



Edu-Logger Soil Moisture Logger Sensor Guide 900-239



Edu-Logger soil moisture logger sensor 900-239

The Edu-Logger soil moisture sensor can be used for any science experiment or activity which can utilize accurate soil moisture levels such as in the fields of Environmental Science, Ecology, Animal Behavior, Biology, Chemistry, etc.

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

Hundreds of possible experimental subjects that can be done with the 900-239 sensors are: monitoring habitats, ecosystem health, animal behavior, soil chemistry, soil comparisons, ecological monitoring, and many more.

This logger sensor is based on measuring the vacuum pressure in a tensiometer. A tensiometer is a closed tube full with water with a special ceramic part in its end. In dry soil water goes out by diffusion through the ceramic holes and vacuum pressure is created in the tensiometer. The vacuum pressure is proportional to the soil dryness.

The soil moisture sensor uses the following units of measure:

- Centibar (cbar): The bar is a non-SI unit of pressure defined as 100,000 Pascals. The centibar is defined as one kilopascal.
- Kilopascal (kPa): the SI derived unit of pressure.

Setting up the soil moisture probe:

The Edu-Logger soil moisture sensor requires only minimal setup prior to each use. Be sure to properly configure your Edu-Logger sensor using one of the following guides (computer/smart device/viewer) prior to data collection.

1. Remove the soil moisture probe's cap which is wired directly into the sensor body.
2. Fill the probe's ceramic cone with tap water. Note: More water will last longer and provide more accurate results though be sure to allow some room for air at the top of the column.
3. Replace the plastic cap and firmly press down to form a strong seal.
4. Gently press the probe (ceramic cone side first) vertically into the soil that you want to test.
5. Ensure that the entire ceramic cone has been pressed into the soil.
6. Begin collecting data.

Quick start procedure:

PC or Mac Computer

Materials needed:

- 900-239 Soil Moisture Sensor
- 900-213 USB Module
- USB to mini USB cable (included with the 900-213 module)

Your soil moisture sensor needs to be connected to a 900-213 module. The 900-213 module then connects to a computer via a USB to mini-USB cable. Please note that you cannot plug the soil moisture sensor directly into the computer.

Resident PC software and browser based application can be downloaded for free at www.edulab.com as well as a full software user guide.

Note: Make sure not to download and install both types of software they will conflict on the computer.

Procedure:

1. Install the Edu-Logger software
2. Connect the 900-213 module to the PC or Mac
3. Connect the soil moisture sensor to the 900-213 module (they directly plug together). Please note there is no calibration required for this sensor.
4. Open the Edu-Logger software.
5. Once a soil moisture sensor logo appears on the left side of the screen the probe has been automatically identified and you can begin experimentation.
6. If the soil moisture sensor is not automatically identified then click the “Search for sensors” icon to find the sensor.
7. Select the “On-line experiment” button; this will open a graph below.
8. Click on the “Module setup” button located on the soil moisture sensor icon in the module window to change the sensor settings if need be.
9. Click on the "experiment set up" button to change the experiment settings if need be (experiment duration for example).
10. The soil moisture sensor will give a live reading in the box to the left of the screen while plugged in.
11. To run an experiment and collect data click “Run experiment”.
12. To end data collection early, click “Stop experiment”.

Tablet, smart phone device

Materials needed:

- 900-239 Soil Moisture Sensor
- 900-268 WiFi module
- 900-215 Battery

Your soil moisture sensor needs to be connected to a 900-268 module. The 900-268 module will create a closed Edu-Logger WiFi network which will stream the Edu-Logger data to a device of your choosing. Once your device is wirelessly connected to the Edu-Logger network you can run experiments and collect data through a browser of your choosing.

Procedure:

1. Connect the soil moisture sensor directly to the left side 900-268 (no wires required).
2. Connect a 900-215 module to the right side of the 900-268 module.
3. Although not required, we recommend plugging the 900-215 to an outlet using a USB to mini USB charger (such as a typical cell phone charger). The 900-268 module will run for 15-75 minutes (depending on the sensor) without being plugged in.
4. The 900-268 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 900-268 units with the USB icon on the cover.
5. For further 900-268 instructions or the 900-268 quick start guide please visit: www.edulab.com
6. The 900-268 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 Edu-Logger network which matches the 900-268 Module ID found on

the back of the 900-268 device. (Edu-LoggerXXXX for example).

8. Give your device about 20 seconds to connect to the 900-268.
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 browser, click on this icon.
11. The browser 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 browser does not auto detect the sensor(s), select “Search for sensors”.
13. Once the sensor is found you will see an icon on the left side of the screen for the soil moisture sensor. The icon will display real time data.
14. Click on the “Module setup” button located on the soil moisture sensor icon in the module window to change the soil moisture probe settings if need be.
15. Click on the experiment set up button to change the experiment settings if need be (Experiment duration for example).
16. To run an experiment and collect data, select “On-Line” experiment, then select "Run".
17. If you have a newer generation 900-268 (with the USB icon on the cover) this can be used as a 900-213, meaning you can tether the probes directly to the computer using the 900-268. To engage operation in this fashion, press 3 times on the panel key. Repeating this operation will return the unit to WiFi mode.

Operation with Edu-Logger viewer

Materials needed:

- 900-239 Soil Moisture Sensor
- 900-272 Viewing Module
- 900-215 Battery

Procedure:

1. Connect the soil moisture sensor to the left side of the viewer.
2. Connect the 900-215 module to the right side of the viewer.
3. The 900-272 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 click the run button (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 Edu-Logger viewer).

Materials needed:

- 900-239 Soil Moisture Sensor
- 900-215 Battery

Materials needed to configure your offline experiment:

- 900-213 Module or 900-268 module or 900-272 Module
- USB to mini USB cable (included with the 900-213 module).

Procedure:

1. Connect the soil moisture sensor directly to the left side of a charged 900-215 module.

2. When ready to collect data press the “Start/Stop” button on the soil moisture sensor, a red light will turn on for the duration of the experiment.
3. To change the experiment settings first connect to your chosen device (PC, Mac, tablet, smart device) and select the “Module setup” button. (For more information on how to change the experiment settings view quick start procedure section for your chosen device in this document.)
4. After the experiment has concluded (when the “Start/Stop” button is pressed again or the data collection period ends) connect the sensor to your chosen device. (full instructions in each device’s quick start procedure section)
5. Open Edu-Logger software.
6. Click the “Off-line experiment” button.
7. Click the “Load data from sensors” button.
8. Select which experimental data to upload. (5 experimental runs can be stored at one time on the 900-239 soil moisture sensor)

Restoring sensor’s factory default settings:

Procedure:

1. Connect the 900-213 to a PC, Mac, tablet, or smart device.
2. Connect the soil moisture sensor to a 900-213 module (they directly plug together). Please note there is no calibration required for this sensor.
3. Open the Edu-Logger software.
4. Click the “Tools” icon.
5. Click “Restore sensor’s factory defaults” icon.
6. If prompted to clear the graph, click either the “Off-line experiment” or “On-line experiment” (whichever you are using).
7. Click “Clear experiment results”.
8. Resume from step 4.

Included with sensor:

- Edu-Logger 900-239 Soil Moisture Sensor Guide (this document).
- Blumat soil moisture probe attached directly to the Edu-Logger sensor body.

Sensor specifications		
Range and operation modes	-20 to 50 cbar	-20 to 50 kPa
ADC resolution	13 bit	
Resolution	0.01 cbar	0.01 kPa
Max sample rate (S/sec)	100	

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:** Edu-Logger products are intended for educational use.

Videos and experiment examples:

- Videos, literature and other probes can be found at www.edulab.com

Technical background:

The philosophy behind Edu-Logger'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 Edu-Logger 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 at any time using software.

The soil moisture sensor is a very technologically complex system which utilizes a Blumat soil moisture probe in conjunction with the Edu-Logger sensor's hardware and software.

After the probe has been filled with water and placed into a soil sample, the specialized ceramic cone tip allows for water diffusion across a gradient. A vacuum is formed inside of the probe when the cap is sealed and the sensor is automatically calibrated.

When the soil has less moisture than the probe, water will diffuse out of the ceramic cone creating a larger volume vacuum. When the soil has a higher moisture

content than the probe, water will diffuse into the probe through the ceramic cone creating a smaller volume vacuum.

The Edu-Logger soil moisture sensor directly measures the pressure of the vacuum which is why the soil moisture reading is presented in pressure units.

Maintenance and storage:

- Never submerge the Edu-Logger plastic body in any liquid.
- Do not allow liquid into the soil moisture sensor's body.
- After use, gently wipe away any foreign material from the soil moisture 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 for a period of 3 years from the date of purchase. Our warranty 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 Edu-Logger!

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