



Ethanol Sensor

Product Number: ENETH105




Overview

The Ethanol sensor is an accurate, easy to use, sensor designed to measure ethanol vapor levels in air, and is mostly used in experiments dealing with fermentation.

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

Typical experiments

 Biology	Monitoring the rate of fermentation over time Studying factors that affect the rate of fermentation
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Sensor specification

Range:	0% - 4%
Accuracy:	±1.5%
Resolution (12-bit):	12 bit
Temperature Compensation:	Yes
Response Time for 95% of Reading:	1 minute
Operating Temperature	-10 to 40 °C
Note: sensor cables sold separately	

Important Technical Notes

- **Do not immerse the electrode in ANY solution**
- The sensor measures the concentration of alcohol molecules emitted from the surface of the solution. This concentration is lower than the concentration of ethanol in the solution but proportional to it in the range of 0% to 4%, therefore it is effective in evaluating the rate of fermentation in certain ranges.
- Since the concentration of ethanol vapors above the solution may be affected by the ambient temperature and the surface area of the liquid, it is important to conduct all the measurements in a particular experiment in vessels with the same tin and the same air-liquid science area, and at the same temperature. Recommended in 100 ml test tubes or beaker. Also use a magnetic stirrer to mix the detected solution during the measurement.
- You must set the sensor as close as possible to the surface of the liquid, but without touching it. It is recommended to hold the sensor about 1 cm from the surface of the liquid, and to keep the same distance in all measurements.
- See below (Maintenance), how to change the thread seal (Teflon) tape.

Data logging and analysis

MiLAEBx™ 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 MiLAEBx
4. MiLAEBx will automatically detect the sensor and select it for your experiment

5. You are ready to start an experiment

MiLAEBx™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 MiLAEBx.
4. MiLAEBx will automatically detect the sensor and show it in the Current Setup Summary window
5. You are ready to start an experiment

Maintenance

Changing the Thread seal (Teflon) tape – The tip of the electrode is protected by Thread seal tape.

Periodically changing this tape will help improve sensor accuracy.

1. To change the tape:
2. Remove the blue protective cover
3. Unscrew the black screw top cover
4. Remove the old tape
5. Apply new tape
6. Reattach the black screw top



Calibration

The ethanol sensor can be calibrated with the set zero function or with two-point calibration (0% and 4%).

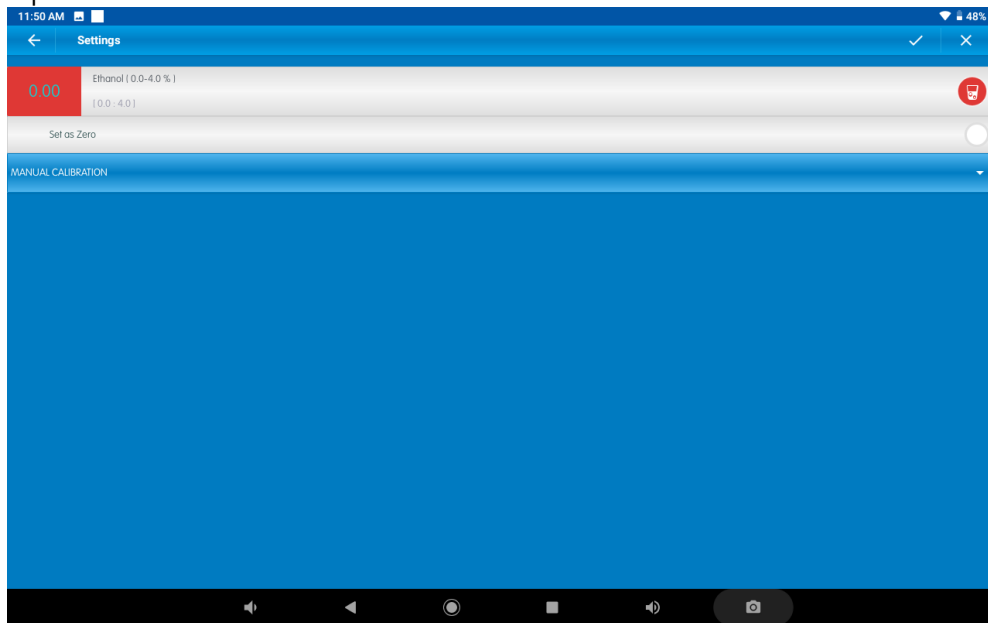
Note: the sensor reading will not show 4% (at the high end of the range) but it will show the ethanol concentration in the air above the vessel for a solution containing 4% ethanol. Consider this value as being in correlation with 4% ethanol in the solution in specific conditions. Therefore, the calibration is according to the vessel that you use at a certain temperature and is correct for only this vessel at this ambient temperature. If you choose to conduct the experiment in a different vessel or at a different

temperature, a new calibration must be conducted.

Calibrating in MiLAEBx™ Android

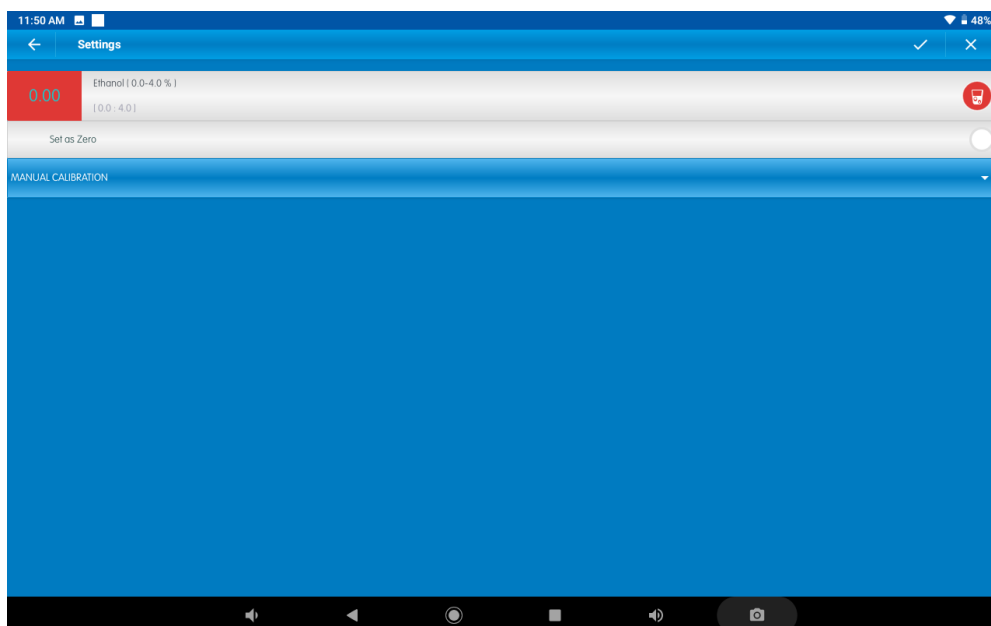
Set Zero Calibration

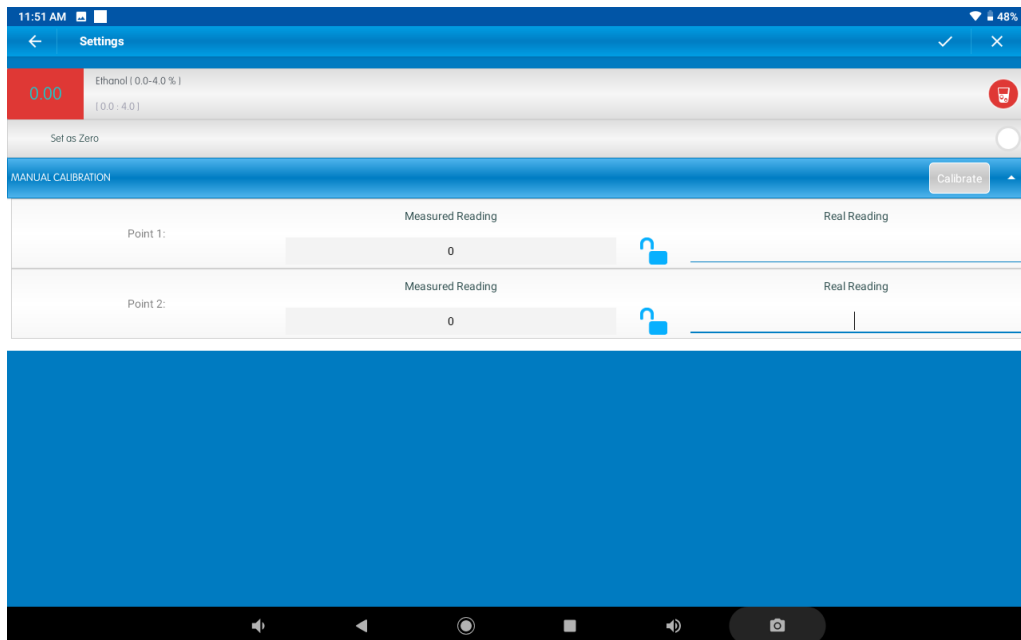
1. Tap the Settings button next to the sensor's name.
2. Flip the Set as Zero switch to set the current value as the zero or base value.





Two Point Calibration

1. Tap the Settings button next to the sensor's name
2. Tap Manual Calibration





3. Prepare a solution with a known value of between 0-4% ethanol. Enter the known value in the Point 1 Real Reading field. Please
4. Measure the substance and wait for the readings to stabilize.
5. Tap the lock icon 
6. Prepare a second solution with a known value of between 0-4% ethanol. Enter this known value in Point 2, Real Reading field
7. Measure the substance and, wait for the readings to stabilize.
8. Tap the lock icon 
9. Tap Calibrate.

Note: For the most accurate results try to calibrate the sensor with one Real Reading under the expected results and one Real Reading over the expected results.

Calibrating in MiLAEBx™Desktop

Set Zero Calibration

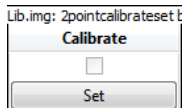
1. Go the full setup window
2. In the Current reading click on Set

Port	Name	Range	Icon	Measurements	Color	Plot	Scale	Current Reading	Trigger	Calibrate
	Temperature	-30 - 50°C		<input type="checkbox"/> Temperature (°C) Set > <input type="checkbox"/> Temperature (°F) Set > <input type="checkbox"/> Temperature (°K) Set >			Auto	21.587 (°C) Set	<input type="radio"/>	<input type="checkbox"/> Set
	Pressure	260 - 1260mbar		<input type="checkbox"/> Pressure (mbar) Set > <input type="checkbox"/> Pressure (kPa) Set > <input type="checkbox"/> Pressure (atm) Set >			Auto	1012.031 (mbar) Set	<input type="radio"/>	<input type="checkbox"/> Set
	UVI	0 - 13		<input type="checkbox"/> UVI (UVI) Set > <input type="checkbox"/> (W/m²) Set >			Auto	0.000 (UVI) Set	<input type="radio"/>	<input type="checkbox"/> Set
	Light	0-150 Klx		<input checked="" type="checkbox"/> Light (lx) Set >			Auto	1220.000 (lx) Set	<input type="radio"/>	<input type="checkbox"/> Set
2	Ethanol	0 - 4%		<input checked="" type="checkbox"/> Ethanol (%) Set >			Auto	0.001 (%) Set	<input type="radio"/>	<input checked="" type="checkbox"/> Set

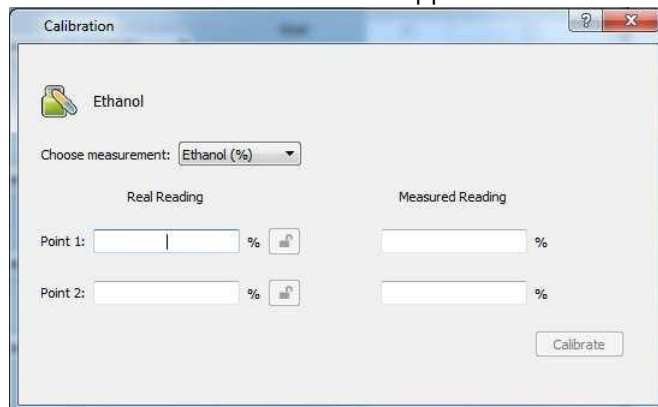
3. Sensor is set Zero.

Two Point Calibration

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



2. The Calibration window will appear



3. Prepare a solution with a known value. Enter this known value in the Point 1, Real Reading field
4. Measure the substance and, wait for the readings to stabilize.
5. Click the lock icon
6. Prepare a second substance with a known value. Enter this known value in the Point 2, Real Reading field
7. Measure the substance and, wait for the readings to stabilize.
8. Click the lock icon
9. Click Calibrate

Note: For the most accurate results try to calibrate the sensor with one Real Reading under the expected results and one Real Reading over the expected results.

An example of using the Ethanol Sensor

Measuring the ethanol level in air

In this experiment we will measure the ethanol level in the air above an ethanol solution. Connect the ethanol sensor to a sealed bottle, so you will be able to measure the ethanol concentration inside.

1. Partially fill the bottle with water
2. Begin measuring the ethanol level
3. Add some ethanol to the water
4. Follow the changes in the ethanol concentration

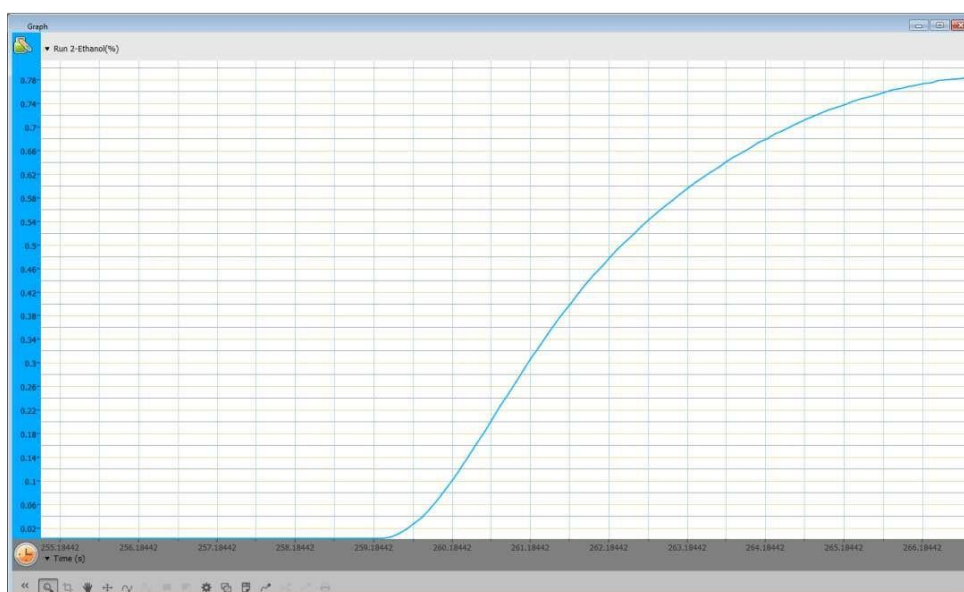


Figure 1. Typical graph produced by this experiment

Troubleshooting

If the Ethanol sensor isn't automatically recognized by MiLAEBx, 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 Phone (in the US): (877) 266-4066

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.

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