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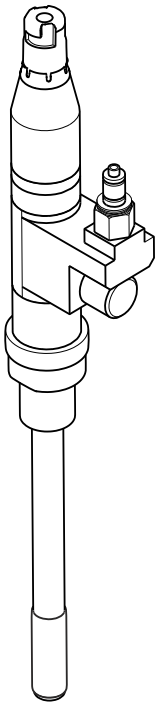
Operating Instructions
Ceramax CPS341D

Sensor with pH-sensitive enamel and digital Memosens technology



Endress+Hauser
People for Process Automation

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1 About this document

1.1 Warnings

The structure, signal words and safety colors of the signs comply with the specifications of ANSI Z535.6 ("Product safety information in product manuals, instructions and other collateral materials").

Safety message structure	Meaning
⚠ DANGER **Cause (/consequences)** Consequences if safety message is not heeded ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the situation **will** result in a fatal or serious injury.
⚠ WARNING **Cause (/consequences)** Consequences if safety message is not heeded ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the situation **can** result in a fatal or serious injury.
⚠ CAUTION **Cause (/consequences)** Consequences if safety message is not heeded ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
NOTICE **Cause/situation** Consequences if safety message is not heeded ▶ Action/note	This symbol alerts you to situations that can result in damage to property and equipment.

1.2 Symbols

Additional information, tips

Permitted or recommended

Forbidden or not recommended

2 Basic safety instructions

2.1 Requirements for personnel

- Installation, commissioning, operation and maintenance of the measuring system must only be carried out by trained technical personnel.
- The technical personnel must be authorized by the plant operator to carry out the specified activities.
- The electrical connection may only be performed by an electrical technician.
- The technical personnel must have read and understood these Operating Instructions and must follow the instructions they contain.
- Measuring point faults may only be rectified by authorized and specially trained personnel.

Repairs not described in the enclosed Operating Instructions may only be carried out directly at the manufacturer's or by the service organization.

2.2 Designated use

The sensor is designed for the continuous measurement of the pH value in liquids.
Recommended applications include:

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

Any other use than the one described here compromises the safety of persons and the entire measuring system and is not permitted.
The manufacturer is not liable for damage caused by improper or non-designated use.

2.3 Occupational safety

As the user, you are responsible for complying with the following safety conditions:
- Installation instructions
- Local prevailing standards and regulations.

Electromagnetic compatibility
With regard to electromagnetic compatibility, this device has been tested in accordance with the applicable European standards for industrial applications.
The electromagnetic compatibility indicated only applies to a device that has been connected in accordance with the instructions in these Operating Instructions.

2.4 Operational safety

- Before commissioning the entire measuring point, make sure all the connections are correct. Ensure that electrical cables and hose connections are not damaged.
- Do not operate damaged products, and safeguard them to ensure that they are not operated inadvertently. Mark the damaged product as defective.
- If faults cannot be rectified, the products must be taken out of service and secured against unintentional commissioning.

⚠ CAUTION

The cleaning system is not switched off during calibration or maintenance activities

Risk of injury due to medium or cleaning agent

- If a cleaning system is connected, switch it off before removing a sensor from the medium.
- If you are not switching off the cleaning system because you wish to test the cleaning function, wear protective clothing, goggles and gloves or take other appropriate measures.

2.5 Product safety

The sensor has been designed and tested according to the state of the art and left the factory in perfect functioning order.
Relevant regulations and European standards have been met.

3 Device description

The CPS341D can be divided into the following parts:
- pH-sensitive part
- Reference system
- Process connection

pH-sensitive part	Reference system	Process connection
▪ Glass-lined steel tube (3) ▪ Yellow pH-sensitive enamel with metal reference lead (5) ▪ Diaphragm (4) ▪ Memosens plug-in head (1)	▪ Electrolyte vessel (8) ▪ Electrolyte bottle with septum (9) ▪ Supply of electrolyte with hose and plug-in couplings (2 and 11) ▪ Reference electrode (in sensor head, not visible from the outside)	Depends on version ▪ M20 ▪ Pg 13.5 ▪ 3/4" ▪ 1" ▪ Nozzle DN25 ▪ Nozzle DN30 ▪ Varivent DN50/40 ▪ Sanitary fitting DN50 ▪ Sanitary fitting DN25 ▪ Tri-Clamp DN50

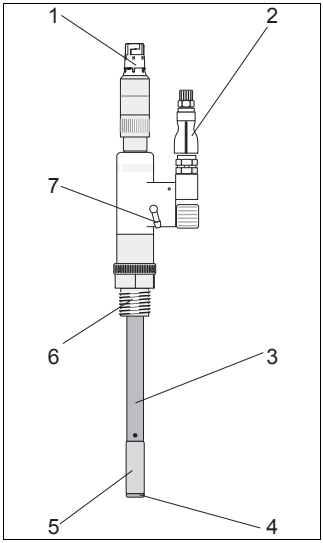


Fig. 1: pH sensor

1	*Memosens plug-in head*
2	*Supply of electrolyte*
3	*Glass-lined steel tube*
4	*Diaphragm*
5	*pH-sensitive enamel (yellow)*
6	*Process connection*
7	*Vent*

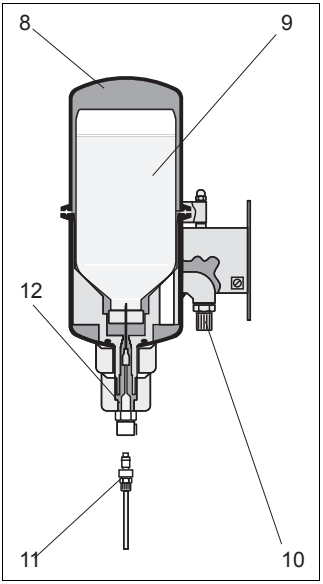


Fig. 2: Electrolyte vessel

8	*Electrolyte vessel*
9	*Electrolyte bottle*
10	*Compressed air connection*
11	*Electrolyte hose*
12	*Electrolyte supply coupling*

4 Incoming acceptance and product identification

4.1 Incoming acceptance

1. Make sure the packaging is undamaged!
   ↳ Inform the supplier about any damage to the packaging.
   Keep the damaged packaging until the matter has been settled.
2. Make sure the contents are undamaged!
   ↳ Inform the supplier about damage to the contents.
   Keep the damaged products until the matter has been settled.
3. Check that the order is complete.
   ↳ Compare with your shipping documents.
4. For storage and transport: The packaging material used must provide shock protection and humidity protection.
   ↳ The original packaging offers the best protection.
   Also, keep to the approved ambient conditions (see "Technical data").

If you have any questions, please contact your supplier or your local sales center.

4.2 Product identification, nameplate

The nameplate can be found on the sensor.

The following information is provided on the nameplate:
- Order code
- Extended order code
- Serial number
- Protection class
- Ambient/process conditions

Compare the data on the nameplate with your order.

To find out what sensor version you have, enter the order code indicated on the nameplate in the search screen at the following address: www.products.endress.com/order-ident

4.3 Certificates and approvals

Declaration of conformity
The product meets the requirements of the harmonized European standards. It thus complies with the legal requirements of the EC directives.
The manufacturer confirms successful testing of the product by affixing the CE symbol.

5 Mounting

5.1 Mounting requirements

5.1.1 Orientation

CPS341D can be installed in any position.

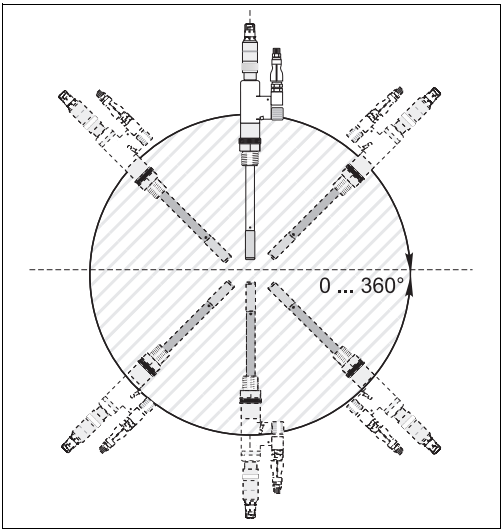


Fig. 3: Installation position

5.1.2 Dimensions

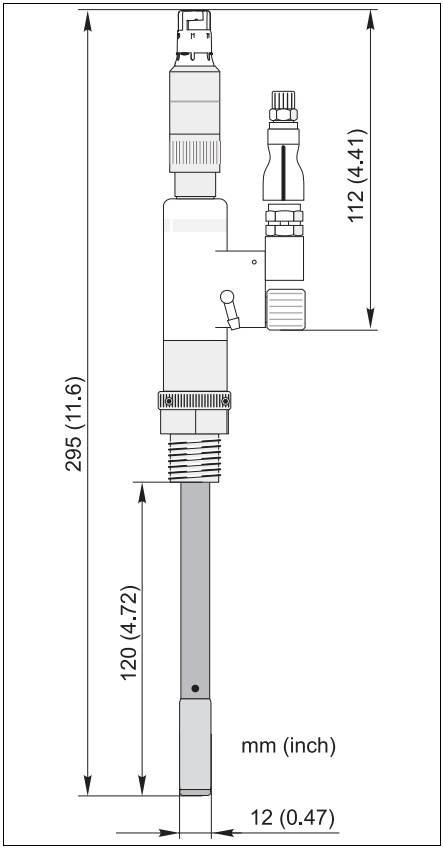


Fig. 4: Dimensions

5.2 Mounting the sensor

5.2.1 Installing into the process

NOTICE

Built-in parts can damage the sensor enamel

- When installing in tanks and pipes, keep a sufficient distance from built-in parts and the wall.

Mounting the sensor

- Screw the sensor directly into an existing process connection.

5.2.2 Installing the electrolyte vessel

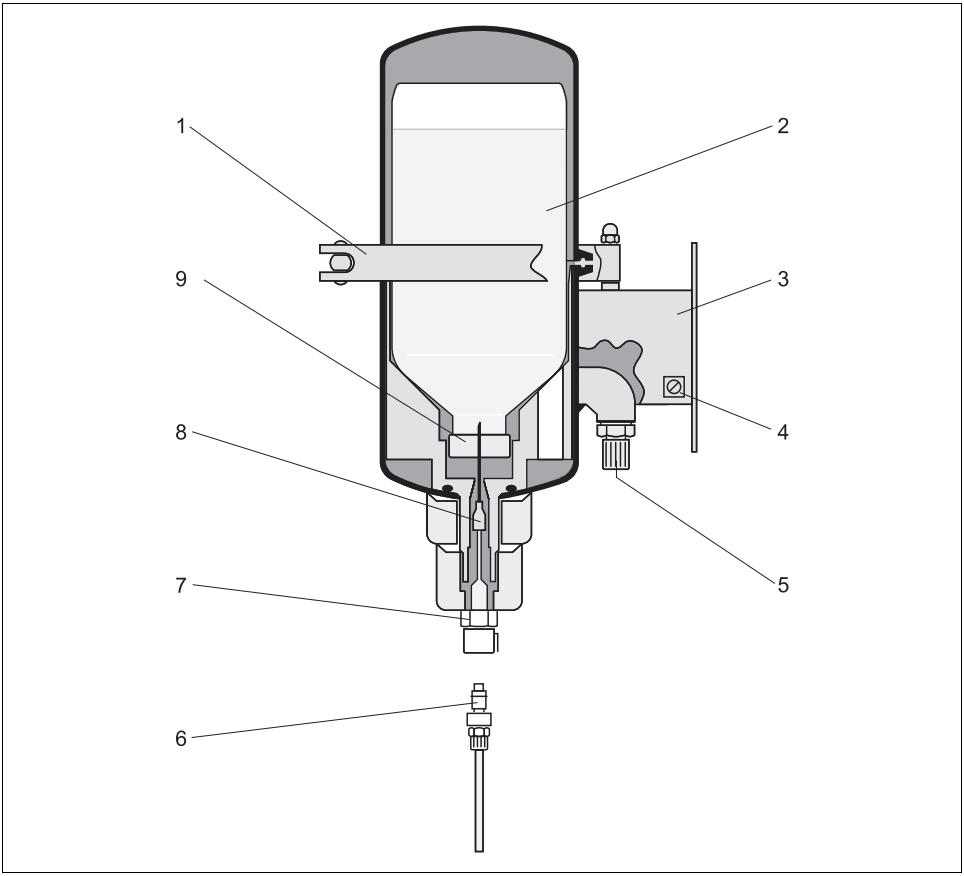


Fig. 5: Electrolyte vessel

1	*Clamp*	*6*	*Self-sealing connector with electrolyte hose*
2	*Electrolyte bottle*	*7*	*Self-sealing coupling*
3	*Mounting plate*	*8*	*Cannula*
4	*Ground terminal*	*9*	*Septum*
5	*G1/4 compressed air connection*		

NOTICE

Minimum internal pressure in electrolyte system

If the internal pressure is too low, there is the danger of the process medium entering the sensor through the diaphragm and contaminating the electrolyte.

- ▶ Set the compressed air supply in such a way that the pressure in the electrolyte vessel is always at least 0.5 bar (7 psi) above the process pressure.

Mounting the electrolyte vessel

1. Mount the electrolyte vessel vertically on a wall.
   ↳ Maximum distance from sensor: 5m (16 ft) (length of the connecting hose).
2. If necessary, shorten the connecting hose supplied to the desired length.
3. Connect the hose end with the self-sealing coupling to the connector of the sensor KCl coupling.
4. Connect the hose end with the self-sealing connector to the coupling of the electrolyte vessel (item 7).
5. Connect the compressed air supply to the G1/4 gland (item 5) via the onsite pressure-reducing valve.
6. Set the internal pressure in the electrolyte vessel in such a way that the pressure is at least 0.5 bar above the process pressure but does not exceed the permitted sensor process pressure of 6 bar (90 psi).

A higher difference in pressure is possible but increases the rate of electrolyte consumption.

5.2.3 Mounting the optional electrolyte monitor

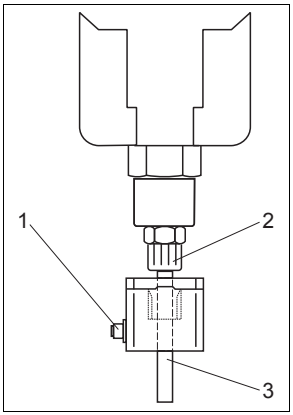


Fig. 6: Electrolyte monitor

Mounting the electrolyte monitor

1. Unscrew the cover of the electrolyte monitor (bubble sensor).
2. Fit the bubble sensor at the outlet of the electrolyte vessel (2) onto the hose (3).
3. Screw the cover back on.
4. Connect the plug of the connecting cable CPS341Z-D3 to the M12 connection (1).

Always order the connecting cable with the bubble sensor as the sensor cannot work without the cable.

For information on how to connect the external supply voltage: → 14

6 Electrical connection

6.1 Connecting the sensor

The sensor is connected to the transmitter via the measuring cable CYK10.

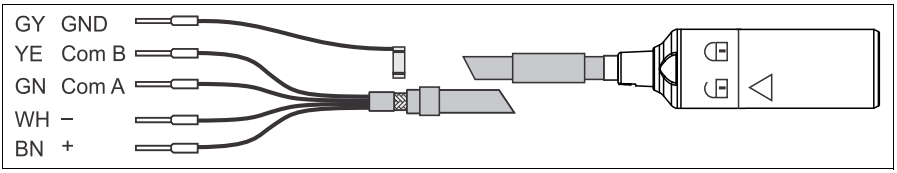


Fig. 7: Measuring cable CYK10

NOTICE

Zero point shift

If the sensor is immersed in medium and the transmitter is disconnected from the power supply, polarization can cause an **irreversible** zero point shift. In such instances, the device must be recalibrated.

- Do not disconnect the transmitter from the power supply while the sensor is immersed in the medium.
- When performing maintenance work or similar with the sensor connected, remove the sensor from the medium and dry it before disconnecting the transmitter from the power supply.
- In general, avoid any kind of conductive connection between the reference and the pH-sensitive enamel when the unit is switched off.
- If you have taken the sensor out of the medium, it is **essential** you use the KCl protection cap specially designed for CPS341D to protect the diaphragm.

6.2 Connecting the optional electrolyte monitor

Connecting the electrolyte monitor

1. Connect the connecting cable to an **onsite power supply provided by the customer** (see examples).
2. Connect the M12 plug to the M12 connection of the bubble sensor (if not already performed during installation).

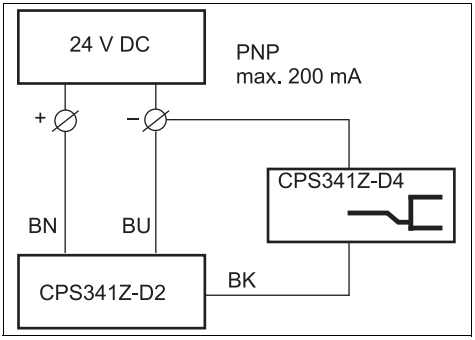


Fig. 8: Connecting to the customer power supply with a relay

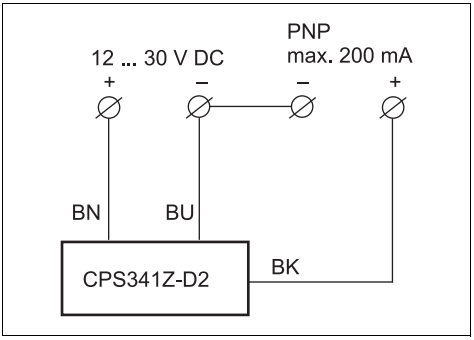


Fig. 9: Connecting to the customer power supply with a PLC

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 hose (electrolyte vessel empty)

7 Commissioning

Prior to initial commissioning, make sure that:
- The sensor has been installed correctly
- The electrical connection is correct

Several steps are involved in the process of commissioning the sensor:
1. Disinfecting the electrolyte system (optional, for sterile applications)
2. Regenerating the sensor
3. Filling the electrolyte vessel
4. Calibrating/adjusting the sensor

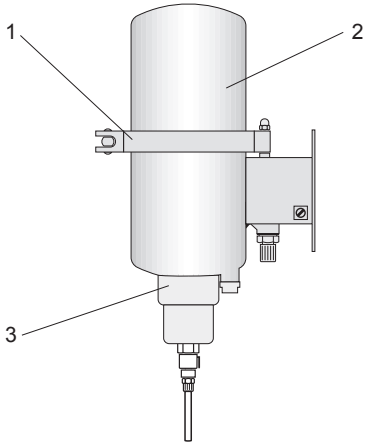
7.1 Disinfecting the electrolyte system

For sterile applications, you can disinfect the entire electrolyte system with 70% ethanol **prior to commissioning** (ethanol is not included in the scope of supply).

The sensor parts in contact with the medium must be sterilized by appropriate means (SIP).

Insert the ethanol bottle

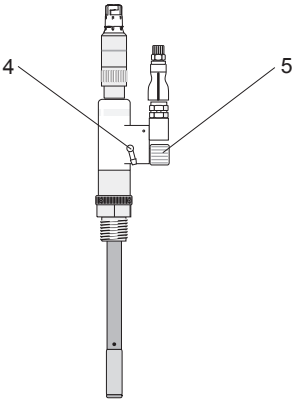
1. Release the clamp (1) on the mounted electrolyte vessel and remove the upper part (2).



2. Fill an empty septum bottle (see "Accessories") with 70% ethanol.
3. Place the bottle into the bottom part of the electrolyte vessel with the septum in a central position and pointing downwards. This causes the cannula of the electrolyte vessel to pierce the septum.
4. Fit the upper part and seal the device tightly with the clamp.
5. If you have not already done so, connect the electrolyte vessel and the sensor via the electrolyte hose that can be plugged in at both ends.

Disinfect the electrolyte system

1. Apply at least 3 bar (45 psi) pressure to the electrolyte vessel.
2. Open the vent screw on the sensor (5) (one revolution) until approx. 50 to 100 ml of ethanol flows out of the vent opening (4).



3. Allow the ethanol to take effect for 2 to 5 minutes.

Remove the ethanol bottle

1. Switch off the compressed air and release the pressure on the electrolyte vessel (release the thread adapter nut on the plastic insert (Fig. under 1., item 3) by 2-3 revolutions).
2. Once the vessel is unpressurized tighten the thread adapter nut immediately.
3. Release the clamp on the electrolyte vessel and remove the upper part.
4. Remove the ethanol bottle.

▶ Fill the sensor with electrolyte (→ 17) directly after disinfecting the unit.

7.2 Regenerating the sensor

Slightly larger measured errors can occur during commissioning when using new sensors and sensors that have been dry for extended periods. Regeneration eliminates these measured errors.
During the regeneration process, the necessary gel layer is formed on the surface of the pH-sensitive enamel.

If the sensor is cleaned and sterilized in the tank or pipe before commissioning, additional regeneration is not required.

The sensor is regenerated with the sensor installed and connected. The transmitter must be switched on.
There are three possible ways to regenerate the sensor:
1. Wet the sensor for 12-24 hours.
2. Immerse the sensor in hot water (temperature of 70 to 100 °C (160 to 210 °F)) for approximately 30 minutes.
3. Treat the sensor with water vapor for 10 to 15 minutes.

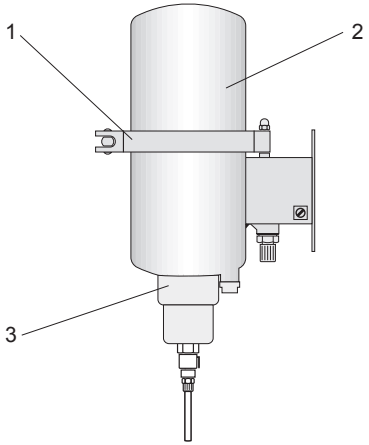
7.3 Filling the electrolyte vessel

The electrolyte must be free from bubbles. This is the only way to ensure the correct electrical connection between the reference electrode and the diaphragm.

The electrolyte is 3M KCl (pH 4) with an added inhibitor (1 ml/l colloidal silicic acid) which prevents the formation of bacteria.

Insert the electrolyte bottle (see "Accessories")

1. Release the clamp (1) on the electrolyte vessel and remove the upper part (2).



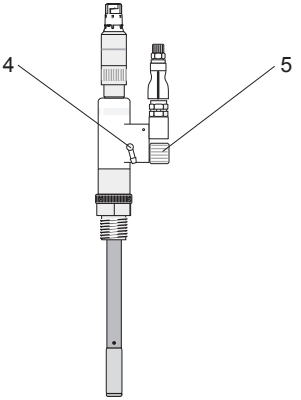
2. Remove the read seal cap on the bottle of electrolyte.
3. Place the bottle into the bottom part of the electrolyte vessel with the septum in a central position and pointing downwards. This causes the cannula of the electrolyte vessel to pierce the septum.
4. Fit the upper part and seal the device tightly with the clamp.

Fill the electrolyte system

1. Apply at least 3 bar (45 psi) pressure to the electrolyte vessel.

If you have not already done so:

2. Connect the electrolyte vessel and the sensor via the electrolyte hose that can be plugged in at both ends. Connect the sensor to the transmitter and switch on the transmitter.
3. Open the vent screw on the sensor (5) (one revolution) until bubble-free electrolyte exits the vent opening (4).



   ↳ If you disinfected the electrolyte system beforehand, allow at least 50-100 ml of electrolyte to escape.

4. Close the vent screw and clean the sensor around the vent opening with water.
5. Establish the process pressure in the electrolyte vessel.

7.4 Calibration

7.4.1 Need for calibration

The calibration data are stored in the Memosens head at the factory and are transferred to the transmitter.
The sensor is ready to measure immediately.
It is recommended to verify the calibration data and recalibrate if necessary if the device has not been in operation for an extended period.

Calibrating the sensor

- ▶ Perform the calibration as specified in the Operating Instructions of the transmitter.

NOTICE

Missing electrical contact between sensor's process connection and calibration buffer
Causes fluctuations of the measured value
- ▶ Insert sensor in order that the sensor's process connection is in contact with the calibration buffer, or
- ▶ Realize electrical contact between sensor's process connection and buffer, e.g. by using a wire.

7.4.2 Types of calibration

The following types of calibration are possible:
- Two-point calibration
  - With calibration buffers
  - Entry of data for the slope, zero point and temperature
- Single-point calibration
  - Entry of an offset or a reference value
  - Sample calibration with laboratory comparative value
- Temperature adjustment by entering a reference value

8 Diagnostics and troubleshooting

Problem	Cause	Remedial action
Value displayed fluctuates when the electrolyte hose is touched	▪ Not vented sufficiently ▪ Overpressure too low	▪ Vent ▪ Check and increase pressure
Reading does not change in media with different pH values	Pinhole in pH enamel/insulation error	Have repaired by the Service Team
Fluctuations of the measured value when not installed in the process	Missing electrical contact between sensor's process connection and medium	▪ Insert sensor in the medium to its process connection ▪ Realize eletrical contact, e.g by using a wire
Zero point drifts, is no longer in permitted range and shifts during venting	Reference electrode defective	Have repaired by the Service Team
Slope too low or very slow reaction	Limescale or other material buildup	▪ Measure potential at pH 3 and pH 7 ▪ Check slope, --> min. 55 mV/pH at 25 °C ▪ Immerse sensor in 10% HCl for 30 minutes, then wet and measure again ▪ If acid treatment does not have the desired effect: Have the unit checked by the Service Team

9 Maintenance

9.1 Changing the electrolyte bottle

You should change the bottle before it is completely empty. In this way, you can ensure that the electrolyte system is always full.
If you are using the optional electrolyte monitor, a message is activated when the first air bubble is detected at the outlet of the vessel. Then replace the bottle of electrolyte within the next 10 hours.

NOTICE

Process pressure and process temperature

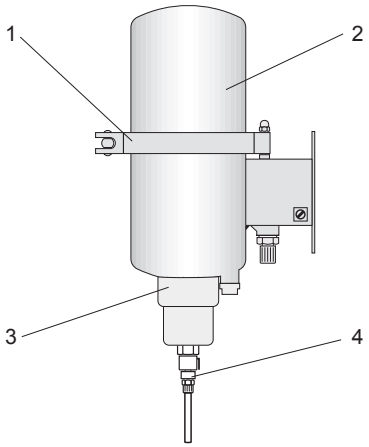
Medium penetrating the system can contaminate the sensor reference system

- Only replace the bottle of electrolyte when no process pressure is applied and at temperatures below 80 °C (176 °F).
- If this is not possible, you must replace the bottle very quickly.

Releasing the pressure on the electrolyte vessel

1. Disconnect the electrolyte hose from the outlet of the electrolyte vessel by pressing the unlocking unit on the coupling (4) and removing the hose with the connector.

   ↳ The pressure is maintained briefly in the hose and sensor.



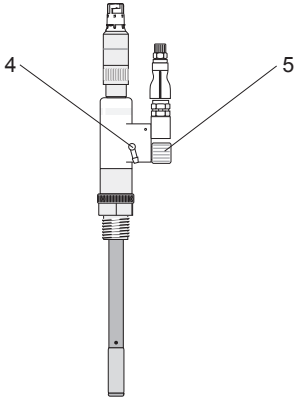
2. Switch off the compressed air and release the pressure on the electrolyte vessel (release the thread adapter nut on the plastic insert (item 3) by 2-3 revolutions).

Inserting the electrolyte bottle

1. Release the clamp (1) on the electrolyte vessel and remove the upper part (2).
2. Place the bottle of electrolyte into the bottom part of the electrolyte vessel with the septum in a central position and pointing downwards. This causes the cannula of the electrolyte vessel to pierce the septum.
3. Fit the upper part and seal the device tightly with the clamp.

Filling the electrolyte system

1. Reinsert the (self-sealing) connector of the electrolyte hose into the coupling on the electrolyte vessel.
2. Apply at least 3 bar (45 psi) pressure to the electrolyte vessel.
3. Open the vent screw on the sensor (5) (one revolution) until bubble-free electrolyte exits the vent opening (4).



4. Close the vent screw and clean the sensor around the vent opening with water.
5. Establish the process pressure in the electrolyte vessel.

9.2 Cleaning the sensor

9.2.1 Cleaning agent

Suitable cleaning agents
- Water or solvents
- Non-scratch stainless steel cleaner
- Diluted hydrochloric acid (5 to 20%)

NOTICE

Fluorinated acids and abrasive cleaners

Fluorinated acids (e.g. hydrofluoric acid) and abrasive substances corrode the enamel.
- ▶ Never use fluorinated acids to clean the sensor.
- ▶ Do not use metal or abrasive cleaning agents.

9.2.2 Cleaning the sensor

NOTICE

Acids and alkalis

If the permitted process limits are exceeded, this can increase the level of enamel corrosion
- ▶ Avoid exceeding the maximum permitted values for temperatures and cleaning times.
- ▶ Please note that when cleaning with alkalis, the level of corrosion doubles with every 10 °C increase in temperature.
- ▶ Do not use acid or alkali concentrations that are higher than the permitted concentration levels.

The sensor can be cleaned in place (CIP).
- Example:
  1. 2% alkali, 85 °C (176 °F), 1 hour
  2. 1.5% acid, 60 °C (140 °F), 15 minutes
  3. Water vapor, 135 °C (275 °F)
- Cleaning with alkaline media affects the gel layer of the enamel. This results in a zero point shift which, in turn, causes temporary measured errors.
- Regenerating the sensor by treating it subsequently with steam regenerates the gel layer and rectifies the zero point shift.

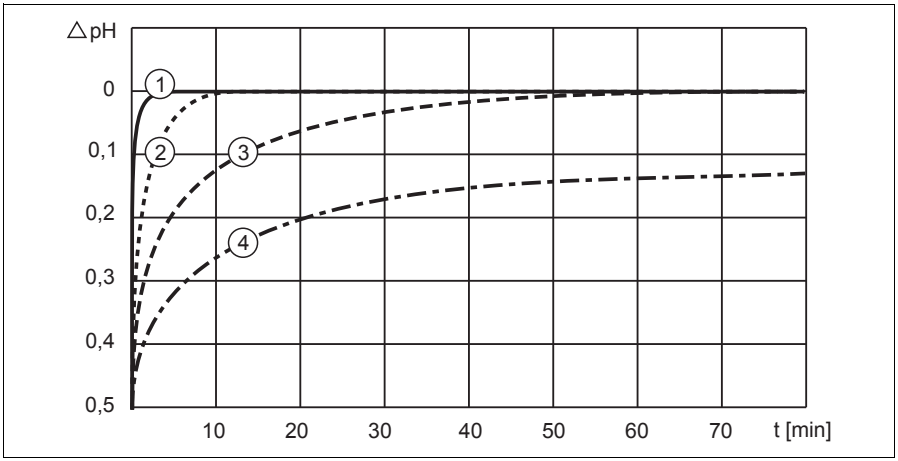


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Fig. 10: Regeneration after 30-minute CIP with 2%NaOH at 85 °C (185 °F)

1 Regeneration with steam, 135 °C (275 °F)
2 Regeneration with water, 95 °C (203 °F)
3 Regeneration with water, 80 °C (176 °F)
4 Regeneration with water, 25 °C (77 °F)

9.2.3 Sterilizing the sensor

The sensor can be sterilized in place (SIP). The following are permitted for SIP:
- Process medium
- Water vapor
- Alcohol solutions
- Aseptic solutions

10 Repair

10.1 Spare parts

Order no.	Designation
71118068	Kit CPS341 o-ring set DN25
71118070	Kit CPS341 o-ring set DN30
71118071	Kit CPS341D o-ring set different types
71118072	Kit CPS341D gasket clamp DIN, DN100
71118073	Kit CPS341D insertadapt.reservoir compl.
71118074	Kit CPS341D needle with holder complete
71118075	Kit CPS341D connect electr. reservoir

10.2 Return

The device must be returned if repairs or a factory calibration are required, or if the wrong device has been ordered or delivered. According to legal regulations, Endress+Hauser, as an ISO-certified company, is required to follow certain procedures when handling returned products that are in contact with medium.

To ensure swift, safe and professional device returns, please read the return procedures and conditions on the internet site:
www.services.endress.com/return-material

10.3 Disposal

The device contains electronic components and must therefore be disposed of in accordance with regulations on the disposal of electronic waste.
Please observe local regulations.

11 Accessories

In the following sections, you find the accessories available at the time of issue of this documentation.
For information on accessories that are not listed here, please contact your local service or sales center.

11.1 CPS341Z

Correct function of Ceramax CPS341D depends on reliable supply of KCl to the reference part of the sensor. The pressurized electrolyte vessel CPS341Z-D1 is best suited for this.

The electrolyte supply can be monitored by the ultrasonic sensor for level monitoring CPS341Z-D2 (air bubble sensor). The ultrasonic sensor requires a supply voltage of 18 to 30 V DC at a max. of 70 mA (without switching current).
The signal is output via the relay CPS341Z-D4 as well as optically via the LED display CPS341Z-D3.

	Accessories for Ceramax CPS341D
A1	Welding nozzle DN30, straight
A2	Dummy plug for welding nozzle DN30
A3	Welding nozzle DN25, straight
A4	Welding nozzle DN25, inclined
D1	Electrolyte vessel, stainless steel
D2	Ultrasonic sensor level monitoring
D3	Cable with LED display
D4	Relay, type KCD2-R, P+F
D5	KCl electrolyte, sterile, 1 l plastic bottle
D6	Purified water, sterile, 1 l plastic bottle
D7	Plastic bottle, empty
D8	Protection cap
CPS341Z-	

To obtain a valid order code, simply attach the optional features to the order code. If you have any questions, please contact our sales office.

11.2 Transmitters

Liquiline CM44x/CM44xR
- Multiple-channel transmitter for the connection of digital sensors with Memosens technology
- Field device (CM44x) or DIN rail device (CM44xR)
- Power supply: 100 to 230 V AC, 24 V AC/DC
- Universally upgradeable
- SD card slot
- Ordering per product structure (--> Online configurator on product page)
- Technical Information TI00444C/07/EN (CM44x) or TI01112C/07/EN (CM44xR)

Liquiline M CM42
- Modular two-wire transmitter for Ex and non-Ex areas
- HART, PROFIBUS or FOUNDATION Fieldbus available
- Ordering acc. to product structure (Online configurator: www.products.endress.com/cm42)
- Technical Information TI00381C/07/EN

Mycom S CPM153
- Transmitter for pH and redox
- Ex or Non-Ex
- HART or PROFIBUS available
- Ordering by product structure (Online configurator: www.products.endress.com/cpm153)
- Technical Information TI00233C/07/EN

Liquisys CPM223/253 could not be recommended. The CPM223/253 software does not completely support the Ceramax CPS341D functionality.

11.3 Buffer solutions

High-quality buffer solutions of 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.

	pH value				
	A	pH 2.00 (accuracy ± 0.02 pH)			
	C	pH 4.00 (accuracy ± 0.02 pH)			
	E	pH 7.00 (accuracy ± 0.02 pH)			
	G	pH 9.00 (accuracy ± 0.02 pH)			
	I	pH 9.20 (accuracy ± 0.02 pH)			
	K	pH 10.00 (accuracy ± 0.05 pH)			
	M	pH 12.00 (accuracy ± 0.05 pH)			
		Quantity			
		01	20 x 18 ml (0.68 fl.oz) only buffer solutions pH 4.00 and 7.00		
		02	250 ml (8.45 fl.oz)		
		10	1000 ml (0.26 US gal)		
		50	5000 ml (1.32 US gal) canister for Topcal S		
			Certificates		
			A	Buffer analysis certificate	
				Version	
				1	Standard
CPY20-					complete order code

11.4 Measuring cables

CYK10 Memosens data cable
- For digital sensors with Memosens technology
  pH, redox, oxygen (amperometric), chlorine, conductivity (conductive)
- Ordering acc. to product structure (-> online Configurator,
  www.products.endress.com/cyk10)

12 Technical data

12.1 Input

12.1.1 Measured variables

pH value
Temperature

12.1.2 Measuring range

0 to 10 pH (linear range)
-2 to 14 pH (application range)
0 to 140 °C (32 to 280 °F)

12.2 Environment

12.2.1 Ambient temperature range

The sensor must not be used at temperatures below 0 °C (32 °F).

12.2.2 Storage temperature

0 to 50 °C (32 to 120 °F)

12.2.3 Degree of protection

IP 68 (10 m (33 ft) water column, 25 °C (77 °F), 45 days, 1 M KCl)

12.3 Process

12.3.1 Process temperature

0 to 140 °C (32 to 280 °F)

12.3.2 Process pressure

0 to 6 bar (0 to 87 psi)

12.3.3 Minimum conductivity

50 µS/cm

12.3.4 pH range

-2 to 14 pH

12.4 Mechanical construction

12.4.1 Weight

600 g (1.3 lbs)

12.4.2 Material

Sensor body:	Porcelain enamel metal substrate (PEMS), chemically resistant and shock resistant
Adapter and plug-in head:	Stainless steel 1.4404 (AISI 316 L), PVDF, PTFE
Electrolyte vessel:	Stainless steel 1.4301 (AISI 304)
Process connection adapters:	Stainless steel 1.4404 (AISI 316 L)

12.4.3 Process connections

M20
Pg 13.5
3/4"
1"
Nozzle, DN25
Nozzle, DN30
Varivent DN50/40
Dairy pipe DN50
Dairy pipe DN25
Triclamp DN50

12.4.4 Temperature sensor

NTC 30KΩ

12.4.5 Reference system

Ag/AgCl with 3 M KCl and inhibitor

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