NeuLog Relative Humidity logger sensor
NUL-207

The NeuLog relative humidity sensor can be used for any science experiment which requires an accurate relative humidity reading such as in the fields of Biology, Physiology, Exercise Science, Chemistry, Environmental Science, Earth Science, Weather Science, Botany, Entomology, etc.

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

Among hundreds of possible experiments that can be performed with the NUL-207 sensor are: perspiration, photosynthesis rates, insect behavior, water vapor emitting chemical reactions, desiccants, ecological studies, animal behavior, and weather patterns.

Relative humidity is a measurement which examines the ratio of water vapor present in the air compared with the maximum amount of water vapor that the air can hold for a specific temperature.
Data is presented as a percentage which is the ratio of the amount of water vapor in the air versus the maximum amount that could be allowed at a given temperature.

Quick start procedure:

PC or Mac Computer

Materials needed:

- NUL-207 Relative Humidity Sensor
- USB-200 USB Module
- USB to mini USB cable (included with the USB-200 module)

Your relative humidity sensor needs to be connected to a USB-200 module. The USB-200 module then connects to a computer via a USB to mini-USB cable. Please note that you cannot plug the relative humidity sensor directly into the computer.

The browser based 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. Install the NeuLog application.
2. Connect the USB-200 module to the PC or Mac.
3. Connect the relative humidity sensor to the USB-200 module (they directly plug together). Please note that no calibration is required for this sensor.
4. Open the NeuLog application by clicking on the shortcut on the screen.
5. Once a relative humidity sensor module box appears on the left side of the screen the probe has been automatically identified and you can begin experimentation.
6. If the relative humidity sensor is not automatically identified, click the "Search for sensors" icon to find the sensor.
7. Click on the "On-line experiment" icon; this will open a graph below.
8. Click on the "Module setup" button located in the relative humidity sensor module box to change the sensor's settings if need be.
9. Click on the "Experiment set up" icon to change the experiment settings if need be (experiment duration for example).
10. The relative humidity sensor will give a live reading in its module box while plugged in.
11. To run an experiment and collect data click the "Run experiment" icon.
12. To end data collection early, click the "Stop experiment" icon.

Tablet, smart phone device

Materials needed:

- NUL-207 Relative Humidity Sensor
- WIFI-201 WiFi Module
- BAT-200 Battery Module

Your relative humidity sensor needs to be connected to a WIFI-201 module. The WIFI-201 module will create a closed NeuLog WiFi network which will stream the NeuLog data to the device of your choosing. Once your device is wirelessly connected to the NeuLog network, you can run experiments and collect data through a browser of your choosing.

Procedure:

1. Connect the Relative Humidity Sensor directly to the left side of a WIFI-201 module (no wires required).
2. Connect a BAT-200 module to the right side of the WIFI-201 module.
3. Although not required, we recommend plugging the BAT-200 to an outlet using a USB to mini USB charger (such as a typical cell phone charger). The WIFI-201 module will run for 60-90 minutes (depending on the sensor) without being plugged in.
4. The WIFI-201 can be powered directly using a mini to USB cord and plugging it into your computer or a wall charger. Please note this function is only available on WIFI-201 modules with the USB icon on the cover.
5. For further WIFI-201 instructions or the WIFI-201 quick start guide please visit: www.NeuLog.com; Choose "Products" on the main menu, then choose "WiFi Communication module".
6. The WIFI-201 indicator lights will flash; take no action until the LED to the far left turns blue; this can take up to one minute.
7. Take your tablet or smart phone, go to the WiFi settings and select the NeuLog network (NeuLog0184 for example) which matches the ID found on the back of the WIFI-201 module (0184 for example).
8. Give your device about 20 seconds to connect to the WIFI-201 module.
9. Once the device is connected, go to your browser and type the website **wifi201.com** into the URL bar, then wait for 30-60 seconds.
10. You will see a "Control mode" icon in the application, click on it.
11. The application will then load a new screen and begin to auto detect the sensor(s); this can take a minute. (You can stop the search when the sensor is found.)
12. If the application does not auto detect the sensor(s), select "Search for sensors".
13. Once the sensor is found you will see a module box on the left side of the screen for the relative humidity sensor. In this box, real time data will be displayed.
14. Click on the "Module setup" button located in the relative humidity sensor module box to change the relative humidity probe settings if need be.
15. Click on the "Experiment setup" icon to change the experiment settings if need be (Experiment duration for example).
16. To run an experiment and collect data, click on the "On-Line experiment" icon, then click the "Run experiment" icon.
17. If you have a newer generation WIFI-201 module (with the USB icon on the cover) this can be used as a USB-200, meaning you can tether the probes directly to the computer using the WIFI-201. To engage operation in this fashion, press 3 times on the panel button. Repeating this operation will return the module to WiFi mode.

Operation with NeuLog Graphic Display Module (viewer)

Materials needed:

- NUL-207 Relative Humidity Sensor
- VIEW-101 Graphic Display Module
- BAT-200 Battery Module

Procedure:

1. Connect the relative humidity sensor to the left side of the viewer.
2. Connect the BAT-200 module to the right side of the viewer.
3. The VIEW-101 will auto detect the sensor and you will see it appear on the left side of the screen.
4. Once the sensor appears, it will be monitoring data in real time.
5. To run an experiment and collect data, press the run icon (little green person).

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

Materials needed:
- NUL-207 Relative Humidity Sensor
- BAT-200 Battery Module

Materials needed to configure your offline experiment:
- USB-200 Module, WIFI-201 module or VIEW-101 Module.
- USB to mini USB cable (included with the USB-200 module)

Procedure:

1. To determine the experiment settings, first connect to your chosen device (PC, Mac, tablet, smart device) and click on the "Off-line experiment" icon after the sensor search has ended. (For more information on how to change the experiment settings, view the quick start procedure section for your chosen device in this document.)
2. Connect the relative humidity sensor directly to the left side of a charged BAT-200 module.
3. When ready to collect data, press the "Start/Stop" button on the relative humidity sensor; a red light will turn on for the duration of the experiment.
4. After the experiment has concluded (the "Start/Stop" button is pressed again or the data collection period ends) connect the sensor to your chosen device (you can find full instructions in each device's quick start procedure section).

5. Open the NeuLog application.
6. Click the "Off-line experiment" icon.
7. Click the "Load data from sensors" icon.
8. Select which experimental data to upload (5 experimental runs can be stored at one time on the NUL-207 relative humidity sensor).

Restoring sensor's factory default settings:

Procedure:

1. Connect the USB-200 to a PC, Mac, tablet, or smart device.
2. Connect the relative humidity sensor to a USB-200 module (they directly plug together).
3. Open the NeuLog application.
4. Click the "Tools" icon.
5. Click the "Restore sensor's factory defaults" on the menu.

Included with the sensor:

▪ NeuLog NUL-207 Relative Humidity Sensor guide (this document)

Sensor specifications	
Range and operation modes	0 to 100% RH
ADC resolution	16 bit digital
Accuracy	± 5% RH
Resolution	0.1%
Max sample rate (S/sec)	100

Experiment Duration: 1 second to 31 days.

Sensor 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
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 relative humidity sensor's page, choose "Products" on the main menu and then "Relative humidity logger sensor".
- In order to find the science experiments, choose "Experiments" on the main menu of the NeuLog website, then choose "Physics", "Chemistry", "Biology" or "Environmental Science".
- Biology Experiment:
  - Thermoregulation and Perspiration (B-9)
- Environmental Science Experiments:
  - Microclimates and GPS (E-7)
  - Temperature and Relative Humidity (E-9)

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 (^{o}C, ^{o}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 relative humidity sensor's casing houses a capacitive polymer which reacts with water vapor present in the air. The reaction with the polymer produces a voltage which is relative to the concentration of water vapor in the air.

Maintenance and storage:

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