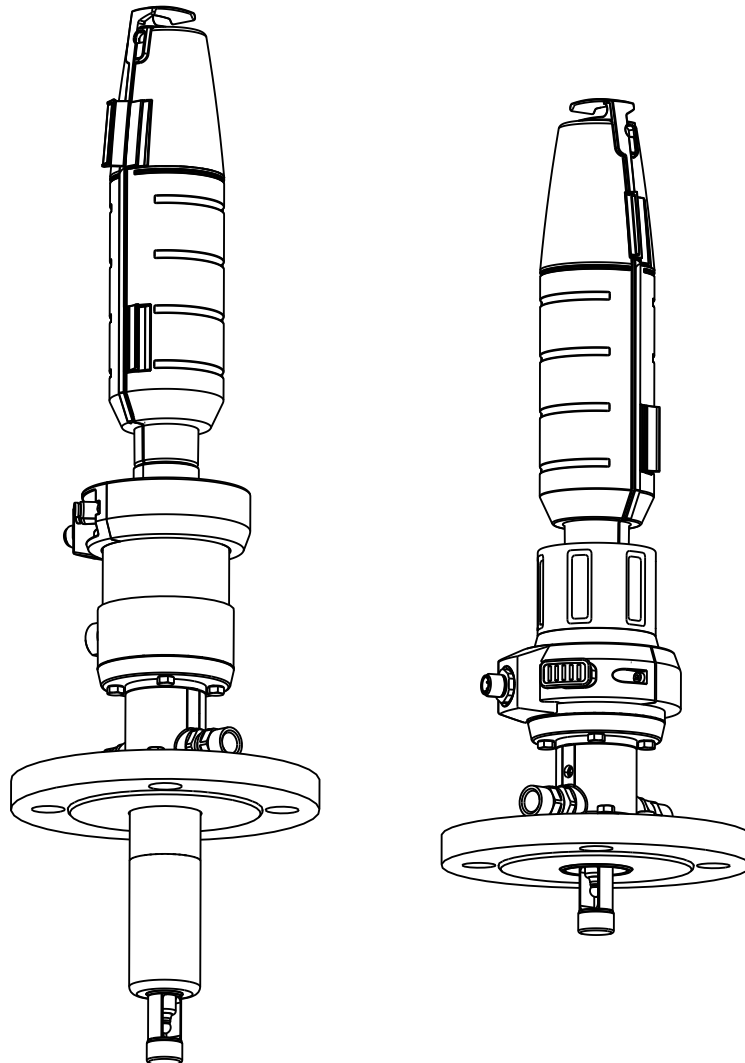


# Operating Instructions

## Cleanfit CPA871

Flexible process retractable assembly for water,  
wastewater and chemical industry






# Document information

## Safety information

The structure, signal words and color coding applied to safety information comply with the requirements of ANSI Z535.6 ("Product safety information in product manuals, instructions and other collateral materials").

Structure of information	Meaning
<b>⚠ DANGER</b> <b>Cause (/Consequences)</b> Possible consequences if ignored ▶ Preventive measures	This symbol alerts you to a dangerous situation. If you do not avoid this dangerous situation, it <b>will</b> result in death or serious injury.
<b>⚠ WARNING</b> <b>Cause (/Consequences)</b> Possible consequences if ignored ▶ Preventive measures	This symbol alerts you to a dangerous situation. If you do not avoid the dangerous situation, it <b>may</b> result in death or serious injury.
<b>⚠ CAUTION</b> <b>Cause (/Consequences)</b> Possible consequences if ignored ▶ Preventive measures	This symbol alerts you to a dangerous situation. If you do not avoid the dangerous situation, it may result in minor or more serious injuries.
<b>NOTICE</b> <b>Cause/situation</b> Possible consequences if ignored ▶ Action/note	This symbol alerts you to situations which may result in damage to property.

## Symbols

-  additional information, tip
-  permitted or recommended
-  forbidden or not recommended

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# 1 Basic safety instructions

## 1.1 Personnel requirements

- ▶ 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.
  - ▶ Measuring point faults may be rectified only by authorized and specially trained personnel.
- i** Repairs not described in the Operating Instructions provided may only be carried out directly by the manufacturer or by the service organization.

## 1.2 Designated use

The Cleanfit CPA871 retractable assembly, which can be manually or pneumatically operated, is designed for the installation of sensors in tanks and pipelines. Its mechanical construction means that it can be operated in pressurized systems (see Technical data).

Use of the device for any purpose other than that described, poses a threat to the safety of people and of the entire measuring system and is therefore not permitted. The manufacturer is not liable for damage resulting from improper or non-designated use.

## 1.3 Workplace safety

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

- Regulations for explosion protection (Ex devices only)
- Installation guidelines
- Local standards and regulations

## 1.4 Operational safety

- ▶ Before commissioning the entire measuring point, verify that all connections are correct. Ensure that electrical cables and hose connections are not damaged.
- ▶ Do not operate damaged products, and safeguard them to ensure that they are not operated inadvertently. Mark the damaged product as defective.
- ▶ If faults cannot be rectified, the products must be taken out of service and secured against unintentional commissioning.

## 1.5 Product safety

The product is designed to meet state-of-the-art safety requirements, has been tested and left the factory in a condition in which it is safe to operate. The relevant regulations and European standards have been observed.

## 2 Incoming acceptance and product identification

### 2.1 Incoming acceptance

- Verify that the packaging is not damaged.
- Notify your supplier of any damage to the packaging. Keep the damaged packaging until the matter has been settled.
- Verify that the contents are not damaged.
- Notify your supplier of any damage to the delivery contents. Hold on to the damaged goods until the matter has been settled.
- Check the delivery for completeness. Check it against the delivery papers and your order.
- 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. Furthermore, the permitted ambient conditions must also be observed (see "Technical data").
- If you have any questions, please contact your supplier or your local sales center.

### 2.2 Product identification

#### 2.2.1 Nameplate

You can find the following information on the nameplate:


- Manufacturer details
- Order code
- Extended order code
- Serial number
- Operating conditions
- Safety information symbols

Compare the order code on the nameplate with your order.

#### 2.2.2 Product identification

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

- on the nameplate
- in the delivery papers.

 To establish your device version, enter the order code from the nameplate into the search field at the following address:

[www.products.endress.com/order?ident](http://www.products.endress.com/order?ident)

### 2.3 Scope of delivery

The scope of delivery comprises:

- Ordered version of the assembly
- Operating Instructions in English

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

### 3 Installation

#### 3.1 Installation

##### 3.1.1 Orientation

The assembly is designed for installation 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 its orientation.

**i** The sensor that is used can restrict the orientation.

##### 3.1.2 Dimensions

###### Short version

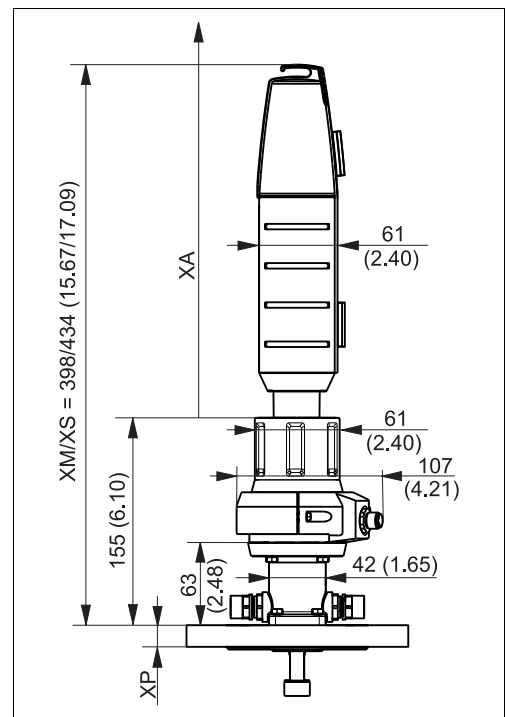
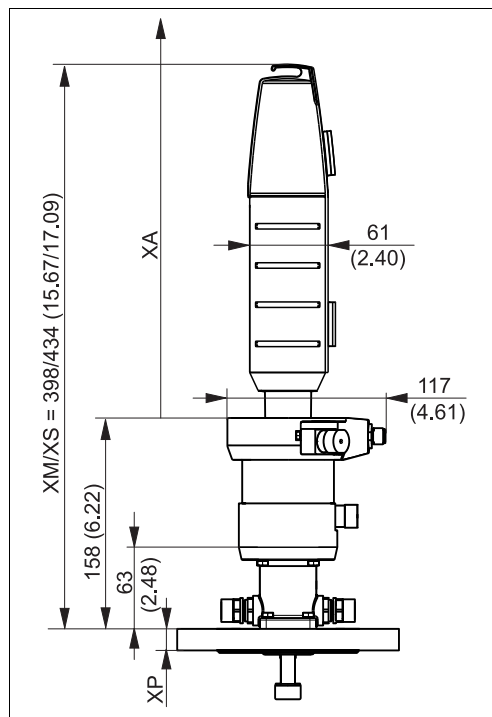


Fig. 1: Pneumatic drive, short version, dimensions in mm (inch)

Fig. 2: Manual drive, short version, dimensions in mm (inch)

- XM Assembly in measuring position
  - XS Assembly in service position
  - XP Height of particular process connection (see table below)
  - XA Necessary mounting distance for sensor replacement
- The mounting distance XA is 280 mm (11.02") for 120 mm sensors  
 The mounting distance XA is 408 mm (15.94") for 225 mm sensors

**Long version**

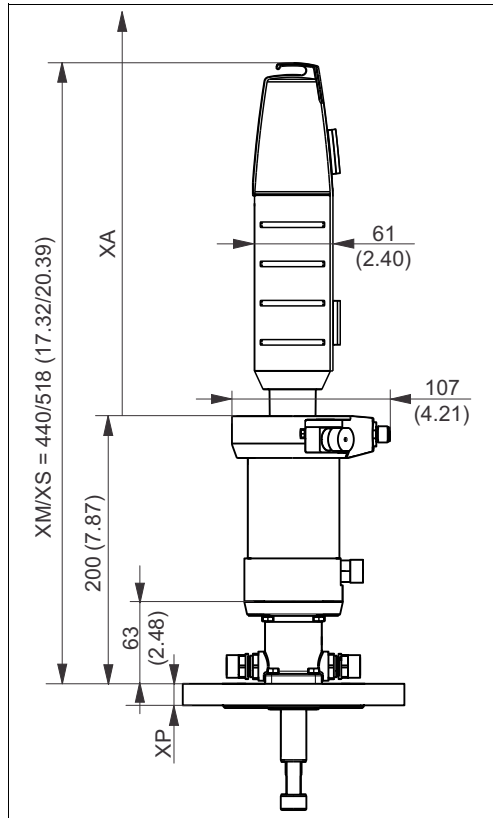


Fig. 3: Pneumatic drive, long version, dimensions in mm (inch)

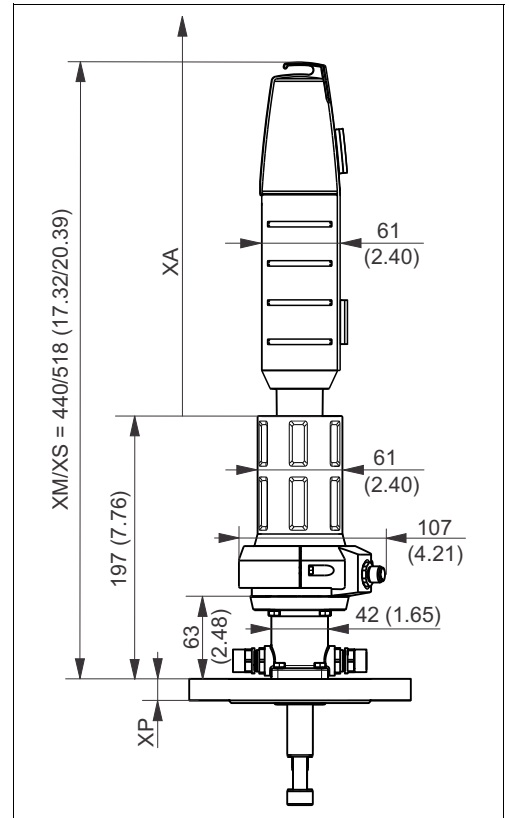


Fig. 4: Manual drive, long version, dimensions in mm (inch)

- XM Assembly in measuring position
  - XS Assembly in service position
  - XP Height of particular process connection (see table below)
  - XA Necessary mounting distance for sensor replacement
- The mounting distance XA is 360 mm (14.17") for 225 mm sensors

**Immersion chamber version**

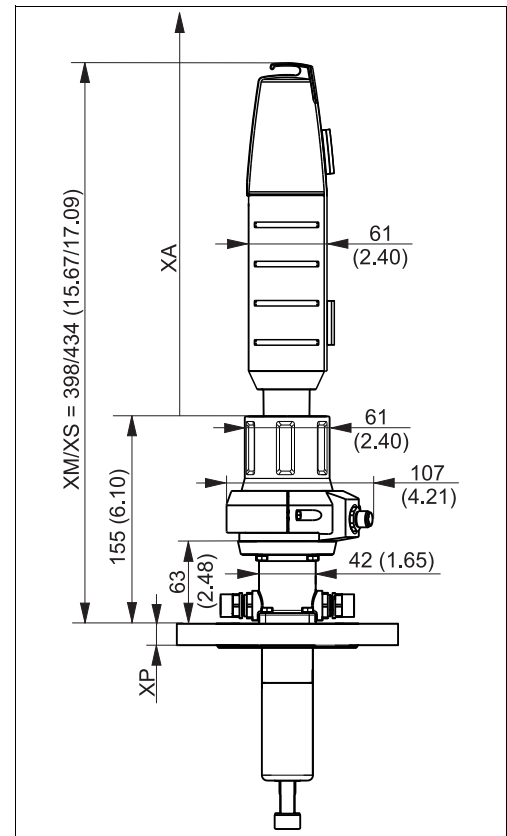
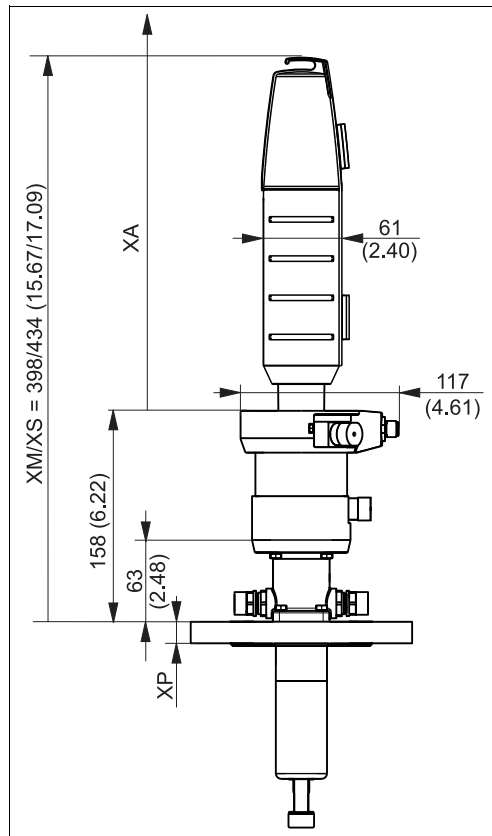
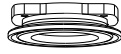
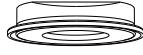


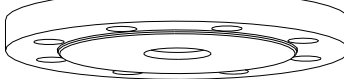

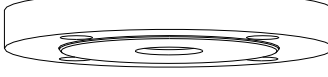
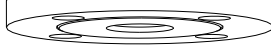
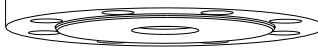

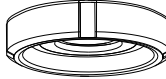



Fig. 5: Immersion chamber version with pneumatic drive, dimensions in mm (inch)

Fig. 6: Immersion chamber version with manual drive, dimensions in mm (inch)

- XM* Assembly in measuring position
- XS* Assembly in service position
- XP* Height of particular process connection (see table below)
- XA* Necessary mounting distance for sensor replacement  
 The mounting distance *XA* is 280 mm (11.02") for 225 mm sensors  
 The mounting distance *XA* is 570 mm (22.44") for 360 mm sensors



Process connection (EHEDG)		Height XP in mm (inch)
<b>CB</b> Clamp 2"		16 (0.63)
<b>CC</b> Clamp 2½"		16 (0.63)
<b>FA</b> Flange DN 40, EN1092-1		18 (0.71)
<b>FB</b> Flange DN 50, EN1092-1		18 (0.71)
<b>FC</b> Flange DN 80, EN1092-1		20 (0.79)
<b>FD</b> Flange 2" 150 lbs, ASME B16.5		19.1 (0.75)
<b>FE</b> Flange 3" 150 lbs, ASME B16.5		23.8 (0.94)
<b>FF</b> 10K50, JIS B2220		16 (0.63)
<b>FG</b> 10K80, JIS B2220		18 (0.71)
<b>MA</b> Dairy fitting DN 50 DIN 11851		15.5 (0.61)
<b>MB</b> Dairy fitting DN 65 DIN 11851		15.5 (0.61)
<b>HB</b> Thread NPT 1½"		40.5 (1.57)

### 3.1.3 Immersion depths

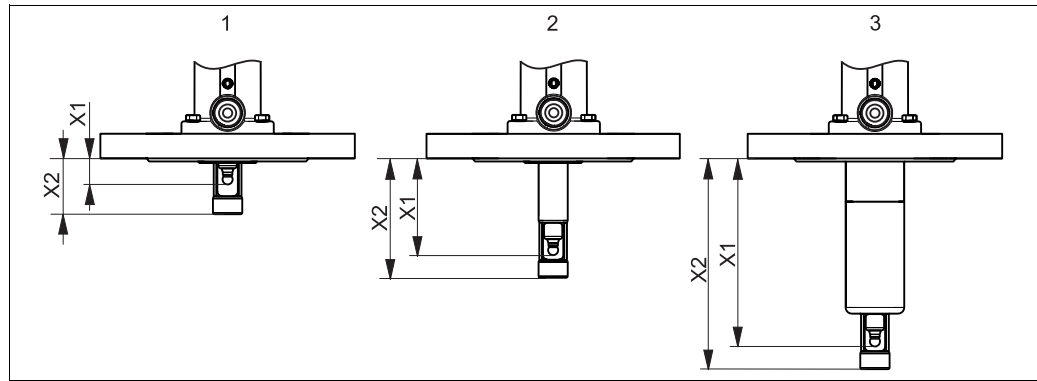


Fig. 7: Immersion depths

- 1 Short stroke (36 mm)
- 2 Long stroke (78 mm)
- 3 Immersion chamber version

Immersion depths in mm (inch)

Process connection		Versions		
		1	2	3
CB Clamp ISO2852 ASME BPE-2012 2"	X1	14.9 (0.59)	61.0 (2.40)	119.9 (4.72)
	X2	34.2 (1.35)	75.7 (2.98)	134.6 (5.30)
CC Clamp ISO2852 ASME BPE-2012 2½"	X1	14.9 (0.59)	61.0 (2.40)	119.9 (4.72)
	X2	34.2 (1.35)	75.7 (2.98)	134.6 (5.30)
FA Flange DN 40 EN1092-1	X1	14.9 (0.59)	61.0 (2.40)	119.9 (4.72)
	X2	34.2 (1.35)	75.7 (2.98)	134.6 (5.30)
FB Flange DN 50 EN1092-1	X1	14.9 (0.59)	61.0 (2.40)	119.9 (4.72)
	X2	34.2 (1.35)	75.7 (2.98)	134.6 (5.30)
FC Flange DN 80 EN1092-1	X1	12.9 (0.51)	59.0 (2.32)	117.9 (4.64)
	X2	32.2 (1.27)	73.7 (2.90)	132.6 (5.22)
FD Flange 2" 150 lbs ASME B16.5	X1	13.8 (0.54)	59.9 (2.36)	118.8 (4.68)
	X2	33.1 (1.30)	74.6 (2.94)	133.5 (5.26)
FE Flange 3" 150 lbs ASME B16.5	X1	-	-	114.1 (4.49)
	X2	-	-	128.8 (5.07)
FF Flange 10K50 JIS B2220	X1	14.4 (0.57)	61.3 (2.41)	120.2 (4.73)
	X2	33.7 (1.33)	76.0 (2.99)	134.9 (5.31)
FG Flange 10K80 JIS B2220	X1	14.4 (0.57)	60.5 (2.38)	119.4 (4.70)
	X2	33.7 (1.33)	75.2 (2.96)	134.1 (5.28)
HB Thread NPT 1½"	X1	-	63.0 (2.48)	121.9 (4.80)
	X2	-	77.7 (3.06)	136.6 (5.38)
MA Dairy fitting DN 50 DIN11851	X1	15.4 (0.61)	61.5 (2.42)	120.4 (4.74)
	X2	34.7 (1.37)	76.2 (3.00)	135.1 (5.32)
MB Dairy fitting DN 65 DIN11851	X1	15.4 (0.61)	61.5 (2.42)	120.4 (4.74)
	X2	34.7 (1.37)	76.2 (3.00)	135.1 (5.32)
NA Thread ISO228 G 1¼"	X1	-	61.5 (2.42)	-
	X2	-	76.2 (3.00)	-

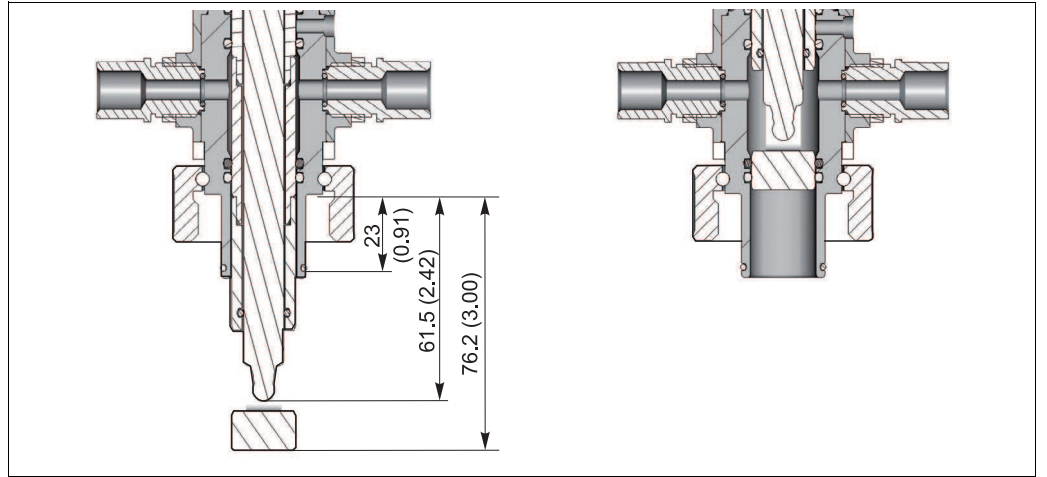


Fig. 8: Immersion depth in mm (inch) for process connection NA thread ISO228 G1 1/4

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## 3.2 Installation

### 3.2.1 Measuring system

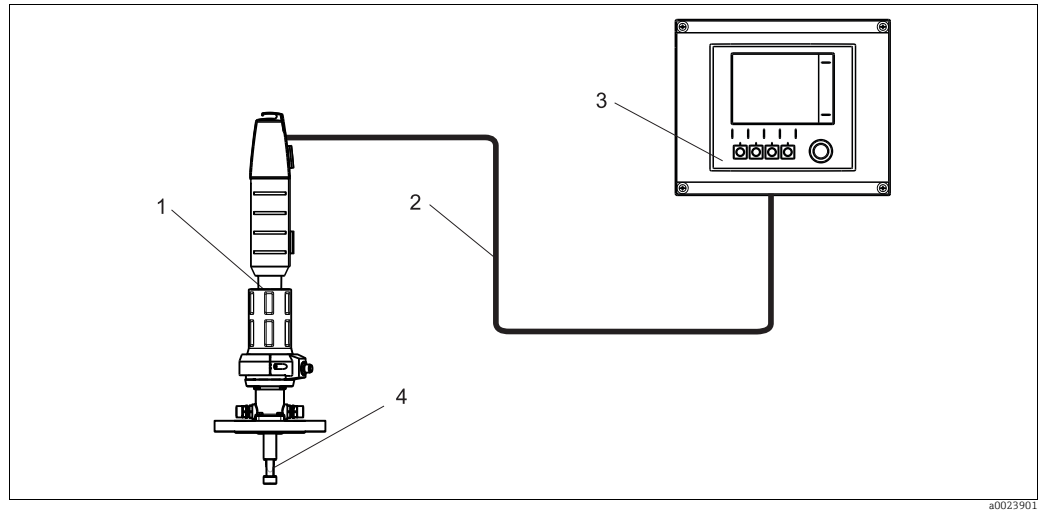


Fig. 9: Measuring system (example)

- 1 Cleanfit CPA871 assembly
- 2 Measuring cable
- 3 Liquline CM44x transmitter
- 4 Sensor


### 3.2.2 Installing the assembly in the process

#### ⚠ CAUTION

If process medium leaks out, there is a risk of injury due to high pressure, high temperature or chemicals.

- ▶ Wear protective gloves, goggles and clothing.
- ▶ Install the assembly only if the tanks and piping 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 (→  10)).
2. Secure the assembly to the tank or piping using 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).

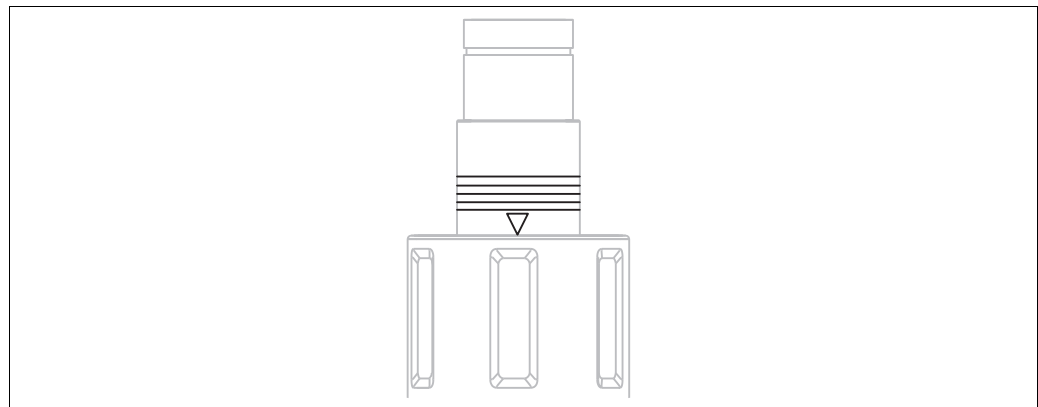


Fig. 10: Position markings (service position)

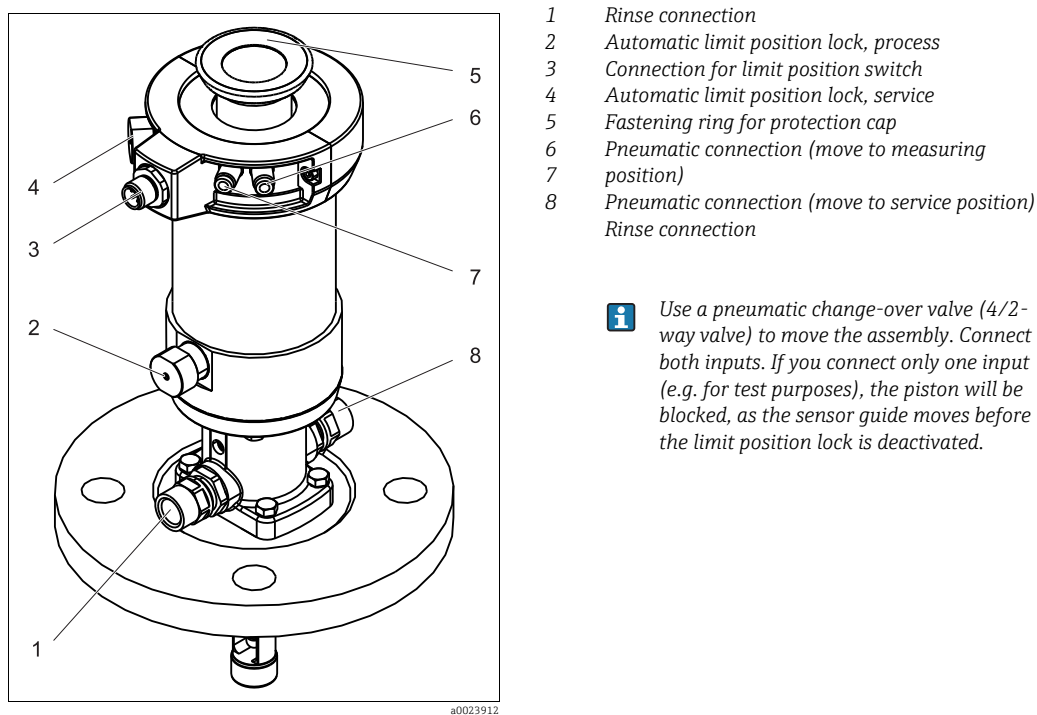
### 3.2.3 Pneumatic connection for automatic operation

Requirements:

- Air pressure of 4 to 7 bar (58 to 102 psi)
- Compressed air quality as per ISO 8573-1:2001  
Quality class 3.3.3 or 3.4.3 (see below)
- Solids class 3 (max. 5 µm, max. 5 mg/m<sup>3</sup>, contamination with particles)
- Water content for temperatures ≥ 15 °C: class 4 pressure dew point 3 °C or lower
- Water content for temperatures 5 to 15 °C: class 3 pressure dew point -20 °C or lower
- Oil content: class 3 (max. 1 mg/m<sup>3</sup>)
- Air temperature: 5 °C or higher
- No continuous air consumption
- Minimum nominal diameter of the air lines: 2 mm (0.08 ")

Connection: Threaded union M5, hose 4/2 mm AD/ID (adapter to 6/4 mm AD/ID enclosed)

Drive can be damaged if the air pressure is too high.  
There must be a pressure-reducing valve upstream if the air pressure can increase to above 7 bar (102 psi) (including any short pressure surges).



- 1 Rinse connection
- 2 Automatic limit position lock, process
- 3 Connection for limit position switch
- 4 Automatic limit position lock, service
- 5 Fastening ring for protection cap
- 6 Pneumatic connection (move to measuring position)
- 7 Pneumatic connection (move to service position)
- 8 Rinse connection

**i** Use a pneumatic change-over valve (4/2-way valve) to move the assembly. Connect both inputs. If you connect only one input (e.g. for test purposes), the piston will be blocked, as the sensor guide moves before the limit position lock is deactivated.

Fig. 11: Assembly with pneumatic drive (without protection cap)

### 3.2.4 Rinse connections

The connections of the service chamber of the CPA871 retractable assembly make it possible to clean the chamber and the sensor with water or cleaning solution with a maximum pressure of 6 bar (87 psi).

Seals can be damaged if the water pressure is too high. Install an upstream pressure-reducing valve if the water pressure can increase to above 6 bar (87 psi) (including any short pressure surges).

### 3.2.5 Assignment of rinse connections

In the standard version, the inlet and outlet of the service chamber can be assigned as desired.

In the immersion chamber version, the inlet and outlet of the service chamber are fixed. The outlet of the service chamber is located under the leakage borehole. The leakage borehole is sealed with an M5 screw.

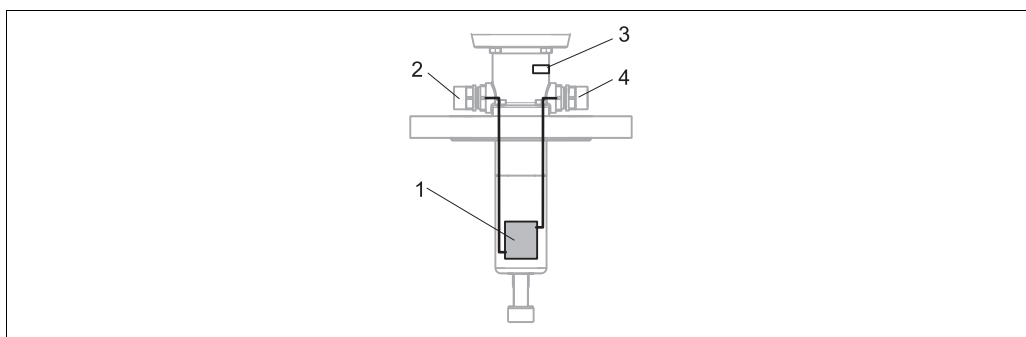
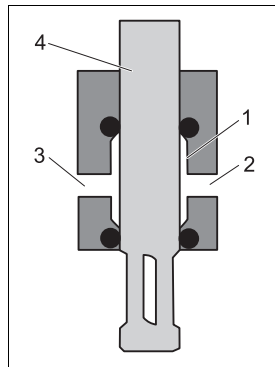


Fig. 12: Connection of service chamber in the immersion chamber version

- 1 Service chamber
- 2 Service chamber inlet
- 3 Leakage borehole
- 4 Service chamber outlet

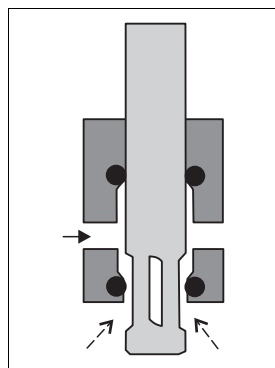
### 3.2.6 Separation of service chamber and process



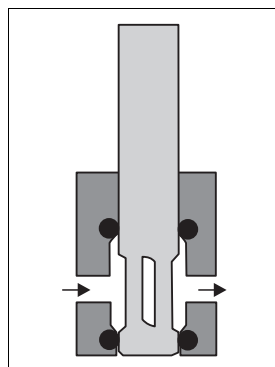
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Fig. 13:

- 1 Service chamber
- 2 Service chamber outlet
- 3 Service chamber inlet
- 4 Sensor guide



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In measuring position, the service chamber is separated from the process by the process seals and sensor guide. No process medium can get into the service chamber.

When the assembly is moving from measuring to service position (or the other way around), the service chamber is no longer separated from the process. Now process medium can get into the service chamber.

To prevent this, you can rinse the service chamber with a sealing medium via the service chamber inlet. This also means that no process medium potentially containing solid particles needs to be removed through the service chamber.

In service position, the service chamber is separated from the process.

### 3.2.7 Connecting the limit position switches

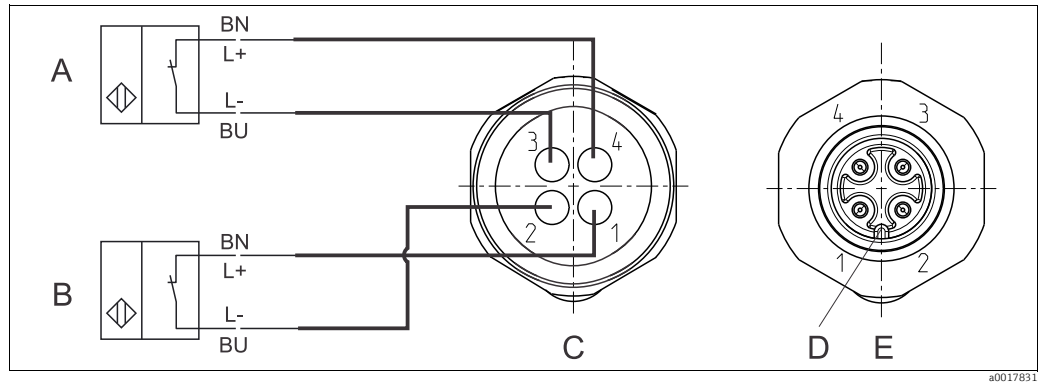


Fig. 14: Inductive limit position switches

- A Limit position switch, Service position
- B Limit position switch, Measure position
- C Plug, M12, solder side
- D Coding
- E Plug, pin side

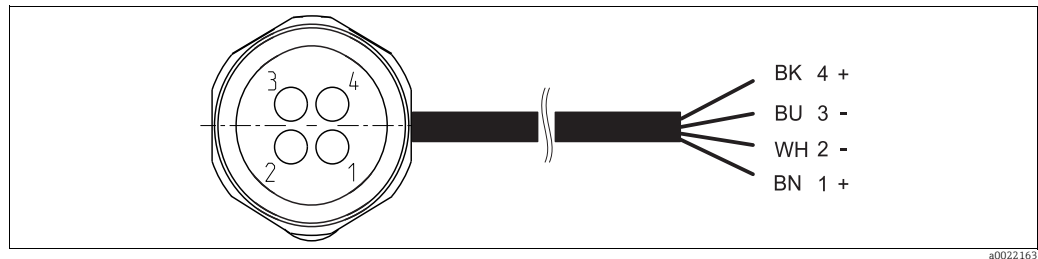


Fig. 15: Connecting cable for limit position switch

- 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).

Signal table for limit position switches

Position of assembly	Limit position switch for "measuring" position	Limit position switch for "service" position
Measuring	Active HIGH	Active HIGH
Service	Active LOW	Active LOW




### 3.3 Installing the sensor

#### ⚠ CAUTION

If process medium leaks out, there is a risk of injury due to high pressure, high temperature or chemicals.

- ▶ Wear protective gloves, goggles and clothing.
- ▶ Install the assembly only if the tanks and piping are empty and unpressurized.

#### 3.3.1 Preparing the sensor and assembly

1. Remove the protection cap from the sensor.  
Ensure that the o-ring and thrust collar (→ , pos. 1) are present.
2. Immerse the sensor shaft in water. This makes for easier installation.
3. Move the assembly to the service position.

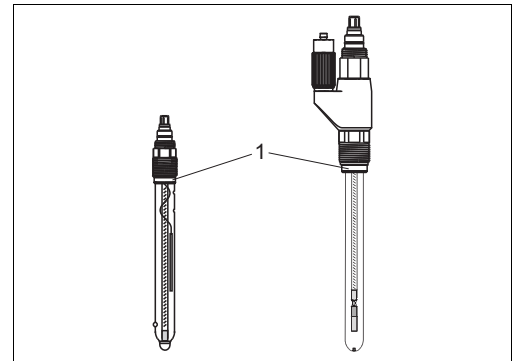


Fig. 16: Installing the sensor

1 Thrust collar with o-ring

#### 3.3.2 Installing and removing sensors

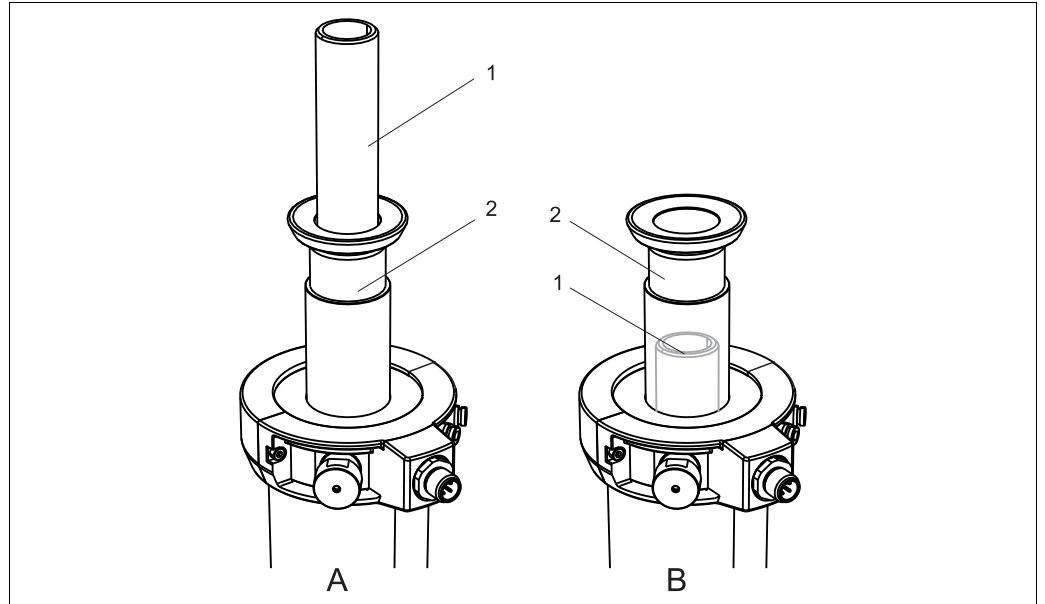



Fig. 17: Sensor installation options

- 1 Sensor adapter
- 2 Retraction pipe
- A Sensor adapter is on top of the retraction pipe
- B Sensor adapter is below the retraction pipe (not visible)

Depending on the assembly version, the sensor adapter is either visible (→ , pos. A) or installed inside the retraction pipe where it is not visible (pos. 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 (pos. A)

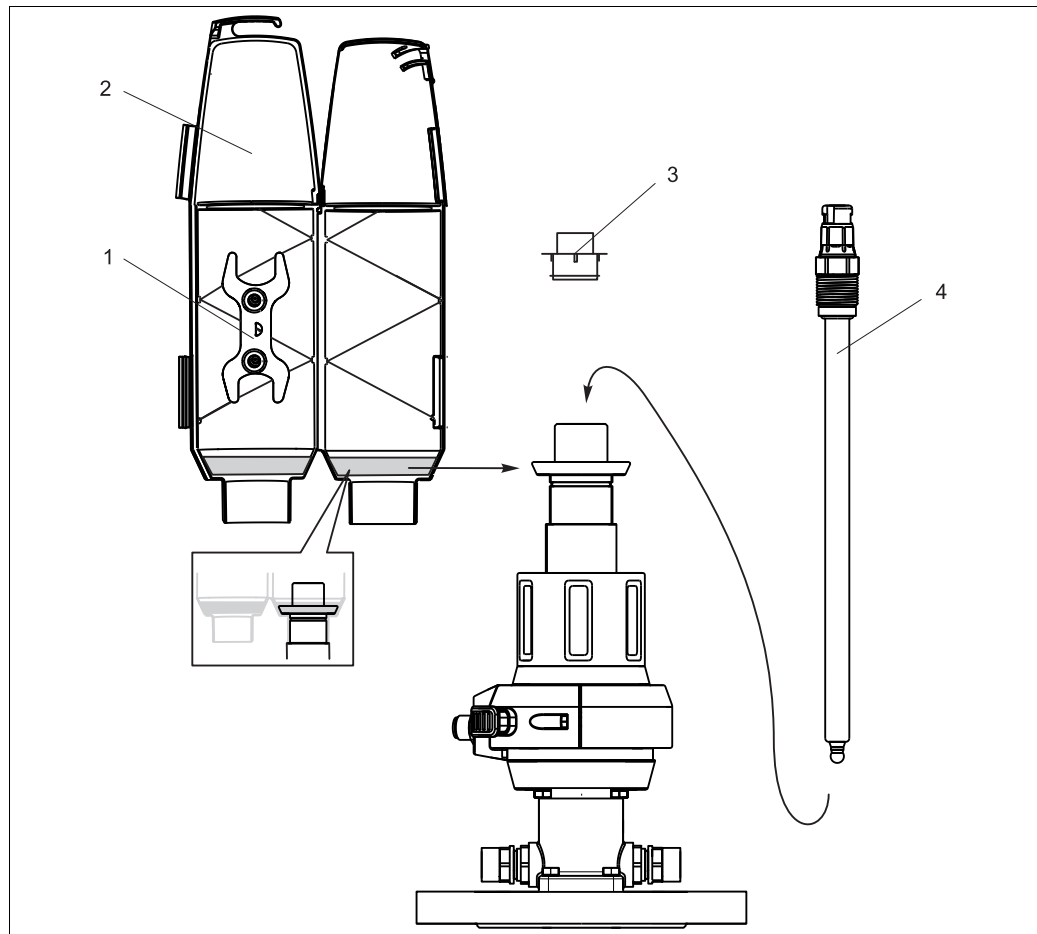


Fig. 18: Installing the sensor

- 1 Open-ended wrench (AF 17/19 mm)
- 2 Protection cap
- 3 Dummy plug (protection cap)
- 4 Sensor

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

Install the sensor as follows:

1. Remove the protection cap (→ Fig. 18, pos. 2) (this is possible only if the assembly is in the service position).
2. Remove the yellow dummy plug (pos. 3).
3. Screw in the sensor (pos. 4) in the place of the dummy plug:
  - hand-tighten initially
  - then tighten it by approx.  $\frac{1}{4}$  turn using the open-ended wrench (pos. 1)
4. Attach the open-ended wrench back into the protection cap.
5. Put the protection cap on the assembly. When doing so, guide the measuring cable through the cable run (top of protection cap).

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

### Installing and removing sensors if the sensor adapter is not visible (pos. B)

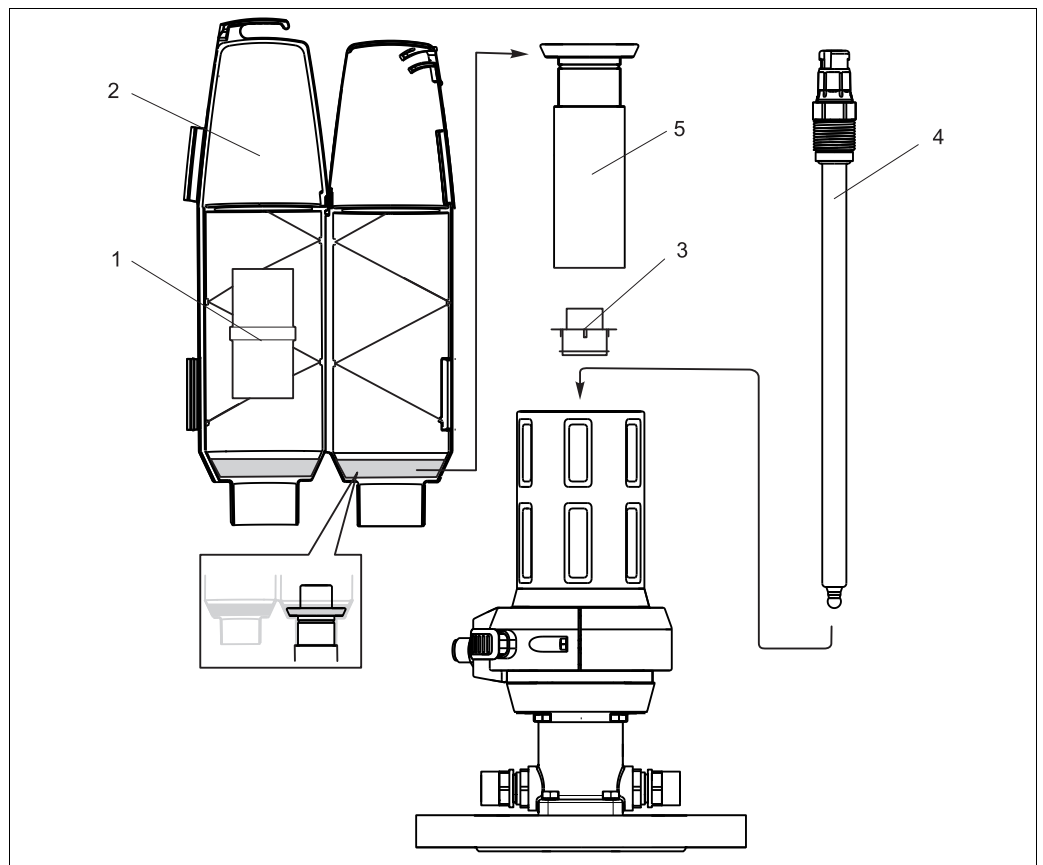



Fig. 19: Installing the sensor

- 1 Socket wrench (AF 17/19 mm)
- 2 Protection cap
- 3 Dummy plug (protection cap)
- 4 Sensor
- 5 Retraction pipe

**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 protection cap (→  19, pos. 2) (this is possible only if the assembly is in the service position).
2. Unscrew and remove the retraction pipe (pos. 5) (in an anticlockwise direction).
3. Remove the yellow dummy plug (pos. 3).
4. Screw in the sensor (pos. 4) in place of the dummy plug:
  - hand-tighten initially
  - then tighten it by approx. ¼ turn using the socket wrench (pos. 1).
5. Guide the sensor cable through the retraction pipe and connect it to the sensor.
6. Screw the retraction pipe back in.
7. Attach the socket wrench back into the protection cap.
8. Put the protection cap on the assembly. When doing so, guide the measuring cable through the cable run (top of protection cap).

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

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

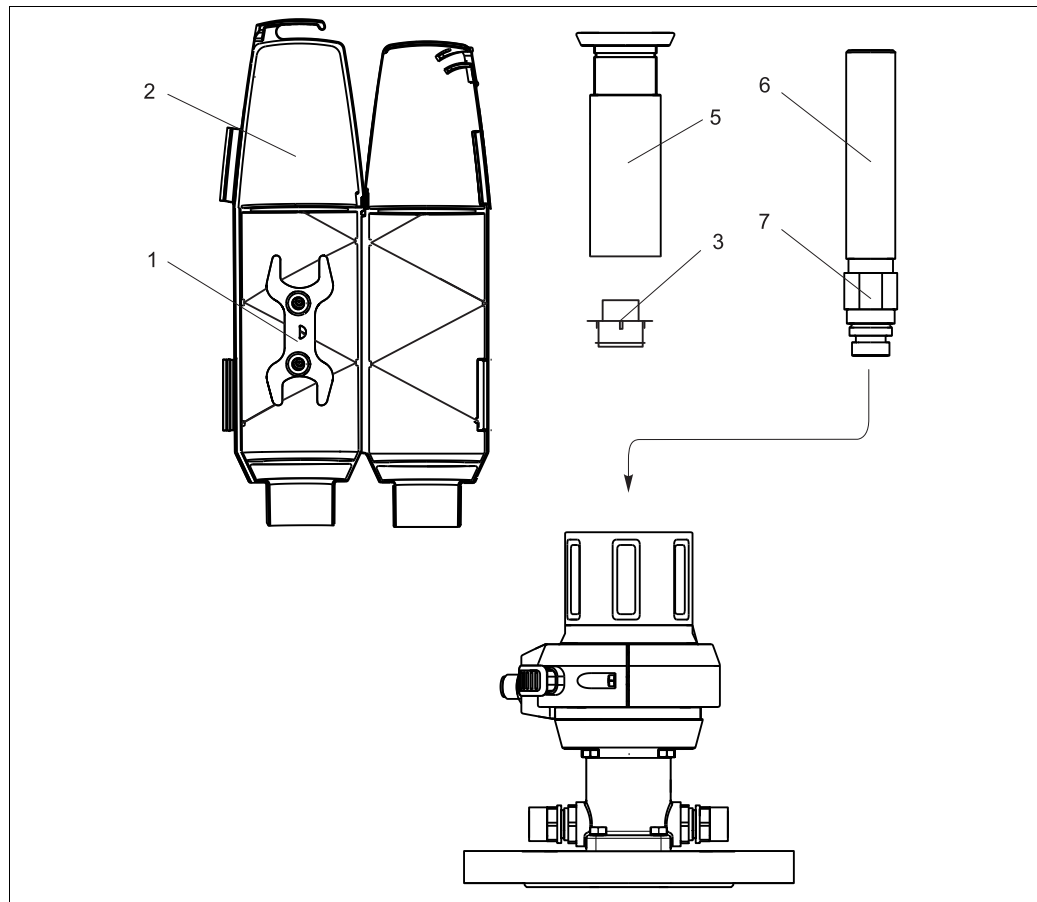




Fig. 20: Sensor installation, Part 1

- |   |                                 |
|---|---------------------------------|
| 1 | Open-ended wrench (AF 17/19 mm) |
| 2 | Protection cap                  |
| 3 | Dummy plug (protection cap)     |
| 5 | Retraction pipe                 |
| 6 | Adapter gel - KCl               |
| 7 | Lock nut                        |

Install the sensor as follows:

1. Remove the protection cap (→  20, pos. 2) (this is possible only if the assembly is in the service position).
2. Unscrew and remove the retraction pipe (pos. 5) (in an anticlockwise direction).
3. Turn the lock nut (pos. 7) on the "Gel - KCl adapter" (pos. 6) as far as it will go in an upward direction.
4. Remove the yellow dummy plug (pos. 3).
5. In the place of the dummy plug, screw in the "Gel - KCl adapter" (pos. 6) and hand-tighten:
6. Hand-tighten the lock nut (in a clockwise direction), and then use an open-ended wrench (AF 24 mm) to tighten it by  $\frac{1}{4}$  turn.
7. Screw the retraction pipe back in.
8. Screw in the sensor (→  21, pos. 4) (360 mm gel sensor or 360 mm KCl sensor):
  - hand-tighten initially
  - then tighten it by approx.  $\frac{1}{4}$  turn using the open-ended wrench (pos. 1)
9. Attach the open-ended wrench back into the protection cap.
10. Put the protection cap on the assembly. When doing so, guide the measuring cable through the cable run (top of protection cap).

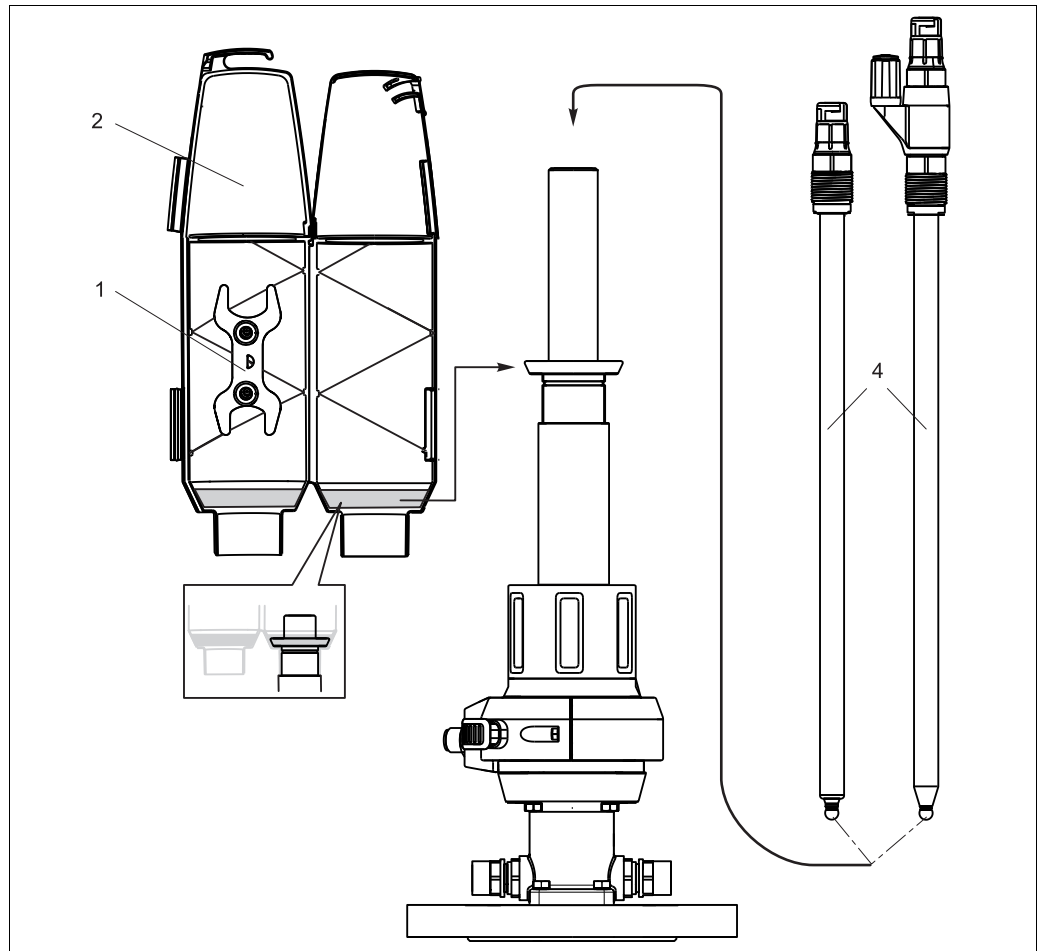


Fig. 21: Sensor installation, Part 2

- 1 Open-ended wrench  
 2 Protection cap  
 4 360 mm gel or KCl sensor

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

### 3.4 Post-installation check

- Following installation, check all the connections to ensure that they are properly secured and sealed.
- Ensure that the hoses for the rinse water connections cannot be removed without effort. These pipes are in open contact with the medium and must be secured accordingly.
- Check the hoses for damage.

## 4 Operating options

### 4.1 Initial commissioning

Prior to initial 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).

**⚠ CAUTION**

**If process medium leaks out, there is a risk of injury due to high pressure, high temperature or chemicals.**

- ▶ Before subjecting the assembly to process pressure, verify that all connections are sealed!

- i** Note that when moving the assembly, an open connection exists for a short period between the process and service chamber.

## 4.2 Operating elements

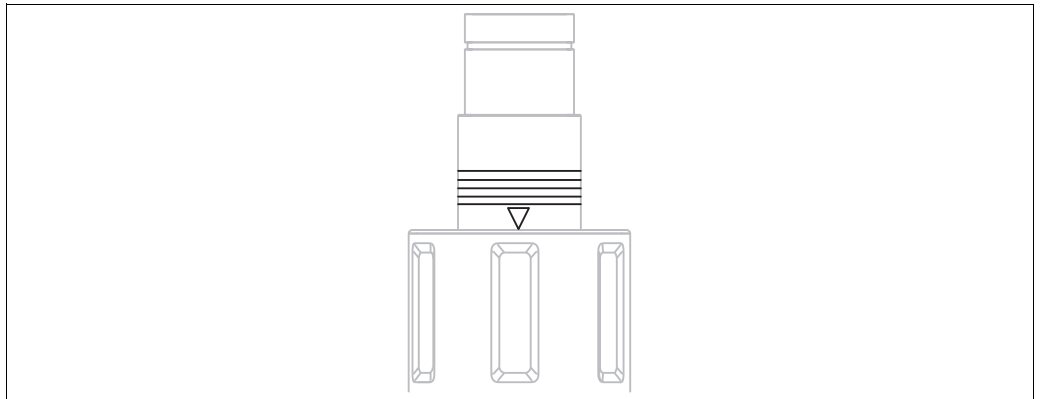


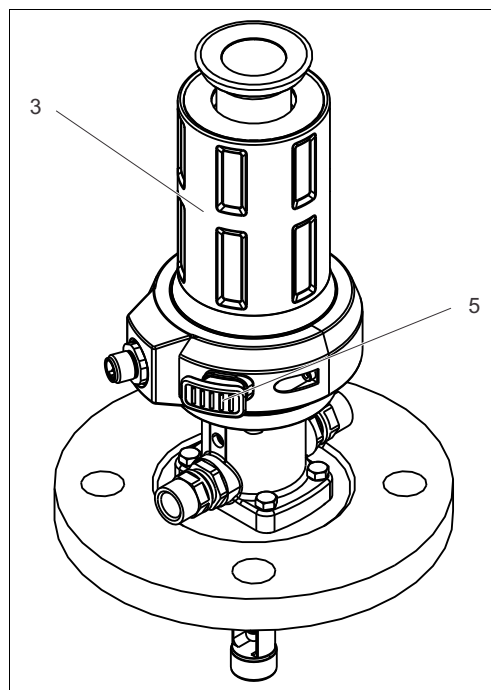
Fig. 22: Position markings (service position)

a0023307

### Assembly with pneumatic drive

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

### Assembly with manual drive



- 3 Manual drive
- 5 Unlocking button

Fig. 23: Operating elements

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## 4.3 Manual operation

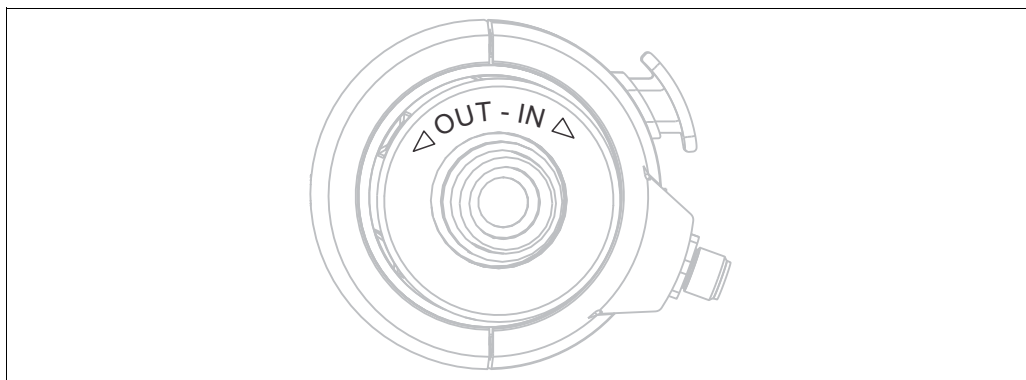





Fig. 24: Direction of rotation

### Moving the assembly from the service position to the measuring position

1. Rotate the drive in a clockwise direction (→ ) 24), so that the sensor holder enters the process (this is possible only if a sensor is installed).
2. Rotate the drive until the lock engages.

### Moving the assembly from the measuring position to the service position

1. Press the unlocking button.
2. Rotate the drive in an anti-clockwise direction (→ ) 24) as far as it will go (→ ) 22, service position).
3. Perform the required service activities.



## 4.4 Pneumatic operation

The assembly can be moved only if a sensor is installed.

The operation of the pneumatic version depends on the controller in question. The Operating Instructions can be found in the manual for the controller.

**i** Use a pneumatic change-over valve (4/2-way valve) to move the assembly. Connect both inputs. If you connect only one input (e.g. for test purposes), the piston will be blocked, as the sensor guide moves before the limit position lock is deactivated.

### 4.4.1 Moving the assembly if the compressed air supply fails

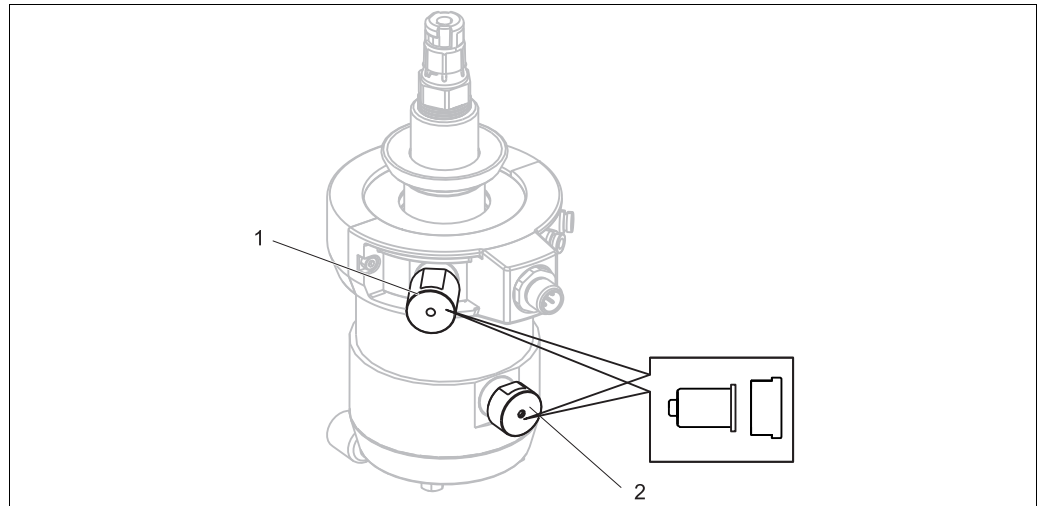


Fig. 25: Failure of compressed air supply


- 1 Limit position lock for service position  
2 Limit position lock for measuring position

If the compressed air supply fails, you can still move the assembly manually. To do so, proceed as follows:

#### **CAUTION**

#### **Risk of injury due to high medium pressure**

► Depressurize the system

1. Use an open-ended wrench to unscrew and remove both limit position locks (AF 17 mm) (→  25, pos. 1 and 2) and also remove the internal component. If the internal component is stuck (if an attempt was made to move the assembly without deactivating the limit position lock), move the assembly manually to the respective limit position.
2. Move the assembly to the desired position.
3. Screw the limit position lock back in.

## 5 Maintenance

### **⚠ WARNING**

#### **Risk of injury if medium escapes**

- ▶ Before each maintenance activity, verify that the process piping, the tank and the service chamber are unpressurized, empty and have been rinsed.
- ▶ Move the assembly to the "service" position.

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

### 5.1 Cleaning the assembly

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

#### 5.1.1 Manually operated assembly

All parts in contact with the medium, such as the sensor and the sensor guide, must be cleaned regularly. To do so, you must remove the sensor<sup>1)</sup>.

- Low levels of contamination are removed using suitable cleaning agents (see "Cleaning agent" section).
- High levels of contamination are removed using a soft brush and a suitable cleaning agent.
- For contamination that is difficult to remove, soak the parts in a cleaning solution. Then clean the parts using a brush.

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

#### 5.1.2 Pneumatically controlled assembly

Regular, pneumatically controlled cleaning is possible using the rinse water connection and the right equipment e.g. the fully automatic cleaning and calibration system, Topcal S CPC310.

### 5.2 Cleaning the sensor

You must clean the sensor:

- before each calibration
- regularly during operation
- before returning it for repair

You can remove the sensor and clean it manually, or you can clean it in automatic mode<sup>2)</sup> using the rinse water connection.

### **NOTICE**

#### **Incorrect measurement or damage to sensor due to incorrect cleaning**

- ▶ The ORP electrodes must always be cleaned mechanically and using water. Do not use any chemical cleaning agents. These cleaning agents cause a potential to be imposed on the electrode which takes several hours to dissipate. This potential results in a measurement error.
- ▶ Do not use abrasive cleaning agents. These cleaning agents may cause irreparable damage to the sensor.
- ▶ After the sensor has been cleaned, rinse the assembly's rinse chamber using an ample quantity of water (possibly distilled or deionized). Otherwise, the residue from the cleaning agent may distort the measurement.
- ▶ If necessary, carry out a new calibration following cleaning.

1) same as sensor installation, but in reverse order

2) only if the assembly is fitted out accordingly

### 5.3 Cleaning agent

The choice of cleaning agent depends on the degree and type of contamination. The most common types of contamination and the appropriate cleaning agents can be found in the following table.

Type of contamination	Cleaning agent
Grease and oils	Hot water or tempered, surfactant-containing (alkaline) media <sup>1)</sup> or water-soluble organic solvents (e.g. ethanol)
Limescale, metal hydroxide coatings, sparingly soluble biofilms	approx. 3% hydrochloric acid
Sulfide deposits	Mixture of 3% hydrochloric acid and thiocarbamide (commercially available)
Protein-based coatings	Mixture of 3% hydrochloric acid and pepsin (commercially available)
Fibers, suspended solids	Pressurized water, possibly surfactants
Thin biofilms	Pressurized water

- 1) do not use with Tophit ISFET sensor! Instead use the usual commercially available acidic cleaning agents for the food industry (e.g. P3-horolith CIP, P3-horolith FL, P3-oxonia active).

#### **⚠ CAUTION**

##### **Health hazard due to solvents**

- ▶ Do not use any halogen-containing, organic solvents or acetone. These solvents may destroy plastic components of the sensor and are also suspected of causing cancer (e.g. chloroform).

## 5.4 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 which are in contact with the medium, protect yourself from residual medium and elevated temperatures. Wear protective gloves and goggles.

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

### Preparation

1. Interrupt the process. Pay attention to residual medium, residual pressure as well as elevated temperatures.
2. Move the assembly to the service position.
3. Completely remove the assembly from the process connection.
4. Clean the assembly (see "Cleaning the assembly" section).

### 5.4.1 Standard version

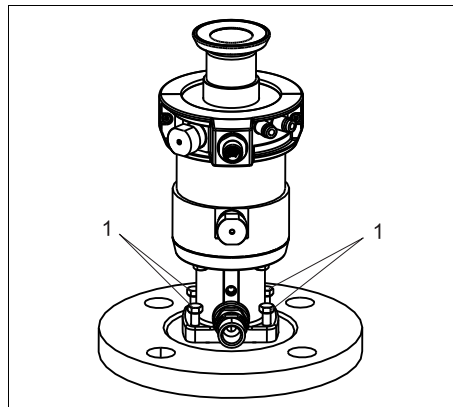


Fig. 26: Replacing seals, Part 1

1 Securing screws

1. Release the four securing screws (→  26, pos. 1).

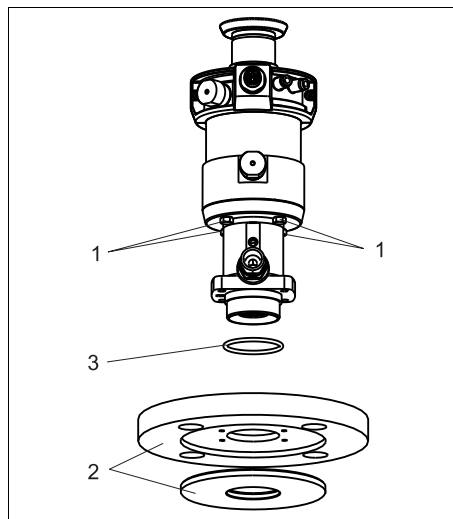


Fig. 27: Replacing seals, Part 2

1 Securing screws  
2 Process connection  
3 O-ring in process connection

2. Remove the process connection (pos. 2).
3. Remove the o-ring (pos. 3) from the process connection (sealing disk).
4. Apply a thin layer of grease to the new o-ring (e.g. Klüber Paraliq GTE 703).
5. Insert the o-ring into the process connection.

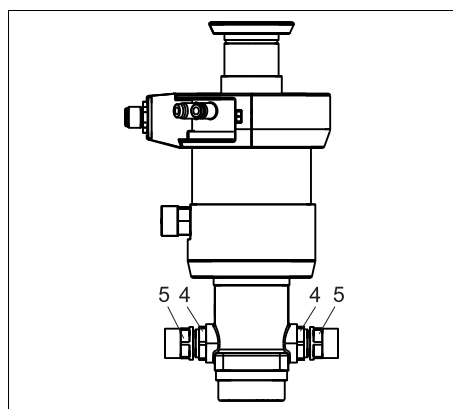


Fig. 28: Replacing seals, Part 3

4 Lock nut  
5 Rinse connection adapter

6. Release the lock nuts (pos. 4) using an open-ended wrench or socket wrench (AF 19 mm, in protection cap).
7. Unscrew and remove the two rinse connection adapters (pos. 5) using an open-ended wrench or socket wrench (AF 17 mm, in protection cap).

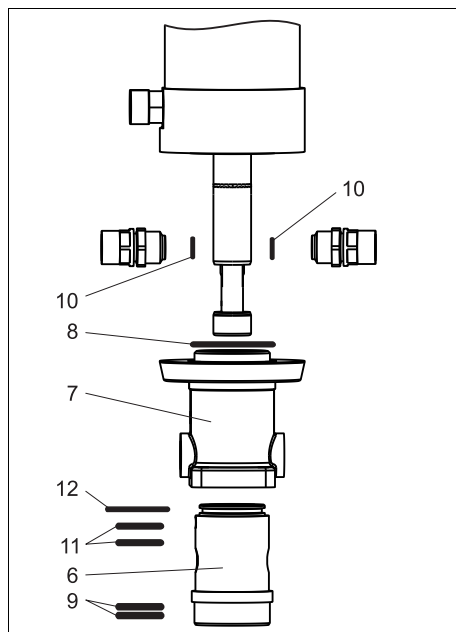



Fig. 29: Replacing seals, Part 4

- 6 Service chamber
- 7 Support housing
- 8 O-ring, support housing
- 9 O-rings, service chamber, bottom
- 10 O-rings, rinse connection adapter
- 11 O-rings, service chamber, top
- 12 O-ring, service chamber, outer

8. Release the four securing screws (→  27, pos. 1).
9. Remove the support housing (pos. 7).
10. Pull the service chamber (pos. 6) out of the support housing.
11. Remove the o-rings indicated.
12. Apply a thin layer of grease to the new o-rings (e.g. Klüber Paraliq GTE 703) and insert the o-rings into the corresponding grooves.

## Assembly

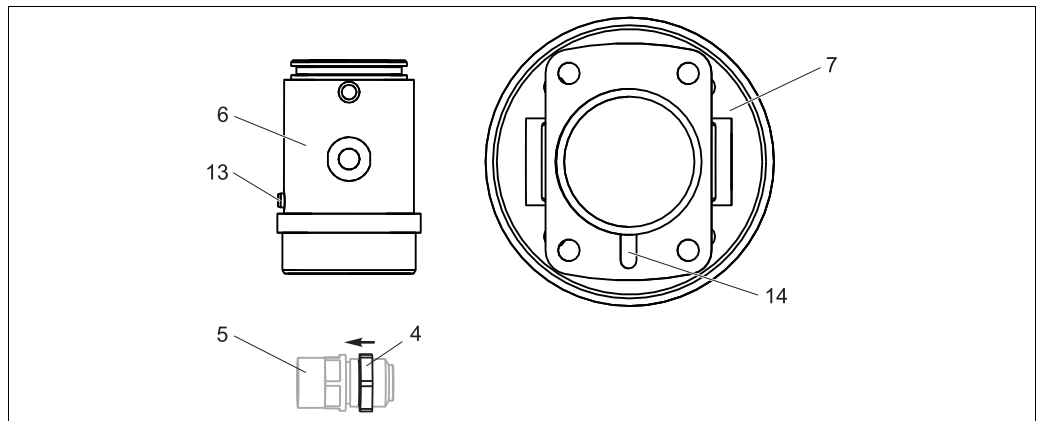


Fig. 30: Assembly

- 6 Service chamber
- 7 Support housing
- 13 Positioning pin
- 14 Positioning groove

1. Place the support housing (pos. 7) on a flat surface (the positioning groove (pos. 14) is visible from above).
2. Place the service chamber (pos. 6) on the support housing and let the service chamber glide into the support housing.
3. Place the positioning pin above the corresponding groove and push the service chamber in the remaining millimeters.
4. Fit the process connection on the support housing and tighten the securing screws with a torque of 4 Nm.
5. Turn the lock nut (pos. 4) on both of the rinse connection adapters (pos. 5) as far as possible in the direction of the arrow.
6. Insert the rinse connection adapters with o-rings into the support housing (open-ended wrench or socket wrench AF 17 mm).
7. Tighten the lock nut (AF 19 mm) (in the opposite direction to the arrow).
8. Fit the support housing on the assembly. Pay attention to the positioning pin. Tighten the four securing screws with a torque of 4 Nm.

### 5.4.2 Immersion chamber version

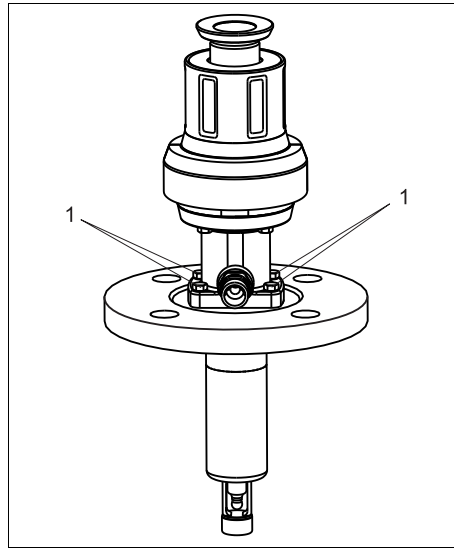


Fig. 31: Replacing seals, Part 1

1 Securing screws

1. Release the four securing screws (→  31, pos. 1).

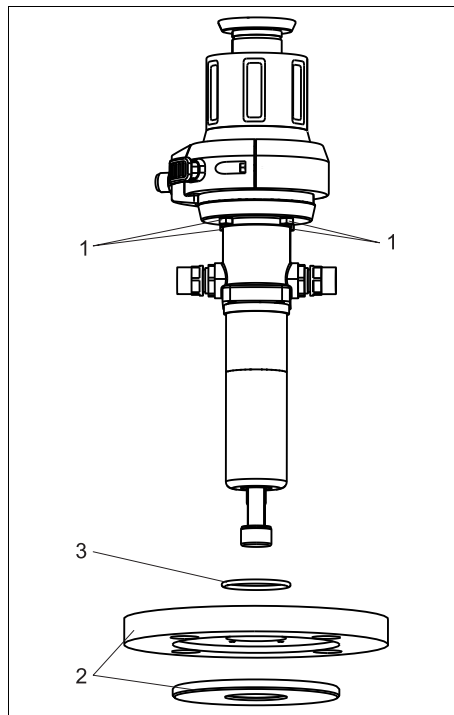
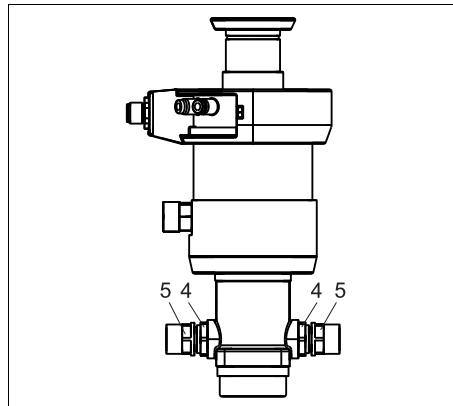


Fig. 32: Replacing seals, Part 2

1 Securing screws  
2 Process connection  
3 O-ring in process connection

2. Remove the service chamber (pos. 3) together with the process connection (pos. 2).
3. Remove the o-ring (pos. 3) from the process connection (sealing disk).
4. Apply a thin layer of grease to the new o-ring (e.g. Klüber Paraliq GTE 703).
5. Insert the o-ring into the process connection.

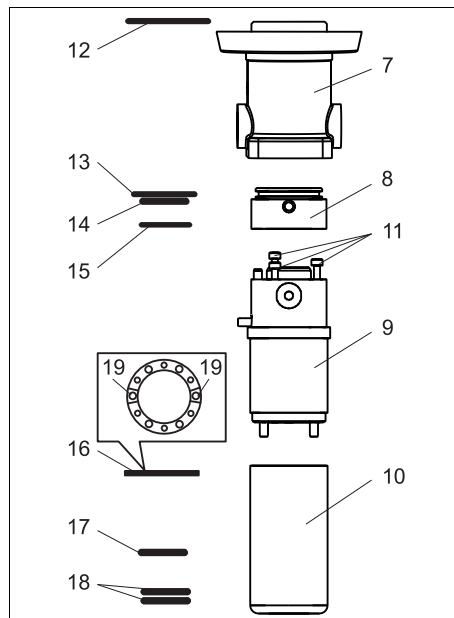




a0024437

Fig. 33: Replacing seals, Part 3

- 4 Lock nut  
5 Rinse connection adapter




a0024501

Fig. 34: Replacing seals, Part 4

- 7 Support housing  
8 Immersion chamber - top part  
9 Immersion chamber - middle part  
10 Immersion chamber - bottom part  
11 Securing screws  
12 O-ring, service chamber, outer  
13 O-ring, service chamber, top  
14 O-ring, top part of service chamber, inner  
15 O-ring, top part of service chamber, inner  
16 Moulded seal (ensure correct orientation)  
17 O-ring, service chamber, top  
18 O-rings, service chamber, bottom  
19 Service chamber, inlet and outlet

6. Release the lock nuts (pos. 4) using a 19 mm open-ended wrench or socket wrench (in protection cap).
7. Unscrew and remove the two rinse connection adapters (pos. 5).

8. Remove the support housing (→  34, pos. 7) with the immersion chamber (pos. 8 to 10).
9. Pull the immersion chamber out of the support housing.
10. Remove the top part of the immersion chamber (pos. 8).
11. Release the three screws (pos. 11) and remove the bottom part of the immersion chamber.
12. Remove the o-rings and the moulded seal (pos. 12 to 18).
13. Apply a thin layer of grease to the new o-rings (e.g. Klüber Paraliq GTE 703) and insert the o-rings into the corresponding grooves.
14. Insert the moulded seal so both apertures with boundaries (pos. 19) are placed on top of the inlet and the outlet of the service chamber.

### Assembly

In the immersion chamber version, the inlet and outlet of the service chamber are fixed.

- i** When assembling the immersion tube, please ensure that the leakage borehole (pos. 11), the service chamber outlet (pos. 12) and the marking at the bottom of the immersion chamber (pos. 16) are all in one line.

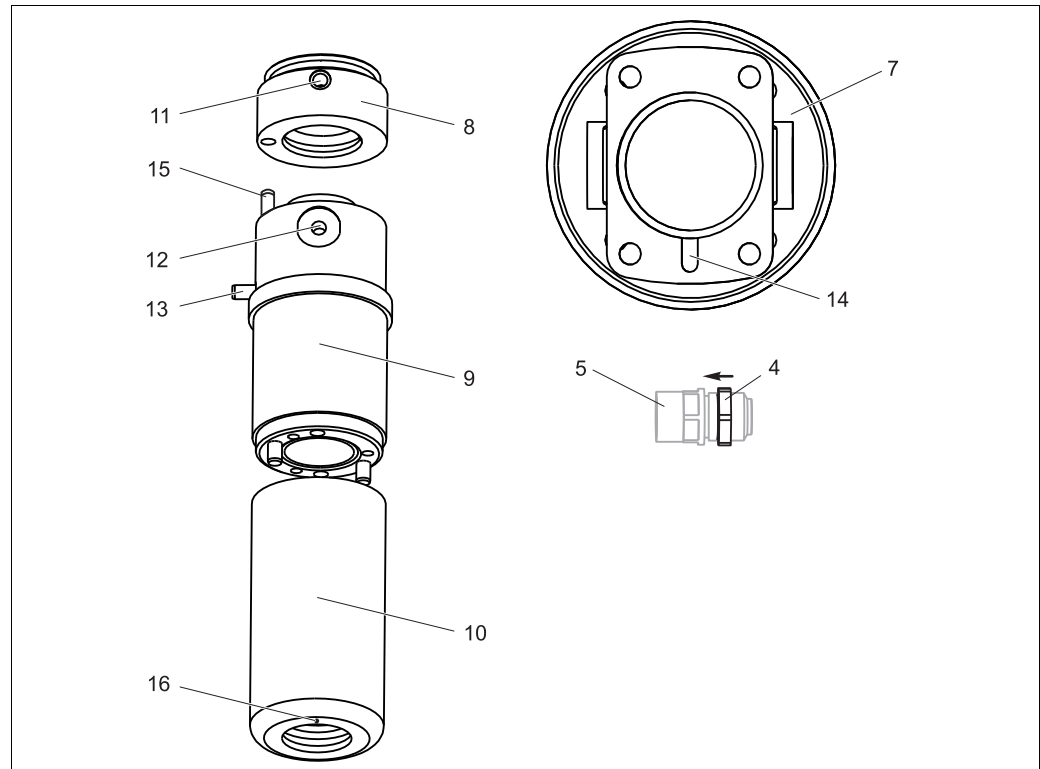


Fig. 35: Assembly

- 4 Lock nut
- 5 Rinse connection adapter
- 7 Support housing
- 11 Leakage borehole
- 12 Rinse connection - service chamber outlet
- 13 Positioning pin
- 14 Positioning groove
- 15 Positioning pin
- 16 Position mark

1. Fit the middle and bottom parts of the immersion chamber together. Ensure correct orientation!
2. Tighten the two parts using the three securing screws.
3. Attach the top part of the immersion chamber.
4. Place the support housing (pos. 7) on a flat surface (the positioning groove (pos. 14) is visible from above).
5. Place the immersion chamber on the support housing and let the immersion chamber glide into the support housing.
6. Place the positioning pin above the corresponding groove and push the service chamber in the remaining millimeters.
7. Fit the process connection on the support housing and tighten the securing screws with a torque of 4 Nm.
8. Turn the lock nut (pos. 4) on both of the rinse connection adapters (pos. 5) as far as possible in the direction of the arrow.
9. Insert the rinse connection adapters with o-rings into the support housing (open-ended wrench or socket wrench AF 17 mm).

10. Tighten the lock nut (AF 19 mm) (in the opposite direction to the arrow).
11. Fit the support housing on the assembly. Pay attention to the positioning pin. Tighten the four securing screws with a torque of 4 Nm.

## 6 Repair

### 6.1 Replacing damaged components

**▲ WARNING**

**Danger resulting from improper repair**

- ▶ Damage to the assembly, which 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, the assembly must be checked 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.

### 6.2 Spare parts kits

Detailed information on spare parts kits can be obtained using the "Spare Part Finding Tool" on the Internet: [www.products.endress.com/spareparts\\_consumables](http://www.products.endress.com/spareparts_consumables)

### 6.3 Return

The product must be returned if it is in need of repair or a factory calibration, or if the wrong product was ordered or delivered. Legal specifications require Endress+Hauser, as an ISO-certified company, to follow certain procedures when handling all returned products that have been in contact with the medium.

To ensure that your device is returned swiftly, safely and in an appropriate manner, please read the procedures and conditions on the Endress+Hauser website at [www.services.endress.com/return-material](http://www.services.endress.com/return-material)

### 6.4 Disposal

All assembly components must be disposed of separately, based on the material they are made of.

Please observe local regulations.

## 7 Accessories

**i** The most important accessories available at the time this document went to print are listed below. Please contact your sales center for accessories that are not listed here.

The following accessories can be ordered via the product structure (see ordering information):

- 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

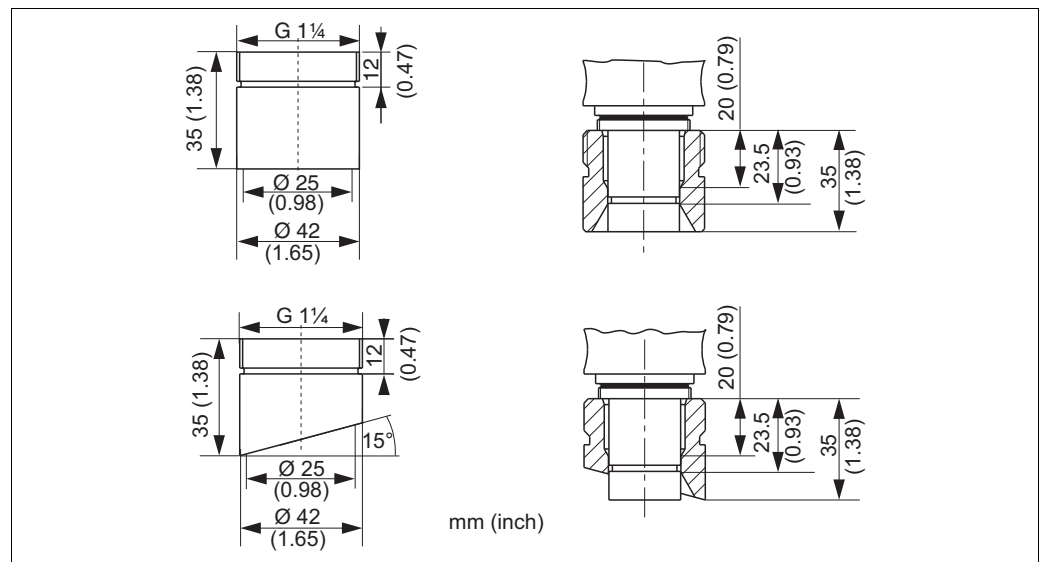


Fig. 36: Welding neck (safety nozzle)

- Dummy plug G1¼, 1.4435 (AISI 316 L), FPM - FDA
- Sensor dummy 120 mm, 1.4435 (AISI 316 L), Ra = 0.38 µm
- 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, seals not in contact with the medium
- Kit, FKM seals, G1¼, wetted parts
- Kit, FKM seals, immersion chamber version, wetted parts
- Kit, EPDM seal, wetted
- Kit, FKM seal, wetted
- Kit, FFKM seal, basis, wetted
- Cable, plug-in, limit switch, M12, 5 m
- Cable, plug-in, limit switch, M12, 10 m
- Tool in case for installation/removal

## 7.1 Installation material for rinse connections

Filter set CPC310, CVC400

- Water filter (dirt trap) 100 µm, complete, incl. angle bracket
- Order No. 71031661

Pressure reducer kit

- Complete, incl. manometer and angle bracket
- Order No. 51505755

Hose connection nipples for rinse connections G ¼, DN 12

- Stainless steel 1.4404 (AISI 316 L) (2 units);
- Order No. 51502808

Hose connection nipples for rinse connections G ¼, DN 12

- PVDF, 2 pieces;
- Order No. 50090491

## 7.2 Cleaning systems

Topcal CPC310

- Fully automatic measuring, cleaning and calibration system; Ex or Non-Ex
- Cleaning and calibration under process conditions, automatic sensor monitoring
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cpc310](http://www.products.endress.com/cpc310))
- Technical Information TI00404C/07/EN

Topclean CPC30

- Fully automatic measuring and cleaning system; Ex or Non-Ex
- Cleaning under process conditions, automatic sensor monitoring
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cpc30](http://www.products.endress.com/cpc30))
- Technical Information TI00235C/07/EN

Air-Trol 500

- Control unit for Cleanfit retractable assemblies
- Order No. 50051994
- Technical Information TI00038C/07/EN

Cleanfit Control

- Converts electrical signals into pneumatic signals to control pneumatically-operated retractable assemblies or pumps in conjunction with Liquiline CM44x
- Wide range of control options
- Order No. CTSP-MC1CR1 (as per TSP modification 71248395)

## 7.3 Sensors

### 7.3.1 Glass electrodes

#### Orbisint CPS11/CPS11D

- pH electrode for process engineering
- Optional SIL version for connection to SIL transmitter
- With dirt-repellent PTFE diaphragm
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps11](http://www.products.endress.com/cps11) or [www.products.endress.com/cps11d](http://www.products.endress.com/cps11d))
- Technical Information TI00028C/07/EN

#### Orbisint CPS12/CPS12D

- ORP electrode for process engineering
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps12](http://www.products.endress.com/cps12) or [www.products.endress.com/cps12d](http://www.products.endress.com/cps12d))
- With dirt-repellent PTFE diaphragm
- Technical Information TI00367C/07/EN

#### Memosens CPS16D\*

- pH-ORP combination sensor for process engineering, with dirt-repellent PTFE diaphragm
- With Memosens technology
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps16d](http://www.products.endress.com/cps16d))
- Technical Information TI00503C/07/EN

#### Ceraliquid CPS41/CPS41D

- pH electrode with ceramics diaphragm and liquid KCl electrolyte,
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps41](http://www.products.endress.com/cps41) or [www.products.endress.com/cps41d](http://www.products.endress.com/cps41d))
- Technical Information TI00079C/07/EN

#### Ceraliquid CPS42/CPS42D

- ORP electrode with ceramics diaphragm and liquid KCl electrolyte,
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps42](http://www.products.endress.com/cps42) or [www.products.endress.com/cps42d](http://www.products.endress.com/cps42d))
- Technical Information TI00373C/07/EN

#### Ceragel CPS71/CPS71D

- pH electrode with double chamber reference system and integrated bridge electrolyte,
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps71](http://www.products.endress.com/cps71) or [www.products.endress.com/cps71d](http://www.products.endress.com/cps71d))
- Technical Information TI00245C/07/EN

#### Ceragel CPS72/CPS72D

- ORP electrode with double chamber reference system and integrated bridge electrolyte,
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps72](http://www.products.endress.com/cps72) or [www.products.endress.com/cps72d](http://www.products.endress.com/cps72d))
- Technical Information TI00374C/07/EN

#### Memosens CPS76D\*

- pH-ORP combination sensor for process engineering, hygiene and sterile applications
- With Memosens technology
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps76d](http://www.products.endress.com/cps76d))
- Technical Information TI00506C/07/EN

#### Orbipore CPS91/CPS91D

- pH electrode with open aperture diaphragm for media with high dirt load,
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps91](http://www.products.endress.com/cps91) or [www.products.endress.com/cps91d](http://www.products.endress.com/cps91d))
- Technical Information TI00375C/07/EN

**Orbipore CPS92/CPS92D**

- ORP electrode with open aperture diaphragm for media with high dirt load,
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps92](http://www.products.endress.com/cps92) or [www.products.endress.com/cps92d](http://www.products.endress.com/cps92d))
- Technical Information TI00435C/07/EN

**Memosens CPS96D\***

- pH-ORP combination sensor for chemical processes
- With poison-resistant reference with ion trap
- With Memosens technology
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps96d](http://www.products.endress.com/cps96d))
- Technical Information TI00507C/07/EN

\* not 120 mm sensor

### 7.3.2 ISFET sensors

**Tophit CPS471/CPS471D**

- Sterilizable and autoclavable ISFET sensor for food and pharmaceutical industry, process engineering,
- Water treatment and biotechnology;
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps471](http://www.products.endress.com/cps471) or [www.products.endress.com/cps471d](http://www.products.endress.com/cps471d))
- Technical Information TI00283C/07/EN

**Tophit CPS441/CPS441D**

- Sterilizable ISFET sensor for media with low conductivity, with
- Liquid KCl electrolyte;
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps441](http://www.products.endress.com/cps441) or [www.products.endress.com/cps441d](http://www.products.endress.com/cps441d))
- Technical Information TI00352C/07/EN

**Tophit CPS491/CPS491D**

- ISFET sensor with open aperture for media with high dirt load;
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps491](http://www.products.endress.com/cps491) or [www.products.endress.com/cps491d](http://www.products.endress.com/cps491d))
- Technical Information TI00377C/07/EN



## 8 Technical data

### 8.1 Environment

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**Ambient temperature** -10 to +70 °C (+ 14 to 158 °F)

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**Storage temperature** -10 to +70 °C (+ 14 to 158 °F)

### 8.2 Process

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**Process temperature range** -10 to +140 °C (14 to 284 °F) for all materials except PVDF and conductive PVDF  
-10 to +100/70 °C (14 to 212/158 °F) for materials PVDF and conductive PVDF


---

**Process pressure for pneumatic drive** Materials: 1.4404 (SS 316L), Alloy C22, titanium, PEEK

Basic and immersion chamber version: 16 bar (232 psi) up to 140 °C (284 °F)

Materials: PVDF, conductive PVDF

Basic version: 16 bar (232 psi) up to 100 °C (212 °F)  
Immersion chamber version: 16 bar (232 psi) up to 70 °C (158 °F)

 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.


---

**Process pressure for manual drive** Materials: 1.4404 (SS 316L), Alloy C22, titanium, PEEK

Basic version: 8 bar (116 psi) up to 140 °C (284 °F)  
Immersion chamber version: 8 bar (116 psi) up to 140 °C (284 °F)

Materials: PVDF, conductive PVDF

Basic version: 8 bar (116 psi) up to 100 °C (212 °F)  
Immersion chamber version: 8 bar (116 psi) up to 70 °C (158 °F)

 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 for pneumatic drive**

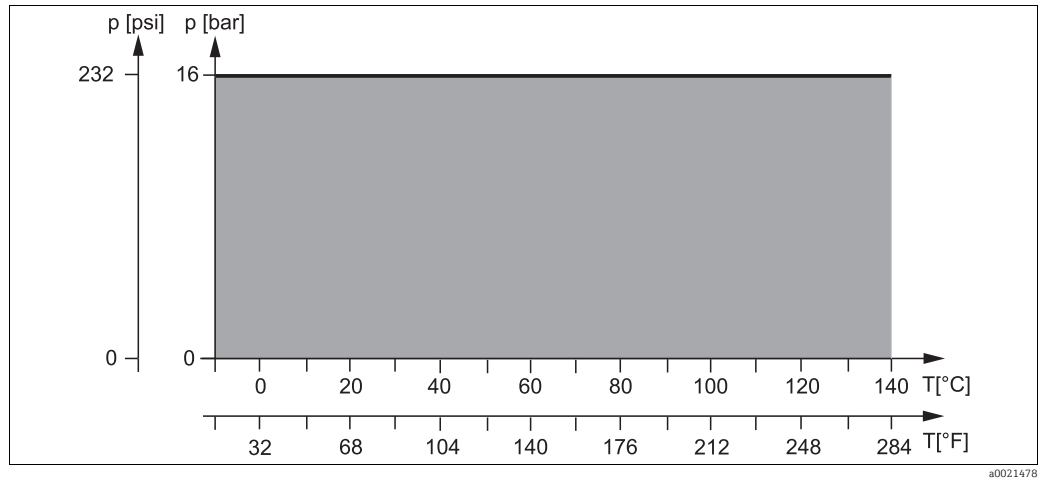


Fig. 37: Pressure temperature ratings for basic and immersion chamber version for materials 1.4404, Alloy C22, titanium and PEEK

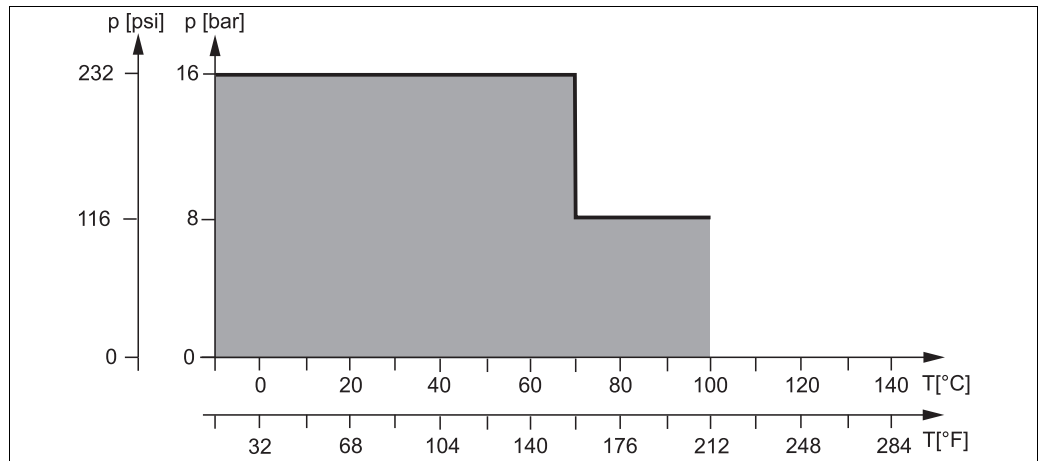


Fig. 38: Pressure temperature ratings for basic version for materials PVDF and conductive PVDF

**Pressure-temperature ratings for manual drive**

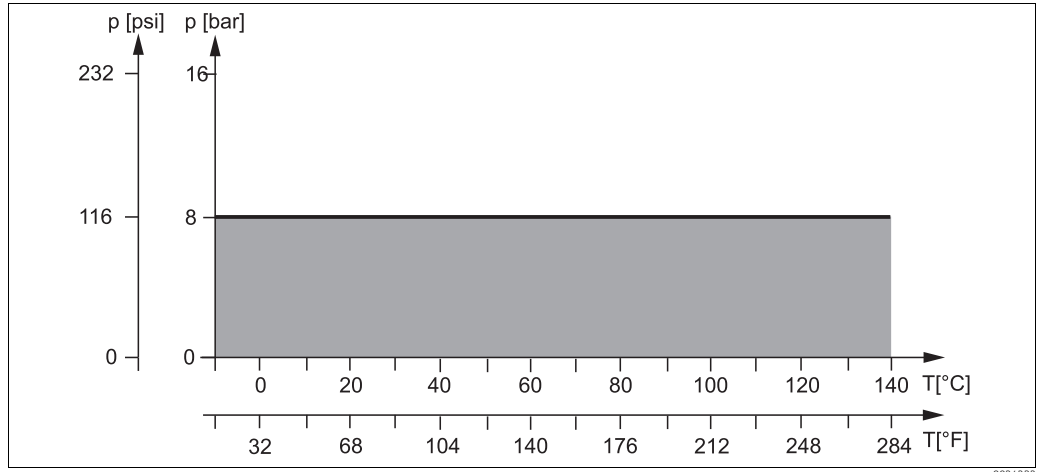


Fig. 39: Pressure temperature ratings for basic and immersion chamber version for materials 1.4404, Alloy C22, titanium and PEEK

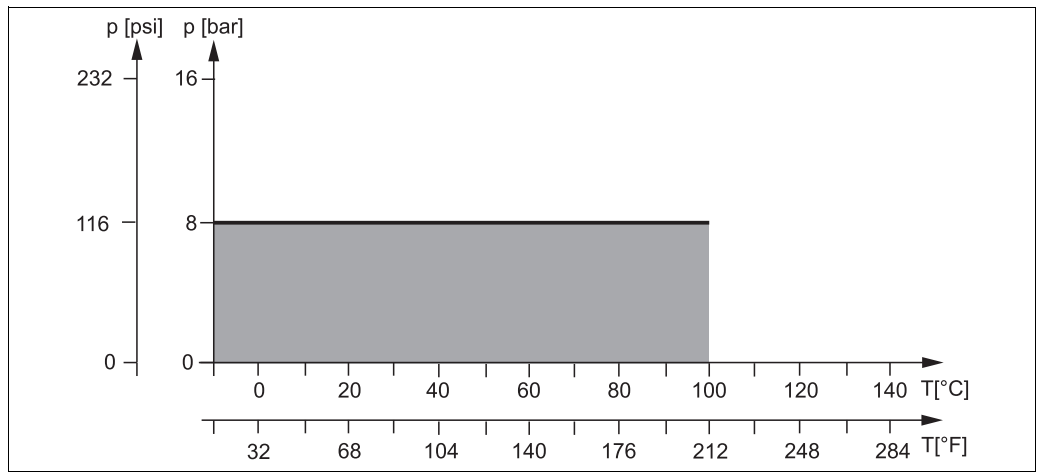


Fig. 40: Pressure temperature ratings for basic version for materials PVDF and conductive PVDF

**Pressure temperature ratings for immersion chamber version (PVDF)**

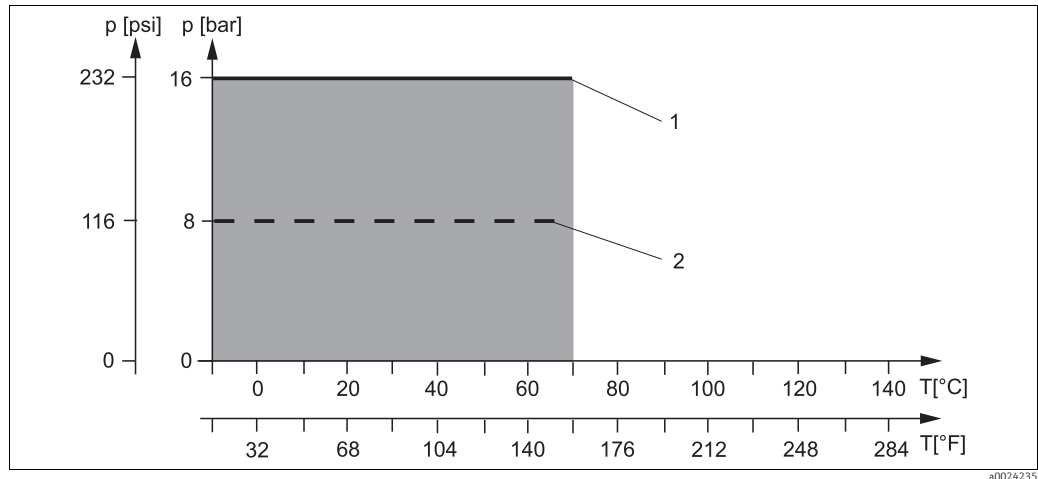


Fig. 4.1: Pressure temperature ratings for immersion chamber version for materials PVDF and conductive PVDF

- 1 Pneumatic drive
- 2 Manual drive

## 8.3 Mechanical construction

<b>Design, dimensions</b>	See "Installation" section		
<b>Weight</b>	Depends on version:		
	Pneumatic drive:	3.8 to 6 kg (8.4 to 13.2 lbs)	
	Manual drive:	3 to 4.5 kg (6.6 to 9.9 lbs)	
<b>Materials</b>	In contact with medium:		
	Seals:	EPDM/FPM (Viton)/FFKM	
	Immersion tube, process connection, service chamber:	Stainless steel 1.4404 (AISI 316L) Ra < 0.76/ titanium/PEEK/Alloy C22 Ra < 0.76/PVDF/conductive PVDF	
	Rinse connections:	Stainless steel 1.4404 (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	
<b>Sensors</b>	Short version	Gel sensors, ISFET	120 mm
		Gel sensors, ISFET	225 mm
		KCl sensors	225 mm
	Long version	Gel sensors, ISFET	225 mm
		Gel sensors, ISFET	360 mm
		KCl sensors	360 mm
<b>Limit position switches</b>	Switching element function:	NAMURNC contact, inductive (permitted for use in hazardous atmospheres)	
	Switching distance:	1.5 mm (0.06 ")	
	Nominal voltage:	8 V	
	Switching frequency:	0 to 5000 Hz	
	Housing material:	Stainless steel	

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71254692

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