

ENGLISH

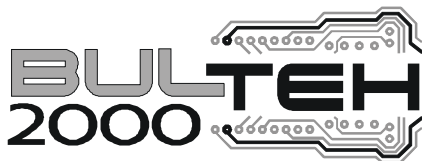
USER'S GUIDE

MILK ANALYZERS

**EKOMILK®**

EKOMILK ULTRA + MILK BILL

**INOXα**



# EKOMILK ULTRA + MILK BILL

## Super Fast Model

Measuring cycle

**65-70** measurements per hour

This Guide refers to  
**LU48ldxx2T\_BL**  
firmware version



## ISO 9001

Ultrasonic Milk Analyzers EKOMILK are certified by the Bulgarian, Ukrainian, Czech, Rumanian, Polish, Russian and Belarusian Centers of Metrology.



## Power Supply

- 220V +10/-15%
- 110V +10/-15%
- 12V 3A

## Measure modes

- Mixed milk
- Cow milk
- Buffalo milk

## Interfaces

- RS232

## Printer support

EPS258S

JUSBULL

SRP3150

MTP135 (panel type)

## Parameters

- Fat
- Solids non Fat (SNF)
- Density (CLR-Corrected Lactometer Reading)
- Added water

- Protein

Some parameters are optional. Contact your dealer for more information.

## Additional Options

- Data collection system
- Records numbers

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**EKOMILK** Ultrasonic Milk Analyzers are designed for fast and cost effective analysis of fat contents, solids non fat (SNF), protein, milk density (CLR) for both cow and buffalo milk and added water to milk as well. We offer one additional option - measuring mixed milk. The mixed milk channel is adapted to analyze mixed (buffalo & cow) milk and it is calibrated in proportion 60% buffalo milk to 40% cow.

## KEYFEATURE

- Simple and lightweight design;
- +12V DC and 220V (or 110V optional) AC Power supply;
- Cost effective:
  - Low power consumption;
  - Very small quantity of milk required;
  - No acid or other chemicals are used;
- Measuring accuracy adjustment can be done by the user;
- RS 232 Interface;
- USB Interface;
- ESC POS and/or Matrix Printer EPSON LX300+Printer Support.

## ENVIRONMENTAL CONDITIONS:

Ambient air temperature	15° - 35°C
Milk temperature	5° - 35°C
Relative humidity	30% - 80%

## ELECTRICAL PARAMETERS:

Power Supply voltage	see p. 2
Power Consumption	30W max

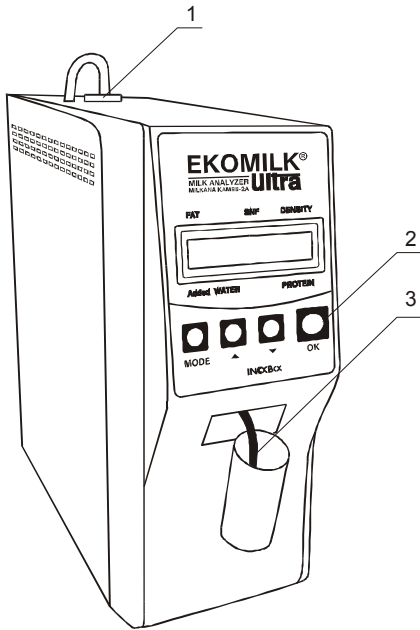
## MECHANICAL PARAMETERS:

Dimensions (WxDxH)	90 x 280 x 270 mm
Weight	3.2 kg max (220 V power supply)
Weight	2.3 kg max (12 V power supply)

## MEASURING PARAMETERS:

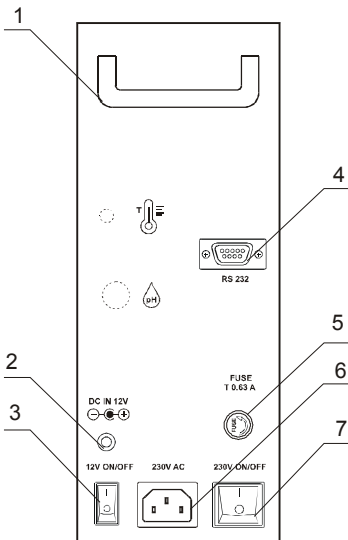
Fat	from 0,5% to 12% with accuracy $\pm 0,1\%$
Solids non fat (SNF)	from 6% to 12% with accuracy $\pm 0,2\%$
Milk density (CLR)*	from 1,0250 g/cm <sup>3</sup> to 1,0400 g/cm <sup>3</sup> $\pm 0,0005$ g/cm <sup>3</sup>
Protein*	from 2% to 6% with accuracy $\pm 0,2\%$
Added water to milk	from 0% to 60% with accuracy $\pm 5\%$

*\*These parameters are optional. Contact your dealer for more information.*



**CONTROLS  
(on the front panel)**

- 1. Plastic plug
- 2. Keyboard
- 3. Tube (sucker)

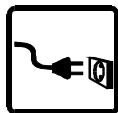


**SWITCHES and OUTLETS  
(on the rear panel)**

- 1. Foldable handle
- 2. 12V DC Power supply inlet 5.5 x 2.1 mm
- 3. 12 V ON/OFF Switch
- 4. RS 232 Interface outlet
- 5. Fuse\*
- 6. AC power connector\*
- 7. 220 V ON/OFF Switch\*

\* These controls are available with 220V power supply option only .

# INSTRUCTIONS FOR USE



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## ANALYZER INSTALLATION

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Place vertically the Analyzer on a table or any other flat surface.

- AC Power Supply Voltage

Connect the AC power lead to the mains socket.

Set the Power switch to "On".

- 12V DC Power Supply Voltage

Connect the DC supply jack (5,5 x 2,1 mm) to 12V inlet.

Set the +12 V Power switch to "On".

### Warm up

When the power is on, **WARM UP** appears on the display. When the "warm up" stage is over in about 5 minutes, **EKOMILK** is shown on the display. The Analyzer is ready to use.

Do not take into consideration the first sample because it is likely to be with a deviation out of specification.

In case the analyzer has not been in use for more than a week (after transport for example), please first make 3 to 5 measurements of clean water without taking in consideration the measurement readings.

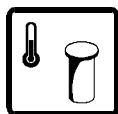
**Warning: The covers of the Analyzer should never be removed while the power leads are connected.**

**Warning: Under no circumstance should you try to repair the Analyzer's power lead yourself. In case of power lead damage, contact your dealer to make the repairs.**

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## MILK SAMPLES

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Milk samples temperature should be 5 - 35°C. If the milk temperature is above 38°C the message **HOT SAMPLE** appears on the display.

If you try to test cool (refrigerated) milk which has some milk fat/cream separated you will probably get wrong result especially for the milk fat contents. In this case you need to warm up the milk up to 40 - 42°C first, mix the milk in order to solve the separated fat, cool it down to 20 - 25°C and then you can test it with the EKOMILK Analyzer.

The acidity of the milk sample must be less than 25°T for cow, buffalo and goat milk and less than 28°T for sheep milk.

Use the milk sample only once. When the measuring is carried out, throw the sample away.

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## BASIC MODES FOR USE

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- MIXED MILK** - analysis of mixed (buffalo & cow) milk
- BUFFALO MILK** - analysis of buffalo milk\*
- COW MILK** - analysis of cow milk\*
- SYSTEM** - manufacturer's mode only
- CALIBRATION** - calibration cleaning in the end of working day
- CLEANING** - cleaning in the end of working day
- RECORD CHOICE** – Turning on/off the Data collection system. REC CHOICE OFF is the default mode.

**REPORTS** - printing several types of reports, based on the collected data.

**SYSTEM SHUTDOWN** - fill the measuring system with clean water before setting the Power switch to OFF

**PC MODE** – This option controls data transferring to PC or matrix printer. When PC MODE is on the display press OK for confirmation.

**In case of PC connected to the Milk analyzer** – set the mode ON using search buttons  $\blacktriangle$ ,  $\blacktriangledown$  and confirm with **OK**. The message **PC MODE SET ON** appears on the display. This way this mode remains set even if the power supply is turned off. The milk analyzer will send automatically the data to the PC when the measurement is finished.

**In case of matrix printer connected to the Milk analyzer** – set the mode **OFF** using search buttons  $\blacktriangle$ ,  $\blacktriangledown$  and confirm with **OK**. The message **PC MODE SET OFF** appears on the display. This way this mode remains set even if the power supply is turned off. In case of matrix printer connected to the milk analyzer, after the current measurement is completed the results could be printed by pressing the arrow button  $\blacktriangle$  on the analyzer front panel. Results are printed every time when this button is pressed.

**DATE & TIME** - time and date calibration (See section “**DATE AND TIME CALIBRATION**”).

**AUTO PRINT**- when set, this option allows data to be printed automatically after measurement is completed.

**ACK.SLIP WATER - AS WATER ON/OFF**. This option controls printings of AWM (added water to milk) parameter in acknowledgment slip.

These menu items are optional and appear only if they are activated from **CALIBRATION -PROFILES** menu item.

Press the search buttons  $\blacktriangle$ ,  $\blacktriangledown$  to select desired mode.



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## DATA COLLECTION SYSTEM

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### 1.SETTINGS

Press the **MODE** button only once.

Press the search buttons  $\blacktriangle$ ,  $\blacktriangledown$  to select **REC CHOICE** mode. Press **OK** when **REC CHOICE** mode is displayed. The message **RECORD DATA?** appears on the display. Set with search buttons  $\blacktriangle$ ,  $\blacktriangledown$  the desired mode **Y** or **N**.

**Attention: The mode REC CHOICE - OFF is the default mode. This mode becomes active every time the power supply is switched on.**

1.1. **N (NO)** - Milk analysis without saving data.

After the current measurement is completed the results could be printed by pressing the arrow button ▲ on the analyzer front panel. Results are printed every time when this button is pressed. The recipe will contain information about milk parameters, time and date of measurement.

1.2. **Y (YES)** - Milk analysis with saving data for vendor ID, milk volume, milk parameters, time and date of measurement.

After the current measurement is completed the results could be printed by pressing the arrow button ▲ on the analyzer front panel. Results are printed every time when this button is pressed. The recipe will contain information about milk parameters, vendor ID, milk volume, time and date of measurement.

## **2. COLLECTING DATA**

The message **CODE: 0000** appears on the display after measurement is completed and OK button is pressed (it does not matter which measuring mode is activated - **COW MILK** or **BUFFALO/MIXED MILK**).

**CODE** defines the supplier's ID number. In this case it is necessary you to have a suppliers list with vendor's ID numbers and names.

- button ▼ changes the cursor position;
- button ▲ changes the over cursor digit value;
- button **MODE** cancels the changes and returns **COW MILK** on the display;
- button **OK** confirms the **ID NUMBER** and shows **QUANTITY:000.0**;
- button ▼ changes the cursor position;
- button ▲ changes the over cursor digit value;
- button **MODE** cancels the changes and returns **COW MILK** on the display;
- button **OK** shows calculated amount on the display and the user can return back to results screen pressing ▼ button.

Before starting a new measurement, there is a possibility to erase the last measurement from the analyzer's memory. Press button ▼ and then press button ▲ not releasing button ▼. The message **RECORD DISCARDED** appears on the display.

This can be done only once. Pressing both buttons once again will not discard previous record.

The size of memory for DC system is for 2039 records. If a new measurement is started after the maximum number of records is reached then the oldest record will be overwritten! The customer must take care of not losing data. Reports must be printed often enough in order not to lose data.





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## REPORTS

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### 1. SHIFT SUMMARY REPORT

Description :

This report represents all measurements done within one shift.

Records are ordered by milk type and by time within every milk type

Input data :

- Start time

- End time

Calculations:

Amount = Rate \* Qty.

Milk type Average FAT = {Sum of ( FAT \* Qty.)} / Milk type Total Qty

Milk type Average SNF = {Sum of ( SNF \* Qty.)} / Milk type Total Qty

Milk type total Qty. = Sum of all Milk type Qty's

Milk type total Am = Sum of all Milk type Amount's

Milk type Average Rate = Milk type total Am / Milk type total Qty.

Total Average FAT = {Sum of ( FAT \* Qty.)} / Total Qty

Total Average SNF = {Sum of (SNF \* Qty.)} / Total Qty

Total Qty. = Sum of all Qty's

Total Amt: = Sum of all Milk type Total Am

Total Average Rate = Total Amt. / Total Qty.

Provisional Shift Summary

Date: 24/11/09

Time Code Qty. FAT SNF Rate Amount  
Milk type: Cow  
10:41 0005 50.50 3.41 8.73 15.55 785.28  
10:44 0006 0.60 3.41 8.74 15.56 9.34  
10:55 0005 0.50 3.30 8.71 15.31 7.66  
10:56 0006 60.00 3.30 8.72 15.32 919.20  
11:08 0005 5.00 3.32 8.70 15.34 76.70  
11:10 0006 0.60 3.32 8.70 15.34 9.20  
11:15 0001 1.00 3.34 8.70 15.38 15.38  
11:29 0001 10.00 3.32 8.70 15.34 153.40  
11:36 0014 1.30 3.20 8.70 15.10 19.63  
11:38 0015 1.40 3.20 8.80 15.20 21.28

Average FAT/SNF: 3.34 8.72  
Total Qty: 130.90 Total Am: 2017.07

Average Rate: 15.41

Milk type: Buf  
10:37 0003 3.00 3.50 9.18 5.04 15.12  
10:40 0004 4.40 3.50 9.17 5.04 22.18  
10:52 0003 3.10 3.40 9.09 4.90 15.19  
10:54 0004 4.10 3.40 9.09 4.90 20.09  
11:06 0003 30.03 3.37 9.00 4.85 145.65  
11:07 0004 4.00 3.37 9.10 4.85 19.40  
11:34 0012 1.10 3.30 9.10 4.75 5.23  
11:35 0013 1.20 3.30 9.10 4.75 5.70

Average FAT/SNF: 3.39 9.05  
Total Qty: 50.93 Total Am: 248.56

Average Rate: 4.88

Milk type: Mix  
10:35 0001 1.11 3.70 9.53 14.48 16.07  
10:36 0002 2.22 3.53 9.15 13.87 30.79  
10:49 0001 10.01 3.40 8.99 13.53 135.44  
10:51 0002 22.00 3.40 8.96 13.50 297.00  
11:03 0001 1.20 3.42 9.00 13.56 16.27  
11:05 0002 2.22 3.35 8.90 13.37 29.68  
11:30 0010 1.32 3.20 9.00 13.25 17.49  
11:31 0011 1.55 3.20 9.00 13.25 20.54  
11:47 0000 0.00 3.26 9.04 13.37 0.00  
14:13 0000 0.00 0.06 0.46 0.43 0.00

Average FAT/SNF: 3.40 8.99  
Total Qty: 41.63 Total Am: 563.28

Average Rate: 13.53

\*\*\*\*\*

Total Average FAT/SNF: 3.36 8.85  
Total Qty.: 223.46 Total Am: 2828.91  
Average Rate: 12.66

## 2. MILK BILL REPORT

### Description:

Milk Bill represents measurements done within certain period of time. Data is ordered by vendor. All measurements done for one vendor are grouped by milk type. The total milk quantity and payment amount are printed at the end of each milk type. The average value of the milk parameters is printed as well. The same parameters calculated for all milk types supplied by this vendor are printed at the end of the Milk Bill for this vendor.

### Input data:

- Start Date
- Start Time
- End Date
- End Time
- Start Vendor Code
- Last Vendor Code

### Calculations:

Amount = Rate \* Qty.

Average FAT = {Sum of ( FAT \* Qty.)} / Total Qty

Average SNF = {Sum of ( SNF \* Qty.)} / Total Qty

Total Qty. = Sum of all Qty's

Total Am = Sum of all Amounts

Average Rate = Total Am / Total Qty.

### Provisional Milk Bill

From 24/03/10 To 01/04/10

Member Code: 6

Date	Time	Milk	Qty.	FAT	SNF	Rate	Amount
24/03	10:44	Cow	0.60	3.41	8.74	15.56	9.34
24/03	10:56	Cow	60.00	3.30	8.72	15.32	919.20
24/03	11:10	Cow	0.60	3.32	8.70	15.34	9.20
Total:			61.20	3.30	8.72	15.32	937.74

### Provisional Milk Bill

From 24/03/10 To 01/04/10

Member Code: 10

Date	Time	Milk	Qty.	FAT	SNF	Rate	Amount
24/03	11:30	Mix	1.32	3.20	9.00	13.25	17.49
24/03	11:35	Mix	2.00	2.55	9.00	13.25	26.50
Total:			3.32	2.81	9.00	13.25	43.99

### Provisional Milk Bill

From 24/03/10 To 01/04/10

Member Code: 11

Date	Time	Milk	Qty.	FAT	SNF	Rate	Amount
24/03	11:31	Mix	1.55	3.20	9.00	13.25	20.54
Total:			1.55	3.20	9.00	13.25	20.54

### 3. BILL SUMMARY REPORT

Description:

This report is just a summary of Milk Bill report. It represents all measurements done within a period and every line shows the total parameters for every milk vendor. The report ends with grand total parameters.

Input data:

-Start Date

-Start Time

-End Date

-End Time

-Start Vendor Code

-Last Vendor Code

Calculations:

Amount = Rate \* Qty.

Average FAT = {Sum of (FAT \* Qty.)} / Total Qty

Average SNF = {Sum of (SNF \* Qty.)} / Total Qty

Total Qty. = Sum of all Qty's for each vendor

Total Am = Sum of all Amounts for each vendor

Average Rate = Total Am / Total Qty.

Grand Total Qty = Sum of all Total Qty's

Grand Total Avg. Rate = Grand Total Amount/ Grand Total Qty

Grand Total Amount = Sum of all Total Amounts

### Milk Bill Summary

From 24/03/10 To 01/04/10

Code	Total Qty	Avg.Rate	Total Amount	Signature
1	24.32	13.85	336.79	_____
2	28.44	12.57	357.47	_____
3	39.13	4.50	175.96	_____
4	12.50	4.93	61.67	_____
5	56.00	15.53	869.64	_____
6	61.20	15.32	937.74	_____
10	1.32	13.25	17.49	_____
11	1.55	13.25	20.54	_____
Grand Total:				
	224.46	12.37	2777.30	



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## MILK ANALYSIS

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Take out the plunger from the syringe (Step1). Insert the plastic plug with the vinyl tube instead of the plunger (Step 2).

### Measurement

**Steps:** Fill the measuring mug with the milk sample to be measured. Place the measuring mug on the plastic support (5) with the tube (sucker) into the milk sample.

Press **MODE** and by means of the search buttons  $\blacktriangle$ ,  $\blacktriangledown$  select the desired mode:

- MIXED MILK** - analysis of mixed (buffalo & cow) milk
- COW MILK** - analysis of cow milk
- BUFFALO MILK** - analysis of buffalo milk

These menu items are optional and appear only if they are activated from **CALIBRATION -PROFILES** menu item.

When the proper type of milk is displayed, press **OK** to start the measurement. The milk is automatically driven into the measuring camera.

**Attention: In case of DATA COLLECTION SYSTEM installed (see page 3), you will be prompted to enter vendor ID and milk quantity - for more information see section "DATA COLLECTION SYSTEM".**

The message **WORKING** appears on the display while the measurement is running.

**Warning: Do not remove the measuring mug while the measurement is going on. This might cause result deviations out of the spec limits.**

**Warning: In case of formation of air bubble in the measuring camera the message EMPTY CAMERA will appear on the display. In this case make the measurement again.**

As soon as the measurement is completed the display shows the results for following milk parameters:

**FAT, SOLIDS NON FAT (SNF), MILK DENSITY (CLR)** - on the upper row

**ADDED WATER TO MILK, PROTEIN, MILK RATE** - on the bottom row

**Attention! Some of measuring parameters are optional. If some are not installed, the inscription NA (Not Available) will be on the display instead the result. Contact your dealer for more information about their activation.**

The milk returns automatically into the mug.



**Warning: In case of motor damage the message MOTOR ERROR will appear on the display. Contact your dealer to make the repairs.**



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## PRINTING DATA (IN CASE OF PRINTER CONNECTED TO THE ANALYZER)

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After the current measurement is completed the results could be printed by pressing the arrow button ▲ on the analyzer front panel. Results are printed every time when this button is pressed.



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## CLEANING OUT

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This section has for an object to give directions for daily and periodical cleaning of milk analyzers Ekomilk with a view to protect their measuring systems from contamination and ensure troublefree work for a long time.

### 1. DAILY PROCEDURE

It is necessary to clean the analyzer within the working day in the following cases:

- **Forced cleaning out** ;
- **End of working day**.

**1.1. Forced cleaning out** when the interval between two consecutive measurements is more than half an hour or the analyzer has performed 200 measurements.

One way or another, the analyzer shows the message:

#### **LOAD CLEAN WATER**

##### **Steps:**

1.1.1. Fill the measuring mug with clean and warm, but not hot water (40°-60°C).

1.1.2. Confirm with **OK**. The display shows message **CYCLES 02** - number of cleaning cycles to be done. One cleaning cycle pumps the water in and out of the sensor five times. When the cleaning stage is over **CLEANING END** is shown on the display.

1.1.3. Remove the mug and throw away the muddy water.

1.1.4. Done.

### **1.2. Cleaning out at the end of the working day.**

This procedure prevents formation and collection of fat and “Milk stone” deposits into the sensor. Milk stone consists of milk solids, calcium, magnesium, iron, sulfates, etc. Milk and water mineral deposits become hardened and layered on the sensor and vinyl pipes inner surfaces, which contact with milk and disturb the milk analyzer work. For maximum cleaning efficiency we recommend 2% solution of the alkaline cleaner **EkoDay** to be used as a daily cleaning solution.

Preparation of 2% **EkoDay** working solution:

- a. Use pipette to add 10 mL **EkoDay** to glassware with 490 mL distilled water.

b. Pour into a labeled container.

Take care this solution does not contact your eyes or skin!

**Attention!** Use only 2% **EkoDay** working solution as a cleaning agent. The EkoDay concentrate can damage your analyzer!

Steps:

1.2.1. First clean the analyzer with pure water:

- Fill the measuring mug with clean and warm (but not hot) water (40°- 60°C).
- Press the **MODE** button once. Press the search buttons **▲**, **▼** to select **CLEANING** option. Confirm with **OK**. The display shows message **CYCLES 01** - number of cleaning cycles to be done. One cleaning cycle pumps the water in and out of the sensor five times. Press the search buttons **▲**, **▼** to set the desired number of cleaning cycles. This number can range from 1 to 99. We recommend one or two cleaning cycles to be chosen. When the desired number is displayed, press **OK** to start the cleaning. When the **CLEANING** stage is over **CLEANING END** is shown on the display.
- Remove the mug and throw away the muddy water. Repeat this procedure several times till clean water comes out from the Analyzer.
- Done.

**Attention!** Using 2% solution of the alkaline cleaner **EkoDay** without first cleaning analyzer for removing the milk remains will result in fixing the “milk stone” to the inner surface. Always clean analyzer with pure water before using the cleaning agent.

1.2.2. Fill the measuring mug with 2 % solution of the alkaline cleaner **EkoDay** (25°- 40°C), put the analyzer in cleaning mode, set 20 cycles and press the **OK** button. When the cleaning stage is over **CLEANING END** is shown on the display.

1.2.3. Fill the measuring mug with clean water, put the analyzer in cleaning mode, set 2 cycles and press the **OK** button. When this procedure is done, remove the mug and throw away the water. Fill the measuring mug with clean water and repeat this procedure 3-4 times.

### **Switching off**

1.2.4. Press the **MODE** button only once. Press the search buttons **▲**, **▼** to find **SYSTEM SHUTDOWN**. Press **OK**. The analyzer shows the message: **LOAD CLEAN WATER**

1.2.5. Fill the measuring mug with clean water.

1.2.6. Confirm with **OK**. The display shows message **PLEASE WAIT...** and the measuring system is filled with the clean water.

1.2.7. The next message **SHUTDOWN IS SAFE** shows that the measuring system is full and the analyzer is ready for switching off.

1.2.8. Set the Power switch to “OFF”. This way the measuring system will remain full, even if the power supply is turned off.

1.2.9. Done.

## 2. PERIODICAL PROCEDURE

To ensure a good work of the Milk Analyzer it is advisory to clean the device at least once a week strictly performing underwritten procedure.

This procedure uses 5% solution of acid cleaner **EkoWeek** as a periodical cleaning solution.

Preparation of 5% **EkoWeek** working solution:

a. Use pipette to add 25 mL **EkoWeek** to glassware with 475 mL distilled water.

b. Pour into a labeled container.

Take care this solution does not contact your eyes or skin!

**Attention! Use only 5% EkoWeek working solution as a cleaning agent. The EkoWeek concentrate can damage your analyzer!**

2.1. Clean the analyzer first as it is cleaned at the end of the working day.

**Attention!** Make sure that the analyzer is properly cleaned with pure water before going on to the next item of the procedure. Mixing both cleaning solutions- alkaline **EkoDay** and acid **EkoWeek** will result in forming "milk stone".

2.2. Fill the measuring mug with 5 % solution of the acid cleaner **EkoWeek** (25°- 40°C), put the analyzer in cleaning mode, set 40 cycles and press the **OK** button. When the cleaning stage is over, **CLEANING END** is shown on the display.

2.3. Take the plastic plug with the vinyl tube out of the top cover hole. Insert the plunger instead of the plastic plug with the vinyl tube.

2.4. Fill the measuring mug with clean and warm, but not hot, water (40°- 60°C).

Pull up and down the plunger several times. Remove the mug and throw away the water. Fill the mug with clean and warm water and repeat this step 4-5 times.

2.5. Take the plunger out of the syringe. Wait until all water comes out. Insert back slowly the plunger to the bottom.

2.6. Remove the measuring mug. Take the plunger out of the syringe again. This time insert the rubber plug with the vinyl tube instead of the plunger.

2.7. Done.

**Attention!**

**1. Perform strictly this procedure to remove both acid cleaning solution remains and milk stone from the analyzer measuring system.**

**2. Do not use hard water (water that contains high amounts of  $\text{Ca}^{2+}$  and/or  $\text{Mg}^{2+}$ ) for analyzer cleaning. For best results use distilled or deionized water.**



## EKOMILK HEAVILY CONTAMINATED SENSORS (CLEANING PROCEDURE)

This procedure is to be applied to any type of EKOMILK series milk analyzers in order to clean heavily contaminated ultrasonic sensors from milk stone deposits. Milk stone is naturally laid on the ultrasonic sensors inside wall during the measurement cycles. In case the Analyzer's cleaning procedure described in the User's Guide is not properly and regularly applied milk stone deposits gradually fill ultrasonic sensor inside volume. This process leads to increased measurement results deviations and sensor damage. This procedure will help you to completely clean and recover such heavily contaminated sensors:

### CLEANING STEPS

1. Fill the measuring mug with clean and warm, but not hot water (40°- 60°C).
2. Press the **MODE** button once. Press the search buttons **▲**, **▼** to select **CLEANING** option. Confirm with **OK**. Set 1 or 2 cleaning cycles using the search buttons **▲**, **▼**. When the desired number is selected, press **OK** to start the cleaning. When the CLEANING stage is over **CLEANING END** is shown on the display.
3. Remove the mug and throw away the muddy water. Repeat this procedure few times till clean water comes out of the Analyzer.
4. Fill the measuring mug with 20% solution\* of EkoPower cleaning liquid. Select **CLEANING** option again and set 99 cycles. Press **OK** button and wait till all cycles are done. This usually takes about one hour and a half. Then replace the used cleaning solution with fresh and repeat same procedure 5 - 8 times. After a while you will probably see some debris in the cleaning solution. It is not necessary to clean the sensor with water if you need to break this cleaning sequence during the nighttime. Just stop the cleaning and continue on the next day.
5. Take the rubber plug with the vinyl tube out of the syringe hole and insert the syringe plunger instead. Fill the measuring mug with clean and warm, but not hot water (40°- 60°C). Pull up and down the plunger several times in order to push milk stone debris out of the ultrasonic sensor. Remove the mug and throw away the muddy water. Fill the mug with clean and warm water and repeat this step 4-5 times.  
Take the syringe plunger out of the syringe and insert the rubber plug with the vinyl tube instead. Repeat steps 4 and 5 until the ultrasonic sensor is completely cleaned.

**WARNING: Sometimes separated milk stone debris may be so big they can not pass through the pipes and block up water flow. In this case never apply an extreme pressure to the syringe plunger in order to blow out the choke up since this may result in sensor damage. Slowly push and pull the syringe plunger in order to remove the choke up.**

6. When the milk stone is completely removed, apply the procedure described above in steps 2 and 3 in order to remove cleaning solution remains.
7. Done

\* Preparation of 20% **EkoPower** working solution:

1. Use pipette to add 25 ml of **EkoPower** to glassware with 100 ml distilled water.
2. Pour into a labeled container.



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## CALIBRATION

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The Analyzer should be calibrated if the measuring accuracy for one or more milk parameters is out of the specified limits.

**Calibration values determination:**

- **Determine a milk sample FAT contents by means of a classical method (for example you can use Gerber method);**

- Test the same milk using Milk analyzer;
- Subtract the Milk analyzer **FAT** value from **FAT** value achieved by the classical method. If the difference is in the spec limits there is no need of fat calibration. Otherwise add this difference as a fat calibration value using the procedure described in "**Calibration values saving**";

- **Determine a milk sample SOLIDS NON FAT (SNF) by means of a classical method;**

- Test the same milk using Milk analyzer;
- Subtract the Milk analyzer **SOLIDS NON FAT (SNF)** value from **SOLIDS NON FAT (SNF)** value achieved by the classical method. If the difference is in the spec limits there is no need of **SOLIDS NON FAT (SNF)** calibration. Otherwise add this difference as a **SOLIDS NON FAT (SNF)** calibration value using the procedure described in "**Calibration values saving**";

- **Determine the milk sample DENSITY (CLR) by means of a density meter;**

- Test the same milk using Milk analyzer again;
- Subtract the Milk analyzer **DENSITY (CLR)** value from **DENSITY (CLR)** value achieved by the classical method. If the difference is in the spec limits there is no need of milk **DENSITY (CLR)** calibration. Otherwise add this difference as a milk **DENSITY (CLR)** calibration value using the procedure described in "**Calibration values saving**";

**Note: If you will calibrate both SOLIDS NON FAT (SNF) and DENSITY (CLR) parameters, first calibrate SOLIDS NON FAT (SNF). Test the same milk using EKOMILK Analyzer again. Calibrate the DENSITY (CLR) only if it is necessary.**

- **Determine a milk sample PROTEIN contents by means of a classical method (for example you can use Kjeldahl method);**

- Test the same milk using **EKOMILK** Analyzer;
- Subtract the Milk analyzer **PROTEIN** value from **PROTEIN** value achieved by the classical method. If the difference is in the spec limits there is no need of protein calibration. Otherwise add this difference as a protein calibration value using the procedure described in "**Calibration values Saving**";



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## CALIBRATION VALUES SAVING

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- To save a new calibration value press **MODE** button first.
- Press the search buttons ▲, ▼ to select calibration mode:

### ■ CALIBRATION

- Press **OK**.
- The display shows **PASS 1** - first password number prompt.
- Set with search buttons ▲, ▼ the first password number. Press **OK** to confirm it.
- A prompt for the second password number appears on the display - **PASS 2**. Enter the second password number then in the same way as the first one. Enter the third password number when a **PASS 3** prompt appears on the display.

**Note: In case of incorrect password is entered, a message *WRONG PASSWORD* appears on the display. Then make a fresh start.**

In case the right password numbers is entered the display will show **MIXED MILK CAL**. Press **OK** to select the mixed milk parameter to be calibrated or press the search buttons ▲, ▼ to select other calibration option

MIXED MILK CAL



COW MILK CAL



BUFFALO MILK CAL



- FAT MIX (COW or BUF) - FAT calibration
  - SNF MIX (COW or BUF) - SNF calibration
  - CLR MIX (COW or BUF) - CLR calibration
  - PROT MIX (COW or BUF) - PROT calibration
  - AWM MIX (COW or BUF) - AWM calibration
  - FAT RATE MIX (COW or BUF) parameters for FAT in rate calculation formula
    - KG FAT RATE kg fat rate parameter
    - FAT CUT OFF cut off for FAT
    - FAT MAX maximum FAT value for the analyzer
    - FAT DEDUCTION deduction for FAT
  - SNF RATE MIX (COW or BUF) SNF RATE parameter in rate calculation formula
    - KG FAT RATE kg fat rate parameter
    - FAT CUT OFF cut off for FAT
    - FAT MAX maximum FAT value for the analyzer
    - FAT DEDUCTION deduction for FAT
- For more information - see section "Measuring calibration values saving" - p. 23*

PROFILES



DATA FORMAT



CHANNEL MODE



RATE CALC METHOD



CRL COEFFICIENT



RS PROTOCOL



PRINTERS

This option controls which types of milk to appear as measuring option in the main menu and respectively in the calibration menu.

- COW PROFILE
- BUF PROFILE

This option formats the decimal point position for SNF and Fat values.  
*For more information - see section "DATA FORMAT" - p. 21*

Customer could switch channel mode to ON or OFF.  
*For more information - see section "CHANNEL MODE" - p. 21*

Customer can determine the formula for rate calculation  
*For more information - see section "RATE CALC METHOD" - p. 22*

Customer can determine the formula for CLR calculation  
*For more information - see section "CRL COEFFICIENT" - p. 22*

**ONE TIME** This option sets the protocol for data sending to PC. Contact your local distributor for more information.

**CONTINUOUS**

**EPS258S**

**JUSBULL**

**SRP3150** Select the printer type connected to the analyzer

**MTP135 (panel type)**

The menu items in grey are optional and appear only if they are selected from **PROFILES** menu item.

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## MEASURING CALIBRATION VALUES SAVING

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Select desired calibration parameter. Confirm it with **OK**.

- The inscription **VALUE** appears on the display.
  - Press the buttons **▲**, **▼** to set the calibration value required.
  - The number can range from -2,54 to +2,54 (at interval of 0,02) for fat, protein and Solids non fat (SNF), from -12,7 to +12,7 (at interval of 0,10) for density (CLR) calibration and and from -25% to +25% (at interval of 0,5) for AWM. This number defines the calibration value. When desired value is set on the display press the **OK** button to save it.
  - Then the display shows **TOTAL** and a number equal to the total calibration value for this milk parameter. The total calibration value is an algebraic sum of all calibration values added for this milk parameter.
  - The calibration is completed.
- Press **OK** to go back to the last calibrated parameter or press **MODE** to enter measuring mode.

**Note: The total calibration value can range from -2,54 % to +2,54% (for fatness, protein and Solids non fat (SNF)), -12,7°A to +12,7°A (for density (CLR)) and from -25% to +25% at interval of 0,5 for AWM. In case a bigger number has been achieved during a calibration procedure a CAL OUT OF RANGE error message appears on the display.**

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## DATA FORMAT

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Select **DATA FORMAT** and press **OK** to confirm it. Press the search buttons **▲**, **▼** to select the milk parameter to be formatted: **FAT** or **SNF**.

Press once again **OK**. The analyzer offers 2 option for formatting – numbers with 1 or 2 digit after the decimal point. Select the desired formatting and press **OK** for confirmation.

Press **OK** to go back to the last formatted parameter or press **MODE** to enter measuring mode.

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## CHANNEL MODE

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If Channel Mode is set ON each measurement is done using the calibration made for the milk profile (type) selected for this measurement (MAIN MENU > MEASUREMENT > MILK TYPE).

Channel Mode should be set OFF if you want all measurements to be made using Mixed Milk Profile calibration regardless of the milk profile selected for the measurement (MAIN MENU > MEASUREMENT > MILK TYPE). When the Channel Mode is OFF the Milk Profile is only used to select the corresponding payment rate for this milk type.

In order to set desired Channel Mode state go to the MAIN MENU, select CALIBRATION and enter password if required. When in the CALIBRATION menu select CHANNEL MODE and then select desired state (ON or OFF).

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## RATE CALC METHOD

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Selecting this option, user is prompted to enter milk type and corresponding rate calculation method for this milk type. There are three methods provided as described below:

### Method 1

If(Fat >= FatCutOff) Then FatRate = Fat\*KgFAt/100  
Else FatRate = Fat\*KgFAt/100+(Fat-FatCutOff)\*KgFAt/100\*FatDed/100

If(Snf >= SnfCutOff) Then SnfRate = Snf\*KgSnf/100  
Else SnfRate = Snf\*KgSnf/100+(Snf-SnfCutOff)\*KgSnf/100\*SnfDed/100

Rate= FatRate+SnfRate  
if(Rate< 0) Then Rate = 0

### Method 2

If(Fat >= FatCutOff) Then FatRate = Fat\*KgFAt/100  
Else FatRate = Fat\*KgFAt/100\*(100-FatDed)/100

If(Snf >= SnfCutOff) Then SnfRate = 0  
Else SnfRate = (Snf-SnfCutOff)\*KgSnf/100

Rate= FatRate+SnfRate  
if(Rate< 0) Then Rate = 0

### Method 3

If(Fat >= FatCutOff) Then FatRate = Fat\*KgFAt/100  
Else FatRate = Fat\*KgFAt/100\*(100-FatDed)/100

If(Snf >= SnfCutOff) Then SnfRate = Snf\*KgSnf/100  
Else SnfRate = Snf\*KgSnf/100\*(100-SnfDed)/100

Rate= FatRate+SnfRate  
if(Rate< 0) Then Rate = 0

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## CLR COEFFICIENT

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Milk Density (or CLR) parameter is calculated based on the measured Fat and SNF values by using the following formula:

$$\text{CLR} = (\text{SNF} - 0.01 \cdot \mathbf{B} \cdot \text{FAT} - 0.01 \cdot \mathbf{C}) / (\mathbf{A} \cdot 0.01)$$

where **A**, **B** and **C** coefficients can be independently set for each milk type.

After one of coefficients is selected its current value appears on the LCD.

- button  $\blacktriangledown$  changes the cursor position;
- button  $\blacktriangle$  changes the over cursor value;
- button **MODE** cancels changes and returns to **MAIN MENU**;
- button **OK** confirms changes.



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## TIME & DATE CALIBRATION

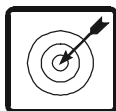
---

Press the search buttons  $\blacktriangle$ ,  $\blacktriangledown$  to select **TIME & DATE calibration**. Press **OK** to confirm.

The message **TIME: 00:00:00** appears on the display:

- button  $\blacktriangledown$  changes the cursor position;
- button  $\blacktriangle$  changes the over cursor value;
- button **MODE** cancels the changes and returns **COW MILK** on the display;
- button **OK** confirms the **TIME** and shows **DATE: 00:00:00**;
- button  $\blacktriangledown$  changes the cursor position;
- button  $\blacktriangle$  changes the over cursor value;
- button **MODE** cancels the changes and returns **COW MILK** on the display;
- button **OK** confirms the **DATE** and shows **TIME SET OK**.

If **TIME & DATE** Chip is not installed or does not work properly or an incorrect Time or Date value has been achieved during a calibration procedure an error message **ERROR SETTING TIME** appears on the display.



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## SOME REASONS FOR EKOMILK ACCURACY AND REPEATABILITY DEVIATIONS

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Below are described some reasons that may worsen the accuracy and repeatability of the EKOMILK Analyzers measurement results. Some information about the way to avoid these problems is provided as well.

**1. Aired milk** - this is milk with a lot of tiny air bubbles inside. This air bubbles are very small and it takes long time - from one to more than 10 or even 20 hours for these air bubbles to get out of the milk. This time depends on the milk parameters and mainly on the milk Fat contents - the higher milk fat contents is the longer time is required for the air bubbles to get out of the milk. The ultrasonic method is not suitable for aired milk testing since the measurement results are with significant deviations from the real values and even in some particular cases the measurement can not be completed successfully. The milk becomes aired usually during the milk processing - milking, homogenization, UHT etc. but it can be aired even when the milk sample is mixed if this is made by hard continuous shaking. This is why the sample should be mixed smoothly and carefully.

There are two known methods that allow aired milk to be quickly recovered. The first method requires the measuring mug with the milk sample to be processed for about 10 to 15 seconds in an ultrasonic cleaning machine. The cavitation phenomena of the powerful ultrasonic field removes the air bubbles almost instantaneously. The other method requires the milk sample to be put under pressure - several  $\text{kg/cm}^2$  for about 10 to 20 seconds. Unfortunately as you may note both methods require additional equipment but as long as there are small inexpensive ultrasonic cleaning machines commercially available it is easier to apply the first method if necessary.

**2. Milk acidity** - The ultrasonic method requires the milk sample to be warmed during the measurement process. In case the milk has an increased acidity

a milk coagulation may occur when the milk is warmed and the measurement results will have significant deviations from the real values and even in some particular cases the measurement can be not completed successfully. For your reference the milk acidity of the milk sample must be less than 25°T for cow, buffalo and goat milk and less than 28°T for sheep milk. Another issue is the milk coagulation contaminates the ultrasonic sensor and it must be properly cleaned then.

**3. Separated milk fat** - If you try to test cool (refrigerated) milk which has some milk fat/cream separated you will probably get wrong result especially for the milk fat contents. In this case you need to warm up the milk up to 40 - 42°C first, mix the milk in order to solve the separated fat, the cool it down to 20 - 25°C and then you can test it with the EKOMILK Analyzer.

**4. Contaminated milk** - Any solid particle with a size above 0.5mm may cause measurement result deviations. This is why we recommend the milk sample to be filtered before it is tested if there is a doubt the milk is contaminated.

**5. Milk preservatives** - The milk preservatives change the measurement results. Usually the result deviation is not big but it'll depend on the particular preservative used.

**6. Adulterated milk** - The measurement results may significantly differ from the real milk parameters if the milk contains some additives - salt, sugar, urea etc.

**7. Contaminated sensor** - During the normal work of the EKOMILK analyzers some solid deposits are laid on the ultrasonic sensor walls. In case the analyzer is not regularly and properly cleaned these deposits are gradually accumulated and the measurement results begin to differ from the real milk parameters. This is why it is very important the milk analyzers to be always properly cleaned in accordance with their cleaning procedure.

**8. Power supply** - The power supply can also cause problems with the measurement results accuracy and repeatability. Generally this can happen if the power supply voltage is out of the specified range (220/110V ± 5%) or if the power supply line is too noisy - especially if there is powerful equipment working nearby and connected to the same power supply line.

**9. Measurement system leakage** - Once the milk sample is sucked into the measurement system it must remain immobile until the test completes. In case there is some leakage and the measurement system is not sealed well the milk sample would drain out more or less slowly. This will cause measurement results deviation or the measurement even may fail in case some air goes into the ultrasonic sensor. A clear indication of measurement system leakage is if the sample is dropping out of the Analyzer's sucking nozzle during the measurement time (just few drops per measurement is normal). Most often some leakage occurs since the plastic plug with the rubber O-ring is not properly plugged into the syringe.

**10. Ultrasonic sensor conditioning** - Sometimes after the Analyzer has not been used for a long time (several days or more) the ultrasonic sensor dries inside and this may result in increase measurement results deviations for the first tested samples. In this case it is recommended several dummy



samples (with water or milk) to be made before the real samples are tested.

**11. Wrong milk type tested** - EKOMILK analyzers are factory calibrated for two different kinds of milk in accordance with the customer request. Mixed milk option can be provided as well for measurement of milk mixtures composed of the milk kinds the Analyzer is calibrated for. If another kind of milk is tested it may result in a measurement result deviation out of the Analyzer's specification. It's important to be known that raw and processed (homogenized) milk of one kind requires different calibration. For example if you need to test raw cow milk and processed cow milk different calibration will be required for each of them.

## ERROR LIST

ERROR MESSAGE	PROBLEM & CAUSES & REMEDY
<b>MOTOR ERROR</b>	Motor damage. Contact your dealer to make the repairs.
<b>EMPTY CAMERA</b>  <b>ERROR 02</b>	1. Air bubble in the measuring sensor. Fill again the mug with the same milk sample and make a fresh start. 2. The suction system has some air leak. Check the Plastic Plug position and fix it if it is necessary. If the Plastic Plug stays loose in the Syringe, replace the Syringe. 3. If the problem still exists, the measuring system is contaminated or damaged. Contact your dealer to make the repairs.
<b>HOT SAMPLE</b>	1. The milk sample temperature is above the spec. Fill again the mug with milk sample with proper temperature and make a fresh start. 2. If the problem still exists, the measuring system is contaminated or damaged. Contact your dealer to make the repairs.
<b>WRONG PASSWORD</b>	Incorrect Password. Reenter the password
<b>CAL OUT OF RANGE</b>	Attempt to enter a calibration value out of allowed limits. See <b>“CALIBRATION VALUES SAVING”</b> . If a calibration value out of allowed limits is really needed, the measuring system is out of order.
<b>ERROR 03</b>	PROM is damaged or erased. Contact your dealer for repairs.
<b>ERROR 07</b>	There is no communication between the main processor and PROM -PROM is burnt or not properly put in the socket. Contact your dealer to make the repairs.
<b>ERROR 09</b>	1. The power supply voltage is below spec. Use proper power supply voltage value. 2.The measuring system is out of order. Contact your dealer to make the repairs.
<b>ERROR SETTING TIME</b>	TIME & DATE Chip is not installed or does not work properly. Check the TIME & DATE Chip or enter a correct value for time and date.
<b>ERROR 06</b>	Data collection system error – invalid current DC address.This error resets DC pointer to the beginning of DC area.

# EKOMILK DAILY CLEANING PROCEDURE

## OBJECT, REAGENTS, WHEN and HOW

### DAILY CLEANING PROCEDURE

**OBJECT:** **CLEANING REAGENT**

Prevention of formation and collection of fat and "Milk stone" deposits into the sensor.



#### EkoDay alkaline cleaner

Preparation of 2% EkoDay working solution: Add 10 mL EkoDay to 490 mL distilled water.

**Attention!** Use only 2% EkoDay working solution as a cleaning agent. The EkoDay concentrate can damage your analyzer!

### WHEN AND HOW

#### DURING THE WORKING DAY (FORCED CLEANING)

When the interval between two consecutive measurements is more than half an hour or the analyzer has performed 200 measurements, one way or another, the analyzer shows the message: **LOAD CLEAN WATER.**

1. Fill the measuring mug with clean and warm, but not hot water (40°- 60°C).
2. Press **OK**. The display shows message **CYCLES 02**. Confirm with **OK**. Ekomiilk will pump the water in and out of the sensor five times per cycle.
3. When **CLEANING END** is shown on the display remove the mug and throw away the muddy water.

#### END OF THE WORKING DAY

1. Clean the analyzer with pure warm (but not hot) water (40°- 60°C) performing **BASIC CLEANING HANDLING - 2 cycles**. Repeat this procedure several times till clean water comes out from the analyzer.
2. Clean the analyzer with 2 % solution of EkoDay (25°- 40°C) performing **BASIC CLEANING HANDLING 20 - 40 cycles**.
3. Clean the analyzer with pure warm (but not hot) water (40°- 60°C) performing **BASIC CLEANING HANDLING - 2 cycles**. Repeat this procedure 3 times.

#### JUST BEFORE SWICHING OFF

1. Select **SYSTEM SHUTDOWN** from the main menu. Press **OK**. The analyzer shows the message: **LOAD CLEAN WATER.**
2. Fill the measuring mug with clean water and place it on the front panel plastic support.
3. Confirm with **OK**. The display shows message **PLEASE WAIT...** and the measuring system is filled with the clean water.
4. The next message **SHUTDOWN IS SAFE** shows that the measuring system is full and the analyzer is ready for switching off.
5. Set the Power switch to "OFF". This way the measuring system will remain full, while the power supply is turned off.

# EKOMILK PERIODICAL CLEANING PROCEDURES OBJECT, REAGENTS, WHEN and HOW

## PERIODICAL CLEANING PROCEDURE OBJECT: CLEANING REAGENT

Cleaning and prevention of formation and collection of fat and "Milk stone" deposits into the sensor.



### **EkoWeek** acid cleaner

Preparation of 5% **EkoWeek** working solution: Add 25 mL **EkoWeek** to 475 mL distilled water.

**Attention!** Use only 5% **EkoWeek** working solution as a cleaning agent. The **EkoWeek** concentrate can damage your analyzer!

## WHEN AND HOW

### ONCE A WEEK

1. Clean the analyzer performing **Daily Cleaning Procedure (End of the working day)**
2. Clean the analyzer with 5 % solution of **EkoWeek** (25° - 40°C) performing **BASIC CLEANING HANDLING** 40 - 50 cycles.
3. Clean the analyzer with pure warm (but not hot) water (40° - 60°C) performing **MANUAL CLEANING HANDLING**. Repeat this procedure 3 times.

## HEAVILY CONTAMINATED SENSORS CLEANING PROCEDURE OBJECT: CLEANING REAGENT

Cleaning and recovering of heavily contaminated sensors



### **EkoPower** acid cleaner

Preparation of 20% **EkoPower** working solution: Add 25 mL **EkoPower** to 100 mL distilled water.

**Attention!** Use only 20% **EkoPower** working solution as a cleaning agent. The **EkoPower** concentrate can damage your analyzer!

## WHEN AND HOW

### ON SERVICE TECHNICIAN RECOMMENDATION

1. Clean the analyzer performing **Daily Cleaning Procedure (End of the working day)**
2. Clean the analyzer with 20 % solution of **EkoPower** (25° - 40°C) performing **BASIC CLEANING HANDLING** - 99 cycles. Replace the used cleaning solution with fresh and repeat same procedure one more time.
3. Clean the analyzer with pure warm (but not hot) water (40° - 60°C) performing **MANUAL CLEANING HANDLING**. Repeat this procedure 3 times.

# GUARANTEE CARD

**PRODUCER:**  
**BULTEH 2000 Ltd.**  
19, Industrial Area  
Stara Zagora, **BULGARIA**  
Tel./Fax: (+359 42) 626019;  
Tel.: (+359 42) 620896  
e-mail: bulteh@sz.inetg.bg

## EKOMILK-ULTRA

Super Fast Model

Firmware version U81ldxx2\_BL

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

**SERIAL №:**

**Distributor**

**PASSWORD:**

**DATE OF PURCHASE:**

Signature



**Purchaser**

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**Service report**

Service entry date	Damage	Deliveriy date	Signature

