

Technical Information

Ceramax CPS341D

pH sensor for use in the pharmaceutical industry and food production

Digital with Memosens technology

Application

- Food production, including highly viscous media
- Beverage production and filling
- Quality control
- Pharmaceutical industry:
 - Water treatment
 - Active ingredient production
 - Active ingredient preparation
 - Fermentation
 - Biotechnology

Your benefits

- Continuous online measurement possible when process is running
- Direct installation in vessel nozzles or piping
- Self-cleaning by the flowing medium
- Long-term stability over many years
- High mechanical loading capacity due to steel substrate
- Extremely corrosion-resistant to acids
- Hygienic design: in-line CIP and SIP cleaning
- Available with hygienic reference electrolyte in CPS341Z

Other advantages of Memosens technology

- Maximum process safety
- Data security thanks to digital data transmission
- Very easy to use as sensor data saved in the sensor
- Recording of sensor load data in the sensor enables predictive maintenance



Function and system design

Measuring principle

pH measurement

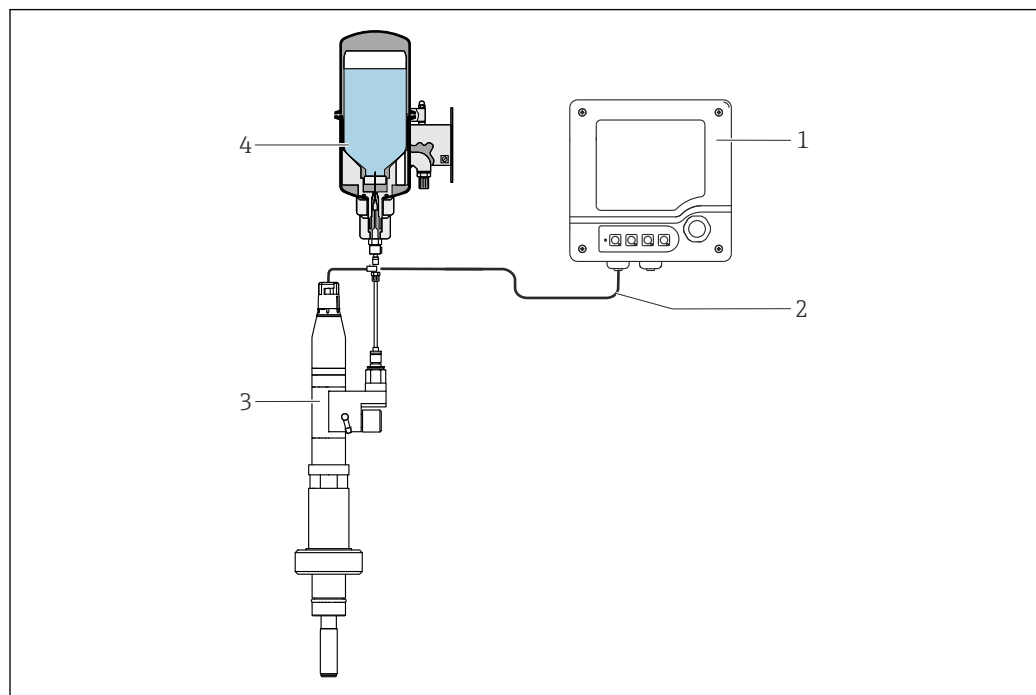
The pH value is used as a unit of measurement for the acidity or alkalinity of a medium. The enamel of the electrode delivers an electrochemical potential that depends on the pH value of the medium. This potential is generated by the selective accumulation of H^+ ions on the outer layer of the pH-sensitive enamel. 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 comprises at least:

- pH sensor CPS341D
- Electrolyte vessel CPS341Z
- Transmitter, e.g. Liquiline CM44x, CM42
- Memosens data cable CYK10 or CYK20



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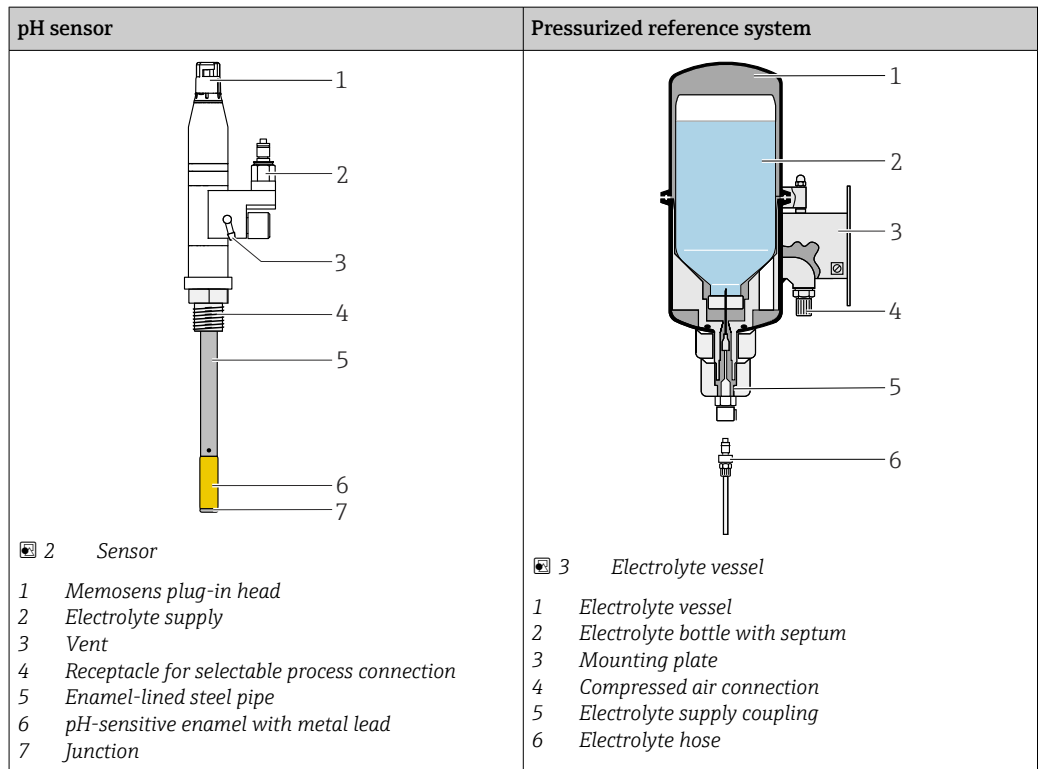
1 Measuring system

- 1 Transmitter CM42
- 2 Memosens data cable
- 3 pH sensor CPS341D
- 4 Electrolyte vessel CPS341Z - D1 + D5



The ultrasonic sensor D2 can be used to monitor the level of the electrolyte.

The measuring sensor is divided into the pH sensor with a process connection and the pressurized reference system with an electrolyte bottle and hose connections.



Communication and data processing

Digital sensors are able to store the following system data in the sensor:

- Manufacturer 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 to perform the last calibration
- Application data
 - Temperature application range
 - pH application range
 - Date of first commissioning
 - Maximum temperature value
 - Hours of operation at temperatures over 80 °C (176 °F)/100 °C (212 °F)
 - Operating hours at very low and very high pH values (Nernst voltage below -300 mV, above +300 mV)
 - Number of sterilizations
 - Resistance of glass membrane

The data shown above can be displayed with the Liquisys CPM223, Liquiline M CM42 and Liquiline CM44x transmitters.

Dependability

Maintainability

Easy handling

Sensors with Memosens technology have integrated electronics that store calibration data and other information (e.g. total operating hours 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.
- The availability of sensor data means that maintenance intervals can be accurately defined and predictive maintenance is possible.
- The sensor history can be documented with external storage media and evaluation programs.
- The application range of the sensor can be determined based on its previous history.

Integrity

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:

- If the sensor fails or there is an interruption in the connection between the sensor and transmitter, this is reliably detected and reported.
- The availability of the measuring point is reliably detected and reported.

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.

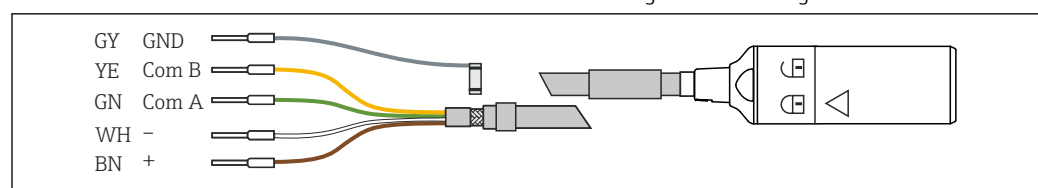
Input

Measured variable	pH value Temperature
Measuring range	0 to 10 pH (linear range) -2 to 14 pH (application) 0 to 140 °C (32 to 280 °F)

Power supply

Electrical connection Connecting the sensor

The electrical connection to the transmitter is established using the measuring cable CYK10.



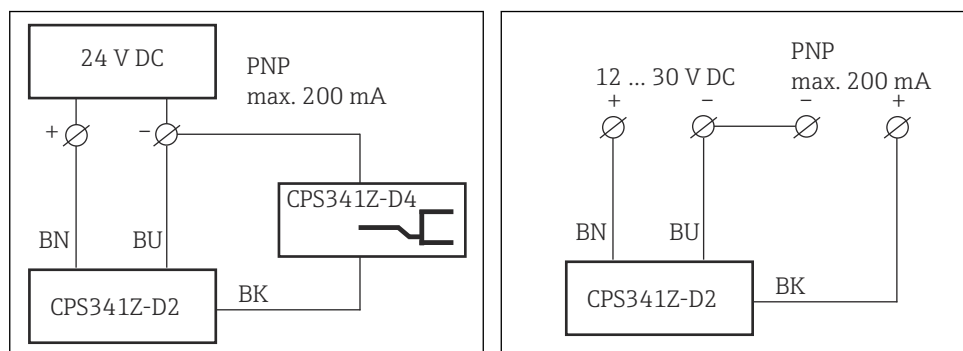
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4 Measuring cable CYK10

NOTICE

If the sensor is immersed in the medium and the transmitter is disconnected from the power supply, polarization can cause an irreversible zero point shift.

- ▶ Perform a calibration.
- ▶ Regenerate the sensor, e.g. in 3 M KCl for 24 hours.
- ▶ Leave the transmitter switched on while the sensor is immersed in the medium. The sensor can become damaged if it immersed in the medium without electricity.
- ▶ When performing maintenance work when the sensor is connected, remove the sensor from the medium and dry it before disconnecting the transmitter from the power supply.
- ▶ Avoid any kind of conductive connection between the reference and the pH-sensitive enamel when the device is switched off.
- ▶ If the sensor has been removed from the medium: to protect the junction, it is essential to use the KCl protective cap specially designed for CPS341D and the red sealing cap on the electrolyte connection.

Connecting optional ultrasonic sensor level monitoring

5 Connection to the customer power supply with a relay

6 Connection to the customer power supply with a PLC

1. Connect the connecting cable to an on-site power supply (→ 5, → 6).
2. Connect the M12 connector to the M12 coupling of the bubble sensor (if you have not already done so during installation).

Light emitting diodes in the cable connector indicate the status in the electrolyte supply system:

- Green = supply voltage on
- Green + yellow = air bubble in the electrolyte hose or electrolyte vessel is empty

Performance characteristics

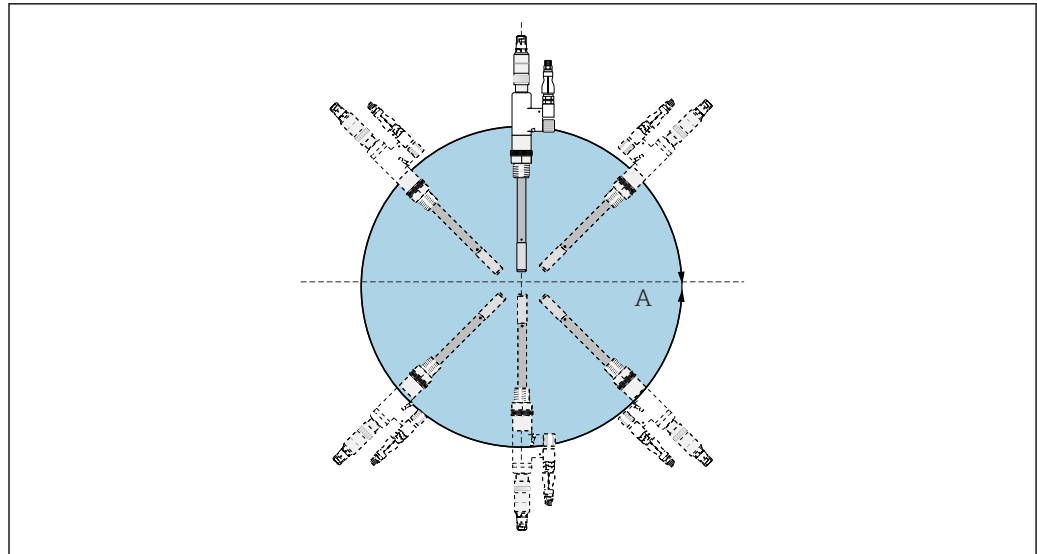
Reference system

Ag/AgCl with 3 M KCl and inhibitor (1 ml/l colloidal silica)

Mounting

Orientation

- ▶ Install the sensor at any angle.



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7 Orientation

A Any installation angle 0 to 360 °

Environment

Ambient temperature range

NOTICE

Risk of damage from frost!

► Do not use the sensor at temperatures below 0 °C (32 °F).

Storage temperature

0 to 50 °C (32 to 122 °F)

Degree of protection

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

Electromagnetic compatibility (EMC)

Interference emission and interference immunity as per EN 61326: 2012

Process

Process temperature range

0 to 140 °C (32 to 284 °F)

Process pressure range

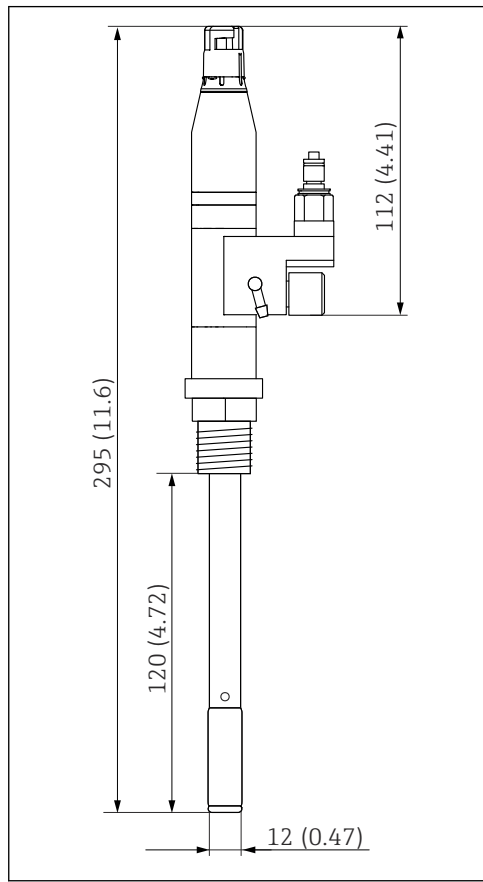
0.8 to 7 bar (11.6 to 101.5 psi) (absolute)

Conductivity

Min. 50 µS/cm

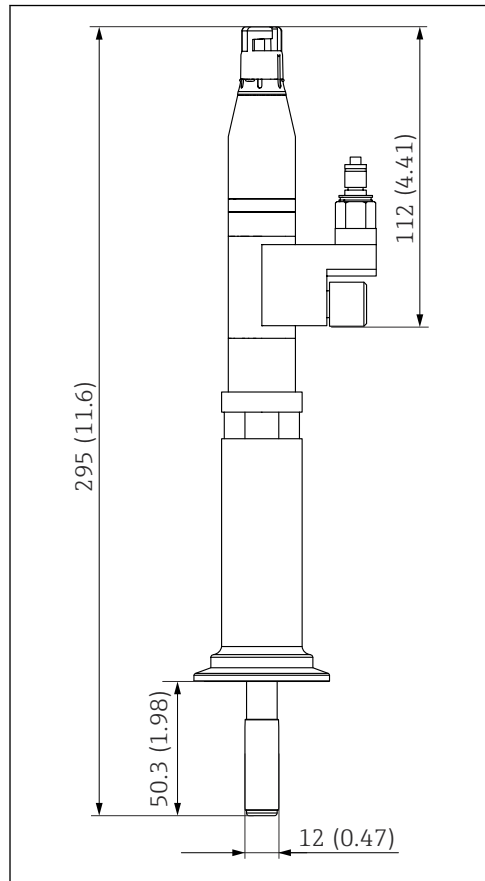
Mechanical construction

Dimensions



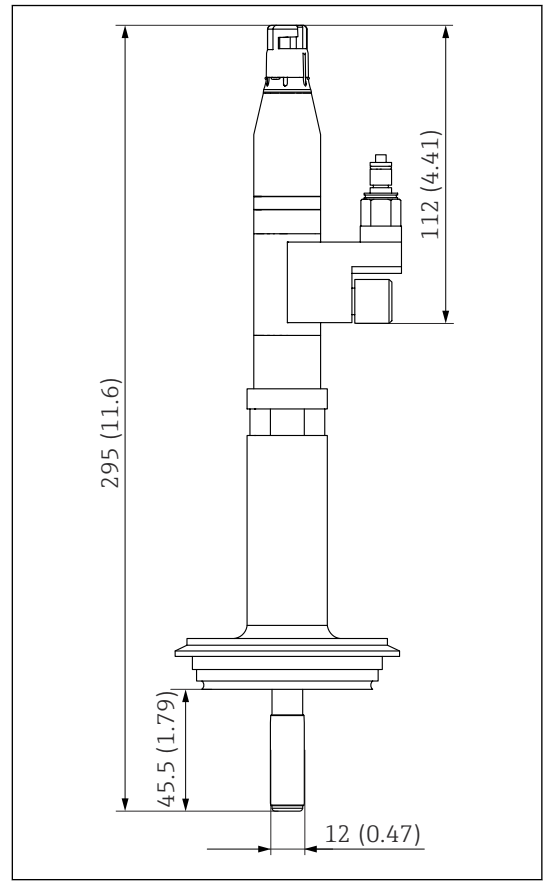
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- 8 Sensor without process connection, dimensions: mm (in)



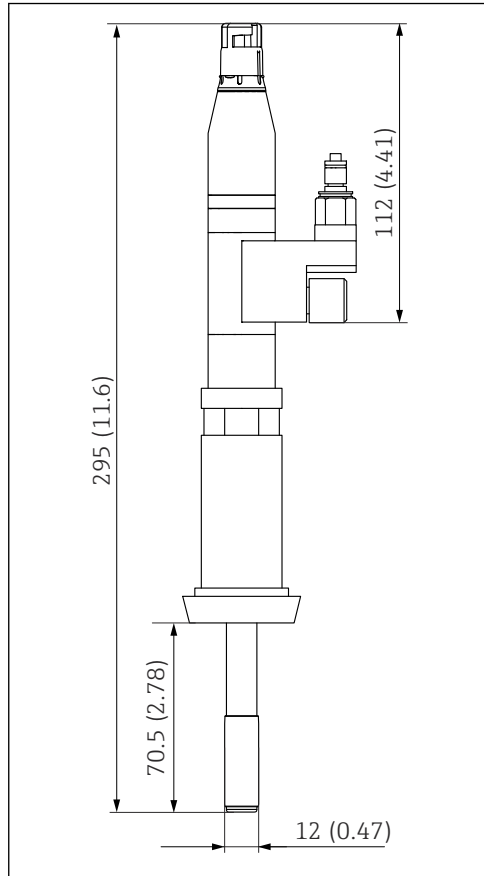
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9 Sensor with process connection Tri-Clamp DN50, dimensions: mm (in)

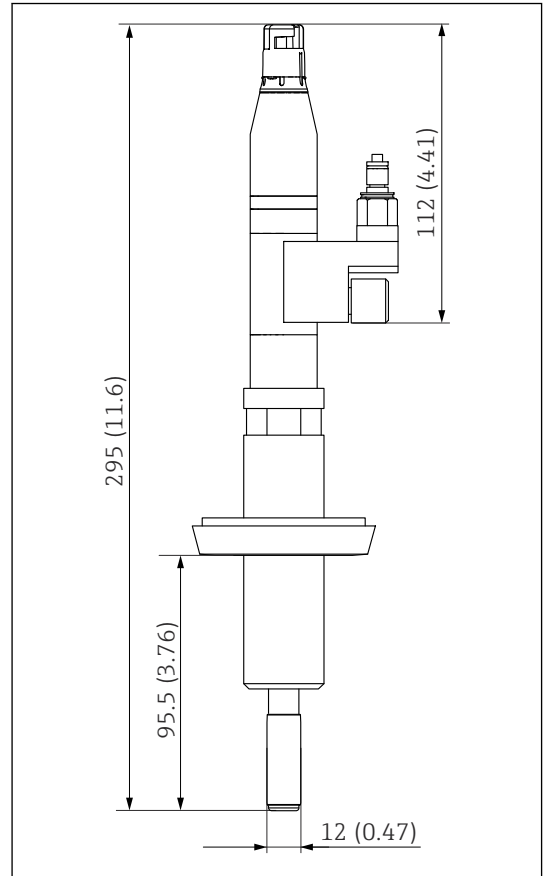


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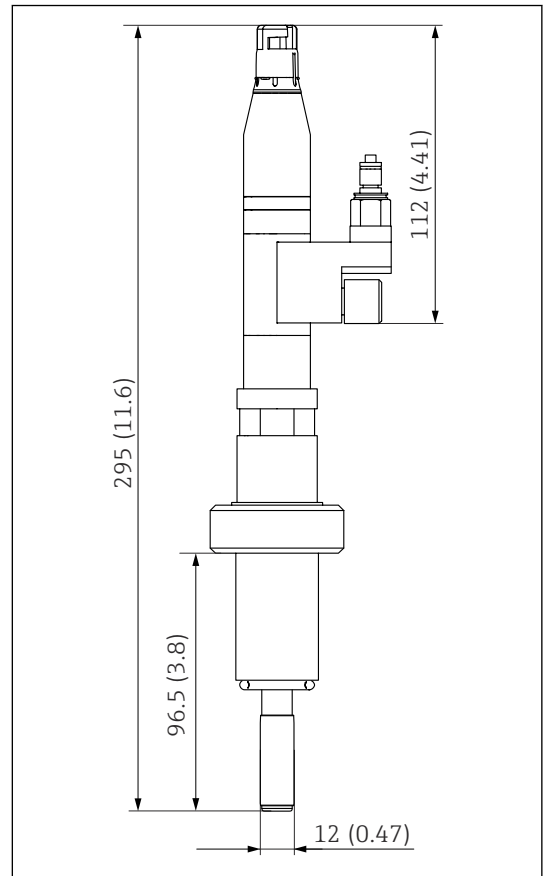
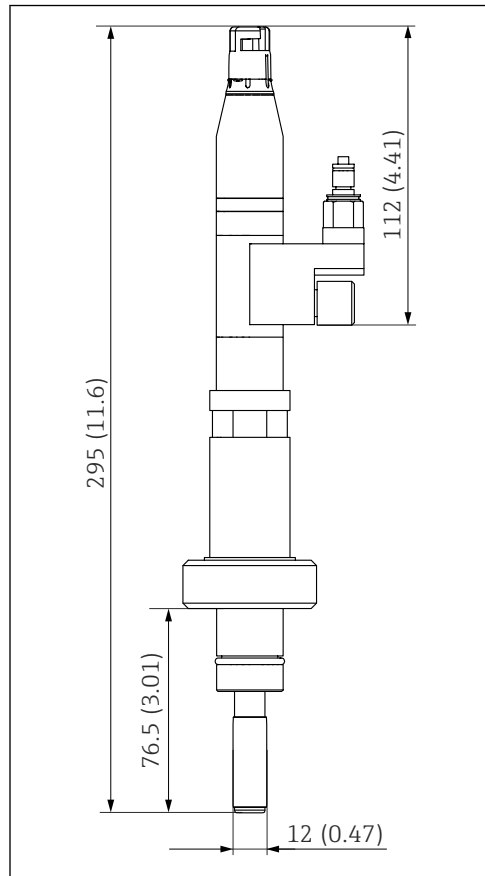
10 Sensor with process connection Varivent DN50, dimensions: mm (in)



11 Sensor with process connection milk pipe DN25, dimensions: mm (in)



12 Sensor with process connection milk pipe DN50, dimensions: mm (in)



13 Sensor with process connection socket DN25, dimensions: mm (in)

14 Sensor with process connection socket DN30, dimensions: mm (in)


Weight	0.6 kg (1.3 lbs)	
Materials	Sensor body:	Glass-lined steel, chemically resistant and shock resistant
	Adapter and terminal head:	Stainless steel 1.4404 (AISI 316 L), PVDF, PTFE
	Electrolyte vessel:	Stainless steel 1.4301 (AISI 304)
	Process connections:	Stainless steel 1.4404 (AISI 316 L)
Volume	Volume of electrolyte in sensor: 1.6 ml (0.05 fl oz)	
Temperature sensor	NTC 30K	
Plug-in head	Memosens plug-in head for digital, non-contact data transmission, pressure resistance 16 bar (232 psi) (relative)	
Process connections	Depending on version <ul style="list-style-type: none"> ■ M20 (replacement for installed sensor) ■ Nipple DN25 ■ Nipple DN30 ■ Varivent DN50/40 ■ Dairy fitting DN50 ■ Dairy fitting DN25 ■ Tri-Clamp DN50 	

Certificates and approvals

Current certificates and approvals that are available for the product can be selected via the Product Configurator at www.endress.com:

1. Select the product using the filters and search field.
2. Open the product page.
3. Select **Configuration**.

Ordering information

Product page	www.endress.com/cps341d
Product Configurator	<ol style="list-style-type: none"> 1. Configure: Click this button on the product page. 2. Select Extended selection. <ul style="list-style-type: none"> ↳ The Configurator opens in a separate window. 3. Configure the device according to your requirements by selecting the desired option for each feature. <ul style="list-style-type: none"> ↳ In this way, you receive a valid and complete order code for the device. 4. Apply: Add the configured product to the shopping cart. <p> For many products, you also have the option of downloading CAD or 2D drawings of the selected product version.</p> <ol style="list-style-type: none"> 5. Show details: Open this tab for the product in the shopping cart. <ul style="list-style-type: none"> ↳ The link to the CAD drawing is displayed. If selected, the 3D display format is displayed along with the option to download various formats.
Scope of delivery	<p>The scope of delivery comprises:</p> <ul style="list-style-type: none"> ▪ Ordered version of the sensor ▪ Operating Instructions ▪ 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.

Device-specific accessories	<p>CPS341Z</p> <p>Electrolyte vessel CPS341Z</p> <p>Pressurized electrolyte vessel for safe supply of KCl to the sensor</p> <p>The electrolyte supply can be monitored by the ultrasonic level monitoring sensor CPS341Z-D2 (air bubble sensor). For the ultrasonic sensor, a supply voltage of 18 to 30 V DC at maximum 70 mA</p>
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(without switching current) is necessary. The signal is output via the relay CPS341Z-D4 and is also indicated visually via the LED display CPS341Z-D3.

CPS341Z-	Accessories for Ceramax CPS341D
A1	Welding socket DN30, straight
A2	Dummy plug for welding socket DN30
A3	Welding socket DN25, straight
A4	Welding socket DN25, beveled
D1	Electrolyte vessel, stainless steel
D2	Ultrasonic sensor level monitoring
D3	Cable with LED indicator
D4	Relay, type KCD2-R, P+F
D5	KCl electrolyte, sterile, 1 l (0.26 gal) plastic bottle
D7	Plastic bottle, empty
D8	Protective cap

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

Cable

Memosens data cable CYK10

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



Technical Information TI00118C



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www.addresses.endress.com