
ISE Sensor Calibration: Performing a 3-Point Calibration Instructions for ISE Sensors

Glenn Carlson, Technical Support, In-Situ Inc.
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Overview

While most sensors on In-Situ products can be calibrated in about five minutes, the ISE sensors require 45-60 minutes of laboratory time to calibrate properly. If the sensor has been shipped dry, it will also require a day or two of conditioning before use.

Procedure

1. Soak the sensor in one of the calibration standards that will be used. This can be done with the sensor removed from the TROLL[®]. If the sensor membrane is dry, it should soak in this standard solution for 24-48 hours before the first use.
2. To calibrate the ISE sensor, insert it into port #3 of the TROLL (center port) and connect to the TROLL with Win-Situ.
3. Perform the Quick Cal first, and then rinse all of the sensors well with clean water.
4. Under "Parameters" in the Win-Situ navigation tree, highlight the ISE sensor, and then press the "Calibrate" button.
5. The three point calibration will be done using two standards of different concentrations, with one of the standards being measured at different temperatures as follows:
 - a. Point 1 = Standard #1 at room temperature
 - b. Point 2 = Standard #2 at room temperature.
 - c. Point 3 = Standard #2 in ice bath (held at constant temperature)NOTE: Standard #2 should be 10x the concentration of standard #1. Enter the appropriate standard concentrations where prompted
6. It is better to use small beakers for this calibration rather than the calibration cup. This permits the use of a smaller volume of calibration solution. It is also much easier to control temperature in the glass beakers as opposed to the thick plastic calibration cup. Immerse the tip and as much of the body of the ISE sensor in the room temperature solution #1 as possible. It is important to submerge as much of the sensor as possible because this allows

the internal reference cell to equilibrate to the same temperature as the sensing electrode and membrane. This allows for the most accurate calibration possible. Let the sensor sit in the calibration solution for at least five minutes before hitting the "Run" button on each step of the calibration wizard. Waiting fifteen minutes is preferable. This allows both the membrane to adjust to the concentration of the solution as well as allows full temperature equilibration before readings are initiated.

7. Before starting measurement of the third calibration point, pre-chill the calibration solution and immerse the beaker containing it in an ice bath for the duration of the calibration. Let the sensor sit in this chilled solution for fifteen minutes prior to hitting "Run" for the third calibration point.

Conclusion

Although somewhat involved, this three-point calibration process will allow the sensor to make corrections for temperature differences. This is the biggest source of error for Ion Selective Electrodes. Once this three-point calibration has been done, the sensor will remember the slope and temperature correction factor from it. The user will then be able to do a single point calibration prior to making field measurements over the course of the next several days. This single point calibration will establish the correct offset to use at that time (always a moving target), but will remember and use the slope and temperature correction from the earlier three-point calibration. Your test results will tell you how long you can get away with using this one point calibration before another three point calibration is needed, but expecting about a week of such operation is reasonable.

For more information contact In-Situ Inc.

221 East Lincoln Avenue

Fort Collins, CO 80524

Toll-Free 1-800-446-7488 (U.S. & Canada)

Internet: www.in-situ.com