



## ORP Sensor Troubleshooting Guide

Troubleshooting guide for Equipment, Meter, Preamplifier, Controller, ORP Electrode, Speed of Response, Offset, and Span. If you can't find what you're looking for, please [Contact Us](#).

### Troubleshooting Equipment

The following tools are recommended to assist you in problem identification:

- Portable pH/mV meter with interconnect cable
- The meter and mV standards can verify operational status of an ORP electrode.
- DVM (Digital Volt Meter)
- If you do not have a portable pH/ORP meter, you can read ORP electrode output on a DVM in millivolt scale.
- pH/ORP Simulator
- Simulators similar to Sensorex C110 pH/ORP Checker can quickly identify or eliminate the meter, preamplifier, or controller as the cause of the problem.
- ORP/mV solutions
- Use 7 and either 4 or 10 buffer depending upon at which end of the pH scale you normally operate in.

### Meter, Preamplifier, Controller Troubleshooting

The meter or controller is the easiest component to eliminate as a possible cause of your problem. Follow the stepwise instructions below for quick problem solving.

- Disconnect the ORP electrode from the meter, preamplifier (if you have an external preamp), or controller.
- Connect a pH/ORP Simulator (like the Sensorex C110 pH/ORP Checker) in the position where the electrode was connected.
- Set the C110 simulator to +mV (+700mV) and verify the meter, preamplifier, or controller output.
- Reset the C110 simulator to -mV and verify output. If you did not get +700 and -700mV respectively, recalibrate or troubleshoot the meter, preamplifier, or controller in accordance with its instruction manual. Note that miswired preamps usually give negative readings or constant zero reading regardless of electrode or simulator input

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## ORP Electrode Troubleshooting

Remove the electrode from the sample or process and disconnect it from the meter or controller. Connect to the portable pH/mV meter or DVM and test electrode in ORP/mV solutions of your choice. We suggest using two standards so that a span/slope\*\* number can be established. Compare results to the following table:

ORP standard solution output	Possible Cause	Corrective Action
0 mV in all mV standards	a) Bad connection b) Internal short circuit	a) Check/fix connection b) Contact Sensorex for Return Authorization
Large offset in ORP/mV solutions**	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 <a href="#">Ground Loop Interrupt ORP electrode</a> for <a href="#">S8100 Submersion ORP Sensor</a>
Short span*** (Typically less than 70%)	a) Dirty platinum or reference junction or scratched platinum 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!)

If you are still having problems after trying the above diagnostics, fill out our Application Questionnaire and email it to us for assistance.

### Speed of Response\*

New ORP electrodes from Sensorex will respond to within 95% of their final value in less than 30 seconds in ORP solutions/mV standards. Response in the solution being measured may be slow and could take hours to equilibrate. As electrodes age, Speed of Response will become slower. Coatings or scratches on the ORP electrode's platinum surface will also give a slower response time.

### Offset\*\*

A perfect electrode will read within the range of the respective ORP/mV solution as shown on the label. Offset is defined as the difference between the electrode's reading in an ORP/mV solution and the expected range. For example, when using Sensorex's ORP Calibration Kit, pH 7 buffer + quinhydrone should give 70-105mV (90mV being a perfect reading) and pH4 + quinhydrone should give 245-280mV (260mV being a perfect reading). Also available are premixed standard solutions such as B225 (225+/-11mV). Based on the ranges, an electrode that reads outside of the range should be evaluated further. Cleaning the electrode or replacing should rectify the offset.

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## Span\*\*\*

A perfect electrode will have 100% of the theoretical Span which means that when an electrode is measured in two different ORP/mV solutions and the difference is calculated, if the difference is within 10% of the ideal span then the electrode can continue to be used. Normal electrode aging will reduce the Span.

## Ground Loops\*\*\*\*

When an ORP 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. This will permit voltage in the system to be transferred through the wire into the solution in the beaker. If the reading becomes unstable or shifts, a ground loop is your problem. To fix the ground loop, ground the solution to a known earth ground source or use a Sensorex Ground Loop Interrupt ORP electrode.

**ELECTRODE CALIBRATES  
IN BUFFER**

**THEN**

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



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