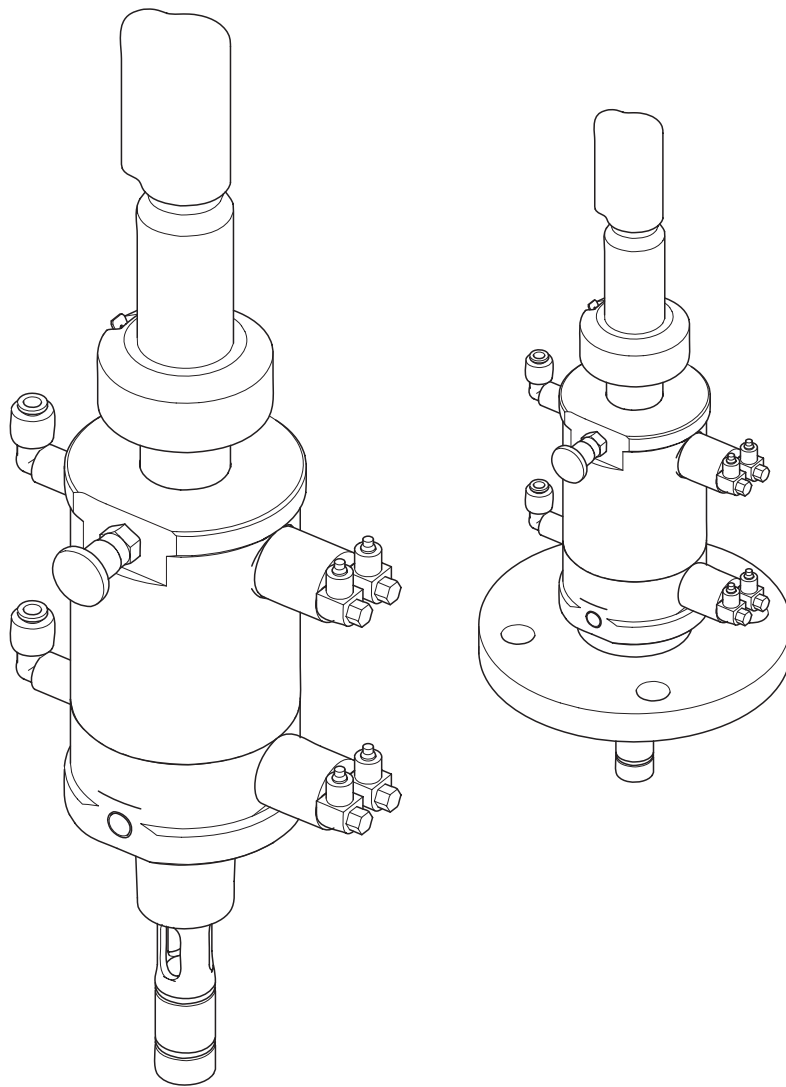


# **OPA 472**

## **Retractable Process Assembly**

### **Operating Instructions**





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# 1 Safety instructions

## 1.1 Designated use

The manually or pneumatically operated retractable assembly OPA 472 is designed for installing pH/redox sensors in tanks and pipes.

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

Any other use than the one described here compromises the safety of persons and the entire measuring system and is, therefore, 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, electrical connection, commissioning, operation and maintenance of the measuring system must only be carried out by trained technical personnel. The technical personnel must be authorised for the specified activities by the system operator.
- 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 for correctness. 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 authorised 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 service organisation.

## 1.3 Operational safety

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

Relevant regulations and European standards have been met.

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

- Installation instructions
- Local prevailing standards and regulations.

## 1.4 Return

If the assembly has to be repaired, please return it *cleaned* to the sales centre responsible. Please use the original packaging, if possible.

Please enclose the completed Dangerous Goods sheet (copy the second last page of these Operating Instructions) with the packaging and also the shipping documents.

No repair without completed Dangerous Goods sheet!

## 1.5 Notes on safety icons and symbols



### Warning!

This symbol alerts you to hazards. They can cause serious damage to the instrument or to persons if ignored.



### Caution!

This symbol alerts you to possible faults which could arise from incorrect operation. They could cause damage to the instrument if ignored.



### Note!

This symbol indicates important items of information.

## 2 Identification

### 2.1 Nameplate

You can identify the assembly version by the order code on the nameplate. Please compare this code with your order.

OPA 472	
order code:	OPA472-B1A1C2A3
serial no.:	2 12318 09C14
spec.	pressure: PN=6 bar (20°C) T=90°C

C07-OPA472xx-18-07-00-en-001.eps

*Fig. 1: Example of a nameplate*

You can find possible assembly versions and the resulting order codes in the product structure.

### 2.2 Scope of delivery

The scope of delivery comprises:

- Assembly (ordered version)
- Operating Instructions (English).

If you have any questions, please contact your supplier or your sales centre responsible.

## 2.3 Product structure

<b>Drive type and limit contact switches</b>										
A										Manual (cannot be converted to pneumatic)
B										Pneumatic without limit contact switches (suitable for retrofitting)
C										Pneumatic with 2 pneumatic limit contact switches
D										Pneumatic with 2 electric limit contact switches (max. 90 °C / 194 °F)
E										Pneumatic with 2 electric Ex limit contact switches (max. 90 °C / 194 °F)
<b>Assembly version</b>										
1										Standard version
<b>Electrode holder</b>										
A										For gel electrodes / ISFET sensors with Pg 13.5
B										For liquid KCl electrodes / ISFET sensors with Pg 13.5 hose connection head
<b>Immersion depth</b>										
1										Short version: up to 101 mm (depending on process connection) (possible electrode lengths: A = 120 mm, B = 225 mm)
2										Long version: up to 208 mm (depending on process connection) (possible electrode length: A = 225 mm)
9										Special version acc. to customer
<b>Assembly material (in contact with medium)</b>										
A										In contact with medium: PP
B										In contact with medium: PEEK
C										In contact with medium: PVDF
<b>Seal material (in contact with medium)</b>										
2										FPM (Viton®, preferred for process application)
3										KALREZ®
<b>Process connection</b>										
A										G 1¼ external thread
B										NPT 1" external thread
C										Dairy fitting DN 50 (acc. to. DIN 11 851)
D										DN 50 flange, PP (acc. to EN 1092)
E										2" ANSI flange, PP
<b>Optional equipment</b>										
1										Without rinse connection (retrofitting not possible)
3										With rinse fitting 2 x G ¼ internal thread
4										With rinse fitting 2 x NPT ¼" internal thread
OPA 472-										complete order code

### 3 Installation

#### 3.1 Incoming acceptance, transport, storage

- Make sure the packaging is undamaged!  
Inform the supplier about 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 delivery contents.  
Keep the damaged products until the matter has been settled.
- Check that the scope of delivery is complete and agrees with your order and the 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 sales centre responsible.

#### 3.2 Installation conditions

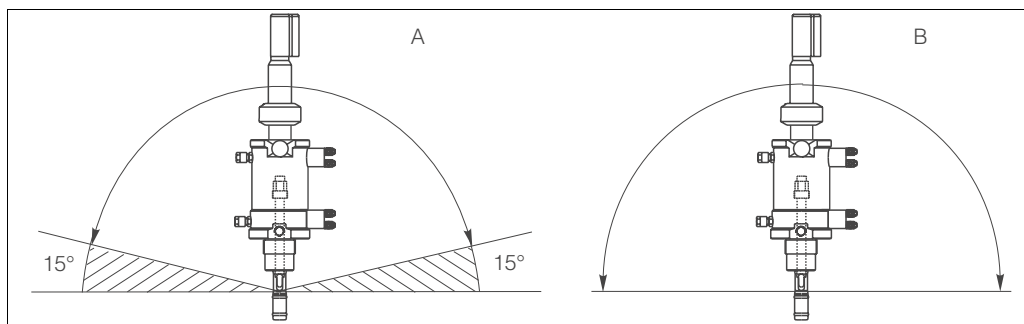
##### 3.2.1 Notes on installation

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



Note!

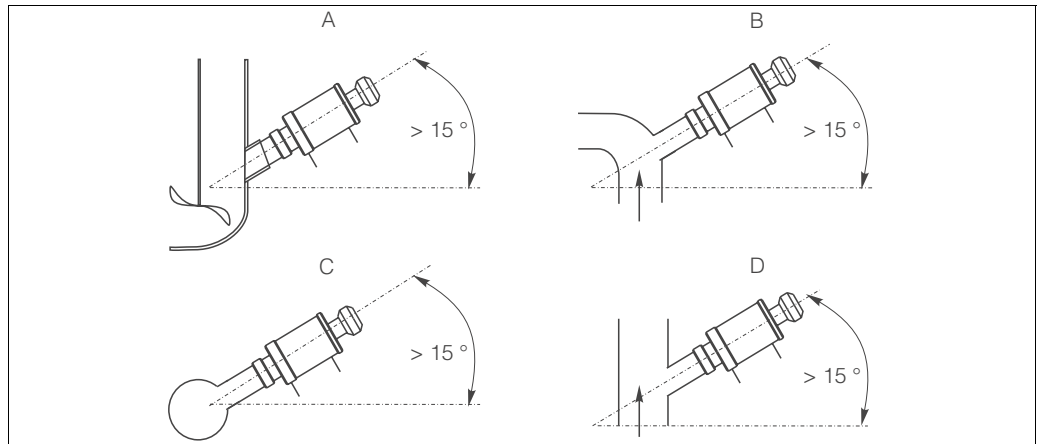
- When using standard glass electrodes, only installation positions are permitted in which the middle axis of the assembly lies at least at an angle of 15° from the horizontal (see diagram). Otherwise, there will not be a reliable contact between the inner side of the pH membrane and the inner terminal leads via the electrolytes.
- When using an ISFET sensor, there are, in principle, no restrictions for the installation position. An installation angle of 0 to 180° is, however, recommended.



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Fig. 2: Installation angle

- A Glass electrodes: minimum 15 ° to the horizontal
- B ISFET sensors: recommended 0 ... 180 °, overhead possible (depending on sensor type)



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

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



#### Caution!

- Avoid a siphon effect<sup>1</sup> at the rinse chamber outlet when installing with inclined orientation. The inlet to the rinse chamber must be from below.

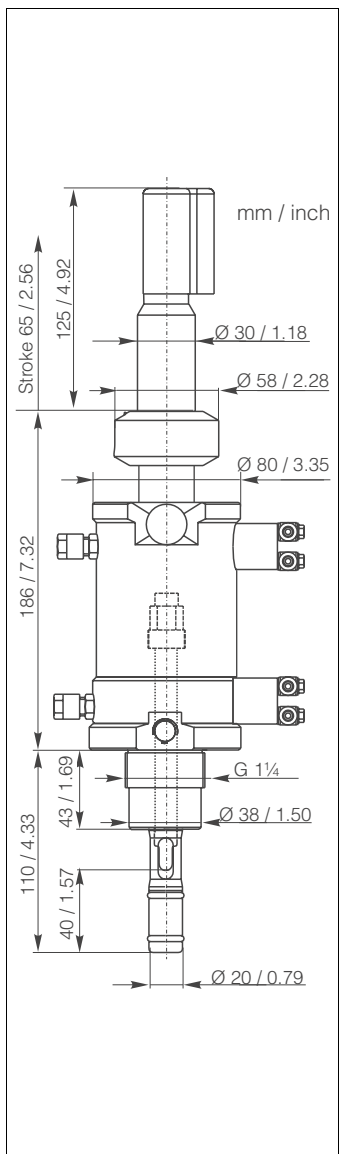


#### Note!

- 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 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").

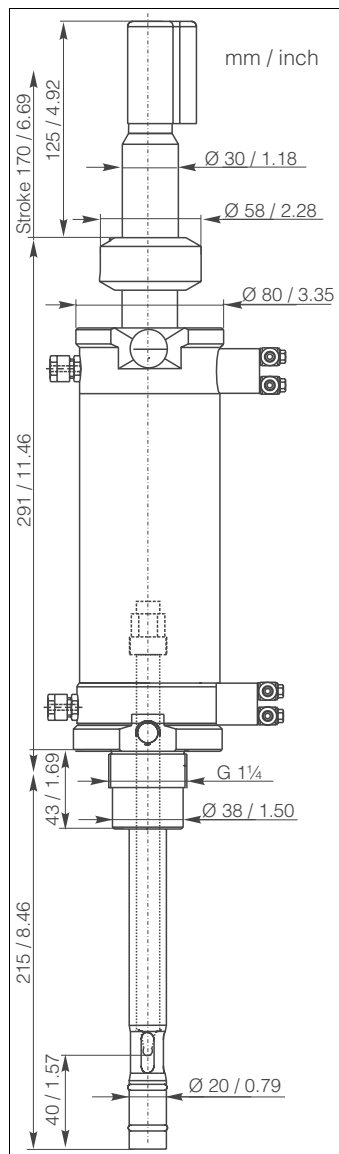
1) Siphon effect: line emptied by vacuum

### 3.2.2 Dimensions



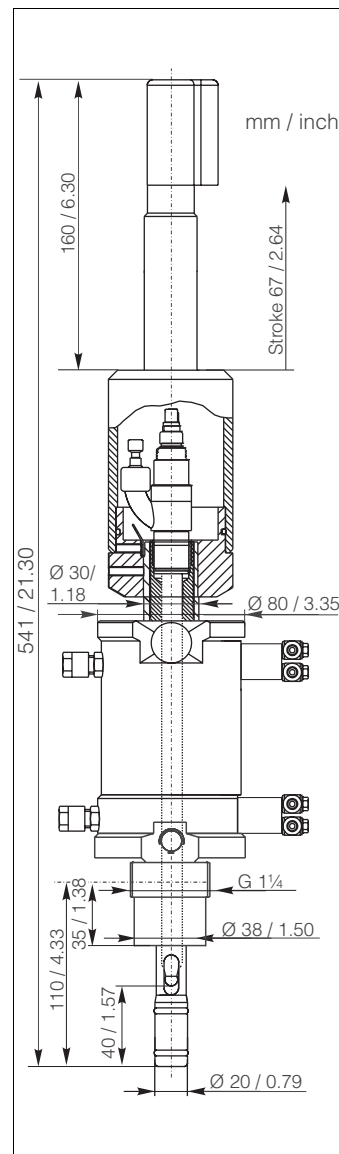
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Fig. 4: Short version



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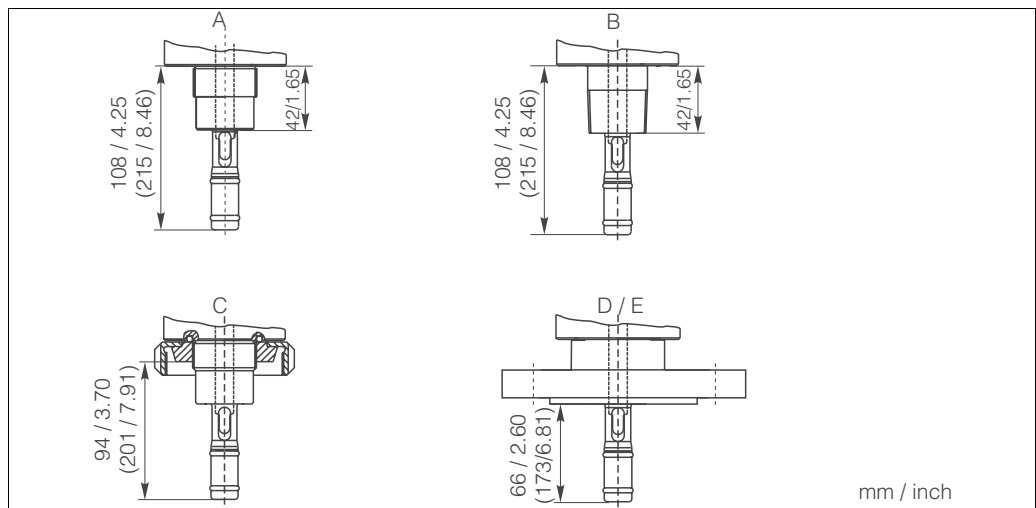
Fig. 5: Long version



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Fig. 6: Short version for liquid KCl sensors

### 3.2.3 Process connections



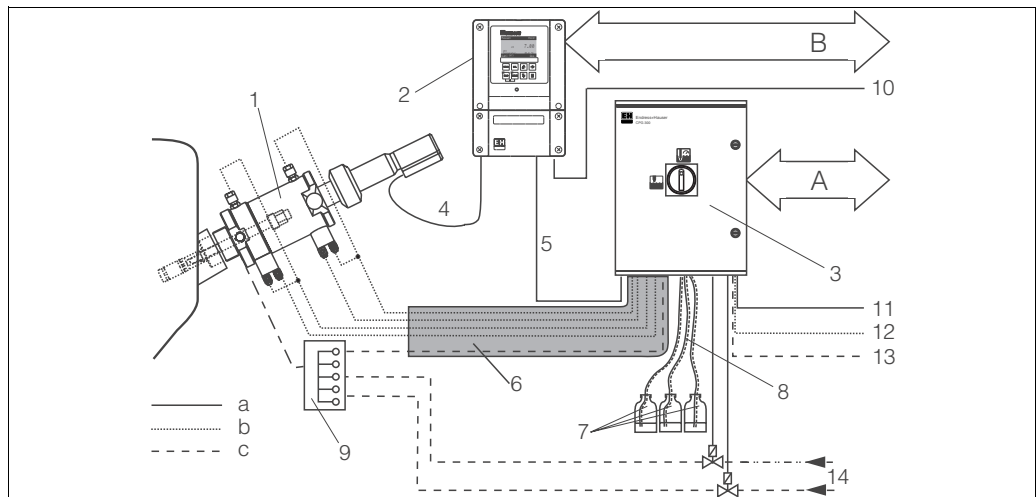
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Fig. 7: Process connections (short version, long version dimensions in brackets)

- A G1 ¼ external thread
- B NPT 1" external thread
- C DN 50 dairy fitting
- D/E DN 50 flange (DIN 1092-1) resp. ANSI 2" flange

## 3.3 Installation instructions

### 3.3.1 Measuring system



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Fig. 8: Fully automatic measuring system (example)

A, B For information on function and connection of the pneumatic resp. electric limit position switches to the assembly, please refer to the related chapters.

- 1 Assembly
- 4 Special measuring cable, e.g. OPK 9, OPK 12
- 9 Rinse block OPR 40 (optional)
- a Electric line
- b Compressed air line
- c Water / cleaning agent / buffer

**OPC 300:<sup>1</sup>**

- 2 Transmitter OPM 153
- 3 Control unit OPG 300
- 5 Supply / control cable
- 6 Multi hose
- 7 Vessels for cleaning agents + buffer solutions
- 8 Hoses of cleaning agents and buffers
- 10 Power supply for OPM 153
- 11 Power supply for OPG 300
- 12 Compressed air
- 13 Water supply
- 14 Steam / water / cleaning agent (optional)

1) Fully automatic calibration and cleaning system

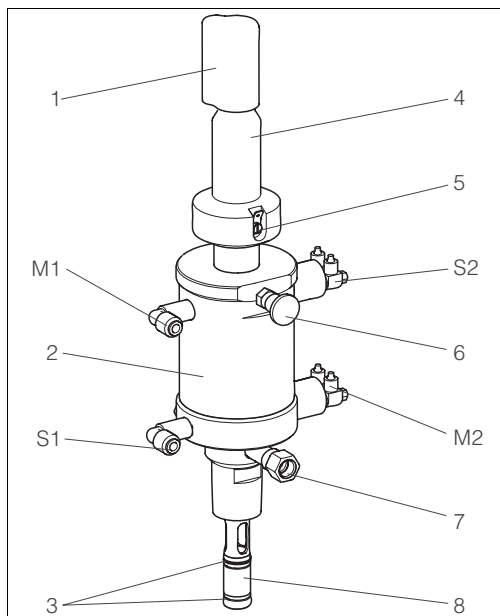
### 3.3.2 Installing the assembly into the process



**Note!**

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 ¼ does not function as a seal. Therefore, simply tighten the thread adapter nut by hand.



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Fig. 9: Pneumatics and limit position switches

- 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 Seals in contact with medium  
4 Retractable pipe  
5 Potential matching  
6 Stop bolt  
7 Rinse fitting (optional)  
8 Sensor holder (= sensor guide)

- 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>1</sup>

Requirements:

- air pressure of 4 to 8 bar (58 to 116 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 inch).



**Caution!**

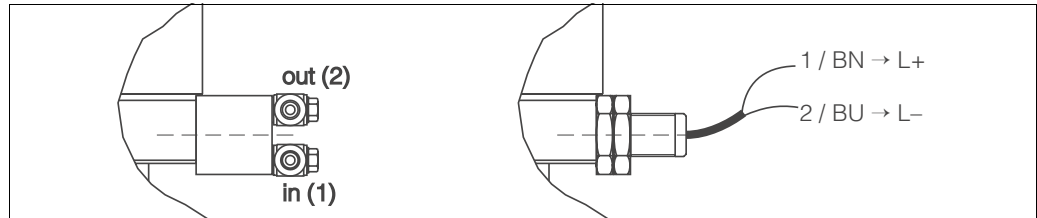
There must be a pressure-reducing valve upstream if the air pressure can increase to above 8 bar (116 psi) (including any short pressure surges).

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

1) pneumatically operated assembly only

### Limit position switches

Pneumatic: 3/2 way valve  
 Electric: inductive (NAMUR type)



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



**Note!**

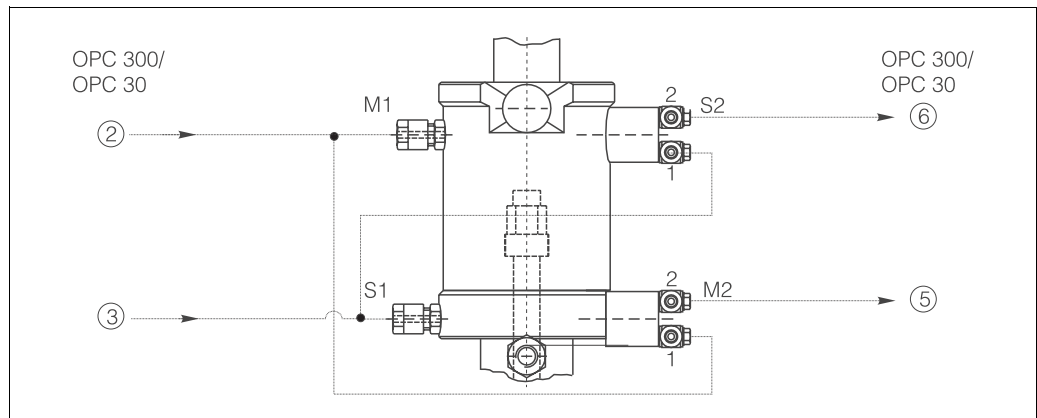
The position of the input resp. the output may be different from the figure. Please, refer to the marks at the limit position switch: "1" is the input (in), "2" is the output (out).

### Pneumatics and limit position switch connection



**Note!**

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 OPC 300 resp. OPC 30 as an example.



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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 OPC 300/OPC 30: hose no. 2
- ③ OPC 300/OPC 30: hose no. 3
- ⑤ OPC 300/OPC 30: hose no. 5
- ⑥ OPC 300/OPC 30: hose no. 6

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

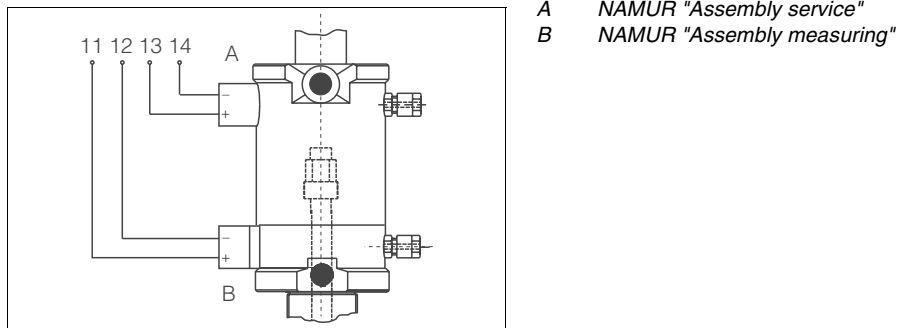
1. Connect the compressed air supply line for "Assembly measuring" (OPC 300/OPC 30: hose no. ②) to the upper G $\frac{1}{4}$  pneumatics connection (Fig. 11).
2. Also, connect the compressed air supply line no. ② to the inlet (1) of the lower limit position switch (M2, via T-piece). This limit position switch supplies the position feedback signal "Assembly measuring".

3. When the "Measuring" position is reached, the air applied to the inlet (1) is switched through and can be tapped at the outlet (2) (OPC 300/OPC 30: connect hose ⑤ to the limit position switch outlet).
4. Connect the compressed air supply line for "Assembly service" (OPC 300/OPC 30: hose no. ③) to the lower G¼ 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 (1) is switched through and can be tapped at the outlet (2) (OPC 300/OPC 30: 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 OPC 300 control unit, as an example.



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Fig. 12: Electric limit position switches to OPC 300

**3.3.4 Rinse water connection**

1. Connect the rinse water pipe to the designated rinse nozzle. Both rinse nozzles on the assembly are identical. Use one as an inlet and the other as an outlet.
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.

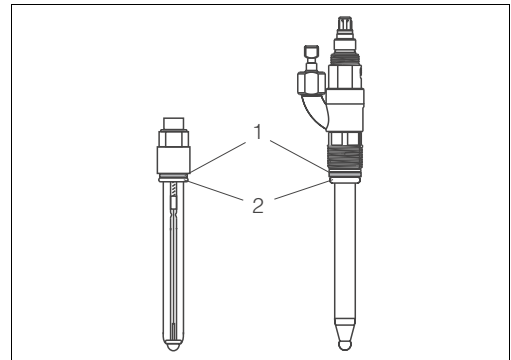


**Caution!**

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. Otherwise the assembly may be damaged.

### 3.3.5 Sensor installation

1. Before installing a sensor, remove the dummy plug from the assembly.
2. Remove the protection cap of the sensor.  
Make sure the sensor shaft is fitted with the O-ring (Fig. 13, A) and the thrust collar (B).
3. Moisten the sensor shaft before installing the sensor.

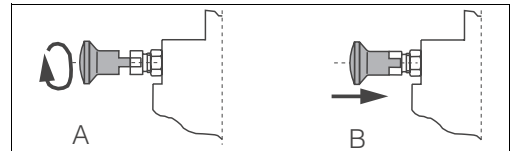


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Fig. 13: Sensor installation

#### Gel sensors

1. Pull the retractable pipe as far as possible out of the assembly ("Service" position).
2. Turn the stop lock bolt through 90° so that the plastic grooves are located above the recesses (Fig. 14, A).
3. Turn the retractable pipe **clockwise** until the stop lock bolt engages (B).



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Fig. 14: Stop bolt

A Step 2, see left

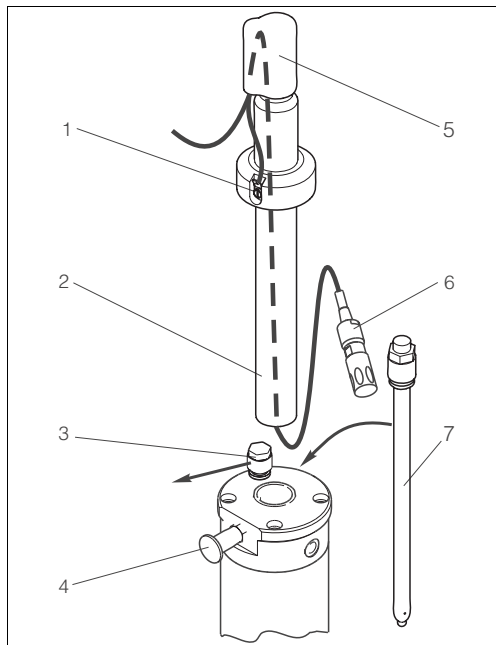
B Step 3



#### Caution!

If turned in the opposite direction, the stop lock bolt does not engage. This could, however, loosen the sensor holder. The reason for this is 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.

1. Remove the splash protection cap (Fig. 15, position 5) from the assembly.
2. Then loosen the retractable pipe (position 2) by turning it anticlockwise.
3. Install the sensor (position 7) instead the dummy plug (position 3):
  - first screw by hand
  - then tighten the sensor using a socket wrench (AF 17) by approx. ¼ turn.
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 it on the retractable pipe.



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Fig. 15: Sensor installation

- 1 PML connection
- 2 Retractable pipe
- 3 Dummy plug (a=inserted and b=not inserted)
- 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.



Note!

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. Pull the retractable pipe as far as possible out of the assembly ("Service" position).
2. Turn the stop lock bolt through 90°, so that the plastic grooves are located above the recesses.
3. Turn the retractable pipe **clockwise** until the stop lock bolt engages.



Caution!

If turned in the opposite direction, the stop lock bolt does not engage. This could, however, loosen the sensor holder. The reason for this is 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.

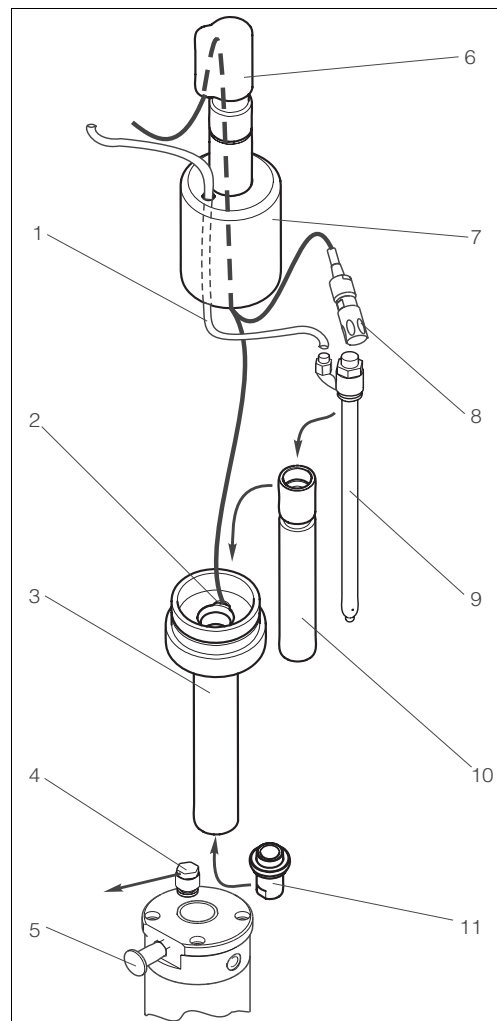
1. Remove the splash protection cap (Fig. 16, position 6) and the KCl hood (position 7) from the assembly.
2. Then slacken the retractable pipe by turning it anticlockwise.
3. Screw in the sensor:
  - a. Unscrew the tension sleeve (position 11) from the inner pipe (position 10).
  - b. Install the sensor (position 9) into the inner pipe:
    - first screw by hand
    - then tighten the sensor using a socket wrench (AF 17) by approx.  $\frac{1}{4}$  turn.
  - c. Push the inner pipe with the sensor into the retractable pipe and screw the tension sleeve to the inner pipe.
4. Screw the retractable pipe with the sensor onto the assembly (clockwise, by hand).
5. Insert the measuring cable through the protective tube and the KCl hood (position 7):
6. *Plug-in head sensor only:*  
Connect sensor and cable.
7. Insert the electrolyte supply tube (position 1) through the KCl hood and connect it to the electrolyte connection of the sensor.
8. Attach the KCl hood to the retractable pipe.
9. Place the measuring cable in the splash protection cap and place it on the protective tube of the KCl hood.

Remove the sensor in the reverse sequence of operations.



#### Note!

In case of symmetrical pH measurement, you must push the PML connector onto the PML connection (PML = potential matching line, position 2). Please, read the Operating Instructions of the transmitter.



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Fig. 16: Liquid KCl electrolyte sensor installation

- |    |                                   |
|----|-----------------------------------|
| 1  | Liquid KCl supply tube            |
| 2  | PML connection                    |
| 3  | Retractable pipe                  |
| 4  | Dummy plug                        |
| 5  | Stop lock bolt                    |
| 6  | Splash protection cap             |
| 7  | KCl hood                          |
| 8  | Plug-in head cable                |
| 9  | Sensor with liquid KCl connection |
| 10 | Inner pipe                        |
| 11 | Tension sleeve                    |

### 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!

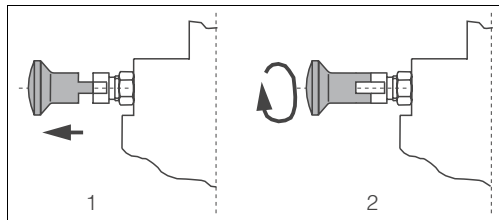
Danger of squirting medium.

Before applying compressed air to the pneumatic assembly, make sure the connections are correctly fitted with either rinsing hoses or dummy plugs. Otherwise the assembly may **not** be put into the process!

### 4.2 Operating elements

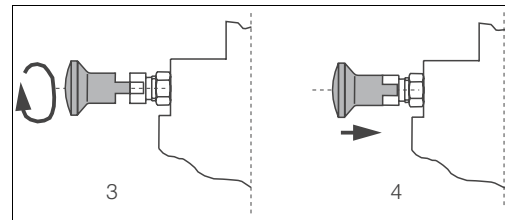
Use the stop lock bolt to lock or release the retractable pipe (Fig. 17, Fig. 18).

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.



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Fig. 17: Releasing the stop lock bolt



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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!

#### 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 control fitted. Refer to the control operating manual for instructions.



#### Caution!

- During maintenance work (e.g. installing and removing the sensor), always lock the assembly in the "Service" position by the stop bolt.
- During the automatic rinse process, do not lock the retractable pipe by the stop 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".



#### Note!

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!

Before starting maintenance work on the assembly, make sure that the process line and the tank are depressurised, 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>1</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.

#### 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 OPC 300.

### 5.2 Cleaning the sensor

You have to clean the sensor:

- before every calibration
- regularly during operation
- before being returned for repair

You can remove and clean the sensor manually or perform cleaning in automatic operation<sup>2</sup> via the rinse connection.



Note!

- Clean redox 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-ionised). Otherwise, remaining residues of cleaning agent can corrupt measurement.
- If required, re-calibrate after cleaning.

1) in reverse sequence of operations to the installation procedure  
2) 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	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)
Fibres, suspended substances	Water under pressure, poss. with surface-active agents
Light biological deposits	Water under pressure

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



#### Caution!

Do not use organic solvents containing halogen or acetone. These solvents could destroy plastic components of the assembly or the sensor and it is also partly suspected that they cause cancer (e.g. Chloroform).

### 5.4 Notes on calibration

Regular sensor calibration is vital for reliable measurement. The calibration cycles depend on the range of applications 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.



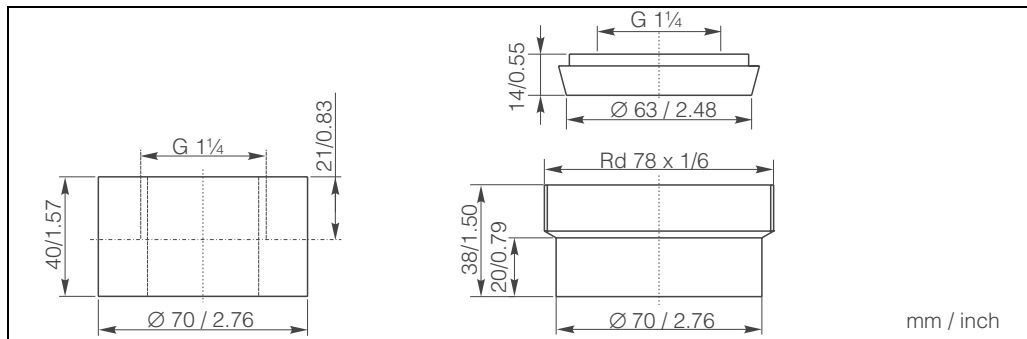
#### Note!

- 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

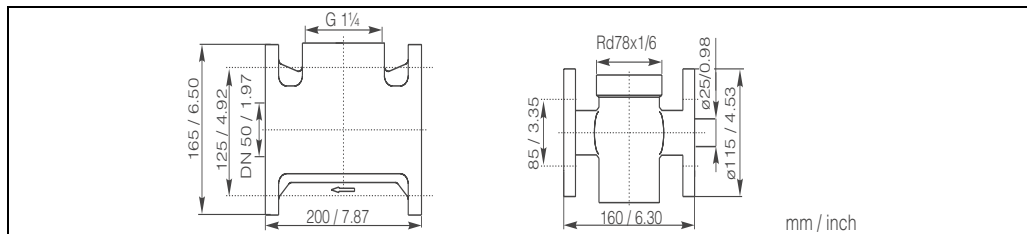
- Filter set OPC 300  
Water filter (dirt trap) 100 µm, complete, incl. angle bracket;  
order no. 51511336
- Pressure reducer kit  
complete, incl. manometer and angle bracket;  
order no. 51505755
- G1¼ welded fitting, PP;  
order no.: 51502809
- G1¼ welded fitting, PVDF;  
order no.: 51502810
- Dairy pipe welded fitting, PP, with FPM seal;  
order no.: 51502811
- Dairy pipe welded fitting, PVDF, with FPM seal;  
order no.: 51502812



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Fig. 19: Welded fitting

- DN 50 flow vessel,  
G 1¼ internal thread, PP;  
order no.: 51502815
- DN 25 flow vessel,  
Rd 78 external thread, PVDF;  
order no.: 51502816



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Fig. 20: Flow vessel: left DN 50, right DN 25



**Note!**

More flow vessels, e.g. with/without view glass, PFA lined, DN 24, DN 50, DN 80 etc., are available on request.

## 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 Pneumatic throttle

- Pneumatic throttle for the reduction of the assembly moving speed,  
order no. 51511990

## 6.4 Sensors

### 6.4.1 Glass electrodes

- OPS 11  
pH electrode for process applications, with PTFE diaphragm;  
Ordering acc. to product structure, see Technical Information (TI 028e/00)
- OPS 12  
ORP electrode for process applications, with PTFE diaphragm;  
Ordering acc. to product structure, see Technical Information (TI 367e/00)
- OPS 41  
pH electrode with ceramics diaphragm and KCl liquid electrolyte;  
Ordering acc. to product structure, see Technical Information (TI 079e/00)
- OPS 42  
ORP electrode with ceramics diaphragm and KCl liquid electrolyte;  
Ordering acc. to product structure, see Technical Information (TI 079e/00)
- OPS 71  
pH electrode with double chamber reference system and integrated bridge electrolyte;  
Ordering acc. to product structure, see Technical Information (TI 245e/00)
- OPS 72  
ORP electrode with double chamber reference system and integrated bridge electrolyte;  
Ordering acc. to product structure, see Technical Information (TI 374e/00)
- OPS 91  
pH electrode with double chamber reference system and open aperture;  
Ordering acc. to product structure, see Technical Information (TI 375e/00)

### 6.4.2 ISFET sensors

- OPS 471  
Sterilisable and autoclavable ISFET sensor for food and pharmaceuticals, process technology, water treatment and biotechnology;  
Ordering acc. to product structure, see Technical Information (TI 283e/00)
- OPS 441  
Sterilisable ISFET sensor for media with low conductivity, with liquid KCl electrolyte;  
Ordering acc. to product structure, see Technical Information (TI 352e/00)
- OPS 491  
ISFET sensor with open aperture for media with high dirt load;  
Ordering acc. to product structure, see Technical Information (TI 377e/00)

## 6.5 Calibration solutions

### 6.5.1 pH

Technical buffer solutions, accuracy 0.02 pH, acc. to NIST/DIN

- pH 4.0 red, 100 ml (0.026 US gal.), order no. OPY 2-0
- pH 4.0 red, 1000 ml (0.264 US gal.), order no. OPY 2-1
- pH 7.0 green, 100 ml (0.026 US gal.), order no. OPY 2-2
- pH 7.0 green, 1000 ml (0.264 US gal.), order no. OPY 2-3

Technical buffer solutions for single use, accuracy 0.02 pH, acc. to NIST/DIN

- pH 4.0 20 x 20 ml (0.005 US gal.), order no. OPY 2-D
- pH 7.0 20 x 20 ml (0.005 US gal.), order no. OPY 2-E

### 6.5.2 ORP

- +225 mV, pH 7, 100 ml (0.026 US gal.); order no. OPY 3-0
- +468 mV, pH 0, 100 ml (0.026 US gal.); order no. OPY 3-1

## 6.6 Measuring cables

### 6.6.1 Glass electrodes

- OPK 9 special measuring cable
  - For pH-/redox electrodes with TOP 68 plug-in head
  - Ordering acc. to product structure, see Technical Information (TI 118e/00)
- OPK 1 special measuring cable
  - For pH-/redox electrodes with GSA plug-in head
  - Ordering acc. to product structure, see Technical Information (TI 118e/00)
- OPK 12 special measuring cable
  - For pH-/redox glass electrodes and ISFET sensors,
  - Ordering acc. to product structure, see Technical Information (TI 118e/00)

### 6.6.2 ISFET sensors

- Special measuring cable OPK 12
  - Ordering by product structure, see Technical Information (TI 118e/00)

## 6.7 Transmitters

- OPM 223/253
  - Transmitter for pH and ORP, field or panel-mounted housing,
  - Hart® or PROFIBUS available,
  - Ordering acc. to product structure, see Technical Information (TI 194e/00)
- OPM 153
  - 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 (TI 233e/00)

## 6.8 Measuring, cleaning and calibration systems

- OPC 300  
Fully automatic measuring, cleaning and calibration system; Ex or Non-Ex,  
In-situ cleaning and calibration, automatic sensor monitoring,  
Ordering acc. to product structure, see Technical Information (TI 236e/00)
- OPC 30  
Fully automatic measuring and cleaning system; Ex or Non-Ex,  
In-situ cleaning, automatic sensor monitoring,  
Ordering acc. to product structure, see Technical Information (TI 235e/00)

## 6.9 Documentation

- Technical Information OPM 223/253, TI 194e/00; order no. 51513109
- Technical Information OPS 11, TI 028e/00; order no. 51503148
- Technical Information OPS 12, TI 367e/00; order no. 51503202
- Technical Information OPS 41, TI 079e/00; order no. 51503200

## 7 Trouble-shooting

### 7.1 Replacing damaged parts



Warning!

Damage to the assembly which affects the pressure safety must **only** be repaired by authorised technical personnel.

After every repair and maintenance activity, suitable measures must be taken to test whether the assembly shows any signs of leaking. The assembly must then correspond to the specifications stated in the technical data.

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

### 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 sales center.



Warning!

Risk of medium leaking out!

Seals must **only** be replaced by authorised technical personnel.

#### 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.



Warning!

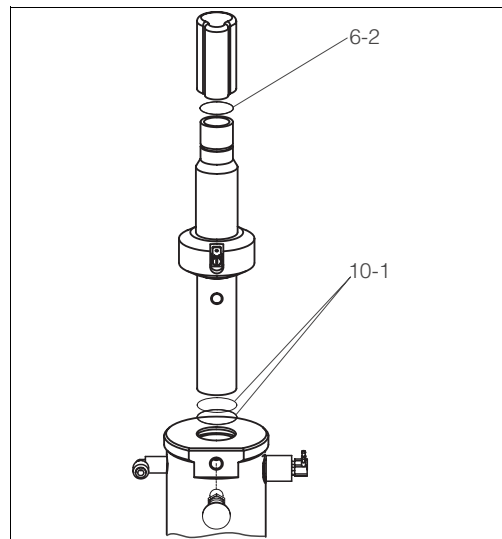
**Before** replacing components, lock the "Service" position by the stop bolt!

Otherwise, there is a risk of injury through escaping medium.

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

Proceed as follows (Fig. 21):

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.**



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Fig. 21: Seal replacing without process interrupt

## 7.2.2 Replacing seals with process interrupt

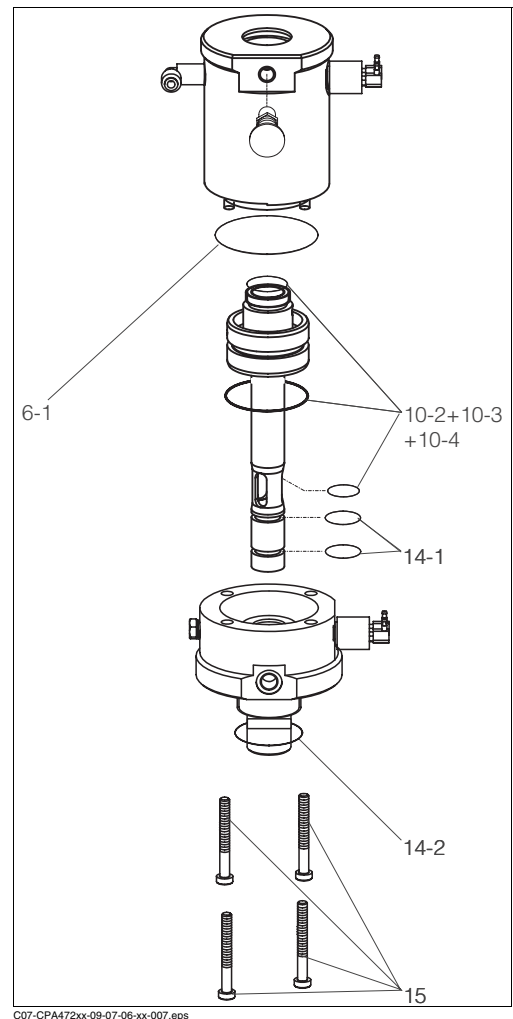
You can only replace the seals of the cylinder, of the rinse chamber and of the sensor guide when the process is interrupted and the assembly is dismantled from the process connection (Fig. 22).



### Warning!

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

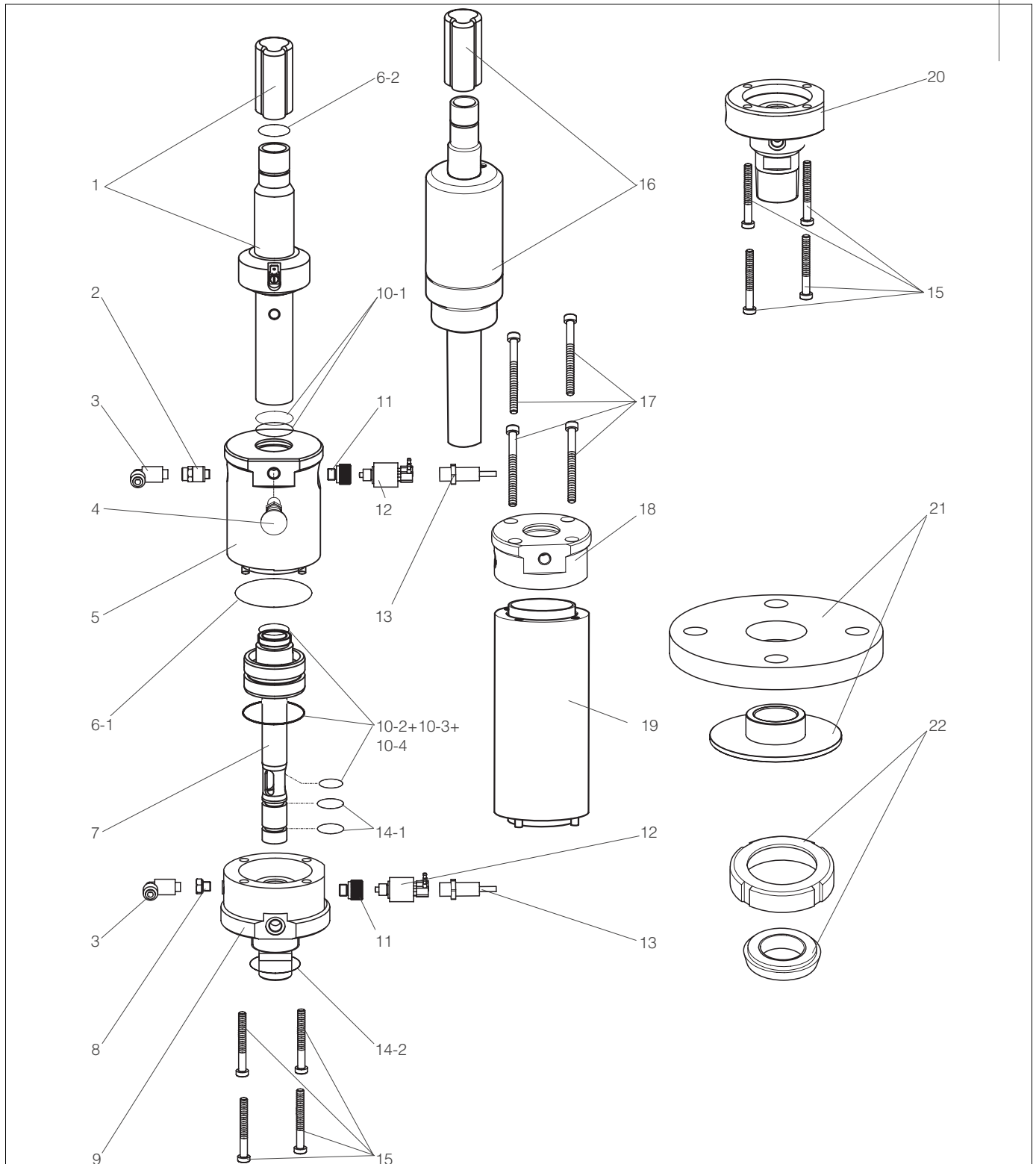
1. Interrupt the process. Beware of medium residues, residual pressure and higher temperatures.
2. Dismount the assembly from the process connection.
3. Unscrew the retractable pipe counterclockwise.
4. Loosen the screws between rinse chamber and cylinder (pos. 15).
5. Separate the rinse chamber from the cylinder and take out the sensor guide.
6. Replace the O-rings (pos. 6-1, 10-2, 10-3, 10-4, 14-1 und 14-2). For ordering of spare part kits see following chapter "Spare part kits".
7. If necessary, also replace the retractable pipe 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.**



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Fig. 22: Seal replacing with process interrupt

### 7.3 Spare part kits



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Abb. 23: Spare parts (all assembly versions)



**Note!**

Please, refer to the following table for the spare part kits ordering numbers acc. to the positions in Fig. 23.

Position	Description and kit content	Spare part kit order no.
1	Retractable pipe for 120 mm (4.72 inch) gel electrodes For assembly version: – pneumatic – short, immersion depth up to 110 mm (4.33 inch) Kit 471/472 short, pneumatic	51503715
	Retractable pipe for 225 mm (8.86 inch) gel electrodes For assembly version: – pneumatic – long, immersion depth up to 215 mm (8.46 inch) Kit 471/472 long, pneumatic	51503716
	For assembly version: – manual – short, immersion depth up to 110 mm (4.33 inch) Kit 471/472 short, manual	51503717
	Retractable pipe for 225 mm (8.86 inch) gel electrodes For assembly version: – manual – long, immersion depth up to 215 mm (8.46 inch) Kit 471/472 long, manual	51503718
2, 8	Exhaust air restrictor (2) and SS 1.4404 (AISI 316L) blind stopper (8) For assembly version: – manual 5 pieces each	51503732
3	G1/8 pneumatic connections For assembly version: – pneumatic 10 pieces	51503730
4	Stop bolt	51503731
5	PA cylinder, with O-ring For assembly version: – short, immersion depth up to 110 mm (4.33 inch)	51503773
6-1, 6-2	Set of gaskets, not dynamically loaded	51503729

Position	Description and kit content	Spare part kit order no.
7	Sensor guide, PP, complete For assembly version: – short, immersion depth up to 110 mm (4.33 inch)	51503722
	Sensor guide, PVDF, complete For assembly version: – short, immersion depth up to 110 mm (4.33 inch)	51503723
	Sensor guide, PEEK, complete For assembly version: – short, immersion depth up to 110 mm (4.33 inch)	51503724
	Sensor guide, PP, complete For assembly version: – long, immersion depth up to 215 mm (8.46 inch)	51503725
	Sensor guide, PVDF, complete For assembly version: – long, immersion depth up to 215 mm (8.46 inch)	51503726
	Sensor guide, PEEK, complete For assembly version: – long, immersion depth up to 215 mm (8.46 inch)	51503727
9	Rinse chamber complete, G1¼ external thread, PP For assembly version: – process connection: G1¼ thread adapter, DN 50 / ANSI 2" flange, Rd 78 grooved nut – without rinse fittings	51503748
	Rinse chamber complete, G1¼ external thread, PVDF For assembly version: – process connection: G1¼ thread adapter, DN 50 / ANSI 2" flange, Rd 78 grooved nut – without rinse fittings	51503749
	Rinse chamber complete, G1¼ external thread, PEEK For assembly version: – process connection: G1¼ thread adapter, DN 50 / ANSI 2" flange, Rd 78 grooved nut – without rinse fittings	51503750
	Rinse chamber complete, G1¼ external thread, PP For assembly version: – process connection: G1¼ thread adapter, DN 50 / ANSI 2" flange, Rd 78 grooved nut – with G1/8 rinse fittings	51503751
	Rinse chamber complete, G1¼ external thread, PVDF For assembly version: – process connection: G1¼ thread adapter, DN 50 / ANSI 2" flange, Rd 78 grooved nut – with G1/8 rinse fittings	51503752
	Rinse chamber complete, G1¼ external thread, PEEK For assembly version: – process connection: G1¼ thread adapter, DN 50 / ANSI 2" flange, Rd 78 grooved nut – with G1/8 rinse fittings	51503753
10-1, 10-2, 10-3	Set of gaskets, dynamically loaded	51503728

Position	Description and kit content	Spare part kit order no.
11	M12x1 stopper For assembly version: – pneumatic, without limit switch 10 pieces	51503733
12	Set of pneumatic limit switches For assembly version: – pneumatic 2 pieces	51502874
13	Set of electric limit switches, Ex and Non-Ex For assembly version: – pneumatic 2 pieces	51502873
14-1, 14-2, 14-3	Set of gaskets, in contact with medium VITON	51502803
	Set of gaskets, in contact with medium KALREZ	51502804
15	M6x30 screws, DIN 69612 A-4/2, 20 pieces	51503734
16	Retractable pipe for 225 mm (8.86 inch) liquid KCl electrodes For assembly version: – pneumatic – short, immersion depth up to 110 mm (4.33 inch) Kit 471/472 short, pneumatic	51503713
	Retractable pipe for 225 mm (8.86 inch) liquid KCl electrodes For assembly version: – manual – short, immersion depth up to 110 mm (4.33 inch) Kit 471/472 short, manual	51503714
17	M6x45 screws, DIN 69612 A-4/3 For assembly version: – long, immersion depth up to 215 mm (8.46 inch) 20 pieces	51503738
17-19	PA cylinder (19), with O-ring (6-1), cylinder head (18), screws (17) For assembly version: – long, immersion depth up to 215 mm (8.46 inch)	51503774

Position	Description and kit content	Spare part kit order no.
20	Rinse chamber complete, NPT 1" external thread, PP For assembly version: – process connection: NPT 1" thread adapter – without rinse fittings	51503754
	Rinse chamber complete, NPT 1" external thread, PVDF For assembly version: – process connection: NPT 1" thread adapter – without rinse fittings	51503755
	Rinse chamber complete, NPT 1" external thread, PEEK For assembly version: – process connection: NPT 1" thread adapter – without rinse fittings	51503756
	Rinse chamber complete, NPT 1" external thread, PP For assembly version: – process connection: NPT 1" thread adapter – with G1/8 rinse fittings	51513176
	Rinse chamber complete, NPT 1" external thread, PVDF For assembly version: – process connection: NPT 1" thread adapter – with G1/8 rinse fittings	51513177
	Rinse chamber complete, NPT 1" external thread, PEEK For assembly version: – process connection: NPT 1" thread adapter – with G1/8 rinse fittings	51513178
21	Retrofitting kit DN 50 flange, with sealing element, PP	51503739
	Retrofitting kit DN 50 flange, with sealing element, PVDF	51503740
	Retrofitting kit DN 50 flange, with sealing element, PEEK	51503741
	Retrofitting kit ANSI 2" flange, with sealing element, PP	51503742
	Retrofitting kit ANSI 2" flange, with sealing element, PVDF	51503743
	Retrofitting kit ANSI 2" flange, with sealing element, PEEK	51503744
22	Retrofitting kit Rd 78 grooved nut, PP	51503745
	Retrofitting kit Rd 78 grooved nut, PVDF	51503746
	Retrofitting kit Rd 78 grooved nut, PEEK	51503747

## 7.4 Return

If the assembly has to be repaired, please return it *cleaned* to the sales centre responsible. Please use the original packaging, if possible.

Please enclose the completed Dangerous Goods sheet (copy the second last page of these Operating Instructions) with the packaging and also the shipping documents.  
No repair without completed Dangerous Goods sheet!

## 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.

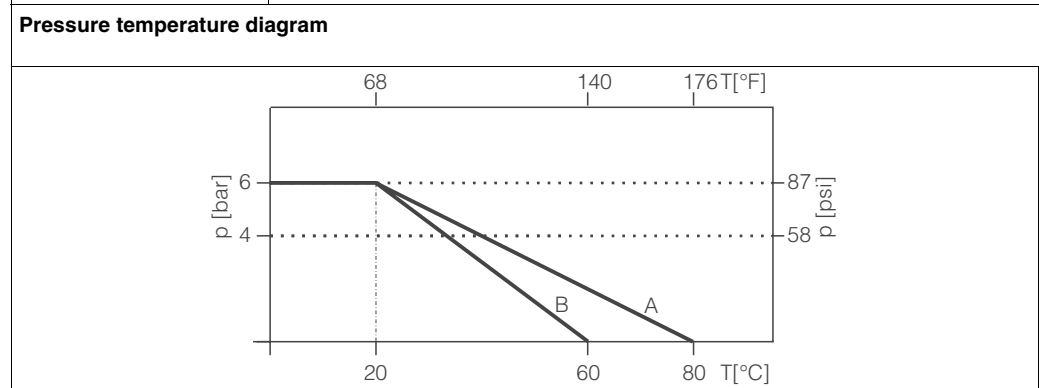
## 8 Technical data

### 8.1 Environment

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

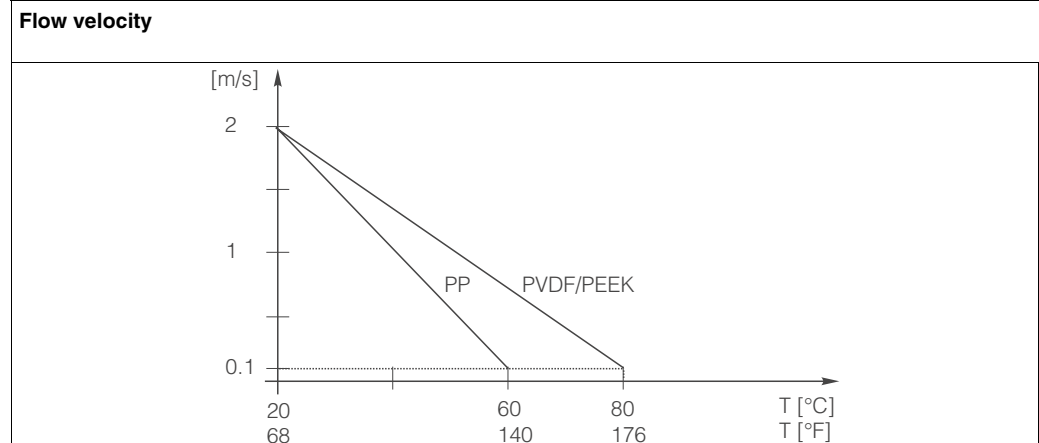
<b>Process pressure</b>	max. 6 bar (87 psi)
<b>Process temperature</b>	max. 80 °C (176 °F)



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Fig. 24: Pressure-temperature diagram due to assembly material (overpressure)

- A PA housing, materials in contact with medium: PVDF, PEEK
- B PA housing, materials in contact with medium: PP



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Fig. 25: Maximum permissible flow velocity in dependence of temperature and materials (in contact with medium)



**Caution!**

The process pressure for a manually driven assembly must not exceed 4 bar (58 psi)!

### 8.3 Mechanical construction

<b>Design, dimensions</b>	see chapter "Installation"	
<b>Sensors</b>	Short version	pH glass electrodes, gel 120 mm pH glass electrodes, KCl 225 mm pH ISFET sensors, gel, 120 mm pH ISFET sensors, KCl, 225 mm
	Long version	pH glass electrodes, gel, 225 mm pH ISFET sensors, gel, 225 mm
<b>Weight</b>	1.5 to 3 kg (3.3 to 6.6 lb), depending on assembly version and additional equipment, see product structure	
<b>Material</b> (in contact with medium)	Seals Sensor holder	FPM / Kalrez® PP, PEEK, PVDF
<b>Material</b> (not in contact with medium)	Cylinder Electric limit position switch	PA fore-part PBT, cable PVC
<b>Rinse connection fittings</b>	2 x G $\frac{1}{4}$ (internal) or 2 x NPT $\frac{1}{4}$ " (internal)	





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# Declaration of contamination

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Dear customer,

Because of legal determinations and for the safety of our employees and operating equipment we need this "Declaration of contamination" with your signature before your order can be handled. Please put the completely filled in declaration to the instrument and to the shipping documents in any case. Add also safety sheets and/or specific handling instructions if necessary.

type of instrument / sensor: \_\_\_\_\_ serial number: \_\_\_\_\_  
medium / concentration: \_\_\_\_\_ temperature: \_\_\_\_\_ pressure: \_\_\_\_\_  
cleaned with: \_\_\_\_\_ conductivity: \_\_\_\_\_ viscosity: \_\_\_\_\_

### Warning hints for medium used:



radioactive



explosive



caustic



poisonous



harmful of health



biological hazardous



inflammable



safe

Please mark the appropriate warning hints.

### Reason for return:

\_\_\_\_\_  
\_\_\_\_\_

### Company data:

company: _____	contact person: _____
_____	_____
_____	department: _____
address: _____	phone number: _____
_____	Fax/E-Mail: _____
_____	your order no.: _____

I hereby certify that the returned equipment has been cleaned and decontaminated acc. to good industrial practices and is in compliance with all regulations. This equipment poses no health or safety risks due to contamination.

\_\_\_\_\_  
(Date)

\_\_\_\_\_  
(company stamp and legally binding signature)

