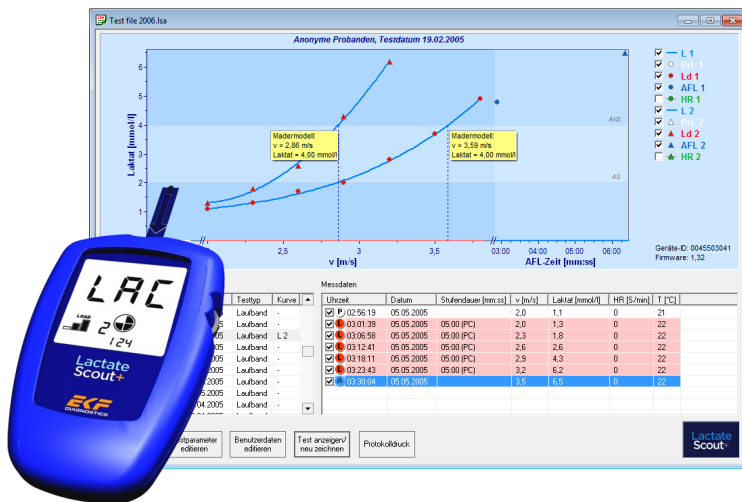


Lactate Scout Assistant



Software installation and user manual

INTENDED USE

The Lactate Scout Assistant analysis software 1.0.7 is only to be used with the Lactate Scout+ handheld device and a certified PC Connection (USB data cable for older generations of devices or integrated Bluetooth® interface for the newer generations) for transmission of test results to a standard Windows® PC and for subsequent evaluation. The intended use of the Lactate Scout+ system is to determine the lactate concentration in capillary whole blood primarily for sports medical analysis.

For correct usage of analyzer, USB cable or Bluetooth® interface, PC and all other items in use for the application refer to their respective product documentation, instructions for use and application notes.

WARNING NOTICES

The handling of electronic equipment generally involves potential risks. Handling mistakes can cause impairment of function or irreversible damage of the connected devices and loss of data.

The Lactate Scout Assistant analysis software was tested for its compatibility with a wide range of common PC environments and configurations. Still, we cannot exclude all potential risks of conflicts with individual computer configurations, applications, drivers or hardware components during the installation or application of this software. **It is strictly recommended to save relevant settings and data prior to the installation!**

SensLab GmbH does not take any liability for 3rd party components. Impaired function, data loss or any other defects and resulting claims other than the provision of the software are not covered by SensLab GmbH.

If you are uncertain of any instruction given herein please contact your system administrator, an authorized PC support or ask your local dealer for assistance with the software installation or check of your PC system.

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1. GENERAL FEATURES

As a data manager for the Lactate Scout+ device, the Lactate Scout Assistant software offers many options for organizing results, data export as well as the graphic display. In addition, further relevant parameters of performance diagnostics as training conditions, effort level, heart rate and much more can be entered and edited manually.

These features help beginners to get an overview in the essential parts of lactate based training. But it's also a helpful tool for professionals, focused to a „pure“ data collection: In contrary to some other software solutions, the Lactate Scout Assistant doesn't interpret the transmitted data and is intentionally limited to a few calculation models in its analysis method.

According to the various sports disciplines and scientific recommendations, there are different commercial software solutions in the market, realizing a wide range of more sophisticated options (as treadmill control, digital data import from heart rate monitors, VO₂ analysis, various lactate threshold models etc.). SensLab and EKF diagnostic welcome these developments and are engaged in technical support of 3rd party software for best customer satisfaction: The Lactate Scout Assistant does not compete herein, but offers a low budget access to PC based sports diagnostics for everyone. The current release 1.0.7 includes following features:

1. Import measuring data from the Lactate Scout / Lactate Scout+ device by special USB cable or integrated Bluetooth® interface in the newer Lactate Scout+ device generations.
2. Chart summary of readings (single or step test measurements) including time, date, memory ID, step length, lactate, heart rate and temperature
3. Graphic display of up to two step tests simultaneously, including approximation of lactate curves based on polynomic or spline calculation
4. Protocol print of up to two step tests simultaneously, including user data, lactate charts and table
5. Analysis of the individual anaerobic lactate threshold (IANS), heart rate relation and effort level at IANS
6. Step test types: Treadmill, bike ergometer or field test

7. At field tests, the velocity at IANS for the manually defined distance and for 1000 meter standard distance is calculated additionally
8. Supported analysis models: Mader, Keul, Simon
9. Free Cursor positioning to calculate corresponding data as effort level and heart rate at each point of the displayed lactate curves
10. Import of measured or pre-defined step lengths from Lactate Scout+ analyzer (by using „dur“ or „clc“ function)
11. Automatic compensation of effort level / lactate interpolation in case of aborted step test (using „dur“ function of the device)
12. Manual entry and edit of step length, effort level, imported lactate readings, heart rate values, time and date
13. Manual grouping of single measurements to step test measurements, manual definition of training level (PreLoad, Load or AfterLoad / P, L, A)
14. Reset function for markings / data selection
15. Parallel use of multiple devices (in different application windows)
16. Small file size for convenient data storage
17. Free grouping and export of selected data in new files, e.g. for creating individual data sets to manage different persons
18. Export of data as .CSV-file for import in common office applications
19. Language support for German, English, Spanish or Italian

Information about additional options like direct manual entry of new data sets or additional lactate values (without PC connection), import functions for EKF Biosen devices, entry of hematocrit levels and individual test profiles is available through EKF Support or the software providers listed in the attachment.

2. SOFTWARE INSTALLATION

To install the software there are the following system requirements:

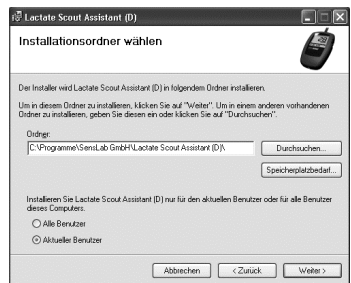
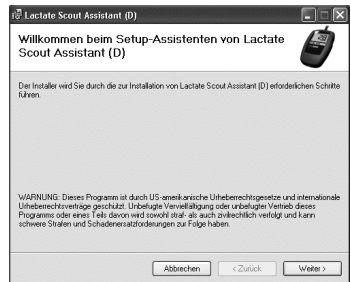
- 1 GHz or higher Pentium-compatible CPU
- 512 MB RAM and 20 MB free hard disk space
- Operating System: Windows® Vista, Windows® 7, Windows® 8 or Windows® 10

Start the installation by double-clicking on the file „setup.exe“ and follow the instructions. When starting the installation, a welcome screen appears.

Please ensure that important data is backed up and open applications are closed to prevent system crashes or data loss! Click on „Next“.

Now you can select the directory for installing of the Lactate Scout Assistant Software. By default, a new folder „SensLab GmbH“ is created in the „Program Files“ folder on the C: partition, where usually also other applications are accessible via the Start menu in the Windows taskbar („All Programs“). To install the Lactate Scout Assistant in a different directory, click on the „Browse“ button. To make the software accessible to all users, select the option „All Users“.

Now click on „Next“ and the installation is performed with the appropriate settings. On the Windows desktop, you will see this icon:



3. PC CONNECTION

Lactate Scout Assistant allows manual editing of lactate and other values, but is dependent on a connection the Lactate Scout+ device to receive the initial data set. Without PC connection only existing files or the included sample file can be edited but no further data sets can be added.

The latest generation of the Lactate Scout+ handheld device uses an integrated Bluetooth® interface to transfer the measuring data to the PC. To use the interface, the included USB Bluetooth® dongle has to be installed once on the PC. The procedure is described in the documentation on the CD, „**Instructions for Bluetooth® installation for Lactate Scout+**“ and corresponds to the usual steps for installing new hardware. The risk of system conflicts has been reduced by testing in different environments, but cannot be completely eliminated due to the complexity of modern computer systems and upgrades of software and other device drivers and is therefore not the responsibility of the manufacturer or provider.

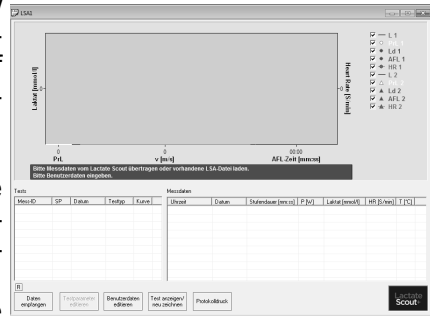


To transfer the measuring data to the software, make sure the Lactate Scout+ device is turned on and the Bluetooth® module has been activated in the device. At the beginning of the data transfer, the Lactate Scout Assistant automatically scans all available serial ports for the port that has been assigned to the Lactate Scout+ device. If the Bluetooth® connection or data transfer fails despite of a correct installation, check the system settings of the PC with help from a qualified service provider.

Lactate measurement devices of third parties that do not support the data format of the Lactate Scout Assistant software should be used with alternative software solutions (possibly third-party) featuring manual input options.

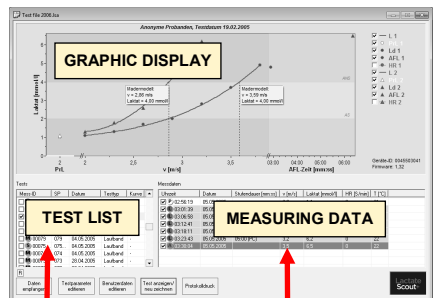
4. USER INTERFACE

At start of the Lactate Scout Assistant (by double click on the desktop icon or by selecting from the Start menu), a new blank application window will appear without any data sets. Familiarize yourself with the main elements of the user interface.



The upper part of the window shows the menu which allows access to most functions of Lactate Scout Assistant. Frequently used functions like Open, Save, Print etc. can be available directly above their related symbols.

The major part of the displayed area is consumed by the graphic display, where the lactate curves and other elements are drawn. Clicking in the check box on the right side, the display of separate parameters can be switched on or off.



Below this area, sometimes a red box with problem reports (e.g. „curve cannot be approximated“) or special notes for required data entries will appear (e.g. „Please import data from Lactate Scout or open existing LSA-file“: This message will usually appear when launching the software).

- M Single measurement
- S Step test:
- P Resting value / Preload / PrL
- L Exercise value / Load / Ld
- A „Cool down“ value / After load / AFL

To continue open the sample file “example.lsa“ by menu „File | Open“. Using this function from the menu or the corresponding symbol you can also open existing lsa-files for editing their data. A new window opens with the selected data sets (you may close the empty window).

All data read from the device are shown in the “test list“ in the lower left corner in descending order: The latest value is displayed on top of the list. The different columns are split as selection, type of measurement (single „M“, step test „S“), ID (unlimited registration number of data set), storage position in device memory (1 - 250), date, test type and display (curve L1/L2).

Clicking in a data row, all related readings and values appear in the „value directory“ at the right side, additional columns as selection, effort level (pre-load, load or after-load, P, L, A), time, date, step duration (with preset timer), effort unit (e.g. speed or power), lactate, heart rate and temperature.

While effort level, time, date, lactate value and temperature are transferred automatically from the device, step duration and intensity can only be calculated after the entry of the “test parameters” (see example below). **Heart rate values always need to be entered manually**, from personal notes or data stored in a pulse watch.

Testtyp		Kurve	Uhrzeit	Datum	Stufendauer [mm:ss]	v [m/s]	Laktat [mmol/l]	HR [S/min]	T [°C]
Laufband	-		<input checked="" type="checkbox"/> P 15:33:40	10.10.2004		0,0	1,3	80	24
Laufband	-		<input checked="" type="checkbox"/> P 15:34:21	10.10.2004		0,0	1,3	90	24
Laufband	-		<input checked="" type="checkbox"/> P 15:35:27	10.10.2004		0,0	1,2	95	24
Laufband	-		<input checked="" type="checkbox"/> L 15:50:38	10.10.2004	06:40 [PC]	3,0	2,6	110	23
Laufband	-		<input checked="" type="checkbox"/> L 15:51:25	10.10.2004	06:40 [PC]	3,0	2,4	120	23
Feldtest	L 1		<input checked="" type="checkbox"/> L 15:50:3	10.10.2004	05:42 [PC]	3,5	4,2	130	23
Laufband	-		<input checked="" type="checkbox"/> L 16:05:54	10.10.2004	05:42 [PC]	3,5	4,1	0	23
Laufband	-		<input checked="" type="checkbox"/> L 16:07:04	10.10.2004	05:42 [PC]	3,5	4,3	0	23
Laufband	-		<input checked="" type="checkbox"/> L 16:22:39	10.10.2004	05:00 [PC]	4,0	7,9	0	23

In order to enter or edit values in the columns click on the corresponding field in the line. Enter or edit the values and press “Enter” / “Return” to confirm. Effort levels can be edited as well by clicking on the corresponding line: A selection field is displayed and enables a new assignment of the level (PrL, Ld, AFL)

Testtyp		Kurve	Uhrzeit	Datum	Stufendauer [mm:ss]	v [m/s]	Laktat [mmol/l]	HR [S/min]	T [°C]	
Laufband	-		<input checked="" type="checkbox"/> P 15:33:40	10.10.2004		0,0	1,3	0	24	
Laufband	-		<input checked="" type="checkbox"/> P 15:34:21	10.10.2004		0,0	1,3	0	24	
Laufband	-		<input checked="" type="checkbox"/> P 15:50:3	10.10.2004	PrL 00:04	0,0	1,2	0	24	
Laufband	-		<input checked="" type="checkbox"/> L 15:50:3	10.10.2004	Ld 00:04	06:40 [PC]	3,0	2,6	0	23
Laufband	-		<input checked="" type="checkbox"/> L 15:51:2	10.10.2004	AFL 00:04	06:40 [PC]	3,0	2,4	0	23
Feldtest	L 1		<input checked="" type="checkbox"/> L 16:05:00	10.10.2004	05:42 [PC]	3,5	4,2	0	23	
Laufband	-		<input checked="" type="checkbox"/> L 16:05:54	10.10.2004	05:42 [PC]	3,5	4,1	0	23	
Laufband	-		<input checked="" type="checkbox"/> L 16:07:04	10.10.2004	05:42 [PC]	3,5	4,3	0	23	

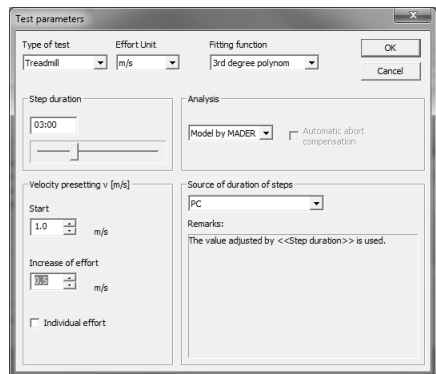
If a single measurement (M) is selected from the test list, the value directory shows only the related, single data set in a single row. A step test measurement (S) contains a sequel of data sets, as shown above.

Please note, the data sets of step test measurements are listed in the value directory by their date from top down: This means the first reading appears at the top, and the latest reading at the end of the directory.

5. BUTTONS & MENUS

After opening the example file or importing stored data from Lactate Scout+ device, select test data from the test list in the left window. To select additional data sets, hold down the CTRL-key on the PC keyboard and click on data sets in the rows below or above. After selection, the button „Edit test parameter“ will be active.

Test parameters can only be edited for a individual test (single test or step test). Doing this settings are applied that are essential for the analysis of the selected data set. At first you have to select the test type (treadmill, ergometer/home trainer or field test). The related effort unit (km/h, m/s, Watt) will be set automatically but can be edited manually afterwards. Now you have to set the step duration (equal for all selected measurement data sets) by moving the square on the line at left or at right by mouse, or enter the value manually. The usual step duration is between 3 to 5 minutes. Alternatively to the described settings on PC, the Lactate Scout+ device can also be used as data source for step duration. In this case the „dur“ option of the Lactate Scout+ has to be used (see Lactate Scout+ User Manual).



To calculate the individual anaerobic threshold (IAT), you can select different mathematical models from Keul and Simon in the field „Analysis model“ (only available for treadmill and field test). The standard setting is the established Mader-Model, operating with a fixed threshold of 4 mmol/l. Finally you must set the effort level (power/speed) by entering the start level and the incremental increase. If these values are not defined yet or unknown, you have to select „Individual Setting“. If all settings are done, click „OK“ to save it.

Click on the third button to enter the personal data. These settings not related to single data sets but to the whole file and will appear in the protocol print. As minimum Name and Surname need to be entered to ensure correct assignment of the data.

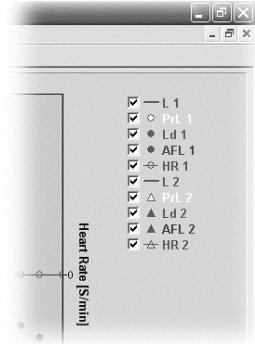
6. GRAPHS & CURVES

To display a lactate curve, select a step test (orange „S“), containing a number of data sets with measurements. Click into the square beneath the corresponding line in the left test window to select the test for display. Single measurements (green „M“) cannot be displayed directly. They must be manually converted to a step test at first: Hold down the CTRL-key on your PC keyboard, and select the related single measurements by clicking (left mouse button) in their row in the test list. After marking all single measurements for converting in a step test, click the right mouse button. Next to the mouse pointer the option „Convert to step test“ appears. To select this option, move the mouse pointer onto and click the left mouse button to confirm. PLEASE NOTE: After converting single measurements to a step test, it is not possible to revoke this command! There is also no option to add single or step test measurements to another step test. To cancel or to edit the selection click in a free area and repeat the selection.

Mess-ID	SP	Datum	Testtyp	Kurve
<input type="checkbox"/> M 02399	149	01.10.2004	Laufband	-
<input type="checkbox"/> M 02398	148	01.10.2004	Laufband	-
<input type="checkbox"/> M 02397	147	01.10.2004	Laufband	-
<input type="checkbox"/> M 02396	146	01.10.2004	Laufband	-
<input type="checkbox"/> M 02395	145	01.10.2004	Laufband	-
<input type="checkbox"/> M 02394	144	01.10.2004	Laufband	-
<input type="checkbox"/> M 02393	143	01.10.2004	Laufband	-
<input type="checkbox"/> M 02392	142	01.10.2004	Laufband	-
<input type="checkbox"/> M 02391	141	01.10.2004	Laufband	-
<input type="checkbox"/> M 02390	140	01.10.2004	Laufband	-

After converting the selected single measurements a step test symbol “S” is displayed on the left instead of the previously marked single measurements. The related single measurements of this step test are shown in the “Measuring data” window. They stay marked automatically, as long as no other action happens.

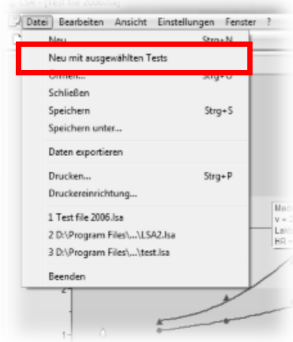
To calculate a curve from step test data, the test parameters must be defined: If the message „Please enter test parameter for curve...“ appears click on the button „Edit test parameter“ and make all required settings as described before. Using the button “Display test / redraw chart“ the graph is updated, e. g. following a change of single results or test parameter. Single values of a step test can be displayed or hidden by check-marking the corresponding box. Two curves (L1, L2) can be selected and displayed simultaneously. If heart rate values have been entered manually, they can be displayed (HR 1, HR 2), too. In the default setting all boxes are check-marked and the values are shown. By clicking on the corresponding box whole curves or sections like pre-load, load and after-load (PrL, Ld, AFL) are displayed or hidden.



7. DATA MANAGEMENT

The Lactate Scout+ device stores up to 250 readings in its internal memory, before the first readings will be overwritten automatically by the latest ones. All readings are registered in the device with a unique ID, counting up to 65.536: This is used to automatically match the imported device data with already existing data in the software file, completed with memory position number (SP), test mode (single or step: Pr, Ld, AFL), timer values, temperature, date and time.

To administrate the readings in compact files or to separate data sets of different people, you can make a free selection of data and copy it into a new file: To reset potentially existing selections, click the Reset-Button („R“, above the button „Receive data“). Press the Ctrl-key on your PC-keyboard and click with the left mouse button in the rows of the test list, to select the data sets. Then, move the mouse pointer to the menu bar, select „File“ and click on the option „New from selected tests“.



Now you can save the selected data in a separate new file, giving a specific name and edit them independently from the original file (e.g. assign individual user data).

The data set of the original file is not altered (the selected data are only copied, not moved), the test ID's of the copied data sets are kept in the new file as well.

If you intend to view or edit selected data in other applications like MS Excel, proceed as described above and click on "Data export" in the menu "File". The data can now be saved with a chosen file name in CSV-format which can be imported into standard applications like Excel etc.

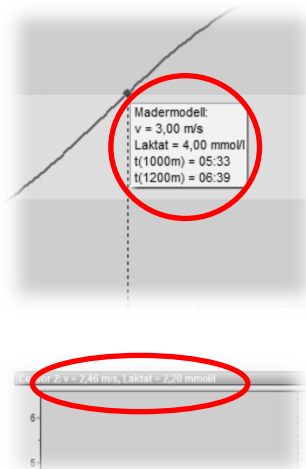
When forwarding data to third parties, please make sure to protect the personal rights of individuals carefully and anonymize the user data.



8. ANALYSIS

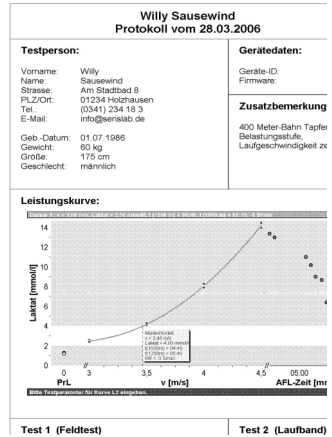
Drawing the lactate curves, the lactate threshold (IAT) will be calculated and displayed as well. The formula for calculation can be set at „Edit test parameter“. Additionally to the lactate value at the IAT, a yellow square indicates the analyzed effort grade (power or speed) and target times for field tests (1000 m and 1200 m distances). The heart rate at IAT can also be calculated, if the heart rates have been entered manually before. The corresponding heart rate values can be noted together with the memory position number of the Lactate Scout+ reading for easier identification later on.

Additionally to the calculated and shown IAT, in the menu „Settings“ a intercept (cursor) can be activated and moved along the lactate curve (L1, L2). This allows to calculate the data at each point of the curve. The calculated data appear in a blue bar above the graph diagram, heart rates are shown as beats per minute (bpm). Expanded analysis models or automatically generated training plans are not intended in the future development of the „Lactate Scout Assistant“: For this we recommend commercial 3rd party solutions, examples of which are listed at the end of this document.



9. PROTOCOL PRINT

Clicking the button „Print protocol“ user data, test parameter and analyzed data sets can be printed as graphs and tables. According to the display settings, some elements of the charts are shown or hidden. The two pages print-out is issued using the “Print” dialog, further settings can be done under “File | Printer settings”.



10. SPECIAL OPTIONS

Graph display: Fitting function

To connect step test values to a curve, polynomial functions are the usual method for calculation. The calculation based on polynoms of 3rd order is also the standard setting of the Lactate Scout Assistant, generating the typical shape of a lactate curve.

Often the real measuring points are not exactly in line with the calculated curve. In contrast to other software solutions Lactate Scout Assistant does not skip the display of the real measuring points (independent from the curve). In some cases the curve cannot be fitted mathematically to a polynomial (“**Curve not approximable**”).

As an alternate calculation model / fitting function, the option „Edit test parameter“ offers to select „Splines“ instead of “Polynomes”. Using this calculation the curve is fitted through every measuring point giving a more objective picture. On the other hand curves calculated with “Splines” are less harmonic, furthermore - just like with polynoms - not every set of data can be matched to a graph using splines.

In exceptional cases a curve can neither be fitted to a graph using polynomial or spline functions. In this case evaluate the data set for clear “outliers” and hide them (remove the check-mark from the box in measuring data window on the right and click “Display test / redraw chart”).

Automatic compensation of aborted step test

When a person reaches the limit of her endurance it may happen that the step test cannot be completed and has to be aborted. The lactate value reached at this point of time can still be used for a valid analysis. For this the function "Automatic compensation of aborted step test" must be activated (checked) under "Edit test parameters".

Additionally, the step test mode (PrL, Ld, AFL) and the timer functions (dur, cdn) of the Lactate Scout+ must be used during the step test. E.g., if a step duration of 5 min was set, and aborted after 3 min already, the user can stop the running countdown manually by pressing the scrollwheel-button briefly. The time of this abort is stored together with the following lactate reading. Lactate Scout Assistant (as well as some commercial 3rd party solutions, i. e. Winlactat) calculate the approximate lactate level for the complete step duration based on these data. In the graph diagram and the measuring data window the real reading (at time of abort, blue colored) will appear as well as the approximated value (black arrow).

Bluetooth compatibility mode

For data transfer using the integrated Bluetooth® interface, the operating system Windows® XP with Service Pack 3 or later is recommended. This operating system meets all requirements for an easy installation and easy use. For PCs with older operating systems a special driver software is required for using Bluetooth®. In case of repeated data transmission problems despite of using the appropriate driver, a special Bluetooth® compatibility mode can be enabled in the Lactate Scout Assistant menu „Settings“. In this mode, the software uses larger time intervals for Bluetooth® communication, in order to ensure the connection. The transfer time increases accordingly.

Reset to manufacturer settings / Reset device memory

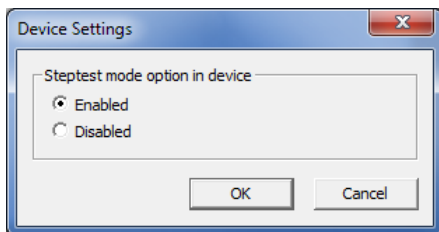
To reset the device memory and different settings of the Lactate Scout, there is a hidden function using the Lactate Scout Assistant: If the device is connected and switched on, hold down the CTRL-key and press „R“ on your PC keyboard. A warning dialog will appear. To confirm and to execute the action (total reset of device memory), click „Yes“. Standard setting is „No“. Confirm the action by clicking „Yes“. An acoustic signal is given by the Lactate Scout+, and the device is reset to manufacturer settings. Doing this all test results are deleted from the memory of the device.

PLEASE NOTE: The reset of the device memory is not reversible!

Additionally to the stored readings („mem“), timer settings and sensor code are deleted and must be entered again. Upon insertion of a new sensor the code “77” is shown as default setting. We recommend to use this reset function only in exceptional cases and not during regular use. See section 7 and Lactate Scout+ User manual, “memory”)

De-activate step test function

In order to prevent accidental switching into the step test mode of the Lactate Scout+ device or if step test measurements should always be recorded as single measurements the step test function can be deactivated using the Lactate Scout Assistant Software rev. 1.0.7. In order to change this setting the Lactate Scout+ device must be turned on and the Bluetooth® function must be activated. In the “Settings” menu click on “Device settings”. The current setting will be called from the device and is displayed in the dialog “Device settings”. Select the appropriate setting and confirm by clicking on “OK”. The setting is saved to the device and a message indicates the successful transfer of the setting.



11. THIRD PARTY SOLUTIONS

All listed software solutions support a direct data import via the interface of the Lactate Scout+, independently from the type of connection (Bluetooth or cable connection). SensLab GmbH and EKF diagnostic GmbH take no liability for the functionality, performance or analysis results when software from third-party providers is used. Inquiries about prices, dealers and support of third party products must generally be addressed to the provider of the software.

LACTATE EXPRESS

Easy and affordable access to sports diagnostics, supporting Polar heart rate monitors, BMI, VO2max and different training profiles (www.mesics.de)

WINLACTAT

Professional tool with a wide range of analysis models and connectivity to e.g. h/p/cosmos, Polar and EKF BioSen. Additionally available in the professional version: interface to Cycclus2 high performance ergometer (www.mesics.de)

