

NEULOG GPS LOGGER SENSOR GUIDE



NeuLog GPS logger sensor NUL-243

The NeuLog GPS (Global Positioning System) sensor can be used for any science experiment which utilizes sensor readings in relation to the location of each reading. It is mostly used in the fields of Biology and Environmental science.

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

Some of the hundreds of possible experimental subjects that can be studied with the NUL-243 sensor are: Environmental monitoring (weather, soil quality, water quality, and temperature), fitness testing, and more!

The Global Positioning System (GPS) is a space-based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites.

The GPS sensor's measurement units are:
Location in latitude and longitude data.

The data from all the sensors connected to the GPS sensor can be uploaded into the NeuLog application.
The application can also export the GPS data to Google Earth so the sensors' measurements and their locations can be displayed together.

Off-line experiment:

(Off-line experiments are when you do not have a sensor connected directly to a computer, tablet, or smartphone).

Materials needed:

- NUL-243 GPS Sensor
- BAT-200 Battery Module
- Any NeuLog sensor other than NUL-209 (photo gate sensor)

Materials needed to configure your offline experiment:

- USB-200 module (modules with SV: 30.16 or previous should be upgraded, for more information contact info@neulog.com).
- USB to mini USB cable (included with the USB-200 module)

The application can be downloaded for free at www.NeuLog.com as well as a full application user guide.
Choose "Downloads" on the main menu and then choose "Software and Application".

Procedure:

1. Connect the USB module to the PC.
2. Connect the GPS sensor and other sensor/s (optional) to the USB module (the GPS sensor should blink 3 times with a red led after a few seconds).
3. Run the NeuLog application and check that the sensors are identified.
4. Click separately on each sensor module box and set the experiment duration and sample rate (it is recommended to set the sampling rate to 1 per second).

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5. Disconnect the sensors from the USB module and connect them to a charged battery module.
6. Wait a few seconds until the GPS sensor blinks three times with a red LED.
7. Go outside where the GPS sensor can receive the satellites' signals.
8. Push on all the sensors' start/stop button. If there is no satellite reception, the red LED on the GPS sensor will turn on constantly. Make sure the sensors' LEDs (not including the GPS sensor) are flashing every second (if you chose a different sample rate for the other sensor/s, they will flash at that rate).
9. Wait a few seconds/minutes in place until the signal is detected and the red LED flashes every second. This means the sensor has started to receive and store GPS data.
10. Start your route.
11. If while performing the experiment the GPS sensor's red LED turns on constantly it means it lost the satellite reception; in this case the other sensors will continue to measure as usual (the GPS sensor will record the value 0).
12. If the red LED on the GPS sensor and the other sensors blinks fast, it means that the battery's power is low and it will soon shut off (all data will be stored in the internal memory of the sensors). When the battery shuts off, no more measurements will be taken by the GPS or any other sensor connected to it.
13. At the end of your route, press the start/stop button again on all the sensors. This will stop the incorporation of data.

Loading experiment:

PC Computer

Materials needed:

- NUL-243 GPS Sensor
- USB-200 module
- USB to mini USB cable (included with the USB-200 module)

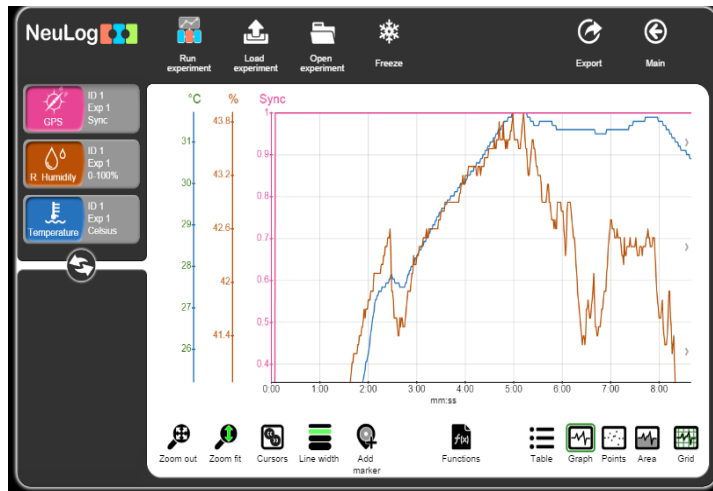
Procedure:

1. Connect the USB module to the computer through the USB cable.
2. Connect the GPS module and other sensor/s to the USB module.
3. Make sure that the most current version of the Google Earth software is installed on your computer.
4. You can download it from:
<http://www.google.com/earth/download/ge/agree.html>
5. Run the NeuLog application (**version 7.56.47 or later**).
6. After the sensors have been found you will see their module boxes on the left side of the screen.
7. Click on the **Load Experiment** icon. The menu shows a list of stored experiments in the sensor's memory (up to 5).

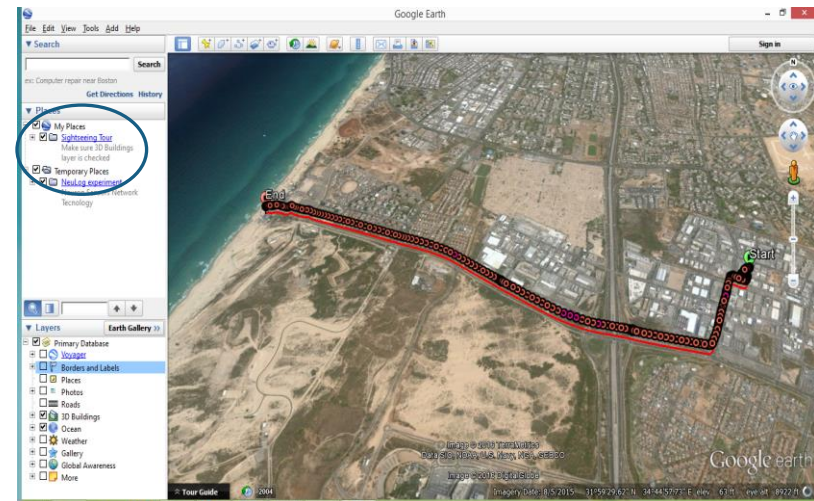
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8. Click on the Load experiment button.



9. Click on the Export icon and then on the Save value table (.CSV) button to save your graph.
10. Click on the Save GPS (.KML) button on the Export experiment menu.
11. The saved file can be opened by Google Earth.
12. After opening the file in the Google Earth program, look for the "Places" bar on the left.



13. When clicking on the "+" sign next to **NeuLog experiment** you will see these options:
 - a. Start position
 - b. Track
 - c. End position
 - d. Measurements for every sensor that was connected at the time data was uploaded.
14. Sensors' measurements are shown as circles.
15. Clicking on a circle (in the map or at the bar on the left) will open a balloon with the time (from the beginning of the experiment) and the sensor's measurement at that point.

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Included with sensor:

- NeuLog General Guide

Sensor specifications	
Position accuracy	10 m, 2D RMS 5 m, 2D RMS with WAAS enabled
Velocity accuracy	0.1 m/s
Maximum sample rate	1 Hz
Time to first fix (average)	42 s, cold start 38 s, warm start 1 s, hot start
Channels	20

Experiment duration: up to 11 hours

Sensor features:

- Fully digital data
- Rugged plastic ergonomic case
- Push button switch for Start/Stop experiments
- LED indicator of experiment status
- Pre-calibrated sensing equipment

Note: NeuLog products are intended for educational use.

Videos and experiment examples:

- Videos, literature and other probes can be found at www.NeuLog.com.
- In order to access the GPS sensor's page, choose "Products" on the main menu and then "GPS logger sensor".
- In order to access the GPS sensor's experiments, choose "Example Labs":
 - Microclimates and GPS (E-7)

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Maintenance and storage:

- Never submerge the NeuLog plastic body in any liquid.
- Do not allow liquid into the GPS sensor's body.
- After use, gently wipe away any foreign material from the 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!



Flexible, simple, fast, forward thinking.

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