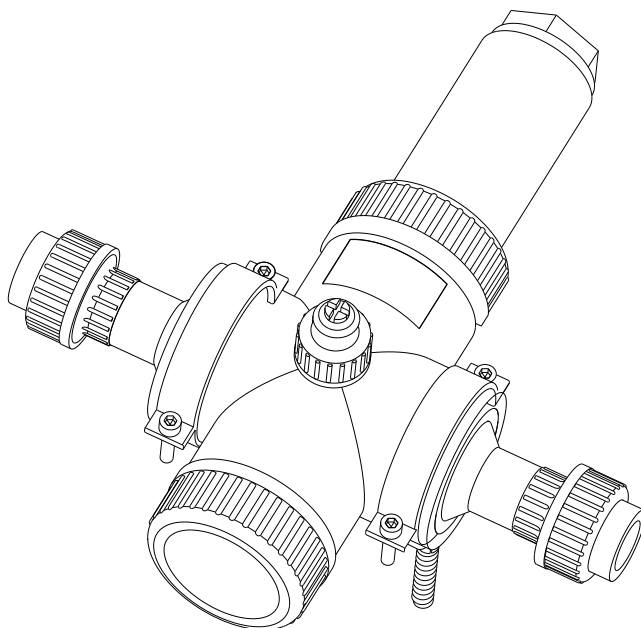


# Operating Instructions

## CYA251

Flow assembly for nitrate/SAC, turbidity and oxygen sensors









# Table of contents








<b>1</b>	<b>About this document</b> .....	<b>4</b>
1.1	Warnings .....	4
1.2	Symbols used .....	4
1.3	Symbols used .....	5
<b>2</b>	<b>Basic safety instructions</b> .....	<b>6</b>
2.1	Requirements for the personnel .....	6
2.2	Designated use .....	6
2.3	Workplace safety .....	6
2.4	Operational safety .....	7
2.5	Product safety .....	7
<b>3</b>	<b>Product description</b> .....	<b>7</b>
3.1	Product design .....	7
<b>4</b>	<b>Incoming acceptance and product identification</b> .....	<b>8</b>
4.1	Incoming acceptance .....	8
4.2	Product identification .....	10
<b>5</b>	<b>Installation</b> .....	<b>12</b>
5.1	Installation conditions .....	12
5.2	Mounting the assembly .....	13
5.3	Mounting the sensor .....	17
5.4	Post-installation check .....	21
<b>6</b>	<b>Commissioning</b> .....	<b>21</b>
<b>7</b>	<b>Maintenance</b> .....	<b>22</b>
7.1	Maintenance tasks .....	22
<b>8</b>	<b>Repair</b> .....	<b>25</b>
8.1	Spare parts .....	25
8.2	Return .....	25
8.3	Disposal .....	26
<b>9</b>	<b>Accessories</b> .....	<b>27</b>
9.1	Device-specific accessories .....	27
<b>10</b>	<b>Technical data</b> .....	<b>30</b>
10.1	Environment .....	30
10.2	Process .....	30
10.3	Mechanical construction .....	31
	<b>Index</b> .....	<b>33</b>

# 1 About this document

## 1.1 Warnings

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

## 1.2 Symbols used

Symbol	Meaning
	Additional information, tips
	Permitted or recommended
	Not permitted or not recommended
	Reference to device documentation
	Reference to page
	Reference to graphic
	Result of a step

## 1.3 Symbols used

### 1.3.1 Symbols on the device

Symbol	Meaning
The symbol consists of a warning triangle on the left, which is a triangle with a thick border and an exclamation mark inside. A horizontal arrow points from the right side of the warning triangle to the left side of an information symbol on the right. The information symbol is a book with a thick border and a lowercase letter 'i' on its cover.	Reference to device documentation

## 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 Designated use

The assembly is designed exclusively for use in liquid media.

The CYA251 flow assembly is designed for the installation of nitrate/SAC, turbidity and oxygen sensors, each with a diameter of 40 mm (1.57 in), in pipes and hoses.

Their mechanical construction means that they can be operated in pressurized systems (see technical data).

Use of the device for any purpose other than that described, poses a threat to the safety of people and of the entire measuring system and is therefore not permitted.

The manufacturer is not liable for damage caused by improper or non-designated use.

### 2.3 Workplace safety

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

- Installation guidelines
- Local standards and regulations

## 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:  
products must be taken out of service and protected 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 European standards have been observed.

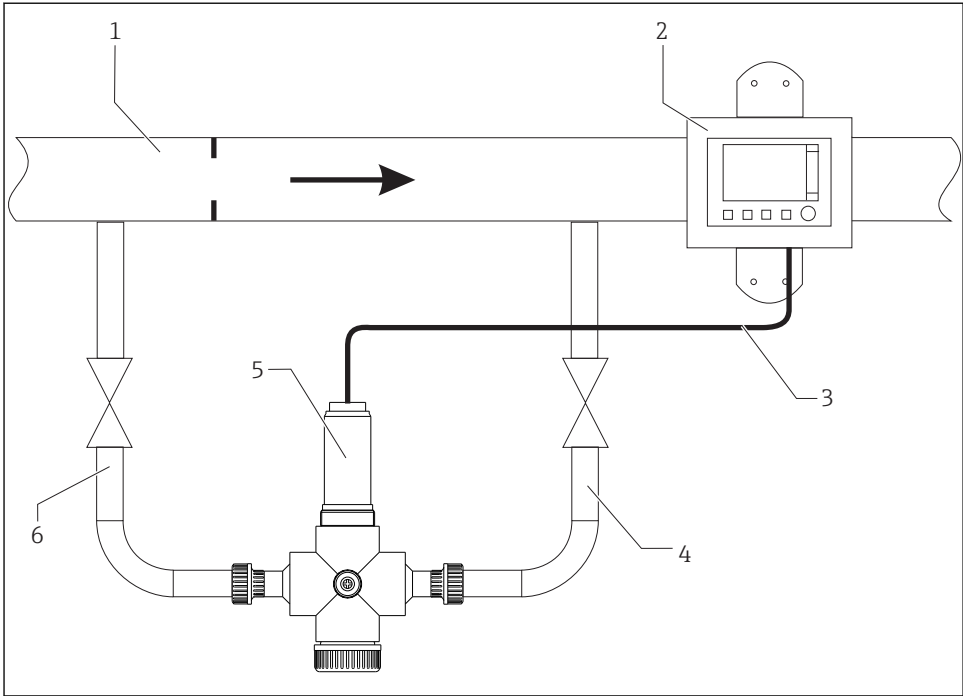
# 3 Product description

## 3.1 Product design

### 3.1.1 Measuring system

A complete measuring system comprises:

- Flowfit CYA251 flow assembly
- Transmitter, e.g. Liquiline CM442
- 40 mm sensor, e.g. CUS50D
- Measuring cable



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### 1 Example of a measuring system

- 1 Process pipe
- 2 Liquiline CM442 transmitter
- 3 Measuring cable
- 4 Return line with shut-off valve
- 5 Flow assembly CYA251 with 40 mm sensor
- 6 Inlet with shut-off valve

## 4 Incoming acceptance and product identification

### 4.1 Incoming acceptance

1. Verify that the packaging is undamaged.
  - ↳ Notify the supplier of any damage to the packaging.  
Keep the damaged packaging until the issue has been resolved.
2. Verify that the contents are undamaged.
  - ↳ Notify the supplier of any damage to the delivery contents.  
Keep the damaged goods until the issue has been resolved.



3. Check that the delivery is complete and nothing is missing.
  - ↳ Compare the shipping documents with your order.
4. Pack the product for storage and transportation in such a way that it is protected against impact and moisture.
  - ↳ The original packaging offers the best protection.  
Make sure to comply with the permitted ambient conditions.

If you have any questions, please contact your supplier or your local Sales Center.

## 4.2 Product identification

### 4.2.1 Nameplate

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

- Manufacturer identification
- Order code
- Extended order code
- Serial number
- Ambient and process conditions
- Safety information and warnings

► Compare the information on the nameplate with the order.

### 4.2.2 Identifying the product

#### Product page

[www.endress.com/cya251](http://www.endress.com/cya251)

#### 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](http://www.endress.com).
2. Call up the site search (magnifying glass).
3. Enter a valid serial number.
4. Search.
  - ↳ The product structure is displayed in a popup window.
5. Click on the product image in the popup window.
  - ↳ A new window (**Device Viewer**) opens. All of the information relating to your device is displayed in this window as well as the product documentation.

#### Manufacturer address

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

### 4.2.3 Certificates and approvals

The assembly has been manufactured according to good engineering practice as per Article 4, Paragraph 3 of the Pressure Equipment Directive 2014/68/EU and is therefore not required to bear the CE label.

#### **4.2.4 Scope of delivery**

The delivery comprises:

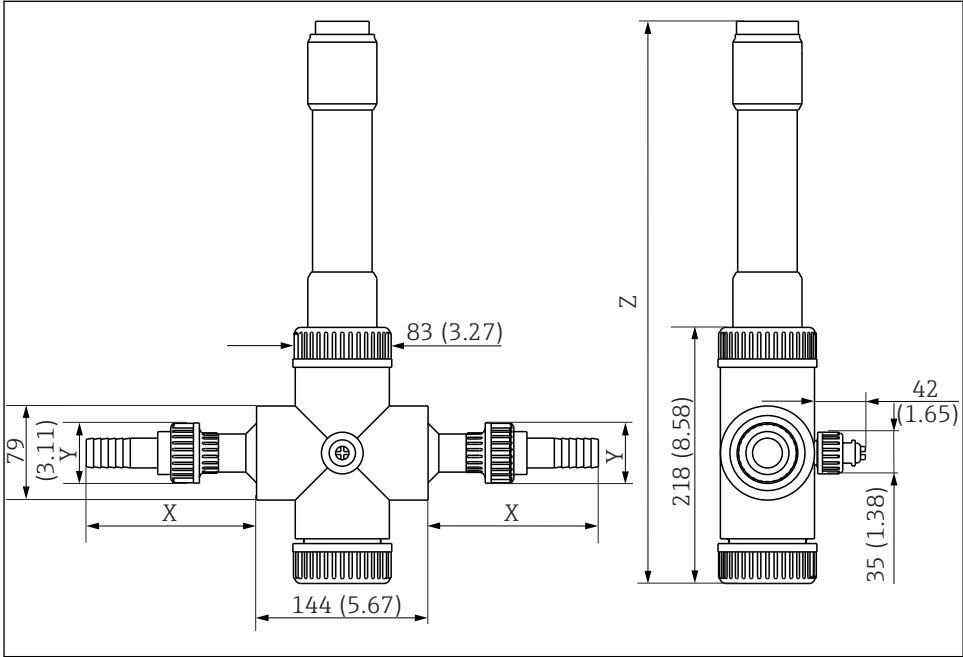
- Flow assembly in the version ordered (including the selected sensor adapters and process connections)
- Accessories ordered
- Adapter with check valve (for optional cleaning only, 6 mm (0.24 in) connection for compressed air)
- 1 tube of lubricant (for O-rings)
- Operating Instructions

When the flow assembly is delivered, the cleaning port and cleaning connection are fitted with dummy plugs.

# 5 Installation

## 5.1 Installation conditions

### 5.1.1 Dimensions



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2 Dimensions in mm (in)

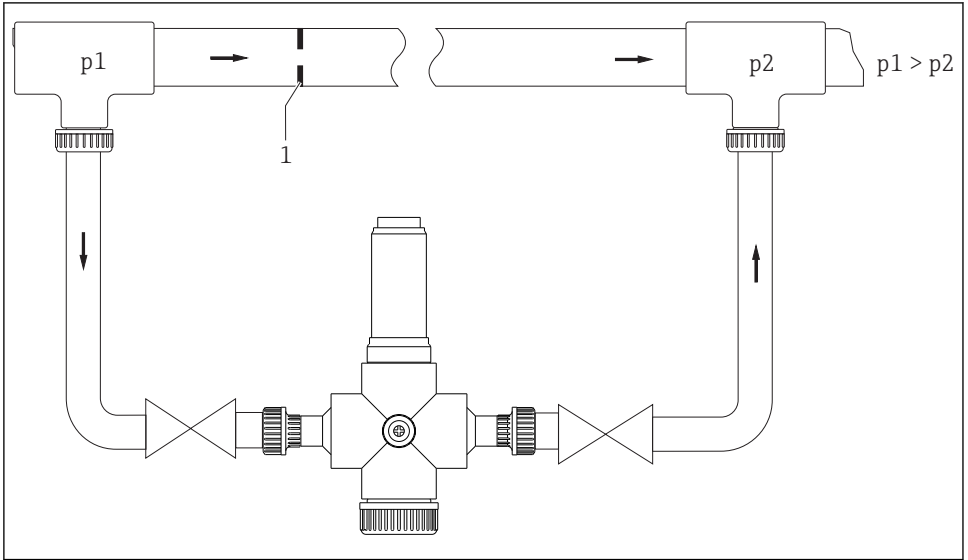
Sensor	CAS51D 2 mm (0.08 in)	CAS51D 8 mm (0.31 in)	CAS51D 40 mm (1.57 in)	COS51D COS41	COS61D COS61 COS31	CUS51D	CUS50D
Z	468 (18.43)	471 (18.54)	477 (18.78)	284 (11.18)	326 (12.83)	332 (13.07)	360 (14.2)

Ports	NPT 3/4"	G 3/4	DN 25	ANSI 1"	Hose D20	G1 1/4
X	83 (3.27)	83 (3.27)	83 (3.27)	50 (1.97)	137 (5.39)	61 (2.40)
Y	50.5 (1.99)	50.5 (1.99)	50.5 (1.99)	115 (4.53)	50.5 (1.99)	44.5 (1.75)

## 5.2 Mounting the assembly

### 5.2.1 Installation instructions

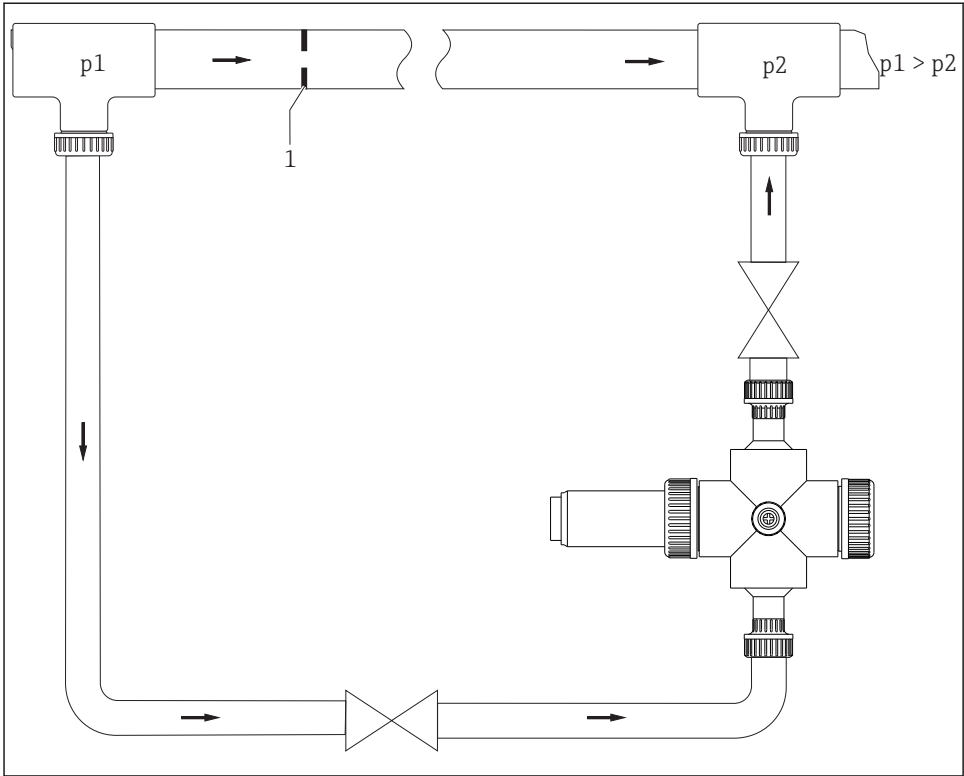
To achieve flow through the assembly with a bypass, pressure  $p_1$  must be higher than pressure  $p_2$ . This can be achieved by installing an orifice plate in the main pipe.



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3 Connection example with bypass and orifice plate in the main pipe

1 Orifice plate

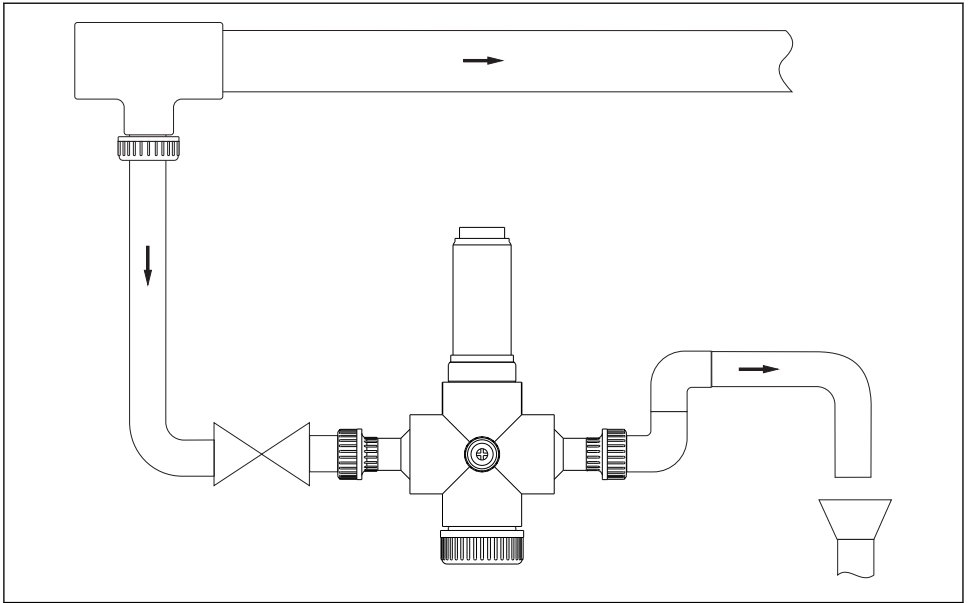


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4 Connection example involving a bypass and an orifice plate (assembly rotated by 90°, inlet at bottom)

1 Orifice plate

No measures to increase pressure are required for branch pipes that branch off from the main pipe.



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5 Connection example involving an open outlet

The inlet and outlet connection of the flow assembly are always identical.

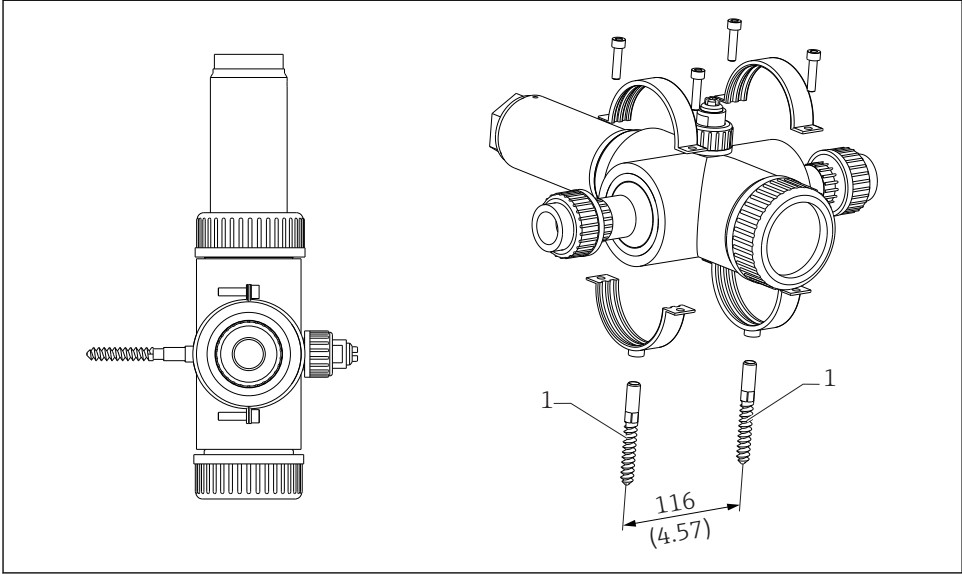
The inlet and outlet side are not specified by the flow assembly and can therefore be selected to suit the particular application.

The flow assembly is designed for connection to pipes and hoses.

*Required at point of installation:*

Required components	Application
2 shut-off valves	Bypass solution
1 shut-off valve	Solution with open outlet
Orifice plate in the main pipe	Bypass solution
Dirt filter (500 µm or finer)	If the medium contains coarse particles of dirt
Pressure-reducing valve	If the medium pressure exceeds the permitted value → 30
Wall holder unit to secure the assembly → 27	Hose connection
Pipe or hose connections to the assembly	All versions

## 5.2.2 Mounting the assembly with wall holder unit



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### 6 Wall holder unit

- 1 Hanger bolt STST 10 × 60 (included in scope of delivery of wall mounting kit)

**i** Observe maximum permitted medium pressure for assembly and sensor.

If the pressure of the medium is higher than the permitted maximum value, install a pressure-reducing valve upstream from the flow assembly. The permitted medium pressure depends on the temperature → 30.

### Mounting the flow assembly in a bypass

1. Install a shut-off valve upstream and downstream from the flow assembly. This makes it possible to clean the sensor or perform other maintenance tasks without affecting the process.
2. Mount the assembly in a vertical, upright position or rotated by 90°. Make sure that the position of the assembly and the inlet guarantees automatic venting.
3. Establish the medium connection using commercially available connection fittings.
4. If the medium contains coarse dirt particles, install a filter upstream from the flow assembly.

### Mount the flow assembly in a branch pipe with an open outlet.

1. Install a shut-off valve upstream from the flow assembly.



2. Mount the assembly in a vertical, upright position or rotated by 90°. Make sure that the position of the assembly and the inlet guarantees automatic venting.
3. Establish the medium connection using commercially available connection fittings.
4. If the medium contains coarse dirt particles, install a filter upstream from the flow assembly.

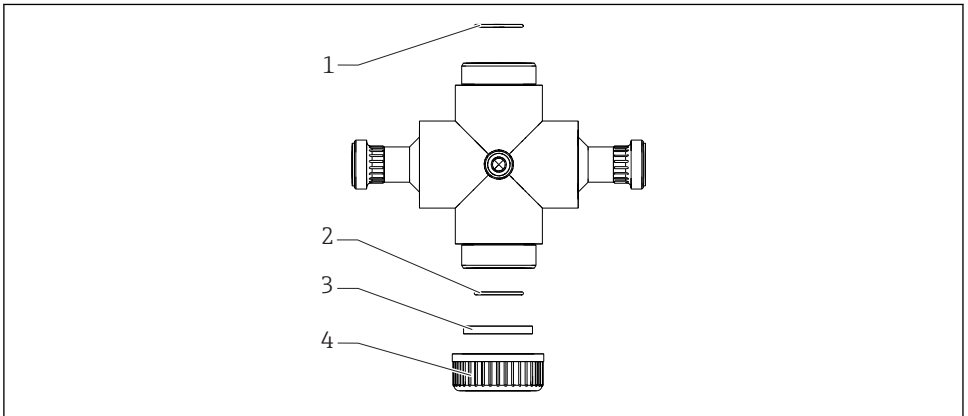
## 5.3 Mounting the sensor

### 5.3.1 Preparation



The inside of the flow assembly is not symmetrical.

You can identify the difference from the outside as follows: the bottom inlet to the assembly is sealed by a dummy cover when delivered.



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7 Assembly body with bottom fixing ring and dummy cover

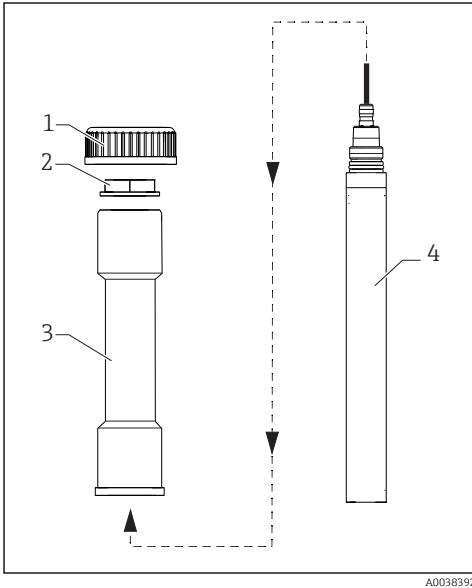
- 1 Inner O-ring "at top"
- 2 Inner O-ring "at bottom"
- 3 Dummy cover
- 4 Bottom fixing ring

### Preparing to install the sensor

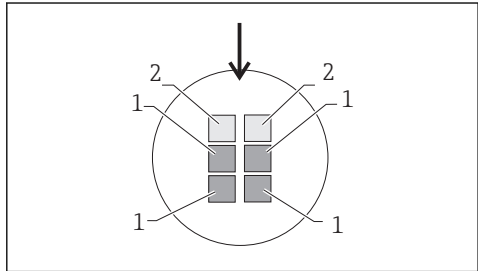
1. Lightly lubricate the O-ring on the sensor head.
2. Loosen the bottom fixing ring and remove the dummy cover.
3. Make sure that there is lubricant on the bottom O-ring inside the flow assembly.
4. Screw the dummy cover and the fixing ring back on.
5. Make sure that there is lubricant on the top O-ring inside the flow assembly.

- 6. **Only for 40 mm oxygen sensors with protection guard:** To avoid buildup and to ensure an uniform rate of flow towards the sensor, unscrew the protection guard from the sensor.

### 5.3.2 Installing the oxygen and turbidity sensors



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9 CUS51D

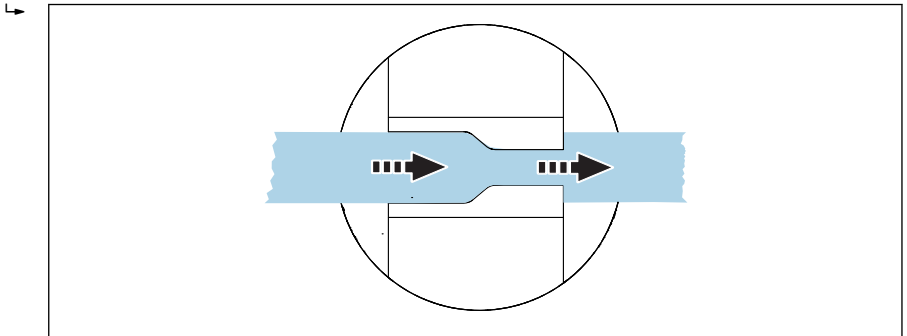
- 1 Receiver
- 2 LED

8 Installation sleeve

- 1 Fixing ring
- 2 Lock nut
- 3 Sensor adapter
- 4 Sensor



1. Guide the sensor into the sensor adapter.
2. Using the counter nut, secure the sensor in the sensor adapter until it is hand-tight.
3. Insert the sensor into the flow assembly.

4. **For the CUS50D sensor:** Align the sensor in such a way that the measurement gap is facing in the direction of flow.

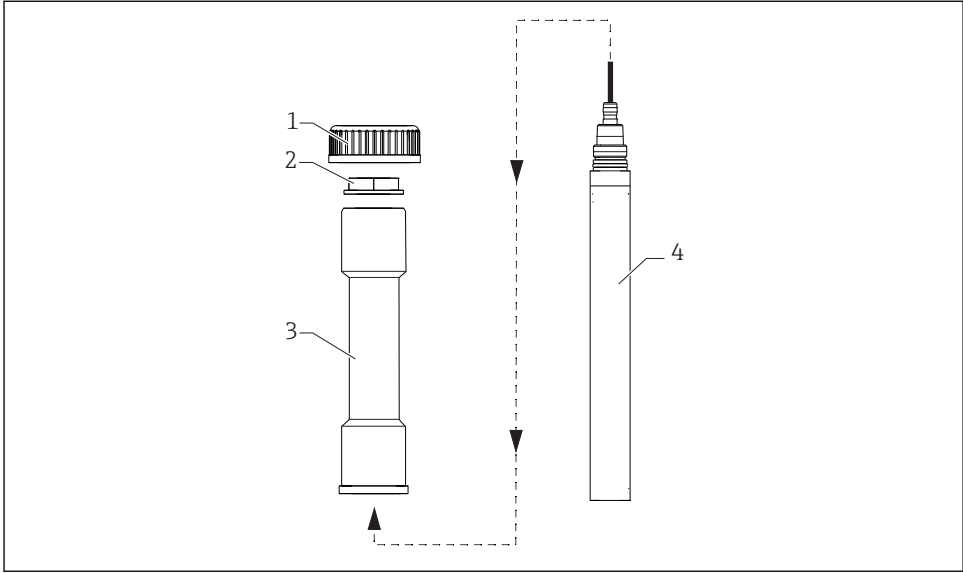


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 10 *Direction of flow*

5. **For the CUS51D sensor:** Align the sensor →  9,  18. Locate both LEDs (they are installed at an angle and have a bright enclosure). Align the sensor in such a way that the cleaning connection is on the LED side (see arrow).
6. **For the COS61 and COS51D sensor:** No special alignment applies for the oxygen sensors COS61 and COS51D.
7. Only if cleaning option has been ordered: plug the cleaning nozzle into the cleaning connection in such a way that the nozzle opening is pointing upwards. Secure the position of the cleaning nozzle with an open-ended wrench, AF 17 mm, and tighten the fixing ring on the cleaning connection.
8. Screw the fixing ring into place on the flow assembly until it is hand-tight.

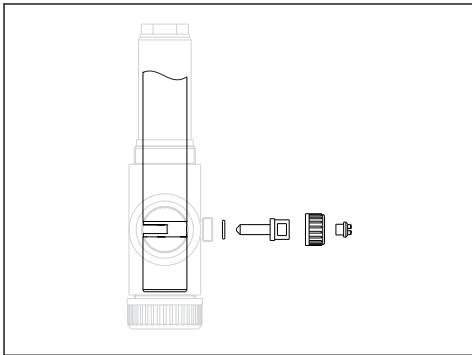
### 5.3.3 Installing sensor CAS51D



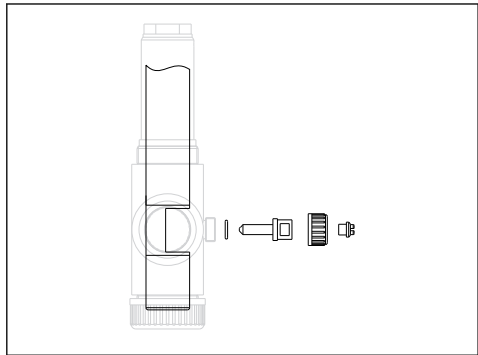
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**11** Installation sleeve

- 1 Fixing ring
- 2 Lock nut
- 3 Sensor adapter
- 4 Sensor



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**12** CAS51D 2 mm (0.08 in) / 8 mm (0.31 in)      **13** CAS51D 40 mm (1.57 in)

1. Guide the sensor into the sensor adapter.
2. Using the counter nut, secure the sensor in the sensor adapter until it is hand-tight.

3. Insert the sensor into the flow assembly.
4. **Sensor with 2 mm (0.08 in) or 8 mm (0.31 in) gap:** Align the sensor. The threaded opening (at rear of gap) must be positioned exactly at the cleaning connection. This ensures that the medium flows through the measurement gap.
5. Only if cleaning option has been ordered: screw the cleaning nozzle (maximum 0.2 Nm (0.15 lbf ft)) into the threaded opening of the sensor until it is finger-tight. Tighten the fixing ring on the cleaning connection.
6. **Sensor with 40 mm (1.57 in) gap:** Align the sensor. The gap must be positioned exactly at the cleaning connection. This ensures that the medium flows through the measurement gap.
7. Only if cleaning option has been ordered: plug the cleaning nozzle into the cleaning connection in such a way that the nozzle opening is pointing upward and downwards. Secure the position of the cleaning nozzle with an open-ended wrench, AF 17 mm, and tighten the fixing ring on the cleaning connection.
8. Screw the fixing ring into place on the flow assembly until it is finger-tight.

## 5.4 Post-installation check

- ▶ After mounting, check all the connections to ensure they are secure and leak-tight.

# 6 Commissioning

## WARNING

### Risk of injury if medium escapes!




- ▶ Before applying pressure to an assembly, ensure that the medium is correctly connected.
- ▶ Otherwise, do not introduce the assembly into the process.

### Connecting the compressed air hose to the cleaning nozzle

The flow assembly is optionally fitted with a cleaning nozzle.

- ▶ Connect the compressed air hose to the cleaning nozzle via the enclosed adapter (G $\frac{1}{4}$  to 6 mm) with a check valve.

Before commissioning check whether:

1. All the seals are seated correctly on the assembly and the process connection  
→  14,  24.
2. The sensor is correctly installed and connected →  17.

## 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 removing the sensor from the medium.

### 7.1 Maintenance tasks

#### 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 cleaning agents used in each case are shown in the following table.

Type of soiling	Cleaning agent
Greases and oils	Hot water or tempered (alkaline) agents containing surfactants 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 process depend on the medium.

1. Remove the sensor.
2. Clean the assembly depending on the degree of fouling →  22.
  - ↳ Remove light dirt and fouling using suitable cleaning agents →  22.  
Remove heavy soiling using a soft brush and a suitable cleaning agent →  22.  
For very persistent dirt, soak the parts in a cleaning solution. Then clean the parts with a brush.



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

### 7.1.3 Replace the O-rings


#### **⚠ CAUTION**

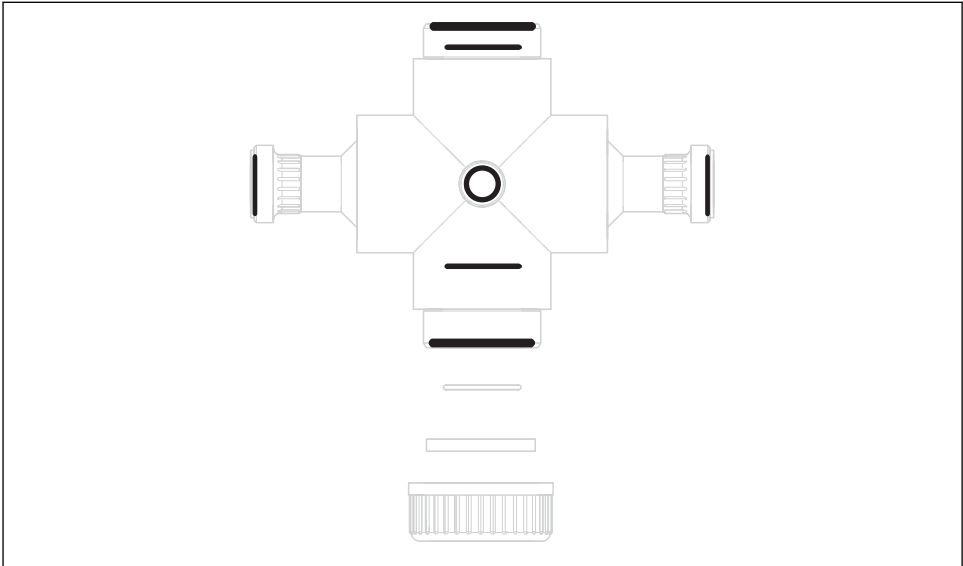
#### **Risk of injury due to residual medium and elevated temperatures**

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

**i** The appropriate replacement intervals are heavily dependent on the process.

Preparation:

1. Interrupt the process. Pay attention to residual medium, residual pressure and elevated temperatures.
2. Completely detach the assembly from the process connection.
3. Remove the sensor.
4. Clean the assembly →  23.



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#### **i** 14 *Position of O-rings*

1. Apply a thin layer of lubricant to the new O-rings (e. g. Syntheso Glep1).
2. Position the new O-rings in the appropriate grooves.
3. Reassemble the assembly.

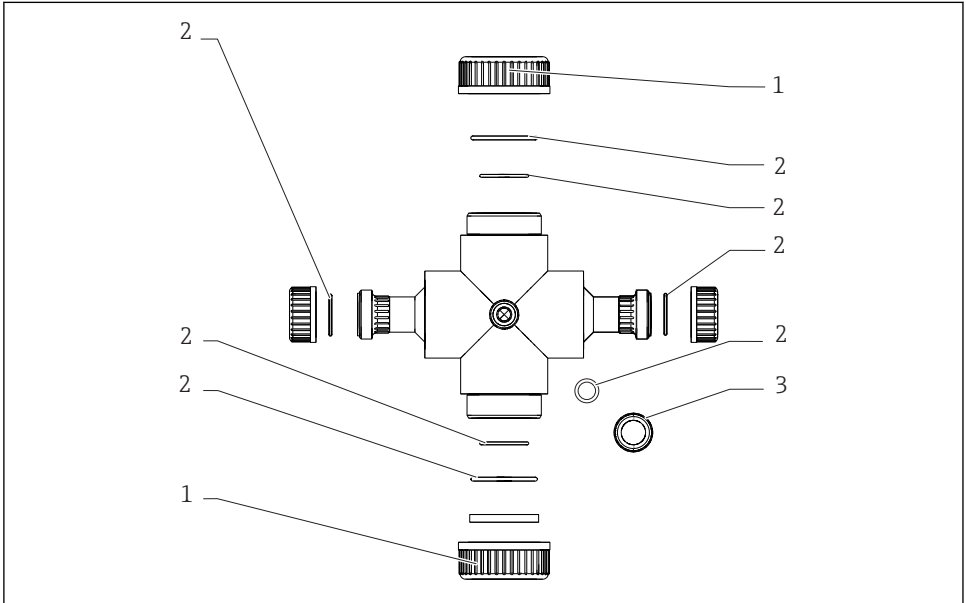


## 8 Repair

### 8.1 Spare parts

For more detailed information on spare parts kits, please refer to the "Spare Part Finding Tool" on the Internet:

[www.endress.com/spareparts\\_consumables](http://www.endress.com/spareparts_consumables)



#### 15 Spare parts

- 1 Fixing ring
- 2 O-ring kit
- 3 Fixing ring

### 8.2 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:

- ▶ Refer to the website [www.endress.com/support/return-material](http://www.endress.com/support/return-material) for information on the procedure and conditions for returning devices.

## 8.3 Disposal

- ▶ Please observe local regulations!

## 9 Accessories

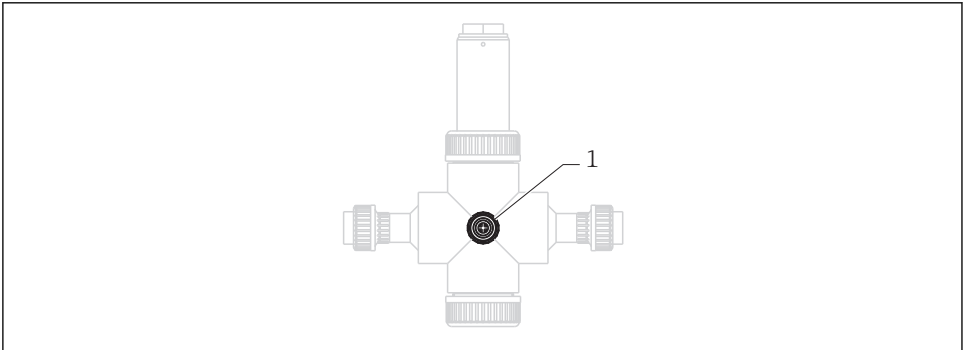
The following are the most important accessories available at the time this documentation was issued.

- ▶ For accessories not listed here, please contact your Service or Sales Center.

### 9.1 Device-specific accessories

#### Cleaning nozzle

- For automatic sensor cleaning
- For sensor CAS51D (2 mm (0.08 in) or 8 mm (0.31 in) gap)  
Order number: 71144328
- For sensor CAS51D (40 mm (1.57 in) gap)  
Order number: 71144330
- For sensor CUS51D, COS61D, COS61, COS31, COS41  
Order number: 71144331
- For sensor CUS50D  
Order number: 71424819



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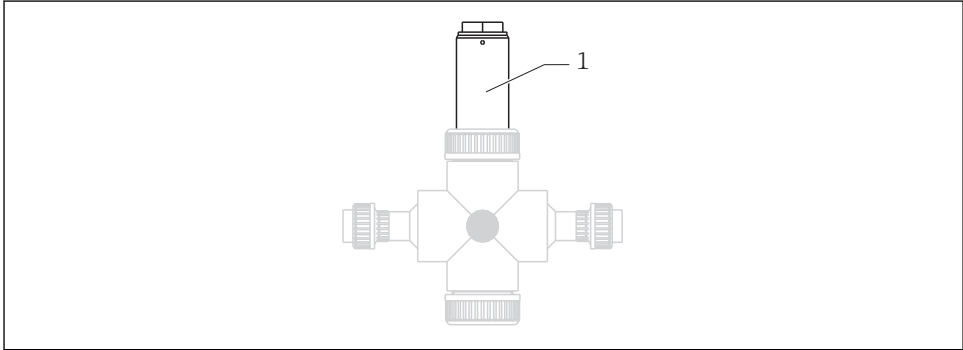
16 *CYA251 with cleaning nozzle*

1 *Cleaning nozzle*


#### Sensor adapter

- Adapter for installing the following sensors:
- For sensor COS61D, COS61, COS31  
Order number: 71144333
- For sensor COS41, COS51D  
Order number: 71144334
- For sensor CUS50D  
Order number: 71420151
- For sensor CUS51D  
Order number: 71144335

- For sensor CAS51D (2 mm (0.08 in) gap)  
Order number: 71144337
- For sensor CAS51D (8 mm (0.31 in) gap)  
Order number: 71144338
- For sensor CAS51D (40 mm (1.57 in) gap)  
Order number: 71144339



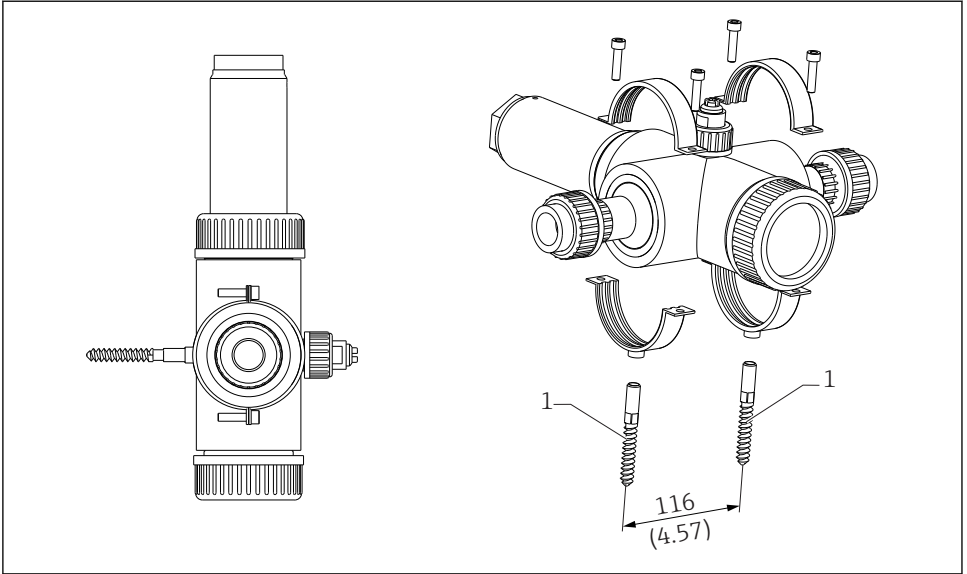
A0038384

 17 CYA251 with sensor adapter

1 Sensor adapter

### Wall holder unit

- Wall mounting kit for CYA251
- Order number: 71144369



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18 Wall mounting kit, dimensions in mm (in)

1 Hanger bolt STST 10 × 60 mm

# 10 Technical data

## 10.1 Environment

### 10.1.1 Ambient temperature range

0 to 50 °C (32 to 122 °F)

### 10.1.2 Storage temperature

0 to 50 °C (32 to 122 °F)

## 10.2 Process

### 10.2.1 Process temperature

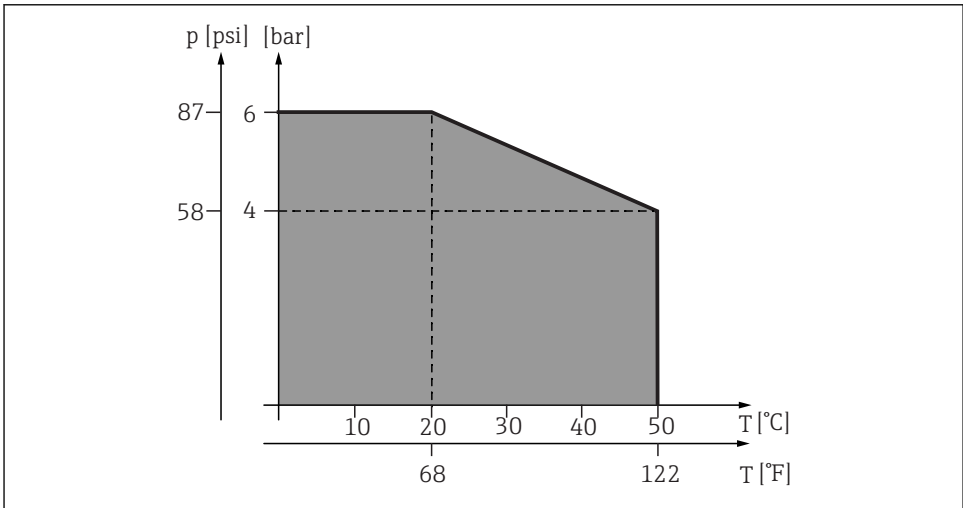
0 to 50 °C (32 to 122 °F), non-freezing

### 10.2.2 Process pressure

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



A0038408-EN

19 Pressure/temperature ratings

### 10.2.4 Flow

Depending on the sensor used and the sensor's properties. The data are based on water.

Typical values: For oxygen sensors approx. 200 l/h (53 gal/hr)

For turbidity and UV sensors approx. 100 l/h (26.5 gal/hr)

Minimum value: Depends on the parameter to be measured but must be such that representative measured values are still delivered.

Maximum value: It is not recommended to operate above 300 l/h (80 gal/hr).

## 10.3 Mechanical construction

### 10.3.1 Dimensions

→ Section "Installation"

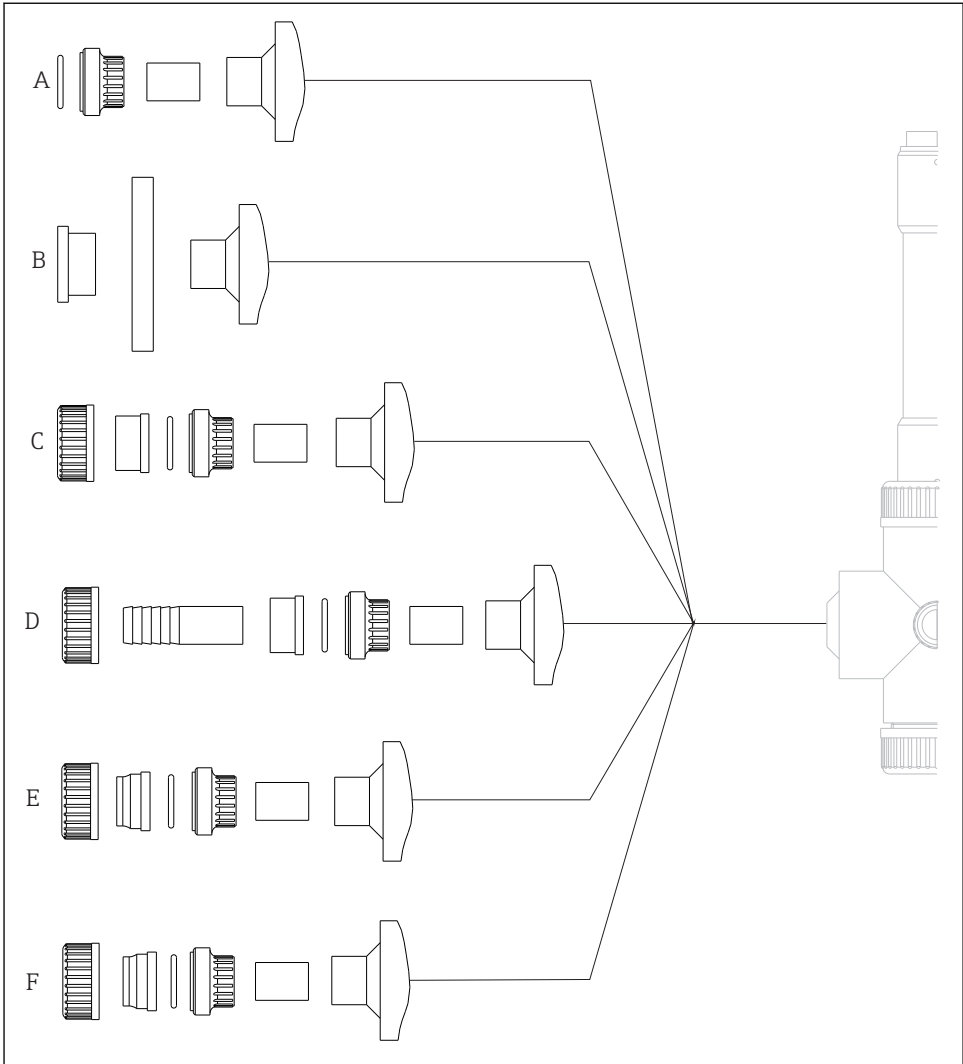
### 10.3.2 Weight

1.5 to 1.8 kg (3.3 to 4.0 lbs), depending on version

### 10.3.3 Materials

O-rings	EPDM
Flange (not in contact with medium)	PP
Flow vessel, process connections, adapter, fixing ring	PVC
Check valve	Plastic

### 10.3.4 Process connection



A0038406

20

- A External thread G1¼, PVC
- B Flange ANSI 1", PP black
- C Glue-in port DN 25 (thread DN 25 (1") D25), PVC
- D Hose D20 PVC
- E Internal thread G ¾", PVC
- F Internal thread NPT ¾", PVC



# Index

## C

Check	
Installation . . . . .	21
Cleaning . . . . .	23
Cleaning agent . . . . .	22

## D

Designated use . . . . .	6
Dimensions . . . . .	12
Disposal . . . . .	26

## I

Identifying the product . . . . .	10
Incoming acceptance . . . . .	8
Installation . . . . .	12
Check . . . . .	21
Installation conditions . . . . .	12

## M

Maintenance . . . . .	22
Measuring system . . . . .	7
Mounting the sensor . . . . .	17

## N

Nameplate . . . . .	10
---------------------	----

## R

Replace the O-rings . . . . .	24
Replace the seals . . . . .	24
Return . . . . .	25

## S

Safety instructions . . . . .	6
Scope of delivery . . . . .	11
Symbols . . . . .	4

## T

Technical data . . . . .	30
Mechanical construction . . . . .	31

## U

Use . . . . .	6
---------------	---

## W

Warnings . . . . .	4
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