Poly-Spectrum-TM

series of digital ECG stress test systems for exercise testing on treadmill

Main Features of Digital ECG Stress Test System Poly-Spectrum-TM:

- Stress-test with the continuous ECG control on treadmill
- Continuous recording from 1 to 12 ECG leads
- Possibility of ECG recording in Frank or Nehb lead system
- Displaying the user-defined number of ECG leads during the whole test
- Displaying dynamically averaged cardiocomplex as superimposed with displacement on the averaged rest ECG
- Displaying large number of objective indices during the test which are received from the patient on-the-fly
- Displaying the graphs of heart rate (HR), workload, blood pressure (BP) and ST amplitude changing during the whole test
- Automatic control of treadmill
- Storing of the whole ECG record during the test on hard disk
- Possibility of automatic measurement of any chosen ECG fragment
- Calculation of large quantity of ergometric parameters and indices after test termination
- Automatic checkup report generation

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Poly-Spectrum-Ergo Software Features

Poly-Spectrum-Ergo Software Capacities

The large quantity of exercise tests protocols gives you the possibility to solve the wide range of tasks such as CAD diagnostics and prognosis (expert questions solving), evaluation of exercise tolerance, study of abnormal heart rhythm dynamics during exercise, assessment of maximal work capacity in normal individuals (also in sports medicine) and asymptomatic individuals.

Protocols:

- Multistage test (on cycle ergometer or treadmill)
- One-stage test based on BEE value (on cycle ergometer)
- Astrand-Test (on cycle ergometer)
- PWC 170 (on cycle ergometer)
- Three-stage Swedish protocol by Sjostrand (on cycle ergometer)
- R. Bruce protocol (on treadmill)
- J. Naughton protocol (on treadmill)
- Any protocol constructed by the user (on cycle ergometer or treadmill)

The possibility of gaining of objective recommendations concerning quality and quantity of exercise needed for a beneficial effect (recommended training parameters: running and walking speed, cycle ergometer training schedule, training pulse, energy loss per day, etc.) make the program attractive for doctors in sports medicine and for specialists in physical rehabilitation and also for individuals willing to keep them in shape.

Certainly, your work with program can be facilitated by function of automatic report generation containing objective assessment of exercise testing results and interpretation based on our algorithms.

The program has a convenient structured database of patients. The volume of this database can be limited only by the capacity of your PC hard disk.

If the stress test system includes Poly-Spectrum-8/EX digital ECG unit which transfers full electrocardiogram to PC by radio (using Bluetooth interface), the most part of problems associated with noises caused by intensive movements of patient cable will disappear. Besides, in case Poly-Spectrum-8/EX application, you can put the cycle ergometer or treadmill in any place within 7-10 meters from computer without paying attention to ECG wires positioning.

Variant of elements displaying with HR and workload graphs representation.

Selection of exercise testing protocol.

Variant of elements displaying with graph representation of ST displacement in all leads.

Wide Possibilities of Setting up

A big list of exercise testing protocol is available. It is possible to set up many testing parameters and also create testing protocols according to your own requirements. You can also adjust the color for ECG, figures and graphs drawing and also size and visibility of different screen areas.

Test Performing

During the test performing the main part of the screen is occupied by the curves area. The patient ECG recorded in the real-time operation mode is represented here. The lead system (standard, Frank or Nehb system), number of displayed leads, ECG sweep speed and sensitivity are software switchable. The averaged cardiocomplex field is to the right of the curves area. Averaging is done by several last complexes on-line. The averaged complex is represented as superimposed with displacement on the complex, which is averaged through the rest ECG recordings. HR (or R-R duration), workload and BP time variation curves are given under the curves area.

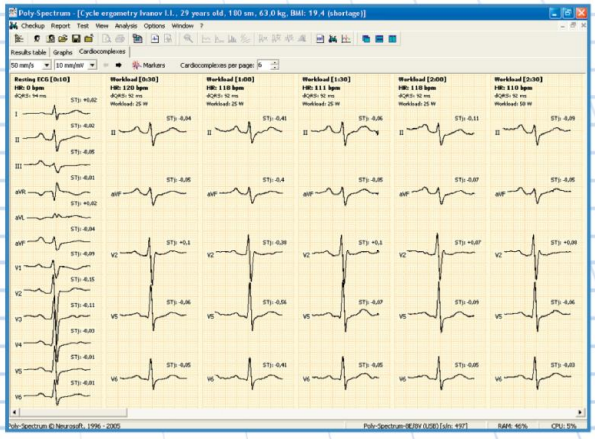
Besides, time variation curves of ST displacement through all leads may also be shown under the curves area. To the right of the curves the numerical information is shown, these are test elapsed time, current stage elapsed time, current HR, current workload, cycling speed for cycle ergometer or speed and grade for treadmill. A switch to the next stage can be done manually (by keystroke) or automatically (by the software preset interval).

At any time you can "freeze" ECG by keystroke. Then you can send it in ECG measurement and interpretation window or print it. The number of blood pressure measurements and their savings is unlimited. If BP measurement module is available, the program can download measured values automatically. Monitoring and saving of whole ECG record to PC memory is done during recovery period as well as during exercise period.

"Freezed" ECG window.

ECG measurement and interpretation window.

ECG monitoring and recording in the recovery period.



Averaged cardiocomplexed stored in the PC memory.

Record Analysis

At the end of the test, any ECG fragment can be analyzed in ECG measurement and interpretation window. The analysis can be done by selected or averaged for any interval complex. Besides, every 30 seconds the program makes automatic averaging of small ECG fragment. The averaged fragment is stored in PC memory. After finishing of testing all the averaged fragments are displayed in the separate window and they also can be analyzed.

ECG measurement and interpretation window contains the table of amplitude-time parameters of cardiocomplex in all the leads.

In addition to ECG analysis a number of ergometric parameters can be analyzed after exercise testing. Some of them are represented in "Ergometry" or "Treadmill" window. Moreover, combined graph of HR, BP, workload changing and combined graph of ST displacement changing before and during the testing and also in the recovery period are shown here.

Automatic Report Generation

At the end of the test the program automatically generates the checkup report. It consists of interpretation text; per minute exercise and recovery protocols with HR, BP and double product values, ergometric parameters table, automatically defined functional class and exercise tolerance values (physical working capacity), quality and quantity of exercise needed for a beneficial effect.

You may choose the elements you would like to include in the report. The most representative ECG fragments (at user's option) with QRS complex amplitude-time parameters tables can be included in the report. Besides, you may also print the whole ECG record.

Checkup Storing

The checkups are stored in the database providing the advanced capabilities of search. The records can be stored not only on the computer connected to digital ECG stress test system but also on any remote computer (file server).

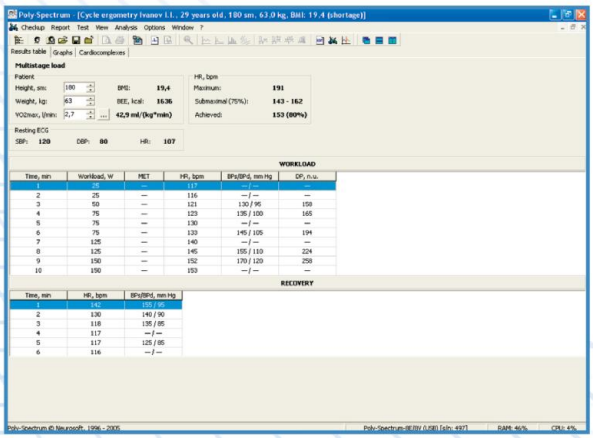
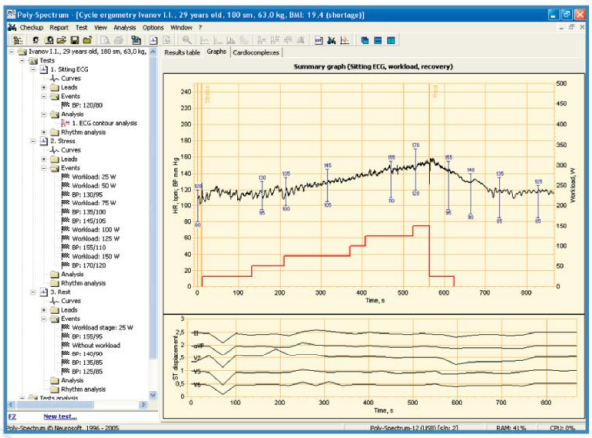
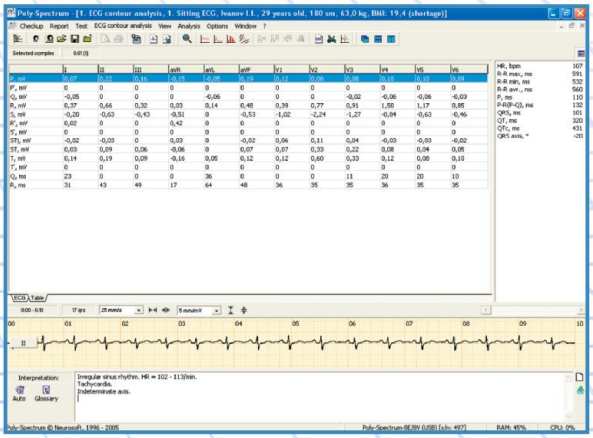


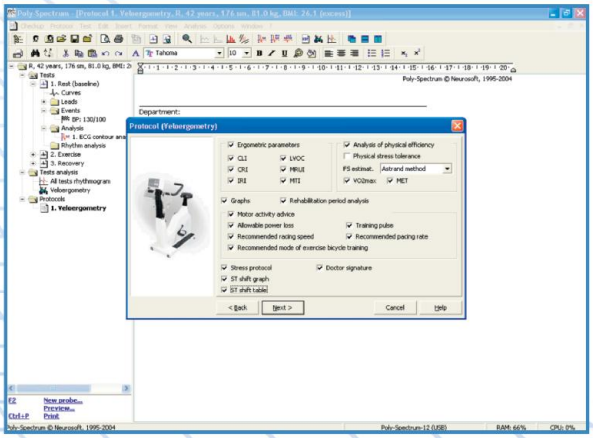
Table of cardiocomplex amplitude-time parameters by all leads in ECG measurement and interpretation window.



Combined graph of HR, BP, workload changing and combined graph of ST displacement changing before and during the testing and also in the recovery period.



"Ergometry" or "Treadmill" window with ergometric parameters table



Selection of elements which will be included in the report.

Specifications

Digital ECG Systems

	Poly-Spectrum-8/E	Poly-Spectrum-8/EX
Number of ECG channels	12	12
ECG leads:	I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6; X, Y, Z (by Frank)	
A/D converter	12	24
Sampling rate	2000 Hz	250, 500, 1000 Hz
Bandpass	0.05 – 250 Hz	0.05 – 250 Hz
High pass filter	35 Hz (myogram), 75 Hz	35 Hz (myogram), 75 Hz
Low pass filter	0.05 Hz (3.2 s)	0.05 Hz (3.2 s)
Additional filters (switched by software):	AC, drift filter	AC, drift filter
Sensitivity	2.5, 5, 10, 20, 40 mm/mV	2.5, 5, 10, 20, 40 mm/mV
Paper speed	5, 10, 12.5, 25, 50, 75, 100, 200 mm/s	5, 10, 25, 50, 75, 100, 200 mm/s
Interface	USB	Bluetooth
Defibrillation protection	yes	yes
Control of electrode setting	yes	yes
Safety	class II, BF type	class II, BF type
Power supply	5 V (from PC)	2 batteries of AA type (R6)
Continuous working time (from one set of power source)	–	not less than 6 hours
Physiological signals transmission range	–	not less than 7 м (in the direct visibility range)

«Lode Valiant» Treadmill

Belt speed range	1 – 22.5 km/hr. (continuously variable)
Smooth startup	yes
Elevation range	0 – 25% grade
Maximum patient weight	204 kg
Standard full handrail set	yes
Standard emergency stop switch	yes
Weight	181.4 kg
Walking area width/length	457 mm/1524 mm
Floor space required width/length	737 mm/1956 mm
Power supply	208 – 240 V AC, 50/60 Hz
Interface	COM-port

Cycle Ergometers

	Kettler X5	Lode Corival	SECA CARDIOTEST 100	e-Bike Ergometer
				
Braking system	electromagnetic	electromagnetic	electromagnetic	electromagnetic
Load range, watt	25 – 400 (rmp independent)	7 – 750 (rmp independent) 750 – 1000 (rmp dependent)	25 – 400 (rmp independent)	20 – 999 (rmp independent)
Minimum increment, not less than, watt	5	1	5	5
Maximum patient weight, kg	150	150	120	140
Blood pressure measurement module	no	optional	no	optional
Dimensions, mm	1080×530×1230	1150×600×1140	1195×490×850	900×460×1350
Weight, kg	47	56	38	61

If you intend to use the exercise testing device which is not supported by Poly-Spectrum-Ergo software, Neurosoft Company can modify the software. In this case the approval of the exercise testing device manufacturer and the provision of the interface protocols are required.

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