

Brief Operating Instructions

Proline Promag H

Electromagnetic sensor

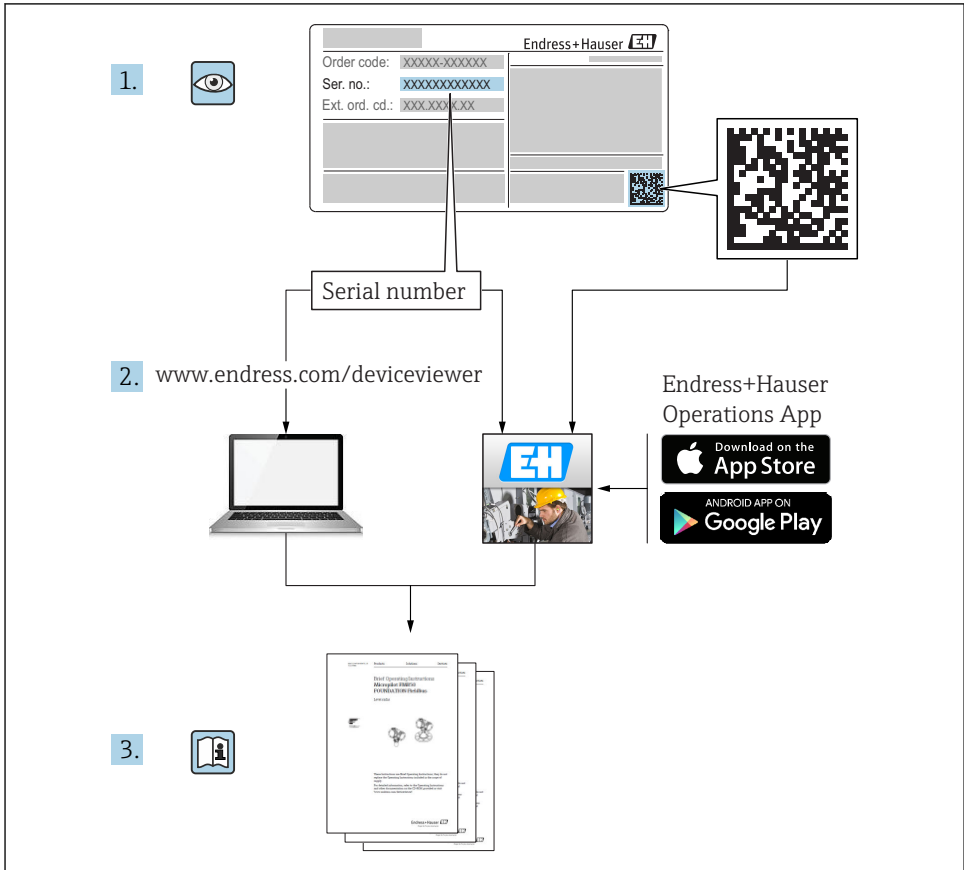


These instructions are Brief Operating Instructions; they are **not** a substitute for the Operating Instructions pertaining to the device.

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	7
2.1	Requirements for the personnel	7
2.2	Designated use	7
2.3	Workplace safety	8
2.4	Operational safety	8
2.5	Product safety	8
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	Installation	14
5.1	Installation conditions	14
5.2	Mounting the measuring device	21
5.3	Post-installation check	30
6	Disposal	31
6.1	Removing the measuring device	31
6.2	Disposing of the measuring device	31











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
	Protective ground connection A terminal which must be connected to ground prior to establishing any other connections.
	Equipotential connection A connection that has to be connected to the plant grounding system: This may be a potential equalization line or a star grounding system depending on national or company codes of practice.





1.1.4 Communication symbols

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

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
	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 $\mu\text{S}/\text{cm}$ (Promag 100, 300, 500) or 20 $\mu\text{S}/\text{cm}$ (Promag 200).

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:

- ▶ 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.

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

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.

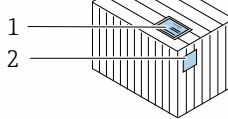
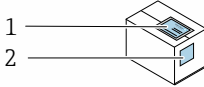
2.6 IT security

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.

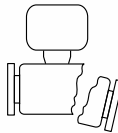
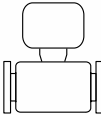
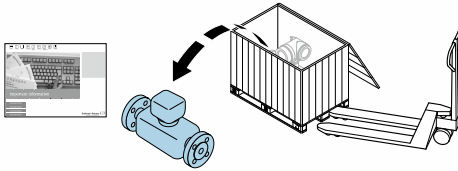
IT security measures in line with operators' security standards and designed to provide additional protection for the device and device data transfer must be implemented by the operators themselves.

3 Incoming acceptance and product identification

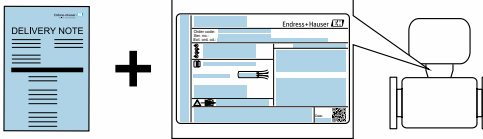
3.1 Incoming acceptance



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



Are the goods undamaged?



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



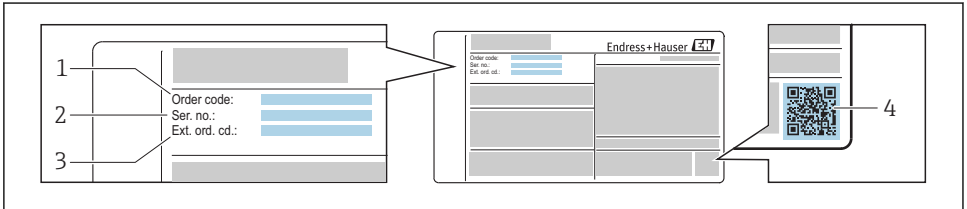
Is the CD-ROM with the Technical Documentation (depends on device version) and documents present?

- 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

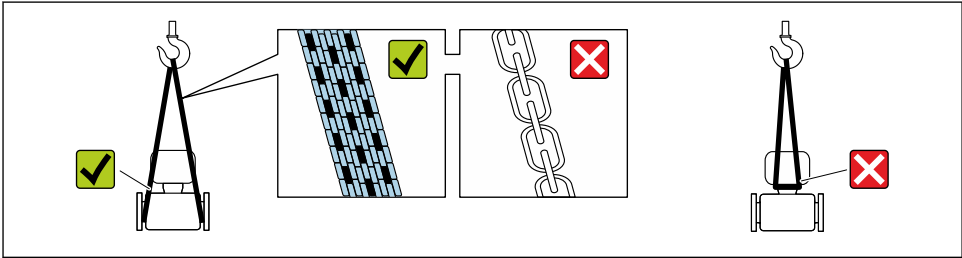
4.1 Storage conditions

Observe the following notes for storage:

- Store in original packaging.
- Do not remove protective covers or protective caps installed on process connections.
- Protect from direct sunlight.
- Select a storage location where moisture cannot collect in the measuring device.
- 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.

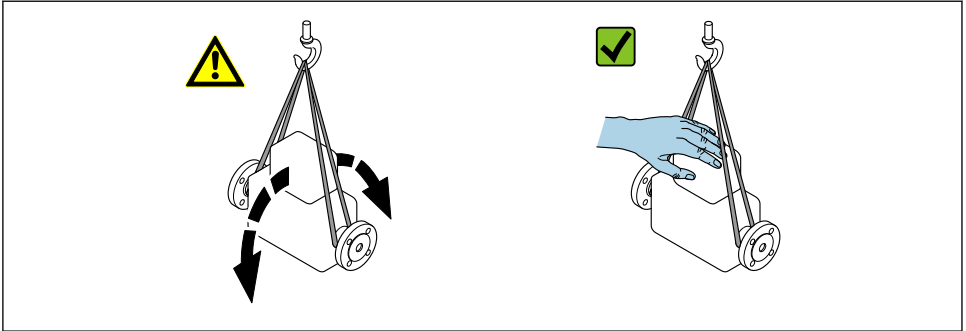
4.2.1 Measuring devices without lifting lugs

⚠ 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.

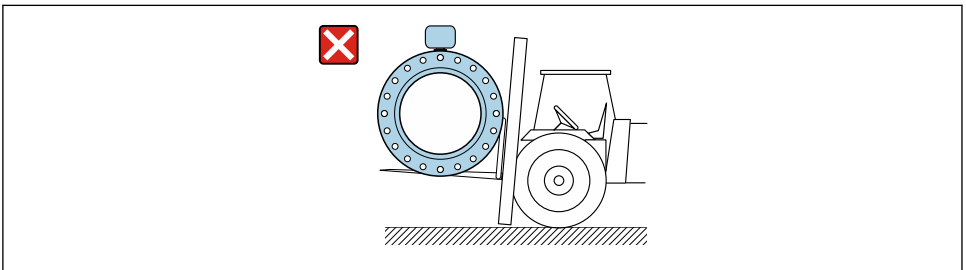
4.2.3 Transporting with a fork lift

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.



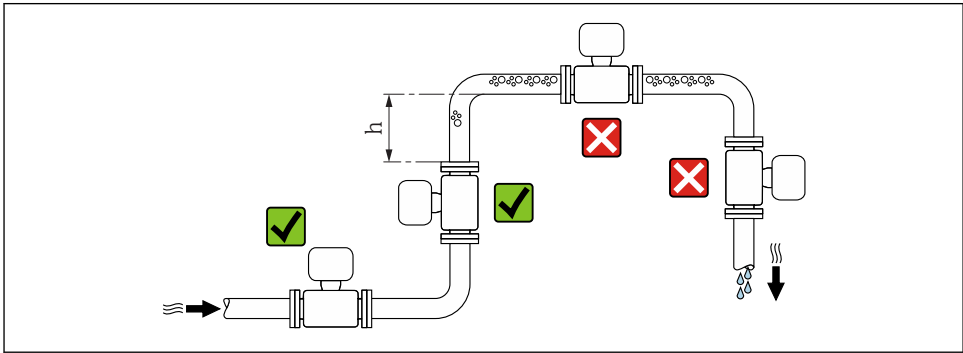
A0029319

5 Installation

5.1 Installation conditions

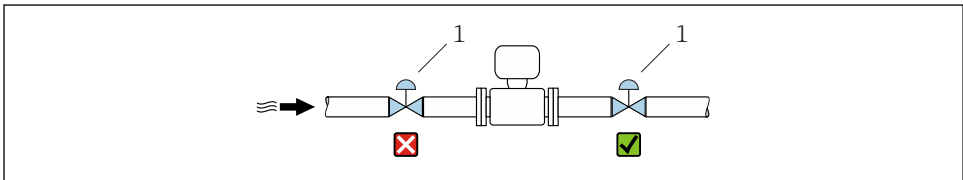
5.1.1 Mounting position

Mounting location



A0029343

$$h \geq 2 \times DN$$



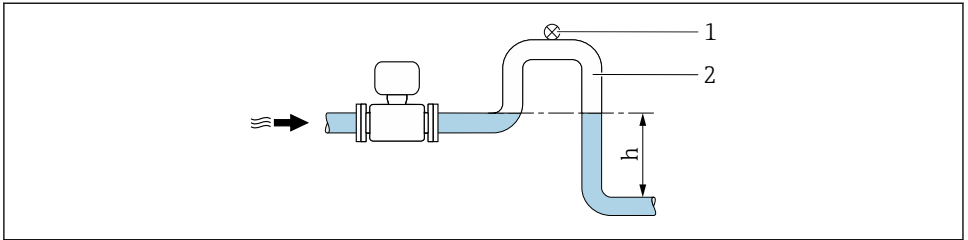
A0033017

❗ 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.



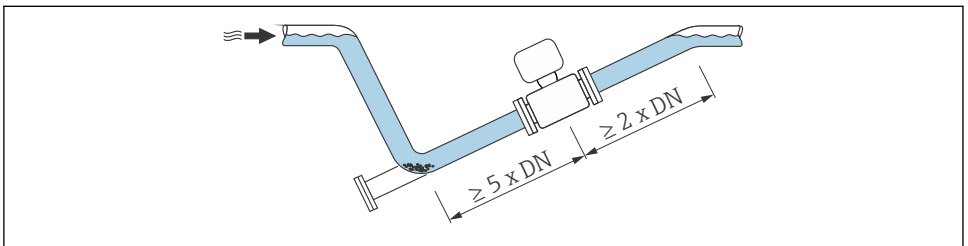
A0028981

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.



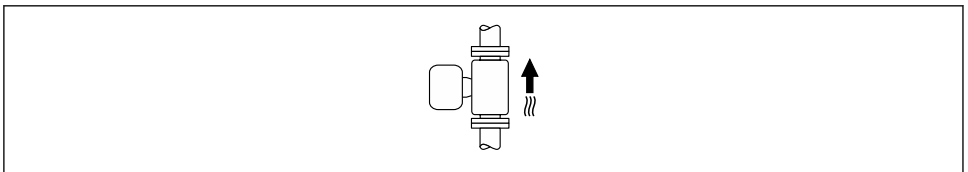
A0019257

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.

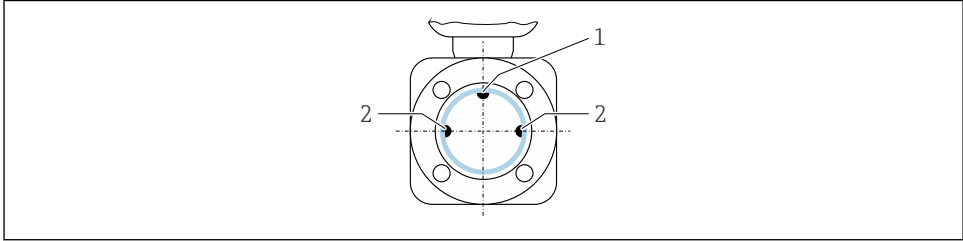
Vertical



A0015591


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

Horizontal

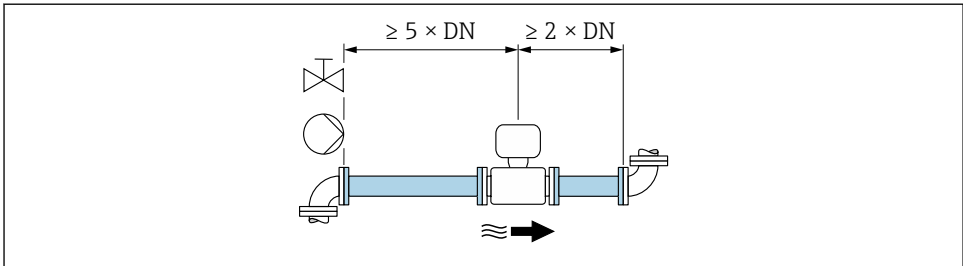


A0028998


- 1 EPD electrode for empty pipe detection
2 Measuring electrodes for signal detection

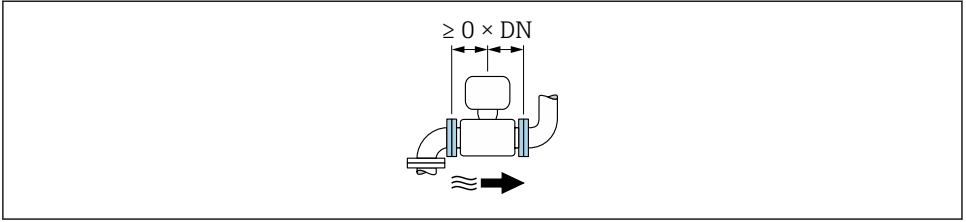
-  Ideally, the measuring electrode plane should be horizontal. This prevents brief insulation of the two measuring electrodes by entrained air bubbles.
- Empty pipe detection only works if the transmitter housing is pointing upwards as otherwise there is no guarantee that the empty pipe detection function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

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"

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

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

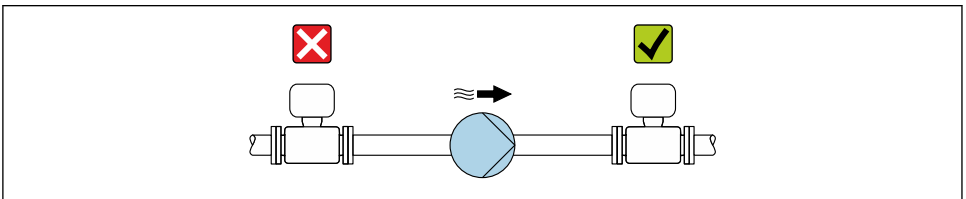
If operating outdoors:

- 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.

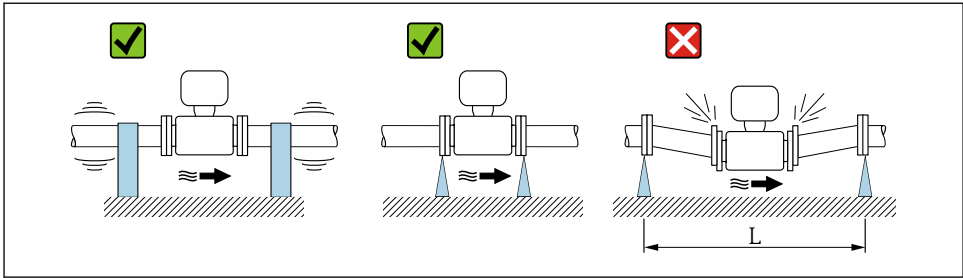
System pressure



A0028777

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

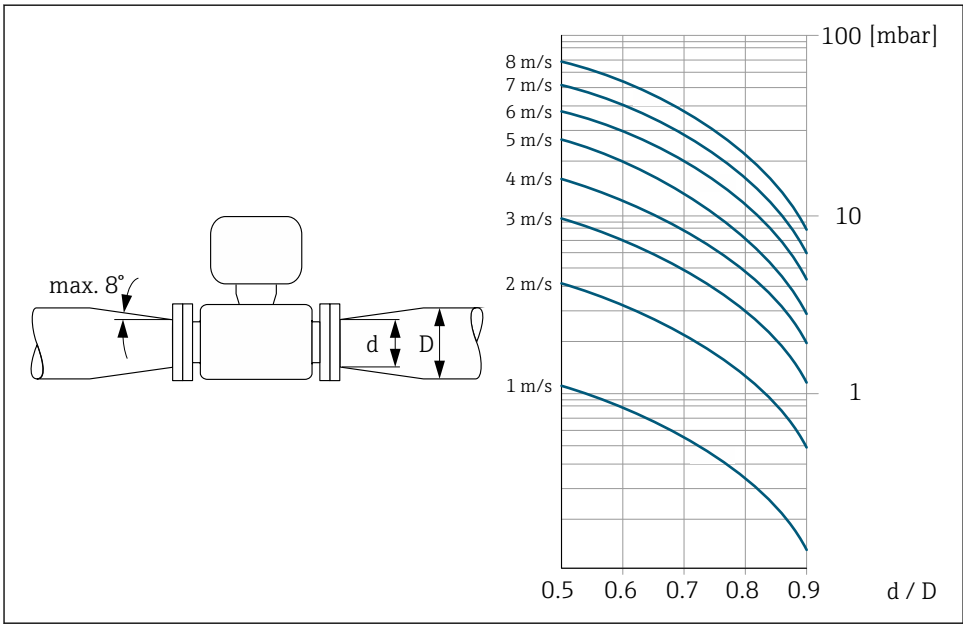
Vibrations



A0029004

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

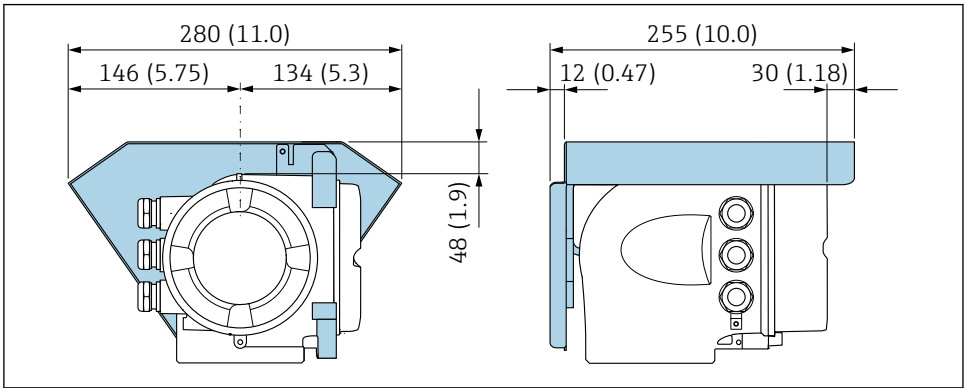
Adapters



A0029002

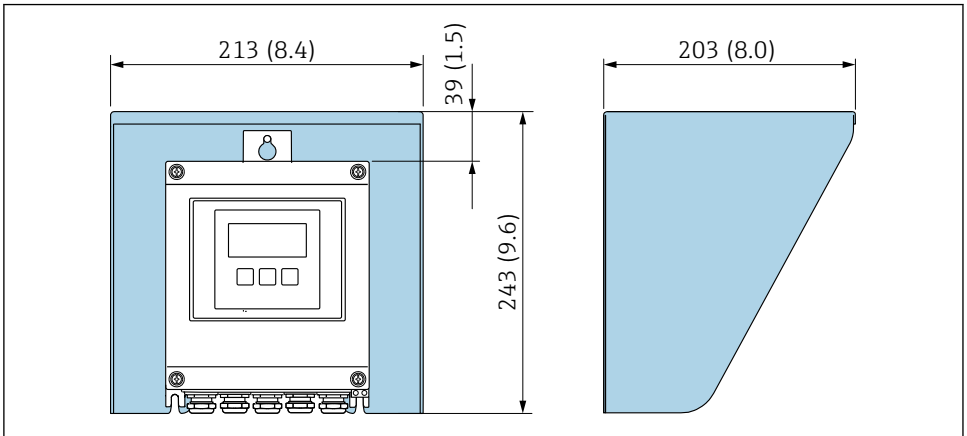
5.1.3 Special mounting instructions

Weather protection cover: Proline 300



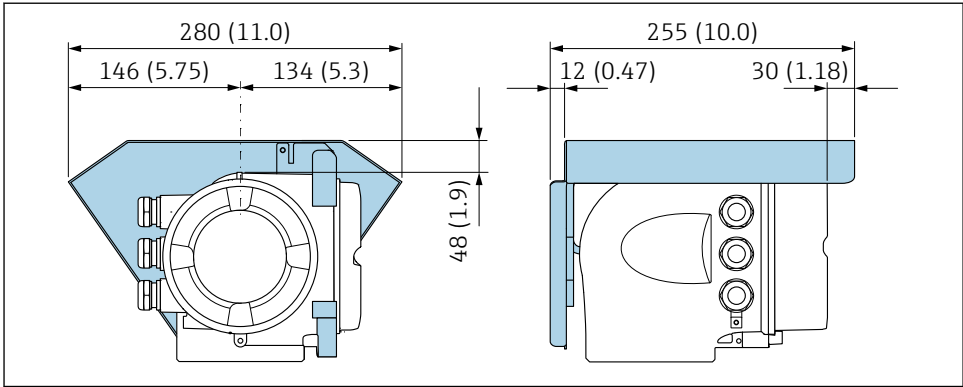
A0029553

Weather protection cover: Proline 500



A0029552

7 Weather protection cover for Proline 500 – digital



A0029553

8 Weather protection cover for Proline 500

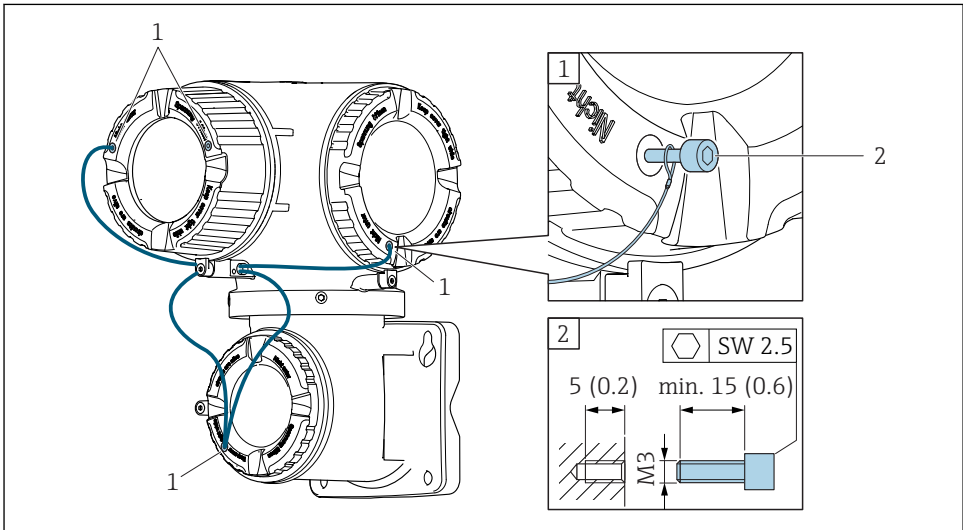
Cover locking

NOTICE

Order code "Housing" "Transmitter housing", option L "Cast, stainless": The covers of the transmitter housing are provided with a borehole to lock the cover.

The cover can be locked using screws and a chain or cable provided by the customer.

- ▶ It is recommended to use stainless steel cables or chains.
- ▶ If a protective coating is applied, it is recommended to use a heat shrink tube to protect the housing paint.



A0029799

1 Cover borehole for the securing screw

2 Securing screw to lock the cover

5.2 Mounting the measuring device

5.2.1 Required tools

For transmitter

- Torque wrench
- For wall mounting:
Open-ended wrench for hexagonal screw max. M5
- For pipe mounting:
 - Open-ended wrench AF 8
 - Phillips head screwdriver PH 2

For transmitter Proline 500

For mounting on a post:

- Proline 500 – digital transmitter
 - Open-ended wrench AF 10
 - Torx screwdriver TX 25
- Proline 500 transmitter
Open-ended wrench AF 13

For wall mounting:

Drill with drill bit \varnothing 6.0 mm

For sensor

For flanges and other process connections: Corresponding mounting tools

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!

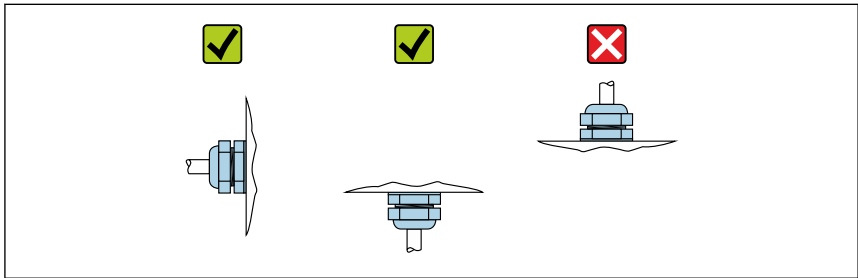
Risk of measuring signal short circuit.

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



A0029263

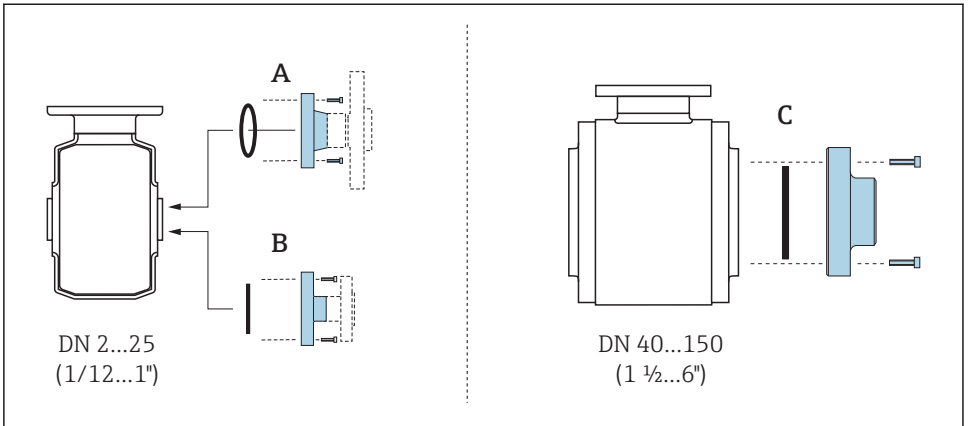
Process connections

The sensor is supplied to order, with or without pre-installed process connections. Pre-installed process connections are firmly secured to the sensor by 4 or 6 hexagonal-headed bolts.

- i** The sensor may need to be supported or additionally secured depending on the application and pipe length. In particular, it is absolutely essential to secure the sensor additionally if plastic process connections are used. An appropriate wall mounting kit can be ordered separately as an accessory from Endress+Hauser.

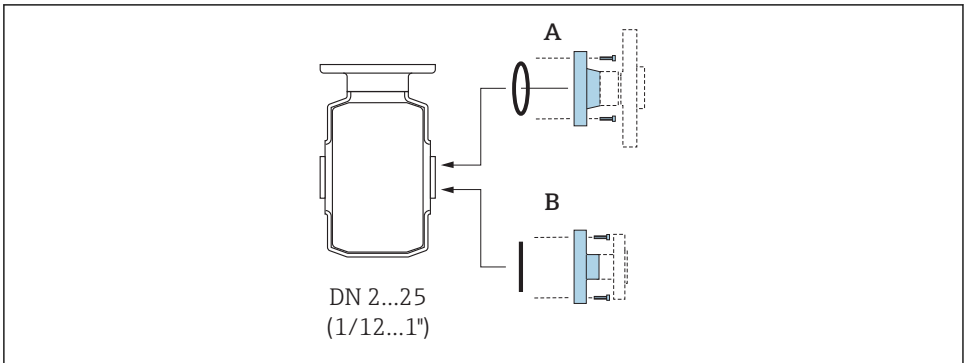
Seals

- In the case of metal process connections, the screws must be tightened securely. The process connection forms a metal connection with the sensor, which ensures a defined compression of the seal.
- In the case of plastic process connections, observe the maximum torques for lubricated threads: 7 Nm (5.2 lbf ft); always insert a seal between the connection and the counterflange.
- Depending on the application the seals should be replaced periodically, particularly if molded seals are used (aseptic version)! The interval between changes depends on the frequency of the cleaning cycles, the cleaning temperature and the medium temperature. Replacement seals can be ordered as an accessory.
- For "PFA" lining: additional seals are **always** required (Promag 200).



9 Seals of process connections Promag H 100

- A Process connections with O-ring seal
- B Process connections with aseptic molded seal, DN 2 to 25 (1/12 to 1")
- C Process connections with aseptic molded seal, DN 40 to 150 (1 1/2 to 6")



10 Seals of process connections Promag H 200

- A Process connections with O-ring seal
- B Process connections with aseptic gasket seal

Mounting grounding rings, DN 2 to 25 (1/12 to 1")

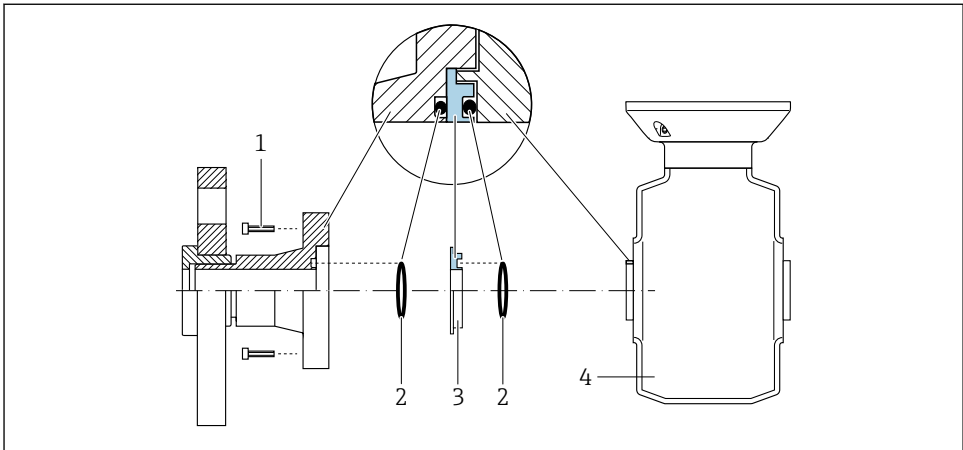


For information on potential equalization, see the Transmitter Brief Operating Instructions.

In the case of plastic process connections (e.g. flange connections or adhesive fittings), additional ground rings must be used to ensure potential matching between the sensor and the fluid. If grounding rings are not installed, this can affect the measuring accuracy or cause

the destruction of the sensor as a result of the electrochemical decomposition of the electrodes.

- i** ■ Depending on the option ordered, plastic disks are used instead of grounding rings on some process connections. These plastic disks only act as "spacers" and do not have any potential matching function. Furthermore, they also perform a significant sealing function at the sensor/process connection interface. Therefore, in the case of process connections without metal grounding rings, these plastic disks/seals should never be removed and should always be installed!
- Grounding rings can be ordered separately as an accessory from Endress+Hauser . When ordering make sure that the grounding rings are compatible with the material used for the electrodes, as otherwise there is the danger that the electrodes could be destroyed by electrochemical corrosion!
- Grounding rings, including seals, are mounted inside the process connections. Therefore the installation length is not affected.



A0028971

i 11 *Installing grounding rings*

- 1 Hexagonal-headed bolts of process connection
- 2 O-ring seals
- 3 Grounding ring or plastic disk (spacer)
- 4 Sensor


1. Release the 4 or 6 hexagonal-headed bolts (1) and remove the process connection from the sensor (4).
2. Remove the plastic disk (3), along with the two O-ring seals (2), from the process connection.
3. Place the first O-ring seal (2) back into the groove of the process connection.
4. Fit the metal grounding ring (3) in the process connection as illustrated.
5. Place the second O-ring seal (2) into the groove of the grounding ring.

6. Mount the process connection back on the sensor. When doing so, make sure to observe the maximum screw tightening torques for lubricated threads: 7 Nm (5.2 lbf ft)

Welding the sensor into the pipe (welding connections)

WARNING

Risk of destroying the electronics!

- ▶ Make sure that the welding system is not grounded via the sensor or transmitter.
1. Tack-weld the sensor to secure it in the pipe. A suitable welding aid can be ordered separately as an accessory.
 2. Release the screws on the process connection flange and remove the sensor, along with the seal, from the pipe.
 3. Weld the process connection into the pipe.
 4. Reinstall the sensor in the pipe, and in doing so make sure that the seal is clean and in the right position.
-  If thin-walled pipes carrying food are welded correctly, the seal is not damaged by the heat even when mounted. However, it is recommended to disassemble the sensor and seal.
 - It must be possible to open the pipe by approx. 8 mm (0.31 in) for disassembly.

Cleaning with pigs

It is essential to take the internal diameters of the measuring tube and process connection into account when cleaning with pigs. All the dimensions and lengths of the sensor and transmitter are provided in the separate "Technical Information" document.

5.2.4 Mounting the transmitter of the remote version: , Proline 500 – digital

CAUTION

Ambient temperature too high!

Danger of electronics overheating and housing deformation.

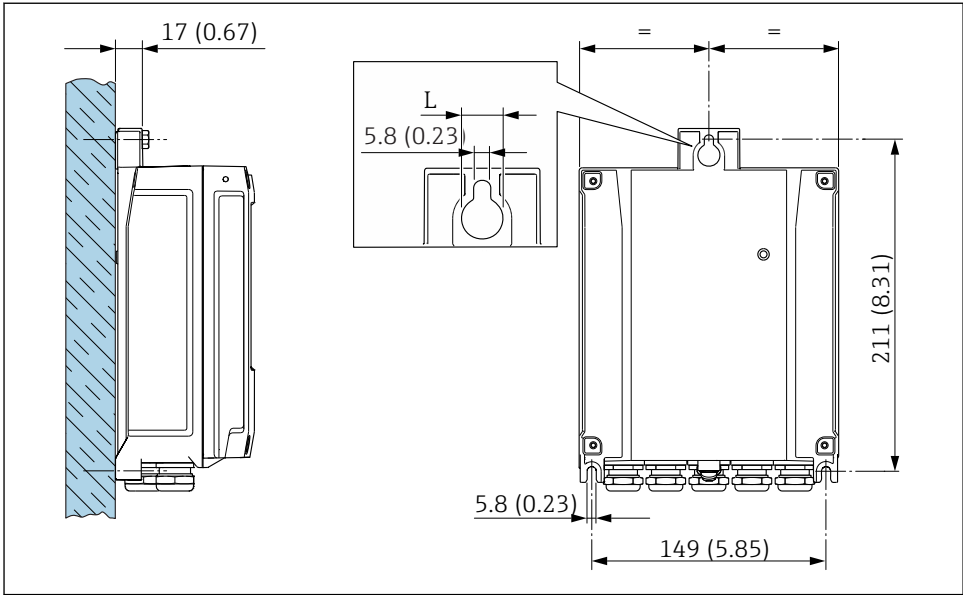
- ▶ Do not exceed the permitted maximum ambient temperature .
- ▶ If operating outdoors: Avoid direct sunlight and exposure to weathering, particularly in warm climatic regions.

CAUTION

Excessive force can damage the housing!

- ▶ Avoid excessive mechanical stress.

Wall mounting



A0029054

12 Engineering unit mm (in)

L Depends on order code for "Transmitter housing"

Order code for "Transmitter housing"

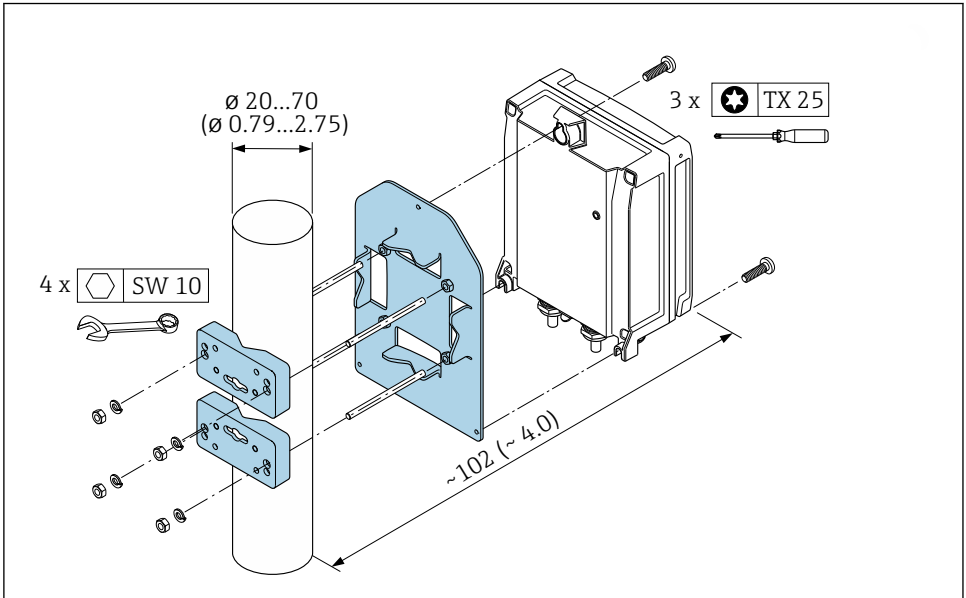
- Option A, aluminum coated: L = 14 mm (0.55 in)
- Option D, polycarbonate: L = 13 mm (0.51 in)

Post mounting

⚠ WARNING

Excessive tightening torque applied to the fixing screws on plastic housing!
Risk of damaging the plastic transmitter.

- ▶ Tighten the fixing screws as per the tightening torque: 2 Nm (1.5 lbf ft)



A0029051

13 Engineering unit mm (in)

5.2.5 Mounting the transmitter housing: Proline 500

⚠ CAUTION

Ambient temperature too high!

Danger of electronics overheating and housing deformation.

- ▶ Do not exceed the permitted maximum ambient temperature .
- ▶ If operating outdoors: Avoid direct sunlight and exposure to weathering, particularly in warm climatic regions.

⚠ CAUTION

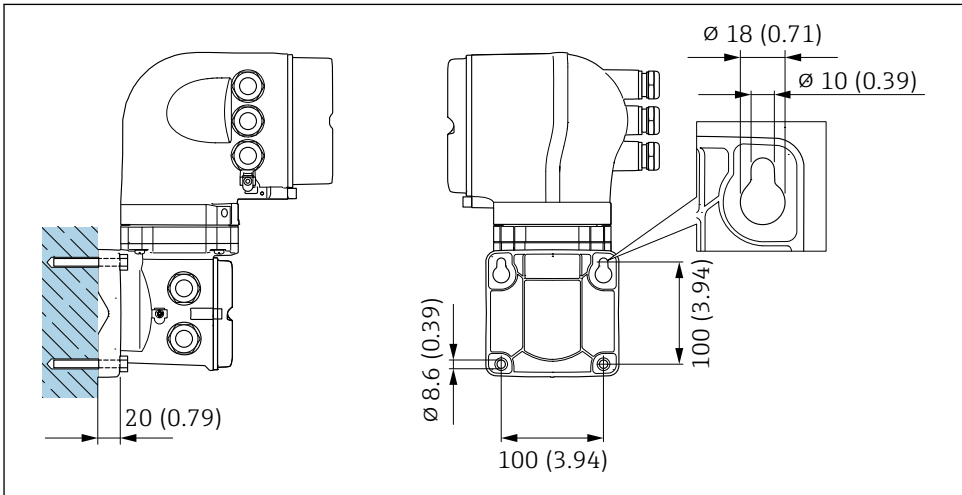
Excessive force can damage the housing!

- ▶ Avoid excessive mechanical stress.

The transmitter can be mounted in the following ways:

- Post mounting
- Wall mounting

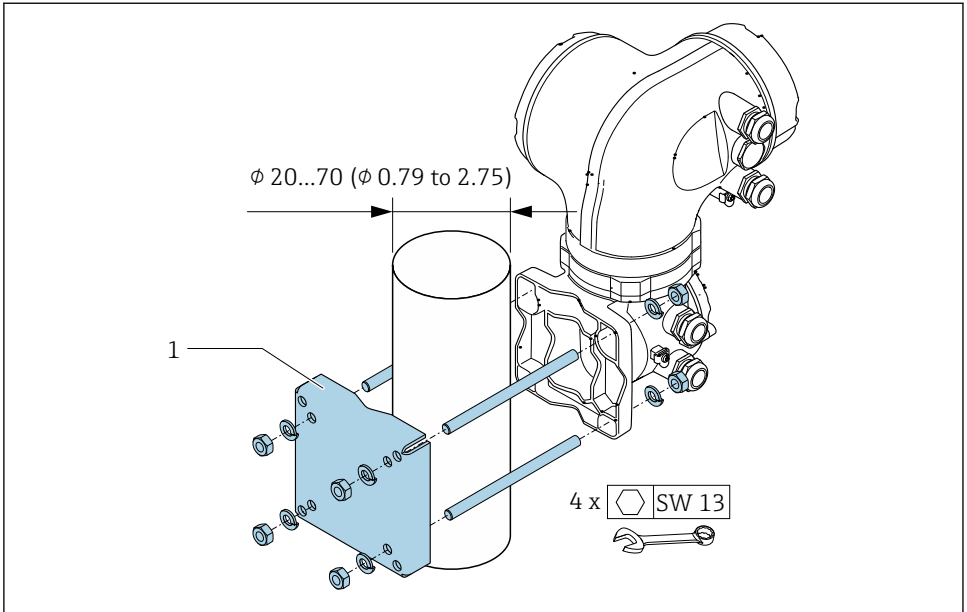
Wall mounting



A0029068

14 Engineering unit mm (in)

Post mounting



A0029057

15 Engineering unit mm (in)

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.

www.addresses.endress.com
