
HEART RATE SENSOR ML87s

USER'S GUIDE



CENTRE FOR MICROCOMPUTER APPLICATIONS

<http://www.cma-science.nl>

Short description

The Heart Rate sensor ML87s monitors a person's heart rate. The sensor measurement range is between 0 and 250 beats per minute (bpm).

The Heart Rate sensor consists of a transmitter belt and a receiver. The transmitter belt has to be worn just below the chest and held in a place by delivered with the sensor an elastic strap.

The transmitter detects electrical signals at the surface of the skin by two electrodes embedded in the chest belt and transmits the information to the receiver via a low frequency electromagnetic field. The receiver receives the signals and determines the heart rate in beats per minute. The reception range of the receiver is 90 cm.

The transmitter switches off automatically as soon as there is no skin contact between electrodes and the belt. Store the belt dry. The battery in the belt has lifetime of about 2500 transmit hours. Then the belt has to be replaced.

The Heart Rate sensor is an I2C digital sensor, which gives calibrated values of the measured quantity. This sensor can only be connected to special interfaces that support I2C digital sensor like the CMA MoLab interface. The sensor cable needed to connect the sensor to an interface is not supplied with the sensor (sensor cables are supplied with interfaces).

Sensor specifications

The Heart Rate sensor ML87s is a digital sensor that generates a pulse for each detected heartbeat. The resolution of the sensor is 1 bpm.

Collecting data

This Heart Rate sensor works only with specific interfaces. The sensor will be automatically detected when connected to such an interface. For detailed information about measurements with sensors consult the User Manuals of the interface and the Coach 6 software.

Calibration

The Heart Rate sensor is supplied with a factory calibration and gives values in beats per minute (bpm).

Suggested experiments

- Compare the heart rate of different individuals.
- Check the person's heart rate before, during and after a short period of vigorous activity.
- Monitor the recovery rate: that is how fast a person's heart rate returns to

normal after exercises.

- Check for *baroreceptor reflex*: that is, changes in heart rate for a person when reclined, sitting, and standing caused by the need for the heart pump blood to different levels.
- Check a person's heart rate before and after caffeine consumption.
- Check a person's heart rate before and after eating.
- Check your own heart rate at different times of the day.
- Monitor a person's heart rate as they hold their breath.

Using of the Exercises Heart Rate Sensor

1. Connect the receiver to the one of the interface inputs.
2. Secure one of the plastic ends of the elastic strap to the transmitter belt of the sensor. It is important that the strap provide a snug fit to the transmitter.
3. Wet each of the electrodes (the two grooved rectangular areas on the underside of the transmitter belt) with 3 drops of saline solution.
4. Secure the transmitter belt against the skin directly over the base of the rib cage. The POLAR logo on the front of the belt should be positioned in the center of your chest. Adjust the elastic strap to ensure a tight fit.

Helpful Tips

- It is important to have a good contact between the transmitter belt and the test subject. The belt must fit snugly, but not too tight. Both electrodes should be wet with either saline solution or contact lens solution (most conductive solutions will work). A 5% salt solution works well and can be prepared by adding 5g of NaCl per 100 ml of solution.
- Be sure to hold the receiver within 90 cm of the transmitter. This is the maximum transmission range of the transmitter in the chest belt.
- Computer monitors can be source of electrical interference. Keep the receiver as far as possible from any computer monitors in the class.
- The receiver will receive signals from the closest transmitter source.
- To avoid confusion or erroneous readings, have test subjects from different lab teams stay at least 2 meters apart.
- Typical symptoms of the inadequate contact with the electrodes are a noisy signal with erroneous peaks, missing heartbeat readings, or a flat-line display. If the students receive a flat reading with no heart rate detected then the transmitter and the receiver have to be moved closer together. If there is still no a good pattern tight the transmitter belt and/or place 2-3 drops of saline solution on each of the electrodes of the belt.

Technical Specifications

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| <i>Sensor kind</i> | Digital, communication via I2C generates a pulse for each detected heartbeat, |
| <i>Measuring range</i> | 0 .. 250 bpm |
| <i>Resolution</i> | 1 bpm |
| <i>Maximal sampling rate</i> | 1 Hz |
| <i>Transmitter (chest belt)</i> | T31 by POLAR |
| <i>Transmitter frequency</i> | 5.2 kHz |
| <i>Transmitter battery lifetime</i> | 2500 hour of use |
| <i>Transmitter range</i> | 90 cm (typical) |
| <i>Connector</i> | 5-pins mini jack plug |

Warranty:

The Heart Rate sensor ML87s is warranted to be free from defects in materials and workmanship for a period of 12 months from the date of purchase provided that it has been used under normal laboratory conditions. This warranty does not apply if the sensor has been damaged by accident or misuse.

Note: *This product is to be used for educational purposes only. It is not appropriate for industrial, medical, research, or commercial applications.*

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