

# Brief Operating Instructions

## Proline Prosonic Flow I

Ultrasonic time-of-flight sensor



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

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

Contain information about the sensor.

Brief Operating Instructions Part 2 of 2: Transmitter

→  3.



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## Brief operating instructions Flowmeter

The device consists of a transmitter and a sensor.

The process of commissioning these two components is described in two separate manuals which 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
- Mounting procedure

### 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
- Mounting procedure
- 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*

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

### 1.1.4 Tool symbols

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

### 1.1.5 Symbols in graphics

Symbol	Meaning	Symbol	Meaning
1, 2, 3,...	Item numbers	<u>1.</u> , <u>2.</u> , <u>3.</u> ...	Series of steps
A, B, C, ...	Views	A-A, B-B, C-C, ...	Sections
	Hazardous area		Safe area (non-hazardous area)
	Flow direction		

## 2 Basic safety instructions

### 2.1 Requirements for the personnel

The personnel must fulfill the following requirements for its tasks:

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

## 2.2 Intended use

### Application and media

The measuring device described in these Operating Instructions is intended only for the flow measurement of liquids.

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

Measuring devices for use in explosive atmospheres, in hygienic applications or where there is a high risk of pressures, are labeled accordingly on the nameplate.

To ensure that the measuring device is in proper condition during the operation period:

- ▶ 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.
- ▶ Refer to the nameplate to check whether the ordered instrument can be operated for the intended application in areas requiring specific approvals (e. g. explosion protection, pressure equipment safety).
- ▶ Use the measuring device only for media to which the process-wetted materials are sufficiently resistant.
- ▶ Keep within the specified pressure and temperature range.
- ▶ Keep within the specified ambient temperature range.
- ▶ 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.

### Residual risks

#### CAUTION

**Risk of hot or cold burns! The use of media and electronics with high or low temperatures can produce hot or cold surfaces on the device.**

- ▶ Mount suitable touch protection.
- ▶ Use suitable protective equipment.

## 2.3 Workplace safety

When working on and with the device:

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

## 2.4 Operational safety

Risk of injury!

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

## 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. The manufacturer confirms this by affixing the CE mark to the device..

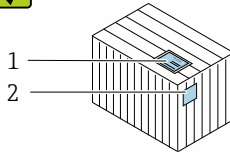
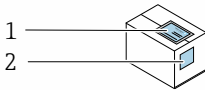
## 2.6 IT security

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

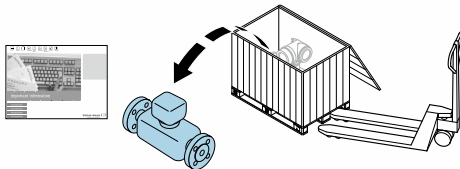
IT security measures, which provide additional protection for the product and associated data transfer, must be implemented by the operators themselves in line with their security standards.

# 3 Incoming acceptance and product identification

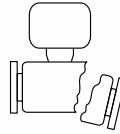
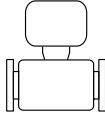
## 3.1 Incoming acceptance



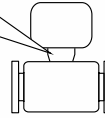
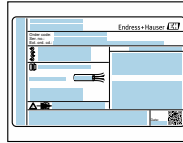
Are the order codes on the delivery note (1) and the product sticker (2) identical?







Are the goods undamaged?



Does the data on the nameplate match the order specifications on the delivery note?



Is the envelope present with accompanying documents?

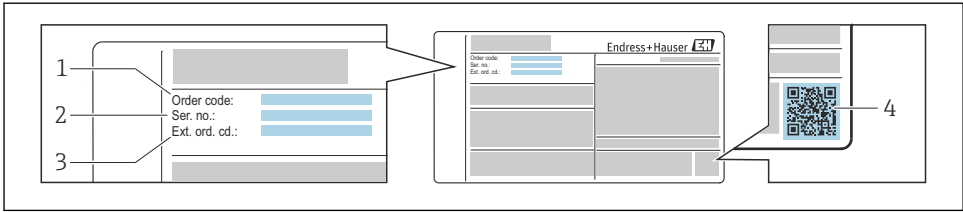


- If one of the conditions is not satisfied, contact your Endress+Hauser Sales Center.
- The Technical Documentation is available via the Internet or via the *Endress+Hauser Operations app*.

## 3.2 Product identification

The device can be identified in the following ways:

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



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#### 1 Example of a nameplate

- 1 Order code
- 2 Serial number
- 3 Extended order code
- 4 2-D matrix code (QR code)

 For detailed information on the data 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. Avoid unacceptably high surface temperatures.
- ▶ 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.

#### 4.2.1 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.

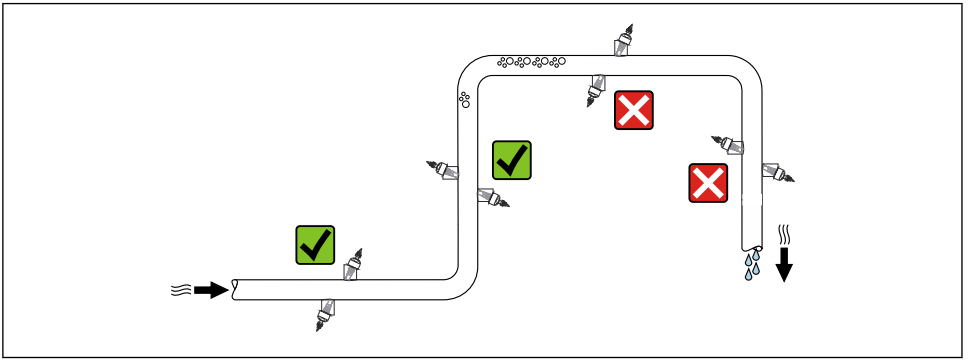
## 5 Mounting procedure

### 5.1 Mounting requirements

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

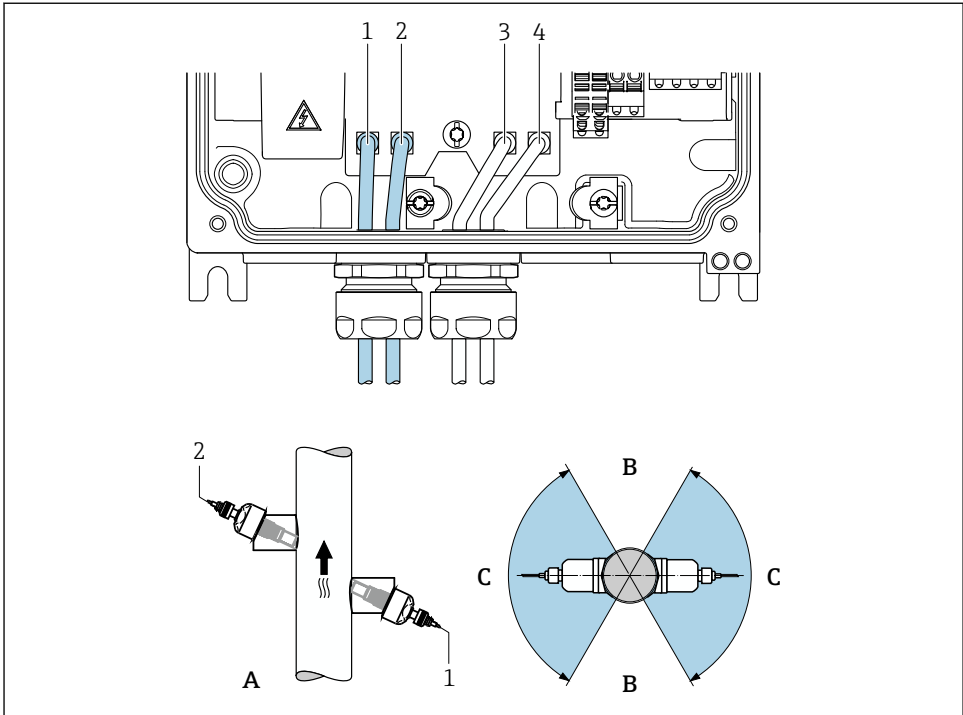
### 5.1.1 Mounting position

#### Mounting location



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## Orientation



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### 2 Orientation views

- 1 Channel 1 upstream
- 2 Channel 1 downstream
- 3 Channel 2 upstream
- 4 Channel 2 downstream
- A Recommended orientation with upward flow direction
- B Non-recommended installation range with horizontal orientation (60°)
- C Recommended installation range max. 120°

### Vertical

Recommended orientation with upward flow direction (view A) With this orientation, entrained solids sink and gases rise away from the sensor area when the medium is not flowing. In addition, the pipe can be completely drained and protected against the buildup of deposits.

### Horizontal

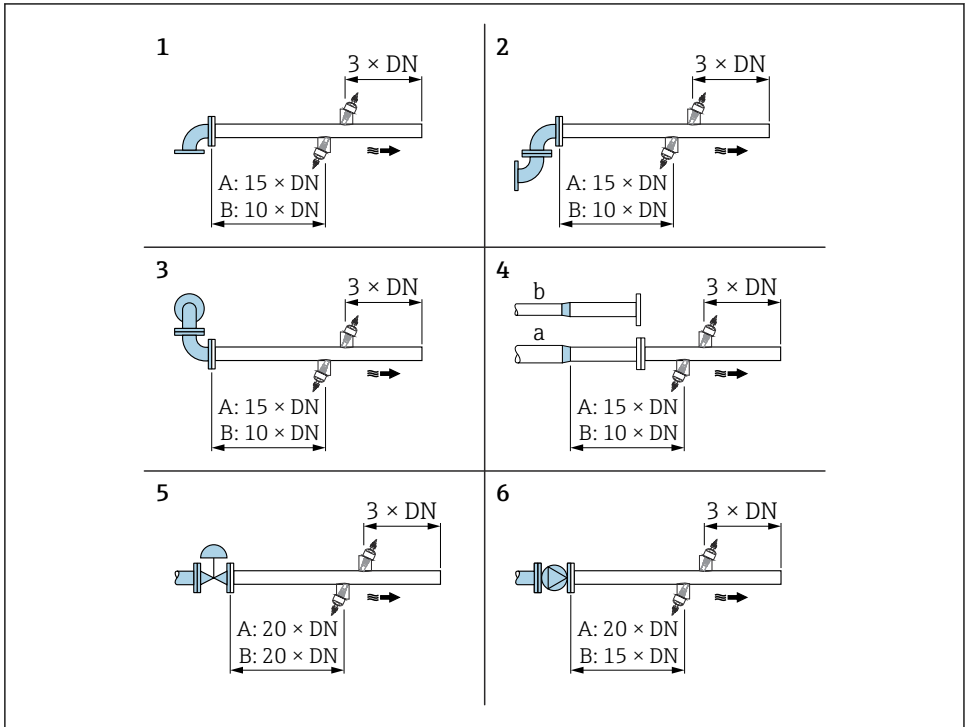
In the recommended installation range with a horizontal orientation (View B), gas and air accumulations at the top of the pipe and interference from deposit buildup at the bottom of the pipe can influence the measurement to a lesser degree.

## Inlet and outlet runs

If possible, install the sensors upstream of assemblies such as valves, T-pieces, elbows, and pumps. If this is not possible, the specified measurement accuracy of the measuring device is achieved by observing the specified minimum inlet and outlet runs with optimum sensor configuration. If there are several flow obstructions, the longest specified inlet run must be taken into account.



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




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3 Minimum inlet and outlet runs with different flow obstructions (A: single-path measurement, B: two-path measurement)

- 1 Pipe bend
- 2 Two pipe bends (on one plane)
- 3 Two pipe bends (on two planes)
- 4a Reduction
- 4b Extension
- 5 Control valve (2/3 open)
- 6 Pump

## 5.1.2 Environmental and process requirements

### Ambient temperature range

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

If operating outdoors:

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

## 5.2 Mounting the measuring device

### 5.2.1 Required tools

#### For sensor







For mounting on the measuring tube: Use a suitable mounting tool.

### 5.2.2 Preparing the measuring device

1. Remove all remaining transport packaging.
2. Remove stick-on label on the electronics compartment cover.

### 5.2.3 Mounting the sensor

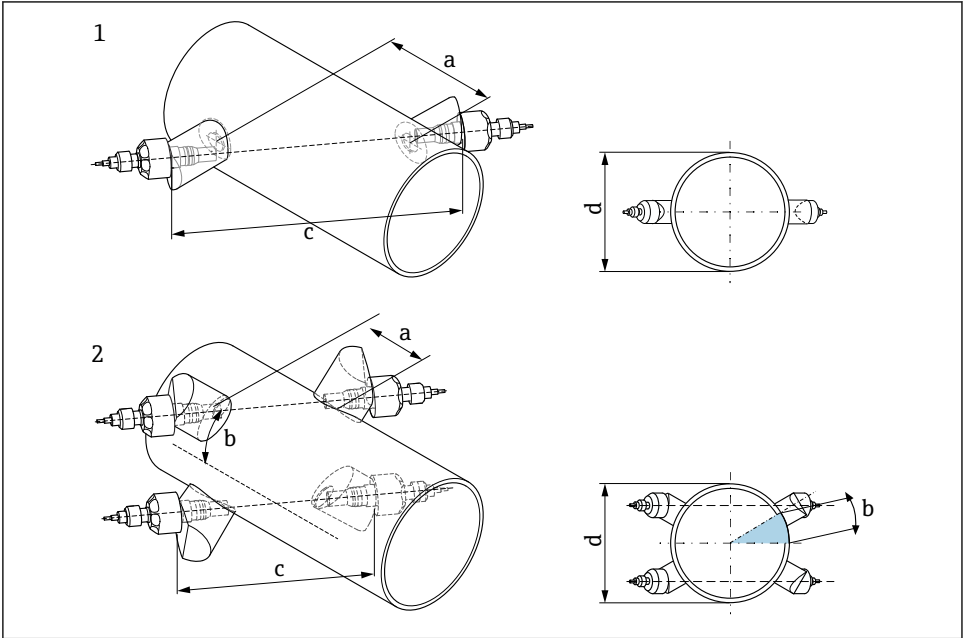
#### Sensor configuration and settings

DN 200 to 4000 (8 to 160")	
Single-path version [mm (in)]	Two-path version [mm (in)]
Sensor distance <sup>1)</sup>	Sensor distance <sup>1)</sup>
Path length →  4,  15	Path length →  4,  15 Arc length →  4,  15

- 1) Depends on the conditions at the measuring point (e.g. measuring pipe). The mounting position of the sensor can be determined via FieldCare or Applicator. See also **Result Sensor Type / Sensor Distance** parameter in **Measuring point** submenu

## Determining the mounting positions of the sensor

### Description of installation



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#### 4 Terminology Description of installation

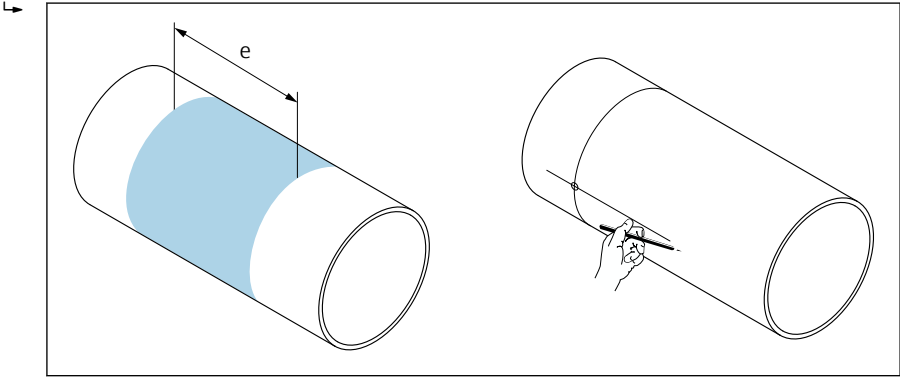
- 1 Single-path version
- 2 Two-path version
- a Sensor distance
- b Arc length
- c Path length
- d External diameter of measuring pipe

#### Detailed information:

*Sensor holder for single-path version*

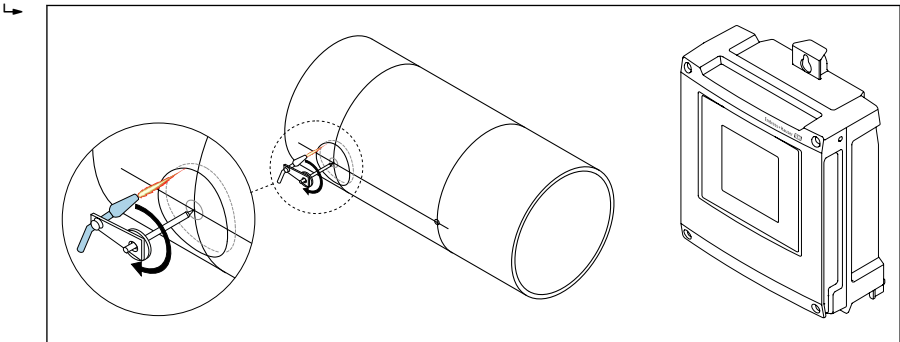
Procedure:

1. Determine mounting area (e) on measuring pipe section (space required at measuring point approx. 1x diameter of measuring pipe).
2. Mark the center line on the measuring pipe at the mounting location and mark the first the drill hole (drill hole diameter: 65 mm (2.56 in)). The center line marking should extend beyond the hole to be drilled.



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3. Cut the first drill hole using a plasma cutter, for example. Measure the wall thickness of the measuring pipe, if not already known.
4. Determine the sensor distance → 14.

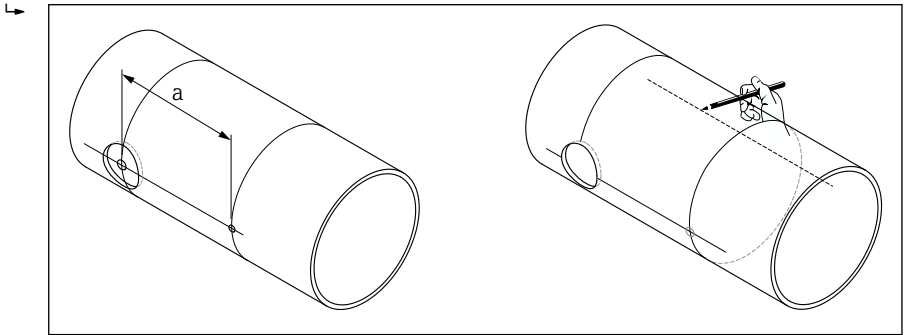


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5. Mark the sensor distance (a) starting from the center line of the first drill hole.

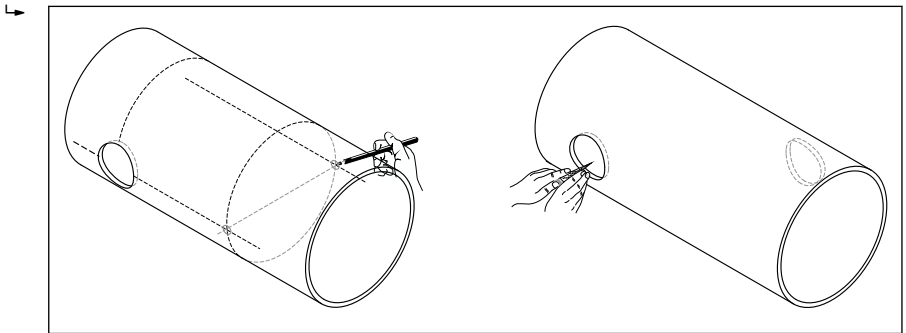


6. Project and draw the center line onto the rear of the measuring pipe.



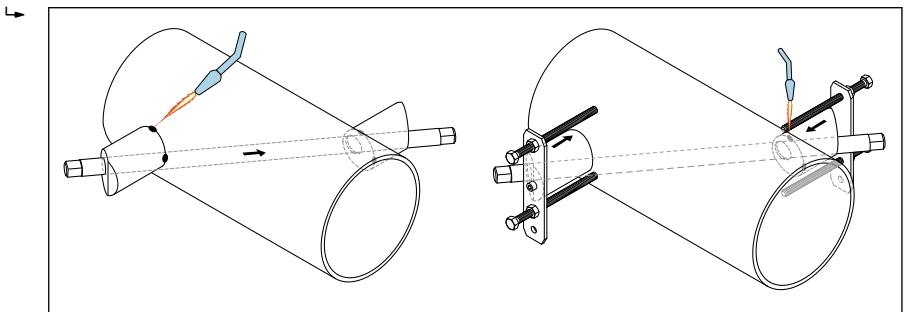
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7. Mark the drill hole on the rear center line.
8. Cut out the second drill hole and prepare holes for welding in the sensor holders (deburr, clean).



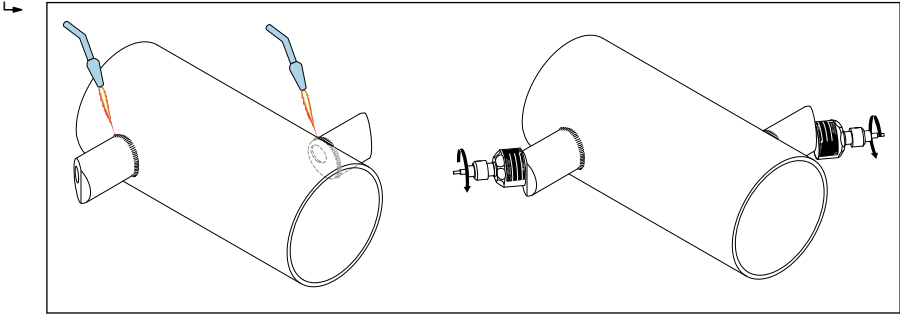
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9. Insert sensor holders into both drill holes. To adjust the welding depth, both sensor holders can be secured with the special tool for regulating the insertion depth and then aligned using the path rod. The sensor holder must be flush with the inside of the measuring pipe.
10. Spot-weld both sensor holders. To align the path rod, screw both guide bushes into the sensor holders.



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11. Weld in both sensor holders.
12. Check the distances between the drill holes again and determine the path length  
→ 14.
13. Manually screw the sensors into the sensor holders. If using a tool, tighten with max. 30 Nm.
14. Insert the sensor cable plugs into the openings provided and manually tighten the plugs as far as they will go.

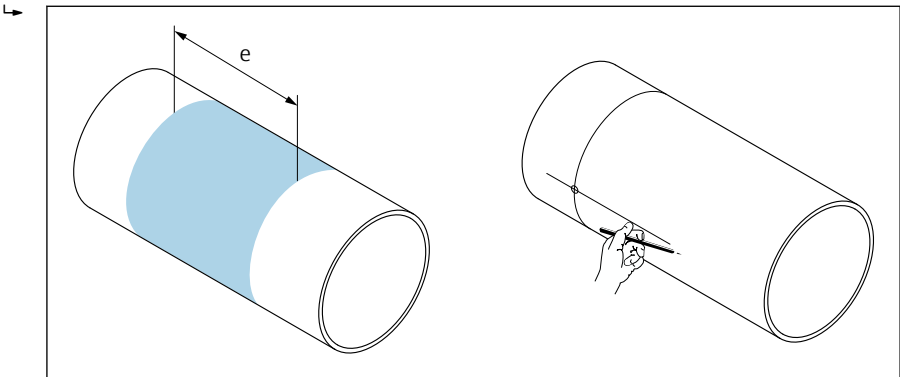


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*Sensor holder for two-path version*

Procedure:

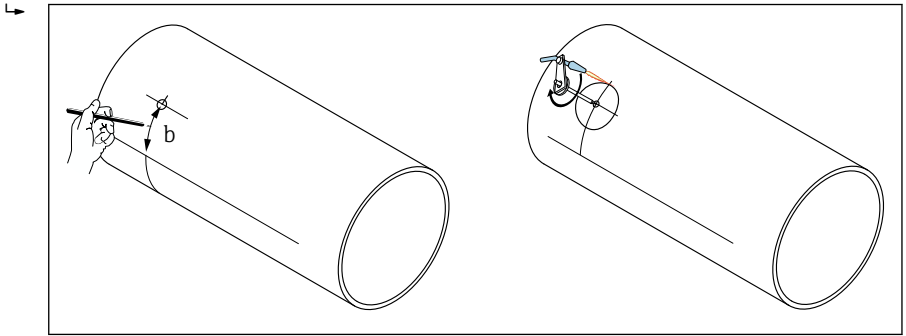
1. Determine mounting area (e) on measuring pipe section (space required at measuring point approx. 1x diameter of measuring pipe).
2. Mark the center line on the measuring pipe at the mounting location.



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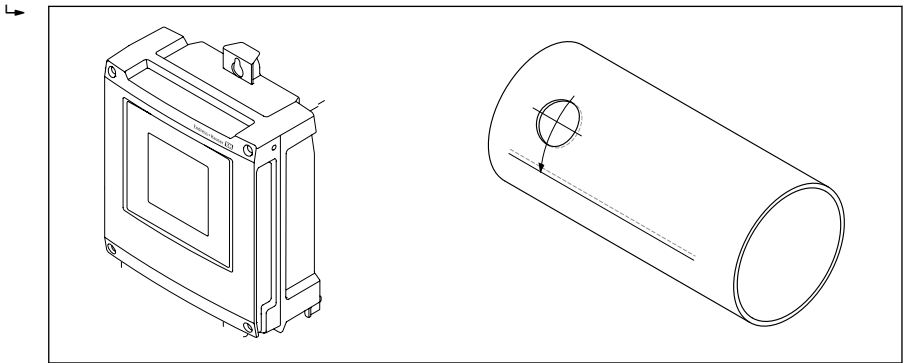
3. Draw the length of the arc (b) at the mounting position of the sensor holder from the center line out to one side. Base the arc length on approx. 1/12 of the circumference of the measuring pipe. Mark the first drill hole (drill hole diameter: 81 to 82 mm (3.19 to 3.23 in)). Extend the center line beyond the hole to be drilled.

4. Cut the first drill hole using a plasma cutter, for example. Measure the wall thickness of the measuring pipe, if not already known.



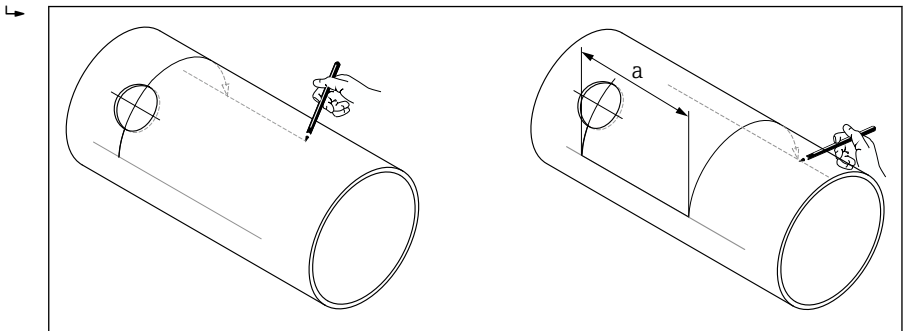
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5. Determine the sensor distance and arc length → 14.
6. Use the arc length that was determined to correct the center line.



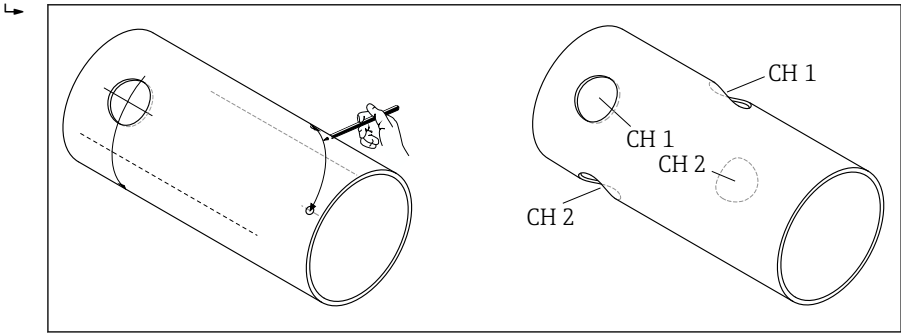
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7. Project and draw the corrected center line onto the opposite side of the measuring pipe (half of measuring pipe circumference).
8. Mark the sensor distance on the center line and project it onto the center line on the rear of the pipe.



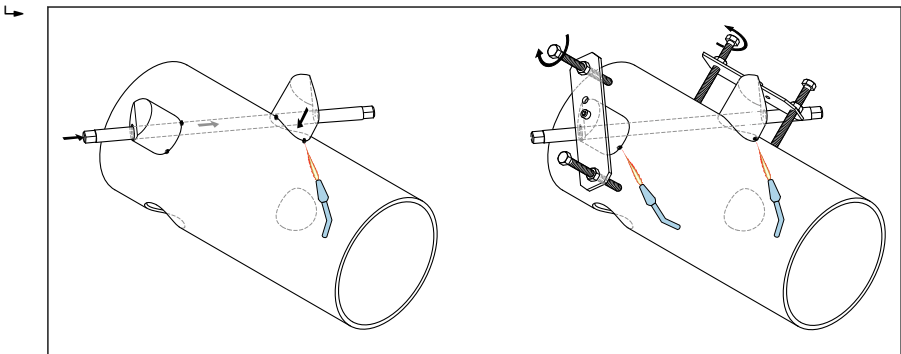
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9. Draw the length of the arc from the center line out to both sides and mark the drill holes.
10. Create drill holes and prepare them for welding in the sensor holders (deburr, clean). Drill holes for the sensor holders are paired together (CH 1 - CH 1 and CH 2 - CH 2).



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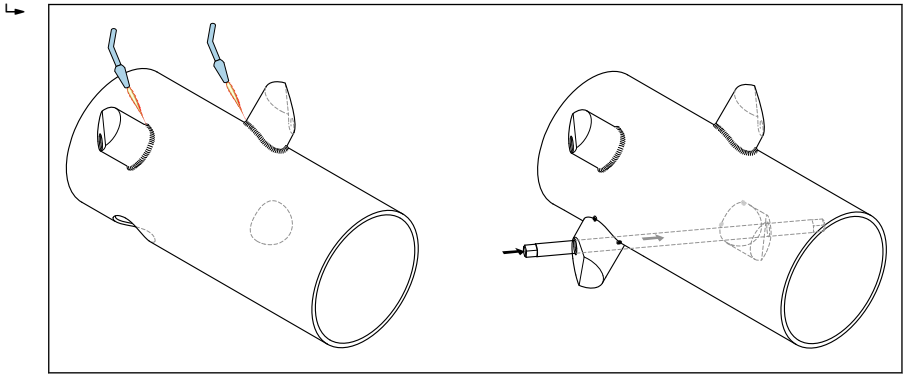
11. Insert the sensor holders into the first two drill holes and align them using the path rod (alignment tool). Spot-weld with the welding device and then weld both sensor holders together. To align the path rod, screw both guide bushes into the sensor holders.



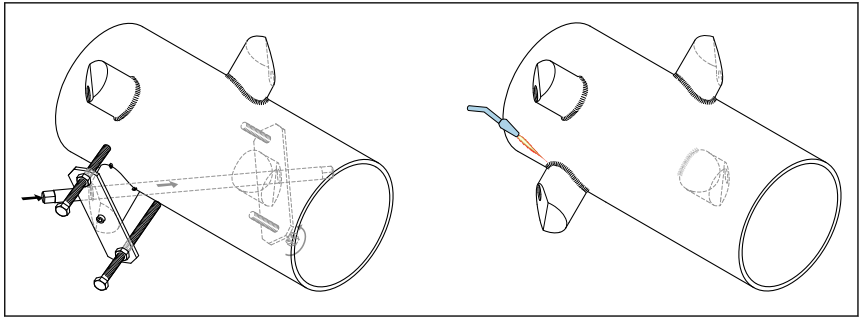
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12. Weld in both sensor holders.
13. Check the path length, sensor distances and arc lengths again. Deviations can be entered as calibration factors later on when commissioning the measuring point.

- 14. Insert second pair of sensor holders into the two remaining drill holes as per step 11, and then weld in place.

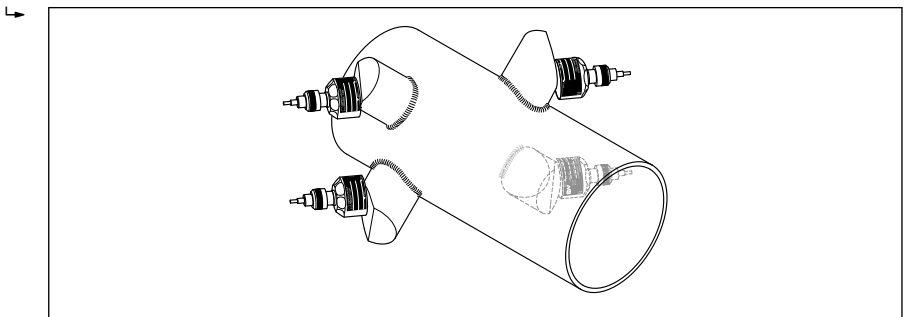


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- 15. Manually screw the sensors into the sensor holders. If using a tool, tighten with max. 30 Nm.
- 16. Insert the sensor cable plugs into the openings provided and manually tighten the plugs as far as they will go.



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## 5.3 Post-mounting check

Is the measuring device undamaged (visual inspection)?	<input type="checkbox"/>
Does the measuring device correspond to the measuring point specifications? For example: <ul style="list-style-type: none"> <li>▪ Process temperature</li> <li>▪ Inlet run conditions</li> <li>▪ Ambient temperature</li> <li>▪ Measuring range</li> </ul>	<input type="checkbox"/>
Has the correct orientation for the sensor been selected →  12? <ul style="list-style-type: none"> <li>▪ According to sensor type</li> <li>▪ According to medium temperature</li> <li>▪ According to medium properties (outgassing, with entrained solids)</li> </ul>	<input type="checkbox"/>
Are the sensors correctly connected to the transmitter (upstream/downstream) →  2,  12?	<input type="checkbox"/>
Are the sensors correctly mounted (distance, path length, arc length) ?	<input type="checkbox"/>
Is the tag name and labeling correct (visual inspection)?	<input type="checkbox"/>
Is the device sufficiently protected from precipitation and direct sunlight?	<input type="checkbox"/>
Are the securing screw and securing clamp tightened securely?	<input type="checkbox"/>
Is the sensor holder properly grounded (in the event of different potential between the sensor holder and transmitter)?	<input type="checkbox"/>

## 6 Disposal



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

### 6.1 Removing the measuring device

1. Switch off the device.

#### WARNING

#### Risk of personal injury due to process conditions!

- ▶ Beware of hazardous process conditions such as pressure in the measuring device, high temperatures or aggressive media.

2. Carry out the mounting and connection steps from the "Mounting the measuring device" and "Connecting the measuring device" sections in reverse order.
3. 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.

Follow these instructions when disposing of the device:

- ▶ Comply with national regulations.
- ▶ Ensure proper separation and reuse of the device components.



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

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