einstein™
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Apr 2024

Microphone

Product Number: ENMCR008

Overview

The Microphone is a sound sensor with an output of ±1.5 V. It is designed to study the properties of sound waves from voices and musical instruments. The Microphone can also be used for measuring the speed of sound. The frequency range of the Microphone is 35 Hz to 10,000 Hz.

The Microphone sensor can be connected to all types of einstein™ data loggers.

Typical experiments

Physics

- Testing the concentration of ammonium ions in the irrigation water
- Testing the concentration of ammonium ions in drinking water
- Investigate correlations between ammonium ion concentrations and other water quality parameters, such as pH, temperature, or dissolved oxygen.
- Conduct field studies to explore spatial variations in ammonium ion concentrations in different water bodies.
- Monitor landfill leachate to ensure that ammonium levels are within acceptable limits and do not pose a threat to groundwater or nearby surface water.

Biology

- Effectiveness of Fertilizers
- Level of Ammonium in Processed Meat
- Corrosiveness of Ammonium in Canned Foods

How it works

The microphone component inside the Microphone sensor contains a variable capacitor. One of the capacitor's plates is a sound-sensitive membrane, moving back and forth as sound waves resonate through it. As the sound waves move the membrane, which is one of the capacitor plates, the distance between the plates changes, the capacity of the capacitor changes and the voltage changes. This voltage is then adjusted to a range of 0-3 V, which is accepted by the Analog-Digital converter of the data logger, and transformed to a value between ±1.5 V. The result is then displayed.

Sensor specification

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Frequency Range:	35 Hz to 10,000 Hz
Range:	±1.5 V
Resolution (12-bit):	0.73 mV
Sample Rate	For best results, the Sampling Rate should be 5 times the expected frequency

Note: sensor cables sold separately

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

4. Tap on LAB start an Experiment

5. MiLABEx will automatically detect the sensor and selects it

6. To Ensure sensors selection, go to Sensors and check the check box.
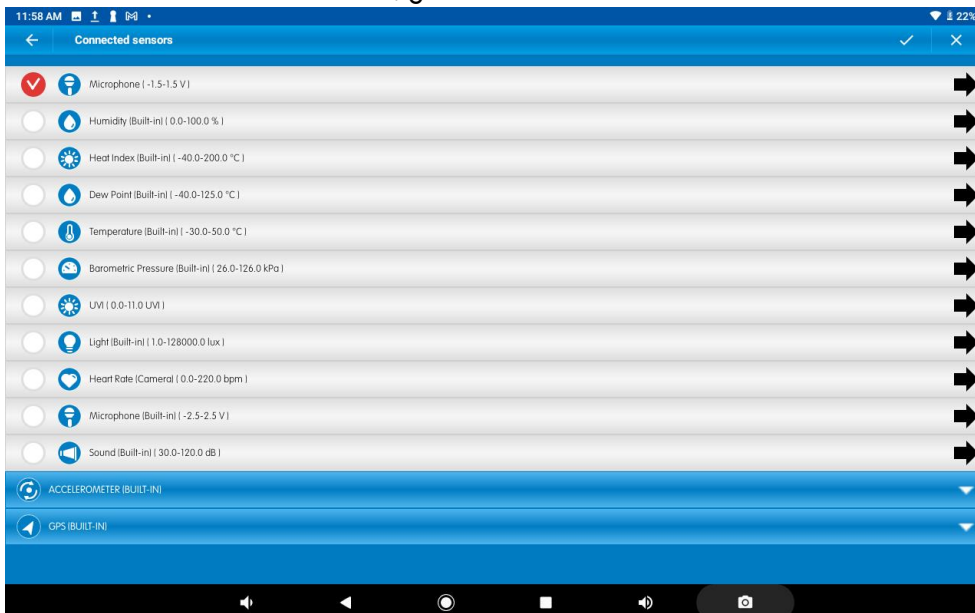
7. To change the range of the microphone tap on the arrow icon
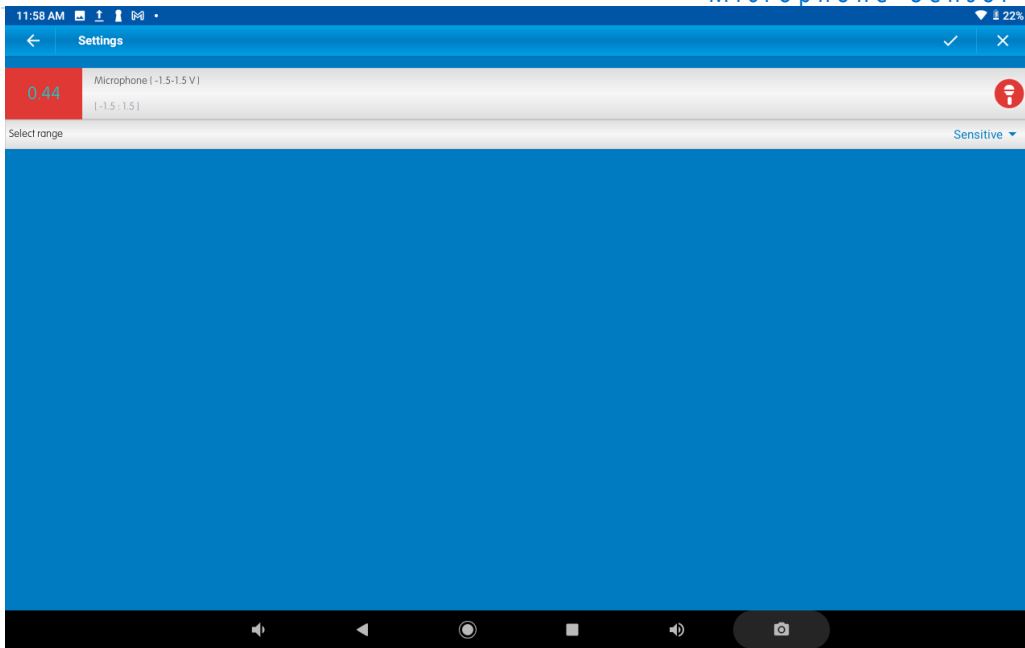
8. Select the desired range

9. Tap on V to confirm the selection

10. Tap V to confirm the sensors settings

11. You are ready to start an experiment

Desktop 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 and Click on LAB start an Experiment

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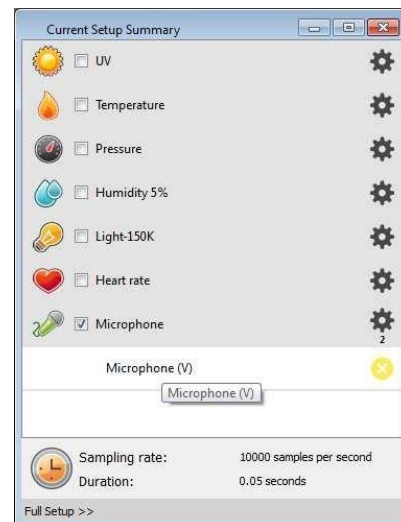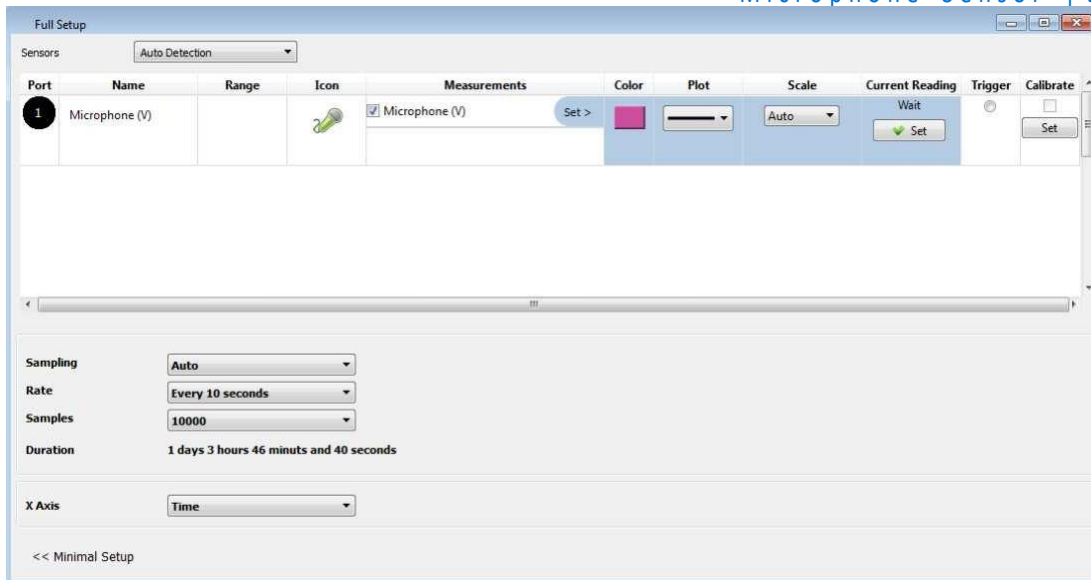
6.   Click the Run button on the main toolbar of the Launcher View to start logging
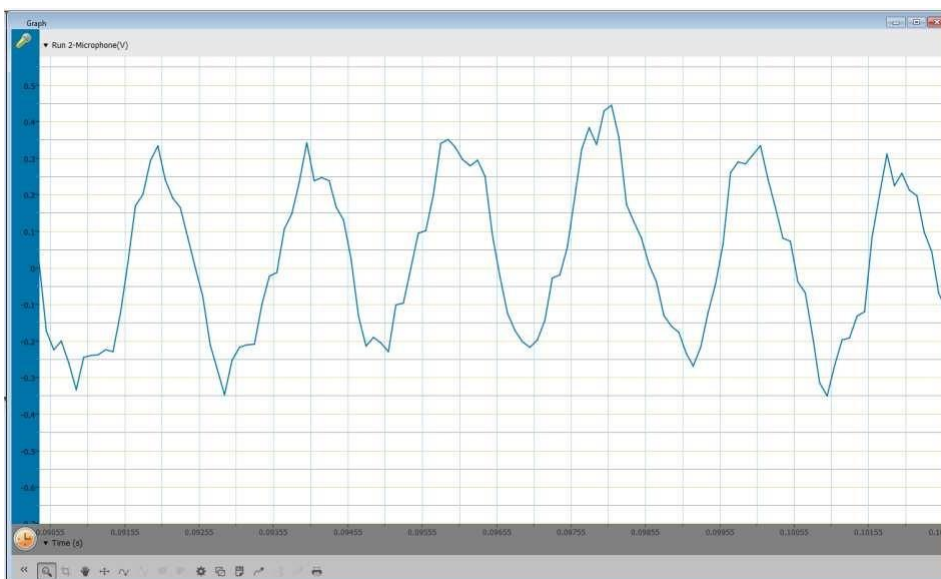
Calibration

The Microphone sensor requires no calibration.

An Example of using the Microphone Sensor

Measuring sound frequency

Use a sound generator to create sounds at different frequencies and then measure the frequencies.

Sample graph of sound frequencies

Troubleshooting

If the Microphone Sensor isn't automatically recognized byMiLABEx, 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.