



Level



Pressure



Flow



Temperature



Liquid  
Analysis



Registration



Systems  
Components



Services

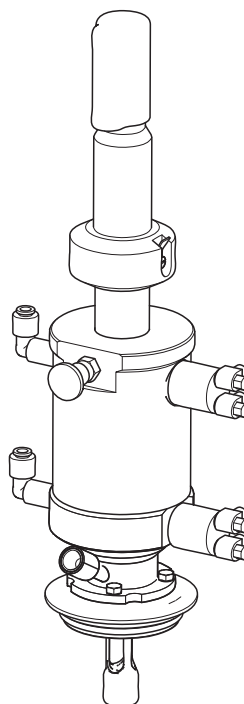
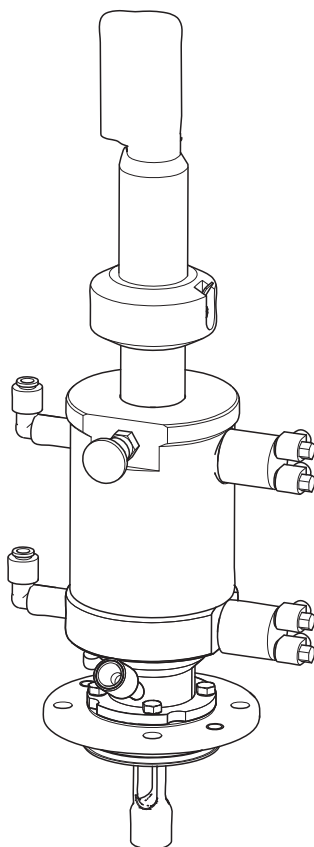


Solutions

## Operating Instructions

# Cleanfit H CPA475

## Retractable Process Assembly





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# 1 Safety instructions

## 1.1 Designated use

The manually or pneumatically operated retractable assembly Cleanfit H CPA475 is designed for installing pH/redox sensors in tanks and pipes under sterile conditions.

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.

## 1.2 Installation, commissioning and operation

Please note the following items:

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

## 1.3 Operational safety

The assembly has been designed and tested in accordance with the latest industry standards and left the factory in perfect functioning order.

Relevant regulations and standards have been met.

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

- Installation instructions
- Local prevailing standards and regulations.

## 1.4 Notes on safety icons and symbols

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

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

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

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

## 2 Identification

### 2.1 Nameplate

The nameplate contains the following information:

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

Compare the order code on the nameplate with your order.

### 2.2 Scope of delivery

The scope of delivery comprises:

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

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

### 2.3 Certificates and approvals

#### 2.3.1 3A

The following versions meet the requirements of the rule 3A 74-:

- CPA475-XXXXXXCX (process connection: triclamp)
- CPA475-XXXXXXDX (process connection: dairy fitting)
- CPA475-XXXXXXEX (process connection: varivent)
- CPA475-XXXXXXFX (process connection: APV)

#### 2.3.2 Sterilizability

TNO report V3641:

"The retractable assembly for pH measurement Cleanfit H CPA475 – including the seals – is classified as in-line steam sterilizable by a 30 minute saturated steam treatment at a temperature of 120 °C." <sup>1)</sup>

---

1) acc. to the test method of the European Hygienic Design Group (EHEDG)

## 2.4 Order code and device version

Enter the following address in your browser to access the product page:  
[www.products.endress.com/cpa475](http://www.products.endress.com/cpa475)

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

| Product page function        |
|------------------------------|
| :: Add to product list       |
| :: Price & order information |
| :: Compare this product      |
| :: Configure this product    |

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

## 3 Installation

### 3.1 Incoming acceptance, transport, storage

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

### 3.2 Installation conditions

#### 3.2.1 Notes on installation

**i** For the installation of the assembly use only materials complying with the standard of 3A 74-I

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 an angle greater than  $15^\circ$  from the horizontal ( $\rightarrow$   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.

Limited permissible angle of the installation position is above  $75^\circ$  from the horizontal, air bubbles can accumulate in the chamber.

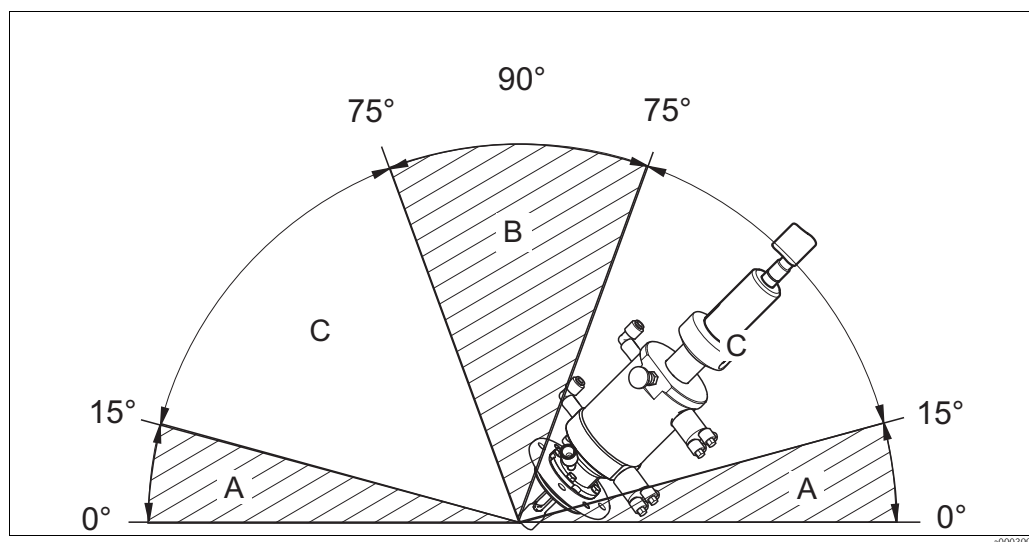


Fig. 1: Installation angle

- A Inadmissible installation angle
- B Limited permissible angle (air bubbles can build up in the chamber)
- C Recommended installation angle

When using an ISFET Tophit sensor, there are, in principle, no restrictions for the installation position. An installation angle of 0 to 75° is, however, recommended. An overhead installation is possible.

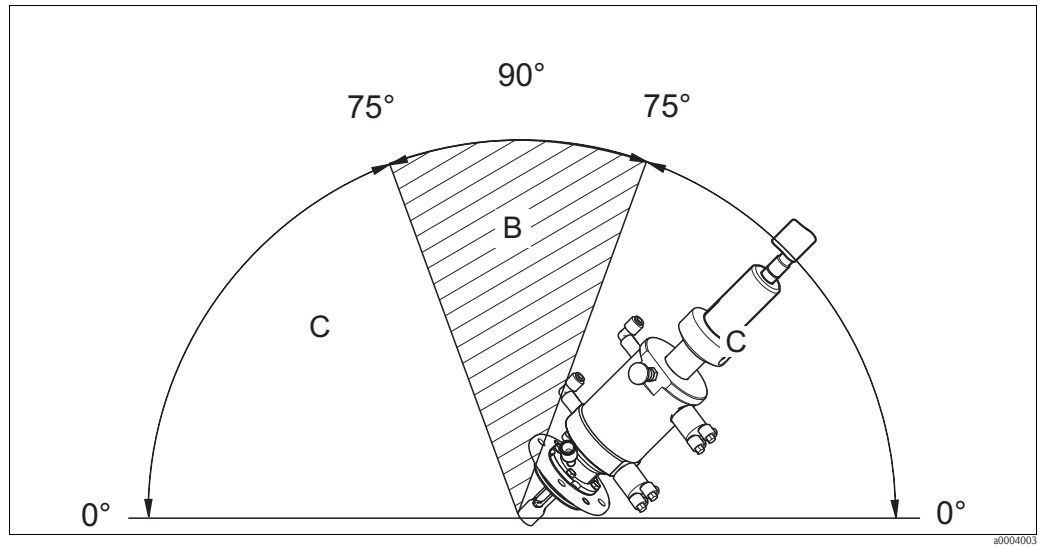


Fig. 2: Installation angle for assemblies with ISFET sensors

- B Limited permissible angle (air bubbles can build up in the chamber)  
 C Recommended installation angle

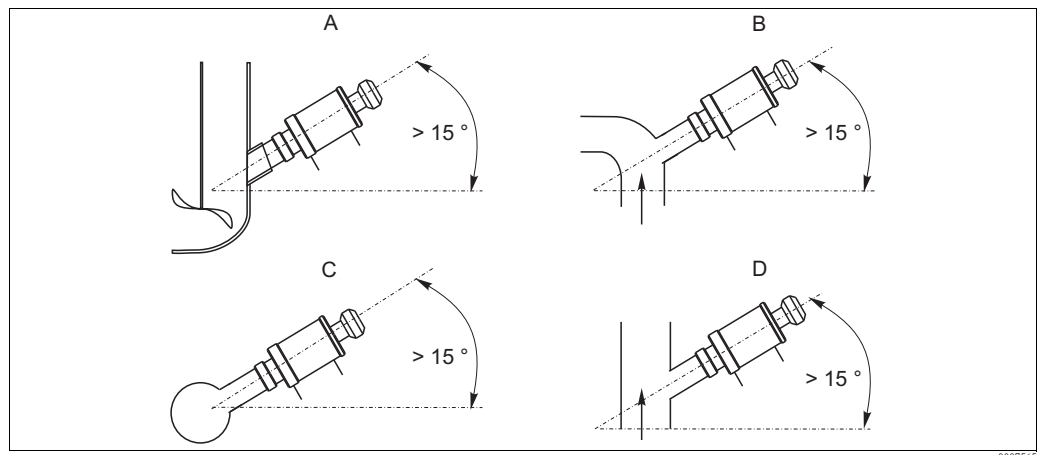


Fig. 3: Installation examples with recommended installation angle (glass electrodes)

- A Tank  
 B Pipe bend  
 C Horizontal pipe  
 D Ascending pipe

**NOTICE****Wrong connection affects process safety**

- For all assemblies with stainless steel pressure cylinders, we recommend to use a flanged version when installing with inclined orientation. Otherwise, the weight of the assembly could affect the safety of the process connection.
- Avoid a siphon effect<sup>2)</sup> at the rinse chamber outlet when installing with inclined orientation. The inlet to the rinse chamber must be from below.

**i** The minimum diameter for direct installation in pipework is DN 50. 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 observe the total immersion depth in operation (sensor holder not inserted). Ensure that the sensor is always immersed in the medium during operation (see "Dimensions").

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2) Siphon effect: line emptied by vacuum

3.2.2 Dimensions

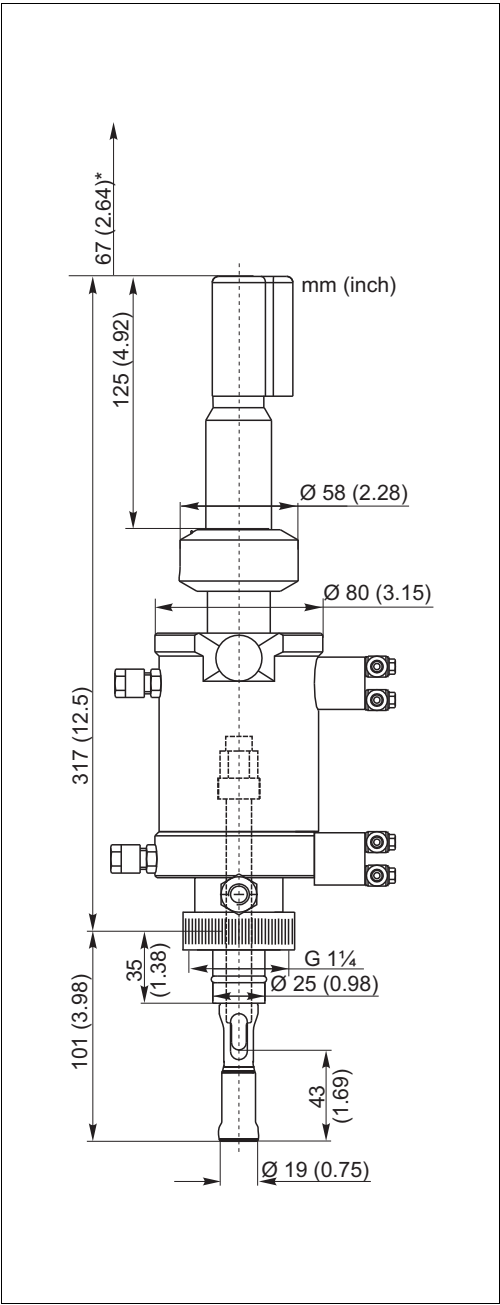


Fig. 4: Standard version with G1 1/4 thread nut  
\* stroke

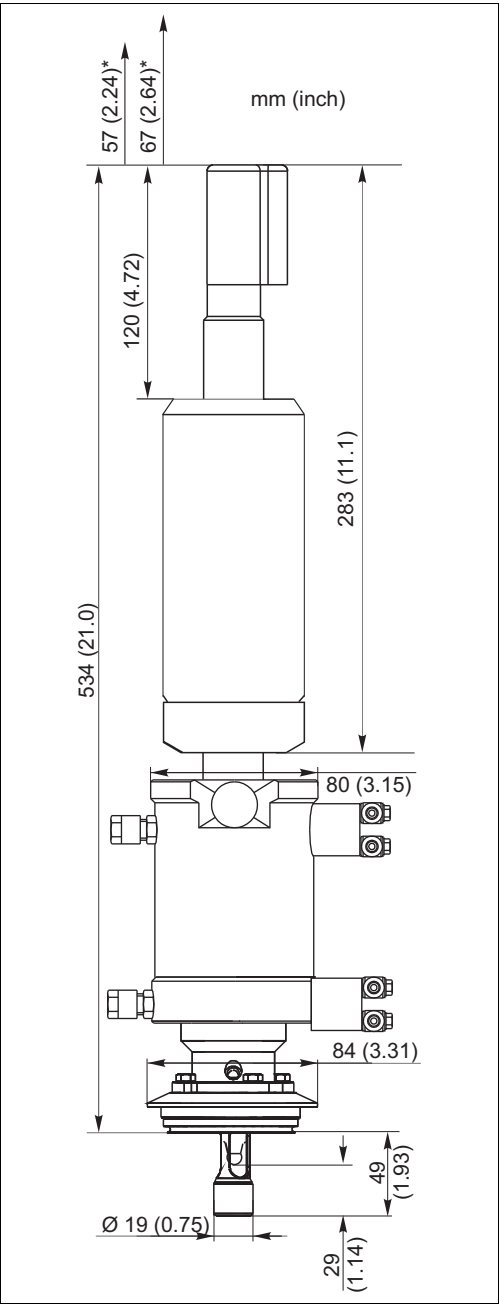


Fig. 5: Liquid KCl electrolyte version  
\* stroke (depending on version)

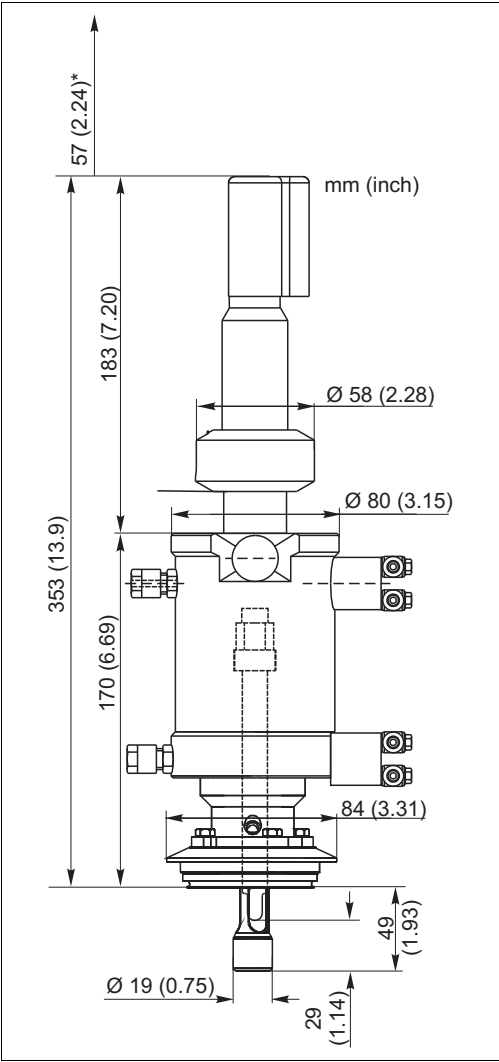


Fig. 6: Version with Varivent

\* stroke

### 3.2.3 Process connections

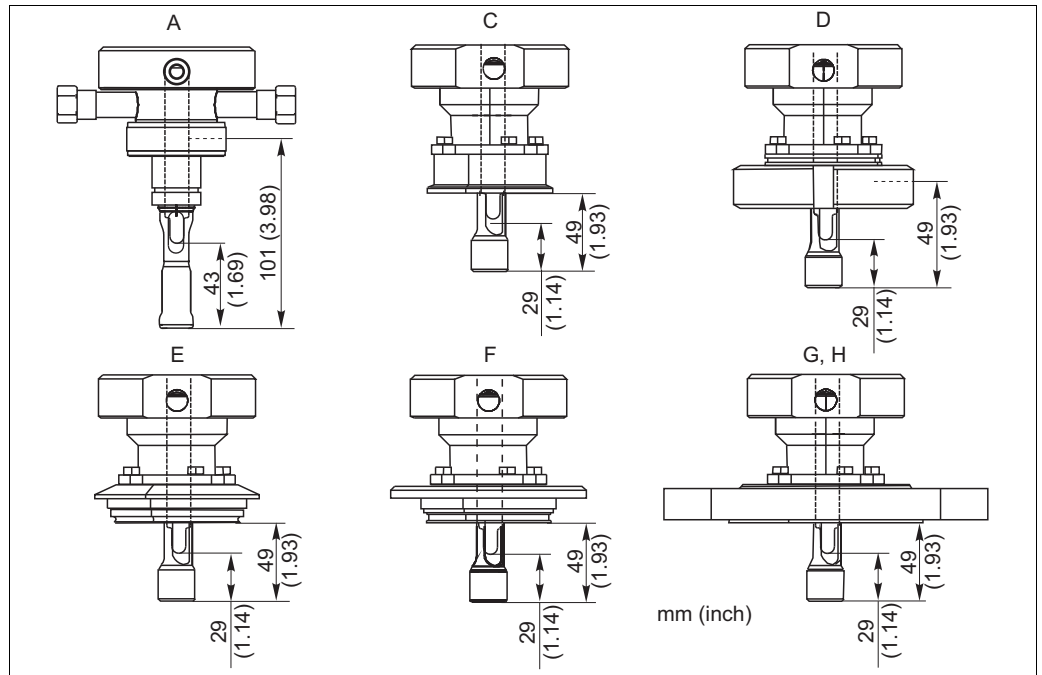


Fig. 7: Process connections

A G1 1/4 internal thread with thread nut

C Triclamp 2"

D DN 50 dairy fitting (DIN 11851)

E Varivent DN 50 to 125

F APV DN 50 to 100

G/H DN 50 flange (DIN 1092-1) resp. ANSI 2" flange



#### Welding socket:

For CPA475 with G1 1/4 process connection only Endress+Hauser welding sockets with length=35 mm are fitting. See accessories.



### 3.3.2 Installing the assembly into the process

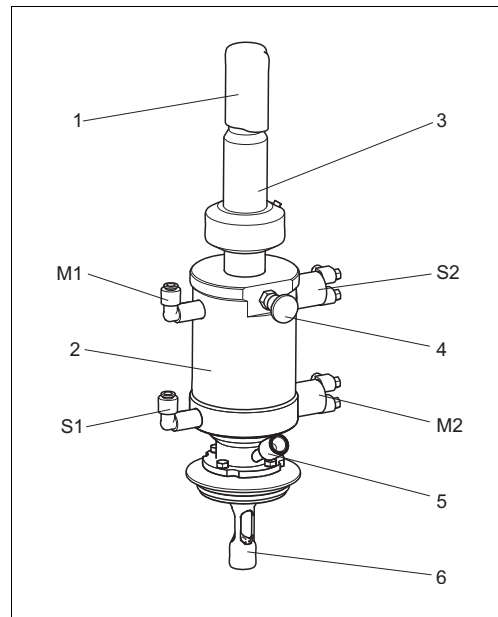
#### **⚠ WARNING**

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

- Never insert the assembly into measuring position if no sensor is installed. Medium could leak out.



Depending on the process connection, please observe the following:  
Check the flange seal between the flanges before installing the assembly.  
The thread adapter nut of thread G 1 1/4 does not function as a seal. Therefore, simply tighten the thread adapter nut by hand.



*M = Measuring  
S = Service*

*M1 Pneumatics "Assembly measuring"  
M2 Limit position switch "Assembly measuring" <sup>1)</sup>  
S1 Pneumatics "Assembly Service"  
S2 Limit position switch "Assembly Service" <sup>1</sup>  
(see chapter "Pneumatic operation")*

*1 Splash protection cap  
2 Assembly housing (cylinder)  
3 Retractable pipe  
4 Stop bolt  
5 Rinse fitting (optional)  
6 Sensor holder (= sensor guide)*

Fig. 9: Pneumatics and limit position switches

- 1) pneumatic or electric limit position switch depending on assembly version (see product structure)
1. Move the assembly into the "Service" position (electrode holder inserted in the assembly).
2. Secure the assembly to the tank or the piping using your selected process connection.
3. Follow the instructions for compressed air and rinse water connection (if used) given in the following chapters.

### 3.3.3 Compressed air connection<sup>3)</sup>

Requirements:

- air pressure of 4 to 6 bar (60 to 90 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 inches).

#### **NOTICE**

##### **Air pressure too high**

The assembly may be damaged.

- There must be a pressure-reducing valve upstream if the air pressure can increase to above 6 bar (90 psi) (including any short pressure surges).

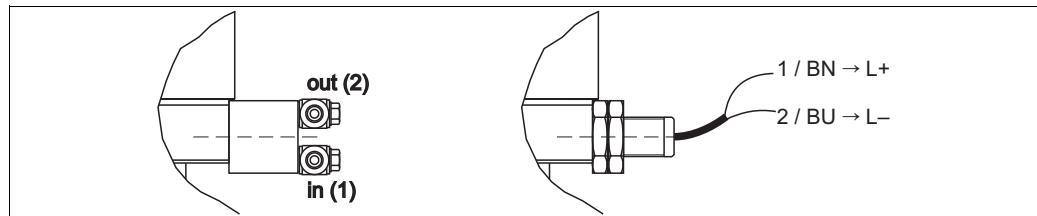


We recommend you also use a pneumatic throttle for lower pressures. This results in a smoother assembly operation. Endress+Hauser offers such a throttle as an accessory (see chapter "Accessories").

3) pneumatically operated assembly only

### Limit position switches

- 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  
ⓈII 1G EEx ia IIC T6; switching distance: 2 mm, flush



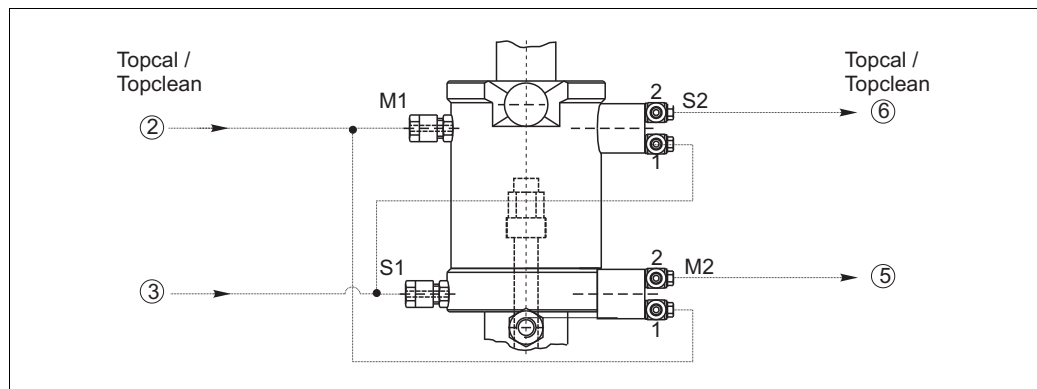
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Fig. 10: Limit position switches, left: pneumatic (1 = compressed air inlet, 2 = compressed air outlet) right: electric (NAMUR)

- 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).

### Pneumatics and limit position switch connection

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.



a0004480

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).

### Electric limit position switch connection

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.

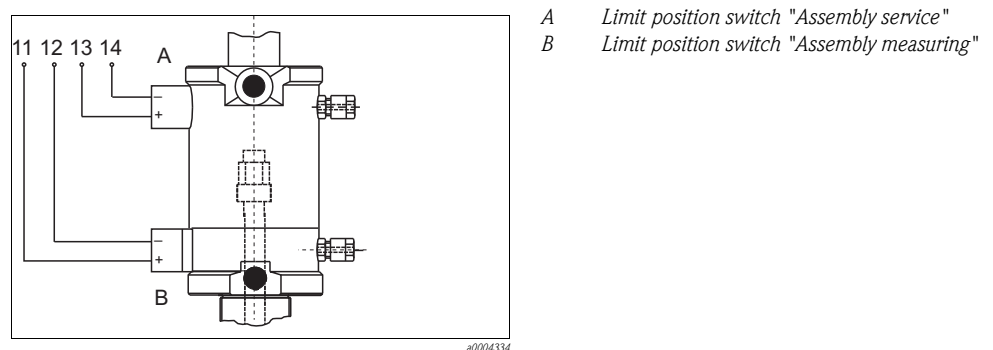


Fig. 12: Electric limit position switches to Topcal

### 3.3.4 Rinse water connection

1. Connect the rinse water pipe to the designated rinse nozzle:
  - a. Assembly version with G1¼ internal thread process connection (→  13, pos. b):  
Both rinse nozzles on the assembly are identical. Use one as inlet and the other as outlet.
  - b. all other assembly versions (pos. a):  
Connect the rinse nozzles such that the inlet is bottom-up and the outlet top-down.

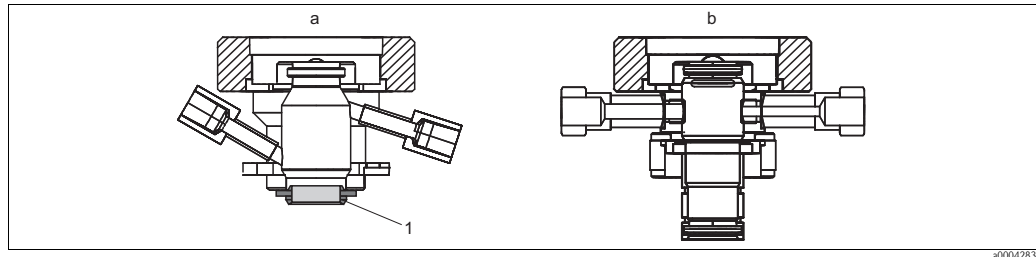


Fig. 13: Rinse chamber versions (depending on process connection)

- a Rinse chamber with welded rinse fittings, for: Triclamp, Dairy fitting, Varivent, APV and flanges  
 b Rinse chamber with threaded fittings, for: G1¼ internal thread  
 1 Moulded seal

2. Operate the rinse water connection of the assembly with a water pressure of 2 to max. 6 bar (29 to 87 psi).
3. In addition, install a non-return valve and a dirt trap (100 µm) in the water supply line (at the inlet to the assembly).

Besides water, other or additional cleaning solutions may be used in the rinse chamber. Pay attention to the material resistance of the assembly and comply with the maximum permitted temperatures and pressures.

#### NOTICE

##### Water pressure too high

The assembly may be damaged.

- If it is possible for the water pressure to rise above 6 bar (87 psi, including any transient pressure surges), install a pressure reducing valve upstream.

### 3.3.5 Sensor installation

1. Remove the protection cap from the sensor. Make sure the sensor shaft is fitted with the O-ring and the thrust collar (→  14).
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 (→  15, A).
5. Turn the retractable pipe **clockwise** until the stop lock bolt engages (B).
6. Vent the rinse chamber.

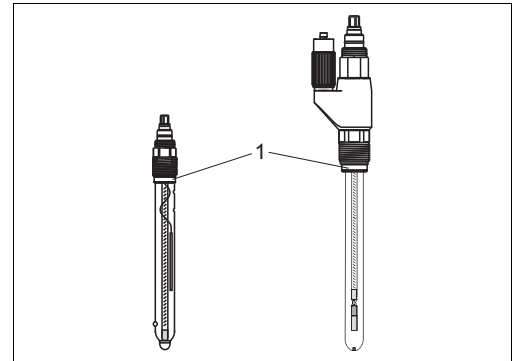


Fig. 14: Sensor installation

1 Thrust collar and O-ring

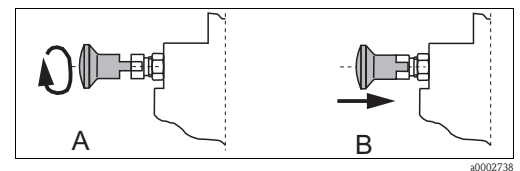


Fig. 15: Stop bolt

#### 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.

### Gel sensors

1. Remove the splash protection cap (→  16, pos. 5) from the assembly.
2. Then loosen the retractable pipe (pos. 2) by turning it anticlockwise.
3. Install the sensor (pos. 7) instead of the dummy plug (pos. 3):
  - first screw by hand
  - then tighten the sensor by approx. ¼ turn using an open end wrench (AF 17).
4. Insert the measuring cable through the retractable pipe (pos. 2):
  - 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
5. *Plug-in head sensor only:*  
Connect sensor and cable.
6. Screw the retractable pipe back onto the pressure cylinder (clockwise, by hand).
7. Place the measuring cable in the splash protection cap and place the cap on the retractable pipe.
8. Unlock the stop lock bolt (pos. 4).

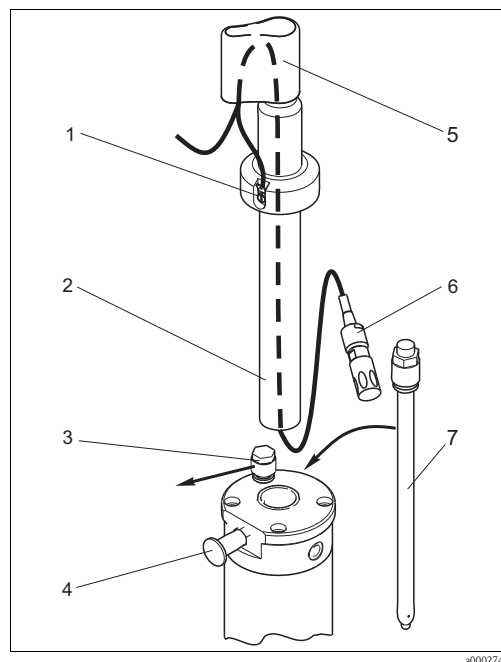


Fig. 16: Sensor installation

- |   |                                 |
|---|---------------------------------|
| 1 | PML connection                  |
| 2 | Retractable pipe                |
| 3 | Dummy plug                      |
| 4 | Stop lock bolt                  |
| 5 | Splash protection cap           |
| 6 | Measuring cable with cable plug |
| 7 | Sensor or electrode             |

Remove the sensor in the reverse sequence of operations.

-  In case of symmetrical pH measurement, you must push the PML connector onto the PML connection (PML = potential matching line, position 1). Please, read the Operating Instructions of the transmitter.

### Sensor with liquid KCl electrolyte

1. Verify that the assembly is in the service position and the stop lock bolt is engaged.
2. Remove the splash protection cap (→  17, pos. 6) and the KCl hood (pos. 7).
  -  From version 11/2010 on the retractable pipe stays in the cylinder head.
3. Screw in the sensor directly into the inner thread of the retractable pipe:
  - first screw by hand
  - then tighten the sensor by approx. ¼ turn using an open end wrench (AF 17).
4. Insert the measuring cable through 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, you must push the PML connector onto the PML connection (PML = potential matching line, pos. 3).
5. *Plug-in head sensor only:* Connect sensor and cable.
6. Connect the electrolyte supply tube (pos. 1) to the electrolyte connection of the sensor.
7. Affix the supplied tubing support (pos. 9) to the electrolyte supply tube directly above the electrolyte connection.
8. Attach the KCl hood to the retractable pipe. Guide the electrolyte supply tube through the lateral slot of the hood.
9. Place the measuring cable in the splash protection cap and place the cap on the KCl hood.
10. Unlock the stop lock bolt (pos. 5).

Remove the sensor in the reverse sequence of operations.

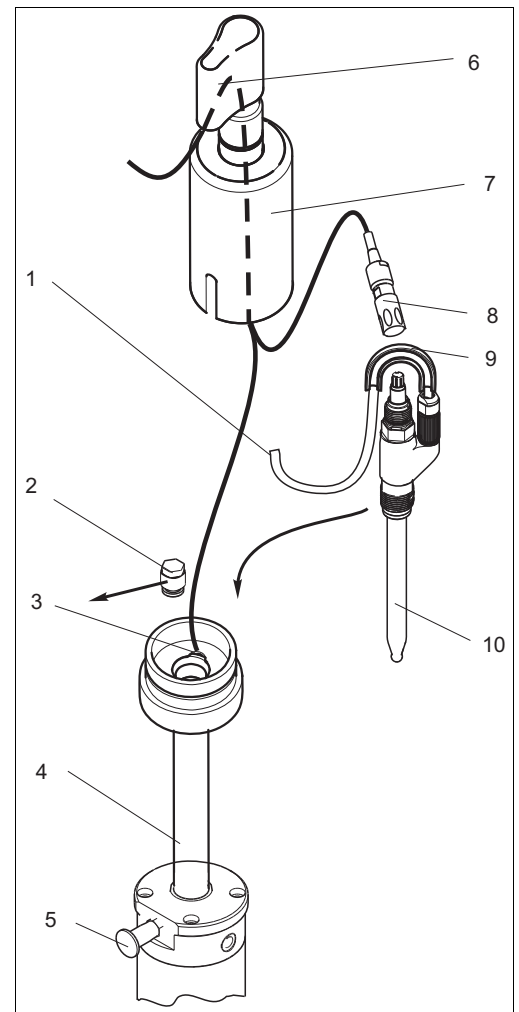


Fig. 17: Liquid KCl electrolyte sensor installation

- |    |                                   |
|----|-----------------------------------|
| 1  | Liquid KCl supply tube            |
| 2  | Dummy plug                        |
| 3  | PML connection                    |
| 4  | Retractable pipe                  |
| 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 cannot be removed without force.
- Check all hoses for damage.

## 4 Operation

### 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).
- The limit position switches (according to assembly version) are correctly connected.

#### **⚠ WARNING**

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

- Make sure the connections are correctly fitted with either rinsing hoses or dummy plugs before applying compressed air to the pneumatic assembly. 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 (→  18, →  19).

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.

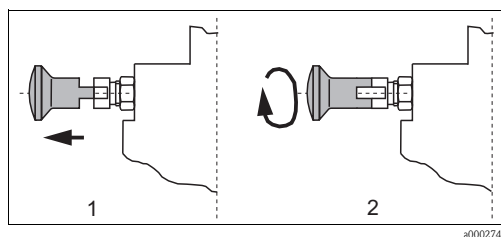


Fig. 18: Releasing the stop lock bolt

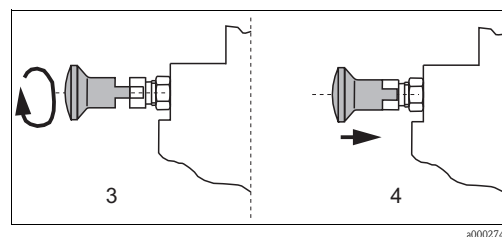


Fig. 19: Locking the stop lock bolt

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

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



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 sensor<sup>4)</sup>.

- 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 operation<sup>5)</sup> 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.

4) in reverse sequence of operations to the installation procedure

5) 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) <sup>1)</sup> 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 Notes on calibration

Regular sensor calibration is vital for reliable measurement. The calibration cycles depend on the range of application and the desired accuracy.

You have to define the calibration cycles separately for each application. At the start, perform calibration frequently (e.g. weekly) to determine the operating characteristics of the sensor. Follow the corresponding instructions for calibration in the Operating Instructions of the transmitter used.

-  The calibration cycles depend on the process conditions and the medium.  
When using a symmetrical connection, there must be an electrical connection between the potential matching (PML) and the buffer solution.  
Do not allow a glass electrode to stand dry or pH sensors (including ISFET) to stand in distilled water.  
Do not use compressed air to blow clear automatic calibration systems with ISFET sensors.

## 6 Accessories

### 6.1 Installation accessories

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

Pneumatic throttle for the reduction of the assembly moving speed,

- G1/8 threaded connection
- order no. 50036864

Welded fitting G1¼, straight,

- SS 1.4435 (AISI 316L); order no. 51502798

Welded fitting G1¼, angular 15°,

- SS 1.4435 (AISI 316L); order no. 51502799

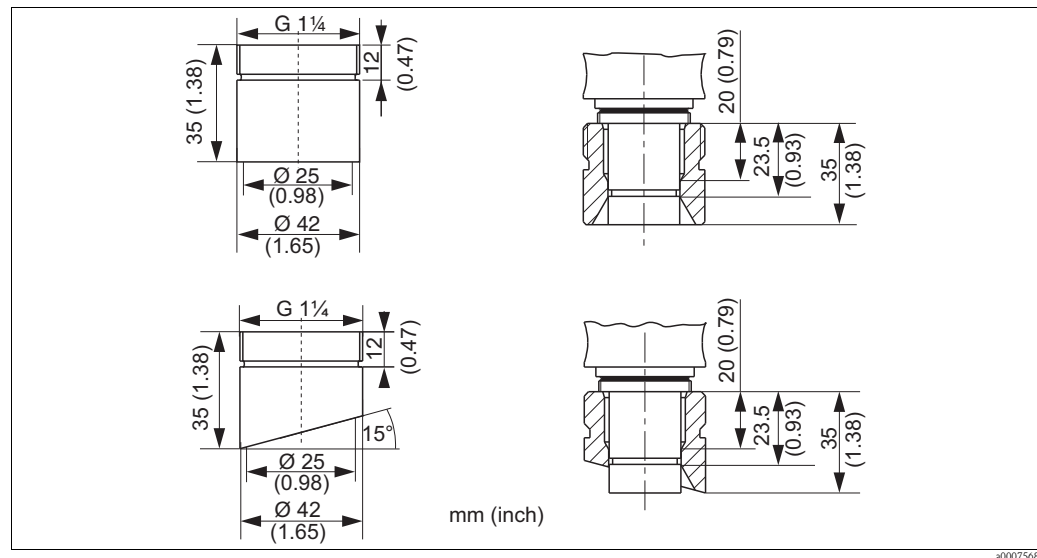


Abb. 20: Welded fittings

Dummy plug for G1¼ process connection,

- SS 1.4435 (AISI 316L), FPM (Viton®) seal, G1¼ internal thread; order no. 51502800

- DN 25 flow vessel,
- G1¼ external thread, SS 1.4404 (AISI 316L);
  - order no. 51502801

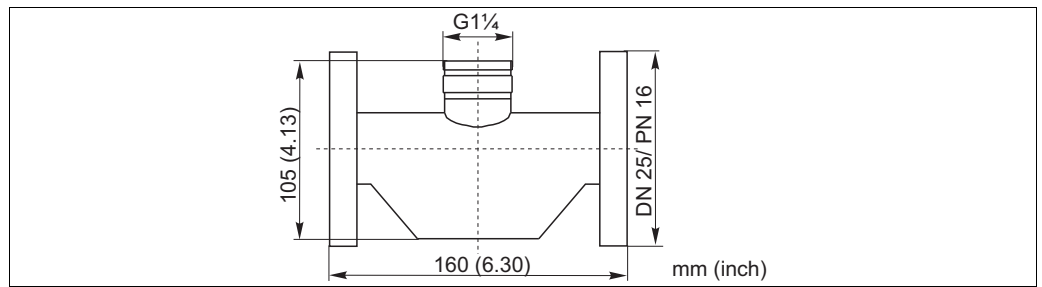


Fig. 21: Flow vessel

Hose nozzles for rinse connections G¼, DN 12

- SS 1.4404 (AISI 316L), 2 pieces
- Order no.: 51502808

Hose nozzles for rinse connections G¼, DN 12

- PVDF, 2 pieces
- Order no.: 50090491

## 6.2 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

## 6.3 Sensors

### 6.3.1 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](http://www.products.endress.com/cps11) or [www.products.endress.com/cps11d](http://www.products.endress.com/cps11d))
- Technical Information TI028C/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](http://www.products.endress.com/cps12) or [www.products.endress.com/cps12d](http://www.products.endress.com/cps12d))
- Technical Information TI367C/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](http://www.products.endress.com/cps41) or [www.products.endress.com/cps41d](http://www.products.endress.com/cps41d))
- Technical Information TI079C/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](http://www.products.endress.com/cps42) or [www.products.endress.com/cps42d](http://www.products.endress.com/cps42d))
- Technical Information TI373C/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](http://www.products.endress.com/cps71) or [www.products.endress.com/cps71d](http://www.products.endress.com/cps71d))
- Technical Information TI245C/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](http://www.products.endress.com/cps72) or [www.products.endress.com/cps72d](http://www.products.endress.com/cps72d))
- Technical Information TI374C/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](http://www.products.endress.com/cps91) or [www.products.endress.com/cps91d](http://www.products.endress.com/cps91d))
- Technical Information TI375C/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](http://www.products.endress.com/cps92) or [www.products.endress.com/cps92d](http://www.products.endress.com/cps92d))
- Technical Information TI435C/07/EN

### 6.3.2 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](http://www.products.endress.com/cps471) or [www.products.endress.com/cps471d](http://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](http://www.products.endress.com/cps441) or [www.products.endress.com/cps441d](http://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](http://www.products.endress.com/cps491) or [www.products.endress.com/cps491d](http://www.products.endress.com/cps491d))
- Technical Information TI377C/07/EN

## 7 Trouble-shooting

### 7.1 Replacing damaged parts

#### ⚠ WARNING

**Incorrectly repaired devices can be a source of danger**

- 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 once again meet the technical data specifications when it has been repaired.

Replace all other damaged components immediately. To order accessories and spare parts, please use the "Accessories" and "Spare parts" chapters or contact your local sales center.

### 7.2 Replacing seals

- Keep the sealing surfaces of the assembly free of dirt.
- Remove deposits clinging to the assembly from time to time.
- In the event of leakages, contact your local sales center.

#### 7.2.1 Replacing seals without process interrupt

You can replace the seals of the retractable pipe and the corresponding components (retractable pipe, splash protection cap) when the assembly is in the "Service" position. You do not need to interrupt the process for this.

#### ⚠ CAUTION

**Risk of injury if medium escapes!**

- Before replacing components, lock the "Service" position by the stop bolt!

Proceed as follows (→  22):

1. Move the assembly to the "Service" position.
2. Lock the retractable pipe by the stop bolt.
3. Pull off the splash protection cap.
4. Unscrew the retractable pipe counterclockwise.
5. Replace O-rings pos. 6-2 and 10-1 (O-ring spare part kits, see following chapter "Spare part kits").
6. If necessary, remove the sensor and replace the sensor O-rings.
7. Re-install the sensor and screw-in the retractable pipe clockwise.
8. Unlock the stop bolt.
9. Move the assembly to the "Measuring" position and **check it for tightness**.

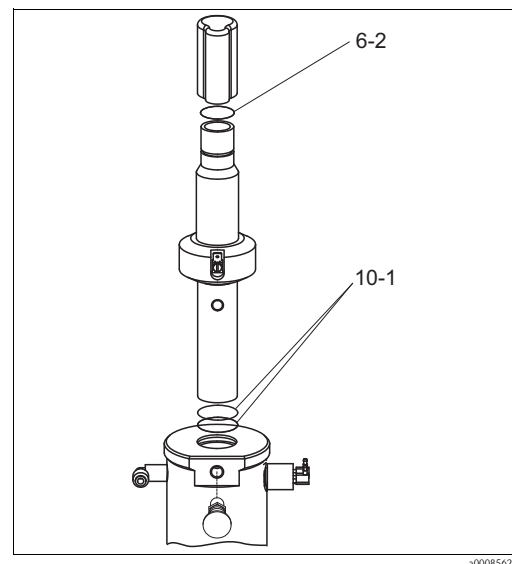


Fig. 22: Seal replacing without process interrupt

## 7.2.2 Replacing seals with process interrupt

You can only replace the seals of the cylinder, of the rinse chamber and of the sensor guide when the process is interrupted and the assembly is dismantled from the process connection (→  23, G1 ¼ internal thread version as an example. Other versions corresponding, see also exploded view in chapter "Spare part kits").

### **⚠ 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.

1. Interrupt the process. Beware of medium residues, residual pressure and higher temperatures.
2. Dismount the assembly from the process connection.
3. Unscrew the retractable pipe counterclockwise.
4. Loosen the screws between rinse chamber and cylinder (pos. 16).
5. Separate the rinse chamber from the cylinder and take out the sensor guide.
6. Replace the O-rings (pos. 6-1, 10-2, 10-3, 10-4, 14-1, 14-2, 14-3 and 14-4). For ordering of spare part kits see following chapter "Spare part kits".
7. If necessary, also replace the retractable guide seals (see previous chapter).
8. Re-assemble the assembly.
9. Install the assembly into the process via the process connection.
10. Restart the process and move the assembly to the "Measuring" position.
11. **Check the leak-tightness.**

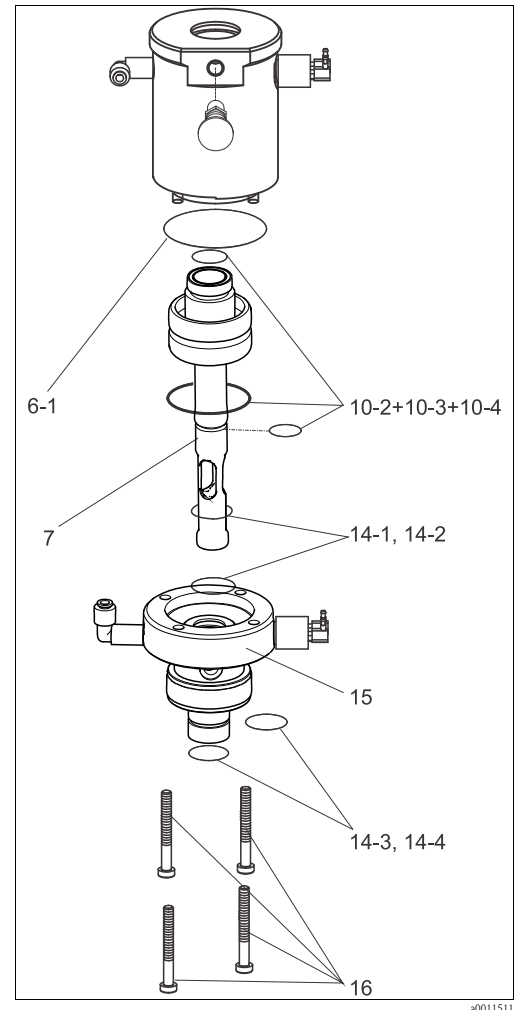


Fig. 23: Seal replacing with process interrupt

7.3 Spare part kits

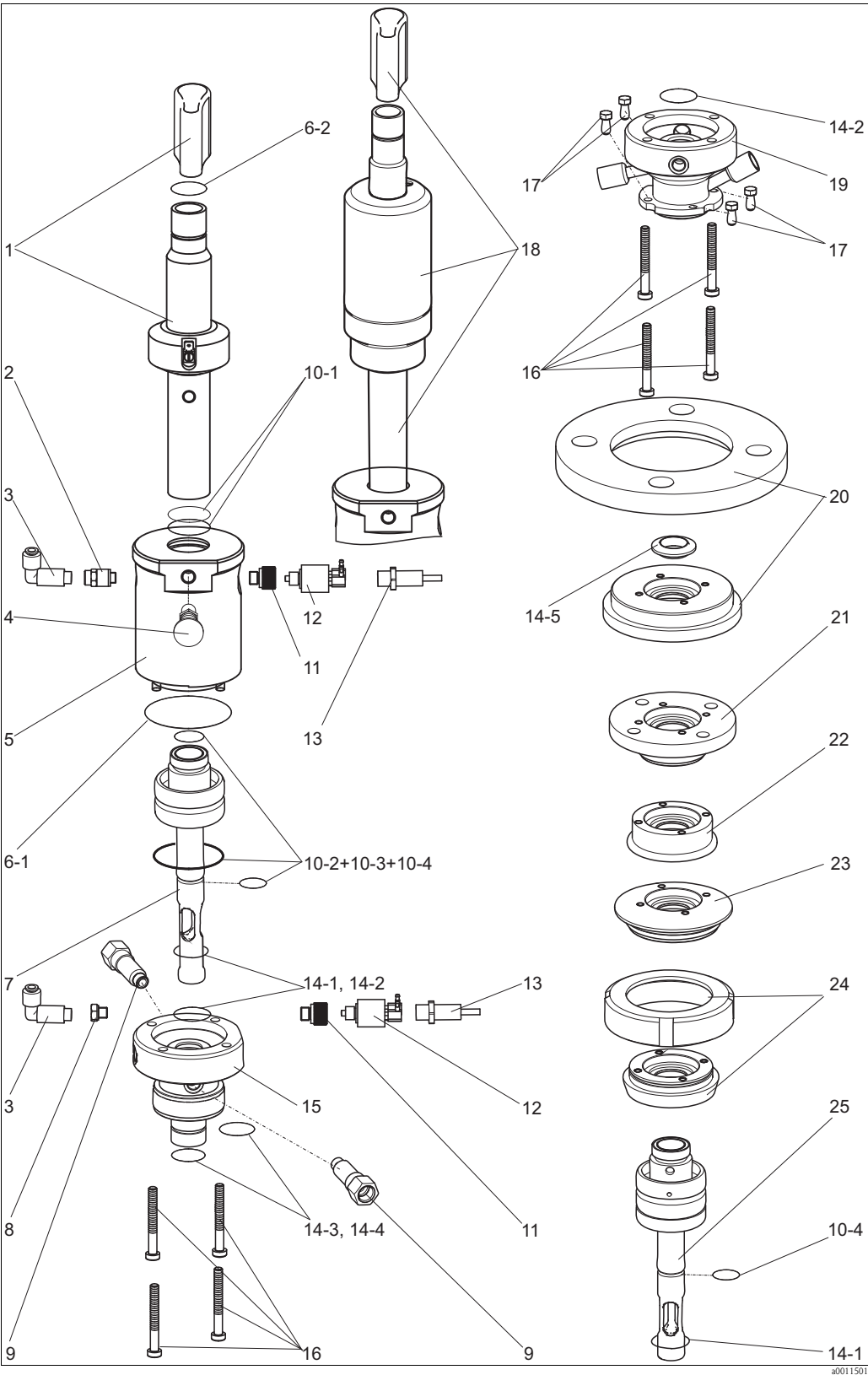


Fig. 24: Spare parts (all assembly versions)

 Please, refer to the following table for the spare part kits ordering numbers acc. to the positions in →  24.

| Position                     | Description and kit content                                                                                                                                    | Spare part kit order no. |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 1                            | Retractable pipe for 120 mm (4.72 inch) gel electrodes<br>For assembly version:<br>– pneumatic                                                                 | 51503715                 |
|                              | Retractable pipe for 120 mm (4.72 inch) gel electrodes<br>For assembly version:<br>– manual<br>– for G1 ¼ internal thread process connection <b>only</b>       | 51503717                 |
|                              | Retractable pipe for 120 mm (4.72 inch) gel electrodes<br>For assembly version:<br>– manual<br>– all process connections <b>excluding</b> G1 ¼ internal thread | 51506844                 |
| 2, 8                         | Exhaust air restrictor (pos. 2) and SS 1.4404 (AISI 316L) blind stopper (pos. 8)<br>For assembly version:<br>– manual<br>5 pieces each                         | 51503732                 |
| 3                            | G1/8 pneumatic connections<br>For assembly version:<br>– pneumatic<br>10 pieces                                                                                | 51503730                 |
| 4                            | Stop bolt                                                                                                                                                      | 51503731                 |
| 5                            | PA cylinder, with O-ring                                                                                                                                       | 51503773                 |
|                              | SS 1.4404 (AISI 316L) cylinder, with O-ring                                                                                                                    | 51503775                 |
| 6-1, 6-2                     | Set of gaskets, not dynamically loaded                                                                                                                         | 51503729                 |
| 7                            | Sensor guide, standard version, complete<br>For assembly version:<br>– for G1 ¼ internal thread process connection <b>only</b>                                 | 51506842                 |
| 9                            | Set of G¼ rinse connectors, complete                                                                                                                           | 51503771                 |
|                              | Set of NPT¼" rinse connectors, complete                                                                                                                        | 51503772                 |
| 10-1, 10-2, 10-3, 10-4       | Set of gaskets, dynamically loaded                                                                                                                             | 51503728                 |
| 11                           | M12x1 stopper<br>For assembly version:<br>– pneumatic, without limit switch<br>10 pieces                                                                       | 51503733                 |
| 12                           | Set of pneumatic limit switches<br>For assembly version:<br>– pneumatic<br>2 pieces                                                                            | 51502874                 |
| 13                           | Set of electric limit switches, Ex and Non-Ex<br>For assembly version:<br>– pneumatic<br>2 pieces                                                              | 51502873                 |
| 14-1, 14-2, 14-3, 14-4, 14-5 | Set of gaskets, in contact with medium EPDM                                                                                                                    | 51518385                 |
|                              | Set of gaskets, in contact with medium VITON                                                                                                                   | 51518386                 |
| 15                           | Rinse chamber, complete<br>For assembly version:<br>– for G1 ¼ internal thread process connection <b>only</b><br>– with G¼ rinse connections                   | 51506840                 |

| Position | Description and kit content                                                                                                                                           | Spare part kit order no. |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 16       | M6x30 screws, DIN 69612 A-4/2, 20 pieces                                                                                                                              | 51503734                 |
| 18       | Retractable pipe for 225 mm (8.86 inch) liquid KCl electrodes<br>For assembly version:<br>– pneumatic                                                                 | 71162343                 |
|          | Retractable pipe for 225 mm (8.86 inch) liquid KCl electrodes<br>For assembly version:<br>– manual<br>– for G1 ¼ internal thread process connection <b>only</b>       | 71162345                 |
|          | Retractable pipe for 225 mm (8.86 inch) liquid KCl electrodes<br>For assembly version:<br>– manual<br>– all process connections <b>excluding</b> G1 ¼ internal thread | 71162344                 |
| 19       | Rinse chamber, complete<br>For assembly version:<br>– all process connections <b>excluding</b> G1 ¼ internal thread<br>– with NPT ¼" rinse connections                | 51506855                 |
|          | Rinse chamber, complete<br>For assembly version:<br>– all process connections <b>excluding</b> G1 ¼ internal thread<br>– with G¼ rinse connections                    | 51506839                 |
| 20, 17   | Flange DN 50 (DIN 1092-1), complete, including M5x12 screws, DIN 933 (pos. 17)                                                                                        | 51506834                 |
|          | Flange ANSI 2", complete, including M5x12 screws, DIN 933 (pos. 17)                                                                                                   | 51506833                 |
| 21, 17   | APV process connection, including M5x12 screws, DIN 933 (pos. 17)                                                                                                     | 51506835                 |
| 22, 17   | Clamp 2" process connection, including M5x12 screws, DIN 933 (pos. 17)                                                                                                | 51506838                 |
| 23, 17   | Varivent process connection, including M5x12 screws, DIN 933 (pos. 17)                                                                                                | 51506836                 |
| 24, 17   | Dairy fitting, including M5x12 screws, DIN 933 (pos. 17)                                                                                                              | 51506837                 |
| 25       | Sensor guide, standard version, complete<br>For assembly version:<br>– all process connections <b>excluding</b> G1 ¼ internal thread                                  | 51506841                 |

## 7.4 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](http://www.services.endress.com/return-material)

## 7.5 Disposal

Remove electronic components, e.g. electric limit position switches. Dispose of these components in accordance with regulations on the disposal of electronic waste.

You have to separately dispose of pressure cylinder, sensor holder and other components according to their material.

Please observe local regulations.

## 8 Technical data

### 8.1 Environment

|                            |                                                                                                                                                         |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Ambient temperature</b> | Ambient temperature not below 0 °C (32 °F).<br>The maximum permissible temperature for electric limit position switches (NAMUR type) is 90 °C (194 °F). |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|

### 8.2 Process

|                            |                                                                                                                                         |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Process temperature</b> | 0 to 100 °C (32 to 210 °F)<br>up to 140 °C (280 °F) at 3 bar (45 psi) for max. 1 hour                                                   |
| <b>Process pressure</b>    | 0 to max. 4 bar (0 to max. 58 psi) overpressure for manual actuation<br>0 to 10 bar (0 to 145 psi) overpressure for pneumatic actuation |

#### Temperature pressure diagram

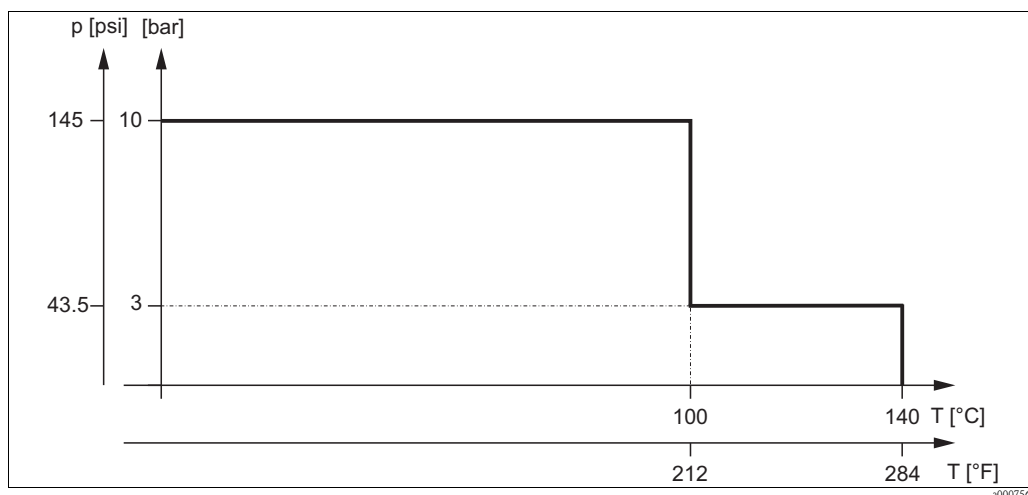


Abb. 25: Pressure temperature diagram

## 8.3 Mechanical construction

|                            |                                                                                                                                                                    |                                                                                                                                                                                                                                                           |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Design, dimensions</b>  | See chapter "Installation"                                                                                                                                         |                                                                                                                                                                                                                                                           |
| <b>Fitting sensors</b>     | pH glass electrodes, gel 120 mm<br>pH glass electrodes, KCl 225 mm<br>pH ISFET sensors, gel, 120 mm<br>pH ISFET sensors, KCl, 225 mm<br>Oxygen sensors, 120 mm     |                                                                                                                                                                                                                                                           |
| <b>Weight</b>              | approx. 4 kg (8.8 lbs), depending on cylinder material, on process connection and additional equipment, see product structure                                      |                                                                                                                                                                                                                                                           |
| <b>Material</b>            | in contact with medium<br>Seals<br>Sensor holder<br>Rinse chamber<br>Rinse fittings<br>not in contact with medium<br>Cylinder<br>Electric limit position<br>switch | EPDM / FPM (Viton®, FDA certified)<br>SS 1.4435 (AISI 316L), electro-polished, Ra=0.8 µm<br>SS 1.4435 (AISI 316L), electro-polished, Ra=0.8 µm<br>SS 1.4435 (AISI 316L), electro-polished, Ra=0.8 µm<br>SS 1.4404 (AISI 316L)<br>fore-part PBT, cable PVC |
| <b>Process connections</b> | See chapter "Installation"                                                                                                                                         |                                                                                                                                                                                                                                                           |
| <b>Rinse fittings</b>      | 2 x G¼ (internal) or<br>2 x NPT ¼" (internal)                                                                                                                      |                                                                                                                                                                                                                                                           |



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