

OPA 475 **Retractable Process Assembly**

Operating Instructions

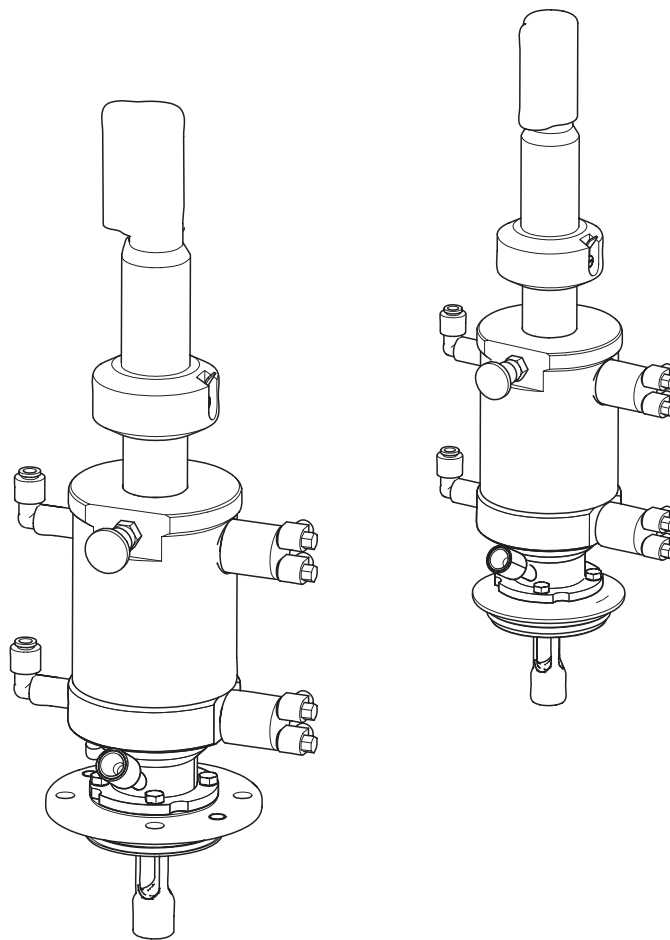


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1 Safety instructions

1.1 Designated use

The manually or pneumatically operated retractable assembly OPA 475 is designed for installing pH/redox sensors in tanks and pipes under sterile conditions.

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 or by the 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 recognise the assembly version from the order code on the nameplate. Please compare this code with your order.

OPA 475	
order code:	OPA475-B1A1A1D3
serial no.:	2 10029 05A05
spec.	pressure: PN=6 bar (20°C) T=90°C

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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 (see back page of these Operating Instructions).

2.3 Certificates and approvals

2.3.1 3A

Following versions meet the requirements of the rule 3A 74-01:

- OPA 475-XXXXXXCX (process connection: triclamp)
- OPA 475-XXXXXXDX (process connection: dairy fitting)
- OPA 475-XXXXXXEX (process connection: varivent)
- OPA 475-XXXXXXFX (process connection: APV)

2.3.2 EHEDG

Classified as in-line steam sterilisable by a 30 minute saturated steam treatment at a temperature of 120 °C. ¹

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

2.4 Product structure

Drive type and limit contact switches	
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)
Assembly version	
1	Standard version
Electrode holder	
A	For 120 mm gel electrodes / ISFET sensors with Pg 13.5
B	For 225 mm liquid KCl electrodes / ISFET sensors with Pg 13.5 hose connection head
Immersion depth / maximum stroke	
1	Immersion depth / stroke: 101/65 mm resp. 48/23 mm (depending on process connection)
9	Special version acc. to customer
Assembly material (in contact with medium)	
A	1.4435 (AISI 316L) in contact with medium, with PA housing (max. 6 bar/87 psi at 20 °C/68 °F or max. 80 °C/176 °F at 1 bar/14.5 psi)
B	1.4435 (AISI 316L) in contact with medium, with stainless steel 1.4404 (AISI 316L) housing (max. 10 bar / 145 psi at 100 °C / 212 °F)
C	1.4435 (AISI 316L) in contact w. medium, with test cert. 3.1B acc. to EN10204, with PA housing
D	1.4435 (AISI 316L) in contact w. medium, with test certificate 3.1B acc. to EN10204, with 1.4571 (AISI 316Ti) housing
Seal material (in contact with medium)	
1	EPDM (preferred for food application)
2	FPM (Viton®, preferred for process application)
Process connection	
A	G 1¼ internal thread (union)
C	Tri-Clamp 2"
D	Dairy fitting DN 50 (acc to. DIN 11 851)
E	Varivent N, 68 mm, for pipe lines DN 50 ... 125 and tank connection
F	APV DN 50 ... 100
G	DN 50 flange (acc. to EN 1092-1)
H	2" ANSI flange
Optional equipment	
3	With rinse fitting 2 x G ¼ internal thread
4	With rinse fitting 2 x NPT ¼" internal thread
OPA 475-	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 (see back page of these Operating Instructions).

3.2 Installation conditions

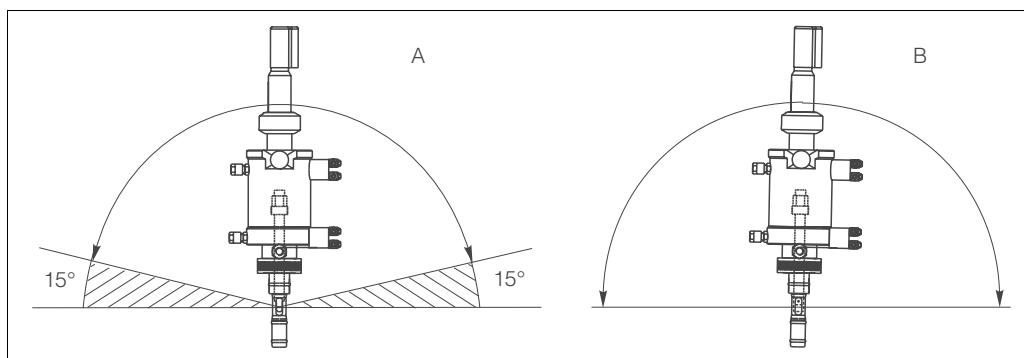
3.2.1 Notes on installation

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



Note!

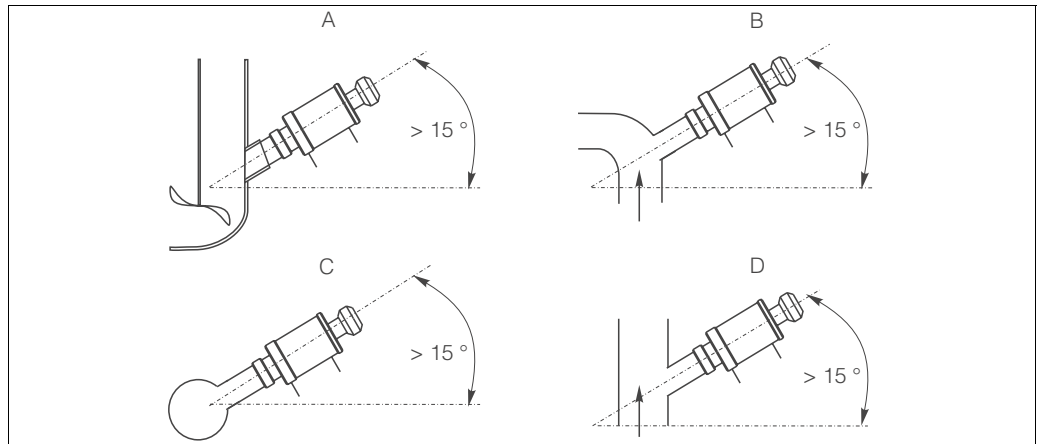
- When using standard glass electrodes, only installation positions are permitted in which the middle axis of the assembly lies at least at an angle of 15° from the horizontal (see diagram). Otherwise, there will not be a reliable contact between the inner side of the pH membrane and the inner terminal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

- 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 effect¹ at the rinse chamber outlet when installing with inclined orientation. The inlet to the rinse chamber must be from below.

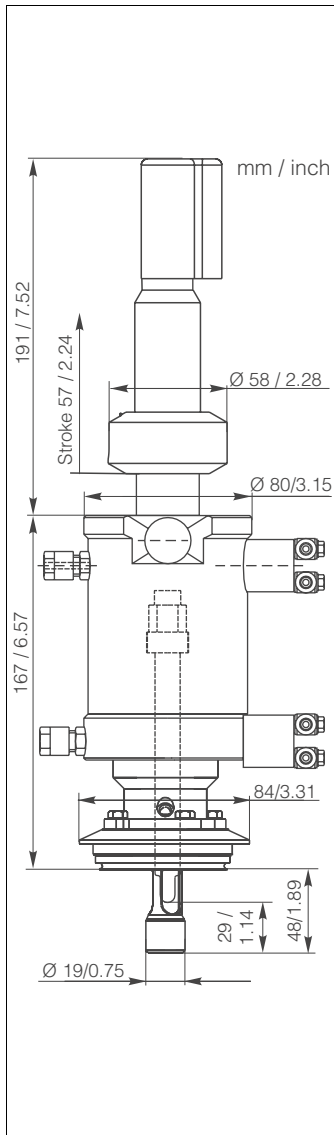


Note!

- The minimum diameter for direct installation in pipework is DN 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").

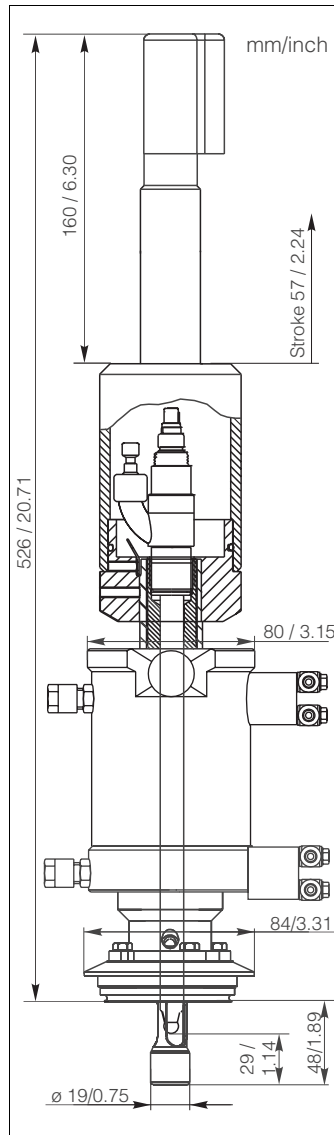
1) Siphon effect: line emptied by vacuum

3.2.2 Dimensions



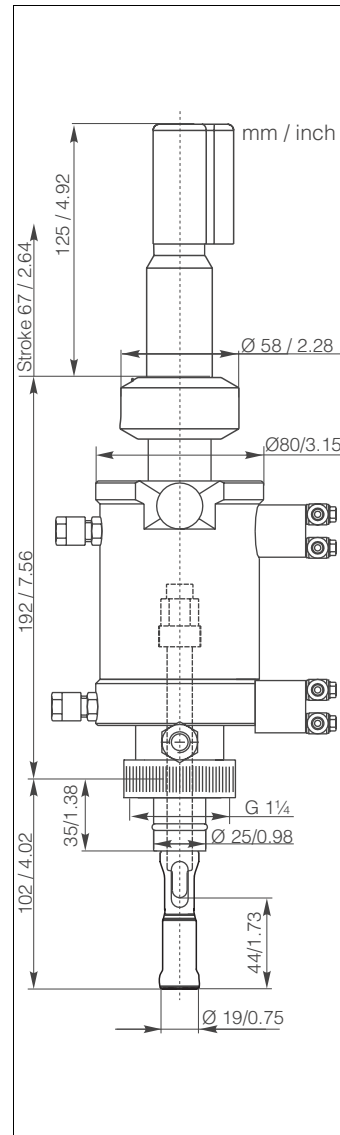
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Fig. 4: Varivent version



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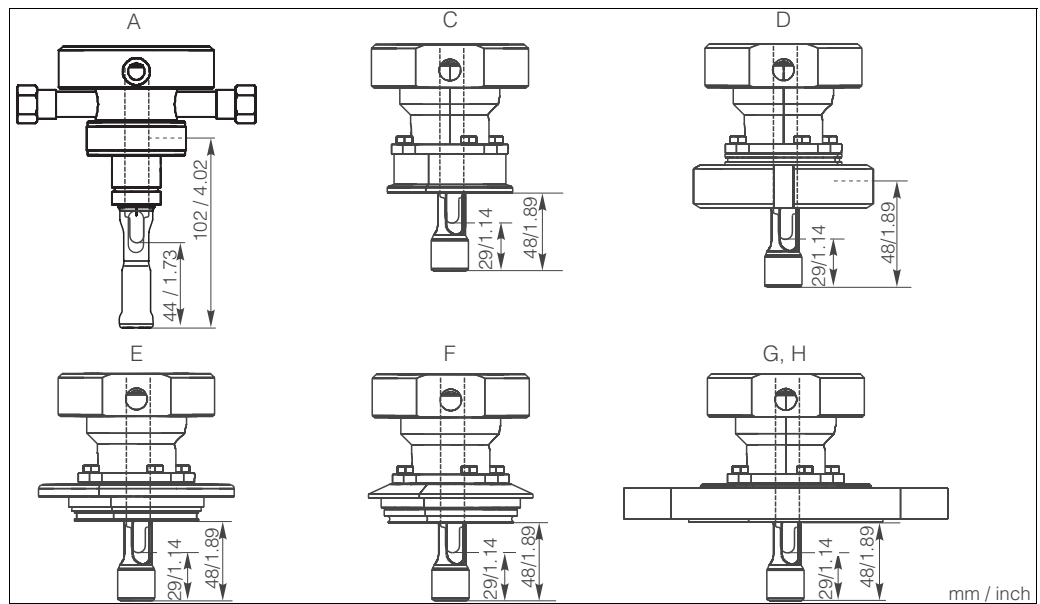
Fig. 5: Liquid KCl electrolyte version



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Fig. 6: G1 1/4 thread nut version

3.2.3 Process connections



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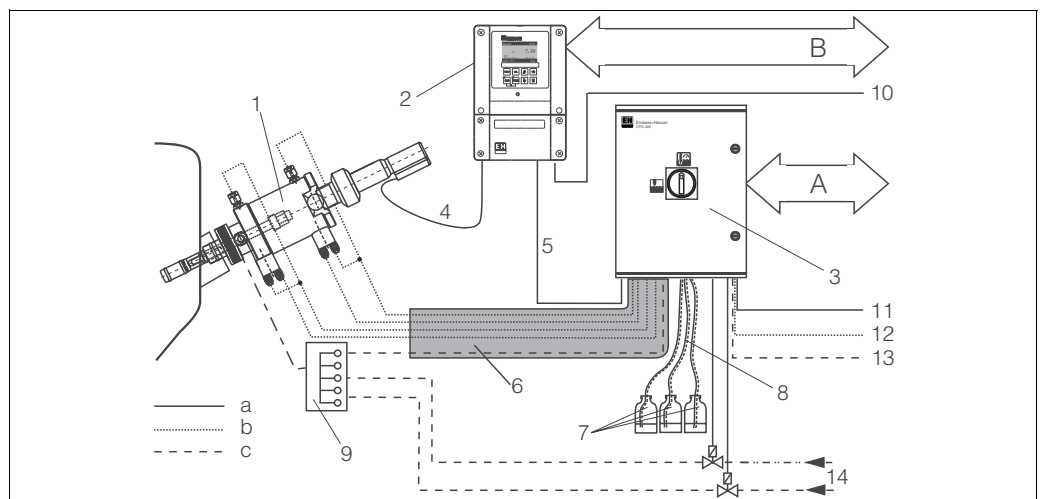
Fig. 7: Process connections

- A G1 ¼ internal thread with thread nut
- C Triclamp 2"
- D DN 50 dairy fitting

- E Varivent DN 50 ... 125
- F APV DN 50 ... 100
- G/H 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 limit position switches, refer to the related chapters.

- 1 Assembly
- 2 Transmitter OPM 153
- 3 Control unit OPG 300
- 4 Special measuring cable, e.g. OPK 9, OPK 12
- 5 Supply / control cable
- 6 Multi hose
- 7 Vessels for cleaning agents + buffer solutions
- 8 Hoses of cleaning agents and buffers
- 9 Rinse block OPR 40 (optionally)
- a Electric line
- b Compressed air line
- c Water / cleaning agent / buffer

OPC 300:

- 2 Transmitter OPM 153
- 3 Control unit OPG 300
- 5 Supply / control cable

To be supplied by customer:

- 10 Power supply for OPM 153
- 11 Power supply for OPG 300
- 12 Compressed air
- 13 Water supply
- 14 Steam / water / cleaning agent (optionally)

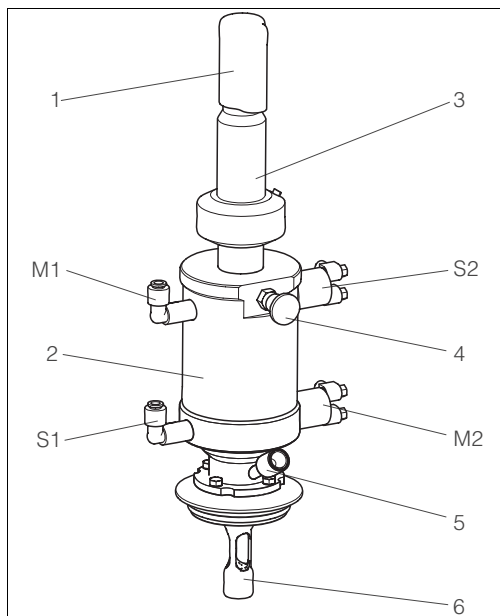
3.3.2 Installing the assembly into the process



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" ¹
S1 Pneumatics "Assembly Service"
S2 Limit position switch "Assembly Service" ¹
(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)

1) pneumatic or electric limit position switch depending on assembly version (see product structure)

Move the assembly into the "Service" position (electrode holder inserted in the assembly) and secure the assembly to the tank or the piping using your selected process connection.

3.3.3 Compressed air connection¹

The assembly is operated with an air pressure of 4 to 8 bar (58 to 116 psi). The air must be filtered (40 µm) and be free of water and oil. There is no continuous air consumption. The air lines must have a minimum nominal diameter of 4 mm (0.16 inch).



Caution!

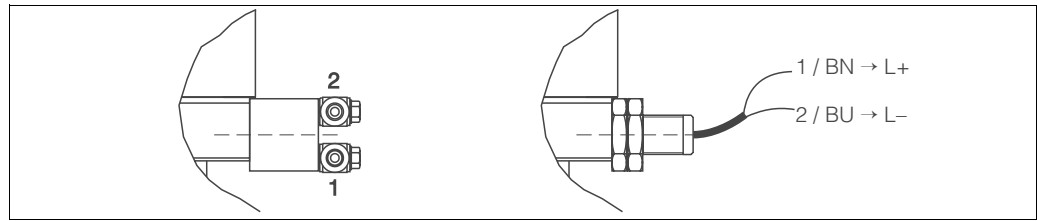
There must be a pressure-reducing valve upstream if the air pressure can increase to above 8 bar (116 psi) (including any short pressure surges).

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

Limit position switches

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

1) pneumatically operated assembly only



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



Note!

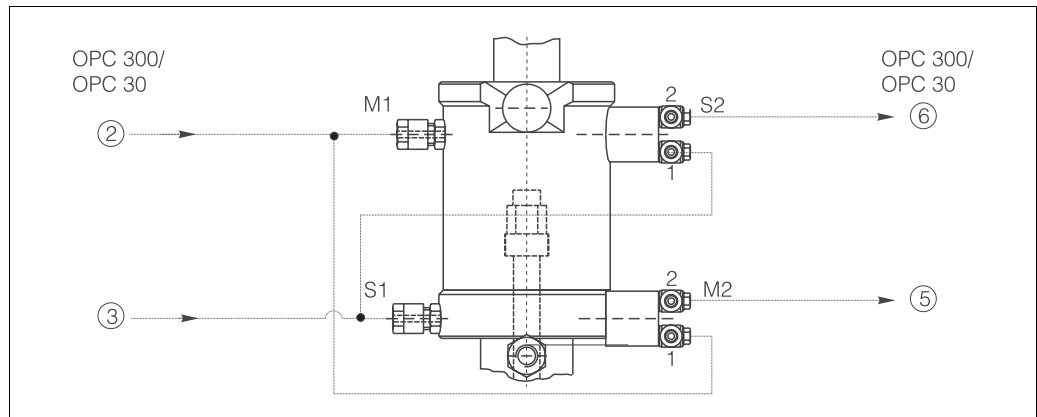
The position of the input resp. the output may be different from the figure. Please, refer to the marks at the limit position switch: "1" is the input, "2" is the output.

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 G $\frac{1}{4}$ 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.

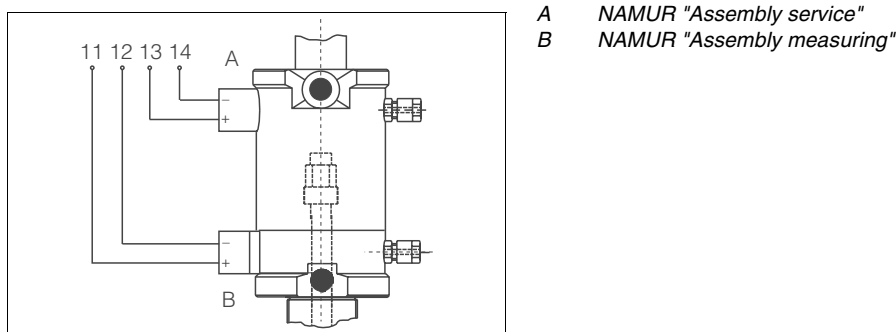


Fig. 12: Electric limit position switches to OPC 300

3.3.4 Rinse water connection

Connect the rinse water pipe to the designated rinse nozzle:

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

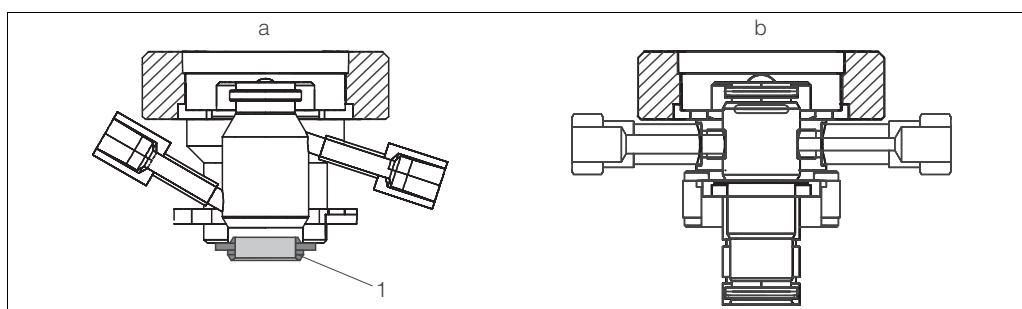


Fig. 13: Rinse chamber versions (depending on process connection)
 a Rinse chamber with welded rinse fittings, for: Triclamp, Dairy fitting, Varivent, APV and flanges
 b Rinse chamber with threaded fittings, for: G1¼ internal thread
 1 Moulded seal

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

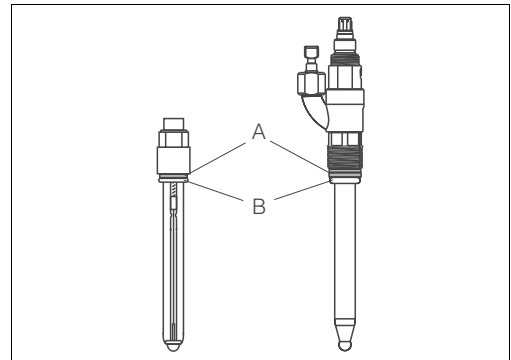
**Caution!**

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.

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.

3.3.5 Sensor installation

1. Before installing a sensor, remove the dummy plug from the assembly.
2. Remove the yellow protection cap of the sensor.
Make sure the sensor shaft is fitted with the O-ring (Fig. 14, A) and the thrust collar (B).
3. Moisten the sensor shaft before installing the sensor.

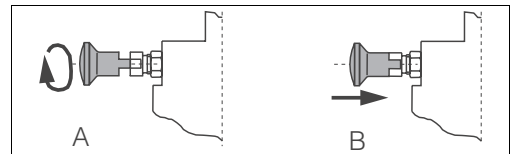


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Fig. 14: Sensor installation

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. 15, A).
3. Turn the retractable pipe **clockwise** until the stop lock bolt engages (B).



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Fig. 15: Stop bolt

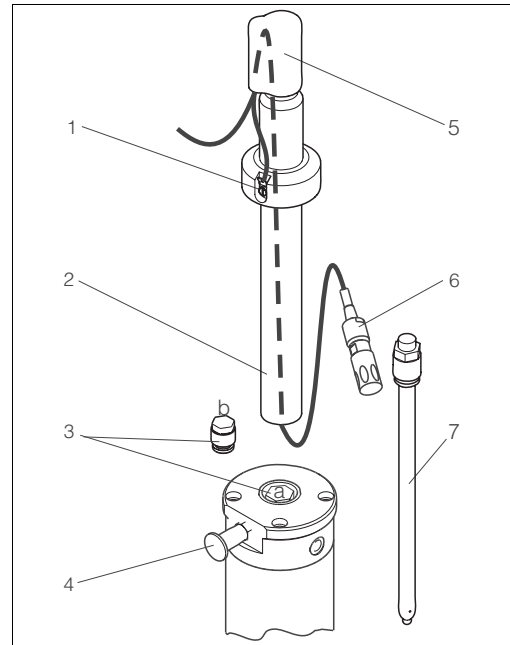
A Step 2 see left
B Step 3

**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.

4. Remove the splash protection cap (Fig. 16, position 5) from the assembly.
5. Then loosen the retractable pipe (position 2) by turning it anticlockwise.

6. Remove the dummy plug (position 3).
7. Screw the sensor or the electrode (position 7) into the sensor holder by hand.
8. Tighten the sensor using a socket wrench (AF 17) by approx. ¼ turn.
9. Insert the measuring cable from the top through the retractable pipe (pos. 2).
10. Plug the measuring cable into the sensor plug-in head using the cable plug (position 6) and tighten it by hand.
11. Screw the retractable pipe back onto the pressure cylinder (clockwise, by hand).
12. Place the measuring cable in the splash protection cap and place it on the retractable pipe.
13. Push the PML connector onto the PML connection (PML = potential matching line, position 1).
14. Release the stop lock bolt catch by pulling it out and turning it by 90°.



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Fig. 16: 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.

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.

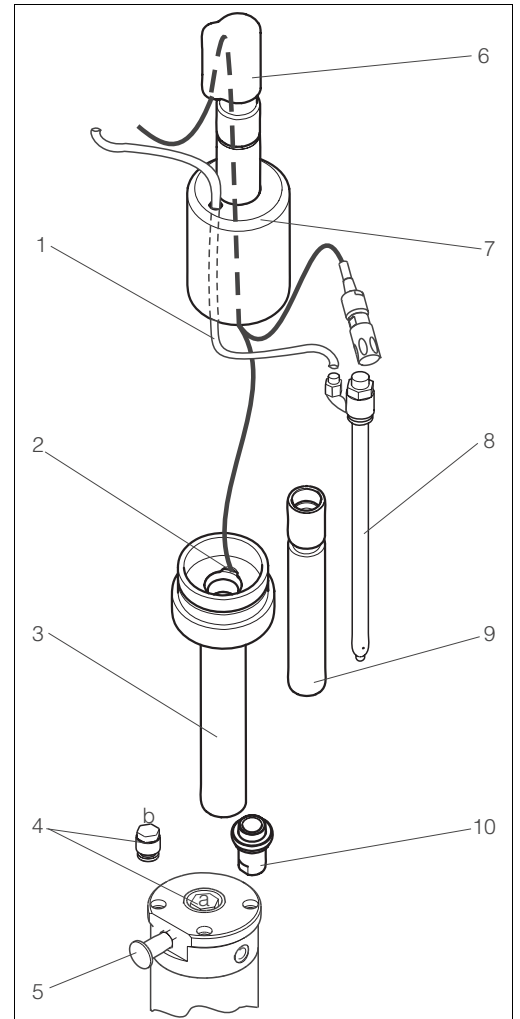


Caution!

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.

4. Remove the splash protection cap (Fig. 17, position 6) and the KCl hood (position 7) from the assembly.
5. Then slacken the retractable pipe by turning it anticlockwise.
6. Unscrew the tension sleeve (position 10).
7. Remove the sensor holder (position 9) from the retractable pipe.

8. Screw the sensor into the sensor holder by hand.
9. Tighten the sensor using a socket wrench (AF 17) by approx. ¼ turn.
10. Push the sensor holder with the sensor into the retractable pipe.
11. Insert the tension sleeve from the bottom into the retractable pipe and screw it to the sensor holder.
12. Screw the retractable pipe with the sensor onto the assembly (by hand).
13. Insert the measuring cable from the top through the protective tube and the KCl hood (position 7).
14. Screw the measuring cable onto the sensor plug-in head and tighten it by hand.
15. Push the PML connector onto the PML connection (PML = potential matching line, position 2).
16. Insert the electrolyte supply tube (position 1) through the KCl hood and connect it to the electrolyte connection of the sensor.
17. Attach the KCl hood to the retractable pipe.
18. Place the measuring cable in the splash protection cap and place it on the protective tube of the KCl hood.
19. Release the stop lock bolt catch (pull it out and turn it by 90°).



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Fig. 17: Liquid KCl electrolyte sensor installation

- 1 Liquid KCl supply tube
- 2 PML connection
- 3 Retractable pipe
- 4 Dummy plug (a = inserted, b = not inserted)
- 5 Stop lock bolt
- 6 Splash protection cap
- 7 KCl hood
- 8 Sensor with liquid KCl connection
- 9 Sensor holder
- 10 Tension sleeve

Remove the sensor in the reverse sequence of operations.

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!

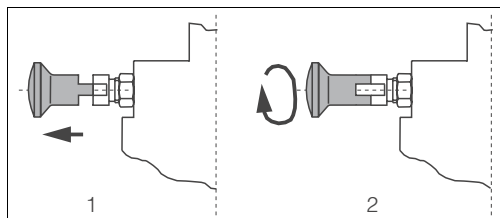
Danger of squirting medium.

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

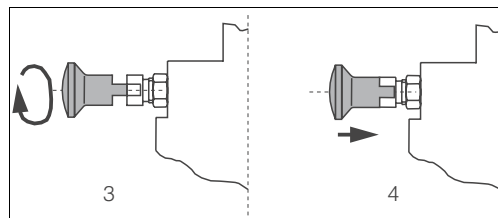
Use the stop lock bolt to lock or release the retractable pipe (Fig. 18, Fig. 19).

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.



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Fig. 18: Releasing the stop lock bolt



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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!

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 sensor¹.

- 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 operation² 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) ¹ or water-soluble organic solvents (e.g. Ethanol)
Calciferous deposits, metal hydroxide deposits, lyophobic biological deposits	approx. 3% hydrochloric acid
Sulphide deposits	Mixture of 3% hydrochloric acid and thiocarbamide (commercially available)
Protein deposits	Mixture of 3% hydrochloric acid and pepsin (commercially available)
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.



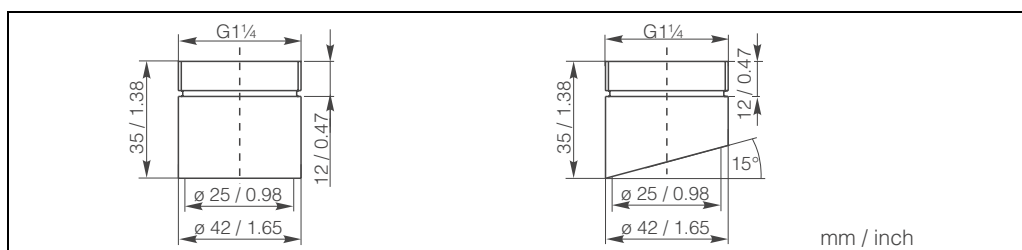
Note!

- 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

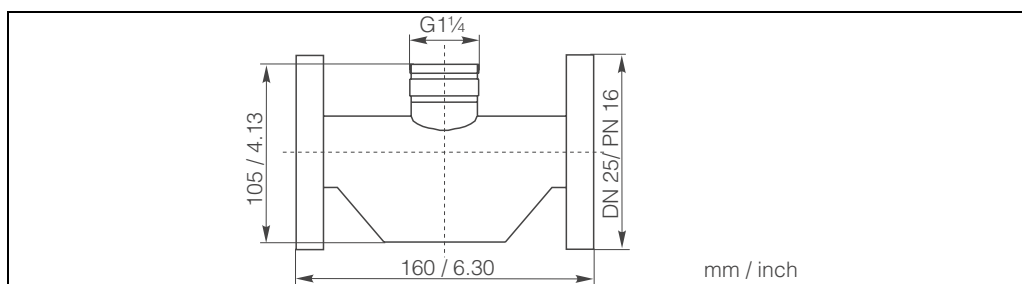
- Filter set
Water filter (dirt trap) 100 µm, complete, incl. angle bracket;
order no. 51511336
- Pressure reducer kit
complete, incl. manometer and angle bracket;
order no. 51505755
- Welded fitting G1¼, straight,
SS 1.4435 (AISI 316L); order no. 51502798
- Welded fitting G1¼, angular 15°,
SS 1.4435 (AISI 316L); order no. 51502799



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Fig. 20: Welded fitting

- 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



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Fig. 21: Flow vessel

- Hose nozzles for rinse connections G1¼, DN 12,
SS 1.4404 (AISI 316L), 2 pieces;
order no. 51502808
- Hose nozzles for rinse connections G1¼, 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 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;
- OPS 12
ORP electrode for process applications, with PTFE diaphragm;
- OPS 41
pH electrode with ceramics diaphragm and KCl liquid electrolyte;
- OPS 42
ORP electrode with ceramics diaphragm and KCl liquid electrolyte;
- OPS 71
pH electrode with double chamber reference system and integrated bridge electrolyte;
- OPS 72
ORP electrode with double chamber reference system and integrated bridge electrolyte;
- OPS 91
pH electrode with double chamber reference system and open aperture;

6.4.2 ISFET sensors

- OPS 471
Sterilisable and autoclavable ISFET sensor for food and pharmaceuticals, process technology, water treatment and biotechnology;
- OPS 441
Sterilisable ISFET sensor for media with low conductivity, with liquid KCl electrolyte;
- OPS 491
ISFET sensor with open aperture for media with high dirt load;

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. CPY 2-0
- pH 4.0 red, 1000 ml (0.264 US gal.), order no. CPY 2-1
- pH 7.0 green, 100 ml (0.026 US gal.), order no. CPY 2-2
- pH 7.0 green, 1000 ml (0.264 US gal.), order no. CPY 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. CPY 2-D
- pH 7.0 20 x 20 ml (0.005 US gal.), order no. CPY 2-E

6.5.2 ORP

- +225 mV, pH 7, 100 ml (0.026 US gal.); order no. CPY 3-0
- +468 mV, pH 0, 100 ml (0.026 US gal.); order no. CPY 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
- OPK 1 special measuring cable
For pH-/redox electrodes with GSA plug-in head
- OPK 12 special measuring cable
For pH-/redox glass electrodes and ISFET sensors

6.6.2 ISFET sensors

- Special measuring cable OPK 12

6.7 Transmitters

- OPM 223/253
Transmitter for pH and ORP, field or panel-mounted housing,
Hart® or PROFIBUS available
- OPM 153
Transmitter for pH and ORP, one or two channel version, Ex or Non-Ex,
Hart® or PROFIBUS available

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
- OPC 30
Fully automatic measuring and cleaning system; Ex or Non-Ex,
In-situ cleaning, automatic sensor monitoring

7 Troubleshooting

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 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 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!

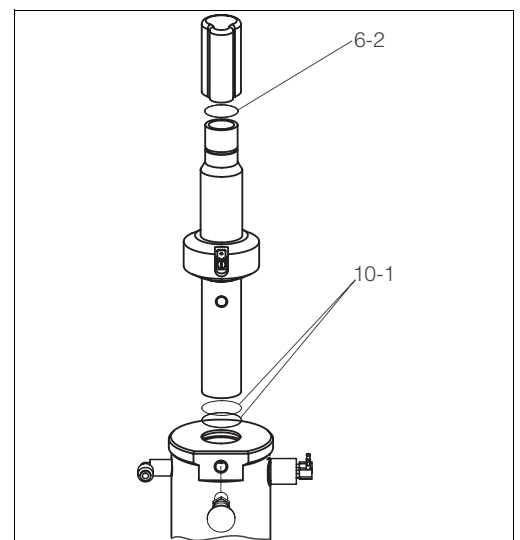
Before replacing components, lock the "Service" position by the stop bolt!

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. 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**.



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Fig. 22: Seal replacing without process interrupt

7.2.2 Replacing seals with process interrupt

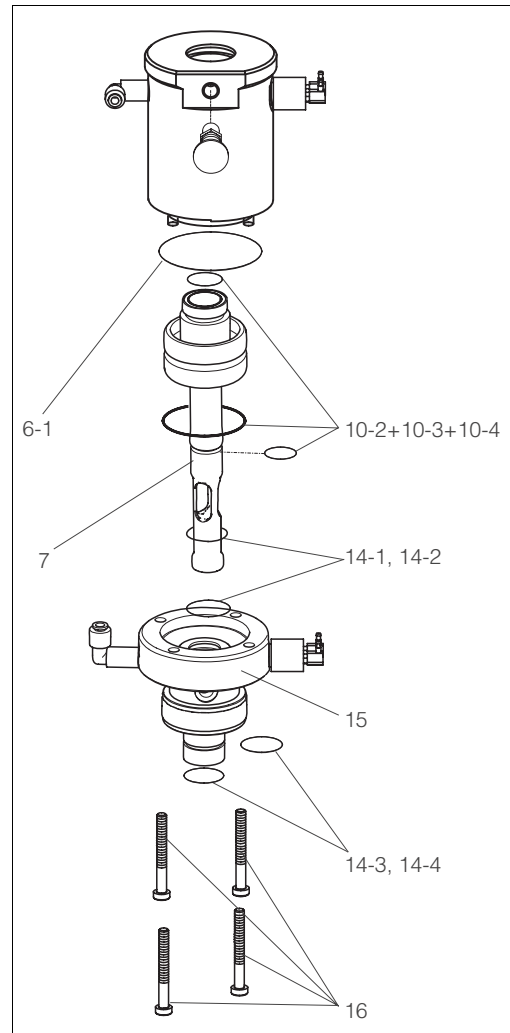
You can only replace the seals of the cylinder, of the rinse chamber and of the sensor guide when the process is interrupted and the assembly is dismantled from the process connection (Fig. 23, G1¼ internal thread version as an example. Other versions corresponding, see also exploded view in chapter "Spare part kits").



Warning!

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

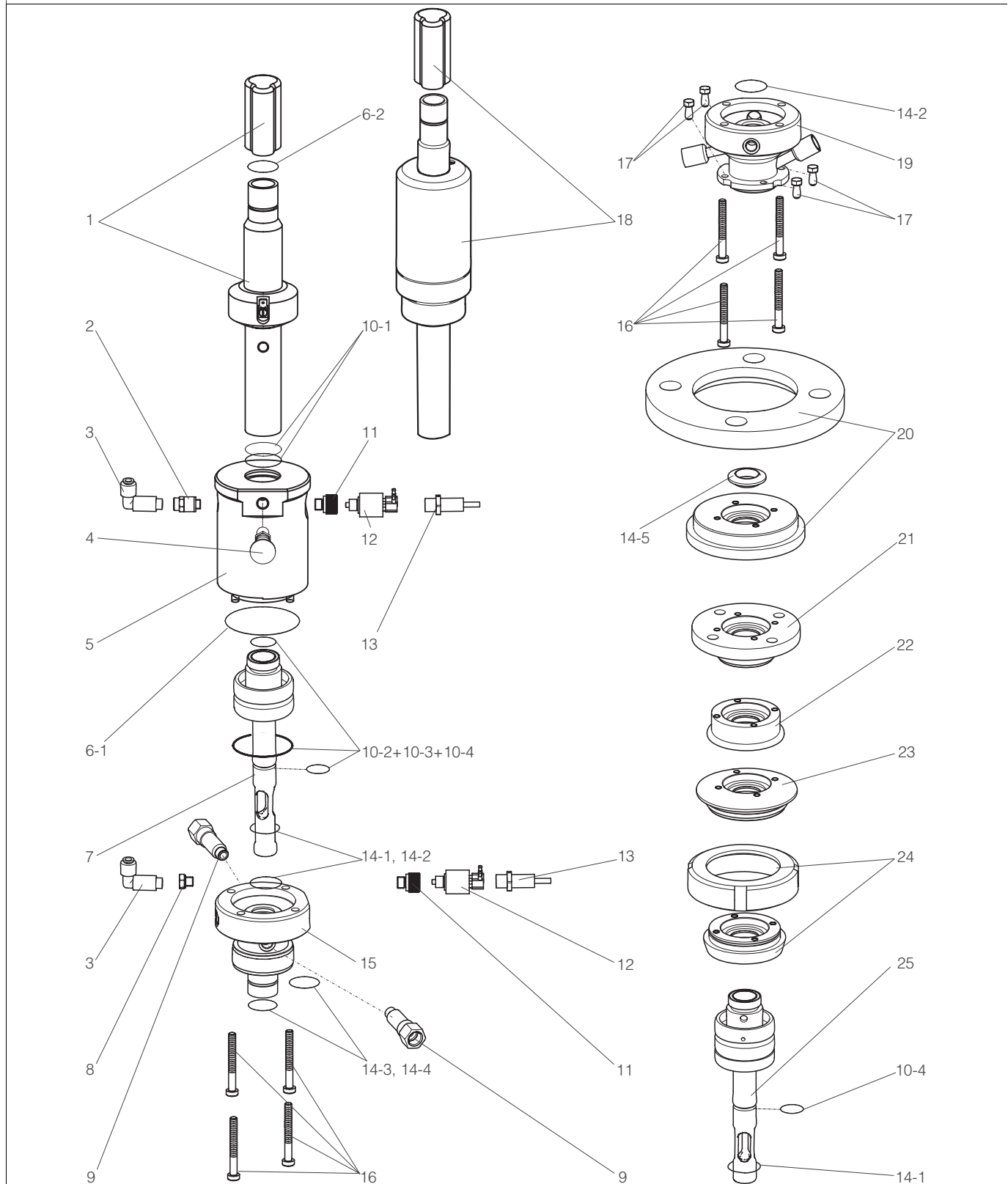
1. Interrupt the process. Beware of medium residues, residual pressure and higher temperatures.
2. Dismount the assembly from the process connection.
3. Unscrew the retractable pipe counterclockwise.
4. Loosen the screws between rinse chamber and cylinder (pos. 16).
5. Separate the rinse chamber from 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.**



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Fig. 23: Seal replacing with process interrupt

7.3 Spare part kits



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Fig. 24: 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. 24.

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	51503715
	Retractable pipe for 120 mm (4.72 inch) gel electrodes For assembly version: – manual – for G1¼ internal thread process connection only	51503717
	Retractable pipe for 120 mm (4.72 inch) gel electrodes For assembly version: – manual – all process connections excluding G1¼ internal thread	51506844
2, 8	Exhaust air restrictor (pos. 2) and SS 1.4404 (AISI 316L) blind stopper (pos. 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	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 For assembly version: – all process connections excluding G1¼ internal thread	51506841
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 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

Position	Description and kit content	Spare part kit order no.
14-1, 14-2.	Set of gaskets, in contact with medium EPDM	51506408
14-3, 14-4, 14-5	Set of gaskets, in contact with medium VITON	51506407
15	Rinse chamber, complete For assembly version: – for G1¼ internal thread process connection only – with G¼ rinse connections	51506840
16	M6x30 screws, DIN 69612 A-4/2, 20 pieces	51503734
18	Retractable pipe for 225 mm (8.86 inch) liquid KCl electrodes For assembly version: – pneumatic	51503713
	Retractable pipe for 225 mm (8.86 inch) liquid KCl electrodes For assembly version: – manual – for G1¼ internal thread process connection only	51503714
	Retractable pipe for 225 mm (8.86 inch) liquid KCl electrodes For assembly version: – manual – all process connections excluding G1¼ internal thread	51506843
19	Rinse chamber, complete For assembly version: – all process connections excluding G1¼ internal thread – with NPT ¼" rinse connections	51506855
	Rinse chamber, complete For assembly version: – all process connections excluding G1¼ internal thread – 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 For assembly version: – for G1¼ internal thread process connection only	51506842

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

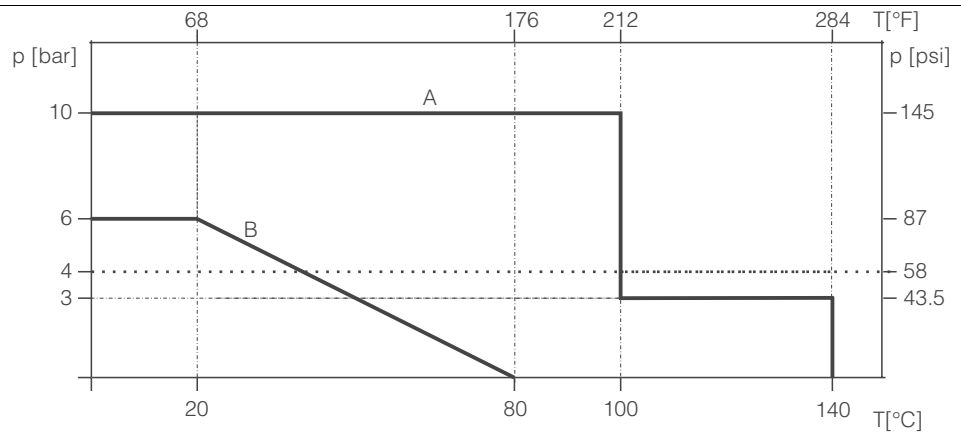
8.1 Environment

Ambient temperature	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

Process pressure	PA cylinder: SS cylinder:	max. 6 bar (87 psi) max. 10 bar (145 psi)
Process temperature	PA cylinder: SS cylinder:	max. 80 °C (176 °F) long-term: 100 °C (212 °F) / 10 bar (145 psi), short-term: (max. 1 h): max. 140 °C (284 °F) at 3 bar (43.5 psi)

Pressure temperature diagram



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Fig. 25: Pressure-temperature diagram acc. to the assembly material (overpressure)

- A SS 1.4404 (AISI 316L) cylinder
- B PA cylinder



Caution!

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

8.3 Mechanical construction

Design, dimensions	see chapter "Installation"	
Sensors	pH glass electrodes, gel 120 mm pH glass electrodes, KCl 225 mm pH ISFET sensors, gel, 120 mm pH ISFET sensors, KCl, 225 mm Oxygen sensors, 120 mm	
Weight	approx. 4 kg (8.8 lb), depending on cylinder material, on process connection and additional equipment, see product structure	
Material (in contact with medium)	Seals Sensor holder Rinse chamber Rinse fittings	EPDM / FPM (Viton [®] , FDA certified) SS 1.4435 (AISI 316L) SS 1.4435 (AISI 316L) SS 1.4435 (AISI 316L)
Material (not in contact with medium)	Cylinder Electric limit position switch	PA / SS 1.4404 (AISI 316L) / SS 1.4571 (AISI 316 Ti) fore-part PBT, cable PVC
Rinse fittings	2 x G¼ (internal) or 2 x NPT ¼" (internal)	

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Declaration of contamination

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 to health



biologically 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)



