Microphone

Product Number: ENMCR008

Overview

The Microphone is a sound sensor with an output of ±2.5 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 the all einstein™ Tablets™, einstein™LabMate™, and einstein™LabMate+™.

Typical experiments

Physics

- Measuring the speed of sound
- Measuring sound beats
- Comparing the wave forms from various musical instruments or animals
- Investigating how the wave pattern change when the amplitude and the frequency are changed

How it works

The microphone component inside the Microphone sensor contains a variable capacitor. One of the capacitor's plates is actually a sound-sensitive membrane, moving back and forth as sound waves resonate through it. This capacitor is connected to a resistor. 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 ±2.5 V. The result is then displayed.

Sensor specification

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Frequency Range:	35 Hz to 10,000 Hz
Range:	±2.5 V
Resolution (12-bit):	1.22 mV
Maximum Sample Rate:	20,000 samples per second
	Note: Sampling rate must be
	5 times the test frequency

Note: sensor cables sold separately

# Data logging and analysis

MiLAB™

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 MiLAB
4. MiLAB will automatically detect the sensor and show it in the Launcher View
5. Check the icon next to the sensor (✅) to enable it for logging

MultiLab4™

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 MultiLab4
4. MultiLab4 will automatically detect the sensor and show it in the Current Setup Summary window
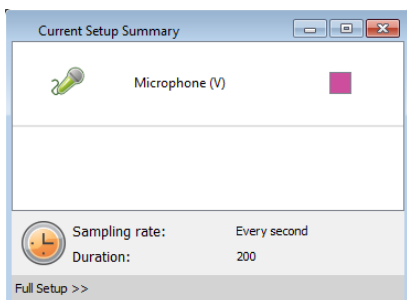
5. Click Full Setup, located at the bottom of the Current Setup Summary window to program the data logger's sample rate, number of samples, units of measurement, and other options

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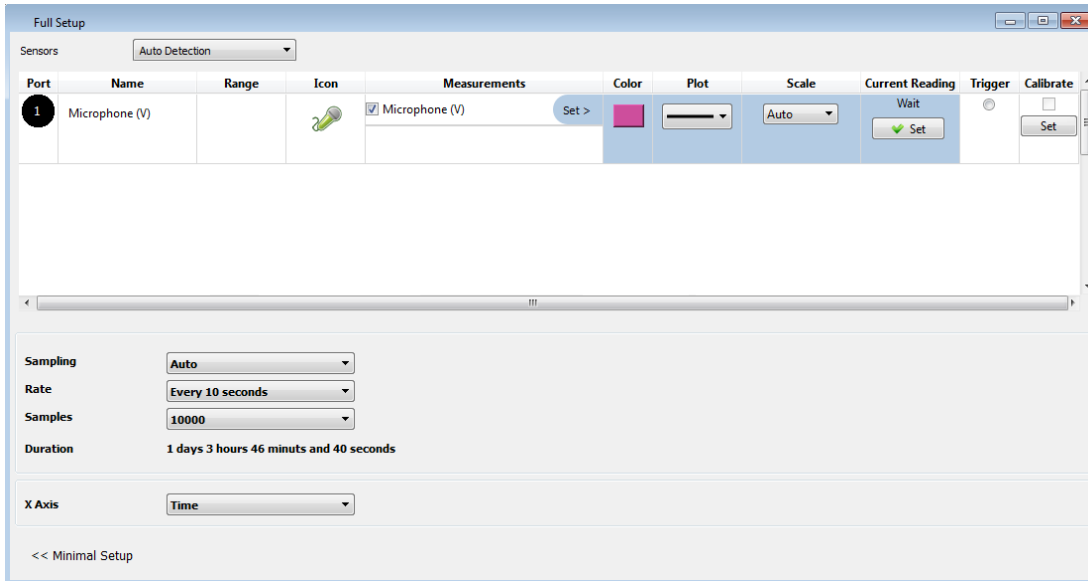
6.   Click the Run button ( )on the main toolbar of the Launcher View to start logging

Calibration

The Microphone sensor requires no calibration.

An Example of using the Microphone Sensor

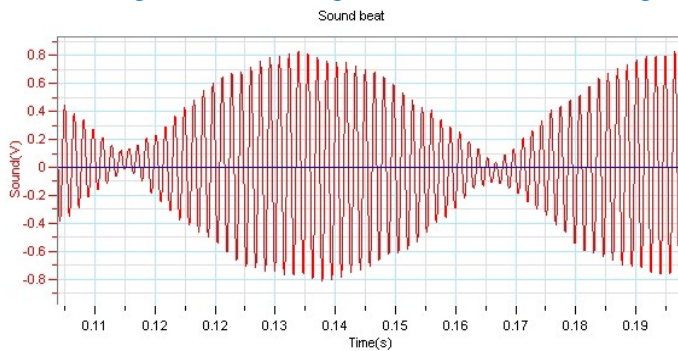### Measuring two interfering sound waves, creating a sound beat

Figure 1: Displaying sound beats

Troubleshooting

If the Microphone Sensor isn't automatically recognized by MultiLab4/ 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

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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