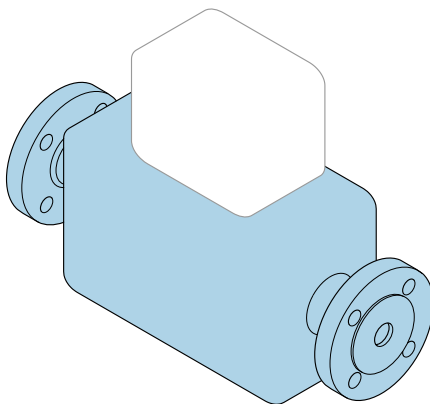


Brief Operating Instructions

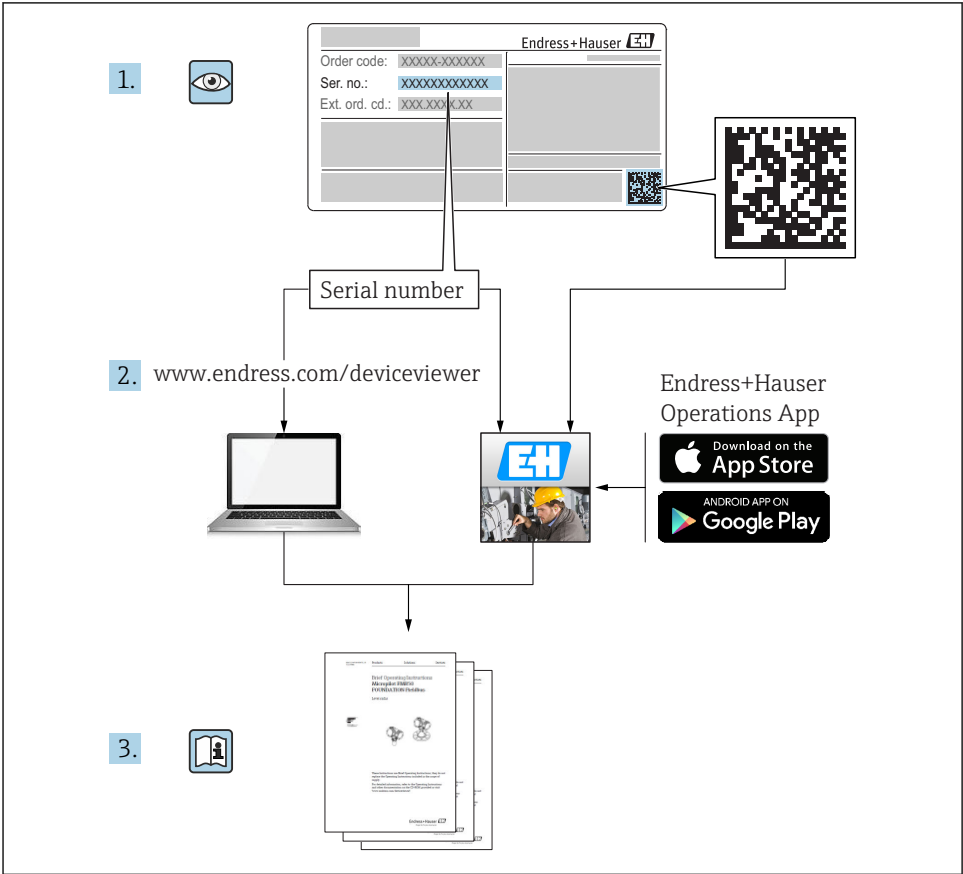
Proline Promass X

Coriolis sensor



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

These Brief Operating Instructions contain all the information for the sensor. When commissioning, please also refer to the "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*

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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	 1,  2,  3...	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 described in these Instructions is intended only for flow measurement of liquids and gases.

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.

⚠ WARNING**Danger of housing breaking due to measuring tube breakage!**

- In the event of a measuring tube breakage for a device version without rupture disk it is possible for the pressure loading capacity of the sensor housing to be exceeded. This can lead to rupture or failure of the sensor housing.

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.

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

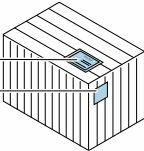
3.1 Incoming acceptance


A0028673

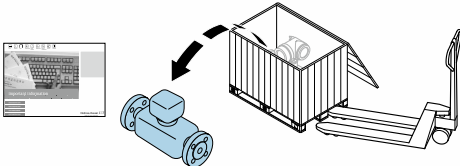






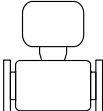


Are the order codes on the delivery note (1) and the product sticker (2) identical?

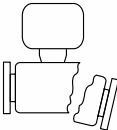



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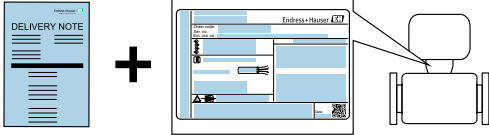




Are the goods undamaged?



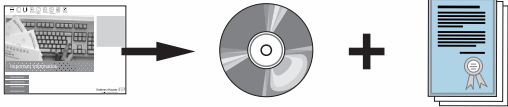
A0028673



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



A0028673



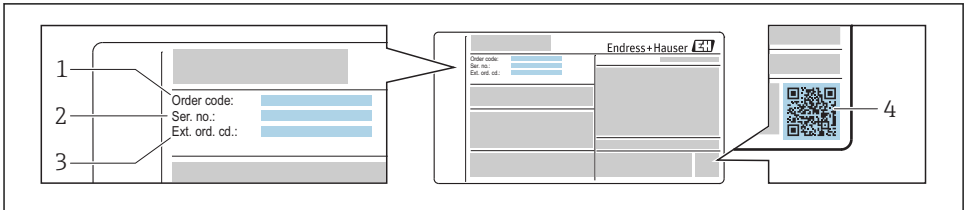
Is the CD-ROM with the Technical Documentation (depends on device version) and documents present?

- 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

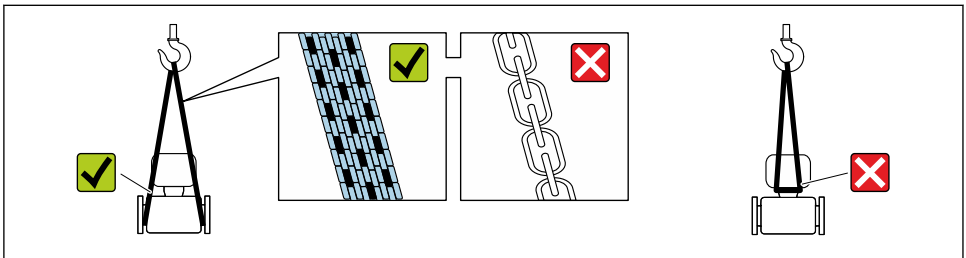
4.1 Storage conditions

Observe the following notes for storage:

- Store in original packaging.
- Do not remove protective covers or protective caps installed on process connections.
- Protect from direct sunlight.
- 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



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.

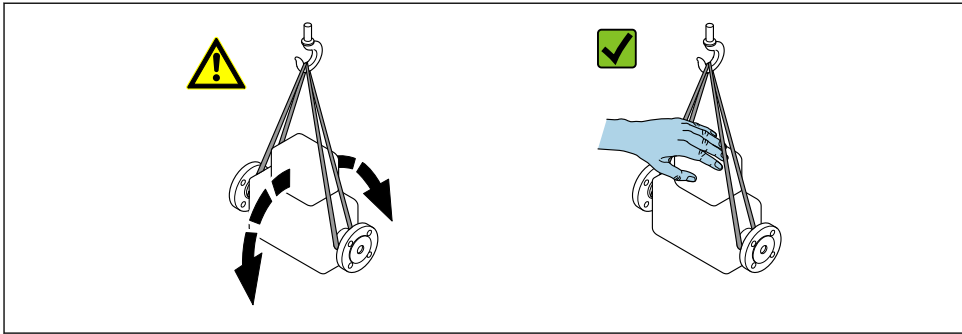
4.2.1 Measuring devices without lifting lugs

⚠ 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.

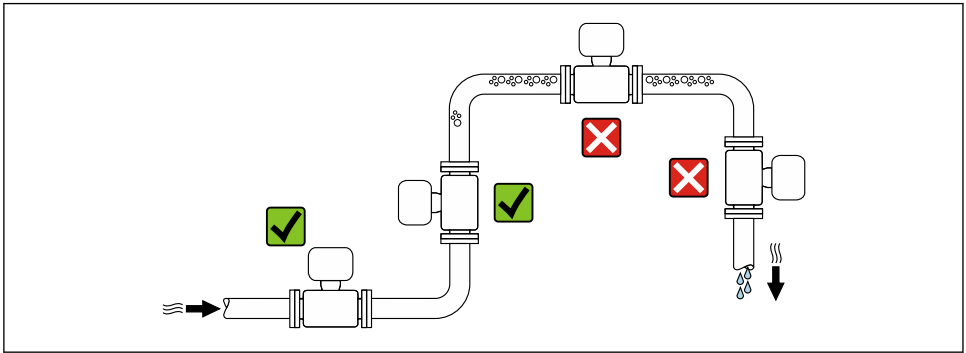
5 Installation

5.1 Installation conditions

No special measures such as supports are necessary. External forces are absorbed by the construction of the device.

5.1.1 Mounting position

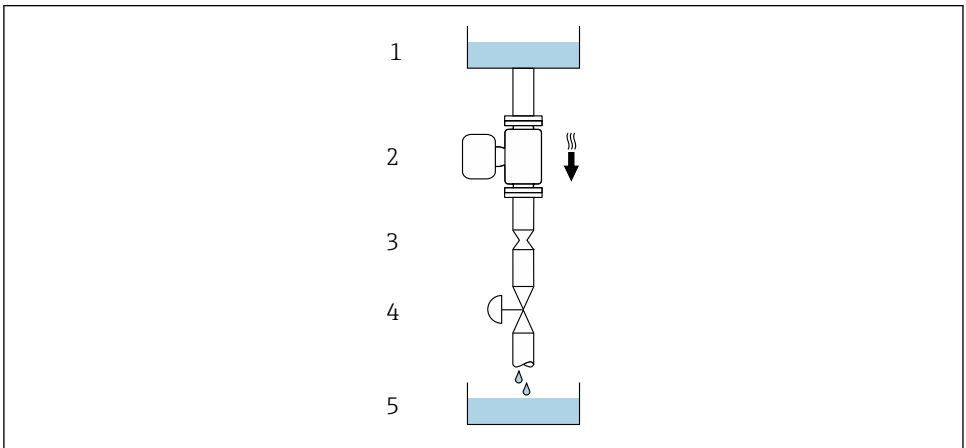
Mounting location



A0028772

Installation in down pipes

However, the following installation suggestion allows for installation in an open vertical pipeline. Pipe restrictions or the use of an orifice with a smaller cross-section than the nominal diameter prevent the sensor running empty while measurement is in progress.



A0028773

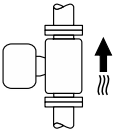
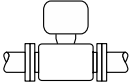
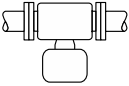
2 Installation in a down pipe (e.g. for batching applications)

- 1 Supply tank
- 2 Sensor
- 3 Orifice plate, pipe restriction
- 4 Valve
- 5 Batching tank

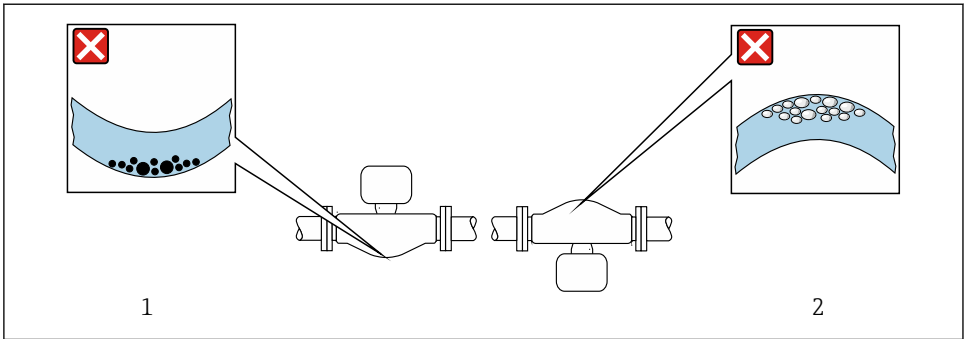
DN		Ø orifice plate, pipe restriction	
[mm]	[in]	[mm]	[in]
300	12	210	8.27
350	14	210	8.27
400	16	210	8.27

Orientation

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

Orientation			Recommendation
A	Vertical orientation	 A0015591	✓✓
B	Horizontal orientation, transmitter at top	 A0015589	✓✓ ¹⁾ → ☒ 3, ☒ 15
C	Horizontal orientation, transmitter at bottom	 A0015590	✓✓ ²⁾ → ☒ 3, ☒ 15
D	Horizontal orientation, transmitter at side	 A0015592	✓→ ☒ 3, ☒ 15

- 1)
- Applications with low process temperatures may decrease 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.



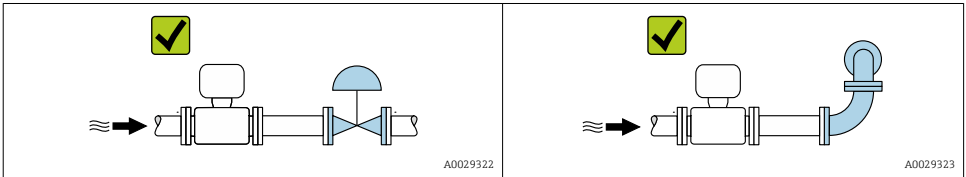
A0028774

3 Orientation of sensor with curved measuring tube

- 1 Avoid this orientation for fluids with entrained solids: Risk of solids accumulating.
- 2 Avoid this orientation for outgassing fluids: Risk of gas accumulating.

Inlet and outlet runs

No special precautions need to be taken for fittings which create turbulence, such as valves, elbows or T-pieces, as long as no cavitation occurs → 16.



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

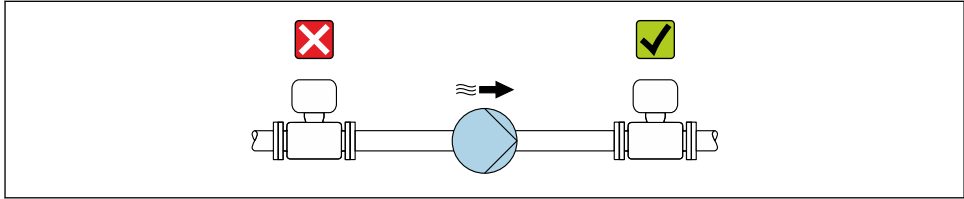
For detailed information on the temperature tables, see the separate document entitled "Safety Instructions" (XA) for the device.

System pressure

It is important that cavitation does not occur, or that gases entrained in the liquids do not outgas. This is prevented by means of a sufficiently high system pressure.

For this reason, the following mounting locations are recommended:

- At the lowest point in a vertical pipe
- Downstream from pumps (no danger of vacuum)



A0028777

Thermal insulation

In the case of some fluids, it is important that the heat radiated from the sensor to the transmitter is kept to a minimum. A wide range of materials can be used for the required insulation.

NOTICE

Electronics overheating on account of thermal insulation!

- Observe maximum permitted insulation height of the transmitter neck so that the transmitter head is completely free.

NOTICE

Promass 100 , 300: Danger of overheating with insulation

- Ensure that the temperature at the lower end of the transmitter housing does not exceed 80 °C (176 °F).

NOTICE

Promass 500: Danger of overheating with insulation

- Ensure that the temperature at the lower end of the sensor connection housing does not exceed 80 °C (176 °F).

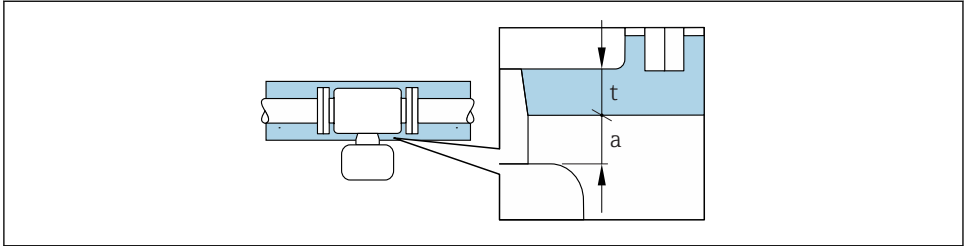
NOTICE

The insulation can also be thicker than the maximum recommended insulation thickness.

Prerequisite:

- Ensure that convection takes place on a sufficiently large scale at the transmitter neck.
- Ensure that a sufficiently large area of the housing support remains exposed. The uncovered part serves as a radiator and protects the electronics from overheating and excessive cooling.

Minimum distance to insulation



A0028853

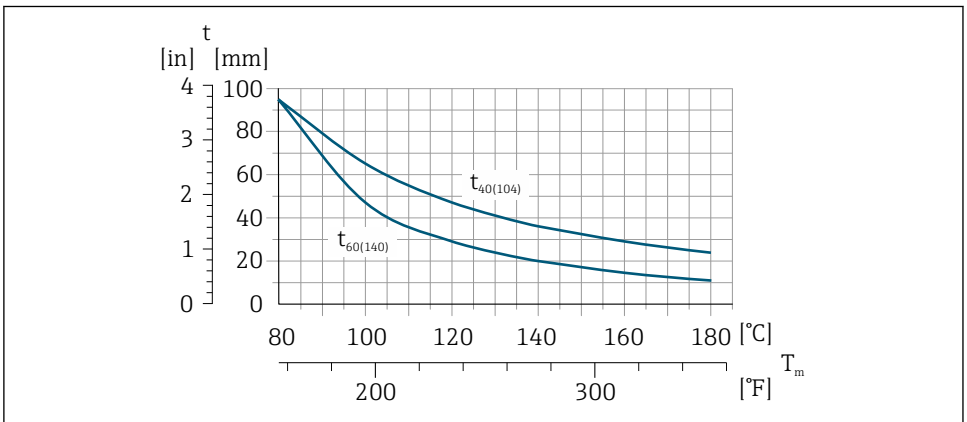
a Minimum distance to insulation

t Maximum insulation thickness

- Promass 100, 300: To ensure that the transmitter remains completely free, the minimum distance *a* from the transmitter to the insulation is 10 mm (0.39 in).
- Promass 200: To ensure that the transmitter remains completely free, the minimum distance *a* from the transmitter to the insulation is 20 mm (0.79 in).
- Promass 500: To ensure that the sensor connection housing remains completely free, the minimum distance *a* from the sensor connection housing to the insulation is 10 mm (0.39 in).

Maximum recommended insulation thickness

Maximum recommended insulation thickness depending on the temperature of the medium and the ambient temperature.



A0029990

t Insulation thickness

T_m Medium temperature

$t_{40(104)}$ Maximum recommended insulation thickness at an ambient temperature of $T_a = 40$ °C (104 °F)

$t_{60(140)}$ Maximum recommended insulation thickness at an ambient temperature of $T_a = 60$ °C (140 °F)

Heating

NOTICE

Electronics can overheat due to elevated ambient temperature!

- ▶ Observe maximum permitted ambient temperature for the transmitter.
- ▶ Depending on the fluid temperature, take the device orientation requirements into account.



Under critical climatic conditions, in particular, it is important to ensure that the temperature difference between the ambient temperature and the fluid temperature is not >100 K. Suitable measures must be taken, such as heating or insulation.

NOTICE

Danger of overheating when heating

- ▶ Ensure that the temperature at the lower end of the transmitter housing does not exceed 80 °C (176 °F).
- ▶ Ensure that convection takes place on a sufficiently large scale at the transmitter neck.
- ▶ Ensure that a sufficiently large area of the housing support remains exposed. The uncovered part serves as a radiator and protects the electronics from overheating and excessive cooling.

Heating options

If a fluid requires that no heat loss should occur at the sensor, users can avail of the following heating options:

- Electrical heating, e.g. with electric band heaters
- Via pipes carrying hot water or steam
- Via heating jackets



For detailed information on heating with electric band heaters, see the Operating Instructions for the device.

Vibrations

The high oscillation frequency of the measuring tubes ensures that the correct operation of the measuring system is not influenced by plant vibrations.

5.1.3 Special mounting instructions

Rupture disk

⚠ WARNING

Limited functional reliability of the rupture disk.

Danger to persons from escaping fluids!

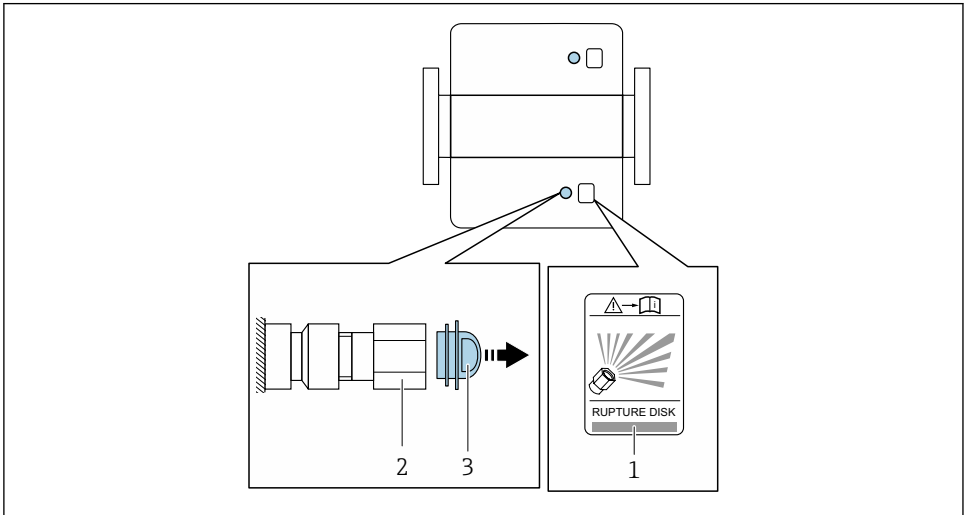
- ▶ Do not remove the rupture disk.
- ▶ When using a rupture disk, do not use a heating jacket.
- ▶ Make sure that the function and operation of the rupture disk is not impeded through the installation of the device.
- ▶ Take precautions to prevent damage and danger to persons if the rupture disk is actuated.
- ▶ Observe information on the rupture disk sticker.

The position of the rupture disk is indicated on a sticker beside it.

The transportation guard must be removed.

The existing connecting nozzles are not intended for the purpose of rinsing or pressure monitoring, but instead serve as the mounting location for the rupture disk.

In the event of a failure of the rupture disk, a discharge device can be screwed onto the internal thread of the rupture disk in order to drain off any escaping medium.



A0029944

- 1 Rupture disk label
- 2 Rupture disk with 1/2" NPT internal thread with 1" width across flat
- 3 Transport protection



For detailed information on the use of a rupture disk: see the Operating Instructions for the device.

Zero point adjustment

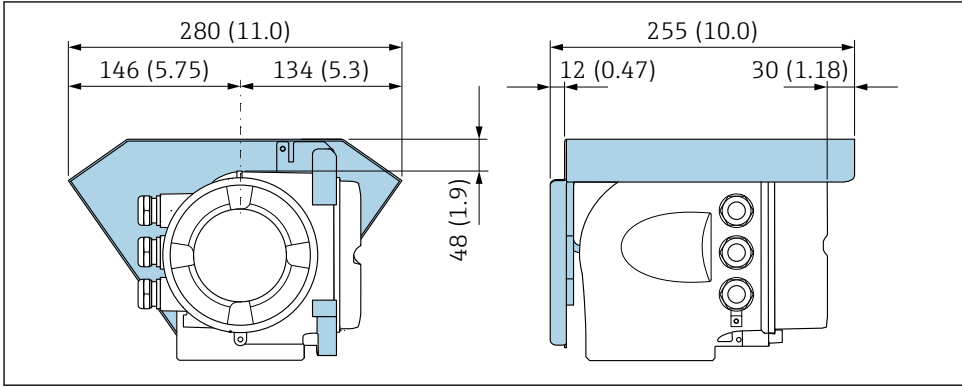
All measuring devices are calibrated in accordance with state-of-the-art technology. Calibration takes place under reference conditions. Therefore, a zero point adjustment in the field is generally not required.

Experience shows that zero point adjustment is advisable only in special cases:

- To achieve maximum measuring accuracy even with low flow rates.
- Under extreme process or operating conditions (e.g. very high process temperatures or very high-viscosity fluids).

Proline 300

Protective cover



A0029553

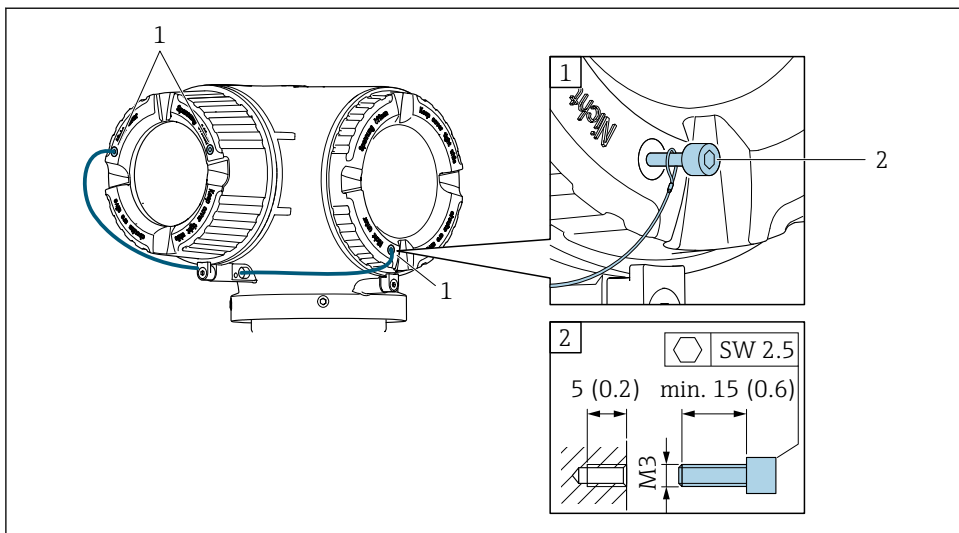
Cover locking

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.

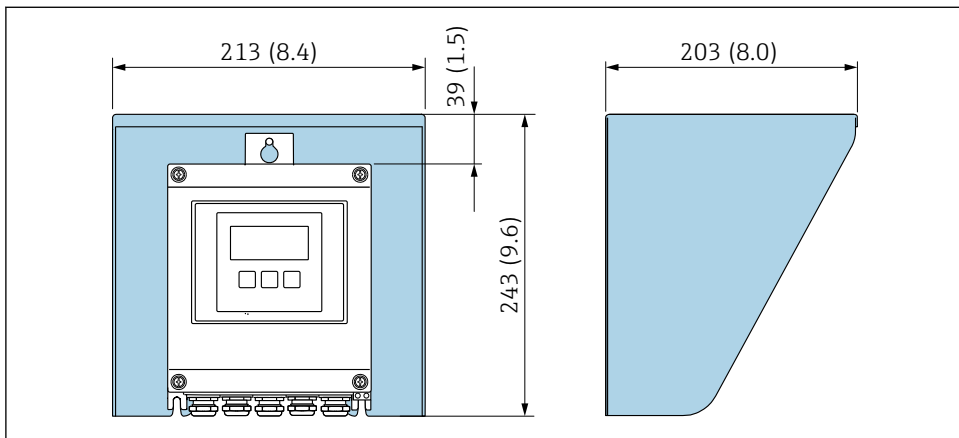


A0029800

- 1 Cover borehole for the securing screw
- 2 Securing screw to lock the cover

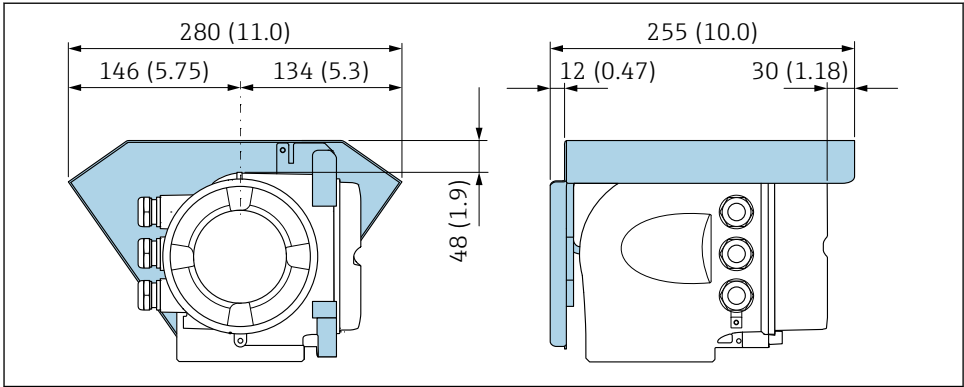
Proline 500

Protective cover



A0029552

- 4 Weather protection cover for Proline 500 – digital



A0029553

5 Weather protection cover for Proline 500

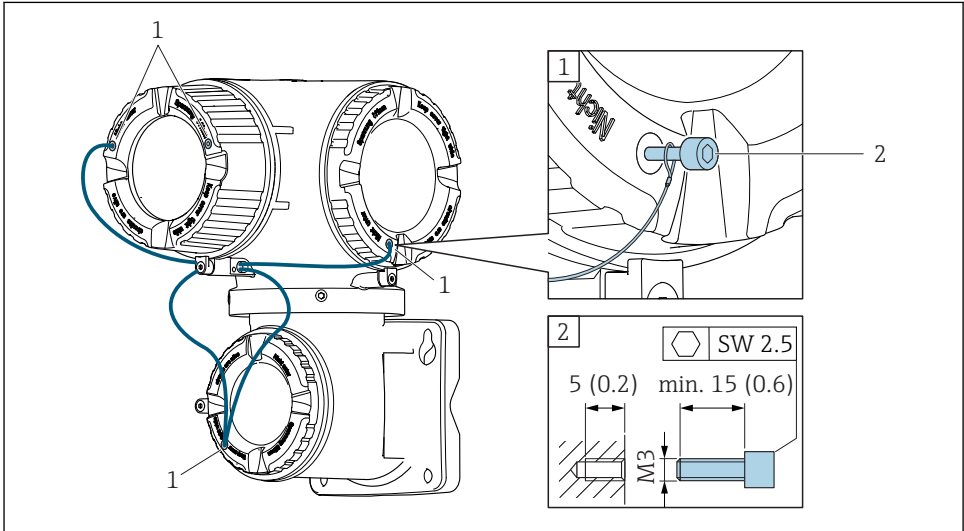
Cover locking

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 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 Ø 6.0 mm

For sensor

For flanges and other process connections: Corresponding mounting tools

5.2.2 Preparing the measuring device

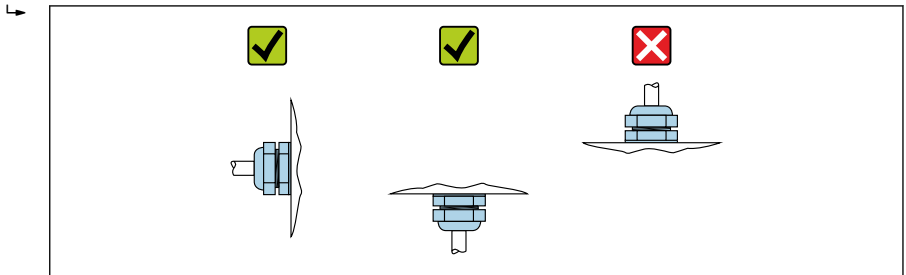
1. Remove all remaining transport packaging.
2. Remove any protective covers or protective caps present from the sensor.
3. Remove stick-on label on the electronics compartment cover.

5.2.3 Mounting the sensor

WARNING

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 nameplate of the sensor matches the flow direction of the fluid.
 2. Install the measuring device or turn the transmitter housing so that the cable entries do not point upwards.



A0029263

5.2.4 Mounting the transmitter housing: 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.

The transmitter can be mounted in the following ways:

- Post mounting
- Wall mounting

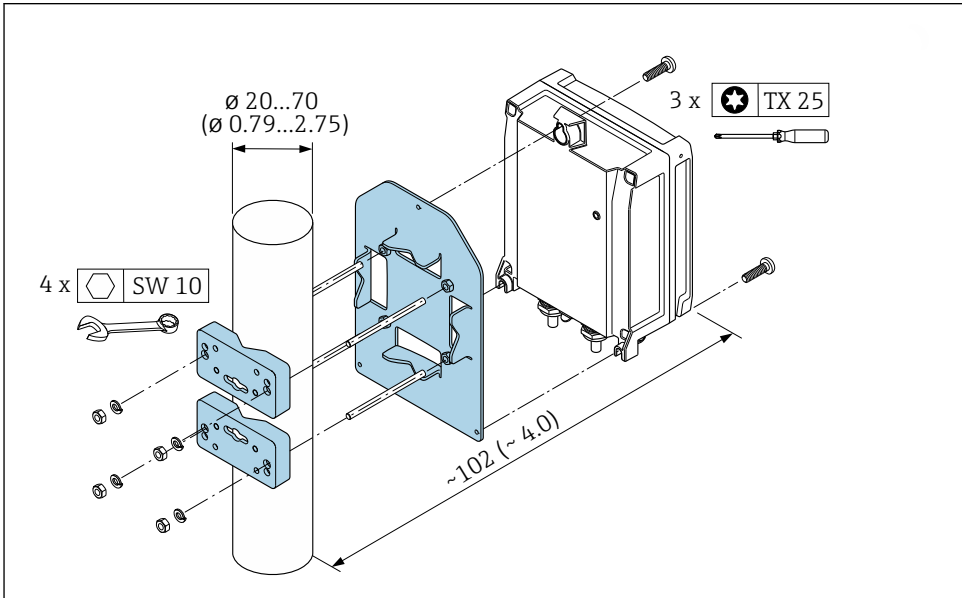
Post mounting

⚠ WARNING

Excessive tightening torque applied to the fixing screws!

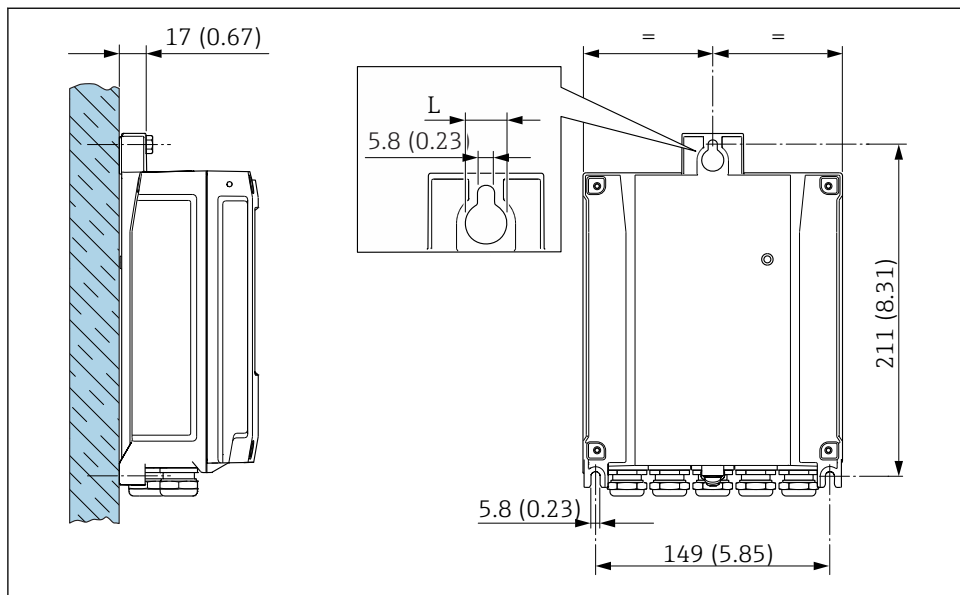
Risk of damaging the plastic transmitter.

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



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Wall mounting



A0029054

7 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)

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

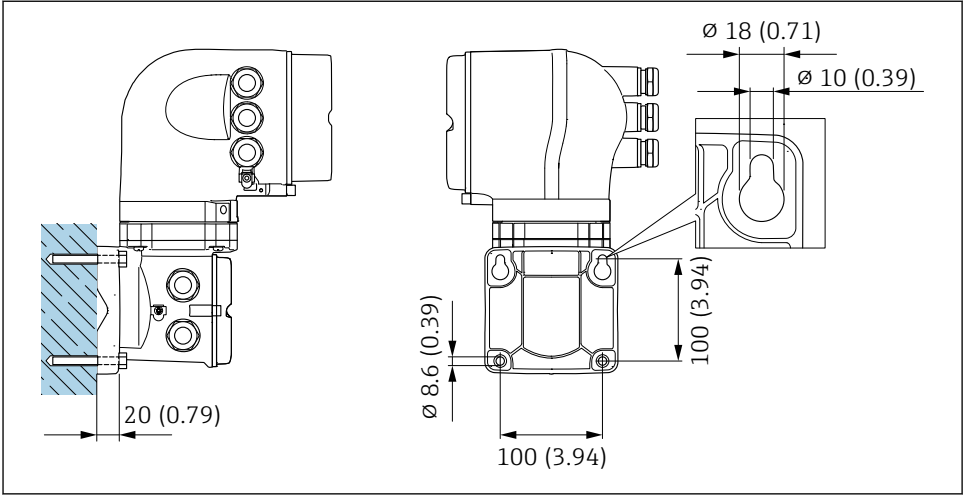
Excessive force can damage the housing!

- ▶ Avoid excessive mechanical stress.

The transmitter can be mounted in the following ways:

- Post mounting
- Wall mounting

Wall mounting



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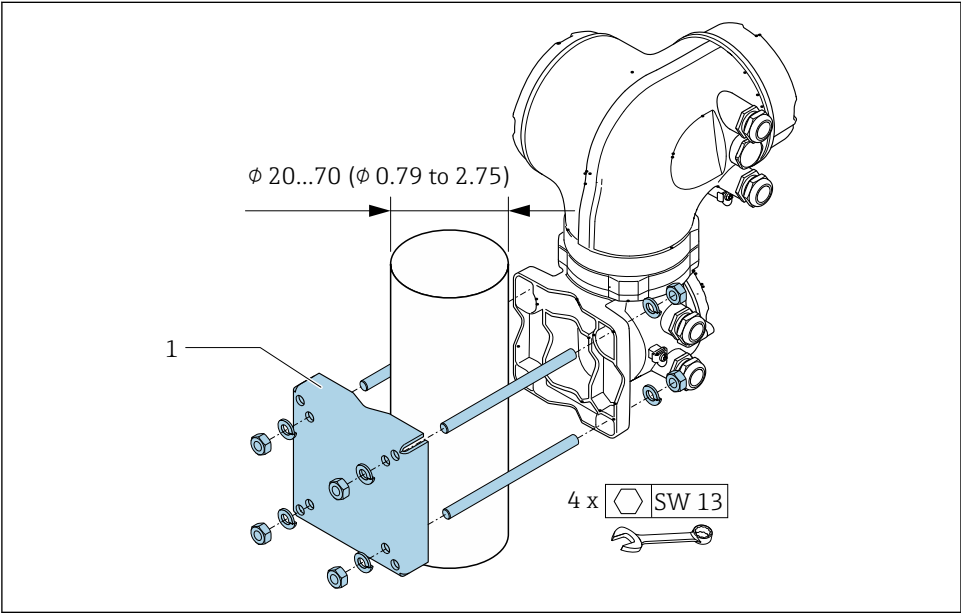
8 Engineering unit mm (in)

Post mounting



Order code for "Transmitter housing", option L "Cast, stainless": cast transmitters are very heavy.

- They are unstable if they are not mounted on a secure, fixed post.
- Only mount the transmitter on a secure, fixed post on a stable surface.



A0029057

9 Engineering unit mm (in)

5.3 Post-installation check

Is the device undamaged (visual inspection)?	☐
Does the measuring device conform to the measuring point specifications? For example: ■ Process temperature ■ Process pressure (refer to the section on "Pressure-temperature ratings" in the "Technical Information" document) ■ Ambient temperature ■ Measuring range	☐
Has the correct orientation for the sensor been selected ? ■ According to sensor type ■ According to medium temperature ■ According to medium properties (outgassing, with entrained solids)	☐
Does the arrow on the sensor nameplate match the direction of flow of the fluid through the piping → 14?	☐

Are the measuring point identification and labeling correct (visual inspection)?	☐
Is the device adequately protected from precipitation and direct sunlight?	☐
Are the securing screw and securing clamp tightened securely?	☐

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.

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