einstein™
imagine • explore • learn

Thermocouple TC-K Sensor

0 °C to 1200 °C

Product Number: ENTMP025

Overview

The Thermocouple Type K (TC-K) sensor is a high temperature sensor with a range of 0°C to 1200 °C. It is extremely accurate and boasts a rapid response time.

The TC-K sensor is mainly used for high temperature measurements, monitoring chemical processes that occur in high temperatures or even measuring ovens. The high accuracy and reliability of this sensor makes it an excellent tool for advanced Chemistry experiments.

The Temperature TC-K sensor can be connected to all types of einstein™ data loggers.

Typical experiments

Chemistry

- Exploring the temperature of a candle flame
- Different boiling points of various solutions
- Melting points of certain solids

How it works

A thermocouple consists of two long wires made of different metals connected at one end while at the other end they are close to each other but without making contact. When the connected end of the thermocouple is placed in a higher temperature than the unconnected end, voltage is produced between the wires. In order to correct for room temperature, another temperature sensor is built into the thermocouple. The adjusted voltage is then amplified and adjusted to a range of 0 - 3 V. The result is then displayed and recorded.

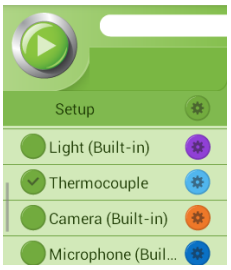
Sensor specification

Range:	0 °C to 1200 °C 32 °F to 2192 °F 273.15 K to 1473.15 K
Accuracy:	±2 % over entire range
Resolution (12-bit):	0.3 °C 0.55 °F
Default Sample Rate:	samples per second
Recommended Sensor Usage:	Resistant to mild chemical solutions Do not place the sensor's cable in liquid

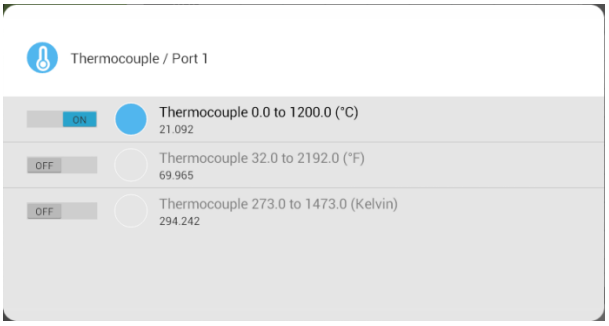
Data logging and analysis

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

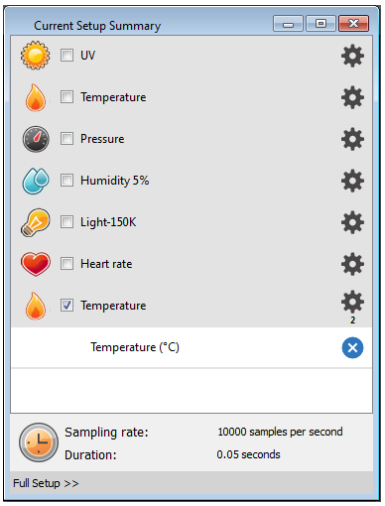


5. Make sure the icon next to the sensor is checked ( ) to enable it for logging
6. Tap Settings to switch between measuring in Celsius, Fahrenheit and Kelvin

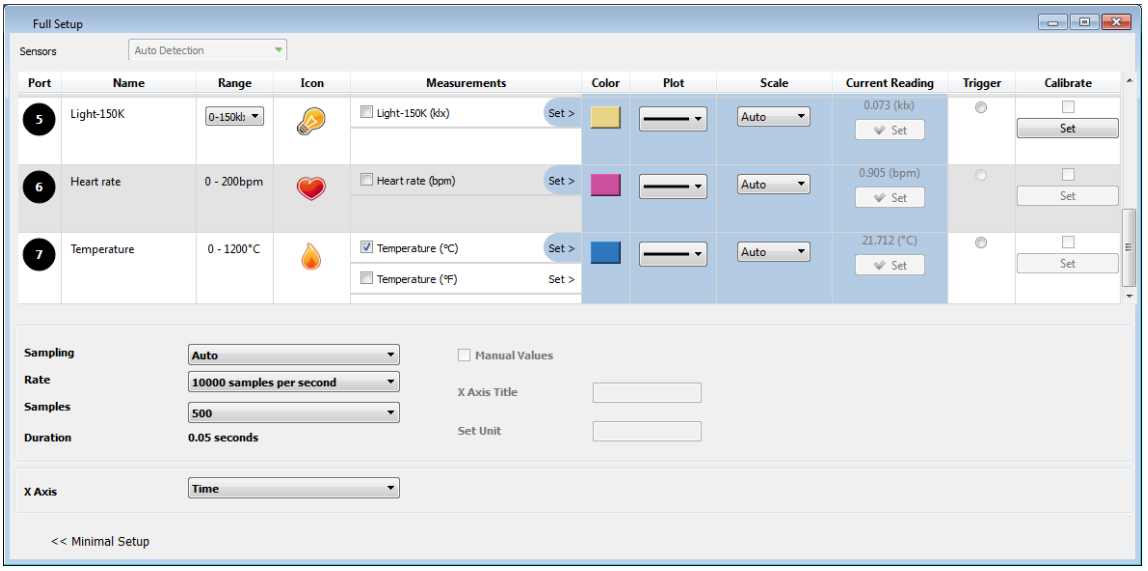


MiLAB™ Desktop

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

Calibration

The Temperature TC-K sensor is shipped fully calibrated.

An Example of using the Thermocouple Sensor

Exploring a Flame

The heat of a flame is not uniform. Zones within a flame have differing temperatures. These zones can be mapped utilizing the thermocouple's high-sensitivity, fast reaction times and ability to withstand high temperatures.

The following graph shows the temperature in three different zones of the candle flame.

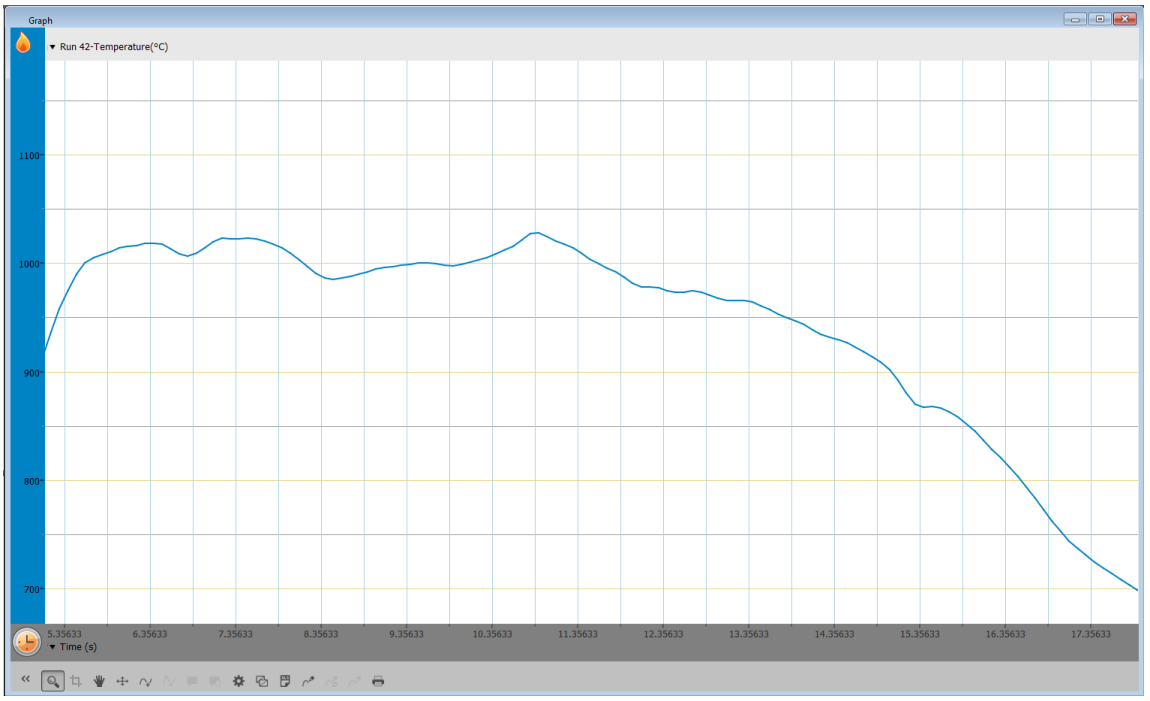


Figure 1: The temperature in three different zones of the candle flame

Troubleshooting

If the 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

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.