

Technical Information

Orbipac CPF81D/CPF82D and CPF81/CPF82

pH/ORP sensors, with digital Memosens technology or analog

For mining operations, industrial water and wastewater treatment



Application

- Flotation
- Leaching
- Neutralization
- Outlet monitoring

Your benefits

- With patented KNO_3 electrolyte bridge for improved protection against electrode poisons such as S^{2-} or 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 in the 0 to 14 pH range and in the 0 to 110 °C (32 to 230 °F) temperature range
- Digital pH sensors with integrated temperature sensor, analog pH sensors with or without integrated temperature sensor
- Protection guard against damage

Other advantages provided by Memosens technology

- Maximum process safety
- Data security thanks to digital data transmission
- Very easy to use as sensor data are saved in the sensor
- Predictive maintenance can be performed by recording sensor load data 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 medium. The membrane glass of the electrode delivers an electrochemical potential that depends on the pH value of the medium. This potential is generated by the selective accumulation of H^+ ions on the outer layer of the membrane. As a result, an electrochemical boundary layer with an electrical potential difference forms at this point. An integrated Ag/AgCl reference system serves as the required reference electrode.

The measured voltage is converted to the corresponding pH value using the Nernst equation.

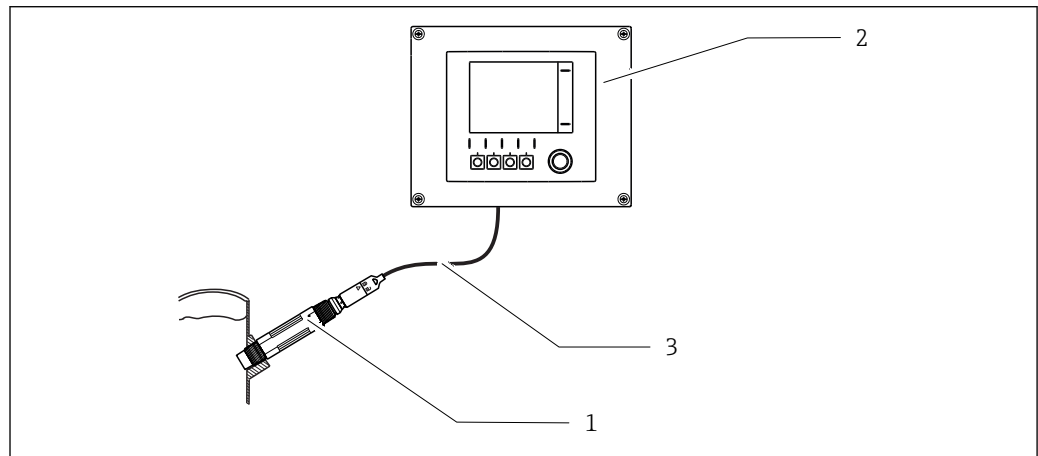
ORP measurement

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. 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 fixed cable



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1 Example of a measuring system

- 1 Sensor CPF81D
- 2 Transmitter Liquiline CM44x
- 3 Measuring cable CYK10

Communication and data transmission

Communication with the transmitter

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

Digital sensors can store measuring system data in the sensor. These include the following:

- 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)

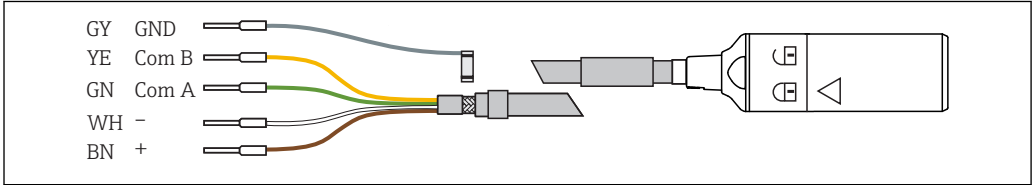
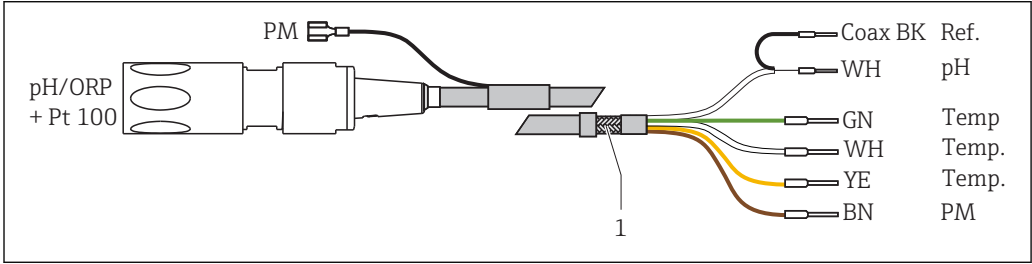
Reliability

Dependability	Easy handling Sensors with Memosens technology have integrated electronics that store calibration data and other information (e.g. total hours of operation or 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. ■ Thanks to the availability of the sensor data, maintenance intervals can be accurately defined and predictive maintenance is possible. ■ The sensor history can be documented on external data carriers and in evaluation programs. ■ 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 via 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 values cannot be distorted by moisture ■ 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.

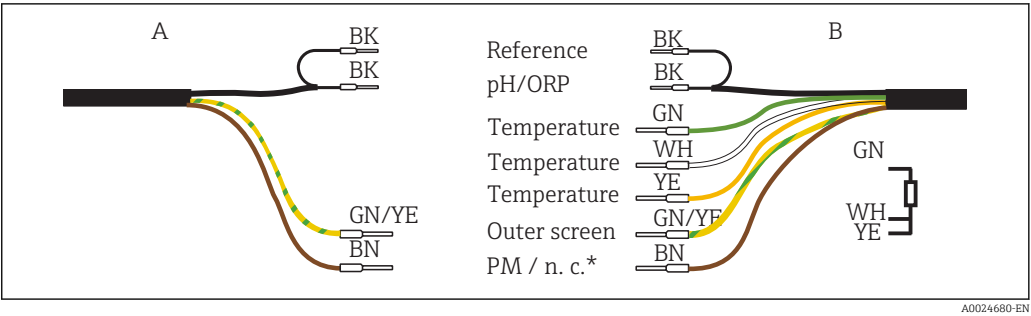
Input

Measured values	CPF81D and CPF81 pH value Temperature CPF82D and CPF82 ORP
Measuring range	CPF81D and CPF81 Version LH ▪ pH: 0 to 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 176 °F) CPF82D, CPF82 -1500 mV to +1500 mV  Pay attention to the operating conditions in the process.

Power supply

Electrical connection	CPF81D and CPF82D The electrical connection to the transmitter is established using measuring cable CYK10.   2 <i>Measuring cable CYK10</i> CPF81 and CPF82 with TOP68 plug-in head   3 <i>Measuring cable CPK9</i> 1 <i>Shield connection</i>
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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)

Performance characteristics

Resistance

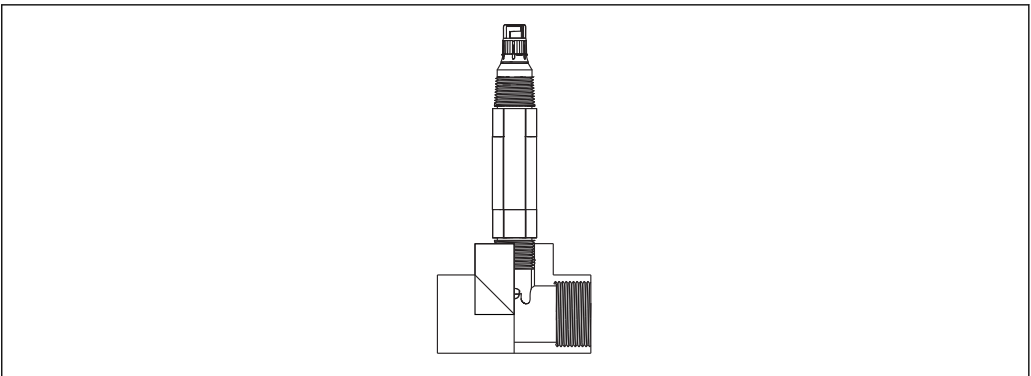
Glass impedance

150 MΩ at 25 °C (77 °F)

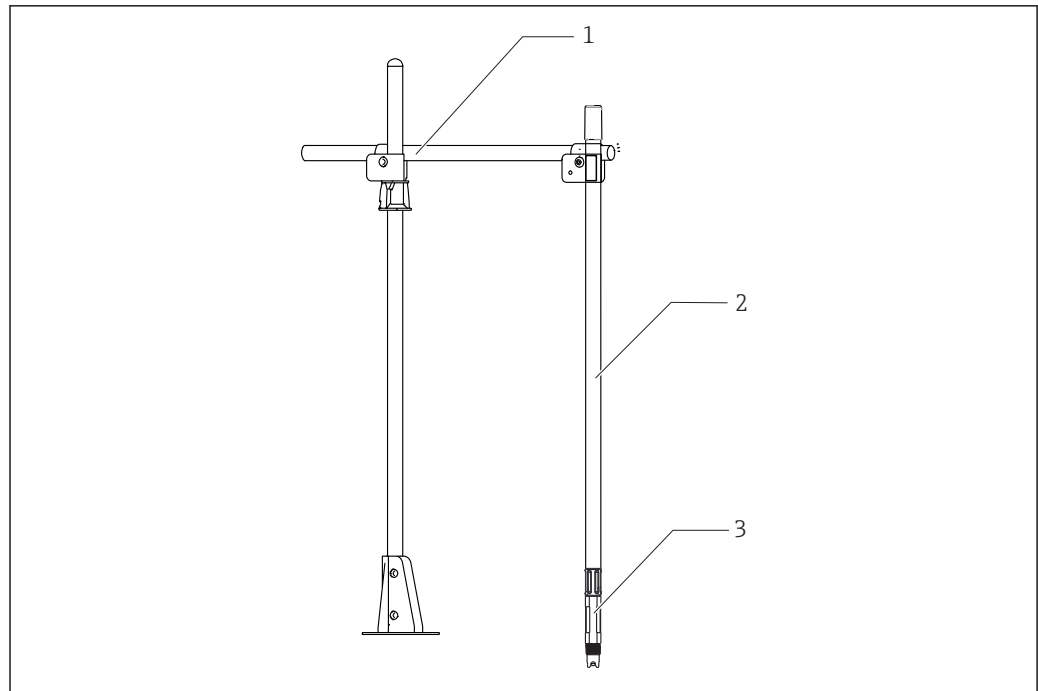
Installation

Installation instructions

- Before screwing in the sensor, make sure the assembly thread, the O-rings and the sealing surface are clean and undamaged and that the thread runs smoothly.
- Pay attention to the installation instructions provided in the Operating Instructions of the assembly used.
- Screw in the sensor and tighten by hand with a torque of 3 Nm (2.21 lbf ft) (specifications only apply if installing in Endress+Hauser assemblies).



5 Flow installation



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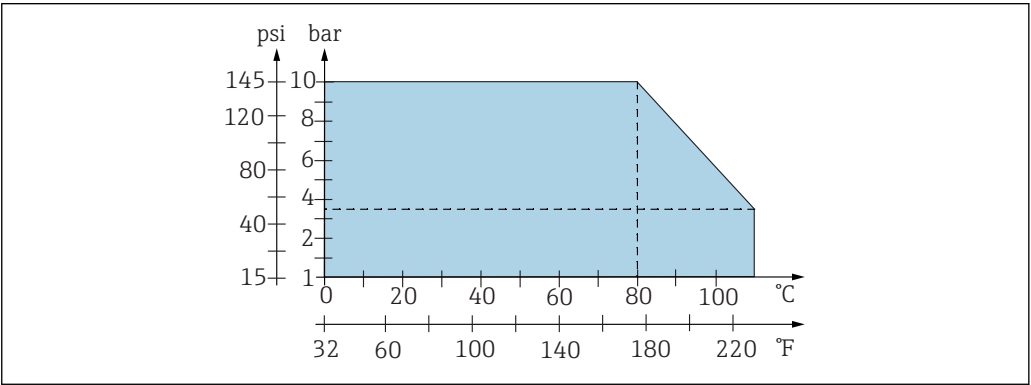
6 Installation with immersion assembly with Flexdip CYA112

- 1 CYH112 holder
- 2 CYA112 assembly
- 3 Sensor

Environment

Ambient temperature range	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 122 °F)
Degree of protection	CPF81D and CPF82D IP 68 (10 m (33 ft) head of water at 25 °C (77 °F) over 45 days, 1 mol/l KCl)
	CPF81 and CPF82 with TOP68 plug-in head IP 68 (1 m (3.3 ft) water column, 50 °C (122 °F), 168 h)
	CPF81 and CPF82 with fixed cable IP67
Electromagnetic compatibility (EMC)	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 range	CPF81D, CPF81 ■ Version LH: 0 to 110 °C (32 to 230 °F) ■ Version NN: 0 to 80 °C (32 to 176 °F) CPF82D, CPF82 0 to 80 °C (32 to 176 °F)
Process pressure range	1 to 10 bar absolute, at 80 °C (15 to 145 psi absolute, at 176 °F)
Pressure-temperature ratings	 A0024703 7 Pressure-temperature ratings
Conductivity	Minimum conductivity 50 μ S/cm

Mechanical construction

Design, dimensions

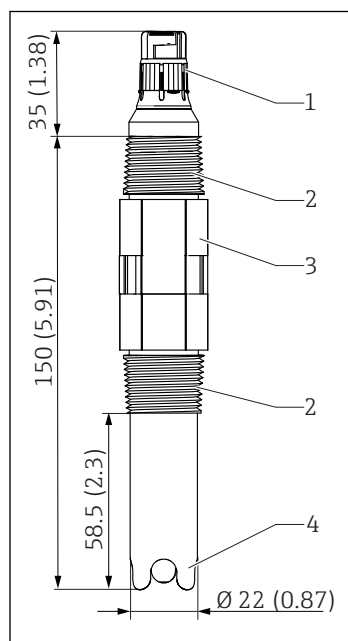
Integrated preamplifier (optional)

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.

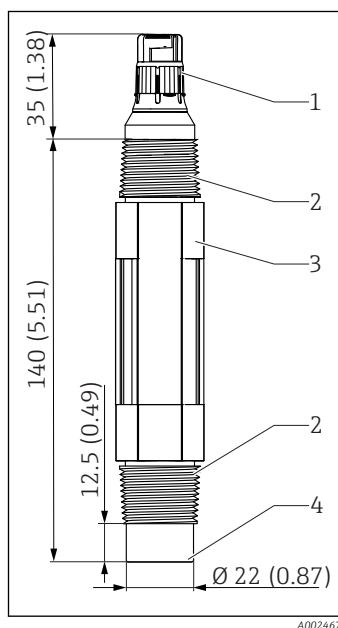
Dimensions

CPF81D, CPF82D



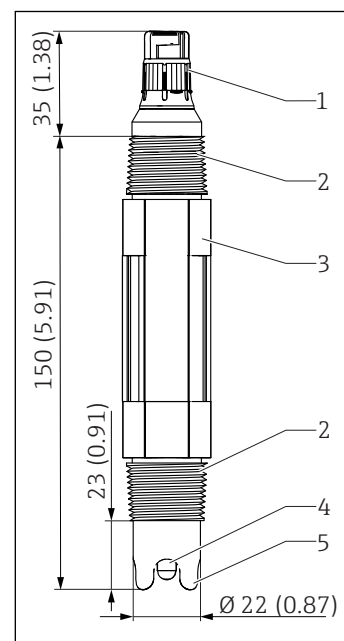
8 CPF81D with long shaft.
Dimensions: mm (in)

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



9 CPF81D with flat membrane.
Dimensions: mm (in)

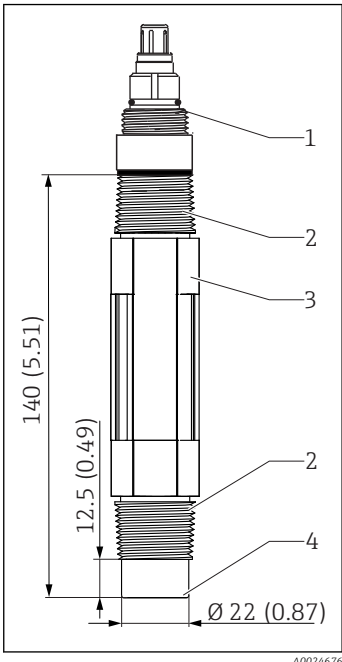
- 1 Memosens plug-in head
- 2 NPT 3/4" thread
- 3 Across flats AF 26
- 4 Flat membrane



10 CPF82D with short shaft.
Dimensions: mm (in)

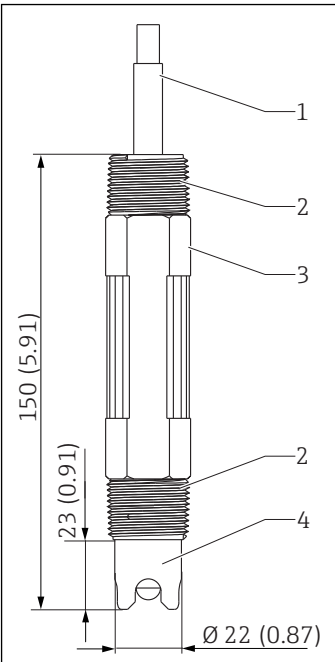
- 1 Memosens plug-in head
- 2 NPT 3/4" thread
- 3 Across flats AF 26
- 4 Platinum ring
- 5 Protection guard

CPF81, CPF82



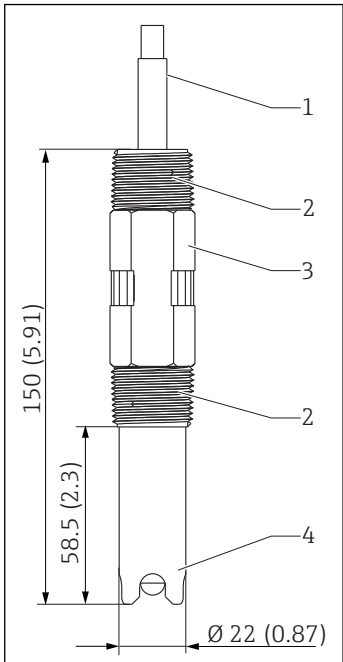
11 CPF81 with TOP68 plug-in head and short shaft. Dimensions: mm (in)

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



12 CPF82 fixed cable version and short shaft. Dimensions: mm (in)

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



13 CPF82 fixed cable version and long shaft. Dimensions: mm (in)

- 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 lb), depending on the version and excluding a cable	
Materials	Housing, sensor shaft	PPS
	pH sensor (in contact with medium)	Lead-free membrane glass, suitable for process applications
	ORP sensor (in contact with medium)	Platinum
	Double chamber reference system	KNO ₃ and KCl/AgCl
Process connections	NPT 3/4"	

Certificates and approvals

Ex approval	FM IS NI Cl. I Div.1&2, Groups A-D
	CSA C/US IS CL. I. Div 1&2, Group A-D T4/T6
EAC	The product has been certified according to guidelines TP TC 004/2011 and TP TC 020/2011 which apply in the European Economic Area (EEA). The EAC conformity mark is affixed to the product.
Marine approvals	A selection of the devices and sensors have type approval for marine applications, issued by the following classification societies: ABS (American Bureau of Shipping), BV (Bureau Veritas), DNV-GL (Det Norske Veritas-Germanischer Lloyd) and LR (Lloyd's Register). Details of the order codes of the approved devices and sensors, and the installation and ambient conditions, are provided in the relevant certificates for marine applications on the product page on the Internet.

Ordering information

Product page	www.endress.com/cpf81d www.endress.com/cpf81 www.endress.com/cpf82d www.endress.com/cpf82
Product Configurator	On the product page there is a Configure button to the right of the product image. 1. Click this button. ↳ 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 on the right above the selection window.  For many products you also have the option of downloading CAD or 2D drawings of the selected product version. Click the CAD tab for this and select the desired file type using picklists.
Scope of delivery	The delivery comprises: ■ Sensor in the version ordered ■ Operating Instructions

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 Center.

Assembly	Flexdip CYA112 ■ Immersion assembly for water and wastewater ■ Modular assembly system for sensors in open basins, channels and tanks ■ Material: PVC or stainless steel ■ Product Configurator on the product page: www.endress.com/cya112  Technical Information TI00432C
Measuring cables	Memosens data cable CYK10 ■ For digital sensors with Memosens technology ■ Product Configurator on the product page: www.endress.com/cyk10  Technical Information TI00118C Measuring cable CPK9 ■ Terminated measuring cable for connecting analog sensors with TOP68 plug-in head ■ Selection in accordance with product structure ■ Ordering information: Endress+Hauser sales office or www.endress.com.
Buffer solutions	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) or to standard reference material of NIST (National Institute of Standards and Technology) according to DIN 19266 by a laboratory accredited by the DAkkS (German accreditation body) according to DIN 17025. Product Configurator on the product page: www.endress.com/cpy20 ORP buffer solution CPY3 ■ 220 mV, pH 7, 250 ml (8.5 fl oz) ■ 468 mV, pH 0.1, 250 ml (8.5 fl oz)

Product Configurator on the product page: www.endress.com/cpy3

www.addresses.endress.com
