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Oxygen Sensor with Electrode

Product Number: ENOXY-A222

Overview

The Oxygen sensor is a maintenance-free galvanic oxygen electrode, capable of measuring Oxygen both in the air and in solutions.

The Oxygen sensor can be used to perform a wide variety of experiments in both liquid and gaseous environments. It is used in a variety of experiments such as measuring the amount of oxygen in an aquarium or understanding the effects of photosynthesis.

The Oxygen Sensor can be connected to all types of einstein™ data loggers.

Typical experiments

Biology

- Monitoring changes in oxygen levels during photosynthesis and respiration of plants
- Consumption of oxygen by yeast during respiration of sugars
- Monitoring human respiration
- Monitoring oxygen levels during enzyme activity, e.g. the breakdown of H2O2 by catalase

Water Quality

- Monitoring dissolved oxygen concentrations resulting from photosynthesis and respiration in an aquarium containing plants and/or fish.
- Monitoring the pattern between light and dissolved oxygen levels, in an aquarium with pondweed.
- On-site testing in streams and ponds to evaluate the capability of their water to support different types of plant and animal life.

Chemistry

- Oxidation of metals
- Discovering the change in oxygen level during combustion – using a candle burning in a bell jar

Sensor specification

Range:	0 to 12.5 mg/L DO 0 to 25% O_2
Accuracy:	± 7% over entire range
Resolution (12-bit):	0 to 12.5 mg/L 0.003 mg/L 0 to 25% 0.007%
Temperature Compensation:	No
Response Time for 95% of Reading:	Up to 2 minutes
Default Sample Rate:	10 samples per second

Note: sensor cables sold separately

Technical Notes

- If the ambient temperature is different than 25 °C, then calibrate the sensor (see below).
- It is important to stir the solution during measurement as oxygen consumption by the probe can momentarily reduce the oxygen concentration at the probe's surface.
- Do not allow any air bubbles to be trapped on the membrane surface, as it will read an air bubble and an oxygen–saturated sample.
- The electrode membrane is very robust, relative to other electrodes. Its function is more of

a physical barrier (permeable to O_2) rather than a chemical reaction type membrane. In pond water, its useful life is determined by how well it is cared for e.g. by avoiding stretching, scratching, and fouling the membrane.

- The membranes only problem areas are:
  - Scratches or tears - Scratches could change the accuracy of the probe, tears will cause immediate failure
  - Fouling of the membrane - Impacts measurement only if it impedes the membranes permeability to DO. This is unlikely in pond water whereas in wastewater this may be a common problem.
  - Stretching of the membrane - The thickness of the membrane and position of the membrane on the cathode are critical parameters of the measurement.

Maintenance and Storage

Maintenance

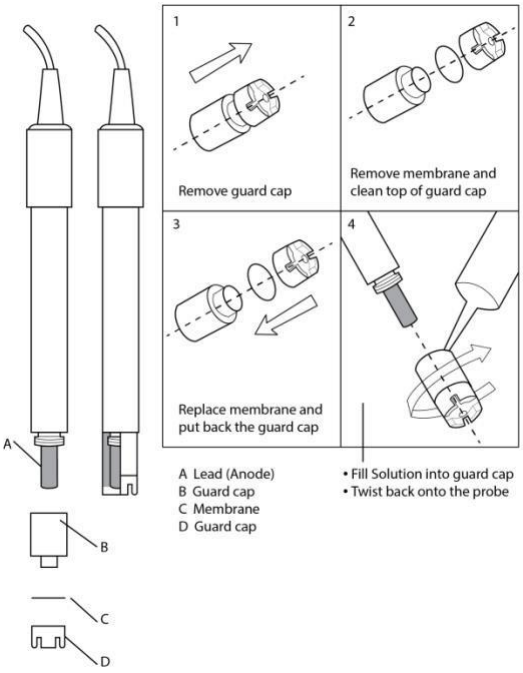
After the electrode has been used for a period the following cleaning method is recommended:

1. Carefully unscrew the cap from the body.
2. Rinse the inside of the membrane cartridge with DI water.
3. Soak the lead anode in 0.1 N HCl (8.3 mL concentrated HCl in 1000 ml DI water) for 15 to 20 minutes. Rinse the lead anode with DI water, blot dry with tissue paper. Screw the lead anode back onto the body.
4. Rinse the soaked portions thoroughly with DI water. Blot dry with tissue paper.
5. Fill the cap with Galvanic O_2 Fill Solution to a level just above the membrane cartridge using the dropper provided with the sensor. Hold the electrode in an upright position and gently screw the cap back onto the body.
6. Inspect the membrane for tears or leakage. The membrane should be uniformly stretched across the inner body. Replace the membrane if any damage has occurred.

Membrane Replacement

1. The membrane should be examined routinely after each fermentation cycle and replaced if any deterioration is evident. See the illustration below.
2. Carefully unscrew the cap from the body.
3. Using the membrane tool provided, pop the membrane cartridge from the cap.
4. Inspect the platinum cathode. Gently wipe it with tissue paper and see if there are any cracks or damage.
5. Take a new membrane out of the plastic package and insert into the cap. Push it down inside until firmly seated inside the outer cap using the membrane tool provided.
6. Fill the cap with electrolyte to a level just above the membrane cartridge, using the dropper provided with the sensor.
7. Do not allow any air bubbles to be trapped on the membrane surface, as it will read an air bubble as an oxygen–saturated sample

8. Hold the electrode in an upright position and gently screw the cap back onto the body. Inspect the membrane for tears or leakage. The membrane should be uniformly stretched across the inner body.



Storage

Short term (up to one week)

1. Inspect the membrane for tears or leakage. The membrane should be uniformly stretched across the inner body
2. Replace the membrane if any damage has occurred.

Long term

1. Carefully unscrew the cap from the body.
2. Rinse the inside of the membrane cartridge with DI water.
3. Rinse the soaked portions thoroughly with DI water. Blot dry with tissue paper.
4. Screw the cap back onto the body without the electrolyte

Data logging and analysis

Android

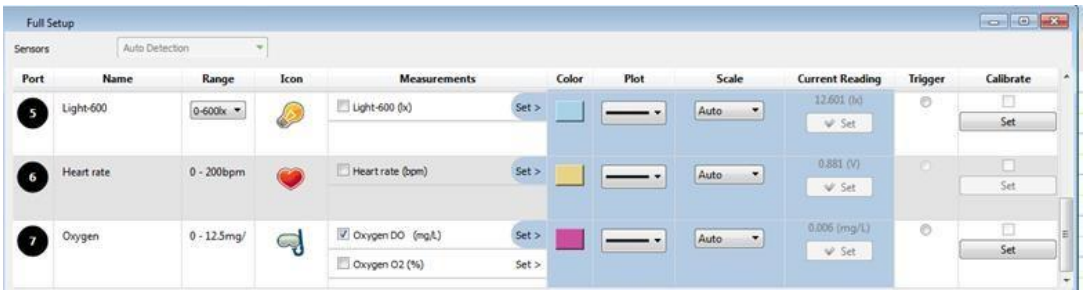
1. Take your einstein™ Tablet or pair your einstein™LabMate™ with your Android or iOS tablet via Bluetooth
2. Insert the sensor cable into one of the sensor ports
3. Launch MiLABEx and then tap on LAB start an Experiment
4. MiLABEx will automatically detect the sensor

5. To ensure it is checked, for calibration and setting tap on sensors

Desktop

1. Pair your einstein™LabMate™ with your PC, MAC, or Linux machine via Bluetooth, or connect it via the USB cable (found in the einstein™LabMate™ box).
2. Insert the sensor cable into one of the sensor ports.
3. Launch MiLABEx then Click on LAB start an Experiment
4. MiLABEx will automatically detect the sensor and show it in the Current Setup Summary window
5. Click Full Setup, located at the bottom of the Current Setup Summary window to program the data

   logger's sample rate, number of samples, units of measurement, and other options.



6. Click the Run button on the main toolbar of the Launcher View to start logging.

What's included

The Oxygen Sensor comes with:

- One Oxygen sensor
- One electrode
- One bottle Galvanic O_2 Fill Solution
- One bottle Salt for zero solution – (Sodium Sulfite, Na_2SO_3)

- One plastic dropper
- Extra membranes

Calibration

There are two types of calibration available. Set zero and two poin calibration. Please find below the instructions.

Desktop

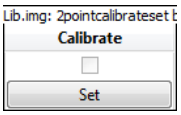
Set Zero Calibration

In the Current Reading column, click Set to set the current value as the zero or base value.

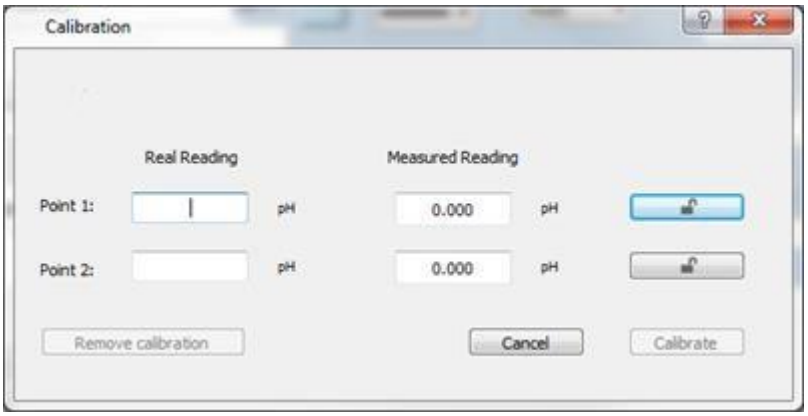
Reset cancels this action

Two Point Calibration

1. Go to the Full Setup window and in the Calibrate column click Set



2. The Calibration window will appear



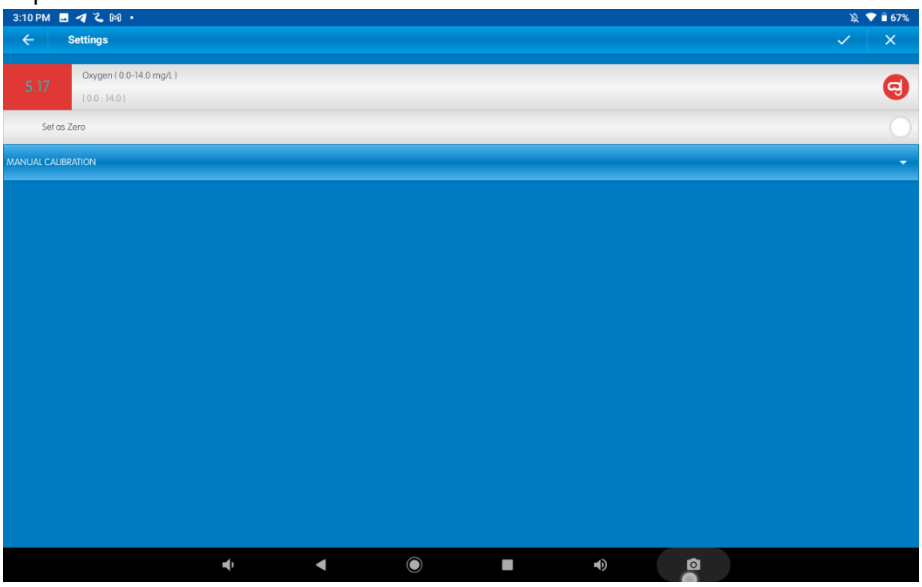
3. Saturate water with Oxygen by vigorously stirring the water. Enter the known value for saturated water according to your location in the Point 1, Real Reading field
4. Measure the solution and, wait for the readings to stabilize. Enter the measurement as the Point 1 Measured Reading field and click the lock button
5. Prepare a second solution with a known value (we recommend using the salt for zero solution in order to reduce the DO of water to zero). Enter this known value in the Point 2, Real Reading field
6. Measure the solution and, wait for the readings to stabilize. Enter the measured value as the Real Reading on the first line and click the lock button
7. Click Calibrate

Android

In LAB Start an Experiment

Tap Sensors

Tap the arrow icon

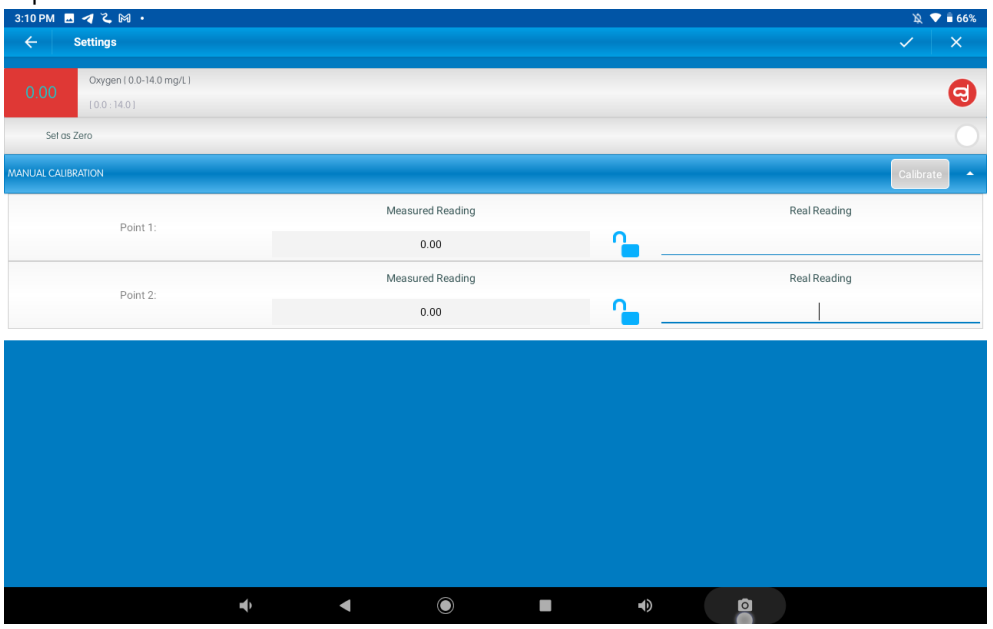


Set Zero Calibration

Under Current Reading column flip the Set As Zero switch to set the current value as the zero or base value.

Two Point Calibration

1. Tap manual calibration



2. Saturate water with Oxygen by vigorously stirring the water. Enter the known value for saturated water according to your location in the Point 1, Real Reading field
3. Measure the substance and, wait for the readings to stabilize. Enter the value as the Point 1 Measured
   Reading field and Tap the lock button
4. Prepare a second solution with a known value (we recommend using the salt for zero solution in order to reduce the DO of water to zero). Enter this known value in the Point 2, Real Reading field
5. Measure the solution and, wait for the readings to stabilize. Enter the known value as the Real Reading at the first line and Tap the lock button

6. Tap Calibrate
7. Tap V to save the calibration and settings
8. Tap V to save the sensors selection
9. You are ready to start an Experiment.

Troubleshooting

If the Oxygen sensor isn't automatically recognized by MiLAB, please contact Fourier Education's technical support.

Technical support

For technical support, you can contact the Fourier Education's technical support team at: Web: www.einsteinworld.com/support
Email: support@fourieredu.com

Copyright and Warranty

All standard Fourier Systems sensors carry a one (1) year warranty, which states that for a period of twelve months after the date of delivery to you, it will be substantially free from significant defects in materials and workmanship.
This warranty does not cover breakage of the product caused by misuse or abuse.
This warranty does not cover Fourier Systems consumables such as electrodes, batteries, EKG stickers, cuvettes and storage solutions or buffers.