



Level



Pressure



Flow



Temperature

Liquid  
Analysis

Registration

Systems  
Components

Services



Solutions

## Technical Information

# Cleanfit CPA472D

Retractable process assembly for pH and ORP sensors  
Heavy duty version



CPA472D is a robust, universal process assembly with a modular design. This heavy-duty retractable assembly can withstand harsh working environments and is available in the following materials:

- PVDF
- Conductive PVDF
- PVDF, Alloy C4 electrode holder
- PEEK
- Alloy C4
- Titanium
- Stainless steel 1.4571 (AISI 316 Ti)

The retractable assembly is moved into position either manually or pneumatically. The process-optimized design in which the sensitive synthetic parts are sandwiched between stainless steel components means that the device can also be used at high temperatures up to 140 °C (284 °F) at 6 bar (87 psi). Every common process connection, such as flanges and threads, are available with the CPA472D. The sensor can be immersed deeply, with depths of up to 280 mm (11") possible with the standard version of the device.

### Functions

- Move to measurement position with process pressures of up to 10 bar (145 psi)
- No pneumatic positioning in process if a sensor is not installed
- Gel electrodes or pressure-overlay KCl electrodes can be accommodated in the same assembly
- Electrode can be replaced when tank is full or under process conditions
- Electrode rinsing in service position
- Fully automated cleaning and calibration with Topcal CPC310

### Your benefits

- Service-friendly design saves money
- Locking mechanism offers additional safety during sensor replacement
- Pressure-tight stainless steel housing enhances system safety
- Maximum chemical resistance properties ensure long operating times
- Immersion depth suitable for industrial use
- Easy sensor replacement allows Memosens laboratory calibration
- Flexible choice of material and practical modifications

### Application

- Chemical industry
- Biodiesel plants
- Power plants
- Plant design
- Tanks, process vats or pipes

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## Function and system design

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### Function

With the retractable assembly Cleanfit CPA472D you can realize reliable pH and ORP measurements. The retractable assembly is designed as a chemically resistant assembly for the chemical industry, process engineering and plant construction. Without interrupting the process you can perform the following manual or pneumatic operations for the electrode:

- separate from the process and move into the rinse chamber
- rinse with water or cleaning solution
- keep wet during operation pauses
- dismount
- sterilize
- or calibrate

The modular assembly is especially designed for applications with aggressive chemicals, high temperatures and pressures up to 10 bar. Therefore the assembly housing (A) is made of stainless steel. The parts in contact with medium like the rinse chamber (PVDF) are installed between the structural housing parts (B) with machine screws. This ensures the dimensional stability.

The assembly Cleanfit CPA472D is available in PEEK, PVDF, conductive PVDF, Alloy C4, titanium and stainless steel 1.4571. It has only three modules in contact with medium: Rinse chamber (D), electrode holder (F) and raised face (E). Thanks to the modular design you can combine materials as required for your application. The assembly can be used for temperatures up to 140 °C (284 °F) and pressures up to 6 bar (87 psi). Please see the pressure and temperature diagram.

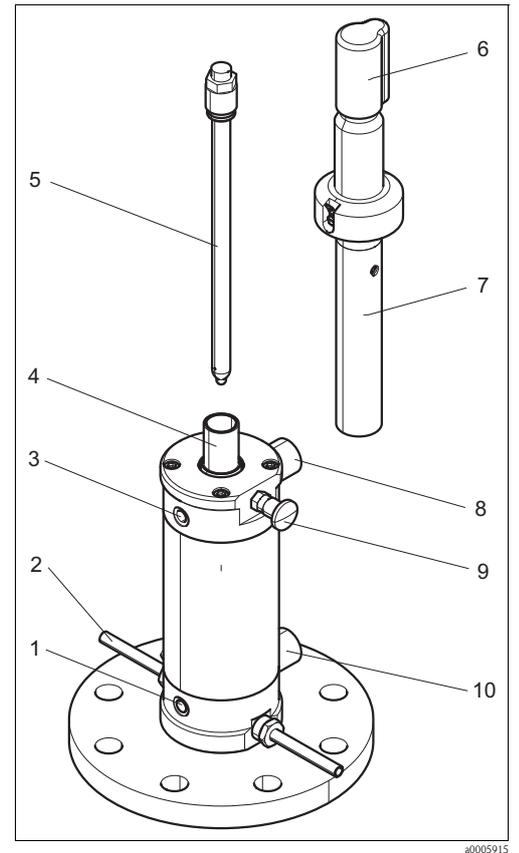
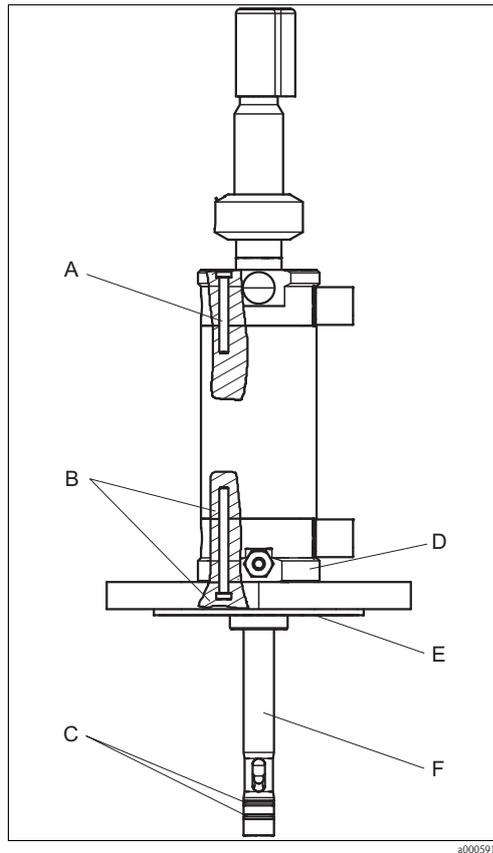
The novel electrode holder (4) supports an easy installation of the retractable pipe (7).

You have the choice of two immersion depths with gel and KCl electrodes:

- the standard version (immersion depth up to 146 mm (5.75 "), applicable with 225 mm gel electrodes, 360 mm gel electrodes with adapter or 360 mm KCl electrodes) or
- the long version (immersion depth up to 280 mm (7.87 "), applicable with 360 mm gel electrodes).

The following process connections are available:

- DN 50 / DN 80 / ANSI 2" / JIS for tanks
- DN 50 / DN 80 for flow assembly pipes with sight glass assembly
- G 1¼ with union nut for metal versions



A	Stainless steel housing, screwed	3	Compressed air "Measurement"
B	Rinse chamber armoring	4	Electrode holder (head) with guidance for installation of the retractable pipe
C	Seals, in contact with medium	5	Electrode
D	Rinse chamber	6	Splash protection cap
E	Raising face	7	Retractable pipe
F	Electrode holder	8	Limit switch "Service"
1	Compressed air "Service"	9	Stop lock bolt
2	Rinse connection	10	Limit switch "Measurement"

### Safety stop

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

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

**The electrode is not installed** and the command is given to "Move to measuring position":

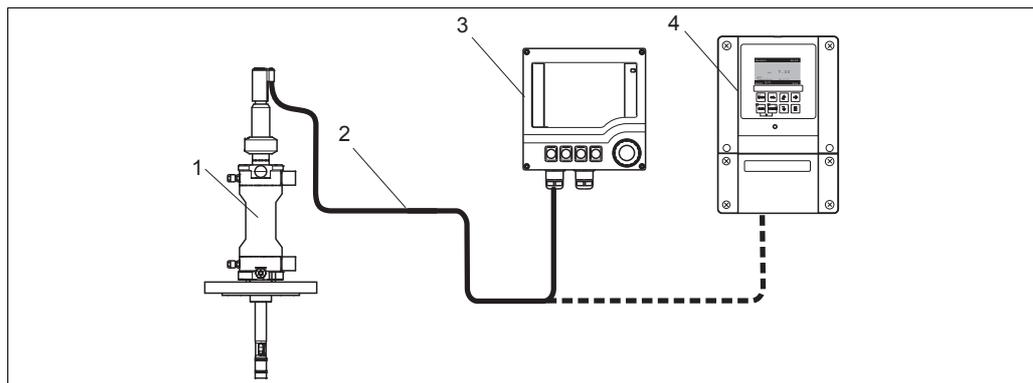
Pressure cannot build up since the compressed air enters the upper section of the electrode holder via the air channels and escapes via the retraction pipe. This is signaled by a loud noise.

**The electrode is installed** and the command is given to "Move to measuring position":

The electrode closes the air channels and seals off the chamber above the electrode thread. The upper part of the cylinder is filled with compressed air. Pressure builds and the electrode holder enters the process.

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

### Measuring system without control

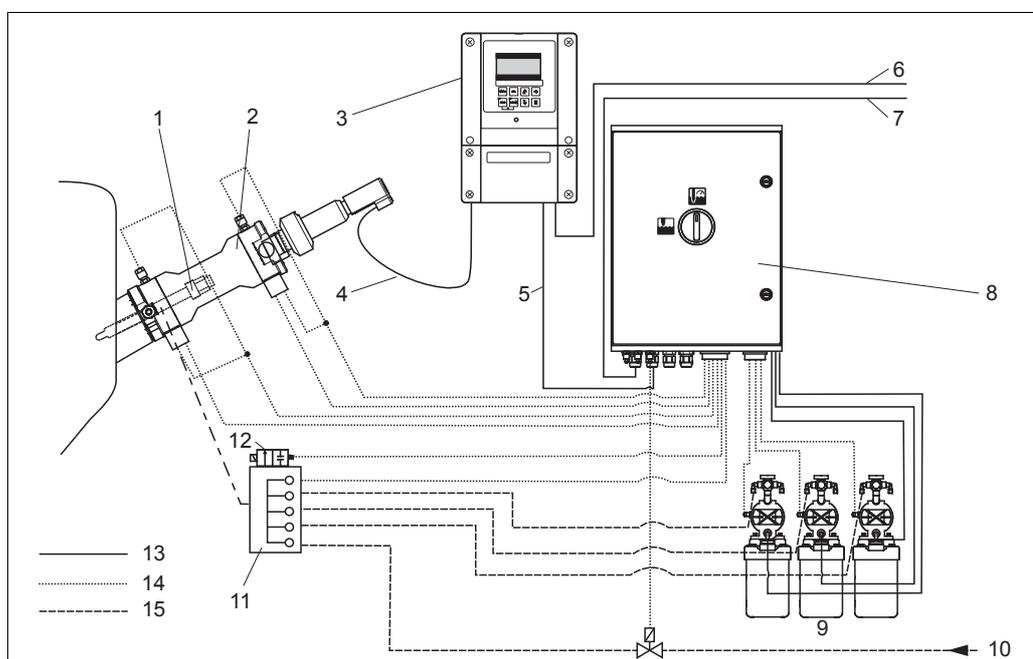


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Measuring system without control (example)

- |   |                                      |   |                                 |
|---|--------------------------------------|---|---------------------------------|
| 1 | Cleanfit assembly with pH/ORP sensor | 3 | Transmitter Liquiline M CM42 or |
| 2 | Special measuring cable              | 4 | Transmitter Mycom S CPM153      |

### Measuring system with pneumatical control



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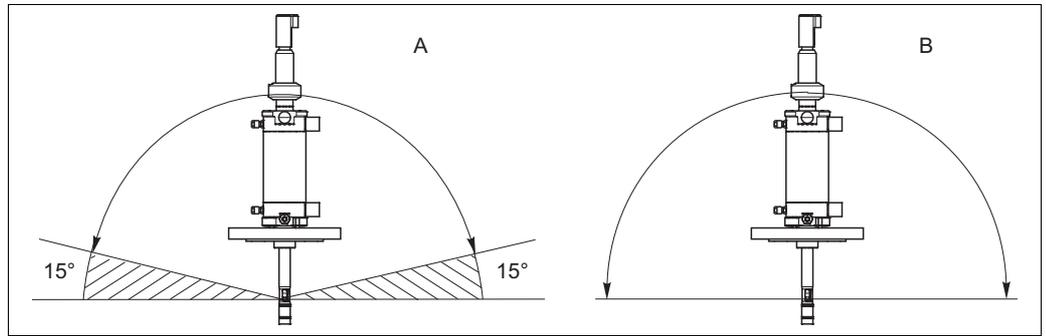
Measuring system with pneumatic control

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

## Installation

### Installation instructions

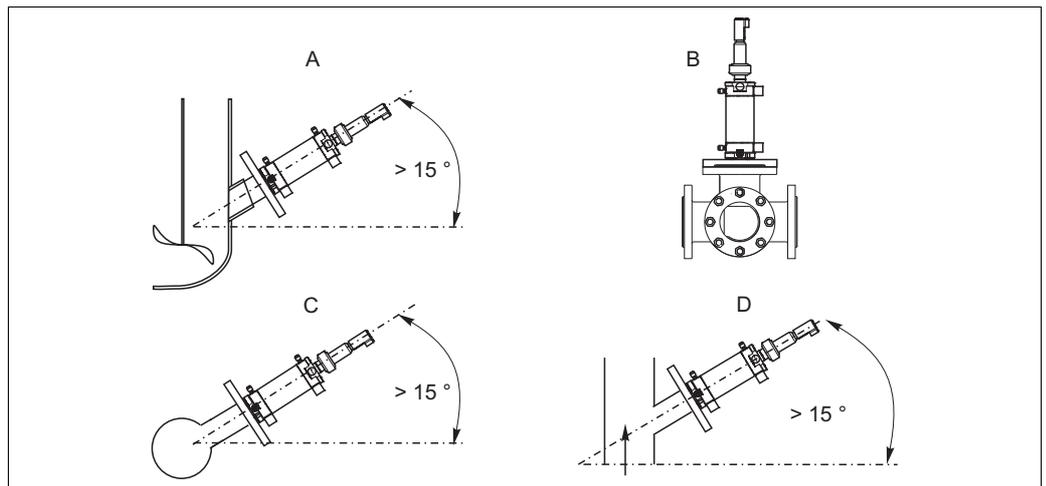
- |   |                         |  |
|---|-------------------------|--|
| A | Glass electrode:        | Installation angle of at least 15° from the horizontal |
| B | ISFET pH-sensor Tophit: | No restrictions, recommended 0 to 180°                 |



Permitted orientations depending on the sensor used

### Note!

The assembly is designed for installation in pipes with nominal diameters of DN 80 or larger. To install it in pipes with the nominal diameter DN 50, please use the flow assembly with integrated sight glass (see "Accessories")



Installation examples with recommended installation angle (glass electrodes)

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

### Pneumatic connection for automatic operation

#### Requirements:

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

#### Caution!

There must be a pressure-reducing valve upstream if the air pressure can increase to above 6 bar (87 psi) (including any short pressure surges).

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

**Rinse water connection**

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

**Caution!**

There must be a pressure-reducing valve (see "Accessories") upstream if the water pressure can increase to above 6 bar (87 psi) (including any short pressure surges).

**Note!**

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

## 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).

**Protection cover**

We recommend to use the protection cover for installations in corrosive, moist or dusty atmosphere. The protection cover is available as accessory.

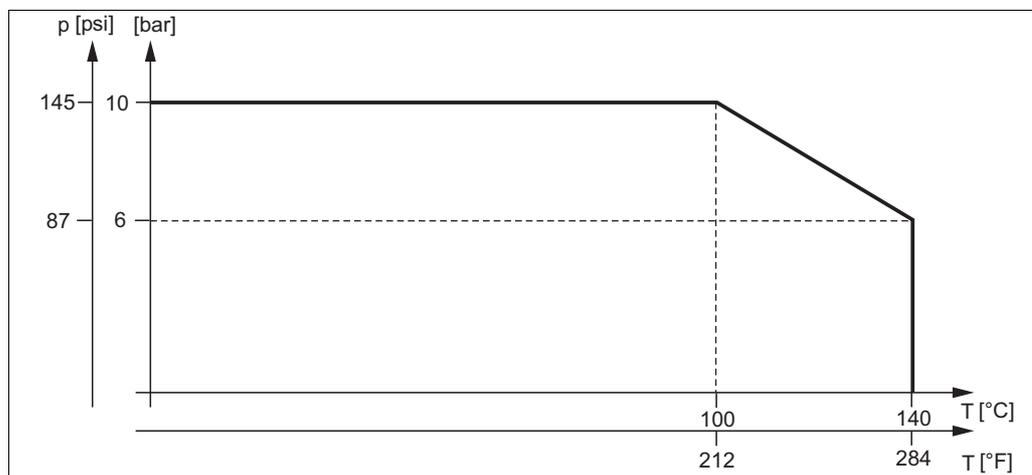
## Process

**Process temperature range**

0 to 140 °C (32 to 284 °F)

**Process pressure range**

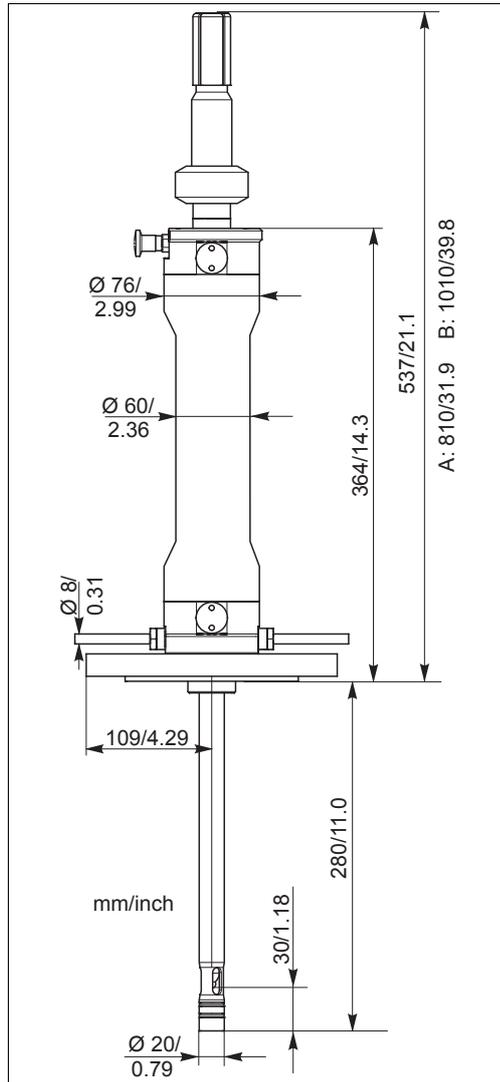
0 to max. 4 bar (0 to max. 58 psi) overpressure for manual actuation  
0 to 10 bar (0 to 145 psi) overpressure for pneumatic actuation

**Pressure temperature diagram**

Pressure temperature diagram

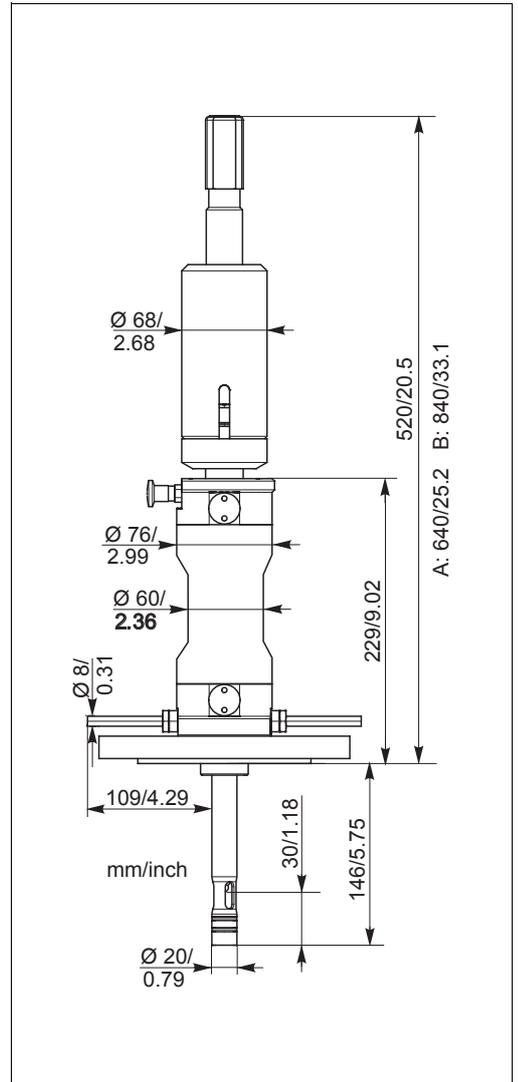
## Mechanical construction

### Dimensions



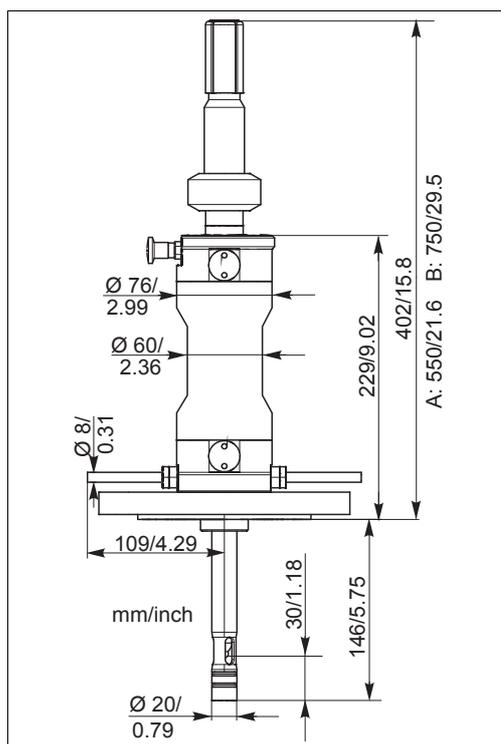
Assembly version: long, for gel sensors

- A Length when extended
- B Required mounting clearance



Assembly version: standard, for KCl sensors

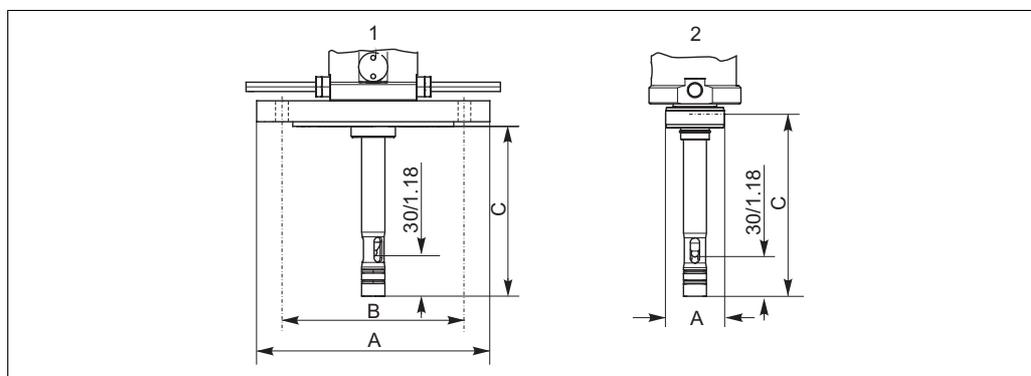
- A Length when extended
- B Required mounting clearance



Assembly version: standard, for gel sensors

- A Length when extended  
B Required mounting clearance

## Process connections



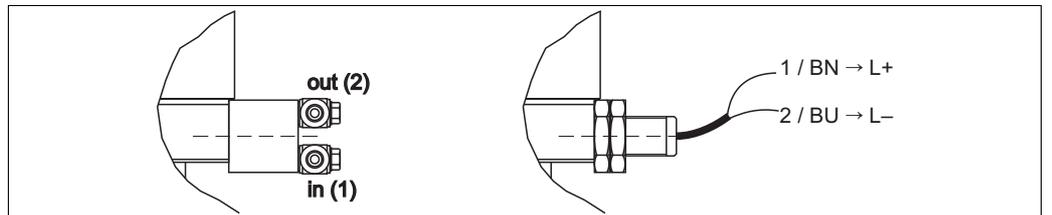
Process connections

- 1 Flange DN 50 / DN 80 / ANSI 2" / JIS IS10K50A  
2 Internal thread G1¼

Connection	A	B	C (standard)	C (long)
DN 50	165/6.50	125/4.92	146/5.75	280/11.0
DN 80	200/7.87	160/6.30	146/5.75	280/11.0
ANSI 2"	152.4/6.00	120.7/4.75	146/5.75	280/11.0
JIS IS10K50A	155/6.10	120/4.72	146/5.75	280/11.0
G 1¼	51/2.01	—	156/6.14	290/11.4
Dimensions in mm/inch				

<b>Sensors</b>	Standard version	Gel sensors, ISFET KCl sensors	225 mm 360 mm
	Long version	Gel sensors, ISFET	360 mm
<b>Weight</b>	Depending on the material: 7.5 to 12.0 kg (16.54 to 26.46 lbs)		
<b>Materials</b>	In contact with medium:		
	Electrode holder	PEEK, PVDF, conductive PVDF, Alloy C4, titanium, stainless steel 1.4571 (AISI 316 Ti)	
	Rinse chamber and raised face	PEEK, PVDF, conductive PVDF, Alloy C4, titanium, stainless steel 1.4571 (AISI 316 Ti)	
	Seals	EPDM/FPM (Viton)/FFKM (Kalrez®)	
	Not in contact with medium:		
	Housing	Stainless steel 1.4404 (AISI 316 L)	
	Seals	FPM	
	Limit position switches (NAMUR-type)	Front surface PBT, cable PVC	
	Handle/protection cap	PVC	
<b>Rinse connections</b>	2 x G $\frac{1}{4}$ (internal) or 2 x NPT $\frac{1}{4}$ " (internal) or 2 x pipe 8 x 60 Swagelok as nozzle		

<b>Limit position switches</b>	Pneumatic:	3/2 way valve; thread M 12 x 1; connection for hoses with OD = 6 mm (0.24")
	Electric:	inductive (NAMUR type); cable length: 10 m (32.8 ft); housing material: stainless steel; thread M 12 x 1; nominal voltage: 8 V ⓈII 1G EEx ia IIC T6; switching distance: 2 mm, flush



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

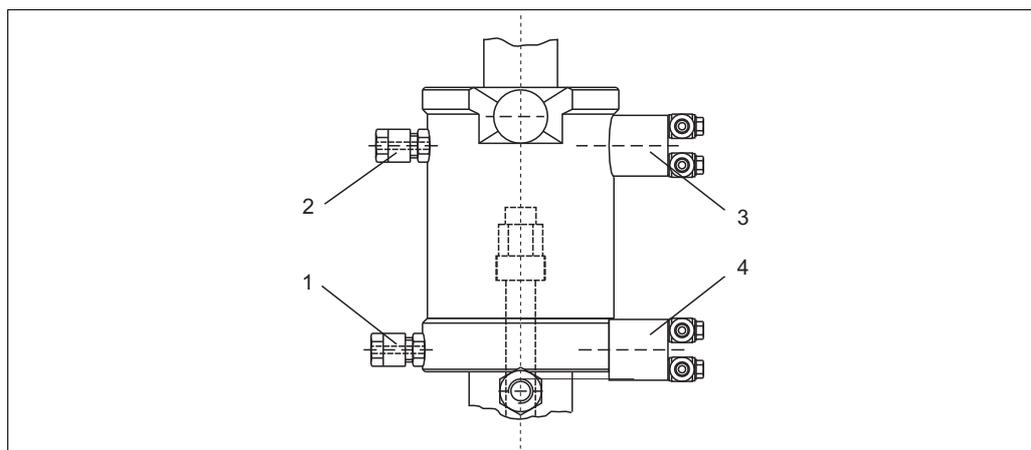
**Note!**

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).

PVC protective cover for retraction pipe area

**Pneumatic connections**

(depending on version)

*Pneumatic connections for automatic assembly actuation*

40005328

1	Compressed air for "service"	3	Limit switch "service"
2	Compressed air for "measurement"	4	Limit switch "measurement"

The assembly Cleanfit CPA472D is operated with an air pressure of 5 to 6 bar (72.5 to 87 psi). The air must be filtered (40 µm) and free from water and oil. There is no continuous pressure demand. The air lines must have a minimum nominal diameter of 4 mm.

**Note!**

If pressure increases to above 6 bar (87 psi) are likely (including short peak pressures), a pressure reducer must be installed. A pressure reducer is recommended for lower pressures as well for a softer starting of the assembly.

## Certificates and approvals

**Limit switches**

The inductive limit switches meet the requirements of DIN EN 60 947-5-6 (NAMUR).

**Inspection certificate**

Inspection certificate 3.1 acc. to EN 10204 on demand.

## Ordering information

### Product structure

Drive type and limit contact switches	
A	Manual without limit contact switches
B	Pneumatic without limit contact switches
C	Pneumatic with 2 pneumatic limit contact switches
D	Pneumatic with 2 electric Ex limit contact switches
E	Pneumatic with 1 electric Ex limit contact switch, "Measure" position
Locking, assembly version	
1	Service position; with locking mechanism
2	Service position + measuring position; with locking mechanism
Electrode type	
A	For gel electrodes / ISFET sensors, 225 mm
B	For gel electrodes / ISFET sensors, 360 mm
C	For liquid KCl electrodes, 360 mm
Immersion depth	
1	max 146 mm (5.75")
2	max 280 mm (11.02")
Assembly material (in contact with medium)	
B	In contact with medium: PEEK
C	In contact with medium: PVDF
D	In contact with medium: PVDF, conductive
E	In contact with medium: PVDF, electrode holder Alloy C4
F	In contact with medium: Alloy C4 including 3.1
G	In contact with medium: Titanium
H	In contact with medium: Stainless steel 1.4571; 316Ti
Seal material (in contact with medium)	
1	EPDM
2	FPM Viton®
3	FFKM KALREZ®
Process connection	
D	DN 50 flange (acc. to EN 1092), stainless steel
E	DN 80 flange (acc. to EN 1092), stainless steel
F	2" ANSI flange, stainless steel
G	Thread G1 ¼ internal (only with materials F/G/H)
J	Flange JIS IS10K50A
Y	Special version acc. to customer specification
Rinse connection	
1	Without rinse connection
3	With rinse fitting 2 x G ¼ internal thread
4	With rinse fitting 2 x NPT ¼" internal thread
5	With rinse fitting 2 x pipe 8x60 mm Swagelok
CPA472D-	complete order code

### Scope of delivery

The scope of delivery comprises:

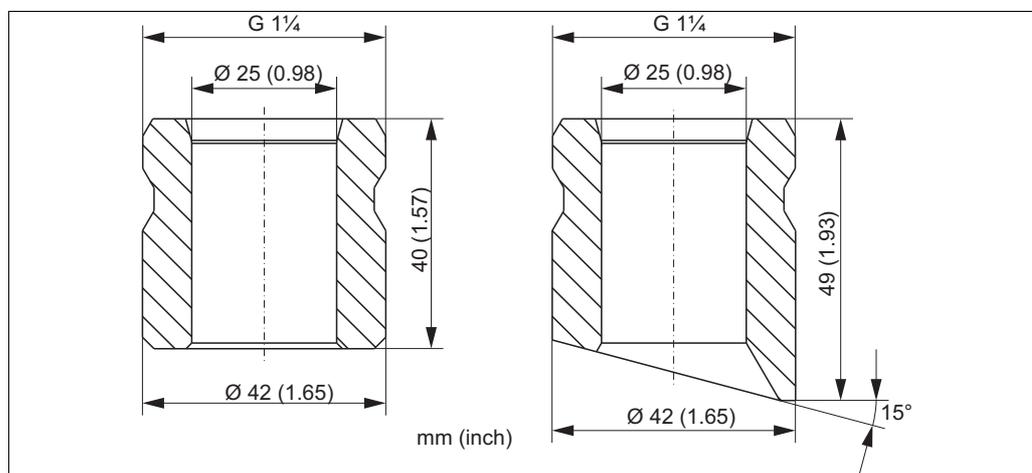
- Cleanfit CPA472D assembly (ordered version)
- Operating Instructions (English)

## Accessories

### Process adapter

Built-in adapter DN 25

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

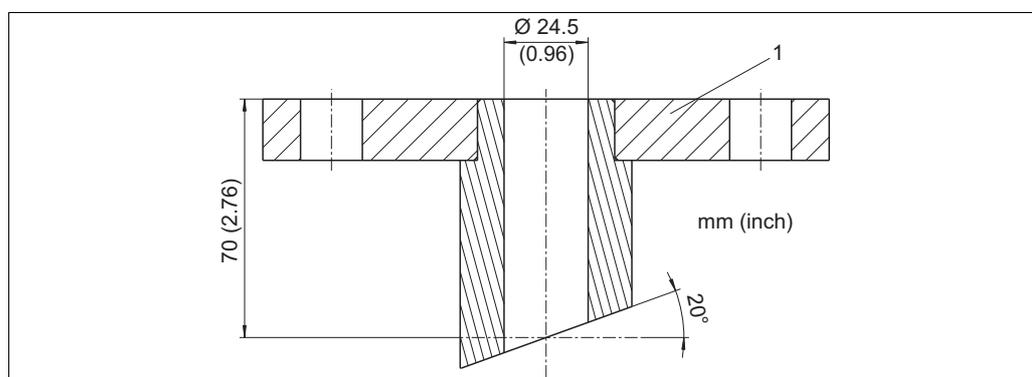


*G 1/4 built-in adapter, straight and inclined*

40009781

Welded fitting DN 50 (70 mm), inclined, material: 1.4571 (AISI 316 Ti);

- order no. 71098682



*Welded fitting*

1 Flange DN 50 / PN16

40009671

Dummy plug for G1/4 process connection,

- SS 1.4435 (AISI 316L), FPM (Viton®) seal, G1/4 internal thread; order no. 51502800

Dummy plug for G1/4 rinse connection,

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

Manual ball valve

- DN50 for mounting between process flange and assembly CPA472D
- Stainless steel 1.4404 (AISI 316L)
- Wetted parts, PVDF; FPM
- Order No.: 51515151 following C-PA070627-50

**Water filter and pressure reducer**

Filter set CPC310

- Water filter (dirt trap) 100 µm, complete, incl. angle bracket;
- Order no. 71031661

Pressure reducer kit

- Complete, incl. manometer and angle bracket;
- Order no. 51505755

**Rinse adapter**

- Rinse connection adapter CPR40 for connecting 2 or 4 different media.  
Order acc. to product structure, see Technical Information (TI342C/07/en).

**Hose nozzle**

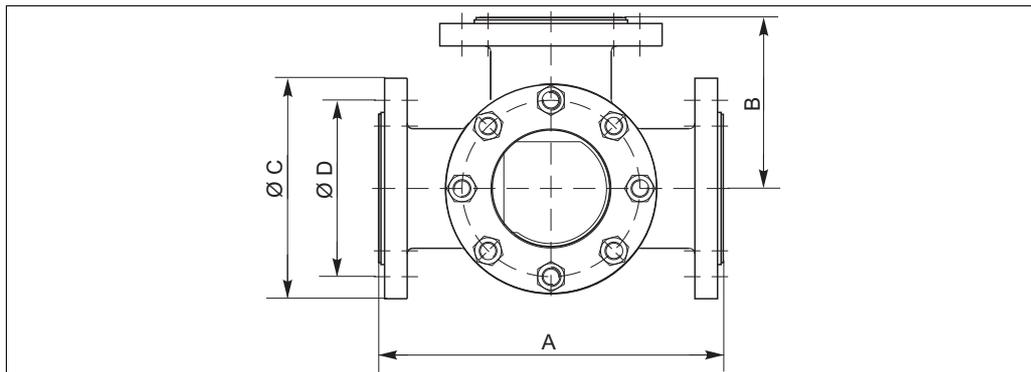
- Hose nozzles for rinse connections G $\frac{1}{4}$ , DN 12, PVDF, 2 pieces;  
order no. 50090491

**Rinse chamber valve**

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

**Flow assembly with and without sight glass**

- Flow assembly with sight glass, PFA lined, conductive (see Fig. )  
DN 50, length 230 mm (9.06 "), only for CPA472D-xxx1xxDx, order no. 51515653  
DN 80, length 310 mm (12.20 "), order no. 71024439
- Flow assembly (without sight glass), PFA lined, conductive  
DN 50, length 230 mm (9.06 "), only for CPA472D-xxx1xxYx with C-PA060418-50 for stroke reduction and flange adaption, order no. 71024441  
DN 80, length 310 mm (12.20 "), order no. 71024442



Flow assembly with integrated sight glass

DN	A	B	Ø C	Ø D
50	230 (9.06")	115 (4.53")	165 (6.50")	125 (4.92")
80	310 (12.20")	155 (6.10")	200 (7.87")	160 (6.30")

**Installation seal**

- Profile seal  
DN 50, PTFE, order no. 51515675  
DN 80, PTFE, order no. 51515677

**Holder**

- Holder for retraction pipe, material: PP  
order no. 51518530

**Protection cover**

- On request at TSP

**Limit 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

**Pneumatic throttle**

Pneumatic throttle for the reduction of the assembly moving speed,

- G1/8 threaded connection
- order no. 50036864

**Sensors****Glass electrodes**

Orbisint CPS11/CPS11D

- pH sensor for process applications
- Optionally with Memosens technology
- With PTFE diaphragm
- Ordering acc. to product structure, see Technical Information (TI028C/07/en)

Orbisint CPS12/CPS12D

- ORP electrode for process applications
- Optionally with Memosens technology
- With PTFE diaphragm
- Ordering acc. to product structure, see Technical Information (TI367C/07/en)

Ceraliquid CPS41/CPS41D

- pH sensor
- Optionally with Memosens technology
- With ceramics diaphragm and liquid KCl electrolyte
- Ordering acc. to product structure, see Technical Information (TI079C/07/en)

Ceraliquid CPS42/CPS42D

- ORP electrode
- Optionally with Memosens technology
- With ceramics diaphragm and liquid KCl electrolyte
- Ordering acc. to product structure, see Technical Information (TI373C/07/en)

Ceragel CPS71/CPS71D

- pH sensor
- Optionally with Memosens technology
- With double chamber reference system and integrated bridge electrolyte
- Ordering acc. to product structure, see Technical Information (TI245C/07/en)

Ceragel CPS72/CPS72D

- ORP electrode
- Optionally with Memosens technology
- With double chamber reference system and integrated bridge electrolyte
- Ordering acc. to product structure, see Technical Information (TI374C/07/en)

Orbipore CPS91/CPS91D

- pH sensor
- Optionally with Memosens technology
- With open aperture for media with high dirt load
- Ordering acc. to product structure, see Technical Information (TI375C/07/en)

**ISFET sensors**

Tophit CPS471/CPS471D

- Sterilizable and autoclavable ISFET sensor for food and pharmaceuticals, process technology, water treatment and biotechnology;
- Ordering acc. to product structure, see Technical Information (TI283C/07/en)

Tophit CPS441/CPS441D

- Sterilizable ISFET sensor for media with low conductivity, with liquid KCl electrolyte;
- Ordering acc. to product structure, see Technical Information (TI352C/07/en)

Tophit CPS491/CPS491D

- ISFET sensor with open aperture for media with high dirt load;
- Ordering acc. to product structure, see Technical Information (TI377C/07/en)

**Cable**

CPK9 special measuring cable

- For sensors with TOP68 plug-in head, for high-temperature and high-pressure applications, IP 68
- Ordering acc. to product structure, see Technical Information (TI118C/07/en)

CPK1 special measuring cable

- For pH/ORP electrodes with GSA plug-in head
- Ordering acc. to product structure, see Technical Information (TI118C/07/en)

CPK12 special measuring cable

- For pH/ORP glass electrodes and ISFET sensors with TOP68 plug-in head
- Ordering acc. to product structure, see Technical Information (TI118C/07/en)

CYK10 Memosens data cable

- For digital sensors with Memosens technology
  - Ordering according to product structure, see Technical Information (TI376C/07/en)
- 

**Transmitter**

Liquiline CM42

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

Liquisys CPM223/253

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

Mycom CPM153

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

**Measuring, cleaning and calibration systems**

Topcal CPC310

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

Topclean CPC30

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

## International Headquarters

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