Milkotronic Ltd

LACTOSCAN INDI

MILK ANALYZER

LCD display – 4 lines x 16 characters

(with option for manual cleaning with syringe)

Operation manual

Switching Adapter

- **Input**: 100 – 240 V ~1.6 A max. 50-60 Hz
- **Output:** +12 V ⎓ 3 A min.
- **Output power:** 36 – 42 W

Measurement modes

- cow milk ☐
- buffalo milk ☐
- mixed milk ☐

CAUTION!

Keep the switching adapter dry!

Please, read and follow strictly all the instructions in the manual.

Due to continuous improvement in the device, information contained in this manual is subject to change without notice. Contact the company-producer for revisions and corrections

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SAFETY INSTRUCTIONS

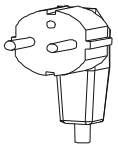
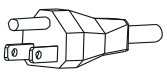
1. **Read this manual carefully and make sure that you understand all the instructions.**
2. **For safety purposes the device is equipped with grounded power cable. If there is no grounded electrical outlet where the device will be used, please, install such before using the device.**
3. **Place the device on leveled and stable plate. In case it falls or is severely shocked it may be damaged.**
4. **Connect to the electrical network in such a way that the power cable to stay away from the side for accessing the device and not to be stepped on.**
5. **Every time before cleaning the device switch it off and unplug it from the electrical outlet. The device has to remain unplugged till the cleaning completion.**
6. **Do not disassemble the unit in order to avoid possible electrical shock. In case of malfunction contact your local dealer.**
7. **Handle the liquids the device works with carefully, following all the instructions for their preparation.**
8. **Place the switching adaptor in such a way as to be protected from overflow and spillage of liquids.**

PARTS AND ACCESSORIES

In the table below the standard delivery configuration of the milk analyzer is listed:

№	Description	Item №	pcs
1.	Ultrasonic portable milk analyzer	LSS001	1
1 sample measurement time		20 sec	☐
		Operation manual	LSS002
		Plastic sample holder	LSS003
2.	Spare Pipes	LSS004	1
3.	12 V DC Power Supply Cable	LSS005	2
4.	Alkaline cleaning solution Lactodaily	100 g	2
5.	Acidic cleaning solution Lactoweekly	100 g	1
7.	Piston		1

In the table below the milk analyzer spares and accessories, which are delivered on customers request are listed:

№	Description a) included in the set: ☒ b) not included in the set (may be additionally bought): ☐	Item №	pcs	☒ / ☐
7.	RS232 Interface Cable - Analyser-IBM PC	LSS006		☐
8.	ECS POS Serial Printer	LSS017	1	☐
9.	RS232 Interface Cable - Milk Analyser – Serial Printer/IBM PC	LSS018	1	☐
10.	Plug type		1	☒
			1	☐

1. FUNCTION

The function of the milk analyzer is to make quick analyses of milk on fat (FAT), non-fat solids (SNF), proteins, lactose and water content percentages, temperature (^{o}C), freezing point, salts, total solids, as well as density of one and the same sample directly after milking, at collecting and during processing.

2. TECHNICAL PARAMETERS

2.1. Working modes characteristics:

The program of the milk analyzer has four working modes.

2.1.1. Measurement mode milk / dairy product – first type

2.1.2. Measurement mode milk / dairy product – second type

2.1.3. Measurement mode milk / dairy product – third type

These modes have been calibrated on customers' request for 3 milk types from the following: cow, sheep, UHT, buffalo, goat, camel milk, cream, ice cream mixtures, whey, recovered milk, etc. before leaving the production facilities and the text on the display will be for the corresponding types, as is indicated on page 2 Measurement modes.

2.1.4. Cleaning

Note:
Pressing the button labeled A - start re-printing the results
Pressing the button labeled B - start of rinsing (2.1.4.)
These commands are possible when the unit is in Idle mode, i.e. expecting command for measuring sample.

Lactoscan INDI has a possibility for manual cleaning with piston.

2.2. Measuring range:

Fat …….....	……...from 0.01% to 25%
SNF ……	..……...from 3% to 40%
Density * …….	……..…….from 1000 to 1160 kg/m^3
Proteins …….	……..from 2% to 15%
Lactose ……...	……from 0.01 % to 20 %
Water content ……	……..……..from 0 % to 70 %
Temperature of milk ……	……..from 5^{o}C to 40^{o}C
Freezing point*……	……from – 0,4 to – 0,7^{o}C
Salts …….	……..……from 0,4 to 4%

* Density data are shown in an abbreviated form. For example 27.3 have to be understood as 1027.3 kg/m^3. To determine the milk density, write down the result from the display and add 1000.
Example: result 21,20; density = 1000 + 21,20 = 1021,2 kg/m^3
The abbreviated form of the density is used also when entering data for samples in working mode **Recalibrate**, for example:
If the measured sample density is 1034.5 kg/m3, then in the menu for entering the samples parameters used for calibration, across the parameter Den = , you have to enter 34.5.

** Please, carefully read Appendix Freezing Point.

2.3. Accuracy:

Fat …..……..	…..……...± 0.06%
SNF ……..	……..……...± 0.15%
Density ……	……..± 0.3 kg/m^3
Proteins ……...	……..……...± 0.15%
Lactose …….	……...± 0.20%
Water content ……..	……..± 3.0%
Temperature of milk ……..	……± 1^{o}C
Freezing point……..	..……..……± 0.005^{o}C
Salts ……...	…..……..……...± 0.05%

The difference between two consequent measurements of one and the same milk could not exceed the maximum permissible absolute error.

2.4 Correct ambient conditions:

Maximum permissible absolute error is guaranteed in case of normal ambient conditions:

Air temperature…… ……from 10^{o}C to 40^{o}C

Relative humidity …… ……...from 30% to 80%

Power supply …… ……...220V (110V)

Extent of contamination at normal environmental conditions……..2

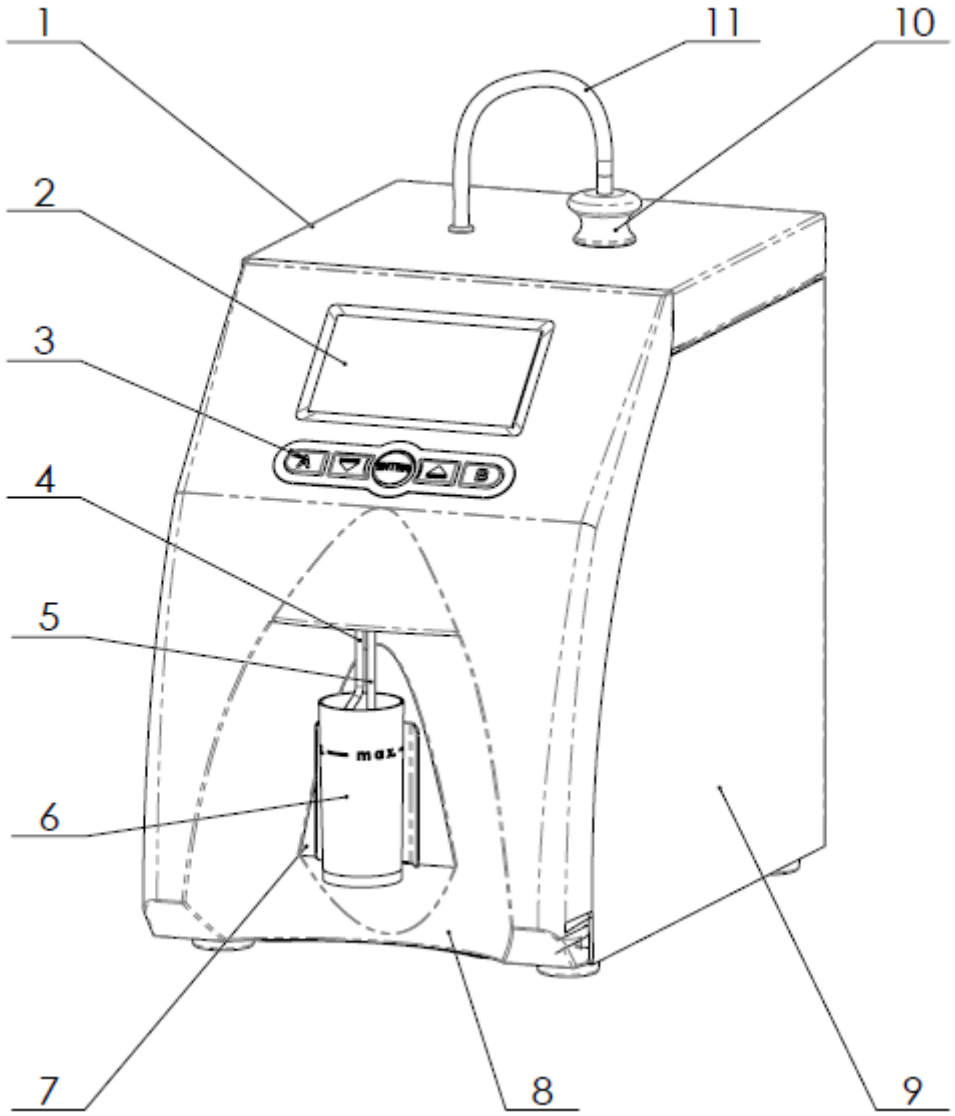
Maximum permissible absolute error values in point 2.3 are in dependence on the correctness of the corresponding chemical method, used for component content determination. In point 2.3. are used the following reference methods: Gerber – for fat, gravimetric – for SNF, Kjeldahl – for protein. The boundary for maximum variation of repeatability when the power supply voltage is from +10 to – 15% from the nominal voltage values (220 V) have to be no more than 0.8 accuracy according point 2.3. The analyzer is used in conditions free of outer electrical and magnetic fields (except the magnetic field of the Earth) and vibrations.

2.5. Dimensions: …….240/220/100 mm, mass 3,0 kg

2.6. Continuous working time:……...……....non-stop

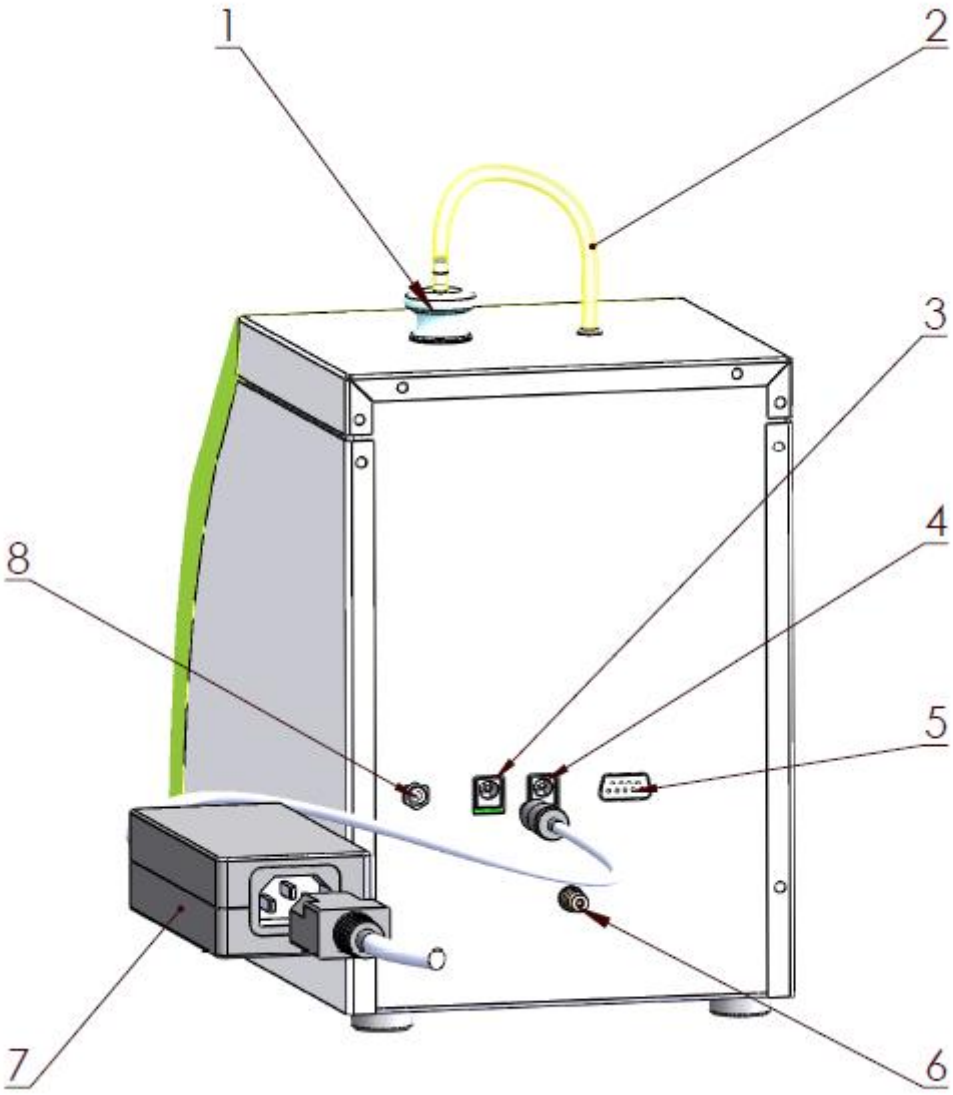
2.7 Milk sample volume per one measurement: …..……..25 ml

Fig.1 Front panel



1. ss cover
2. LCD
3. buttons
4. output pipe
5. input pipe
6. plastic mug for the sample
7. Sample holder
8. ABS color front panel
9. ss side cover
10. tap for the manual cleaning opening
11. pipe

Fig. 2 Back panel



1. tap for the manual cleaning opening
2. pipe
3. AC adaptor input
4. DC Power Supply output
5. RS232/printer
6. air outlet
7. Switching adapter
8. Power switch

Fig. 3 Connecting peripheral devices

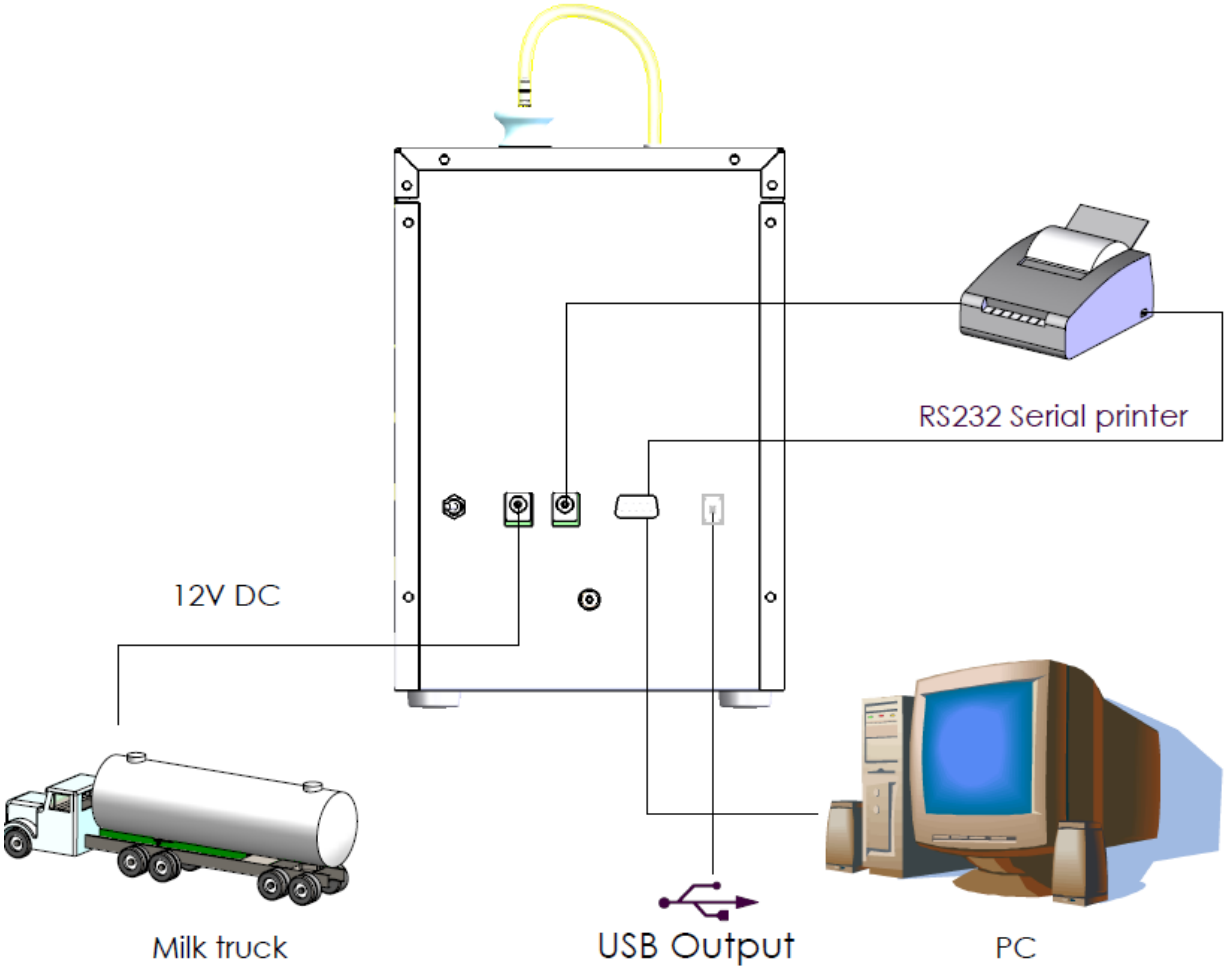
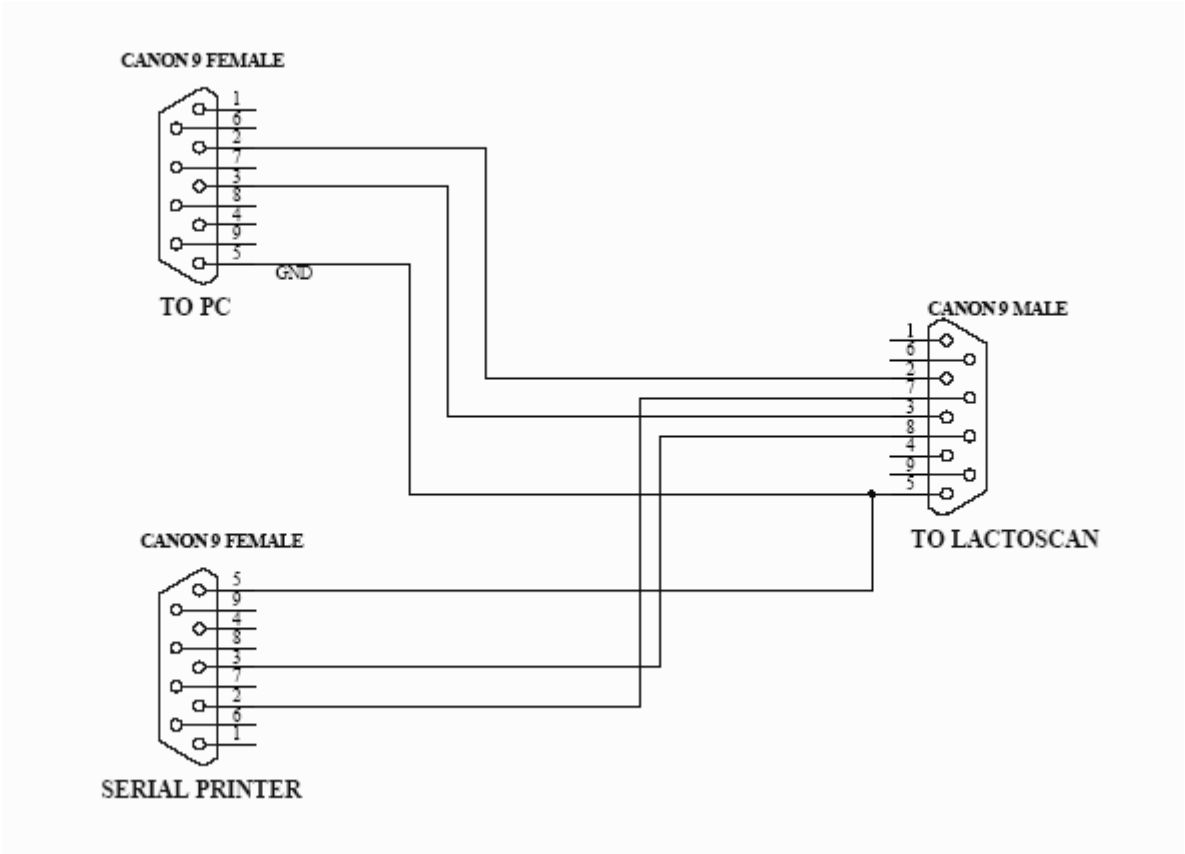


Fig. 4 Cable Description

90-1801-0008

RS232 Interface Cable - Milk Analyser – Serial Printer/ IBM PC



90-1801-0009

DC 12V Power Supply Milk Analyzer Cable

1. GND
2. No connection
3. No connection
4. 12V DC

3. QUALIFICATION OF RAW MILK, THERMALLY TREATED MILK, OTHER DAIRY PRODUCTS AND DERIVATIVES

3.1. Taking samples and preparation for analyses

In order to receive reliable results in qualification of milk, dairy products and derivatives are needed: precise samples taking; correct samples storing (in need to be preserved); correct preparation before making measurement. The rules and requirements for this are described in details in *Appendix Preparing Samples.*

3.2. Making the measurement.

3.2.1. Preparing the analyzer for working mode

3.2.1.1. Put the analyzer on the working place, providing good ventilation and not in the vicinity of heat providing devices or sources. The temperature in the premises has to be in the boundaries 10-30^{o}C.

3.2.1.2. Check if the power switch is in "0" position and that the outlet voltage complies with the voltage indicated on the rating plate of the analyzer. Connect the power supply cable to the electrical outlet.

3.2.1.3. Switch on the "**POWER**" button, which starts the identification procedure. For a short time the display shows the number of the software versions, for example:

Milkanalyzer xxx
LCD vers xx
MA vers yy
MA ser. N. xxxx

where:

Milkanalyzer xxx is the time for measurement.
LCD vers XX is display control software version.
MA vers YY is the motherboard software version.

MA ser. N. **xxxx** is the serial number – written on the rear panel of the analyzer.
These data are called analyzer's **Identity**

If in the process of exploitation there is a need to ask a question the company-producer, you have to send the data, written on the display during the above described initialization procedure i.e the analyzer's identity.

3.2.1.4. Till the analyzer is prepared for work (at about 5 minutes) the following message is written on the display: "**Getting ready**". Above pointed time is in dependence of the environmental temperature and increases with decreasing the temperature.

3.2.1.5. When the device is ready for work the display shows: **"Ready to start**".

The analyzer is ready to make analyses in mode 1 (normally Cow)

3.2.1.6. If you want to pass to another mode press the button **Enter** and hold it pressed. The following message appears on the display:

Release button to start menu

Release the button **Enter**. The display shows the possible working modes:

Mode selector
Cal1 – Cow
Cal2 – Sheep
Cal3 – UHT

Rinsing
Final Clean
Printing

Using “up”▲and ”down”▼buttons, choose the working mode and press **Enter** in order to start it.

3.2.2. Making analyses

To start measurement: pour the preliminary prepared sample in the sample holder of the analyzer; put the sample holder in the recess of the analyzer; press the button **Enter**. The analyzer sucks the milk, makes the measurement and returns the milk in the sample-holder. During the measurement the temperature of the sample is shown on the display.
Ignore the results received immediately after switching on the analyzer and after measuring distilled water. Make a second measurement with new portion of the same sample.

3.2.3. Displaying the results

3.2.3.1. When the measurement is finished, the sample returns in the sample-holder and the display shows the results. For example:

Results:	
F=ff.ff	**S=ss.ss**
D=dd.dd	**P=pp.pp**
L=ll.ll	**W=ww.ww**

Where:

F= ff.ff - measured FAT in percentage;
S= ss.ss - measured SNF in percentage;
D= dd.dd - measured density in percentage;
P= pp.pp - measured protein in percentage;
L= ll.ll - measured lactose in percentage;
W= ww.ww - measured sample’s added water in percentage.

By pressing the button” Down” ▼ the display shows the second page, containing the results:

Page 2 Results:	
T=tt.tC	**pH=pp.pp**
FP=-0.fff	
S=0.sss	**A=aa.aa**

Where:
tt.tC - sample’s temperature;

pp.pp - sample's pH result – if there is a pH probe connected;
-0.fff - measured sample's freezing point;
0.sss - measured salts values;
aa.aa - measured total solids

3.2.3.2. Write down the results in the form. The results remain on the display till a new measurement is started. If the analyzer is connected to a computer or a printer, it sends the data to the computer or prints them.

Fig. 5 Printing the results

SCHEME:
PRINTOUT OF THE RESULTS-EXAMPLE

Time: xx:xx:xx
Date: xx:xx:xxxx
Milk analyser 60 SN: xxxxx
Calibration 1 – UHT
Results:
Temp.Sample……..˚C
Fat……..xx.xx%
SNF……xx.xx%
Density……xx.xx
Protein……...xx.xx%
Lactose……..xx.xx%
Added water…….xx.xx%
pH……..xx
Salts……..xx.xx%
Freezing point……-x.xxx˚C
Deliverer No…….xxxx
Liters……xx.x

4. CLEANING THE ANALYZER

This procedure prevents gathering milk fat residues and milk stone on the sensor. The milk stone consists of milk solids, calcium, iron, sulphates, magnesium, etc. All these substances form layer on the pipe and sensor's walls, which leads to deviations in the measurement results and blocking up the piping.

The company-producer recommends usage of the chemicals, supplied with the analyser – alkaline and acidic (Lactodaily and Lactoweekly). You may order them separately or together with the analyser. Try to use only these chemicals for cleaning the analyser.

In case you missed to order these chemicals, the alternative is to use alkaline and acidic cleaning solutions for dairy equipment by one the companies, producing such chemicals, as for example:
http://www.diversey.com
http://www.ecolab.com
http://www.calvatis.com

Do not use chemicals not intended for usage in the milking systems or vessels in the dairy sector. Pay special attention to the concentration of the acidic chemical. **Increased concentration may damage the measuring sensor.**

4.1. Periodically cleaning (rinsing) the analyzer

It is done in the process of routine work of the analyzer. Its aim is to prevent drying up and adhesion of different milk components in the milk analyzer's measuring system.

4.1.1. Periodical cleaning frequency.

It is easy to understand what is the period on which the rinsing could be done as the analyzer reminds you when it is necessary. This is done by a sound signal in 1-second cycle after the set time intervals elapse:

- 55 min. after switching on the power supply of the analyser, but idle work;

- 15 min. after the last measurement of real milk sample.

*Idle Mode is that part of the standard working mode, when the analyser is not making measurements. There's embedded in the analyser system for measurement of the idle time. The idle time is measured starting from the last action of the operator. In dependence of it (what the operator last did), are taken decisions regarding the cleaning.

There are 2 options:

Option A: If the analyser:

1. Was only switched on but was not started in measurement mode,
2. Or the last action was cleaning,
3. Or the last action was measuring sample with very low Fat (similar to water)

Then the cleaning is started after 55 min.

Option B: If the last thing done with the analyser was measurement of normal milk sample, the cleaning is started after 15 min.

After cleaning completion, new measurement takes place in above described time intervals.
The following message appears on the display:

Time to start cleaning

4.1.2. Rinsing

After above message is received put in the recess of the analyzer a sample holder with water.
Press Enter to start the rinsing mode.
In this mode the analyzer makes 8 cycles and stops.
Already used solution is poured out of the analyser. Now the device is ready for the next measurement. In case of doubt that the analyzer is still not well cleaned, the procedure may be executed repeatedly.

4.2. Complete cleaning (Final clean)

4.2.1. Complete cleaning frequency

This cleaning is done after finishing the work with the analyzer at the end of the working day or if it is obvious that the measuring system of the analyzer is contaminated in case of intensive work with it. It is done with alkaline cleaning solution.
Then follow the instruction for milk analyzer cleaning.

4.2.2. Cleaning

4.2.2.1. Cleaning with alkaline solution

Preparation of 3 % alkaline solution of Lactodaily for circulation cleaning in the milk analyzer:
1. Take the package 100 g concentrated chemical Lactodaily
2. In appropriate vessel (for example bucket) pour 1 l water.
3. Add the powder and then again water up to 3 l.

For a single cleaning cycle you need only 25 ml cleaning solution. We recommend you to prepare working solutions of cleaning chemicals, enough for normal work for 1 week, because, during their stay unused, the working solutions lose their strength and also is difficult to store them.

The following procedure is executed:

1.Rinsing milk residues
Fill in the glass with water. Put it in the recess of the analyser and start command Final Clean from the main menu. After finishing it pour out the contaminated water.
2.Cleaning with alkaline cleaning solution
Fill in the glass with warm (50-60 C) alkaline cleaning solution. Put it in the recess of the analyser and start the command Final Clean from the main menu. After finishing it, pour out the contaminated liquid.
3.Rinsing with water
Fill in the glass with water. Put it in the recess of the analyser and start command Final Clean from the main menu. After finishing it pour out the contaminated water. Now the device is ready for work.

4.2.2.2. Cleaning with acidic solution
It is recommended to be done every day.

Preparation of 3 % acidic solution of Lactoweekly for circulation cleaning in the milk analyzer:
1. Take the package 100 g concentrated chemical Lactodaily
2. In appropriate vessel (for example bucket) pour 1 l water.
3. Add the chemical and then again water up to 3 l.

The following procedure is executed:
1. Rinsing the milk residues:
Fill in the glass with water. Put it in the recess of the analyser and start command Final Clean from the main menu. After finishing it pour out the contaminated water.
2. Cleaning with acidic solution
Fill in the glass with warm (50-60 C) acidic cleaning solution. Put it in the recess of the analyser and start the command Final Clean from the main menu. After finishing it, pour out the contaminated liquid.
3. Rinsing with water
Fill in the glass with water. Put it in the recess of the analyser and start command Final clean from the main menu. After finishing it pour out the contaminated water.
Now the device is ready for work.

Please, pay attention that, when the analysers gives a signal for need of cleaning 15 min after the last measurement of real milk samples or 55 min. after being powered and not used, cleaning is made ONLY with alkaline solution in concentration 1-3%.

During the basic/final/manual cleaning sequence is: alkaline solution – water – acidic solution - water

4.3. Final clean procedure
After choosing "Final Clean" the display shows:

Put Filled with Water Glass and Press Enter to Start Clean

Place a glass with water and press button Enter to continue. The following message appears on the display:

Phase 1:
Cleaning

And the number of the current cleaning cycle. After rinsing is finished, the display shows:

Put Filled with Detergent Glass and Press Enter to Continue

Place a glass filled with cleaning solution and press button Enter. Display shows:

Phase 2
Detergent
Temp

The temperature of the detergent is measured. If it is lower than recommended, the display shows:

Cleaning Fail
Low Deterg Temp
Press Enter
to Start Again

The current procedure is stopped and is registered as not successful and it must be repeated with preliminary heated detergent.
If the temperature of the detergent is as per the technology recommendation, the set in the analyser number of cleaning cycles sre executed. Then the Phase 3 is completely executed – rinsing the measurement system.
The end of the Final Clean is indicated on the display with:

Cleaned
Ready to Start

Now the analyser is ready to continue normal work.

4.4. Manual cleaning with piston:

The Lactoscan INDI model has an option for manual cleaning with piston for cases when the customer is not satisfied with the cleaning quality, or there's no electrical power supply, or sudden interruption on the power supply in the region.

Please, pay attention that the cleaning solution for manual cleaning needs to be preliminary heated up to 50-60 degrees C.

4.3.1. Preparation of milk analyser for manual cleaning:

- Take out the tap with the silicone pipe and place the piston in the opening:

- Place the sample holder filled with warm cleaning liquid in the recess of the analyser;
- Press the piston;

- Till the bottom

- Make up and down intensive movements at least 10 times.
- Change the liquid if there are milk residues particles or the cleaning liquid is not clear.
- Repeat the procedure if needed.

Do the total cleaning with alkaline solution – water – acidic solution – water.

- Remove the sample holder and throw away the water.
- Take the piston out.
- Place the plastic tap back on the opening.

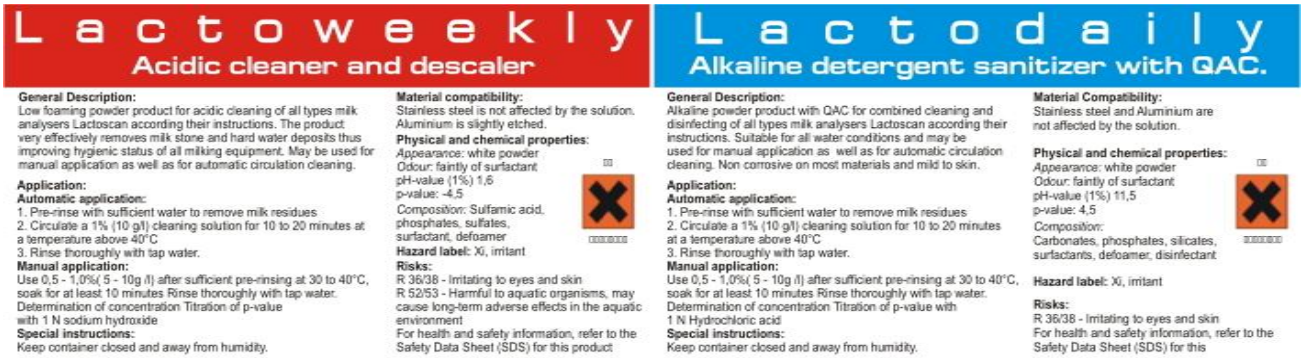
Now the analyser is ready to continue work after manual cleaning.

IMPORTANT

THE MAIN REASON FOR MALFUNCTIONING OF THE DEVICE IS THE BAD CLEANING OF THE SYSTEM AFTER MAKING ANALYSIS.

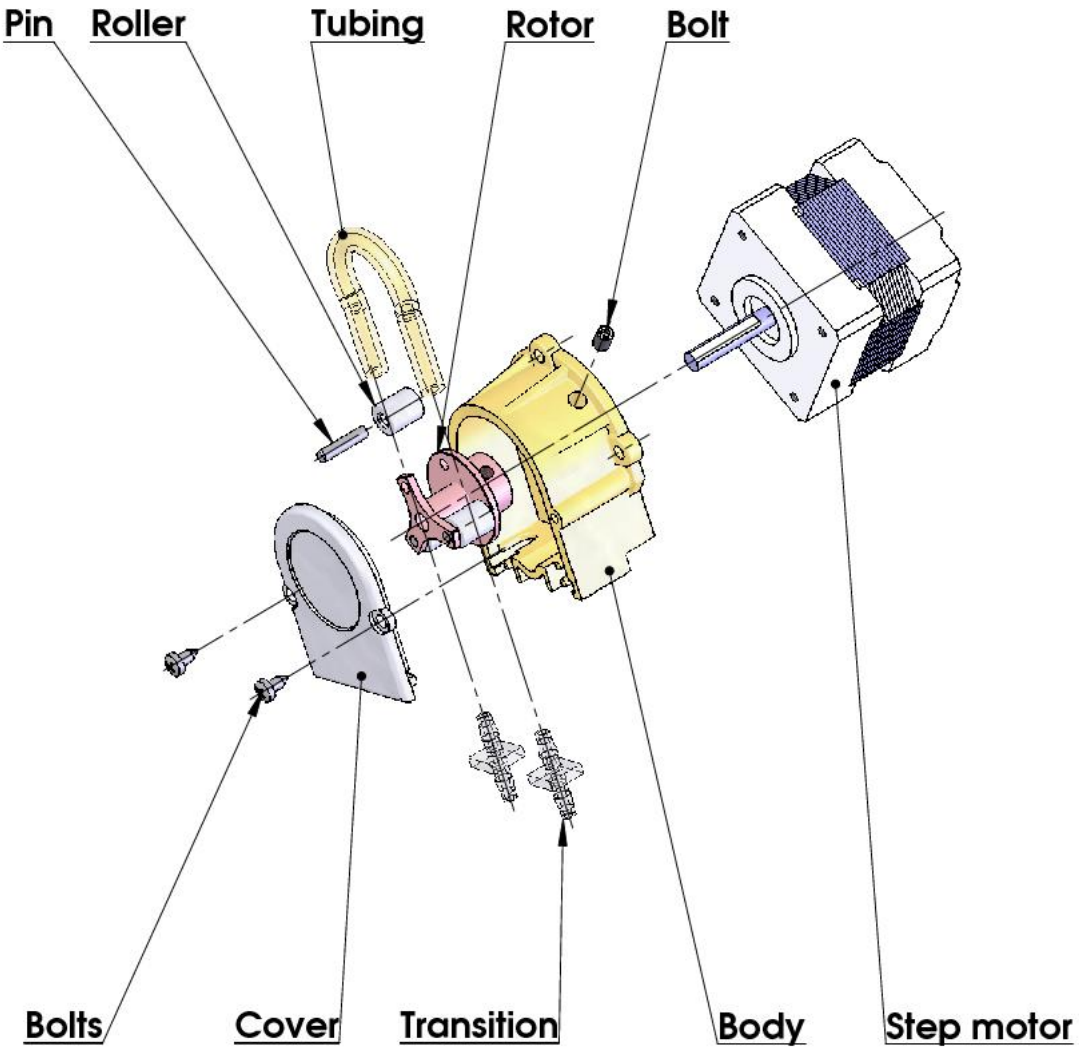
In case of malfunction due to the bad cleaning of the analyser your guarantee is not valid anymore and any repair has to be paid.

Fig.6 Labels for the cleaning chemicals



Peristaltic pump service

Fig.7 Peristaltic pump



5. POSSIBLE MALFUNCTIONS AND ERROR MESSAGES, TROUBLESHOOTING

In the table below are described the possible malfunctions during the milk analyzer's exploitation and ways for their repair/remedy. If the problem persists after all recommended measures are taken, please, connect the nearest service center for help. Do not forget to tell the analyser's identity.

To receive the analyzer's identity, refer to point 3.2.1.3.

Error message	Possible problem /cause	Repair/remedy
2 MA overheated Accompanied by a continuous sound signal	Overheated milk analyzer	Immediately switch off the analyzer. Pay attention the analyzer to be situated away from direct sunlight or heating devices. Wait 5-10 minutes the device to cool down or to be normalized the ambient temperature and switch it on again.
3 Empty Camera	Insufficient quantity of the milk sample sucked in the system or air in the sample	The analyzer is ready to measure the next sample. In order to avoid the future appearance of the same error message, please, check the following: - The sample is prepared according the instructions and there aren't air bubbles in it. - There is a real suction of the sample after starting measurement, i.e. it is obvious that the level of the milk sample in the sample holder decreases. In other case – there is damage in the suction system. - Avoid the end of the suction pipe to be above the surface of the liquid (not dipped enough). - Avoid curdling of the milk sample. Clean immediately if there is a sample curdled in the system. - In mode Measurement, after starting the

		measurement, remove the sample holder and see if there is no milk poured back in the sample holder.
4 Sample Overheat	Sucked overheated sample	The analyzer is ready to measure the next sample. In order to avoid the future appearance of the same error message, please, check the following: -The sample is prepared according the instructions and its temperature does not exceed the maximum permissible sample's temperature. -Complete the procedure for checking the analyzer in case of error message **Empty Camera.**

6. MAKING CORRECTIONS AND RECALLIBRATION OF THE DEVICE

In the process of work with the analyser there is a possibility the results to start differing between the data for some of the measuring parameters when measured with the milk analyzer and the corresponding reference method of analyses (Gerber for fat, Kjeldhal for proteins etc). In order to establish the possible discrepancy and to correct the readings of the milk analyser do the following:

6.1. Taking samples and preparation of samples for checking the accurracy of the milk analyser, making corrections and recalibration

This is a basic moment for the correct checking the accuracy of the analyser and for making correct and precise correction and calibration. It is accomplished according Appendix Sampling and preparation of samples for verification the accuracy of the milk analyzer, making corrections and recalibration.

6.2. Determination the type of the discrepancy:

6.2.1. Making measurements

Make measurements with different samples (not less than 3) with known values of a separate parameter (for example fat content), determined by the known reference methods of analyses (for example Gerber's method for determination of fat content). For more accuracy it is recommended among these samples to be also such with values, close to the lowest and highest bounds for the measured parameters.
Make 5-time measurement for each of the samples. Calculate the average value for each sample parameter, without taking into consideration the first measurement for each sample.

6.2.2. Analysing the measurement results

Make comparison between the values of the parameter from the reference sample and measured with the analyser. Make analyses of the difference received.

6.2.2.1. If the received differences are relatively constant value for samples with different content of the analysed parameter, it is necessary to make correction.

For example

M% of the reference samples:	2,20	3,00	3,80	4,60	5,20
M%average when measuring with the analyser:	2,38	3,17	4,01	4,79	5,42
Difference:	0,18	0,17	0,21	0,19	0,22

Conclusion: the difference is relatively constant value and correction is possible to be done with – 0,2 % (see Corrections, p6.3.3)

6.2.2.2. If the differences are not a constant value it is necessary recalibration to be done.

For example.

M% of the reference samples:	2,20	3,00	3,80	4,60	5,20
M% when measured with the analyser:	2,02	2,93	3,76	4,75	5,44
Difference:	-0,18	-0,07	-0,04	0,15	0,24

Conclusion: It is obvious that the difference is variable value and recalibration have to be done (See Recalibration, p.6.4).

6.3. Making corrections

6.3.1. Possible corrections, limits and changing steps

Every parameter from each calibration may be separately corrected. Below is the table with possible corrections, limits and changing steps:

Parameter	Increasing	Decreasing	Step
FAT	0.95%	0.95%	0.01%
SNF	4.75%	4.75%	0.05%
Density	4.75%	4.75%	0.05%
Lactose	0.95%	0.95%	0.01%
Salts	0.95%	0.95%	0.01%
Proteins	0.95%	0.95%	0.01%
Added water	9.00%	9.00%	1.00%
Sample's temperature	9.90^{o}C	9.90^{o}C	0.1^{o}C

6.3.2. Preparing the analyzer for mode Corrections

6.3.2.1. Press the button **Enter** and without releasing it switch on the power supply of the device, wait for the starting identification messages and release the button after the following message appears on the display:

Release button
to start setup

After releasing the button on the display is shown:

Setup Menu

followed by possible to be entered by the operator menus:

Special modes
Corrections
Settings

Tests
pH & Co Meter
Accessories
Exit

6.3.2.2. By using buttons "**up**" ▲ and "**down**" ▼position on **Corrections** and press **Enter**.

6.3.3. Making correction

6.3.3.1 Determining the correction mode

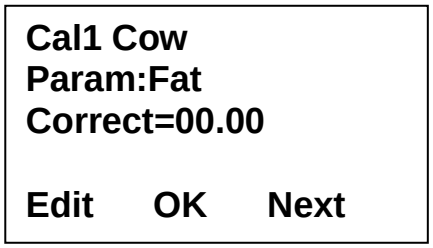
When starting **Corrections**, the following appears on the display:

Corrections:
Measurement
Temperature
Cond measure
Exit

By using buttons “up”▲ and ”down”▼position on the corresponding calibration (for example **Correction 1** – cow) and press **Enter**.

6.3.3.2. Choosing correction parameter

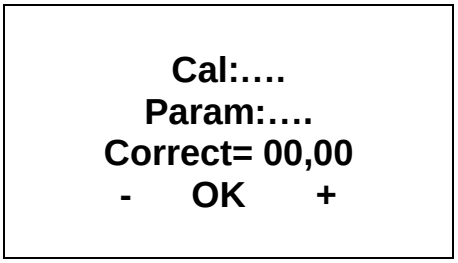
After choosing calibration mode the display shows the following:



Using the buttons “up”▲ and ”down”▼position on the action you want to take (for example Edit**)** and press the button **Enter**.

6.3.3.3. Making correction

After choosing parameter (for example fat) the display shows the following:



Using the buttons “up”▲ and ”down”▼is possible to increase or decrease the value of the measured parameter in the above pointed limits. Leaving this mode means saving the correction value and activating it.

6.3.3.4. Making verification

After the corrections are made put the milk analyser in working mode and make several times measurement of reference samples with known values of the corrected parameter. If the difference between the values of the parameter from the reference methods and milkanalyser are in the limits for the parameter it may be considered that the correction is successfully made.
If the discrepancy between the measurements from the milk analyser and classical methods is bigger than is necessary to make second correction according above described way.
If after the second correction the results are unsatisfactory we recommend making a calibration of the analyser. In dependence of the conditions and your requirements you may make the calibration using a personal computer type IBM PC and the company's calibration program or autonomous - by recalibration.

When making corrections or calibrations be 100% sure in the accuracy of the reference methods result.

6.4. Recalibrating the milk analyser

6.4.1. Running the analyser in mode Recalibrate

6.4.1.1. Press the button **Enter** and without releasing it switch on the power supply of the device, wait for the starting identification messages and release the button after the following message appears on the display:

Release button to start setup

After releasing the button on the display is shown:

Setup menu

Followed by the possible to be entered by the operator menus:

Special modes **Corrections** **Settings** **----------** **Tests** **pH & Co Meter** **Accessories** **Exit**

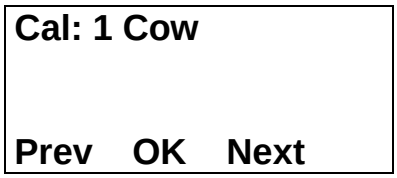
6.4.1.2. By using buttons “up” ▲ and “down” ▼ position on **Settings** and press button **Enter.**

6.4.1.3. Analogically, position on **Recalibrate** and press the button **Enter**.

6.4.2. Making recalibration

6.4.2.1. Choosing the calibration mode

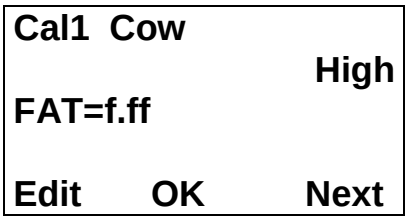
After starting **Recalibrate**, the display shows the following:



You can choose the type of milk to be calibrated. By pressing ▼ **(Next**) you can switch between **Cal: 1, Cal: 2 or Cal: 3.**
By pressing the button **OK** you are choosing the type of calibration.

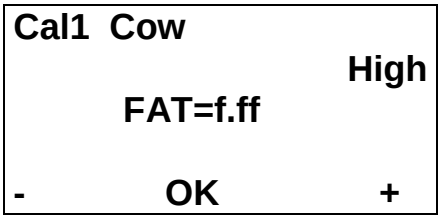
6.4.2.2. Entering values for the separate sample parameters

The following menu is displayed:

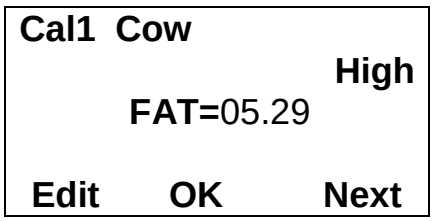


In this display the results, received by using the corresponding reference methods from *Appendix Methods* for **high-fat** milk analyses must be entered.
In this menu, with button ▼ (**Edit)** must be entered the values of the high fat milk sample

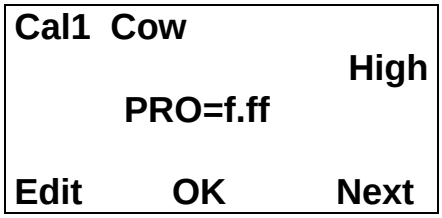
For example:
FAT=05.29



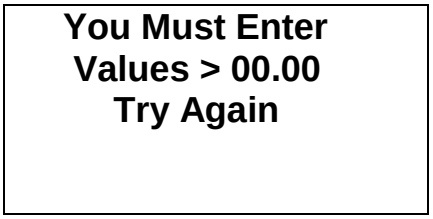
With buttons ▼(-),▲(+) set the needed value. With next pressing of **Enter** the cursor is moved to the next number. After needed value entering completion for FAT, press **Enter (OK)** and you are going back to the previous menu:



With the button ▲(**Next**), choose **SNF** and in the same as above described procedure, enter the value for **SNF**. After it is finished, press "**Enter**" (OK) and you are going back to the previous menu. With button ▲ (**Next)**, choose **DEN (density**) and enter the value for density; the rest of the parameters are entered in the same manner – LAC (lactose), SOL (salts), PRO (protein)



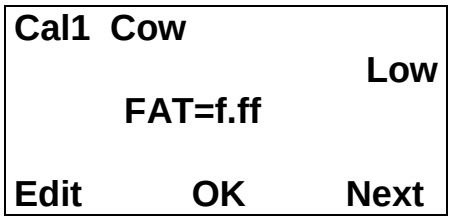
If you miss to enter some of the parameters of milk, the following warning message will appear:



Then you must press the button **Enter (OK)** and enter the missed parameters. After all the parameters are entered, press **Enter (OK).**

You must enter values for all the measured milk parameters!!!

The screen for entering the results, received with the corresponding reference methods (See *Appendix Methods)* for the **<u>low-fat</u>** milk is displayed:



In the same way the values of milk with low fat sample are entered.

You must enter values for all the measured milk parameters!!!

In other case the calibration will not be correct.

6.4.2.3. Making recalibration with the available samples

After entering the values for the separate parameters of the sample, pressing **Enter (OK)** will display the following menu:

Cal: Cow
Put sample High
5 times

which reminds us to put 5 times the sample with high **FAT**.

The sample has to be with temperature in the boundaries 15-25°C.

Before each milk measurement stir 2-3 times the milk sample by pouring it from one vessel to another. The needed quantity is poured in the sample-holder and it is put in the recess of the analyser. Start the measurement by pressing the button **Enter.** The sample is sucked. Appears the following menu:

Cal: Cow
Put sample: High
5 times
Temp=….

After the sample is measured, appears the following menu:

Cow
High
N1=….. 2=…….

Cal meas=1/5

which reminds us to make the next measurement. Before each measurement the milk is stirred by pouring it 2-3 times from vessel to vessel. Continue the procedure till the 5th measurement.
After 5th measurement completion automatically appears the menu, which reminds us to place the **Low fat** milk sample:

Cal: Cow
Put Sampl: Low
5 times

Stir 2-3 times the milk sample before each measurement by pouring it from one vessel to another. The needed quantity is poured in the sample-holder and it is put in the recess of the analyser. Start the measurement by pressing the button **Enter**. The sample is sucked. Appears the following menu:
Make 5 times measurement of the low FAT sample.
After 5th measurement completion automatically appears the menu:

Cal: Cow
Put sample: Water
5 times

Which reminds for 5-times water measurement.
After the 5th measurement appears the menu:

Recalibrated
Power Off-On

This means that the calibration was completed successfully and the analyzer is recalibrated for cow milk, marked as “Cal: Cow”.
Switch off the power supply of the device and switch it on again.
The device is ready to work with the new calibration.

Next time when the analyser is switched on, it will be ready for work with those milk types it was just calibrated with.
If calibration with another milk type is needed, do not forget to change the calibration number for the new type of milk.
Calibration for Sheep milk will be saved as second calibration, UHT – as third. This consequence may not be followed and calibrations can be saved in

whichever order is needed. Calibration can be done with different liquid dairy products using 2 representative samples.

Checking the calibration

1. Switch on the calibrated device.
2. Make sure it shows the same serial number as this already calibrated.

For checking, use the third sample with medium FAT content.

3. Measure the milk 5 times in the mode you've calibrated it.

In case that the device is not connected towards printer write down the results.

4. Ignore the first two results.

The rest three could not differ more than 0,05% FAT, 0,07% SNF, 0,7% Density one from another

7. STARTING THE DEVICE IN A SERVICE TEST/SETUP OPERATIONAL MODE. MENUS DESIGNATION

7.1. Starting the device in a service Test/Setup operational mode.

In order to start the **Setup** of the device the operator has to press the button **Enter** and without releasing it to switch on the power supply of the device, to wait for the starting identification messages and to release the button after the following message appears on the display:

Release button to start setup

After releasing the button on the display is shown:

Setup Menu

Followed by possible to be entered by the operator menus:

Special modes
Corrections
Settings

Tests
pH & Co Meter
Accessories
Exit

You may move in the menus by using buttons “**up**” ▲ and “**down**” ▼.
If by pressing the button **Enter** you choose a menu, each menu offers new points/submenus. When **Exit** is chosen the device leaves the **Setup** mode and returns to normal work.

Due to the continuous improvements made in the milk analyser or due to the type of the ordered product, it is possible some of the options in the device to be not active. In this case, if you try to enter the corresponding menu, the following message will appear: **Not available option.**

7.2. Menus Function:

7.2.1. Special modes.

Serve for choosing special (technological) working modes. After starting it the following appears on the display:

Special modes
Calibration
Cycle
Exit

This mode is normally used in production conditions.

7.2.1.2. Calibration mode

In mode **Calibration** the analyzer is ready to make measurement and to send the received results towards the technological milk analyzers calibration system. For this purpose you need personal computer type IBM PC, company's calibration system LSC.EXE and methods for calibration of milk analyzers (see the corresponding documents). To start measurement in this mode, the operator has to put a sample-holder containing milk sample in the recess of the analyzer and to press the button **Enter**.

7.2.1.2. Cycle mode

Mode **Cycle** serves for training the analyzers. When you start this mode, the analyzer, without additional commands, sucks the sample, makes the measurement, pours the sample out in the sample-holder and displays the received results cyclically.

7.2.2. Corrections

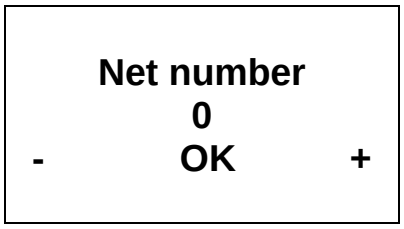
Serves for entering corrections in the measured data. Detailed description in point 6.3.2 and 6.3.3.

7.2.3. Settings.

Serve for assigning different working parameters (modes).

Net number.

Serves for assigning the device network number when connecting it in the production network. The possible numbers are from 0 to 15 including.
After starting this function the display shows the following:



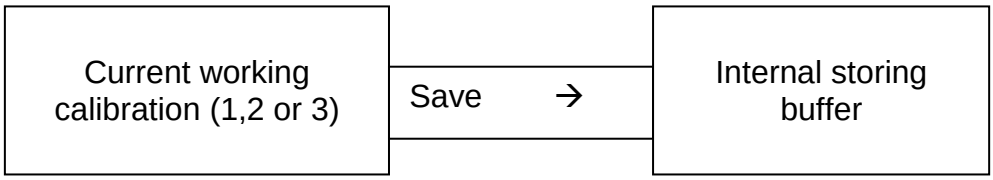
By using the button "up"▲ the operator has the possibility to increase the number, showing the channel's number, and by button "down"▼, to decrease it. Pressing the button **Enter** saves the chosen channel and exits the function.

When connected in the production network each device has to have a unique number.

Recalibrate.
Serves for changing definite calibration. Methods are described in point 6.4.

Save Calibr
Through this menu you may save the new calibration

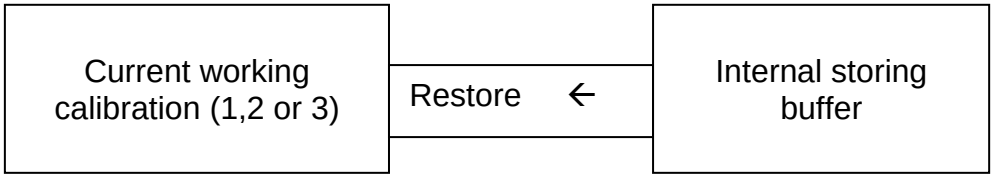
Save calibration – saves the chosen calibration in an internal buffer.
The procedure **Save/Restore** is done for each calibration separately.



Current calibration content is not changed, the analyzer continues using it, but there is a reserve copy in an internal buffer.

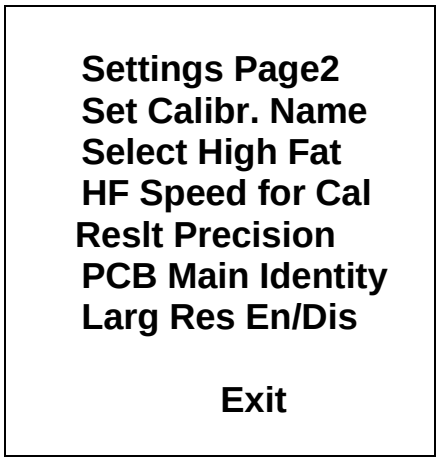
If after recalibration "Save calibration" is pressed the new calibration settings will be saved over the factory settings. After that is impossible to restore the factory settings of the calibration. Save the newly made calibration only if you are sure about its correctness.

Restore Calibr.
Through this menu you may restore the old one (factory) calibration. in the device or to restore the old one (factory) calibration. This is necessary in case that you've calibrated the device for cow milk, but after that the device is not measuring correctly and you decide to restore the factory calibration settings.
Position the cursor across "Restore calibration" and press "Enter"
Restore calibration – restores the chosen calibration from the internal **buffer.**



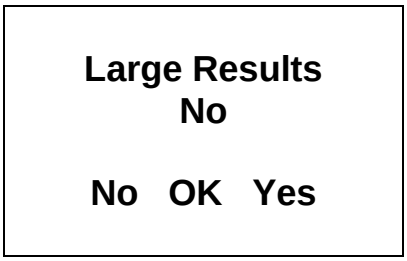
The current calibration is replaced with the calibration from the internal buffer and the analyzer starts working with it. The content of the internal buffer is not changed.

Settings Page 2.
After this menu is started the display shows the following:



Now there is a possibility one of the following options to be set:

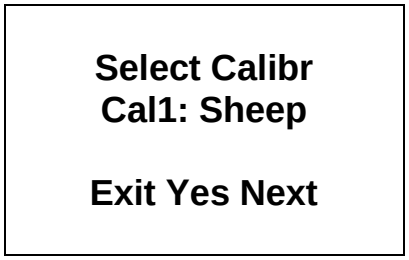
Larg Res En/Dis.
The format of the measurement data send towards the computer is set.
If the option **Large Disable**, is chosen, then only the main results are send to the computer – Fat, SNF, Density, Lac, Proteins, Added Water, sample temperature, device serial number and calibration number.
If the option **Enable**, is chosen, except the above mentioned parameters also data for Solids, Freezing Point, pH, Conductivity will be send to the computer. In this case is necessary the software in the computer to be conformable to the format of the sent data. After starting the menu, the display shows (for example):



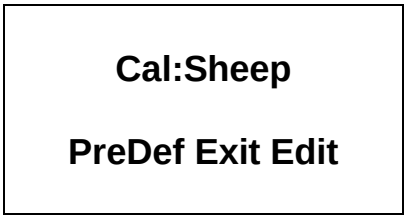
Set Calibr Name.
Sets the names of the separate calibrations. The name could be chosen from the group of predefined calibrations names or to edit a new one. When editing the new name there is a possibility all ASCII codes to be used, as letters (caps

and normal), numbers and punctuation marks and popular symbols. The calibration name consists of 8 symbols.

Example:
When it is suitable to us this possibility of the analyser? For example if you have a device factory calibrated for Cow milk, Sheep Milk and UHT milk, but you need oftenly to measure camel milk. Using the methods, explained in details in Appendix Methods you may make a new calibration without need to send the analyser back to the producer for calibration. Using this procedure you may make calibrations for most oftenly analysed milk and to write down the exact calibration name, which will be shown on the display and printed on the printer.
After starting this menu the display shows:

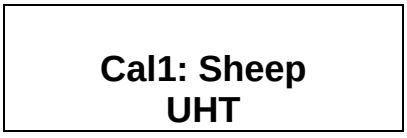


There are the following possibilities:
With button **Exit** – to leave the menu.
With button **Yes** – to confirm the chosen for editing calibration name.
With button **Next** – to choose the next calibration name for editing.
If a calibration for change or edit of name is chosen, the display shows (example):



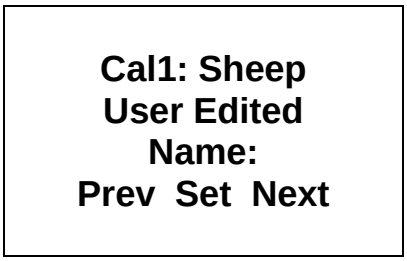
There are the following possibilities:
With button **PreDef** – to choose a calibration name from the list of preliminary given names.
With button **Exit** – to leave the menu.
With button **Edit** – to edit the new calibration name.

If a name from the preliminary given names list is chosen, the display shows:



There are the following possibilities:
With button **Exit** – to leave the menu.
With button **Yes** – to confirm the chosen from the list calibration name.Now the program returns to the beginning of the menu for setting calibration names.
With button **Next** – to show the next calibration name from the list.

If it is decided a new calibration name to be edited, the display shows:

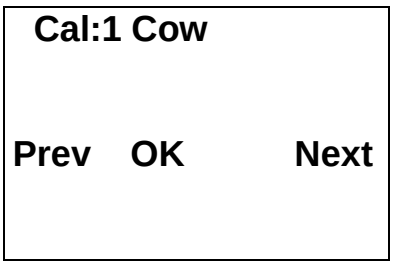


There are the following possibilities:
With button **Prev** – to display the previous ASCII symbol.
With button **Set** – to confirm the ASCII symbol, shown on the display and passes to editing the next symbol from the calibration name.
With button **Next** – to show the next ASCII symbol.

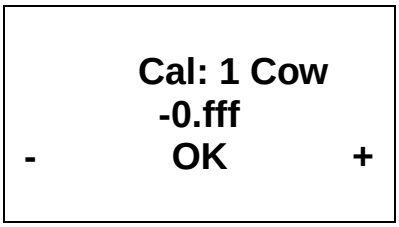
After editing the last (eighth) name symbol, the display shows:

There are the following possibilities:
With button **Exit** – to leave the menu.
With button **Save** – to confirm already edited calibration name and to save it in the device. The program returns to the beginning of the menu for setting calibration names.

Set Base FrPnt
Through this menu you have the possibility to enter the basic freezing point separately for each calibration. For more information, see *Appendix Freezing point* . After choosing the menu the following is displayed:



After choosing freezing point for the calibration, the following is displayed:



Where:
Cal: 1 - basic freezing point to be edited for chosen calibration.
-0.fff - basic freezing point current value.

By pressing the buttons:
"**up**"▲ - you may increase the absolute value of the freezing point
"**down**"▼ - you may decrease the absolute value of the freezing point
"**Enter**" - saves the edited value and exits the menu.

7.2.4. Tests.

Start different tests. Possibilities:
Test pump.
Starts pump's test. The number of the completed suction/display cycles is indicated.
Ultrasound.
Test for the ultrasonic system. Used in production conditions.
Set Amplitude.
Serves for ultrasound amplitude adjustment. It is used under production conditions or by the customer (after sensor change) according the instructions in the document SetCell.pdf.

Please, use this menu only after reading the above pointed document SetCell.pdf

RS232 COMPort.

Display a short text of a serial printer, connected to COM2 – output with message **Printer** on the back panel of the device.

Keypad

USB Flash

7.2.5. Exit

By pressing the button you may leave the program and pass towards another menu.

7.2.6. Milk analysers' setup menu structure

Setup menu

- Special modes
  - Calibration
  - Cycle
  - Exir
- Corrections
  - Measurement
  - Cal 1
    - Fat
    - SNF
    - Density
    - Lactose
    - Salts
    - Proteins
    - Water
  - Cal 2
    - Fat
    - SNF
    - Density
    - Lactose
    - Salts
    - Proteins
    - Water
  - Cal 3
    - Fat
    - SNF
    - Density
    - Lactose
    - Salts
    - Proteins
    - Water
  - Temperature
  - Cond measure

- Settings
  - Net number
  - Recalibrate
    - Cal 1
    - Cal 2
    - Cal 3
  - Edit FrPoints
    - FrPoint Calibr1
    - FrPoint Calibr2
    - FrPoint Calibr3
  - Save/Rest Cal
    - Save Calibr 1
    - Save Calibr 2
    - Save Calibr 3
    - Rest Calibr 1
    - Rest Calibr 2
    - Rest Calibr 3
  - Fan Temp Offs
  - Settings Page2
    - Set Calibr Name
    - Select High Fat
    - HFSpeed for Cal
    - Reslt Precision
    - PCB Main Identi
    - Larg Res En/Dis
  - Set Base FrPnt
- Tests
  - Test pump
  - Ultrasound
  - Set Amplitude
  - RS232 COMPort
  - KeyPad
  - USB Flash
  - Battery
    - Measure Bat U
    - Ctrl Enabl/Dis
  - RT Clock
    - Display Time
    - Adjust Time
    - Adjust Date

8. ADDITIONAL POSSIBILITIES OF THE ANALYSER

8.1. Connecting to 12 V DC power supply.

If there is a need the analyser to work on place without electrical supply available, then it could be powered by car battery or other 12 V DC external power supply. Use the 12 V power supply cable (art. number 30030).

8.2. Connecting to IBM PC

The analyser can be connected to IBM PC using the RS232 interface cable (art. number 30012, Parts and Accessories, point 16). In order to make the connection: switch off both the milk analyser and PC. Connect the RS 232 cable towards Com. Port 1 and towards the computer. Turn on both analyser and PC. Now the device is ready to communicate with IBM PC. For more detailed information regarding milk collection data program see the file resLS_SupLiters.pdf from the CD, accompanying the device.

8.3. Connecting additional serial printer (option).

The interface connector for the printer is on the rear panel of the device (Com. Port 2). The printer should be connected towards it. Connect it via cables, delivered by the company-producer. If the printer is connected directly to the electrical network, then the analyser and the printer should be connected to one and the same electrical phase.

Communication parameters: 9600 bps, No parity, 8 bits, 1 stop bit. It’s one-way communication (uses one line) – the analyser only sends and the printer only accepts data.

APPENDICES

APPENDIX 1: PREPARATION OF SAMPLES FOR MILKANALYSERS' CALIBRATION

For calibration are needed samples of cow milk with the following parameters:

		Low Fat	High Fat	Middle
1	Cow	2,2%	5,2%	3,6%

For the calibration are needed:
1. Distilled water
2. Min. 3 milk samples with known values for fat, SNF, protein, density, lactose, salts.

Calibration samples have to be with low, middle and high values of the analyzed components. Samples have to be representative for given milk type. Volume of the sample has to be enough for making min 5 measurements for each sample – not less than 1,00 l. Changes in the analyzed parameters in the samples have, if possible, to cover the whole measuring range – i.e. used samples to be with low, middle and high content of the analyzed components.

Methods of milk samples preparation for calibration.
For milk sample with middle value of the analysed components we recommend to use milk taken from not less than 10 animals from most common in the region breed.
Sample with low and high value are prepared on the following way:

1. Pour the fresh milk with FAT at about 3.7% in a separating funnel.
2. Leave the funnel with the milk in refrigerator for 12 hours at temperature +5-+8 ° C.
3. Draw the substratum of the separated milk in a vessel, mix it well, pour it and heat it in water-bath up to 20°C.
4. Pour the upper layer in another vessel.
5. Determine the concentration of the measured components (FAT, protein, SNF, density, lactose, solids) by using certified methods.

The analyser's accuracy depends only on the correctness of the chemical analyses of the components in the samples and the normal acidity during calibration!

It is recommended the first cow milk sample with low fat content to be with the following parameters:
2-2,3% FAT; 8.7-9% SNF; 3,3-3,5 % Protein; 4,8-4,9% Lactose; 0,75 Salts; 1030-1033 kg/m3 Density.
The second cow milk sample with high fat content to be with the following parameters:
5-5,3% FAT; 8.4-8,79% SNF; 3,1-3,2% Protein; 4,6-4,7% Lactose; 0,7 Salts; 1028-1029 kg/m3 Density.
If, after milk's separation you do not obtain samples in the requested range, then, by adding milk with high fat value into the low fat milk sample you can obtain necessary value-2,3%
Analogous to this, by adding low fat milk sample into a milk sample with high fat value you may receive 5,3%
Samples with medium values are received by mixing low fat and high fat samples in necessary proportion.
If there is a need of longer sample storing they have to be preserved; the most commonly used preservative is potassium dichromate (K2Cr2O7) - 1 g for 1 000 ml.
When using samples, stored shortly, preliminary pour the sample from one vessel to another in order to distribute the milk components evenly paying attention not to form foam in the sample.
When the samples are stored for a longer period it is recommended to warm it up to 35-45 °C, and the vessel to be shaken carefully. In case that there is a cream stuck on the vessel's surfaces – remove it. The sample is poured from vessel to vessel several times and is cooled down (advisable to 20 °C /.

If there is separated liquefied fat or white particles with irregular form on the vessel's walls reliable results could not be received.

Because it is very difficult both lactose and salts to be measured but they are substantial and influence in great extend when determine added water. That's why it is better both lactose and salts to be calculated by using SNF results. The milk must be for sure without added water.
If you are unable to make the analysis of milk in certified methods in a pinch you can use the following formulas:

DETERMINATION OF THE BASIC PARAMETERS IN THE MILK SAMPLE BY USING FORMULAS IS NOT AS PRECISE AS USING THE ARBITRARY METHODS, BUT IS SUITABLE FOR USAGE IN FIELD WORK.

1. Determination some of the parameters by formulas

There is dependence between the different parameters in milk and its density, which may be expressed with mathematical equation. On this base different formula, tested and confirmed by the classical laboratory methods for analyses, are developed. We recommend the following:

2. SNF determination.

For determination of SNF the correlation dependence exists between the milk's density, fat and SNF in the milk. When the density and the fat are known, the SNF can be calculated.
There are several formulas with different applicability.

A/ When the Total Solids and fat are known
SNF is calculated by subtracting the fat percentage from the Total solids.

SNF = Total Solids – F (%)

Where
Total Solids in (%),
F – fat content in (%),
This formula is used for determination of SNF in whey, buttermilk, and cream.

B/ Known quantity of fat and density (most commonly used method when maximum accuracy is needed).
We recommend the following formula:

$$SNF = \frac{0{,}075 * F\% + 100 - 100 / density}{0{,}378}$$

This is a universal formula and actual for milk of almost all kind of cows and sheep all over the world.

3. Determination of lactose content

We recommend the following formulas:

A/ for cow milk

Lact. = SNF * 0,55 (%)

Where
SNF – content of SNF in percentages (%),
0,55 – constant coefficient.

B/ for sheep milk

Lact. = SNF* 0,45 (%)

Where
SNF –solids-non-fat content in percentages (%),
0,45 – constant coefficient.

This is an actual coefficient for sheep breeds on the territory of the Balkan Peninsula.

4. Determination of salts content
We recommend using the following formulas:

A/ for cow milk

$$Salts = SNF * 0,083\ (\%)$$

Where
SNF – solids-non-fat content in percentages (%),
0,083 – constant coefficient.

B/ for sheep milk

$$Salts = SNF * 0,075\ (\%)$$

Where
SNF – solids-non-fat content n percentages (%),
0,075 – constant coefficient.

This is an actual coefficient for sheep breeds on the territory of the Balkan Peninsula.

5. Determination of total proteins content
We recommend using the following formulas:

A/ for cow milk

$$Protein = SNF * 0,367\ (\%)$$

Where
SNF - solids-non-fat content in percentages (%),
0,367 – constant coefficient.

B/ for sheep milk

$$Protein = SNF * 0,475 (\%)$$

Where

SNF – solids-non-fat content in percentages (%),

0,475 - constant coefficient.

This is an actual coefficient for sheep breeds on the territory of the Balkan Peninsula.

APPENDIX 2 FREEZING POINT DETERMINATION

1. Methods for determination.

The milk analyzer determines the freezing point of each sample and the quantity of added water. The milk analyser does not measure the freezing point, but calculates it from the components it depends on. The basic components in the milk are water, solids, lactose, FAT, proteins, minerals (salts) and acids. The freezing point depends only on the diluted in the milk components and quantity of the solvent (in the milk it is water). The ultrasonic technology allows direct measurement of FAT, proteins, lactose + salts (the soluble components, only influencing the freezing point), and the quantity of the solvent in % is determined by 100 % – total solids %, total solids = lactose % + FAT % + proteins % + salts % + acids %.
Without understanding the meaning of the freezing point – determined or shown from the milk analyzer added water result easily may lead to a mistake for the value of this parameter.

2. The basic freezing point.

Milk freezes at lower temperature than water. The average freezing point of the raw milk in the most regions is at about -0,540°C. The average reading for your region is called “basic” freezing point.
The freezing point of milk is a “physiological constant”. This does not mean that it will not vary. In fact feed, breed, season, time of lactation, climate, whether the sample is taken at the beginning, middle or end of lactation – all these factors will have an effect on the freezing point of the individual sample. This means that there is an average value of all these numbers. The more samples used in obtaining this average, the more reliable it is as a base. Or the basic freezing point is an average of freezing points of milk, taken from many cows. When a laboratory checks a producer, it is only comparing the average of the producer’s cows against a larger area average.
The Health authorities establish the basic freezing point or agriculture departments in some regions, sometimes by universities, separate dairy producers, or their associations. Frequently, tolerances have been established on top of a basic freezing point to allow some variations in the milk as well as device or operator variations.
Without mentioning the basic freezing point, the Association of Official Analytical Chemists now recommends an upper limit freezing point at -

0,525°C (2,326 standard deviations above the most recently determined North American average of –0,5404°C), below which there will be at 95% confidence that will show 99% of all freezing point determinations on unwatered milk:
“if the freezing point is –0,525°C or below, milk may be presumed to be free of water or may be confirmed as water free by tests, specified below. If the freezing point is above –0,525°C, milk will be designated as “presumptive added water” and will be confirmed as added water or added water free by tests specified below. Evaluate extreme daily fluctuations in the freezing point of herd, pooled herd, or processed milk for presence of added water”.
“Presumed added water”, as described above, must be “confirmed” by means of tests on authentic milk samples obtained as specified in the AOAC METHODS.
After determination the freezing point of your sample via the milk analyzer, the added water is calculated using the following formula:

$$AddedWater = \frac{FrPo\,\mathrm{int}_{Base} - FrPo\,\mathrm{int}_{Calc}}{FrPo\,\mathrm{int}_{Base}} * 100[\%]$$

Where:
FrPointBase is the basic freezing point
FrPointCalc is measured freezing point

Note:
If the freezing point is not correctly determined, the result for the added water is not valid. In this case results for FrPoint and AddWater are not shown on the display and on the printout from the printer. If the density of the measured sample is 0, the result for AddWater is not valid and is also not shown on the display and the printouts.

Sample:
First variant
If you’ve entered for milk analyzer basic freezing point -0.520°C (according article 5.9 of the EU Milk Hygiene Directive 92/46/EEC), measured freezing point –0.540°C, using the above pointed formula you’ll receive –3,8%. Because it is not possible the added water to be negative value, the milk analyzer indicates 0% added water. The reason for this is the tolerance in the basic freezing point, reasons for which are described below.

If in the same milk we add 3,8% water, and the basic freezing point is the same, the milk analyzer will measure freezing point –0.520°C, and will indicate again 0% added water.

Second variant

If you've entered for the device basic freezing point –0.540°C, measured freezing point –0.540°C, the milk analyzer will indicate 0%. When you add 3,8% water, the device will indicate 3,8%-added water.

From the above mentioned follows that it is very important to enter correct basic freezing point in the device.

The device's results for added water may give information about doubt of added water in the milk and the exact value of this added water may be determined after a "cowshed sample" is taken and the result for the freezing point, measured by the milk analyzer of the "cowshed sample" is entered as basic freezing point in the formula for calculation of added water.

Then the result from this formula will give us the absolute value of the added water for the corresponding milk supplier.

Contents:

GUARANTEE CARD

LACTOSCAN INDI

Standard model

Guarantee period is 1 (one) year after purchasing date.
Improper handling, transport and storage will invalidate the guarantee.
Guarantee is void if warranty labels are removed.

Serial №

Date of purchase:

Password:

Distributor:

Signature:

Stamp:

GUARANTEE CARD

Purchaser:

Service report:

Service entry date	Damage	Delivery date	Signature

Covers:
Lactoscan INDI

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