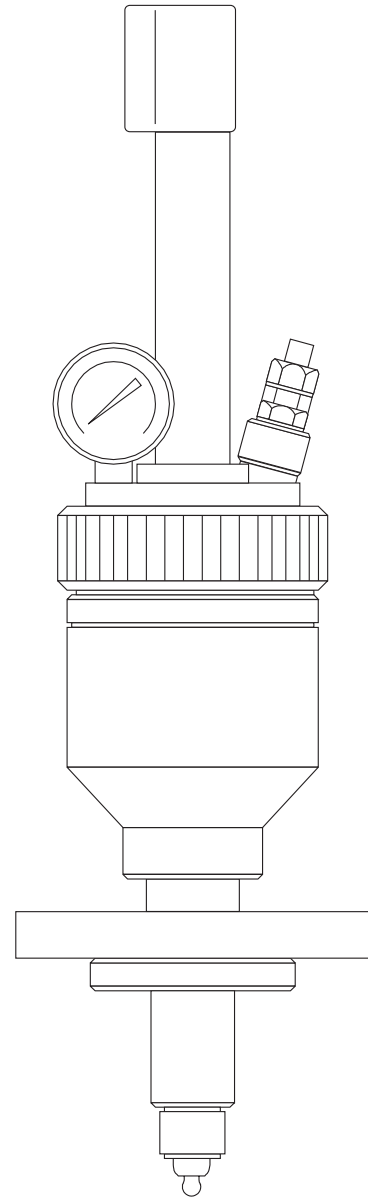
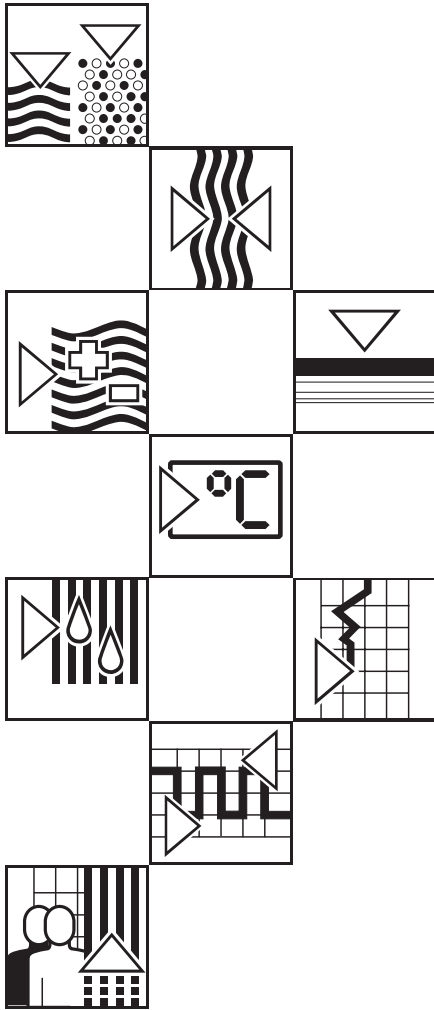


UniFit H CPA 441 Process Assembly for pH/Redox Measurement

Operating Instructions



Quality made by
Endress+Hauser



ISO 9001

Endress + Hauser

Nothing beats know-how



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1 General information

1.1 Symbols used



Warning:

This symbol alerts to hazards. Failure to observe these warnings may result in injury or damage to equipment.



Note:

This symbol indicates important items of information. Ignoring this information may result in malfunction.

1.2 Storage and transport

The packaging material used to store or transport the assembly must provide shock protection. Optimal protection is provided by the original packaging materials.

The ambient conditions also have to meet the requirements (see Technical data).

1.3 Unpacking

Verify that the packaging and contents are undamaged! Inform the post office or freight carrier of any damage. Damaged merchandise must be retained until the matter has been settled.

Keep the original packaging materials for future storage or shipping of the assembly.

Check that the delivery is complete and agrees with the shipping documents and your order (refer to nameplate for type and version).

If you have any questions, consult your supplier or the Endress+Hauser sales agency in your area (see back cover of these operating instructions for addresses).

The delivery comprises:


- Assembly UniFit H CPA 441
- Size 17 socket wrench
- Built-in adapter, as per your order already mounted or separate
- Operating instructions BA 026C/07/en.

1.4 Packaging and disposal

Package the assembly properly for reuse at a later point in time. Optimal protection is provided by the original packaging materials.

Observe local regulations for disposal.

1.5 Product structure

pH/redox process assembly UniFit H CPA 441	
O-ring / body / protection guard	
11	EPDM / PVC / screw-in (only version A)
12	EPDM / PVDF / screw-in (only version A)
13	EPDM / 1.4571 (SS 316Ti) / screw-in
14	EPDM / 1.4571 (SS 316Ti) / plug-in
23	Viton / 1.4571 (SS 316Ti) / screw-in
24	Viton / 1.4571 (SS 316Ti) / plug-in
Mounting version	
A	Without adapter
F	Adapter 1.4571 (SS 316Ti) / DN 25, G 1¼ / straight
G	Adapter 1.4571 (SS 316Ti) / DN 25, G 1¼ / oblique
I	Adapter 1.4571 (SS 316Ti) / dairy fitting DN 40
K	Adapter 1.4571 (SS 316Ti) / Tri-Clamp 2"
L	Adapter 1.4571 (SS 316Ti) / Varivent for DN 40 ... 125 (only version 14)
CPA 441-	
complete order code	

2 Safety

2.1 Intended use

The pH/redox process assembly UniFit H CPA 441 is intended for applications where the components in contact with medium must be steam-sterilised. Typical areas of application are fermenters, food industry, highly pasty media and media with very low conductivity.

The assembly consists of a built-in part and a vessel filled with liquid electrolyte. The cap of the electrolyte vessel contains the thread which will hold the electrode, a manometer and a screw coupling for the compressed-air connection. This quick-release coupling also serves as opening for refilling the electrolyte.

It is not necessary to remove the assembly or the electrode to refill. The pressure may be applied by compressed air or a manual pump.

It is the operator's responsibility to assure that the following safety regulations are observed:

- Regulations for explosion protection
- Regulations for installation
- Operating conditions for the device and its materials
- Local standards and regulations.

2.2 General safety notes

The assembly CPA 441 has been designed for safe operation according to the state of the art in engineering and according to current regulations and European standards (see Technical data).

However, if used improperly or other than for the intended purpose, it may be dangerous, e.g. due to incorrect installation or incorrect operating conditions.



Warning:

- Operating this assembly in any way other than described in these instructions may compromise the safety and function of the measuring system.
- The notes and warnings in these operating instructions must be strictly adhered to.

2.3 Installation, start-up, operation



Warning:

- This device may only be installed, connected electrically, commissioned, operated and serviced by properly trained personnel authorised by the system operator.
- The personnel must be familiar with these operating instructions and must adhere to the instructions contained therein.
- When this assembly is used in an explosive atmosphere, adherence to the applicable regulations is mandatory.
- Check that all connections have been properly made before powering up the system.
- Damaged assemblies that may be dangerous must not be operated and should be clearly identified as being defective.
- Any troubleshooting of the measuring system must be performed exclusively by authorised, trained personnel.
- If faults cannot be remedied, the assembly must be removed from service and secured to prevent accidental start-up.
- Repairs not described in these operating instructions may only be performed directly at the manufacturer's works or by the Endress+Hauser service organisation.



2.4 Safety features

Safety devices

The assembly is protected against external influences and damage by media-resistant materials.

2.5 Notes for installation in pressurised systems



Warning:

- The maximum operating pressure of the assembly must not be exceeded.
- The system must be depressurised before installation or removal of the assembly.
- Couplings, cocks and lines must be checked for leakage and damage at regular intervals.

3 Installation

3.1 Measuring system

A complete measuring system comprises:

- the UniFit H CPA 441 assembly
 - a combined pH/redox electrode, length 225 mm
 - a measuring cable CPK 1 or CPK 7 (terminated)
 - a pH/redox measuring instrument
- and optionally
- a junction box VBA and a measuring cable (not terminated) for measuring cable extension.

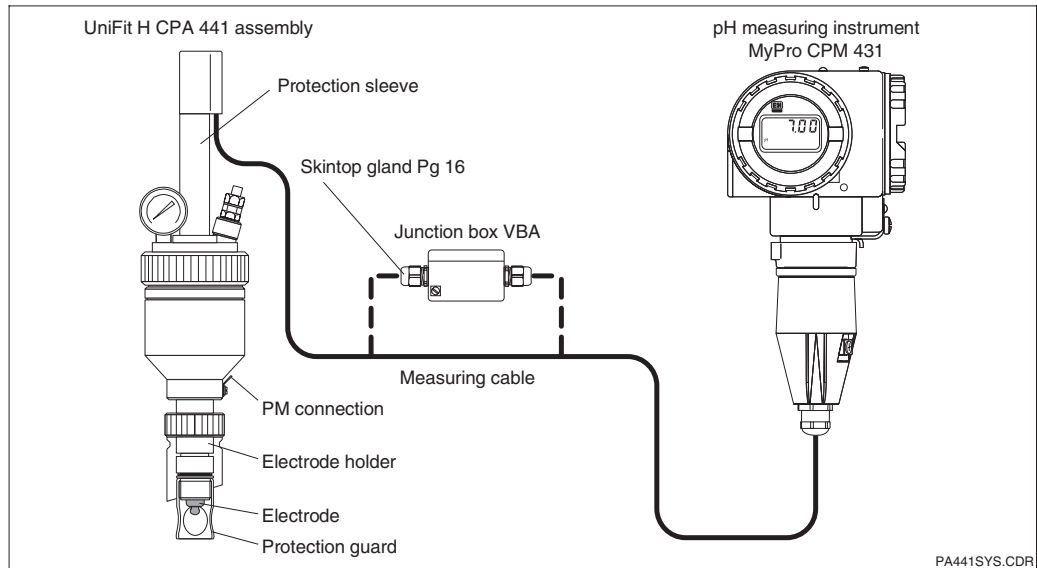
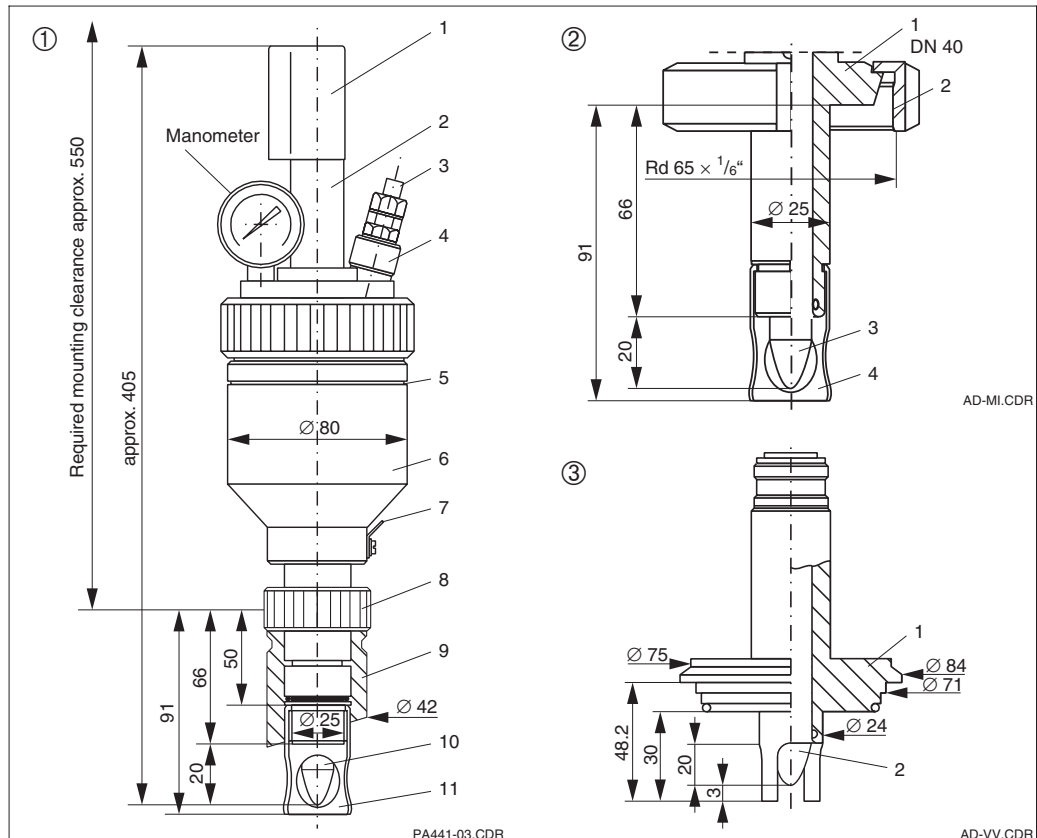


Fig. 3.1 Example of a complete measuring system

3.2 Dimensions

- Fig. 3.2
- ① *Mounting version: Adapter DN 25*
- 1 Splash protection cap with cable entry
 - 2 Protection sleeve
 - 3 Connection for compressed-air tube ID 6 / OD 8 or $\varnothing 5$ mm connection for air pump, max. 8 bar
 - 4 KCl refilling
 - 5 Filling mark
 - 6 Pressure vessel, transparent
 - 7 PM connection
 - 8 Coupling nut G 1 1/4
- Material: 1.4571 (SS 316Ti)
- 9 Built-in adapter, straight or oblique
 - 10 Electrode, shaft length 225 mm
 - 11 Protection guard
- ② *Mounting version: Dairy fitting DN 40*
- 1 Taper fitting
 - 2 Coupling nut F 40, DIN 11851
 - 3 Electrode
 - 4 Protection guard
- ③ *Mounting version: Varivent adapter*
- 1 Clamp fitting
 - 2 Electrode



3.3 Mounting positions and mounting versions

The UniFit H CPA 441 assembly is installed with the selected adapter.



Note:

- The permissible range of mounting positions comprises inclinations of the central axis of the assembly that do not fall below 15° from the horizontal (see Fig. 3.3). Ensure that the electrode contacts the medium to be measured. With inclined mounting, the change in the usable electrolyte volume must be considered (see chapter 3.5).
- The assembly must always be installed in such a way that the manometer and the compressed-air connection are located at the highest point and do not contact the electrolyte. Select an installation site that will allow easy removal of the quick-release coupling and will facilitate pressure readings. Ensure adequate mounting clearances for removal, installation, cleaning and maintenance.

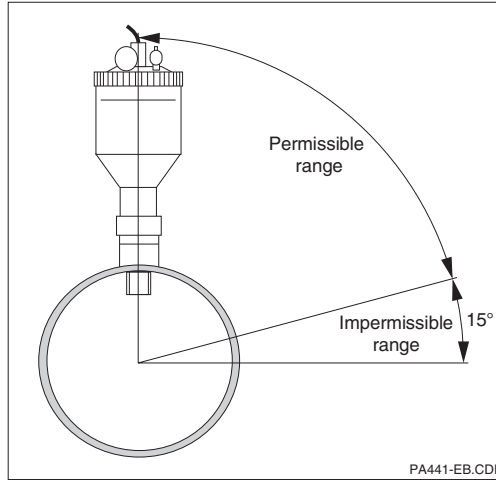


Fig. 3.3 Permissible mounting positions for CPA 441

Built-in adapter

The UniFit H CPA 441 assembly is introduced into the adapter – which may be welded on or glued on – and hand-tightened with the coupling nut. During installation, ensure that the O-ring is properly seated and clean.

The sealing surface of the built-in adapter must be protected against mechanical damage. To permit use in food applications, an Endress+Hauser built-in adapter should be used (see Fig. 3.4 and Fig. 3.5).

However, adapters from other manufacturers are basically usable as well. When installing the assembly in built-in adapters of less than 50 mm in length, the O-ring must be inserted in the second O-ring seat located further up. You should therefore avoid using pointed or sharp tools to change the O-rings.

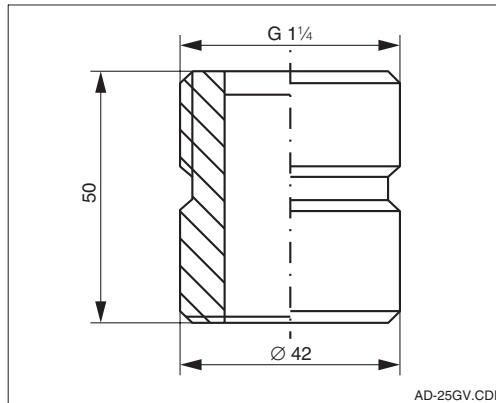


Fig. 3.4 Built-in adapter, straight

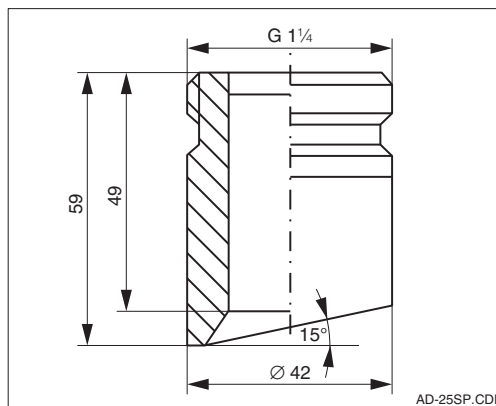


Fig. 3.5 Built-in adapter, oblique

Varivent adapter and dairy fitting

The versions of the UniFit H CPA 441 with Varivent adapter or dairy pipe fitting meet the requirements of the corresponding DIN standards, which must also be fulfilled by the counterparts. Observe the relevant regulations for installation. As a general rule, always ensure that the sealing elements are properly seated, clean and intact.

Protection guard

- The UniFit H CPA 441 assembly can be equipped with a protection guard (see Fig. 3.2) if desired.
- All versions are screwed in.
- Stainless steel versions are optionally plugged in.
- With the protection guard screwed in, even the stainless steel versions are no longer suitable for food applications.

3.4 Installation or replacement of electrode and mounting of measuring cable

pH/redox electrodes with a Pg 13.5 threaded plug-in head, a shaft length of 225 mm and a shaft diameter of 12 mm can be fitted into the assembly.

The sealing of the electrode is provided

- at the threaded plug-in head by an O-ring and a clamping ring
- at the lower shaft end via the O-ring in the hole of the assembly.



Warning:

- Always depressurise the assembly before removing the electrode (see chapter 3.5.2).
- Electrolyte present in the electrolyte vessel must be emptied out first, or it drains from the assembly through the built-in part.
- With installed assembly, by all means note the medium pressure!



Note:

- Make the electrode slidable before screwing in. Wetting with water is sufficient.
- During electrode installation, ensure that both O-rings are properly seated and clean.
- The rubber hoses above the electrode holes must be removed prior to installation. No air bubbles must be visible in the lower part of the electrode shaft. Shake the electrode several times if required.
- Should the assembly remain dry for an extended period after electrode installation, then the electrode tip must be kept moist, e.g. in KCl solution (3 mol/l).

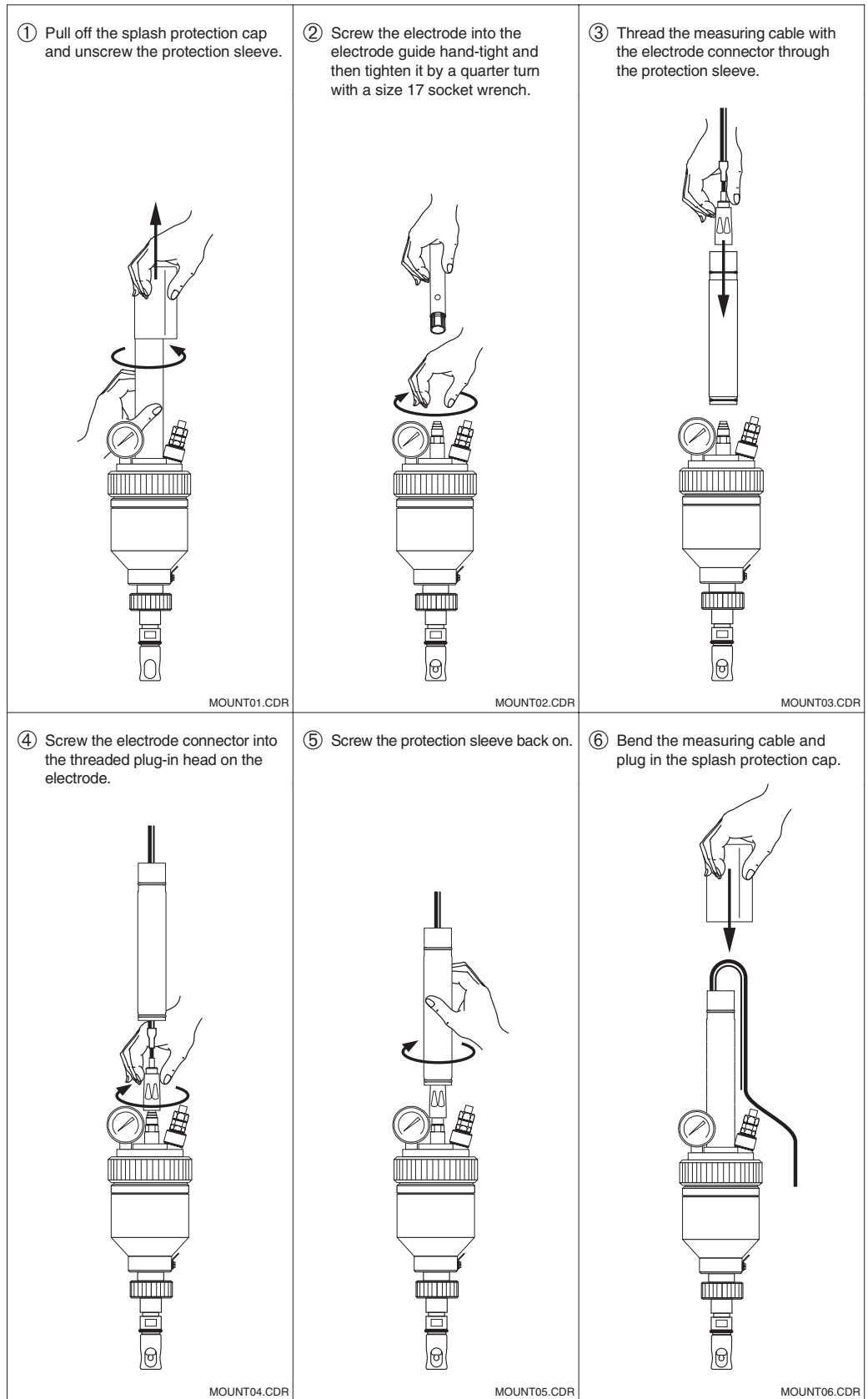


Fig. 3.6 Electrode installation and mounting of measuring cable

3.5 Filling with electrolyte

Filling the electrolyte vessel is only possible with installed electrode. The coupling of the compressed-air connection serves as the filling hole.

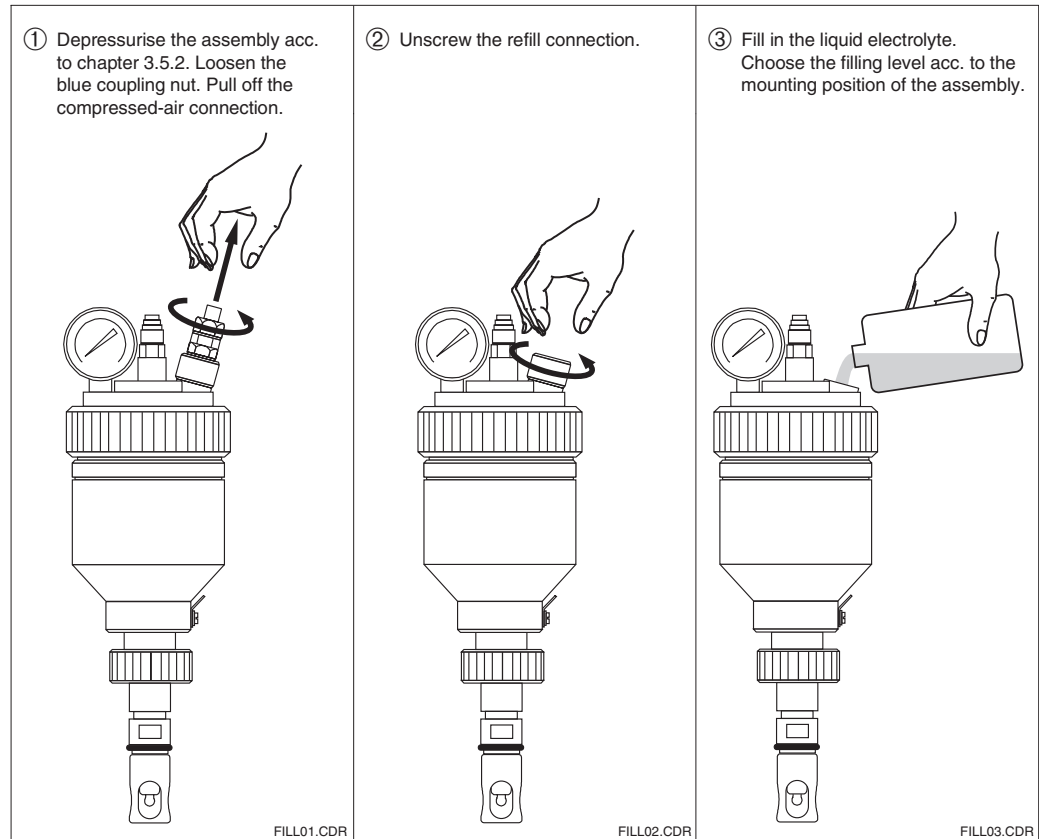


Fig. 3.7 Filling with electrolyte

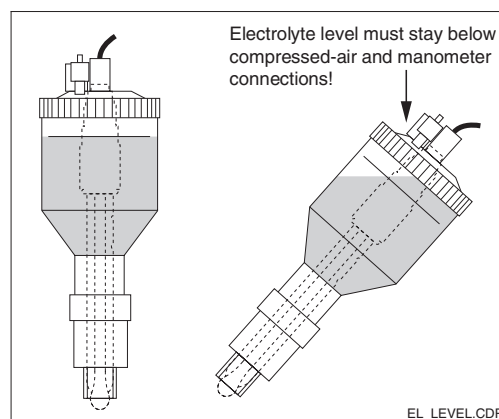


Fig. 3.8 Electrolyte filling level



Note:

- If the electrolyte vessel is pressurised, then the pressure will escape after the first half turn of the refill connection.
- Ensure by all means that no electrolyte penetrates the electrode head or the cable plug.
- The compressed-air and manometer connections must not be flooded with electrolyte (see Fig. 3.8).

3.5.1 Pressurisation

There must always be a differential pressure between the electrolyte vessel and the medium to be measured in order to prevent a penetration of the medium into the electrode.

There are two ways to pressurise the electrolyte:

- via an existing compressed-air ductwork system with screw coupling
- via a hand pump with hand pump adapter.

Both the sealing socket integrated into the assembly cover and the quick-release coupling are self-locking, i.e. the connections can be interrupted without pressure loss. If compressed air is not continuously supplied, then an appropriate air cushion must be present above the electrolyte to maintain the pressure as the quantity of electrolyte decreases.

3.5.2 Depressurisation

Replacement of the electrode, refilling electrolyte and opening the assembly require by all means to depressurise the assembly before:

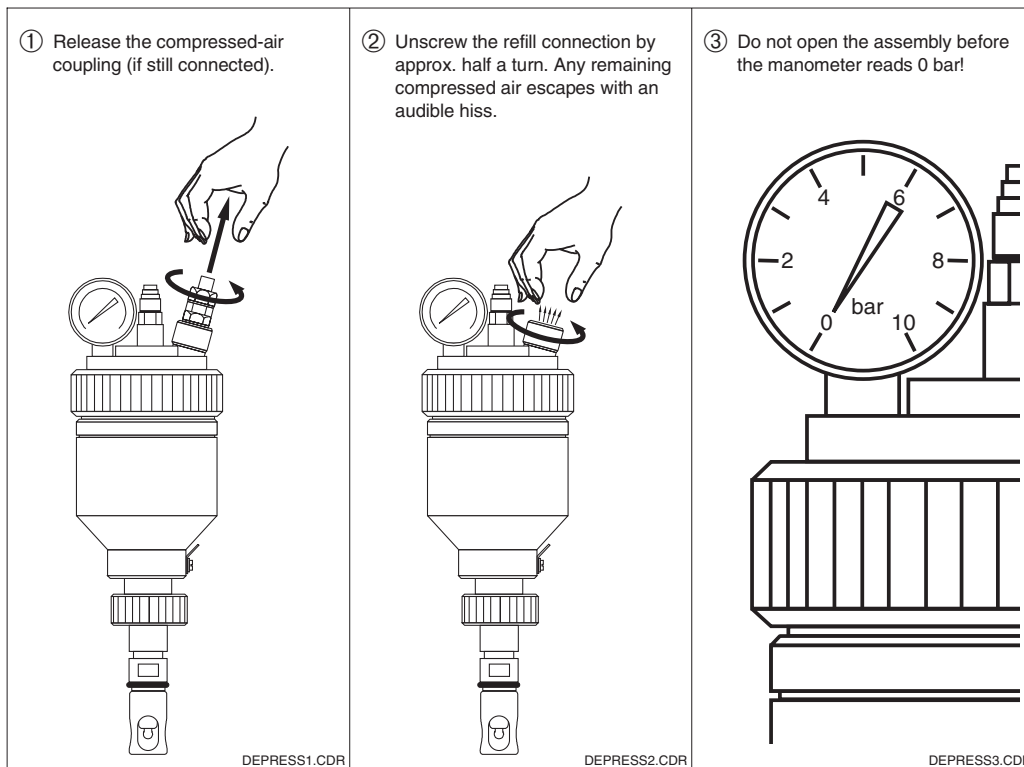


Fig. 3.9 Depressurisation

Differential pressure electrolyte / medium

The quantity of electrolyte flowing out of the electrode depends on the differential pressure between electrolyte vessel and medium. To prevent a penetration of medium into the electrode, the electrolyte pressure must always exceed the medium pressure. Fig. 3.10 shows the electrolyte flow for various diaphragm types.

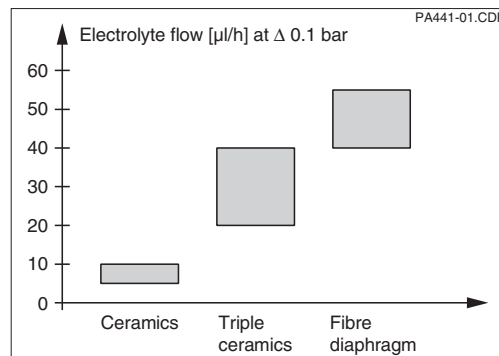


Fig. 3.10 Dependence of the electrolyte flow on the diaphragm type

4 Maintenance

4.1 Assembly cleaning

The assembly must be removed at intervals dependent on the medium. The sealing O-rings must then be visually inspected and replaced if necessary. Complete cleaning of the side in contact with medium may be required.

4.2 Electrode cleaning

Soiling may impair the function of the electrode to such an extent that it ceases to work. For example, coatings on the pH sensitive glass membrane may cause poor response, low sensitivity/slope and unstable measured values. Therefore all parts of the electrode in contact with medium must be cleaned regularly. The frequency and intensity of cleaning depend on the medium to be measured.



Note:

Do not use abrasive cleaning agents! These may cause irreparable damage to the glass membrane.

- Remove light soiling and coatings by rinsing with a suitable cleaning solution (see table below).
- Remove adhering coatings by a soft brush and a suitable cleaning solution. Soak in cleaning solution beforehand if necessary.
- Rinse the electrode with distilled water after cleaning! Cleaning agent residue not removed may impair the measurement.
- By all means recalibrate the measuring system after cleaning!

Soiling, coating	Cleaning agent
Grease and oil	(Alkaline) agents containing surfactants or water-soluble organic solvents (e.g. alcohol)
Limestone deposits, cyanide deposits, heavy biological and metal hydroxide coatings	Hydrochloric acid (10%), diluted to approx. 3% in the injector
Sulfide deposits	Mixture of hydrochloric acid (3%) and thiourea (saturated)
Protein coatings	Mixture of hydrochloric acid (3%) and pepsin (saturated)
Fibres, suspended substances	Pressure water, possibly containing wetting agents
Light biological coatings	Pressure water

4.3 Calibration

The pH/redox measuring system must be calibrated regularly and carefully to maintain accuracy.

The periods between the calibrations depend on the operating conditions and the desired accuracy. They must be determined individually for each application. More frequent calibration, e.g. once a week, is recommended at the beginning to study the performance in service.

Clean the electrode before each calibration!



Note:

- Do not leave the electrode in distilled water.
- Do not allow the electrode to stand dry. Keep the electrode tip moist, e.g. in KCl solution (3 mol/l).



Warning:

In case of a symmetrical high-impedance electrode connection, establish by all means an electrical connection between the buffer solution and the PM connection.

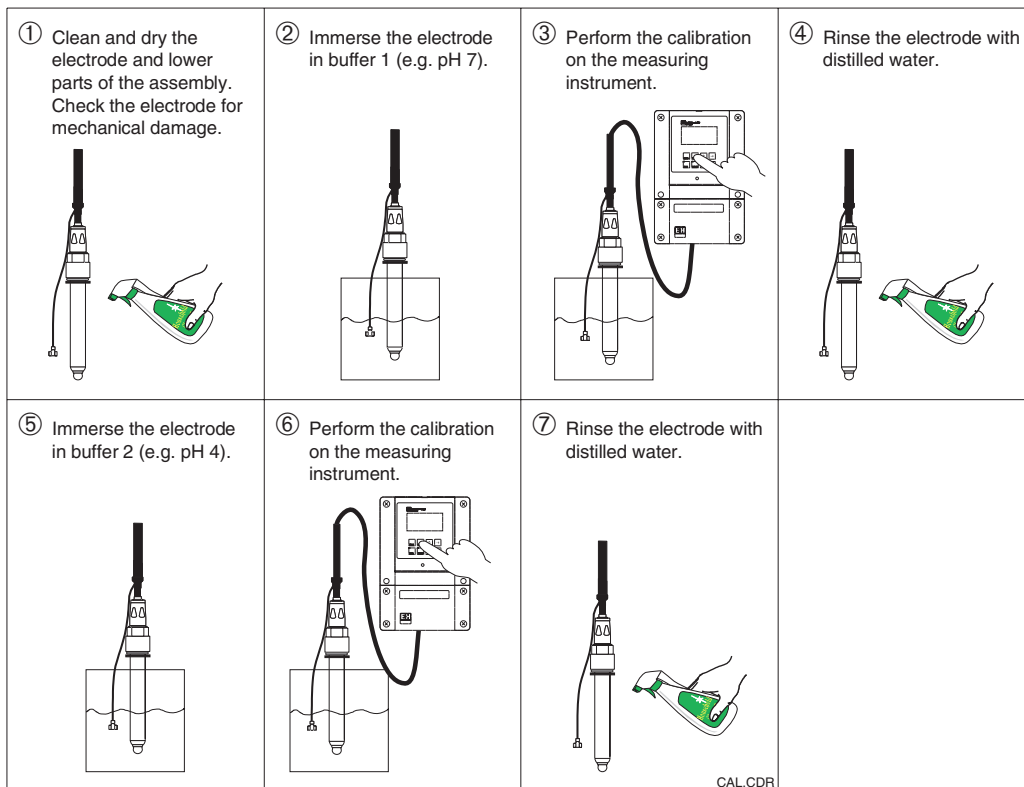
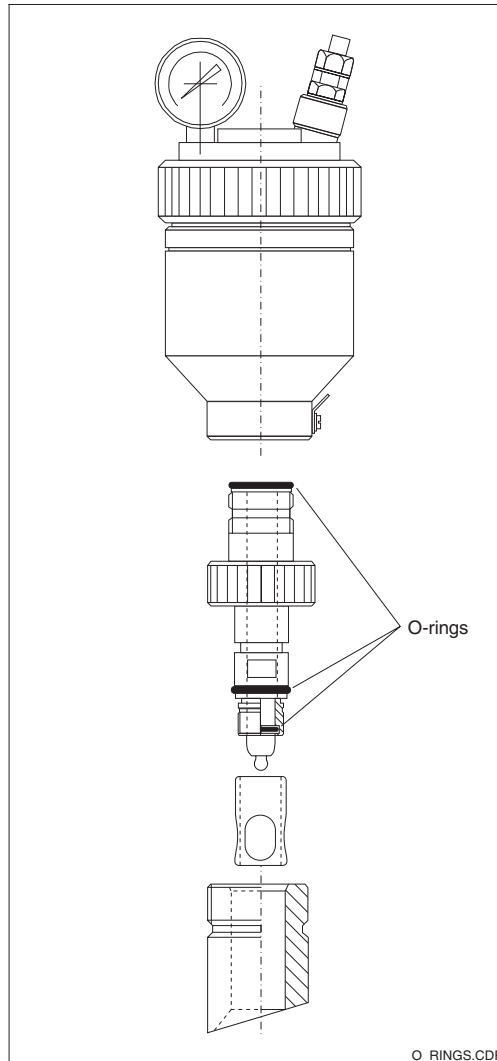


Fig. 4.1 Calibration

4.4 O-ring replacement



All O-rings in the assembly (see Fig. 4.2) should be examined for damage from time to time. The standard material for O-rings in contact with medium is EPDM.



Note:

- Should an O-ring replacement become necessary, then avoid any damage to the new O-rings and to the O-ring seat. Ensure that a special O-ring material is used if required by the medium.
- To grease polycarbonate parts (e.g. couplings), only use lubricants approved for this plastic material. Otherwise there is a risk of stress cracks on the polycarbonate parts. Observe by all means the instructions of the lubricant manufacturer.

Example of a suitable lubricant:

ISOFLEX Topas AK 50

(art. no. 004151)

Manufacturer:

Klüber Lubrication KG, Munich

- Any other interventions in and modifications of the assembly are impermissible and will void the warranty.

Fig. 4.2 O-rings in the CPA 441

O_RINGS.CDR

5 Accessories and spare parts

The following spare parts may be ordered separately:

Combined pH electrodes

Electrode type	Temperature	pH range
CPS 41-1 AB4 GSA	-15 ... 80 °C	1 ... 12
CPS 41-2 AB4 TSA with Pt 100	-15 ... 80 °C	1 ... 12
CPS 41-1 DB4 GSA	0 ... 80 °C	1 ... 12
CPS 41-2 DB4 TSA with Pt 100	0 ... 80 °C	1 ... 12

Combined redox electrode

CPS 42-0 PB4 GSA with platinum ring	-15 ... 130 °C	0 ... 14
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Built-in adapter

Material, version	Order no.
PVDF, straight	50005194
PVDF, oblique	50029768
PVC, straight	50005193
PVC, oblique	50047270
1.4571 (SS 316Ti), straight	50005192
1.4571 (SS 316Ti), oblique	50028446

Protection guard

PVC, screw-in	50029764
1.4571 (SS 316Ti), plug-in	50028445
1.4571 (SS 316Ti), screw-in	50038929

O-ring set

EPDM	50029766
Viton	50043956

Dummy plug

1.4571 (SS 316Ti), DN 25	50028491
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Measuring cable CPK 1 for combined pH/redox electrodes

Cable length	Order code
5 m	CPK 1-050A
10 m	CPK 1-100A
15 m	CPK 1-150A
20 m	CPK 1-200A
25 m	CPK 1-250A
30 m	CPK 1-300A
40 m	CPK 1-400A

Measuring cable CPK 7 for combined pH/redox electrodes with Pt 100

5 m	CPK 7-05A
10 m	CPK 7-10A
15 m	CPK 7-15A
20 m	CPK 7-20A
25 m	CPK 7-25A

Junction box VBA

Features	Order no.
For extension of measuring cable connection between assembly and measuring instrument; ingress protection IP 65	50005276

KCl-electrolyte solutions CPY 4 for Ceraliquid electrodes

Concentration, temp. range	Volume	Order code
3.0 mol, -10 ... 100 °C	100 ml	CPY 4-1
	1000 ml	CPY 4-2
1.5 mol, -30 ... 100 °C	100 ml	CPY 4-3
	1000 ml	CPY 4-4

6 Technical data

General data	Manufacturer	Endress+Hauser
	Product designation	UniFit H CPA 441
Materials in contact with medium	Electrode holder	stainless steel 1.4571 (SS 316Ti)
	O-rings	EPDM, Viton
Materials not in contact with medium	O-rings	silicone, EPDM
	Electrolyte vessel	PC (polycarbonate)
	Electrolyte vessel cap	PC (polycarbonate)
	Coupling nut (built-in adapter version)	stainless steel 1.4571 (SS 316Ti)
Mounting versions	Without adapter	PVC / PVDF / stainless steel 1.4571 (SS 316Ti)
	Built-in adapter, straight or oblique	stainless steel 1.4571 (SS 316Ti)
	Dairy fitting	stainless steel 1.4571 (SS 316Ti)
	Tri-Clamp 2"	stainless steel 1.4571 (SS 316Ti)
Operating pressure and temperature	PVC version	8 bar at 20 °C, 0 bar at 50 °C
	PVDF version	8 bar at 20 °C, 0 bar at 115 °C
	Stainless steel version	8 bar at 90 °C, 0 bar at 130 °C
	Electrolyte vessel	80 °C
Measures and weight	Total volume	220 ml
	Payload volume	150 ml
	Electrode installation	via Pg 13.5 thread
	Shaft length	225 mm
	Shaft diameter	12 mm
	Weight	approx. 2 kg
Supplementary documentation	Technical Information Ceraliquid CPS 41/42/43	order no. 50059346

Subject to modifications.

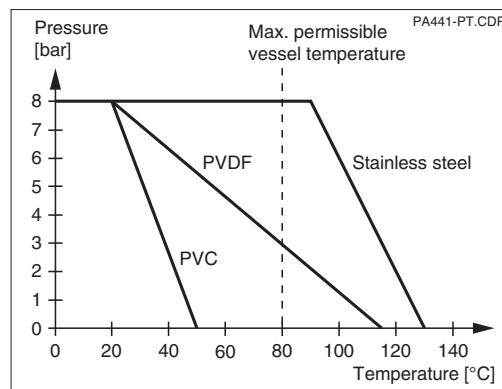


Fig. 6.1 Pressure-temperature diagram



Note:

The operating limits of the entire system are determined by the operating limits of the individual components used (assembly, sensors, cables, accessories, etc.).

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