Edu-Logger Respiration
Monitor Belt Logger Sensor
Guide
900-255

Edu-Logger respiration monitor belt logger sensor 900-255

The Edu-Logger respiration sensor can be used for any science experiment or activity which involves respiration measurements such as in the fields of Exercise Science, Biology, Physiology, Human Health, 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 900-255 sensors are: exercise studies, human health studies, athlete comparisons, respiration abnormalities, and many more.

The respiration sensor uses the following units of measure:
- Arbitrary analog units (Arb): An arbitrary unit to demonstrate wave functions without units.

Using the respiration monitor belt:

To accurately record respiration rates you must first properly attach the respiration monitor belt to the user. **Note:** The belt works through clothing though try to minimize layers for the best readings possible.

1. Unwrap the respiration belt and locate the Velcro connection pads.
2. Situate the respiration belt so the Velcro pads are facing outwards.

3. Wrap the respiration belt tightly, without causing discomfort, around the user's lower ribs and diaphragm area.
4. Ensure that the rubber tubing connected directly to the respiration belt is situated above the user's naval facing downwards.
5. Close the air pressure release valve by twisting the metallic knob until it tightens.
6. Using the hand-pump fill the respiration belt's bladder until it forms a snug but not uncomfortable fit.
7. Run an experiment following one of the following guides.

Quick start procedure:

PC or Mac Computer

Materials needed:

- 900-255 Respiration Sensor
- 900-213 USB Module
- USB to mini USB cable (included with the 900-213 module)

Your respiration 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 respiration sensor directly into the computer.

Resident PC software and browser based application can be downloaded for free at www.edulab 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 respiration 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 respiration sensor logo appears on the left side of the screen the probe has been automatically identified and you can begin experimentation.
6. If the respiration 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 respiration 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 respiration 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:
- 900-255 Respiration Sensor
- 900-268 WiFi module
- 900-215 Battery

Your respiration 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 respiration 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 respiration sensor. The icon will display real time data.
14. Click on the "Module setup" button located on the respiration sensor icon in the module window to change the respiration 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:
- 900-255 Respiration Sensor
- 900-272 Viewing Module
- 900-215 Battery

Procedure:
1. Connect the respiration 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:
▪ 900-255 Respiration 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 respiration 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 respiration 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 900-255 respiration sensor)

Restoring sensor's factory default settings:

Procedure:

1. Connect the 900-213 to a PC, Mac, tablet, or smart device.
2. Connect the respiration 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:

- Edu-Logger 900-255 Respiration Sensor Guide (this document).
- Respiration monitor belt attached directly to the sensor by flexible rubber tubing.
- Hand pump with pressure release valve attached directly to the respiration monitor belt.

Sensor specifications	
Range and operation modes	0 to 20,000 arbitrary units
ADC resolution	13 bit
Resolution	1
Max sample rate (S/sec)	100

Sensor features:

- Fully digital data.
- Rugged plastic ergonomic case.
- Respiration monitor belt attached to the sensor body by a flexible rubber hose.
- Hand pump with pressure valve for increasing and decreasing pressure attached directly to the respiration monitor belt by a flexible rubber hose.
- 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, 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 (^{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 at any time using software.

The pressure sensor uses the piezoresistive effect. The transducer is based on silicon between metal foils that changes its resistance according to pressure. One side of it is at complete vacuum that enables to measure the absolute pressure on its other side.

This transducer is built as a strain gauge with Wheatstone bridge circuit so its output is a voltage depends on it absolute pressure.

When the user inhales, a pressure is applied directly to the blood pressure monitor cuff's bladder and detected

by the internal sensing unit. The pressure in the cuff is equal to the pressure operated on the subject's arm.

When the user inhales, a pressure is applied directly to the respiration monitor belt's air bladder and detected by the internal sensing unit and converted to a voltage.

The voltage reading is easily converted into arbitrary units and the pressure changes to monitor respiration rate.

Maintenance and storage:

- Never submerge the Edu-Logger plastic body in any liquid.
- Do not allow liquid into the respiration sensor's body.
- After use, gently wipe away any foreign material from the respiration 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 proves 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

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