PH SENSOR BT61i

USER'S GUIDE

CENTRE FOR MICROCOMPUTER APPLICATIONS

http://www.cma-science.nl

Short description

The CMA pH Sensor is a general-purpose pH measurement system that allows measuring the degree of acidity/pH value of a solution in the range between 0 and 14. The sensor consists of a pH amplifier and pH electrode. The pH Electrode (031) is not delivered with the pH sensor and has to be purchased separately.

The pH Sensor can be directly connected to analog BT inputs of the CMA interfaces. The sensor cable BT - IEEE1394 needed to connect the sensor to an interface is not supplied with the sensor and has to be purchased separately (CMA Article BTsc_1).

Sensor recognition

The pH Sensor has a memory chip (EEPROM) with information about the sensor: its name, measured quantity, unit and calibration. Through a simple protocol this information is read by the CMA interfaces and the sensor is automatically recognized when it is connected to these interfaces.
If your pH Sensor is not automatically detected by an interface you have to manually set up your sensor by selecting it from the Coach Sensor Library.

pH Amplifier

The CMA pH amplifier is a device, which allows a standard combination pH electrode (such as the CMA pH Electrode (031)) to be monitored by a lab interface. The pH electrode is connected to the pH amplifier via BNC connector located on one end of the sensor box. The pH amplifier adjusts the voltage produced by the pH electrode to a range between 0 to 5 V, which can be measured by an interface.

Figure 1. The pH Amplifier (BT61i).

pH Electrode

The CMA pH electrode is designed to make measurements in the pH range of 0 to 14. It has a coax cable, with a BNC connector. The electrode (made from glass) is built in a plastic tube with an opening at the bottom side. It is supplied in a bottle filled with a protective solution. When the pH electrode is not being used, it must be kept in this liquid. For use and maintenance of the CMA pH electrode follow instructions given in its User's Guide.

Figure 2. The pH Electrode (031).

Calibration

The CMA pH sensor is supplied calibrated. The output of the sensor is linear with respect to pH value. The supplied calibration function is:

$$pH = -4.04 * V_{out} (V) + 13.68$$

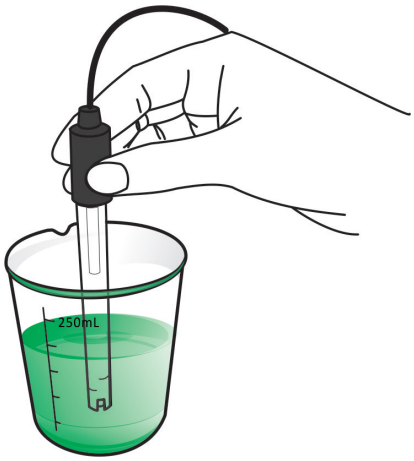
The Coach program allows selecting the calibration supplied by the sensor memory (EEPROM) or the calibration stored in the Coach Sensor Library. For better accuracy a new user calibration can be performed in the Coach program. In order to calibrate a pH Sensor, you should have a supply of pH buffer solutions that cover the range of pH values you will be measuring. To perform a two-point calibration:

- Rinse the tip of the electrode in distilled water.
- Place the electrode into one of the buffer solutions. When the voltage reading stabilizes, enter the pH value.
- For the next calibration point, rinse the electrode and place it into a second buffer solution.
- When the voltage reading stabilizes, enter the second pH value.
- Test your calibration in different known pH buffer solutions.

Suggested experiments

The pH sensor can be used for various experiments in biology, chemistry and environmental science such as:

- Measuring pH values of different acids and bases,
- Acid-base titration experiments,
- Monitoring pH during chemical reactions,
- Investigating of water quality in streams and lakes.



Practical information

- Do not place the electrode in base solution (pH > 10) for longer than few hours. This can affect the glass of the electrode.
- The pH electrode has a limited operational life and can be ordered separately. During a measurement the end of the plastic tube of the electrode has to be held approximately 1 cm in the liquid.

Technical Specifications

Sensor kind	Analog, generates an output voltage between 0 - 5 V
Measuring range	0 .. 14
Resolution using 12- bits 5V AD converter	0.005 pH
Temperature range	5°C and 80°C
Isopotential pH	pH 7 (point at which temperature has no effect on output)
Calibration function	pH = -4.04 * V_{out} (V)+ 13.68
Connection	IEEE1394 connector for BT-IEEE1394 sensor cable. Sensor cable not delivered with the sensor.

Warranty:

The pH Sensor BT61i is warranted to be free from defects in materials and workmanship for a period of 12 months 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.

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

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