

# 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  $\text{KNO}_3$  electrolyte bridge for better protection against electrode poisons such as  $\text{S}^{2-}$  or  $\text{CN}$  ions
- Optionally available with flat membrane for improved wear resistance
- Threaded connection NPT  $\frac{3}{4}$ " 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

## 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.

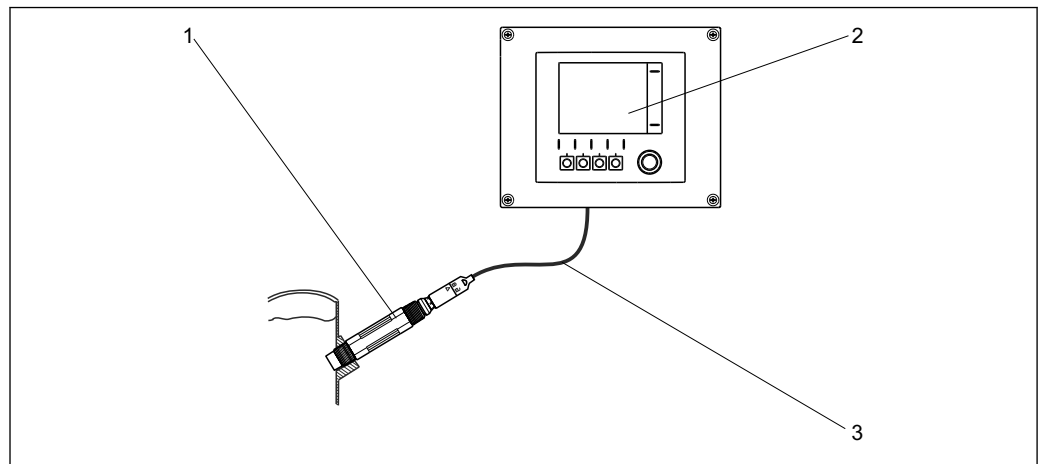
#### ORP measurement

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



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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

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### 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



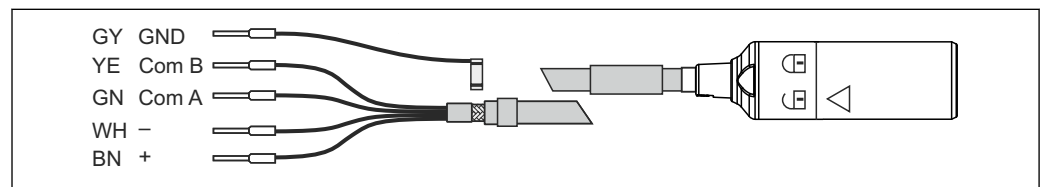
Please note the process operating conditions.

## Power supply

### Electrical connection

**CPF81D and CPF82D**

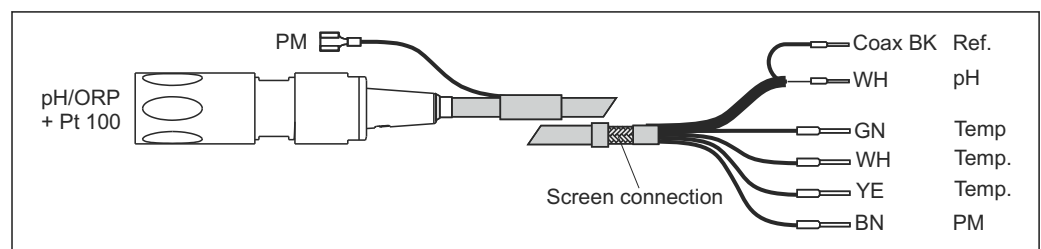
The electrical connection of the sensor to the transmitter takes place via special measuring cable CYK10 or CYK20.



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2 Measuring cable CYK10/CYK20

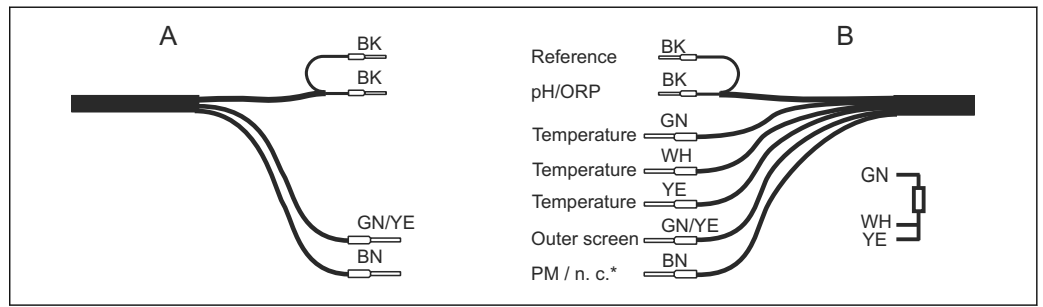
**CPF81 and CPF82 with TOP68 plug-in head**



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3 Measuring cable CPK9

CPF81 and CPF82 with fixed cable



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4 Fixed cable connection

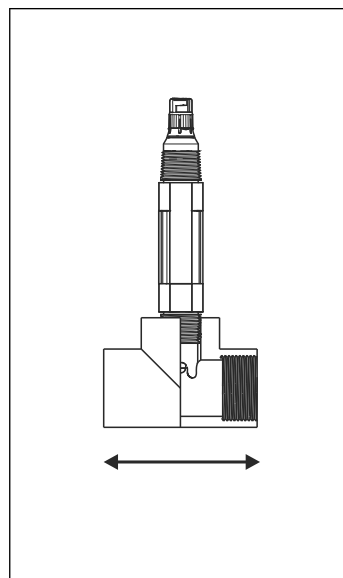
A Fixed cable CPF81 without temperature sensor and CPF82

B Fixed cable CPF81 with temperature sensor

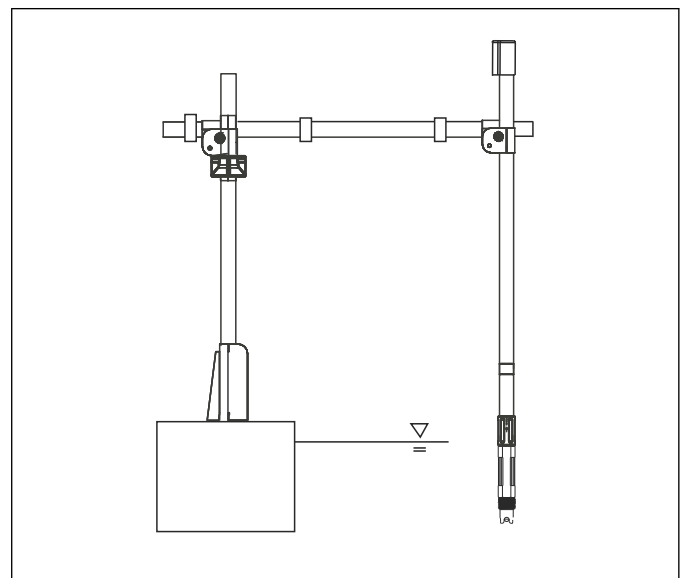
\* The PML is connected only in the case of sensor versions with an internal PML (CPF81-xxx2xx)

## Installation

### Installation instructions



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5 Flow installation

6 Immersion installation with Flexdip CYA112

**i** 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  $\pm 1.5$  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)

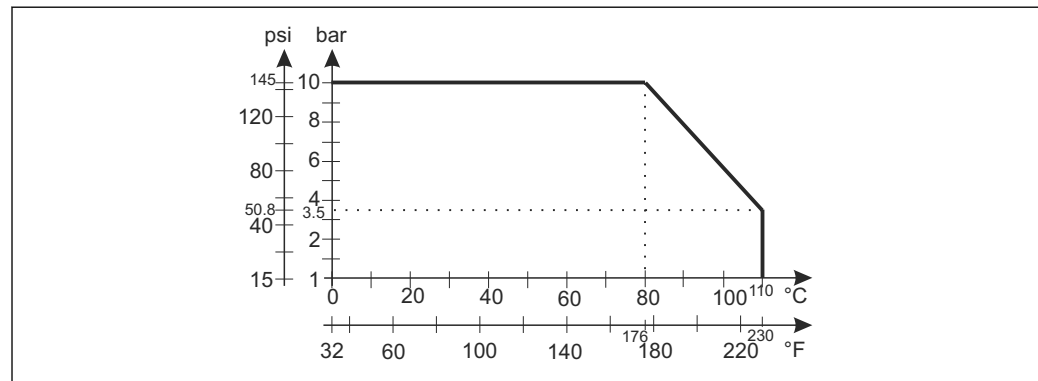
CPF82D, CPF82

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



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### Glass impedance

150 M $\Omega$  at 25 °C (77 °F)

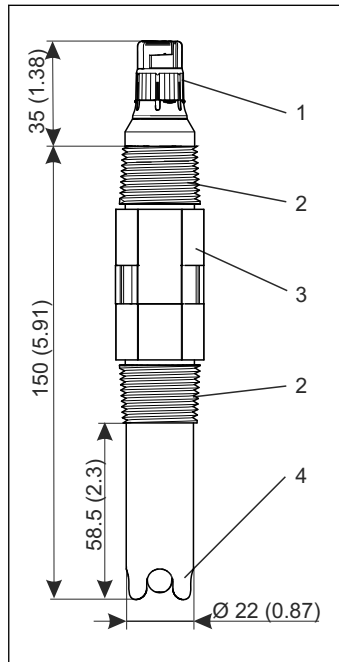
### Minimum conductivity

50  $\mu$ S/cm

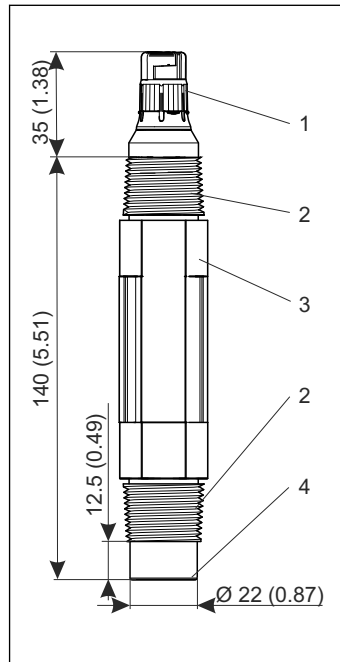
## Mechanical construction

Design, dimensions

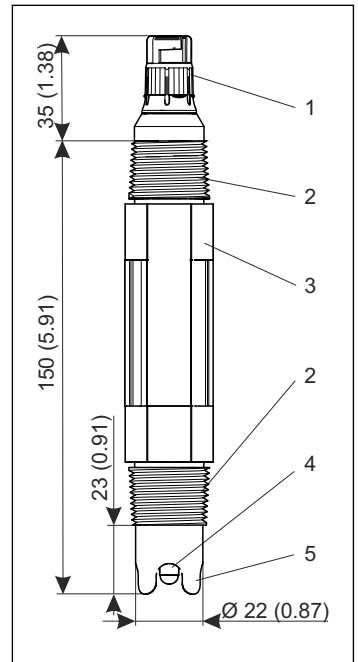
CPF81D, CPF82D



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7 CPF81D, long shaft, protection guard

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

8 CPF81D, flat membrane

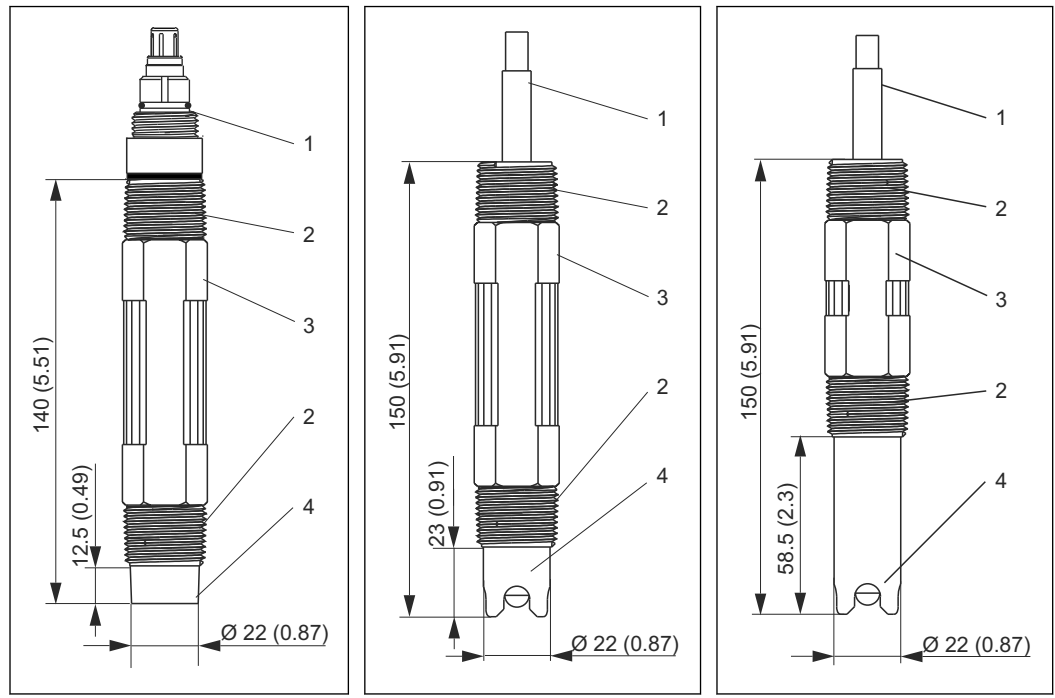
- 1 Memosens plug-in head
- 2 NPT 3/4" thread
- 3 Across flats AF 26
- 4 Flat membrane

9 CPF82D, short shaft, protection guard

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

12 Fixed-cable version, long shaft, protection guard

- 1 Fixed cable
- 2 NPT 3/4" 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 <sub>3</sub> and KCl/AgCl

**Process connection** NPT 3/4"

**Integrated preamplifier (optional)**

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

**i** 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

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### Product page

[www.endress.com/cpf81d](http://www.endress.com/cpf81d)  
[www.endress.com/cpf81](http://www.endress.com/cpf81)  
[www.endress.com/cpf82d](http://www.endress.com/cpf82d)  
[www.endress.com/cpf82](http://www.endress.com/cpf82)

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### 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

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## 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.

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### 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](http://www.endress.com/cya112)

 Technical Information TI00432C

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### Measuring cables


#### CYK10 Memosens data cable

- For digital sensors with Memosens technology
- Product Configurator on the product page: [www.endress.com/cyk10](http://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.

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### 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](http://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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[www.addresses.endress.com](http://www.addresses.endress.com)

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