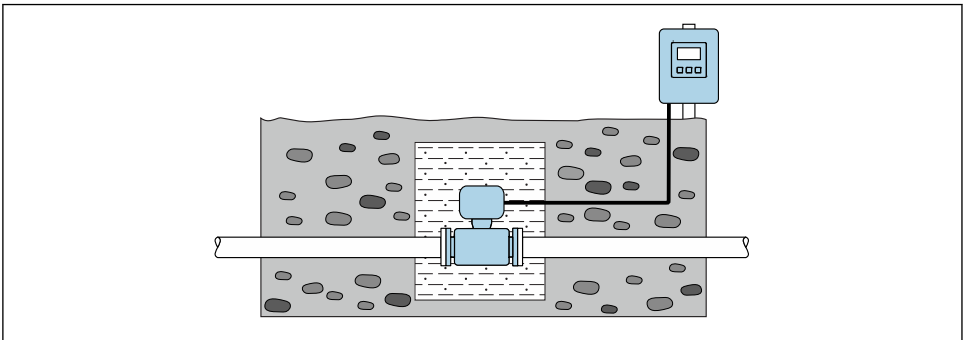
7 Engineering unit in m(ft)



For detailed information on replacing the cable gland on the connection housing, see the Transmitter Brief Operating Instructions.

Buried applications

A remote version with IP68 protection is optionally available for buried applications. The measuring device satisfies the certified corrosion protection Im1/Im2/Im3 in accordance with EN ISO 12944. It can be used directly underground without the need for additional protective measures. The device is mounted in accordance with the usual regional installation regulations (e.g. EN DIN 1610).



A0029321

Degree of protection IP68, Type 6P enclosure, with "Cust-potted" option

Depending on the version, the sensor fulfills all the requirements for the IP68 degree of protection, Type 6P enclosure and can be used as a remote version.

The degree of protection of the transmitter is always only IP66/67, Type 4X enclosure and the transmitter must therefore be treated accordingly.

To guarantee IP68 degree of protection, Type 6P enclosure for the "Cust-potted" options, carry out the following steps after the electrical connection:

1. Firmly tighten the cable glands (torque: 2 to 3.5 Nm) until there is no gap between the bottom of the cover and the housing support surface.
2. Firmly tighten the union nut of the cable glands.
3. Pot the field housing with a potting compound.
4. Check that the housing seals are clean and fitted correctly. Dry, clean or replace the seals if necessary.
5. Tighten all housing screws and screw covers (torque: 20 to 30 Nm).

5.2 Mounting the measuring device

5.2.1 Required tools

For flanges and other process connections, use an appropriate mounting tool

5.2.2 Preparing the measuring device

1. Remove all remaining transport packaging.
2. Remove any protective covers or protective caps present from the sensor.
3. Remove stick-on label on the electronics compartment cover.

5.2.3 Mounting the sensor

WARNING

An electrically conductive layer could form on the inside of the measuring tube!

Risk of measuring signal short circuit.

- ▶ Ensure that the inside diameters of the gaskets are greater than or equal to that of the process connections and piping.
- ▶ Ensure that the gaskets are clean and undamaged.
- ▶ Install the gaskets correctly.
- ▶ Do not use electrically conductive sealing compounds such as graphite.

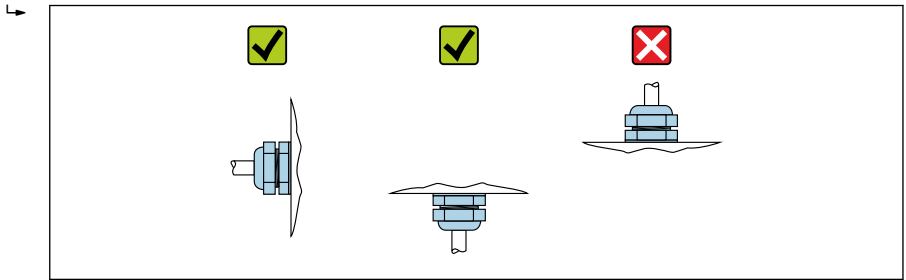
WARNING

Danger due to improper process sealing!

- ▶ Ensure that the inside diameters of the gaskets are greater than or equal to that of the process connections and piping.
- ▶ Ensure that the gaskets are clean and undamaged.
- ▶ Install the gaskets correctly.

1. Ensure that the direction of the arrow on the sensor matches the flow direction of the medium.
2. To ensure compliance with device specifications, install the measuring device between the pipe flanges in a way that it is centered in the measurement section.
3. If using ground disks, comply with the Installation Instructions provided.
4. Observe required screw tightening torques .

5. Install the measuring device or turn the transmitter housing so that the cable entries do not point upwards.



A0029263

Mounting the seals

⚠ CAUTION

An electrically conductive layer could form on the inside of the measuring tube!

Risk of measuring signal short circuit.

- ▶ Do not use electrically conductive sealing compounds such as graphite.

Comply with the following instructions when installing seals:

- Make sure that the seals do not protrude into the piping cross-section.
- For DIN flanges: only use seals according to DIN EN 1514-1.
- For "hard rubber" lining: additional seals are **always** required.
- For "polyurethane" lining: generally additional seals are **not** required.

Mounting the ground cable/ground disks

For information on potential equalization and detailed mounting instructions for the use of ground cables/ground disks, see the Transmitter Brief Operating Instructions.

Screw tightening torques

→ 📄 26

5.3 Post-installation check

Is the device undamaged (visual inspection)?	<input type="checkbox"/>
Does the measuring device conform to the measuring point specifications? For example: <ul style="list-style-type: none"> ▪ Process temperature ▪ Process pressure (refer to the section on "Pressure-temperature ratings" in the "Technical Information" document) ▪ Ambient temperature ▪ Measuring range 	<input type="checkbox"/>
Has the correct orientation for the sensor been selected ? <ul style="list-style-type: none"> ▪ According to sensor type ▪ According to medium temperature ▪ According to medium properties (outgassing, with entrained solids) 	<input type="checkbox"/>
Does the arrow on the sensor nameplate match the direction of flow of the fluid through the piping ?	<input type="checkbox"/>
Are the measuring point identification and labeling correct (visual inspection)?	<input type="checkbox"/>
Is the device adequately protected from precipitation and direct sunlight?	<input type="checkbox"/>
Have the fixing screws been tightened with the correct tightening torque?	<input type="checkbox"/>

6 Disposal

6.1 Removing the measuring device

1. Switch off the device.

WARNING

Danger to persons from process conditions.

- ▶ Beware of hazardous process conditions such as pressure in the measuring device, high temperatures or aggressive fluids.
2. Carry out the mounting and connection steps from the "Mounting the measuring device" and "Connecting the measuring device" sections in reverse order. Observe the safety instructions.

6.2 Disposing of the measuring device

WARNING

Danger to personnel and environment from fluids that are hazardous to health.

- ▶ Ensure that the measuring device and all cavities are free of fluid residues that are hazardous to health or the environment, e.g. substances that have permeated into crevices or diffused through plastic.

Observe the following notes during disposal:

- ▶ Observe valid federal/national regulations.
- ▶ Ensure proper separation and reuse of the device components.

7 Appendix

7.1 Screw tightening torques



For detailed information on the screw tightening torques, see the "Mounting the sensor" section of the Operating Instructions for the device

Please note the following:

- The torques listed only apply:
 - For lubricated threads.
 - For pipes that are free from tensile stress.
- Tighten the screws uniformly and in diagonally opposite sequence.
- Overtightening the screws will deform the sealing faces or damage the seals.

EN 1092-1 (DIN 2501), PN 6/10/16/25/40

Nominal diameter [mm]	Pressure rating [bar]	Screws [mm]	Flange thickness [mm]	Max. screw tightening torque [Nm]	
				Hard rubber	Polyurethane
25	PN 40	4 × M12	18	–	15
32	PN 40	4 × M16	18	–	24
40	PN 40	4 × M16	18	–	31
50	PN 40	4 × M16	20	48	40
65 ¹⁾	PN 16	8 × M16	18	32	27
65	PN 40	8 × M16	22	32	27
80	PN 16	8 × M16	20	40	34
80	PN 40	8 × M16	24	40	34
100	PN 16	8 × M16	20	43	36
100	PN 40	8 × M20	24	59	50
125	PN 16	8 × M16	22	56	48
125	PN 40	8 × M24	26	83	71
150	PN 16	8 × M20	22	74	63
150	PN 40	8 × M24	28	104	88
200	PN 10	8 × M20	24	106	91
200	PN 16	12 × M20	24	70	61
200	PN 25	12 × M24	30	104	92
250	PN 10	12 × M20	26	82	71
250	PN 16	12 × M24	26	98	85
250	PN 25	12 × M27	32	150	134
300	PN 10	12 × M20	26	94	81

Nominal diameter [mm]	Pressure rating [bar]	Screws [mm]	Flange thickness [mm]	Max. screw tightening torque [Nm]	
				Hard rubber	Polyurethane
300	PN 16	12 × M24	28	134	118
300	PN 25	16 × M27	34	153	138
350	PN 6	12 × M20	22	111	120
350	PN 10	16 × M20	26	112	118
350	PN 16	16 × M24	30	152	165
350	PN 25	16 × M30	38	227	252
400	PN 6	16 × M20	22	90	98
400	PN 10	16 × M24	26	151	167
400	PN 16	16 × M27	32	193	215
400	PN 25	16 × M33	40	289	326
450	PN 6	16 × M20	22	112	126
450	PN 10	20 × M24	28	153	133
450	PN 16	20 × M27	40	198	196
450	PN 25	20 × M33	46	256	253
500	PN 6	20 × M20	24	119	123
500	PN 10	20 × M24	28	155	171
500	PN 16	20 × M30	34	275	300
500	PN 25	20 × M33	48	317	360
600	PN 6	20 × M24	30	139	147
600	PN 10	20 × M27	28	206	219
600 ¹⁾	PN 16	20 × M33	36	415	443
600	PN 25	20 × M36	58	431	516
700	PN 6	24 × M24	24	148	139
700	PN 10	24 × M27	30	246	246
700	PN 16	24 × M33	36	278	318
700	PN 25	24 × M39	46	449	507
800	PN 6	24 × M27	24	206	182
800	PN 10	24 × M30	32	331	316
800	PN 16	24 × M36	38	369	385
800	PN 25	24 × M45	50	664	721
900	PN 6	24 × M27	26	230	637

Nominal diameter [mm]	Pressure rating [bar]	Screws [mm]	Flange thickness [mm]	Max. screw tightening torque [Nm]	
				Hard rubber	Polyurethane
900	PN 10	28 × M30	34	316	307
900	PN 16	28 × M36	40	353	398
900	PN 25	28 × M45	54	690	716
1000	PN 6	28 × M27	26	218	208
1000	PN 10	28 × M33	34	402	405
1000	PN 16	28 × M39	42	502	518
1000	PN 25	28 × M52	58	970	971
1200	PN 6	32 × M30	28	319	299
1200	PN 10	32 × M36	38	564	568
1200	PN 16	32 × M45	48	701	753
1400	PN 6	36 × M33	32	430	398
1400	PN 10	36 × M39	42	654	618
1400	PN 16	36 × M45	52	729	762
1600	PN 6	40 × M33	34	440	417
1600	PN 10	40 × M45	46	946	893
1600	PN 16	40 × M52	58	1007	1100
1800	PN 6	44 × M36	36	547	521
1800	PN 10	44 × M45	50	961	895
1800	PN 16	44 × M52	62	1108	1003
2000	PN 6	48 × M39	38	629	605
2000	PN 10	48 × M45	54	1047	1092
2000	PN 16	48 × M56	66	1324	1261

1) Designed acc. to EN 1092-1 (not to DIN 2501)

EN 1092-1 (DIN 2501), PN 10/16/25, P245GH/stainless; calculated according to EN 1591-1:2014 for flanges as per EN 1092-1:2013

Nominal diameter [mm]	Pressure rating [bar]	Screws [mm]	Flange thickness [mm]	Nom. screw tightening torque [Nm]	
				PUR	HG
350	PN 6	12 × M20	22	75	60
350	PN 10	16 × M20	26	80	70
350	PN 16	16 × M24	30	135	125

Nominal diameter [mm]	Pressure rating [bar]	Screws [mm]	Flange thickness [mm]	Nom. screw tightening torque [Nm]	
				PUR	HG
350	PN 25	16 × M30	38	235	230
400	PN 6	16 × M20	22	70	65
400	PN 10	16 × M24	26	120	100
400	PN 16	16 × M27	32	190	175
400	PN 25	16 × M33	40	325	315
450	PN 6	16 × M20	22	90	70
450	PN 10	20 × M24	28	110	100
450	PN 16	20 × M27	34	190	175
450	PN 25	20 × M33	46	310	300
500	PN 6	20 × M20	24	70	65
500	PN 10	20 × M24	28	120	110
500	PN 16	20 × M30	36	235	225
500	PN 25	20 × M33	48	370	370
600	PN 6	20 × M24	30	105	105
600	PN 10	20 × M27	30	160	165
600	PN 16	20 × M33	40	340	340
600	PN 25	20 × M36	48	540	540
700	PN 6	24 × M24	30	110	110
700	PN 10	24 × M27	35	190	190
700	PN 16	24 × M33	40	340	340
700	PN 25	24 × M39	50	595	615
800	PN 6	24 × M27	30	145	145
800	PN 10	24 × M30	38	260	260
800	PN 16	24 × M36	41	455	465
800	PN 25	24 × M45	53	880	885
900	PN 6	24 × M27	34	180	170
900	PN 10	28 × M30	38	275	265
900	PN 16	28 × M36	48	475	475
900	PN 25	28 × M45	57	915	930
1000	PN 6	28 × M27	38	185	175
1000	PN 10	28 × M33	44	360	350

Nominal diameter [mm]	Pressure rating [bar]	Screws [mm]	Flange thickness [mm]	Nom. screw tightening torque [Nm]	
				PUR	HG
1000	PN 16	28 × M39	59	620	630
1000	PN 25	28 × M52	63	1290	1300
1200	PN 6	32 × M30	42	250	235
1200	PN 10	32 × M36	55	480	470
1200	PN 16	32 × M45	78	900	890
1400	PN 6	36 × M33	56	-	300
1400	PN 10	36 × M39	65	-	600
1400	PN 16	36 × M45	84	-	1050
1600	PN 6	40 × M33	63	-	340
1600	PN 10	40 × M45	75	-	810
1600	PN 16	40 × M52	102	-	1420
1800	PN 6	44 × M36	69	-	430
1800	PN 10	44 × M45	85	-	920
1800	PN 16	44 × M52	110	-	1600
2000	PN 6	48 × M39	74	-	530
2000	PN 10	48 × M45	90	-	1040
2000	PN 16	48 × M56	124	-	1900

ASME B16.5, Class 150/300

Nominal diameter		Pressure rating [psi]	Screws [in]	Max. screw tightening torque [Nm] ([lbf · ft])	
[mm]	[in]			Hard rubber	Polyurethane
25	1	Class 150	4 × ½	-	7 (5)
25	1	Class 300	4 × 5/8	-	8 (6)
40	1 ½	Class 150	4 × ½	-	10 (7)
40	1 ½	Class 300	4 × ¾	-	15 (11)
50	2	Class 150	4 × 5/8	35 (26)	22 (16)
50	2	Class 300	8 × 5/8	18 (13)	11 (8)
80	3	Class 150	4 × 5/8	60 (44)	43 (32)
80	3	Class 300	8 × ¾	38 (28)	26 (19)
100	4	Class 150	8 × 5/8	42 (31)	31 (23)
100	4	Class 300	8 × ¾	58 (43)	40 (30)

Nominal diameter		Pressure rating [psi]	Screws [in]	Max. screw tightening torque [Nm] ([lbf · ft])	
[mm]	[in]			Hard rubber	Polyurethane
150	6	Class 150	8 × ¾	79 (58)	59 (44)
150	6	Class 300	12 × ¾	70 (52)	51 (38)
200	8	Class 150	8 × ¾	107 (79)	80 (59)
250	10	Class 150	12 × 7/8	101 (74)	75 (55)
300	12	Class 150	12 × 7/8	133 (98)	103 (76)
350	14	Class 150	12 × 1	135 (100)	158 (117)
400	16	Class 150	16 × 1	128 (94)	150 (111)
450	18	Class 150	16 × 1 1/8	204 (150)	234 (173)
500	20	Class 150	20 × 1 1/8	183 (135)	217 (160)
600	24	Class 150	20 × 1 ¼	268 (198)	307 (226)

AWWA C207, Class D

Nominal diameter		Screws [in]	Max. screw tightening torque [Nm] ([lbf · ft])	
[mm]	[in]		Hard rubber	Polyurethane
700	28	28 × 1 ¼	247 (182)	292 (215)
750	30	28 × 1 ¼	287 (212)	302 (223)
800	32	28 × 1 ½	394 (291)	422 (311)
900	36	32 × 1 ½	419 (309)	430 (317)
1000	40	36 × 1 ½	420 (310)	477 (352)
1050	42	36 × 1 ½	528 (389)	518 (382)
1200	48	44 × 1 ½	552 (407)	531 (392)
1350	54	44 × 1 ¾	730 (538)	-
1500	60	52 × 1 ¾	758 (559)	-
1650	66	52 × 1 ¾	946 (698)	-
1800	72	60 × 1 ¾	975 (719)	-
2000	78	64 × 2	853 (629)	-

AS 2129, Table E

Nominal diameter [mm]	Screws [mm]	Max. screw tightening torque [Nm]	
		Hard rubber	Polyurethane
50	4 × M16	32	–
80	4 × M16	49	–
100	8 × M16	38	–
150	8 × M20	64	–
200	8 × M20	96	–
250	12 × M20	98	–
300	12 × M24	123	–
350	12 × M24	203	–
400	12 × M24	226	–
450	16 × M24	226	–
500	16 × M24	271	–
600	16 × M30	439	–
700	20 × M30	355	–
750	20 × M30	559	–
800	20 × M30	631	–
900	24 × M30	627	–
1000	24 × M30	634	–
1200	32 × M30	727	–

AS 4087, PN 16

Nominal diameter [mm]	Screws [mm]	Max. screw tightening torque [Nm]	
		Hard rubber	Polyurethane
50	4 × M16	32	–
80	4 × M16	49	–
100	4 × M16	76	–
150	8 × M20	52	–
200	8 × M20	77	–
250	8 × M20	147	–
300	12 × M24	103	–
350	12 × M24	203	–
375	12 × M24	137	–

Nominal diameter [mm]	Screws [mm]	Max. screw tightening torque [Nm]	
		Hard rubber	Polyurethane
400	12 × M24	226	-
450	12 × M24	301	-
500	16 × M24	271	-
600	16 × M27	393	-
700	20 × M27	330	-
750	20 × M30	529	-
800	20 × M33	631	-
900	24 × M33	627	-
1000	24 × M33	595	-
1200	32 × M33	703	-

JIS B2220, 10/20K

Nominal diameter [mm]	Pressure rating [bar]	Screws [mm]	Max. screw tightening torque [Nm]	
			Hard rubber	Polyurethane
25	10K	4 × M16	-	19
25	20K	4 × M16	-	19
32	10K	4 × M16	-	22
32	20K	4 × M16	-	22
40	10K	4 × M16	-	24
40	20K	4 × M16	-	24
50	10K	4 × M16	40	33
50	20K	8 × M16	20	17
65	10K	4 × M16	55	45
65	20K	8 × M16	28	23
80	10K	8 × M16	29	23
80	20K	8 × M20	42	35
100	10K	8 × M16	35	29
100	20K	8 × M20	56	48
125	10K	8 × M20	60	51
125	20K	8 × M22	91	79
150	10K	8 × M20	75	63
150	20K	12 × M22	81	72

Nominal diameter [mm]	Pressure rating [bar]	Screws [mm]	Max. screw tightening torque [Nm]	
			Hard rubber	Polyurethane
200	10K	12 × M20	61	52
200	20K	12 × M22	91	80
250	10K	12 × M22	100	87
250	20K	12 × M24	159	144
300	10K	16 × M22	74	63
300	20K	16 × M24	138	124

JIS B2220, 10/20K

Nominal diameter [mm]	Pressure rating [bar]	Screws [mm]	Nom. screw tightening torque [Nm]	
			PUR	HG
350	10K	16 × M22	109	109
350	20K	16 × M30×3	217	217
400	10K	16 × M24	163	163
400	20K	16 × M30×3	258	258
450	10K	16 × M24	155	155
450	20K	16 × M30×3	272	272
500	10K	16 × M24	183	183
500	20K	16 × M30×3	315	315
600	10K	16 × M30	235	235
600	20K	16 × M36×3	381	381
700	10K	16 × M30	300	300
750	10K	16 × M30	339	339

www.addresses.endress.com
