# EKOMILK®

## Bond

# STANDARD

**ULTRASONIC MILK ANALYZER**

# OPERATING INSTRUCTIONS

**TABLE OT CONTENTS**

## KEY FEATURE

**EKOMILK BOND**   is robust, reliable, automated multi-parameter milk analyzer providing rapid test results for: Fat, Protein, Solids Not Fat, Lactose, Density, Freezing point, Added Water, Temperature and Conductivity in fresh milk (cow, sheep and/or buffalo, goat). RS-232 & USB interface, Micro printer and automatic data capture are integrated. Based upon ultra-sound technology, the instrument does not require any costly chemicals, caustic or reagents for testing. EKOMILK BOND is an example of accuracy and efficiency of bench chemistry methods. Test results are coming just in 45 seconds!

### Key feature:

Fast Analysis - allows a large number of measurements to be done;
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;
One year full warranty;
Measuring accuracy adjustment can be done by the user;
RS 232 Interface and Data collection System;
ESC POS Printer built in.

### Environmental   Conditions:

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

### Electrical Parameters:

| | |
|---|---|
| AC Power Supply voltage | ☐  220V ±5% |
| | ☐  110V +10/-15% |
| Power Consumption | 30W max |

Mechanical Parameters:

| | |
|---|---|
| Dimensions (WxDxH) | 530 x 320 x 290 mm |
| Weight | 12.6 kg |

### Measuring Parameters:

| | |
|---|---|
| Fatness | from 0,5% to 12% with accuracy ± 0,1% |
| Solids non fat (SNF) | from 6% to 12% with accuracy ± 0,2% |
| Milk density | from 1,0260 $g/cm^3$ to 1,0330 $g/cm^3$ ± 0,0005 $g/cm^3$ |
| Protein | from 2% to 6% with accuracy ± 0,2% |
| Lactose * | from 0.5% to 7% with accuracy ± 0,2% |
| Freezing Point | from 0 to -1.000 °C± 0,015°C |
| Added water to milk | from 0% to 60% with accuracy ± 5% |
| Conductivity * | from 2 to 20 mS/cm ± 1 % (18°C) |
| Temperature | from 0 to 50 °C with accuracy ± 0,1°C |
| Measuring cycle | ☐  45 seconds |

* Optional parameter – on customer request

### Data Collection System:

Data Collection System is able to store up to 120 measurements.

## CONTROLS

### Fig. 1. Appearance

1. Select the work mode

2. Skip and search forward and backwards (Up and Down buttons are active only)

3. Confirm the choice

4. Tube (sucker)

5. Plastic support

6. Ultrasonic Processor* START button

7. Ultrasonic Processor* Probe (for more information – see Appendix 7 Ultrasonic Processor)

8. Cleaning compartment

9. Thermal panel printer
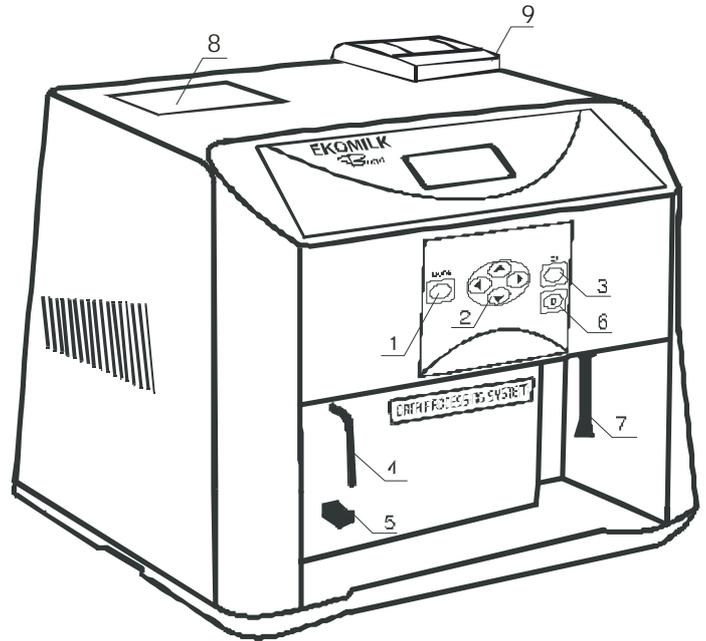


### Fig. 2. Controls on the rear panel
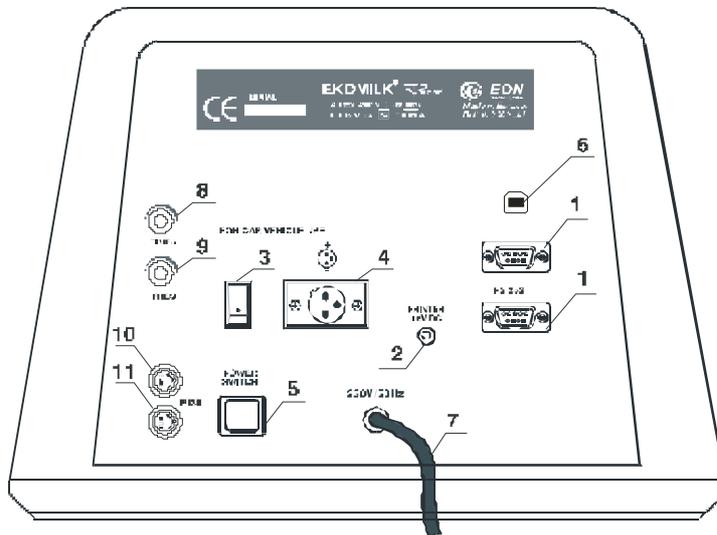


**BACK PANEL**

1. RS 232 Interface outlet

2. 12V DC Printer Power Supply outlet

3. ON/OFF Switch - for car vehicle use 12V

4. 12V DC Power supply outlet

5. POWER Switch

6. AC power led

7. USB Interface outlet

8. Ultrasonic Processor TIMER control* knob

9. Ultrasonic Processor Frequency Control* knob

10. Fuse (measuring system)

220 V Power Supply–  T 0,63 A

110 V Power Supply–  T 1,00 A

11. Fuse (Ultrasonic Processor)*

220 V Power Supply –   T 0,63 A

110 V Power Supply - T 1,00 A

## PARTS AND ACCESSORIES

| Item | Description | Qty |
|------|-------------|-----|
| 1. | EKOMILK BOND | 1 |
| 2. | User's guide (EKOMILK BOND) | 1 |
| 3. | Connector 12V | 1 |
| 4. | AC Power cable | 1 |
| 5. | CD Milk analyzer software tools | 1 |
| 6. | User's guide (CD Milk analyzer software tools) | 1 |
| 7. | RS232 Cable (Null Modem, Link cable) | 1 |
| 8. | Measuring mug | 6 |
| 9. | Plunger | 1 |
| 10. | Buffer solution Conductivity 500 ml 5.02 (±0,5%) mS/cm (18±0,1°C). (on request) | 1 |
| 11. | Ekoday (alkaline cleaner – concentrate) | 1 |
| 12. | Ekoweek (acid cleaner – concentrate) | 1 |
| 13. | Ekopower (acid cleaner – concentrate) | 1 |
| 14. | Micro printer (on request) | 1 |
| 15. | USB cable(on request) | |

## ANALYZER INSTALLATION

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

Place vertically the Analyzer on a table or any other flat surface.
Setting of AC Power Supply Voltage
Connect the AC power lead first to the analyzer and then to the mains socket.
Switch on the AC power.

Setting of 12V DC Power Supply Voltage
Connect the DC supply lead to 12V input on the analyzer (black is "-") and then to the autonomous DC supply (for example car battery).
Switch on the DC power.

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

*Warning:*
*1. The covers of the Analyzer should never be removed while the power leads are connected.*
*2. 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.*

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

## MILK SAMPLES

Milk samples temperature should be between 5 and 35°C. If the milk temperature is above 35°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 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.
Use the milk sample only once. When the measuring is carried out, throw the sample away.

## MILK SAMPLE DEAERATION (DEGASSING)

See Appendix  Ultrasonic Processor for Ultrasonic Processor settings.
One of the most common problems of the ultrasonic measurement of milk is the presence of air inside the milk sample (Please see  "Some reasons for EKOMILK accuracy and repeatability deviations" for reference). In order good measurement accuracy and repeatability to be guarantied the milk sample must be completely free of air. This is why Ekomilk Bond milk analyzers are equipped with Ultrasonic Processor unit. Each milk sample should be processed with the Ultrasonic Processor before it is measured as follows.
1.  Fill the measuring mug with the milk sample to be processed;

2. Place the measuring mug on the front panel right hand side plastic support (5) with the Ultrasonic Processor probe in it (Fig.1. Pos.7.). ***WARNING: Never operate the Ultrasonic Processor without probe load (milk or water sample loaded) as this can damage it!***

3. Start the Ultrasonic Processor by pressing the "D" button on Analyzer's front panel keyboard. A LED near the "D" button lights while Ultrasonic Processor is running. Ultrasonic Processor automatically stops in a while.

4. Done

## MAIN MENU

Press the **MODE** button only once. Press the search buttons ▲, ▼ to find desired mode:
- **COW MILK** - analysis of cow milk
- **SEND & CLEAR** - data transferring mode;
- **REC CHOICE** - turning on/off the data collection system;
- **CLEANING** - cleaning in the end of working day
- **CALIBRATION** - calibration
- **SYSTEM** - manufacturer's mode only
- SHEEP/BUFFALO/ GOAT MILK - analysis of sheep/buffalo/goat milk



## HOW TO ANALYZE THE MILK

**Step 1:**
Fill the measuring mug with milk sample to be measured. Dip the tube (sucker) into the milk sample and place the measuring mug on the Ekomilk working surface.

**Step 2:**
Press **MODE** and by means of the search buttons ▲, ▼ select the desired mode:
- **COW MILK** - analysis of cow milk
- **SHEEP/BUFFALO/ GOAT MILK** - analysis of sheep/buffalo/goat milk

When the proper type of milk is displayed, press **OK** to start the measurement.

**Supplier ID selection:**
The message **NUMBER: 001** appears on the display while measurement is started (it does no matter which measuring mode is activated - **COW MILK** or **SHEEP/BUFFALO/ GOAT MILK**).
**NUMBER** defines the ID of supplier. In this case it is necessary to write in advance a list by ID's and names of suppliers.
- button ▼ changes the cursor position;
- button ▲ changes the over cursor value;
- button **MODE** cancels the changes and returns **COW MILK** on the display;
- button **OK** confirms the **ID NUMBER** and **QUANTITY: 0000.0** appears.

**QUANTITY selection:**
- button ▼ changes the cursor position;
- button ▲ changes the over cursor value;
- button **MODE** cancels the changes and returns **COW MILK** on the display;
- button **OK** start measurement.

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

**Remarks:**
1. How to discard the current measurement? While the measuring results are on the display, press button ▼ and then press button ▲ not releasing button ▼ and then release both of them. The message **RECORD DISCARDED** appears on the display.

2. The maximum number of records is 120. If you try to write over then 120 records, **NO MEMORY SPACE** error message appears on the display. There are 2 possibilities:
**a. To send the data to a computer** and clear (empty) the analyzer memory *(See procedure described in "Data transferring").*
**b. Deactivating of data storage**
Press button **MODE** and by means of the search buttons ▲, ▼  select  REC CHOICE. Press OK. The message RECORD DATA? Y   will appear on the display. Change Y to N by means of the search buttons ▲, ▼  and press OK to start the measurement. This way the **RECORD DATA** mode will remain turned off until the Milk analyzer is switched off.

When the measurement is completed the display shows the results for following milk parameters:

**F: FAT %**  **T: TEMPERATURE °C**
**S: SOLIDS NON FAT (SNF) %**  **L: LACTOSE\*\***
**D: MILK DENSITY**  **Z: CONDUCTIVITY\*\***
**P: PROTEIN %**  **W: ADDED WATER TO MILK%**
**FP: FREEZING VALUE**
*\*FREEZING VALUE = FREEZING POINT [°C] \* (-100)*
*\*\* OPTIONAL PARAMETER*

*Warning:*
*1. Do not remove the measuring mugs while the measurement is going on. This might cause result deviations out of the spec limits.*
*2. Do not move the Analyzer while the measurement is going on. This might cause result deviations out of the spec limits.*
*3. In case of air bubbles presents in the measuring camera the message EMPTY CAMERA appears on the display. Throw out the sample and repeat the measurement.*
*4. In case of motor problem the message MOTOR ERROR appears on the display. Switch off the device, wait for 1 minute and then switch it on again. If the problem persists, please contact your dealer.*



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

The printing is about of the current results on the screen. Every press on the arrow button ▲ prints the same results again.
For more information – see section "Micro printer – additional information"

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**CLEANING**

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**This section is to give directions for daily and periodical cleaning of milk analyzers Ekomilk in order to assure their long life and proper functioning.**

**ULTRASONIC SENSOR CLEANING**

**1. DAILY CLEANING**
Daily cleaning is required when:
- The interval between two consecutive measurements is more than half of one hour;
- The daily job is finished.

**1.1. Cleaning out when the interval between two consecutive measurements is more than half an hour.**
Steps:

1.1.1. Fill the measuring mug with clean and warm, but not hot, and clean water (40°- 60°C). Dip the tube (sucker) into the water and place the measuring mug on the Ekomilk working surface.

1.1.2. 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 change 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.

1.1.3. Remove the mug and throw away the muddy water. Repeat this procedure several times till clean water comes out from the Analyzer.

1.1.4. Done.

**1.2. Cleaning out at the end of a 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 disturbs the milk analyzer work. Cleaning will be effective if a reagent which attacks the "milk stone" is used. 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.Put 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 as it is described in procedure 1.1. (see above).

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

1.2.2. Fill the measuring mug with 2 % solution of the alkaline cleaner **EkoDay** (25°- 40°C), dip the tube (sucker) into the cleaning solution and place the measuring mug on the Ekomilk working surface. 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 5 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.

1.2.4. 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. Put 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. Perform the daily cleaning first.
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), dip the tube (sucker) into the cleaning solution and place the measuring mug on the Ekomilk working surface. 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. Open the top cover by pressing its left side – fig. 3 – step 1.
2.4. Remove the plug as it is shown on the fig. 3 – step 2.
2.5. Insert the plunger instead of the plug – step 3.
2.6. Fill the measuring mug with clean and warm, but not hot, water (40°- 60°C), dip the tube (sucker) into the water and place the measuring mug on the Ekomilk working surface.
Move 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 – step 3.

**Fig. 3. Hand-cleaning**



Step 1          Step 2          Step 3
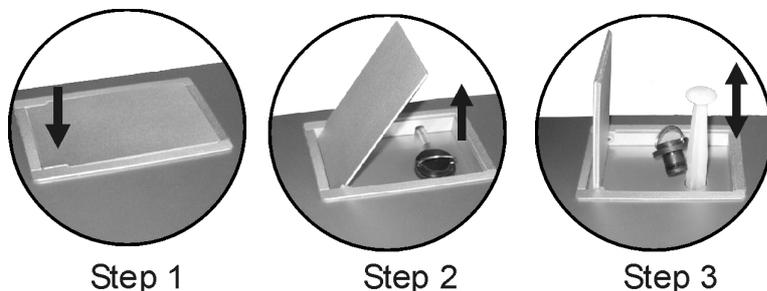
2.7. Take the plunger out of the hole. Wait until all water comes out. Insert the plunger again and press it to the bottom.
2.8. Remove the measuring mug and move the plunger out. Put the plug firmly and close the top cover.
2.9. Done.

**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 buttons and waits 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. . Open the top cover by pressing its left side – fig. 3 – step 1. Remove the plug as it is shown on the fig. 3 – step 2. Insert the plunger instead of the plug – step 3. Fill the measuring mug with clean and warm, but not hot, water (40°- 60°C), dip the tube (sucker) into the water and place the measuring mug on the Ekomilk working surface. 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.

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

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



**DATA TRANSFER**

**Transfer requirements:**
r  Milk analyzer EKOMILK BOND
r  PC with Milk Data 2001 program Version 1.3;
r  RS 232 Null Modem Cable or USB cable

**Communication set up:**
**Step 1**
**Connect the milk analyzer EKOMILK BOND to the PC.**
Switch off the milk analyzer and the PC.
**Step 2**
**Start Milk Data 2001 (version 1.4) program.**
**Step 3**
Press a Milk Analyzer's **MODE** button once. Scroll with the search buttons ▲, ▼ to select **SEND & CLEAR** mode. Press **OK**. While the data transferring, the message **PLEASE, WAIT...** is on the Analyzer's display, followed by the message **TRANSFER OK? Y (or N)**.

On the bottom of the PC screen a progress bar provides visual feedback about the progress of transmission procedure

**ATTENTION!**
**IN ABOUT 1-2 MINUTES A MESSAGE APPEARS ON THE COMPUTER SCREEN:**

**1. Transfer is successful**
When transfer is completed successfully, new rows are added to the table. The message **"The data received successfully! OK** appears on the computer display.

**If you want to erase the data and empty Analyzer's memory** - select with search button ▲, ▼ TRANSFER **OK?Y** and confirm with button **OK**. The message "**READY"** registers that the deletion is completed. Now, you can store another 120 milk data records.

**If you want keep data in the Analyzer memory** - press button **MODE**. This way the data remains in Analyzer's memory and it is possible to transfer it again to another computer.

**2. Transmission error**
In case of a transmission error a warning message appears on the display:
**The data received contains 1 error(s). Accept data? (YES or NO).**
**YES** puts the correct data to the program table.
**NO** denies all data.

To over this situation you have to keep the date on the milk analyzer and to repeat the transfer again. Selection of **N** to the question **TRANSFER OK? Y/N** will keep the data on the analyzer from Milk analyzer and will transfer it to the PC again.
If you want keep data in the Analyzer memory - press button **MODE.** In this way the data just remains in Analyzer.

**3. No data received**
This may be for one of following reasons:
**1. Analyzer's memory is empty;**
**2. The RS232 cable is not correctly fixed or it is damaged;**
**3. MILK DATA 2001 setup is not correct**
So please check:
- selection **FROM MEMORY** option from Setting menu - the program version must be 1.3 and higher;
- selection of the right COM port connected to the Milk analyzer.

Repeat the transfer selecting **N** to the question **TRANSFER OK? Y/N.** This will keep the data on Milk analyzer and will transfer it to the PC again.
If you want keep data in the Analyzer memory - press button **MODE.** In this way the data just remains in Analyzer.
**Attention! TRANSFER OK? Y will erase all data.**

**CALIBRATION**

**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 with classical method. If the difference value is in the spec limits there is no need of fat calibration. Otherwise add this difference value 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 with classical method. If the difference value is in the spec limits there is no need of **SOLIDS NON FAT (SNF)** calibration. Otherwise add this difference value as a **SOLIDS NON FAT (SNF)** calibration value using the procedure described in "*Calibration values saving";*

**- Determine the milk sample DENSITY by means of a density meter;**
- Test the same milk using Milk analyzer again;
- Subtract the Milk analyzer **DENSITY** value from **DENSITY** value achieved with classical method. If the difference value is in the spec limits there is no need of milk **DENSITY** calibration. Otherwise add this difference value as a milk **DENSITY** calibration value using the procedure described in "*Calibration values saving";*
*Note: If you will calibrate both* **SOLIDS NON FAT (SNF)** *and* **DENSITY** *parameters, first calibrate* **SOLIDS NON FAT (SNF)**. *Test the same milk using EKOMILK Analyzer again. Calibrate the* **DENSITY** *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 Milkanalyzer **PROTEIN** value from **PROTEIN** value achieved with classical method. If the difference value is in the spec limits there is no need of protein calibration. Otherwise add this difference value as a protein calibration value using the procedure described in "*Calibration values saving".*

**- Determine a milk sample** FREEZING POINT BY **means of a classical method (for example you can use Cryoscope);**
- Test the same milk using EKOMILK Analyzer;
- Subtract the Milkanalyzer FREEZING POINT value from **FREEZING** POINT value achieved with classical method. If the difference value is in the spec limits there is no need of freezing point calibration. Otherwise add this difference value as a freezing point calibration value using the procedure described in "*Calibration values Saving";*
*Example1:*
*Freezing point by classical method - (-0.548)*
*Freezing value by EKOMILK - (53.0)*
*Freezing point by EKOMILK - (-0.53)*
*Freezing value correction value=(-0.548) - (-0.53)=(-0,018)*
*Example2:*
*Freezing point by classical method - (-0.548)*
*Freezing value by EKOMILK - (56.0)*
*Freezing point by EKOMILK - (-0.56)*

*Freezing value correction value=(-0.548) - (-0.56)=(+0,012)*
***Attention:***
**1. If you need to calibrate both SOLIDS NON FAT (SNF) and FREEZING POINT, first calibrate
SOLIDS NON FAT (SNF). *Test the same milk using EKOMILK Analyzer again. Calibrate the*
FREEZING POINT *only if it is necessary*.**
**2. The freezing point correction will change also the Added water measuring result.**



## CALIBRATION VALUES SAVING

- To save a new calibration value press **MODE** button first.
-   Press the search buttons▲, ▼ to select calibration mode:
     **r  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 are entered the display will show **FAT COW MILK** - Press the
search buttons ▲, ▼ to select the milk parameter to be calibrated:

     **r  FAT COW MILK** - cow milk fatness calibration;
     **r  SNF COW MILK** - cow milk Solids non fat (SNF) calibration;
     **r  DEN COW MILK** - cow milk density calibration;
     **r  PROT COW MILK** - cow milk protein calibration;
     **r  FAT SHEEP/BUFFALO/GOAT MILK** - sheep/buffalo/goat milk fatness calibration;
     **r  SNF SHEEP/BUFFALO/GOAT MILK** - sheep/buffalo/goat milk SNF calibration;
     **r  DEN SHEEP/BUFFALO/GOAT MILK**- sheep/buffalo/goat milk density calibration;
     **r  PROT SHEEP/BUFFALO/GOAT MILK** - sheep/buffalo/goat milk protein calibration
     **r  FP COW MILK** - cow milk freezing point calibration;
     **r  FP SHEEP/BUFFALO/GOAT MILK** - sheep/buffalo/goat milk freezing point calibration
     **r  CONDUCTIVITY\*** - conductivity calibration (See section "Conductivity calibration")
     **r  TIME & DATE** - time and date calibration (See section **"TIME AND DATE CALIBRATION"**).
\*Optional parameter

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 and from -0,250 to + 0,250   (at interval of
0,002)   for freezing point  calibration . 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 value saving is completed.
***Note: The total calibration value can range from -2,54% to +2,54% (for fat, protein and Solids
non fat (SNF)) , from -12,7°A to +12,7°A for density) and   from  -0,250 to + 0,250   for
freezing point . In case a bigger number has been achieved during a calibration procedure a
CAL OUT OF RANGE error message appears on the display.***

## CONDUCTIVITY CALIBRATION

Conductivity sensor needs to be calibrated on a regular basis (once in a month). This assures the accuracy of measurement. Ekomilk conductivity calibration is performed at one specific value - 5.02 (±0,5%) mS/cm (18±0,1°C). For conductivity calibration, use only producer's conductivity buffer solution.

Steps:

1. Switch on the analyzer for one hour in advance.
2. Before calibrating, it is necessary to clean the Ekomilk using the procedure described in **"CLEANING OUT - Weekly procedure".**

3. Fill the mug with conductivity buffer. Put the mug on to pos. 4, 5 – fig. 1 the tube (sucker) to be into the solution. Rinse the measuring system by using the **CLEANING** menu. Throw out the buffer.

4. Fill the measuring mug with conductivity buffer 5.02 (±0,5%) mS/cm (18±0,1°C). Place the measuring mug onto pos. 4, 5 – fig. 1 the tube (sucker) to be into the solution.

5. Press the search buttons ▲, ▼ to select **CALIBRATION** mode. Enter the password as it is described in "**CALIBRATION VALUES SAVING"** and select the Conductivity to be calibrated. Confirm it with **OK.** The inscription **LOAD CAL LIQUID** appears on the display. Press **OK**. A message **WORKING ...** appears on the display while the calibration is going on. When the measurement is completed the display shows **CAL FINISHED**. The conductivity calibration procedure is complete. Throw away the used buffer.
You may repeat steps 4 and 5 again for better result.

**Remark:** Conductivity buffer solution can be used only once.

6. After calibrating, clean the Ekomilk with only water using the procedure described in **"CLEANING OUT - Daily procedure".**

For more information see section "**CONDUCTIVITY MEASUREMENT - ADDITIONAL INFORMATION**")

| COND. CAL ERROR MESSAGE | PROBLEM & CAUSES | REMEDY |
|---|---|---|
| CAL ERROR 64 | Pump damage | Try again to calibrate the milk analyzer If the problem still exists, the Pump is out of order. Contact your dealer. |
| CAL ERROR 65 | Wrong buffer solution | Fill the measuring mug with conductivity buffer 5.02 (±0,5%) mS/cm (18±0,1°C) and repeat the calibration procedure. |
| CAL ERROR 66 | Power supply trouble | Switch off the milk analyzer and switch it on after 10-15 sec. Try again to calibrate the milk analyzer If the problem still exists, the Pump is out of order. Contact your dealer. |

## TIME & DATE CALIBRATION

Press the search buttons▲, ▼ to select **CALIBRATION** mode. Enter the password as it is described in **"CALIBRATION VALUES SAVING"** and select **TIME & DATE** to be calibrated. Press **OK** to confirm.

The message **TIME: 00:00:00** appears on the display**:**
- button ▼changes the cursor position;
- button ▲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 ▼changes the cursor position;
- button ▲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 a incorrect Time or Date value is achieved during a calibration procedure a error message **ERROR SETTING TIME** appears on the display.

## MILK CONDUCTIVITY - ADDITIONAL    INFORMATION:

Conductivity (or Electrolytic Conductivity) is defined as the ability of a substance to conduct electrical current. It is the reciprocal of the resistivity.
In a healthy animal*, the mean value of electric conductivity is:
cow/goat milk - between 4 to 6   mS/cm   (18°C);
sheep milk - between 3 to 5   mS/cm   (18°C);
buffalo - between 2,5 to 5   mS/cm   (18°C);

*These values depend on the geographical region, the race and on other factors.

Milk conductivity changes on the concentration of ions in the milk:
- Added salts increase the ion's concentration. Milk conductivity increases.
- Added water, sugar, proteins, insoluble solids decrease the ion's concentration. Milk conductivity decreases.
- Significantly extreme value (6,5 - 13,00 mS/cm   (18°C)) should indicate the development of mastitis. Infections damage the tissue of the udder. This allows sodium and chlorine ions from the blood to be released into the milk. The concentration of ions in the milk is thereby raised, and it can more easily conduct an electrical current - the conductivity of the milk increases.
- Milk conductivity can be used as a test of grade of water evaporation in production of condenses milk.

## MICRO PRINTER - ADDITIONAL INFORMATION:

### 1. General information

| | |
|---|---|
| Printing Method: | Thermal |
| Paper Width: | 57.5mm |
| Paper Diameter: | 55mm |
| Resolution: | 203DPI |
| Printing Speed: | Up to 90mm/s |
| Barcode Supported: | I25,UPC-A,UPC-E,EAN-8, EAN-13,Codebar,Code39, Code93,Code128,Code11,MSI |
| Font: | ASCII(12x24) |
| Graphic printing: | Direct bitmap printing |
| Paper Sensor: | Photo-sensor |
| Head temperature detection: | Thermistor |
| Communication Interface: | RS232 or RS232 with TTL level |
| Power supply: | 5V-9V |
| Head Life: | 50km |
| Printing width: | 48mm |
| Operation condition: | 5~45 **°C**,  20~90%RH(40 **°C**) |
| Storage condition: | -40~60°C,  20~93%RH(40°C) |



### 2. How to replace the paper roll

2.1. Lift the lock to to release the cover
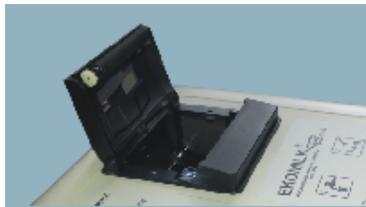


2.2. Open the cover and remove the used paper roll spool if one is in the paper roll compartment.



2.3. Loosen the paper end edge from the new paper roll. The end of the paper will be taped or sealed with a sticky material. The paper end edge must be loose. Unroll the loose end 2 to 3 cm from the roll. Place the paper roll in the compartment as is shown on the image.



2.4. Close the paper cover.

### 3. Printer Error's messages:

The message **PRINTER ERROR** appears in 2 cases:

- Printer is out of paper.
- Printing mechanism is overheated.

In both cases analyzer stops printing until the problem is solved.

If the message **PRINTER ERROR** appears on the display first check the paper and put a new paper roll if it is necessary – the procedure is described in the next item.

In case of overheating of printer mechanism the analyzer will continue printing when the mechanism cools down to normal temperature. This will take some time depending on the ambient temperature.

**ULTRASONIC PROCESSOR**

**1. General information**
The ultrasonic technology used by Ekomilk Analyzers is not suitable for aired milk testing since in such case 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.
The best method for quickly recovering of aired milk is the exposure of the milk sample to a powerful ultrasonic field for about 10 to 15 seconds.
The Ultrasonic Processor is a device that generates suitable ultrasonic field for instant deaeration of milk sample.

**2. Caution**
*- Never operate the Ultrasonic Processor without probe load (milk or water sample loaded) as this can damage it!*
*- Never touch the tip of a live probe to your hand or skin!*
*- Always allow the unit to reach room temperature before operating!*
*- Avoid touching the activated probe to the sides or bottom of the sample container!*
*·   Do Not touch any open cable connections on the unit while the power is turned on.*
*- High voltage is present in the Ultrasonic Processor section. Please always turn the power supply off and unplug the power cables before you access any Ultrasonic Processor PCB and cables.*

**3. Adjust Ultrasonic Processor's Timer and Frequency as follows:**
- Fill the measuring mug with clean water.
- Place the measuring mug on the front panel right hand side plastic support (5) with the Ultrasonic Processor probe in it.
- Start the Ultrasonic Processor by pressing the "D" button on Analyzer's front panel keyboard. A LED near the "D" button lights while Ultrasonic Processor is running. Ultrasonic Processor automatically stops in a while.
- Turn Ultrasonic Processor Frequency Control knob on Analyzer's back panel (9) until noisy sound appears.
- Use Ultrasonic Processor TIMER Control knob on Analyzer's back panel (8) to set the run time of the Ultrasonic Processor to about 15 sec.
- Done.

**4. How to operate**
- Fill the measuring mug with milk sample to be tested.
- Place the measuring mug on the front panel right hand side plastic support (5) with the Ultrasonic Processor probe in it.
- Start the Ultrasonic Processor by pressing the "D" button on Analyzer's front panel keyboard. A LED near the "D" button lights while Ultrasonic Processor is running. The Ultrasonic Processor automatically stops in about 15 s (if the Ultrasonic Processor timer is set at 15 s – see the previous item)
- The milk is ready for analyzing with Ekomilk milk analyzer.

**5.   How to clean the Ultrasonic Processor probe**
The Ultrasonic Processor probe may be cleaned using acid-free cleaning solution, and an antistatic cleaning cloth. Probe can be cleaned with isopropyl alcohol.

## ERROR'S LIST

| ERROR MESSAGE | REMEDY |
|---|---|
| MOTOR ERROR | Motor damage.<br>Contact your dealer   to make the repairs. |
| EMPTY CAMERA<br><br>ERROR 02 | 1. Air bubbles in the measuring sensor.<br>Fill again the mug with milk and repeat the measurement.<br>2. The suction system has some air leak.<br>Check the Plug (on the top of the analyzer) position and fix it using the plunger if it is necessary.<br>3. If the problem still exists, the measuring system or the Pump is contaminated or damaged. Contact your dealer. |
| HOT SAMPLE | 1. The milk sample's temperature is above the spec. Fill again the mug with proper temperature milk sample and make a fresh start.<br>2. If the problem still exists, the measuring system is contaminated or damaged. Contact your dealer. |
| WRONG PASSWORD | Incorrect Password.<br>Reenter the password. |
| CAL OUT OF RANGE | Attempt to enter a calibration value out of allowed limits.<br>The total calibration value can range from -2,54 % to +2,54% (for fat, protein and Solids non fat (SNF)) and from -12,7°A to +12,7°A (for density). In case a bigger number has been achieved during a calibration procedure a **CAL OUT OF RANGE** error message appears on the display.<br>If a calibration value out of limits the device needs of factory calibration. Contact your dealer. |
| ERROR 03 | PROM is damaged or erased.<br>Contact your dealer   to make the repairs. |
| ERROR 06 | Incorrect or lost data. (Stored data for suppliers and milk parameters was lost)<br>To correct this error you must refresh Analyzer's memory. Press MODE button, select with search buttons▲, ▼   SEND & CLEAR, confirm with OK. The message PLEASE, WAIT... appears on the display while memory clearing is going on.<br>Wait for message TRANSFER OK? Y and press OK to confirm the clearing procedure. Message READY confirms that memory refresh process is completed. |
| ERROR 07 | There is no communication between the main processor and PROM - PROM is damaged or not properly put in the socket. Contact your dealer. |
| ERROR 09 | 1. The power supply voltage is below spec. Use proper power supply voltage value.<br>2.The measuring system is out of order. Contact your dealer. |
| ERROR SETTING TIME | TIME & DATE Chip is not installed or does not work properly or an incorrect Time or Date value is achieved during a calibration procedure. |
| NO MEMORY SPACE | Data collection error. The maximum number of records is 120. If you try to write more records, NO MEMORY SPACE error message appears on the display. In this case you must transfer the data to a computer and clear (empty) the Analyzer's memory (See procedure described in section "Data transferring" - User's Guide). |
| CAL ERROR 64 | Conductivity calibration error. Pump damage. Try again to calibrate the milk analyzer If the problem still exists, the Pump is out of order. Contact your dealer to make the repairs. |
| CAL ERROR 65 | Conductivity calibration error. Wrong buffer solution. Fill the measuring |

| ERROR MESSAGE | REMEDY |
|---|---|
| | mug with conductivity buffer 5.02 (±0,5%) mS/cm (18±0,1°C) and repeat the calibration procedure. |
| CAL ERROR 66 | Conductivity calibration error. Power supply trouble. Switch off the milk analyzer and switch it on again in 10-15 sec.<br>Try again to calibrate the milk analyzer If the problem still exists, the Pump is out of order. Contact your dealer to make the repairs. |

## SOME REASONS FOR EKOMILK ACCURACY AND REPEATABILITY DEVIATIONS

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 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 a powerful equipment working nearby and connected to the same power supply line.

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**GUARANTEE**

Guarantee is one full year. Guarantee is void if warranty labels are removed. Under no circumstance you should try to repair the Analyzer yourself, as this will invalidate the guarantee. The guarantee conditions for this analyzer are as defined by our representative in the country of sale.

**Password:**

**Serial N:**

**Date:**