Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Technical Information

LENNTECH
WATER TREATMENT SOLUTIONS

Orbisint CPS12/CPS12D/CPS13

ORP electrodes, analog and digital with Memosens technology and reference electrode
Each with dirt-repellent PTFE diaphragm for standard applications in process and environmental technology



Application

- Long-term monitoring and limit monitoring of processes with stable process conditions
  - Paper industry
  - Plastics chemistry
  - Power plants (e.g. flue gas washers)
  - Incineration plants
  - Food industry
  - Breweries
- Water treatment
  - Drinking water
  - Cooling water
  - Well water

With ATEX, FM[1] and CSA[1] approval for application in hazardous areas

Your benefits

- Robust electrode requiring low maintenance thanks to large PTFE ring diaphragm
- Application under pressures of up to 16 bar (232 psi)
- Long service life due to double junction system of metal lead and thus long electrode poison diffusion path
- Various measuring elements for application in oxidising and reducing media
- Three lengths: 120, 225 and 360 mm (4.72, 8.86, 14.17 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

TI367C/07/en/05.05
51513586

Endress+Hauser
People for Process Automation

Function and system design

Measuring principle

Redox measurement
The redox potential is a unit of measurement for the state of equilibria between oxidising and reducing components of a medium. Redox 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

- **Low maintenance**
  The dirt-repellent, sterilisable PTFE ring diaphragm of the CPS12 prevents blocking and assures long-time stability and accuracy.
- **Long service life**
  The double junction system of the metal lead offers better protection from electrode poisons and guarantees a considerably longer service life.
- **Durability**
  Depending on the ordered version, the electrode is pressure proof up to 16 bar / 232 psi and can be applied at temperatures of up to 135 °C / 275 °F.

Important properties CPS12D

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 unter 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 CPS12D

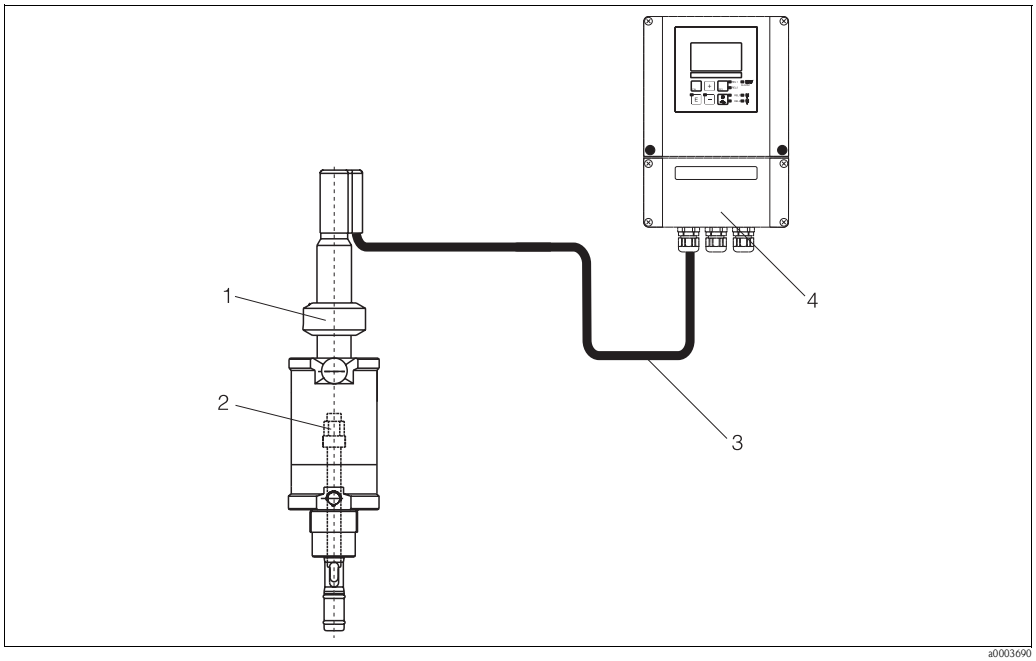
Digital sensors are able to store the following system data in the sensor.

- 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:
- CPS12 or CPS12D ORP electrode
- transmitter, e.g. Liquisys M CPM223/253 (with Memosens technology for CPS12D)
- special measuring cable, e.g. CPK9 or Memosens data cable CYK10 for CPS12D
- immersion, flow or retractable assembly, e.g. Cleanfit P CPA472



Measuring system for measurement of redox potential

1 Retractable Cleanfit P CPA472 assembly
2 CPS12 / CPS12D 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

Redox potential

Measuring range

-1500 ... 1500 mV

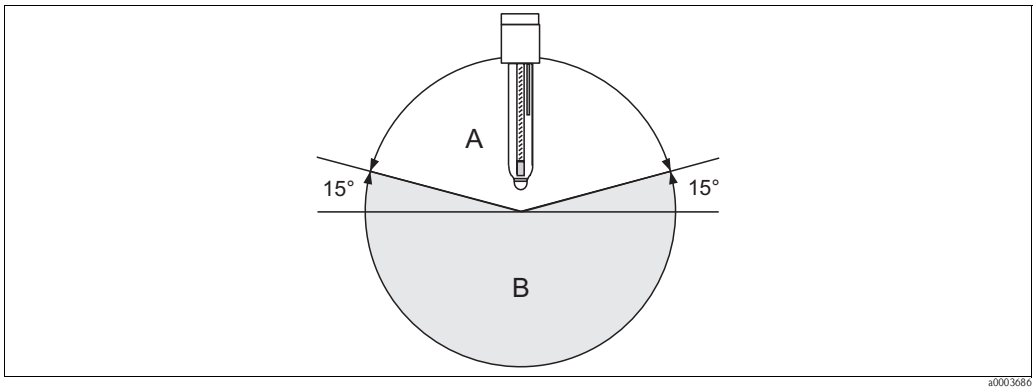
Caution!
Please note the process operating conditions.

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 (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
Do not use the electrode at temperatures below -15 °C / 5 °F.

Storage temperature

0 ... 50 °C / 32 ... 122 °F

Ingress protection

IP 67: GSA plug-in head (with closed plug-in connection)
IP 68: TOP 68 plug-in head (1 m / 3.28 ft water column, 50 °C / 122 °F, 168 h)
IP 68: Memosens plug-in head (10 m / 32.8 ft water column, 25 °C /77 °F, 45 days, 1 M KCl)

Process

Process temperature

-15 ... 135 °C / 5 ... 275 °F

Process pressure

0 ... 16 bar / 0 ... 232 psi

Application

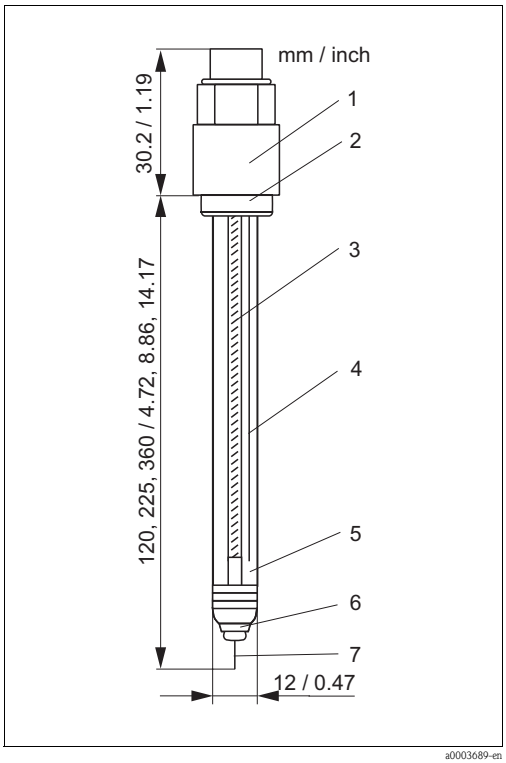
CPS12, CPS12D:
- Gold electrode
  for oxidising media, e.g. cyanide oxidation, nitrite oxidation, ozone measurement, hydrogen superoxide measurement
- Platinum electrode
  for reducing media, e.g. chromate reduction, chlorine dosing in swimming pools

CPS13: Single reference electrode, used in combination with the single pH electrode CPS64

Caution!
Danger of damage to the electrode
Never use the electrode in applications outside the given specifications!

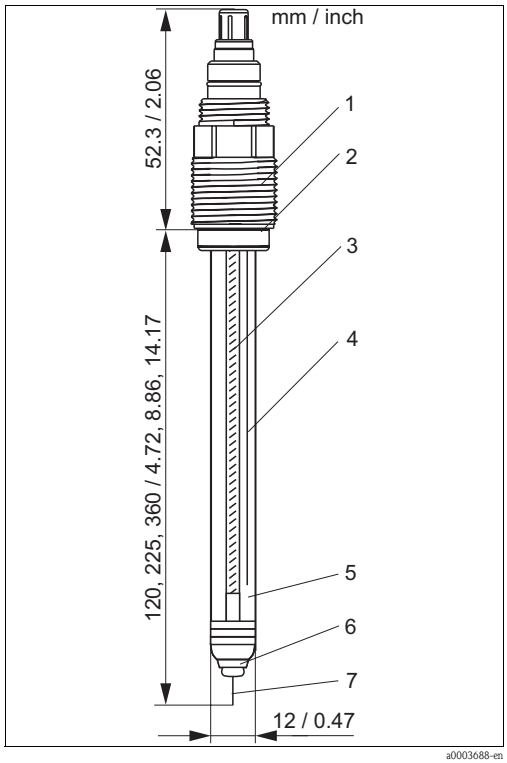
Mechanical construction

Design, dimensions CPS12



CPS12 with GSA plug-in head

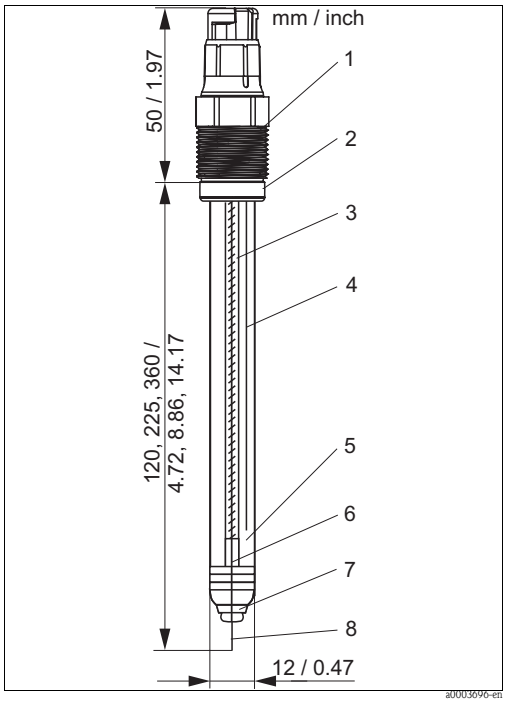
1 GSA plug-in head, PG 13.5
2 Viton O-ring with thrust collar
3 Inner metal lead
4 Ag/AgCl lead for the reference
5 "Advanced Gel" electrolyte
6 PTFE diaphragm
7 Gold pin or platinum ring



CPS12 with TOP68 plug-in head

1 TOP68 plug-in head, Pg 13.5
2 Viton O-ring with thrust collar
3 Inner metal lead
4 Ag/AgCl lead for the reference
5 "Advanced Gel" electrolyte
6 PTFE diaphragm
7 Gold pin or platinum ring

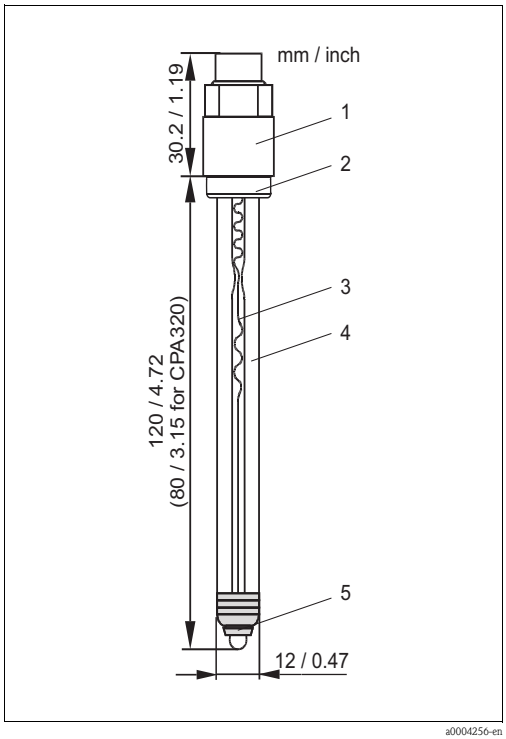
Design, dimensions CPS12D



CPS12D with Memosens plug-in head

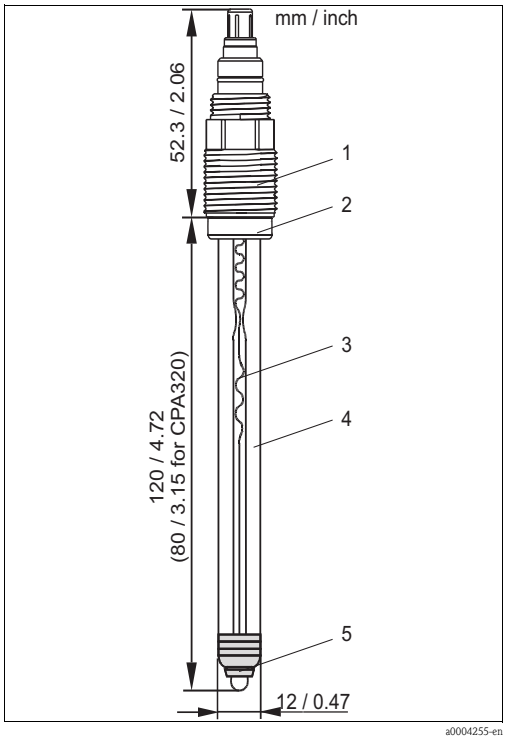
1 Memosens plug-in head
2 Viton O-ring with thrust collar
3 Inner metal lead
4 Ag/AgCl lead for the reference
5 "Advanced Gel" electrolyte
6 NTC 30K temperature sensor
7 PTFE diaphragm
8 Gold pin or platinum ring

Design, dimensions CPS13



CPS13 with GSA plug-in head

1 GSA plug-in head, Pg 13.5
2 Viton O-ring with thrust collar
3 Ag/AgCl reference lead
4 "Advanced Gel" electrolyte
5 PTFE diaphragm



CPS13 with TOP68 plug-in head

1 TOP68 plug-in head, Pg 13.5
2 Viton O-ring with thrust collar
3 Ag/AgCl reference lead
4 "Advanced Gel" electrolyte
5 PTFE diaphragm

Weight	0.1 kg / 0.2 lb.	
Material	Electrode shaft	glass, suitable for processes
	Redox measuring element	platinum ring or gold pin
	Diaphragm	ring-shaped Teflon® diaphragm, sterilisable
Process connection	Pg 13.5	
Plug-in heads	CPS12, CPS13:	
	ESA:	ESA plug-in head Pg 13.5, TOP68, 16 bar / 232 psi, Ex
	GSA:	GSA plug-in head Pg 13.5
	CPS12D:	Memosens plug-in head for digital, contactless data transmission, 16 bar / 232 psi, Ex or non-Ex
Reference system	Ag/AgCl lead with Advanced Gel 3 M KCl, AgCl free	

Certificates and approvals

Ex approval CPS12 (ESA) / CPS13 (ESA)	■ ATEX II 1G EEX ia IIC T3/T4/T6 ■ FM Class I Div. 2, in combination with the Liquiline M CM42 and Mycom S CPM153 transmitters
Ex approval CPS12D	■ ATEX II 1G EEX ia IIC T3/T4/T6 ■ FM[a] / CSA[a] Class 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 head	Pressure resistance 16 bar, min. triple overpressure safety
Electromagnetic compatibility of CPS12D	Interference emission and interference immunity complies with EN 61326: 1997 / A1: 1998

a) approval pending

Ordering information

Product structure CPS12

	Electrode type	
	0	Standard type

		Measuring surface	
		NA	Gold pin
		PA	Platinum ring

			Shaft length	
			2	120 mm / 4.72"
			4	225 mm / 8.86"
			5	360 mm / 14.17"

				Type of head	
				ESA	Plug-in head Pg 13.5, TOP68, 16 bar, Ex
				GSA	Plug-in head Pg 13.5

CPS12-						complete order code

Product structure CPS12D

	Version	
	7	Basic version, max. 135 °C / 275 °F

		Measuring surface	
		NA	Gold pin
		PA	Platinum ring

			Shaft length	
			2	120 mm / 4.72"
			4	225 mm / 8.86"
			5	360 mm / 14.17"

				Approval	
				1	Non-hazardous areas
				G	ATEX II 1G EEx ia IIC T3/T4/T6

CPS12D-						complete order code

Product structure CPS13

	Electrode type	
	0	Standard type

		Electrolyte	
		TA	Advanced Gel filling (120 mm / 4.72" only)
		TD	Advanced Gel filling / double reference (80 mm / 3.15" only)

			Shaft length	
			1	80 mm / 3.15"
			2	120 mm / 4.72"

				Type of head	
				ESA	Plug-in head Pg 13.5, TOP68, 16 bar / 232 psi, Ex
				GSA	Plug-in head Pg 13.5

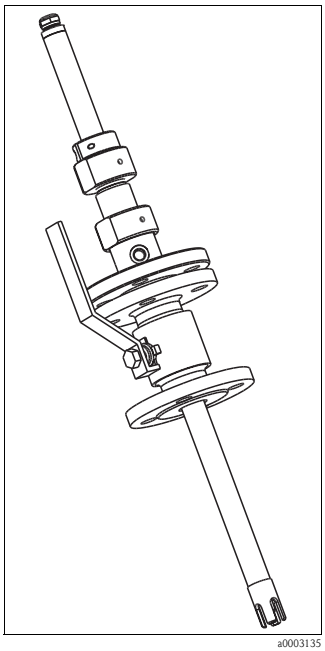
CPS13-						complete order code

Accessories

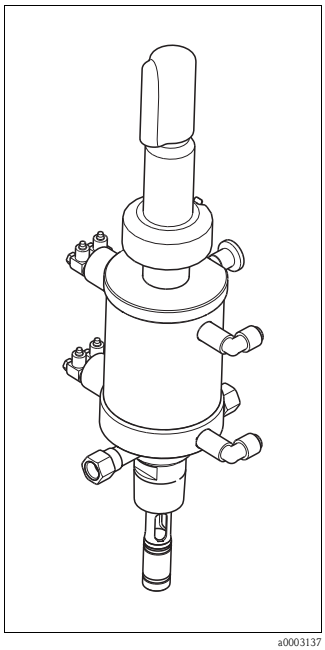
Note!
In the following sections, you find the accessories available at the time of issue of this documentation.
For information on accessories that are not listed here, please contact your responsible service.

Assemblies

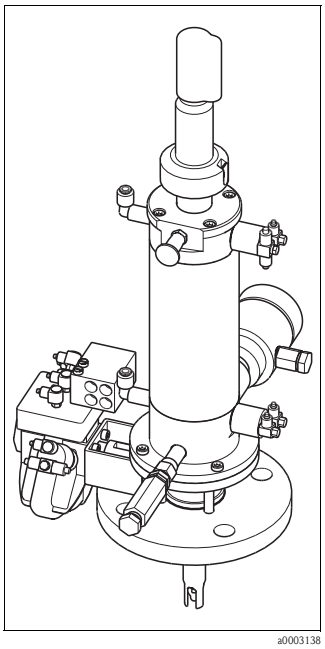
- Cleanfit W CPA450
  Manually operated, retractable assembly for installation of 120 mm / 4.72" pH/ORP electrodes in tanks and pipes,
  Ordering acc. to product structure, see Technical Information (TI183C/07/en)
- Cleanfit P CPA471
  Compact retractable stainless steel assembly for installation in tanks and pipes, manual or pneumatic operation
  Ordering acc. to product structure, see Technical Information (TI217C/07/en)
- Cleanfit P CPA472
  Compact retractable plastic assembly for installation in tanks and pipes, manual or pneumatic operation,
  Ordering acc. to product structure, see Technical Information (TI223C/07/en)
- 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/07/en)
- 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/07/en)



Cleanfit W CPA450

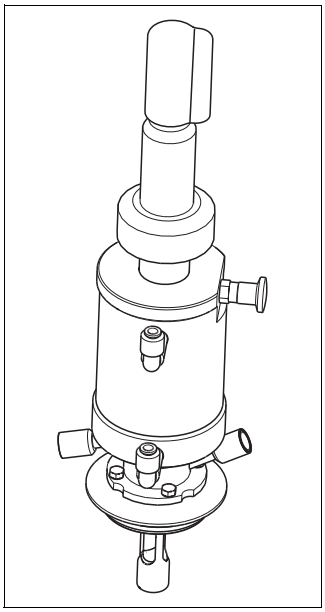


Cleanfit P CPA471 or 472

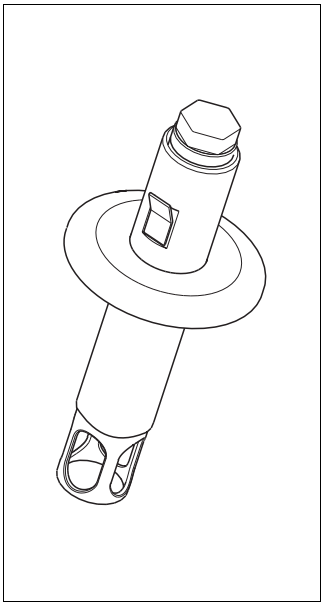


Cleanfit P CPA473 or 474

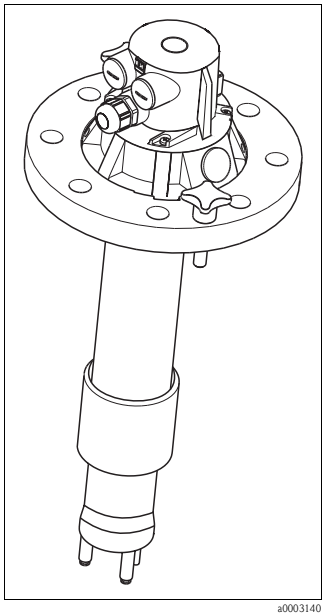
- Cleanfit H CPA475
  Retractable assembly for installation in tanks and pipes under sterile conditions,
  Ordering acc. to product structure, see Technical Information (TI240C/07/en)
- Unifit H CPA442
  Process assembly for the food industry, biotechnology and pharmaceutical industry, with EHEDG and 3A certificates,
  Ordering acc. to product structure, see Technical Information (TI306C/07/en)
- Dipfit W CPA111
  Plastic immersion and installation assembly for open and closed tanks,
  Ordering acc. to product structure, see Technical Information (TI112C/07/en)



Cleanfit H CPA475

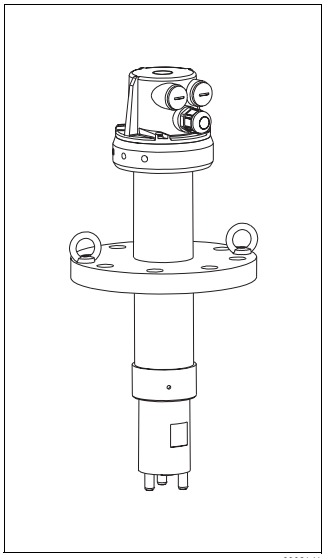


Unifit H CPA442

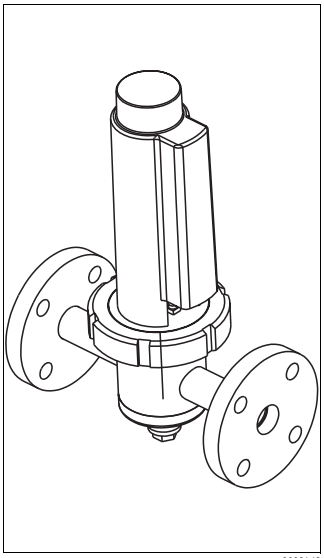


Dipfit W CPA111

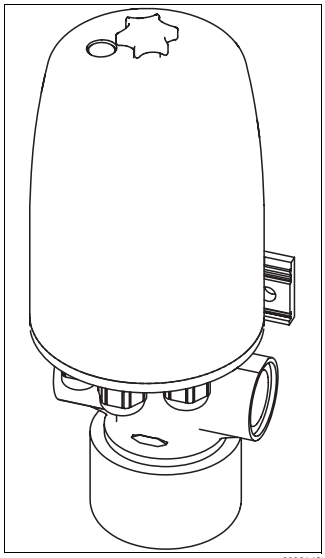
- Dipfit P CPA140
  Immersion assembly for pH/ORP electrodes for demanding processes,
  Ordering acc. to product structure, see Technical Information (TI178C/07/en)
- Flowfit P CPA240
  Flow assembly for pH/ORP electrodes, for demanding processes,
  Ordering acc. to product structure, see Technical Information (TI179C/07/en)
- Flowfit W CPA250
  Flow assembly for pH/ORP electrodes,
  Ordering acc. to product structure, see Technical Information (TI041C/07/en)



Dipfit P CPA140

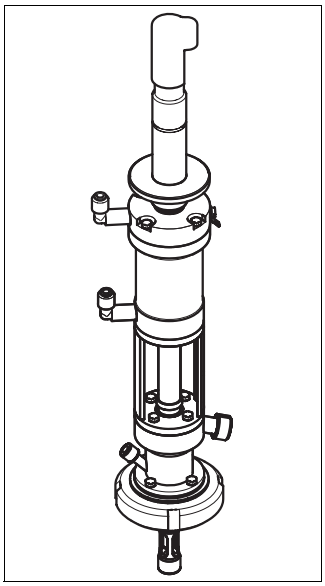


Flowfit P CPA240

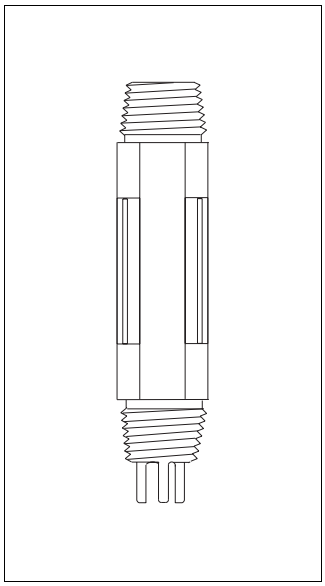


Flowfit W CPA250

- Probfit H CPA465
  Retractable assembly for installation in tanks and pipes under sterile conditions,
  Ordering acc. to product structure, see Technical Information (TI146C/07/en)
- Ecofit CPA640
  Process connection adapter and cable set for 120 mm pH/ORP electrodes,
  Ordering acc. to product structure, see Technical Information (TI264C/07/en)



Probfit H CPA465



Ecofit CPA640

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/07/en)
- 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/07/en)
- 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/07/en)

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.

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