

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

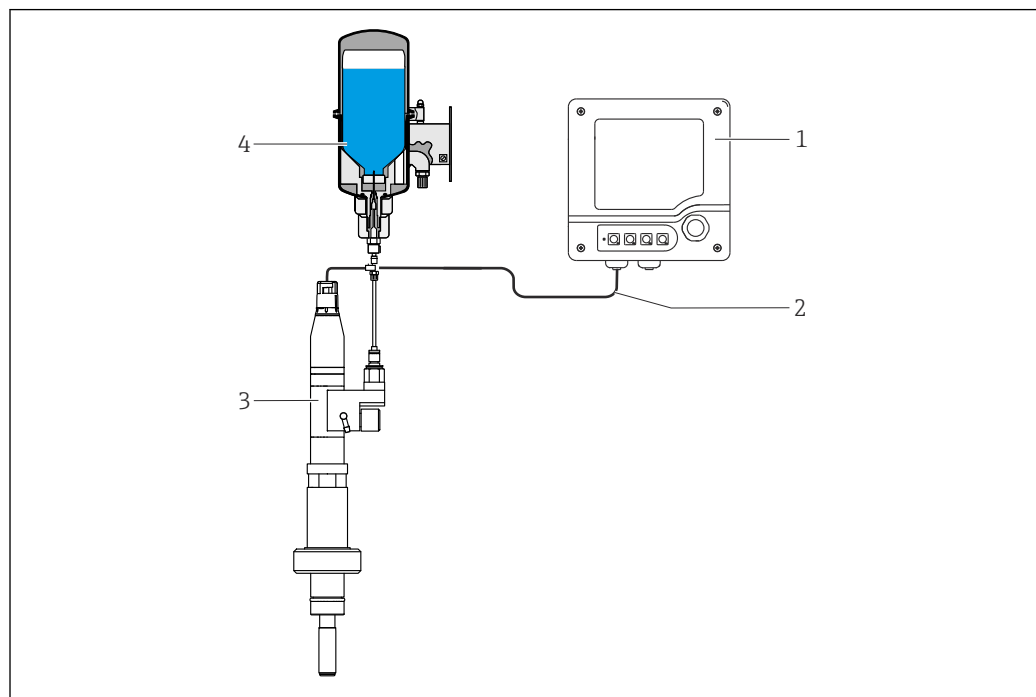
The pH value is used as a unit of measurement for the acidity or alkalinity of a medium. The enamel of the electrode delivers an electrochemical potential that depends on the pH value of the medium. This potential is generated by the selective accumulation of H^+ ions on the outer layer of the pH-sensitive 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-D1
- Transmitter, e.g. Liquiline CM44x, CM42
- Memosens data cable CYK10 or CYK20



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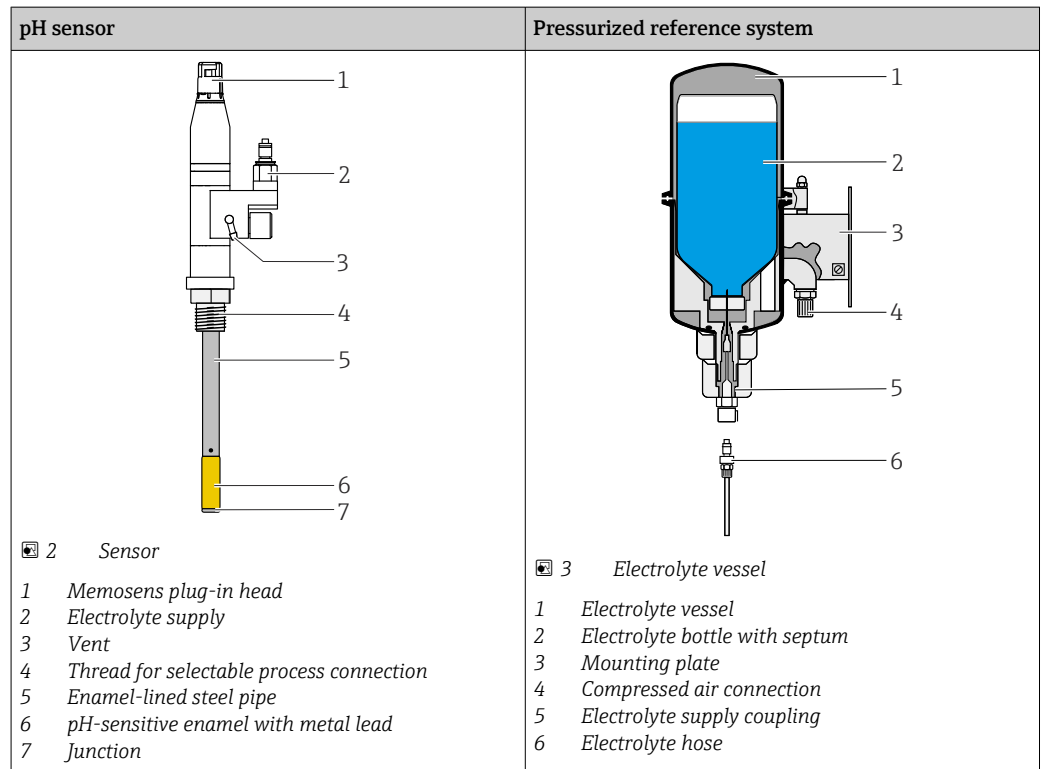
1 Measuring system

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



The ultrasonic sensor CPS341Z-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.

Reliability

Ease of maintenance

Easy handling

Sensors with Memosens technology have integrated electronics that store calibration data and other information (e.g. total hours of operation or hours of operating 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.
- Precalibrated sensors can be replaced quickly and easily, resulting in a noticeable 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 evaluation programs.
- Thus, the current application of the sensor can be determined depending on its previous history.

Interference immunity

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.

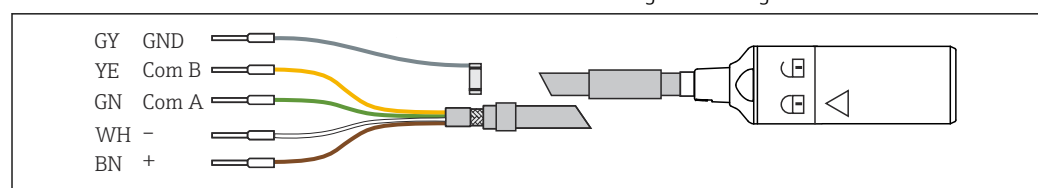
Input

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 measuring cable CYK10.



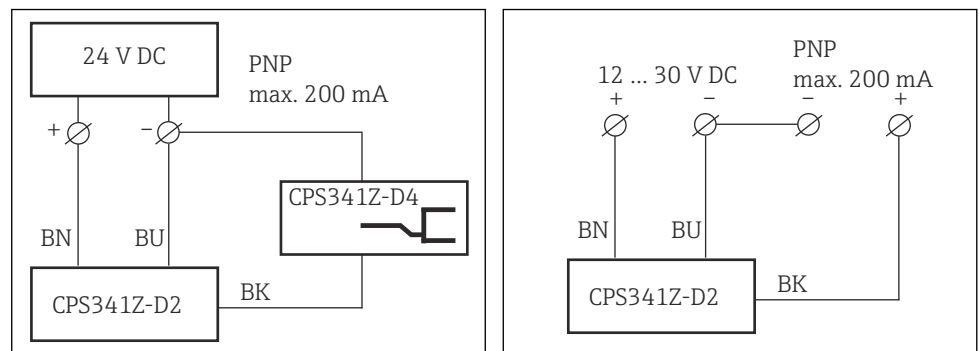
4 Measuring cable CYK10

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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 be irreversibly damaged if it is immersed in the medium without being powered.
- ▶ 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

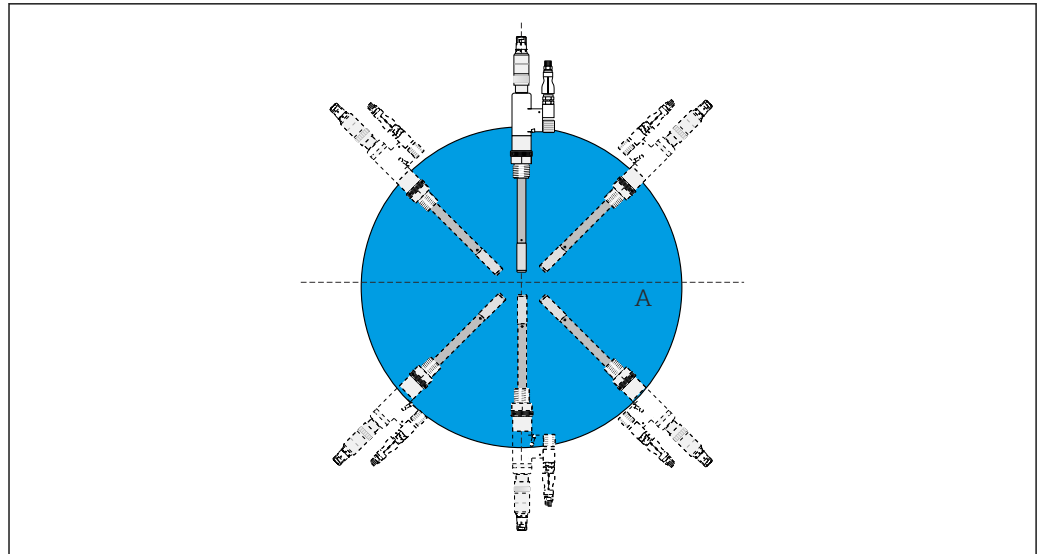
Reference system

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

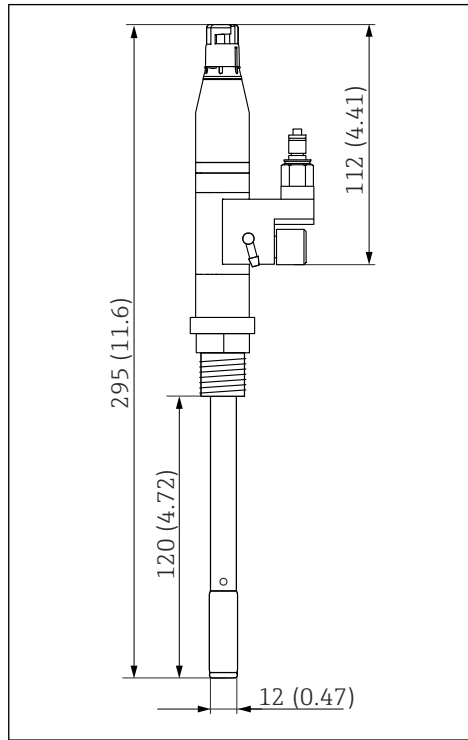
0.8 to 7 bar (11.6 to 101.5 psi) (absolute)

Conductivity

Min. 50 µS/cm

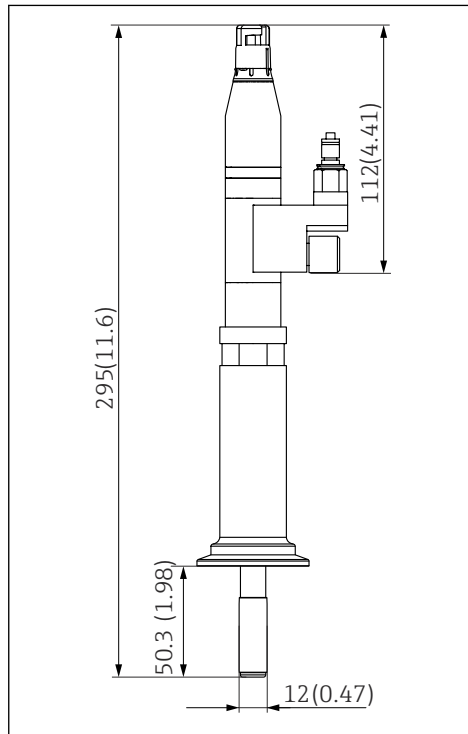
Mechanical construction

Dimensions



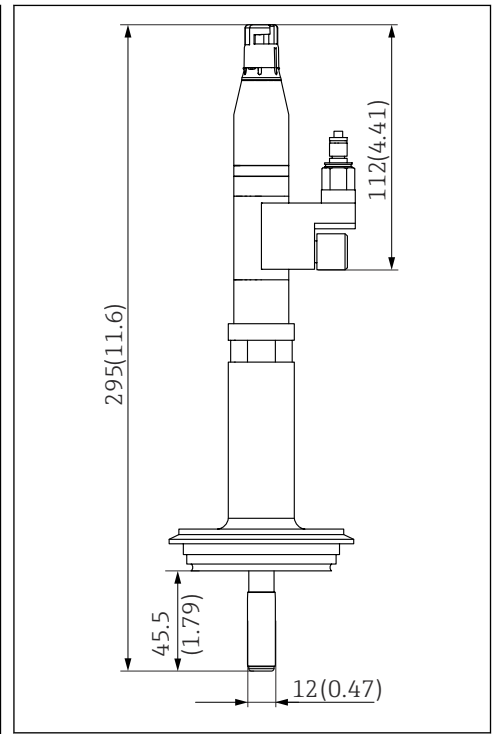
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8 Sensor without process connection, dimensions: mm (in)



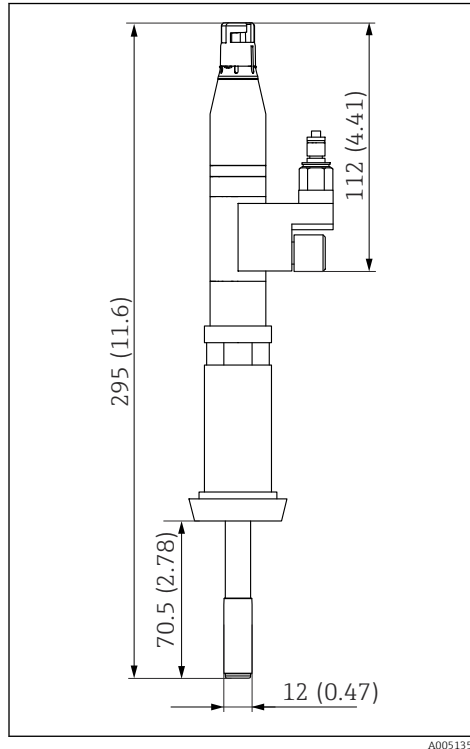
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9 Sensor with process connection Tri-Clamp DN50, dimensions: mm (in)

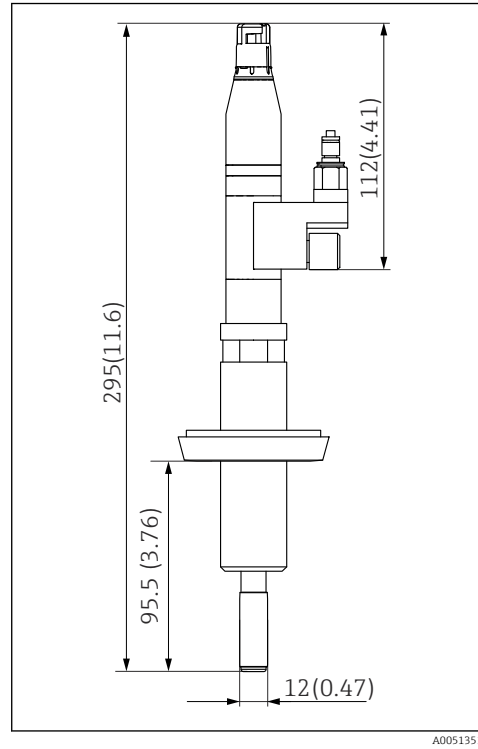


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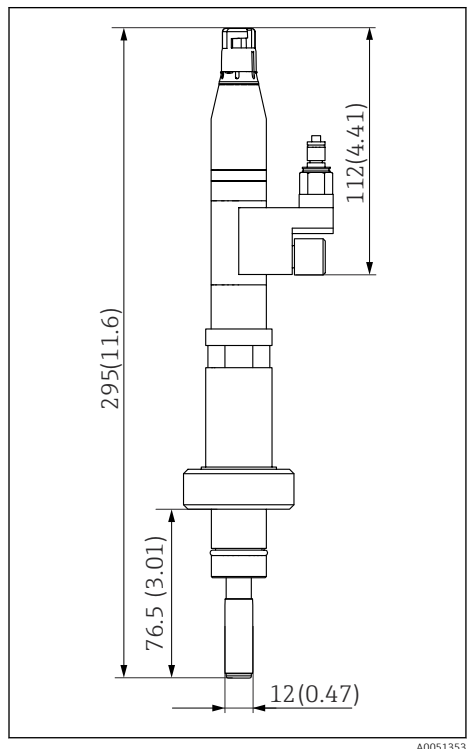
10 Sensor with process connection Varivent DN50, dimensions: mm (in)



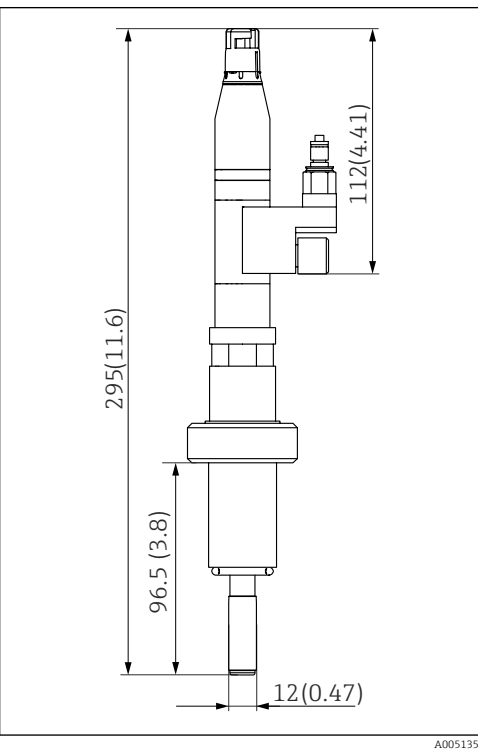
11 Sensor with process connection milk pipe DN25, dimensions: mm (in)



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

- 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 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**.

Ordering information

Product page www.endress.com/cps341d

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
- 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.

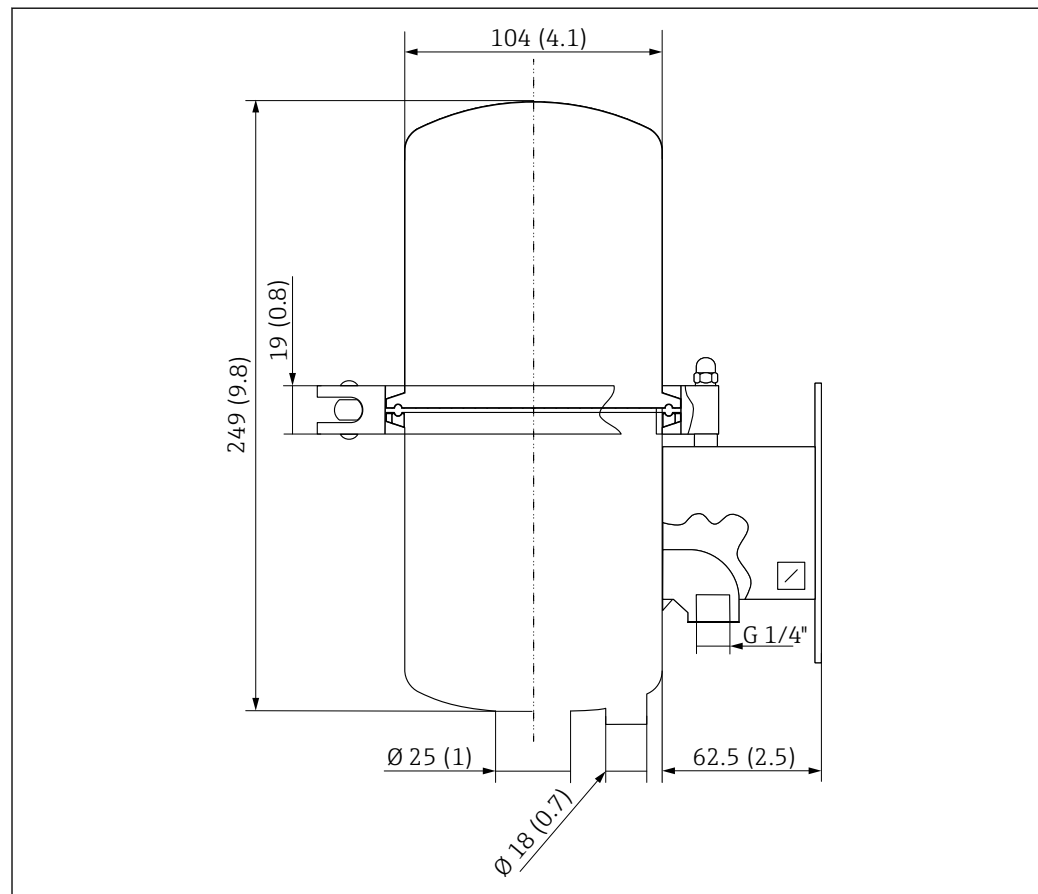
Device-specific accessories

CPS341Z

Electrolyte vessel CPS341Z-D1

Pressurized electrolyte vessel for safe supply of KCl to the sensor

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 (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.



15 Electrolyte vessel CPS341Z Dimensions: mm (in)

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

CPS341Z-	Accessories for Ceramax CPS341D
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

Solutions that are produced in the production laboratory and bottled for testing in the calibration laboratory are used as secondary reference buffer solutions. This test is carried out on a partial sample in accordance with the requirements of ISO 17025.

Product Configurator on the product page: www.endress.com/cpy20

Cables

Memosens data cable CYK10

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



Technical Information TI00118C



www.addresses.endress.com
