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

Technical Information

Orbipac CPF81/CPF82 and CPF81D/CPF82D

Compact pH/ORP electrodes, analog or with digital Memosens technology
For installation or immersion in industrial water and wastewater

Application

- Industrial and municipal wastewater treatment
- Water conditioning
- Condensate cleaning

Your benefits

- Suitable for flow and immersion installation
- Suitable for measurement within pH range 0 to 14 pH and temperature range 0 to 110 °C (32 to 230 °F)
- Analog pH electrodes with or without integrated temperature sensor, digital pH sensors with integrated temperature sensor
- With patented KNO_3 electrolyte bridge for better protection against electrode poisons like S^{2-} or CN^- ions
- Protection guard against damage
- Flat membrane suitable for high flow rates and fibrous media
- Optional integrated preamplifier for low-impedance and noise-free measuring value transmission
- NPT ¾" threaded connection, top and bottom

Further benefits offered by Memosens technology

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

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Function and system design

Measuring principle

pH measurement

The pH value is used as a unit of measurement for the acidity or alkalinity of a liquid medium. The membrane glass of the electrode supplies an electrochemical potential which is dependent upon the pH value of the medium. This potential is generated by the selective penetration of H^+ ions through the outer layer of the membrane. An electrochemical boundary layer with an electric potential forms at this point. An integrated Ag/AgCl reference system serves as reference electrode.
The transmitter converts the measured voltage into the corresponding pH value using the Nernst equation.

ORP measurement

The ORP potential is a unit of measurement for the state of equilibria between oxidizing and reducing components of a medium. ORP potential is measured similarly to the pH value. A platinum 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.

Important properties of CPF81D/CPF82D

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 non-contacting and therefore 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" (for pH/ORP measurement) 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 values in the sensor and transfers them to the transmitter contactlessly and free from interference potential. 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.

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 under extreme measuring conditions. When the sensor is mounted, the calibration data are automatically transferred to the transmitter and used to calculate the current measured value. Storing the calibration data in the sensor allows for calibration away from the measuring point. The result:

- 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.
- The transmitter does not need to be installed close to the measuring point but can be placed in the control room.

Communication with the transmitter

Always connect digital sensors to a transmitter with Memosens technology. Data transmission to a transmitter for analog sensors is not possible.

Data storage

CPF81D

The 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 slope at 25 °C (77 °F)
  - Calibrated zero point at 25 °C (77 °F)
  - Temperature offset
  - Number of calibrations
  - Serial number of the transmitter used for the last calibration
- Application data
  - Temperature application range
  - pH application range
  - Date of first commissioning
  - Maximum temperature value
  - Total operating hours
  - Operating hours at temperatures above 80 °C (176 °F) and 100 °C (212 °F)
  - Operating hours at very low and very high pH values (Nernst voltage below –300 mV, above +300 mV)
  - Glass membrane impedance

These system data can be displayed with Mycom S CPM153 and Liquiline M CM42 transmitters.

CPF82D

The 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
  - ORP application range
  - Date of first commissioning
  - Operating hours

These system data can be displayed with Mycom S CPM153 or Liquiline M CM42 transmitters.

Input

Measured values

CPF81, CPF81D: pH value
Temperature
CPF82, CPF82D: ORP potential

Measuring range

CPF81/81D

Electrode version LH
- pH: 0 to 14 pH
- Temperature: 0 to 110 °C (32 to 230 °F)

Electrode version NN
- pH: 0 to 14 pH (reduced accuracy for 11 to 14 pH)
- Temperature: 0 to 80 °C (32 to 176 °F)

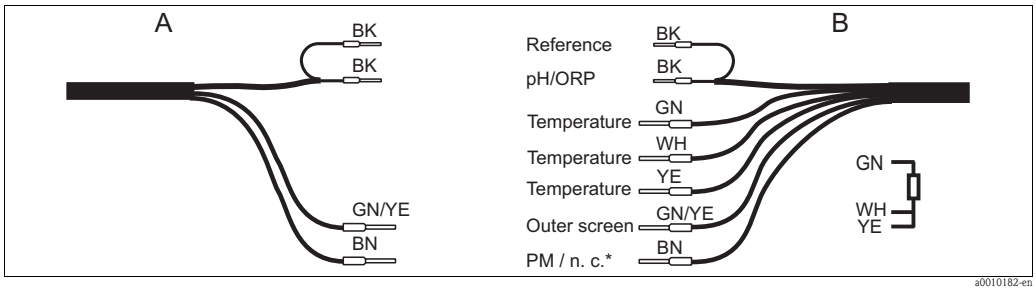
CPF82/82D

ORP potential: -1500 mV to +1500 mV

Caution!
Please note the process operating conditions.

Cable specification

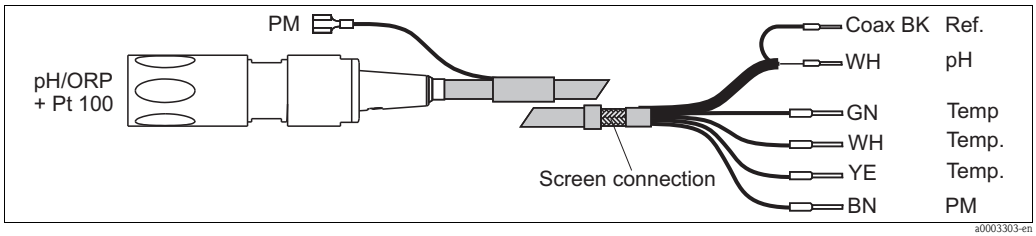
CPF81/82 with fixed cable



Measuring cable

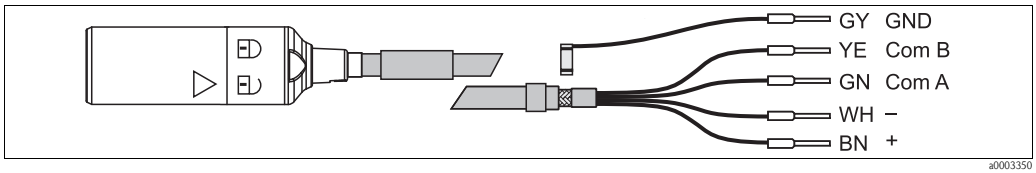
A Fixed cable for CPF81 without temperature sensor and CPF82
B Fixed cable for CPF81 with temperature sensor
** PM is only connected for sensor versions with internal solution ground (CPF81-xxx2xx).*

CPF81/82 with TOP68 plug-in head



CPK9 special measuring cable

CPF81D/82D

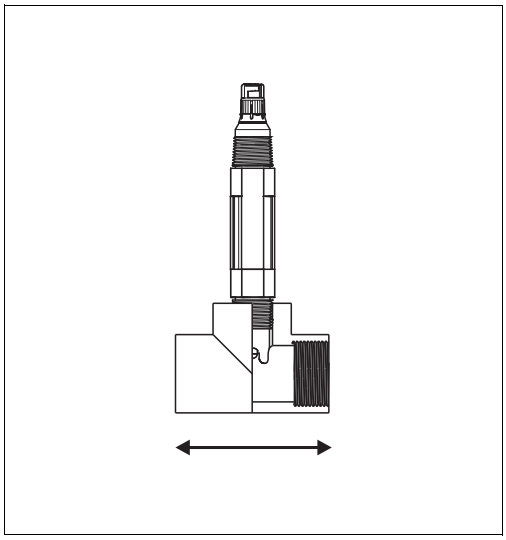


CYK10 Memosens data cable

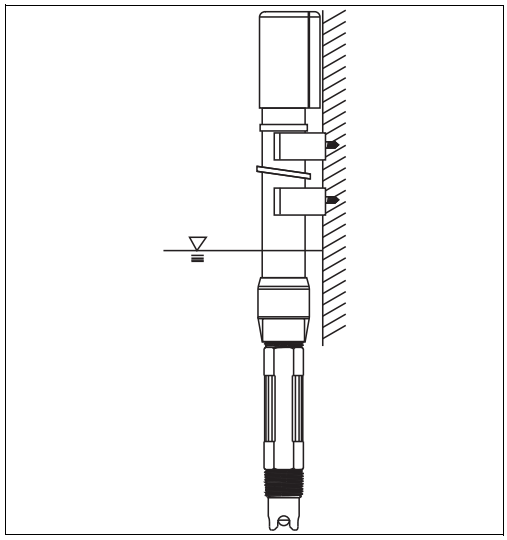
Installation

Installation instructions

The electrode is suitable for flow and immersion installation.



Flow installation



Immersion installation with Flowfit CYA611

Note!
Make sure to follow the installation instructions in the Operating Instructions of the used assembly.

Environment

Ambient temperature

Caution!
Danger of frost damage
Do not use the electrodes at temperatures below 0 °C (32 °F.)

Storage temperature

0 to 50 °C (32 to 122 °F)

Ingress protection

Fixed-cable version:	IP 67
TOP68 plug-in head:	IP 68 (1 m (3.28 ft) water column, 50 °C (122 °F), 168 h)
Memosens plug-in head:	IP 68 (10 m (32.8 ft) water column, 25 °C (77 °F), 45 days, 1 M KCl)

Process

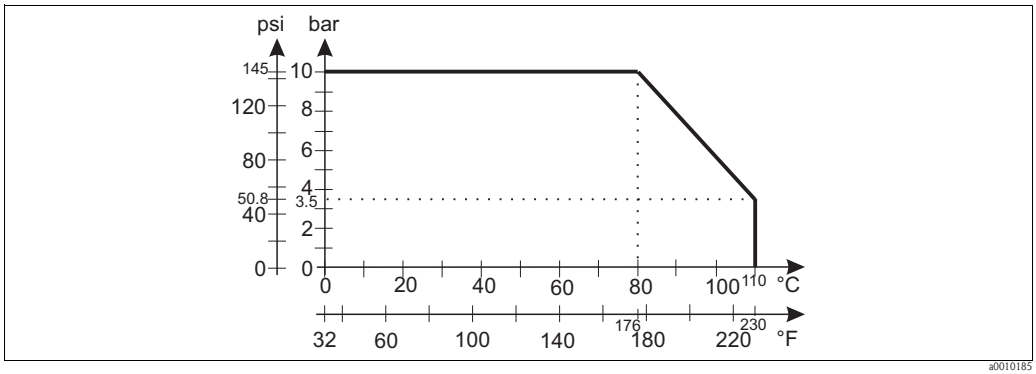
Process temperature

CPF81/81D	
Electrode version LH:	0 to 110 °C (32 to 230 °F)
Electrode version NN:	0 to 80 °C (32 to 176 °F)
CPF82/82D	0 to 80 °C (32 to 176 °F)

Process pressure

0 to 10 bar @ 80 °C (0 to 145 psi @ 176 °F)

Pressure temperature load curve



Glass impedance

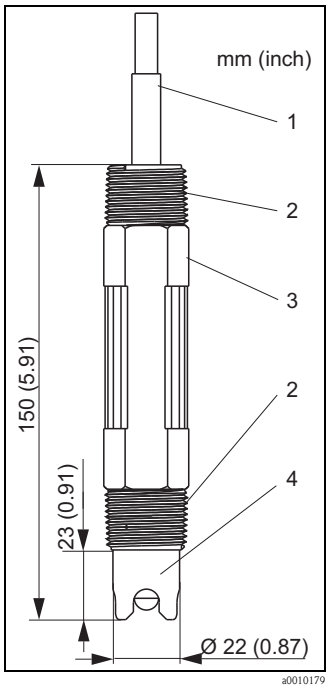
150 MΩ @ 25 °C (77 °F)

Minimum conductivity

min. 50 µS/cm

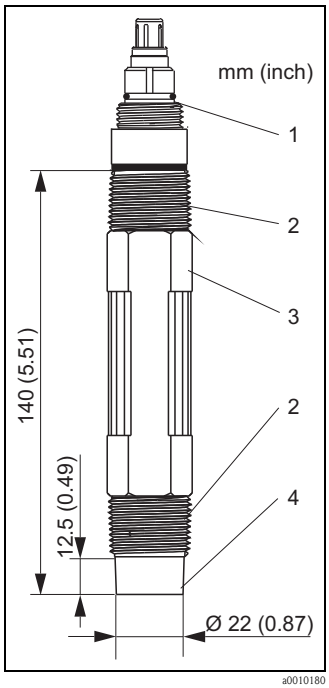
Mechanical construction

Design, dimensions CPF81/82



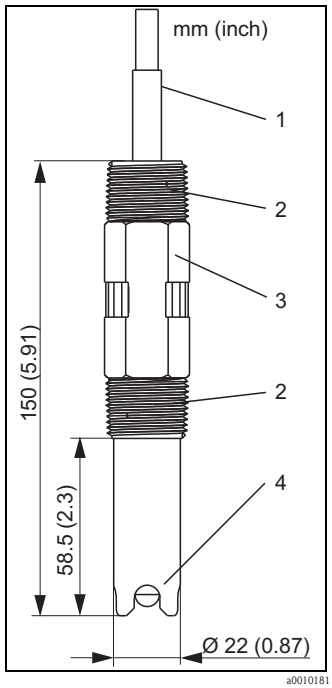
Fixed-cable version, short shaft, protection guard

1 Fixed cable
2 NPT ¾" thread
3 Across flats AF 26
4 Protection guard



CPF81 with TOP68 plug-in head, short shaft, flat membrane

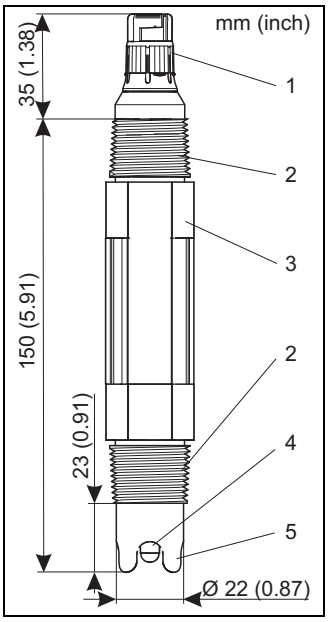
1 TOP68 plug-in head
2 NPT ¾" thread
3 Across flats AF 26
4 Flat membrane



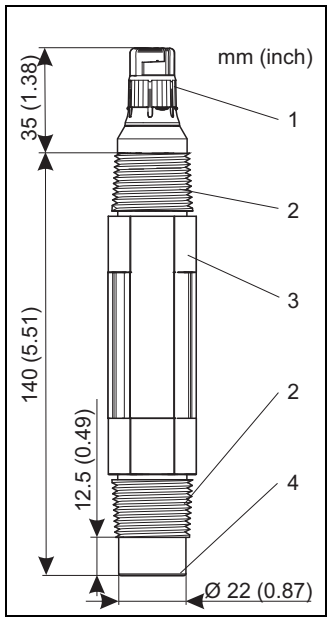
Fixed-cable version, long shaft, protection guard

1 Fixed cable
2 NPT ¾" thread
3 Across flats AF 26
4 Protection guard

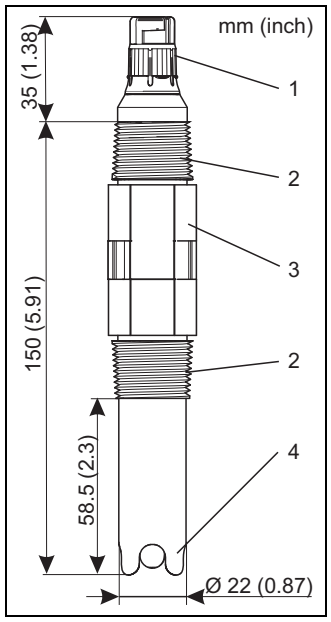
Design, dimensions CPF81D/82D



CPF82D, short shaft, protection guard
1 Memosens plug-in head
2 NPT ¾" thread
3 Across flats AF 26
4 Platinum ring
5 Protection guard



CPF81D, flat membrane
1 Memosens plug-in head
2 NPT ¾" thread
3 Across flats AF 26
4 Flat membrane



CPF81D, long shaft, protection guard
1 Memosens plug-in head
2 NPT ¾" thread
3 Across flats AF 26
4 Protection guard

Material

Housing, electrode shaft:	PPS
pH electrode (in contact with medium):	lead-free membrane glass, suitable for process applications
ORP electrode (in contact with medium):	platinum ring
Double chamber reference system:	KNO_3 and KCl/AgCl

Process connection

NPT ¾" thread

Integrated preamplifier (if ordered)

Design:	cast in sensor body
Power supply:	via integrated coin cells
Reference potential:	reference electrode

Note!
With preamplifier versions, the sensor check function (SCS) of the transmitter is not available and should be turned off.

Ordering information

Product structure CPF81

	Application range	
	LH	pH 0 to 14, T = 0 to 110 °C (32 to 230 °F)
	NN	pH 0 to 11, T = 0 to 80 °C (32 to 176 °F)

		Version	
		1	Insertion length 23 mm (0.91") with protection guard
		2	Insertion length 12.5 mm (0.51") with flat membrane
		3	Insertion length 58.5 mm (2.28") with protection guard

			Process connection	
			1	NPT ¾"
			2	NPT ¾" with integrated solution ground

				Equipment	
				A	No preamplifier, no Pt 100
				B	With preamplifier, no Pt 100
				C	No preamplifier, with Pt 100
				D	With preamplifier, with Pt 100

					Cable connection	
					2	4.5 m (15 ft) fixed cable
					3	9 m (30 ft) fixed cable
					4	13 m (45 ft) fixed cable
					8	TOP68/ESA plug-in head

CPF81-							complete order code

Product structure CPF82

	Application range	
	PA	ORP, platinum ring, 0 to 80 °C (32 to 176 °F)

		Version	
		1	Insertion length 23 mm (0.91") with protection guard
		3	Insertion length 58.5 mm (2.28") with protection guard

			Process connection	
			1	NPT ¾"

				Equipment	
				A	No preamplifier
				B	With preamplifier

					Cable connection	
					2	4.5 m (15 ft) fixed cable
					3	9 m (30 ft) fixed cable
					4	13 m (45 ft) fixed cable
					8	TOP68/ESA plug-in head

CPF82-							complete order code

Product structure CPF81D

	Version				
	7	Basic version			
		Application range			
		LH	0 to 14 pH; 0 to 110 °C (32 to 230 °F)		
		NN	0 to 11 pH; 0 to 80 °C (32 to 176 °F)		
			Insertion length		
			1	23 mm (0.91") + electrode guard	
			2	13 mm (0.51"); flat membrane	
			3	58 mm (2.28") + electrode guard	
				Approval	
				1	Non-hazardous area
CPF81D-					complete order code

Product structure CPF82D

	Version				
	7	Basic version			
		Application range			
		PA	ORP, platinum, 0 to 80 °C (32 to 176 °F)		
			Insertion length		
			1	23 mm (0.91") + electrode guard	
			3	58 mm (2.28") + electrode guard	
				Approval	
				1	Non-hazardous area
CPF82D-					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 local service.

Transmitters

Liquiline M 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 M 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 S 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)

Assembly

Immersion assembly Dipfit W CYA611
- For sensor immersion in basins, open channels and tanks, PVC
- Ordering acc. to product structure, see Technical Information TI166C/07/en

Buffer solutions

pH

High-quality buffer solutions of Endress+Hauser - CPY20
The secondary buffer solutions have been referenced to primary reference material of the PTB (German Federal Physico-technical Institute) and to standard reference material of NIST (National Institute of Standards and Technology) according to DIN 19266 by a DKD (German Calibration Service) accredited laboratory.

	pH value	
	A	pH 2.00 (accuracy ± 0.02 pH)
	C	pH 4.00 (accuracy ± 0.02 pH)
	E	pH 7.00 (accuracy ± 0.02 pH)
	G	pH 9.00 (accuracy ± 0.02 pH)
	I	pH 9.20 (accuracy ± 0.02 pH)
	K	pH 10.00 (accuracy ± 0.05 pH)
	M	pH 12.00 (accuracy ± 0.05 pH)

		Quantity	
		01	20 x 18 ml (0.68 fl.oz) only buffer solutions pH 4.00 and 7.00
		02	250 ml (8.45 fl.oz)
		10	1000 ml (0.26 US gal)
		50	5000 ml (1.32 US gal) canister for Topcal S

			Certificates	
			A	Buffer analysis certificate

				Version	
				1	Standard

CPY20-						complete order code

ORP

Technical buffer solutions for ORP electrodes
- +220 mV, pH 7.0, 100 ml (3.4 fl.oz.); order no. CPY3-0
- +468 mV, pH 0.1, 100 ml (3.4 fl.oz.); order no. CPY3-1

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)

CYK10 Memosens data cable
- For digital sensors with Memosens technology
- Ordering according to product structure, see below

CYK10 product structure

	Certificates			
	A	Standard, non Ex		
	G	ATEX II 1G EEx ia IIC T6/T4		
		Cable length		
		03	Cable length: 3 m (9.8 ft)	
		05	Cable length: 5 m (16 ft)	
		10	Cable length: 10 m (33 ft)	
		15	Cable length: 15 m (49 ft)	
		20	Cable length: 20 m (66 ft)	
		25	Cable length: 25 m (82 ft)	
		88	... m length	
		89	... ft length	
			Ready-made	
			1	Wire terminals
CYK10-				complete order code

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