

Operating Instructions

CAV01

Flow assembly for optical sensors






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
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1 About this document



1.1 Warnings

Structure of information	Meaning
 DANGER Causes (/consequences) If necessary, Consequences of non-compliance (if applicable) ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the dangerous situation will result in a fatal or serious injury.
 WARNING Causes (/consequences) If necessary, Consequences of non-compliance (if applicable) ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the dangerous situation can result in a fatal or serious injury.
 CAUTION Causes (/consequences) If necessary, Consequences of non-compliance (if applicable) ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or more serious injuries.
NOTICE Cause/situation If necessary, Consequences of non-compliance (if applicable) ▶ Action/note	This symbol alerts you to situations which may result in damage to property.

1.2 Symbols used

-  Additional information, tips
-  Permitted
-  Recommended
-  Not permitted or not recommended
-  Reference to device documentation
-  Reference to page
-  Reference to graphic
-  Result of an individual step


1.2.1 Symbols on the device

-  Reference to device documentation
-  Do not dispose of products bearing this marking as unsorted municipal waste. Instead, return them to the manufacturer for disposal under the applicable conditions.

2 Basic safety instructions

2.1 Requirements for the personnel

- Installation, commissioning, operation and maintenance of the measuring system may be carried out only by specially trained technical personnel.
- The technical personnel must be authorized by the plant operator to carry out the specified activities.
- The electrical connection may be performed only by an electrical technician.
- The technical personnel must have read and understood these Operating Instructions and must follow the instructions contained therein.
- Faults at the measuring point may only be rectified by authorized and specially trained personnel.

 Repairs not described in the Operating Instructions provided must be carried out only directly at the manufacturer's site or by the service organization.

2.2 Intended use

The flow assembly is suitable for the installation of the optical sensors Viomax CAS51D and Memosens Wave CAS80E. Thanks to its design, it can be operated in pressurized systems.

The assembly is designed exclusively for use in liquid media.

Any use other than that intended puts the safety of people and the measuring system at risk. Therefore, any other use is not permitted.

The manufacturer is not liable for harm caused by improper or unintended use.

2.3 Workplace safety

As the user, you are responsible for complying with the following safety conditions:

- Installation guidelines
- Local standards and regulations
- Regulations for explosion protection

2.4 Operational safety

Before commissioning the entire measuring point:

1. Verify that all connections are correct.
2. Ensure that electrical cables and hose connections are undamaged.
3. Do not operate damaged products, and protect them against unintentional operation.
4. Label damaged products as defective.

During operation:

- ▶ If faults cannot be rectified,
take products out of service and protect them against unintentional operation.

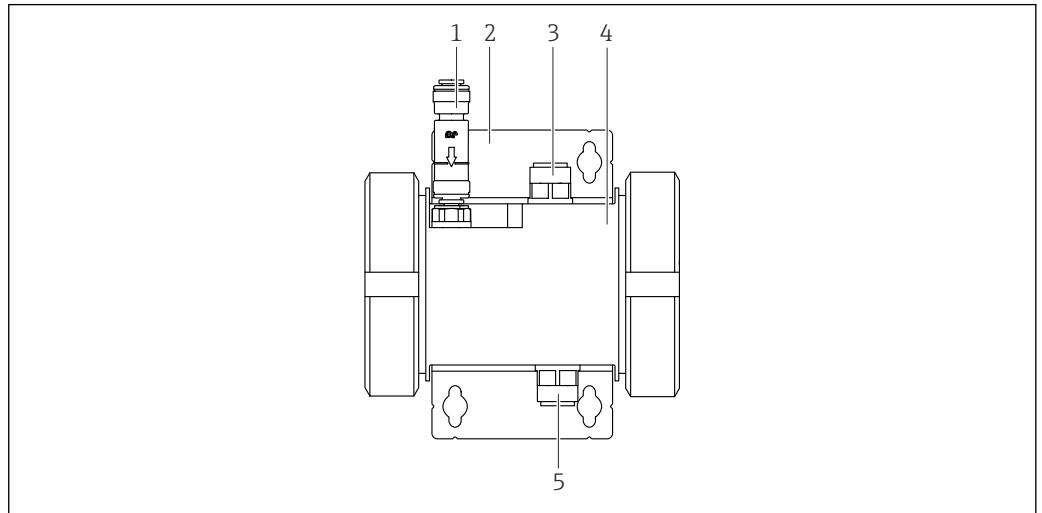
2.5 Product safety

The product is designed 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. The relevant regulations and international standards have been observed.


3 Product description

3.1 Product design

The flow assembly is suitable for optical sensors with different optical path lengths.



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 1 Flow assembly


- 1 Cleaning connection (optional)
- 2 Wall holder (pre-assembled on flow vessel)
- 3 Medium outlet
- 4 Flow vessel
- 5 Medium inlet

4 Incoming acceptance and product identification

4.1 Incoming acceptance

On receipt of the delivery:

1. Check the packaging for damage.
 - ↳ Report all damage immediately to the manufacturer.
Do not install damaged components.
2. Check the scope of delivery using the delivery note.
3. Compare the data on the nameplate with the order specifications on the delivery note.
4. Check the technical documentation and all other necessary documents, e.g. certificates, to ensure they are complete.

 If one of the conditions is not satisfied, contact the manufacturer.

4.2 Product identification

4.2.1 Nameplate

The nameplate provides you with the following information on your device:

- Manufacturer identification
 - Extended order code
 - Serial number
 - Ambient and process conditions
 - Safety information and warnings
 - Certificate information
- ▶ Compare the information on the nameplate with the order.

4.2.2 Identifying the product

Product page

www.endress.com/cav01

Interpreting the order code

The order code and serial number of your product can be found in the following locations:

- On the nameplate
- In the delivery papers

Obtaining information on the product

1. Go to www.endress.com.
2. Page search (magnifying glass symbol): Enter valid serial number.
3. Search (magnifying glass).
 - ↳ The product structure is displayed in a popup window.
4. Click the product overview.
 - ↳ A new window opens. Here you fill information pertaining to your device, including the product documentation.

4.2.3 Manufacturer address

Endress+Hauser Conducta GmbH+Co. KG
Dieselstraße 24
70839 Gerlingen
Germany

4.3 Scope of delivery

The scope of delivery comprises:

- Device, version as ordered
- Process connections POM G1/4" (optional)
- Operating instructions

4.4 Certificates and approvals

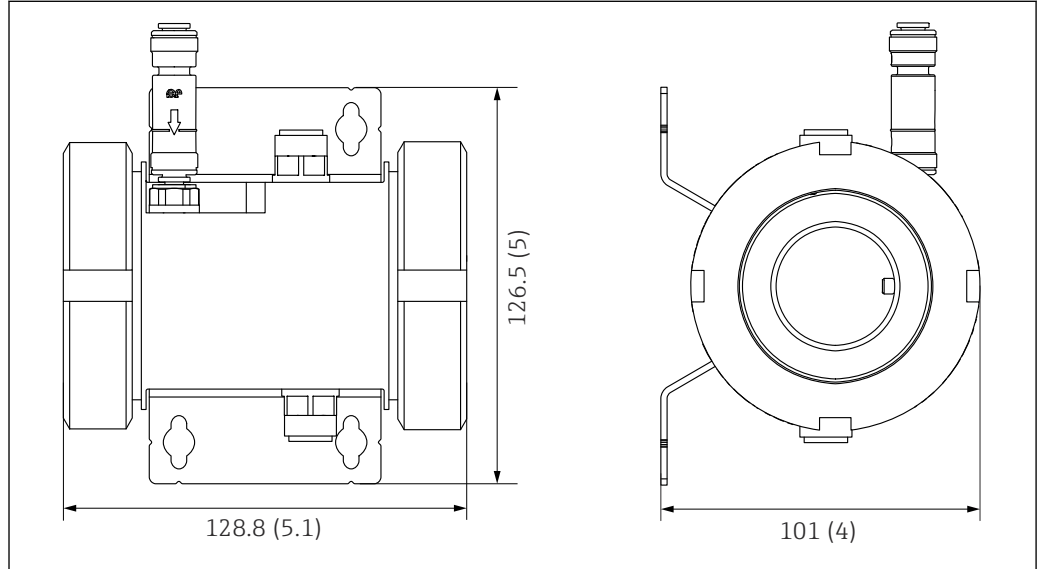
Current certificates and approvals for the product are available at www.endress.com on the relevant product page:

1. Select the product using the filters and search field.
2. Open the product page.
3. Select **Downloads**.

5 Mounting

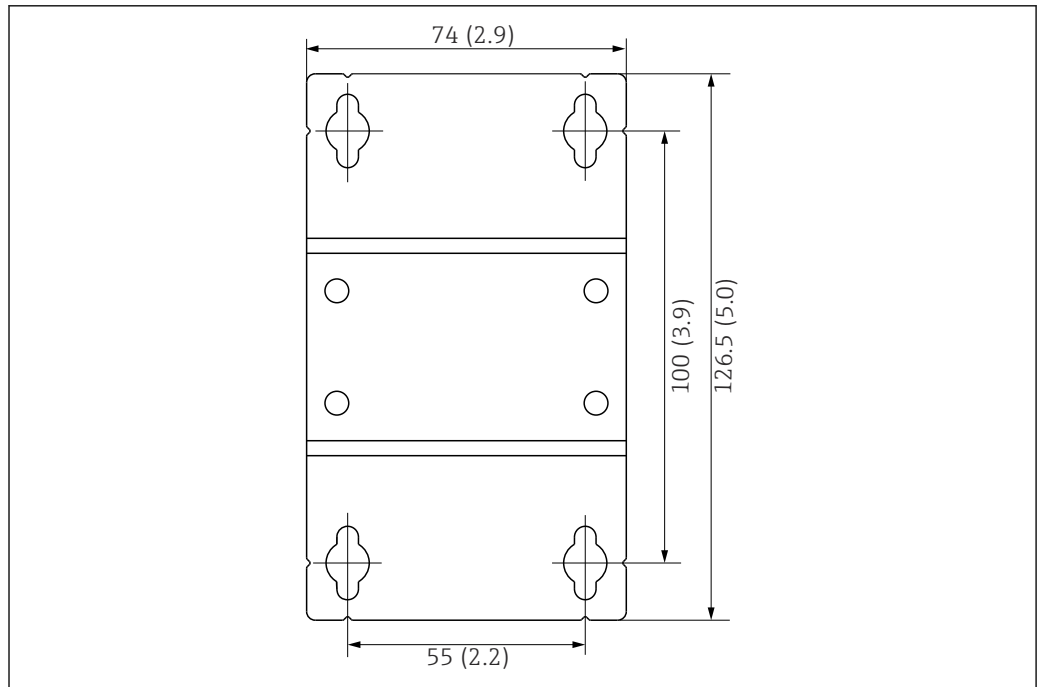
5.1 Mounting requirements

5.1.1 Dimensions



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2 Dimensions. Dimensions: mm (in)

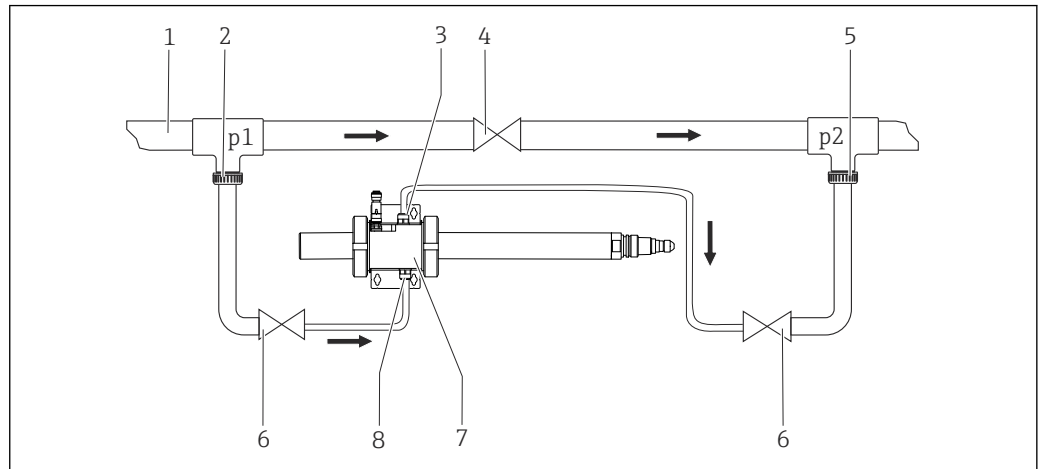


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3 Dimensions of wall holder Dimensions: mm (in)

5.1.2 Orientation

Assembly in the bypass



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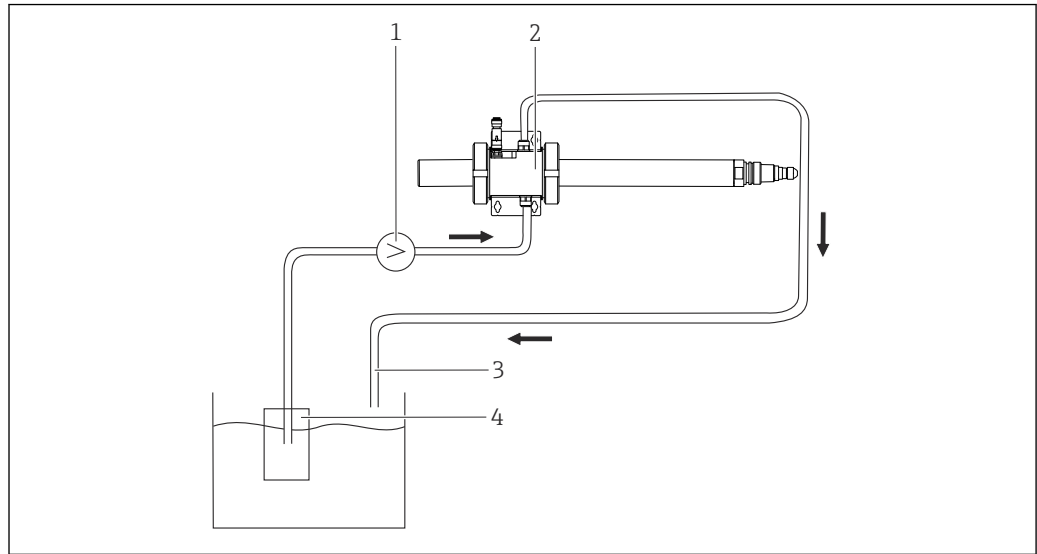
4 Connection diagram using the example of CAS80E, arrow indicates the flow direction

- 1 Main pipe
- 2 Medium sampling
- 3 Medium outlet
- 4 Adjustment and shut-off valve or orifice plate
- 5 Medium return
- 6 Adjustment and shut-off valves
- 7 Flow assembly
- 8 Medium inlet
- p1 Pressure
- p2 Pressure

To achieve flow through the assembly with a bypass, pressure p1 must be higher than pressure p2. No measures to increase pressure are required for branch pipes that branch off from the main pipe (no return medium).

1. Connect the medium inlet and outlet to the hose connections of the assembly.
 - ↳ The assembly is filled from below and is therefore self-venting.
2. Install an orifice plate or adjustment valve in the main pipe to ensure that pressure p1 is higher than pressure p2.
3. Make sure that the flow is at least 100 ml/h (0.026 gal/h).
4. Take the extended response times into consideration.

Assembly in open outlet



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5 Connection diagram with open outlet using the example of CAS80E, arrow indicates the flow direction

- 1 Pump
- 2 Flow assembly
- 3 Open outlet
- 4 Filter unit

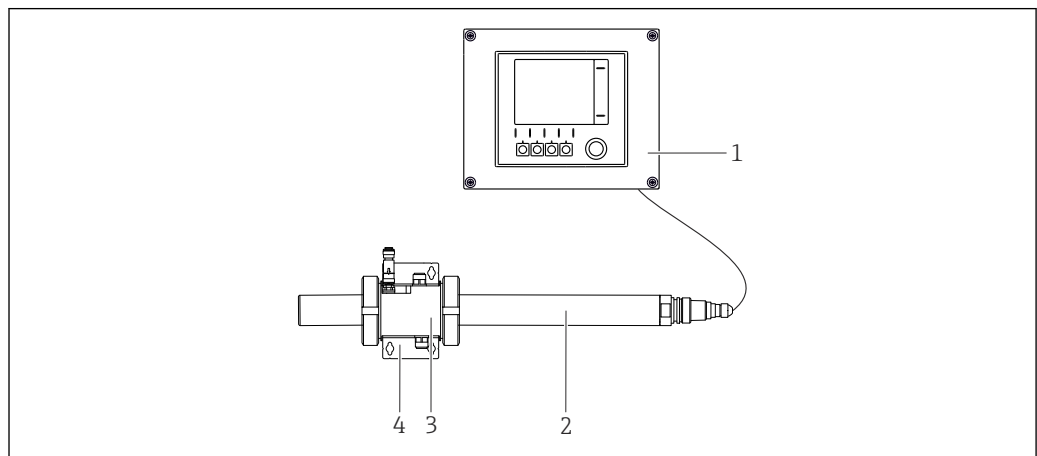
As an alternative to operation in the bypass, it is also possible to direct the sample flow from a filter unit with an open outlet through the assembly.

5.2 Mounting the assembly

5.2.1 Measuring system

A complete measuring system comprises:

- Sensor, e.g Memosens Wave CAS80E or Viomax CAS51D
- Liquiline CM44x multi-channel transmitter
- Flow assembly CAV01





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6 Measuring system

- 1 Transmitter
- 2 Sensor
- 3 Flow assembly
- 4 Holder

5.2.2 Mounting the wall holder with the flow vessel on the panel

i The wall holder and flow vessel are pre-assembled.

1. Position the wall holder at the desired fastening point.
2. Mark the 4 boreholes on the panel. In doing so, pay attention to the dimensions →  3,  10.
3. Drill holes for the wall holder.
4. Fasten the wall holder.

5.2.3 Mounting with CAS51D sensor

CAUTION

Residual medium and high temperatures

Risk of injury!

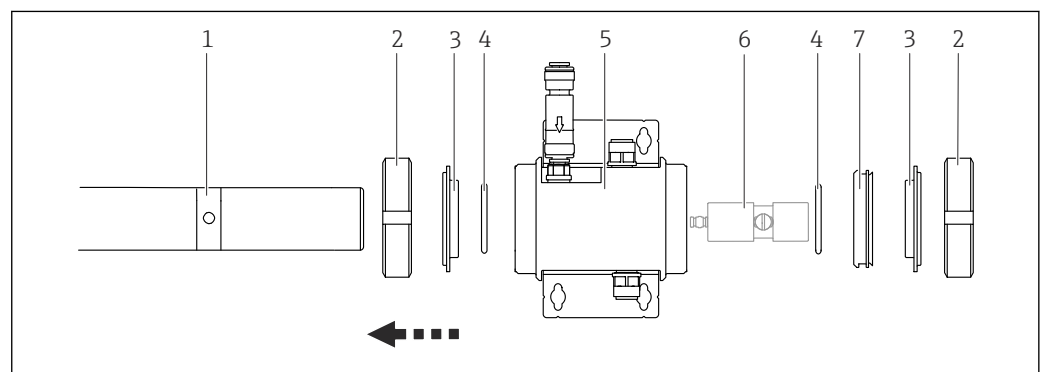
- ▶ When working with parts that are in contact with the medium, protect against residual medium and elevated temperatures.
- ▶ Wear protective goggles and safety gloves.

NOTICE


Turning the sensor inside the flow assembly causes the sensor tube to loosen and allow liquid penetration.

- ▶ Only push the sensor forwards or backwards in the flow assembly.

i Preferably align the assembly with the cleaning connection upwards. This makes it easier for any air remaining in the pipe after cleaning or maintenance to escape.



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 7 Individual parts of the assembly

- 1 Back of sensor (mounting hole for air distributor)
- 2 Coupling nut
- 3 Ring
- 4 O-ring
- 5 Flow vessel with wall holder
- 6 Air distributor
- 7 Lock ring

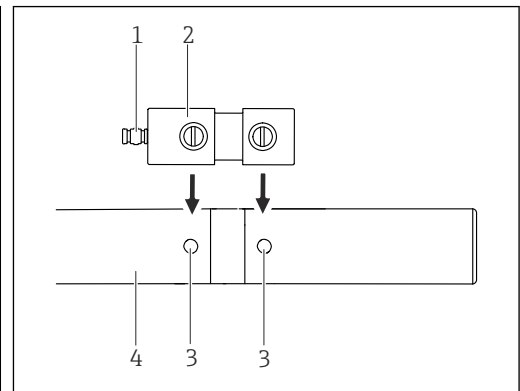
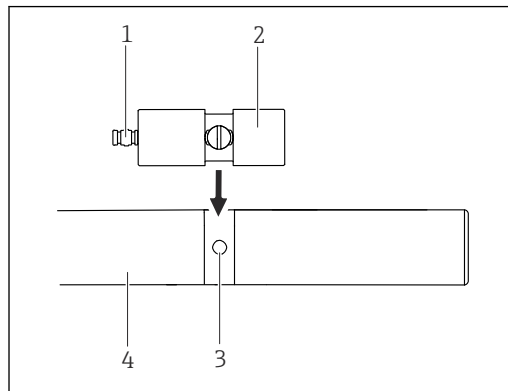
Preparation:

1. Wet the O-rings with water or grease them before use.
 - ↳ The O-rings slide more easily over the sensor and do not twist.
2. Make sure that optical windows do not come in contact with grease.

Mounting with the CAS51D sensor →  13

1. Slide the coupling nut back over the sensor until it is clearly behind the measurement gap.

2. Slide the ring and O-ring over the sensor until all parts are clearly behind the measurement gap.
3. Push the sensor through the mounted flow vessel until the flow vessel is behind the measurement gap.



8 Air distributor for gaps up to 10 mm (0.39 in)

9 Air distributor for gaps as of 40 mm (1.57)

- 1 Double nipple
- 2 Air distributor
- 3 Mounting holes
- 4 Sensor

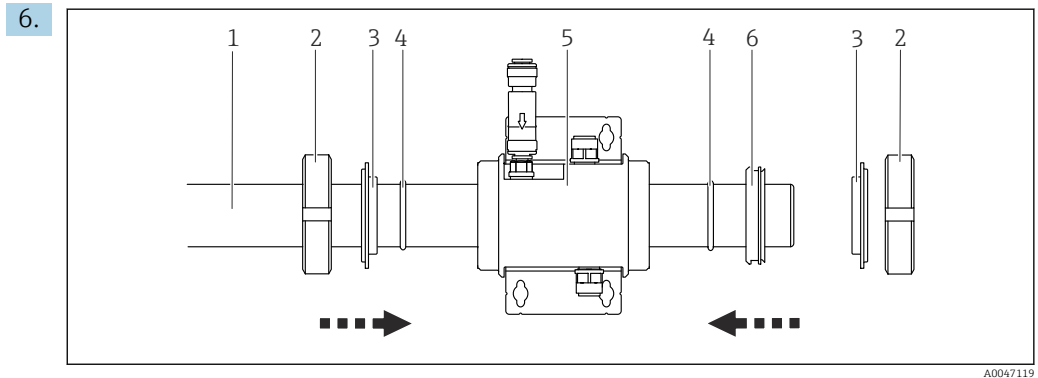
- 1 Double nipple
- 2 Air distributor
- 3 Mounting holes
- 4 Sensor

Mounting the air distributor on the device → 8, 14 → 9, 14

1. Note the orientation of the air distributor → 7, 13 or → 10, 16.
2. Place the air distributor on the device right on top of the mounting hole.
3. Check whether the O-ring is located between the air distributor and banjo bolt.
4. Screw on the air distributor.

Mounting and fastening the assembly:

1. Push the sensor through the mounted flow vessel until the flow vessel engages with the air distributor.
2. Slide the second O-ring over the sensor as far as it will go in the assembly.
3. Slide the lock ring over the sensor as far as it will go in the assembly.
4. Slide the second ring over the sensor as far as it will go in the assembly.
5. Slide the second coupling nut over the sensor.



- 1 Sensor
- 2 Coupling nut
- 3 Ring
- 4 O-ring
- 5 Flow vessel with wall holder
- 6 Lock ring

Slide all parts towards the flow vessel.

- 7. Push the rings into the opening as far as they will go.
- 8. Tighten both coupling nuts as far as they will go.

5.2.4 Mounting with CAS80E sensor

CAUTION

Residual medium and high temperatures

Risk of injury!

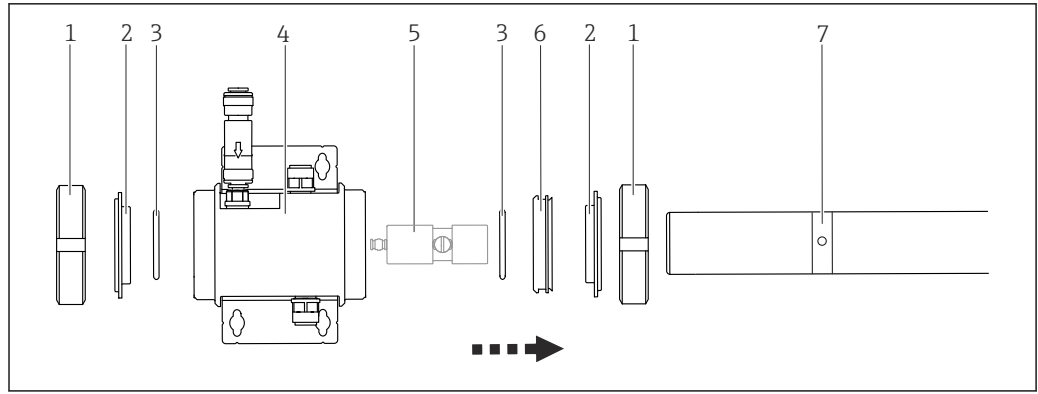
- ▶ When working with parts that are in contact with the medium, protect against residual medium and elevated temperatures.
- ▶ Wear protective goggles and safety gloves.

NOTICE

Turning the sensor inside the flow assembly causes the sensor tube to loosen and allow liquid penetration.

- ▶ Only push the sensor forwards or backwards in the flow assembly.

- i** Preferably align the assembly with the cleaning connection upwards. This makes it easier for any air remaining in the pipe after cleaning or maintenance to escape.



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10 Individual parts of the assembly

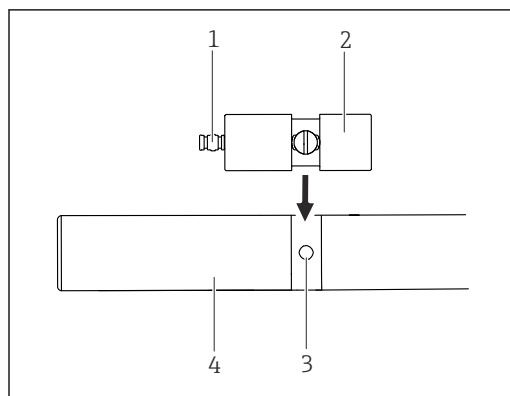
- 1 Coupling nut
- 2 Ring
- 3 O-ring
- 4 Flow vessel with wall holder
- 5 Air distributor
- 6 Lock ring
- 7 Back of sensor (mounting hole for air distributor)

Preparation:

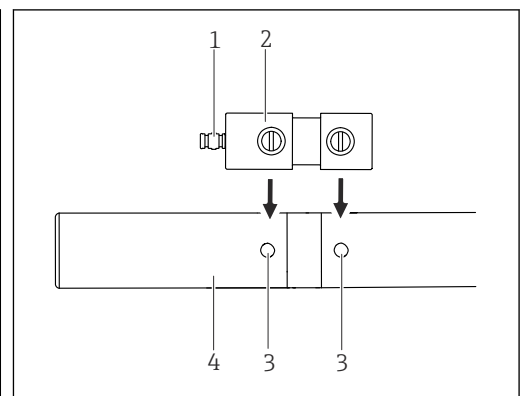
1. Wet the O-rings with water or grease them before use.
 - ↳ The O-rings slide more easily over the sensor and do not twist.
2. Make sure that optical windows do not come in contact with grease.

Mounting with the CAS80E sensor → 10, 16

1. Slide the coupling nut back over the sensor until it is clearly behind the measurement gap.
2. Slide the ring, the lock ring, and the O-ring over the sensor until all parts are clearly behind the measurement gap.



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11 Air distributor for gaps up to 10 mm (0.39 in)

12 Air distributor for gaps as of 40 mm (1.57 in)

- 1 Double nipple
- 2 Air distributor
- 3 Mounting holes
- 4 Sensor

- 1 Double nipple
- 2 Air distributor
- 3 Mounting holes
- 4 Sensor

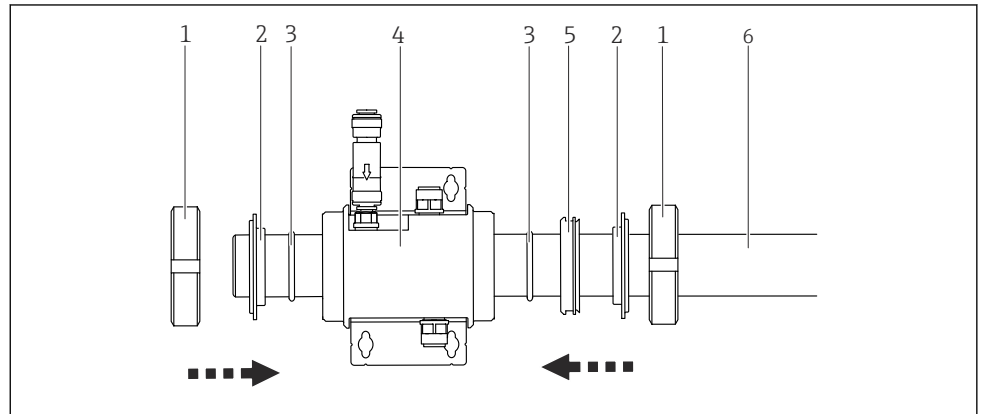
Mounting the air distributor on the device → 11, 16 → 12, 16

1. Note the orientation of the air distributor → 7, 13 or → 10, 16.
2. Place the air distributor on the device right on top of the mounting hole.
3. Check whether the O-ring is located between the air distributor and banjo bolt.
4. Screw on the air distributor.

Mounting and fastening the assembly:

1. Push the sensor through the mounted flow vessel until the flow vessel engages with the air distributor.
2. Slide the second O-ring over the sensor as far as it will go in the assembly.
3. Slide the second ring over the sensor as far as it will go in the assembly.
4. Slide the second coupling nut over the sensor.

5.

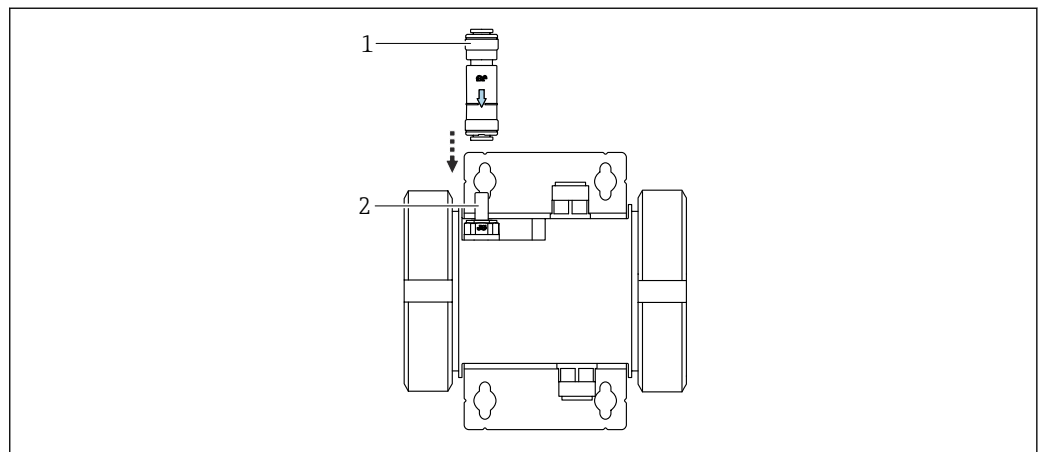


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- 1 Coupling nut
- 2 Ring
- 3 O-ring
- 4 Flow vessel with wall holder
- 5 Lock ring
- 6 Sensor

Slide all parts towards the flow vessel.

6. Push the rings into the opening as far as they will go.
7. Tighten both coupling nuts as far as they will go.

5.2.5 Mounting the cleaning connection

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13 Mounting the cleaning connection

- 1 Cleaning connection
- 2 Nozzle

- Screw the cleaning connection onto the nozzle provided, with the arrow pointing downwards.

5.3 Post-mounting check

1. After mounting, check all the connections to ensure they are secure.
2. Check the tight sealing of all the seals on the assembly (no leaks).
3. Check whether the sensor is installed and connected correctly.

6 Commissioning

⚠ WARNING

Risk of injury if medium escapes!

- ▶ Before applying pressure to the assembly, ensure that the medium is correctly connected.
- ▶ If the medium connection is not correct, do not introduce the assembly into the process.
- ▶ Before commissioning, check the chemical compatibility of materials, the temperature range and the pressure range.

6.1 Preparations

The flow assembly is optionally fitted with a cleaning connection.

Connect the compressed air hose:

- ▶ Connect a compressed air hose (outer diameter 6 mm (0.24 in)) to the cleaning connection with the connection supplied (G1/8" DN4/6, 6 mm (0.24 in)).

7 Maintenance

WARNING

Risk of injury if medium or cleaner escapes!

- ▶ Before each maintenance task, ensure that the process pipe is unpressurized, empty and rinsed.
- ▶ Switch off the cleaning unit before the sensor is removed from the medium.

7.1 Maintenance work

CAUTION

Risk of injury due to residual medium and elevated temperatures!

- ▶ When handling parts that are in contact with the medium, protect against residual medium and elevated temperatures.
- ▶ Wear protective goggles and safety gloves.

7.1.1 Cleaning agent

WARNING

Organic solvents containing halogens

Limited evidence of carcinogenicity! Dangerous for the environment with long-term effects!

- ▶ Do not use organic solvents that contain halogens.

WARNING

Thiocarbamide

Harmful if swallowed! Limited evidence of carcinogenicity! Possible risk of harm to the unborn child! Dangerous for the environment with long-term effects!

- ▶ Wear protective goggles, protective gloves and appropriate protective clothing.
- ▶ Avoid all contact with the eyes, mouth and skin.
- ▶ Avoid discharge into the environment.

The most common types of soiling and the appropriate cleaning agents in each case are shown in the following table.

 Pay attention to the material compatibility of the materials to be cleaned.

Type of soiling	Cleaning agent
Greases and oils	Hot water or tempered, surfactant-containing (basic) agents or water-soluble organic solvents (e.g. ethanol)
Limescale deposits, metal hydroxide buildup, lyophobic biological buildup	approx. 3% hydrochloric acid
Sulfide deposits	Mixture of 3% hydrochloric acid and thiocarbamide (commercially available)
Protein buildup	Mixture of 3% hydrochloric acid and pepsin (commercially available)
Fibers, suspended substances	Pressurized water, possibly surface-active agents
Light biological buildup	Pressurized water

- ▶ Choose a cleaning agent to suit the degree and type of soiling.

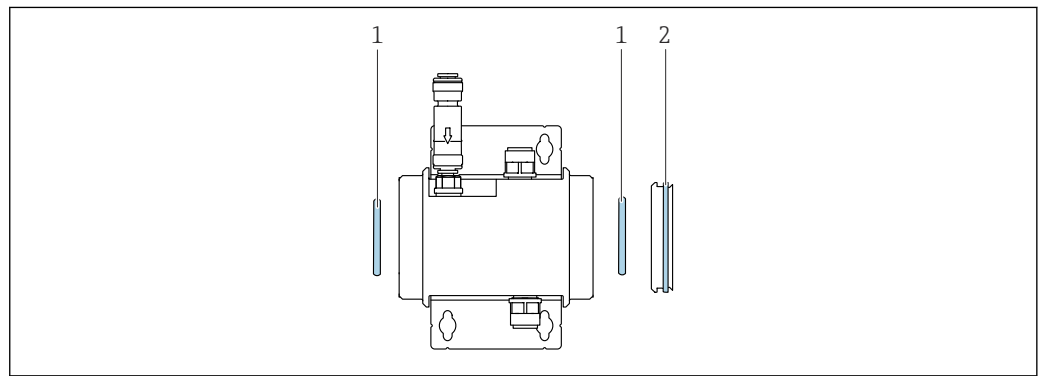
7.1.2 Cleaning the assembly

To ensure stable and reliable measurements, the assembly and the sensor must be cleaned regularly. The frequency and intensity of the cleaning depend on the medium.

1. Remove the sensor.
2. Clean the assembly depending on the degree of fouling.
3. Remove light dirt and fouling using suitable cleaning agents → 20.
4. Remove heavy soiling using a soft brush and a suitable cleaning agent.
5. For very persistent dirt, soak the parts in a cleaning solution.
6. After soaking the parts, clean them with a brush.

i A typical cleaning interval for drinking water, for example, is 6 months.

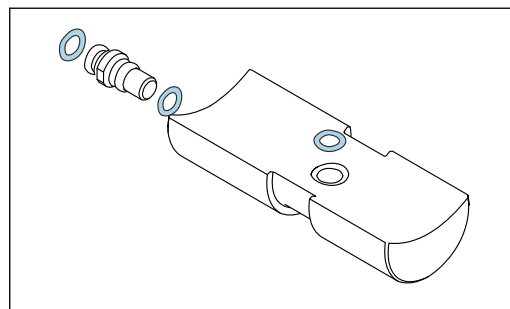
7.1.3 Replace the O-rings



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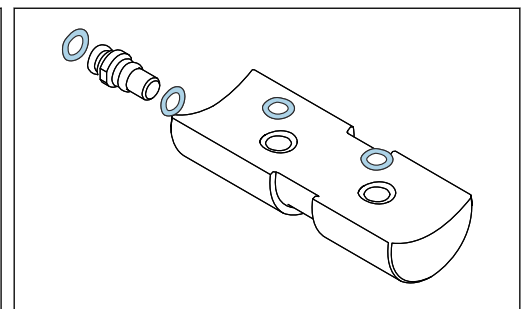
14 O-rings on assembly

- 1 O-ring
2 O-ring on lock ring



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15 O-rings on air distributor with one mounting hole



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16 O-rings on air distributor with 2 mounting holes

The air distributor for the sensors with a gap width of 40 mm (1.57 in) or 50 mm (1.97 in) has 2 mounting holes, each with an O-ring. It is recommended to replace the O-rings annually.

1. Replace the O-rings at regular intervals.
2. Ensure the appropriate process conditions are in place.

8 Repair

8.1 General notes

The repair and conversion concept provides for the following:

- The product has a modular design
- Spare parts are grouped into kits which include the associated kit instructions
- Only use original spare parts from the manufacturer
- Repairs are carried out by the manufacturer's Service Department or by trained users
- Certified devices can only be converted to other certified device versions by the manufacturer's Service Department or at the factory
- Observe applicable standards, national regulations, Ex documentation (XA) and certificates

1. Carry out the repair according to the kit instructions.
2. Document the repair and conversion and enter, or have entered, in the Life Cycle Management tool (W@M).

8.2 Spare parts

Device spare parts that are currently available for delivery can be found on the website:

<https://portal.endress.com/webapp/SparePartFinder>

- ▶ Quote the serial number of the device when ordering spare parts.

8.3 Return

The product must be returned if repairs or a factory calibration are required, or if the wrong product was ordered or delivered. As an ISO-certified company and also due to legal regulations, Endress+Hauser is obliged to follow certain procedures when handling any returned products that have been in contact with medium.

To ensure the swift, safe and professional return of the device:

- ▶ Check the website www.endress.com/support/return-material for information on the procedure and general conditions.

8.4 Disposal

- ▶ Observe the local regulations.



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.

9 Accessories

The following are the most important accessories available at the time this documentation was issued.

Listed accessories are technically compatible with the product in the instructions.

1. Application-specific restrictions of the product combination are possible. Ensure conformity of the measuring point to the application. This is the responsibility of the operator of the measuring point.
2. Pay attention to the information in the instructions for all products, particularly the technical data.
3. For accessories not listed here, please contact your Service or Sales Center.

9.1 Device-specific accessories

Process connection: POM G1/4" DN6/8

10 Technical data

10.1 Environment

10.1.1 Ambient temperature range

0 to 60 °C (32 to 140 °F)

10.2 Process

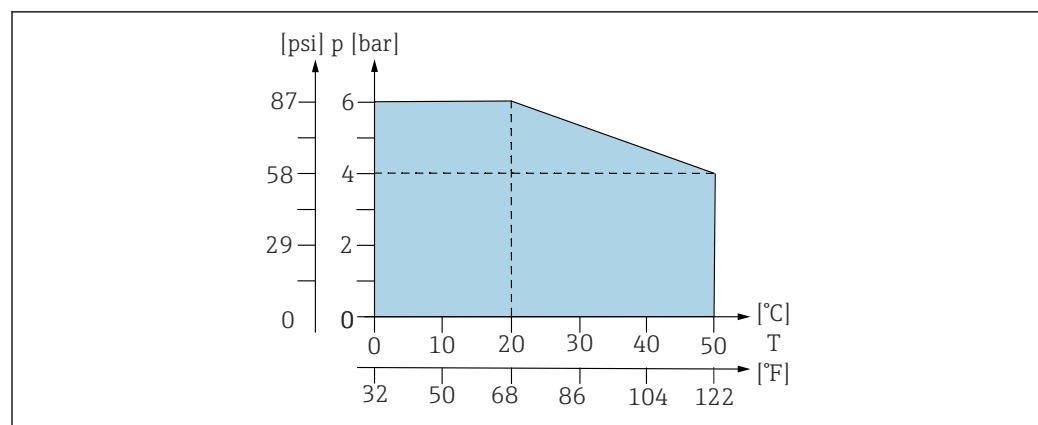
10.2.1 Process temperature range

0 to 50 °C (32 to 122 °F)

10.2.2 Pressure range

- Maximum 6 bar (87 psi) at 20 °C (68 °F)
- Maximum 4 bar (58 psi) at 50 °C (122 °F)

10.2.3 Pressure-temperature ratings



17 Pressure/temperature ratings

10.2.4 Flow limit

The flow limit depends on the sensor used and its properties. The data are based on water.

- Minimum 100 ml/h (0.026 gal/h)
- Maximum 10 l/h (2.64 gal/h)

10.3 Mechanical construction

10.3.1 Dimensions

→ Section "Installation"

10.3.2 Weight

1.48 kg (3.26 lb)

10.3.3 Materials

Wetted material

Housing:	POM-C
O-rings:	EPDM
Other parts:	Stainless steel 1.4404, PTFE

10.3.4 Process connections

POM G1/4" DN6/8 (for hoses with outer diameter 8 mm (0.31 in))

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