

EcgMove 3

ECG and Physical Activity Sensor

User Manual



movisens 

Imprint

EcgMove 3 User Manual

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The newest version of the User Manual can be found here:

http://www.movisens.com/wp-content/downloads/EcgMove3_User_Manual.pdf

Frequently asked questions:

<https://www.movisens.com/en/faq/>

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Contents

| | | |
|-----|---|----|
| 1 | Welcome! | 1 |
| 2 | Scope of Application | 3 |
| 3 | Instructions of Use | 5 |
| 4 | Scope of Delivery and Accessories | 7 |
| 4.1 | Scope of Delivery | 7 |
| 4.2 | Accessories | 8 |
| 4.3 | Complementary Products | 9 |
| 4.4 | Complete Measurement System | 10 |
| 5 | Description of the Sensor | 12 |
| 6 | Software Installation | 17 |
| 6.1 | System Requirements | 17 |
| 6.2 | Installing the Software | 18 |
| 6.3 | Updating the Software | 19 |
| 6.4 | Updating the Sensor Firmware | 19 |
| 6.5 | Uninstalling the Software | 20 |
| 7 | Handling | 21 |
| 7.1 | Charging the Sensor | 23 |
| 7.2 | Preparing a Measurement | 25 |
| 7.3 | Starting a Measurement | 26 |
| 7.4 | Attaching the Sensor to the Test Person | 28 |
| 7.5 | Setting a Marker | 30 |
| 7.6 | Stopping a Measurement | 31 |
| 7.7 | Storing Measurement Data | 31 |
| 7.8 | Viewing Measurement Data | 37 |
| 7.9 | Analyzing Data | 39 |
| 8 | Maintenance and Proper Disposal | 41 |
| 8.1 | Maintenance | 41 |

| | | |
|------|-----------------------------|----|
| 8.2 | Cleaning Instructions | 41 |
| 8.3 | Cleaning of Chest Belt..... | 41 |
| 8.4 | Proper disposal | 42 |
| 8.5 | Troubleshooting..... | 42 |
| 9 | Technical Data | 43 |
| 10 | Legal Notes..... | 45 |
| 10.1 | Copyright..... | 45 |
| 10.2 | Disclaimer..... | 45 |
| 10.3 | Trademarks..... | 45 |

1 Welcome!

Dear customer,

Thank you for choosing the ECG and physical Activity Sensor **EcgMove 3** from movisens. With this sensor, you get the newest technology for mobile monitoring of the ECG and the 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 all Information relevant to the use and maintenance of the measurement system as well as for solving problems.

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

2 Scope of Application

EcgMove 3 is a scientific research instrument to capture the ECG, the physical activity and other secondary parameters derivable from these measurement signals. **EcgMove 3** is designed and tailored for the use in research applications.

The ECG and physical activity sensor EcgMove 3 is not a medical device!

The sensor acquires a single channel ECG signal. It can be used with a chest belt with dry electrodes or with disposable electrodes. In addition the sensor measures the physical activity of a person based on the acquisition of acceleration in three dimensions and atmospheric air pressure. Moreover the ambient temperature is acquired.

The configuration of the sensor is done from PC by means of the **Sensor Manager** software included in this package.

EcgMove 3 allows the measurement of the following parameters:

- Electrocardiogram
- Acceleration in three dimensions
- Atmospheric Air Pressure
- Temperature
- Marker

In conjunction with movisens **DataAnalyzer** the offline calculation and analysis of the following parameters is possible. In addition to these parameters, reports can be generated.

- Heart rate and heart rate variability
- Movement Acceleration and Step Count

- Activity Classes and Body Position
- Energy Expenditure
- Reports

In addition to the offline calculation, **EcgMove 3** offers the possibility of live analysis of ECG and physical activity and in conjunction with **movisensXS**, the software platform for experience sampling and the **Sensor Trigger** the realization of interactive ambulatory assessment strategies. In live mode, the following parameters can be measured, calculated and transmitted via Bluetooth Smart interface:

- Movement Acceleration
- Heart Rate
- HRV RMSSD
- HrvIsValid

These values are transmitted with 1 value per minute. Additional live parameters will be available soon.

Heart Rate is transmitted for every heart beat with a delay of 90 seconds.

HRV and Movement Acceleration are calculated in segments of 30 s. The transmitted value is the mean value of two segments.



Tip:

On demand, other parameters can be calculated from raw data by movisens.

3 Instructions of Use

- ! **EcgMove 3 is not a medical device.**
- ! Only use **EcgMove 3** for the designated applications.
- ! Never open **EcgMove 3**.
- ! The battery of **EcgMove 3** may only be changed by the manufacturer.
- ! **EcgMove 3** is not waterproof. Don't use the sensor in wet environments.
- ! Only use the **EcgMove 3** under the specified conditions.
- ! To charge the battery of **EcgMove 3**, only use USB standard compatible devices.
- ! If **EcgMove 3** is used with chest strap, this has to be cleaned regularly.
- ! If any problems occur by wearing the sensor/ chest belt (e.g. pressure marks, skin irritations or other discomfort), stop using the sensor/ chest belt immediately.

4 Scope of Delivery and Accessories

In this chapter, you learn which parts are within the scope of delivery and what accessories are available. All of these parts can be reordered. Please consider the order numbers in the following paragraph.

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

4.1 Scope of Delivery

The following components are included in delivery:

| Article | Order No. |
|---|-----------|
| EcgMove 3 ECG- and Activity Sensor Raw data acquisition: ECG 1024 Hz, 3D Acceleration 64 Hz, Barometric Altitude 8 Hz Measurement duration: 3 days (up to 2 weeks with re-charging) Live analysis of data Bluetooth Smart interface For use with chest belt or adhesive electrodes Includes cradle, Micro USB cable and SensorManager software to read out and configure the sensor | 10113 |

4.2 Accessories

The following accessories can be ordered optionally:

| Article | Order No. |
|--|-----------|
| Chest Belt EcgMove 3 (S) Size: S Chest Measurement: 58 to 66 cm | 10122 |
| Chest Belt EcgMove 3 (M) Size: M Chest Measurement: 66 to 81 cm | 10123 |
| Chest Belt EcgMove 3 (L) Size: L Chest Measurement: 80 to 110 cm | 10124 |
| Chest Belt EcgMove 3 (XL) Size: XL Chest Measurement: 110 to 166 cm | 10125 |
| Micro USB Cable | 30102 |
| Cradle EcgMove 3 Cradle for EcgMove 3 with Micro USB Interface | 30110. |
| USB Charger USB Charger for 110-240V | 30100 |
| USB Hub USB Hub 2.0, 7 Ports | 30101 |

4.3 Complementary Products

The following products can be used together with the **EcgMove 3**:

| Article | Order No. |
|---|-----------|
| DataAnalyzer Base Single User Licence Basic Software with Algorithms for Physical Activity | 20100 |
| DataAnalyzer Module EnergyExpenditure Single User Licence, in combination with DataAnalyzer Base Algorithms for Energy Expenditure | 20101 |
| DataAnalyzer Module Cardio Single User Licence, in combination with DataAnalyzer Base Algorithms for Heart Rate and Heart RateVariability | 20103 |
| DataAnalyzer Module Sleep Single User Licence, in combination with DataAnalyzer Base Algorithms for Sleep Analysis | 20104 |
| movisensXS Basic Experience Sampling for Android Bundle license for 10.000 item results usable with unlimited number of smartphones | 20110 |
| movisensXS Gold Experience Sampling for Android Bundle license for 100.000 item results usable with unlimited number of smartphones | 20111 |

| | |
|--|-------|
| <p>movisensXS Platinum Experience Sampling for Android Bundle license for 1.000.000 item results usable with unlimited number of smartphones</p> | 20112 |
| <p>SensorTrigger Solution for Interactive Ambulatory Assessment to retrieve the sensor data on your android device and trigger forms in movisensXS.</p> | 20120 |

4.4 Complete Measurement System

A complete system for measurement and analysis of the ECG and the physical activity consists of the following components:

- **EcgMove 3** sensor for the objective assessment of the ECG and the physical activity
- Software movisens **SensorManager** to configure and read out the sensor
- Software **UnisensViewer** for visualization and preprocessing of sensor data and calculated results
- Software **DataAnalyzer** for analysis of sensor data, calculation of outcome parameters and for the creation of reports (for offline analysis of sensor data)
- Experience sampling platform **movisensXS** (for interactive ambulatory assessment)
- **Sensor Trigger** to get the sensor data on your android device, evaluate these data with predefined and configurable algorithms and trigger forms in **movisensXS**.

A detailed description of these components can be found in the following documents:

- Online help for **UnisensViewer** (www.unisens.org)
- **DataAnalyzer** User Manual
- Online help **movisensXS** (xs.movisens.com/help)
- **Sensor Trigger** User Manual

5 Description of the Sensor

EcgMove 3 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.

The sensor can be attached to the belt by two press buttons.



If used with disposable electrodes, the electrodes are attached directly to the sensor.



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 3 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 (see 6.4)

The axes of the integrated acceleration sensor are defined as described in the following figure:



EcgMove 3 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 sensor (see 8.5). 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 3 features a vibration alarm when a marker is set and when Bluetooth is getting disconnected.

6 Software Installation

This chapter describes how to install and uninstall the software and how to update it. Beside this, the system requirements are defined.

6.1 System Requirements

Before installing the software, please check if the following system requirements are fulfilled.

- PC with one of the following Versions of Microsoft Windows: Windows 7, Windows 8, Windows 8.1, Windows 10
- USB 2.0 or USB 3.0 interface
- Administrator rights during installation
- A minimum of 300 MB free space on hard disc

The delivered software consists of two programs:

- **SensorManager:** Program to configure the sensor, to start a measurement and to download the data from the sensor.
- **UnisensViewer:** Program to view the stored data.

Option:

In addition to this, analysis software and cloud service for experience sampling can be ordered as a complement to the sensor (see 0):

- **DataAnalyzer:** Program to analyze the stored sensor data.
- **movisensXS:** Experience sampling platform.
- **movisensXS Sensor Trigger:** android sensor trigger app to evaluate the analyzed data transmitted over Bluetooth smart interface.

6.2 Installing the Software

Please ensure that your PC fulfills the requirements described above.

Step 1: Plug the USB drive into the USB port of your PC. The content of the medium will be shown.

- ! If the window does not open automatically, select the appropriate drive from the window “My computer”.

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: Double click the file “UnisensViewer_Setup_Full.exe”

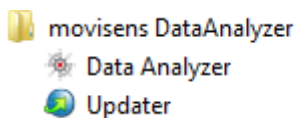
- ✓ The Installation runs automatically in the background. After successful installation, a shortcut “UnisensViewer” is created in the Windows Start Menu.

Option:

If you ordered a licence for **DataAnalyzer**, please follow the next step. Detailed information can be found in the **DataAnalyzer** User Manual.

Step 4: Double click the file “DataAnalyzer_Setup_Full.exe”

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



The use of the different programs is explained in the **DataAnalyzer** User Manual.

6.3 Updating the Software

You need an internet connection to make an update. Select Windows Start Menu → movisens SensorManager → Updater.

If a new version is available, it will be downloaded and installed automatically after starting the updater software.

6.4 Updating the Sensor Firmware

If the **SensorManager** contains a sensor firmware version that is newer than the firmware on the sensor a button “Update sensor” is shown.

Step 1: Check that the sensor is charged.

Step 2: Start the update by clicking the “Update sensor” button.

- ! Never unplug the sensor during firmware update or interrupt the firmware update process.

Special firmware versions are used to change the default configuration of the sensor, e.g. in customized sensor applications or to deactivate the Bluetooth interface. You can get these firmware versions on request from movisens.

To install the new firmware, please start
Windows Start Menu → movisens SensorManager → Firmware
Updater

You can now select the new firmware and Start the update.

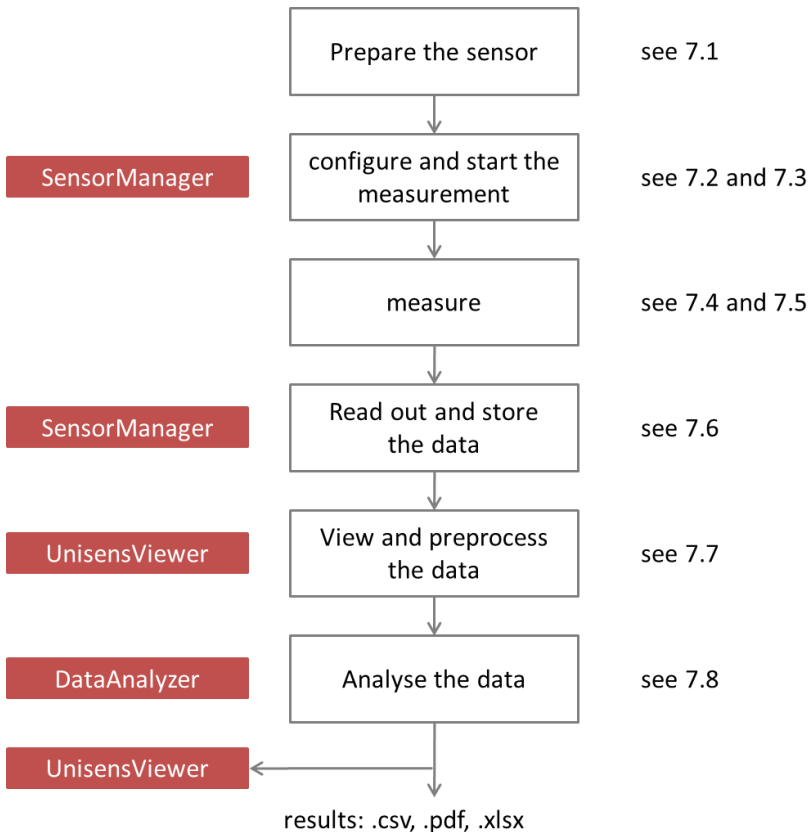
6.5 Uninstalling the Software

The software can be uninstalled using the Windows Control Panel.

7 Handling

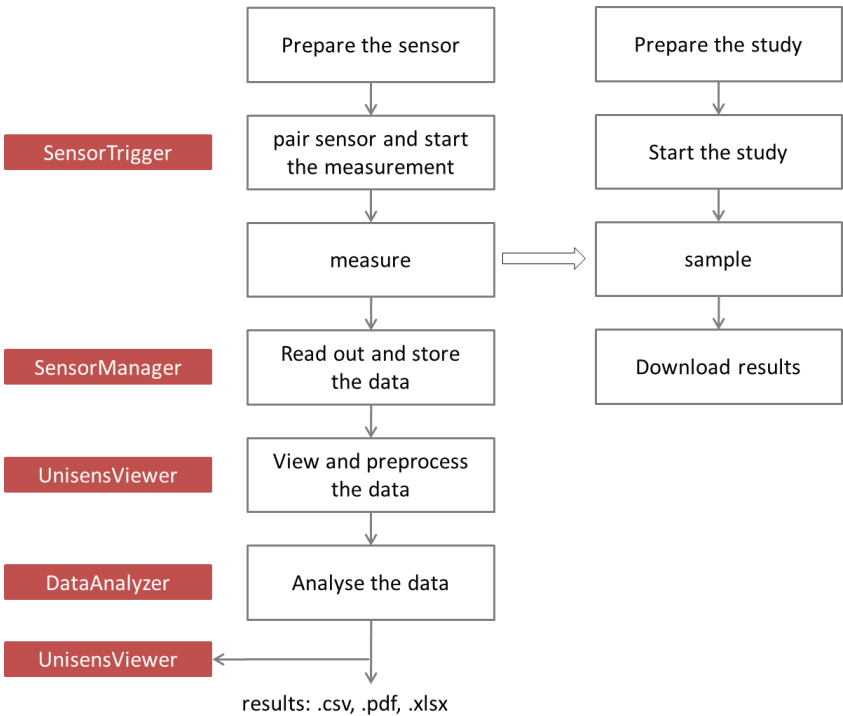
This chapter describes how to prepare a measurement and how to attach the sensor to a test person. Furthermore you get information on how to save, delete and analyze data from the sensor.

A typical usage scenario for the assessment of data and offline analysis is shown in the following diagram. The relevant software for each step is indicated on the left side of the diagram.



The different steps are described in further detail in the chapters indicated on the right of the diagram.

If you want to use the sensor in combination with the experience sampling platform **movisensXS**, the different steps to use the sensor are shown in the following figure. Unlike the offline measurement, the measurement is initiated on your mobile device.



The right side of the diagram illustrates the process to prepare and run a study on **movisensXS**.

To retrieve the data from the **EcgMove 3**, you have to read out the sensor after the measurement. The results of **movisensXS** only contain the sensor information that causes a trigger.

7.1 Charging the Sensor

Step 1: Connect the cradle with the USB cable to a USB 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 (see 4.2).



- ✓ 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.

Step 2: To extend the measurement duration you can recharge the sensor during a measurement.

- ! If recharging while taking a measurement be sure **NOT** to plug it into your PC as that will stop the measurement. Instead use a USB charger.

When recharging the sensor you have to ensure that the battery is fully charged (until the sensor is blinking yellow).



Tip:

If the sensor should be reloaded by the test person, you can define a regular time (e.g. during night or during taking a shower in the morning) when they can plug the sensor to a USB charger.

- ! To be sure that the sensor is not running out of battery, you must advise the test persons to recharge the sensor every day until it is blinking yellow. The time for **daily recharging** the sensor is **about 15 minutes**.

If you recharge the sensor regularly you can make a measurement up to the maximum recording capacity of the sensor of about 2 weeks.

If the sensor runs out of battery lifetime during a long measurement, the recording of data will be stopped. The measurement won't be continued even if you connect it to a charger.

If the sensor is discharged completely (e.g. after a long period where it was not used), it can take up to several minutes until the sensor reacts and can be identified by the computer.

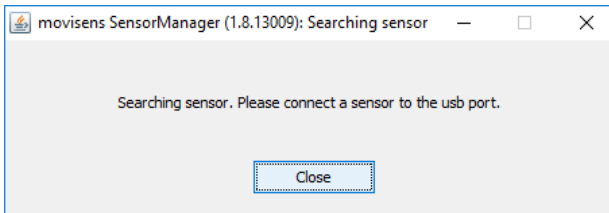
You can control the battery status before the measurement with the sensor manager, see the following section.

7.2 Preparing a Measurement

Before conducting a measurement please make sure you installed the software as described in chapter 6.2.

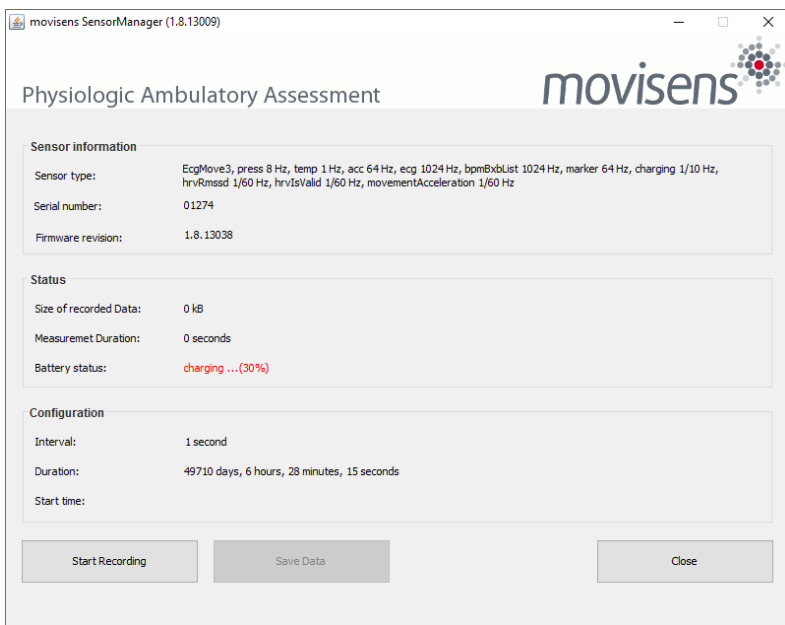
Step 1: Start the **SensorManager** by selecting Windows Startmenu → movisens SensorManager → SensorManager

✓ **SensorManager** is now searching for available sensors.



Step 2: Connect the **EcgMove 3** sensor with your PC using the cradle.

✓ The software will automatically detect the device and open the following window:



This 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.

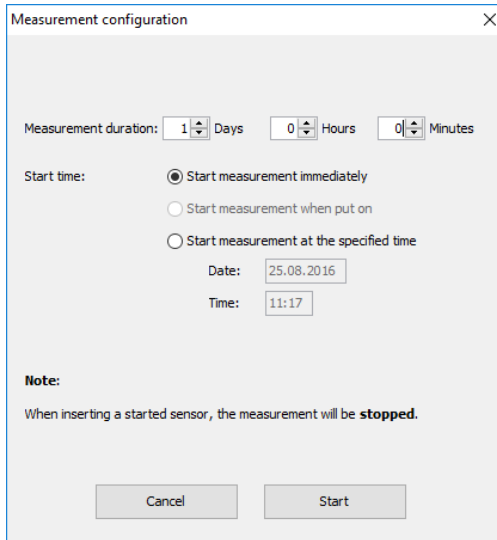
- ! When connecting for the first time allow up to 30 seconds, for the device to be detected, as it installs the driver.

7.3 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.

✓ You can see the following window:

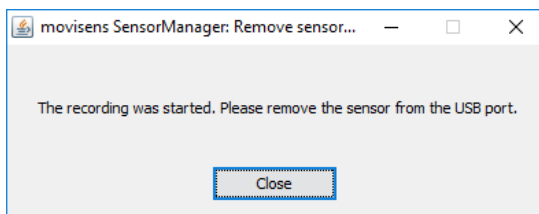


Step 2: Please supply the following information into the text fields:

- **Measurement duration:** The maximum measurement duration of the **EcgMove 3** is about 3 days without recharging the sensor.
- **Start time:** You can start the measurement immediately or delayed at a specific time. If you want to start your measurement delayed please specify date and time. The given time should not be more than 2 days from now as the maximum measurement duration can be influenced.

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

✓ You will see the following window:



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.
 - ! If you reconnect the sensor after starting a measurement again with a PC, the measurement will be stopped prematurely.
 - ! If you connect the sensor to a USB charger, the measurement won't be stopped. That means you can extend the measurement duration by intermediately charging the sensor during a measurement (see 7.1).

7.4 Attaching the Sensor to the Test Person

Using a chest belt:

Place the chest belt directly on the skin at the level of the sternum at the test person, in order that the two snap fasteners point 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 comfortable over long periods. Attach the **EcgMove 3** sensor to the two snap fasteners. The movisens label on the sensor has to be upright and readable.

Using disposable electrodes:

Place two disposable electrodes 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 hair from electrode sites since 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 used in the chest belt, the maximum signal quality will be reached in about 15 minutes after wearing the chest belt. Therefore please take care that the chest belt is always attached long enough before the acquisition of relevant data. Otherwise strong artifacts can occur in the ECG signal, especially under vigorous movements (e.g. while running).
- ! If you use a chest belt, you can shorten the time to obtain good signal if you moisten 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 8.3.
- ! If you use adhesive electrodes, you thoroughly have to dry the skin as electrodes will not adhere well to moist skin.

Correct wearing position of chest belt and sensor is shown in the following figures:



7.5 Setting a Marker

To set a marker, the user has to tip two times on the front side of the sensor. If setting a marker is successful, this is confirmed by the sensor by a short vibration.

7.6 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 (three times per second). The sensor will then turn off soon.

7.7 Storing Measurement Data

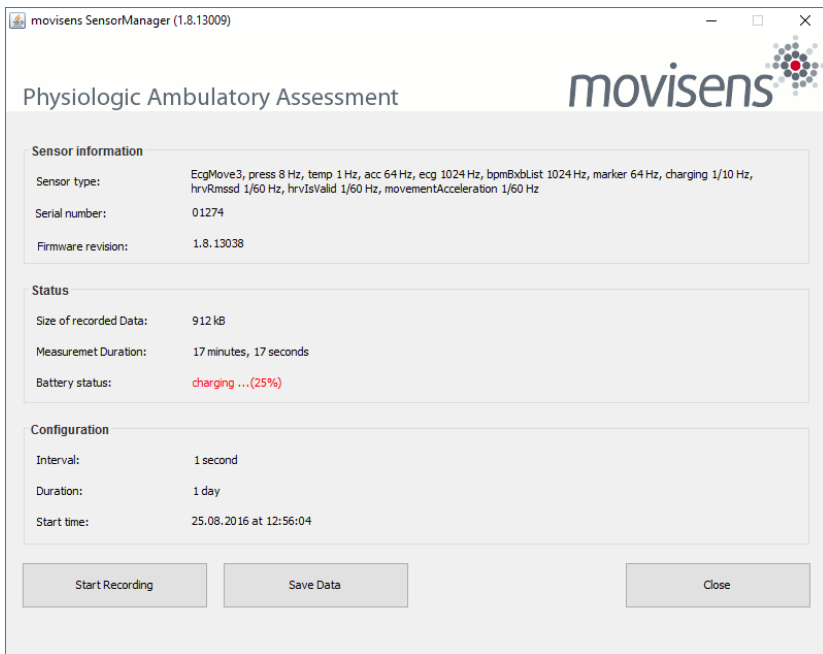
The measurement data of the sensor is stored as raw data (e.g. the acceleration data as it is measured). The data is not processed or aggregated neither in the sensor nor in the **SensorManager** software. Due to that you have a sustainable database with all the raw data of your study that can be used with future studies and with future algorithms.

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 3** sensor to the PC using the cradle.

- ✓ After the **SensorManager** has detected the connected sensor, the following windows will be shown:



Step 3: Click on „Save Data“.

✓ You will see the following window:

The screenshot shows a dialog box titled "Save data of sensor 01274". It contains the following fields and controls:

- Base folder:** C:\Measurements (with a browse button "...")
- Measurement id:** 2016-08-25 12.56.04 (with a browse button "...")
- Name or subject id:** ID01
- Age:** 28 Years
- Weight:** 70 kg
- Height:** 175 cm
- Gender:** M (dropdown menu)
- Sensor location:** chest (dropdown menu)
- Comment:** (empty text area)
- Store data as csv
- Buttons:** Cancel and Save data

Step 4: Please type in the following information:

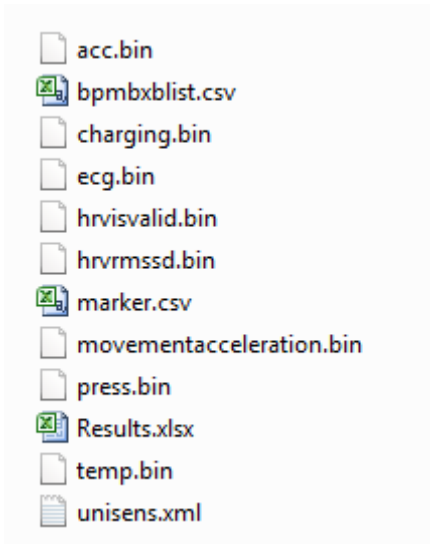
- Select the base folder, where your measurements should be stored. To do this, click the button after the text field.
- Type in the ID of the measurement. If you want to use date and time in the ID click the button after the input field.
- If the measurement data shall be further processed with the movisens **DataAnalyzer** the additional information about the person and the sensor location is mandatory.

Step 5: Finally click on „Save data“

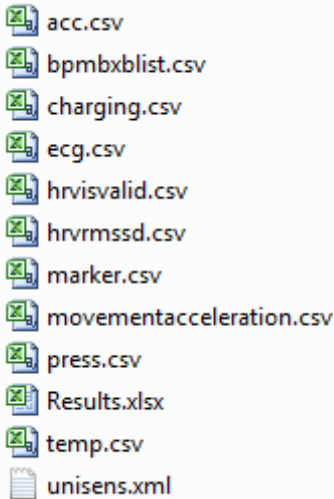
The measurement data will be stored either in the unisens format or as .csv file. Unisens is an open data format for multi sensor data. You can find further information about unisens here: www.unisens.org

- ! If you store the measurement data in .csv format, you can't analyze the data with the movisens **DataAnalyzer**.

A unisens data set consists of meta file (unisens.xml) and different data files for each measurement signal. If you select to store data in unisens format, the following files will be generated:



If you select to store data in .csv format, the following files will be generated:

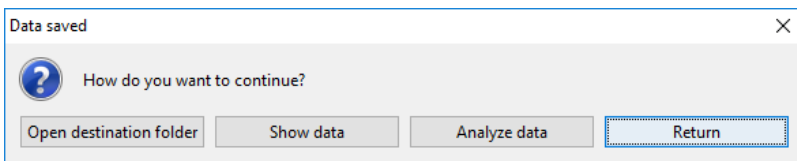


Tip:



When storing data as .csv file, you have to take into account that the size of the data file doesn't exceed the maximum size of the program you want to use (e.g. Microsoft Excel)

- ✓ The software confirms the end of data storing process. The following window is shown:



You can now directly show the stored data. The measurement will be opened in the **UnisensViewer**. If you have installed the **movisens DataAnalyzer** you can directly start data analysis and generate

reports by clicking on “Analyze data”. You can find more information in the **DataAnalyzer** User Manual.

7.8 Viewing Measurement Data

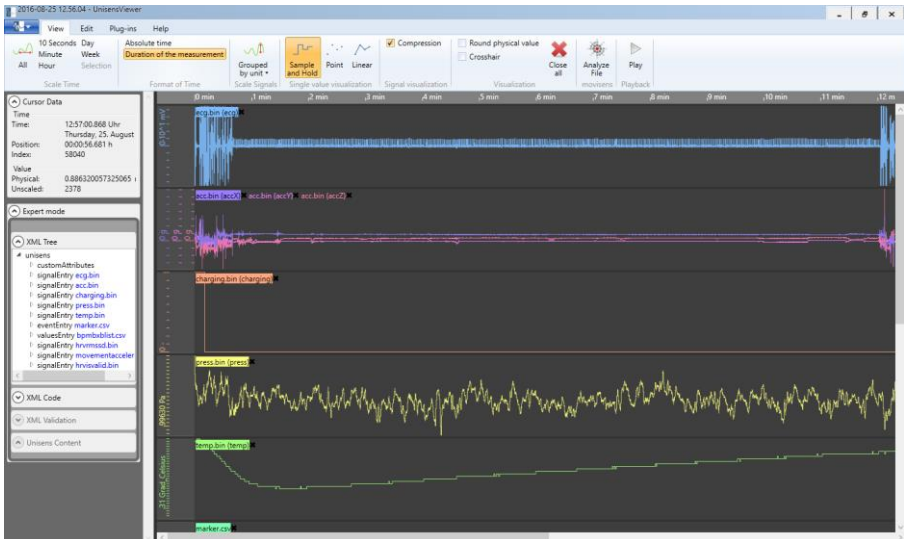
To view recorded measurements click on „Show data“ directly after storing the data.



Tip:

Directly after storing the data you should control if the measurement is complete and correct. You can check visually if all signals are recorded for the full measurement duration and if the signals are of high quality.

To view previously stored measurements use the Windows Explorer to navigate to your measurements folder and then open the folder with the desired ID. Then double click on the “unisens.xml” file. The measurement will then be shown in the **UnisensViewer**:



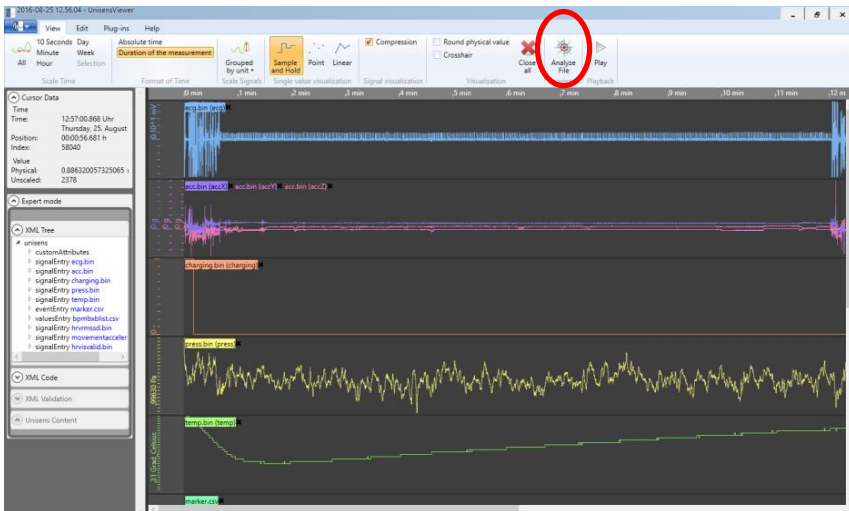
A first preprocessing of the data can be done with **UnisensViewer**. You can crop your signal to the desired time, set markers and annotate artefacts. Details can be found in the online help of **UnisensViewer**.



Tip:

Before changing the data of your study, be sure to have a copy of your raw data.

You directly start the analysis of the data with **DataAnalyzer** by clicking the “Analyze Data” button.

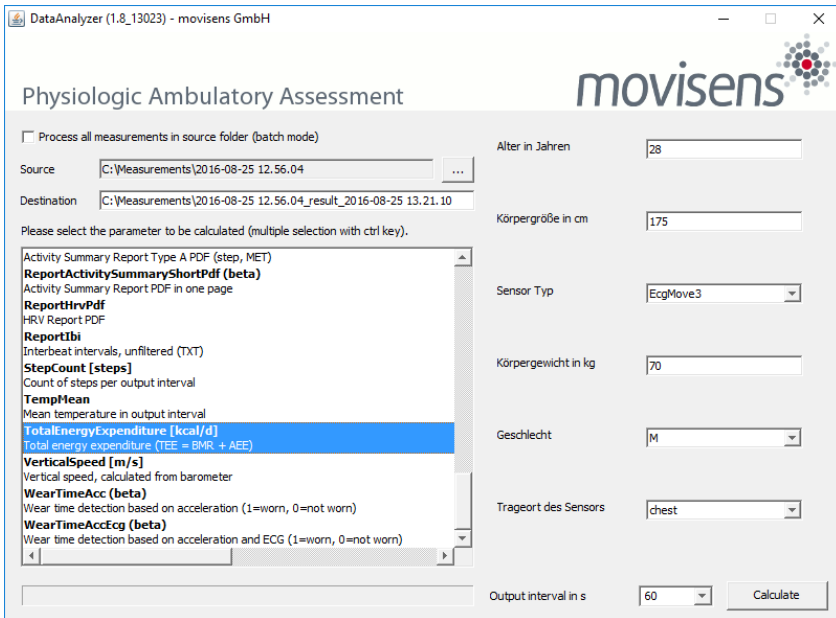


7.9 Analyzing Data

Option:

To analyze the data, movisens offers the modular analyzing software **DataAnalyzer**. This product is a scientific software for the analysis of physiologic measurement data. The software is optimized but not limited for the use with sensor systems from movisens.

With the help of **DataAnalyzer** you can calculate secondary parameters from your physiologic measurement data, create summaries and reports. **DataAnalyzer** is capable of batch-processing complete measurement data bases.



After a measurement was selected all possible analysis outputs (secondary parameter and reports) are shown. The list of analysis outputs is dependent on your licensed modules and the data contained in you measurement. You can now select the desired analysis output. If you want to select more than one analysis outputs keep the Ctrl-key pressed while selecting.

The results of the analysis are stored as a unisens data set. A unisens data set consists of meta file (unisens.xml) and different data files for each measurement signal and secondary parameter. Secondary parameters are stored as .csv file within the unisens data set and can be processed e.g. with Microsoft Excel or SPSS



Tip:

movisens also offers analyzation of your data and generating reports according to your needs as a service. If you have any further questions, please do not hesitate to contact us.

8 Maintenance and Proper Disposal

8.1 Maintenance

Besides charging the batteries, **EcgMove 3** 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.

8.2 Cleaning Instructions

If you want to clean **EcgMove 3**, please note the following:

- Disconnect the sensor from chest belt and cradle.
- Use a soft slightly moistened cloth.
- Take care that no humidity enters the sensor housing.

8.3 Cleaning of Chest Belt

To clean the chest belt please consider the following:

- Wash the straps by hand and not in the washing machine.
- Use a mild liquid detergent.
- Directly after washing, air-dry the bands/belts before storing or using it for new measurements.

8.4 Proper disposal

EcgMove 3 is subject to the EU directive WEEE (Waste Electrical and Electronic Equipment). Please consider your local regulations for waste disposal.



8.5 Troubleshooting

Frequently asked questions: <https://www.movisens.com/en/faq/>

| Error | Solutions |
|---------------------------------------|---|
| Sensor is not blinking when connected | If battery is empty it can take 30 seconds or more for the LED to start blinking. |
| Sensor is not found by sensor manager | Reset Sensor. This is found in the start menu under the movisens Sensor Manager folder. The LED will flash all colours (blue, red, green) when it is reset. |
| Flashing Red (3 times per second) | An Error occurred. Reset sensor. If the sensor doesn't stop flashing, please contact the manufacturer. |

9 Technical Data

| | |
|-------------------------------|--|
| Power supply | Lithium-Polymer-Battery |
| Supply voltage | 3 V |
| Battery voltage | 3.0 – 4.2 V |
| Number of charging cycles | 300 with 1C/1C > 80% |
| Maximum recording capacity | ~ 2 weeks |
| Battery run time (recording) | ~ 3 days |
| Size of sensor (W x H x D) | 62,3mm x 38,6mm x 11,5mm |
| Internal sensors | <p>ECG-Amplifier: Resolution: 12bit, Input range CM=560mV, DM=+/-5mV, Gain 227, 3db bandwidth 1,6 to 33Hz Output rate: 256Hz to 1024Hz</p> <p>3D acceleration sensor: Measurement range: +/- 16 g Noise: 4 mg Output rate: 64 Hz</p> <p>Pressure sensor: Measurement range: 300 - 1100 hPa Noise: 0.03 hPa Output rate: 8 Hz</p> |
| Indicators | <p>LED, 3-color (operation and charging status)</p> <p>Vibration alarm (Marker, Bluetooth Smart is disconnected)</p> |
| Interfaces | Micro-USB, Bluetooth Smart |

Environmental conditions

Temperature:

-20 °C to 60 °C

0 °C to 45 °C during charging

Humidity:

0 to 75% RH relative humidity

Atmospheric pressure:

300 to 1100 hPa absolute

10 Legal Notes

10.1 Copyright

The software that comes with **EcgMove 3** is protected by copyright. Renting, exchanging, broadcasting, duplication or copies are not permitted.

10.2 Disclaimer

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The activity sensor **EcgMove 3** is not a medical device and is not intended to be used for medical purposes.

10.3 Trademarks

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