Water Quality Sensors FAQ

Q: What is your warranty on sensors?

A: The warranty for the Series 5 and Series 4a sensors is two years. The warranty for the Quanta and Quanta-G sensors is three years. The only exception to the sensor warranty is the ISE sensors, which are warranted for 6 months.

Q: What makes Hydrolab's sensors "superior"?

A: Hydrolab's sensors provide high-quality data, are easy to maintain, and are built to last. Our expectations for our sensor's lifetime are backed by our sensor warranties, which are the best in the industry.

Dissolved Oxygen

Q: How often do I need to change the DO membrane?

A: The frequency with which a user needs to change the DO membrane is largely dependent on the environment in which the sensor is deployed. The DO sensor is among the most susceptible sensors to fouling, and the readings will be affected if fouling becomes too heavy. Fortunately, the adverse effects of fouling can be counteracted by using the DS5X which periodically and automatically cleans the sensors.

Q: How often should I calibrate DO?

A: See above.

Q: How long should I wait after changing my DO sensor membrane to perform the calibration?

A: After approximately four hours, the membrane will reach 90% relaxation. For complete relaxation, Hydrolab recommends 24 hours between membrane replacement and calibration. If the sensor is calibrated before the membrane has fully relaxed, the initial readings may drift slightly until the membrane relaxes, at which time, the readings will stabilize.

Q: Should I calibrate using mg/L solution or % saturation?

A: Standard methods for DO calibration suggest that a DO sensor should be calibrated to match a known mg/L standard or the mg/L measurement of a Winkler titration. However, air calibration using "% saturation" is considerably faster and easier, and does not require any known calibration solution.

Q: How can I determine Barometric Pressure when calibrating my Dissolved Oxygen sensor?

A: The Surveyor 4a can be equipped with a Barometric Pressure option that will allow you to determine the BP at your specific site. However, if you need to determine the BP without using the Surveyor or another portable BP measurement instrument, you can contact the local airport and get the current Barometric pressure in mm/Hg.

Because the local airport reading will be compensated to sea level readings, you would then need to adjust the airport's BP readings to account for the change in altitude at your site. In order to make this conversion, first multiply the local reading by 2.4 to get the reading in inches of Hg. Then multiply your site altitude (in feet) by 0.025. Finally, subtract this number from the compensated barometric pressure reading in inches of Hg.

Example: airport reading is 29.98 mm/Hg x 25.4 = 761.49 in/HG. 761 – (5000(Denver) x .025) = 636. This is the calibration point for Dissolve Oxygen in % saturation in Denver.

Q: What happens if I change altitude after calibrating my DO sensor?

A: The Dissolved oxygen readings in mg/L are based on a known saturation (100%) at a known Barometric Pressure; therefore, these readings remain accurate. Percent

saturation readings, however, would no longer remain accurate without a new calibration.

Q: Will the brush on my DataSonde 4X damage the membrane on my DO sensor?

A: No. The brush only enhances your DO measurement accuracy because it counteracts the effects of fouling. Although Hydrolab's brush is designed to have a considerable amount of stiffness to ensure that it retains its effectiveness over time, and works in even the harshest fouling environments, it will not damage the membrane. Before releasing this product platform to our customers, Hydrolab performed extensive testing to ensure that the DO sensor would perform within specifications throughout its life.

Q: Do I need a circulator?

A: Standard Methods Article 4500-OG states that any Clark Cell DO sensor must have sufficient sample flow across the membrane surface. The easiest and most consistent means of supplying this flow is to pair the DO sensor with a sample circulator.

Q: What is the difference between Hydrolab's Clark Cell technology and competitors?

A: Hydrolab uses a sintered silver anode that provides the maximum possible anode surface area, which ensures the longest possible life before the anode becomes consumed. Competitors Clark cell DO sensors do not have nearly the same surface area and may require special "reconditioning kits" that the customer will use to grind the surface of the anodes when they become consumed. These sensors often require frequent replacement at the customer's expense. In addition, Hydrolab's DO sensor gives a continuous, steady-state reading whereas other DO sensors may rely on averaging of measurements which relies on several assumptions. Finally, any DO sensor that is not paired with a circulator will require the user to manually move the sensor continuously in order to obtain an accurate measurement.

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Hach LDO™

Q: What is Hach LDO and how does it work?

A: The Hach LDO sensor cap is coated with a luminescent material. Blue Light from an LED strikes the luminescent chemical on the sensor. The luminescent chemical instantly becomes excited. As the excited chemical relaxes, it releases red light. The higher the oxygen concentration, the less red light given off by the sensor cap. The red light is detected by a photo diode. The time it takes for the chemical to return to a relaxed state is measured.

The oxygen concentration is inversely proportional to the time it takes for the luminescent material on the sensor cap to return to a relaxed state.

Between flashes from the Blue LED, a red LED of known intensity is flashed. The red LED acts as an internal standard for reference comparison to the red light given off by the luminescent sensor cap. This comparison allows the sensor readings to remain stable for long periods of time.

Q: How long will the sensor cap last?

A: The sensor cap is a consumable item that Hach Environmental recommends replacing once per year.

Q: What is the warranty on the Hach LDO sensor?

A: The LDO sensor is covered by our standard 2-year warranty. The consumable sensor cap is covered by a 1-year warranty.

Q: Is a circulator required with the Hach LDO sensor?
A: No. Because the Hach LDO sensor does not consume oxygen, it is not necessary to continually replenish the water sample around the sensor.

Q: Will fouling affect the DO readings from a Hach LDO sensor?
A: Passive fouling will not affect the Hach LDO sensor because the sensor does not need to consume oxygen. However, active fouling, such as barnacles, that consumes oxygen itself will misrepresent the condition of the water around the sensor. Active fouling can be easily removed from the sensor by using the self-cleaning mechanism included with the Hydrolab DS5X.

Q: What is the recommended calibration procedure for Hach LDO?
A: When calibrating Hach LDO, it is very important that the Temperature sensor and the LDO sensor cap have equilibrated in the same environment. This can be accomplished in any of the three calibration procedures (air saturated water, water saturated air, and known standard calibration), but Hach Environmental recommends the air saturated water procedure. Our tests have shown this procedure to be the most consistent and replicable.
The air saturated water calibration can be accomplished without the use of expensive and clumsy pump mechanisms. Instead, please refer to our instruction sheets for a full description of the method, which utilizes a 2-liter plastic bottle, (e.g., an empty soda bottle) and our standard calibration cup.

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Conductivity

Q: What is the difference between Conductivity and Specific Conductance?
A: Specific conductance is the scientific term for conductivity values that have been compensated to 25 degrees C.

Q: How is Salinity measured using this sensor?
A: Salinity is a value that is derived mathematically from the conductivity readings. Hydrolab instruments use an algorithm from the USGS Water Supply Paper 2311 titled "Specific Conductance: Theoretical Considerations and Application to Analytical Quality Control" as the default. Users also have the option to choose the algorithm described in section 2520B od "Standard Methods for the Examination of Water and Wastewater."

Q: How do you determine Total Dissolved Solids (TDS)?
A: Total Dissolved Solids is also derived mathematically from the conductivity readings. The default factor for TDS calculations is 0.64 however this can be user defined if historical data for a specific water body dictates the need for a different factor.

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pH

Q: How often will I have to rebuild the pH reference?
A: The frequency with which a pH reference needs to be refilled depends on the deployment conditions of the sonde. The more frequently that a user logs readings, the more frequently the reference will need to be refilled.

Q: What are these salt pellets in my reference junction?
A: The salt pellets are 99.99% KCL and during deployment they dissolve, keeping the reference solution at a desired molarity level.

Q: What is the difference between a Standard Reference and an Integrated Reference?

A: The Standard Reference used with a pH sensor is installed in a separate sensor port on the DataSonde or MiniSonde. The Integrated Reference is incorporated into a single sensor and will allow the sonde to be configured with another sensor that would not otherwise be possible. Both sensors have the same specifications, and both will provide measurements of equally high quality. The MiniSonde and DataSonde are available with either option, and the Quanta is available only with the Integrated Reference.

Q: When would I need a Low Ionic Strength reference junction?
A: If the water body that is being measured has the possibility of having a conductivity value of .200 ms/cm or lower, we recommend the use of the Low Ionic Reference.

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Depth

Q: What is the Vented Level sensor?
A: The Vented Level sensor provides extremely accurate water level measurements at depths to 10 m. This sensor requires that the sonde be equipped with a fixed, vented cable that allows the level measurement to be compensated for the barometric pressure above the water.

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Turbidity: Self-Cleaning

Q: How often should I change the wiper?
A: The frequency with which the wiper should be changed depends on the environment in which the sonde is deployed. In extremely active waters, the wiper itself may become fouled and require more frequent replacement. For your convenience, Hydrolab provides four additional wipers in the maintenance kit that is included with all Self-Cleaning Turbidity sensors.

Q: What solution should I use to calibrate Turbidity?
A: Hydrolab recommends using Hach's StablCal solution for calibrating Turbidity. Another type of calibration solution is known as polymer beads. However, all sensors "see" polymer beads differently, so if this type of calibration solution is used, please confirm that the type sensor in use has been characterized to the specific sensor being calibrated.

Q: Sometimes I see an asterisk (*) after my Turbidity readings. What does this mean?
A: The asterisk (*) appears if the Turbidity readings are outside the range at which you calibrated the sensor. Although the sensor is exceptionally linear, even outside the calibration, it is important that the user understand that these readings are outside their calibration range.

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Turbidity: 4-Beam

Q: How is the Quick Cal-Cube™ used to check the calibration of the 4-Beam Turbidity sensor?
A: The Quick Cal-Cube™ is the simplest method available for checking the calibration of the 4-Beam Turbidity sensor. After calibration with primary standards, the value of the optional Quick-Cal Cube™ secondary standard, if used, must be determined and recorded for each individual instrument. The Quick-Cal Cube™ value is determined by removing the storage/calibration cups, wiping the optical areas, both sensor and cube, clean and dry with a non-abrasive, lint free cloth, and placing the ceramic glass cube into the turbidity sensor's optical area. Align the Quick-Cal Cube™'s pin with the turbidity sensor's recessed hole and, for optimum repeatability, rotate the Quick-Cal Cube™

clockwise to remove mechanical play in the pin/hole. To test for drift between primary calibrations, reinstall the Quick-Cal Cube™.

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ORP

Q: What is ORP?

A: ORP, or Oxidation-Reduction Potential, (also known as Redox) is a measurement of the voltage at an inert electrode, reflecting the extent of oxidation of the water sample. The more positive the ORP of a solution, the more oxidized are the chemical components of the water (less positive indicates less oxidized, or more reduced).

Q: Why would I want to measure ORP?

A: ORP measurements are used to monitor chemical reactions, to quantify ion activity, or to determine the oxidizing or reducing properties of a solution. The ORP is greatly influenced by the presence or absence of molecular oxygen. Low redox potentials may be caused by extensive growth of heterotrophic microorganisms. Such is often the case in developing or polluted ecosystems where microorganisms utilize the available oxygen. Here again, is another relative measure for biological oxygen demand; low ORP

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Chlorophyll *a*

Q: Why would I want to measure Chlorophyll *a*?

A: There are several important reasons for measuring Chlorophyll *a*. The most basic reason is that chlorophyll-containing organisms are the first step in most food chains, and the health and/or abundance of these primary producers will have cascading effects to all higher organisms. In addition, the measurement of photosynthetic pigments, particularly chlorophyll a, is used to estimate phytoplankton productivity and biomass.

Q: Will the readings for the new integrated Chlorophyll *a* sensor correlate with my SCUFA?

A: Yes. The new integrated Chlorophyll *a* sensor is still based on Turner's industry leading fluorescence technology. The most significant changes for the new design compared to the SCUFA is the ultra-compact size and the cost optimization.

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Blue-Green Algae

Q: Why would I want to measure Blue-Green Algae in real time?

A: Real-time measurement of Blue-Green Algae can allow early detection of Harmful Algal Blooms before they become problematic. Early detection in recreational waters can allow authorities to warn the general public of potentially unsafe water conditions that could otherwise result in illness to humans, or potential death of livestock and other animals. In drinking water facilities, early detection can allow preventive action that will help avoid a taste and odor event, clogged filters, or other potential risks to the drinking water supply.

Q: What form of Blue-Green Algae does the Hydrolab sensor measure?

A: Hydrolab's Blue-Green Algae sensor is available for measuring either phycocyanin, the most common form of Blue-Green Algae in fresh water, or phycoerythrin, the most common form of Blue-Green Algae in marine water.

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Rhodamine WT

Q: What is Rhodamine WT?

A: Rhodamine WT a highly specific tracer dye, which is a highly fluorescent material with the unique ability to absorb green light and emit red light.

Q: In what type of applications is a Rhodamine WT sensor used?
A: Rhodamine WT is used for measuring water flows, studying and modeling surface and ground water systems, tracing contaminants in emergency response situations, detecting leaks, and measuring tank retention times. Some example applications include: Measuring Effluent Discharge Rates; Localizing Sewer Infiltration; Mapping Discharge Dilution in Receiving Water Systems; and Calculating Time of Travel & Identifying Dispersion Patterns

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ISEs

Q: Why is the warranty different for the ISE sensors?
A: The ISE sensors use consumable, doped tips that have a shelf life of 6 months. These tips can be easily replaced without the need to replace the entire sensor.

Total Dissolved Gas

Q: What is Total Dissolved Gas (TDG)?
A: TDG is the amount of total gaseous compounds dissolved in a liquid. TDG is measured in units of pressure; this pressure includes the partial pressure of all gas species dissolved in the water.

Q: Why would I want to measure TDG?
A: It is important to know the extent of saturation of a water body; water supersaturated with atmospheric gases can cause gas bubble gill disease in aquatic organisms and may result in fish kills.

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Li-Cor Ambient Light

Q: What is PAR? Is this the same as Ambient Light?
A: PAR stands for Photosynthetically Active Radiation. PAR is a specific type of Ambient Light. Hydrolab's Ambient Light sensor is also a PAR sensor.

Q: Why would I want to measure PAR?
A: Ambient light measurement, in the context of water quality monitoring, is a measurement of sunlight intensity at a certain point in the water column. Sunlight intensity influences biota that rely on photosynthesis for nutrition. This includes photosynthetic phytoplankton (green and blue-green algae, some diatoms), and both submerged and emergent macrophytes (larger plants that grow underwater or partially underwater).

Q: Under what circumstances would I use the Dual-PAR sensor instead of the Single-PAR sensor?
A: A Dual-PAR sensor is used when ambient light needs to be analyzed in a differential mode, where sunlight intensity is measured both at the surface of the water and in the water column. In this way, light attenuation can be monitored, providing an integrated indicator of water clarity over the entire vertical water column.

Q: Under what circumstances would I use the Flat-PAR sensor instead of the Spherical-PAR sensor?
A: The flat-faced, or "cosine-corrected" sensor, is used when measurement of sunlight extinction in the water column is important: normally the sensor is always pointed vertically upward so that it measures only unreflected sunlight. A "spherical" sensor that collects light from all directions (not just "up," as does the cosine-corrected sensor) is

used when total light energy available for photosynthes is at a certain depth in the water column (including reflected light).

Q: How is the PAR sensor calibrated?

A: Hydrolab recommends factory calibration of the PAR sensor every two years. This can be arranged by contacting either Technical Support or Service group in Loveland, Colorado.