LENNTECH
WATER TREATMENT SOLUTIONS

Technical Information
Orbipac CPF81D/CPF82D and CPF81/CPF82

pH/ORP compact electrodes, with digital Memosens technology or analog



For processes in mining industries and for treatment of industrial water and wastewater

Application

- Flotation
- Leaching
- Neutralization
- Outlet monitoring

Your benefits

- With patented KNO_3 electrolyte bridge for better protection against electrode poisons such as S^{2-} or CN ions
- Optionally available with flat membrane for improved wear resistance
- Threaded connection NPT ¾" top and bottom for easy installation at user end
- Suitable for measurements within pH range 0 to 14 and within temperature range 0 to 110 °C (32 to 230 °F)
- Digital pH sensors with integrated temperature sensor, analog pH electrodes with or without integrated temperature sensor
- Protection guard against damage

Other advantages of Memosens technology

- Maximum process safety owing to non-contact, inductive signal transmission
- Data security thanks to digital data transmission
- Very easy to use as sensor data saved in the sensor
- Predictive maintenance possible as sensor load data logged in the sensor

Endress+Hauser
People for Process Automation

Function and system design

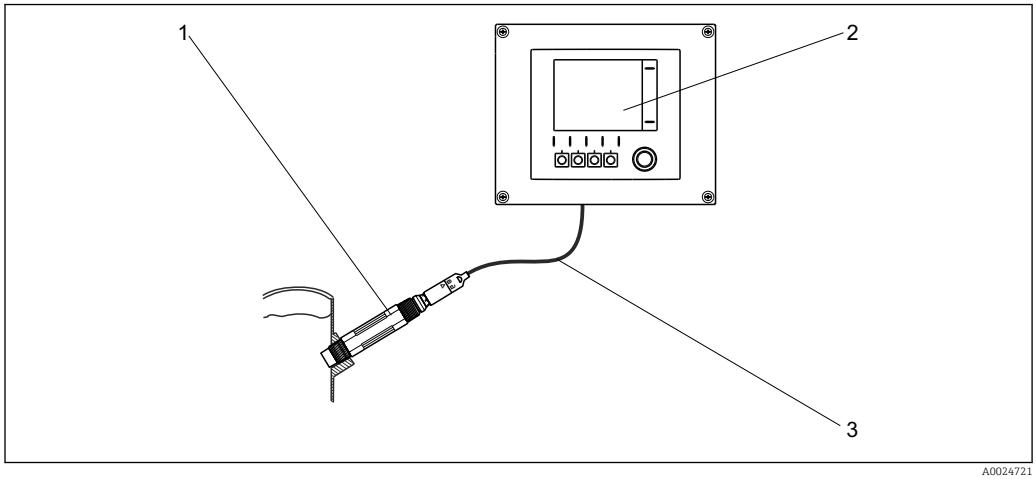
Measuring principle

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 the required 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. The ORP is measured using a platinum or gold electrode instead of the pH-sensitive glass membrane. Analog to the pH measurement, an integrated Ag/AgCl reference system is used as a reference electrode.

Measuring system

A complete measuring system comprises:
- Sensor CPF81D, CPF81, CPF82D or CPF82
- Transmitter,e.g. Liquiline CM44x/R or Liquiline M CM42
- Measuring cable, e.g. CYK10 or sensor's fixed cable



1 Example of a measuring system

1 Sensor CPF81D
2 Liquiline CM44x transmitter
3 Measuring cable CYK10

Communication and data transmission

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.

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) (CPF81D)
  - Calibrated zero point at 25 °C (77 °F) (CPF81D)
  - Calibrated offset (CPF82D, ORP mV measuring mode)
  - Slope as % (CPF82D, ORP % measuring mode)
  - Temperature offset
  - Number of calibrations
  - Serial number of the transmitter used for the last calibration
  - Calibration database (stores the last 8 calibrations in the Memosens head)
- Application data
  - Temperature application range
  - pH application range (CPF81D)
  - ORP application range (CPF82D)
  - Date of first commissioning
  - Maximum temperature value
  - 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)

Reliability

Dependability

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. Once the sensor has been connected, the sensor data are transferred automatically to the transmitter and used to calculate the current measured value. As the calibration data are stored in the sensor, the sensor can be calibrated and adjusted independently of the measuring point. The result:
- Easy calibration in the measuring lab under optimum external conditions increases the quality of the calibration.
- Pre-calibrated sensors can be replaced quickly and easily, resulting in a dramatic increase in the availability of the measuring point .
- 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.

Interference immunity

Data security thanks to digital data transmission
Memosens technology digitizes the measured values in the sensor and transmits the data to the transmitter using a non-contact connection that is free from potential interference. The result:
- Automatic error message if sensor fails or connection between sensor and transmitter is interrupted
- Immediate error detection increases measuring point availability

Safety

Maximum process safety
With inductive transmission of the measured value using a non-contact connection, Memosens guarantees maximum process safety and offers the following benefits:
- All problems caused by moisture are eliminated.
  - Plug-in connection 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. Issues concerning "symmetrical high-impedance" or "asymmetry" or an impedance converter are a thing of the past.
- EMC safety is guaranteed by screening measures for the digital transmission of measured values.

Input

Measured values

CPF81D, CPF81

pH value

Temperature

CPF82D, CPF82

ORP

Measuring range

CPF81D, CPF81

Version LH:

pH	0 ... 14
Temperature	0 to 110 °C (32 to 230 °F)

Version NN:

pH	0 to 14 (11 to 14 with reduced accuracy)
Temperature	0 to 80 °C (32 to 170 °F)

CPF82D, CPF82

-1500 mV to +1500 mV

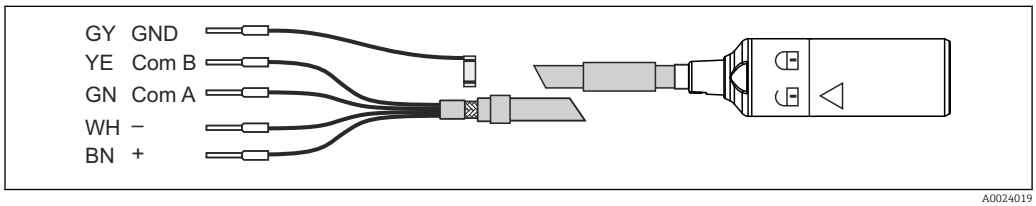
Please note the process operating conditions.

Power supply

Electrical connection

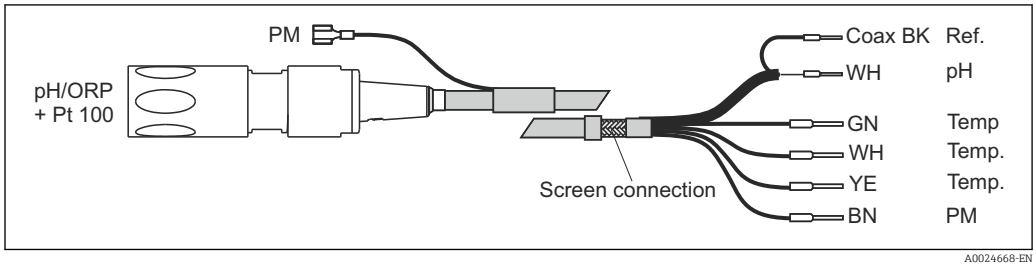
CPF81D and CPF82D

The electrical connection of the sensor to the transmitter takes place via special measuring cable CYK10 or CYK20.



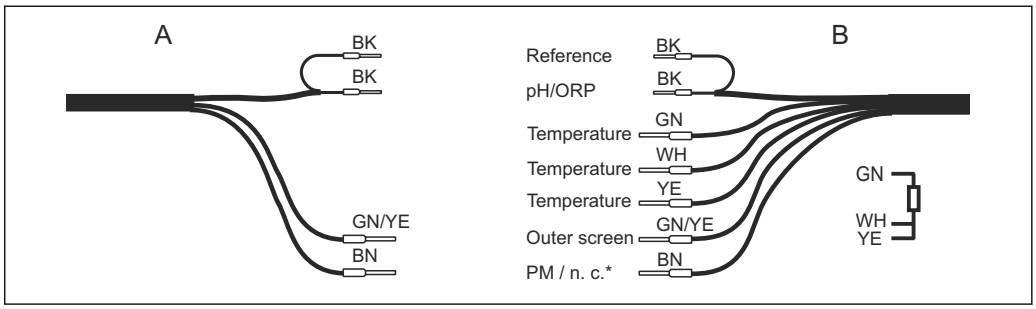
2 Measuring cable CYK10/CYK20

CPF81 and CPF82 with TOP68 plug-in head



3 Measuring cable CPK9

CPF81 and CPF82 with fixed cable

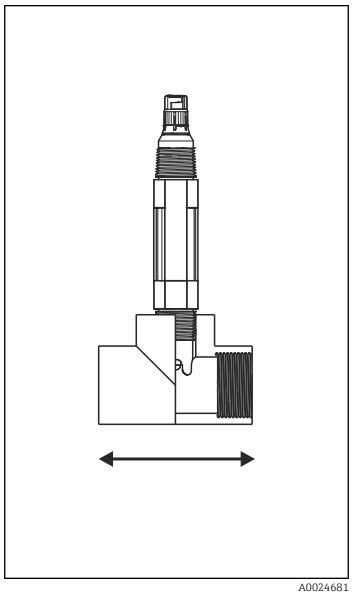


4 Fixed cable connection

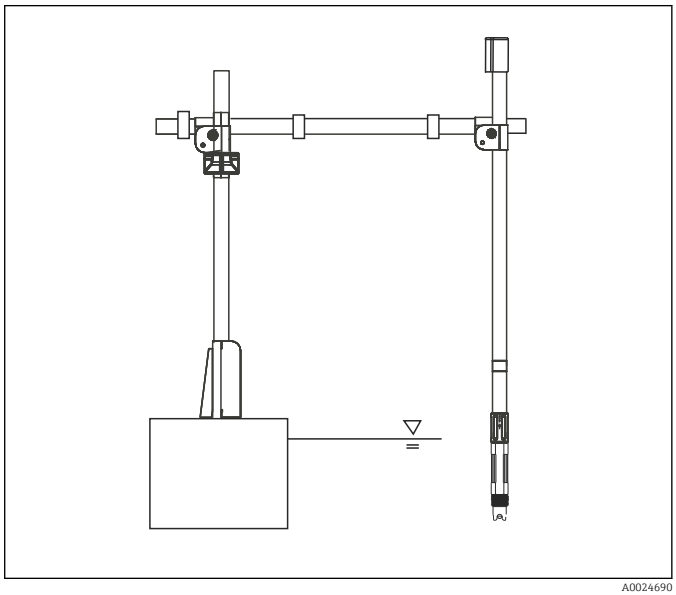
A Fixed cable CPF81 without temperature sensor and CPF82
B Fixed cable CPF81 with temperature sensor
** The PML is connected only in the case of sensor versions with an internal PML (CPF81-xxx2xx)*

Installation

Installation instructions



5 Flow installation



6 Immersion installation with Flexdip CYA112

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

Environment

Ambient temperature

NOTICE

Danger of frost damage

► The sensor must not be used at temperatures below 0 °C (32 °F).

Storage temperature

0 to 50 °C (32 to 120 °F)

Degree of protection

CPF81D, CPF82D

IP 68 (10 m (33 ft) head of water at 25 °C (77 °F) over 45 days, 1 mol/l KCl)

CPF81, CPF82 with TOP68 plug-in head

IP 68 (1 m (3.3 ft) water column, 50 °C (122 °F), 168 h)

CPF81, CPF82 with fixed cable

IP 67

Electromagnetic compatibility

Interference emission and interference immunity in accordance with EN 61326-1:2006, EN 61326-2-3:2006

Memosens versions
for ESD > 8 kV: reduced accuracy ±1.5 pH

Process

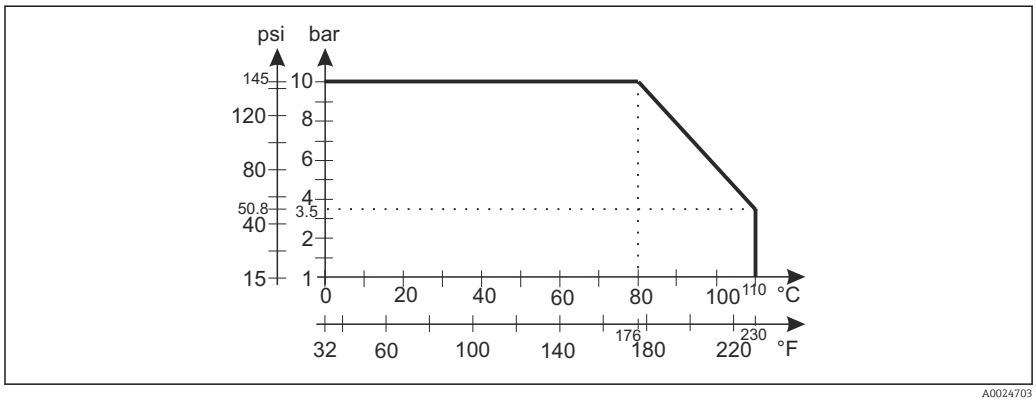
Process temperature

CPF81D, CPF81	
Version LH	0 to 110 °C (32 to 230 °F)
Version NN	0 to 80 °C (32 to 170 °F)
CPF82D, CPF82	0 to 80 °C (32 to 170 °F)

Process pressure

1 to 10 bar absolute, at 80 °C (15 to 145 psi absolute, at 176 °F)

Pressure temperature load curve



A0024703

Glass impedance

150 MΩ at 25 °C (77 °F)

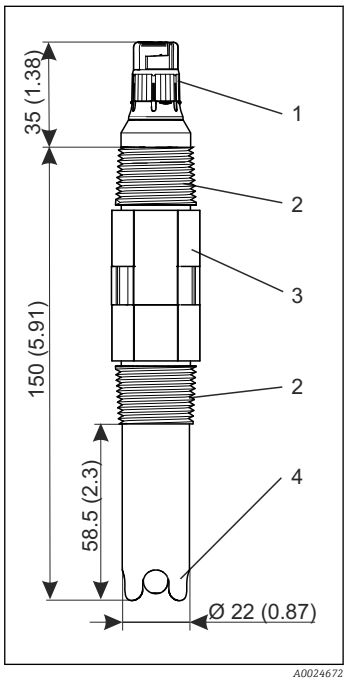
Minimum conductivity

50 µS/cm

Mechanical construction

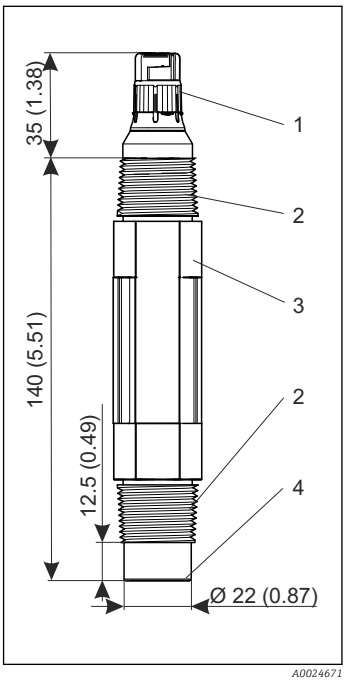
Design, dimensions

CPF81D, CPF82D



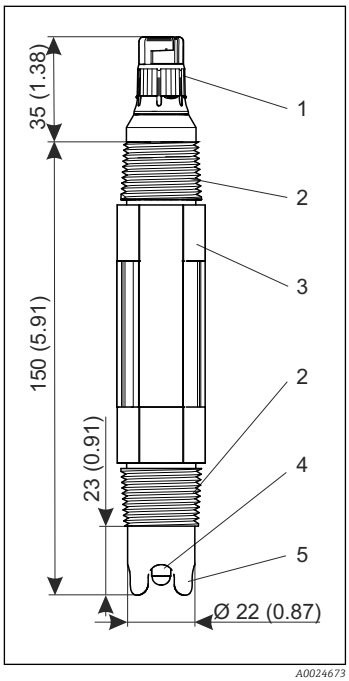
7 *CPF81D, long shaft, protection guard*

1 *Memosens plug-in head*
2 *NPT ¾" thread*
3 *Across flats AF 26*
4 *Protection guard*



8 *CPF81D, flat membrane*

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

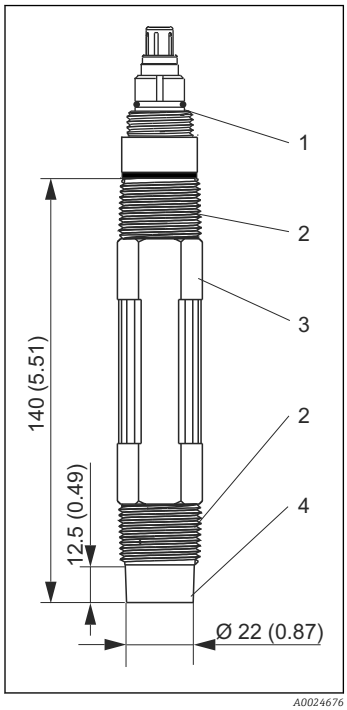


9 *CPF82D, short shaft, protection guard*

1 *Memosens plug-in head*
2 *NPT ¾" thread*
3 *Across flats AF 26*
4 *Platinum ring*
5 *Protection guard*

Dimensions in mm (inch)

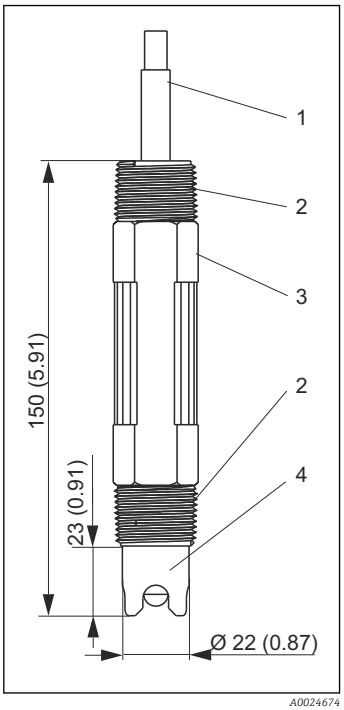
CPF81, CPF82



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

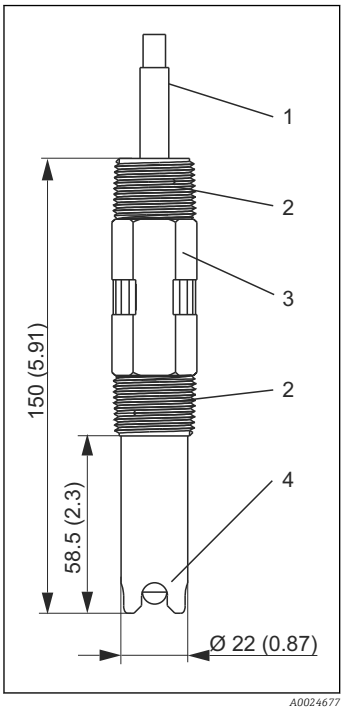
1 TOP68 plug-in head
2 NPT ¾" thread
3 Across flats AF 26
4 Flat membrane

Dimensions in mm (inch)



11 Fixed-cable version, short shaft, protection guard

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



12 Fixed-cable version, long shaft, protection guard

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

Weight	0.12 to 0.15 kg (0.26 to 0.33 lbs, depending on version and without cable)	
Materials	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"	
Integrated preamplifier (optional)	Structure	cast in sensor body
	Power supply	via integrated coin cells
	Reference potential:	reference electrode

With preamplifier versions, the sensor check function (SCS) of the transmitter is ineffective and should be turned off.

Certificates and approvals

Ex approval (optional)	FM IS NI Cl. I Div.1&2, Groups A-D

Ordering information

Product page

www.endress.com/cpf81d

www.endress.com/cpf81

www.endress.com/cpf82d

www.endress.com/cpf82

Product Configurator

The navigation area is located on the right of the product page.

1. Under "Device support" click "Configure your selected product".
   ↳ The Configurator opens in a separate window.
2. Select all the options to configure the device in line with your requirements.
   ↳ In this way, you receive a valid and complete order code for the device.
3. Export the order code as a PDF or Excel file. To do so, click the appropriate button at the top of the screen.

Scope of delivery

The scope of delivery includes:
- Sensor in the version ordered
- Technical Information

Accessories

The following are the most important accessories available at the time this documentation was issued. For accessories not listed here, please contact your service or sales office.

Assembly

Flexdip CYA112
- Immersion assembly for water and wastewater
- Modular assembly system for sensors in open basins, channels and tanks
- Product Configurator on the product page: www.endress.com/cya112

Technical Information TI00432C

Measuring cables

CYK10 Memosens data cable
- For digital sensors with Memosens technology
- Product Configurator on the product page: www.endress.com/cyk10

Technical Information TI00118C

CPK9
- Terminated measuring cable for connecting analog sensors with TOP68 plug-in head
- Selection in accordance with product structure

For more information and to order, please contact your sales office.

Buffer

High-quality buffer solutions from 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.
Product Configurator on the product page: www.endress.com/cpy20

Technical buffer solutions for ORP electrodes
- +220 mV, pH 7, 100 ml; order no. CPY3-0
- +468 mV, pH 0.1, 100 ml; order no. CPY3-1

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