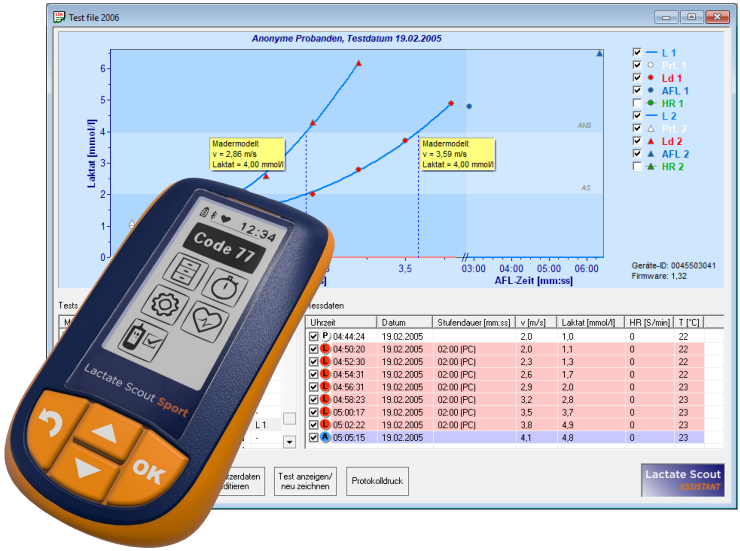
Lactate Scout

ASSISTANT



Software installation and user manual
incl. USB-Bluetooth® dongle installation

EKF DIAGNOSTICS

INTENDED USE

The Lactate Scout Assistant analysis software v1.2.0 is only to be used with the Lactate Scout Sport handheld device for transmission of test results to a Windows® PC and for subsequent evaluation.
The intended use of the Lactate Scout Sport system is to determine the lactate concentration in capillary whole blood primarily for physical performance analysis.

For correct operation of the analyzer, USB- Bluetooth® dongle and, PC please refer to their respective product documentation, instructions for use and application notes.

WARNING NOTICES

The handling of electronic equipment involves potential risks. Handling mistakes can cause impairment of function or irreversible damage to the connected devices and loss of data.
The Lactate Scout Assistant software has been tested for compatibility with a wide range of PC environments and configurations. EKF/SensLab 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 backup current configurations and data prior to installation.**

EKF/SensLab 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 EKF/SensLab.

If you are uncertain of the instructions provided in this document, please contact your system administrator or ask your local Lactate Scout dealer for assistance with the software installation.

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Distributed by:
EKF-diagnostic GmbH, Ebendorfer Chaussee 3, D - 39179 Barleben

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1. GENERAL FEATURES

The Lactate Scout Assistant allows options for organizing and displaying results and data export. In addition, further relevant parameters of performance diagnostics such as training conditions, effort level and heart rate can be entered and edited manually.

The current release 1.2.0 includes the following features:

1. Import measured data including lactate, time, date, memory ID, step duration, heart rate[1] and temperature from the Lactate Scout Sport via integrated Bluetooth® Low Energy wireless technology.

2. Chart summary of readings (single or step test measurements) including lactate, time, date, memory ID, step duration, heart rate and temperature.

3. Graphic display of up to two step tests simultaneously, including approximation of lactate curves based on polynomial regression or spline interpolation calculations.

4. Protocol print of up to two step tests simultaneously, including user data, lactate charts and table of measured values.

5. Analysis of the individual anaerobic lactate threshold (IAT), heart rate relation and effort level at IAT.

6. Step test types: Treadmill, bike ergometer or field test.

7. During analysis of field tests, the velocity at IAT for a user defined distance and for a 1000 meter standard distance can be calculated.

8. Supported analysis models: Mader, Keul, Simon

9. Free cursor positioning on displayed lactate curves to derive corresponding effort levels and heart rate at each point on the curve.

10. Import of measured step duration from Lactate Scout Sport using stop watch function.

[1] See the Lactate Scout Sport User Guide for how to record heart rate values with compatible pulse wristbands or chest straps.

11. Manual entry and edit of step duration, effort level, imported lactate readings und heart rate values.

12. Manual grouping of single measurements into step test measurements, manual definition of training level PreLoad, Load or AfterLoad (P, L, A).

13. Reset function for markings / data selection.

14. Parallel use of multiple devices in different application windows.

15. Small file size for convenient data storage.

16. Free grouping and export of selected data in new files for the creation of individual data sets to manage different subjects.

17. Export of data as .CSV-file for use in various Office applications.

18. Language support for German, English, Spanish and Italian.

2. SOFTWARE INSTALLATION

To install the software there are the following system requirements:

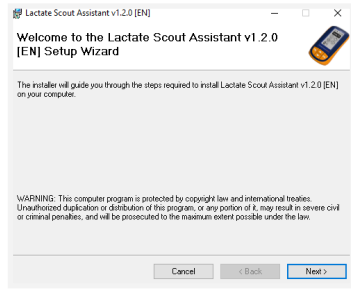
- 1 GHz or higher Pentium-compatible CPU
- 512 MB RAM and 20 MB free hard disk space
- Operating System: Windows® 7, Windows® 8, Windows® 10 and Windows® 11

Start the installation by double-clicking on the file ”LSASetup.msi“ 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 ”Next”.

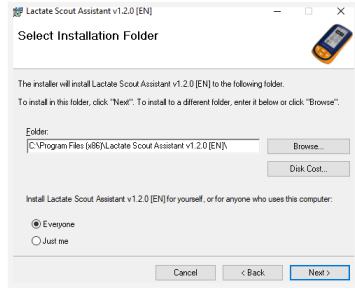


Select the directory for installation of the Lactate Scout Assistant Software.

By default, a new folder ”Lactate Scout Assistant“ is created in the ”Program Files“ folder on the C: partition. 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“.

Click ”Next“ to install the software.



Once installed, you will see the following icon on the Windows desktop:



3. ENABLE PC CONNECTIVITY WITH LACTATE SCOUT SPORT

Lactate Scout Assistant allows manual editing of lactate and other values, but is dependent on a connection the Lactate Scout Sport 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.

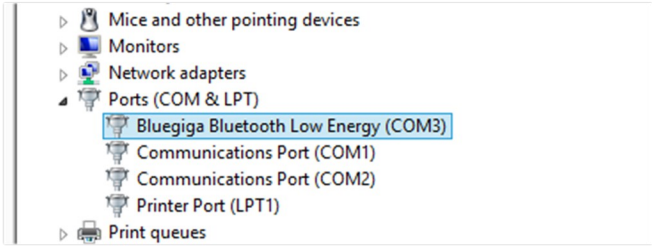
In the case of the Lactate Scout Sport, data is transferred to the PC via the integrated Bluetooth® Low Energy interface. To use the interface, a one-time installation of the USB Bluetooth® dongle is required on the PC. [1]

The installation procedure is described in the following section.



4. INSTALLATION OF THE USB- BLUETOOTH® DONGLE

Plug the USB- Bluetooth® dongle into an available USB slot. Open the device manager in the Control Panel and check whether the entry **"Bluegiga Bluetooth Low Energy (COMxx)"** is shown in the section **"Ports (COM & LPT)"**:

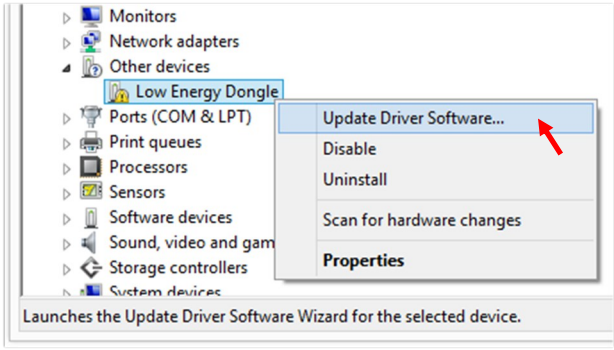


[1] Please use only the enclosed USB- Bluetooth® dongle type **"BlueGiga BLED112-v1"** for data transfer. The software has been adapted for this particular dongle, therefore no data transfer is possible with conventional USB- Bluetooth® dongles from other manufacturers.

If the Bluegiga USB device is not visible, proceed as follows:

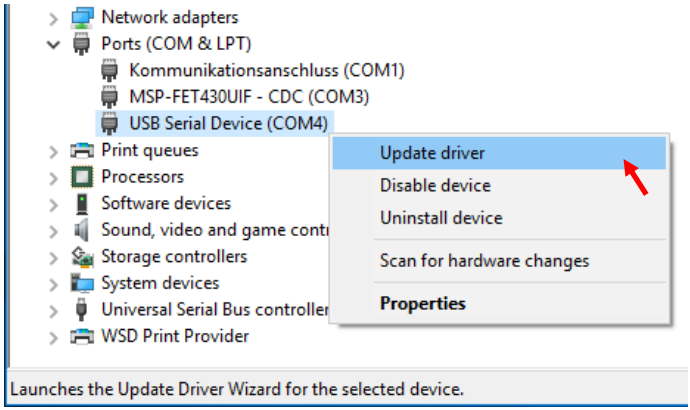
→ Windows 7 and 8:

Click on the entry **"Low Energy Dongle"** in the category **"Other devices"** with the right mouse button. Now select the menu item **"Update driver software"** in the context menu:

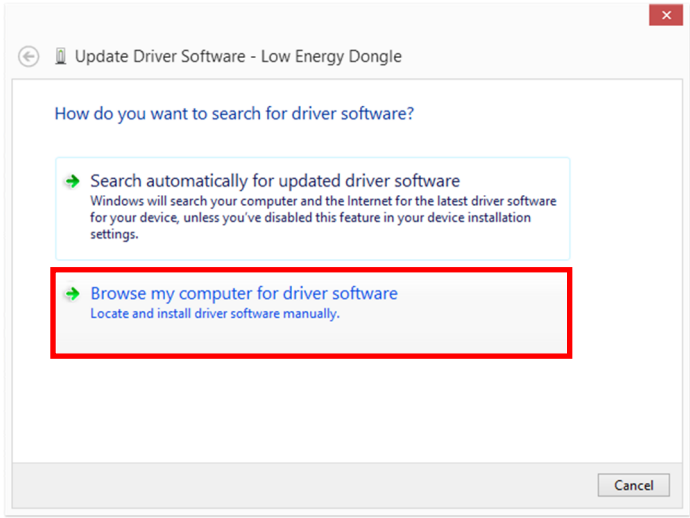


→ Windows 10 and 11:

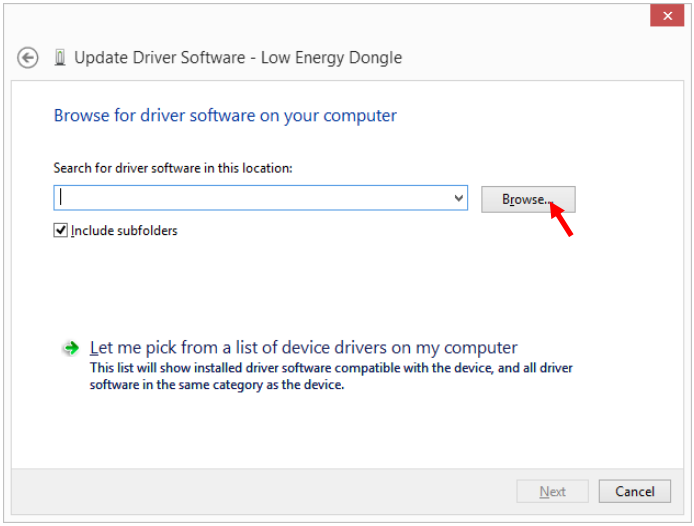
Click on the entry **"USB Serial Device (COMxx)"** in the category "**Ports (COM & LPT)"** with the right mouse button. Now select the menu item **"Update driver"** in the context menu:



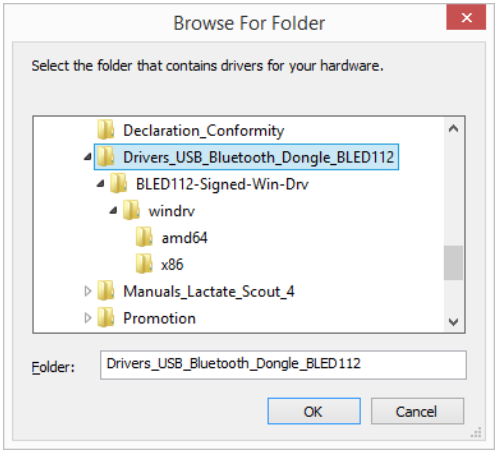
In the dialog box that appears, select the option **"Browse my computer for driver software"**:



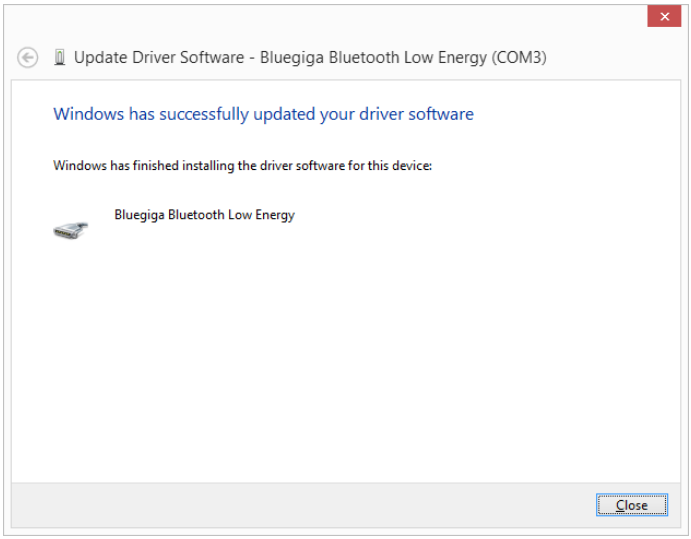
Click on the **"Browse"** button in the next dialog box:



On the enclosed USB stick please select the subfolder **"Drivers_USB_Bluetooth_Dongle_BLED112"**:



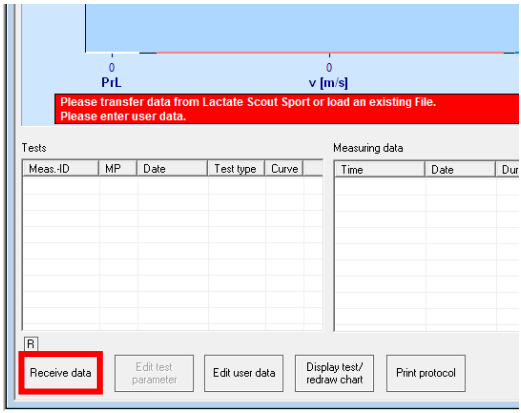
Wait for the driver installation to complete:



5. Data transfer

In order to transfer the data to the software, the Lactate Scout Sport must be switched on and the Bluetooth® module must be activated in the device (see Lactate Scout Sport User Manual).

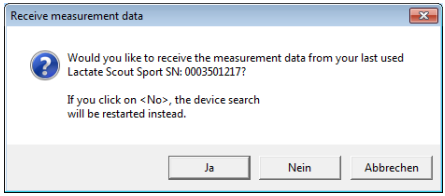
Upon starting, Lactate Scout Assistant automatically opens a new application window that contains no data records.



Click on the **"Receive data"** button in the application window:

If you are transferring data from the device for the first time, the software will automatically search for nearby Lactate Scout Sport devices. If a Lactate Scout Sport is found, data will be transferred automatically. If more than one device is found, then you have the option of selecting the device (by serial number) to be used before the data transfer.

If you have already transferred data from a Lactate Scout Sport, after clicking on the button **"Receive data", new** data can be transferred from this device by clicking **"Yes"** or a new device search can be started by clicking **"No".**



If you only use a single device, click **"Yes"** to begin data transfer.

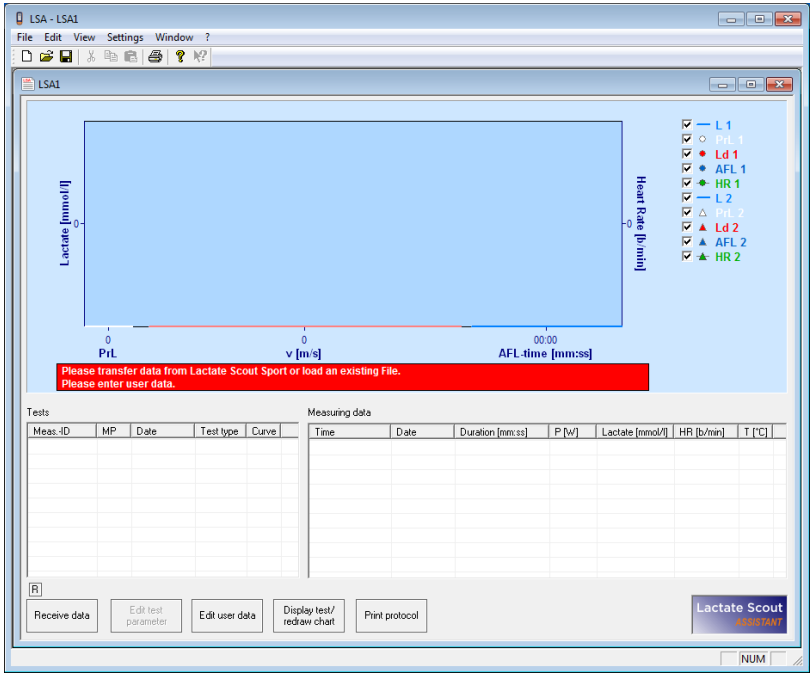
Device data is stored in the Lactate Scout Sport file on the PC with the measured data, so after opening the file again and clicking on the **"Receive data"** button, data transfer will start immediately without device search.

If the Bluetooth® connection or data transfer fails despite correct installation, check the system settings of the PC with help from a qualified service provider.

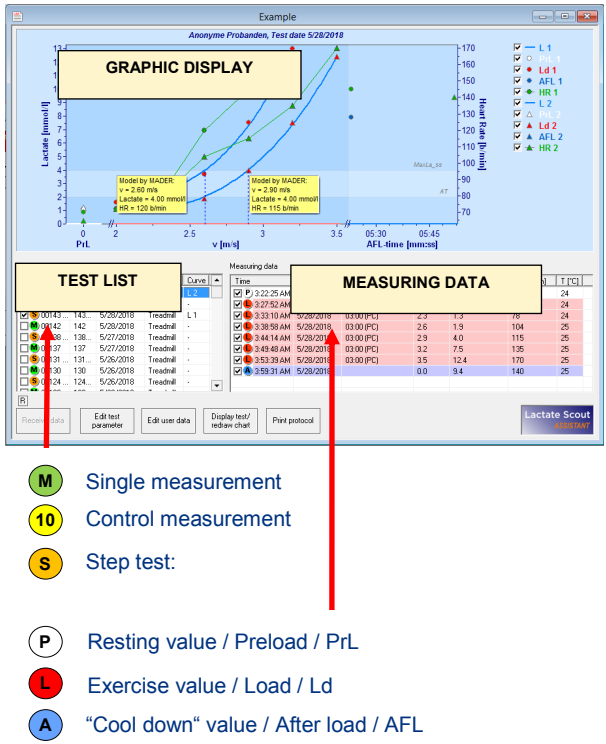
6. USER INTERFACE

Familiarize yourself with the main elements of the user interface.

The upper part of the window shows menu items allowing access to most functions of Lactate Scout Assistant. Frequently used functions (Open, Save, Print etc.) can be found above the relevant symbols.



The graphic display shows the lactate curves. By clicking in the check boxes to the right of the graph allows various parameters to be displayed. Below the graphic display an error box will display relevant error messages or actions required.



M Single measurement

10 Control measurement

S Step test:

P Resting value / Preload / PrL

L Exercise value / Load / Ld

A "Cool down" value / After load / AFL

EKF have included an example file of data to familiarize you with data manipulation without risking corruption of your own data. Open the sample file "Example.ls4" (in folder "Documents\Lactate Scout Assistant") by clicking "File | Open". A new window will open with the example data sets. You can close the empty data widow. All data received from the Lactate Scout Sport are shown in the "Test List" box in the lower left corner. The most recently acquired data is displayed at top of the list. The different columns describe the following:

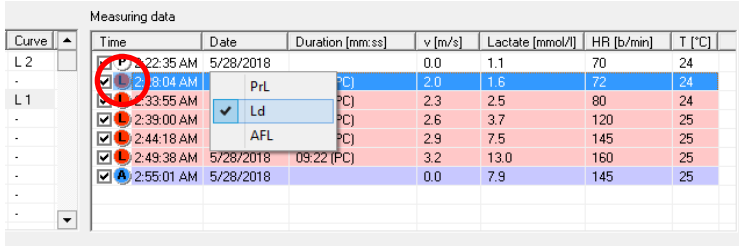
- Type of measurement: Single (M) or step test (S)
- Data identification number (unlimited registration for unique ID of data)
- Storage position in the device memory (1-500)
- Date in mm/dd/yyyy format
- Test type and assigned display curve (L1 or L2)

Upon opening the "Example" file, two curves will be displayed. These curves correspond to two different step tests.

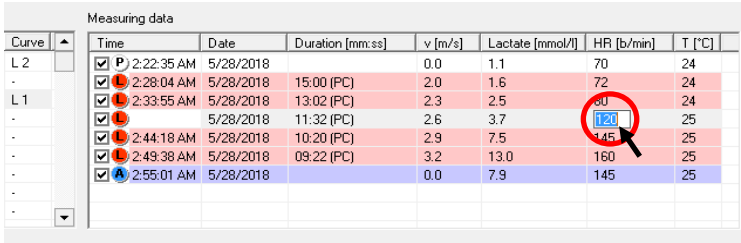
By selecting the first data row the following data will be displayed in the “Measuring data” box to the left:

- Type of measurement:
  - P: pre-load/test data (PrL)
  - L: load/test data (Ld)
  - A: post load/test data (AFL)

  These measurement assignments can be changed by right clicking on the corresponding row:



- Time and date
- Step duration (see section 7 to change source of step duration)
- Load value (see section 7 to change load type)
- Lactate value (editable by clicking, see figure below)
- Heart rate (editable by clicking)
- Temperature transferred from device

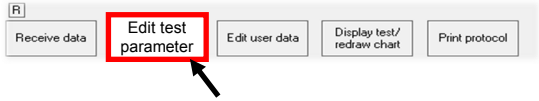


Measurement type, time, date, lactate value, heart rate and temperature are transferred automatically from the device. The source of step duration can be selected in the “test parameters” box (see section 7). Also, the effort values can only be calculated after entering/editing these parameters using the “test parameters” box.

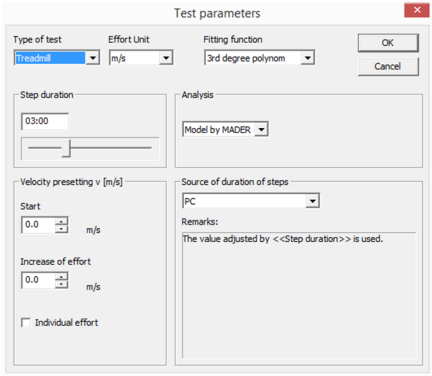
If a single measurement (M) is selected from the test list, the measuring data list shows only the related, single data set in a single row. A step test measurement (S) contains a sequence of data sets, as shown above. Note that data sets from step test measurements are sorted in the measuring data list by their date from top down: the first reading appears at the top and the last reading at the end of the list.

7. BUTTONS & MENUS

After importing data or opening a saved file and selecting a data set, "Edit test parameter“ will become active:

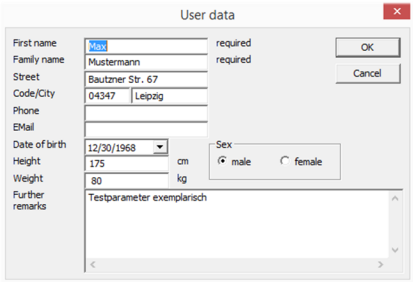


Test parameters can only be edited for an individual (step) test. These settings are essential for the evaluation of the selected data records.
Select the test type (treadmill, ergometer/home trainer or field test) from the drop-down menu. The output value (km/h, m/s, Watt) will be set automatically but can be edited from the drop down menu. To select curve fitting choose 3rd degree polynomial or cubic splines from the drop down menu. To set the step duration (which is equal for all selected measurement data sets) move the slider left or right using the mouse, or enter the value via the keyboard in the text box. Alternatively, the Lactate Scout Sport device can also be used as data source for step duration. In this case the stop function of the Lactate Scout Sport has to be used (see Lactate Scout Sport User Manual). To set the start velocity and the incremental steps use the arrow buttons or enter the value via the keyboard in the relevant text box. If velocity and increments are unknown select the individual effort tick box:



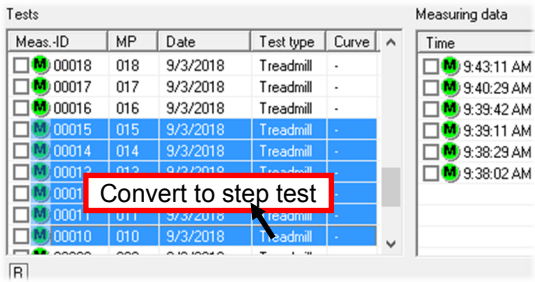
To calculate the individual anaerobic threshold (IAT), select the mathematical models from Keul, Simon or Mader in the drop down menu “Analysis model”. Note that the Mader model is the only model available for ergometer tests. All three models are available in treadmill and field test mode. The default setting is the Mader model which operates with a fixed threshold of 4 mmol/L.
Click ”OK“ to save parameters.

To edit personal data click on “Edit User Data”. This data is applied to the whole file and will appear in the protocol print. Minimum requirements for this field are name and surname to ensure correct assignment of the data:



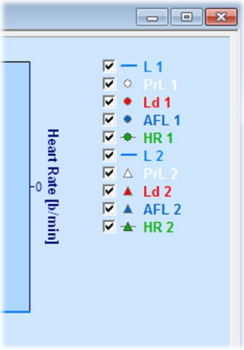
8. GRAPHS & CURVES

To display a lactate curve, select a step test (orange ”S“), containing a number of data sets. 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 graphically. To plot individual measurements, they must be converted into a step test. Hold down the CTRL-key on your PC keyboard and select the related single measurements by left clicking the relevant data sets. After selecting relevant single measurements for conversion into a step test, click the right mouse button and left click “Convert to step test”. PLEASE NOTE: After converting single measurements to a step test, it is not possible to reverse the command and that there is no option to add single or step test measurements to another step test.



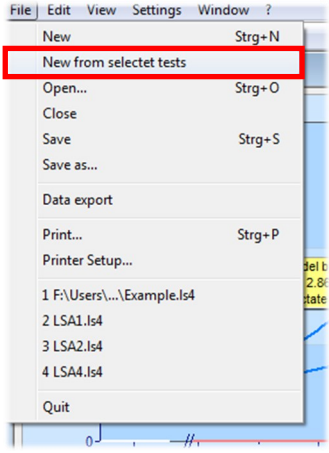
To cancel or to edit the selection click in a free area and repeat the selection.

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.



To display a lactate curve from step test data, the test parameters must be selected. If the message “Please enter test parameter for curve...“ is displayed, click on the button “Edit test parameter“ and enter the relevant parameters (Type of test, step duration, start velocity etc) as described in section 7. By clicking “Display test / redraw chart“ the lactate curve graph will be displayed or updated according to the new parameters. Single values of a step test can be displayed or hidden by check-marking the corresponding box on the right of the graph. Two curves (L1, L2) can be selected and displayed simultaneously. If heart rate values have been transferred from the Lactate Scout Sport or entered manually, they can be displayed (HR 1, HR 2). The default setting is for all parameters to be displayed. By clicking on the corresponding box, parameters and sections can be hidden or displayed.

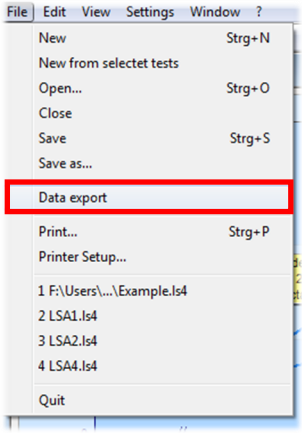
9. DATA MANAGEMENT



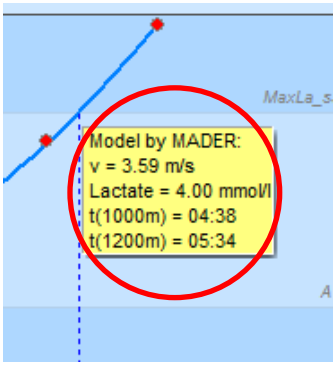
The Lactate Scout Sport can store up to 500 readings in its internal memory, before the first readings will be overwritten automatically by the latest measurements. All readings are registered in the device with a unique identity (ID) This ID is used to automatically match the imported device data with pre-existing data in the software file, composed of memory position number (SP), test mode (single or step: Pr, Ld, AFL), timer values, temperature, date and time.

To administer 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 existing selections, click the Reset-Button (“R“, above the button “Receive data“). Press the Ctrl-key on your PC-keyboard and select relevant data sets by left clicking in the test list. Once data has been selected, use the “File” and “New from selected tests“ to save the selected sets as a new data set.

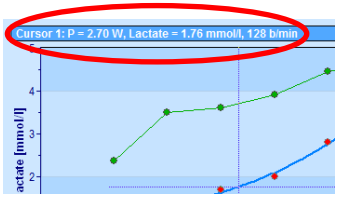
Note that the original data in the original file is not altered (the selected data are only copied) and that the test ID´s of the copied data remain the same in the new file.
If you intend to view or edit selected data in other applications like MS Excel, proceed as described above and click on “Data export” in the menu “File”. The data can know be saved with a chosen file name in CSV-format which can be imported into eg Microsoft Excel.



10. ANALYSIS



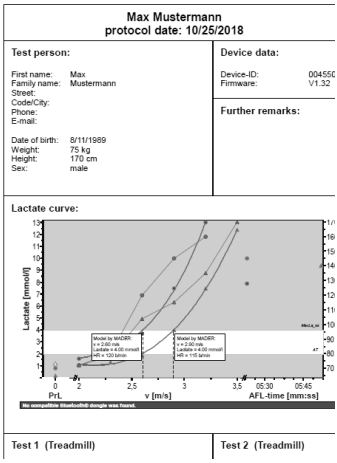
Upon drawing of the lactate curves, the lactate threshold (IAT) will be calculated and displayed. The formula for calculation can be set at “Edit test parameter". In addition to the lactate value at the IAT, the analyzed effort grade (power or speed) and target times for field tests (for the manually defined distance and for 1000 m) are also displayed. Heart rate values can be assigned to the lactate values in Lactate Scout Sport via a compatible Bluetooth® Low Energy wristband or chest strap or entered manually.
Using the “Settings“ menu an intercept (cursor) can be activated and moved along the lactate curve (L1, L2), allowing calculation of any data point along 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.

11. PROTOCOL PRINT

Clicking the button “Print protocol“, user data, test parameter and data sets can be printed as graphs and tables. Depending on the graph display check boxes, some elements of the charts may be hidden.
To print the data, click the “Print” button.



12. SPECIAL OPTIONS

Graph display: Fitting function
To generate a curve from the measured step test values, polynomic functions are the usual method for calculation. The calculation based on 3rd order polynomials is also the standard setting of the Lactate Scout Assistant, generating the typical shape of a lactate curve. The real data points often do not fit exactly to the calculated curve. Lactate Scout Assistant displays both the calculated curve and the actual data points. In some cases, the curve cannot be fitted mathematically to a polynomial and “**Curve not approximable”** will be displayed.

An alternate calculation model is available in the “Edit test parameter“ menu. Selecting “Cubic splines” ensures that the calculation curve is fitted through every data point giving a more objective picture. Curves calculated with “Cubic splines” are less harmonic and not every data set can be matched to a graph/model 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”).

Reset device memory
To completely reset the Lactate Scout Sport data memory to factory settings, the Lactate Scout Assistant provides a function, which is executed by holding down the CTRL- key and pressing the "R" key. A dialog box appears in which the action to be performed (Reset Device Memory) must be confirmed. Default setting is "No". If confirmed with "Yes", the device memory of the connected Lactate Scout Sport is reset. All measured values in memory are deleted. If the process has been completed successfully, a confirmation message will appear on the screen and the device will switch off automatically.

ATTENTION: Resetting the data memory is irreversible.

13. GLOSSARY

Polynomial regression
In polynomial regression, a given set of data points is approximated using a polynomial function of the degree *n*.

Spline interpolation
In spline interpolation, given data points (interpolation points) are interpolated using piecewise continuous polynomials (splines).

Mader by Model [Mader et al. 1976]
The "aerobic-anaerobic threshold" is determined at a load value corresponding to a lactate value of 4 mmol / L.

Model by Simon [Simon et al. 1981]
The "individual anaerobic threshold" is determined at a load value, corresponding to a slope of the lactate curve of 45°.

Model by Keul [Keul et al. 1979]
The "individual anaerobic threshold" is determined at a load value, corresponding to a slope of the lactate curve of 51.34°.