**MILK ANALYZERS**

# EKOMILK®

**EKOMILK  ULTRA  PRO**

**USER'S GUIDE**

**BULTEH 2000**
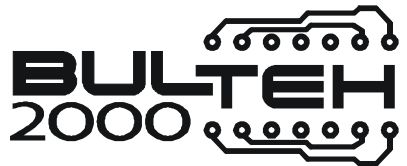
## EKOMILK ULTRA PRO

### High Speed Model

*Measuring cycle*
**90-95** *measurements per hour*

*This Guide refers to*
**LD62Ixxx2T** *firmware version*

# CE

# ISO 9001

## AC Power Supply voltage

- 220V +10/-15%
- 110V +10/-15%

## Measure modes

- ✓ Mixed milk
- ✓ Cow milk
- ✓ Buffalo milk

## Interfaces

- ✓ RS232
- USB

## Printer support

- ✓ ESC POS
- Matrix Printer EPSON LX300+

## Parameters

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

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

- Lactose
- Protein
- Milk sample tempeature
- Milk sample ash (salts)

# CONTENTS

**i** | **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.

**KEY FEATURE**

- 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:

| | |
|---|---|
| AC Power Supply voltage | *see p. 3* |
| DC Power Supply voltage | 12V to 14,2V |
| Power Consumption | 100W max Ekomilk UltraPro |

## MECHANICAL PARAMETERS:

| | |
|---|---|
| Dimensions (WxDxH) | 105 x 300 x 250 mm |
| Weight | < 4 kg |

## MEASURING PARAMETERS:

| | |
|---|---|
| Fat | from 0,5% to 12% with accuracy ± 0,1% |
| Solids non fat (SNF) | from 6% to 12% with accuracy ± 0,2% |
| Milk density (CLR)* | from 1,0250 g/cm$^3$ to 1,0400 g/cm$^3$ ± 0,0005 g/cm$^3$ |
| Protein* | from 2% to 6% with accuracy ± 0,2% |
| Added water to milk | from 0% to 60% with accuracy ± 5% |
| Lactose* | from 0,5% to 7% with accuracy ± 0,2% |
| Milk sample temperature* | from 3°C to 38°C with accuracy ± 1°C |
| Milk sample ash (salts)* | from 0% to 1.00% with accuracy ± 0,1% |

*These parameters are optional. Contact your dealer for more information.*
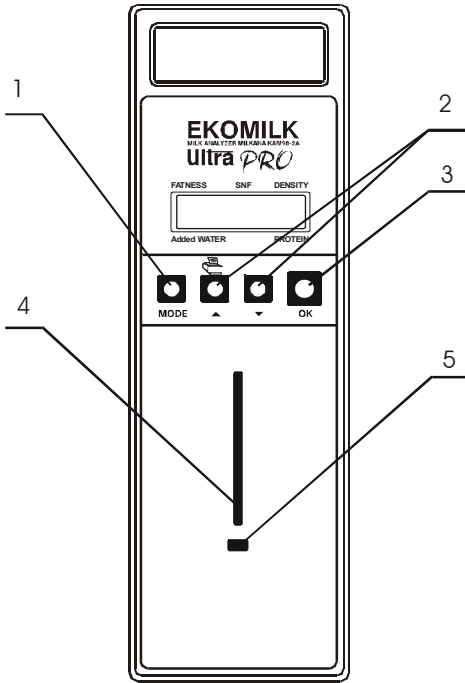
**CONTROLS
(on the front panel)**
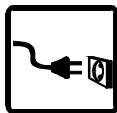
1. Select the work mode

2. Skip and search forwards and backwards

3. Confirm the choice

4. Tube (sucker)

5. Plastic support
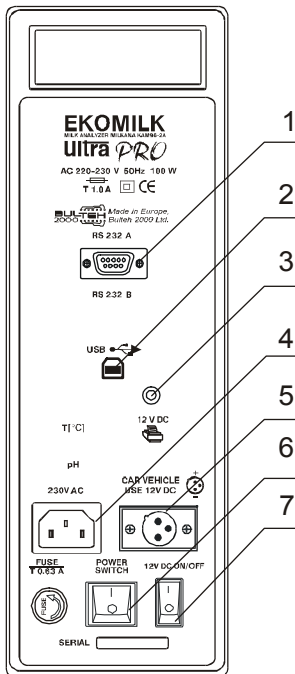
**SWITCHES and OUTLETS
(on the rear panel)**

1. RS 232 Interface outlet

2. USB Interface outlet

3. 12V DC Printer Power supply outlet

4. AC power connector

5. 12V DC Power supply outlet

6. POWER Switch

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

# INSTRUCTIONS
# FOR USE

## ANALYZER INSTALLATION

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 lead to 12V outlet  (black is "-") and to the autonomous DC supply (for example car supply).
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 you should  try to repair the Analyzer's power lead yourself. In case of power lead damage, contact your dealer to make the repairs.*

## MILK SAMPLES

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.

## BASIC MODES FOR USE

- **COW MILK** - analysis of cow milk
- **BUFFALO MILK** - analysis of buffalo milk
- **MIXED MILK** - analysis of mixed (buffalo & cow) milk
- **SYSTEM** - manufacturer's mode only
- **CLEANING** - cleaning in the end of working day
- **CALIBRATION** - calibration
- **SYSTEM SHUTDOWN** - fill the measuring system with  clean water

before setting the Power switch to OFF
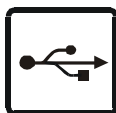
## USB DRIVER INSTALLATION

Ekomilk uses a FTDI chip to connect to USB port. The FTDI chip driver comes in two parts.

The first driver type is the D2XX direct driver. This provides direct access to the milkanalyzer via a dynamic link library (DLL). The second driver type is the virtual COM port (VCP) driver.

Place the CD "Milk analyzer software tools" into your CD drive. Use Windows Explorer to set your CD-ROM drive as the default device. Open folder "…FTDI\FTDI Installation guides". Find out the file corresponding to your Windows version. To open the instruction file you need to have Adobe Acrobat Reader installed on your computer.

First uninstall any previous version of FTDI drivers. Connect Ekomilk to some USB port via USB data cable provided, read the instruction and install the driver.

After the drivers are successfully installed, the EKOMILK USB connection will appear as an additional (virtual) RS 232 COM port.

## MILK ANALYSIS

Take out  the plungers from the syringes (Step1) . Insert the plastic plugs with the vinil tubes instead of the plungers (Step 2).



Plug    Plunger    Step 1    Step 2
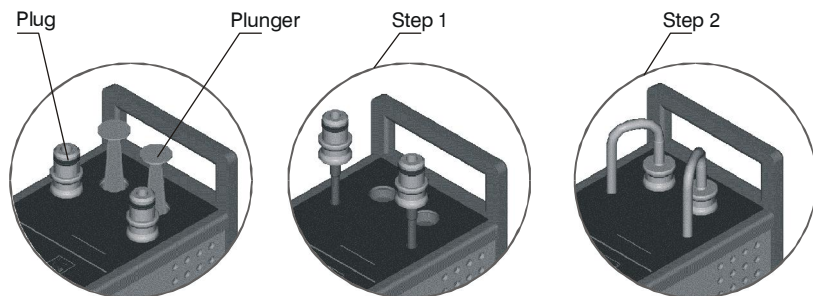
**The Analyzer is ready  for use in mode with suction pump.**

**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 ▲, ▼ select the desired mode:

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

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

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, LACTOSE\*, PROTEIN\*-** 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.*

If your milk Analyzer measures milk sample temperature (ST) and ash (salts - SA), push button ▼ to display second screen with the readings ot these parameters. Push again the same button to go back to the first screen.

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.*

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

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.

## CLEANING OUT

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 troublesfree 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 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 that attacks the "milk stone" is used. We recommend solution of the alkaline cleaner **EkoDay** to be used as a daily cleaning solution.

Preparation of **EkoDay** working solution - see the label on the package.
a. Pour into a labeled container.
b. Take care this solution does not contact your eyes or skin!

**Attention! Use only 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! Using 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. Always clean analyzer  with pure water before**

using the cleaning agent.

1.2.2. Fill the measuring mug with 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 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.

Done


**SYSTEM SHUTDOWN**

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 solution of acid cleaner **EkoWeek** as a periodical cleaning solution.
Preparation of **EkoWeek** working solution - see the label on the package
a. Pour into a labeled container.
b.Take care this solution does not contact your eyes or skin!
**Attention! Use only 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 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 (for Ekomilk UltraPro both plastic plugs)  with the vinyl tube out of the holes. 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 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 and milk stone from the analyzer measuring system.**
**2. Do not use hard water (water that contains high amounts of $Ca^{2+}$ and/or $Mg^{2+}$) 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 plugs with the vinyl tube sout of the syringe holes and insert the syringe plungers instead. Fill the measuring mug with clean and warm, but not hot water (40°- 60°C). Pull up and down the plungers 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 plungers out of the syringes and insert the rubber plugs with the vinyl tubes 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 trough 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 water.**

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 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.

## 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 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";***

**- Determine a milk sample Added water (AWM) by means of a classical method (for example you can use Crioscope);**
- Test the same milk using **EKOMILK** Analyzer;
- Subtract the Milk analyzer **AWM** value from **AWM** value achieved by the

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classical method. If the difference is in the spec limits there is no need of **AWM** calibration. Otherwise add this difference as an **AWM** calibration value using the procedure described in "***Calibration values saving";***

***Attention:***
***If you need to calibrate both Solids none fat (SNF) and AWM, first calibrate Solids non fat (SNF). Test the same milk using EKOMILK Analyzer again. Calibrate AWM only if it is necessary.***

## CALIBRATION VALUES SAVING

- 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 **CALIBRATE DEV.** Press the search buttons ▲ , ▼ to select other calibration option.

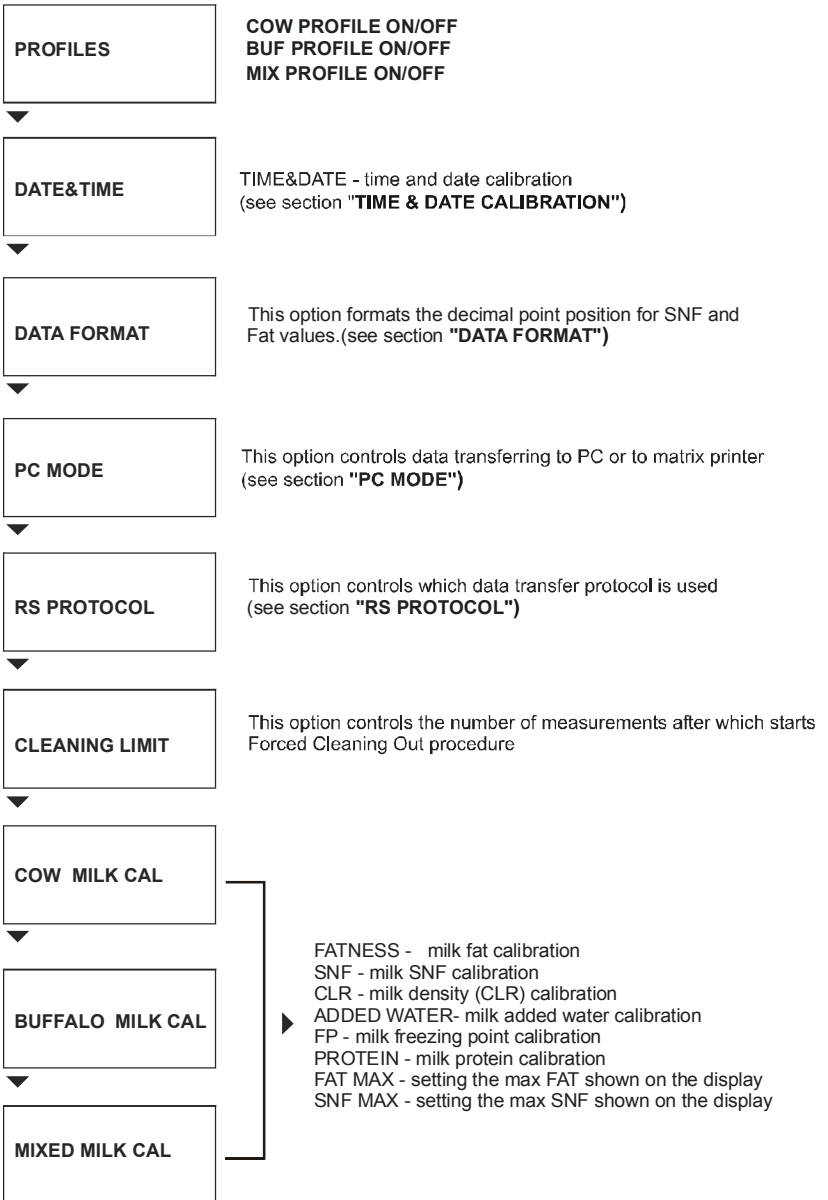| CALIBRATE DEV | Press OK to enter the calibration menu - see next section "CALIBRATE  DEV (CALIBRATE DEVICE)" |
| VIEW CALS | Press OK to view all current calibrations |
| PRINT CALS | Press OK to print all current calibrations (in case of printer connected to the analyser) |

## CALIBRATE DEV (CALIBRATE DEVICE)

**PROFILES**

**COW PROFILE ON/OFF**
**BUF PROFILE ON/OFF**
**MIX PROFILE ON/OFF**

▼

**DATE&TIME**

TIME&DATE - time and date calibration
(see section **"TIME & DATE CALIBRATION"**)

▼

**DATA FORMAT**

This option formats the decimal point position for SNF and
Fat values.(see section **"DATA FORMAT"**)

▼

**PC MODE**

This option controls data transferring to PC or to matrix printer
(see section **"PC MODE"**)

▼

**RS PROTOCOL**

This option controls which data transfer protocol is used
(see section **"RS PROTOCOL"**)

▼

**CLEANING LIMIT**

This option controls the number of measurements after which starts
Forced Cleaning Out procedure

▼

**COW  MILK CAL**

▼

**BUFFALO  MILK CAL**

▼

**MIXED MILK CAL**

FATNESS -   milk fat calibration
SNF - milk SNF calibration
CLR - milk density (CLR) calibration
ADDED WATER- milk added water calibration
FP - milk freezing point calibration
PROTEIN - milk protein calibration
FAT MAX - setting the max FAT shown on the display
SNF MAX - setting the max SNF shown on the display

## 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 fat, 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.*

## DATA FORMAT

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.

## TIME & DATE CALIBRATION

Press the search buttons ▲, ▼ to select **TIME & DATE calibration**. 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 an incorrect Time or Date value has been achieved during a calibration procedure an error message **ERROR SETTING TIME** appears on the display.

## 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 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     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 on the analyzer front panel. Results are printed every time when this button is pressed.

## RS PROTOCOL

This is the protocol for data transfer to a PC after measurement is finished. Select **RS PROTOCOL** and then press **OK** to confirm it. Then use up and down keys to select the desired protocol. Press once again **OK** for confirmation. Then message **PROTOCOL IS SET TO CONTINUOUS/ ONE TIME** appears on the display.

## 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 commer-

cially 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 require 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 |
|---|---|
| **MOTOR ERROR** | Motor damage. Contact your dealer to make the repairs. |
| **EMPTY CAMERA**<br><br>**ERROR 02** | 1. Air bubble in the measuring sensor.<br>Fill again the mug with the same milk sample and make a fresh start.<br>2. The suction system has some air leak.<br>Check the Plastic Plug position and fix it if it is necessary. If the Plastic Plug stays loose in the Syringe, replace the Syringe.<br>3. If the problem still exists, the measuring system is contaminated or damaged. Contact your dealer to make the repairs. |
| **HOT SAMPLE** | 1. The milk sample temperature is above the spec. Fill again the mug with milk sample with proper temperature and make a fresh start.<br>2. If the problem still exists, the measuring system is contaminated or damaged. Contact your dealer to make the repairs. |
| **WRONG PASSWORD** | Incorrect Password.<br>Reenter the password |
| **CAL OUT OF RANGE** | Attempt to enter a calibration value out of allowed limits. See **"CALIBRATION VALUES SAVING".** If a calibration value out of allowed limits is really needed, the measuring system is out of order. |
| **ERROR 03** | PROM is damaged or erased. Contact your dealer for repairs. |
| **ERROR 07** | 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. |
| **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 to make the repairs. |
| **ERROR SETTING TIME** | 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. |

# GUARANTEE CARD

**PRODUCER:**
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## EKOMILK-ULTRA PRO
High- speed Model

☐     **G**uarantee period is one year after purshasing date. Improper handing, transport and storage will invalidate the guarantee.

☐     Guarantee is void if warranty labels are removed.
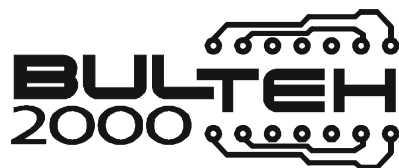
**SERIAL №:**

**Distributor**

**PASSWORD:**

**DATE OF PURCHASE:**

**Purchaser**

**Service report**

| Service entry date | Damage | Deliveriy date | Signature |
|---|---|---|---|
| | | | |

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