



pH Electrode Troubleshooting Guide

pH Trouble Shooting Guides for Buffer Reading, Possible Cause, Corrective Action, Speed of Response, Offset, Span and Ground Loops are listed below. If you can't find what you're looking for, please [Contact Us](#).

Buffer reading	Possible Cause	Corrective Action
6.2-6.8 in all buffers	a) Cracked pH glass b) Stress crack	a) Replace electrode b) Contact Sensorex for Return Authorization
7.00 in all buffers	a) Bad connection b) Internal short circuit	a) Check/fix connection b) Contact Sensorex for Return Authorization
Buffers read close to expected value but speed of response* is slow (>30 seconds)	a) Dirty electrode pH glass and/or reference junction b) Temperature too low	a) Clean electrode per instructions included with it when shipped b) Flat pH glass pH electrodes should be used at temperature >10C/50F Bulb pH should be used at temperature >0C/32F
Large offset in buffers**	a) Reference poisoned b) Ground loop****	a) Contact Sensorex about special references b) Ground solution for tank or line to known earth ground or buy Sensorex Ground Loop Interrupt pH electrode
Short span*** (Typically less than 70%)	a) Dirty pH glass or reference junction b) aged electrode	a) Clean electrode per electrode's care and use instructions b) Replace electrode (too old)
Unstable or drifting reading	Reference dirty or plugged	Clean electrode per electrode's care and use instructions (do not use abrasives to clean reference junctions!)

DESIGNED AND ASSEMBLED IN CALIFORNIA, USA

11751 MARKON DRIVE • GARDEN GROVE, CA 92841 • 714.895.4344 • WWW.SENSOREX.COM

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Speed of Response*

If you are still having problems after trying the above diagnostics, fill out our [Application Questionnaire](#) and e-mail it to us for assistance.

Offset*

New pH electrodes from Sensorex with spherical pH measuring surfaces will respond to within 95% of their final value in less than one second. New flat surface electrodes (due to their higher initial impedance) have 95% response in less than five seconds. As electrodes age, their impedance will increase and their Speed of Response will become slower. Coatings on the pH glass will also give a slower response time.

A perfect electrode will read 7.00 in 7.00 buffer. Offset is defined as the difference between the electrode's reading in 7.00 buffer and 7.00. For example, when an electrode reads 7.15 in 7.00 buffer, its Offset is 0.15 ($7.15 - 7.00 = 0.15$). The factory specification for a new electrode is 7.00 ± 0.20 pH since all modern meters and controllers are easily capable of correcting such offset.

Span***

A perfect electrode will have 100% of the theoretical Span which means that when an electrode is calibrated to read 7.00 in 7.00 buffer and is placed in 4.00 buffer, it will read 4.00. Sensorex specification for a new electrode is at least 97% of theoretical Span. So when an electrode is placed in 4.00 buffer, it can read between 3.90 and 4.10. Similar to Offset, most meters and controllers have Span adjustments to correct for span errors. Normal electrode aging will reduce the Span. As long as the pH meter or controller has sufficient adjustment to correct the reduced span, the electrode is usable, providing the speed of response is acceptable to your process. Coating on the pH sensitive glass can also reduce the Span.

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Ground Loops***

When a pH system is unstable, erratic, or the offset drifts, the most common problem is an electrical ground loop in the system, particularly if the tank and/or pipes are plastic. To verify this problem, remove the electrode and calibrate it in a known buffer in a beaker. If the electrode measures within specification (stable and adjustable offset) when calibrated, place a copper wire in the beaker and the other end in your system. If the reading becomes unstable or shifts, a ground loop is your problem.

**ELECTRODE CALIBRATES
IN BUFFER**

**THEN ELECTRODE READS HIGH
OR OUT OF RANGE IN PROCESS**



The sources of the ground loop could be any mixer motor, pump, conductivity probe, or other electrically powered device in the media with the pH electrode. Do not attach the conductivity probe or any other electrically powered device to the same ground on your meter or controller as the pH electrode. You can also try placing a large (12 or 14 AWG) copper wire into the media and the other end to the meter or controller ground terminal to draw the ground loop away from the pH electrode. Sensorex also offers a [Ground Loop Interrupt electrode](#) to solve this problem.

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