



**Edu-Logger Turbidity
Logger Sensor Guide
900-241**



Edu-Logger turbidity logger sensor 900-241

The Edu-Logger Turbidity Sensor can be used for any science experiment or activity using samples with suspended particles in liquids such as in the fields of Chemistry, Biology, Microbiology, Earth Science, Environmental Science, Biochemistry, etc.

Turbidity is a measurement of the concentration of suspended particles in a solution. The particles could be anything from sand, and non-dissolved nutrients to bacterial cells. When a liquid is turbid, it is often referred to as cloudy or hazy. This sensor measures turbidity by measuring sending a beam of light through a cuvette and measuring the unreflected light from the beam.

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

Three cuvettes with lids come packaged with the sensor, which load directly into the opening on the sensor's faceplate.

Hundreds of possible experiments that can be done with the 900-241 sensors are: Monitoring of ecological systems, bacteria or yeast culturing, studying colonies of Protozoa, environmental health testing, water quality testing, etc.

The turbidity sensor can take measurement with the following units of measure:

- NTU – Nephelometric Turbidity Unit

Cuvette usage and handling:

It is important to maintain a standard for cuvette usage as their quality will directly make an impact on the results of your experiments. If the cuvette has fingerprints, smudges, or cracks the sensor will detect them and give off an improper turbidity reading. Smudges left from handling can easily be wiped off with tissue paper.

Proper usage:

1. Carefully remove the cuvettes from their packaging.
2. Load your liquid sample into the cuvette before placing it into the sensor to prevent spilling and damaging the sensor.
3. Plug the cap into the cuvette and gently invert a few times. Shaking will create air bubbles which will be detected by the sensor and give an incorrect reading.
4. Before placing the cuvette in the sensor; hold the cuvette as far toward the top as you can and wipe the bottom portion of the cuvette off with a tissue. Do not touch the bottom of the cuvette again as this will leave a residue which will affect the results of the experiment.
5. Load the cuvette into the square hole located on the sensor's faceplate and press down gently to slide the cuvette into place.
6. After experimentation, empty your samples and gently rinse out the cuvettes with distilled water and then let the cuvettes air-dry.

Quick start procedure:

PC or Mac Computer

Materials needed:

- 900-241 Turbidity Sensor
- Cuvettes + Cuvette Lids
- 900-213 USB Module
- USB to mini USB cable (included with the 900-213 module)

Your turbidity 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 turbidity 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 turbidity 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 turbidity sensor logo appears on the left side of the screen the probe has been automatically identified and you can begin experimentation.
6. If the turbidity 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 turbidity 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 turbidity 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:

- 900-241 Turbidity Sensor
- Cuvettes + Cuvette Lids
- 900-268 WiFi module
- 900-215 Battery

Your turbidity 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 turbidity 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 turbidity sensor. The icon will display real time data.
14. Click on the “Module setup” button located on the turbidity sensor icon in the module window to change the turbidity 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:

- 900-241 Turbidity Sensor
- Cuvettes + Cuvette Lids
- 900-272 Viewing Module
- 900-215 Battery

Procedure:

1. Connect the turbidity 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:

- 900-241 Turbidity Sensor
- Cuvettes + Cuvette Lids
- 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 turbidity 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 turbidity 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 900-241 turbidity sensor)

Restoring sensor’s factory default settings:

Procedure:

1. Connect the 900-213 to a PC, Mac, tablet, or smart device.
2. Connect the turbidity 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 the “Restore sensor’s factory defaults” on the menu.
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:

- Three plastic cuvettes with three lids.
- Edu-Logger 900-241 Turbidity sensor Guide (This Document)

Sensor specifications	
Range and operation modes	0-200 NTU
ADC resolution	10 bit
Resolution	0.2 NTU
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)
- Internal photodiode for collecting scattered infrared light
- 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.

Samples are poured into cuvettes which are then placed inside the Turbidity Sensor for analysis. Infrared light is directed at the cuvette and is scattered off of any suspended particles present in the sample. A photodiode positioned perpendicular to the light source loses free electrons (photoelectrons) when the scattered photons hit it, creating a readable voltage. The amount of light being scattered, and then detected, is directly proportional to how many solid particles are present in the sample. Turbidity is calculated in Nephelometric Turbidity Units (NTU) based on the voltage reading.

Beer's Law:

Beer's Law is an extremely useful concept in solution concentration testing in the fields of Chemistry and Biology. Standard curves are created by using solutions of known concentrations which analyzed in a

turbidity to determine the absorbance then graphed. The absorption for unknown samples can easily be tested and plotted on the standard curve to determine their concentration.

Maintenance and storage:

- Never place anything into the turbidity sensor opening other than the cuvettes.
- Never submerge the Edu-Logger plastic body in any liquid.
- Do not allow liquid into the Edu-Logger plastic body.
- After using the probe wipe off all excess material liquid or residue from the turbidity sensor.
- Store in a box at room temperature out of direct sunlight.
- Cuvette usage guide can be found in the beginning of this document

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!

W: www.edulab.com

E: info@edulab.com

V10012013