

Operating Instructions

Flowfit CYA251

Flow assembly for nitrate/SAC, turbidity and oxygen sensors

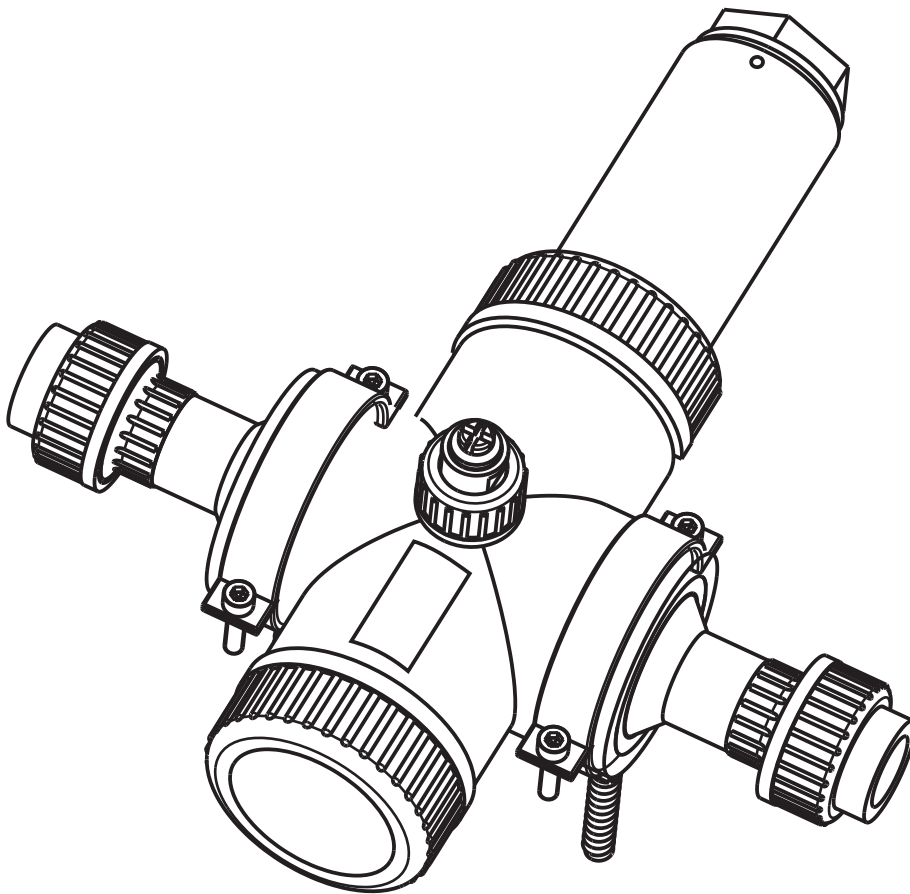


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1 Safety instructions

1.1 Designated use

The CYA251 flow assembly is designed for the installation of nitrate/SAC, turbidity and oxygen sensors, each with a diameter of 40 mm. The assembly is used in pipes and hoses. Thanks to its special design, it is possible to operate the flow assembly in pressurized systems (see "Technical data").

Any other use than the one described here compromises the safety of persons and the entire measuring system and is not permitted.

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

1.2 Installation, commissioning and operation

Please note the following items:

- Switch off the cleaning unit before removing the sensor from the medium.
- Installation, commissioning, operation and maintenance of the measuring system must only be carried out by trained technical personnel.
Trained personnel must be authorized for the specified activities by the system operator.
- Electrical connection must only be carried out by a certified electrician.
- Technical personnel must have read and understood these Operating Instructions and must adhere to them.
- Before commissioning the entire measuring point, check all the connections. Ensure that electrical cables and hose connections are not damaged.
- Do not operate damaged products and secure them against unintentional commissioning. Mark the damaged product as being defective.
- Measuring point faults may only be rectified by authorized and specially trained personnel.
- If faults can not be rectified, the products must be taken out of service and secured against unintentional commissioning.
- Repairs not described in these Operating Instructions may only be carried out at the manufacturer's or by the service organization.

1.3 Operational safety

The sensor has been designed and tested according to the state of the art and left the factory in perfect functioning order.

Relevant regulations and European standards have been met.


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


- Installation instructions
- Local prevailing standards and regulations.

1.4 Notes on safety icons and symbols

The structure, signal words and safety colors of the signs comply with the specifications of ANSI Z535.6 ("Product safety information in product manuals, instructions and other collateral materials").

Safety message structure	Meaning
<p>⚠ DANGER Cause (/consequences) Consequences if safety message is not heeded</p> <ul style="list-style-type: none"> ■ Corrective action 	<p>This symbol alerts you to a dangerous situation. Failure to avoid the situation will result in a fatal or serious injury.</p>
<p>⚠ WARNING Cause (/consequences) Consequences if safety message is not heeded</p> <ul style="list-style-type: none"> ■ Corrective action 	<p>This symbol alerts you to a dangerous situation. Failure to avoid the situation can result in a fatal or serious injury.</p>
<p>⚠ CAUTION Cause (/consequences) Consequences if safety message is not heeded</p> <ul style="list-style-type: none"> ■ Corrective action 	<p>This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.</p>
<p>NOTICE Cause/situation Consequences if safety message is not heeded</p> <ul style="list-style-type: none"> ■ Action/note 	<p>This symbol alerts you to situations that can result in damage to property and equipment.</p>

→  1 This symbol indicates a cross reference to a defined page (e.g. p. 1).

→  2 This symbol indicates a cross reference to a defined figure (e.g. fig. 2).

2 Identification

2.1 Nameplate

The nameplate contains the following information:

- Manufacturer data
- Order code
- Extended order code
- Serial number
- Operating conditions
- Safety icons

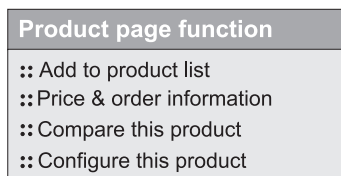
Compare the order code on the nameplate with your order.

2.2 Order code and device version

Enter the following address in your browser to access the product page:

www.products.endress.com/cya251

1. You can choose from the following options on the product page located on the right:



2. Click "Configure this product".
3. The configurator opens in a separate window. You can now configure your device and receive the complete order code that applies for the device.
4. Afterwards, export the order code as a PDF or Excel file. To do so, click the appropriate button at the top of the page.

2.3 Scope of delivery

The scope of delivery comprises:

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

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

If you have any questions, please contact your supplier or your local sales center.

3 Installation

3.1 Incoming acceptance, transport, storage

- Make sure the packaging is undamaged!
- Inform the supplier about any damage to the packaging.
Keep the damaged packaging until the matter has been settled.
- Make sure the contents are undamaged!
- Inform the supplier about damage to the contents. Keep the damaged products until the matter has been settled.
- Check that the order is complete and agrees with your shipping documents.
- The packaging material used to store or to transport the product must provide shock protection and humidity protection. The original packaging offers the best protection. Also, keep to the approved ambient conditions (see "Technical data").
- If you have any questions, please contact your supplier or your local sales center.

3.2 Installation conditions

3.2.1 Dimensions

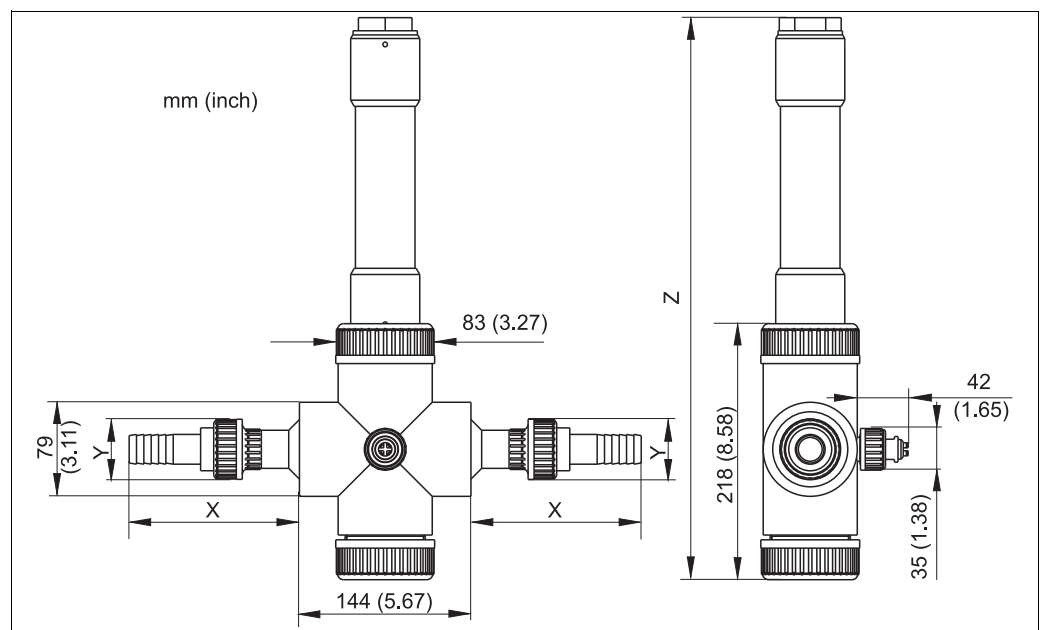


Fig. 1: Dimensions

Sensor	CAS51D 2 mm	CAS51D 8 mm	CAS51D 40 mm	COS51D COS41	COS61D COS61 COS31	CUS31 CUS41	CUS51D
Z mm(inch)	468 (18.43)	471 (18.54)	477 (18.78)	284 (11.18)	326 (12.83)	325 (12.80)	332 (13.07)

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

3.2.2 Notes on installation

To ensure that medium flows through the assembly in a bypass configuration, the pressure p_1 must be greater than the pressure p_2 . This is achieved by installing an orifice plate in the main pipe.

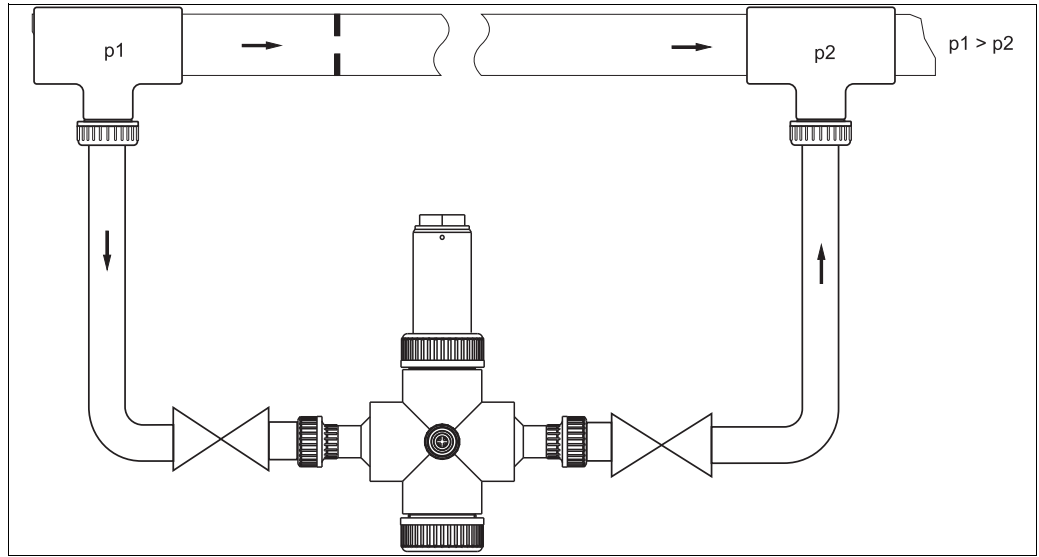


Fig. 2: Connection example involving a bypass and an orifice plate in the main pipe

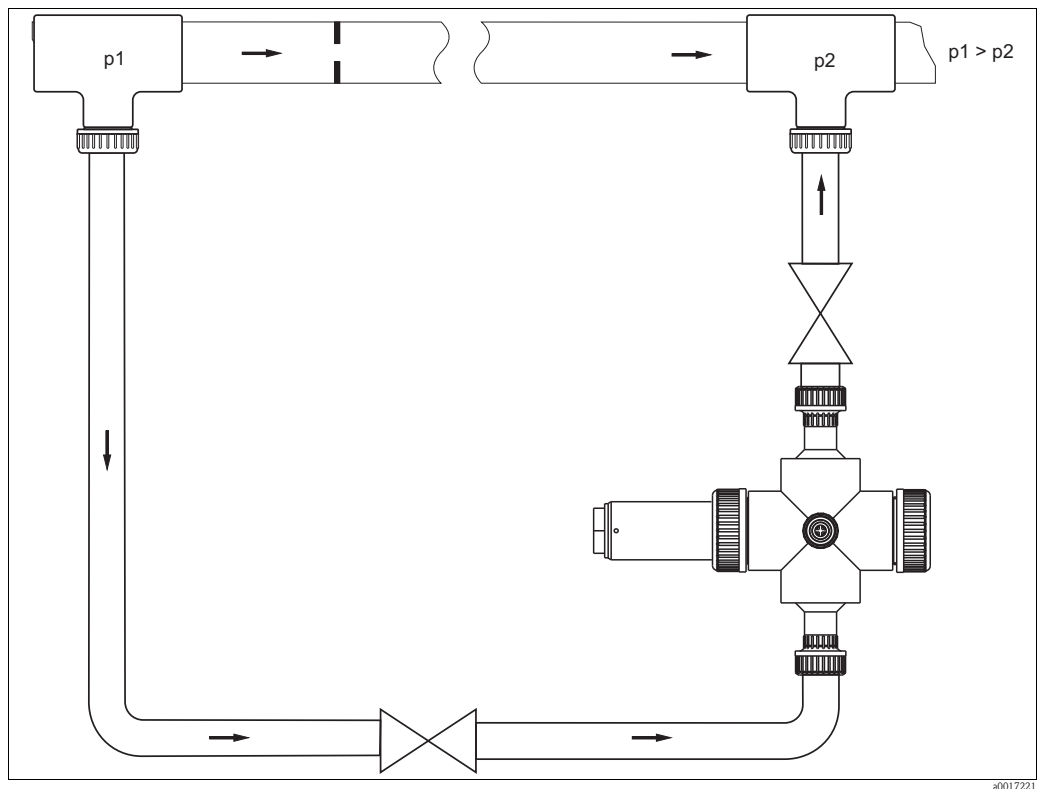


Abb. 3: Connection example involving a bypass and an orifice plate in the main pipe (assembly rotated by 90°, inlet at bottom)

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

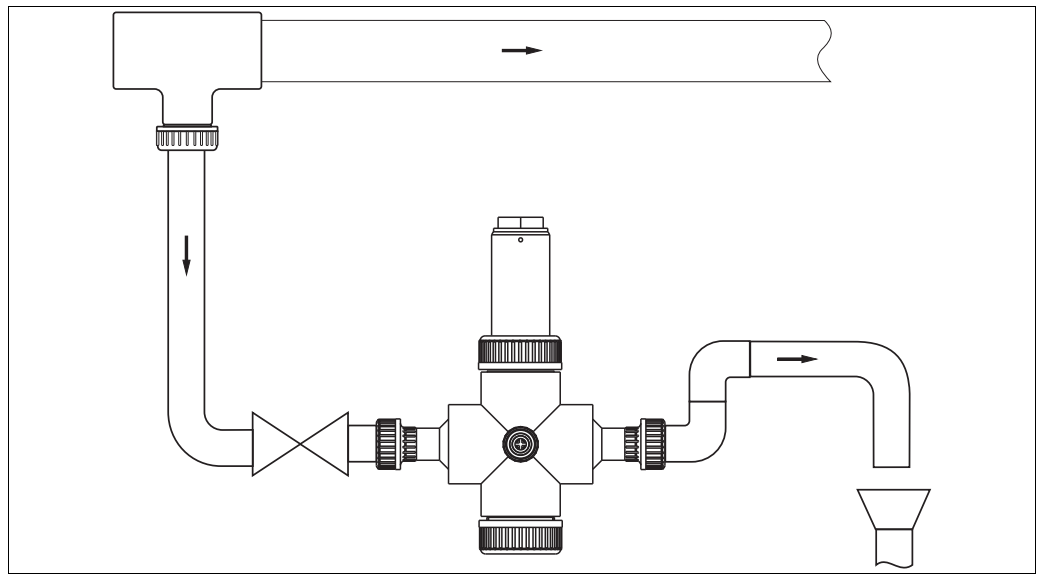


Fig. 4: Connection example involving an open outlet

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 to be connected to pipes and hoses. You require the following at the mounting location to install the assembly:

Part name	Where required ...
Two shutoff valves	For the bypass solution
One shutoff valve	For the solution with an open outlet
Orifice plate in the main pipe	For the bypass solution
Dirt filter (500 µm or finer)	If the medium contains coarse dirt particles
Pressure-reducing valve	If the pressure of the medium is higher than the permitted value (see "Technical data" section)
Wall holder unit (see "Accessories" section) to secure the assembly	For hose connections
Pipe or hose connections to the assembly	For all versions

3.3 Installation instructions

3.3.1 Measuring system

A complete measuring system comprises:

- Flowfit CYA251 flow assembly
- A 40 mm sensor, e.g. CAS51D
- Transmitter, e.g. Liquiline CM442
- Measuring cable

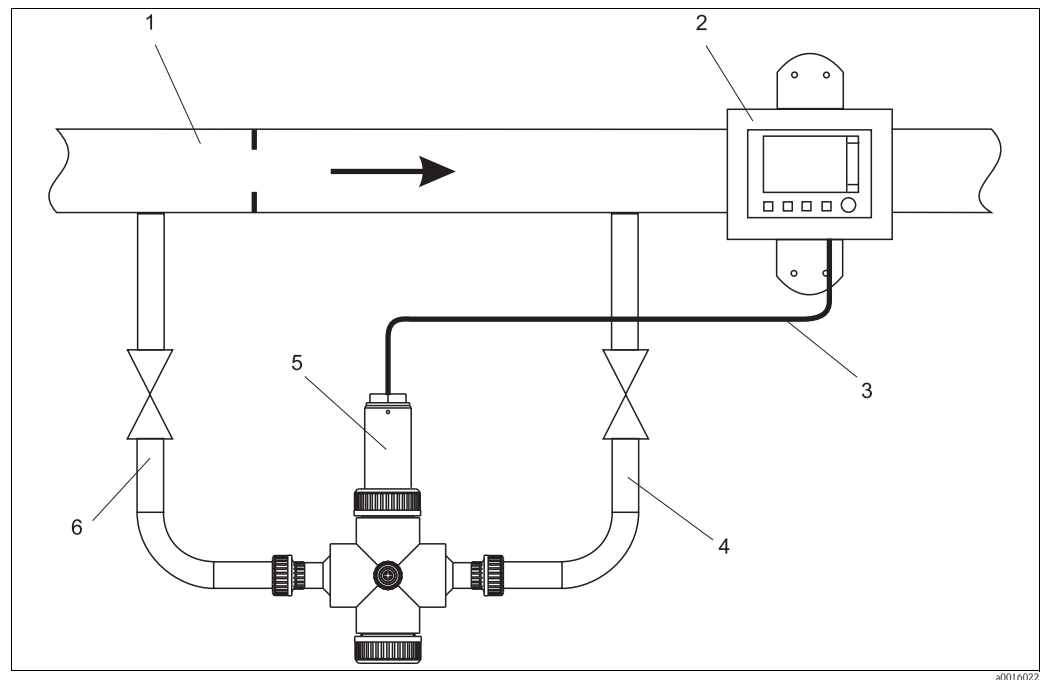


Fig. 5: Measuring system (example)

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

3.4 Installation with wall holder unit

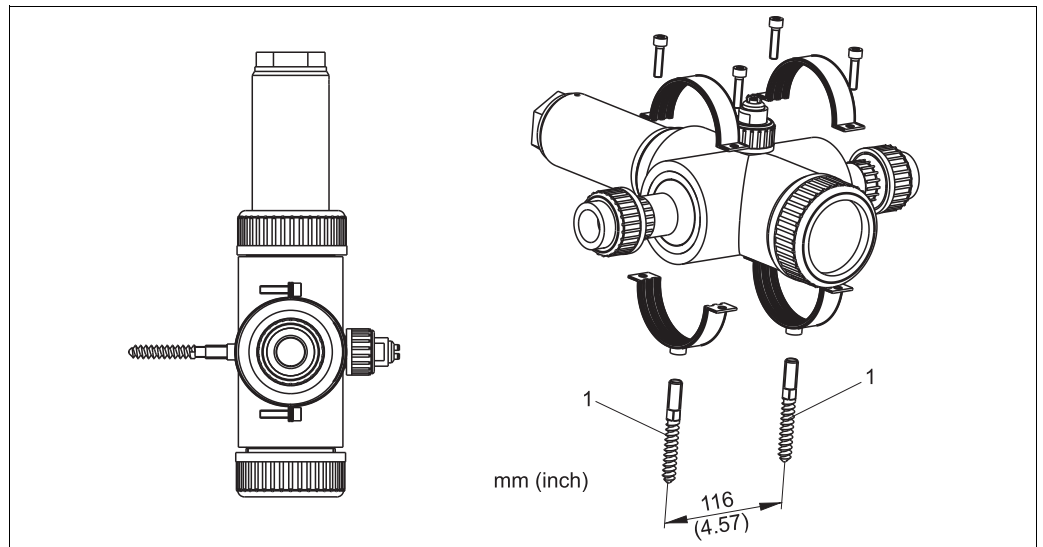


Fig. 6: Wall holder unit

1 Hanger bolt STST 10x60 (forms part of the delivery)

Please comply with the following instructions when installing the flow assembly:

- Mount the flow assembly either
 - in a bypass
 - In the bypass pipe, install a shutoff valve upstream and downstream of the flow assembly. This makes it possible to clean the sensor or perform other maintenance tasks without affecting the process.
 - or in a branch pipe with an open outlet
 - Install a shutoff valve upstream of the flow assembly.
- Mount the assembly in a vertical, upright position or rotated by 90 °. Make sure that the position of the inlet guarantees automatic venting.
- Establish the medium connection using commercially available connection fittings.
- If the medium contains coarse dirt particles, install a filter upstream of the flow assembly.

NOTICE

Observe the maximum permissible medium pressure for the assembly and sensor.

- You must install a pressure-reducing valve upstream of the flowmeter if the pressure of the medium is higher than the maximum value. The permissible medium pressure depends on the temperature (see "Technical data").

3.5 Sensor installation

3.5.1 Preparatory steps

NOTICE

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.

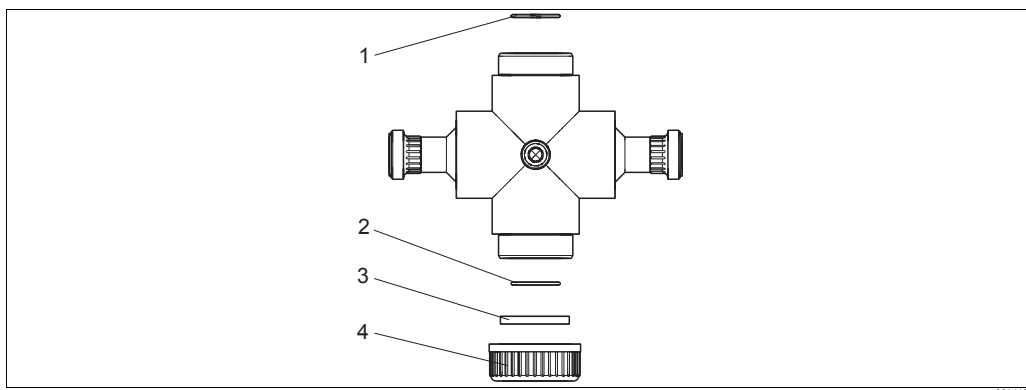


Fig. 7: Assembly body with bottom fixing ring and dummy cover

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

Prepare to install the sensor as follows:

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 oxygen sensors: unscrew the basket protector from the sensor.

3.5.2 Installing oxygen and turbidity sensors

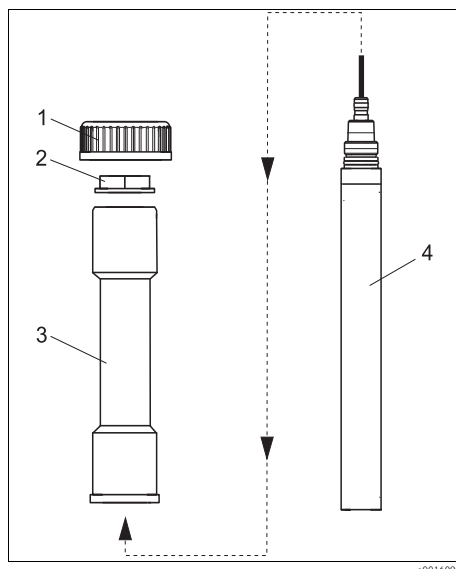


Fig. 8: Installation sleeve

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

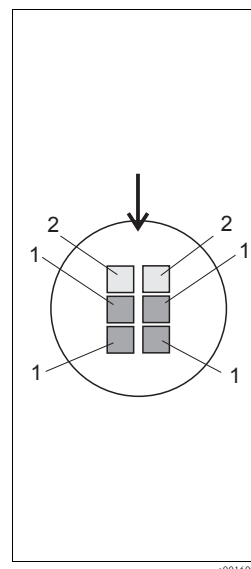


Fig. 9: CUS51D

- 1 Receiver
- 2 LED

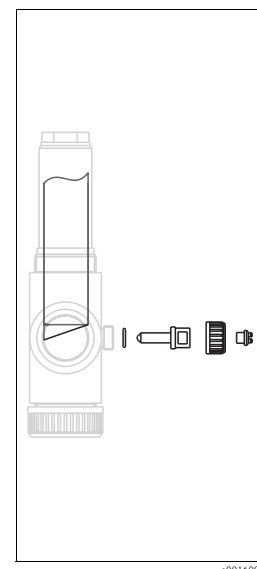


Fig. 10: CUS31

Install the sensor as follows:

1. Guide the sensor into the sensor adapter (→ 8).
2. Using the counter nut, secure the sensor in the sensor adapter.
3. Insert the sensor into the flow assembly.

4. **For the CUS51D sensor:**

Align the sensor as illustrated in → 9 as follows. Locate the two 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). The following step only applies if the 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.

For the CUS31 sensor:

Align the sensor as illustrated in → 10. The slanted side must point in the direction of the cleaning connection. The following step only applies if the cleaning option has been ordered: plug the cleaning nozzle into the cleaning connection and tighten the fixing ring on the cleaning connection.

For the COS61 and COS51D sensors:

No special alignment applies for the COS61 and COS51D oxygen sensors. The following step only applies if the 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.

5. Tighten the fixing ring (→ 8) on the flow assembly.

3.5.3 Installing the CAS51D sensor

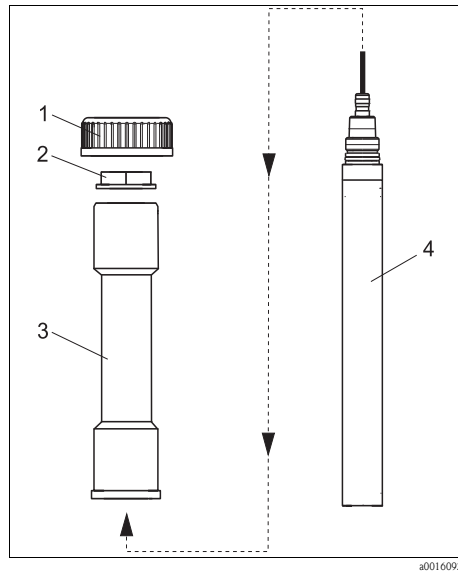


Fig. 11: Installation sleeve

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

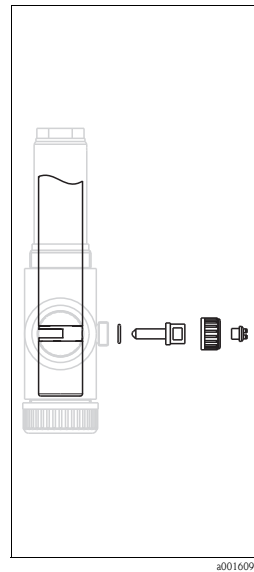


Fig. 12: CAS51D 2/8 mm

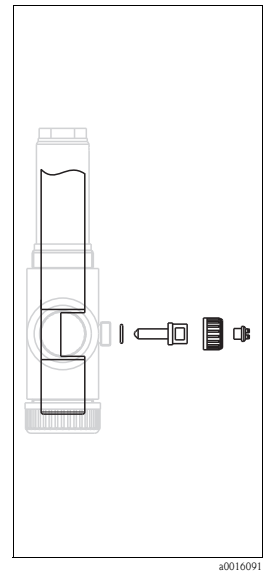






Fig. 13: CAS51D 40 mm

Install the sensor as follows:

1. Guide the sensor into the sensor adapter (→  11).
2. Using the counter nut, secure the sensor in the sensor adapter.
3. Insert the sensor into the flow assembly.
4. **For sensors with a 2 mm or 8 mm gap:**
Align the sensor as illustrated in →  12. The threaded opening (at rear of gap) must be located at the cleaning connection exactly. This ensures that the medium flows through the measurement gap. The following step only applies if the cleaning option has been ordered: screw the cleaning nozzle into the threaded opening of the sensor (finger-tight, max. 0.2 Nm (0.15 lbf ft)). Tighten the fixing ring on the cleaning connection.
For sensors with a 40 mm gap:
Align the sensor as illustrated in →  13. The gap must be located at the cleaning connection exactly. This ensures that the medium flows through the measurement gap. The following step only applies if the cleaning option has been ordered: plug the cleaning nozzle into the cleaning connection in such a way that the nozzle openings point upwards 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.
5. Tighten the fixing ring (→  11) on the flow assembly.

3.6 Cleaning

The flow assembly is optionally fitted with a cleaning nozzle.

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

3.7 Post-installation check

- After installation, check that all connections are firmly in position and leak-tight.
- Ensure that the hoses cannot be removed without force.
- Check all hoses for damage.

4 Commissioning

Prior to initial commissioning, make sure that:

- All the seals are seated correctly (on the assembly and the process connection)
- The sensor is correctly installed and connected

⚠ WARNING

Medium incorrectly connected to the assembly

Danger of medium leaking

- Before applying pressure to an assembly, make sure the medium is connected correctly. Otherwise do **not** introduce the assembly into the process!

5 Maintenance

⚠ WARNING

Risk of injury if medium or cleaner escapes!

- Prior to performing any maintenance task, make sure that the process pipe is unpressurized, empty and rinsed.
- Switch off the cleaning unit before removing the sensor from the medium.

5.1 Cleaning the assembly

All parts in contact with the medium, e.g. the sensor and the sensor holder, must be cleaned at regular intervals. Remove the sensor¹⁾.

- Remove light dirt using suitable cleaning agents (see chapter "Cleaning agents").
- Remove severe fouling with a soft brush and a suitable cleaning agent.
- Remove persistent fouling by soaking in a liquid cleaner and if necessary by cleaning with a soft brush.

i A typical cleaning interval for e.g. drinking water is at least half a year.

5.2 Cleaning the sensor

You must clean the sensor:

- Before every calibration
- At regular intervals during operation
- Before returning the sensor for repair
- In line with the operating conditions, but at least twice a year

If a cleaning nozzle (accessory) is installed, you can clean the sensor surfaces during operation. A system pressure of 1 to 2 bar (15 to 29 psi) above the process pressure is recommended for the cleaning nozzle.

If the assembly does not have a cleaning nozzle, you must remove the sensor and clean it manually. In the case of oxygen and turbidity sensors, you can clean the sensor surfaces via the cleaning port.

NOTICE

Incorrect cleaning can damage the sensor or corrupt the measurement result.

- Only clean the outside of the sensor. Do not open the sensor!
- Do not use any abrasive cleaning agents as they can do irreparable damage to the sensor.
- After cleaning the sensor, rinse the assembly chamber thoroughly with water. Otherwise cleaning agent residues can corrupt the measurement.
- If necessary, recalibrate the sensor after cleaning it.

1) in reverse sequence of operations to the installation procedure

5.3 Cleaning agents

The choice of cleaning agent depends on the degree and type of fouling. The most common types of dirt and fouling and the suitable cleaning agents are listed in the following table.

Type of fouling	Cleaning agent
Greases and oils	Agents containing surfactants (alkaline agents) or water-soluble organic solvents (halogen-free, e.g. ethanol)
Limescale deposits, metal hydroxide buildup, lyophobic biological buildup	Approx. 3% hydrochloric acid
Sulfide deposits	Mixture of 3% hydrochloric acid and thiocarbamide (usual commercial)
Protein buildup	Mixture of 3% hydrochloric acid and pepsin (usual commercial)
Fibers, suspended substances	Pressurized water, possibly surface-active agent
Light biological buildup	Pressurized water

CAUTION

Solvents can cause a health hazard

- Never use acetone or any organic solvents containing halogens. Such solvents can damage plastic parts of the sensor and some are suspected of causing cancer (e.g. chloroform).

5.4 Replacing the seals

You must interrupt the process and remove the assembly entirely to replace the seals in the assembly.

WARNING

Medium can cause injury!

- When handling parts that are in contact with medium, take suitable precautions to protect yourself from high temperatures and residual medium. Wear protective safety gloves and goggles.

The seals are available as a spare parts kit (see the "Spare parts kits" section).

Clean the assembly before you replace the seals (see the "Cleaning the assembly" section).

Apply a thin layer of lubricant (e.g. Syntheso Glep1) to the new seals.

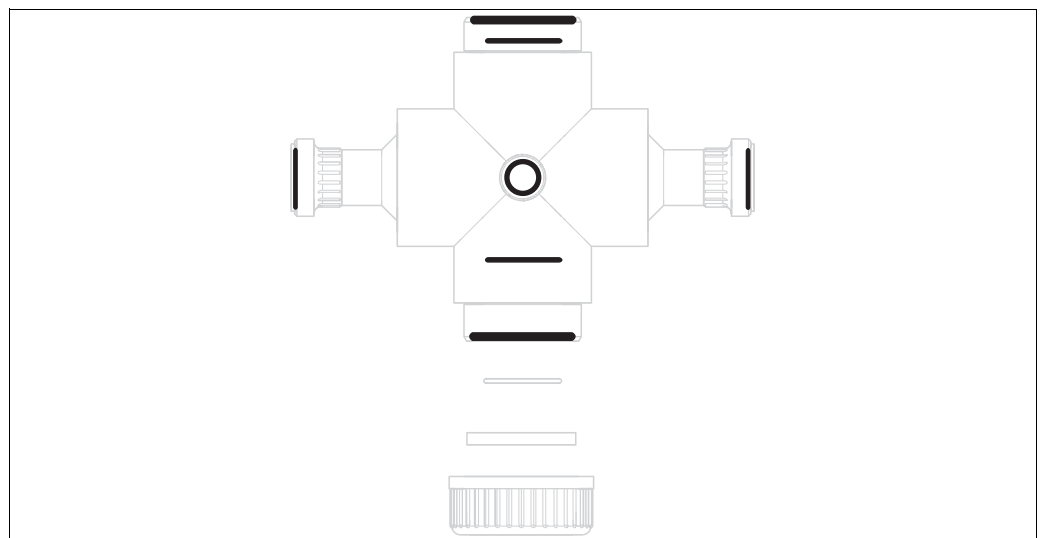


Fig. 14: Position of the O-rings

6 Accessories

6.1 Cleaning nozzle

Cleaning nozzle for CYA251

- For automatic sensor cleaning.
- Order number: 71144328 (suitable for the CAS51D sensor (2 mm or 8 mm gap))
- Order number: 71144330 (suitable for the CAS51D sensor (40 mm gap))
- Order number: 71144331 (suitable for the CUS51D, COS51D, COS61D, COS61, COS31, COS41 sensors)
- Order number: 71144332 (suitable for the CUS31, CUS41 sensors)

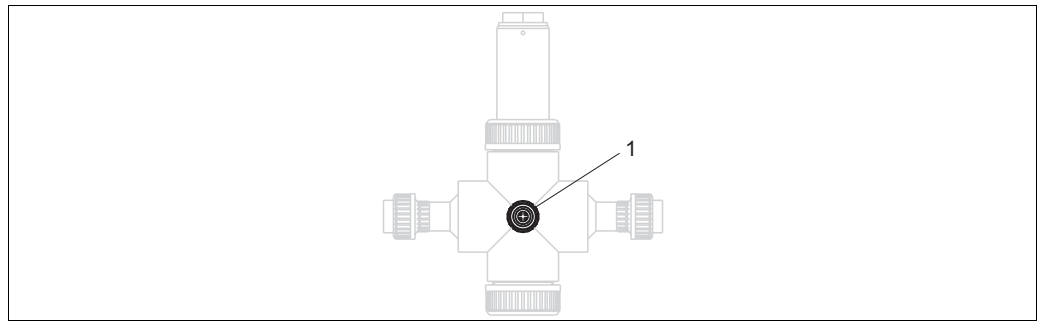


Abb. 15: CYA251 with cleaning nozzle

1 Cleaning nozzle

6.2 Sensor adapter

Sensor adapter for CYA251

- Adapter for installing the following sensors:
- Order number: 71144333 (suitable for the COS61D, COS61, COS31 sensors)
- Order number: 71144334 (suitable for the COS41, COS51D sensors)
- Order number: 71144335 (suitable for the CUS51D sensor)
- Order number: 71144336 (suitable for the CUS31, CUS41 sensors)
- Order number: 71144337 (suitable for the CAS51D sensor (2 mm gap))
- Order number: 71144338 (suitable for the CAS51D sensor (8 mm gap))
- Order number: 71144339 (suitable for the CAS51D sensor (40 mm gap))

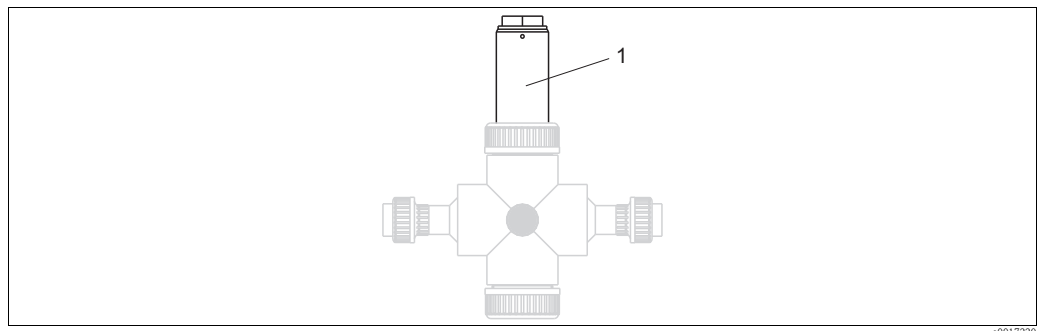


Abb. 16: CYA251 with sensor adapter

1 Sensor adapter

6.3 Wall holder unit

Wall mounting kit for CYA251

- Order number: 71144369

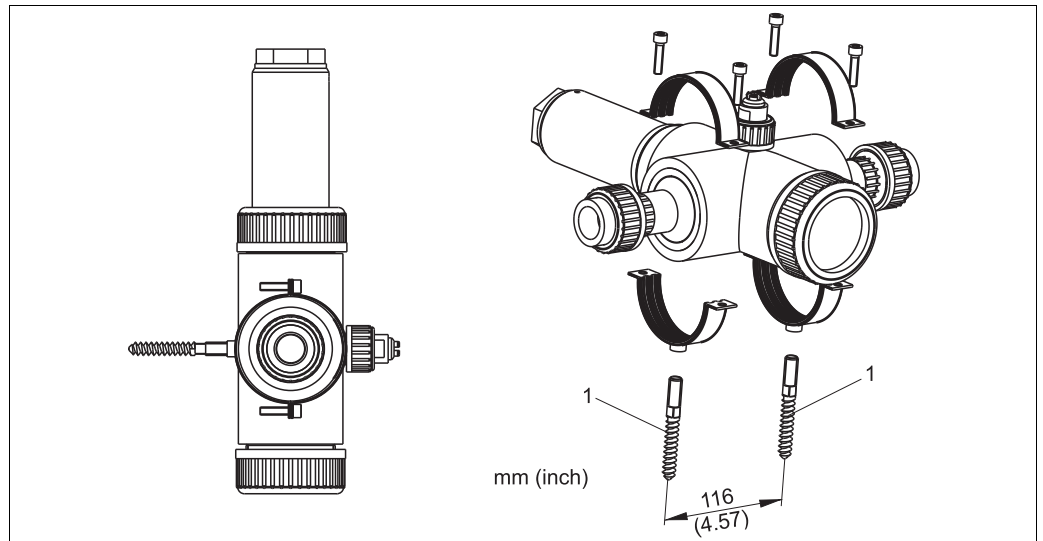


Fig. 17: Wall mounting kit

- 1 Hanger bolt STST 10x60 mm

7 Troubleshooting

7.1 Replacing damaged parts

⚠ WARNING

Incorrectly repaired devices can cause hazard

- Assembly damage which affects the pressure safety may **only** be repaired by authorized technical personnel.
- Following every repair and maintenance task, suitable measures must be taken to ensure that the assembly is leak-tight. The assembly must again meet the technical data specifications when it has been repaired.

Replace all other damaged parts immediately.

7.2 Spare parts kits

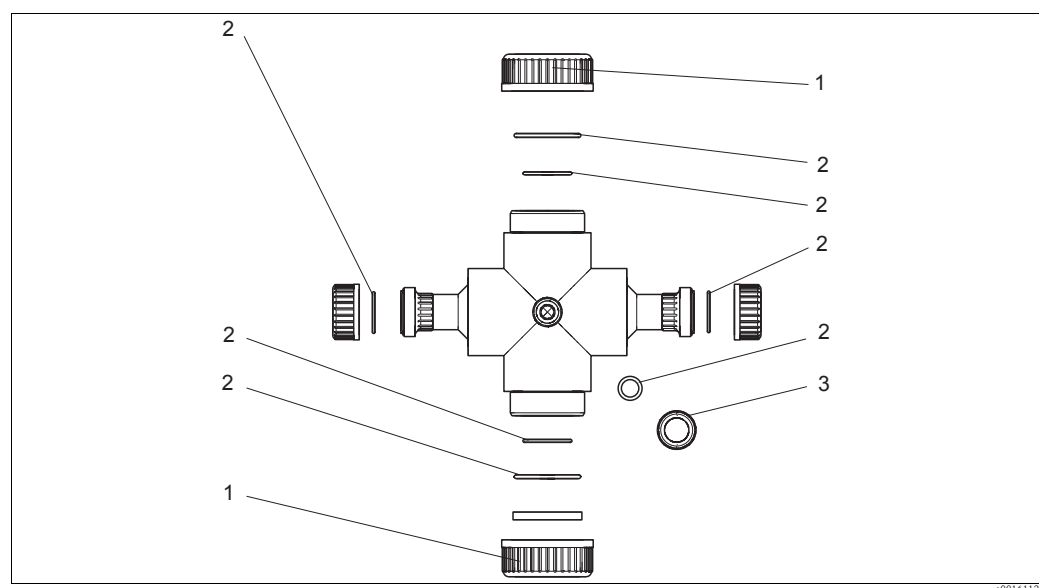


Fig. 18: Spare parts

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

Detailed information on the spare parts kits is available in the "Spare Part Finding Tool", which can be accessed on the Web at:

www.products.endress.com/spareparts_consumables

7.3 Return

The device must be returned if repairs or a factory calibration are required, or if the wrong device has been ordered or delivered. According to legal regulations, Endress+Hauser, as an ISO-certified company, is required to follow certain procedures when handling returned products that are in contact with medium.

To ensure swift, safe and professional device returns, please read the return procedures and conditions on the internet site:

www.services.endress.com/return-material

7.4 Disposal

Please dispose of the device in accordance with the local regulations.

8 Technical Data

8.1 Environment

Ambient temperature range 0 to 50 °C (32 to 120 °F)

Storage temperature 0 to 50 °C (32 to 120 °F)

8.2 Process

Process temperature 0 to 50 °C (32 to 122 °F), not freezing

Process pressure Max. 6 bar (87 psi) at 20 °C (68 °F) and 4 bar (58 psi) at 50 °C (122 °F)

Pressure-temperature diagram

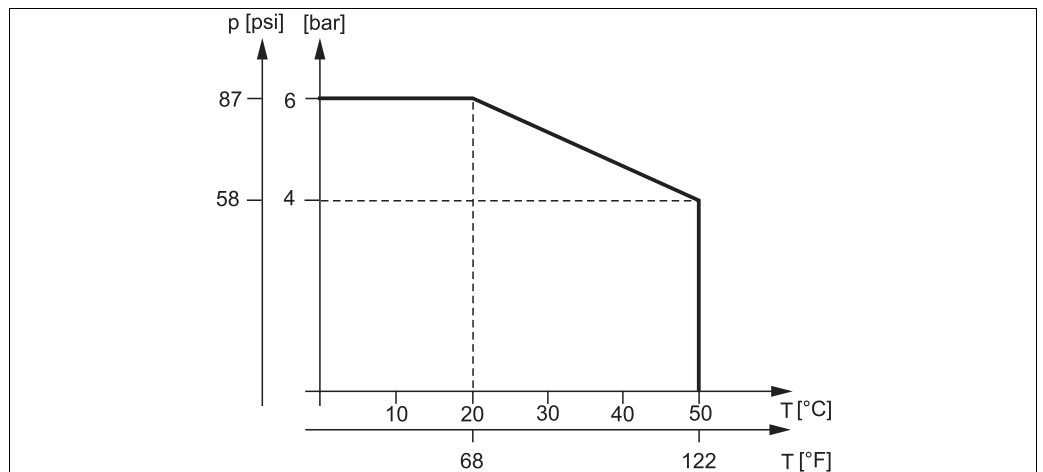


Fig. 19: Pressure-temperature diagram

Flow

Depends on the sensor used and the sensor's properties.

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).

8.3 Mechanical construction

Dimensions

See the "Installation" section

Weight

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

Materials

EPDM (seals)
PVC
PP (flange)

Process connection

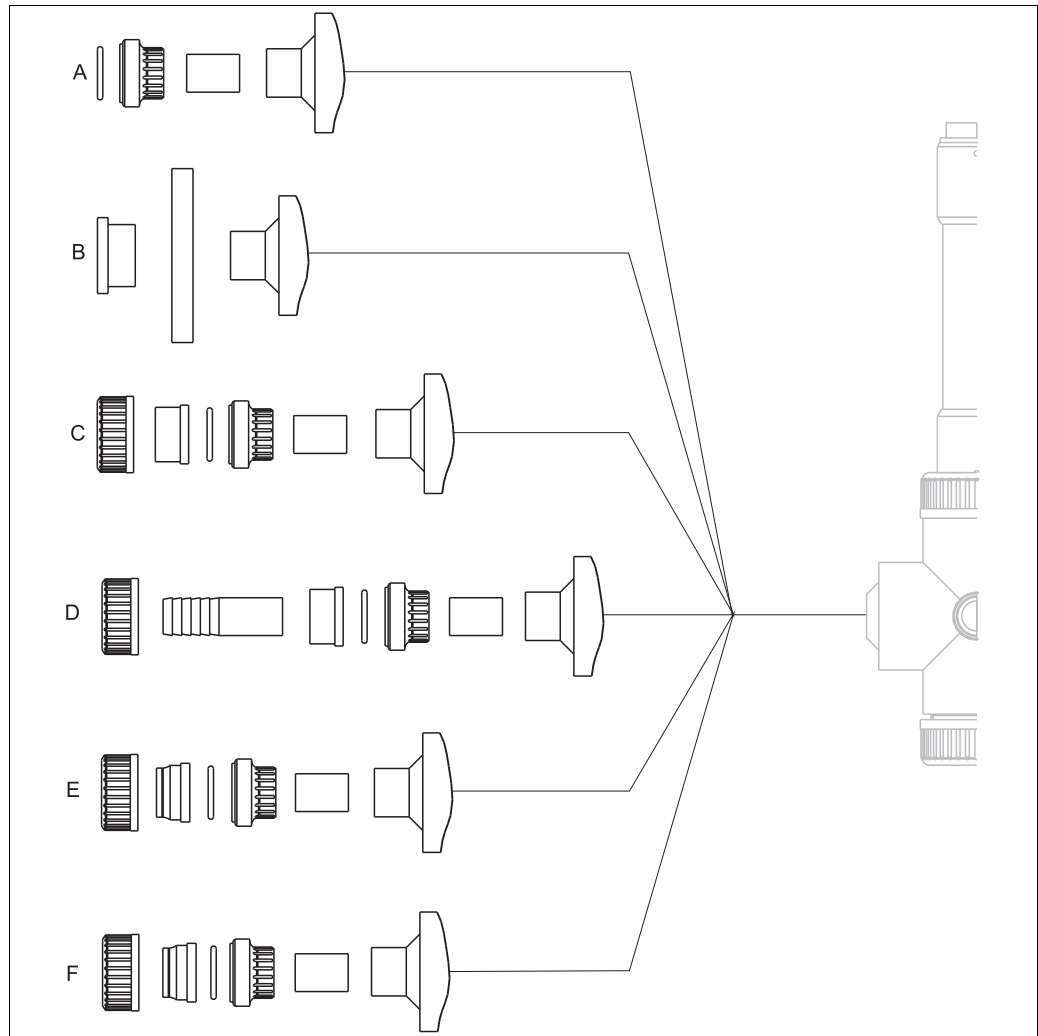


Fig. 20: Process connections

- A External thread G1 1/4, PVC
- B Flange ANSI 1", PVC
- C Glue-in port DN 25, PVC
- D Hose D20 PVC
- E Internal thread Rp 3/4", PVC
- F Internal thread NPT 3/4", PVC

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