

**einstein™**

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Current Senso ± 250 mA

Product Number: ENCRN006



Overview

The Current sensor is an ammeter, measuring current values between -250 mA and $+250$ mA. It is a differential sensor, capable of measuring both direct and alternating current and is ideal for use in a wide range of Physics and Chemistry experiments.

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

Typical experiments



Electricity and And
Magnetic Fields

- EMF and Internal Resistance
- V-I Characteristics of a Wire, a Light Bulb and a Diode
- Resistance of a Wire – Ohm's Law
- Series and Parallel Circuits
- Charging and Discharging a Capacitor
- AC Circuit - RCL Resonance

How it works

The sensor contains a $1\ \Omega$ resistor. According to Ohm's Law ($V=I \cdot R$), this makes the voltage (the potential energy between two points) equal to the current (measured in Ampere).

Sensor specification

Range:	$\pm 250\ \text{mA}$
Accuracy:	$\pm 3\ \%$ over entire range
Resolution (12-bit):	$125\ \mu\text{A}$
Default Sampling Rate:	10 samples per second
Input Current:	AC or DC
Input Resistance	$1\ \Omega$
Maximum Input Current:	1.7 A

Note: sensor cables sold separately

Technical Notes

- Short the two leads before connecting the Current sensor
- For more accurate measurements connect the sensor's negative input (black) to the power source's negative input (ground)

Calibration

The Current sensor requires no calibration.

For greater accuracy the sensor can be manually set to zero or calibrated.

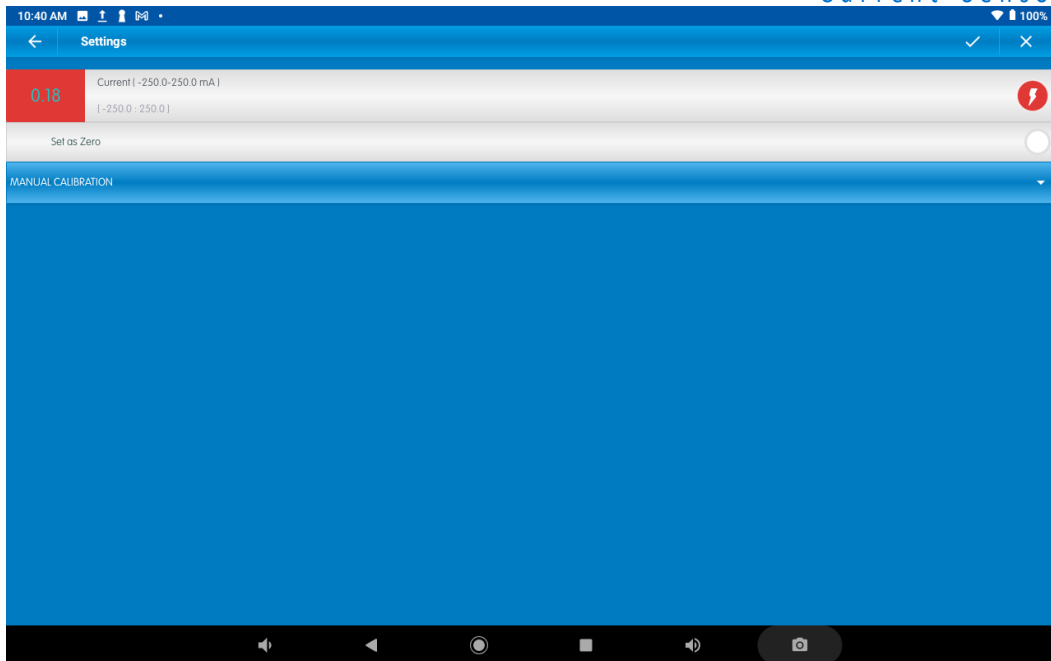
Android

Tap on Sensors

Tap on the arrow icon to go to the sensors settings

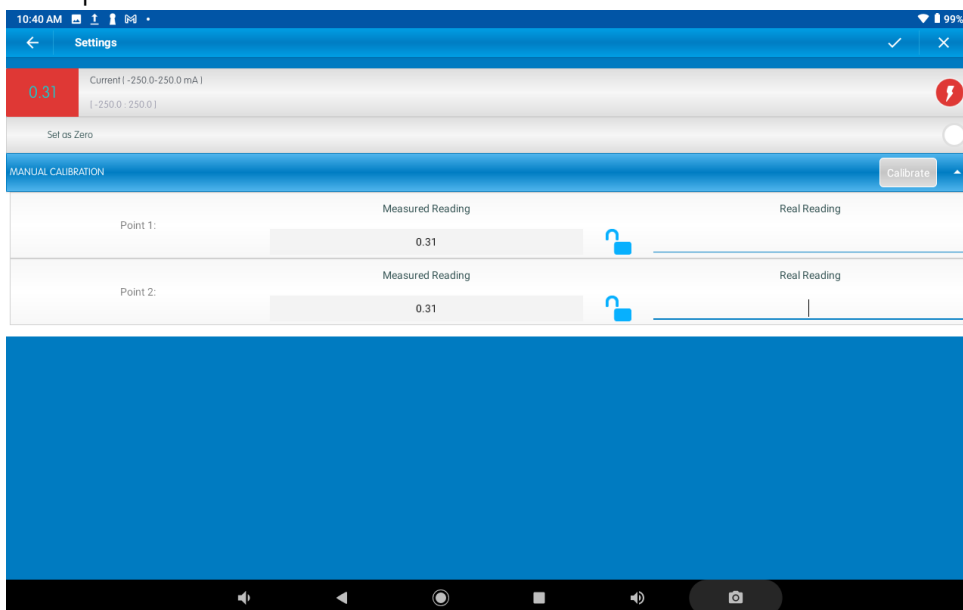
Set Zero Calibration

Flip the Set as Zero switch to set the current value as the zero or base value.



Two Point Calibration

1. Tap Manual Calibration



2. Measure a current of a known value (e.g. 100 mA). Enter this known value in the Point 1, Real Reading field
3. Wait for the readings to stabilize.
4. Tap the lock icon
5. Measure a second current of a different known value (e.g. 250 mA). Enter this known value in the Point 2 Real Reading field
6. Wait for the readings to stabilize.
7. Tap the lock icon
8. Tap Calibrate.
9. Tap V to confirm the settings
10. Tap V to return to the LAB
11. You are ready to start an Experiment.

Desktop

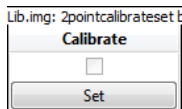
Set Zero Calibration

In the Current Reading column, click Set  to set the current value as the zero or base value.

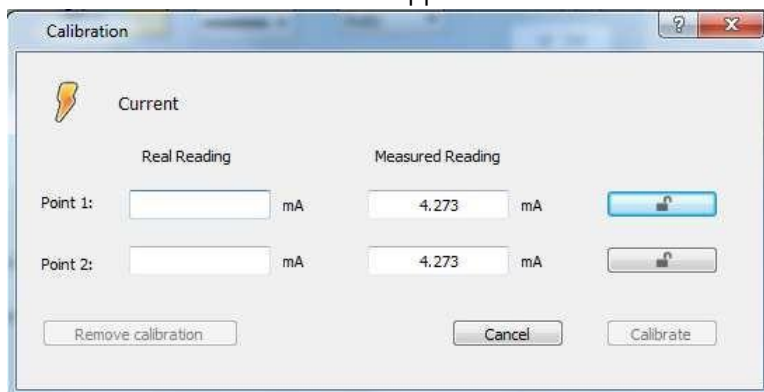
Reset  cancels this action

Two Point Calibration

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



2. The Calibration window will appear



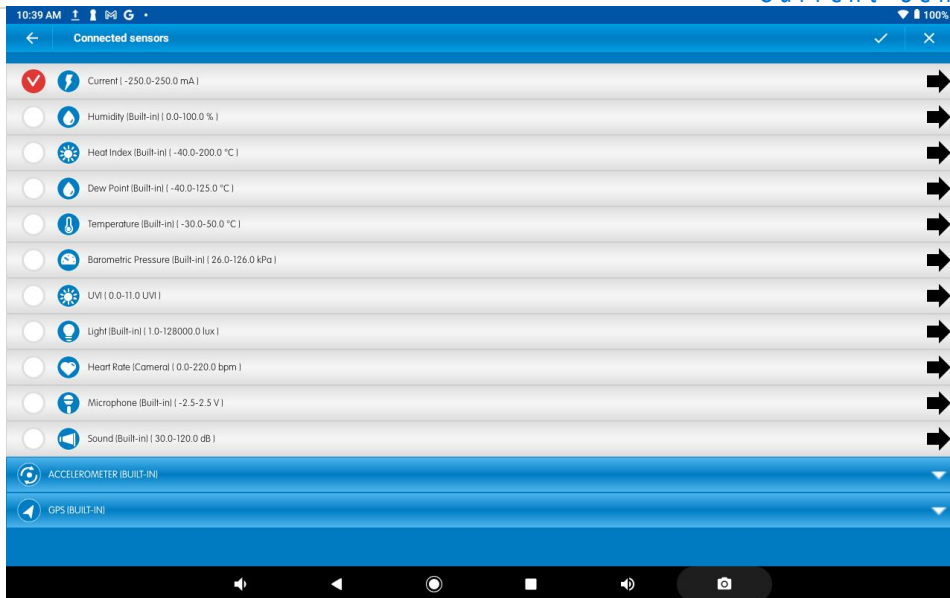
3. Measure a current of a known value (e.g. 100 mA). Enter this known value in the Point 1, Real Reading field
4. Wait for the readings to stabilize.
5. Click the lock icon
6. Measure a second current of a different known value (e.g. 250 mA). Enter this known value in the Point 2 Real Reading field
7. 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.

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 and tap on LAB - Start an Experiment
4. MiLABEx will automatically detect the sensor
5. Tap on Sensors to Make sure the icon next to the sensor is checked



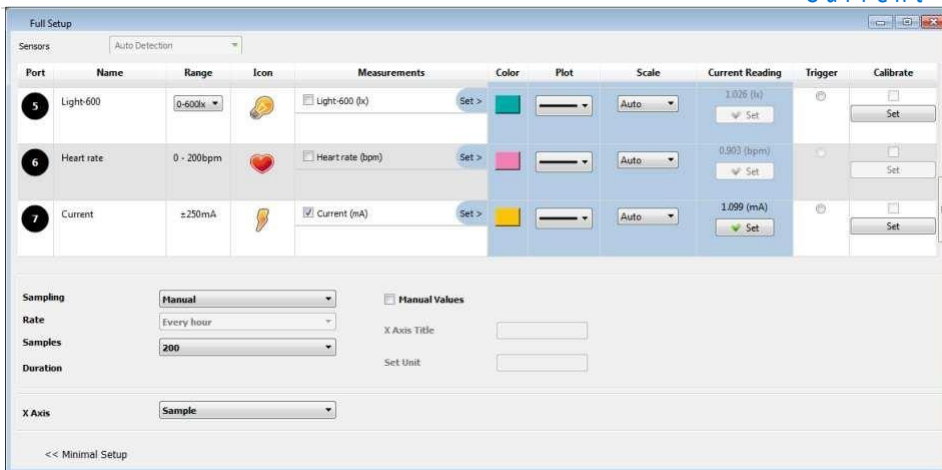
6. You are ready to start an Experiment

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
4. MiLABEx 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

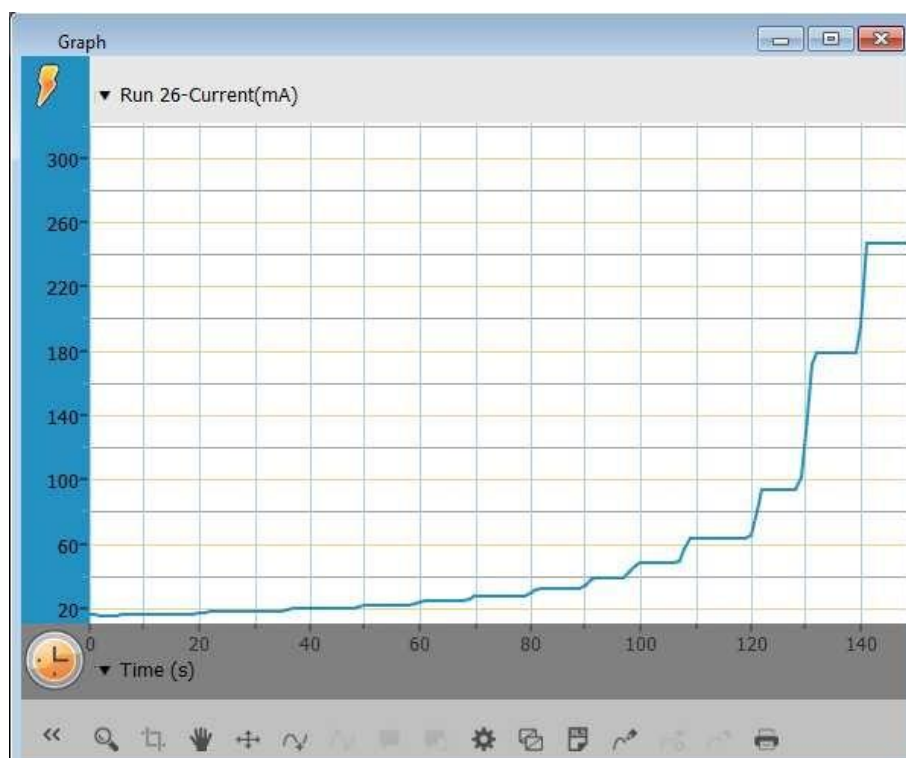


- Click the Run button on the main toolbar of the Launcher View to start logging

An example of using the Current ± 250 mA Sensor

Build a simple circuit of a Potentiometer (max value around 100 ohm) serially connected to the a current sensor and to a voltage source of 1.5V (it is possible to use a battery) Set the Potentiometer to its maximal resistance.

- Click the Run button on the main toolbar of the Launcher View to start logging.
- Gradually reduce the resistance of the Potentiometer and see how it affects the current measured.
- When you reach 250mA , click Stop button.
- See the expected results.



Troubleshooting

If the Current sensor isn't automatically recognized by MiLABEx, 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.

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