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LaboTRACE *compact*

Offline Analyzer for the simultaneous
determination of Glucose and L-Lactate



User manual

(Version 09/2018)

Important note:

The data and information contained in this manual were compiled with the greatest of care. Notwithstanding the scrupulous attention paid to preparing this document, no absolute guarantee of its accuracy can be given. Please notify us if any important information in this guidance is missing, if technical errors were found or if you would like to get more information about individual components. Reproduction, translation and duplication in any form, also in part, require written permission from TRACE Analytics GmbH.

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List of Symbols













| | |
|---|---|
|  | Waiting period |
|  | Blue reaction cup with standard solution |
|  | White reaction cup for sample |
|  | Arrows upwards – remove reaction cup |
|  | Arrows downwards – insert reaction cup |
|  | Sample cartridge |
|  | Arrow to the right – remove sample cartridge |
|  | Arrows to the left – insert sample cartridge |
|  | Analysis time (calibration and sample scan) |
|  | Send to printer |
|  | Send to EDP |
|  | Equipment locked because of incorrect follow-up measurement |

Table 1: List of Symbols

Explanation of Symbols



Refers to useful additional information and user tips



Warning against potential damage



Warning against hazardous voltages



Warning against harmful or irritating substances

1. Introduction

The analysis of nutrient and metabolite concentrations is essential for bioprocesses. In many laboratories offline analysis is part of the daily routine and helps to control cell cultivations or fermentations.

LaboTRACE *compact* combines the latest technology with decades of experience in the area of electrochemical analysis with biosensors.

LaboTRACE *compact* is the perfect solution for the daily work in the lab for the simultaneous determination of glucose and L-lactate. The well proved biosensor technology guarantee fast and accurate results in less than one minute.

The device is easy to handle, easy to operate and requires little service. All users are thus able to achieve analysis results that meet the highest quality demands.

1.1 Safety instructions and warning



Read the user manual prior to operating the device, and follow the safety rules. Every person working with the device must be acquainted with the relevant safety rules prior to operating the device and these rules should be kept at hand all the time. The user manual cannot describe all safety issues that could possibly arise. Every user is responsible for adhering to safety, health and legal regulations, and operating the device only according to its intended use.

- Please pay attention to all general safety rules such as the wearing of protective gloves, and the relevant disinfection and hygiene regulations.
- The use of reagents and consumption materials that have not been recommended by the manufacturer can cause several measuring errors and malfunctions and is therefore not allowed.
- The device may only be used for the intended use with special attention to the defined usage restrictions and constraints that have to be strictly adhered to.
- Operate the device only on smooth, horizontal basis! Avoid variations in temperature, drafts, direct sun light and vibrations. These can result in faulty measuring values.
- In case of malfunctions, stop operating the device immediately. Prior to continuing to operate the device, read the notes concerning cleaning, error messages and troubleshooting. If necessary, send the device to your service organization for repairs.
- Make sure that the supply voltage matches the voltage noted on the power supply adapter.
- To reduce risk of electric shock, do not place the device or power supply in water or other liquids! If the cable or the power supply unit are damaged in anyway, you must not continue using the power supply. Never touch the plug of the power supply adapter with wet hands! The power supply adapter may only be used indoors. Protect from humidity.



If the user opens the device without authorization, the user shall not be entitled to any rights concerning the liability for the device and damages caused hereby.



Use only original accessories and spare parts to avoid damage to device and people. Repairs must be conducted by authorized distributor only.

1.2 Intended use of the device

LaboTRACE *compact* is an automatic analyzer for the determination of glucose and l-lactate in nutrient parts at fermentation or cell cultivations.

The device has the following features:

- Determination of glucose and l-lactate (also simultaneously) by using the enzymatic-amperometric measuring principle
- Automatic individual sample measurement for up to 6 samples
- Automatic calibration
- Serial printer interface
- Serial RS232 electronic data processing interface



Figure 1: Front view LaboTRACE compact

1.3 Measuring principle

The determination of glucose and l-lactate is based on an electrochemical measuring principle using a biosensor. With the help of an analyzer pump either buffer solution, calibration solution, control or sample material is pumped through a sensor. The electrodes inside the sensor are separated from the liquid by sealing layers containing immobilized enzymes. The following figures 2, 3 and 4 show the flow chart and the reactions taking place inside the sensor.

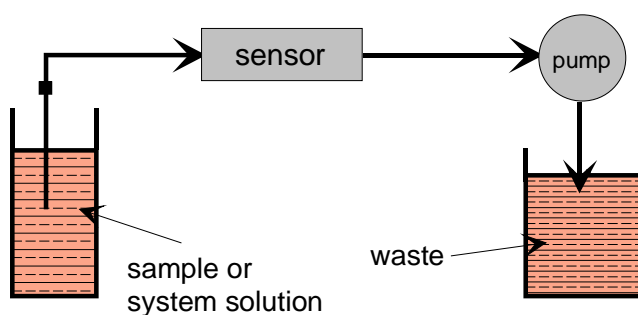


Figure 2: Flow chart

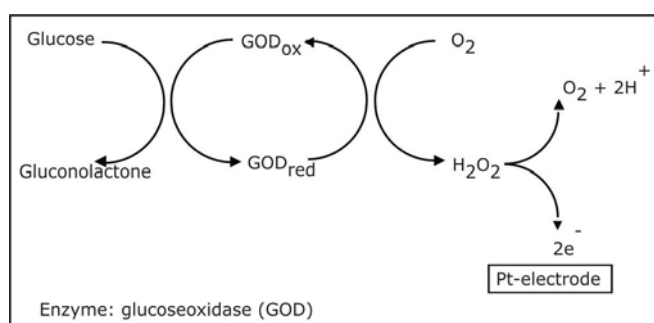


Figure 3: Reactions in glucose sensor

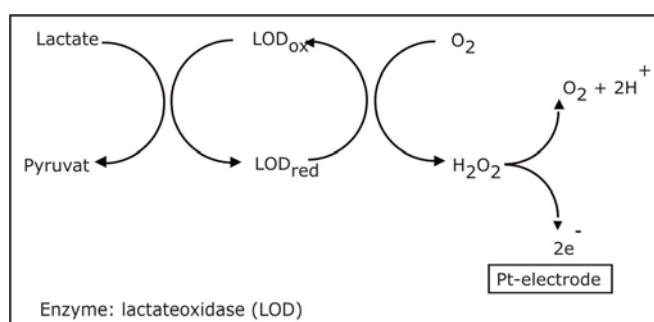


Figure 4: Reactions in lactate sensor

1.4 Maintenance intervals

LaboTRACE *compact* needs maintenance once a year. A warning will appear on the touch screen once the service interval has elapsed.

Without regular maintenance, false measuring results can occur that are not the responsibility of the manufacturer.

For further information, please refer to the chapter 7 and 8 „Maintenance and Troubleshooting“.

2. Delivery

2.1 Scope of delivery

| Description | Quantity | Part No. |
|--|----------|-------------|
| LaboTRACE <i>compact</i> | 1 | 134.000.000 |
| Sample cartridge for up to 6 samples | 1 | |
| Main cable | 1 | |
| Power supply unit for device and printer | 1 | |
| User manual | 1 | |

Table 2: Scope of delivery

2.2 Accessories

| Description | Quantity | Part No. |
|---------------------------|----------|-------------|
| Further sample cartridges | 1 | 134.000.010 |
| Printer DPU 414 | 1 | 134.000.005 |
| Printer cable | 1 | 135.000.011 |
| EDP cable | 1 | 135.000.012 |
| Power supply unit | 1 | 136.000.022 |
| Thermal paper | 1 | 150.100.331 |

Table 3: Accessories

2.3 Consumables

The following consumables are required for operating the LaboTRACE compact:

| Description | Quantity | Part No. |
|--|-------------|-------------|
| Sensor Glucose/Lactate | 1 | 850.102.000 |
| Container kit (buffer solution/waste) | 1 | 135.000.110 |
| Reaction cups, predosed with buffer solution | 1000 cups | 134.000.110 |
| Operation card | 1 | 134.000.115 |
| Calibration solution | 100 cups | 136.000.145 |
| OPTIONAL, as necessary | | |
| Maintenance set | 1 | 134.000.020 |
| Maintenance date reset card | 1 | 134.000.116 |
| Capillaries | 1000 pieces | 134.000.120 |
| Control N, ready to use | 50 cups | 134.000.030 |
| Control P, ready to use | 50 cups | 134.000.031 |

Table 4: Consumables

3. Installation and initial operation

3.1 Installation of the device

Before start-up, check the supplied device and accessories for completeness referring to the list in table 2 and 3. Furthermore, check all parts for intactness. Proper and safe operation is only guaranteed when using original parts and accessories. NEVER use damaged parts or parts from other manufacturer!

Place the device on a horizontal, level and dry work basis. Choose a position where the device is protected from direct sunlight and extreme temperature variations, as this can impair the measuring results.

Conditions on the set-up site:

- No direct influence of moisture
- No direct sunlight
- No strong electromagnetic fields or ionizing radiation
- No rapid temperature change caused by windows, doors, air conditioning etc.
- Level, waterproof basis
- Ground clearance of the whole placement basis

Connecting the device to the electricity supply (see figure 5)

Make sure that the voltage given on the power supply unit matches your mains supply. Mains connection of the device is carried out via the supplied power supply unit. Connect the mains connection lead to the power supply unit. Insert the plug into the power supply unit connection at the right side of the housing (marked with „DC12V“) and insert the mains connection lead plug into the socket.

Connecting the printer (see figure 5)

If you use the LaboTRACE *compact* with the printer DPU 414, the printer´s voltage supply comes via the second power supply unit connection. The voltage adapter must be switched between the printer and the power supply unit. The printer cable plug is inserted into the printer connection on the right side of the device`s housing (marked with „Printer“) and connected to the appropriate socket on the back of the printer.

EDP - connection (see figure 5)

Insert the EDP connection cable into the EDP connection socket on the right side of the housing (marked with „EDP“) and connect the other end with the serial interface of your EDP. Make sure you follow the information in the interface description.

A terminal program (e.g. hyperterminal) can be used for data recording.

The transfer parameter baud rate

| | | | |
|------|------|------|------|
| 1200 | 2400 | 4800 | 9600 |
|------|------|------|------|

and parity

| | | | | | |
|-----|-----|-----|-----|-----|-----|
| 7N1 | 7E1 | 7O1 | 8N1 | 8E1 | 8O1 |
|-----|-----|-----|-----|-----|-----|

are selectable in the menu item

Functions ➡ Setting ➡ EDP ➡ Parameter. These settings must match with the settings of your terminal program or your PC.

Figure 5 shows the connections at the right side of the housing of the LaboTRACE *compact* .

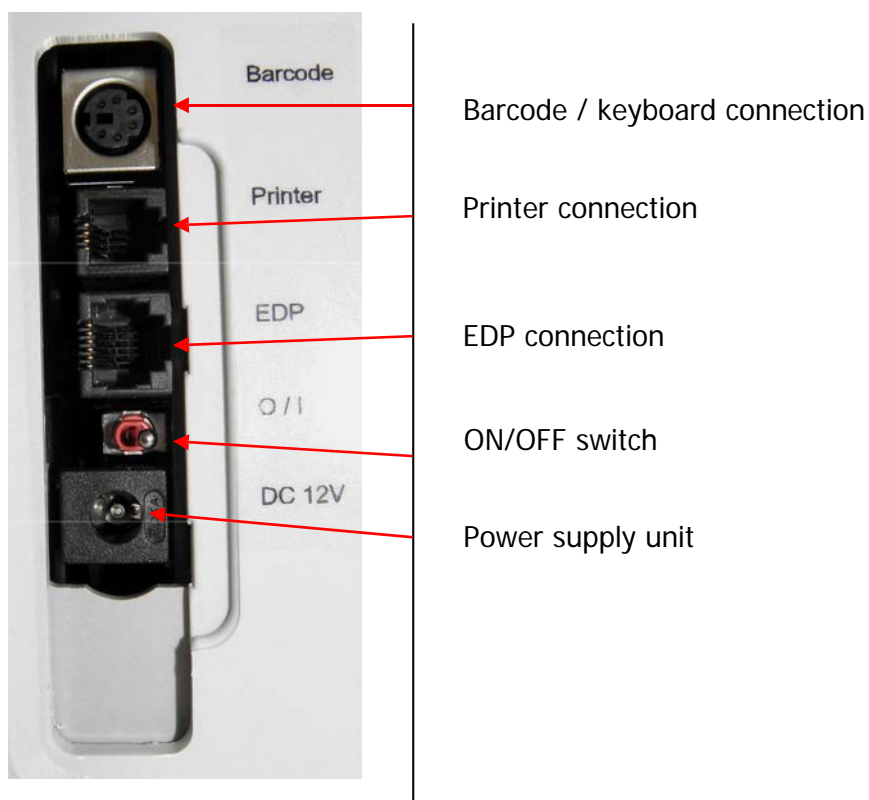


Figure 5: Connector panel

3.2 Initial operation of the device

When the device has been installed as described above, the following steps must be carried out so that the LaboTRACE *compact* can start working:

1. Installation of the sensor (see chapter 7.3.1)
2. Installation of the containerkit (see chapter 7.3.2)
3. Installation of the operation card (see chapter 6.4.3)


Once these tasks have been completed the installation of the device is finished. The device is switched on by activating the ON/OFF switch.

After switching on the device, the necessary warm-up period of 10 to 15 minutes starts. After it the device is ready for operating.

Subsequent operation of the LaboTRACE *compact* is carried out by using the touch-screen, only (see figure 6).




Figure 6: Touch-screen

| | |
|---|--|
|  | <p>When using the touch-screen, pay attention to the following:</p> <ul style="list-style-type: none"> • Only a light touch is required on the screen • Do not use any pointed or sharp objects • Do not use any solvents for cleaning, apart from the planned solutions for disinfection |
|---|--|

Leafing through the menu or adjusting the numbers is carried out by touching the relevant buttons. Note that dark underlined buttons describe the „off“ or „inactiv“ state, while light underlined buttons show the „on“ state.

There are menu points/functions which may be needed for daily work and those which are only used for servicing.

Functions which are needed on a daily basis can be called up without any passwords and can also be changed. However, the service functions are protected with a password known only to authorized staff who are the only ones entitled to use them. Functions which are not available in the current configuration of the device are also not shown as buttons.

| | |
|---|--|
|  | <p>With unauthorized entry to protected fields the manufacturer cannot accept any liability for incorrect readings or defective equipment.</p> |
|---|--|

4. Sample preparation

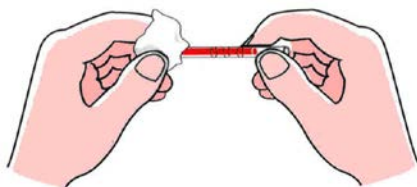
With the LaboTRACE *compact* diluted cell-free samples can be measured. The sample has to be diluted at a ratio of 1 part sample + 50 parts buffer solution. This dilution process guarantees the chemical stability of the sample.

To get a cell-free sample, the microorganism or cells will be separated by centrifugation or by sterile filtration. Capillaries, pipettes or automatic dosing devices can be used to dose the cell-free sample material.

For the analysis closable sample cups are available which are filled with 0.5 ml buffer solution. For taking sample use 10 µl capillaries or withdraw 10 µl sample with a pipette. End-to-end capillaries are used because of the easy and simple handling.

The method for sample preparation with end-to-end capillaries is described as follows:

1. Take the sample from the fermenter and centrifuge it to sublimate the microorganism or cells
2. Fill the capillary
3. Carefully wipe off the outer surface of the capillary



4. Put the completely filled part of the capillary into the sample cup



5. Shake sample cup thoroughly



After this procedure the measurement can start.

The cups are placed on the appropriate labeled spots on the sample plate or in the cartridge and after insertion of the reaction cup with the samples either individual sample measurement or series measurement is started. Measuring starts automatically if a sample cup is placed in the sample position (red segment) on the sample plate.

Calibration is carried out if necessary before measurement.



Do not position a cartridge at the side of the device during the calibration.

Series measurement starts automatically if the cartridge is positioned in the analyzer. Only the occupied positions will be processed.

5. Measuring

5.1 Calibration

LaboTRACE *compact* requires valid calibration to ensure correct readings. Therefore an automatic calibration is carried out before measurement for each variant of the measuring operation. After the first calibration, the device automatically checks or adjust calibration according to a prescribed time schedule.

A choice can just be made between „autocal in“, i.e. calibration is performed in the prescribed time schedule and „autocal out“, i.e. calibration is left out according to the prescribed time schedule and calibrated automatically before the next measurement.

Before the first calibration or if the calibration cup is empty, the LaboTRACE *compact* requests the use of a new calibration cup.



Even if the standard solution in the calibration cup is not used up in a day´s work, in the interests of accuracy of the readings a new calibration cup should be used each day.

Note that the calibration cups are not fully emptied and that a small residue remains in them. When the LaboTRACE *compact* requests a new calibration cup, a new one must be inserted, even though there is still some residue in the old one.

5.2 Samples

With the LaboTRACE *compact* it is possible to carry out measurements in two types of operation.

- Determination of individual or control samples with the sample plate
- Determination of a sample series with the sample cartridge





The sample cups have to be closed because the sample needle penetrates the cover automatically.
Position the sample cups into the sample cartridge in parallel to each other.

5.2.1 Start a sample series

If a valid calibration is not available, a blue reaction cup is displayed on the touch-screen

with an arrow (empty position: downward arrow ; loaded position: upward arrow ). To start calibration, insert a sample cup filled with calibration solution.

After successful calibration or if a valid calibration is available, the touch-screen displays a

red reaction cup  and a cartridge symbol  with appropriate positioned arrows and the last measured result.

Load the cartridge with reaction cups. It is not necessary to begin with position 1 and positions can be left empty, only the occupied positions will be processed.



Place the cartridge in the analyzer. Measuring begins automatically. It is not possible to measure an individual sample or control samples during series measuring.

5.2.2 Determination of an individual sample

If a valid calibration is not available, a blue reaction cup is displayed on the touch-screen

with an arrow (empty position: downward arrow ; loaded position: upward arrow ). To start calibration, insert a sample cup filled with calibration solution.

After successful calibration or if a valid calibration is available, the touch-screen displays a

red reaction cup  and a cartridge symbol  with appropriate positioned arrows and the last measured result. Cartridges must not be positioned in the analyzer.



Place a sample in the sample position (red segment) on the plate. Measuring begins automatically.

5.2.3 Start a control sample series

If a valid calibration is not available, a blue reaction cup is displayed on the touch-screen

with an arrow (empty position: downward arrow ; loaded position: upward arrow ). To start calibration, insert a sample cup filled with calibration solution.

After successful calibration or if a valid calibration is available, the touch-screen displays a

red reaction cup  and a cartridge symbol  with appropriate positioned arrows and the last measured result. Cartridges must not be positioned in the analyzer.

For a control sample series only the occupied control positions are measured and no samples.

Proceed as follows to determine a series of control samples:

- Order the control measurement on the touch-screen
- The plate turns automatically to the loading position for the control samples
- Load the control samples into the positions within 15 seconds
- Start the measurement of the control sample using the touch-screen
- LaboTRACE *compact* reverts into the initial state when you do not start the measurement.

5.3 Explanation about the data memory

The data memory is designed as a ring memory. It stores the results of the last 100 readings. If it is full, the oldest value is deleted. The data memory can also be manually deleted.

The stored values can be looked at, or can be repeatedly sent to the EDP, or can be repeatedly printed or can be deleted.

The data memory is permanently available even though no reading is being carried out. The last result measured is displayed. There is an arrow on the right which indicates upwards. By clicking on this arrow the next oldest result is displayed. Two arrows are now displayed (up and down). By clicking on the printer symbol displayed below on the right, all results are printed out again from the sample displayed to the last measured value.

5.4 Controls

LaboTRACE *compact* has two control positions to meet quality assurance requirements.

To ensure effective quality assurance, the two control positions can be individually programmed (control 1: orange coloured ring; control 2: red ring). The following input options are programmable for the individual positions:

- Lower warning limit for glucose
- Upper warning limit for glucose
- Lower warning limit for I-lactate
- Upper warning limit for I-lactate
- Name of control

The stored values can be displayed for the control positions.



Do not dilute the control cups. They are ready to use.

5.5 Switching off the device

The device should not be switched off during a measuring process, calibration or rinsing, as this can lead to faulty functioning.

If the device is switched off for a longer time (i.e. during holidays) it should be rinsed and emptied before switching off in order to prevent the liquid in the tubing system from drying. The consumable material has to be stored suitably (see chapter 7.3.3).

6. Menu functions

6.1 Menu structure

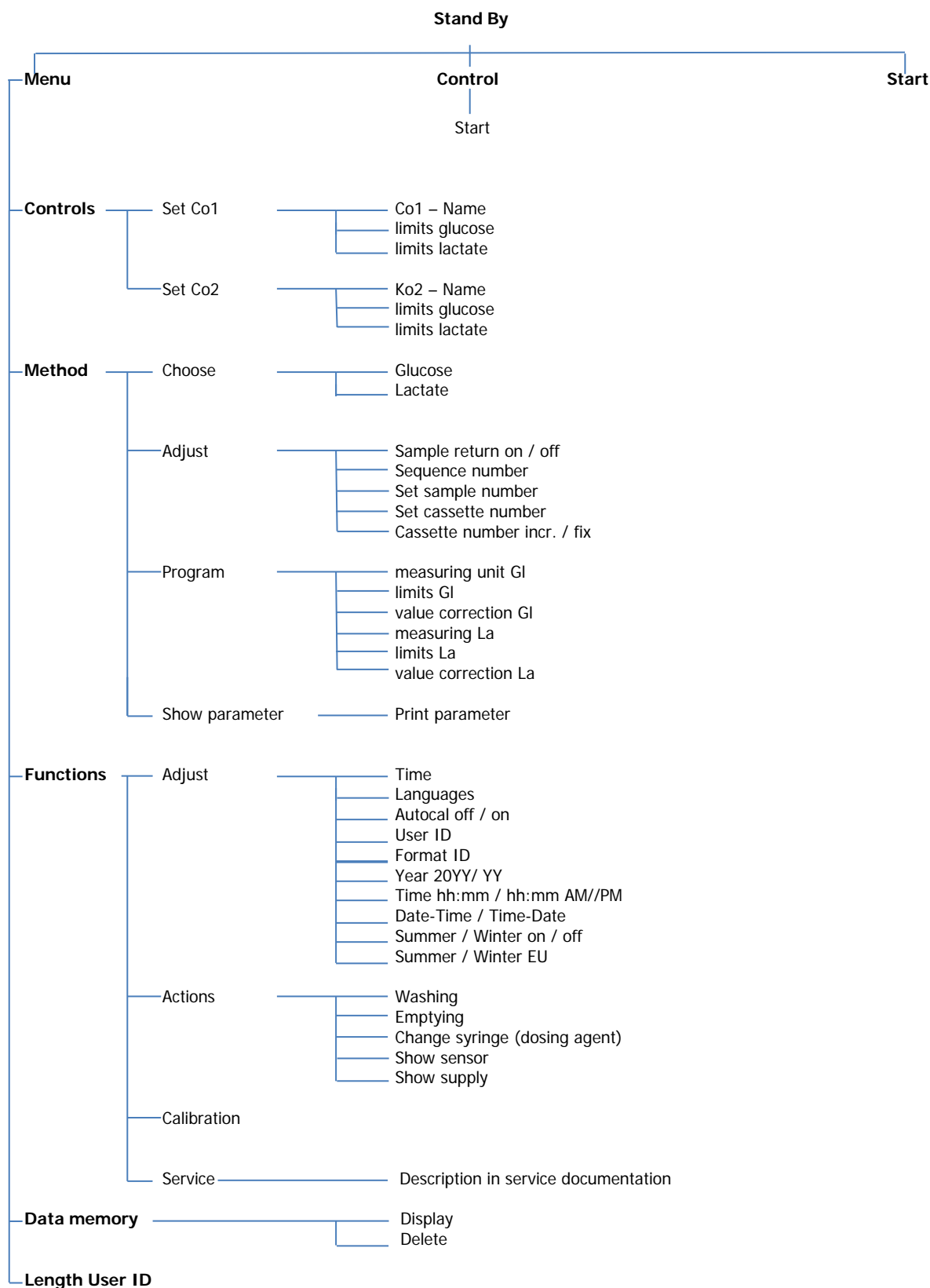


Figure 7: Menu structure

6.2 Controls

Details, see chapter 5.4.

6.3 Method

6.3.1 Select

LaboTRACE *compact* is able to measure the following parameter combinations (selectable button)

- Glucose
- L-Lactate
- Glucose/L-Lactate

Two parameter (glucose/lactate) are displayed as buttons. Select the relevant method by pressing the button „ON“ i.e. the parameter is measured or „OFF“ i.e. the parameter is not measured. Please note: light button means “ON” and the dark button means “OFF”.

6.3.2 Adjust

The following settings are available:

- Repeat sample on/off
At very low / high values, a repeat determination can be switched on or off with this function. The limit values are specified in the menu „program“.
- Sequence number (1-999) or day sample number (begins with 1 each day)
- Reset sample number, sets the sample number to 1

6.3.3 Programming

The following parameter can be programmed for each method:

- Unit of measurement
- Sample warning limits (if a measured value is outside the set limits, the result will be marked resp. repeated). Such a repeated determination can be helpful at very low results.
- Reading correction (for adjusting the reading on a control station which measures with another method), e.g. to adjust the values with a photometer.
- Display parameters, the parameter list can also be printed out here.

6.4 Functions

6.4.1 Adjust

Time

The time is given in the form HH:MM

Dialogue language

The dialogue languages German, English, Czech and Russian are available.

Autocal on/off

„Autocal on“ means that after a defined time schedule calibrations or checks on calibrations are carried out independently whether samples are to be measured or not. This function is sensible if urgent samples are measured and time is critical.

„Autocal off“ means that after the above time schedule, calibration elapse. In this case, a calibration is repeated only if a sample or sample series should be measured. If no measurements are performed for more than 6 hours, a calibration must be instructed by positioning a calibration cup. Make sure that calibration cups which have started are not used longer than 12 hours.

Operator ID

The operator number must be a maximum of 14 alphanumerical strokes. Options for this are as follows:

- ID active / ID inactive (activates operator ID administration)
- ID control / ID sample (ID query time: either during control measurement only or before each sample or sample series)

Date format

Different date formats, e.g. European, American can be entered.

Year format

It can be displayed as double-digit or four-digit.

Time format

Display in 24 hour format or in 12 hour format (am; pm).

Date-Time

Date and time sequence can be selected.

Summer/Winter

Switching on/off of automatic summer or winter time setting.

6.4.2 Actions

Rinsing the system

Liquid is pumped through the system for a defined time and is sucked in via the suction tube.

Emptying

The system is emptied by using the pump. It is a combination of rinsing and emptying. Follow the instructions on the display.

Change dosing agent (see maintenance)

Moves the piston of the dosing agent into a position where the change is possible.

Display sensor

Displays the data currently programmed in the sensor. The display shows the following data (see figure 8):



Figure 8: Display of the current sensor data

Display supply

The display shows the following data (see figure 9):

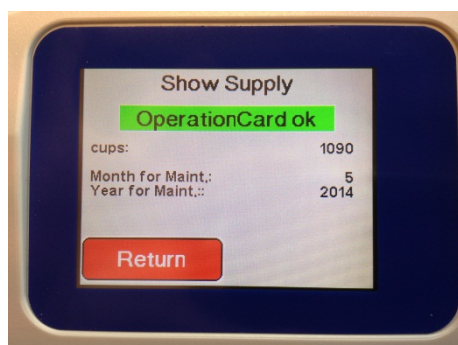


Figure 9: Display of the supply

6.4.3 Function of the operation card

Stocks of reaction cups are electronically stored on the operation card. The operation card therefore guarantees the use of the full system (device and consumable material) to ensure analysis quality. Before operation, the operation card must be inserted into the machine.

7. Maintenance and servicing

7.1 Introduction

This chapter gives information about the maintenance of the LaboTRACE *compact* and about problems that may occur and how you can remedy them yourself.

If you are uncertain about the items or options, DO NOT UNDER ANY CIRCUMSTANCES try any options you think might help without technical help. DO NOT UNDER ANY CIRCUMSTANCES open the device without an authorized service technician!

7.2 Maintenance

LaboTRACE compact needs servicing once a year. A warning will appear on the touch-screen once the service interval has elapsed.

If the service is not carried out, this can lead to incorrect readings which are not the responsibility of the manufacturer.

Please contact your sales partner to have this service carried out.



The device must be switched off during the maintenance.

7.2.1 Maintenance Set

The following parts are included in the maintenance set which is needed for the maintenance:

- Dosing agent (piston/cylinder system) (1)
- Rinse vessel (2)
- Sample tubings short and long (3)
- Gaskets for the sensor chamber (4)

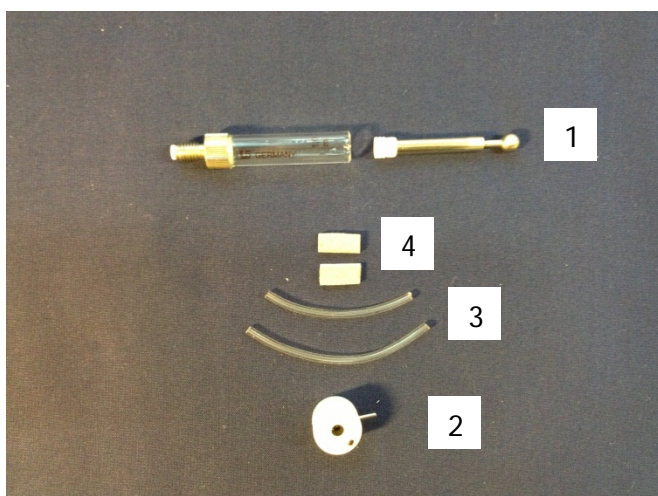


Figure 10: Maintenance Set

7.2.2 Change of the dosing agent (piston/cylinder system)

To change the piston/cylinder system the following work should be carried out in the given order:

7.2.2.1 Assembly of the dosing agent according to the following figures 11-13:



Figure 11-13: Assembly of the dosing agent

7.2.2.2 Change the dosing agent (piston/cylinder system)

Select on the touch-screen Menu → Functions → Actions → Change syringe (see figures 14-17)

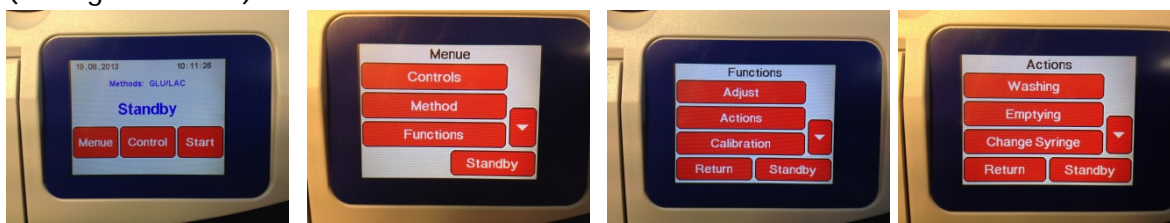


Figure 14-17: Touch-screen (Menu/Functions/Action/Change syringe)

The following view is displayed on the touch-screen

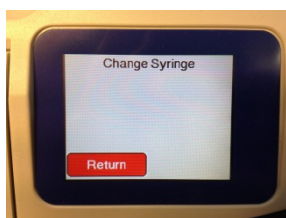


Figure 18: Change syringe

When the piston/cylinder system is in the correct position where the change is possible, a short „BEEP“ is carried out.



Now the device must be switched off for the further maintenance!

To change the piston/cylinder system proceed as follows:

- Switch off the analyzer,
- Open the door of the device,
- Unscrew the piston/cylinder system from the valve block,
- Take the piston/cylinder system out through the flaps and pull out (see figures 19-22)

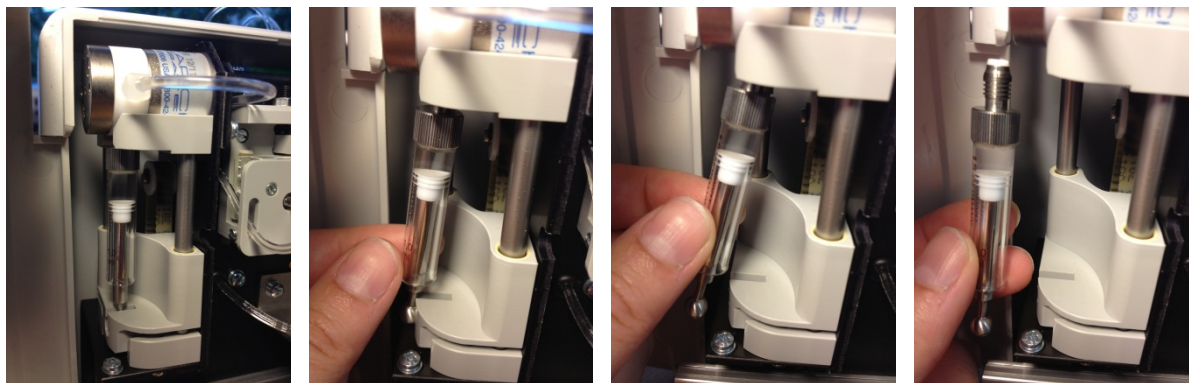


Figure 19-22: Removal of the piston/cylinder system

Insert the piston/cylinder system in the reverse order (see figures 23 and 24)



Figure 23, 24: Fitting the piston/cylinder system

Close the door of the device!

7.2.3 Change the rinse vessel

Switch off the analyzer and take off the suction tube from the container kit. Place the suction end at the level of the table in a small cup or on a little cellulose wadding (a little fluid will run out), see figures 25 and 26.



Figure 25, 26: Remove the suction tube

Open the door of the device and pull off the tube from the rinse vessel (see figures 27-29)

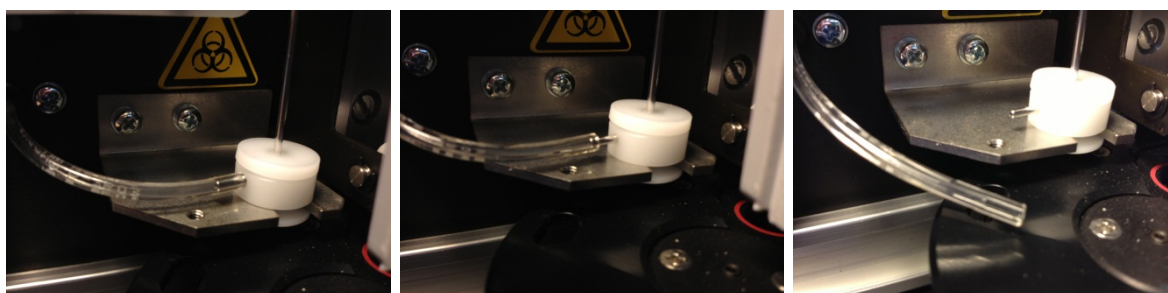


Figure 27-29: Pulling off the rinse tube

Release the screw, lift the needle (sample cannula) and take the rinse vessel out of the holder (see figures 30 and 31)



Figure 30: Release the screw

Figure 31: Removal of the rinse vessel

Insert the new rinse vessel in the reverse order:

- Place the rinse vessel into the holder
- Move the needle (sample cannula) into the rinse vessel
- Tighten the screw
- Connect the tube to the rinse vessel
- Place the suction tube in the container kit
- Close the door of the device!

7.2.4 Change the sample tubings

Open the door of the device!

Take-off the short tubing from the needle (sample cannula) and from the left connection in the LaboTRACE *compact* . Take-off the long tubing from the sensor plate and from the right connection in the LaboTRACE *compact* (see figure 32). Then fix the new short and long tubing in the LaboTRACE *compact* and close the door of the device.

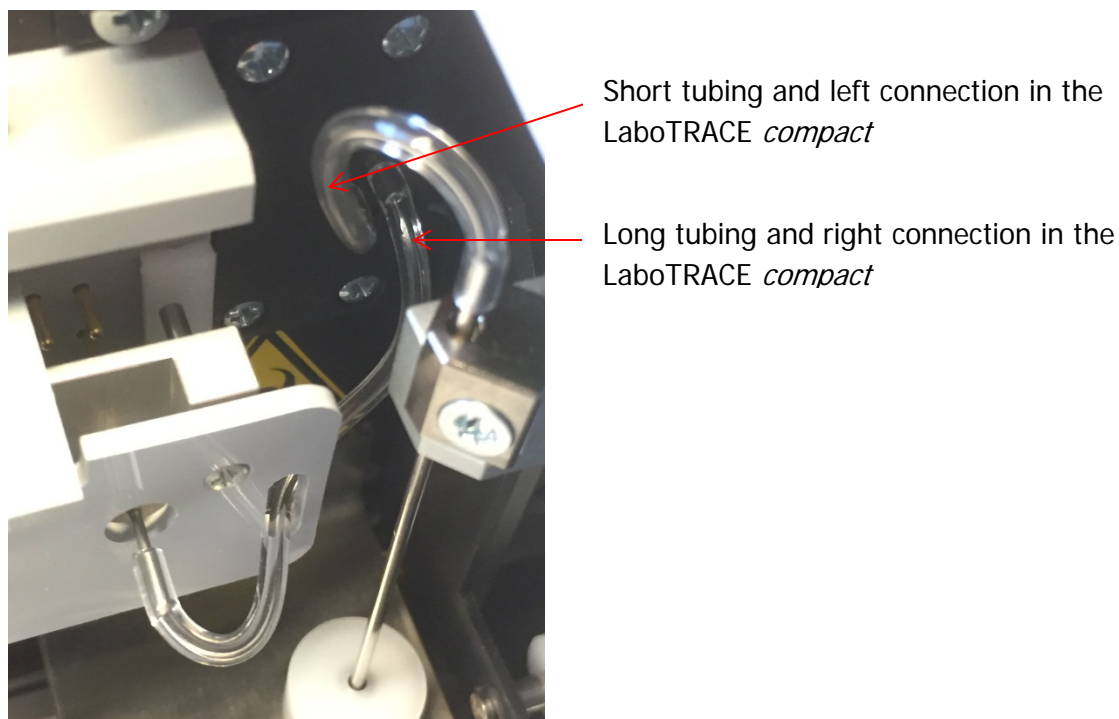


Figure 32: Change of the sample tubings



DO NOT MIX UP the sample tubing, this can lead to incorrect readings.

7.2.5 Change of the gaskets in the sensor housing

Please proceed as follows:

- Open the door of the device
- Open the sensor plate
- Remove the gaskets (see figure 33)
- Stick the new gaskets
- Close the sensor plate and the door of the device

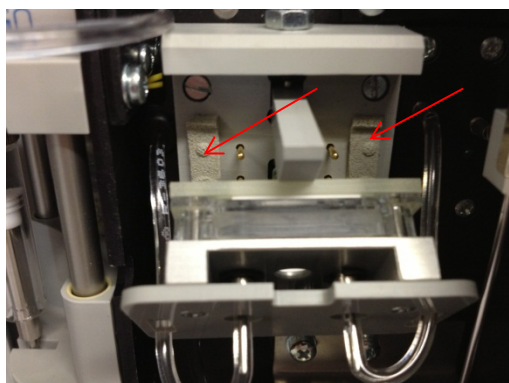


Figure 33: Change of the gaskets

7.2.6 Maintenance date reset card

After the service is carried out the signal „Maintenance“ is still displayed on the touch-screen. It disappears after using the maintenance reset card. Please proceed as follows:

- Switch off the analyzer
- Remove the operation card
- Insert the maintenance date reset card
- Switch on the analyzer
- The device reads the data from the card and a message displays on the touch-screen about the successful reset
- Switch off the analyzer
- Remove the maintenance date reset card
- Insert the operation card
- Switch on the analyzer



The maintenance date reset card has no expiry date.
Please store it safe for all further yearly maintenances with the
LaboTRACE *compact*.

7.3 Servicing

7.3.1 Exchange of the sensor

Removal of the sensor

Open the sensor plate by turning the fastener upwards and remove the sensor

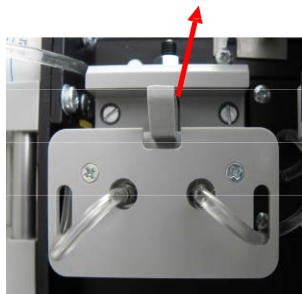


Figure 34: Sensor plate closed

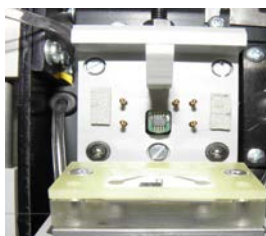


Figure 35: Sensor plate open

Installation of the sensor

- Open the door of the device
- Open the packaging and take out the sensor
- Open the sensor plate by turning the fastener upwards
- Remove the sensor and insert a new one
- Close the sensor plate and the door of the device

7.3.2 Changing the container kit

LaboTRACE *compact* is operated with a container kit. This is a system solution/waste bottle combination specially produced for this type of analyzer. It is hung on the back of the analyzer and connected by the tubes to the analyzer tubing. The volume is designed so that the waste bottle is full when the supply bottle is used up. The analyzer monitors the availability of the solution but not the waste container.



Never refill the container kit.



To avoid disruption in the work process of the analyzer and soiling, we recommend changing the container kit only when the operating status is „Stand by“ and when there is an inbuilt rinse vessel and sample cannula. Changing the container kit should be carried out quickly, as liquid is expelled during the rinsing process from time to time.



Figure 36: Container kit

7.3.3 Taking the device out of operation

To take the analyzer out of operation for a long period or to prepare it for transport, proceed as follows:

- Take the suction tube from the bottle with buffer solution and put it in a cup with distilled water.
- Select in the menu: Functions  Actions  Rinsing and rinse the analyzer with distilled water.
- Empty the system by taking the suction tube out of the cup with distilled water and select the menu item "Emptying".
- Switch the analyzer off and remove all connections

The consumable material (sensor, calibration solution) must also be stored suitably.

7.3.4 Prepare the device for transport

To prepare the LaboTRACE *compact* for transport, proceed as follows:

- Rinse and empty the system, as described in chapter 7.3.3
- Switch off the device
- Remove the container kit and all reaction cups from the analyzer
- Remove the plug from the power supply unit and printer/EDP
- Disinfect the outside of the analyzer
- Pack and transport the equipment in the original cardboard box with foam insert only as this is the only way to avoid damage during transport as far as possible:
Place the analyzer in one half of the foam, making sure that the analyzer is placed correctly in the mould. Place the other half of the foam on top and close the carton.
Please note: if force is needed to close the transport box, the analyzer is not correctly seated in the mould.

7.3.5 Storage of the consumables

To guarantee the shelf life of the consumables, it is necessary to store the parts in a dark and dry room.

The sensor has to be stored at 2-8°C. All other parts have to be stored at a room temperature of 5-30°C.

8. Troubleshooting

8.1 Warnings

Before reading out the results, the analyzer checks whether the set warning limits have been exceeded. When assessing samples, the sample warning limits who are set (see chapter 6) are decisive. For control samples, however, the control limits who are set are decisive (see chapter 6).

The following warnings are given on the display and printer:

| Warning | Meaning |
|---------|--|
| ++++ | Measurement range exceeded |
| ---- | Measurement range below limits |
| !! | Sample or control warning limits exceeded or not reached |
| ! | Previous control measurement outside the control limits and below or above the sample warnings |

Table 5: Warnings

8.2 Errors during the measurement

| | |
|----------------------------|--|
| Zero line unstable | <ul style="list-style-type: none"> - Occurred by chance → repeat process - Reagent replaced → select „Washing“ - Blockage in system → rinse by hand - Sensor defect → change sensor - Electronic error → call service engineer |
| Calibration value too low | <ul style="list-style-type: none"> - Wrong reaction cup is used - Sensor defect → change sensor - Electronic error → call service engineer |
| Calibration drift too high | <ul style="list-style-type: none"> - Occured by chance → recalibrate - Major temperature change (draught) → recalibrate - Blockage in system → rinse by hand - Sensor defect → change sensor - Electronic error → call service engineer |
| Sample error | <ul style="list-style-type: none"> - Blockage in system → rinse by hand - Connection tube sample needle - sensor very discolored - Sample cannula out of adjustment or defective |
| Sample cup empty | <ul style="list-style-type: none"> - The residual quantity left in the reaction cup was insufficient for a reading |

Table 6: Errors during the measurement

8.3 Equipment error

If the following errors occur, the user cannot intervene without the help of the service engineer. The announcements serve only to better describe the error for the service engineer.

| Type of fault | |
|--|--|
| <u>Communication error</u> ERROR (Name of assembly unit) | No action (no command receipt) |
| <u>Handler does not send a command receipt</u> ERROR (Name of assembly unit) | Timeout |
| <u>Analyzer / photoelectric beam error</u> ERROR (Name of assembly unit) | Photoelectric beam does not open |
| <u>Handler does not reach final position</u> ERROR (Name of assembly unit) ERROR (Name of assembly unit) | 3 attempts 3 attempts reference run |
| <u>Communication problem between control computers</u> ERROR (Name of assembly unit) | Device not available |
| <u>Erroneous parameters in the memory</u> ERROR (Name of assembly unit) | Parameter-Flash |
| <u>Hardware and software are not compatible</u> ERROR (Name of assembly unit) | Hardware version |
| <u>Plunger does not reach instructed final position</u> ERROR Plunger | Types of error in plain language |
| <u>Error lifter</u> ERROR lifter | Cannot prick |
| <u>Internal memory error</u> ERROR Fe-RAM 1 | (Error name) |

Table 7: Type of fault

Other similarly stored error reports can occur which may be displayed according to the same pattern.

8.4 Measurement errors

Glucose and /or l-lactate measurement happens after the enzymatic-amperometric measurement process. The signal occurs after a chemical reaction with the immobilized enzyme as a change in current on an electrode. A special procedure was applied to the LaboTRACE compact, which comes out with a minimum of sample quantity. The tubes between cannula and sensor are crucial for the functioning of this process. These tubes must therefore be replaced by original replacement parts only.

As with all flow systems, the tightness and patency of the channel between the sample cannula and piston pump is very important for the function of the analyzer. Escaping fluid just like air segments running irregularly through the system is always an indicator of lack of tightness, e.g. worn out seals in the rinse cup, loose tubes or incorrectly inserted sample cannula.

8.4.1 Testing for patency and tightness

Switch the analyzer off and on again after about 2 seconds. This ensures that the piston pump is switched on. The sound of it will tell you whether the piston pump is working. Take the lid off the waste bottle and observe whether fluid escapes from time to time. If that is the case, there is no error in the flow system. If no fluid drips off, the system is either leaking or blocked. In this case, proceed as follows:

- Pull off the connection tube between the right sensor connection and the housing of the housing connection
- Place a suitable syringe on the tube
- Suck fluid out of the supply bottle with the syringe
- Observe the fluid in the tube between sample cannula and sensor.

The following phenomena may occur:

The syringe is easily moved and there are a number of air bubbles or only air in the tube

- In this case, the system is leaking.
- The best way to find the site of the leak is by noting the site where the air bubbles occur.
- Check all the connection sites and change the tubes and rinsing cup one after another if necessary.

The syringe is very difficult to move and the liquid in the tube hardly moves at all

- In this case, the system is blocked
- Take the tube out of the supply bottle
- Loosen the fixing screw on the sample cannula and pull it out of the rinsing cup
- Place the sample cannula in a glass beaker
- Fill the syringe with distilled water or buffer solution and squeeze it out of the tube in the direction of the sample cannula
- The liquid must flow out of the cannula.
- If this does not happen, clean the cannula with a cleaning wire and /or replace the sensor

The syringe can be moved against resistance but can still be moved evenly, so that the fluid flows back and forth in the tube

- In this case, the error is inside the housing and must be repaired by the service engineer.

8.4.2 Errors in the flow system

The following phenomena may occur:

Scattered readings

- Sampling is not correct: Check with a few calibration solution cups where the precision has been incorrect on several occasions
- Defective sensor

Calibration is unstable, frequent errors, scattering too great

- Can be due to extreme temperature variations e.g. direct sunlight or draught

Calibration not possible (value too small)

- Can be due to a defective (insensitive) sensor, frequent occurrence of the error „maximum margin“

9. Technical data

| | |
|--------------------------------------|--|
| Measuring time per sample | 45 sec. |
| Measurement range glucose | 0.11 g/L – 9.1 g/L |
| Measurement range l-lactate | 0.045 g/L – 2.70 g/L |
| Sample quantity | 10 µl sample diluted with 500 µl buffer solution |
| Precision (20 samples) | |
| Glucose (216 mg/dl) | <1.5 % |
| L-Lactate (90 mg/dl) | <2.0 % |
| Sensor storage time | 12 months |
| Sensor storage temperature | + 2°C to + 8°C |
| Duration of sensor operation | 3 months after the first activation |
| Interfaces for printer / EDP | V24, RS-232 |
| Work temperature | + 15°C to + 35°C |
| Storage temperature (without sensor) | -10°C to + 50°C |
| Operating voltage | 12 VDC |
| Power consumption | Approximately 12 W |
| Dimensions (WxHxD) | 200 x 150 x 170 mm |
| Weight | Approximately 2.5 kg |

Table 8: Technical data