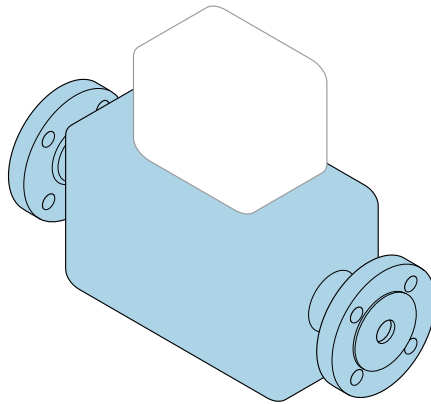


# Brief Operating Instructions

## Proline Prosonic Flow I

Ultrasonic transit time sensor



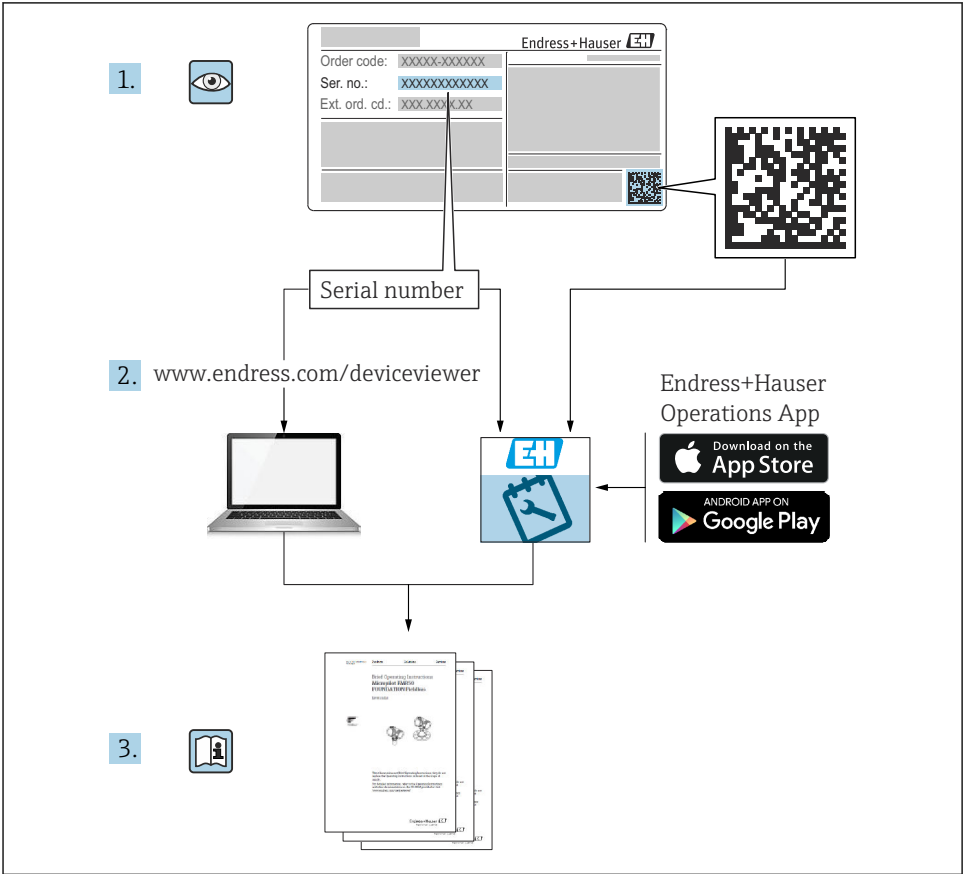
These instructions are Brief Operating Instructions; they are **not** a substitute for the Operating Instructions pertaining to the device.

### **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*

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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
	<b>Protective Earth (PE)</b> A terminal which must be connected to ground prior to establishing any other connections.  The ground terminals are situated inside and outside the device: <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 Tool symbols

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

1.1.5 Symbols in graphics

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

2 Basic safety instructions

2.1 Requirements for the personnel

The personnel must fulfill the following requirements for its tasks:

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

## 2.2 Intended use

### Application and media

The measuring device described in this manual is intended only for 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 hazardous areas, in hygienic applications or in applications where there is an increased risk due to process pressure, are marked accordingly on the nameplate.

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

- ▶ Keep within the specified 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).
- ▶ 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.

### Residual risks



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

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

## 2.3 Workplace safety

For work on and with the device:

- ▶ Wear the required personal protective equipment according to 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.

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

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

Contact address Endress+Hauser UK:

Endress+Hauser Ltd.  
Floats Road  
Manchester M23 9NF  
United Kingdom  
[www.uk.endress.com](http://www.uk.endress.com)

## 2.6 IT security

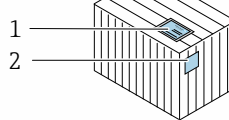
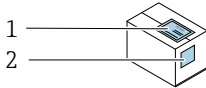
Our warranty is valid only if the device is installed and used as described in the Operating Instructions. The device is equipped with security mechanisms to protect it against any inadvertent changes to the settings.

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.

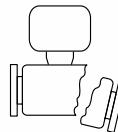
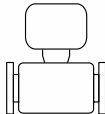
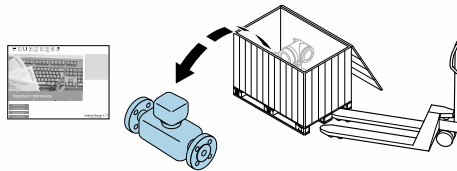


### 3 Incoming acceptance and product identification

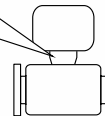
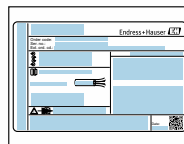
#### 3.1 Incoming acceptance



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?

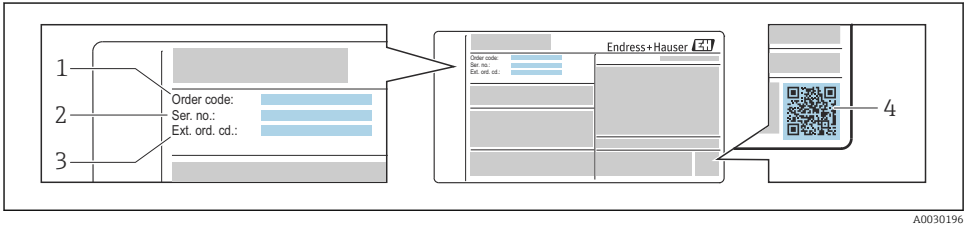


- If one of the conditions is not satisfied, contact your Endress+Hauser Sales Center.
- The Technical Documentation is available via the Internet or via the *Endress+Hauser Operations App*.


## 3.2 Product identification

The following options are available for identification of the device:


- Nameplate specifications
- Order code with breakdown of the device features on the delivery note
- Enter the serial numbers from the nameplates in *W@M 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 (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.
- ▶ 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.

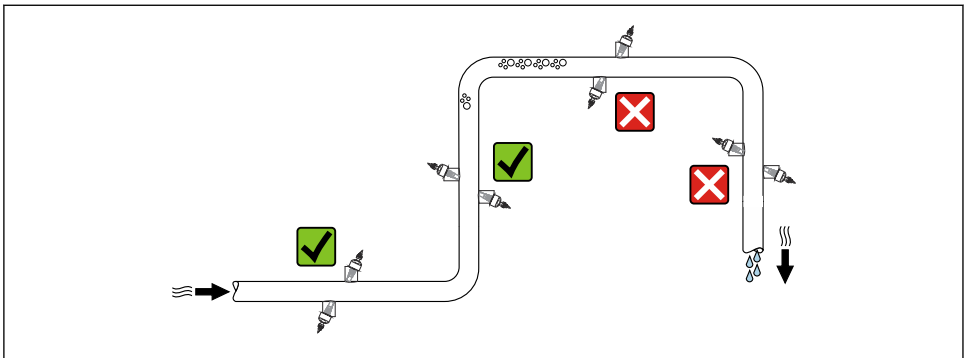
## 5 Mounting

### 5.1 Mounting requirements

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

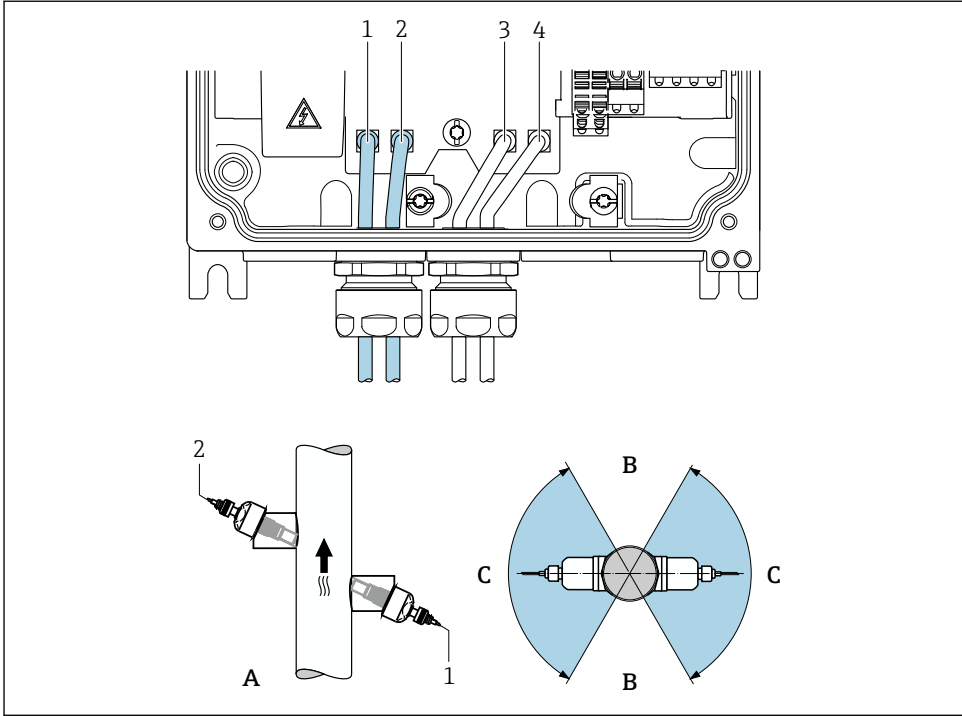
#### 5.1.1 Mounting position

##### Mounting location



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## Orientation



A0045281

### 2 Orientation views

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

## Vertical

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

## Horizontal

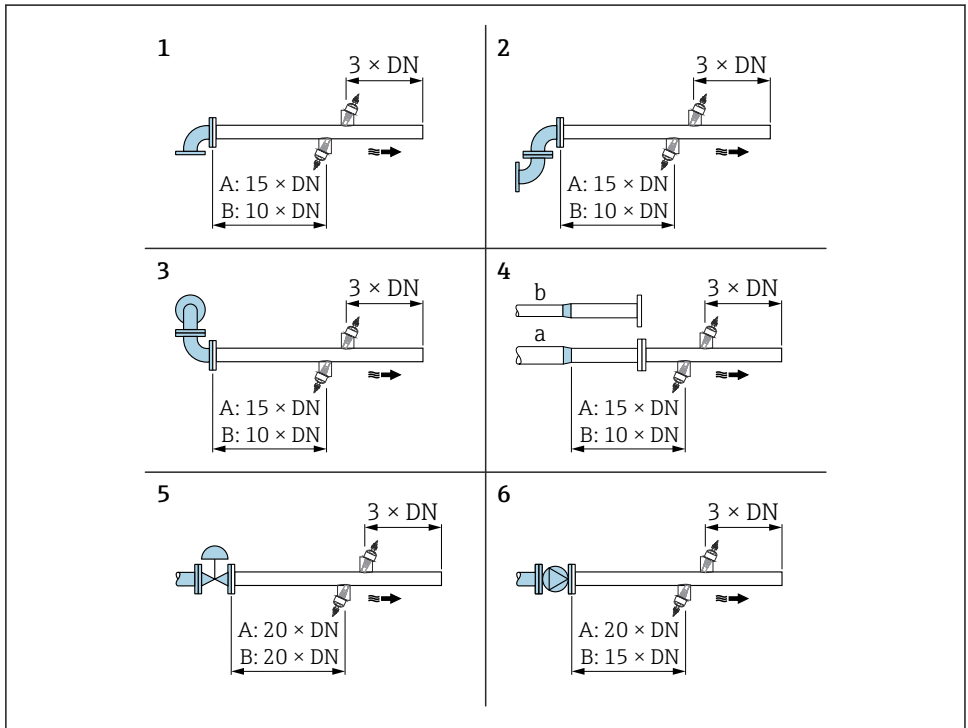
In the recommended installation range with a horizontal orientation (View B), gas and air accumulations at the top of the pipe and interference from deposit buildup at the bottom of the pipe can influence the measurement to a lesser degree.

## Inlet and outlet runs


If possible, the sensor should be installed upstream from valves, T-sections, pumps etc. If this is not possible, the inlet and outlet runs indicated below must be maintained at the very minimum in order to attain the specified level of accuracy of the measuring device. If there are several flow disturbances present, the longest specified inlet run must be maintained.



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



A0045289

 3 Minimum inlet and outlet runs for various 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 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.

5.2 Mounting the measuring device

5.2.1 Required tools

For sensor







For installation on the measuring pipe: 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

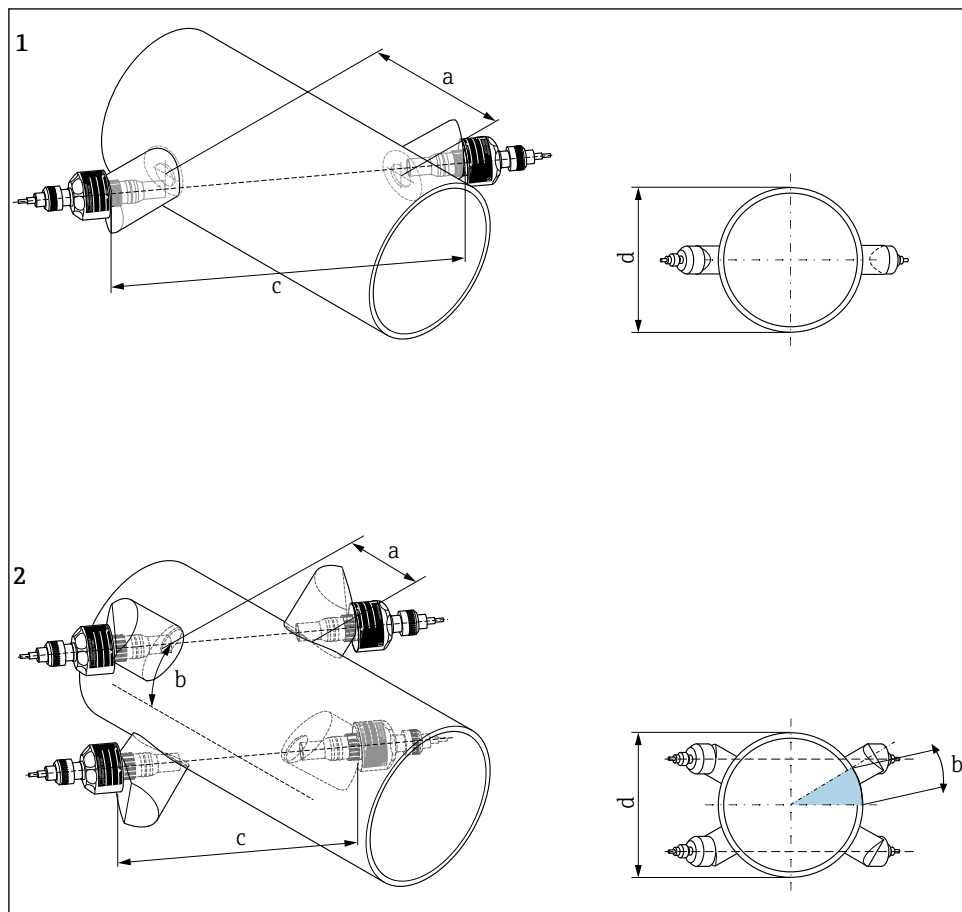
Sensor configuration and settings

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 (measuring pipe etc.). The sensor mounting position can be determined via FieldCare or Applicator. See also the **Result Sensor Type / Sensor Distance** parameter in the **Measuring point** submenu

## Determining the sensor mounting positions

### Mounting description



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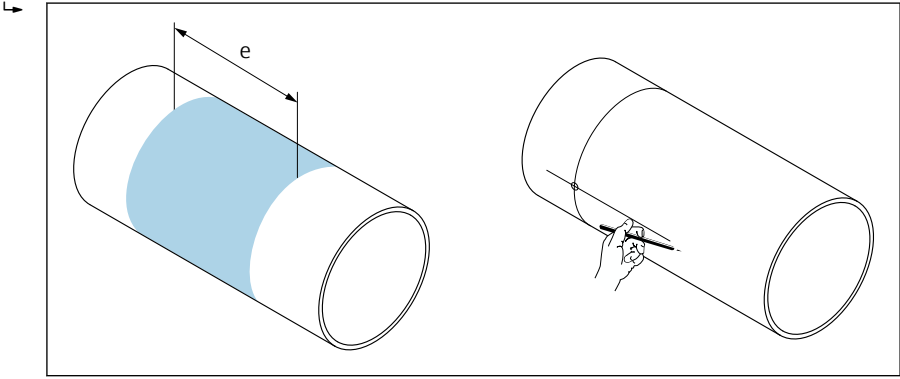
#### 4 Sensor mounting: terminology

- 1 Single-path version
- 2 Two-path version
- a Sensor distance
- b Arc length
- c Path length
- d Measuring pipe outer diameter

### Sensor holder for single-path version

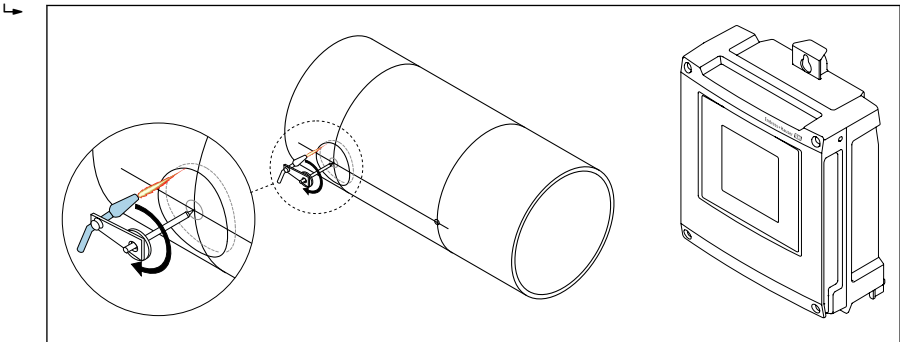
#### Procedure:

1. Determine the mounting area (e) on the pipe section (space required at measuring point approx. 1x pipe diameter).
2. Draw a center line on the measuring pipe at the mounting location and mark the first drill hole (drill hole diameter: 65 mm (2.56 in)). Make the center line longer than the hole to be drilled.



A0044951

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

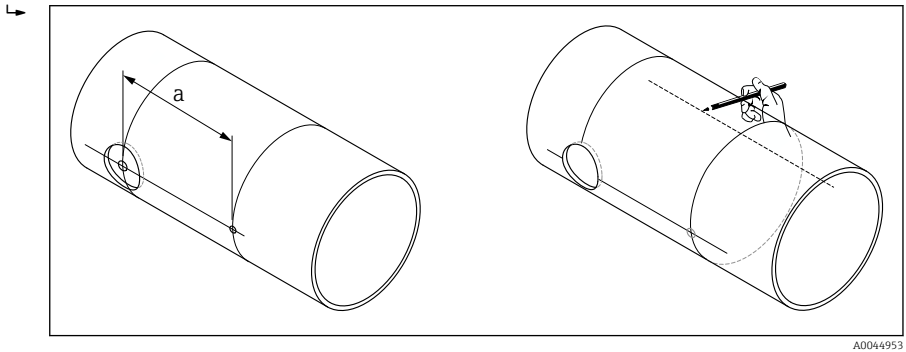


A0044952

5. Starting from the center line of the first drill hole, plot the sensor distance (a).



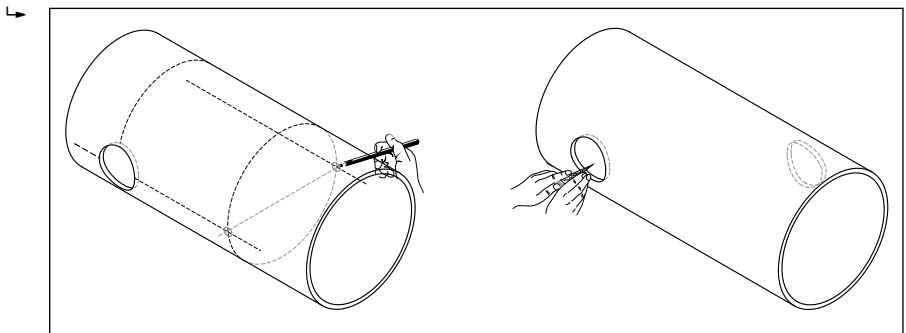
6. Project the center line onto the rear of the measuring pipe and draw the line.



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7. Mark the drill hole on the rear center line.

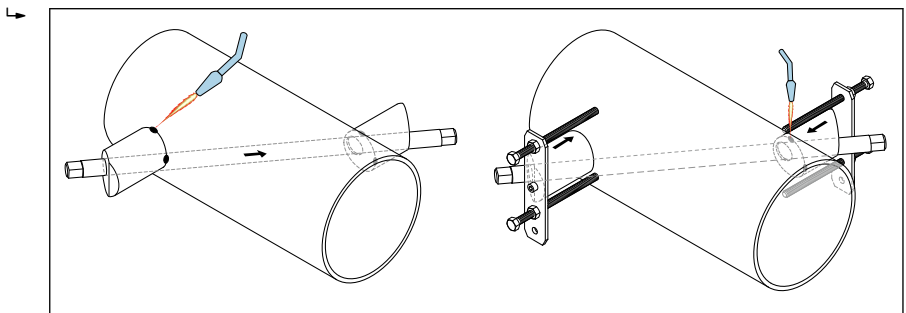
8. Cut out the second drill hole and prepare the holes (deburr, clean) to weld in the sensor holders.




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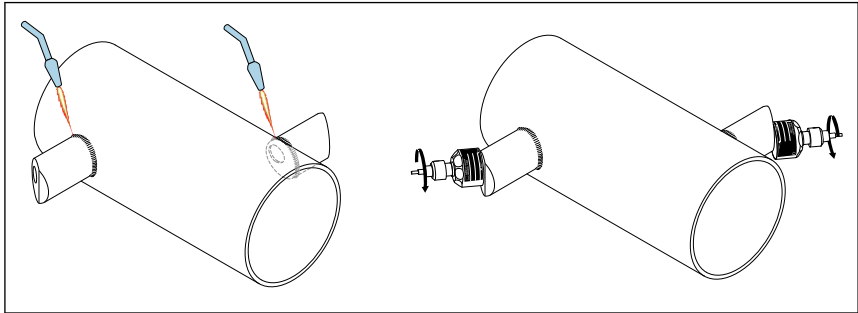
9. Insert the sensor holders into both holes. To set the weld-in depth, both sensor holders can be fixed in place with the special tool to regulate the insertion depth (optionally available) and then aligned using the path rod. The sensor holder must be flush with the inside of the measuring pipe.

10. Spot-weld both sensor holders. To align the path rod, screw the two guides into the sensor holders.



A0044955

11. Weld in both sensor holders.
12. Check the distance between the drill holes again and determine the path length  
→  14.
13. Screw the sensors into the sensor holders by hand. If using a tool, do not tighten by more than 30 Nm.
14. Guide the sensor cable plugs into the openings provided for this purpose and tighten the plugs manually to the end stop.

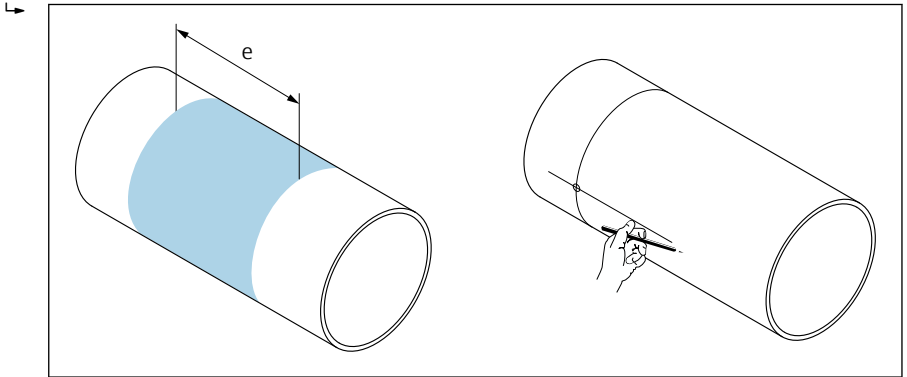


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*Sensor holder for two-path version*

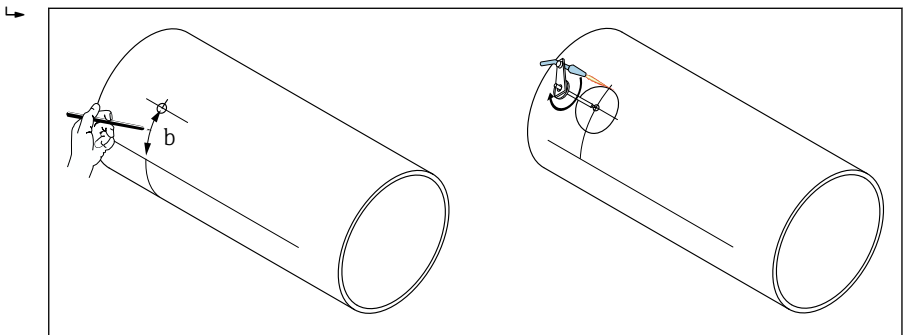
## Procedure:

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



A0044951

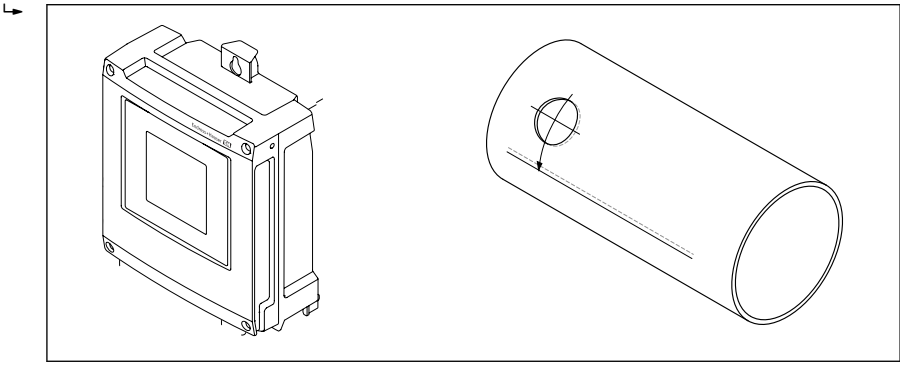
3. At the mounting location of the sensor holder, mark the arc length (b) to one side of the center line. Take approximately 1/12 of the pipe circumference as the measure for the length of the arc. Mark the first drill hole (drill hole diameter: 81 to 82 mm (3.19 to 3.23 in)). Make the center line longer than the hole to be drilled.
4. Cut the first drill hole with a plasma cutter for example. Measure the wall thickness of the measuring pipe if it is not already known.



A0044957

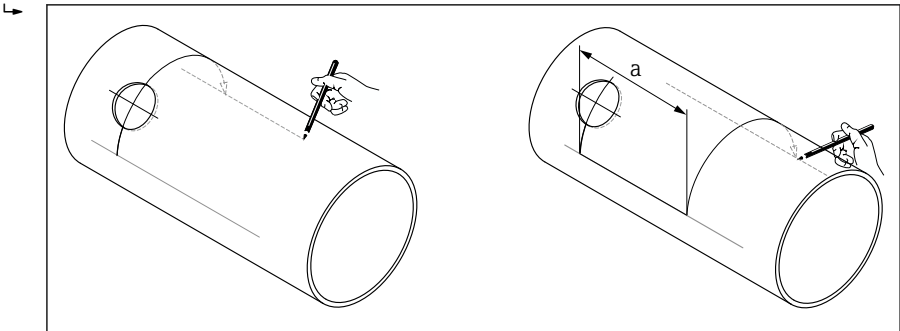
5. Determine the sensor distance and arc length →  14.

6. Correct the center line with the arc length determined.



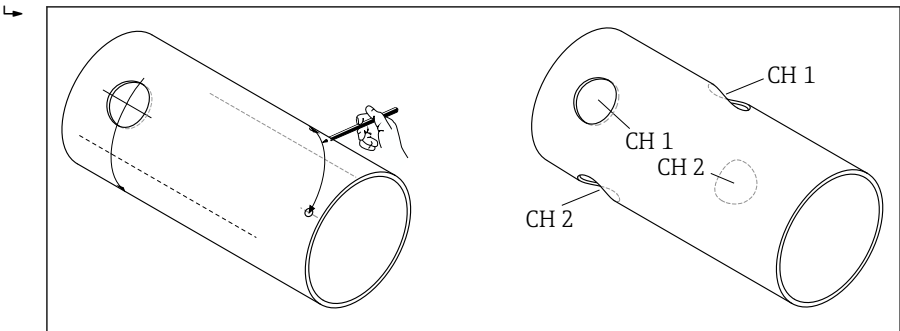
A0044958

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



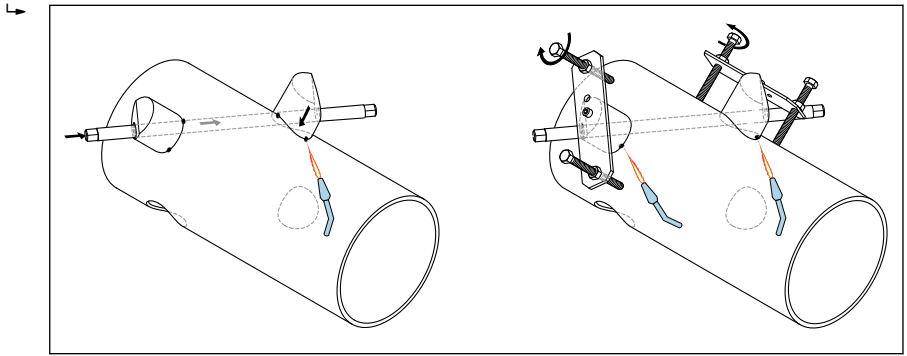
A0044959

9. Mark the length of the arc to both sides of the center line and mark the drill holes.
10. Cut out the drill holes and prepare the holes (deburr, clean) to weld in the sensor holders. The holes for the sensor holders are in pairs (CH 1 - CH 1 and CH 2 - CH 2).



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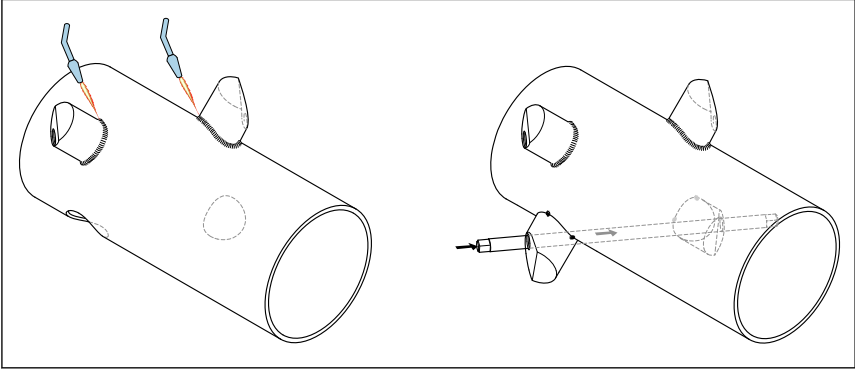
11. Insert sensor holders into the first two drill holes and align with the path rod (alignment tool). Spot-weld with the welding machine and then securely weld both sensor holders. To align the path rod, screw the two guides into the sensor holders.



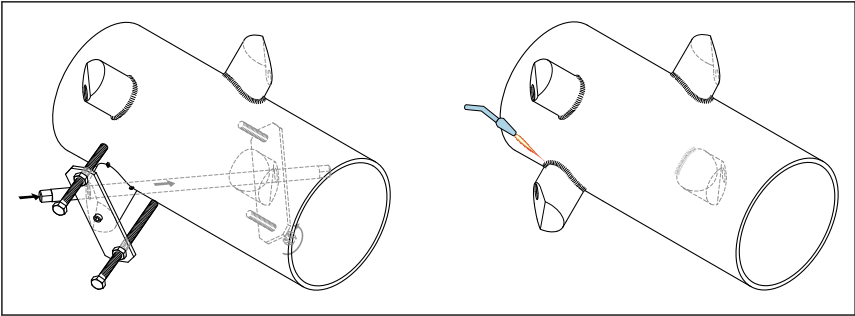
A0044961

12. Weld in both sensor holders.
13. Check the path length, sensor distances and arc lengths once again. Any deviations from the correct length can be entered later as correction factors when commissioning the measuring point.

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



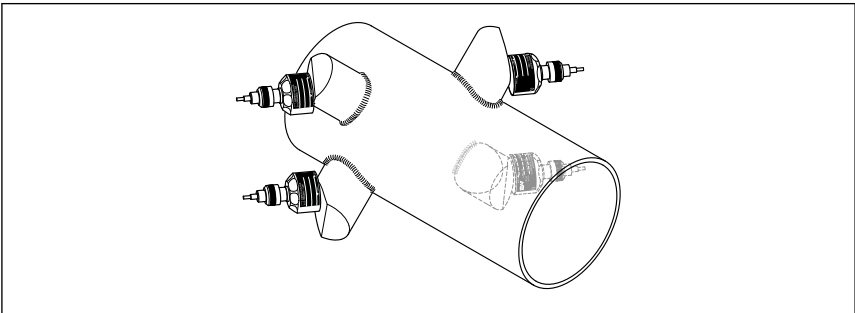
A0044962



A0044963




15. Screw the sensors into the sensor holders by hand. If using a tool, do not tighten by more than 30 Nm.

16. Guide the sensor cable plugs into the openings provided for this purpose and tighten the plugs manually to the end stop.



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## 5.3 Post-mounting check

Is the device undamaged (visual inspection)?	<input type="checkbox"/>
Does the measuring device meet 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 mounted correctly (distance, path length, arc length) ?	<input type="checkbox"/>
Are the measuring point identification and labeling correct (visual inspection)?	<input type="checkbox"/>
Is the device adequately protected from precipitation and direct sunlight?	<input type="checkbox"/>
Are the securing screw and securing clamp tightened securely?	<input type="checkbox"/>
Is potential equalization established at the sensor holder (in the event of different potentials 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 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.



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

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