

# ***TENDO Weightlifting Analyzer***

*A microcomputer system for strength diagnostic and feedback monitoring of weight training*

## ***USER'S MANUAL***

***TWA Computer Software***

***Single Station USB Interface Model V-206***

[www.tendosport.com](http://www.tendosport.com)

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Please check our web site [www.tendosport.com](http://www.tendosport.com) for latest **updates** for the Tendo Weightlifting Analyzer software.

# 1. Introduction



*Do you want to know more how you weight train? Let TENDO Sports Machines introduce you a new training tool for weight training.*

*You will need the following items to use completely TENDO Weightlifting Analyzer:*

- *Microcomputer system TENDO Weightlifting Analyzer*
- *USB Interface V-206 or Net Interface V-104*
- *Cable to connect Interface to microcomputer (Interface MC Cable)*
- *Cable to connect Interface to computer (Interface PC Cable)*
- *TENDO Weightlifting Analyzer CD (software)*

-The minimum computer requirement:

Processor 1.6GHz, RAM 512Mb, Operating system Windows XP, Viste or 7, 32bit or 64 bit.

## 2. Installation

### 2.1 Installing TENDO Weightlifting Analyzer software

- *Insert CD in your PC CD-ROM drive*
- *Select My Computer and select the CD drive*
- *Follow the instructions given on screen to complete the installation*
- *When the installation is complete, a new program called TENDO Weightlifting Analyzer is added to your system. Also an icon will be placed on your computer desktop.*

### 2.2 Uninstalling TENDO Weightlifting Analyzer software

- *Click Start – Settings – Control Panel – select Add or Remove Programs -*
- *Select TENDO Weightlifting Analyzer V-206*
- *Follow the instructions given on screen to complete uninstallation*

## 2.3 USB Driver Installation for USB Interface V-206:

1. Plug the connector on your Interface PC Cable into the connector on the side of the interface unit.



2. Plug the other end of USB Interface Cable into USB port on your computer.



First time you connect USB Interface to your computer, Windows will report that a new device is detected and it will search for drivers.

3. Insert Tendo Weightlifting Analyzer V-206 Installation CD to your computer.
4. Run the **Found New Hardware Wizard** to assist you in setting up the new device.

Click **Next** to continue.



5. click Next to continue. Select the “ **Search for a suitable driver for my device(recommand)** “



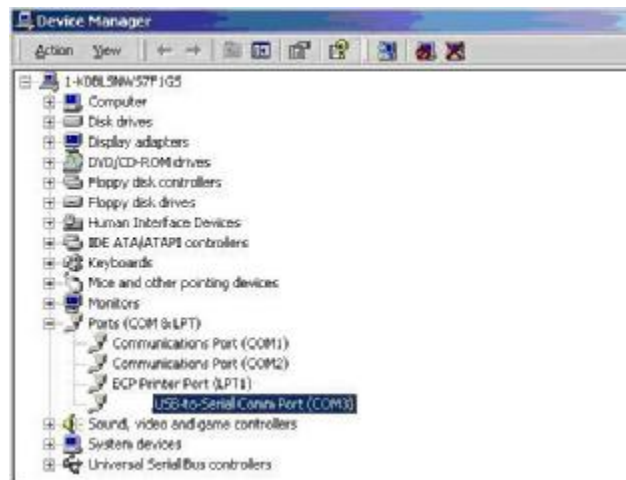
6. Windows will detect the driver and Click Next to continue installation.



7. Click Finish to continue and let Windows copy the needed files to your hard disk.



8. You can check the Device Manager and see the USB Serial Port (COM..)



Repeat the steps above to complete virtual COM installation (follow the instructions on the screen).

### 3. Connecting Interface to Microcomputer

1. Plug the male connector on your Interface MC Cable into the connector in the front of the microcomputer (left female connector)



*Microcomputer*



*Interface MC Cable*

2. Plug the other end of the Interface MC cable into the appropriate connector on Interface.



*USB Interface V-206*

## **4. Connecting Interface to Computer**

### **4.1 USB Version V-206 Interface:**

1. *Plug the connector on your Interface-PC Cable into the connector on the side of the interface unit.*



*USB Interface V-206 and USB cable*

2. *Plug the other end of USB Interface Cable into USB port on your computer.*



## **5. Connecting power supply**

***The USB Interface Version V-206 does not need an external power supply.***

*If you use the USB Interface Version V-206, your Microcomputer needs to be power supplied from 4 AA batteries.*

*But if microcomputer battery voltage is low (the microcomputer is still working properly), the USB Interface does not transfer the data to Computer.*

***It is highly recommended to use full charged batteries for microcomputer if the USB Interface is used.***

### ***Recommendation:***

***Connect the Interface to computer first and then open Tendo Weightlifting Analyzer program!***

*If the communication between Computer and Interface is lost, close the TWA Program and unplug USB connector from your PC.*

*Then plug the USB Cable into the USB Port on your computer again, open TWA program and click Connect.*

## 6. START TENDO Weightlifting Analyzer (TWA) program:

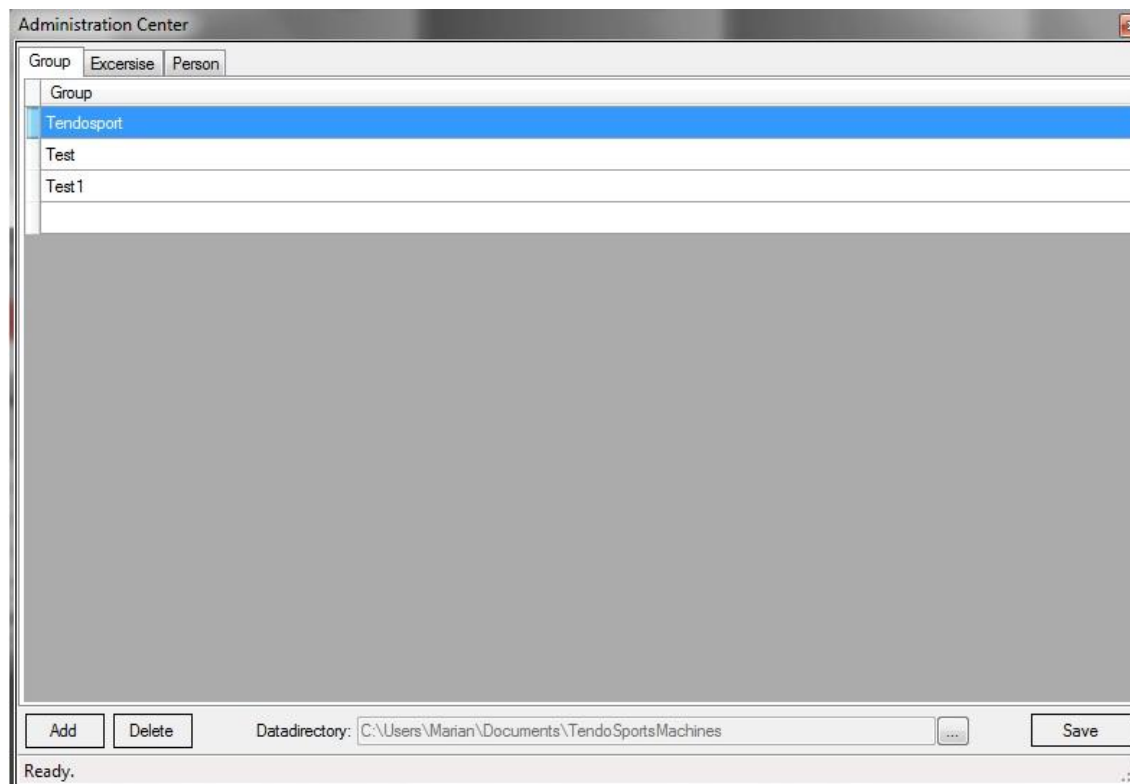
Start the Tendo Weightlifting Analyzer program by double-clicking the Tendo Weightlifting Analyzer icon on your computer desktop. When you open the application you will see a program window.



Before you start to use the system it is recommended to fill in the Administration Form to create database for saving the files:

### 6.1 Administration Center

Click "Administration" on the left side of menu bar on top. The Group table will appear.



Click "Add" – write down the group name – click "Save"  
 Click "Add" for next group and again click "Save", etc.  
 If you want to delete any group, select group and click "Delete" to delete particular group.  
 Click "Exercise" to create exercise database.  
 To add or delete the exercise, use the same procedure as for Group.

Click "Person" to create person in database. **Recommended format is "Last\_name First\_name"**  
 To add or delete person, use the same procedure as for Group.  
**In Person Window, you have to assign particular Group from group list for particular Person.**



If you click on "Personal Info", the Personal Info window will appear. Just fill in the information you want.



Close the Administration Center window click "Close" or "X".

**TENDO Weightlifting Analyzer database directory C:\Users\.....\Documents\Tendo Sports Machines\Group\Exercise\Name**

Database directory is created from filled Administration Form automatically in the following location:  
**C:\Users\...\Documents\TendoSportsMachines\...**

## 6.2 Communication port detection

(on the Menu bar).

It is recommended to connect Net Interface V-104 through USB Serial Converter to computer first and then open TWA Program. In this case TWA Program detects the communication port automatically. **In case you do not use that sequence, TWA Program does not detect the communication port. Click "Refresh COM" to find communication port.**

**But do not forget:**

1. Firstly, plug USB Serial Converter (Interface-PC Cable) into the USB port on your computer. (Your computer recognize the USB-Serial Converter)
2. Secondly, plug the other end of the USB Serial Converter (Interface-PC Cable) the into the connector on the side of the Interface unit.
3. Connect power adapter to NET Interface



If your computer is not connected to the Interface unit, or the microcomputer is turn off you can use the TWA program to open saved files.

## 7. How to use TENDO Weightlifting Analyzer program on-line:

To make a connection with Interface click "Connect Interface" If there is not connection, click "Connect Interface" again, or check COM port setting on the TWA Program.

If the communication between Computer and Interface is lost, close the TWA Program and unplug USB connector from your PC.

Then plug the USB Cable into the USB Port on your computer again, open TWA program and click "Connect Interface".



If the connection with Interface is successful and the microcomputer is turn off, the workstation numbers on menu bar are red and "Connect Interface" symbol is green.



If the connection with Interface is successful and the particular microcomputer is turn on, the particular workstation numbers on menu bar is green and "Connect Interface" symbol is green.



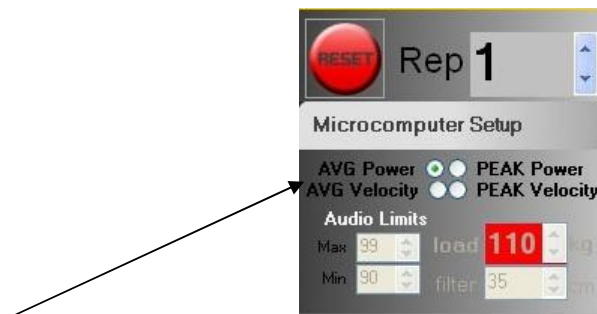
To disconnect Interface click "Disconnect Interface" and you can use the program off-line, only. (it means open saved files)

If the particular workstation is connected on-line with the Microcomputer (green number), it is not possible to open saved files, there.

It is possible to open saved files in off-line workstation panel, only. (red or grey workstation number indicate off-line mode)

## 7.1 New exercise set:

1. Set the microcomputer parameters (**Load, Filter, Audio** signal). The program reads actual microcomputer setting (if not press Reset button) and it is possible to change it using microcomputer itself or using TENDO Weightlifting Analyzer program.



-means which parameter is displayed by upper display of the microcomputer.

2. Click "Reset" in program or press **Reset button** in microcomputer – delete data from microcomputer to start new measurement (exercise) set.
3. Perform the exercise set. You can click on "Graph" to see table and Velocity-Displacement and Force – Time curve anytime.
4. **Save** the collected data:  
First choose Group  
Choose Person. Person is selected from particular Group (assigned in Administration Form)  
Choose Exercise

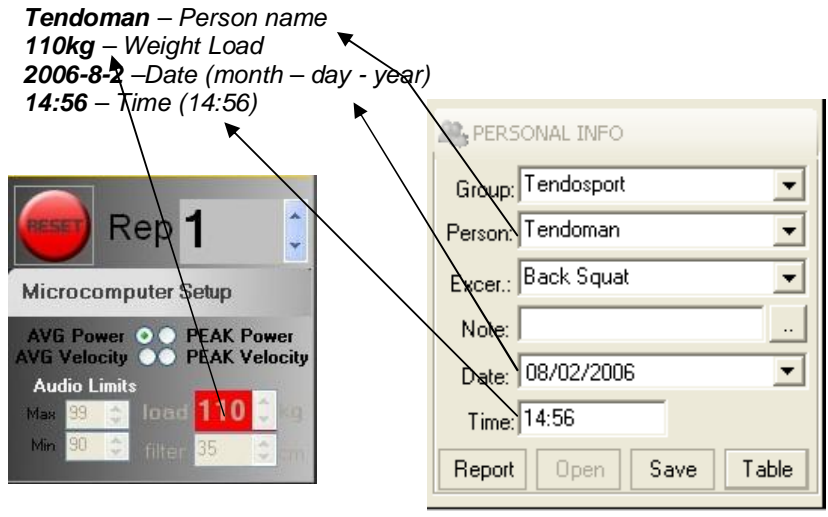
**Tip:** Quick Search  
Type first letters to combobox

It is not recommended to save the data without filling this window.  
"Note" - it is possible to put down any note.

5. Click "Save" on particular workstation panel.  
click „Yes“

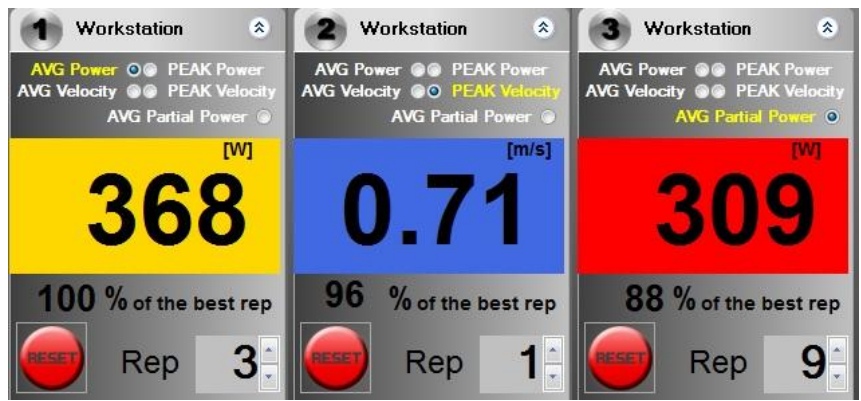
**If you do not fill in the Personal Info tab, the software will save the file in theTendo Sports Machines Temporary Files.**

The File name is automatically assigned in form: **Person\_exercise\_Load\_kg Date Time**  
 e.g. Tendoman Back Squat 45kg 2006-8-2 1



The File name is able to rename anytime.

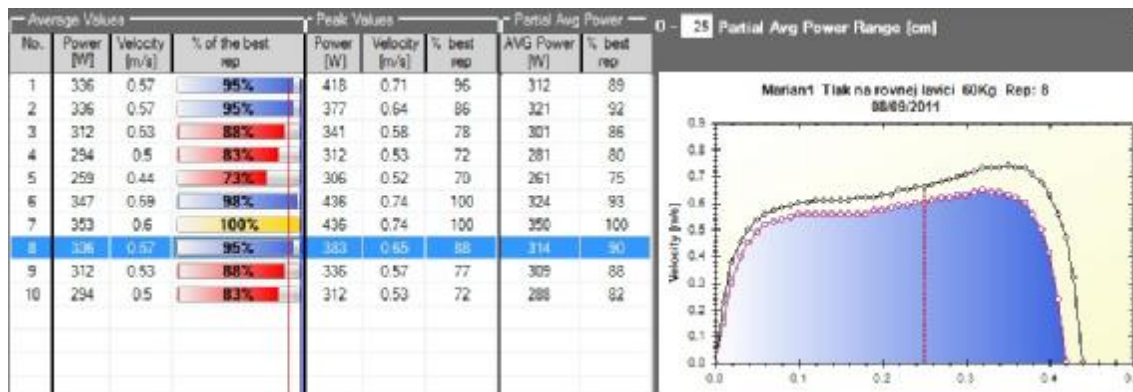
It is possibel to choose parameters displayed in Weightlifting Analyzer Program by clicking on a particular parameter.



AVG Power – Average Power  
 AVG Velocity – Average Velocity  
 AVG Partial Power – Average Partial Power

**To unpack graph section, click “Graph’ button**

**AVERAGE VALUES    PEAK VALUES    PARTIAL AVERAGE POWER**



## Partial Average Power

*What is Partial Average Power?*

*It is the value of average power which is measured from start (0) to a certain predefined value of the range of motion in centimeters. Default setting is 25 centimeters.*

*The software calculates power from equation  $P=F \times v$  ( $P$ -power,  $F$ -force,  $v$ -velocity)*

*$F = m \times a$ , (instantaneous Force  $F$  is given by mass  $m$  and acceleration  $a$ )*

*for vertical movement  $F = (m \times g) + (m \times a)$ , where  $m$  is a mass,  $g$ -acceleration of gravity and  $a$ -acceleration.*

*It is possible to change range for the partial average power measurement.*

*Click on the square with setting value and rewrite it with new value and press ENTER on a computer keyboard.*



*The value of partial range also indicate vertical red line in Velocity – Displacement graph.*

*The range for measurement for partial avg power is from 0 to red vertical line.*

## Why Partial AVG Power?

*Sometimes average or peak power is not sufficient parameter for assessment of athlete's qualities in weight training, because many athletes in effort to reach maximal value of power are tried to accelerate weight at the end of movement. This way they reach high average and peak power, but those parameters misrepresenting results. Simply saying, it is too late. Other words they have high average and peak power, but with low RFD - rate of force development.*

*And Rate of force development (RFD) is a key factor in sports performance, where explosiveness is required.*

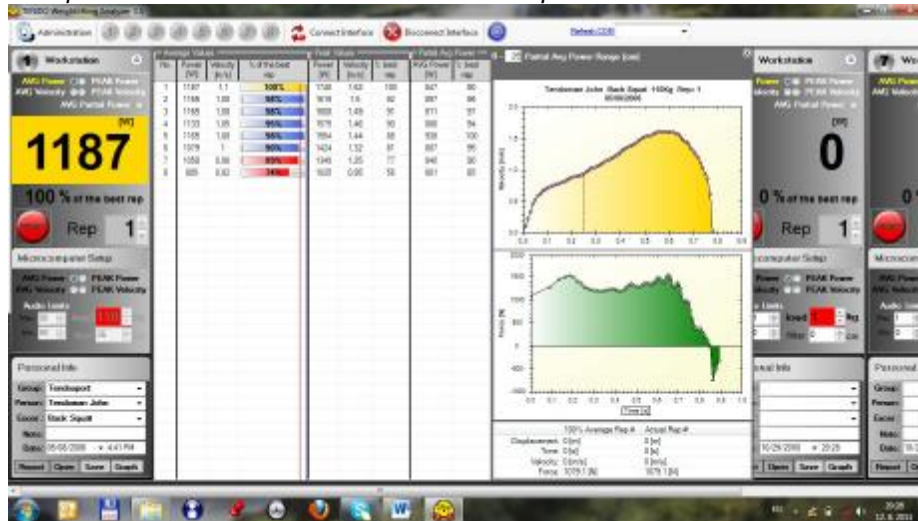
*The Partial Average Power will help emphasize RFD.*

## 8. How to use TENDO Weightlifting Analyzer program off-line:

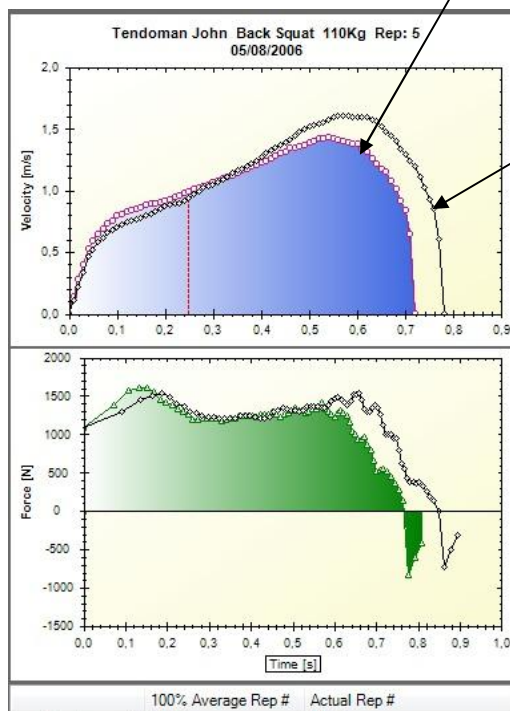
## 8.1 Open the saved file from database:

Click "Open" on workstation panel and select the file from **database directory**  
**C:\Users\.....\Documents\Tendo Sports Machines\Group\ExerciseName**

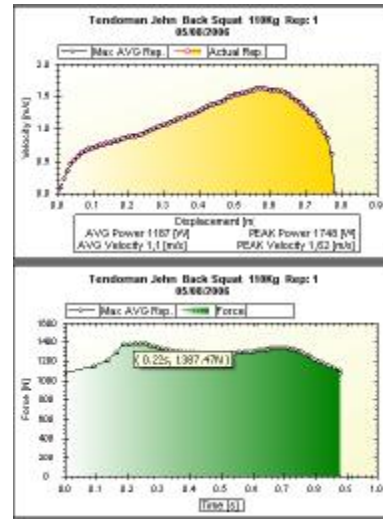
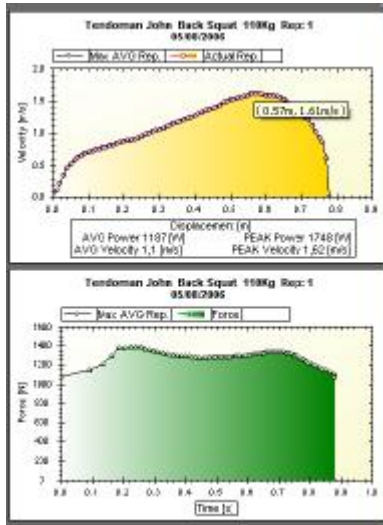
It is possible to check each exercise repetition by up and down arrows on the workstation panel. If you would like to see all repetitions, Velocity-Displacement and Force-Time curve for each repetition, click on "Graph". Use up and down arrows or click on the particular repetition in the table, to check Velocity – Displacement or Force-Time curve for each repetition.



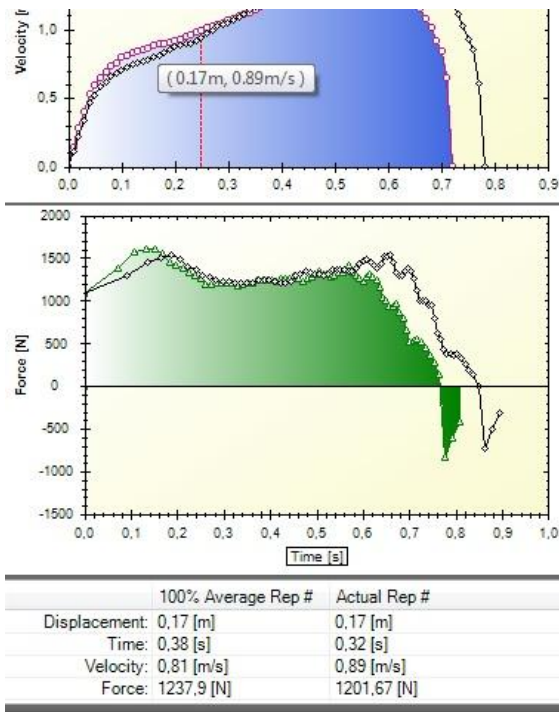
There are two curves in each graph.  
The black curve is for repetition with maximum average value of Power or Velocity.  
The colored curve is for selected repetition.



If you move the cursor on the curve, the actual value of displacement and velocity (Time, Force) will be displayed.



If you place a mouse cursor on a particular point of the line for velocity-displacement graph, then click and move the mouse cursor away from that point, the table under the Force-Time graph presents actual values of displacement, time, velocity and force for particular point of both lines.



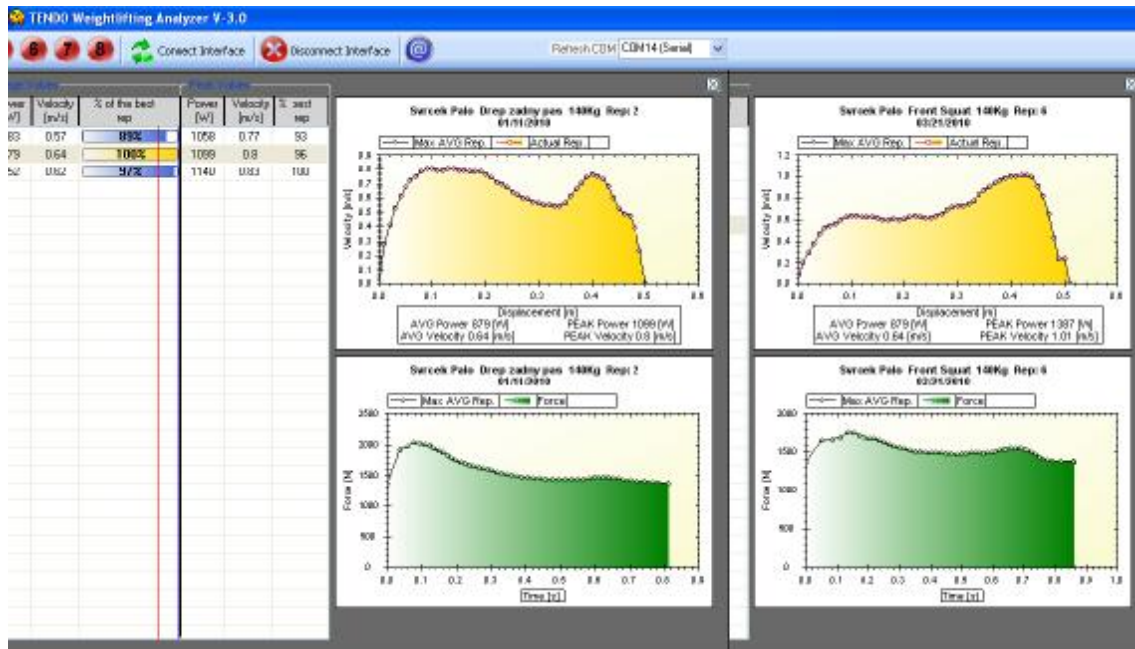
To close the table, click on "Graph" or use "X" in the right upper corner.

**Recommendation:**

It is possible to open up to 8 different files in the computer program, each file at the different workstation panel. Each workstation panel in the computer program represents one microcomputer workstation.



If you would like to compare 2 or more different files (for example Back Squat in January and Back Squat in August), first file open in the workstation 1 and the second file open in workstation 3 (5, 7). Choose the repetition you want to compare with, click on “Graph” and you will see both graphs.



## 8.2 Export data to Microsoft Excel Program

Tendo Weightlifting Analyzer program allow you to export data to the Microsoft Excel program. Open the file, click „Report“ on workstation panel to export data from workstation to the Microsoft Excel.

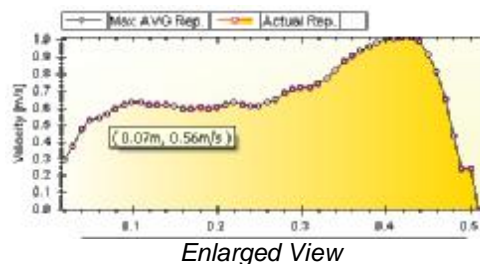
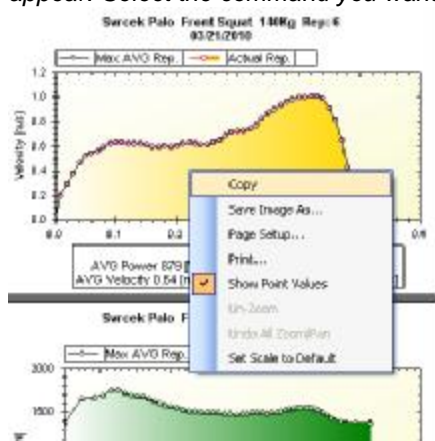
	A	B	C	D	E	F	G	H
1		DATE	8/2/2006 14:50					
2		PERSON	Tendoman					
3		GROUP	Tendosport					
4		EXERCISE	Back Squat					
5		LOAD	100					
6		FILTER	35					
7		NOTE						
8		REP. NO.	AVG POWER [W]	AVG VELOCITY [m/s]	AVG [%]	PEAK POWER [W]	PEAK VELOCITY [m/s]	PEAK [%]
9	1	1020	1.04	98	1491	1.52	100	
10	2	1010	1.03	97	1413	1.44	94	
11	3	1040	1.06	100	1354	1.38	90	
12	4	952	0.97	91	1285	1.31	86	
13	5	942	0.96	90	1324	1.35	88	
14	6	912	0.93	87	1128	1.15	75	
15								

## 8.3 Print data

Export the table to the Microsoft Excel program and use print command.

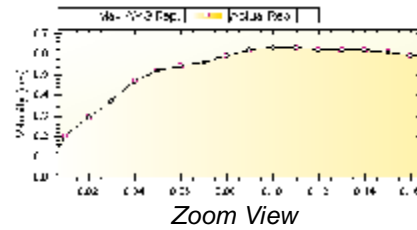
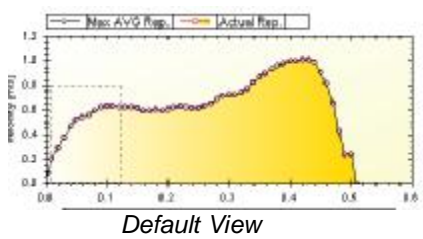
## 8.4 Work with graph

Move the cursor to the graph area. Click the right button of mouse and a command window will appear. Select the command you want to use and click left mouse button.



Go back to Default View – click the right button of mouse for command window and click left button of mouse to “Set Scale to Default”.

You can also “Zoom” any part of graph. Press CTRL button on a computer keyboard and use left mouse button – move the cursor on the graph area you want to be zoomed, click the left button of mouse (hold) and stretch the window to the part of graph you want zoom and release the left mouse button.



**Back to Default View** – click the right button of mouse and click “Set Scale toDefault ” or “Undo Zoom”.

### 8.5 Exercise set Report or what is what:



AVG Power – average power, AVG velocity – average velocity

Percent of the best rep. – for average value

REP [5] – repetition number 5

Peak Power, Peak Velocity

Percent of the best rep. – for peak value

AVG Partial Power – average partial power for predefined range from 0 to setting value

Percent of the best rep. – for partial average power

**Column colored chart** represents percent value of best average power.

**Column colors** – depends on microcomputer audio signal setting.

**Yellow column** – each repetition with value of average power performed above upper limit of the audio signal.

**Blue column** – each repetition with value of average power performed between upper and lower limit of audio signal.

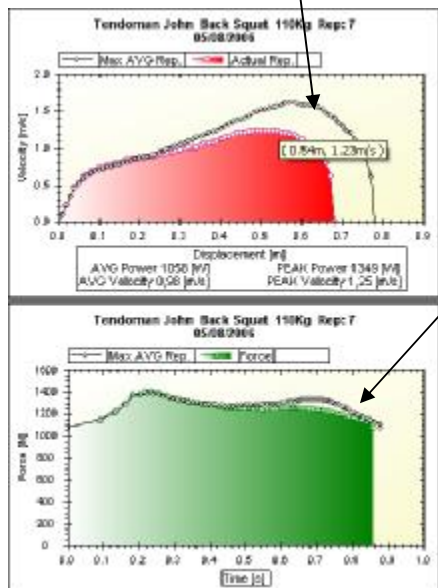
**Red column** – each repetition with value of average power performed below lower limit of audio signal.

Blue row – represents actual repetition displayed in Line chart (velocity – displacement curve).

**Line chart** – (right side of the program window) represents **Velocity - Displacement** and **Force-Time** curve

**You can use the cursor to find velocity (in meter per second) at each point of Velocity – Displacement curve and Force (in Newton) at Force-Time curve.**

**An example of velocity – displacement curve:**



### **Precaution:**

*For safety do not disassemble or modify Tendo Weightlifting Interface or its supplied accessories. Do not use the system in places subject to excessive humidity, dust, shock or vibration. Protect the unit from becoming wet and do not drop or strike the unit against hard objects.*

### **Important Recommendation:**

***It is useful and transparent if you archiving saved data periodically (at the end of training cycle, or season) and then delete old files from program database, because the database could extend to very big size.***

Check our web site [www.tendosport.com](http://www.tendosport.com) for latest **updates** of Tendo Weightlifting Analyzer software.

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