PH SENSOR W42

USER GUIDE

Short description

CMA Wireless pH sensor W42 measures the degree of acidity/pH value of a solution in the range from 0 to 14 pH. The pH electrode is connected to the sensor box using a coax cable and a BNC connector.

The power button on the top of the sensor allows you to turn the sensor on/off. The sensor is equipped with an OLED color display which shows some sensor information and the measured by the sensor values. This makes the sensor suitable to use as an independent measuring instrument.

The sensor can be used wirelessly via Bluetooth or wired via USB with the Coach 7 or Coach 7 Lite programs/apps on computers (Windows and Mac), Chromebooks and mobile devices (Android and iOS).
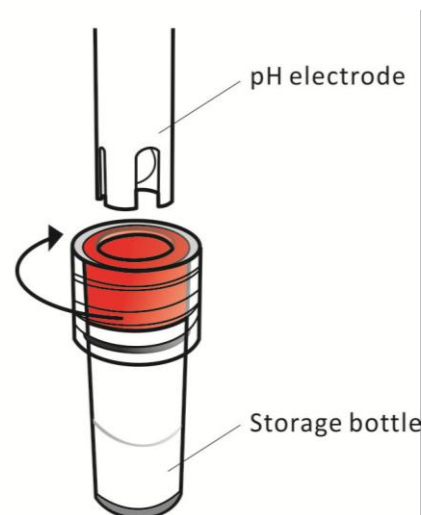
pH electrode

The pH electrode is a gel-filled glass electrode built into a plastic tube with an opening at the bottom side. The pH electrode has been designed to function reliably and accurately under varied conditions. The rugged epoxy body protects the pH-sensing glass bulb. The gel-filled reference electrode is sealed, and it never needs to be refilled.

The pH electrode is supplied in a storage bottle containing a protective solution. When it is not being used, it must be kept in this storage solution. During measurements, the electrode must be dipped in the solution for about 1 cm.

The pH electrode can be damaged beyond repair by improper use such as keeping the electrode in distilled water storage, usage over its temperature range and long-time exposure to strong acids/bases.

The pH electrode has a limited operational life and can be ordered separately.

Preparing the pH electrode for use

Carefully remove the electrode from the bottle of storage solution and rinse the tip of the electrode with distilled water. If air bubbles are seen in the pH bulb, gently shake the electrode downward, like a clinical thermometer, until the bubbles disappear. The electrode is ready for measurement.

Maintenance and storage

Maintain the level of pH electrode storage solution, the pH-sensitive membrane must be kept wet. For a long-term storage, use a saturated potassium chloride solution (KCl 3M).

To prepare an additional saturated potassium chloride solution (3mol/L KCl) weigh 22.37 grams of KCl and dissolve in 100 mL of demineralized water.

CAUTION: ***Never*** *store the electrode in distilled water. Using or storing the electrode at very high or very low temperatures (near 0°C) can damage it beyond repair.*

Cleaning of the electrode

A dirty but mechanically intact electrode can often be restored by one of the following procedures, in general: soak the electrode in 0.1 M HCl for 15 minutes.

- Deposit of proteins: soak the electrode in 0.1 M HCl to which 1% of Pepsin has been added.
- Deposit of inorganic material: rinse the electrode with a 0.1 M EDTA tetrasodium solution.
- Deposit of oil or grease films: wash the electrode in a mild detergent or solvent known to attack the particular film (but not the electrode itself!).

After cleaning, soak the electrode in a pH 7 buffer for 30 minutes. If none of these procedures improves response, replace the electrode.

Do not use the electrode in:

- base solution (pH > 10) for longer than a few hours. This can affect the glass of the electrode,
- hydrofluoric acid or in acid or base solution with a concentration greater than 1.0 M,
- solutions containing perchlorate, silver, or sulfide ions.

The electrode can be used to measure the pH of sodium hydroxide solutions with a concentration near 1.0 M, but should not be left in this concentration for periods longer than 5 minutes.

The white crust on the electrode

The white crystals you might find on the electrode are formed by the Potassium Chloride (KCl) from the storage solution. Carefully remove the electrode from the bottle of storage solution, rinse the electrode with distilled water and proceed as usual.

Calibration

The pH sensor W42 converts measured pH values to digital values. It uses 14-bit analogue-to-digital conversion resulting in a resolution of 0.001 pH. The pH sensor is supplied with a factory calibration and gives values in pH. When working with the Coach program the pre-defined calibration can be shifted by using the **Set to Value** option. For routine measurements, one buffer suffices the calibration.

Software

You can use the pH sensor W42 with Coach 7 or Coach 7 Lite (free) program on computers (Windows and Mac) or Coach 7 and Coach 7 Lite (free) app on mobile devices (Android and iOS). For Chromebooks, we offer a special Android app. The support for wireless sensors is added starting from Coach version 7.10.

Check the CMA website for the latest installations. https://cma-science.nl/downloads_en

Working with Sensor

- Turn the pH sensor on by pressing its power button.
- The sensor briefly displays its Bluetooth identification code. This code is also printed on the sticker located on the bottom side of the sensor box.
- Then the display shows:
    - the Bluetooth mode, 'Mobile' or 'PC'.
    Mobile indicates Bluetooth Low Energy mode which should be used when working with mobile devices (Android, iOS), Chromebook and Apple computers. PC indicates Bluetooth Classic which should be used for Windows computers.
    - the battery level, and
    - the current measured value.
- Now you can use the sensor as an independent measuring instrument.
- To turn off the sensor press and hold its power button for 3 sec. To save its battery the sensor automatically turns off after a few minutes of inactivity (no connection to power, no communication).

Collecting data via the Bluetooth connection

Mobile devices, Chromebooks, and Apple computers
For mobile devices (Android, iOS), Chromebooks and Apple computers Bluetooth Low Energy technology is used for wireless communication. For these devices do not pair the sensor just use it directly in the Coach software.
- Turn the pH sensor on.
- Ensure your sensor is set to Mobile mode.
If the display shows in the top-left corner 'PC' first you must set the sensor to the Mobile mode. Turn off the sensor. Then press and hold the power button until the text 'Bluetooth mode Change Mobile' is shown, then release the button. The mode is set to 'Mobile', meaning Bluetooth Low Energy is used.
- Start the Coach 7 or Coach 7 Lite program/app.
- Select the Dashboard Activity 'Measurement with Wireless sensors'.
- Coach starts searching for sensors which are turned on and in the Mobile discovery mode. The found Bluetooth sensors appear in the list.
- Select the pH sensor you want to connect to. If needed check the sensor's

Bluetooth ID which is located on the sensor's bottom label.
- When the connection is established the Bluetooth symbol appears in the top-left corner of the sensor's display and the sensor icon appears showing the measured pH values.
- Now you are ready to use the pH sensor for your measurement.

Windows computers

For Windows computers, Bluetooth Classic technology is used for wireless communication. Before you start to use the sensor for measurement in Coach you **have to pair** it.
- Turn the pH sensor on.
- Ensure your sensor is set to PC mode.
  If the display shows in the top-left corner 'Mobile' first you must set the sensor to the PC mode. Turn off the sensor. Then press and hold the power button until the text 'Bluetooth mode Change PC' is shown, then release the button. The mode is set to 'PC', meaning Bluetooth Classic is used.
- Pair your sensor.
  - Go to the Windows Settings **Bluetooth and other devices** and select **Add Bluetooth or other devices**. Select **Bluetooth device**.
  - Windows looks for Bluetooth devices and after a while lists discovered devices. The wireless sensors are listed with their Bluetooth IDs.
  - Select the sensor you want to connect to. If needed check the sensor's Bluetooth ID which is located on the bottom label of your sensors.
  - When the connection is successfully established Windows indicates that the sensor is paired and ready to go.
  - Click **Done** to accept it. The sensor appears in the list of paired Bluetooth devices.
- Start the Coach 7 or Coach 7 Lite program.
- Select the Dashboard Activity 'Measurement with Wireless sensors'.
- Coach starts searching and displays the list with detected sensors, even if they are not paired.
- Select the pH sensor you want to connect to. If needed check the sensor's Bluetooth ID which is located on the sensor's bottom label. If the sensor was not paired yet Coach will force you to pair the sensor first via Windows Settings.
- When the connection is established the Bluetooth symbol appears in the top-left corner of the sensor's display and the sensor icon appears showing the measured pH values.
- Now you are ready to use the pH sensor for your measurement.

Collecting data via the USB connection

For computers (Windows and Mac) the pH sensor can also be used as a USB sensor.

- Turn the pH sensor on.
- Use the provided USB cable to connect the sensor to a USB port.
- Start the Coach 7 or Coach 7 Lite program.
- Select the Dashboard Activity 'Measurement with Wireless sensors'.
- The connected USB sensor should be detected automatically, and its icon appears on the first empty sensor position in the Wireless sensors panel.
- When the connection is established the USB symbol appears in the top-left corner of the sensor's display and the sensor icon shows measured data.
- Now you are ready to use the pH sensor for your measurement.
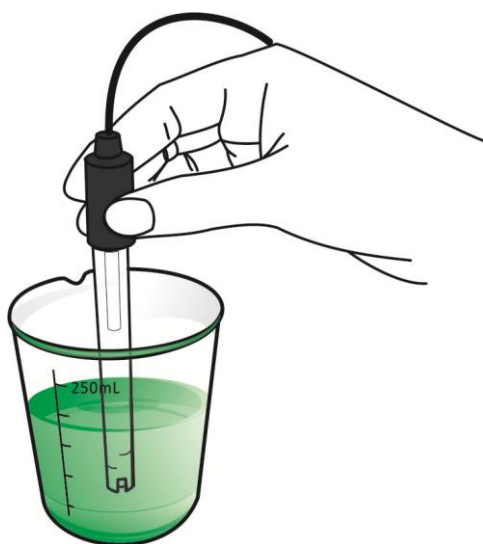
Charging a battery

An internal rechargeable battery (Li-Poly 3.7 V, 700 mAh) powers the sensor. The battery symbol located in the top-right corner of the sensor's display shows the battery level. When the battery level becomes critical, the battery gauge shows an empty battery. Use the provided cable to connect the sensor to a USB port for charging. A fully discharged battery requires up to 2 hours of charge time to become fully charged again. To prolong battery life, automatic power down turns the sensor off after 5 minutes of inactivity.

To replace the battery, use **only** the approved rechargeable batteries provided by CMA.

Suggested experiments

The pH sensor can be used for various experiments such as:

- measurements of the pH of different acids and bases,
- acid-base titration experiments,
- monitoring pH during chemical reactions,
- investigations of water quality in streams and lakes.

Technical Specifications

Sensor kind	Digital, on-sensor digital conversion, 14-bit resolution
Measuring range	0 .. 14 pH
Resolution	0.001 pH
Type electrode	Sealed, gel-filled, epoxy body, Ag/AgCl
Sensitivity	0.06 V per pH unit
Response time	90% of final reading in 1 second
Temperature range	5 to 80°C
Isopotential pH	pH 7 (point at which temperature has no effect on output)
Maximal sampling rate	4 Hz
Display	OLED 0.96" (128*64 px)
Battery	Li-Poly Rechargeable Battery (3,7 V 700 mAh)
Battery life after full charge	Approximately 13 hours Battery life varies by use, configuration, temperature, and many other factors; actual results will vary.
Connection	Bluetooth 5, Low Energy (Mac, Android, iOS) Bluetooth 2.1, Classic (Windows) USB 2.0 (type C)
Bluetooth ID	W42PH-xxx

Warranty

The pH sensor W42 is warranted to be free from defects in materials and workmanship for a period of 3 years from the date of purchase provided that it has been used under normal laboratory conditions. This warranty does not apply if the sensor has been damaged by accident or misuse.

The sensor battery is consumable and is warranted to be free from defects in materials and workmanship for a period of 12 months from the date of purchase.

Discard batteries according to local regulations.

Note: This product is to be used for educational purposes only.
It is not intended for industrial, medical, research, or commercial applications.

Rev. 01.09.2025