



einstein™
imagine • explore • learn

Magnetic Field Sensor (Triple Axis)

Product Number: ENMGN



Overview

The triple axis Magnetic Field sensor is able to measure magnetic fields along the x, y and z axes simultaneously. It contains two Hall Effect transducers placed at right angles to each other. The axial transducer measures the magnetic field along the axis of the sensor while the radial transducer measures the magnetic field perpendicular to the sensor.

This Magnetic Field Sensor can be used for measuring a wide range of magnetic fields, from the Earth's weak magnetic field to the strong magnetic fields inside solenoids – up to 100 mT.

The Magnetic Field sensor can be connected to all types of Einstein™ data loggers.

Typical experiments



Electricity and Magnetic Fields

- Measuring the vertical and horizontal components of the Earth's magnetic field
- Investigating magnetic field patterns around magnets and coils
- Exploring the relationship between the magnetic field and current in a coil
- Investigating the variations in a magnetic field due to Helmholtz coils
- Investigating the magnetic fields created by AC current
- Investigating the field strength of different types of magnets
- Investigating the changes of the magnetic field strength with distance
- Investigating the changes of the magnetic field strength between magnets

How it works

The sensor uses a Hall Effect transducer, which produces a voltage proportional to the magnetic field. The sensor measures both the axial and radial axes relative to the sensor.

The line mark at the front of the sensor indicates the exact location of the Hall element. The Magnetic Field sensor measures positive values when the sensor is pointed directly at the magnetic field. (see figure below).

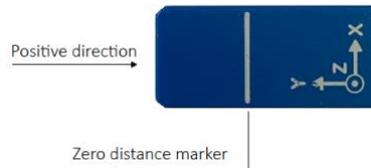


Figure 1: Magnetic Field Sensor

Sensor specification

Range:	Two axis: ± 20 mT Three axis: ± 0.4 mT
Accuracy:	± 6 % over entire range
Resolution (12-bit):	For: 0 to 20 mT: $10 \mu\text{T}$ For: 0 to 0.4 mT: $0.2 \mu\text{T}$
Default Sampling Rate:	10 samples per second

Note: sensor cables sold separately

Calibration

The Magnetic sensor comes fully calibrated.

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 the sensor
3. Insert the other end of the sensor cable into your einstein™ device
4. Launch MiLAB
5. MiLAB will automatically detect the sensor and show it in the Launcher View



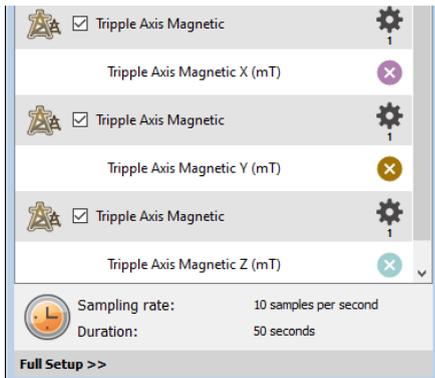
6. Make sure the icon next to the axis you want to measure is checked () to enable it for logging

7. Tap Setup to change the range of your measurement

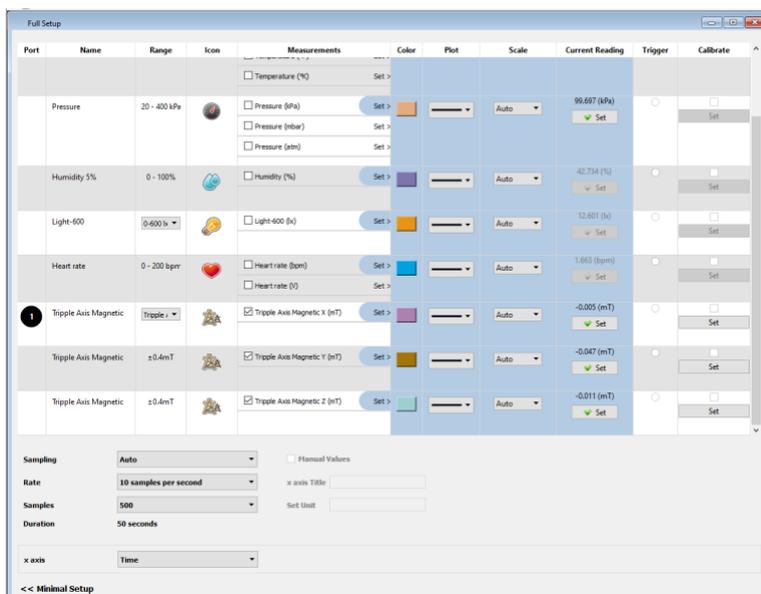


MiLAB™ Desktop

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 the sensor
3. Insert the other end of the sensor cable into your einstein™ device
4. Launch MiLAB
5. MiLAB 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, and other options



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

An example of using the Magnetic Field Sensor

Magnetic Field of Helmholtz Coils

In this experiment we map the magnetic field along the axis of Helmholtz coils, using the Magnetic Field sensor and the Distance sensor:

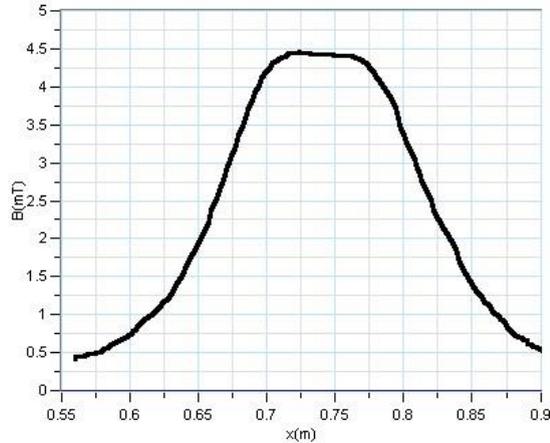


Figure 1: Magnetic field produced by a pair of Helmholtz coils

Troubleshooting

If the Magnetic Field 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.

©Fourier Systems Ltd. All rights reserved. Fourier Systems Ltd. logos and all other Fourier product or service names are registered trademarks or trademarks of Fourier Systems. All other registered trademarks or trademarks belong to their respective companies.

ALBERT EINSTEIN and EINSTEIN are either trademarks or registered trademarks of The Hebrew University of Jerusalem. Represented exclusively by Green Light. Official licensed merchandise. Website: einstein.biz