



**einstein™**  
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# Surface Temperature Sensor

-40°C to 140°

Product Number: ENTMP060



## Overview

This high accuracy Surface Temperature Sensor measures the temperature of a wider variety of surfaces, including skin. It is used in situations in where low thermal mass or flexibility is required. With its wide range and ease of use it is ideal for Human Physiology, Chemistry and Physics experiments

The Surface Temperature sensor can be connected to all types of einstein™ data loggers. It can be used for various experiments in Types of Experiments.

## Typical experiments



### Chemistry

- Specific Heat
- Heat Transfer



## Physics

- Friction and energy studies



- Skin temperature measurements
- Human respiration studies

## How it works

The Surface Temperature sensor contains a sensing element that changes its resistance proportional to the temperature. A conditioning circuit translates this change into 0-3V, the range accepted by the Analog-Digital converter. The Analog-Digital converter translates the voltage and sends this data to the software where the information is displayed and recorded.

## Sensor specification

Range:	- 40 °C to 140 °C - 40 °F to 284 °F
Accuracy:	±2 % over entire range
Resolution (12-bit):	0.03°C
Recommended Sampling Rate:	10 samples per second
Maximum temperature that the sensor can tolerate without damage: 160°C	

## Calibration

The Surface Temperature sensor requires no calibration

## Data logging and analysis

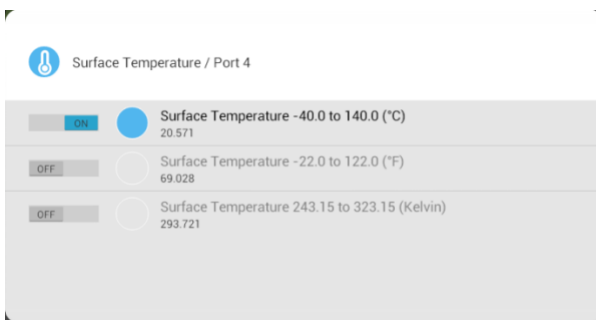
### MiLAB™

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™

- MiLAB™ will automatically detect the sensor and show it in the Launcher View

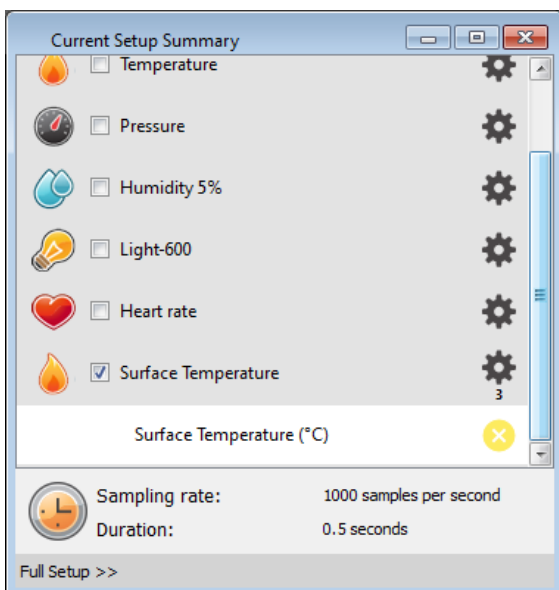


- Make sure the icon next to the sensor is checked (✔) to enable it for logging
- Tap the Setup icon next to the sensor name to switch between measuring Celsius, Fahrenheit and Kelvin

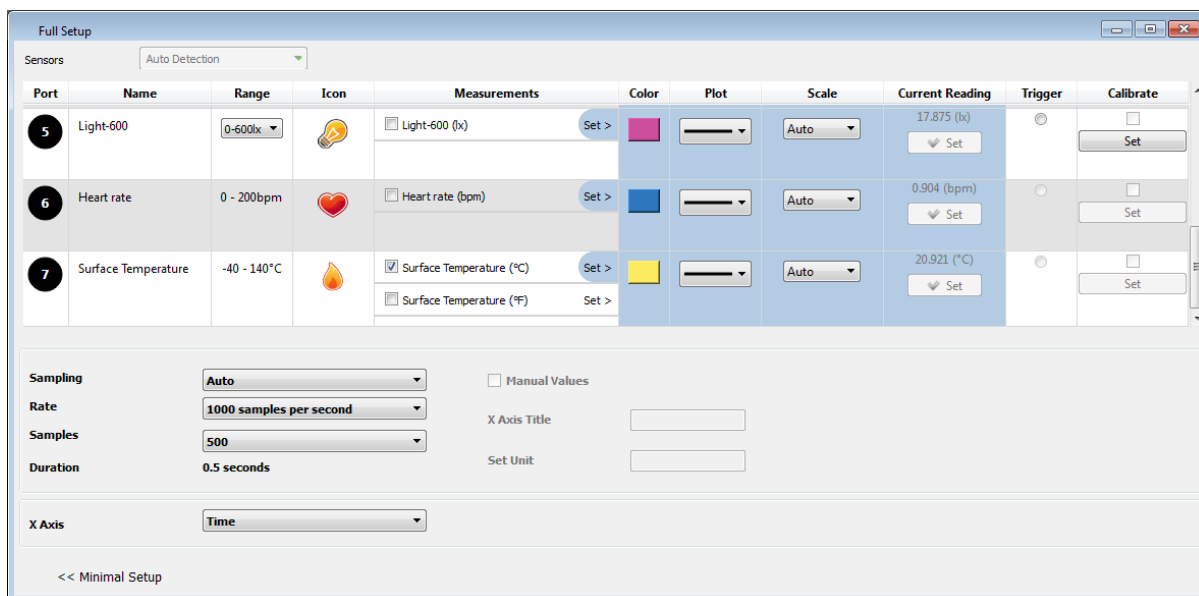



## MiLAB™ Desktop

- 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).
- Insert the sensor cable into one of the sensor ports
- Launch MiLAB™
- MiLAB™ will automatically detect the sensor and show it in the Current Setup Summary window



- 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



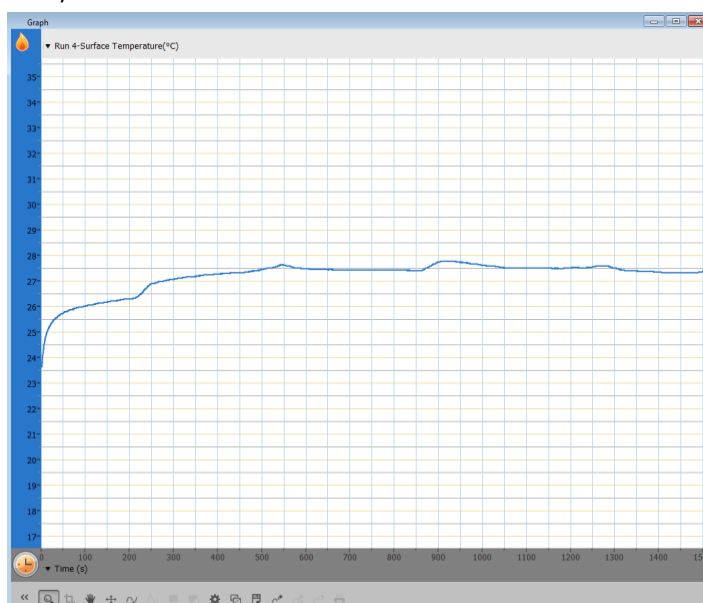
- Click the Run button (  ) to start logging

## An example of using the Sensor

### The Effect of Exertion on Body Temperature

As we exert ourselves our muscles burn calories for energy. The heat of these reactions causes our body temperature to rise. In response our bodies produce sweat. As sweat evaporates it cools off our skin. Measuring the changes before, during and after physical activity allows us to follow these effects.

- Place the Surface Temperature Sensor on the back of your hand and hold it there (without pressing)
- Select Run to begin recording data.
- Follow changes in temperature until it stabilizes (at about two minutes).
- Jog in place for 2 minutes
- Follow changes in temperature for an additional one to two minutes after completing the exercise.
- Save your data



Example of a graph produced by this experiment

## Troubleshooting

If the Surface Temperature 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.

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