pH Electrode Maintenance Guide

Calibrate

Calibration Procedure

A clean, calibrated, and conditioned pH electrode will provide accurate and repeatable results. When using a new electrode, remove the protective bulb cap and inspect the electrode.

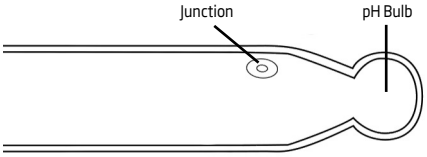
As storage solution may have evaporated during shipping or storage, salt crystals may be found in and around the protective cap or on the pH bulb. This is normal .

Rinse the electrode with water to clean salt deposits. During transport, air bubbles may have formed inside the glass bulb. Shake down the electrode as you would with a liquid thermometer. If the electrode is dry, condition the sensing tip by soaking the pH bulb and junction in HI70300L storage solution for at least one hour. An overnight soak is best. This will hydrate the electrode bulb and reference junction.

Rinse Electrode with Deionized Water (DI)

Prior to placing the electrode in calibration solution, it should be thoroughly rinsed with deionized water (DI) to prevent any contamination to the pH buffer. The electrode should always be rinsed with DI before and after placing it in any solution.

Hanna recommends using deionized water (DI) for rinsing electrodes; however, distilled, RO, pure, or demi water works as well.



Use Fresh pH Buffer for Calibration

The calibration of the pH electrode is only as good as the buffer used. For buffer pH values less than 7.01, the bottle should be used within 3-6 months after opening. For pH values over 7.01, the bottle should be used within 1-3 months for best results. To prevent cross-contamination, do not place electrode in the bottle of calibration buffer and never pour buffer back into the bottle. If the same buffer is to be used for multiple calibrations, it is better to pour a small amount of buffer in a separate container that can be sealed. If using a separate container, the buffer should be changed frequently (i.e. daily, weekly).

It is important to note that basic pH buffers (i.e. pH 7.01 and up) are less stable than acidic pH buffers. This is due to contamination from atmospheric CO_2 diffusing into the buffer, forming carbonic acid and changing the buffer pH value. If the buffer is old, the actual value might be less than stated on the bottle, which will decrease the accuracy of the calibration and measurement.

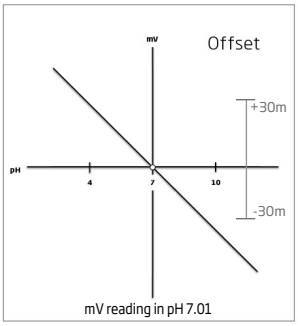
Open Reference Fill Cap on Refillable Electrodes

If using a refillable pH electrode, the fill cap should be removed prior to calibration and measurement. Removing the cap creates positive head pressure in the reference cell, allowing for higher flow rate of electrolyte through the outer junction. A higher flow rate will result in a faster and more stable reading.

Use a Stirrer

For best results, use a stirrer. A stirrer will ensure that the pH buffer or sample is homogeneous. The movement of the solution will also increase the response time of the electrode in the solution.

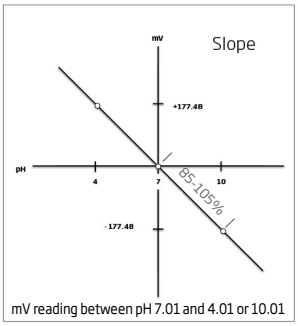
Multiple-point Calibration



mV reading in pH 7.01

It is recommended to perform a two or more point calibration. pH 7.01 should be first; this determines the offset. The second calibration point determines the slope. It is important to use fresh buffers that bracket the expected pH of the sample. For example, if the expected value is pH 8, the electrode should be calibrated using pH 7.01 and pH 10.01 buffer. Hanna Instruments recommends that the offset does not exceed +/-30 mV and the slope percentage is between 85%-105%.

Visit for instructions on calculating slope and offset hannaints.com/slope



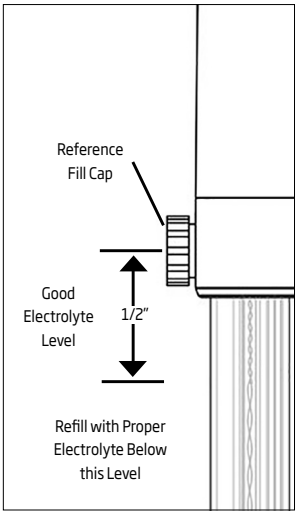
mV reading between pH 7.01 and 4.01 or 10.01

CAL Check™

Many Hanna pH meters feature CAL Check™ technology. CAL Check™ is a diagnostic system that measures accurate pH readings every time. CAL Check™ eliminates erroneous readings due to dirty or faulty pH electrodes or contaminated pH buffer solutions during calibration.

Visit hannainst.com/calcheck-portable for a list of portable pH meters or hannainst.com/calcheck-bench for benchtop pH meters.

Electrode Fill Solutions



The electrolyte level in refillable electrodes should be checked before performing any calibration. If the level is low (½" below fill hole), refill with the proper electrolyte solution and keep the cap loose or open to ensure optimal electrode performance. This simple step helps guarantee adequate head pressure to promote efficient and precise readings.

Always use the appropriate fill solution for your pH electrode. Typically, single junction pH electrodes use the HI7071 electrolyte solution (3.5M KCl + AgCl), while double junction pH electrodes use HI7082 electrolyte solution (3.5M KCl).

Clean Regularly | **Calibrate** Often | **Condition** Always

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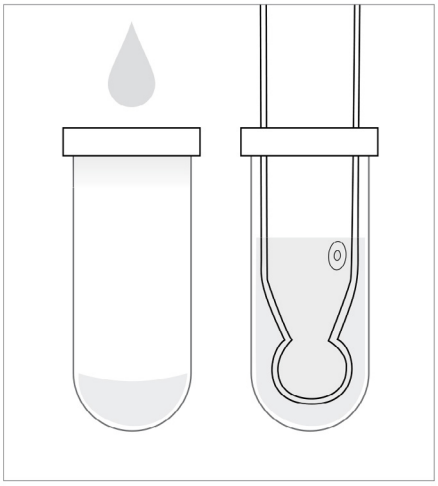
Condition (Storage)

Conditioning Procedure

To minimize junction clogging and ensure fast response time, always keep the glass bulb and the junction of your pH electrode clean and hydrated. Use HI70300L storage solution in a beaker or storage cap, making sure that the junction is covered.

If storage solution is not available, use pH 4.01 or pH 7.01 buffer. Do not store the electrode in a buffer higher than pH 7.01 or deionized (DI) water.

Never store a pH electrode in DI, distilled, RO, pure or dimi water!



The concentration of the fill solution is 3.5M KCl. The reference cell with this concentration generates a specific voltage. Placing a probe in DI water will have an osmotic effect causing water to move into the reference cell. There will also be a higher rate of diffusion of electrolyte from the reference cell into the water due to a concentration gradient. Both will result in a different reference electrolyte concentration which cause a change in the reference potential. Additionally, storage in DI can cause the sensing glass to break down overtime, premature failure, and ultimately replacement of the electrode.

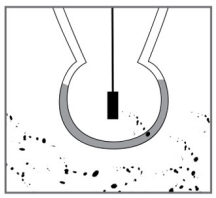
Clean

Cleaning Procedure

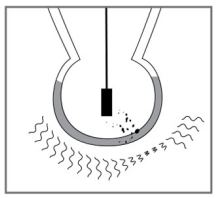
The most common cause for inaccurate measurement is a dirty or improperly cleaned electrode. Remember, just because an electrode looks clean, does not mean that it is. This is important because during calibration, the instrument assumes that the electrode is clean. pH meters on the market will accept calibrations with an offset voltage of approximately ±60 mV. Deviation from 0 mV is not unusual but ideally should be no greater than ±30 mV. The calibration process compensates for the change in offset voltage.

The pH electrode offset can be checked by placing the meter in mV mode and reading the mV potential in pH 7.01.If after cleaning, changing the fill solution, and using fresh calibration buffer, the offset is still outside the acceptable ±30mV range, the electrode may need to be replaced. For meters that do not have a mV mode, signs of dirty electrodes may include drifting readings, inability to calibrate, or slow stabilization times.

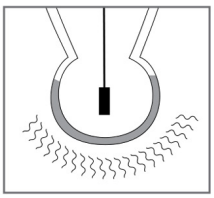
Inspect the electrode for any scratches or cracks on the bulb or stem. If any are present, replace the electrode.



Over time, particles during routine measurement can contaminate the sensor tip.



Your meter can still be calibrated even if the electrode sensor tip is not properly cleaned before calibration. If the contamination dissipates, the calibration is no longer valid and the readings are inaccurate.



A proper cleaning ensures the whole surface of the sensor tip is reading correctly, ensuring an accurate calibration

General Cleaning

Your meter can still be calibrated even if the electrode sensor tip is not properly cleaned before calibration. If the contamination dissipates, the calibration is no longer valid and the readings are inaccurate.

A proper cleaning ensures the surface of the sensor tip is reading correctly, ensuring an accurate calibration.

Visit hannainst.com/cleaning for a complete list of cleaning solutions.

Soak in Hanna HI7061L General Cleaning Solution or appropriate application specific cleaning solution for 15-30 minutes to dissolve contamination.

Protein Coating

Soak in Hanna HI7073L Protein Cleaning Solution for 15 minutes to enzymatically dissolve protein deposits.

Inorganic Soak

Soak in Hanna HI7074L Inorganic Cleaning Solution for 15 minutes. This cleaner is especially effective at removal of precipitates caused by reaction with the silver in the filling solution that may form in a ceramic junction.

Oil and Grease

Oil and grease removal requires the correct chemicals to dissolve the coating, but are mild enough to leave the electrode unaffected. Use Hanna HI7077L Oil and Fat Cleaning Solution and soak for 15 minutes.

After performing any of these cleaning procedures, rinse the electrode thoroughly with DI water and then soak the electrode in HI70300L storage solution for at least 2-3 hours before calibration and measurement. We recommend soaking overnight for best results.

Hanna has put together this guide to serve as a quick reference tool for best practices. Always remember to consult the instruction manual or contact us for detailed instructions for your specific needs.

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