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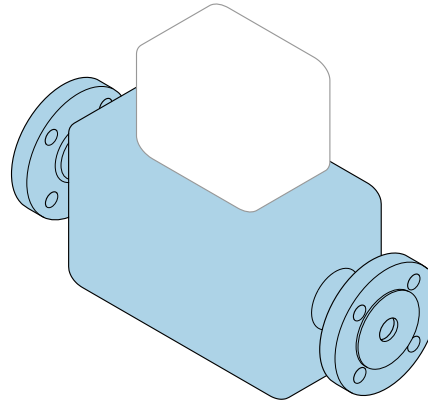
71637050
2024-03-15

Brief Operating Instructions **Measuring device for total solids measurement Proline Teqwave MW**

Sensor for total solids measurement via microwave transmission

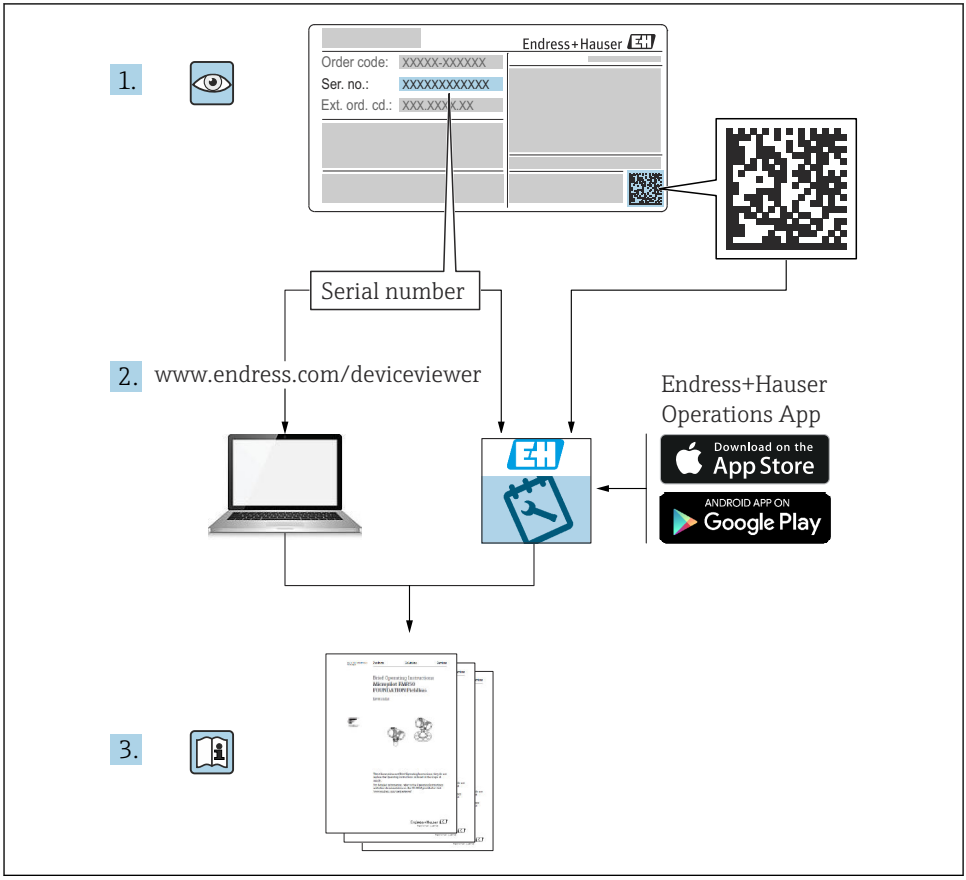


These Brief Operating Instructions are **not** a substitute for the Operating Instructions pertaining to the device.

Brief Operating Instructions Part 1 of 2: Sensor
Contain information about the sensor.

Brief Operating Instructions Part 2 of 2: Transmitter
→ 3.

Endress+Hauser
People for Process Automation


1.
Endress+Hauser
Order code: XXXXX-XXXXXX
Ser. no.: XXXXXXXXXXXX
Ext. ord. cd.: XXX.XXX.XXX
Serial number
2.
www.endress.com/deviceviewer
Endress+Hauser
Operations App
Download on the App Store
ANDROID APP ON Google Play
3.

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Brief operating instructions Measuring device for total solids measurement

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 measuring device for total solids measurement:
- 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 Instructionspart 1: Sensor**.

The "Brief Operating Instructions part 2: Transmitter" are available via:
- Internet: www.endress.com/deviceviewer
- Smart phone/tablet: *Endress+Hauser Operations App*

Detailed information about the device can be found in the Operating Instructions and the other documentation:
- Internet: www.endress.com/deviceviewer
- Smart phone/tablet: *Endress+Hauser Operations App*

Table of contents

1 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
	**Permitted** Procedures, processes or actions that are permitted.		**Preferred** Procedures, processes or actions that are preferred.
	**Forbidden** Procedures, processes or actions that are forbidden.		**Tip** Indicates additional information.
	Reference to documentation		Reference to page
	Reference to graphic	1., 2., 3...	Series of steps
	Result of a step		Visual inspection

1.1.3 Electrical symbols

Symbol	Meaning	Symbol	Meaning
	Direct current		Alternating current
	Direct current and alternating current		**Ground connection** A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.

Symbol	Meaning
	**Potential equalization connection (PE: protective earth)** Ground terminals that must be connected to ground prior to establishing any other connections. The ground terminals are located on the interior and exterior of the device: ▪ Interior ground terminal: potential equalization is connected to the supply network. ▪ Exterior ground terminal: device is connected to the plant grounding system.

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

2 Basic safety instructions

2.1 Requirements for the personnel

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

2.2 Intended use

Application and media
The measuring device described in these Operating Instructions is intended only for total solids measurement in water-based liquids.

Measuring devices for use in explosive atmospheres 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 device 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.

⚠ 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.

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..

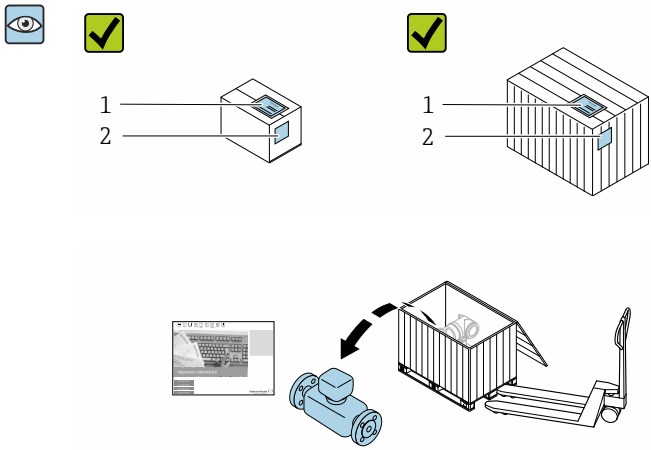
2.6 IT security

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.

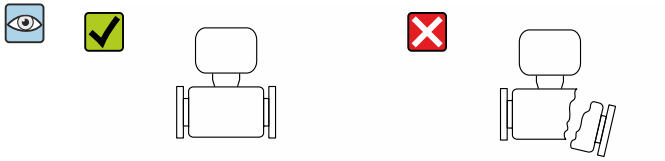
3 Incoming acceptance and product identification

3.1 Incoming acceptance

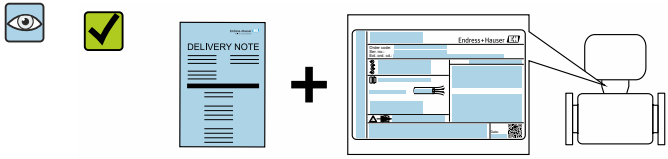


Are the order codes on the delivery note (1) and the product sticker (2) identical?

Are the goods undamaged?



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

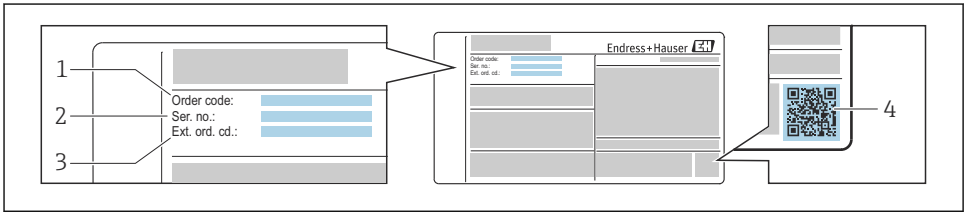


Is the envelope present with accompanying documents?

- 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 following options are available for identification of the device:
- 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): 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.



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 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.
- Do not remove protective covers or protective caps installed on process connections. They prevent mechanical damage to the sealing surfaces and contamination in the measuring tube.
- Protect from direct sunlight to avoid unacceptably high surface temperatures.
- Store in a dry and dust-free place.
- Do not store outdoors.

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

4.2 Transporting the product

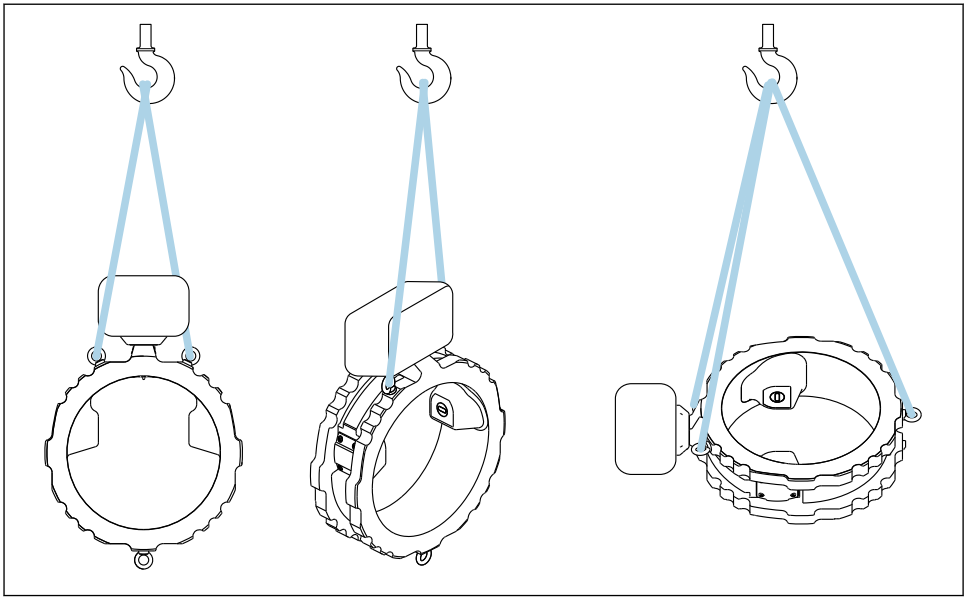
Do not remove protective covers or caps installed on process connections. They prevent mechanical damage to the sealing surfaces and contamination in the measuring tube.

4.2.1 Measuring devices with lifting lugs

Devices with a nominal diameter of DN 200 to 300 mm (8 to 12 in) have two options for mounting lifting lugs (eyebolts) for the purpose of transport. The two upper threaded holes are provided for vertically transporting the device, while the two upper threaded holes and one of the opposite lower threaded holes are provided for horizontal transport.

⚠ CAUTION

Special transportation instructions for devices with lifting lugs
- Only use the lifting lugs fitted to the device for transport.
- The device must always be attached to two lifting lugs when transported vertically and three lifting lugs when transported horizontally.



2 Vertical and horizontal transport of the device using mounted lifting lugs

4.3 Packaging disposal

All packaging materials are environmentally friendly and 100% recyclable:

- Outer packaging of device
  Stretch wrap made of polymer in accordance with EU Directive 2002/95/EC (RoHS)
- Packaging
  - Wood crate treated in accordance with ISPM 15 standard, confirmed by IPPC logo
  - Cardboard box in accordance with European packaging guideline 94/62/EC, recyclability confirmed by Resy symbol
- Transport material and fastening fixtures
  - Disposable plastic pallet
  - Plastic straps
  - Plastic adhesive strips
- Filler material
  Paper pads

5 Mounting procedure

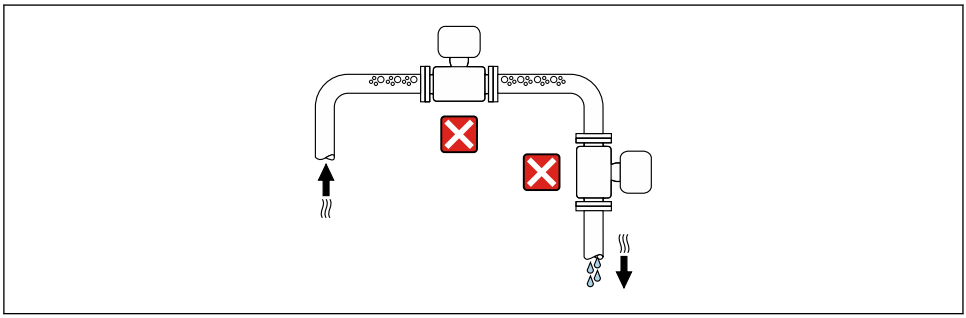
5.1 Mounting requirements

5.1.1 Mounting position

Installation point

Installation in pipe

Do **not** install the device:
- At the highest point of the pipe (risk of gas bubbles accumulating in the measuring tube)
- Upstream of a free pipe outlet in a down pipe



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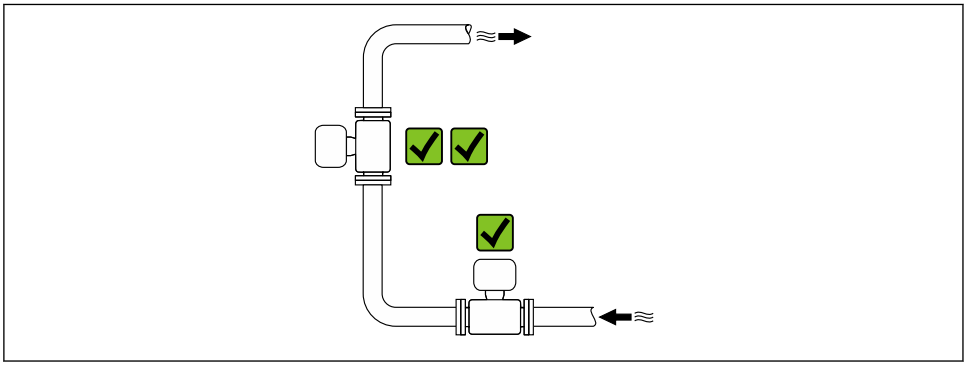
Install the device:
- Ideally in an ascending pipe
- Upstream of an ascending pipe or in areas where the device is filled with medium



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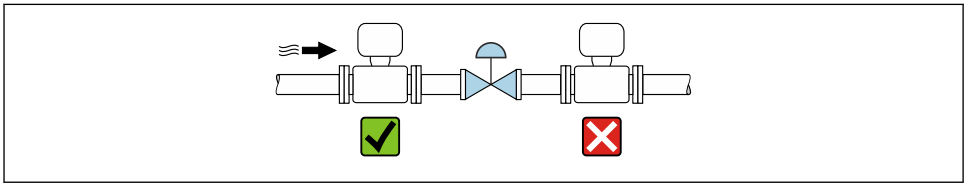
Installation near valves

Mount the sensor upstream from control valves if possible.



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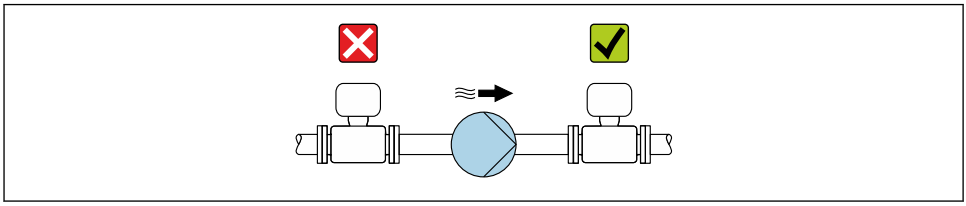
Installation near pumps

- Install the device in the direction of flow downstream from the pump.
- Also install pulsation dampers if reciprocating, diaphragm or peristaltic pumps are used.



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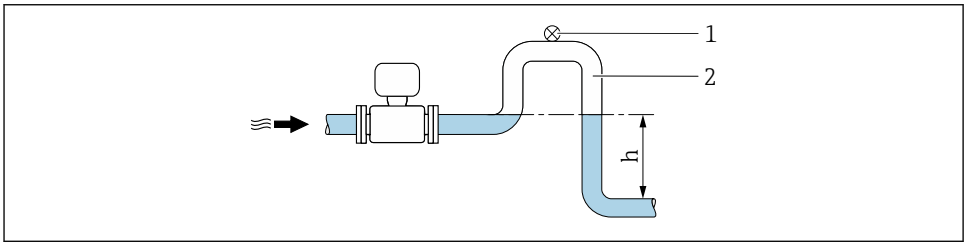
Installation upstream from a down pipe

If installing upstream of down pipes with a length h ≥ 5 m (16.4 ft): Install a siphon with a vent valve downstream of the device.



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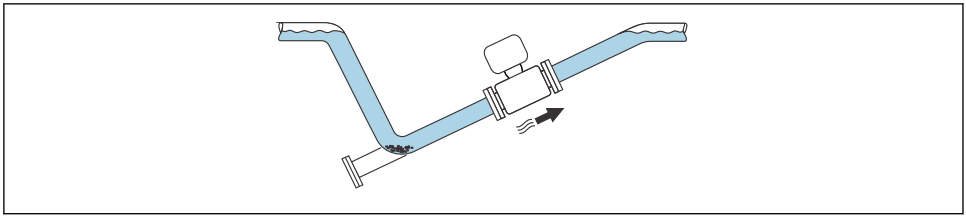
3 This arrangement prevents the flow of liquid stopping in the pipe and the formation of air pockets.

1 Vent valve
2 Pipe siphon
h Length of down pipe

Installation with partially filled pipes

- Partially filled pipes with a gradient require a drain-type configuration.
- The installation of a cleaning valve is recommended.



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Installation in event of pipe vibrations

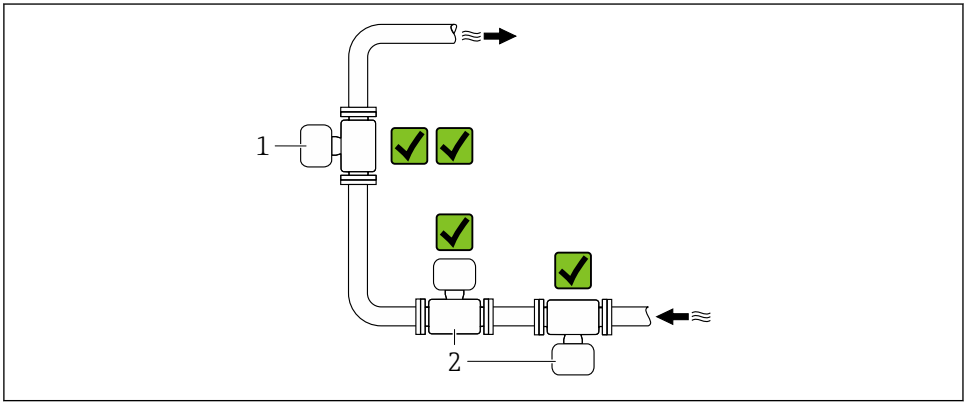
NOTICE

Pipe vibrations can damage the device!

► Do not expose the device to strong vibrations.

For information on the measuring system's resistance to vibration and shock, see the Operating Instructions for the device.

Orientation



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1 Vertical orientation
2 Horizontal orientation

Vertical orientation

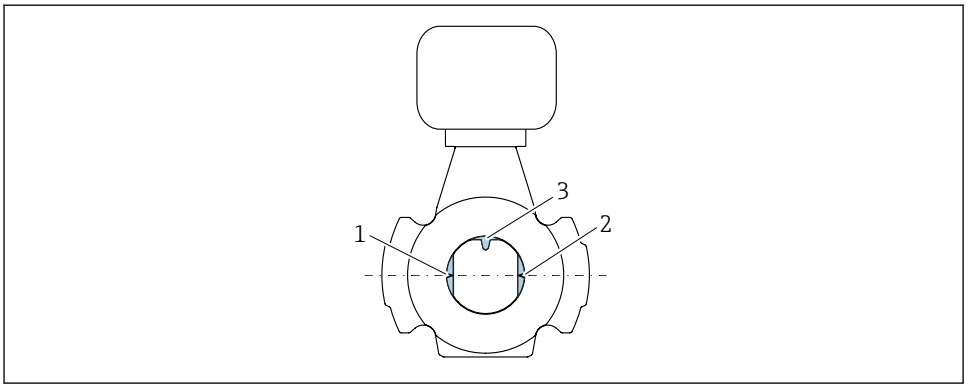
The device should ideally be installed in a rising pipe:
- To avoid having a partially filled pipe
- To avoid any gas accumulation
- The measuring tube can be completely drained and protected against the buildup of deposits.

In the case of total solids of ≥ 20 %TS:

Install the device vertically. If it is installed horizontally, separating layers can form as a result of sedimentation, separating liquid and solids. This can lead to measurement errors.

Horizontal orientation

The antennas (transmitter and receiver) should be positioned horizontally in order to avoid interference to the measurement signal caused by entrained air bubbles.



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1 Antenna - transmitter
2 Antenna - receiver
3 Temperature sensor

Flow direction

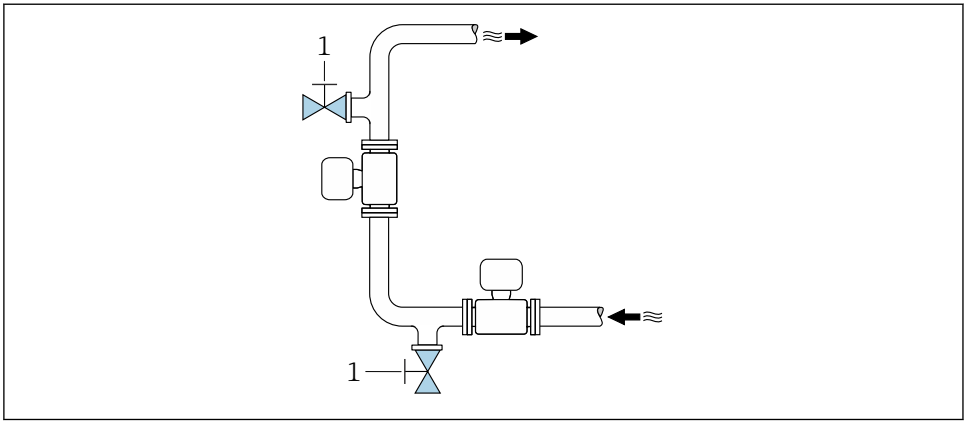
The device can be installed independently of the flow direction.

Inlet and outlet runs

When installing the device, no inlet and outlet runs need to be taken into account. No special precautions need to be taken for fittings that create turbulence, such as valves, elbows or T-pieces, as long as no cavitation occurs.

Installation with sampling points

To obtain a representative sample, the sampling points should be installed in the immediate vicinity of the device. This also makes it easier to take the sample and run the wizards via the device's local operation.



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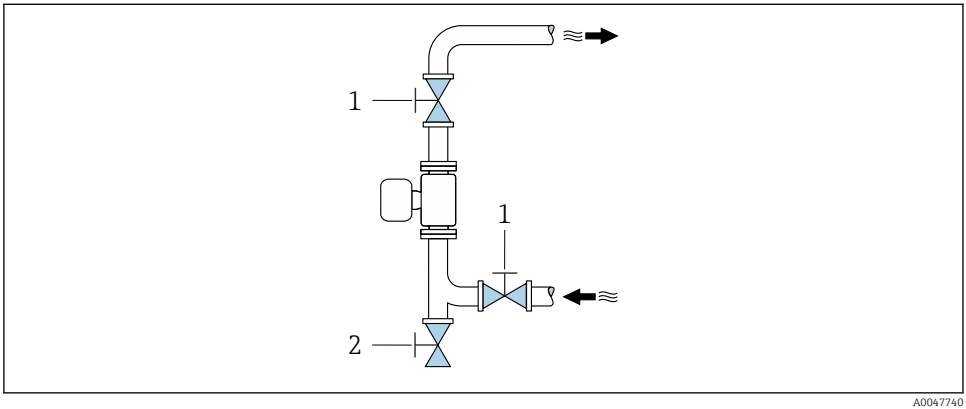
1 Sampling point

Installation with option for cleaning

Depending on the process conditions (e.g. grease deposits), it may be necessary to clean the device. Additional components can be fitted to avoid any need to remove the device for cleaning:

- Rinse connection
- Cleaning shaft



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1 Shutoff valve
2 Shut-off flap for cleaning

If there is a risk of deposits building up in the measuring tube, as a result of grease for example, a flow velocity of >2 m/s (6.5 ft/s) is recommended.

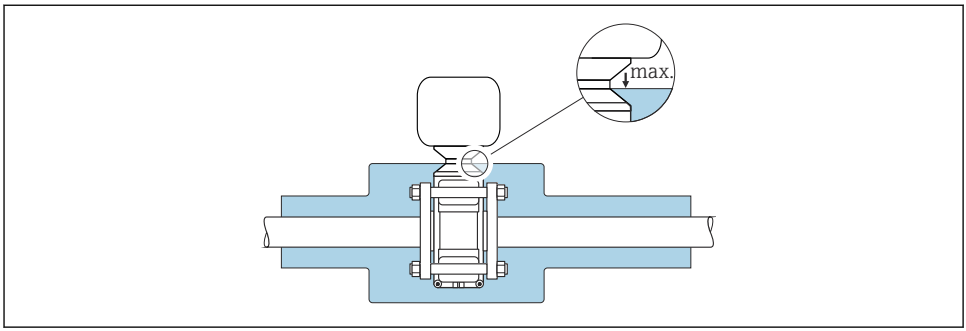
5.1.2 Environmental and process requirements

For detailed information on the ambient temperature range, static pressure and use in the presence of vibration, 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.

Thermal insulation

- For very hot media: To reduce energy losses and prevent accidental contact with hot pipes
- In cold environments: To prevent cooling of the pipe wall and the sensor from the outside, which could promote the formation of grease deposits



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WARNING

Electronics overheating on account of thermal insulation!
- ▶ Do not insulate the sensor connection housing.
- ▶ Insulation may be provided as far as the connection between the sensor and the transmitter housing or between the sensor and the sensor connection housing.
- ▶ Maximum permitted temperature at the lower end of the sensor connection housing: 75 °C (167 °F)

5.2 Mounting the measuring device

5.2.1 Preparing the measuring device

Devices with a nominal diameter of DN 200 to 300 mm (8 to 12 in) have lifting lugs for transporting the measuring device to the measuring point → 11.

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.

5.2.2 Mounting the sensor

WARNING

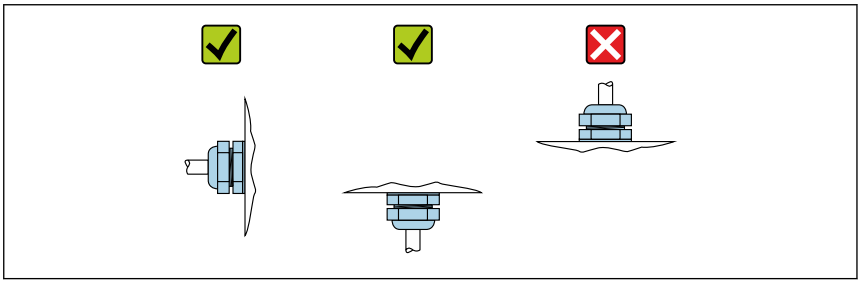
Danger due to improper process sealing!

- Ensure that the inside diameters of the gaskets are greater than or equal to that of the process connections and piping.
- Ensure that the seals are clean and undamaged.
- Secure the seals correctly.
- Apply the correct screw-tightening torques and comply with the mounting instructions → 23.

Mount the sensor between the pipe flanges in density measuring path.

A mounting kit comprising mounting bolts, seals, nuts and washers can be ordered as an optional extra:
- Directly with the device: order code for "Accessory enclosed", option PE
- Order separately as an accessory

1. Position the device so that the cable entries do not point upwards.



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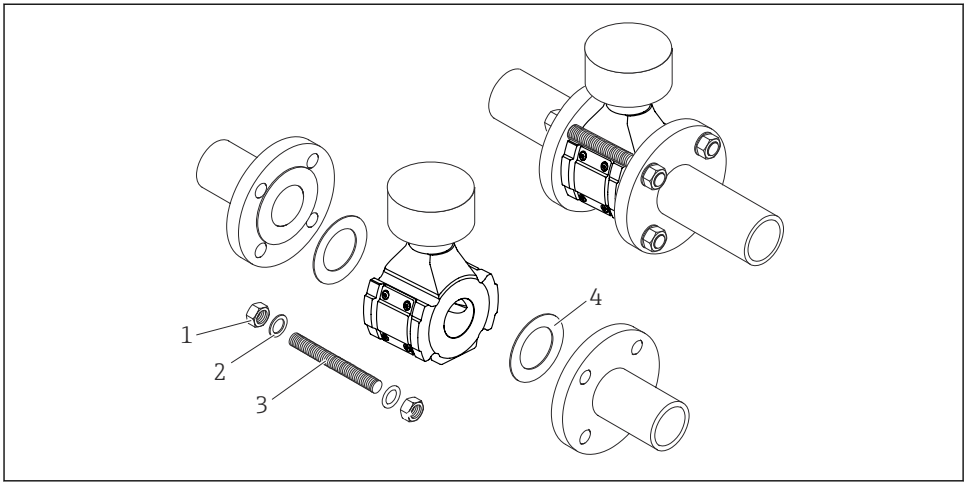
2. Following the correct screw-tightening torques and mounting instructions → 23, mount the sensor between the pipe flanges in the density measurement path.



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4 Mounting the sensor

1 Nut
2 Washer
3 Mounting bolts
4 Sealing

5.3 Post-mounting check

Is the device undamaged (visual inspection)?	❑
Does the measuring device conform to the measuring point specifications? For example: ▪ Process temperature ▪ Pressure (refer to the "Pressure-temperature ratings" section of the "Technical Information" document) ▪ Ambient temperature ▪ Measuring range	❑
Has the correct orientation for the sensor been selected? ▪ According to sensor type ▪ According to medium temperature ▪ According to medium properties	❑
Are the measuring point identification and labeling correct (visual inspection)?	❑
Is the device adequately protected against precipitation and direct sunlight?	❑
Have the fixing screws been tightened with the correct tightening torque?	❑

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.

7 Appendix

7.1 Screw tightening torques

NOTICE

Failure to observe screw tightening torques or mounting instructions

The process connection may be overloaded if screw tightening torques are not observed or the mounting instructions cannot be followed. This can produce a leaking process connection from which the medium escapes.

▶ Apply the correct screw tightening torques and comply with the mounting instructions.

The following mounting instructions must be observed:

- The specified screw tightening torques only apply when using the mounting kit, which can be ordered as an accessory .
- Nuts, threads and screw head surfaces must be greased before assembly.
- The pipes must be free of tensile stress.
- The screws must be tightened evenly in diagonally opposite sequence.

The values for the screw tightening torques depend on variables such as seals, screws, lubricants, tightening methods etc. These variables are outside the control of the manufacturer. The values indicated are therefore guideline values only.

Maximum screw tightening torques for EN 1092-1

Nominal diameter		Pressure rating	Screws	Max. screw tightening torque
[mm]	[in]		[mm]	
50	2	PN 10	4 x M16	85 Nm (62.7 lbf ft)
		PN 16		
80	3	PN 10	8 x M16	85 Nm (62.7 lbf ft)
		PN 16		
100	4	PN 10	8 x M16	100 Nm (73.8 lbf ft)
		PN 16		
150	6	PN 10	8 x M20	200 Nm (147.5 lbf ft)
		PN 16		
200	8	PN 10	8 x M20	200 Nm (147.5 lbf ft)
		PN 16	12 x M20	200 Nm (147.5 lbf ft)
250	10	PN 10	12 x M20	220 Nm (162.3 lbf ft)
		PN 16	12 x M24	250 Nm (184.4 lbf ft)
300	12	PN 10	12 x M20	220 Nm (162.3 lbf ft)
		PN 16	12 x M24	300 Nm (221.3 lbf ft)

Maximum screw tightening torques for ASME B16.5

Nominal diameter		Pressure rating	Screws	Max. screw tightening torque
[mm]	[in]		[in]	
50	2	Class 150	4 x 5/8"	110 Nm (81.1 lbf ft)
80	3	Class 150	4 x 5/8"	130 Nm (95.9 lbf ft)
100	4	Class 150	8 x 5/8"	130 Nm (95.9 lbf ft)
150	6	Class 150	8 x 3/4"	220 Nm (162.3 lbf ft)
200	8	Class 150	8 x 3/4"	250 Nm (184.4 lbf ft)
250	10	Class 150	12 x 7/8"	300 Nm (221.3 lbf ft)
300	12	Class 150	12 x 7/8"	350 Nm (258.2 lbf ft)

Maximum screw tightening torques for JIS B2220

Nominal diameter		Pressure rating	Screws	Max. screw tightening torque
[mm]	[in]		[mm]	
50	2	10K	4 x M16	90 Nm (66.4 lbf ft)
80	3	10K	8 x M16	90 Nm (66.4 lbf ft)
100	4	10K	8 x M16	90 Nm (66.4 lbf ft)
150	6	10K	8 x M20	200 Nm (147.5 lbf ft)
200	8	10K	12 x M20	200 Nm (147.5 lbf ft)
250	10	10K	12 x M22	280 Nm (206.5 lbf ft)
300	12	10K	16 x M22	280 Nm (206.5 lbf ft)

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