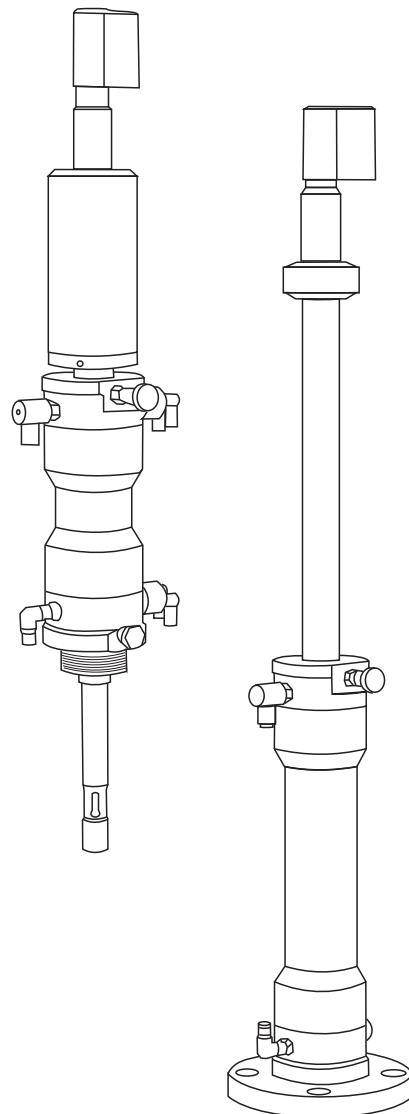


Operating Instructions

Cleanfit CPA472D

Retractable Process Assembly



About this document

Safety messages

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

Safety message structure	Meaning
⚠ DANGER Cause (/consequences) Consequences if safety message is not heeded ► Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the situation will result in a fatal or serious injury.
⚠ WARNING Cause (/consequences) Consequences if safety message is not heeded ► Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the situation can result in a fatal or serious injury.
⚠ CAUTION Cause (/consequences) Consequences if safety message is not heeded ► Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
NOTICE Cause/situation Consequences if safety message is not heeded ► Action/note	This symbol alerts you to situations that can result in damage to property and equipment.

Symbols

-  Additional information, tips
-  Permitted or recommended
-  Forbidden or not recommended

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1 Basic safety instructions

1.1 Requirements for the personnel

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

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

1.2 Designated use

The manually or pneumatically operated retractable assembly Cleanfit CPA472D is designed for installing pH/ORP sensors in tanks and pipes.

Its mechanical design permits its use in pressurized systems (see "Technical data").

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

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

1.3 Workplace safety

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

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

1.4 Operational safety

- ▶ Before commissioning the entire measuring point, make sure all the 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. Relevant regulations and European standards have been observed.

2 Incoming acceptance and product identification

2.1 Incoming acceptance

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

2.2 Product identification

2.2.1 Nameplate

The nameplate contains the following information:

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

Compare the order code on the nameplate with your order.

2.2.2 Identifying the product

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

- On the nameplate
- In the delivery papers

 To find out the version of your device, enter the order code indicated on the nameplate in the search screen at the following address: www.products.endress.com/order-ident

2.3 Scope of delivery

The scope of delivery comprises:

- Cleanfit CPA472D assembly (ordered version)
- Operating Instructions (English)

3 Mounting

3.1 Installation conditions

3.1.1 Notes on installation

The assembly is designed for installation on tanks and pipes. Suitable nozzles must be available for this.

When using standard glass electrodes, only installation positions are permitted in which the middle axis of the assembly lies at least at an angle of 15° from the horizontal (→  1). Otherwise, there will not be a reliable contact between the inner side of the pH membrane and the inner terminal leads via the electrolytes.

When using an ISFET Tophit sensor, there are, in principle, no restrictions for the installation position. An installation angle of 0 to 180° is, however, recommended.

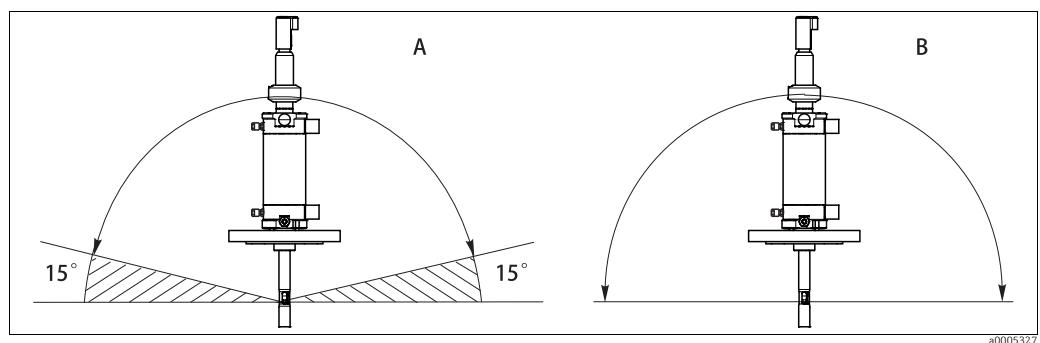


Fig. 1: Installation angle

A Glass electrodes: minimum 15 ° to the horizontal
 B ISFET sensors: recommended 0 ... 180 °, overhead possible

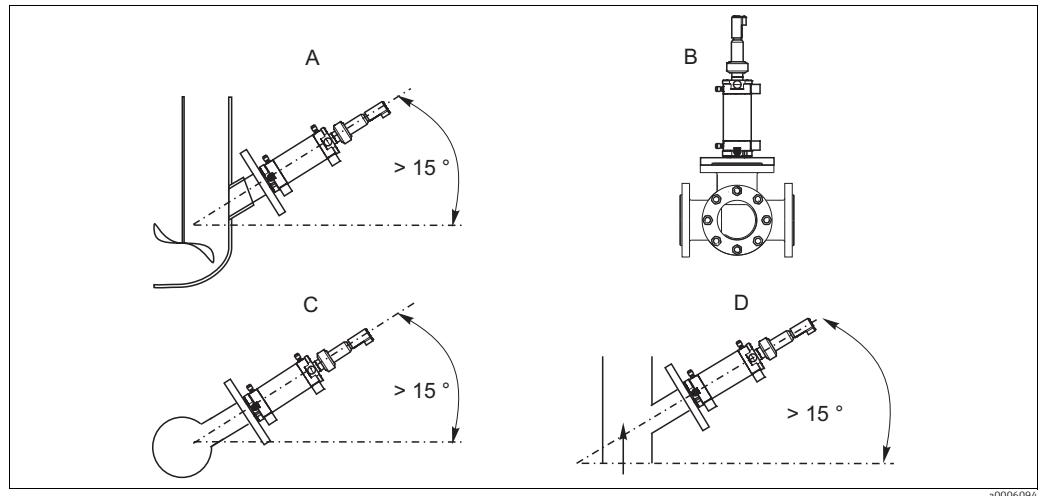


Fig. 2: Installation examples with recommended installation angle (glass electrodes)

A Tank
 B Flow assembly DN 50/80
 C Horizontal pipe minimum DN 80
 D Ascending pipe minimum DN 80

 Avoid a siphon effect¹⁾ at the rinse chamber outlet when installing with inclined orientation. The inlet to the rinse chamber must be from below.

1) Siphon effect: line emptied by vacuum

Pay attention to the following:

- The minimum diameter for direct installation in pipework is DN 80. This diameter is required so that the assembly has sufficient distance from the pipe wall when brought into the "Measuring" position.
- Use a flow assembly to install the assembly in smaller pipe diameters (see Accessories).
- When designing the installation nozzle, please take into account the total immersion depth in operation (sensor holder not inserted). Ensure that the sensor is always immersed in the medium during operation (see "Dimensions").

3.1.2 Dimensions

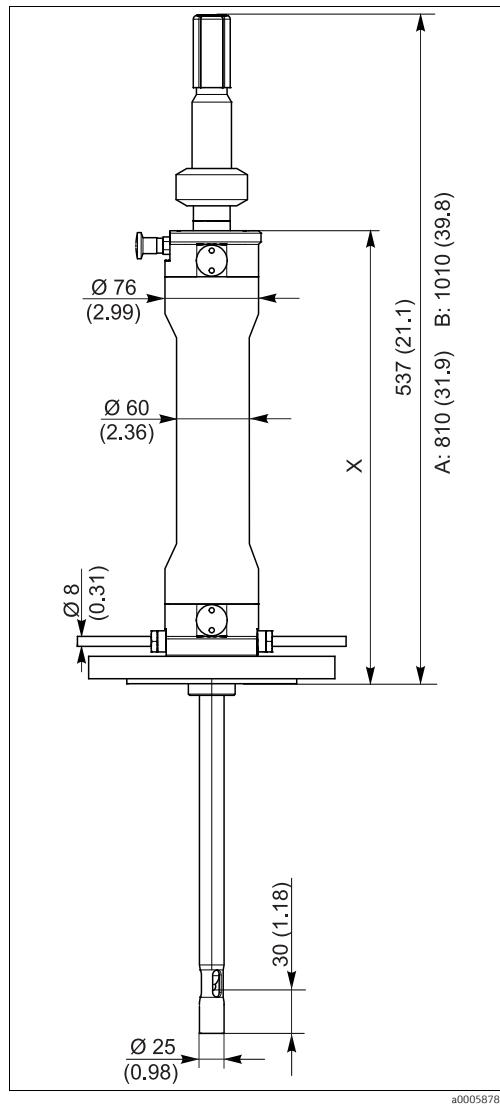


Fig. 3: Assembly version: long, for gel sensors

- A Length when extended
- B Required mounting clearance
- X 364/366 mm (14.3/14.4") depending on flange size

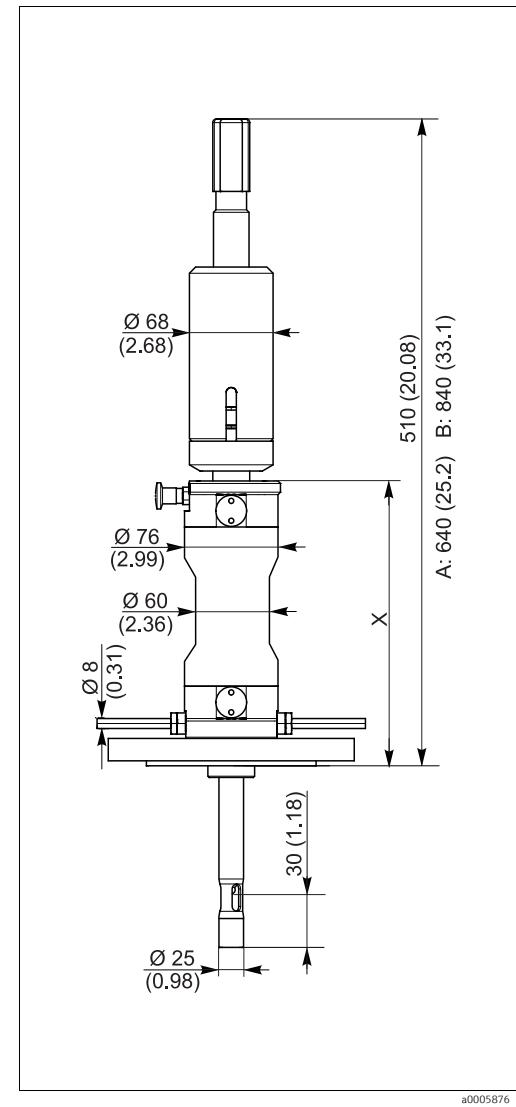


Fig. 4: Assembly version: standard, for KCl sensors

- A Length when extended
- B Required mounting clearance
- X 229/231 mm (9.02/9.09") depending on flange size

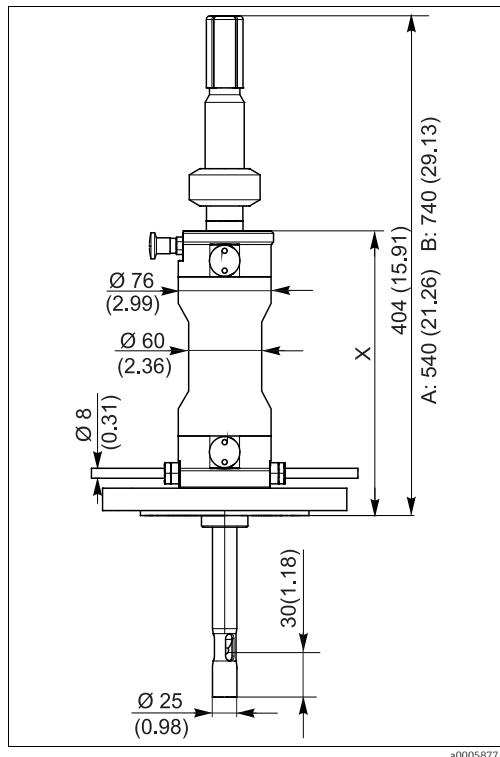


Fig. 5: Assembly version: standard, for gel sensors

A Length when extended
 B Required mounting clearance
 X 229/231 mm (9.02/9.09") depending on flange size

3.1.3 Process connections

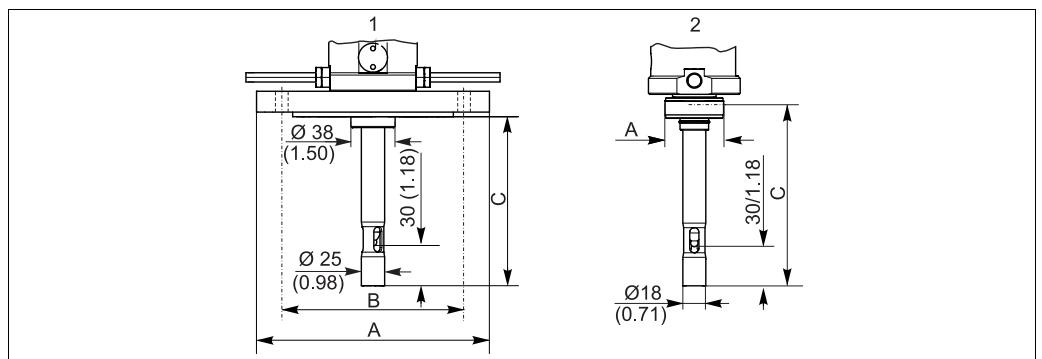


Fig. 6: Process connections
 1 Flange DN 50 / DN 80 / ANSI 2" / JIS IS10K50A
 2 Internal thread G1 1/4

Connection	A	B	C (standard)	C (long)
DN 50	165/6.50	125/4.92	145/5.71	280/11.0
DN 80	200/7.87	160/6.30	143/5.63	278/10.94
ANSI 2"	152.4/6.00	120.7/4.75	145/5.71	280/11.0
JIS IS10K50A	155/6.10	120/4.72	147/5.79	282/11.10
G 1 1/4	51/2.01	---	152/5.98	287/11.30
Dimensions in mm/inch				

For 425 mm gel sensors a special version with extra large immersion depth of 378 mm (14.9") is available. Order no. 71220488 / C-PA100525-40

3.2 Installation

3.2.1 Measuring system

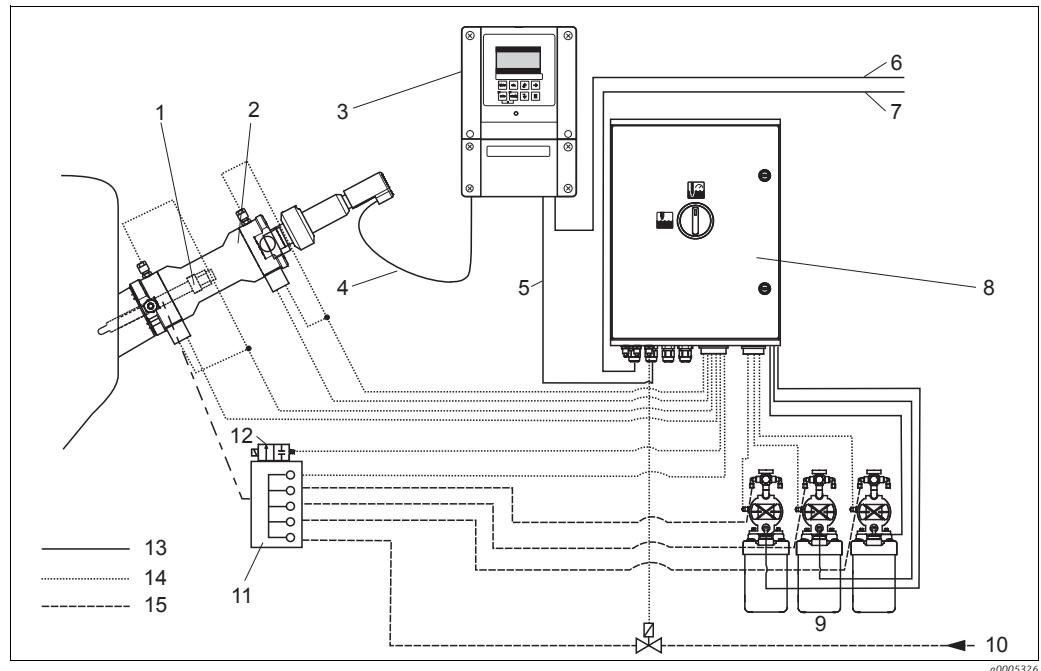


Fig. 7: Measuring system with pneumatic control

1	pH/ORP sensor	9	Canisters for cleaning and buffer solutions
2	Assembly Cleanfit	10	Superheated steam/water/cleaning solutions (optional)
3	Transmitter Mycom CPM153	11	Rinse block
4	Special measuring cable	12	Rinse water valve
5	Communication and extension cables	13	Power/signal cable
6	Power supply Mycom	14	Air hoses
7	Power supply CPG310	15	Medium
8	Control unit CPG310		

3.2.2 Installing the assembly into the process

⚠ WARNING

There is a risk of injury due to high pressure, high temperature or chemicals.

- Wear protective gloves, protective goggles and protective clothing.
- Install the assembly only on empty and unpressurized tanks or pipes.

- i** Before installing the assembly into the process check the seal between the flanges.

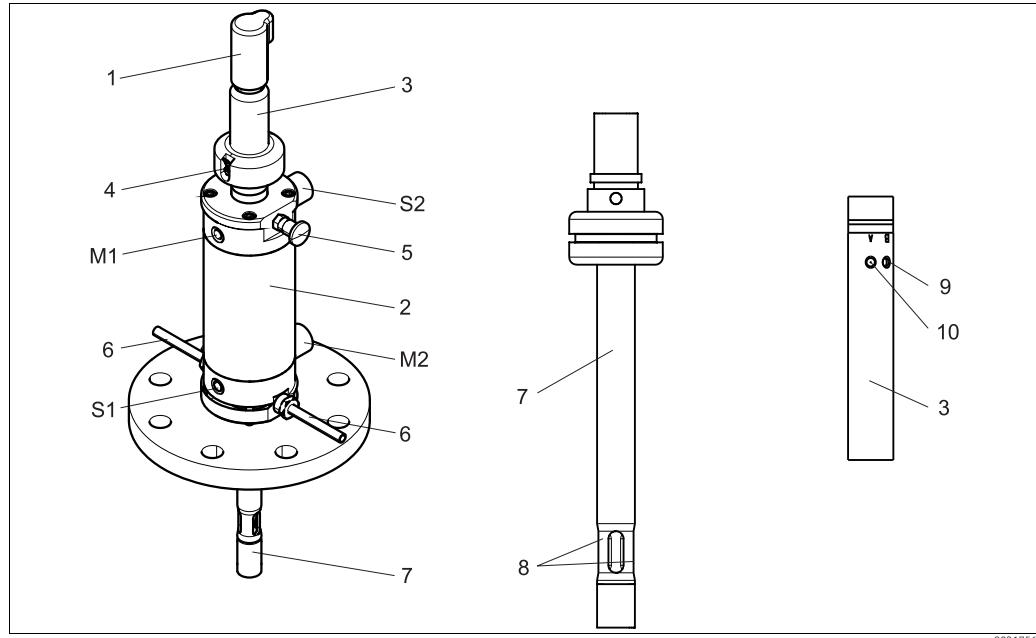


Fig. 8: Installation

<i>M</i> = Measuring	3	Retractable pipe
<i>S</i> = Service	4	Potential matching
<i>M</i> 1	5	Stop lock bolt
<i>M</i> 2	6	Rinse fitting Swagelok (optional)
<i>S</i> 1	7	Sensor holder
<i>S</i> 2	8	Sensor protection guard
1	9	Stop lock hole B
2	10	Stop lock hole A

1. Move the assembly into the "Service" position (electrode holder inserted back in the assembly).
2. Install the sensor (see chapter "Sensor installation") to de-activate the safety stop.
3. Secure the assembly to the tank or the piping using your selected process connection.
4. Turn the stop lock bolt through 90° so that the plastic grooves are located above the recesses (→ 9, A).
5. Turn the retractable pipe clockwise until the stop lock bolt engages (→ 9, B).
 - i** The stop lock bolt is now engaged in hole A or B (→ 8, item 9 or 10). Select hole A or B to get the best position of the sensor protection guard.
6. Follow the instructions for compressed air and rinse water connection (if used) given in the following chapters.

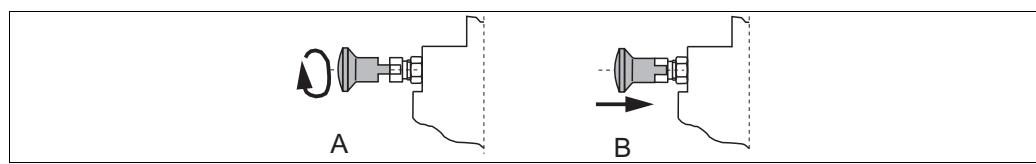


Fig. 9: Stop lock bolt

3.2.3 Pneumatic connection (optional)

Requirements:

- air pressure of 5 to 6 bar (72.5 to 87 psi)
- air must be filtered (40 µm) and be free of water and oil
- no continuous air consumption
- minimum nominal diameter of the air lines: 4 mm (0.16").

NOTICE

If the air pressure can increase to above 6 bar (87 psi) (including any short pressure surges) the assembly can get damaged.

- ▶ Install a pressure-reducing valve upstream.
- ▶ We recommend you also use a pneumatic throttle for lower pressures. This results in a smoother assembly operation. Endress+Hauser offers such a throttle as an accessory (see chapter "Accessories").

Limit position switch

Pneumatic: 3/2 way valve; thread M 12 x 1;
connection for hoses with OD = 6 mm (0.24")

Electric: inductive (NAMUR type); cable length: 10 m (32.8 ft);
housing material: stainless steel; thread M 12 x 1;
nominal voltage: 8 V
Ex II 1G EEx ia IIC T6; switching distance: 2 mm, flush

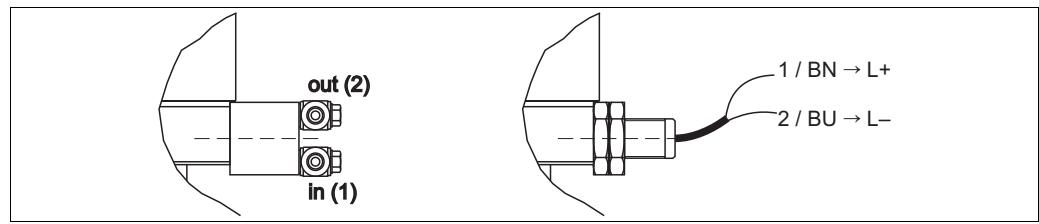


Fig. 10: Limit position switches, left: pneumatic (1 = compressed air inlet, 2 = compressed air outlet) right: electric (NAMUR)

i The position of the input resp. the output may be different from the figure. Please, refer to the marks at the limit position switch: "1" is the input (in), "2" is the output (out).

Connection of the compressed air and pneumatic limit position switches

Following, you find the connection of the compressed air lines to the assembly. The compressed air supply and the tapping of the position feedback signals are described for Topcal S CPC310 resp. Topclean S CPC30 as an example.

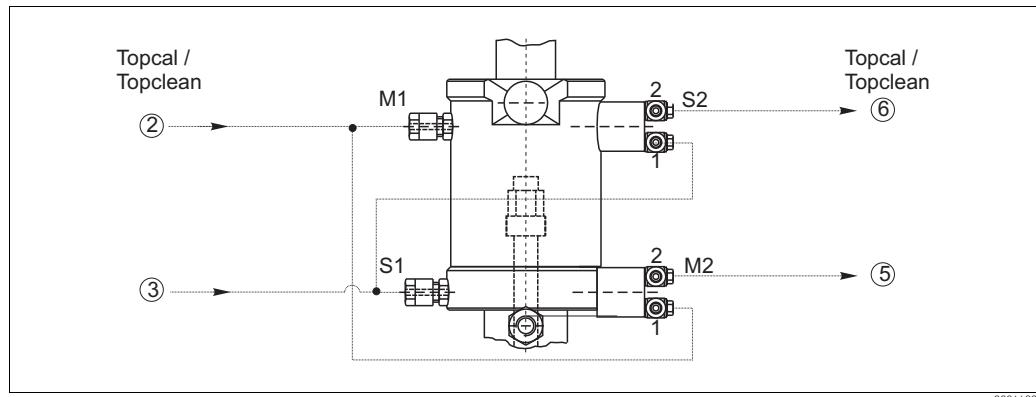


Fig. 11: Pneumatic connections and pneumatic limit position switches (1=inlet, 2=outlet)

M1	Pneumatics "Assembly measuring"
M2	Position feedback signal "Assembly measuring"
S1	Pneumatics "Assembly service"
S2	Position feedback signal "Assembly service"
②	Topcal/Topclean: hose no. 2
③	Topcal/Topclean: hose no. 3
⑤	Topcal/Topclean: hose no. 5
⑥	Topcal/Topclean: hose no. 6

The pneumatic limit position switches serve as control elements and determine the sequence of the individual steps.

1. Connect the compressed air supply line for "Assembly measuring" (Topcal/Topclean: hose no. ②) to the upper G 1/8 pneumatics connection (→ Fig. 11).
2. Also, connect the compressed air supply line no. ② to the inlet (1) of the lower limit position switch (M2, via T-piece). This limit position switch supplies the position feedback signal "Assembly measuring".
3. When the "Measuring" position is reached, the air applied to the inlet M2 (1) is switched through and can be tapped at the outlet M2 (2) (Topcal/ Topclean: connect hose ⑤ to the limit position switch outlet).
4. Connect the compressed air supply line for "Assembly service" (Topcal/Topclean: hose no. ③) to the lower G 1/8 pneumatics connection.
5. Also, connect the compressed air supply line no. ③ to the inlet (1) of the upper limit position switch (S2, via T-piece). This limit position switch supplies the position feedback signal "Assembly service".
6. When the position "Service" is reached, the air applied to the inlet S2 (1) is switched through and can be tapped at the outlet S2 (2) (Topcal/ Topclean: hose no. ⑥).

Connection of the electric limit position switches

Like the pneumatic limit position switches, the electric limit position switches also serve as control elements and determine the sequence of the individual steps.

Connect the NAMUR limit position switches to the corresponding terminals at the transmitter. Please, refer to the Operating Instructions of the transmitter for the terminal numbers. The following figure shows the electric limit position switch connection to the terminals 11 to 14 of the Topcal S control unit, as an example.

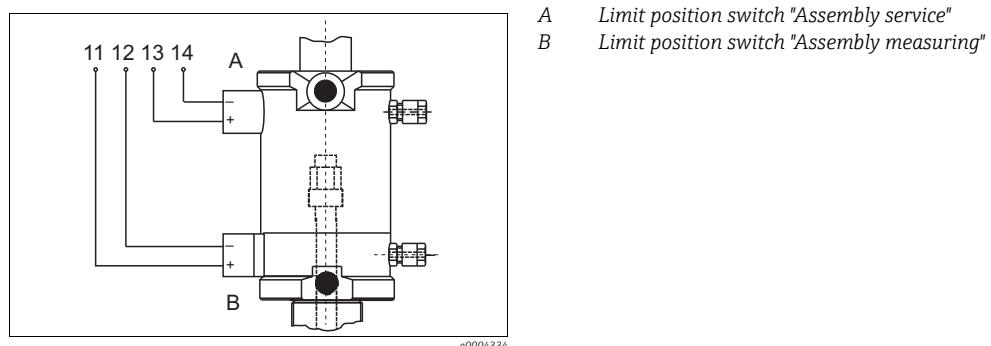


Fig. 12: Electric limit position switches to Topcal

3.2.4 Rinse water connection (optional)

The rinse chamber allows you to clean the electrode with water or cleaning solution with a pressure of 2 to max. 6 bar (30 to max. 87 psi). When using water, you have to install a check valve and a filter (100 µm) at the inlet side. When you operate the assembly with pneumatic actuation and use a cleaning solution, you have to install the chemically resistant ON/OFF valve (see "Accessories"). Install an outlet valve at the outlet side of the rinse chamber (see "Accessories").

NOTICE

If the water pressure can increase to above 6 bar (87 psi) (including any short pressure surges) the assembly can get damaged.

- Install a pressure-reducing valve upstream

- i** Connect the rinse connections to the in-house facilities via ball valves. If you do not use the rinse function, please leave the dummy plug installed.

3.3 Sensor installation

⚠ WARNING

There is a risk of injury due to high pressure, high temperature or chemicals.

- ▶ Wear protective gloves, protective goggles and protective clothing.
- ▶ Install the assembly only on empty and unpressurized tanks or pipes.

3.3.1 Preparing sensor and assembly

1. Remove the protection cap from the sensor.
Make sure the sensor shaft is fitted with the O-ring and the thrust collar (→  13).
2. Moisten the sensor shaft before installing the sensor.
3. Depending on the assembly version:
 - a. *Manually driven assembly*: Pull the retractable pipe as far as possible out of the assembly.
 - b. *Pneumatically driven assembly*: Move the assembly into the "Service" position.
4. Turn the stop lock bolt through 90° so that the plastic grooves are located above the recesses (→  14, A).
5. Turn the retractable pipe **clockwise** until the stop lock bolt engages (B).
6. Vent the rinse chamber.

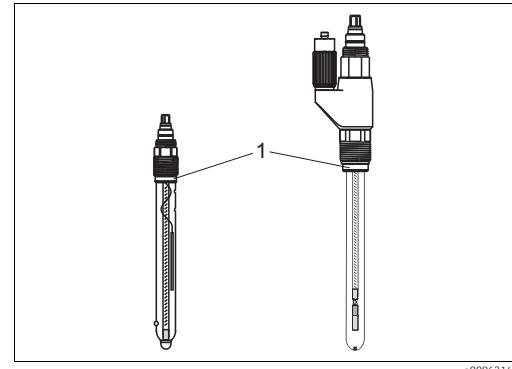


Fig. 13: Sensor installation

1 Thrust collar and O-ring

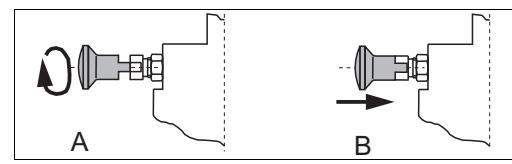


Fig. 14: Stop bolt

NOTICE

Malfunction due to counter clockwise rotation

- ▶ If turned in the opposite direction, the stop lock bolt does engage, too. This could, however, loosen the sensor holder. The reason for this are adhesions on the lower part of the sensor holder. These can cause the sensor holder to get stuck, producing a counterforce when unscrewing the sensor holder.

3.3.2 Gel sensor installation

1. Open a rinse fitting to vent the rinse chamber.
2. Remove the splash protection cap (→  15, pos. 1) from the assembly.
3. Take care that the surface of the retractable pipe (pos. 3) is not damaged. The surface is a seal face. Loosen the retractable pipe by turning it counterclockwise.
4. Install the sensor (pos. 7) instead of the dummy plug (pos. 4):
 - first screw by hand
 - then tighten the sensor by approx. $\frac{1}{4}$ turn using an open end wrench (AF 17).
5. Insert the measuring cable (pos. 6) through the retractable pipe :
 - Fixed cable:
from the bottom through the retractable pipe, from the sensor to the transmitter
 - Plug-in head sensor:
from the top to the sensor head
6. *Plug-in head sensor only:*
Connect sensor and cable.
7. Screw the retractable pipe back onto the electrode holder (pos. 5) (clockwise, by hand).
8. Place the measuring cable in the splash protection cap and place the cap on the retractable pipe.
9. Put the PML plug onto the PML terminal (PML = potential matching line, pos. 2).
10. Unlock the stop lock bolt.

Remove the sensor in the reverse sequence of operations.

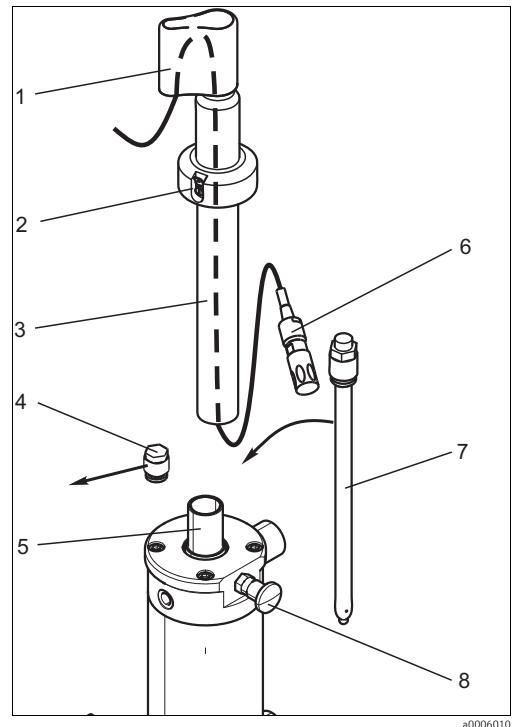


Fig. 15: Sensor installation

1	Splash protection cap
2	PML terminal (potential matching line)
3	Retractable pipe
4	Dummy plug
5	Electrode holder with guidance
6	Measuring cable with cable plug
7	Sensor or electrode
8	Stop lock bolt

3.3.3 Sensor with liquid KCl electrolyte

1. Make sure the assembly is in the service position.
2. Open the rinse connection to vent the rinse chamber.
3. Remove the splash protection cap (→ Fig. 16, pos. 6) and the KCl hood (pos. 7) incl. the protective tube from the assembly.
4. Screw in the sensor into the retractable pipe:
 - first screw by hand
 - then tighten the sensor by approx. $\frac{1}{4}$ turn using an open end wrench (AF 17).
5. Insert the measuring cable through the protective tube and the KCl hood:
 - Fixed cable:
from the sensor upwards to the transmitter
 - Sensor with plug-in head:
from the top through the KCl hood to the sensor
 - In case of symmetrical pH measurement:
connect the PML connector (pos. 3)
6. *Plug-in head sensor only:*
Connect sensor and cable.
7. Connect the electrolyte supply tube (pos. 1) to the electrolyte connection of the sensor.
8. Affix the supplied tubing support (pos. 9) to the electrolyte supply tube directly above the electrolyte connection.
9. Attach the KCl hood to the retractable pipe. Guide the electrolyte supply tube through the lateral slot of the hood.
10. Place the measuring cable in the splash protection cap and place the cap on the protective tube of the KCl hood.
11. Unlock the stop lock bolt.

Remove the sensor in the reverse sequence of operations.

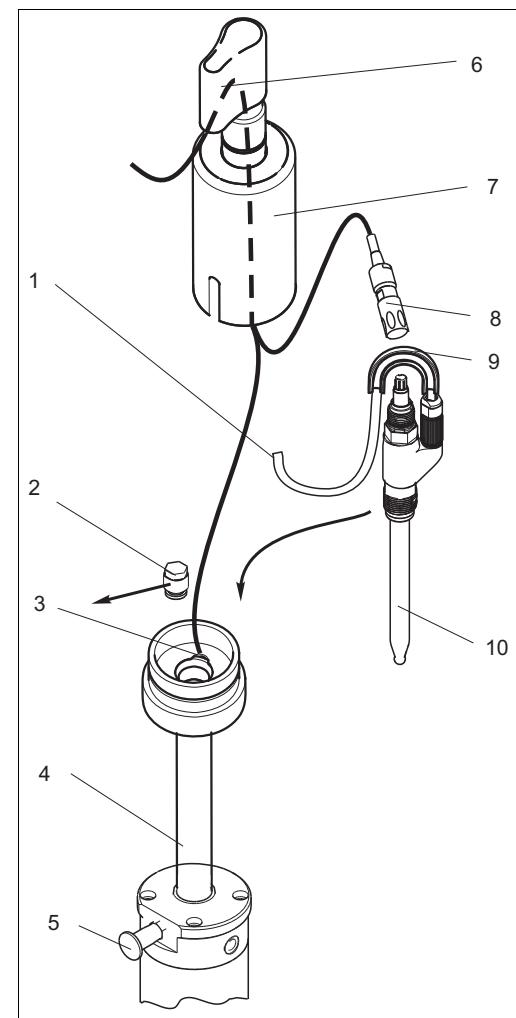


Fig. 16: Liquid KCl electrolyte sensor installation

1	Liquid KCl supply tube
2	Dummy plug
3	PML connection
4	Retractable pipe (fixed)
5	Stop lock bolt
6	Splash protection cap
7	KCl hood
8	Plug-in head cable
9	Tubing support
10	Sensor with liquid KCl connection

3.4 Post-installation check

- After installation, check that all connections are firmly in position and leak-tight.
- Ensure that the hoses of the rinse water connections (optionally) are tight. These hoses are in contact with the medium and must be secured accordingly.
- Check all hoses for damage.

4 Operability

4.1 First commissioning

Before the first commissioning, make sure of the following items:

- All seals are correctly seated (on the assembly and process connection).
- The sensor is correctly installed and connected.
- The water supply line is correctly connected to the rinse connections (if fitted).

⚠ WARNING

There is a risk of injury due to high pressure, high temperature or chemicals.

- ▶ Before applying the process pressure to the assembly, make sure the connections are correctly fitted.
- ▶ If you use a manual outlet valve for the rinse chamber as a vent valve, ensure the counter side of the rinse chamber is closed by the dummy plug. Otherwise the assembly may **not** be put into the process!

4.2 Operating elements

Use the stop lock bolt to lock or release the retractable pipe (→ 17, → 18).

When using manually operated assemblies, the retractable pipe can be locked in both, the "Measuring" position and the "Service" position. When using pneumatically operated assemblies, this can only be done in the "Service" position.

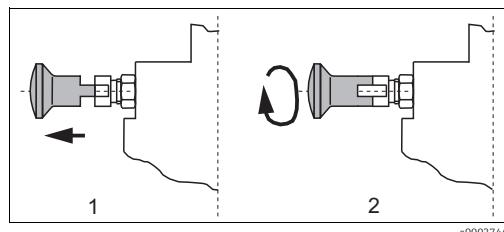


Fig. 17: Releasing the stop lock bolt

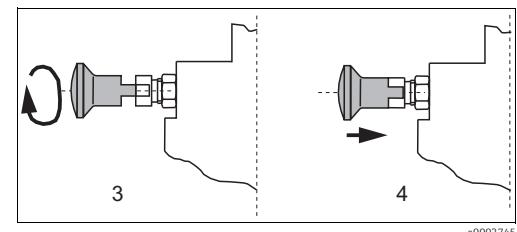


Fig. 18: Locking the stop lock bolt

Releasing the stop lock bolt:

1. Pull the bolt out.
2. Turn the bolt by 90° so that the plastic grooves rest on the metal edge.

Locking the stop lock bolt:

3. Turn the stop lock bolt through 90° so that the plastic grooves are located above the recesses.
4. When the retractable pipe is turned clockwise, the bolt engages.

4.3 Manual operation

Moving the assembly from the "Service" position to the "Measuring" position

1. Release the stop lock bolt catch.
2. Push the retractable pipe so that the sensor holder is inserted fully into the process.
3. Lock the sensor holder with the stop lock bolt. This prevents the retractable pipe from returning inadvertently into the "Service" position.

⚠ WARNING

Uncontrolled movement of the retractable pipe

Risk of injury

► Always lock the sensor holder. Otherwise, the retractable pipe may exit uncontrolled as a result of the process pressure and injure somebody.

Moving the assembly from the "Measuring" position to the "Service" position

1. Release the stop lock bolt catch.
2. Pull the retractable pipe out as far as possible ("Service" position).
3. Lock the sensor holder with the stop lock bolt.
4. Complete the necessary service tasks.

4.4 Pneumatic operation

Safety stop

The pneumatic retractable assembly CPA472D is fitted with an integrated safety stop mechanism (patented). This mechanism prevents the assembly from entering the process if the electrode is not installed but the compressed air supply is connected.

The safety stop mechanism is based on the air channels and works as follows:

The electrode is not installed and the command is given to "Move to measuring position": Pressure cannot build up since the compressed air enters the upper section of the electrode holder via the air channels and escapes via the retraction pipe. This is signalled by a loud noise.

The electrode is installed and the command is given to "Move to measuring position": The electrode closes the air channels and seals off the chamber above the electrode thread. The upper part of the cylinder is filled with compressed air. Pressure builds and the electrode holder enters the process.

This means that an electrode must be installed in the assembly before the assembly can move to the measuring position.

Operation of the pneumatic version depends on the used control unit. Refer to the operating manual of the control unit for instructions.

i During maintenance work (e.g. installing and removing the sensor), always lock the assembly in the "Service" position by the stop lock bolt.
During the automatic rinse process, do not lock the retractable pipe by the stop lock bolt. Otherwise the assembly can no longer move automatically to the "Measuring" position. If a maintenance switch is fitted on the transmitter, set it to "Maintenance" or "Service". It is not possible to lock the assembly in the "Measuring" position. The pneumatic system maintains the back pressure to the process pressure.

5 Maintenance

⚠ WARNING

Risk of injury if medium escapes!

- ▶ Prior to performing any maintenance task, make sure that the process pipe is unpressurized, empty and rinsed.

Move the assembly to the "Service" position and lock the retractable pipe by the stop lock bolt.

5.1 Cleaning the assembly

To ensure a reliable measurement, the assembly and the sensor must be cleaned at regular intervals. The frequency and intensity of the cleaning operation depend on the process medium.

5.1.1 Manually operated assembly

All parts in contact with the medium, e.g. the sensor and the sensor holder, must be cleaned at regular intervals. Remove the sensor²⁾.

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

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

5.1.2 Pneumatically operated assembly

Pneumatically-controlled cleaning can be carried out regularly via the rinse connection and the corresponding equipment, e.g. with the fully automatic cleaning and calibration system Topcal S CPC310.

5.2 Cleaning the sensor

You have to clean the sensor:

- before every calibration
- regularly during operation
- before being returned to the supplier

You can remove and clean the sensor manually or perform an automatic cleaning operation³⁾ via the rinse connection.

NOTICE

Incorrect measurement or damage of the sensor due to inaccurate cleaning

- ▶ Clean ORP electrodes only mechanically and with water, do not use any chemical cleaning agents. These cleaning agents apply a potential to the electrode that takes several hours to decay. This potential causes measuring errors.
- ▶ Do not use any abrasive cleaning agents. This can lead to irreparable damage of the sensor.
- ▶ After cleaning the sensor, rinse the rinse chamber of the assembly with copious amounts of water (possibly distilled or de-ionized). Otherwise, remaining residues of cleaning agent can corrupt measurement.
- ▶ If required, re-calibrate after cleaning.

2) in reverse sequence of operations to the installation procedure

3) with the corresponding assembly equipment only

5.3 Cleaning agents

The selection of the cleaning agent is dependent on the degree and type of contamination. The most common contaminations and the suitable cleaning agents are listed in the following table.

Type of contamination	Cleaning agent
Greases and oils	Hot water or tempered substances containing tensides (alkaline) ¹⁾ or water-soluble organic solvents (e.g. ethanol)
Calciferous deposits, metal hydroxide deposits, lyophobic biological deposits	Approx. 3% hydrochloric acid
Sulphide deposits	Mixture of 3% hydrochloric acid and thiocarbamide (commercially available)
Protein deposits	Mixture of 3% hydrochloric acid and pepsin (commercially available)
Fibers, suspended substances	Water under pressure, poss. with surface-active agents
Light biological deposits	Water under pressure

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

⚠ CAUTION

Health hazards due to solvents

- Do not use organic solvents containing halogen or acetone. These solvents could destroy plastic components of the assembly or the sensor and are suspected carcinogens.

5.4 Replacing seals

To replace the seals of the assembly you have to interrupt the process and to remove the assembly completely

⚠ CAUTION

Medium residues and higher temperatures

Risk of injury

- Beware of medium residues and higher temperatures when handling components that were in contact with medium. Wear protection gloves and protection glasses.

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

i The retractable pipe is used as seal face. Do not scratch the surface.

Preparation:

1. Interrupt the process. Beware of medium residues, residual pressure and higher temperatures.
2. Move the assembly to the "Service" position. Secure this position by the stop lock bolt.
3. Dismount the sensor.
4. Dismount the assembly from the process connection.
5. Clean the assembly (see chapter "Cleaning the assembly")

Dismantling the assembly

1. Remove the clip-on raising face. Use a screw driver to loosen the raising face (→  19).
2. Loosen the four bolts (→  20) and remove the flange and the rinse chamber.
3. Only versions with gel sensors: Unscrew the retractable pipe (counterclockwise).
4. Unscrew the electrode.
5. Release the stop lock bolt and turn it by 90°.
6. Pull the electrode holder out of the bottom side of the assembly body.
7. Loosen the four bolts of the cylinder head and remove the cylinder head.

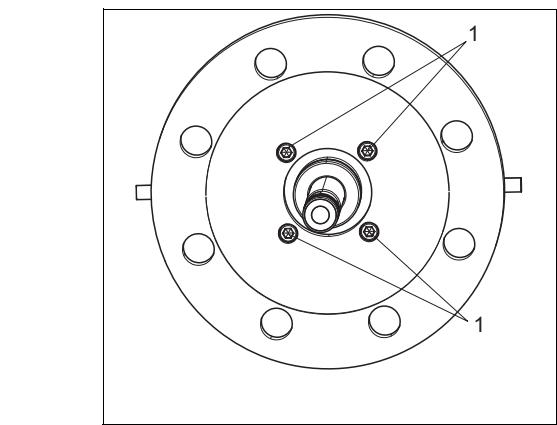
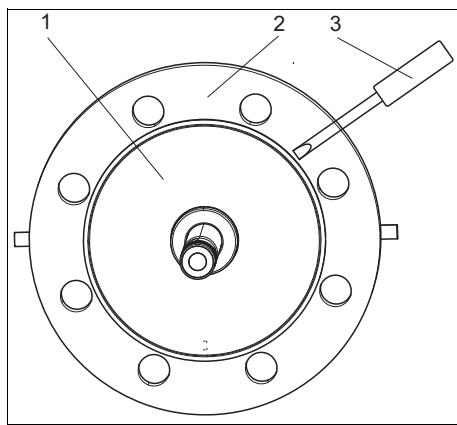


Fig. 19: Remove the raising face

1 Raising face
2 Flange
3 Screw driver

Fig. 20: Remove flange and rinse chamber

1 Bolts with locking washers

Replacing the seals

1. Apply a thin layer of grease to the new seals (e.g. Syntheso Glep1).
2. Replace the seals shown below.
3. Re-assemble the assembly.

Flange version

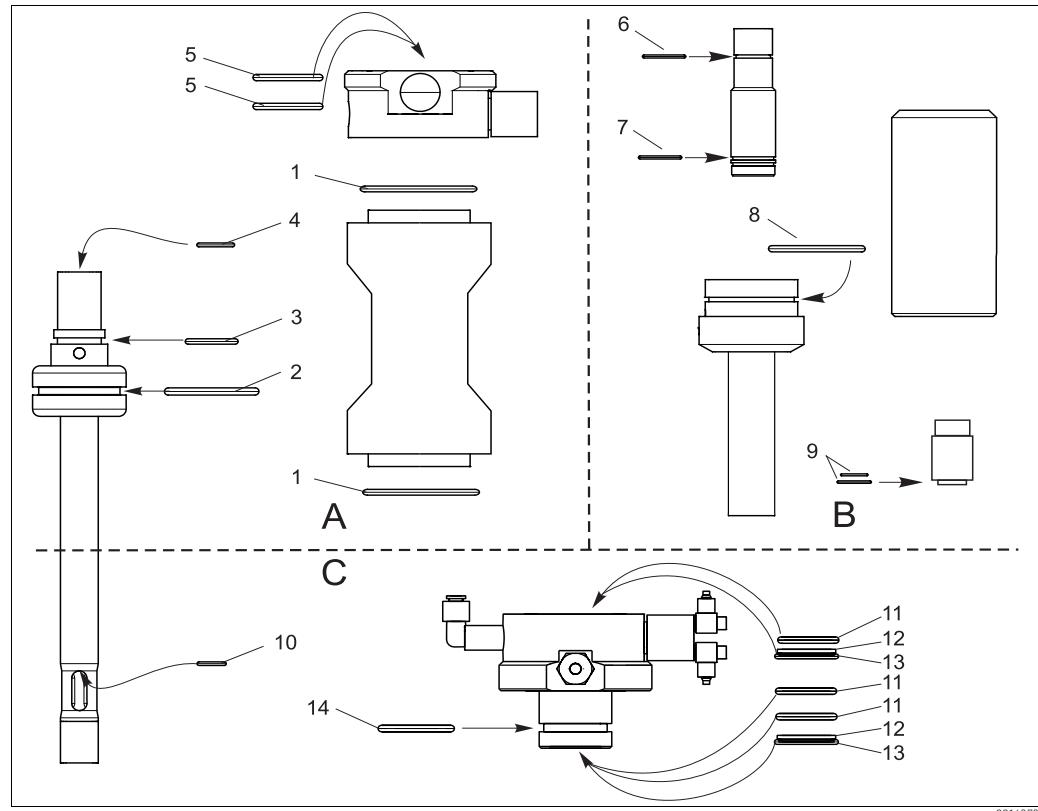


Fig. 21: O-rings of the flange version

A O-rings not in contact with medium
 B O-rings for KCl version
 C O-rings in contact with medium

No.	Kit No.	Kit pos. No. (installation drawing)	Size	Remarks/material
1	71024454	Pos. 20	ID 52.00 W1.50	2x, EPDM
2	71024454	Pos. 10	ID 42.00 W4.00	Pneumatic version only, FPM
		Pos. 140	ID 37.00 W4.00	Manual version only, FPM
3	71024454	Pos. 30	ID 22.00 W3.00	EPDM
4	71024454	Pos. 70	ID 11.00 W2.00	FPM
5	71024454	Pos. 40	ID 30.00 W3.50	1x, FPM manual version 2x, FPM pneumatic version
6	71024454	Pos. 100	ID 20.35 W1.78	EPDM
7	71024454	Pos. 110	ID 23.52 W1.78	KCl version
8	71024454	Pos. 120	ID 55.25 W2.62	KCl version
9	71024454	Pos. 130	ID 15.00 W2.00	KCl version (adapter below)
	71024454	Pos. 150	ID 11.00 W2.00	KC version (adapter inside)
10	71211751	Pos. 70	ID 11.00 W 2.00	FPM

No.	Kit No.	Kit pos. No. (installation drawing)	Size	Remarks/material
10	71211752	Pos. 70	ID 11.00 W 2.00	EPDM
10	71211749	Pos. 70	ID 11.00 W 2.00	Kalrez
11	71211751	Pos. 100	ID 24.99 W 3.53	3x, FPM
11	71211752	Pos. 100	ID 24.99 W 3.53	3x, EPDM
11	71211749	Pos. 100	ID 24.99 W 3.53	3x, Kalrez
12	71211751	Pos. 80	25 mm	2x, scraper
12	71211752	Pos. 80	25 mm	2x, scraper
12	71211749	Pos. 80	25 mm	2x, scraper
13	71211751	Pos. 90	ID 28.24 W 2.62	2x, FPM
13	71211752	Pos. 90	ID 28.24 W 2.62	2x, EPDM
13	71211749	Pos. 90	ID 28.24 W 2.62	2x, Kalrez
14	71211751	Pos. 110	ID 32.92 W 3.53	FPM
14	71211752	Pos. 110	ID 32.92 W 3.53	EPDM
14	71211749	Pos. 110	ID 32.92 W 3.53	Kalrez

Thread version

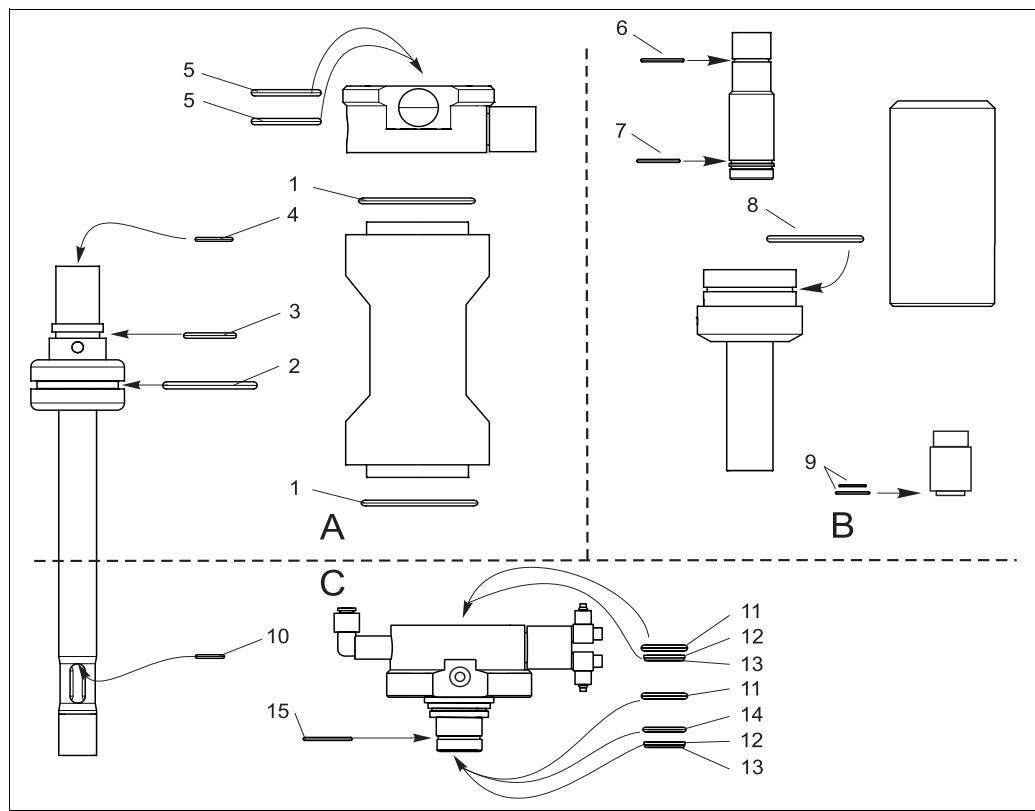


Fig. 22: O-rings of the thread version

A O-rings not in contact with medium
 B O-rings for KCl version
 C O-rings in contact with medium

No.	Kit No.	Kit pos. No. (installation drawing)	Size	Remarks/material
1	71024454	Pos. 20	ID 52.00 W1.50	2x, EPDM
2	71024454	Pos. 10	ID 42.00 W4.00	Pneumatic version only, FPM
		Pos. 140	ID 37.00 W4.00	Manual version only, FPM
3	71024454	Pos. 30	ID 22.00 W3.00	EPDM
4	71024454	Pos. 70	ID 11.00 W2.00	FPM
5	71024454	Pos. 40	ID 30.00 W3.50	1x, FPM manual version 2x, FPM pneumatic version
6	71024454	Pos. 100	ID 20.35 W1.78	EPDM
7	71024454	Pos. 110	ID 23.52 W1.78	KCl version
8	71024454	Pos. 120	ID 55.25 W2.62	KCl version
9	71024454	Pos. 130	ID 15.00 W2.00	KCl version (adapter below)
	71024454	Pos. 150	ID 11.00 W2.00	KCl version (adapter inside)
10	71211745	Pos. 70	ID 11.00 W 2.00	FPM
10	71211736	Pos. 70	ID 11.00 W 2.00	EPDM
10	71211748	Pos. 70	ID 11.00 W 2.00	Kalrez
11	71211745	Pos. 60	ID 18.64 W 3.53	2x, FPM
11	71211736	Pos. 60	ID 18.64 W 3.53	2x, EPDM
11	71211748	Pos. 60	ID 18.64 W 3.53	2x, Kalrez
12	71211745	Pos. 10	18 mm	2x, scraper
12	71211736	Pos. 10	18 mm	2x, scraper
12	71211748	Pos. 10	18 mm	2x, scraper
13	71211745	Pos. 20	ID 18.77 W 1.78	2x, FPM
13	71211736	Pos. 20	ID 18.77 W 1.78	2x, EPDM
13	71211748	Pos. 20	ID 18.77 W 1.78	2x, Kalrez
14	71211745	Pos. 50	ID 18.72 W 2.62	FPM
14	71211736	Pos. 50	ID 18.72 W 2.62	EPDM
14	71211748	Pos. 50	ID 18.72 W 2.62	Kalrez
15	71211745	Pos. 30	ID 21.50 W 1.50	FPM
15	71211736	Pos. 30	ID 21.50 W 1.50	EPDM
15	71211748	Pos. 30	ID 21.50 W 1.50	Kalrez

6 Repair

6.1 Replacing damaged parts

⚠ WARNING

Incorrectly repaired devices can cause hazard

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

Replace all other damaged parts immediately.

6.2 Spare part kits

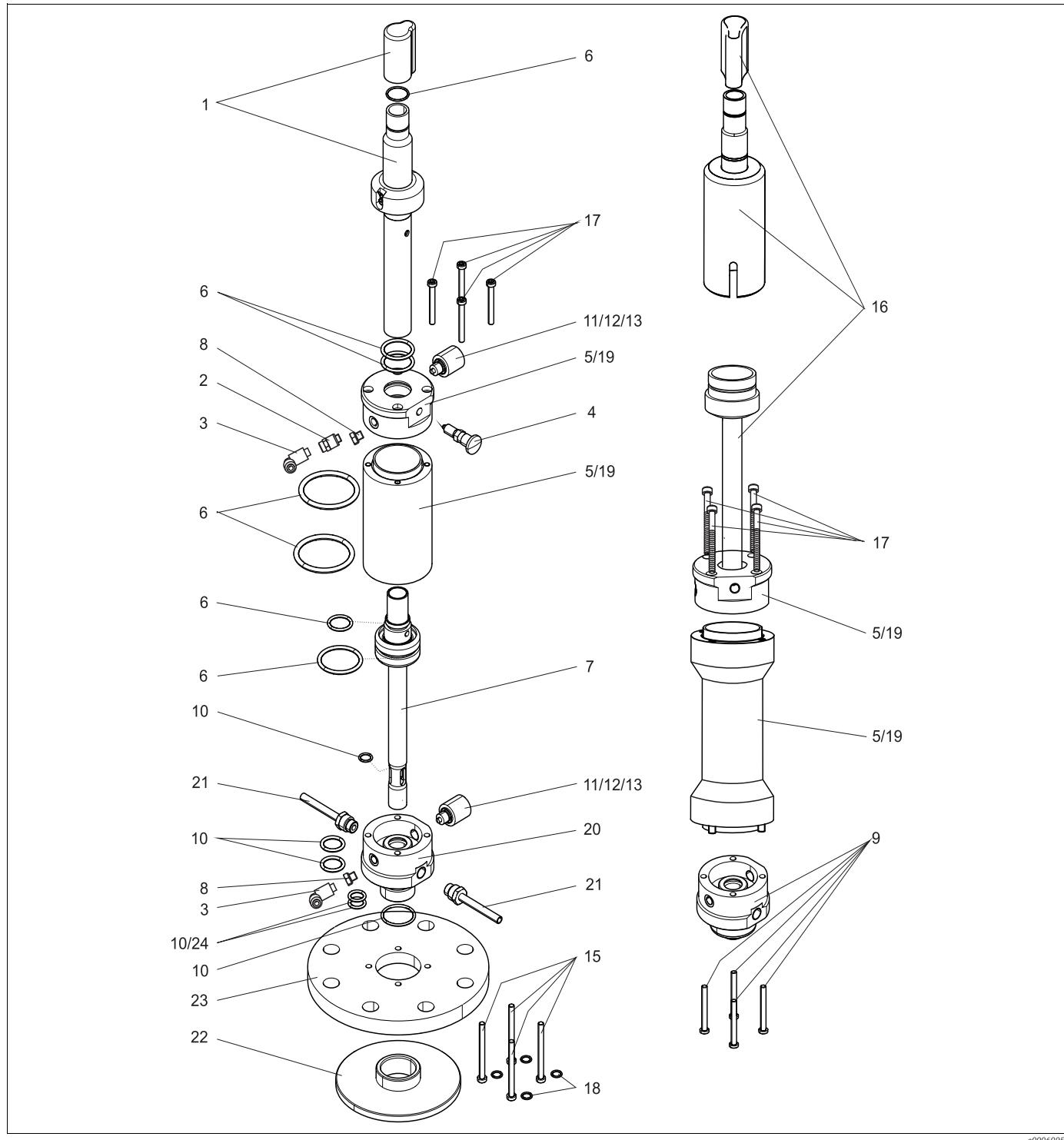


Fig. 23: Spare parts (all assembly versions)

i Please, refer to the following table for the spare part kits ordering numbers acc. to the positions in → 23
For KCl version the retractable pipe is fixed in the cylinder head (Loctite).

Position	Description and kit content	Spare part kit order no.
1	Retractable pipe for gel electrodes 360 mm For assembly version: - manual - long, immersion depth up to 280 mm Kit 472D long, manual	71026649
	Retractable pipe for gel electrodes 360 mm For assembly version: - pneumatic - long, immersion depth up to 280 mm Kit 472D long, pneumatic	71026651
	Retractable pipe for gel electrodes 225 mm For assembly version: - manual - short, immersion depth up to 148 mm Kit 472D short, manual	71026652
	Retractable pipe for gel electrodes 225 mm For assembly version: - pneumatic - short, immersion depth up to 148 mm Kit 472D short, pneumatic	71026653
2, 8	Exhaust air restrictor (pos. 2) and SS 1.4404 (AISI 316L) dummy plug (pos. 8) For assembly version: - manual 5 pieces each	51503732
3	G1/8 pneumatic elbow connections , material: stainless steel For assembly version: - pneumatic 2 pieces	71027935
4	Stop bolt with handle	51503731
5	PA cylinder 1.4404 with cylinder head For assembly version: - short, immersion depth up to 148 mm	71026658
6	Set of seals, not in contact with medium FPM (Viton)	71024454

Position	Description and kit content	Spare part kit order no.
7	Sensor guide with piston, without gaskets, material: 1.4571 (AISI 316Ti) For assembly version: – long, immersion depth up to 280 mm – for metal rinse chamber	71214236
	Sensor guide with piston, without gaskets, material: Alloy C22 For assembly version: – long, immersion depth up to 280 mm – for metal rinse chamber	71214237
	Sensor guide with piston, without gaskets, material: 1.4571 (AISI 316Ti) For assembly version: – short, immersion depth up to 148 mm – for metal rinse chamber	71214238
	Sensor guide with piston, without gaskets, material: Alloy C22 For assembly version: – short, immersion depth up to 148 mm – for metal rinse chamber	71214239
	Sensor guide with piston, without gaskets, material: 1.4571 (AISI 316Ti) For assembly version: – long, immersion depth up to 280 mm – for plastic rinse chamber	71214240
	Sensor guide with piston, without gaskets, material: Alloy C22 For assembly version: – long, immersion depth up to 280 mm – for plastic rinse chamber	71214242
	Sensor guide with piston, without gaskets, material: 1.4571 (AISI 316Ti) For assembly version: – short, immersion depth up to 148 mm – for plastic rinse chamber	71214243
	Sensor guide with piston, without gaskets, material: Alloy C22 For assembly version: – short, immersion depth up to 148 mm – for plastic rinse chamber	71214244
	Sensor guide with piston, without gaskets, material: PEEK For assembly version: – long, immersion depth up to 280 mm – for plastic rinse chamber	71214245
	Sensor guide with piston, without gaskets, material: PEEK For assembly version: – short, immersion depth up to 148 mm – for plastic rinse chamber	71214246
	Sensor guide with piston, without gaskets, material: PVDF For assembly version: – long, immersion depth up to 280 mm – for plastic rinse chamber	71214247
	Sensor guide with piston, without gaskets, material: PVDF For assembly version: – short, immersion depth up to 148 mm – for plastic rinse chamber	71214248
	Sensor guide with piston, without gaskets, material: PVDF conductive For assembly version: – long, immersion depth up to 280 mm – for plastic rinse chamber	71214249
	Sensor guide with piston, without gaskets, material: PVDF conductive For assembly version: – short, immersion depth up to 148 mm – for plastic rinse chamber	71214250

Position	Description and kit content	Spare part kit order no.
9	Rinse chamber, complete, G1¼ internal thread, material: Alloy C22 For assembly version: - process connection: internal thread G1¼ - with rinse connection G¼	71214033
	Rinse chamber, complete, G1¼ internal thread, material: 1.4571 (AISI 316Ti) For assembly version: - process connection: internal thread G1¼ - with rinse connection G¼	71214026
	Rinse chamber, complete, G1¼ internal thread, material: Alloy C22 For assembly version: - process connection: internal thread G1¼ - with rinse connection NPT¼	71214228
	Rinse chamber, complete, G1¼ internal thread, material: 1.4571 (AISI 316Ti) For assembly version: - process connection: internal thread G1¼ - with rinse connection NPT¼	71214227
10	Set of seals, in contact with medium FPM (Viton), for flange version	71211751
	Set of seals, in contact with medium FPM (Viton), for G1¼ version	71211745
	Set of seals, in contact with medium EPDM, for flange version	71211752
	Set of seals, in contact with medium EPDM, for G1¼ version	71211736
	Set of seals, in contact with medium Kalrez, for flange version	71211749
	Set of seals, in contact with medium Kalrez, for G1¼ version	71211748
11	M12x1 stopper For assembly version: - pneumatic, without limit position switch 10 pieces	51503733
12	Set of pneumatic limit position switches For assembly version: - pneumatic 2 pieces	51502874
13	Set of electric limit position switches, Ex and Non-Ex For assembly version: - pneumatic 2 pieces	51502873
15	M6x70 screws, DIN 69612 A-4/2, 20 pieces	71026789
16	Retractable pipe for 360 mm (14.2") liquid KCl electrodes For assembly version: - pneumatic - short, immersion depth up to 148 mm Kit 472D short, pneumatic	71102513
	Retractable pipe for 360 mm (14.2") liquid KCl electrodes For assembly version: - manual - short, immersion depth up to 148 mm Kit 472D short, manual	71102512
17	M6x45 screws, DIN 69612 A-4/3 20 pieces	51503738
18	Locking washers, 1.4301 (AISI 304) 20 pieces	71103282

Position	Description and kit content	Spare part kit order no.
19	PA cylinder stainless steel 1.4404 (AISI 316 L) with cylinder head For assembly version: – long, immersion depth up to 280 mm	71026656
20	Rinse chamber complete, material: PEEK For assembly version: – process connection: flange DN 50 / DN 80 / ANSI – with rinse connection G $\frac{1}{4}$	71214230
	Rinse chamber complete, material: PVDF For assembly version: – process connection: flange DN 50 / DN 80 / ANSI – with rinse connection G $\frac{1}{4}$	71214232
	Rinse chamber complete, material: conductive PVDF For assembly version: – process connection: flange DN 50 / DN 80 / ANSI – with rinse connection G $\frac{1}{4}$	71214233
	Rinse chamber complete, material: Alloy C22 For assembly version: – process connection: flange DN 50 / DN 80 / ANSI – with rinse connection G $\frac{1}{4}$	71214235
21	Rinse chamber complete, material: stainless steel 1.4571 (AISI 316 Ti) For assembly version: – process connection: flange DN 50 / DN 80 / ANSI – with rinse connection G $\frac{1}{4}$	71214234
	Rinse connection nozzle G $\frac{1}{4}$, Alloy C22, Swagelok	71026794
22	Rinse connection nozzle G $\frac{1}{4}$, stainless steel 1.4571 (AISI 316 Ti), Swagelok	71026796
	Raised face, PEEK, for DN 50 and ANSI 2"	71026766
	Raised face, PVDF, for DN 50 and ANSI 2"	71026767
	Raised face, conductive PVDF, for DN 50 and ANSI 2"	71026768
	Raised face, Alloy C22, for DN 50 and ANSI 2"	71026770
	Raised face, titanium, for DN 50 and ANSI 2"	71026771
	Raised face, stainless steel 1.4571 (AISI 316 Ti), for DN 50 and ANSI 2"	71026772
	Raised face, PEEK, for DN 80	71026781
	Raised face, PVDF, for DN 80	71026783
	Raised face, conductive PVDF, for DN 80	71026784
	Raised face, Alloy C22, for DN 80	71026785
	Raised face, titanium, for DN 80	71026786
23	Raised face, stainless steel 1.4571 (AISI 316 Ti), for DN 80	71026787
	Flange DN 50	71026774
	Flange DN 80	71026775
	Flange ANSI 2"	71026776

6.3 Return

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

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

www.services.endress.com/return-material

6.4 Disposal

The device contains electronic components and must therefore be disposed of in accordance with regulations on the disposal of electronic waste.

Please observe local regulations.

7 Accessories

7.1 Process adapter

Built-in adapter DN 25

- Stainless steel 1.4404
- "Straight" version - Order No.: 51500328
- "Inclined" version - Order No.: 51500327

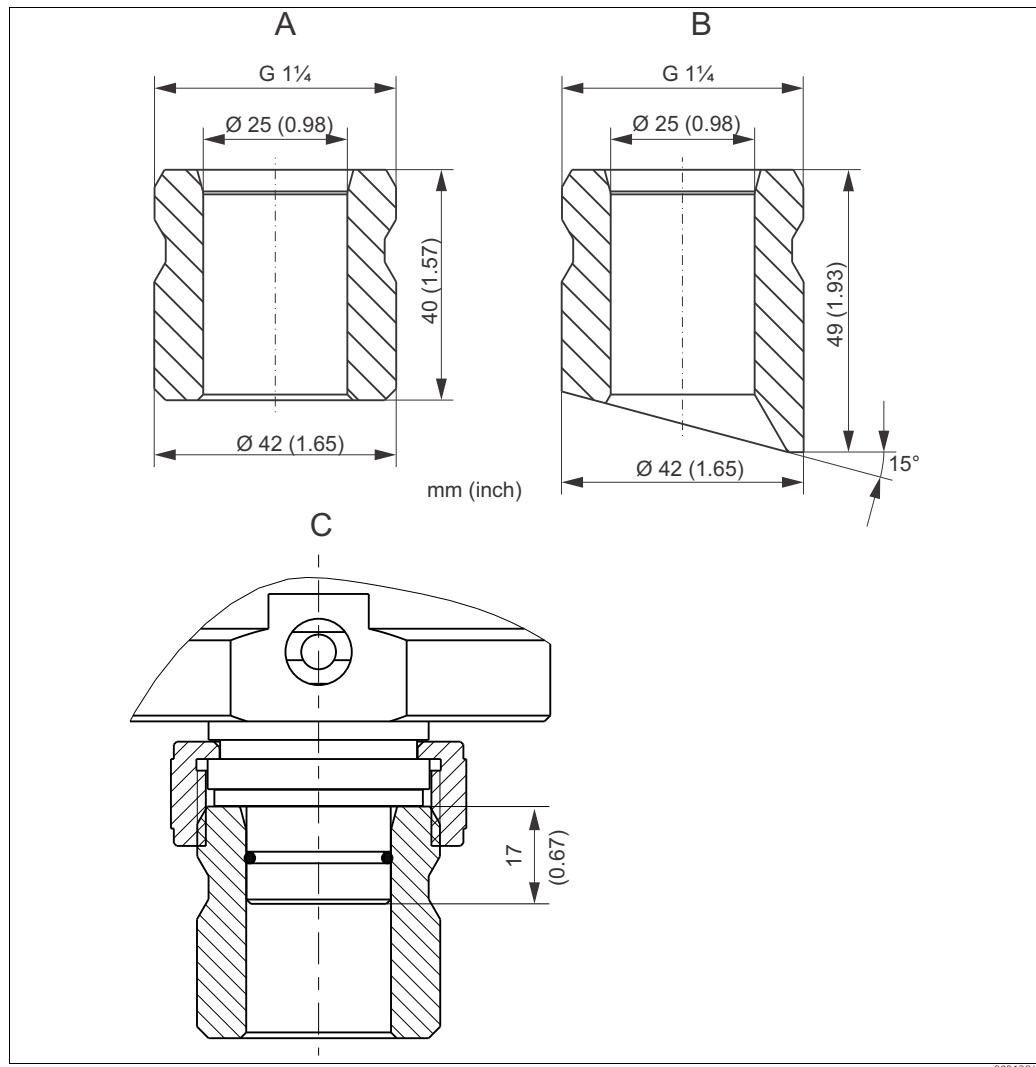


Fig. 24: Build-in adapter

- A** Build-in adapter, straight
- B** Build-in adapter, inclined
- C** Build-in adapter, CPA472D installed

Welded fitting DN 50 (70 mm), inclined, material: 1.4571 (AISI 316 Ti);
► order no. 71098682

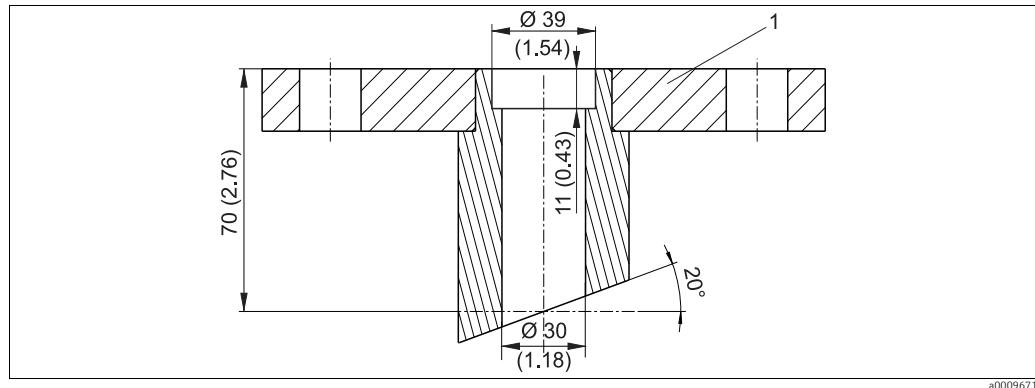


Fig. 25: Welded fitting

1 Flange DN 50 / PN16

Dummy plug for G1¼ process connection,

- Stainless steel 1.4435 (AISI 316L), FKM (Viton®) seal, G1¼ internal thread; order no. 51502800

Dummy plug for G¼ rinse connection,

- SS 1.4404 (AISI 316L); order no. 50092264

7.2 Anti-twist device

Anti-twist device

- Anti-twist device for CPA472D
- Screw (5): stainless steel 1.4404 (AISI 316 L)
- Plate (3): PA 6 G black
- Star-knob screw (1): thermoplast black and stainless steel 1.4305 (AISI 303)
- Sleeves (2 and 3): PVC black
- Order no. 71224451

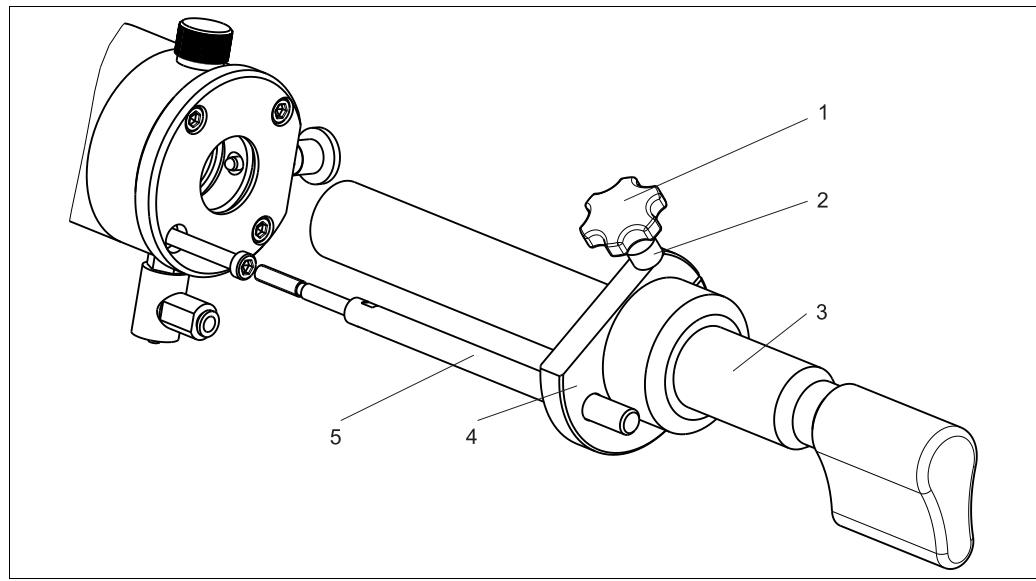


Fig. 26: Anti-twist device

1	Star-knob screw
2	Distance sleeve
3	Sleeve
4	Plate
5	Screw

7.3 Installation material for rinse connection

Filter set CPC310

- 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 nozzles for rinse connections G $\frac{1}{4}$, DN 12, PVDF, 2 pieces; order no. 50090491

- Manual outlet safety seal for rinse chamber outlet, G $\frac{1}{4}$, order no. 51511937
- NPT $\frac{1}{4}$ ", order no. 51511938

- Rinse chamber input valve, pneumatically ON - OFF, PVDF with bellows, connection G $\frac{1}{4}$, (on request)

7.4 Limit position switches

Set of pneumatic limit position switches (2 pieces);

- order no. 51502874

Set of electric limit position switches, Ex and non-Ex (2 pieces);

- order no. 51502873

7.5 Pneumatic throttle

Pneumatic throttle for the reduction of the assembly moving speed,

- G1/8 threaded connection
- order no. 50036864

7.6 Sensors

7.6.1 Glass electrodes

Orbisint CPS11/CPS11D

- pH sensor for process applications
- Optional SIL version for connection to SIL approved transmitters
- With dirt-repellent PTFE diaphragm
- Ordering per product structure (--> Online configurator, www.products.endress.com/cps11 or www.products.endress.com/cps11d)
- Technical Information TI00028C/07/EN

Orbisint CPS12/CPS12D

- ORP electrode for process applications
- With dirt-repellent PTFE diaphragm
- Ordering per product structure (--> Online configurator, www.products.endress.com/cps12 or www.products.endress.com/cps12d)
- Technical Information TI00367C/07/EN

Ceraliquid CPS41/CPS41D

- pH sensor
- With ceramics diaphragm and liquid KCl electrolyte
- Ordering per product structure (--> Online configurator, www.products.endress.com/cps41 or www.products.endress.com/cps41d)
- Technical Information TI00079C/07/EN

Ceraliquid CPS42/CPS42D

- ORP electrode
- With ceramics diaphragm and liquid KCl electrolyte
- Ordering per product structure (--> Online configurator, www.products.endress.com/cps42 or www.products.endress.com/cps42d)
- Technical Information TI00373C/07/EN

Ceragel CPS71/CPS71D

- pH sensor
- With double chamber reference system and integrated bridge electrolyte
- Ordering per product structure (--> Online configurator, www.products.endress.com/cps71 or www.products.endress.com/cps71d)
- Technical Information TI00245C/07/EN

Ceragel CPS72/CPS72D

- ORP electrode
- With double chamber reference system and integrated bridge electrolyte
- Ordering per product structure (--> Online configurator, www.products.endress.com/cps72 or www.products.endress.com/cps72d)
- Technical Information TI00374C/07/EN

Orbipore CPS91/CPS91D

- pH sensor
- With open aperture for media with high dirt load
- Ordering per product structure (-> Online configurator, www.products.endress.com/cps91 or www.products.endress.com/cps91d)
- Technical Information TI00375C/07/EN

Orbipore CPS92/CPS92D

- ORP sensor
- With open aperture for media with high dirt load
- Ordering per product structure (-> Online configurator, www.products.endress.com/cps92 or www.products.endress.com/cps92d)
- Technical Information TI00435C/07/EN

7.6.2 ISFET sensors

Tophit CPS471/CPS471D

- Sterilizable and autoclavable ISFET sensor for food and pharmaceuticals, process technology,
- water treatment and biotechnology;
- Ordering per product structure (-> Online configurator, www.products.endress.com/cps471 or www.products.endress.com/cps471d)
- Technical Information TI283C/07/EN

Tophit CPS441/CPS441D

- Sterilizable ISFET sensor for media with low conductivity, with liquid KCl electrolyte;
- Ordering per product structure (-> Online configurator, www.products.endress.com/cps441 or www.products.endress.com/cps441d)
- Technical Information TI352C/07/EN

Tophit CPS491/CPS491D

- ISFET sensor with open aperture for media with high dirt load;
- Ordering per product structure (-> Online configurator, www.products.endress.com/cps491 or www.products.endress.com/cps491d)
- Technical Information TI377C/07/EN

7.7 Measuring cables

CPK9 measuring cable

- For sensors with TOP68 plug-in head, for high-temperature and high-pressure applications, IP 68
- Ordering acc. to product structure, see Technical Information (TI00118C/07/EN)

CPK1 measuring cable

- For pH/ORP electrodes with GSA plug-in head
- Ordering acc. to product structure, see Technical Information (TI00118C/07/EN)

CPK12 special measuring cable

- For pH/ORP glass electrodes and ISFET sensors with TOP68 plug-in head
- Ordering acc. to product structure, see Technical Information (TI00118C/07/EN)

CYK10 Memosens data cable

- For digital sensors with Memosens technology
pH, redox, oxygen (amperometric), chlorine, conductivity (conductive)
- Ordering acc. to product structure (-> online Configurator, www.products.endress.com/cyk10)

7.8 Transmitters

Liquiline CM44x/CM44xR

- Multiple-channel transmitter for the connection of digital sensors with Memosens technology
- Field device or DIN rail device
- Power supply: 100 to 230 V AC, 24 V AC/DC
- Universally upgradeable
- SD card slot
- Ordering per product structure (--> Online configurator on product page)
- Technical Information TI00444C/07/EN (CM44x) or TI01112C/07/EN (CM44xR)

Liquiline CM42

- Modular two-wire transmitter, stainless steel or plastic, field or panel instrument
- Various Ex approvals (ATEX, FM, CSA, Nepsi, TIIS)
- HART, PROFIBUS or FOUNDATION Fieldbus available
- Ordering acc. to product structure, see Technical Information (TI381C/07/en)

Liquisys CPM223/253

- Transmitter for pH and ORP, field or panel-mounted housing
- HART or PROFIBUS available
- Ordering acc. to product structure, see Technical Information (TI194C/07/en)

Mycom CPM153

- Transmitter for pH and ORP, one or two channel version, Ex or non-Ex
- HART or PROFIBUS available
- Ordering acc. to product structure, see Technical Information (TI233C/07/en)

7.9 Measuring, cleaning and calibration systems

Topcal CPC310

- Fully automatic measuring, cleaning and calibration system; Ex or non-Ex
- In-situ cleaning and calibration, automatic sensor monitoring
- Ordering acc. to product structure, Technical Information TI404C/07/en

Topclean CPC30

- Fully automatic measuring and cleaning system; Ex or non-Ex
- In-situ cleaning, automatic sensor monitoring
- Ordering acc. to product structure, see Technical Information TI235C/07/en

8 Technical data

8.1 Environment

Ambient temperature	Ambient temperature not below 0 °C (32 °F). With an optional inlet/outlet safety seal, the ambient temperature may not exceed 80 °C (176 °F).
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8.2 Process

Process temperature range	0 to 140 °C (32 to 284 °F)
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Process pressure	0 to max. 4 bar (0 to max. 58 psi) overpressure for manual actuation 0 to 10 bar (0 to 145 psi) overpressure for pneumatic actuation
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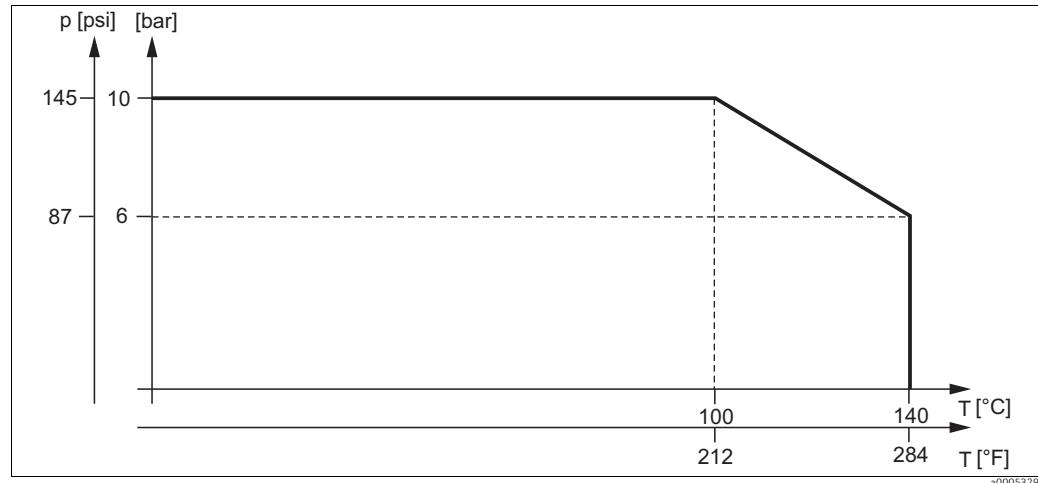
Pressure temperature diagram

Fig. 27: Pressure temperature diagram

8.3 Mechanical construction

Design, dimensions	See chapter "Installation"	
Weight	Depending on the material: 7.5 to 12.0 kg (16.54 to 26.46 lbs)	
Materials	In contact with medium:	
	Electrode holder	PEEK, PVDF, conductive PVDF, Alloy C22, stainless steel 1.4571 (AISI 316 Ti)
	Rinse chamber and raised face	PEEK, PVDF, conductive PVDF, Alloy C22, stainless steel 1.4571 (AISI 316 Ti)
	Seals	EPDM/FPM (Viton)/FFKM (Kalrez®)
	Not in contact with medium:	
	Housing	Stainless steel 1.4404 (AISI 316 L)
	Seals	FPM
	Limit position switches (NAMUR-type)	Front surface PBT, cable PVC
	Handle/protection cap	PVC
Rinse fittings	2 x G ¹ / ₄ (internal) or 2 x NPT ¹ / ₄ " (internal) or 2 x pipe 8 x 60 Swagelok as nozzle	

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