Glass-Body pH Electrode BNC

(Order Code GPH-BNC)

This high-quality glass-body pH electrode can be used in non-aqueous solutions and solutions that contain organic solvents, strong acids, or strong bases. The electrode features a sealed, gel-filled Ag-AgCl combination reference electrode and uses a BNC connector. It is designed to be used with the Vernier Electrode Amplifier (order code EA-BTA) or Vernier Go Wireless® Electrode Amplifier (order code GW-EA) to make measurements in the pH range of 0 to 14.

Inventory of Items Included with the Glass-Body pH Electrode

- Glass-Body pH Electrode
- Electrode storage bottle, containing pH 4/KCl solution

NOTE: Vernier products are designed for educational use. Our products are not designed nor are they recommended for any industrial, medical, or commercial process such as life support, patient diagnosis, control of a manufacturing process, or industrial testing of any kind.

Prepare the Electrode for Use

To prepare the electrode to make measurements, follow this procedure:

- Remove the storage bottle from the electrode by first unscrewing the lid and then removing the bottle and lid. Thoroughly rinse the lower section of the probe, especially around the bulb-shaped tip, using distilled or deionized water.
- Connect the electrode to one of the Vernier electrode amplifiers. Push the BNC connector of the electrode cable onto the connector on the amplifier, then turn the BNC connector about one-half turn clockwise. It should lock tight.
- Connect the amplifier to your lab interface and run data-collection software. **Note:** Do not completely submerge the sensor. The handle is not waterproof.
- Readings can be displayed in pH or mV. Chose the desired unit before proceeding.

When you are finished making measurements, rinse the electrode with distilled water. Slide the cap onto the electrode body, and then screw the cap onto the storage bottle so the tip of the electrode is immersed in the storage solution. When the probe is not being stored in the storage bottle, it can be stored for short periods of time (up to 24 hours) in pH 4 or pH 7 buffer solution.

The electrode should never be stored in distilled water. It is a good idea to prepare a quantity of pH 4 buffer/KCl storage solution (see the section on Maintenance and Storage) and use it to replace lost solution.

Calibration

For many experiments, calibrating the Glass-Body pH Electrode is not required. We store a pH calibration equation on each electrode amplifier before shipping it. If the software displays mV and pH is desired, change the units.

The stored pH calibration equation was determined in aqueous solutions. When determining the pH in organic media or non-aqueous solutions (less than 5% water), the conventional pH range of pH 0 to 14 is not valid because it is based on the dissociation behavior of water. In applications involving non-aqueous solvents it is common to measure relative rather than absolute pH. Therefore, when doing a pH measurement in non-aqueous samples it is important to remember that the measurement will not give an absolute pH value.

To measure quantitatively in non-aqueous solvents, prepare a calibration curve for the pH electrode with different samples that have a known composition corresponding to the conditions of the samples to be measured. This makes it possible to differentiate the different sample compositions during the measurement without having to quantify an absolute value during the measurement.

For the most accurate measurements with this sensor in aqueous solutions, we recommend calibration. It is a simple process that takes only a few minutes. Vernier does not provide calibration standards for this product; it is best to make your own designed around your experimental setup. Using the standards, perform a 2-point calibration option in a Vernier data-collection program. Detailed instructions based on your data-collection program can be viewed at these web addresses:

Logger *Pro* 3: www.vernier.com/til/2341

LabQuest App: www.vernier.com/til/3394

Graphical Analysis App: www.vernier.com/til/3395

Maintenance and Storage

Short-term storage (up to 24 hours): Place the electrode in pH 4 or pH 7 buffer solution.

Long-term storage (more than 24 hours): Store the electrode in a pH 4 buffer/KCl storage solution in the storage bottle. The Glass-Body pH Electrode is shipped in this solution. Vernier sells 500 mL bottles of pH Storage Solution (order code PH-SS), or you can prepare additional storage solution by adding 10 g of solid potassium chloride (KCl) to 100 mL of pH 4 buffer solution. Flinn Scientific (800-452-1261) sells a Buffer Solution Preservative (order code B0175) that can be added to this storage solution. By storing the electrode in this solution, the reference portion of the electrode is kept moist. Keeping the reference junction moist contributes to electrode longevity and retains electrode response time when the unit is placed back into service. If the electrode is inadvertently stored dry, immerse the unit in pH 4 buffer/KCl storage solution for a minimum of eight hours prior to service.

When testing the pH electrode, it is best to measure a buffer solution because it is easier to determine if the sensor is reading correctly. Do not test your sensor by measuring distilled water. Distilled water can have a pH reading in the range of

5.5–7.0, due to varying amounts of dissolved carbon dioxide. Furthermore, due to a lack of ions, the pH values reported with the sensor in distilled water will be erratic. Remember that non-aqueous solvents are usually very ion-deficient and that this can result in measurement instabilities.

If your pH electrode is reading differently from the pH of a buffer solution (e.g., reads 6.7 in a buffer 7), you may simply need to calibrate the sensor.

If your readings are off by several pH values, the pH readings do not change when moved from one buffer solution to a different buffer, the sensor was stored dry, or the sensor's response seems slow, the problem may be more serious. A method called "shocking" can be used to revive pH electrodes. To shock your pH electrode, perform the following:

1. Soak the pH electrode for 4–8 hours in an HCl solution of 0.1 M–0.5 M.
2. Rinse off the electrode and soak the tip in long-term storage solution (recipe above) for 30–60 minutes.
3. Rinse the electrode and test it with buffer solutions of known pH.

Occasionally, mold will grow in the pH 4 buffer/storage solution. Mold will not harm the electrode and can easily be removed using a mild detergent solution. Mold growth in the storage solution can be inhibited by adding a buffer preservative.

When testing in non-aqueous solutions, the electrode will lose its hydrated gel layer around the pH-sensitive membrane. To ensure that measurements can still be performed, take care to rehydrate the gel layer in an ion-rich aqueous solution between experiments.

Specifications

Type	Glass shaft, Sealed combination electrode with Ag/AgCl reference
Response time	2 s (to 90% of full reading in aqueous buffer) 5 s (to 90% of full reading in 50% acetonitrile)
Temperature range	0 to 80°C (readings not compensated)
Range	pH 0–14
Accuracy	± 0.2 pH units (stored calibration, new) ± 0.05 pH units (user calibration)
Shaft diameter	12 mm OD

pH Electrode Accessories

Item	Order Code
pH Storage Solution, 500 mL	PH-SS
pH Buffer Capsules	PHB
pH Storage Solution Bottles, pkg of 5	BTL

Related Items

Item	Order Code
Electrode Amplifier	EA-BTA
Go Wireless Electrode Amplifier	GW-EA

Warranty

Vernier warrants this product to be free from defects in materials and workmanship for a period of five years from the date of shipment to the customer. This warranty does not cover damage to the product caused by abuse or improper use. Additionally, the warranty does not cover accidental breakage.

Measure. Analyze. Learn.™

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