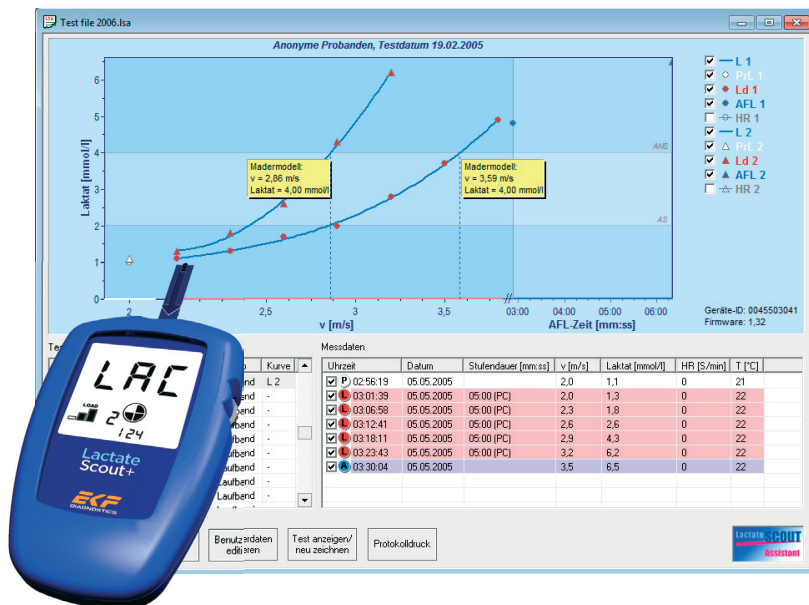# Lactate SCOUT - Assistant

Product information for „Lactate Scout Assistant" analysis software
(Version 1.0.5 for Windows operating system)
for correct use with the Lactate Scout+ analyzer
to determine lactate in whole blood

SensLab
member of EKF group

INTENDED USE

The Lactate Scout Assistant analysis software is only to be used with the Lactate Scout+ handheld device and a cerified PC Connection (USB data cable for older generations of devices or integrated Bluetooth® interface for the latest generation) for transmission of measurement data 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.

To ensure the correct use and to avoid potential mistakes, damages or loss of data, please read the product information and instructions for the Lactate Scout+ device, the USB cable or Bluetooth® interface, the PC-system and the installed soft- and hardware components carefully.

WARNING NOTICES

The handling of electronic components and computer equipment involves generally potential risks. Handling errors can cause impairment of functionality or irreversible damage on the connected devices, and loss of data.: So it is strictly recommended to take care during the installation and operation with the „Lactate Scout Assistant" software, regarding technical documentations, instructions and system messages of the PC and its components.

The „Lactate Scout Assistant"-software was checked of compatibility to a wide range of usual PC-environments and configurations. Anyway, we cannot exclude all potential risks by conflict with individual computer configurations, applications, drivers or hardware components during the installation or application of this software product: So it is strictly recommended to store settings and data (or to make a complete backup) before! The SensLab GmbH does not accept any claims such as compensation for loss of use, loss of earnings, or compensation for loss of stored data, or reduced or lost functionality of any 3rd party components.

If you are in doubt of any instruction given herein, or if you are in doubt of your PC configuration and standard procedures of your operating system, please contact an expert or ask your local dealer before. For an experied PC user, the complete installation of the „Lactate Scout Assistant" software takes less than 10 minutes.

CONTENT

1. GENERAL FEATURES

As a data manager for the Lactate Scout device, the Lactate Scout Assistant software offers many options for organizing readings, data import and export as well as the graphic display of lactate curves and other values. In addition, further relevant parameters as training conditions, effort level, heart rate and much more can be entered and managed 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, focussed 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 1.0.5 includes following features:

1. Import measuring data from the Lactate Scout / Lactate Scout+ device by special USB cable or integrated Bluetooth® interface in the latest Lactate Scout+ device generation.

2. Chart summary of readings (single or step test measurements) including time, date, memory ID, step length, lactate, heart rate, 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, charts and analysis results

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 lenghts from Lactate Scout pocket analyzer (by using „dur", „cdn" 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. EMail-friendly file format (small sized)

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 usual office applications

19. Language support for German, English, Spanish or Italian (selectable during installation, if installed from Service-CD: Not included in download)

Additional options as direct manual entry of new data sets or additional lactate values (without PC connection) are not featured by the Lactate Scout Assistant. Please ask your dealer for commercial software solutions and take a view of our 3rd party software directory on the last page of this manual.
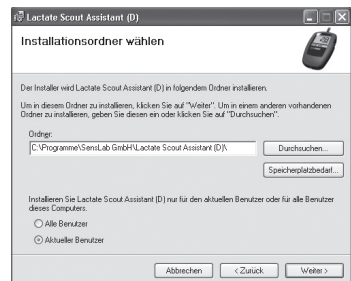
2. SOFTWARE INSTALLATION

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: Microsoft Windows® XP (SP3), Microsoft Windows® Vista, Windows® 7 or Windows® 8

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".
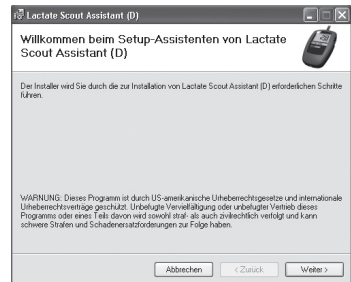
Now you can select the directory for installing of the Lactate Scout Assistant Software. By default, a new folder „SensLab GmbH" is created in the „Program Files" folder on the C: partition, where usually also other applications are accessible via the Start menu in the Windows taskbar („All Programs"). 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

To get your data into the Lactate Scout Assistant software, a connection to the Lactate Scout+ handheld device is required. Without the appropriate PC connection, it is only possible to edit already created files or the (automatically installed) sample file, but you cannot add additional records.

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 can not 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 scans automatically 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

Launching the Lactate Scout Assistant (by double click on the desktop icon or selecting from the Start menu), a new blank application window will appear without any data. At the beginning, please make familiar with the essential control elements and display areas of the user interface:
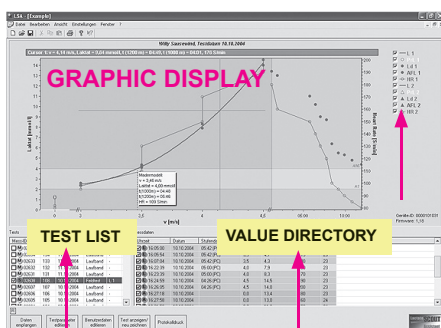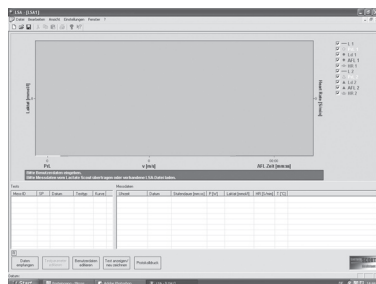

As usual for Windows applications, a menu bar is placed at the top for access to frequently used operations. Essential functions (as „new file", „open", „save" and „print" etc.) are additionally available as control symbols below.

The biggest part is taken by the graphic display, where the lactate curves and other elements will be draft. 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 while launching the software).

Ⓜ Single measurement
Ⓢ Step test:

Ⓟ Resting value / Preload (PrL)
Ⓛ Exercise value / Load (Ld)
Ⓐ „Cool down" value / After load (AFL)

To get in touch with the main functions, open the sample file „example.lsa" by menu „File/open". Within this function you can also open existing lsa-files for editing their data. For data transfer from the device, the Lactate Scout+ must be turned on and the Bluetooth® module must be activated. By clicking the button „Receive data", the software checks all serial ports to load data from the connected device. Please note, all Lactate Scout+ devices have an unique, internally stored ID. To avoid data conflicts by using different devices, you can open, view and edit the data from one device in one window only (no merging of data).

Now the data will be shown in a new application window, listed in the directory in the left corner („test list"). The latest readings are at the top, structured in columns: Selection, type of measurement (single „M", step test „S"), ID (unlimited registration number of data set), storage place in device memory (1-250), date, test type and display (curve L1 or L2).

Clicking in a data row, all related readings and values appear in the „value directory" at the right side, added by additional columns as Selection, effort level, time, date, step length, effort unit, lactate, heart rate and temperature. Regardless the most values are given by the device memory automatically, the calculation of step length and effort level needs additional information, to enter manually by the option „test parameters" (see below). **Heart rates must always be entered manually**, taken e.g. from the memory of a heart rate monitor or from personal notes, made during the training.

To enter or to edit specific data manually, click to the specific field in the sheet, enter the new data and confirm by „Enter/Return" on PC keyboard:

Effort levels can also be edited by clicking with the right mouse button: It appears a context menu (Preload PrL, Load Ld, Afterload AFL): Select the effort level by mouse pointer, and confirm by clicking left mouse button.

Selecting a single measurement (M) 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 (in contrary to the sorting of the test list at left, with the latest reading at the top). The display of measurement time helps to understand this sequel.

5. BUTTONS & MENUS

After loading a data 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, corresponding with the last selected test: By editing test parameters you can enter essential settings, as required for analysis and graphical display of selected data.


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, to edit manually afterwards. Different units (as mph) will be integrated in future software releases. Now you have to set the step length (unified for all selected measurement data sets) by moving the square on the line at left or at right by mouse, or enter the time (or distance, if field test was selected) for step length manually. During the training (Load phase), the usual step length is 3 min at least.
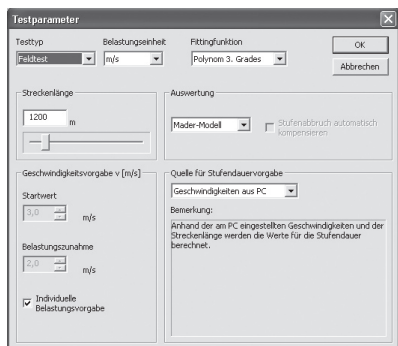
Alternatively to the described setting on PC, the Lactate Scout device can also be used as data source for step length. Therefore, the „dur" option of the Lactate Scout has to be used before (please note chapter 5, „timer functions" in the Lactate Scout instruction guide).

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 continual 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.

Clicking on the third button „User data", you have to enter the personal data. These settings (at least the christian and the familiar name) are related to all data in the file, and will also appear in the protocol print. Splitting data from different people is explained in chapter 7.
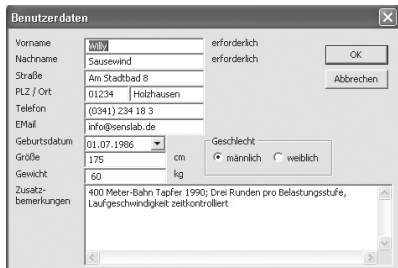
6. GRAPHS & CURVES

To draw a lactate curve, select a step test (orange „S"), containing three data sets of measurements at least. Therefore click into the square beside the „S" symbol in the test list (left window), and a little hook will appear. Single measurements (green „M") cannot be displayed directly. They must be converted manually at first to a step test: 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 (to „group" it), click the right mouse button. Close by the mouse pointer appears the option „Convert to step test". 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! Here is also no option to add single or step test measurements to another step test.
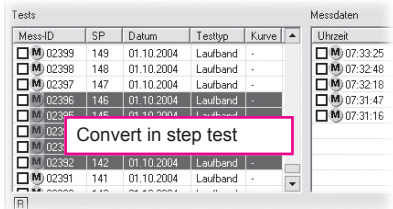
To cancel oder to edit selections before, release the CTRL key, click in a free area and repeat again. After converting, the selected single measurements are replaced in the test list by a step test measurement symbol („S"), combining the single data in a set, as shown in the value directory in the right window. They stay marked automatically, as long no other action happens.

To calculate a curve from step test data, the test parameter must be defined: If a red square appears with the message „Please enter test parameter for curve...", click to the button „Edit test parameter" and make all required settings as explained in chapter 5. If it's done (or if you have edited other settings e.g. in the value directory), click on the button „Draw / Redraw" to get an updated graph.

Some of its elements (resting/exercise/afterload value) can be added or removed from display by clicking in the different squares, setting or removing the little hooks. Two curves (L1, L2) can be selected and displayed for comparison, as well as heart rate curves (HR 1, HR 2) if their values are entered manually in the value directory.
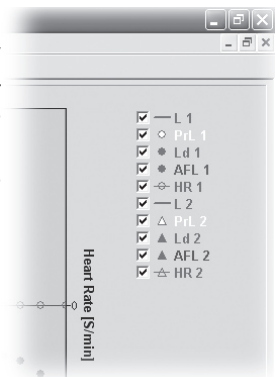
7. DATA MANAGEMENT

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. Additionally, all readings get a unique ID, counting up to 65.536: This is used to relate automatically the imported device data with already existing data in the software file, especially if the file contains more than 250 measurement data. The measurement ID (five characters) is also recognizable in the test list.

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"). Hold down the STRG-key on your PC-keyboard and click with the left mouse button in the rows of the test list, to select the data sets. Afterwards move the mouse pointer to the menu bar, selecting "files" and clicking on the option "New with selected data". Now you can save the selected data in a separate new file, giving a specific name. This method is recommended to split data sets for single persons (e.g. for protocol print), or to edit the data independently from the origin file: Its data content will not be changed by creating new files. Also the data sets in different files can always be compared by their unalterate measurement-ID numbers.

Another option for flexible data management is the export of selected data sets for editing in external applications, e.g. Office/Excel. To select the data, proceed as described above: Afterwards select "files" in the menu bar again and click on the option "Export data": Giving a specific file name, the selected data will now be stored in CSV-format, ready for import by regular Office applications.

Forwarding the data to third parties, please take generally care to protect carefully the personal rights of patients and anonymize the user data.
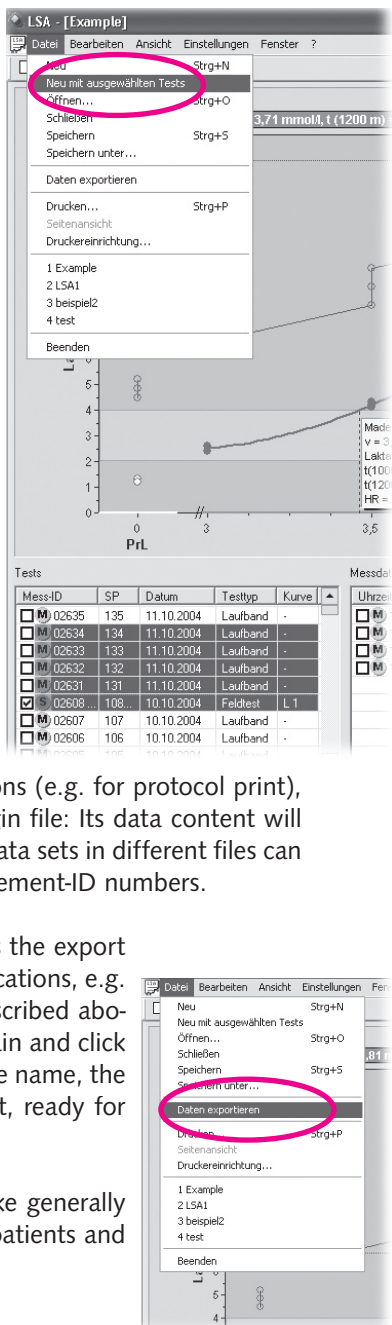
8. ANALYSIS

Drawing the lactate curves, the lactate threshold (IAT) will be calculated and displayed. The formula for calculation can be set at „Edit test parameter" (see chapter 5). Additionally to the lactate value at the IAT, a yellow square indicates the analysed 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 are entered manually in relation to the lactate values. Heart rate values can be taken e.g. from the memory of a heart rate monitor or from personal notes, made during the training and related to the time or the memory ID of Lactate Scout readings.
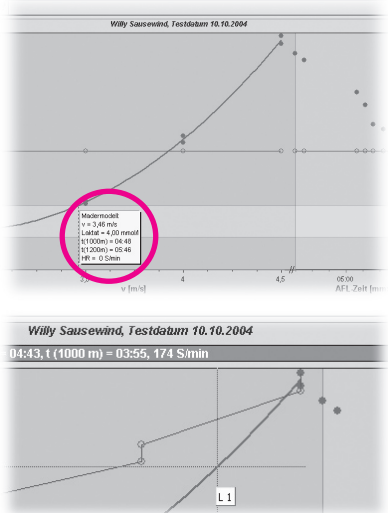
Additionally to the calculated and shown IAT, in the „settings" menu a cross line (cursor) can be activated and moved along the lactate curve (L1, L2). This allows to calculate the data at each point of the curve, independently from any analysis models. The calculated data appear in a blue bar above the graph diagram, heart rates are shown as beats per minute (bpm). Expanded analysis models or automatically generated training plans are not scheduled in the future development of the „Lactate Scout Assistant": Here we recommend commercial 3rd party solutions, as „Lactate Express" or „Winlactat" (www.mesics.de) with manifold options for professional users.

9. PROTOCOL PRINT

Clicking the button „Protocol print", all selected data of a step test (corresponding to the graphic display and its settings) will open the standard „Print" dialog, to print two protocol pages on a connected PC printer. Special settings as size and direction can be edited in „Printer settings", selectable in the „File" option of the menu bar. The protocol print shows the user data, a graph diagram and several sheets with all data, related to the selected step test.
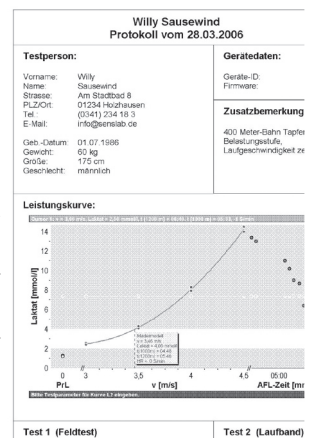
10. SPECIAL OPTIONS

Graph display: Fitting function
To connect step test values to a curve, polynomic functions are the usual method for calculation. This function is also the standard setting of the Lactate Scout Assistant, generating the typical shape of a lactate curve.

Caused by natural differences between mathematical calculations and physical data, the real measurement data does not match always the calculated, „ideal" curve. The Lactate Scout shows the real data (as red points) as well as the calculated curve (blue linie), to keep the information „pure" from interpretations and potential misunderstandings in analysis. Sometimes, the mathematical function is not able to create / to approximate a curve from the selected data: This problem is reported then by an error message.

As an alternate calculation model / fitting function, the option „Edit test parameter" offers to select „Splines" instead of Polynomes. Splines create a point-to-point connection, what means a more realistic, but unusual shape. Sometimes, the selected data can be draft only by using Spline function, or only by using Polynomic function, or it is generally impossible to approximate a curve from. If so, please check the selected data and eliminate unambiguous outliers or misreadings. Removing the hook from these data (=no calculation / no display) and clicking to „Draw / Redraw" may help to solve this problem.

Automatic compensation of aborted step test
In the training of beginners, or at high effort levels it isn't always possible to finish a step test as scheduled. But even if a test step must be aborted, the measured lactate value at this point (after a reduced step length) can be used for meaningful analysis reasons: Therefore, in the dialog box of „Edit test parameter" the function „Automatic compensation of aborted step test" must be activated by setting a hook.

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 length of 5 mins was set, and aborted after 3 mins already, the user can stop the running Countdown (cdn) manually by pressing briefly the scrollwheel-button. The time of this abort will be registered by the Lactate Scout and stored in its memory with the next measurement, to proceed immediately after the abort.

Based on the lactate value after a reduced step length, the Lactate Scout Assistant (as well as some commercial 3rd party solutions, as Winlactat) calculates the approximate lactate level for the full step length, compensating the differences by abort automatically. In the graph diagram and in the sheet will appear the real reading (at time of abort, blue coloured) as well as the approximated value (black arrow). This kind of display also corresponds with the protocol print.

Bluetooth compatibility mode
For data transfer using the integrated Bluetooth® interface, the operating system Windows® XP with Service Pack 3 or later is recommended. In this case the operating system is fulfilling all the conditions for an easy installation and easy use.
For PCs with older operating systems 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". Confirming the action by clicking „Yes", an acoustic signal is given by the Lactate Scout, and the device is resetted to manufacturer settings: Inserting a new test strip, code „77" will be shown as manufacturer setting.

PLEASE NOTE: The reset of the device memory is not reversible! Additionally to the stored readings („mem"), timer settings and test strip code are deleted and must be entered again. **We recommend to use this function only in special exceptions:** The standard memory functions of the Lactate Scout (overwriting the first readings with the latest ones after 250 measurements) fits all regular customer needs, as well as the data management of the Lactate Scout Assistant offers many suitable options for daily use.

11. THIRD PARTY SOLUTIONS

All named software solutions support the direct data import by the serial interface of the Lactate Scout, independently from the used hardware (Bluetooth or cable connection). SensLab GmbH and EKF diagnostic GmbH accept no liability for the functionality, efficiency or analysis results when software from third-party providers is used. An updated list of software providers can be found at: **www.lactatescout.com**. Inquiries concerning prices, dealers and support of third party products must generally be send to the manufacturer or software developer:

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 leading training equipment e.g. from Polar, h/p/cosmos, EKF BioSen, Ergo-spirometers, Thedex, card reader, MS Office (www.mesics.de)