

## NEULOG INFRARED THERMOMETER LOGGER SENSOR GUIDE



### NeuLog infrared thermometer logger sensor NUL-235 Part# NL-2350

The NeuLog infrared thermometer sensor can be used for any science experiment which requires accurate temperature measurements such as in the fields of Physics, Chemistry, Biology, Environmental Science, etc.

The sensor comes pre-calibrated so you can start experimentation right out of the box using this guide.

Using the infrared thermometer sensor over the standard temperature sensor or the surface temperature sensor has several advantages:

- It can take measurements of hazardous materials safely from a distance.
- It has no probe which can react with chemicals.
- It has a more flexible use.
- It is very precise when measuring zones; this means you can reliably measure the temperature of a specific point instead of a large area.
- It is great for outdoor experiments.

Among hundreds of possible experimental subjects that can be studied with the NUL-235 sensor are: exothermic and endothermic chemical reactions, metabolism, heat and energy transfer, human temperature changes, effects of heat on enzyme function, weather studies, material thermal conductance properties, and many more.

This sensor is capable of measuring both in Celsius and Fahrenheit.  
Celsius: The SI (International System of Units) unit of temperature.  
Fahrenheit: The temperature measurement unit of the English System commonly used in the United States.

### Infrared light:

Infrared light (radiation) is emitted by moving molecules inside of bodies with a temperature above absolute zero (0 K). This phenomenon is called “black body radiation”. When the temperature of an object increases the molecules inside move much more rapidly and more infrared radiation is released.

### How the infrared thermometer sensor works:

At the top of the NeuLog infrared thermometer sensor is a metallic lens which focuses infrared light from an object onto an internal detector called a thermopile. The thermopile acts as a heat-sink as it collects infrared radiation. An electrical current runs through the thermopile and as more heat is absorbed more resistance is produced. The resistance is measured and easily converted into a temperature reading.

### How to use the infrared thermometer sensor:

For instructions on connecting the sensor to computers, tablets, smartphones, or NeuLog Viewer please review the following sections.

After you have connected your NeuLog infrared sensor to the smart device of your choosing:

1. Locate the metallic lens on the top of the infrared sensor (this is where infrared radiation is detected).

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2. Direct the metallic lens towards the target you want to measure, it can be either solid or liquid.
3. The sensor works over very long distances, however detecting small objects from far away can be tricky so you may need to measure from a closer distance.

### Included with the sensor:

- NeuLog General Guide

Sensor's specifications		
	Celsius	Fahrenheit
Range and operation modes	-30 to 382°C	-22 to 719°F
ADC resolution	13 bit	
Resolution	0.1°C	0.2°F
Max sample rate (S/sec)	100	

**Experiment Duration:** 1 second to 31 days.

### Sensor's features:

- Fully digital data
- Rugged plastic ergonomic case
- Push button switch for Start/Stop experiments in off line mode
- LED indicator of experiment status (blinks while collecting data)
- Pre-calibrated sensing equipment
- Internal thermopile detector to gather infrared light

**Note:** NeuLog products are intended for educational use.

### Videos and experiment examples:

- Videos, literature and other probes can be found at [www.NeuLog.com](http://www.NeuLog.com).
- In order to access the infrared thermometer sensor's page, choose "Products" on the main menu and then "Infrared thermometer logger sensor".
- In order to access the infrared thermometer sensor's experiments, choose "Example Labs":
  - Temperature Variations in the Human Body (B-42)

### Technical background:

The philosophy behind NeuLog's plug and play technology is based on each sensor's ability to store its own data due to an internal flash memory chip and micro-controller in each plastic NeuLog body. This technology allows the sensor to collect and then store the digital data in the correct scientific units (°C, °F, Lux, %, ppm, for example).

The sensor is pre-calibrated at the factory. The built-in software in the logger can be upgraded for free at any time using the provided firmware update.

The NeuLog infrared sensor is based on a phenomenon known as "black body radiation". As molecules are heated up, they move much more rapidly and in turn put off more infrared radiation.

Inside the infrared sensor is a detector called a thermopile, which collects infrared light directed from the external lens. As the thermopile heats up, an electrical current which flows through it encounters more resistance which scales with temperature changes. The resistance can easily be measured and then calculated back into a temperature value.

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### Maintenance and storage:

- Never submerge the NeuLog plastic body in any liquid.
- Do not allow liquid into the infrared thermometer sensor's body.
- After use, gently wipe away any foreign material from the infrared thermometer sensor.
- Store in a box at room temperature out of direct sunlight.

### Warranty:

We promise to deliver our sensor free of defects in materials and workmanship. The warranty is for a period of 3 years from the date of purchase and does not cover damage of the product caused by improper use, abuse, or incorrect storage. Sensors with a shelf life such as ion selective probes have a warranty of 1 year. Should you need to act upon the warranty, please contact your distributor. Your sensor will be repaired or replaced.

Thank you for using NeuLog!

**NeuLog** 

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