ME6000 - Introduction

This manual is to provide information to work with the ME6000 Data Logger (MegaElectronics, current Bittium) in Aalto Behavioral Laboratory (ABL). Further information can be found from the ME6000 *Manuals* and web page https://www.bittium.com/products__services/medical/bittium_biomonitor_me6000. Contact ABL personnel in any trouble.

Biomonitor ME6000 is a portable telemetry and data logger at 100 / 250 / 1000 / 2000 / 10000 Hz. Several different sensors can be connected to data logger; currently there are EMG, GSR, ECG and Accelerometer sensors in ABL.

1 System setup

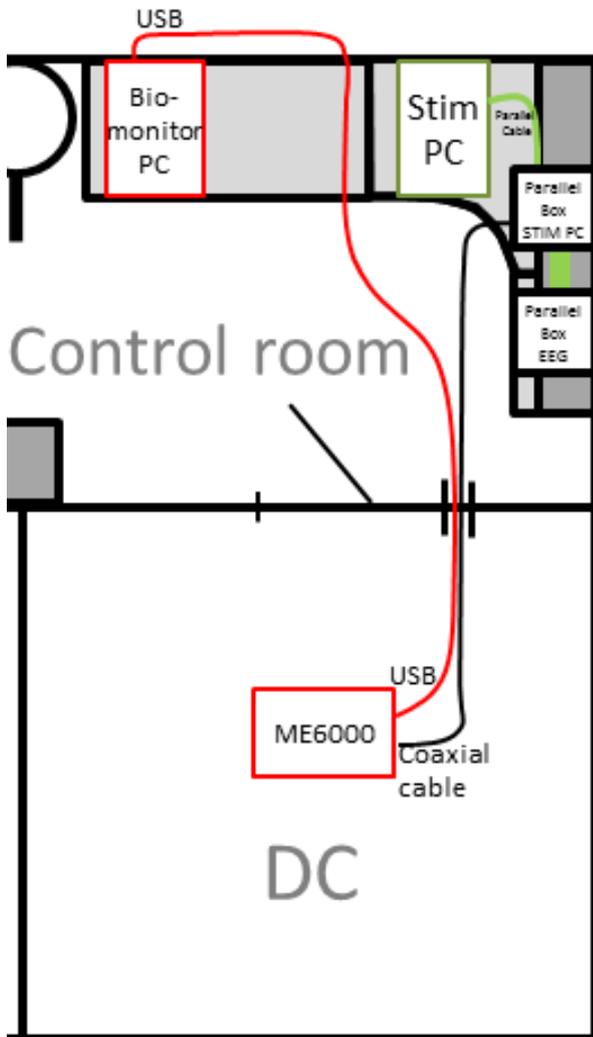This chapter explains the components and wiring of ME6000 Data Logger.

1.1) Components

Component	Image, details
Biomonitor PC	 BIOMONITOR Fujitsu, Celsius
ME6000 - DataLogger	 DATALOGGER ME6000, Muscle tester, Mega Electronics MT-M6TIG-0-10EN S/N: Z2008078

GSR sensor	x 2 Mega Electronics	
EMG sensor	x 16 Mega Electronics	
ECG sensor	x2 WBA-1-ECG, Mega Electronics ECG A375	
Accelerometer	x2 Mega Electronics Ltd 3-Axismodel 3G 10G	
Analog isolator	DATALOGGER – ANALOG ISOLATOR Mega Electronics Model: ME 3750-ISO-1 S/N: I2008009	
DV-Trigger	DV-Trigger, Mega Electronics Typr Wired S/N 08008	

Resistors	
	100k 300k
TP-LINK	Model: TZ-WN620G S/N: 07215001932
2+2 Adapter	x2 Mega Electronics 800988

1.2) Wiring

1.3) ME6000 details

ME6000	Mega Electronics (Bittium)
Channels	16
Sampling rate	100 / 250 / 1000 / 2000 / 10 000 Hz
On-line monitoring	USB / WiFi
Portable	Yes
Dimensions	181 x 85 x 35 mm

1.4) Consumer products

Electrodes, alcohol wipes and other consumer products can be found from the AC Shelf.
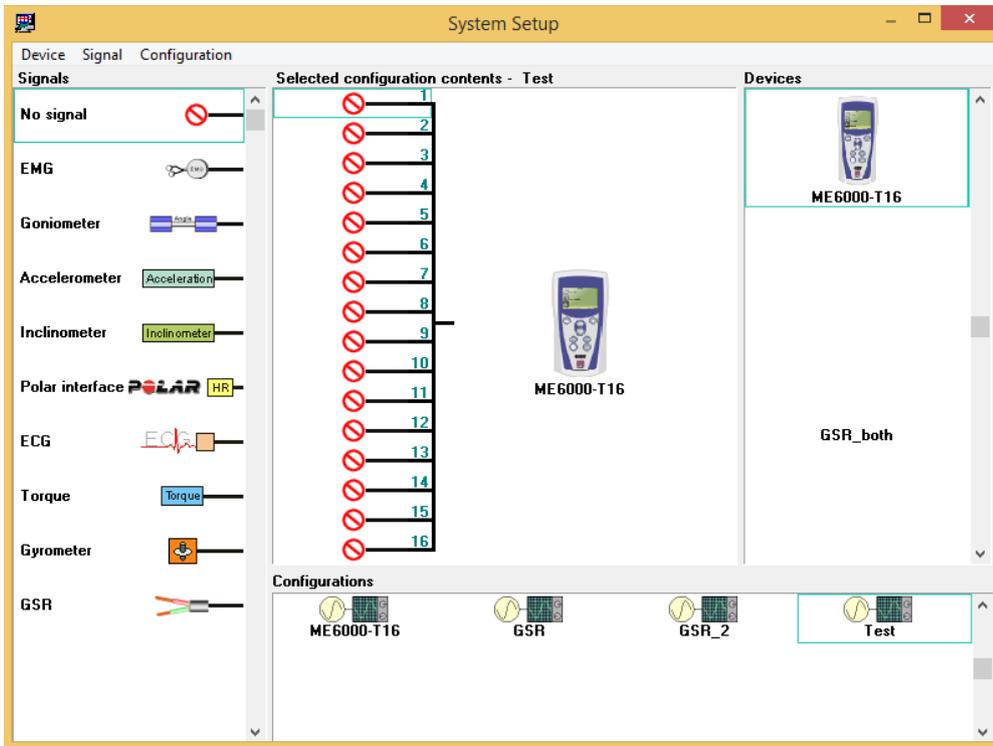
2 Biomonitor PC

Turn on Biomonitor PC and choose dataloggeruser (ask password from personnel). Run MegaWin software as administrator from the desktop icon MegaWin (Click the mouse right click, and then choose "Run as administrator"). If "User account control" question appears, press yes.
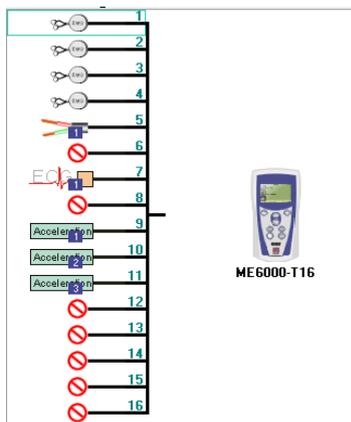

2.1) System configuration

Open System setup from Options->System setup. Check from existing configurations (at the bottom) for suitable setup. You can also create a new one from "Configuration –> new".

- Add a name and a description.
- Define configuration

- Choose the wanted configure
- Drag the device "ME6000-T16 to the middle
- Drag wanted signals on the channels of device

New signals can be created from "Signal –> New"

Notice that the 2+2 adapter takes over 2 channels even though the sensor (for example GSR and ECG) would use only one signal line. For example GSR can be connected through the 1-2 channels of adapter to 1-4 port in ME6000. Then the signal is seen on channel 1, plus channel 2 is blocked.
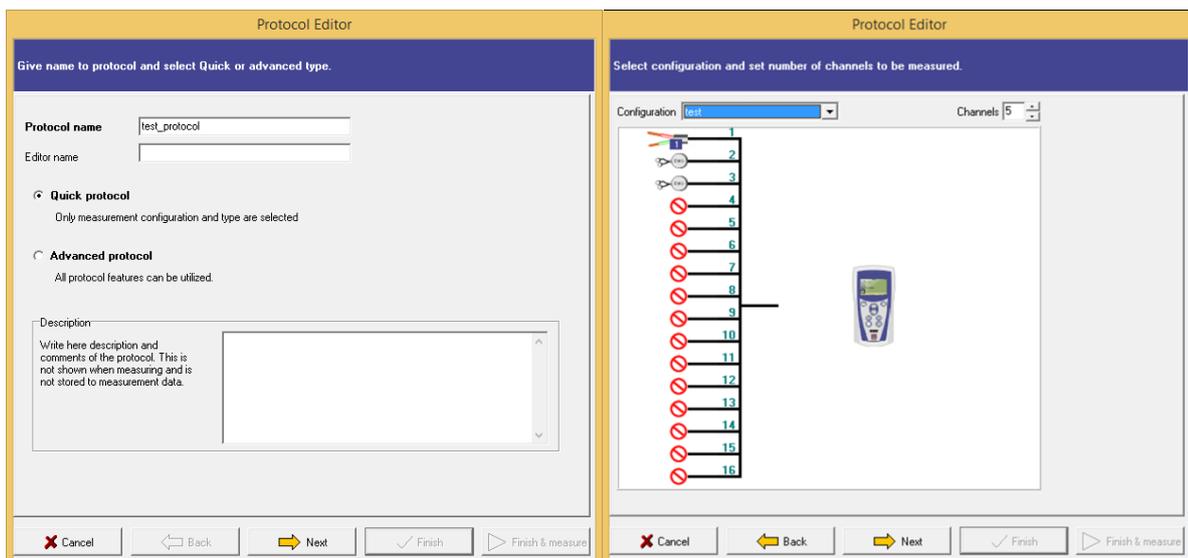
Image 1: GSR-sensor connected to ME6000 through datalocker on channel 1

After defining the setup, you can close the window (no saving needed).
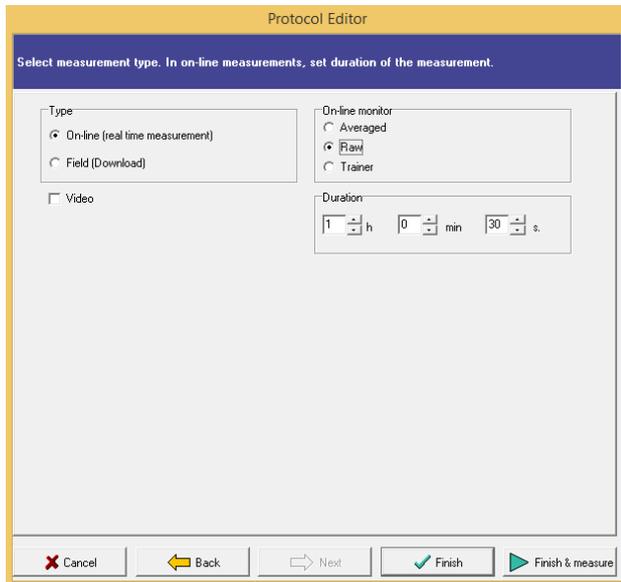
2.2) Protocol

Click "Protocol" icon. Choose protocol for your experiment from the dropdown menu on the top left. You can create new protocol by choosing "New".

If you are using EMG-sensors and want to use body model, choose "Advance protocol"; otherwise choose "Quick Protocol".
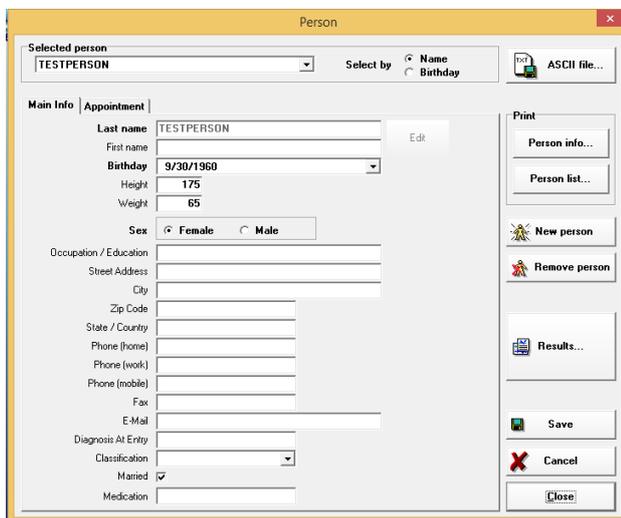
- Select which configuration you are using, and how many channels you want to record (starting from channel 1, so "4 channels" would mean channels 1-5).

Protocol editor window. Measuring type, online monitoring and maximum duration for recording can be set. Notice that recording stops automatically when the max duration is achieved, but you can stop it anytime by manually.

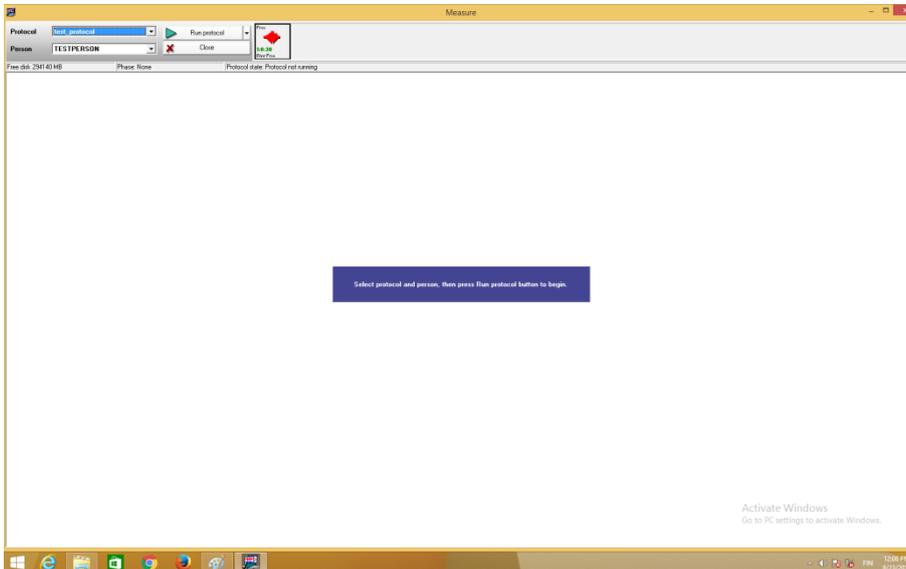Click "Finish" to close this Protocol editor.

2.3) Person

Click "Person" in a main menu to advance on Person window. Add new Person by clicking "New Person"; define the needed information. Only information which is relevant for your research is needed. You can also use codes instead of full names. Press "Close" when you are ready.

2.4) Measuring

Click "Measure" in the main menu. Choose the wanted Protocol and Person from the dropdown list.

NOTICE: Make sure that ME6000 is connected than turned on.

- Press "Run Protocol".

  After measurement
- Press stop icon after measurement.
- Close window.

3 Setting up ME6000

ME6000 works with 4 AA batteries. If you want to monitor the data stream in on-line, use USB cable labeled ME6000. (WiFi option doesn't work in ABL). Check from the system setup that ME6000 is detected.

In Main window select Options ->ME6000 Manager. The USB cable is connected so that the system detects it as COM5. Click the "presets" window; if it opens, the connection works.

4 Mobile usage

ME6000 can be used without the USB connection, so that data is stored on CF-Memory (Compact Flash) card. Experiment settings needs to be uploaded to the ME6000 before measuring. After the measurement, data needs to be downloaded from the device.

See instruction for mobile usage from "800411 ME6000 user manual rev101", chapter 5.

5 Triggering

ME6000 can be triggered with TTL pulses through "Tr/In" channel. Connect Parallel box output signals to the ME6000 with special BNC-cable.

Triggers will show as flags in on-line monitoring viewing window, or they can be seen in the data file as "markers".

6 Sensors

ME6000 can handle simultaneously 16 channels of sensors. The device had 4 input ports, where each port can receive 4 line signals. Different sensors can either be connected directly to ME6000 like EMG, or through 2+2 adapter (like GSR or ECG). Notice that 2+2 adapter doesn't handle single channels but a duel. So for example GSR blocks two channels, even though it uses only one.

See more about the sensors from "800576-1.1, ME6000 sensor quide for MegaWin".

6.1) GSR

Galvanic skin response (GSR) measures the skin conductivity. Skin resistance can change due to sweat glances.
- Connect the GSR sensor to the Measurement Unit with 2-2 adapter.
- Wipe fingers with alcohol wipes before attaching the sensors.
  - Use <u>no</u> conductive paste on the electrodes.
- Attach electrodes to the index and ring fingers as in the image below (on the fingertip, at the palm side).

Cleaning: After the use, clean the sensor using a water and mild soap with dampened cloth.

6.1.1 Calibration

Resistors (100kOhm and 300 kOhm) can be used to calibrate the system.
Detailed guide for calibration procedure can be found from "800576-1.1, ME6000 sensor guide for MegaWin".
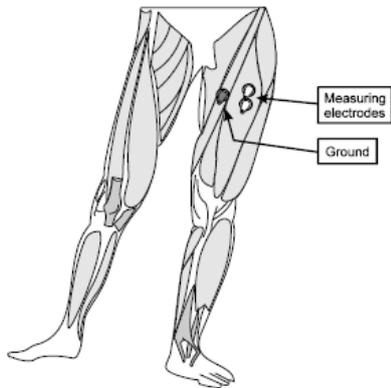

Image 2: 100kOhm and 300 kOhm resistors.

6.2) EMG

Electromyography (EMG) records electrical activity of the muscles. Surface electrodes (sEMG) are used in ABL, so activations are restricted to the superficial muscles
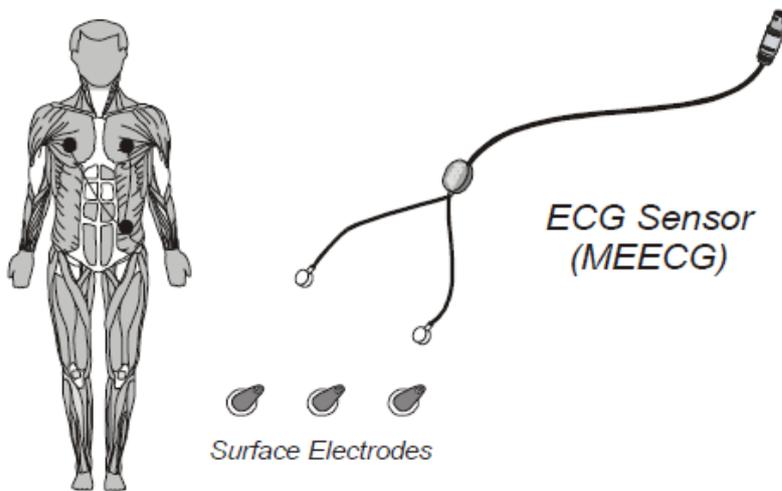
Prefilled disposable Ag/Ag Cl electrodes are used. Each sensor consists of the three electrodes (1 ground and 2 measuring electrodes). Prepare the skin by cleaning it with an alcohol wipes. Attach electrodes to electrode patch, and then to the skin. Attach the electrodes to the skin above the muscle. Place the ground electrode at least 10 cm from measuring electrodes. Use tape if needed.
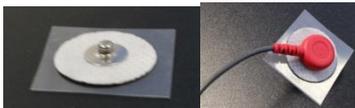
Read more about the EMG electrodes and their placements from "800411 ME6000 user manual rev101" chapter "4 EMG Measurement".

6.3) ECG

Records electrical activity of the heart. Electrodes detect tiny electrical changes on the skin that arise from the heart

- Prepare wanted areas for the electrodes. Remove hair with a razor if needed and wipe the area with alcohol wipes.
- Attach electrodes to the leads of the device

- Place the electrodes as on the skin: Ground (black) to the side of the body and measuring electrodes (yellow and red) to the chest. Use tape if to attach electrodes more firmly if needed.

Image 3: ECG signal on MegaWin software

6.4) Accelerometer

Measures acceleration changes in free movement. Produces three line signals. Connect the device directly to the ME6000.
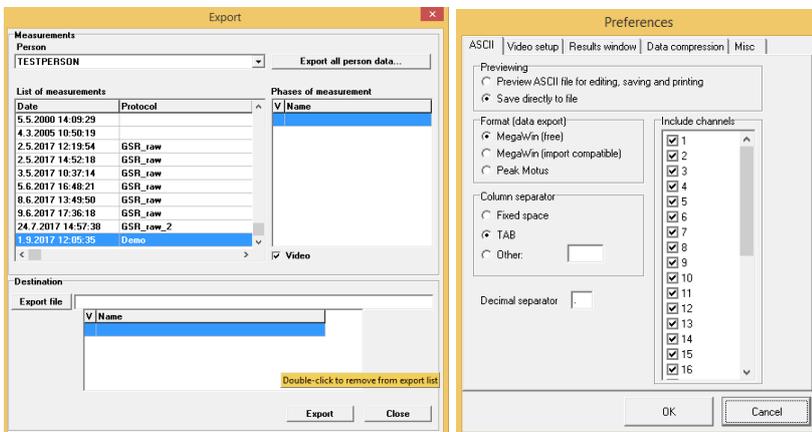
Attach the sensor with a tape or belt to the subject.

7 Data analysis

7.1) Exporting data

Data files can be exported in two ways:

- MegaWin exchange format: File -> Export MegaWin eXchange File.. (*.mxf)
- ASCII, Matlab or C3D: Results-> Convert to ASCII file.. -> Press txt-disk icon)

You can import data from main menu: File -> Import