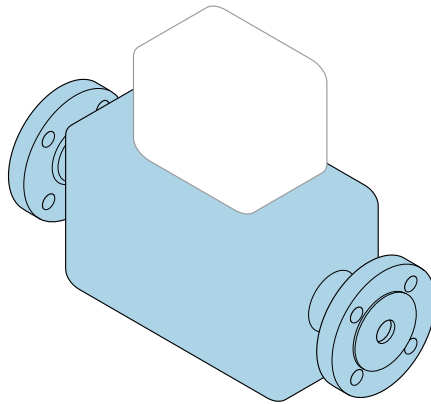


# Brief Operating Instructions Flowmeter Proline Promag W

Electromagnetic sensor



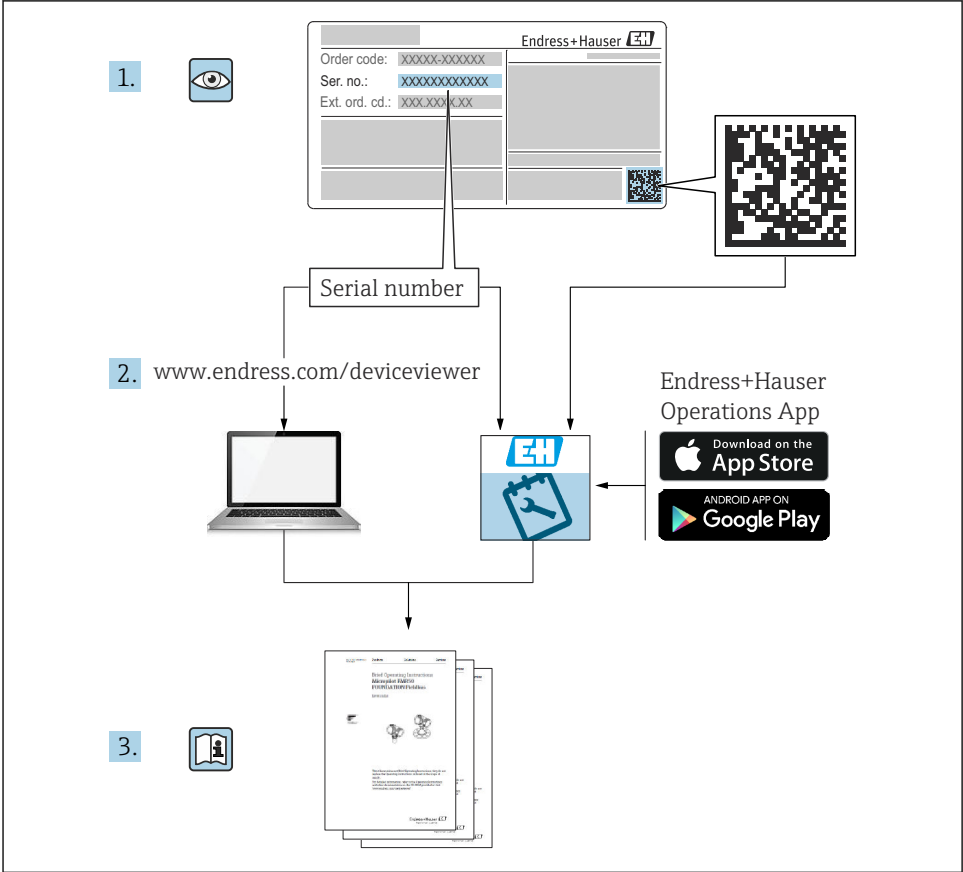
These Brief Operating Instructions are **not** a substitute for the Operating Instructions pertaining to the device.

## **Brief Operating Instructions Part 1 of 2: Sensor**

Contain information about the sensor.

Brief Operating Instructions Part 2 of 2: Transmitter

→  3.



A0023555

## Brief Operating Instructions for flowmeter

The device consists of a transmitter and a sensor.

The process of commissioning these two components is described in two separate manuals that together form the Brief Operating Instructions for the flowmeter:

- Brief Operating Instructions Part 1: Sensor
- Brief Operating Instructions Part 2: Transmitter

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

### Brief Operating Instructions Part 1: Sensor

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

### Brief Operating Instructions Part 2: Transmitter

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 **Brief Operating Instructions part 1: Sensor**.

The "Brief Operating Instructions part 2: Transmitter" are available via:

- Internet: [www.endress.com/deviceviewer](http://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](http://www.endress.com/deviceviewer)
- Smart phone/tablet: *Endress+Hauser Operations App*

# Table of contents

- 1 About this document ..... 5**
  - 1.1 Symbols ..... 5
- 2 Basic safety instructions ..... 7**
  - 2.1 Requirements for the personnel ..... 7
  - 2.2 Intended use ..... 7
  - 2.3 Workplace safety ..... 8
  - 2.4 Operational safety ..... 9
  - 2.5 Product safety ..... 9
  - 2.6 IT security ..... 9
- 3 Incoming acceptance and product identification ..... 10**
  - 3.1 Incoming acceptance ..... 10
  - 3.2 Product identification ..... 11
- 4 Storage and transport ..... 12**
  - 4.1 Storage conditions ..... 12
  - 4.2 Transporting the product ..... 12
- 5 Mounting ..... 14**
  - 5.1 Mounting requirements ..... 14
  - 5.2 Mounting the measuring device ..... 29
  - 5.3 Post-installation check ..... 31
- 6 Disposal ..... 32**
  - 6.1 Removing the measuring device ..... 32
  - 6.2 Disposing of the measuring device ..... 32
- 7 Appendix ..... 33**
  - 7.1 Screw tightening torques ..... 33

# 1 About this document

## 1.1 Symbols

### 1.1.1 Safety symbols

**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.





**NOTICE**


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
	<b>Permitted</b> Procedures, processes or actions that are permitted.		<b>Preferred</b> Procedures, processes or actions that are preferred.
	<b>Forbidden</b> Procedures, processes or actions that are forbidden.		<b>Tip</b> 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		<b>Ground connection</b> A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.

Symbol	Meaning
	<p><b>Potential equalization connection (PE: protective earth)</b></p> <p>Ground terminals that must be connected to ground prior to establishing any other connections.</p> <p>The ground terminals are located on the interior and exterior of the device:</p> <ul style="list-style-type: none"><li>■ Interior ground terminal: potential equalization is connected to the supply network.</li><li>■ Exterior ground terminal: device is connected to the plant grounding system.</li></ul>

1.1.4 Tool symbols

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

1.1.5 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
	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 Intended use

#### **Application and media**

The measuring device is intended only for the 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 in applications where there is an increased risk due to process pressure, are marked 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 ambient temperature of the measuring device is outside the atmospheric temperature, it is absolutely essential to comply with the relevant basic conditions as specified in the device documentation.

- 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 medium temperature in these applications is 0 to 50 °C (32 to 122 °F).



### Promag 800

The measuring device is optionally tested in accordance with OIML R49: 2013 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).

### 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 and ambient conditions!**

- 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

**If the temperature of the media or electronics unit is high or low, this may cause the surfaces of the device to become hot or cold. This poses a risk of burns or frostbite!**

- In the case of hot or cold medium temperatures, install appropriate protection against contact.

## 2.3 Workplace safety

When working on and with the device:

- Wear the required personal protective equipment as per national regulations.



## 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.

### **Ambient requirements for transmitter housing made of plastic**

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.

Furthermore, the device meets the legal requirements of the applicable UK regulations (Statutory Instruments). These are listed in the UKCA Declaration of Conformity along with the designated standards.

By selecting the order option for UKCA marking, Endress+Hauser confirms a successful evaluation and testing of the device by affixing the UKCA mark.

Contact address Endress+Hauser UK:

Endress+Hauser Ltd.

Floats Road

Manchester M23 9NF

United Kingdom

[www.uk.endress.com](http://www.uk.endress.com)

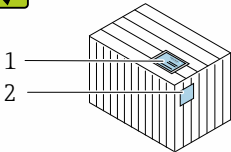
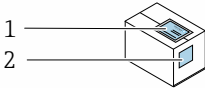
## 2.6 IT security

Our warranty is valid only if the product is installed and used as described in the Operating Instructions. The product is equipped with security mechanisms to protect it against any inadvertent changes to the settings.

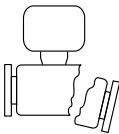
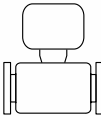
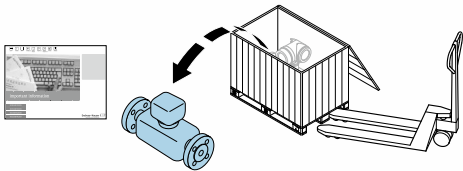
IT security measures, which provide additional protection for the product and associated data transfer, must be implemented by the operators themselves in line with their security standards.

### 3 Incoming acceptance and product identification

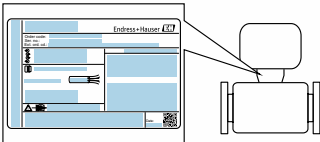
#### 3.1 Incoming acceptance



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



Are the goods undamaged?



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



Is the envelope present with accompanying documents?

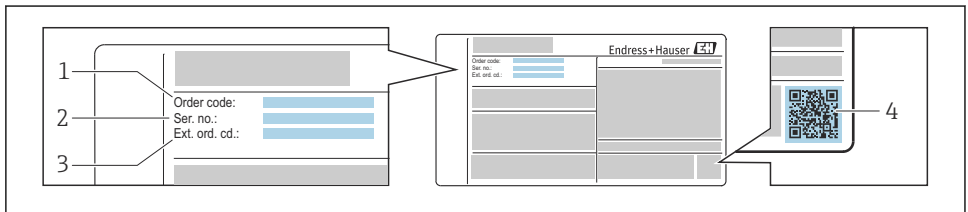


- If one of the conditions is not satisfied, contact your Endress+Hauser Sales Center.
- The Technical Documentation is available via the Internet or via the *Endress+Hauser Operations App*.

## 3.2 Product identification

The following options are available for identification of the device:

- Nameplate specifications
- Order code with breakdown of the device features on the delivery note
- Enter the serial numbers from the nameplates in the *Device Viewer* ([www.endress.com/deviceviewer](http://www.endress.com/deviceviewer)): all the information about the device is displayed.
- Enter the serial numbers from the nameplates into the *Endress+Hauser Operations App* or scan the DataMatrix code on the nameplate with the *Endress+Hauser Operations App*: all the information about the 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

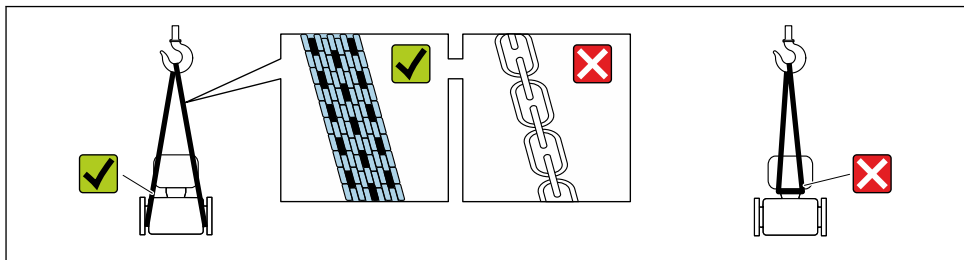
### 4.1 Storage conditions

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 pipe.
- ▶ 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 liner.
- ▶ Store in a dry and dust-free 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.

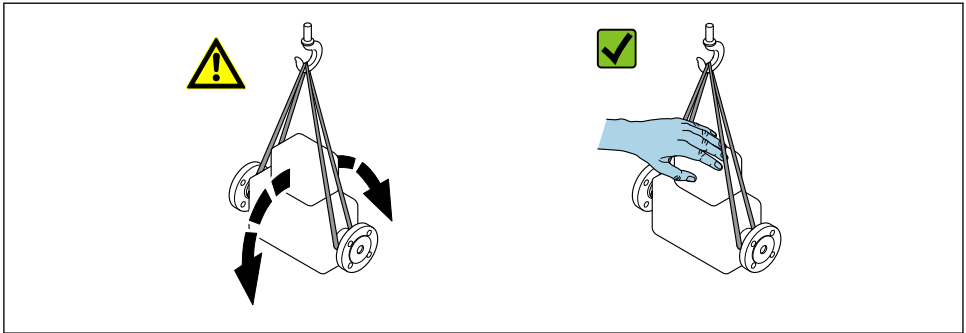
#### 4.2.1 Measuring devices without lifting lugs

##### **⚠ 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.

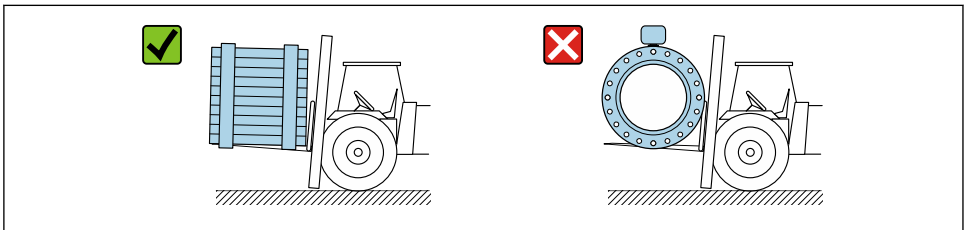
#### 4.2.3 Transporting with a fork lift

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.



A0029319

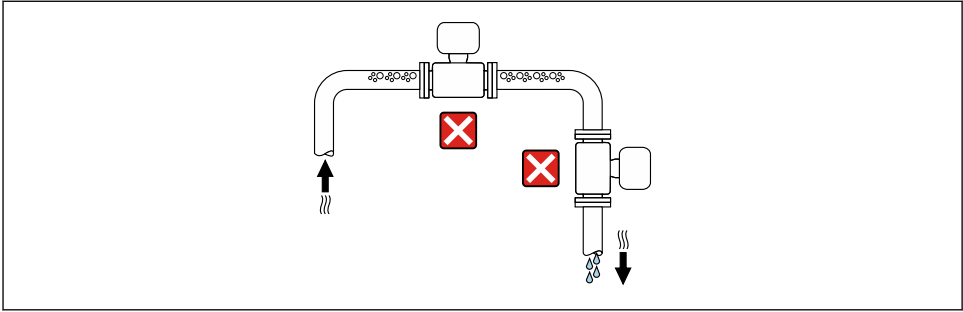
## 5 Mounting

### 5.1 Mounting requirements

#### 5.1.1 Mounting position

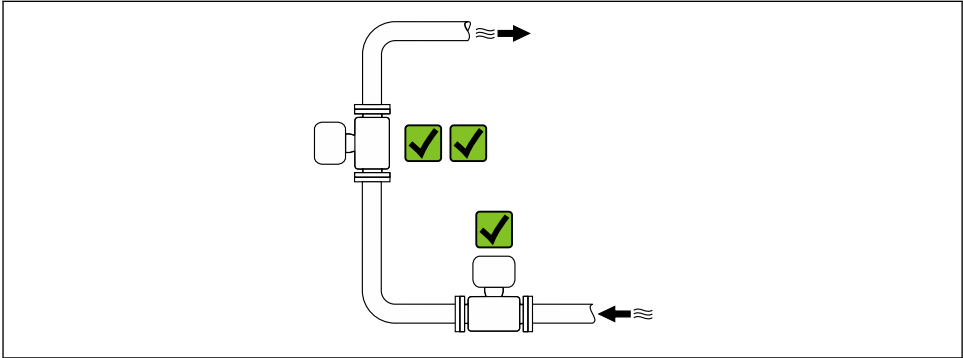
##### Mounting location

- Do not install the device at the highest point of the pipe.
- Do not install the device upstream from a free pipe outlet in a down pipe.



A0042131

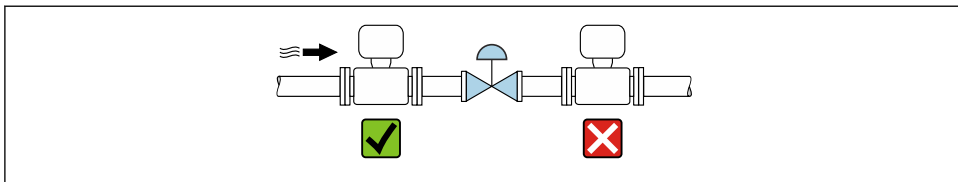
The device should ideally be installed in an ascending pipe.



A0042317

##### Installation near valves

Install the device in the direction of flow upstream from the valve.




A0041091

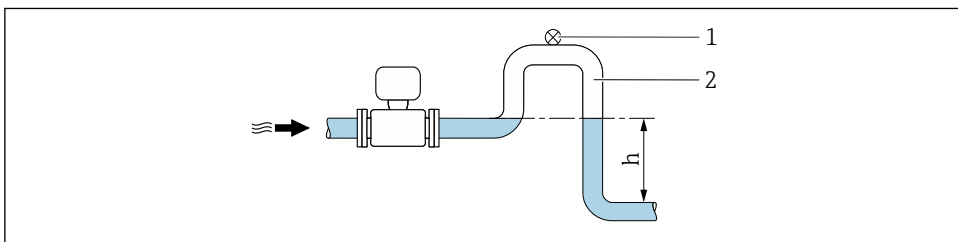
### Installation upstream from a down pipe

#### NOTICE

#### Negative pressure in the measuring pipe can damage the liner!

- If installing upstream of down pipes whose length  $h \geq 5 \text{ m}$  (16.4 ft): install a siphon with a vent valve downstream of the device.

 This arrangement prevents the flow of liquid stopping in the pipe and air entrainment.



A0028981

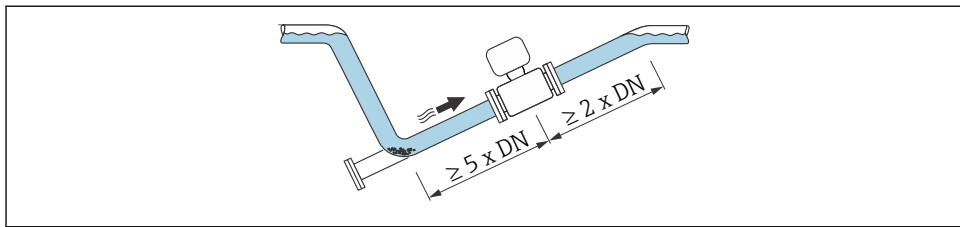
1 Vent valve

2 Pipe siphon




$h$  Length of down pipe

### Installation with partially filled pipes

- Partially filled pipes with a gradient require a drain-type configuration.
- The installation of a cleaning valve is recommended.



A0041083

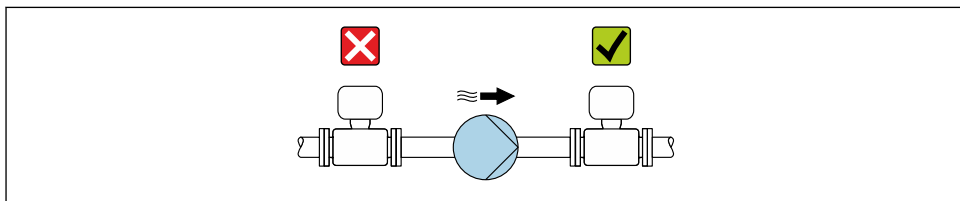
-  No inlet and outlet runs for devices with the order code for "Design": Option C, H, I, J or K.
-  No inlet and outlet runs for devices with the order code for "Design": Option C, H or I.
-  No inlet and outlet runs for devices with the order code for "Design": Option C.

### Installation near pumps

#### NOTICE

#### Negative pressure in the measuring pipe can damage the liner!

- In order to maintain the system pressure, install the device in the flow direction downstream from the pump.
- Install pulsation dampers if reciprocating, diaphragm or peristaltic pumps are used.



A0041083

### Installation of very heavy devices

Support required for nominal diameters of  $DN \geq 350$  mm (14 in).

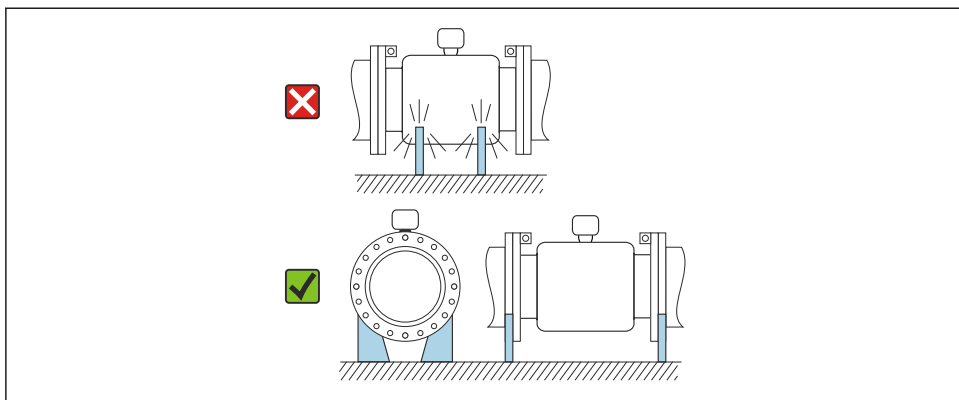
#### NOTICE

#### Damage to the device!

If incorrect support is provided, the sensor housing could buckle and the internal magnetic coils could be damaged.

- Only provide supports at the pipe flanges.





A0041087

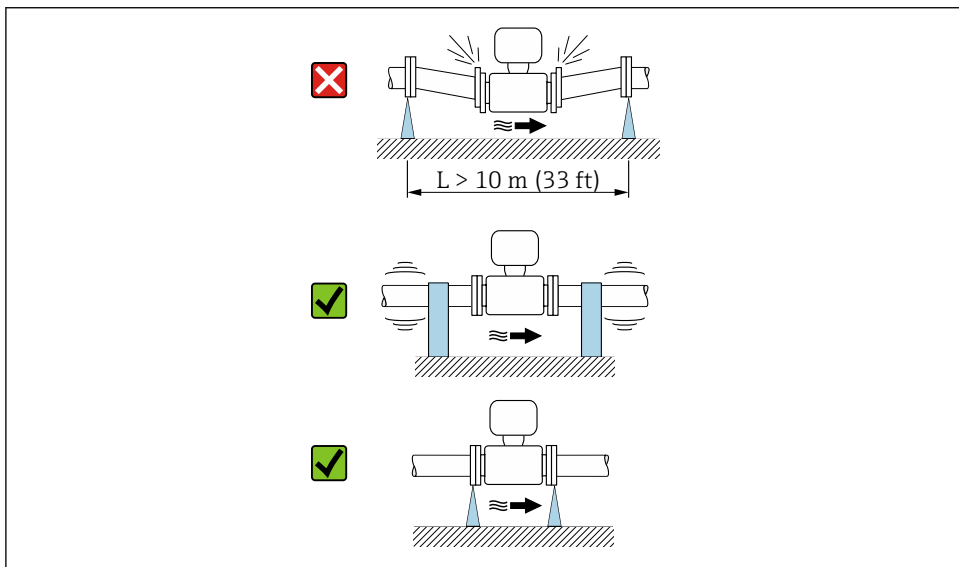
### Installation in event of pipe vibrations

A remote version is recommended in the event of strong pipe vibrations.

#### NOTICE

#### Pipe vibrations can damage the device!

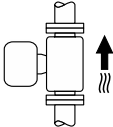
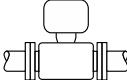
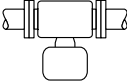

- ▶ Do not expose the device to strong vibrations.
- ▶ Support the pipe and fix it in place.
- ▶ Support the device and fix it in place.
- ▶ Mount the sensor and transmitter separately.



A0041092

Orientation

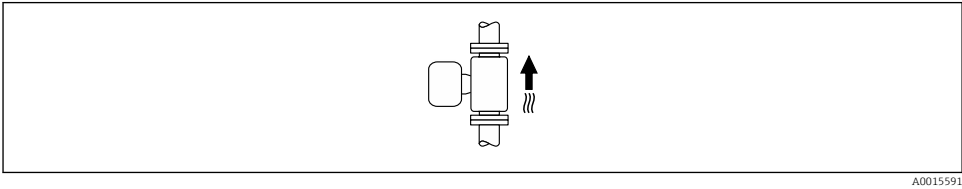
The direction of the arrow on the sensor nameplate helps you to install the sensor according to the flow direction.

Orientation		Recommendation
Vertical orientation	 A0015591	✓✓
Horizontal orientation, transmitter at top	 A0015589	✓✓ <sup>1)</sup>
Horizontal orientation, transmitter at bottom	 A0015590	✓✓ <sup>2) 3)</sup> ✗ <sup>4)</sup>
Horizontal orientation, transmitter at side	 A0015592	✗

- 1)
- Applications with low process temperatures may reduce the ambient temperature. To maintain the minimum ambient temperature for the transmitter, this orientation is recommended.
- 2)
- Applications with high process temperatures may increase the ambient temperature. To maintain the maximum ambient temperature for the transmitter, this orientation is recommended.
- 3)
- To prevent the electronics from overheating in the event of strong heat formation (e.g. CIP or SIP cleaning process), install the device with the transmitter part pointing downwards.
- 4)
- When the empty pipe detection function is switched on, empty pipe detection only works if the transmitter housing is pointing upwards.

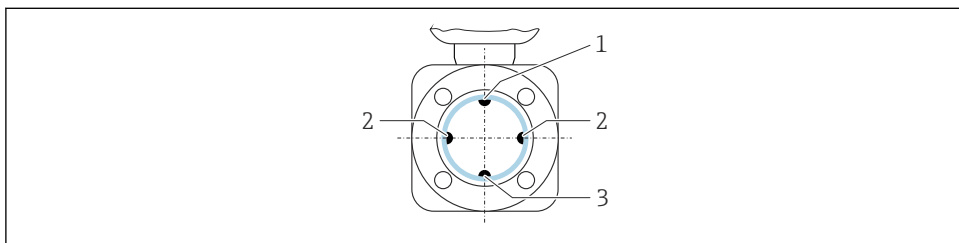
Vertical

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 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

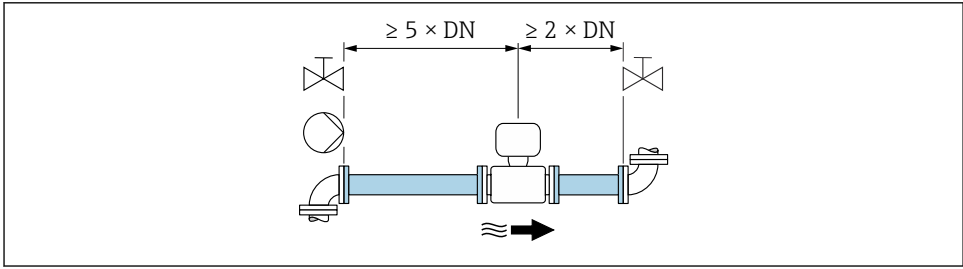
### Installation with inlet and outlet runs

Installation requires inlet and outlet runs: devices with the order code for "Design", option D, E, F and G.

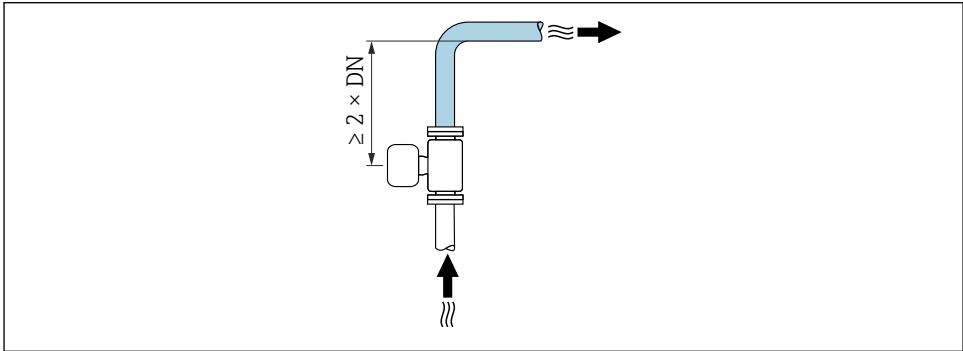
### Installation with elbows, pumps or valves

To avoid a vacuum and to maintain the specified level of accuracy, if possible install the device upstream from assemblies that produce turbulence (e.g. valves, T-sections) and downstream from pumps.

Maintain straight, unimpeded inlet and outlet runs.



A0028997



A0042132

### Installation without inlet and outlet runs

Depending on the device design and installation location, the inlet and outlet runs can be reduced or omitted entirely.

### Maximum measured error

When the device is installed with the inlet and outlet runs described, a maximum measured error of  $\pm 0.5\%$  of the reading  $\pm 1 \text{ mm/s}$  ( $0.04 \text{ in/s}$ )  $\pm 2 \text{ mm/s}$  ( $0.08 \text{ in/s}$ ) can be guaranteed.

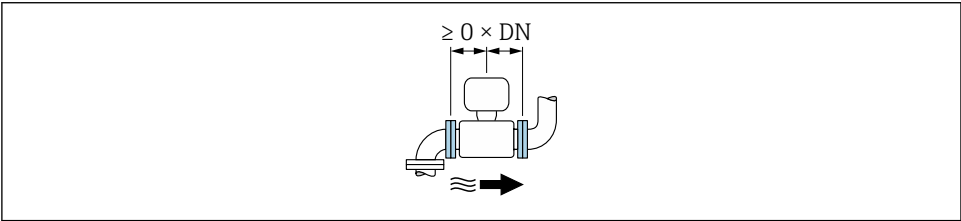
Devices and possible order options

Order code for "Design"		
Option	Description	Design
C	Fixed flange, constricted measuring tube, 0 x DN inlet/outlet runs	Constricted measuring tube <sup>1)</sup>
H	Lap joint flange, 0 x DN inlet/outlet runs	Full Bore <sup>2)</sup>
I	Fixed flange, 0 x DN inlet/outlet runs	
J	Fixed flange, short installed length, 0 x DN inlet/outlet runs	
K	Fixed flange, long installed length, 0 x DN inlet/outlet runs	

- 1) "Constricted measuring tube" stands for a reduction of the internal diameter of the measuring tube. The reduced internal diameter causes a higher flow velocity inside the measuring tube.
- 2) "Full Bore" stands for the full diameter of the measuring tube. There is no pressure loss with a full diameter.

Installation before or after bends

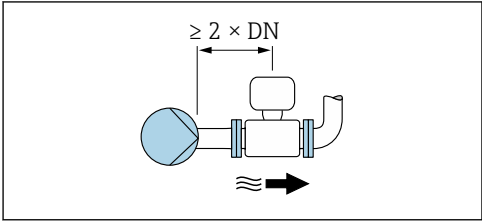
Installation without inlet and outlet runs is possible: devices with the order code for "Design", option C, H, I, J and K.



Installation downstream of pumps

Installation without inlet and outlet runs is possible: devices with the order code for "Design", option C, H and I.

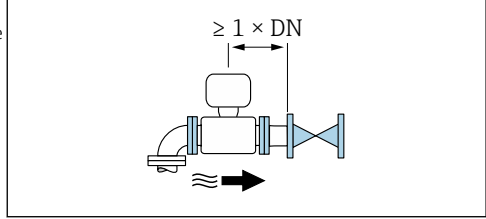
 In the case of devices with the order code for "Design", option J and K, an inlet run of only  $\geq 2 \times DN$  must be taken into consideration.



### Installation upstream of valves

Installation without inlet and outlet runs is possible: devices with the order code for "Design", option C, H and I.

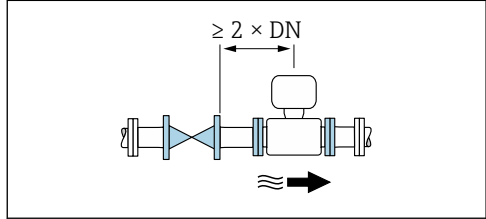
**i** In the case of devices with the order code for "Design", option J and K, an outlet run of only  $\geq 1 \times \text{DN}$  must be taken into consideration.



### Installation downstream of valves

Installation without inlet and outlet runs is possible if the valve is 100% open during operation: devices with the order code for "Design", option C, H and I.

**i** In the case of devices with the order code for "Design", option J and K, an inlet run of only  $\geq 2 \times \text{DN}$  must be taken into consideration if the valve is 100% open during operation.



### 5.1.2 Environmental and process-specific requirements

#### Ambient temperature range



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

If operating outdoors:

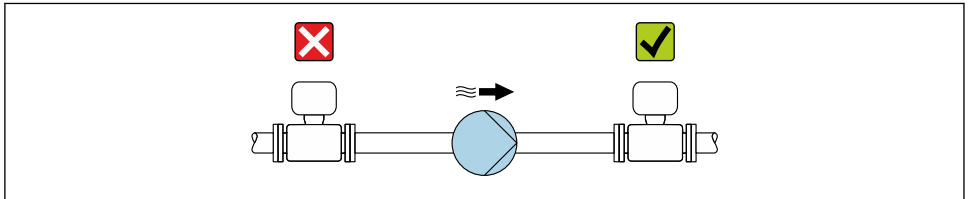
- Install the measuring device in a shady location.
- Avoid direct sunlight, particularly in warm climatic regions.
- Avoid direct exposure to weather conditions.

#### Temperature tables



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

#### System pressure

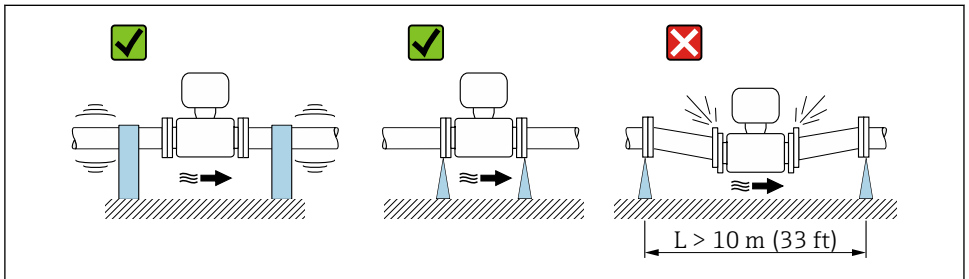


A0028777



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

#### Vibrations

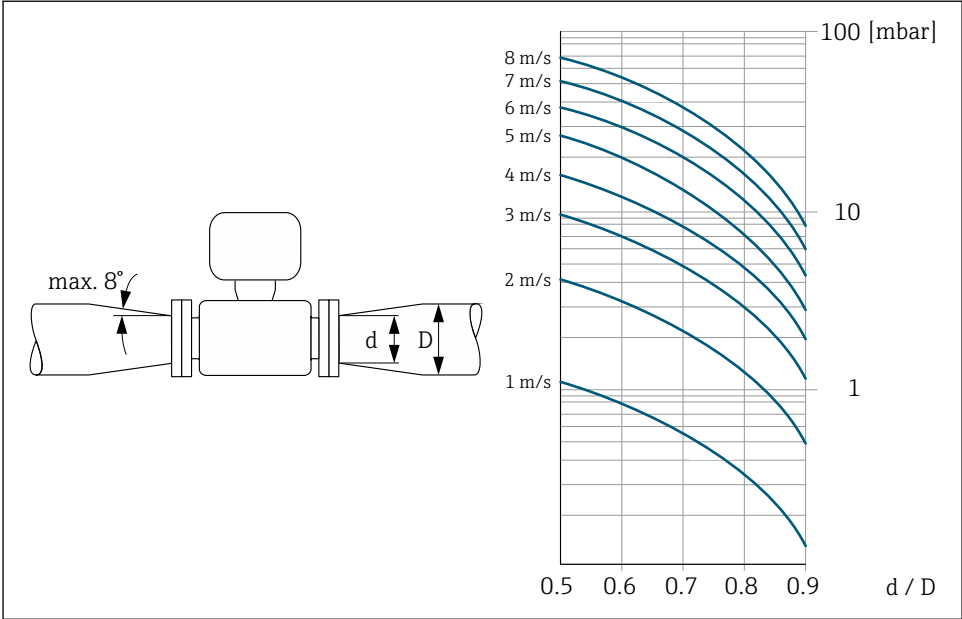


A0029004



2 Measures to prevent vibration of the device

Adapters



A0029002



### 5.1.3 Special mounting instructions

#### Display guard

- To ensure that the optional display guard can be easily opened, maintain the following minimum head clearance: 350 mm (13.8 in)

#### 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).

#### Promag W 10, 400, 500

##### *Immersion in water*



- Only the remote version of the device with IP68 protection, Type 6P is suitable for underwater use: order code for "Sensor option", options CB, CC, CD, CE and CQ.
- Pay attention to regional installation instructions.

#### **NOTICE**

**If the maximum water depth and operating duration is exceeded, this can damage the device!**

- Observe the maximum water depth and operating duration.

##### *Order code for "Sensor option", options CB, CC*

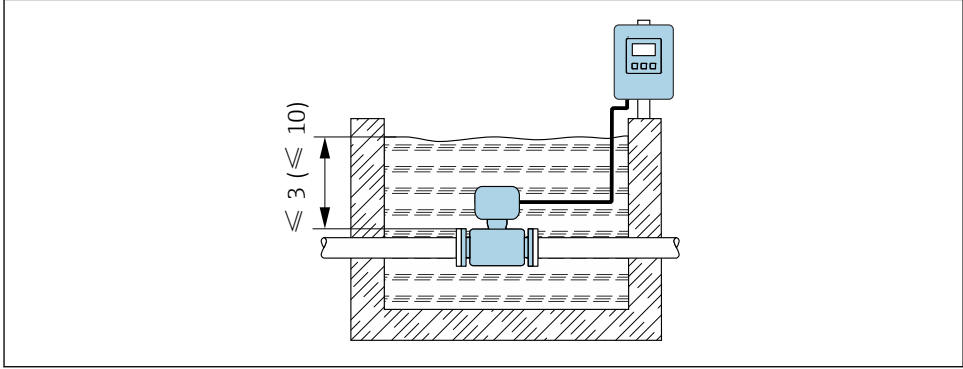
- For the operation of the device under water
- Operating duration at a maximum depth of:
  - 3 m (10 ft): permanent use
  - 10 m (30 ft): maximum 48 hours

##### *Order code for "Sensor option", option CQ "Temporarily water-proof"*

- For the temporary operation of the device under non-corrosive water
- Operating duration at a maximum depth of:
  - 3 m (10 ft): maximum 168 hours


*Order code for "Sensor option", options CD, CE*

- For the operation of the device under water and in saline water
- Operating duration at a maximum depth of:
  - 3 m (10 ft): permanent use
  - 10 m (30 ft): maximum 48 hours



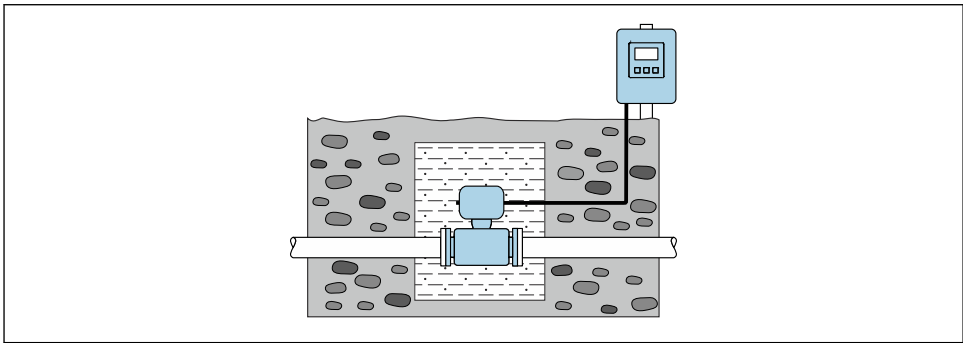
A0042412

*Use in buried applications*

-  Only the remote version of the device with IP68 protection is suitable for use in buried applications: order code for "Sensor option", options CD and CE.
- Pay attention to regional installation instructions.

*Order code for "Sensor option", options CD, CE*

For the use of the device in buried applications.



A0042646

## Promag W 800

*For immersion in water, Proline 800*

### NOTICE

**If the maximum water depth and operating duration is exceeded, this can damage the device!**

- Observe the maximum water depth and operating duration.

*Order code for "Sensor option", option CQ "Temporarily water-proof"*

- For the temporary operation of the device under non-corrosive water
- Operating duration at a maximum depth of:  
3 m (10 ft): maximum 168 hours

*For immersion in water, Proline 800 - Advanced*



- Only the remote version of the device with IP68 protection, Type 6P is suitable for underwater use: order code for "Sensor option", options CB, CC, CD, CE and CQ.
- Pay attention to regional installation instructions.

### NOTICE

**If the maximum water depth and operating duration is exceeded, this can damage the device!**

- Observe the maximum water depth and operating duration.

*Order code for "Sensor option", options CB, CC*

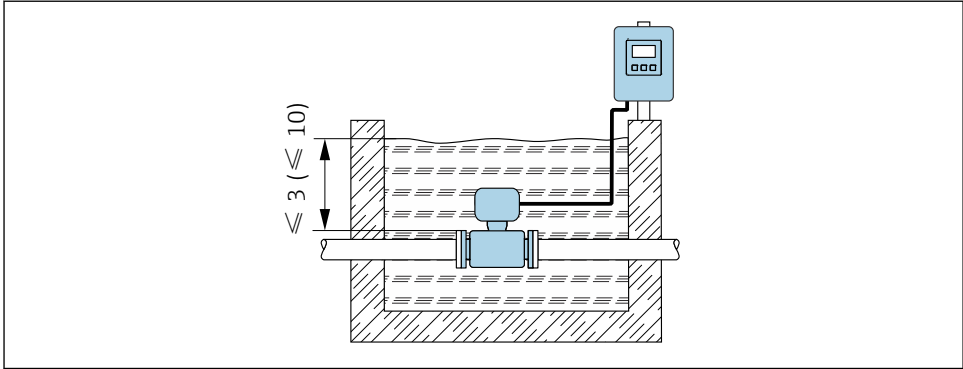
- For the operation of the device under water
- Operating duration at a maximum depth of:
  - 3 m (10 ft): permanent use
  - 10 m (30 ft): maximum 48 hours

*Order code for "Sensor option", option CQ "Temporarily water-proof"*

- For the temporary operation of the device under non-corrosive water
- Operating duration at a maximum depth of:  
3 m (10 ft): maximum 168 hours

*Order code for "Sensor option", options CD, CE*


- For the operation of the device under water and in saline water
- Operating duration at a maximum depth of:
  - 3 m (10 ft): permanent use
  - 10 m (30 ft): maximum 48 hours



A0042412

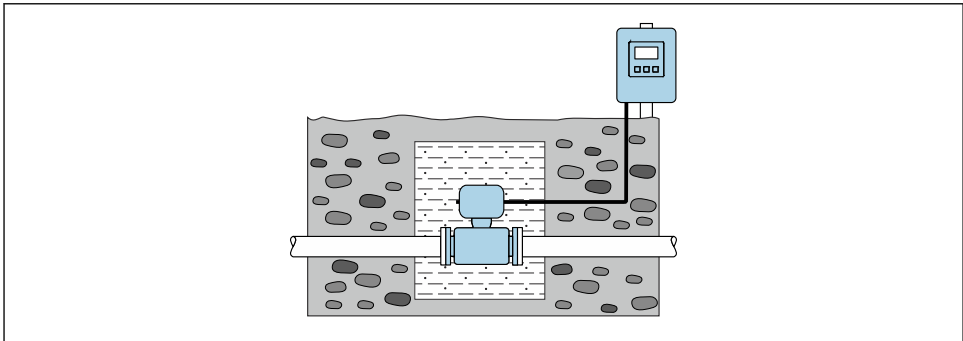
3 Installation for permanent immersion in water

For use in buried applications, Proline 800 - Advanced

-  Only the remote version of the device with IP68 protection is suitable for use in buried applications: order code for "Sensor option", options CD and CE.
- Pay attention to regional installation instructions.

Order code for "Sensor option", options CD, CE

For the use of the device in buried applications.



A0042646

## 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.

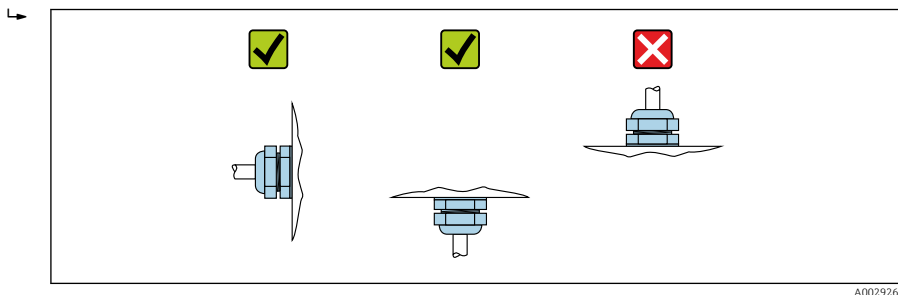
#### WARNING

**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 seals are clean and undamaged.
- ▶ Secure the seals 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.
- When mounting the process connections, make sure that the seals concerned are clean and centered correctly.
- 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.
- For "PTFE" 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

→ 33

## 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"> <li>■ Process temperature</li> <li>■ Process pressure (refer to the "Pressure-temperature ratings" section of the "Technical Information" document)</li> <li>■ Ambient temperature</li> <li>■ Measuring range</li> </ul>	<input type="checkbox"/>
Has the correct orientation been selected for the sensor →  18 ? <ul style="list-style-type: none"> <li>■ According to sensor type</li> <li>■ According to medium temperature</li> <li>■ According to medium properties (outgassing, with entrained solids)</li> </ul>	<input type="checkbox"/>
Does the arrow on the sensor nameplate match the actual direction of flow of the fluid through the piping →  18?	<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



If required by the Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), the product is marked with the depicted symbol in order to minimize the disposal of WEEE as unsorted municipal waste. Do not dispose of products bearing this marking as unsorted municipal waste. Instead, return them to the manufacturer for disposal under the applicable conditions.

### 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.

*Maximum screw tightening torques for EN 1092-1 (DIN 2501)*

Nominal diameter		Pressure rating [bar]	Screws [mm]	Flange thickness [mm]	Max. screw tightening torque [Nm]		
[mm]	[in]				HG	PUR	PTFE
25	1	PN 40	4 × M12	18	–	15	26
32	–	PN 40	4 × M16	18	–	24	41
40	1 ½	PN 40	4 × M16	18	–	31	52
50	2	PN 40	4 × M16	20	48	40	65
65 <sup>1)</sup>	–	PN 16	8 × M16	18	32	27	44
65	–	PN 40	8 × M16	22	32	27	44
80	3	PN 16	8 × M16	20	40	34	53
		PN 40	8 × M16	24	40	34	53
100	4	PN 16	8 × M16	20	43	36	57
		PN 40	8 × M20	24	59	50	79
125	–	PN 16	8 × M16	22	56	48	75
		PN 40	8 × M24	26	83	71	112
150	6	PN 16	8 × M20	22	74	63	99
		PN 40	8 × M24	28	104	88	137
200	8	PN 10	8 × M20	24	106	91	141
		PN 16	12 × M20	24	70	61	94
		PN 25	12 × M24	30	104	92	139
250	10	PN 10	12 × M20	26	82	71	110
		PN 16	12 × M24	26	98	85	132
		PN 25	12 × M27	32	150	134	201

Nominal diameter		Pressure rating	Screws	Flange thickness	Max. screw tightening torque [Nm]		
[mm]	[in]	[bar]	[mm]	[mm]	HG	PUR	PTFE
300	12	PN 10	12 × M20	26	94	81	126
		PN 16	12 × M24	28	134	118	179
		PN 25	16 × M27	34	153	138	204
350	14	PN 6	12 × M20	22	111	120	–
		PN 10	16 × M20	26	112	118	–
		PN 16	16 × M24	30	152	165	–
		PN 25	16 × M30	38	227	252	–
400	16	PN 6	16 × M20	22	90	98	–
		PN 10	16 × M24	26	151	167	–
		PN 16	16 × M27	32	193	215	–
		PN 25	16 × M33	40	289	326	–
450	18	PN 6	16 × M20	22	112	126	–
		PN 10	20 × M24	28	153	133	–
		PN 16	20 × M27	40	198	196	–
		PN 25	20 × M33	46	256	253	–
500	20	PN 6	20 × M20	24	119	123	–
		PN 10	20 × M24	28	155	171	–
		PN 16	20 × M30	34	275	300	–
		PN 25	20 × M33	48	317	360	–
600	24	PN 6	20 × M24	30	139	147	–
		PN 10	20 × M27	28	206	219	–
600	24	PN 16	20 × M33	36	415	443	–
600	24	PN 25	20 × M36	58	431	516	–
700	28	PN 6	24 × M24	24	148	139	–
		PN 10	24 × M27	30	246	246	–
		PN 16	24 × M33	36	278	318	–
		PN 25	24 × M39	46	449	507	–
800	32	PN 6	24 × M27	24	206	182	–
		PN 10	24 × M30	32	331	316	–
		PN 16	24 × M36	38	369	385	–
		PN 25	24 × M45	50	664	721	–

Nominal diameter		Pressure rating	Screws	Flange thickness	Max. screw tightening torque [Nm]		
[mm]	[in]	[bar]	[mm]	[mm]	HG	PUR	PTFE
900	36	PN 6	24 × M27	26	230	637	–
		PN 10	28 × M30	34	316	307	–
		PN 16	28 × M36	40	353	398	–
		PN 25	28 × M45	54	690	716	–
1000	40	PN 6	28 × M27	26	218	208	–
		PN 10	28 × M33	34	402	405	–
		PN 16	28 × M39	42	502	518	–
		PN 25	28 × M52	58	970	971	–
1200	48	PN 6	32 × M30	28	319	299	–
		PN 10	32 × M36	38	564	568	–
		PN 16	32 × M45	48	701	753	–
1400	–	PN 6	36 × M33	32	430	–	–
		PN 10	36 × M39	42	654	–	–
		PN 16	36 × M45	52	729	–	–
1600	–	PN 6	40 × M33	34	440	–	–
		PN 10	40 × M45	46	946	–	–
		PN 16	40 × M52	58	1007	–	–
1800	72	PN 6	44 × M36	36	547	–	–
		PN 10	44 × M45	50	961	–	–
		PN 16	44 × M52	62	1108	–	–
2000	–	PN 6	48 × M39	38	629	–	–
		PN 10	48 × M45	54	1047	–	–
		PN 16	48 × M56	66	1324	–	–
2200	–	PN 6	52 × M39	42	698	–	–
		PN 10	52 × M52	58	1217	–	–
2400	–	PN 6	56 × M39	44	768	–	–
		PN 10	56 × M52	62	1229	–	–

1) Sizing as per EN 1092-1 (not DIN 2501)

*Nominal screw tightening torques for EN 1092-1 (DIN 2501); calculated according to EN 1591-1:2014 for flanges according to EN 1092-1:2013*

Nominal diameter		Pressure rating	Screws	Flange thickness	Nom. screw tightening torque [Nm]		
[mm]	[in]	[bar]	[mm]	[mm]	HG	PUR	PTFE
350	14	PN 6	12 × M20	22	60	75	–
		PN 10	16 × M20	26	70	80	–
		PN 16	16 × M24	30	125	135	–
		PN 25	16 × M30	38	230	235	–
400	16	PN 6	16 × M20	22	65	70	–
		PN 10	16 × M24	26	100	120	–
		PN 16	16 × M27	32	175	190	–
		PN 25	16 × M33	40	315	325	–
450	18	PN 6	16 × M20	22	70	90	–
		PN 10	20 × M24	28	100	110	–
		PN 16	20 × M27	34	175	190	–
		PN 25	20 × M33	46	300	310	–
500	20	PN 6	20 × M20	24	65	70	–
		PN 10	20 × M24	28	110	120	–
		PN 16	20 × M30	36	225	235	–
		PN 25	20 × M33	48	370	370	–
600	24	PN 6	20 × M24	30	105	105	–
		PN 10	20 × M27	30	165	160	–
600 <sup>1)</sup>	24	PN 16	20 × M33	40	340	340	–
600	24	PN 25	20 × M36	48	540	540	–
700	28	PN 6	24 × M24	30	110	110	–
		PN 10	24 × M27	35	190	190	–
		PN 16	24 × M33	40	340	340	–
		PN 25	24 × M39	50	615	595	–
800	32	PN 6	24 × M27	30	145	145	–
		PN 10	24 × M30	38	260	260	–
		PN 16	24 × M36	41	465	455	–
		PN 25	24 × M45	53	885	880	–
900	36	PN 6	24 × M27	34	170	180	–

Nominal diameter		Pressure rating	Screws	Flange thickness	Nom. screw tightening torque [Nm]		
[mm]	[in]	[bar]	[mm]	[mm]	HG	PUR	PTFE
		PN 10	28 × M30	38	265	275	–
		PN 16	28 × M36	48	475	475	–
		PN 25	28 × M45	57	930	915	–
1000	40	PN 6	28 × M27	38	175	185	–
		PN 10	28 × M33	44	350	360	–
		PN 16	28 × M39	59	630	620	–
		PN 25	28 × M52	63	1300	1290	–
1200	48	PN 6	32 × M30	42	235	250	–
		PN 10	32 × M36	55	470	480	–
		PN 16	32 × M45	78	890	900	–
1400	–	PN 6	36 × M33	56	300	–	–
		PN 10	36 × M39	65	600	–	–
		PN 16	36 × M45	84	1050	–	–
1600	–	PN 6	40 × M33	63	340	–	–
		PN 10	40 × M45	75	810	–	–
		PN 16	40 × M52	102	1420	–	–
1800	72	PN 6	44 × M36	69	430	–	–
		PN 10	44 × M45	85	920	–	–
		PN 16	44 × M52	110	1600	–	–
2000	–	PN 6	48 × M39	74	530	–	–
		PN 10	48 × M45	90	1040	–	–
		PN 16	48 × M56	124	1900	–	–
2200	–	PN 6	52 × M39	81	580	–	–
		PN 10	52 × M52	100	1290	–	–
2400	–	PN 6	56 × M39	87	650	–	–
		PN 10	56 × M52	110	1410	–	–

1) Sizing as per EN 1092-1 (not DIN 2501)

*Maximum screw tightening torques for ASME B16.5*

Nominal diameter		Pressure rating  [psi]	Screws  [in]	Max. screw tightening torque			
[mm]	[in]			HG		PUR	
				[Nm]	[lbf · ft]	[Nm]	[lbf · ft]
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
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

*Maximum screw tightening torques for AWWA C207, Class D*

Nominal diameter		Screws	Max. screw tightening torque				
[mm]	[in]		[in]	HG		PUR	
				[Nm]	[lbf · ft]	[Nm]	[lbf · ft]
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	

Nominal diameter		Screws	Max. screw tightening torque			
[mm]	[in]		HG		PUR	
		[in]	[Nm]	[lbf · ft]	[Nm]	[lbf · ft]
1000	40	36 × 1 ½	420	310	477	352
–	42	36 × 1 ½	528	389	518	382
–	48	44 × 1 ½	552	407	531	392
–	54	44 × 1 ¾	730	538	–	–
–	60	52 × 1 ¾	758	559	–	–
–	66	52 × 1 ¾	946	698	–	–
–	72	60 × 1 ¾	975	719	–	–
–	78	64 × 2	853	629	–	–
–	84	64 × 2	931	687	–	–
–	90	64 × 2 ¼	1048	773	–	–

Maximum screw tightening torques for AS 2129, Table E

Nominal diameter [mm]	Screws [mm]	Max. screw tightening torque [Nm]	
		HG	PUR
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	–

Nominal diameter [mm]	Screws [mm]	Max. screw tightening torque [Nm]	
		HG	PUR
1000	24 × M30	634	–
1200	32 × M30	727	–

Maximum screw tightening torques for AS 4087, PN 16

Nominal diameter [mm]	Screws [mm]	Max. screw tightening torque [Nm]	
		HG	PUR
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	–
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	–

Maximum screw tightening torques for JIS B2220

Nominal diameter [mm]	Pressure rating [bar]	Screws [mm]	Max. screw tightening torque [Nm]	
			HG	PUR
25	10K	4 × M16	–	19
25	20K	4 × M16	–	19
32	10K	4 × M16	–	22



Nominal diameter [mm]	Pressure rating [bar]	Screws [mm]	Max. screw tightening torque [Nm]	
			HG	PUR
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
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

*Nominal screw tightening torques for JIS B2220*

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

Nominal diameter [mm]	Pressure rating [bar]	Screws [mm]	Nom. screw tightening torque [Nm]	
			HG	PUR
	20K	16 × M30×3	315	315
600	10K	16 × M30	235	235
	20K	16 × M36×3	381	381
700	10K	16 × M30	300	300
750	10K	16 × M30	339	339

---



71574710

[www.addresses.endress.com](http://www.addresses.endress.com)

---