

# Brief Operating Instructions

## Proline t-mass I

Thermal mass flow sensor



These instructions are Brief Operating Instructions; they 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

<b>1</b>	<b>About this document</b> .....	<b>5</b>
1.1	Symbols used .....	5
<b>2</b>	<b>Basic safety instructions</b> .....	<b>7</b>
2.1	Requirements for the personnel .....	7
2.2	Designated use .....	7
2.3	Occupational safety .....	8
2.4	Operational safety .....	8
2.5	Product safety .....	8
2.6	IT security .....	9
<b>3</b>	<b>Incoming acceptance and product identification</b> .....	<b>9</b>
3.1	Incoming acceptance .....	9
3.2	Product identification .....	10
<b>4</b>	<b>Storage and transport</b> .....	<b>11</b>
4.1	Storage conditions .....	11
4.2	Transporting the product .....	11
<b>5</b>	<b>Installation</b> .....	<b>11</b>
5.1	Mounting conditions .....	11
5.2	Mounting the measuring device .....	22
5.3	Post-installation check .....	29
<b>6</b>	<b>Disposal</b> .....	<b>30</b>
6.1	Removing the measuring device .....	30
6.2	Disposing of the measuring device .....	30

# 1 About this document

## 1.1 Symbols used

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





### 1.1.4 Communication symbols

Symbol	Meaning	Symbol	Meaning
	<p><b>Wireless Local Area Network (WLAN)</b>                      Communication via a wireless, local network.</p>		<p><b>Bluetooth</b>                      Wireless data transmission between devices over a short distance.</p>
	<p><b>Promag 800 Cellular radio</b>                      Bidirectional data exchange via cellular network.</p>		<p><b>LED</b>                      Light emitting diode is off.</p>
	<p><b>LED</b>                      Light emitting diode is on.</p>		<p><b>LED</b>                      Light emitting diode is flashing.</p>

### 1.1.5 Tool symbols

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

### 1.1.6 Symbols in graphics

Symbol	Meaning	Symbol	Meaning
1, 2, 3,...	Item numbers		Series of steps
A, B, C, ...	Views	A-A, B-B, C-C, ...	Sections
	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 this manual is intended only for the flow measurement of 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 or where there is an increased risk due to process pressure, are labeled accordingly on the nameplate.

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

- ▶ Keep within the specified pressure and temperature range.
- ▶ Only use the measuring device in full compliance with the data on the nameplate and the general conditions listed in the Operating Instructions and supplementary documentation.
- ▶ Based on the nameplate, check whether the ordered device is permitted for the intended use in the hazardous area (e.g. explosion protection, pressure vessel safety).
- ▶ Use the measuring device only for media to which the process-wetted materials are sufficiently resistant.
- ▶ If the 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.

#### 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.

**⚠ WARNING****Injury from sensor being ejected!**

- ▶ The sensor gland should be opened only when in an unpressurized state.

**NOTICE****Penetration of dust and moisture when the transmitter housing is opened.**

- ▶ Only open the transmitter housing briefly, ensuring that no dust or moisture enters the housing.

**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 Occupational safety

When working on and with the device:

- ▶ Wear the required personal protective equipment as per 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, wear suitable gloves.

## 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

Our warranty is valid only 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 settings.

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

## 3 Incoming acceptance and product identification

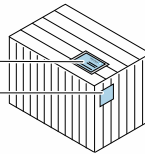
### 3.1 Incoming acceptance



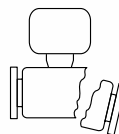
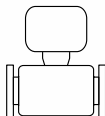
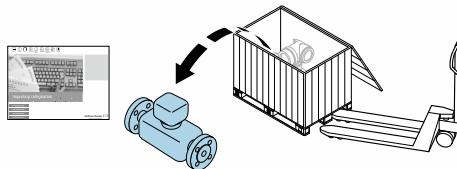
1  
2



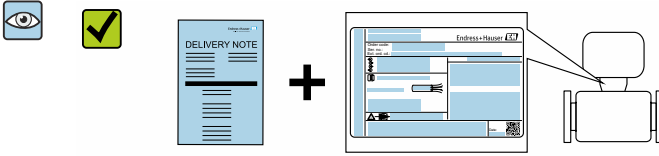
1  
2



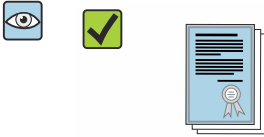
Are the order codes on the delivery note (1) and the product sticker (2) identical?



Are the goods undamaged?



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



Is the envelope present with accompanying documents?

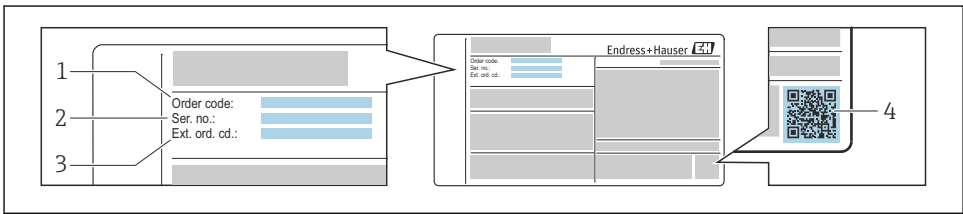
- i

  - 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 serial numbers from nameplates in the *W@M Device Viewer* ([www.endress.com/deviceviewer](http://www.endress.com/deviceviewer)): All information about the device is displayed.
- Enter the serial number from nameplates in the *Endress+Hauser Operations App* or scan the 2-D matrix code (QR code) on the nameplate using the *Endress+Hauser Operations App*: All 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.
- ▶ 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.



Do not remove protection caps. They prevent mechanical damage.

## 5 Installation

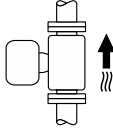
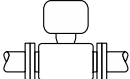
### 5.1 Mounting conditions

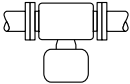

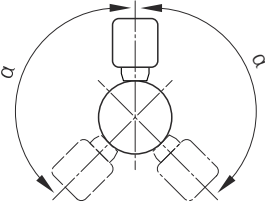
No special measures such as supports are necessary. External forces are absorbed by the construction of the device.

#### 5.1.1 Mounting position

##### Orientation

The direction of flow must match the direction of the arrow on the sensor. In the case of the bidirectional sensor, the arrow points in the positive direction. When performing bidirectional measurement, the sensing element must be installed with an accuracy of 3°.

Orientation		Recommendation
Vertical orientation	 <p style="text-align: right; font-size: small;">A0015591</p>	<input checked="" type="checkbox"/> <sup>1)</sup>
Horizontal orientation, transmitter head up	 <p style="text-align: right; font-size: small;">A0015589</p>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>

Orientation		Recommendation
Horizontal orientation, transmitter head down	 <p style="text-align: right;">A0015590</p>	<input checked="" type="checkbox"/> <sup>2)</sup>
Horizontal orientation, transmitter head at side	 <p style="text-align: right;">A0015592</p>	<input checked="" type="checkbox"/>
Inclined orientation, transmitter head down	 <p style="text-align: right;">A0015773</p>	<input checked="" type="checkbox"/> <sup>2)</sup>

- 1) In the case of saturated or impure gases, vertical orientation is preferred in order to minimize condensation or contamination. For bidirectional sensors, select horizontal orientation.
- 2) Select inclined orientation ( $\alpha = \text{approx. } 135^\circ$ ) for very wet or water-saturated gas (e.g. digester gas, undried compressed air), or if deposits or condensate are constantly present.

## Pipes

**The measuring device must be professionally installed, and the following points must be observed:**

- Weld pipes professionally.
- Use seals of the correct size.
- Align flanges and seals correctly.
- Remove protection cap from sensing element.
- Following installation, the pipe must be free from dirt and particles in order to avoid damage to the sensors.
- For further information → ISO standard 14511.

## Insertion depth

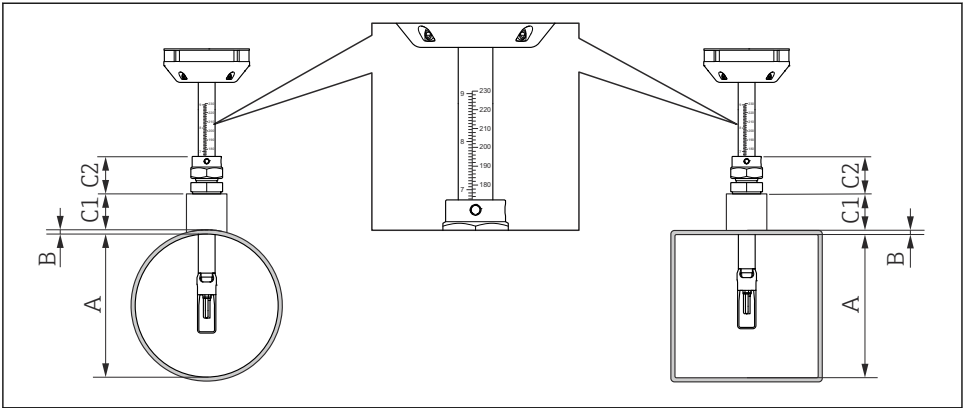
The minimum length of the insertion version can be determined using the Endress+Hauser Applicator program or with the calculation formula below. The calculated necessary insertion depth must be within the adjusting range of the selected insertion version.

### NOTICE

**Metal ferrules undergo plastic deformation during the initial installation.**

As a result the insertion depth is fixed after initial installation and the ferrules can no longer be replaced.

- ▶ Pay attention to information on preconditions and on determining the insertion depth.
- ▶ Check the insertion depth closely before tightening the ferrules.



A0039548

**2** Determine the dimensions A, B, C1 and C2

- A In the case of a circular pipe: the pipe internal diameter (DN); in the case of a duct: the inner dimension
- B Thickness of pipe wall or of duct wall
- C1 Mounting kit
- C2 Sensor's compression fitting

*Calculating the insertion depth*

Insertion depth =  $(0.3 \cdot A) + B + (C1 + C2)$

**i** The insertion depth must be at least 100mm.

*Determining dimensions C1 and C2*

*If only Endress+Hauser mounting bosses are used*

<b>Mounting boss 1" NPT</b>	C1 + C2 = 112 mm (4.409 in)
<b>Mounting boss G1"</b>	C1 + C2 = 106 mm (4.173 in)
<b>Mounting boss ¾" NPT</b>	C1 + C2 = 108 mm (4.252 in)
<b>Mounting boss G¾"</b>	C1 + C2 = 105 mm (4.134 in)

**i** If a cold/hot tap is used, use dimension "L" instead of "C1".

**i** Use Applicator to determine dimensions C1 and C2 if using other E+H mounting kits (e.g. cold/hot taps).

*If not exclusively using Endress+Hauser mounting bosses*

C1	Length of pipe connection used
C2 (compression fitting with 1" NPT thread)	52 mm (2.047 in)
C2 (compression fitting with G1" thread)	46 mm (1.811 in)
C2 (compression fitting with ¾" NPT thread)	48 mm (1.889 in)
C2 (compression fitting with G¾" thread)	45 mm (1.772 in)

*Selecting the length of the insertion version*

Select the length of the insertion version using the calculated insertion depth and the following table. The insertion depth must be within the adjusting range of the insertion version.

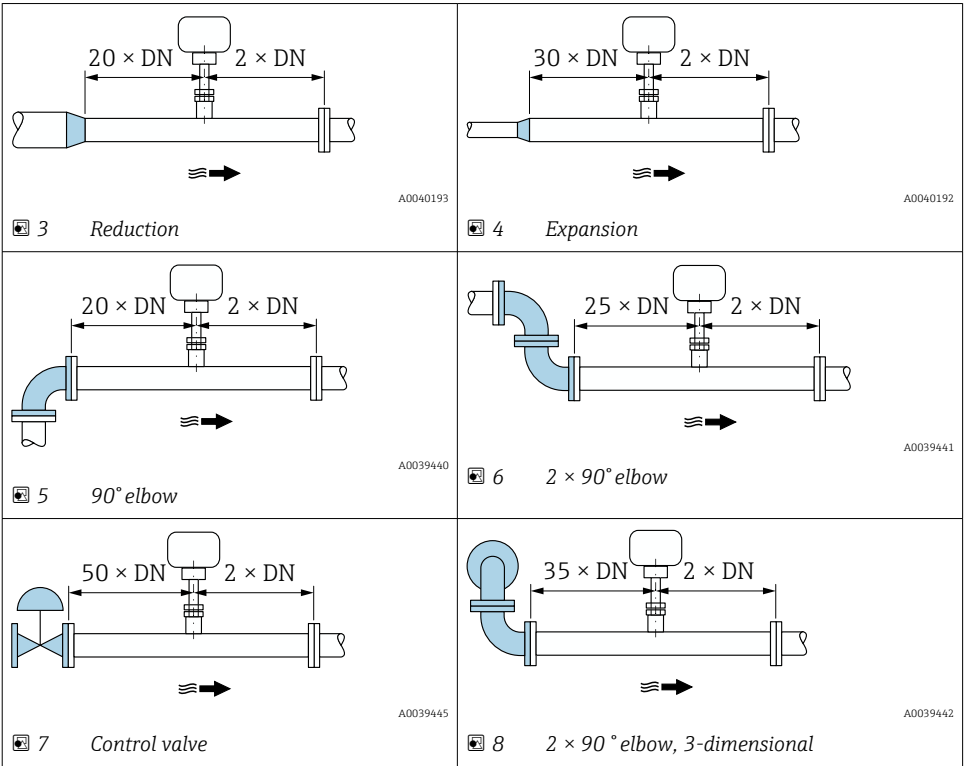
Length of insertion tube		Adjusting range (insertion depth)	
[mm]	[in]	[mm]	[in]
235	9	100 to 235	3.9 to 9.3
335	13	100 to 335	3.9 to 13.2
435	17	100 to 435	3.9 to 17.1
608	24	100 to 608	3.9 to 23.9

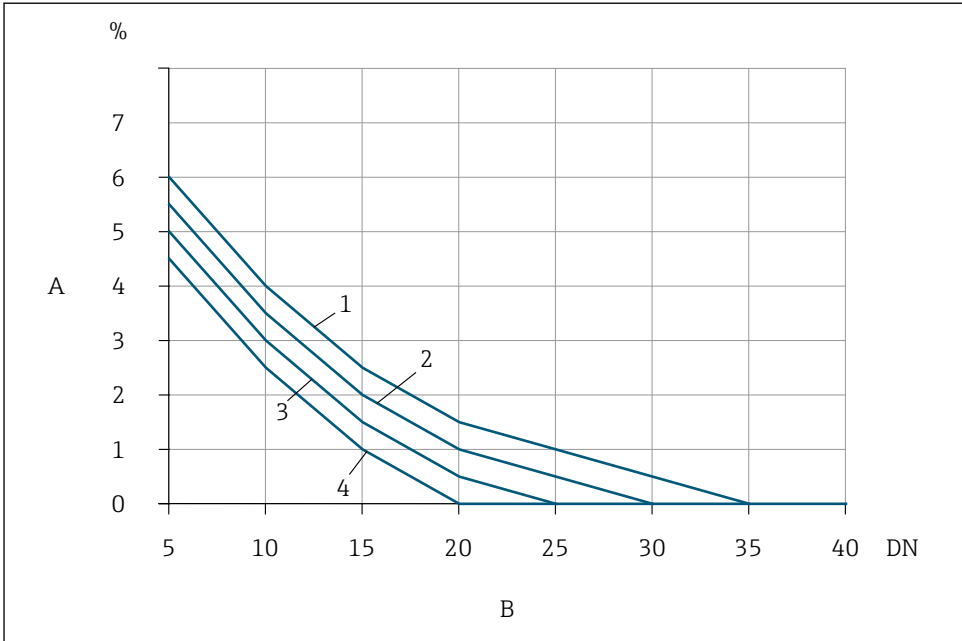
### **Inlet and outlet runs**

A fully developed flow profile is a requirement for optimal thermal flow measurement.

To achieve the best possible measuring performance, observe the following inlet and outlet runs at the very minimum.

- In the case of bidirectional sensors, also observe the recommended inlet run in the opposite direction.
- If several flow disturbances are present, use flow conditioners.
- Use flow conditioners if it is not possible to observe the required inlet runs.
- In the case of control valves, the amount of disturbance depends on the valve type and opening degree. The recommended inlet run for control valves is  $50 \times \text{DN}$ .
- In the case of very light gases (helium, hydrogen), the recommended inlet run must be doubled.





A0045846

9 The additional measured error to be expected without flow conditioners depending on the disturbance type and inlet run

- A Additional measured error (%)  
 B Inlet run (DN)  
 1  $2 \times 90^\circ$  elbow, 3-dimensional  
 2 Expansion  
 3  $2 \times 90^\circ$  elbow  
 4 Reduction or  $90^\circ$  elbow

#### Flow conditioner

Use flow conditioners if it is not possible to observe the required inlet runs. Flow conditioners improve the flow profile and therefore reduce the necessary inlet runs.

Mount the flow conditioner in flow direction in front of the measuring device.

Available in the following flange standards:

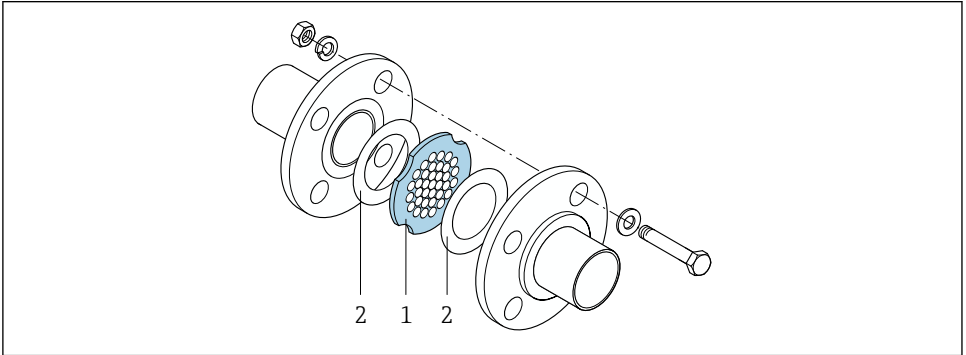
- ASME B16.5 Cl. 150/Cl. 300
- EN 1092-1 PN10/PN16/PN25/PN40
- JIS B2220 10K/20K

Available in the following line sizes:

- DN 80 (3")
- DN 100 (4")
- DN 150 (6")

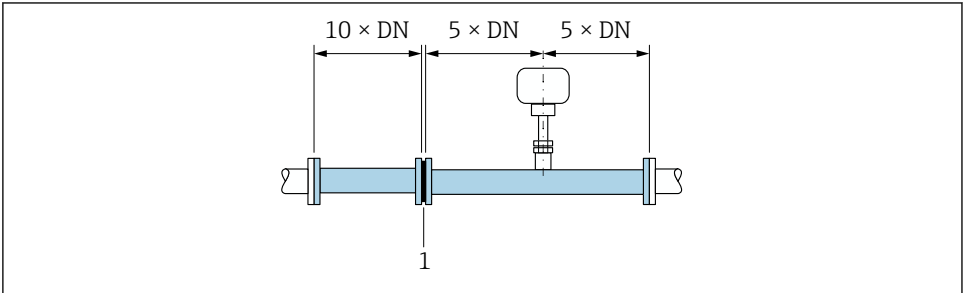


- DN 200 (8")
- DN 250 (10")
- DN 300 (12")



A0039538

- 1 Flow conditioner
- 2 Seal



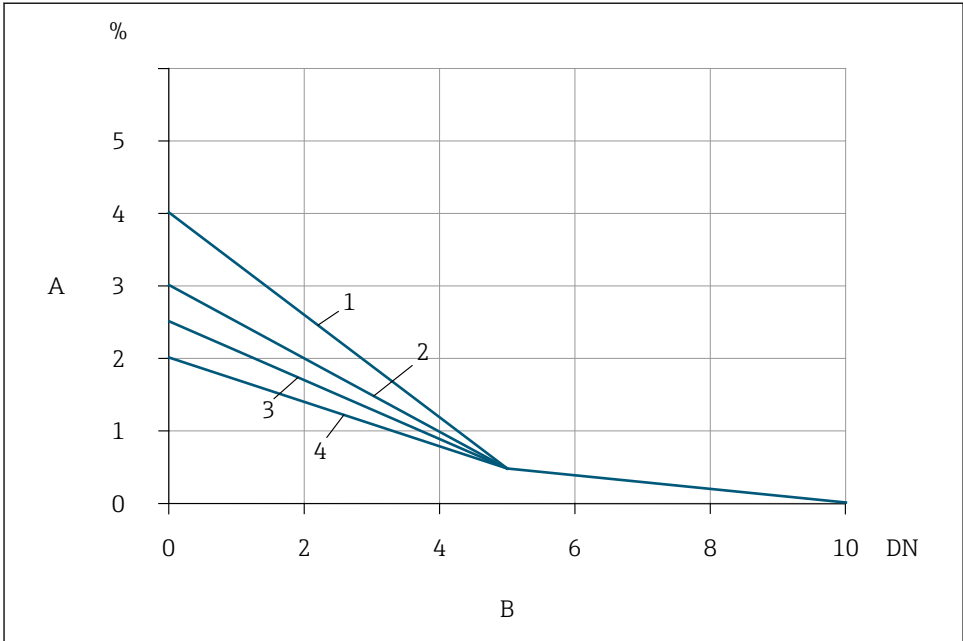
A0039424

☑ 10 Recommended inlet and outlet runs when using a flow conditioner

- 1 Flow conditioner



In the case of bidirectional sensors, also observe the inlet run in the opposite direction.



A0039508

11 The additional measured error to be expected with flow conditioners depending on the disturbance type and inlet run

- A Additional measured error (%)  
 B Inlet runs upstream of the flow conditioner (DN)  
 1  $2 \times 90^\circ$  elbow, 3-dimensional  
 2 Expansion  
 3  $2 \times 90^\circ$  elbow  
 4 Reduction or  $90^\circ$  elbow

The pressure loss for flow conditioners is calculated as follows:  $\Delta p \text{ [mbar]} = 0.0085 \cdot \rho \text{ [kg/m}^3] \cdot v^2 \text{ [m/s]}$

Example of air

$p = 10 \text{ bar abs.}$

$t = 25^\circ \text{C} \rightarrow \rho = 11.71 \text{ kg/m}^3$

$v = 10 \text{ m/s}$

$\Delta p = 0.0085 \cdot 11.71 \cdot 10^2 = 9.95 \text{ mbar}$

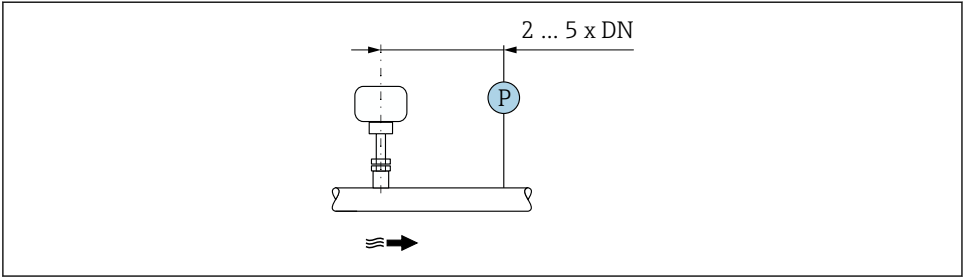
$\rho$  : density of the process medium

$v$  : average flow velocity


abs. = absolute

### Outlet runs with pressure measuring points

Install the pressure measuring point downstream of the measuring system. This prevents the pressure transmitter from potentially affecting the flow in the measuring point.

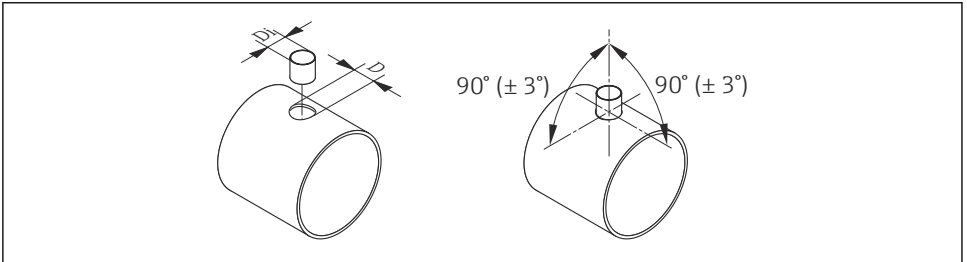


A0039447

 12 Installation of a pressure measuring point (P = pressure transmitter)

### Installation conditions for nipples

 Suitable support brackets must be used if installing in rectangular air ducts (or pipes with thin walls).




A0040684

$D$   $\varnothing 31.0 \pm 0.5 \text{ mm}$  ( $1.22 \pm 0.019 \text{ in}$ )

$D_i$   $\varnothing 23.0 \pm 0.5 \text{ mm}$  ( $0.91 \pm 0.019 \text{ in}$ )

## 5.1.2 Environment and process 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

Pressure-reducing valves and some compressor systems can generate significant process pressure variations that can distort the flow profile. This can produce an additional measured error. Suitable measures must be taken to reduce these pressure pulses, such as:

- The use of expansion tanks
- The use of inlet diffusers
- Positioning the measuring device further downstream

To avoid pulsating flow and contamination from oil/dirt in compressed air applications, it is recommended to install the measuring device downstream of filter, drying and storage devices. Do not install the measuring device directly after the compressor.

## Thermal insulation

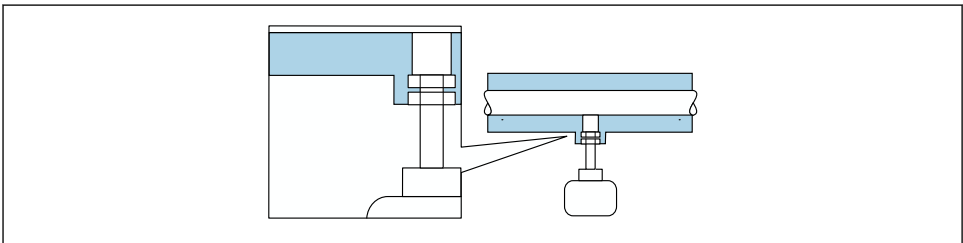
In the case of some fluids, it is important to keep the heat radiated from the sensor to the transmitter to a low level. A wide range of materials can be used for the required insulation.

If the gas is very wet or saturated with water (e.g. digester gas), the pipe and the sensor housing should be insulated, and heated where necessary, to prevent water droplets condensing on the sensing element.


### NOTICE

#### Electronic overheating on account of thermal insulation!

- ▶ Recommended orientation: horizontal orientation, transmitter housing sensor connection housing pointing downwards.
- ▶ Do not insulate the transmitter housing sensor connection housing.
- ▶ Maximum permissible temperature at the lower end of the transmitter housing sensor connection housing: 80 °C (176 °F)
- ▶ Thermal insulation with not isolated extended neck: We recommend that you do not insulate the extended neck in order to ensure optimum dissipation of heat.



A0039420

 13 Thermal insulation with not isolated extended neck

## Heating

### NOTICE

#### **Electronics can overheat due to elevated ambient temperature!**

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

### NOTICE

#### **Electronics overheating on account of thermal insulation!**

- ▶ Recommended orientation: horizontal orientation, transmitter housing sensor connection housing pointing downwards.
- ▶ Do not insulate the transmitter housing sensor connection housing.
- ▶ Maximum permissible temperature at the lower end of the transmitter housing sensor connection housing: 80 °C (176 °F)
- ▶ Thermal insulation with extended neck free: We recommend that you do not insulate the extended neck in order to ensure optimum dissipation of heat.

### 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 sufficient convection takes place at the transmitter neck.
- ▶ When using in potentially explosive atmospheres, observe the information in the device-specific Ex documentation. For detailed information on the temperature tables, see the separate document entitled "Safety Instructions" (XA) for the device.
- ▶ Ensure that a sufficiently large area of the transmitter neck 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

### 5.1.3 Special mounting instructions

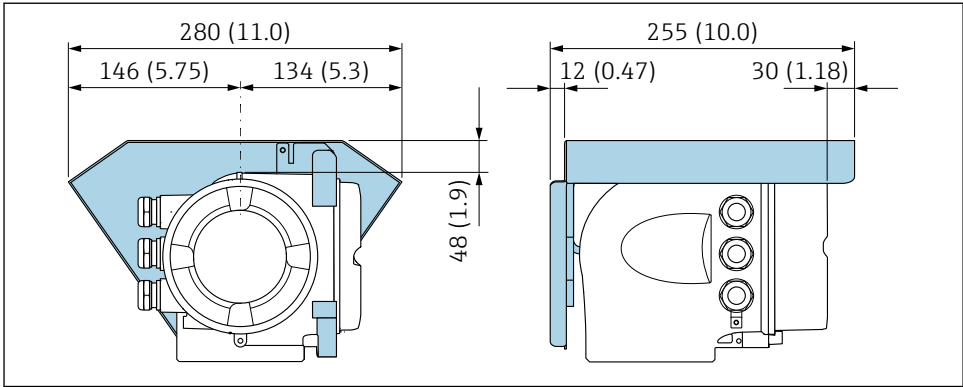
#### **Zero point adjustment**

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:

- If strict measuring accuracy requirements apply.
- Under extreme process or operating conditions (e.g. very high process temperatures or light gases (helium, hydrogen)).

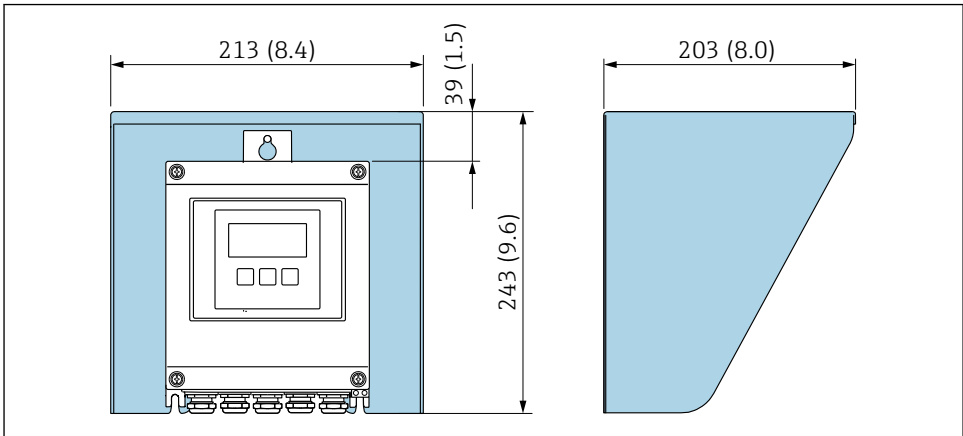
### Weather protection cover



A0029553

14 Engineering unit mm (in)

### Weather protection cover



A0029552

15 Weather protection cover for Proline 500 – digital; engineering unit mm (in)

## 5.2 Mounting the measuring device

### 5.2.1 Required tool

#### For sensor

Sensor's compression fitting; 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.

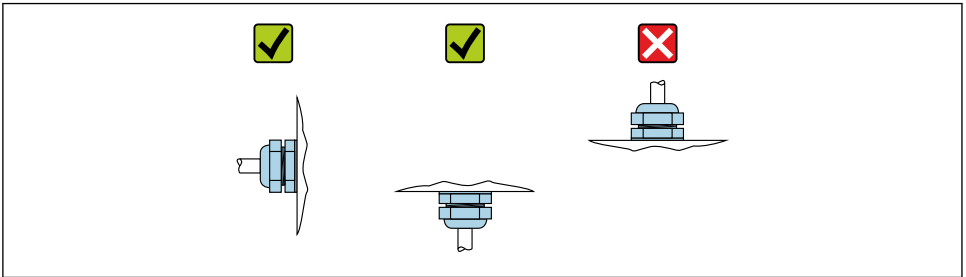
### 5.2.3 Mounting the sensor

#### **⚠ WARNING**

#### **Danger due to improper process sealing!**

- ▶ Ensure that the seals are clean and undamaged.
- ▶ Ensure that the correct sealing material is used (e.g. Teflon tape for NPT compression fitting).
- ▶ Secure the seals correctly.

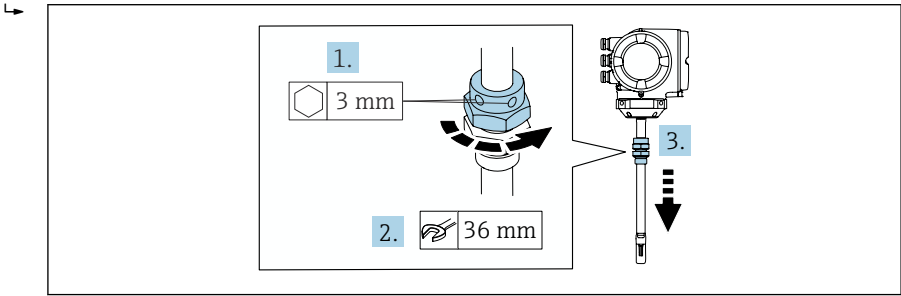
Install the measuring device or turn the transmitter housing so that the cable entries do not point upwards.



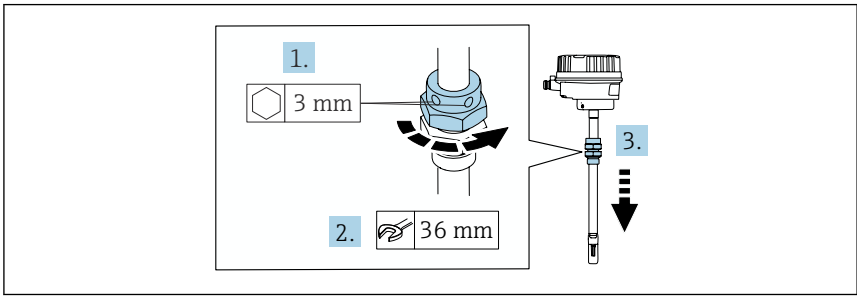
A0029263

1. Weld in the mounting boss in accordance with the requirements.

2. Loosen the union nut (1) and push down the compression fitting (2).



A0041022



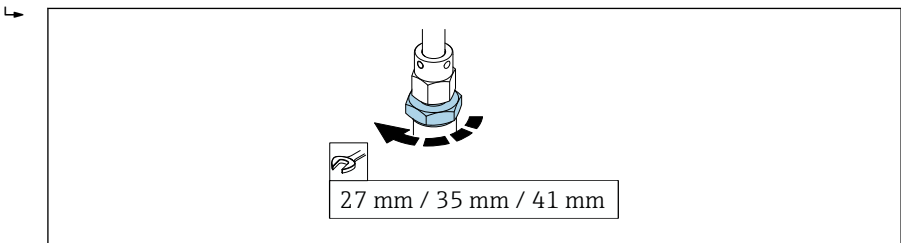
A0041023

3. **NOTICE**

**Damage to the sensing element!**

- Make sure the sensing elements do not hit against anything.

Using a wrench (27 mm / 35 mm / 41 mm), tighten the bottom nut of the compression fitting to the end stop.

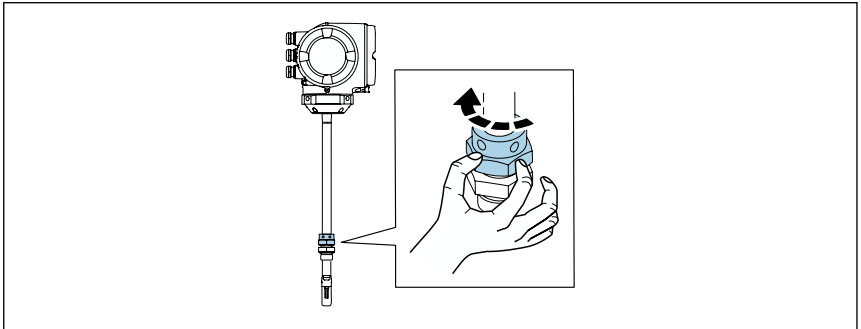


A0036810

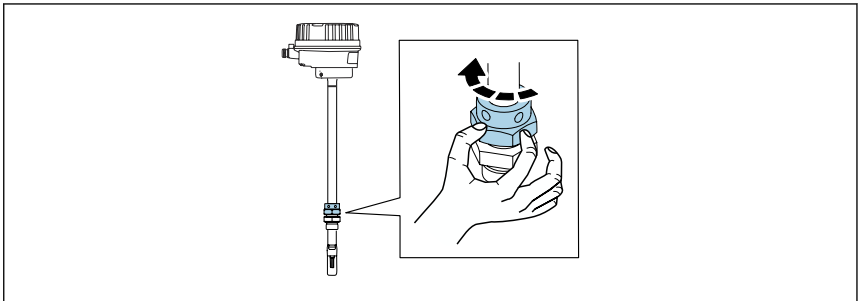
4. Now read off the previously calculated insertion depth from the scale and insert the sensor until this value is at the same height as the upper end of the compression fitting.



- 5. Tighten the union nut by hand. It should still be possible to move the sensor slightly.



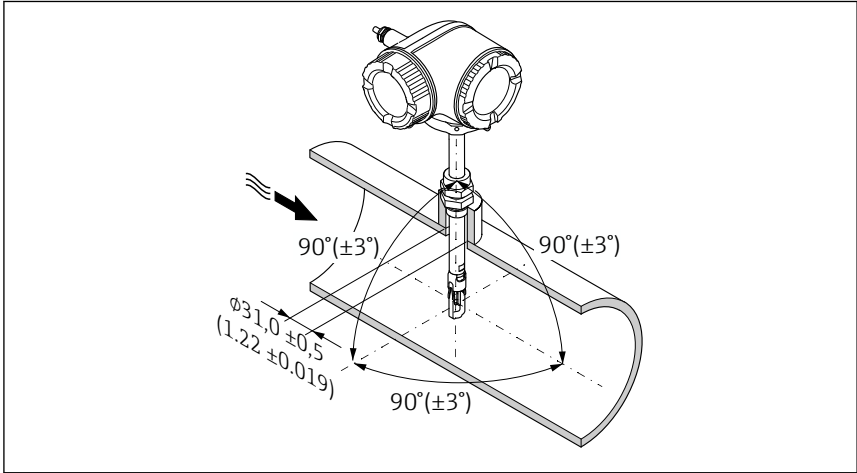
A0041024



A0041025

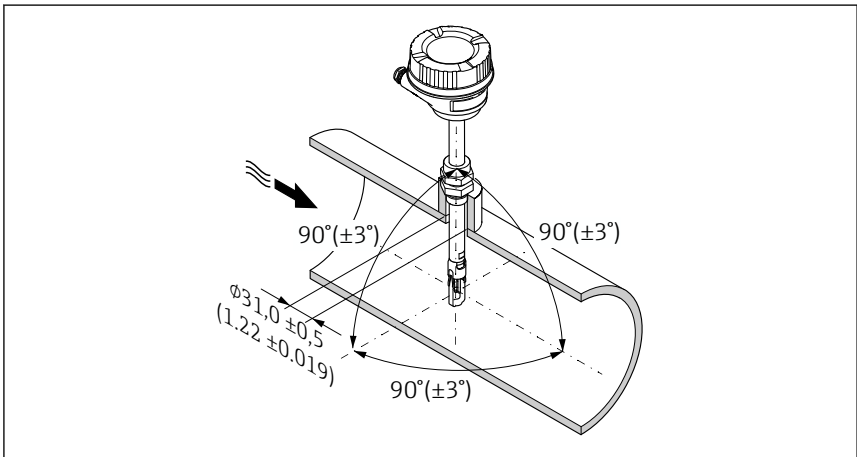
**6.** Align the sensor with the flow direction.

- ↳ Pay attention to the direction of the arrow on the neck section of the sensor for the flow direction.  
The maximum permitted deviation from the flow direction is 3°.



A0039511

16 Engineering unit: mm (in)



A0039512

17 Engineering unit: mm (in)

**7. Depending on the process connection:**

Tighten union nut with x turns:

- ↳ For PEEK ferrules continue with Step 8.
- ↳ For metal ferrules continue with Step 9.

**8. For PEEK ferrules:**

Mounting for the first time: tighten union nut with 1¼ turns. Repeat mounting: tighten union nut with 1 turn.

↳ **Tip** If strong vibrations can be expected, tighten the union nut with 1½ turns when mounting for the first time.

**9. For metal ferrules:**

Mounting for the first time: tighten union nut with 1¼ turns. Repeat mounting: tighten union nut with ¼ turn.

**10.** Tighten both securing screws again with a 3 mm (⅛ in) Allen screw with 4 Nm (2.95 lbf ft).

↳ It is now no longer possible to move the sensor.

**11.** Check the measuring point for leaks (max. process pressure).**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.

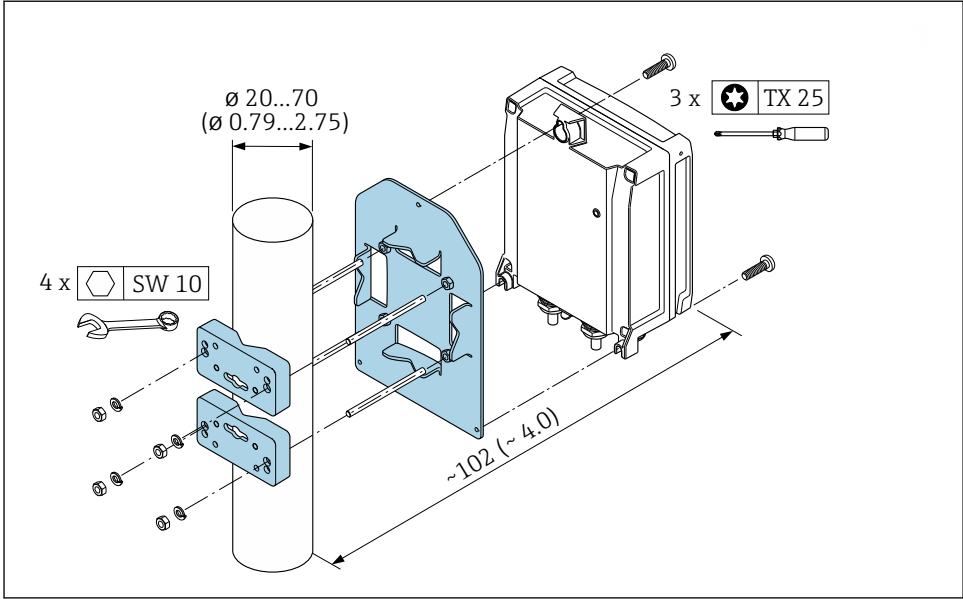
The transmitter can be mounted in the following ways:

- Post mounting
- Wall mounting

**Post mounting****⚠ WARNING****Excessive tightening torque applied to the fixing screws!**

Risk of damaging the plastic transmitter.

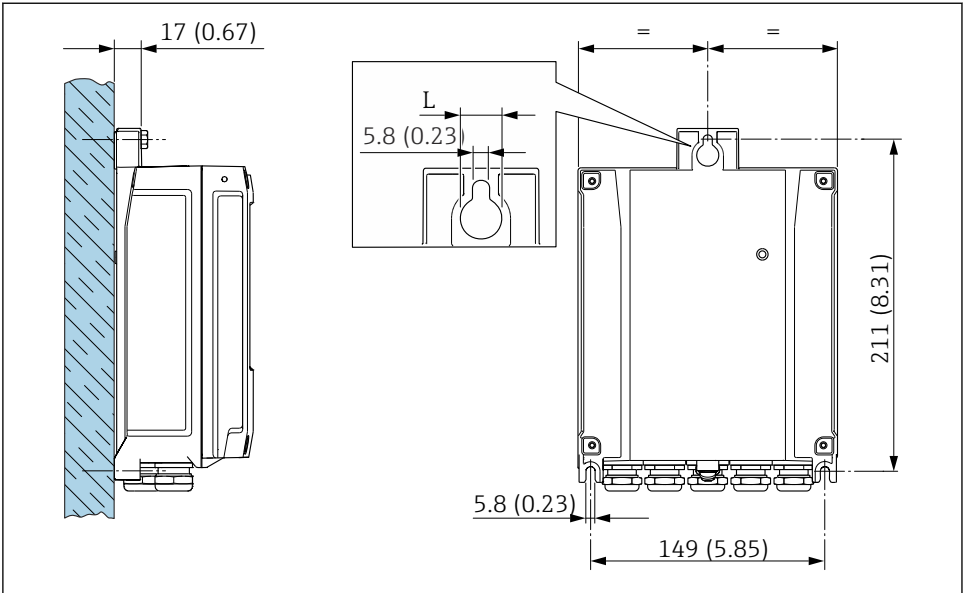
- ▶ Tighten the fixing screws as per the tightening torque: 2 Nm (1.5 lbf ft)



A0029051

18 Engineering unit mm (in)

### Wall mounting



A0029054

19 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)

### 5.3 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 (refer to the "Process" section of the "Technical Information" document)</li> <li>▪ Process pressure (refer to the "Pressure-temperature ratings" section of the "Technical Information" document)</li> <li>▪ Ambient temperature</li> <li>▪ Measuring range (refer to the "Input" section of the "Technical Information" document on the CD-ROM provided)</li> </ul>	<input type="checkbox"/>
Has the correct orientation been selected for the sensor → 11? <ul style="list-style-type: none"> <li>▪ According to sensor type</li> <li>▪ According to medium properties</li> <li>▪ According to medium temperature</li> <li>▪ According to process pressure</li> </ul>	<input type="checkbox"/>

Does the arrow on the sensor match the actual direction of flow of the medium through the piping ?	<input type="checkbox"/>
Have sufficient inlet and outlet runs been provided upstream and downstream of the measuring point →  14?	<input type="checkbox"/>
Correct sensor insertion depth?	<input type="checkbox"/>
Is the device adequately protected from precipitation and direct sunlight?	<input type="checkbox"/>
Is the device protected against overheating?	<input type="checkbox"/>
Is the device protected against excessive vibrations?	<input type="checkbox"/>
Gas property checked (e.g. purity, dryness, cleanness)?	<input type="checkbox"/>
Are the measuring point identification and labeling correct (visual inspection)?	<input type="checkbox"/>
Are the securing screw and securing clamp tightened securely?	<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 Endress+Hauser 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.



71528706

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

---