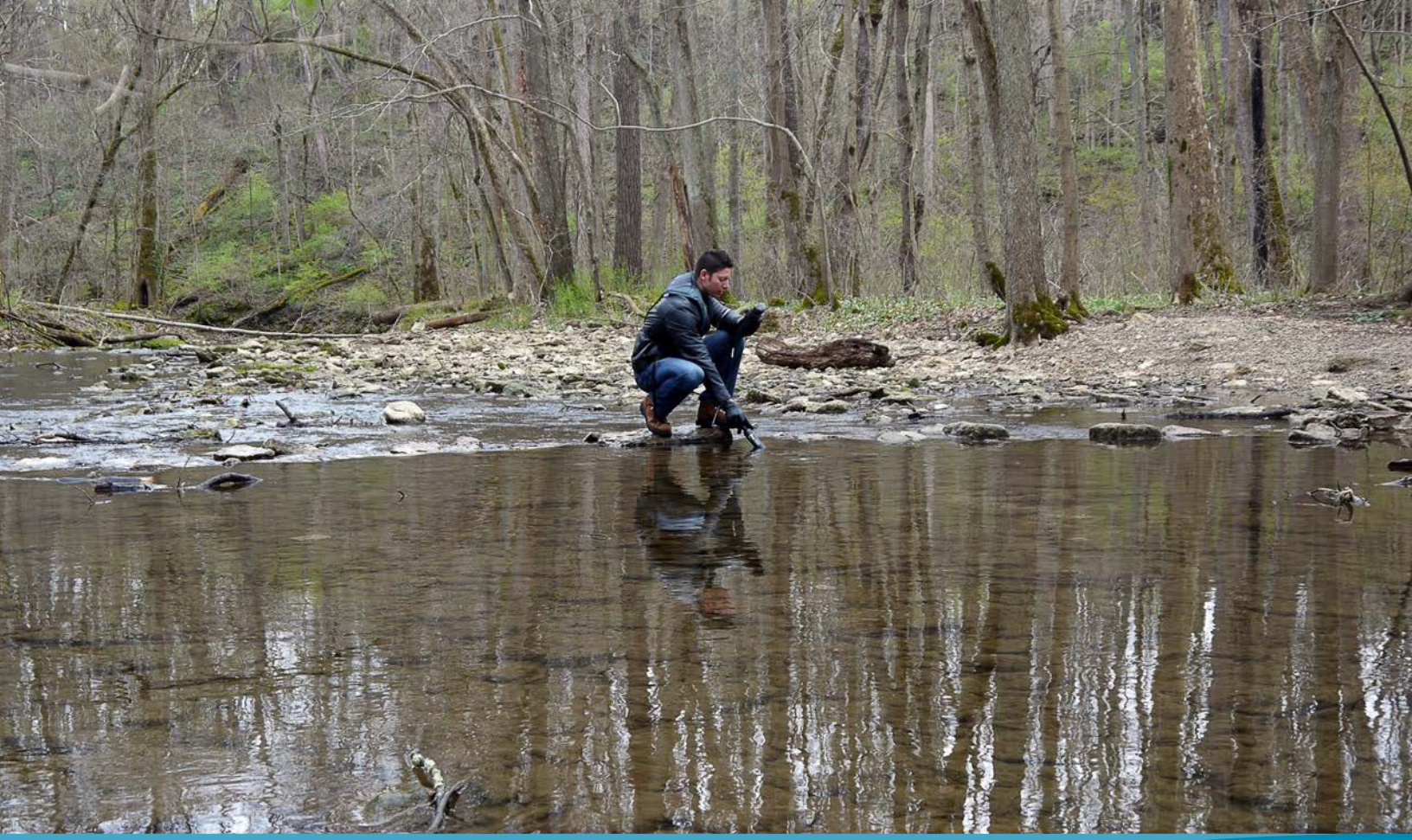

ProDSS Calibration Guide

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YSI

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Introduction

This guide provides helpful instructions, tips and troubleshooting suggestions for calibrating a ProDSS instrument. For more detailed information on calibration and information on how to setup and operate a ProDSS, please refer to the ProDSS User Manual.

Calibration Worksheet

The Calibration Worksheet on the following pages is provided for your convenience. This can help document your calibration and track the performance of your sensors. Please follow the detailed calibration procedures in the ProDSS manual or your facility's standard operating procedure (SOP) to ensure all calibrations are as accurate and as consistent as possible.

Refer to the YSI Solution Expiration Dates document to ensure your calibration solutions are fresh. In addition to using fresh standards, never accept out-of-range or questionable calibration results.

Calibration Date_____ ***Technician:***_____

Handheld Serial Number:_____ ***Handheld Software Version:***_____

Cable Serial Number:_____

Temperature

*Reading when sensor is dry and in room temp air:*_____ *Accurate?* ***Y*** ***N***

Conductivity

*Reading when sensor is dry and in room temp air:*_____ *Acceptable value is less than* ***1 µS/cm***

*Actual Reading in solution before calibration is accepted:*_____

*Reading in calibration solution after calibration is completed:*_____

Conductivity Cell Constant in GLP record after calibration:*_____

Acceptable range for ProDSS conductivity/temperature sensors (626902) is ***4.5*** *to* ***6.5***

Acceptable range for integral (i.e. built-in) sensors on ODO/CT assemblies is ***4.4*** *to* ***6.4***

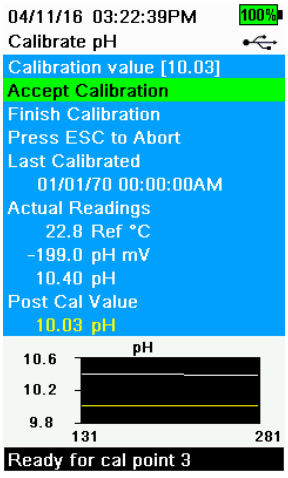
Optical Dissolved Oxygen

*Barometric pressure:*_____

*Actual Reading before DO% calibration is accepted:*_____

*Reading in DO% calibration environment after calibration is completed:*_____

*ODO gain in GLP record after calibration:*_____ *Acceptable range is* ***0.75*** *to* ***1.50***



pH

		Actual Readings during calibration		
Buffer	*Calibration Value*	*pH*	*pH mV***	*Acceptable pH mV in buffer*
7				-50 mV to 50 mV
4				+165 to +180 from pH 7 buffer mV value
10				-165 to -180 from pH 7 buffer mV value

*pH slope in GLP record after calibration:*_____ *Acceptable range is ~* ***55*** *to* ***60*** *pH/mV (Ideal is 59.16 mV/pH)*

ORP

*Actual Reading in solution before calibration is accepted:*_____

*Reading in calibration solution after calibration is completed:*_____

*ORP Cal Offset in GLP record after calibration:*_____ *Acceptable range is* ***-100*** *to* ***50***

**GLP stands for Good Laboratory Practice file. This calibration record contains important information about the calibration result.*

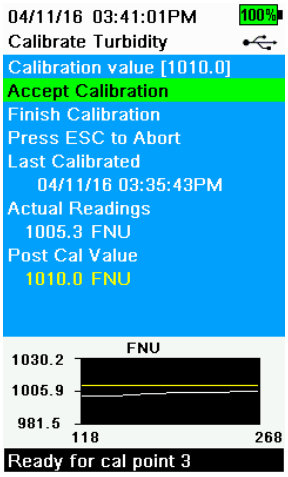
***The pH mV at the time of calibration (Sensor Value) can also be seen in the final pH GLP record.*

Turbidity

Calibration value (FNU)*	Actual Reading during calibration
0	
12.4*	
124*	
1010	

*Acceptable range for **Actual Reading** during calibration of the first point is **-10** to **10** FNU*

***Note:** The turbidity sensor can be calibrated to 3 points. Either 12.4 or 124 FNU standard can be used for the second point, but not both. Other calibration values can be used when calibrating.*



Depth (Completed in Air)

Actual Reading before calibration is accepted:_____

Reading in air after calibration is completed:_____

Ammonium

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
1st point: 1 mg/L			-20 mV to 20 mV
2nd point: 100 mg/L			+90 to +130 from mV value in 1 mg/L standard

Nitrate

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
1st point: 1 mg/L			180 mV to 220 mV
2nd point: 100 mg/L			-90 to -130 from mV value in 1 mg/L standard

Chloride

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
1st point: 10 mg/L			205 mV to 245 mV
2nd point: 1,000 mg/L			-80 to -130 from mV value in 10 mg/L standard

***Other standard concentrations can be used. A 2 point calibration without chilling a third calibration solution is extremely accurate and is the preferred method. However, if there is a large temperature variation during sampling, a chilled third calibration point is recommended.*

****The mV at the time of calibration (Sensor Value) for each point can also be seen in the GLP record after a calibration is complete.*

Temperature

Calibration Tips

Before calibrating any other ProDSS sensor, verify the temperature sensor is reading accurately by comparing it to a traceable thermometer or other known reference in a water bath.

With the exception of the turbidity and TSS, accurate temperature compensation is required for all parameters, so temperature accuracy should be verified and recorded each time the ProDSS is calibrated. Be sure to consider the specification tolerances of both the ProDSS temperature sensor and the thermometer when comparing the measurements.

The ProDSS temperature sensor cannot be calibrated nor should calibration be required.

Troubleshooting Tips

If the temperature sensor is not reading accurately, ensure that it is clean and free of debris. The conductivity cleaning brush and warm water with mild detergent can be used to scrub the temperature sensor if needed. Alternatively, you can use a toothbrush to clean the sensor.

ProDSS 4 port cables feature a replaceable conductivity/temperature sensor (626902), while all other ProDSS cables have integral (i.e. built-in) temperature sensors. If using a ProDSS 4 port cable and your temperature sensor is not reading accurately even after cleaning, remove the conductivity/temperature sensor from the cable and inspect the sensor port and sensor connector for any damage or moisture. Please follow the section on Cleaning a Sensor Port if needed.

Conductivity

The conductivity calibration should be verified every day the instrument is used. However, the conductivity sensor is very stable and may hold its calibration for several weeks.

Calibration Tips

1. It is not necessary to calibrate conductivity, specific conductance and salinity. Calibrating one of these parameters will simultaneously calibrate the others. YSI recommends calibrating specific conductance (temperature compensated conductivity) for greatest ease and accuracy.
2. Ensure the conductivity sensor is clean and dry before performing a specific conductance calibration.
3. Always use fresh, traceable conductivity calibration solution when calibrating the conductivity sensor.
    a. The shelf life of conductivity solution is one month after being opened. This is due to potential changes in the value of the solution caused by evaporation which can occur after opening the bottle. Be sure to write the open date on the bottle so you know that you are using good calibration solution.

b. Never calibrate with a conductivity solution that is less than 1.0 mS/cm. You are setting the slope on a linear device so a good, strong conductivity signal will give you the best performance. Use 1.0 mS/cm for fresh water, 10 mS/cm for brackish to estuarine water and 50 mS/cm for salt water. Please note that 1.0 mS (millisiemens) = 1000 uS (microsiemens).

4. Pre-rinse the cal cup and sensors with a small amount of calibration standard or rinse standard and discard.
5. The calibration solution must cover the top vent holes of the conductivity sensor. If the entire sensor is not in solution, the instrument will read approximately half the expected value.
    a. If using a ProDSS 4 port cable, the top vent hole is located on the side of the combination conductivity/temperature sensor (i.e. 626902 sensor). Filling the ProDSS calibration cup to line 2 (i.e. the top line) when the cup is empty will ensure the vent hole is covered.

    or

    b. If using the ODO/CT assembly, ensure the vent holes at the top of the sensor are completely immersed and the solution level is at least 1/2 inch higher than these top vent holes.
6. After placing the sensor into the solution, gently move the sensor up and down to remove any air bubbles that may be trapped in the conductivity sensor.
7. If calibrating Specific Conductance, enter the value of the conductivity solution as it is listed for 25 °C. Make sure you are entering the correct units. 1 mS = 1,000 uS.
8. If you receive a warning message stating that the calibration is questionable, do not continue with the calibration. Instead, select 'No' and investigate what is causing the questionable results. If you accept a questionable calibration, your conductivity readings (and your DO mg/L readings) will be erroneous. Typical causes for this error message include: incorrect entries (entering 1000 uS/cm instead of 1.0 mS/cm), not using enough solution to cover the vent holes, air bubbles trapped in the sensor, calibrating in conductivity instead of specific conductance, dirty conductivity electrodes, and/or bad calibration solution.
9. After accepting a good calibration, navigate to the GLP file and check the conductivity cell constant for the calibration. The cell constant should be 5.0 to 6.0 for highest accuracy (4.9 to 5.9 on ODO/CT probe and cable assemblies). However, 4.5 to 6.5 is the acceptable range (4.4 to 6.4 on ODO/CT cables).

Troubleshooting Tips

If you get an error message during calibration, be sure that you are:

1. Entering the correct calibration value (1 mS/cm = 1000 uS/cm).
2. Calibrating in Specific Conductance mode.
3. Using enough solution to cover the vent holes on the sensor.
4. Dislodging any air bubbles that could be trapped in the sensor.
5. Using a fresh, traceable conductivity calibration solution.

If you are following the above recommendations and still receiving an error message, check the conductivity sensor to make sure it is clean. A clean conductivity sensor should read less than 1 uS/cm in dry air. If your sensor is dry and giving you a reading higher than 1 uS/cm in air, it should be cleaned.

Any significant jump or change in the conductivity cell constant from one calibration to the next usually indicates a problem with the calibration and/or sensor. If you are sure that your calibration standard is good and your calibration process is correct, then your sensor may need to be cleaned.

Cleaning the Conductivity Sensor

The openings that allow sample access to the conductivity electrodes should be cleaned regularly. The small cleaning brush included with each new conductivity sensor and cable is intended for this purpose. Dip the brush in clean water and insert it into each hole 10 to 12 times. In the event that deposits have formed on the electrodes, it may be necessary to use a mild detergent (laboratory grade soap or bathroom foaming tile cleaner) with the brush. Rinse thoroughly with clean water, then check the response and accuracy of the conductivity sensor with calibration solution.

Cables with user-replaceable sensors

If using a 4 port cable and your conductivity sensor is not calibrating or is reading > 1 uS/cm in dry air after being cleaned, remove the conductivity/temperature sensor from the cable and inspect the sensor port and sensor connector for any damage or moisture. Please follow the section on Cleaning a Sensor Port if needed.

Cables with integral (i.e. built-in) sensors

If your conductivity sensor is not calibrating or is reading > 1 uS/cm in dry air after performing a sensor cleaning, contact your local YSI Representative or a YSI Authorized Service Center.

pH

The pH calibration should be verified every day the instrument is used. However, a new pH sensor may be capable of holding its calibration for several days.

pH Calibration Tips

1. The pH sensor can be calibrated with up to three calibration points.
2. Calibration can be accomplished in any buffer order.
3. pH 7 buffer should be used regardless of how many calibration points you use; however, it does not have to be the first point.
4. In most cases, a two-point calibration is all that is required (4 and 7 or 7 and 10). You can bracket the expected in-situ pH values. Use a three-point calibration with 4, 7 and 10 if the in-situ pH values are unknown or if you expect the in-situ values to be on both sides of the pH scale.

5. Rinse the sensors and cal cup with a small amount of pH buffer. Fill the cup so that the pH sensor tip and the temperature sensor are submerged in buffer.
6. Calibration values will not have to be entered if using a USA (4, 7, 10) or a NIST (4.01, 6.86, 9.18) buffer set, as the ProDSS will automatically recognize these buffers and will compensate the calibration value for temperature. The buffer set can be changed in the pH Sensor Setup menu.
7. Record the pH millivolts for each calibration point. The acceptable mV outputs for each buffer are shown below.

   pH 7 mV value = 0 mV +/- 50 mV
   pH 4 mV value = +165 to +180 from pH 7 buffer mV value
   pH 10 mV value = -165 to -180 from pH 7 buffer mV value

   - A value of +50 or -50 mVs in buffer 7 does not indicate a bad sensor.
   - The mV span between pH 4 and 7 and 7 and 10 mV values should be ≈ 165 to 180 mV. 177 is the ideal distance. The slope can be 55 to 60 mV per pH unit with an ideal of 59 mV per pH unit.
   - If the mV span between pH 4 and 7 or 7 and 10 drops below 160, clean the sensor and try to recalibrate.
8. Wait for the measurement to stabilize in each buffer and then press Enter to accept each calibration point.
9. Rinse the sensor and cal cup with a small amount of the next buffer between calibration points.
10. If you want to finish calibration after 1 or 2 points, select **Finish Calibration**. Otherwise, the calibration will automatically be completed after accepting the third point in a 3 point calibration.
11. If you receive a warning message stating that the calibration is questionable, do not continue with the calibration. Instead, select 'No' and investigate what is causing the questionable results. If you accept a questionable calibration, your pH readings will be erroneous. Typical causes for this error message include: incorrect buffer set selected, a dirty sensor, or bad buffer solution.
12. After accepting a good calibration, navigate to the GLP file and check the pH Slope and Slope % of ideal. A good slope should be between 55 and 60 mVs while the ideal is 59 mV. If the slope drops below 53, the sensor should be reconditioned and recalibrated.

pH Troubleshooting Tips

Typical working life for pH sensors is approximately 12-24 months depending on usage, storage and maintenance. Proper storage and maintenance generally extends the sensor's working life.

Clean and recondition the sensor if a slow response in the field has been reported or if it takes more than 90 seconds to stabilize in pH buffer.

If you get an error message during a pH calibration, check the following:

1. Ensure the pH buffers are good and not expired.
2. The correct buffer set is enabled.
3. Check for damage to the glass bulb or the electrode body.
4. Ensure the sensor module is installed correctly, especially if it has recently been replaced.
5. If you continue to get error messages during calibration, clean and recondition the sensor.

Cleaning and Reconditioning the pH, ORP or pH/ORP Sensor

If the pH or pH/ORP sensor has been allowed to dry out or has been stored in distilled or deionized water for an extended period of time, soak the sensor in buffer 4 overnight to try and restore functionality.

Cleaning is required whenever deposits or contaminants appear on the glass and/or platinum surfaces or when the sensor's response slows. The cleaning can be chemical and/or mechanical. Removing the sensor from the cable may make cleaning easier. Initially, moisten a soft clean cloth, lens cleaning tissue or cotton swab to remove all foreign material from the glass bulb and/or platinum button. Then use a moistened cotton swab to carefully remove any material that may be blocking the reference electrode junction of the sensor.

CAUTION: When using a cotton swab, be careful NOT to wedge the swab between the guard and the glass sensor. If necessary, remove cotton from the swab tip, so that the cotton can reach all parts of the sensor tip without stress. You can also use a pipe cleaner for this cleaning if more convenient.

If good pH and/or ORP response is not restored, perform the following additional procedure:

1. Soak the sensor for 10-15 minutes in clean water containing a few drops of commercial dishwashing liquid.
2. Rinse the sensor in clean water, wipe with a cotton swab moistened with clean water, and then re-rinse with clean water.

If good pH and/or ORP response is still not restored or if hard deposits have built up on the electrode, perform the following additional procedure:

1. Soak the sensor for ~3 minutes in one molar (1 M) hydrochloric acid (HCl). This reagent can be purchased from most lab supply distributors. Be sure to follow the safety instructions included with the acid. Vinegar can also be used, but will require a longer period of soaking.
2. Rinse the sensor in clean water, wipe with a cotton swab moistened with clean water (not DI water), and then re-rinse with clean water. To be certain that all traces of the acid are removed from the sensor crevices, soak the sensor in clean tap water for about an hour with occasional stirring.

If biological contamination of the reference junction is suspected or if good response is not restored by the above procedures, perform the following additional cleaning step:

CAUTION: Do not mix the acid from the previous step with the chlorine bleach in the following step. A toxic gaseous product can form from the reaction between the acid and the chlorine bleach. Be certain to copiously rinse the sink and drain system of acid after its disposal and before the disposal of chlorine bleach.

1. Soak the sensor for approximately 1 hour in a 1:1 dilution of commercially available chlorine bleach.
2. Rinse the sensor with clean water and then soak for at least 1 hour in clean tap water with occasional stirring to remove residual bleach from the junction. (If possible, soak the sensor for a period of time longer than 1 hour in order to be certain that all traces of chlorine bleach are removed.) Then re-rinse the sensor with clean water and retest.

Prior to reinstalling the sensor, dry the port and sensor connector with compressed air. If you suspect port contamination, follow the instructions in the Cleaning a Sensor Port section of this document before reinstalling the sensor.

If your pH sensor is still not calibrating after performing a sensor cleaning, contact your local YSI Representative or a YSI Authorized Service Center.

ORP

The ORP calibration should be verified every day the instrument is used. However, a new ORP sensor may be capable of holding its calibration for several days.

ORP Calibration Tips

1. If using a pH/ORP combination sensor, calibrate pH first to ensure it is working.
2. Rinse the sensors and cal cup with a small amount of ORP calibration solution. Fill the cup so that the ORP sensor tip and the temperature sensor are submerged in solution.
3. If using YSI Zobell calibration solution, the ProDSS will automatically adjust the calibration value based on temperature. Otherwise, the Calibration value can be manually adjusted.
4. Wait for the readings to stabilize and then press Enter to accept the calibration.
5. If you receive a warning message stating that the calibration is questionable, do not continue with the calibration. Instead, select 'No' and investigate what is causing the questionable results. If you accept a questionable calibration, your ORP readings will be erroneous. Typical causes for this error message include a dirty sensor or bad calibration solution.

ORP Troubleshooting Tips

Typical working life for ORP sensors is approximately 12-24 months depending on usage, storage and maintenance. Proper storage and maintenance generally extends the sensor's working life.

Clean and recondition the sensor if the sensor exhibits a slow response in Zobell solution, i.e. it takes more than 90 seconds to stabilize when placed in Zobell.

If you get error messages during an ORP calibration, check the following:

1. Ensure the ORP calibration solution is good and not expired.
2. If you continue to get error messages during calibration, clean and recondition the sensor per the instructions in the pH Troubleshooting section of this document. If you suspect port contamination, follow the instructions in the Cleaning a Sensor Port section before reinstalling the sensor.
3. If you continue to have problems, you can check the offset of the ORP sensor by performing a factory reset to the ORP sensor. After resetting the sensor, compare the ORP mV readings in Zobell solution to the calibration value. The difference between values should be less than 100 mVs. If the difference is 80 mVs or higher, consider replacing the sensor as it is nearing the end of its life span.

Dissolved Oxygen

The dissolved oxygen sensor should be calibrated every day the instrument is used. It is not necessary to calibrate in both % and mg/L or ppm. Calibrating in % will simultaneously calibrate mg/L and ppm and vice versa.

DO Calibration Tips

1. The ProDSS optical DO sensor can be calibrated in air-saturated water, water-saturated air or against a Winkler Titration. You can perform a 1 or 2 point DO calibration. A 2 point calibration includes 1 point in a zero oxygen environment and the 2nd point at full saturation.
2. For both ease of use and accuracy, YSI recommends that you perform a 1 point calibration in water-saturated air.
3. Make sure that there is a good optical DO sensor cap installed. The cap should not be scratched or excessively dirty. Caps should be changed as needed (15-18 month expected life for caps with a 1 year warranty).
4. To perform a 1 point calibration in water-saturated air, place the sensor in a 100% humid environment. This can be accomplished several ways:
    a. For the ProDSS 4 port cables, place a small amount of water in the calibration/storage cup and place it over the sensors and sensor guard. ***Partially*** tighten the locking ring on the calibration cup to the bulkhead. The goal is to have air exchange between inside and outside the calibration cup.
    b. For the ProDSS ODO/CT (627150) or ProODO (626250) cables, moisten the sponge in the gray calibration sleeve with a small amount of clean water and place it over the sensor guard.
5. The sponge and calibration sleeve/cup should be clean since bacterial growth may consume oxygen and interfere with the calibration. Be sure the sensor is in air, not water, and that there are not any water droplets on the sensor cap or temperature sensor.

6. After entering the % calibration mode, wait approximately 5 to 10 minutes for the storage container to become completely saturated.
7. Salinity affects the ability of water to hold oxygen and is used by the instrument to calculate DO mg/L (ppm). The Salinity value displayed near the top of the DO calibration screen is either the salinity correction value entered in the Sensor menu or the Salinity value as measured by the conductivity sensor in use. If you are using a conductivity sensor, ensure that it is calibrated and reading correctly in order to obtain accurate DO mg/L (ppm) measurements. If you are not using a conductivity sensor, the Salinity correction value should be the salinity of the water you will be testing. Press the Probe key, highlight Salinity, and press Enter to modify this setting if necessary. The salinity of fresh water is typically 0-0.5 ppt and seawater is typically 35 ppt.
8. If you receive a warning message stating that the calibration is questionable, do not continue with the calibration. Instead, select 'No' and investigate what is causing the questionable results. If you accept a questionable calibration, your DO readings will be erroneous. Typical causes of a calibration error message include a dirty and/or bad sensor cap or a sensor that needs reconditioned.

DO Troubleshooting Tips

1. Ensure the ProDSS barometer is reading accurately. The DO % Saturation calibration uses the instrument's barometric pressure reading for the DO % calibration. If the barometer is not reading accurately, the calibration will be erroneous. The barometer should be reading true barometric pressure. If you suspect the barometer reading is incorrect, calibrate the barometer and then recalibrate the DO sensor. Laboratory barometer readings are usually "true" (uncorrected) values of air pressure and can be used "as is" for barometer calibration. Weather service readings are usually not "true", i.e., they are corrected to sea level, and therefore cannot be used until they are "uncorrected". An approximate formula for this "uncorrection" is: True BP in mmHg = Corrected BP in mmHg – [2.5 * (Local Altitude in ft. above sea level/100)]
2. Clean the ODO sensor cap and rehydrate it if needed.
3. If you have changed the sensor cap, ensure the sensor cap coefficients have correctly been entered. These can be seen under Sensor Setup on the handheld, or within KorDSS.
4. If you suspect port contamination, remove the sensor and follow the instructions in the Cleaning a Sensor Port section.
5. If you continue to have trouble calibrating the DO sensor, contact your local YSI Representative or a YSI Authorized Service Center.

ODO Sensor Cap Replacement

The sensor cap should be replaced about once per year for those with a 1 year warranty, but the cap may last longer. It should also be replaced if it is cracked or damaged.

The instructions for replacing the sensor cap on ProDSS ODO sensors (626900) are different than the instructions for integral (i.e. built-in) ODO sensors on ODO/CT (627150) and ProODO (626250) cable assemblies, so ensure the correct directions are being followed when replacing the sensor cap. Each replacement ODO sensor cap is shipped in a humidified container and the package should not be opened until immediately before sensor cap replacement.

The instruction sheet shipped with the replacement ODO sensor cap includes the calibration coefficients specific to your sensor cap. Make sure to save this instruction sheet in case you need to reload the calibration coefficients. ***These coefficients must be entered whenever the sensor cap has been replaced.*** Coefficients can be entered using the ProDSS handheld (under ODO Sensor Setup) or KorDSS (under the Instrument and Sensors tab).

Cleaning the ODO Sensor Cap

The sensor cap should be kept clean since some types of fouling may consume oxygen which could affect the dissolved oxygen measurements. To clean the sensor cap, gently wipe away any fouling with a lens cleaning tissue that has been moistened with water.

Caution: Do not use organic solvents to clean the sensor cap. Using an organic solvent to clean the sensor cap may cause permanent damage to the cap. For example, alcohol will dissolve the outer paint layer and other organic solvents will likely dissolve the dye in the cap.

Rehydrating the ODO Sensor Cap

To prevent sensor drift, always store the ODO sensor in a wet or water-saturated air environment. If the ODO sensor has accidentally been left dry for longer than 8 hours, it must be rehydrated.

If rehydration is necessary, soak the ODO sensor cap in warm (room temperature) tap water for approximately 24 hours. After the soak, calibrate the sensor.

Turbidity

The turbidity calibration should be verified every day the instrument is used. However, the turbidity sensor is very stable and may hold its calibration for several weeks.

Turbidity Calibration Tips

1. For proper calibration, you must use standards that have been prepared according to details in Standard Methods for the Treatment of Water and Wastewater (Section 2130 B). Standards from other vendors are NOT approved, and their use will likely result in a bad calibration and incorrect field readings. Acceptable standards include:
    - AMCO-AEPA standards prepared specifically for the ProDSS turbidity sensor manufactured by YSI (i.e. YSI turbidity standards)
    - Formazin prepared according to Standard Methods, especially for calibration points greater than 1010
    - Dilutions of 4000 FNU (NTU) formazin concentrate purchased from Hach
    - Hach StablCal™ standards in various FNU (NTU) denominations
2. It is important to use the same type of standard for all calibration points (i.e. do not mix formazin and AMCO-AEPA standard for different points in a multi-point calibration).
3. The ProDSS turbidity sensor can be calibrated by using up to three calibration points by using the following limits:

- 1st calibration point: 0-1 FNU (NTU) (see Preventing Negative Turbidity Readings).
- 2nd calibration point: 5-200 FNU (NTU)
- 3rd calibration point: 400-4200 FNU (NTU)

4. DI water can be used for the first calibration point (see Preventing Negative Turbidity Readings)
5. The ProDSS calibration cup and sensor guard ***must*** be used (and correctly installed!) when calibrating. The sensor guard must be installed when taking any measurements.
6. The sensor guard has a metal bottom that is painted black. Ensure the inside surface (i.e. the surface that faces the sensor tip) is not significantly scratched. This surface needs to be black to eliminate any stray light reflection. Also ensure the sensor guard and calibration cup are free of any reflective material.
7. Pour standard slowly down the side of the calibration container so you do not aerate the sample. This will reduce the possibility of air bubbles becoming trapped on the surface of the sensor.
8. Slowly place the turbidity sensor into the calibration cup when the cup is tilted at a 45 degree angle, as this will help prevent air bubbles from being caught on the sensor surface.
9. Wait for the turbidity measurement to stabilize in each standard and then press Enter to accept each calibration point.
10. Rinse the sensor and cal cup with a small amount of the next standard between calibration points.
11. If you want to finish calibration after accepting 1 or 2 points, select **Finish Calibration**. Otherwise, the calibration will automatically be completed after accepting the third point in a 3 point calibration.
12. If you receive a warning message stating that the calibration is questionable, do not continue with the calibration. Instead, select 'No' and investigate what is causing the questionable results. If you accept a questionable calibration, your turbidity readings will be erroneous. Typical causes for this error message include a dirty sensor or bad standard solution.

Turbidity Troubleshooting Tips

The ProDSS turbidity sensor has a two year warranty and there are no replaceable components (e.g. no optical sensor cap). Proper storage and maintenance will help extend the sensor's life.

If you get error messages during a turbidity calibration, check the following:

1. Ensure the standard solutions are good and not expired.
2. The calibration environment (e.g. calibration cup, sensor guard, and sensors) should be clean. See Preventing Negative Turbidity Readings if having issues with negative turbidity readings.
3. There should not be any reflective material on the sensor guard and calibration cup. The metal sensor guard bottom (inside; faces the sensors) should be free of any scratches.
4. If you suspect port contamination, remove the sensor and follow the instructions in the Cleaning a Sensor Port section.
5. If you continue to have trouble calibrating the turbidity sensor, contact your local YSI Representative or a YSI Authorized Service Center.

Cleaning the Turbidity Sensor

Clean the sensing window with a non-abrasive, lint-free cloth. This should be done carefully to prevent scratches. If necessary, use mild soapy water.

Preventing Negative Turbidity Readings

A negative turbidity reading is almost always connected to the 'zero' standard. Despite best practices, it is sometimes impossible to clean the sensors, calibration cup, and sensor guard to a point where the 'zero' standard will not be contaminated by some small amount.

A brand new instrument can contaminate a zero standard to ~0.1 FNU, even in a lab environment. Cleaned but used ProDSS sensors, calibration cup, and sensor guard can contaminate a zero standard to almost 1.0 FNU.

As an example, if a Calibration Value of zero is entered, but the actual reading in the 'zero' standard is 0.6 FNU, then a ProDSS turbidity sensor in a 0.3 FNU environment will display a measurement of -0.3 FNU.

Since the 'zero' calibration environment may not be 0 FNU due to contaminated standard, dirty sensors, dirty calibration cup, and/or dirty sensor guard, a Calibration Value from 0 to 1 FNU can be entered.

The following tips can help eliminate negative turbidity readings:

1. Use a calibration cup and sensor guard that is exclusively used for calibration. Calibration cups and sensor guards can easily become contaminated over time, especially if the instrument is used to measure in dirty samples and/or field conditions.
2. In cases where the equipment is properly cleaned and serviced, the level of contamination of the zero turbidity standard is quite small. Typically the average contaminant level ranges from 0.2 to 0.8 NTU. Knowing this, you can pick a number between these points (0.5) and enter this as the first calibration point.
3. Calibrating turbidity is best done in a lab environment; calibrations in the field can result in errors.
4. The only true way to determine if your zero standard is being contaminated is to analyze the zero solution with a laboratory turbidimeter.

Depth

The depth calibration is very easy to perform and should be completed every time the instrument is used to take depth measurements.

Depth Calibration Tips

1. Input a Depth Offset, Altitude, or Latitude under Sensor Setup if desired. Entering a value for these is not required to complete a calibration.
    a. **Depth offset**: Depth offset can be used if referencing water elevation against a known datum. If a depth offset is entered (in meters), the output value will shift by the value of the offset. The most common offset entered is 0.272 meters, as this is the distance from the depth sensor on 4 port cables to the sensor tips.
    b. **Altitude** and **Latitude**: To compensate for atmospheric pressure based on elevation and gravitational pull, enter the local altitude in meters relative to sea level and latitude in degrees where the ProDSS is sampling. This will ensure highest accuracy, although the altitude and latitude effects are relatively small. ***Varying altitudes*** cause approximately 90 mm change from sea level to 8000 m. A 100 m change causes 1.08 mm of change to the readings. ***Varying latitudes*** cause a 200 mm change in depth from equator to pole.
2. Ensure the depth sensor is clean and in air, not immersed in any solution.
3. For highest accuracy, keep the bulkhead still and in one position while calibrating. The holes on the side of the depth sensor should not be covered.
4. The Calibration Value will be set at zero even if a depth offset is entered. There is no need to change this as long as you're calibrating in air.
5. Wait for the depth measurement to stabilize and then press Enter to accept the calibration. Only a 1 point calibration can be completed.
6. If you receive a warning message stating that the calibration is questionable, do not continue with the calibration. Instead, select 'No' and investigate what is causing the questionable results. If you accept a questionable calibration, your depth readings will be erroneous. Typical causes of a calibration error message include dirty ports on the side of the depth sensor, not waiting for stable measurements before accepting the calibration, moisture in the depth ports, and/or covering the depth ports with your hand during calibration.

Depth Troubleshooting Tips

The YSI ProDSS depth sensor measures virtually vented depth. This type of measurement allows for real time compensation for atmospheric pressure using the instrument's internal barometer. A major advantage to this type of depth sensor is there is no vented cable, tube or desiccant to worry about. Some troubleshooting tips include:

1. The ports on the side of the depth sensor should not be covered during calibration and should be free of any debris. These ports can be cleaned with the syringe included with the maintenance kit. When cleaning, fill the syringe with clean water and gently force water into one of the ports. Flush until clean water flows from the opposite depth port.

2. A sensor guard weight installed at the end of the sensor guard can help keep the bulkhead stable when sampling at depth. Up to 5 lbs of YSI stackable sensor guard weights can be installed.
3. Enable Vertical Position under Depth Display to view the real-time position of the depth sensor in the water column. This is helpful in profiling applications to ensure the depth sensor is lowered to the desired depth without waiting for the depth data to stabilize.

Ammonium

The ammonium sensor should be calibrated every day the instrument is used. The ammonium sensor should only be used in fresh water (salinity < 2 ppt) and to depths of 55 feet (17 meters) of water.

Ammonia is calculated from the ammonium, temperature and pH readings. pH greatly affects the ammonia calculation. Therefore, for highest accuracy in the ammonia calculation, be sure to use a pH sensor in conjunction with an ammonium sensor during measurements. If a pH sensor is not in use, the instrument will assume the sample is neutral (pH 7) for the calculation.

Ammonium Calibration Tips

1. Exposure to the high ionic content of pH buffers can cause a significant, but temporary, drift in the ammonium sensor. Therefore, if calibrating a pH sensor, either:
    a. Remove the ammonium sensor from the cable bulkhead and plug the port. After pH calibration is complete, reinstall the ammonium sensor and proceed with its calibration with no stabilization delay.

    or

    b. Calibrate pH first, immersing both sensors in the pH buffers. After calibrating pH, place the sensors in 100 mg/L ammonium standard and monitor the reading. Usually, the reading starts low and may take awhile to reach a stable value. When it does, proceed with the calibration. This may take several hours.
2. The ammonium sensor can be calibrated with up to three calibration points. For highest accuracy, perform a two point calibration with 1 and 100 mg/L standards within 10 °C of your sample temperature.
3. Rinse the sensors and cal cup with a small amount of ammonium solution (1 mg/L for the first point and 100 mg/L for the second point). Fill the cup so that the ammonium sensor tip and the temperature sensor are submerged in solution. Ensure the conductivity sensor is also submerged in the calibration solution. The salinity reading from the conductivity sensor is used in the algorithm for the ammonium measurement.
4. After entering the calibration screen, change the calibration value if necessary.
5. Record the NH_4 millivolts for each calibration point. The acceptable mV outputs for each calibration solution are shown below.
    - NH_4 1 mg/L = 0 mV +/- 20 mV (new sensor only)
    - NH_4 100 mg/L = 90 to 130 mV from 1 mg/L mV value
    - The mV span between 1 mg/L and 100 mg/L values should be ≈ 90 to 130 mV. The slope should be 45 to 65 mV per decade.

6. Wait for the ammonium and temperature readings to stabilize in each calibration solution and then press Enter to accept each calibration point.
7. Rinse the sensor and cal cup between calibration points with a small amount of the next standard.
8. After pressing Enter to accept the second calibration point, highlight **Finish Calibration** and press Enter to complete the calibration. Otherwise, you can continue calibrating with a third calibration point (see the ProDSS User Manual for more information on a chilled third calibration point).
9. If you receive a warning message stating that the calibration is questionable, do not continue with the calibration. Instead, select 'No' and investigate what is causing the questionable results. If you accept a questionable calibration, your ammonium and ammonia readings will be erroneous. Typical causes for this error message include a dirty sensor or bad standard solution.

Preparing Ammonium Calibration Solutions

We recommend using YSI calibration solutions whenever possible. However, qualified users can save cost by following the following recipes for 1 and 100 mg/L standards. Other concentrations can be made by altering the amount of ammonium chloride. All other ingredient concentrations should remain unchanged. It is important to note that some of these chemicals are hazardous and therefore, the standards should only be prepared by qualified chemists in laboratories where proper safety precautions are possible. It is the responsibility of the user to obtain and study the MSDS for each chemical and to follow the required instructions with regard to handling and disposal of these materials.

You will need: solid Ammonium Chloride or a certified 100 mg/L NH_4^+-N standard solution from a supplier, Lithium Acetate Dihydrate, concentrated hydrochloric acid, high purity water, a good quality analytical balance, a 1000 mL volumetric flask, accurate volumetric measuring devices for 100 mL and 10 mL of solution, and a 1000 mL glass or plastic storage vessels. (*Caution*: Hydrochloric acid is highly corrosive and toxic and should therefore be handled with extreme care in a well-ventilated fume hood. The user could also add the equivalent amount of a less-hazardous, more dilute sample of the acid if preferred.)

100 mg/L Standard: Accurately weigh 0.3817 g of ammonium chloride and transfer quantitatively into a 1000 mL volumetric flask. Add 2.6 g of lithium acetate dihydrate to the flask. Add approximately 500 mL of distilled or deionized water to the flask, swirl to dissolve all of the reagents and then dilute to the volumetric mark with distilled or deionized water. Mix well by repeated inversion and then transfer the 100 mg/L standard to a storage bottle. Add 3 drops of concentrated hydrochloric acid to the bottle, then seal and agitate to assure homogeneity. Alternatively, 100 mL of certified 100 mg/L NH_4^+-N standard can be used in place of the solid ammonium chloride.

1 mg/L Standard: Accurately measure 10.0 mL of the above 100 mg/L standard solution into a 1000 mL volumetric flask. Add 2.6 g of lithium acetate dihydrate to the flask. Add approximately 500 mL of distilled or deionized water, swirl to dissolve the solid reagents and then dilute to the volumetric mark with water. Mix well by repeated inversion and then transfer the 1 mg/L standard to a storage bottle. Add 3 drops of concentrated hydrochloric acid to the bottle, then seal and agitate to assure homogeneity.

Ammonium Troubleshooting Tips

Typical working life for ammonium sensors is approximately 3-6 months depending on use, storage and maintenance. Proper storage and maintenance generally extends the sensor's working life.

If you get error messages during an ammonium calibration, check the following:

1. Ensure the ammonium solutions are good and not expired.
2. Clean the sensor.
3. If you continue to get error messages during calibration, soak the sensor in 100 mg/L ammonium standard for several hours or overnight.
4. If you suspect port contamination, follow the instructions in the Cleaning a Sensor Port section.
5. If you continue to have trouble calibrating the ammonium sensor, contact your local YSI Representative or a YSI Authorized Service Center.

Cleaning the Ammonium Sensor

The ammonium sensor uses a PVC membrane. As always, when handling a sensor, care should be taken to avoid damaging the membrane. After extensive use, the membranes may become coated with a deposit or scoured with fine scratches which may cause a slow or reduced response (low slope) or unstable readings. Deposits may be removed with a fine jet of deionized water or rinsing in alcohol followed by soaking in 100 mg/L ammonium calibration standard.

The sensor may require soaking in the high ammonium calibration solution to recover its performance. Soak in 100 mg/L for several hours or overnight.

Nitrate

The nitrate sensor should be calibrated every day the instrument is used. The nitrate sensor should only be used in fresh water (salinity < 2 ppt) and to depths of 55 feet (17 meters) of water.

Nitrate Calibration Tips

1. Exposure to the high ionic content of pH buffers can cause a significant, but temporary, drift in the nitrate sensor. Therefore, if calibrating a pH sensor, either:
    a. Remove the nitrate sensor from the cable bulkhead and plug the port. After pH calibration is complete, reinstall the nitrate sensor and proceed with its calibration with no stabilization delay.

    or

    b. Calibrate pH first, immersing both sensors in the pH buffers. After calibrating pH, place the sensors in 100 mg/L nitrate standard and monitor the reading. Usually, the reading starts low and may take awhile to reach a stable value. When it does, proceed with the calibration. This may take several hours.
2. The nitrate sensor can be calibrated with up to three calibration points. For highest accuracy, perform a two point calibration with 1 and 100 mg/L standards within 10 °C of your sample temperature.

3. Rinse the sensors and cal cup with a small amount of nitrate solution (1 mg/L for the first point and 100 mg/L for the second point). Fill the cup so that the nitrate sensor tip and the temperature sensor are submerged in solution. Ensure the conductivity sensor is also submerged in the calibration solution. The salinity reading from the conductivity sensor is used in the algorithm for the nitrate measurement.
4. After entering the calibration screen, change the calibration value if necessary.
5. Record the NO_3^- millivolts for each calibration point. The acceptable mV outputs for each calibration solution are shown below.
    - NO_3^- 1 mg/L = 200 mV +/- 20 mV (new sensor only)
    - NO_3^- 100 mg/L = -90 to -130 mV from 1 mg/L mV value
    - The mV span between 1 mg/L and 100 mg/L values should be ≈ 90 to 130 mV. The slope should be -45 to -65 mV per decade.
6. Wait for the nitrate and temperature readings to stabilize in each calibration solution and then press Enter to accept each calibration point.
7. Rinse the sensor and cal cup between calibration points with a small amount of the next standard.
8. After pressing Enter to accept the second calibration point, highlight **Finish Calibration** and press Enter to complete the calibration. Otherwise, you can continue calibrating with a third calibration point (see the ProDSS User Manual for more information on a chilled third calibration point).
9. If you receive a warning message stating that the calibration is questionable, do not continue with the calibration. Instead, select 'No' and investigate what is causing the questionable results. If you accept a questionable calibration, your nitrate readings will be erroneous. Typical causes for this error message include a dirty sensor or bad standard solution.

Preparing Nitrate Calibration Solution

We recommend using YSI calibration solutions whenever possible. However, qualified users can save cost by following the following recipes for 1 and 100 mg/L nitrate standards. Other concentrations can be made by altering the amount of potassium nitrate. All other concentrations should remain unchanged. It is important to note that some of these chemicals are hazardous and therefore, the standards should only be prepared by qualified chemists in laboratories where proper safety precautions are possible. It is the responsibility of the user to obtain and study the MSDS for each chemical and to follow the required instructions with regard to handling and disposal of these materials.

You will need: Solid Potassium Nitrate or a certified 1000 mg/L NO_3^--N from a supplier, Magnesium Sulfate, high purity water, good quality analytical balance, 1000 mL volumetric flask, accurate volumetric measuring devices for 100 mL, 10 mL and 1 mL of solution, and 1000 mL glass or plastic storage vessels.

100 mg/L standard: Accurately weigh 0.7222 g of anhydrous potassium nitrate and transfer quantitatively into a 1000 mL volumetric flask. Add 1.0 g of anhydrous magnesium sulfate to the flask. Add approximately 500 mL of water to the flask, swirl to dissolve all of the reagents, and then dilute to the volumetric mark with distilled or deionized water. Mix well by repeated

inversion and then transfer the 100 mg/L standard to a storage bottle. Rinse the flask extensively with water prior to its use in the preparation of the 1 mg/L standard. Alternatively, 100 mL of certified 1000 mg/L NO_3^--N standard can be used in place of the solid potassium nitrate.

1 mg/L standard: Accurately measure 10.0 mL of the above 100 mg/L standard solution into a 1000 mL volumetric flask. Add 1.0 g of anhydrous magnesium sulfate to the flask. Add approximately 500 mL of distilled or deionized water, swirl to dissolve the solid reagents, and then dilute to the volumetric mark with water. Mix well by repeated inversion and then transfer the 1 mg/L standard to a storage bottle.

Recipes are given for 1 and 100 mg/L. Other concentrations can be made by altering the amount of potassium nitrate. All other concentrations should remain unchanged.

Nitrate Troubleshooting Tips

Typical working life for nitrate sensors is approximately 3-6 months depending on use, storage and maintenance. Proper storage and maintenance generally extends the sensor's working life.

If you get error messages during a nitrate calibration, check the following:

1. Ensure the nitrate solutions are good and not expired
2. Clean the sensor.
3. If you continue to get error messages during calibration, soak the sensor in 100 mg/L nitrate standard for several hours or overnight.
4. If you suspect port contamination, follow the instructions in the Cleaning a Sensor Port section.
5. If you continue to have trouble calibrating the nitrate sensor, contact your local YSI Representative or a YSI Authorized Service Center.

Cleaning and Reconditioning the Nitrate Sensor

The nitrate sensor uses a PVC membrane. As always, when handling a sensor, care should be taken to avoid damaging the membrane. After extensive use the membranes may become coated with a deposit or scoured with fine scratches which may cause a slow or reduced response (low slope) or unstable readings. Deposits may be removed with a fine jet of deionized water or rinsing in alcohol followed by soaking in 100 mg/L nitrate calibration standard.

The sensor may require soaking in the high nitrate calibration solution to recover its performance. Soak in 100 mg/L for several hours or overnight.

Chloride

The chloride sensor should be calibrated every day the instrument is used. The chloride sensor should only be used in fresh water (salinity < 2 ppt) and to depths of 55 feet (17 meters) of water.

Chloride Calibration Tips

1. Exposure to the high ionic content of pH buffers can cause a significant, but temporary, drift in the chloride sensor. Therefore, if calibrating a pH sensor, either:
    a. Remove the chloride sensor from the cable bulkhead and plug the port. After pH calibration is complete, reinstall the chloride sensor and proceed with its calibration with no stabilization delay.

    or

    b. Calibrate pH first, immersing both sensors in the pH buffers. After calibrating pH, place the sensors in 1,000 mg/L chloride standard and monitor the reading. Usually, the reading starts low and may take awhile to reach a stable value. When it does, proceed with the calibration. This may take several hours.
2. The chloride sensor can be calibrated with up to three calibration points. For highest accuracy, perform a two point calibration with 10 and 1000 mg/L standards within 10 °C of your sample temperature.
3. Rinse the sensors and cal cup with a small amount of chloride solution (10 mg/L for the first point and 1,000 mg/L for the second point). Fill the cup so that the chloride sensor tip and the temperature sensor are submerged in solution. Ensure the conductivity sensor is also submerged in the calibration solution. The salinity reading from the conductivity sensor is used in the algorithm for the chloride measurement.
4. After entering the calibration screen, change the calibration value if necessary.
5. Record the Cl millivolts for each calibration point. The acceptable mV outputs for each calibration solution are shown below.
    - Cl 10 mg/L = 225 mV +/- 20 mV (new sensor only)
    - Cl 1,000 mg/L = -80 to -130 mV from 10 mg/L mV value
    - The mV span between 10 mg/L and 1000 mg/L values should be ≈ 80 to 130 mV. The slope should be -40 to -65 mV per decade.
6. Wait for the chloride and temperature readings to stabilize in each calibration solution and then press Enter to accept each calibration point.
7. Rinse the sensor and cal cup between calibration points with a small amount of the next buffer.
8. After pressing Enter to accept the second calibration point, highlight **Finish Calibration** and press Enter to complete the calibration. Otherwise, you can continue calibrating with a third calibration point (see the ProDSS User Manual for more information on a chilled third calibration point).
9. If you receive a warning message stating that the calibration is questionable, do not continue with the calibration. Instead, select 'No' and investigate what is causing the questionable results. If you accept a questionable calibration, your chloride readings will be erroneous. Typical causes for this error message include a dirty sensor or bad standard solution.

Preparing Chloride Standards

The following recipes are provided for preparation of 10 and 1000 mg/L chloride reagents.

It is important to note that some of the chemicals required for these solutions could be hazardous under some conditions. It is the responsibility of the user to obtain and study the MSDS for each chemical and to follow the required instructions with regard to handling and disposal of these chemicals.

You will need: Solid sodium chloride or a certified 1000 mg/L chloride solution from a supplier, magnesium sulfate, high purity water, a good quality analytical balance, 1000 mL volumetric flask, an accurate 10 mL measuring devices, and 1000 mL glass or plastic storage vessels.

1000 mg/L standard: Accurately weigh 1.655 grams of anhydrous sodium chloride and transfer into a 1000 mL volumetric flask. Add 0.5 grams of anhydrous magnesium sulfate to the flask. Add 500 mL of distilled or deionized water to the flask, swirl to dissolve all of the reagents, and then dilute to the volumetric mark with water. Mix well by repeated inversion and then transfer the 1000 mg/L standard to a storage bottle. Rinse the flask extensively with water prior to its use in the preparation of the 10 mg/L standard. Alternatively, simply add 0.5 grams of magnesium sulfate to a liter of a 1000 mg/L chloride standard from a certified supplier.
10 mg/L standard: Accurately measure 10 mL of the above 1000 mg/L standard solution into a 1000 mL volumetric flask. Add 0.5 grams of anhydrous magnesium sulfate to the flask. Add 500 mL of distilled or deionized water, swirl to dissolve the solid reagents, and then dilute to the volumetric mark with water. Mix well by repeated inversion and then transfer the 10 mg/L standard to a storage bottle.

Chloride Troubleshooting Tips

Typical working life for chloride sensors is approximately 3-6 months depending on use, storage and maintenance. Proper storage and maintenance generally extends the sensor's working life.

If you get error messages during a chloride calibration, check the following:

1. Ensure the chloride solutions are good and not expired
2. Clean the sensor.
3. If you continue to get error messages during calibration, soak the sensor in 1000 mg/L chloride standard for several hours or overnight.
4. If you suspect port contamination, follow the instructions in the Cleaning a Sensor Port section.
5. If you continue to have trouble calibrating the chloride sensor, contact your local YSI Representative or a YSI Authorized Service Center.

Cleaning and Reconditioning the Chloride Sensor

The chloride sensor is considered a pellet membrane ISE. As always, when handling sensors, care should be taken to avoid damaging the membrane. This sensor can be regenerated by washing with alcohol and/or gently polishing with fine emery paper in a circular motion to remove any deposits or discoloration, then thoroughly washing with deionized water to remove any debris.

The sensor may require soaking in the high chloride calibration solution to recover its performance. Soak in 1000 mg/L for several hours or overnight.

Installing and Uninstalling Sensors

General Precautions

It is important that the entire sensor connector and cable connector be dry when installing, removing or replacing sensors. This will prevent water from entering the port. Once a sensor is removed, examine the connector inside the port. If any moisture is present, use compressed air to completely dry the connector or place directly in front of a steady flow of fresh air. If you suspect port contamination, follow the port cleaning procedures listed under Cleaning a Sensor Port.

Remove sensors with the sensor tips facing the ground to help prevent water from entering the port upon removal.

The instrument utilizes o-rings as seals to prevent water from entering the sensor ports. When the sensors are removed, the o-rings that provide the seal should be carefully inspected for contamination (e.g. debris, grit, etc.) and cleaned if necessary.

If no dirt or damage to the o-rings is evident, wipe the o-rings with a lint free cloth or lens cloth to remove the old o-ring grease. Then, lightly apply new o-ring grease (provided in the maintenance kit) to the o-rings without removing them from their groove. If there is any indication of damage, the o-ring should be replaced with an identical o-ring. At the time of o-ring replacement, the entire o-ring assembly should be cleaned.

Do not over-grease the o-rings. The purpose of the o-ring grease it to keep the o-ring in good condition. Excess grease may collect grit particles that can compromise the seal. Excess grease can also cause the waterproofing capabilities of the o-ring to diminish, potentially causing leaks. If excess grease is present, remove it using a lens cloth or lint-free cloth.

To remove the o-rings:
Use a small, flat-bladed screwdriver or similar blunt-tipped tool to remove the o-ring from its groove. Do not use a sharp object to remove the o-rings. Using a sharp object could damage the o-ring groove which would allow water to enter the port resulting in permanent damage to the port and sensor. Check the o-ring and the groove for any excess grease or contamination. If contamination is evident, clean the o-ring and the portion of the titanium sensor where the o-ring fits with lens cleaning tissue or equivalent lint-free cloth. Alcohol can be used to clean the titanium sensor, but use only water and mild detergent on the o-ring itself. Using alcohol on o-rings may cause a loss of elasticity and may promote cracking. Also, inspect the o-rings for nicks and imperfections.

Before re-installing the o-rings, make sure to use a clean workspace, clean hands, and avoid contact with anything that may leave fibers on the o-ring or grooves. Even a very small amount of contamination (hair, grit, etc.) may cause a leak.

To re-install the o-rings:
Place a small amount of o-ring grease between your thumb and index finger. Draw the o-ring through the grease while pressing the fingers together to place a very light covering of grease to the o-ring. Place the o-ring into its groove making sure that it does not twist or roll. Do not excessively stretch the o-ring during installation.

Use your grease-coated finger to once again lightly go over the mating surface of the o-ring.

Do not over-grease the o-rings. The excess grease may collect grit particles that can compromise the seal. Excess grease can also cause the waterproofing capabilities of the o-ring to diminish, potentially causing leaks. If excess grease is present, remove it using a lens cloth or lint-free cloth.

Cleaning a Sensor Port

If you suspect port contamination, you can clean the port on the cable by filling the port with Isopropyl Alcohol for 30 seconds and then dumping it out. Next, allow the port to air dry completely or blow it out with compressed air. Installing a sensor into a port that is not completely dry is likely to cause erratic and erroneous readings.

If the connector is corroded, contact your local YSI Representative or a YSI Authorized Service Center.

Verifying Sensor Accuracy and Calibration

Sensor accuracy and calibration can be verified by immersing a sensor into calibration solution or YSI Confidence Solution®. Compare the readings on the ProDSS display to the value of the solution. If the readings have drifted more than the accuracy specification of the sensor, perform a calibration before taking field measurements.

YSI Confidence Solution can be used to check the accuracy and calibration of the conductivity, pH and ORP sensors. However, to maintain the highest accuracy of the instrument, it should not be used to perform a calibration.

Resetting a Sensor to Factory Default

Occasionally, it may be necessary to reset the instrument to its factory calibration default values. To reset the calibration values, press the Cal key, highlight Restore Default Cal and press Enter. Highlight the parameter you wish to reset to default and press Enter. Next, you will be asked to confirm the operation. Highlight Yes and press Enter to confirm.

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