Manual

SRM – High Performance Ergometer

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1. General preparation for performance diagnostics

- Power-on spiroergometry (30min before beginning of test)
- Power-on ergometer's power supply
- Preparation diagnostic devices (Lactate analysis, etc.) 30min beginning of test
- Room temperature (18 – 24°C) should measured
- Relative air humidity should measure (30 – 60%) in room
- Check position of ventilator

2. Connecting the Ergometer (Ports)

1- Power Supply

2- Serial Port

The serial port is only for the external control by CPX/CPET, EKG or other medical devices by the so called "ergoline" protocol. The idea is to specify the protocols in the CPX/CPET or EKG software to be independend of the SRM Ergometer software.

Please connect the SRM ergometer via the serial port and the USB-to-Serial Adapter to the controlling computer.

Please note: If you like to control the protocol by an external device don't start the performance diagnostics in the SRM ergometer software. The SRM ergometer software are dominant.

3- Torque Analysis

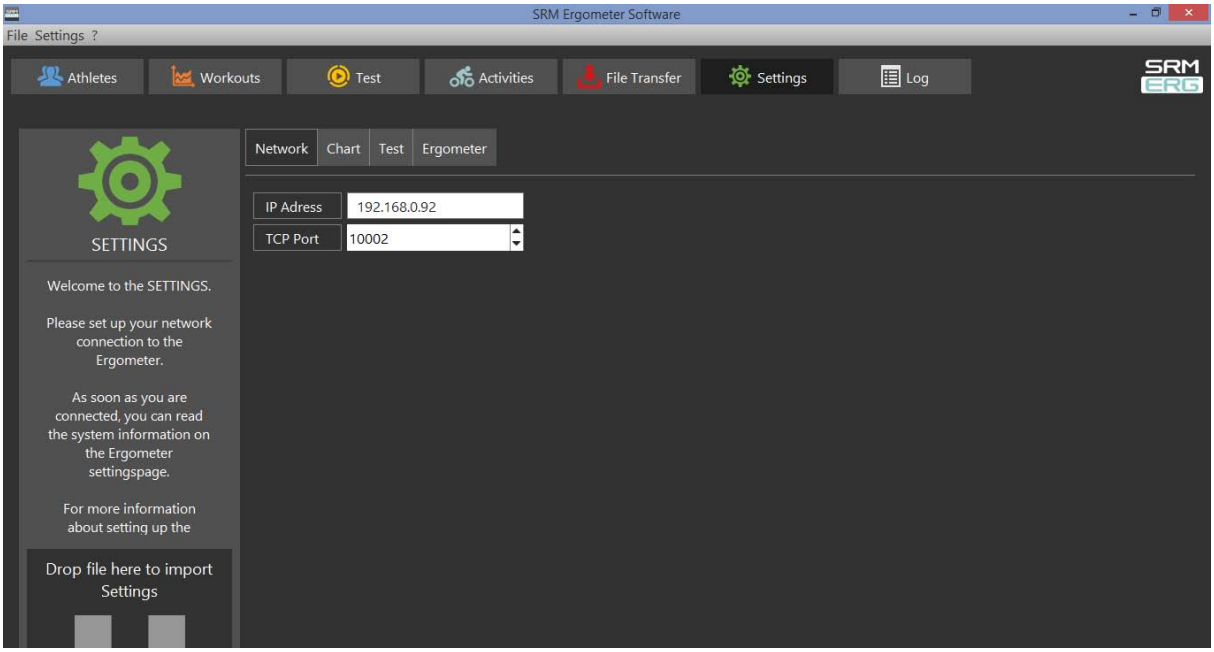
4- Ethernet Ergometer

3. Installation and Landing Page of the SRM Ergometer Software

Please install the SRM ergometer software first on your controlling computer. Install or deinstall the software with the option *Installer.*
It´s possible to choose one of the shown options directly. But before starting with the test procedure we recommend to check the settings first. Please start pedaling and check the connection indicator on the lower left corner of the screen: this indicator should be green, if not go to log tab and check the messages and the settings again.

4. Settings SRM Ergometer Software

Network



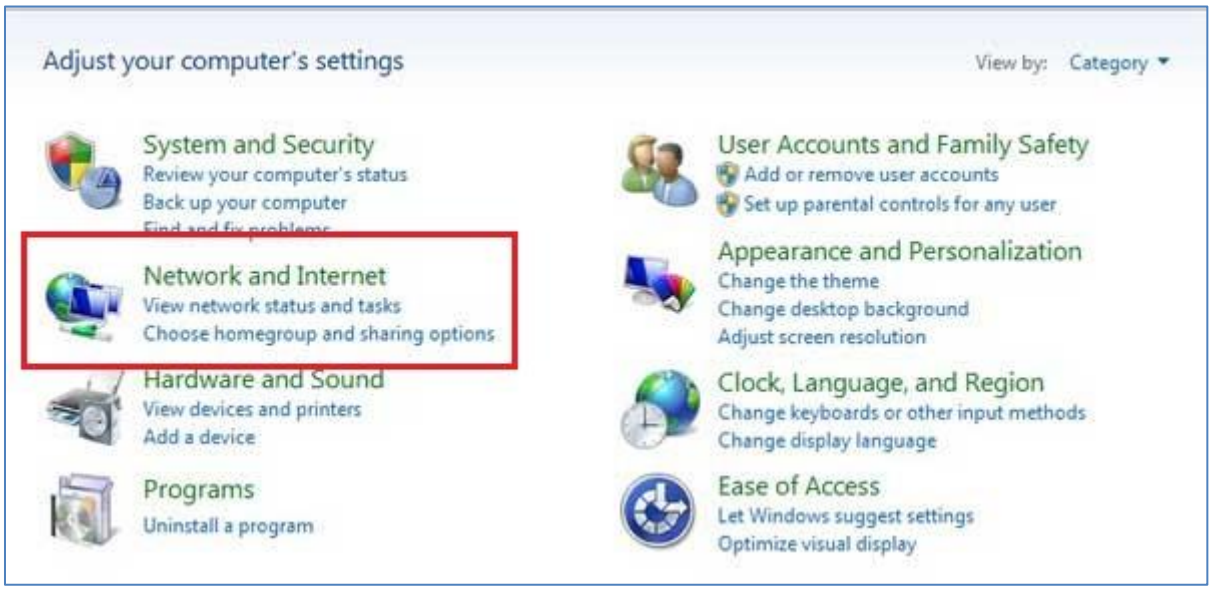
Choose a free and valid IP address (192.168.0.x) for your computer in the same sub network as the SRM Ethernet Torque Analysis Box (To install the Torque Analysis Box see the manual of the Torque Analysis).

If you are using MS Windows: Press "Start" button, open "Control Panel", open "Network and Internet", select "Network and Sharing Center", click "View Network Connections", click on the connection you need to change (i.e. LAN), open "Properties", double click on "Internet Protocol Version 4 (TCP/IPV4)" and insert the chosen IP address.

Please insert a different IP address than that of the Torque Box. Just change the last or the last two numbers of the Torque Box IP (e.g. 192.168.0.89). Otherwise there will be a conflict of the IP addresses.

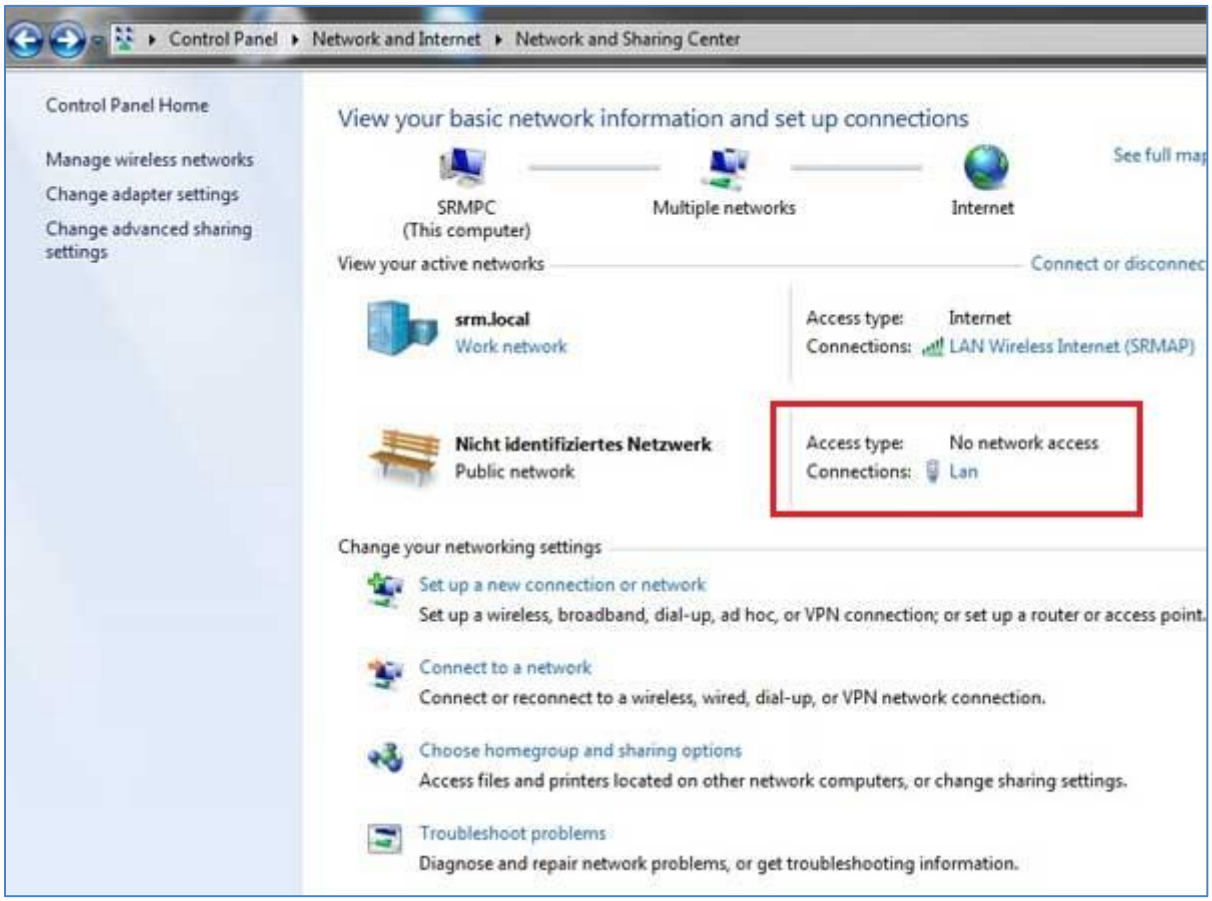
Network settings in windows

1. Network and Internet

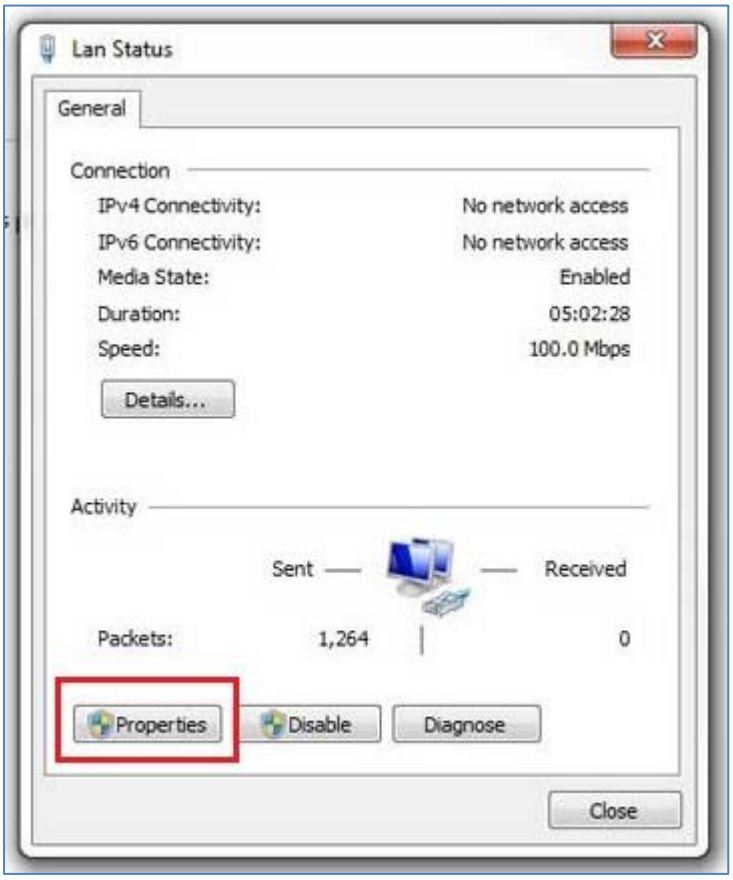


2. Network and Sharing Center

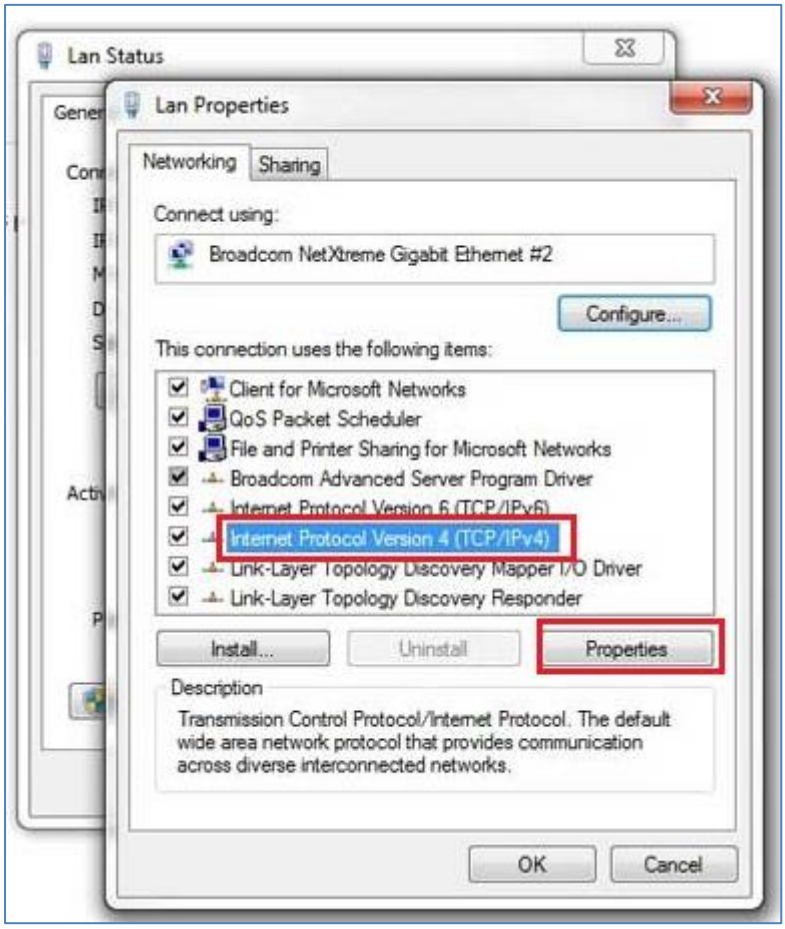
3. View Network Connections



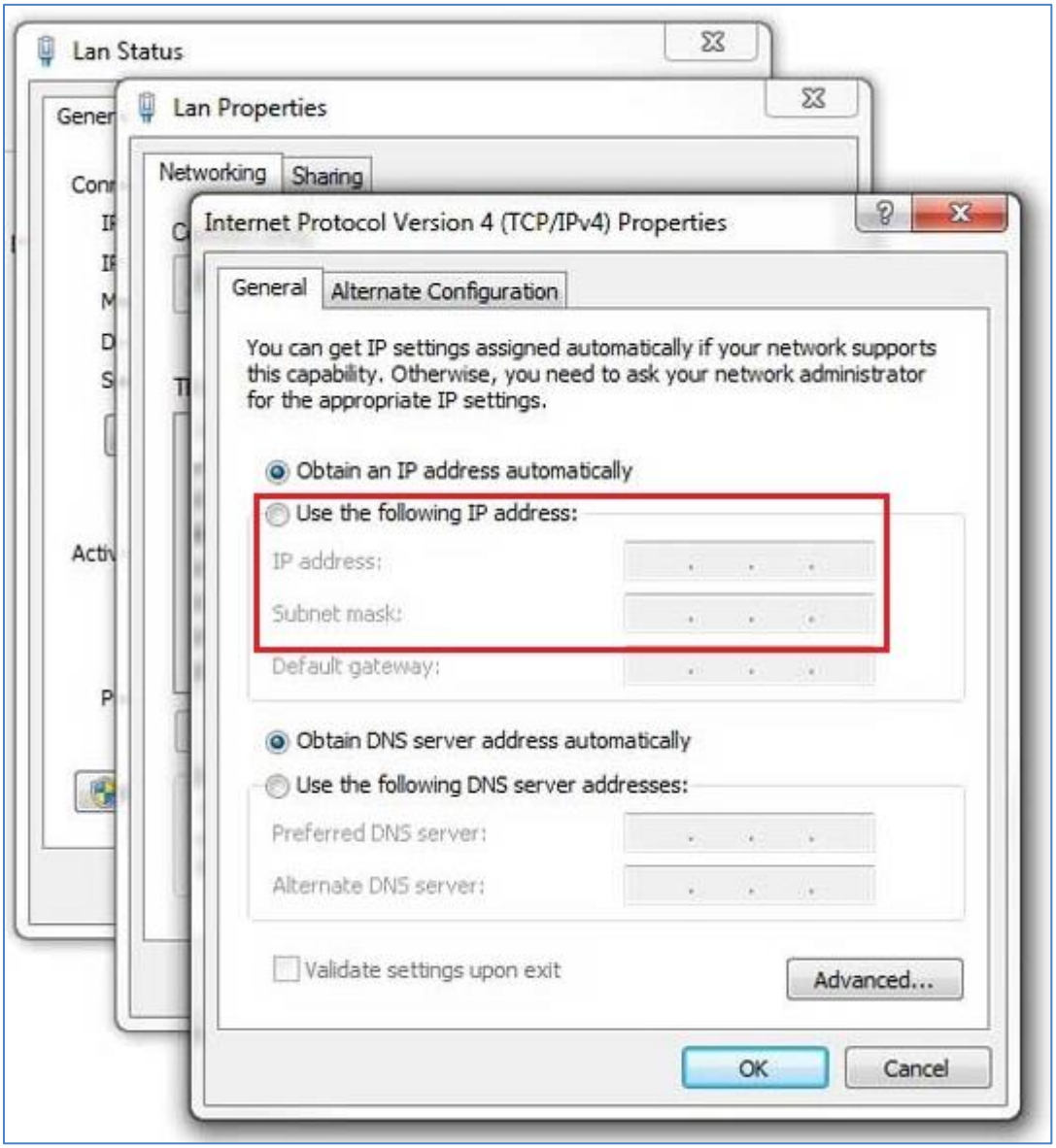
4. Properties



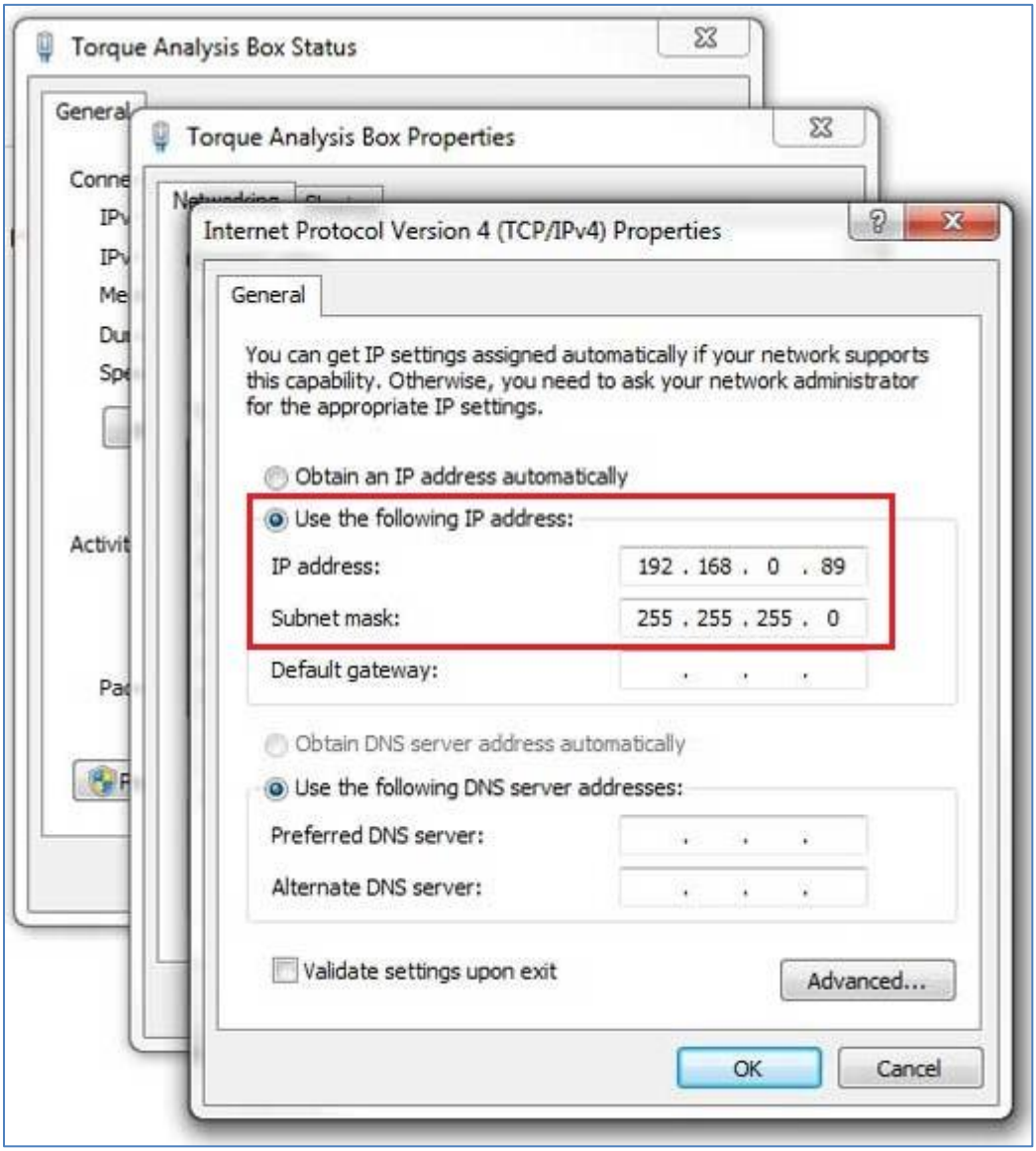
5. Internet Protocol Version 4 (TCP/Ipv4)



6. Use the following IP address



7. IP address: 192.168.0.89

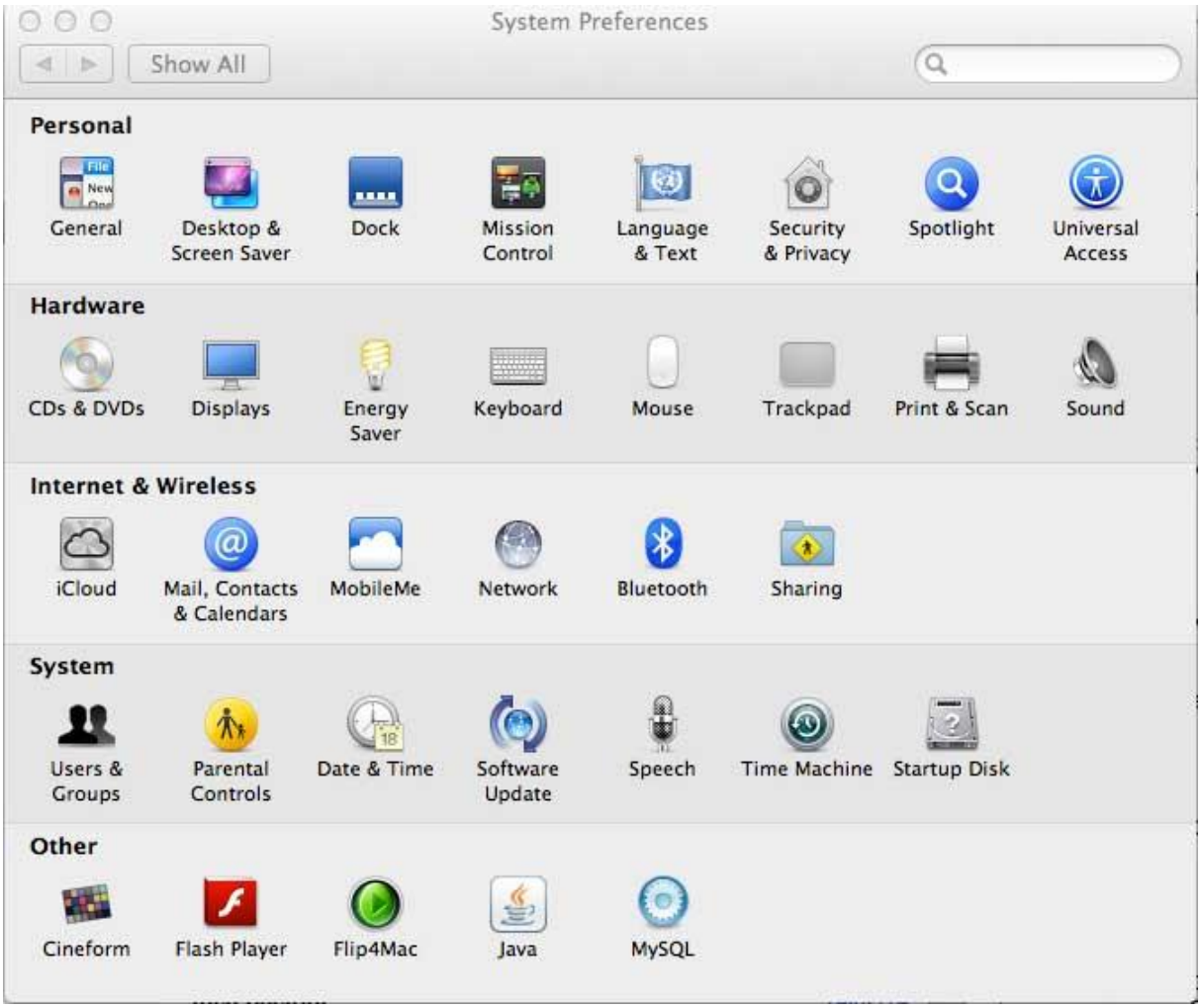


Please start the ergometer software again, start pedaling and check the connection indicator on the lower left corner of the screen: this indicator should be green. If not go to log tab and check the messages and the settings again.

Network settings in OSX

If you are using Apple OSX: Launch „System Preferences" from the Apple menu (or Spotlight), click on the „Network" icon in the lower right, click on the „Advanced" button, in the pulldown menu next to „Configure Ipv4" select „Manually" and insert the chosen IP address.

1. System Preferences



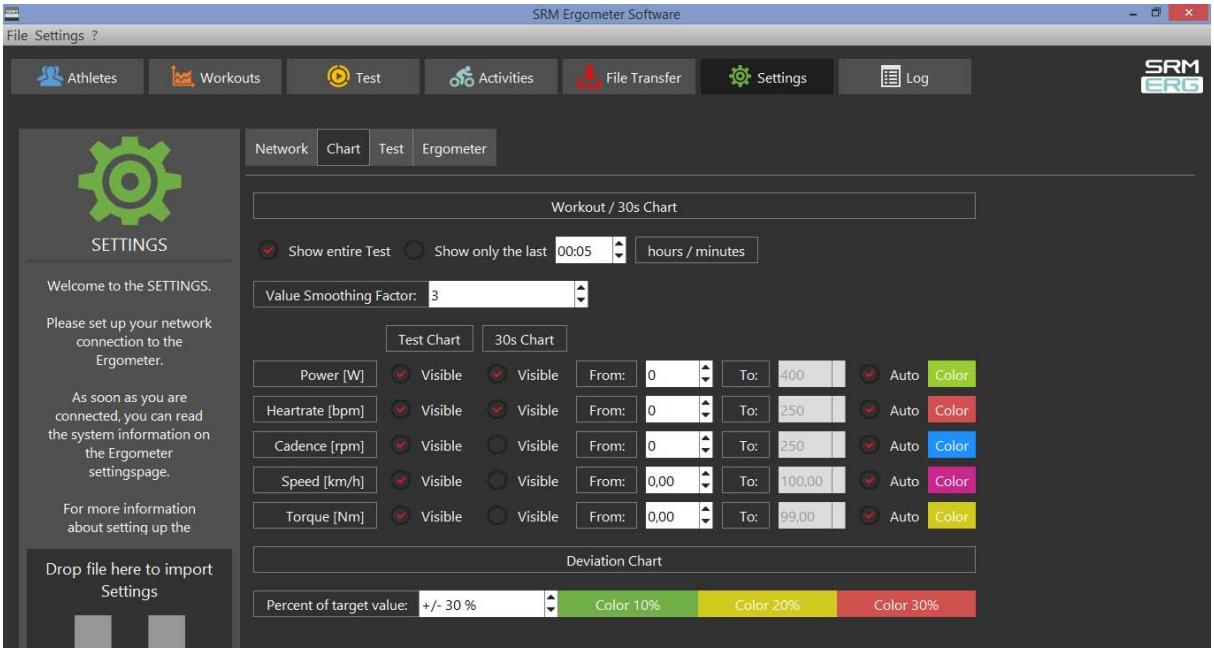
2. Network


Network
Show All
Location: Automatic
Ethernet
Connected
Wi-Fi
Connected
MBBEthernet
Not Connected
Arduin...Serial 2
Not Configured
Arduin...B-Serial
Not Configured
Bluetooth DUN
Not Connected
FireWire
Not Connected
iPhone
Not Connected
TomTom
Not Connected
Status: Connected
Turn Wi-Fi Off
Wi-Fi is connected to srm.it3 and has the IP address 192.168.10.226.
Network Name: srm.it3
Ask to join new networks
Known networks will be joined automatically. If no known networks are available, you will be asked before joining a new network.
Show Wi-Fi status in menu bar
Advanced...
Click the lock to prevent further changes.
Assist me...
Revert
Apply

3. Set the IP Address under Ethernet

Please start the ergometer software again, start pedaling and check the connection indicator on the lower left corner of the screen: this indicator should be green. If not go to log tab and check the messages and the settings again.

Chart



In this menu you can set the scaling of the graphs and the length of the displayed segments.

By selection of *Show entire Test* you will be shown the entire test on the monitor. By clicking on "Show only the last…minutes", you will only be shown the time period you entered before.

In the lower part of the window please specify by clicking on *Visible*, if you want to see the values *Power*, *Heart rate*, *Cadence* and/or *Speed*. Under *From / To*, you can define the range, in which the values will be shown. *Distance* gives you the difference of the chosen range.

Test Chart / 30s Chart

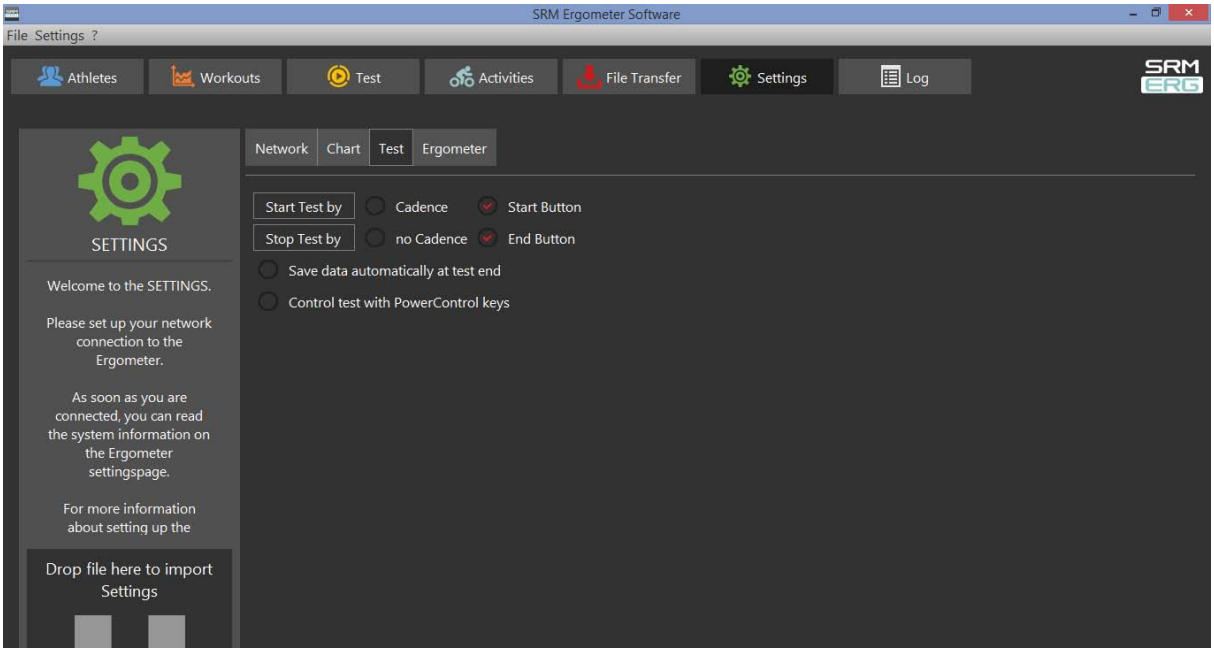
The settings of *Test Chart* and *30s Chart* are able to configure individually.

Deviation Chart

Indicates the deviation of the cadence at the hyperbolic mode or the devation of the performance at the isokinetic mode. To use this skill it is necessary to drop data into the workout table.

(For example: Power 100W / Cadence 50rpm / Choose *Controll by Power*)

Test



Start Test by

Under the button *Start Test by* you can decide if the test (or training session) will be started by reaching a specific cadence or by clicking the *Start Button*.

Starting by cadence: *Start pedalling* is displayed on the test interface.

Stop Test by

Under *Stop Test by* you can decide if the test will end automatically when there is no more cadence to be measured or by manually clicking the *End Button*.

Save data automatically at test end

Here you can set an automatically storage of your data file on your computer. Even when you click no, you will asked to save the data file by ending the test.

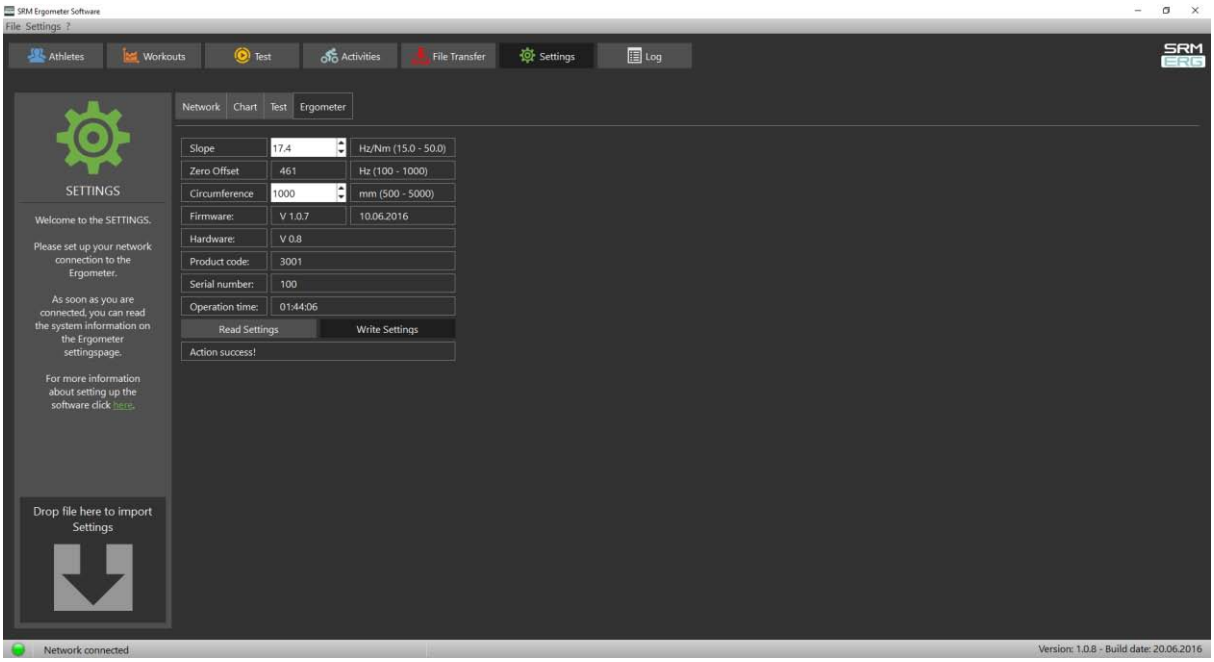
Control test with PowerControl keys

Here you have the possibility to start and stop the test (or the training session) with the keys of the PowerControl. Therefor the option have to activate.

Keybord Shortcuts

- PRO (short): Test Start
- SET (short): Test Pause
- PRO (long): Test Resume
- SET (long): Test Stop

Ergometer



Slope

The slope in the ergometer software must be correspond to the slope of the PowerMeter and the PowerControl.

We recommend to verify and control the slope of the PowerMeter before every test day. You can find the correct PowerMeter slope on small labels located-at

- the rear of the PowerMeter (s. PowerMeter picture),
- the front of the ergometer,
- the right crankarm,
- the handlebar.

Zero Offset

The PowerMeter delivers a certain frequency which is proportional to the torque of the pedal force on the crank. If there is no load on the crank, the PowerMeter is sending a base frequency which must be communicated to the ergometer software and to the PowerControl as a reference value. This procedure is called zero offset calibration (offset adjustment).

The zero offset calibration has to be done before every new assembly of the PowerMeter and also before every measurement resp. every training on the Ergometer. A wrong zero offset calibration can result in an internal miscalculation of the power.

Please perform the zero offset calibration as it is described below:

- For a manual comparison, please turn the right unloaded crank clockwise to activate the PowerMeter.
- Wait a few seconds until the displayed value is stabilized.

- By pressing the **Read Settings** button, the zero offset will be displayed in the white background field.
- Press the **Write Settings** button, so that the zero offset will be saved.

Circumference

The circumference only influence the displayed speed and is not important for the calculation of the data. We recommend to insert a value of 1.000 mm.

The following points show the current state of the ergometer. They are important for the identification and the service.

Firmware

The firmware can be updated if you drop the latest "**S**RM **F**irmware **I**mage" file (*.sfi) in the box on the lower left corner of the screen: Drop file here to import.
The current firmware incl. date is displayed (e.g. V 1.0.8, 20.06.2016).

Hardware

Product Code

Serial Number

Operation time

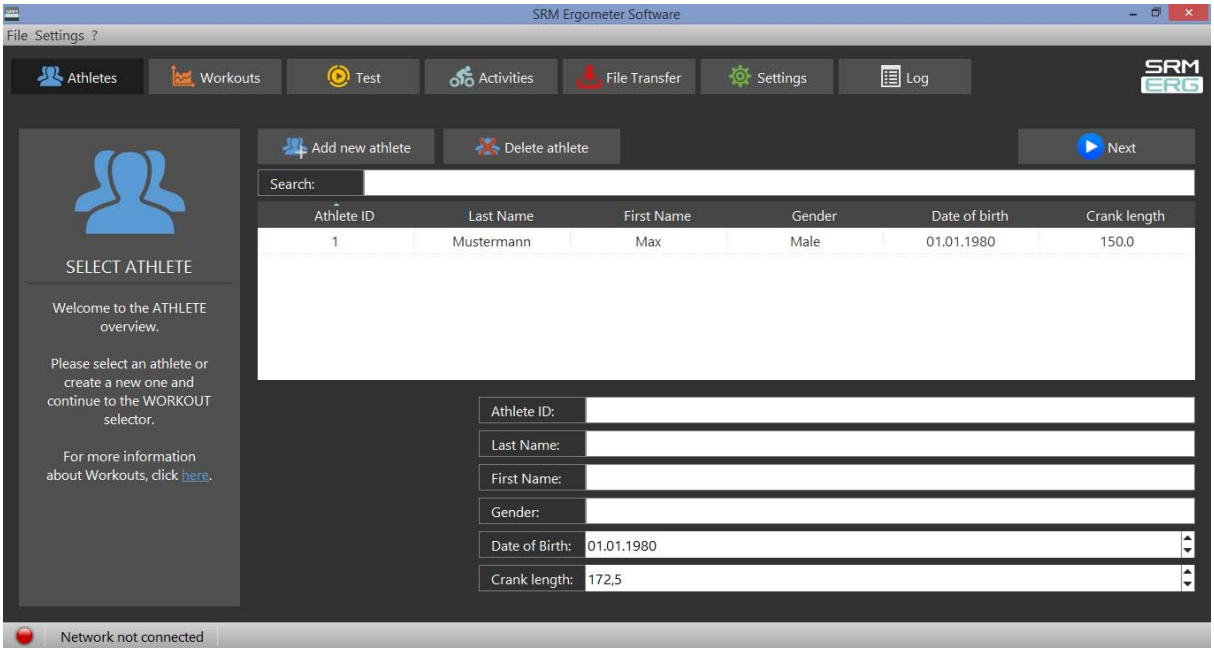
Read Settings

Read the current settings of the ergometer incl. the zero offset and the Slope.

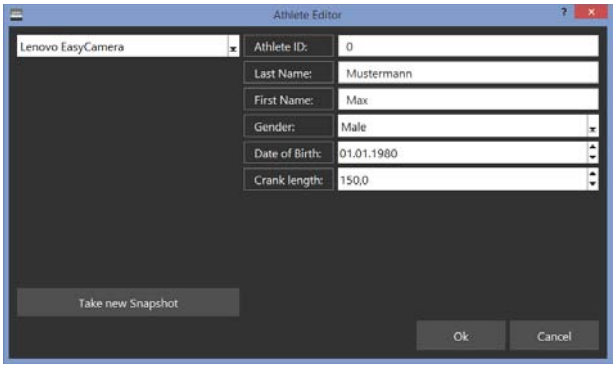
Write Settings

Here it is possible to insert the slope and to save/to write it for the correct data. Please note that the must be correspond to the slope of the PowerMeter.

5. Athletes



- Welcoming
- Clients prepare for test - put on the heart rate strap
- Choose the option "Add new athlete" to create a new profile or "Search" for an athlete you added before
- Documentation of personal data of client (name, height, weight, gender, date of birth, crank length)



- Completion questionnaire / exclusion of liability
- Discussion of the data and test procedure
- Choose an "Athlete" or a "Workout" with the *Next-Button*. An information sign indicates if there is not chosen an Ahtlete/Workout.

6. Ergometer preparation for testing & training

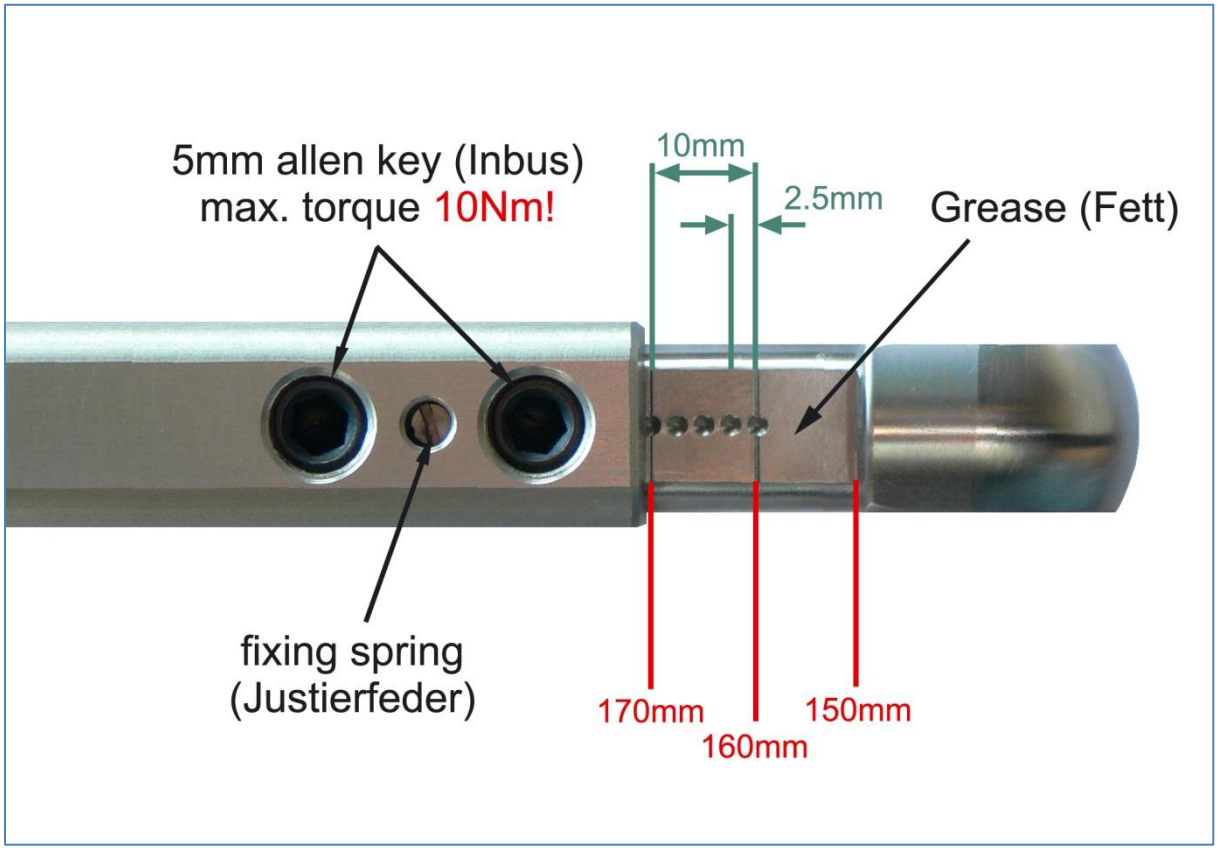
Before every performance diagnostic or every training you should check the positioning of the athlete. The mechanical adjustment of the SRM – Ergometer allows the rider to find his individual positioning.

Settings the Crank length

First we recommend to mount the client's pedals and set-up the crank length as on client's bicycle.

The prolongable crank has round markings every 2.5 mm and every 10 mm a line. If the steel element of the crank is completely retracted in the aluminium crank the minimal length of the crank arm is 150 mm. If the crank arm is completely pulled out, the maximal length is 190 mm. Before changing the crank arm length you have to open both Allen screws.

After adjusting the right crank arm length, please tighten the Allen screws again with a maximal torque of 10 Nm so that they won't come loose while you ride the Ergometer. Make also sure that the screws are situated with a distance of a 2.5 mm. This can be determined when the fixing spring (situated between the Allen screws) locks into the holes of the steel element of the crank. Please do never remove or adjust the fixing spring.



From time to time it is necessary to grease the steel elements of the crank to protect them from sweat and to maintain the free movement.

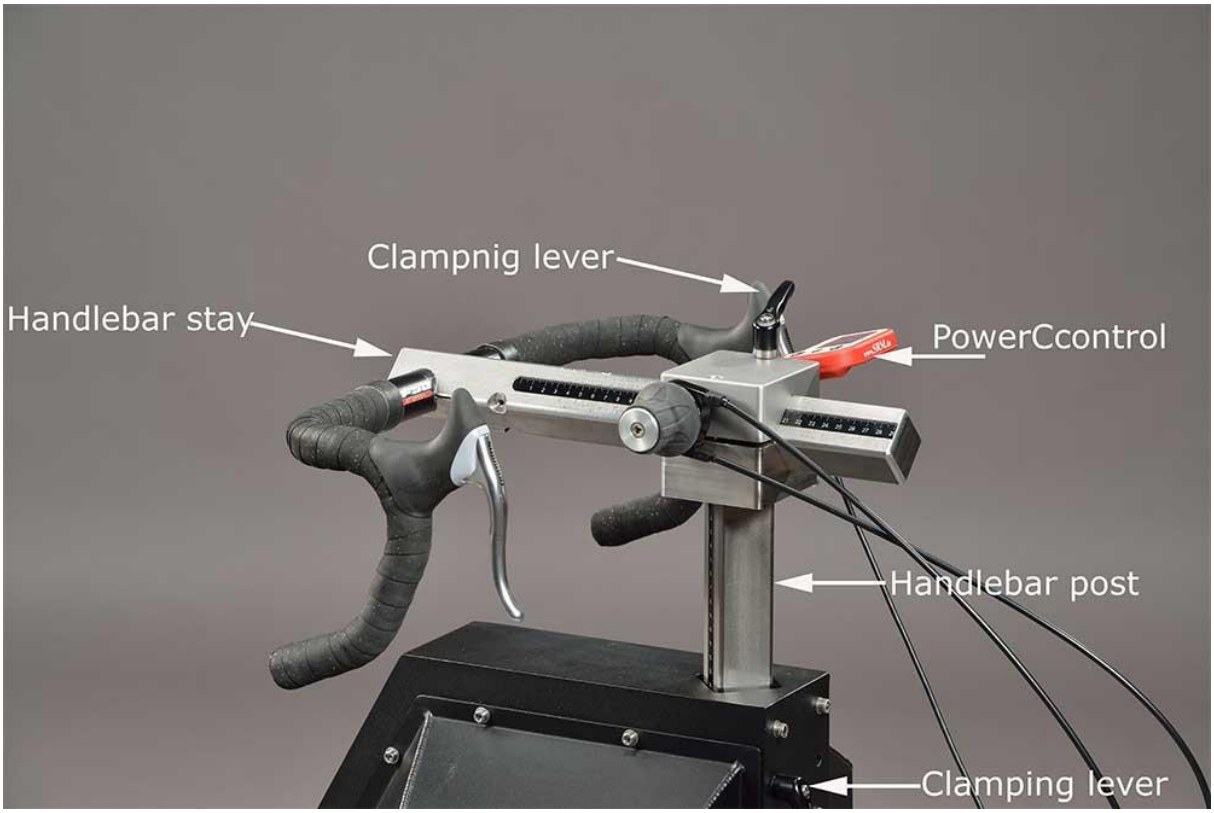
Mechanical adjustment & positioning of the athlete

Optimizing individual positioning is quickly achieved by adjusting the saddle and handlebar vertically and/or horizontally. To do so you have to open the locking lever. Because of a ruler which is attached to the saddle post you can reproduce your perfect positioning.
If adjusted correctly, it should be easy to move the vertical and horizontal stems when the quick release is open. A 5 mm Allen key situated on the saddle and handlebar mounts allows for further rigidity.

Horizontal & Vertical Positioning of the saddle

The ruler which is integrated in the seat stay gives you the distance between the center of the bottom bracket and the front of the saddle. The distance in cm can be read from the left hand side of the seat stay.

Horizontal / Vertical Positioning of the handlebars



Fly masses

The mass moment of inertia of a cycling athlete causes an approximate constant angular velocity of the pedaling circle, although thee cyclist´s torque (power) is nearly zero when the cranks are in vertical position. If the SRM Ergometer had no fly mass, the cadence would decrease to nearly zero in the vertical crank position and high power output, resulting in a non-circular pedal cadence. This would result in a very non-circular tread then. Therefore the SRM Ergometer is currently equipped with two fly masses: **SMALL (12mm thick, 4,6kg)** and **LARGE (24mm thick, 9,1kg)**.

Notice:

The default configuration for the most common Ergometer tests is installing the LARGE fly mass inside the gearbox on its own!

Please remove the SMALL fly mass as described below! For more information on kinetic energy simulation, fly masses and gear ratio of the Rohloff hub see the manual or visit our webpage at www.srm.de

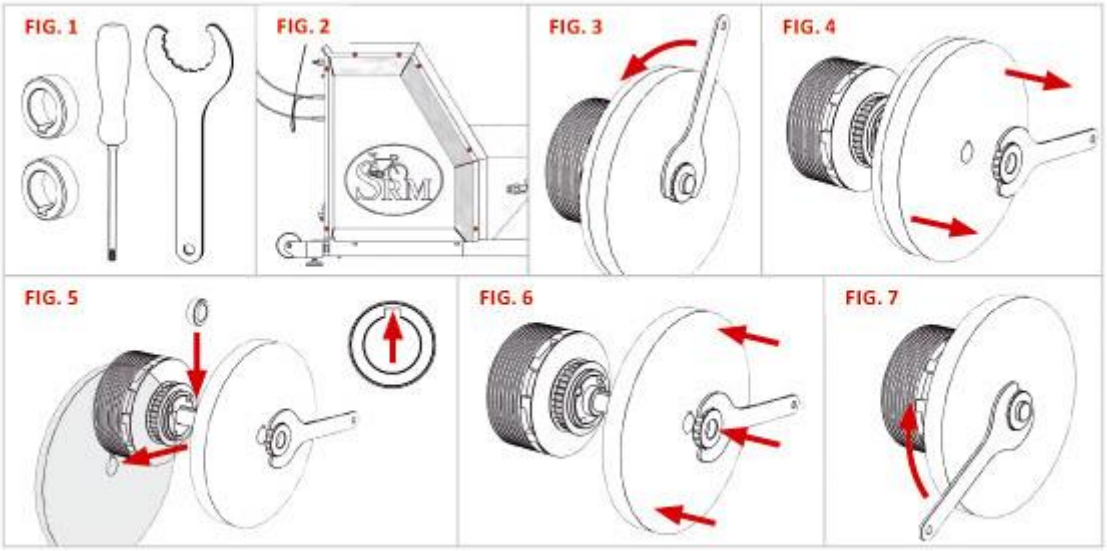
Removal and mounting instructions

Always disconnect thee power supply from the Ergometer when opening the side covers! Never operate the Ergometer without the side covers! Before removing side covers insure fly masses have stopped spinning completely and use care when handling the fly masses to prevent injuries or bruises – both are very heavy!

- To remove/mount a fly mass you need the following tools: One or two aluminum spacer, Torx screwdriver an nut wrench (Fig.1)
- Open the cap of the Ergometer by removing the seven Torx screws (marked red) with the Torx T30 wrench (Fig.2)
- Use the nut wrench to rotate the brass nut counterclockwise (Fig.3). Hold the fly mass to counter the tool pressure if needed
- Remove the nut and pull the two fly masses off thee axle (Fig.4). Pay attention not to damage the threads on the axle
- Replace the SMALL fly mass with one aluminum spacer (Fig.5) or add two spacers when replacing the LARGE fly mass. Make sure the groove in the spacer coincides with the feather key in the axle

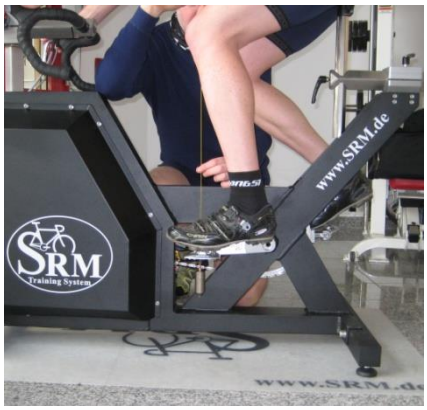
Always insure the correct fly mass/spacer configuration: When installing both fly masses always add the SMALL fly mass first onto the axle. When removing the SMALL fly mass, add one spacer first, then add the LARGE flywheel. Same when replacing the LARGE fly mass – add the SMALL fly mass first and then add the two spacers. When testing without any fly mass remove all parts including the brass nut.

- To reinstall the fly mass on the axle (Fig.6) make sure the groove in the fly mass coincides with the feather key in the axle. This groove will lock the fly mass an prevent thee fly mass from spinning free
- Using the nut wrench, rotate the brass nut clockwise until hand-tight (Fig.7)
- Make sure the fly mass sits firmly, has no play on the axle and can rotate freely! Remove all tools inside the gearbox! Reinstall thee cover with the seven Torx head screws. Do not over tighten!



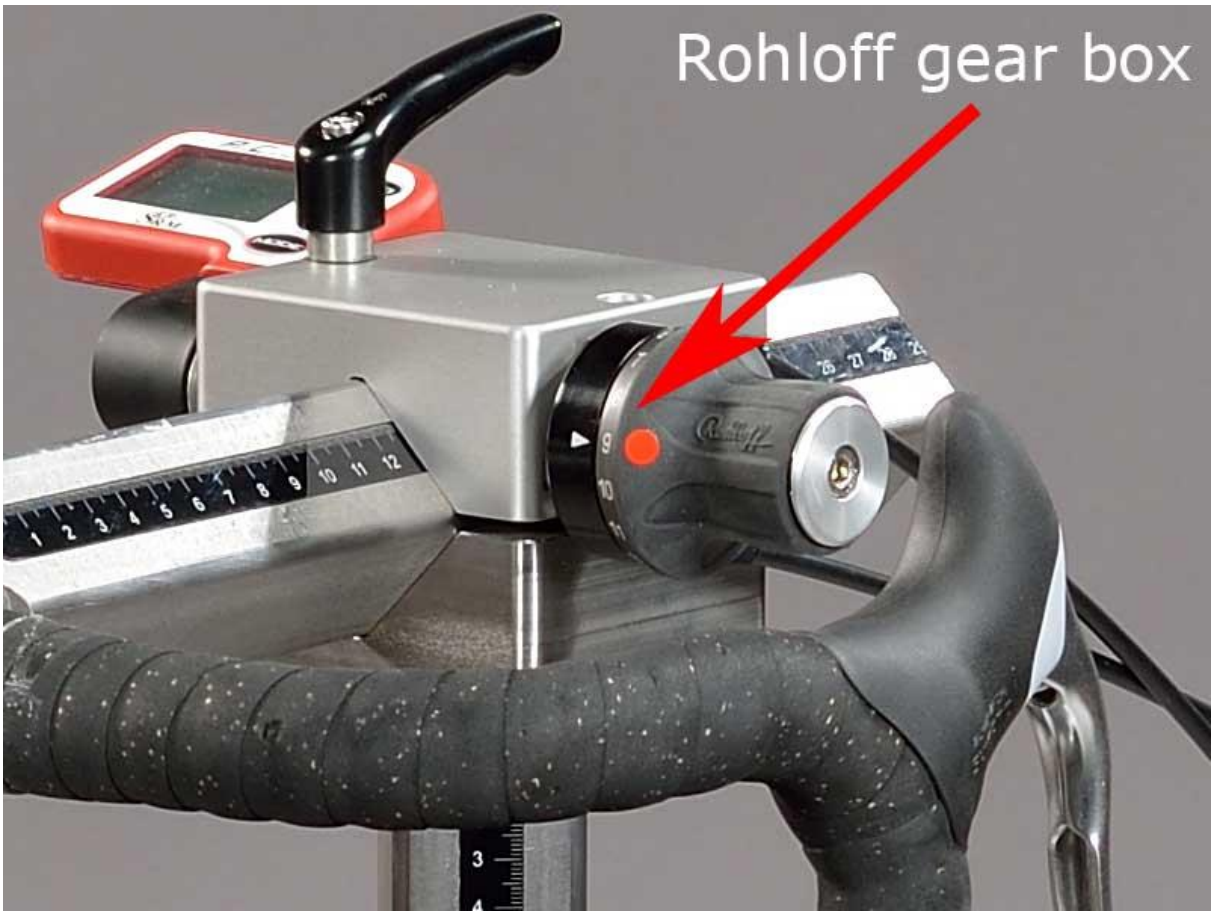
Bike fitting

Transfer settings of client's own bike to the sitting position.

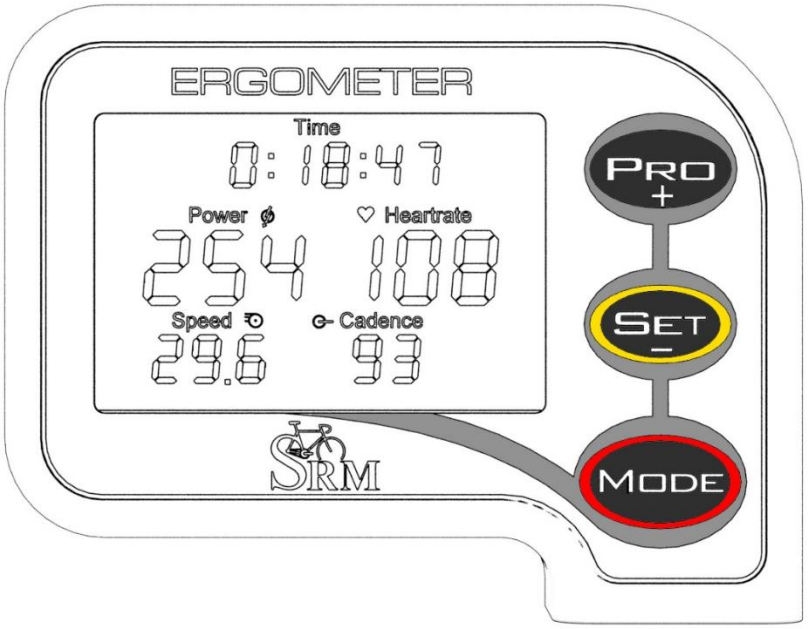
	**Saddle height** The heel with the extended leg should reach the lowest position in the pedaling cycle.
	**Saddle setback** In the horizontal position of the crank the knee (patella) should be perpendicular to the pedals axle.

Rohloff gear check

We recommend to verify the gear of thee Rohloff hub before every test or training. Our general recommendation is to use gear 9 - corresponding to the red point at the turning handle.



7. PowerControl Ergometer



Main menu

The main menu shows real-time data as the athlete trains. Press MODE to change between the different information modes on your display.

Real-time Training Data Menu:

- Top Line: Total training time, training time cadence > 0, distance [miles or km], ascending altitude [feet or m] or all four alternating (Setting can be changed in the SRM Windows Software).
- Middle Line: Power [Watt] (> 1000W, 1.0 = 1000W), heart rate [bpm].
- Bottom Line: Training zone, speed [km/h or miles/h], cadence [rpm].

If no signal from a sensor is picked up, the display shows "-" for this data instead of a number (for example "-" speed if the speed sensor is not working).

Average Training Data Menu:

- Top Line: Total training time, training time cadence > 0, distance, altitude or all four alternating.
- Middle Line: Power, heart rate.
- Bottom Line: Speed, cadence.

Maximum Training Data Menu:

- Top Line: Mechanical energy uptake in kilojoules [kJ] (Estimating an efficiency of 25% riding the bike, this is approximately the same as the total energy burned by the athlete in kcal).
- Middle Line: Power, heart rate.
- Bottom Line: Speed, cadence.

Time/Date Menu:

- Top Line: Time of day.
- Middle Line: Day, month.
- Bottom Line: Year, temperature in Celsius or Fahrenheit.

Sensor Pairing

You need to pair the PowerControl Ergometer with the power, speed and heartrate sensors. If you don't do this, no data will be received by the PowerControl Ergometer for any of the sensors that you want to use on your bike.

Pairing the sensors with the PowerControl Ergometer will only be possible if they are switched on.

- Switch on the PowerMeter by pedaling the crank forward a few times (it will switch on when the sensor in the PowerMeter passes the magnet attached to the bottom bracket).
- Switch on the speed sensor by spinning the wheel.

- Switch on heartrate sensor by putting the belt on your chest. Please moisten the electrodes to improve contact.
- Switch on the PowerControl by pressing the MODE button.

Hold PRO for about 3 seconds to enter Sensor Pairing mode. Press MODE once quickly to select the device you want to pair and press SET once quickly to tell the PC Ergometer to start searching.

The Antenna symbol blinking on the right of the display shows that the searching process has started. The search bar in the middle of the display shows the progress of the search.

If no signal is picked up, please check:

- If the sensor is switched on.
- The position of the magnet.
- Depending on the total miles/km your PowerMeter battery might be empty.
- If it is still not working, please get in touch with the SRM Service Center.

When a sensor is found, the PC Ergometer will show "Found" in the top line, alternating with the sensor's serial number.
If the pairing fails, please repeat pairing from the beginning.

To pair another sensor, press MODE once quickly to get back to the device selection Menu. Continue with pairing the heart rate sensor and speed sensor.
Hold MODE for about 3 seconds to leave the device pairing menu and go back to the main menu.

It is also possible to program the sensor identification numbers in the SRM Windows Software. Then manual pairing is not necessary.

Zero offset calibration

- By simultaneously pressing MODE and SET, the PowerControl turns into calibration mode
- Wait a few seconds until the value on the right-hand side of the display stabilized itself
- Press SET to apply the zero offset
- The number on the right-hand side of the display is the current frequency of the PowerMeter (SET)
- The number on the left-hand side of the display is the frequency which is used for the power measurement (MANU)

(See also: Chapter 4 – Settings SRM Ergometer Software – Ergometer)

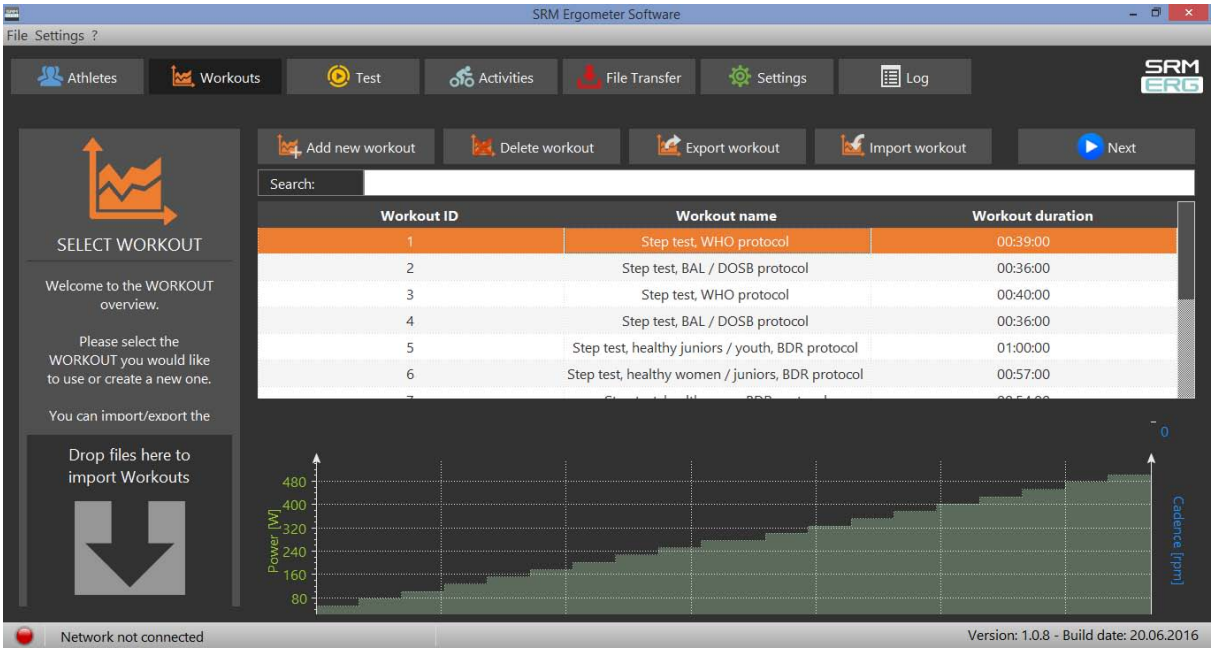
Plug of the PowerControll Ergometer

- male, 4 pins
- Eddy current brake instructions from PowerControl to the power supply
- Charging
- Speed

Warm-up

- Recommendation of at least 3 - 4 min with a low workload (e.g. 75-100W)
  - predefined warm-up
- Check the correct settings for:
  - Heart rate
  - Cadence
  - Power
  - Speed

8. Workouts

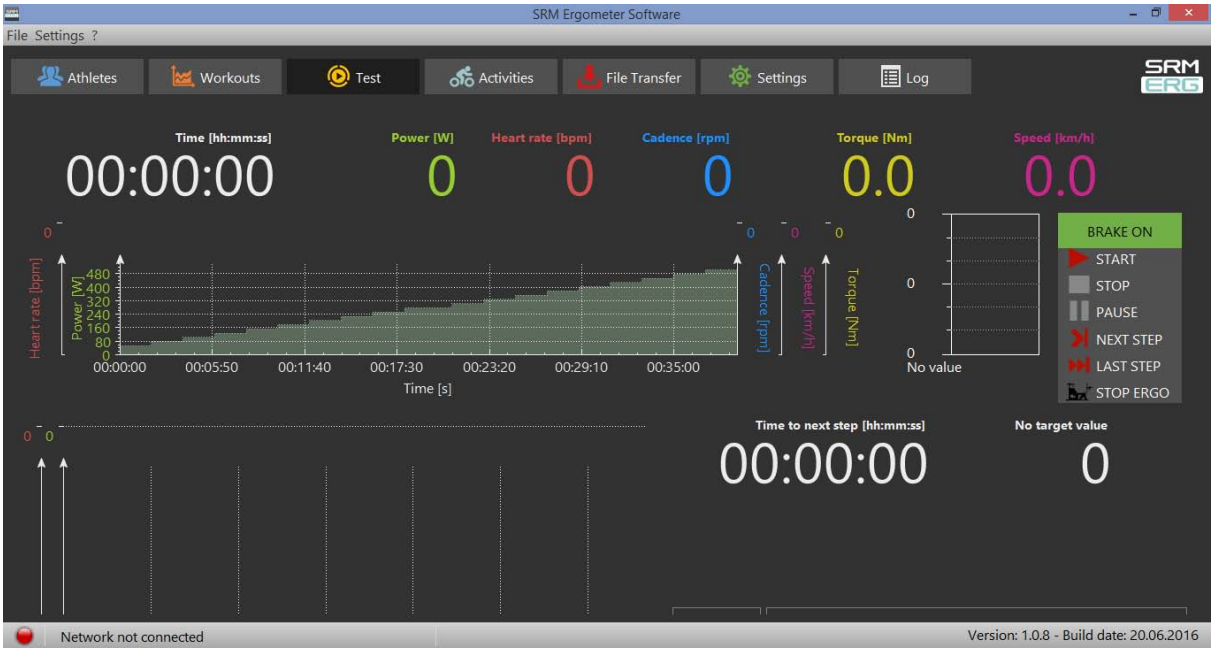


Determine the test protocol:

- Add new workout
- Import new workout
- Drop file to import workout
- Last saved workout is opened automatically. Caution: The workout allways have to save!

You can import new workouts as .erg files and as .fit files.

9. Test



Start and Stop performance diagnostics

BRAKE ON: The brake is active and the client can pedaling with resistance

BRAKE OFF: The brake is deactivate and the client can continue pedaling without resistance and cool down – continuous recording of the heart rate *(No Brake or Brake on only works in combination with an Ergometer)*

START: Start by beginning to pedal or pushing the Start Button (Check the values displayed on the computer screen)

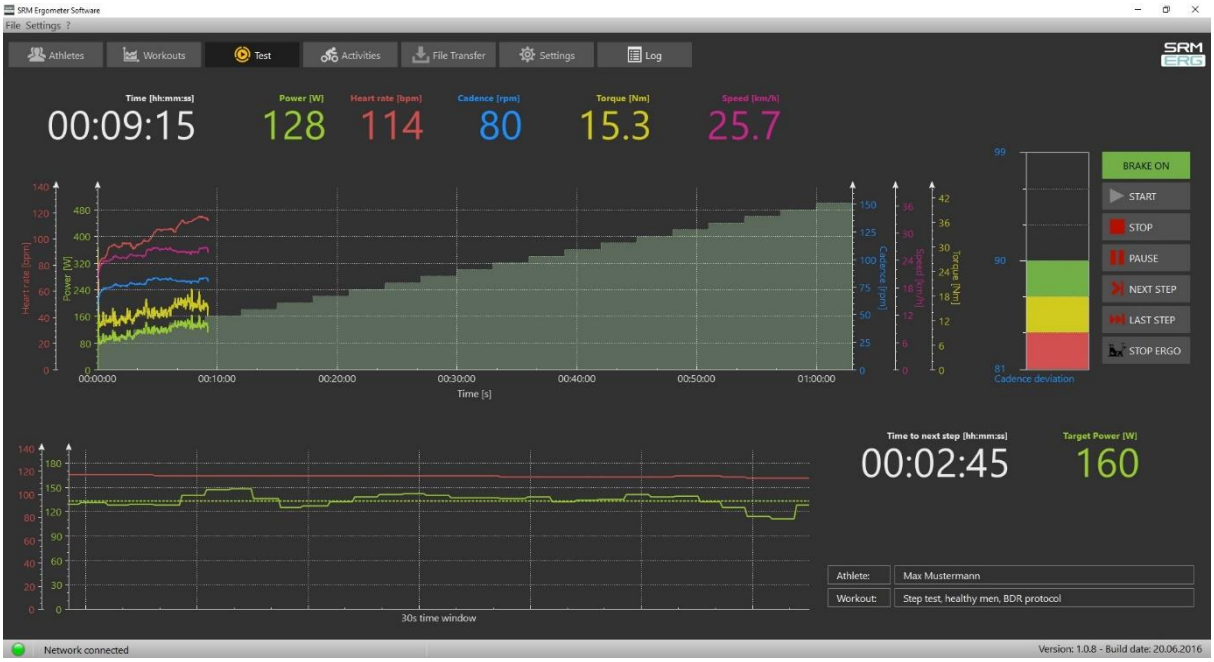
STOP: Finish the test

PAUSE: Interrupt the test

NEXT STEP: Go to the next step of the test

LAST STEP: Go to the last step of the test

STOP ERGO: Stop the ergo immediately (it only works without cadence)



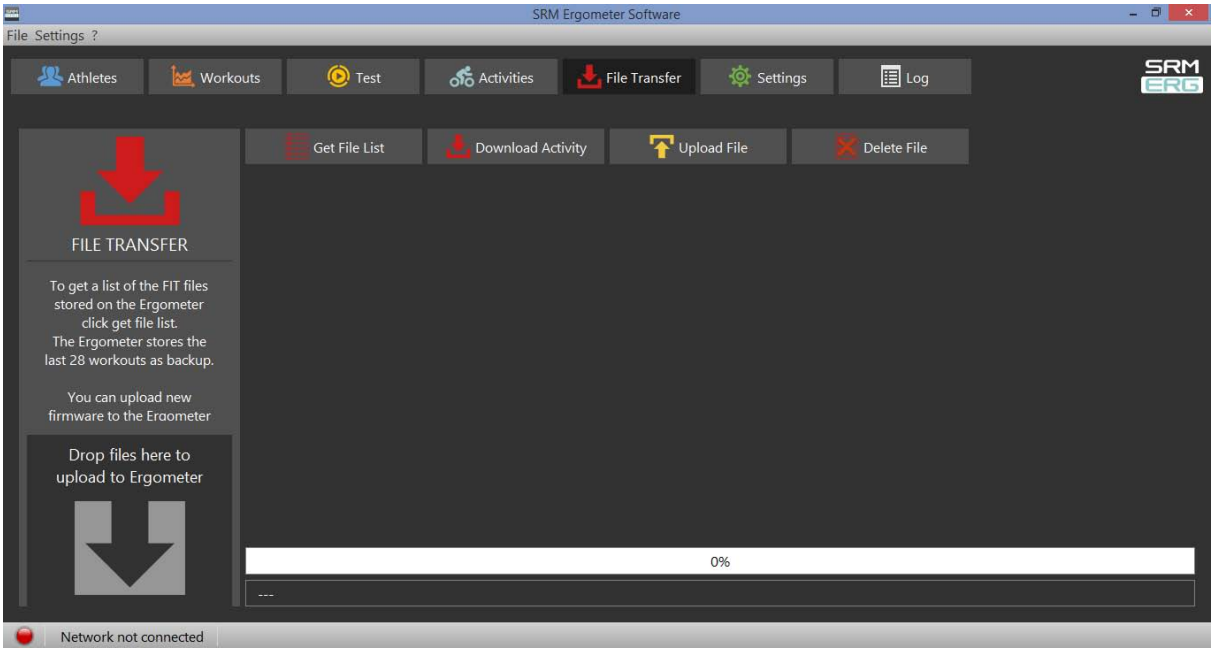
Next steps

- Comment: Entry file name then press Save
- Recommended cool – down - protocol with lower workload
- Clean the ergometer (!)

10. Activities

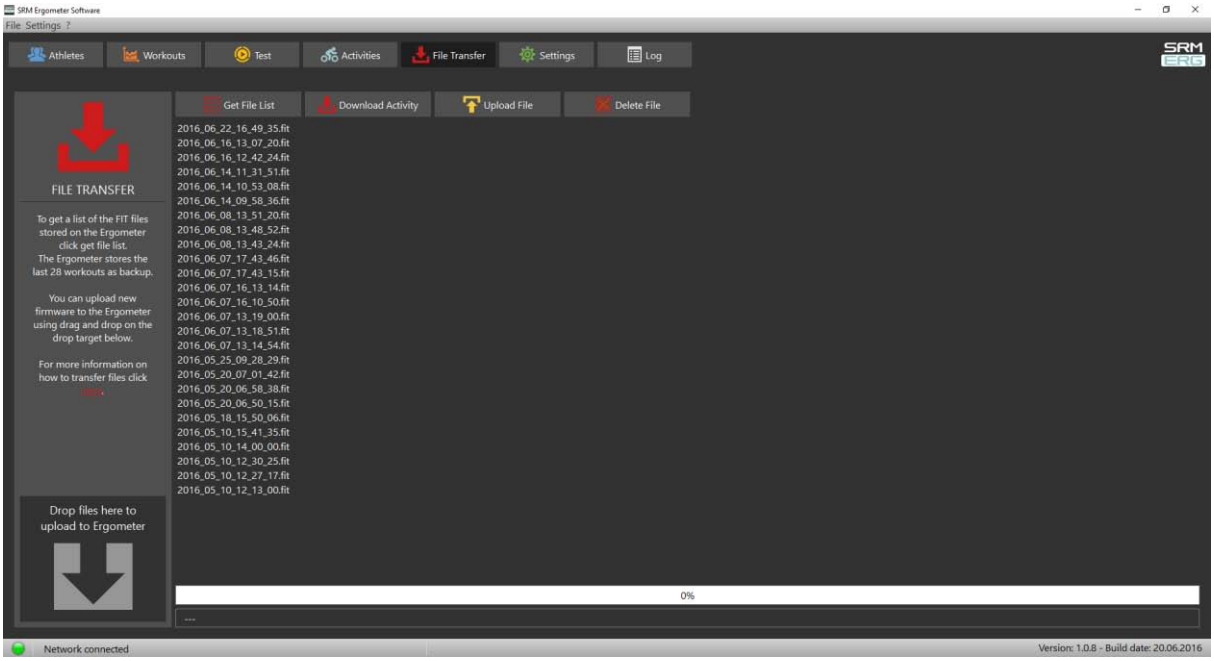
- Select activity to analyze, export or delete
- Export activity as .fit file, pdf, png, jpg
- Activity-ID is automatically generated

11. File Transfer



GET FILE LIST:

- Get a list of the FIT files
- Upload new files to the Ergometer or Download an activity
- The Ergometer stores the last 28 workouts as backup



DOWNLOAD ACTIVITY:

- To determine the save location

UPLOAD FILE:

- You can upload new firmware to the Ergometer (.sfi files)

12. Service

Recommendation:

- crank: send in for service every two years
- ergometer: send in for service every four years

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13. FAQ

1. No resistance from ergometer

- check speed
- check 'Brake is on'
- check PowerControl →Cadence, Power
- check slope, zero offset, circumference
- check the IP-address of the ergometer and the torque box

Contact person:

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