



Edu-logger Force Logger Sensor Guide 900-211



Edu-logger force logger sensor 900-211

The Edu-logger force sensor can be used for any science experiment or activity which involves both constant and changing forces such as in the fields of Physics, Physiology, Mechanics, Biomechanics, Biology, etc.

With the ability to hang the sensor using a stand and rod, an attached hook to hang weights, as well as two directional measurement capabilities the Edu-logger force sensor can easily be set up to your specific requirements to give quick, easy, accurate, and reliable data.

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

The sensor can easily be reset to zero at any time.

Hundreds of possible experimental subjects that can be done with the 900-211 sensors are: Applied forces and energy, friction, Newton's Laws of Motion, physiological concepts, collisions, harmonic motion, and many more.

This sensor measures force in both the push and pull directions.

The unit of measurement that the force sensor collects data in is the newton:

- Newton (N): The SI unit of force.
 $1 \text{ N} = 1 \text{ kg} \cdot \text{m/s}^2$

Reset to zero:

The force sensor comes pre-calibrated however after use you may find that the sensor is slightly off or you may want to run an experiment that requires you to zero the sensor with a constant applied force on it.

To zero the sensor:

1. Connect the 900-211 force sensor to a computer/tablet/smart device following one of the guides below.
2. Open the Edu-logger software.
3. When your sensor has been detected click on the force sensor icon (on the left side of your screen).
4. Remove all force from the sensor and click reset to zero your force sensor.
5. You can also reset the sensor to zero by pressing and holding the sensor push button for 3 seconds.
6. Your force sensor is now reset to zero.

Note: You can zero the scale with a constant force being applied to it to set that value as your new “zero”

Quick start procedure:

PC or Mac Computer

Materials needed:

- 900-211 Force Sensor
- 900-213 USB Module
- USB to mini USB cable (included with the 900-213 module)

Your force 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 force 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 force sensor to the 900-213 module (they directly plug together).
4. Open the Edu-logger software.
5. Once a force sensor logo appears on the left side of the screen the probe has been automatically identified and you can begin experimentation.
6. If the force sensor is not automatically identified, click the “Search for sensors” icon to find the sensor.
7. Click the “On-line experiment” button; this will open a graph below.
8. Click on the “Module setup” button located on the force 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 force 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:

- 900-211 Force Sensor
- 900-268 WiFi module
- 900-215 Battery

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

- 900-211 Force Sensor
- 900-272 Viewing Module
- 900-215 Battery

Procedure:

1. Connect the force 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:

- 900-211 Force Sensor
- 900-215 Battery Module

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 force 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 force 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 900-211 force sensor)

Restoring sensor’s factory default settings:

Procedure:

1. Connect the 900-213 to a PC, Mac, tablet, or smart device.
2. Connect the force sensor to a 900-213 module (they directly plug together).
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:

- Edu-logger 900-211 force sensor guide (this document).
- Utility probe with hook attached to the sensor by a durable rubber-coated wire.

Sensor specifications

	10 N range	50 N range
Range and operation modes	$\pm 10\text{ N}$	$\pm 50\text{ N}$
ADC resolution	14 bit	
Resolution	0.01 N	
Max sample rate (S/sec)	3000	

The slow sampling rate is aimed for static force measurements. The fast one is aimed for dynamic experiments such as harmonic movement of spring with weight.

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.
- Strong plastic force utility sensor with hook attached to the sensor's plastic body by a durable rubber-coated wire.
- The force takes measurements in two directions for both pushing and pulling experiments.

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 ($^{\circ}\text{C}$, $^{\circ}\text{F}$, 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 force sensor is based on a metal rod connected in both sides to the force sensor hooks in a special shape called 'S' shape. A strain gauge is attached to the metal rod and connected to a very sensitive operational amplifier.

Pulling or pushing the hooks bends very little the metal rod, changes the strain gauge resistances and the amplifier output voltage. This voltage is converted into force (N) by the sensor controller.

Maintenance and storage:

- 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 sensor.
- Store in a box at room temperature out of direct sunlight.
- Avoid storing with weight applied directly to the sensor.
- Do not apply more than 250 Newtons of force to the sensor.

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!



Flexible, simple, fast, forward thinking.

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