

# EcgMove 4

ECG and Physical Activity Sensor

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Operating and Safety Instructions



# Imprint

**EcgMove 4** Operating and Safety Instructions

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# 1 Welcome!

Dear customer,

Thank you for choosing the ECG and Physical Activity Sensor **EcgMove 4** from movisens. With this sensor, you get the newest technology for mobile monitoring of ECG and physical activity in everyday life.

Please read this manual completely and thoroughly before bringing the measurement system into service!

In this manual you will find the most relevant operating instructions and the safety instructions.

Please find the full movisens documentation here:

[docs.movisens.com](https://docs.movisens.com)

If you have any further questions, don't hesitate to contact us. It is our pleasure to help you:

Phone: +49 721 381344-0

E-Mail: [support@movisens.com](mailto:support@movisens.com)

## 2 Intended use

**EcgMove 4** is a scientific research instrument that captures the ECG, physical activity, and other secondary parameters derivable from these measurement signals. **EcgMove 4** is designed and tailored for use in research applications.

**The ECG and physical activity sensor EcgMove 4 is not a medical device!**

The sensor acquires a single channel ECG signal and can be used with a dry electrode chest belt or with disposable electrodes. In addition to capturing the ECG signal, the sensor records the physical activity of a person through the acquisition of acceleration in three dimensions, the angular rate (gyroscope) and atmospheric air pressure. Moreover the ambient temperature is acquired.

The sensor configuration occurs via a USB 2.0 connection to a Windows PC using the **Sensor Manager** software.

## 3 Explanation of Symbols



**Caution.**

**Read the manual and the safety instructions to find out about possible hazards and the needed actions to avoid these hazards!**

# 4 Safety Instructions

Please follow these safety instructions. Improper use of the product may impair/affect the protection provided by the product and cause product damage or personal/physical injury:

- ! **EcgMove 4 is not a medical device. Do not use it for a medical purpose.**
- ! Only use **EcgMove 4** for the intended use.
- ! Carefully read and follow the cleaning instructions.
- ! Use adhesive electrodes only once.
- ! For long term measurements (> 1 day) we suggest wearing pauses of at least 20min per day.
- ! If any problems occur by wearing the sensor, chest belt or electrodes (e.g. pressure marks, skin irritations or other discomfort), stop using the system immediately.
- ! Only use the **EcgMove 4** under the specified environmental conditions.
- ! To charge the battery of **EcgMove 4**, only use USB 2.0 standard compatible devices.
- ! Charge the sensor only at ambient temperatures below 45°C.
- ! The use of the cradle is only intended for indoor use.
- ! Never open **EcgMove 4**.
- ! The battery of **EcgMove 4** may only be changed by the manufacturer.

## 5 Scope of Delivery

The following components are included in delivery:

Article	Order No.
<b>EcgMove 4</b> ECG- and Activity Sensor, Cradle, Micro USB cable, Operating and safety instructions	10402

To be able to do measurements a PC is needed in addition to the scope of delivery.

## 6 Accessories

The following accessories can be ordered optionally:

Article	Order No.
<b>Chest Belt (XS)</b> For EcgMove 4 and EcgMove 3 Size: XS, Underbust Measurement: 51 to 59 cm	30420
<b>Chest Belt (S)</b> For EcgMove 4 and EcgMove 3 Size: S, Underbust Measurement: 58 to 66 cm	30421
<b>Chest Belt (M)</b> For EcgMove 4 and EcgMove 3 Size: M, Underbust Measurement: 66 to 81 cm	30422
<b>Chest Belt (L)</b>	30423

For EcgMove 4 and EcgMove 3 Size: L, Underbust Measurement: 80 to 110 cm	
<b>Chest Belt (XL)</b> For EcgMove 4 and EcgMove 3 Size: XL, Underbust Measurement: 110 to 166 cm	30424
<b>Cradle 4</b> Cradle for EcgMove 4 with Micro USB Interface	30400
<b>USB Charger</b> USB Charger for 110-240V	30100
<b>USB Hub</b> USB Hub 2.0, 7 Ports	30101
<b>Micro USB Cable</b>	30102

## 7 Consumables

The following consumables can be ordered optionally:



Article	Order No.
<b>Alcohol Pads (100 pcs.)</b> Single-use alcoholic wipes for skin cleansing Saturated with 70% isopropyl alcohol Size of unfolded wipes: 30 x 65 mm	40103
<b>ECG Electrodes (30 pcs.)</b>	40104
<b>Meliseptol Rapid (250 ml)</b> Ready-to-use alcoholic disinfectant for spraying or wiping.	40410

# 8 Description of the Sensor

**EcgMove 4** can either be used

- with a comfortable chest belt with dry electrodes
- with two disposable electrodes

For long term measurements the belt is more comfortable. For short term measurements the disposable electrodes may be more practical.

	<p>The sensor can be attached to the belt by two snap fasteners.</p>
	<p>If used with disposable electrodes, the electrodes are attached directly to the sensor.</p>

Included in the delivery you also receive a cradle with a micro USB interface. To connect the sensor to a PC, you have to separate it from the chest belt or the electrodes and plug it into the cradle.

**EcgMove 4** is also equipped with a Bluetooth Smart interface. The sensor can be used in conjunction with a gateway or a mobile phone for live applications. The Bluetooth Smart interface is activated in the default configuration of the sensor. To deactivate this interface, a firmware update is required.



## 9 User interface and indicators

**EcgMove 4** is equipped with a multi-colored LED to show the status of the sensor:

Status-LED	Meaning
Flashing red (once per second)	The sensor is active and records data
Flashing red slowly (every two seconds)	Delayed recording active
Flashing green	The sensor is connected to a PC or a charger. The battery is fully charged.
Flashing blue	The sensor is connected to a PC or a charger. The battery is actually being charged.
Flashing magenta	The sensor is active and records data. It is connected to a charger. The battery is actually being charged.
Flashing yellow	The sensor is active, records data. It is connected to a charger. The battery is fully charged.
Flashing blue fast (three times per second)	The battery is low, sensor will turn off soon.
Flashing red fast (three times per second)	An Error occurred. Reset the sensor with the Reset Sensor Program. If

	the sensor doesn't stop flashing, please contact the manufacturer.
No LED active	The sensor is inactive.

Combinations of red and green blinking as well as red and blue blinking are possible with the appropriate combination of the above described meanings.

**EcgMove 4** features a vibration alarm. It vibrates two times when a marker is set. During measurement a marker can be set by double tapping on the front of the sensor.

## 10 Software Installation

Please ensure that your PC fulfills the requirements:

- A PC with Microsoft Windows 7 or higher, 64bit
- USB 2.0 Port
- Administrator rights during installation
- A minimum of 300 MB free space on hard disc

**Step 1:** Download the SensorManager from the movisens Website

**Step 2:** Double click the file "movisens\_SensorManager\_Setup.exe"

- ✓ The Installation runs automatically in the background. After successful installation, shortcuts are created in the Windows Start Menu under the entry "movisens SensorManager".

**Step 3:** Download the UnisensViewer from the movisens Website:

**Step 4:** Double click the file "UnisensViewer\_Setup\_Full.exe"

- ✓ The Installation runs automatically in the background. After successful installation, a shortcut "UnisensViewer" is created in the Windows Start Menu.

# 11 Handling

This chapter describes how to prepare a measurement and how to attach the sensor to a test person. Furthermore you get information on how to save, delete and analyze data from the sensor.

## 11.1 Charging the Sensor

**Step 1:** Connect the cradle with the USB cable to a USB 2.0 port (USB port of your computer or another port that conforms to USB standard like USB hub or USB charger). Attach the sensor with the help of the push buttons at the cradle. Please make sure that the 4 contacts are connected (marked red in the picture). To charge multiple sensors at the same time, we suggest using a USB hub.



- ✓ After connecting the sensor to a USB port, the charging process starts immediately. During charging, the status LED is blinking blue. If the sensor is fully charged, the LED is blinking green. The charging process of the sensor can take up to two hours, depending on the battery status of your sensor.

- ✓ If the sensor is fully charged, the battery run time during recording is 3 days.

## 11.2 Preparing a Measurement

**Step 1:** Start the **SensorManager** by selecting Windows Startmenu → movisens SensorManager → SensorManager

**Step 2:** Connect the **EcgMove 4** sensor to your PC using the cradle.

The SensorManager application shows information about sensor hardware, sensor state and sensor configuration.

Before you start a measurement please check the charging status of the battery. The maximum measurement duration can only be reached when the battery is fully charged.

## 11.3 Starting a Measurement

To start a measurement, please perform the following steps:

**Step 1:** In the **SensorManager** software click on the „Start Recording“ button in the lower left of the window.

**Step 2:** Please supply the requested information into the text fields.

**Step 3:** Start the measurement by clicking the „Start“ button.

**Step 4:** Please follow the instructions and remove the sensor from the cradle.

- ✓ The status LED will flash red once per second as soon as the measurement has started and data will be recorded. If a delayed start was configured the LED flashes red every two seconds until the measurement starts.

- ✓ At the end of the measurement the LED stops flashing.

## 11.4 Attaching the Sensor to the Test Person

### Using a chest belt:

Place the chest belt directly on the skin at the level of the participant's sternum, with the two snap fasteners pointing forward. Adjust the size of the chest belt in order that it cannot slip out of position, but only so tightly that it can be worn comfortably over long periods. Attach the **EcgMove 4** sensor to the two push buttons. The movisens label on the sensor has to be upright and readable.

- When adjusting the belt too tight this will result in more artifacts because the belt cannot compensate movements and it will eventually damage the belt.

### Using disposable electrodes:

Attach a disposable electrode to each side of the sensor. Attach the electrodes to the test person. The movisens label on the sensor has to be upright and readable.

### For both types of electrodes:

- Shave or cut excessive hair from electrode sites as excessive hair prevents good electrode contact.
- Clean the electrode sites with oil/grease free soap and water, or with alcohol wipes (e.g. Alcohol Pads, B. Braun).
- Don't use body lotions. Oily skin will not conduct clear signals.
- Due to the dry long-term electrodes in the chest belt, it obtains maximum signal quality in about 15 minutes after putting it on.

Therefore please take care to attach the chest belt 15 minutes preceding the acquisition of relevant data.

- If you use a chest belt, you can shorten the time to obtain a good signal by moistening the electrode areas with water before attaching the chest belt.
- If you use a chest belt, please wash the belt regularly. For cleaning instructions, see chapter 12.2.
- If you use adhesive electrodes, you have to thoroughly dry the skin, as electrodes will not adhere to moist skin.
- Use adhesive electrodes only once.

The following figures display the correct location of the chest belt and the electrodes:



## 11.5 Stopping a Measurement

The measurement will automatically be stopped if the configured measurement duration has passed.

A running measurement will also be stopped when:

- The sensor is connect to a PC
- The end of the battery run time has been reached

If the battery is low, this is indicated by fast blue flashing light (three times per second). The sensor will turn off soon.

## 11.6 Storing Measurement Data

The measurement data of the sensor is stored as raw data (e.g. the acceleration data as it is measured).

To store recorded measurement data on the PC do the following steps:

**Step 1:** Start the **SensorManager** by selecting Windows Start menu → movisens SensorManager → SensorManager

**Step 2:** Connect **EcgMove 4** sensor to the PC using the cradle.

**Step 3:** Click on „Save Data“.

**Step 4:** Please type in the requested information.

**Step 5:** Finally click on „Save data“

The measurement data will be stored either in the unisens format or as .csv file. Unisens is an open data format for multi sensor data. You can find further information about unisens here: [www.unisens.org](http://www.unisens.org)

# 12 Cleaning Instructions

It is important to clean the sensor and the dry electrode chest belts regularly to avoid possible infections between users.

Clean the sensor and the chest belt at least after each participant.

## 12.1 Cleaning the Sensor

If you want to clean **EcgMove 4**, please note the following:

- Disconnect the sensor from chest belt and cradle.
- Use fast-acting alcoholic surface disinfectant (e.g. Meliseptol Foam Pure) to clean the complete sensor housing. Respect the instructions of the manufacturer.

## 12.2 Cleaning the Chest Belt

To clean the chest belt please observe the following:

- Disconnect the sensor from chest belt.
- Disinfect the chest belt with fast-acting alcoholic surface disinfectant (e.g. Meliseptol rapid). Respect the instructions of the manufacturer.
- Wash the chest belt by hand and not in the washing machine. Use a mild liquid detergent.
- After washing, rinse the chest belt with clear water.
- Directly after washing, air-dry the belt before storing or using it for new measurements.



# 13 Maintenance and Proper Disposal

## 13.1 Maintenance

Besides charging the batteries, **EcgMove 4** does not need any further maintenance. The battery capacity will decrease slowly with charging cycles and age. The battery can only be changed by movisens. Please contact us in the case when a replacement is necessary.

## 13.2 Proper disposal

For the proper disposal send **EcgMove 4** back to movisens. Alternatively contact a licensed, certified electronic scrap disposal merchant. Please consider your local regulations for waste disposal.

# 14 Troubleshooting

Frequently asked questions related to all of our products can be found here: <https://www.movisens.com/en/faq/>

# 15 Technical Data

Power supply	Lithium-Polymer-Battery, 3,7V
Number of charging cycles	300 (with 1 C / 1 C > 80%)
Internal memory	4 GB
Maximum recording capacity	2 weeks
Battery run time	~ 3 days
Recharging time	~ 1 hour
Connectors	USB 2.0 via Micro-USB, 5V, 500mA
Size of sensor (W x H x D)	62,3mm x 38,6mm x 11,5mm
Weight of sensor	26 g
Internal sensors	<p><b>ECG sensor:</b>  Resolution: 12 bit, Input range CM = 560 mV, DM = +/-5 mV, 3db bandwidth 1,6 - 33 Hz  Output rate: 1024 Hz</p> <p><b>3D acceleration sensor:</b>  Measurement range: +/- 16 g  Output rate: 64 Hz</p> <p><b>Rotation rate sensor:</b>  Measurement Range: +/-2000 dps  Resolution: 70 mdps  Output rate: 64 Hz</p> <p><b>Pressure sensor:</b>  Measurement range: 300 - 1100 hPa  Resolution: 0,03 hPa</p>

	<p>Output rate: 8 Hz</p> <p><b>Temperature sensor:</b></p> <p>Output rate: 1 Hz</p>
Live Analysis	Heart Rate, bpmBxB, NN-List, HRV Rmssd, HRV is valid, Movement Acceleration, Step count
Indicators	LED, 3-color Vibration alarm
User Interfaces	Marker (tapping)
Wireless interface	Bluetooth Smart (4.0)
API	Java API for USB (Windows) Java Bluetooth Smart Gatt Library
Wear locations	Chest
Wearing systems	Chest Belt, Adhesive Electrodes
Environmental conditions Sensor	<p>indoor/outdoor use, pollution degree 2</p> <p>Altitude: up to 2000m</p> <p>Ambient Temperature: -20 °C to 55 °C 5°C to 40°C during charging</p> <p>Maximum rel. humidity: 80% for temperatures up to 31°C, linearly decreasing to 50% for temperatures &gt;= 40°C</p>
Environmental conditions Cradle	indoor use only, pollution degree 1, other conditions as above

# 16 Legal Notes

## 16.1 Disclaimer

The products this manual describes are subject to change without prior notice. movisens makes no representations or warranties with respect to this manual or with respect to the products described herein.

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