Instruction Sheet

00745589

Hach LDO™ Sensor

Safety Precautions

Please read this entire instruction sheet before operating this sensor. Pay particular attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the sensor.

Do not use or install this sensor in any manner other than that which is specified in this instruction sheet.

Use of Hazard Information
If multiple hazards exist, this instruction sheet will use the signal word (Danger, Caution, Note) corresponding to the greatest hazard.

DANGER
Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION
Indicates a potentially hazardous situation that may result in minor or moderate injury or instrument damage.

Important Note: *Information that requires special emphasis.*

Note: *Information that supplements points in the main text.*

Precautionary Labels
Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed.

This symbol, if noted on the instrument, references the instruction sheet for operational and/or safety information.

Introduction

The luminescent dissolved oxygen (Hach LDO) sensor is an in-situ optical probe that determines the dissolved oxygen concentration in a given water sample. The sensor cap is coated with a luminescent material. Blue light from a LED is transmitted to the sensor surface. The blue light excites the luminescent material. As the luminescent material relaxes it emits red light. The time from when the blue light was sent and the red light is emitted is measured. The more oxygen that is present, the shorter the time it takes for the red light to be emitted. This time is measured and correlated to the oxygen concentration. Between the flashes of blue light a red LED is flashed on the sensor and used as an internal reference to help validate each measurement. The sonde can display the oxygen either as a concentration from 0–20 mg/L or as a percent saturation with either air saturated water or water-saturated air serving as the 100% reference point.

Maintenance

Important Note: *Do not use organic solvent solutions such as acetone or methanol with the Hach LDO sensor. These solvents will damage the plastic sensor cap.*

The Hach LDO sensor is not affected by fouling or other debris, unless the growth is an organism that locally consumes or produces oxygen, such as barnacles, or algae growing on the sensor cap. Nevertheless, the manufacturer recommends periodic maintenance to remove contaminants such as oil, biological growth, dirt, etc. Sensor maintenance should be conducted after every deployment cycle.

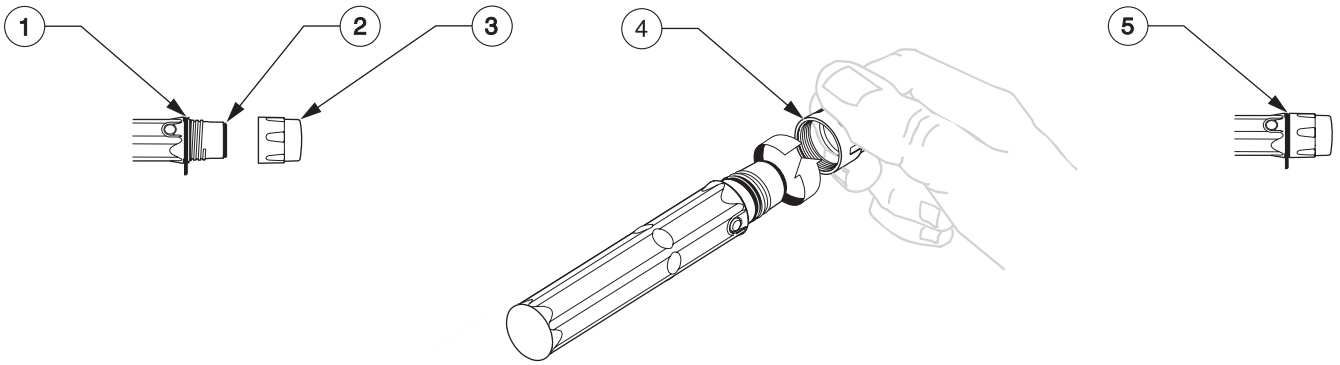
1. Flush the entire instrument with clean, fresh water. Use soapy water and a soft brush to clean the outside surfaces of the instrument.
2. Soak the entire instrument in fresh water for at least 30 minutes.
3. Visually inspect the sensor cap. Use optical tissue or a cotton swab with soapy water to clean the sensor cap. Rinse with fresh water.

It is not advised to remove the sensor cap unless the cap is being replaced. If the cap is sealed properly using the top O-ring seal, no water should be present between the sensor cap and the clear plastic window at the top of the probe. If water is present between the sensor cap and the clear plastic window at the top of the probe, remove the cap and thoroughly dry the inside of the cap and the clear plastic window. The cap may require replacement.

Installing the Sensor Cap

1. Place the cap seal item 1, Figure 1 and the O-ring item 2, Figure 1 on the probe.
2. Screw on the sensor cap (Figure 1) so that the o-ring seal is compressed. Do not over-tighten the sensor cap.

Figure 1 Installing the Sensor Cap



1. Cap Seal; Place the narrow shoulder towards probe tip.	**3.** Sensor cap	**5.** Narrow shoulder is inside the cap.
2. O-ring in place on probe tip	**4.** Screw sensor cap onto probe tip.	

Hach LDO Sensor Calibration

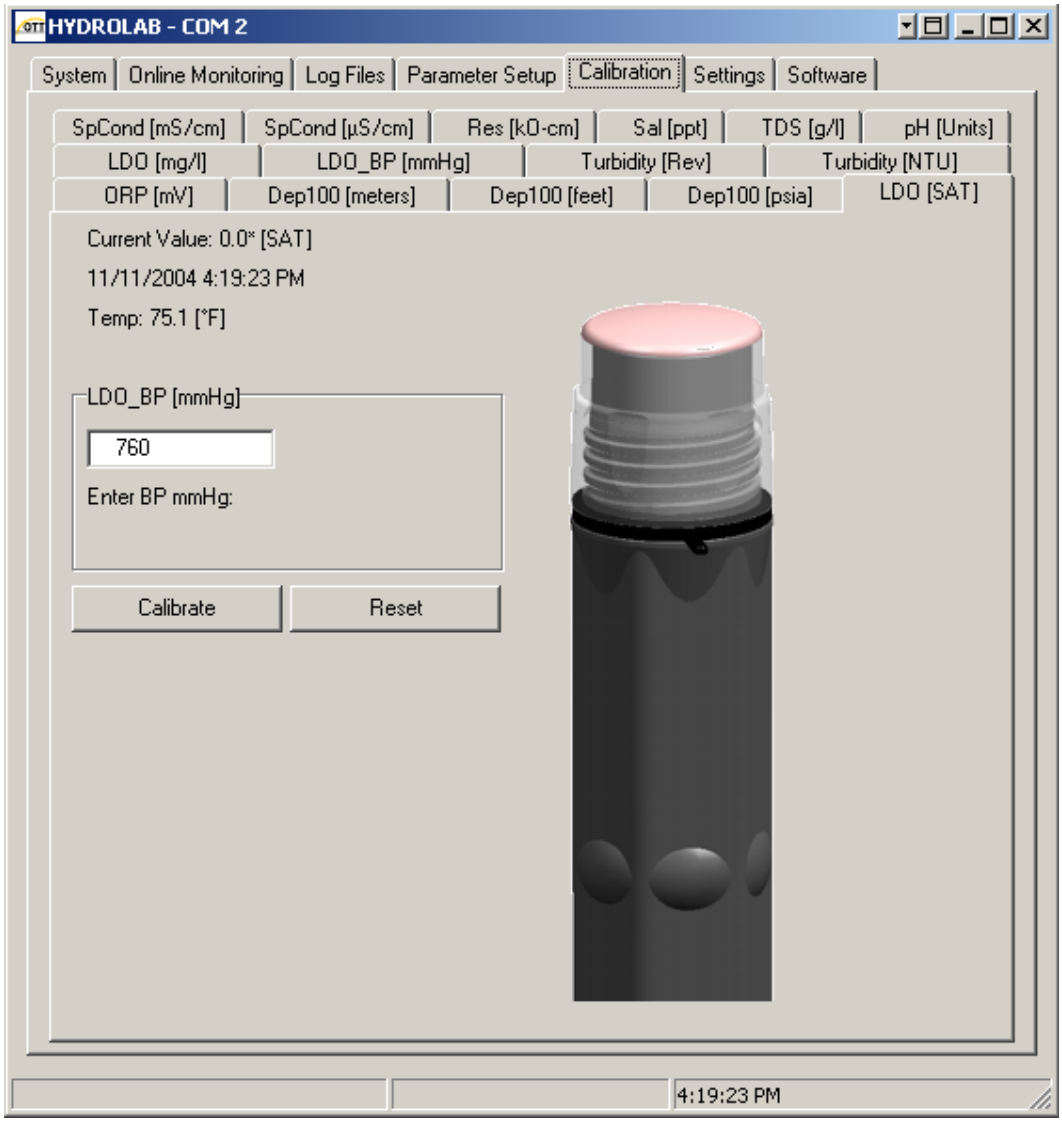
Dissolved oxygen concentration is associated with either a concentration in mg/L or a percent saturation, relative to 100% water saturated air or air saturated water.

There are three standard methods for calibrating the Hach LDO sensor. Each method requires a single point calibration for measurement of concentration in mg/L. In order to calibrate the sensor for percent saturation reading, the local barometric pressure must be determined independently by the user and inputed in the software during calibration.

In order to retain calibration accuracy between multiple deployments, store with sensor fully immersed in water at all times or at a minimum stored in a sealed container with water saturated air such as a sealed storage cup. Make sure the storage cap has at least 10cc of water and is sealed to prevent evaporation. It is important that the end of the sensor cap and the sonde temperature sensor are at the same temperature during calibration. When calibrating in water saturated air, the temperature sensor should be in air. When calibrating in air saturated water or water with a known oxygen concentration, the temperature sensor should be immersed in water.

Method 1
Use this method when water saturated air is applied to the sensor.

1. Connect the sensor to a PC.
2. Start Hydras 3 LT. Wait for Hydras 3 LT to establish communications with the sensor. Click the **OPERATE SONDE** button.
3. Click the **Calibration** tab and select the **LDO [SAT]** tab.

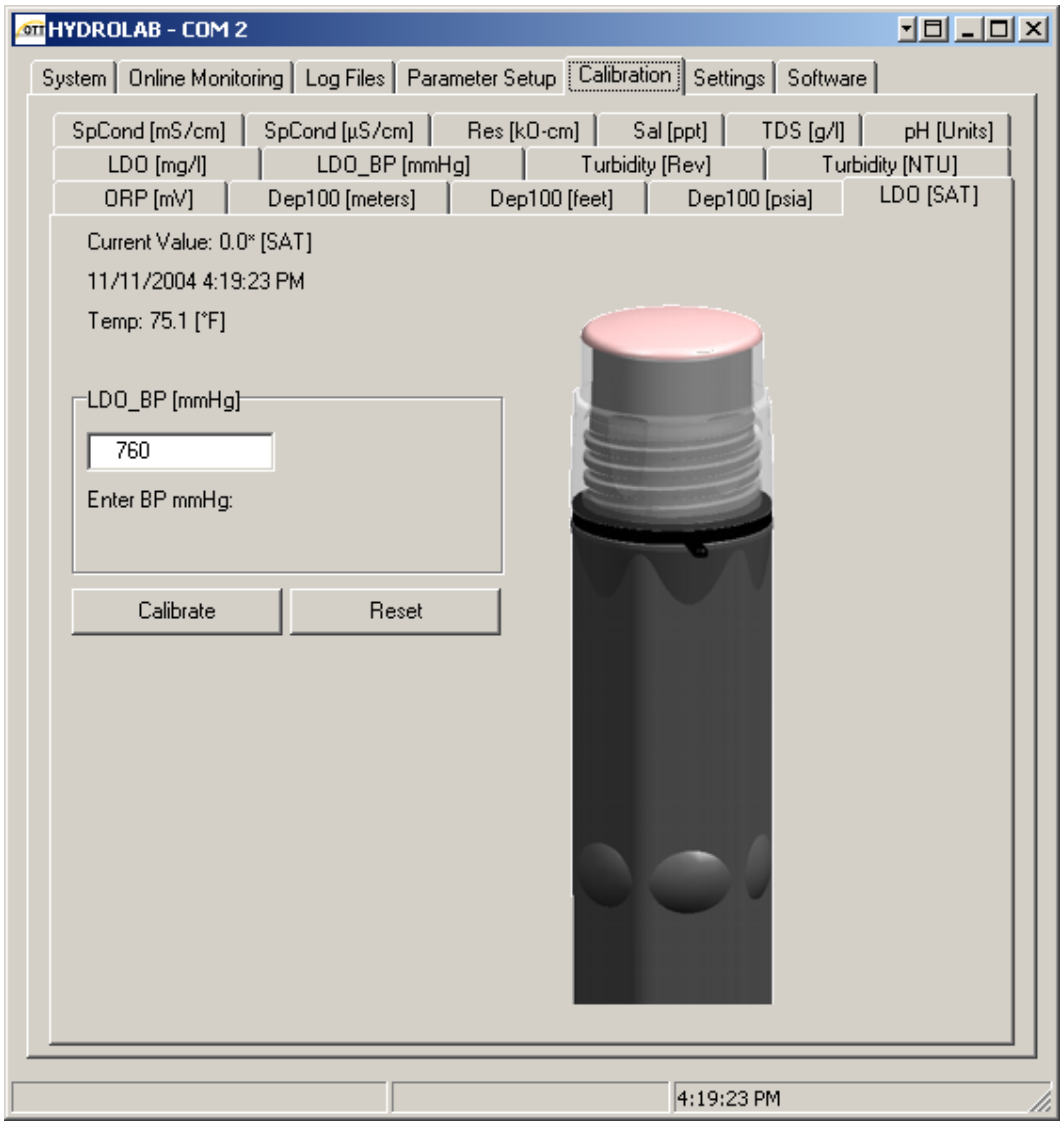


4. Place the calibration cup with one end sealed so that the calibration cup opening is facing upwards. The sonde will be inserted downwards into this cap.

5. Fill the calibration cup with deionized water or tap water (specific conductance less than 0.5 mS/cm). Fill until the water is just below the level of the top of the sensor cap when the sonde sensors are inserted into the calibration cup. Water should not touch the top of the sensor cap.
6. Carefully remove any water droplets from the sensor cap and temperature probe with the corner of a tissue or clean cotton cloth. It is important that no evaporative cooling take place either on the sensor cap or the temperature probe during calibration.
7. Gently set the sonde with sensors down into the calibration cup blocking any air exchange with the outside environment. Do not screw the calibration cup fully onto the sonde body as this will increase the pressure inside the calibration cup to above the barometric pressure and give a false 100% saturated reading. The goal is to block air exchange between the sealed calibration cup and the outside.
8. Allow the dissolved oxygen and temperature readings to stabilize. As the temperature sensor has a smaller thermal mass than the luminescent dissolved oxygen sensor, it is best to allow the entire unit to stabilize for 3–5 minutes after the temperature sensor stabilizes. At this point, the air inside the calibration cup should be fully saturated with water, hence the name “water saturated air.”
9. Determine the barometric pressure for entry as the calibration standard.
10. Enter the barometric pressure in the field provided.
11. Click **CALIBRATE**. A "Calibrate Successful!" screen will be displayed.

Method 2
Use this method when air saturated water is applied to the sensor.

1. Connect the sensor to a PC.
2. Start Hydras 3 LT. Wait for Hydras 3 LT to establish communications with the sensor. Click the **OPERATE SONDE** button.
3. Click the **Calibration** tab and select the **LDO [SAT]** tab.



4. Place the sensor into a water tank with temperature stabilized water (typically by allowing it to sit at least 12 hours after being run from a faucet), which is saturated with air (typically by using an air stone for the 12 hours of temperature stabilization). Make sure that no bubbles are present on the face of the sensor and that the temperature probe is fully immersed.
5. Determine the barometric pressure for entry as the calibration standard.

6. After the temperature and luminescent dissolved oxygen readings have stabilized, wait an additonal 3–5 minutes to assure that the luminescent dissolved oxygen sensor material has reached the same temperature as the water bath. Enter the barometric pressure in the field provided.

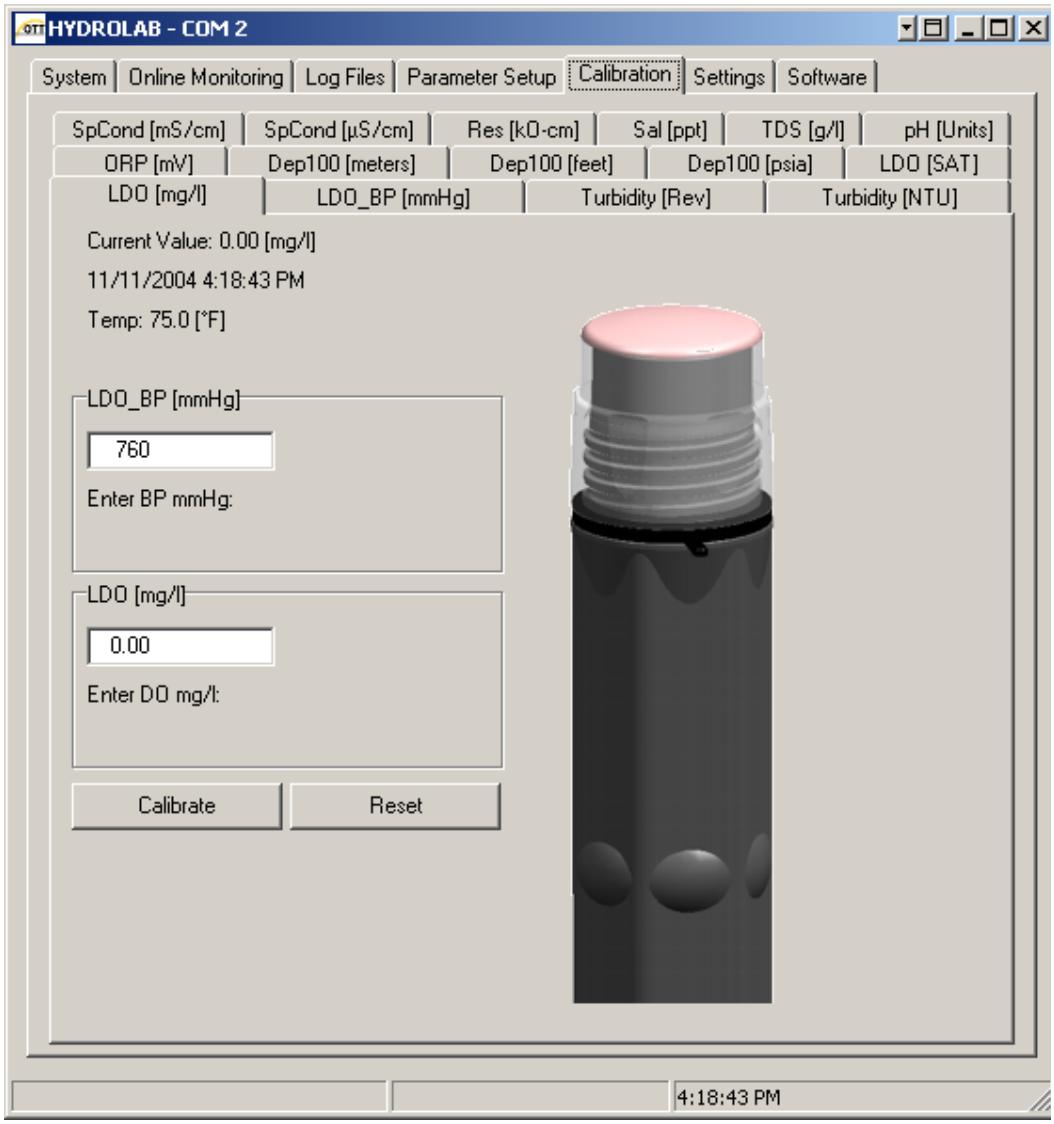
7. Click **CALIBRATE**. A "Calibrate Successful!" screen will be displayed.

Method 3
Use this method when a known calibration standard is applied to the sensor.

1. Connect the sensor to a PC.

2. Start Hydras 3 LT. Wait for Hydras 3 LT to establish communications with the sensor. Click the **OPERATE SONDE** button.

3. Click the **Calibration** tab and select the **LDO [mg/l]** tab.



4. Place the sensor into a solution with a known concentration of oxygen. For example, a reference tank with a calibrated Hach Luminescent Dissolved Oxygen sensor. Make sure that no bubbles are present on the face of the sensor and that the temperature probe is fully immersed.

5. Determine the barometric pressure for entry as the calibration standard.

6. After the temperature and luminescent dissolved oxygen readings have stabilized, wait an additional 3–5 minutes to assure that the luminescent dissolved oxygen sensor material has reached the same temperature as the water bath. Enter the barometric pressure in the field provided.
7. Determine dissolved oxygen in mg/L in the sample using a known reference.
8. Enter the known concentration of oxygen the Dissolved Oxygen mg/L field.
9. Click **CALIBRATE**. A "Calibrate Successful!" screen will be displayed.

Specifications

Specifications are subject to change without notice.

Minimum Detection Limit	0.1 mg/L
Range	0–20 mg/L
Accuracy[1]	±.01 mg/L for 0–8 mg/L; ±.02 mg/L for greater than 8 mg/L
Resolution	0.01 or 0.1 mg/L
% Saturation	0.1%
Warranty	Sensor is covered by a two-year warranty. Sensor cap is covered by a one-year warranty.

[1] The following exceptions are taken to the specified accuracy under IEC 1000-4-3:1996: Vertically-oriented radiated interference of 10V/m between 20 and 600 MHz has been observed to cause measurement shifts up to 5V (with corresponding shifts in the analyte reading) when the sonde with this sensor was exposed to the stated field. Horizontally-oriented radiation interferences of 10V/m between 50 and 150 MHz and between 450 and 600 MHz has been observed to cause measurement shifts up to 140 mV (with corresponding shifts in the analyte reading) when the sonde with this sensor was exposed to the stated field. Radiated interference testing was performed in air. Normal operation of the sonde under water is expected to decrease the impact of the radiation interference.

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