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## Current Sensor

±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 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 ( $V=I*R$ ), this makes the voltage (the potential energy between two points) equal to the current (measured in Ampere).

## Sensor specification

Range:	$\pm 250$ mA
Accuracy:	$\pm 3$ % over entire range
Resolution (12-bit):	125 $\mu$ 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

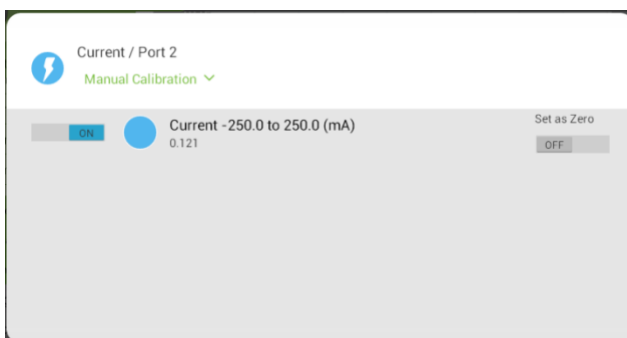
The Current sensor requires no calibration.

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

## MiLAB

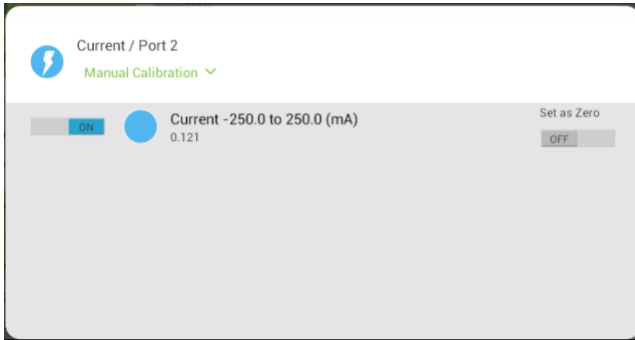
### Set Zero Calibration

1. Tap the Settings button next to the sensor's name
2. Flip the Set as Zero switch to set the current value as the zero or base value.

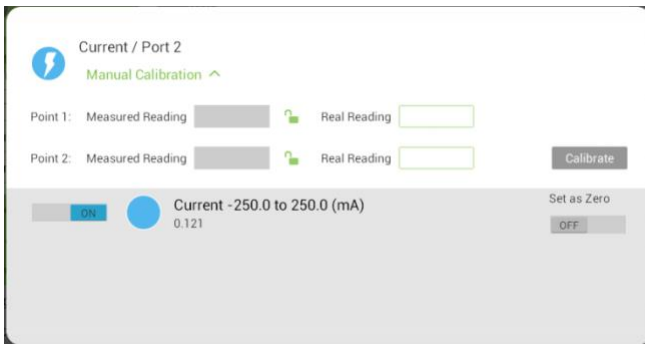




### Two Point Calibration

1. Tap the Settings button next to the sensor's name





2. Tap Manual Calibration



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. Tap 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. Tap the lock icon 
9. Tap Calibrate.

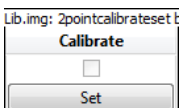
**MiLAB Desktop**

*Set Zero Calibration*

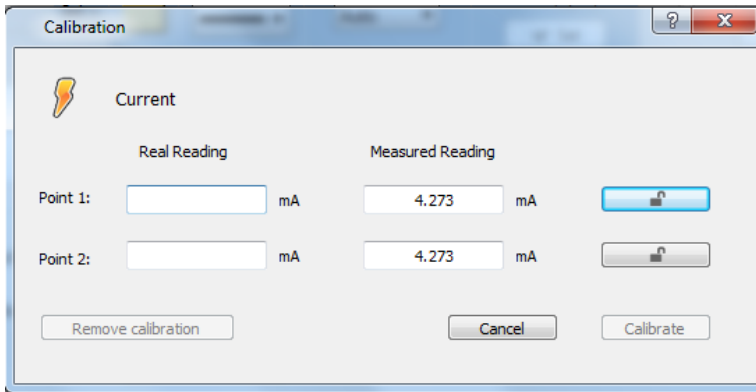
In the Current Reading column, click Set  to set the current value as the zero or base value. Reset  cancels this action



*Two Point Calibration*

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



2. The Calibration window will appear



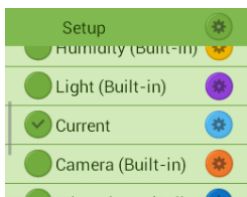
3. Measure a current of a known value (e.g. 100 mA). Enter this known value in the Point 1, Real Reading field
4. Wait for the readings to stabilize.
5. Click the lock icon 
6. Measure a second current of a different known value (e.g. 250 mA). Enter this known value in the Point 2, Real Reading field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

### MiLAB™

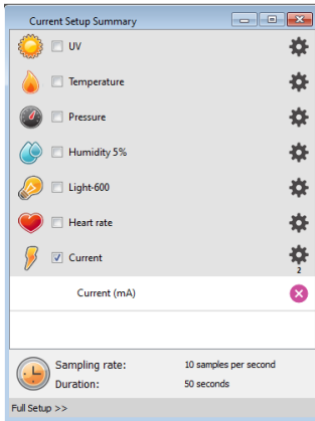
1. Take your einstein™ Tablet+ OR pair your einstein™ LabMate with your Android or iOS tablet via Bluetooth
2. Insert the sensor cable into one of the sensor ports
3. Launch MiLAB
4. MiLAB will automatically detect the sensor and show it in the Launcher View



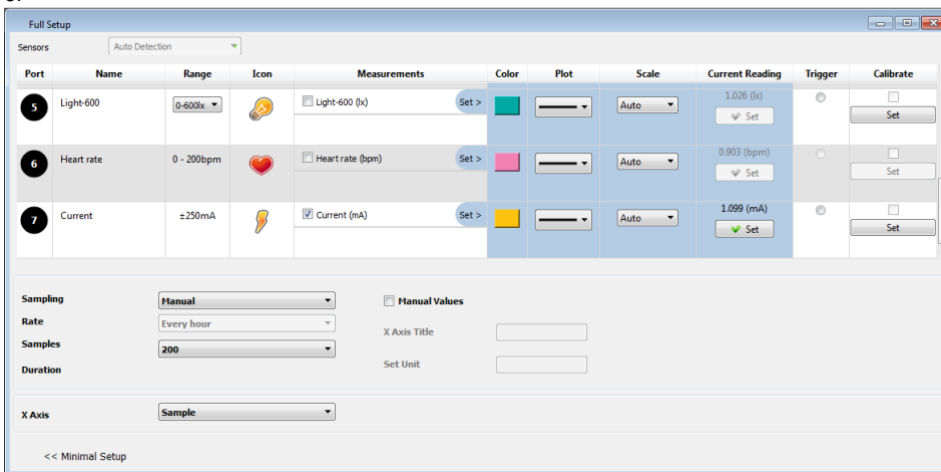
5. Make sure the icon next to the sensor is checked (  ) to enable it for logging


### 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 one of the sensor ports
3. Launch MiLAB
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.



7. 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) .

1. Set the Potentiometer to its maximal resistance.
2. Click the Run button (  ) on the main toolbar of the Launcher View to start logging.
3. Gradually reduce the resistance of the Potentiometer and see how it affects the current measured.
4. When you reach 250mA ,click Stop button (  ).
5. See the expected results - Figure 1.

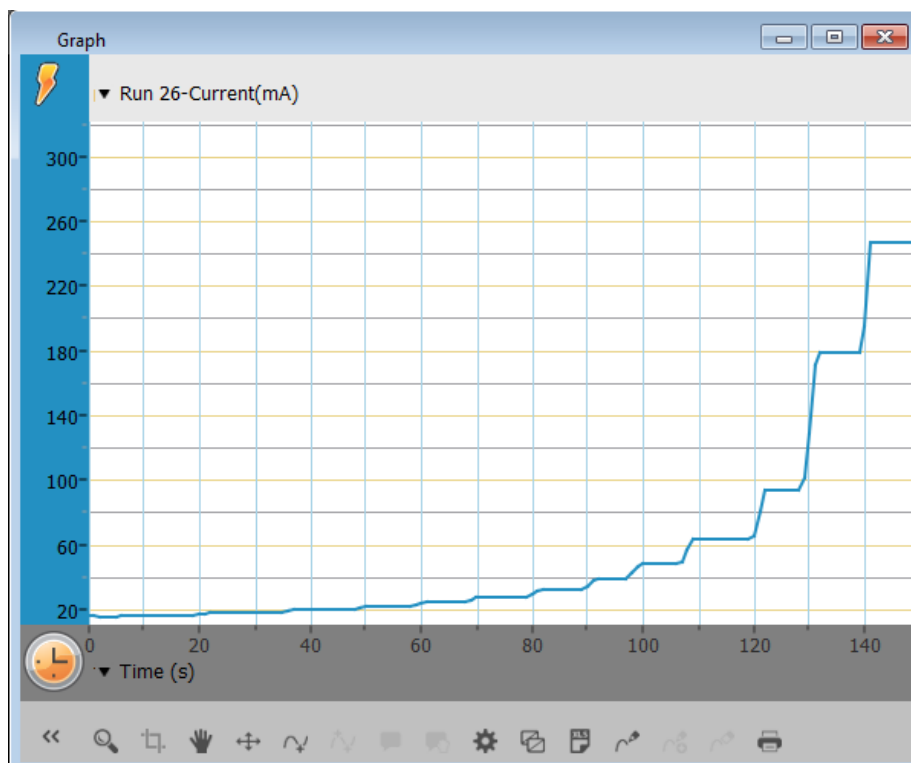


Figure 1

## Troubleshooting

If the Current 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.