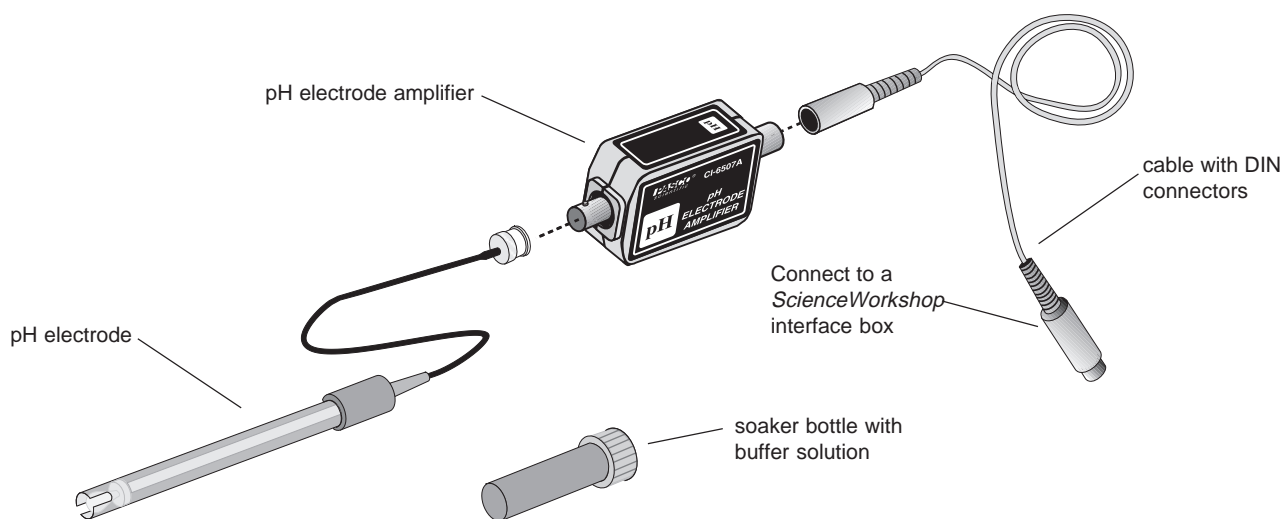


**Instruction Sheet
for the PASCO
Model CI-6507A**

pH Sensor



Introduction

The PASCO CI-6507A pH Sensor (pH electrode and amplifier) is designed to be used with PASCO *ScienceWorkshop* computer interface systems (300, 500, 700, and 750).

The pH electrode connects to the amplifier box with a BNC connector, and the amplifier plugs into the interface box directly or via a connecting cable.

The pH electrode is a standard type, producing an electrical potential difference depending on the hydrogen ion concentration (potential of hydrogen) in a solution. The pH electrode is stored in a small plastic container that contains a pH 4 buffer solution.

The pH amplifier translates the potential differences measured by the pH electrode into the voltages required by the *Science Workshop* interface. The amplifier allows any standard pH electrode to be used with *ScienceWorkshop*.

Equipment

Included:

- PASCO CI-6507A pH amplifier
- pH electrode with soaker bottle
- connecting cable
- soaker bottle containing KCl buffer solution (pH 4)

Additional Equipment Required:

- *ScienceWorkshop 300, 500, 700, or 750* Interface

Additional Material Required

- distilled water (for rinsing the pH electrode)
- buffer solutions, such as pH 4 and pH 7 (for calibration of the electrode)

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Using the pH Sensor

Connecting the pH Sensor to the interface box

1. Connect the 8-pin DIN plug of the pH Sensor amplifier box into analog channel A, B or C of the computer interface (Figure 1a).
or
Use the supplied cable to connect the pH electrode amplifier box to the analog channel of the interface box (Figure 1b).

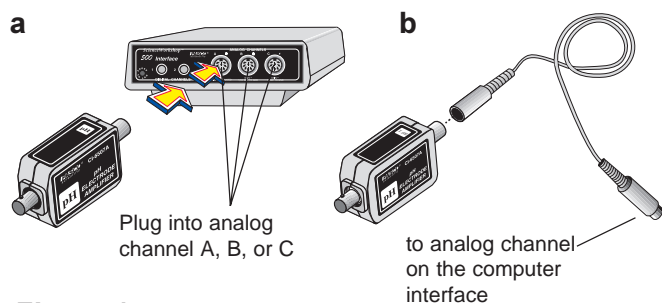


Figure 1

Connecting the pH electrode amplifier to the computer interface (two methods)

2. Unscrew and remove the protective soaker bottle from the end of the pH electrode, leaving the O-ring and cap in place on the shaft of the pH electrode.
3. Rinse the electrode tip in distilled water. If bubbles are seen in the pH electrode bulb, gently shake the electrode downward (similar to shaking down a thermometer) until the bubbles disappear.
4. Connect the pH electrode to the BNC connector of the pH electrode amplifier (Figure 2). Insert the plug at the end of the electrode cable over the BNC connector, and twist the plug one quarter turn clockwise to lock it onto the BNC connector.

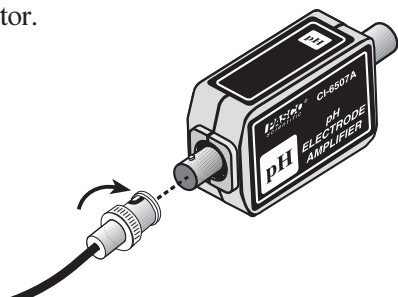


Figure 2

Connecting the pH electrode to the amplifier

Calibrating the pH Sensor

- **Note:** Use buffer solutions that are at a temperature similar to the temperature of the sample to be measured.

Two Buffer Method:

1. Run the *ScienceWorkshop* program. In the Experiment Setup window, set up the *ScienceWorkshop* interface and sensor so the pH Sensor is connected into the correct analog channel of the interface.
2. In the Experiment Setup window, double-click the pH Sensor icon to open the sensor's setup window. (Note: In *ScienceWorkshop* version 3, click the Calibration tab located near the top of the sensor's setup window.)
3. Place the pH electrode in a high pH buffer solution and wait about 30 seconds for the voltage readings to stabilize.
4. Once the readings have stabilized, click the **Take Reading** button. Enter the pH value of the high pH buffer solution in the **High Value** box.
5. Rinse the pH electrode with distilled water and then place the pH electrode in a second solution, such as a low pH buffer solution. Wait about 30 seconds for the voltage readings to stabilize. Again, after the readings have stabilized, click the **Take Reading** button. Enter the pH value of the low pH buffer solution in the **Low Value** box. Click **OK** to return to the Experiment Setup window.

One Buffer Method:

1. Choose a buffer of known pH that is close to the pH of the unknown.
2. Place the electrode in the buffer solution and wait about 30 seconds for the voltage readings stabilize.
3. Type the pH of the buffer solution in the **High Value** box, and click **Take Reading**.
4. Type **0** in the **Low Value** box, and type **0** in the **Volts** box next to the **Low Value** box.

Taking a pH Measurement

1. Rinse the pH electrode in distilled water and place it in the sample to be measured.
2. In the Experiment Setup window, set up a data display (such as the Graph display) and begin recording data.

Electrode Maintenance

Restoring the Electrode

Mechanically intact electrodes can often be restored by one of the following procedures:

- **General:** Soak the electrode in 0.1 Molar Hydrochloric Acid (HCl) for 15 minutes.
- **Proteins:** Soak the electrode in 1% Pepsin in 0.1 Molar Hydrochloric Acid (HCl).
- **Inorganic Deposits:** Rinse the electrode with 0.1 Molar Ethylene Dinitric Tetra-acidic Acid (EDTA) Tetrasodium solution.
- **Oil and Grease Film:** Wash the electrode carefully in a mild detergent or solvent known to be effective for the particular film.

If the electrode is not working well, try soaking the electrode alternately in 12 Molar NaOH (sodium hydroxide) and 1 Molar HCl (hydrogen chloride), as recommended in recent article from the Institute for Chemical Education (ICE). Leave it in each solution for one minute. Rinse completely between soakings, and end with HCl. Apparently, the NaOH etches the glass and the HCl reestablishes hydrogen ions on the surface.

- **Note:** After any of these procedures, soak the electrode in a pH 7 buffer solution for 30 minutes. If these steps fail to improve the response of the electrode, it should be replaced. Contact PASCO scientific about replacement of the pH electrode.

Electrode Storage

The pH Electrode should not be stored dry and should be stored as follows:

- Short Term Storage (up to one week): store in a pH 4 buffer solution or tap water.
- Long Term Storage (over one week): store in a pH 4 buffer solution with 1 gram per 100 milliliter of potassium chloride (KCl) added.

- **Note:** The electrode should be rinsed but never stored in distilled water.

Replacement Part

The pH electrode can be purchased separately as part number 699-085.

Specifications

(pH electrode)

- pH range = 0 to 14
- electrode type = gel-filled (nonrefillable), Ag/AgCl
- output: 0.413V to -0.413V, corresponding to a pH range 0 to 14 (0 V at pH 7)
- potential difference change/pH unit = 0.059 V

Specifications (pH amplifier)

- output: 0 to 1.4 V DC (.7 V corresponds to a pH of 7)
- pH-to-voltage ratio: 1 pH = 0.1 V



CAUTION: The electrode should not be used in percholate, silver, sulfide, or hydrofluoric solutions, or in solutions containing acids or bases that are more than 1 Molar or at temperatures above 50 °C. Use of the electrode at high temperatures can shorten the electrode life.

Contacting Technical Support

Before you call the PASCO Technical Support staff, it would be helpful to prepare the following information:

- If your problem is with the PASCO apparatus, note:
 - Title and model number (usually listed on the label);
 - Approximate age of apparatus;
 - A detailed description of the problem/sequence of events (in case you can't call PASCO right away, you won't lose valuable data);
 - If possible, have the apparatus within reach when calling to facilitate description of individual parts.
- If your problem relates to the instruction manual, note:
 - Part number and revision (listed by month and year on the front cover);
 - Have the manual at hand to discuss your questions.

For technical support, call us at 1-800-772-8700 (toll-free within the U.S.) or (916) 786-3800.

fax: (916) 786-3292
 e-mail: techsupp@pasco.com
 web: www.pasco.com



The exclamation point within an equilateral triangle is intended to alert the user of the presence of important operating and maintenance (servicing) instructions in the literature accompanying the device.

Limited Warranty

PASCO scientific warrants the product to be free from defects in materials and workmanship for a period of one year from the date of shipment to the customer. PASCO will repair or replace, at its option, any part of the product which is deemed to be defective in material or workmanship. The warranty does not cover damage to the product caused by abuse or improper use. Determination of whether a product failure is the result of a manufacturing defect or improper use by the customer shall be made solely by PASCO scientific. Responsibility for the return of equipment for warranty repair belongs to the customer. Equipment must be properly packed to prevent damage and shipped postage or freight prepaid. (Damage caused by improper packing of the equipment for return shipment will not be covered by the warranty.) Shipping costs for returning the equipment after repair will be paid by PASCO scientific.

Address: PASCO scientific
 10101 Foothills Blvd.
 Roseville, CA 95747-7100

Phone: (916) 786-3800
 FAX: (916) 786-8905
 e-mail: techsupp@pasco.com
 web: www.pasco.com

- **Note:** This instruction sheet was written assuming that the user has a basic familiarity with *ScienceWorkshop*. Users can gain basic skills by working through the tutorial within the *ScienceWorkshop* program.