



**einstein™**

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APR 2024

# Salinity Sensor

Product Number: ENSLT



## Overview

The Salinity sensor is designed to measure the salinity of solutions and is capable of measuring the entire range of 24-52,000 ppm (parts per million). Salinity is one of the most basic tests conducted in solutions. It is correlated with the total concentration of salts in a solution.

The Conductivity sensor can be connected to all types of einstein™ data loggers. It can be used for various experiments in Biology, Chemistry and Environmental Science.

## Typical experiments



### Water Quality

- Comparing conductivity of different water samples (e.g. tap water vs distilled water to measure the effectiveness of distilling apparatuses)



### Chemistry

- Determining the concentration of salts in the solution



### Environmental Science

- Conducting environmental studies, e.g. the quality of different sources of water
- Exploring marine habitats



### Electricity

- Determine the quality of different solutions and their electrical potential

## How it works

In a solution, current flows by ion transport. An increasing concentration of ions in the solution will result in higher conductivity values. The Salinity sensor contains two carbon electrodes. A potential difference is applied to these electrodes which results in a current proportional to the concentration of the solution.

## Sensor specification

Range: 24 – 52,000 ppm

Accuracy: ±8% over entire range

Resolution (12-bit): 12 ppm

Conductivity Cell Material: Carbon, 2-Cell

K Cell Value: 1.0

K cell Value Tolerance: ±20%

Temperature Range: 0 to 80 °C

Minimum Sample Size: 25mL

Response time for 95% of reading: 5 seconds

Default Sample Rate: 10 samples per second

Note: Sensor cable sold separately

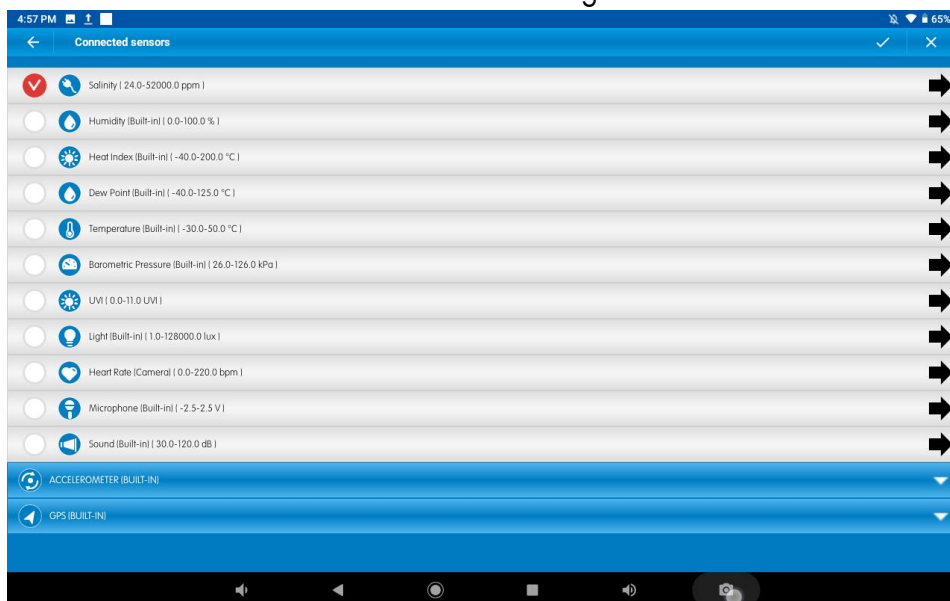
## Technical Notes

- For the best results soak the probe in distilled water (DI) before use.
- During measurement, avoid particulate matter. Allow it to settle. Do not let sediment build up on the sensor.
- Rinse the electrode after measurements with DI water.
- Do not touch the probe cell surface with any hard or sharp object. If the probe cell surface is contaminated, clean the electrode (see Cleaning below).
- Store the electrode dry.
- The Salinity sensor was designed only for educational purposes and shouldn't be used for industrial,
- medical, or research applications.

## 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. Remove the blue protective cap from the electrode
4. Launch MiLABEx and tap LAB start an Experiment
5. MiLABEx will automatically detect the sensor
6. Make sure the icon next to the sensor is checked- go to Sensors and check that it is checked.



7. To Calibrate tap on the Arrow Icon – then calibrate according to the process written below.
8. You are ready to start an Experiment

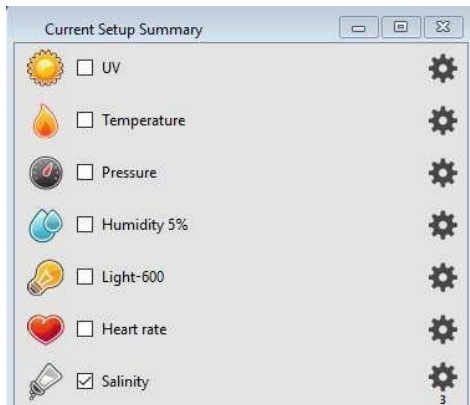
### Desktop

1. Pair your einstein™ LabMate with your PC, MAC, or Linux machine via

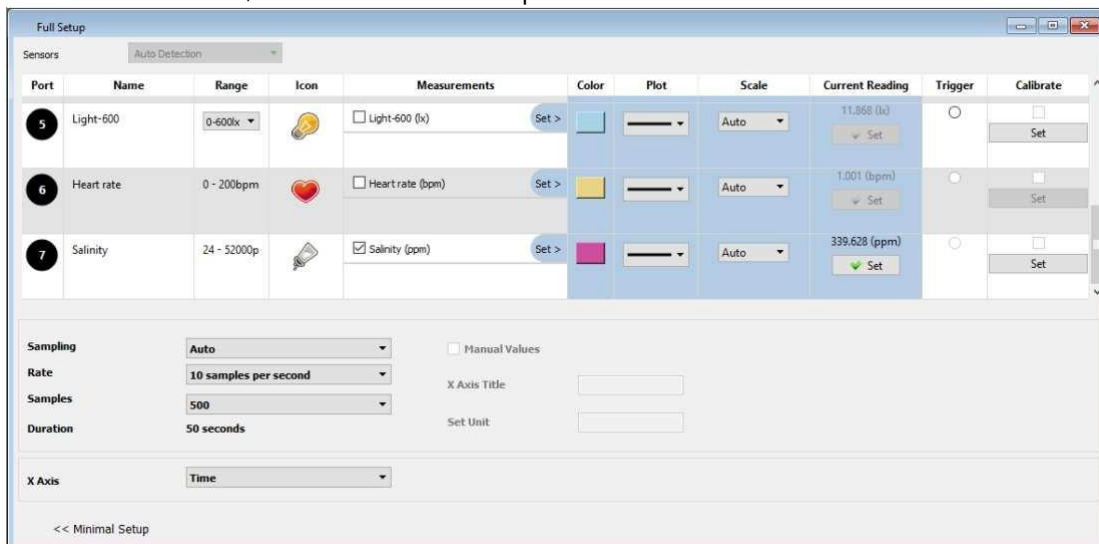
[www.einsteinworld.com](http://www.einsteinworld.com)

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. Remove the blue protective cap from the electrode
4. Launch MiLABEX and then click on LAB start an Experiment
5. MiLABEx will automatically detect the sensor and show it in the Current Setup Summary window



6. 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, calibration and other options



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

## Electrode Maintenance

### Cleaning the Electrode General method

Prepare a solution of 1/2 teaspoon of liquid soap in 200 mL warm water. Soak the electrode for a few minutes and then gently wipe the element with a cotton swab. Rinse thoroughly with DI

water.

### Inorganic Build-up Method

When there is a buildup of inorganic material on the electrode soak the electrode tip in 0.1 M HCl for 5 minutes, then rinse thoroughly with DI water.

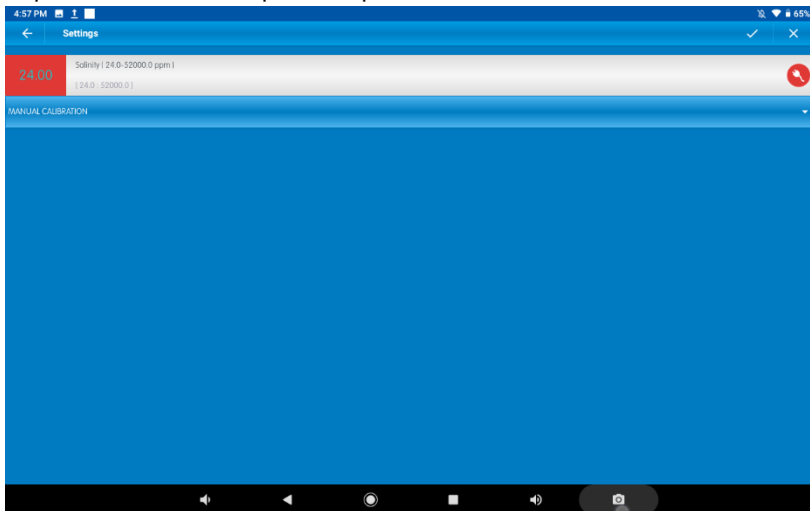
### Greasy Film Method

When there is a buildup of greasy film on the electrode rinse the electrode tip with acetone or methanol (do not soak), then wash with the general method above. Rinse thoroughly with DI water.

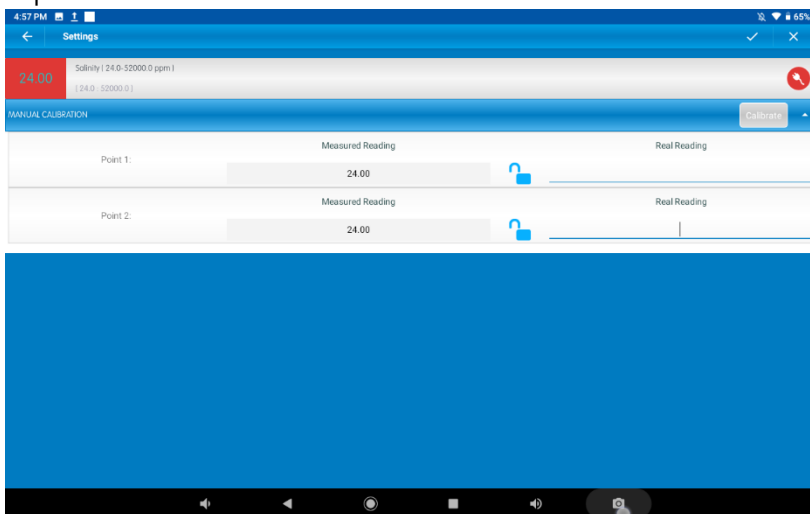
## Calibration

### Android

1. Tap on Sensors
2. Tap on arrow icon to open setup



3. Tap Manual Calibration



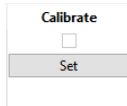
4. Prepare a solution with a known salinity (e.g. distilled water). Enter this known value in the Point 1, Real Reading field

5. Measure the substance and wait for the readings to stabilize
6. Tap the lock icon
7. Prepare a second substance with a (different) known salinity. Enter this known value in the Point 2, Real Reading field
8. Measure the substance and wait for the readings to stabilize
9. Tap the lock icon
10. Tap Calibrate
11. Tap V to save the calibration
12. Tap V to save the sensors selection set up
13. You are ready to start an Experiment

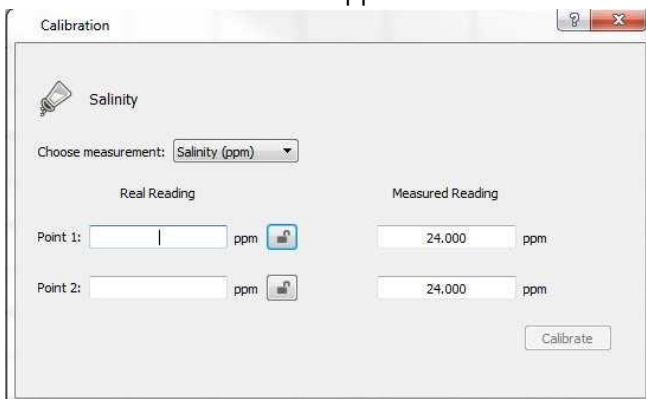
*Note: For the most accurate results try to calibrate the sensor with one Real Reading under the expected results and one Real Reading over the expected results.(e.g. 24-1200 ppm, 1200-12000 ppm, 12000 - 52000 ppm)*

## Desktop

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 salinity (e.g. distilled water). Enter this known value in the Point 1, Real Reading field
4. Measure the substance and, wait for the readings to stabilize. Enter the known value as the Point Measured Reading field and click the lock button
5. Prepare a second substance with a (different) known salinity. Enter this known value in the Point 2, Real Reading field
6. Measure the substance and, wait for the readings to stabilize. Enter the known value as the Real Reading on the first line and click the lock button
7. Click Calibrate

## An example of using the Salinity Sensor

### Measuring the salinity of NaCl solutions

Prepare several NaCl solutions according to the table below:

Salt (NaCl) Concentration (g/L)	Salinity (ppm)
*58.44 mg	14,006
*83.45 mg	20,000
*125.17 mg	30,000

- \*Add the above amount of NaCl to make 1 liter of solution
  - Alternatively, one can use premade conductivity calibration solutions from companies such as Eutech and Reagecon.
1. Perform the calibration process with solutions of 14,006 ppm and 30,000 ppm.
  2. Rinse the electrode with DI water and perform a measurement of 20,000 ppm solution.
  3. Click the Run button to start logging.
  4. After this calibration you will be able to measure other solutions of NaCl in the range of 14,006- 30,000 ppm

## Troubleshooting

If the salinity values are out of the range, are drifting, or are generally inaccurate:

- Verify cell constant compatibility with a standard solution
- Use fresh standards or glassware
- Calibrate with standards at the same temperature as the sample
- Tap the cell against the container bottom to dislodge air bubbles
- Clean the electrode
- Condition the electrode in DI water overnight

**Note:** Attempt each suggestion in the order listed above.

If the 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](http://www.einsteinworld.com/support)

Email: [support@fourieredu.com](mailto: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.

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