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Apr 2024

Heart Rate Exercise Sensor

Product Number: ENEXRT298



Overview

Understanding how the heart works is basic to biology studies and is one of the first experiments any science student should learn to perform. The Heart Rate Exercise sensor bundle includes a Polar belt, a wireless transmitter, and a receiver. This bundle gives teachers an ideal way to run experiments involving physical exertion such as running in place or other strenuous activity. The Heart Rate sensor measures heart rate between 0 and 250 bpm (beats per minute).

The Heart Rate Exercise sensor can be connected to all **einstein™** data loggers.

Typical experiments



Human Physiology

- Comparing the heart rates of different individuals
- Comparing the heart rates of athletes and non-athletes
- Effect of exercise on heart rate
- Effect of caffeine on heart rate

How it works

The transmitter belt is worn just below the chest and held in place by an elastic strap. Two electrodes in the transmitter detect the electrical changes that accompany a heartbeat (similar to an EKG) and send a wireless signal to the receiver. The receiver then sends an electric pulse to the software where it is recorded and displayed. The reception range of the plug-in receiver is 80 cm or about 3 feet.

Sensor specification (Polar belt)

Range Pulse:	0 to 250 bpm (beats per minute)
Range Waveform:	0 – 5 V
Transmitter Range:	80 cm
Waveform resolution (12-bit):	1.25 V
Data Logger Input Type:	Digital

Note: sensor cables sold separately

Technical Notes

- The transmitter belt contains a non-rechargeable battery, which will last for up to 2,500 hours of use. The battery cannot be replaced.
- Make sure the receiver is no more than 80 cm from the belt.
- The receiver can only communicate with one belt at a time, but any belt can communicate with any receiver. There is no need to match a specific belt with a specific receiver.
- To optimize signal reception, keep the receiver oriented vertically and in the front of the subject's body.
- The receiver must point toward the transmitter.
- Erratic measurements, or large reading fluctuations, such as a drop to 0 bpm or sudden increase to 250 bpm, indicate signal loss. The most common causes of signal loss are belt movement, inadequate electrode contact, improper orientation, or too much distance between

the receiver and transmitter.

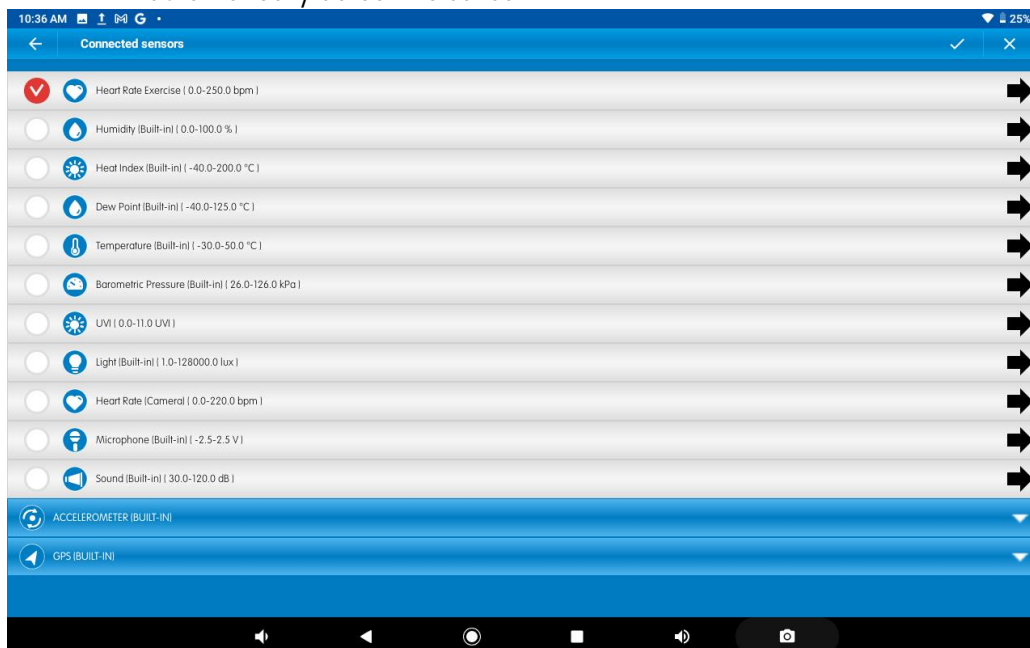
- If signal loss occurs, moisten the electrodes, check the electrodes' contact (try tightening the belt) and move the receiver closer to the transmitter.
- The transmitter belt can be washed with mild soap and a gentle brush.
- If the electrodes appear discolored, the transmitter needs to be washed. Do not use any alcohol or asolvent based detergent.
- Salt that remains on the belt for long periods can cause an electrical short and reduce battery life.
- The transmitter's textile strap is removable and machine washable.
- The Heart Rate Exercise sensor must be connected to the einstein™ devices digital inputs.

NOTE: This product is to be used for educational purposes only. It is not appropriate for medical or research applications. **Specifically, it should not be used for patient diagnosis.**

Data logging and analysis

MiLABEx™

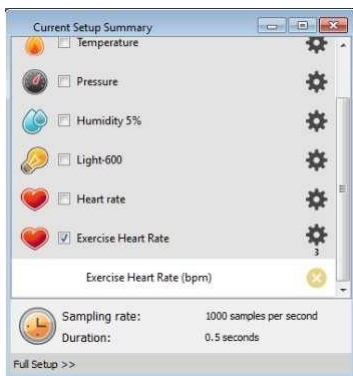
1. Take your einstein™ Tablet OR pair your einstein™ LabMate with your Android or iOS tablet via Bluetooth
2. Insert the sensor cable into one of the sensor ports
3. Launch MiLABEx and then tap on LAB – Start an Experiment
4. MiLABEx will automatically detect the sensor



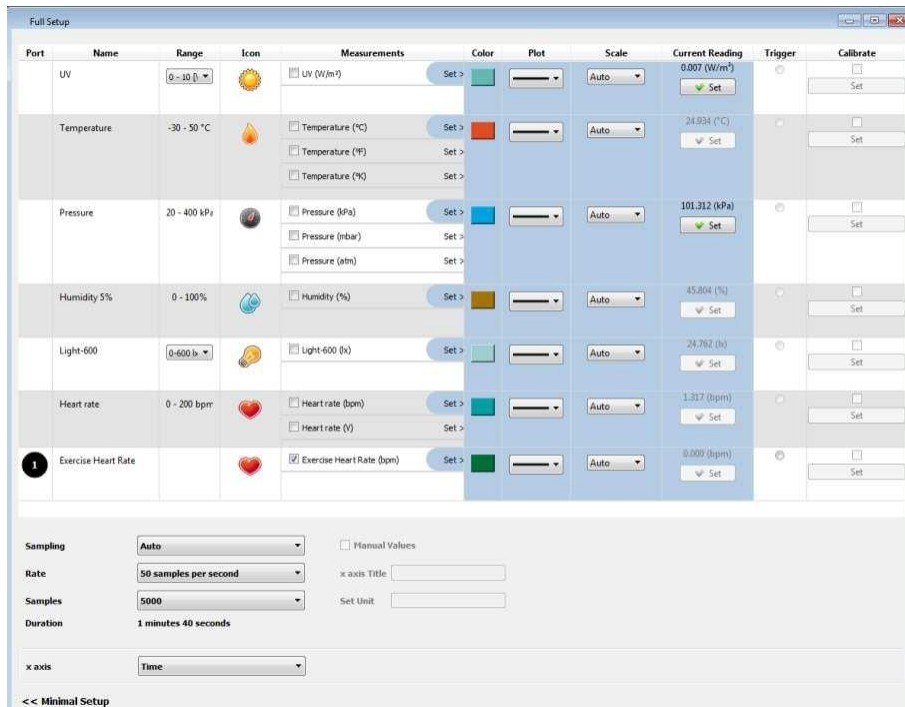
5. Tap on Setting to change duration or sample rate
6. You are ready to start an experiment

MiLABEx Desktop

1. Pair your einstein™ LabMate with your PC, MAC, or Linux machine via Bluetooth, or connect it via USB cable (found in the einstein™ LabMate box).
2. Insert the sensor cable into one of the sensor ports
3. Launch MiLABEx and then LAB – Start an Experiment
4. MiLABEx will automatically detect the sensor and show it in the Current Setup Summary window



5. Click Full Setup, located at the bottom of the Current Setup Summary window to program the data logger's sample rate, number of samples, units of measurement, and other options



6. Click the Run button on the main toolbar to start logging

Calibration

The Heart Rate sensor requires no calibration.

An Example of using the Heart Rate Sensor

Experiment Set-Up

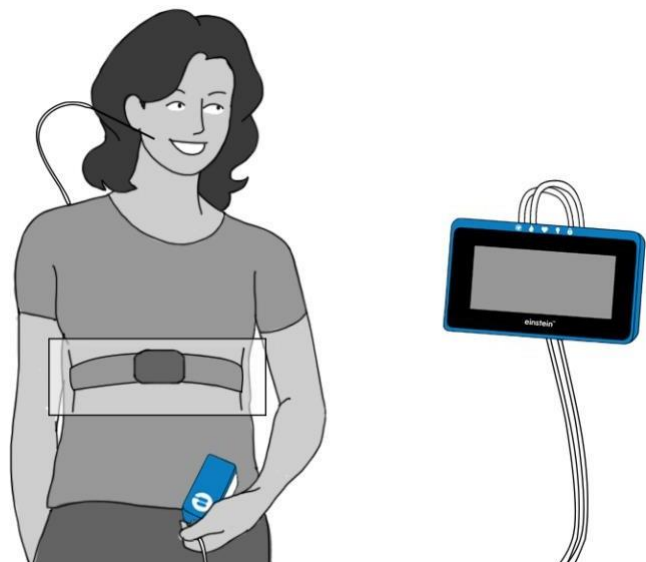
The Heart rate sensor comes with:

- One Heart Rate sensor (receiver)
- One transmitter belt
- One textile strap.

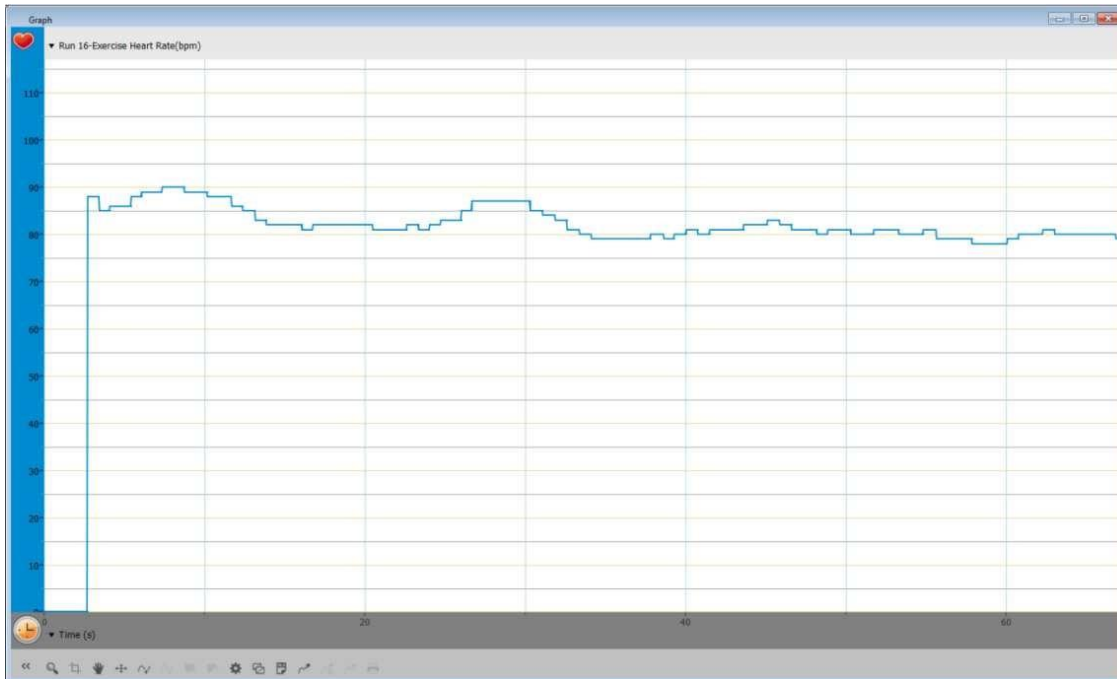
The Effect of Exercise on Heart Rate

When we exercise, our muscles need increased fuel and oxygen, both of which are carried around our bodies by blood. To increase the flow of blood the heart pumps faster, increasing blood flow. This experiment demonstrates that process.

The two electrode strips with a zigzag pattern on the back side of the belt must be wetted using 4 drops of saline solution or water. Secure the transmitter belt over the base of the rib cage using the textile strap. The belt should be directly on your skin. Be sure that the belt is in the right place by checking that the POLAR logo of the belt is centered. Fasten the strap to make sure it fits tightly (see figure below).



1. Select Run.
2. Follow changes in heart rate until it stabilizes (at about two minutes).
3. Jog in place for two minutes.
4. Follow changes in heart rate for an additional one to two minutes while at rest.
5. Save your data by Selecting Save.



Troubleshooting

If the Heart Rate sensor isn't automatically recognized by MiLABEx, please contact Fourier Education's technical support.

Technical support

For technical support, you can contact the Fourier Education's technical support team at: Web:

www.einsteinworld.com/support

Email: support@fourieredu.com

Copyright and Warranty

All standard Fourier Systems sensors carry a one (1) year warranty, which states that for a period of twelve months after the date of delivery to you, it will be substantially free from significant defects in materials and workmanship.

This warranty does not cover breakage of the product caused by misuse or abuse.

This warranty does not cover Fourier Systems consumables such as electrodes, batteries, EKG stickers, cuvettes and storage solutions or buffers.

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