

Step 1: Cleaning

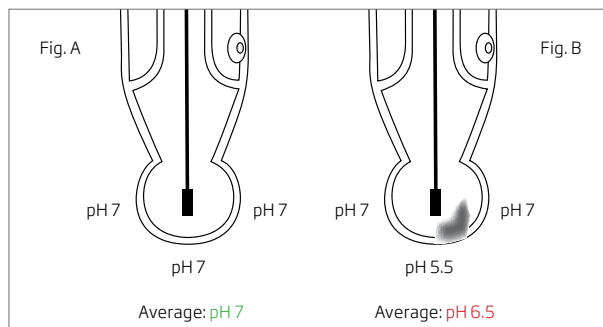


Fig. A: pH reading from a properly cleaned electrode in pH 7 solution.

Fig. B: pH reading from a dirty electrode in pH 7 solution.

Just because you can't see contamination doesn't mean it isn't there.

An electrode generates a voltage of the average hydrogen ion concentration from the surface area outside the pH bulb tip. Fig. A above shows that the clean electrode is submerged in pH 7 from all areas of the bulb surface.

When an electrode becomes dirty from use or neglect, the contaminated surface contributes to a voltage offset based on the surface area exposed to buffer as seen in Fig. B. Now the pH meter is mistakenly reading pH 6.5 instead of the actual pH 7.

Always clean your electrode before calibration. If a dirty electrode is used for calibration, all subsequent measurements will be in error.

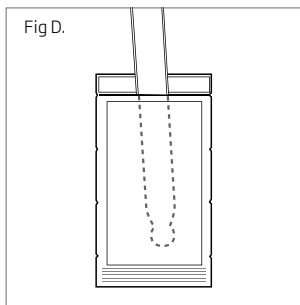
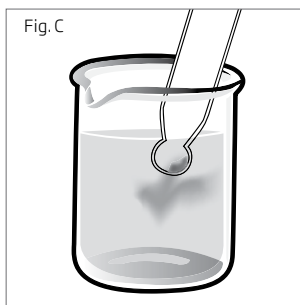
A dirty electrode can contaminate solutions.

Always use fresh solutions with each calibration. Buffer solutions can be contaminated by dirty electrodes as in Fig. C. Always clean your electrode before each calibration and measurement, and always use fresh solutions.

Contamination can take time to work its way around the beaker. If you notice fluctuations in your readings, it may be time to calibrate with fresh solutions.

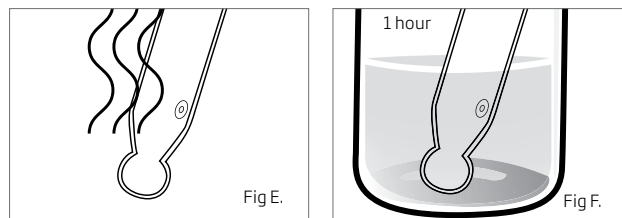
Fresh Every Time

Hanna single-use sachets are a great way to ensure your solution is always fresh. Fig. D shows just how easy it is to tear open the packet and insert the electrode. These light-tight sachets are also the ideal size for testers.



pH Cleaning Procedure

Hanna manufactures a full complement of cleaning solutions formulated to address general and specific cleaning needs.



IMPORTANT: After performing any of the cleaning procedures, rinse the electrode thoroughly with purified water (Fig. E) and soak the electrode in HI70300 or HI80300 Storage Solution for at least 1 hour before taking measurements (Fig. F).

General Cleaning

Soak in Hanna HI7061 or HI8061 General Cleaning Solution for approximately 30 minutes to dissolve mineral deposits and other general coatings.

Protein Coating

Soak in Hanna HI7073 or HI8073 Protein Cleaning Solution for 15 minutes to enzymatically dissolve deposits from protein sources.

Inorganic Soak

Soak in Hanna HI7074 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.

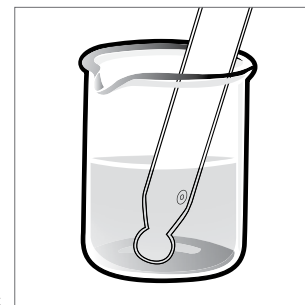
Oil and Grease Rinse

Oil and grease removal require the correct chemicals to solubilize the coating, but mild enough to leave the electrode unaffected. Use Hanna HI7077 or HI8077 Oil and Fat Cleaning Solution.

Step 2: Calibration

Calibration only counts when using fresh solutions and properly cleaned electrodes.

A pH electrode that is properly manufactured and kept clean will retain its measuring integrity for a long time. As a result of many factors such as age, use, poor maintenance or improper handling, any electrode will lose its integrity in time.



Routine maintenance will ensure accurate readings while extending the life of your electrode.

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pH and ORP Solutions

A proper calibration restores the ability of an electrode to take accurate measurements. The most common cause for pH measurement inaccuracies is an unclean or improperly cleaned electrode. This is very important to note because during calibration, the instrument assumes that the electrode is clean and that the standardization curve created during the calibration process will remain a valid reference until the next calibration. pH meters on the market today will allow an offset of approximately ± 60 mV while Hanna only allows an offset of approximately ± 30 mV. An offset voltage is the mV at 7.00 pH. The deviation from 0 mV is not unusual, in fact it represents the true characteristics of a normal pH electrode.

An offset can be compensated for by calibrating a pH meter with a properly cleaned electrode. Calibrating a meter with a dirty electrode will only compound the problem. An mV offset that continues to deviate with a properly cleaned electrode is a good indication that the electrode may need to be replaced.

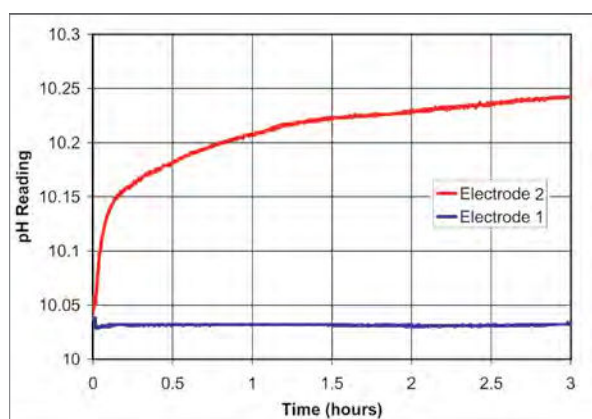


Fig G.

Electrode 1 has been properly cleaned before calibration.
Electrode 2 has not been properly cleaned.

Electrode readings may vary with insufficient cleanings.

Fig. G (above) shows that the pH measured by a dirty electrode changes over a short period of time, resulting from the residue on the pH electrode bulb. The resulting pH measurements, based upon the calibration of a coated electrode, will then be incorrect.

Conventional pH meters do not warn the user when a pH electrode is dirty or when a solution may be contaminated. A common example of this occurs just after calibrating the instrument; the pH electrode is immersed into the pH 7 buffer and the reading is lower than expected (pH 6.8 or 6.9 instead of pH 7). Hanna meters that feature our exclusive CAL Check™ electrode diagnostics automatically alert the user of any potential electrode or solution problems during calibration.

Precision Solutions

Hanna's wide range of solutions will help guarantee correct cleaning and calibration of electrodes and probes for maximum performance. Our solutions have been manufactured with your application in mind.

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Step 3: Maintenance

Measurement

Always calibrate the electrode and pH meter together before making measurements. Rinse the pH electrode sensor tip with deionized or distilled water. For a faster response, and to avoid cross-contamination of the samples, rinse the electrode tip with a few drops of the solution to be tested. Before taking measurements submerge the pH sensor tip and reference junction (~ 3 cm / $1\frac{1}{4}$ ") in the stirred sample.

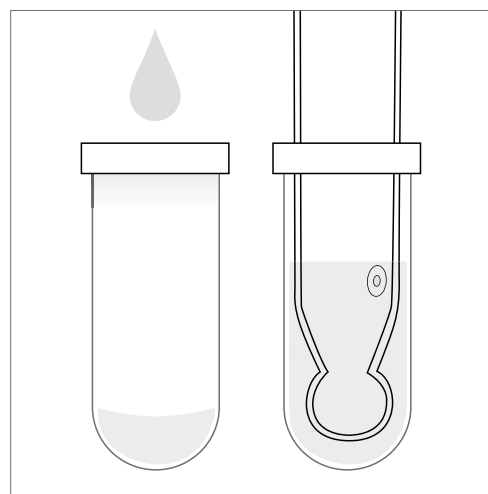


Fig H

Storage

To ensure an optimum response time, the glass sensor tip and the reference junction of the pH electrode should be kept moist and not be allowed to dry out.

Replace the solution in the protective cap with a few drops of HI70300 or HI80300 Storage Solution or, in its absence, with pH 4 or pH 7 buffer (Fig H).

NOTE: Never store the electrode in distilled or deionized water.



Inspect

Inspect and clean the electrode on a regular schedule to ensure the electrode will be ready when you need it. Coatings and reactions from samples result in decreased efficiency and longer response times.

General Cleaning, Storage and Refilling Solutions

General Use Electrode Cleaning Solutions

Clean sensing portion of your electrodes weekly to prevent fouling and to maintain accuracy. Immerse the electrode in the proper cleaning solution for at least 15 to 20 minutes.

Electrode Storage Solutions

To minimize junction clogging and ensure fast response time, always keep the glass bulb and the junction of your pH electrode moist. Store the electrode with a few drops of HI70300 storage or pH 4 or pH 7 buffer solution in the protective cap.

Electrode Fill Solutions

The electrolyte level in refillable electrodes should be checked before performing any measurement. If the level is low, refill with the proper electrolyte solution to ensure the correct electrode performance. This simple maintenance helps guarantee adequate head pressure to keep the liquid junction flowing.

Some electrolyte solutions are available in FDA compliant bottles.



General Use Electrode Cleaning Solutions

Code	Application	Package
HI70000P	rinsing	20 mL sachet (25)
HI7061L	general purpose	500 mL bottle
HI7061M	general purpose	230 mL bottle
HI7073L	proteins	500 mL bottle
HI7073M	proteins	230 mL bottle
HI7074L	inorganic substances	500 mL bottle
HI7074M	inorganic substances	230 mL bottle
HI7077L	oil and fats	500 mL bottle
HI7077M	oil and fats	230 mL bottle
HI8061L	general purpose	500 mL FDA bottle
HI8073L	proteins	500 mL FDA bottle
HI8077L	oil and fats	500 mL FDA bottle

Electrode Storage Solutions

Code	Description	Package
HI70300L	electrode storage solution	500 mL bottle
HI70300M	electrode storage solution	230 mL bottle
HI80300L	electrode storage solution	500 mL FDA bottle
HI80300M	electrode storage solution	230 mL FDA bottle

Electrode Fill Solutions

Code	Description	Package
HI7071	electrolyte solution, 3.5M KCl + AgCl	30 mL bottle (4)
HI7071M	electrolyte solution, 3.5M KCl + AgCl	230 mL bottle
HI7071L	electrolyte solution, 3.5M KCl + AgCl	500 mL bottle
HI7072	electrolyte solution, 1M KNO ₃	30 mL bottle (4)
HI7072L	electrolyte solution, 1M KNO ₃	500 mL bottle
HI7075	electrolyte solution, 1.7M KNO ₃ , 0.7M KCl	30 mL bottle (4)
HI7076	electrolyte solution, 1.0M NaCl	30 mL bottle (4)
HI7078	electrolyte solution, 0.5M (NH ₄) ₂ SO ₄	30 mL bottle (4)
HI7082	electrolyte solution, 3.5M KCl	30 mL bottle (4)
HI7082M	electrolyte solution, 3.5M KCl	230 mL bottle
HI7082L	electrolyte solution, 3.5M KCl	460 mL bottle
HI8071	electrolyte solution, 3.5M KCl + AgCl	30 mL FDA bottle (4)
HI8082	electrolyte solution, 3.5M KCl	30 mL FDA bottle (4)
HI8093	electrolyte solution, 1M KCl + AgCl	30 mL FDA bottle (4)

Specific Cleaning Solutions - Bottles

Code	Description	Size
HI70630L	acid cleaning solution for meat grease and fats (food industry)	500 mL
HI70631L	alkaline cleaning solution for meat grease and fats (food industry)	500 mL
HI70632L	cleaning and disinfection solution for blood products	500 mL
HI70635L	cleaning solution for wine deposits (winemaking)	500 mL
HI70636L	cleaning solution for wine stains (winemaking)	500 mL
HI70640L	cleaning solution for milk deposits (food industry)	500 mL
HI70641L	cleaning and disinfection solution for dairy products (food industry)	500 mL
HI70642L	cleaning solution for cheese residues (food industry)	500 mL
HI70643L	cleaning and disinfection solution for yogurt products (food industry)	500 mL
HI70663L	cleaning solution for soil deposits (agriculture)	500 mL
HI70664L	cleaning solution for humus deposits (agriculture)	500 mL
HI70670L	cleaning solution for salt deposits (industrial processes)	500 mL
HI70671L	cleaning and disinfection solution for algae, fungi and bacteria (industrial processes)	500 mL
HI70681L	cleaning solution for ink stains	500 mL



- The easy to open and always fresh sachet package is a practical and ideal solution for field measurements.

Specific Cleaning Solutions - Sachets

Code	Description	Qty/Size
HI700601P	general purpose cleaning solution for laboratories	20 mL (25)
HI700630P	acid cleaning solution for meat grease and fats (food industry)	20 mL (25)
HI700635P	cleaning solution for wine deposits (winemaking)	20 mL (25)
HI700636P	cleaning solution for wine stains (winemaking)	20 mL (25)
HI700640P	cleaning solution for milk deposits (food industry)	20 mL (25)
HI700641P	cleaning and disinfection solution for dairy products (food industry)	20 mL (25)
HI700642P	cleaning solution for cheese residues (food industry)	20 mL (25)
HI700643P	cleaning and disinfection solution for yogurt products (food industry)	20 mL (25)
HI700661P	general purpose cleaning solution for agriculture	20 mL (25)
HI700663P	cleaning solution for soil deposits (agriculture)	20 mL (25)
HI700664P	cleaning solution for humus deposits (agriculture)	20 mL (25)
HI700670P	cleaning solution for salt deposits (industrial processes)	20 mL (25)

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Cleaning Solution Series

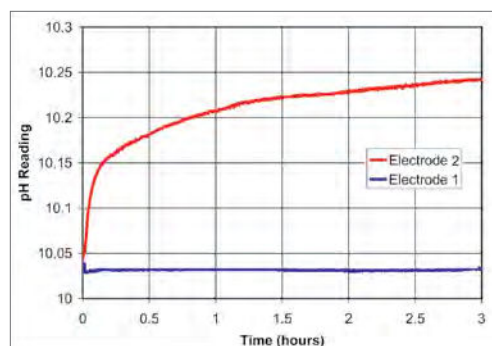


Focused Cleaning for a Top Performing Sensor

In many applications, electrodes become contaminated from use and produce inaccurate results. Since these contaminants cannot be removed during normal use, special cleaning solutions are needed.

Hanna has prepared a complete line of cleaning and disinfection solutions that eliminate impurities and residues left on electrode surfaces when immersed in special samples; residues may result from measurements in wines, musts, oils, soil, industrial solutions, grease, algae, and dairy products.

The Cleaning Solution Series ensures maximum efficiency and accuracy of your sensors when used for its designated application



Electrode 1 has been properly cleaned before calibration.

Electrode 2 has not been properly cleaned.