

## 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  
Altitude in m.

Also, the sensor can be used as a USB module and can be connected directly to the PC for configuring it and other sensors connected to it.  
The data from the sensors can be uploaded into the NeuLog software.

With the NeuLog software data from the sensors connected to the GPS sensor can be analyzed. The software can also export the GPS data to Google Earth so the measurements and their locations can be displayed together.

The NeuLog software is used after an experiment is carried out in off-line mode.

### Off-line experiments

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

### 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 to mini USB cable (included with the USB-200 module)

### Procedure:

1. Go outside where the GPS sensor can receive the satellites' signals.
2. Connect the GPS sensor to a charged battery module and (optional) to any other sensor(s).
3. When connecting the battery, the GPS sensor will flash once with a red LED and three times with a blue LED. Any connected sensors' red LED will flash three times.

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4. After three seconds, the red LED on the GPS module will flash three times. This means that the GPS sensor is OK and ready for use.
5. Press the blue “start/stop” button on the front of the GPS sensor for roughly a second.
6. The red LED indicator light will turn on until connection with the satellites is made; this can take a few minutes.
7. When there is no satellite reception, the red LED on the GPS sensor will remain on constantly.
8. If there is satellite reception, the red LED on the GPS sensor will flash every second.
9. After the GPS sensor has been synchronized with the satellites, the GPS sensor and any other connected sensor will take measurements every 10 seconds.
10. When you are done collecting data, press the blue “start/stop” button on the front of the GPS sensor for a second to end measurements.
11. If the GPS sensor’s red LED changes from blinking every second to being constantly on, this means that the GPS sensor has lost satellite reception. Any other connected NeuLog sensors will continue taking measurements. The GPS sensor will continue to try and resynchronize with the satellites.
12. If the red LED on the GPS sensor and the other sensors blinks rapidly, 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).
13. When the battery shuts off, no more measurements will be taken by the GPS or any other sensor connected to it.

### Quick start procedure:

#### PC Computer

#### Materials needed:

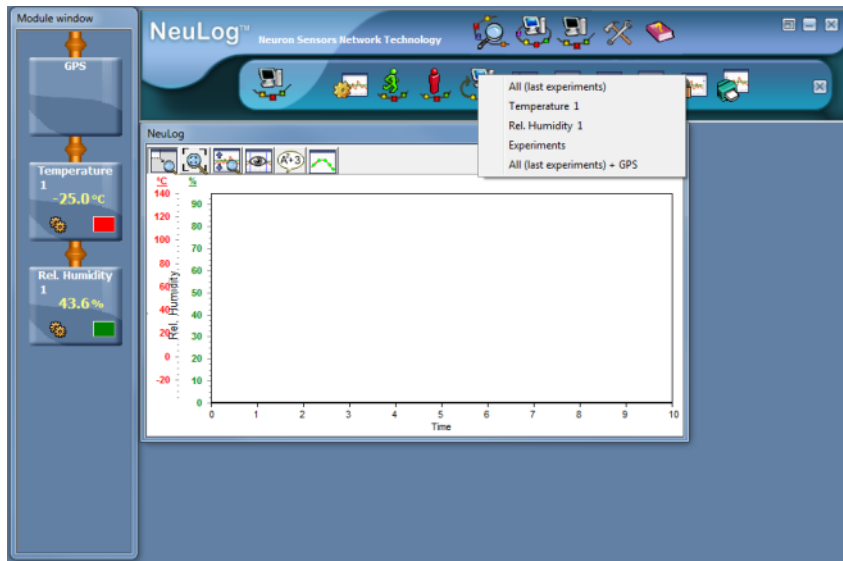
- NUL-243 GPS Sensor
- USB to mini USB cable (included with the GPS-243 module)

The software can be downloaded for free at [www.NeuLog.com](http://www.NeuLog.com) as well as a full software user guide. Choose "Downloads" on the main menu and then choose "Software and Application".

#### Procedure:

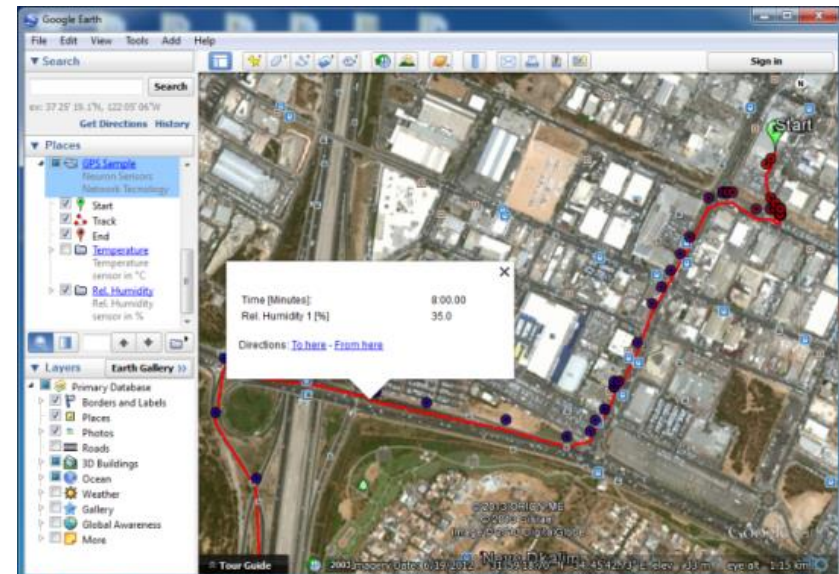
1. Install the NeuLog software.
2. Connect the GPS module to the computer through the USB cable.
3. (The GPS sensor functions as a USB module so make sure you do not connect the GPS sensor to a USB module).
4. Make sure that the most current version of the Google Earth software is installed on your computer.
5. You can download it from:  
<http://www.google.com/earth/download/ge/agree.html>
6. Run the NeuLog software (**version 3.63 or later**).
7. After searching for sensors, make sure that you see a module box for each of the connected NeuLog sensors on the left side of the screen (including the GPS sensor).
8. On the main icon bar, click on the “Off-Line Experiment” icon.
9. On the sub-icon bar, click on the “Load data from sensors” icon.
10. A pop-up menu will open.
11. Click on the “All (last experiment) + GPS” option.

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12. The NeuLog software will upload the collected data from any connected NeuLog sensor first.
13. Then it will upload the GPS data.
14. When finished uploading the GPS data, the software will ask you to save it as a “KML” file (Google Earth type).

15. The saved file will automatically open with Google Earth.
16. After running the Google Earth program, look for the “Places” bar on the left.



17. There, you should find the file which you saved in the NeuLog Program (GPS Sample).
18. Expand the file.
19. You should find:
  - a. Start position
  - b. Track
  - c. End position
  - d. Measurements for every sensor that was connected at the time data was uploaded.
20. Sensors' measurements are shown as circles.

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21. The color of the circle is changed from blue (for a low value measurement) to red (for a high value measurement).
22. 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.

### Included with sensor:

- NeuLog General Guide

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