LAURA SMART

USER MANUAL

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1. Introduction

This manual contains the operation and maintenance instructions for the LAURA® Smart photometer.

1.1 Intended use

The LAURA® Smart reader is a reflection photometer for semiquantitative urine analysis using test strips PHAN® LAURA. The LAURA® Smart reader is designed for use in medical laboratories and doctors offices.

1.2 Measurement principle

The following drawing shows the theoretical working function of the LAURA® Smart reader. The strip is inserted into the urine sample then it has to be placed onto the strip holder tray. The built-in strip detector recognizes the strip and starts the timing of incubation. The instrument moves the strip under the measuring head and measures the reflectance. White LED makes the illumination and a colour detector detects the reflected light. The processing unit converts the reflected light intensity to the analytical value. The result is resented on the display and printed by the built-in thermal printer. The instrument moves out the strip holder tray and the user dispose the strip.
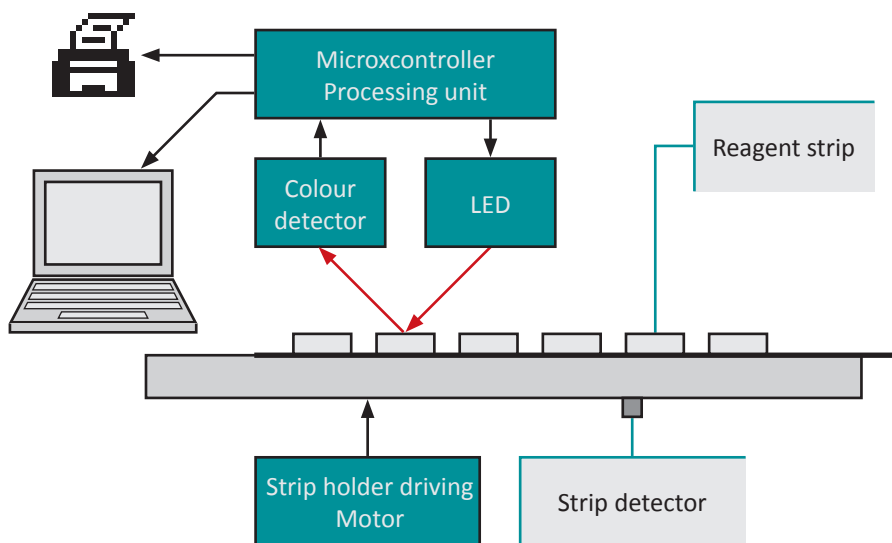
1.3 User Interfaces

1.3.1 Overview of the instrument

Printer

Paper release button

Display

Strip holder tray

1.3.2 Overview of connection of the instrument

RS232 Serial interface

Keyboard or Barcode reader PS2 input

Master switch

USB interface

Power input
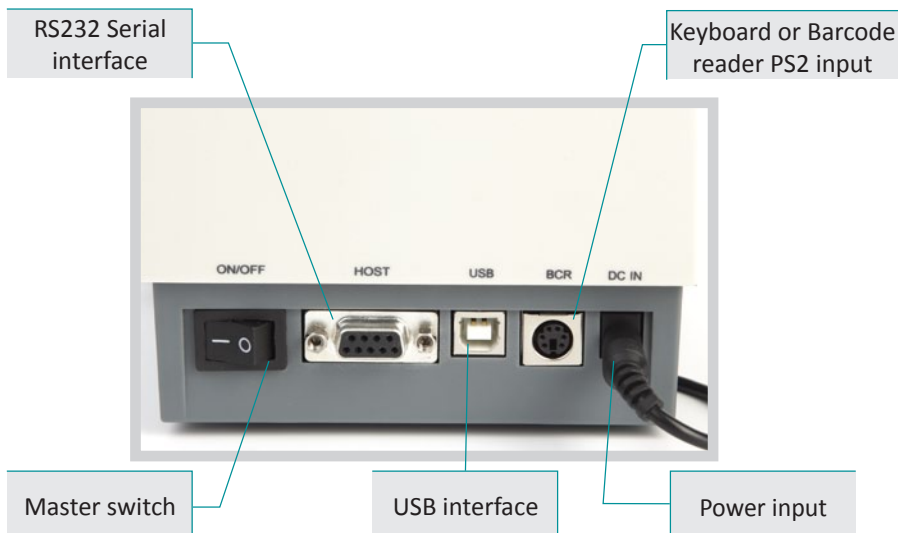
1.4   Icons and abbreviation

ID   -   Patient identification code
                              (a figure or a text, max. 15 characters)

Seq.No   -   Sequence number of the measurement

Sample   -   Urine specimen to be measured

REM   -   Remission value

BCR   -   Barcode reader

Host   -   Computer (Laboratory Information System)

Smart Timing®   -   Incubation timing method

2.1 Unpacking

After unpacking the instrument, please check carefully that your package contains all the parts listed below, and all of them are in a good condition.

Figure 1

- LAURA® Smart instrument
- DC Adapter
- Serial interface cable
- 1 roll of the thermal printer paper
- Tube with control grey strips
- User manual
- Plastic pad for Smart Timing
- CD with drivers

2.2 Set up the instrument

Please follow the steps below:

- Select the working place
- Choose a place for the reader, which is flat and clear

Do not place the device close to the window, centrifuge or heating surface. Protect it from the direct sun light, the intensive artificial light, vibrations and extreme temperature.

- Connect the power and interfaces

☞ **Check if the master switch on the rear side is turned off!**

Refer to Fig 2.

- Insert the serial cable and the keyboard or BCR to the reader, for the keyboard/BCR use the PS2 input.
- Insert the adapter output plug into reader.
- Insert the adapter into the net.

Inserting the printer paper

- Open the printer cover by pressing the release button!
- Place the paper roll into its holder and pull out approx. 10 cm of it in front direction.
- Check if the paper lies between the 2 metal ears of the printer.
- Close the cover while holding the paper tight with one hand.
- Push the cover in the middle or both sides until it clicks into its place.

☞ **Never push the cover asymmetrically!**

The reader LAURA is now ready to be turned on; switch on the master switch!

Figure 2

After power-on the display lights up and the reader carries out a self test.
During this test the optic and the built in calibration PAD is tested.
Completing the test successful, the reader prints out the OK message and goes into the Standby mode.

The reader is now ready for measurement.

3.1 Ready to measure status

This is the status where the instrument after performing the self Test waits for user command. The instrument has a touch sensitive display. The user can control the instrument by pressing the displayed buttons.

In the Ready to Measure status the following possibilities are available for the user:

INSERT STRIP!			12:23
Seq.No: 0001			
PATIENT	SAMPLE	MENU	HOME

Start a new measurement process, by placing a strip on the strip holder

- Enter patient information:
    o Seq.No
    o ID

- Enter sample information:
    o Select a sample colour from the predefined list
    o Select a sample clarity from the predefined list
    o Insert comment

- Enter the menu, by pressing the MENU icon.

- Send the instrument to Stand by mode by pressing of button HOME or automatically after the defined time.

3.2 Measurement

The instrument LAURA® Smart begins the measurement automatically when a strip is placed on the strip holder tray.

To carry out a measurement do the following steps:

- Enter a new Seq.No or ID if necessary
- If you want to define appearance of the sample, select a colour or clarity from the offer - manually by buttons or by external BCR
- Dip the reagent strip into the urine sample
- Remove excess urine from the strip (Push the edge of the strip to an absorbent paper, follow instruction for the strips PHAN® LAURA)
- Insert the strip into the strip holder tray

Figure 3

LAURA® Smart has a build in strip detector at the end of the insert area, under the tray. If the strip is placed correctly this detector will recognize it and the incubation time countdown starts.

A progress bar displays the status:
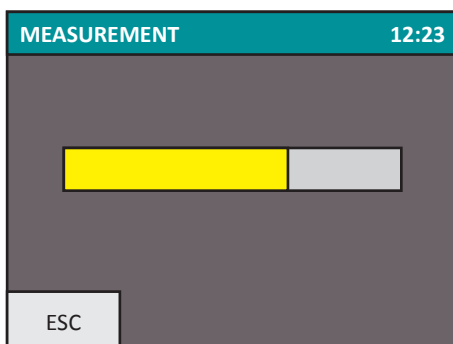
- After 55 sec the reader moves the tray in, measures the strip, displays and prints out the result.

RESULT:		DekaPHAN LAURA	
Seq.No: 0023	BLD	NEG	
ID: *	LEU	75	Leu/ul
03.10.2007 18:08	BIL	NEG	
Colour: YELLOW	UBG	NORM	
Clarity: CLEAR	KET	NEG	
*	GLU	50	mg/dl
COMMENTS:	PRO	NEG	
	pH	6.5	
	NIT	NEG	
ESC		SEND	PRINT

The result is displayed on the LCD. The positive parameters are marked with* and are displayed in yellow colour. Pressing the PRINT or SEND button the result can be send or print any time again. It is possible to add comment to the result by touching the screen inside the comment rectangle.

If a comment to this measurement already exists, the new comment will overwrite the old one!

The comment and all the other result parts are stored in the memory.
Placing a new strip into the holder will start the next measurement procedure.
After pushing the ESC button the, program jumps back to the Ready to Measure status.

- After the strip was measured the reader moves the strip holder out, and the strip has to be removed and disposed manually by the user.

The instrument recognizes automatically the type of the test strip, which is possible to measured:
DekaPHAN® LAURA
HeptaPHAN® LAURA
PentaPHAN® LAURA
TetraPHAN® SG LAURA
DiaPHAN® LAURA
MicroalbuPHAN® LAURA

The instrument increases the Seq.No after every measurement.

3.3 Patient identification

- Seq.No - working with Sequence Number
- Patient ID - working with Identification number

Seq.No.
In order to enter a new Seq No the user has to touch the PATIENT button and then select the SEQ.NO button.

INSERT STRIP!	12:23
Seq.No: 0001	
SEQ.NO	
ID	
▽	
PATIENT	SAMPLE MENU

The following numeric PAD will appear and the user can type a number between 1-9999.

Seq.No:	1234

1	2	3	ESC
4	5	6	
7	8	9	OK
	0	←	

Selecting the ID button a similar edit field appears, where the user can enter a max 15 characters long ID string. This ID could also be entered with help of external keyboard or the barcode reader in the Ready to Measure status as well.

ID:	ABCD1234abcd		
_./	ABC	DEF	ESC
GHI	JKL	MNO	abc
PQR	TUV	WZXYZ	OK
	-(#)	←	

3.4 Colour and clarity

Before placing the strip to the way user can set the colour and clarity informations of the sample.
The colours and clarities are preddefined and can be modified by the user in the customisation menu (see 4.6).
There are four different colours and four different clarities available.

The colour and clarity information will be listed after pressing the following buttons: SAMPLE and COLOUR or CLARITY:

INSERT STRIP!			12:23
		STRAW	BROWN
COLOUR		YELLOW	RED
CLARITY		DARK YEL.	GREEN
COMMENTS		AMBER	COLORLESS
	▽		ORANGE
PATIENT	SAMPLE	MENU	

Pressing the desired button will select the corresponding information. It will appear on the display and will be added to the next measured sample. For deleting the previously selected information, the user can go into the selection menu again but instead of selecting a value from the list the COLOUR or CLARITY button has to be pressed again. In this case the program clears the previously set value.

Description of colour and clarity can be performed also by using of external bar code reader (BCR).

For prompt and comfortable input of colour and clarity are used special bar codes. They define each colour and clarity. After reading through BCR are information automatically entered into the line colour or clarity. For the routine usage of mentioned bar codes in the laboratory practice is recommended to make a copy and the lamination.

Bar codes - colour

COLOUR	BAR CODE
STRAW COLOURED	9 0 1 9
YELLOW	9 0 2 9
DARK YELLOW	9 0 3 9
AMBER	9 0 4 9
BROWN	9 0 5 9
RED	9 0 6 9
GREEN	9 0 7 9
COLORLESS	9 0 8 9
ORANGE	9 0 9 9

CLARITY	BAR CODE
CLEAR	9 1 1 9
CLOUDY	9 1 2 9
TURBID	9 1 3 9
DARK	9 1 4 9

3.5 Comments

It is possible to add comments (39 characters long) to the measurements at two different points:

INSERT STRIP!	12:23
COLOUR	
CLARITY	
COMMENTS	
▽	
PATIENT	SAMPLE	MENU	HOME

- Before the measurement
- After the measurement when the result is displayed on the LCD
- When the result is selected from the memory

To add a comment before a measurement starts use the following buttons:

This picture shows an example screen when all measurement related parameters are set:

INSERT STRIP!	12:23
Seq.No:	0001
ID:	125X333
Colour:	YELLOW
Clarity:	CLEAR
Comments: Short comment to ...	
PATIENT	SAMPLE	MENU	HOME

3.6 Cleaning

To keep the instrument clean and in the order to avoid crosscontamination, the strip holder tray must be cleaned. The strip holder has to be clean periodically every day after the finishing the work. The excess of urine has to be removed from the strip before inserting it into the instrument.

For cleaning wipe off the tray use a soft textile or paper. For cleaning with disinfections, use an alcohol disinfectant (max 85 %) such as ethanol, isopropanol, if necessary!

☞ **Never use acetone, petrol or other aggressive solvents for the cleaning!**

If necessary, the tray could be removed from the reader by pulling it out manually. So it could be cleaned or washed easier.

☞ **In this case pay attention not to damage, scratch or rub the white REF plastic PAD!**

This PAD could also be washed and wiped with soft materials.

☞ **The strip holder is possible to remove only it the instrument is switched off.**

The instrument case and the touch screen could also be wiped off with the above mentioned solvents.

The REF pad

WASTE DISPOSAL:
Used strip should be treated as potentially infectious and should be disposed in accordance with local and national regulations relating to safe handling of such materials. Waste is to be recycled or to be put to municipal waste.

LAURA® Smart has a clear, well organized menu structure. The user is guided through the menu by the LCD. The menu functions are represented by buttons or list controls.

Pressing the touch screen can activate the desired function.

The pressed buttons are highlighted by blue colour.

If no button is pressed for a few minutes the program jumps back to Stand by status.

In this status the reader pulls in the strip holder tray, the buttons disappear from the screen and the actual time is displayed.

To leave this status and enter back to Ready to measure status the screen has to be touched anywhere.

4.1 Menu overview

Time out
or pressing HOME

Stand by status
or power ON

Ready to measure

Strip
inserted

Measurement

Display Result

Patient
information

ID

Seq.No

Mode

Timing: Standard / Smart

Memory

Filter: All / ID / Seq.No /
Positive / Not printed

Day: All / Today / Date

Action: Display / Print /
Send / Delete

Sample
information

Comment

Colour

Clarity

QC Test

Calibration

Calibration code / Default

Setup

Strip Parameter

Order: Deafult / New

Unit: CONV / SI / ARB

User Interface

Printer: On / Off

Interface: On / Off

Sound: On / Off

Language

EN, DE, FR, IT, PL, CZ, HU, RU

Date / Time

Customisation

Logo: On / Off

Header text: 1 / 2

Greetings text: 1 / 2

Colour text: 1/2/3/4/5/6/7/8/9

Clarity text: 1 / 2 / 3 / 4

SG recount

4.2 Main menu

After pressing the MENU in Ready to measure status the following main functions are available:

INSERT STRIP!	12:23
MODE	MEMORY
CALIBRATION	QC TEST
	SETUP
	▽
PATIENT	SAMPLE	MENU	HOME

- **Mode**
  The instrument can work in two timing modes:
  - Standard mode
  - Smart Timing®

  In standard mode the strip is inserted to the holder tray and the incubation timing is started. After 60 sec the reader measures the colour of placed strip and reports the result.

  In case of the Smart Timing® the incubation takes place outside the reader, max 4 strips could be incubated at once.

- **Calibration**
  Allows to calibrate instruments for the current used batch of test strips MicroalbuPHAN® LAURA.

- **Memory**
  LAURA® Smart has a memory for the last 360 measurements. The stored measurement results with all of their related information (date, time, comment, colour..), can be selected from the memory, displayed, printed or send to the computer anytime.

- **QC Test**
  In this function the instrument measuring capability could be tested, by using the grey control strip and control urines Urinorm. The instrument measures the grey control strip and compares the result with the predefined should values. The test result is displayed and also printed for QA purpose. In the case of control urines Urinorm are results automatically compared with target values that are listed in user manual for control urines Urinorm.

- **Set up**
  In this menu point the working parameters of the reader could be set.

4.2.1 Timing modes

LAURA® Smart has two different timing modes: Standard mode and Smart Timing®

Standard mode
It is a linear workflow as described in the routine measurement chapter. Working in this mode only 1 strip/minute measuring speed could be achieved.

Smart Timing®
It is used to speed up the measurement with the LAURA® Smart.

In this working mode the throughput is increased due to incubating of the strips are outside of the reader. The user places the measured strips outside of the reader and when the incubation time elapses, the strip will be inserted into the reader only for the time of the measurement. To support this process is offered an incubation plate with the four slots and the reader gives four corresponding software timers.

General workflow for use of the Smart Timing® mode:
• Whenever a timer is available (green) insert a strip to the urine sample.
• Place the strip on the incubation plate, to the corresponding slot, and start the timer/ the corresponding progress bar by pushing it. The green progress bar changes the colour to the yellow.
• Whenever a timer runs down, it beeps and the colour turns from yellow to red.
• Pick up the corresponding strip from the incubation plate and place it to the instruments strip holder tray.

The following pictures help to understand the procedure.

The position 1 is available for the new strip. The incubation has finished on the position 2 and the strip is inserted on the strip holder. The incubations run on the positions 3 and 4 with the strips/samples with Seq.num. 12 and 13.
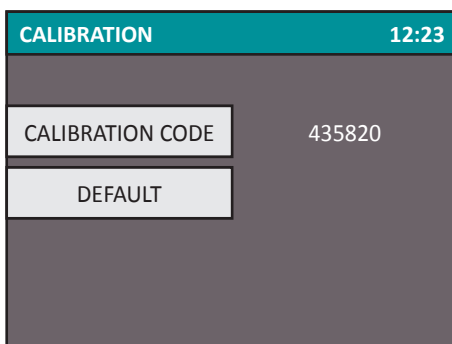

MEASUREMENT			12:23
1	2	3	4
		0012	0013
ESC			
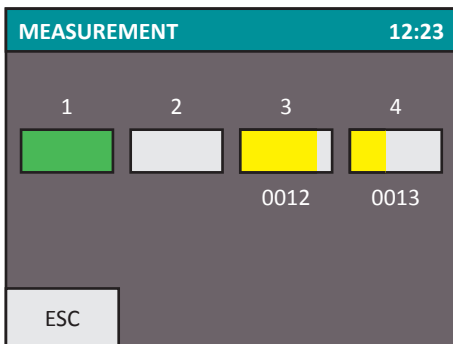
👉 **Keep the incubation plate clean, in order to prevent the possibility of cross- contamination among samples.**

4.2.2 Calibration
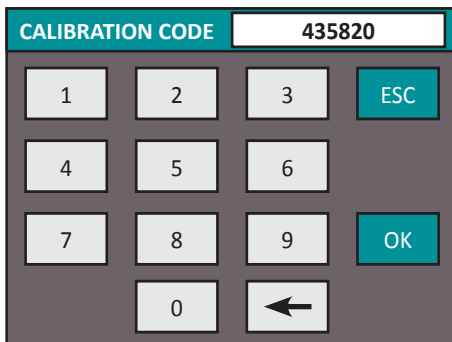
Calibration mode allows to perform calibration on the currently used batches of test strips MicroalbuPHAN® LAURA. Calibration is performed for both diagnostic pads for the determination of microalbumin and for determination of creatinine in urine.

Six-digit calibration code is an integral part of the label and on the label is always under the batch number. The first three digits are associated with a pad for determination of creatinine, the other 3 digit with pad for the determination of microalbumin in urine.

After pressing the CALIBRATION in MENU the following functions are available:

CALIBRATION	12:23
CALIBRATION CODE	435820
DEFAULT	

After pressing the CALIBRATION CODE the numeric keypad appears for entering of calibration code. The update setting becomes valid after pressing the OK button.

CALIBRATION CODE	435820		
1	2	3	ESC
4	5	6	
7	8	9	OK
	0	←	

After pressing the DEFAULT is set value 435820 (original value).

☞ **Calibration is intended for strips MicroalbuPHAN® LAURA only!**

4.2.3 Memory

The reader has a non-volatile memory, which automatically stores the last 360 measurements.

👉 **The oldest result will be overwritten by the new measurement without any warning.**

When the current measurement is ready the reader stores the result along with the following parameters:

• Result of the strip
• Type of the strip
• Seq.No
• ID
• Date and time
• Colour
• Clarity
• Comment

The user can reach the memory from the Menu by selecting the Memory button.

For administration of the memory the following display appears:

MEMORY	
FILTER	ALL
DAY	ALL
ACTION	DISPLAY
ESC	START

FILTER and DAY button serve to set the selection parameters, after then the START button activates the selected action.

The desired measurement can be selected in the following way:

- Select the FILTER criterion:
    - o All   - all stored result
    - o ID   - enter the desired ID
    - o Seq.No   - enter the desired Seq.No
    - o Positive   - where at least 1 value was positive
    - o Not printed - results that were not printed yet
    - o Error   - when the measurement failed

- Select the DAY of the measurement:
    - o All   - regardless of the date
    - o Today   - searching only among the today measured result
    - o Specific date - select the desired day
    (The program offers only those days for which there are results in the memory.)

- Choose an ACTION (what should happen with the selected results):
    - o Display   - the selected measurements will be displayed
    - o Print   - the selected measurements will be printed
    - o Send   - results will be sent to HOST, RS232 and USB
    - o Delete   - the measurements correspond with the selection criterion are dele-
ted

When all three above mentioned parameters (Filter, Day and Action) have been defined, the process can be activated by pressing the START button.

In case of DISPLAY was selected the found results are displayed in following form:

MEMORY: 1 / 3 DekaPHAN LAURA			
Kol. nr: 0023	BLD	NEG	
ID: *	LEU	75	Leu/ul
03.10.2008 18:08	BIL	NEG	
Colour: YELLOW	UBG	NORM	
Clarity: CLEAR	KET	NEG	
*	GLU	50	mg/dl
COMMENTS:	PRO	NEG	
	pH	6.5	
	NIT	NEG	
	SG	1.025	
ESC	◄	►	PRINT

The last measurement in the list will be displayed as the first one.
With help of the buttons the user can step forward or backward in the list.
The actually displayed result could be printed and the new comment could be attached.

4.2.4 Check mode

Menu Check mode provides the user checking of optical parts of instruments and also checking of whole system test strip - instrument LAURA Smart by using of control urines Urinorm.

4.2.4.1 Grey control strips

The purpose of this test measurement is to verify that the optical measuring capability of the instrument works properly. Perform this test once a week, or if you receive suspicious result in normal use. For testing the instrument the grey control strips are provided in the LAURA® Smart package.

👆 **Clean carefully the strip holder before using of QC Test. You prevent the degradation of the grey control strip with the rest of urine.**

Take out one from the tube and follow the steps below:
- Select the QC Test button
- Place the grey strip on the strip holder tray
- The reader starts the measurement
- Wait for the measurement is complete.

After measurement the reader compares the obtained remission values to the predefined ranges, stored in the instrument, in every greyscale and wavelength. After that it displays and prints out the result. When the measured values are in harmony with the predefined values the result of the QC Test is OK.

The picture of the display after QC Test is follows:

TEST MEASUREMENTS		12:23
1:	690	700
2:	350	354
3:	145	130
	Test: OK	
ESC		

Print out the result of the measurement:

```
TEST MEASUREMENT
2009.10.01      11:39
************************
PAD:      %Rg  %Ro

  1       696  671
  2       361  347
  3       141  132

TEST: OK
------------------------
```

Keep the print out for QC reference. If the test fails, Test Error will be reported and the wrong result is displayed in red. In this case repeat the test with another check strip. If it reports an error again call the service.

☞ **Keep the grey strips always in the tube, do not touch the surfaces by hand, and handle them with care. The strips are reusable. Refer to the label of the grey strip tube!**

4.2.4.2 Control urines Urinorm

URINORM control urines are designed for verification and confirmation of precision and accuracy of PHAN® diagnostic strips as well as LAURA® and LAURA® Smart urine analysers (for the visual and objective evaluation). Measured values are automatically compared with target values.

Test performance:

• Press the button „Check mode" and submenu Urinorm (N, P).

• Remove 2 test strips from the tube.

• Press the button Urinorm N.

• Dip the first strip into sample of Urinorm N, remove excess amount of urine and place the strip on the plastic holder.

• After evaluation of Urinrom N press the button Urinorm P.

• Dip the second strip into sample of Urinorm P, remove excess amount of urine and place the strip on the plastic holder.

• Wait for evaluation.

After finishing of evaluation are results automatically compared with target values that are stored in instrument and is completely identical with the targets target values in the instructions of the control urines Urinorm. If the result is in agreement with the target values, it is marked by white colour in memory. Non complying results are marked by red colour in memory.

Save the results in printed form as proof of the measurements for evidence for inspection.

If the results are unsatisfactory (do not correspond to predefined values), then unsatisfactory result is indicated on the screen in red and printout contains two exclamation marks. In this case, repeat the test with another pair of test strips. If the error message appears again, please, contact the service.

4.2.5 Settings

Under this menu point the instrument working parameters could be set.

The available settings are displayed in the following format:

SETUP INSTRUMENT	
PARAMETER	DATE / TIME
USER INT.	CUSTOMISATION
LANGUAGE	
ESC	

The working parameters are organized as follows:

• Parameter – strip and measurement related parameters could be set here, as:
    ORDER of parameter at printing
    UNIT of parameters

• User interface – turning ON/OFF the following user interfaces:
    PRINTER
    SOUND
    ID MODE

• Language – selecting the language from the 7 defined languages:
    EN – English
    DE – German
    FR – French
    IT – Italian
    CZ – Czech
    HU – Hungarian
    RU – Russian

• Date / Time – set the date and time aand the date format

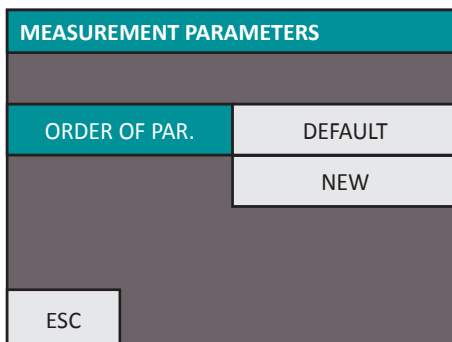• Customisation – customizing the header text and logo, defining colour and clarity texts

4.3 Parameter Settings

This menu point is divided into two submenus:
- Printing order
- Unit settings

4.3.1 Printing order

The parameter printing order can be set in the following menu point:

MEASUREMENT PARAMETERS	
ORDER OF PAR.	DEFAULT
	NEW
ESC	

After pressing the DEFAULT button the printing order will correspond to the Parameter order of the strip DekaPHAN® LAURA.

The instrument enables to change this order according to the user's wish. In this case the NEW menu point should be used. The program offers all the parameters and they should be touched one after each other in the desired order.

4.3.2 Unit settings

Unit can be selected with help of the following menu point:

Possibilities for settings of units are CONV, SI and ARB or their combination.

The ALL: button set the selected unit for all the 10 parameters.

If the user would like to set the unit individually for the parameters then the PAD TO PAD button can be used. In this case the parameters are displayed in the header of the LCD and the desired unit can be set individually.

MEASUREMENT PARAMETERS		
		ALL: CONV
	UNIT	PAD TO PAD
ESC		OK

BLD		
CONV		CONV + ARB
SI		**SI + ARB**
ARB		
ESC	◄	►

The following table summarizes the possible reported values in the entire of three units:

4.3.3 Parameter table

Parameter	CONV		SI		ARB
	Value	Unit	Value	Unit	Value
BLD	NEG	Ery/µl	NEG	Ery/µl	NEG
	10		10		1+
	50		50		2+
	250		250		3+
LEU	NEG	Leu/µl	NEG	Leu/µl	NEG
	25		25		1+
	75		75		2+
	500		500		3+
BIL	NEG	mg/dl	NEG	µmol/l	NEG
	1		17		1+
	3		51		2+
	6		103		3+
UBG	NORM	mg/dl	NORM	µmol/l	NORM
	1		17		1+
	3		51		2+
	6		102		3+
	12		203		4+
KET	NEG	mg/dl	NEG	mmol/l	NEG
	5,2		0,5		±
	16		1,5		1+
	52		5		2+
	156		15		3+
GLU	NORM	mg/dl	NORM	mmol/l	NORM
	50		2,8		1+
	100		5,5		2+
	300		17		3+
	1000		55		4+
PRO	NEG	mg/dl	NEG	g/l	NEG
	30		0,3		1+
	100		1		2+
	500		5		3+
pH	5				
	6				
	6,5				
	7				
	8				
	9				
NIT	NEG				
	POS				
SG	1,000				
	1,005				
	1,010				
	1,015				
	1,020				
	1,025				
	1,030				
CRE	0,1	g/l	0,9	mmol/l	
	0,25		2,2		
	1		8,8		
	2		17,7		
	> 3		> 26,5		
MA	10	mg/l	0,01	g/l	
	30		0,03		
	80		0,08		
	150		0,15		
	300		0,3		
	1000		1		
	5000		5		

4.4 User Interface

In this menu point the built in interfaces could be switched ON or OFF. These interfaces are:

- Printer
- Serial interface
- Sound

The factory setting for LAURA® Smart is all interfaces: ON.

USER INTERFACE	
PRINT	ON
INTERFACE	ON
SOUND	ON
ESC	OK

Printer ON /OFF means, that the results will be printed automatically after measurement, or not. It is possible to switch off this feature, in this case the instrument will measure the strip and store it in the memory, but it won't print it. The result can be printed at any time from the memory or when the result is displayed.

Interface ON /OFF means that the results will be send to Host automatically after measurement, or not. It is possible to switch off this feature, in this case the instrument will measure the strip and store it in the memory, but it won't send it. The result can be sent at any time from the memory.

Sound ON/OFF turns the button feedback beep on or off. Warning beeps are always ON, this setting has no influence to them.

4.5 Language Setting

Here the user can select the language of the instrument. Pressing the corresponding button can make the selection. The actual set language button is pressed. OK button must be pressed to make the selection valid.

Pressing the ▶ button the next four available languages are displayed.

The following languages are available:
English
German
French
Italian
Czech
Polish
Hungarian
Russian

LANGUAGE	
ENGLISH	FRANCAIS
DEUTSCH	**ITALIANO**
ESC	OK

4.6 Date / Time setting

The Time and the Date format can be set in this menu point.

Select the Date / Time button in settings menu, the following display will appear:

To change the date or time values push the corresponding button! A numeric PAD will appear and the desired value can be entered. When date and time are correct the DATE format can be set, by pressing the FORM button.

SET DATE & TIME		
03 — 11 — **2008**		
	11 : 49	
ESC	FORM	OK

The following formats could be used: Year – Month – Day YYYY-MM-DD
Day – Month – Year DD-MM-YYYY
Month – Day – Year MM-DD-YYYY

Pressing the OK button the actual settings became valid. The real time clock in LAURA® Smart is running from a built in lithium battery. This battery is independent on the removable batteries.

4.7 Customisation menu

Customisation menu serves to enter user defined texts into the reader LAURA® Smart. The text lines could be entered with help of alphanumeric PAD or with a connected external keyboard:

These texts are as follows:

• 2 result header lines, appear with each result print out, max 24 characters

• 2 greeting lines, are printed after self test, max 24 characters

• 4 clarity text each, max 10 characters

• 9 colour text each, max 10 characters

CUSTOMISATION	
LOGO	ON
HEADER	Header 1. line 123456 Header 2. line labor na 1. greetings line 2. greetings line
GREETING	
ESC	▶	OK

Beyond these, the Logo ON/OFF switch could be reached from this menu point. In case of Logo ON is set, the LAURA SMART logo will be printed with every results.

CUSTOMISATION		
	Colour 1	Colour 5
COLOUR	Colour 2	Colour 6
	Colour 3	Colour 7
CLARITY	Colour 4	Colour 8
		Colour 9
ESC	◀	OK

Paging could be done by pressing the ◀▶ buttons.

4.7.1 Automatic re-calculation of SG

Urines that have pH 7 or higher, move measured results of specific gravity (SG) to lower values. In the case of urines, wherein the pH is 7 or higher, should always be added to the measured result of SG value 0,005 SG so that the results were more comparable to the higher reference method, such as refractometer or urometer. Readers LAURA include a feature that provides automatic conversion (re-calculation) of results of SG depending on pH.

If the SG recount (re-calculation) is switched on, results of SG are always automatically increased by 0.005. In the case where the SG conversion is switched off, the result of SG is not corrected according to the pH.

When the control mode and the control urines Urinorm are used, automatic re-calculation of SG is deactivated even when it is turned on.

4.8 Powering by batteries

LAURA® Smart could also be used with batteries power supply. The battery holder is locating at the bottom of the instrument. 6 pcs 1.5 V AA type batteries or accumulators could be used. While inserting the batteries, please pay attention to the polarity. It is indicated on the holder.

When using the batteries type LRG, 200 measurements with printing or 240 without printing could be carried out with one set. The instrument displays a BAT icon on the LCD that gives information about the battery status.

To increase the batteries lifetime generally consider the following:

• Turn off the automatic printing and print the result only if it is really necessary!
• If the measurement series has been done switch off the instrument.

👉 **The Standby status needs also energy!**

The instrument gives a beep warning in Stand by when battery is used. If the adapter power plug is inserted the instrument will work from adapter and the batteries are disconnected.

LAURA® Smart is a high sensitive and accurate optical measuring instrument. All optical components, and REF PAD are adjusted with special tools during manufacturing.

5.1 Trouble-shooting

In case of any error, please refer to the following table. It helps to identify the possible cause of the error and gives instruction how to solve it.

Error description	Possible cause	Corrective action
The reader cannot be switched on. The display remains dark	Power supply is not connected or wrong type.	Check the power supply and the connections.
Self test failed.	Strip holder tray is missing or the REF PAD dirty or movement of the tray obstructed.	Check the strip holder tray, it must be clean and easy to move also by hand.
The reader doesn't print, or the printout is not visible.	Paper cover is not closed. Wrong paper is loaded (not thermal paper). Paper is inserted with wrong side up.	Check the printer visually, for any damage or jam. Insert the right type of paper correctly. Close the printer cover.
The reader does not recognize the inserted strip.	The strip holder tray is in wrong position.	Check if the hole of the tray is exactly above the strip detector.
Host communication failed.	Serial cable is not attached or wrong. Interface mode is turned OFF, or parameter doesn't match with HOST settings.	Check the cable! Check that interface mode is ON and parameters are correct.
Reader displays Measurement Error.	Strip is placed wrong. Wrong strip is used. Dry or not fully moistured strip is used.	Repeat the measurement with correct strip.

5.2 Service information

In case of an error, try to solve it according to the above troubleshoot guide first. If the failure remains, please contact your distributor for service.

☞ **Never open the reader's case.**

5.3 Safety information

LAURA® Smart complies the with EMC directive 89/336/EEC and low voltage directive 73/23/EEC.

LAURA® Smart instrument in combination with PHAN® LAURA test strips complies with the requirements of IVD directive 98/79/EC.

5.4 Producer

Producer of the system LAURA® Smart and diagnostic strips PHAN® LAURA:

Erba Lachema s.r.o.
Karásek 1d, 621 00 Brno
Czech Republic

5.5 Ordering information

	cat. number:
LAURA® Smart reader	– 50003508
DekaPHAN® LAURA	– 10008297
HeptaPHAN® LAURA	– 10008298
PentaPHAN® LAURA	– 10010239
TetraPHAN® SG LAURA	– 10020292
DiaPHAN® LAURA	– 10010238
MicroalbuPHAN® LAURA	– 10010262

Spare parts:

Strip holder tray for LAURA® Smart	– 50003510
Power supply for LAURA® Smart	– 50003511
Interface cable for LAURA® Smart	– 50003512
The grey control strips for LAURA® Smart	– 50003513

5.6 Guarantee conditions

The producer Erba Lachema s.r.o. guarantees the reader LAURA® Smart for 12 months after installation. The free service isn't guarantead for spare parts from the list (see 5.5).

General	Dimension	230×127×110 mm
	Weight	0.7 kg without batteries
	Power source	External adapter 9 V DC / 2 A 90–230 V / 50–60 Hz
	Power consumption max / standby	20 W / 6 W
	Battery	6×1.5 V AA
	Battery life type LRG	200 measurements with printing or 240 without printing

Measurement	Method	Reflection photometry
	Throughput	max. 240 strips/hour
	Wavelength	470, 540, 650 nm
	AD resolution	10 bit

User Interface	Printer	58 mm graphical thermal printer, 24 char/line
	LCD	320×240 colour TFT

Memory	Capacity	360 complete measurement results
	RTC	Lithium battery kept real time clock

Interfaces	Host interface	RS 232 Serial interface, 2 400–19 200 Bd
	BCR / PC AT keyboard	Wedge type BCR with standard PS2 interface

Recommended operating environment	Temperature	15–35 °C Optimal range 20–25 °C
	Humidity	20–80 %
	Place	Horizontal surface No shock or vibration Not direct Sun shine

Storing / transport	Temperature	-20–60 °C
	Humidity	20–90 %

7. Serial interface protocol

The LAURA® Smart has an RS232 interface to HOST computer. If the communication is enabled (Interface: ON) the reader sends out the result immediately after measurement. Stored measurements can also be sent at any time from the memory.

The hardware parameters of the RS232 port are:
Baud rate: 19 200 Bd
Bit length   8
Parity: No
Stop bit: 1

The interface has a DB9 mother type connector with the following PIN connection:

PIN number	Connected
2	TxD
3	RxD
5	GND
1, 4, 6, 7, 8, 9	- not connected

If USB host is connected, the reader sends the data trough the USB port as well.
The format of the data stream is identical to the serial (RS232) case.
The communication is unidirectional LAURA® Smart -> HOST, and is in ASCII text form.
The reader sends 1 result in 1 package. Every package has the same format, which is:

Name of field	Characters sent out									# of bytes
Frame start	STX		Strip name		9 space				CR, LF	26
Seq.No line	"Seq.No:" 7 char		SP	4 char long Seq number, right justified, filled with 0					CR, LF	26
ID line	"Pat.ID:" 7char		SP	14 char long ID				2×SP	CR, LF	26
COLOR	„COLOR:"		3×SP	Color text 10 char					CR.LF	21
CLARITY	„CLARITY:"		SP	Clarity text 10 char					CR LF	21
Date line	YYYY.MM.DD		6×SP		HH:MM		3×SP		CR, LF	26
1st. result line	'*' or SP	SP	3char par. name	SP	5char result Conv or SI	SP	6char unit	SP	5char ARB result	CR, LF	26
10th. result line	'*' or SP	SP	3char par. name	SP	5char result Conv or SI	SP	6char unit	SP	5char ARB result	CR, LF	26
Comment line	{	80 char long comment or space							}	82
Frame end	ETX									1

Where:

- STX = 0x02, ETX= 0x03, CR=0x0d, LF=0x0a, SP=0x20
- The parameter order is the default regardless of printing order.
- In case of shorter strip (HeptaPHAN® LAURA, PentaPHAN® LAURA, TetraPHAN® SG LAURA, DiaPHAN®LAURA, MicroalbuPHAN® LAURA) only the measured parameter lines are sent
- The result and the unit is depending on the selected unit (SETTINGS/STRIP/PARAMETER)

8. Short Instructions

1. Check carefully if the instrument is complete and not damaged.

2. Connect the instrument to the plug, check if there is a connection between the instrument and external plug.

3. Switch on the instrument with the main switch.

4. Wait till the instrument performs the self-test.

5. Set the mode of the results (direct printing after analysis, printing after measurement of all samples, sending to the external net etc.).

6. Start the measurement in the mode Seq.No or ID.

7. Complete the measurements of urine samples; follow all recommendations during the operation, which are included in the instruction of the diagnostic strips.

8. Perform the everyday cleaning after having finished your daily measurements.

9. Leave the instrument switched on in Standby mode or switch it off using the main switch.

9. Index

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