



Level



Pressure



Flow



Temperature

Liquid
Analysis

Registration

Systems
Components

Services



Solutions

Technical Information

Ceraliquid CPS42/CPS42D/CPS43

ORP electrodes, analog and digital with Memosens technology and reference electrode

Each with ceramic diaphragm and liquid KCl electrolyte



Application

Media with very low conductivities or a high percentage of organic solvents or alcohols:

- Food industry
- Biotechnology
- Laboratory measurements
- Power plants



With ATEX, FM¹ and CSA¹ approval
for application in hazardous areas

Your benefits

- Liquid KCl electrolyte enabling use at very low conductivities
- Ceramic diaphragm with defined KCl flow
- Application under pressures of up to 10 bar / 145 psi with counter pressure
- Resistant to poisoning thanks to separate reference lead
- Suitable for CIP / SIP cleaning
- Three lengths available: 120, 225 and 425 mm / 4.72, 8.86 and 16.7 inches

Further benefits offered by Memosens technology

- Maximum process safety through contactless inductive signal transmission
- Data safety through digital data transmission
- Easy handling due to storage of sensor-specific data
- Predictive maintenance possible thanks to registration of sensor load data

¹ approval for digital sensors pending

Function and system design

Measuring principle

ORP measurement

The ORP potential is a unit of measurement for the state of equilibria between oxidising and reducing components of a medium. ORP potential is measured similarly to the pH value. A platinum or gold electrode is used instead of pH-sensitive membrane glass. Analog to the pH measurement, an integrated Ag/AgCl reference system is used as a reference electrode.

General properties

■ Application at low conductivity

Thanks to its liquid KCl electrolyte filling, the CPS42 can be applied at very low conductivities ($\geq 5 \mu\text{S}/\text{cm}$).

■ Sterilizable

The electrode can be used in applications with steam sterilization (max. 130 °C / 266 °F).

■ Durability

The electrode can be applied under pressures of up to 10 bar / 145 psi with counter pressure.

Important properties CPS42D

Maximum process safety

The inductive and non-contacting measured value transmission of Memosens guarantees maximum process safety and offers the following benefits:

- All problems caused by moisture are eliminated.
 - The plug-in connection is free from corrosion.
 - Measured value distortion from moisture is not possible.
 - The plug-in system can even be connected under water.
- The transmitter is galvanically decoupled from the medium. The result: No more need to ask about "symmetrically high-impedance" or "unsymmetrical" or an impedance converter.
- EMC safety is guaranteed by screening measures for the digital measured value transmission.

Data safety through digital data transfer

The Memosens technology digitalizes the measured value in the sensor and transfers it to the transmitter via a contactless connection. The result:

- An automatic error message is generated if the sensor fails or the connection between sensor and transmitter is interrupted.
- The availability of the measuring point is dramatically increased by immediate error detection.
- The digital signals are suitable for application in hazardous areas; the integrated electronics are intrinsically safe.

Easy handling

Sensors with Memosens technology have integrated electronics that allow for saving calibration data and further information such as total hours of operation and operating hours at very high temperatures. When the sensor is mounted, the calibration data are automatically transferred to the transmitter and used to calculate the current redox potential. Storing the calibration data in the sensor allows for calibration and adjustment away from the measuring point. The result:

- The sensors can be calibrated under optimum external conditions in the measuring lab. Wind and weather do neither affect the calibration quality nor the operator.
- The measuring point availability is dramatically increased by the quick and easy replacement of precalibrated sensors.
- The transmitter does not need to be installed close to the measuring point but can be placed in the control room.
- Maintenance intervals can be defined based on all stored sensor load and calibration data and predictive maintenance is possible.
- The sensor history can be documented on external data carriers and evaluation programs at any time. Thus, the current application of the sensors can be made to depend on their previous history.

Communication with the transmitter

Always connect the digital sensor to a digital transmitter with Memosens technology. Data transmission to an analog transmitter is not possible.

Data storage of the CPS42D

Digital sensors are able to store the following system data in the sensor.

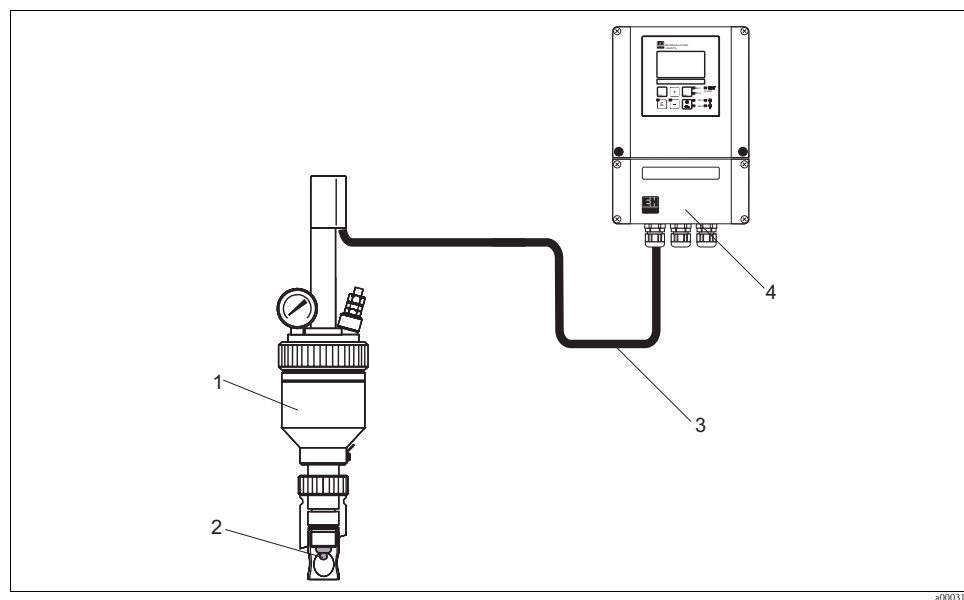
- Manufacturing data
 - Serial number
 - Order code
 - Date of manufacture
- Calibration data
 - Calibration date
 - Calibrated offset (operating mode "mV")
 - % slope (operating mode "%")
 - Number of calibrations
 - Serial number of the transmitter used for the last calibration
- Application data
 - Temperature application range
 - Redox application range
 - Date of first commissioning
 - Operating hours

These system data can be displayed with the Mycom S or the Liquiline M CM42 transmitter.

Measuring system

A complete measuring system comprises:

- CPS42 or CPS42D ORP electrode
- Transmitter, e.g. Liquisys M CPM223/253 (with Memosens technology for CPS42D)
- Special measuring cable, e.g. CPK9 or CYK Memosens data cable for CPS42D
- Immersion, flow or retractable assembly, e.g. Unifit H CPA441



Measuring system for redox measurement

- 1 Unifit H CPA441
- 2 CPS42 or CPS42D ORP electrode
- 3 CPK9 special measuring cable (for electrodes with TOP68 plug-in head) / CYK10 for digital sensors
- 4 Liquisys M CPM253 transmitter

Input

Measured variables

ORP potential

Measuring range

-1500 to 1500 mV



Caution!
Please note the process operating conditions.

Installation

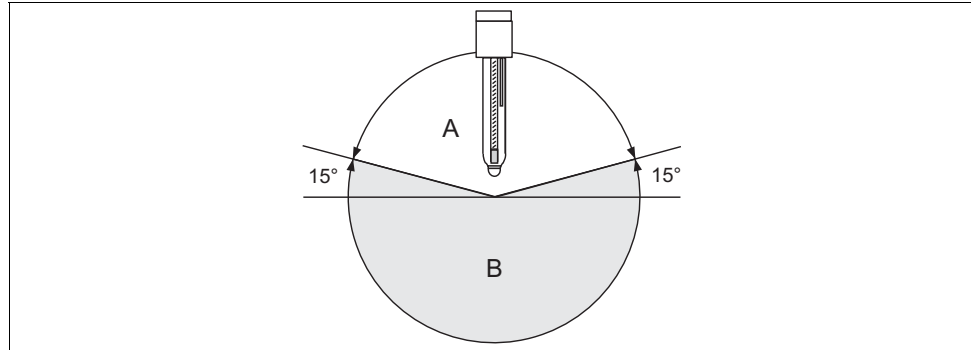
Installation instructions

Do not install the electrode upside down. The inclination angle must be at least 15° from the horizontal. A smaller inclination angle is not permitted as such an inclination results in air cushion forming. This might impair the contact of reference and metal lead.



Caution!

- Make sure that the assembly's threaded connection for the electrode is clean and well running before installing the electrode.
- Hand tighten the electrode (2.2 lbf ft / 3 Nm)! (Given value only applies to installation in Endress+Hauser assemblies.)
- Make sure to follow the installation instructions in the operating instructions of the used assembly.



Electrode installation; inclination angle min. 15° from the horizontal

- A Permitted inclination angle
B Non-permitted inclination angle

Environment

Ambient temperature



Caution!

Danger of frost damage

Never use the electrode at temperatures below -15 °C / 5 °F.

Storage temperature

0 to 50 °C / 32 to 122 °F

Ingress protection

IP 67 / NEMA4X: GSA/SSA plug-in head (with closed plug-in system)

IP 68 / NEMA6P: TOP68 plug-in head (1 m / 3.28 ft water column, 50°C / 122°F, 168 h)

IP 68 / NEMA6P: Memosens plug-in head (10 m / 32.8 ft water column, 25°C / 77°F, 45 days, 1 M KCl)

Process

Process temperature

CPS42, CPS43: -15 to 130 °C / 5 to 266 °F

CPS42D: -15 to 135 °C / 5 to 275 °F

Process pressure

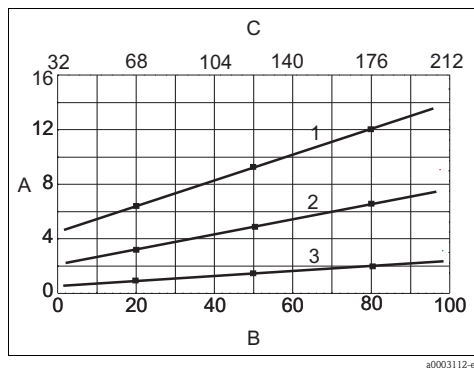
0 to 10 bar / 0 to 145 psi with counter pressure via a separate KCl vessel

Application

CPS42, CPS42D: Reducing media, e.g. chromate reduction, chlorine dosing in swimming pools

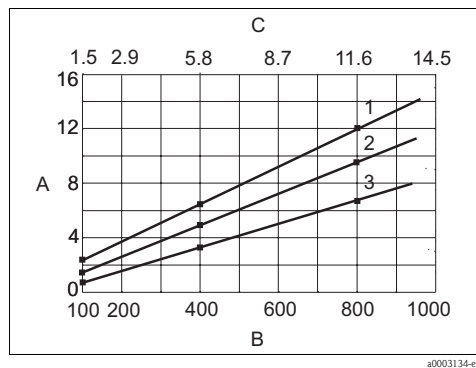
CPS43: Single reference electrode, used in combination with the CPS64 single pH electrode

KCl consumption



KCl consumption dependent on medium temperature

- A KCl consumption (ml/d)
 B Temperature (°C)
 C Temperature (°F)
 1 800 mbar / 11.6 psi overpressure
 2 400 mbar / 5.8 psi overpressure
 3 100 mbar / 1.5 psi overpressure

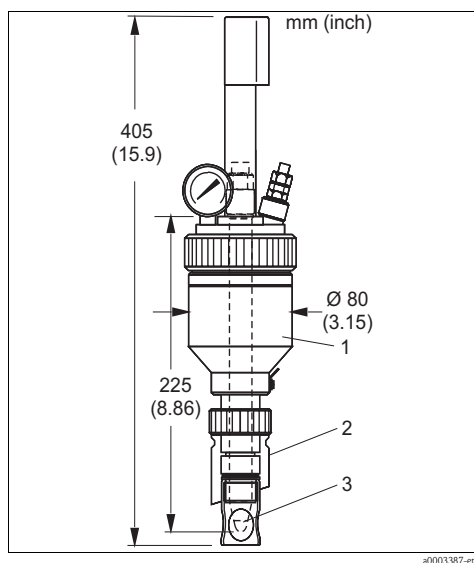


KCl consumption dependent on process pressure

- A KCl consumption (ml/d)
 B Overpressure to process (mbar)
 C Overpressure to process (psi)
 1 Medium temperature 80 °C / 176 °F
 2 Medium temperature 50 °C / 122 °F
 3 Medium temperature 20 °C / 68 °F

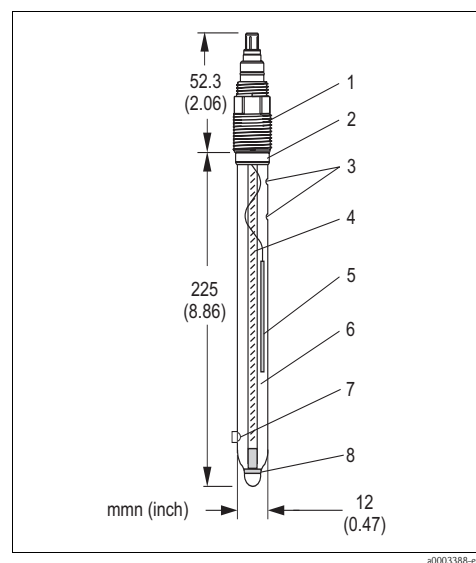
Mechanical construction

Design, dimensions CPS42



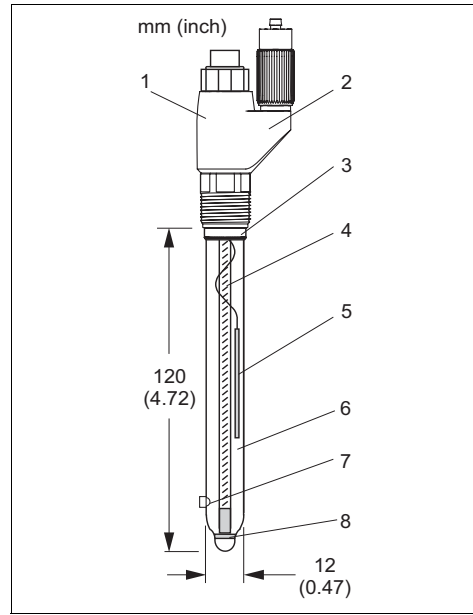
Unifit H CPA441 with CPS42 with GSA plug-in head

- 1 KCl reservoir
 2 Mounting device
 3 CPS42 (shaft length: 225 mm / 5.91")



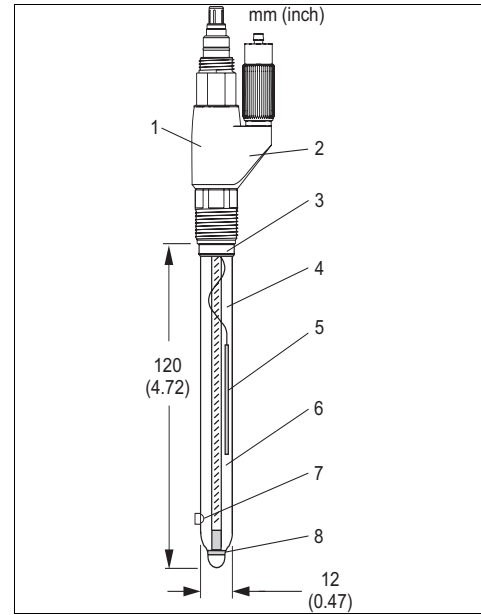
CPS42 with ESA plug-in head for CPA441

- 1 TOP68 plug-in head Pg 13.5
 2 Viton O-ring with thrust collar
 3 KCl refilling
 4 Inner metal lead
 5 Ag/AgCl lead for the reference
 6 Liquid KCl electrolyte
 7 Ceramic diaphragm
 8 Platinum ring



CPS42 with SSA plug-in head

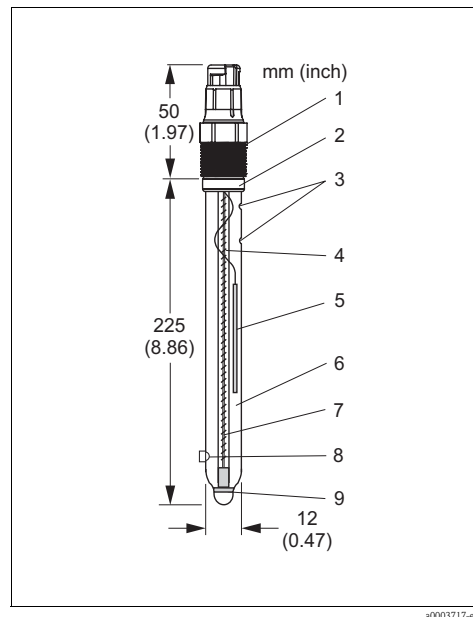
- 1 SSA plug-in head, Pg 13.5
- 2 Hose connection for KCl refilling
- 3 Viton O-ring with thrust collar
- 4 Inner metal lead
- 5 Ag/AgCl lead for the reference
- 6 Liquid KCl electrolyte
- 7 Ceramic diaphragm
- 8 Platinum ring



CPS42 with ESS plug-in head

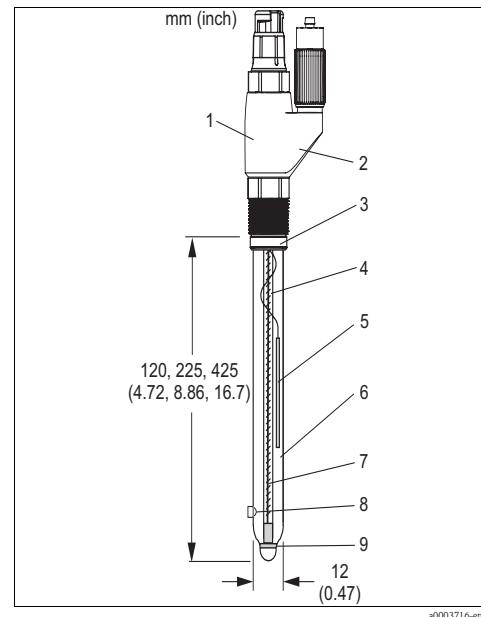
- 1 ESS plug-in head, Pg 13.5
- 2 Hose connection for KCl refilling
- 3 Viton O-ring with thrust collar
- 4 Inner metal lead
- 5 Ag/AgCl lead for the reference
- 6 Liquid KCl electrolyte
- 7 Ceramic diaphragm
- 8 Platinum ring

Design, dimensions CPS42D



CPS42D with Memosens plug-in head

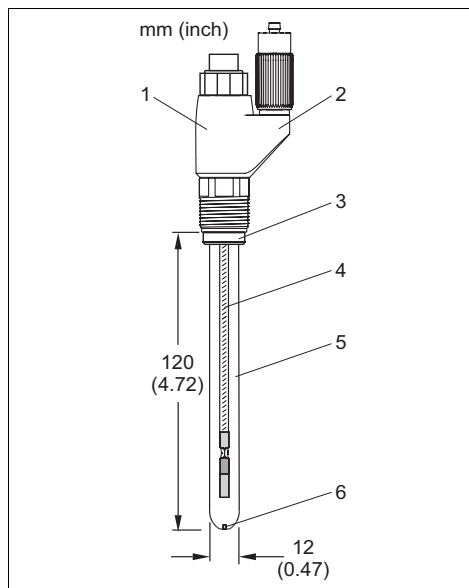
- 1 Memosens plug-in head
- 2 Viton O-ring with thrust collar
- 3 KCl refilling
- 4 Inner metal lead
- 5 Ag/AgCl lead for the reference
- 6 Liquid KCl electrolyte
- 7 NTC 30K temperature sensor
- 8 Ceramic diaphragm
- 9 Platinum ring



CPS42D with Memosens plug-in head and KCl connection

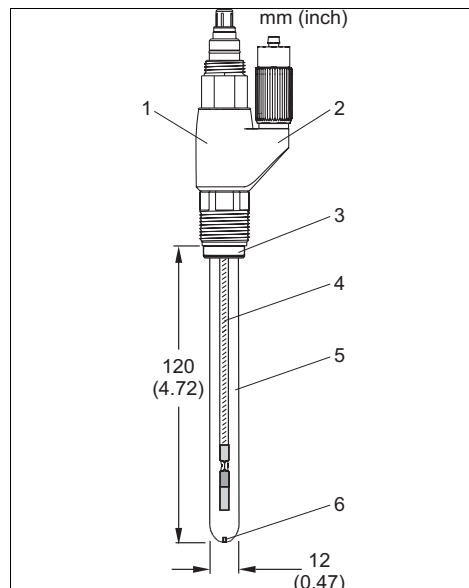
- 1 Memosens plug-in head
- 2 Hose connection for KCl refilling
- 3 Viton O-ring with thrust collar
- 4 Inner metal lead
- 5 Ag/AgCl lead for the reference
- 6 Liquid KCl electrolyte
- 7 NTC 30K temperature sensor
- 8 Ceramic diaphragm
- 9 Platinum ring

Design, dimensions CPS43



CPS43 with SSA plug-in head

- 1 SSA plug-in head, Pg 13.5
- 2 Hose connection for KCl refilling
- 3 Viton O-ring with thrust collar
- 4 Ag/AgCl reference lead
- 5 Liquid KCl electrolyte
- 6 Ceramic diaphragm



CPS43 with ESS plug-in head

- 1 ESS plug-in head, Pg 13.5
- 2 Hose connection for KCl refilling
- 3 Viton O-ring with thrust collar
- 4 Ag/AgCl reference lead
- 5 Liquid KCl electrolyte
- 6 Ceramic diaphragm

Weight

0.1 kg / 0.2 lb.

Material

Electrode shaft	process glass
Redox measuring element	platinum ring
Diaphragm	ceramic diaphragm, sterilisable

Process connection

Pg 13.5

Plug-in heads

CPS42:	
ESA:	threaded plug-in head Pg 13.5, TOP68, 16 bar / 232 psi, Ex
ESS:	hose connection Pg 13.5, TOP 68, 10 bar / 145 psi, Ex
GSA:	threaded plug-in head Pg 13.5
SSA:	hose connection Pg 13.5
CPS42D-****A*:	Memosens plug-in head for digital, contactless data transmission, 16 bar / 232 psi, Ex and non-Ex
CPS42D-****B*:	Memosens plug-in head with hose connection for KCl refilling, for digital, contactless data transmission, 10 bar / 145 psi, Ex and non-Ex

Reference system

Ag/AgCl metal lead with liquid KCl, 3 M, AgCl free

Certificates and approvals

Ex approval CPS42 (ESA, ESS)	■ ATEX II 2G EEx ia IIC T3/T4/T6 ■ FM Class I Div. 2, in combination with the Mypro CPM431 and Mycom S CPM153 transmitters
Ex approval CPS42D	■ ATEX II 2G EEx ia IIC T3/T4/T6 ■ FM^a / CSA^a I Div. 2, in combination with the Liquiline M CM42 and Mycom S CPM153 transmitters
	Note! Ex versions of digital sensors with Memosens technology are indicated by an orange-red ring in the plug-in head.
Biocompatibility	Biocompatibility validated according to: ■ ISO 10993-5:1993 ■ USP, current revision
TÜV certificate TOP68 and Memosens plug-in heads	Pressure resistance 16 bar (232 psi), min. triple overpressure safety
Electromagnetic compatibility of CPS42D	Interference emission and interference immunity complies with EN 61326: 1997 / A1: 1998

Ordering information

Product structure CPS42	Electrode type				
	0	Standard version			
	Measuring element				
	PB	Platinum ring			
	Shaft length				
	2	120 mm / 4.72" (ESS and SSA plug-in heads only)			
	4	225 mm / 8.86" (ESA and GSA plug-in heads only)			
	Plug-in head				
	ESA	Plug-in head Pg 13.5, TOP68, 16 bar / 232 psi, Ex			
	ESS	Hose connection Pg 13.5, TOP68, 16 bar / 232 psi, Ex			
GSA	Plug-in head Pg 13.5				
SSA	Hose connection Pg 13.5				
CPS42-					complete order code

Product structure CPS42D	Version				
	0	Basic version, max. 135 °C / 275 °F			
	Measuring element				
	PB	Platinum ring			
	Shaft length				
	2	120 mm / 4.72" (versions with KCl hose connection only)			
	4	225 mm / 8.86"			
	6	425 mm / 16.73" (versions with KCl hose connection only)			
	Electrolyte supply				
	A	Shaft hole KCl refilling, CPA441			
B	KCl hose connection, CPY7				
Approval					
1	Non-hazardous areas				
G	ATEX II 2G EEx ia IIC T3/T4/T6				
CPS42D-					complete order code

a) approval pending

Product structure CPS43 (for combination with single pH electrode CPS64)

	Electrode type			
	0	Standard version		
	Reference type			
	TB	Liquid KCl		
	Shaft length			
	2	120 mm / 4.72		
	Plug-in head			
			ESS	Hose connection Pg 13.5, TOP68, 16 bar / 232 psi, Ex
			SSA	
CPS43-				complete order code

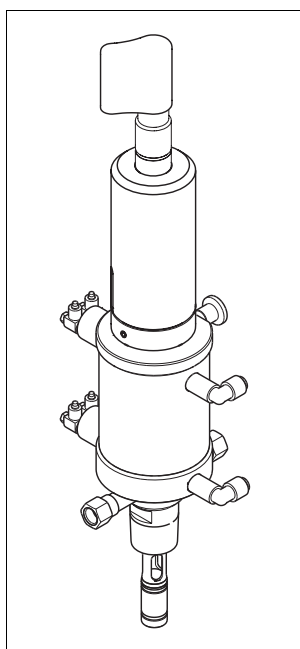
Accessories

**Note!**

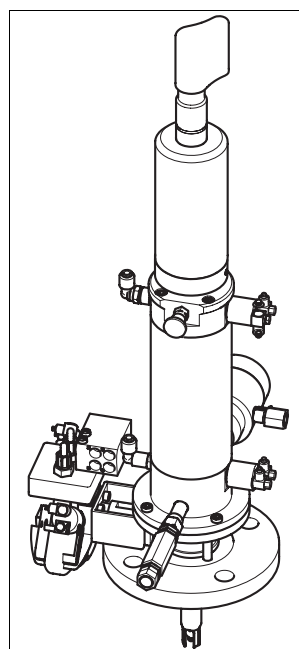
In the following sections, you find the accessories available at the time of issue of this documentation. For information on accessories that are not listed here, please contact your responsible service.

Assemblies

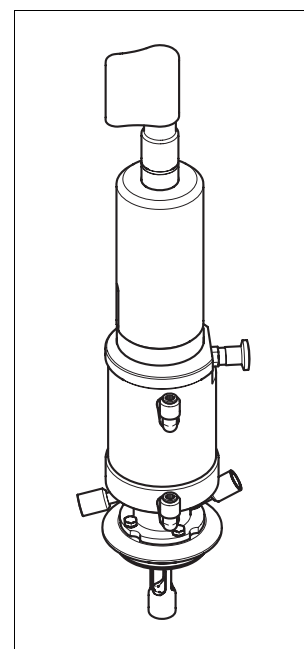
- **Cleanfit P CPA471**
Compact retractable stainless steel assembly for installation in tanks and pipes, manual or pneumatic operation
Ordering acc. to product structure, see Technical Information (TI217C/24/ae)
- **Cleanfit P CPA472**
Compact retractable plastic assembly for installation in tanks or pipes, manual or pneumatic operation
Ordering acc. to product structure, see Technical Information (TI223C/24/ae)
- **Cleanfit P CPA473**
Retractable stainless steel process assembly with ball valve for a particularly safe and reliable separation of the medium from the environment
Ordering acc. to product structure, see Technical Information (TI344C/24/ae)
- **Cleanfit P CPA474**
Retractable plastic process assembly with ball valve for a particularly safe and reliable separation of the medium from the environment
Ordering acc. to product structure, see Technical Information (TI345C/24/ae)
- **Cleanfit H CPA475**
Retractable assembly for installation in tanks and pipes under sterile conditions
Ordering acc. to product structure, see Technical Information (TI240C/24/ae)



Cleanfit P CPA471 or 472

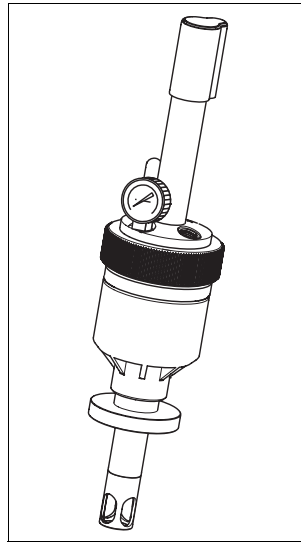


Cleanfit P CPA473 or 474

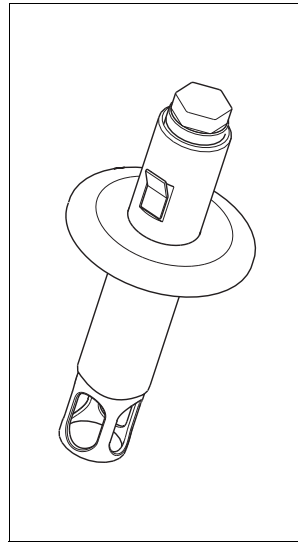


Cleanfit H CPA475

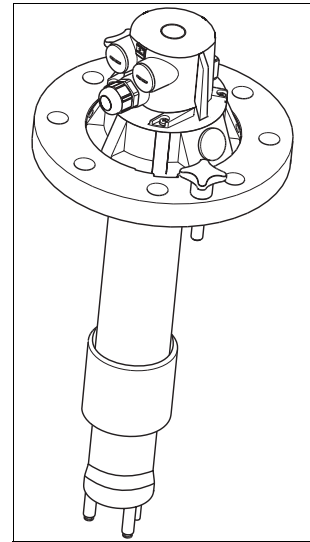
- Unifit H CPA441
Process assembly with integrated electrolyte vessel for installation of pH/ORP electrodes
Ordering acc. to product structure, see Technical Information (TI026C/24/ae)
- Unifit H CPA442
Process assembly for the food industry, biotechnology and pharmaceutical industry, complies with EHEDG criteria and 3-A standard 74-02
Ordering acc. to product structure, see Technical Information (TI306C/24/ae)
- Dipfit W CPA111
Immersion and installation assembly for open and closed tanks
Ordering acc. to product structure, see Technical Information (TI112C/24/ae)



Unifit H CPA441

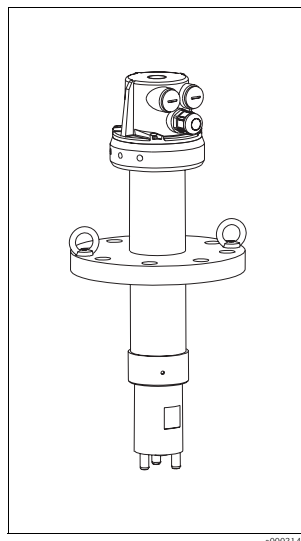


Unifit H CPA442

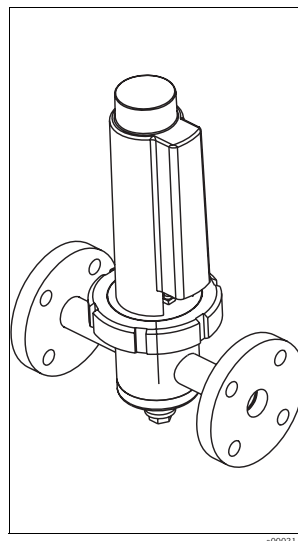


Dipfit W CPA111

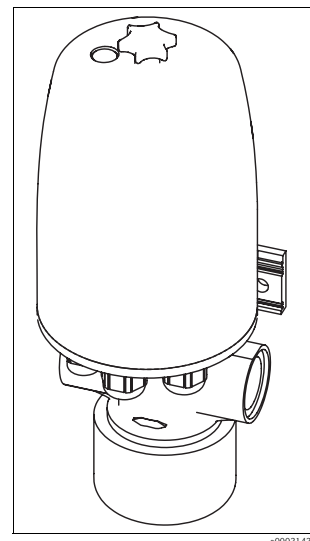
- Dipfit P CPA140
Immersion assembly for pH/ORP electrodes, for demanding processes
Ordering acc. to product structure, see Technical Information (TI178C/24/ae)
- Flowfit P CPA240
Flow assembly for pH/ORP electrodes, for demanding processes
Ordering acc. to product structure, see Technical Information (TI179C/24/ae)
- Flowfit W CPA250
Flow assembly for pH/ORP electrodes
Ordering acc. to product structure, see Technical Information (TI041C/24/ae)



Dipfit P CPA140

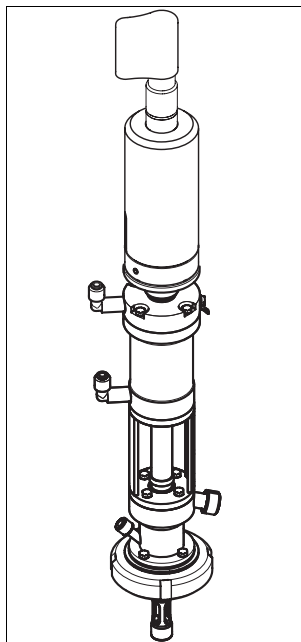


Flowfit P CPA240

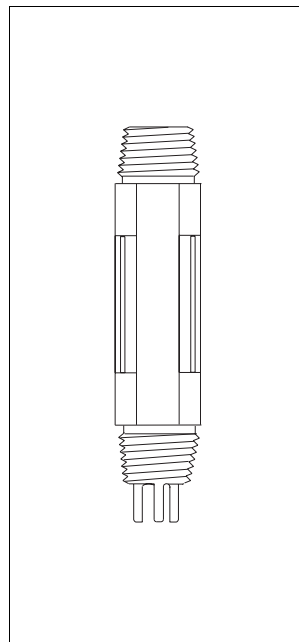


Flowfit W CPA250

- Probit H CPA465
Retractable assembly for installation in tanks and pipes under sterile conditions
Ordering acc. to product structure, see Technical Information (TI146C/24/ae)
- Ecofit CPA640
Process connection adapter and cable set for 120 mm / 4.72" pH/ORP electrodes
Ordering acc. to product structure, see Technical Information (TI264C/24/ae)



Probit H CPA465



Ecofit CPA640

Electrolyte vessel

- CPY7 electrolyte vessel
Reservoir for KCl electrolyte, 150 ml / 0.04 US.gal
Ordering acc. to product structure, see Operating Instructions (BA 128C/07/en)

Electrolyte solutions

- KCl-electrolyte solutions for liquid filled electrodes
- 3.0 mol, T = -10 to 100 °C (14 to 212 °F), 100 ml (3 oz), order no. CPY4-1
 - 3.0 mol, T = -10 to 100 °C (14 to 212 °F), 1000 ml (30 oz), order no. CPY4-2
 - 1.5 mol, T = -30 to 100 °C (-22 to 266 °F), 100 ml (3 oz), order no. CPY4-3
 - 1.5 mol, T = -30 to 100 °C (-22 to 266 °F), 1000 ml (30 oz), order no. CPY4-4

Buffer solutions

- Technical buffer solutions for ORP electrodes
- +220 mV, pH 7.0, 100 ml (0.026 US gal.); order no. CPY3-0
 - +468 mV, pH 0.1, 100 ml (0.026 US gal.); order no. CPY3-1

Transmitters

- Liquisys M CPM223/253
Transmitter for pH and redox, field or panel-mounted housing,
HART® or PROFIBUS available
Ordering acc. to product structure, see Technical Information (TI194C/24/ae)
- Mycom S CPM153
Transmitter for pH and redox, one or two channel version, Ex or Non-Ex,
HART® or PROFIBUS available
Ordering acc. to product structure, see Technical Information (TI233C/24/ae)
- Liquiline M CM42
Modular two-wire transmitter for Ex and non-Ex areas
HART®, PROFIBUS or FOUNDATION™ Fieldbus available
Ordering acc. to product structure, see Technical Information (TI381C/24/ae)

Measuring cables

- 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/redox electrodes with GSA 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 below

Certificates			
	A	Standard, non Ex	
	G	ATEX II 1G EEx ia IIC T6/T4	
Cable length			
		03	Cable length: 3 m / 9.84 ft
		05	Cable length: 5 m / 16.41 ft
		10	Cable length: 10 m / 32.81 ft
		15	Cable length: 15 m / 49.22 ft
		20	Cable length: 20 m / 65.62 ft
		25	Cable length: 25 m / 82.03 ft
		88	... m length
		89	... ft length
Ready-made			
		1	Wire terminals
CYK10-			complete order code



Note!

Ex versions of CYK10 are indicated by an orange-red coupling end.

United States	Canada	Mexico
Endress+Hauser, Inc. 2350 Endress Place Greenwood, IN 46143 Tel. 317-535-7138 Sales 888-ENDRESS Service 800-642-8737 fax 317-535-8498 inquiry@us.endress.com www.us.endress.com	Endress+Hauser Canada 1075 Sutton Drive Burlington, ON L7L 5Z8 Tel. 905-681-9292 800-668-3199 Fax 905-681-9444 info@ca.endress.com www.ca.endress.com	Endress+Hauser, México, S.A. de C.V. Fernando Montes de Oca 21 Edificio A Piso 3 Fracc. Industrial San Nicolás 54030. Tlalnepantla de Baz Estado de México México Tel: +52 55 5321 2080 Fax +52 55 5321 2099 eh.mexico@mx.endress.com www.mx.endress.com

TI373C/24/ae/10.07
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