Technical Information
Orbisint CPS11

pH sensor for standard applications in process technology and environmental engineering

Analog sensor

Application

- Long-term monitoring and limit control in processes with stable process conditions
  - Chemical industry: strong acids/bases, plastic, pulp and paper industry
  - Power plants (e.g. flue gas cleaning), oil and gas
  - Incinerator plants
- Water and wastewater treatment
  - Boiler feedwater and cooling water
  - Well water and drinking water
  - All industrial and municipal treatment plants

Your benefits

- Low-maintenance and robust thanks to large, dirt-repellent PTFE ring junction
- Can be used at pressures up to 17 bar (246.5 psi) (absolute)
- Process glass for standard applications (AA version)
- Process glass also for very alkaline applications (BA and BT versions)
- Process glass for applications in media containing hydrofluoric acid (FA version)
- Optional: For media with low conductivity (AS version)
- Optional: Poison-resistant reference with ion trap
- Various optional approvals for use in non-hazardous areas

Endress+Hauser

People for Process Automation

Function and system design
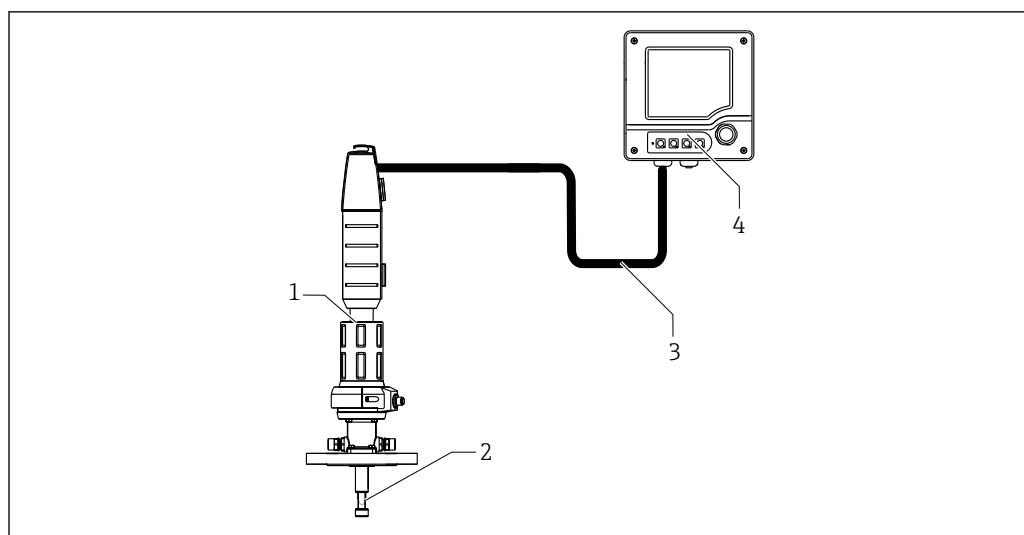
Measuring principle

pH measurement
The pH value is used as a unit of measurement for the acidity or alkalinity of a medium. The membrane glass of the sensor supplies an electrochemical potential depending 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.

Measuring system

A complete measuring system consists of the following components at least:
- pH sensor CPS11
- Transmitter, e.g., Liquiline CM42B, Liquisys M CPM2x3
- Measuring cable CPK9 or CPK1 for analog sensors
- Assembly
  - Immersion assembly, e.g. Dipfit CPA111
  - Flow assembly, e.g. Flowfit CPA25
  - Retractable assembly, e.g. Cleanfit CPA871
  - Permanent installation assembly, e.g. Unifit CPA842

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▣ *1   Example of a measuring system for pH measurement*

1   Cleanfit CPA871 retractable assembly
2   CPS11 pH sensor
3   Measuring cable CPK9
4   Liquiline M CM42 two-wire transmitter for hazardous areas

Input

Measured variables

pH value

Temperature

Measuring range

AA and AS versions
- pH: 1 to 12
- Temperature: −15 to 80 ℃ (5 to 176 ℉)

BA version
- pH: 0 to 14
- Temperature: 0 to 135 ℃ (32 to 275 ℉)

FA version
- pH: 0 to 10
- Temperature: 0 to 70 °C (30 to 158 °F)

BT version with ion trap
- pH: 0 to 14
- Temperature: 0 to 135 °C (32 to 275 °F)

AT version with ion trap
- pH: 0 to 12
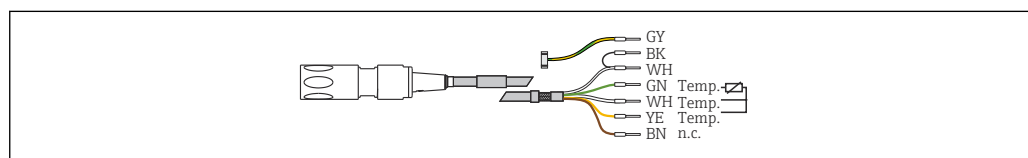- Temperature: –15 to 80 °C (5 to 176 °F)

ℹ️ Pay attention to the operating conditions in the process.
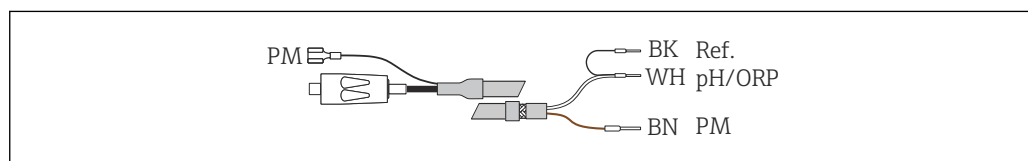
Power supply

Electrical connection

Sensors with TOP68 plug-in head

GY
BK
WH
GN Temp.
WH Temp.
YE Temp.
BN n.c.

A0028048

🖼 *2   Measuring cable CPK9*

Sensors with GSA plug-in head

PM

BK Ref.
WH pH/ORP
BN PM

A0028051

🖼 *3   Measuring cable CPK1*

▸ Please follow the connection instructions contained in the Operating Instructions for the transmitter.

Plug-in head

- ESA: Threaded plug-in head Pg 13.5, TOP68 for electrodes with and without a temperature sensor, 17 bar (246 psi)(abs.) overpressure protection (threefold), Ex
- GSA: Threaded plug-in head Pg 13.5 for electrodes without a temperature sensor

Performance characteristics

Reference system

- AA, BA, FA versions: Ag/AgCl lead with advanced gel 3M KCl, AgCl-free
- AT, BT versions: Ag/AgCl lead with ion trap and advanced gel 3M KCl
- AS version: Ag/AgCl lead with advanced gel, saturated KCl (> 3M KCl) with salt rings, AgCl-free

ℹ️ The following are indicative of used salt rings (fixed supply of KCl) under constant process conditions (e.g. stable temperature and flow):
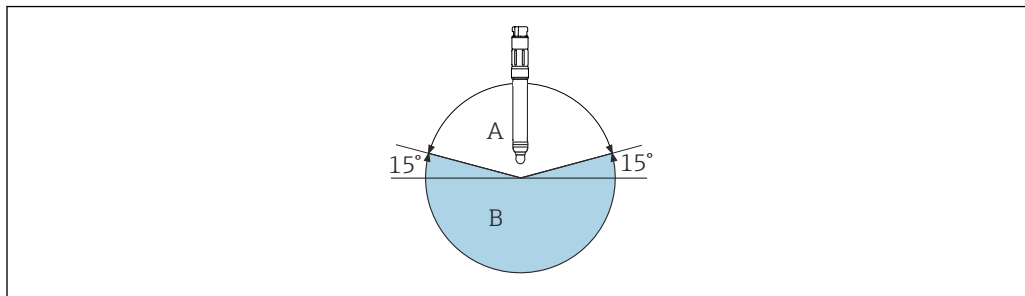- a continuous upward trend in the pH value (to alkaline pH values)
- a continuous downward trend in the zero point (to acidic pH values) following adjustment during calibration

Installation

Orientation

- Do not install the sensors upside-down.
- The installation angle from the horizontal must be at least 15°.

An installation angle <15° is not permitted, as otherwise an air bubble will form. Contact between the membrane glass and the reference lead will then no longer be guaranteed.

🖼 4 *Installation angle at least 15° from the horizontal*

A Permitted orientation
B Forbidden orientation

Installation instructions

📖 Follow the Operating Instructions for the assembly used for detailed information on installing the assembly.

1. 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.

2. Hand-tighten the sensor with a torque of 3 Nm (2.21 lbf ft) (Only applies when installing in Endress+Hauser assemblies).

Environment

Ambient temperature range

NOTICE

Risk of damage from frost!
▶ Do not use the sensor at temperatures below −15 ℃ (5 ℉) .

Storage temperature

0 to 50 ℃ (32 to 122 ℉)

Degree of protection

- IP 68: TOP68 plug-in head, autoclavable up to 135 ℃ (275 ℉), 1 m (3.3 ft) water column, 50 ℃ (122 ℉), 168 h
- IP 67: GSA plug-in head (with closed connector system)

Process

Process temperature range

AA, AS versions. AT:	−15 to 80 ℃ (5 to 176 ℉)
BA, BT versions:	0 to 135 ℃ (32 to 275 ℉)
FA version:	0 to 70 ℃ (32 to 158 ℉)

Process pressure range

⚠ CAUTION

Pressurization of sensor due to prolonged use under increased process pressure
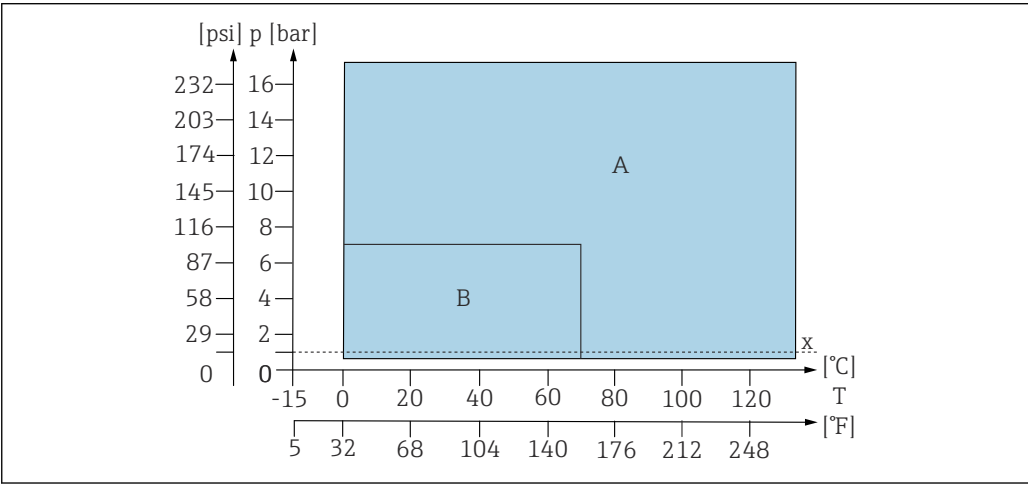Possibility of sudden rupture and injury from glass splinters!
▶ Avoid fast heating of these pressurized sensors if they are used under reduced process pressure or under atmospheric pressure.
▶ When handling these sensors, always wear protective goggles and appropriate protective gloves.

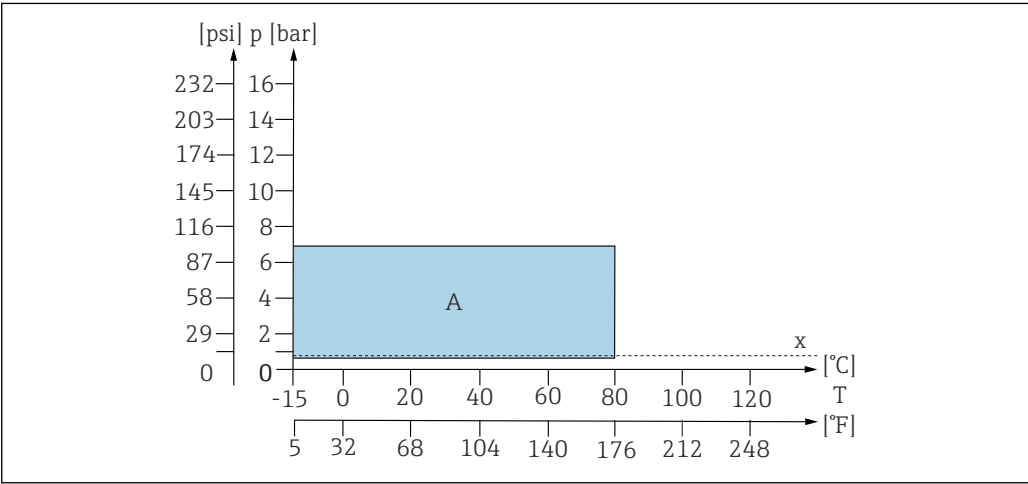|	AA, AS, AT, FA versions:	1 to 7 bar (14.5 to 101.5 psi) (absolute)
	BA, BT versions:	1 to 17 bar (14.5 to 246.5 psi) (absolute)

Conductivity	AA, AT, BA, BT, FA versions:	50 µS/cm minimum (minimized flow; pressure and temperature must be stable)
	AS version:	0.1 µS/cm minimum (stainless steel flow assembly with grounding; stable and minimized flow; pressure and temperature must be stable)

Pressure/temperature ratings

🖼 5   *Pressure/temperature diagram*

A   BA, BT versions
B   FA version
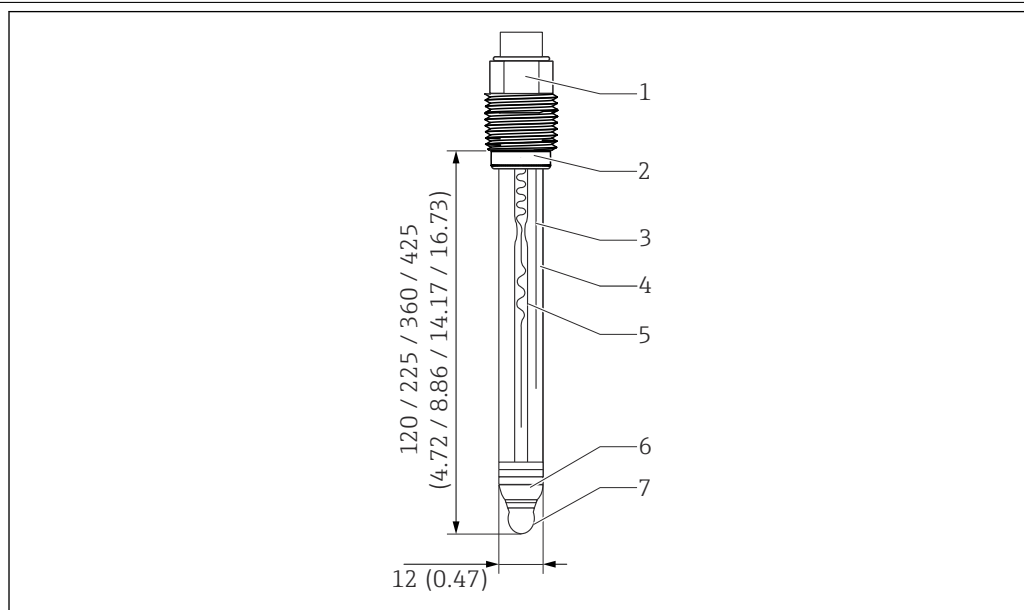*x   Atmospheric pressure*

🖼 6   *Pressure/temperature diagram*

A   AA, AS, AT versions
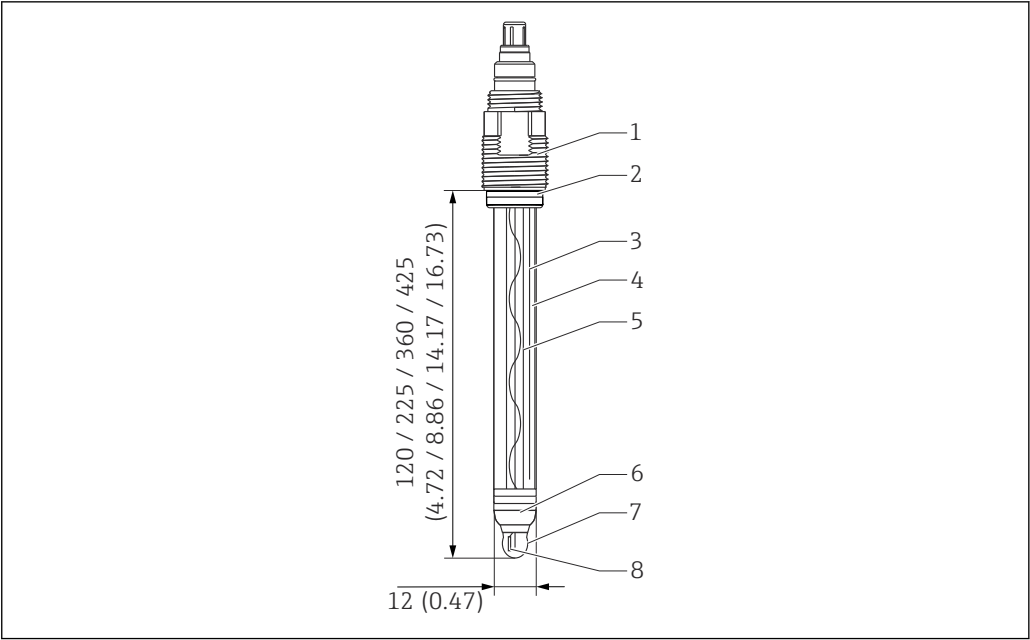*x   Atmospheric pressure*

Mechanical construction

Design, dimensions

7   CPS11 with GSA plug-in head

1   GSA plug-in head, Pg 13.5
2   Viton O-ring with thrust collar
3   Ag/AgCl lead - reference
4   "Advanced gel" electrolyte
5   Ag/AgCl lead - pH
6   PTFE junction
7   pH glass membrane

8   CPS11 with TOP68 plug-in head, temperature sensor

1   TOP68 plug-in head, Pg 13.5
2   Viton O-ring with thrust collar
3   Ag/AgCl reference lead - reference
4   "Advanced gel" electrolyte
5   Ag/AgCl reference lead - pH
6   PTFE junction
7   pH glass membrane
8   Temperature sensor Pt100

Weight	0.1 kg (0.2 lbs)

Materials	Sensor shaft:	Glass to suit process
	pH membrane glass:	Type A, B, F
	Metal lead:	Ag/AgCl
	Open aperture:	Ring-shaped PTFE junction, sterilizable, not cytotoxic

Temperature sensor	Pt100, Pt1000

Process connections	Pg 13.5

Certificates and approvals

Current certificates and approvals for the product are available at www.endress.com on the relevant product page:

1. Select the product using the filters and search field.

2. Open the product page.

3. Select **Downloads**.

Ex approval	**TOP68** • ATEX II 1G Ex ia IIC T3/T4/T6 Ga • UKCA Ex II 1G Ex ia IIC T3/T4/T6 Ga • FM Class I Div. 2, in conjunction with the Liquiline M CM42 and Mycom S CPM153 transmitters • CSA Class I Div. 1, in conjunction with the Liquiline M CM42 and Mycom S CPM153 transmitters

Additional certification	**EAC** The product has been certified according to Directive TP TC 020/2011 applicable in the Eurasian Economic Union (EAEU). The EAC conformity mark has been affixed to the product.

Ordering information

Product page	www.endress.com/cps11

Product Configurator	1. **Configure**: Click this button on the product page.
	
	2. Select **Extended selection**.
	   ↳ The Configurator opens in a separate window.
	
	3. Configure the device according to your requirements by selecting the desired option for each feature.
	   ↳ In this way, you receive a valid and complete order code for the device.
	
	4. **Accept**: Add the configured product to the shopping cart.
	
	For many products, you also have the option of downloading CAD or 2D drawings of the selected product version.
	
	5. **CAD**: Open this tab.
	   ↳ The drawing window is displayed. You have a choice between different views. You can download these in selectable formats.

Scope of delivery	The scope of delivery comprises: • Ordered version of the sensor • Operating Instructions • Safety instructions for the hazardous area (for sensors with Ex approval) • Supplementary sheet for optionally ordered certificates

Accessories

The following are the most important accessories available at the time this documentation was issued.

Listed accessories are technically compatible with the product in the instructions.

1. Application-specific restrictions of the product combination are possible.

   Ensure conformity of the measuring point to the application. This is the responsibility of the operator of the measuring point.

2. Pay attention to the information in the instructions for all products, particularly the technical data.

3. For accessories not listed here, please contact your Service or Sales Center.

Assemblies	**Unifit CPA842** • Installation assembly for food, biotechnology and pharmaceutics • With EHEDG and 3A certificate • Product Configurator on the product page: www.endress.com/cpa842 📖 Technical Information TI01367C **Cleanfit CPA875** • Retractable process assembly for sterile and hygienic applications • For in-line measurement with standard sensors with 12 mm diameter, e.g. for pH, ORP, oxygen • Product Configurator on the product page: www.endress.com/cpa875 📖 Technical Information TI01168C

Dipfit CPA140
- pH/ORP immersion assembly with flange connection for very demanding processes
- Product Configurator on the product page: www.endress.com/cpa140

📖 Technical Information TI00178C

Cleanfit CPA871
- Flexible process retractable assembly for water, wastewater and the chemical industry
- For applications with standard sensors with 12 mm diameter
- Product Configurator on the product page: www.endress.com/cpa871

📖 Technical Information TI01191C

Cleanfit CPA473
- Stainless steel process retractable assembly with ball valve shutoff for particularly reliable separation of the medium from the environment
- Product Configurator on the product page: www.endress.com/cpa473

📖 Technical Information TI00344C

Cleanfit CPA474
- Plastic process retractable assembly with ball valve shutoff for particularly reliable separation of the medium from the environment
- Product Configurator on the product page: www.endress.com/cpa474

📖 Technical Information TI00345C

Dipfit CPA111
- Immersion and installation assembly made of plastic for open and closed vessels
- Product Configurator on the product page: www.endress.com/cpa111

📖 Technical Information TI00112C

Flowfit CPA240
- pH/ORP flow assembly for processes with stringent requirements
- Product Configurator on the product page: www.endress.com/cpa240

📖 Technical Information TI00179C

Flowfit CPA25
- Flow assembly for pH/ORP measurement
- Product Configurator on the product page: www.endress.com/cpa25

📖 Technical Information TI01710C

Ecofit CPA640
- Set comprising adapter for 120 mm pH/ORP sensors and sensor cable with TOP68 coupling
- Product Configurator on the product page: www.endress.com/cpa640

📖 Technical Information TI00246C

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

Buffer solutions	**High-quality buffer solutions from Endress+Hauser - CPY20** High-quality CPY20 pH buffers ensure maximum precision in pH calibrations. Available in pH 2.0, pH 4.0, pH 7.0, pH 9.0, pH 9.2, pH 10.0 and pH 12.0. They only contain FDA-listed preservatives. Further details and Product Configurator on the product page: www.endress.com/cpy20

Measuring cable	**Measuring cable CPK9**
	• Terminated measuring cable for connecting analog sensors with TOP68 plug-in head
	• Selection in accordance with product structure
	• Product Configurator on the product page: www.endress.com/cpk9

     📖 Technical Information TI00118C

CPK1
• For pH/ORP sensors with GSA plug-in head
• Product Configurator on the product page: www.endress.com/cpk1

     ℹ️ For ordering information, contact your sales office or see www.endress.com.

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