

Operating Instructions

Cleanfit CPA875

Retractable process assembly for sterile and hygienic applications



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1 About this document

1.1 Safety information

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

	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.

1.3 Documentation

 Special Documentation for hygienic applications, SD02751C

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 Cleanfit CPA875 retractable assembly, which can be manually or pneumatically operated, is designed for the installation of sensors in vessels and pipes.

Thanks to its design, it can be operated in pressurized systems (→  66).

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.

2.2.1 Use in explosion-proof areas

As a manufacturer of products used for analysis, we declare that the product supplied has undergone an ignition risk assessment and may be used in hazardous atmospheres once the following conditions for safe usage have been met:

- The protective ring is labeled as follows: "CAUTION, DANGER DUE TO ELECTROSTATIC CHARGES, CLEAN USING ONLY AN ANTISTATIC CLOTH". This instruction must be observed.
- Assemblies comprising wetted parts made of non-conductive material, must not be used in potentially explosive atmospheres.
- The compressed air supply, sensors and limit position switches must comply with the applicable guidelines and standards for use in hazardous atmospheres, be labeled with the degree of protection and meet the requirements of the relevant range of application. The ambient temperatures must be observed. The limit position switch used in the product complies with this requirement.
- Ensure that the compressed air does not contain a potentially explosive atmosphere.
- Please ensure that movements associated with the retraction and insertion of the sensor do not damage the connection.
- The product must be incorporated into the local potential equalization system.
- The Operating Instructions for the product and in particular the conditions for safe usage must be read, understood and implemented.

The product does not need to be labeled with the degree of protection.

2.3 Workplace safety

The operator is responsible for ensuring compliance with the following safety regulations:

- 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.

Procedure for damaged products:

1. Do not operate damaged products, and protect them against unintentional operation.
2. Label damaged products as defective.

During operation:

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

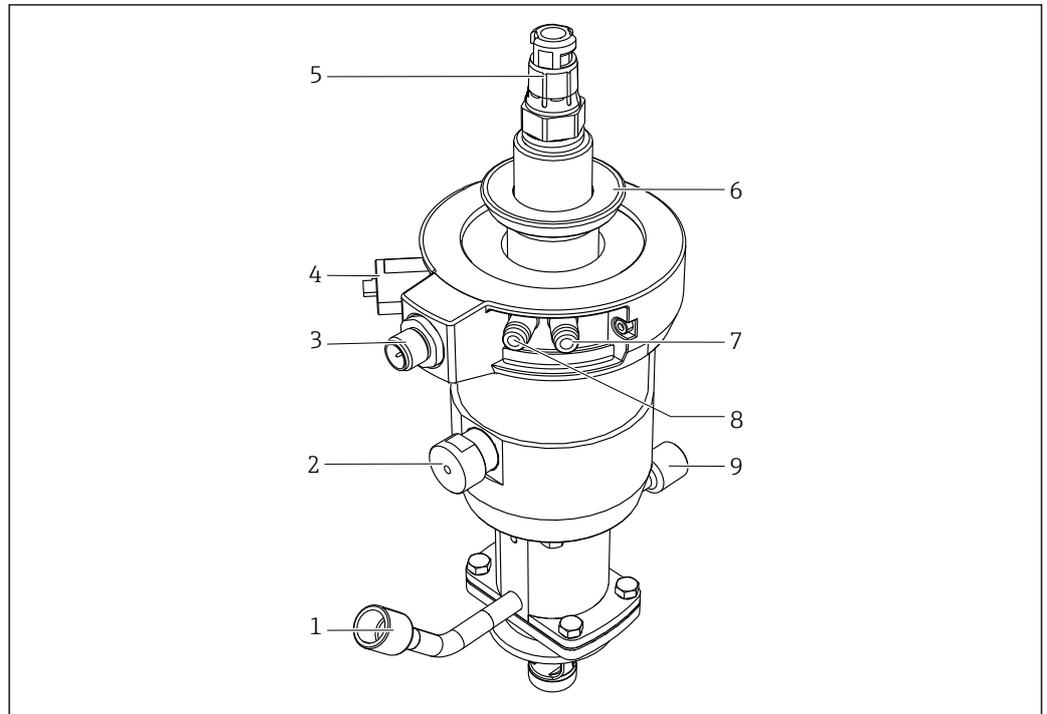
2.5 Product safety

2.5.1 State-of-the-art technology

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

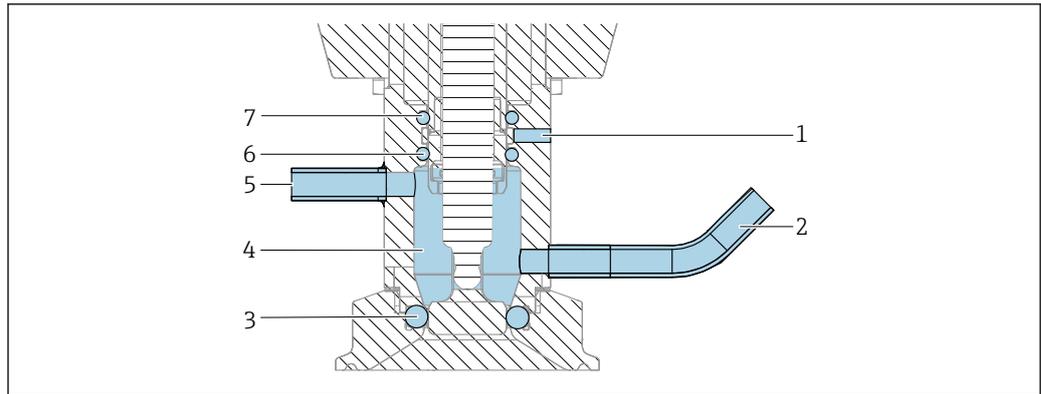


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1 Assembly with pneumatic drive (without protective cover)

- 1 Rinse connection (inlet)
- 2 Automatic limit position lock, process
- 3 Connection for limit position switch
- 4 Automatic limit position lock, service
- 5 Sensor head
- 6 Fastening ring for protective cover
- 7 Pneumatic connection (move to measuring position)
- 8 Pneumatic connection (move to service position)
- 9 Rinse connection (outlet)

3.1.1 Operating principle

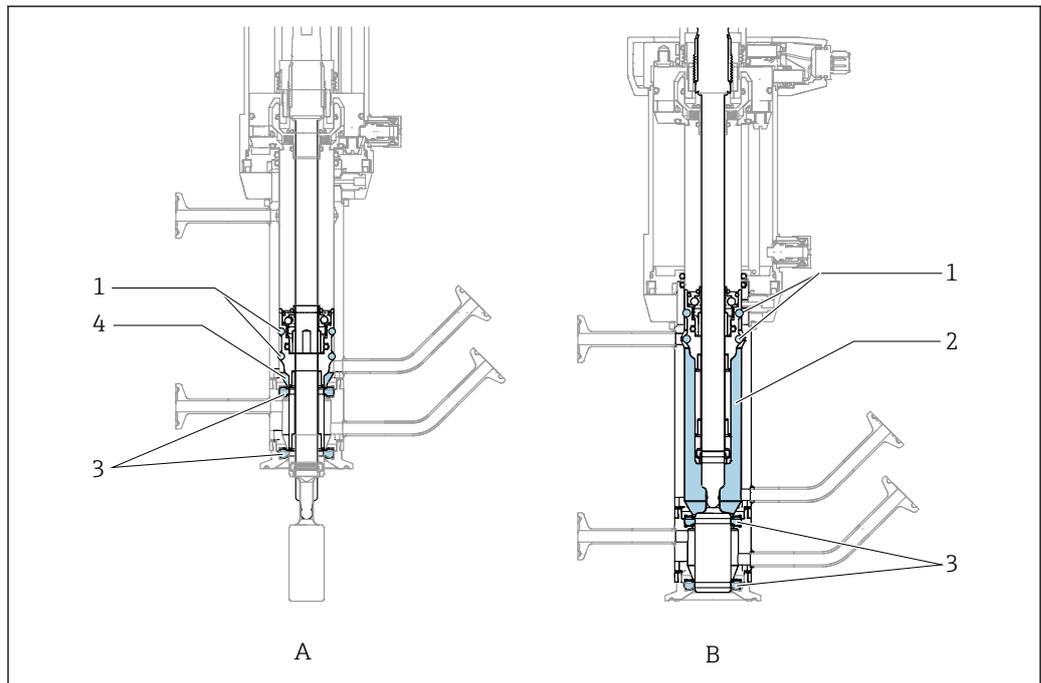


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2 Sealing system, assembly in service position

- 1 Leakage hole
- 2 Rinse chamber, inlet
- 3 Process seal, seal for DN25 with 1 x O-ring
- 4 Rinse chamber
- 5 Rinse chamber, outlet
- 6 Seal, rinse chamber (1 x O-ring)
- 7 Seal drive (1 x O-ring)

Process seal



A0044088

3 Moving sealing rings, only refers to the double chamber

- A Measuring position
- B Service position
- 1 "Moving" seals in the double chamber
- 2 Chamber volume in service position
- 3 Molded seal
- 4 Chamber volume in measuring position

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 Scope of delivery

The scope of delivery comprises:

- Assembly in the version ordered
- Operating Instructions
- Adapter for plug-in connector, 6 mm (0.24 in) to 4 mm (0.16 in) (outer diameter)
- Optional accessories ordered

4.3 Product identification

4.3.1 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.

4.3.2 Identifying the product

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 will find information pertaining to your device, including the product documentation.

Product page

www.endress.com/CPA875

Manufacturer address

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

5 Installation

5.1 Installation requirements

5.1.1 Information regarding hygiene-compliant installation according to EHEDG

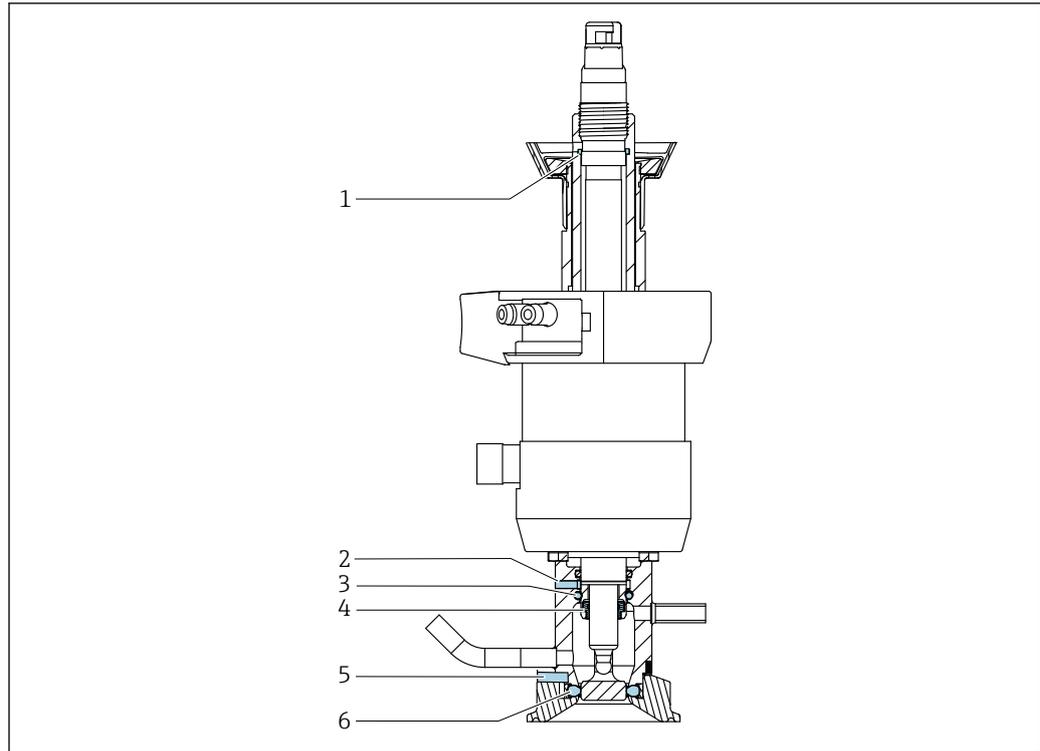
Easily cleanable installation of equipment according to the criteria of the EHEDG must be free of dead legs. If a dead leg is unavoidable, it shall be kept as short as possible. Under no circumstances shall the length of a dead leg L exceed the pipe's inner diameter D minus the equipment's enveloping diameter d . The condition $L \leq D - d$ applies. Furthermore, the dead leg must be self-draining, so neither product nor process fluids are retained therein. Within tank installations, the cleaning device must be located so that it directly flushes the dead leg.

For further reference, see the recommendations concerning hygienic seals and installations in EHEDG Doc. 10 and the Position Paper: "Easy cleanable Pipe couplings and Process connections".

5.1.2 Information regarding hygiene-compliant installation according to 3-A

For 3-A-compliant installation, please observe the following:

1. After mounting the device, ensure its hygienic integrity. For this purpose, the assembly must be installed in such a way that the leakage holes are located at the lowest point on the device.
2. Use 3-A-compliant process connections.



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 4 *Hygienic bores and seals according to 3A*

- 1 *Bore, sensor screw-in*
- 2 *Bore, rinse chamber*
- 3 *Drive seal*
- 4 *Sensor seal*
- 5 *Process connection bore*
- 6 *Process seal*

 Versions with the DA, DC, DF, EA and NA process connections only have a leakage hole on the rinse chamber.

5.1.3 Leakage paths for monitoring the process seals

The leakage paths serve as an indicator for damaged seals.

If medium escapes at one of the leakage paths:

- Perform maintenance work on the assembly.
- Replace the seals.
- Clean the assembly completely.

5.1.4 Rinse connections

 **CAUTION**

There is a direct connection between the process and the service chamber when the assembly is inserted/retracted. Medium can escape through the service chamber connections.

Risk of injury from escaping process medium.

- ▶ Connect the service chamber connections.
- ▶ Check all connections for leaks prior to commissioning.

Due to the operating principle, there is a connection between the process and the service chamber during insertion/retraction. This serves a number of purposes:

- Prevention of contamination of the process: due to the pressure in the process, small volumes of process medium are flushed into the service chamber, thereby preventing any negative interference with the process.
- Implementation of the sealing water function: in applications with media that cake easily, suitable media (e.g. condensate) can be flushed into the process to extend the service life of the seals.

1. Connect the rinsing chamber connections accordingly.
2. Include the assembly in the maintenance concept.
3. Clean the assembly regularly.

5.1.5 Orientation

NOTICE

Frost damage to the assembly

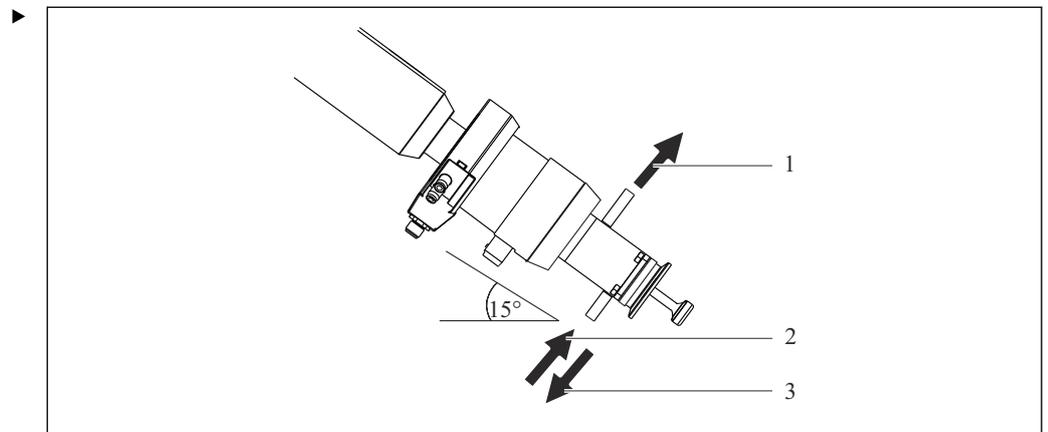
- ▶ If used outdoors, ensure that water cannot penetrate the drive.

The assembly is designed to be mounted on vessels and pipes. Suitable process connections must be available for this.

The assembly is designed in such a way that there are no restrictions with regard to the orientation.

-  The sensor that is used can restrict the orientation.

The assembly can be installed in such a way that it can drain on its own.



 5 Installation angle for self-draining

- 1 Rinsing
- 2 Rinsing
- 3 Draining

Install the assembly at an angle of $\geq 5^\circ$ and $\leq 15^\circ$ to the horizontal.

- ↳ The service chambers are now self-draining.

-  Ensure compliance with the Operating Instructions of the sensor installed.

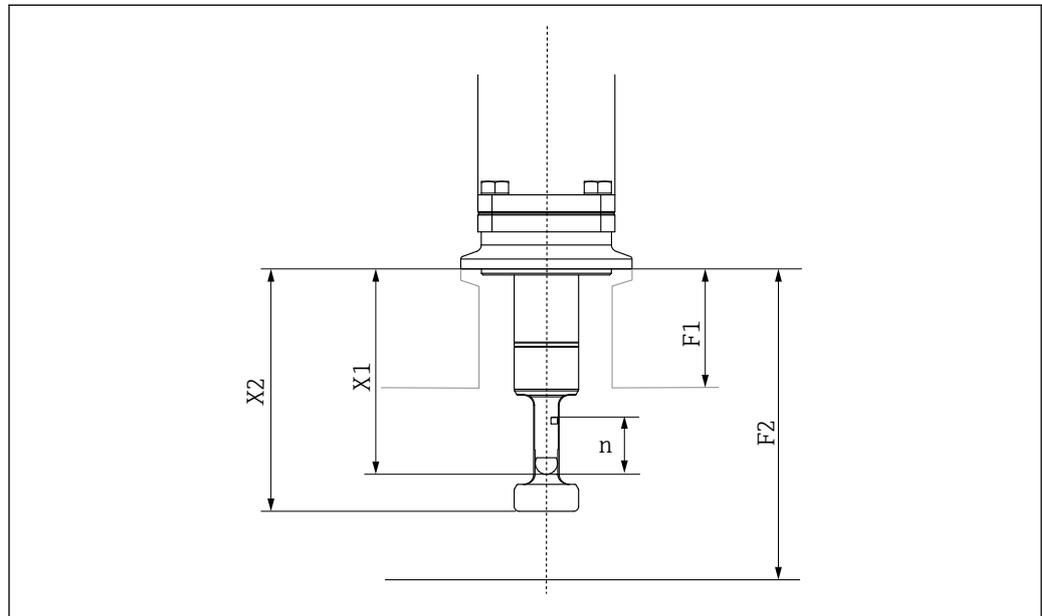
Installation free of dead space

A measurement in the dead space is inaccurate due to the low exchange of medium.

- ▶ Install the assembly in such a way that measurement is not possible in the dead space.

Configure the assembly in such a way that dimension X1, reduced by the distance between the measuring elements n (in the case of pH sensors 20 mm (0.8 in)), exceeds dimension F1 (distance between the process connection support and the inside of the pipe).

When installing inside a pipe, make sure the sensor guide does not hit the opposite wall. To do this, ensure that dimension X2 is smaller than dimension F2 (distance between process connection and inside of pipe).

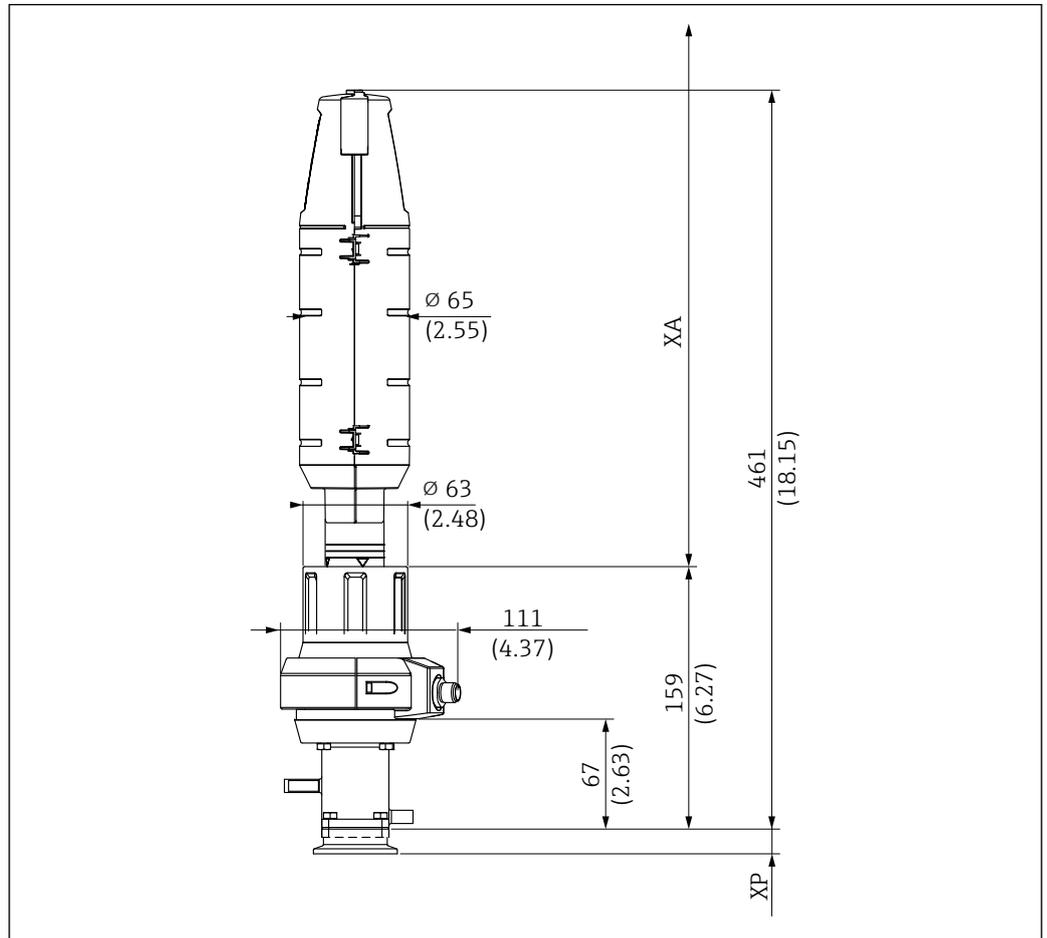


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- n* 20 mm (0.8 in)
- F1* Refers to the system; customer's specific situation
- F2* Refers to the system; customer's specific situation
- X1* Dimensions of process assemblies CPA87x
- X2* Dimensions of process assemblies CPA87x

5.1.6 Dimensions

Short version

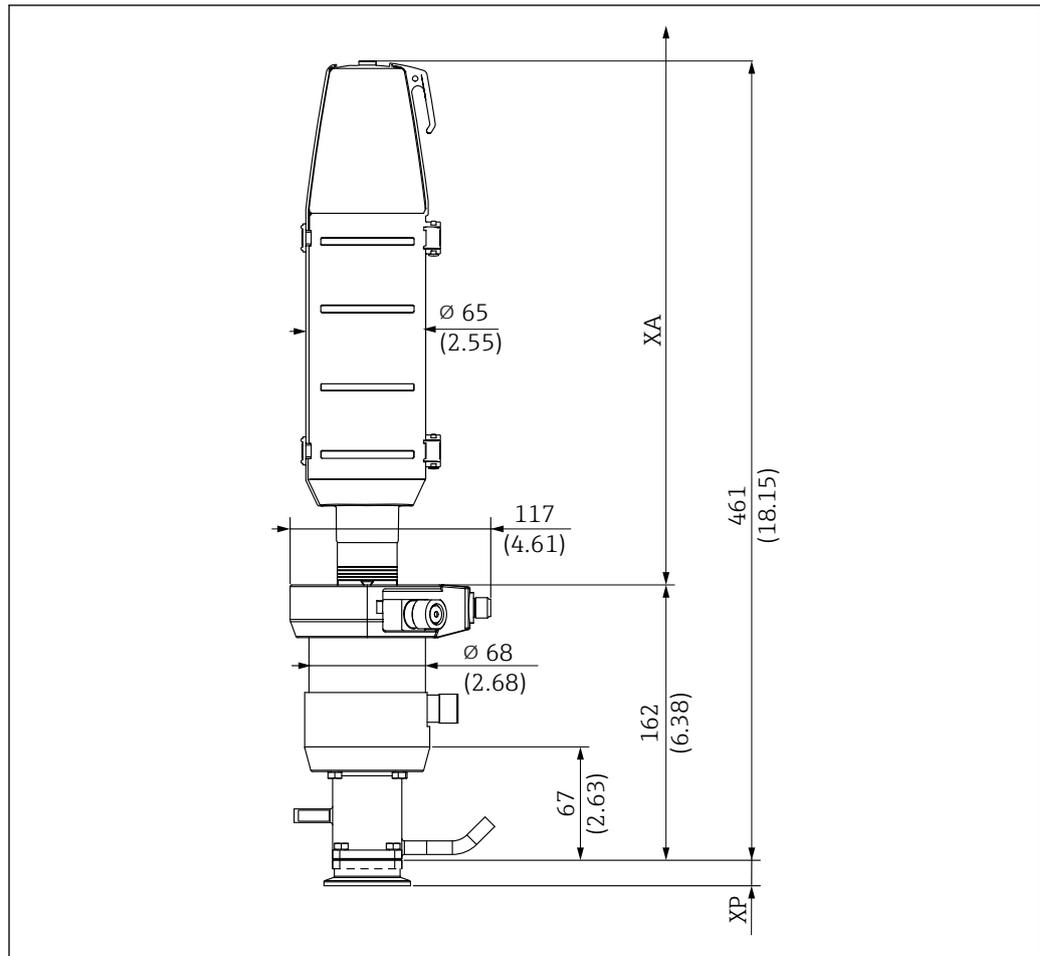


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6 Dimensions for short version (36 mm stroke) with manual drive in service position in mm (in)

XP Height of particular process connection (see table below)

XA Necessary mounting distance for sensor replacement = 425 mm (16.73")



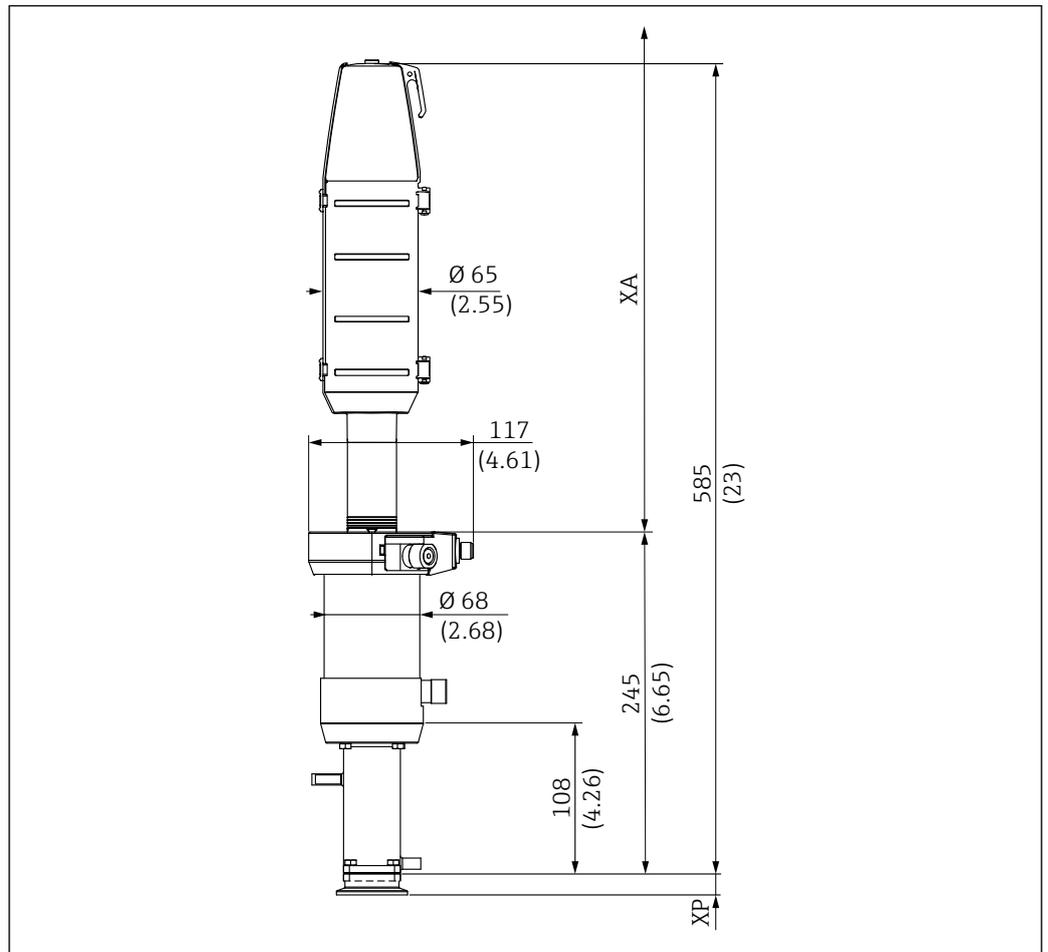
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7 Dimensions for short version (36 mm stroke) with pneumatic drive in service position in mm (in)

XP Height of particular process connection (see table below)

XA Necessary mounting distance for sensor replacement = 425 mm (16.73")

Long version

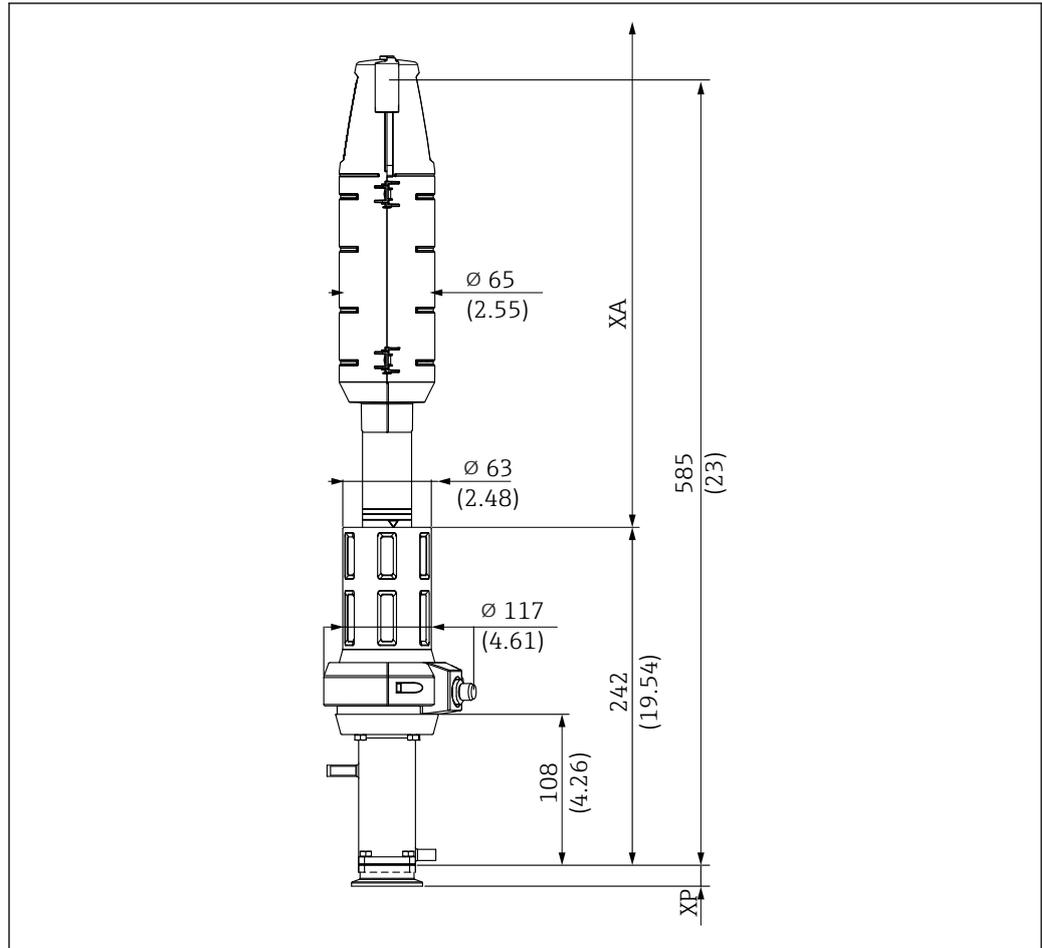


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8 Dimensions for long version (78 mm (3.1 in) stroke) with pneumatic drive in service position in mm (in)

XP Height of particular process connection (see table below)

XA Necessary mounting distance for sensor replacement



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9 Dimensions for long version (78 mm (3.1 in) stroke) with manual drive in service position in mm (in)

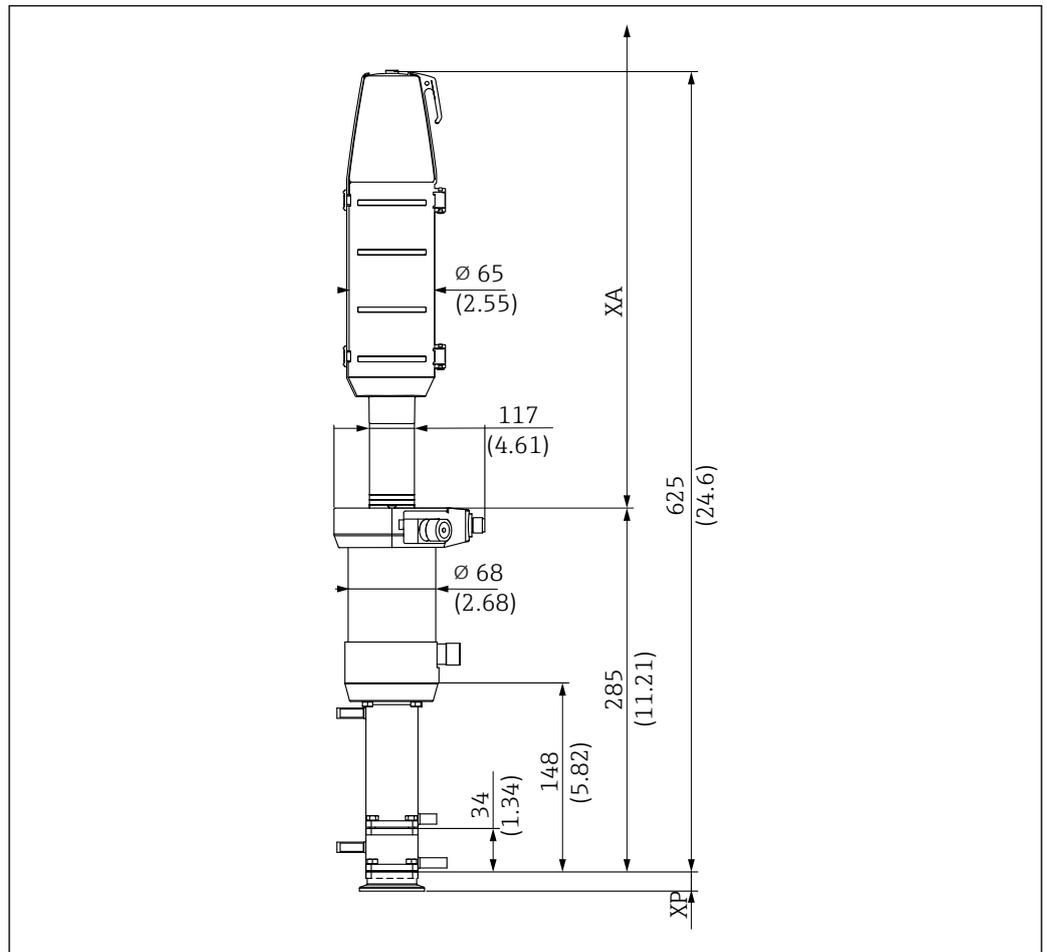
XP Height of particular process connection (see table below)

XA Necessary mounting distance for sensor replacement

A free path length XA above the drive is required to replace the sensors:

XA is 440 mm (17.3 in) for 225 mm sensors

XA is 610 mm (24.02 in) for 360 mm sensors

Double chamber

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▣ 10 Dimensions of double chamber in mm (in)

XP Height of particular process connection (see table below)

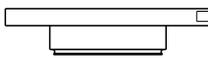
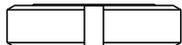
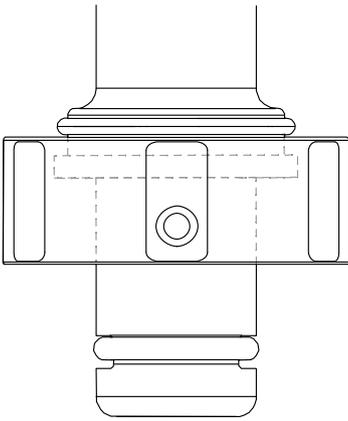
XA Necessary mounting distance for sensor replacement

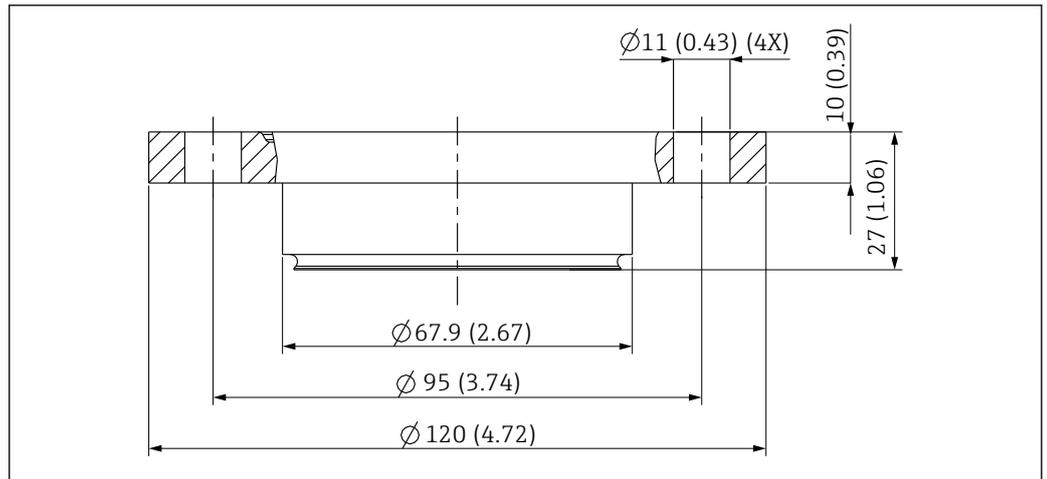
A free path length XA above the drive is required to replace the sensors:

XA is 440 mm (17.3 in) for 225 mm sensors

XA is 610 mm (24.02 in) for 360 mm sensors

Process connection height

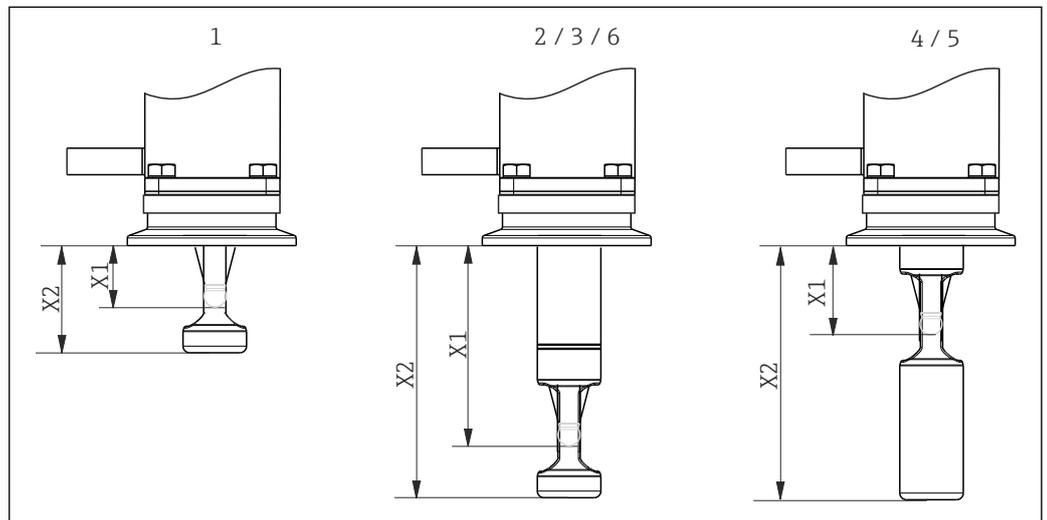
Process connection		Height XP in mm (in)
CA Clamp ISO 2852, ASME BPE-2012, 1½"	 <small>A0021866</small>	14.9 (0.59)
CB Clamp ISO 2852, ASME BPE-2012, 2"	 <small>A0021867</small>	19.5 (0.77)
CC Clamp ISO 2852, ASME BPE-2012, 2½"	 <small>A0021869</small>	13.0 (0.51)
DA Aseptic DN 25 clampable DIN 11864-3 A, grooved clamp connector	 <small>A0021871</small>	16.0 (0.63)
DC Aseptic DN 50 screw-in DIN 11864-1 A	 <small>A0021872</small>	16.0 (0.63)
DF Aseptic DN 50 grooved flange DIN 11864-2 A	 <small>A0021874</small>	14.2 (0.56)
EA NEUMO Biocontrol D 65	 <small>A0021875</small>	25.0 (0.98)
MA Dairy fitting DN 50 DIN 11851 (EHEDG approval only with seal from Siersema)	 <small>A0021879</small>	14.5 (0.57)
NA DN 25 <ul style="list-style-type: none"> ▪ Thread ISO 228 G1¼" ▪ Compatible with hook wrench, DIN 1810 flat face <p>NOTICE</p> <p>Mounting with pipe wrench causes damage.</p> <p>▶ Use a hook wrench for mounting and removal.</p>	 <small>A0042904</small>	31.1 (1.22)
VA Varivent flange N (DN 40 to 100)	 <small>A0021873</small>	19.0 (0.75)



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11 Dimensions of EA NEUMO Biocontrol D 65 in mm (in)

5.1.7 Immersion depths



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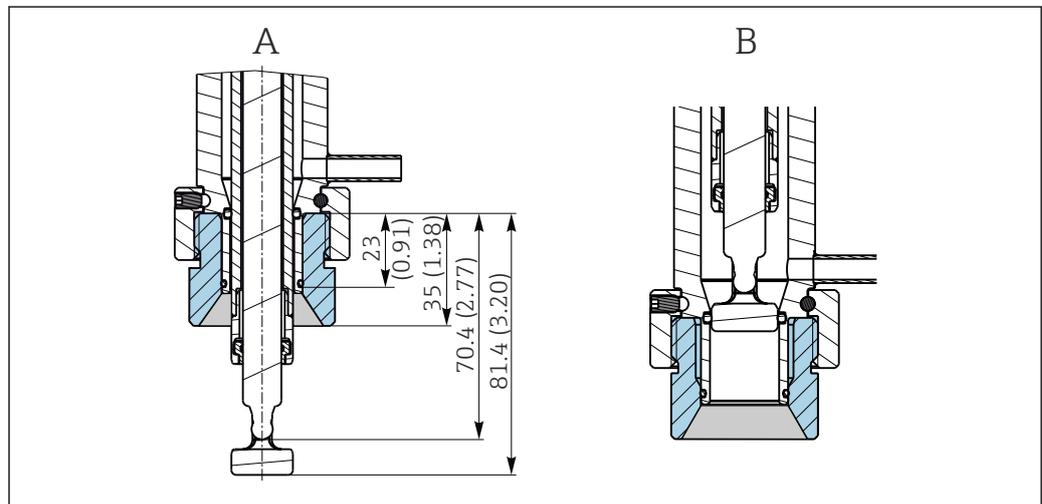
12 Immersion depths for different service chambers

- 1 Single chamber/36 mm stroke/225 mm sensor incl. KCI
- 2 Single chamber/78 mm stroke/225 mm sensor excl. KCI
- 3 Single chamber/78 mm stroke/360 mm sensor incl. KCI
- 4 Double chamber/78 mm stroke/225 mm sensor excl. KCI/service position, "inner" service chamber
- 5 Double chamber/78 mm stroke/360 mm sensor incl. KCI/service position, "inner" service chamber
- 6 Double chamber/78 mm stroke/360 mm sensor incl. KCI/service position, "front" service chamber

Immersion depths in mm (in)

Process connection		Service chamber					
		1	2	3	4	5	6
CA Clamp ISO 2852 ASME BPE-2012 1½"	X1	20.6 (0.81)	62.1 (2.44)	62.1 (2.44)	28.1 (1.11)	28.1 (1.11)	62.1 (2.44)
	X2	31.6 (1.24)	73.1 (2.88)	73.1 (2.88)	73.1 (2.88)	73.1 (2.88)	73.1 (2.88)
CB Clamp ISO 2852 ASME BPE-2012 2"	X1	16.1 (0.63)	57.6 (2.27)	57.6 (2.27)	23.6 (0.93)	23.6 (0.93)	57.6 (2.27)
	X2	27.1 (1.07)	68.6 (2.70)	68.6 (2.70)	68.6 (2.70)	68.6 (2.70)	68.6 (2.70)
CC Clamp ISO 2852 ASME BPE-2012 2½"	X1	22.6 (0.89)	64.1 (2.52)	64.1 (2.52)	30.1 (1.19)	30.1 (1.19)	64.1 (2.52)
	X2	33.6 (1.32)	75.1 (2.96)	75.1 (2.96)	75.1 (2.96)	75.1 (2.96)	75.1 (2.96)
DA Aseptic DN 25 clampable DIN 11864-3 A	X1	19.6 (0.77)	61.1 (2.41)	61.1 (2.41)	27.1 (1.07)	27.1 (1.07)	61.1 (2.41)
	X2	30.6 (1.20)	72.1 (2.84)	72.1 (2.84)	72.1 (2.84)	72.1 (2.84)	72.1 (2.84)

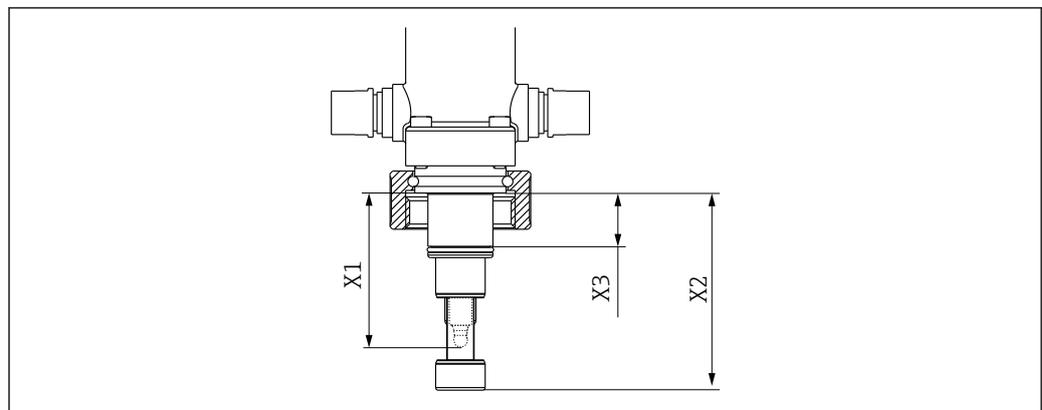
Process connection		Service chamber					
		1	2	3	4	5	6
DC Aseptic DN 50 screw-in DIN 11864-1 A	X1	27.1 (1.07)	68.6 (2.70)	68.6 (2.70)	34.6 (1.36)	34.6 (1.36)	68.6 (2.70)
	X2	39.0 (1.53)	79.6 (3.13)	79.6 (3.13)	79.6 (3.13)	79.6 (3.13)	79.6 (3.13)
DF Aseptic DN 50 Grooved flange DIN 11864-2 A	X1	21.4 (0.84)	62.9 (2.48)	62.9 (2.48)	28.9 (1.14)	28.9 (1.14)	62.9 (2.48)
	X2	32.4 (1.28)	73.9 (2.91)	73.9 (2.91)	73.9 (2.91)	73.9 (2.91)	73.9 (2.91)
EA NEUMO BioControl D 65	X1	27.6 (1.09)	69.1 (2.72)	69.1 (2.72)	35.1 (1.38)	35.1 (1.38)	69.1 (2.72)
	X2	38.5 (1.51)	80.1 (3.15)	80.1 (3.15)	80.1 (3.15)	80.1 (3.15)	80.1 (3.15)
MA Dairy fitting DN 50 DIN 11851	X1	21.1 (0.83)	62.6 (2.46)	62.6 (2.46)	28.6 (1.13)	28.6 (1.13)	62.6 (2.46)
	X2	32.1 (1.26)	73.6 (2.90)	73.6 (2.90)	73.6 (2.90)	73.6 (2.90)	73.6 (2.90)
NA DN 25 Thread ISO 228 G1¼"	X1		70.4 (2.77)	70.4 (2.77)			
	X2		81.4 (3.20)	81.4 (3.20)			
VA Varivent flange N (DN 40 to DN 100)	X1	16.6 (0.65)	58.1 (2.29)	58.1 (2.29)	24.1 (0.95)	24.1 (0.95)	58.1 (2.29)
	X2	27.6 (1.09)	69.1 (2.72)	69.1 (2.72)	69.1 (2.72)	69.1 (2.72)	69.1 (2.72)



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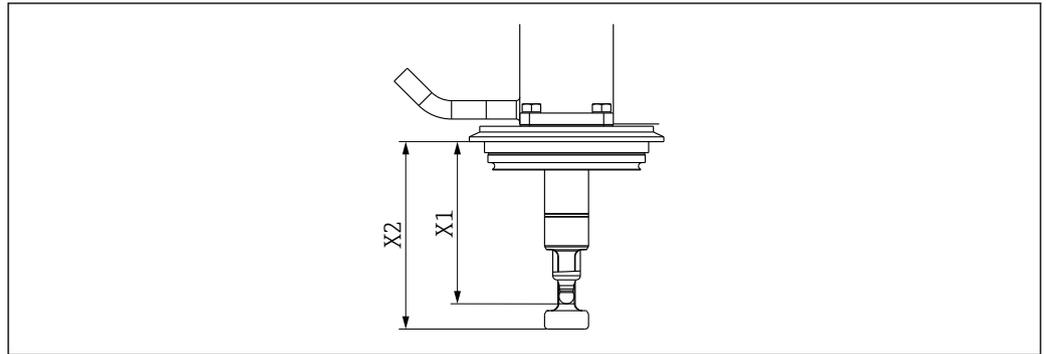
13 Immersion depth in mm (in) for process connection NA DN 25 male thread ISO 228 G1¼ (service chambers 2 and 3) in measuring and service position, mounted on weld-in adapter G1¼"

- A Measuring position
- B Service position



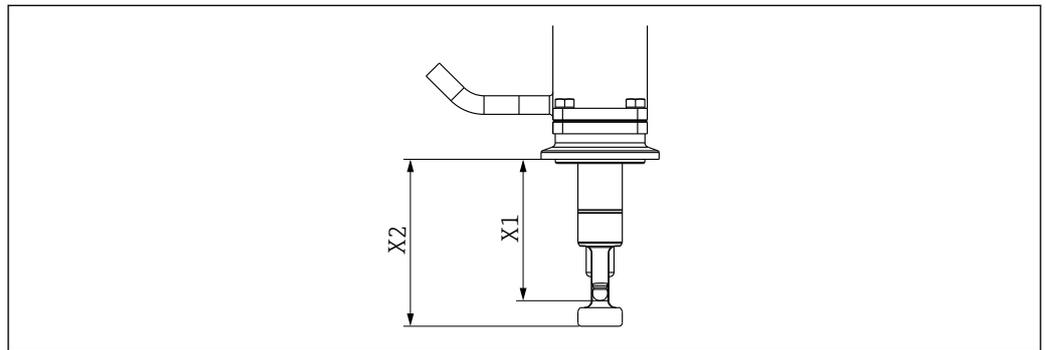
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14 Immersion depth in mm (in) for process connection NA DN 25 male thread ISO 228 G1¼



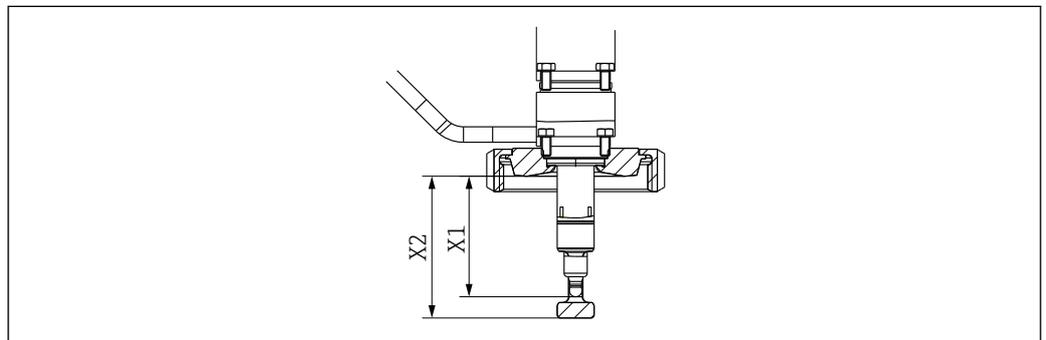
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15 Immersion depth in mm (in) for process connection VA Varivent flange N



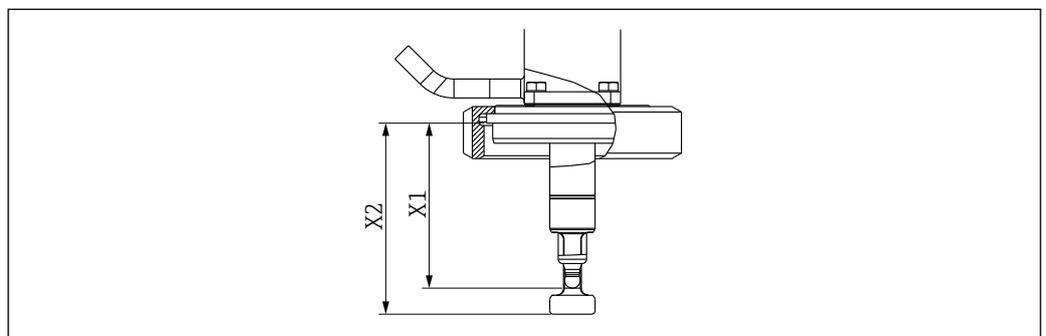
A0046155

16 Immersion depth in mm (in) for process connections CA, CB, CC, DA clamp (sample illustration)



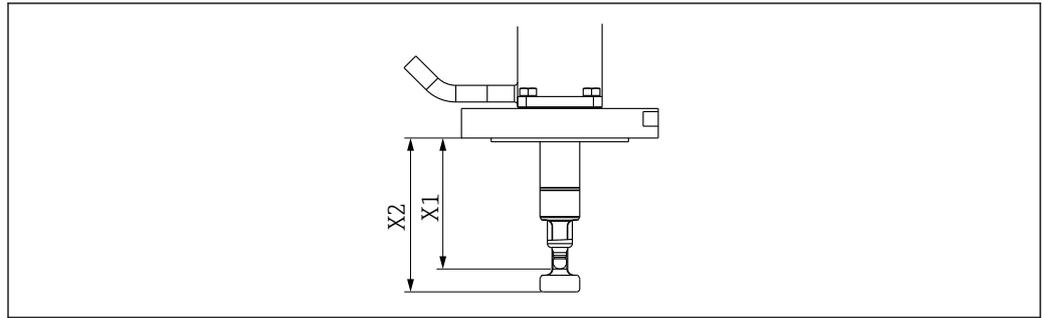
A0046160

17 Immersion depth in mm (in) for process connection MA Dairy fitting DN 50 DIN 11851



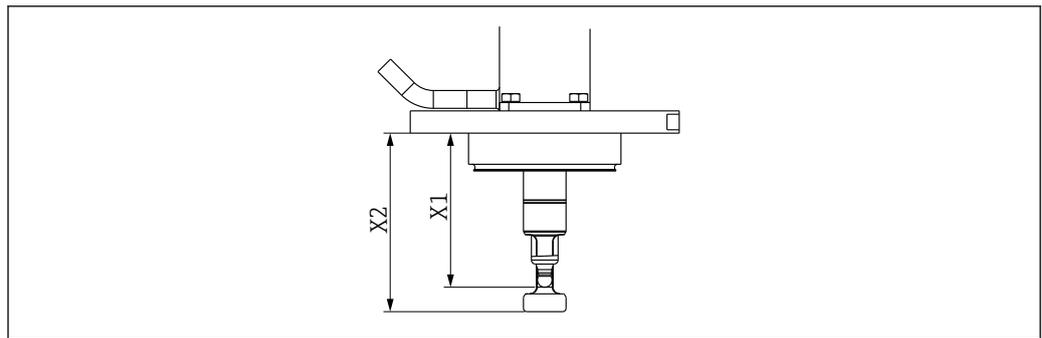
A0046156

18 Immersion depth in mm (in) for process connection DC Aseptic DN 50 screw-in DIN 11864-1 A



A0046166

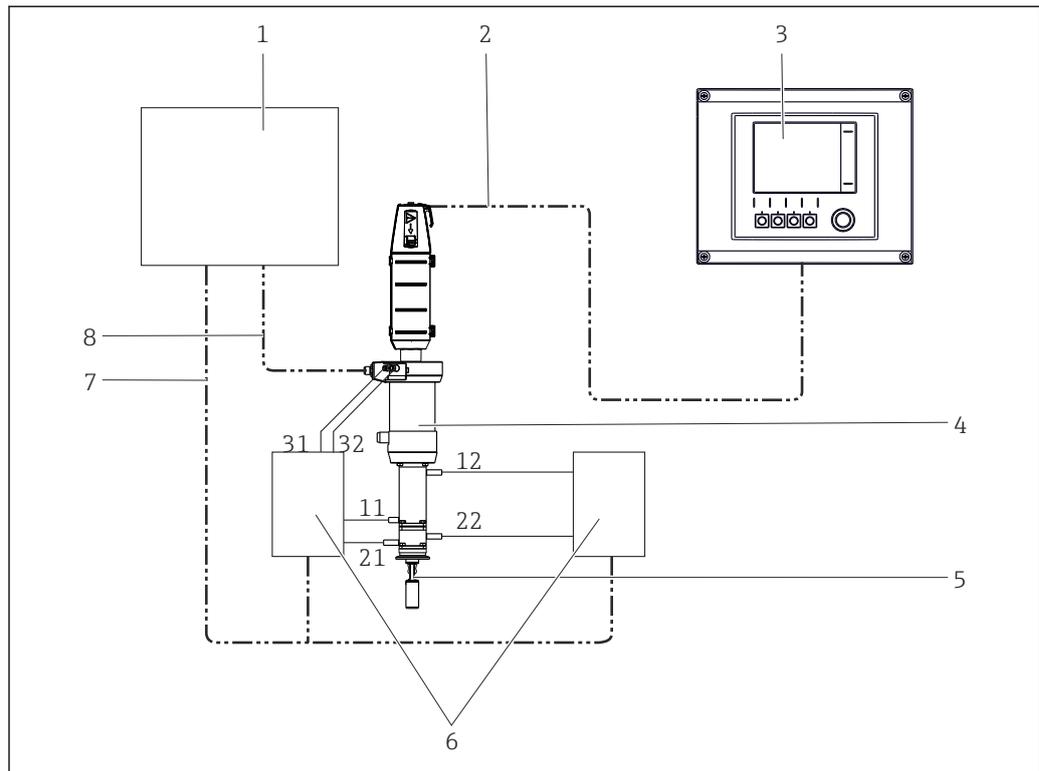
19 Immersion depth in mm (in) for process connection DF Aseptic DN 50 grooved flange DIN 11864-2 A



A0046157

20 Immersion depth in mm (in) for process connection EA NEUMO Biocontrol D65

Measuring system with double chamber



A0022821

■ 22 Measuring system with pneumatic drive and double chamber (example)

- | | | | |
|---|-----------------------------|-------|---|
| 1 | Control unit | 7 | Control signals (electric/pneumatic) |
| 2 | Measuring cable | 8 | Limit position switch relay signal |
| 3 | Transmitter Liquiline CM44x | 11/12 | Inlet/outlet of "inner" service chamber |
| 4 | Assembly Cleanfit CPA875 | 21/22 | Inlet/outlet of "front" service chamber |
| 5 | Sensor | 31/32 | Drive control |
| 6 | Manifold | | |

Installation recommendation

⚠ CAUTION

There is a direct connection between the process and the service chamber when the assembly is inserted/retracted. Medium can escape through the service chamber connections.

Risk of injury from escaping process medium.

- ▶ Connect the service chamber connections.
- ▶ Check all connections for leaks prior to commissioning.

NOTICE

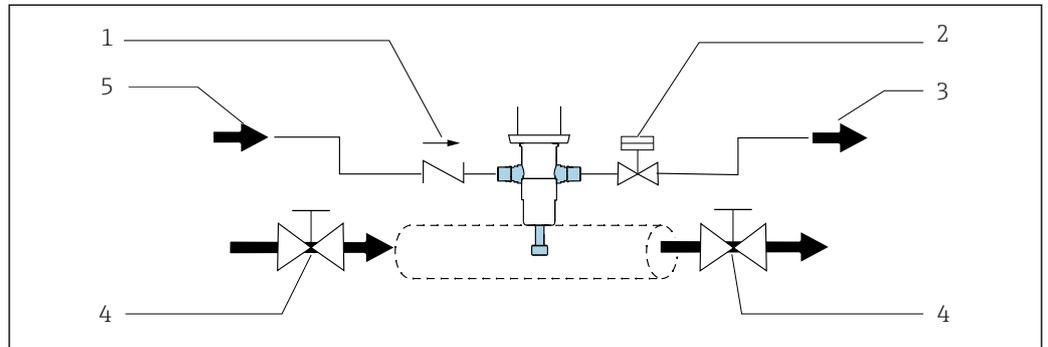
There is a connection between the process and the service chamber during insertion/retraction.

Contamination of the assembly.

- ▶ Include the assembly in the cleaning concept.
- ▶ Ensure regular cleaning.

The process seals seal the process in the relevant end position. The assembly is open to the process during insertion/retraction; the rinse connections must either be pipe-fitted or sealed.

i The connection between the service chamber and the process is open during movement; the sealing water function can be used as a result. The rinse chamber outlet must be blocked (e.g., with a shutoff valve) to implement the sealing water function.



23 Installation suggestion for seal system using a bypass

- 1 Check valve
- 2 Valve open/closed, sealing water function
- 3 Wastewater
- 4 Shutoff valve open/closed (optional)
- 5 Water/cleaning agent

The seals must be checked and serviced regularly. Therefore measures must be taken to separate the assembly from the process, e.g., by installing a bypass.

Installing/removing the assembly from the process

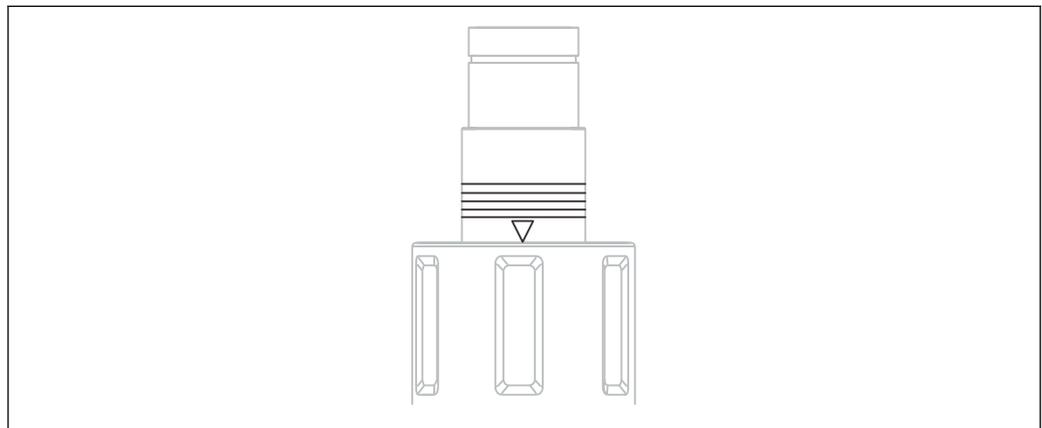
⚠ WARNING

Risk of injury from high pressure, high temperature or chemical hazards if process medium escapes.

- ▶ Wear protective gloves, protective goggles and protective clothing.
- ▶ Mount the assembly only if vessels or pipes are empty and unpressurized.

i Prior to installation, check the flange seal between the flanges.

1. Move the assembly to the service position.
 - ↳ (The triangle position marking is visible (→  24).
2. Secure the assembly on the tank or piping via the process connection.
3. Follow the instructions in the next section to connect pipes for compressed air and rinse water (for the relevant assembly version).



A0023307

 24 Position markings (service position)

Pneumatic connection for automatic operation

Prerequisites:

- Air pressure 5 to 8 bar (72 to 116 psi) (absolute) or air pressure 4 to 7 bar (58 to 102 psi) (relative)
- Compressed air quality in accordance with ISO 8573-1:2001 Quality class 3.3.3 or 3.4.3
- Solids class 3 (max. 5 µm, max. 5 mg/m³, contamination with particles)
- Water content for temperatures ≥ 15 °C (59 °F): Class 4 pressure dew point 3 °C (37 °F) or lower
- Water content for temperatures 5 to 15 °C (41 to 59 °F): Class 3 pressure dew point -20 °C (-4 °F) or lower
- Oil content: Class 3 (max. 1 mg/m³)
- Air temperature: 5 °C (41 °F) or higher
- Minimum nominal diameter of the air lines: 2 mm (0.08 in)

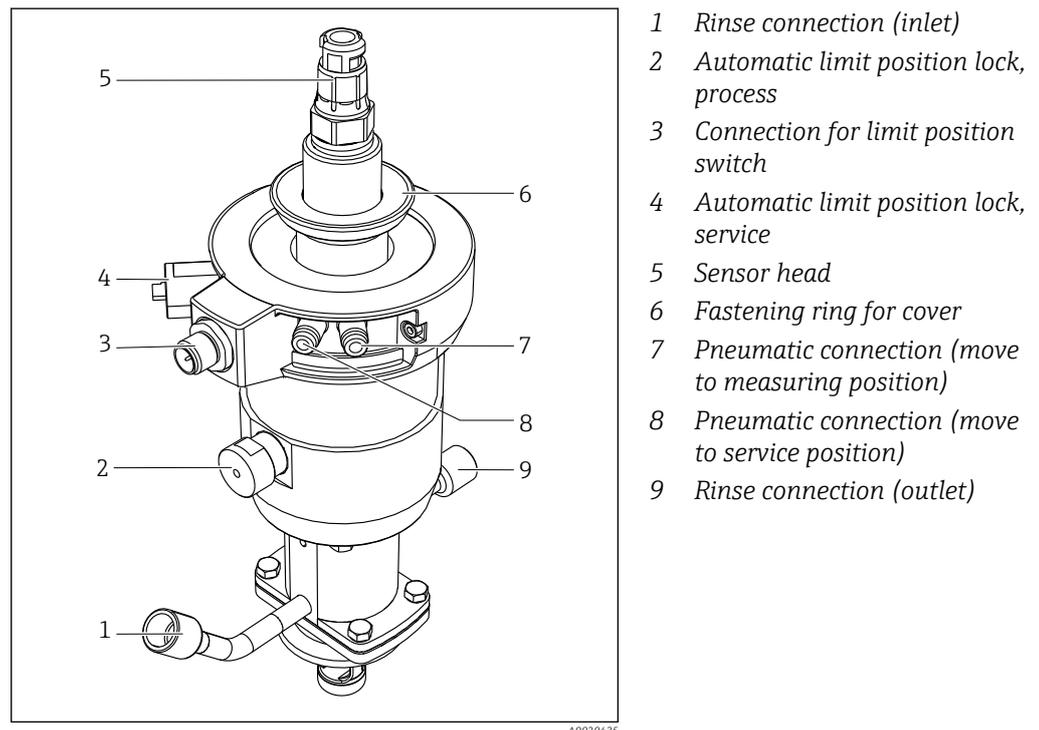
Connection: Plug-in connector M5, hose 4/2 mm OD/ID (adapter for 6/4 mm OD/ID enclosed)

NOTICE

Air pressure too high

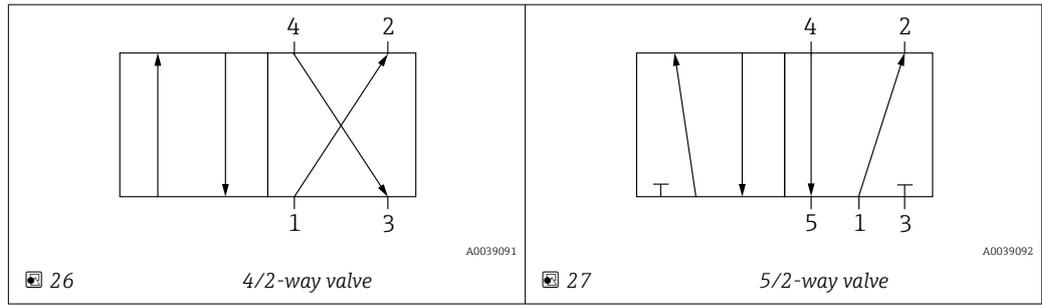
Damage to seals.

- ▶ Install a pressure-reducing valve upstream if the air pressure is likely to increase to more than 7 bar (102 psi) (absolute) (even short pressure surges).



25 Assembly with pneumatic drive (without cover)

- i** Use a pneumatic pilot valve (4/2-way or 5/2-way) to insert/retract the assembly. Connect the two inputs of the assembly.



Connection 1 is attached to the compressed air supply.

Connections 2 and 4 are used to attach to the pneumatic drive.

Connection 3 and, if present, connection 5 are not attached; they are used to vent the drive.

Rinse connections

The service chamber connections of the sterile CPA875 retractable assembly make it possible to rinse the chamber (including the sensor) with water or cleaning solution or to sterilize it with steam (SIP) at a maximum pressure of 6 bar (87 psi).

The retractable assembly can be selected with a single-chamber system or double-chamber system. If the double-chamber system is used, all four connections must be connected to inlet and outlet lines.

i Install a pressure-reducing valve upstream if there is the possibility that water pressures can exceed the specified sealing water pressure (8 bar (116 psi) or 16 bar (232 psi)).

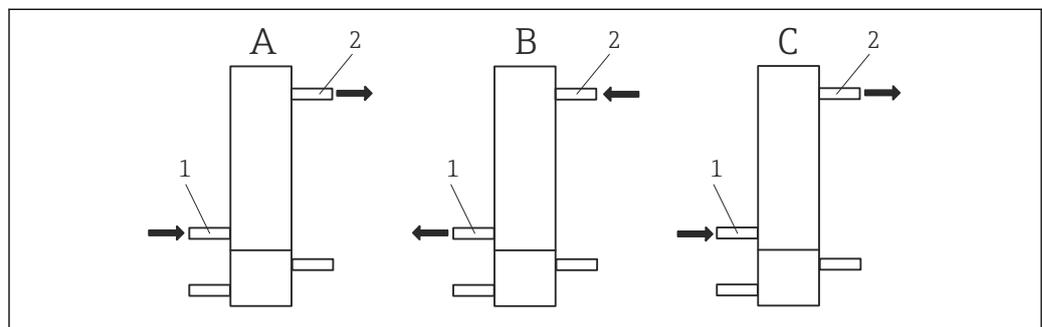
NOTICE

Pressure difference too high between process and wastewater system or if rinse connections are not properly connected.

Damage to seals

- ▶ Close rinse connections.
- ▶ Pipe-fit rinse connections.
- ▶ Use sealing water function.

Assignment of rinse connections for double chamber



28 Assignment of rinse inlet and outlet

- A "Clean" function: connection and water/cleaner flow direction
- B Aeration/de-aeration when moving from the service position to the measuring position
- C Aeration/de-aeration when moving from the measuring position to the service position
- 1 Service chamber inlet
- 2 Service chamber outlet

Service chambers I and II

The double-chamber assembly has 2 service chambers that can be controlled independently of each other:

- Service chamber I on the process connection side
- Service chamber II on the drive side

Process-side service chamber I performs the same function as the service chamber of the standard CPA875. Service chamber II on the drive side operates according to the spraying principle. During insertion/retraction, a piston completely displaces the contents from the chamber so that the volume on this side approaches zero, while it increases steadily on the other side of the piston. This change in volume in service chamber II must be compensated by switching the inlet and outlet of the service chamber during extension and retraction of the assembly.

In the "Cleaning" state (A), the inlet and outlet of drive-side service chamber II are used as follows (the internal volume of the "front" service chamber does not change, and so no pressure compensation measures are required here):

- Depending on the cleaning method, cleaning agent and purge gas are supplied via the inlet (1).
- These media are removed via the outlet (2).

In the "Move from service position to measuring position" state (B), the pressure conditions in the service chamber must be balanced when moving. The inlet and outlet of the service chamber are assigned as follows:

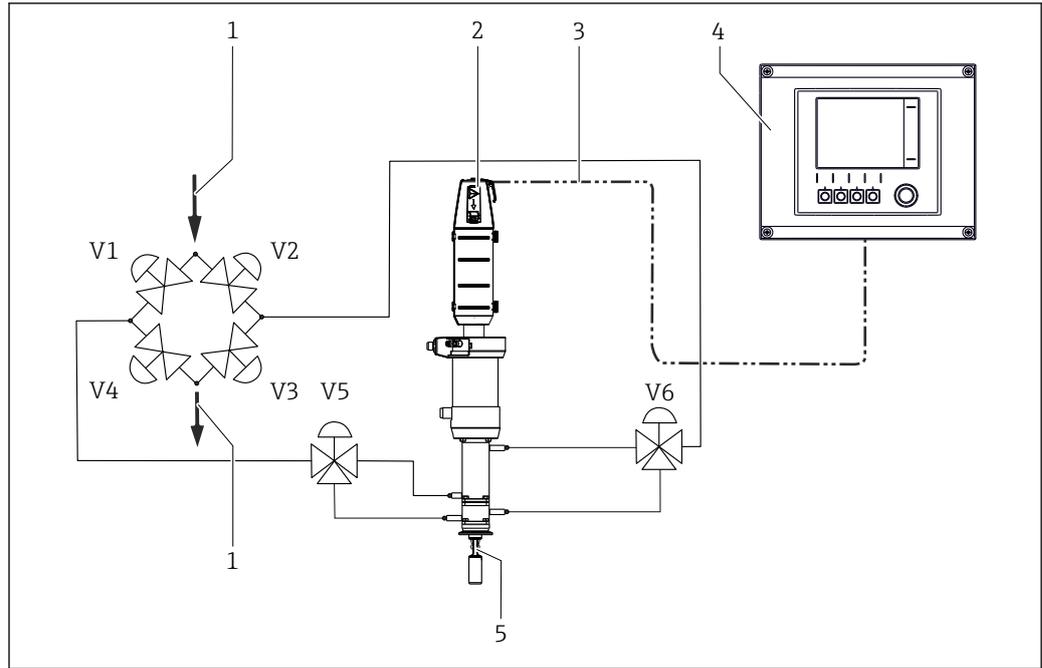
- The air is removed via the inlet (1) (inlet is open).
- Air is supplied via the outlet (2).

In the "Move from measuring position to service position" state (C), the pressure conditions in the service chamber must be balanced when moving. The inlet and outlet of drive-side service chamber II are assigned as follows:

- The air is supplied via the inlet (1).
- The air is removed via the outlet (2) (outlet is open).

 The drive must be controlled simultaneously with the inlets and outlets of service chamber II.

The controller for the inlets, outlets and the drive is installed at the place of installation. It is not included in the assembly delivery.



A0061190

- 1 Media supply
- 2 Assembly
- 3 Measuring cable
- 4 Liquiline CM44x transmitter
- 5 Sensor

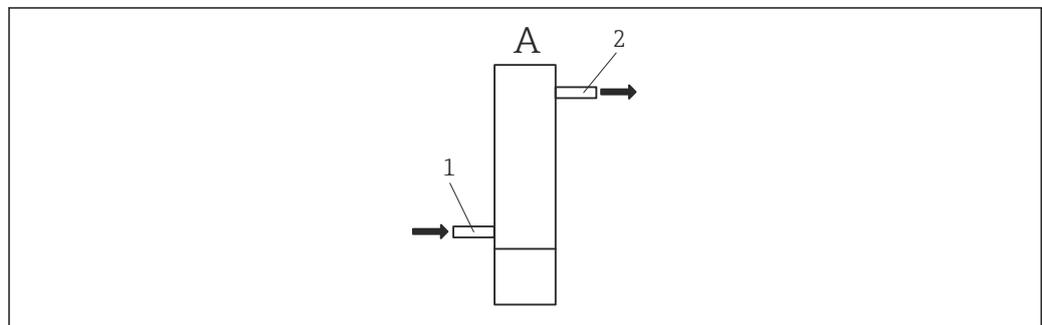
Control of the double-chamber assembly

The double-chamber assembly can be controlled using the following configuration, for example:

Valves V1, V2, V3, and V4 enable targeted switching of the inlet and outlet of the two service chambers. Two three-way valves V5 and V6 allow independent control of process-side service chamber I and drive-side service chamber II.

This configuration allows flexible switching between the two chambers and use of their specific functions – taking into account, in particular, the changing volume of the drive-side chamber during insertion/retraction.

Assignment of rinse connections for single chamber



A0043570

29 Connection and water/cleaner flow direction

- A "Clean" function: connection and water/cleaner flow direction
- 1 Service chamber inlet
- 2 Service chamber outlet

In the "Cleaning" state (A), the inlet and outlet of the service chamber are used as follows (the internal volume of the service chamber does not change, and so no pressure compensation measures are required here):

- Depending on the cleaning method, cleaning agent is supplied via the inlet (1).
- These media are removed via the outlet (2).
- When self-draining is used, draining occurs via (1) and must be taken into account when connecting the system.

Connecting the limit position switches

With limit position detection, you can notify a system located downstream (transmitter, switching amplifier, output interface terminal) whether the assembly is in the measuring or service position (in the case of manual drive, only the measuring position is queried).

The limit position switches must be connected to output interface terminals (can be ordered as accessories for the non-hazardous area) to enable power supply.

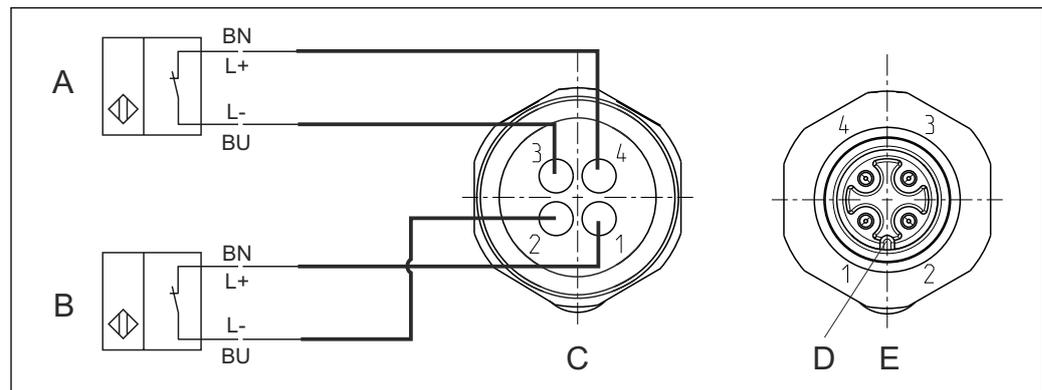
The assembly can be ordered directly with limit position detection, or it can be retrofitted at a later stage. The cable for the limit position switches must be ordered as an accessory.

Feedback devices

The feedback devices are intrinsically safe. The approval for the feedback devices is no longer valid if they are not installed or connected correctly.

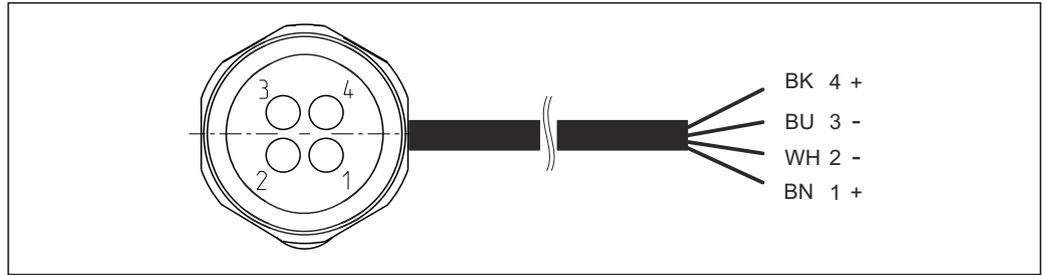
1. Ensure full compliance with manufacturer documentation.
2. Connect the feedback devices in accordance with the relevant instructions.

Switching element function:	NAMUR NC contact (inductive)
Switching distance:	1.5 mm (0.06 in)
Nominal voltage:	8 V DC
Switching frequency:	0 to 5000 Hz
Housing material:	Stainless steel



30 Inductive limit position switches, internal cabling in the blue protective ring

- A Limit position switch, service position
 B Limit position switch, measuring position
 C Connector, M12, solder side (inside of assembly)
 D Coding
 E Connector, pin side (outside of assembly)



A0022163

31 Connecting cable for limit position switch on transmitter, switching amplifier, output interface terminal etc.

- 1 Measuring position
- 2 Measuring position
- 3 Service position
- 4 Service position

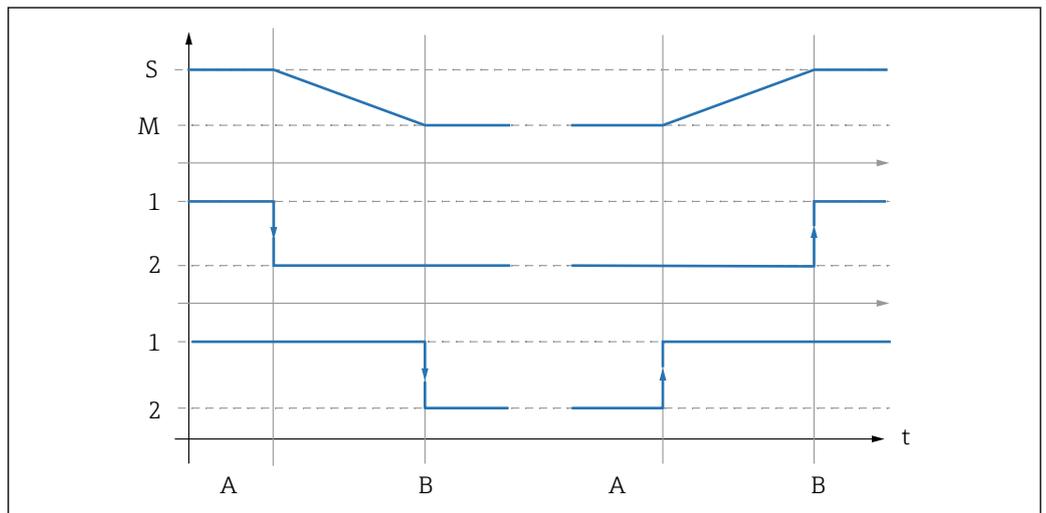
i Only pins 1 and 2 are assigned for manually activated assemblies with one switch (measuring position).

i If the feedback devices are operated with a 24 V DC power supply, e.g. at Liquiline CM442/CM444/CM448, NAMUR terminals must be used. NAMUR terminal (8 V DC) for the non-hazardous area available as an accessory → 60. The NAMUR terminal must have its own power supply and cannot be powered by a current output of the CM44.

i For versions CPA87x-AB* for use in hazardous areas, the enclosed manufacturer's declaration and the operating instructions for the installed Pepperl+Fuchs NJ1.5-6.5-15-N-Y180094 feedback devices must be observed.

Signal table for limit position switches

Position of assembly	Limit position switch, measuring position	Limit position switch, service position
Measuring	Active LOW (≥ 3 mA)	Active LOW (≥ 3 mA)
Service	Active HIGH (≤ 1 mA)	Active HIGH (≤ 1 mA)



A0039144

32 Description of switching function

- S Service
- M Measuring
- 1 High
- 2 Low
- A Movement starts
- B Limit position reached

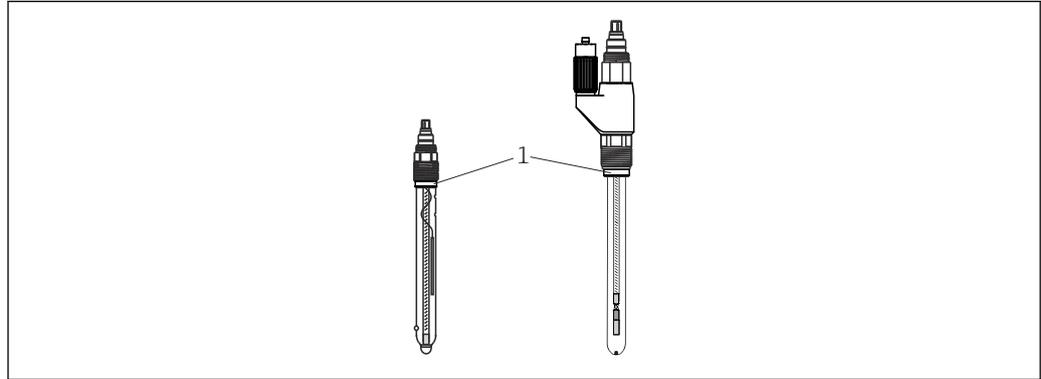
5.2.2 Sensor installation

Preparing the sensor and assembly

NOTICE

Danger of medium penetrating if a defective sensor is installed.

- ▶ Inspect the sensor and use a new, intact sensor if necessary.



A0030154

33 Sensor installation

1 Thrust collar with O-ring

1. Remove the protective cap from the sensor. Make sure that the O-ring and thrust collar (→ 33, item 1) are provided.
2. To aid installation, immerse the sensor shaft in water.
3. Move the assembly to the service position.

3-A versions

Leakage path at sensor screw connection for 3-A versions → 11:

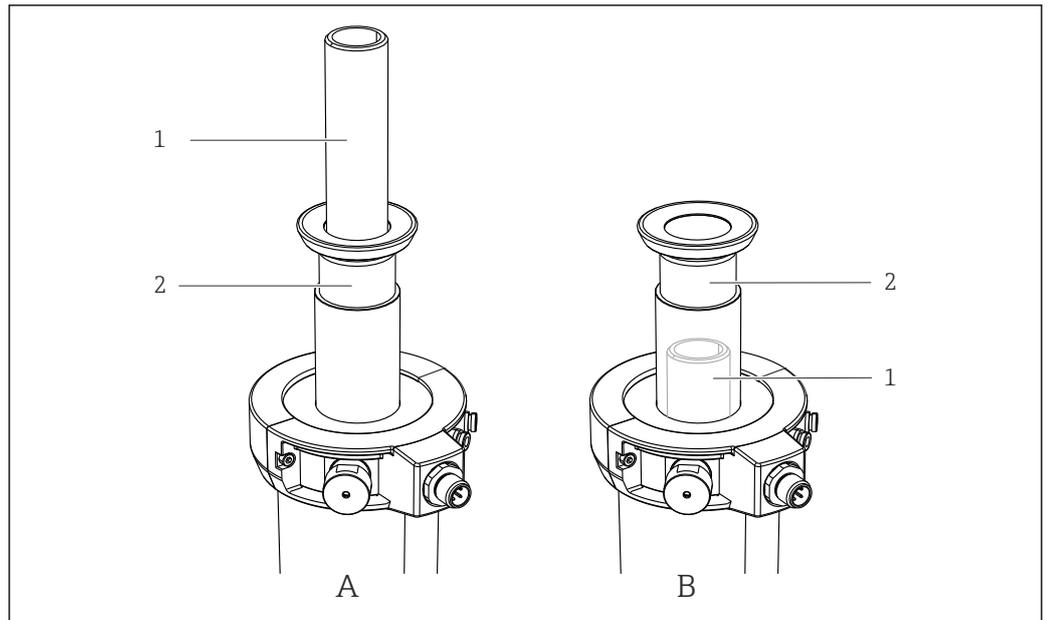
- ▶ Replace the thrust collar of the sensor with the slotted thrust collar enclosed.

Installing and removing sensors

⚠ WARNING

Risk resulting from temperature, pressure and chemical composition!

- ▶ Establish pressure compensation in the service chamber.
- ▶ Before removing, clean and rinse the sensor adequately in the rinse chamber.
- ▶ Check process seals. (There can be no leakage of medium from the rinse chamber in limit position when rinsing is disabled)



A0030155

34 Sensor installation options

1 Sensor adapter

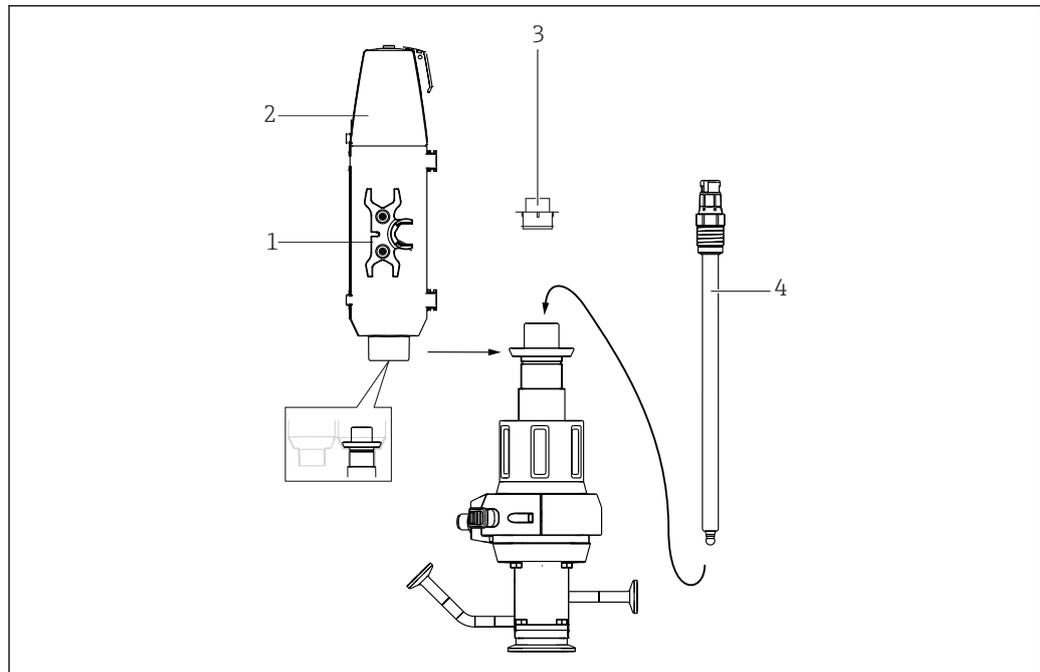
2 Retraction tube

A Sensor adapter is on top of the retraction tube

B Sensor adapter is below the retraction tube (not visible)

Depending on the assembly version, the sensor adapter is visible (, item A) or is positioned within the retraction tube and is not visible (item B). As a result, the procedures for installing and removing the sensors differ as follows:

Installing and removing sensors if the sensor adapter is visible (item A)



A0090186

35 Sensor installation

- 1 Open-ended wrench (AF 17/19 mm)
- 2 Protective cover
- 3 Dummy plug
- 4 Sensor

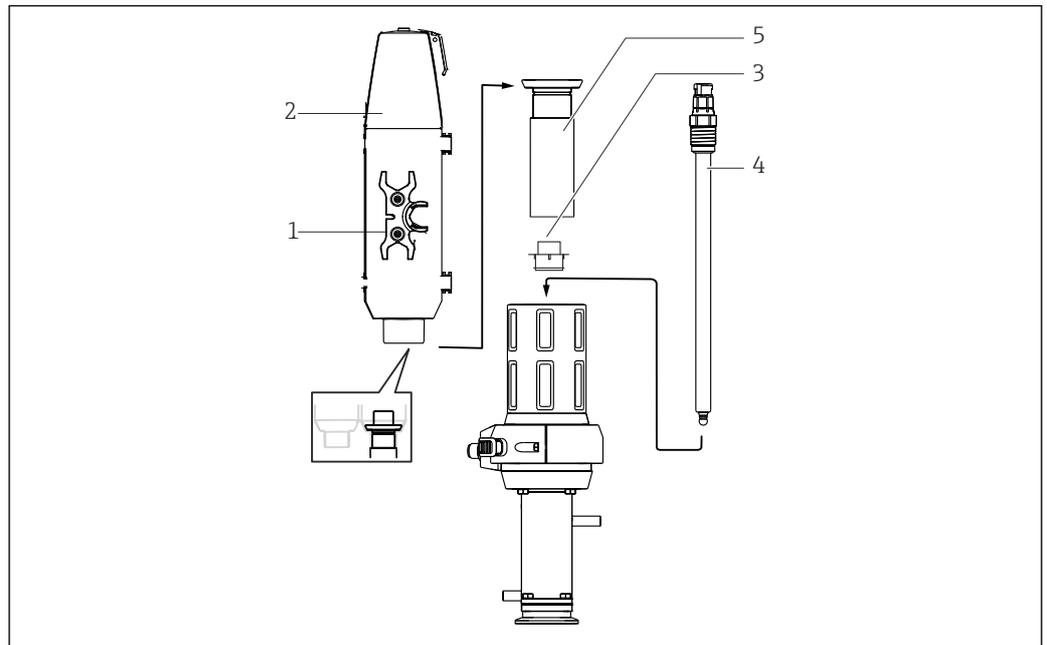
i Gel and KCl sensors can be installed in this version.

Install the sensor as follows:

1. Remove the protective cover (→ **35**, item 2) (this is only possible if the assembly is in service position).
2. Remove the yellow dummy plug (item 3).
3. Use the open-ended wrench (item 1) to screw in the sensor (item 4) in place of the dummy plug and hand-tighten (3 Nm (2.2 lbf ft)).
4. Attach the open-ended wrench back into the protective cover.
5. Mount the protective cover on the assembly. When doing so, guide the measuring cable through the cable run (top of protective cover).

i Always install the protective cover before moving the assembly to measuring position. The protective cover cannot be removed in measuring position. This prevents the sensor from being removed.

Installing and removing sensors if the sensor adapter is not visible (item B)



A0030187

36 *Sensor installation*

- 1 Socket wrench (AF 17/19 mm)
- 2 Protective cover
- 3 Dummy plug (protective cap)
- 4 Sensor
- 5 Retraction tube

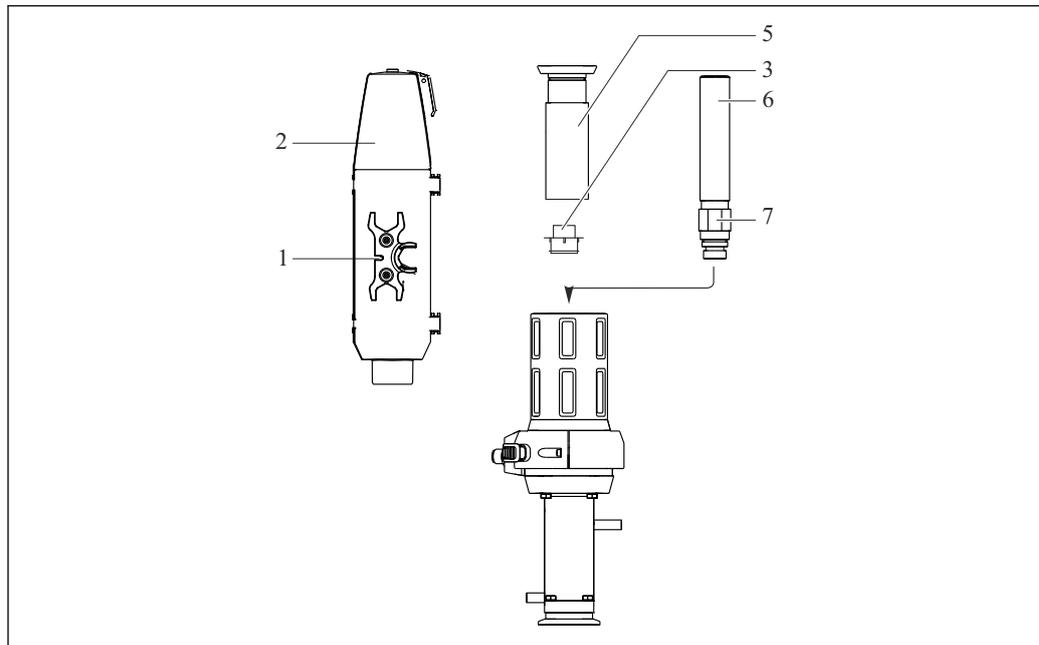
i Gel sensors can be installed in this version. To install KCl sensors, you will need a "Gel - KCl adapter".

Install the sensor as follows:

1. Remove the protective cover (→ **36**, item 2) (this is only possible if the assembly is in service position).
2. Unscrew the retraction tube (item 5) in a counterclockwise direction.
3. Remove the yellow dummy plug (item 3).
4. Use the open-ended wrench (item 1) to screw in the sensor (item 4) in place of the dummy plug and hand-tighten (3 Nm (2.2 lbf ft)).
5. Screw in the retraction tube again.
6. Attach the open-ended wrench back into the protective cover.
7. Mount the protective cover on the assembly. When doing so, guide the measuring cable through the cable run (top of protective cover).

i Always install the protective cover before moving the assembly to measuring position. The protective cover cannot be removed in measuring position. This prevents the sensor from being removed.

Installation of 360 mm gel and KCl sensors with the "Gel - KCl adapter"



A0030188

37 Sensor installation, Part 1

- 1 Open-ended wrench (AF 17/19 mm)
- 2 Protective cover
- 3 Dummy plug (protective cap)
- 5 Retraction tube
- 6 Gel - KCl adapter
- 7 Lock nut

i Gel sensors can be installed in this version. To install KCl sensors, you will need a "Gel - KCl adapter".

NOTICE

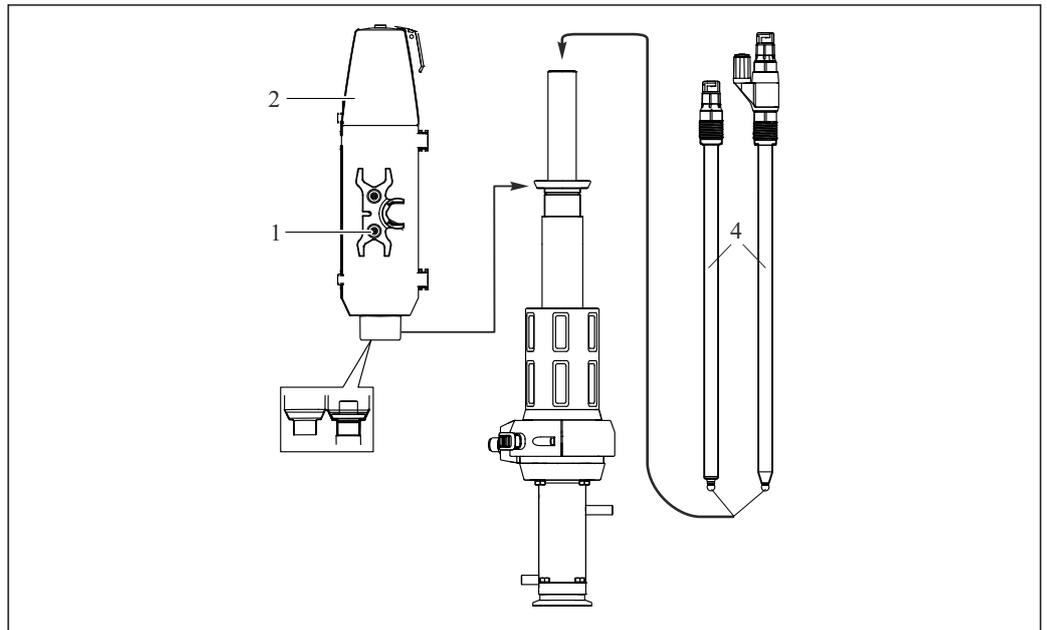
The protective cover cannot be removed in measuring position. This prevents the sensor from being removed.

- ▶ Always install the protective cover before moving the assembly to measuring position.
- ▶ There is an opening prepared at the top of the cover which can be broken out if necessary to feed the hose through.

Install the sensor as follows:

1. Remove the protective cover (→ 37, item 2) (this is only possible if the assembly is in service position).
2. Unscrew the retraction tube (item 5) (in a counterclockwise direction).
3. Turn the lock nut (item 7) on the "Gel - KCl adapter" (item 6) as far as it will go in an upward direction.
4. Remove the yellow dummy plug (item 3).
5. Screw in the "Gel - KCl adapter" (item 6) in place of the dummy plug and hand-tighten (3 Nm (2.2 lbf ft)).
6. Hand-tighten the lock nut in a clockwise direction, and then use an open-ended wrench (AF 24 mm) to tighten it by ¼ turn.
7. Screw in the retraction tube again.
8. Use the open-ended wrench (item 1) to screw in the sensor (→ 38, item 4) and hand-tighten (3 Nm (2.2 lbf ft)).
9. Attach the open-ended wrench back into the protective cover.

10. Mount the protective cover on the assembly. When doing so, guide the measuring cable through the cable run (top of protective cover).



38 Sensor installation, Part 2

- 1 Open-ended wrench
 2 Protective cover
 4 360 mm gel or KCl sensor

5.3 Post-installation check

Put the sensor into operation only if you can answer "yes" to the following questions:

- Are the sensor and cable undamaged?
- Is the orientation correct?
- Is the sensor installed in an assembly and not suspended from the cable?

5.3.1 Checking that the sealing system is intact

Check the seals after mounting or removing the sensor and when maintenance work is performed. At regular intervals.

1. Move the assembly to the service position
2. If provided, open the ball valve of the service chamber outlet
 - ↳ It is normal for a slight amount of medium to escape (connection between the service chamber and process during insertion/retraction).
3. If provided, rinse the service chamber/sensor.
4. Observe the outlet. No more medium should escape after a short period of time.
5. If medium continues to escape, the sealing system is damaged; take the measuring point out of service and perform maintenance on the assembly.

6 Commissioning

6.1 Preliminaries

Before commissioning, ensure that:

- all seals are correctly seated (on the assembly and on the process connection).
- the sensor is correctly installed and connected.
- the water connection at the rinse connections is correct (if present) or the rinse connections are sealed.

WARNING

Risk of injury from high pressure, high temperature or chemical hazards if process medium escapes.

- ▶ Check the connections to ensure they are sealed tightly.

WARNING

Process medium may escape during insertion/retraction of the assembly.

- ▶ Check that the process seal is intact.
- ▶ Pipe-fit the rinse chamber outlet accordingly.
- ▶ Seal the rinse connections with dummy plugs.

 Note that when the assembly is inserted/retracted, an open connection exists for a short period between the process and service chamber. This intermediate position can be used for what is known as "sealing water" or for the third rest position (see "Optional cleaning/sterilization of process seal").

Install the service chamber connections accordingly.

7 Operation

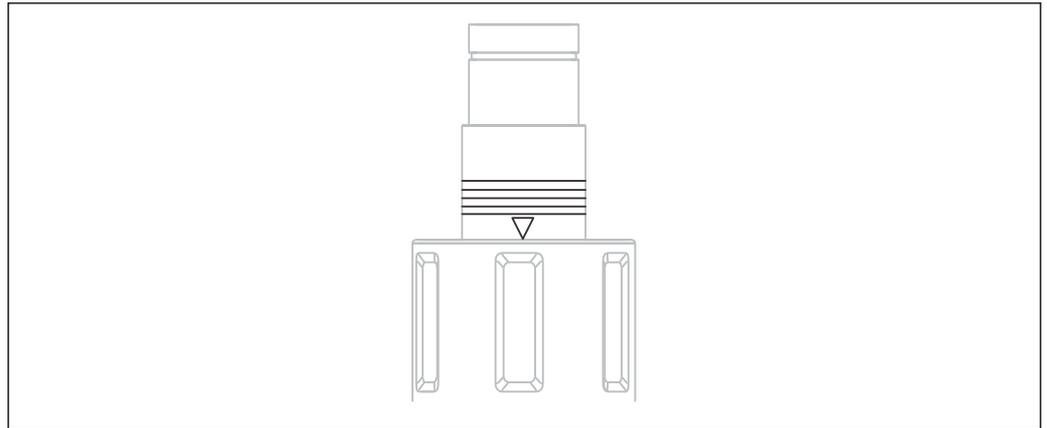
7.1 Adapting the assembly to the process conditions

CAUTION

Due to the operating principle, there is a connection between the process and the service chamber. The service chamber can be pressurized as a result.

Process medium may escape during insertion/retraction.

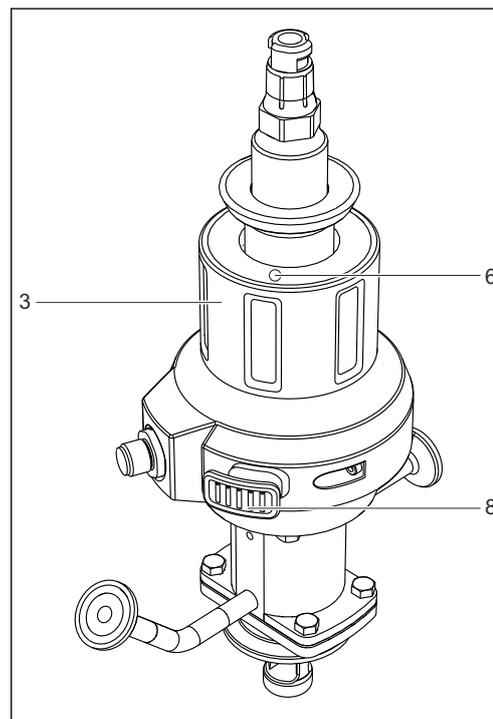
- ▶ Check that the process seal is intact.
- ▶ Pipe-fit the rinse chamber outlet accordingly.
- ▶ Seal the rinse connections with dummy plugs.



A0023307

 39 Position markings (service position)

 The assembly with pneumatic drive does not have any operating elements.

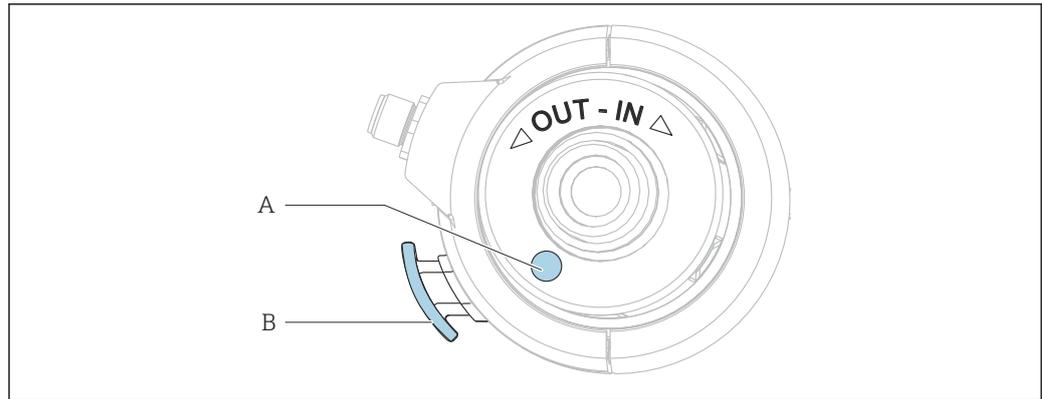


A0030299

 40 Assembly with manual operation, operating elements

- 3 Manual drive
- 6 Unlocking button (service position)
- 8 Unlocking button (measuring position)

7.1.1 Manual operation



41 Direction of rotation

A Unlocking button (service position)

B Unlocking button (measuring position)

Moving the assembly from the service position to the measuring position

The assembly can only be inserted/retracted if a sensor is installed.

1. Press the unlocking button (A).
2. With the unlocking button (A) pressed, during the first quarter turn, rotate the drive in a clockwise direction so that the sensor holder moves into the process (only possible with the sensor installed). The button can be released while turning the rest of the way.
3. Rotate the drive until the lock engages.

Moving the assembly from the measuring position to the service position

1. Press the unlocking button (B).
2. With the unlocking button (B) pressed during the first quarter turn, rotate the drive in a counterclockwise direction until the stop (service position).
3. Perform the required service activities.

7.1.2 Pneumatic operation

The assembly can only be inserted/retracted if a sensor is installed.

The operation of the pneumatic version depends on the controller. Consult the controller manual for instructions.

Use a pneumatic pilot valve (4/2-way or 5/2-way) to insert/retract the assembly.

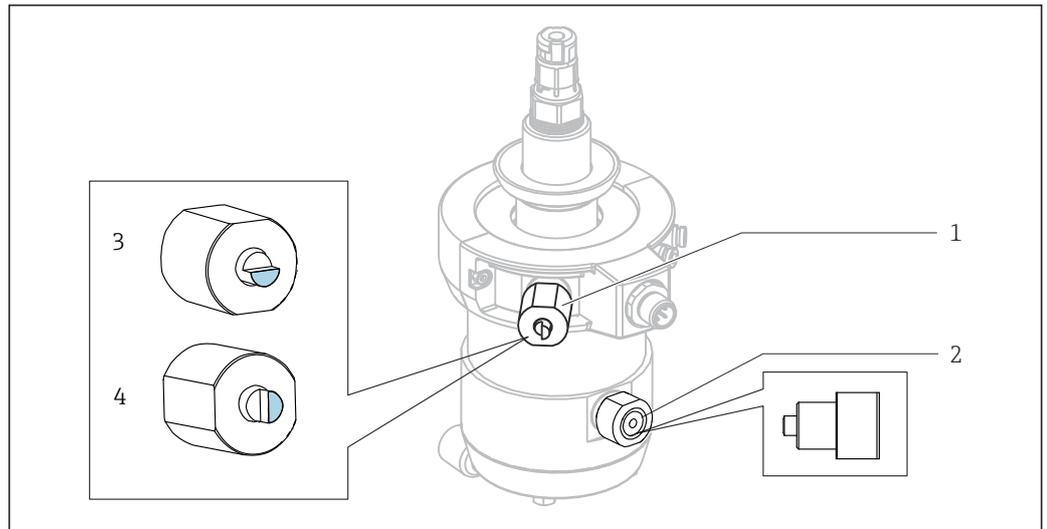
- ▶ Connect the two inputs.
 - ↳ If only one input is connected (e.g. for test purposes), the piston is blocked as the sensor guide moves before the limit position lock is disabled.

Inserting/retracting the assembly if the compressed air supply fails

CAUTION

Risk of injury due to high medium pressure

- ▶ Depressurize the system.



▣ 42 Failure of compressed air supply

- 1 Limit position lock for service position
- 2 Limit position lock for measuring position
- 3 Normal position (flat side is on top)
- 4 Position for optional sterilization of seal (flat side is on left)

If the compressed air supply fails, you can still move the assembly manually. Proceed as follows here:

1. Use an open-ended wrench (AF 17 mm (0.67 in)) to unscrew both limit position locks (items 1 and 2).
2. Move the assembly to the desired position.
3. Screw the limit position lock back in (Only in the case of optional sterilization of the process seal: Re-install the lock in the normal position (item 3)).

Optional cleaning/sterilization of process seal

In this version, you can clean and sterilize the process seal. To do so, proceed as follows:

1. Move the assembly to service position.
2. Use the open-ended wrench to rotate the pin for the limit position lock (item 1) from item 3 to item 4.
3. Move the assembly to measuring position.
 - ↳ The assembly now moves in the direction of the measuring position and remains in the "third lock position". When cleaning/sterilizing the service chamber, the process seal is now also cleaned/sterilized.
4. Following cleaning/sterilization, move the assembly to service position.
5. Use the open-ended wrench to rotate the pin for the limit position lock from item 4 to item 3.

Move the assembly to measuring position and continue measuring.

8 Maintenance

⚠ WARNING

Risk of injury if medium escapes

- ▶ Before each maintenance task, ensure that the process pipe is empty and rinsed.
- ▶ Move the assembly to the service position.
- ▶ The assembly may contain residual medium; rinse thoroughly before commencing work.

i The assembly drive is maintenance-free. It is not possible to carry out maintenance or repair work on the drive.

8.1 Maintenance schedule

i A maintenance log is recommended to adapt to the correct maintenance intervals.

i The specified intervals serve as a guide. For harsh process or ambient conditions, it is recommended that the interval be shortened accordingly. Cleaning intervals for the sensor and assembly are dependent on the medium.

i Following cleaning or replacement, apply a generous layer of Klüber XPC0003-V+R8 grease to the seals.

Interval	Maintenance measures
During initial commissioning / when putting back into service after maintenance	<ul style="list-style-type: none"> ▶ Perform initial inspection. ▶ Check that all connections are sealed tightly. ▶ Check the locking mechanism (no movement without sensor). ▶ Check the locking bolt (no movement without compressed air).
Regularly	<p>Visual inspection:</p> <ul style="list-style-type: none"> ▶ Check movement of the assembly. ▶ Clean and lubricate the retraction tube as needed, depending on the level of dirt. ▶ Check that all connections are sealed tightly. <p>Check for tightness:</p> <ul style="list-style-type: none"> ▪ Rinse lines ▪ Process connection ▪ Compressed air hoses (pneumatic drive). <p>Clean the process seal using the sealing water function:</p> <ul style="list-style-type: none"> ▶ Close the rinse chamber outlet. ▶ Rinse in the process in order to clean the seals.
Monthly or after 500 strokes (whichever comes first)	<ul style="list-style-type: none"> ▶ Check that the process seal is intact. ▶ Replace the seals if medium is escaping. ▶ Check the leakage hole. Remove the screw to do this. <p>Does medium escape from the leakage hole when the assembly is moving? This can be an indicator of faulty inner O-rings in the service chamber or faulty immersion tube O-rings in the case of the double-chamber assembly.</p> <p>Version without 3-A:</p> <ol style="list-style-type: none"> 1. Check the leakage hole of the service chamber. 2. Clean the assembly thoroughly. 3. Replace seals in contact with the medium. <p>Version with 3-A:</p> <ol style="list-style-type: none"> 1. Check leakage paths. 2. Clean the assembly thoroughly. 3. Replace seals in contact with the medium.

Interval	Maintenance measures
	<ol style="list-style-type: none"> 1. Inspect the sensor. 2. Disassemble the sensor. 3. Check the sensor for deposits. 4. If deposits are present, check cleaning cycle (cleaning agents, temperature, duration, flow volume). <p>When process pressure is applied and cleaning disabled, there should be no discharge of medium from the assembly's rinse chamber outlet.</p> <ul style="list-style-type: none"> ▶ Check for defective process seal(s).
Biannually or after 5000 strokes (whichever comes first)	<ul style="list-style-type: none"> ▶ Clean the assembly thoroughly. ▶ Remove the residual medium. ▶ Replace all seals in contact with the medium. ▶ Clean the retraction tube. ▶ Lubricate the retraction tube. <ol style="list-style-type: none"> 1. Check mobility of retraction protection 2. Remove the sensor. <ul style="list-style-type: none"> ↳ The contact surface of the sensor in the assembly is spring-loaded and must be free to move. <p>Possible cause of failure: contamination inside the drive, e.g. caused by a broken sensor.</p>

8.2 Maintenance work

8.2.1 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 contamination and the cleaning agents used in each case are shown in the following table.

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

Type of contamination	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)

Type of contamination	Cleaning agent
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.

8.2.2 Cleaning the assembly

WARNING

Risk of injury if medium escapes

- ▶ Before each maintenance task, ensure that the process pipe is empty and rinsed.
- ▶ Move the assembly to the service position.
- ▶ The assembly may contain residual medium; rinse thoroughly before commencing work.

WARNING

Loss of proper functionality.

- ▶ Do not open or disassemble the drive.
- ▶ Only the O-ring on the base of the retraction pipe should be renewed during maintenance.
- ▶ Clean and lubricate the retraction pipe regularly.

For stable and safe measurements:

1. Clean the assembly and sensor regularly. The frequency and intensity of the cleaning depend on the medium.
2. Use isopropyl alcohol to clean metal parts, but not the O-rings.

Manually operated assembly

All parts in contact with the medium, such as the sensor and the sensor guide, must be cleaned regularly.

1. Remove the sensor in the logically reverse sequence to the mounting procedure.
→  36
2. Remove light dirt and fouling with suitable cleaning solutions. (→  47
3. Remove heavy soiling using a soft brush and a suitable cleaning agent.
4. For very persistent dirt, soak the parts in a cleaning solution. Then clean the parts with a brush.

 A typical example of a cleaning interval would be 6 months in the case of drinking water.

Pneumatically controlled assembly

Regular, pneumatically controlled cleaning is recommended using the rinse water connection and the appropriate equipment.

1. Take apart parts that are in contact with the medium.
2. Clean parts that are in contact with the medium.
3. Clean metal parts with isopropyl alcohol. Do not use isopropyl alcohol to clean the O-rings.

8.2.3 Cleaning the sensor

→ Documentation of the connected sensor

1. Always clean ORP electrodes mechanically and with water.
2. Do not use chemical cleaning agents.
 - ↳ Such cleaning agents cause a potential to build up at the electrode which takes a few hours to dissipate. The potential causes errors in the measurement.
3. Do not use abrasive cleaning agents.
 - ↳ These can cause irreparable damage to the sensor.
4. Perform another calibration following cleaning if necessary.

Clean the sensor:

- Before every calibration
- Regularly during operation
- Before returning it for repairs

You can remove the sensor and clean it manually, or you can clean it in automatic mode ¹⁾ using the rinse water connection.

In event of minor deposit build-up:

1. Place the sensor in warm water.
2. Clean the sensor with a mild dishwashing detergent.

8.2.4 Replacing seals

To replace the seals in the assembly, you must interrupt the process and remove the assembly completely.

⚠ 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.

⚠ CAUTION

Increased wear on seals subject to dynamic load

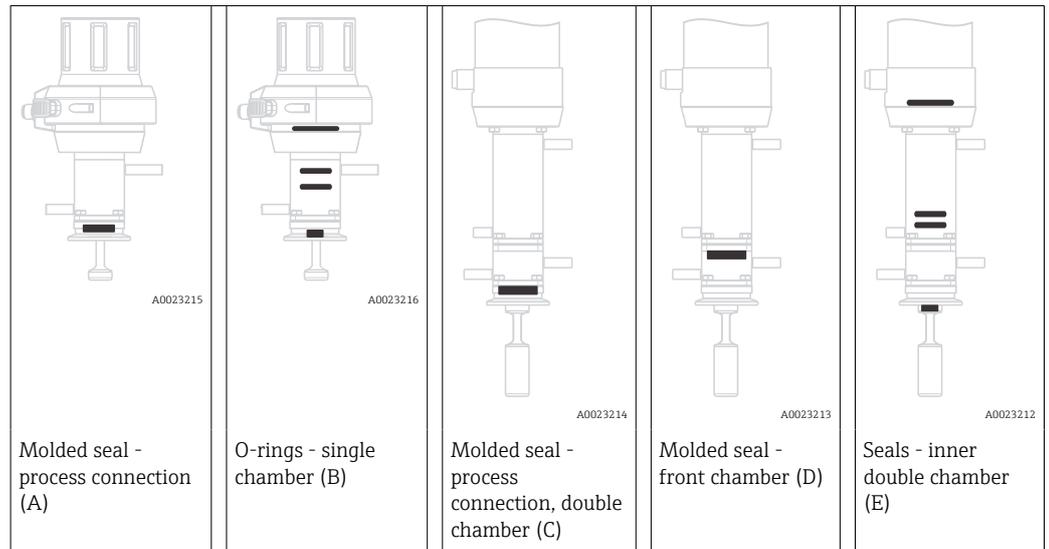
- ▶ Lubricate seals sufficiently, e.g. with Paraliq GTE 703.
- ▶ Reduce maintenance cycles.
- ▶ Clean the assembly prior to replacing seals. (→  49)

Preparation:

1. Interrupt the process. Pay attention to residual medium, residual pressure as well as elevated temperatures.
2. Move the assembly to service position.
3. Completely detach the assembly from the process connection.
4. Clean the assembly. (→  49)

1) only if the assembly is fitted out accordingly

The following sections describe how to replace the seals. The following table serves as a guide to the relevant sections.



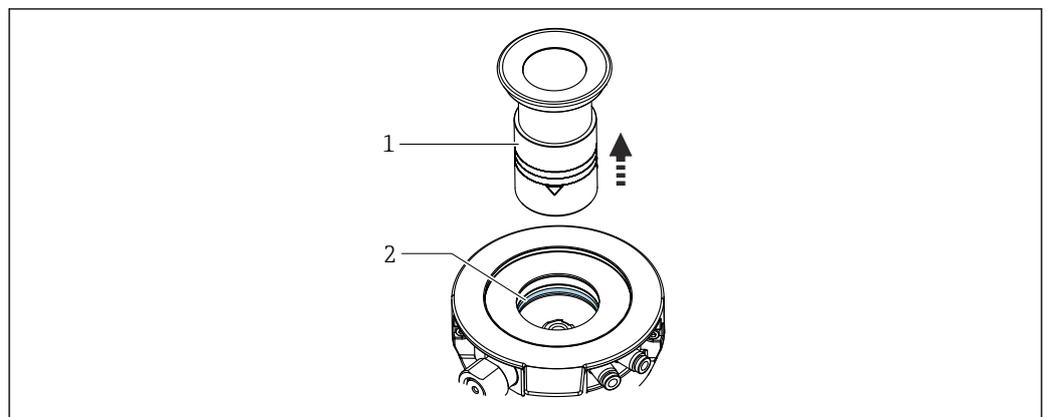
Checking that the sealing system is intact

Check the seals after mounting or removing the sensor and when maintenance work is performed. At regular intervals.

1. Move the assembly to the service position
2. If provided, open the ball valve of the service chamber outlet
 - ↳ It is normal for a slight amount of medium to escape (connection between the service chamber and process during insertion/retraction).
3. If provided, rinse the service chamber/sensor.
4. Observe the outlet. No more medium should escape after a short period of time.
5. If medium continues to escape, the sealing system is damaged; take the measuring point out of service and perform maintenance on the assembly.

Retraction tube

Seal replacement in the retraction pipe

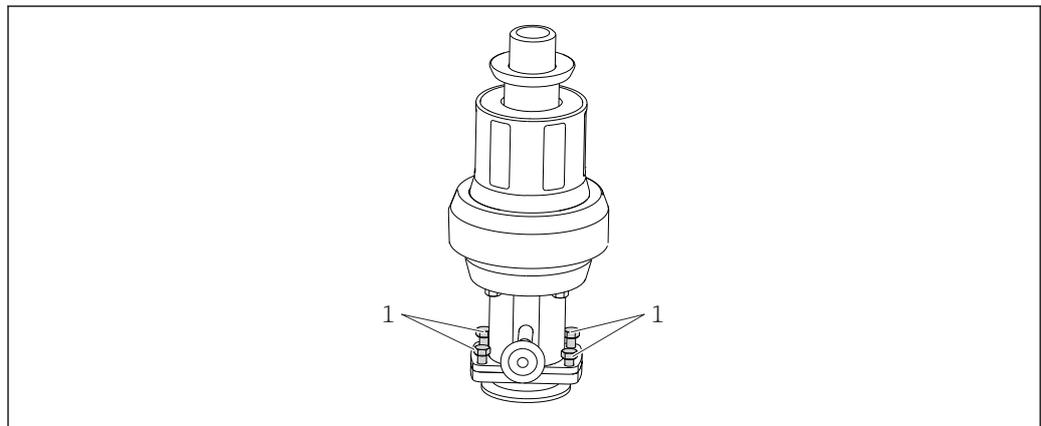


- 1 Retraction pipe
- 2 O-ring

1. Unscrew the retraction pipe (1) from the assembly.

2. In the pneumatic version, unscrew the automatic limit position locks with a combination wrench (AF 17).
3. Move the assembly to measuring position manually.
4. Use a suitable tool, e.g. a spark plug wrench, to press the protection pipe carefully downwards.
5. Remove the exposed O-ring (2) from the groove using an O-ring picker.
6. Apply a thin layer of grease (e.g. Klüber Paraliq GTE 703) to the retraction pipe (1).
7. Grease the O-Ring and insert.
8. Mount the retraction pipe (1) and, where applicable, the pneumatic limit position locks on the assembly.

Molded seal - process connection (A)

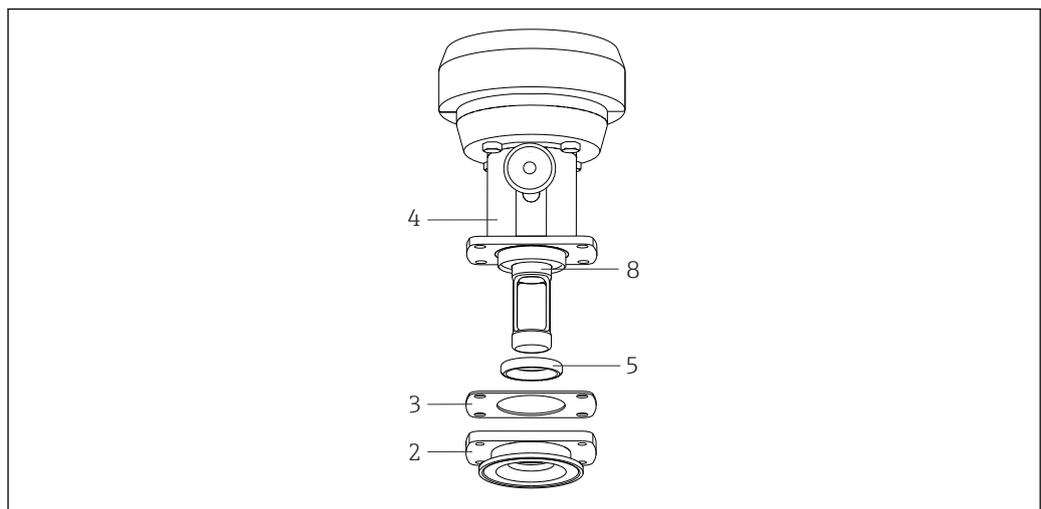


A0030357

43 Replacing seals, Part 1

1 Securing screws

1. Release four securing screws (pos. 1).



A0030365

44 Replacing seals, Part 2

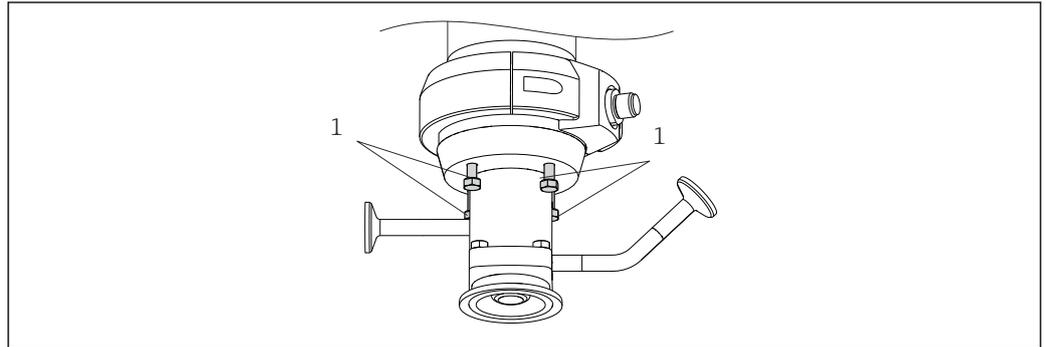
- 2 Process connection
- 3 Gasket
- 4 Service chamber
- 5 Molded seal
- 6 Immersion tube

2. Remove the process connection (pos. 2).
3. Take the molded seal (pos. 5) out of the process connection.

4. Apply a thin layer of grease to the new molded seal (e.g., Klüber Paraliq GTE 703).
5. Slide the molded seal over the immersion tube (pos. 8) and into the guide groove of the service chamber. Ensure that the molded seal is seated correctly.
6. Position the gasket (pos. 3) on the service chamber.
7. Attach the process connection to the service chamber.
8. Tighten the four securing screws with a torque of 4 Nm.

O-rings - single chamber (B)

O-rings

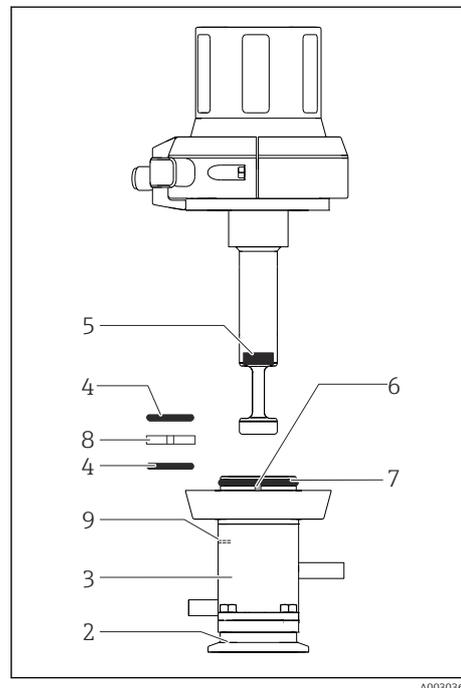


A0030356

45 Replacing seals, Part 1

1 Securing screws

1. Release the four securing screws (item 1).
2. Remove the service chamber (item 3) with the process connection (item 2).



A0030364

46 Replacing seals, Part 2

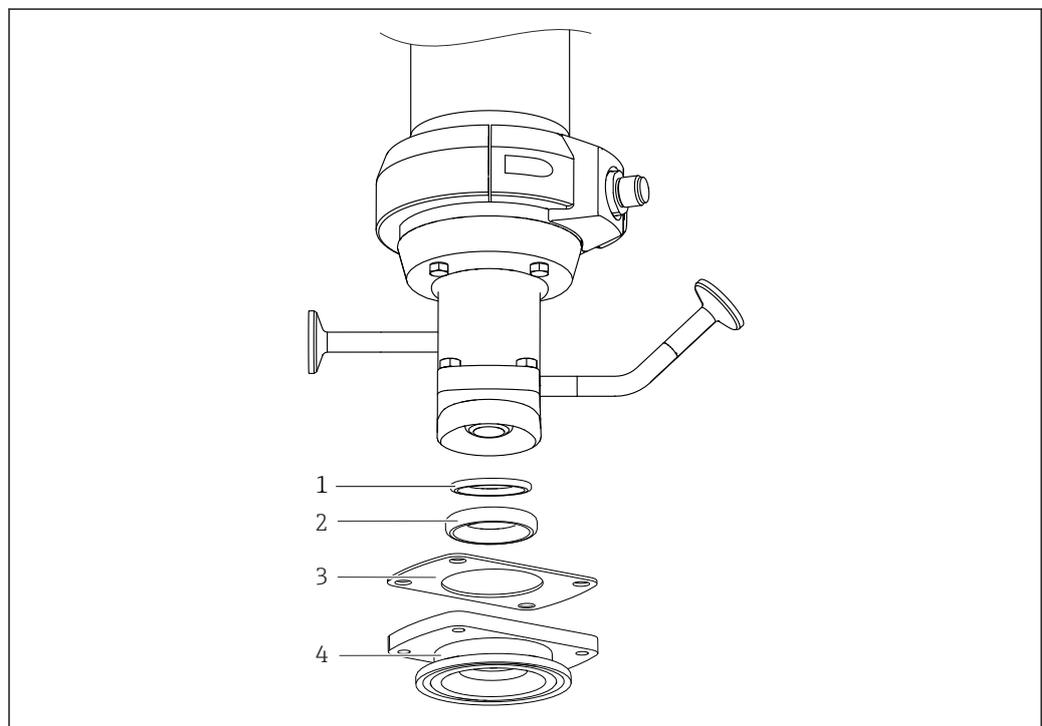
3. Use a tweezers to remove both O-rings (item 4) from the service chamber.
4. Pneumatic drive only: Use a thin screwdriver to push through the leakage hole (item 9).
 - ↳ The slide bushing (item 8) is pushed out of the guide groove.
5. Use a tweezers to remove the slide bushing.

6. Apply a thin layer of grease (e.g., Klüber Paraliq GTE 703) to the new O-rings and the new slide bushing.
7. Pneumatic drive only: Insert the slide bushing into the middle guide groove.
8. Insert the two O-rings into the corresponding grooves in the service chamber.

Molded seal

1. Remove the molded seal (→  46,  53 item 5) using a tweezers or long-nosed pliers.
2. Apply a thin layer of grease to the molded seal.
3. Press the molded seal into the guide groove of the immersion tube. Ensure that the molded seal is seated correctly.

 If you insert a dummy sensor or circular rod (Ø 12 mm (0.47 in)) until it protrudes just above the seal, the molded seal cannot move upwards while it is being inserted.



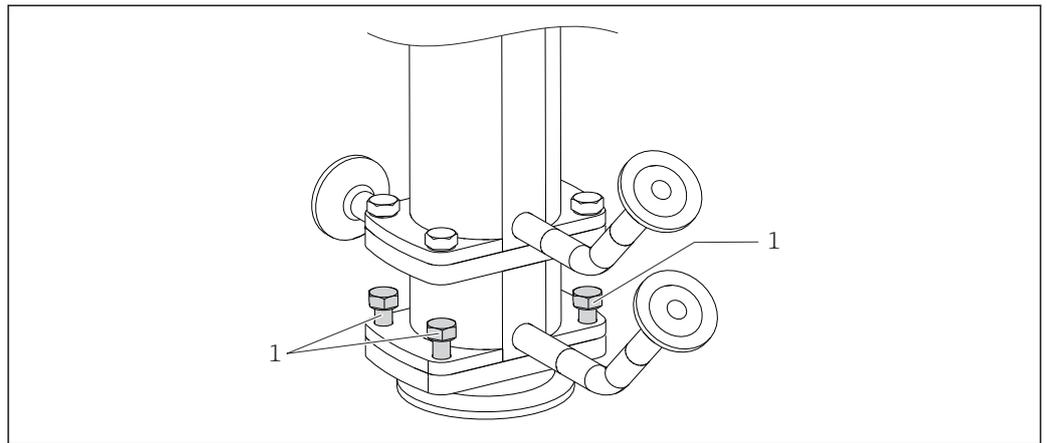
A0061201

- 1 Sealing ring
- 2 Molded seal
- 3 Gasket
- 4 Process connection

Pneumatic drive

Pneumatic drive only:

1. Remove the O-ring (→  46,  53 item 7).
2. Apply a thin layer of grease to the molded seal.
3. Press the molded seal into the guide groove of the immersion tube. Ensure that the molded seal is seated correctly.
4. Mount the service chamber together with the process connection on the assembly. Pay attention to the positioning pin (item 6).
5. Tighten the four securing screws with a torque of 4 Nm.

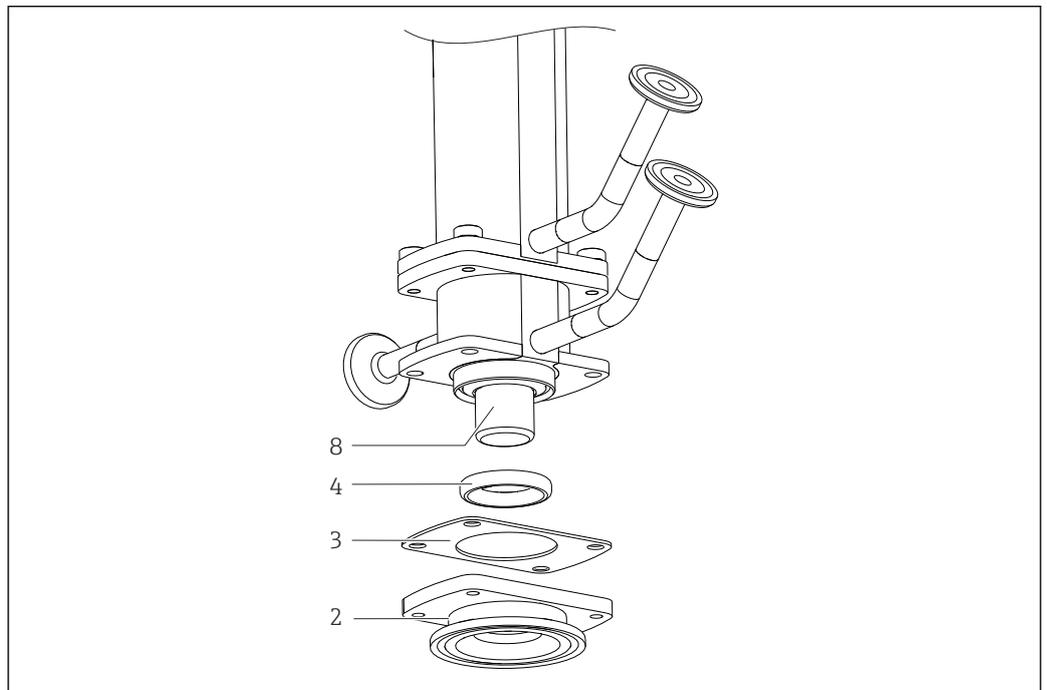
Molded seal - process connection, double chamber (C)

A0030358

47 Replacing seals, Part 1

1 Securing screws

1. Release the four securing screws (pos. 1).



A0030359

48 Replacing seals, Part 2

2 Process connection

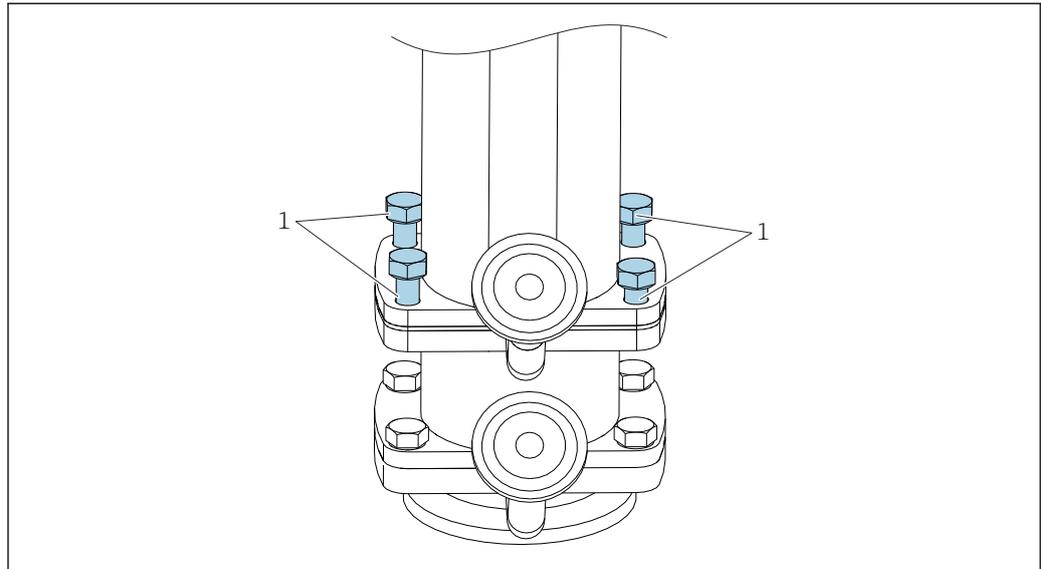
3 Gasket

4 Molded seal

8 Immersion tube

2. Remove the process connection (pos. 2).
3. Remove the molded seal (pos. 4) from the process connection.
4. Apply a thin layer of grease to the new molded seal (e.g., Klüber Paraliq GTE 703).
5. Slide the molded seal over the immersion tube (pos. 8) and into the guide groove of the service chamber. Ensure that the molded seal is seated correctly.
6. Position the gasket (pos. 3) on the rinse chamber.
7. Attach the process connection to the "inner" service chamber.
8. Tighten the four securing screws with a torque of 4 Nm.

Molded seal - "front" service chamber (D)

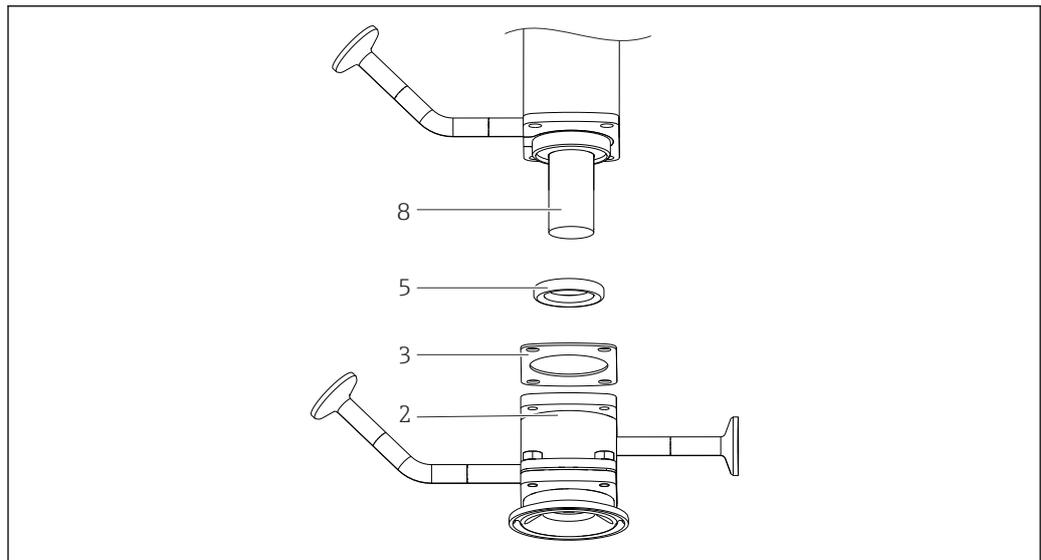


A0030360

49 Replacing seals, Part 1

1 Securing screws

1. Release the four securing screws (item 1).



A0030366

50 Replacing seals, Part 2

2 "Front" service chamber with process connection

3 Gasket

5 Molded seal

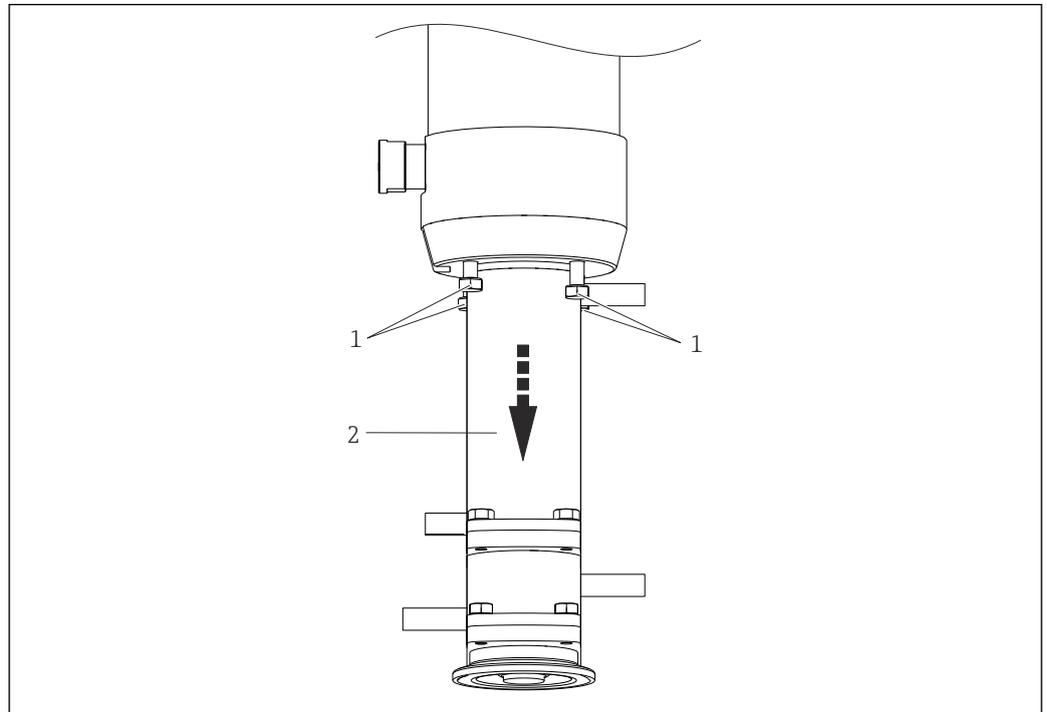
8 Immersion tube

2. Remove the "front" service chamber with the process connection (item 2).
3. Remove the molded seal (item 5) from the "front" service chamber.
4. Apply a thin layer of grease to the new molded seal (e.g., Klüber Paraliq GTE 703).
5. Slide the molded seal over the immersion tube (item 8) and into the guide groove of the service chamber. Ensure that the molded seal is seated correctly.
6. Position the gasket (item 3) on the front chamber.
7. Attach the front chamber together with the process connection to the "inner" service chamber.

8. Tighten the four securing screws with a torque of 4 Nm.

Seals - inner double chamber (E)

O-ring in process connection

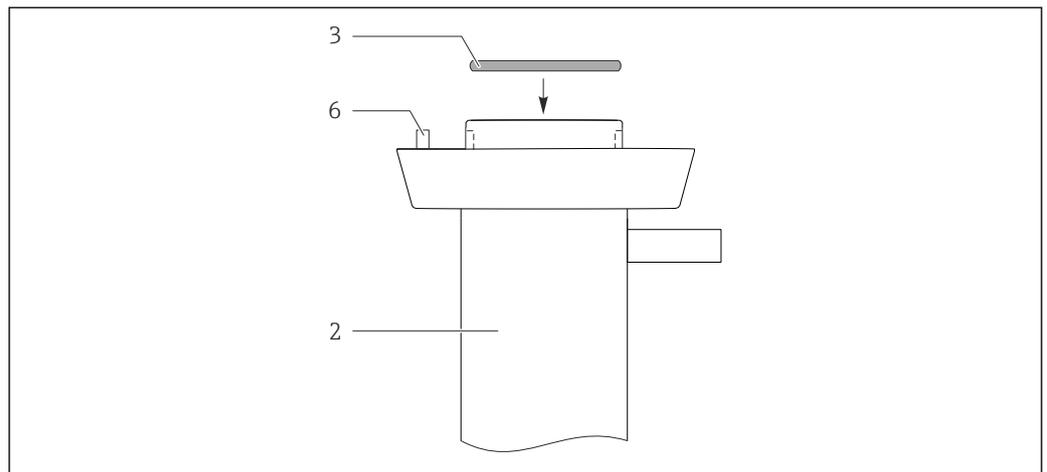


A0030361

51 Replacing seals, Part 1

- 1 Securing screws
- 2 Service chamber with front chamber and process connection

1. Release the four securing screws (item 1).
2. Remove the service chamber with front chamber and process connection (item 2).



A0030362

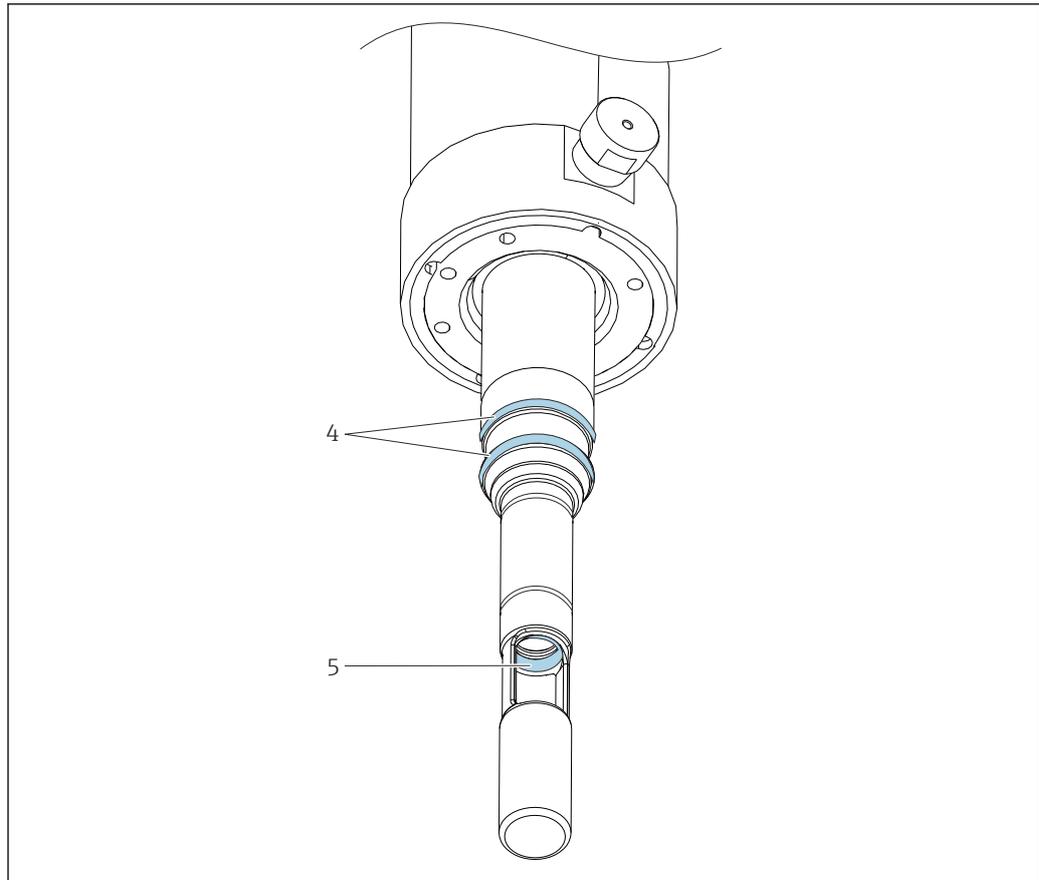
52 Replacing seals, Part 2

- 2 "Inner" service chamber with "front" service chamber and process connection
- 3 O-ring
- 6 Positioning pin

3. Remove the O-ring (item 3).
4. Apply a thin layer of grease to the new O-ring (e.g., Klüber Paraliq GTE 703) and

5. position the O-ring in the groove.

Molded seal



A0030362

53 Replacing seals, Part 3

- 4 O-rings
- 5 Molded seal

1. Remove the molded seal (item 5) using a tweezers or long-nosed pliers.
2. Apply a thin layer of grease to the new molded seal (e.g., Klüber Paraliq GTE 703).
3. Press the molded seal into the guide groove of the immersion tube. Ensure that the molded seal is seated correctly.

i If you insert a dummy sensor or circular rod (\varnothing 12 mm) until it protrudes just above the seal, the molded seal cannot move upwards while it is being inserted.

O-rings in the immersion tube

1. Remove both O-rings (\rightarrow 53, 58 item 4).
2. Apply a thin layer of grease to the new O-rings.
3. Position the O-rings in the two grooves.
4. Attach the "inner" service chamber with "front" service chamber and process connection to the assembly. Pay attention to the positioning pin (item 6).
5. Tighten the securing screws with a torque of 4 Nm.

9 Repair

9.1 General information

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).

WARNING

Danger resulting from improper repair!

- ▶ Any damage to the assembly that compromises pressure safety must be repaired only by authorized and qualified personnel.
- ▶ Damage to the drive can be repaired only at the place of manufacture. Repairs cannot be carried out onsite.
- ▶ Following each repair and maintenance task, check the assembly for leaks using appropriate procedures. Following this, the assembly must again comply with the specifications in the technical data.
- ▶ Replace all other damaged components immediately.
- ▶ Following repairs, check that the device is complete, in a safe condition and functioning correctly.

9.2 Spare parts

Spare parts currently available for the device can be found at:

www.endress.com/onlinetools

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

9.3 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.

www.endress.com/support/return-material

9.4 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.

10 Accessories

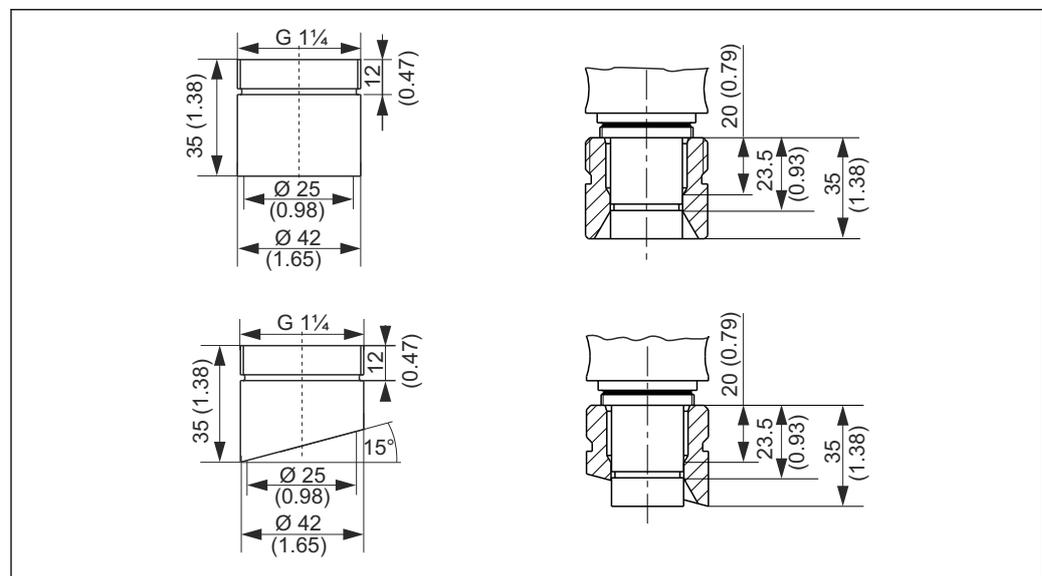
The following are the most important accessories available at the time this documentation was issued.

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.

The following accessories can be ordered via the product structure or the XPC0001 spare part structure:

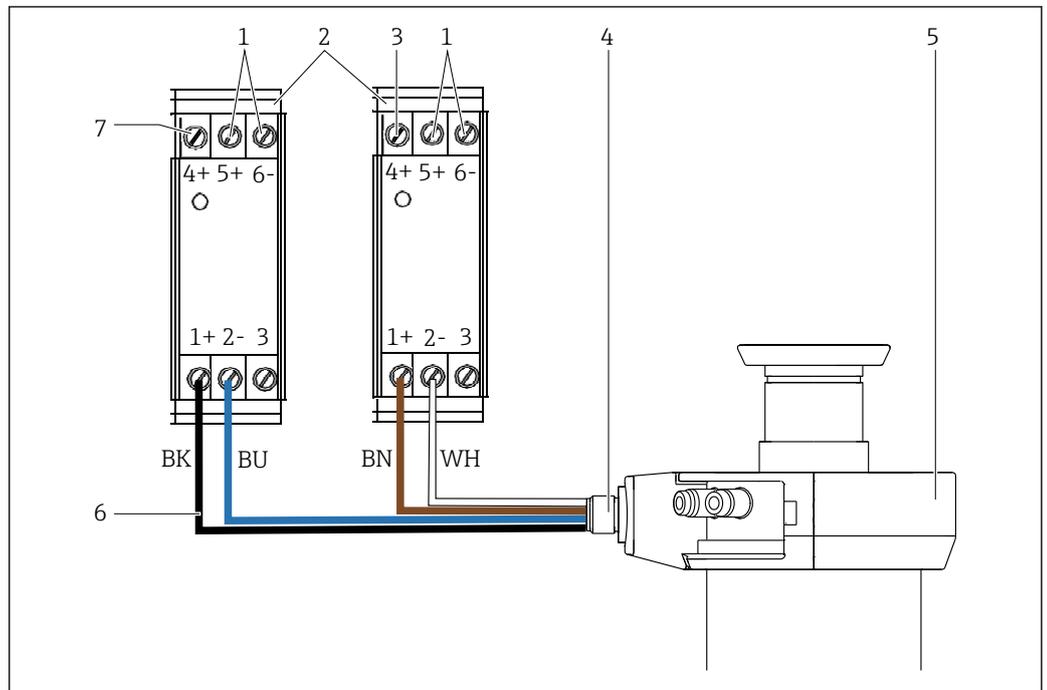
- Weld-in adapter G1¼, straight, 35 mm, 1.4435 (AISI 316 L), safety nozzle
- Weld-in adapter G1¼, angled, 35 mm, 1.4435 (AISI 316 L), safety nozzle



■ 54 Weld-in adapter (safety nozzle), dimensions in mm (in)

- Dummy plug G1¼, 1.4435 (AISI 316 L), FPM - FDA
- Sensor dummy 225 mm, 1.4435 (AISI 316 L), Ra = 0.38 µm
- Sensor dummy 360 mm, 1.4435 (AISI 316 L), Ra = 0.38 µm
- Kit, EPDM FDA seals only for process connection G1¼, wetted parts, single chamber
- Kit, FKM FDA seals only for process connection G1¼, wetted parts, single chamber
- Kit, FFKM FDA seals only for process connection G1¼, wetted parts, single chamber
- Kit, EPDM FDA seals, wetted parts, single chamber, not for process connection G1¼
- Kit, FKM FDA seals, wetted parts, single chamber, not for process connection G1¼
- Kit, FFKM FDA seals, wetted parts, single chamber, not for process connection G1¼
- Kit, EPDM FDA seals, wetted parts, double chamber, all process connections
- Kit, FKM FDA seals, wetted parts, double chamber, all process connections
- Kit, FFKM FDA seals, wetted parts, double chamber, all process connections
- Kit, seals not in contact with the medium
- Cable, plug-in, limit switch, M12, 5 m
- Cable, plug-in, limit switch, M12, 10 m

- Tool in case for installation/removal
- Kit, Klüber Paraliq GTE 703 lubricant (60g)
- Output interface terminals, version: CPA871-620-R7
 - NAMUR terminals for limit position switches
 - Operation of 8V DC feedback signals on 24V DC devices
 - Suitable for top-hat rail mounting



55 Wiring of output interface terminal with assembly

- 1 Supply voltage
- 2 Output interface terminals
- 3 Output measuring position
- 4 Limit position switches
- 5 Assembly
- 6 Cable for wiring → 60
- 7 Output service position

10.1 Device-specific accessories

10.1.1 Sensors

pH sensors

Memosens CPS11E

- pH sensor for standard applications in process and environmental engineering
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps11e

 Technical Information TI01493C

Orbisint CPS11

- pH sensor for process technology
- With dirt-repellent PTFE diaphragm
- Product Configurator on the product page: www.endress.com/cps11

 Technical Information TI00028C

Memosens CPS31E

- pH sensor for standard applications in drinking water and swimming pool water
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps31e



Technical Information TI01574C

Memosens CPS41E

- pH sensor for process technology
- With ceramic junction and KCl liquid electrolyte
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps41e



Technical Information TI01495C

Ceraliquid CPS41

- pH electrode with ceramic junction and KCl liquid electrolyte
- Product Configurator on the product page: www.endress.com/cps41



Technical Information TI00079C

Memosens CPS61E

- pH sensor for bioreactors in life sciences and for the food industry
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps61e



Technical Information TI01566C

Memosens CPS71E

- pH sensor for chemical process applications
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps71e



Technical Information TI01496C

Ceragel CPS71

- pH electrode with reference system including ion trap
- Product Configurator on the product page: www.endress.com/cps71



Technical Information TI00245C

Memosens CPS91E

- pH sensor for heavily polluted media
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps91e



Technical Information TI01497C

Orbipore CPS91

- pH electrode with hole junction for media with high dirt load
- Product Configurator on the product page: www.endress.com/cps91



Technical Information TI00375C

ORP sensors**Memosens CPS12E**

- ORP sensor for standard applications in process and environmental engineering
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps12e



Technical Information TI01494C

Orbisint CPS12

- ORP sensor for process technology
- Product Configurator on the product page: www.endress.com/cps12

 Technical Information TI00367C

Memosens CPS42E

- ORP sensor for process technology
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps42e

 Technical Information TI01575C

Ceraliquid CPS42

- ORP electrode with ceramic junction and KCl liquid electrolyte
- Product Configurator on the product page: www.endress.com/cps42

 Technical Information TI00373C

Memosens CPS72E

- ORP sensor for chemical process applications
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps72e

 Technical Information TI01576C

Ceragel CPS72

- ORP electrode with reference system including ion trap
- Product Configurator on the product page: www.endress.com/cps72

 Technical Information TI00374C

pH ISFET sensors**Memosens CPS47E**

- ISFET sensor for pH measurement
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps47e

 Technical Information TI01616C

Memosens CPS77E

- Sterilizable and autoclavable ISFET sensor for pH measurement
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps77e

 Technical Information TI01396

Combined pH/ORP sensors**Memosens CPS16E**

- pH/ORP sensor for standard applications in process technology and environmental engineering
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps16e

 Technical Information TI01600C

Memosens CPS76E

- pH/ORP sensor for process technology
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps76e



Technical Information TI01601C

Memosens CPS96E

- pH/ORP sensor for heavily polluted media and suspended solids
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps96e



Technical Information TI01602C

Conductivity sensors**Memosens CLS82E**

- Hygienic conductivity sensor
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cls82e



Technical Information TI01529C



The sensor is suitable for the assembly with the following sensor lengths:
120 mm (4.7 in), 215 mm (8.5 in) and 360 mm (14.2 in)

Oxygen sensors**Oxymax COS22E**

- Sterilizable sensor for dissolved oxygen
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cos22e



Technical Information TI00446C



The sensor is suitable for the assembly with the following sensor lengths:
120 mm (4.7 in), 215 mm (8.5 in) and 360 mm (14.2 in)

Oxymax COS22

- Sterilizable sensor for dissolved oxygen
- With Memosens technology or as an analog sensor
- Product Configurator on the product page: www.endress.com/cos22



Technical Information TI00446C

Absorption sensor**OUSBT66**

- NIR absorption sensor for the measurement of cell growth and biomass
- Sensor version suitable for pharmaceutical industry
- Product Configurator on the product page: www.endress.com/ousbt66



Technical Information TI00469C



The assembly can only be used with the absorption sensor with the optical path lengths 5 mm (0.2 in) and 10 mm (0.39 in).

10.2 Service-specific accessories

10.2.1 Cleaning systems

Air-Trol 500

- Control unit for Cleanfit retractable assemblies
- Order No. 50051994



Technical Information TI00038C/07/EN

Cleanfit Control CYC25

- Converts electrical signals into pneumatic signals to control pneumatically-operated retractable assemblies or pumps in conjunction with Liquiline CM44x
- Wide range of control options
- Product Configurator on the product page: www.endress.com/cyc25



Technical Information TI01231C

Liquiline Control CDC90

- Fully automatic cleaning and calibration system for pH and ORP measuring points in all industries
- Cleaned, validated, calibrated and adjusted
- Product Configurator on the product page: www.endress.com/cdc90



Technical Information TI01340C

10.3 Installation material for rinse connections

Kit, water filter

- Water filter (dirt trap) 100 µm, complete, incl. angle bracket
- Order No. 71390988

Pressure reducer kit

- Complete, incl. manometer and angle bracket
- Order No. 71390993

Hose connection set G¹/₄, DN 12

- 1.4404 (AISI 316L) 2 x
- Order No. 51502808

Hose connection set G¹/₄, DN 12

- PVDF (2 x)
- Order No. 50090491

11 Technical data

11.1 Installation

Sensor selection	Short version	Gel electrodes, ISFET	225 mm (8.86 in)
		KCl electrode	225 mm (8.86 in)
	Long version	Gel electrodes, ISFET	225 mm (8.86 in)
		Gel electrodes, ISFET	360 mm (14.17 in)
		KCl electrode	360 mm (14.17 in)
Limit position switches	Switching element function:		NAMUR NC contact (inductive)
	Switching distance:		1.5 mm (0.06")
	Nominal voltage:		8 V
	Switching frequency:		0 to 5000 Hz
	Housing material:		Stainless steel
	Output interface terminals		NAMUR
	Limit position switches (inductive conductivity sensors)		Pepperl+Fuchs NJ1.5-6.5-15-N-Y180094

11.2 Environment

Ambient temperature range	-10 to 70 °C (14 to 158 °F)
Storage temperature	-10 to 70 °C (14 to 158 °F)
Degree of protection	IP66
Vibration resistance and shock resistance	Sinusoidal similar to DIN EN IEC 60068-2-6
	<ul style="list-style-type: none"> ■ 2-8.4 Hz, 7.5 mm peak ■ 8.4-2000 Hz, 5 g peak
	Broadband noise similar to DIN EN IEC 60068-2-64
	<ul style="list-style-type: none"> ■ 10-200 Hz, 0.01 g²/Hz ■ 8200-2000 Hz, 0.003 g²/Hz ■ Total: 2.70 g rms
	Shocks (half-sine) similar to DIN EN IEC 60068-2-2 30 g, 6 ms

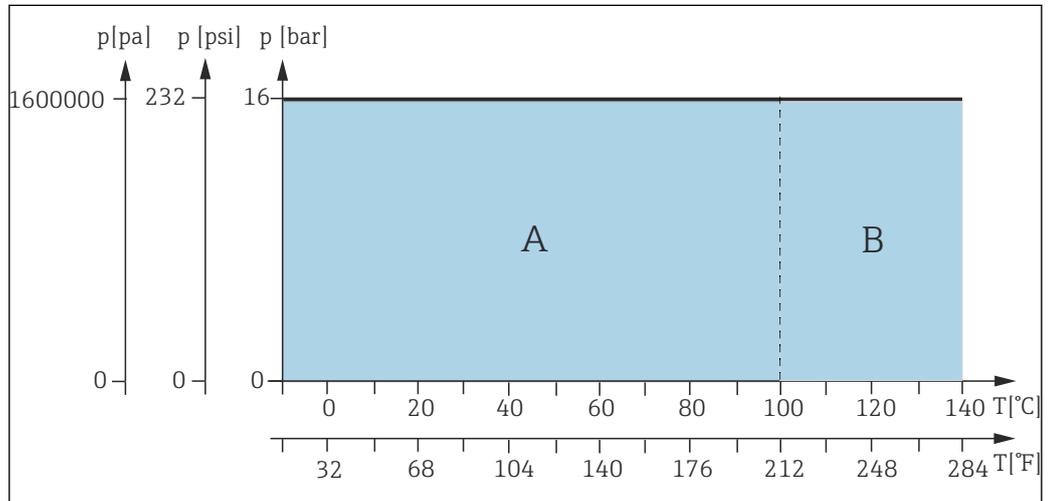
11.3 Process

Process temperature range	-10 to 140 °C (14 to 284 °F)	
Process pressure range	Pneumatic drive	16 bar (232 psi) to 140 °C (284 °F)
	Manual drive	8 bar (116 psi) to 140 °C (284 °F)

(PP version may vary)

i The service life of the seals is reduced if process temperatures are constantly high or if SIP is used. The other process conditions may also reduce the service life of the seals.

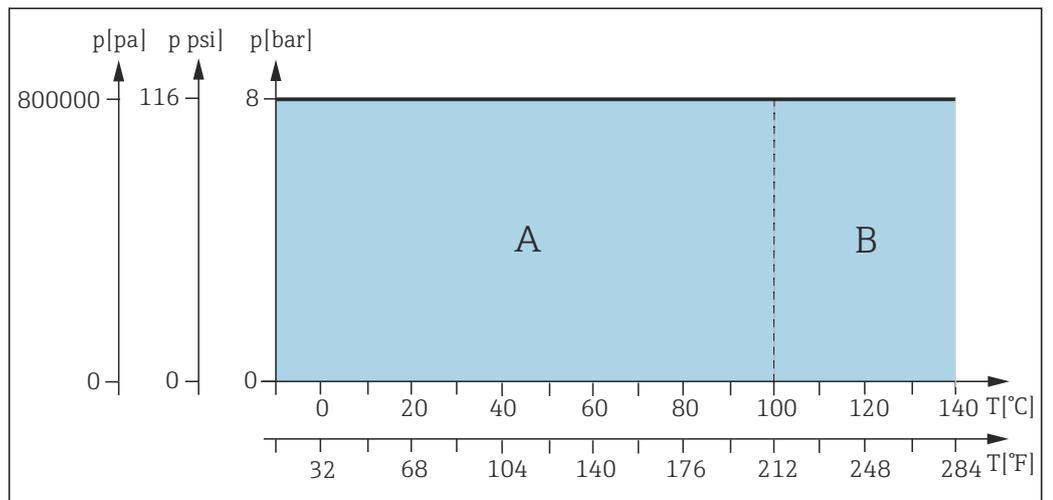
Pressure/temperature ratings



A0042816

56 Pressure-temperature ratings for pneumatic drive

- A Dynamic range
- B Static range



A0042815

57 Pressure-temperature ratings for manual drive

- A Dynamic range
- B Static range

11.4 Mechanical construction

Design and dimensions → Section "Installation"

Rinse chamber volume	Volume cm ³ (in ³) (max.)	Volume cm ³ (in ³) (min.)
Single chamber, short stroke	20.94 (1.28)	10.51 (0.64)
Single chamber, long stroke	42.97 (2.62)	20.77 (1.27)
Double chamber (front)	18.53 (1.13)	9.80 (0.6)
Double chamber (rear)	77.49 (4.72)	47.04 (2.87)
Double chamber (total)	96.02 (5.87)	56.84 (3.47)

Weight Depends on version:
 Pneumatic drive: 3.8 to 6 kg (8.4 to 13.2 lbs) depending on version
 Manual drive: 3 to 4.5 kg (6.6 to 9.9 lbs) depending on version

Materials		In contact with medium
Seals:		EPDM-FDA (USP Class VI) / FKM-FDA (USP Class VI) / FFKM-FDA (USP Class VI)
Immersion tube:		Stainless steel 1.4435 (AISI 316L) Ra < 0.76 / Ra < 0.38
Process connection, service chamber		Stainless steel 1.4435 (AISI 316L) Ra < 0.76
Rinse connections:		Stainless steel 1.4435 (AISI 316L)

Not in contact with medium	
Manual drive:	Stainless steel 1.4301 (AISI 304) or 1.4404 (AISI 316L), plastics PPS, CF15, PBT, PP
Pneumatic drive:	Stainless steel 1.4301 (AISI 304) or 1.4404 (AISI 316L), plastics PBT, PP

Rinse connections	Option	Description
	Pipe 6/8mm ID/OD	Pipe DIN 11866 series A 8 x 1 hygiene class H4 Internal diameter 6 mm (0.24 in) Outer diameter 8 mm (0.31 in) Ra ≤ 0.38
	G1/4 female	Female thread DIN EN ISO 228 G1/4" Pipe internal diameter 6 mm (0.24 in) Surface (excluding thread): Ra ≤ 0.38

Option	Description
NPT1/4 female	Female thread ASME B 1.20.1 – 1983 1/4" NPT Pipe internal diameter 6 mm (0.24 in) Surface (excluding thread): Ra ≤ 0.38
Clamp D6/D25	Clamp nozzle DIN 32676 Pipe internal diameter 6 mm (0.24 in) Outer diameter, clamp 25 mm Ra ≤ 0.4

Surface finish may vary depending on the manufacturing process.

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