

# **FiTRO JUMPER**

**Windows version**

**OPERATING MANUAL**

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## **I. CONNECTING OF THE JUMP MATTRESS TO THE COMPUTER**

Using cable enclosed connect the mattress with the interface.

Use universal interface (one with four connectors) to plug the cynch into the right socket (see the symbols on the interface).

The second output from interface (while the computer is still turned off) needs to be inserted into a USB port.

**WARNING: FOR SAFETY REASONS TO AVOID SLIPPING, IT IS STRONGLY RECOMMENDED TO FIX THE MATTRESS ONTO THE GROUND BY MEANS OF STICKY TAPE!**

## **II. SOFTWARE INSTALLATION AND OPERATION**

Run the file “setup.exe” from CD and follow the instructions.

Program main menu with following options appears at the top of the screen: File, Subject, Test, Report, Communication port, Help.

### **FILE**

The program module offering the possibilities of saving and opening data files from diagnostic and exercise measurement routines as well as configuration files (containing parameter assignment to particular axes, ranges, step, etc. for measurement and report routines).

OPEN  
SAVE  
EXIT

### **SUBJECT INFORMATION**

Input the information (optional), which will be stored with the data.

### **TEST**

Click on “TEST” opens 4 options to choose from.

New test set  
Continue with a new subject  
Continue with the same subject  
Test specifications

New test set

Use this option if you wish to start new test set with a new subject.

First, fill in optional "Subject information" (see the section SUBJECT INFORMATION in this manual).

As the next step user can specify the assignment to the forthcoming test. Clicking OK opens the measurement routine.

Continue with the new subject

This option should be selected if we are about to continue with a subject already having his file containing a previous repetition (or repetitions) on the disk.

Selecting this option activates a dialogue box to open a file of particular subjects containing data sets from previous repetitions.

As a next step user can specify the assignment to the forthcoming test. Clicking OK opens the measurement routine.

Continue with the same subject

Selecting this option recalls the routine, in which modification of weight may be carried out. (OPEN file procedure is unnecessary since the system keeps the data from previous repetitions).

As a next step user can specify the assignment to the forthcoming test. Clicking OK opens the measurement routine.

Test specification

User can specify:

- start of the test - in the moment when the subject touches the jump mattress (start at the touchdown), or when the subject takes off from the jump mattress (start at the take off)
- termination of the test - either by elapsed time in seconds or number of jumps.
- parameter, which has to be displayed on line in a graphical form
- minima, maxima and scaling of x-axis parameters

MEASUREMENT ROUTINE

Following information appears on the screen: subject's name, date, test duration, test number, selected on-line variable and headings of all parameters measured:

- ta - time of one jump cycle in seconds
- tc - contact time in seconds
- tf - flight time in seconds
- Pact - power in the active phase of the take off -in W/kg
- P - medium power in one jump cycle in W/kg
- h - height of the jump in cm
- v - speed in the last moment of the take off in m/s
- a - average acceleration during the take off in m/s.s

Formulae for calculation of particular parameters can be found in appendix at the end of this manual.

The digital numbers of all parameters are shown in three successive jump cycles during the measurement. (a jump cycle = contact time + flight time).

The measurement ends after the first jump cycle exceeds the preset time or after completing the preset number of jumps. The beginning and the end of the test is signalled by a short beep.

After the test has been completed you can:

- Exit
- Repeat
- Ignore
- Save
- Repeat with a new input assignment

Exit

Exit measurement routine. Data remain in memory. One can enter report routine and then return to the test with the same subjects.

Repeat.

The system is ready for the next measurement, while the data from the previous trial/trials remain in memory.

Ignore

Erases the last test and prepares the system for the following test. The results from the previous test will stay unaffected in the memory.

Save

Data from all the previous tests will be saved.

Repeat with a new assignment

After input of the new assignment system is ready for the next measurement, while the data from the previous trial/trials remain in memory.

## REPORT

### Graph report

One can select an attempt from the stored test sets, specify parameter for Y-axis, its minimum, maximum and scaling, as well as jumps to be displayed.

Use the horizontal bar to move along the x-axis. Digital data of the corresponding jump cycle are displayed in the window in the lower part of the screen.

An unreal value from the test (for example if the subject missed the jump mattress) can be highlighted and deleted. After the unreal values were deleted, it is possible to save the data through the program option TEST FILES - Store data.

Click on the print button if you wish the chart to be printed.

Click on the OK button closes the window and keeps the current setup of the chart (parameter assignment for Y-axis and its maximum, minimum and scaling).

Closing with Cancel (or click on the cross in the right upper corner of the window) closes the window without keeping any set up modification performed.

### Digital “Jump by Jump”

Displays digital data from particular jump cycles.

One can select the test, copy a jump cycle (Copy), or copy the data of the whole test (Copy All).

Click on OK closes the window.

### Digital “Interval”

As a first step averaging intervals in seconds have to be specified.

Confirming selection displays digital data – mean values from the intervals selected.

One can select a test from the series stored, copy a jump cycle (Copy), or copy the data of the whole test (Copy All). Click on OK closes the window.

### Means of the best jumps

Computer can rank the parameters from a given number of jump cycles (from 1 to number of jumps completed in test) and calculate means.

In this case the values in each parameter are the best of all measured, which does not mean parameters are all from one jump cycle!

One can choose the parameter, according to which all the jump cycles will be ranked. Such a parameter will be marked by a b and other parameters by a double star. Corresponding parameter will be calculated from the cycle ranked by “ranking parameter”. Some of them may not be ranked from the best one to the worst one, so they do not have to correspond with the ranking of the previous screen.

One can select a test from the series stored, copy the data of a jump cycle (Copy), or copy the data of the whole test (Copy All). Click on OK closes the window.

### Population norms

Option compares the results of the subject tested with population norms (6-18 years old). Norms are based on the parameter Pact from 10 second test of repeated rebound jumps with arms fixed to the hips, performed with aim to spend shortest time on the ground with the longest possible flight periods (imagination of jumping on a hot plate). The graph is divided into percentiles of age population groups, and is different for boys and girls. The dot on the graph will be shown only if the sex and age (from 6 to 18) were filled in.

For the adult population from 18 to 60 the norms based on the maximal height achieved -in single jumps with aim to reach the longest flight time regardless of the time spent on the ground during take off-. For this purpose termination after 1 jump has to be set up in routine Test specification prior to measurement.

### Digital series report

Routine displays simultaneously mean values from attempts performed in a test series together with corresponding assignments.

The number of the best jumps to calculate the mean values from can be specified in the lower parts of the screen.

One can also copy data to the clip board from the attempt highlighted (Copy) or, copy the data from all test sets (Copy All). Click on OK closes the window.

#### Graph series report

Routine displays simultaneously graph consisting of mean values from attempts performed in a test series together with the corresponding digital data.

Y-axis parameter and number of the best jumps to calculate the mean values from can be specified in the upper right corner of the screen. Also minimum, maximum and scaling of X-axis can be adjusted.

Unwanted attempt can be highlighted and deleted.

Click on the print button if you wish the chart to be printed.

Click on the OK button closes the window and keeps the current setup of the chart (parameter assignment for Y-axis and its maximum, minimum and scaling).

Closing with Cancel (or click on the cross in the right upper corner of the window) closes the window without keeping any set up modification performed.

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## Supplement I.

### Principle of measurement:

Flight and contact time with an accuracy of 1/1000 s during repeated jumps on contact switch mattress are measured by means of interface, -PC and special software.

Parameters such as

- height of a jump
- mean power in the complete jump cycle
- mean power in the active phase of a take off
- mean acceleration in the active phase of a take off
- velocity in the final moment of a take off

are calculated using basic laws of mechanics describing the common relations between force, acceleration, velocity, time, free fall trajectory, work and power. Check the literature for more detailed explanation.

### Height of a jump

$$h = (g \times T_f^2) / 8$$

### Mean acceleration during concentric phase of take off

$$a = g \times T_f / T_c$$

### Mean velocity during concentric phase of take off

$$v = (g \times T_f) / 2$$

### Mean power during concentric phase of take off

$$P_{con} = ((g^2 \times T_f) \times (T_c + T_f)) / 4 T_c$$

### Power in entire jump cycle

$$P = (g^2 \times T_f) / 8$$

T<sub>c</sub> - contact time

T<sub>f</sub> - flight time

g - gravitational constant